

ATHERTON SUSTAINABILITY ATTRIBUTES - ELEMENTS/APPROACHES

CATEGORY	ATTRIBUTE	EXTENT	SUSTAINABILITY SCORECARD NOTES	ROI LIBRARY	ROI ADMIN PD	EDUCATIONAL ASSETS	RESILIENCY	OPPORTUNITIES	BASE BID ESTIMATED COST \$,000	ALTERNATE ESTIMATED COST \$,000
ENERGY										
Lighting										
Electrical	Energy Monitoring	Each panelboard 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	TBD	Immediate	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. Saves operational costs	Library \$16	CH \$13
	Solar Emergency Microgrid	Police Station-Solar PV; energy storage; and monitoring, communications & control SEM to provide indefinite back-up power for critical loads	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.	TBD	TBD	Leadership role in community.	renewable source for emergencies; may reduce generator size	First civic center to include technology; showcase for SValley		Library: \$604K; PD: \$422K; Admin/PD/Chambers: \$770K
PVs	PVs	Exterior Roof	PV system can reduce size of Emergency Generator.	Approx. 5 years	Depending on amount 5-10 years	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 : \$573K	ADMIN/PD: \$2.42M
Mechanical										
Geo Exchange	Water Source Heat Pumps	Geothermal field with ~45 wells.	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 geoechange 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.	CAMPUS benefit approx. 24 years	See Library	Leadership Opportunity. Ties Water story to Energy Story				CH \$581 Lib \$193
Chilled Water Thermal Storage Tanks	Demand based electrical reduction and reduced energy use	Central Plant	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.	CAMPUS benefit approx. 5 years	See Library	Contributes to Water Story				\$98
Energy Monitoring	Measurement of building systems by end use	Campus wide	Important for net-zero to verify energy usage and production and to identify problem areas of high energy use for reduction. You cannot manage what you don't measure.	NA	NA	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. Contributes to achieving ZNE results		Provides ability to track system performance and save on potential operational costs	Lib \$40	
Central Plant	Efficient system for campus approach	Campus wide	Each building in the facility is served by a central chilled and hot water plant. The plant consists of a modular heat pump chiller which provides both heating and cooling from the single unit. The modular nature of the system allows it to operate at peak efficiency, regardless of load.	CAMPUS	App. 0 yrs	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. Contributes to achieving ZNE results		Provides ability to track system performance and save on potential operational costs	Lib \$40	

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Water										
On-site Well	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 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 \$0.01/gal. - Savings Year 1&2 = \$21,669 - ROI = (\$89,000 - \$21,669)/\$6,834/yr = 10 years ROI (irrigation only) = (\$89,000 - \$20,000)/\$6,000 = 11.5 years	CAMPUS benefit - 10-11 years for both Library and CO/PD	See Library	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			\$89
Graywater	Treatment for Passive Irrigation	At Library	Reduces reliance on well for irrigation. CAC raised concerns that graywater could be harmful to redwoods if proper soaps are not used in bathrooms for handwashing 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. Graywater Alternate Additional Cost: - TOTAL COST = \$42,000 Estimated ROI: - Assumes 10,000 gal of water savings per year at \$0.01/gal. (\$100/yr) - ROI = (\$42,000 / \$100/yr) = 420 yrs	CAMPUS benefit - app. 420 yrs	See Library	N	Resiliency from water price increase and water shortage	First civic center to include rainwater for full Water Reuse Story; showcase for SValley		Lib \$42
Rainwater Harvesting	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 raingarden 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 \$0.01/gal. (\$150/yr) - ROI = (\$231,000/\$150/yr) = 1,540 yrs	CAMPUS benefit - app. 1540 yrs	See Library	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 SValley		\$48
Additional Stormwater Infiltration	Underground storage for permeability and compliance	site water	Prioritizes infiltration into soils rather than storage and release to Atherton channel. Improves flood risk. Supports aquifer exchange concept. Base Cost: - Below grade storage for detention (assume buried pipe or chamber system). SW Infiltration Alternate Additional Cost: - Cost = \$57,490 Estimated ROI: - NA. No annual savings from this strategy.	NA	NA	Part of the Water Story; illustration of Atherton as a Steward; allows civic center to demonstrate alternative products and approaches.		Contributes to Water Story		\$43
Blackwater	Treatment for unconditional reuse	All building wastewater	City Council rejected: Reduces reliance on well for irrigation / flushing. Requires additional room for equipment and plumbing fixtures to be provided with dual connections.	M	M	N				
Dual Plumbing	Dual plumb library building such that non-potable water can be used for flushing toilets	Library Building and Potentially Police / Admin Bldg.	Net zero requires no potable water to be used for non-potable demands. Base Cost: - Plumb library building and police/admin building with municipal domestic water only. Dual Plumbing Alternate Additional Cost: LIBRARY: - Cost = \$13,000 POLICE BUILDING - Cost = \$28,000 Estimated ROI: LIBRARY - Assumes 15,000 gal of water savings per year at \$0.01/gal. (\$150/yr) - ROI = (\$13,000/\$150/yr) = 87 yrs POLICE / ADMIN BUILDING - Assumes 69,000 gal of water savings per year at \$0.01/gal. (\$690/yr) - ROI = (\$28,000/\$690/yr) = 40 yrs	App. 87 yrs	App. 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		CH \$28 Lib \$13

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Well + Dual Plumbing Combined	Combined costs / ROI for Well and Dual plumbing at library building and police/admin building such that non-potable water can be used for flushing toilets	Campus wide	Net zero requires no potable water to be used for non-potable demands. Base Cost: - Plumb library building and police/admin building with municipal domestic water only. Well and Dual Plumbing Alternate Additional Cost: - Cost = \$130,000 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 - ROI = (\$130,000 - \$21,669)/\$6,834/yr = 16 years	CAMPUS benefit - app. 16 yrs	See Library	Enhances water balance story. Water from well is used for potable uses, recycled water for in building use		Contributes to Water Story; ROI improved		\$130K
Well + Dual Plumbing + Stormwater Infiltration Combined	Combined costs / ROI for Well, Stormwater Infiltration, Dual plumbing at library building and police/admin building such that non-potable water can be used for flushing toilets	Campus wide	Net zero requires no potable water to be used for non-potable demands. Base Cost: - Plumb library building and police/admin building with municipal domestic water only. Well, Infiltration and Dual Plumbing Alternate Additional Cost: - Cost = \$187,490 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 - ROI = (\$187,490 - \$21,669)/\$6,834/yr = 24 years	CAMPUS benefit - app 24 yrs.	See Library	Enhances water balance story. Water from well is used for irrigation and goes back to replenish aquifer		Contributes to Water Story		\$187K
Plumbing										
Solar Thermal	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.	App. 7 yrs	App. 7 yrs	Displays how some PV is used for building energy and some hot water use. Water and Energy connection		Contributes to Water Story		PD \$53
Architectural										
Envelope	Good insulated walls and roofs	Library Building and Police / Admin Bldg.	New civic center and library: 2x6 metal stud wall with R-19 batt insulation and 1" of rigid insulation (U-0.071, R-14.1 overall) At historic council chambers: 2x4 wood stud wall with R-15 batt insulation (U-0.083, R-12 overall) Civic center and Historic building: Pitched roof with R-30 insulation at ceiling (U-0.032, R-31.25) Library: flat roof with R-30 insulation (U-0.032, R-31.25) Solarban 72 low-e double pane glazing (U-0.40, SHGC-0.30, VLT 70%)	App. 0 yrs	App. 0 yrs	Reduces demand on electrical and mechanical systems	Assists in providing comfort a if power should go out	Contributes to Energy Story		PD \$53
Glazing	High efficiency glazing as part of architectural envelope	Library Building and Police / Admin Bldg.	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.	App. 0 yrs	App. 0 yrs	Reduces demand on electrical and mechanical systems		Contributes to Energy Story		PD \$53
Lighting type	Reduced Light Power Density (LPD)	Library Building and Police / Admin Bldg.	An aggressive yet achievable building average lighting power density (LPD) target of 0.65 W/ft2 is assumed for the project. All regularly occupied spaces are simulated as having daylight responsive controls, which continuously adjust the electric light output in response to available daylight. The controls are continuous dimming with a 50 FC set point. Exterior lighting is estimated at 0.05 w/sf, for a total of 2,000 watts. – expected ROI details as follows: immediate payback	App. 0 yrs	App. 0 yrs	Reduces demand on mechanical systems; increases indoor environmental quality		Contributes to Indoor Environmental Quality		PD \$53
Windows	Good occupant satisfaction	Library Building and Police / Admin Bldg.	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:	App. 0 yrs	App. 0 yrs	User comfort	assists in providing comfort and ventilation if power should go out	Contributes to Indoor Environmental Quality		PD \$53
Ceiling Fans	Good occupant satisfaction	Library Building and Police / Admin Bldg.	HV Ceiling Fans provide user comfort and satisfaction while increasing the temperature band by as much as 3 degrees	App. 0 yrs	App. 0 yrs	User comfort		Contributes to Water Story		PD \$53