

Chitina Electric, Inc.
P.O. Box 88
Chitina, Alaska

September 14, 2015

Mr. Daniel Hertrich, P.E..
Hydroelectric Program and Project Manager
Alaska Energy Authority
813 West Northern Lights Blvd
Anchorage, AK 99503

Re: Renewable Energy Fund Grant Application
Round IX

Dear Mr. Hertrich:

The community of Chitina, Alaska is seeking funding through the Renewable Energy Fund Program to construct a small hydroelectric plant at Fivemile Creek, a local resource which crosses the Edgerton Highway near the community's existing diesel power plant. Work completed on the project to date includes:

- Conceptual Design Report (CDR) - A CDR was completed for the project in January 2012 utilizing funds awarded under REF Round II. The CDR predicts that power generation from the proposed hydro plant will meet community electrical demand the majority of the time (displacing around 45,000 gallon of diesel fuel annually). Dispatchable electric heaters placed at residential housing complexes, community buildings and businesses have the potential to displace an additional 20,000 gallons of heating fuel each year (total of around 65,000 gallons of diesel avoidance in the first year). In the summer months the hydro will also produce substantial excess energy that can be used for commercial and industrial growth.
- Design and Permitting: Based on the findings of the CDR, additional funding was awarded under REF Round IV for design and permitting. This funding was utilized to complete field investigations, prepare 65% design documents and complete preliminary permitting efforts for the project.

As currently envisioned, the project will be constructed utilizing a design / build approach. This project delivery system will allow for a smooth and efficient transition from the current level of project design to the construction phase. The current project documents (65% drawings, specifications, permitting documents, etc) will be utilized to prepare a design / build procurement package, consisting of concept drawings and a performance specification for the proposed system. The project will be advertised and qualified design-build firms will submit bids on the project which will be scored based upon their approach to completing the design and anticipated

construction costs. The proposed project management team will consist of Chitina Electric Inc (Owner) and CRW Engineering Group, LLC., acting as a technical advisor to the utility.

The proposed Fivemile Creek Hydro Project would help to relieve the ever increasing cost of diesel power generation, a burden that greatly impacts the community and its residents and businesses. The opportunity for excess hydro power generation during the summer months will create economic opportunity for local businesses and entrepreneurs. We appreciate your consideration of our application for construction funding for the proposed facilities.

Chitina Electric realizes that the cost of construction will likely exceed the per-project funding available through the REF Grant Program. CEI is actively pursuing funding from other grant sources such as the US Department of Agriculture and US Department of Energy to supplement this funding request. A letter of financial commitment from the CEI board is attached to this application. Letters of support from various community and regional entities are also attached.

If you have any questions concerning our application please do not hesitate to contact the CEI office at 907-823-2223. Again, thank you for your consideration of this important project.

Sincerely,



Martin Finnesand

Attachments: As stated.

Application Forms and Instructions

This instruction page and the following grant application constitutes the Grant Application Form for Round VIII of the Renewable Energy Fund. A separate application form is available for projects with a primary purpose of producing heat (see RFA section 1.5). This is the standard form for all other projects, including projects that will produce heat and electricity. An electronic version of the Request for Applications (RFA) and both application forms is available online at:

<http://www.akenergyauthority.org/Programs/Renewable-Energy-Fund/Rounds#round9>.

- If you need technical assistance filling out this application, please contact Shawn Calfa, the Alaska Energy Authority Grants Administrator at (907) 771-3031 or at scalfa@aidea.org.
- If you are applying for grants for more than one project, provide separate application forms for each project.
- Multiple phases (e.g. final design, construction) for the same project may be submitted as one application.
- If you are applying for grant funding for more than one phase of a project, provide milestones and grant budget for each phase of the project.
- In order to ensure that grants provide sufficient benefit to the public, AEA may limit recommendations for grants to preliminary development phases in accordance with 3 ACC 107.605(1).
- If some work has already been completed on your project and you are requesting funding for an advanced phase, submit information sufficient to demonstrate that the preceding phases are completed and funding for an advanced phase is warranted. *Supporting documentation may include, but is not limited to, reports, conceptual or final designs, models, photos, maps, proof of site control, utility agreements, power sale agreements, relevant data sets, and other materials. Please provide a list of supporting documents in Section 11 of this application and attach the documents to your application.*
- If you have additional information or reports you would like the Authority to consider in reviewing your application, either provide an electronic version of the document with your submission or reference a web link where it can be downloaded or reviewed. Please provide a list of additional information; including any web links, in section 12 of this application and attach the documents to your application. For guidance on application best practices please refer to the resource specific Best Practices Checklists; links to the checklists can be found in the appendices list at the end of the accompanying REF Round IX RFA.
- In the sections below, please enter responses in the spaces provided. You may add additional rows or space to the form to provide sufficient space for the information, or attach additional sheets if needed.

REMINDER:

- Alaska Energy Authority is subject to the Public Records Act AS 40.25, and materials submitted to the Authority may be subject to disclosure requirements under the act if no statutory exemptions apply.
- All applications received will be posted on the Authority web site after final recommendations are made to the legislature.

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- In accordance with 3 AAC 107.630 (b) Applicants may request trade secrets or proprietary company data be kept confidential subject to review and approval by the Authority. If you want information to be kept confidential the applicant must:
 - Request the information be kept confidential.
 - Clearly identify the information that is the trade secret or proprietary in their application.
 - Receive concurrence from the Authority that the information will be kept confidential. If the Authority determines it is not confidential it will be treated as a public record in accordance with AS 40.25 or returned to the applicant upon request.

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SECTION 1 – APPLICANT INFORMATION

Please specify the legal grantee that will own, operate, and maintain the project upon completion.

Name (Name of utility, IPP, local government, or other government entity)

Chitina Electric Inc. (CEI)

Type of Entity:	Fiscal Year End:
<i>Native Corporation Rural Utility</i>	<i>2015</i>

Tax ID #

Tax Status: For-profit Non-profit Government (check one)

Date of last financial statement audit:

Mailing Address:	Physical Address:
<i>Chitina Electric Inc.</i>	
<i>P.O. Box 88</i>	
<i>Chitina, AK 99566</i>	

Telephone:	Fax:	Email:
<i>(907) 823-2220</i>	<i>(907) 823-2202</i>	<i>mnfinn@cvinternet.net</i>

1.1 Applicant Point of Contact / Grants Manager

Name: *Martin Finnesand* **Title:** *President/General Manager*

Mailing Address:

*P.O. Box 88
Chitina, AK 99566*

Telephone:	Fax:	Email:
<i>(907) 823-2223</i>	<i>(907) 822-4006</i>	<i>mnfinn@cvinternet.net</i>

1.1.1 APPLICANT SIGNATORY AUTHORITY CONTACT INFORMATION

Name: *Martin Finnesand* **Title:** *President/General Manager*

Mailing Address:

*P.O. Box 88
Chitina, AK 99566*

Telephone:	Fax:	Email:
<i>(907) 823-2223</i>	<i>(907) 822-4006</i>	<i>mnfinn@cvinternet.net</i>

1.1.2 Applicant Alternate Points of Contact

Name	Telephone:	Fax:	Email:
<i>Harry Billum</i>	<i>(907) 823-2220</i>	<i>(907) 823-2202</i>	<i>N/A</i>

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1.2 Applicant Minimum Requirements

Please check as appropriate. If applicants do not meet the minimum requirements, the application will be rejected.

1.2.1 Applicant Type

- An electric utility holding a certificate of public convenience and necessity under AS 42.05, or
- An independent power producer in accordance with 3 AAC 107.695 (a) (1), or
- A local government, or
- A governmental entity (which includes tribal councils and housing authorities)

1.2 APPLICANT MINIMUM REQUIREMENTS (continued)

Please check as appropriate.

- 1.2.2** Attached to this application is formal approval and endorsement for the project by the applicant's board of directors, executive management, or other governing authority. If the applicant is a collaborative grouping, a formal approval from each participant's governing authority is necessary. **(Indicate by checking the box)**
- 1.2.3** As an applicant, we have administrative and financial management systems and follow procurement standards that comply with the standards set forth in the grant agreement (Section 3 of the RFA). **(Indicate by checking the box)**
- 1.2.4** If awarded the grant, we can comply with all terms and conditions of the award as identified in the Standard Grant Agreement template at <http://www.akenergyauthority.org/Programs/Renewable-Energy-Fund/Rounds#round9>. (Any exceptions should be clearly noted and submitted with the application.) **(Indicate by checking the box)**
- 1.2.5** We intend to own and operate any project that may be constructed with grant funds for the benefit of the general public. If no please describe the nature of the project and who will be the primary beneficiaries. **(Indicate yes by checking the box)**

SECTION 2 – PROJECT SUMMARY

2.1 Project Title
Provide a 4 to 7 word title for your project. Type in the space below.

Fivemile Creek Hydroelectric Project

2.2 Project Location

2.2.1 Location of Project – Latitude and longitude (preferred), street address, or community name.

Latitude and longitude coordinates may be obtained from [Google Maps](#) by finding you project’s location on the map and then right clicking with the mouse and selecting “What is here?” The coordinates will be displayed in the Google search window above the map in a format as follows: 61.195676.-149.898663. If you would like assistance obtaining this information please contact AEA at 907-771-3031.

*The project is located on Fivemile Creek, which crosses the Edgerton Highway at mile 28, approximately 5 miles north of Chitina, adjacent to the Chitina Airport. The project area is shown on USGS quad map Valdez C-2. **Latitude 61°34’56.14” N, Longitude 144°26’11.34”***

2.2.2 Community benefiting – Name(s) of the community or communities that will be the beneficiaries of the project.

The community of Chitina will benefit from the project. The project will provide clean, lower cost energy to residents, local businesses and public facilities. In addition, through the use of dispatchable load heaters / boilers, the project will provide significant reductions in heating fuel consumption at the community hall, HUD housing complex, hotel and ADOT facilities at the Chitina Airport.

2.3 Project Type
Please check as appropriate.

2.3.1 Renewable Resource Type

- | | |
|---|--|
| <input type="checkbox"/> Wind | <input type="checkbox"/> Biomass or Biofuels (excluding heat-only) |
| <input checked="" type="checkbox"/> Hydro, Including Run of River | <input type="checkbox"/> Hydrokinetic |
| <input type="checkbox"/> Geothermal, Excluding Heat Pumps | <input checked="" type="checkbox"/> Transmission of Renewable Energy |
| <input type="checkbox"/> Solar Photovoltaic | <input type="checkbox"/> Storage of Renewable |
| <input type="checkbox"/> Other (Describe) | <input type="checkbox"/> Small Natural Gas |

2.3.2 Proposed Grant Funded Phase(s) for this Request (Check all that apply)

- | <u>Pre-Construction</u> | <u>Construction</u> |
|--|--|
| <input type="checkbox"/> Reconnaissance | <input type="checkbox"/> Final Design and Permitting |
| <input type="checkbox"/> Feasibility and Conceptual Design | <input checked="" type="checkbox"/> Construction |

2.4 Project Description

Provide a brief one paragraph description of the proposed project.

The proposed Fivemile Creek Hydroelectric Project consists of the following major components:

- 1. Creek diversion/intake structure – The proposed diversion / intake structure would divert a portion of the flow from Fivemile Creek into a pipeline (penstock) and would also create a small impoundment that would provide freeze protection.*
- 2. Penstock – The proposed penstock will transport water from the intake structure to the turbine powerhouse. The penstock will be buried, and will consist of HDPE pipe (lower pressure reach) and welded steel pipe (high pressure reach). The pipe will range from 12-20 inches in diameter and will be roughly 10,400 feet long. The purpose of the penstock is to pressurize and deliver the water from the creek to the hydro turbine power plant.*
- 3. Diversion Access Road – An access road will be constructed between the existing jeep trail and the proposed diversion / intake structure location. This road will be approximately 2,850 feet long and will provide access for construction and maintenance of the diversion / intake structure.*
- 4. Turbine Building – The turbine building will house a 300 to 400 kW pelton wheel turbine / generator and controls. The building foundation will include a tailrace that will return water from the penstock to the creek.*
- 5. Electrical Intertie – An existing 4-mile long overhead transmission line will connect the turbine power plant step up transformer to the community grid. The transmission line was constructed utilizing federal grant funds in 2008.*
- 6. Diesel Integration – The proposed hydro switchgear will be linked to the community’s existing diesel powerhouse controls. The diesel plant will function primarily as a backup system after the hydro is constructed.*
- 7. Heat Recovery – An electric boiler will be installed in the existing diesel module and connected to the existing hydronic heat recovery system currently utilized to heat the clinic building and the aboveground storage tank used to store diesel fuel for the diesel plant. The boiler will provide a dual purpose; provide frequency control during operation of the hydro turbine, and allow for continued utilization of the existing heat recovery system infrastructure.*
- 8. Excess energy utilization – During most times of the year, excess water flow will be available to produce electricity above and beyond the community’s electric demand. During these times, the excess energy will be available for beneficial use. As currently envisioned, the excess energy will be used for space heating during winter months via electric boilers installed in various community buildings, residential living facilities, and commercial facilities. In the summer, when flow in Fivemile Creek is higher, there will be considerable excess energy available for commercial and industrial uses such as ice making, sawmill operation, etc. The excess energy will be provided on a “dispatchable” basis and therefore will be sold at a lower rate. The excess energy will “displace” diesel fuel currently utilized for space heating, and will provide inexpensive power for commercial development while also providing an additional revenue stream for the utility.*

2.5 Scope of Work

Provide a scope of work detailing the tasks to be performed under this funding request. This should include work paid for by grant funds and matching funds or performed as in-kind match.

The current request is for Phase IV (construction, commissioning, operation and Reporting) including all tasks related to advertising, bidding, material procurement, freight, construction, construction management, grant management, contract administration, startup and commissioning and reporting. As currently envisioned the project will be constructed using a “design-build” model. Utilizing the remaining funds from previous REF awards, the current 65% design drawings and specifications will be used to prepare design-build project documents.

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Chitina Electric is also pursuing funding from other sources. CEI intends to apply for the next round of the USDA High Energy Grant Program. Also, CEI is investigating the possibility of a low interest loan to fund a portion of the project through the USDA Electric Infrastructure Loan Program and/or the AEA Power Project Loan Fund.

SECTION 3 – Project Management, Development, and Operation

3.1 Schedule and Milestones

Criteria: Stage 2-1.A: The proposed schedule is clear, realistic, and described in adequate detail.

Please fill out the schedule below (or attach a similar sheet) for the work covered by this funding request. Be sure to identify key tasks and decision points in in your project along with estimated start and end dates for each of the milestones and tasks. Please clearly identify the beginning and ending of all phases of your proposed project. Add additional rows as needed.

Milestones	Tasks	Start Date	End Date	Deliverables
				<i>Grant Application</i>
<i>Submit REF Round IX</i>			<i>9/15/15</i>	<i>Schedule Assumes full funding of project</i>
<i>AEA Evaluation / Recommendations</i>		<i>9/15/15</i>	<i>1/30/16</i>	
<i>Finalize Permitting with Key Agencies (ADOT, ADF&G, etc.)</i>	<i>After project is funded and firm construction schedule is established, CEI will submit final permit applications to the various agencies for approval. The cost of final permitting will be funded using remaining funds from previous REF grant awards.</i>	<i>2/1/16</i>	<i>3/15/16</i>	<i>Final permitting decisions from these key agencies. Note that this task will be completed using funds from a previous REF award.</i>
<i>Prepare Design / Build Bid Documents</i>	<ul style="list-style-type: none"> <i>Prepare design/build bid documents based on current (65% level) plans.</i> <i>Develop performance based project specifications</i> <i>Incorporate any necessary revisions based upon final permitting efforts.</i> 	<i>2/1/16</i>	<i>5/1/16</i>	<i>Design/Build Bid Package Note that this task will be completed using previously Awarded REF Funding</i>
<i>Receive REF IX Funding</i>	<ul style="list-style-type: none"> <i>Finalize grant agreement.</i> 	<i>2/1/16</i>	<i>2/1/17</i>	
<i>Bid Project / Contractor Selection</i>	<ul style="list-style-type: none"> <i>Advertise – The project will be advertised in appropriate business circulars in Alaska and the Pacific</i> 	<i>2/15/17</i>	<i>3/15/17</i>	<i>Executed Construction Contract</i>

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	<p><i>Northwest (the Plans Room, AE Plans, Seattle Journal of Commerce, etc).</i></p> <ul style="list-style-type: none"> <i>Award Project – The project will be awarded to the contractor that provides the lowest responsive and responsible bid.</i> <i>Execute Construction Contract</i> 			
<i>Construction</i>	<ul style="list-style-type: none"> <i>Value Engineering - The successful design build contractor will prepare final design drawings based upon the concept drawings and performance specification included in the bid documents.</i> <i>Submittal Review - Contractor will submit required submittals for review by the owner's representative.</i> <i>Procurement – Contractor will procure all necessary materials.</i> <i>On Site Construction Activities</i> <i>Integration and Testing</i> <i>Operation and Maintenance Manual Preparation,</i> <i>As Built / Record Drawings</i> 	<i>4/1/17</i>	<i>10/31/18</i>	<p><i>Final Design with Value Engineering</i></p> <p><i>Approved submittals.</i></p> <p><i>As-built documents.</i></p> <p><i>Operation and Maintenance Manual.</i></p>
<i>Final Acceptance, Commissioning, and Startup</i>	<i>The contractor will be required to provide operator training at startup.</i>	<i>11/1/18</i>	<i>12/1/18</i>	
<i>Operations Reporting</i>	<i>Reports will be provided to AEA as required by the grant conditions.</i>			

3.2 Budget

Criteria: Stage 2-1.B: The cost estimates for project development, operation, maintenance, fuel, and other project items meet industry standards or are otherwise justified.

3.2.1 Budget Overview

Describe your financial commitment to the project. List the amount of funds needed for project completion and the anticipated nature and sources of funds. Consider all project phases, including future phases not covered in this funding request.

Residents and commercial businesses in Chitina are subject to high energy costs which vary dramatically due to fluctuations in the world oil market. Chitina Electric is fully aware of the negative impacts of fossil fuel-based energy and is financially committed to the proposed hydroelectric project. However, CEI is a small utility and does not have the financial resources to pursue a project of this magnitude without grant assistance. At this time CEI intends to pursue several grants in addition to the Renewable Energy Fund, including:

- USDA High Energy Cost Grant Program – CEI will apply for the next available USDA HEGP.*
- Indian Community Development Block Grant (ICDBG, HUD) – The local corporation is currently utilizing ICDBG grant funds to upgrade community housing. The community housing project is expected to be completed within the next year. Afterwards, the Corporation intends to apply for a new ICDBG grant in support of the proposed hydroelectric project.*
- USDA Community Facilities Grant Program – CEI will submit an application for the 2016 Community Facilities Grant Program.*

3.2.2 Budget Forms

Applications MUST include a separate worksheet for each project phase that was identified in section 2.3.2 of this application, (I. Reconnaissance, II. Feasibility and Conceptual Design, III. Final Design and Permitting, and IV. Construction. Please use the tables provided below to detail your proposed project’s total budget. Be sure to use one table for each phase of your project. The milestones and tasks should match those listed in 3.1 above.

If you have any question regarding how to prepare these tables or if you need assistance preparing the application please feel free to contact AEA at 907-771-3031 or by emailing the Grants Administrator, Shawn Calfa, at scalfa@aidea.org.

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Milestone or Task	RE- Fund Grant Funds	Grantee Matching Funds	Source of Matching Funds: Cash/In-kind/Federal Grants/Other State Grants/Other	TOTALS
CONSTRUCTION				
(List milestones based on phase and type of project. See sections 2.3 thru 2.6 of the RFA)	\$	\$		\$
<i>Prepare Business Operating Plan</i>	\$ 20,000	\$		\$ 20,000 (Covered by previous REF awards)
<i>Finalize Permitting</i>	\$30,000	\$		\$ 30,000 (Covered by previous REF awards)
<i>Prepare Design / Build Bid Documents</i>	\$50,000	\$		\$ 50,000 (Covered by previous REF awards)
<i>Construction</i>	\$3,000,000	\$2,500,000	<i>Future Federal Grants</i>	\$ 5,550,000
<i>Bidding, CM/CA,</i>	\$300,000	\$		\$ 350,000
<i>Operations Reporting</i>	\$0	\$		\$
	\$	\$		\$
	\$	\$		\$
	\$	\$		\$
	\$	\$		\$
TOTALS	\$3,500,000	\$		\$ 6,000,000
Budget Categories:				
<i>Direct Labor & Benefits</i>	\$	\$		\$
<i>Travel & Per Diem</i>	\$50,000	\$		\$ 50,000
<i>Equipment</i>	\$ 300,000	\$		\$ 300,000
<i>Materials & Supplies</i>	\$ 2,000,000	\$ 1,500,000		\$ 3,500,000
<i>Contractual Services</i>	\$ 150,000	\$ 250,000		\$ 400,000
<i>Construction Services</i>	\$ 850,000	\$ 750,000		\$ 1,600,000
<i>Other</i>	\$ 150,000	\$		\$ 150,000
TOTALS	\$3,500,000	\$		\$ 6,000,000

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3.2.3 Cost Justification

Indicate the source(s) of the cost estimates used for the project budget.

The project construction cost estimate was prepared by CRWE Engineering Group, LLC. The cost is based upon 65% level design drawings and input from multiple contractors with experience in applicable fields.

3.2.4 Funding Sources

Indicate the funding sources for the phase(s) of the project applied for in this funding request.

Grant funds requested in this application	\$3,400,000
Funds from previous REF grant awards	\$100,000
In-kind match to be provided	\$ 2,500,000
Total costs for project phase(s) covered in application (sum of above)	\$6,000,000

3.2.5 Total Project Costs

Indicate the anticipated total cost by phase of the project (including all funding sources). Use actual costs for completed phases.

Reconnaissance	\$
Feasibility and Conceptual Design	\$277,000 (completed)
Final Design and Permitting	\$303,000 (Completed)
Construction	\$6,000,000
Total Project Costs (sum of above)	\$6,580,000

3.2.6 Operating and Maintenance Costs

O&M costs can be estimated in two ways for the standard application. Most proposed RE projects will fall under Option 1 because the new resource will not allow for diesel generation to be turned off. Some projects may allow for diesel generation to be turned off for periods of time; these projects should choose Option 2 for estimating O&M.

Options	O&M Impact of proposed RE project
Option 1: Diesel generation ON <i>For projects that do not result in shutting down diesel generation there is assumed to be no impact on the base case O&M. Please indicate the estimated annual O&M cost associated with the proposed renewable project.</i>	\$
Option 2: Diesel generation OFF <i>For projects that will result in shutting down diesel generation please estimate:</i> <ol style="list-style-type: none"> 1. Annual non-fuel savings of shutting off diesel generation 2. Estimated hours that diesel generation will be off per year. 3. Annual O&M costs associated with the proposed renewable project. 	
	<ol style="list-style-type: none"> 1. \$61,000 (Includes \$15,000 in materials/contract services and \$46,000 in labor) 2. Hours diesel OFF/year: 7,800 hours 3. \$51,000 (Includes \$5,000 in materials/contract services and \$46,000 in labor)

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3.3 Project Communications

Criteria: Stage 2-1.C: The applicant's communications plan, including monitoring and reporting, is described in adequate detail.

Describe how you plan to monitor the project and keep the Authority informed of the status.

The project will be managed by a combination of Owner (Chitina Electric Inc) and CRW Engineering Group staff. CRW will act as the owner's representative and provide technical assistance on an as-needed basis. Project accounting services will be provided by Clear Idea Accounting and Consulting (CIAC). CIAC also provides accounting services to Chitina Native Corporation and Chitina Electric Inc. The following methods will be implemented to insure seamless communication between the project team:

- A weekly project status meeting / teleconference including representatives from the successful design / build firm, CEI, and CRW Engineering Group.*
- During construction, a CEI employee will be designated as the Onsite Project Representative (OPR). The OPR will observe the contractor, prepare daily reports documenting contractor activities, and facilitate communication between the Contractor and the project management team.*
- During construction, the Owners Representative (CRW) will make periodic site inspections to monitor the progress and quality of the work.*
- A project status report will be submitted to the AEA on a quarterly basis. The report will summarize work completed during the reporting period and work planned for the upcoming period. The report will also identify any anticipated challenges and proposed solutions or mitigation measures, and provide a budget summary.*

3.4 Operational Logistics

Criteria: Stage 2-1.D: Logistical, business, and financial arrangements for operating and maintaining the project throughout its lifetime and selling energy from the completed project are reasonable and described in adequate detail.

Describe the anticipated logistical, business, and financial arrangements for operating and maintaining the project throughout its lifetime and selling energy from the completed project.

The proposed project will be owned and operated by Chitina Electric, Inc., a subsidiary of Chitina Native Corporation which has been serving the community for over 30 years. CEI's existing management structure and administrative department will remain in place. The overall operation of the utility will change little as a result of this project. The Utility will continue to operate and maintain its facilities, and bill its customers for services provided. It is anticipated that operation and maintenance efforts will increase initially while CEI's staff familiarize themselves with the Hydro plant. However, once startup is completed, the Hydro plant should require about the same level of maintenance as the existing diesel system. The diesel system will need to be exercised on a regular basis to insure it is ready for backup service. Similarly, during periods of low water when the diesel plant is carrying the load, the Hydro will need to be maintained in a ready condition.

Operation, maintenance and management requirements will be addressed in detail in the project Business Plan. The Plan will provide an organizational structure to help the Utility transition to Hydro power. In addition to the business plan, administrative and operator training will be provided on an as-needed basis as part of the startup services.

CEI will monitor, record and report savings and benefits afforded by the proposed hydro plant. The hydro plant will be equipped with an advanced SCADA system. The system will be programmed to record and provide reports of whatever parameters are necessary. The information will be available in real time over the internet, similar to the community's existing diesel plant.

SECTION 4 – QUALIFICATIONS AND EXPERIENCE

4.1 Project Team

Criteria: Stage 2-2.A: The Applicant, partners, and/or contractors have sufficient knowledge and experience to successfully complete and operate the project. If the applicant has not yet chosen a contractor to complete the work, qualifications and experience points will be based on the applicant's capacity to successfully select contractors and manage complex contracts.

Criteria: Stage 2-2.B: The project team has staffing, time, and other resources to successfully complete and operate the project.

Criteria: Stage 2-2.C: The project team is able to understand and address technical, economic, and environmental barriers to successful project completion and operation.

Criteria: Stage 2-2.D: The project team has positive past grant experience.

4.1.1 Project Manager

Indicate who will be managing the project for the Grantee and include contact information, and a resume. In the electronic submittal, please submit resumes as separate PDFs if the applicant would like those excluded from the web posting of this application. If the applicant does not have a project manager indicate how you intend to solicit project management support. If the applicant expects project management assistance from AEA or another government entity, state that in this section.

*Mr. Martin Finnesand,
President, Chitina Electric Inc.
Tel: (907) 823-2223
Cell: (907) 259-3587
Email: mfinn@cvinternet.net*

4.1.2 Expertise and Resources

Describe the project team including the applicant, partners, and contractors. Provide sufficient detail for reviewers to evaluate:

- the extent to which the team has sufficient knowledge and experience to successfully complete and operate the project;
- whether the project team has staffing, time, and other resources to successfully complete and operate the project;
- how well the project team is able to understand and address technical, economic, and environmental barriers to successful project completion and operation.

If contractors have not been selected to complete the work, provide reviewers with sufficient detail to understand the applicant's capacity to successfully select contractors and manage complex contracts. Include brief resumes for known key personnel and contractors as an attachment to your application. In the electronic submittal, please submit resumes as separate PDFs if the applicant would like those excluded from the web posting of this application

[Chitina Electric, Inc. \(CEI\)](#)

Martin Finnesand, (CEI President), will be the project manager and primary contact from CEI. He has over 25 years of experience in his position with CEI and is very familiar with past and present construction projects in the community. CEI has administered the local utility since its inception in 1981. Utility personnel have attended AVTEC training and are certified as powerhouse operators; they also have hydro operations training. It is the intent that the local operators will be involved with QA/QC during construction of the proposed hydro facility to enhance their understanding of system operation and maintenance requirements. The construction contractor will also be required to provide formal training to the operators on the new system during startup operations.

Owner's Representative / Engineering Consultants

CRW Engineering Group will act as the owner's representative and technical advisor for this project. CRW is a multi-disciplinary engineering firm that's been in business in Alaska for over 30 years. CRW has 65 employees (including 35 engineers) and provides engineering design and construction management services in the fields of civil, electrical, mechanical, structural and environmental engineering, and maintains surveying and procurement departments. CRW utilizes state of the art engineering tools including the latest versions of CAD and engineering design software. CRW has completed design and construction management services for hundreds of millions worth of projects throughout Alaska, including rural and municipal utilities, bulk fuel facilities, power generation and distribution facilities, vertical construction, highway and traffic system upgrades, etc. CRW has also completed business operating plans for over 30 bulk fuel and power system upgrade projects throughout the state. When necessary, CRW has access to specialty sub consultants such as Golder Associates (geotechnical engineering), Gray Stassel Engineering (SCADA systems and controls), Clifton Laboratories (hydrology and hydraulic transient analysis), Solstice Alaska Consulting, Inc. (hydro permitting specialists), and Rick Elliot, Land Consultant (site control).

Resumes for specific project personnel are attached.

4.1.3 Project Accountant(s)

Indicate who will be performing the accounting of this project for the grantee and include a resume. In the electronic submittal, please submit resumes as separate PDFs if the applicant would like those excluded from the web posting of this application. If the applicant does not have a project accountant indicate how you intend to solicit financial accounting support.

Financial accounting will be handled by Ms. Elena Begojevic, owner of Clear Idea Accounting and Consulting Inc. Ms. Begojevic's resume is attached.

4.1.4 Financial Accounting System

Describe the controls that will be utilized to ensure that only costs that are reasonable, ordinary and necessary will be allocated to this project. Also discuss the controls in place that will ensure that no expenses for overhead, or any other unallowable costs will be requested for reimbursement from the Renewable Energy Fund Grant Program.

Accounting controls will consist of a multi-tiered system of checks and balances. Pay requests from the design build contractor will be received by the owner's representative and will undergo a detailed review based on the contractor's daily reports, inputs from the onsite project representative, and requirements of the grant agreement and construction contract. Discrepancies

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will be resolved prior to forwarding the pay request to the Owner for approval. Approved pay requests will be forwarded to the owner and then to the project accounting firm for processing. All reviewers (owner's representative, Owner, and accounting professional) will be fully aware of the grant conditions governing appropriate charges.

Invoices generated by the Owner's representative (CRW) will be reviewed by the owner and the accounting professional prior to being submitted to AEA for payment. Invoices generated by the Owner will be reviewed by the accounting professional prior to submittal to the AEA. Any discrepancies will be corrected prior to submitting the invoice to AEA for payment.

All invoices will be reviewed in this manner, minimizing the chances for inappropriate charges against the project grant.

4.2 Local Workforce

Criteria: Stage 2-2.E: The project uses local labor and trains a local labor workforce.

Describe how the project will use local labor or train a local labor workforce.

The design/build project documents developed during this project phase will include requirements for utilization of local labor and provisions for on the job training opportunities. Consideration will also be given to dedicating a portion of the project grant funds for employing local workers on the job. The final approach for incorporating local labor into the project will depend upon the level of funding received and other factors.

The project will also require that the successful contractor provide operator training during project startup.

SECTION 5 – TECHNICAL FEASIBILITY

5.1 Resource Availability

Criteria: Stage 2-3.A: The renewable energy resource is available on a sustainable basis, and project permits and other authorizations can reasonably be obtained.

5.1.1 Proposed Energy Resource

Describe the potential extent/amount of the energy resource that is available, including average resource availability on an annual basis. Describe the pros and cons of your proposed energy resource vs. other alternatives that may be available for the market to be served by your project. For pre-construction applications, describe the resource to the extent known. For design and permitting or construction projects, please provide feasibility documents, design documents, and permitting documents (if applicable) as attachments to this application.

The project Conceptual Design Report (CDR) completed in January 2012 provides a detailed description of Fivemile Creek resource as well as the results of regional hydrologic studies, economic feasibility analysis, and a discussion of / comparison with other alternatives considered. Hard copies of the CDR were provided to AEA as part of previous REF applications (REF rounds IV and V); an electronic copy is attached to this application. Additional hardcopies can be provided upon request.

A brief summary of the resource analysis findings are provided below:

Using a 300 kW impulse turbine: Annual generating capacity is estimated at 2,070,000 kWh. This is sufficient to meet the community electrical demand, displace approximately 20,000 gallons of heating oil use in the winter and providing over 800,000 kWh of excess energy during the summer months that will be utilized for future commercial / industrial growth.

Using a 400 kW impulse turbine would provide approximately 270,000 kWh of additional excess energy in the summer months. Winter energy production would be similar to the 300 kW turbine due to flow limitations.

5.1.2 Permits

Provide the following information as it may relate to permitting and how you intend to address outstanding permit issues.

- List of applicable permits
- Anticipated permitting timeline
- Identify and describe potential barriers

A list of project related permits and their current status is provided below:

- *Federal Energy Regulatory Commission (FERC) – A determination of no FERC license required has been issued for this project*
- *Review by the State Historic Preservation Office – In August 2014 Cultural Resource Consultants, LLC. completed a review of the Alaska Heritage Resources Survey. No known historic properties were noted to exist within the proposed project’s “area of potential affect.” Once construction funding is in place, a letter stating the results of the literature review will be sent to SHPO, requesting a finding of No Historic Properties Affected.*
- *ADOT Right of Way Permit – A draft utility permit application was submitted to ADOT in 2014. The utility permit must be issued within 12 months of construction, so final permitting will commence once funding is acquired and the construction schedule is better defined.*

- *United States Army Corps of Engineers – The ACOE has determined that the project will be covered under Nationwide Permit 17, for Hydro Projects. A pre-construction notification must be submitted prior to beginning construction. The ACOE requested that the preconstruction notification be submitted once the design drawings are 95% complete.*
- *Federal Aviation Administration (FAA) – FAA has issued a Determination of No Hazard to Air Navigation for the project.*
- *Alaska Department of Fish and Game (ADF&G) Habitat Permit – ADF&G has reviewed the preliminary drawings. A fish habitat permit will be required, but ADF&G anticipates that the permit will be issued quickly upon receiving final design drawings. There are no apparent habitat concerns above the Edgerton Highway and downstream concerns will be mitigated if water is returned to the creek bed immediately downstream of the Edgerton Highway culver crossing.*
- *ADNR water rights – An application for water rights has been submitted to ADNR. Based on the ADNR website, previous water rights have not been granted in the area surrounding the proposed project.*
- *Alaska Dam Safety Engineer Review – The proposed diversion structure does not meet the physical definition of a regulated dam as described in AS 46.17.900(3), namely the diversion structure: A) will not impound 50 acre feet or more water, and B) does not have a height in excess of 20-ft. However, the diversion will need to undergo hazard classification analysis. Due to the low height and very small containment volume of the proposed structure, it is unlikely that the dam will be regulated by the State. Once the diversion structure design is finalized, the engineer will submit an application for jurisdictional determination for the diversion structure to the office of the State Dam Safety Engineer for review.*

5.2 Project Site

Criteria: Stage 2-3.B: A site is available and suitable for the proposed energy system.

Describe the availability of the site and its suitability for the proposed energy system. Identify potential land ownership issues, including whether site owners have agreed to the project or how you intend to approach land ownership and access issues.

Land required for the development of the proposed improvements is owned by Chitina Native Corporation, and will be provided to the utility as an in-kind contribution to the project. The utility, Chitina Electric Inc, is owned by the Chitina Native Corporation and donation of the land is considered a benefit to the community and Corporation stakeholders.

5.3 Project Risk

Criteria: Stage 2-3.C: Project technical and environmental risks are reasonable.

5.3.1 Technical Risk

Describe potential technical risks and how you would address them.

As with any remote project, there are some potential risks associated with construction of the proposed hydroelectric facility. The goal of the project team is to minimize the potential risks via thorough planning, proper field investigations, and realistic design assumptions. The following potential risks have been addressed:

1. *Access Road Alignment – During early planning stages, there was a concern that the proposed access road to the intake was not feasible due to terrain features. Over the 2014 season, project participants proved that the road alignment is feasible through onsite survey, substantial tree and brush clearing, and onsite constructability review by a seasoned road contractor.*

2. *Penstock Grade – There were early concerns that the proposed penstock could not “escape the canyon,” while maintaining a positive downhill grade. Field efforts in 2014 proved that it is possible to keep a positive grade, with no need for a siphon or other less reliable approaches.*
3. *Bedrock Depth – Prior to the summer of 2014, the bedrock depth at the diversion site, along the access road, and penstock alignment was unknown. A Ground Penetrating Radar study has provided bedrock depth data, which is critical to developing a realistic cost estimate.*
4. *Seepage – The proposed intake / diversion site is underlain by loose deposits to a depth of 30+ feet. The material should provide a stable foundation for the proposed intake/diversion structure. However, some seepage is expected. In warm months the seepage will not affect the facility output. However, during cold, winter months with low stream flow the seepage could affect the ability of the facility to meet community power demands. If this becomes an issue, seepage control measures could be implemented.*

It is not possible to eliminate all risks associated with a project of this type. However, with proper planning, field studies, and diligent design it is possible to mitigate most concerns. The project team has worked hard to address major concerns identified to date and to account for their costs in the construction cost estimate.

5.3.2 Environmental Risk

Explain whether the following environmental and land use issues apply, and if so how they will be addressed:

- Threatened or endangered species
- Habitat issues
- Wetlands and other protected areas
- Archaeological and historical resources
- Land development constraints
- Telecommunications interference
- Aviation considerations
- Visual, aesthetics impacts
- Identify and describe other potential barriers

- **Threatened or endangered species** – *United States Fish and Wildlife Service (USFWS) has determined that there are no threatened or endangered species within the extents of the project.*
- **Habitat Issues** – *Any new utility lines will be designed with raptor concerns in mind. USFWS identifies no critical habitats within the project area. The State of Alaska Department of Fish and Game (ADF&G) does not list Fivemile Creek as an anadromous stream. Formal consultation with ADF&G has been initiated. No apparent habitat concerns exist above the Edgerton Highway. ADF&G has indicated that fish habitat concerns downstream of the highway could likely be mitigated by returning water to the creek as close to the Edgerton Highway culvert outfall as possible. A fish habitat permit will be required prior to beginning construction, but ADF&G does not anticipate any additional mitigation measure requirements. ADF&G has requested that a formal application for a habitat permit wait until the design is at 95% completion level.*
- **Wetlands and other protected areas** – *Research into USFWS National Wetlands Inventory does not show any wetlands within the project area; wetlands are not anticipated to be an issue for the Fivemile Creek project. The ACOE has verified that work within the*

streambed will be covered by Nationwide Permit 17 for hydroelectric facilities. A pre-construction notification will need to be submitted to the ACOE prior to beginning construction activities within the streambed.

- **Archaeological and historical resources** – Based on a preliminary review of the Alaska Heritage Resource Survey (AHRs), completed by Cultural Resource Consultants, LLC, no significant historical properties are within the project area. A letter will be submitted to the State Historic Preservation Officer, citing the literature review and requesting a finding of “No Historic Properties Affected.”
- **Land development constraints** – With the exception of the ADOT ROW (Edgerton Highway), the project involves lands owned by the Chitina Native Corporation. The Corporation plans to provide these lands as an in-kind contribution; there are no zoning restrictions on the affected lands. In order to cross the Edgerton Highway ADOT will need to issue a utility permit. Negotiations for the proposed crossing are ongoing.
- **Telecommunications Interference** – There are no anticipated telecommunication conflicts.
- **Aviation considerations** – FAA has issued a Determination of No Hazard to Air Navigation for the project.
- **Visual, aesthetics impacts** – Given that the majority of the proposed facilities will be buried (penstock) and/or hidden within wooded areas (stream diversion structure, access road), visual impacts are not anticipated to be an issue for this project. Note that the proposed turbine house will be situated adjacent to the existing diesel plant. Noise, odor, and aesthetic impacts of the turbine building will be less significant than the existing diesel plant.

5.4 Existing and Proposed Energy System

Criteria: Stage 2-3.D: The proposed energy system can reliably produce and deliver energy as planned.

5.4.1 Basic Configuration of Existing Energy System

Describe the basic configuration of the existing energy system. Include information about the number, size, age, efficiency, and type of generation.

CEI’s existing diesel power plant was constructed in 2008 and energized in September, 2009. The project, which replaced the community’s aged, non-code compliant diesel power plant, was funded through the Denali Commission and managed by the Alaska Energy Authority. The facility consists of a pre-engineered, modular metal structure (15’x42’) founded on concrete strip footings. The structure contains three diesel gensets, including one 54kW and two 117 kW units, and paralleling switchgear. The power plant SCADA system reports typical generation efficiencies of around 12.2kW-h per gallon of diesel consumed. Power is generated at 480 volts AC and stepped up to 7.2/12.47 kV, using a pad mount transformer. A 4-mile overhead, 3-phase transmission line connects the power plant to the community power grid; the intertie was designed to provide a tie-in point for the proposed hydroelectric plant.

Existing Energy Generation and Usage

a) Basic configuration (if system is part of the Railbelt¹ grid, leave this section blank)

- | | |
|--|--|
| <ul style="list-style-type: none"> i. Number of generators/boilers/other ii. Rated capacity of generators/boilers/other iii. Generator/boilers/other type iv. Age of generators/boilers/other v. Efficiency of generators/boilers/other vi. Is there operational heat recovery? (Y/N) If yes estimated annual displaced heating fuel (gallons) | <ul style="list-style-type: none"> i. 3 ii. 117kW, 117kW, 54 kW iii. Diesel Power Generation iv. 7 years v. 12.2 kWh per gallon of diesel fuel vi. Yes, there is an existing heat recovery system that heats the clinic. Estimated fuel displacement of around 2,000 gallons annually. |
|--|--|

b) Annual O&M cost (if system is part of the Railbelt grid, leave this section blank)

- | | |
|---|---|
| <ul style="list-style-type: none"> i. Annual O&M cost for labor ii. Annual O&M cost for non-labor | <ul style="list-style-type: none"> <i>\$46,000 (2013 CEI Financial Statement)</i> <i>\$237,500 (2013 CEI Financial Statement)</i> |
|---|---|

c) Annual electricity production and fuel usage (fill in as applicable) (if system is part of the Railbelt grid, leave this section blank)

- | | | | | | |
|--|---|---|-------|--|--|
| <ul style="list-style-type: none"> i. Electricity [kWh] ii. Fuel usage <table border="0" style="margin-left: 20px;"> <tr> <td style="padding-right: 10px;">Diesel [gal]</td> <td><i>43,253 gal (Average of FY 2012-2014 PCE Figures)</i></td> </tr> <tr> <td>Other</td> <td></td> </tr> </table> iii. Peak Load iv. Average Load v. Minimum Load vi. Efficiency vii. Future trends | Diesel [gal] | <i>43,253 gal (Average of FY 2012-2014 PCE Figures)</i> | Other | | <ul style="list-style-type: none"> <i>528,903 kWh (Average of FY 2012-2014 PCE Figures)</i> <i>90 kW</i> <i>65 kW</i> <i>42 kW</i> <i>12.2 kWh per gallon of diesel fuel</i> <i>Average load is increasing at around 2.5% per year</i> |
| Diesel [gal] | <i>43,253 gal (Average of FY 2012-2014 PCE Figures)</i> | | | | |
| Other | | | | | |

d) Annual heating fuel usage (fill in as applicable)

- | | |
|--|---|
| <ul style="list-style-type: none"> i. Diesel [gal or MMBtu] ii. Electricity [kWh] iii. Propane [gal or MMBtu] iv. Coal [tons or MMBtu] v. Wood [cords, green tons, dry tons] vi. Other | <ul style="list-style-type: none"> <i>Diesel plant is currently heated via waste heat from the gen sets.</i> |
|--|---|

¹ The Railbelt grid connects all customers of Chugach Electric Association, Homer Electric Association, Golden Valley Electric Association, the City of Seward Electric Department, Matanuska Electric Association and Anchorage Municipal Light and Power.

5.4.2 Future Trends

Describe the anticipated energy demand in the community over the life of the project.

Based on the previous 10 years of PCE data, the community's average load is increasing at around 2.5% per year. For the purposes of this grant application, the average community load is assumed to grow at 2.5% per year over the life of the project.

5.4.3 Impact on Rates

Briefly explain what if any effect your project will have on electrical rates in the proposed benefit area over the life of the project. For PCE eligible communities, please describe the expected impact would be for both pre and post PCE.

The proposed project will reduce the pre-PCE cost of power generation by an amount approximately equivalent to the value of displaced diesel. For example, if the proposed hydro reduces the amount of diesel consumed by 45,000 gallons per year and the purchase price for diesel is \$4.33/gallon, the operating cost for the utility will be decreased by 45,000 gallons x \$4.33/gal = \$195,000. If the utility sells 528,000 kW-h of electricity during the same year, the cost of each kW-h will be reduced by approximately \$195,000 / 528,000 kW-h = \$0.37 per kW-h. This would correspond to a dramatic reduction in energy costs for commercial (non-PCE eligible) customers (+/- 40% reduction). The reduction in fuel costs would also reduce the utility's calculated PCE level (for PCE eligible power sales) and ultimately reduce the cost to PCE-eligible consumers as well, by around 10%.

5.4.4 Proposed System Design

Provide the following information for the proposed renewable energy system:

- A description of renewable energy technology specific to project location
- Optimum installed capacity
- Anticipated capacity factor
- Anticipated annual generation
- Anticipated barriers
- Integration plan
- Delivery methods

System Design – Primary working components of the proposed Fivemile Creek Hydro Project Include:

1. a concrete diversion/intake structure,
2. 10,400 LF of buried penstock,
3. a turbine building housing a 300 to 400 kW Pelton Wheel Turbine
4. a 4-mile overhead electrical intertie to connect the generation equipment to the community's existing grid (this portion of the project was constructed in 2008).
5. An electric boiler (frequency control unit) connected to the existing clinic hydronic heat recovery system.

6. Dispatchable electric heating elements for utilizing excess energy at various community facilities.

Note that the current (65%) design drawings show several features that have been eliminated from the design to reduce costs. The features removed from the design include: an automated gate at the diversion/intake structure, grouting/seepage control measures at the diversion, and insulated arctic pipe for the penstock. These details will be removed from the design drawings during preparation of the design / build bid package.

The diversion/intake structure will incorporate a manual gate to flush sediment buildup. The pool created by the diversion will protect the intake from freezing. Communication and low voltage power lines will be extended to the intake location to provide SCADA controls. The intake will be accessible via a proposed 12-ft wide road.

The proposed penstock will consist of a combination of High Density Polyethylene (HDPE) and steel pipe sections; the diameter of the pipeline will range from 20 to 12 inches. The pipeline will be buried. The design of the pipeline addresses thrust restraint, air release/vacuum concerns, water hammer effects, etc. The penstock will terminate at a hydroelectric powerhouse situated adjacent to the community's existing diesel powerhouse. The turbine building will include a pelton turbine, generator, and necessary controls. Water from the turbine tailrace will be directed back into Fivemile Creek, below the Edgerton Highway culvert. The facility will operate under approximately 950 feet of static head.

Optimum Installed Capacity – Turbine selection was based on a review of historic community demands, as well as extensive hydraulic and hydrologic modeling. The preliminary turbine selection (300 kW) provides good generation efficiency at expected design loads over the life of the project, while providing excess capacity during periods of high flow to power expected heating and future commercial loads. During the value engineering process, a larger turbine (400 kW) will be considered, as the difference in installed cost between the units would be minimal.

Anticipated Capacity Factor – Estimating the capacity factor for the proposed hydro plant will depend on a number of factors, and is heavily influenced by the availability and utilization of excess energy from year to year. For this discussion, we assume that the capacity factor is defined as the ratio of the actual output of the power plant to its potential output if operating at nameplate capacity over one year. For the initial years of operation, it is assumed that the hydro plant will meet the community load 90% of the time (10% diesel on time for maintenance, troubleshooting, etc). Further, it is assumed that the dispatchable load heaters displace approximately 20,000 gallons of heating fuel, and that initial commercial loads can utilize up to 50,000 KWH of excess energy produced during the summer. Based on these assumptions, and a turbine nameplate capacity of 300 kW, the estimated capacity factor would be around 44%. Note that the factor will increase over time as community demand increases. For example, if the community and commercial demands grow at 2.5% per year, the estimated capacity factor in the year 2025 is 56%, and in the year 2035 is 72%.

Anticipated Annual Generation – As noted above, it is estimated that the proposed hydro plant will supply the full community demand 90% of the time during a typical year and displace 20,000 gallons of heating fuel in the first year via dispatchable heating elements. Further, it is assumed that commercial demand will utilize 50,000 KWH of excess summertime generation in the first year of operation. Based on PCE data, the current annual electric demand is around 530,000 kW-h (90% of this amount is 480,000 kW-h). Further, assuming that a gallon of heating oil is equivalent to 30 kW-h of end user heat, the dispatchable electric heaters will deliver around 600,000 kW-h of energy. Based on this accounting, the total anticipated generation from the hydro plant during the

first year of operation will be approximately 480,000 kW-h + 600,000 kW-h + 50,000 kW-h = 1.13 MW-h of energy. The annual generation is expected to increase with population and industrial growth in the community. For example, in the year 2025 the plant is expected to generate 1.3 MW-h, and in the year 2035 nearly 1.5 MW-h. Of course, if a larger turbine is selected during the design build process, the amount of excess energy available for commercial ventures during the summer months will increase proportionately.

Potential Barriers – *The project team has taken great care in identifying and addressing potential challenges or “fatal flaws” throughout the initial design process. Field investigations, to date, include multi-year stream gauging, LIDAR aerial contour generation, ground survey, penstock alignment clearing, geophysical survey (ground penetrating radar), constructability review, and fish habitat assessment and gap analysis. At this time, design and construction of the proposed facilities appears feasible.*

Delivery Method – *The hydro plant will generate power at 480 volts, and transformers adjacent to the plant will step the voltage up to 7.2/12.47 kV. Power from the hydro plant will be transmitted to the community’s electrical grid via an existing 4-mile long, 3-phase, overhead power line.*

Proposed System Design Capacity and Fuel Usage

(Include any projections for continued use of non-renewable fuels)

a) Proposed renewable capacity (Wind, Hydro, Biomass, other) [kW or MMBtu/hr]	<i>300 to 400 kW Hydro</i>
b) Proposed annual electricity or heat production (fill in as applicable)	
i. Electricity [kWh]	<i>First year: 1,130 kW-h, Year 20: 1,500,000 kW-h</i>
ii. Heat [MMBtu]	
c) Proposed annual fuel usage (fill in as applicable)	
i. Propane [gal or MMBtu]	
ii. Coal [tons or MMBtu]	
iii. Wood or pellets [cords, green tons, dry tons]	
iv. Other	
d) i. Estimate number of hours renewable will allow powerhouse to turn diesel engines off (fill in as applicable)	<i>90% of time = 7,884 hours/year</i>

5.4.5 Metering Equipment

Please provide a short narrative, and cost estimate, identifying the metering equipment that will be used to comply with the operations reporting requirement identified in Section 3.15 of the Request for Applications.

CEI understands the grant requirement, and the importance, of providing the AEA with Performance / O&M Reports for 10-years after construction. The proposed improvements will include a sophisticated SCADA system that will provide for real time monitoring and reporting on a myriad of operational parameters. The information will be available in real time over the internet, similar to the communities existing diesel plant. This system will provide CEI and AEA with nearly unlimited monitoring and reporting capabilities.

SECTION 6 – ECONOMIC FEASIBILITY AND BENEFITS

6.1 Economic Feasibility

Criteria: Stage 2-4.A: The project is shown to be economically feasible (net positive savings in fuel, operation and maintenance, and capital costs over the life of the proposed project).

6.1.1 Economic Benefit

Explain the economic benefits of your project. Include direct cost savings, and how the people of Alaska will benefit from the project. The benefits information should include the following:

- Anticipated annual and lifetime fuel displacement (gallons and dollars)
- Anticipated annual and lifetime revenue (based on i.e. a Proposed Power Purchase Agreement price, RCA tariff, or cost based rate)
- Additional incentives (i.e. tax credits)
- Additional revenue streams (i.e. green tag sales or other renewable energy subsidies or programs that might be available)

The economic model used by AEA is available at <http://www.akenergyauthority.org/Programs/Renewable-Energy-Fund/Rounds#round9>. This economic model may be used by applicants but is not required. The final benefit/cost ratio used will be derived from the AEA model to ensure a level playing field for all applicants. If used, please submit the model with the application.

In addition to providing a clean, renewable source of energy for Chitina, the proposed hydropower project will provide substantial cost savings for the community over the life of the project as described below:

Diesel Generation Fuel Displacement

During the first year of operation, it is estimated that the hydropower plant will displace roughly 41,000 gallons of diesel fuel that would have been used for diesel generation, equating to \$162,000. Assuming that the community will continue its current growth trend, the diesel generation avoidance over the lifetime of the project will equate to roughly 3,800,000 gallons, which, based on predicted diesel prices in the ACEP model, would save the utility roughly \$8,500,000 (2015 dollars).

PCE Level Reduction

The proposed project will substantially decrease the utility's operating costs, primarily as a result of the diesel displacement described above. As a result, the utility will be able to produce less expensive power, effectively decreasing CEI's calculated PCE level. The lower PCE level will save the state of Alaska hundreds of thousands of dollars in annual subsidies and also lower the residential rate that customers pay.

Additional Revenue Streams

For most of the project life, it is anticipated that the utility will generate a surplus of energy during the summer months that will be made available to commercial users at a discounted rate. Calculations for the life of the project show that these sales could result in revenue of roughly \$1,900,000 (NPV). See attached "Project Benefit" spreadsheet for additional information.

During winter months, proposed dispatchable heaters at various community buildings will utilize available surplus energy from the hydro plant to displace heating fuel. It is estimated that the project will displace over \$1,500,000 (2015 dollars) worth of heating fuel over the life of the project.

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6.1.2 Power Purchase/Sale

The power purchase/sale information should include the following:

- Identification of potential power buyer(s)/customer(s)
- Potential power purchase/sales price - at a minimum indicate a price range
- Proposed rate of return from grant-funded project

Identify the potential power buyer(s)/customer(s) and anticipated power purchase/sales price range. Indicate the proposed rate of return from the grant-funded project.

The existing and future CEI consumers will remain the potential power buyers for the proposed hydro generation that will replace/supplement the existing diesel generation. CEI also intends to pursue interruptible electric heating sales. Due to the effects of the Power Cost Equalization Program (PCE), consumers may not see large reductions to their effective rates (the current effective residential rate is \$0.32/kW-h). However, electricity generation costs and commercial rates will decrease sharply, providing a more sustainable electric utility and reducing the level of PCE funding required (effectively saving the State of Alaska money). A future business plan will assess the impact on electrical rates in more detail.

Based on the most recent fuel purchase records (\$4.33 per gallon) and the total estimated diesel avoidance attributable to the project (approximately 60,000 gallons per year), the simple payback period for the estimated capital construction cost is around 23 years. A more sophisticated analysis is presented in the attached economic analysis spreadsheet. The current benefit/cost ratio for the project is estimated to be 2.8.

6.1.3 Public Benefit for Projects with Private Sector Sales

For projects that include sales of power to private sector businesses (sawmills, cruise ships, mines, etc.), please provide a brief description of the direct and indirect public benefits derived from the project as well as the private sector benefits and complete the table below. See section 1.6 in the Request for Applications for more information.

The proposed project, assuming a 300 kw turbine is installed, will provide approximately 765,000 kW-h annually of equivalent excess energy between May and September of each year. This energy will be available for purchase by current and future commercial entities in and around Chitina. The excess energy will be sold by the utility at a reduced rate, providing opportunities for growing current commercial customers and encouraging new commercial enterprises in the community. See the attached economic spreadsheet for additional information on this subject.

Renewable energy resource availability (kWh per month)	Average 113,000kW-h per month (May-Sept.)
Estimated sales (kWh)	50,000 kW-H (year 1), 2.5% annual growth in sales.
Revenue for displacing diesel generation for use at private sector businesses (\$)	\$1,900,000 (life of project)
Estimated sales (kWh)	4,700,000 kWh

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Revenue for displacing diesel generation for use by the Alaskan public (\$)	N/A
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6.2 Financing Plan

Criteria: Stage 2-4.B: The project has an adequate financing plan for completion of the grant-funded phase and has considered options for financing subsequent phases of the project.

6.2.1 Additional Funds

Identify the source and amount of all additional funds needed to complete the work in the phase(s) for which REF funding is being applied in this application. Indicate whether these funds are secured or pending future approvals. Describe the impact, if any, that the timing of additional funds would have on the ability to proceed with the grant.

To date, CEI has received \$580,000 in funding through the REF program for planning and design of the proposed hydro project. Our current (REF Round IX) application requests funding for constructing the proposed improvements (estimated construction cost of \$6,000,000). It is our understanding that the REF program can provide a maximum of \$4 million in funding for a single project. Given funding received to date, CEI's current grant application requests \$3,500,000 for construction. To demonstrate its commitment to the project, CEI intends to generate the additional \$2.5 million required for construction through federal grants. CEI is actively pursuing grants through the following federal programs:

- ICDBG – Indian Community Development Block Grant Program*
- CDBG – Community Development Block Grant Program*
- USDA – High Energy Cost Grants*
- USDA – Community Facilities Direct Loan & Grant Program*
- USDA – Rural Energy for America*
- DOE – Department of Energy Tribal Clean Energy and Energy Efficiency Funding*

6.2.2 Financing opportunities/limitations

If the proposed project includes final design or construction phases, what are your opportunities and/or limitations to fund this project with a loan, bonds, or other financing options?

There are a number of low-interest loan opportunities from federal and state agencies. However, CEI is a relatively small utility and the addition of substantial debt burden could endanger the financial sustainability of the utility. CEI is actively researching the possibility of utilizing federal loan programs available through USDA, DOE, and the state of Alaska. A final decision on the ability to take on debt will depend upon the terms and financial options available.

6.2.3 Cost Overruns

Describe the plan to cover potential cost increases or shortfalls in funding.

The current construction cost estimate includes a 20% contingency intended to cover unanticipated project related costs.

6.2.4 Subsequent Phases

If subsequent phases are required beyond the phases being applied for in this application, describe the anticipated sources of funding and the likelihood of receipt of those funds.

No subsequent phases beyond the construction phase.

6.3 Other Public Benefit

Criteria: Stage 3-4.C: Other benefits to the Alaska public are demonstrated. Avoided costs alone will not be presumed to be in the best interest of the public.

Describe the non-economic public benefits to Alaskans over the lifetime of the project. For the purpose of evaluating this criterion, public benefits are those benefits that would be considered unique to a given project and not generic to any renewable resource. For example, decreased greenhouse gas emission, stable pricing of fuel source, won't be considered under this category. Some examples of other public benefits include:

- The project will result in developing infrastructure (roads, trails, pipes, power lines, etc.) that can be used for other purposes
- The project will result in a direct long-term increase in jobs (operating, supplying fuel, etc.)
- The project will solve other problems for the community (waste disposal, food security, etc.)
- The project will generate useful information that could be used by the public in other parts of the state
- The project will promote or sustain long-term commercial economic development for the community

Expected non-economic benefits to the community of Chitina include:

- *The project is expected to spur commercial and industrial growth in the community over time, making the community more sustainable.*
- *The expected increases in commercial business will result in a direct, long term increase in jobs.*
- *The project will provide on the job training resulting in a more competent and employable local workforce.*
- *The project will reduce the handling of diesel fuel and lubricants in the community, reducing the possibility of a spill, which could contaminate the Copper River and cause significant downstream economic impacts.*

SECTION 7 – SUSTAINABILITY

Describe your plan for operating the completed project so that it will be sustainable throughout its economic life.

Include at a minimum:

- Capability of the Applicant to demonstrate the capacity, both administratively and financially, to provide for the long-term operation and maintenance of the proposed project
- Is the Applicant current on all loans and required reporting to state and federal agencies?
- Likelihood of the resource being available over the life of the project
- Likelihood of a sufficient market for energy produced over the life of the project

The proposed project will be owned and operated by Chitina Electric, Inc., a subsidiary of Chitina Native Corporation which has been serving the community for over 30 years. CEI's existing management structure and administrative department will remain in place. The overall operation of the utility will change little as a result of this project. The Utility will continue to operate and maintain its facilities, and bill its customers for services provided. Once startup is completed, the Hydro plant should require little, if any more maintenance than the existing diesel system. The diesel system will need to be exercised on a regular basis to insure it is ready for backup service. Similarly, during periods of low water when the diesel plant is carrying the load, the Hydro will need to be maintained in ready condition.

Operation, maintenance and management requirements will be addressed in detail in the project Business Plan. The Plan will provide an organizational structure to help the Utility transition to Hydro power. In addition to the business plan, administrative and operator training will be provided on an as-needed basis as part of the startup services.

CEI will monitor, record, and report savings and benefits afforded by the proposed hydro plant. The hydro plant will be equipped with an advanced SCADA system. The system will be programmed to record and provide reports for whatever parameters are necessary. The information will be available in real time over the internet, similar to the community's existing diesel plant.

SECTION 8 – PROJECT READINESS

Describe what you have done to prepare for this award and how quickly you intend to proceed with work once your grant is approved.

Specifically address your progress towards or readiness to begin, at a minimum, the following:

- The phase(s) that must be completed prior to beginning the phase(s) proposed in this application
- The phase(s) proposed in this application
- Obtaining all necessary permits
- Securing land access and use for the project
- Procuring all necessary equipment and materials

CEI is prepared to move swiftly once additional grant moneys are in place. The project management team is already assembled and ready to go. A preliminary schedule for proceeding with the project is provided in Section 3.1. Immediately upon receiving grant approval, the project team will begin preparing the design/build bid documents and firming up remaining permit approvals. Site control for the proposed facilities is secure, with the exception of the Edgerton Highway crossing. Concurrent with preparation of the design build documents, the project team

will vigorously pursue a final utility permit for the highway crossing. Having construction funding in place will assist with the negotiating process with ADOT. Procurement of materials will be the responsibility of the selected design/build contractor. The time required for procurement is built into the preliminary schedule shown in section 3.1.

SECTION 9 – LOCAL SUPPORT AND OPPOSITION

Describe local support **and opposition**, known or anticipated, for the project. **Include letters, resolutions, or other documentation** of local support from the community that would benefit from this project. The Documentation of support must be dated within one year of the RFA date of July 8, 2015.

The proposed project is fully supported by the residents and local businesses (consumers), the utility (owner/operator), and the local Corporation (land owner). Please see the grant application cover letter submitted by the CEI President, Mr. Martin Finnesand, in support of the project and the attached resolutions in support of the project

The utility has offered to provide free use of its limited spread of heavy equipment for the project, and the utility manager is donating his time as needed for project coordination. In addition, the Corporation has agreed to donate the necessary land for the project. The Corporation has also purchased two commercial grade ice makers as a means to use surplus hydro power during summer months. The residents of Chitina are excited about the potential project; the idea of powering their community with clean, renewable energy has invigorated the community.

SECTION 10 – COMPLIANCE WITH OTHER AWARDS

Identify other grants that may have been previously awarded to the Applicant by the Authority for this or any other project. Describe the degree you have been able to meet the requirements of previous grants including project deadlines, reporting, and information requests.

The project has received funding through REF rounds II and IV. The funds from these previous awards have been utilized to plan and prepare 65% design drawings for the project. The funds remaining from these grant awards will be utilized to prepare the design/build bid documents, complete a business plan, and complete remaining permitting efforts. The project team has diligently reported progress on the project to AEA and has quickly responded to information requests.

SECTION 11 – LIST OF SUPPORTING DOCUMENTATION FOR PRIOR PHASES

In the space below please provide a list additional documents attached to support completion of prior phases.

*CDR
65% Design Drawings
Permit Correspondence*

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SECTION 12 – LIST OF ADDITIONAL DOCUMENTATION SUBMITTED FOR CONSIDERATION In the space below please provide a list of additional information submitted for consideration.

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**Renewable Energy Fund Round IX
Grant Application - Standard Form**



SECTION 13 – AUTHORIZED SIGNERS FORM

Community/Grantee Name: <i>Chitina Electric, Inc.</i>	
Regular Election is held: <i>Annually</i>	Date: <i>July 24, 2015</i>

Authorized Grant Signer(s):

Printed Name	Title	Term	Signature
<i>Martin Finnesand</i>	<i>President/General Manager</i>	<i>1 year</i>	<i>Martin H. Finnesand</i>

**I authorize the above person(s) to sign Grant Documents:
(Must be authorized by the highest ranking organization/community/municipal official)**

Printed Name	Title	Term	Signature
<i>Martin Finnesand</i>	<i>President/General Manager</i>	<i>1 year</i>	<i>Martin H. Finnesand</i>

Grantee Contact Information:


Mailing Address:	<i>P.O. Box 88 Chitina, AK 99566</i>
Phone Number:	<i>907-823-2220</i>
Fax Number:	<i>907-823-2202</i>
E-mail Address:	<i>mfinn@cvinternet.net</i>
Federal Tax ID #:	<i>920079071</i>

Please submit an updated form whenever there is a change to the above information.

SECTION 14 – ADDITIONAL DOCUMENTATION AND CERTIFICATION
SUBMIT THE FOLLOWING DOCUMENTS WITH YOUR APPLICATION:

- A. Contact information and resumes of Applicant’s Project Manager, Project Accountant(s), key staff, partners, consultants, and suppliers per application form Section 3.1, 3.4 and 3.6.**
Applicants are asked to provide resumes submitted with applications in separate electronic documents if the individuals do not want their resumes posted to the project web site.
- B. Letters or resolutions demonstrating local support per application form Section 9.**
- C. For projects involving heat: Most recent invoice demonstrating the cost of heating fuel for the building(s) impacted by the project.**
- D. Governing Body Resolution or other formal action taken by the applicant’s governing body or management per RFA Section 1.4 that:**
 - Commits the organization to provide the matching resources for project at the match amounts indicated in the application.
 - Authorizes the individual who signs the application has the authority to commit the organization to the obligations under the grant.
 - Provides as point of contact to represent the applicant for purposes of this application.
 - Certifies the applicant is in compliance with applicable federal, state, and local, laws including existing credit and federal tax obligations.
- E. An electronic version of the entire application on CD or other electronic media, per RFA Section 1.7.**
- F. CERTIFICATION**

The undersigned certifies that this application for a renewable energy grant is truthful and correct, and that the applicant is in compliance with, and will continue to comply with, all federal and state laws including existing credit and federal tax obligations and that they can indeed commit the entity to these obligations.

Print Name	<i>Martin Finnesand</i>
Signature	
Title	<i>President/General Manager</i>
Date	<i>09/14/2015</i>

Fivemile Creek Hydro Project
Renewable Energy Fund, Round IX Grant Application

List of Attachments

1. Project Team Resumes – 16 Pages
2. Chitina Electric Inc. Resolution to Support Project & Pursue Additional Funding – 1 Page
3. Letters of Support for Project: - 9 Pages
 - a. Chitina Native Corporation
 - b. Chitina Traditional Indian Village Council
 - c. Copper River Basin Regional Housing Authority
 - d. Alaska DOT & PF Building Maintenance Manager
 - e. Wrangell St. Elias National Park
 - f. Gilpatrick’s Hotel Chitina, Inc.
 - g. Spirit Mountain Artworks
 - h. Taral Enterprises, LLC.
 - i. Hem Charters
4. Permitting Documents – 21 Pages
 - a. ADNR Water Rights Application
 - b. ADOT - Utility Permit Application
 - c. FAA Permit
 - d. FERC – Finding of No License Required
 - e. ADF&G
5. Fivemile Creek Hydro Project 65% Construction Drawings – 34 Pages

Project Team Resumes

Martin has over 25 years of electrical experience, both with Chitina Electric, Inc. and as it relates to the construction industry. Over 40 years' experience in the construction industry. He performed all tasks related to management and operations for work in both fields. General Manager for Chitina Electric, Inc. since its inception, performing all tasks required for its growth and operation. Community of Chitina being serviced in a professional manner with a high-quality product as a result of years of dedicated work.

Project Experience

Chitina Electric, Inc. - General Manager

Manage and operate all business for this wholly-owned subsidiary of Chitina Native Corporation since its inception in 1979. From scratch, purchased and installed all materials and supplies for providing electricity to the entire community of Chitina, Alaska. Established management records, price sheets and maintenance schedules. Administered all grants for Chitina Electric, including \$261,000 grant for hydroelectric plant construction, and grants for hydroelectric plant repair and upgrade of transmission lines. Built original generator building. Currently oversee all aspects of Chitina Electric, Inc., including running of generators; performance of all powerline work to customers; performance of overhauls on generators; all purchasing of equipment and supplies; hookup of new customers; installation of new power lines. Supervise Chitina Electric's two other employees. 1980 – Present.

Tsedina Construction - President and General Manager

Coordinated work efforts for Tsedina Construction on its joint ventures with Dokoozian & Associates for two separate projects constructing housing units. Held meetings, communicated via telephone, fax and in person all the necessary tasks to enter into construction projects by joint venture. Secured financing to assist with bonding requirements for Tsedina Construction to joint venture. Resulted in a successful and profitable project being completed on time and under-budget for the joint venture with Dokoozian & Associates. 1997 – 2000.

Ahtna Construction Corporation – Project Manager

Over a period of 20 years, beginning work as a mechanic, heavy equipment operator, and welder, earning the position of crew foreman, and promoted to construction project manager for jobs undertaken by Ahtna. 1979 – 2000.

Various Construction Companies – Construction Work

Performed construction duties for companies including: Morrison/Knutson, Green Construction, Arctic Slope/Alaska General, Rogers & Babler, Chris Berg Construction, Walch Construction Company, Johnson Sand & Gravel, City of Valdez, and Bayless & Roberts. 1959 – 1979.

B&F Chevron Service – Self-Employed

Worked in Chitina. 1958 – 1959.

Years of Experience:

40+ Years

Professional Discipline:

Construction

Residency: AK

Education:

*Electrical Seminar,
Alaska Power Authority
(1984)*

Professional Affiliations:

*Local 302, Operating
Engineers (1969)*



Karl Hulse has over fifteen years of experience in the planning, design and construction management of civil, sanitary, solid waste, bulk fuel, and power generation system projects in rural Alaska. Karl has logged thousands of hours in the field, and this experience has given him an excellent understanding of the challenges associated with remote, cold-climate construction. Karl's project management experience includes extensive client and contractor interaction, and oversight of engineering design, permitting, and contract administration services. Karl has been with CRW since 2002. Since joining CRW, Karl has successfully managed over \$30 million dollars' worth of construction projects throughout the state, from Atka in the western Aleutians and Sterling Landing in the Brooks Range, to Point Baker in Southeast.



Project Experience | Bulk Fuel Facilities

Deering Bulk Fuel Upgrades - *Deering*

Project Engineer and Manager for the planning, design and force account construction of new bulk fuel storage and handling facilities at Deering Alaska, located on the shore of Kotzebue Sound. This project included a new pile-supported tank farm with 242,000-gallons of bulk fuel storage, a barge header, and a bulk transfer area to facilitate filling of local fuel delivery vehicles. The project also included a new retail sales dispenser with remote controls, and upgrades to existing fuel systems at the school, power plant and water treatment facility. This project was complicated due to strict archaeological monitoring requirements, difficult soil conditions and the long distance between the dispenser and the retail fuel sales office.

Kwethluk Bulk Fuel Upgrades - *Kwethluk*

Project Engineer and Manager for the planning, design, bidding and construction of approximately \$4 million in bulk fuel storage and handling facilities for the village of Kwethluk, Alaska located near Bethel. This project was completed in 2007, and included approximately 420,000-gallons of fuel storage, a timber wall secondary containment dike, two barge headers, and over 1,000-LF of buried fuel pipeline to connect the school and power plant to the new bulk facility. The project also included a new retail sales dispenser with remote controls and upgrades to existing fuel systems at the school.

Atka Bulk Fuel Upgrades - *Atka*

Project Engineer and Manager for the planning, design and force account construction of new bulk fuel storage and handling facilities at Atka Alaska, located in the western Aleutians. This project was completed in 2006, and included a tank farm with 205,000-gallons of bulk fuel storage, a dual product barge header, 400-feet of dual fuel pipeline, and a bulk transfer area to facilitate filling of local fuel delivery vehicles. The project also includes a new retail sales dispenser with remote controls and upgrades to existing fuel systems at the school.

Years of Experience:

17+ Years

Professional Discipline:

Civil / Environmental Engineer, Project Manager

Registration:

Professional Civil and Environmental Engineer, Alaska
(CE 10583, EV 14138)

Residency: AK

Education:

BS Civil Engineering, University of Idaho, Moscow, ID 1997
Completed all course work for M.S. in Environmental Engineering, 3.9 GPA, University of Alaska, Anchorage

Professional Affiliations:

American Water Works Association,
Alaska Resource Development Council

*Indicates projects completed at a previous employer.

Sterling Landing Bulk Fuel Upgrades - Sterling

Project Engineer and Manager for the planning, design and force account construction of new bulk fuel storage and handling facilities at Sterling Landing, located near McGrath, Alaska. This project included 150,000-gallons of fuel storage, a barge header, and a bulk transfer area to facilitate filling of fuel tanker trucks.

False Pass Bulk Fuel Upgrades - False Pass

Project Engineer and Manager for the planning, design and force account construction of new bulk fuel storage and handling facilities at False Pass Alaska, located on the Aleutian Chain. This project included 60,000-gallons of fuel storage, a barge header at the City dock, 400-feet of dual product fill pipeline and a bulk transfer area to facilitate filling of fuel tanker trucks.

Akutan Bulk Fuel Upgrades - Akutan

Project Engineer and Manager for the planning, design and force account construction of new bulk fuel storage and handling facilities at Akutan Alaska, located on the Aleutian Chain. This project included 72,000-gallons of bulk fuel storage, a barge header, 1,000-feet of fuel transfer pipeline, and a bulk transfer area to facilitate filling of local fuel delivery vehicles, as well as new tanks and controls at the existing community power plant.

Karluk Bulk Fuel Upgrades - Karluk

Project Engineer and Manager for the planning and design of bulk fuel storage and handling facilities at Karluk Alaska, located on Kodiak Island. This project included refurbishment of a 50,000-gallon tank and barge header and installation of a new fuel transfer pump box.

Whitestone Bulk Fuel Upgrades - Whitestone

Project Engineer and Manager for the planning, design and force account construction of new bulk fuel storage and handling facilities for the community of Whitestone, located near Delta Junction, Alaska. This project included 160,000-gallons of bulk fuel storage, a bulk transfer area to facilitate the filling and off-loading of tanker trucks, and a fleet dispensing area. This project was complicated due to the lack of barge and plane access; all materials were shipped in via ice road during a narrow time window.

Akhiok Bulk Fuel Upgrades - Akhiok

Project Engineer and Manager for the planning, design and force account construction of new bulk fuel storage and handling facilities at Akhiok Alaska, located on Kodiak Island. This project included 36,000-gallons of fuel storage, a barge header, and a bulk transfer area to facilitate filling of fuel tanker trucks, as well as new tanks and controls at the existing community power plant. This project was complicated due to the lack of a permanent power source near the facility.

Point Baker Bulk Fuel Upgrades - Point Baker

Project Engineer and Manager for the planning, design and construction of bulk fuel storage and handling facilities for the community of Point Baker, Alaska. This project includes approximately 46,000-gallons of fuel storage, a dual product barge header, a floating marine sales dispenser and approximately 200 LF of submerged, double wall flexible piping connecting the bulk tanks to the dispenser. Construction of this project is slated to begin in April 2009.

Port Lions Bulk Fuel Upgrades - Port Lions

Project Engineer and Manager for the planning, design, and force account construction of bulk fuel storage and handling facilities for the community of Port Lions, Alaska. This project included approximately 96,000-gallons of fuel storage, a dual product barge header, a retail sales dispenser and piping.

Ruby Bulk Fuel Upgrades - Ruby

Project Engineer and Manager for the planning, design and construction of bulk fuel storage and handling facilities for the community of Ruby, Alaska. This project included approximately 242,000-gallons of fuel storage, a dual product barge header, a retail sales dispenser and associated piping. The project was bid in winter 2008, and is substantially complete. Total change orders to date are less than 1% of contract amount.

Ekwok Bulk Fuel Upgrades - Ekwok

Performed site / geotechnical investigation for new bulk fuel storage and handling facilities for the community of Ekwok, Alaska. This project is currently in the design phase. Construction is planned to begin in Spring, 2010.

Napakiak Bulk Fuel Upgrades - Napakiak

Project Engineer and Manager for the planning and design of bulk fuel storage and handling facilities for the community of Napakiak, Alaska. This project includes approximately 106,000-gallons of fuel storage, a dual product barge header and 1,600 LF fill pipelines, and retail and fleet dispensers. This project is currently in the design phase.

Tuluksak Bulk Fuel Upgrades - Tuluksak

Project Engineer and Manager for the planning and design of bulk fuel storage and handling facilities for the community of Tuluksak, Alaska. This project includes approximately 250,000-gallons of fuel storage, a dual product barge header and 1,000 LF fill pipelines, and retail and fleet dispensers. This project is currently in the planning phase.

Project Experience | Power System Upgrades

Unalakleet Power System Upgrades - Unalakleet

Project Engineer and Manager for the planning and design of a 1.9 mW power house and electrical distribution system upgrades for the City of Unalakleet, Alaska located on the Coast of Norton Sound. This project requires refurbishment of the existing pre-engineered metal power plant structure, and replacement of all mechanical and electrical components within the plant (generators, switchgear, heat recovery equipment, etc). This project also includes the installation of wind monitoring equipment and planning for future integration of the diesel plant with multiple wind turbines. This project is currently in the final design phase.

Nikolski Power System Upgrades - Nikolski

Project Engineer and Manager for the planning, civil design and force account construction of a new 225 kW power house and electrical distribution system upgrades for the community of Nikolski, Alaska located on the Aleutian Chain.

Atka Power System Upgrades - Atka

Project Engineer and Manager for the planning, civil design and force account construction of a new 225 kW power house and electrical distribution system upgrades for the community of Atka, Alaska located on the Aleutian Chain. This project also includes construction of a new hydroelectric facility on nearby Chunisax creek, including dam, turbine house, 1000-LF of 30" diameter penstock and over a mile of 3-phase high voltage transmission line. Construction of the diesel powerhouse and distribution system upgrades was completed in 2006. Construction of the hydro facilities is ongoing.

Larsen Bay Power System Upgrades - Larsen Bay

Completed a conceptual design report for a new modularized diesel power plant and upgrades to the City's existing 450 kW Hydropower Turbine. This project also included management of the design of upgrades to the local cannery's electrical distribution system. As a result of the upgrades, the City is now able to sell power to the Cannery.

Port Heiden Power System Upgrades - Port Heiden

Completed a conceptual design report for a new 460 kW power house and electrical distribution system upgrades for the community of Port Heiden, Alaska located on the Aleutian Chain. This project also included the installation of wind monitoring equipment and planning for future integration of the diesel plant with multiple wind turbines.

Project Experience | Water & Sewer

Unalakleet Water and Sewer Improvements - Unalakleet

Assistant project manager, responsible for overseeing the completion of multiple water and sewer related studies, designs and construction projects for the City of Unalakleet. Karl is the primary contact for this dynamic project, which has included the completion of a geophysical groundwater study (water source investigation), sewage lagoon improvements (including dredging the lagoon, installation of septic tanks, etc.), and a water transmission line feasibility study with recommendations for utilizing the North River for future community water needs. Construction of the sewage lagoon improvements was completed this year. As a result, the City has a refurbished, code-compliant wastewater treatment system at a fraction of the cost of a new lagoon system.

Deering Water Storage Tank Improvements - Deering

Project engineer for the planning, design and force account construction of a new 425,000 gallon insulated, bolted steel, raw water storage tank and associated piping and controls for the City of Deering, Alaska. The City of Deering operates a summer fill / winter draw water treatment system, and had experienced severe water shortages in recent years. This project essentially doubled the community's raw water storage capacity, a critical step towards preventing future water shortages. The project was designed and constructed in a single season, providing immediate benefit to the community.

Unalakleet Main Street Sewer Line Extension - Unalakleet

Project Engineer and Assistant project manager for the design and force account construction of a 400-LF extension of the City's existing buried gravity sewer system. This project was complicated due to the constraints of multiple utilities in a narrow right of way, and available grade. The project was successfully constructed in 2007 and has been operating since that time with no problems.

Gambell Lift Station Improvements - Gambell

Assistant project manager for the renovation of three existing lift stations located in the City of Gambell. The improvements included the replacement of all mechanical and electrical equipment, and retrofitting protective enclosures around the lift stations. Responsible for overseeing the preparation of design drawings, structural drawings, determination of quantities, cost estimate and project coordination.

Quinhagak Sanitation Improvements - Quinhagak

Project Engineer responsible for general assistance with the planning, design and construction management of new piped water distribution, wastewater collection, and solid waste disposal facilities for the Native Village of Kwinhagak.

Gambell Water Storage Tank Improvements - Gambell

Project engineer and assistant project manager for the planning and design of a new 1.3 million gallon insulated, welded steel, treated water storage tank for the City of Gambell, Alaska.

Napaskiak Lagoon - Napaskiak

Project engineer responsible for the planning and design of a 3-acre, dual cell wastewater treatment lagoon and land disposal area. Additional responsibilities included preparation of contract documents, bidding the project, assisting with the procurement of all major system components, periodic site inspections, and the preparation of record drawings. This project was completed in 2005; on time and within budget.

Egegik Southside Water and Sewer Improvements - Egegik

Project engineer responsible for procurement of all major components during construction of a state of the art direct filtration domestic water treatment plant.

Egegik Northside Water System Improvements - Egegik

Project engineer responsible for the design and construction of a Class B well and self contained water treatment plant, 20,000 gallons of water storage, 1000 ft long water main and a community watering point.

Other work experience | Prior to joining CRW, Karl completed the following projects:

Akiachak Water and Sewer System - Akiachak

Piped gravity sewage collection system and circulating water distribution system serving over 600 residents in the community of Akiachak. The project also included the design and force account construction of multiple lift stations, 5,000 LF of force main and a new dual cell wastewater treatment lagoon and land disposal area.

Brevig Mission Water and Sewer System (Phases 1 and 2) - Brevig Mission

Gravity sewer collection system and circulating water distribution system serving over 300 residents in the community of Brevig Mission. This project also included the design and force account construction of a new community septic tank and leach field system for the treatment and disposal of domestic wastewater.

Igiugig Municipal Solid Waste Landfill (MSWL) and Asbestos Monofill - Igiugig

Designed and constructed a new landfill for the community of Igiugig, and closed the existing dump in town in accordance with DEC requirements.

Tuluksak Wastewater Lagoon, Lift Station and Force Main - Tuluksak

Completed design of wastewater collection, pumping and treatment systems to transfer wastewater from the existing washeteria to the a new lagoon located outside of town.

Nanwalek Surface Water Impoundment and Transmission Line - Nanwalek

Designed a new concrete faced rock dam and water intake and transmission infrastructure to provide the community of Nanwalek with a municipal water source.

Nanwalek Dam Hazard Classification Analysis - Nanwalek

Worked closely with the State Dam Inspector to permit a new dam and water intake structure.

Saxman Water System Improvements (800,000 gallon tank, transmission line and pump station) - Saxman

Designed a new water storage system for the City of Saxman to increase fireflow and tap pressures.

Mountain Village HUD Housing Water and Sewer Mainline Extensions – Mountain Village

Responsibilities included design of new water and sewer mainline extensions, residential service connections and foundation pads for eight new HUD homes in Mt. Village.

Larsen Bay Water Tank and Transmission Line – Larsen Bay

Responsibilities included the design of a new 250,000 gallon bolted steel water storage tank and approximately 800 ft of raw water transmission line.

Akiachak Road Improvements – Akiachak

BIA funded road improvements project included resurfacing and widening of all roads in the community of Akiachak.

Sleetmute Water System Improvements – Sleetmute

Responsibilities included design of new buried piped water distribution system to serve all residents in Sleetmute, AK. This project was complicated due to the concurrent BIA roads project in the community.

Hooper Bay Ocean Floodway Crossing – Hooper Bay

Designed a rock-fill crossing of the floodway in Hooper Bay. This 1,000-LF section of road was subject to tidal and storm damage prior to construction of the floodway.

Nelson Lagoon Community Building Sanitation Improvements – Nelson Lagoon

Designed a new septic tank and drainfield system for the Community Building in Nelson Lagoon.



Nunam Iqua Causeway Feasibility Study – Nunam Iqua

Prepared a study for the ADOT analyzing the feasibility of constructing a rock-fill causeway across Swan Lake in Nunam Iqua.

North Slope Borough Gravel Inventory reports – Wainwright, Pt. Hope, Atkasuk, Barrow, Pt. Lay, Kaktovik

Performed gravel inventory studies for future capital improvement project planning purposes.

References

David Lockard, P.E. - Alaska Energy Authority, (907)771-3062

Alan Fetters, Alaska Energy Authority, (907) 771-3063

Lynn Marino, P.E., Village Safe Water, (907) 269-7602



Jeff Stanley has 25 years of engineering experience in civil and sanitary design, soil and site investigations, cold region engineering, and construction management. He has worked on dozens of projects in rural Alaska and has an excellent understanding of the logistics and planning required to complete such projects. He specializes in planning and feasibility studies, engineering analyses, and the development of construction documents. In addition to his technical skills, he is an excellent project and contract manager. Jeff joined CRW in 1999 and is a primary owner of the company.



Project Experience | Energy

Bulk Fuel and Power System Upgrade Projects, Statewide

Jeff has served as Principal in Charge and Contract Manager for over a dozen bulk fuel and power system upgrade projects throughout Alaska. Jeff assisted with key projects in Kwethluk, Sterling Landing, Akhiok, Akutan, and Deering, among others.

Project Experience | Water & Sewer

Egegik Southside Water and Sewer Improvements, Egegik

Project manager for the planning, design and construction of over \$5 million in water and sewer improvements for the City of Egegik. The work included the design and installation of a Class A community well, major water treatment plant upgrades, a new 100,000 gallon water storage tank, over 5 miles of water and sewer mains, 4 lift stations, and 80 new house service connections. Construction services included the procurement of all major system components, period site inspections, and the preparation of record drawings and an O&M manual.

Egegik Northside Water Improvements, Egegik

Project manager for the planning, design and construction of a Class B community well, self-contained water treatment plant module, 20,000 gallons of water storage, 1000 ft long water main and a community watering point. The project was complicated by the fact that there wasn't a permanent power source and the only means of access to the site is by boat.

Emmonak Water & Sewer Upgrades, Emmonak

Project manager for the planning and design of upgrades to the City of Emmonak's existing above ground arctic pipe water and sewer system. Primary upgrades will include the installation of helical piles to better protect the system from seasonal flooding, replacement of deteriorating stick framed service boxes, regrading of the vacuum sewer mains, reconfiguration of the high/low pressure water system to four circulating loops, and repair of the glycol heat trace system for the sewer mains. Other improvements will include the installation of water circulation pumps in each house, and mechanical and electrical upgrades in the water treatment plant. The project was initially scheduled for construction in 2013 but has been delayed by the need to secure more than 150 easements including 83 easements across BIA restricted deed properties.

Alakanuk Sanitation Facilities Design, Alakanuk

Project manager and lead engineer for design and construction of the community wide vacuum sewer collection system and circulating water mains for the City of Alakanuk. Other design

Years of Experience:

25 Years

Professional Discipline:

Civil Engineer / Project Manager

Registration:

Professional Engineer, Alaska (CE 8678)

Professional Engineer, Guam (CE 940)

Residency: AK

Education:

Arctic Engineering, University of Alaska, Anchorage

MS Civil Engineering, San Diego State University, 1989

BS Civil Engineering, San Diego State University, 1987

Professional Affiliations:

American Society of Civil Engineers

American Water Works Association

*Indicates projects completed at a previous employer.

components included a new washeteria, bulk fuel tank farm, emergency power system, waste heat recovery loop, short-term retention sewage lagoon, 4,200 SF water treatment plant/utility building, and a 300,000 gallon potable water storage tank. Design responsibilities included engineering analyses and design, construction drawings and specifications, community relations, client coordination, utility easements, and project scheduling and cost control. Construction management responsibilities included the planning and scheduling of contract work, preparation of bid documents, contract negotiations, management of subcontractors, and procurement of major water and sewer system components.

Quinhagak Sanitation Improvements, *Quinhagak*

Project manager and lead engineer for the planning, design and construction of a community wide low pressure sewer system and circulating water mains. Work to date has included the construction of a river bank infiltration gallery and raw water transmission main, 5+ miles of above ground water and sewer piping, 120 house plumbing upgrades/service connections, 10-acre sewage lagoon, 5,200 ft long force main, 2,500 square foot water distribution/sewage collection building, water treatment system upgrades including a diatomaceous earth filtration system, new Class III landfill with equipment storage building and custom burn box, 45,000-gallon water storage tanks, 250,000-gallon water storage tank, and asbestos abatement in the old WTP and three BIA facilities. All work with the exception of the asbestos removal was accomplished with the use of force account labor and an onsite construction manager. Current project activities include the construction of additional water and sewer mains to serve another 26 homes.

Haul System Evaluation, *Quinhagak*

Project manager and lead investigator for the review of a water and sewer haul system in Quinhagak Alaska. The primary purpose of the review was to identify any areas for improvement prior to expanding the initial pilot project to an additional 40 homes. The results of the investigation indicated that although there were some technical areas that could be improved, the real challenge was system affordability. The average family of four could only afford two trailer loads of water (125-gallons each) and two sewage hauls (150-gallons each) per month. This limited consumption to about 2 gallons of water per person per day which didn't significantly improve in home sanitation conditions. Ultimately the community decided to pursue a piped water and sewer system rather than continue with a haul system.

Unalakleet Water and Sewer Project. Project manager for the planning, design and construction of sewage lagoon upgrades, and a Design Analysis Report for a new 5 mile long water transmission main. Lagoon upgrades included the installation of two 30,000-gallon septic tanks, dredging of the primary treatment cell, containment of the sludge in geotubes, and improvements to the force main and outfall piping. The project also included design and construction of a 500 ft gravity sewer main and two new house service connections. All work was accomplished with the use of force account labor and a local construction manager.

North Pole Water System Design Review, *North Pole*

Project manager and lead reviewer for a detailed peer review of proposed water system improvements for the City of North Pole. The project included; the installation of two high capacity Class A wells, water treatment plant improvements, over 3-miles of buried distribution piping, and 40 plus service connections. The scope included a review of the construction documents (plans and specs) as well as a review of the construction cost estimate and proposed schedule.

North Seward Water System Improvements, *Seward*

Project manager for the planning and design of a water main between the Gateway Subdivision Tank and Forest Acres Subdivision, located in North Seward. The project was required to improve system pressures and provide adequate flows for fire protection.

Bethel Sanitation Facilities Master Plan Update, *Bethel*

Project manager for the preparation of an update to the community's existing water and sewer master plan. Responsible for coordinating the project, participating in public meetings and the community involvement

program, evaluating alternatives for service upgrade, evaluating existing facilities, reviewing the results of a community survey, and preparation of recommendations for the various service areas and existing facilities.

Kwethluk Sanitation Facilities Improvement Plan, Kwethluk

Project manager for the preparation of a 20-year sanitation facilities improvement plan. The project included an in-depth evaluation of various alternatives for providing a piped water and sewer system for the community of Kwethluk, located approximately 12 miles up the Kuskokwim River from Bethel. Detailed capital, operation and maintenance cost estimates were provided, along with an estimate of the required user fee for the various alternatives.

Twin Hills Sanitation Facilities Master Plan, Twin Hills

Project manager for the preparation of a 20-year sanitation facilities master plan. The project included a condition assessment of the community's existing water and sewer systems and provided recommendations for capital improvements. The recommendations included a combination of central and decentralized facilities. Homes with poor quality wells would be served by an extension of the existing piped water distribution system. Onsite septic systems were proposed for the school, outlying homes and areas proposed for future development. Other recommendations included a replacement Class A well, 60,000-gallon potable water storage tank, a second sewage lagoon cell, and the purchase of a septage vacuum trailer to periodically pump out the septic tanks. Detailed capital, operation and maintenance cost estimates were provided, along with estimated user fee rates.

Quinhagak School Lagoon, Quinhagak

Project manager for feasibility study for analysis of the existing school lagoon located at Quinhagak. The original lagoon was constructed in 1981 and was expanded with the addition of another 108-foot cell in 1987. The existing lagoon is in disrepair and is not functioning as designed. The dikes of the lagoon have settled reducing the storage volume of the facility to less than required to achieve minimum treatment standards. The liner of the lagoon has been compromised allowing untreated wastewater to leak from the facility. Several options were identified in the study including upgrading existing facilities, construction of a new lagoon system, and connection to the planned community system.

Seward Water and Sewer System Modeling, Seward

Project manager for evaluating Seward's water and sewer system with emphasis on modeling. Jeff was responsible for transferring all the City's as-builts to CAD files, modeling the water system with WATERCAD and developing a capital improvements plan for utility upgrades.

Water Resource Investigations, Nawalek and Tatitlek

Project manager for water resource investigations to identify alternative water sources for community public drinking water supplies for the City of Nawalek and The Tatitlek IRA Council. Components of the project included site reconnaissance and geologic mapping efforts, geophysical investigations, and selection of potential groundwater well locations and alternative surface water sources.

Mekoryuk Water & Sewer Project, Mekoryuk

Project Manager for preparation of plans and specifications for a 9-million gallon sewage lagoon, access road and dumping station. In addition to the sewage lagoon, Jeff managed the design and construction of a replacement liner for the City's 8-million gallon water reservoir, a new riverbed infiltration gallery, and water treatment system upgrades.

Hooper Bay Sanitation Facilities Upgrades, Hooper Bay

Project manager for the design of sanitation improvement roads for the City of Hooper Bay. Work included preparing design drawings for force account construction, permitting, agency coordination, land status research, surveying, geotechnical investigation, and other aspects of project design. Responsible for oversight of technical staff, review of project deliverables, client and agency coordination, and overall project management.

*Indicates projects completed at a previous employer.

Atmautluak Sewer System Upgrades, Atmautluak

Project manager for the design of a sewer system to connect the Atmautluak High School, elementary school, and five teacher housing units to the City's gravity sewer system. The project also included the preparation of a sewage lagoon closure plan and limited construction management services. Responsible for engineering analyses and design, construction drawings and specifications, client coordination, project scheduling, and overall project management and cost control.

Galena Septic System Feasibility Study, Galena

Project manager for the evaluation of on-site septic systems as an alternative to truck haul sewage collection. Responsible for review of existing literature on the soils and groundwater conditions in Galena, investigation of three existing types of on-site septic systems, excavation and logging of a test pit in an area proposed for a leachfield, and preparation of typical drawings and specifications for approval by ADEC as a demonstration project.

Nikiski Wastewater Treatment Facility Assessment, Nikiski

Project engineer responsible for a waste disposal assessment of an infectious industrial sludge from a wastewater treatment facility in Nikiski. Responsible for outlining the regulatory requirements and developing alternative options for disposal of the sludge. Rough order-of-magnitude cost estimates were prepared for each option and an evaluation of the alternatives in terms of ease of implementation, future risk, and permit requirements was performed.

Dillingham Sewage Lagoon Evaluation and Modeling Study, Dillingham

Project engineer responsible for a sewage lagoon evaluation and outfall modeling study. Responsible for preparation of a corrective action plan to limit erosion and stabilize the failing cut slopes surrounding the sewage lagoon. The plan included an evaluation of the cause of deterioration, development of four remedial alternatives to repair and stabilize the slopes, cost estimates for each alternative, and a recommendation for the preferred approach. The project also included a review of the existing outfall and extensive modeling to determine flow and dispersion characteristics as well as operational limitations.

Shageluk Water and Sewer Upgrades. Project Manager responsible for the design of a new sewage lagoon, lift station and outfall. The project also included the preparation of a business plan, the preliminary design of a new piped water and sewer system to serve the community.

Alaska Native Tribal Health Consortium Term Contract (ANTHC), Alaska

Project manager for a multi-disciplinary engineering services contract to assist ANTHC with the planning and design of rural sanitation projects. Projects completed to date have included the design of a water treatment plant/washeteria building, a utility building and two water storage tank foundations, several piping system upgrades, the installation of two Class A wells, and the design of two sewage lagoon and a solid waste landfill. The project has involved twelve different villages, primarily in the Yukon Kuskokwim Delta.

ADEC Bulk Fuel Upgrades, Various Communities

Project manager for term contract projects conducted in Koyuk, Chefornak, Mentasta, Northway, and Beaver. The work included the evaluation of existing bulk fuel storage systems, preparation of conceptual (35%) design of upgrades for each community, and the preparation of final design drawings for force account construction. Work at the various sites also included conducting geotechnical investigations and surveying as required. Duties included overall management of each project, supervision of technical staff, client and agency coordination, and other duties as required to complete each project.

References

John Hutchison, P.E. – ANTHC, Office (907) 729-3723, Cell (907) 947-9402

David Lockard, P.E. – Alaska Energy Authority, (907) 771-3062

Martin Moore – City of Emmonak, (907) 949-1227 Ext 302

With 8 years of engineering experience, Andrew Horazdovsky brings some unique design and field experience with him from the Kenai Peninsula. Andrew is proficient in a wide range of Civil Engineering tasks including; sanitary sewer & water design and permitting, geotechnical investigations, as-well-as construction inspection & onsite materials testing. Andrew is responsible for design, drafting, technical report writing and general engineering support on many Village Safe Water and sewer projects as well as for Alaska Energy Authority bulk fuel upgrade and rural power system upgrade projects. Andrew has been an Alaskan resident for 19 years, attended UAF and has been with CRW since 2008.



Project Experience

Alaska Rural Bulk Fuel Upgrade Design & Construction Management - Various Communities

Staff Engineer for the planning and design of bulk fuel storage and handling facilities in Rural, Alaska. These projects include complex community involvement & coordination, design & permitting, and contract administration services. Andrew has worked on projects throughout the state, from Perryville in the Aleutians and Bettles North of the Arctic Circle, to Edna Bay in Southeast.

Prior to joining CRW, Andrew worked on the following projects.

- Geotechnical investigations across the Kenai Peninsula for residential & commercial foundation designs, ADEC approved septic systems, road designs and water & sewer projects.
- Design, ADEC submittal, and construction management of 40+ nonconventional and conventional onsite wastewater disposal systems. Clients included private, commercial, government and industry; project sites ranged from small community to rural sites accessible only by plane or ATV.
- In-lab materials testing including: concrete compressive strengths, soil gradations, proctors and organic content of soils.
- Onsite material testing including: nuclear density, concrete control, and soil percolation testing for commercial, state and borough projects.
- Structural design and construction administration of Kenai Peninsula commercial structures including; The Law Offices of Joseph Kashi, Saint Elias Brewing Co., Salvation Army Church of Homer and Lamendola Orthodontics.
- Building inspection for the City of Soldotna at the Central Peninsula Hospital, Kenai Peninsula College and commercial and private structures within the city limits.
- AutoCAD drafting and detailing for civil, structural and mechanical engineers.

Seldovia Water and Sewer Improvements - Seldovia

Staff engineer responsible for onsite field investigation & testing of extensive infiltration issues in the community's sub-tidal sewer mains. Andrew is the primary engineer for this dynamic project, which has included the excavation and inspection of

Years of Experience:

8 Years

Professional Discipline:

Civil Engineer

Registration:

Professional Engineer,
Alaska (CE 14054)

Residency: AK

Education:

BS, Civil Engineering
University of Alaska
Fairbanks,
Cum Laude (2006)

sewer main & services, dye testing & flow monitoring, and direct camera inspection of a 1,500 + feet of services and sewer main. Andrew is currently analyzing the field collected data and developing designs for much needed repairs.

Andrew has also provided engineering support for several Seldovia water projects including inspection of water service installation and design of onsite wastewater disposal for the communities planned water treatment plant.

Arctic Village Water System Improvements - Arctic Village

Andrew provided preliminary field investigation and design for this on-going project that includes the design and construction of a new water treatment plant, washeteria, and river intake system in Arctic Village. Winter field water sampling was conducted and evaluated for a new water source and existing facility deficiencies were inspected.

Seward Water Crossing at Lowell Creek Canyon - Seward

Andrew worked on several projects for the City of Seward including the design of a water main crossing of Lowell Creek canyon that was damaged during large storm events.

AWWU Water and Sewer Design Support - Anchorage

Andrew has provided engineering support on several AWWU projects including analysis and testing of the Ship Creek Water Treatment Plant onsite sewer system. Additionally, he assisted in the design of the Eagle River Waste Water Treatment Facility TWAS Pump Replacement project.

Nunapitchuk Water and Sewer Project - Nunapitchuk

Andrew provided general engineering support for construction of an 84,000-gallon water storage tank and pile foundation as well as inspection of the facilities bulk fuel tank farm. Responsibilities included design, inspection of work for conformance with project documents and preparation of technical documents. Additional activities included inspection and design of the sewage outfall to the community lagoon.

Nashwoods Subdivision Road and Drainage Improvements - Seward

Staff engineer for the design and permitting of access roads and drainage within Nashwoods Subdivision Phase 5 for CIRI Real Estate and Development. The new roads include Johnson Ave, Godwin Rd and Nell Road. Andrew will be responsible for onsite inspection and construction coordination in the summer months of 2010.

88th Avenue Upgrades - Anchorage

Staff engineer for the preliminary design and engineering of several retaining walls necessary to facilitate the addition of a bike path and storm sewer system along this half mile section of collector roadway located in south Anchorage.

References

David Lockard, PE – Alaska Energy Authority Project Manager (907 771-3000)

Lynn Marino, P.E. – State of Alaska, Village Safe Water Project Manager (907 269-7602)

Tim Dillon – Seldovia City Manager (907 234-7643)

Elena Begojevic, CPA

2315 Ridgemont Drive, Anchorage, AK 99507
(907) 317-4242 elena@clearideaak.com

Objective

To provide accounting, bookkeeping, and consulting services on a contract basis.

Education

University of Alaska Anchorage, Bachelor of Business Administration, Accounting	2001 - 2004
Sakhalin State University, Russia, Master of Arts, Education	1994 - 1999

Professional Experience and Skills

- Audits of construction and retail companies, for profit entities including Alaska Native Corporations, government contractors, health care and non-for-profit organizations, governmental entities such as municipalities and school districts;
- Knowledge of Generally Accepted Accounting Principles (GAAP) and their application in various industries ranging from for-profit government contractors, construction and retail entities to health care and non-for-profit organizations;
- Expertise in performing reconciliations and reviewing reconciliations of various general ledger accounts, including but not limited to: cash, prepaid expenses, accounts receivable, investments, construction work in process, fixed assets, deferred tax asset and liability, accounts payable, payroll, accrued liabilities, deferred revenue, long-term debt, equity accounts, various revenue and expense accounts, etc.;
- Expertise in performing journal entries in simple to highly complex areas of general ledger and financial statements;
- Proficiency in accounting for various construction contracts such as: fixed price contracts, time and material, cost plus fixed fee contracts, etc.;
- Expertise in preparing, analyzing, and reviewing financial statements and making corrective recommendations based on findings;
- Proficiency in preparation and review of consolidating financial statements and preparation of various consolidating journal entries and transactions;
- Knowledge of budget preparation and analysis techniques;
- Knowledge of Sarbanes-Oxley Act and internal controls principles;
- Proficiency in assessing the design and implementation of internal control system;
- Proficiency in identifying and resolving deficiencies in internal control system;
- Proficiency in establishing key internal controls to prevent or detect and correct misstatements in financial statements by appropriate employees in timely manner;
- Knowledge of audit preparation related to quarterly and annual financial statements audits;
- Experience in effectively managing, supervising and leading teams of accountants;
- Experience in training and reviewing work of staff members;
- Experience in establishing collaborative working relationships with other colleagues;
- Proficiency in assessing and prioritizing multiple tasks, projects and demands;
- Proficiency in operating a personal computer utilizing a variety of software applications including MS Office, QuickBooks, CaseWare;

Job Descriptions

Clear Idea Accounting and Consulting

June 2014 - Present

Owner

BDO USA, LLP

July 2013 - May 2014

Assurance Senior

- Supervised, directed and reviewed the results of audit, review and compilation client engagements through the delegation of tasks throughout the planning, field work and "wrap-up" stages;
- Documented, validated, tested, and assessed clients' financial reporting control systems to identify areas requiring improvement and to recommend best practices and solutions;
- Coordinated the day-to-day "in-charge" duties of planning, fieldwork and "wrap-up" to include the preparing of financial statements with disclosures;
- Advised clients on various economic and regulatory risks within their industry;
- Resolved accounting issues and apply GAAP and GAAS consistently within clients' situations;
- Wrote technical consultation memos on GAAP / GAAS issues;
- Prepared various types of financial statement depending on clients industry;

Mikunda, Cottrell & Co., Inc.

Audit Senior

2005 - June 2013

- Supervised, directed and reviewed the results of audit, review and compilation client engagements through the delegation of tasks throughout the planning, field work and "wrap-up" stages;
- Documented, validated, tested, and assessed clients' financial reporting control systems to identify areas requiring improvement and to recommend best practices and solutions;
- Coordinated the day-to-day "in-charge" duties of planning, fieldwork and "wrap-up" to include the preparing of financial statements with disclosures;
- Advised clients on various economic and regulatory risks within their industry;
- Resolved accounting issues and apply GAAP and GAAS consistently within clients' situations;
- Wrote technical consultation memos on GAAP / GAAS issues;

Professional References

- Eric Campbell, Audit Partner, BDO USA, LLP, ecampbell@bdo.com, (907) 278-8878
- Joy Merriner, Audit Director, BDO USA, LLP, jmerriner@bdo.com, (907) 278-8878
- Jim Hasle, Office Managing Partner, BDO USA, LLP, jhasle@bdo.com, (907) 278-8878

**Chitina Electric Inc. Resolution to Support Project &
Pursue Additional Funding**



Chitina Electric, Inc.
P.O. Box 88, Chitina, Alaska 99566
phone (907) 823-2220 fax (907) 823-2202
email: cei99566@yahoo.com

Chitina Electric, inc.

A Subsidiary of Chitina Native Corporation Gateway to the Wrangell - St. Elias National Park™

Resolution 2015-02

A RESOLUTION OF THE CHITINA ELECTRIC, INC. ON BEHALF OF THE RESIDENTS OF CHITINA AUTHORIZING THE UTILITY TO SUBMIT AN APPLICATION UNDER THE ALASKA ENERGY AUTHORITY RENEWABLE ENERGY FUND GRANT PROGRAM FOR FUNDING OF A RENEWABLE ENERGY PROJECT AND AUTHORIZING THE PRESIDENT TO EXECUTE ANY SUBSEQUENT DOCUMENTS NECESSARY TO SECURE GRANT FUNDING FOR THE PROJECT.

WHEREAS, Chitina Electric, Inc. (CEI) is authorizing to provide electric power to the community of Chitina under Certification of Public Convenience and Necessity, CPC&N No.368, issued by the Regulatory Commission of Alaska, and

WHEREAS, it is recognized that the residents and infrastructure in the community Chitina are dependent on the electric utility to operate in a cost effective and reliable manner, and

WHEREAS, CEI has identified a Hydro Electric project as a viable technology to improve the operational efficiency of the utility and to help reduce the community's reliance on diesel fuel, and

WHEREAS, the CEI ranks this project as one of the highest priorities in the comprehensive development of the community; and CEI is in good standing with respect to its existing credit and Federal Tax Obligations,

NOW THEREFORE BE IT RESOLVED, that it is the determination of CEI to pursue a Renewable Energy Fund Grant for a Hydro Electric project in Chitina to help reduce the community's dependency on diesel fuel,

BE IT FURTHER RESOLVED, that CEI is committed to pursuing additional matching grant funds of 2.5 million from the following federal and state programs:

ICDBG - Indian Community Development Block Grant Program

CDBG - Community Development Block Grant Program

USDA - Rural Energy for America

DOE - Department of Energy Tribal Clean Energy and Energy Efficiency Funding

USDA - High Energy Cost Grants

CEI President, Martin N. Finnesand is authorized and empowered to submit on behalf of Chitina Electric, Inc. an application for funding under the REF Program.

Executed on this 14 day of September, 2015, by the action of the President of Chitina Electric, Inc.

CERTIFICATE

The Under signed President of Chitina Electric, Inc., does hereby certify the above to be true and correct on the 14 day of September, 2015, at Chitina, Alaska.

Martin N. Finnesand, President

Letters of Support for Project



Chitina Native Corporation
P.O. Box 3, Chitina, Alaska 99566
phone (907) 823-2223 fax (907) 823-2202
email: chitina_native@cvinternet.net

CHITINA NATIVE Corporation

Gateway to Wrangell-St. Elias National Park TM

September 10, 2015

To whom it may concern:

The Chitina Native Corporation is pleased to provide this letter of support for the construction of the Five-mile Creek Hydroelectric project as designed and spearheaded by Chitina Electric, Inc. This project would not only provide energy security and stabilize Chitina's electric rates but it will also provide the possibility of reduced heat and hot water for the Wrangell View Store facility.

This project will result in substantial cost savings to the community and support the community's effort to increase economic wellbeing. Reduced and stabilized energy cost will help our local businesses and our community organizations.

Sincerely,

M. Anne Thomas

M. Anne Thomas
President
Chitina Native Corporation



**Chitina Traditional Indian Village Council
PO Box 31, Chitina, Alaska 99566
(P) 907-823-2215/16/17 (F) 907-823-2285**

DATE: September 4, 2015

RE: Letter of Support for Five Mile Creek Hydroelectric Project

To whom it may concern:

This letter is in regards of the Chitina Traditional Indian Village Council's (CTIVC) full support for the construction of the Five Mile Creek Hydroelectric Project as designed and spearheaded by the Chitina Electric Company.

This project would not only provide energy security and stabilize Chitina's electric rates but, it will also provide the possibility of reduced cost for heat and hot water for the following CTIVC Facilities:

- Chitina Village Community Hall
- Chitina Village FEMA Trailer #1
- Chitina Village FEMA Trailer #2
- Chitina Tribal and Community Health Center

This project will result in substantial cost savings to the community and support the community's efforts to increase economic wellbeing. Reduced and stabilized energy costs will help our local businesses and our community organizations.

Thank you,

Toni Goodlataw, CTIVC
Village Administrator



COPPER RIVER BASIN REGIONAL HOUSING AUTHORITY
P.O. BOX 89 GLENNALLEN, ALASKA 99588

August 28, 2015

RE: Letter of Support for the Five-mile Creek Hydroelectric Project

To Whom It May Concern:

The Copper River Basin Regional Housing Authority (CRBRHA), is pleased to provide this letter of support for the construction of the Five-mile Creek Hydroelectric project as designed and spearheaded by Chitina Electric. This project would not only provide energy security and stabilize Chitina's electric rates but it will also provide the possibility of reduced costs for heat and hot water for the Shallow Water Apartment complex.

This project will result in substantial costs savings to the community and support the community's effort to increase economic well-being. Reduced and stabilized energy costs will help our local businesses and our community organizations.

Regards,

COPPER RIVER BASIN REGIONAL HOUSING AUTHORITY

A handwritten signature in black ink, appearing to be 'Teri Nutter', with a stylized, flowing script.

Teri Nutter
Executive Director

Good afternoon.

As the Building Maintenance Manager for the State of Alaska - Department of Transportation & Public Facilities, I oversee operation and maintenance of the State's Chitina Maintenance Station. After evaluating the concept proposed by AEA for a Chitina Electric hydro-electric project to provide thermal energy (heat) to Chitina Maintenance Station, I support the project.

Should the project move forward and become a reality, DOT&PF will seriously consider a contract to utilize thermal energy from the utility long term. The commitment to contract will be based upon two factors:

1. Cost to convert station heating systems to utilize the waste heat stream.
2. Recurring operational cost of the waste heat.

In general, the conversion cost must be reasonable. The recurring operational cost must be competitive with the current heating oil system.

DOT&PF is always evaluating new technologies and potential efficiencies. The hydro-electric project appears to be a step forward for clean, affordable, reliable power in the Chitina area. I hope that DOT&PF can benefit from this technology project.

Steve Meierotto
Building Maintenance Manager
Alaska DOT&PF
2301 Peger Road
Fairbanks, AK 99709
907 451-2203



United States Department of the Interior
NATIONAL PARK SERVICE

Wrangell-St. Elias National Park & Preserve
Mile 106.8 Richardson Hwy. P.O. Box 439
Copper Center, AK 99573-0439
907 822 5234 Fax 907 822 7216
<http://www.nps.gov/wrst>



9/14/15

Alaska Energy Authority
813 W Northern Lights Blvd,
Anchorage, AK 99503

Dear Sir or Madam,

I would like to provide a letter of support for a proposal submitted by Chitina Electric, Inc. seeking funding for the construction of a hydroelectric project at Five-Mile Creek near Chitina, Alaska. Chitina is a rural Alaska community that serves as one of the gateways to Wrangell-St. Elias National Park and Preserve. The community of Chitina provides services that support park visitors. In addition, the historic and cultural context that Chitina provides adds to the unique experience that is offered by a visit to Wrangell-St. Elias National Park and Preserve. I support investment in appropriate infrastructure that will maintain or enhance the long term viability of this community.

Like many communities in rural Alaska, the high cost of energy limits economic growth and opportunities. An energy project that provides stability in both the supply and cost of electricity will clearly benefit the health of the community. Our Park operates a Ranger Station in Chitina and we would benefit from a reduction in the cost of electricity.

Due to a short review timeframe I was only able to provide a minimal review of the project, but it appears that the proponents have examined relevant cultural and natural resource concerns including a review of historic properties, aquatic resources and other species of concern that could potentially be affected by the project. I would encourage the proponents to continue to work closely with appropriate regulatory agencies and affected stakeholders throughout the project. I hope you will give serious consideration to the proposal.

Sincerely,

Rick Obernesser ACTING FOR:

Rick Obernesser
Superintendent



Gilpatrick's Hotel Chitina, Inc

907-823-2244

Susan Gilpatrick 907-255-2020

www.hotelchitina.com info@hotelchitina.com

Re: Letter of Support for the Five-mile Hydroelectric project

To all that this concerns:

All of us at Gilpatrick's Hotel Chitina, Inc would like to voice our support for the Five-mile Creek Hydroelectric project as designed and spearheaded by Chitina Electric.

This community's needs for stable and cost effective energy are dire and rising rapidly each year. Chitina continues to grow with more buildings and businesses. These businesses need to have affordable energy to survive and grow so that they can provide jobs and affordable products and services to not only its residents but the countless visitor's each year.

Stable and affordable energy would definitely factor into more growth for Gilpatrick's Hotel Chitina, Inc and in turn the community. Current power costs are somewhat crippling and a deterrent to growth.

Thank you for your consideration of this important project,

Susan Gilpatrick

Gilpatrick's Hotel Chitina, inc



SPIRIT MOUNTAIN ARTWORKS

P.O. BOX 22, Chitina, AK 99566

(907) 823-2222

September 11, 2015

To whom it may concern:

As the owner of Spirit Mountain Artworks in Chitina, Alaska since 1978, I would like to express my support for the establishment of a hydro-electric system for the town. Such a development would add greatly to the sustainability of our community, giving us year-round power, independent of the outside grid and fossil fuels. Assuming that it would also lead to a reduction in power costs, it could add substantially to the viability of local businesses. Having a reliable source of power independent of the fluctuations of fossil fuel costs will give us the ability to project our power expenses well into the future. Perhaps more importantly, it will benefit the environment by reducing our carbon emissions.

Sincerely

A handwritten signature in black ink that reads "Art Koeninger". The signature is written in a cursive style.

Art Koeninger, owner



September 12, 2105

To whom it May Concern:

Taral Enterprises, LLC is pleased to provide this letter of support for the construction of the Fivemile Creek Hydroelectric project as designed and spearheaded by Chitina Electric. This project would not only provide energy security and stabilize Chitina's electric rates but it will also provide the possibility of reduced cost for heat and hot water for Taral's facilities.

This project will result in substantial cost savings to the community and support the community's effort to increase economic wellbeing. Reduced and stabilized energy costs will help our local businesses and our community organizations.

Sincerely,

Aileen Leonard
Printed Name

President
Title

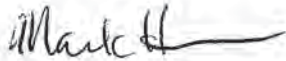
9.12.2015
Date

September 14, 2015

To Whom It May Concern,

Mark Hem, owner of Hem Charters, supports Chitina Electric in their goal of providing sustainable energy to the community of Chitina through the completion of the hydroelectric project at 5 mile.

Sincerely,

A handwritten signature in black ink, appearing to read "Mark Hem", with a long horizontal flourish extending to the right.

Mark Hem
Hem Charters
PO Box 58
Chitina, Alaska 99566

Permitting Documents

DIVISION OF MINING, LAND AND WATER
WATER RESOURCES SECTION

www.dnr.state.ak.us/mlw/water/index.htm



Anchorage Office 550 West 7 th Avenue, Suite 1020 Anchorage, AK 99501-3562 (907) 269-8600 Fax: (907) 269-8947	Juneau Office PO Box 111020 400 Willoughby Avenue Juneau, AK 99811-1020 (907) 465-3400 Fax: (907) 586-2954	Fairbanks Office 3700 Airport Way Fairbanks, AK 99709 (907) 451-2790 Fax: (907) 451-2703	For ADNR Use Only Date/Time Stamp
For ADNR Use Only LAS #	For ADNR Use Only CID #	For ADNR Use Only Receipt Type WR	

APPLICATION FOR WATER RIGHT

INSTRUCTIONS
<ol style="list-style-type: none"> 1. Complete one application for each water source (incomplete applications will not be accepted). 2. Attach copy of executed deed, lease agreement, or other possessory interest document for property where water will be used (applicant must own, lease, or obtain written authorization to use water on property). 3. Attach copy of legal access document (e.g. right-of-way, easement, permit) or application for legal access to water withdrawal point and transport route, if applicable, or copy of request or application for legal access to water withdrawal point. 4. Attach driller's well log for drilled wells (if already drilled and available). 5. Attach sketch, photos, plans of water system, or project description (if applicable). 6. Attach legible map that includes meridian, township, range, and section lines such as a subdivision plat, USGS topographical quadrangle, or borough tax map. Indicate location of water withdrawal, route of water transmission, water use area boundary, points of water use within boundary, and point of water return flow (if applicable). 7. Attach copy of approved ADEC water and wastewater system certificate (if applicable). 8. Attach copy of ADNR fish habitat permit (if applicable). 9. Attach notarized Statement of Beneficial Use of Water form and associated fee, if water system and water use are fully developed, and total water use does not exceed 500 gallons of water per day. 10. Attach completed Coastal Project Questionnaire (if applicable - see page 4). 11. Submit non-refundable fee (see page 4).

APPLICANT INFORMATION			
Chitina Electric Inc.		CRW Engineering Group, LLC.	
Organization Name (if applicable)		Agent or Consultant Name (if applicable)	
Martin Finnesand, Utility Manager			
Individual Applicant Name (if applicable)		Individual Co-applicant Name (if applicable)	
P.O. Box 88	Chitina	Alaska	99566
Mailing Address	City	State	Zip Code
907-823-2220			
Daytime Phone Number	Alternate Phone Number (optional)		
907-823-2202	cei99566@yahoo.com		
Fax Number (if available)	E-Mail Address (optional)		

PROPERTY DESCRIPTIONS

Location of Water Use

Subdivision Name or Survey Number	Lot, Block, or Tract	Meridian	Township	Range	Section	Quarter Sections	
IC No. 947		Copper River	3S	5E	25	¼	¼

Location of Water Source

Subdivision Name or Survey Number	Lot, Block, or Tract	Meridian	Township	Range	Section	Quarter Sections	
IC No. 947		Copper River	3S	5E	27	¼	¼

Location of Water Return Flow or Discharge (if applicable)

Geographic Name of Water Body or Well Depth	Meridian	Township	Range	Section	Quarter Sections	
Five Mile Creek	Copper River	3S	5E	25	¼	¼

WATER SOURCE

Ground Water

Type (e.g. drilled, dug)	Total Depth (in feet)	Static Water Level (in feet)	Date Completed	Well Production Capacity

Surface Water

Type (e.g. stream, lake, spring)	Geographic Name (if named)
Stream	Five Mile Creek

METHOD OF TAKING WATER (IF KNOWN)

Pump	Pump Intake _____ Inches Pump Output _____ GPM	Hours Working _____ Hours/Day Length of Pipe _____ Feet (from pump to point of use)
Gravity	Pipe Diameter _____ Inches Head _____ Feet	Length of Pipe _____ Feet (take point to point of use)
Ditch	L _____ H _____ W _____ Feet	Diversion Rate _____ <input type="checkbox"/> GPM or <input type="checkbox"/> CFS
Reservoir	L _____ H _____ W _____ Feet	Water Storage _____ AF
Dam	L <u>40</u> H <u>13</u> W <u>13</u> Feet	Water Storage <u>0.15</u> AF

AMOUNT OF WATER							
Common Water Uses and Standard Amounts							
Type of Use	How Many		Standard Amounts		Total Amount Requested	Months of Use	
						Begin	End
Fully Plumbed Single-family Home (includes irrigation of 10,000 sq. ft.)	# <u>0</u> Homes	X	500 GPD	=			
Partially Plumbed Single-family Home (no hot water heater)	# <u>0</u> Homes	X	250 GPD	=			
Unplumbed Single-family Home (hand carry water)	# <u>0</u> Homes	X	75 GPD	=			
Duplex or Triplex	# <u>0</u> Bldgs.	X	1000 GPD	=			
Four-plex and Larger Housing	# <u>0</u> Units	X	250 GPD	=			
Motel or Resort	# <u>0</u> Rooms	X	150 GPD	=			
Work Camps	# <u>0</u> People	X	50 GPD	=			
Domestic Irrigation	# <u>0</u> Sq. ft.	X	250 GPD per 10,000 Sq. ft.	=			
Non-domestic Irrigation	# <u>0</u> Acres	X	0.5 AFY	=			
Other Water Uses							
Type of Use	How Many		Amount		Total Amount Requested	Months of Use	
						Begin	End
300 kW Hydroelectric Facility	1	X	max 6 CFS	=	3.9 MGD		
		X		=			
Type of Use					Total Amount Requested	Months of Use	
Hydroelectric Generation					Up to 3.9 MGD		

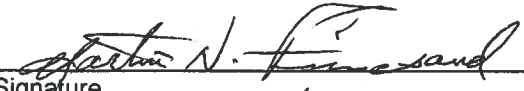
Expected date for water system and water use to be fully developed *or* date when existing use started fall 2016.

Note: Pursuant to AS 46.15.180(a)(1). Crimes, a person may not construct works for an appropriation, or divert, impound, withdraw, or use a significant amount of water from any source without a permit, certificate of appropriation, or authorization issued under this chapter.

11 AAC 93.040 sets out the required information on an application for a water right. 11 AAC 93.050 authorizes the commissioner to decide what additional information is needed to process an application for a water right. This information is made a part of the state public water records and becomes public information under AS 40.25.110 and 40.25.120. Public information is open to inspection by you or any member of the public. A person who is the subject of the information may challenge its accuracy or completeness under AS 44.99.310, by giving a written description of the challenged information, the changes needed to correct it, and a name and address where the person can be reached. False statements made in an application for a benefit are punishable under AS 11.56.210.

SIGNATURE

The information presented in this application is true and correct to the best of my knowledge. I understand that per 11 AAC 93.040 and 11 AAC 93.050 additional information may be required by the department to adjudicate this application. Failure to provide requested information could result in this file being closed.


Signature

11-01-14
Date

MARTIN N. FINNESAND
Name (please print)

President
Title (if applicable)

REFERENCES

Measurement Units

- GPD = gallons per day
- CFS = cubic feet per second
- GPM = gallons per minute
- AF = acre-feet
- AFY = acre-feet per year (325,851 gallons/year)
- AFD = acre-feet per day (325,851 gallons/day)
- MGD = million gallons per day

Conversion Table

<u>5,000 GPD=</u>	<u>30,000 GPD=</u>	<u>100,000 GPD=</u>	<u>500,000 GPD=</u>	<u>1,000,000 GPD=</u>
0.01 CFS	0.05 CFS	0.2 CFS	0.8 CFS	1.5 CFS
3.47 GPM	20.83 GPM	69.4 GPM	347.2 GPM	694.4 GPM
5.60 AFY	33.60 AFY	112.0 AFY	560.1 AFY	1120.1 AFY
0.2 AFD	0.09 AFD	0.3 AFD	1.5 AFD	3.1 AFD
0.01 MGD	0.03 MGD	0.1 MGD	0.5 MGD	1.0 MGD

Fees required by regulation 11 AAC 05.010(a)(8)

- **\$100** for one single-family residence or duplex, or for water use associated with one single-family residence or duplex
- **\$1,200** for activities related to oil and gas and associated substances
- **Fee varies** for activities related to locatable minerals, unless the application is filed under 11 AAC 05.010(a)(9)(E)(i) or (9)(F)(i) - *contact Water Resources Section for pre-application meeting*
- **Fee varies** for hydroelectric power generation - *contact Water Resources Section for pre-application meeting*
- **Fee varies** for water removal out of a hydrologic unit under AS 46.15.035 or 46.15.037 - *contact Water Resources Section for pre-application meeting*
- **\$200** for 5,000 GPD or less for a use not listed above
- **\$450** for greater than 5,000 GPD and no more than 30,000 GPD for a use not listed above
- **\$550** for greater than 30,000 GPD and no more than 100,000 GPD for a use not listed above
- **\$900** for greater than 100,000 GPD for a use not listed above

Make checks payable to "Department of Natural Resources."

Coastal Zone

If this appropriation is within the Coastal Zone, and you are planning to use more than 1,000 GPD from a surface water source or 5,000 GPD from a subsurface water source, you need to submit a completed Coastal Project Questionnaire with this application. For more information on the Coastal Zone, contact the Office of Project Management and Permitting; Anchorage 269-7470, Juneau 465-3562, www.dnr.state.ak.us/acmp/.

CRW ENGINEERING GROUP, LLC
3840 ARCTIC BLVD., SUITE 300
ANCHORAGE, AK 99503
PH. 907-562-3262

1843

89-93-1252

Check Fraud
Prevention for Business

DATE Sept 18, 2014

PAY TO THE ORDER OF State of Alaska

\$900.00

Nine Hundred & No/100 DOLLARS

**Northrim Bank**
3111 C ST., ANCHORAGE, AK 99503

D. A. M.

⑈001843⑈ ⑆ 12520093410102013780⑈

DETACH AND RETAIN THIS STATEMENT
IF NOT CORRECT, PLEASE NOTIFY US PROMPTLY. NO RECEIPT DESIRED.

PRODUCT 55202N

1843

DATE	DESCRIPTION	AMOUNT
	Chubna Hydro. Waters Rights Applications 30405.00 - 0140	

**STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES**

APPLICATION FOR UTILITY PERMIT ON STATE RIGHTS-OF-WAY

Application is hereby made for permission to place, construct and thereafter maintain a utility facility in, on, along, or across the Rights-of-Way of the Department of Transportation and Public Facilities, as described below:

Major Permit
\$600.00

Minor Permit*
\$100.00

Linear Footage
\$1.00/foot

*If Minor, Utility Permit being amended: _____

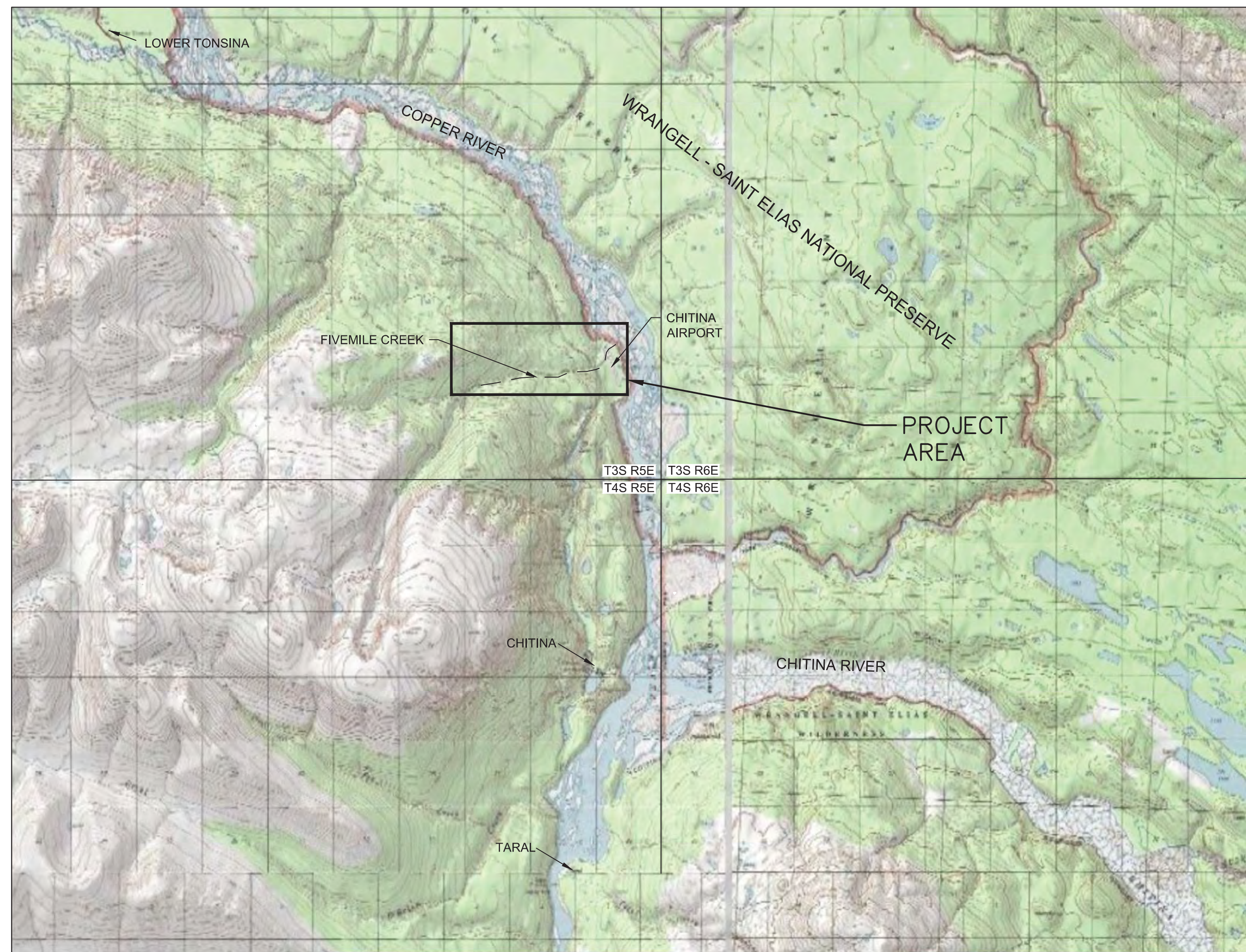
1. Type of Facility: BURIED PENSTOCK
2. Location of Facility: EDGERTON HIGHWAY NEAR CHITINA AIRPORT AND FIVE MILE CREEK CULVERT CROSSING.
3. Location and Extent of Required Clearing: MINOR CLEARING WITHIN ROW AT POINT WHERE PENSTOCK ENTERS ROW.
4. Joint Use with: OWNER: CHITINA ELECTRIC INC
in accordance with _____
attached as Exhibit _____
5. Facility to be constructed in accordance with the following:
 - a. Plans dated 7/23/14, consisting of 4 sheets attached to and made a part of this application.
 - b. Specifications dated _____, consisting of _____ pages attached to and made a part of this application.
 - c. In conformance with Code(s) _____
6. Work to commence on or about JUNE 2016 and to be completed on or about AUGUST 2016.

The applicant in carrying out any or all of the work herein above mentioned or referred to in this application, and in the authorized Utility Permit issued therefore, shall strictly conform to the terms of such Utility Permit; AS 02.15.102, AS 02.15.106, AS 19.25.010, AS 19.25.200, AS 35.10.210; and AS 35.10.230; regulations as set forth in 17 AAC 15 and any revisions thereto, and such policy directives as issued by the Commissioner of the Department of Transportation and Public Facilities.

The applicant shall comply with regulations of all other governmental agencies and the work shall be accomplished in a manner that will not be detrimental to the Department facility and appurtenances nor in any manner endanger the traveling public or facility users.

APPLICANT: CRW ENGINEERING AS AGENT FOR CHITINA ELECTRIC INC, DATE: 7/24/2014
ADDRESS: 3940 ARCTIC BLVD SUITE 300 ANCHORAGE 99503 PHONE: 907-646-5621
SIGNED: Karl Hulbe TITLE: PROJECT MANAGER

APPROVED: _____ DATE: _____



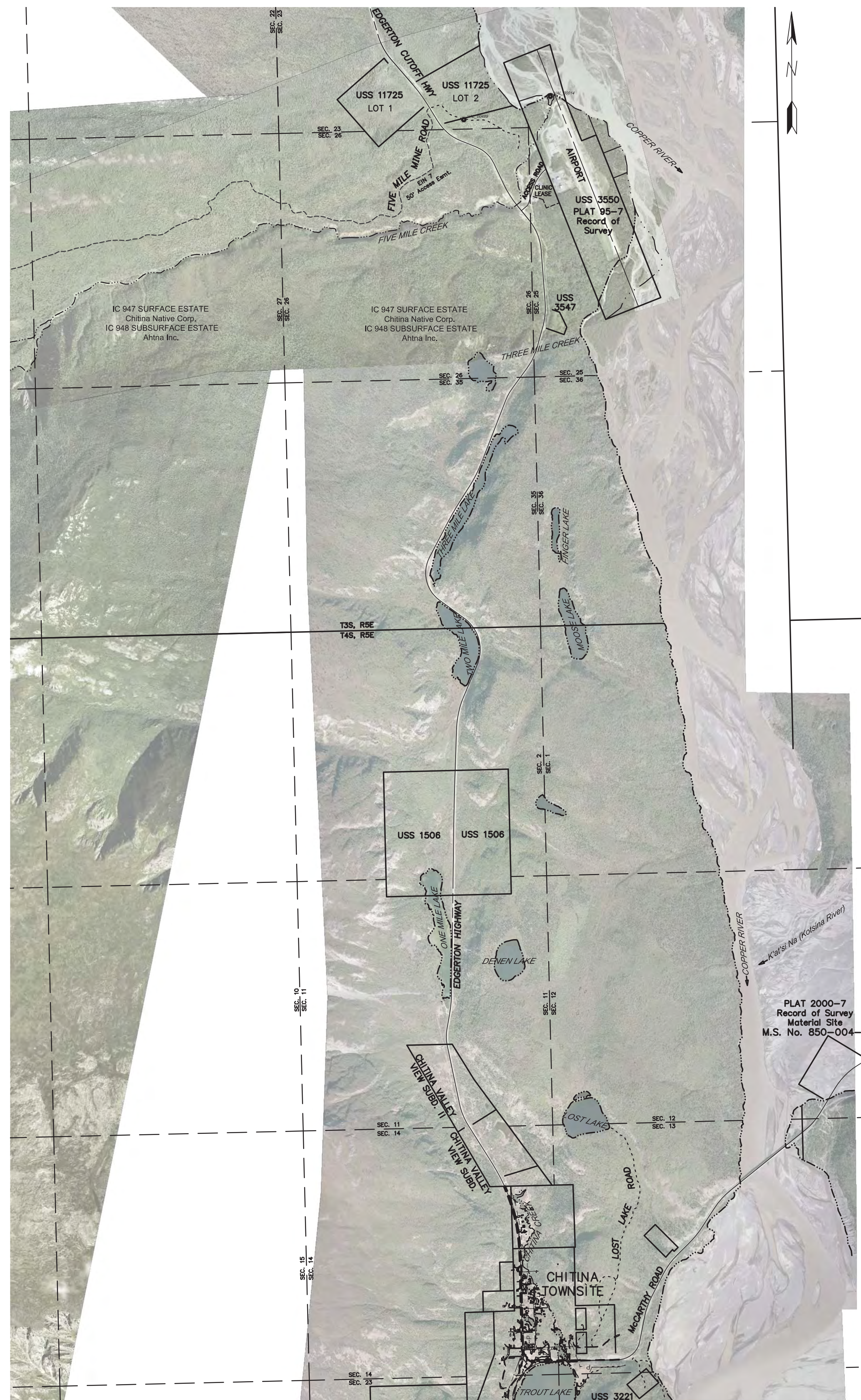
1 LOCATION MAP
SCALE: GRAPHIC



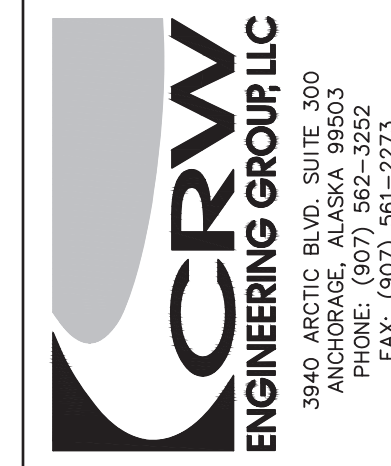
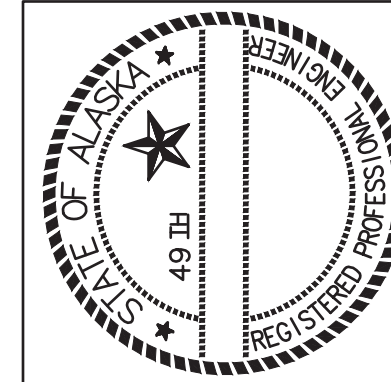
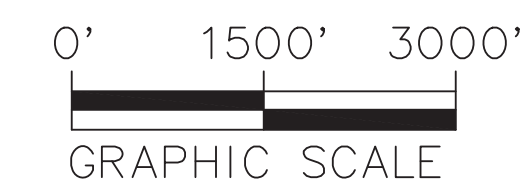
SCOPE OF WORK:

THIS PROJECT PROVIDES FOR THE CONSTRUCTION OF A NEW HYDROELECTRIC FACILITY AT FIVEMILE CREEK, NEAR THE COMMUNITY OF CHITINA, ALASKA. SPECIFIC ACTIVITIES WILL INCLUDE THE CONSTRUCTION OF:

- A CONCRETE GRAVITY DIVERSION STRUCTURE ON FIVEMILE CREEK (AT ELEV=1560 FT). THE STRUCTURE WILL DIVERT STREAM FLOW INTO THE PROPOSED PENSTOCK.
- A 10,000 FOOT LONG, 12-16 INCH DIAMETER PENSTOCK TO CONNECT THE INTAKE STRUCTURE TO THE PROPOSED TURBINE HOUSE. THE PENSTOCK WILL BE CONSTRUCTED OF STEEL AND HDPE PIPE. APPROXIMATELY 2,000 LF OF THE PROPOSED PENSTOCK IS WITHIN THE ADOT ROW. (EDGERTON HWY)
- A HYDRO TURBINE HOUSE CONSISTING OF A MODULAR STRUCTURE ON A CONCRETE FOUNDATION. LOCATED ADJACENT TO THE COMMUNITY'S EXISTING DIESEL POWER HOUSE, THE STRUCTURE WILL HOUSE A 300KW PELTON TURBINE, GENERATOR, AND CONTROLS. WATER EXPELLED FROM THE TURBINE TAILRACE WILL FLOW BACK INTO THE CREEK IMMEDIATELY DOWNSTREAM OF THE EDGERTON HWY CULVERT OUTFALL VIA A 3% BURIED CMP CULVERT.



2 VICINITY MAP
SCALE: GRAPHIC



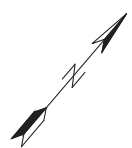
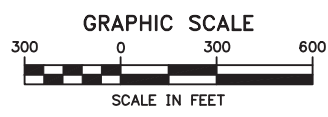
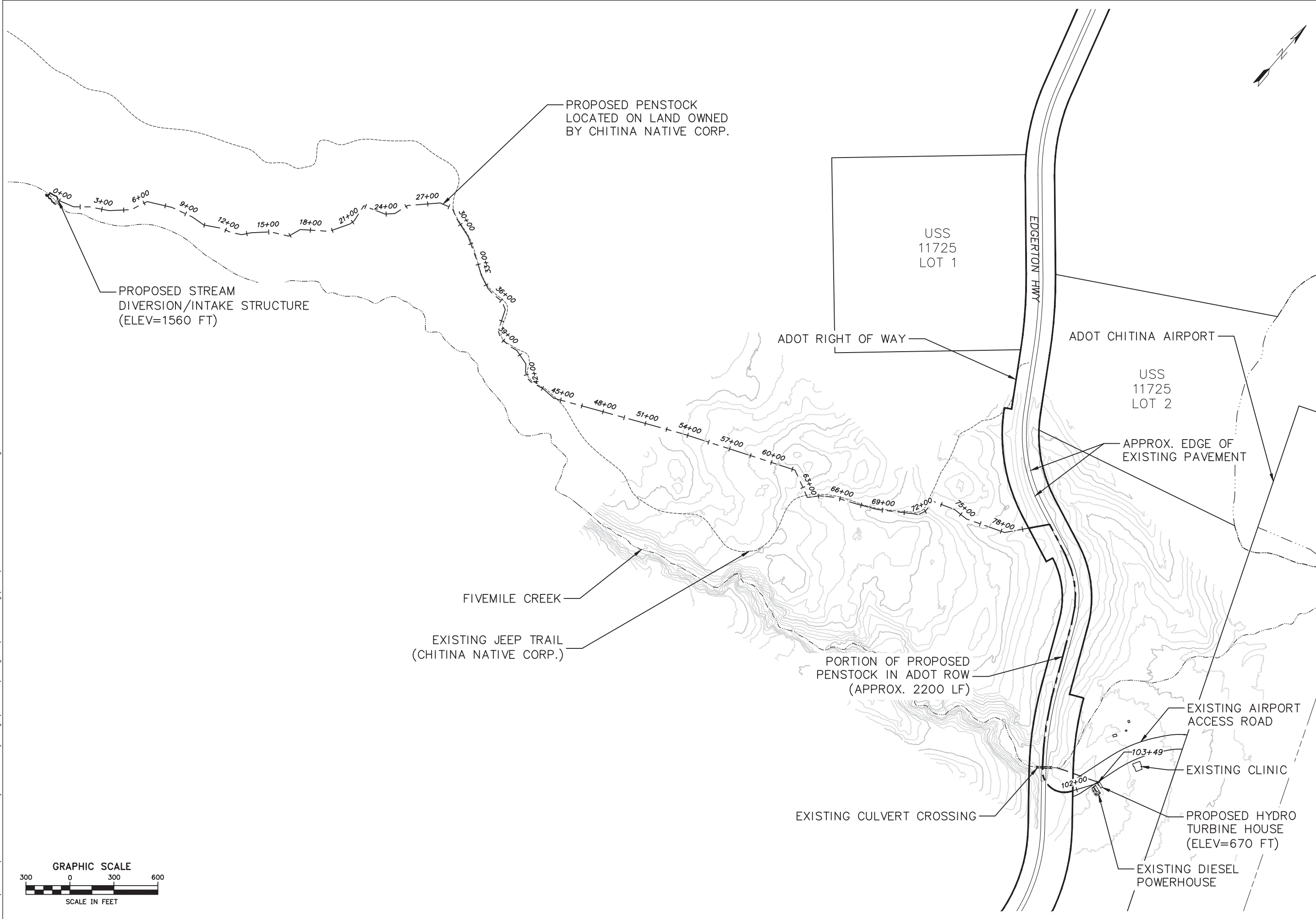
CHITINA, ALASKA
FIVEMILE CREEK HYDROELECTRIC PROJECT
PERMITTING FIGURES
VICINITY MAP AND GENERAL NOTES

NO.	REVISION	BY	DATE

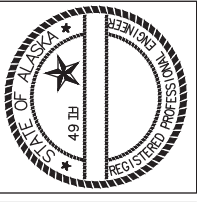
Plot Date: 7/23/14
Designed: AJG
Drawn: AJG
Approved: [Signature]

Sheet No. F1
SHEET OF

File: J:\Jobsdata\30405.00 Chitina Hydro Preliminary Design\00 CADD\02 Figures\03 Permitting\ADOT\30405.00 DOT PERMIT FIGURES.dwg



State of Alaska
 Department of Community
 and Economic Development
AIDEA/AEA
 Rural Energy Group
 813 West Northern Lights Blvd.
 Anchorage, Alaska 99503



CRW
ENGINEERING GROUP LLC
 3940 ARCTIC BLVD., SUITE 300
 ANCHORAGE, ALASKA 99503
 PHONE: (907) 562-2252
 FAX: (907) 562-2275

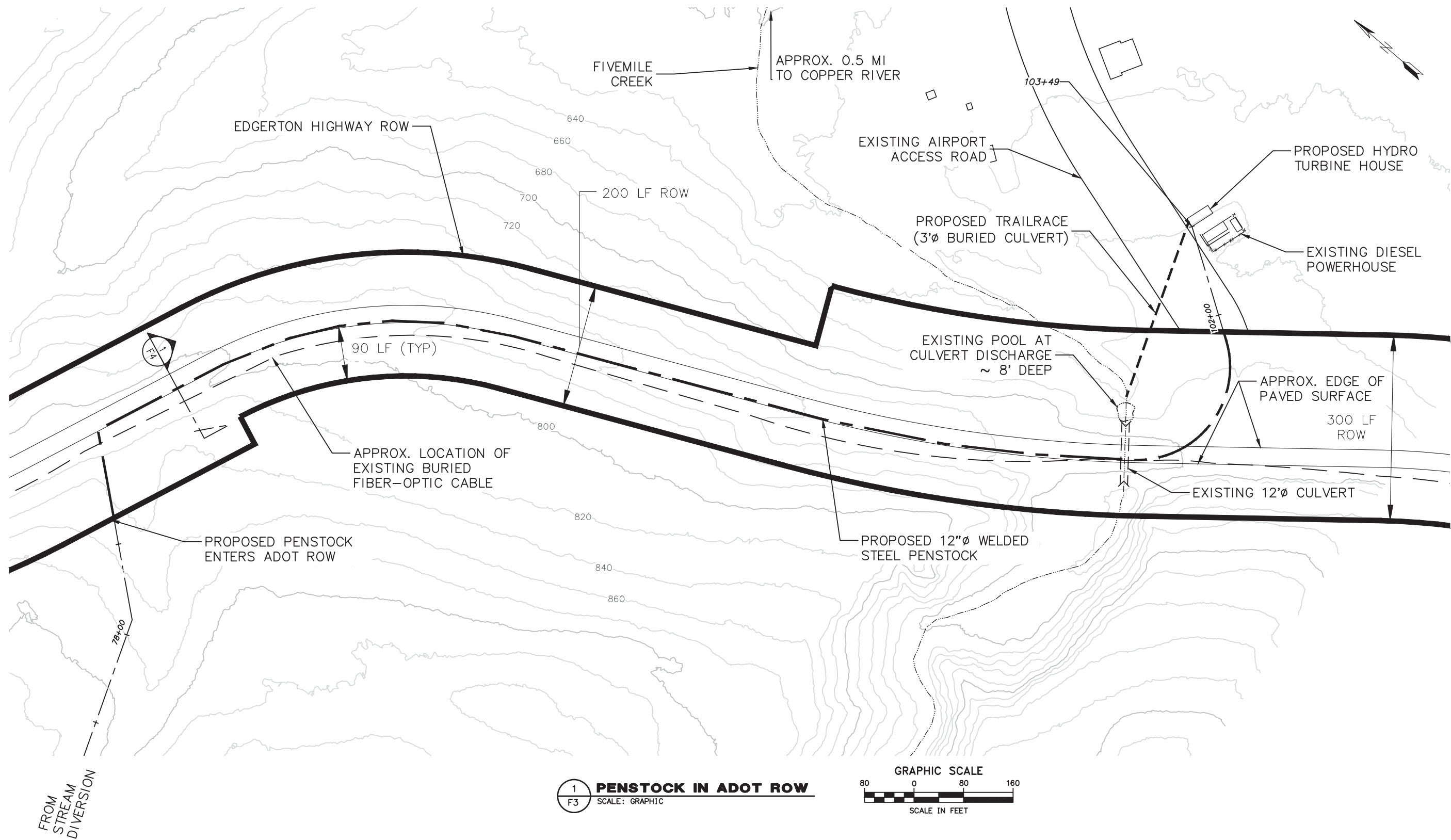
CHITINA, ALASKA
FIVEMILE CREEK HYDROELECTRIC PROJECT
PERMITTING FIGURES
 PROJECT OVERVIEW

NO.	REVISION	BY	DATE

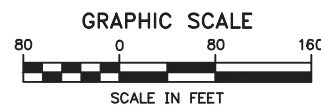
Plot Date: 7/24/14
 Designed: [Signature]
 Drawn: AJG
 Approved: [Signature]

Sheet No. **F2**
 SHEET OF

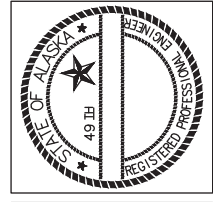
File: J:\Jobsdata\30405.00 Chitina Hydro Preliminary Design\00 CADD\02 Figures\03 Permitting\ADOT\30405.00 DOT PERMIT FIGURES.dwg



1 **PENSTOCK IN ADOT ROW**
F3 SCALE: GRAPHIC



State of Alaska
Department of Community
and Economic Development
AIDEA/AEA
Rural Energy Group
813 West Northern Lights Blvd.
Anchorage, Alaska 99503



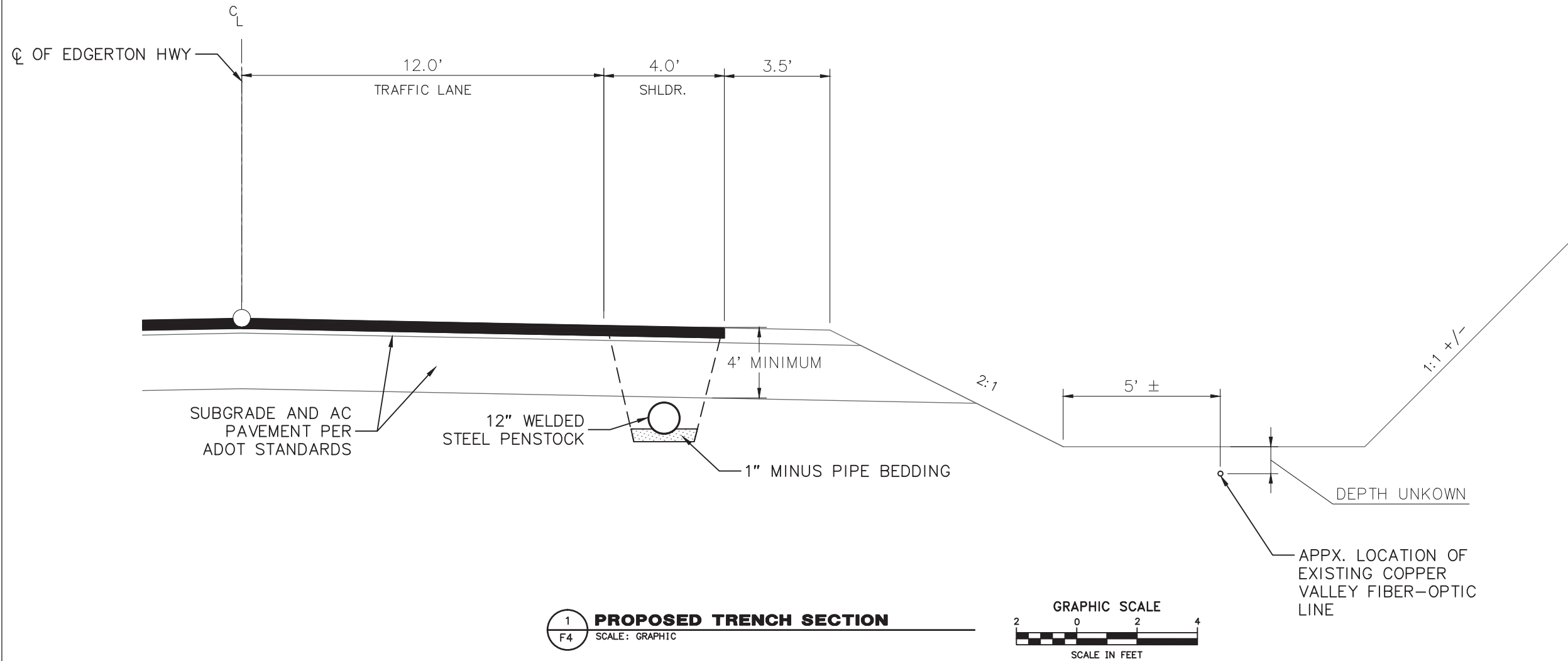
CRW
ENGINEERING GROUP LLC
3940 ARCTIC BLVD., SUITE 300
ANCHORAGE, ALASKA 99503
PHONE: (907) 562-2352
FAX: (907) 562-2275

CHITINA, ALASKA
FIVEMILE CREEK HYDROELECTRIC PROJECT
PERMITTING FIGURES
DOT ROW IMPACTS

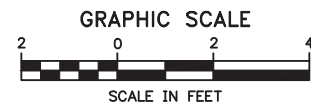
NO.	REVISION	BY	DATE

Plot Date: 7/24/14
Designed: AJG
Drawn: AJG
Approved: _____

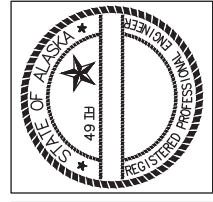
File: J:\Jobsdata\30405.00 Chitina Hydro Preliminary Design\00 CADD\02 Figures\03 Permitting\ADOT\30405.00 DOT PERMIT FIGURES.dwg



1
F4 **PROPOSED TRENCH SECTION**
SCALE: GRAPHIC



State of Alaska
Department of Community
and Economic Development
AIDEA/AEA
Rural Energy Group
813 West Northern Lights Blvd.
Anchorage, Alaska 99503



CRW
ENGINEERING GROUP LLC
3940 ARCTIC BLVD., SUITE 300
ANCHORAGE, ALASKA 99503
PHONE: (907) 562-3352
FAX: (907) 567-2273

CHITINA, ALASKA
FIVEMILE CREEK HYDROELECTRIC PROJECT
PERMITTING FIGURES
EDGERTON HIGHWAY SECTION

NO.	REVISION	BY	DATE

Plot Date: 7/24/14
Designed: AJG
Drawn: AJG
Approved: _____

Sheet No. F4
SHEET OF



Mail Processing Center
 Federal Aviation Administration
 Southwest Regional Office
 Obstruction Evaluation Group
 2601 Meacham Boulevard
 Fort Worth, TX 76193

Aeronautical Study No.
 2014-AAL-283-OE

Issued Date: 08/18/2014

Alan Fetters, PE
 Alaska Energy Authority
 813 W Northern Lights Blvd
 Anchorage, AK, AK 99503

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure: Building Chitina Hydro Turbine House
 Location: Chitina, AK
 Latitude: 61-34-56.04N NAD 83
 Longitude: 144-26-11.34W
 Heights: 670 feet site elevation (SE)
 15 feet above ground level (AGL)
 685 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

- At least 10 days prior to start of construction (7460-2, Part 1)
- Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/lighting are accomplished on a voluntary basis, we recommend it be installed and maintained in accordance with FAA Advisory circular 70/7460-1 K Change 2.

This determination expires on 02/18/2016 unless:

- (a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
- (b) extended, revised, or terminated by the issuing office.
- (c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates , heights, frequency(ies) and power . Any changes in coordinates , heights, and frequencies or use of greater power will void this determination. Any future construction or alteration , including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (800) 478-3576 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

If we can be of further assistance, please contact our office at (907) 271-5863. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2014-AAL-283-OE.

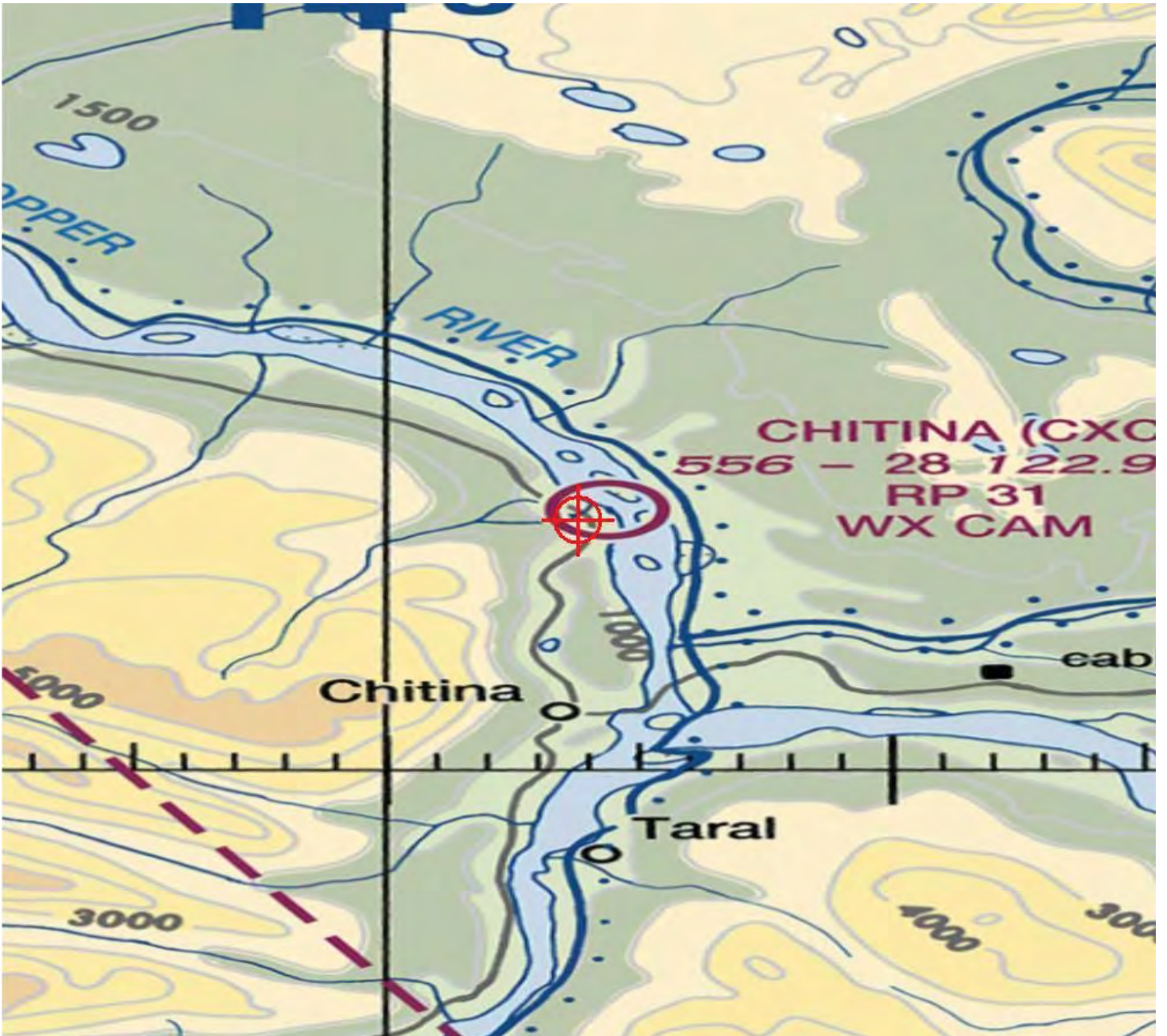
Signature Control No: 225924014-227242229

(DNE)

Robert van Haastert
Specialist

Attachment(s)
Map(s)





139 FERC ¶ 62,088
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Chitina Electric, Inc.

Docket No. DI12-1-000

ORDER FINDING LICENSING NOT REQUIRED

(May 3, 2012)

1. On November 22, 2011, Chitina Electric, Inc. filed a Declaration of Intention (DI) concerning the proposed Fivemile Creek Hydroelectric Project (project), which will be located on Fivemile Creek, near the town of Chitina, Alaska, at T. 3 S., R. 5 E., secs. 23, 24, 25, 26, 27, and 28, Copper River Meridian.

PROJECT DESCRIPTION

2. The proposed run-of-river Fivemile Creek Hydroelectric Project will consist of: (1) an approximately 6-foot-high diversion structure on Fivemile Creek diverting water into a 10,000-foot-long, 12-inch-diameter steel penstock; (2) a proposed 20-foot wide, 40-foot-long powerhouse, containing a 300-kW pelton wheel turbine and electrical generating equipment; (3) a tailrace from the powerhouse to Fivemile Creek; and (4) appurtenant facilities. The power will be used to replace diesel generators used in the town of Chitina.

PUBLIC NOTICE

3. Notice of the DI was published on December 16, 2011. Protests, comments, and/or motions to intervene were to be filed by January 23, 2012. On January 23, 2012, the Department of Fish and Game, State of Alaska, filed a motion to intervene with comments. The comments reflect concerns about the placement of the tailrace and its effect on fish habitat below the Edgerton Highway. The comments also cited concerns about the effect of the proposed project on easements used for recreation. The comments do not provide sufficient information relating to the jurisdictional requirements for licensing. No other protests, comments, or motions to intervene have been received.

JURISDICTION

4. Pursuant to Section 23(b)(1) of the Federal Power Act (FPA), 16 U.S.C. § 817(1), a non-federal hydroelectric project must (unless it has a still-valid pre-1920 federal permit) be licensed if it:

- is located on a navigable water of the United States;
- occupies lands of the United States;
- utilizes surplus water or waterpower from a government dam; or
- is located on a stream over which Congress has Commerce Clause jurisdiction, is constructed or modified on or after August 26, 1935, and affects the interests of interstate or foreign commerce.

DISCUSSION

5. Based on available information it does not appear that the proposed project would be located on a navigable water of the United States. It will not occupy any public lands or reservations of the United States, and will not use surplus water or waterpower from a Federal government dam. The proposed project would be constructed after August 26, 1935, and would use water from a Commerce Clause stream,¹ but would not affect interstate commerce because it would not be connected to the interstate grid. Therefore, the project does not require licensing under Section 23(b)(1) of the FPA.

CONCLUSION

6. Consequently, Section 23(b)(1) of the FPA does not require licensing of the proposed Fivemile Creek Hydroelectric Project. If evidence sufficient to require licensing is found in the future, section 23(b)(1) would require licensing. Under section 4(g) of the FPA, the project owner could then be required to apply for a license.

The Director orders:

(A) Section 23(b)(1) of the Federal Power Act does not require licensing of the proposed Fivemile Creek Hydroelectric Project. This order is issued without prejudice to any future determination upon new or additional evidence that licensing is required.

¹ For purposes of FPA section 23(b)(1), Commerce Clause streams are the headwaters and tributaries of navigable waters of the United States. *See FPC v. Union Electric Co.*, 381 U.S. 90, 94-96 (1965). Fivemile Creek is tributary to the Copper River, a navigable water of the United States [40 FERC ¶ 62,172].

(B) This order constitutes final agency action. Any party may file a request for rehearing of this order within 30 days from the date of its issuance, as provided in section 313(a) of the FPA, 16 U.S.C. § 8251 (2006), and the Commission's regulations at 18 C.F.R. § 385.713 (2011). The filing of a request for rehearing does not operate as a stay of the effective date of this order, or of any other date specified in this order. The licensee's failure to file a request for rehearing shall constitute acceptance of this order.

Charles K. Cover, P.E.
Chief, Project Review Branch
Division of Hydropower Administration
and Compliance

STATE OF ALASKA

DEPARTMENT OF FISH AND GAME

DIVISION OF SPORT FISH

SEAN PARNELL, GOVERNOR

Research and Technical Services
333 Raspberry Road
Anchorage, Alaska 99518-1565
PHONE: (907) 267-2312
FAX: (907) 267-2422

January 23, 2012

Ms. Kimberly Bose, Secretary
Federal Energy Regulatory Commission
888 First Street
Washington D.C. 20426

Subject: DI112-1-000
Five Mile Creek Hydroelectric Project- Chitina Electric Inc.

Dear Ms. Bose:

Attached are department comments and currently identified issues relative to the above referenced Declaration of Intent (DI). The department only became aware of the filing of the DI and notice by FERC of the comment period on Thursday, January 12, 2012. We requested and received information from the applicant on Friday, January 13, 2012.

As part of the filing of the DI, the applicant asks for a waiver of FERC regulations. Based on the waiver request, the filing also appears to be a request for a jurisdictional determination. The following comments as presented are based on very rapid coordination and turnaround within our department and may be subject to modification when additional information becomes available.

Thank you for consideration of our comments and concerns.

Sincerely,

/s/ Monte D. Miller

Monte Miller
Statewide Hydropower Coordinator
Alaska Department of Fish and Game
Division of Sport Fish/RTS
333 Raspberry Road
Anchorage, Alaska 99518-1565

e-copy:

K. Meehleis, CRW Engineering Group, LLC

J. Durst, ADF&G, Habitat-Fairbanks

M. Sommerville, Sport Fish-Glennallen

R. Schwanke, Wildlife Conservation-Glennallen

DI 112-1-000
Fivemile Creek Hydroelectric Project
Chitina Electric Inc.
Filed By: CRW Engineering Group, LLC (CRW)

Alaska Department of Fish and Game Comments
January 23, 2012

General Statement

The proposed Fivemile Creek hydroelectric project appears to be a relatively low impact and potentially beneficial project to the community of Chitina. The project features located above the Edgerton Highway are in a steep gradient area with no identified fish resources (based on limited study work by ABR in 2011). ADF&G agrees with the initial assessment of the habitat availability above the Edgerton Highway. In limited sampling by ABR, Dolly Varden were captured by minnow trap at a location below the Edgerton Highway. The extent of salmon use of Fivemile Creek below the Edgerton Highway culvert barrier remains unknown. Factors affecting trapping success may include method, timing of trapping and site selection (roe baited traps are not effective on some species and effort may have been after outmigration occurred).

Specific Comments and Issues

1. In the CRW cover letter, the second bullet states that “*Fivemile Creek is a steep, shallow, mountainous, un-navigable waterway.*” This statement is correct in areas from the headwaters to the Edgerton Highway. However, the area below the Edgerton Highway is dissimilar in gradient and habitat to the rest of the stream.

The filing by CRW describes the area below the Edgerton Highway as follows: “*Fivemile Creek, as its name implies, flows for ~5 miles, the last 2,500 feet emerging from a culvert which crosses under the Edgerton Highway at milepost 23.4.*” ABR stated “*the powerhouse tailrace would reintroduce diverted water back into the creek ~1,500 feet from its mouth at the Copper River (PCA 2008).*” This apparent placement of the tailrace is the only reference to an actual location of the tailrace in this filing and would result in a 40% loss of habitat below the Edgerton Highway.

The ABR Aquatic Resources Data Gap Analysis included in Appendix D of the CRW filing also references a personal communication from ADF&G, Division of Sport Fish Area Management Biologist (AMB) Mark Summerville stating the possibility of juvenile salmonids utilizing the habitat below the Edgerton Highway. I received a personal communication on January 20, 2012 from James Durst, ADF&G Habitat Division AMB stating that Mark Summerville has seen Chinook salmon fry in Fivemile Creek below the Edgerton Highway. Consequently, the recommendation made by James Durst is:

“To avoid and minimize project effects on the rearing habitat downstream of the culvert, the project tailrace should be placed as near as possible to the culvert outlet.”

Since there has been limited aquatic survey work completed in Fivemile Creek, below the Edgerton Highway, ADF&G would welcome a focused study of this area to determine use and subsequent impact which would result from this project.

2. The location of the diversion, penstock and project boundary are of potential concern to ADF&G, Division of Wildlife Conservation AMB Rebecca Schwanke as identified in an e-mail sent to James Durst on January 13, 2012.

“There is a well-known and well used trail that runs up the north side of Fivemile Creek, EIN 7 (Copper River Basin Easement Atlas; Valdez C2). This trail is used by many people for all purposes including hunting, trapping, and wildlife viewing. The trail and the proposed project are within the Tonsina Controlled Use Area, which limits hunters to non-motorized transportation between July 26 and September 30. Many hunters in particular rely on this trail to access higher elevation hunting areas on foot/bicycle during fall months, while hunters and trappers rely on the trail for snowmachine access during the winter. I would like to make sure ADF&G formally recognizes the current use and importance of this easement throughout this process. I do not want to see this project somehow interfere with this legal easement and access route as it is the only one in the northeast portion of the Tonsina Controlled Use Area.”

It is unknown what impact this project could have on this access trail and ADF&G would request the applicant address this issue.

Fivemile Creek Hydro Project 65% Construction Drawings

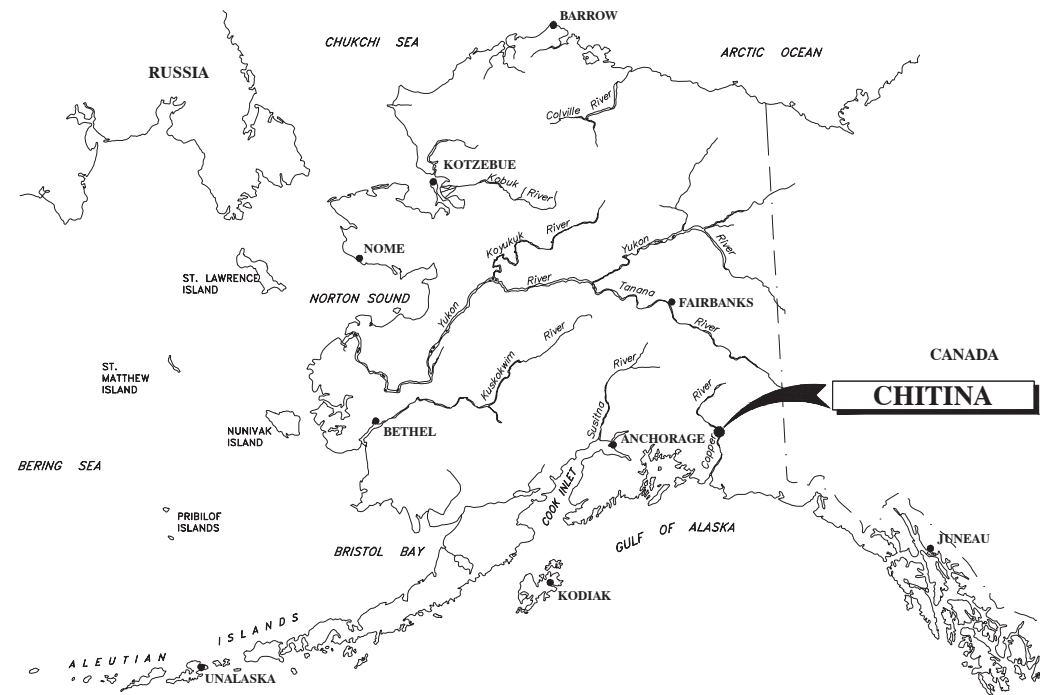
State of Alaska
Department of Community and Economic Development



CHITINA, ALASKA

FIVEMILE CREEK HYDROELECTRIC PROJECT

65% DESIGN DRAWINGS
SEPTEMBER 2014



SHEET INDEX

SHT. NO.	TITLE
<u>GENERAL</u>	
1	G100 COVER SHEET & INDEX
2	G101 VICINITY MAP
3	G102 GENERAL NOTES
4	G103 STANDARDS AND SPECIFICATIONS
5	G104 CANDIDATE BUILDINGS FOR DISPATCHABLE LOAD HEATERS
<u>CIVIL</u>	
6	C100 ACCESS ROAD PLAN AND PROFILE KEY
7	C101 ACCESS ROAD PLAN AND PROFILE - 1
8	C102 ACCESS ROAD PLAN AND PROFILE - 2
9	C103 ACCESS ROAD PLAN AND PROFILE - 3
10	C200 ACCESS ROAD CROSS SECTIONS - 1
11	C201 ACCESS ROAD CROSS SECTIONS - 2
12	C202 ACCESS ROAD CROSS SECTIONS - 3
13	C300 ACCESS ROAD AND TRENCH DETAILS
14	C301 PENSTOCK TRENCH DETAILS
15	C302 INSULATED ARCTIC PIPE DETAILS
16	C400 PENSTOCK PLAN AND PROFILE KEY
17	C401 PENSTOCK PLAN AND PROFILE - 1
18	C402 PENSTOCK PLAN AND PROFILE - 2
19	C403 PENSTOCK PLAN AND PROFILE - 3
20	C404 PENSTOCK PLAN AND PROFILE - 4
21	C405 PENSTOCK PLAN AND PROFILE - 5
22	C406 PENSTOCK PLAN AND PROFILE - 6
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24	C408 PENSTOCK PLAN AND PROFILE - 8
25	C500 DIVERSION DAM AND INTAKE STRUCTURE GRADING PLAN
26	C501 DIVERSION DAM AND INTAKE STRUCTURE PLAN VIEW
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30	C505 DIVERSION DAM AND INTAKE STRUCTURE SECTIONS - 4
31	C600 TURBINE HOUSE AND TAILRACE PLAN AND PROFILE VIEWS
32	C601 POWERHOUSE FOUNDATION PLAN VIEW
33	C602 POWERHOUSE FOUNDATION SECTION VIEWS
<u>MECHANICAL</u>	
34	M100 TURBINE BUILDING LAYOUT
<u>ELECTRICAL AND CONTROLS</u>	
NOT INCLUDED THIS SET	

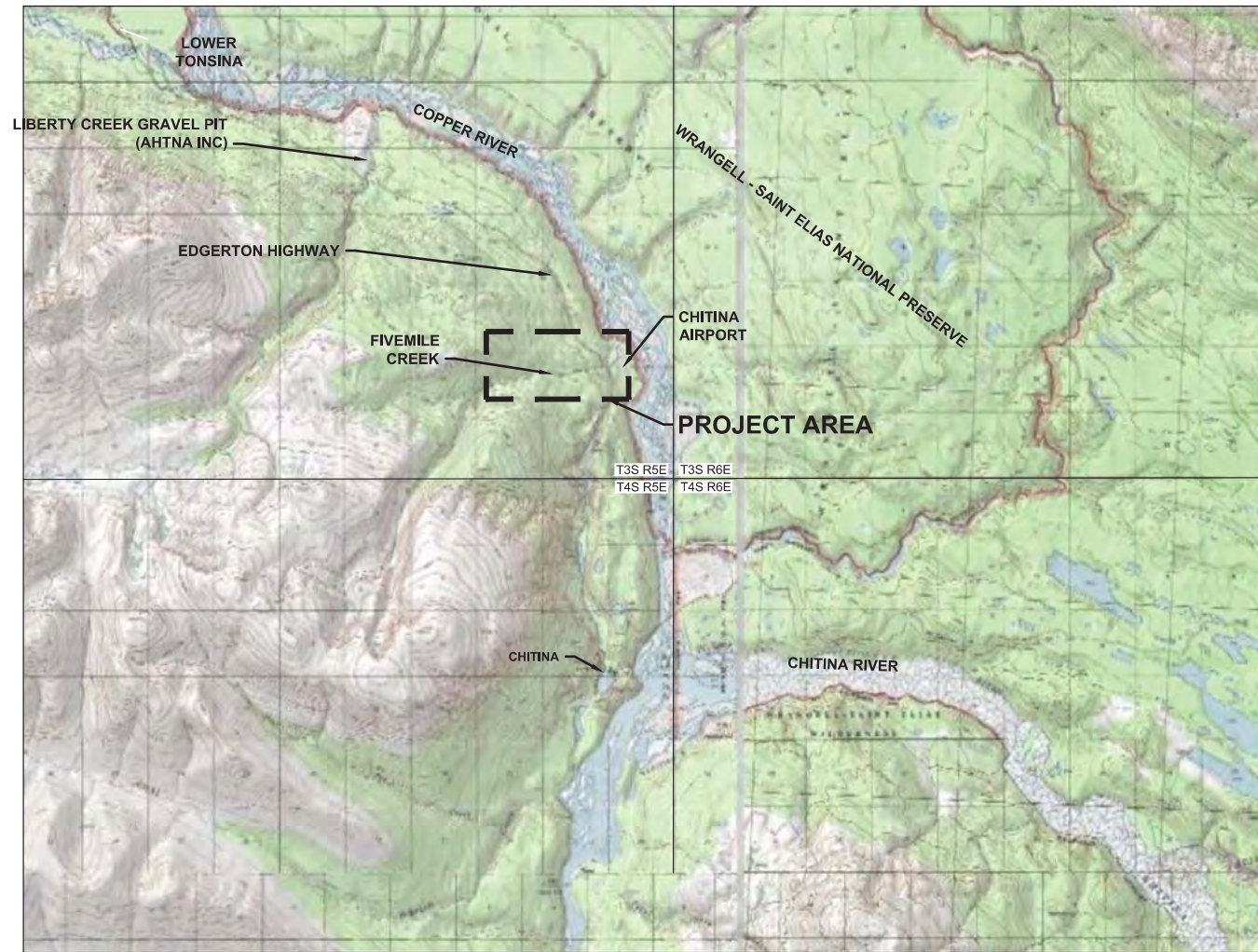
File: J:\Jobsdata\30405.00 Chitina Hydro Preliminary Design\00 CADD\01 Working Set\01 Civil\30405.00 Cover.dwg



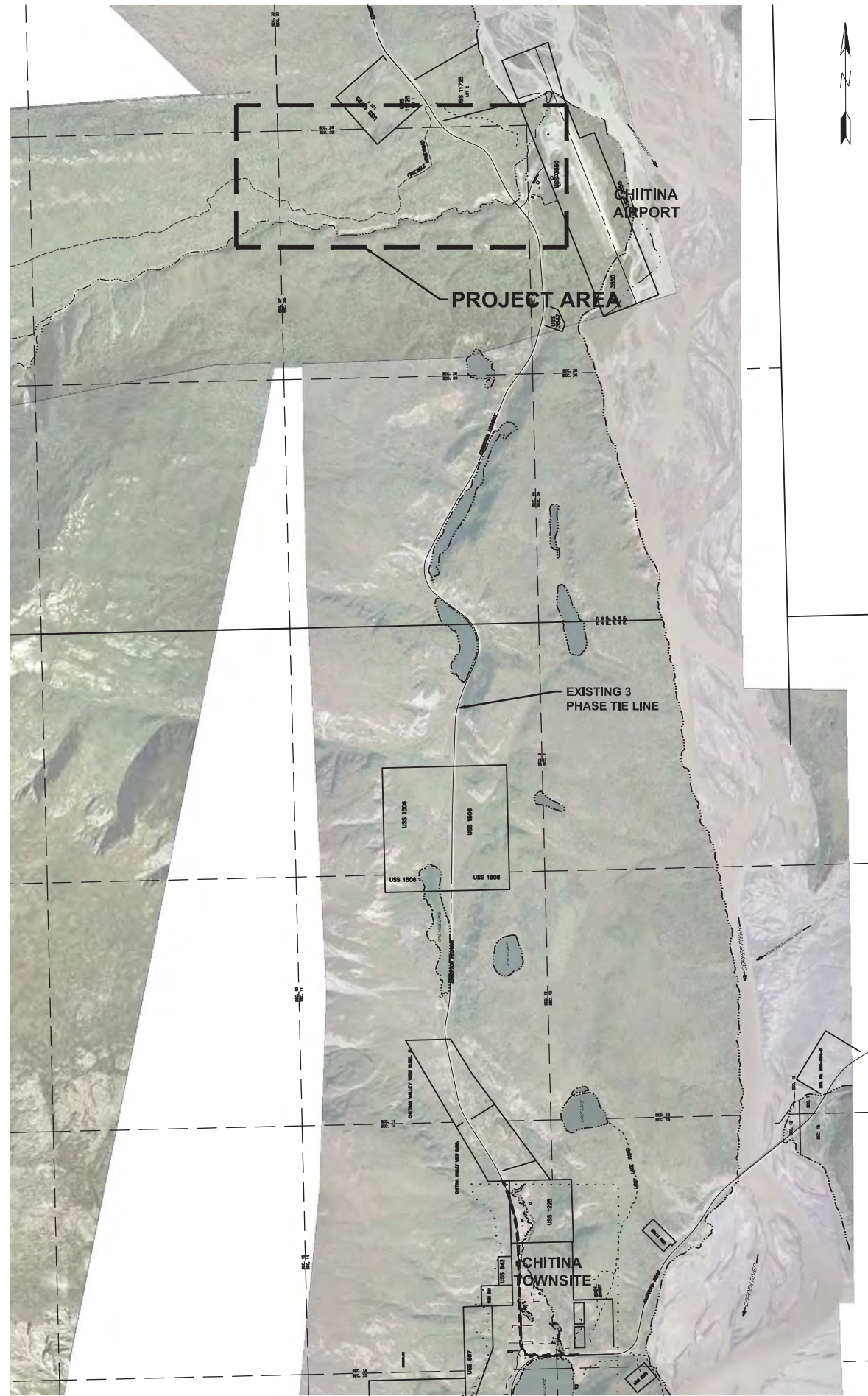
3940 Arctic Blvd. Suite 300
Anchorage, Alaska 99503
PHONE: (907) 562-3252



Project Number (Consultant)	30405.00(AEA)
AEA Project Manager	ALAN FETERS
Construction Manager	X
Final Design	(Date) X
Fire Marshal Approval	(Date) X
Construction Period	(From) X (To) X
As-Builts	(Date) X



1
G101 **LOCATION MAP**
SCALE: GRAPHIC



2
G101 **VICINITY MAP**
SCALE: GRAPHIC



NO.	REVISION	BY	DATE

Plot Date	9/18/14
Designed	KRH
Drawn	AJG
Approved	

Sheet No. G101
SHEET 2 OF 34

CHITINA, ALASKA
FIVEMILE CREEK HYDROELECTRIC PROJECT
65% DESIGN DRAWINGS
VICINITY MAP



State of Alaska
Department of Community
and Economic Development
AEA
Rural Energy Group
813 West Northern Lights Blvd.
Anchorage, Alaska 99503
ALASKA ENERGY AUTHORITY

PROJECT SCOPE

THIS PROJECT PROVIDES FOR THE CONSTRUCTION OF A NEW HYDROELECTRIC FACILITY AT FIVEMILE CREEK, NEAR THE COMMUNITY OF CHITINA, ALASKA. ACTIVITIES WILL INCLUDE THE CONSTRUCTION OF:

- A CONCRETE GRAVITY DIVERSION STRUCTURE ON FIVEMILE CREEK (AT ELEV=1562 FT). THE STRUCTURE WILL DIVERT STREAM FLOW INTO THE PROPOSED PENSTOCK.
- A 10,500± LINEAR FOOT , BURIED PENSTOCK (DIA = 12"-20") TO CONNECT THE INTAKE STRUCTURE TO THE PROPOSED TURBINE HOUSE. THE PENSTOCK WILL BE CONSTRUCTED OF INSULATED STEEL AND HDPE PIPE.
- A HYDRO TURBINE BUILDING, CONSISTING OF A METAL FRAME STRUCTURE ON A CONCRETE FOUNDATION. LOCATED ADJACENT TO THE COMMUNITY'S EXISTING DIESEL POWER HOUSE, THE STRUCTURE WILL HOUSE A 300KW PELTON TURBINE, GENERATOR, AND CONTROLS. WATER EXPELLED FROM THE TURBINE WILL FLOW BACK INTO THE CREEK IMMEDIATELY DOWNSTREAM OF THE EDGERTON HWY CULVERT OUTFALL VIA A 3'± BURIED CMP CULVERT.
- A 2,850 FOOT LONG GRAVEL ROAD WILL BE CONSTRUCTED BETWEEN THE PROPOSED STREAM DIVERSION AND THE EXISTING JEEP TRAIL TO PROVIDE ACCESS FOR CONSTRUCTION AND MAINTENANCE.
- REMOTE ELECTRICAL HEATERS WILL BE INSTALLED IN SELECT COMMUNITY, GOVERNMENT, AND COMMERCIAL STRUCTURES TO TAKE ADVANTAGE OF EXCESS HYDRO ENERGY, WHEN AVAILABLE.

GENERAL NOTES

- THE CONTRACTOR SHALL PROTECT ALL ITEMS NOT SCHEDULED FOR DEMOLITION DURING CONSTRUCTION. DISTURBED AREAS SHALL BE RESTORED TO PRE-CONSTRUCTION CONDITION.
- ALL EXISTING UTILITIES MAY NOT BE SHOWN ON THESE PLANS. THE CONTRACTOR SHALL CONSULT WITH THE APPROPRIATE UTILITY ORGANIZATIONS TO VERIFY AND LOCATE UTILITIES PRIOR TO CONSTRUCTION. SEE UTILITY CONTACT INFORMATION ON THIS SHEET.
- IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE APPROPRIATE TEMPORARY CUT SLOPES AND SHORING FOR EXCAVATIONS AND TRENCHES FOR SITE SOILS, GROUNDWATER AND RUNOFF CONDITIONS AND SURFACE LOADING CONDITIONS. THE CONTRACTOR MUST COMPLY WITH APPLICABLE FEDERAL AND STATE OSHA REGULATIONS. THE CONTRACTOR SHALL MAINTAIN ALL SIGNS, BARRICADES, WARNING LIGHTS AND OTHER PROTECTIVE DEVICES NECESSARY FOR SAFETY AND TRAFFIC CONTROL.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING HIS WORK WITH EXISTING FACILITY OPERATORS, OTHER CONTRACTORS, SUBCONTRACTORS, THE CITY AND STATE AND FEDERAL AUTHORITIES.
- THE DRAWINGS ARE DIAGRAMMATIC AND DO NOT NECESSARILY SHOW ALL FEATURES OF THE REQUIRED WORK. PROVIDE ALL LABOR, EQUIPMENT AND MATERIALS REQUIRED FOR A COMPLETE, AND CODE COMPLIANT SYSTEM. VERIFY EXISTING FIELD CONDITIONS PRIOR TO STARTING CONSTRUCTION. IMMEDIATELY CONTACT THE ENGINEER FOR CLARIFICATION OF QUESTIONABLE ITEMS OR APPARENT CONFLICTS.
- THE CONTRACTOR SHALL PREPARE AND SUBMIT A SWPPP IF ONE IS REQUIRED.
- ALL ITEMS TO BE INSTALLED ARE NEW UNLESS SPECIFICALLY INDICATED AS EXISTING. INSTALL ALL MATERIALS AND EQUIPMENT IAW MANUFACTURERS RECOMMENDATIONS, INSTRUCTIONS, AND INSTALLATION DRAWINGS, UNLESS OTHERWISE INDICATED ON THE DRAWINGS.
- THE SPECIFICATION OF A NAME BRAND PRODUCT FOLLOWED BY THE "OR EQUAL" PHRASE IS DONE MERELY TO ESTABLISH THE MINIMUM LEVEL OF QUALITY OF MATERIALS AND EQUIPMENT REQUIRED AND IS NOT A PRODUCT ENDORSEMENT. SUBMIT ANY PROPOSED SUBSTITUTIONS FOR REVIEW AND APPROVAL, UNLESS "NO SUBSTITUTIONS" IS SPECIFIED.
- PERFORM WORK WITH SKILLED CRAFTSMEN SPECIALIZED IN SAID WORK. INSTALL ALL MATERIALS IN A NEAT, ORDERLY, AND SECURE FASHION, AS REQUIRED BY THE DRAWINGS AND SPECIFICATIONS AND COMMONLY RECOGNIZED STANDARDS OF GOOD WORKMANSHIP.
- CONTRACTOR SHALL MAINTAIN A "REDLINE" SET OF DRAWINGS TO REFLECT FIELD CHANGES THROUGHOUT CONSTRUCTION. RED LINE CONSTRUCTION DRAWINGS SHALL BE SUBMITTED TO ENGINEER AT COMPLETION OF THE PROJECT.
- ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH U.S. ENVIRONMENTAL PROTECTION AGENCY, ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION, AND STATE AND FEDERAL OCCUPATIONAL HEALTH AND SAFETY REGULATIONS.
- ALL CONSTRUCTION IS TO CONFORM TO THE 2009 INTERNATIONAL BUILDING CODE (IBC).

ABBREVIATIONS

ACOE	ARMY CORPS OF ENGINEERS	LF	LINEAR FEET
ADOT	ALASKA DEPARTMENT OF TRANSPORTATION	LB	POUND
ADJ	ADJUSTABLE, ADJACENT	M	METERS
AEA	ALASKA ENERGY AUTHORITY	MAX	MAXIMUM
AGG	AGGREGATE	MIL	0.001 INCH
ALCAP	ALUMINUM SURVEY CAP	MIN	MINIMUM
ALIGN	ALIGNMENT	NA	NOT APPLICABLE
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE	N	NORTH
API	AMERICAN PETROLEUM INSTITUTE	NFS	NON-FROST SUSCEPTIBLE SOIL
APPROX	APPROXIMATE	NOM	NOMINAL
ASCE	AMERICAN SOCIETY OF CIVIL ENGINEERS	NTS	NOT TO SCALE
ASTM	AMERICAN SOCIETY FOR TESTING OF MATERIALS	NWR	NATIONAL WILDLIFE REFUGE
AVG	AVERAGE	OAE	OR APPROVED EQUAL
AWS	AMERICAN WELDING SOCIETY	OD	OUTSIDE DIAMETER
AWWA	AMERICAN WATER WORKS ASSOCIATION	OSHA	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
BC	BEGIN CURVE	OZ	OUNCE
BLDG	BUILDING	PC	POINT OF CURVATURE
BMP	BEST MANAGEMENT PRACTICE	PCC	PORTLAND CEMENT CONCRETE
BOP	BEGINNING OF PROJECT	PI	POINT OF INTERSECTION
BRG	BEARING	PL	PLATE
BTU	BRITISH THERMAL UNIT	PSF	POUNDS PER SQUARE FOOT
BVC	BEGIN VERTICAL CURVE	PSI	POUNDS PER SQUARE INCH
CL	CENTERLINE	PT	POINT OF TANGENCY
CMP	CORRUGATED METAL PIPE	PVC	POINT OF VERTICAL CURVATURE
CNC	CHITINA NATIVE CORPORATION	PVI	POINT OF VERTICAL INTERSECTION
CP	CONTROL PANEL	PVT	POINT OF VERTICAL TANGENCY
DIA	DIAMETER	R	RADIUS
DWG	DRAWING	RF	RAISED FACE
E	EAST	ROW	RIGHT OF WAY
EA	EACH	SCH	SCHEDULE
EG	EXISTING GRADE	SDR	STANDARD DIMENSION RATIO
EL	ELEVATION	SHPO	STATE HISTORIC PRESERVATION OFFICE
ELEC	ELECTRIC	SIM	SIMILAR
ELEV	ELEVATION	SPEC	SPECIFICATION
EOP	END OF PROJECT	SQ	SQUARE
EPA	U.S. ENVIRONMENTAL PROTECTION AGENCY	SS	STAINLESS STEEL
ENGINEER	CRW ENGINEERING GROUP, LLC	STA	STATION
*F	FAHRENHEIT	SY	SQUARE YARD
FG	FINISH GRADE	TBM	TEMPORARY BENCH MARK
FT	FOOT OR FEET	TYP	TYPICAL
GA	GAUGE	UG	UNDERGROUND
GPM	GALLONS PER MINUTE	UPC	UNIFORM PLUMBING CODE
HDPE	HIGH DENSITY POLYETHYLENE	VC	VERTICAL CURVE
HP	HORSE POWER	w/	WITH
HR	HOUR	W	WATER
IAW	IN ACCORDANCE WITH		
IBC	INTERNATIONAL BUILDING CODE		
ID	INSIDE DIAMETER		
IFC	INTERNATIONAL FIRE CODE		
IPC	INTERNATIONAL PLUMBING CODE		

CIVIL LEGEND (GENERAL)

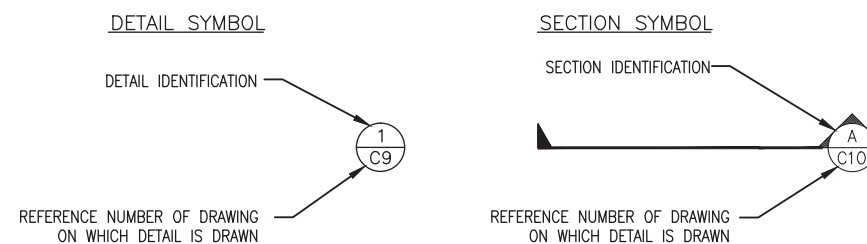
NOTE: SOME DETAILS UTILIZE SYMBOLS NOT IN THIS GENERAL LEGEND. WHERE THIS OCCURS, SYMBOLS ARE DEFINED ON THE SHEET IN WHICH THEY ARE USED.

---	PROPERTY BOUNDARY	---	PROPOSED ACCESS ROAD SURFACE
---	CENTERLINE	---	EXISTING BEDROCK
=====	CULVERT	---	EXISTING GRADE
---	EDGE OF WATER		
---	DITCH LINE/DRAINAGE SWALE		
2% →	DRAINAGE DIRECTION & SLOPE		
---	TRAVELED WAY		
---	FILL SLOPE		
---	CUT SLOPE		
---	FENCE LINE		
●	FIRE EXTINGUISHER		
20	GROUND ELEVATION CONTOURS		
○	BOLLARD		
○PP	POWER POLE		
⊕	SURVEY MONUMENT		
⬢	TEST PIT		
XXX	FINISH GRADE ELEVATION		
⊕	DIAMETER		
⊕	VALVE		

UTILITY LINE/PIPELINE DESIGNATIONS

E	ELECTRIC	---	#	---	UNDERGROUND UTILITY LINE/PIPELINE: EXISTING
W	WATER/PENSTOCK	---	#	---	UNDERGROUND UTILITY LINE/PIPELINE: PROPOSED

DETAIL/SECTION REFERENCES



CALL BEFORE YOU DIG!	
COPPER VALLEY TELECOM	(907) 822-3551
CHITINA ELECTRIC, INC.	(907) 8223-2220

State of Alaska
Department of Community and Economic Development
AEA
Rural Energy Group
813 West Northern Lights Blvd
Anchorage, Alaska 99503
ALASKA ENERGY AUTHORITY



CRW ENGINEERING GROUP LLC
3940 ARCTIC BLVD, SUITE 300
ANCHORAGE, ALASKA 99503
PHONE: (907) 562-2352
FAX: (907) 561-2275

CHITINA, ALASKA
FIVEMILE CREEK HYDROELECTRIC PROJECT
65% DESIGN DRAWINGS
GENERAL NOTES AND ABBREVIATIONS

NO.	REVISION	BY	DATE

Plot Date	9/18/14
Designed	KRH
Drawn	AJG
Approved	

File: J:\Jobsdata\30405.00 Chitina Hydro Preliminary Design\00 CADD\01 Working Set\01 Civil\30405.00 General Sheets.dwg

EARTHWORK

GENERAL
CONTACT LOCAL UTILITIES AND REQUEST A LOCATE FOR ALL EXISTING UNDERGROUND UTILITIES IN THE VICINITY PRIOR TO EXCAVATION.

CAREFULLY LAY OUT WORK TO MINIMIZE DISRUPTION AND DAMAGE TO EXISTING SURFACES.

PERFORM ALL WORK IN ACCORDANCE WITH OSHA REQUIREMENTS. BARRICADE OPEN EXCAVATIONS TO PROHIBIT PUBLIC ENTRY. COORDINATE WORK WITH COMMUNITY'S MAINTENANCE/ENGINEERING STAFF AT EACH LOCATION.

NOTIFY ENGINEER OF ANY DISCREPANCIES BETWEEN CONTRACTUAL REQUIREMENTS AND SITE CONDITIONS PRIOR TO START OF WORK.

WORK IN INCLEMENT WEATHER IS AT CONTRACTOR'S RISK. ANY MATERIALS WHICH BECOME UNSTABLE DUE TO IMPROPER SELECTION OF TECHNIQUES, EQUIPMENT, OR OPERATIONS DURING INCLEMENT WET WEATHER SHALL BE REPLACED AT CONTRACTOR'S EXPENSE.

EXCAVATIONS AND EMBANKMENT SHALL BE ACCOMPLISHED IN SUCH A MANNER THAT DRAINAGE IS MAINTAINED AT ALL TIMES; ANY AREAS NOT SO DRAINED SHALL BE KEPT FREE OF STANDING WATER BY PUMPING IF NECESSARY.

THE CONTRACTOR SHALL PROVIDE FOR THE PROPER MAINTENANCE OF TRAFFIC FLOW AND ACCESSIBILITY AS MAY BE NECESSARY, AND SHALL ALSO MAKE ADEQUATE PROVISIONS FOR THE SAFETY OF PROPERTY AND PERSONS.

CLASSIFIED FILL MATERIAL SPECIFICATIONS: CLASSIFIED FILL AND BACKFILL SHALL CONTAIN NO LUMPS, FROZEN MATERIAL, ORGANICS, OR OTHER DELETERIOUS MATTER. IT SHALL HAVE A PLASTICITY INDEX NOT GREATER THAN SIX (6) AS DETERMINED BY ASTM D-424 AND SHALL CONFORM TO ONE OF THE FOLLOWING TYPES AS REQUIRED BY THE DRAWINGS AND SPECIFICATIONS:

TRENCH BACKFILL:

U.S. STD. SIEVE	% PASSING BY WEIGHT
3"	100
3/4"	50-100
#4	25-60

SURFACE COURSE:

THE SURFACE COURSE SHALL CONSIST OF CRUSHED GRAVEL, ROCK, SAND, OR OTHER APPROVED MATERIAL. THE MATERIAL SHALL BE FREE FROM LUMPS, FROZEN MATERIAL, ORGANICS, OR OTHER OBJECTIONABLE MATTER. IT SHALL CONFORM TO THE QUALITY REQUIREMENTS OF AASHTO M-147. GRADATION SHALL CONFORM TO THE FOLLOWING:

U.S. STD. SIEVE	% PASSING BY WEIGHT
1"	100
3/4"	70-100

ROCK FILL:

ROCK FILL SHALL CONSIST OF SOUND, DURABLE ROCK FRAGMENTS OBTAINED FROM LOCAL BEDROCK SOURCES. ROCK FRAGMENTS SHALL BE REASONABLY WELL GRADED AS DETERMINED BY THE ENGINEER AND SHALL BE UP TO 12 INCHES IN MAXIMUM DIMENSION.

WOVEN GEOTEXTILE FABRIC - BLACK, FUEL RESISTANT GEOTEXTILE FABRIC. INSTALL WITH 3' MINIMUM OVERLAP AT ALL JOINTS. AMOCO 2016 OR APPROVED EQUAL.

SUBMITTALS

CONTRACTOR SHALL MAKE THE FOLLOWING EARTHWORK RELATED SUBMITTALS:

- A. SUBMIT ONE GRADATION ANALYSIS AND MOISTURE-DENSITY (COMPACTION CURVE) TEST REPORT FOR EACH MATERIAL SOURCE. ALL TEST REPORTS SHALL BE FROM A CERTIFIED SOILS TESTING LABORATORY.
- B. IF THE CONTRACTOR CHANGES THE SOURCE AND/OR STOCKPILE FROM WHICH MATERIALS ARE OBTAINED, GRADATION ANALYSIS AND MOISTURE-DENSITY TEST REPORTS FOR THESE NEW SOURCES SHALL BE SUBMITTED TO THE ENGINEER.
- C. ADDITIONAL TESTING:
 - 1. DURING CONSTRUCTION, THE OWNER MAY ELECT TO HAVE FURTHER GRADATION AND COMPACTION TESTING COMPLETED ON THE MATERIALS BEING FURNISHED BY THE CONTRACTOR.
 - 2. THIS TESTING SHALL BE AT THE EXPENSE OF THE OWNER.
 - 3. THE CONTRACTOR SHALL PROVIDE MATERIAL SAMPLES AS MAY BE NECESSARY TO COMPLETE THIS TESTING AND THESE MATERIAL SAMPLES SHALL BE FURNISHED FROM MATERIAL AVAILABLE ON THE PROJECT SITE OR FROM THE CONTRACTOR'S SOURCE AND/OR SUPPLIER.

CLEARING AND GRUBBING

CONTRACTOR SHALL PERFORM ALL CLEARING AND GRUBBING OPERATIONS WHERE DESIGNATED ON THE CONTRACT DRAWINGS AND AS SPECIFIED HEREIN OR AS DIRECTED BY THE ENGINEER.

LOCATE, IDENTIFY AND PROTECT EXISTING UTILITIES FROM DAMAGE.

PROVIDE PROTECTION AS NECESSARY TO PREVENT DAMAGE TO EXISTING IMPROVEMENTS INDICATED TO REMAIN.

- 1. PROTECT IMPROVEMENTS ON ADJOINING PROPERTIES AND ON PROJECT SITE.
- 2. PROTECT TREES, PLANT GROWTH AND FEATURES DESIGNATED TO REMAIN. PROTECT SURVEY BENCHMARKS, PROPERTY CORNERS, SURVEY MONUMENTS AND EXISTING WORK FROM DAMAGE OR DISPLACEMENT.

ALL PROPERTY CORNERS, BENCHMARKS OR OTHER PERMANENT SURVEY MARKER DISTURBED DURING CONSTRUCTION SHALL BE REMOVED AND RECORDED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE RESURVEY AND RESETTING OF ANY DISTURBED PROPERTY CORNERS, BENCHMARKS OR OTHER PERMANENT SURVEY MARKERS BY A PROFESSIONAL LAND SURVEYOR, LICENSED BY THE STATE OF ALASKA.

THE CONTRACTOR SHALL MAKE HIS/HER OWN ARRANGEMENTS AND ASSUME ALL COSTS IN CONNECTION WITH DISPOSAL

SITES. DISPOSAL SITES SHALL BE LOCATED AND MAINTAINED IN SUCH A MANNER AS TO PREVENT A PUBLIC NUISANCE.

IF THE DISPOSAL SITE IS LOCATED ON PRIVATE LAND, THE CONTRACTOR SHALL OBTAIN WRITTEN PERMISSION FROM THE PROPERTY OWNER OR OWNERS FOR SUCH DISPOSAL SITES AND SHALL FURNISH THE AUTHORITY WITH A COPY OF THIS PERMISSION. THE WRITTEN PERMISSION SHALL SPECIFICALLY PROVIDE THAT THE PROPERTY OWNER WILL NOT HOLD THE AUTHORITY, ITS EMPLOYEES, AGENTS, OR ENGINEERS LIABLE FOR USE OF OR DAMAGE TO THIS PROPERTY. THE CONTRACTOR SHALL BE HELD LIABLE FOR ANY TRESPASS AND PROPERTY DAMAGE INCURRED OUTSIDE OF THE DISPOSAL SITE.

EMBANKMENT CONSTRUCTION

PLACEMENT:

THE SPECIFIED MATERIAL SHALL BE PLACED AT THE LOCATIONS AND TO THE LINES AND GRADES INDICATED ON THE CONTRACT DRAWINGS. THE MATERIAL SHALL BE PLACED AND SPREAD UNIFORMLY IN SUCCESSIVE LAYERS NOT EXCEEDING TWELVE (12) INCHES IN LOOSE THICKNESS. THE ENGINEER MAY APPROVE LIFTS OF GREATER THICKNESS PROVIDED THE EQUIPMENT AND METHOD USED WILL CONSISTENTLY ACHIEVE THE SPECIFIED DENSITY. THE LAYERS SHALL BE CARRIED UP FULL WIDTH FROM THE BOTTOM OF THE FILL. EACH LAYER SHALL BE COMPACTED IN ACCORDANCE WITH THE SPECIFICATIONS.

BLADING, ROLLING, AND TAMPING SHALL CONTINUE UNTIL THE SURFACE IS SMOOTH, FREE FROM WAVES AND IRREGULARITIES, AND CONFORMS TO ELEVATIONS SHOWN ON THE CONTRACT DRAWINGS. IF AT ANY TIME THE MATERIAL IS EXCESSIVELY WET, IT SHALL BE AERATED BY MEANS OF BLADE GRADERS, HARROWS, OR OTHER SUITABLE EQUIPMENT UNTIL THE MOISTURE CONTENT IS SATISFACTORY. THE SURFACE SHALL THEN BE COMPACTED AND FINISHED AS SPECIFIED ABOVE.

OVERSIZED MATERIAL SHALL BE REMOVED. PORTIONS OF ANY LAYER IN WHICH THE EMBANKMENT MATERIAL BECOMES SEGREGATED SHALL BE REMOVED AND REPLACED WITH SATISFACTORY MATERIAL OR SHALL BE ADDED TO AND REMIXED TO SECURE PROPER GRADATION AS DIRECTED BY THE ENGINEER.

COMPACTION

- 1. EACH LIFT SHALL BE COMPACTED TO 95% DENSITY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING THE PROPER SIZE AND TYPE OF COMPACTION EQUIPMENT AND FOR SELECTING THE PROPER METHOD OF OPERATING SAID EQUIPMENT TO ATTAIN THE REQUIRED COMPACTION DENSITY.
- 2. PORTIONS OF ANY LIFT IN WHICH THE MATERIALS BECOME SEGREGATED TO THE EXTENT THAT THE REQUIRED COMPACTION CANNOT BE ATTAINED SHALL BE REMOVED BY THE CONTRACTOR AND REPLACED WITH SATISFACTORY MATERIALS, OR BLENDED WITH ADDITIONAL MATERIAL UNTIL SEGREGATION IS ELIMINATED.
- 3. IF, IN THE OPINION OF THE ENGINEER, BASED ON INSPECTION, SUBGRADE AND LAYERS OF EMBANKMENT THAT HAVE BEEN PLACED ARE BELOW SPECIFIED DENSITY, THE CONTRACTOR SHALL PERFORM ADDITIONAL COMPACTION AND TESTING AT ELEVATIONS DIRECTED BY THE ENGINEER UNTIL SPECIFIED DENSITY IS OBTAINED, AT NO ADDITIONAL COST TO THE OWNER.

MAINTENANCE

- 1. AS NECESSARY, CONTRACTOR SHALL WATER THE SITE WHILE GRADING IS IN PROGRESS TO CONTROL DUST.
- 2. CONTRACTOR SHALL PROTECT NEWLY GRADED AREAS FROM TRAFFIC AND EROSION AND KEEP FREE OF TRASH AND DEBRIS.
- 3. CONTRACTOR SHALL REPAIR AND RE-ESTABLISH GRADES IN SETTLED, ERODED AND RUTTED AREAS AS DIRECTED BY THE ENGINEER.
- 4. WHERE COMPLETED COMPACTED AREAS ARE DISTURBED BY SUBSEQUENT CONSTRUCTION OPERATIONS OR ADVERSE WEATHER, SCARIFY SURFACE, RESHAPE, AND COMPACT TO REQUIRED DENSITY PRIOR TO FURTHER CONSTRUCTION.
- 5. ALL OPEN EXCAVATIONS SHALL BE ADEQUATELY SIGNED AND BARRICADED TO PROTECT THE PUBLIC.

TRENCHING AND BACKFILL

PROTECTION

- 1. PROTECT EQUIPMENT AND VEHICULAR TRAFFIC FROM TRENCHES AND EXCAVATIONS BY PROVIDING ADEQUATE BARRICADES AND SIGNAGE.
- 2. PROTECT ADJACENT STRUCTURES BY PROVIDING ADEQUATE BACK-SLOPES, SHORING, BRACING OR OTHER METHODS REQUIRED TO PREVENT SLOPE FAILURE.
- 3. PROTECT ABOVE AND BELOWGROUND UTILITIES.
- 4. NOTIFY THE ENGINEER OF UNEXPECTED SUB-SURFACE CONDITIONS AND DISCONTINUE WORK IN AFFECTED AREAS UNTIL NOTIFICATION IS GIVEN TO RESUME WORK.
- 5. GRADE TOP PERIMETER OF THE EXCAVATION TO PREVENT SURFACE WATER RUNOFF FROM ENTERING THE EXCAVATION.
- 6. PROVIDE FOR DEWATERING OF THE TRENCH WHERE GROUND WATER IS ENCOUNTERED.

NON-WOVEN GEOTEXTILE:

SPUN-BOUND, BLACK, FUEL RESISTANT GEOTEXTILE FABRIC. INSTALL WITH 3' MINIMUM OVERLAP AT ALL JOINTS. GEOTEX 601, OR APPROVED EQUAL.

MISCELLANEOUS STEEL STRUCTURES

THE DESIGN, FABRICATION AND ERECTION OF ALL MISCELLANEOUS STEEL STRUCTURES SHALL COMPLY WITH THE CURRENT CODE OF STANDARD PRACTICE FOR THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION.

ALL STRUCTURAL STEEL SHALL BE ASTM A36 FOR ROLLED SECTIONS AND A500 FOR STRUCTURAL TUBING.

PROVIDE ASTM A325 BOLTS FOR ALL NON-WELDED CONNECTIONS.

ALL WELDING SHALL BE DONE IN ACCORDANCE WITH THE CURRENT CODE OF THE AMERICAN WELDING SOCIETY. MINIMUM WELD SHALL BE 3/16". USE AWS 5.1 E70XX ELECTRODES.

TOLERANCES: STRUCTURAL COMPONENT TOLERANCES SHALL BE ±1/8 INCH AND AS REQUIRED TO ADEQUATELY SUPPORT LOADS.

HOT DIP GALVANIZING SHALL BE IN ACCORDANCE WITH ASTM A123, G90.

TOUCH UP - FINISH ALL CUT ENDS AND DAMAGED SURFACES OF GALVANIZED AND ZINC PLATED SUPPORTS AND FASTENERS WITH SPRAY ON COLD GALVANIZING COMPOUND, ZRC OR APPROVED EQUAL.

CONCRETE

UNLESS OTHERWISE NOTED OR SPECIFIED, ALLS TRUCTURAL CONCRETE SHALL DEVELOP A MINIMUM COMPRESSIVE

STRENGTH OF 4000 PSI IN 28 DAYS. SEE SPECIFICATION 03300 FOR REQUIREMENTS IN CONCRETE CLASSES.

REINFORCEMENT STEEL SHALL BE DEFORMED BARS CONFORMING IN QUALITY TO THE REQUIREMENTS OF ASTM A615, "SPECIFICATIONS FOR DEFORMED BILLET-STEEL BARS FOR CONCRETE REINFORCEMENT", GRADE 60. ALL REINFORCING STEEL WELDING SHALL BE APPROVED BY THE ENGINEER IN ADVANCE OF WELDING AND IS TO BE IN ACCORDANCE WITH AWS D1.4. WELDED REINFORCING STEEL, IF ALLOWED BY THE ENGINEER, SHALL CONFORM TO ASTM A706

COLUMN SPRIALS SHALL CONFORM TO ASTM A82, "SPECIFICATION FOR COLD-DRAWN STEEL WIRE FOR CONCRETE REINFORCEMENT".

ALL DETAILING, FABRICATION AND PLACING OF REINFORCING BARS, UNLESS OTHERWISE INDICATED, SHALL BE IN ACCORDANCE WITH ACI 315, "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES", LATEST EDITION.

DOWELS, PIPE, WATERSTOPS AND OTHER INSTALLED MATERIALS AND ACCESSORIES SHALL BE HELD SECURELY IN POSITION WHILE CONCRETE IS BEING PLACED. DISSIMILAR METALS SHALL BE ISOLATED FROM REINFORCEMENT STEEL.

UNLESS OTHERWISE INDICATED, ASIDE FORM NORMAL ACCESSORIES USED TO HOLD REINFORCING BARS FIRMLY IN POSITION, THE FOLLOWING SHALL BE ADDED:

- IN STALBS WITH #5 RISER BARS AT 6 INCHES OC MAXIMUM TO SUPPORT TOP REINFORCING BARS.
- IN WALLS WITH 2 CURTAINS #3 u OR z SHAPE SPACERS AT 6 FEET OC EACH WAY.

CONCRETE SHALL HAVE A 28 DAY STRENGTH (F_c) OF 3,000 PSI FOR TYPE I CEMENT. MINIMUM CEMENT CONTENT SHALL BE 6 SACKS PER CUBIC YARD. CONCRETE MIX DESIGN SHALL CONFORM TO ACI 318 FOR DURABILITY AND QUALITY.

REBAR REINFORCING SHALL BE ASTM A615 GRADE 60 INSTALLED IN ACCORDANCE WITH ACI 318.

CONCRETE ANCHOR ADHESIVE SHALL BE A TWO-COMPONENT HIGH-SOLIDS, EPOXY-BASED SYSTEM SUPPLIED IN MANUFACTURER'S STANDARD CARTRIDGE AND DISPENSED THROUGH A STATIC-MIXING NOZZLE SUPPLIED BY THE MANUFACTURER. THE ADHESIVE ANCHOR SHALL HAVE BEEN TESTED AND QUALIFIED FOR PERFORMANCE IN CRACKED AND UNCRACKED CONCRETE PER ICC-ES AC308. ADHESIVE SHALL BE SET-XP, EPOXY-TIE, ADHESIVE FROM SIMPSON STRONG-TIE, OR APPROVED EQUAL. ANCHORS SHALL BE INSTALLED PER MANUFACTURERS INSTRUCTIONS.

STRUCTURAL STEEL

- 1. STEEL CONSTRUCTION SHALL CONFORM TO THE SPECIFICATIONS AND STANDARDS AS CONTAINED IN THE LATEST EDITION OF THE MANUAL OF STEEL CONSTRUCTION (ASD OR LRFD).
- 2. FOR STEEL MATERIALS REFER TO SPECIFICATIONS.
- 3. STEEL JOISTS, BEAMS, AND GIRDERS SHALL NOT BE RELOCATED WITHOUT APPROVAL BY ENGINEER.
- 4. ALL WELDING SHALL BE SHIELDED METAL ARC WELDING AND/OR FLUX-CORED ARC WELDING METHODS AND SHALL CONFORM TO AWS CODE FOR ARC AND GAS WELDING IN BUILDING CONSTRUCTION AWS D1.1. QUALIFICATIONS OF WELDERS SHALL BE IAW THE SPECIFICATIONS FOR STANDARD QUALIFICATIONS PROCEDURE OF THE AWS D1.1.
- 5. THE USE OF ROLLED STEEL SECTIONS AND/OR BOLTS MANUFACTURED OUTSIDE THE UNITED STATES WILL REQUIRED VERIFICATION THAT THE PRODUCTS COMPLY WITH APPLICABLE ASTM STANDARDS. MILL CERTIFICATES WILL BE REQUIRED FOR ALL STEEL. STEEL GRADES OTHER THAN ASTM A36 WILL REQUIRE TESTING BY AND APPROVED LABORATORY. ALL FOREIGN BOLTS MUST BE APPROVED BY THE ENGINEER PRIOR TO THEIR USE. CONTRACTOR SHALL PERFORM SYSTEM TESTING, STARTUP AND COMMISSIONING IN ACCORDANCE WITH THE PROCEDURES LISTED HERE AND IN ACCORDANCE WITH MANUFACTURER INSTRUCTIONS. LEAVE ALL WORK SITES IN AN ORDERLY CONDITION CONSISTENT WITH THAT FOUND UPON ARRIVAL.

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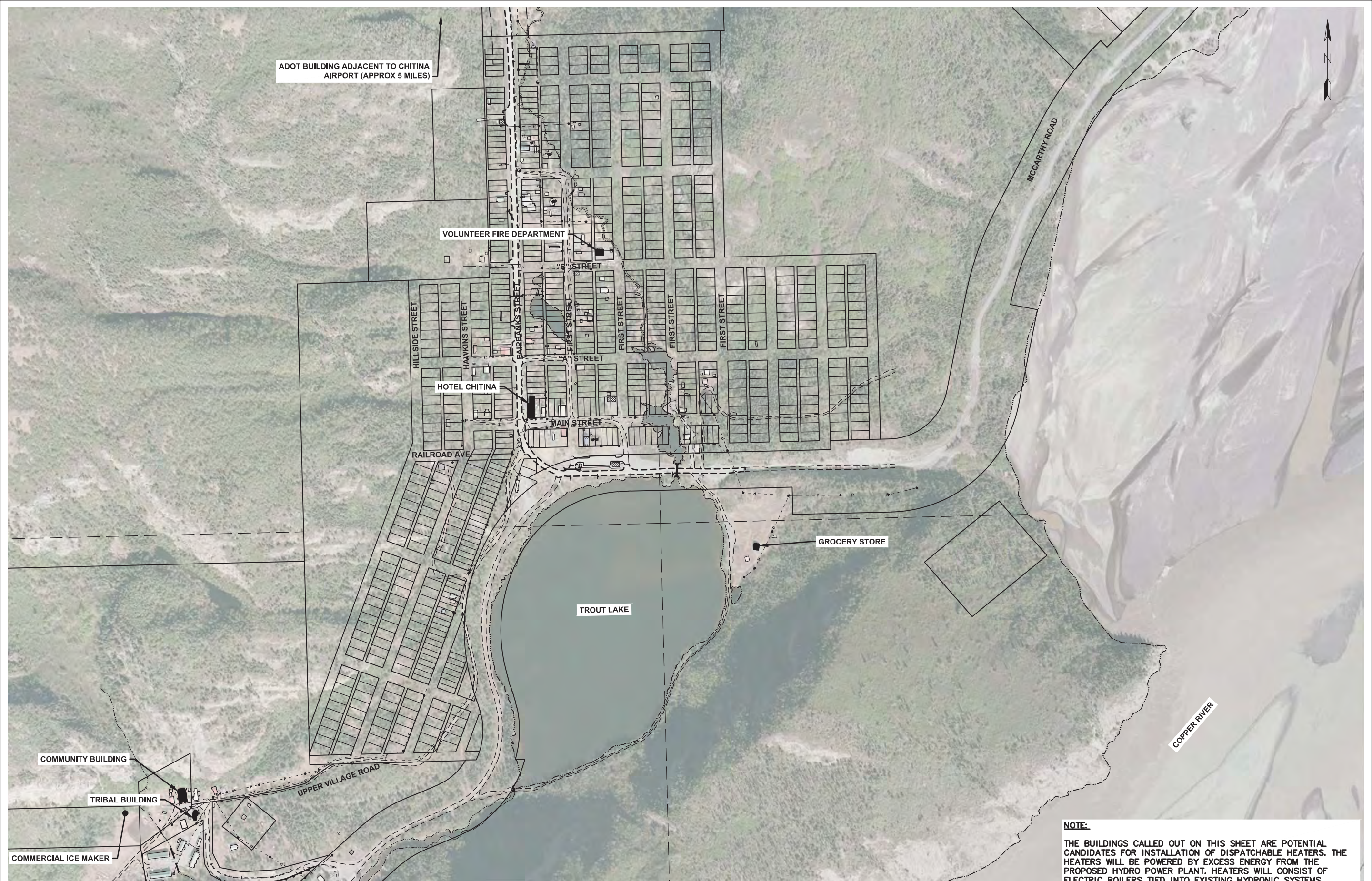


CHITINA, ALASKA
FIVEMILE CREEK HYDROELECTRIC PROJECT
65% DESIGN DRAWINGS
STANDARDS AND SPECIFICATIONS

NO.	REVISION	BY	DATE

Plot Date	9/10/14
Designed	KRH
Drawn	AJG
Approved	

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ADOT BUILDING ADJACENT TO CHITINA AIRPORT (APPROX 5 MILES)

VOLUNTEER FIRE DEPARTMENT

HOTEL CHITINA

GROCERY STORE

TROUT LAKE

COPPER RIVER

MCCARTHY ROAD

COMMUNITY BUILDING

TRIBAL BUILDING

COMMERCIAL ICE MAKER

UPPER VILLAGE ROAD

HILLSIDE STREET

HAWKINS STREET

FAIRBANKS STREET

MAIN STREET

FIRST STREET

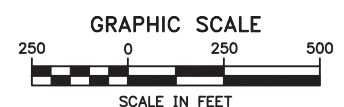
FIRST STREET

FIRST STREET

FIRST STREET

FIRST STREET

1 CANDIDATES FOR DISPATCHABLE HEAT
 G104 SCALE: GRAPHIC



NOTE:
 THE BUILDINGS CALLED OUT ON THIS SHEET ARE POTENTIAL CANDIDATES FOR INSTALLATION OF DISPATCHABLE HEATERS. THE HEATERS WILL BE POWERED BY EXCESS ENERGY FROM THE PROPOSED HYDRO POWER PLANT. HEATERS WILL CONSIST OF ELECTRIC BOILERS TIED INTO EXISTING HYDRONIC SYSTEMS, ELECTRIC UNIT HEATERS ON BASEBOARD AS APPROPRIATE.

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 Department of Community and Economic Development
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 813 West Northern Lights Blvd.
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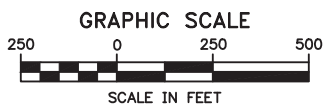
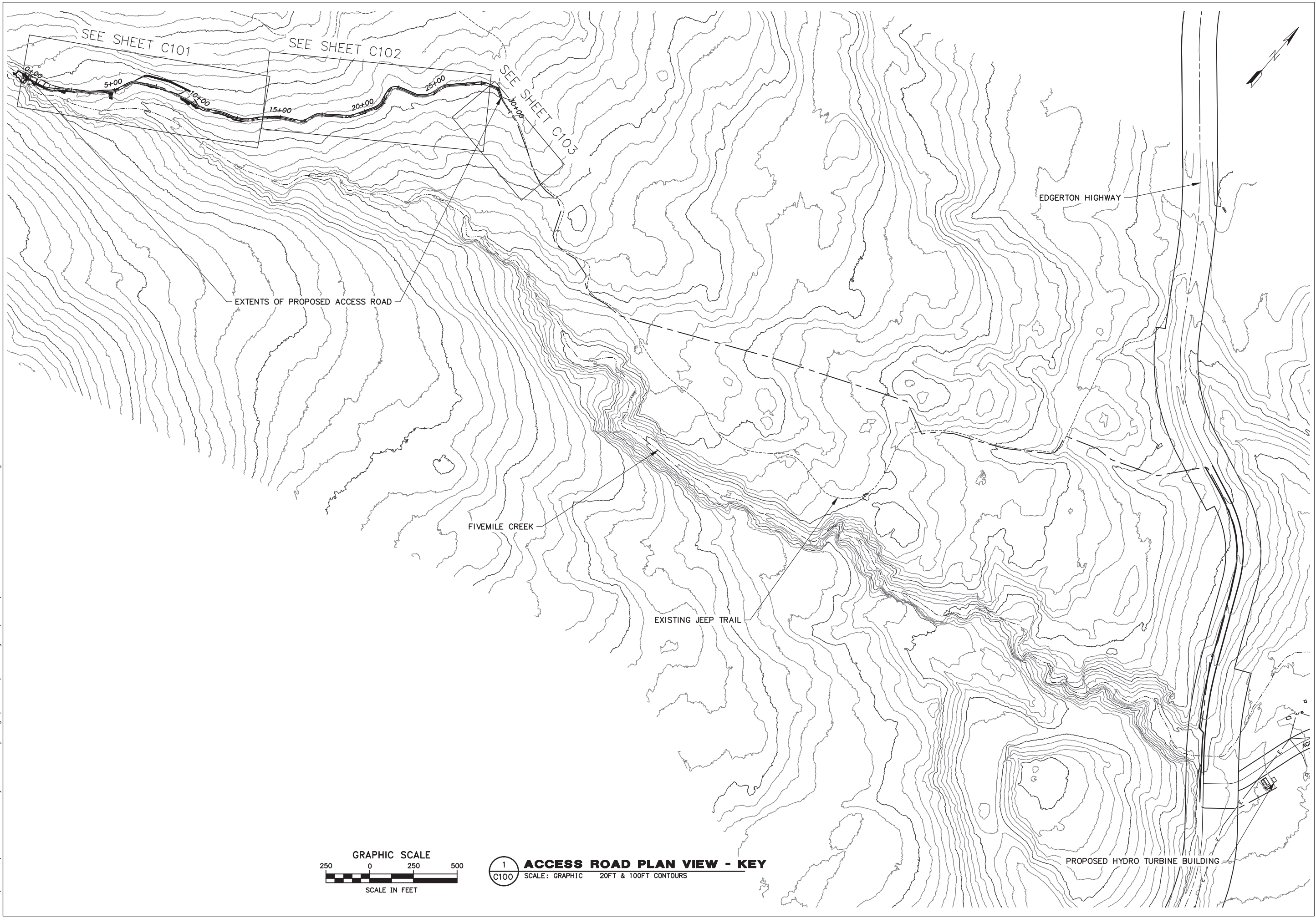
CHITINA, ALASKA
FIVEMILE CREEK HYDROELECTRIC PROJECT
65% DESIGN DRAWINGS
 CANDIDATE BUILDINGS FOR DISPATCHABLE LOAD HEATERS

NO.	REVISION	BY	DATE

Plot Date: 9/18/14
 Designed: KRH
 Drawn: AJG
 Approved: _____

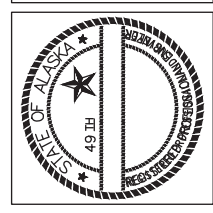
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1 ACCESS ROAD PLAN VIEW - KEY
SCALE: GRAPHIC 20FT & 100FT CONTOURS

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AEA
Rural Energy Group
813 West Northern Lights Blvd.
Anchorage, Alaska 99503
ALASKA ENERGY AUTHORITY



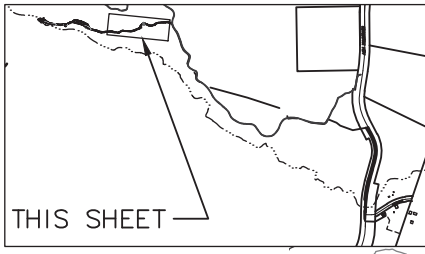
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FIVEMILE CREEK HYDROELECTRIC PROJECT
65% DESIGN DRAWINGS
ACCESS ROAD
PLAN AND PROFILE KEY

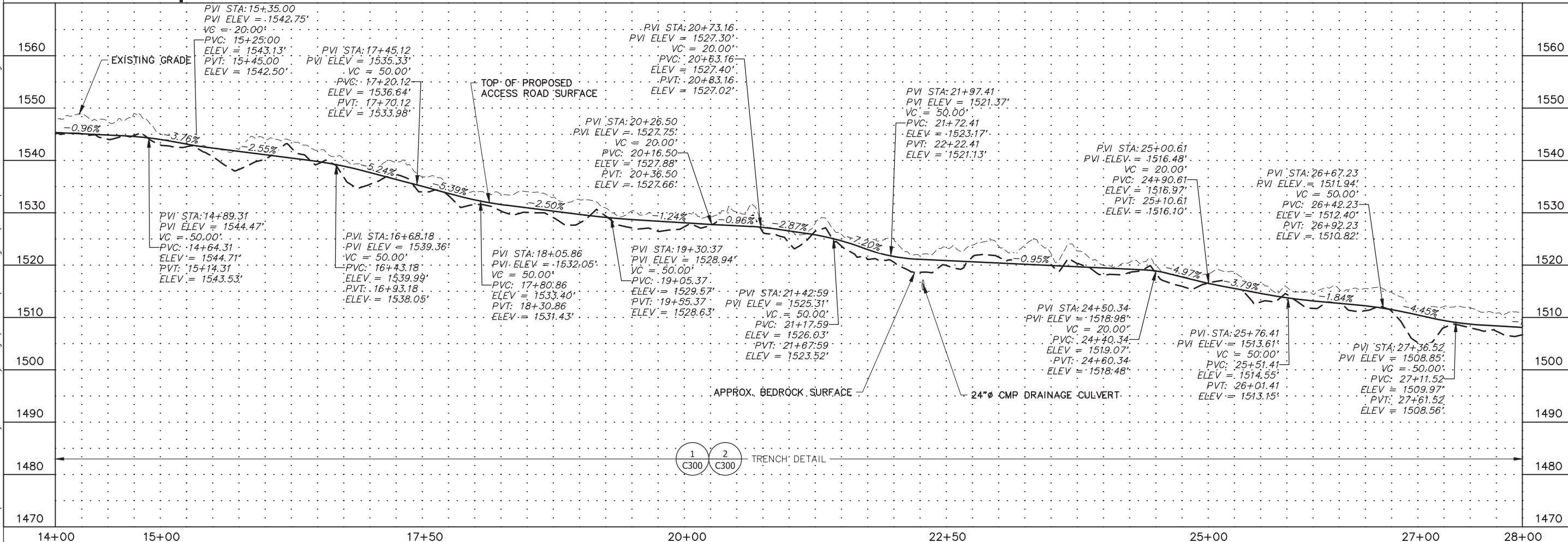
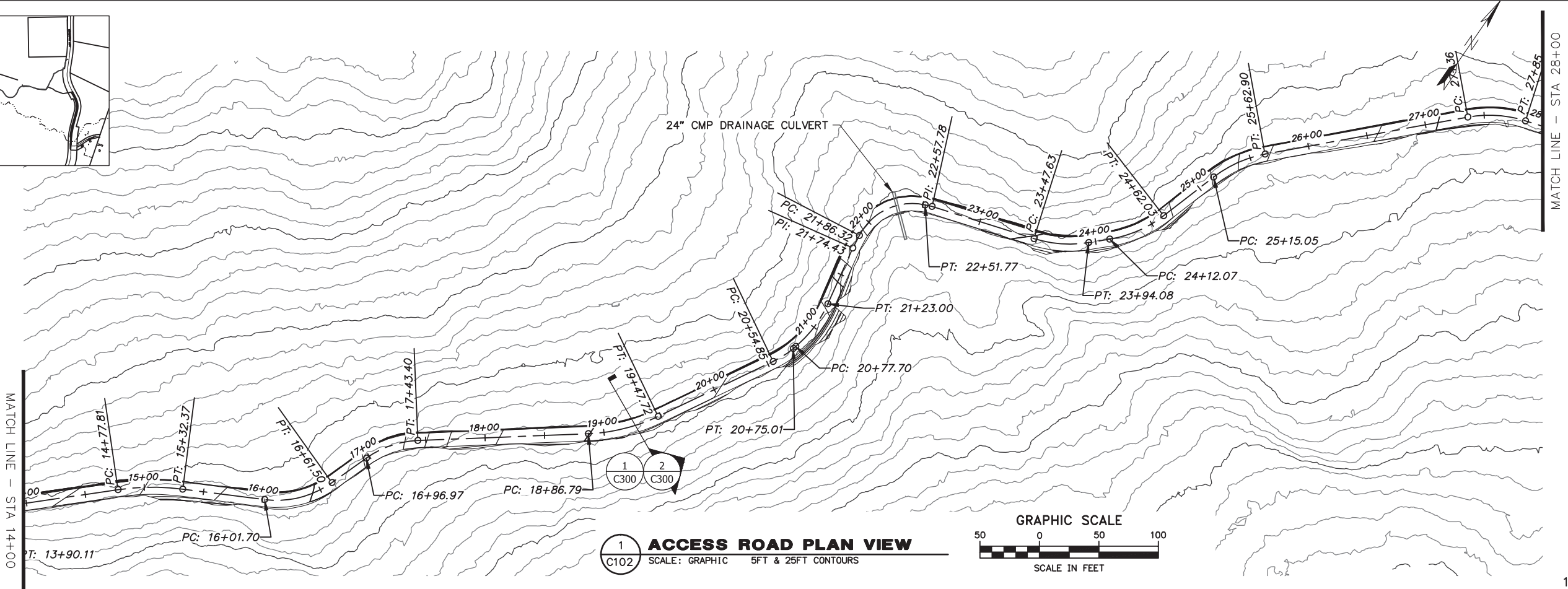
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Plot Date: 9/10/14
Designed: KRH
Drawn: AJG
Approved: _____

Sheet No. **C100**
SHEET **6** OF **34**

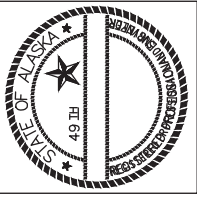


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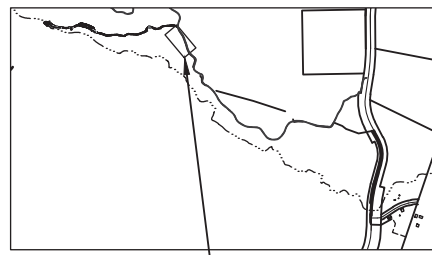


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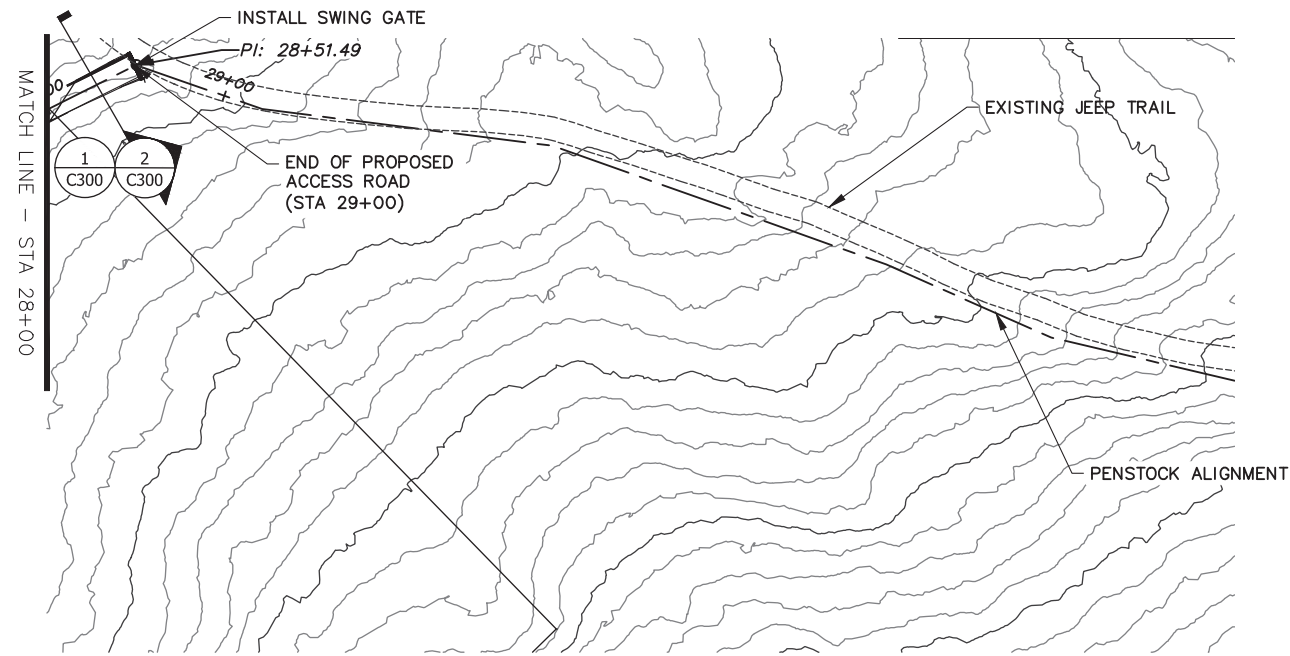
FIVEMILE CREEK HYDROELECTRIC PROJECT
65% DESIGN DRAWINGS
ACCESS ROAD
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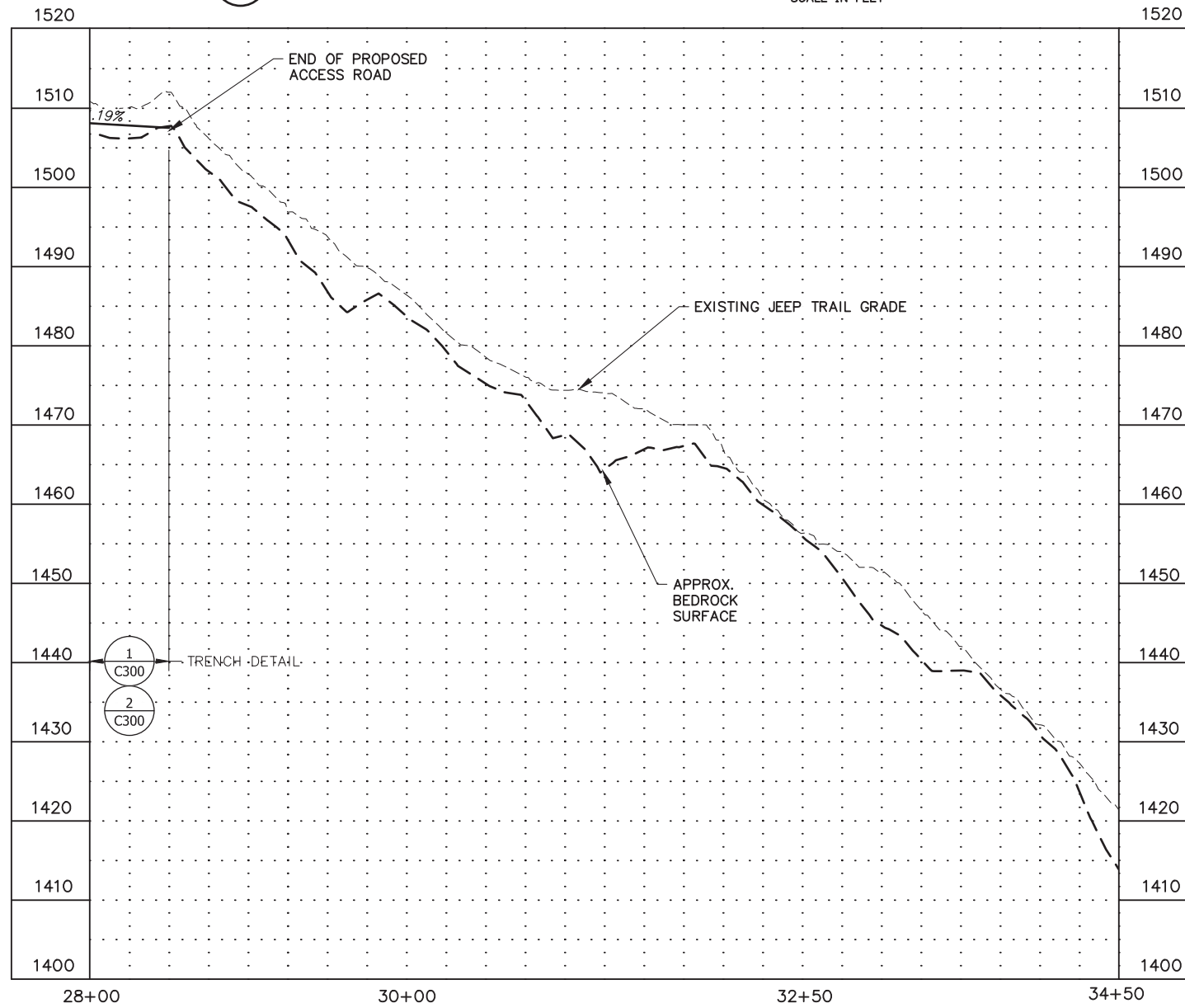
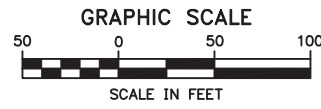
Plot Date: 9/10/14
Designed: KRH
Drawn: AJG
Approved: _____



THIS SHEET



1 ACCESS ROAD PLAN VIEW
 C103 SCALE: GRAPHIC 5FT & 25FT CONTOURS



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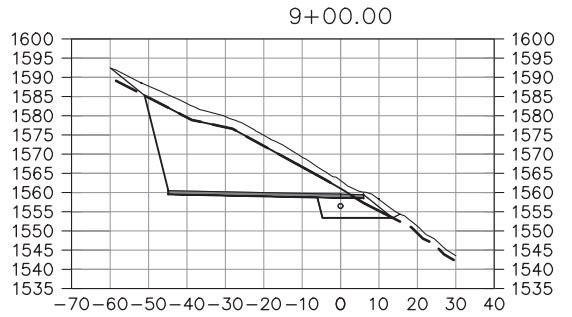
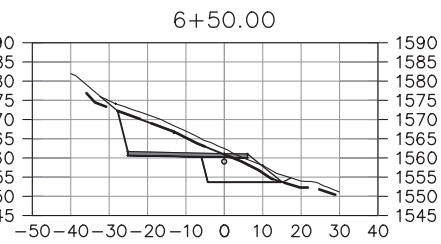
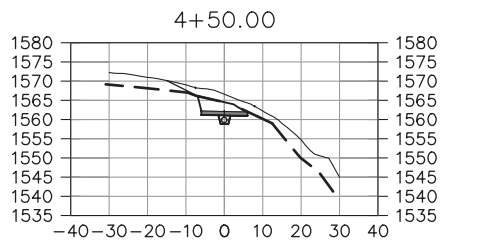
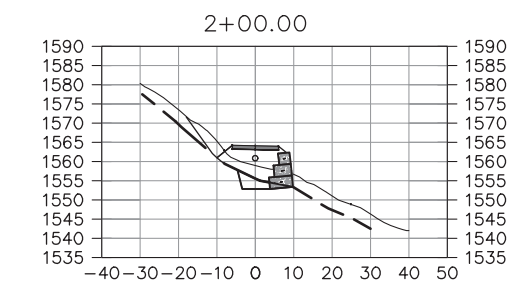
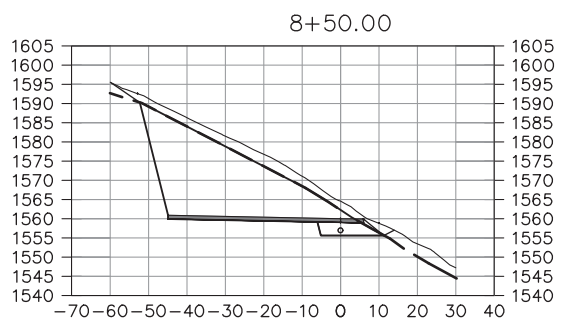
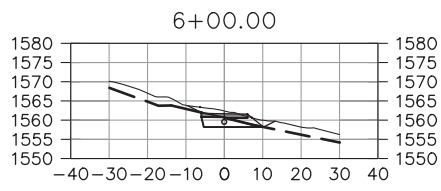
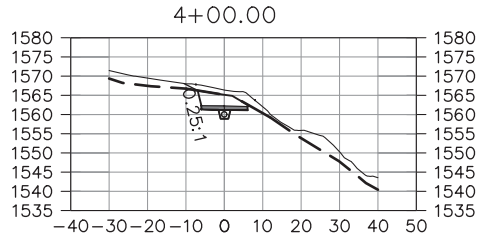
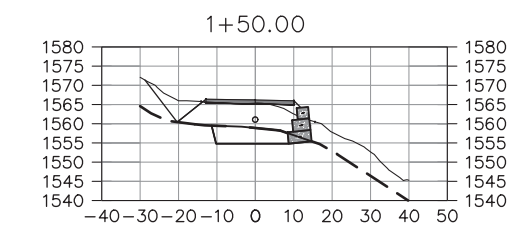
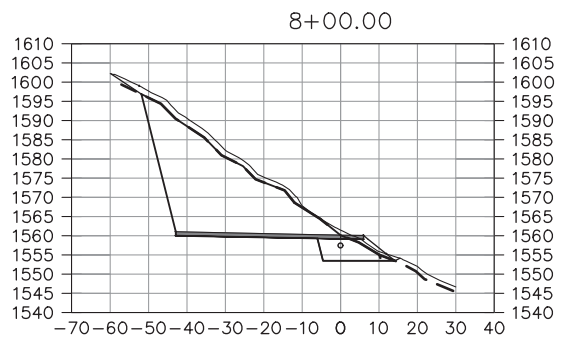
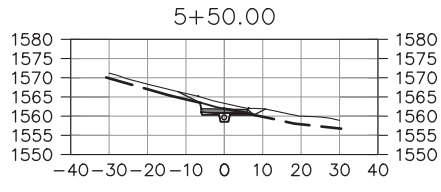
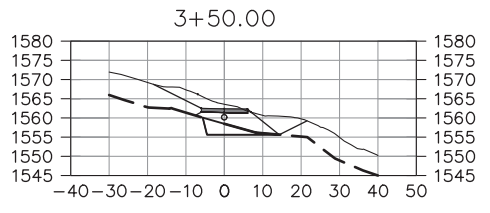
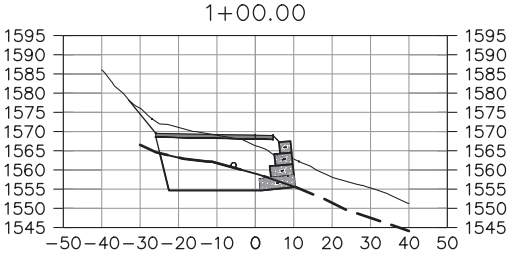
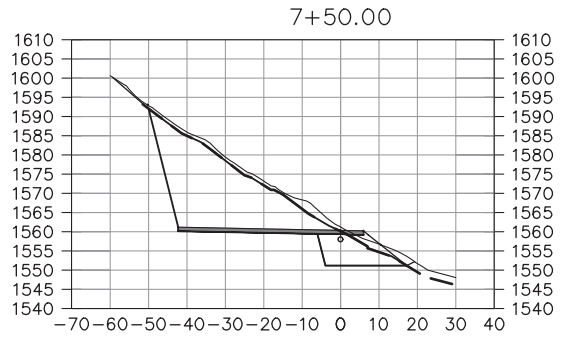
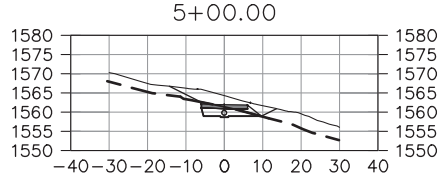
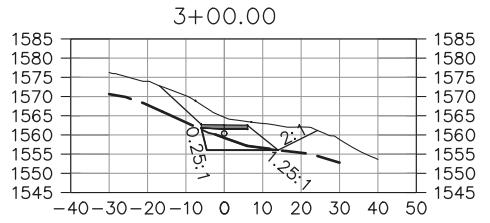
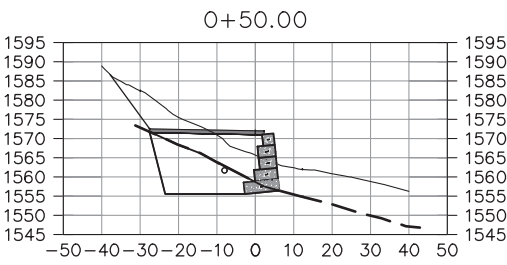
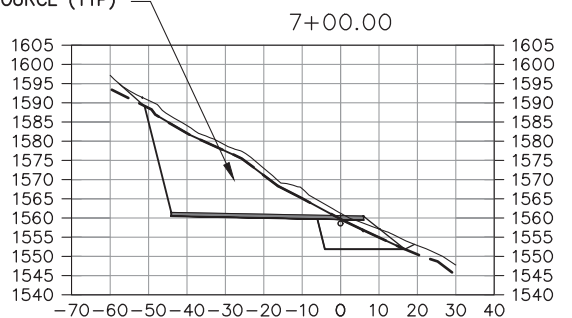
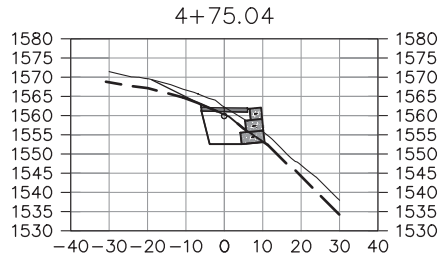
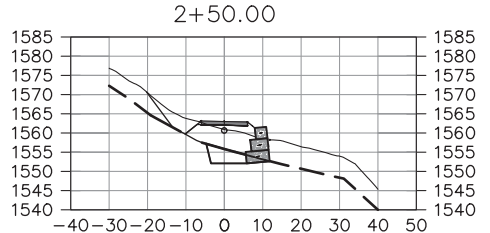
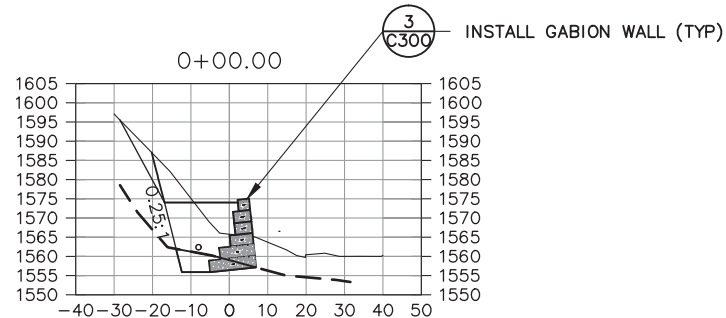
FIVEMILE CREEK HYDROELECTRIC PROJECT
 65% DESIGN DRAWINGS
 ACCESS ROAD
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Plot Date: 9/10/14
 Designed: KRH
 Drawn: AJG
 Approved: _____

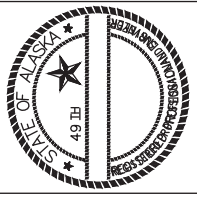
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 SHEET 9 OF 34

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PROPOSED ROCK FILL SOURCE (TYP)

State of Alaska
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and Economic Development
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Anchorage, Alaska 99503
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ENERGY AUTHORITY



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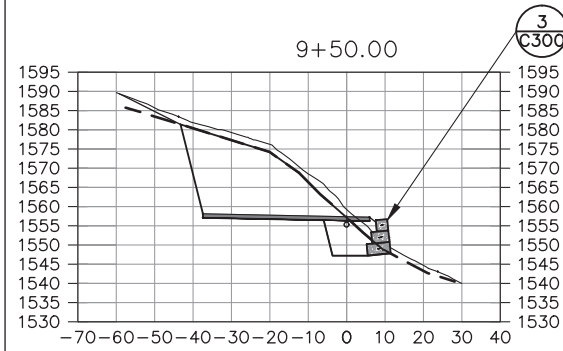
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65% DESIGN DRAWINGS
ACCESS ROAD CROSS SECTIONS
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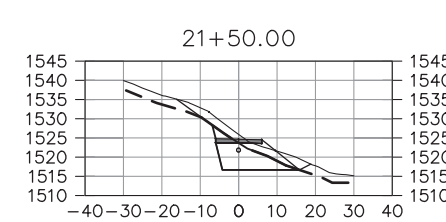
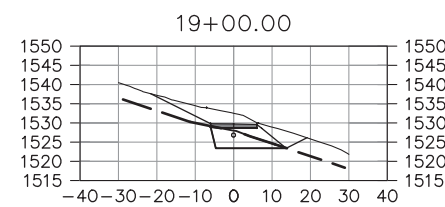
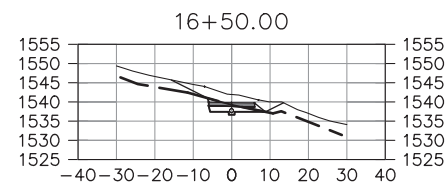
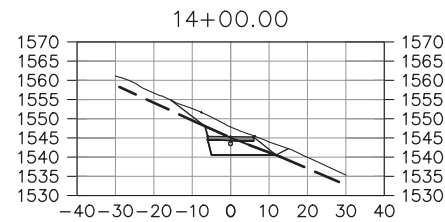
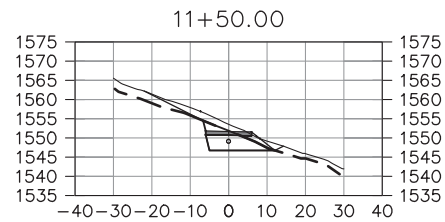
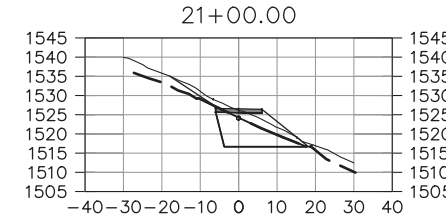
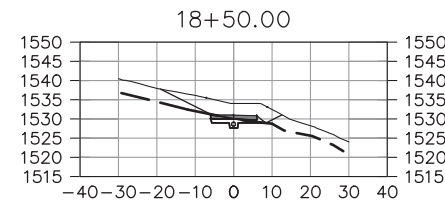
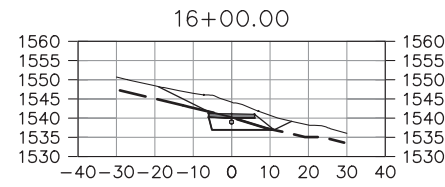
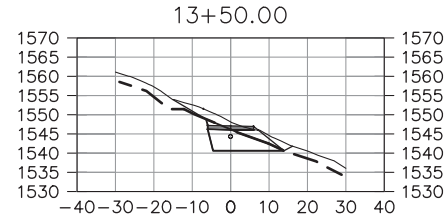
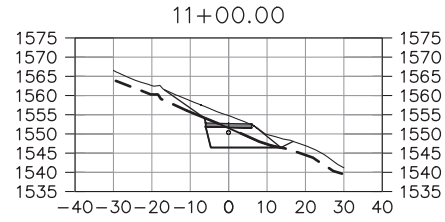
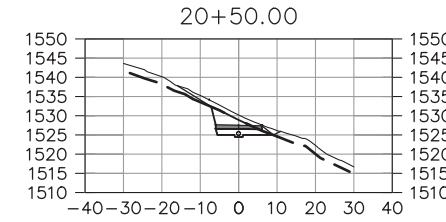
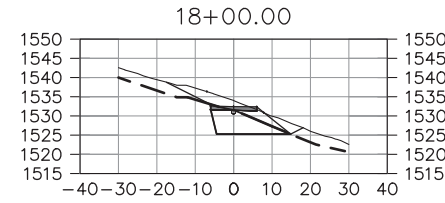
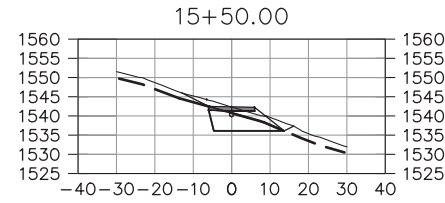
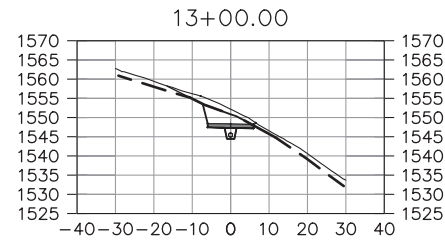
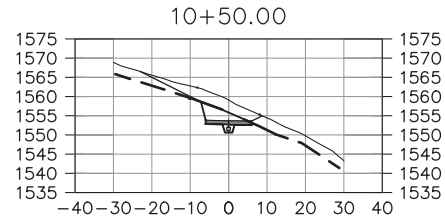
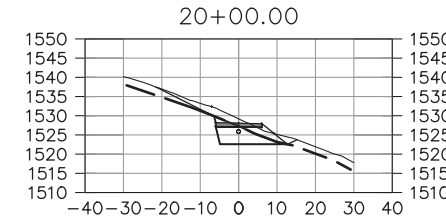
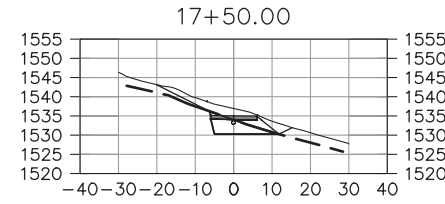
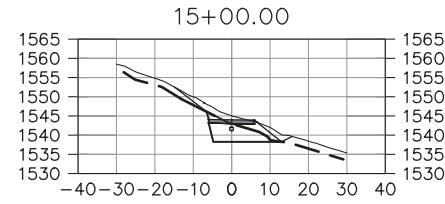
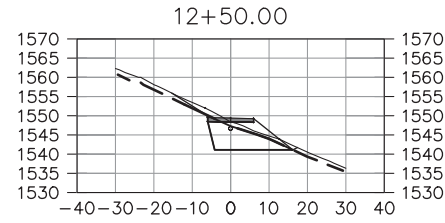
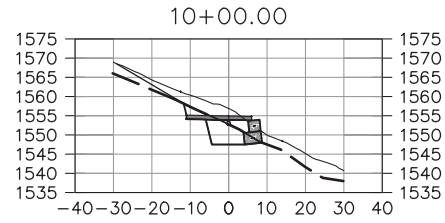
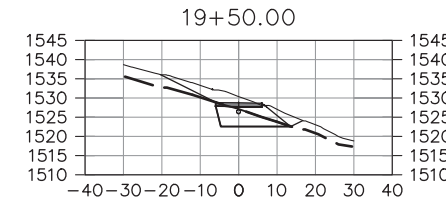
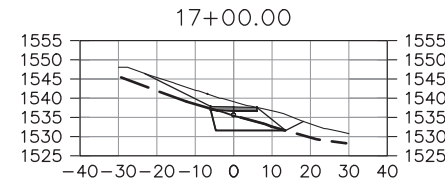
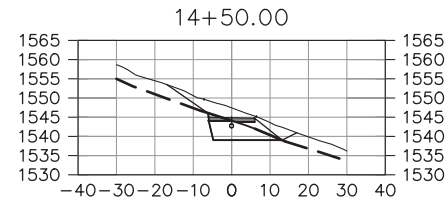
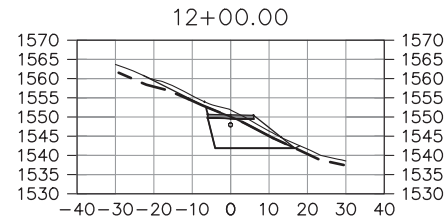
Plot Date: 9/10/14
Designed: KRH
Drawn: AJG
Approved: [Signature]

Sheet No. C200
SHEET 10 OF 34

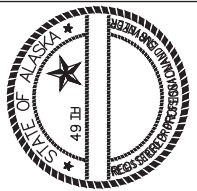
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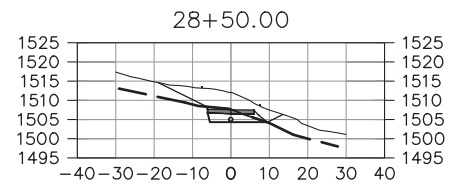
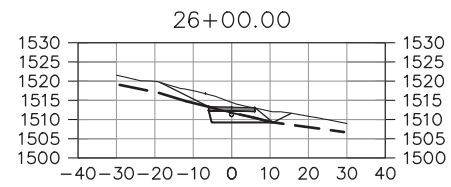
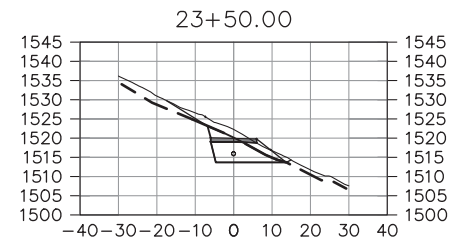
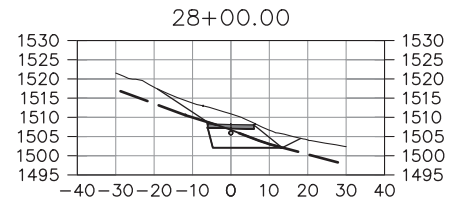
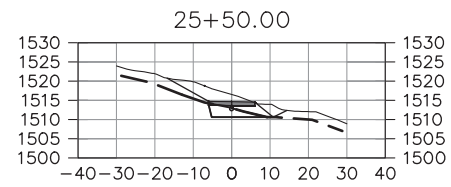
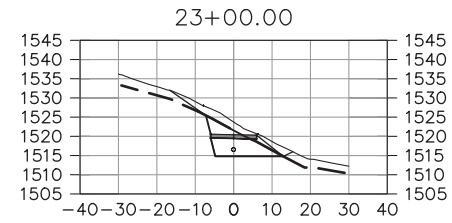
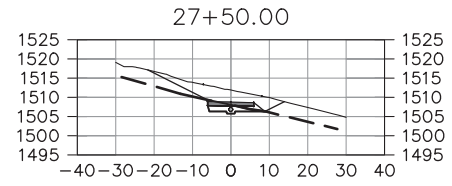
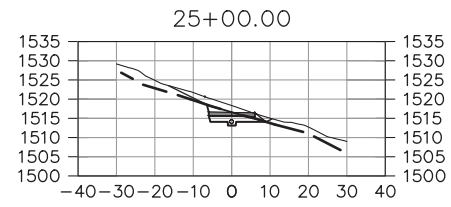
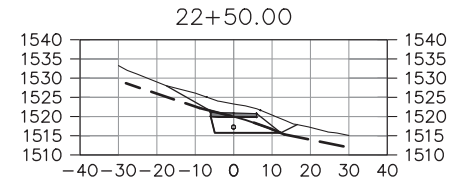
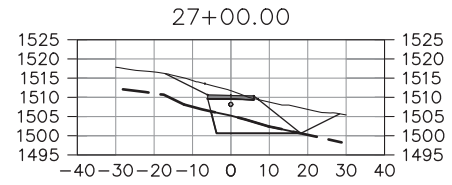
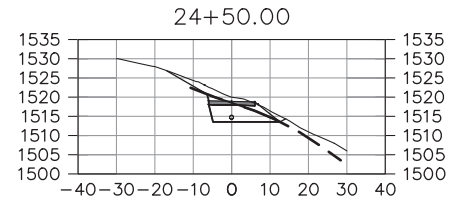
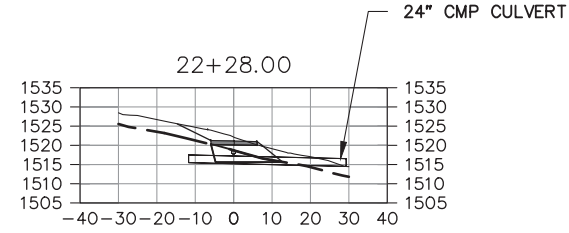
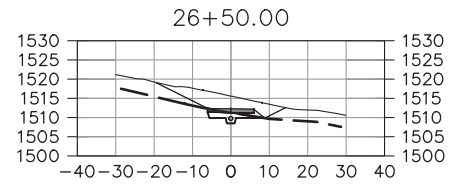
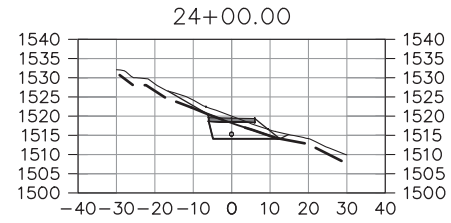
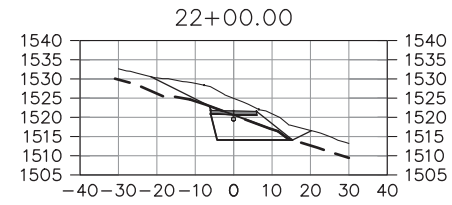
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ANCHORAGE, ALASKA 99503
PHONE: (907) 562-3252
FAX: (907) 561-2275

FIVEMILE CREEK HYDROELECTRIC PROJECT
65% DESIGN DRAWINGS
ACCESS ROAD CROSS SECTIONS
9+50 TO 21+50

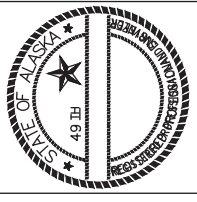
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Plot Date: 9/10/14
Designed: KRH
Drawn: AJG
Approved: [Signature]

File: J:\Jobsdata\30405.00 Chittino Hydro Preliminary Design\00 CADD\01 Working Set\01 Civil\00 SOURCE DRAWINGS\00 ALIGNMENTS\Cross Sections And Takeoffs.dwg



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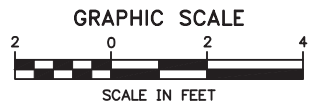
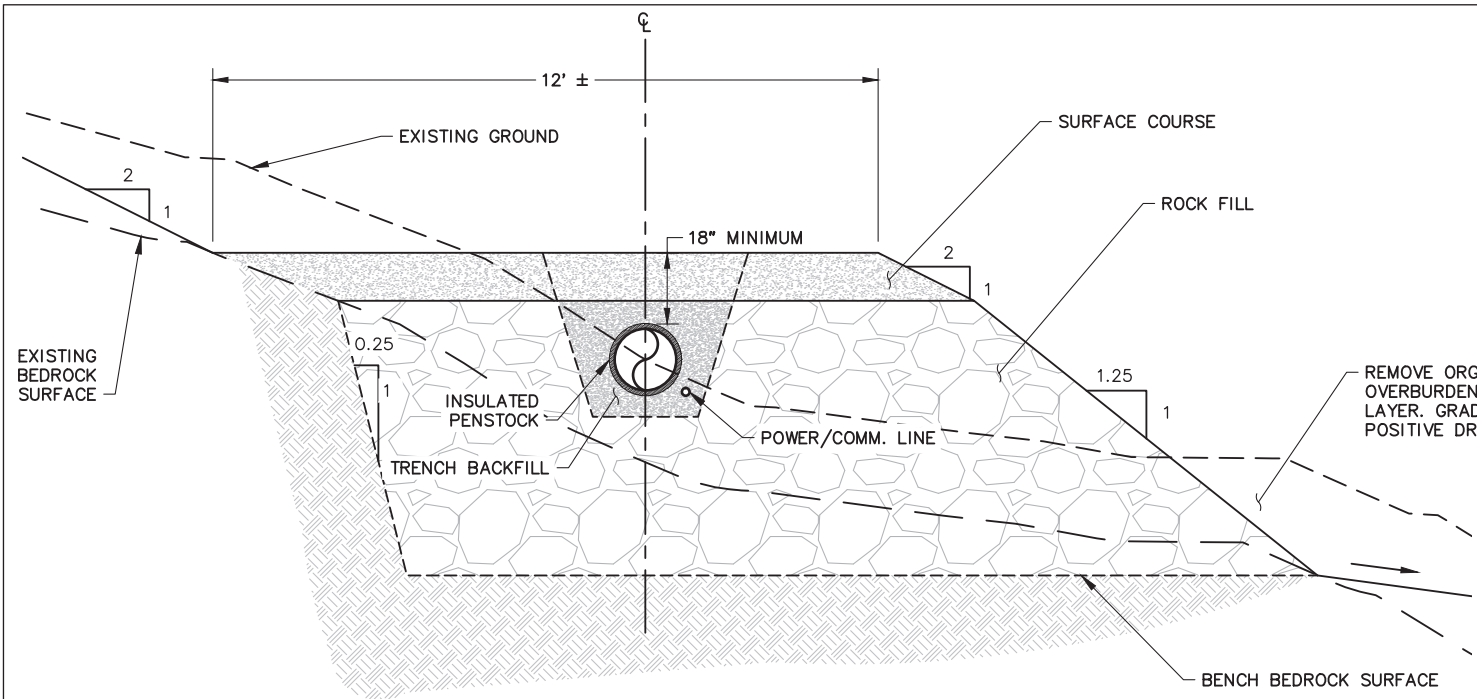
CRW
ENGINEERING GROUP LLC
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ANCHORAGE, ALASKA 99503
PHONE: (907) 562-3352
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FIVEMILE CREEK HYDROELECTRIC PROJECT
65% DESIGN DRAWINGS
ACCESS ROAD CROSS SECTIONS
22+00 TO 28+50

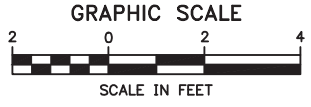
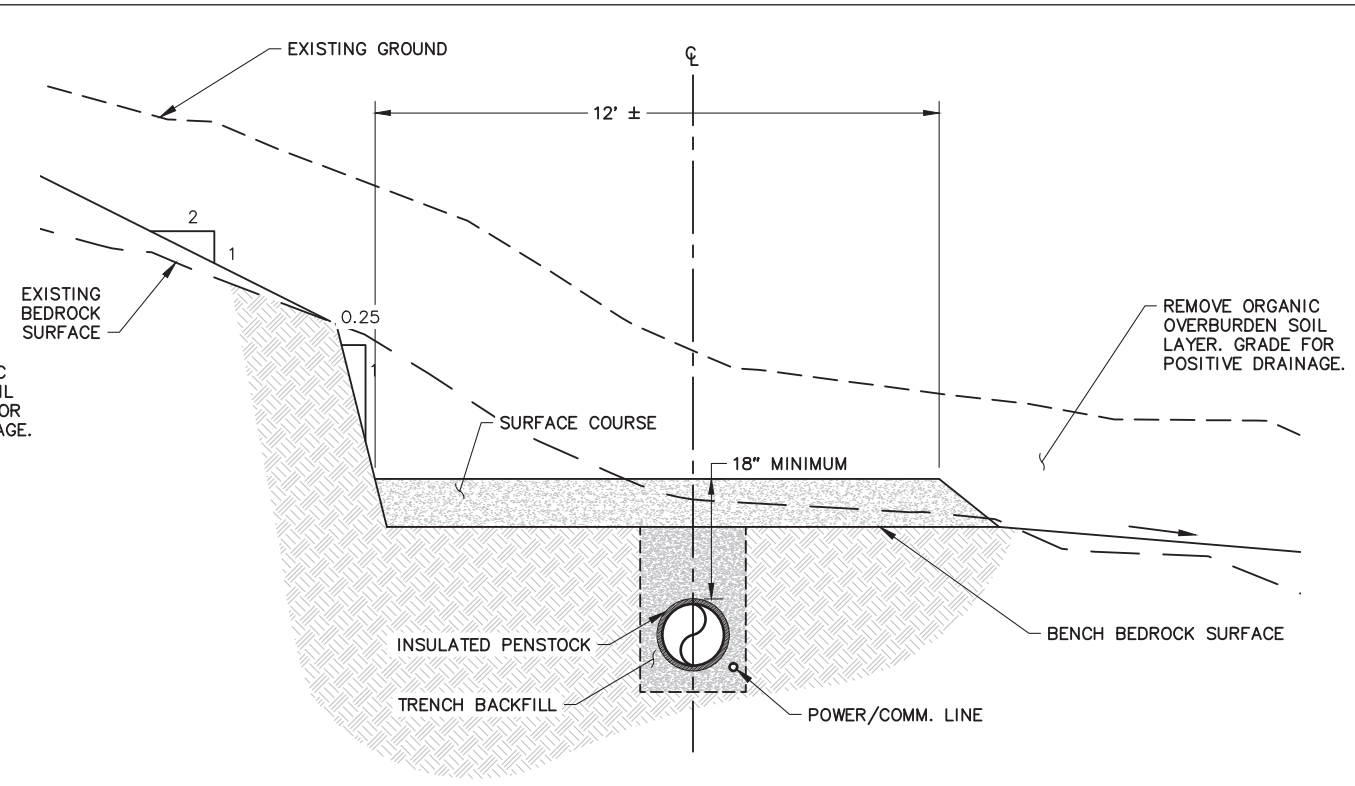
NO.	REVISION	BY	DATE

Plot Date: 9/10/14
Designed: KRH
Drawn: AJG
Approved: [Signature]

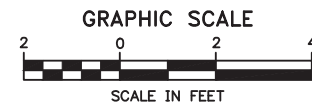
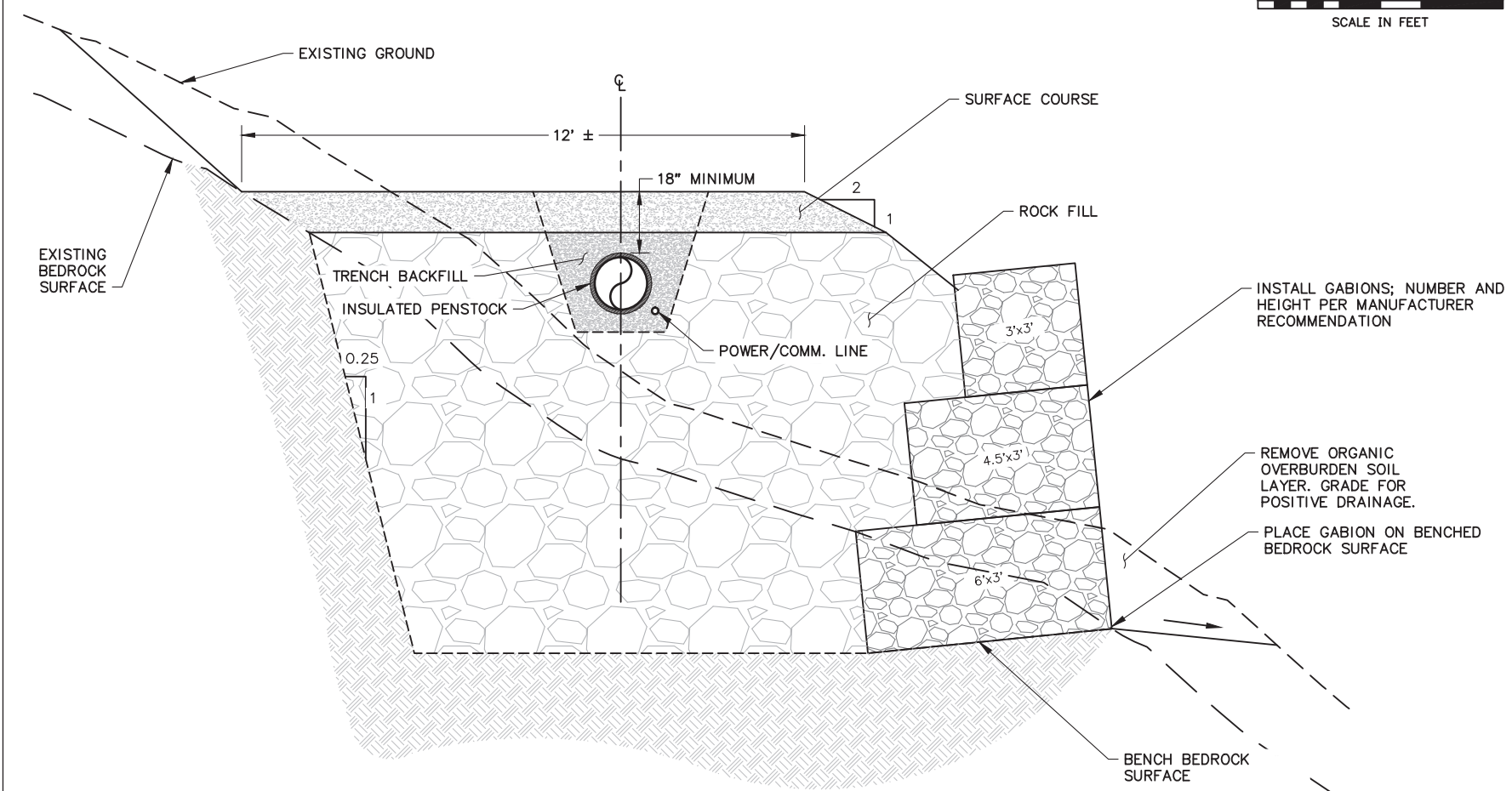
Sheet No. C202
SHEET 12 OF 34



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 SCALE: GRAPHIC



2 GENERALIZED ACCESS ROAD AND TRENCH SECTION - TYPE 2
 SCALE: GRAPHIC



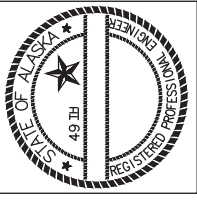
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 SCALE: GRAPHIC

NOTES:

1. THE TRENCH SECTIONS ON THIS SHEET ARE BASED ON LIMITED GEOTECHNICAL INFORMATION. ENGINEER MAY APPROVE ALTERNATIVE TRENCH SECTIONS BASED ON ACTUAL FIELD CONDITIONS.
2. ALL TRENCHES AND OTHER EXCAVATIONS SHALL BE SLOPED OR SHORED IN ACCORDANCE WITH OSHA STANDARDS.

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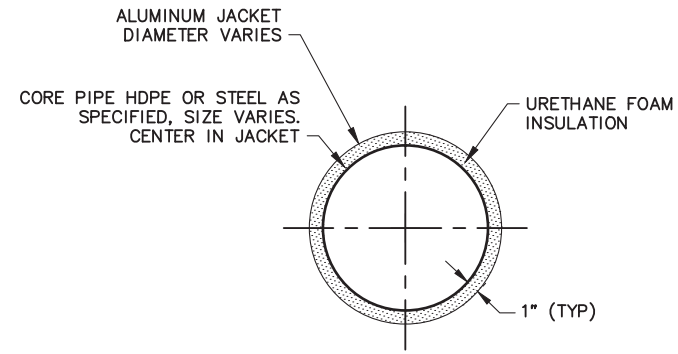
CRW
 ENGINEERING GROUP LLC
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FIVEMILE CREEK HYDROELECTRIC PROJECT
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 ACCESS ROAD AND TRENCH DETAILS

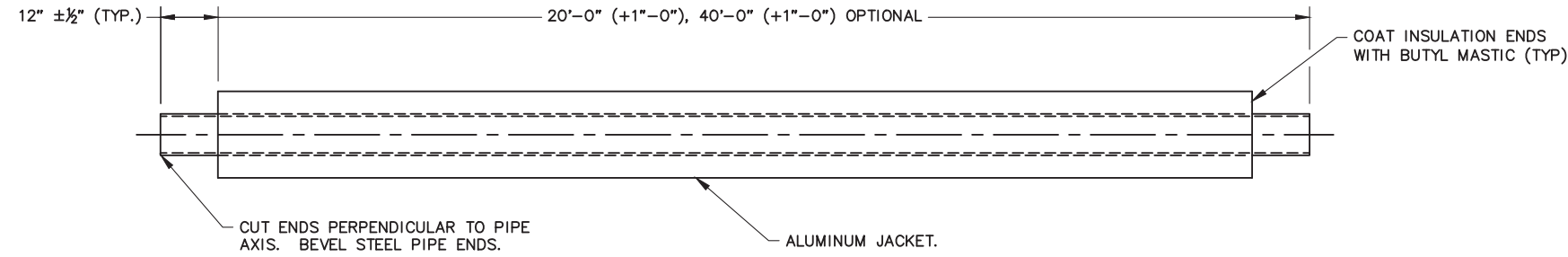
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Sheet No. C300
 SHEET 13 OF 34

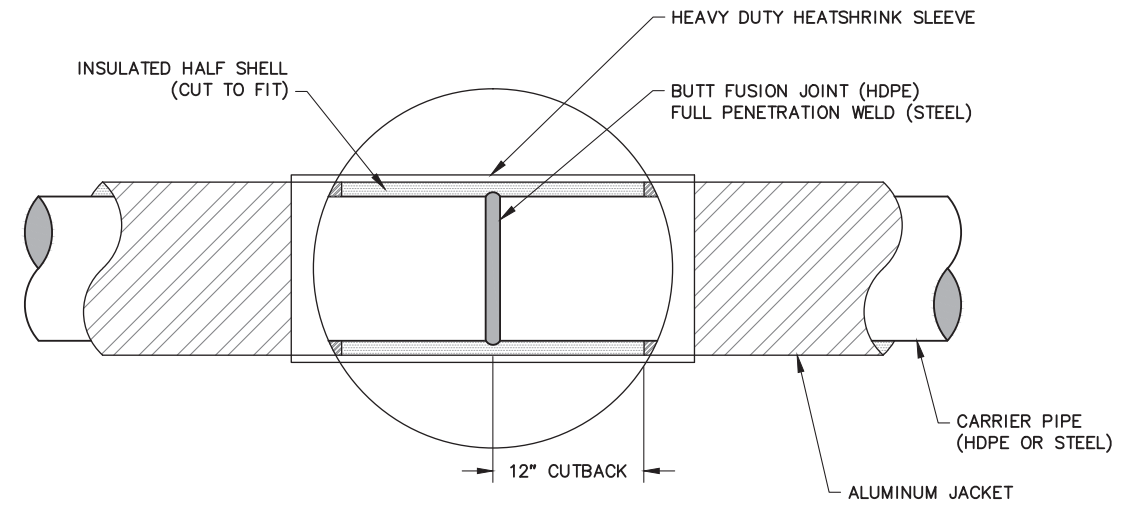


END VIEW



SIDE VIEW

1 PENSTOCK DETAIL
SCALE: NTS



2 PENSTOCK JOINT DETAIL
SCALE: NTS

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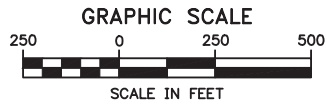
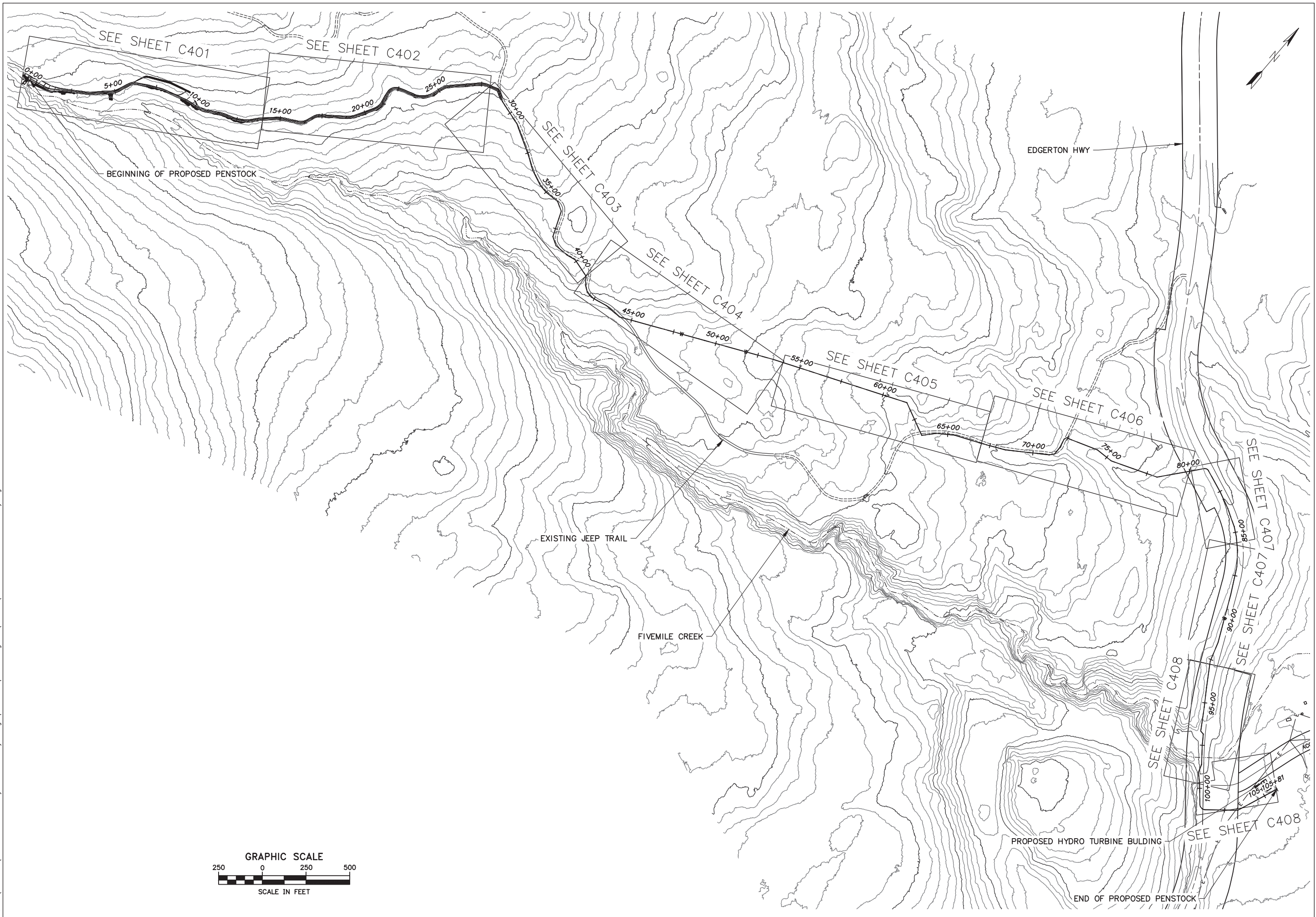
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FIVEMILE CREEK HYDROELECTRIC PROJECT
65% DESIGN DRAWINGS
INSULATED ARCTIC PIPE DETAILS

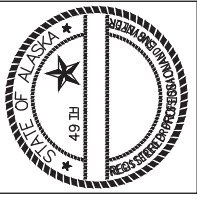
NO.	REVISION	BY	DATE

Plot Date: 9/10/14
Designed: KRH
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Approved: [Signature]

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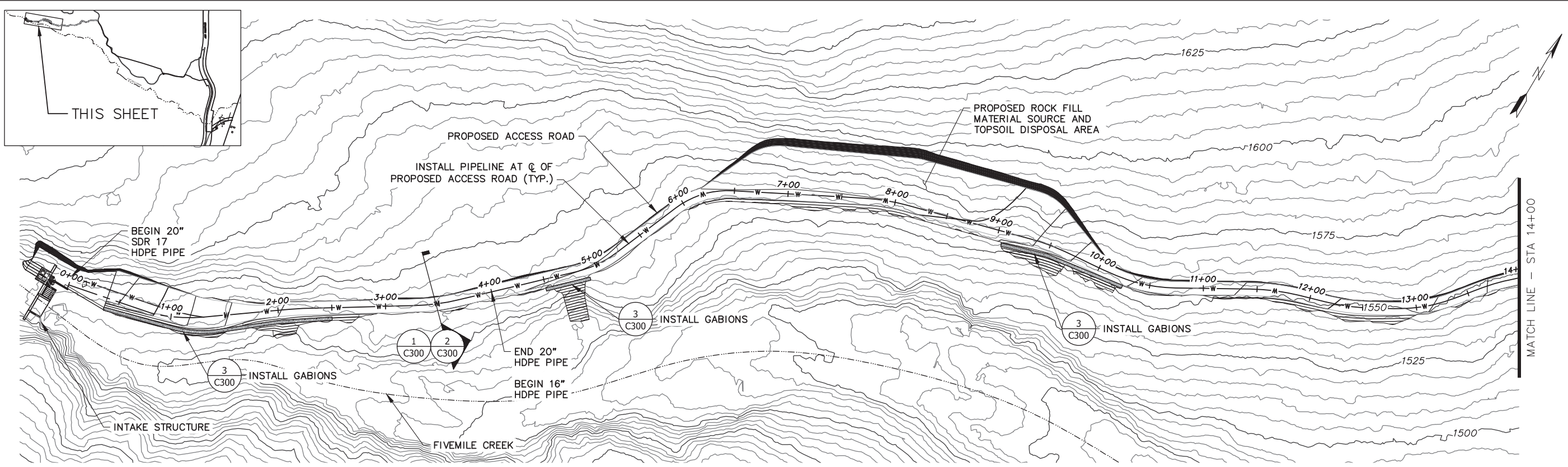
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FIVEMILE CREEK HYDROELECTRIC PROJECT
65% DESIGN DRAWINGS
PENSTOCK PLAN AND PROFILE
PLAN AND PROFILE KEY

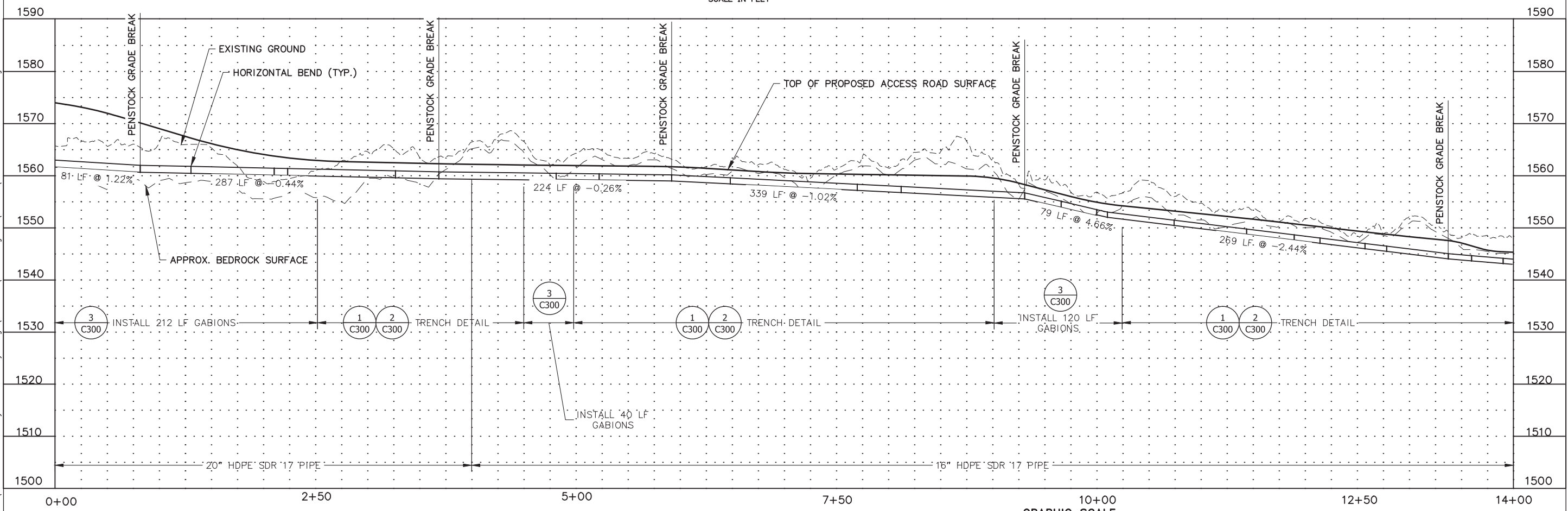
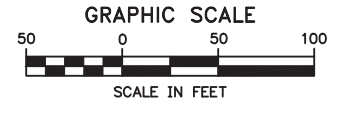
NO.	REVISION	BY	DATE

Plot Date: 9/10/14
Designed: KRH
Drawn: AJG
Approved: [Signature]

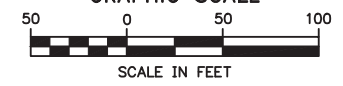
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SHEET 16 OF 34



1 **PENSTOCK PLAN VIEW**
 C401 SCALE: GRAPHIC BEGINNING OF PENSTOCK TO STA 14+00

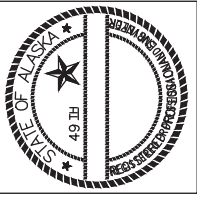


2 **PENSTOCK PROFILE VIEW**
 C401 SCALE: GRAPHIC BEGINNING OF PROJECT TO STA 14+00



THIS SHEET

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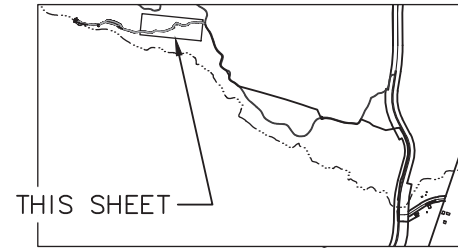
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FIVEMILE CREEK HYDROELECTRIC PROJECT
 65% DESIGN DRAWINGS
 PENSTOCK PLAN AND PROFILE
 BOP TO STA 14+00

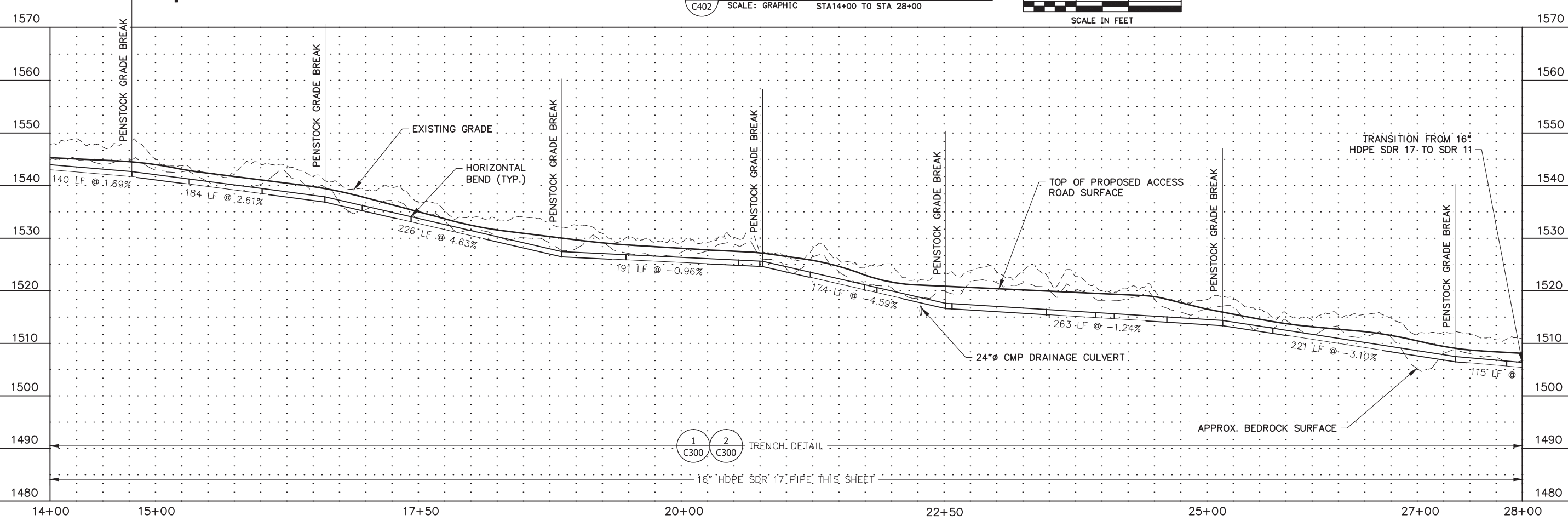
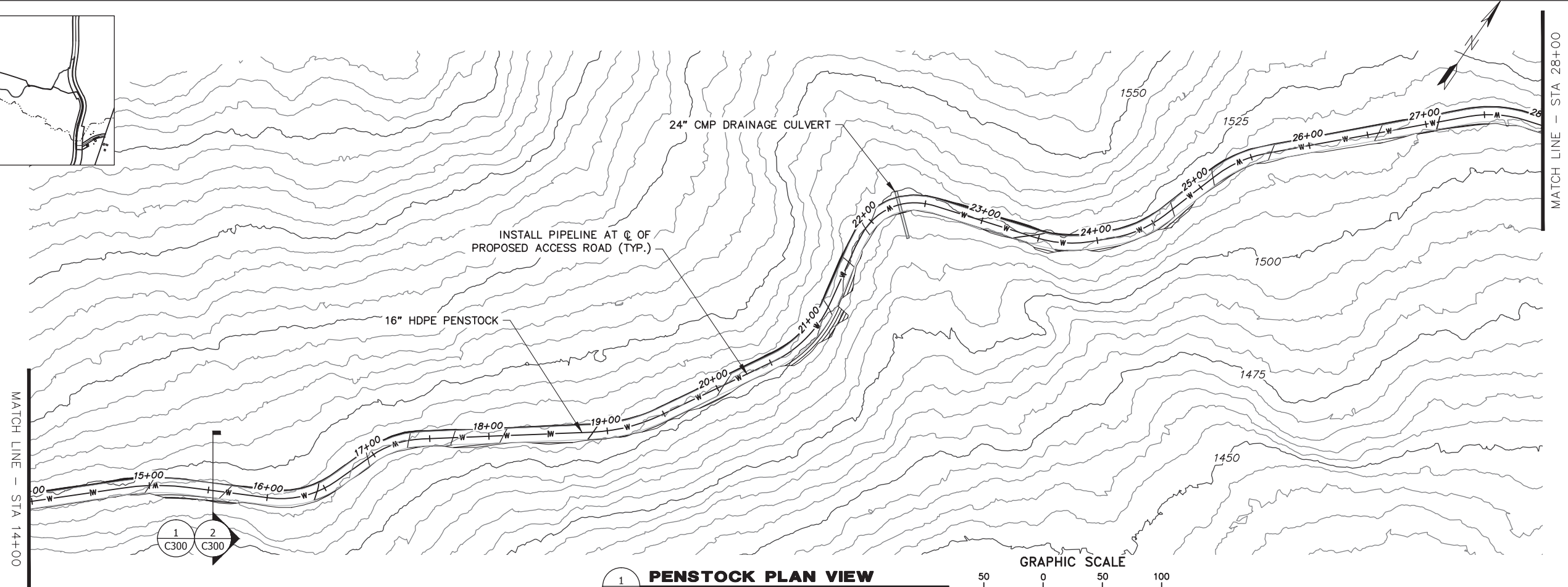
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Plot Date: 9/10/14
 Designed: KRH
 Drawn: AJG
 Approved: _____

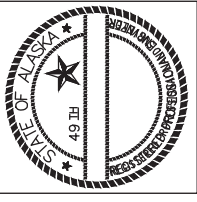
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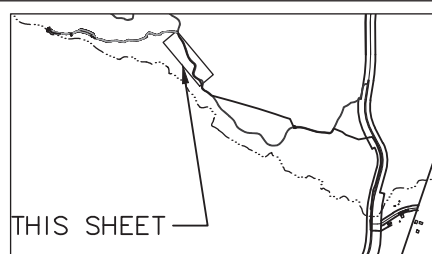
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FIVEMILE CREEK HYDROELECTRIC PROJECT
65% DESIGN DRAWINGS
PENSTOCK PLAN AND PROFILE
STA 14+00 TO STA 28+00

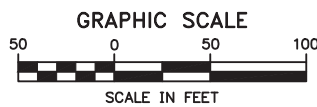
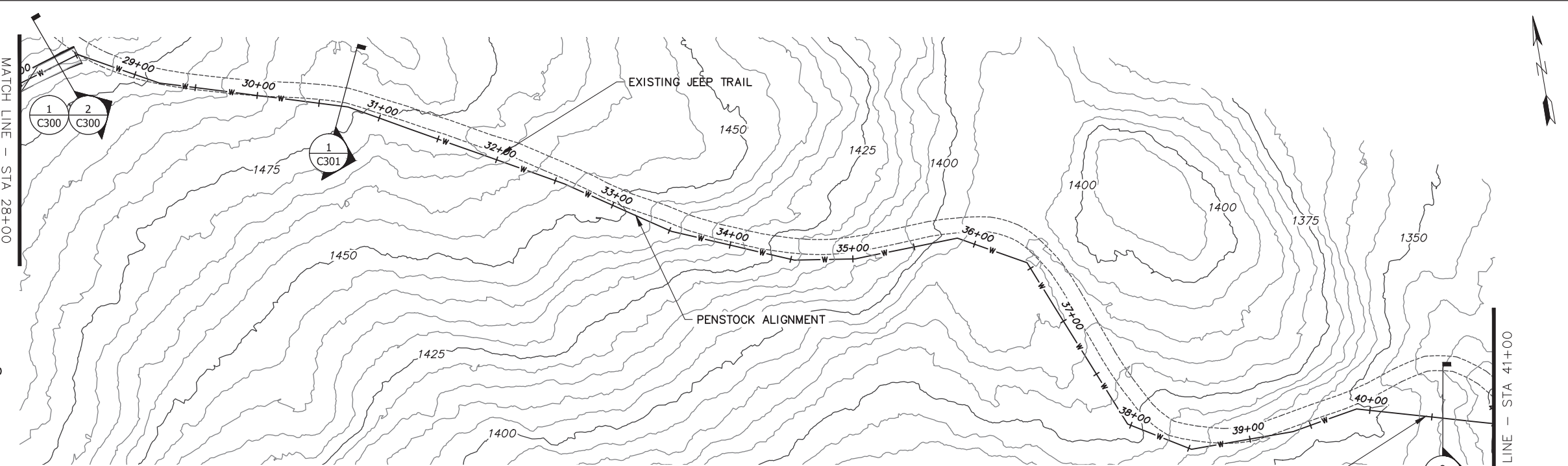
NO.	REVISION	BY	DATE

Plot Date: 9/10/14
Designed: KRH
Drawn: AJG
Approved: [Signature]

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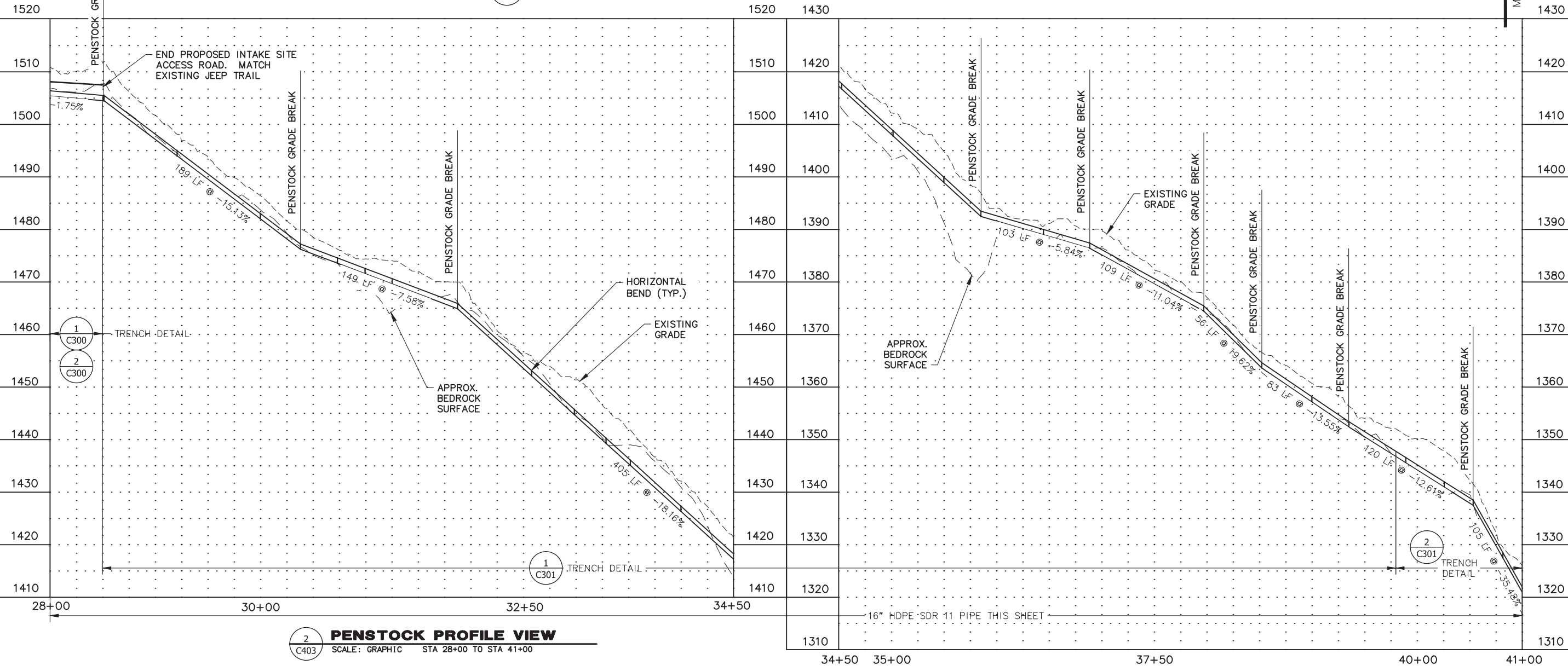


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1 PENSTOCK PLAN VIEW
SCALE: GRAPHIC STA 28+00 TO STA 41+00

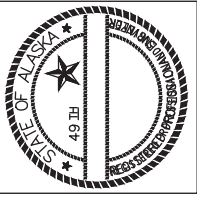
PROPOSED PENSTOCK ALIGNMENT
DEVIATES FROM EXISTING JEEP TRAIL



2 PENSTOCK PROFILE VIEW
SCALE: GRAPHIC STA 28+00 TO STA 41+00

16" HDPE SDR 11 PIPE THIS SHEET

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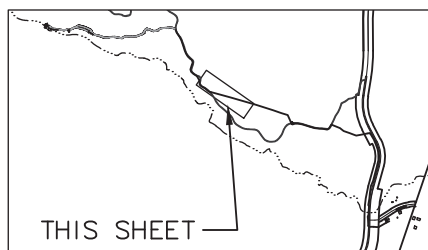
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65% DESIGN DRAWINGS
PENSTOCK PLAN AND PROFILE
STA 28+00 TO STA 41+00

NO.	REVISION	BY	DATE

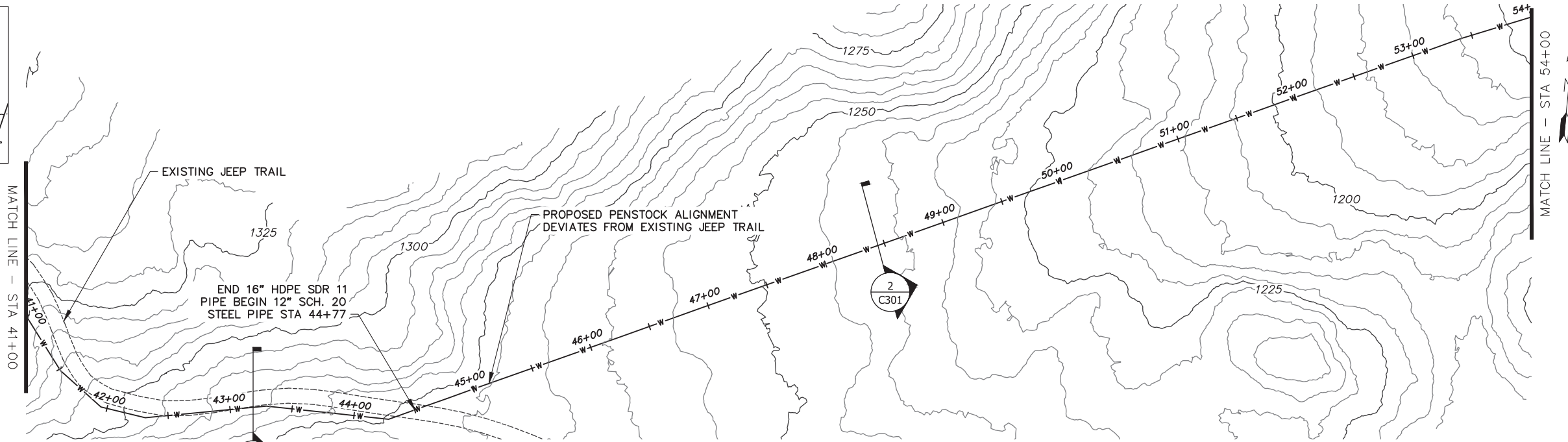
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SHEET 19 OF 34

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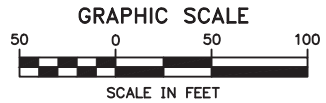


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PENSTOCK PLAN VIEW

SCALE: GRAPHIC STA 41+00 TO STA 54+00



GRAPHIC SCALE

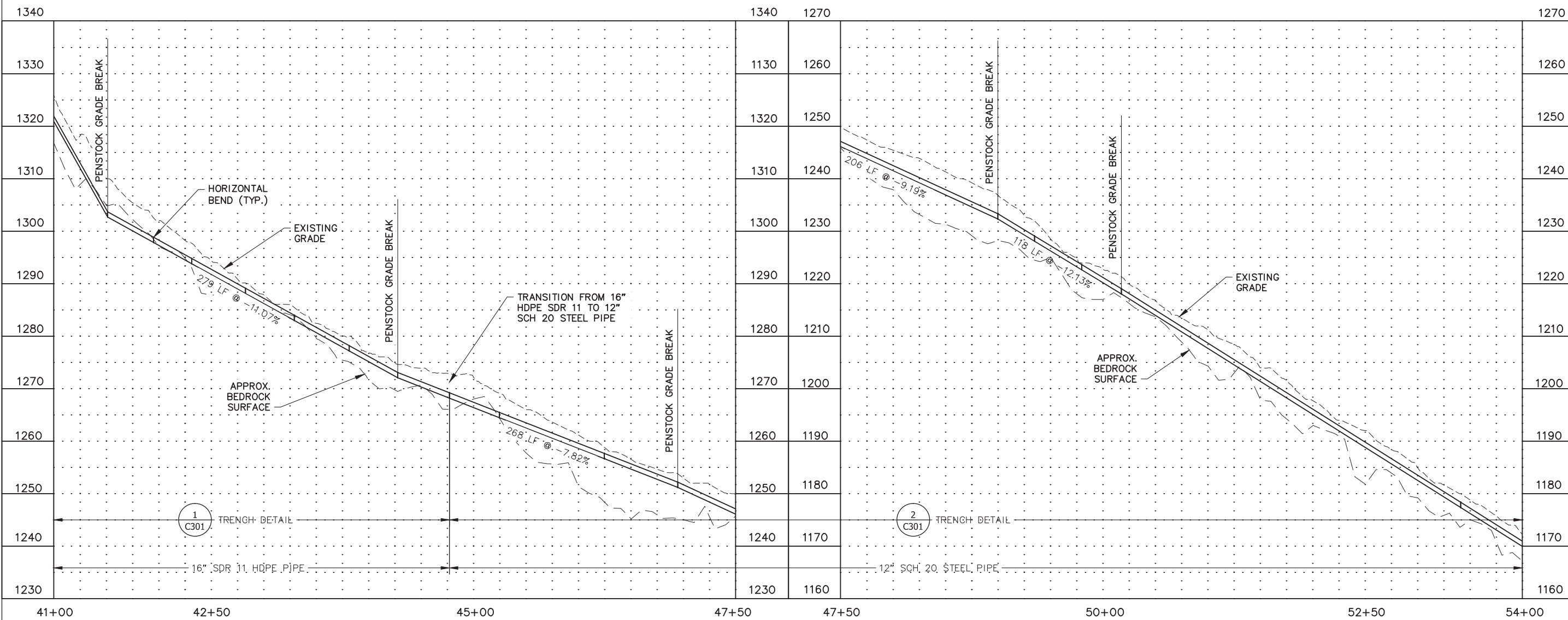
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C404

2
C301

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PENSTOCK PROFILE VIEW

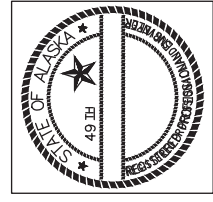
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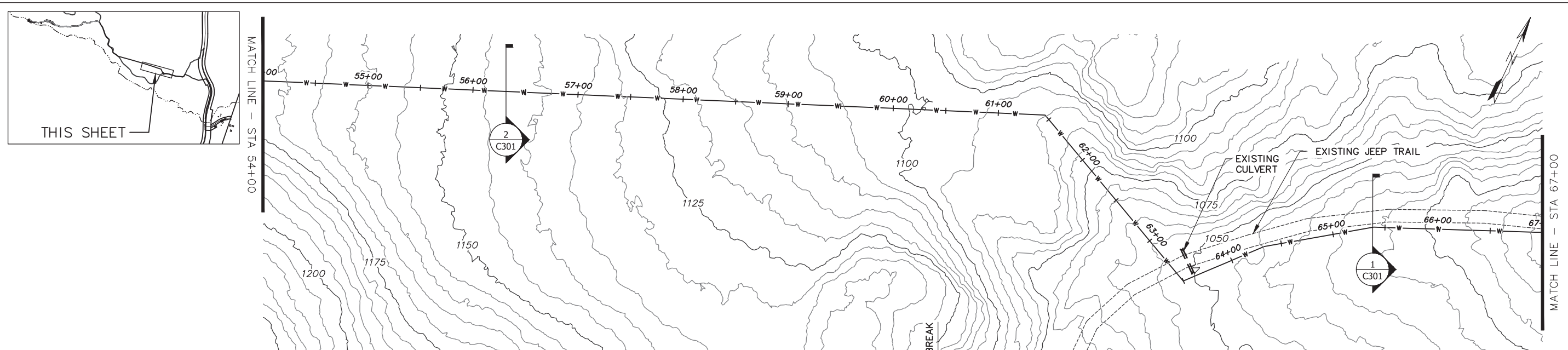
CRW
ENGINEERING GROUP LLC
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ANCHORAGE, ALASKA 99503
PHONE: (907) 562-2352
FAX: (907) 561-2275

FIVEMILE CREEK HYDROELECTRIC PROJECT
65% DESIGN DRAWINGS
PENSTOCK PLAN AND PROFILE
STA 41+00 TO STA 54+00

NO.	REVISION	BY	DATE

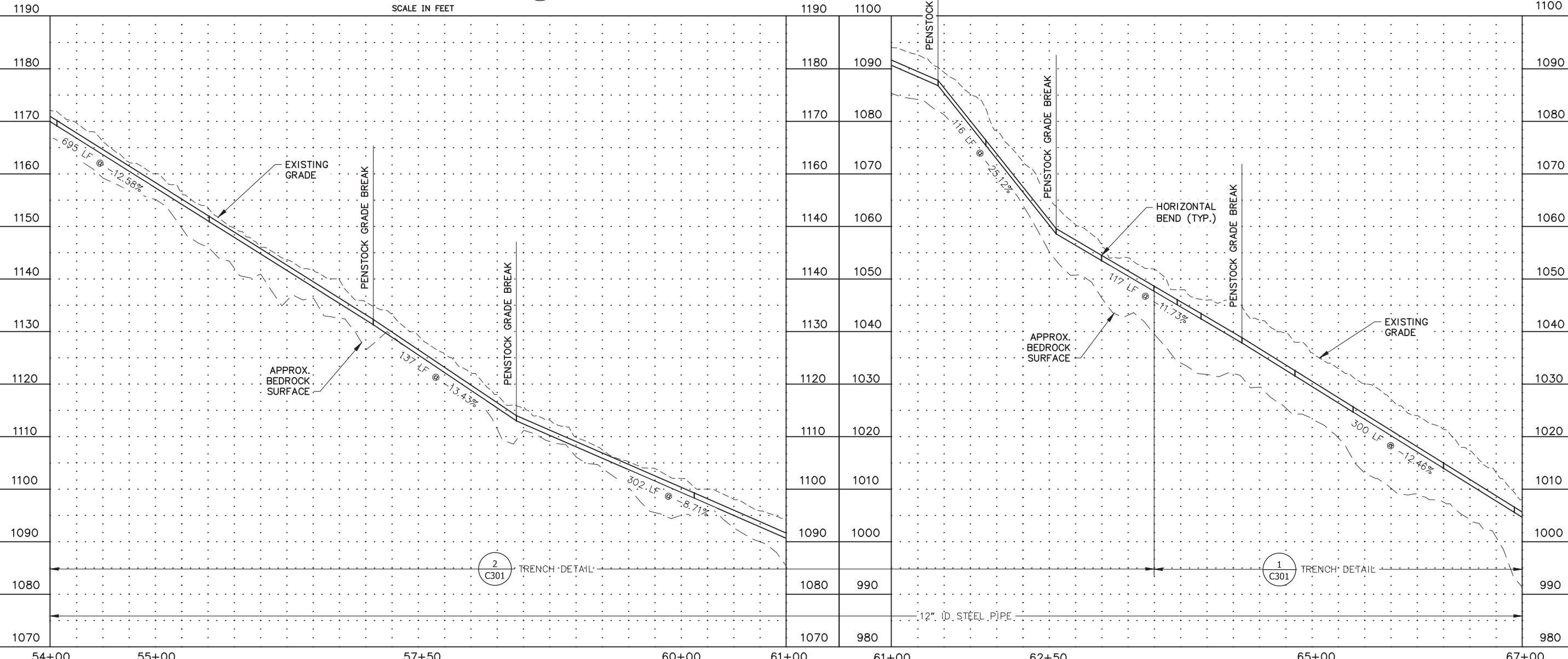
Plot Date: 9/10/14
Designed: KRH
Drawn: AJG
Approved: _____

Sheet No. C404
SHEET 20 OF 34



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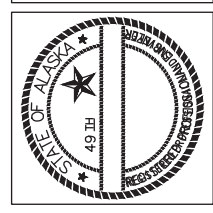
1 C405 **PENSTOCK PLAN VIEW**
SCALE: GRAPHIC STA 54+00 TO STA 67+00



2 C405 **PENSTOCK PROFILE VIEW**
SCALE: GRAPHIC STA 54+00 TO STA 67+00

File: J:\Jobsdata\30405.00 Chitina Hydro Preliminary Design\00 CADD\01 Working Set\01 Civil\30405.00 P&P Penstock.dwg

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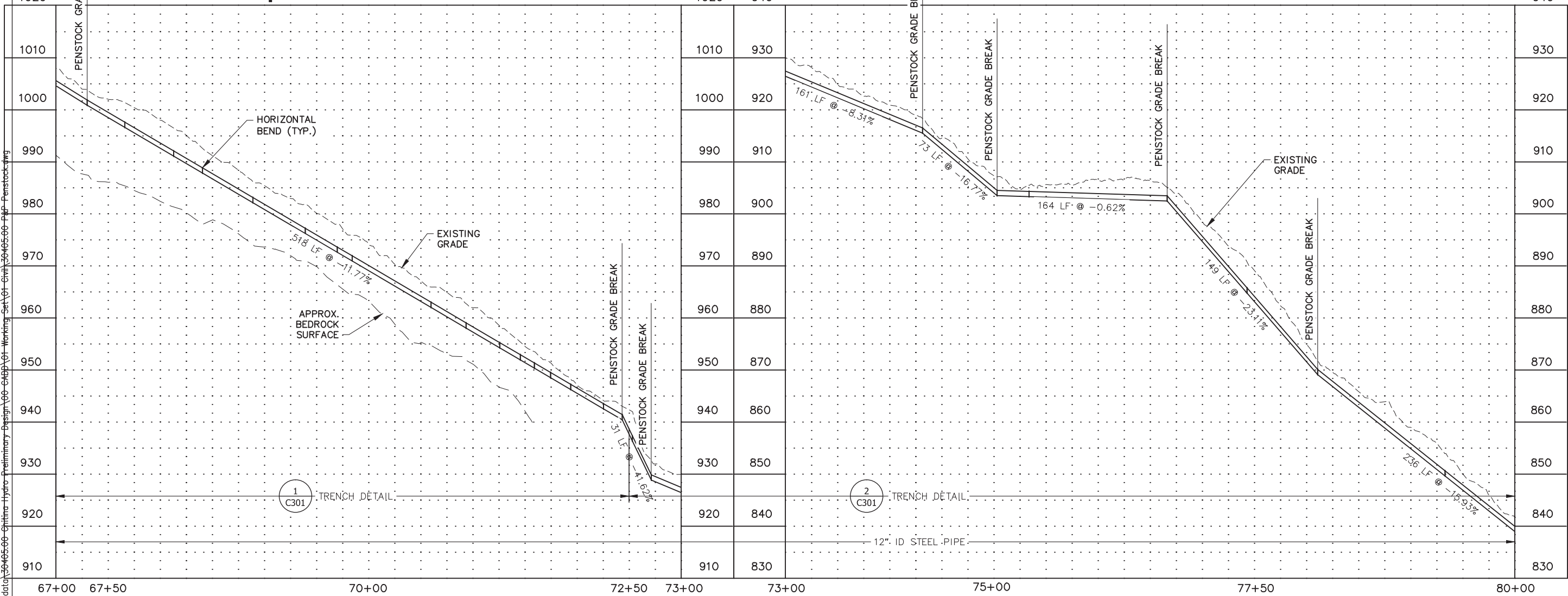
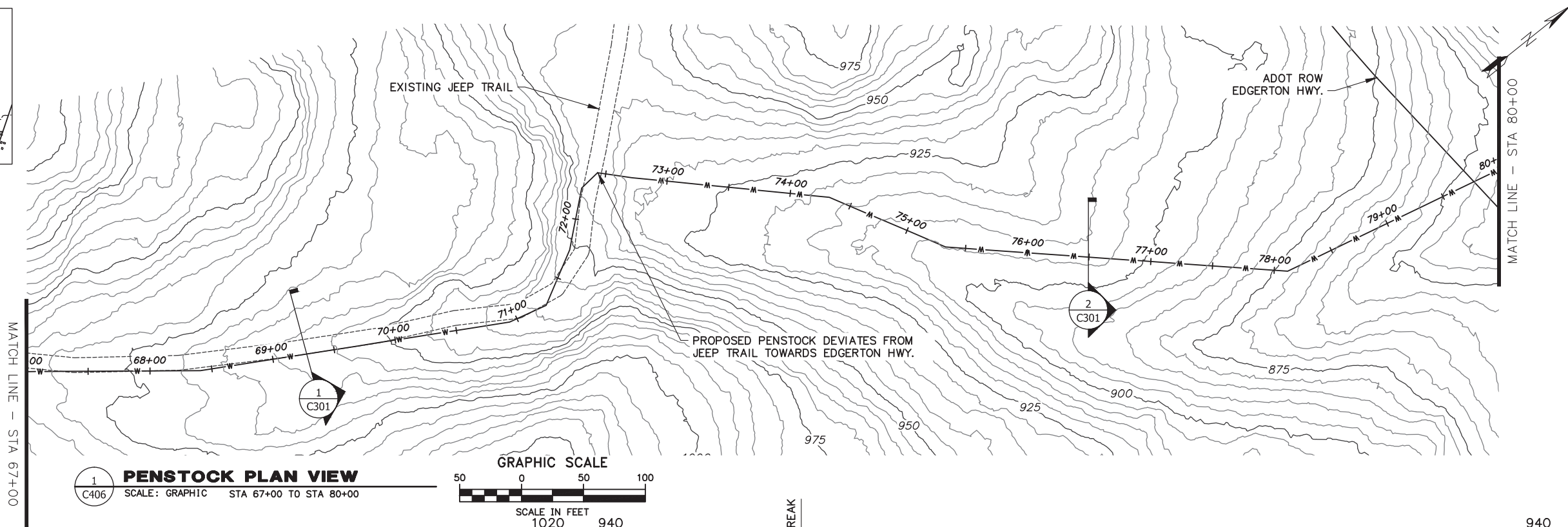
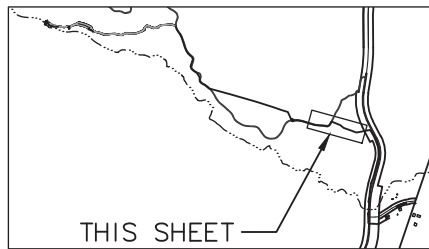


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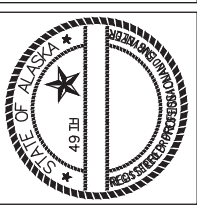
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65% DESIGN DRAWINGS
PENSTOCK PLAN AND PROFILE
STA 54+00 TO STA 67+00

NO.	REVISION	BY	DATE

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Designed: KRH
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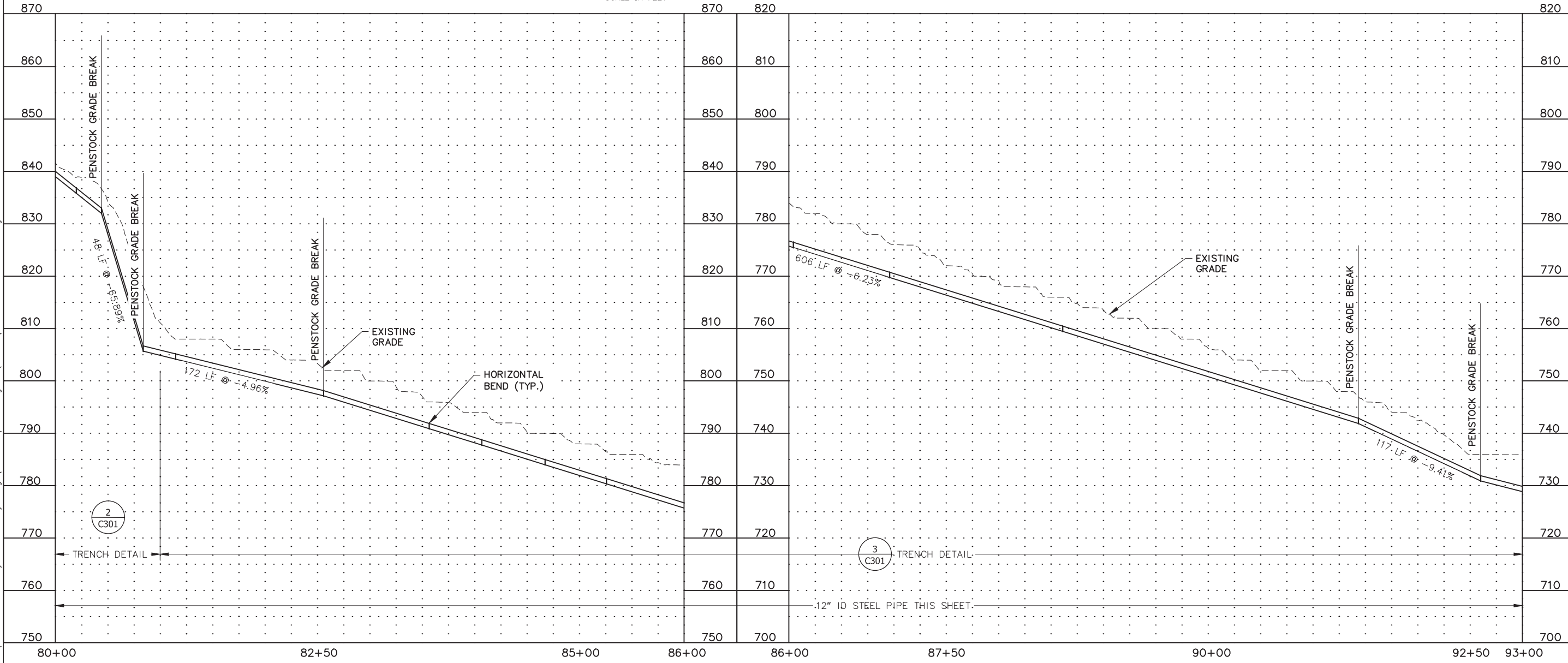
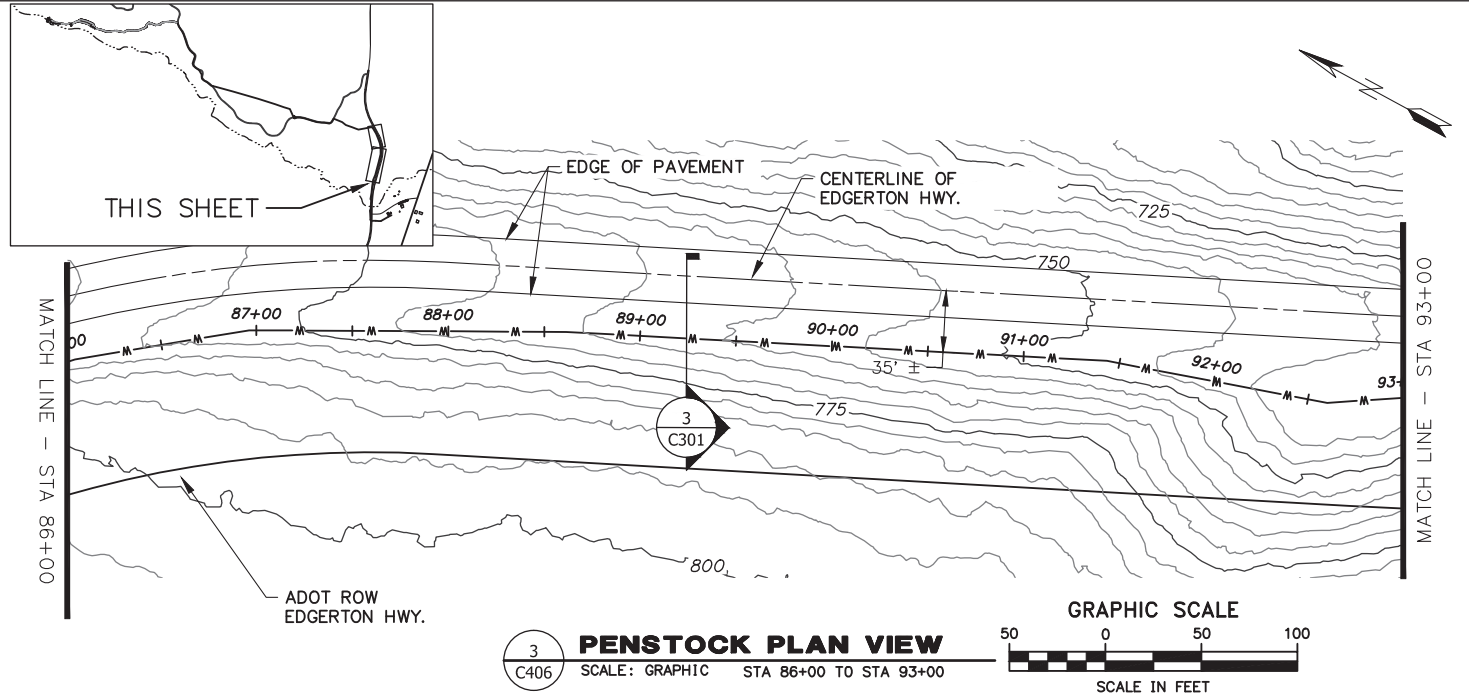
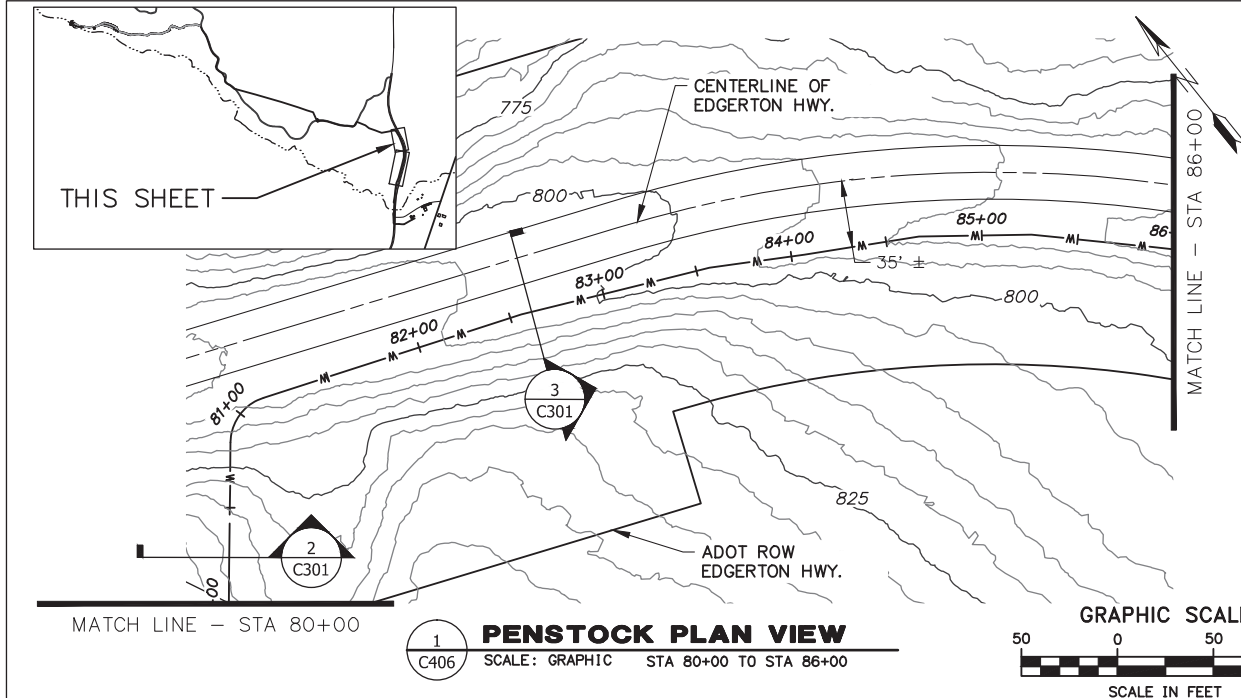


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FIVEMILE CREEK HYDROELECTRIC PROJECT
65% DESIGN DRAWINGS
PENSTOCK PLAN AND PROFILE
STA 67+00 TO STA 80+00

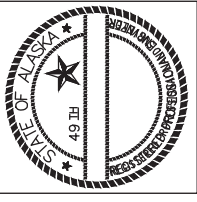
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Plot Date: 9/10/14
Designed: KRH
Drawn: AJG
Approved: _____



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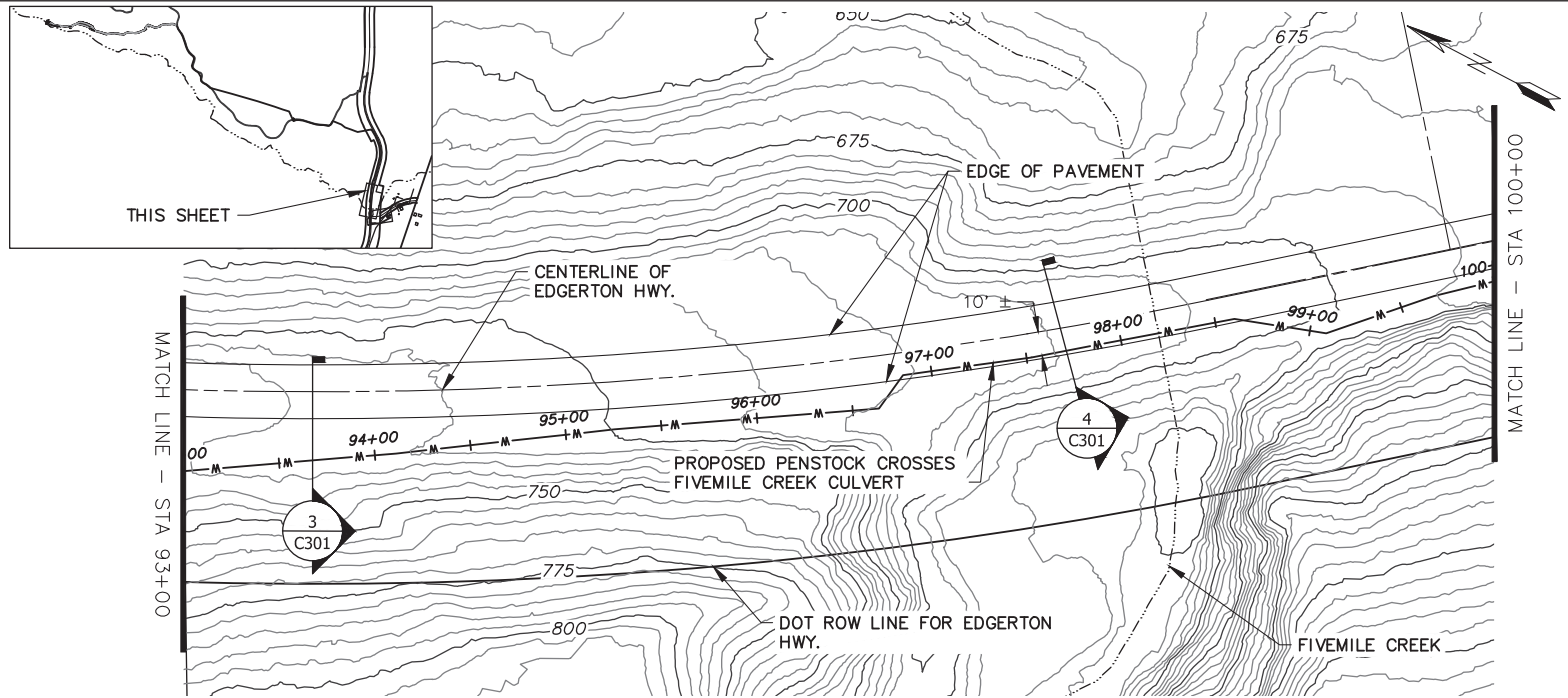
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FIVEMILE CREEK HYDROELECTRIC PROJECT
 65% DESIGN DRAWINGS
 PENSTOCK PLAN AND PROFILE
 STA 80+00 TO STA 93+00

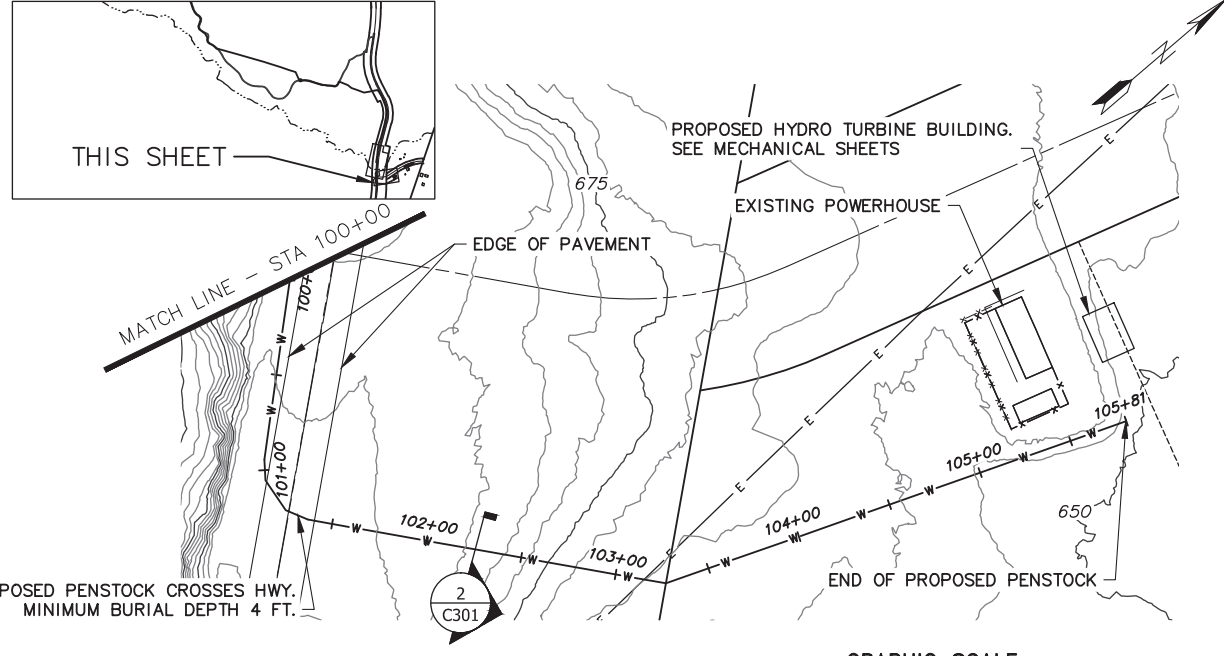
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Plot Date: 9/10/14
 Designed: KRH
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 Approved: _____

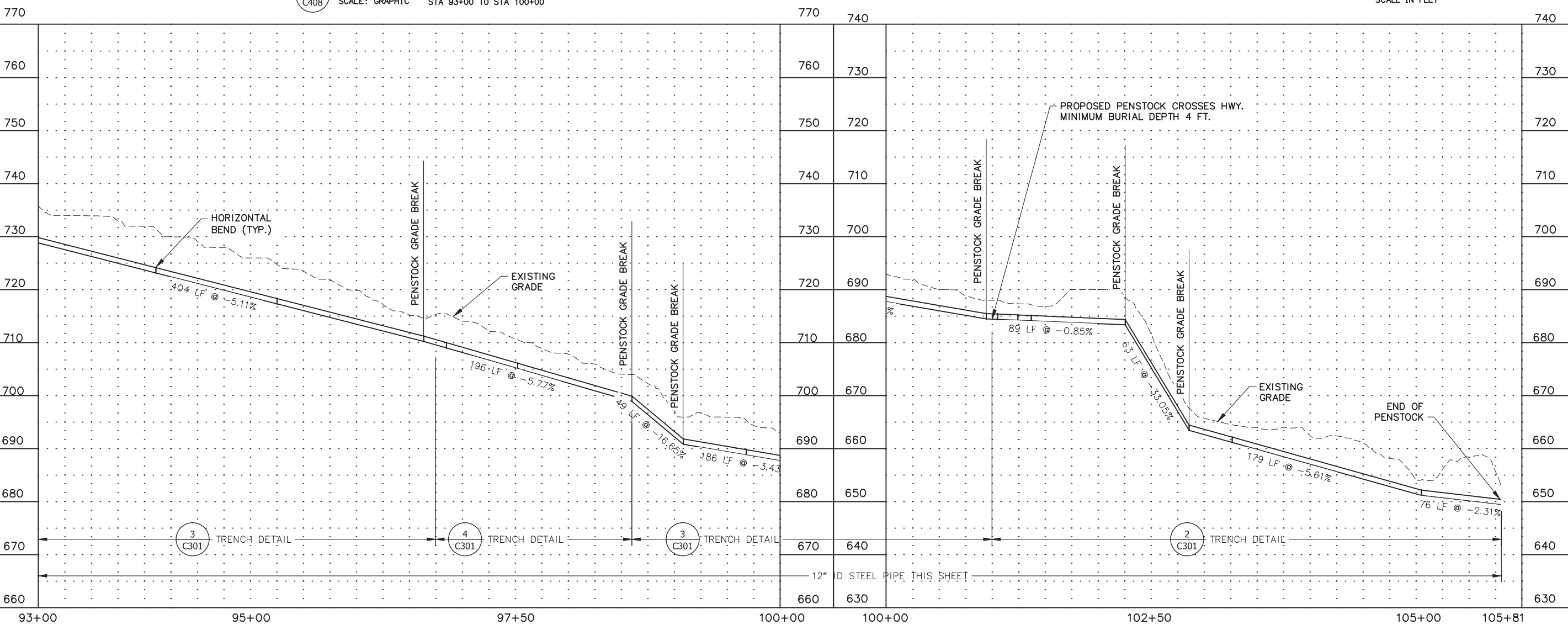
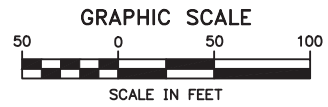
Sheet No. C407
 SHEET 23 OF 34



1 PENSTOCK PLAN VIEW
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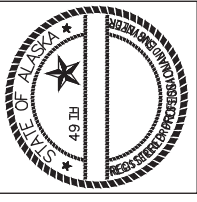
3 PENSTOCK PLAN VIEW
 SCALE: GRAPHIC STA 100+00 TO END OF PENSTOCK



2 PENSTOCK PROFILE VIEW
 SCALE: GRAPHIC STA 93+00 TO END OF PENSTOCK

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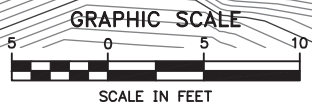
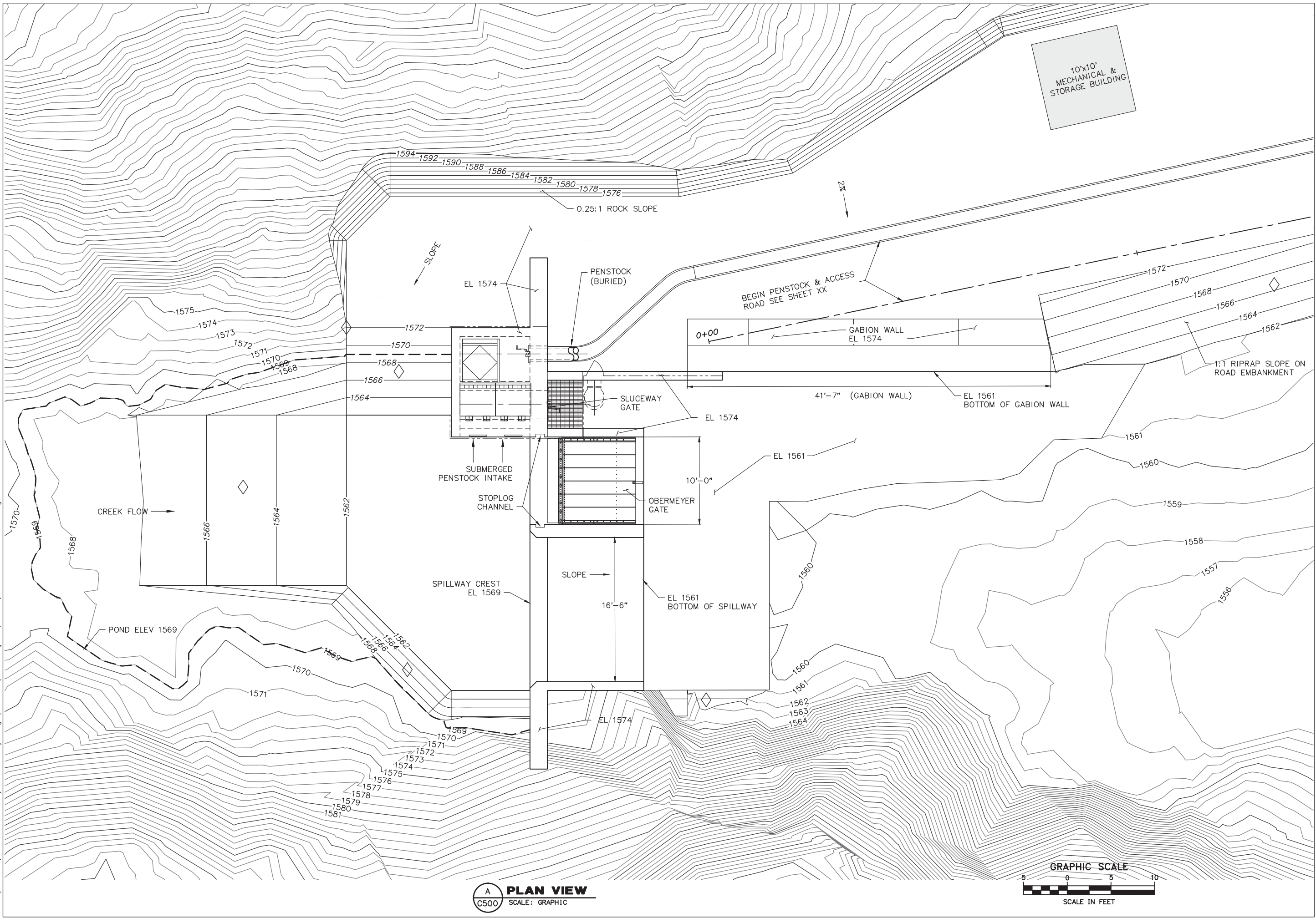
FIVEMILE CREEK HYDROELECTRIC PROJECT
 65% DESIGN DRAWINGS
 PENSTOCK PLAN AND PROFILE
 STA 93+00 TO EOP

NO.	REVISION	BY	DATE

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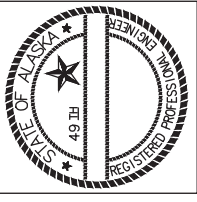
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 SHEET 24 OF 34

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A PLAN VIEW
C500 SCALE: GRAPHIC

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CHITINA, ALASKA
FIVEMILE CREEK HYDROELECTRIC PROJECT
65% DESIGN DRAWINGS
DIVERSION DAM AND INTAKE STRUCTURE
AREA GRADING PLAN

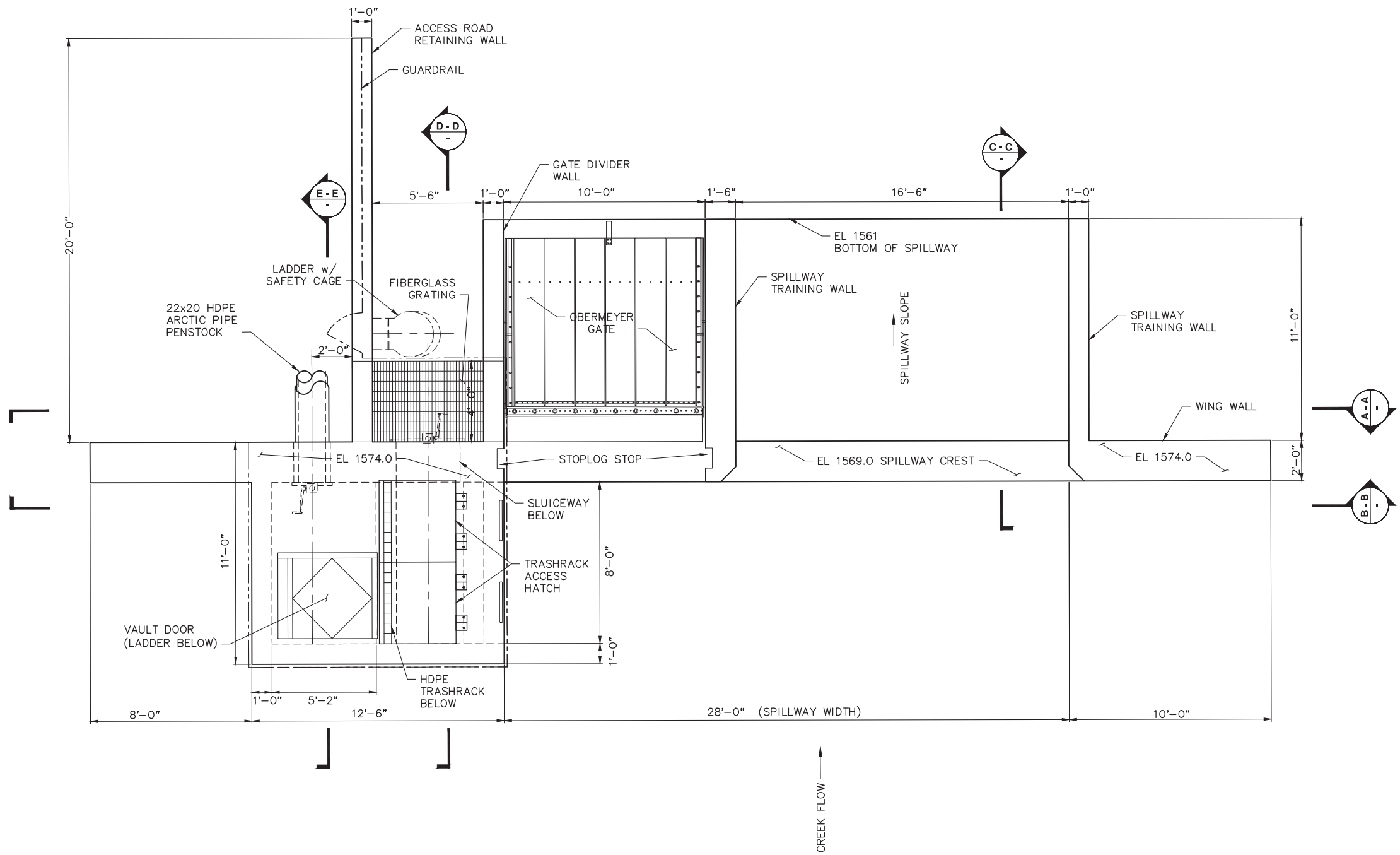
NO.	REVISION	BY	DATE

Plot Date: 9/10/14
Designed: KRH
Drawn: AMH
Approved: _____

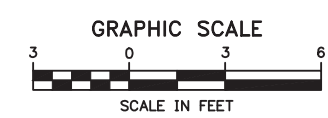
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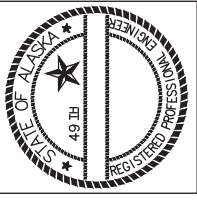


A PLAN VIEW
SCALE: GRAPHIC



File: J:\Jobsdata\30405.00 Chitina Hydro Preliminary Design\00 CADD\01 Working Set\01 Civil\30405.00 Intake Details (2).dwg

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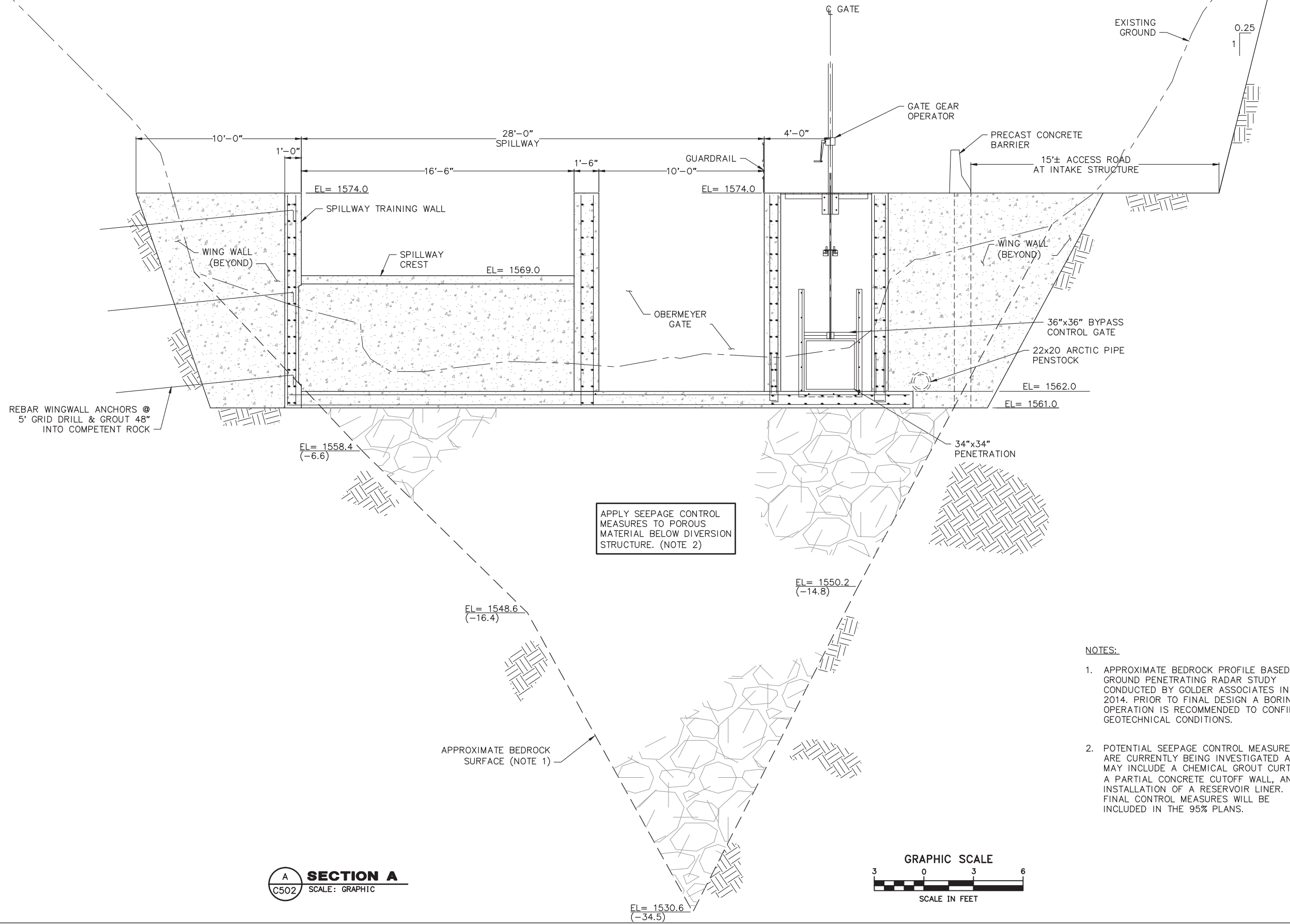
CHITINA, ALASKA
FIVEMILE CREEK HYDROELECTRIC PROJECT
65% DESIGN DRAWINGS
DIVERSION DAM AND INTAKE STRUCTURE
PLAN VIEW

NO.	REVISION	BY	DATE

Plot Date	9/10/14
Designed	KRH
Drawn	AMH
Approved	

Sheet No. **C501**
SHEET **26** OF **34**

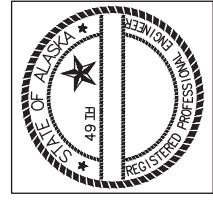
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A SECTION A
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- NOTES:**
1. APPROXIMATE BEDROCK PROFILE BASED ON GROUND PENETRATING RADAR STUDY CONDUCTED BY GOLDER ASSOCIATES IN JULY 2014. PRIOR TO FINAL DESIGN A BORING OPERATION IS RECOMMENDED TO CONFIRM GEOTECHNICAL CONDITIONS.
 2. POTENTIAL SEEPAGE CONTROL MEASURES ARE CURRENTLY BEING INVESTIGATED AND MAY INCLUDE A CHEMICAL GROUT CURTAIN, A PARTIAL CONCRETE CUTOFF WALL, AND/OR INSTALLATION OF A RESERVOIR LINER. FINAL CONTROL MEASURES WILL BE INCLUDED IN THE 95% PLANS.

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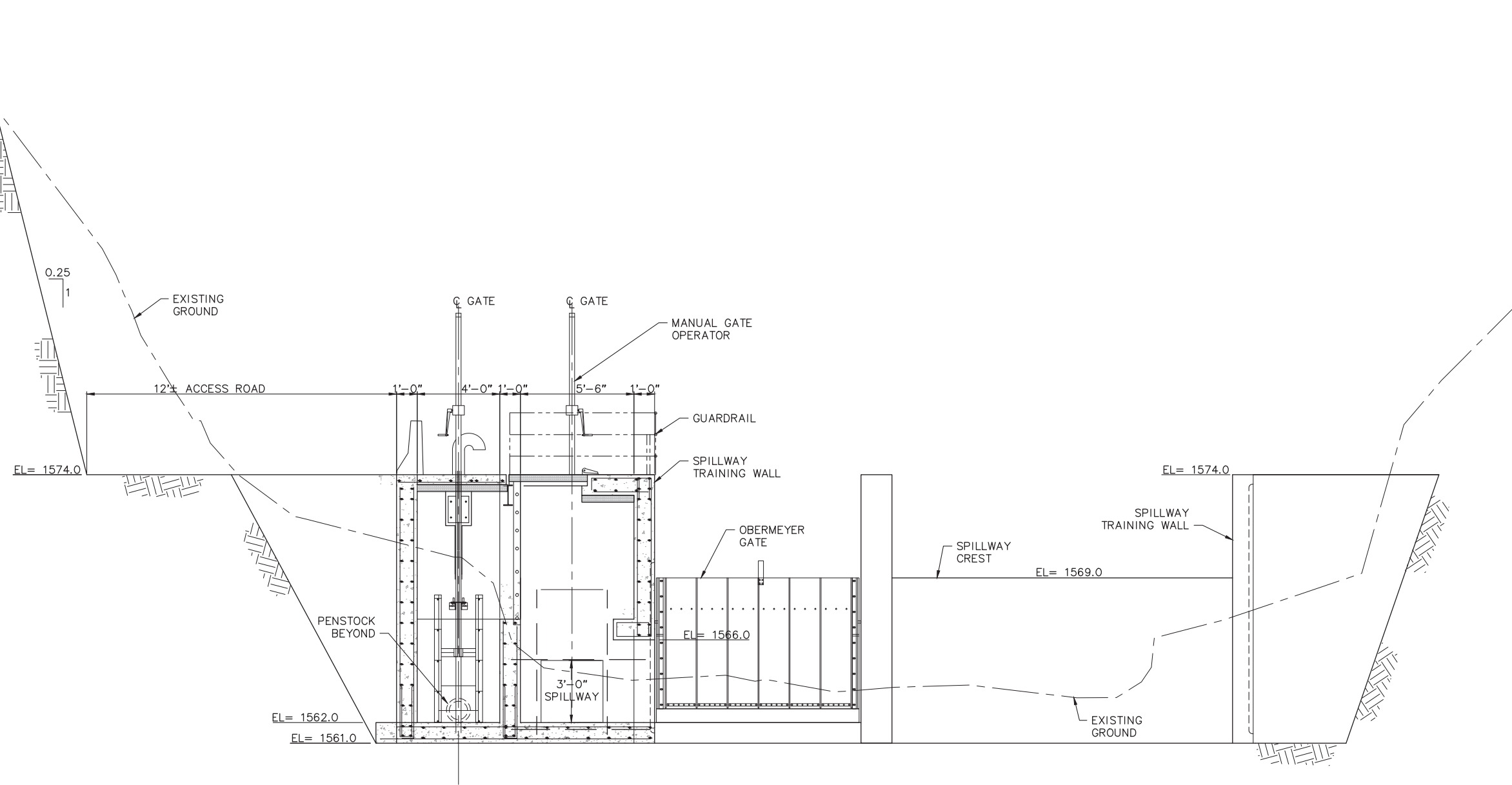
CRW
ENGINEERING GROUP LLC
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ANCHORAGE, ALASKA 99503
PHONE: (907) 562-2352
FAX: (907) 561-2275

CHITINA, ALASKA
FIVEMILE CREEK HYDROELECTRIC PROJECT
65% DESIGN DRAWINGS
DIVERSION DAM AND INTAKE STRUCTURE
SECTIONS - 1

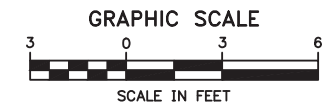
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B SECTION B
 C503 SCALE: GRAPHIC



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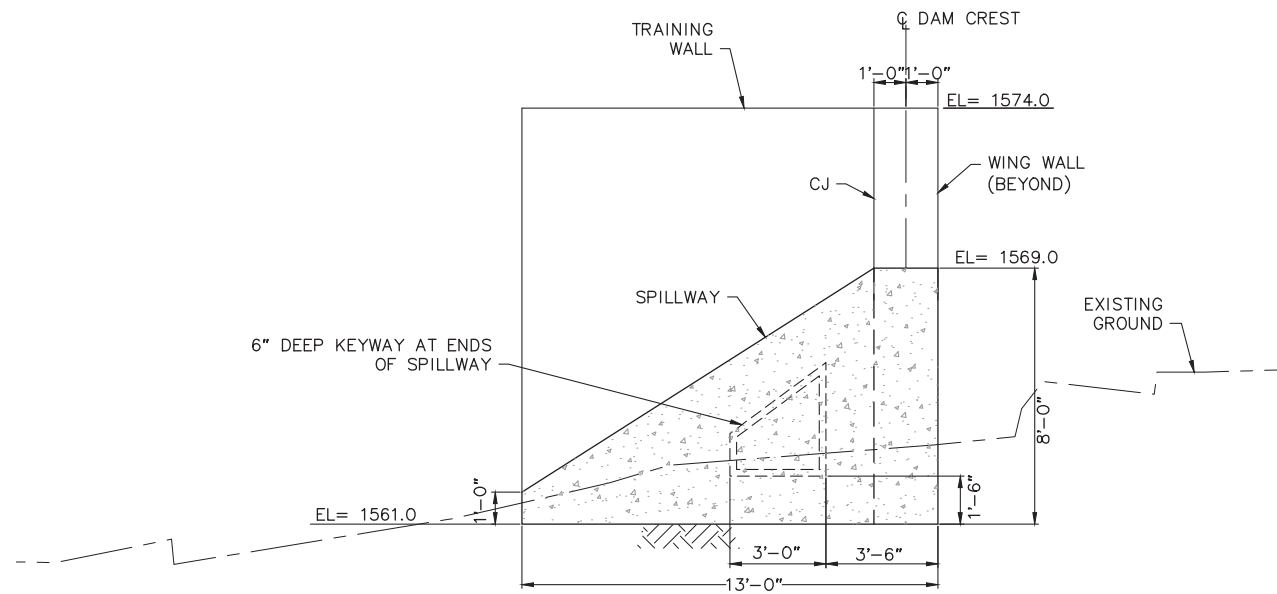
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CHITINA, ALASKA
FIVEMILE CREEK HYDROELECTRIC PROJECT
65% DESIGN DRAWINGS
 DIVERSION DAM AND INTAKE STRUCTURE
 SECTIONS - 2

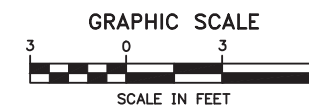
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Plot Date: 9/10/14
 Designed: KRH
 Drawn: AMH
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Sheet No. **C503**
 SHEET **28** OF **34**



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SECTION C
C504 SCALE: GRAPHIC

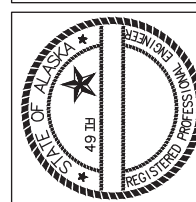


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Plot Date	9/10/14
Designed	KRH
Drawn	AMH
Approved	

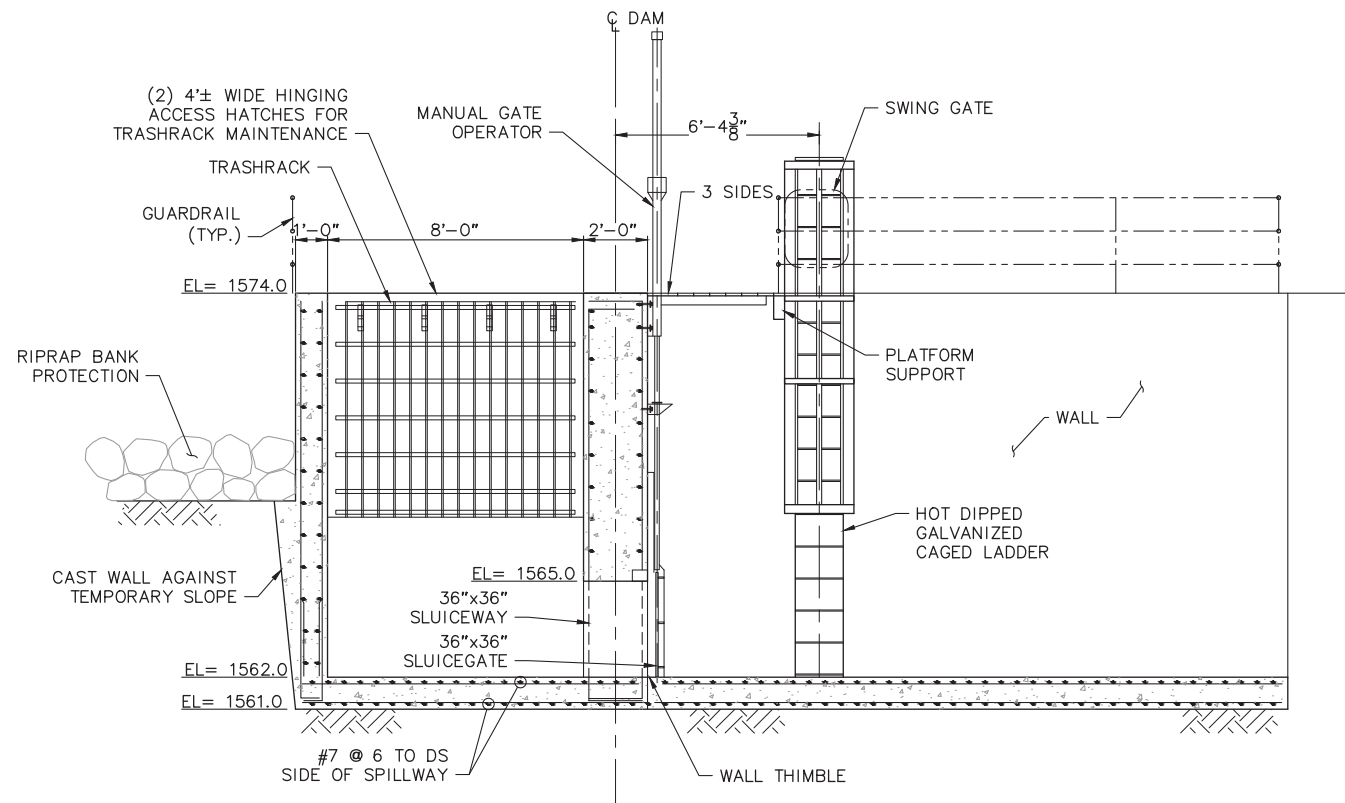
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SHEET 29 OF 34

CHITINA, ALASKA
FIVEMILE CREEK HYDROELECTRIC PROJECT
65% DESIGN DRAWINGS
DIVERSION DAM AND INTAKE STRUCTURE
SECTIONS - 3

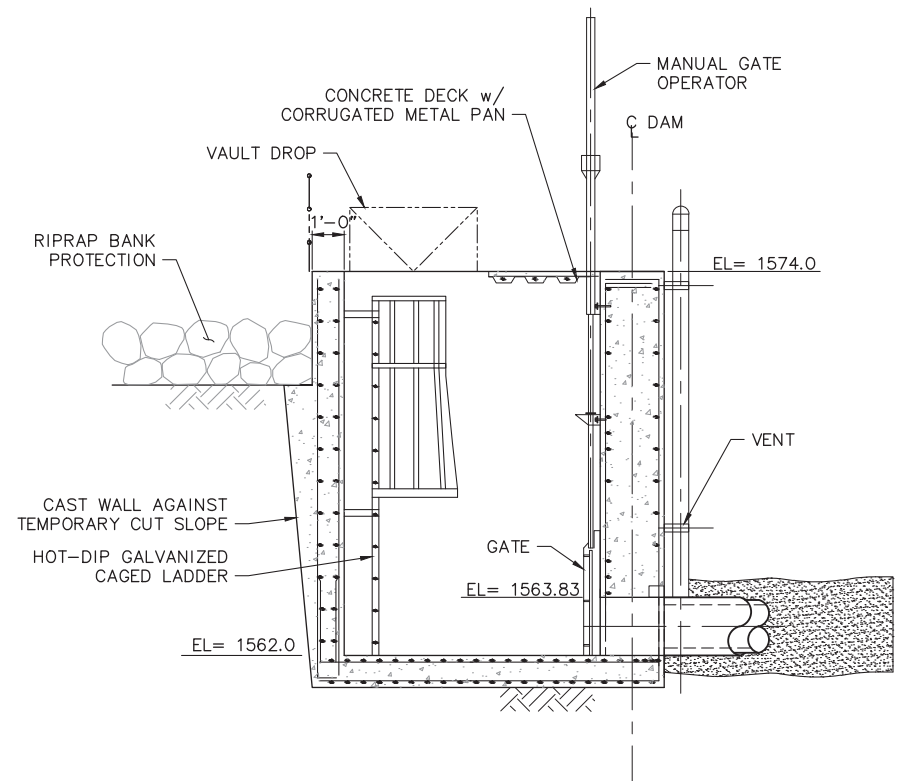


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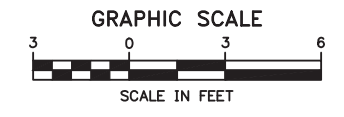
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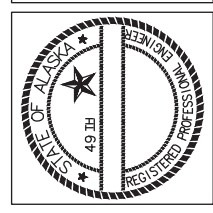
D SECTION D
C505 SCALE: GRAPHIC



E SECTION E
C505 SCALE: GRAPHIC



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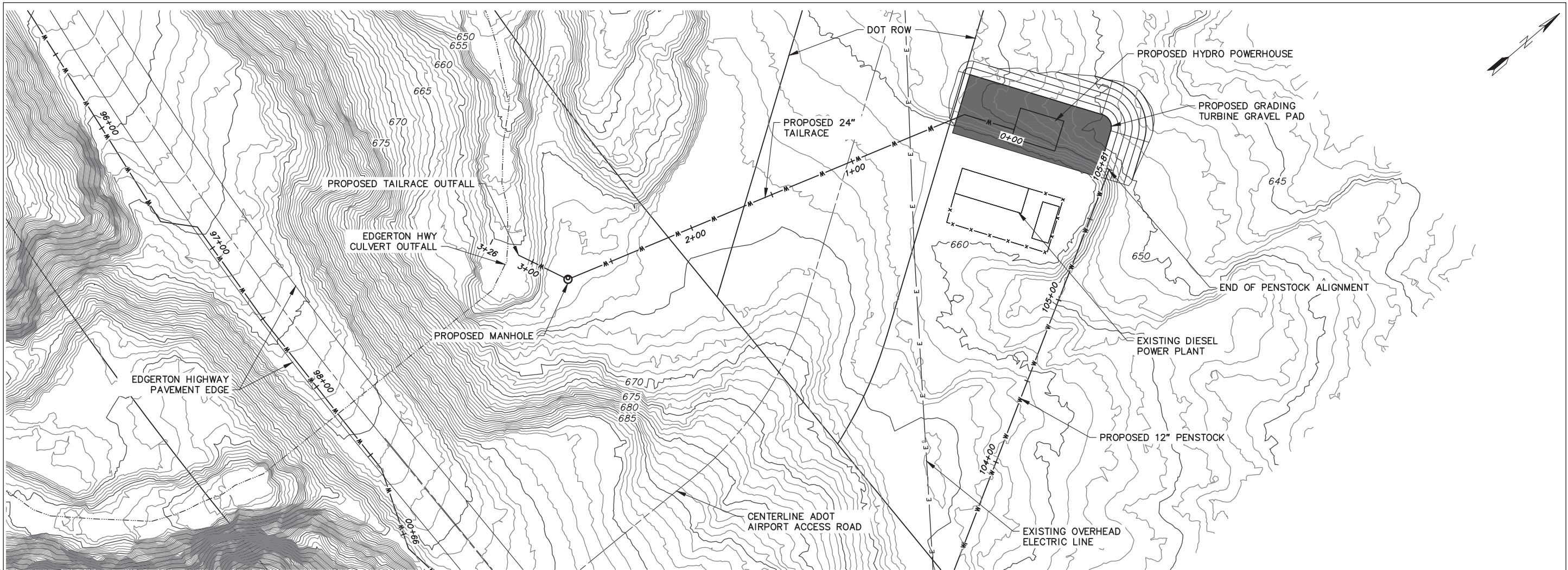
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FIVEMILE CREEK HYDROELECTRIC PROJECT
65% DESIGN DRAWINGS
DIVERSION DAM AND INTAKE STRUCTURE
SECTIONS - 4

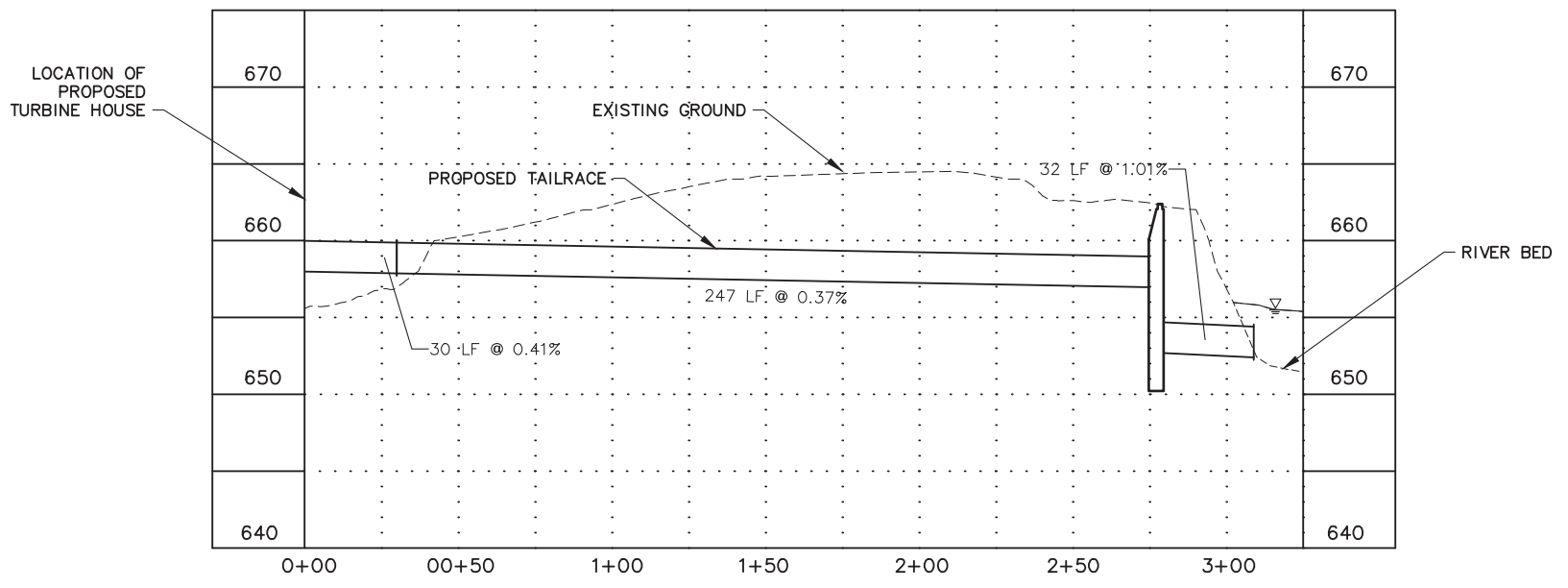
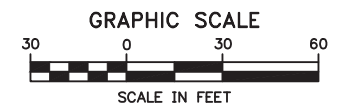
NO.	REVISION	BY	DATE

Plot Date: 9/10/14
Designed: KRH
Drawn: AMH
Approved: _____

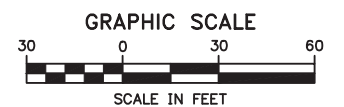
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1 TURBINE HOUSE SITE PLAN AND TAILRACE ALIGNMENT
 SCALE: GRAPHIC TURBINE HOUSE TO CULVERT OUTFALL

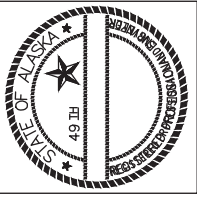


2 TAILRACE PROFILE VIEW
 SCALE: GRAPHIC



File: J:\Jobsdata\30405.00 Chitina Hydro Preliminary Design\00 CADD\01 Working Set\01 Civil\30405.00 Powerhouse Site Plan.dwg

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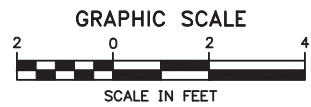
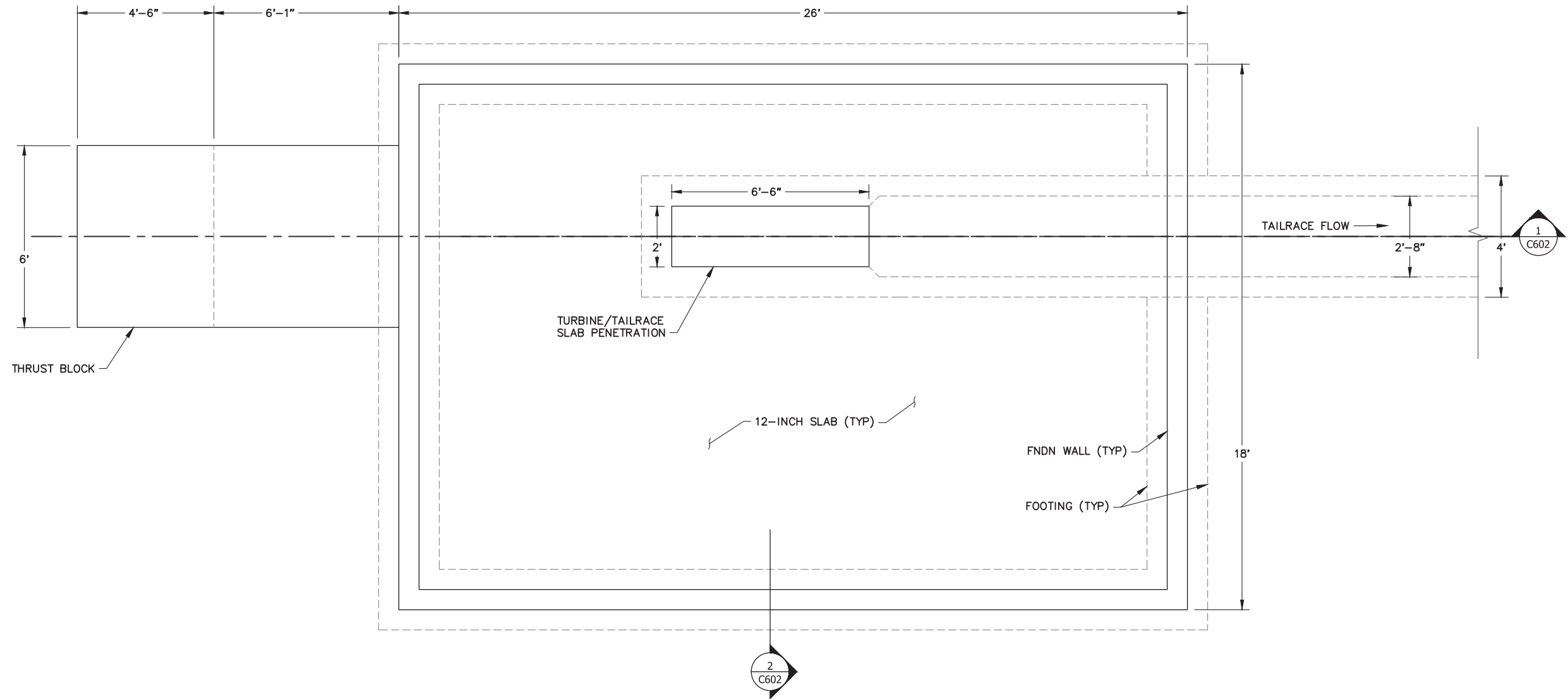
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FIVEMILE CREEK HYDROELECTRIC PROJECT
65% DESIGN DRAWINGS
 TURBINE HOUSE AND TAILRACE
 PLAN AND PROFILE VIEWS

NO.	REVISION	BY	DATE

Plot Date: 9/10/14
 Designed: KRH
 Drawn: AJG
 Approved: _____

Sheet No. **C600**
 SHEET **31** OF **34**

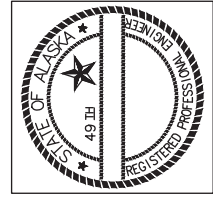
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1 POWER HOUSE FOUNDATION PLAN VIEW
SCALE: GRAPHIC

NOTES:
1.

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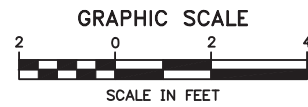
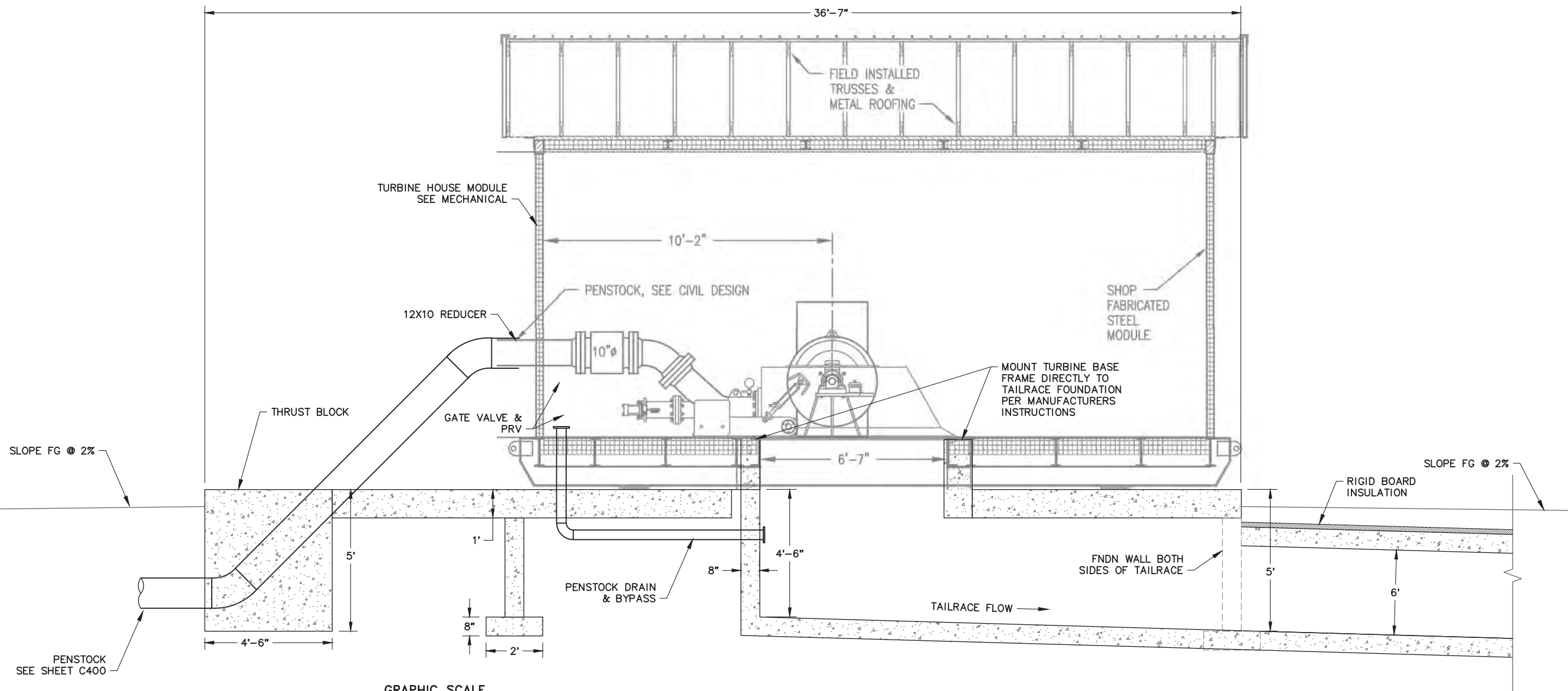
CHITINA, ALASKA
FIVEMILE CREEK HYDROELECTRIC PROJECT
65% DESIGN DRAWINGS
POWERHOUSE FOUNDATION
PLAN VIEW

NO.	REVISION	BY	DATE

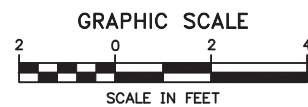
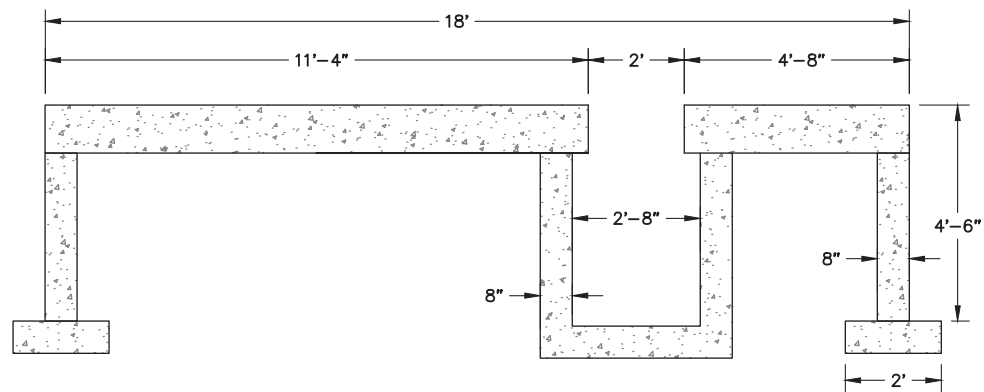
Plot Date 9/10/14
Designed AMH
Drawn AMH
Approved

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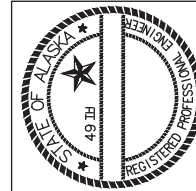


1 POWER HOUSE FOUNDATION SECTION VIEW
SCALE: GRAPHIC
C602



2 POWER HOUSE FOUNDATION SECTION VIEW
SCALE: GRAPHIC
C602

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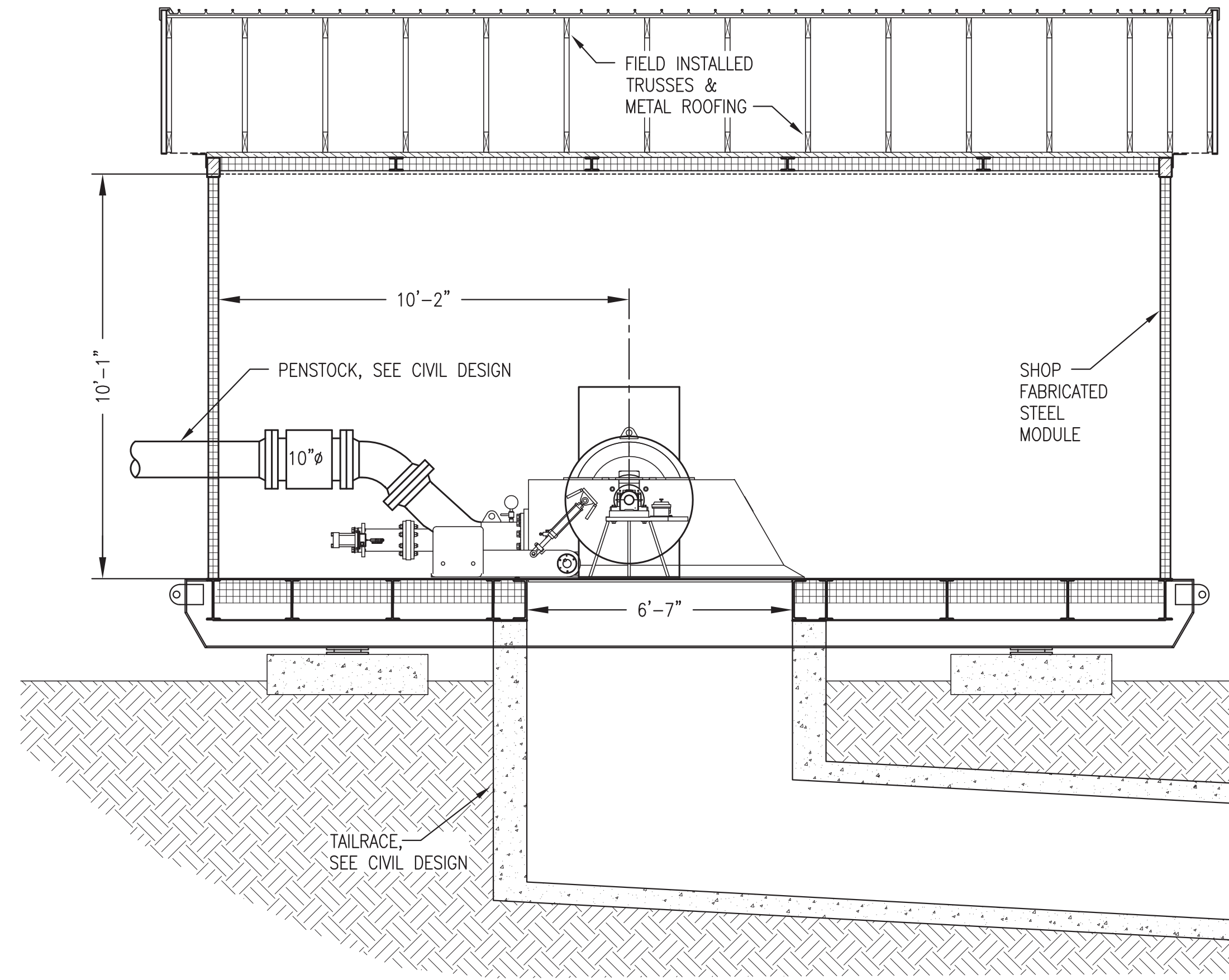
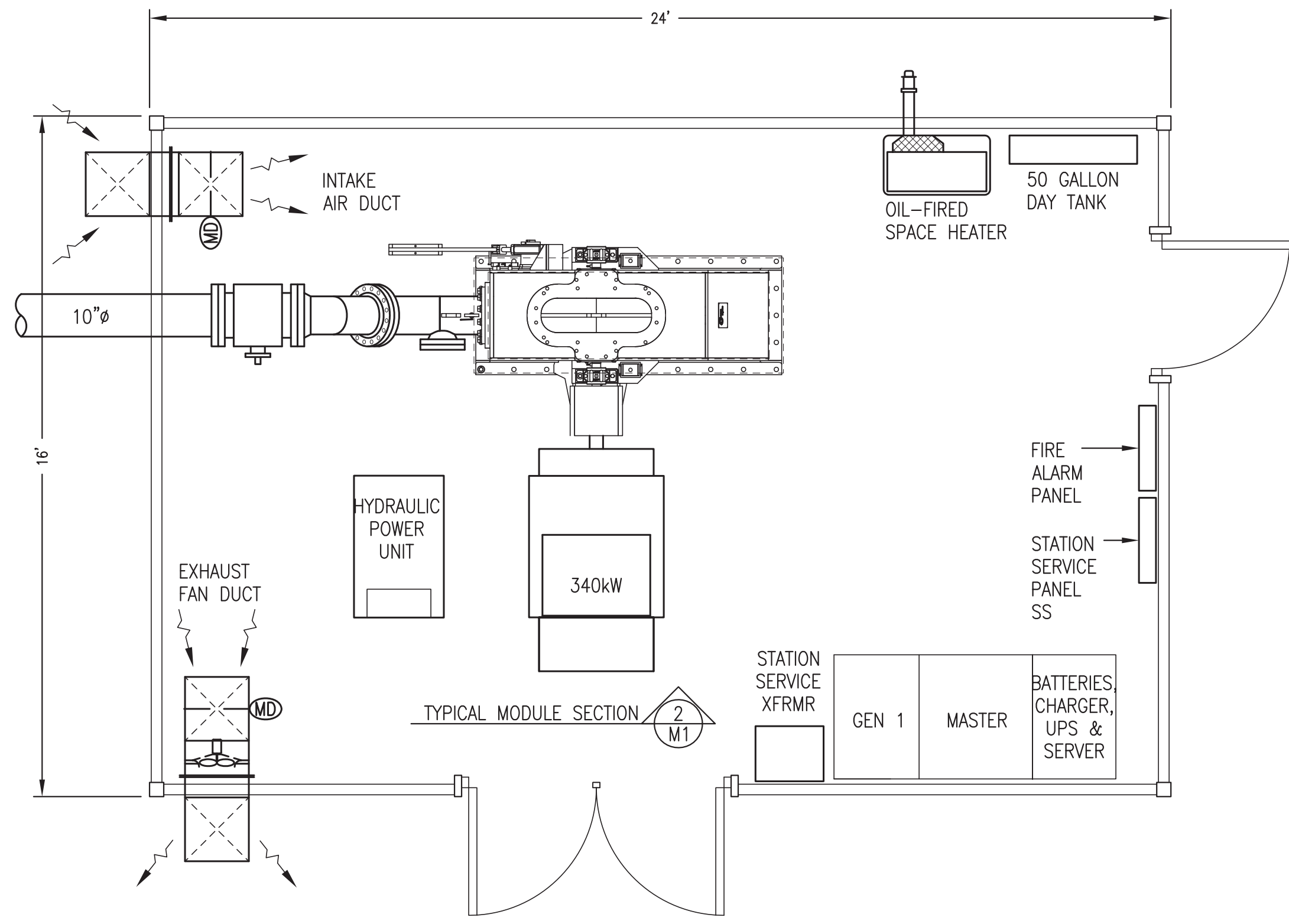
CRW
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FAX: (907) 561-2275

CHITINA, ALASKA
FIVEMILE CREEK HYDROELECTRIC PROJECT
65% DESIGN DRAWINGS
POWERHOUSE FOUNDATION
SECTION VIEWS

NO.	REVISION	BY	DATE

Plot Date 9/10/14
Designed AMH
Drawn AMH
Approved

Sheet No. C602
SHEET 33 OF 34



1 PREFABRICATED MODULAR POWERHOUSE PLAN
M1 3/8" = 1'-0"

2 TYPICAL MODULAR POWERHOUSE SECTION
M1 3/8" = 1'-0"

State of Alaska
Department of Community
and Economic Development
AIDEA/AEA
Rural Energy Group
813 West Northern Lights Blvd.
Anchorage, Alaska 99503

Gray Stassel
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(907)349-0100

CHITINA HYDROELECTRIC PROJECT
MODULAR POWERHOUSE LAYOUT

REV	DESCRIPTION	BY	DATE

Project No.	Date	Designed	Drawn	Approved
Sheet No.	X			
SHEET	X	OF	X	