

**Informal Request for Proposals  
Bradley Lake Hydroelectric  
Probable Maximum Loss**

February 14, 2025

**Introduction**

The Alaska Energy Authority (AEA) is soliciting proposals for a qualified and accredited Contractor to complete the following scope of work

- Perform an Earthquake Probable Maximum Loss (PML) study for the Bradley Lake Hydroelectric project

Proposal must be received on or before **5:00p.m. local time, February 28, 2025**. AEA is estimating a contract amount of approximately \$50,000-\$100,000.

**Background Information:**

**The Bradley Lake Hydro Project**

The Bradley Lake Hydroelectric Project (Project) is a 120 Megawatt capacity hydroelectric project located 27 air miles southeast of Homer on the Kenai Peninsula. It provides approximately 10 percent of the Railbelt area electrical energy. The project consists of Bradley Lake, a 125 foot high concrete faced, rock filled dam structure, four diversion structures, a 19,152 ft. long power tunnel, generating plant, interior substation, 20 miles of transmission line, and substation. In 2020, the Bradley Lake Hydroelectric Project was expanded to include the Battle Creek Diversion Project. The infrastructure associated with this expansion includes a diversion structure, 9100' of 5' diameter HDPE to convey diverted water into Bradley Lake, and 2.9 miles of new gravel road. Due to its remote location, the Bradley Lake project has its own airstrip, boat dock, residential quarters, and utility system.

The power generation potential of Bradley Lake was first studied by the U.S. Corps of Engineers and presented in a report dated March 1955. Congress authorized the project in 1962. Federal funds were not available for its construction until 1982. The Alaska Energy Authority (then Alaska Power Authority) assumed responsibility for the project in 1982. Preliminary plans and field investigations started in 1982. In April 1984, the Authority submitted an application for license to the Federal Energy Regulatory Commission (FERC). The license to construct the project was issued on December 31, 1985. Project was declared in commercial operation September 1, 1991.

In December 1987 the Authority and the Railbelt utilities entered into a Power Sales Agreement (PSA) that established the Bradley Lake Project Management Committee (BPMC). The purpose of the BPMC is to arrange for the operation and maintenance of the Bradley Lake Hydroelectric Project; and the scheduling, production and dispatch of power. The members of the BPMC are AEA and the five utilities that purchase power under the Agreement;

- Chugach Electric Association, Inc.,
- Golden Valley Electric Association
- Homer Electric Association
- Matanuska Electric Association

- Seward Electric Association

The last appraisal of the Project was completed in 2024 (BBG Attached). The current estimated Project value is estimated at \$795M, and includes all insurable project elements.

## **Scope of Work, Schedule, and Deliverables**

### **A. Scope of Work:**

#### **Probable Maximum Loss Study**

1. Proposers shall prepare their Proposals to demonstrate a thorough and complete evaluation methodology and associated qualifications.
2. The scope of the PML study shall perform scenario and probabilistic based analysis of possible earthquake events that could affect the site and the results of the aggregate losses associated with 100, 250, and 500-year return periods.
3. Study shall also analyze scenario earthquakes on controlling faults that correspond to 475-year and 2,500 year return periods.
4. Real estate was included in the attached appraisal but is assumed not to be accounted for in the valuation of probable maximum loss.
5. Bradley Lake and associated facilities include: 125 foot high concrete faced rock filled dam structure, four diversion structures, 3.5 mile long power tunnel, generating plant, interior substation, 20 miles of transmission line, substation, and 9100' of HDPE pipeline.
6. The selected consultant shall produce a final PML report documenting a basis of opinion for the mechanism and magnitude of loss of the Bradley Lake Hydroelectric Project major components.
7. Valuation methodologies and all associated reporting shall demonstrate industry best practices in PML studies and shall comply with codes/standards/best practices.

**B. Deliverables:** The contractor will provide an electronic (PDF) draft and final report for the Probable Maximum Loss study. Report will not be confidential.

**C. Schedule:** The performance period of this contract will be approximately 2 1/2 months from the award date.

- 02/28/2025: Proposals are due.
  - 03/15/2025: Contract Award
  - 05/01/2025: Draft PML Study due
  - 05/15/2025: Final PML Study due
-

## **Proposal Format**

In response to this request, Offeror's proposals will be limited to 5 pages (max.) and must include the following:

1. A cover letter that contains the complete firm name, mailing address, and telephone number of the contact on the proposal; a statement of commitment to the project; and an Alaska business license number.
2. Include a brief discussion of your understanding of the services required, availability of staff, and any issues, potential conflicts or concerns you may have in participating in this contract.
3. Provide statement of firm qualifications. Provide the names and resumes of at least 2 staff members performing the scope of work. (Resumes do not count towards page count)
4. Offerors shall provide a fixed price cost proposal, which includes the fully loaded labor rates of the staff performing the scope of work. Cost should include staff and contractor time, travel, written materials and other associated costs.
5. At least three references for services provided over the last three years. References are to include client contact and telephone numbers.
6. A project schedule

## **Evaluation Criteria and Contractor Selection**

This solicitation does not guarantee that a contract will be awarded. All proposals may be summarily rejected. Our intent however, is to select a contractor that best meets our requirements based on the following weighted criteria:

- 1) Cost of Proposal 40%
  - 2) Company Experience and Qualifications 30%
  - 3) Staff Expertise 30%
- Total 100% = 100 points MAX

\*The distribution of points based on cost will be determined by the method set out below. The lowest cost proposal will receive the maximum number of points allocated to cost.

## **Deadline for Receipt of Proposal**

Interested firms wishing to submit a proposal may do so by mailing, faxing, or e-mailing its proposal response to Selwin Ray, AEA, 813 West Northern Lights Boulevard, Anchorage, AK 99503, f (907) 771-3044, [SRay@akenergyauthority.org](mailto:SRay@akenergyauthority.org)

**Proposal must be received on or before 5:00 p.m. local time, February 28, 2025.**

---

Firm Name

---

Signature

---

Please Print Name and Title                      Date

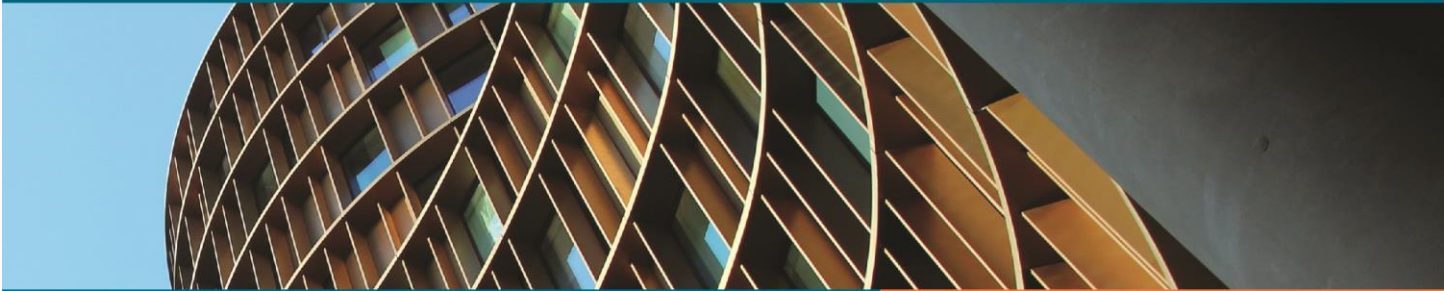
**Questions**

Please direct any questions about this request for proposal to me directly, I may be reached by telephone at (907) 771-3035, or by e-mail at [SRay@akenergyauthority.org](mailto:SRay@akenergyauthority.org)

Professional Regards,  
Selwin Ray  
Contracts Officer

Attachments:

1: Bradley Lake Hydro Facility Appraisal Report, July 11, 2024, BBG Real Estate Services



The insight you need. The independence you trust.

**Bradley Lake Hydro Facility**

Hydroelectric Project  
Homer, Alaska 99603

BBG File #0124009883  
Client File #24125

**Prepared For**

Alaska Energy Authority  
813 West Northern Lights Boulevard  
Anchorage, AK 99503-2407

**Report Date**

July 11, 2024

**Prepared By**

BBG, Inc., Albany Office  
77 Miller Road, Suite 202  
Castleton, NY 12033  
518-219-5645

Client Manager: Chris Harland, MAI  
charland@bbgres.com

**BBG Website**

[bbgres.com](http://bbgres.com)

July 11, 2024

Mr. Selwin Ray, AEA  
Alaska Energy Authority  
813 West Northern Lights Boulevard  
Anchorage, AK 99503-2407

Re: Appraisal of Real Property  
**Bradley Lake Hydro Facility**  
Homer, Alaska 99603  
**BBG File #0124009883**  
**Client File #24125**

Dear Mr. Ray, AEA:

In accordance with your authorization (per the engagement letter found in the *Addenda* of this report), an Appraisal Report of the above-referenced property has been prepared.

The subject consists of a hydroelectric facility (including dam) constructed in 1991.

As of the valuation date of this report, the owner of record is Alaska Energy Authority. The subject is not currently listed for sale, nor is it under a sales contract.

This Appraisal Report was prepared to conform with the requirements of the Uniform Standards of Professional Appraisal Practice (USPAP). This report has been written in accordance with the Code of Ethics and the Standards of Professional Practice of the Appraisal Institute. In addition, this report is intended to be in compliance with additional requirements of Alaska Energy Authority (client) as applicable. This report is intended to be used by the intended user(s) named herein; no other party may rely upon the opinions presented in this report.

#### EXTRAORDINARY ASSUMPTION(S) AND HYPOTHETICAL CONDITION(S)

The values presented within this appraisal report are subject to the extraordinary assumptions and hypothetical conditions listed below. Pursuant to the requirement within Uniform Standards of Professional Appraisal Practice Standards, it is stated here that the use of any extraordinary assumptions and/or hypothetical conditions might have affected the assignment results.

<b>Extraordinary Assumption(s)</b>	This appraisal employs no extraordinary assumptions.
<b>Hypothetical Condition(s)</b>	This appraisal employs no hypothetical conditions.

Based on the analysis undertaken, the following value opinion(s) have been developed.

<b>Breakdown of Concluded Insurable Value - May 29, 2024</b>	
<b>Cost Category</b>	<b>Value</b>
Dam	\$125,000,000
Water Conveyance	\$355,000,800
Electro-Mechanical	\$87,462,000
Powerhouse	\$101,293,200
Electrical Infrastructure	\$13,017,600
Engineering & Construction Management	\$85,021,200
<b>Total of Main Improvements</b>	<b>\$766,794,800</b>
Middle Fork Diversion Project	\$0
Upper Bradley (Nuka) Diversion Project	\$0
East Fork Upper Battle Creek Diversion Project	\$0
West Fork Upper Battle Creek Diversion Project	\$24,800,000
<b>Total of Diversion Projects</b>	<b>\$24,800,000</b>
Shop/Warehouse	\$844,169
Fourplex	\$834,705
Duplex	\$538,061
Bunkhouse	\$545,305
Project Manager Residence	\$344,484
Pole Barn (Sheep Shed)	\$216,578
Incinerator Building	\$71,483
Storage Building	\$158,598
Fire Facility	\$61,916
Fuel Shed	\$35,741
Barge Dock Building	\$36,118
<b>Total of Miscellaneous Improvements</b>	<b>\$3,687,159</b>
<b>Total of all Improvements</b>	<b>\$795,281,959</b>

This letter must remain attached to the report, which should be transmitted in its entirety, in order for the value opinion(s) set forth above to be relied upon by the intended user(s).

The signatories of this report have competency as appraisers to make the value conclusions contained here. This report and the values contained in it are not based on specific engineering knowledge or techniques which the signatories do not possess.

Mr. Ray, AEA  
July 11, 2024  
Page 3

BBG, Inc. appreciates the opportunity to have performed this appraisal assignment on your behalf. If we may be of further service, please contact the Client Manager.

Sincerely,



Chris Harland, MAI  
Alaska Certified General Appraiser  
Temporary (Courtesy) License #: 225798  
518-219-5645  
charland@bbgres.com



Jay Buhr, MAI  
518-219-5646  
hbuhr@bbgres.com



# TABLE OF CONTENTS

Subject Photographs..... 1

Summary of Salient Facts..... 7

Property Transaction History ..... 9

Scope of Work ..... 10

Regional Overview ..... 12

Neighborhood Overview..... 19

Site Description ..... 21

Zoning Analysis ..... 34

Improvements Description ..... 35

Market Analysis ..... 39

Highest and Best Use ..... 48

Valuation Process ..... 50

Replacement Cost New..... 51

Final Value ..... 58

Certification ..... 59

Standard Assumptions and Limiting Conditions ..... 60

Addenda ..... 64

# SUBJECT PHOTOGRAPHS



Photo 1 – Powerhouse Facing Northeast



Photo 2 – Powerhouse Facing Northwest



Photo 3 – Powerhouse and Transformers Facing Southwest



Photo 4 – Powerhouse Facing South

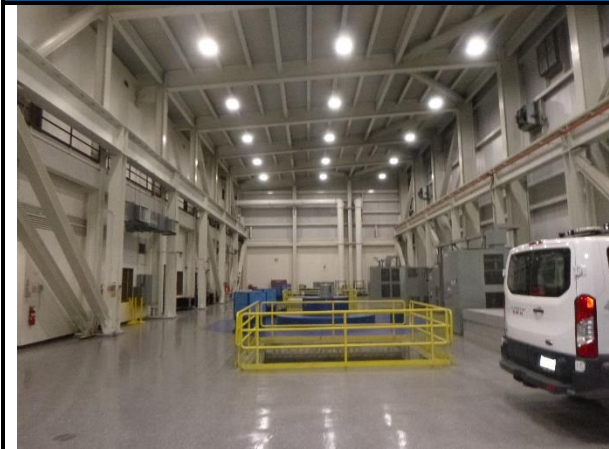


Photo 5 – Powerhouse Interior

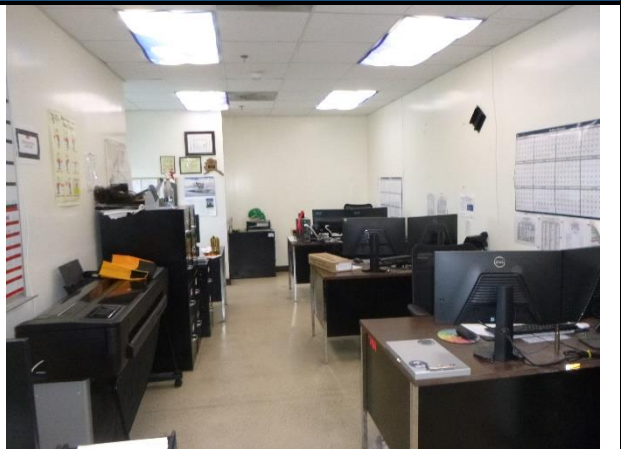


Photo 6 – Powerhouse Office Area



Photo 7 – Powerhouse Pressure Pipes



Photo 8 – Turbine Blades



Photo 9 – Turbine



Photo 10 – Powerhouse Crane



Photo 11 – Powerhouse Control Room



Photo 12 – Powerhouse Workshop Area

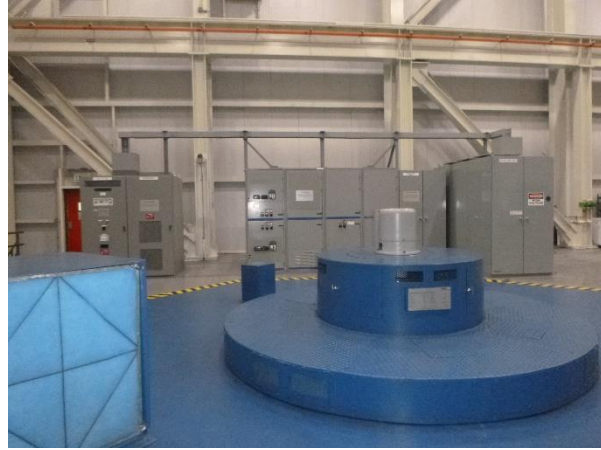


Photo 13 – Powerhouse Interior



Photo 14 – Penstock Tunnel Outlet



Photo 15 – Hydraulic Motor in Powerhouse



Photo 16 – Powerhouse Drive-In Door



Photo 17 – Power Tunnel – Photo from AEA



Photo 18 – Power Tunnel Gatehouse – Photo from AEA



Photo 19 – Dam from Upstream – Photo from AEA



Photo 20 – Dam from Downstream – Photo from AEA



Photo 21 – Spillway – Photo from AEA



Photo 22 – Spillway Drain – Photo from AEA



Photo 23 – Battle Creek Diversion – Photo from AEA



Photo 24 – Battle Creek Diversion – Photo from AEA



Photo 25 – Shop/Warehouse



Photo 26 – Duplex Building



Photo 27 – Fourplex Building



Photo 28 – Bunkhouse



Photo 29 – Project Manager Residence



Photo 30 – Pole Barn (Sheep Shed)



Photo 31 – Incinerator Building



Photo 32 – Storage Building



Photo 33 – Fire Facility



Photo 34 – Fuel Shed



Photo 35 – Barge Dock Building

# SUMMARY OF SALIENT FACTS

## APPRAISAL INFORMATION

<b>Client</b>	Alaska Energy Authority 813 West Northern Lights Boulevard, Anchorage, AK 99503-2407
<b>Intended User(s)</b>	Alaska Energy Authority
<b>Intended Use</b>	This appraisal is to be used for Insurance purposes.
<b>Property Rights Appraised</b>	As Is Insurable Value - Fee Simple
<b>Date of Inspection</b>	May 29, 2024
<b>Marketing Time (Months)</b>	12
<b>Exposure Time (Months)</b>	12
<b>Owner of Record</b>	Alaska Energy Authority
<b>Property Contact(s)</b>	Bryan Carey, P.E., Director of Owned Assets
<b>Most Probable Purchaser</b>	Owner-User
<b>Highest and Best Use</b>	
<b>If Vacant</b>	Conservation Use
<b>As Improved</b>	Continued Hydroelectric Facility Use

## PROPERTY DATA

<b>Property Name</b>	Bradley Lake Hydro Facility		
<b>Address</b>	Homer, Alaska 99603		
<b>Location</b>	Southern Kenai Peninsula		
<b>Property Description</b>	Specialty (Hydroelectric Facility)		
<b>County</b>	Kenai Peninsula Borough		
<b>Census Tract No.</b>	0012.00		
<b>Site Area</b>			
<b>Primary Site</b>	250,905,600 square feet (5,760.00 acres)		
<b>Zoning</b>	No zoning		
<b>Flood Zone/Map Number/Date</b>	X	0200124400A	May 19, 1981
<b>Year Built</b>	1991		
<b>Type of Construction</b>	Masonry, Steel and Wood		
<b>Overall Condition</b>	Average/Good		
<b>Overall Quality</b>	Good		
<b>Overall Design/Functionality</b>	Good		



<b>Breakdown of Concluded Insurable Value - May 29, 2024</b>	
<b>Cost Category</b>	<b>Value</b>
Dam	\$125,000,000
Water Conveyance	\$355,000,800
Electro-Mechanical	\$87,462,000
Powerhouse	\$101,293,200
Electrical Infrastructure	\$13,017,600
Engineering & Construction Management	\$85,021,200
<b>Total of Main Improvements</b>	<b>\$766,794,800</b>
Middle Fork Diversion Project	\$0
Upper Bradley (Nuka) Diversion Project	\$0
East Fork Upper Battle Creek Diversion Project	\$0
West Fork Upper Battle Creek Diversion Project	\$24,800,000
<b>Total of Diversion Projects</b>	<b>\$24,800,000</b>
Shop/Warehouse	\$844,169
Fourplex	\$834,705
Duplex	\$538,061
Bunkhouse	\$545,305
Project Manager Residence	\$344,484
Pole Barn (Sheep Shed)	\$216,578
Incinerator Building	\$71,483
Storage Building	\$158,598
Fire Facility	\$61,916
Fuel Shed	\$35,741
Barge Dock Building	\$36,118
<b>Total of Miscellaneous Improvements</b>	<b>\$3,687,159</b>
<b>Total of all Improvements</b>	<b>\$795,281,959</b>

#### EXTRAORDINARY ASSUMPTION(S) AND HYPOTHETICAL CONDITION(S)

The values presented within this appraisal report are subject to the extraordinary assumptions and hypothetical conditions listed below. Pursuant to the requirement within Uniform Standards of Professional Appraisal Practice Standards, it is stated here that the use of any extraordinary assumptions and/or hypothetical conditions might have affected the assignment results.

<b>Extraordinary Assumption(s)</b>	This appraisal employs no extraordinary assumptions.
<b>Hypothetical Condition(s)</b>	This appraisal employs no hypothetical conditions.

## PROPERTY TRANSACTION HISTORY

There have been no known transactions of the subject property within the three years prior to the effective date of this appraisal.

## SCOPE OF WORK

The scope of work best defines the needs of the client(s) and intended user(s) of the report and dictates what factors an appraiser considered during the valuation process. The scope of work summarized below has been deemed acceptable as it meets or exceeds both the expectations of parties who are regularly intended users for similar assignments and what an appraiser's peers' actions would be in performing the same or a similar assignment. As such, the scope of work summarized below is deemed appropriate for this assignment based on its parameters and will produce credible assignment results. Additional scope details are included in appropriate sections of this report.

SCOPE OF THE INVESTIGATION																					
<b>General and Market Data Analyzed</b>	<ul style="list-style-type: none"> <li>▪ Regional economic data and trends</li> <li>▪ Market analysis data specific to the subject property type</li> <li>▪ Published survey data</li> <li>▪ Neighborhood demographic data</li> <li>▪ Comparable cost data</li> <li>▪ Floodplain status</li> <li>▪ Interviewed professionals knowledgeable about the subject's property type and market</li> </ul>																				
<b>Inspection Details</b>	Chris Harland, MAI made a personal, on-site inspection of the interior and exterior of the subject property.																				
<b>Property Specific Data Requested and Received</b>	<table border="1"> <thead> <tr> <th colspan="2">PROPERTY DATA RECEIVED</th> </tr> </thead> <tbody> <tr> <td></td> <td>Historical operating statements</td> </tr> <tr> <td></td> <td>Building plan</td> </tr> <tr> <td></td> <td>Site plan</td> </tr> <tr> <td></td> <td>Previous studies</td> </tr> </tbody> </table>	PROPERTY DATA RECEIVED			Historical operating statements		Building plan		Site plan		Previous studies										
PROPERTY DATA RECEIVED																					
	Historical operating statements																				
	Building plan																				
	Site plan																				
	Previous studies																				
<b>Data Requested, but not Provided</b>	All data requested was received																				
<b>Data Sources</b>	<table border="1"> <thead> <tr> <th colspan="2">DATA SOURCES</th> </tr> </thead> <tbody> <tr> <td>Site Size</td> <td>Appraiser Measurements</td> </tr> <tr> <td>Building Size</td> <td>Owner</td> </tr> <tr> <td>Flood Status</td> <td>FEMA</td> </tr> <tr> <td>Construction Cost Data</td> <td>Marshall &amp; Swift</td> </tr> <tr> <td>Construction Cost Data</td> <td>US Department of Energy</td> </tr> <tr> <td>Construction Cost Data</td> <td>Oak Ridge National Laboratory</td> </tr> <tr> <td>Construction Cost Data</td> <td>National Renewable Energy Laboratory</td> </tr> <tr> <td>Cost Trending Data</td> <td>US Bureau of Reclamation</td> </tr> <tr> <td>Cost Trending Data</td> <td>US Department of Labor</td> </tr> </tbody> </table>	DATA SOURCES		Site Size	Appraiser Measurements	Building Size	Owner	Flood Status	FEMA	Construction Cost Data	Marshall & Swift	Construction Cost Data	US Department of Energy	Construction Cost Data	Oak Ridge National Laboratory	Construction Cost Data	National Renewable Energy Laboratory	Cost Trending Data	US Bureau of Reclamation	Cost Trending Data	US Department of Labor
DATA SOURCES																					
Site Size	Appraiser Measurements																				
Building Size	Owner																				
Flood Status	FEMA																				
Construction Cost Data	Marshall & Swift																				
Construction Cost Data	US Department of Energy																				
Construction Cost Data	Oak Ridge National Laboratory																				
Construction Cost Data	National Renewable Energy Laboratory																				
Cost Trending Data	US Bureau of Reclamation																				
Cost Trending Data	US Department of Labor																				

VALUATION METHODOLOGY	
<b>Most Probable Buyer</b>	As we are limited to providing an insurable cost estimate for this analysis, an identification of the most probable buyer is not applicable. In addition, the property was constructed by a subdivision of the state of Alaska, which has operated the project since that time, with no short or long term plans to sell the property.
<b>Valuation Methods Utilized</b>	The client requires an insurable replacement cost of the improvements. We utilized four data sources using the Cost per Capacity Method and two data sources using the Trended Original Cost Method.

### DEFINITIONS

Pertinent definitions, including the definition of insurable value, are included in the glossary, located in the *Addenda* of this report. The following definition of market value is used by agencies that regulate federally insured financial institutions in the United States:

**Replacement Cost for Insurance Purposes**

The estimated cost, at current prices as of the effective date of valuation, of a substitute for the building being valued, using modern materials and current standards, design, and layout for insurance coverage purposes guaranteeing that damaged property is replaced with new property (i.e. depreciation is not deducted).

---

### LEVEL OF REPORTING DETAIL

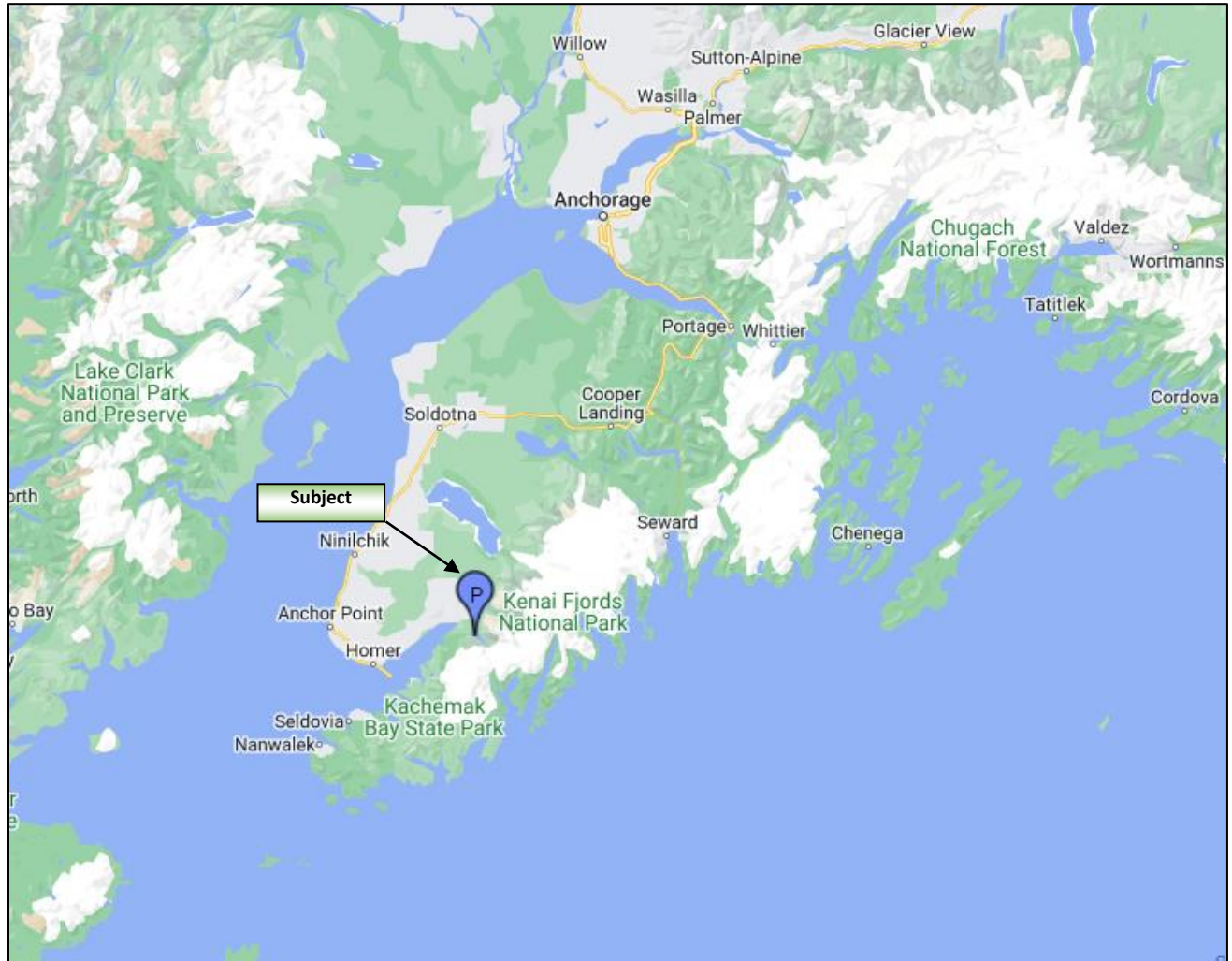
Standards Rule 2-2 (Real Property Appraisal, Reporting) contained in USPAP requires each written real property appraisal report to be prepared as either an Appraisal Report or a Restricted Appraisal Report.

This report is prepared as an **Appraisal Report**. An Appraisal Report must at a minimum summarize the appraiser's analysis and the rationale for the conclusions.

---

# REGIONAL OVERVIEW

## REGIONAL MAP



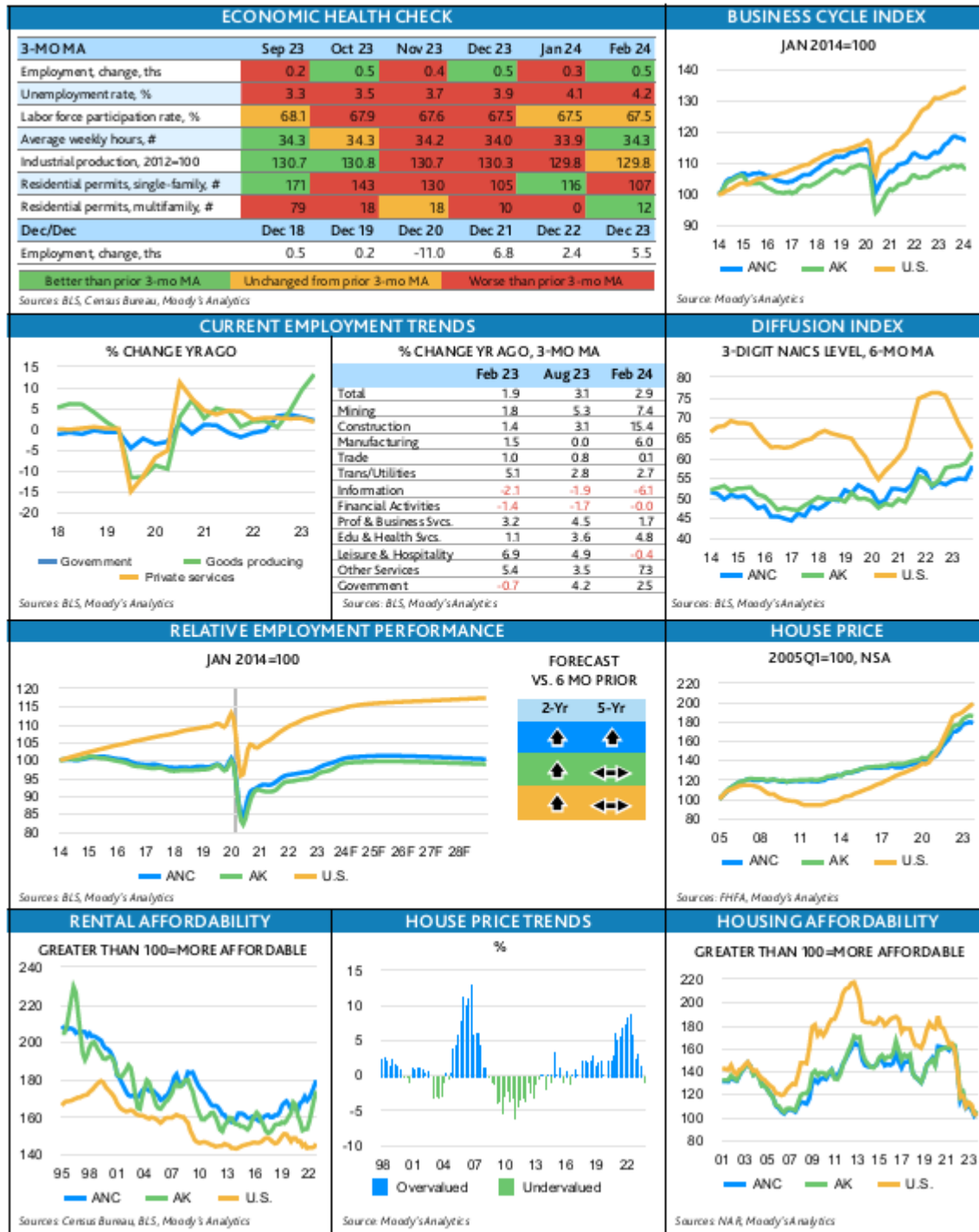
## ECONOMIC & DEMOGRAPHIC PROFILE

The subject property is located in the borough of Kenai Peninsula, Alaska, which is a predominantly rural area situated southwest of Alaska's largest city (and borough) of Anchorage. The 2024 Census estimated population for Kenai Peninsula is 61,158, a 4% increase from the 2020 population figure. Population is expected to increase to 64,075 (or by 5%) by 2029. The 2024 median and average household income for the borough is \$80,325 and \$109,201 respectively. The top three industries in the borough are oil and gas, healthcare and tourism.

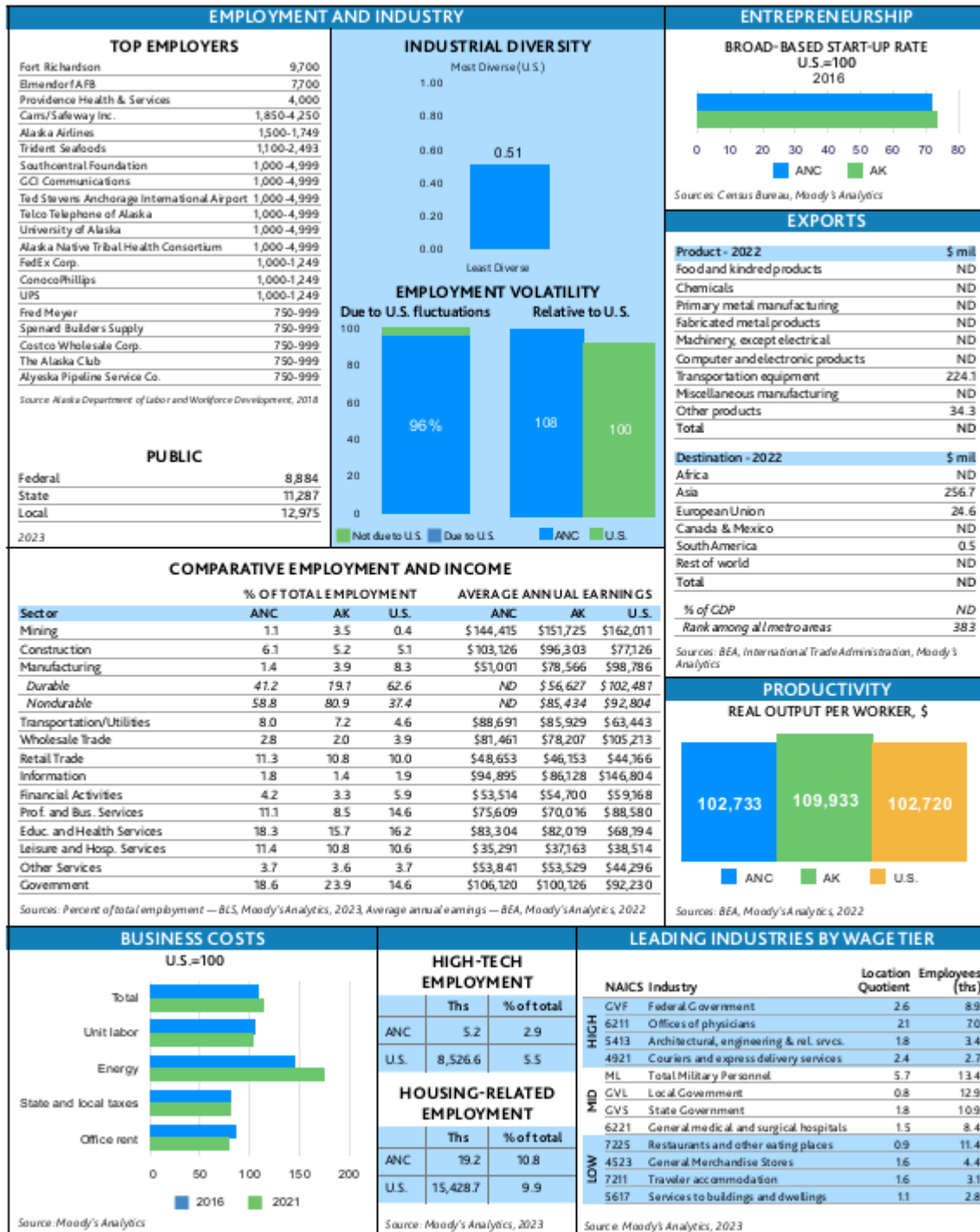
Although the borough is not located in a metropolitan area, it is situated adjacent to and heavily influenced by the Anchorage metropolitan statistical area (MSA). The following MSA profile of the Anchorage MSA was provided by Economy.com, a leading provider of economic, financial, and industry information.



PRÉCIS® U.S. METRO • Anchorage AK

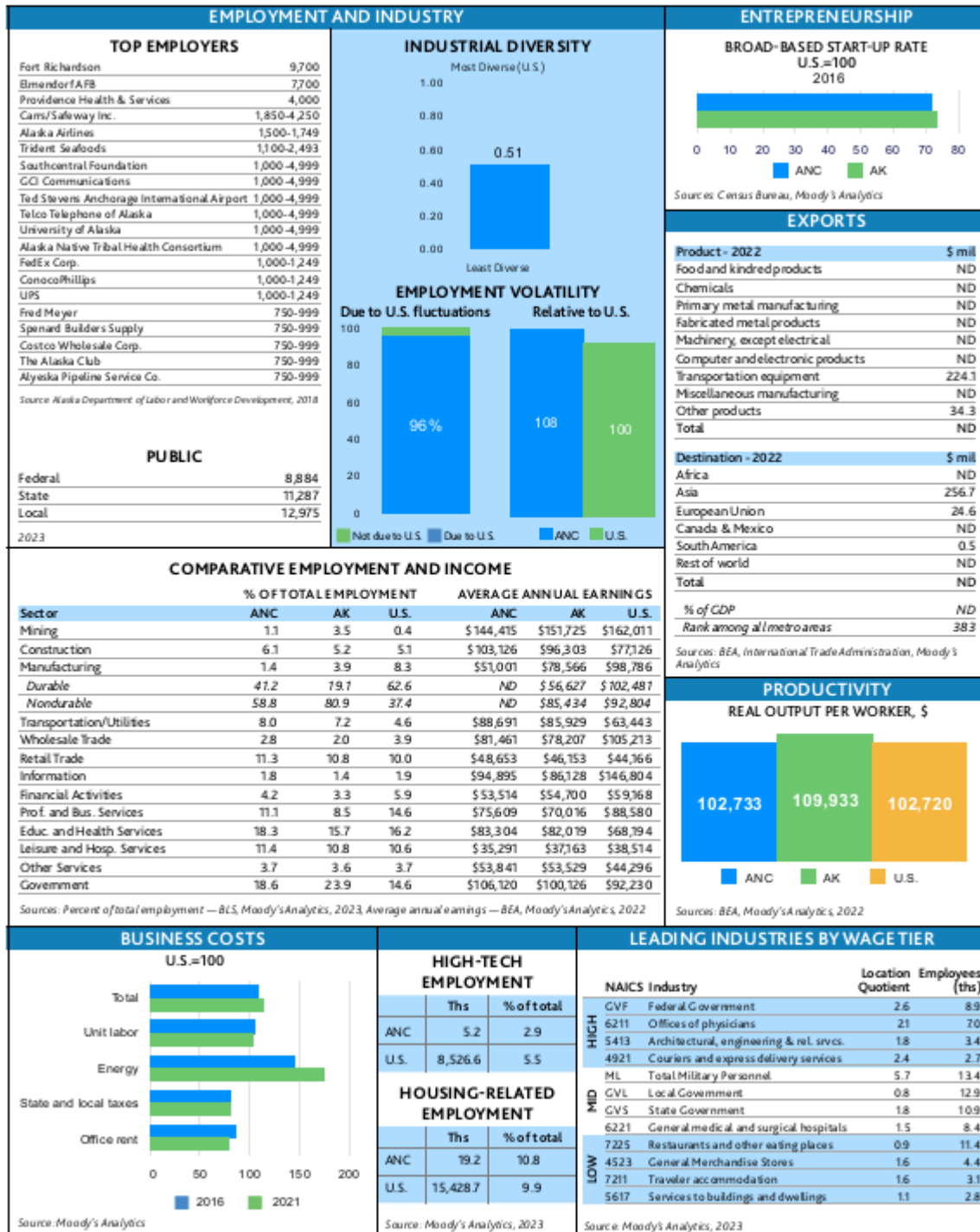


PRÉCIS® U.S. METRO • Anchorage AK

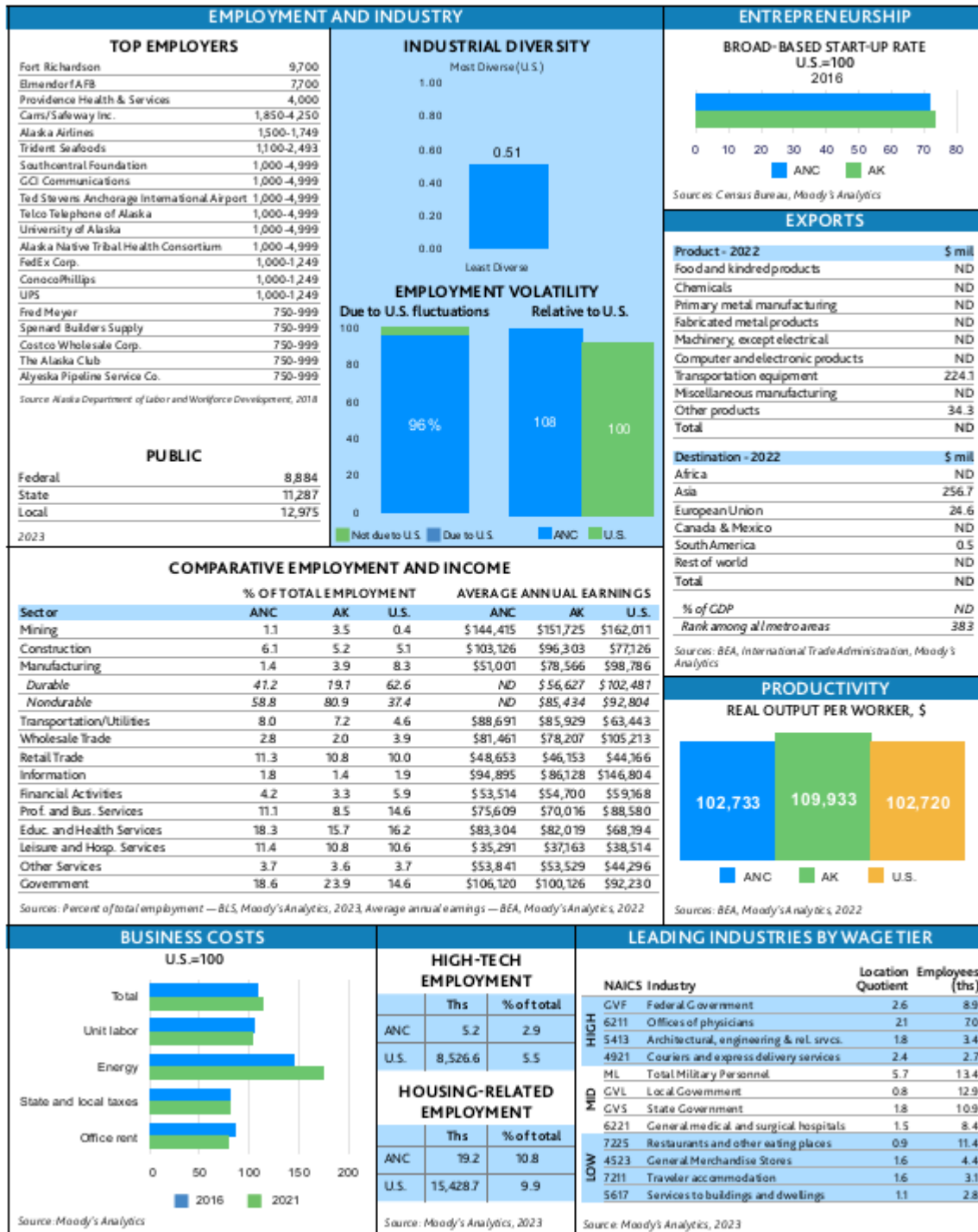




PRÉCIS® U.S. METRO • Anchorage AK



PRÉCIS® U.S. METRO • Anchorage AK



**Recent Performance.** Anchorage is sustaining its solid momentum. Nonfarm payrolls are outperforming those of the nation and the West, driven largely by gains in construction and government. Oil production and logistics are treading water, with the latter seeing a small drop in recent months. The household survey, however, paints a less encouraging picture. The unemployment rate has risen continuously since mid-2023 while labor force levels have fallen over the same period, suggesting some weakness in the labor market. House prices have flattened as single-family home and condo listings have rebounded significantly, although they remain short of pre-pandemic levels.

**Drilling.** New drilling projects will pay dividends for ANC. The metro area houses regional headquarters for oil companies with operations in Alaska, where the share of employment related to oil is more than eight times that of the nation. With OPEC production suppressed and global demand rising, prices will remain elevated, supporting energy payrolls. Meanwhile, the large-scale Willow and Pikka drilling projects in the oil-rich North Slope are moving forward, with developers expecting the latter to begin delivering oil in 2026. Both ConocoPhillips, the operator of the Willow project, and Santos, the operator of Pikka, will expand their presence in the metro area as the projects approach completion. This will bring more white-collar and higher-paying jobs into ANC, brightening its prospects.

**Military.** ANC will greatly benefit from new Department of Defense investments. The metro area is home to the Joint Base Elmendorf-Richardson, the largest employer in the state. The share of employment that is military-related in ANC is in the top 10% of metro areas nationwide. The latest federal defense budget includes more than \$150 million for base upgrades and a raise for servicemembers. This is on top of a new training center expected to break ground near the JBER complex in late 2024. Spillover effects from higher wages and federal investment will boost construction and consumer services in the short run. Still, shortfalls in recruiting servicemembers will put downward pressure on military employment, holding back growth.

**Logistics.** While transportation/warehousing will slow, it will ride structural advantages to continued gains. The logistics sector is primarily driven by air transportation, with significant freight volume passing through Ted Stevens International Airport. Because of the airport's proximity to the Arctic Circle, ANC is uniquely situated to serve Asian and eastern U.S. markets in a way that much of the West Coast is not; as a result, its airport is perennially in the top 10 for most freight traffic. As a major point of access for trade with Asia, ANC is more sensitive to global demand, especially from China, the state's largest trading partner. The resurgence of Chinese industrial demand, following a rebound from its 2023 challenges, coupled with increased U.S. imports driven by a stronger dollar, is expected to boost freight traffic through ANC, thereby bolstering employment. However, slower consumer goods spending from elevated inflation, both domestically and internationally, will limit the sector's performance.

Anchorage will outperform the state in the near term. The metro area will see a temporary boost in construction jobs from military base upgrades. However, long-term hiring will slow due to a decline driven by population losses, which will counteract any benefits from completed energy projects.

# NEIGHBORHOOD OVERVIEW

## NEIGHBORHOOD MAP



## LOCATION

The subject is located in a mountainous area on the northeast shore of Kachemak Bay in the borough of Kenai Peninsula. It is situated on state-owned land southwest of the Kenai Fjords National Park and northeast of the Kachemak Bay State Park. The nearest major city is Homer (population 5,876), which is about 21 miles southwest of the property.

## SURROUNDING LAND USE

The subject site is surrounded on all sides by undeveloped state-owned land.

## ACCESS

Access to the site is available either by helicopter or small plane at the subject's landing strip or by boat or barge at the subject's barge landing, all located along the shoreline of the bay. From these two points, access to the dam and hydro facility structures is provided by a gravel, two-lane access road.

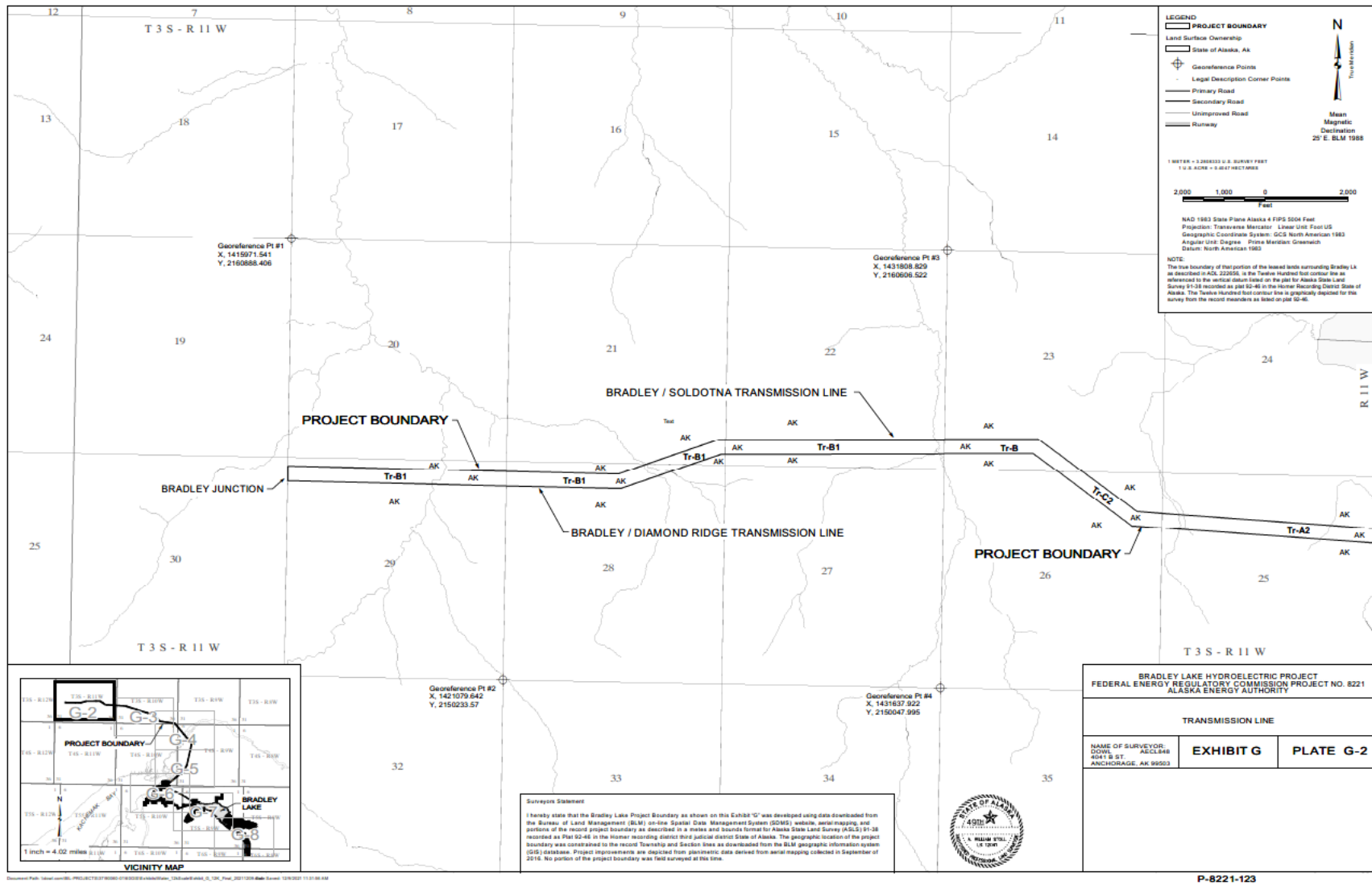
## **CONCLUSION**

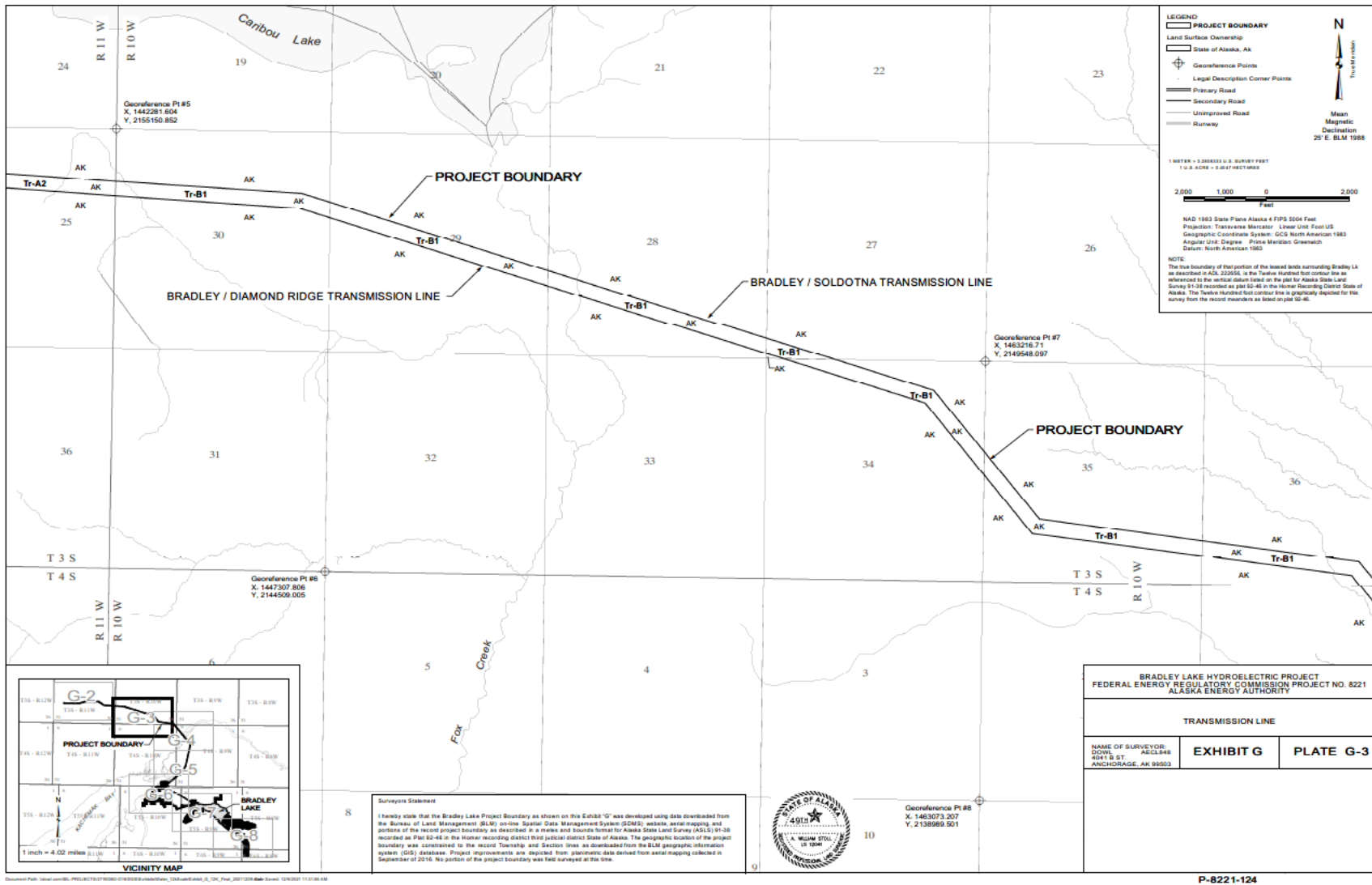
The subject is located in a remote area of the borough of Kenai Peninsula that has only air or sea access to the rest of the region. We expect the neighborhood to remain stable for the foreseeable future.

# SITE DESCRIPTION

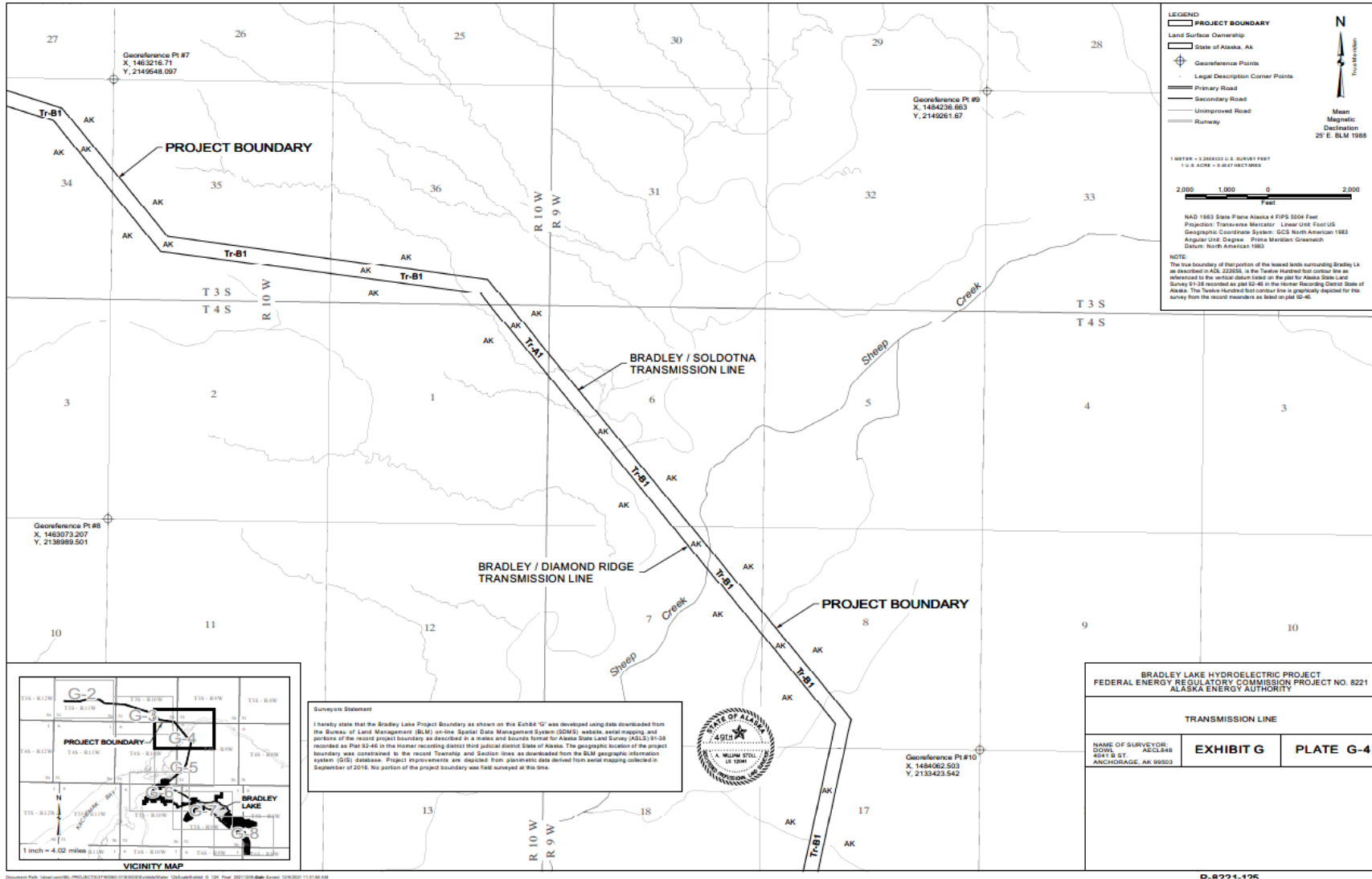
GENERAL SITE DESCRIPTION OVERVIEW			
<b>Location</b>	Southern Kenai Peninsula		
<b>Latitude, Longitude</b>	59.746396, -150.797921		
<b>Site Area</b>	250,905,600 square feet (5,760.00 acres)		
<b>Configuration</b>	Irregular		
<b>Topography</b>	Heavily sloping		
<b>Drainage</b>	Appears adequate		
<b>Utilities/Municipal Services</b>	The subject utilizes a well and septic system.		
<b>Off-Site Improvements</b>	None		
<b>Flood Zone(s)</b>	<u>Zone</u>	<u>Map</u>	<u>Date</u>
	X	0200124400A	May 19, 1981
	Not located in flood zone		
<b>Census Tract No.</b>	0012.00		
<b>Soil/Subsoil Conditions</b>	We did not receive nor review a soil report. However, we assume that the soil's load-bearing capacity is sufficient to support existing and/or proposed structure(s). We did not observe any evidence to the contrary during our physical inspection of the property.		
<b>Environmental Concerns</b>	The inspecting appraiser did not observe any environmental issues and for the purpose of this appraisal, it is specifically assumed that none exist. No independent environmental studies were provided. This appraisal assignment was engaged to determine the market value of the property, independent of any potential environmental issues. In the event the property is determined to be impacted by environmental concerns, it could affect our appraisal conclusions.		
<b>Easements, Encroachments and Deed Restrictions</b>	None detrimental known		
<b>Hazards Nuisances</b>	None noted		
<b>Frontage</b>	Adequate		
<b>Access</b>	From dam landing strip, barge landing, and dam access road		
<b>Visibility</b>	Average		
<b>Surrounding Land Uses</b>	Undeveloped Land		
<b>Opportunity Zone</b>	No		
<b>Enterprise Zone</b>	No		
<b>Traffic Counts</b>	Light		
<b>Transportation Facilities</b>	Barge dock; landing strip; dam access road		
<b>Site Utility</b>	Average		
<b>Comments</b>	The subject site consists of a roughly 5,760-acre project site that encompasses the improvements associated with the Bradley Lake Hydroelectric Project in the southern portion of the Kenai Peninsula, Alaska. The topography of the site includes steep slopes, and the site does not appear to be located in a flood zone. Overall, the site is adequate to support its highest and best use.		

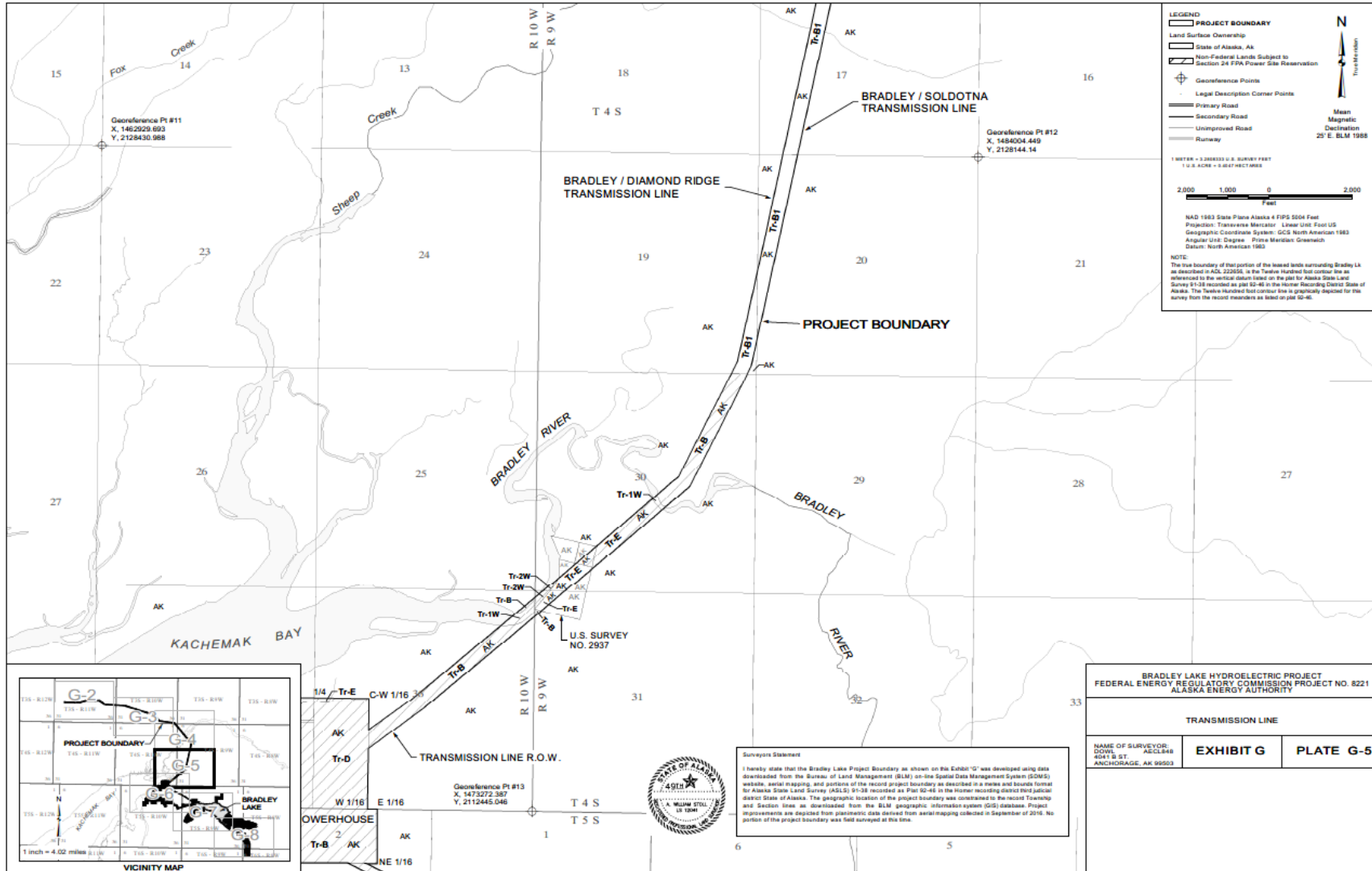
SITE PLANS

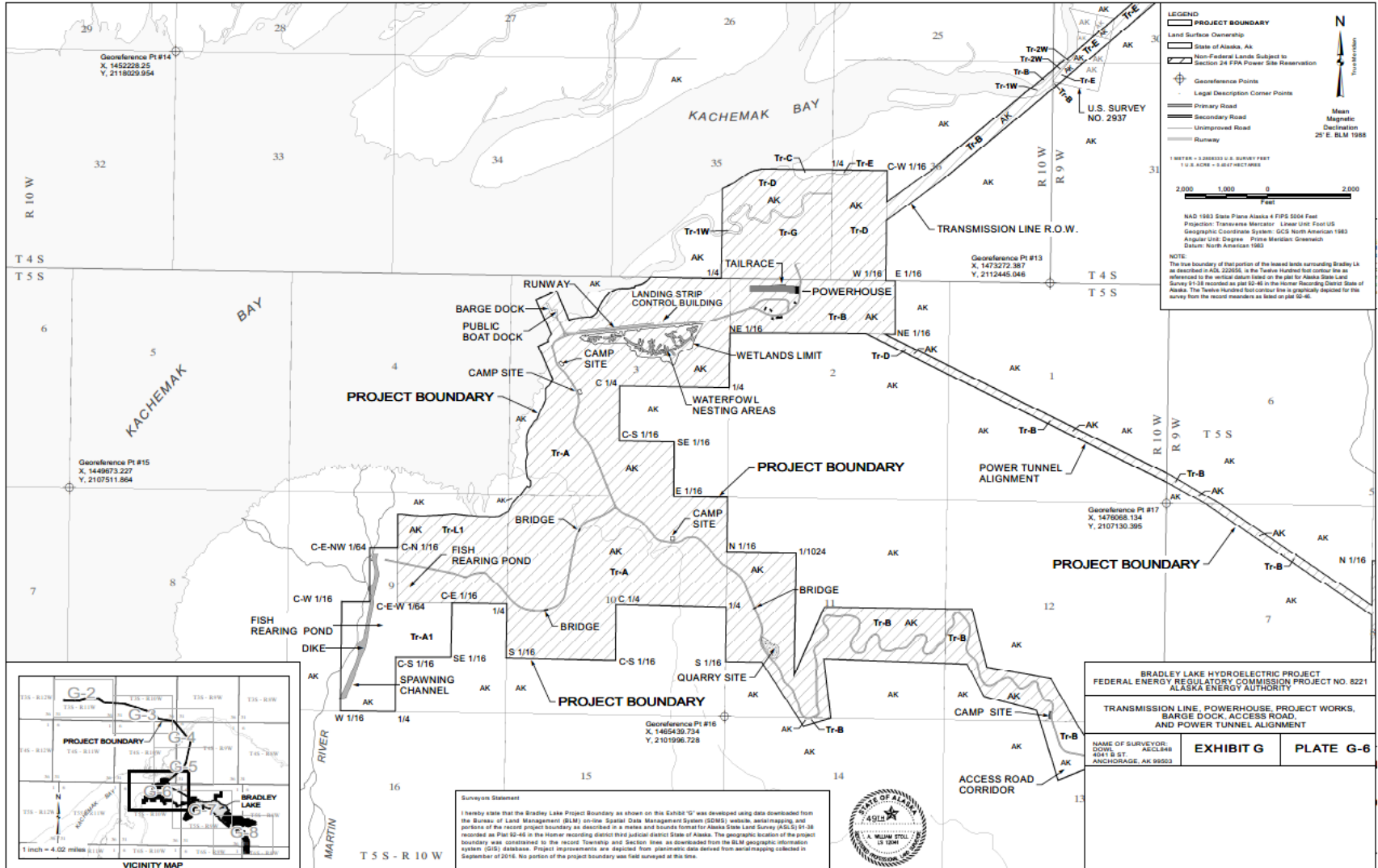


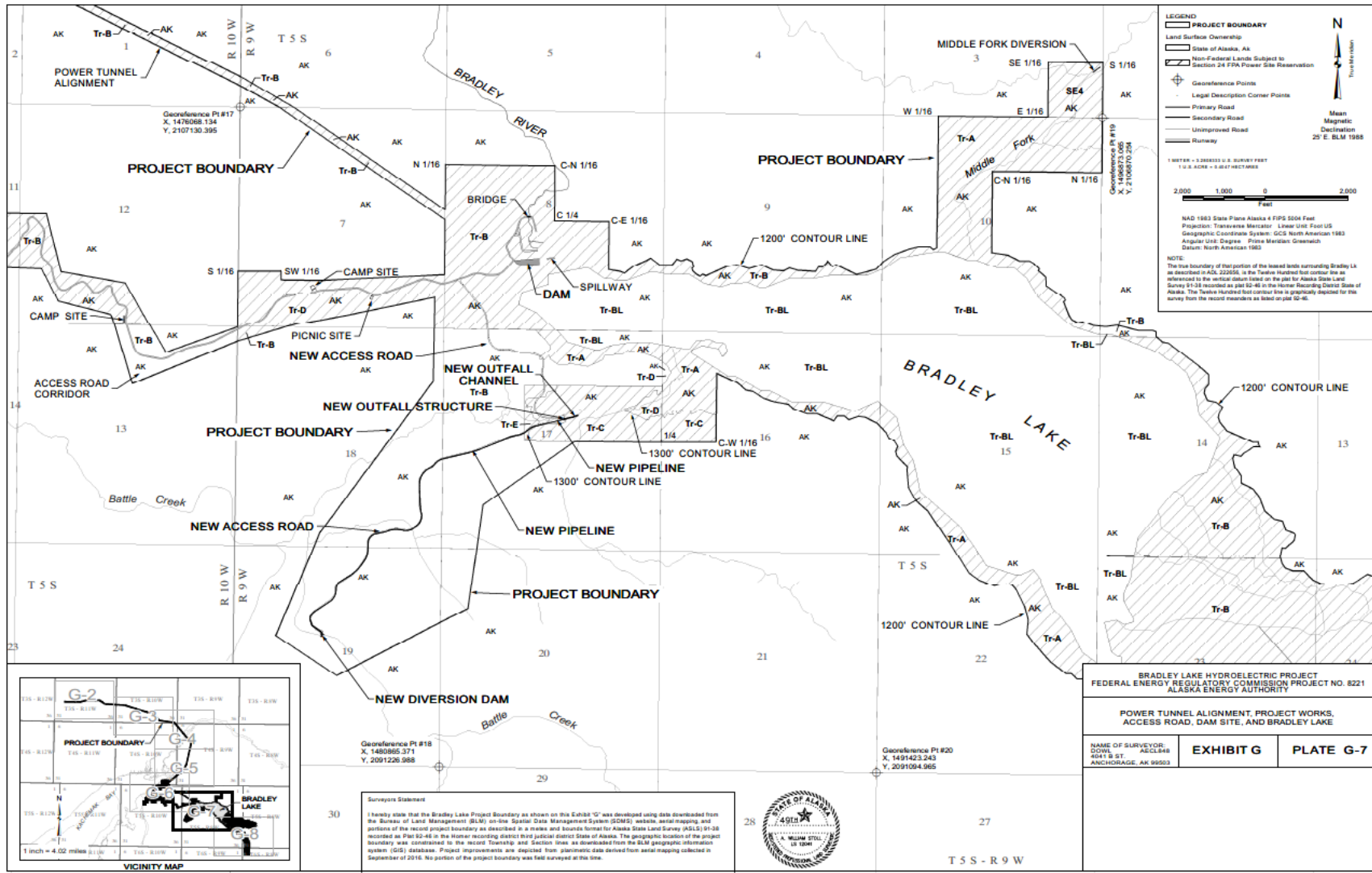


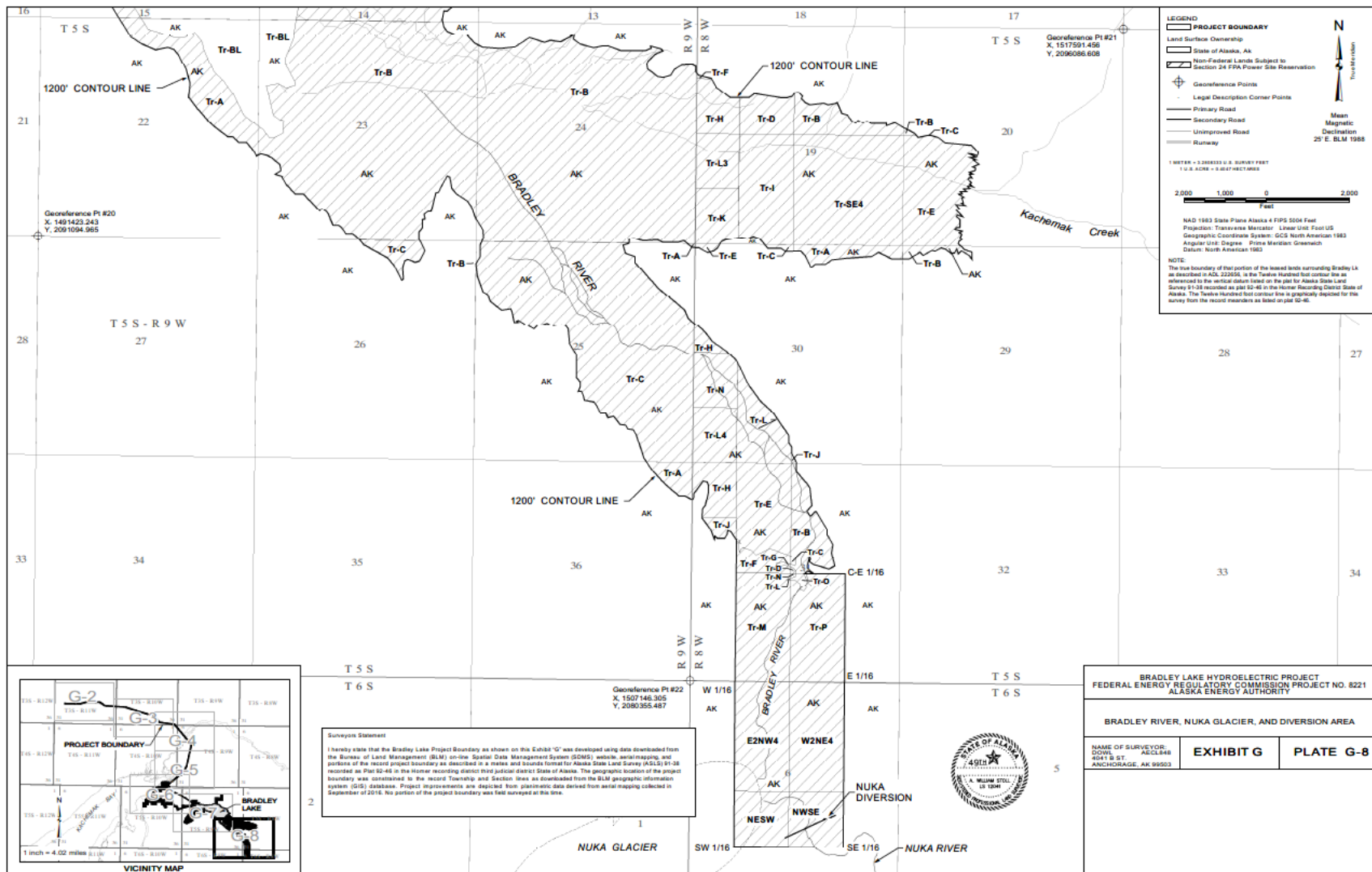












**LEGEND**

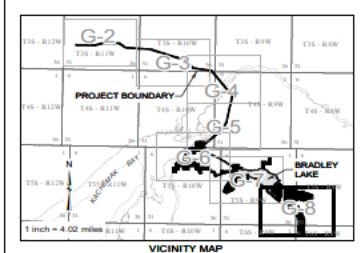
- PROJECT BOUNDARY
- Land Surface Ownership
  - State of Alaska, AK
  - Non-Federal lands Subject to Section 24 FPA Power Site Reservation
- Georeference Points
- Legal Description Corner Points
- Roads
  - Primary Road
  - Secondary Road
  - Unimproved Road
  - Runway

1 METERS = 3.280833 U.S. SURVEY FEET  
1 U.S. ACRE = 0.0047 HECTARES

2000 1000 0 2000  
Feet

NAD 1983 State Plane Alaska 4 FIPS 5004 Feet  
Projection: Transverse Mercator, Lower Unit, East US  
Geographic Coordinate System: GCS North American 1983  
Angular Unit: Degree Prime Meridian: Greenwich  
Datum: North American 1983

**NOTE:**  
The true boundary of that portion of the leased lands surrounding Bradley L4 as described in A.L. 222055, is the Twelve Hundred foot contour line as referenced to the vertical datum listed on the plat for Alaska State Land Survey 91-38 recorded as plat 92-48 in the Homer Recording District State of Alaska. The Twelve Hundred foot contour line is graphically depicted for the survey from the record measurements as listed on plat 92-48.



**Surveyor Statement**

I hereby state that the Bradley Lake Project Boundary as shown on this Exhibit 'G' was developed using data downloaded from the Bureau of Land Management (BLM) on-line Spatial Data Management System (SDMS) website, aerial mapping, and portions of the record project boundary as described in a metric and bounds format for Alaska State Land Survey (SLS) 91-38 recorded as Plat 92-48 in the Homer recording district judicial district State of Alaska. The geographic location of the project boundary was constrained to the record Township and Section lines as downloaded from the BLM geographic information system (GIS) database. Project improvements are depicted from planimetric data derived from aerial mapping collected in September of 2016. No portion of the project boundary was field surveyed at this site.

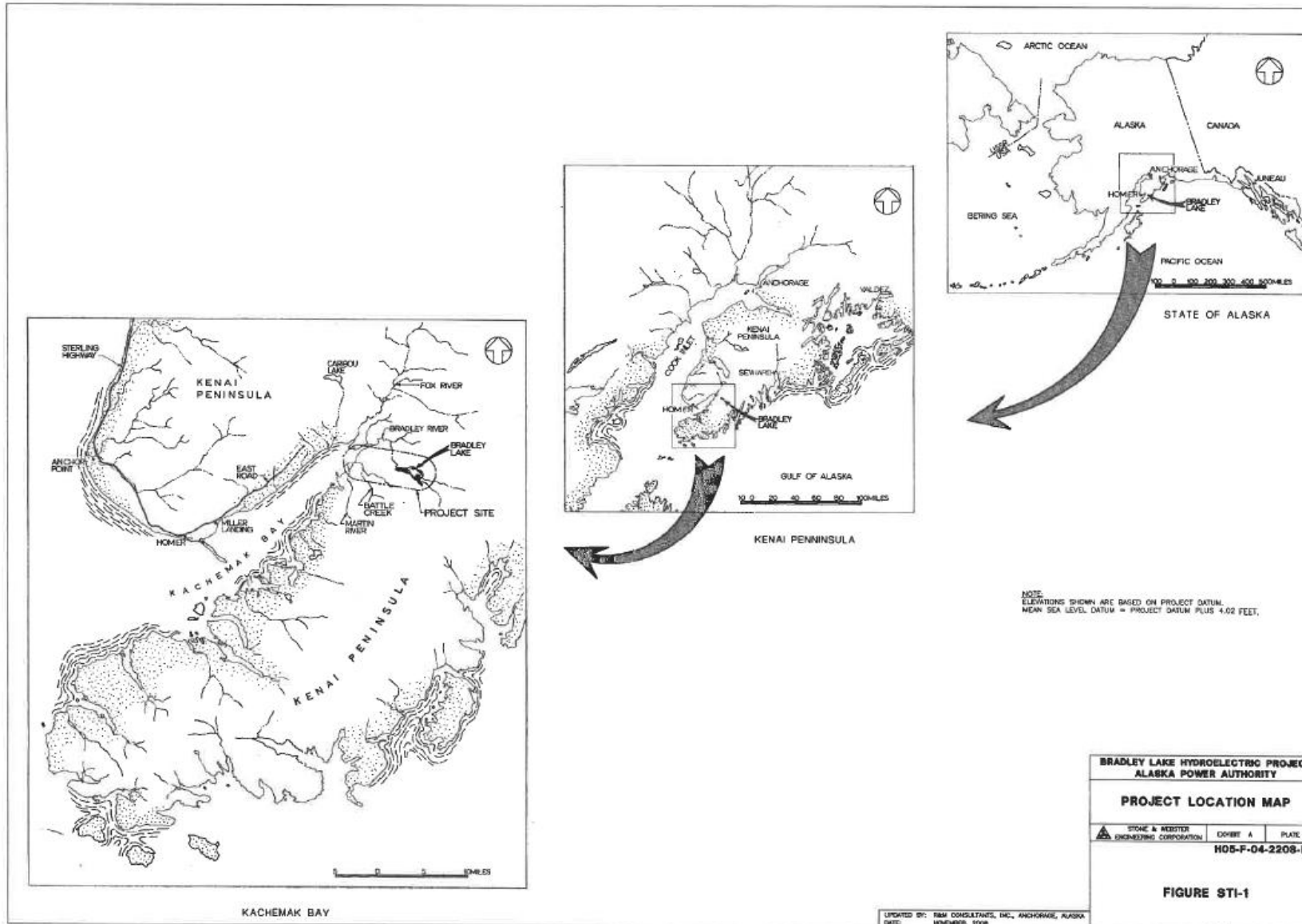
**BRADLEY LAKE HYDROELECTRIC PROJECT**  
FEDERAL ENERGY REGULATORY COMMISSION PROJECT NO. 8221  
ALASKA ENERGY AUTHORITY

**BRADLEY RIVER, NUKA GLACIER, AND DIVERSION AREA**

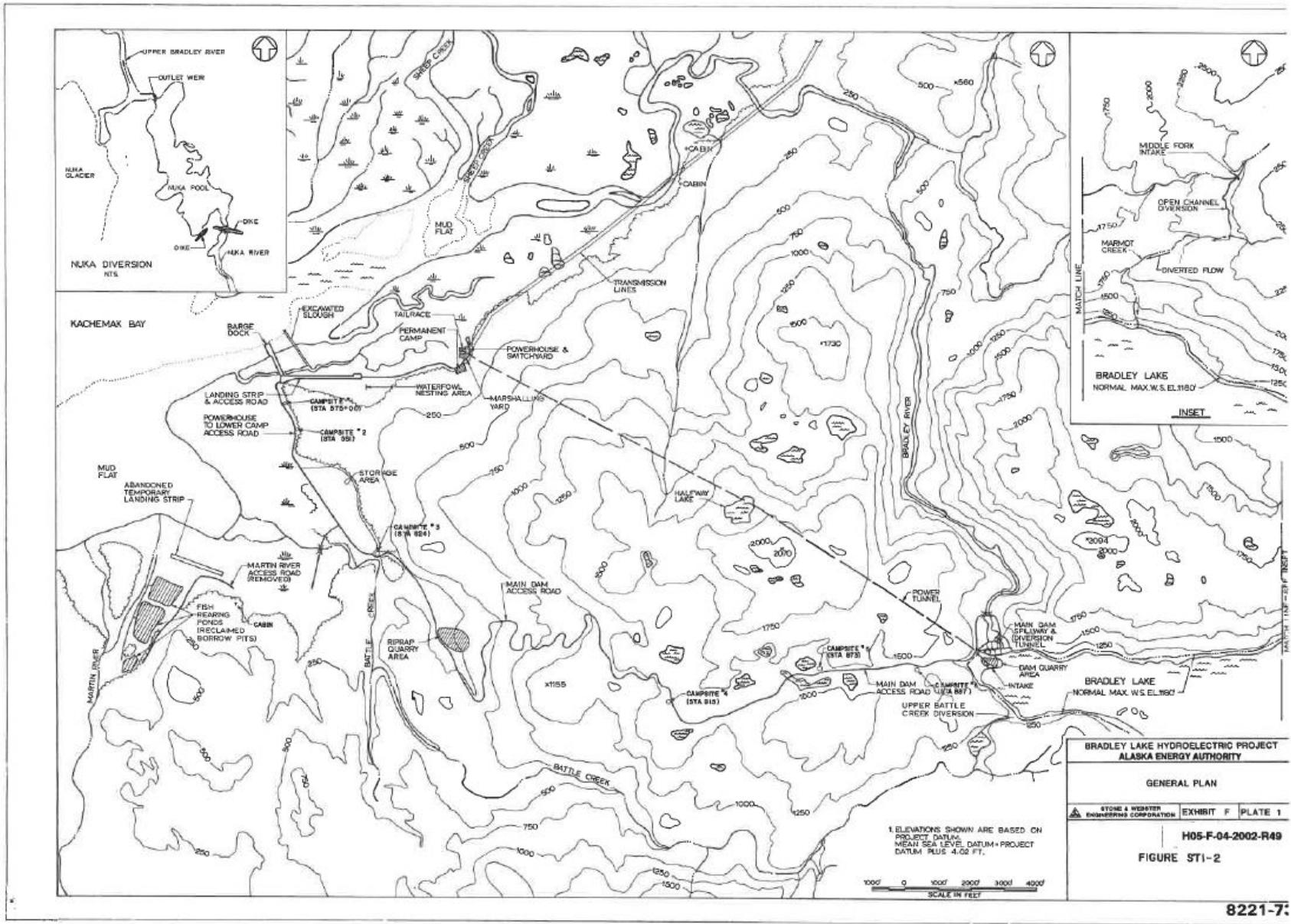
NAME OF SURVEYOR: DOWLS 404 S ST. ANCHORAGE, AK 99503	ACEL488	<b>EXHIBIT G</b>	<b>PLATE G-8</b>
--	---------	------------------	------------------

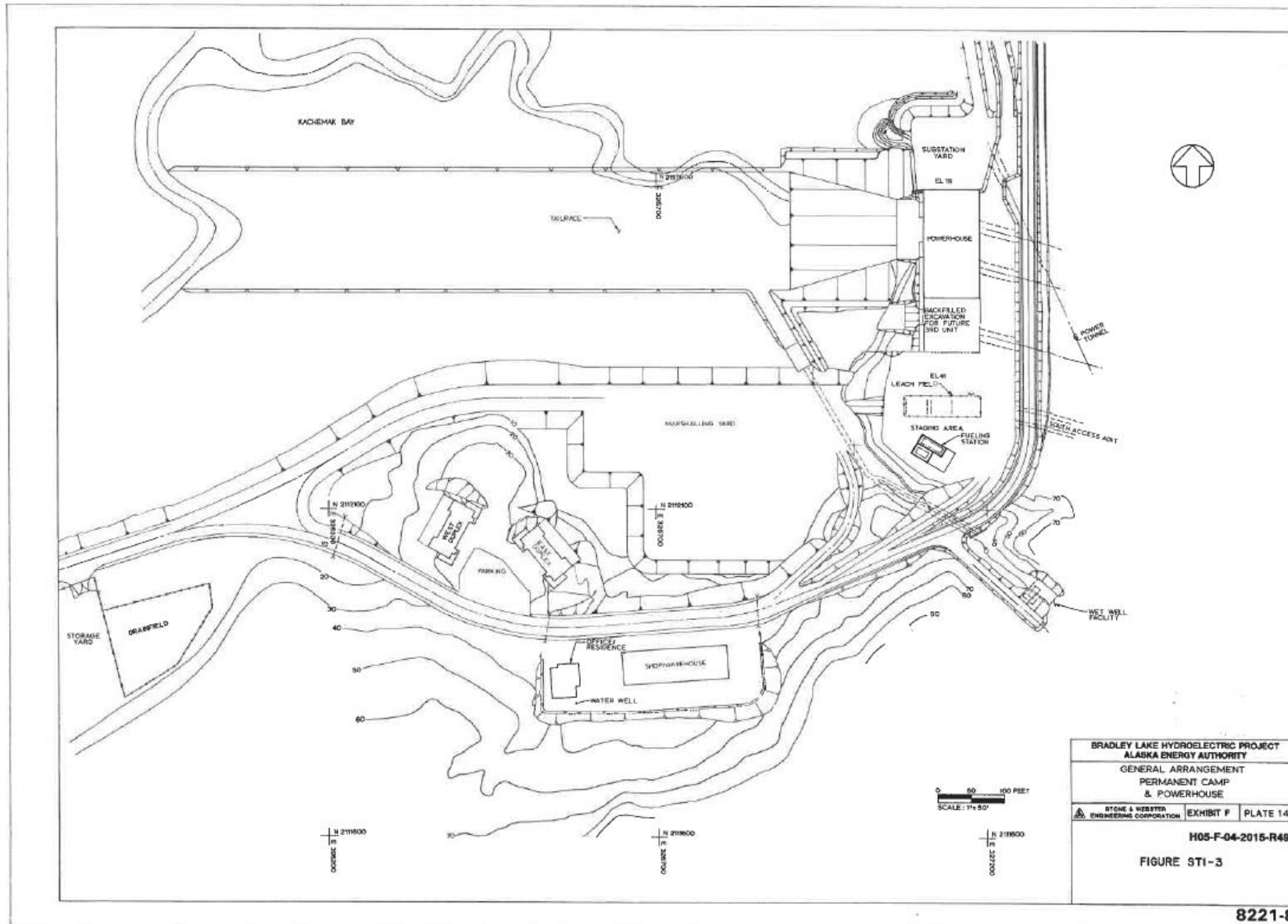
STATE OF ALASKA  
49th  
A. MUMFORD  
SURVEYOR  
1978

P-8221-129

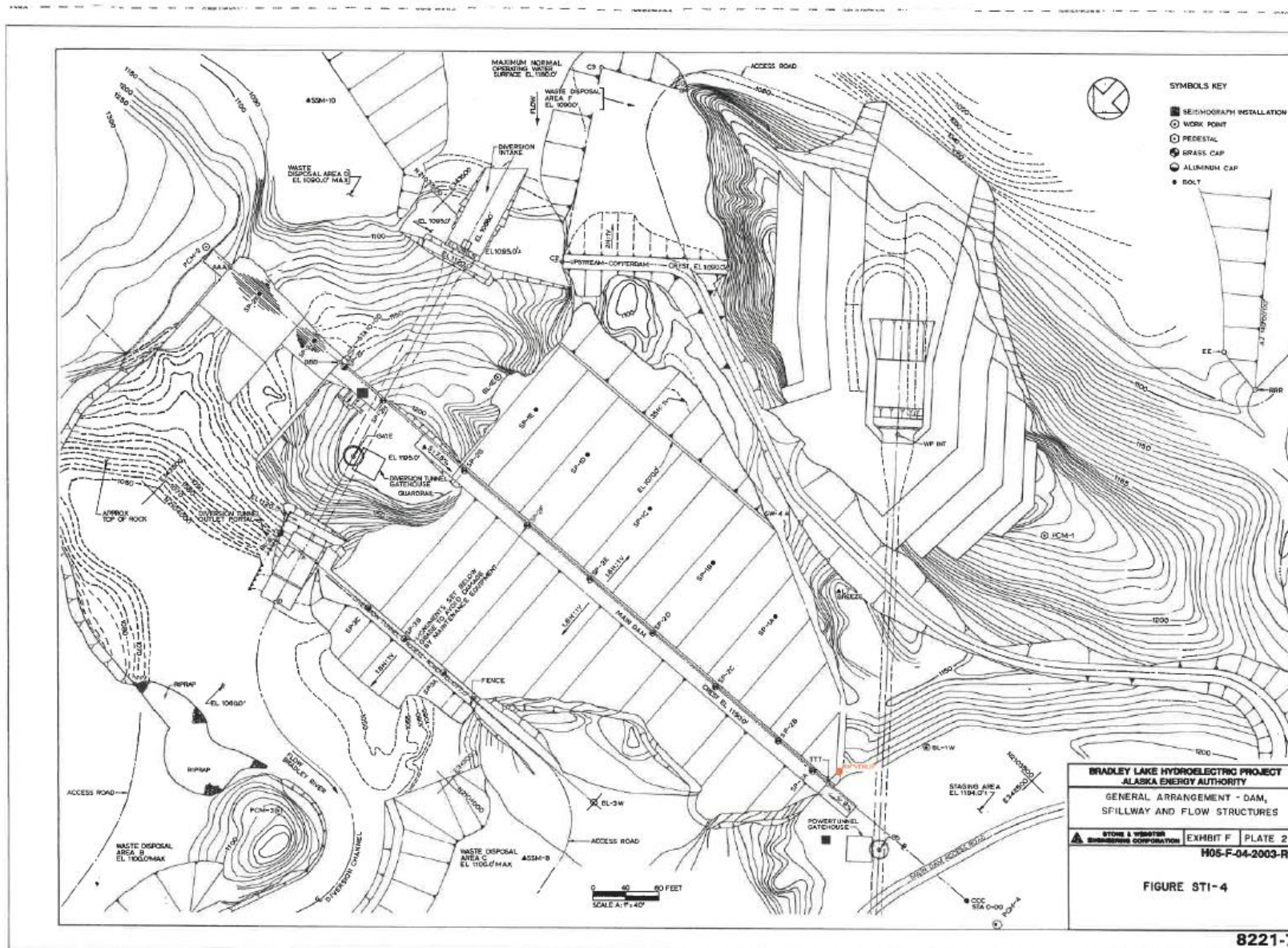


8221

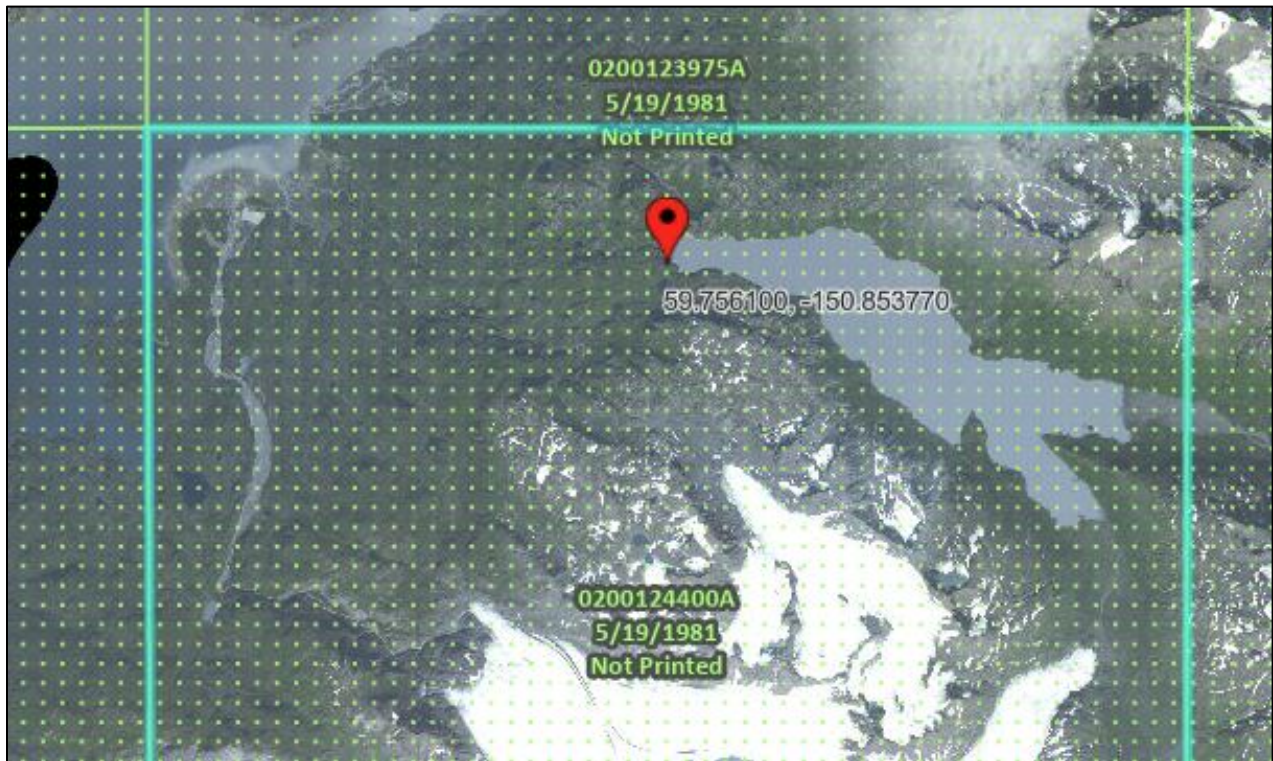








## FLOOD MAP



## ZONING ANALYSIS

The subject is located in an area without zoning. Therefore, potentially any use would be allowable, subject of course to physical and other regulatory restrictions.

## IMPROVEMENTS DESCRIPTION

The subject improvements include the following. Overall the improvements are of good quality and are in average to good condition.

### DAM

The subject's dam structure is a 610 foot long, 125 foot high concrete faced rock fill gravity dam with a 175 foot long ungated ogee spillway system. The reinforced concrete facing acts as the impervious structure and is 12 inches thick. The upstream concrete facing is anchored to the rock foundation upon which the dam sits by a reinforced concrete toe plinth grouted to the rock. The dam contains approximately 360,000 cubic yards of rockfill and approximately 10,800 cubic yards of concrete in the face slab, plinth and parapet. The spillway, which was constructed adjacent to the right abutment of the dam for flood-flow releases, contains approximately 11,000 yards of concrete.

### DIVERSION TUNNEL

During the original construction of the subject, a 408 foot 21 foot diameter horseshoe diversion tunnel was installed between the spillway and the right abutment of the dam to divert the Bradley Lake flows. Subsequently, a 110 foot vertical gate shaft of 20 foot diameter was drilled and blasted using smooth-wall drill and blast techniques and bulkhead gates were inserted at the intake portal of the diversion tunnel to commence filling the reservoir. The tunnel was then converted to serve as a permanent low-level outlet for reservoir drawdown and to provide for fish water releases to the downstream Bradley River drainage. The low level outlet is comprised of a vertical concrete-lined shaft containing two vertical hydraulic operated steel leaf gates which can be operated to control and regulate flow releases from the reservoir if necessary.

### POWER TUNNEL

The power tunnel conveys water stored in the Bradley Lake Reservoir to the turbines for power generation. It is 18,610 feet long and consists of an 11 foot diameter concrete-lined upper tunnel, a 760 foot high, 11 foot diameter vertical shaft and a 13 foot finished diameter concrete-lined power tunnel. The downstream 2,400 feet of the power tunnel is also strengthened by a steel liner. The total distance of the tunnel head (the height difference between where the water enters into the hydro system and where it leaves it) is 1,000 feet.

### POWERHOUSE

The powerhouse is located at tidewater on Kachemak Bay and is a reinforced concrete substructure with a steel superstructure. It is 80 feet wide, 92 feet high and 160 feet long and contains two turbines with generators. The powerhouse structure contains approximately 10,800 cubic yards of concrete, 580 tons of rebar and 700 tons of structural steel. Water is discharged from the powerhouse through the draft tube to the improved tailrace channel to Kachemak Bay. In addition to the turbines, generators and substation (described below), major electrical and mechanical equipment within the powerhouse include:

- Generator circuit-breakers and leads;
- Station service transformers;
- Emergency diesel power generator;
- Station 125 V DC battery system, charger and inverter (HDR);
- Control boards and relay panels;
- Lighting systems;
- 15 KV metal clad vacuum breaker switchgear;

- 480 V double end station service switchgear (GE);
- 480 V motor control centers (GE);
- 160 ton powerhouse bridge crane (Kranco)
- Station and instrument air compressor system;
- HVAC systems;
- Fire water protection system;
- Halon fire protection system;
- Cooling water system.

## TURBINES/GENERATORS/SUBSTATION

The two installed turbines are vertical axis, six jet Pelton units with a design head of 1,100 feet (maximum head of 1,175 feet and minimum head of 920 feet). Output is rated at 63,500 HP at 920 feet of head and 82,500 HP at 1,085 feet of head. The turbine shut off valves are two 60-inch diameter hydraulic oil operated spherical valves.

The two turbines are connected to 160 ton generators which rotate at 300 revolutions per minute. The generators have an output of 63,000 KVA each at a voltage of 13,800.

Generated power passes through a compact gas-insulated substation, which is located entirely within the powerhouse. Output from the generators is stepped-up in voltage from 13.8 KV to 115 KV by the main power transformers before delivery into the transmission system.

## DIVERSION PROJECTS

At the time of construction, the owner spent approximately \$700,000 on three projects that diverted water from nearby streams to the Bradley Lake Reservoir. These diversion projects help increase the flow of the reservoir and therefore the ultimate power output of the project. The Upper Bradley (Nuka) project consists of a wire and rock wall about five feet in height. The other two projects involved a small amount of civil work. The three projects and their costs are summarized in the following chart.

Original Diversion Projects	
Project Name	Original Cost
Middle Fork	\$100,000
Upper Bradley (Nuka)	\$500,000
East Fork Upper Battle Creek	\$100,000
Total	\$700,000

In August 2020, the subject owner completed construction of the West Fork Upper Battle Creek diversion project in order to increase flows even further into the Bradley Lake Reservoir. Project construction started in May 2018 and cost approximately \$47 million. It represents the largest capital project in the history of the subject property. The project consists of three miles of road, a concrete diversion dam and a two-mile, 63-inch diameter pipeline under the road that carries water from its source in the West Fork Upper Battle Creek to Bradley Lake. The project increased energy production at the hydro plant by about 10 percent.

We will be valuing the diversion projects separately from the primary improvements.

## MISCELLANEOUS IMPROVEMENTS

The final group of improvements that are being valued include a number of structures near the powerhouse and airstrip. These improvements include four residential buildings and several warehouse and storage buildings used

to support the project. These improvements that are being valued are summarized as follows. It should be noted that the subject site also includes a gravel road system, an airstrip, a barge dock and transmission lines, that although integral to the project, are not being valued as part of this assignment.

### **SHOP/WAREHOUSE**

There is an 8,330 square foot shop/warehouse building that is used for the repair of equipment and the storage of tools. The building has a steel frame with aluminum siding and a metal roof. It is insulated and heated with electric space heater and has a wellhouse and six overhead doors.

### **FOURPLEX/DUPLEX BUILDINGS**

There is a 5,248 square foot fourplex building and 2,624 square foot duplex building (adjacent to each other) that are located across the road from the shop/warehouse building. The buildings are used by the plant operators. The fourplex features two two-bedroom/two-bathroom units on the first floor and two studio units (each with bathrooms) on the lower level (which is directly accessible from the outside due to the sloping nature of the site). The duplex features two two-bedroom/two-bathroom units on the first floor and a large basement on the lower level (also directly accessible from the outside). The buildings are both wood frame with wood siding and metal roofs have feature electric baseboard heat. They have two fireplaces each.

### **BUNKHOUSE**

There is a 2,100 square foot two-story bunk house, which is used as crew quarters for maintenance personnel. The building is wood frame with wood siding and a metal roof. The building sleeps 16 and features a common kitchen, living room and multipurpose room in addition to a common bathroom on the second floor and two individual bathrooms on the first floor.

### **PROJECT MANAGER RESIDENCE**

There is a 1,700 square foot single family residence to be used by the project manager that was in the final stages of construction on the inspection date. The remaining work to be done included finishing the plumbing and various fixtures along with installation of a concrete patio. The prefabricated building is wood frame with vinyl siding and hardwood trim and is built on 14 inch concrete slab. It contains two bedrooms and two bathrooms.

### **POLE BARN (SHEEP SHED)**

There is a 4,830 square foot pole barn used for truck and other storage. It is a wood frame building with aluminum siding and a metal roof and is not heated.

### **INCINERATOR BUILDING**

There is a 1,440 square foot incinerator building used for burning garbage. It is a metal frame building with aluminum siding and a metal roof.

### **STORAGE BUILDING**

There is a 1,300 square foot storage/warehouse building used for storage and repair of the sanding truck. It is a metal frame building with aluminum siding and a metal roof. It is insulated and heated with electric space heaters.

### **FIRE FACILITY**

There is a 1,200 square foot fire facility. It is a wood frame building with wood siding and an asphalt shingle roof.

### **FUEL SHED**

There is a 720 square foot open fuel station with one gas pump and three fuel storage containers. It features a metal roof.

### **BARGE DOCK BUILDING**

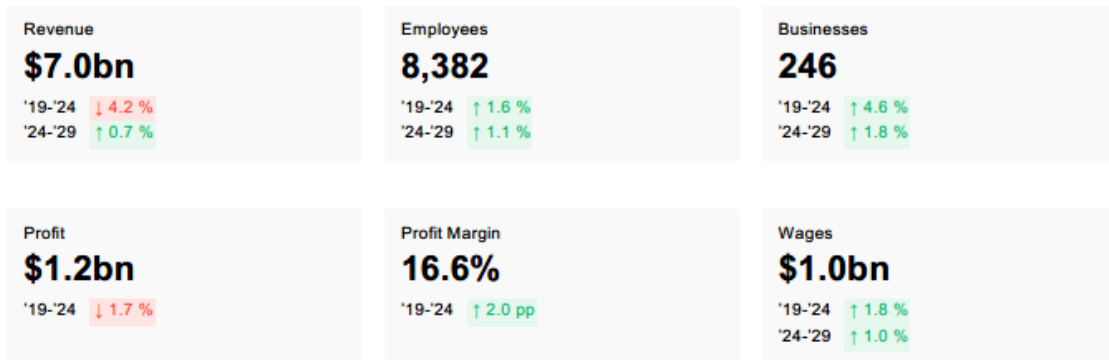
There is a 700 square foot building used for storage near the barge dock. It is a wood frame building with wood siding and an asphalt shingle roof.

## MARKET ANALYSIS

The subject property represents a hydroelectric facility and dam in the borough of Kenai Peninsula, AK. Therefore, we have provided the following information from IBISWorld's May 2024 report on Hydroelectric Power in the US as well as the 2023 US Hydropower Market Report from the US Department of Energy.

### 2. At a Glance

<https://my.ibisworld.com/us/en/industry/22111c/at-a-glance>



### Key Takeaways

#### Performance

- Major droughts have lowered the water supply available. Producers are producing less electricity because of the lack of water, hindering revenue.
- Hydroelectricity facilities have faced scrutiny for the environmental damage they can cause. This has led producers to take on smaller-scale projects known as "small hydro." These projects have a generational capacity of 30 megawatts.

#### External Environment

- Renewable energy targets and requirements support growth. More companies are entering the industry to meet the goals set by the state.
- Hydropower facilities are subject to strict federal and state regulations. Additional regulations may apply depending on the type of project.



## Executive Summary

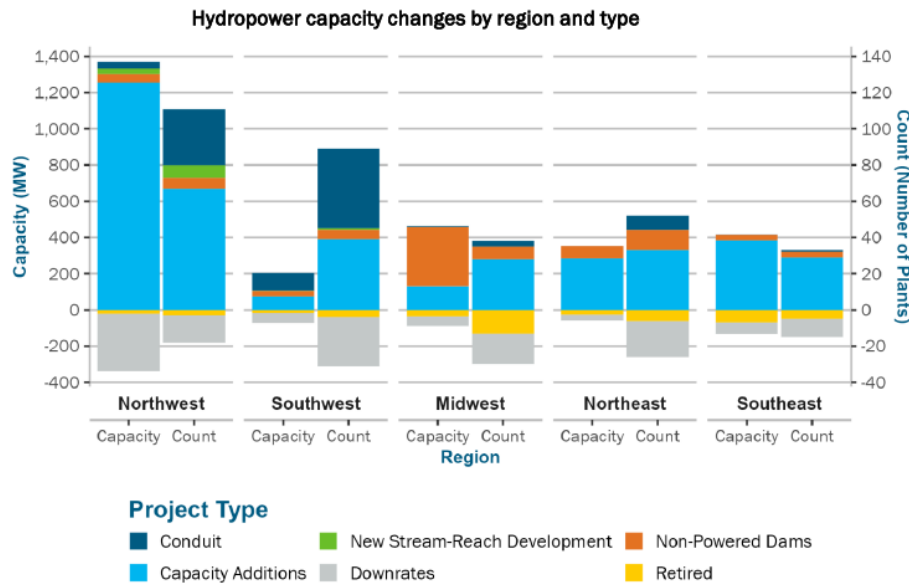
Droughts have limited the availability of water in specific regions across the country. This led to delays in hydroelectric infrastructure investment, halting upgrades to expand storage and efficiency. Although hydroelectricity is an environmentally friendly renewable energy source, it has received considerable scrutiny from state governments because hydroelectric dams can damage river resources. This has led to a slowdown in new facilities as many producers have switched to small hydro projects. Overall, revenue is expected to dip at a CAGR of 4.2% through the five years, reaching \$7.0 billion in 2024, where revenue is set to get a 1.9% boost. Profit remains elevated at 16.6% of revenue as renewable energy projects tend to be profitable.

Government incentives for storage facilities and continuous research and development have remained a bright spot for producers. New turbine technology and automated maintenance systems help facilities improve efficiency while spending less. While hydroelectric power has benefited from government tax credits, other forms of renewable energy, primarily solar and wind, have skyrocketed in popularity, deterring consumers from hydroelectric power. According to the Energy Information Administration (EIA), energy generated from hydroelectric power has lagged compared with its renewable substitutes.

Hydroelectric energy revenue is forecast to expand at a CAGR of 0.7% through the end of 2029 to a total of \$7.2 billion as government incentives and rising electricity prices aid growth. The newly passed Bipartisan Infrastructure Law will also provide \$753.6 million in funding for incentive programs and research and development. Small hydro projects will continue to shape the industry as more extensive facilities threaten the environment. Even so, other forms of energy (think solar, wind and natural gas) will remain a looming threat, keeping revenue at bay.

1.1 New Project Development and Capacity Changes (2010–2022)

**The net increase in U.S. hydropower capacity from 2010 to 2022 was 2.1 GW from a combination of upgrades to existing plants (1.6 GW), new projects (0.7 GW), and retirements (-0.2 GW); PSH capacity increased by 1.4 GW of which 97% resulted from upgrades to the existing fleet.**



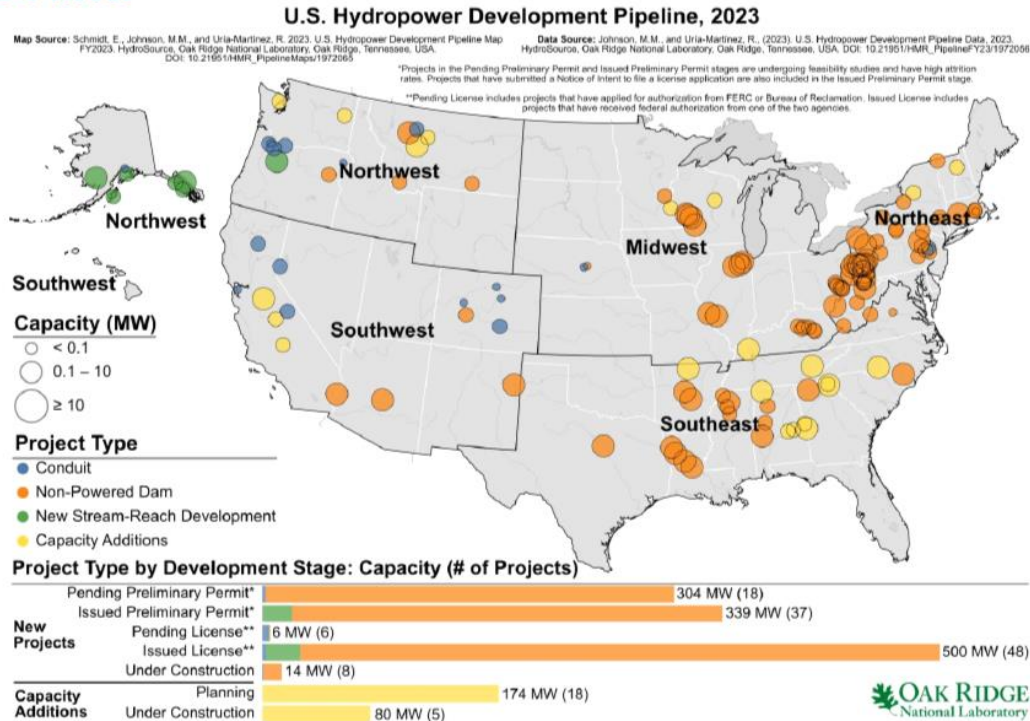
Sources: EIA Form 860 (2010-2021), EIA Form 860 Early Release 2022, ORNL Existing Hydropower Assets (EHA) Plant database 2023

- New project construction included:
  - 32 non-powered dam projects (505 MW; of which 65% is in the Midwest)
  - 89 conduit projects (140 MW; of which 69% is in the Southwest)
  - 8 new stream-reach developments (34 MW; of which 94% is in the Northwest)
- For the 155 plants with capacity additions, the median capacity increase is 15%.
- To date, the pace of capacity increases in the 2020s has slowed down relative to the previous decade.
  - Partly explained by COVID-19 restrictions and supply chain challenges

	Annual average (2010–2019)	Annual average (2020–2022)
Capacity additions to existing fleet	193 MW	66 MW
Capacity from new facilities	60 MW	26 MW

2.1 U.S. Hydropower Development Pipeline

**At the end of 2022, there were 117 hydropower projects (1.2 GW) in the development pipeline; additionally, 23 existing projects looking to increase the capacity of the fleet by 254 MW.**

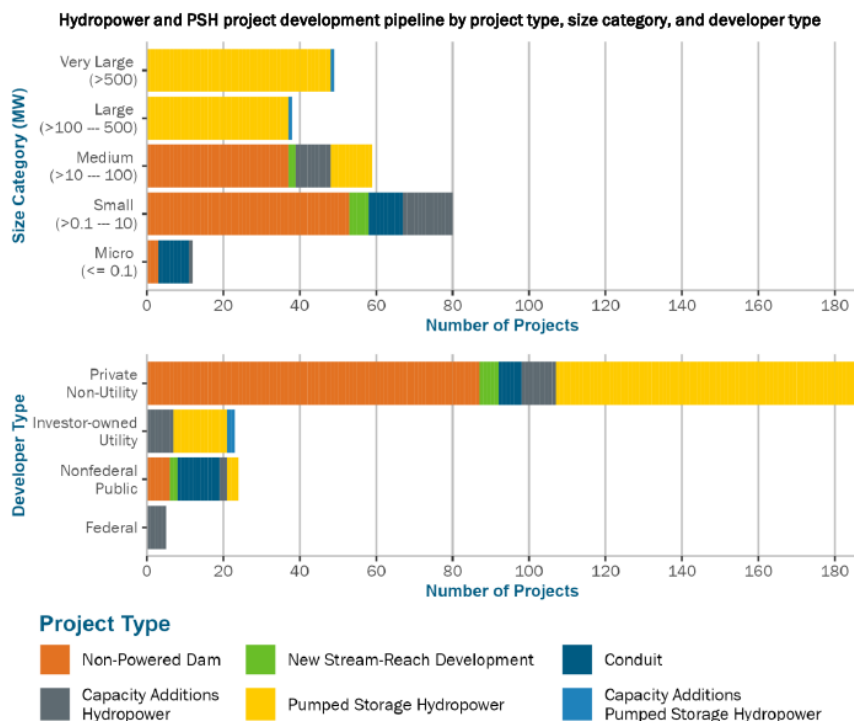


Sources: ORNL U.S. Hydropower Development Pipeline Data 2023, FERC eLibrary, IIR

- Non-powered dam (NPD) retrofits account for 95% of the proposed new capacity.
- The seven new stream-reach developments (NSD) proposed are all in the Northwest.
  - Only one would involve building an impoundment dam.
- Almost half of the projects in the pipeline (56) have already received federal authorization; eight of them have reached the construction stage.
- Most (20) of the capacity additions result from upgrades to existing turbine-generator units.
  - Of the three capacity additions resulting from new units, two seek generating power from mandatory environmental flows.

2.3 U.S. Hydropower and PSH Project Sizes and Developer Types

**Except for PSH and some capacity upgrades, there are no Large (>100 MW) projects in the pipeline. The most active type of developer for new projects are private non-utilities.**

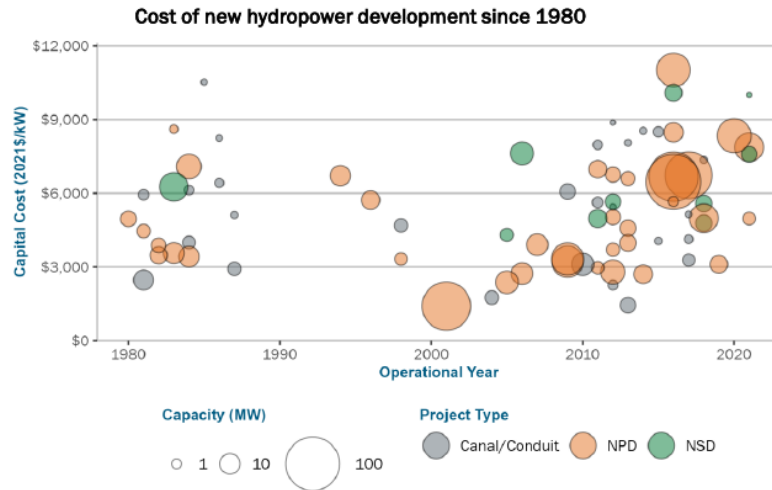


- Proposed project types vary by owner/developer types.
  - Federal owners focus on maintaining and upgrading existing fleets.
    - However, they own most of the infrastructure (dams and conduits) that nonfederal developers are proposing to retrofit with hydropower.
  - Investor-owned utilities (IOUs) have also primarily pursued capacity additions of their hydropower fleets but, in the last two years, they have started showing interest in developing new PSH projects.
    - Four IOUs have PSH projects in the development pipeline.

Sources: ORNL U.S. Hydropower Development Pipeline Data 2023. FERC eLibrary, IIR.

5.1 Capital Costs

**Five new projects starting operation since 2020 reported capital costs ranging from \$5,000/kW to \$10,000/kW.**



- Capacity-weighted mean cost for projects constructed since 2005:
  - Canal/Conduit: \$3,955/kW (16 projects)
  - NPD: \$6,096/kW (26 projects)
  - NSD: \$6,621/kW (9 projects)

Sources: O'Connor (2015), IIR, and internet searches  
 Note: The U.S. Bureau of Reclamation Construction Cost Trends composite trend index was used to adjust for inflation cost data from different years.

---

### 6.3 U.S. Hydropower Supply Chain Challenges and Opportunities

## **Executive Order 14017 “America’s Supply Chains” directed the Secretary of Energy to submit a report on supply chains for the energy sector industrial base.**

- The [Hydropower Supply Chain Deep Dive Assessment](#) (2022) is one of 11 reports produced by DOE to comply with the E.O. 14017. It identified U.S. hydropower supply chain challenges and opportunities.
- Key challenges:
  - Large steel castings (>10 tons) are very difficult to procure domestically.
    - Large castings are imported mainly from Brazil, China, Eastern Europe, and South Korea.
  - Stator windings from large units (>100 MW) are very difficult to procure domestically.
    - Typically imported from Canada, Mexico, Brazil, and Europe.
  - Limited hydropower workforce availability
    - Difficult to hire skilled tradesmen (e.g., machinists, welders), engineers, construction workers for jobs at remote sites.
- Opportunities:
  - Additive manufacturing is well suited to produce custom parts with complex geometries and may offer an alternative to produce domestically some of the components that currently have to be imported.
    - Some turbine OEMs already use additive manufacturing to produce small components as well as molds and castings.
  - Refurbishing and upgrading the U.S. hydropower and PSH fleets offers a large market opportunity to companies considering reshoring manufacturing operations.
  - Federal procurement rules can be leveraged to increase the domestic content of hydropower plant components used in R&U projects for the federal fleet.
    - For Buy American Act domestic content requirements to be widely applicable in federal hydropower R&U projects, the current value threshold (\$7,032,000) would have to be raised.

### 6.3 U.S. Hydropower Supply Chain Challenges and Opportunities

## Domestic content requirements in federal incentives and federal procurement rules try to spur increased domestic manufacturing of hydropower components.

- Buy American Act sets domestic content requirements for federal procurement.
- Non-federal entities receiving incentives from the Bipartisan Infrastructure Law (Section 242, Section 243, Section 247) are also bound by the domestic preference requirements set in the Build America, Buy America Act.
  - Non-federal entities include States, local governments, territories, Indian tribes, Institutions of Higher Education, and nonprofit organizations.
  - For-profit organizations are excluded from the requirements.
- The Inflation Reduction Act (IRA) tax credits for new hydropower and PSH facilities (Section 45, Section 48, Section 45Y, Section 48E) include domestic content bonuses; for tax-exempt entities requesting the elective pay option, domestic content thresholds are required.
- Section 48C qualified advanced energy property credits extended by the IRA apply to investment in factories to produce hydropower components.
  - Factory owners may claim the full credit of 30% if wage and apprenticeship requirements are met (6% otherwise).
  - Of the total \$10 billion authorized in the IRA for these credits, at least \$4 billion must be allocated to factories located in energy communities.

## CONCLUSION

Although the subject is a large hydro facility with a capacity 120 megawatts, its environmental impact is relatively low. Bradley Lake was present prior to the dam, and fish and game appear to be doing just as well now as before the project was constructed. Neither the general public nor government agencies have commented to the subject owner or FERC about negative aspects of the project. In fact, it is held up as a model for hydroelectric development.

As the project is subject to FERC licensing, government regulation of the property is present. Electricity production from the subject facility is dependent on rain, snow and glacial melt in the Bradley River watershed, which have been variable but within a relatively tight range over time. Continued stability for the subject in the market is expected to continue for the foreseeable future.



---

# HIGHEST AND BEST USE

## INTRODUCTION

The highest and best use is the reasonable, probable, and legal use of vacant land or an improved property that is physically possible, legally permissible, appropriately supported, financially feasible and that results in the highest value. These criteria are often considered sequentially. The tests of legal permissibility and physical possibility must be applied before the remaining tests of financial feasibility and maximal productivity. A financially feasible use is precluded if it is legally prohibited or physically impossible. If a reasonable possibility exists that one of the prior, unacceptable conditions can be changed, is it appropriate to proceed with the analysis with such an assumption.

## HIGHEST AND BEST USE CRITERIA

The site's highest and best use is analyzed both as vacant and as improved, and if improvements are proposed then an as proposed analysis is required. In all cases, the property's highest and best use must meet four criteria: (1) legally permissible; (2) physically possible; (3) financially feasible; and (4) maximally productive.

## HIGHEST AND BEST USE AS VACANT

### LEGALLY PERMISSIBLE

Legal restrictions include deed restrictions, CC&R's, lease encumbrances, zoning requirements, building codes, historic district controls and environmental regulations, and were previously analyzed to determine legally permitted uses. Legally, the subject is located in an area without zoning. Allowable uses include any potential use. No other legal restrictions have been identified that would limit development of the property beyond the development standards stipulated by municipal code.

### PHYSICALLY POSSIBLE

Size, shape, topography, soil condition, availability of utilities, transportation access, surrounding uses, and locational characteristics were previously analyzed to determine which legal land uses are physically possible and which are best to conform to the physical and locational aspects of the site and its setting with respect to the neighborhood and community. Overall, the physical site attributes result in adequate utility, and the property could be developed with a variety of legally-conforming uses. Given the surrounding uses and location, the site is best suited for conservation use.

### FINANCIALLY FEASIBLE

Financial feasibility is determined by the relationship of supply and demand for the legally probable land uses versus the cost to create them. Given the remote location of the property, conservation use is considered financially feasible.

### MAXIMALLY PRODUCTIVE

The final test of highest and best use of the site as vacant is that the use be maximally productive, yielding the highest return to the land. In order to determine the maximally productive use, a comparison of rental rates, occupancy, operating expenses, and rates of return for the financially feasible uses have been made. Based on this analysis, conservation use renders the highest residual land value; therefore, conservation of the subject's site is the maximally productive use of the subject as vacant.

## **HIGHEST AND BEST USE AS IMPROVED**

### **LEGALLY PERMISSIBLE**

The subject is legally conforming, as it is located in an area without zoning.

### **PHYSICALLY POSSIBLE**

As noted in the Improvements Analysis section, the site is improved with a hydroelectric facility with dam that was constructed in 1991. The improvements are in average to good overall condition.

### **FINANCIALLY FEASIBLE**

The subject is an owner-occupied/fee simple type property, and is sufficiently suited to the operation of an owner's business with no or minimal reconfiguration. The existing improvements provide contributory value to the site, and there is no alternate use that results in a greater value. Therefore, utilization of the existing improvements is financially feasible.

### **MAXIMALLY PRODUCTIVE**

The improvements contribute return to the site that is far greater than that which would be generated if the land were vacant. Since return to the land and improvements is greater than the expenses associated with maintaining them, continued utilization of the improvements through their economic life is likely.

# VALUATION PROCESS

Valuation in the appraisal process generally involves three techniques, including the Cost Approach, Sales Comparison Approach and the Income Capitalization Approach.

These three valuation methods are defined in the following table:

VALUATION METHODS	DEFINITION
<b>Cost Approach</b>	In this approach, value is based on adding the contributing value of any improvements (after deductions for accrued depreciation) to the value of the land as if it were vacant based on its highest and best use. If the interest appraised is other than fee simple, additional adjustments may be necessary for non-realty interest and/or the impact of existing leases or contracts.
<b>Sales Comparison Approach</b>	In this approach, recent sales of similar properties in the marketplace are compared directly to the subject property. This comparison is typically accomplished by extracting "units of comparison", for example, price per square foot, and then analyzing these units of comparison for differences between each comparable and the subject. The reliability of an indication found by this method depends on the quality of the comparable data found in the marketplace.
<b>Income Capitalization Approach</b>	In this approach, a property is viewed through the eyes of a typical investor, whose primary objective is to earn a profit on the investment principally through the receipt of expected income generated from operations and the ultimate resale of the property at the end of a holding period.

## VALUATION METHODS UTILIZED

The client requires an insurable replacement cost of the improvements. We utilized four data sources using the Cost per Capacity Method and two data sources using the Trended Original Cost Method.

The valuation process is concluded by analyzing each approach to value used in the appraisal. When more than one approach is used, each approach is judged based on its applicability, reliability, and the quantity and quality of its data. A final value opinion is chosen that either corresponds to one of the approaches to value, or is a correlation of all the approaches used in the appraisal.

---

## REPLACEMENT COST NEW

In concluding a replacement cost new (RCN) value for the subject property, we considered two methods that were outlined in an article in the Summer 2014 edition of the Appraisal Journal titled “The Appraisal of Power Plants” by Mark Pomykacz, MAI and Chris Olmsted. The first method is the Cost per Capacity Method. The cost per capacity is estimated by multiplying unit cost (e.g. \$/kW of capacity) by the number of units of capacity at the subject plant. The unit costs can be developed from a variety of sources including research publications, government estimates, manufacturer estimates, owner estimates, or the comparative-unit method. As the article indicates, this method is relatively practical and is used by many market participants because of its simplicity and availability.

The second method is the Trended Original Cost Method. In this method, the RCN is calculated by trending the original construction costs of the plant to the effective date of appraisal with a widely accepted index. The article indicates that this method is widely recognized by power plant appraisers, regulators and courts and is the predominant appraisal technique in regulated states for rate-base analysis. The accuracy of this method is dependent on the accuracy of the historical costs as well as on the trending method used.

In addition to these two methods, appraisers often use construction costs from other projects to determine the reasonableness of valuation results. However, we did not use construction costs from similar projects due to the lack of large hydropower projects similar to the subject being constructed in the US over the past several decades. In addition, all of the data sources used in the Cost per Capacity Method are based on actual costs of hydro projects, making the use of specific project costs redundant.

For purposes of our analysis, we have put most weight on the Cost per Capacity Method and have used the Trended Original Cost Method for support.

### COST PER CAPACITY METHOD

Our estimate of replacement cost new (RCN) is based on four different data sources. All of the sources provide costs or ranges of costs on a cost per kilowatt (kW) of capacity. As noted earlier, the subject’s capacity is 120 megawatts (MW), or 120,000 kilowatts (kW). All but one of the sources (NREL) include the costs of all facility components, including dams. The NREL data source excludes the cost of constructing a dam.

It should be noted that all of the sources are based on recent costs of projects that are much smaller in terms of capacity than the subject. This is due to the fact that large hydropower projects similar to the subject have not been constructed in the US over the past several decades. Therefore, using the principle of economies of scale, it is possible that the costs per kW from these data sources may have the effect of somewhat overstating the cost to reconstruct the subject property. However, the extremely remote location and poor access of the subject property makes the costs of construction at the subject site higher than most any other place, which has the effect of offsetting any potential overstating of costs based on the sources of costs in these four data sources.

- 1) The first source is the Marshall & Swift (M&S) Valuation Service’s January 2018 cost publication. In this publication, M&S provides a range of costs for new hydropower plants.
- 2) The second source is from the 2023 US Hydropower Market Report from the US Department of Energy. The data is for average costs for nine hydro projects constructed since 2005. It also includes a range of costs for projects coming online since 2020.
- 3) The third source is from a baseline cost model from the Oak Ridge National Laboratory. The model was originally created in 2015 and was updated in 2023.
- 4) The fourth source is the Annual Technology Baseline (ATB) database from the National Renewable Energy Laboratory (NREL). Although the NREL data does not include dam costs, the costs are broken down by major component for the non-dam portions of a hydropower facility. The most recent NREL data is from 2023.

## MARSHALL & SWIFT (M&S)

The Marshall & Swift Valuation Service is a nationally recognized publication containing construction costs for all types of building and site improvements and is extensively used for developing replacement costs, depreciated values and insurable values of buildings and other improvements. Up through M&S's January 2018 cost guide, the company provided a range of costs for new hydropower plants. The January 2018 cost guide provided a range from \$1,850 to \$5,800 per kW (Section 14, Page 41). M&S recommends applying current and local cost multipliers to this range, which was originally published in February 2016. These multipliers will convert the costs into 2018 dollars in the general location of the subject. The current cost multiplier for industrial properties (the category M&S applies to hydropower facilities) was 1.06 in the Western region (Section 99, Page 3), and the local cost multiplier for the Kenai Peninsula for industrial properties was 1.28 (Section 99, Page 6). After applying these multipliers, the adjusted range of costs is \$2,510 to \$7,869 per kW. Applying this range to the subject's capacity of 120,000 kW, we obtain a value range of \$301,200,000 to \$944,280,000 using the Marshall & Swift Valuation Service.

Although the range from M&S considers the higher costs associated with building in the borough of Kenai Peninsula, costs have risen since 2018 (by about 29% according to the US Bureau of Reclamation's Construction Cost Trends Index (see the Trended Original Cost method later in this section)). Therefore, the current range in 2024 dollars is from \$388,548 to \$1,218,121,200. In addition, the subject's location is more remote than typical locations in the borough of Kenai Peninsula due to its lack of road access. Given this, we would expect the subject's value to toward the higher end of the M&S range, or \$900,000,000.

## US HYDROPOWER MARKET REPORT (2023)

The 2023 US Hydropower Market Report from the US Department of Energy includes a chart on page 43 that shows the capacity-weighted mean cost for new hydro projects constructed since 2005. The source of the data is from the Oak Ridge National Laboratory and internet searches and is stated in 2021 dollars. For the nine NSD projects that were constructed during this period, the average cost was \$6,621/kW. As an aside and further support for our concluded value, the report also noted that five new projects starting operation since 2020 reported capital costs ranging from \$5,000/kW to \$10,000/kW. Since the nine projects with an average value of \$6,621/kW were "new stream development" (NSD) projects, they include the cost of the dam. All of these projects were under 20 MW in terms of capacity. Therefore, using the principle of economies of scale, we might expect the subject's cost per kW to be lower. However, the subject's remote location and lack of road access counteracts the effects of this principle.

If we apply the \$6,621/kW to the subject's 120,000 kW capacity, we obtain a cost of \$794,520,000. Since the value is in 2021 dollars, we have used the US Bureau of Reclamation's Construction Cost Trends Index (see the Trended Original Cost method later in this section) to convert the value to 2024 dollars. The trended value is \$897,808,000 (or 1.13 times the 2021 figure).

## OAK RIDGE NATIONAL LABORATORY COST MODELING

In a January 2015 report, researchers at the Oak Ridge National Laboratory created several baseline cost models to predict the initial capital cost of hydropower projects. Models were created for non-powered dams (NPDs - without dam construction costs), new stream development (NSDs - with dam costs), canal/conduit projects, pumped storage hydropower projects, unit addition projects and generator rewind projects. In creating the models, almost 600 individual cost estimates were collected from 16 different sources, including reports, market intelligence databases, and private communications with owners, developers and consultants. Based on the US-only subset of the data, the average cost of constructing a hydropower plant along new stream reaches (including dams) was \$4,900 per kW.

In 2023, Oak Ridge updated its 2015 models, producing a spreadsheet model in which a user could enter the project type (i.e. NPD, NSD, etc.), the capacity, the project head (i.e. the height difference between where the water enters into the hydro system and where it leaves it), and the stage (i.e. planning, engineering or construction). Once the information is entered, a cost amount (in 2020 dollars) appears in both absolute dollars and dollars per kW.

Based on the subject's parameters (NSD, 120 MW capacity, 1,000 foot project head and construction stage), the Oak Ridge model shows the cost in 2020 dollars for the subject of \$655,810,000 or \$5,465.05 per kW. Since the value is in 2020 dollars, we have used the US Bureau of Reclamation's Construction Cost Trends Index (see the Trended Original Cost method later in this section) to trend the value to 2024. The trended value is \$826,320,600 (or 1.26 times the 2021 figure).

### **ANNUAL TECHNOLOGY BASELINE (NREL)**

The National Renewable Energy Laboratory (NREL) publishes its Annual Technology Baseline (ATB), which provides a consistent set of technology and performance data for energy analysis. The ATB includes data for wind, solar, geothermal, nuclear, biopower, coal, natural gas, battery storage and pumped storage hydropower in addition to standard hydropower electricity sources. The most recent data is from the ATB 2023 database, which provides cost data in 2021 dollars.

Within the standard hydropower category, the ATB provides construction cost data (on a \$ per kW basis) for the installation of hydropower facilities at non-powered dams (NPD) and for run of river projects (in which water is diverted from rivers to produce hydropower but no dam or a smaller dam is created). There are eight cost categories for the NPD data, four for dams with lakes (low cost, medium cost, high cost and very high cost, which are roughly based on MW capacity) and four for dams with locks (using the same category titles as for dams with lakes). The range of capacity for the NPD data is from 0.1 to 52 MW, much lower than the subject's 120 MW. For the run of river data, there are four categories without a description but are based on MW capacity as well. The capacity ranges for the run of river data are from 1 to 10+. Whereas the run of river data provides just one cost number, the data for NPDs breaks down the costs into the following seven components:

- 1) Site Preparation
- 2) Water Conveyance (i.e. tunnels)
- 3) Electro-Mechanical (i.e. turbines and generators)
- 4) Powerhouse
- 5) Electrical Infrastructure
- 6) Engineering and Construction Management
- 7) Environmental Mitigation

Given the detailed component breakdown and higher capacity ranges of the NPD data and the fact that run of river projects are simpler and smaller, we will use NPD data for our analysis even though it excludes dam construction costs. Since the subject facility features a lake (and not a lock), there are four potential categories from which to choose cost ranges. The low cost, medium cost, high cost and very high cost categories feature capacity ranges of 9-20, 2-52, 1-20 and 0.1-11 MW respectively and head distances of 240-300, 50-150, 30-115 and 10-110 feet respectively. Based on the subject capacity of 120 MW and 1,000 head distance, the low cost category is closest to the subject for the head distance criteria. However, the medium cost category features a higher end range of capacity (although with a lower head distance range). We have also considered that the subject features a remote location with lack of road access, a factor that will increase construction costs over typical ranges. Given this, we have put most weight on the medium cost category. However, we have adjusted the NREL costs for water conveyance and powerhouse by putting more weight on the lower cost category (some weight for water conveyance and all weight for powerhouse), which appear more reasonable based on the subject's layout and improvements. In addition, we have estimated no value for the site preparation and environmental mitigation categories. Site preparation costs are for such items as access roads and land acquisition. These costs are not typically included in insurable costs. As noted previously, the subject property has a low environmental impact. Original environmental mitigation costs were less than \$1 million and would be unaffected by an earthquake or fire. The representative costs (on a \$/kW basis and total based on the subject's 120,000 kW capacity) of the medium cost category (NPD with lake) for the five remaining components indicated above are as follows:

- 1) Water Conveyance (\$2,618/kW or \$314,160,000)
- 2) Electro-Mechanical (\$645/kW or \$77,400,000)
- 3) Powerhouse (\$747/kW or \$89,640,000)
- 4) Electrical Infrastructure (\$96/kW or \$11,520,000)
- 5) Engineering and Construction Management (\$627/kW or \$75,240,000)

Adding up these five component costs, the total cost figure is \$4,733/kW or \$567,960,000. In addition to these component costs, the ATB data provides a cost for development, which is \$306/kW or \$36,720,000 for the medium cost category. However, these are “soft costs” such as environmental and engineering studies, insurance costs and legal fees that are typically not included in an insurable value and will be excluded from our analysis. Since the total cost figures are in 2021 dollars, we need to convert them to 2024 dollars using US Bureau of Reclamation’s Construction Cost Trends Index (see the Trended Original Cost method later in this section). The index shows construction prices increased 13% since that time, which results in a value of \$641,794,800.

In order to estimate the cost of the subject’s dam component using the NREL data, we have considered a 2020 appraisal report provided by the owner showing a value of \$130,136,396 (which converts to \$163,971,859 if trended to 2024 dollars using the US Bureau of Reclamation Construction Cost Trends index) and a 2009 study showing a value of \$69,637,969 (which converts to \$114,26,269 if trended to 2024 dollars). Based on these two sources, we have concluded a 2024 cost for the dam of \$125,000,000. This results in a total cost of \$766,794,800 for the subject property using the NREL method.

## TRENDED ORIGINAL COST METHOD

We have provided the Trended Original Cost Method as support for the Cost per Capacity Method. As of December 30, 1991, the total cost of construction for the subject improvements was \$312,500,000. In order to trend this figure to the effective date of value, we have considered two price indices. The first index is the Consumer Price Index (CPI), which is provided by the US Department of Labor Bureau of Labor Statistics and is used to measure inflation. It is a measure of the average change over time in the prices paid by urban consumers for a market basket of consumer goods and services.

The second index is the US Bureau of Reclamation Construction Cost Trends (CCT) Index, which was developed to track construction relevant to the primary types of projects being constructed by the Bureau. The Bureau was established in 1902 and has constructed more than 600 dams and reservoirs in the US, mainly in the western states. It is the second largest producer of hydroelectric power in the US (after the US Corps of Engineers). Therefore, the index measures the change in price of construction related to hydroelectric plants. The index is divided into various subcategories like dams, powerhouses, etc. and also includes a composite index number for all components. Since the mid-1980s, the number and magnitude of construction projects being performed by the Bureau has declined. Despite this, the index is still considered valuable to a wide range of users. In addition, cost models consisting of appropriate labor, equipment and material types are now used as the principal costs reference in lieu of actual field data. Data for the models are primarily extracted from the US Departments of Labor and Agriculture and from Engineering News-Record, a weekly publication. Actual field data, when available, is used to confirm the reasonableness of models.

The CPI reports index numbers on a monthly basis, whereas the CCT Index reports on a quarterly basis. In order to gauge the change in cost over time, the more recent index number is divided by the more distant index number. The following chart summarizes the change in costs from 1991 to 2024 for the subject property for both indices.

Trended Original Cost Method					
Index	1991*	2024**	2024/1991	1991 Costs	2024 Costs
CPI	137.9	313.548	2.27	\$312,500,000	\$710,542,059
CCT	185	540	2.92	\$312,500,000	\$912,162,162

\*CPI is December '91; CCT is October '91

\*\*CPI is April '24; CCT is January '24

Since the CCT index is based on construction costs of hydroelectric facilities, we have put more weight on the trending value using that index. Also, since the composite figure relates to all components of a hydropower project, we have utilized the composite index for our trending. The CCT Index-based cost figure of \$912,162,162 is within a reasonable range (just four percent higher) of the average of the costs provided by the Cost per Capacity Method. Therefore, the cost figure from the Trended Original Cost Method provides support for the cost figures from the Cost per Capacity Method.

## RECONCILIATION – MAIN IMPROVEMENTS

The following chart summarizes our concluded values using the four sources of the Cost per Capacity Method and the concluded source using the Trended Original Cost Method.

Reconciliation - Main Improvements					
M&S	DOE	Oak Ridge	NREL	Trending	BBG Conclusion
\$900,000,000	\$897,808,000	\$826,320,600	\$766,794,800	\$912,162,162	\$766,794,800

Based on the above and taking into consideration the subject property's condition and location, we put most weight on the NREL method and have concluded at a value of \$766,794,800 for the subject based on the Cost per Capacity Method. Although the NREL method results in the lowest cost among the four methods, its breakdown of costs allows us to be able to exclude costs that are not applicable to the subject property (including site preparation, environmental and development costs). The other three methods include these cost and do not have any sort of breakdown available. Therefore, they are less useful for our analysis. Using the breakdown provided by the NREL data source, the following chart summarizes the breakdown of this total value. We have trended the individual component values using the same 13% increase used for the total figure (which is based on the CCT index noted above).

Breakdown of Concluded Value - Main Improvements	
Cost Category	Value
Dam	\$125,000,000
Water Conveyance	\$355,000,800
Electro-Mechanical	\$87,462,000
Powerhouse	\$101,293,200
Electrical Infrastructure	\$13,017,600
Engineering & Construction Management	\$85,021,200
<b>Total</b>	<b>\$766,794,800</b>

## DIVERSION PROJECTS VALUATION

In order to value the four diversion projects identified in the Improvements Description section of the report, we have used the Trended Original Cost Method. We have used this method for two reasons. First, the Cost per Capacity Method applies only to the main dam, tunnel and power structures of a hydroelectric facility and assumes



a known capacity figure for the subject. The diversion projects, although they feed into the larger project, do not have a capacity figure on their own. Secondly, by far the largest of the diversion projects (the West Fork Upper Battle Creek project) was completed in August of 2020. Given the small amount of time that has elapsed since those original costs were expended, the Trended Original Cost Method is a reasonable method for valuation in this case.

For the older diversion projects (Middle Fork, Upper Bradley and East Fork Upper Battle Creek), we have assigned an insurable value of \$0 due to the fact that they are quite small and would not be damaged in an earthquake or fire. For the newer and larger, West Fork Upper Battle Creek diversion project, the original cost for the whole project was \$47,000,000, as noted previously. However, about \$27,000,000 of this cost is related to the building of a road to the site. Under the assumption that roads would not be damaged in an earthquake or fire, we have excluded these costs, resulting in an original cost figure of \$20,000,000 for the largest of the four diversion projects.

As with the larger hydropower project, we have used the US Bureau of Reclamation Construction Cost Trends (CCT) Index to trend the original cost figures forward. Rather than use the composite index figures that we have used up to now, we have used the index figure for diversion dams. Using this specific index, costs increased by a degree of 1.24 since 2020 (just slightly lower than for the composite index). The following chart summarizes our valuation of the diversion projects using the Trended Original Cost Method.

Valuation of Diversion Projects			
Project Name	Original Cost	Cost Index	2024 Cost
Middle Fork	\$100,000	N/A	\$0
Upper Bradley (Nuka)	\$500,000	N/A	\$0
East Fork Upper Battle Creek	\$100,000	N/A	\$0
West Fork Upper Battle Creek	\$20,000,000	1.24	\$24,800,000
<b>Total</b>	<b>\$20,700,000</b>		<b>\$24,800,000</b>

## MISCELLANEOUS IMPROVEMENTS VALUATION

Our estimate of replacement cost new for the 11 miscellaneous improvements is based on the Calculator Section in the Marshall & Swift (M&S) valuation guide, one of the four sources used in the Cost per Capacity Method to value the main improvements. The M&S guide includes base building costs per square foot for various categories of structures. The costs differ by construction class and condition for each of the categories.

These base costs are adjusted by four multipliers which adjust for 1) current costs (as the M&S base costs are often one to several years old), 2) local area costs, 3) area/ perimeter and 4) story height. The current cost multipliers are also dependent on construction class and building category, and the local cost multipliers are dependent on construction class. These four multipliers are then multiplied by the base cost per square foot to obtain an adjusted base cost per square foot. This figure is then multiplied by the building square footage to obtain the replacement cost new value.

The chart on the following page summarizes the M&S categories, construction classes, condition, base costs, multipliers, adjusted base costs and final valuations for each of the 11 miscellaneous improvements. In the category column, we also identify the section and page number of the M&S guide that provides the base cost figures.

Miscellaneous Improvements - Valuation Using Marshall & Swift											
Improvement	M&S Category - Section/Page #	Class	Condition	Base Cost	Current Cost	Local Cost	Area/Perimeter	Story Height	Adjusted Base Cost	Area (SF)	Replacement Cost
Shop/Warehouse	Storage Warehouse - 14/26	S	Good	\$79.50	1.03	1.19	1.04	1.00	\$101.34	8,330	\$844,169
Fourplex	Multiple Residence - 12/16	D	Good	\$145.00	0.99	1.17	0.95	1.00	\$159.05	5,248	\$834,705
Duplex	Town House - 12/31 & 32	D	Good	\$177.03	0.99	1.17	1.00	1.00	\$205.05	2,624	\$538,061
Bunkhouse	Lodge - 12/14	D	Good	\$207.00	0.99	1.17	1.08	1.00	\$259.67	2,100	\$545,305
Project Manager Residence	Single Family Residence - 12/25	D	Good	\$176.00	0.99	1.17	0.99	1.00	\$202.64	1,700	\$344,484
Pole Barn (Sheep Shed)	Light Commercial Utility - 17/12	D	Good	\$36.50	1.05	1.17	1.00	1.00	\$44.84	4,830	\$216,578
Incinerator Building	Light Commercial Utility - 17/12	S	Good	\$40.50	1.03	1.19	1.00	1.00	\$49.64	1,440	\$71,483
Storage Building	Storage Warehouse - 14/26	S	Good	\$79.50	1.03	1.19	1.25	1.00	\$122.00	1,300	\$158,598
Fire Facility	Light Commercial Utility - 17/12	D	Good	\$42.00	1.05	1.17	1.00	1.00	\$51.60	1,200	\$61,916
Fuel Shed	Light Commercial Utility - 17/12	S	Good	\$40.50	1.03	1.19	1.00	1.00	\$49.64	720	\$35,741
Barge Dock Building	Light Commercial Utility - 17/12	D	Good	\$42.00	1.05	1.17	1.00	1.00	\$51.60	700	\$36,118
<b>Total</b>											<b>\$3,687,159</b>

# FINAL VALUE

The following chart summarizes our concluded insurable value (replacement cost new) for the subject property.

<b>Breakdown of Concluded Insurable Value - May 29, 2024</b>	
<b>Cost Category</b>	<b>Value</b>
Dam	\$125,000,000
Water Conveyance	\$355,000,800
Electro-Mechanical	\$87,462,000
Powerhouse	\$101,293,200
Electrical Infrastructure	\$13,017,600
Engineering & Construction Management	\$85,021,200
<b>Total of Main Improvements</b>	<b>\$766,794,800</b>
Middle Fork Diversion Project	\$0
Upper Bradley (Nuka) Diversion Project	\$0
East Fork Upper Battle Creek Diversion Project	\$0
West Fork Upper Battle Creek Diversion Project	\$24,800,000
<b>Total of Diversion Projects</b>	<b>\$24,800,000</b>
Shop/Warehouse	\$844,169
Fourplex	\$834,705
Duplex	\$538,061
Bunkhouse	\$545,305
Project Manager Residence	\$344,484
Pole Barn (Sheep Shed)	\$216,578
Incinerator Building	\$71,483
Storage Building	\$158,598
Fire Facility	\$61,916
Fuel Shed	\$35,741
Barge Dock Building	\$36,118
<b>Total of Miscellaneous Improvements</b>	<b>\$3,687,159</b>
<b>Total of all Improvements</b>	<b>\$795,281,959</b>

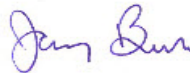
# CERTIFICATION

We certify that, to the best of our knowledge and belief:

1. The statements of fact contained in this report are true and correct.
2. The reported analyses, opinions, and conclusions are limited only by the reported assumptions and limiting conditions and are our personal, impartial, and unbiased professional analyses, opinions, and conclusions.
3. We have no present or prospective interest in the property that is the subject of this report and no personal interest with respect to the parties involved with this assignment.
4. We have no bias with respect to the property that is the subject of this report or to the parties involved with this assignment.
5. Our engagement in this assignment was not contingent upon developing or reporting predetermined results.
6. Our compensation for completing this assignment is not contingent upon the development or reporting of a predetermined value or direction in value that favors the cause of the client, the amount of the value opinion, the attainment of a stipulated result, or the occurrence of a subsequent event directly related to the intended use of this appraisal.
7. This appraisal assignment was not based upon a requested minimum valuation, a specific valuation, or the approval of a loan.
8. Our analyses, opinions, and conclusions were developed, and this report has been prepared, in conformity with the Uniform Standards of Professional Appraisal Practice, as well as the requirements of the state of Alaska.
9. The reported analyses, opinions, and Value Indications were developed, and this report has been prepared, in conformity with the requirements of the Code of Professional Ethics, the Standards of Professional Practice of the Appraisal Institute.
10. The use of this report is subject to the requirements of the Appraisal Institute relating to review by its duly authorized representatives.
11. As of the date of this report, Chris Harland, MAI has and Jay Buhr, MAI has completed the continuing education program for Designated Members of the Appraisal Institute.
12. Chris Harland, MAI has and Jay Buhr, MAI has not made a personal inspection of the property that is the subject of this report.
13. No one provided significant real property appraisal assistance to the person signing this certification.
14. Chris Harland, MAI has not and Jay Buhr, MAI has not provided services, as an appraiser or in any other capacity, regarding the property that is the subject of this report within the three-year period immediately preceding the agreement to perform this assignment.



Chris Harland, MAI  
Alaska Certified General Appraiser  
Temporary (Courtesy) License #: 225798  
518-219-5645  
charland@bbgres.com



Jay Buhr, MAI  
518-219-5646  
hbuhr@bbgres.com

---

# STANDARD ASSUMPTIONS AND LIMITING CONDITIONS

This appraisal report has been made with the following general assumptions:

- 1) Notwithstanding that Appraiser may comment on, analyze or assume certain conditions in the appraisal, BBG, Inc. shall have no monetary liability or responsibility for alleged claims or damages pertaining to: (a) title defects, liens or encumbrances affecting the property; (b) the property's compliance with local, state or federal zoning, planning, building, disability access and environmental laws, regulations and standards; (c) building permits and planning approvals for improvements on the property; (d) structural or mechanical soundness or safety; (e) contamination, mold, pollution, storage tanks, animal infestations or other hazardous conditions affecting the property; and (f) other conditions and matters for which licensed real estate appraisers are not customarily deemed to have professional expertise. Accordingly:
  - a) The Appraiser has not conducted any engineering or architectural surveys in connection with this appraisal assignment. Information reported pertaining to dimensions, sizes, and areas is either based on measurements taken by the Appraiser or the Appraiser's staff or was obtained or taken from referenced sources and is considered reliable. The Appraiser and BBG, Inc. shall not be monetarily liable or responsible for or assume the costs of preparation or arrangement of geotechnical engineering, architectural, or other types of studies, surveys, or inspections that require the expertise of a qualified professional.
  - b) Unless otherwise stated in the report, only the real property is considered, so no consideration is given to the value of personal property or equipment located on the premises or the costs of moving or relocating such personal property or equipment. Further, unless otherwise stated, it is assumed that there are no subsurface oil, gas or other mineral deposits or subsurface rights of value involved in this appraisal, whether they are gas, liquid, or solid. Further, unless otherwise stated, it is assumed that there are no rights associated with extraction or exploration of such elements considered. Unless otherwise stated it is also assumed that there are no air or development rights of value that may be transferred.
  - c) Any legal description or plats reported in the appraisal are assumed to be accurate. Any sketches, surveys, plats, photographs, drawings or other exhibits are included only to assist the intended user to better understand and visualize the subject property, the environs, and the competitive data. BBG, Inc. has made no survey of the property and assumes no monetary liability or responsibility in connection with such matters.
  - d) Title is assumed to be good and marketable, and in fee simple, unless otherwise stated in the report. The property is considered to be free and clear of existing liens, easements, restrictions, and encumbrances, except as stated. Further, BBG, Inc. assumes there are no private deed restrictions affecting the property which would limit the use of the subject property in any way.
  - e) The appraisal report is based on the premise that there is full compliance with all applicable federal, state, and local environmental regulations and laws unless otherwise stated in the appraisal report; additionally, that all applicable zoning, building, and use regulations and restrictions of all types have been complied with unless otherwise stated in the appraisal report. Further, it is assumed that all required licenses, consents, permits, or other legislative or administrative authority, local, state, federal and/or private entity or organization have been or can be obtained or renewed for any use considered in the value opinion. Moreover, unless otherwise stated herein, it is assumed that there are no encroachments or violations of any zoning or other regulations affecting the subject property, that the utilization of the land and improvements is within the boundaries or property lines of the property described, and that there are no trespasses or encroachments.

- f) The American Disabilities Act (ADA) became effective January 26, 1992. The Appraiser has not made a specific compliance survey or analysis of the property to determine whether or not it is in conformity with the various detailed requirements of ADA. It is possible that a compliance survey of the property and a detailed analysis of the requirements of the ADA would reveal that the property is not in compliance with one or more of the requirements of the Act. If so, this fact could have a negative impact upon the value of the property. Since the Appraiser has no direct evidence relating to this issue, possible noncompliance with the requirements of ADA was not considered in estimating the value of the property.
  - g) No monetary liability or responsibility is assumed for conformity to specific governmental requirements, such as fire, building, safety, earthquake, or occupancy codes, except where specific professional or governmental inspections have been completed and reported in the appraisal report.
  - h) It is assumed the subject property is not adversely affected by the potential of floods; unless otherwise stated herein. Further, it is assumed all water and sewer facilities (existing and proposed) are or will be in good working order and are or will be of sufficient size to adequately serve any proposed buildings.
  - i) Unless otherwise stated within the appraisal report, the depiction of the physical condition of the improvements described therein is based on visual inspection. No monetary liability or responsibility is assumed for (a) the soundness of structural members since no engineering tests were conducted; (b) the condition of mechanical equipment, plumbing, or electrical components, as complete tests were not made; and (c) hidden, unapparent or masked property conditions or characteristics that were not clearly apparent during the Appraiser's inspection.
  - j) If building improvements are present on the site, it is assumed that no significant evidence of termite damage or infestation was observed during physical inspection, unless so stated in the appraisal report. Further, unless so stated in the appraisal report, no termite inspection report was available. No monetary liability or responsibility is assumed for hidden damages or infestation.
  - k) Unless subsoil opinions based upon engineering core borings were furnished, it is assumed there are no subsoil defects present, which would impair development of the land to its maximum permitted use or would render it more or less valuable. No monetary liability or responsibility is assumed for such conditions or for engineering which may be required to discover them.
  - l) BBG, Inc., excepting employees of BBG Assessment, Inc., and the appraiser(s) are not experts in determining the presence or absence of hazardous substances toxic materials, wastes, pollutants or contaminants (including, but not limited to, asbestos, PCB, UFFI, or other raw materials or chemicals) used in construction or otherwise present on the property. BBG, Inc. and the appraiser(s) assume no monetary liability or responsibility for the studies or analyses which would be required to determine the presence or absence of such substances or for loss as a result of the presence of such substances. The Client is free to retain an expert on such matters in this field; however, Client retains such expert at Client's own discretion, and any costs and/or expenses associated with such retention are the responsibility of Client.
  - m) BBG, Inc. is not an expert in determining the habitat for protected or endangered species, including, but not limited to, animal or plant life (such as bald eagles, gophers, tortoises, etc.) that may be present on the property. BBG, Inc. assumes no monetary liability or responsibility for the studies or analyses which would be required to determine the presence or absence of such species or for loss as a result of the presence of such species. The Appraiser hereby reserves the right to alter, amend, revise, or rescind any of the value opinions contained within the appraisal report based upon any subsequent endangered species impact studies, research, and investigation that may be provided. However, it is assumed that no environmental impact studies were either requested or made in conjunction with this analysis, unless otherwise stated within the appraisal report.
- 2) If the Client instructions to the Appraiser were to inspect only the exterior of the improvements in the appraisal process, the physical attributes of the property were observed from the street(s) as of the

inspection date of the appraisal. Physical characteristics of the property were obtained from tax assessment records, available plans, if any, descriptive information, and interviewing the client and other knowledgeable persons. It is assumed the interior of the subject property is consistent with the exterior conditions as observed and that other information relied upon is accurate.

- 3) If provided, the opinion of insurable replacement cost is included at the request of the Client and has not been performed by a qualified insurance agent or risk management underwriter. This cost estimate should not be solely relied upon for insurable replacement cost purposes. The Appraisers are not familiar with the definition of insurable replacement cost from the insurance provider, the local governmental underwriting regulations, or the types of insurance coverage available. These factors can impact cost estimates and are beyond the scope of the intended use of this appraisal. The Appraisers are not cost experts in cost estimating for insurance purposes.
- 4) The dollar amount of any value opinion herein rendered is based upon the purchasing power and price of the United States Dollar as of the effective date of value. This appraisal is based on market conditions existing as of the date of this appraisal.
- 5) The value opinions reported herein apply to the entire property. Any proration or division of the total into fractional interests will invalidate the value opinions, unless such proration or division of interests is set forth in the report. Any division of the land and improvement values stated herein is applicable only under the program of utilization shown. These separate valuations are invalidated by any other application.
- 6) Any projections of income and expenses, including the reversion at time of resale, are not predictions of the future. Rather, they are BBG, Inc.'s best estimate of current market thinking of what future trends will be. No warranty or representation is made that such projections will materialize. The real estate market is constantly fluctuating and changing. It is not the task of an appraiser to estimate the conditions of a future real estate market, but rather to reflect what the investment community envisions for the future in terms of expectations of growth in rental rates, expenses, and supply and demand. The forecasts, projections, or operating estimates contained herein are based on current market conditions, anticipated short-term supply and demand factors, and a continued stable economy. These forecasts are, therefore, subject to changes with future conditions.
- 7) The Appraiser assumes no monetary liability or responsibility for any changes in economic or physical conditions which occur following the effective date of value within this report that would influence or potentially affect the analyses, opinions, or conclusions in the report. Any subsequent changes are beyond the scope of the report.
- 8) Any proposed or incomplete improvements included in the appraisal report are assumed to be satisfactorily completed in a workmanlike manner or will be thus completed within a reasonable length of time according to plans and specifications submitted.
- 9) If the appraisal report has been prepared in a so-called "public non-disclosure" state, real estate sales prices and other data, such as rents, prices, and financing, are not a matter of public record. If this is such a "non-disclosure" state, although extensive effort has been expended to verify pertinent data with buyers, sellers, brokers, lenders, lessors, lessees, and other sources considered reliable, it has not always been possible to independently verify all significant facts. In these instances, the Appraiser may have relied on verification obtained and reported by appraisers outside of our office. Also, as necessary, assumptions and adjustments have been made based on comparisons and analyses using data in the report and on interviews with market participants. The information furnished by others is believed to be reliable, but no warranty is given for its accuracy.
- 10) Although the Appraiser has made, insofar as is practical, every effort to verify as factual and true all information and data set forth in this report, no responsibility is assumed for the accuracy of any information furnished the Appraiser either by the Client or others. If for any reason, future investigations should prove any data to be in substantial variance with that presented in this report, the Appraiser reserves the right to alter or change any or all analyses, opinions, or conclusions and/or opinions of value.

- 11) The right is reserved by the Appraiser to make adjustments to the analyses, opinions, and conclusions set forth in the appraisal report as may be required by consideration of additional or more reliable data that may become available. No change of this report shall be made by anyone other than the Appraiser. The Appraiser shall have no monetary liability or responsibility for any unauthorized change(s) to the report.
- 12) The submission of the appraisal report constitutes completion of the services authorized and agreed upon. Such appraisal report is submitted on the condition the Client will provide reasonable notice and customary compensation, including expert witness fees, relating to any subsequent required attendance at conferences, depositions, or judicial or administrative proceedings. In the event the Appraiser is subpoenaed for either an appearance or a request to produce documents, a best effort will be made to notify the Client immediately. The Client has the sole responsibility for obtaining a protective order, providing legal instruction not to appear with the appraisal report and related work files, and will answer all questions pertaining to the assignment, the preparation of the report, and the reasoning used to formulate the opinion of value. Unless paid in whole or in part by the party issuing the subpoena or by another party of interest in the matter, the Client is responsible for all unpaid fees resulting from the appearance or production of documents regardless of who orders the work.
- 13) Client shall not disseminate, distribute, make available or otherwise provide any Appraisal Report prepared hereunder to any third party (including without limitation, incorporating or referencing the Appraisal Report, in whole or in part, in any offering or other material intended for review by other parties) except to (a) any third party expressly acknowledged in a signed writing by Appraiser as an "Intended User" of the Appraisal Report provided that either Appraiser has received an acceptable release from such third party with respect to such Appraisal Report or Client provides acceptable indemnity protections to Appraiser against any claims resulting from the distribution of the Appraisal Report to such third party, (b) any third party service provider (including rating agencies and auditors) using the Appraisal Report in the course of providing services for the sole benefit of an Intended User, or (c) as required by statute, government regulation, legal process, or judicial decree. In the event Appraiser consents, in writing, to Client incorporating or referencing the Appraisal Report in any offering or other materials intended for review by other parties, Client shall not distribute, file, or otherwise make such materials available to any such parties unless and until Client has provided Appraiser with complete copies of such materials and Appraiser has approved all such materials in writing. Client shall not modify any such materials once approved by Appraiser. In the absence of satisfying the conditions of this paragraph with respect to a party who is not designated as an Intended User, the receipt of an Appraisal Report by such party shall not confer any right upon such party to use or rely upon such report, and Appraiser shall have no liability for such unauthorized use or reliance upon such report. In the event Client breaches the provisions of this paragraph, Client shall indemnify, defend and hold Appraiser, and its affiliates and their officers, directors, employees, contractors, agents and other representatives (Appraiser and each of the foregoing an "Indemnified Party" and collectively the "Indemnified Parties"), fully harmless from and against all losses, liabilities, damages and expenses (collectively, "Damages") claimed against, sustained or incurred by any Indemnified Party arising out of or in connection with such breach, regardless of any negligence on the part of any Indemnified Party in preparing the Appraisal Report.



## Overview

### BBG OVERVIEW

BBG is one of the nation's largest real estate due diligence firms with more than 45 offices across the country serving more than 3,000 clients. We deliver best-in-class valuation, advisory and assessment services with a singular focus of meeting our clients' needs.

Our professional team offers broad industry expertise and deep market knowledge to help clients meet their objectives throughout the real estate life cycle.

BBG clients include commercial real estate professionals, investors, lenders, attorneys, accountants and corporations.

### THE BBG DIFFERENCE

**National Footprint.** BBG is one of only two national firms offering in-house valuation and environmental and property condition assessment services for all commercial property types.

**Customer-focused Growth.** BBG is one of the largest national due diligence firms because we deliver best-in-class work product and provide excellent customer care.

**Qualified Team.** Over 50 percent of BBG appraisers are MAI designated and offer deep industry expertise gained through real-world experience.

**Unbiased Independence.** By focusing exclusively on due diligence services, BBG guarantees an independent perspective free from potential conflicts of interest.

**Innovative Technology.** BBG has made significant analytics and IT investments to continually improve our data and report quality.

### SERVICES

#### Valuation

- + Single Asset Valuation
- + Portfolio Valuation
- + Institutional Asset Valuation
- + Appraisal Review
- + Appraisal Management
- + Lease and Cost Analysis
- + Insurance Valuation
- + Arbitration & Consulting
- + Feasibility Studies
- + Highest and Best Use Studies
- + Evaluation
- + Investment analysis
- + Tax appeals
- + Litigation Support
- + Manufactured Housing and Campgrounds

#### Advisory

- + ASC 805 Business combinations
- + ASC 840 Leases
- + Purchase Price Allocations
- + Portfolio Valuations for reporting net asset values (NAV)
- + Public and non-traded REIT valuations
- + Valuations for litigation and litigation support
- + Sale-leaseback valuation analysis
- + Valuations for bankruptcy/fresh start accounting
- + Cost segregation analysis

#### Assessment

- + Environmental due diligence
- + Property condition consulting
- + Small loan services
- + Energy consulting
- + Environmental consulting
- + Zoning
- + ALTA Surveys

---

# ADDENDA

Glossary ..... A

Letter of Engagement ..... B

Appraiser Qualifications and Licenses ..... C

Appraisal Journal Article 2014 ..... D

Marshall & Swift Hydropower Costs 2018 ..... E

US Department of Energy Hydropower Costs 2023 ..... F

Oak Ridge National Laboratory Cost Model 2023 ..... G

Annual Technology Baseline (NREL) Costs 2023 ..... H



## GLOSSARY

**Appraisal:** (noun) the act or process of developing an opinion of value; an opinion of value. (adjective) of or pertaining to appraising and related functions such as appraisal practice or appraisal services.<sup>7</sup>

**Appraisal Practice:** valuation services performed by an individual acting as an appraiser, including but not limited to appraisal and appraisal review.<sup>7</sup>

**Appraisal Review:** (noun) the act or process of developing an opinion about the quality of another appraiser's work (i.e., a report, part of a report, a workfile, or some combination of these), that was performed as part of an appraisal or appraisal review assignment, (adjective) of or pertaining to an opinion about the quality of another appraiser's work that was performed as part of an appraisal or appraisal review assignment.<sup>7</sup>

**Appraiser:** one who is expected to perform valuation services competently and in a manner that is independent, impartial and objective.<sup>7</sup>

**Appraiser's Peers:** other appraisers who have expertise and competency in a similar type of assignment.<sup>7</sup>

**Assessed Value:** The value of a property according to the tax rolls in ad valorem taxation; may be higher or lower than market value, or based on an assessment ratio that is a percentage of market value. <sup>1</sup>

**Asset:**

1. Any item, the rights to which may have economic value, including financial assets (cash or bonds), business interests, intangible assets (copyrights and trademarks), and physical assets (real estate and personal property).
2. In general business usage, something owned by a business and reflected in the owner's business sheet.

**Asset:** A resource controlled by the entity as a result of past events and from which future economic benefits are expected to flow to the entity. <sup>2</sup>

**Assignment:** a valuation service that is provided by an appraiser as a consequence of an agreement with a client.<sup>7</sup>

**Assignment Conditions:** Assumptions, extraordinary assumptions, hypothetical conditions, laws and regulation, jurisdictional exceptions, and other conditions that affect the scope of work.<sup>7</sup>

**Assignment Elements:** Specific information needed to identify the appraisal or appraisal review problem: client and any other intended users, intended use of the appraiser's opinions and conclusions, type and definition of value; effective date of the appraiser's opinions and conclusions; subject of the assignment and its relevant characteristics; and assignment conditions.<sup>7</sup>

**Assignment Results:** An appraiser's opinions or conclusions, not limited to value, that were developed when performing an appraisal assignment, an appraisal review assignment, or a valuation service other than an appraisal or appraisal review.<sup>7</sup>

**Bias:** a preference or inclination that precludes an appraiser's impartiality, independence, or objectivity in an assignment.<sup>7</sup>

**Business Enterprise:** an entity pursuing an economic activity.<sup>7</sup>

**Business Equity:** the interests, benefits, and rights inherent in the ownership of a business enterprise or a part thereof in any form (including, but not necessarily limited to, capital stock, partnership interests, cooperatives, sole proprietorships, options, and warrants).<sup>7</sup>

**Capital Expenditure:** Investments of cash (or the creation of liability) to acquire or improve an asset, e.g., land, buildings, building additions, site improvements, machinery, equipment; as distinguished from cash outflows for expense items that are normally considered part of the current period's operations. Also referred to as Cap Ex.<sup>1</sup>

**Cash Equivalency Analysis:** An analytical process in which the sale price of a transaction with nonmarket financing or financing with unusual conditions or incentives is converted into a price expressed in terms of cash or its equivalent.<sup>1</sup>

**Client:** the party or parties (i.e., individual, group or entity) who engage an appraiser by employment or contract in a specific assignment, whether directly or through an agent.<sup>7</sup>

**Condominium Ownership:** A form of fee ownership of separate units or portions of multiunit buildings that provides for formal filing and recording of a divided interest in real estate.<sup>1</sup>

**Confidential Information:**

**1:** information that is either:

- Identified by the client as confidential when providing it to a valuer and that is not available from any other source, or
- Classified as confidential or private by applicable law or regulation.

**2:** Information that is either

- Identified by the client as confidential when providing it to an appraiser and that is not available from any other source; or
- Classified as confidential or private by applicable law or regulation \*
- NOTICE: For example, pursuant to the passage of the Gramm-Leach-Bliley Act in November 1999, some public agencies have adopted privacy regulations that affect appraisers. The Federal Trade Commission (FTC) issued two rules. The first rule (16 CFR 313) focuses on the protection of "non-public personal information" provided by consumers to those involved in financial activities "found to be closely related to banking or usual in connection with the transaction of banking." These activities include "appraising real or personal property." The second rule (16 CFR 314) requires appraisers to safeguard customer non-public personal information. Significant liability exists for appraisers should they fail to comply with these FTC rules. <sup>7</sup>

**Cost:** the actual or estimated amount required to create, reproduce, replace or obtain a property.<sup>7</sup>

**Cost Approach:** A set of procedures through which a value indication is derived for the fee simple interest in a property by estimating the current cost to construct a reproduction of (or replacement for) the existing structure, including an entrepreneurial incentive, deducting depreciation from the total cost, and adding the estimated land value. Adjustments may then be made to the indicated fee simple value of the subject property to reflect the value of the property interest being appraised. <sup>1</sup>

**Credible:** worthy of belief.<sup>7</sup>

**Deferred Maintenance:** Items of wear and tear on a property that should be fixed now to protect the value or income-producing ability of the property, such as a broken window, a dead tree, a leak in the roof, or a faulty roof that must be completely replaced. These items are almost always curable.<sup>1</sup>

**Disposition Value:** The most probable price that a specified interest in real property should bring under the following conditions: 1) Consummation of a sale within a specific time, which is short than the typical exposure time for such a property in that market. 2) The property is subjected to market conditions prevailing as of the date of valuation. 3) Both the buyer and seller are acting prudently and knowledgeably. 4) The seller is under compulsion to sell. 5) The buyer is typically motivated. 6) Both parties are acting in what they consider to be their best interests. 7) An adequate marketing effort will be made during the exposure time. 8) Payment will be made in cash in U.S. dollars (or the local currency) or in terms of financial arrangements comparable thereto. 9) The price represents the normal consideration of the property sold, unaffected by special or creative financing or sales concessions granted by anyone associated with the sale. This definition can also be modified to provide for valuation with specified financing terms. <sup>1</sup>

**Economic Life:** The period over which improvements to real estate contribute to property value. <sup>1</sup>

**Effective Date:** the date to which the appraiser's analysis, opinions and conclusions apply, also referred to as date of value.<sup>7</sup>

**Effective Gross Income Multiplier (EGIM):** The ratio between the sale price (or value) of a property and its effective gross income.<sup>1</sup>

**Effective Rent:** Total base rent, or minimum rent stipulated in a lease, over the specified lease term minus rent concessions, the rent that is effectively paid by a tenant net of financial concessions provided by a landlord. <sup>1</sup>

**Exposure Time:** an opinion, based on supporting market data, of the length of time that the property interest being appraised would have been offered on the market prior to the hypothetical consummation of a sale at the market value on the effect date of the appraisal.<sup>7</sup>

**Extraordinary Assumption:** an assignment-specific assumption as of the effective date regarding uncertain information used in an analysis which, if found to be false, could alter the appraiser's opinions or conclusions.<sup>7</sup>

**Fair Market Value:**

1. In nontechnical usage, a term that is equivalent to the contemporary usage of market value.
2. As used in condemnation, litigation, income tax, and property tax situations, a term that is similar in concept to market value but may be defined explicitly by the relevant agency. For example, one definition of *fair market value* provided by the Internal Revenue Service for certain purposes is as follows: The price at which the property would change hands between a willing buyer and a willing seller, neither being under any compulsion to buy or to sell and both having reasonable knowledge of relevant facts. The fair market value of a particular item of property includible in the decedent's gross estate is not to be determined by a forced sale price. Nor is the fair market value of an item of property to be determined by the sale price of the item in a market other than that in which such item is most commonly sold to the public, taking into account the location of the item wherever appropriate. (IRS Regulation §20.2031-1)<sup>1</sup>

**Fair Share:**

1. A share of a fund or deposit that is divided or distributed proportionately.
2. A share of a burden or obligation that is divided proportionately; e.g., a tenant in a multitenant building or development may be required to pay a pro rata share of the building's operating expenses based on the number of square feet the tenant occupies. In a shopping center, the tenant's share of operating costs is often stated as a fraction, with the gross leasable area of the tenant's premises as the numerator and the gross leasable area or gross leased area of the entire shopping center as the denominator.
3. The share of a trade area that a retail facility is likely to capture; assumes that capture is a function of property size as a proportion of the overall inventory of competitive space in the trade area, i.e., that the facility captures a "fair share" of the trade area.<sup>1</sup>

**Fair Value:**

1. The price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. (FASB)
2. The estimated price for the transfer of an asset or liability between identified knowledgeable and willing parties that reflects the respective interests of those parties. (This does not apply to valuations for financial reporting.) (IVS).<sup>1</sup>
3. The price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date.<sup>2</sup>

**Feasibility Analysis:** a study of the cost benefit relationship of an economic endeavor.<sup>1</sup>

**Fee Simple Estate:** Absolute ownership unencumbered by any other interest or estate, subject only to the limitations imposed by the governmental powers of taxation, eminent domain, police power, and escheat.<sup>1</sup>

**Floor Area Ratio (FAR):** The relationship between the above-ground floor area of a building, as described by the zoning or building code, and the area of the plot on which it stands; in planning and zoning, often expressed as a decimal, e.g., a ratio of 2.0 indicates that the permissible floor area of a building is twice the total land area.<sup>1</sup>

**Going Concern:**

1. An established and operating business having an indefinite future life.
2. An organization with an indefinite life that is sufficiently long that, over time, all currently incomplete transformations [transforming resources from one form to a different, more valuable form] will be completed.<sup>1</sup>

**Gross Building Area (GBA):**

1. Total floor area of a building, excluding unenclosed areas, measured from the exterior of the walls of the above-grade area. This includes mezzanines and basements if and when typically included in the market area of the type of property involved.
2. Gross leasable area plus all common areas.
3. For residential space, the total area of all floor levels measured from the exterior of the walls and including the super structure and substructure basement; typically does not include garage space.<sup>1</sup>

**Highest and Best Use:**

1. The reasonably probable use of property that results in the highest value. The four criteria that the highest and best use must meet are legal permissibility, physical possibility, financial feasibility, and maximum productivity.
2. The use of an asset that maximizes its potential and that is possible, legally permissible, and financially feasible. The highest and best use may be for continuation of an asset's existing use or for some alternative use. This is determined by the use that a market participant would have in mind for the asset when formulating the price that it would be willing to bid. (IVS).
3. [The] highest and most profitable use for which the property is adaptable and needed or likely to be needed in the reasonably near future. (Uniform Appraisal Standards for Federal Land Acquisitions)<sup>1</sup>

**Hypothetical Condition:** a condition, directly related to a specific assignment, which is contrary to what is known by the appraiser to exist on the effective date of the assignment results, but is used for the purpose of analysis.<sup>7</sup>

**Income Capitalization Approach:** Specific appraisal techniques applied to develop a value indication for a property based on its earning capability and calculated by the capitalization of property income.<sup>1</sup>

**Inspection:** Personal observation of the exterior or interior of the real estate that is the subject of an assignment performed to identify the property characteristics that are relevant to the assignment, such as amenities, general physical condition, and functional utility. Note that this is not the inspection process performed by a licensed or certified building inspector.<sup>1</sup>

**Insurable Value:** A type of value for insurance purposes.<sup>1</sup>

**Intangible Property (intangible Assets):** Nonphysical assets, including but not limited to franchises, trademarks, patents, copyrights, goodwill, equities, securities, and contracts as distinguished from physical assets such as facilities and equipment.<sup>7</sup>

**Intended Use:** the user(s) of an appraiser's reported appraisal or appraisal review assignment results, as identified by the appraiser based on communication with the client at the time of the assignment.<sup>7</sup>

**Intended User:** the client and any other party as identified, by name or type, as users of the appraisal or appraisal review report by the appraiser, based on communication with the client at the time of the assignment.<sup>7</sup>

**Internal Rate of Return ("IRR"):** The annualized yield rate or rate of return on capital that is generated or capable of being generalized within an investment of portfolio over a period of ownership. Alternatively, the indicated return of capital associated with a projected or pro forma income stream. The discount rate that equates the present value of the net cash flows of a project with the present value of the capital investment. It is the rate at which the Net Present Value (NPV) equals zero. The IRR reflects both the return on invested capital and the return of the original investment, which are basic considerations of potential investors. Therefore, deriving the IRR from analysis of market transactions of similar properties having comparable income patterns is a proper method for developing market discount rates for use in valuations to arrive at Market Value. Used in discounted cash flow analysis to find the implied or expected rate of return of the project, the IRR is the rate of return which gives a zero net present value (NPV). See also equity yield rate (YE); financial management rate of return (FMRR); modified internal rate of return (MIRR); yield rate (Y).<sup>1</sup>

**Investment Value:** 1) The value of a property to a particular investor or class of investors based on the investor's specific requirements. Investment value may be different from market value because it depends on a set of investment criteria that are not necessarily typical of the market. 2) The value of an asset to the owner or a prospective owner for individual investment or operational objectives. (IVS)<sup>1</sup>

**Jurisdictional Exception:** an assignment condition established by applicable law or regulation, which precludes an appraiser from complying with a part of USPAP.<sup>7</sup>

**Leasehold Interest:** The right held by the lessee to use and occupy real estate for a stated term and under the conditions specified in the lease.<sup>1</sup>

**Leased Fee Interest:** The ownership interest held by the lessor, which includes the right to receive the contract rent specified in the lease plus the reversionary right when the lease expires.<sup>1</sup>

**Liquidation Value:** The most probable price that a specified interest in real

property should bring under the following conditions: 1) Consummation of a sale within a short time period; 2) The property is subjected to market conditions prevailing as of the date of valuation; 3) Both the buyer and seller are acting prudently and knowledgeable; 4) The seller is under extreme compulsion to sell; 5) The buyer is typically motivated. 6) Both parties are acting in what they consider to be their best interests. 7) A normal marketing effort is not possible due to the brief exposure time 8) Payment will be made in cash in U.S. dollars or in terms of financial arrangements comparable thereto. 9) The price represents the normal consideration for the property sold, unaffected by special or creative financing or sales concessions granted by anyone associated with the sale. This definition can also be modified to provide for valuation with specified financing terms.<sup>1</sup>

**Load Factor:** A measure of the relationship of common area to useable area and therefore the quality and efficiency of building area layout, with higher load factors indicating a higher percentage of common area to overall rentable space than lower load factors; calculated by subtracting the amount of useable area from the rentable area and then dividing the difference by the useable area:<sup>1</sup>

Load Factor =

$$\frac{(\text{Rentable Area} - \text{Useable Area})}{\text{Useable Area}}$$

**Market Value:** a type of value stated as an opinion, that presumes the transfer of a property (i.e., a right of ownership or a bundle of such rights), as of a certain date, under specific conditions set forth in the value definition that is identified by the appraiser as applicable in an appraisal.<sup>7</sup>

**Market Value "As If Complete" On The Appraisal Date:** Market value as if complete on the effective date of the appraisal is an estimate of the market value of a property with all construction, conversion, or rehabilitation hypothetically completed, or under other specified hypothetical conditions as of the date of the appraisal. With regard to properties wherein anticipated market conditions indicate that stabilized occupancy is not likely as of the date of completion, this estimate of value should reflect the market value of the property as if complete and prepared for occupancy by tenants.

**Market Value "As Is" On The Appraisal Date:** Value As Is -The value of specific ownership rights to an identified parcel of real estate as of the effective date of the appraisal; relates to what physically exists and is legally permissible and excludes all assumptions concerning hypothetical market conditions or possible rezoning. See also effective date; prospective value opinion.

**Market Value of the Total Assets of the Business:** The market value of the total assets of the business is the market value of all of the tangible and intangible assets of a business as if sold in aggregate as a going concern. This assumes that the business is expected to continue operations well into the future.<sup>4</sup>

**Marketing Time:** An opinion of the amount of time it might take to sell a real or personal property interest at the concluded market value level during the period immediately after the effective date of an appraisal. Marketing time differs from exposure time, which is always presumed to precede the effective date of an appraisal. (Advisory Opinion 7 of the Appraisal Standards Board of The Appraisal Foundation and Statement on Appraisal Standards No. 6, "Reasonable Exposure Time in Real Property Market Value Opinions" address the determination of reasonable exposure and marketing time).<sup>3</sup>

**Mass Appraisal:** the process of valuing a universe of properties as of a given date using standard methodology, employing common data and allowing for statistical testing.<sup>7</sup>

**Mass Appraisal Model:** a mathematical expression of how supply and demand factors interact in a market.<sup>7</sup>

**Misleading:** intentionally or unintentionally misrepresenting, misstating or concealing relevant facts or conclusions.<sup>7</sup>

**Net Lease:** A lease in which the landlord passes on all expenses to the tenant. See also lease.<sup>1</sup>

**Net Rentable Area (NRA):** 1) The area on which rent is computed. 2) The Rentable Area of a floor shall be computed by measuring to the inside finished surface of the dominant portion of the permanent outer building walls, excluding any major vertical penetrations of the floor. No deductions shall be made for columns and projections necessary to the building. Include space such as mechanical room, janitorial room, restrooms, and lobby of the floor.<sup>5</sup>

**Penetration Ratio (Rate):** The rate at which stores obtain sales from within a trade area or sector relative to the number of potential sales generated; usually applied to existing facilities. Also called: penetration factor.<sup>1</sup>

**Personal Inspection:** a physical observation performed to assist in identifying relevant property characteristics in a valuation service.<sup>7</sup>

**Personal Property:** any tangible or intangible article that is subject to ownership and not classified as real property, including identifiable tangible objects that are considered by the general public as being "personal", such as furnishings, artwork, antiques, gems and jewelry, collectibles, machinery and equipment, and intangible property that is created and stored electronically such as plans for installation art, choreography, emails or designs for digital tokens.<sup>7</sup>

**Physical Characteristics:** attributes of a property that are observable or measurable as a matter of fact, as distinguished from opinions and conclusions, which are the result of some level of analysis or judgement.<sup>7</sup>

**Price:** the amount asked, offered or paid for a property.<sup>7</sup>

**Prospective opinion of value.** A value opinion effective as of a specified future date. The term does not define a type of value. Instead it identifies a value opinion as being effective at some specific future date. An opinion of value as of a prospective date is frequently sought in connection with projects that are proposed, under construction, or under conversion to a new use, or those that have not yet achieved sellout or a stabilized level of long-term occupancy.<sup>1</sup>

**Real Estate:** an identified parcel or tract of land, including improvements, if any.<sup>7</sup>

**Real Property:** the interests, benefits and rights inherent in the ownership of real estate.<sup>7</sup>

**Reconciliation:** A phase of a valuation assignment in which two or more value indications are processed into a value opinion, which may be a range of value, a single point estimate, or a reference to a benchmark value.<sup>1</sup>

**Relevant Characteristics:** features that may affect a property's value or marketability such as legal, economic or physical characteristics.<sup>7</sup>

**Reliable Measurement:** [The IAS/IFRS framework requires that] neither an asset nor a liability is recognized in the financial statements unless it has a cost or value that can be measured reliably.<sup>2</sup>

**Remaining Economic Life:** The estimated period over which existing improvements are expected to contribute economically to a property; an estimate of the number of years remaining in the economic life of a structure or structural components as of the effective date of the appraisal; used in the economic age-life method of estimating depreciation.<sup>1</sup>

**Replacement Cost:** The estimated cost to construct, at current prices as of the effective appraisal date, a substitute for the building being appraised, using modern materials and current standards, design, and layout.<sup>1</sup>

**Report:** any communication, written or oral, of an appraisal or appraisal review that is transmitted to the client or a party authorized by the client upon completion of an assignment.<sup>7</sup>

**Retrospective Value Opinion:** A value opinion effective as of a specified historical date. The term retrospective does not define a type of value. Instead, it identifies a value opinion as being effective at some specific prior date. Value as of a historical date is frequently sought in connection with property tax appeals, damage models, lease renegotiation, deficiency judgments, estate tax, and condemnation. Inclusion of the type of value with this term is appropriate, e.g., "retrospective market value opinion."<sup>1</sup>

**Sales Comparison Approach:** The process of deriving a value indication for the subject property by comparing sales of similar properties to the property being appraised, identifying appropriate units of comparison, and making adjustments to the sale prices (or unit prices, as appropriate) of the comparable properties based on relevant, market-derived elements of comparison. The sales comparison approach may be used to value improved properties, vacant land, or land being considered as though vacant when an adequate supply of

comparable sales is available.<sup>1</sup>

**Scope of Work:** the type and extent of research and analyses in an appraisal or appraisal review assignment.<sup>7</sup>

**Signature:** personalized evidence indicating authentication of the work performed by the appraiser and the acceptance of the responsibility for content, analyses and the conclusions in the report.<sup>7</sup>

**Stabilized value:** A value opinion that excludes from consideration any abnormal relationship between supply and demand such as is experienced in boom periods when cost and sale price may exceed the long-term value, or during periods of depression, when cost and sale price may fall short of long-term value. It is also a value opinion that excludes from consideration any transitory condition that may cause excessive construction costs, e.g., a premium paid due to a temporary shortage of supply.

**Substitution:** The principle of substitution states that when several similar or commensurate commodities, goods, services are available, the one with the lowest price will attract the greatest demand and widest distribution. This is the primary principle upon which the cost and sales comparison approaches are based.<sup>3</sup>

**Total Assets of a Business:** Total assets of a business is defined by the Appraisal Institute as “the tangible property (real property and personal property, including inventory and furniture, fixtures and equipment) and intangible property (cash, workforce, contracts, name, patents, copyrights, and other residual intangible assets, to include capitalized economic profit).”

**Use Value:**

The value of a property assuming a specific use, which may or may not be the property’s highest and best use on the effective date of the appraisal. Use value may or may not be equal to market value but is different conceptually.<sup>1</sup>

**Valuation Service:** a service pertaining to an aspect of property value, regardless of the type of service and whether it is performed by appraisers or by others.<sup>7</sup>

**Value:** the monetary relationship between properties and those who buy and sell, or use those properties, expressed as an opinion of the worth of a property at a given time.<sup>7</sup>

**Workfile:** data, information and documentation necessary to support the appraiser’s opinions and conclusions and to show compliance with USPAP.<sup>7</sup>

<sup>1</sup>Appraisal Institute, *The Dictionary of Real Estate Appraisal*, 6th ed. (Chicago: Appraisal Institute 2010). <sup>2</sup>Appraisal Institute, *International Financial Reporting Standards for Real Property Appraiser*, IFRS Website, [www.ifrs-ebooks.com/index.html](http://www.ifrs-ebooks.com/index.html). <sup>3</sup>Appraisal Institute, *The Appraisal of Real Estate*, 13th ed. (Chicago: Appraisal Institute 2008). <sup>4</sup> This definition is taken from “Allocation of Business Assets Into Tangible and Intangible Components: A New Lexicon,” *Journal of Real Estate Appraisal*, January 2002, Volume LXX, Number 1. This terminology is to replace former phrases such as: value of the going concern. <sup>5</sup>Finacial Publishing Company, *The Real Estate Dictionary*, 7 ed. <sup>6</sup> U.S. Treasury Regulations. <sup>7</sup>USPAP 2020-2021