Integrated Truss Plant and Sawmill Business Plan

A Business Plan for the Yukon-Kuskokwim Economic Development Council

Prepared by the University of Alaska Center for Economic Development

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I. Executive Summary

In the Yukon-Kuskowkim Delta, the housing crisis grows worse by the day. The region, dominated by winds gusting off the Bering Sea and soggy, permafrost-prone ground conditions, has some of the lowest-quality housing stock in Alaska, a huge percentage of which needs to be replaced as soon as possible. Homes in the region are often drafty, moldy and lacking in adequate water and sewer facilities. On top of that, they are small – on average, some of the smallest homes in the state are found in the Y-K Delta. Families in the Wade Hampton Census Area face the nation's most extreme levels of overcrowding, and their neighbors in the Bethel Census Area don't fare much better. These rates are higher than the national average by a factor of 10 or more.

The region is projected to grow at a rate greater than that of the rest of Alaska over the coming decades, which will only exacerbate existing housing issues. The Association of Village Council Presidents (AVCP), established in the pre-ANCSA era to respond to the social-service needs of residents of the region, commissioned this study to examine the feasibility of manufacturing home-construction components in the region, using locally sourced lumber, as a means of lowering the barriers to housing development while providing local jobs and bolstering the fledgling regional timber industry.

Specifically, AVCP proposes to build an integrated truss plant in Bethel, at the site of a former fish-processing facility on the banks of the Kuskokwim River. The product, integrated trusses, are a structural component integral to the construction of a highly energy-efficient style of housing developed by the Cold Climate Housing Research Center (CCHRC) in Fairbanks, prototypes of which are already improving the lives of residents in Atmautluak, Crooked Creek and Galena, to name a few. CCHRC's integrated truss homes boast 6 Star energy ratings through the State of Alaska's Building Energy Efficiency Standards program and can be built with a variety of foundation types depending on local ground conditions. Moving from an older home typical of the region into an integrated truss home will net thousands of dollars in annual energy savings, not to mention safer indoor air quality. Integrated trusses are whole-home trusses; as opposed to traditional construction, which makes use of roof and floor trusses and wall joists, the integrated truss combines all of these elements in one assembly that looks a bit like the house's cross-sectioned skeleton. Integrated trusses facilitate a quicker, less technical build; a typical integrated truss home can be framed in one day, without a large crew or specialized equipment or labor.

There are many reasons to be optimistic about AVCP's proposal and the promise of local lumber manufacturing in the region. The truss plant's competitive advantages will be its ability to bring this specialized, engineered-for-Alaska style of home to the region on a much broader scale, as well as the significant cost savings associated with not having to ship large structural components into the region via barge. (Between 50-60 percent of the cost of home construction in the region is attributable to shipping.) Working in partnership with a sawmill located upriver in Chuathbaluk, the opportunity also exists to use local, Kuskokwim River white spruce to manufacture the trusses. This option features the twin benefits of providing local jobs in a community hungry for opportunity and helping to strengthen the ongoing efforts of organizations like AVCP and the Yukon Kuskokwim Economic Development Council (YKEDC) to establish a viable forestry and wood products industry in the region.

The proposal also faces a few obstacles, which is to be expected. Looming largest among them is the relative paucity of funding for home construction in the region. Today, the dominant regional builder is

the AVCP Regional Housing Authority, which for the past few years has constructed approximately 22 houses per season in the region. The AVCP RHA already has a home style it is using in these constructions that relies on traditional trusses, and a crew trained to build in this style. The truss plant's managers will need to win over AVCP RHA to the integrated truss style of building in order to succeed. Although the RHA has a regular, ongoing program of new housing construction, the need in the region far outstrips the funding it has been able to secure. An aggressive effort on the part of AVCP, working in partnership with CCHRC and the RHA and others, may help grow the market for new housing by seeking out new and innovative ways to finance their construction. However, the State of Alaska's fiscal challenges are expected to make this a tall order. Technical challenges associated with running the sawmill and receiving grade stamping and certification for the lumber and trusses also exist, but with a thoughtful, phased approach to operations, could be surmountable. Using lumber purchased and shipped from outside the region is also an option, and one that results in little net change to the truss plant's profitability under current assumptions.

The detailed financial analysis attached to this report includes data for both lumber-sourcing options – local or Lower 48 lumber. Financial highlights for the proposed truss plant include the following:

- Whether using local lumber or Lower 48 lumber, the plant is expected to achieve profitability by its third year of operation;
- In year three, the break-even number of home constructions is 24;
- Compared to industry averages, both local lumber and Lower 48 lumber options produce significantly higher ratios of net income to gross revenue and net profit margin to gross revenue by year three;
- Cost of goods sold for both lumber-source options falls below industry averages by year three;
- And overhead costs drop below industry averages by year three, falling to half of the industry average by year 10.

The assumptions on which these projections are based are detailed in the respective sections on the financial analysis for both truss plant and sawmill included in this report. The report analyzes the truss plant first, followed by the sawmill, and then includes several sections relevant to both operations, including combined economic impacts, legal and regulatory considerations, facility design considerations, business structure options, and potential sources of funding to finance the build-out and initial operations of the plant.

The opportunity to bring greatly improved housing to the region fits perfectly with AVCP's mission to "promote self-determination, protection and enhancement of our culture and traditions through a working partnership with member villages of the Yukon-Kuskokwim Delta." Although a move into the manufacturing sector will be a substantial deviation from AVCP's existing social-service profile, it is a complement to the organization's role within the newly established YKEDC and ongoing efforts to develop a Yukon-Kuskokwim Freight and Energy Corridor. Economic development in rural Alaska is not easy. There are significant challenges to overcome on the path to a rate of new-home construction that would even begin to meet the demand and established need. But with the right combination of careful and well-developed business planning for the truss plant and sawmill; a partnership with AVCP RHA to provide at least some of its annual new housing construction; and a successful effort to develop additional funding sources for new-home construction in the region, the proposed AVCP truss plant could one day be an example of how aligning need with local resources and capabilities has a positive outcome for rural residents.

II. Yukon-Kuskokwim Regional Background

The truss plant under consideration by the Association of Village Council Presidents would be located in Bethel, the regional hub and population center for the Yukon-Kuskokwim Delta. Housing needs are intense in Bethel and throughout the region, and the proposed development would offer positive economic impacts across multiple communities. For that reason, this overview covers demographic, population and housing trends for the Bethel and Wade Hampton census areas, also referred to collectively as the Calista Corporation region. Data on demographics and population are primarily based on the decennial census and the U.S. Census Bureau's American Community Surveys; housing data are drawn from the census as well as the Alaska Housing Finance Corporation, which in 2014 released a comprehensive report on housing conditions statewide based on Alaska Native Corporation boundaries.

A. City of Bethel

Bethel is located on the banks of the Kuskokwim River in western Alaska, about 60 miles inland from the Bering Sea. It is the largest city in Western Alaska with a population of 6,363 as of 2013.[1] It serves as a transportation, medical and services hub for the 56 surrounding villages in the Calista Corporation region.

The community is accessible only by air and water, with a regional airport served by seven passenger airlines and four cargo carriers. The Port of Bethel on the Kuskokwim River is the northernmost medium-draft port in the United States,[2] and a local barge company distributes goods from Bethel to surrounding river-accessible villages.

Bethel sits on a river delta, and the surrounding terrain is mostly flat and treeless. The city lies within the Yukon Delta National Wildlife Refuge (YDNWR), which, at 19.16 million acres, is the second-largest wildlife refuge in the United States. The YDNWR is a coastal plain created by the Yukon and Kuskokwim rivers and is home to one of the largest concentrations of waterfowl in the world, making Bethel a prime area for bird watchers. The refuge is administered from offices in the community. Bethel's climate is classified as subarctic, with long, moderately cold winters and short, mild summers. Bethel receives around 17 inches of rain per year, concentrated in June, July and August.

Yup'ik people have lived in the area for thousands of years, but it was the creation of an Alaska Commercial Company trading post in 1880 that led to the establishment of Bethel as a permanent settlement and regional hub. Moravian missionaries opened a mission in 1885, and a post office opened in 1905. The population has grown steadily since the early 1900s, with increases of more than 70 percent between decennial census records from the 1950s through the 1970s. Between the 2000 and 2010 censuses, the population grew 11 percent.

Bethel is an Alaska Native community, with Yup'ik Eskimo the predominant Alaska Native culture. The local lifestyle includes a blend of traditional subsistence practices with a modern Western economy. For example, many Yup'ik families spend time each summer at a seasonal fish camp, catching and preserving salmon to last throughout the year. Subsistence hunting for big game animals and birds is also common, and resources are often shared between families, neighbors and throughout the

[1] U.S. Census Bureau

[2] http://www.avec.org/communities/community.php?ID=59

community. Yet Bethel is also home to numerous retail shops and restaurants, and a great number of residents find employment at these locations as well as within the public sector, which has a large presence.

B. The Region: Bethel and Wade Hampton Census Areas

The Bethel Census Area, which includes more than 45,000 square miles in western Alaska, was home to 17,103 residents at the time of the 2010 U.S. Census. Bethel is by far the largest community in the Census Area and the largest community in Alaska's Unorganized Borough, the portion of the state not part of a locally-administered borough. At 19,673 square miles, Wade Hampton Census Area (also part of the Unorganized Borough) sits north of the Bethel Census Area and had a population of 7,459 as of the 2010 census. Its largest community is Hooper Bay, with slightly more than 1,000 residents.

Employment

The single largest employment sector in the Bethel Census Area is the public sector: schools, social services, health care and other government services employ 46 percent of local residents. The balance of jobs is in the service sector, particularly in the transportation industry (flight services and cargo) and in local retail.[3]

In the Wade Hampton Census Area, the public sector provides an even larger proportion of local jobs: of the 2,032 workers in the area, 56 percent were employed in the public sector. The second-largest local industry, at 12 percent, was retail trade.

Demographic profile

Unemployment is high throughout western Alaska, which commonly records one of the highest rates in the state. The Bethel Census Area reported a 19 percent unemployment rate at the time of the US Census Bureau's 2013 American Community Survey. The same report indicated a 28 percent unemployment rate for the Wade Hampton Census Area. Unemployment in both of these areas is significantly higher than the statewide unemployment rate, which stood at 6.3 percent as of December 2014.

The unemployment rate for the more broadly defined Southwest Economic Region, which includes Bethel and Wade Hampton census areas as well as the Dillingham Census Area, Bristol Bay Borough, Lake and Peninsula Borough, Aleutians East Borough and the Aleutians West Census Area, was the highest in the state during 2013 at 13.2 percent[4].

[3] U.S. Census Bureau, American Community Survey, 2009-2013 5-Year Data
[4] Alaska Department of Labor and Workforce Development, Research and Analysis Section

Table 1: Bethel and Wade Hampton Census Areas Workforce Characteristics

	Bethel CA	Wade Hampton CA
Population size	17,356	7,678
Median Household Income	$51,689	$40,176
Civilian Labor Force	7,432	2,825
Employed	6,049	2,032
Private wage & salary workers	3,128 (51.7%)	868 (42.7%)
Government workers	2,796 (46.2%)	1,147 (56.4%)
Self-employed workers	117 (1.9%)	11 (0.5%)
Unpaid family workers	8 (0.1%)	6 (0.2%)
Unemployed	1,383 (18.6%)	793 (28.1%)
Not in Labor Force	4,337	1,951

Source: American Community Survey 2009-2013 5-Year Data, U.S. Census Bureau

Table 2: Bethel and Wade Hampton Census Area Workers by Industry

Workers by Industry	Bethel	Bethel %	Wade Hampton	WH %
Agriculture, forestry, fishing and hunting, and mining	74	1.2%	14	0.7%
Construction	203	3.4%	136	6.7%
Manufacturing	40	0.7%	47	2.3%
Wholesale trade	24	0.4%	2	0.1%
Retail trade	727	12.0%	247	12.2%
Transportation and warehousing, and utilities	654	10.8%	180	8.9%
Information	92	1.5%	28	1.4%
Finance and insurance, and real estate and rental and leasing	218	3.6%	47	2.3%
Professional, scientific, management and administration	114	1.9%	27	1.3%
Educational services, and health care, and social assistance	2271	37.5%	759	37.4%
Arts, entertainment, and recreation, and accommodations, and food services	235	3.9%	40	2.0%
Public administration	180	3.0%	83	4.1%
Other	1217	20.1%	422	20.8%

Source: American Community Survey 2009-2013 5-Year Data, U.S. Census Bureau

The Bethel and Wade Hampton census areas are predominantly Alaska Native. Among residents claiming one race in the Bethel Census Area, 86 percent are of Alaska Native heritage. In the Wade Hampton Census Area, the percent claiming Native ancestry is even higher, at 95 percent. Alaska Natives in this region, predominantly the Yup'ik and Cup'ik, are named after the two main dialects of the Yup'ik language.[5] Of a total Yup'ik population of approximately 21,000, 10,000 are fluent speakers of the language and many children grow up speaking Yup'ik as their primary language.[6] Cultural and language preservation efforts, including a Yup'ik language immersion school in Bethel, aim to keep the language alive. The Bethel Census Area is one of only 38 county-level census areas in the United States where English is not the most commonly spoken language, and one of only three where it is neither English nor Spanish.[7] In the Wade Hampton Census Area, 50 percent of residents speak Yup'ik at home as a first language.[8]

Table 3: Race of Residents in the Bethel Census Area

	Bethel: Claiming 1 race	Bethel: Claiming 1 or more races	Wade Hampton: Claiming 1 race	Wade Hampton: Claiming 1 or more races
White	1894	2486	276	624
Black or African American	65	142	15	65
American Indian or Alaska Native	14109	14757	6946	7299
Asian	160	249	38	43
Pacific Islander	27	58	24	33
Other	45	66	0	3

Source: American Community Survey 2009-2013 5-Year Data, U.S. Census Bureau

Projected Growth

Both the Bethel and Wade Hampton census areas are expected to grow steadily over the coming decades, and to outpace the rate of growth expected for the rest of the state. The key factor behind this projected growth is the median age of residents.[9]

Wade Hampton Census Area is Alaska's youngest, by median age at just 22, which compares to 26 in the neighboring Bethel Census Area and 34 statewide. Alaska's population is expected to age steadily by 2042, with the population of those 65 and older increasing by a staggering 120 percent. However, this trend will be less pronounced among Alaska Native residents, and particularly in rural areas where the population is younger than average to begin with. Coupled with these age-related trends is the fact that Alaska Natives have a higher birth rate than their non-Native fellow Alaskans, and the population increase due to births alone is enough to explain the State of Alaska's projected increases in population

[5] Alaska Native Heritage Center, http://www.alaskanative.net/en/main-nav/education-and-programs/cultures-of-alaska/yupik-and-cupik/
[6] University of Alaska Fairbanks, Alaska Native Language Program, http://www.uaf.edu/anlc/languages/cy/
[7] Modern Languages Association, Language Map Data Center, mla.org
[8] Modern Languages Association, Language Map Data Center, mla.org
[9] Alaska Department of Labor and Workforce Development, Alaska Economic Trends, June 2014

for both the Wade Hampton and Bethel census areas between the present and 2042. State demographers caution that projections for small, rural areas are difficult to make and can be greatly impacted by large, unanticipated events or projects.

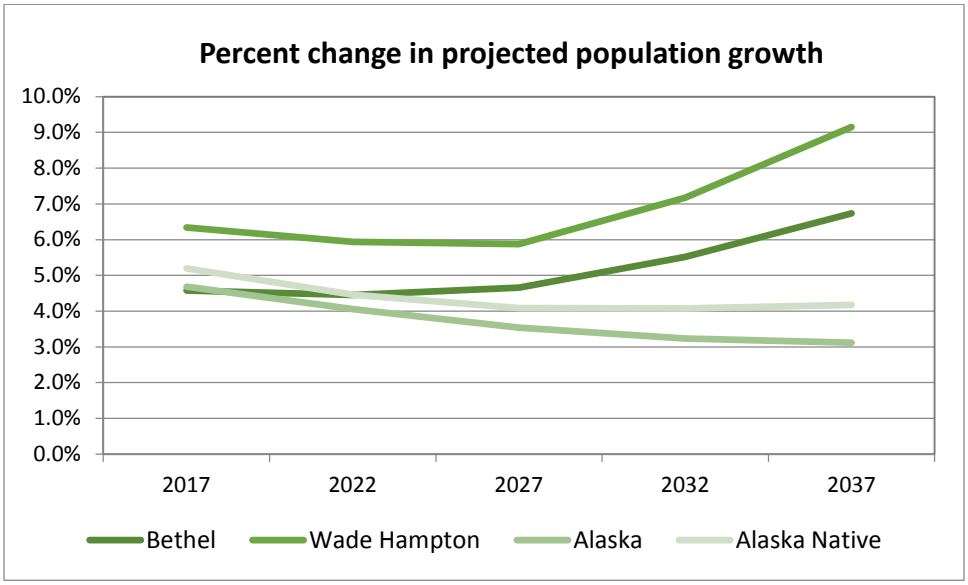


Figure 1: Population Growth Rates in Bethel and Wade Hampton as Compared to Alaska as a Whole and Alaska Natives.
Source: Alaska Department of Labor and Workforce Development, Research and Analysis Section

C. Housing Trends

In 2014, the Alaska Housing Finance Corporation (AHFC) released its Alaska Housing Assessment, a comprehensive survey of the state's housing stock and its characteristics prepared by the Cold Climate Housing Research Center (CCHRC) in Fairbanks. The report detailed an ongoing crisis in the Calista Corporation region – 40 percent of existing homes in the region can be classified as "overcrowded" (13 percent) or "severely overcrowded" (27 percent), according to thresholds established by the U.S. Department of Housing and Urban Development.[10] This rate is roughly 13 times higher than the national average and considerably higher than the statewide rate of 6.1 percent. It also makes the Calista region the most overcrowded in the state. Part of the reason for this level of overcrowding may be related to the average size of the region's homes – at 875 square feet on average, they are the smallest in the state. Average home sizes in the region range from a low average of 627 square feet in Hooper Bay to a high average of 1,237 square feet in Bethel.[11]

[10] The U.S. Department of Housing and Urban Development sets its threshold for what constitutes "overcrowded" at more than one person per room, and "severely overcrowded" as more than 1.5 persons per room. A "room" is defined as any space that is separated by a partial or complete wall, including kitchens, living rooms, dining rooms, etc. but not including bathrooms, foyers, halls or unfinished basements.
[11] 2014 Alaska Housing Assessment, Calista Corporation

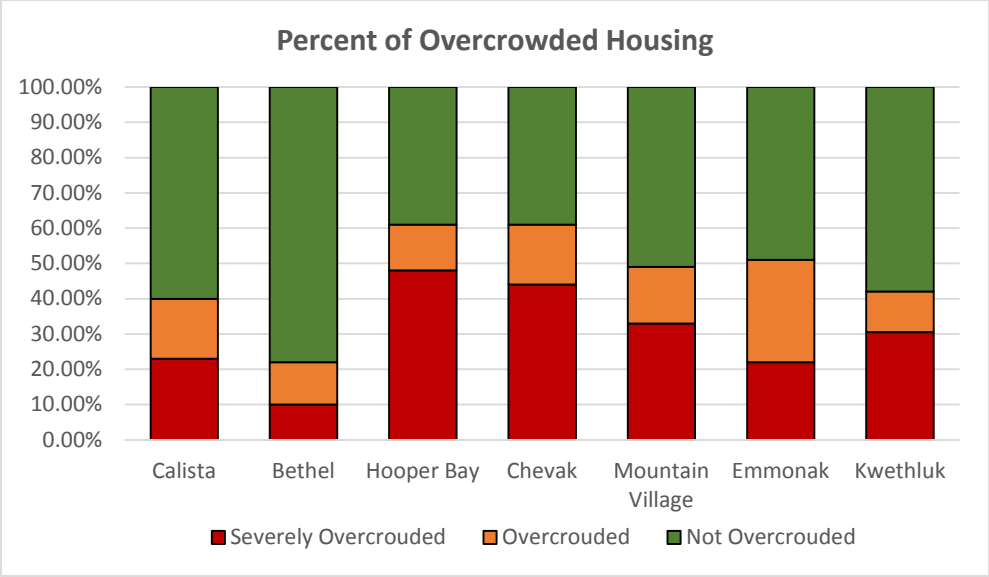


Figure 2: Percent of Overcrowded Housing in the Calista Region and Most Populous Communities
Source: Pre-Feasibility Analysis for Developing and Operating a Truss Plant in Bethel, Alaska, Cold Climate Housing Research Center

The cost of home construction in Alaska is largely dictated by distance from Seattle, where most materials used in Alaska home construction are sourced. Generally speaking, the farther an Alaska community is from Seattle, the more expensive it is to build there. Bethel is not the most expensive rural hub community in Alaska – Barrow boasts that unfortunate distinction – but it is still substantially more expensive than Anchorage, Juneau and even Kodiak. Construction costs in outlying villages in the Calista region are not tracked by the State of Alaska, but would also be higher based on distance from Bethel, from which materials are transported to their final destination.

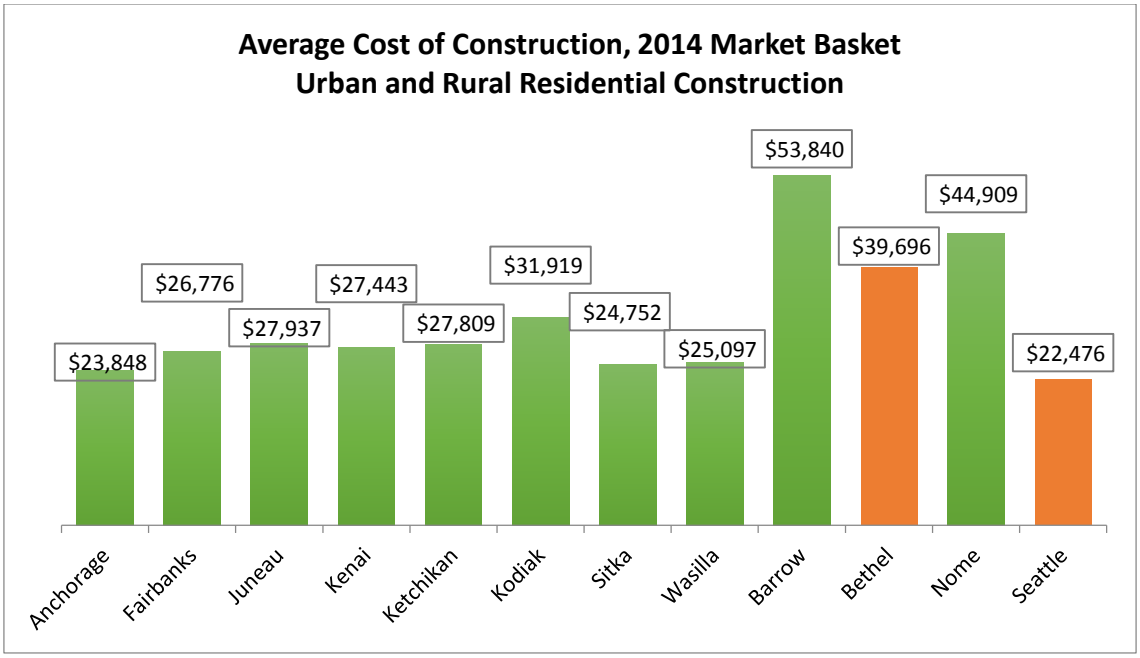


Figure 3: Construction Cost Market Basket, Statewide
Source: Alaska Department of Labor and Workforce Development, Research & Analysis Section, Construction Cost Survey 2014

The Alaska Department of Labor's annual construction cost survey is based on a market basket of materials used in the construction of a model home. Costs for the same components needed to build the model home are gathered in each of the surveyed communities. The state's market basket does not include trusses, but based on work done by CCHRC for AVCP in its "pre-feasibility" study of the truss plant concept, the cost of trusses to regional buyers can be reduced if the trusses are produced in-region.

These are the conditions in the region today. Combined with the State of Alaska's projections for population growth in the Wade Hampton and Bethel census areas over the next 25 years, it appears the overcrowding problem will grow more acute as time goes by. Although the need for more and improved housing in the region is readily demonstrated by the data, it will likely take time and outside funding to address the problem in a systemic fashion because the region has one of the highest unemployment rates and lowest median income levels in the state.[12]

[12] 2014 Alaska Housing Assessment, Calista Corporation

III. Market Opportunity

A. Bethel and Wade Hampton Housing Demand

There are two ways to think about the market opportunity for AVCP's proposed truss plant: the market as it exists today; and the need for new housing in the region.

The market today is served primarily by the AVCP Regional Housing Authority (AVCP RHA), which has built 35 units per year, on average, since 2000 and is the only entity in the region that is consistently building new single-family homes every year. Over the course of the last 15 years, the level of construction (based on funding availability) has fluctuated considerably from year to year, with a high of 40 homes in 2001 and 2002 and a low of 12 single-family homes at the bottom of the recession in 2009. The trend line for housing construction is on the decline. Although it is unlikely to decline to zero, it is difficult to anticipate where the bottom will be. AVCP RHA CEO Ron Hoffman said he expects that in the short term, federal funding will remain stable while state funding is expected to continue to decrease, despite the obvious and well-documented need for hundreds of new, energy-efficient homes throughout the region.

In 2014, AVCP RHA used $9.3 million in funding from the U.S. Department of Housing and Urban Development's Office of Native American Programs and a $2 million grant from the Alaska Housing Finance Corporation to pay for the construction of 22 houses in the region. Funding from other federal programs, such as the U.S. Department of Housing and Urban Development Rural Innovation Fund, which paid for two houses constructed by CCHRC in Atmautluak, may also be available. Other new homes, such as those built in Crooked Creek and Galena following major flooding that damaged dozens of local homes, were paid for with a combination of funds from the Alaska Division of Homeland Security and Emergency Management, the Federal Emergency Management Agency (FEMA), churches, nonprofits and the Donlin Mine, which is located near Crooked Creek. Non-RHA-built housing such as that built by the Lower Kuskokwim School District or the Yukon Kuskokwim Health Corporation is built with funds from those organizations.

However, the amount of housing being built is not indicative of need. AHFC's 2014 Statewide Housing Assessment paints a clear picture of the high level of need in the Bethel and Wade Hampton census areas. The study examined three different metrics to illustrate the percentage of homes in a given geographic area that are in need of replacement: those that are overcrowded, cost burdened and 1 Star energy rated[13] (based on the State of Alaska's Building Energy Efficiency Standards, or BEES).

With these three metrics in mind, it is clear the Calista ANCSA region faces some of the steepest challenges in the state associated with the quality of the region's housing stock. The Calista region has the highest rates of overcrowding in Alaska, and Wade Hampton's 51.2 percent rate of overcrowding is

[13] Overcrowding is defined by the U.S. Department of Housing and Urban Development as homes with more than one person per room; severely overcrowded is more than 1.5 persons per room. The HUD definition of "cost burdened" is any household spending more than 30 percent of annual income on housing expenses, which include heating costs. In the AHFC 2014 Housing Assessment, the authors report that cost-burdened statistics for rural Alaska are likely very low due to the poor energy-cost information used by the U.S. Census Bureau in its American Community Survey, from which the cost data originates. The number of homes with a 1 Star energy rating was drawn from a database maintained by AHFC, which includes energy-rating information on 30 percent of Alaska homes.

the highest for any Alaska census area by far (the next-highest level of overcrowding is found in the Northwest Arctic Census Area, which has a rate of 38.9 percent; the Bethel Census Area sits at 35.6 percent). Combine that with the fact that more than 19 percent of the homes in the Wade Hampton Census Area are 1 Star energy rated (a level categorized as "extreme" by the report, and the fourth-highest level in Alaska), and it's clear that this area in particular is greatly in need of more energy-efficient homes. The Bethel Census Area fares slightly better than neighboring Wade Hampton, but its rates of overcrowding and 1 Star energy-rated homes are still among the highest in Alaska. As the housing assessment states:

"Strictly speaking, a 1 Star rating in AKWarm means that a home uses at least four times as much energy as it would if built to AHFC's 2012 Building Energy Efficiency Standard. While in some cases a low rating is attributable to a very inefficient heating device, generally it is a good indicator that a home is drafty, very poorly insulated, and in need of significant retrofit work." [14]

Although the region's residents do not appear to be particularly cost-burdened in comparison to residents elsewhere in Alaska, the report acknowledges that costs in rural Alaska are likely much higher than is indicated by these percentages because estimates on energy costs in rural Alaska are known to be inaccurate.

Table 4: Housing Need by ANCSA Region and Census Area[15]

	Calista	Bethel	Wade Hampton
Cost Burdened	18.70%	19.30%	17.00%
Overcrowded	40.10%	35.60%	51.20%
1 Star	16.40%	14.20%	19.10%

Level of need
Extreme
High
Moderate

[14] Appendix B, AHFC 2014 Statewide Housing Needs Assessment
[15] Appendix B, AHFC 2014 Statewide Housing Needs Assessment

Table 5: Severity of Housing Need for Yukon-Kuskokwim Delta Communities with Sufficient Energy Data[16]

	Percent of Cost-Burdened Households	Percent of Overcrowded Housing Units	Percent of 1-Star Housing Units
Akiachak	9.80%	57.20%	0.60%
Alakanuk	8.40%	36.10%	11.40%
Aniak	21.90%	19.70%	0.40%
Bethel	23.30%	23.30%	4.60%
Eek	13.80%	20.60%	17.20%
Emmonak	16.70%	52.30%	3.80%
Goodnews Bay	21.50%	40.80%	5.90%
Hooper Bay	18.00%	61.70%	21.10%
Kipnuk	21.00%	41.20%	6.10%
Kwethluk	6.30%	43.40%	24.80%
Lower Kalskag	17.90%	32.40%	3.10%
Marshall	18.00%	36.20%	5.70%
Napakiak	29.30%	37.20%	12.40%
Nightmute	10.90%	66.70%	6.20%
Nunam Iqua	5.40%	60.50%	12.40%
Nunapitchuk	4.40%	48.10%	44.10%
Scammon Bay	11.30%	64.80%	33.00%
Sleetmute	29.70%	4.10%	3.20%
Tununak	12.30%	37.20%	21.60%

[16] Appendix E, AHFC 2014 Statewide Housing Needs Assessment

Table 6: Severity of Housing Need for Yukon-Kuskokwim Delta Communities Without Sufficient Energy Data[17]

	Percent of Cost-Burdened Households	Percent of Overcrowded Housing Units
Akiak	69.40%	18.40%
Atmautluak	7.80%	66.70%
Chefornak	18.80%	69.40%
Chevak	17.80%	61.50%
Chuathbaluk	5.00%	23.10%
Crooked Creek	6.50%	32.40%
Kasigluk	15.20%	56.40%
Kongiganak	15.00%	55.10%
Kotlik	8.50%	39.30%
Kwigillingok	20.80%	50.00%
Lime Village	28.60%	
Mekoryuk	36.20%	8.60%
Mountain Village	14.40%	49.40%
Napaskiak	16.90%	53.80%
Oscarville	23.10%	43.80%
Pilot Station	12.80%	59.30%
Pitkas Point	17.90%	56.40%
Platinum	60.00%	12.50%
Quinhagak	22.10%	44.80%
Red Devil	33.30%	
St. Mary's	35.90%	28.90%
Stony River	12.50%	30.80%
Tuluksak	22.60%	71.40%
Tuntutuliak	16.90%	59.00%

It is impossible to project what future federal budgets will include for the Department of Housing and Urban Development (HUD) for its various Native American housing programs, however the CEO of AVCP RHA said he expects to receive less combined federal and state funding in the immediate future. For the purpose of this report, projections of housing development and home building activity were developed using a hybrid approach that considers both historical trends in funding as reflected in the number of homes built by AVCP RHA over the past 15 years and population growth in the region as projected by State of Alaska demographers.

[17] Appendix E, AHFC 2014 Statewide Housing Needs Assessment

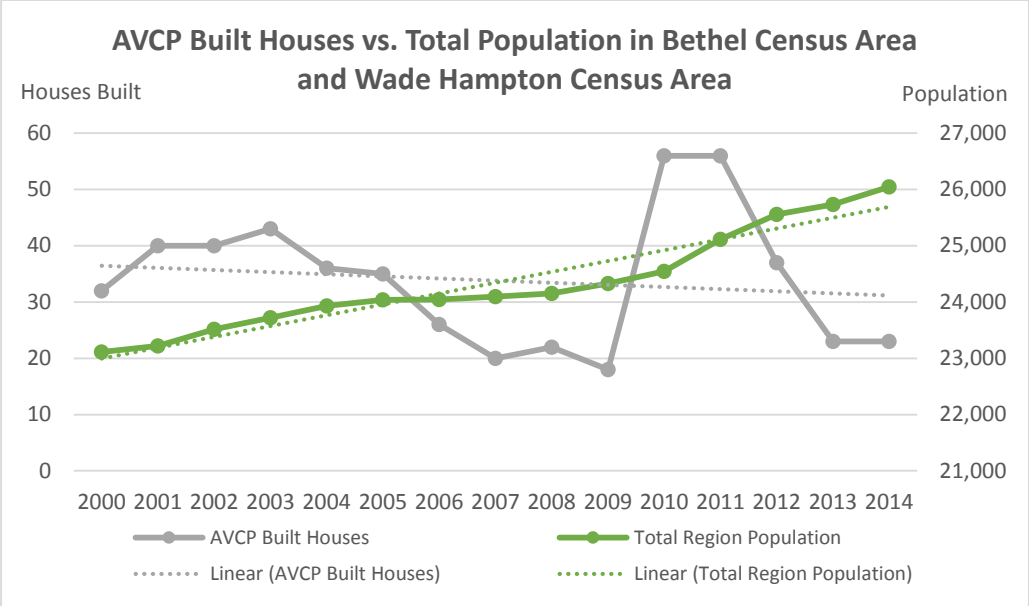


Figure 4: AVCP RHA Housing Units Built and Total Population in the Region, 2000-2014
Source: Information Provided by AVCP Regional Housing Authority.

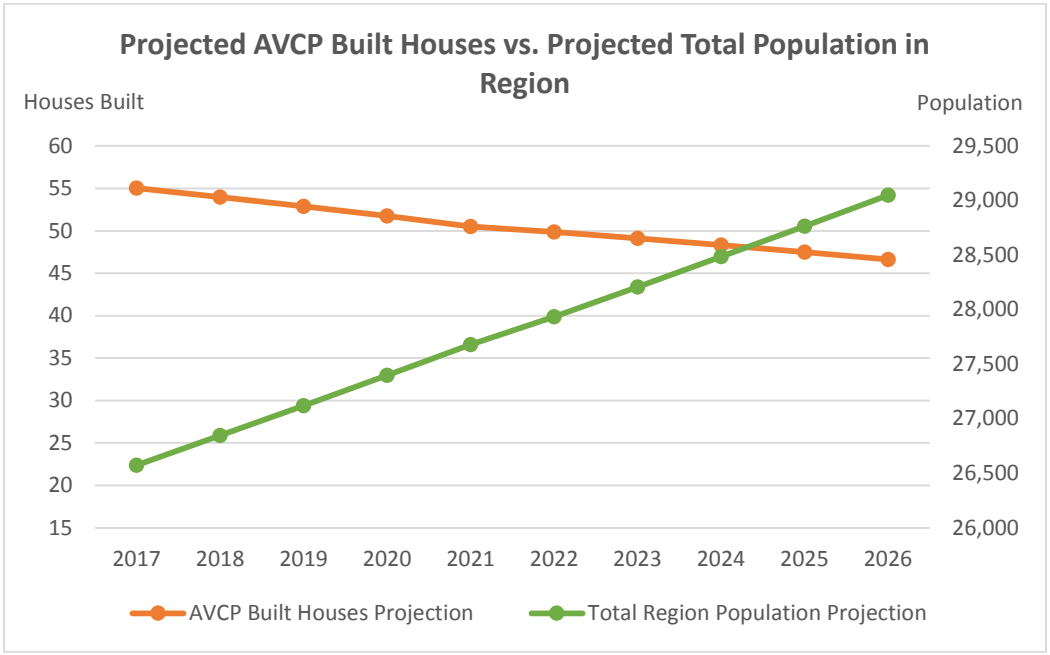


Figure 5: Projected AVCP RHA Houses Built and Projected Regional Population.
Source: Information Provided by AVCP Housing Authority.

In order to develop housing projections for the potential number of houses built in the next 10 years, a multiple regression model was developed with the number of houses built as the dependent variable and the population in the Bethel and Wade Hampton Census Areas as the independent variables. Population projections were drawn from the Alaska Department of Labor and Workforce Development's 2014 publication, "Alaska Population Projections 2012 to 2042." The regression analysis equation shows

the relationship between the number of houses built by AVCP and the two independent variables as follows:

Number of Houses AVCP=-273.50+0.08*Population Bethel-0.14*Population WH

The multiple regression model shows that the Bethel Census Area population is a significant factor for the projection of the number of houses built with p-value equal to 2.8 percent (less than 5 percent is a significant factor). Wade Hampton Census Area population is also a significant factor for the projection of the number of houses built with p-value equal to 3.8 percent. The multiple regression model is 52.4 percent better than a projection based on simple average (R-square equal to 52.4 percent).

B. Case Study: Quinhagak

While the severe overcrowding detailed previously in this report is concerning on its own, it only tells part of the story of the region's housing situation. Perhaps even more troubling than the overcrowding issue in the region is that much of the existing housing stock is unsafe, not energy efficient and not structurally sound.

While there are few thorough studies of the issue, a recent study in the village of Quinhagak helps to outline the full extent of the poor housing stock issue. In 2009, the CCHRC, in partnership with other entities in the region, conducted a thorough assessment of housing stock in Quinhagak, which documented a startling situation. A few of the study's key findings are outlined below.

Study Findings

The CCHRC found that nearly one-third of the housing stock in the community was beyond the point of being salvageable and would require a complete rebuild.[18] While these homes should be condemned, the community's existing housing stock simply could not accommodate the displaced residents if they were. As a result, significant numbers of residents live in homes that are not suitable for habitation.

Mold Exposure

The Quinhagak research found that most homes suffered from extensive mold damage. Mold can cause a number of health problems for residents, including nasal and sinus congestion, eye irritation, respiratory problems, coughing, headaches, skin problems and sneezing.[19] Mold grows as a result of poor moisture control. In Quinhagak, the homes were without the needed airtightness properties to prevent mold growth. The result is extensive mold development throughout the home and its support structure.[20] The damage in many of these homes is so severe that it would require a complete rebuild in order to improve safety.

Subsidence

Another finding from the study was widespread subsidence of homes within the community. Subsidence occurs in the Y-K Delta due to the challenges associated with building homes on permafrost. As heat radiates from the home it warms the ground underneath. This can cause thawing of the foundational

[18] Housing Analysis in Quinhagak, Alaska, CCHRC, http://www.cchrc.org/sites/default/files/docs/CCHRC_Housing_Analysis_Report.pdf
[19] Mold Exposure Risks, http://professionalmoldinspections.com/bethel_alaska/is_mold_dangerous_to_my_health.htm
[20] A Brief Guide to Mold, Moisture, and Your Home, http://www.epa.gov/mold/moldguide.html

soil which in turn can result in the foundation sinking and becoming uneven, a phenomenon known as subsidence. CCHRC's study found that 60 percent of homes inspected suffered from significant subsidence.[21] In particular, subsidence caused problems with home entryways, leaving them unsafely attached to the housing structure and representing an immediate danger of injury or death in the event of entryway falling apart.

Energy Consumption

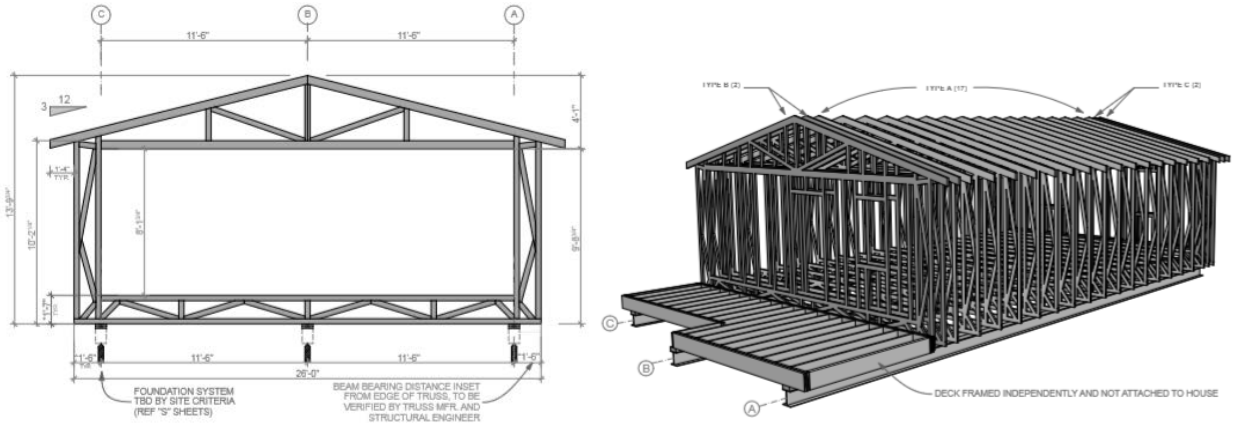
Data available from CCHRC indicates that the typical home in the Y-K Delta uses, on average, approximately 600-800 gallons of heating fuel each year. At a rate of $7 per gallon, this comes at an annual cost of approximately $4,200 to $5,600 per year. It is estimated that a new, integrated truss home would reduce heating demand to less than 200 gallons per year and would confer an annual savings of $2,800 to $4,200. Energy consumption savings could, in effect, help subsidize new home construction. Over the 30-year life of a home, these savings can account for more than $100,000.

[21] Housing Analysis in Quinhagak, Alaska, CCHRC, http://www.cchrc.org/sites/default/files/docs/CCHRC_Housing_Analysis_Report.pdf

IV. Business Description

A. Business Product Concept

AVCP is interested in operating a truss plant to be located in Bethel, Alaska to manufacture a style of trusses known as integrated trusses. This particular type of truss is associated with home designs developed by the Cold Climate Housing Research Center (CCHRC) specifically for use in rural Alaska. Trusses arrive to the project site in a single piece and combine the roof, walls, and floor into one structural framing unit. This type of home is well suited to rural Alaska because it is quick to build, requires limited or no specialized construction skills or equipment, is highly energy efficient and is less expensive to build and to own. Integrated trusses combine roof/ceiling and floor trusses in one unit so that the frame of the house can be quickly "tipped up" in a matter of a day or so.



Source: CCHRC: INTEGRATED TRUSS THREE BEDROOM Plan.

The AVCP plant may use lumber produced locally by companies located in villages along the Kuskokwim River or lumber shipped in by barge from suppliers in Anchorage or Seattle. Metal plates used to join truss sections will need to be sourced from Anchorage or Lower 48 suppliers and shipped in by barge.

Integrated truss homes are not currently the standard in terms of new residential construction in the region. In order to create demand for integrated trusses, AVCP will need to market both its product and the concept of the integrated truss home to the various builders in the region. Working closely with CCHRC to promote the benefits of the integrated truss style to institutional builders in the region will be crucial. CCHRC has already built a few integrated truss homes in the region that can be used as examples of attributes of integrated truss designs:

- In 2011, CCHRC worked in collaboration with a variety of tribal, nonprofit, state and federal organizations to build 10 integrated truss homes in the village of Crooked Creek on the Kuskokwim River following severe flooding that spring;
- In Atmautluak, two integrated truss prototype homes were built in the summer of 2013 and finished in nine weeks using a local, untrained crew through a grant from the U.S. Department of Housing and Urban Development Rural Innovation Fund;
- CCHRC is in the process of developing Aviation Housing using integrated trusses (duplexes) in Bethel in collaboration with AVCP;
- Farther up the Yukon River, CCHRC worked with the Federal Emergency Management Agency,

the State of Alaska, tribal and nonprofit organizations to construct six integrated truss homes in Galena following the flooding that devastated the community in 2013.

Due to the high cost of shipping building materials to Bethel and the surrounding villages via barge from Seattle or Anchorage, significant savings can be realized by manufacturing the integrated trusses in the region. At the same time, jobs will be created in the region and a projected modest profit may be earned by AVCP.

Manufacturing integrated trusses and being a leader in bringing this style of home to the region offers several advantages to AVCP:

- First, the homes have superior energy efficiency compared to traditional construction based on their R-values. (R-value refers to the capacity of insulating material to resist heat flow.) The Alaska Housing Finance Corporation establishes minimum R-values for homes receiving AHFC or State of Alaska funding; the current lower-bound limits are 38 for the ceiling, 21 for above-grade walls and 38 for floors[22]. By comparison, the integrated truss homes built in Atmautluak have R-values of 45 for the ceiling and 54 for the walls and floor. This means heating costs for homeowners will considerably lower than for traditional construction, making the homes more affordable in a region burdened with low employment and high rates of poverty.
- Second, due to the simplicity of design, local laborers without specialized training or equipment can construct the homes fairly quickly. Framing can be accomplished in a single day. Spray-foam insulation also offers advantages over traditional insulation types in communities with limited accessibility. Spray foam comes in liquid form and is shipped in compact drums, while batting or Structural Insulated Panels (SIPs) are voluminous and increase shipping costs.
- Several of the Cold Climate Housing Research Center's integrated truss prototypes feature adjustable, above-grade foundations ideal for homes located in the Yukon-Kuskokwim region, where low ground, permafrost, and wet conditions mean that homes must be elevated to prevent rot, subsidence and other problems. The adjustable post-and-pile foundation style means when the ground shifts due to changes in permafrost or moisture conditions, the homeowner can adjust the home to remain level.
- CCHRC's designs do not rely on access to heavy equipment, which in outlying villages is often nonexistent or very expensive to ship in.
- Materials for the 1,000-square-foot integrated truss homes designed by CCHRC are estimated at approximately $100,000 +/- 10 percent not including foundation, shipping and labor;[23] CCHRC analysts estimate inclusive costs at approximately $320,000 for the same size house. This compares to AVCP RHA's current per-house average of about $350,000[24].

AVCP's current strengths lie in the administration of social and cultural services to the people of the Y-K Delta. Its mission statement reads as follows:

> *"Provides Human Development, Social Services, and other culturally relevant programs for the people, to promote self-determination, protection and enhancement of our culture and traditions through a working partnership with member villages of the Yukon-Kuskokwim Delta."*

[22] AHFC Home Energy Guide for Alaska Homes: A Consumer Guide to Minimum Standards for Energy Efficiency
[23] http://www.cchrc.org/galena-prototype-home
[24] Personal communication, Abraham Palacios, AVCP RHA development director, May 12, 2015

The move into a manufacturing-type business will obviously be an extension of AVCP's capabilities, but it is not inconsistent with the organization's goals. In fact, it indirectly supports a number of initiatives already underway at AVCP. For example, AVCP provides assistance to eligible applicants for heating costs and housing improvement or replacement. The stated program purpose associated with AVCP's Housing Improvement Program is that every resident of the region should "have an opportunity to own a decent home with a suitable living environment." Building trusses that can be used to improve the local housing stock is entirely consistent with this goal. Additionally, local jobs will be created at the truss plant itself, and, if local lumber is used, at the sawmill as well, which is consistent with AVCP's goals in relation to education, employment and training. Therefore, the mission for the truss plant could be something similar to "Supporting AVCP's work to ensure residents have access to suitable, energy efficient and dignified housing while providing jobs and economic activity by reducing the cost of local home construction."

B. Service and Market Description

As discussed previously, the Bethel and Wade Hampton census areas suffer from a well-documented housing shortage and the highest rates of residential overcrowding in Alaska. According to the AHFC's 2014 Alaska Housing Assessment for the Calista ANCSA region, 17 percent of occupied units are overcrowded, and 23 percent are severely overcrowded. (By comparison, the statewide rate of overcrowding for Alaska is 6.1 percent, and the national rate is 3.1 percent.) The housing in the region also tends to be of low quality: 78 percent of the local housing stock was built prior to 1990 and is significantly less airtight and energy efficient than more modern construction. Additionally, 22 percent of the region's housing stock has an energy efficiency rating of only 1 Star. AHFC currently requires all new construction it finances to be at least 5 Star due to the substantially lower costs and energy consumption associated with improved energy efficiency. In short, there is a great need for a considerable amount of new, energy efficient housing in the region. (See tables 4, 5, and 6)

However, the economics of the region make improving its housing stock complex. In the Bethel Census Area, 22 percent of families meet the federal definition of poverty.[25] In the Wade Hampton Census Area, the threshold climbs to 30 percent.[26] Among households with children under 18 years of age, 56 percent of those in the Bethel Census Area received Supplemental Security Income (SSI), cash public assistance income or food stamps/Supplemental Nutrition Assistance Program (SNAP) benefits in the previous 12 months; in the Wade Hampton Census Area, the rate was 72 percent.

Due to high rates of unemployment and poverty in the region as well as high construction costs, new home construction is primarily made possible by public money. There are a number of state and federal programs available for Alaska Native tribal members with demonstrated need. The AVCP RHA is the dominant builder of new, single-family homes in the Bethel and Wade Hampton census areas (outside of the City of Bethel). Other new, single-family homes are built by private individuals with bank financing or by large employers in the region that provide housing to employees like the Yukon Kuskokwim Health Corporation, Lower Kuskokwim School District, and others.

[25] 2009-2013 American Community Survey 5-Year Data, Bethel Census Area
[26] 2009-2013 American Community Survey 5-Year Data, Wade Hampton Census Area

Association of Village Council Presidents Regional Housing Authority

The AVCP RHA was established in 1974, 10 years after AVCP was established. The RHA functions as a completely separate entity from AVCP, despite the implication of a closer relationship suggested by the two organizations' names.

AVCP RHA applies for and receives annual funding from various programs under the umbrella of the U.S. Department of Housing and Urban Development, which it uses to construct the vast majority of new homes in the Bethel and Wade Hampton census areas (not including the City of Bethel). AVCP RHA also provides rental assistance, home heating-cost assistance, conducts maintenance of existing AVCP RHA multi-unit housing facilities and conducts outreach and education. The RHA screens and approves applications from residents of the region based on a variety of criteria depending on the funding source, often in collaboration with local tribal organizations. Since its inception, AVCP RHA has constructed more than 1,500 homes in the region.

Each year, the RHA submits an application packet to the U.S. Department of Housing and Urban Development Office of Native American Programs (HUD/ONAP) detailing the anticipated needs of regional residents in a variety of different housing program areas. Funds are disbursed based on availability and other federal priorities. In 2014, AVCP RHA was responsible for constructing 22 new, single-family homes in the Bethel and Wade Hampton census areas.[27] The volume of new, single-family homes built by AVCP RHA fluctuates considerably year-to-year (Figure 6).

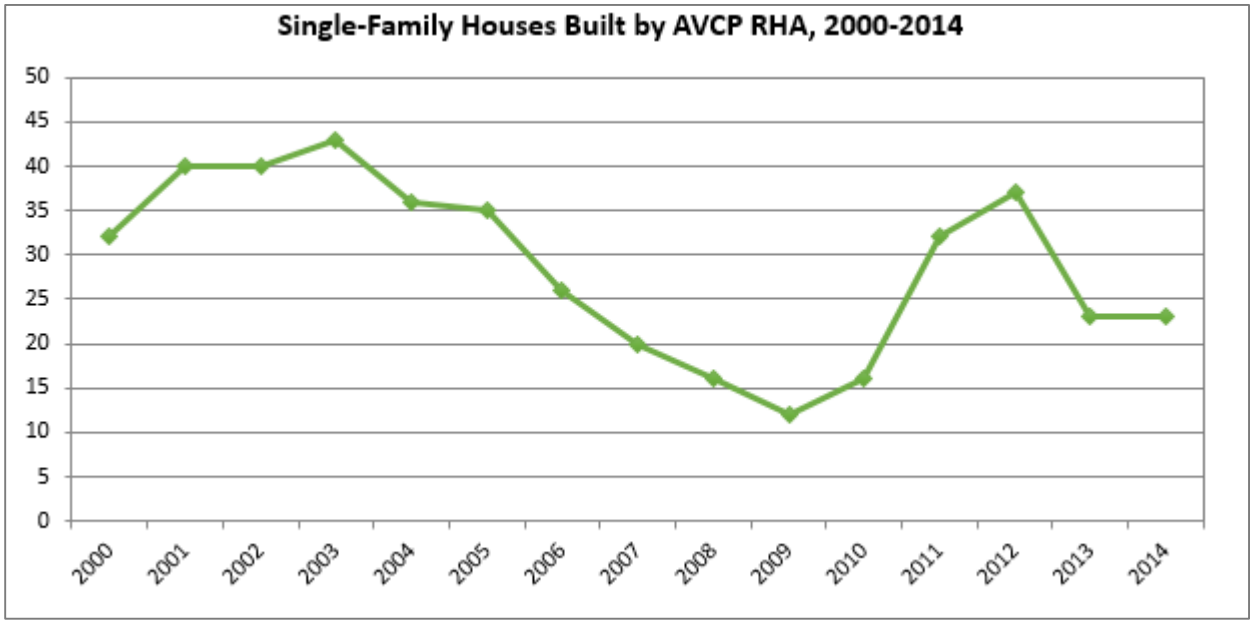


Figure 6: Houses Built by Year, 2000-2014, AVCP RHA .
Source: AVCP Regional Housing Authority.

AVCP RHA purchases materials for each home it builds through a request for proposals (RFP) for a whole-home package. These RFPs are generally released in January and winning bidders are notified by March.[28] The RHA selects a winning bidder to provide all the materials, from framing and insulation to

[27] AVCP RHA FY14 Annual Performance Report to HUD/ONAP, http://www.avcphousing.org/avcp-rha-fy14-apr-available-for-review/

[28] Conversation with Abraham Palacios, Development Director, AVCP RHA, May 12, 2015

finishes like cabinets and appliances. RFPs generally receive a response from two building-supply companies.

Other

A few homes are built in the region by private homeowners with bank financing. These buyers may also benefit from lower-cost integrated trusses being sold in Bethel, but will need to be educated about the attributes of integrated truss homes.

The Yukon Kuskokwim Health Corporation is the region's largest employer and provides housing for many of its employees, who often come from outside the region. The YKHC currently has 144 housing units in Bethel, both apartments and duplexes. Newton Chase, YKHC development director, said the organization plans to add up to 250 new jobs in the coming decade but does not yet have firm plans for how to house these new employees. This organization represents another potential customer for integrated trusses, but it is likely that much of this housing will be multi-family units, so the plant would need to be able to produce more than just single-family integrated trusses.

In the past, individual tribal organizations have built housing in their communities. In 2013, the Atmautluak Traditional Council received funding from the U.S. Department of Housing and Urban Development's Rural Innovation Fund to construct the two integrated truss prototype homes in that community. Although small projects like this are likely in the future, it is hard to project when, how many and where these houses will be built. Outreach to all relevant social service and housing-related organizations in the region will ensure the attributes of the integrated truss approach are widely known.

C. AVCP's Approach

In order to win bids to build new homes in the integrated truss style for the region's institutional builders, AVCP may want to consider forming a partnership with an existing building-supply company to supply the rest of the home components. The two companies would respond to RFPs for home-construction bids together. AVCP would bring the integrated truss concept and lower-cost trusses to the partnership along with a wealth of local knowledge and understanding. Partner companies would supply the rest of the components needed to build a home and the ability to work with suppliers to find the lowest possible prices for those items. In time, AVCP will gain the experience needed to potentially become a supplier of whole-home packages itself.

AVCP's primary competitive advantage in selling integrated trusses is going to be "differentiation,"[29] which refers to the unique nature of the integrated truss product as compared to traditional trusses and traditional construction types. In this case, AVCP will be introducing not only integrated trusses, but the concept of the integrated truss-style home, to the market. (Although a few integrated truss homes have been built in the region, the establishment of AVCP's truss plant would increase the capacity for building this type of home and expose many more residents to its attributes.) AVCP will need to build on the work of CCHRC in educating institutional builders about the benefits of integrated truss construction and convincing them that integrated truss homes are superior to traditional residential construction. AVCP and its building-supply company partner will need to position the two companies as informed by the

[29] Porter, Michael E. (1980). Generic Competitive Strategies. In Porter, Michael E. (2nd ed.), *Competitive Strategy: Techniques for Analyzing Industries and Competitors* (34-46). New York, New York: The Free Press.

latest scientific research and oriented toward bringing best practices in innovative home design to the region for the betterment of its people.

AVCP's secondary advantage will be cost. Once residents and institutional builders have been convinced that integrated truss homes are a superior option, it is reasonable to expect they will shop around to make sure AVCP's price for trusses is competitive. Additional cost factors associated with the integrated truss home include a quicker construction schedule; the lower shipping costs for spray-foam insulation as compared to batting or structural integrated panels (SIPs); the fact that specialized skills and equipment are not required in their assembly; and the lower cost of ownership due to the homes' high level of energy efficiency.

D. Key "Production" Factors

The main production factors associated with the manufacture of trusses will be lumber and labor. While qualified labor is an absolute necessity for the successful manufacture of integrated trusses, it is not expected to be difficult for AVCP to find and hire the carpenter/manager and crew for the truss plant in Bethel. The plant will need one carpenter/manager to oversee truss plant operations and to be responsible for checking trusses as they come off the manufacturing line to ensure they meet standards established by the West Coast Lumber Inspection Bureau. The other four employees do not need specialized training or experience and can be trained for their specific tasks upon hiring. Bethel is home to the Yuut Elitnaurviat Construction Trades training program, which should make it relatively easy to find an employee to serve as the manager who has received training in construction and carpentry.

More challenging is the question of whether to use local lumber or to "import" it from the Lower 48. Each of these options will be examined in detail below. Under current assumptions, these options are essentially equal in strictly financials terms, but using local lumber offers benefits (and risks) that sourcing lumber outside the region does not.

Local Lumber

In order to use local lumber, AVCP may work with Nelson Enterprises LLC, which operates a sawmill in Chuathbaluk. The mill's owner and the Native Village of Napaimute, which runs a logging operation to meet firewood demand in the region, would work as a team to supply the truss plant with milled and planed lumber for use in its trusses. Timber would be harvested from lands owned by The Kuskokwim Corporation, which has expressed willingness to provide lumber for this purpose.[30] The sawmill is not currently operating and would need to hire workers and add some equipment in order to fulfill the truss plant's demand. Due to the length of time it takes to dry wood to the required levels, the mill would need to begin operations a year before the truss plant could accept its products. During this first year, the plant could fulfill its needs by ordering from a supplier outside the region or simply delay the start of operations. The specifics of how the sawmill would operate and recommendations for its working relationship with the truss plant are outlined in considerably greater depth in section X of this report.

Lower 48 Lumber

Potential suppliers for lumber outside the region are numerous, and can be found in Anchorage and the Pacific Northwest (British Columbia, Washington, Oregon and Idaho). Because all lumber sold commercially for residential construction must be grade-stamped to meet the requirements of the

[30] Meeting with Andrea Gusty, The Kuskokwim Corporation, 03/26/2015

International Code Council, lumber should be of equivalent quality regardless of source. Hundreds of potential suppliers exist in the region, so the selection will most likely be based on reliability and credit terms.

E. Location and Physical Facilities

The proposed location for the AVCP truss manufacturing plant is on the banks of the Kuskokwim River and offers easy, convenient barge access. This strategic location would allow for easy loading of trusses and equipment onto a barge, and would reduce overland transport costs and logistics if utilizing barge transport for raw materials sourcing or delivery of finished products.

This will be the primary location for the truss manufacturing plant, and AVCP anticipates it could also serve as a retail shop where prospective customers could purchase home kits and obtain information about the integrated truss in home construction. A fish processing plant previously occupied the proposed site. The plant is a prefabricated steel building and is set on a post-and-pad foundation. The foundation has not been maintained throughout the years, however, and may not be suitable for immediate occupancy. The building measures 150 feet long by 114 feet wide.[31]

The property is currently owned by AVCP and is 83,037 square feet, providing ample space for a manufacturing facility and storage area. It is projected that the manufacturing plant will require a minimum of 2,400 square feet of space, measuring 60 feet by 40 feet. If needed, new construction will come at a cost of approximately $300 per square foot. If a structural engineer determines that the existing fish processing plant can be repurposed as a truss manufacturing plant, this may reduce costs of constructing the new facility.

F. Relationship to Regional Development Strategy

In December 2014, the State of Alaska approved a request by AVCP to create the Yukon-Kuskokwim Economic Development Corporation (YKEDC). The newly formed YKEDC is the state's newest Alaska Regional Development Organization (ARDOR), and as such will be eligible for baseline grant funding from the State of Alaska on an annual basis to support economic development opportunities in the region. The YKEDC will help ensure that regional entrepreneurial efforts are supported and bring relevant businesses and people together to maximize opportunities.

Under the guidance and coordination of YKEDC, there are several economic development initiatives or plans for the region that could benefit from the establishment of AVCP's truss plant in Bethel, which are described here.

AVCP is currently in the planning process for the Y-K Freight and Energy Corridor, a project that envisions an overland link between the Kuskokwim and Yukon rivers for the purposes of economic development and to lower the cost of living for regional residents.[32] The soonest this project could be completed is at least 10 years away. But if the corridor is built, it would open up additional markets along the Yukon River for integrated truss homes. Residents of Yukon River villages face many of the same challenges associated with inadequate housing and high home heating costs as those in the Calista region and could greatly benefit from the availability of this style of home for a reasonable price.

[31] Personal Communication with Marc Stemp, AVCP
[32] http://y-kconnection.com/

AVCP's Comprehensive Economic Development Strategy (CEDS) document,[33] which was completed in June 2014, established a major goal for the region related to affordable housing, specifically reducing the cost of living to attract and retain businesses. The plan details how overreliance on fuel oil for heat and diesel for energy is hampering efforts to make the region more attractive to business and affordable to residents. Through an earlier analysis AVCP determined that a proposed wood briquetting business would not be self-sustaining, but it is conceivable that if the truss plant uses local lumber, it could help support a wood products industry in the Y-K Delta region.

The AVCP CEDS also identifies the need for more and better information about the forestry/timber industry in the region – as it exists now and about its potential. The document suggests that with more information, it may be possible for AVCP to take a direct role in supporting development of this industry. Gaining experience in timber manufacturing through operating a truss plant would help AVCP identify other potential opportunities for use of regional wood products and give AVCP invaluable experience in manufacturing and marketing wood products in the region.

[33] Association of Village Council Presidents, Comprehensive Economic Development Strategy, June 2014

V. Marketing Strategies

A. Relationship Formation

The key buyers of AVCP-produced integrated trusses will be institutional and private homebuilders in the Bethel and Wade Hampton census areas. This includes current homebuilders, such as the AVCP Regional Housing Authority, which is responsible for approximately 84 percent of new housing construction in the region, and new housing developers, should they arise.

AVCP already enjoys a working relationship with AVCP RHA, but a formal introduction to the truss plant's capabilities and the attributes of integrated truss home construction should be scheduled as soon as detailed plans for the truss plant's operations are formalized, including when AVCP expects the truss plant to come online, its capacity and information on local economic impacts like hiring on both the truss plant and sawmill sides of the business. Briefings of this nature should be held with all potential institutional builders, including the Yukon-Kuskokwim Health Corporation, the Lower Kuskokwim School District and others. Ideally, representatives from the Cold Climate Housing Research Center will participate in the briefings as well to answer detailed technical questions about the benefits of integrated truss construction. A site visit to the Atmautluak integrated truss homes with key representatives would allow leaders in regional homebuilding to observe the attributes of the homes firsthand, while hearing from residents about energy-cost savings and their experiences as part of the construction team. These activities will help AVCP develop customers among existing builders.

Developing additional opportunities for new-home construction may require taking a similar approach with local, regional and state lawmakers. If AVCP intends to propose that, for example, Power Cost Equalization (PCE) or Low Income Home Energy Assistance Program (LIHEAP) funds be redirected to offset high energy use through quality home construction, it will need to make its case on a sound scientific basis and with considerable political finesse. Developing allies and advocates from among the region's representatives in the Alaska State Legislature, including Reps. Bob Herron and Neal Foster and Sens. Lyman Hoffman and Donny Olson, is the first step. Again, working in close coordination with CCHRC, which has a strong reputation for its work statewide, is advisable, as is bringing legislators and key decision makers in various state agencies to Atmautluak or Crooked Creek to see the success of the integrated truss homes built there firsthand.

The supplier relationships most relevant to AVCP depend on whether it decides to use local lumber or to purchase lumber from outside the region. If local lumber is used, then working closely with Nelson Enterprises, LLC or a firm with comparable local knowledge will be imperative. Frequent site visits to the sawmill and scheduled quarterly meetings (at a minimum) with sawmill management to review operational successes and challenges are suggested. If local lumber is used, the relationship with Case Nelson will be more significant than a normal buyer-supplier relationship because both entities will be key players in an important regional economic development initiative. Working closely together and communicating often will be critical to early identification of challenges in supply or labor issues so they can be mitigated early.

AVCP could start the process of looking for a supplier of lumber outside the region by arranging meetings in Anchorage with a variety of building-supply companies to discuss the project and compare price quotes. If AVCP intends to form a partnership with a building-supply company for the purpose of

bidding on AVCP RHA or other institutional builders' RFPs, it will want to take a more circumspect approach, ascertaining which companies are currently bidding on these RFPs. More than likely, AVCP's best partnership prospects will be those companies who have bid recently but were not successful.

B. Product Advantages

Integrated trusses are a single structural framing unit that combines the exterior walls, floor joists and roof into one assembly. Integrated truss homes offer several advantages (and a few drawbacks) for homebuilders and homeowners in the Yukon-Kuskokwim Delta region.

Advantages

- Because integrated trusses combine floor joists, wall framing and roof trusses in one assembly, an entire house's framing can be "tipped up" in a matter of a day or two. Shortening the time it takes to construct homes means more homes can be built in a season and the cost of labor per home is reduced. The homes can be framed "by hand," without booms or other heavy equipment that add expense when they must be shipped into remote locations by barge.
- Integrated truss homes are known for their high levels of energy efficiency, with R-values around 45 for the ceiling and 54 for the walls and floor. This equates to a 6 Star energy rating under the Alaska Housing Finance Corporation's AKWarm energy-rating system, which represents an approximate cost reduction in home heating costs of 35 percent over 5 Star Plus homes, the next highest rating level available and the level to which AVCP RHA is currently building its homes. CCHRC's integrated truss home prototypes use spray-foam insulation, which creates a monolithic thermal and air barrier with no thermal bridging. Spray foam is shipped to the building site in liquid form in drums, making the cost of shipping considerably less than voluminous materials like batting, cellulose or Structural Insulated Panels (SIPs).
- CCHRC's integrated truss prototype homes are designed with thick walls that allow for various levels of insulation based on the local climate where the homes are being built. The wall cavity is thick enough to allow ample space for high R-value insulation while also including enough room for the home's wiring and mechanical systems.
- Integrated truss homes are compatible with a variety of foundation types. In some parts of the region, post-and-pile foundations that elevate homes off wet ground and minimize heat transfer from the homes to permafrost are advisable; in other areas, a simple gravel pad is sufficient. In places where homes are elevated, glulam beams are connected with an adjustable bracket that allows the home to be re-leveled by the homeowner when ground conditions shift.
- The standardized shape of integrated trusses means homes can be scaled up or down to create more or less square footage with minimal changes to the overall home design.
- CCHRC estimates an average cost of $320,000 per approximately 1,000-square-foot integrated truss home. This estimate includes foundation, plumbing, labor and administrative overhead. This price compares favorably to AVCP RHA's average of $350,000 for the same square footage. In addition, an important component of the value proposition offered by the AVCP integrated truss home is the homeowner's sense of ownership when following the CCHRC approach to building. Past CCHRC projects have required future homeowners to be part of the construction crew building their home. This gives the owner

an intimate familiarity with all of the home's systems, allowing him or her to quickly identify maintenance issues, make repairs and prolong the useful life of the home. These homeowners can then help build new integrated truss homes in their community as funding becomes available.

Disadvantages

- Shipping costs for integrated trusses from Bethel to outlying villages may be higher than that of mono trusses, which AVCP RHA is currently using. This is because mono trusses, which are shaped like a right-angle triangle, are combined into the whole-house span on site. Unassembled, they are less cumbersome than whole-house integrated trusses. Mono trusses require more lengthy assembly at the project site, however, which adds significantly to the cost of a home.

AVCP's key competitive advantage with integrated trusses is that it will be bringing a new, rigorously tested and superior product to the region. While there are a handful of integrated truss homes in the region, AVCP's truss plant will greatly increase the number of integrated truss homes that could be built in the Y-K Delta. In partnership with CCHRC, AVCP will bring extensive expertise in cold-climate housing construction to the region's builders and make a better quality home available to all builders and future homeowners in the region. To capitalize on this advantage, AVCP will need to engage in a comprehensive education campaign targeting public and private builders, construction companies, tribal entities, legislators and others on the advantages of CCHRC's integrated truss prototypes.

C. Promotion Strategy

To support the outreach efforts outlined in subsection A ("Relationship Formation") of this section, AVCP will want to work with CCHRC develop a comprehensive information packet describing the attributes of integrated truss homes. A heavy emphasis on talking points, photography and other graphics will make this detailed, scientific information easily digestible for both lay and expert audiences. Supporting materials of various lengths and formats should be developed, including a full packet, short and longer PowerPoint presentations, a brochure and fact sheets. All documents should be available in electronic form on AVCP's website.

Due to the nature of the market, it will not be necessary to purchase advertising in traditional channels like TV, radio, print publications or social media. However, outreach to news organizations should be included in the briefings detailed above to help support the legislative outreach strategy and make the public-policy case for changing the way the state works to reduce the high cost of energy in rural Alaska. Initially, this outreach could be limited to the local region, but as plans develop, meetings with reporters, editors and other prominent thought leaders in Alaska are advisable.

VI. Competitive Landscape Analysis

The key competitive advantage for the AVCP truss plant is that it will be offering a different, superior product to institutional builders in the region. The integrated truss home prototypes developed by CCHRC are among the most energy efficient for the dollar and have been designed with the challenges associated with building in rural Alaska in mind. This includes speedy assembly; a low reliance on specialized tools, labor and equipment; lower average cost of home construction; and the social benefits of allowing future homeowners to participate in the construction of their own homes. In essence, AVCP will be bringing a premium product to the region and doing so at a competitive price.

Frequently, firms that pursue a differentiation strategy bear high costs of research and development, but here again, AVCP is well positioned. The development of integrated truss home prototypes has already been completed by CCHRC, which will be a willing partner and advocate in seeing AVCP's truss plant succeed. Once builders in the region have experienced the substantial benefits associated with integrated truss construction, AVCP can take advantage of another benefit associated with a differentiation strategy – brand loyalty. There are several other benefits associated with the differentiation strategy that are not as applicable in the case of governmental buyers, including lower price sensitivity once loyalty has been established and higher margins to insulate the firm from fluctuations in supplier pricing. Because AVCP's main interest is in seeing as many high-quality homes built in the region as possible, it will likely not take advantage of the opportunity to maximize profits as much as a private, for-profit entity would. But earning modest profits that insulate the truss plant from inevitable shortfalls in federal or state funding will help ensure the long-term viability of the business.

There are also disadvantages to this strategy. First, AVCP must convince the market that its product is superior to the status quo. Convincing people and institutions to change is never easy, even when the advantages of doing so are substantial. In the case of the regional housing market in the Bethel and Wade Hampton census areas, a great deal has been invested by the RHA in its current style of building, which even the leadership of CCHRC acknowledges is very good. For example, the construction trades vocational program in Bethel is housed in the same building as the RHA, and its graduates are used as construction crew to build its houses. Switching to a model that doesn't require as much skilled labor may mean there is less use for this program and less work for its graduates. And if builders throughout the region adopt the integrated truss style of construction, other suppliers will soon begin competing with AVCP and its partner on price to win back the business.

This study examines the competitive position of the AVCP truss plant using a model developed by Michael E. Porter, professor at The Institute for Strategy and Competitiveness at Harvard Business School. Porter originally proposed his "five forces" approach to business and industry analysis in 1985, and since then it has been rigorously studied and tested by other academics as well as "boots-on-the-ground" businesspeople. The five forces Porter identifies are the bargaining power of suppliers; threat of new entrants; bargaining power of buyers; threat of substitutes; and industry rivalry. Each will be examined in detail below.

Bargaining Power of Suppliers

The profitability of the truss plant will depend largely on its cost for raw materials – most notably, lumber. This study looks at two scenarios: using local lumber and bringing in lumber from outside the region.

In the case of local lumber, it is not expected that suppliers will have much power or be able to increase prices much. The sawmill would be gaining a substantial new customer in AVCP for which it will need to add employees and infrastructure. It will have little to gain by increasing its prices since it will have made a substantial investment to meet AVCP's needs and will want to keep the truss plant as a customer. AVCP's decision to use local lumber or source it from outside the region will not be a profit-based decision – both options are essentially equal from a profitability standpoint. The choice to use local lumber will be a choice to help bolster the local timber industry and/or support job creation in the region. If at any point the sawmill's prices become too high, AVCP could switch to importing lumber from outside the region and see little impact on its profitability. This fact also weakens the sawmill's position as a distinct business entity.

If AVCP decides to source its lumber from outside the region, the potential suppliers are too numerous to list. Barges from Anchorage and Seattle travel to Bethel each summer season, so any sawmill or lumber-supply company in the region is a possible supplier. For example, there are 222 businesses operating under the North American Industry Classification System code for sawmills in Alaska, Idaho, Oregon and Washington and another 152 in British Columbia. This doesn't include the many retail suppliers of lumber in the region as well. Given the sheer number of suppliers, it is safe to say they will not have much bargaining power with AVCP either. In markets with numerous suppliers, the condition of near-perfect competition is said to exist – in other words, no individual company has any power over the price of its product. The market dictates the price.

Because the lumber needed in truss manufacturing must meet quality standards established and verified by outside ratings agencies, no suppliers have the opportunity to provide lesser-quality products for a lower price. This means that as long as AVCP is purchasing lumber graded by a recognized lumber-grading agency, which it must in order for its trusses to receive the required approval from the West Coast Lumber Inspection Bureau, it can expect the product it receives to be of the same quality regardless of the source. Which firm is the most attractive supplier for AVCP will likely rest on its credit terms and reliability.

Threat of New Entrants

Companies entering a new market – or creating one, as AVCP will be doing by introducing integrated truss construction to the region – need to consider whether the market is so attractive that other companies are likely to flood into the market, increasing supply and driving down potential profits. This is a concern any time a market offers the potential for high returns or has low barriers to entry like up-front costs, specialized skill or knowledge, availability of suitable locations, etc.

The truss plant under consideration by AVCP is unlikely to draw new entrants into this market – at least not in the short term. The profits will be modest under the best circumstances, and AVCP has the advantage of already owning a desirable site for the truss plant along the river in Bethel. As discussed earlier in this analysis, if AVCP is successful in convincing major regional builders to switch to integrated truss construction, it is likely companies outside the region will bid on these jobs. But as long as AVCP

forms a partnership with a successful and competitive building-supply company to bid on whole-home packages, its cost advantage in assembling trusses in the region should give it an edge over suppliers outside the region.

Bargaining Power of Buyers

It cannot be overstated that the bargaining power of buyers is the truss plant's biggest weakness. Under current market conditions, there is really only one buyer of consequence: AVCP RHA. It is by far the largest builder in the region and the only one with a regular, ongoing annual program of new-home construction. This situation represents a huge vulnerability for the truss plant. In order for the truss plant to be successful, AVCP must succeed in at least one of two fairly substantial tasks:

1. Convince AVCP RHA that integrated trusses are a superior style of home construction and get the RHA to change the style of homes it is building in the region; or
2. Convince state or federal officials to introduce new programs to fund the construction of a substantial number of new homes in the region, and to use the integrated truss approach.

AVCP RHA has already met with officials from CCHRC and – at the time at least – seemed favorably disposed to the integrated truss concept.[34] However, the RHA has acquired expertise and educated its funders about the style of home it builds. Changing styles will mean the RHA will need to educate its funders about integrated truss construction and spray-foam insulation, and will need to train its workforce and superintendents on a new building style. Unless substantial cost savings can be demonstrated, it may be difficult to convince them to change. AVCP RHA's current homes are 5 Star Plus energy rated, and the integrated truss home is 6 Star, which represents a 35 percent decrease in the cost of home heating, but the cost of construction may only be marginally lower. According to CCHRC, the integrated truss home would cost approximately $320,000 including pile foundations. By comparison, AVCP RHA identified the average cost of its smaller, 1,008-square-foot home at roughly $350,000; a four-bedroom model at 1,344 square feet costs approximately $579,000 on average.

With a break-even point for the truss plant of 24 homes in year three, relying on the existing local market would make the truss plant extremely vulnerable. Meanwhile, AVCP RHA CEO Ron Hoffman expects federal funding of new home construction to remain stable in the near term, while expecting state funding to decrease amidst budget cuts. It is recommended that in addition to aggressively marketing the benefits of integrated truss construction to regional builders, AVCP work with local legislators and state officials to identify other funding sources for new-home construction. For example, the State of Alaska currently subsidizes the high cost of energy in rural Alaska through the Power Cost Equalization (PCE) program and Low Income Home Energy Assistance Program (LIHEAP). Convincing state leaders to subsidize the front end of energy consumption – energy efficient homes – versus the end result of homes lacking energy efficiency – high energy costs – could result in grant funding to build more energy efficient homes.

Threat of Substitutes

The threat of substitutes is also high for AVCP's integrated truss operation. AVCP RHA's homes are built using mono trusses and Structural Insulated Panels (SIPs). Mono trusses are used in roof construction

[34] Video produced by CCHRC featuring AVCP RHA CEO Ron Hoffman in November 2013: https://www.youtube.com/watch?v=8bUMzPtWoqE

and look like a right-angle triangle; two mono trusses can be combined to create a whole-home roof span. The mono trusses are less expensive to transport to remote building sites than roof or gable trusses because they are combined at the building site and therefore take up a bit less space on the barge.

The perceived level of product differentiation between AVCP RHA's existing style of home construction and that of the integrated truss home may be low. Both are energy efficient and cost roughly the same amount to build. The RHA will likely need to be convinced that the speed of assembly and somewhat reduced costs are significant enough factors to compel the organization to change. Integrated truss homes that have already been built in the region offer a solid foundation on which to build this case. By examining average annual fuel cost between the integrated truss homes in Atmautluak and AVCP RHA-built homes in comparable environmental and geographic circumstances may help make this case.

Intensity of Industry Rivalry

Industry rivalry in the home-construction market in the Bethel and Wade Hampton census areas is basically nonexistent. There is only one major builder in the region, AVCP RHA, and it follows its own program of construction to its own specifications, and has developed its business model over decades with significant success. Because the market is dictated by the availability of federal or other institutional funding and not consumer demand, there is little over which to compete. The mere fact that there is only one builder demonstrates that there's no rivalry in the industry. According to AVCP RHA, few bidders respond to its annual RFP process for home packages, and prices for materials aren't terribly competitive. Although these circumstances may seem ideal to the successful bidder, it is also a precarious position due to the dependence on one customer.

Landscape Analysis Conclusion

In sum, everything rests on AVCP's ability to convince local builders and thought leaders that the integrated truss home is the best choice for the region. Although the truss plant would face little pressure from suppliers or potential new entrants into the market, it would also be incredibly vulnerable to the availability of funds and organizational priorities of the RHA. The position of the truss plant would be much stronger with other builders active in the region.

VII. Truss Plant SWOT Analysis

	Beneficial	Harmful
Internal	**Strengths** 1. High quality product; different than anything currently available in the local market 2. Truss plant and sawmill will bring local jobs and boost efforts to establish a local forestry industry 3. Strong position relative to suppliers 4. Abundant local labor market 5. Highly respected partner in CCHRC, which has already done R&D for integrated truss home prototypes 6. Well documented need for improved housing in the region will make convincing funders and lawmakers easier	**Weaknesses** 1. Existing regional housing market is dominated by a single buyer, AVCP RHA, which is currently utilizing a different style of home construction 2. AVCP will be reliant on partners to supply the remaining components of home packages 3. In early years, AVCP will not have access to significant local lumber at lower rates than found in the Lower 48
External	**Opportunities** 1. Creation of local jobs and investment 2. Ability to utilize a local resource (timber) 3. Meeting an intense housing shortage 4. Reach out to public officials and lawmakers to build support for the integrated truss concept 5. With experience, AVCP could become a supplier of whole-home packages 6. Y-K Freight and Energy Corridor could open up new markets in Yukon River villages 7. YKHC plans to hire 250 new employees in the coming decade, and they will need housing	**Threats** 1. Supply interruptions if sourcing lumber locally 2. AVCP will need to develop a market outside of the RHA in order to thrive

VIII. Financial Analysis – Truss Plant

Comprehensive financial statements for the AVCP truss plant project rely on several key assumptions, which are detailed below.

A. Financial Analysis Assumptions

Revenue

AVCP's truss plant revenue is derived from two primary sources, integrated gable trusses and integrated field trusses. The pre-feasibility analysis completed by CCHRC informed the assumptions in this area. Projections are based on the number of trusses needed to build a typical 1,092-square-foot house. The assumptions utilized in calculating revenue include the following:

- A "standard" house will be 1,092 square feet and will require 19 integrated field trusses and four integrated gable trusses. Integrated gable trusses will be sold at $840 each, while integrated field trusses will be sold at $480 each.[35] The prices are based on pre-feasibility study estimations for the Lower 48 sale price, not taking into account cost of delivery.
- The truss plant's annual revenues are based on capturing sales from three separate markets: AVCP RHA, non-RHA housing construction, and the creation of new housing market demand to satisfy the unmet need for housing in the region.
  - Projections assume that the truss plant will be slowly phased in as the supplier of choice for AVCP RHA: the truss plant will cover 10 percent of the RHA's demand in year one; 23 percent in year two; 50 percent in year three; and 100 percent beginning in year four.
  - Projections also assume that the truss plant will capture 50 percent of the existing non-RHA housing construction demand, which is equivalent to approximately five homes per year.[36]
  - Projections also assume that AVCP will create its own market for housing construction in the region in order to address the chronic overcrowding and low-quality housing in the region. This market is dependent on the ability of AVCP and CCHRC to piece together creative financing techniques to fund home construction. Without these financing methods it is unlikely that the private-sector demand would be significant. This model projects one new home for this segment in year one, eventually leveling out at 20 new homes in year nine. Recommendations for how to develop this market are included in section V of this report.

Utilities and Trash Disposal Expense

Utilities and trash disposal expense was calculated based on the following assumptions:

- Electricity consumption of 1,500 kilowatt hours per month; a year-one work season of 10 weeks (building up to 22 weeks by year 10); and a local electricity rate in Bethel of 56 cents per kilowatt hour.[37]

[35] Bethel Truss Pre-Feasibility, CCHRC, 06/02/2014

[36] Non-RHA constructions were calculated based on CCHRC's pre-feasibility analysis which stated that the RHA currently builds 84 percent of the homes in the region.

[37] Rates derived from Power Cost Equalization Program report, 2013

- Local utilities expenses were estimated based on local water rates of $166 per month and local sewer rates of $47 per month.[38]
- Garbage disposal expense was estimated based off of two trash disposals per month at a rate of $200 per truck.[39]

Service and Repair Expense

Service and repair expense is drawn from the CCHRC pre-feasibility analysis and takes into account damages caused by the work crew becoming familiar with the equipment. This expense is estimated at $13,000 in year one, followed by $12,000 beginning in year two. The costs for cyclic rebuilds are annuitized into the calculation.

Software Expense

Software expense depends on the type of software chosen for the facility. This expense was taken from the CCHRC pre-feasibility analysis and is estimated at $300 in year one. Subsequent years are adjusted for inflation.

Lumber Expense

The primary input cost for the construction of trusses is lumber. In calculating this expense, two different inputs were used: local lumber and Lower 48 lumber. In year one, local lumber was calculated at a rate of $19.80 for a 2"x 6"x 20' piece of lumber, without delivery. When delivery costs were factored in, this price increased to $20.37 per piece. Delivery expense includes fuel consumption, truck rental and delivery-driver wages. In subsequent years, inflation was factored into these inputs.

Lower 48 lumber expenses were calculated by contacting several different lumber retailers for lumber in sizes of 2" x 6" x 20' and 2" x 4" x 20' including delivery charges from Seattle to Bethel. Both types of lumber can be used for construction of integrated trusses, but using 2" x 6" lumber saves from $1,771 in a year one to $14,157 in year ten. A quoted price of $11.95 per piece of 2" x 6" x 20' lumber was received. When delivery is factored in, the final cost is $20.56[40].

Plates Expense

Plates expense was calculated by deriving the total square inches of metal plates necessary for each type of truss and then multiplying by the total annual demand. The analysis uses Home Depot's price of $2.50 for each 100-square-inch plate.[41] Total plate cost in year one is $14,394.

Other Expense

Other expenses are those that are not accounted for in other expense lines. This category includes phone, fax and Internet charges and other incidental expenses. This expense was estimated at $5,000 in year one and adjusted for inflation thereafter.

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[38] "Bethel City Council Raises Water Rates," Ben Matheson, KYUK, 09/10/2014

[39] "City of Bethel, Fees and Charges," http://www.cityofbethel.org/index.asp?Type=B_PRGSRV&SEC={44ED41B8-5C19-4B07-94AB-DD4D026BBDC5}&DE={778CEF66-FB24-4696-9F21-F764896EAEB8}

[40] Based on a quote, provided by Spenard Builders Supply (Anchorage).

[41] Home Depot, Tie Plate, http://www.homedepot.com/p/Simpson-Strong-Tie-1-13-16-in-x-5-in-Tie-Plate-TP15/100375260?keyword=Gusset+plates+teeth#specifications

Packaging Expense

Based on information received from professionals in the sawmill business, there is no need for specific packaging to deliver lumber to the home site. But it was recommended to budget for the fact that trusses will need to be covered when delivered during rainy weather conditions. The number of deliveries varies from two to 12 within the projection period and it is assumed that this expense will not go over $500 per year. Three percent inflation is factored into the model beginning in year two.

Professional Fees/Permits/Certifications Expense

This expense includes a $50 annual business-license fee; $700 in year one for local building permits; and $7,000 for truss plant certification in year one. It is anticipated that the plant would require four inspections in year one, and annual inspections beginning in year two.

Insurance Expense

Insurance expense is calculated by factoring in three different types of insurance necessary for the AVCP truss plant: general liability insurance, property insurance and worker's compensation insurance. An agent in the WoodPro division of Bowermaster and Associates provided the estimates detailed below. Bowermaster is a California-based insurance company with specialization in the wood products industry and licensed to write policies in Alaska. Bowermaster's quote was confirmed by Arizona-based Mohave West Insurance Agency, which has an office in Haines and also specializes in the industry.

General liability insurance was calculated as a variable expense at a rate of $7 for every $1,000 in sales. Bowermaster cited a figure of $4-$6 per $1,000 in sales as a standard, conservative industry rate.[42] In the interest of providing an even more conservative estimate, projections in this analysis are based on slightly more than the quoted rate.

Property insurance rates were based on a total property value of $700,000, resulting in an estimated cost of between $3,500 and $7,500. Final estimates for the total insured property value of the facility is approximately $1,000,000, so this expense was adjusted proportionately. Final calculations incorporated the most conservative rate of this range, $7,500 per $700,000 of insured property. Insured property includes a facility valued at $720,000, equipment valued at $180,000, and inventory and materials with a value of $100,000. It is important to note that property insurance rates are based on specific information about the facility, including its exact square footage, number of smoke detectors and many other details that were not yet available. Rates will certainly vary with more complete information.

Workers compensation insurance was estimated at between $8 and $15 per $100 in payroll. In an effort to generate more conservative estimates than those provided, the consulting team calculated workers compensation rates based on the prevailing base rate in Washington state, which is $4.97 per labor hour for "wood-framed building construction."[43] Rates in Alaska are generally 24 percent higher than in

[42] Corey Kroviak, Bowermaster and Associates Insurance, Personal Communication, March 13, 2015
[43] "2015 Composite Base Rates by Risk Classification," http://www.lni.wa.gov/ClaimsIns/Files/Rates/2015RatesBusTypeClassCode.pdf

Washington, so the estimate was adjusted accordingly.[44] This resulted in an estimated rate of $6.16 per labor hour, or $18 per $100 in payroll.

Tractor Rent Expense

This expense includes the cost of delivering products to their final destination, as well as the cost of delivering lumber to the facility. Vehicle rent is based on a rate of $188 per day and the number of days rented is calculated based on the total number of houses produced, the local lumber purchased, as well as the load-bearing capacity of the rental truck.

Office Equipment and Supplies

This expense was seen as a variable expense that is dependent on sales volume. It was calculated using the prevailing industry average of $4 per $1,000 in revenue.

Payroll Services Expense

Payroll services expense covers the cost of processing payroll and other administrative tasks associated with employing people, and was based on the prevailing market rate. This is a recurring expense for each employee pay period. This rate is calculated using a base rate of $40 plus an additional $45 for each employee on the payroll. With six employees, this factors out to $310. Subsequent years are adjusted to include inflation.

Management Expense

The manager's role will be to promote the product to the necessary partners within the region, including state and federal funding agencies. The manager will also be responsible for sourcing raw materials, hiring and terminating employees, and identifying new market segments for the business. The manager will primarily be functioning in a regulatory and business development role. It is anticipated that the plant will require significant management expertise in year one, with slightly less in years two and three as the plant builds efficiency. Managerial time is then expected to slowly increase beginning in year four due to the truss plant scaling up operations and capturing additional new markets. Management expense is based on a total need of 700 hours for year one. It is expected that the manager would be a half time (20 hours per week) position lasting 35 weeks per year. The manager's expense is prorated based on an annual salary of $70,000.[45]

Carpenter Expense

Carpenter expense was based on a year one requirement of 410 labor hours at $25 per hour.[46] This was based off of CCHRC pre-feasibility data for the rate of production for an experienced crew lead familiar with truss construction. It is anticipated that the carpenter, in addition to manufacturing trusses, will oversee the project team and provide guidance on an as-needed basis. It is also assumed that the carpenter's work season will begin a month before the plant goes into production to open it up and train employees and will extend a month later, to close things down at the end of the season.

[44] "2014 Oregon Workers' Compensation Premium Rate Ranking Summary," Jay Dotter and Mike Manley, October 2014, http://www.cbs.state.or.us/external/dir/wc_cost/files/report_summary.pdf
[45] Annual salary based on CCHRC Pre-Feasibility analysis
[46] Hourly wage based on CCHRC Pre-Feasibility analysis

Crew Expense

Crew expense was based on a year one requirement of 1,640 labor hours at $18 per hour[47]. This was based off of CCHRC pre-feasibility data for the rate of production for crewmembers working in a truss plant. This expense also factors in one month at the beginning of the season for training and plant opening, as well as one month at the end of the season for plant closing.

Benefits and Payroll Tax Expense

Benefits and payroll tax expense is calculated using AVCP's established fringe benefit rates of 40 percent of employee salaries.

Loan Interest Expense

Loan interest expense is based on a prevailing interest rate of 6 percent and is used to cover initial working capital needs as well as AVCP's 50 percent of startup costs (those not covered by a grant). It is anticipated AVCP will need a $450,125 capital loan and a $190,000 operating loan in year one.

Depreciation Expense

Depreciation expense was based on the manufacturing equipment required by the truss plant, as well as the construction of the truss plant facility. Depreciation was discounted by 50 percent based on the assumption that half of the capital costs will be financed by a federal grant. This is due to the fact that organizations are not permitted to depreciate the portion of a piece of equipment financed with a federal grant[48]. Depreciation will vary depending on the exact amount of grant funding AVCP is able to secure.

B. Capital Costs

Total capital costs for the project are estimated to be $900,250 and include the following expenses:

Table 7: Miscellaneous Capital Costs

Office Equipment	Quantity	Unit Price	Subtotal Cost, $	Depreciation per Year, $	Useful Life, Years
Computer	1	1,000	1,000	200	5
Printer	1	500	500	100	5
Telephone/Fax	1	150	150	30	5
Other	-	350	350	-	-
Total			2,000	330	
Freight			600		
Total Cost, Including Freight			2,600		

[47] Hourly wage based on CCHRC Pre-Feasibility analysis which estimated $15/hr. These numbers were adjusted to $18/hr after consulting with AVCP on local laborer wage rates.

[48] http://f2.washington.edu/fm/maa/recharge/equipment

In this plan, it is assumed that a new production facility will be built at a price $300 per square foot and the approximate size of the facility will be 2,400 square feet.

Table 8: Facility Construction Expenses.

Facility Costs	Size, sq. ft.	Price per sq. ft., $	Total, $	Useful Life, Years	Depreciation per Year, $
Facility Construction	2,400	300	720,000	50	14,400

Table 9: Manufacturing Equipment.

Manufacturing Equipment	Quantity	Unit Price, $	Subtotal Cost, $	Depreciation per Year, $	Useful Life, years
Caterpillar RC60, 6,000# Fork Lift	1	13,000	13,000	1,300	10
Lumber racks. 6 bunks per rack	3	7,000	21,000	2,100	10
Lumber/material handling carts	11	250	2,750	275	10
Linear Saw w/ Speed Cut Express	1	18,000	18,000	1,800	10
Metal Jig Tables	12	1,000	12,000	2,400	5
Lasers: straight line and cross	3	400	1,200	240	5
Pallet rack for plates	1	600	600	60	10
Truss building hand tools and equipment	1	3,500	3,500	700	5
Eagle TP600 hydraulic presses	2	9,000	18,000	1,800	10
Small air compressor	1	900	900	180	5
30' finished truss handling wagon	1	2,200	2,200	220	10
Finished truss staging racks	4	1,000	4,000	800	5
Metal material banding equipment	1	500	500	100	5
Floor truss machine	1	25,000	25,000	5,000	
Total			122,650	16,975	
Freight Cost			55,000		
Total Cost, Including Freight			177,650		

Overall the capital cost, including manufacturing facility construction, is equal to $844,650.

IX. Income Statements and Cash Flows, and Financial Summary

A. Income Statements (10 Years)

Table 10: Income Statement Local Lumber

REVENUE	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Gable Integrated, $	39,453	78,299	141,571	246,923	257,621	271,156	284,978	299,189	313,787	319,768
Field Integrated, $	107,087	212,527	384,265	670,219	699,257	735,995	773,513	812,085	851,707	867,942
Gross Revenue	146,540	290,826	525,837	917,142	956,879	1,007,151	1,058,491	1,111,274	1,165,494	1,187,710
Occupancy Expense										
Utilities and Trash Disposal	4,487	4,915	5,657	7,093	7,173	7,286	7,396	7,505	7,613	7,617
Land Lease	-	-	-	-	-	-	-	-	-	-
Service and Repair	13,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000
Software	300	310	320	331	342	353	365	377	389	402
Total Occupancy Expense	17,787	17,225	17,977	19,423	19,515	19,639	19,761	19,882	20,002	20,019
Operating Expense										
Lumber	45,207	89,786	162,463	283,574	296,082	311,872	328,017	344,633	361,719	368,891
Plates	14,394	28,588	51,728	90,289	94,272	99,299	104,440	109,730	115,171	117,454
Other	5,000	5,150	5,305	5,464	5,628	5,796	5,970	6,149	6,334	6,524
Packaging	500	515	530	546	563	580	597	615	633	652
ional Fees/Permit Costs/Certification	7,750	1,800	1,853	1,907	1,962	2,020	2,079	2,140	2,202	2,267
Insurance	24,660	28,589	34,607	44,156	44,991	46,057	47,126	48,206	49,297	49,694
Total Operating Expense	97,511	154,428	256,485	425,935	443,498	465,625	488,228	511,473	535,357	545,482
Administrative Expense										
Office Equipment and Supplies	586	1,163	2,103	3,669	3,828	4,029	4,234	4,445	4,662	4,751
Bookkeeping	-	-	-	-	-	-	-	-	-	-
Payroll	1,589	1,641	1,695	1,751	1,809	1,869	1,931	1,994	2,060	2,128
Total Administrative Expense	2,175	2,805	3,799	5,420	5,637	5,897	6,165	6,439	6,722	6,879
Personnel Expense										
Management	23,558	22,597	21,547	22,926	24,393	25,954	27,614	29,382	31,262	33,262
Carpenter	10,251	12,730	16,612	22,904	23,805	24,878	25,977	27,108	28,272	28,956
Crew	29,522	36,664	47,844	65,963	68,559	71,648	74,813	78,072	81,424	83,393
Benefits+Payroll Taxes	25,332	28,796	34,401	44,717	46,703	48,992	51,362	53,825	56,383	58,244
Total Personnel Expense	88,662	100,788	120,405	156,510	163,459	171,471	179,766	188,386	197,341	203,855
Total Expense before Depreciation	206,135	275,245	398,666	607,288	632,109	662,633	693,920	726,180	759,422	776,235
Depreciation and Amortization										
Facilities & Equip. Loan Interest	38,408	36,382	34,236	31,960	29,548	26,991	24,281	21,408	18,363	15,135
Depreciation	15,853	15,853	15,853	15,853	15,853	15,853	15,853	15,853	15,853	15,853
Total	54,260	52,235	50,088	47,813	45,400	42,844	40,134	37,261	34,216	30,988
Net Income Before Taxes	**(113,855)**	**(36,654)**	**77,083**	**262,042**	**279,369**	**301,675**	**324,438**	**347,834**	**371,857**	**380,487**
Income Tax	**-**	**-**	**17,575**	**106,118**	**114,505**	**125,301**	**136,846**	**147,000**	**157,426**	**161,172**
Income after Taxes	**(113,855)**	**(36,654)**	**59,508**	**155,923**	**164,865**	**176,374**	**187,592**	**200,834**	**214,431**	**219,316**

Table 11: Income Statement Lower 48 Lumber

REVENUE	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Gable Integrated, $	39,453	78,299	141,571	246,923	257,621	271,156	284,978	299,189	313,787	319,768
Field Integrated, $	107,087	212,527	384,265	670,219	699,257	735,995	773,513	812,085	851,707	867,942
Gross Revenue	146,540	290,826	525,837	917,142	956,879	1,007,151	1,058,491	1,111,274	1,165,494	1,187,710
Occupancy Expense										
Utilities and Trash Disposal	4,487	4,915	5,657	7,093	7,173	7,286	7,396	7,505	7,613	7,617
Land Lease	-	-	-	-	-	-	-	-	-	-
Service and Repair	13,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000
Software	300	310	320	331	342	353	365	377	389	402
Total Occupancy Expense	17,787	17,225	17,977	19,423	19,515	19,639	19,761	19,882	20,002	20,019
Operating Expense										
Lumber	45,695	90,755	164,215	286,633	299,277	315,237	331,556	348,351	365,622	372,871
Plates	14,394	28,588	51,728	90,289	94,272	99,299	104,440	109,730	115,171	117,454
Other	5,000	5,150	5,305	5,464	5,628	5,796	5,970	6,149	6,334	6,524
Packaging	500	515	530	546	563	580	597	615	633	652
ional Fees/Permit Costs/Certification	7,750	1,800	1,853	1,907	1,962	2,020	2,079	2,140	2,202	2,267
Insurance	24,660	28,589	34,607	44,156	44,991	46,057	47,126	48,206	49,297	49,694
Total Operating Expense	97,999	155,396	258,238	428,994	446,692	468,989	491,767	515,190	539,259	549,462
Administrative Expense										
Office Equipment and Supplies	586	1,163	2,103	3,669	3,828	4,029	4,234	4,445	4,662	4,751
Bookkeeping	-	-	-	-	-	-	-	-	-	-
Payroll	1,589	1,641	1,695	1,751	1,809	1,869	1,931	1,994	2,060	2,128
Total Administrative Expense	2,175	2,805	3,799	5,420	5,637	5,897	6,165	6,439	6,722	6,879
Personnel Expense										
Management	23,558	22,597	21,547	22,926	24,393	25,954	27,614	29,382	31,262	33,262
Carpenter	10,251	12,730	16,612	22,904	23,805	24,878	25,977	27,108	28,272	28,956
Crew	29,522	36,664	47,844	65,963	68,559	71,648	74,813	78,072	81,424	83,393
Benefits+Payroll Taxes	25,332	28,796	34,401	44,717	46,703	48,992	51,362	53,825	56,383	58,244
Total Personnel Expense	88,662	100,788	120,405	156,510	163,459	171,471	179,766	188,386	197,341	203,855
Total Expense before Depreciation	206,622	276,214	400,418	610,347	635,303	665,997	697,459	729,898	763,324	780,214
Depreciation and Amortization										
Facilities & Equip. Loan Interest	38,408	36,382	34,236	31,960	29,548	26,991	24,281	21,408	18,363	15,135
Depreciation	15,853	15,853	15,853	15,853	15,853	15,853	15,853	15,853	15,853	15,853
Total	54,260	52,235	50,088	47,813	45,400	42,844	40,134	37,261	34,216	30,988
Net Income Before Taxes	**(114,342)**	**(37,622)**	**75,331**	**258,982**	**276,175**	**298,310**	**320,899**	**344,116**	**367,954**	**376,508**
Income Tax	**-**	**-**	**16,839**	**104,637**	**112,959**	**123,672**	**135,310**	**145,386**	**155,732**	**159,444**
Income after Taxes	**(114,342)**	**(37,622)**	**58,492**	**154,345**	**163,216**	**174,638**	**185,589**	**198,730**	**212,222**	**217,063**

B. Cash Flow Statements (10 Years)

Table 12: Cash Flow Local Lumber

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Starting Cash	0	58,244	1,665	39,100	170,675	308,779	455,836	611,400	777,334	953,819
Operations										
Cash Inflow:										
Cash receipts from customers	146,540	290,826	525,837	917,142	956,879	1,007,151	1,058,491	1,111,274	1,165,494	1,187,710
Cash paid for:										
Occupancy Expense	(17,787)	(17,225)	(17,977)	(19,423)	(19,515)	(19,639)	(19,761)	(19,882)	(20,002)	(20,019)
Operating Expense	(97,511)	(154,428)	(256,485)	(425,935)	(443,498)	(465,625)	(488,228)	(511,473)	(535,357)	(545,482)
Administrative Expense	(2,175)	(2,805)	(3,799)	(5,420)	(5,637)	(5,897)	(6,165)	(6,439)	(6,722)	(6,879)
Personnel Expense	(88,662)	(100,788)	(120,405)	(156,510)	(163,459)	(171,471)	(179,766)	(188,386)	(197,341)	(203,855)
Interest	(38,408)	(36,382)	(34,236)	(31,960)	(29,548)	(26,991)	(24,281)	(21,408)	(18,363)	(15,135)
Income Taxes	0	0	(17,575)	(106,118)	(114,505)	(125,301)	(136,846)	(147,000)	(157,426)	(161,172)
Net Cash Flow from Operations	**-98,002**	**-20,801**	**75,361**	**171,776**	**180,717**	**192,227**	**203,444**	**216,686**	**230,283**	**235,168**
Investing Activities										
Cash receipts	-	-	-	-	-	-	-	-	-	-
Cash Paid for:										
Equipment Purchase	(180,250)	-	-	-	-	-	-	-	-	-
Building Facilities	(720,000)									
Net Cash Flow from IA	(900,250)	0	0	0	0	0	0	0	0	0
Financing Activities										
Cash receipts from:										
USDA Grant	450,125	-	-	-	-	-	-	-	-	-
EDA Grant	-	-	-	-	-	-	-	-	-	-
Borrowing (loan)	640,125	-	-	-	-	-	-	-	-	-
Cash paid for:										
Debt Principal Payments	(33,754)	(35,779)	(37,925)	(40,201)	(42,613)	(45,170)	(47,880)	(50,753)	(53,798)	(57,026)
Net Cash Flow from FA	1,056,496	(35,779)	(37,925)	(40,201)	(42,613)	(45,170)	(47,880)	(50,753)	(53,798)	(57,026)
Final Cash position	58,244	1,665	39,100	170,675	308,779	455,836	611,400	777,334	953,819	1,131,961
Net Change in Cash	58,244	-56,580	37,435	131,575	138,104	147,057	155,564	165,934	176,485	178,142

Table 13: Cash Flow Lower 48 Lumber

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Starting Cash	0	57,757	208	36,627	166,623	303,079	448,400	601,961	765,791	940,067
Operations										
Cash Inflow:										
Cash receipts from customers	146,540	290,826	525,837	917,142	956,879	1,007,151	1,058,491	1,111,274	1,165,494	1,187,710
Cash paid for:										
Occupancy Expense	(17,787)	(17,225)	(17,977)	(19,423)	(19,515)	(19,639)	(19,761)	(19,882)	(20,002)	(20,019)
Operating Expense	(97,999)	(155,396)	(258,238)	(428,994)	(446,692)	(468,989)	(491,767)	(515,190)	(539,259)	(549,462)
Administrative Expense	(2,175)	(2,805)	(3,799)	(5,420)	(5,637)	(5,897)	(6,165)	(6,439)	(6,722)	(6,879)
Personnel Expense	(88,662)	(100,788)	(120,405)	(156,510)	(163,459)	(171,471)	(179,766)	(188,386)	(197,341)	(203,855)
Interest	(38,408)	(36,382)	(34,236)	(31,960)	(29,548)	(26,991)	(24,281)	(21,408)	(18,363)	(15,135)
Income Taxes	0	0	(16,839)	(104,637)	(112,959)	(123,672)	(135,310)	(145,386)	(155,732)	(159,444)
Net Cash Flow from Operations	-98,490	-21,770	74,344	170,197	179,069	190,491	201,441	214,582	228,075	232,916
Investing Activities										
Cash receipts	-	-	-	-	-	-	-	-	-	-
Cash Paid for:										
Equipment Purchase	(180,250)	-	-	-	-	-	-	-	-	-
Building Facilities	(720,000)									
Net Cash Flow from IA	(900,250)	0	0	0	0	0	0	0	0	0
Financing Activities										
Cash receipts from:										
USDA Grant	450,125	-	-	-	-	-	-	-	-	-
EDA Grant	-	-	-	-	-	-	-	-	-	-
Borrowing (loan)	640,125	-	-	-	-	-	-	-	-	-
Cash paid for:										
Debt Principal Payments	-33,754	-35,779	-37,925	-40,201	-42,613	-45,170	-47,880	-50,753	-53,798	-57,026
Net Cash Flow from FA	1,056,496	-35,779	-37,925	-40,201	-42,613	-45,170	-47,880	-50,753	-53,798	-57,026
Final Cash position	57,757	208	36,627	166,623	303,079	448,400	601,961	765,791	940,067	1,115,957
Net Change in Cash	57,757	-57,548	36,419	129,996	136,456	145,321	153,561	163,829	174,277	175,890

C. Break Even Point Calculation

Local Lumber		39		Lower 48 Lumber		39
	Year 3	Per Unit			Year 3	Per Unit
Gross Revenue	525,837	13,317		Gross Revenue	$ 525,837	13,317
Variable Cost:				Variable Cost:		
Lumber	$162,463	4,115		Lumber	$ 164,215	4,159
Plates	$51,728	1,310		Plates	$ 51,728	1,310
Carpenter	$16,612	421		Carpenter	$ 16,612	421
Crew	$47,844	1,212		Crew	$ 47,844	1,212
Benefits+Payroll Taxes	$34,401	871		Benefits+Payroll Taxes	$ 34,401	871
Total VC	$313,048	7,928		Total VC	$ 314,801	7,973
Contribution Margin	212,789	5,389.06		Contribution Margin	$ 211,036	5,345
Fixed Cost				Fixed Cost		
Utilities and Trash Disposal	$5,657	-		Utilities and Trash Disposal	$ 5,657	-
Service and Repair	$12,000	-		Service and Repair	$ 12,000	-
Software	$320	-		Software	$ 320	-
Other	$5,305	-		Other	$ 5,305	-
Packaging	$530	-		Packaging	$ 530	-
onal Fees/Permit Costs/Certification	$1,853	-		Professional Fees/Permit Costs/Ce	$ 1,853	-
Office Equipment and Supplies	$2,103	-		Office Equipment and Supplies	$ 2,103	-
Payroll	$1,695	-		Payroll	$ 1,695	-
Depreciation	$15,853			Depreciation	$ 15,853	
Interest	$34,236			Interest	$ 34,236	
Management	$21,547			Management	$ 21,547	
Insuarance	$34,607			Insuarance Fixed	$ 34,607	
Total FC	$135,705	-		Total FC	$ 135,705	-
NI before taxes	77,083	-		NI before taxes	75,331	-
Break even point_local lumber	25	houses		Break even point_Lower 48 Lumber	25	houses

X. Sawmill Business Description

A. Current Status

Sawmill

Should AVCP decide to purchase its lumber locally, a key consideration will be the successful operation of a local sawmill to process raw timber into graded dimensional lumber for use in its truss manufacturing plant. The proposed sawmill under consideration is located in Chuathbaluk, a community of 118 residents located in the Bethel Census Area near the Kuskokwim River. It is owned and operated by Nelson Enterprises, LLC.

The Chuathbaluk sawmill was established in 1959. It operates using a circular automated mill capable of producing between 10,000 and 15,000 board feet of lumber per day. The mill has an auto carriage for easy loading of timber, and could be run by a single individual if need be. The mill also features air dry and air storage capabilities in order to get the lumber down to the moisture content required by grading agencies. The acquisition of a band re-saw would help to reduce energy costs at the mill, as well as increase daily production capacity by approximately 2,500 board feet. The entire system is currently powered by diesel fuel. The mill would be capable of producing both 2"x 4" and 2"x 6" dimensional lumber.[49]

Historically, the sawmill has produced logs for use in log cabin-style homes in the region. The sawmill takes round timber and saws off three sides to create stackable logs that can be pieced together to form a cabin. In recent years, however, these operations have slowed in the region and today the mill largely sits idle. If restarted for lumber production, it is anticipated that the mill will either remain owned by Nelson Enterprises, LLC or will be purchased by the Village of Napaimute.

Timber Harvesting

In 2008, the Village of Napaimute established one of the first sizable businesses in the region to harvest local timber for firewood. Napaimute's experience over the last decade developing its firewood business has helped to increase its core competencies in timber harvesting. Napaimute has the necessary harvesting equipment and manpower to support a timber industry in the region. Napaimute is now interested in expanding its business to provide lumber for integrated truss production in the Y-K Delta[50].

At present, there is a strong demand for firewood in the Y-K Delta. Much of the population lives in villages located on the Lower Kuskokwim and the coast, where trees are scarce. This leaves these communities dependent on firewood harvested from upriver communities. Firewood is useful throughout the region for home heating and steam bathing, which is a common solution to the lack of running water in many of the region's communities. Napaimute believes that the current supply of cut firewood in the region is not meeting demand.

[49] AVCP Meeting Notes, January 2015, Case Nelson
[50] Mark Leary, Village of Napaimute, Personal Communication

B. Proposed Opportunity

Due to the high costs of shipping raw materials to the region, an opportunity exists to use locally sourced lumber in the supply chain for an integrated truss plant located in Bethel. This would have the benefit of reducing shipping costs, creating local jobs and keeping money and other resources in the region.

The present analysis has shown that the delivery cost for sourcing lumber from Anchorage to Bethel is approximately 23 percent to 42 percent of the cost of raw materials, depending on the size of lumber and the vendor chosen. When shipping fully constructed trusses to Bethel, delivery costs can rise even more – to as high as 60 percent of total cost. While Alaska's high shipping costs often negatively impact the feasibility of local production facilities, in this case the high shipping costs to rural Alaska may present the opportunity for the development of an insulated, local lumber market. While it is unlikely that the lumber operation would be cost competitive if exporting outside the region, it may be able to meet the local lumber demand of the Y-K Delta region at an affordable price.

The sawmill would likely operate seasonally during the summer months between May and October. This would allow raw materials to be transported to the mill via the Kuskokwim ice road during the winter, and then processed during the summer. It is anticipated that partially dried lumber would then be transported to Bethel via the ice road in winter. Once in Bethel, the lumber would receive its final processing and drying so that it could be graded. By locating the primary lumber yard in Bethel, it is anticipated that inspection costs would be reduced. Alternately, however, AVCP and the sawmill could also choose to have grading and drying take place in Chuathbaluk. In Bethel, AVCP would then utilize this lumber supply to manufacture integrated trusses. It is anticipated that the timber harvesting operation would occur primarily in during the winter months when travel to the project site is easiest.

C. Necessary Equipment

While the sawmill already has some of the capabilities necessary to successfully support a lumber industry in the region, several additional pieces of equipment will be required in order for the sawmill to supply AVCP's proposed integrated truss plant. The total estimated cost of needed equipment is $59,850. For the purpose of this financial analysis, it is assumed that the sawmill will be able to secure a grant to cover the capital costs of needed equipment. Specific equipment needs and costs (including delivery) are detailed below:

Mid-Sized Front-End Loader ($39,900) – The sawmill will require a mid-sized front-end loader. The loader will serve as a backup when existing equipment fails, needs maintenance or is otherwise unavailable to be used in the sawmill operation. Case Nelson from Nelson Enterprises recommended this equipment. This estimate is for a used model, which costs approximately $30,000, plus nearly $10,000 in shipping costs to Chuathbaluk.

Wood-Fired Boiler ($19,950) – Using a wood-fired boiler for heat and power at the sawmill facility will help to reduce overall operational expenses. Waste material and scraps leftover after sawing logs into dimensional lumber can be used to fuel the boiler, solving an operational concern while lowering costs.

Mid-Range Re-Saw ($35,000-$55,000) – Re-saws provide the ability to efficiently cut large diameter timber into the necessary dimensions for lumber. Re-saws are essentially large band saws that can improve the efficiency of a lumber cutting operation by reducing the amount of time spent using a sawmill to make lumber and increasing daily board foot capacity. During the course of UACED's

research, it was unclear whether a re-saw would be essential for the sawmill operation to be successful. The current mill owner has suggested that this piece of equipment is necessary, while foresters familiar with the Chuathbaluk mill believe that the existing equipment is likely sufficient. As a result of these conflicting findings, UACED has excluded the cost of a re-saw from the pro forma financial statements. If a re-saw is needed for operations, its cost is estimated at between $35,000 and $55,000 including delivery and setup. If at all possible, the sawmill operation should refrain from purchasing a re-saw until production levels are high enough to warrant its purchase.

All quoted prices assume that the equipment will be able to be sourced in good, used condition. Purchasing used equipment will allow the mill to keep costs to a minimum during the initial operations of the facility.

D. Staffing

Even if peak production capacities are reached at the Chauthbaluk sawmill, local lumber production will still be significantly less than that found at sawmills outside Alaska. For instance, the average milling capacity at the largest Oregon sawmills is as high as 110,000,000 board feet, approximately 320 times more than the anticipated peak production of the Chauthbaluk sawmill.[51] As a result, the Chauthbaluk sawmill will not require the same level of staffing as is required by larger mills.

Even at peak production levels forecast in this study, the Chauthbaluk sawmill will likely only require one full time mill operator to be employed by the facility. The mill may, however, require the assistance of additional employees to handle the loading and offloading of raw materials and finished goods. AVCP and the local mill operator will also need to determine whether they wish to dry the lumber in Chauthbaluk or in Bethel. It is likely that managing the lumberyard and stacking lumber will require additional staffing. The sawmill itself will only require one direct position, however, the sawmill operator. Despite it being possible to operate the mill with a single employee, UACED has assumed that two employees will be utilized for sawmill operations. This will allow for a replacement employee in the event that the primary employee is unable to work at the mill. Furthermore, this additional employee will help to improve production of the mill.

It is also anticipated that the sawmill will require some level of managerial expertise. The sawmill manager will primarily be responsible for regulatory concerns and identification of new markets for lumber. The sawmill manager will also be responsible for building relationships with necessary partners for the success of the milling operation.

Sawmill Operator

Sawmill operators are responsible for operating, monitoring, and controlling the equipment of the sawmill. They are responsible for sawing logs into rough lumber, as well as trimming and planing the rough lumber into final dimension cuts of various sizes. Sawmill operators are responsible for operating

[51] Oregon Softwood Lumber Industry 1995-2012: Fewer Mills and Jobs, but Larger Timber Processing Capacity http://static1.1.sqspcdn.com/static/f/797309/22062915/1362107440963/LOP19ORSoftwoodLumberMillingCapacity.pdf?token=gA8onSbQJSVKUuXFZeag93bpTEA%3D

front-end loaders to feed logs into the mill, examine logs and cut lumber to determine size, condition and quality, and monitor the logs as they go through the mill[52].

Sawmill operators are semi-skilled positions. Although they do not require formal college training, training in wood processing technology is useful. It is also recommended that sawmill operators have a minimum of several weeks of on-the-job training.

According to the U.S. Bureau of Labor Statistics, wages within the wood products manufacturing industry average $18.45 per hour nationally as of April 2015.[53] Adjusting for the higher wages offered in Alaska due to the state's higher cost of living, a wage of $22.00 an hour for the Chauthbaluk sawmill operator is recommended. Other jobs involved with the lumber yard aspect of the business would pay considerably less, closer to $18 an hour, which would be comparable to other unskilled manual labor positions in the region.

E. Key Risks

The operation of a successful timber harvesting and sawmill operation in rural Alaska is a challenging endeavor that carries a number of risks. It will be important for the sawmill owners to address as many of these risks as possible in order to ensure successful long-term operations moving forward.

Power of Buyers

One of the most prevalent risks associated with the establishment of a lumber operation in the Y-K Delta is the small number of potential customers for the product. Most home construction in the region is paid for with state or federal funds. These buyers are typically required to follow International Construction Code standards for lumber quality, which means local lumber must be formally graded to be sold for this purpose. Procurement rules often dictate the price that can be paid. Local lumber will only be competitive if it offers a price advantage over other lumber sources. Given the vast economies of scale found at mills in the Lower 48, even with the high cost of shipping to rural Alaska it will be difficult (although not impossible) to compete with these operations on a price basis. In order to supply local buyers, the sawmill operation will need to operate on extremely small margins and economies of scale, which will be difficult.

It is important to note that the local sawmill will have a major partner, AVCP's integrated truss plant. This is likely the only major customer for the mill's lumber, however, which brings with it a number of challenges. One such challenge is that the truss plant will have significant buying power over the mill. The truss plant customer could demand lower prices and the sawmill would have relatively little ability to resist due to its reliance on the truss plant as a customer.

While these scenarios are unlikely due to the collaborative nature of the project, they must be addressed in order for all parties to be aware of potential pitfalls. One method of protection that the sawmill could use is to operate the mill using forward contracts in which the lumber supply is purchased one year in advance. This will ensure that the truss plant purchases the mill's product prior to

[52] Sawmill Machine Operators (Job Description) – Emploi Quebec -- http://imt.emploiquebec.gouv.qc.ca/mtg/inter/noncache/contenu/asp/mtg122_descrprofession_01.asp?cregn=QC&lang=ANGL&prov=FPT&pro=9431&Porte=1&PT1=36&PT2=17&PT3=9

[53] Data was unavailable for the State of Alaska due to too few jobs within wood products manufacturing in Alaska. As a result, an adjusted national average was used in this calculation.

production. This arrangement will benefit the truss plant and the sawmill since prices can be agreed to in advance, creating price stability for forecasting. It also reduces the possibility of the sawmill producing high volumes of lumber without a buyer in place. This type of an arrangement also makes sense given that the sawmill will need to carry significant inventory because lumber requires nearly a year to dry to the required moisture content.

Logistical Risks

The local sawmill operation will also be subject to a number of logistical risks stemming from area transportation challenges. One of the major logistical risks is the reliance on the ice road for delivery of final products and raw materials. In an unseasonably warm year, the river may not permit the ability to transport supplies quickly enough to their final destination. This may require transporting materials by barge occasionally, which would drive up costs.

Low Lumber Yield

Another challenge for the sawmill will be the ability to create graded framing lumber that meets the quality requirements set forth by the American Lumber Standards Committee to qualify as grade 2 lumber or higher, which is required for Machine Stress Rated (MSR) lumber. Our analysis uses an estimate that approximately 80 percent of cut lumber from the region will yield lumber of grade 2 or higher. This estimate is based on the opinion of a timber expert familiar with Interior Alaska spruce, who felt that an 80 percent yield rate would be comparable to what is found in the Interior.[54] The specific yield rate will not be fully known until further information is gathered, however. It would be wise to perform a thorough timber analysis or trial run to determine a more accurate yield rate for lumber in the region. If the yield rate winds up being lower than expected, the sawmill would be faced with increased costs and a smaller supply of higher value lumber, which would impact the sawmill's financial viability.

F. External Lumber Markets

A key consideration for the sawmill operation in Chuathbaluk will be identifying market opportunities for the dimensional lumber produced that does not reach the grading requirements necessary to serve as structural lumber (grade 2 or better). For the purposes of this analysis, UACED has calculated grade 3 and lower lumber sales at a rate of $13.00 per piece of 2" x 6" x 20', approximately 65 percent of the price charged for grade 2 and better lumber from within the region. This assumption was made to serve as a conservative estimate for the revenue potential of the sawmill since similar wood species sell grade 3 lumber at closer to 70 percent of the price of grade 2 and better lumber. The current scope of the feasibility analysis and business plan focused solely on selling the lumber to AVCP for use in integrated trusses; opportunities beyond this level of demand certainly exist, but are outside the scope of this analysis.

These assumptions are based on the current structure of the residential construction market in which whole-home packages are purchased from suppliers outside the Y-K Delta and shipped to the region for home construction. The accompanying financial models assume that most non-truss lumber used in home construction will be sourced from these companies. If the sawmill is able to work with AVCP to develop cold climate building packages, there may be an opportunity to use local lumber for siding or

[54] Personal Communication, Allen Brackley, USFS, 06/01/2015

other construction applications that do not require grade 2 or better lumber, which could open up additional sales.

Other Market Segments

In addition to the potential uses outlined above for non-grade 2 or better lumber, there are several other smaller local markets available as well. Lumber for temporary shelters, fish camps, dog houses or sheds could be sold to individual customers, although these applications are not likely to result in a significant level of demand. It is anticipated that these "other" markets will serve as a small, supplemental source of demand for the lumber produced.

One possible customer that has been identified is the "winter trail-marking project." The trail-marking project utilizes shelters that measure 10'x12'. These trail marking shelters could then also be repurposed to serve as summer fish-camp shelters. While this is likely not a large source of demand, it represents an additional possible source of income to the sawmill's lumber operation.[55]

G. Location and Logistics

The sawmill is located in the community of Chuathbaluk, Alaska. Chauthbaluk is situated on the banks of the Kuskokwim River approximately 100 miles upriver from the regional hub community, Bethel. Chauthbaluk began as a summer fish camp in the mid-1800s, and has seen several name changes throughout the years. The name of "Chuathbaluk" was derived from a Yup'ik word meaning "the hills where the big blueberries grow."

The 2010 population for the community was 118 people. The community is predominantly of Native descent, with 91.6 percent of the community identifying as Alaska Native. Nearly 17 percent of the community's residents live under the poverty level, while the community has a median household income of $34,286.

Logistics

It is anticipated that the Chuathbaluk sawmill will need to take advantage of the seasonal nuances of Southwest Alaska. Specifically, access to Chuathbaluk is dependent on the ice road on the frozen Kuskokwim River during winter months. This ice road will serve as an efficient thoroughfare on which raw timber logs can be delivered to the sawmill. The ice road will also provide delivery to Bethel of finished goods that can be used in the construction of integrated trusses. Given this reality, Chuathbaluk will be dependent upon the regular freezing of the Kuskokwim River to provide access throughout the transport season. Poor ice conditions may impact the sawmill's ability to deliver lumber at anticipated prices. In the event that ice conditions are unsuitable for transportation of materials, a barge will be needed for shipping the products to their destination, drastically increasing shipping costs.

[55] AVCP Meeting Notes, January 2015

XI. Implementation Strategy

One of the most important considerations for a local lumber production facility is the development of an effective implementation strategy. It is worth noting that a number of foresters expressed skepticism over the viability of a local lumber operation within the Bethel region. These concerns primarily focused on the following issues: lack of scale economies; need for lumber grading and certification; low yield potential (inability of local lumber to meet grading requirements); and challenges associated with selling or disposing of waste wood material. These are very real concerns that affect the viability of a successful sawmill in the region. A proper implementation strategy will address these concerns while simultaneously setting the business up for long-term success.

One possible way to remedy these concerns would be to adopt a multi-phased approach to local lumber production. This strategy would allow the sawmill to increase its core competencies and establish whether it is able to meet the necessary grading requirements for Machine Stress Rated lumber. This approach would likely result in early operational losses, but would greatly minimize the overall downside risk for the sawmill operation. A phased-in approach would involve the following stages:

Initial Stage – Trial Period

During the "trial period" stage, the Chuathbaluk sawmill would focus on producing small batches of local lumber. The mill would focus on low production runs, building expertise in lumber production and establishing whether it is possible to produce lumber at a high enough yield rate to meet grading requirements for trusses. This phase would also reduce working capital constraints on the sawmill operator. Since lumber must be produced one year in advance of when it is actually sold in the region (due to the amount of time it takes to dry lumber to the required moisture-content levels under the climatic conditions in Southwest Alaska), a lumber production facility would essentially need the working capital to handle significant levels of inventory as it reaches the point to which it can be sold to the consumer. It is anticipated that this phase will require 2-3 years. The first year would be the initial cutting and drying, while years two and three would allow the mill to see whether or not the lumber meets necessary requirements. If costs are an especially pressing concern, it is possible that the sawmill could begin this stage without purchasing a wood-fired boiler and front-end loader. Once the sawmill then determines that lumber production meets the criteria necessary to be profitable, these investments could be made.

Mass Production Stage

If the local sawmill demonstrates that it can produce lumber at a high enough yield rate to be successful, the mill can then begin to focus on the mass production of local lumber. At this stage, the mill would begin to invest in the equipment needed for higher levels of production, and could perhaps approach a funding entity about a working capital loan to drastically increase production capacity to meet the needs of AVCP. It is anticipated that annual production at this stage could approach 320,000 board feet or more. The sawmill may then also increase production to meet other sources of local lumber demand in the Y-K Delta.

This multi-phase approach allows the Chauthbaluk mill to test its ability to meet the requirements of the truss plant without making significant capital investment in equipment or inventory. It will also allow the local mill to slowly identify other local markets that can serve as customers for its product offering.

XII. Timber Analysis

A core component of a thorough analysis of the feasibility of a timber products supply chain supporting the production of integrated trusses in the Y-K Delta is an assessment of local timber resources in the region. Unlike forests in the Lower 48, Y-K Delta forests possess a lower density of timber available for harvesting. Furthermore, the harvestable local timber is also older in age, which can negatively impact its ability to be milled into dimensional, graded lumber of grade 2 or higher.

The analysis of the local timber supply for use in the production of local, graded lumber centers around three key questions that affect overall project feasibility:

1. Are there enough timber resources to supply the volume of lumber the truss plant requires?
2. Would the resource owner (The Kuskokwim Corporation) be interested and willing to offer harvest rights to this resource?
3. Could the timber be harvested and converted to dimensional lumber at a price that is comparable to that found in the lower 48?

A. Timber Supply – Is it Adequate?

In short, yes. There are enough timber resources on the Kuskokwim to supply the needs of the truss plant for the foreseeable future. The truss plant in Bethel will use around 270,000 board feet of grade 2 or better lumber annually. Because only approximately 80 percent of what is harvested will meet quality standards to earn a grade 2 or better rating, it is also anticipated that the sawmill will produce at least 67,000 board feet of grade 3 and lower lumber each year. In his 1979 survey of the timber resources in Kuskokwim drainage, Karl Hegg estimated the annual allowable cut (the amount of timber that can be harvested sustainably) for the drainage was 16.3 million board feet.[56]

While the Hegg survey indicates that there is more than enough timber on the Kuskokwim, it also points out that the river has two distinct harvest regions, the upper and lower river. The Upper Kuskokwim is the area east of the Kuskokwim Mountains including areas near McGrath and Stony River, as well as the Holitna River drainage. This area holds the majority of the timber resources, but is more difficult to access from Bethel. Although this area holds more, better quality timber than the Lower Kuskokwim, challenges associated with accessing the area and delivering timber from there to Chauthbaluk impact the feasibility of its use.

This study has specifically looked at the more realistic option of supplying lumber cut on the Lower Kuskokwim River near Naipaimute and Aniak. This area lies west or downriver from the Kuskokwim Mountains, is more accessible from Bethel, and residents already have experience with small logging and milling operations. However, this area has significantly fewer timber resources than the upper river. Despite this, concentrated pockets of timber exist that may yield timber volumes large enough to support the needs of the truss plant. For instance, although the bulk of the timber resources in the region are found in the upper river, the board foot volumes per acre for those areas that are commercially viable in the lower Kuskokwim are 6,700 net board feet per acre. Since the most recent assessment was conducted in 1979, however, it is possible that these yield rates per acre are now

[56] Karl Hegg, Timber Resources of the Upper Kuskokwim Flood Plain, December 1979

higher. It is recommended to perform a thorough assessment of timber in the proposed region to determine specific harvest yields for the harvest site.

Hegg estimated that commercial stands of timber on the Lower Kuskokwim would yield around 6,700 net board feet of white spruce per acre.[57] Not all of this lumber will be grade 2 or higher, however. If 80 percent of the white spruce lumber from the Lower Kuskokwim will be grade one or two, then each acre will yield roughly 5,600 board feet of grade 2 or better lumber. At that yield rate, 50 acres of timber would have to be harvested annually to meet the requirements of the truss plant at peak operations in year 10. Hegg estimated that there were 17,700 acres of commercially harvestable forest and 28,400 acres of "operable" non-commercial forests on the Lower Kuskokwim in 1979.[58] Operable, non-commercial land includes stands of trees that are mature, and could be harvested but do not meet the annual growth necessary to be sustainable. Hegg pointed out in his study that harvesting operable non commercial stands might be desirable given that white spruce is a climax commercial species in the Kuskokwim drainage and if they are not harvested they tend to cool the soil and then give way to black spruce. In their 1988 report on the prospects for the forest industry in Interior Alaska, George Sampson and Willem van Hees indicated that by scarifying areas where timber has been harvested, land owners might be able to create more valuable, contiguous stands of white spruce.[59] So, harvesting mature white spruce stands, even if the stands are not sustainable, might be the best option from a forest management standpoint. Regardless of whether operable non-commercial stands are harvested, Hegg's 1979 estimates indicate that there is clearly enough timber on the Lower Kuskokwim to support the truss plant's needs for the foreseeable future. It is worth noting, however, that a significant assessment of Kuskokwim timber has not been completed in several decades. If possible, it is recommended to have a local timber assessment completed before investing significantly in sawmill operations.

While harvesting white spruce may be a good management strategy, there are risks that white spruce will not regenerate well. Both Hegg's survey and a more recent study of the effects of climate change on white spruce regeneration conducted by Stephen Wilson in 2008 indicate that white spruce on the Lower Kuskokwim may not regenerate as quickly as on the Upper Kuskokwim and other parts of the Interior. Hegg found very few seedlings and young trees. Wilson estimated that climate change would negatively affect the rainfall and temperatures on the Lower Kuskokwim, making it harder for white spruce to reproduce.

B. Would the Resource Owner Grant Harvesting Rights?

Questions of regeneration and forest management are important to the owners of the forest resources. By far the largest owner of these resources in the region is The Kuskokwim Corporation (TKC), which was formed in 1977 by merging 10 village corporations in the Y-K Delta: Lower Kalskag, Upper Kalskag, Aniak, Chuathbaluk, Napaimute, Crooked Creek, Georgetown, Red Devil, Sleetmute and Stony River. TKC owns the surface rights to 950,000 acres including all of the land along the Kuskokwim from 20 miles below Lower Kalskag to 20 miles above Stony River.[60]

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[57] Hegg p. 8

[58] Hegg, p. 4

[59] Sampson p. 21

[60] http://www.kuskokwim.com/content/land-use accessed April 7, 2015

During discussions with The Kuskokwim Corporation, they expressed a willingness to negotiate an agreement with a local harvester to allow them to access TKC timber for use in the Bethel integrated truss plant[61]. It is anticipated that harvesting rights to the land would be charged at a rate comparable to the current rate of approximately $20 per cord. In terms of lumber board feet, a comparable fee would be approximately $40 per 1,000 board feet. This would have an overall negligible impact on the feasibility of supplying local timber and lumber to the truss plant. It is worth noting that TKC has an existing agreement in place with the Village of Napaimute to harvest local timber for the sale of firewood.

C. Is Local Lumber Price Competitive?

Sampson and van Hess evaluated the competitiveness of Alaska-produced lumber in their 1988 study Potential for Forest Products in Interior Alaska. They noted that Alaska lumber faced stiff competition from Canada and the Pacific Northwest. At the time of their study, Canadian lumber was flooding the U.S. market due to the low exchange rate. In addition, both Canadian and Northwest lumber had other advantages over locally produced lumber. First, timber resources are more concentrated and easier to access in Canada and the Pacific Northwest. Additionally, sawmills in these areas have achieved large economies of scale that allow them to spread the cost of planing, grading and kiln drying their lumber over much larger volumes. Lastly, these regions also have weather that is more conducive to air drying as opposed to kiln drying, which further decreases costs of production. By 1982, sawmills in Oregon able to process 120,000 board feet in a shift had taken 89 percent of the market.[62] Sampson and van Hess pointed out that:

> "Some of Interior Alaska's small mills have planers; most do not have dry kilns. Mills with low production cannot economically have kiln drying and lumber grading capabilities. Both fixed costs and operating costs decrease per unit of volume from the smallest kilns to the largest kilns (Rosen 1980, Shottafer and Shuler 1974). Each mill that is a member of an existing lumber-grading agency must pay a periodic cost of certifying their grader(s) as well as an assessment based on volume graded.[63]"

They went on to observe that "only two cost components potentially provide Interior Alaska producers an advantage over the Lower 48 and Canadian producers: stumpage costs and lumber transport costs.[64]" (Stumpage refers to the charge assessed by a private landowner in exchange for lumber harvested on its land.)

These challenges significantly impact the ability of local mills to compete on price with outside suppliers. Successful price competition locally will require the ability to identify local markets for non-grade 2 lumber. Selling this lower-quality lumber will contribute to the mill's profitability, decreasing the per-unit fixed costs that must be absorbed by the lumber used in the production of integrated trusses.

[61] Meeting with Andrea Gusty, The Kuskokwim Corporation, 03/26/2015

[62] Sampson p. 13

[63] Sampson p. 13

[64] Sampson p.14

XIII. Sawmill SWOT Analysis

Based on a situational analysis, the Chuathbaluk sawmill's internal strengths and weaknesses as well as external opportunities and threats are identified and listed below. The graphic below synthesizes the full analysis into a simplified format; however, it is important to remember that items in the different categories do not necessarily bear the same weight. The basic idea of a SWOT analysis is that the business or enterprise needs to capitalize on its strengths while minimizing its weaknesses and take advantage of identified opportunities while countering threats.

	Beneficial	Harmful
Internal	**Strengths** 1. Knowledge and experience with Y-K Delta timber harvesting and sawmill operations 2. Existing equipment in place to handle operations 3. Close relationship with The Kuskokwim Corporation as well as AVCP 4. Close proximity to end destination can allow for reduced shipping costs.	**Weaknesses** 1. Sawmill has not been operational for some time 2. The sawmill does not currently have the internal capabilities to produce graded lumber
External	**Opportunities** 1. Local demand for firewood is likely not currently being fully met (growth opportunity) 2. AVCP truss plant would create a reasonable market for local lumber (160,000+ board feet annually) 3. Grants may be available to help scale up production 4. The Kuskokwim River provides relatively easy transportation routes to harvesting site as well as Bethel.	**Threats** 1. Lower 48 lumber can generate high economies of scale, reducing price 2. Getting local lumber graded would be expensive and logistically challenging 3. Sawmill would be providing lumber for essentially one customer (AVCP) 4. Logistical challenges can arise due to early thawing of river, or regional flooding

XIV. Financial Analysis

The Chuathbaluk sawmill project relies on several key assumptions in the development of comprehensive financial statements. In an effort to help inform project partners of the underlying financials to the project, these various assumptions have been outlined below.

A. Income Statement Financial Assumptions

Revenue

The Chuathbaluk sawmill's revenue is derived from two primary sources, the sale of structural grade lumber (defined as grade #2 or better) to the AVCP truss plant, and the sale of non-structural lumber (defined as grade #3 and below) for use in non-structural components of home construction as well as other local lumber demand. In generating revenue assumptions, information was utilized from the CCHRC pre-feasibility analysis and other sources. Revenue projections are based on the number of trusses needed in a typical house. The assumptions utilized in calculating revenue include the following:

- A "standard" house will be 1,092 square feet and will require 19 integrated field trusses and four integrated gable trusses. Each home construction would require 189 pieces of 2" x 6" x 20' lumber, for a total of 3,780 board feet for each house. Specific dimensions for a "standard" home are 26' x 42' and are a typical model designed by CCHRC.
- Based on information gathered from discussions with forestry experts[65], it is assumed that 80 percent of all lumber milled in Chuathbaluk would meet the grading requirements necessary to be classified as grade #2 or better for use in integrated trusses[66]. This means that 20 percent of all lumber produced would not meet the grading requirements necessary for use in AVCP's truss plant. If this assumption is correct, then in order to meet the annual lumber demand for trusses, the sawmill would have to produce approximately 25 percent more lumber than the amount of board feet required for trusses alone. It is anticipated that timber will be purchased per 1,000 board feet based on a log scale such as the Scribner Scale.
    - It is assumed that grade #2 and better lumber could be sold at a price of $19.80 per piece of 2" x 6" x 20', which is a comparable price to what would be found in the lower 48 when delivery to Bethel is factored into the price. While specific lumber pieces required for home construction will use more than simply 2" x 6" x 20' pieces of lumber, this size was used as an overall estimate of the lumber costs for construction.
    - For lumber of grade #3 and below it is assumed that the plant would be able to make use of some of this lumber for non-structural components of home constructions such as siding and shelving. Additionally, other demand could be found from the local market for other lumber needs. Due to the lower quality of this lumber, it is anticipated to sell at a rate that is 65 percent of the price for #2 and better lumber. This a somewhat conservative estimate based on the price differentials between different lumber grades for other species of wood, which

[65] Interview with Allen Brackley, USFS, 06/01/2015

[66] 80 percent yield is a figure that is common for Northland Wood Products in Fairbanks. Although Bethel has no perfect comparison, Fairbanks was seen as the best proxy for lumber yields in the Y-K Delta.

typically have grade #3 selling at approximately 70 percent of grade #2 prices.[67] Therefore, the same piece of 2" x 6" x 20' lumber would sell at a rate of $13.00 per piece.

Utilities and Trash Disposal Expense

Utilities and Trash Disposal Expense was calculated based on the following assumptions:

- Electricity consumption was estimated to be approximately 4,800 kilowatt hours per month of operations, a year one work season that would include 89 hours of sawmill operations, and a local electricity rate of 61 cents per kilowatt hour.[68] The national average electricity consumption for US sawmill operations was 2.1 percent of sales in 2013.[69] At projected rates for gasoline and electricity, the Chuathbaluk sawmill has electricity and gasoline costs of approximately 6-7 percent of sales. Over time it is anticipated that the sawmill will attain energy savings through utilization of a wood-fired boiler. In an effort to maintain conservative assumptions, these effects were minimized in this analysis. Full boiler utilization would result in lower electricity costs.

Service and Repair Expense

It is estimated that service and repair expense is approximately three percent of sawmill revenue in year one. Year one expense is $2,000, with subsequent years including a three percent inflation rate.

Timber Expense

The primary input cost for the manufacturing of lumber is timber. To calculate the cost of raw material timber, the consulting team calculated the total board feet of lumber demand projected for the truss plant. This figure was then adjusted to account for the fact that only 80 percent of lumber that is milled will meet the necessary structural grade required for use in truss construction (grade #2 or better). As a result, a year one demand of 55,481 board feet of lumber was projected. This amount of board feet was then multiplied by the prevailing market rate for purchasing raw material timber. The prevailing timber rates mentioned by forestry experts is $300 per 1,000 board feet of timber harvested and delivered in Alaska. To be slightly more conservative, a rate of $333 per 1,000 board feet of timber was used. Year one timber expense is estimated at $18,475.

An important factor to consider that was not included in this analysis is over-run. When timber is scaled, conservative estimates of the expected board foot yield of the timber are used, such as in the Scribner Scale. This is often seen as a "worst case scenario" board foot yield from a piece of timber. Skilled mill operators are often able to produce more board feet of lumber than a typical log scale would estimate. Therefore, skilled mill operations could allow the sawmill to generate an extra 10-20 percent of lumber that would not be included in these calculations, essentially amounting to "free" lumber. In an effort to maintain conservative assumptions, the study assumed that over-runs would not take place, when they often do take place in practice.

[67] http://www.randomlengths.com/UserFiles/Pages/f7f43c90-4c91-4abc-a1d8-470de26800d7/22e90bdf-35b5-4a2d-a7be-c8dbd158bfd6/RL_Lumber_Weekly_Price_Changes.pdf

[68] Rates derived from Power Cost Equalization Program report, 2013

[69] 2013 US Census Annual Survey of Manufacturers

Insurance Expense

Insurance Expense is calculated by factoring in three different types of insurance necessary for the Chuathbaluk sawmill. These three different insurance types include general liability insurance, property insurance, and worker's compensation insurance.

General liability insurance was calculated as a variable expense at a rate of $7 for every $1,000 in sales. To calculate this expense, the consulting team contacted Bowermaster Insurance out of California. Bowermaster is licensed to write policies in Alaska and has experience working within the wood products manufacturing industry. When contacted, Bowermaster cited a figure of $4-$6 per $1,000 of sales as a standard, conservative industry rate[70]. In an effort to further temper assumptions, an even more conservative figure of $7 per $1,000 in sales was used. It is also worth noting that Bowermaster's quote was confirmed by Arizona-based Mohave West Insurance Agency, which has an office in Haines and also specializes in the wood products industry.

Property Insurance rates were also gathered from Bowermaster Insurance and confirmed by Mohave West Insurance Agency. Bowermaster based its estimate on a total property value of $700,000 and estimated an insurance expense of between $3,500 and $7,500. Final estimates for total insured property include $45,000 worth of capital equipment along with year one inventory on hand of $65,613. Given that the sawmill will need to maintain an up to a year's worth of inventory while the lumber is drying before being sent to Bethel, it was estimated that inventory on hand would be equal to total annual sales for that particular year.

Bowermaster, as well as Mohave West Insurance Agency, was also contacted regarding their estimates for workers compensation insurance. In an effort to generate conservative estimates, the consulting team calculated workers compensation rates based on the prevailing base rates in Washington state. The prevailing rate in Washington for "Sawmill Operations" is $2.20 per labor hour[71]. This figure was then adjusted based on information that Alaska's workers compensation rates are typically 24 percent higher than those found in Washington[72]. As a result, the consulting team based its workers compensation rates at a rate of $2.73 per labor hour. This figure is in line with those quoted by the insurance companies contacted for the study.

Delivery Expense

This expense includes the cost of delivering the raw materials to the plant. This expense factors in the cost for renting a transport vehicle from Bethel, the salary for the delivery driver, and the fuel consumption of the transport vehicle. It was assumed that the transport vehicle would average three miles per gallon with a full load, and seven miles per gallon while empty. Fuel costs were estimated at $7 per gallon. Year one delivery expense was estimated at $6,305, based on 19 deliveries at 50,000 pounds of capacity per delivery. After talking to the owner of the only equipment and vehicle renting business in Bethel, it was assumed that the rental rate will be approximately $187.50 per day. This is based on the average rental price in Anchorage, plus a 25 percent premium.

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[70] Corey Kroviak, Bowermaster and Associates Insurance, Personal Communication, March 13, 2015

[71] "2015 Composite Base Rates by Risk Classification," http://www.lni.wa.gov/ClaimsIns/Files/Rates/2015RatesBusTypeClassCode.pdf

[72] "2014 Oregon Workers' Compensation Premium Rate Ranking Summary," Jay Dotter and Mike Manley, October 2014, http://www.cbs.state.or.us/external/dir/wc_cost/files/report_summary.pdf

Lumber Certification Expense

This expense covers the necessary certifications required for producing dimensional structural lumber for the truss plant. This expense was based on four inspections annually at a cost of $2,000 per inspection. This was the figure quoted by the WWPA.

Payroll Services Expense

Payroll Expense was based on the prevailing market rate. This rate is calculated using a base rate of $40 plus an additional $45 for each employee on the payroll. This payroll expense occurs for each employee pay period. With two employees, this factors out to $265 in year one.

Management Expense

Management Expense is based on a total need of 400 hours for year one, with an estimated annual hourly increase of 5 percent. The manager's role will be to promote the product to the necessary partners within the region, including state and federal funding agencies. The manager will also be responsible for sourcing raw materials, hiring and terminating employees, and identifying new market segments for the business. The manager will primarily be functioning in a regulatory and business development role. The manager will be responsible for marketing local lumber to prospective buyers who are not affiliated with the AVCP/CCHRC operation.

Sawmill Operator Expense

Sawmill Operator Expense was based on a year one requirement of 89 labor hours. This was based on information received from the current sawmill owner that states that the mill can produce 10,000 board feet of lumber per day[73]. In an effort to be conservative, this study's analysis assumes that the mill will only produce at a rate of 5,000 board feet per day. This will help to account for employee breaks, inefficient operations as employees learn the equipment, and other inefficiencies that develop during operations. The sawmill manager will be responsible for overseeing all major operations of the mill.

Support Employee Expense

Support Employee Expense was based on a year one requirement of 89 labor hours. This was based on information received from the current sawmill owner that states that the mill can produce 10,000 board feet of lumber per day. In an effort to be conservative, this study's analysis assumes that the mill will only produce at a rate of 5,000 board feet per day. This will help to account for employee breaks, inefficient operations as employees learn the equipment, and other inefficiencies that develop during operations. The support employee would help with loading raw materials, operating the mill when the manager is not available, and with lumber stacking, among other responsibilities.

Benefits and Payroll Tax Expense

Benefits and Payroll Expense is calculated using prevailing fringe benefit rates of 40 percent of employee salaries.

Loan Interest Expense

Loan Interest Expense is based on a prevailing interest rate of 5 percent and is used to cover initial working capital needs of the sawmill. It is anticipated that this would require the sawmill taking out a $20,000 operating loan in year one to maintain positive cash flow.

[73] AVCP Project Kickoff Meeting, Case Nelson (Sawmill Owner), January 2015

Depreciation Expense

Depreciation Expense was based on the manufacturing equipment required by the sawmill. In these calculations, depreciation expense will be zero since it is assumed that the capital costs will be financed with a grant. This zero depreciation is due to the fact that organizations are not permitted to depreciate the portion of a piece of equipment financed with a federal grant[74].

B. Capital Costs

Total capital costs for the project are estimated to be $45,000 and include the following expenses:

Table 15: Capital Expenses.

Capital Cost	Price, $	Delivery, $	Useful Life, years	Depreciation per year, $
Mid-Size Front End Loader	$30,000	$9,900	10	$3,000
Wood Fired Boiler	$15,000	$4,950	10	$1,500
Total	$45,000	$14,850	-	$4,500

It is worth noting that the actual depreciation expenses paid will depend on the level of grant funding contributed toward the project. This is due to the fact that equipment purchased with federal funds is not eligible for depreciation.

[74] http://f2.washington.edu/fm/maa/recharge/equipment

XV. Income Statement, Cash Flow Statement and Financial Summary

A. Income Statement (10 Years)

REVENUE	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
umber Sales Grade 2 and higher, $	43,941	87,272	157,912	275,631	287,790	303,137	318,830	334,980	351,588	358,560
Lumber Sales Grade 3 and lower, $	7,213	14,325	25,920	45,243	47,238	49,757	52,333	54,984	57,710	58,854
Over-Run	-	-	-	-	-	-	-	-	-	-
Gross Revenue	51,153	101,596	183,832	320,874	335,028	352,895	371,163	389,964	409,299	417,414
Occupancy Expense										
Electricity	2,112	4,057	7,102	11,990	12,110	12,339	12,554	12,759	12,954	12,779
Gazolineand Trash Disposal	1,034	2,034	3,646	6,305	6,523	6,811	7,101	7,398	7,700	7,789
Total Occupancy Expense	3,146	6,091	10,747	18,295	18,634	19,150	19,655	20,157	20,654	20,569
Operating Expense										
Timber	18,475	36,666	66,295	115,629	120,639	126,977	133,450	140,105	146,940	149,741
al Fees/Permit Costs/Certification	-	-	-	-	-	-	-	-	-	-
Insurance	1,900	3,254	5,433	9,021	9,303	9,677	10,055	10,441	10,833	10,939
Delivery	6,305	12,457	22,427	38,953	40,475	42,433	44,425	46,467	48,557	49,308
Lumber Certification	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000
Total Operating Expense	34,680	60,378	102,155	171,603	178,417	187,088	195,930	205,012	214,331	217,989
Administrative Expense										
Service and Repare	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Office Equipment and Supplies	-	-	-	-	-	-	-	-	-	-
Bookkeeping	-	-	-	-	-	-	-	-	-	-
Payroll	265	345	345	345	345	345	345	345	345	345
Total Administrative Expense	2,265	2,345	2,345	2,345	2,345	2,345	2,345	2,345	2,345	2,345
Personnel Expense										
Management	13,462	14,559	15,745	17,028	18,416	19,917	21,540	23,296	25,195	27,248
Sawmill Operator	1,953	3,865	6,967	12,117	12,605	13,228	13,862	14,511	15,175	15,420
Support Employee	1,598	3,162	5,700	9,914	10,313	10,823	11,342	11,873	12,416	12,616
Benefits+Payrol Taxes	6,805	8,634	11,365	15,623	16,534	17,588	18,698	19,872	21,114	22,113
Total Personnel Expense	23,817	30,219	39,778	54,682	57,868	61,556	65,443	69,552	73,900	77,397
Total Expense before Depreciation	63,908	99,033	155,025	246,925	257,263	270,139	283,373	297,066	311,230	318,299
Depreciation and Amortization										
Facilities & Equip. Loan Interest	1,000	819	629	429	220	-	-	-	-	-
Depreciation	-	-	-	-	-	-	-	-	-	-
Total	1,000	819	629	429	220	-	-	-	-	-
Net Income Before Taxes	**(13,755)**	**1,744**	**28,179**	**73,520**	**77,545**	**82,756**	**87,790**	**92,899**	**98,069**	**99,115**
Income Tax	**-**	**279**	**4,772**	**16,462**	**17,769**	**19,985**	**22,150**	**24,358**	**26,602**	**27,056**
Income after Taxes	**(13,755)**	**1,465**	**23,407**	**57,058**	**59,776**	**62,771**	**65,640**	**68,541**	**71,467**	**72,059**

B. Cash Flow Statements (10 Years)

Cash Inflow:										
Cash receipts from customers	51,153	101,596	183,832	320,874	335,028	352,895	371,163	389,964	409,299	417,414
Depreciation	0	0	0	0	0	0	0	0	0	0
Cash paid for:										
Occupancy Expense	(3,146)	(6,091)	(10,747)	(18,295)	(18,634)	(19,150)	(19,655)	(20,157)	(20,654)	(20,569)
Operating Expense	(34,680)	(60,378)	(102,155)	(171,603)	(178,417)	(187,088)	(195,930)	(205,012)	(214,331)	(217,989)
Administrative Expense	(2,265)	(2,345)	(2,345)	(2,345)	(2,345)	(2,345)	(2,345)	(2,345)	(2,345)	(2,345)
Personnel Expense	(23,817)	(30,219)	(39,778)	(54,682)	(57,868)	(61,556)	(65,443)	(69,552)	(73,900)	(77,397)
Interest	(1,000)	(819)	(629)	(429)	(220)	0	0	0	0	0
Income Taxes	0	(279)	(4,772)	(16,462)	(17,769)	(19,985)	(22,150)	(24,358)	(26,602)	(27,056)
Net Cash Flow from Operations	-13,755	1,465	23,407	57,058	59,776	62,771	65,640	68,541	71,467	72,059
Investing Activities										
Cash receipts	-	-	-	-	-	-	-	-	-	-
Cash Paid for:										
Equipment Purchase	(59,850)	-	-	-	-	-	-	-	-	-
Building Facilities	-	-	-	-	-	-	-	-	-	-
Net Cash Flow from IA	(59,850)	0	0	0	0	0	0	0	0	0
Financing Activities										
Cash receipts from:										
Grant (EDA plus USDA)	59,850	-	-	-	-	-	-	-	-	-
Borrowing (loan)	20,000	-	-	-	-	-	-	-	-	-
Cash paid for:										
Debt Principal Payments	(3,619)	(3,800)	(3,990)	(4,190)	(4,400)	0	0	0	0	0
Net Cash Flow from FA	76,231	(3,800)	(3,990)	(4,190)	(4,400)	0	0	0	0	0
Final Cash position	2,626	290	19,707	72,575	127,951	190,722	256,362	324,903	396,370	468,429
Net Change in Cash	2,626	-2,335	19,416	52,868	55,376	62,771	65,640	68,541	71,467	72,059

XVI. Business Structure

A. Business Structure

This section discusses three aspects of the operation: how the truss plant could be organized, how a local lumber supply operation could be organized; and finally, how to structure the relationship between the local timber harvesting and sawmill operations and truss plant. It is important to note that any decision regarding the legal organization of this business should involve a team of professionals including a lawyer, an accountant, an expert in financing, and an insurance broker. The legal organization of a business affects four fundamental questions:

- How will decisions be made, including decisions about distributing profits and apportioning losses;
- How much risk will the owners take on from the operation of the business;
- How the business will pay taxes; and
- How will the business raise funds, and the effect of the choice of legal entity on start-up costs.

These issues are interrelated. Investors or grant-making organizations will want to make sure they have a say in how profits are distributed and will want to minimize their risk from the business. So, their willingness to give the business money will depend on how decisions are made, the amount of risk exposure, and the potential tax liability. These questions also inform the inquiry into the different options for legal organization.

Options for the legal organization of the truss plant

In creating a new business there are a host of legal entities to choose from. This study has narrowed the options best suited to the truss plant into three choices: a division of the Association of Village Council Presidents; a limited liability company (LLC); and a subchapter 17 corporation.

Division of AVCP

Organizationally, creating a division within AVCP is the simplest option and could be implemented by a decision of AVCP's board. This option would give AVCP total control over the decision-making at the truss plant, its income stream and how costs will be apportioned. It might also yield some savings by allowing the new business to use some of AVCP's billing, personnel management and executive skills. This, of course, would be placing a greater burden on AVCP's staff and resources.

By far the greatest disadvantage to this option is that AVCP would expose itself to all of the truss plant's risk. These run a wide gamut from the risk of having to repay the truss plant's debts if it fails, to having financial responsibility for injuries to workers, or damages from trusses failing due to a flaw of one kind or another. Some of these risks would most likely be unavoidable regardless of structure. For example, if the truss plant were set up as a separate business, it may well be that any lenders would require AVCP, as a major owner in that business, to cosign loans. The plant should also carry insurance that would cover injuries to workers, and protect it from damage claims from the organizations that buy the trusses. But there is always the chance that insurance will not cover all of the claims or that the truss plant will expose AVCP to risks that it could avoid if the plant were a separate, independent business.

While the truss plant might be able to benefit from AVCP's status as a nonprofit, for example, providing access to government grants, this does not mean that no taxes would be due on the truss plant's profits. AVCP would have to pay tax on income that is not part of its non-profit mission. Having a profit-making division like the truss plant within AVCP would complicate its accounting.

A final consideration in creating the truss plant as a division of AVCP is that it could be difficult to bring in outside investors. Without outside investors the project would depend on loans, grants on internal resources for its start-up funding.

On the whole, the increased exposure to risk and the entire dependence on AVCP to raise capital make this option less desirable.

Limited Liability Company

The simplest way to protect AVCP from the truss plant's risk is to create a separate entity. There are a number of legal entities that create a "liability shield," meaning they limit the owners' liability from the business to the amount of money they have invested. Limited liability companies, corporations and S-corporations all offer a liability shield. The more independent the business, the stronger the protection. As discussed in more detail below, an LLC or S-corporation has tax advantages over a traditional corporation. And an LLC is relatively less complex to set up and more flexible than an S-corporation. But in all of these cases, the effectiveness of the shield depends on how independent the new business is from its investor/owners.

Increased independence, of course, works against the idea of AVCP being in total control over the plant's operation. To get the maximum protection the truss plant would have to have maximum operational independence including its own board and management. While AVCP as a majority owner would be able to appoint board members, this structure creates one more administrative layer between AVCP and the truss plant managers.

Having a separate business raises the question of taxation. One of the major differences between a traditional corporation and an LLC or S-Corporation is that corporations pay taxes twice: first in the form of corporate income tax and again when dividends from profits paid to owners are taxed. LLCs and S-corporations do not pay corporate income tax. Their owners pay tax on the share of the business' profits that are distributed to them. So, their profits are taxed once – as the owners' income.

Having less control to increase liability protection would also mean that the plant would have to be careful about how it used AVCP's existing expertise. Lending expertise in accounting or human resources not only reduces the costs to the plant, it also gives AVCP a window on the truss plant's accounting and decision-making process, making it easier to monitor costs, income and profits. The more AVCP distances itself from these aspects of the truss plant's operation, the harder it becomes to monitor what is happening in the plant. While it might be possible for AVCP to provide these services under contract, the more AVCP and the truss-plant business work together, the weaker the liability protection becomes. In addition to setting up its own management, human resources and accounting systems an independent business needs to be set up by a lawyer and registered with the state. This adds additional cost.

The flexibility afforded by an LLC makes it easier to bring on outside investors. This opens an additional avenue to raise start-up funds. AVCP could still retain control by holding 51 percent of the business, but

could sell smaller shares to other investors. In fact, AVCP could still control the business holding less than 51 percent so long as it maintained the largest share of the business and there was little prospect of the other owners joining together against it. Sharing ownership interest in the truss plant is one way that the potential sawmill or timber owners could be enticed into participating in this project—a topic that is discussed in more detail below.

An LLC offers a number of advantages: it provides a liability shield, it is simple to set up, and has flexibility that allows the ownership structure to be adapted to different financing schemes. Combined, these factors make it a very attractive option.

Subchapter 17 Corporation

Lately, subchapter 17 corporations have attracted a lot of interest from Alaska Native organizations. As a tribal entity, AVCP has the option of organizing the truss plant as a Subchapter 17 corporation. Subchapter 17 corporations are federal entities created through the Department of Interior for the benefit of tribes. The tribal entity must be the majority owner.

A subchapter 17 corporation provides liability protection in the same way as a corporation, LLC, S-corporation. AVCP's risk from the truss plant would be limited to the money it had invested and any additional obligations it had agreed to take on – like cosigning a loan.

Subchapter 17 corporations have the additional benefit of operating tax-free even as they generate profits. As long as the tribal entity is the majority owner, outside investors can own shares of the business. As tribal corporations, subchapter 17 corporations can easily qualify for tribal grant and loans programs. While a tribally owned LLC would probably also qualify for these programs, it would have to demonstrate that it is a tribal business while a subchapter 17 business is by definition a tribal business.

The disadvantage to a subchapter 17 corporation is that as a federal corporation, it is more laborious to set up, including getting permission from the Secretary of the Interior. Another challenge is the relatively rarity of subchapter 17 corporations. As a general rule, banks and other lenders want to lend to businesses they are familiar with and using an uncommon type of business entity might make the process of getting a loan more difficult.

While their tax treatment make subchapter 17 corporations attractive, that benefit is tempered by the fact that they are harder to set up and are not as flexible as an LLC. For this reason it appears to be a less attractive option.

Sawmill and Timber Operations

The same business-structure considerations as detailed above also apply to the timber harvesting and sawmill operations. While those operations are already organized as independent businesses through Napaimute, it would make sense to re-evaluate how they are organized, as participating in this project will require significant investments.

Both the timber harvesting and sawmill businesses will require significant investment to bring production up to a break-even point, and to produce the dried, planed and graded lumber the truss plant will require. In addition, if the lumber is air dried, there will be a year or more between incurring the expenses of harvesting and sawing the lumber to the time it is sold and used in the truss plant. This delay will increase the capital needed to sustain operations. The relationship between the sawmill and

harvesting operations and the truss plant will be a key element in the sawmill and timber harvesting businesses' ability to raise capital to expand.

Timber harvesting in particular is a dangerous business and carries with it a significant risk that employees will be injured. Therefore, the relationship between the truss plant and these operations will have to take into consideration how to limit the liability of the different parties involved and how to make it easier to raise the capital needed for an integrated operation to be sustainable.

Contract or Joint Venture?

The relationship between the truss plant and the timber harvesting operations can range from arms-length contracts to joint ventures. A contractual relationship provides greater liability protection. A contract that guarantees prices and purchase volumes can also serve as a mechanism for the timber harvesting and sawmill operations to attract investors or get loans to access the capital they will need to support expansion.

Even with a contract to supply lumber to the truss plant, it might be difficult for the small timber harvesting and sawmill operations to access the amount of capital they need to expand to the point where they are sustainable. In that situation, it might make more sense to integrate the timber and sawmill operations into the truss plant to create a vertically integrated company. This could be done in a number of ways, including a joint venture. A joint venture would allow Napaimute access to AVCP's business expertise and lenders and could be structured as its own company with each party a partner. This option is more complex to organize, and would involve AVCP taking on more risk not only from the expanded operations but also the risk inherent in having more of partners.

XVII. Combined Economic Impacts – Sawmill and Truss Plant

The AVCP truss plant project will have significant economic impacts within the Y-K Delta, some of which are quantifiable and others that are not immediately so. Quantifiable impacts highlighted in the tables below include new home construction, overall jobs created and energy savings within the region. While other benefits such as improved public health due to safer, more airtight homes will certainly have an economic impact, they are difficult to directly quantify. Our projections estimate a total of 88 direct jobs will be created as a result of this project. *These jobs include those in home construction, timber harvesting, and in sawmilling. If indirect and induced jobs were added to this total, the grant total number of jobs created due to the project would likely grow considerably.*

Table 17: Jobs in Home Construction

Year	Homes Built	New Jobs Created at Truss Plant*	New Jobs Created at Sawmill	New Jobs Created in Timber Harvesting**	Jobs in Home Construction***
1	12	6	3	1	12
2	24	0	0	1	23
3	39	0	0	1	39
4	67	2	0	2	67
5	67	0	0	0	67
6	69	0	0	0	69
7	70	0	0	0	70
8	71	0	0	0	71
9	72	0	0	1	72
10	71	0	0	0	71
Total	**562**	**8**	**3**	**6**	**71******
Grand Total Will be 88 Sustainable Jobs over 10 Years (8+3+6+71)					

*Based on seasonal jobs @ a max of 640 hours per season for non-managerial jobs.

**Based on seasonal jobs @ 640 hours per season. Based on seasonal timber harvest assuming an average tree diameter of 12", height of 65', and harvesting rate of three trees per hour.

***Based on personal communication with CCHRC. Each home construction is estimated to include $80,000 in payroll. At an average rate of $25/hr, plus additional benefits, this is equivalent to one full time position per home constructed. In actuality, this will likely be multiple part-time positions, however.

****71 is used since this is the number of full time positions created as a result of the project. Many of these employees will have full-time employment for multiple years, however, as a result of the project.

Table 18: Energy Savings Based on New Home Construction

Year	Energy Savings in New Homes per Year*	Cumulative Energy Savings in All Home Constructions since Inception*
1	$44,436	$44,436
2	$88,872	$177,744
3	$144,417	$455,469
4	$248,101	$981,295
5	$248,101	$1,755,222
6	$255,507	$2,784,656
7	$259,210	$4,073,300
8	$262,913	$5,624,857
9	$266,616	$7,443,030
10	**$262,913**	**$9,524,116**

*Based on CCHRC Quinhagak study, which showed CCHRC homes used 529 fewer gallons of fuel per year than existing homes in the region

XVIII. Legal/Regulatory Analysis

A. Lumber Grading and Mill Certification

Alaska law does not require lumber and manufactured wood products used in residential construction to be certified or graded, but in most cases, it is still necessary. Ungraded wood products can be used in any area of Alaska where there are no local building codes, which is a substantial part of the state.[75] However, lenders and other funders usually require that construction and materials meet standards established in the International Residential Code (IRC), which does require truss certification and graded lumber.[76] Additionally, manufacturers or mills that are not certified assume full liability for any defects or product failures, which can be extremely costly, whereas the certifying agency assumes some degree of responsibility in the event of an issue or failure when lumber is graded. The AVCP enterprise will require two certifications – one for the lumber, and a separate inspection and certification for the truss plant and trusses.

B. Lumber Grading

The U.S. Department of Commerce and the National Institute of Standards and Technology (NIST), in cooperation with industry, establish product standards for American softwood lumber and a grading system to denote a variety of characteristics of the wood and products made from it. A number of regional, non-profit associations provide training and certification services to verify that a given mill's products meet these standards. In the Western U.S., there are three such associations – the Western Wood Products Association (WWPA), the West Coast Lumber Inspection Bureau (WCLIB) and the Pacific Lumber Inspection Bureau (PLIB). At this time, none of these associations have inspectors located in Alaska.[77]

The WWPA has a history in Alaska[78] and was responsible for machine strength-testing Alaska white spruce, yellow cedar and hemlock as species distinct from West Coast varieties so they could be stamped and certified. Due to its specialized knowledge of Alaska wood varieties, it is a desirable choice for providing lumber grading services to an Alaska mill, but any organization certified by the American Lumber Standards Agency could theoretically do the work.

Stamps are issued by agencies like the WWPA. To receive the right to grade stamp its lumber, a mill must employ certified inspectors to monitor its production on a constant basis to ensure its lumber is meeting the specifications of the applicable grade. In addition, the mill must pay for an inspector from the WWPA (or similar entity) to visit its production facility monthly to ensure its products are in compliance with the grade – essentially, to check the work of the mill-hired inspectors. Inspectors check

[75] There is no State of Alaska building code. The following municipalities have building codes: Anchorage, Fairbanks, Juneau, Kenai, Ketchikan, Kodiak city and borough, Nome, North Pole, Palmer, Petersburg, Seward, Sitka, Soldotna and Valdez. http://www.ahfc.us/pros/builders/approved-municipalities/

[76] International Code Council, International Residential Code 2009, Section R802.1

[77] Conversation with Allen M.M. Brackley, Research Forester, Tongass National Forest, U.S. Forest Service, March 3, 2015

[78] The WWPA used to have an inspector based in Alaska through a partnership with the now-defunct Alaska Science and Technology Foundation and the Industry Network Corporation, but that program was discontinued. Alaska Business Monthly, April 1998.

moisture content, defects and other wood qualities against the standards established for the grade[79]. The monthly inspection fee charged by WWPA is $690, but the total cost to the mill would also include travel for an inspector from Portland, OR to Bethel. The $690 quote is based on a three-day trip (two travel days and one work day); if weather or other issues lengthened the trip, WWPA charges $500 per day for each additional day. With visits presumed in May, June, July and August, an annual cost of between $8,000 and $10,000 is projected.[80]

C. Truss Plant Certification

Through a separate but similar process, AVCP's truss plant would need certification as well. In this case, the relevant inspecting entity is the West Coast Lumber Inspection Bureau, or WCLIB. WCLIB is accredited by the International Accreditation Service as an approved third-party quality assurance agency for metal-plate connected wood trusses. Certification of the plant and its products involves an initial inspection, before the plant is in operation, as well as quarterly re-inspections to ensure the products continue to meet standards. Assuming seasonal operations only, the plant would need an initial inspection, after which its operations could be re-inspected annually. Each visit is estimated by WCLIB to cost approximately $1,750.[81]

If the lumber is planed in Bethel, the WCLIB would be the best choice for both lumber grading and truss-plant inspections because it is qualified to perform both services and could perform both functions in one trip, reducing travel expenses. The WWPA is only certified to grade lumber, although sources with the association said it may be able to do truss plant inspections in the near future.

D. Lumber Type Specifics

Trusses are made from what is known as Machine Stress-Rated (MSR) lumber. MSR is dimensional lumber that has been evaluated by mechanical stress-rating equipment, which measures its stiffness and sorts it into various classes based on modulus of elasticity (E). Grade stamps on MSR lumber typically include the E value as well as a stiffness rating (Fb), with higher Fb numbers indicating stronger lumber. Stamps may also include information relative to stress parallel-to-grain, specific gravity, horizontal sheer and compression perpendicular-to-grain. These values are determined by nondestructively evaluating each piece of lumber to determine its E rating, after which it must also meet certain visual requirements and daily quality control test procedures[82]. MSR lumber that is produced in accordance with the procedures specified by an approved grading agency is accepted by regulatory agencies and all major building codes.

The following areas of responsibility for ensuring MSR lumber meets all appropriate measures are shared by producers and grading agencies as follows:

[79] Conversation with Allen M.M. Brackley, Research Forester, Tongass National Forest, U.S. Forest Service, March 3, 2015
[80] Conversation and correspondence with Michael McGuigan, Western Wood Products Association, March 6, 2015
[81] Correspondence with Don Devisser, executive vice president, West Coast Lumber Inspection Bureau, March 5, 2015
[82] Western Wood Product Association, http://www.wwpa.org/

Table 19: Areas of Responsibility for Producers and Grading Agencies.

Grading Agency	Producer
Certification of machines	Adherence to grading-agency procedures
Calibration of test equipment	Strength-level checks every shift
Plant use regulations	Constant visual quality checks
Quality inspections	E-level checks every shift
Product appearance considerations	Maintenance of detailed test records
	Specific gravity and/or tension-level checks every shift

In order to achieve requisite Fb and E values for MSR lumber, lumber must be dried to 19 percent equilibrium moisture content or lower. In Bethel, it is likely that wood could be seasoned to reach this level by letting it sit in a covered, outdoor area for approximately one year. Alternatively, a dry kiln can be used to dry lumber down to a 19 percent equilibrium moisture level in approximately a week.[83] One potentially cost-effective option for incorporating a kiln would be to utilize a biomass-powered kiln that is fueled by timber waste.

Additional regulations governing the storage of lumber are set forth by the Occupational Safety and Health Administration. The following sections of OSHA code section *1926.250(b)(8)(ii)* are applicable[84]:

- ***1926.250(b)(8)(ii)***
- Lumber shall be stacked on level and solidly supported sills.
- ***1926.250(b)(8)(iii)***
- Lumber shall be so stacked as to be stable and self-supporting.
- ***1926.250(b)(8)(iv)***
- Lumber piles shall not exceed 20 feet in height provided that lumber to be handled manually shall not be stacked more than 16 feet high.
- ***1926.250(b)(9)***
- Structural steel, poles, pipe, bar stock, and other cylindrical materials, unless racked, shall be stacked and blocked so as to prevent spreading or tilting.
- ***1926.250(c)***
- "Housekeeping." Storage areas shall be kept free from accumulation of materials that constitute hazards from tripping, fire, explosion, or pest harborage. Vegetation control will be exercised when necessary.

Additional, more general OSHA regulations related to materials handling and storage also apply. Full consultation of all relevant OSHA standards is necessary before operations begin and as the workspace is being designed.

E. Local Building Permits

The first step in receiving local approval to build in Bethel is to meet with the city's Planning Department. Based on a rough description of the size and type of business AVCP is considering, a representative of the department classified it as "major" commercial construction (the city categorizes commercial projects as either "minor" or "major"). For major construction, the city requires two

[83] Conversation with Allen M.M. Brackley, Research Forester, Tongass National Forest, U.S. Forest Service, March 3, 2015

[84] OSHA, https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=standards&p_id=10685

permits: one for fill and pilings, and the other for construction. Information relevant to both is required in the city's Commercial Site Plan Application form. A $100 fee applies to the fill and pilings application, and the construction permit costs $600.[85]

Title 18 of Bethel Municipal Code requires the review of a site plan prior to the erection of any improvement on real property within city limits. An application for site-plan review must be filed with the city's Planning Department, the Alaska State Fire Marshall and the Army Corps of Engineers. Once the reviews are complete and the plan is approved, the city will issue a building permit, which must be displayed on the property.[86] The permit application requires basic information about the property owner and developer as well as the legal description of the property.

F. Insurance Requirements

An insurance quote for the truss plant was obtained from the WoodPro division of Bowermaster and Associates, a California insurance firm with specialization in wood products. Bowermaster is a member of the Wood Products Manufacturer's Association and is also an Expert Partner in the Wood Truss Council of America. The quote was verified by Mojave West Insurance Agency, which is based in Arizona but has an office in Haines, Alaska. The recommended coverage includes:

- General liability – Coverage is estimated to cost between $4-$6 per $1,000 in sales. This covers product defects or failures.
- Property – This will cover the truss plant facility. Rates vary greatly depending on size and type of facility AVCP ultimately builds.
- Worker's compensation – Rates specific to truss manufacturing typically fall between $8-$15 per $100 in payroll.

G. Other Relevant Permits/Licenses

All Alaska businesses must operate under a business license issued by the state. Applications can be completed and filed online. The North American Industry Classification System (NAICS) provides business-type codes for thousands of businesses and industries, the data from which is used by the state and federal government for statistical and tax purposes. The relevant NAICS code for a truss plant would be 321214, Truss Manufacturing, laminated or fabricated wood roof and floor trusses. Costs for an Alaska business license vary depending on the type of business.

A basic business license in Alaska costs $50 per year and can be filed online.[87] If AVCP intends to establish a corporation, additional fees and paperwork are required.

[85] City of Bethel, Construction Fees and Procedures (PDF)
[86] City of Bethel, Commercial Site Plan Permit Application
[87] http://commerce.state.ak.us/dnn/cbpl/BusinessLicensing/NewBLOnline.aspx

XIX. Facility Design Considerations

A. Lumber Drying/Yard Maintenance

At the heart of a successful lumber manufacturing business is quality control. In the case of truss manufacturing, where differences in lumber quality can alter a housing structure's usable life, maintaining close quality control of raw materials is essential. Thankfully, many resources exist that cover in detail the requirements for properly drying and storing lumber. The Iowa State University Cooperative Extension Service published an extensive and useful report with a considerable amount of detail beyond what is included here that should be referenced when designing the lumberyard. It is included on the references page at the end of this document. Much of the information that follows is drawn from that report.[88]

One key question to consider is where specifically the lumber yard will be located. The existing sawmill in Chuathbaluk has air dry and dry storage capabilities,[89] making it a logical choice for a lumberyard. One key disadvantage to maintaining a lumberyard in Chuathbaluk is the additional cost for lumber grading. Chuathbaluk's difficult logistics would require certification trips to take longer, adding additional cost. One way to get around this issue would be to maintain a lumber yard in Bethel. This would allow lumber grading and truss plant certification to both take place on the same trip, reducing costs. This was actually an idea suggested by the grading agencies contacted throughout this study. One drawback to a lumberyard in Bethel, however, would be the additional cost of shipping "green" lumber to the community, due to the increased weight of undried lumber. Despite this drawback, however, it would likely make sense to maintain the lumberyard in Bethel, although lumber would likely need to be stored in Chuathbaluk for short periods of time between deliveries. Chuathbaluk would also need to store raw materials for use in sawmill operations.

Why is Lumber Drying Necessary?

In order to be used in most construction products, wood needs to be dried prior to use. From a practical standpoint, dried lumber confers many advantages over freshly sawn, undried "green" lumber. These advantages extend beyond the producer/manufacturer to the consumer as well. One of the main advantages of drying lumber is that it reduces the moisture content, and therefore the weight, of lumber, which can reduce the shipping and handling costs of product transport. Drying the wood will also restrict the level to which it shrinks and swells, allowing for more durable construction. Properly dried lumber can also be cut to precise dimensions and machined more easily and efficiently. These precise cuts allow for wood parts to be more securely fitted and fastened together with nails, screws, bolts and adhesives.

The strength properties of wood increase as it dries, as do its electrical and thermal insulating properties. Common drying defects such as warping (curving of the board), splitting and checking (cracking) will largely be eliminated through a proper drying process, allowing for reduced inventory waste. Wood must also be dry before it can be glued or treated with fire retardant and decay-preventing chemicals.

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[88] Iowa State University Cooperative Extension Service, "Air Drying of Lumber", http://www.extension.iastate.edu/forestry/publications/pdf_files/fpl-gtr-117.pdf

[89] AVCP Kickoff Meeting, January 2015

What is the Goal When Drying Lumber?

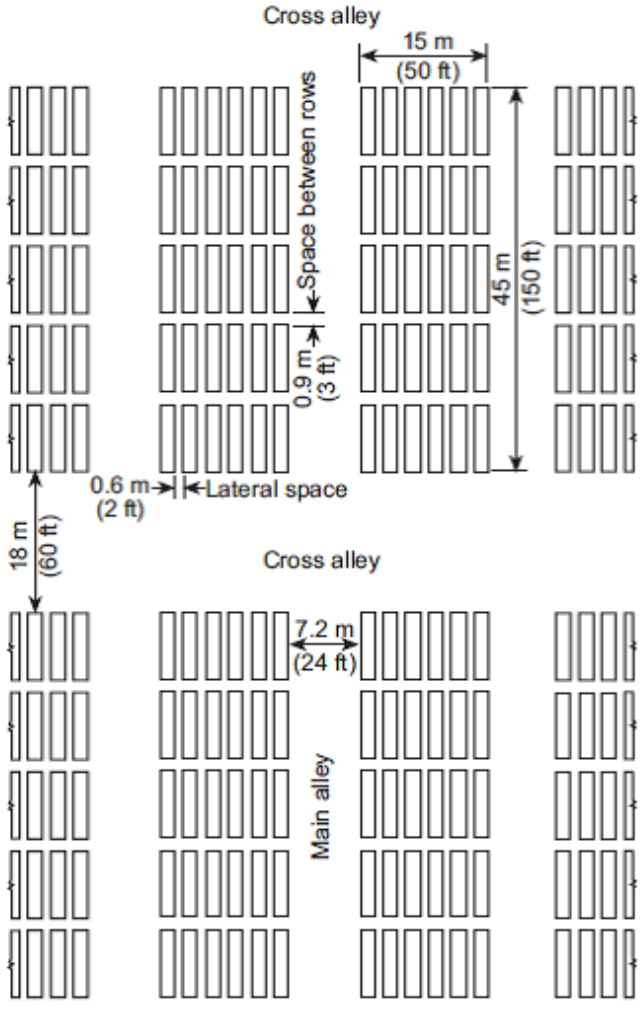
When drying lumber, the goal is to control the drying process as much as is practical, and to dry as quickly as the species will allow without damaging the wood product. Slow drying can be uneconomical and increase the risk of staining, fungal accumulation, and other lumber defects. Especially in colder, northern climates like those found in Bethel, air drying times can be considerable, which leads to significant inventory storage values that may impact AVCP's working capital involved in the project.

For truss manufacturing, softwood lumber (such as spruce) should be dried to a target moisture content of between 15 and 19 percent.[90] The typical starting moisture content for a species like white spruce is approximately 55 percent, meaning that the lumber needs to be dried considerably before being used in construction. Air drying is a common method for lumber drying, although kiln drying is also popular. While a species like white spruce would normally air dry in as little as 30-60 days in most climates, the cold, damp location of Bethel could result in drying times closer to a year. In many cases, producers will air dry lumber initially to reduce the moisture content before putting it into a kiln for final drying and processing. This helps to reduce the energy use associated with a kiln. Air drying also helps to reduce the necessary kiln capacity, allowing for a smaller, less expensive kiln.

Air Drying Lumber Yard – Best Practices

There are a number of best practices available in operation of a lumberyard that can speed the air drying process, which will be essential due to the lengthy drying times found in a region like Bethel. At the heart of air drying, the yard should be set up in such a way that will allow for good drainage of rain and melting snow, free movement of air in and out of the yard, and easy transportation and piling of lumber. The yard should, when practical, be oriented in such a way as to reduce obstructions to prevailing winds in the area. Ideally, air drying facilities should not be located near standing water or streams because this can slow the drying process due to excess moisture in the air. Unfortunately, in Bethel, the location may need to be near the river despite this fact.

Overall, the lumberyard should be laid out in a rectangular shape, with a series of alleys between different stacks of lumber. The yard should be outlined like a grid, with each alleyway forming a right angle at alley



[90] http://www.conradlumberco.com/pdfs/ch12_Drying_Control_of_Moisture.pdf

intersections. The alleyways serve a dual purpose: they serve as a transport route for workers moving through the yard, and they also serve as an airflow pathway through the yard. Alleyways also provide protection in the event of a fire in the lumberyard.

As much as possible, the yard should be oriented in a north-south direction, toward prevailing winds. The north-south orientation helps in areas with heavy rain and snowfall, since this orientation style will allow alleyways to receive greater sunlight, melting and drying the lumberyard more quickly. When oriented toward the prevailing winds, lumberyards increase the total airflow through the facility, allowing for better air circulation and faster drying times. Lumber piles should be placed a minimum of three feet apart, with main alleyways being 24-30 feet wide. Piles should be anywhere from four to 15 feet high, although piles could go as high as 20 feet with the use of a forklift. A diagram of a sample lumberyard layout can be seen in the illustration on the previous page:

It may also be advantageous to blacktop the entire lumberyard surface. This has the advantage of speeding drying times since blacktop absorbs sunlight, and it also serves as a moisture barrier against groundwater. Blacktopping also has the benefit of creating a smoother traveling surface to retrieve and transport wood, which will reduce the odds of damaging wood products due to rough or improper handling. It may be prohibitively expensive to pave a large surface in Bethel, however. At a bare minimum, the yard surface should be leveled and topped with gravel.

Each individual woodpile will need to rest on a pile foundation, which will help to prevent the wood from suffering defects, as well as increasing the airflow through the wood. If the lumber is on pavement, only a post is necessary to support each lumber pile. Posts can be made out of wood, concrete, or masonry, and should be approximately six to eight inches in diameter. In the event that the yard is not paved, a mud sill would be necessary to prevent the pile from sinking into the ground or becoming uneven. Cross beams should be laid between pile foundations to provide a base for the lumber to be stacked. The cross beams can be made out of wood or steel. If used out of wood, however, 4”x 6” pieces of lumber should be utilized.

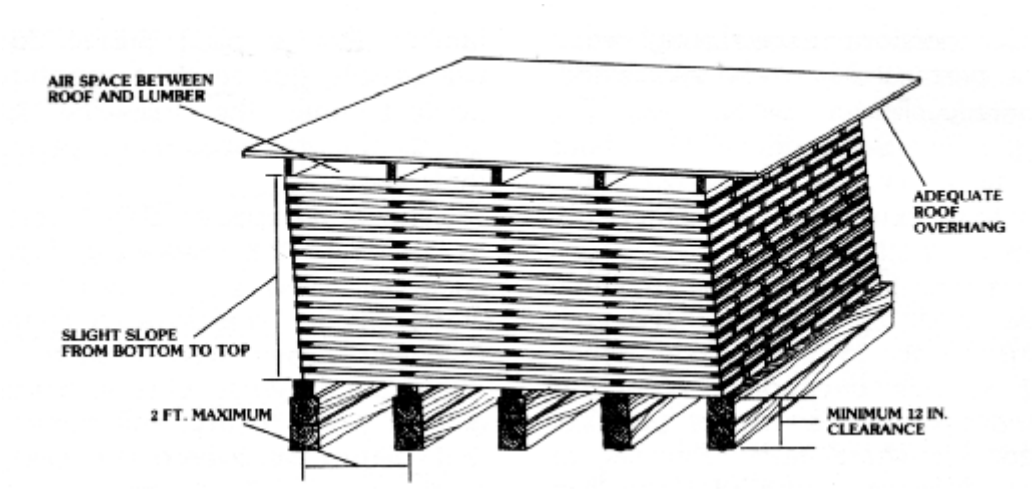


Figure 7: Diagram Showing the Essential Components of a Lumber Stack
Source: University of Iowa Cooperative Extension Service

Another essential feature of an air-drying lumberyard is covers for the woodpiles. Covers protect piles from sunlight and precipitation. Without a proper cover in place, lumber near the top of the pile will be

much more susceptible to warping and splitting. Allowing rain or snow into the pile will also slow the drying process. The roof should extend one foot out on the ends of the pile and should be sloped to allow water drainage off of the roof. The roof should not extend out on the sides of a pile, because it would get in the way of a forklift attempting to move a stack of wood. A side view of an optimal lumberyard setup can be seen below. Notice the vertical alignment between stickers, support posts and cross beams.

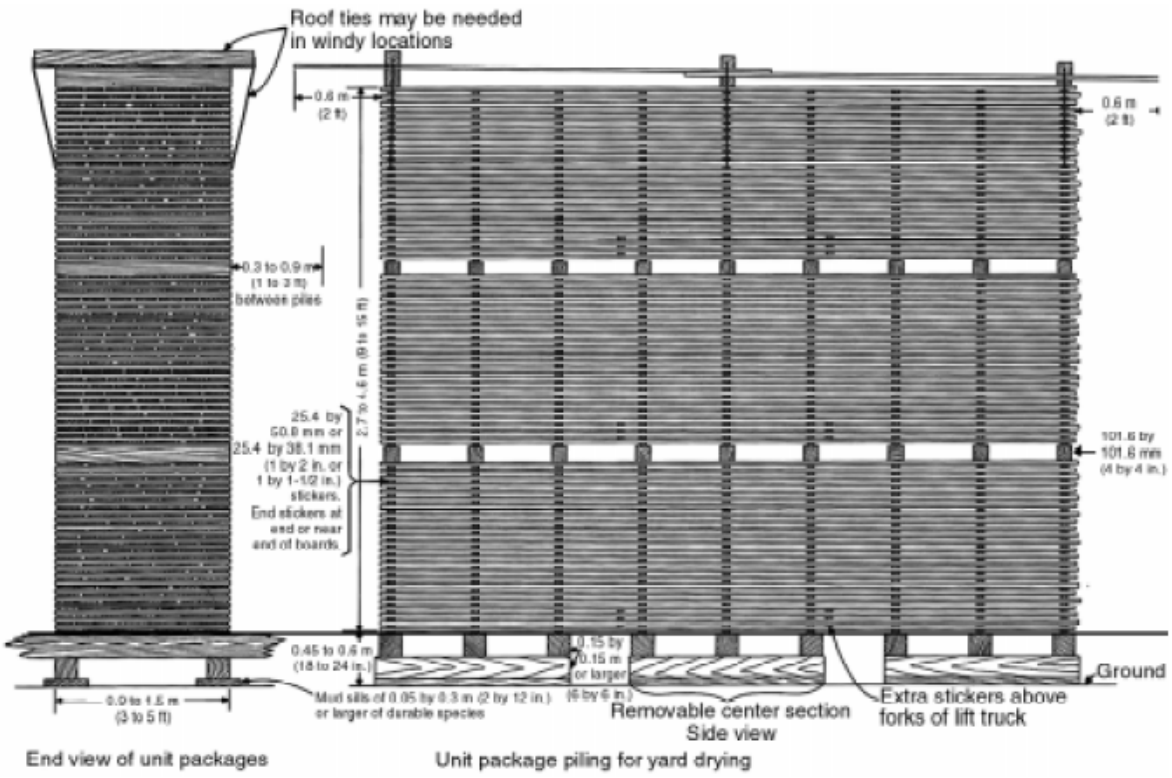


Figure 8: Covered Woodpile.
Source: University of Iowa Cooperative Extension Service.

“Stickers” should also be placed in between each layer of lumber. Stickers are small pieces of wood, often 1”x 1” in size, which are used to add spacing between layers of lumber, increasing airflow. Stickers should be vertically aligned from layer to layer, and should be vertically aligned with the supporting cross beams at the base of the pile. Maintaining vertical alignment will help to decrease the likelihood of wood defects such as warping or splitting. Stickers should be placed between 18 and 24 inches apart. When not in use, stickers should be stored in a dry area to reduce the odds of them contracting fungus or getting stained.

Another option would be to shed-dry lumber. In this system, lumber is stacked normally like it would be out in the open, but a shed is erected to cover the pile. The shed would consist of a framed structure with a tarp that is open at each end to allow for greater airflow. Shed-dried lumber can help lumber dry more quickly in areas prone to slow drying or rewetting.

When the lumber is stored, the ends of the lumber should have an end coating applied to them. End coatings can be applied either as a spray coat or as a brush application and are used to reduce the end splitting in a board. They allow for better yield and keep lumber from being destroyed during the drying process.

Figure 9: Example of Lumber Stacked in a Kiln. Notice the Small Pieces of Wood (Stickers) Vertically Aligned in Between Each Piece of Lumber.
Source: Iowa State University Extension

Regardless of the particular method for lumber drying used, each lumber pile should be given a time stamp that allows for easy cataloging for when it is ready to be used.

Kiln Drying of Lumber

AVCP could accelerate the drying process by operating a dry kiln. The dry kiln allows green lumber to be dried to the proper moisture content in a matter of days or weeks. This would allow AVCP to reduce its storage/inventory costs given that it would not need to deal with the lengthy air drying process. When air drying, AVCP would likely need to have two years of lumber on hand, half of which would be drying, the other half of which would be ready for use in that year's operations.

Dry kilns often operate between 100 and 180 degrees and are designed to accelerate the drying process considerably for lumber. One of the major drawbacks of the kiln system is that is highly energy intensive. A study by the USDA found that it took, on average, 1.2 million BTUs to dry 1000 board feet of wood.[91] It is likely that AVCP's operations would be able to generate a slightly more efficient system, however, due to greater volume and a higher desired moisture content. Nonetheless, it is anticipated that the total associated energy costs would be quite high. One possible way around this would be to utilize a wood-fired kiln that is powered by wood scrap from operations. This type of technology is currently being utilized by a firm in Tweed, Ontario, Canada, as well as by a firm in Delta Junction.[92]

[91] Operation and Cost of a Small Dehumidification Dry Kiln, http://www.fpl.fs.fed.us/documnts/fplrn/fpl_rn310.pdf
[92] Biomass Case Study Series, Chisholm Lumber, http://www.biomasscenter.org/images/stories/chisholm.pdf

XX. Funding Sources

Funding for community and economic development projects in Alaska can come from a variety of private, local, state and federal sources. AVCP and the sawmill owners should actively begin working with a combination of funders early on in the process to determine the best funding mix for the proposed facility. Although grant funding is anticipated to be an integral piece of the development budget, AVCP and the sawmill operators should realize that grant funding is both scarce and highly competitive, decreasing the likelihood that funds will be available to support the project. Recent budget cuts at the state and federal level have further compounded this problem. Any funder contributing outside funds to the project will also expect a large local contribution in the form of project match funding.

A. AVCP Contribution

It is anticipated that most funders will require significant matching funds before they are willing to make a contribution to the project's development. In order to be successful in generating outside funding, AVCP and the sawmill owner will need to find some level of local match to support the project. Additionally, it is worth noting that AVCP and the sawmill owner may be able to provide some of this match through the contribution of in-kind resources to the project. Depending on the specific funding source, the facility itself may be used as match. While the specific amount of match required by each funding source varies, a recommended amount would be somewhere in the 25-50 percent range of the project's cost.

B. Private and Local Funding

Banks, credit unions, and savings and loan institutions are the most familiar sources of debt financing. Obtaining funding through one of these sources will add considerable cost to the project, however, and may impact the project's overall feasibility. The debt financing would require debt service payments above and beyond expenses that are already anticipated in the accompanying financial models. AVCP will have an advantage over traditional buyers, however, given its longstanding history of running businesses in the region. AVCP may also be able to qualify for a Bureau of Indian Affairs or U.S. Department of Agriculture-backed business loan, which would improve AVCP's attractiveness to private-sector lenders.

C. State Sources for Funding

State sources of funding consist of loans and grants. For AVCP and the sawmill owner's purposes, we investigated both of these sources. One source of grant funding is the State of Alaska's Community Development Block Grant program. While the program typically focuses on providing financial resources for public facilities and planning activities related to health and safety, the program also occasionally funds special economic development activities that result in the creation of jobs for low- and moderate-income individuals. It is anticipated that the AVCP/sawmill project would likely be a good candidate to qualify under this special economic development category of funding. If pursuing this grant, AVCP and the sawmill will both need to clearly communicate the projected jobs that will result from the project, and demonstrate the overall economic impact the project will have on the region. Communities are eligible to receive up to $850,000 for their project. Despite this high maximum cap for funding, in FY

2014 the State of Alaska had approximately $2 million in total funding available through this program. This program typically requires match funding of at least 25 percent of the total project cost. With a small budget for available grants and high need throughout the state, this is expected to be a highly competitive source. Grant applications are evaluated on several different criteria, which include the following:

- Project Description and Selection/Citizen Participation Plan (15 points)
- Project Plan/Readiness (25 points)
- Project Impact (25 points)
- Budget/Match/In-Kind (25 points)
- Administrative Capabilities (10 points)

It is important to note that when receiving state funding, any construction project must be built according to the certain specifications outlined by the funding agency. For example, all projects built with Division of Community and Regional Affairs funding must comply with all local building codes, the Uniform Building Code, the Uniform Mechanical Code, the Uniform Plumbing Code, the Americans with Disabilities Act, as well as the National Electrical Code and the energy efficiency standards outlined by the State of Alaska. This factor would not be relevant if making an equipment purchase but become a consideration if funds are used to build or repair a construction facility.

In addition to grant programs, the State also offers loan programs for Alaska businesses. The primary loan programs available to Alaska small businesses are the Rural Development Initiative Fund (RDIF) and the Small Business Economic Development (SBED) loan. The RDIF loan is open to businesses located in communities off the road system with a population of 5,000 or less. These loans have a maximum allowed amount of $300,000 for a maximum term of 25 years.[93] Due to the population restrictions, AVCP would likely not qualify for this program, but the sawmill operation could. The SBED program has a maximum borrowing amount of $300,000 at a maximum term of 20 years.[94] Both of these loan programs would need to demonstrate job creation and match funding within the region in order to qualify.

D. Federal Sources for Funding

Federal funding sources typically consist of grants and federal loan guarantee programs. All loans must be obtained from a bank or lending agency. As discussed previously, if AVCP or the sawmill wishes to pursue a loan for the project's financing, it will be important to verify that they have the ability to meet the necessary debt service coverage demands of the loan. The primary sources of federal grants for the truss manufacturing plant and sawmill include grants through the U.S. Economic Development Administration, U.S. Department of Agriculture, and the U.S. Department of Housing and Urban Development. These grants are for community development, economic and business development, and creating jobs in rural communities. All grants are highly competitive, and federal funders will likely require matching funds. Given the current state of the federal budget, matching requirements have

[93] AIDEA Rural Development Initiative Fund (RDIF)
http://www.aidea.org/Programs/BusinessLoans/RuralDevelopmentInitiativeFundRDIF.aspx
[94] AIDEA Small Business Economic Development
http://www.aidea.org/Programs/BusinessLoans/SmallBusinessEconomicDevelopmentSBED.aspx

increased and now tend to be at least 1:1 between federal and local match. While grant funding can be a great way to make a project more attainable, it does not completely eliminate the need for contributing local funds to the project.

Indian Community Development Block Grant

The Indian Community Development Block Grant Program is a grant program offered through the U.S. Department of Housing and Urban Development (HUD). The program is available to Indian tribes and Alaska Native villages and is designed to help meet their community and economic development needs without having to compete with cities and counties. As of FY 2014, the maximum award for Alaska recipients was $600,000.[95] For FY 2014, the State of Alaska had a total of $5,955,906 allocated to the region[96]. Funds may be used for economic development activities, provided that the primary beneficiaries of jobs and economic activity are low-income individuals. Projects will be rated based on five separate factors, which include the following:

- Capacity of the applicant
- Need/extent of the problem
- Soundness of approach
- Leveraging resources
- Comprehensiveness and coordination

It is also worth noting that ICDBG funds may not be used for a profit-making activity. If for-profit firms are eligible for project funds, they may use them on the project, but only if they do not earn a profit on the project. Despite these issues, there may be partnership arrangements that would allow the local community to pursue this funding source.

USDA Rural Business Development Grants

The USDA's Rural Business Development Grant (RBDG) program is designed to support the expansion and development of rural businesses with fewer than 50 employees and less than $1 million in gross revenues. Generally, RBDG grants are geared toward smaller projects, with typical amounts ranging from $10,000 to $500,000. Funds can be used on a number of different types of projects, including project planning, feasibility studies, technical reports or product/service improvements. Funds can also be used for development of land, construction, renovation of buildings, machinery and equipment.

Applications are evaluated using the following criteria:

- Evidence showing job creation that will occur
- Percent of non-federal match funding for the project
- Economic need of the area served
- Consistency with local economic development priorities
- Experience of the grantee with similar efforts

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[95] Indian Community Development Block Grant Program, *http://portal.hud.gov/hudportal/HUD?src=/program_offices/public_indian_housing/ih/grants/icdbg*

[96] Indian Community Development Block Grant Program http://portal.hud.gov/hudportal/documents/huddoc?id=PostedNOFA2014.pdf

Federal Loan Programs

In addition to its grant programs, USDA also offers assistance to rural businesses through its Business & Industry Loan Guarantee program. The program provides USDA backing for business loans administered by banks and credit unions and lent to businesses in rural communities. The Bureau of Indian Affairs offers similar guarantees. These loan-guarantee programs offer competitive interest rates and can serve as a reduced-cost method of borrowing for both AVCP and the sawmill.

Economic Development Administration (EDA) Grants

The U.S. Economic Development Administration (EDA) offers grant opportunities for tribal entities engaging in economic development projects through its Economic Adjustment Assistance program. The program is designed to "leverage existing regional assets and support the implementation of economic development strategies that advance new ideas and creative approaches to advance economic prosperity in distressed communities." [97] EDA's strategic investments are designed to support economic development and job creation in economically distressed areas of the US.

In the past, EDA has been quite selective in distributing funds as part of its Economic Adjustment Assistance program. For instance, EDA has historically awarded funds to between only 70 and 140 projects each year nationwide. The average size of these awards has been $820,000, although investments range from $100,000 to $1,250,000. In order to receive funding, applicants must clearly demonstrate the overall economic impact of their project on the region, including projections for the number of jobs created over a nine-year project time horizon.
Applications for EDA assistance must include each of the following elements:

- Description of the project region and location
- Description of regional eligibility
- Description of the project
- Documentation of how the project meets regional needs
- Documentation showing how the project aligns with EDA investment priorities
- List of strategic partners involved in the project
- Documentation supporting budget request
- Documentation of project impacts

After being submitted, EDA applications will undergo as many as three separate rounds of review, including from: EDA project officer, Investment Review Committee and the grant officer. The grant officer will have the final say over whether projects receive funding.

E. Summary

AVCP and the sawmill operation will likely face challenges when looking for project funding. However, there are many potential funding sources available to AVCP and the sawmill. It is recommended that AVCP and the sawmill first approach funders at the local level that may be more likely to commit funding before matching funds are available. From there, state and federal agencies can be approached. In all likelihood, successful fundraising will require several different sources of funds.

[97] EDA FY 2015 EDAP NOFA