

Ely Community Meeting

Ely Biomass District Energy System Preliminary Feasibility Study

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Wood Education and Resource Center

Overview



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.Goal of Preliminary Feasibility Study

- Brief project example
- Options evaluated
- Option economics
- Summary

Goal of Preliminary Feasibility Study



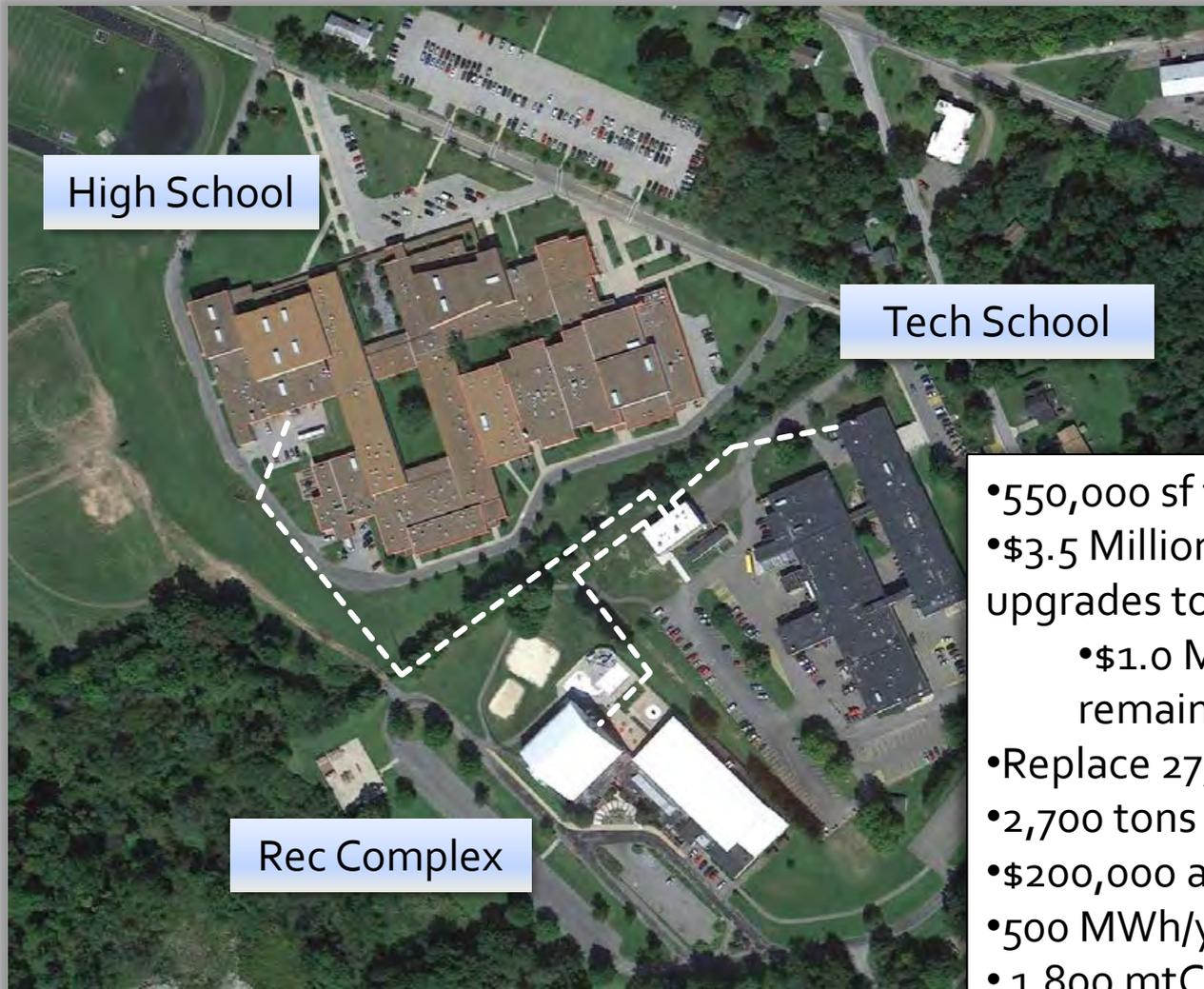
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- Identify major users in Ely
- Evaluate biomass district energy options to serve the major users
- If a project serving the major users looks viable, it may be possible for Ely to then pursue a district system to include smaller energy users

Thermally-led Biomass CHP, District Heating



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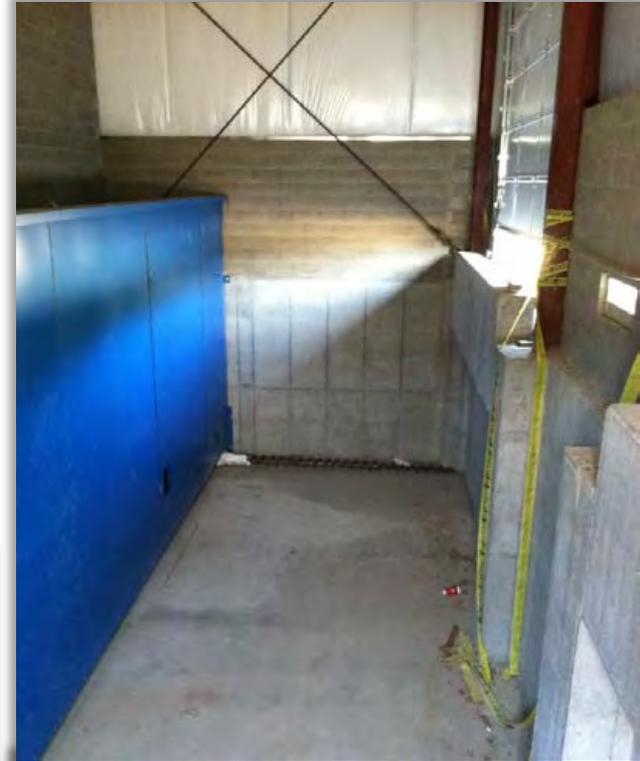


- 550,000 sf total
- \$3.5 Million project cost (\$0.5 M for upgrades to Rec Complex)
 - \$1.0 Million in grant funding remainder financed
- Replace 27,000 mcf ngas per year (80%)
- 2,700 tons wood chips per year
- \$200,000 annual savings (\$8/mcf)
- 500 MWh/yr generated (15%)
- 1,800 mtCO₂/yr net carbon offset



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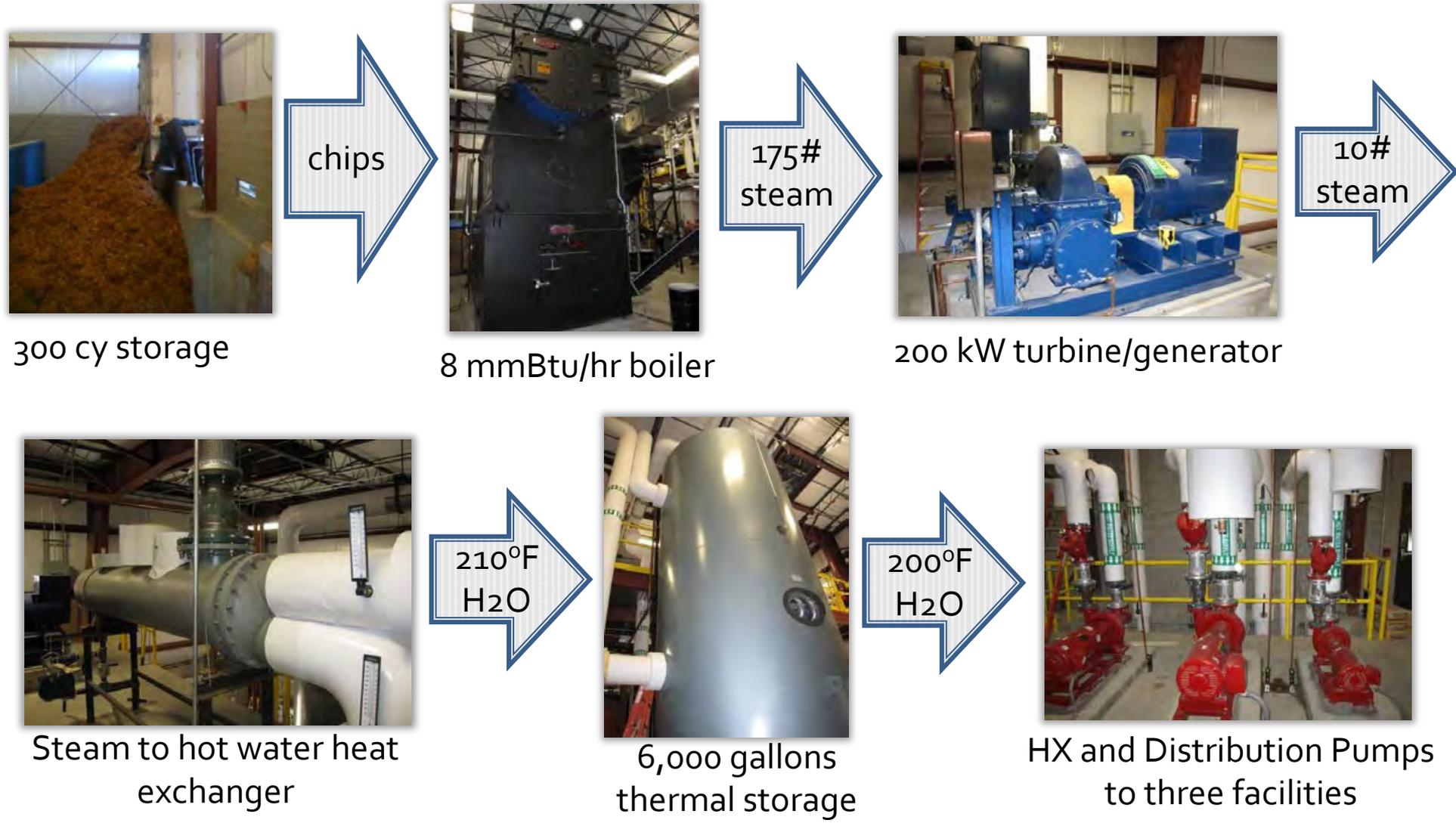
Crawford Central Biomass CHP District Energy System



Key project components



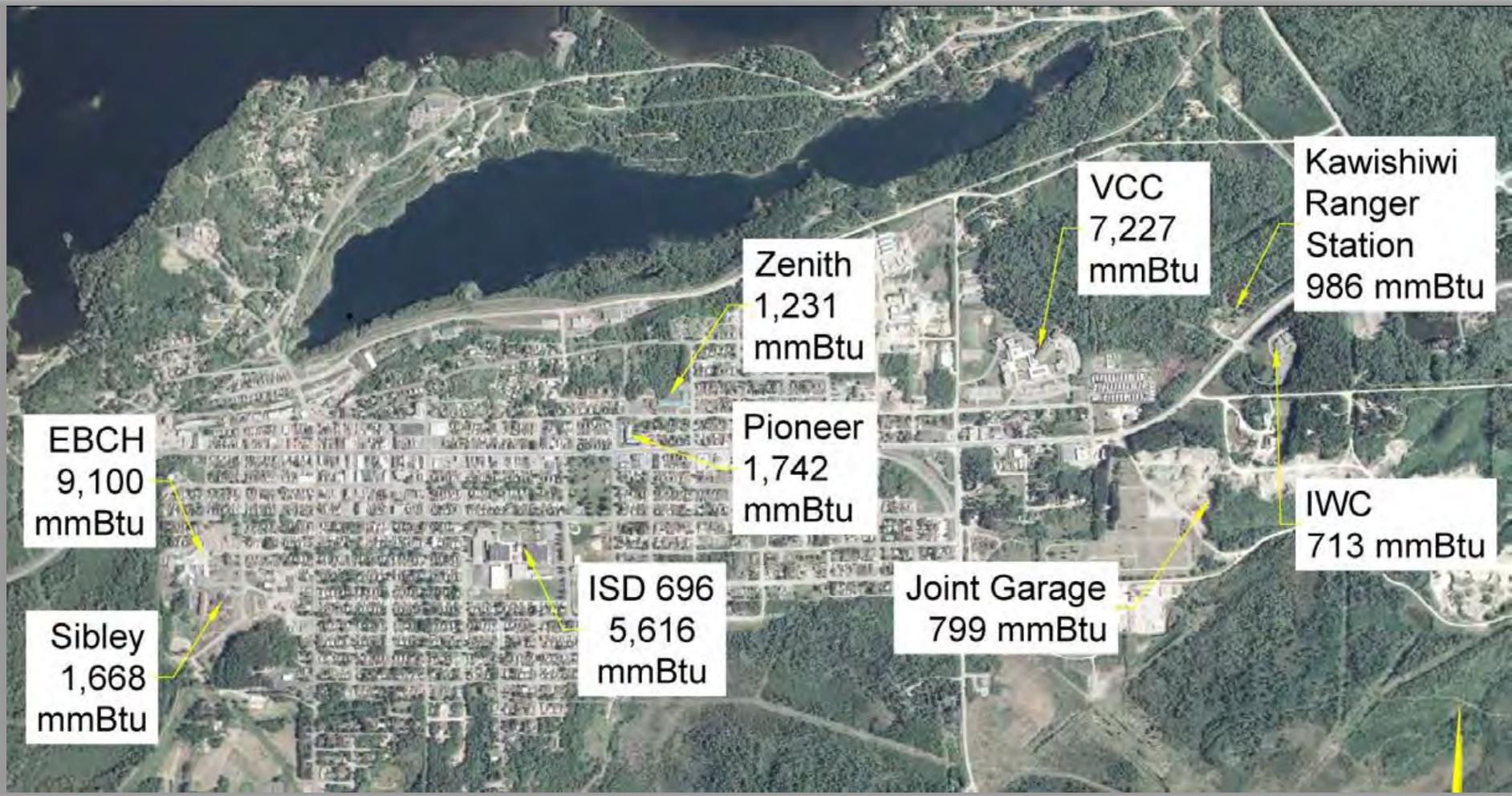
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Major heating fuel users



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Options evaluated



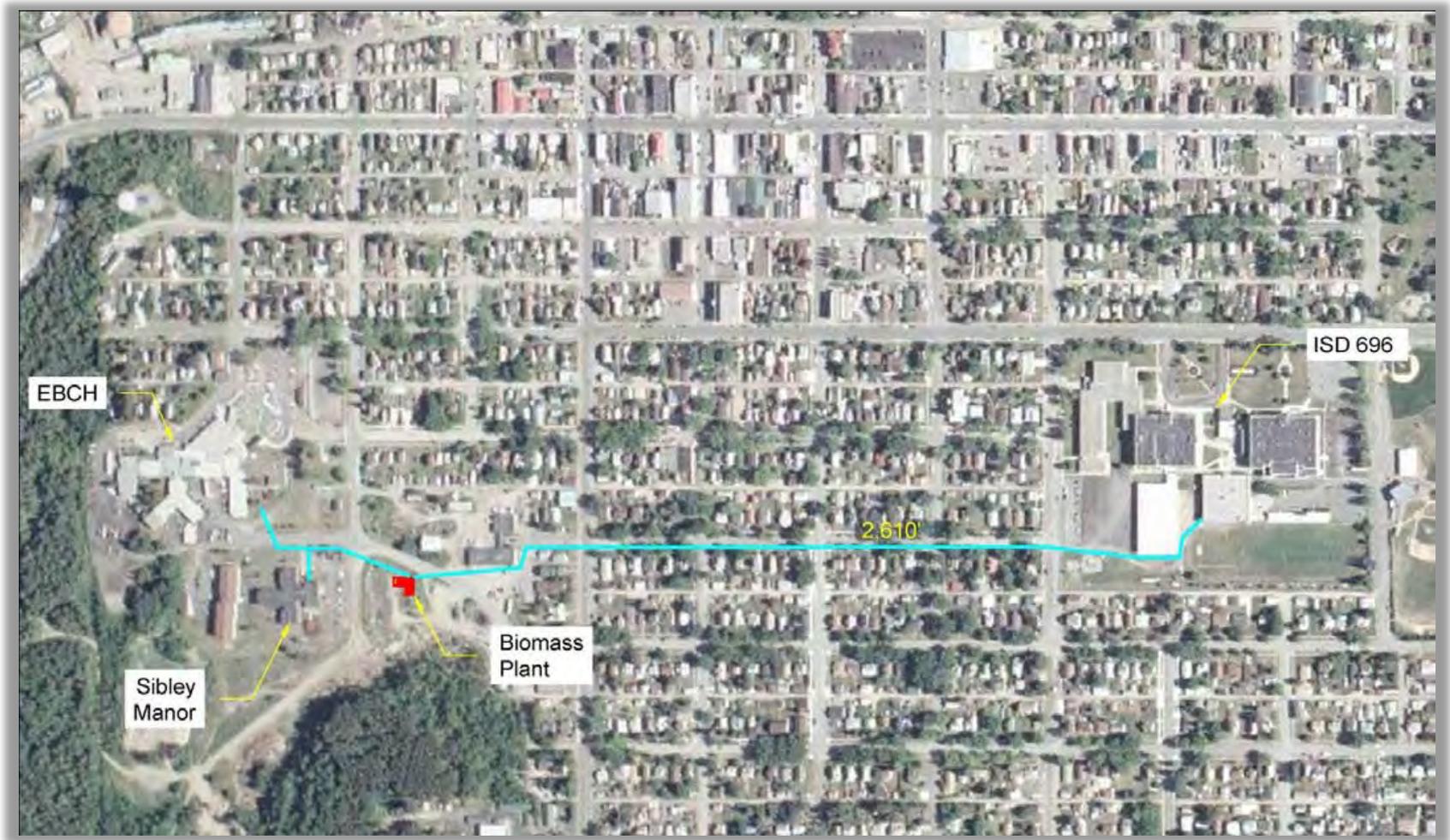
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- Option 1 – Plant serving VCC
- Options 2 - 5 – Plant serving Hospital, School, Sibley
 - Option 2 – Steam to hospital, hot water to school
 - Option 3 – Hot water to hospital and school
 - Option 4 – Option 2 with steam turbine CHP
 - Option 5 – Option 3 with ORC CHP

Options 2&3 Site Plan



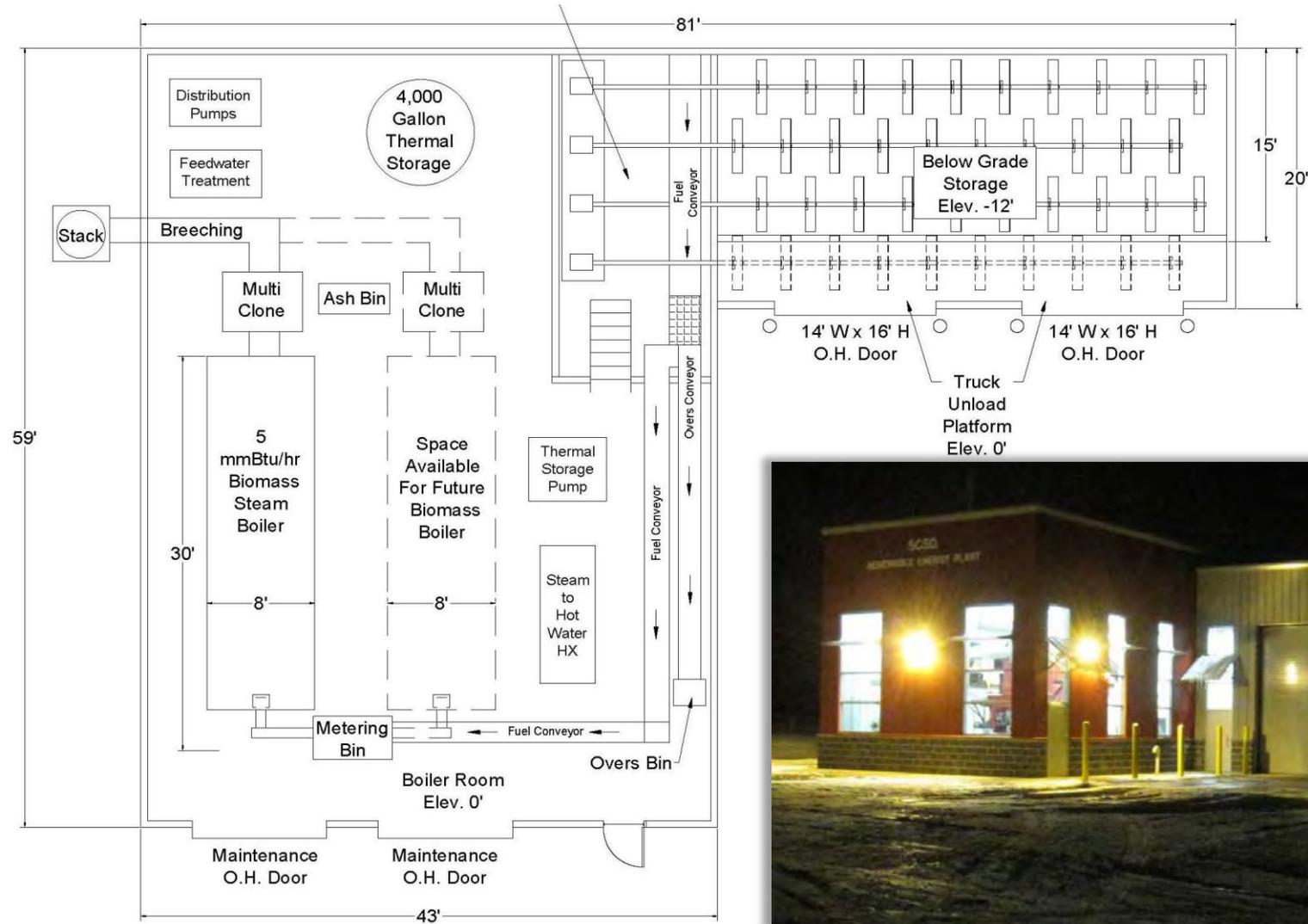
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Biomass building layout



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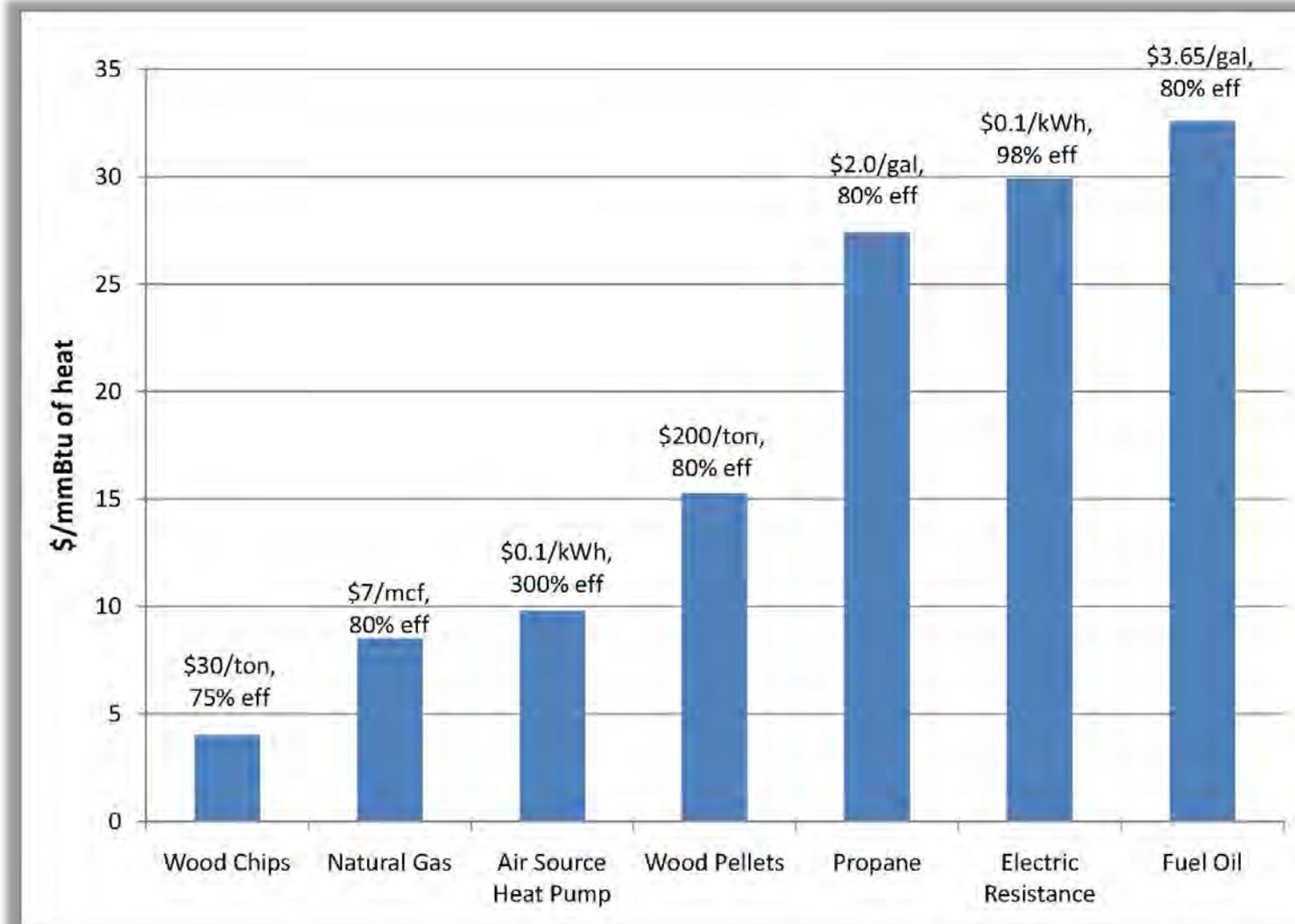


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Heat Costs per mmBtu



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Annual savings potential, Options 2&3



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- ~\$430,000 current annual heating fuel cost
 - Hospital, school, Sibley Manor
- ~\$300,000 potential savings with biomass
 - ~\$90,000 for 2,925 tons wood chips – stays in local economy
 - ~\$20,000 for fuel oil and propane
 - ~\$20,000 in increased operating costs

Economics Options 2&3



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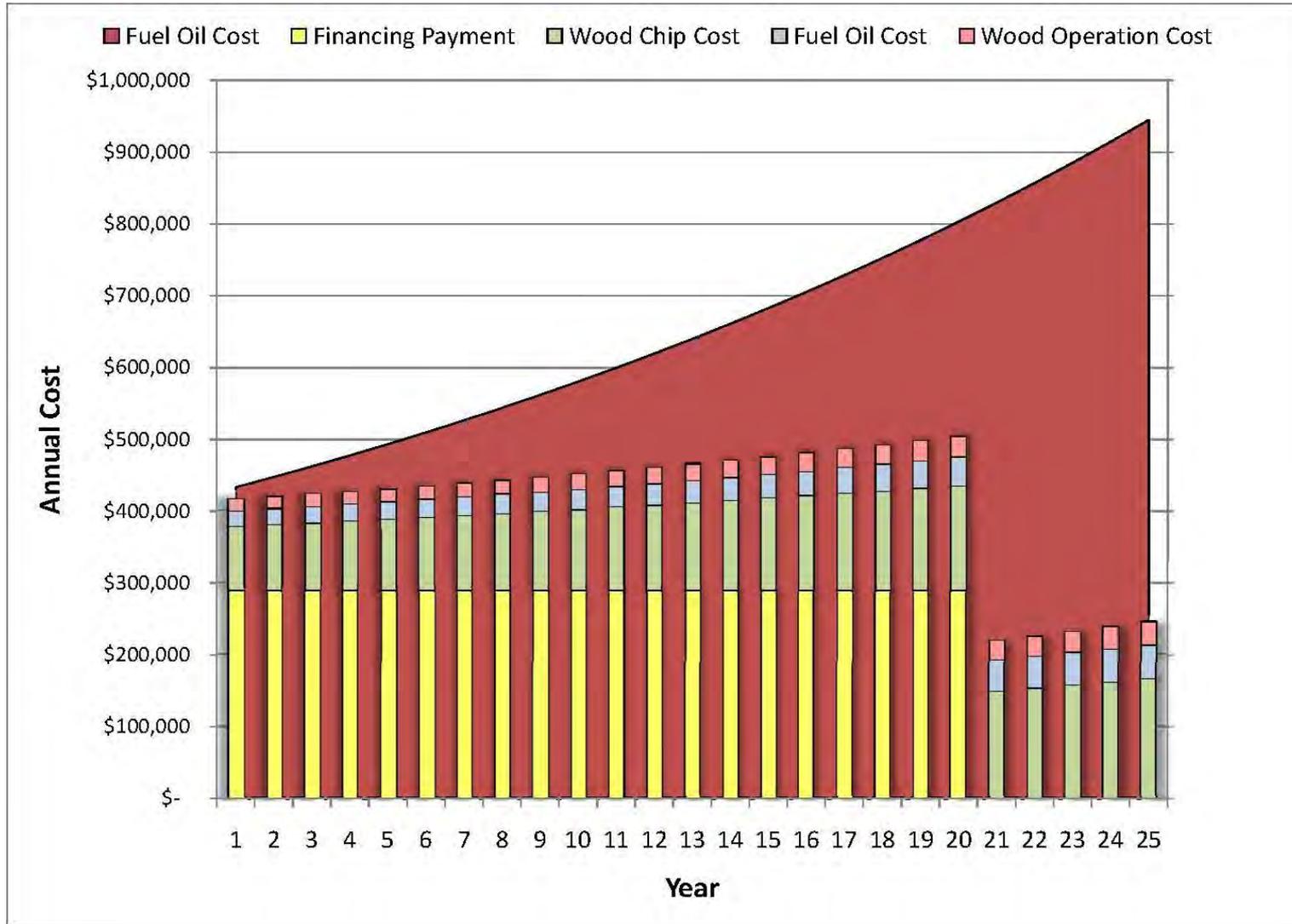
- ~12.5 yr simple payback (cost/annual savings)
 - ~\$3.75 Million project capital cost
 - ~\$0.3 Million annual savings
- Cash flow analysis – finance initial cost and use savings to pay down loan

Amount Financed	Annual Savings	Annual Payment	1 st Year Cash Flow	Net Present Value
\$3,765,866	\$306,854	(\$289,505)	\$17,349	\$3,877,825

Cash flow analysis – Option 2/3



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Economics Options 1-5 & Sensitivity to Fuel Price



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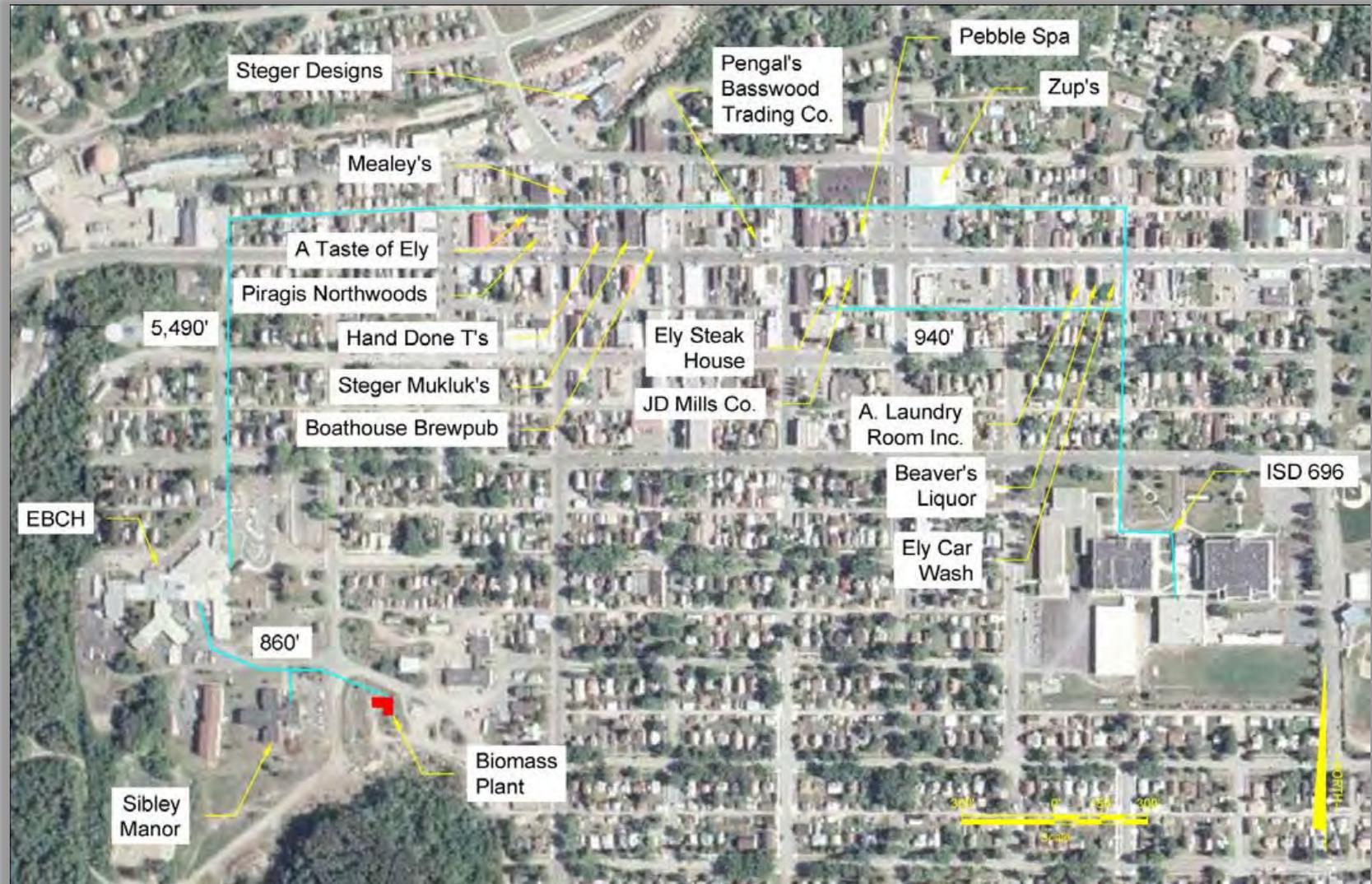
Option	Financed Amount	Annual Financing Payment	20 Year Financing, 1st Yr Cash Flow	25 Year Net Present Value
1	\$1,934,318	(\$148,703)	(\$8,830)	\$1,484,642
2	\$3,783,002	(\$290,823)	\$15,031	\$3,832,127
3	\$3,765,866	(\$289,505)	\$17,349	\$3,877,825
4	\$4,664,050	(\$358,554)	(\$33,439)	\$3,303,992
5	\$7,164,786	(\$550,801)	(\$195,235)	\$1,204,394

Option	Potential Savings at Current Biomass and Fossil Fuel Prices	Potential Savings with Biomass Price Doubled (Fossil Fixed)	Potential Savings with Fossil Fuel Price Doubled (Biomass Fixed)
Option 1	\$139,873	\$113,542	\$316,677
Option 2	\$305,854	\$218,120	\$717,642
Option 3	\$306,854	\$219,120	\$718,642
Option 4	\$325,115	\$229,908	\$736,903
Option 5	\$355,566	\$213,654	\$767,354

Business loop



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Summary of business loop



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- \$153,000 in additional fossil fuel costs for a total of ~\$585,000
 - 15 businesses included – more could be added
- ~\$400,000 in potential annual savings
 - \$124,000 spent on wood chips – stays local
 - \$37,000 spent on fossil fuels
- ~\$1.7 Million in added cost for total of \$5.5 Million

Why utilize biomass for thermal applications?

■ Environmental and Social

- Renewable energy
- Replace fossil fuel (foreign)
- Markets for low-use wood (industry & forest residues)
- Thermal is most efficient use of limited biomass resource (thermal and thermally-led CHP 70 – 90% thermal efficiency)
- Carbon neutral? (sale on voluntary market)

■ Economic

- Energy dollars stay local = local jobs
- Energy savings to owner