



SHOWCASE PROJECT: ARVADA POLICE SUB STATIONS

SOLUTION OVERVIEW

The City of Arvada encompasses 34 square miles and is located at the base of the foothills between Denver and Boulder. The Arvada Police Department is a full service police department serving approximately 106,000 people and organized under two divisions: Operations and Field Services. The police department building was originally located near Old Town Arvada on Grandview Ave and was relocated to the City Hall campus in 1973.

The facility was renovated in 1993, and in the years since, has undergone a variety of changes, including the expansion of the dispatch center in 2006. The Arvada Police Department has grown from 119 sworn positions and 49 non-sworn positions in 1993 to the current staff size of 166 sworn officer positions and 72 non-sworn employees, while remaining located at the City Hall campus.

This project is not a retrofit; rather, it includes the new construction of two police sub stations. In 2012, the city passed an ordinance requiring all government buildings greater than 5,000 square feet in size to achieve a minimum standard of LEED Silver; these will be the city's first LEED-certified buildings. Construction of the two police sub stations began in May of 2013 and was completed in February of 2014.

View new construction photographs.





SECTOR TYPE

Local Government

LOCATION

Arvada, Colorado

PROJECT SIZE

Two Buildings, 9,500 Square Feet Each

SOLUTIONS

Annual energy savings for the project are expected to reach approximately 25% relative to a traditional building built to current code, ASHRAE 90.1-2007 standards. Combining the use of high performance lighting, envelope and equipment options yield a final predicted 32% savings and \$6,500 in annual energy cost savings for building electricity and gas consumption.

The new Arvada Police Stations will implement the following energy efficiency initiatives:

- **Building Envelope:** The buildings will feature well insulated walls with a U value of .059, and roof insulation tops out at R-30. Windows have been strategically placed to maximize passive solar heating and cooling and feature thermally broken aluminum frames on all facades. The western façade windows have Argon-filled glazing and a low Solar Heat Gain Coefficient. Overhangs and vertical fins provide window shading in the warmer months.
- **Lighting and Interior Loads:** Through efficient lighting decisions, the lighting power density has been reduced to 20% below code. Daylighting is prominent in perimeter spaces as well as the center circulation area, and occupancy sensors will be installed in many areas including the community room, conference rooms, lobby, and restrooms.
- **HVAC:** The stations will utilize highly efficient SEER 21 condensing furnaces, complete with variable speed compressors and high-efficiency motors.
- **Water Conservation:** The buildings will feature condensing water heaters, with low flow showers and lavatories.

Return on Investment

A combination of LED and CFL lighting with occupancy sensor controls and daylighting controls were used for the project. The overall cost premium was \$17,500 over code base and provides annual savings of \$5,000, a payback of 3-4 years. Daylighting controls will save \$1,228 annually and pay for themselves in 5 years, while lighting controls will save \$108 per year and have a simple payback period of 1 year. The west glazing with low SHGC will save \$159 per year and have a payback of just 5 years. The Argon fill for all glazing will save \$56 per year and also have a simple payback of 5 years. The R30 roof will save approximately \$132 per year and will have a simple payback period of 15 years. Condensing furnaces with variable speed indoor fans and SEER 21

split DX cooling with 2-stage compressor modulation were selected for the project and provide annual savings of \$1,400 above code base, a payback of 7 years. Condensing water heaters with low flow showers and lavatories were utilized with a cost premium of \$1,500 and a payback of 12 years.

Building Modeling Results for the Project

No.	Strategy	Cost of Electricity	Cost of Natural Gas	Annual Energy Cost	Annual Savings Relative to Cost Base	% Cost Savings (LEED)	LEED Pts	Total Emissions (lbs CO2)	Simplified Payback (Yrs)
LB	LEED Base - ASHRAE 90.1 - 2007	\$15,690	\$5,043	\$20,733	-	-	-	433,877	-
P	Base for cost payback analysis	\$12,075	\$5,204	\$17,279	-	16.7%	3	316,887	-
ENV1	R30 roof	\$12,042	\$5,105	\$1,7147	\$132	17.3%	3	314,492	15
ENV2	R38 roof	\$12,025	\$5,063	\$17,088	\$191	17.6%	3	313,515	25
ENV3	R19 batt wall	\$12,116	\$5,346	\$17,462	-\$183	15.8%	2	319,902	-
ENV4	R21 batt wall	\$12,112	\$5,334	\$17,446	-\$167	15.9%	2	319,665	-
ENV5	1.55 Thermax w 1.5	\$12,068	\$5,185	\$17,253	\$26	16.8%	3	316,525	10
ENV6	west glazing with low SHGC	\$11,914	\$5,206	\$17,120	\$159	17.4%	3	316,138	5
ENV7	Argon fill for all glazing	\$12,079	\$5,144	\$17,223	\$56	16.9%	3	315,742	5
HP ENV	High Performance Envelope (ENV1, 5, 6 & 7)	\$11,883	\$5,024	\$16,907	\$372	18.5%	4	312,046	10
LTG1	Daylighting ctrls	\$10,516	\$5,163	\$15,679	\$1,228	24.4%	7	291,346	5
LTG2	Lighting ctrls	\$11,761	\$5,038	\$16,799	\$108	19.0%	4	310,109	1
HP ENV +	Daylighting	\$10,408	\$5,174	\$15,582	\$1,325	24.8%	7	289,535	5

LTG	and lighting controls								
SYS 1	RTU w/ electric reheat	\$16,818	\$4,737	\$21,555	-\$5973	-	-	398,684	-
SYS 2	Daikin RTU w ERV & elec reheat	\$15,709	\$744	\$16,453	-\$871	20.6%	5	335,956	-
SYS 3	Condensing SEER 21 Furnace	\$9,023	\$5,134	\$14,157	\$1,425	31.7%	10	283,898	-
HP ENV + LTG + HVAC	Condensing SEER 21 Furnace	\$9,023	\$5,134	\$14,157	\$1,425	31.7%	10	283,989	7

OTHER BENEFITS

The Arvada police station project is expected to achieve a LEED Gold rating and will help the City work towards its overall goal of reducing energy use. It will serve as a model for the community and lead by example in terms of demonstrating the payback period and cost savings achievable when following energy efficient design standards. Finally, with the installation of an electric vehicle charging station, the city fleet will have the ability to further the use of alternative fuels, which will increase visibility of electric vehicles in the area.

Annual Energy Use

(Source EUI)

Baseline(ASHRAE Standard)()

297 kBtu/sq. ft.

Actual(2017)

157 kBtu/sq. ft.

Energy Savings

47%

Annual Energy Cost

Baseline(ASHRAE Standard)()

\$20,700

Actual(2017)

\$10,900

Cost Savings

\$9,800



Exterior view



Exterior parking lot view