BHB Industry Insights

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ANIMAL SHELTER DESIGN FROM AN ENGINEERING PERSPECTIVE

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Animal Shelter Design from an Engineering Perspective

Animal shelters are a different kind of cat when it comes to mechanical, electrical, and plumbing (MEP) systems. Specific processes need to be implemented for each aspect of engineering to ensure the health of the animals that reside in the shelter. While the goal is to get animals adopted into loving homes quickly, shelters provide interim housing for dogs, cats, and other domestic pets. The mechanical system needs to control odors, minimize the spread of disease, and provide a comfortable environment. The electrical system should include energy-efficient lighting, power distribution, security access doors, and it may even contain a back-up generator in case of a power outage. The plumbing system will often utilize trench drains with a chemical or power wash system to sanitize kennels.

At BHB, we have designed dozens of animal care facilities including shelters, adoption centers, vet clinics, pet daycares, and even the occasional cattle, swine, or horse barn. While each project has a unique set of challenges, let's discuss a mechanical approach for a typical animal shelter.

Animal shelters consist of several dog and cat areas, separated by function. For example, there are dedicated rooms for large dogs, small dogs, adoptables, quarantine, isolation, medical, cat play, exotic cats, get-to-know spaces, and more. Every space utilized for housing animals should have a high rate of ventilation in order to provide clean air and habitable living spaces. Air changes per hour (ACH) will often range from 8-12 for dogs and 10-20 for cats. The ACH for cats is greater than dogs since they put off more dander and there is generally more of them in a smaller space. In addition, each space should be supplied with 100% fresh air and 100% exhaust, meaning all of the air supplied to the space is then exhausted outside of the building with no recirculation; this keeps spaces fresh and contaminants to a minimum.

One additional safeguard is the requirement of specific air balance. Each air device should be adjusted to provide slightly more exhaust airflow than supply airflow, resulting in a space that will be under negative pressure. When balanced properly, air from the corridor will always be moving into the animal spaces, ensuring odors and contaminants are not spread to other spaces.

Terms Defined

ACH: Air changes per hour (ACH) measures air volume added to or removed from a space divided by the volume of that particular space.

Trench Drain: A receptor that receives and conveys run-off water or other liquids to the drainage system.

RH: Relative Humidity (RH) is the percentage of water vapor present in the air to the amount needed for saturation at the same temperature.

City of Lewisville Animal Adoption Center
Photo courtesy of Quorum Architects, Inc. (AOR)

City of Seguin Animal Services
Photo courtesy of Quorum Architects, Inc. (AOR)

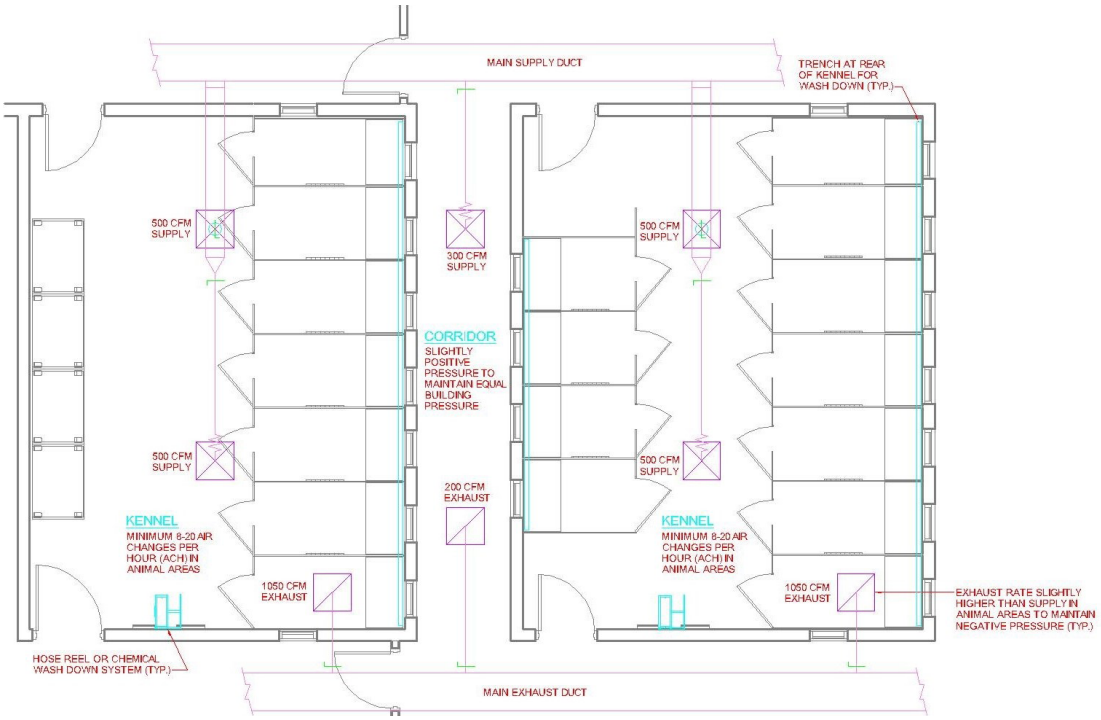
Providing 100% outside air and 100% exhaust is an expensive system that uses a lot of energy, but animal welfare is the top priority. A 100% outside air unit has a supply fan to send fresh air to each space, as well as a return fan to exhaust air from each space. An energy recovery wheel is utilized to capture energy from the conditioned exhaust air (say 75°F/50% RH), and pre-condition the incoming air (say 95°F/80% RH in summer). The leaving air downstream of the wheel might be 85°F/65% RH, and the unit will then apply the cooling, heating, and/or dehumidification cycle to ensure that properly conditioned air is delivered to the building. This unit runs 24 hours a day, 7 days a week at constant air volume. The compressors, gas heating, and dehumidifying reheat cycles modulate as required.

Although this system may sound complicated, it really isn't – the unit performs all of these functions internally. The user simply selects their desired temperature and humidity level, and the unit maintains a clean and comfortable environment for the animals, as well as employees and visitors.

The following illustration is an mock-up example of a typical kennel HVAC/Plumbing arrangement. As 1,000 CFM (cubic feet per minute) of airflow enters the kennels, 1,050 CFM of exhaust exits the space in order to maintain negative pressure. In corridors and common spaces, a slight positive pressure is maintained to equalize the overall pressure of the building.

Did You Know?

According to the ASPCA, 6.5 million animals enter animal shelters in the U.S. each year. To find a local shelter near you, visit aspca.org/adopt-pet/find-shelter.

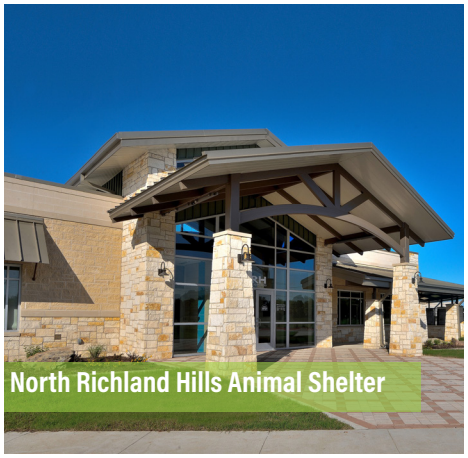


With dogs and cats coming to and from a shelter every single day, it is crucial to keep the air clean and the spaces habitable to reduce the stress of the animals, as well as transferable diseases and bacteria. While implementing a mechanical system for animal shelters can be very technical, it is worth the time and money in order to provide comfortable living spaces for animals until they can find a home that is the perfect match.


Arlington Animal Services Center

Our Animal Shelter/Veterinary Experience


Arlington Animal Services Center


North Richland Hills Animal Shelter

Lewisville Animal Adoption Center

St. Francis Veterinary Clinic

Harker Heights Pet Adoption Center

Arlington Heights Animal Hospital


Wichita Falls Animal Shelter

Seguin Animal Services

To learn more about engineering specific to animal shelters and/or to inquire about how we can help you design a facility that puts animal welfare at top of mind, email us at mail@bhbinc.com.

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