



BHB Industry Insights

Animal Shelter Design from an Engineering Perspective

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Unique Requirements of Animal Shelters

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 facet of engineering to ensure the health of the animals that reside in the shelter.

While the goal is always to get animals adopted into loving homes quickly, shelters provide interim housing for dogs, cats, and other domestic animals, usually ones found as strays or surrendered by a former owner.

The **mechanical system** in these shelters needs to control odors, minimize the spread of diseases, and provide a comfortable environment. The **electrical system** should include energy-efficient lighting, power distribution, and security access doors; it may even contain a backup 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 unique challenges, let us discuss a mechanical approach for a typical animal shelter.

Animal shelters typically consist of several dog and cat areas separated by function. There may

be dedicated rooms for large dogs, small dogs, adoptable animals, 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 to provide clean air and habitable living spaces. Air changes per hour (ACH) often range from 8 to 12 for dogs and 10 to 20 for cats. The ACH for cats is greater than for dogs because they put off more dander and because often more cats are kept in a smaller space. In addition, each space should be supplied with 100 percent fresh air and 100 percent exhaust, meaning all 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 a comprehensive air balance in animal spaces. 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 constantly move into the animal spaces, ensuring odors and contaminants do not spread to other spaces.





Terms Defined

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

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

Airflow and Exhaust Systems

With dogs and cats coming and going from a shelter daily, it is important to keep the air clean and the spaces habitable. A healthy environment can reduce the stress of the animals while controlling the transmission of diseases and bacteria. While designing a mechanical system for an animal shelter can be rather complex, it is essential to provide comfortable living spaces for animals until they can find their perfect home.

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

Terms Defined

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

Although this system may sound complicated, it is not – the unit performs all 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.



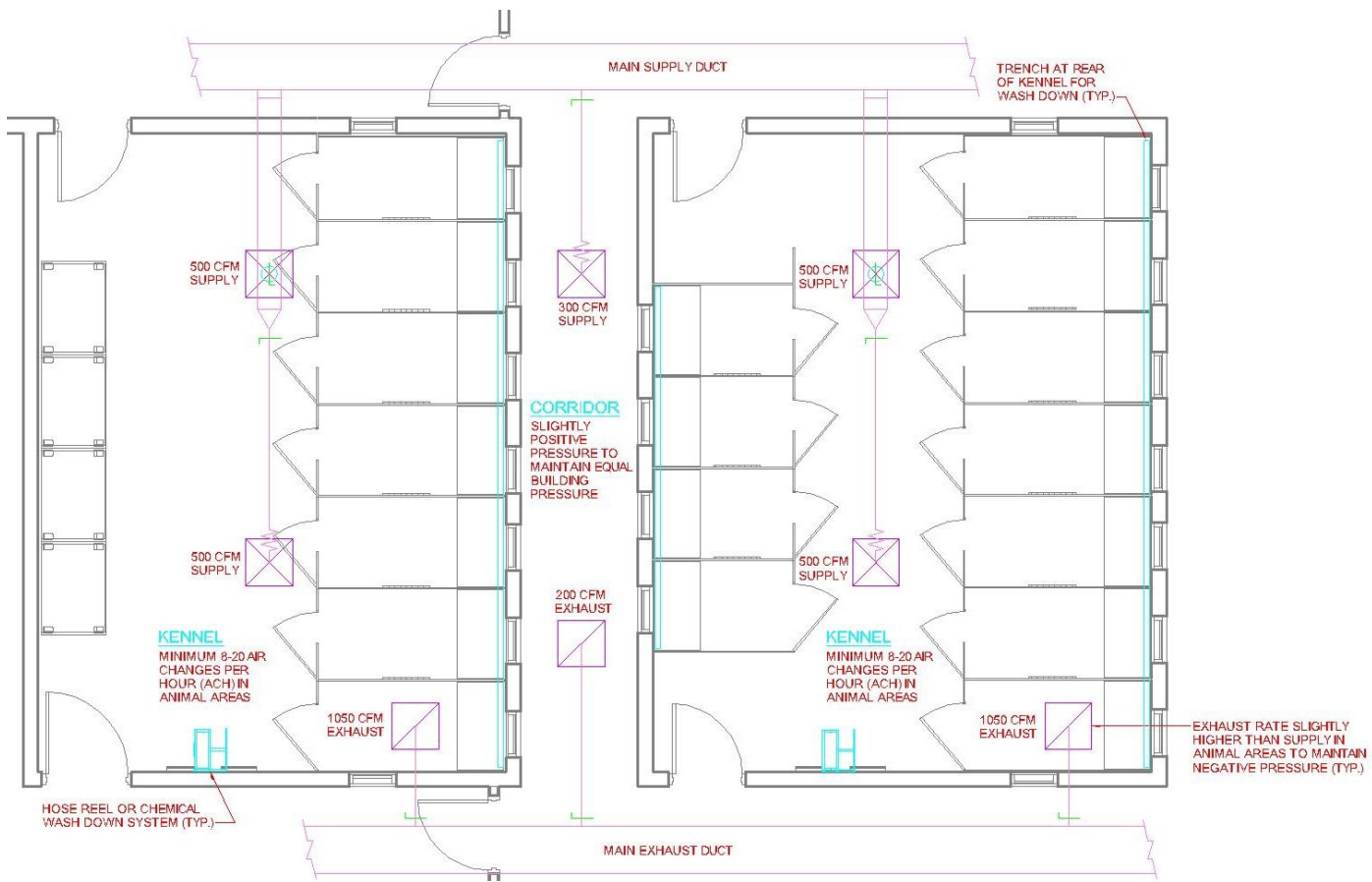


Figure 1 |
Typical Kennel HVAC / Plumbing Arrangement

As 1,000 cubic feet per minute (CFM) of airflow enters the kennels, 1,050 CFM of exhaust exits the space to maintain negative pressure. In corridors and shared spaces, slight positive pressure is maintained to equalize the overall pressure of the building.



Animal Facility Experience



- 1 Operation Kindness
- 2 Grand Prairie - Prairie Paws
- 3 Grapevine Animal Shelter
- 4 Paw Pad
- 5 Midland Animal Shelter
- 6 Baytown Animal Shelter
- 7 Pearland Animal Shelter
- 8 Odessa Animal Shelter



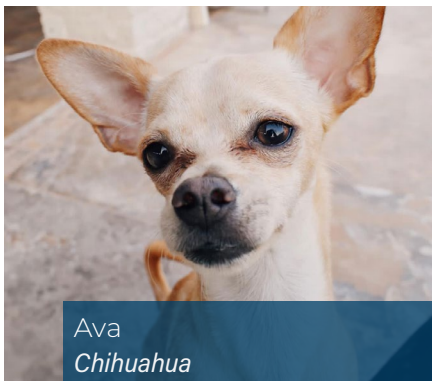
According to the ASPCA, 6.5 million animals enter animal shelters in the U.S. each year. To find a local shelter near you, visit [aspc.org/adopt-pet/find-shelter](https://www.aspc.org/adopt-pet/find-shelter).

- 9 Montgomery County Animal Shelter
- 10 North Richland Hills Animal Shelter
- 11 Lewisville Adoption Center
- 12 Seguin Animal Services
- 13 St. Francis Veterinary Clinic
- 14 Kaufman Animal Shelter

BHB Rescue Pets



“
Secondhand animals
make first class pets.”



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