

ATHERTON SUSTAINABILITY ATTRIBUTES - ELEMENTS/APPROACHES

12.2.2016
Matrix v10

CATEGORY	ALTERNATES PER OVERALL SUMMARY PAGE	ATTRIBUTE	EXTENT	NOTES	BENEFIT: EDUCATIONAL	BENEFIT: RESILIENCY	BENEFIT: OTHER OPPORTUNITIES	INCLUDED IN BASE BID- ESTIMATED COST \$,000	PREMIUM COST - ALTERNATE BID- ESTIMATED COST \$,000	RETURN ON INVESTMENT (ROI)
Electrical										
Energy Monitoring	1 & 2	Energy Monitoring for electrical and mechanical equipment	Each panel board and large piece of equipment	Important for net-zero to verify energy usage and production and to identify problem areas of high energy use for reduction	Potential to educate community as well as city staff. Can be displayed on dynamic screen - production of PVs coupled with energy demand. Has proven to contribute to user responsibility and increased energy savings.		Ability to track usage and ensure system is working efficiently. Ability to diagnose usage issues, Saves operational costs	Library: \$56 (Includes: Mechanical: Campus Energy Monitoring)	City Hall: \$13	NA
Microgrid	3	Microgrid Options	Police Station battery powered off of PV system.	Adds additional level of redundancy for power outages, reduces reliance on fossil fuels in the event that trucks cannot get through to deliver fuel (or in the event that fuel is prioritized for places like hospitals and it is difficult to get in time), provides opportunity to use the police station as a safe refuge where community members can come to charge phones and get in touch with loved ones during a major emergency Space for batteries is currently not included in building layout. While the Micro grid itself does not have a viable ROI, there are intangible benefits to the community to have a space that is resilient to prolonged outages that goes beyond simple financial payback. Conduits for Microgrid are included in the base bid.	Leadership role in community.	Resiliency strategy; may reduce generator size	First civic center to include technology; showcase for Valley. Potential for Peak Energy shaving.	Library: \$164	City Hall: \$606K	NA
PVs	4 & 5	Photovoltaic Panels	Library, Car Ports and City Hall (Composition Roof)	PV system can reduce size of Emergency Generator and contributes to zero net energy (ZNE) usage. Admin/PD/CC building priced to have composition roof under the PVs. Cost includes: PV panels, inverters and installation. Panelboard/disconnect switch/ductbank, and conduits (plumbing) are included in the base bid. Recommended: Corp yard, car ports RA1, RA2 and RA7 and roofs RA10, RA14 and RA17 on Admin/PD/CC. 5: PV's for Library RA6 and RA5 (provides PV power to existing Council Chambers). Results in 114% of ZNE site-wide.	Leadership role for community; Potential to educate community as well as city staff. Can be displayed on dynamic screen - production of PVs coupled with energy demand. Has proven to contribute to user responsibility and increased energy savings.	ZNE: provides renewable source of power;	First ZNE civic center	Library:RA5=\$82K and RA6=\$456K	City Hall: \$2,342	Library-Approx. 5 years; City Hall 5 to 10 years depending on amount of panels
Mechanical										
Geo Exchange	6 & 7	Water Source Heat Pumps	Geothermal field with 45 bores at two tons each. Assume each vertical bore is between 350-450 feet deep with bentonite grout.	Water source heat pumps provide excellent energy efficiency. Any alternate mechanical system would need to reach the efficiency of this system. 24 years expected Payback if the geoexchange will displace PV (i.e. we are included the initial cost reduction of PV to get to ZNE). This ROI assumes no cost of money and a 6% inflation in energy rates per annum.	Leadership Opportunity. Ties Water story to Energy Story	It appears that this system may not yield a significant savings in energy, or in PV panels given the temperate climate.			City Hall: \$581 Library \$193	Campus (City Hall & Library) benefit approx. 24 years
Chilled Water Thermal Storage Tanks	8	Demand based electrical reduction and reduced energy use	Central Plant is made of chillers, boilers, condensed water systems, controls, and distribution systems.	Underground thermal storage tank to store chilled water. Allows the campus to make and store cooling water in the evening and get heat recovery from the heat pumps when the rest of the occupied spaces (police) are in heating. It also reduced PG&E demand charges and allows cooling when the outside air temperature is cooler, making the equipment more efficient and less noise during occupied periods. Drawback: Acoustical in the evening. Potential PGE Energy Design Grant.	Contributes to Water Story	Adds some redundancy in the event of a power failure. Works well with a Micro grid			\$98	Campus benefit approx. 5 years

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Water										
On-site Well	9	Well with power source and pressure tank for onsite non-potable demands	One well for entire site	Well allows for groundwater exchange concept (offset withdrawals with onsite infiltration). Base Cost: Hook irrigation system and building up to municipal water supply. Well Alternate Additional Cost: TOTAL COST = \$89,000 (Cost to be allocated proportional with City Hall (60%=\$53K) and Library (40%=\$36K) Estimated ROI: Water savings: 83,439 gal/yr. at Library and 600,000 gal/yr. for site irrigation (+ 2M gal for irrigation system start up) at \$.01/gal. - Savings Year 1&2 = \$21,669 ESTIMATED ROI = (\$89,000 - \$21,669)/\$6,834/yr. = 10 years ESTIMATED ROI (irrigation only) = (\$89,000 - \$20,000)/\$6,000 = 11.5 years	Enhances water balance story. Water from well is used for irrigation and goes back to replenish aquifer	Resiliency from water price increase and water shortage		\$0	\$89 (Lib: \$36K/City Hall \$53K)	Campus benefit: 10-11 years for both Library and City Hall. Cost split proportional.
Gray water	10	Treatment for Passive Irrigation	At Library	Reduces reliance on well for irrigation. CAC raised concerns that gray water could be harmful to redwoods if proper soaps are not used in bathrooms for hand washing or if children wash paint brushes in bathroom sinks. Some operational controls required to ensure potentially harmful chemicals are not used in the library sinks. Base Cost: Plumb library bathroom sinks directly to sewer. Gray water Alternate Additional Cost: TOTAL COST = \$42,000 Estimated ROI: Assumes 10,000 gal of water savings per year at \$.01/gal. (\$100/yr.) ESTIMATED ROI = (\$42,000 / \$100/yr.) = 420 yrs.	Part of the Water Story; illustration of Atherton as a Steward	Resiliency from water price increase and water shortage	First civic center to include rainwater for full Water Reuse Story; showcase for Valley		Library: \$42	Campus benefit - approx. 420yrs.
Rainwater Harvesting	11	Treatment for reuse as irrigation and/or toilet flushing	Collection and reuse at Library Building. Tie collection system for Police / Admin Bldg. into Library treatment and reuse system.	Meets Stormwater management objectives. Reduces reliance on municipal water for toilet flushing and irrigation. If rainwater harvesting is not implemented additional bio retention area is needed for Stormwater treatment and detention. Base Cost: 400 sq. ft. of rain garden including deep base rock section to provide necessary detention. Rainwater Harvesting Alternate Additional Cost: Total = \$231,000 Estimated ROI: Assumes 15,000 gal of water savings per year at \$.01/gal. (\$150/yr.) ESTIMATED ROI = (\$231,000)/\$150/yr. = 1,540 yrs.	Part of the Water Story; illustration of Atherton as a Steward	Not dependent of municipal systems	First civic center to include rainwater for full Water Reuse Story; showcase for Valley		\$48	Campus benefit - approx. 1540 years
Plumbing										
Dual Plumbing	12 & 13	Dual plumb library building such that non-potable water can be used for flushing toilets		Net zero requires no potable water to be used for non-potable demands. Base Cost: - Plumb library building and City Hall building with municipal domestic water only. Dual Plumbing Alternate Additional Cost: Library Cost = \$13,000 City Hall Building Cost = \$28,000 Estimated ROI: <u>LIBRARY</u> - Assumes 15,000 gal of water savings per year at \$.01/gal. (\$150/yr.) - ROI = (\$13,000/\$150/yr.) = 87 yrs. <u>CITY HALL BUILDING</u> - Assumes 69,000 gal of water savings per year at \$.01/gal. (\$690/yr.) - ROI = (\$28,000/\$690/yr.) = 40 yrs.	Part of the Water Story; illustration of Atherton as a Steward	Plan for alternative water source	Combine with Well water for enhanced water story		City Hall: \$28 Library: \$13	Library: approx. 87 yrs.; City Hall: 40 yrs.
Solar Thermal	14	Solar thermal heating	Located at Police Building to support showers only	Solar thermal systems will work to preheat domestic hot water and reduce the energy needed to heat the buildings. ROI – Plumb-1: Solar Thermal for Police Station showers – expected ROI details as follows: 7 year payback after receipt of California Solar Rebate.	Displays how some PV is used for building energy and some hot water use. Water and Energy connection		Contributes to Water Story		PD \$53	approx. 7 yrs.