

January 15, 2016



Pat Hennessy
City of Lawrence
Park Operations Manager
100 Rock Chalk Lane
Lawrence, KS 66049

Re: Equipment Replacement
Lawrence Indoor Aquatic Center
4706 Overland Dr.
Lawrence, KS 66049

This is a summary of our analysis for the replacement of the three Des Champs HVAC units.

Existing Conditions:

The existing equipment consists of three roof-mounted dehumidification heat recovery air handlers. These units are designed to optimally maintain the interior temperature and humidity in each pool space. The Lap pool area is served by two equally sized units with ductwork along the perimeter of the space. The Play pool (leisure pool) area is served by a single unit with ductwork down the center of the space. All three units are identical in size and configuration with approximately 45 tons of DX cooling and 500 Mbh output gas heating.

There have only been minor comfort complaints with the Lap pool area and is generally assumed that the equipment serving the Lap pool is appropriately sized.

For the Play pool area it has been reported that there are problems maintaining the humidity level during the summer months, with relative humidity readings as high as 80%. Heating in the winter months has also been a problem with the unit struggling to maintain its set point. As a result, a large de-stratification fan (Big Ass Fan) was added to help mix up the air which has helped during the heating season.

The existing Des Champs equipment was installed in 1999 when the building was constructed. Recent roofing work required the temporary removal of some of the equipment and it was reported that the bottoms of the units were severely rusted, which is likely caused by the corrosive pool chemicals. The equipment has been maintained over the years, but at 17 years of age is nearing the end of its useful life. The manufacturer is no longer in business and parts are difficult to find and may be costly.

Analysis:

Heating and cooling loads were calculated using Trace 700 software to determine the building roof, wall, and window sensible loads. The American Society of Heating Refrigeration, and Air Conditioning Engineers (ASHRAE) Applications handbook has guidelines to follow for Natatorium equipment sizing. The rate of evaporation was estimated based on the pool surface area. An activity factor (AF) was applied to each pool area. This is a correction factor that helps to estimate the evaporation rate of the water based on the activity in the pool. The Lap Pool

has a baseline value of 1.0, and the Play Pool would require a minimum value of 1.5 due to the water features and occupants splashing. Indoor design conditions (temperature and humidity) were based on the original equipment selections and are consistent with conditions listed in ASHRAE. Ventilation requirements are based on the approximate occupancy of the space and to provide adequate dilution of contaminants generated by the pool water. It is suggested that both pool areas have at least 4 air changes per hour (ACH).

The total cooling load for the Lap Pool area to maintain 84 deg. F, 60% RH conditions is 89 tons, and the total heating load is 1140 Mbh. The total cooling load for the Play Pool area to maintain 85 deg. F, 60% RH conditions is 80 tons, and the total heating is 640Mbh. These calculations indicate that the existing Play Pool equipment is undersized for the activity level of the space.

Recommendations:

Lap Pool Area: Propose replacing each of the units serving this space with new equipment sized to closely match the existing dimensions and airflow rates. The new equipment would provide about 4.6 ACH, using 50 tons of cooling. The existing ductwork, gas piping, and electrical connections could be re-used. The circuit breakers in the panel boards would need to be replaced to match the ratings of the new equipment.

Play Pool Area: Propose replacing the existing unit serving this space with new equipment sized to closely match the existing equipment dimensions but increasing the capacity to match the calculated loads in the space. The new equipment would provide about 6.5 ACH, using 70 tons of cooling. Given the limitation of space and ability to add additional weight to mount larger equipment, this is the largest increase in capacity that could be added. On a design day the RH could rise to as high as 67%, but this typically only occurs about 1% of the time during the whole year. If using a lower activity factor of 1.25 the RH could be as high as 63% on a design day. The 70 tons of cooling represents a 50% increase in capacity which will help keep the space more comfortable. The existing ductwork would need to be replaced to accommodate the larger airflows, and this would allow for the opportunity to distribute the air more evenly within the space and possibly reduce or eliminate the need for the Big Ass Fan. Attached is a schematic layout of the proposed ductwork modifications. The electrical system would need to be evaluated to determine if there is enough capacity to accept the larger equipment, however, we do not anticipate this as an issue. A new circuit breaker would be required in the MDP with new conduit and wiring sized to the ratings of the new equipment.

Estimate of Probable Costs:

The total probable cost for the equipment replacement and upgrades to the play pool area is \$1,044,244.00. Refer to the attached opinion of probable cost for the equipment replacement itemized costs.

Attachments:

Estimate of Probable cost
Schematic Drawing of the Play Pool Ductwork
Seresco Equipment Selections