

Lawrence Humane Society

1805 E. 19th Street, Lawrence, Kansas 66046

Date: Tuesday, February 11, 2014
Site Visit: Tuesday, February 4, 2014



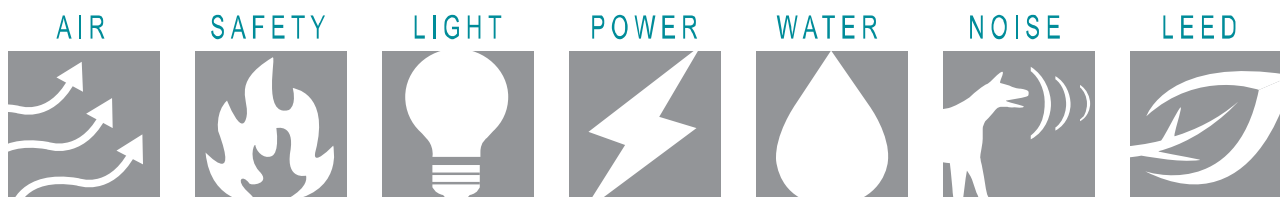
Report Summary

Design Learned has been retained by the Lawrence Humane Society to evaluate the existing conditions at the facility as well as to consider opportunities for improvement and probable cost for remediation. Primarily the owner expressed concerns regarding temperature control, air quality, and degradation of finishes among other issues. The building had animal odors in neLawrence Humane Society every location. We found opportunities to improve virtually every aspect of the building.

The Lawrence Humane Society facility consists of two buildings with a small transition space near the clinic. The overall condition of the building structure is actually very good. There is no evidence of structural failure, wall damage, water damage, or foundation damage.

The flooring, finishes, ceilings, building systems (mechanical, electrical, plumbing), caging and noise control systems are very dated and should be replaced.

Furthermore, and perhaps most importantly, the overall layout and flow of the building is not consistent with best practices in the industry. Since the building components are at an age where replacement is inevitable, we strongly recommend master planning a better shelter prior to investing any substantial revenues in repairs. Finally, some of the immediate HVAC concerns can be easily, albeit temporarily, corrected with existing or portable equipment. (It is notable for example that the empty dog kennel area was reported to have no heat, when in fact there was a perfectly operational Reznor gas heater installed and available.)



The purpose of this report is to document areas for which remediation would improve the health and safety of the animals and improve the public and staff perception and experience in the shelter. Generally the existing facility would benefit from better floor planning as well as updated materials, finishes, noise control, cleaning systems, better lighting, electrical, plumbing, and HVAC systems to what is typical of the animal care industry. We have provided qualitative recommendations to bring these systems to animal care industry norms.

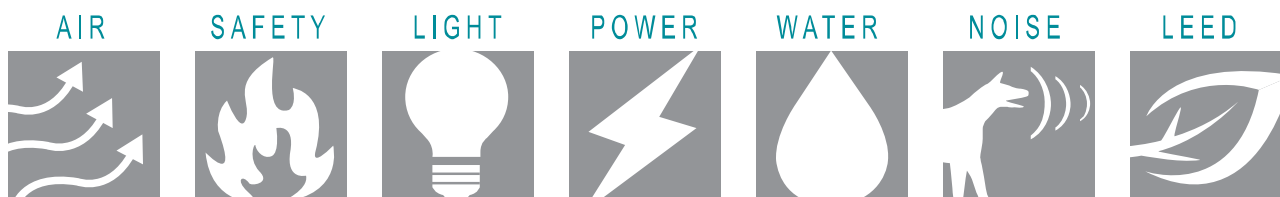
Shelters are incredibly tough environments. Many local architects, engineers, and contractors believe that typical construction products, sealants, equipment, fixtures, and finishes will work. In fact the handful of available, manufactured, animal care specific equipment and finishes are the only products we have found to hold up to the repeated cleaning, urine, humidity, chemicals, and animal claws.

About Us:

Design Learned, Inc. is the premiere animal care facility engineering company in the United States. We have been in business since 1993 and have provided engineering or consultation on over 200 shelters, veterinary hospitals, kennels, daycare, and grooming facilities across the country. Our work includes the engineering blueprints of the mechanical, electrical, plumbing, fire protection, noise control, and interior design. We also research and specify the animal care caging and equipment. In that capacity we have worked on new construction, renovations and remediation design. Through our efforts, we have determined required levels and locations of airflow, lighting, water systems, drainage, and noise control systems to name a few. We have developed guidelines for veterinary proceedings, shelter requirements, and environmental requirements for the Commonwealth of Pennsylvania Dog Laws.

Scott Learned is a licensed mechanical engineer and a licensed electrical engineer as well as a LEED Accredited Professional. We have published articles in Pet Services Journal, Animal Sheltering magazine, as well as the proceedings of the Central Veterinary Conference and the North American Veterinary Conference among others. We provide seminars to the Humane Society of the United States, the Pet Care Services Association, the Central Veterinary Conference, the North American Veterinary Conference, and many other animal care venues as well as expert witness services in animal care building cases.

Scott Learned is a licensed Professional Engineer in Kansas (#19742) and Design Learned, Inc. is a licensed professional engineering corporation in Kansas (#1486).

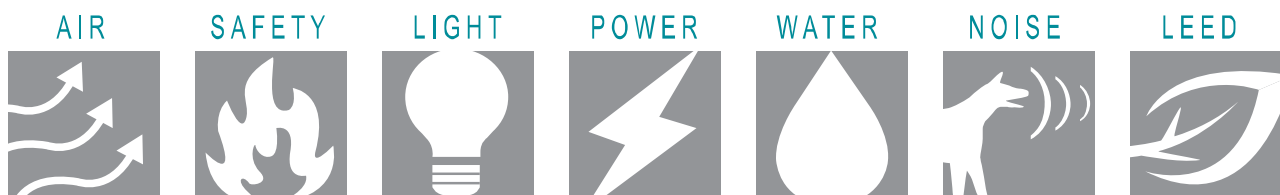


Synopsis of Immediate Recommendations

- Master plan a proposed remediation
- Do not replace any HVAC systems with the proposed items from Dunco or the engineer (they are incorrect)
- Repair the Reznor heating unit in the Dog TLC area
- Repair, but do not yet replace, the fire alarm system in accordance with the Select One quote
- Repair, but do not yet replace, any lighting in accordance with the Lynn Electric quote
- The Maytag commercial laundry equipment may or may not be appropriately sized for the future application
- There is no harm in having floors repainted

Synopsis of Major Recommendations

- Master plan a proposed remediation, including reconsideration of the shelter layout, operation and flow
- Determine a zoning plan and interior partition design to minimize stress, ringworm contagion, noise
- Establish a phased construction plan to match funding and minimize disruption and rework
- Consider revenue generating services and more substantial veterinary clinic capability
- Redesign the intake, surrender and adoption lobbies to accommodate more people and better disease control
- Create more appropriate get acquainted and behavioral evaluation areas
- Reduce the sizes of the animal holding areas (more areas with fewer animals per area)
- Increase hallway areas to permit access to all animal holding directly (without going through other animal areas)
- Design an appropriate shelter specific HVAC system with two to three times the flow rate and multiple small zones
- Add ionization odor and disease control equipment to the HVAC systems
- Provide substantial, dedicated, independent dehumidification capability
- Recover the floor with an animal care specific epoxy floor and coving at the walls
- Install self-rinsing trench drains in the the dog runs
- Add animal care appropriate pressure washing cleaning systems in the proximity of the drains in the canine areas
- Add animal care appropriate wet/dry vacuum systems in the feline, lobby, staff, public, and storage areas
- Replace runs, guillotines, and cages with shelter specific equipment manufactured for animal care
- Redesign the lighting in all areas, particularly in animal caging areas to achieve 50 to 70 fc of illumination
- Replace the fire alarm system with an early detection configuration appropriate to animal sheltering
- Provide noise control improvements to selected internal surfaces
- Add a ceiling system to enclose the exposed truss framing and insulation
- Replace the doors with solid core fiberglass doors and frames
- Redesign the storage
- Incorporate the exterior areas to create dedicated play areas for grouped animals



Operations

Lawrence Humane Society operates as a full service shelter with dogs, cats, and a smaller number of exotic animals, particularly rabbits. There is no significant veterinary function except for shelter medicine. All dog runs are indoor only, although the shelter does have some substantial outdoor space.

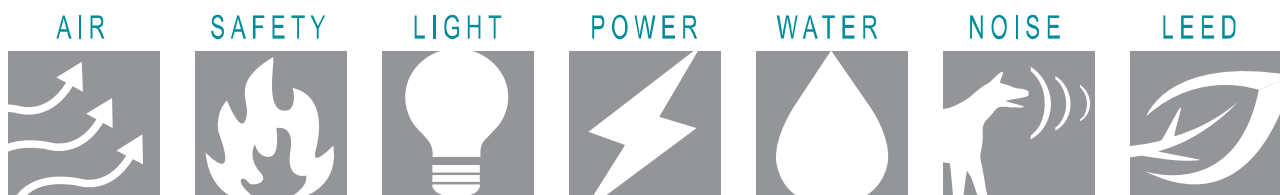
The facility is well kept and clean. Illness is reported as occasional and staff is well trained to properly isolate animals with symptoms. However there is no adequate quarantine area, no true isolation, and no separation for dogs that might require preventative protection from other dogs. Cats are located in stressful areas.

We still require information on the number of animals processed per year and average holding times, but based on the low population at the time of our review, it seems that the shelter is generally appropriately sized for the necessary occupancy.

Canine influenza and Parvovirus are reported as rare, however ringworm is very prevalent. Note that most upper respiratory bacterial disease and most fecal-oral transmitted diseases appear to be best controlled through proper cleaning techniques, quaternary disinfectants with appropriate contact times, a reduction in humidity, and duct mounted ionization.

Feline upper respiratory syndrome is reported as occasional. Upper respiratory viral feline disease is difficult to kill. Cats also frequently harbor dormant viruses that can become active when they are stressed. These are best controlled through significant outside air dilution, high flow rate individual cage exhaust, dehumidification, and multiple, smaller zones.

Note that disease history and stress reduction are very important. Disease history along with temperament and animal density have the single greatest direct impact on the HVAC system choices for fresh air rates, air distribution, and recirculated air treatment choices as well as the cleaning system selections. Stress reduction by mitigating noise and odors between groups of animals is critical to overall shelter health.



Adoption Areas

Front Desk & Adoptions

The separation of the adoption lobby and animal surrender areas is excellent however the lobby area is cramped and the vestibule is small.



Reception areas should be spacious with adequate distance between the door and the reception desk to permit several people with dogs to stand in line. We see many animal facilities that short-change lobby and public areas in favor of more animal care but this negatively impacts the image. Public space, service space, animal housing, and storage space must be balanced. When one of those areas is deficient, it rapidly impacts the operational costs and efficiency.



Surface treatments should include impervious wall and floor systems. In this case there is a considerable use of either tile or rubber cove base moldings at the bottom of the floors. Wall substrates at the lower three feet of walls in animal shelters should be cement board, not gypsum wallboard. The floors should have epoxy coatings that are covered up the wall from 6 to 8 inches. An equally acceptable alternative is porcelain tile with epoxy grout. Base perimeters should use sanitary base tiles. Applied moldings such as glued-on tiles, rubber base mold, or wood, should never be used in an animal shelter.

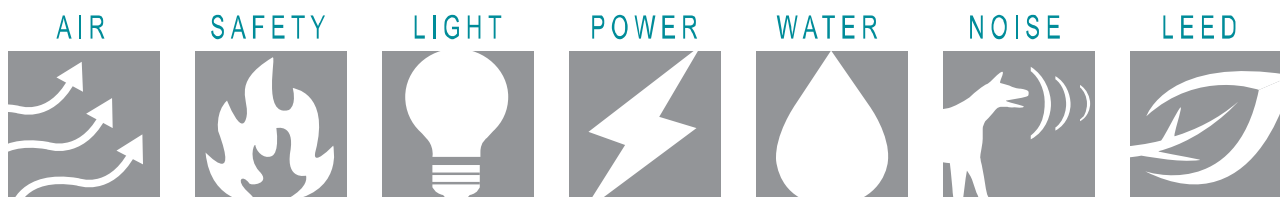


Many interior walls rise only part-way into the space and lack any ceiling or tops of their own. Properly designed ceiling systems in an animal shelter must meet several requirements simultaneously: They must provide a solid finished surface at the ceiling that will not catch animal hair and will prevent animals, particularly cats, from escaping into voids. Ceilings in animal care facilities must separate HVAC and fire zones in the building to minimize air transfer from one zone to another. Ceilings must provide good sound transmission control, good sound reverberation control and good light reflectance. Finally animal shelter ceilings must be moisture resistant and lack any surface texture that is difficult to clean. There are very few ceiling assemblies that will meet all of these requirements. Transmission noise control should be a sound transmission class (STC) of about 50. Reverberation noise control should be added to the surface of the hard ceiling to achieve a noise reduction coefficient (NRC) of about 80%.

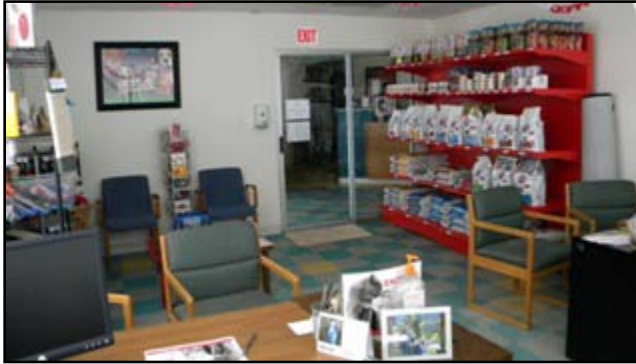


Mechanical or HVAC systems in an animal shelter lobby should provide about 2 to 3 cubic feet per minute (CFM) of air flow, of which about 30% should be fresh air. The recirculated flow should be treated with a biological treatment system, such as an ionizer, as well as a medium efficiency filter bank. Air systems must have a separate, dedicated dehumidification cycle and air should be delivered vertically to the floor. Exhaust air should be drawn from the individual cages. Return air should not be from a central return. It should be drawn from the perimeter of the lobby, the exact opposite of the distribution typical of an office building.

The existing mechanical HVAC system in the Lawrence Humane Society lobby is providing only a fraction of the air requirement. A properly designed system for this lobby would be an independent zone with vertical higher velocity airflow, dehumidification control and vertical air curtains. Humidity must be kept below 50%. Conventional diffusers (shown above) should not be used.



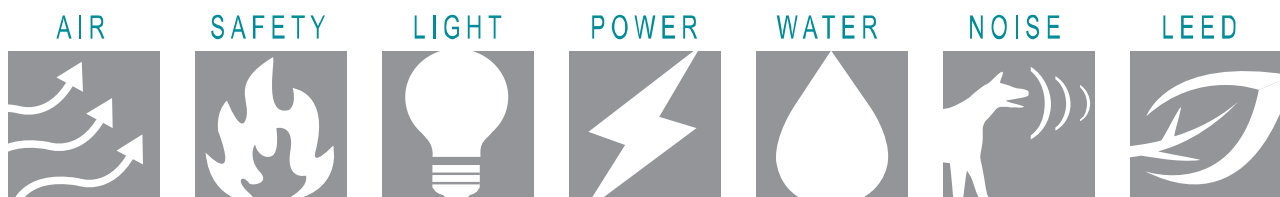
Lighting in an animal shelter lobby should be 40 to 50 fc at 30 inches above the floor, particularly in areas where animals are being viewed or evaluated. The effect should be similar to a well illuminated retail space. This does not preclude the use of natural lighting or lighting controls, which we frequently specify, but the installed lighting levels should not leave the space appearing dark and uninviting. This is also true of the retail space area.



In general the floor area used for offices should be used for get-acquainted areas and the conference room (really being used for retail) should be an animal display area. These offices and perhaps a breakroom should be located in the core or rear of the building.



Finally on the outside of the adoption lobby is a fire hydrant. All animal facilities should have dog relief areas available but they should not be in the path of the door!



Hallways

Surface treatments should include impervious wall and floor systems in hallways. There is some cracking in the concrete and a notable absence of control joints.



The use of block walls within the building is excellent and provides for good biological, fire and noise separation between zones. The floors should have epoxy coatings that are covered up the wall from 6 to 8 inches. Applied moldings such as glued-on tiles, rubber base mold, or wood, should never be used in an animal shelter.

Overall there is a notable absence of hallways. Connecting hallways are essential in animal shelters to permit movement throughout the building without passing through animal holding areas. Finally all hallways, present and future, should have commercial, animal care appropriate wet/dry vacuum system connection with integral disinfectant applications for cleaning.

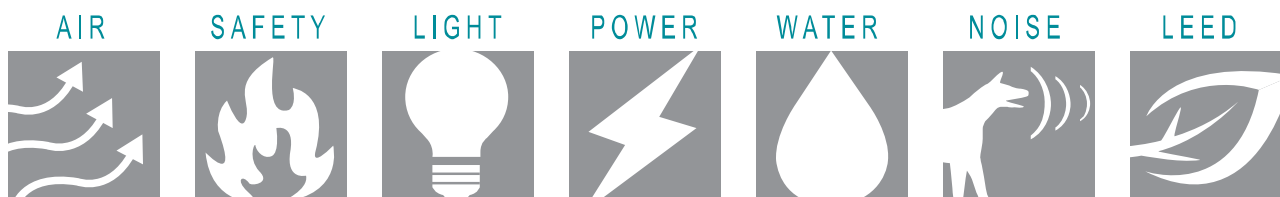
Staff Areas & Bathrooms

The Lawrence Humane Society has an absence of staff areas that needs to be corrected during master planning. Staff breakrooms are essential in animal shelters. We size them to permit use of these rooms as an overflow or evaluation area should it become necessary. All rooms in the shelter should be capable of holding an animal or temporary caging.

In all cases, the walls should be block construction or cement board with epoxy floors. Lighting for staff areas should be capable of 30 to 40 fc. The lower 36 inches of wall area should have impervious material such as fiberglass reinforced plastic (FRP) or epoxy. And these areas should include a commercial, animal care appropriate wet/dry vacuum system connection.

Adoption Counseling

Adoption counseling belongs in an area off of the lobby rather than off of the dog adoption space. As with other animal areas, this should have impervious surfaces, high level lighting, and a cleaning system. This room should have an HVAC system that communicates with the lobby area, not an animal holding area, particularly if it doubles as an evaluation room, which is typical.



Cat Adoption, Cat-Topia and Healthy Kitten Hold

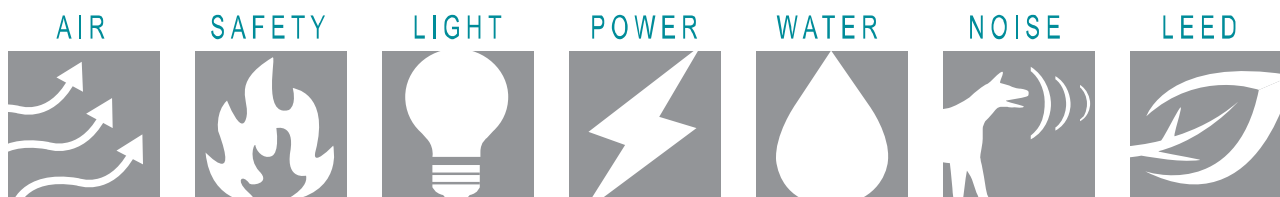
The cat areas should be a well ventilated spaces with vertical airflow, individual cage exhaust, multiple mechanical zones, a central cleaning system, and retail quality lighting.



In this case, the adjacent small animal room should be on a separate zone specifically so that cats and rodents cannot smell each other. Predator/prey odors appear to be a major source of stress and we always put different animal types on different, independent HVAC zones. Fresh, filtered, and dehumidified air should be presented to the zones using linear diffusers. Never use four-way diffusers; the objective is to provide the cleanest air straight to the floor to keep it dry and odor free. There is also evidence of some residue, which appears to be either silt or mold on the diffusers along with moisture accumulation at the window. This should never happen with proper filtration and dehumidification.



The cat adoption/small animal areas should be on their own HVAC zones with dedicated dehumidification and ionization air treatment. The exhaust system should be such that each cat or rodent cage is individually exhausted with exhaust air rates of 30 to 40 cubic feet per minute per animal and a corresponding vertical air supply in the areas in front of the cages. Overall recirculated flow rates should be 2 to 3 CFM per square foot.



The lighting system should provide 40 to 50 fc of light at the cages. Normally cat adoption wall areas are covered with cages and lower wall areas are subject to urine and water. Consequently electrical receptacles should be located only where specifically necessary for a specific function in cat adoption areas. Any receptacles should be located no lower than 48 inches above the finished floor.

A vacuum system in cat areas is critical because it is necessary and appropriate to pick up any loose cat litter or cat litter dust from the floor prior to introducing any liquid cleaning material. Furthermore we discourage the use of janitor's sinks and floor drains in cat areas to preclude wet litter from inadvertently clogging the drains.

There is some staining in some cat and the rodent areas. The caging systems should be standard, customary manufactured enclosures from an established animal care caging manufacturer. These should have washable interiors, including rear walls, with seamless or sealed construction. It is also frequently true, and reported in this case, that custom built enclosures as well as "pet-owner" quality enclosures lack the hardware, fasteners, and construction suitable for the tough shelter environment.

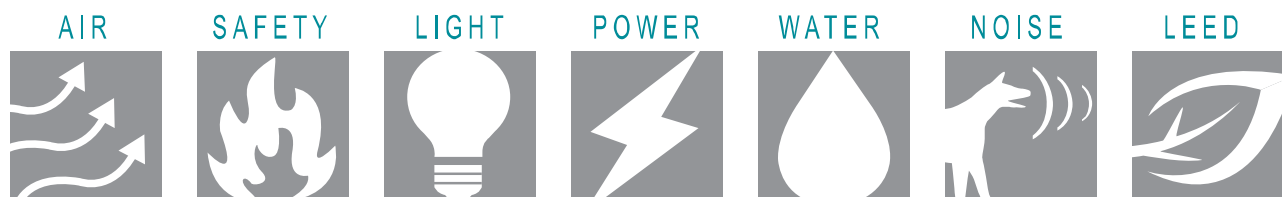
The walls in the rooms should be of an impervious, washable, non-staining system such as FRP, epoxy, PVC, tile, or glazed block. With an appropriate waterproof substrate, some less intensive areas of animal shelters, such as rodent rooms, may use a high quality, washable epoxy paint.

Floors should be epoxy coated with 8 inch coving on the walls. Tile coving, rubber base molding, or any other finish system that is applied with adhesive or caulking is unsuitable for any animal care application without exception. Animal care systems must be monolithic (one piece) with either a waterproof masonry base (such as epoxy grout and porcelain tile) or epoxy flooring.

From the cat adoption area, storage is difficult to access and insufficient. Animal shelter storage must be substantial for each enclosure. For cats, we recommend the manufactured caging systems that include bottom mounted cabinets for storage, integral exhaust connections, and durable surfaces and hardware. In this case, some bottom enclosures are being used for storage because the limited storage above the cages is difficult to access.

Adoption Workroom

For a shelter of this size, food preparation should be in a space of about 150 to 200 square feet. Food storage should be directly accessible to both the food preparation area as well as a delivery door. Food should never be stored in the service areas themselves or in the hallways. In this case, the room serves as animal bathing, food preparation and laundry.

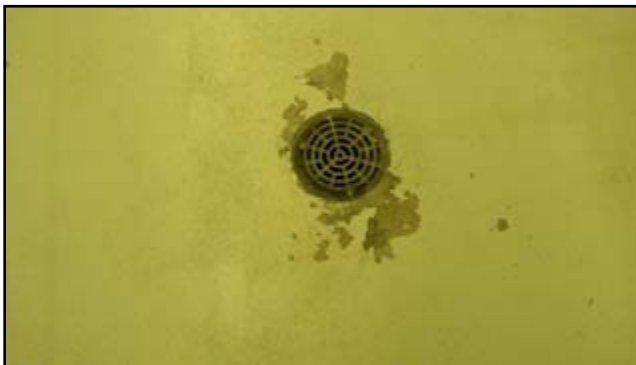


In a related matter, good shelter design includes significant counter space and bowl storage. Configuring cabinets over the counter and using better quality systems below with pull out rack storage might alleviate some of the difficulty.



The counter top should be at a continuous level with no seams or caulk. The counter should be replaced and a new counter should provide a continuous top suitable to accommodate the height of a commercial dishwasher. There is also a questionable discharge for the dryer.

Drainage in this area is poor. The floor finish is peeling and the drains do not work adequately. This is actually a common problem. Typically inexperienced designers and contractors will put the “Building Code minimum” sized piping in place. Animal care facilities, particularly in bathing areas, need oversized drainage piping to accommodate the water quantities.



As with other areas, this space should have better flooring, finishes, lighting, plumbing and a dedicated HVAC system. There should also be an exhaust hood over any areas used for dog bathing.

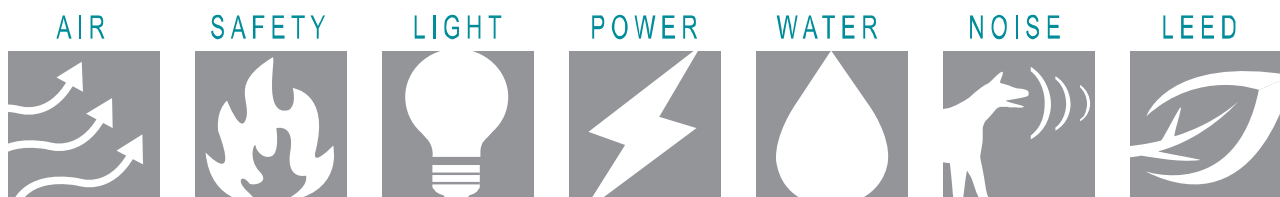


Storage & Mechanical

The storage is inadequate for the shelter. Furthermore the shelving and storage systems are generic and not specific to each type of storage. Given the tight existing floor plan, outside storage may be necessary for this shelter. In any event it should be well planned and the storage systems should be specific to the type of material being stored.



Furthermore the interior storage should be reconfigured in the master planning as the existing storage location may be better suited to food and litter deliveries given the available double access door in this location.

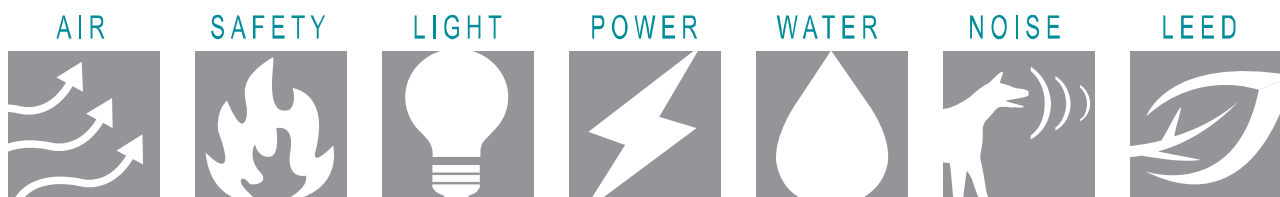


The outside storage requires some considerable relocation, organization and may require the continued use of a storage shed for caging and equipment.



Laundry

A suitable laundry area for a shelter requires separation, humidity control, folding areas and dedicated storage. There should be a large, dedicated laundry area for the shelter and a separate, smaller laundry area for the shelter medicine and surgery area. Pack and prep for surgery should have its own stacked washer and dryer. A laundry area for this size shelter should be in a dedicated room and encompass at least 150 square feet.



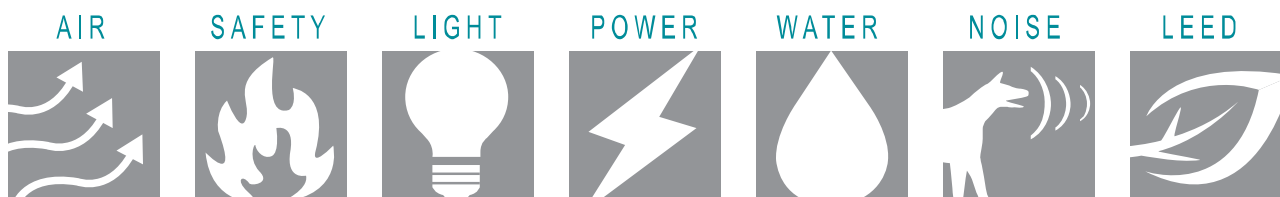
Clinical Areas

Clinic

The treatment and surgery area has opportunities for improvement to the walls and flooring as well as an appropriate cleaning system. Furthermore the lighting in this room should be at 40 to 50 fc for animal evaluation. Lighting should be peripheral to exam and surgical tables to minimize casting shadows on the patient. This room is much too dark for a treatment space.



Presently, this space is also much too small. For basic shelter medicine and holding areas, this should be twice the size and have direct communication with the holding areas and intake areas. Presently the HCH workroom and the hallway are being used for holding.



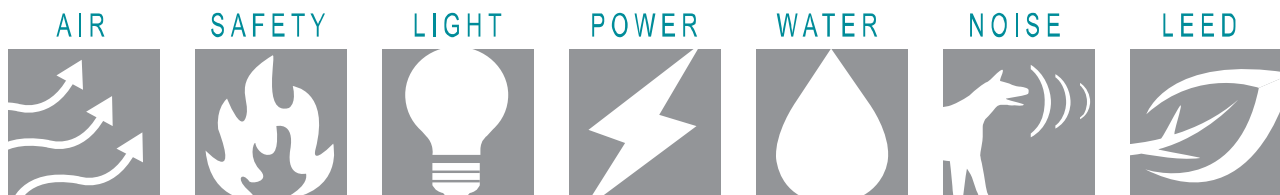
Treatment, offices space and even medical gas are grouped together.



A modern shelter medicine clinic should have separate treatment areas, surgical pack and prep, office, exam rooms and holding space. Power should be hospital grade and drainage should be configured in a clean (non-open) manner.



Lighting should be at 40 to 60 fc in exam areas and have ambient lighting in the perimeter of the surgical suite to preclude glare from the surgical lamp.



This room should also have a dedicated HVAC zone with dehumidification and ionization with a hospital operating room diffuser (HORD) type air distribution. There is no evidence of a dehumidification control and air distribution should be through linear diffusers and there should not be any four-way diffusers.

Ideally, the shelter clinic would have separate dog and cat treatment and surgery areas with dedicated HVAC zones. The HVAC systems for clinics have dehumidification, ionization air treatment and overall circulated flow rates of be 2 to 3 CFM (cubic feet per minute) per square foot.

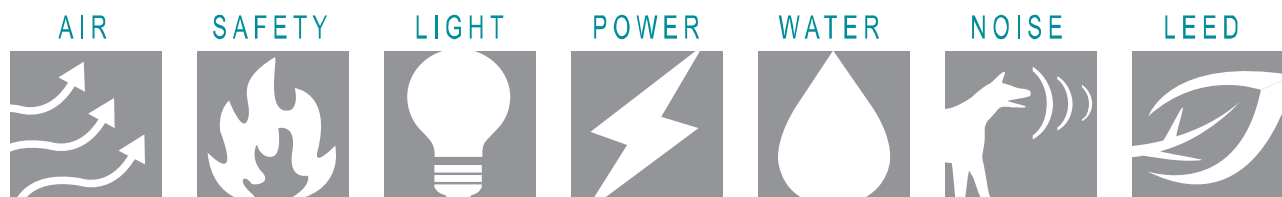
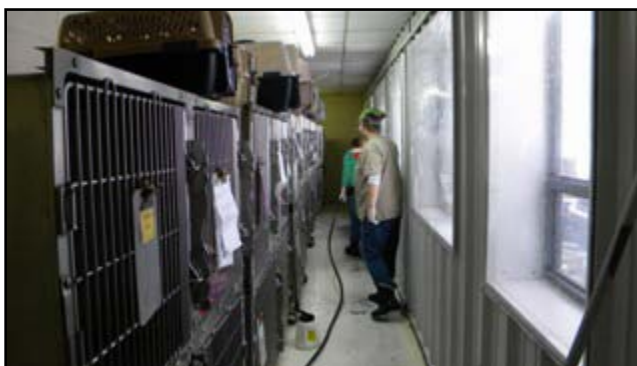
For a surgical suite, floors should be epoxy coated with 8 inch coving on the walls. The cleaning system should be a wet/dry vacuum system.

Healthy Cat Hold

The healthy cat hold areas has many of the problems that exist in other areas of the shelter, but the primary concern in this room is the lack of HVAC separation and biological control. Walls and flooring also need to be refinished and this area lacks an appropriate cleaning system.



The lighting in this room should be at 40 to 50 fc for animal evaluation.

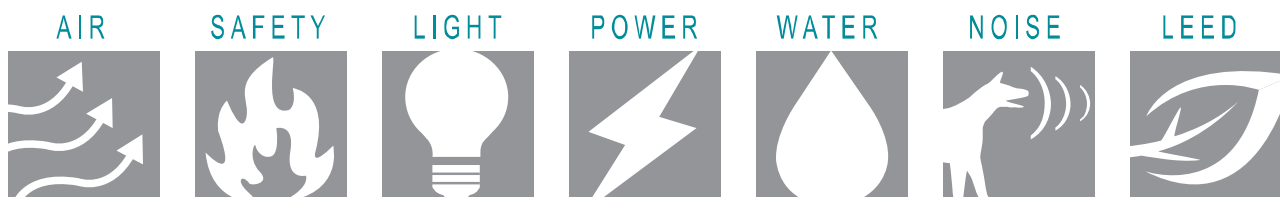


Pre Exam Dog Hold

The pre exam dog hold area has virtually no separation from the healthy cat hold. It also serves as a hallway to transit from the rear to the front of this area. Dogs recovering from surgery may be mixed with dogs waiting for surgery or treatment. This area needs to be reconfigured for a different purpose and the animal recovery and ICU areas should be integral to the clinic.



As with other areas, lighting levels are low, sound control is minimal, and the HVAC system is shared with other areas.



TLC Areas

TLC Admissions

The separation of the adoption lobby and animal surrender areas is excellent. This permits surrendered animals of unknown origin with unknown disease conditions and temperament to be evaluated and receive treatment and quarantine prior to being introduced into the same mechanical zones as healthy adoptable animals.



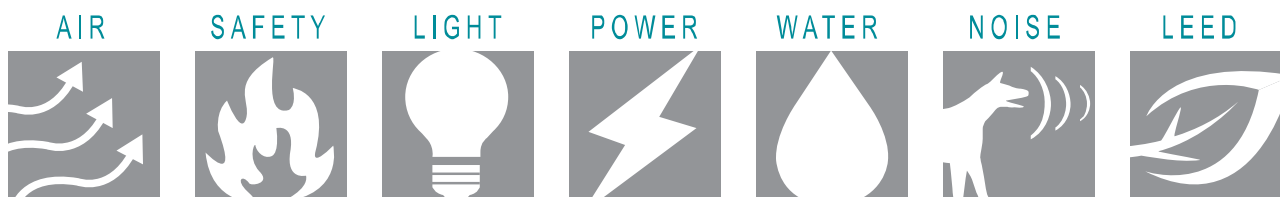
Reception areas should be spacious with adequate distance between the door and the reception desk to permit several people with dogs to stand in line. In this case the office off the lobby should be reconfigured to communicate directly with the lobby, even if a separate entry remains from the outside.



Surface treatments should include impervious wall and floor systems. In this case there is substantial cracking in the concrete along the drainage saw cuts and control joints. These cracks can be treated prior to installing an epoxy or similar monolithic floor, but the work would have been considerably easier with control joints.



There is also a lack of appropriate, water-tight connections at the bottoms of the walls. Wall substrates at the lower three feet of walls in animal shelters should be cement board, not gypsum wallboard. The floors should have epoxy coatings that are covered up the wall from 6 to 8 inches. An equally acceptable alternative is porcelain tile with epoxy grout. Base perimeters should use sanitary base tiles. Applied moldings such as glued-on tiles, rubber base mold, or wood, should never be used in an animal shelter.



The evaluation rooms should be larger with dedicated HVAC systems and separate holding areas. This is particularly true given the disease history of incoming animals with ringworm.



The dip tank arrangement should be in a separate area as well and ideally as part of the intake flow such that animals pass through an evaluation/treatment area into the shelter.



As noted previously, mechanical or HVAC systems in an animal shelter lobby should provide about 2 to 3 cubic feet per minute (CFM) of air flow, of which about 30% should be fresh air. The recirculated flow should be treated with a biological treatment system, such as an ionizer, as well as a medium efficiency filter bank. Air systems must have a separate, dedicated dehumidification cycle and air should be delivered vertically to the floor. Exhaust air should be drawn from the individual cages. Return air should not be from a central return. It should be drawn from the perimeter of the lobby, the exact opposite of the distribution typical of an office building.

The lighting should be 40 to 50 fc at 30 inches above the floor, particularly where animals are being viewed or evaluated. The effect should be similar to a well illuminated retail space.



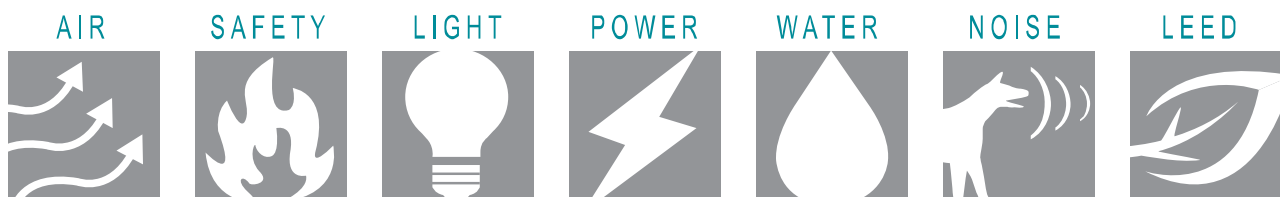
TLC Workroom

The TLC workroom has many of the problems that exist in other areas of the shelter, including the condition of the walls and flooring as well as the lack of an appropriate cleaning system and the need for better storage.



This room should be conducive to use with animals as an overflow or multipurpose space. Properly configured, this space would work well as a training or holding area.

This area needs new ceilings, better HVAC, and better lighting in conjunction with renovation. The method by which animals are held also needs to be evaluated. There were sick animals in this room with no separate exhaust and no separation from the general space.



Cat TLC

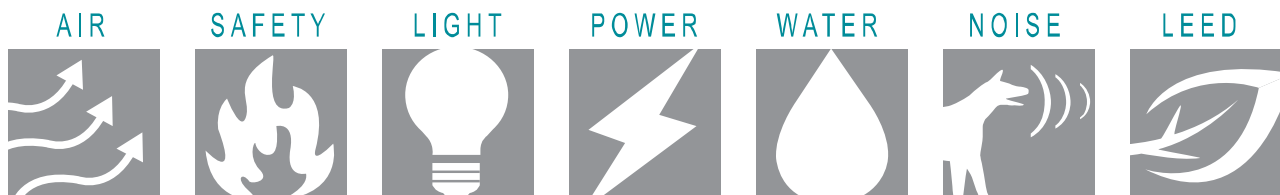
As with cat adoption, the cat TLC area should be a well ventilated space with vertical airflow, individual cage exhaust with high flow rates, a separate mechanical zone, a central cleaning system, and retail quality lighting. Dehumidification is essential and there are no dehumidification controls for this space.



In addition to lacking separate biological air control for this zone, the owner reports that there are temperature problems with this area and the windows were very cold.



Cat holding should be on a separate zone for both stress control and disease mitigation. Fresh, filtered, and dehumidified air should be presented to the zones using linear diffusers. Never use four-way diffusers; the objective is to provide the cleanest air straight to the floor to keep it dry and odor free. The supply and recirculated air should be treated with an ionizer and the exhaust flow should be about three times what presently appears to be installed.



The lighting system should provide 40 to 50 fc of light at the cages. It is so dark at the rear of the enclosures that they are difficult to see adequately to clean. Mechanical, electrical, and plumbing features in animal shelters must be very well coordinated prior to construction. Electrical receptacles are seldom required in cat rooms, but where necessary for pump IV or heating pad use, we locate pull-down receptacles at the ceiling or locate receptacles to the left and right of the caging such that it is accessible at 4 feet from the floor. Electrical receptacles should be located only where specifically necessary for a specific function in cat adoption areas. Any receptacles should be located no lower than 48 inches above the finished floor.

As mentioned previously, a vacuum system in cat areas is critical because it is necessary and appropriate to pick up any loose cat litter or cat litter dust from the floor prior to introducing any liquid cleaning material. Furthermore we discourage the use of janitor's sinks and floor drains in cat areas to preclude wet litter from inadvertently clogging the drains.

The walls in the rooms should be of an impervious, washable, non-staining system such as FRP, epoxy, PVC, tile, or glazed block. With an appropriate waterproof substrate, some of the upper wall areas above 48 inches may use a high quality, washable epoxy paint.

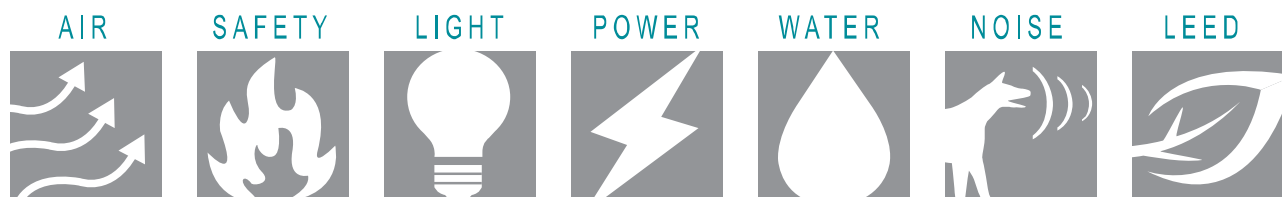
Cat Isolation

There is no true cat isolation area in the building. There should be an area with an appropriate cleaning system, lighting at 40 to 50 fc for animal evaluation, and a dedicated HVAC zone with dehumidification and ionization with positively pressurized central areas and individually exhausted cages.

Dog Areas

Dog Adoption & Healthy Dog Hold

The dog adoption area should be a well ventilated space with vertical airflow, individual cage exhaust, a central pressure washing system, and retail quality lighting. Each dog adoption or holding zone should be limited to 12 to 16 dogs. Each should be on a separate HVAC zone specifically. Fresh, filtered, and dehumidified air should be presented to the zones using linear diffusers as it is critical to provide the cleanest air straight to the floor to keep it dry and odor free. The condition of the HVAC registers indicates a system with no recirculation, no dedicated dehumidification, and no biological air treatment. A new system should include four levels of air treatment for the recirculated portion of the air and about 30 to 40 cubic feet per minute of fresh air dilution per animal. And while low level exhaust is desirable in general, the exhaust grilles within the runs are too low, subjecting them to water, urine, and fecal matter continuously.



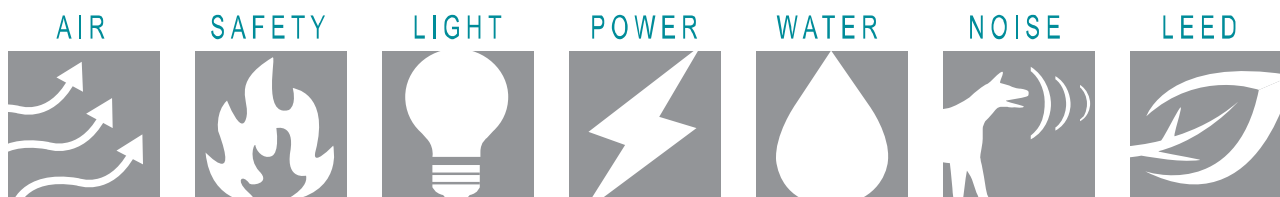
The drainage systems in the dog area are not adequate. Drains should not be in the middle of the floor and trench drains should have automatic rinsing systems.



Drains should not discharge to open areas.



Cleaning systems should include pressure washers and flush fixtures for solid waste.



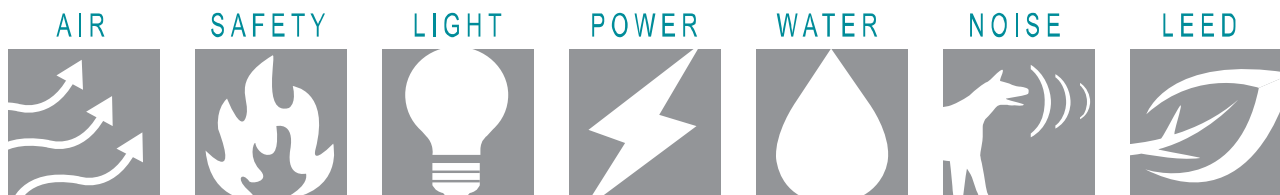
HVAC systems should be individual dedicated zones. They should have individual cage exhaust, not agricultural exhaust fans.



Lighting needs to be two to three times the level presently installed for proper cage cleaning.



Structural elements need to be coated and protected.



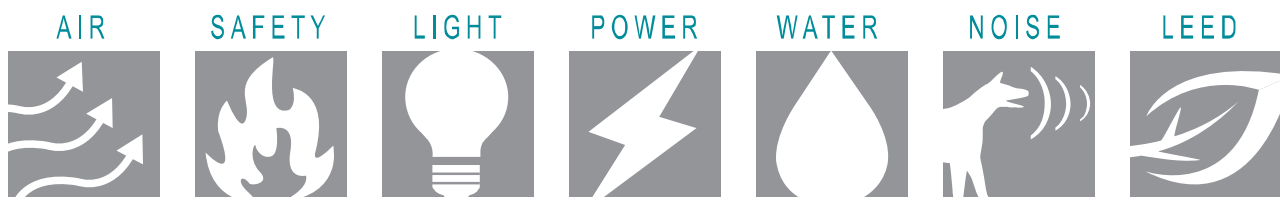
Flooring needs to be repaired and replaced with a two part epoxy system.



Doors and windows should be integral, one-piece fiberglass framing systems.



And storage should not be within a dog area.

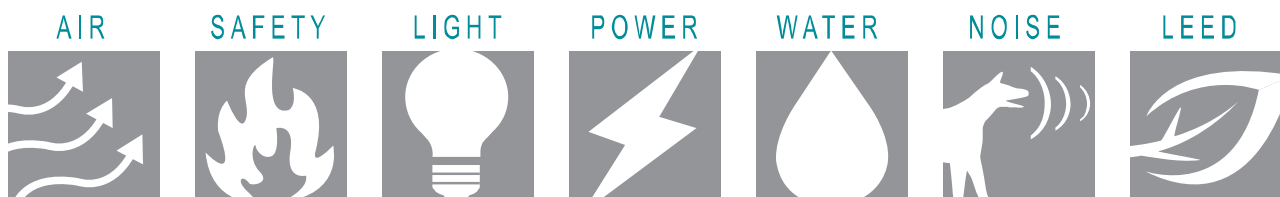


HVAC systems require airflow exhaust rates to 40 cubic feet per minute per animal with a corresponding vertical air supply in the runs. The overall HVAC recirculated flow rate should be 3 cfm per square foot with return filter grilles, carbon impregnated MERV 8 filters in the recirculation system and an ionization air treatment.

Plumbing in the dog adoption area should be very well planned. The owner does not appear to have been properly advised as to cleaning system options for dog adoption. This area is not suitable for hose cleaning. There should be trench drains in the runs with automatic tempered water rinsing systems and commercially available animal care pressure washing systems for the runs. Furthermore the drains should never be stamped metal or cast iron. Always use composite material grates to avoid dogs getting toes broken.

Lighting in the dog adoption area is too dark in the runs. Lighting should be at about 50 to 60 footcandles at the floor of the cage for cleaning with a lower lighting level for normal illumination. These cages are not adequately illuminated for cleaning.

The doors and thresholds of dog adoption are not appropriate to this intensive environment. Ideally thresholds should be either part of the monolithic epoxy system or a stone or fiberglass system that is set into the epoxy. Doors and frames should be solid core, exterior type systems that are gasketed and swept. In all cases it should be a watertight threshold system with little or no requirement for caulk. In this case, the lack of floor pitch is exacerbating the moisture conditions at the walls. These walls and door frames will almost certainly be damaged very quickly by the water.

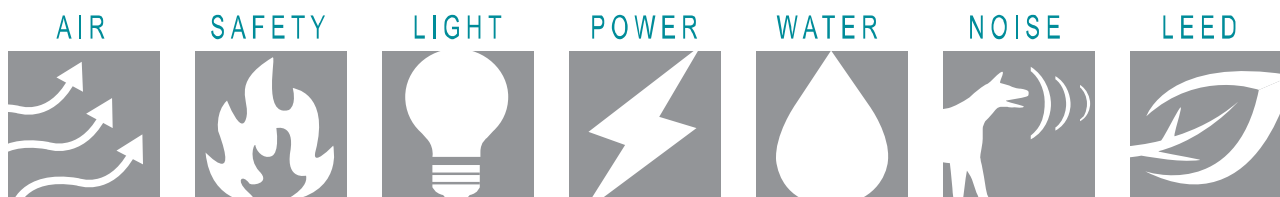
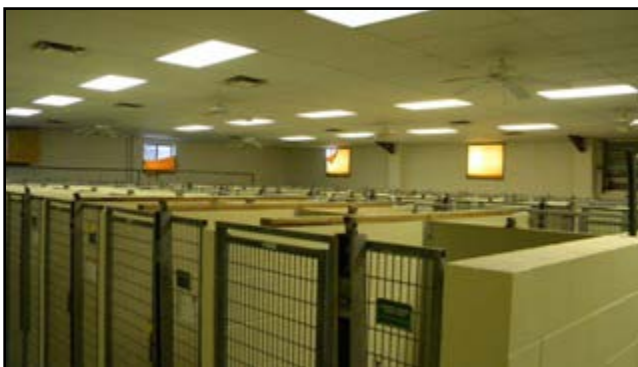


Dog TLC

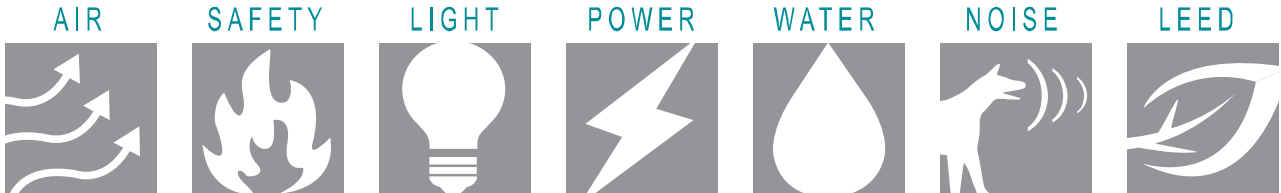
The dog TLC area has the same concerns as the dog adoption areas, including HVAC configurations, lighting, cleaning systems, and a very inappropriately located floor drain that is right in front of the door to the intake lobby.



One additional consideration includes the fact that the block wall configuration could be easily modified to separate the space into smaller zones by extending selected partition walls to the ceiling.



The outside of this area could also be reconfigured to provide a dedicated TLC play yard that directly communicated with some runs.



General Animal Shelter Requirements

Flooring:

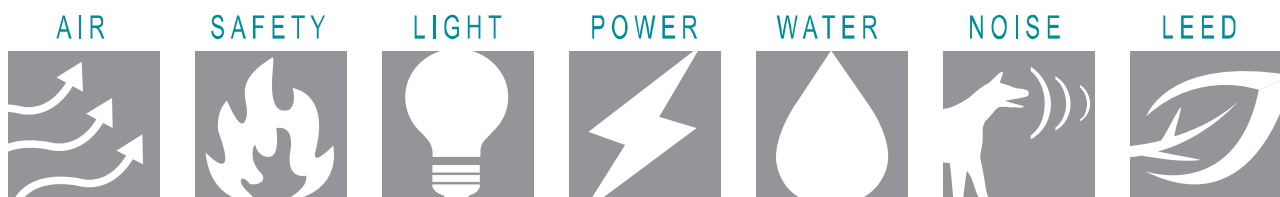
In all cases, as with all finishes, the installation is absolutely critical to quality flooring. There are moisture limitations on the slab and the substrate must have a vapor barrier. In new construction, we recommend 1 inch polyisocyanurate board (Dow Board) underneath the slab. The flooring subcontractor should have significant documented experience with the specific product, ideally being factory trained or certified. We feel that it is imperative to look at several examples of the subcontractor's work before hiring for any flooring. (In our remediation work, flooring problems are probably the second most frequent complaint after HVAC systems.)

In our opinion for a shelter, epoxy or acrylic is the best flooring choice. Prime Coat has an animal care division and they both sell and install their product. This is our recommendation for animal care projects. This product is typically \$12 to \$14 per square foot depending on the coving requirements.

For the lobby or any aesthetic areas, a good choice after epoxy would be porcelain tile with epoxy grout. Be sure to select a darker grout; despite the claims of impervious epoxy grout companies, these grouts will darken with repeated cleaning and the occasional urine stain.

The less intensive areas such as offices, food preparation, laundry, and evaluation areas do not necessarily need the performance of epoxy. Since these areas are not under as much abuse as the dog areas and bathing, an alternative choice that works well is a commercial surgical grade, seamless vinyl such as Armstrong or GAF. Pay particular close attention to the seams and the method of seaming; some contractors try to get away with filling and grouting oversized joints.

Animal care specific rubber flooring is also an excellent choice. The animal care specific aspect is extremely important; many companies sell rubber flooring. Only a few sell it specifically for the canine and equine industry and that is the level of impermeability and strength that is necessary. PrimeCoat makes a SoftFloor product that works well in the treatment, lobby, and other moderate traffic areas. Other products include Mondo and Nora. Mondo makes several products that are 3 mm sheet goods (www.mondousa.com) with their Sport Impact and Ramflex products being the toughest. Nora Rubber (www.norarubber.com) has a little more color selection and they make both 2 mm and 3 mm products. These products must be covered up the walls.



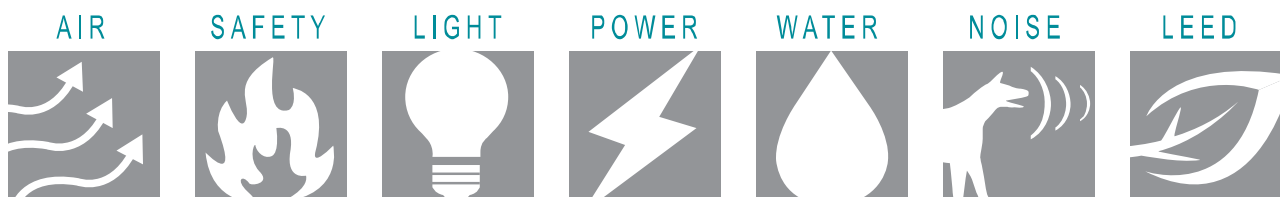
Wall Finishes:

There are many good options for wall finishes. With the exception of any masonry walls, all substrates should be cement board (e.g. Durock) or block wall on the bottom 3 feet of the walls.

Even with the best HVAC system, there are times of the day in any animal shelter when humidity levels rise. The problem with gypsum wallboard is not merely liquid wicking from the outside hallways. It is also condensate that forms on the inside near the floor and door frames, ultimately leading to the failure of the gypsum substrate and door frames. We have seen this many times in remediation projects.

Design walls in animal facilities in the same manner as you would for a tiled shower or swimming pool.

- Epoxy Walls Best option for highly durable, long lasting, pressure wash resistant surface.
- Acrylic Walls Similar to epoxy but more environmentally sound. TNEMEC makes acrylic systems as does Acrylicon. Similar in cost to epoxy.
- Glazed Block Overall excellent choice especially where CMU walls are specified anyway for noise control. Glazed block must use an epoxy mortar in wash down areas. Typically we recommend that the bottom-most course be standard CMU to allow coving of the epoxy or rubber flooring.
- Fiberglass Fiberglass reinforced plastic panels (FRP) work well at a lower cost than epoxy or acrylic. Seams must be chemically welded (no gasket systems) in areas that are pressure washed. Contact points between coved flooring and the wall system must be tight and caulked. Caulking will have some occasional maintenance, particuLawrence Humane Societyy after several years.
- PVC PVC panels have excellent engineering characteristics: the seams are chemically welded, the panels have an R value, they are inherently moisture and vapor barriers and they apply easily to many substrates.
- Wallpaper Certain rooms such as exam rooms, reception, and offices may use washable wallpaper above a wainscot. This must be a highly durable, commercial paper used for damp areas (e.g. bathrooms). It should not be used below 4 ft in exam rooms, lobby, or holding areas.
- Paint Epoxy paint or a very durable, moisture and mold resistant (e.g. bathroom) paint may be used above wainscot or in public bathrooms, breakrooms, or offices. Keep in mind that every part of an animal care facility gets washed and every room is likely to have animals in it from time to time. (Even staff bring their pets into their offices.)



Ceilings:

First and foremost: noise transmission control is not noise reverberation control. Wall constructions that provide good transmission control between rooms seldom provide good reverberation control within the room. The ceiling tiles in the shelter provide some reverberation control within a room but provide virtually no transmission control at all. Both problems must be solved.

Ceiling substrates should be gypsum wallboard regardless of whether a tiled ceiling is installed or not. Alternatively, walls can rise to the level of the roof deck, but must be completely sealed at that joint.

A soundproof zone requires at least two sheets of 1/2 inch wall board, taped, spackled and caulked. Note that this may not be entirely soundproof but would mitigate noise considerably.

While this construction is ideal for noise transmission, animal security, and biological air separation between zones, it also leaves a hard surface that is conducive to reverberation. Therefore the ceiling does require some noise abatement.

The Armstrong Optima Open Plan or Vector Plank at 3/4 inch or thicker has a high noise reduction coefficient (NRC), high light reflectance, and an antimicrobial surface. This would be an excellent choice for dog adoption areas.

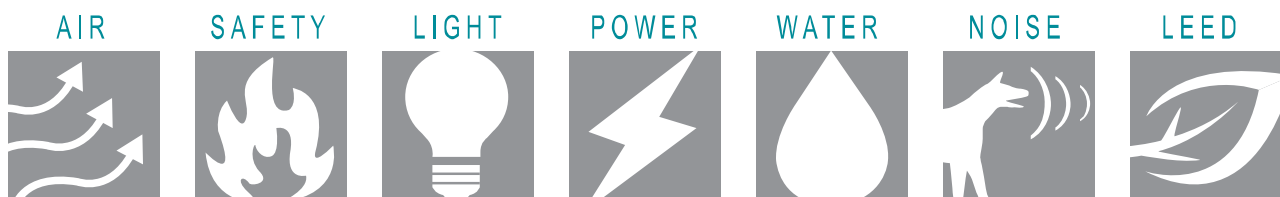
The Armstrong Fine Fissured or Healthzone Ultima in 3/4 inch only or the Cirrus in 7/8 inch only are good choices for veterinary areas. These are lay-in tiles that can be glued to wallboard, although many companies make both types of product.

Most of these tiles are fiberglass (not mineral fiber), have NRC values of 90%, good light reflectance of 90%, humidity and antimicrobial properties.

Be cautious with tiles having similar names or different thicknesses. For example many of the Armstrong tiles with similar names have dramatically different acoustic properties.

Suspended grid ceilings in dog run, isolation, and other pressure washed areas should have a fiberglass or plastic grid system such as that available from Kemlite Sanigrid.

Another option is a sprayed-on acoustic material such as K-13. International Cellulose Corporation makes K-13 as a spray-on ceiling or wall covering material. (www.spray-on.com) It should be applied to 1-1/2 inches thick.



Noise Control

Animal shelter noise control can be different from noise control in other types of buildings for a variety of reasons. Primarily, internal noise control from reverberation frequently relies on porous surfaces. Unfortunately the surfaces in the animal facility must be washable and are typically hard. This precludes the use of many effective acoustic products. Secondly, the noise levels are much higher than those typically associated with noise control in a human occupied building. A kennel of barking dogs is typically at or above 90 dB(A).

The control of noise usually takes one of two forms: The control of noise within a room and the control of noise leaving a room through walls, ceilings, doors, and windows.

Internal noise transmission refers to the propagation of noise through a solid surface to an adjacent room. It is measured in Sound Transmission Class or STC. In this case, noise transmission from one dog area to another as well as the cat area presents the most difficulty. Fortunately the block wall construction and separation of buildings tends to reduce much of the typical transmission problems.

Treating direct kennel noise is difficult and presents a number of technical issues. In facilities other than animal care, reverberation is the primary problem and the sound you hear is mostly reflected (reverberated), not direct. It is measured in Noise Reduction Coefficient or NRC. Shelters are unique in that the dogs create many sources of direct noise that are physically close to the level of your ears. In a renovation of the kennel areas there are three solutions: reverberation control, sound blocking, and canine excitation control.

The acoustic treatments for direct kennel noise are generally limited to ceiling and wall materials. To avoid urine and excessive contact with chemical cleaners, acoustic treatments must necessarily be located five feet or more above the floor, which limits their effectiveness. To withstand higher humidity levels, acoustic treatments should be washable.

With regard to absorbing panels and building materials in general, massive materials absorb low frequencies and light porous materials absorb higher frequencies. All things being equal, thicker materials and trapped air spaces make better absorbers. Non porous, washable surfaces are generally poorer acoustic materials.

Sound blocking refers to a physical, solid barrier between you and the dog. Plexiglas, Lexan, or safety glass panels over most of each cage door will reduce the dB level of the barking from your perspective and cause the dog to hear his own bark more and other dogs less. Some enclosure manufacturers will now make entire suites with solid walls and glass partitions. Note that this recommendation should not be used without an appropriate ventilation system that provides for direct exhaust from the dog cage, similar to that of a cattery. This recommendation should be part of an overall design concept because it will affect the cage conditions without proper direct heating, ventilating, and air conditioning.

Stress leads to barking and aggressive behavior. All kenneling should be designed to provide some protection or safe area with limited views of other animals. This is especially true of aggressive dogs displaying territorial behavior.

Scent trails should be short. By providing multiple paths around the kennel zones in a new design, staff can move an animal along a route with the least exposure to other, caged animals.



Sound masking refers to the design of deliberate background noise such as “white” noise or music. Music must be soothing. Some research has shown calming benefits with classical music played at moderate levels.

For noise transmission control, walls and ceilings need to approach a sound transmission class (STC) of 60. A CMU block wall with no penetrations has an STC of about 45. One layer of 5/8 inch gypsum on steel studs with insulation and cement board on the reverse side has an STC of about 60. In renovations, some of the intervening walls may benefit from some additional treatment (particulate Lawrence Humane Society between the cat areas and the dog adoption), however the building separations in this case are ideal for noise transmission control.

Noise Control – Transmission:

For noise transmission control, walls and ceilings need to approach a sound transmission class (STC) of 60. A CMU block wall with no penetrations has an STC of about 45. One layer of 5/8 inch gypsum on steel studs with insulation and cement board on the reverse side has an STC of about 60.

Noise Control – Reverberation:

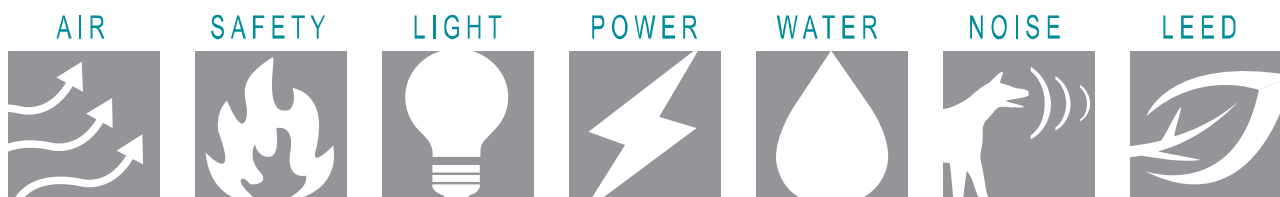
In addition to the ceiling tile options with NRC ratings above .75, the wet areas can also be finished with polypropylene panels. Polypropylene panels are made by Acoustical Surfaces <http://www.acousticalsurfaces.com/>. Their Sound Silencer Porous Expanded Polypropylene (PEPP) Acoustical Wall Panels can be fit to any wall, cut around light switches, windows, and doors as well as any other protrusion, and is completely washable. The panels must be 2 inches thick to achieve the desired NRC. The benefit of this product is the fact that it can be washed and even soaked without any damage or impact on its sound absorption.

Fiberglass Doors and Frames:

The door frames at Lawrence Humane are in poor condition.



All doors and frames in this facility should be solid core, fiberglass systems that are gasketed and swept. It is very difficult to find any door system anywhere that has a combination of high STC (about 35 or better is ideal for a door) and long term tolerance of moisture. Additionally many shelters want to have some doors with glass in them. Chem-Pruf (www.chem-pruf.com) and Simon Door (www.frplite.com) are two options, but there are many fiberglass door manufacturers.



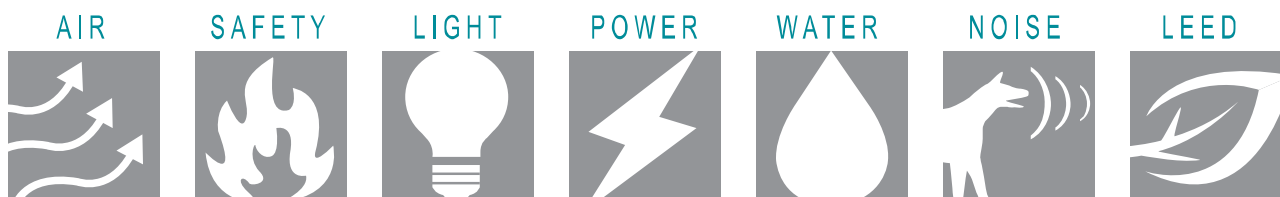
Building Systems:

Mechanical Systems

The mechanical systems presently at Lawrence Humane Society are neither the type nor capacity to which we would normally design HVAC systems. Animal care facility HVAC systems should be entirely different from those designed for human occupancy, including medical buildings. There should be many smaller zones rather than a few large zones. Air flows should be two to three times that of human occupied buildings with supply air systems that use vertical air flow, moderate velocity, and distribution opposite to that of a typical office or retail space. All systems should have dehumidification capability. Fresh air flow rates should be 25% to 35% of total air flow, not 10% typical of office spaces nor 100% typical of many animal facilities designed by inexperienced engineers. In summary, properly designed odor free animal care systems have:

- Multiple, smaller, independent zones
- Ducted return air
- Exhaust air directly from sources of odor and moisture
- Return air low and directly from animal areas
- Dehumidification
- Overall airflow rates of typically 2 to 3 cfm per sq ft in animal areas (a human building has about 1 cfm per sq ft)
- Fresh airflow rates of 20 to 40 cfm per animal

There are minimal zones in the building with fresh air varying from none to 100%, depending on the system. In this case, there are excellent areas in the mezzanines that could effectively serve multiple zones properly.



Both of these areas has access stairs as well.



Total dehumidified airflows should be about 2 cfm per square foot in the cat, veterinary, and lobby areas of the building. Of that amount, there should be about 30 to 40 cfm of fresh air per animal, which typically results in about 25% to 30% fresh air as a proportion of total circulated air.

Note that these are rough, qualitative recommendations. Actual airflows are determined room by room in proper ventilation analysis and are affected by air treatment, fresh air rates, duct distribution, animal disease history, sources of moisture, and budget. Do not use these figures for design or pricing.

Fresh Air & Exhaust

Regardless of whether we designed a renovation to the existing building or designed new, the Lawrence Humane Society facility will require a substantial amount of fresh air on the order of 20 to 40 cubic feet per minute per animal. We usually recommend a dedicated fresh air make-up system with exhaust located primarily over the cages and directed outside. The existing ERV is probably adequate to provide this portion of the air system, however many of the exhaust locations need to be relocated and the intake on the ERV must have an extension to prevent moisture and snow from working into the intake filters.

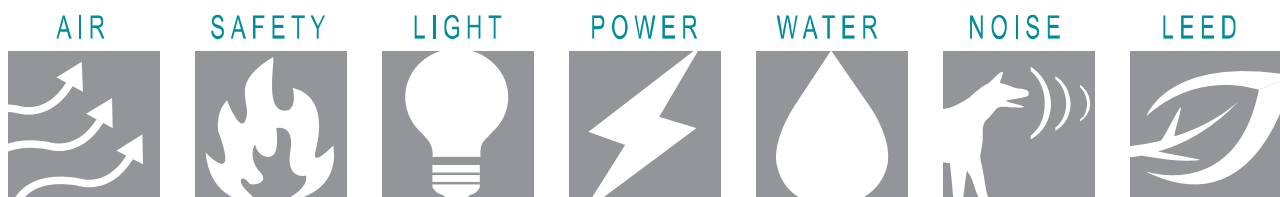
Zoning

The mechanical systems in the shelter are insufficient. Air distribution is very poor. In general, there should be separate systems for the lobby, the clinical areas, the holding rooms, the dog zone, and the cat zone. All zones require excellent distribution, high airflow rates, high fresh air dilution rates, filtration, dehumidification, and biological air treatment.

Filtration

All of the recirculating systems should have four stages of filtration. This would include return filter grilles, pleated medium efficiency filters, carbon filtration, and ionization.

In all areas, any new systems must have dehumidification control and a form of air treatment such as ionization. Be cautious with air treatment systems. There are many systems on the market at many different price levels with many different claims. We know of only a few products, such as Petairapy, that are specifically engineered and tested for animal or analogous human airborne pathogen control.



Energy Recovery

Because of the excessive amounts of fresh air required for a kennel, we recommend energy recovery ventilators to reduce cooling and heating costs. However we do not recommend energy recovery wheels. We typically specify solid-state semi-permeable membrane systems.

A Word About Air Distribution

In addition to adequate air flow, adequate fresh air, dehumidification, and air treatment, proper air distribution is critical. Without proper air distribution, the other features of the HVAC system will perform poorly or not at all. Where possible, air should be delivered vertically to the floor surfaces at moderate velocity. Exhaust should be as low and close to sources of moisture, odor and disease as possible, including direct exhaust from cages. Returns should be located in intermediate locations from the perspective of odor and moisture. All of the ductwork should be metal duct with little or no flexible ductwork.

All of the air distribution features work with the caging and plumbing systems to create a clean environment. In this manner, the direction of the vertical air distribution pushes clean, treated, dehumidified air in the same direction as the washing and cleaning, ideally toward the drains, which is only really possible with a complete renovation or new construction. Typical diffusers should not be used. Improper air flow is the one area where we see the most errors in design and installation for existing buildings.

Plumbing Systems

Water Systems

The water service is probably large enough although water systems should include looped cold water and recirculating hot water distributions. This helps eliminate pressure drops in the systems. Furthermore there should be redundant hot water systems and fully insulated piping. Neither exists in Lawrence Humane Society at this time.

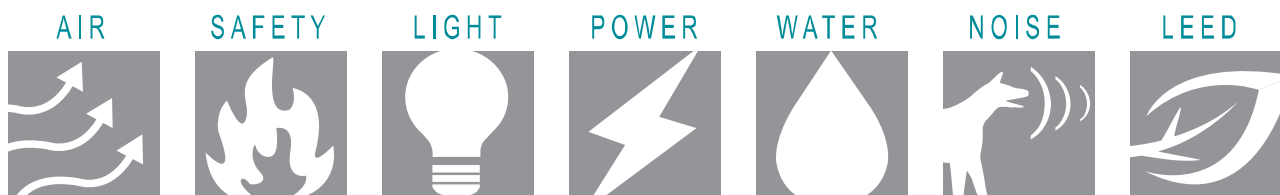
Canine Bathing

It would benefit the facility to add a Hydrosurge system and a handicap shower because the size, type of flexible nozzle, and hand rails, which are ideal for dog handling. We also recommend a quick “clean-up” facilities for dogs. We typically design one dog enclosure with a simple washing system that includes a tempering valve and a sprayer. In this manner a dog can be washed right in one of the enclosures.

Cleaning Systems

We recommend a central wet/dry vacuum system for most locations in the shelter. Typically we recommend the Aqua-Air system because it has a low pressure spray washing attachment.

The dog adoption and wet rooms should be cleaned with a high pressure washing system. Typically we specify SMT systems.



Drainage

Best practice is to separate trench drain and dog tub waste from the sanitary waste. The proper design combines all of the sanitary and solid waste in one lateral, while all of the trench drains and dog bathing fixtures are sent through a hairtrap prior to being introduced to the sewer. The drainage lines are usually designed to exit the building in a manner such that they can be easily cleaned independently.

The trench drains should have an automatic hot water flushing system to keep urine from wetting the drain surface and drying there. This is a big source of odor. In the existing shelter, we would have to consider whether self-draining cages made better economic sense than installing trench drainage in the floor. Trench drainage is expensive to install in an existing building, but it is the superior method of liquid waste removal. The shelter does have one flush fixture for dog waste removal and we agree with the inclusion of that fixture.

Power Systems

Lighting

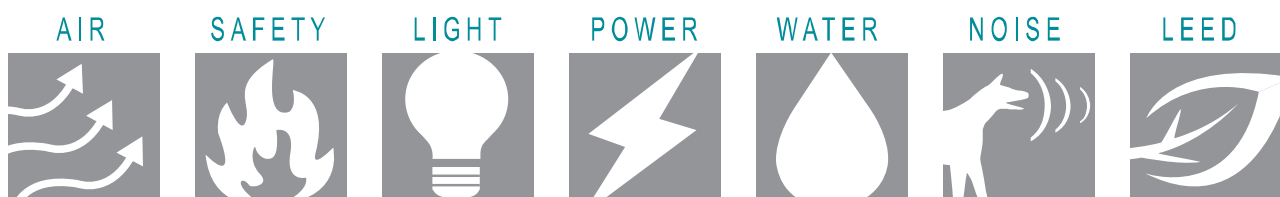
The lighting in the Lawrence Humane Society facility is not adequate. Generally shelter areas should be well illuminated to about 40 to 50 footcandles at 30 inches above the floor. Dog kennels should have multiple lighting levels and be able to be illuminated 50 to 60 fc at the floor for adequate cleaning. Light fixtures presently are sparsely located.

Electrical Systems

Typically we design electrical systems significantly more circuits than would be normal for a “human” occupied building. This is particularly true in the veterinary and clinical areas as equipment often is either life-critical or tends to consume the full ampacity of each circuit breaker. Additionally, we always recommend an emergency generator.

Fire Detection

Smoke detection systems should be designed for early warning in animal shelters. It is very difficult to evacuate a shelter in a fire and for that reason we design smoke detection in every single room, ceiling cavity, mechanical space, and attic.



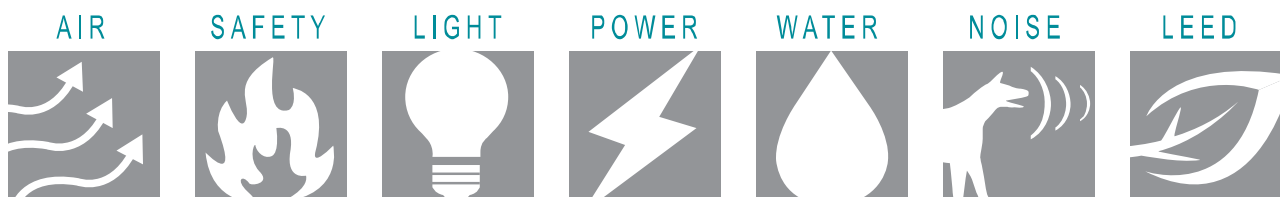
Product Disclaimer

In various sections of our reports and recommendations, we reference company products with which we have experience and have generally been satisfied with performance. We are not endorsing any of these products. They are simply examples of good quality products that have worked well in this application. Other products may be equivalent. As a matter of company policy, we neither solicit nor accept any commissions, percentages or other compensation for mentioning or specifying these companies.

Engineering Disclaimer

This report is a qualitative discussion of our observations and recommendations based on a single site visit. It is not a substitute for complete engineering plans and specifications. Lawrence Humane Society should not use any aspect of this report for actual renovations or contractor pricing under any circumstance. We recommend that the owner engage us for actual engineering and interior design to provide plans and specifications for actual pricing and construction.

This is a report of our review and opinions of the existing conditions of the site and the proposed project. By definition a consultation is general. It is not a substitute for engineered plans and specifications. It is not suitable for obtaining costs from contractors. While this report is complete in terms of the recommended systems in general, it does not even remotely begin to specify all of the products, options, and most importantly, the methods and configuration of installation. We strongly recommend proceeding to engineered plans from an experienced animal care engineering company such as ours.



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animal facility engineering

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Kate Meghji, Executive Director
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30 April 2015

Dear Kate,

Based on our initial distribution of space and an assumption of 10% new construction I have arrived at the following breakdown.

architectural and engineering services	\$380,000	based on \$20 per square foot
building renovations	\$3,600,000	based on 90% of a \$4M budget
new construction	\$400,000	based on 10% of a \$4M budget
equipment		
caging & animal equipment	\$460,000	257+/- enclosures @ \$1,800 ea
veterinary	\$400,000	budget number but typical

Below are some typical costs of construction for animal shelters.

Project:	Memphis shelter	Southold shelter	Austin shelter	Yonkers shelter	North Attleboro shelter	Farmington shelter	Virginia Beach shelter	Paws and Claws shelter	Tyler shelter
Type:	Tennessee	New York	Texas	New York	Massachusetts	New Mexico	Virginia	Minnesota	Texas
State:									
Source:	low bid	low bid (union)	professional estimate	low bid (union)	low bid	low bid	design build	low bid	professional estimate
Date:	Jun-09	Apr-07	Jul-09	Oct-12	Sep-12	Nov-12	Nov-11	Jun-13	Jan-14
Total Area (sf):	34,877	7,235	41,081	13,925	3,126	15,667	35,885	10,791	18,464
Total:	\$ 5,973,034	\$ 2,756,254	\$ 12,658,589	\$ 4,659,173	\$ 598,732	\$ 3,362,168	\$ 9,319,411	\$ 2,163,716	\$ 4,810,566
Mechanical:	\$ 1,400,000	\$ 350,000	\$ 1,340,225	\$ 738,468	\$ 189,250	\$ 546,999	\$ 1,987,900	\$ 416,194	\$ 532,760
Plumbing:	\$ 600,000	\$ 272,969	\$ 409,894	\$ 574,900	\$ 59,100	\$ 341,267	\$ 1,087,949	\$ 175,234	\$ 272,176
Electrical:	\$ 500,000	\$ 285,285	\$ 975,644	\$ 502,085	\$ 44,000	\$ 329,247	\$ 260	\$ 39	\$ 553,920
Total/sf:	\$ 171	\$ 381	\$ 308	\$ 335	\$ 192	\$ 215	\$ 260	\$ 201	\$ 261
Mech/sf:	\$ 40	\$ 53	\$ 33	\$ 53	\$ 79	\$ 35	\$ 55	\$ 39	\$ 29
Plum/sf:	\$ 17	\$ 41	\$ 10	\$ 41	\$ 25	\$ 22	(in mech)	(in mech)	\$ 15
Elec/sf:	\$ 14	\$ 43	\$ 24	\$ 36	\$ 18	\$ 21	\$ 30	\$ 16	\$ 30

Regards,
 Scott

