Operational Guide

Planning and Building
an Animal Shelter

AMERICAN HUMANE

Protecting Children & Animals Since 1877

Acknowledgments

We would like to take this opportunity to thank all the shelter organizations we have had the pleasure of working with. Without exception we have found "shelter people" to be exciting, resourceful and dedicated. It's fun for us as architects to work with people that are on a "mission." We hope that the ideas and projects you find in this book are built upon this same spirit.

Table of Contents

Introduction

An exciting new generation of shelters is being built that celebrates the human/animal bond, and acts as community resources for the public and their companion animals. The progress made by the animal sheltering community in controlling the pet population has allowed animal shelters to increasingly shift their emphasis to include effective educational and adoption programs.

Shelters are being designed that encourage public involvement and dispel the "place where they kill animals" perception that discourages visitation. Across the country, facilities that were developed using 1970's perceptions and technology are reaching the end of their practical and functional life span, and are being replaced by facilities that foster a positive shelter experience.

Your shelter can be an animal resource campus. Beyond providing traditional animal control and housing for the community, it could become a place where a broad range of animal-related services are provided. Programs for behavioral counseling, agility training, dog parks, doggie daycare, and boarding can transform the public perception of your shelter to one of a cheerful place that is utilized on a regular basis. In turn, this increased public involvement will support you in your core mission – preventing cruelty to animals.

A well-designed shelter is a place where people interact, learn to care, and learn to reach out. It is a community. For its inhabitants, both animal and human, the shelter provides places to work, to play, to learn, and to feel secure.

On the most basic level, animals need a safe, secure, and physically healthful environment. Many of the existing shelters have been successful in meeting these needs. In future generations of shelters, the emphasis will shift to providing housing that is psychologically healthy. To avoid kennel stress and reinforce positive behaviors, animals need a balance of social interaction and a secure environment. Animals live to interact and interact to live. They need a place where they can interact with both others of their own kind and humans. Simply stated, animals need *Play Places*, be they indoor or outdoor. Places where they can be challenged and stimulated to "work" and play with others.

Work Areas – A well-designed shelter has a work area for staff that can flex with ongoing and future requirements, plus be durable and pleasant. Animals, especially dogs, need a place to work, such as agility and obedience training.

Play Areas – Play areas for the animals should include a place where group interaction can occur spontaneously. A play area for dogs could include an indoor frisbee park; for cats, a jungle gym; for staff, areas to decompress.

Learning Areas – Besides areas for the animals to learn, there should be places for the staff and community to learn. Since there are many ways to learn, spaces for learning should be many, varied, and flexible. Classrooms, libraries, interactive education, demonstration labs, and conference areas can be provided.

Secure Places – Both animals and people need to feel secure. They need places to get away from the activity. For dogs this could be a cozy resting bench and a place to hide from the public view, for cats a sunny window sill, and for staff an environment that counteracts burnout with enriched spaces designed with a variety of space, color, texture, and light.

To produce a facility with these characteristics requires mastering three basic factors:
- Build an early and lasting consensus among not only the board and the staff, but also the

users, the community, and the funders of the project. A commonly held "vision" of what the facility should be will help with the fund raising and speed the design process. This same vision will help to guide the inception of the shelter, and its life over the long term.

- By identifying specific facility design goals, you create the basic building blocks upon which the balance of the design is constructed. Most likely you are starting with a clean slate. As such, you have a great number of possibilities before you. This is your chance to prioritize your goals and then act on them in designing a facility.

- Materials and building systems must be chosen with an eye to life-cycle costs. It is important to make decisions regarding selection of floor, wall, and ceiling materials, heating and ventilation systems, cleaning and feeding systems, plumbing fixtures, caging, and equipment based not just on initial cost, but on long-term maintenance, operation, and replacement costs. A well-designed facility will most likely have a life span of 30 to 50 years. Unfortunately, it often happens that decisions are made in the design and construction process to cut costs which ultimately cost more in the long run.

Animal shelters have a complicated blend of functional and programmatic requirements. Functional requirements include separate circulation paths for the public, animals, staff, and supplies, sophisticated building systems, extensive computer and communication networks, and control of infectious diseases. Programmatic requirements, such as educational, training, and other service programs, will become increasingly important and will change the face of future facilities.

We have divided the following text into four main areas: Design Process, Implementation, Technical Issues, and Case Studies. As the name implies, the Design Process portion of the book will deal with design concepts, trends, and organization. In the second portion of the book, the more task-oriented aspects of doing a project are covered, namely space allocation, costs, and the construction calendar. The third section explores the technical issues of noise control, heating and ventilation, lighting, and selection of materials. The final Case Studies portion shows a number of representative projects that help to illustrate the design approach and information we shared with you in the first portions of the book. By starting with this information, then mixing in a large helping of special and historical perspective, you can begin to create a shelter facility that is responsive to the unique needs of your animals, staff, board, and community.

Chapter 1: Design Process

Trends in Shelter Design

Not so long ago, animal shelters were designed to maximize the number of animals being held. Capacity, not quality, was the priority. Animals were warehoused, not rehabilitated. Now, around the country, exciting new shelters are being built with emphases not only on quality of environment for the animals, but also on staff environment and the public's experience.

Creating Better Environments for Animals

Imagine how much easier it would be to place companion animals into appropriate homes if your charges behaved and socialized much the same way in the shelter as they would in their adoptive homes. By minimizing stress, reducing boredom, and encouraging opportunities for social interaction, the animals will behave more naturally. It will be easier to judge their ability to adapt to a new home, and the incidence of kennel stress will be reduced for animals that are more difficult to place.

Increasingly we are seeing shelters that are interested not only in furnishing safe and clean enclosures for animals, but also in providing more comfortable environments that help reduce stress for the animals, staff, and the public alike. For years the sheltering community has worked with limited resources to provide housing that minimizes animal handling and the spread of disease while providing for the maximum number of animals possible in a given space. While budget pressures are certainly not easing, there is a growing realization that the construction of damage-resistant, laboratory animal-efficient enclosures may not be the best environment for either holding animals or for encouraging adoption.

Although it is seemingly impossible to overestimate the damage a bored, stressed, uncomfortable dog can do to its enclosure, some shelters are finding that programs involving training, exercise, and social interaction help to minimize the need for "bullet-proof" enclosures. Building on this direction, environments can be designed that stress the comfort of the animals, engender a more pleasant working atmosphere for the staff, and are more adoption friendly for the public. Think of the difference larger enclosures, more daylight, better ventilation, and effective sound control would make in your shelter!

Small, incremental improvements such as visual and auditory separation and the creation of comfortable and defensible spaces have remarkable cumulative effects. When dogs are happier, they tend to bark less. This in turn decreases the stress level and, consequently, the barking of the other dogs in the housing unit.

A variety of types, sizes, and shapes of enclosures should be considered in developing an appropriate mix of housing units. Respecting the "personal" space needs of a Chihuahua and a Great Dane leads to the obvious conclusion that a four-by six-foot enclosure may not be appropriate for every dog. Aggressive and timid animals have very different needs, with timid dogs particularly in need of "defensible" spaces. Poorly-socialized dogs often need to be isolated. Aseptic conditions are a primary consideration for medical and isolation wards. Requirements for lost-and-found animals are unlike those for long-term holds. Every shelter's management is based on a unique philosophy evolving from history, location, and the personalities involved. You may want to consider

incorporating a mix of the following concepts as part of your overall inventory of enclosures.

For cats, working with cat condos for individual enclosures and cat colonies for groups of compatible cats promotes both more comfortable housing for the cats, and a favorable viewing and adoption environment. The condos are larger than traditional cat cages, feature perches and small defensible areas or nooks where the cats can hide from commotion, and can have separate kitty-litter cubbies. Cat colonies are small rooms with features similar to those included in the individual cat condos. However, the perches and nooks are designed for multiple cat use. When possible, we try to locate cat enclosures on outside walls, so the cats can enjoy the sunshine and the view.

Housing in smaller groupings is also an effective tool in reducing noise and commotion and limiting the transmission of disease. With a maximum of six to eight enclosures in a room, smaller numbers of the public are apt to be in the room at any given time and dogs are far less likely to "set each other off" on barking binges.

Some shelters are moving toward the inclusion of group housing in their programs. A well-designed group housing room provides opportunities for animals to interact with each other, much like they would in a free-roaming environment. This can also be an asset during adoption, because by watching the animal interact at the shelter, it is possible to imagine how the animal may interact with other animals currently living in the new home. As an added bonus, a cageless environment is a more natural way for the public to interact with an animal. A properly sized and designed group housing unit will provide secure and defensible spaces, spaces for interaction, places to play, and places to sleep. Group housing units will often enable you to reduce construction costs while increasing facility capacity and flexibility, providing for a more natural and market-effective environment.

Possibly the most exciting changes in animal housing are rooms for dogs rather than runs, and cageless housing for cats. A facility with animal housing that looks more like your living room than a jail cell is more pleasant to visit, and ultimately will better market the animals. On the most fundamental level, a home-like environment is also better for the animals. Modern-day cats and dogs are family, and their natural environment is a home, not a cage. They feel more comfortable in a home environment where they can interact with other companion animals and people. Shelters that have built "real-life rooms" have found that the animals are calmer (less destructive or aggressive), quieter, and less likely to soil their environments. Shelters that have real-life rooms often have a higher adoption rate and a lower return rate, because the public can more naturally interact with the pet during the adoption process and because the animal is already conditioned to the home environment where it ultimately will be placed.

Another component of real-life room housing is an easily-accessible and spacious exercise area. This space can be used for interaction between animals, training with staff, and exercise. If the animal is to be conditioned not to soil his home, then he must also have an outdoor space that he can use appropriately.

Most people in the sheltering community would agree that their ultimate goal is to be so successful in their mission that shelters will no longer be necessary. Until then, the progress made by the animal sheltering community in controlling the pet population has redefined what is necessary for effective animal housing. With longer stays and expanded efforts to place animals that were formerly considered to be unadoptable, care has to be taken to develop habitats that will minimize kennel stress and encourage good behavior. New alternatives to the traditional kennels need to be developed to support animal well being and encourage adoption of hard-to-adopt animals.

Toward More Medical and Extended Care

In larger, better funded shelters in urban areas, fully equipped veterinary medical facilities enable them to provide on-site, low-cost veterinary care for all animals entering the shelter, spay or neutering of all animals before placement, and rehabilitative care of animals before they are put up for adoption. To provide this level of care, these shelters have built state-of-the-art veterinary medical facilities, including surgery suites, imaging capabilities, treatment rooms, labs, pharmacies, and exam rooms. Some facilities have even built apartments to house veterinary students, thus facilitating internship programs. In addition, many of these shelters have built isolation, quarantine, or even foster care wards and runs for long-term holding of animals during treatment and rehabilitation.

Toward Proactive versus Reactive Care

Shelters are increasingly focusing on pro-active education and intervention versus crisis care. The goal here is to educate the public and facilitate proper care of animals *before* an animal is abused, abandoned, or given up for adoption. Instead of focusing on the warehousing of animals that are received, many shelters are putting their primary emphasis into outreach programs. These programs include educational classes about animals and the environment, animal care, training, behavior classes, hotlines, abuse intervention, and rescue programs. As such, most of the larger shelter facilities include libraries, classrooms, training centers, and counseling rooms. Some organizations have even invested in educational video production studios, interactive education centers, and "wet lab" demonstration areas.

More Whole-Life Care

Shelters are also expanding the range of services they are offering the public. In an attempt to be more responsive to the needs of the public, to provide better care for animals, to educate the public, and to develop new funding sources, many shelters have expanded the range of services they offer, including:

- Adoption counseling.
- Behavior, training, and puppy wellness classes.
- Pet products and food.
- Educational outreach, nutrition classes, and counseling.
- Doggy daycare.
- Spay/neuter and health and wellness care.
- Geriatric care and owner-requested euthanasia.
- Grief counseling.

To provide these services, shelters are building training and education centers, retail sales facilities, daycare centers, veterinary facilities, and euthanasia/grieving rooms. While all of these services are beyond the scope of the historical role of shelters, they are representative of the more assertive role animal shelters are playing in our communities and busy lives.

More User-Friendly and Participatory Relationship With the Public

For the most part, today's public is more educated, more consumer savvy, and more demanding. You can't just talk at them from across a desk – you are better off sitting down and spending time with them to understand and educate. For the benefit of the animal, the shelter needs the public to take the time to make informed decisions. Your shelter is ideally suited to promote the human/animal bond and to teach your potential adopters about the proper care and training of their companion animals. Providing get-acquainted and counseling rooms will help you with this task. This will become increasingly important as you are faced

with the task of finding compatible homes for difficult-to-place animals.

Toward a Reduction of Stress

While much of the discussion surrounding shelter design centers on the needs of the animals, the people that the animals depend on for their care and training are often ignored. It is probably fair to say that most volunteers and staff are not working in the shelter as a get-rich-quick scheme. Yet their opinions and advice is often not solicited prior to the design of a new facility.

Even when staff input is carefully taken into account, the substance of their contributions tend to focus on functional requirements.

Both staff and volunteers burn out from the seemingly endless repetition of undesirable tasks and the often objectionable physical work environment. Animal lovers who perform euthanasia, and whose primary contact with the animals is cleaning up after them, often struggle to maintain a sunny and cheerful attitude, and yet they are also expected to be the animals' advocates and their primary boosters with the public.

Job satisfaction is, to a very great degree, a function of feeling appreciated. Designing a shelter that includes an assortment of "enriched spaces" with a variety of color, texture, space, and light can improve the working environment and will also send a message to the public, staff, and volunteers about the level of regard in which they and the animals are held.

Job satisfaction is also a function of taking time out to enjoy your work and the people you work with. Decompression spaces are necessary for the staff to get away from the "madness" and interact with other staff members. With more diversity of people in the workforce today, the staff will enjoy having the opportunity to take some time out to interact with, and get to know, their workmates.

Building a new facility is not only an opportunity to provide more animals with better housing, but it is also a chance to reinvigorate your staff and volunteers by providing them with a less stressful, more productive working environment.

The Typical Pet Owner: An Evolving Picture

Trends are evolving in the American public that are leading to contradictions for animal lovers who are interested in adopting companion animals. On one hand, people are better educated, have more money to spend, and are more apt to think of their animals as members of the family. On the other hand, with the pace of most people's lives accelerating, they are caught in a "time drought" and often have less physical space for their animals. Looking at demographic trends can give us indications of the most effective ways to provide services that will benefit people and animals.

Changing Demographic Profiles of Pet Owners

In years past, the typical companion animal owner could be defined as a middle income, white, suburban family. Now that description has broadened. In addition to the traditional suburban family, companion pet guardians include singles, single parents, those with alternative lifestyles, and empty nesters.

The family in the 21st century is at a precarious point. In 1997, only seven percent of American families were the classic nuclear family with one wage earner. It is no longer possible to support a family on one income. There are a tremendous number of fractured families, such as single parent families, parents with shared custody, and blended families. A significant portion of the population exists outside of the conventional family framework. Many Baby Boomers choose careers over families, including women. Furthermore, a significant portion of the population is approaching retirement age and are empty nesters without families living near. With the sexual revolution and gay rights, people with alternative partners are also increasingly commonplace.

Pet Choices Reflecting Life Styles

As individuals move through life, it is now possible for pet owners to cycle through several distinct niches: child, student, single young professional, double income without children, double income with children, single parent, blended family, and empty nester. And their pet reflects that particular niche in time. For example, as a child, your first pet may be a goldfish, but as a senior, you may have need for a service dog.

Your shelter can benefit people in these niches in diverse ways. Some children may benefit most from an "exploratorium" that will teach them to care properly for animals. Disadvantaged children may profit most from programs were they are directly responsible for training an animal for adoption. Single parents and two-income families may require daycare facilities. Seniors may need the social contact that could be provided by other animal lovers and a dog or cat that would enjoy having its ears rubbed.

Pet Owners on the Move

Additionally, the modern pet owner is on the move. Large numbers of pet owners, along with the population in general, have moved from the rust belt to the sun belt. White collar workers chase job opportunity and advancement across the country. Those who prize their alternative lifestyle move to communities that are supportive of their choices and priorities. That portion of the population that has reached retirement age will increasingly relocate to the retirement Meccas of the south and southwest. The population in general is choosing where they live based on job opportunity, recreation, or lifestyle, not on family ties. Therefore, many of these pet owners will turn to their pets to provide the comfort and solace that they once received from their families.

According to surveys, the reason most often cited for relinquishing an animal is that the owner is moving. While there is debate about whether moving is actually the cause or simply a convenient excuse for relinquishment, developing programs that support people's efforts to find pet-friendly housing could become increasingly helpful in reducing the number of these relinquishments.

Pet Advocacy

In recent years, pet ownership has moved toward stewardship or pet advocacy. The civil rights movement has spilled over into animal rights, and guardians of companion animals look at their pets as surrogate family.

As animals become integral parts of the family, people will want the adoption of their companion animal to be a joyous occasion and will find it increasingly difficult to go to a traditional shelter to find their new family member. Moving animals out of jail-like enclosures into more positive and pleasant environments will reinforce a positive impression. Developing a public environment that is entertaining and educational can enhance the perception that the shelter is a joyous place to visit.

Entertainment and Leisure

Probably the fastest growing segment of the American economy is that portion which is based on entertainment and leisure. This includes the vacation industry, participatory sports, professional sports, and travel. Animal lovers look at their companion animals as participants who share and entertain them during their leisure-time activities.

As people spend more time with their companion animal family, they also need recreational facilities that will allow the inclusion of their companions. Dog parks and dog playgrounds are examples of facilities that are instant hits with the public. Shelters that include these types of facilities reinforce the perception that the shelter is the animal resource place.

We are seeing more people take their pets on vacation with them; consequently, more resorts are making efforts to accommodate pets. We are also seeing a tremendous upsurge in the number of full-service premium pet resorts for people who aren't able to take their pet with them on vacation, but want to make sure their pets are well cared for in their absence. As people are increasingly on the move, shelters may want to consider boarding as a service to their adopters.

Emphasis on Learning

Recently, there has been a tremendous growth in self-help and discovery classes, continuing education, and home correspondence courses, much of which is now available on the Internet. Information and education is becoming more accessible, and people are enjoying it more.

Better-educated and better-informed people are interested in knowing more about the care and behavior of their companion animals. As people spend more time with their pets, it is increasingly important that they behave well and stay healthy. This creates an opportunity for shelters to provide these people with a learning experience connected with the care of their animals.

Nature and the Environment

The ecology movement that started with Earth Day in 1970 has become a mainstream American value. The public is ecologically aware and has a greatly increased appreciation for maintaining our native habitats and endangered species. For a growing portion of the population there is a subliminal connection between being a pet advocate and respecting our natural environment. After all, if you didn't value nature and living things, you would have a cyber pet instead of a live furry one.

For the shelter community, there is an opportunity to reinforce and capitalize on this nature and environmental connection by teaching about the human/animal bond, and combining

learning about the environment with learning about care for animals.

Learning from Trends

Much of the public is aware that buying animals from pet stores only supports the breeding industry which in turn exacerbates the unwanted pet problem. However, when asked why they continue buying pets from pet stores rather than adopting them from shelters, they say, "I just can't go to the shelter. It's too upsetting!"

For the shelter community, the challenge is to respond to these emerging trends in such a way that you will be viewed as the animal resource place rather than the "place where they kill animals." By creating positive interactions with the public and encouraging visitation, your job of finding homes for unwanted animals will become much easier.

Looking at demographic trends can help you plan for your needs in terms of future capacity, and can also help you plan for providing services that will garner public support for your programs.

Animal shelters are unique and complex blends of programs and functions. They are individualized endeavors designed to a specific set of requirements. Some projects begin with years of systematic planning, others in response to spur-of-the-moment opportunity, most with a combination of both. So how do you get started? In the following chapter, we will take you through the first, most critical steps of a new project: the Needs Assessment, the Background Informational Gathering, and the Fund Raising Package. Essentially, these are the steps that take place before the real concrete design work begins. Even if you don't do these steps in a formal way, you have to compile this information.

Needs Assessment

Determining what you want for a facility is a process of combining your most ambitious goals with the most utilitarian details, and forming a program that effectively blends aspirations and requirements.

We have found that an effective way to build consensus on program requirements is through a workshop format. Involvement in this discussion by the board, directors, staff, and volunteers is fundamental to the success of this approach. Even though we recognize that not everyone's opinions carry equal weight, it is a profitable way for the entire shelter organization to grasp the rationale behind the development of a building program. We have also found that some of the best ideas can come from some of the most unlikely sources.

Establishing the long-term direction of the shelter and what you want to accomplish with a new or renovated facility is generally the responsibility of the board and the directors. Avoiding deficiencies in your existing shelter typically falls under the dominion of the staff. We recommend that you start

by looking at the trends and innovations occurring within the larger animal shelter community, establish the goals and aspirations for your shelter, and then work through your specific requirements.

In exploring these ideas, the specific areas to be addressed should include:

- Program goals.
- Design goals (see following chapter).
- Future functional capacity of the facility.
- Departmental organization.
- Infrastructure development and requirements.
- Animal habitats.
- Environmental conditions.
- Vehicular circulation and parking.
- Pedestrian/animal circulation.
- Noise and odor control.
- Maintenance requirements.

Background Information And Research

After you have blocked out your general program requirements, it's generally necessary to do some basic investigation before you actually start on the design process. Lists need to be made and items checked off. This is the time to discover the "hidden" conditions, be it site, soil, or governmental regulations.

This information-gathering, pre-design phase is often overlooked, but from our perspective it is the most important, because everything done later is built on this foundation. There are several elements to consider:

Scope, quality, schedule, and budget – In order for your project to be built on a solid footing, time should be spent developing a program that answers the needs of your long-range plan as well

as your immediate needs for the diverse functions required in your animal shelter. Once you have established a "vision" of what your shelter should be, the budget should be developed, financing options explored, and a schedule determined.

Site studies – After determining that your site has the capacity to meet the needs of your long-term plan, but prior to the initiation of design, site surveys, environmental impact reports, and soil reports should be ordered. They may reveal concerns that will affect the viability of the project, and they will certainly be necessary later in the construction documents phase. Identify planning and code requirements specific to your site and project, including setbacks, parking ratios, signage, and building construction requirements .

Financing – With a building program established, the next step is to determine how to capitalize the project. For nonprofits this will likely entail a capital campaign, targeting individual and corporate donors, or in some instances, obtaining a mortgage. Government-operated facilities are typically funded through bonds or taxes.

Planning approvals – Most projects require regulatory approvals prior to construction. With each passing year, the time it takes to obtain even simple approvals increases. It makes sense to be well prepared, hire experienced consultants, and review with the appropriate agency the time required for approvals.

Delivery process – This includes determining the design, consulting, and construction services needed. How you choose to work with a contractor and establish cost controls will have a significant impact on the success of your project.

The Fund Raising Presentation Package

Key to the success of your capital campaign is your ability to communicate your vision and engage the imagination of your potential donors. Presentation drawings that articulate the concept,

scope, and the appearance of the organization's vision. How you illustrate the asset your shelter will become to your community will be crucial to your success.

Architectural illustrations and information that should be prepared include:

- A Site Plan identifying access points, parking, layout, landscaped areas, and building "footprint" location.
- Diagrammatic Floor Plans with general room sizes and configuration.
- Exterior Elevations demonstrating scale, image, appearance, and massing.
- Exterior and Interior Sketches illustrating building appearance.
- A Working Budget for project costs.

With this package of information it is then possible to go out and "sell" the project. Remember that in order for people to buy they have to be able to "see" and to understand what is being sold.

Once you have completed the Needs Assessment, the Background Information Gathering, and the Fund Raising Package, and once your funding is in place, then you are ready to actually begin the design and construction process.

Typically this process is divided into three phases: Schematic Design, Working Drawings, and Construction Administration. In the Schematic Design phase, the initial building configuration and concept is developed. Working Drawings are used for "pulling" permits, pricing the building, and ultimately constructing the building. During the Construction Administration phase, the architect, owner, and contractor work together to construct the building. These phases will be discussed in detail in a later chapter.

Understanding the vision, limitations, and funding is paramount to getting started, and the Needs Assessment, Background Information Gathering, and the Fund Raising Package are the best tools for collecting this information.

Selecting a Site

What is the ideal location for an animal shelter? Judging by the precedent set by a distressing number of existing shelters, the answer seems to be close to the town dump, maintenance yards, or sewage treatment plant.

There are a number of reasons for this plight: the NIMBY (Not In My Back Yard) syndrome, older facilities with outdoor or indoor/outdoor runs and little or no sound control, outdated zoning laws that exclude shelters from more appropriate sites, and shelter organizations that find it more expedient to trade low cost or free ground for a better location. Fortunately, the new generation of shelters are more than just overgrown kennels. They are community assets and centers. They are symbolic of the priorities and potential that a community holds dear. As such, they deserve to be located where they can be seen and appreciated.

In the following text we will discuss the parameters you should consider in choosing a site for your shelter. Keep in mind the words of every real estate tycoon from the beginning of time: LOCATION, LOCATION, LOCATION. Those are the words to live by. Now, on with the details.

Site Visibility and Access

The most important considerations in selecting a site are visibility and access. Can the people who will use the shelter find and then easily get to the site? Can they easily see it? If the answer to both these questions is not an unqualified yes, then you should think about another site.

Ideally, people need to be able to access the site without fighting traffic or making a long detour. Can you easily and quickly describe to clients how to get there? If not, it's probably not a good site.

Your selected site should also be central to the area that you serve. This keeps the public from having to drive all the way across town, and if animals need to be picked up, the driving time for your staff can be minimized. It also makes sense to think about natural geographic boundaries. Physical obstacles like rivers, mountains, green belts, freeways, or even specific neighborhoods can create real or imagined obstacles for the public when they think about visiting your shelter. We have seen shelters expand their effectiveness by being located on major arterial highways and in highly visible locations.

You don't need the very best site in the county. Instead, look at sites that are not located on the best intersection in the area you plan to serve, but are located close by. Another possibility is to locate at the edge of your existing community with an eye to where future growth may occur. In both of these cases, the land cost will probably be more reasonable.

Site Capacity

On the most basic level, you also need to know if your proposed building will fit on your selected site. A simple way to determine this is to look at what we call "site coverage." Basically, your building will cover 25 percent of the site. If your building is 6,000 square feet, your site should be approximately 24,000 square feet or about half an acre. (An acre is equal to 43,560 square feet.)

If your building covers only 25 percent of the area, what happens with the rest of the site? Seventy-five percent of the site is taken up with setbacks, landscaping, parking, and room for expansion. For example, many sites commonly include:

- A 55-foot front setback and 15-foot side and rear setbacks.

- An additional portion of the site devoted exclusively to landscaping or retention/ detention ponds of storm water runoff.

- Parking provided at a ratio of one parking space per 250 square feet of building area.

- A space unoccupied by parking or the initial building, equal to one-third the building size, for future expansion.

- A significant outdoor space set aside for training or animal exercise.

If some of these stipulations are eliminated, then you can reduce the size of the site. If the site is an odd shape, has a lot of slope, or has some limits on development because of wetlands, then you will need a bigger site.

Topography and Soil

The impact of topography and soil is often overlooked during the initial site selection process. A steep, sloping site can cause the driveways and sidewalk to be too steep for handicap access, make it difficult to keep the site drainage away from the building, and increase the foundation costs.

Soil geology can also dramatically impact site development and building costs. For example, it can be very expensive to blast out bedrock or remove expansive clay. If the site has a lot of fill dirt on it, you will probably need to remove and replace the fill before you can build. Other site-specific geologic issues include high water tables or an excess of organic or peat material.

Avoid these traps by commissioning a topographic survey and a soil report before you finalize the purchase of a site.

Planning and Zoning

Local government agencies impose planning and zoning regulations on sites, and with each project we do, they seem to be more difficult. In addition to normal constraints, like setbacks or allowed uses, these regulations can dictate landscaping, site access, availability of utilities, facility appearance, and even funding of street or utility improvements.

The time involved in making a zoning or planning application and waiting for the municipality to review it also has increased dramatically. And because time equals money, the cost of planning submittals also has increased dramatically. That is why it's important to research the regulations that may impact your site before you buy.

Encumbrances, Easements, and Zoning

As land becomes more scarce, and as governmental regulations increase, finding ground that is not encumbered by onerous easements, encroachments, deed restrictions, covenants, or a "clouded" title is becoming more difficult. Prior to purchasing any ground, be sure to do your homework. Never depend solely on the listing real estate agent or existing owner to tell you all the facts. Talk to the utility company about the availability of electricity, gas, water, and sewer. Find out from them if there are any utility easements that encumber your property. Finally, have a title company do a title search prior to purchasing the ground to determine if there are any untold legal encumbrances of any kind on the property.

Environmental Assessment

With the protection of the natural environment becoming a priority in our society, it is important to have a basic assurance that the site you select does not have any hidden environmental disasters lurking. The best way to do this is to commission a basic environmental assessment for any site you are considering purchasing. The ramifications of purchasing a site that contains even a threshold level of environmental pollutants can be dramatic. In most cases, a Level One Environmental Assessment can identify environmental conditions that may adversely impact the development of your site.

Other Constraints

Wetlands, historic districts, coastal commissions, protected watersheds, and urban renewal areas are also regulatory requirements that

impact sites. From tideland Virginia to coastal California, local and federal governmental agencies have earmarked certain areas for special consideration and additional regulation. It is wise to thoroughly investigate any site you are considering to identify such possible regulatory constraints.

In closing, it is worth noting that in selecting a site, money also enters the picture. More important than the actual listed cost of the site are the potential hidden costs that can come with a site. Virtually all of the problems listed below can be solved if you have enough time and money. For your own sake and that of your organization, be sure that you have a handle on the costs that can spring up.

Costs that can turn a viable project into a "white elephant" include:

Land Costs
- Purchase price
- Hidden development costs

Site Constraints
- Sufficient size to accommodate:
- Building program
- Expansion requirements
- Parking requirements
- Landscaping requirements
- Setbacks
- Public rights-of-way
- Access
- Anticipated street improvements/restrictions
- Topographical constraints

- Soils
- Availability, capacity, and inverts for utilities
- Water
- Sewer
- Gas
- Electric
- Telephone
- Storm drainage
- Off-site requirements for street or utility work

Government Regulations
- Zoning of property and adjacent properties
- Restrictions for shelters
- Anticipated changes in zoning or planning districts
- Development fees

Special Considerations
- Adjacent property owner or tenant opposition
- Neighborhood opposition

Governmental Requirements

Once upon a time in a world far, far away we didn't have Big Brother, taxes or Development Impact Fee Assessments. Life was simple, the sky was blue, the birds sang...but this is not reality now!

Since we started in the architectural field many years ago, we have seen the impact of governmental regulations and requirements grow dramatically. Where once a typical architect or engineer spent a small minority of their time on issues involving governmental regulations, now we probably spend as much as 20 percent of our time designing or responding to these requirements.

Unfortunately, the review process and conformance to these regulations has turned into a tremendous financial obligation for owners as they start their projects. Permitting fees and design fees incurred in designing and coordinating larger and more complex buildings also contributes to increased cost.

OSHA – Occupational Safety and Health Agency

While horror stories abound of OSHA inspectors swooping in and closing a facility down for even the most minor infraction, OSHA regulations are not a significant part of the design, application, and permitting process. For the most part, OSHA deals with how a facility is used or how a facility is constructed, not how a facility is designed.

However, here are some examples of OSHA requirements that do impact design:

- Providing eye wash stations.
- Providing proper shielding for x-ray and other imaging equipment.
- Providing ergonomically-correct work stations (such as keyboards and computer monitors).
- Minimizing noise pollution.

- Controlling or eliminating hazardous air quality situations.
- Controlling access to hazardous materials.

There is no formal OSHA review process that occurs when an building is initially constructed.

ADA – Americans with Disabilities Act

Originally passed by the U.S. Congress in 1992 as a civil law, the ADA was two pronged: 1) To assure that the disabled public had reasonable and immediate access and use of public buildings, and 2) To protect disabled employees from being discriminated against because a facility might not be accessible to them. While most people are familiar with the public component of the act, it is the employee component that often has the greater impact, because it means that most buildings have to be accessible not only in the public areas, but throughout the entire facility.

Since the ADA's original passage, the essential requirements of the law have been adopted and/or incorporated by virtually every municipality in the country as part of the building code review and application process. But unfortunately, every municipality has a different interpretation of what constitutes "accessible" and "reasonable" accommodation for the disabled, causing the requirements to vary greatly from place to place.

The best way to approach this is to contact your local building department directly to see what level of compliance will be required. For example, while most handicap-accessible bathrooms are approximately 5' x 8', the number and location of the bathrooms can vary significantly. In most cases, it is also impossible to have a separate upper or lower floor without providing an elevator!

Life Safety and Building Codes

In all but the most rural locations, you will be required to obtain a Building Permit for the

construction of your facility. With the exception of possibly Indiana and a few other states, the entity reviewing the drawings will be your local city, township, or county governmental agency.

There are three dominant building codes used in the United States. BOCA is used primarily in the northeast and north central, SBCO is used primarily in the southeast, and UBC is used primarily in the west. There are many editions and supplements to these codes. Additionally, a few municipalities have their own code. This can often result in significantly different design and construction requirements based on the local municipality.

In reviewing drawings for permitting, the building department looks primarily at life safety and health issues, including structural soundness, earthquake and hurricane resistance, exiting in case of emergency or fire, containment of fire, eliminating hazardous conditions, and providing necessary light, air supply, and exhaust.

Planning and Zoning

Every significant town, county, or city in the United States, with the exception of Houston, has planning or zoning laws and ordinances. These ordinances control:

- What can a site be used for.
- How far back from the property lines the building must sit.
- How many parking spaces are required.
- What the building must look like (in some instances).
- How much building can be located on the site.
- How tall a building may be.

In addition, planning and zoning ordinances also dictate how a site is titled and platted. For this reason, it is critically important for the owner to know before buying a site what the planning or zoning requirements are for that particular parcel. While it is possible to apply and receive a variance from specific zoning requirements, the primary goal

in acquiring a piece of ground is to buy a parcel where a shelter is a "use by right" and where your building will conform to the setback, parking, height, and area requirements. In most municipalities, applying for a variance is a time-consuming and costly process, with no guarantees of success.

Overlay Zoning

In addition to the normal zoning issues mentioned above, many urban areas have what we in the industry call overlay zones. As the name implies, this is another layer of zoning that also will impact how a site can be developed and what can be built on it. Often overlay zoning deals with aesthetic or quality-of-life issues. These zones may include historic districts, view corridors, entrances to urban areas, urban redevelopment, and landscape districts. The requirements of an overlay zone can be very stringent, and the review process can be both time consuming and very subjective in nature. After all, who's to say that a pink building can't be historic.

Environmental, Wetlands, and Storm Drainage Requirements

Probably one of the fastest growing areas of governmental regulation is the area of environmental impact requirements. This includes:

- Protection of wetlands.
- Control of storm drainage runoff and protection of watersheds, waterways, and aquifers.
- Protection of historic or natural vegetation, including heritage trees.
- Protection of wildlife.
- Wildfire mitigation.
- Slope stabilization.
- Seashore protection.

While there are stringent federal regulations regarding the protection of wetlands and wildlife, the majority of these regulations are local and have

a tendency to vary. In any case, the review and permitting process in areas where there is a high degree of environmental consciousness can turn proving conformance into an expensive and time-consuming procedure.

Hazardous Wastes

The area with potentially the greatest potential for liability and cost is the field of hazardous waste pollution and disposal. While most people are familiar with asbestos, there is also the potential impact of hydrocarbon, heavy metal, and industrial wastes to impact the buildability of selected sites. In locations where there has been a history of dense urban development and heavy industry, a high number of sites are contaminated by hazardous wastes.

On the other side, a number of municipalities have regulations dealing with the disposal of hazardous wastes from your facility. For example, many municipalities control the disposal of silver, a by-product of x-ray film development, and radioactive isotopes, a by-product of radiation therapy. Still others want to know how much and what kind of biological waste your facility will be producing.

Health Department

It is relatively unusual, but sometimes specific state health departments are required to review and approve facilities that are built to hold animals, be it for animal care or boarding. For the most part, these inspections are rather cursory and occur after the facility is built, but you should be aware that this can occur.

State or local Health Departments also often require that the installation of x-ray equipment be inspected and that x-ray shielding be in place. Amazingly, this is one area where we see requirements being slackened, instead of increased, due to less scatter in the more modern x-ray equipment.

Conclusion

As you can see, there are a plethora of regulations that you could face when building or remodeling a facility. Some of these regulations are ridiculous, some sublime, but all translate into increased time for the architect, contractor, and owner, which ultimately results in increased cost. A wise owner asks as many questions as possible before starting into the construction process in an attempt to identify the regulations that may impact the construction. It is usually less cumbersome and less costly to anticipate a regulation or requirement than to change the completed drawings and/or a finished building.

Design Goals

Everyone with direct experience in the shelter community has a long list of design deficiencies that need to be considered when planning for a new facility. While this paints a clear picture of what you don't want, establishing and prioritizing the criteria for what you do want is a far greater challenge. The design goals listed below have been useful leads in initiating discussion about the long-term direction and character of shelters.

I. Provide the best possible health and care for all the animals within the facility.
1. Reduce overcrowding in animal housing.
2. Provide a disease-free environment.
3. Provide better housing facilities for small mammals, exotics, and reptiles.
4. Provide safer animal housing to minimize injuries to animals while they are being housed.
5. Provide appropriate exercise areas.
6. Reduce the incidence of animals developing "kennel shock" during long-term holding and housing while waiting for adoption.

II. Provide a safe and secure environment for animals and staff.
1. Receive and control animals in a safe and secure environment.
2. Minimize unnecessary handling of animals.
3. Provide appropriate housing for animals based on species and size.
4. Provide housing that minimizes stress for the animals.

III. Maximize durability and minimize maintenance, operations, and upkeep.
1. Select materials with an eye to long-term effective and economic performance.
2. Design building systems for ease of operation, energy efficiency, and adaptability or flexibility.
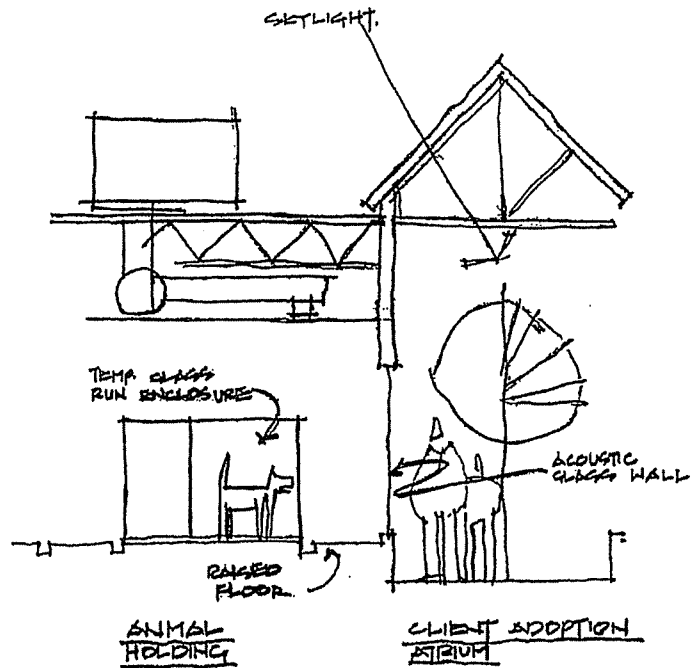
IV. Increase the number of adoptions and eliminate euthanasia of animals.
1. Streamline the adoption process, including traffic flow and data/information systems.
2. House and display the animals in a manner and environment which is more conducive to a positive client experience.
3. Provide a facility that encourages client/animal interaction in a controlled manner.
4. Provide training for animals with behavioral problems.
5. Provide rehabilitation for animals with medical problems.

V. Create a more pleasant environment for the public, animals, and staff.
1. Create an "adoption-friendly" facility.
2. Control noise and odor.
3. Design a facility that utilizes color and natural light to create a pleasing experience.
4. Provide spaces for potential adopters to interact with animals.

VI. "Maximize" staff effectiveness.
  1. Provide a facility that promotes staff training opportunities.
  2. Streamline the flow of clients through the facility and provide the necessary room and facilities for the staff to work effectively.
  3. Design a facility with an eye toward the traffic-flow, including minimizing steps, creating separate staff and client circulation patterns, and streamlining the flow of people throughout the facility.
  4. Increase communication among the staff.
  5. Provide private areas for the staff to "decompress."
  6. Improve the work environment, including required space, circulation patterns, and computer systems.

VII. Increase public education.
  1. Provide community educational and meeting opportunities within the proposed facility.
  2. Provide for interactive educational experiences.
  3. Create off-site outreach programs.

VIII. Increase volunteer participation.
  1. Provide for volunteer training.
  2. Encourage volunteer appreciation.
  3. Provide appropriate work space for volunteers.

IX. Increase community awareness.
  1. Design the facility as an "advertisement" for the organization.
  2. Create a higher profile for the organization within the community.
  3. Create an animal resource center.

A thorough exploration, with your board, staff and community, of broader design goals similar to the ones listed above can help your organization develop a clearer vision of the long-term goals specific to your situation. In turn, these goals will serve as the framework for the increasingly detailed decisions you will be called upon to make as you design and build your facility.

Design of Specific Areas

Your shelter can be divided into seven basic functional modules: Adoptions Lobby, Lost-and-Found Lobby, Evaluation, Animal Habitats, Program Support Areas, Administrative, Ancillary Services, and Building Support. A discussion of some of the specific design features and functional considerations for each area follows.

Animal habitat areas are worthy of a lengthy study of their own and additional information can be found in Chapter 1.9.

Adoption Lobby

In most of the shelters we design, we make the adoption lobby the primary focus and entry of the facility. After all, this is the primary focus of most organizations, and this helps to maximize the number of animals that are adopted. This is also the first space that people see when coming to adopt, and you want to encourage the adoption process by making it fun and easy.

The adoption lobby and entrance is also most often the defacto clearinghouse for those coming to the shelter regardless of where they really need to be. For this reason, it often makes sense to include an information desk front and center once you step through the main entry. This information desk can either be staffed by volunteers or staff. Its purpose is to direct people to their destination and to explain the adoption process and placement requirements.

It is preferable to separate the adoption lobby from the lost-and-found and relinquishment lobby. While minimizing traffic, confusion, and conflict are the primary reason, making the adoption process more friendly and inviting by separating out the "happy" adoption side from the "sad" side is a benefit.

The adoption process involves the public shopping for an animal by walking through the animal adoption areas, getting acquainted with selected animals, screening by the staff for suitability of adopters, and processing of the adoption papers and payment of the fees. The sequence differs between shelters. In some programs, adopters are screened and processed before they get to view the animals that are available for adoption. Therefore, an efficient process needs to be developed, and space set aside for adopters to fill out forms and for staff to evaluate applications. In the more common situation, the adopters meet with the staff after seeing, visiting, and selecting an animal. In this case, the adoption desk may be made up of a number of individual desks or small processing rooms where the adoption screening and paperwork occurs. In some instances, these small processing rooms are also the visiting rooms where the adopters can visit with the animal they have selected.

If the budget allows, plans should be made to accommodate peak capacity of adopters so they can be processed without inordinate delay, minimizing the frustration level for both staff and the adopters. In a small facility we recently designed, the desks that the administrative staff occupy are located in a bullpen behind the front desk where they can do double duty as the visiting, adoptee screening, and animal receiving desks.

Adjacent to the adoption desk, it is important to have a staff work area where the xerox and fax machines, paper, forms, and files may be stored. It is often wise to locate the shelter manager's office adjacent to this work room, with a clear view to the desk.

In most facilities, the access to the administrative offices is off the main adoption lobby. Connecting the administrative work area for the adoption lobby with the lost-and-found and relinquishment areas also minimizes staffing requirements.

Not only should the actual animal adoption

habitats be immediately accessible from the lobby, but we feel that they should also be visible. Glass walls between the adoption habitats and the lobby can let you feature some of the animals and let adopters preview your animal environment. One example might be a premium suite for the Companion of the Week. In designing these premium suites, it is most effective if you can combine the needs of the animal with effective retail sales design. This means having the animals at eye level to the adopters and having the habitat well lit, clean, and odor free. Some shelters have experimented with raised pens without lids where people can reach in and pet some of the small, featured animals. Additional examples of a featured habitat would be glass-enclosed cat condos and cat play areas that are visible from the adoption lobby.

Staging how adopters view the animals can also contribute to the success of your program. People often make contact with different animals than those they had originally imagined. Putting animals that are the hardest to place so they are seen first can increase their chances of being adopted. In practical terms, this means locating the cats, small mammals, and large black dogs up front and puppies in the back.

The adoption lobby has also become "ground zero" for the expanding role that many shelters are playing in animal-related programs like humane education, training, and behavioral modification. Educational features, such as informational kiosks and interactive educational displays, can play a significant role in disseminating your message. While the public waits in the adoption lobby or wanders through the facility, you have an opportunity to both educate and entertain. "Infotainment" is the new buzzword in retail design. This is the concept of combining education, entertainment, and sales in building displays to engage people within your facility. Infotainment can take many forms. It can be as simple as a display board with graphics and narrative

description, a kid's corner with play toys and education tools, or a state-of-the-art interactive computer link. These "happenings" can be grouped together to form an educational center, or be spread throughout the facility so people can continue to learn as they stroll. In any case, you have the opportunity to both entertain and educate the public.

Many shelters have found that having a retail area within their facility is both a convenience for the public and a profit center for the organization. These retail facilities range from a simple one-wall display of food, leashes, and carriers located near the adoption processing desk, to a several hundred square-foot nutrition center and boutique. The retail area should be very visible and accessible from the adoption lobby to encourage impromptu, spur-of-the-moment purchases. Some organizations have even taken this concept a step further by having adopters "cashing out" at the completion of the adoption process in the retail shop. On the other hand, you should also have the ability to secure the retail area from the lobby during after-hours use of the shelter or when the retail store is not open for business. Roll-down grilles, shutters, or glass walls can be used to separate the retail shop from the adoption lobby.

The adoption lobby is also the probably the best place to thank your donors, board, and staff. Remember to save a "wall of honor" in a prominent location for plaques or a donor wall. It is also possible to build in "naming opportunities" throughout your facility.

Lost-And-Found Lobby

Less emphasis is often placed on the lost-and-found and relinquishment lobby in the typical shelter. For shelters with adequate resources, providing grieving rooms for people giving up their companions for euthanasia, and efficient and pleasant facilities for anxious and/or angry guardians looking to retrieve their animals can help promote your shelter's image as a community resource.

The key component in the lost-and-found facility is the receiving desk. This can be as simple as a single desk, or in the larger facilities, it may include two or three desks where people can sit down and talk with the shelter staff and fill out any paper work that may be required. The lost-and-found lobby should also be built to easily accommodate your normal maximum daily load of both people and animals. In large facilities, this may mean a waiting area that can seat six people and their animals. Some shelters have also built consultation rooms adjacent to the lost-and-found lobby where the staff can meet in private with a person that is relinquishing an animal.

In very close proximity to the lost-and-found lobby, you should provide a room or several rooms for animal receiving and holding while waiting for processing. For dogs, this may be a room with a bank of cages and possibly a few large runs. For cats, a wall of oversized cubbies into which you place cats in carriers is the best solution. In either case, a holding area like this is critical when you think of the busy Saturday morning traffic you may experience. At times we have seen lost-and-found receiving desks built with animal-holding cages incorporated into the desk. We would suggest that you do not do this, because these cages are awkward to use, hard to keep clean, and often end up not being used.

In some cases, shelters have a night animal-drop facility and lobby adjacent to the lost-and-found lobby. While some may debate the desirability of providing a way for people to anonymously dump animals, many organizations feel this is an effective way to deal with the significant number of animals that are unceremoniously dumped in the middle of the night. Perhaps it is better to safely house these animals than to find a box of puppies on your doorstep in the morning. The typical night-drop facility should include a bank of cages of different sizes that are equipped with locks that latch after an animal is placed in the individual cage. Forms are provided for the public to fill out, giving information about the animal. Behind the night drop cages is a work room where the animals can be removed from the cages and where supplies can be kept to clean and maintain the cages. This room may include a mop or utility sink.

The actual lost-and-found animal holding facilities are often more utilitarian than those provided for the adoptable animals. This is because the emphasis is on housing as many animals as possible versus "marketing" the animals. For the most part, the long-term holding of animals occurs once the animal has been cleared for adoption and not during the initial, relatively short-term holding period. So as to control the public access to these spaces, the actual lost-and-found animal holding usually occurs behind locked doors. Lost-and-found animal holding should include spaces for large and small dogs, puppies, cats, and exotic or small mammals.

Evaluation

The evaluation center is the clearinghouse for all the animals being received, relinquished, or moved from the lost-and-found facility or other holding facilities to adoption or euthanasia.

In some larger facilities, the evaluation center is divided into rooms for holding animals that are being received or processed, with separate exam or evaluation rooms for cats and dogs and another separate behavior evaluation room. In smaller facilities, the evaluation center can be as simple as one medium-sized room. In any case, the evaluation center is the point where animals are evaluated and then routed to the appropriate place. For this reason, the evaluation center needs to be central to virtually the whole facility. It needs to be easily accessible to the animal receiving areas and be central to animals being moved throughout the facility. For example, an animal that is moving from lost and found to adoption would typically pass through the evaluation center.

The evaluation center needs to have a place to examine animals, a place to hold animals that are either being processed or awaiting examination, a place to store medical supplies, and a place to enter data about the animal being examined into the database. A behavior examination room can also be provided. This allows observation of the animal's behavior away from the confusion that might occur if this observation was conducted in the normal exam or evaluation room.

The actual number of exam tables, exam rooms, cages, or runs for the evaluation center should be determined by the anticipated normal and peak load of animals that will be passing through the center during any given period of time. Factors such as separate animal housing by species or quarantine purposes versus holding for processing might also be considered.

Program Support Areas

Beyond the primary functional areas of most shelters, like adoption or lost and found, there is another level of support-type rooms. Often thought of as behind the scenes, these rooms are the heart of the facility. This is where your dedicated kennel staff toils.

1. Additional Animal Holding

Many larger shelter facilities, based on the sheer number of animals that pass through, have a need to securely house animals in separate animal-housing modules. These animals are sorted by species, the need to isolate them to control contagious diseases, the level of medical care that the animal requires, the need for security, and to minimize the number of animals in an individual room. A listing of the various types of additional animal holding, along with a brief discussion of the functional requirements follows:

Isolation – This is a ward for the isolation of animals with contagious diseases. This might include a ward for feline leukemia, kennel cough, or parvo. Ideally these isolation wards should be located away from traffic. They should include a room where animals can be examined and treated without leaving the isolation area, and the area should include the supplies and equipment necessary for a complete cleaning. For a small shelter, the isolation room could be a small room with a bank of cages, one run, and a fold-down exam table.

Quarantine – This is a holding ward that is used for quarantining an animal before it is placed in the general population. Most shelters do not have a space specifically devoted to this type of holding, but it can be useful to have at least a small area reserved for this. In some of the larger shelters that receive a lot of transfers from other shelters or foster homes, this can be a very critical part of how an animal is processed through the facility.

Processing – The need for holding animals as you process them through the facility has already been discussed in other sections. This area can also be used for receiving animals.

Barnyard, Wildlife, and Exotic Animal Holding – Some shelters provide holding for livestock, injured wildlife, and in some instances large cats like lions and tigers. An experienced designer or architect should be engaged to create a secure, durable, and cleanable environment for these special animals. Additionally, wildlife and exotic animal holding areas should be located and secured so there is only limited access for the public and staff to minimize injury.

Extended and Foster Care – No-kill facilities as well as some traditional shelters have expanded their charge to include undesirable, injured, or unhealthy animals. These animals have to be held for longer periods of time than your typical animal while they either recuperate or are rehabilitated. For this reason the habitats for these animals should be designed with an eye to the animal spending an extended period of time in the facility. Natural light, fresh air, and ventilation along with adequate room

to exercise and engage socially with people and other animals are all important for animals that are in for an extended stay.

Court Ordered Holding – Some shelters, as part of their animal control duties, have the responsibility to house for an extended period of time animals that are being held for court cases. In many cases, these are dangerous and destructive animals. Therefore, the housing for these animals needs to be durable. The design of these facilities should enable the staff to move an animal for cleaning or examining without having to risk danger. Guillotine doors between runs and squeeze chutes are often necessary. Lids on the tops of the runs can be critical as many of the larger breeds are also climbers. Lastly, the court ordered holding should be secured and located away from the public, with an eye to also limiting staff access. Some breeds do very poorly in long-term holding situations and the stress and boredom can turn them into unbelievably destructive animals. Special care needs to be taken to design enclosures for these animals with the most damage-resistant materials, like glazed block and stainless steel, and detailed in such a way as to minimize opportunities for them to get their jaws around anything.

Endowed Care – Some of the state veterinary schools and their respective clinics have begun programs where they offer to care for companion animals after the donor's death. The schools see this as both an opportunity to provide the animals with the proper care and also a fundraiser. The needs of the animal inhabitant in this case are much like that of the animal in extended or home, care as the animal could potentially spend the rest of its life in this facility. Sanctuaries are also becoming more popular throughout the country. These facilities also must provide extended or home care as the animals can live out their lives in the sanctuary.

Emergency Overflow – From time to time, shelters have to deal with animal "collectors". In this case, a shelter may have a sudden influx of a hundred or more animals. Few shelters have the wherewithal in terms of money or space to deal with this kind of onslaught. Often, the best a shelter can hope for is to have some un-designated storage or receiving area that they can fill with impromptu carriers, cages, and pens. While not the ideal situation, this enables a shelter to deal with an emergency without having to set aside a significant portion of their capital to deal with the unusual.

2. Grooming and Bathing

In a small shelter facility, grooming and bathing might occur in a portion of a prep and utility room. In a larger facility, the grooming and bathing facility will probably occupy its own room, complete with a bathing area, a drying area, and a brushing and clipping area. Some organizations utilize a "Bubble Brigade" of volunteers to groom and bathe animals. There is a direct correlation between animals that are clean and neat and animals that are adopted. For that reason, most shelters are moving toward some kind of area specifically devoted to grooming and bathing. As a source of income, some shelters are offering full- and self-serve grooming facilities as a service to their donors and clients.

A raised tub is usually the most effective way to bathe animals. This can be either a typical residential-style tub raised to a height of about three feet to the rim, or a specially designed stainless-steel tub and surround, complete with a walk-up ramp or a fold-open door on the front. Many shelters have also found it convenient to have a walk-in bathing area of about five or six feet square where you can bathe a large dog.

The drying area typically includes a bank of cages and sometimes a number of runs. Cages are typically equipped with cage dryers mounted to the front of the cage. When designing the electrical system, you should be aware that in most instances you cannot have more than a couple of dog dryers on one circuit.

Planning for the proper number of air changes and for adequate exhaust fans is especially important in the grooming area. With safer flea products on the market, dips are becoming less of a health issue, but heat and humidity need to be controlled in order to have a comfortable work environment.

The brush-out area usually includes one or two freestanding brush-out tables that are each two feet by four feet.

Like most of the other "support" facilities, the grooming and bathing area need not be central to the facility, yet must be readily accessible.

3. Food Prep

The food preparation and clean-up room is another critical room in the shelter. It should be central to the animal areas it is serving. In large facilities, there may be several food prep areas serving groupings of animal housing. You should consider having separate food prep rooms for servicing wards dedicated to contagious diseases or quarantine. If your budget allows, it is strongly recommended that you build the food prep room much like you would a commercial kitchen, i.e. stainless-steel tables, sinks, counters, and shelves. This makes for an industrial-strength room that can stand up to constant abuse and is also easy to clean. Specifically, we would recommend a double or triple stainless-steel sink for washing, a stainless-steel freestanding table for preparation, stainless-steel, wire-rack shelving for holding food, and several small stainless-steel, wall-mounted shelves. Some shelters have also installed dishwashers, either commercial-grade, residential-sized units that fit under the counter or in some instances commercial, high-volume, high-pressure systems with attached stainless-steel drain boards to either side. In high-volume shelters, an exhaust fan is a good idea in this area. Even though commercial dishwashers seem like a good idea, they still have the limitation of not being able to handle a hundred oversized stainless-steel bowls at one time.

Most shelters have found it helpful to have large bins, usually plastic garbage cans, for storing dry food located in the food prep area. Many shelters also use rolling carts to then distribute the prepared food and to pick up the dishes. In this instance you want to be sure you have room to load and park these carts in the food prep area. It also makes sense to have oversized doors leading into the food prep room to facilitate easy movement of these carts.

4. Utility/Clean-up

Much like the food prep room, this room or alcove should be centrally located. You might also have individual utility alcoves in each animal housing unit. This alcove should be immediately accessible, but out of the traffic flow. It should typically have room to park a mop bucket in a janitors sink, a place to hang mops, a place to park a rolling trash bin, a stainless-steel shelf for storing miscellaneous cleaning supplies, and a water source. The water source can be a typical hot and cold water faucet, or it can be supplemented with a high-pressure cleaning outlet. In some facilities, we have also installed a clinical sink for the disposal of feces.

5. Laundry

Many shelters underestimate how important and how well used the laundry area is. In many shelters, the washers and dryers run nonstop from dawn to dusk. Many shelters have planned the space for, and installed, residential-grade washers and dryers, and consequently spend an inordinate amount of money replacing them. For most medium to large shelters, we would recommend that you invest in large-capacity commercial washers and dryers. These units come in either a 35 or 90 pound capacity, and are quite a bit larger than residential washer and dryer units. They are often as big as four feet deep and three feet wide. They also need room around them on all sides, a concrete housekeeping pad to sit on, and the washer will need a trench for the

wash water to dump into. These units also require larger electrical, gas, and water connections. You can contact a reputable laundry equipment supply company in your location for specifications.In addition to the large-capacity washer and dryer units, you may consider a smaller, commercial-grade, residential-sized washer and dryer unit for the smaller incidental loads that might occur. The laundry room should also have space for a laundry tub, a rolling hamper, a table for folding, and shelves for storing cleaned linens. Like the food prep room, it makes sense for this to be an industrial-strength room, utilizing stainless-steel shelving and tables. The laundry room also generates a lot of heat and moisture, so you need both a good exhaust fan and the intake of fresh and cooling air.

6. Euthanasia

While many shelters have been very successful in driving down the number of animals euthanized, it is still a reality that the majority of shelters still euthanize at least some of the animals they receive. Consequently, the design of a suitable euthanasia area, and in some cases a crematorium, is necessary. In the past, the euthanasia facilities of a typical small shelter could be as simple as a small euthanasia treatment room and another room for the storage of the deceased animals. The new generation of facilities is designed to minimize the stress of both the staff and the animals. They can have several areas, including euthanasia holding wards for dogs and cats, euthanasia treatment, a walk-in cooler, a crematorium, and/or a pick-up area.

The core of this suite, the euthanasia treatment room, remains as it was. It usually has room for one treatment table, a small refrigerator, a small bank of cages, a sink, and some cabinets. What has changed is that rather than burying it in the back of the facility, this area is located where it can get some natural light and is designed to be as pleasant as possible. It is amazing how much less depressing it

is to have a simple window to the outside and some presentable finishes in the room. Many new facilities have separate wards for the holding of animals to be euthanized so they do not have to be in the actual room where the procedure is occurring. In most cases, the ward for euthanasia holding have runs for large dogs, cages for small dogs, and a separate bank of cages for cats. Many new euthanasia areas also include a walk-in cooler so that deceased animals can be stored while awaiting pick up or cremation. Walk-in coolers are available in a range of sizes, with or without insulated floors and should be located in an area large enough for plenty of air flow around the compressor. You will also need a place for condensation for the compressor to drain. In designing the area to house the crematorium, care should be taken to:

- Provide plenty of working space for loading and unloading the crematorium.
- Provide at least the minimum clearances around the equipment as specified by the manufacturer.
- Design protection to keep staff out of contact with any areas on the crematorium that might become hot.
- Both need sufficient airflow for combustion, and air to help cool the room in which the crematorium is located.
- Provide clearances around the crematorium flue both as it passes through the roof and to adjacent walls or stories above the roof. Also be sure that the top of the flue is above the roof and away from fresh air intakes for the heating, ventilation, and air-conditioning system.
- Provide the necessary gas and electric power to operate the crematorium.
- Provide the necessary floor slab and foundation, including housekeeping pads to which the crematorium is mounted.

Lastly, it often makes sense to have a small ancillary vestibule or loading area adjacent to the euthanasia suite where waste products can be

stored while awaiting pick-up. In some cases, this can be the same as the hazardous material storage for the shelter.

Once again the size and capacity of the holding and storage facilities for euthanasia should be calculated on both normal and peak historical load. The size of the crematorium itself should be based on the typical poundage to be burned versus the burn rate and how long and often the crematorium will be operated. Your best source of information on the crematorium should be the actual manufacturer.

7. Employee Locker Room

Your staff needs a secure place for storing and changing into and out of street clothes, as well as a safe place to store purses, backpacks, and coats. It is often a good idea to provide the kennel employees a locker and shower room. Showers are not frequently used, but it is nice to have in case of emergencies. In designing the locker, bath, and shower areas, be aware that the American with Disabilities Act has some very stringent requirements regarding access and clearances when it comes to designing these rooms.

8. Employee Break Room

Your staff is one of your most significant investments, and it pays to provide them with places to relax and unwind. This may be as simple as an outdoor picnic table or as exotic as a staff gym! Most shelters find that a small lunch room with a table and chairs, a refrigerator, a sink, and a microwave will serve the purpose as a break room for employees.

9. Animal Control Offices

Many shelters are responsible for animal control operations and need to provide work space for the animal control officers. Although there is generally a close working relationship between animal control and the lost-and-found operation run by the shelter, providing separate space helps reduce confusion and conflicts between the shelter staff and the animal control officers. In most cases, a room with multiple work stations arranged around the perimeter will serve the purpose. Often, it makes sense to have a separate office for the chief animal control officer. This room can also be used for more private and secure conversations. A closet for storing equipment that is used by the animal control officers is also recommended. The animal control office is best located close to the animal receiving areas of the shelter.

10. Animal Receiving

A secure and enclosed space to off load animals is important in all shelters, even if you are not performing traditional animal control services. Ideally, the animal receiving vehicle bay should be separate from the loading dock and material handling bay. In many instances the animal receiving bay can be separated by a simple chain-link fence from the loading dock. We also recommend that you allow plenty of extra room around the vehicle in the animal receiving bay to handle a fractious dog. It is also a good idea to have a high-pressure cleaning outlet and floor drains located in the bay to wash down the vehicles. If you are going to have multiple animal receiving bays, consider isolating them from each other by fencing to create secure spaces.

11. Cage Wash

Depending on what kind of caging you are utilizing, it can be very effective to have a room dedicated to washing cages. If all your animal caging can be set on large oversized casters, then you have the ability to roll these cages down the hall and into a specialized room where the cages can be thoroughly cleaned with a high-pressure cleaner. This room needs to be big enough to enable you to spray down a cage without getting soaked yourself. Additionally, it should also have oversized doors to accommodate the cages and durable, waterproof floor, wall, and ceiling finishes. The cage

wash room should also be equipped with a good exhaust system to get rid of "dirty" and wet air.

12. Pressure Wash System Room

Many of the larger facilities have found it effective to have a room dedicated to housing the home station of the high-pressure wash system. A typical high-pressure system may include many separate zones, each with its own pump and in most cases a separate drum for detergent or disinfectant. The pumps in this room can be noisy and should be located away from offices and other noise-sensitive areas. To minimize piping, the spray wash room should be located central to the area it is serving and close to the area where materials like detergent are received. Typically the pressure wash systems need special power and water feeds.

13. Garage, Material Handling, and Receiving

Often the garage, material handling, and receiving are combined into one large multi-purpose room. This is usually a drive-in facility and is therefore not particularly conducive to off-loading, dock-high, over-the-road trailers. Larger facilities combine a drive-in garage with an adjacent dock-high loading dock. For shelters that also have large mobile adoption vans, it is necessary to have these vans parked inside where the loading of the animals can occur in a secure and controlled interior environment. These vans are usually taller than the normal overhead garage door. In some instances, we have also provided enclosed garages for the storage of the animal control vehicles. Handling of trash and waste can be accommodated by having a dumpster located nearby.

14. Maintenance and Storage

The last and possibly most important component of all is the storage and maintenance facilities. Everyone knows that you can't have too much storage, but when facing the building budget crunch, storage is one of the first areas to be downsized. Storage should be provided for paper goods, medical supplies, building materials, crates, and pet food. Ideally, we would project that you have an area equal to five to eight percent of your total building area set aside for storage.

Consistent periodic maintenance and quick repairs are imperative as you plan for minimizing long-term facility costs. The maintenance on a new building is often more important than on an older one. This is not because the new building is falling apart, but because the new building probably includes more complicated building systems, such as heating, ventilation, air conditioning, and cleaning. In most cases, these systems require regular maintenance even during the warranty period. A maintenance shop is necessary, along with storage for spare parts, building materials, and site maintenance equipment like mowers and plows. Furnishing an office for the maintenance manager is also a good idea. This provides a central location for plans, manuals, monitoring equipment, and maintenance records.

Administrative

As shelter organizations have expanded in size and in their emphasis on outreach programs, and as they compete more actively for community support and funding, the staff involved with administrative duties has grown dramatically in relation to those directly involved in animal care and housing. In many of the larger organizations, the administrative staff includes an executive director, development, community outreach, human resources, accounting, and shelter operations directors and staff. To this group you can add computer operations, animal behaviorists, help lines, facilities management, and veterinary medicine and clerical staff. The following is a listing of ideas to consider when designing the administrative areas:

Plan for expansion, and plan for flexibility. This means minimizing interior walls and moving toward open office landscape plans. In all cases,

you should avoid load-bearing walls that divide up the administrative spaces. Even if you have private individual offices, consider including "bullpen" groupings of cubicles for clerical and seasonal employees and future growth. If possible, include a few extra offices for expansion. Often we see the administrative staff of an organization grow significantly as the organization moves into a new facility. This is because the organization is more visible within the community, more effective in its outreach and placement, and is consequently expanding the charge of the organization.

Provide for storage, work room, and file areas in conjunction with the specific office spaces.

Locate the administrative offices so that they are easily accessible to the public without being the dominant entry. In the larger shelters, the administrative space occupies a second floor. You should note that if this is the case, the ADA will require that you provide an elevator for handicap access for both employees and the public.

Ancillary Services

1. Community Education Classrooms

A component of the new generation of shelters being built today is the community education center. This may include a lending and resource library, a classroom, or a studio where filming of educational videos can take place. The classroom can be used for a kindergarten class or continuing education seminars for local veterinarians. Ideally it should be able to hold from 20 to 60 people. In some instances, the community education center may include a board room or a large conference center where community fund-raising events can take place.

Adjacent to the education center, be sure to include a small kitchen for catering, table and chair storage, storage for educational materials and possibly a suite of offices for your education director and staff.

2. Veterinary Medicine

Many large shelter organizations are including veterinary facilities ranging from simple evaluation areas to state-of-the-art, full-service hospitals. The larger facilities may provide low-cost spay and neuter, general or specialty veterinary medical care to the public for a fee, veterinary care for animals within the facility, or care for animals belonging to other organizations. Many shelter organizations spay or neuter all of their animals before they are adopted. Some organizations provide medical guarantees on their adopted animals. Still others provide low-cost veterinary care to animals belonging to local indigent people. In instances where the veterinary medical facility is a relatively small operation, the clinic functions much like the evaluation center, so it is a good idea to locate it centrally. In contrast, when the veterinary clinic provides care to the public, or when it is in a relatively large facility that includes general medical care, specialty care, and spay and neuter work, it makes sense to locate the clinic where it is accessible to the public, yet out of the flow of the shelter.

Veterinary clinics are typically divided into two zones: public and procedural.

Public Zone:

Reception Desk – Allow room for two or three receptionists to work. Include space for computer, printer, copier, phones, and files. Files can be accommodated electronically, in lateral file cabinets, or in open egg-crate shelving.

Waiting Area – Ideally, separate this area into a space for timid animals and one for more agitated and aggressive animals. Provide approximately two to three waiting spaces per exam room. Leave at least four feet of clearance for circulation in front the waiting chairs or benches.

Exam Rooms – Provide approximately 1.5 exam rooms per full-time veterinarian. Exam rooms can range in size from cat-only exam rooms at 6' x

7', to large-dog exam rooms at 10' x 12', with 8' x 10' being the most typical size. Two-way traffic flow, a door from the waiting area for the public, and a door from the procedural area for the doctor is typically the most efficient configuration. Exam rooms are generally equipped with seating for the public, an examination table, sink, trash compartment, drawers, and cabinets.

Procedural Zone

Lab/Pharmacy – This area should be immediately accessible to the exam rooms and close to the treatment areas. Often this area provides a visual and acoustical barrier between the public zone and the procedural zone.

Lab – In addition to a sink with exhaust fan, the lab should include an area for diagnostic equipment (assume two feet per piece of equipment), microscope (with knee space), centrifuge, and work space.

Pharmacy – This can be a combination of base cabinets with drawers and shelving above (open or enclosed) with risers to allow bottles in the back of the shelves to be visible. A full-size residential refrigerator is also necessary.

Treatment – Provide one workstation per two exam rooms, with a minimum of two work stations, one dry, and one wet, and adjacent layout space for equipment. Workstations can either be peninsular or island. Islands should include a utility column for electrical feeds and plumbing. Many clinics now include a separate wet workstation for dental procedures. Provide a bank of cages for intensive care and recovery.

X-ray – The typical size for a veterinary x-ray room is about 8' x 10'. Size requirements increase as ancillary imaging equipment, such as ultrasound, is added. Radiation shielding requirements vary based on the equipment being used and on local regulations. A darkroom should be adjacent to the x-ray equipment. Most facilities have automatic processors, so the old development tanks are no longer necessary. Storage of x-ray films, which are approximately 14" x 18 " each, is also necessary. Wall-mounted x-ray viewers should be provided in exam rooms, treatment, x-ray, and surgery areas.

Surgery Prep – This should be a small alcove off the treatment area for preparing packs and scrubbing for surgery. A hands-free scrub sink, place for an autoclave, and work area for preparing packs is required. A cabinet-top pass-thru to surgery for prepared packs is often requested.

Surgery – Provide one or two tables and space for parking equipment and carts. High-efficiency particulate airflow filters should be specified on ducts feeding the surgery – which should be a positive air pressure room at minimum.

Doctor's Office – In addition to a doctor's station adjacent to the treatment area for filling out charts and doing call backs, a small doctor's office is usually requested.

Rather than try to describe in detail the function, adjacency requirements, and circulation of a veterinary clinic, we recommend that you refer to three books: *The Veterinary Design Starter Kit*, published by the American Animal Hospital Associatio;, *Designing the Future*, published by the Veterinary Medicine Publishing Group, and the veterinary hospital section in *Architectural Graphic Standards*, compiled by the American Institute of Architects and published by John Wiley & Sons.

3. Behavior Exercise and Obedience

A number of recent studies have found that the single biggest factor in minimizing returns is taking the time to work with both the animals and adopters to alter destructive and inappropriate behavior. Many of the new generation of facilities include behavior hot-line answer services and multi-use rooms for dog obedience, agility, and behavior modification classes. These rooms are typically large utilitarian rooms that can be

mopped or hosed. These rooms can be used for adult education/obedience classes in the evening, for doggy day-care during the day, or for the staff to work with animals during the day as part of their training before placement. Training rooms are an example of a place where a dog can go to "work." After all, a bored dog is an unhappy dog.

Building Support

The typical large-scale shelter also contains a whole range of rooms that may best be grouped under the umbrella of building support". Often overlooked, these rooms can take up as much as five percent of the total building area, and in a large-scale facility, this can be significant. These rooms may include boiler, mechanical, and air-handling rooms, electrical closets, telephone and electrical distribution closets, automatic fire sprinkler valve rooms, and elevator mechanical rooms.

Many of the services shelters can provide the public also help strengthen the human-animal bond. Examples of such services include daycare, veterinary clinics, boarding, grooming facilities, obedience and agility classes, and retail stores. When planning for these types of facilities, it makes sense to group them around a common exit, separate from the main shelter exit – this allows the public to use these facilities even if their hours of operation are different from the shelter itself. It also allows segregation of owned animals from shelter animals.

Facility Organization

An organizational concept for an animal shelter is much the same as an assembly line. In rudimentary terms, parts and materials are delivered to the assembly line in the most efficient sequence and then stored until needed. When you are working with a community of people and animals rather than parts, the concept of increasing productivity by reducing unnecessary steps and material movement is the same.

The key planning elements to an effective layout for an animal shelter are flow and adjacency. In other words, what needs to be next to what, and in what order, to work well. In architectural terms, we find that flow and bubble diagrams provide a useful way of picturing the way a shelter functions.

Essentially, the arrows illustrate the flow or the "Ins" and "Outs" of people, animals, and supplies. The bubbles represent rooms or functions. These flow/bubble diagrams let you look at the relative scale, the adjacency of rooms, and circulation between and around rooms, without getting bogged down in details.

While each shelter is unique, there are organizational patterns that are common to all shelters.

The Basic Organizational Concept

The basic organizational structure of all shelters is triangular in configuration: public, support/evaluation, and animals. The public area consists of reception, intake, discharge, adoption, and administration. The support and evaluation module contains the clinical areas, utility, storage, and holding. The animal quarters include adoption, lost-and-found, holding and processing abilities. In this basic organizational concept, each module ideally needs direct access to the others, thus preventing unnecessary circulation through the adjacent areas.
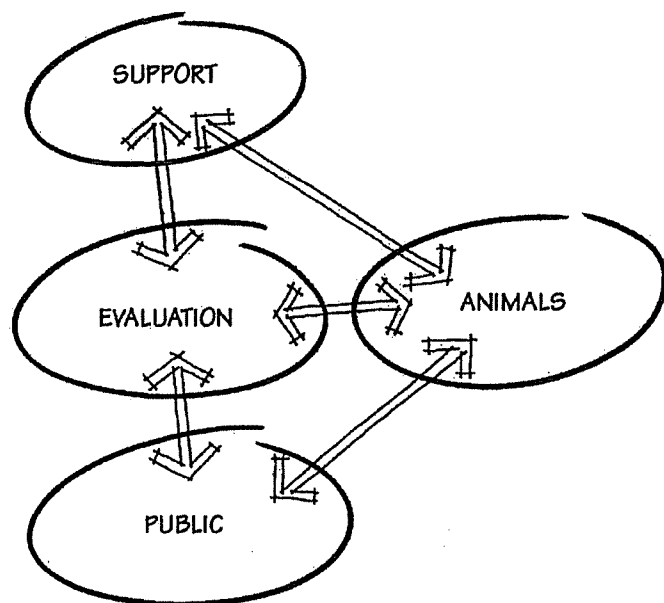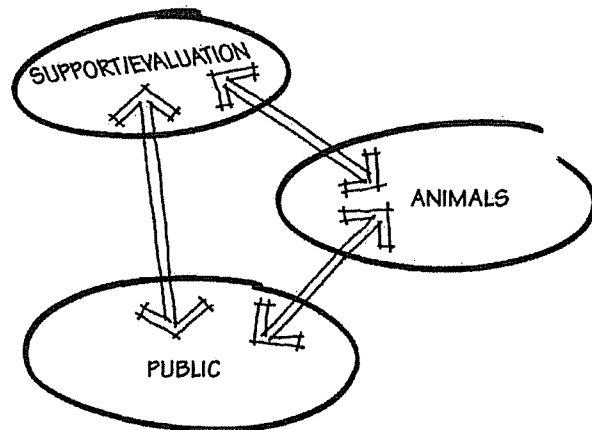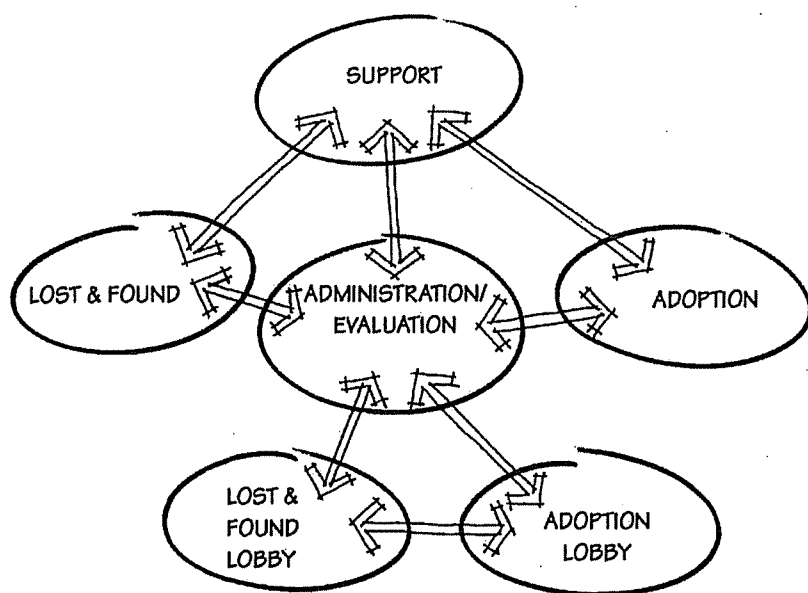
As shelters grow in size, the individual modules that are part of the basic triangular concept expand to include individual rooms for specific functions. Some of the modules, such as administration and evaluation, might actually fracture into two pieces; one devoted to evaluation purposes and the other to support purposes such as food preparation, utility, and grooming.

The Evaluation-Centric Solution
(with separate Adoption and Lost and Found)

If we continue to expand the basic organizational model, we also need to make a fundamental shift in organization. We segregate adoption functions from relinquishment and lost and found. In this expanded model the administration, evaluation, and clinical services move from the periphery to become the central module with direct access to all functions. By segregating adoption from lost and found, you can significantly reduce confusion and conflict for both people and animals. By moving the

evaluation/administration module to the center of the facility, you can service both adoption and lost and found without having to duplicate support services, staff, or space.

Expanded Ancillary Services

As shelter facilities grow from this evaluation-centric structure, they can grow in two ways: by increasing the size and complexity of the individual modules, and by adding other ancillary modules. The lost-and-found module can change from one multi-purpose room to separate facilities for cats, dogs, and small mammals. The support areas may expand to include material handling, storage, locker rooms, specialized animal holding rooms, and laundry.

While maintaining the evaluation-centric organizational concept, many shelters also expand to include a range of ancillary services. Other services or modules can include community outreach and education, additional administrative offices, storage, training areas, doggy day care, retail, extended care, and veterinary medical areas. .

These additional services or modules should be
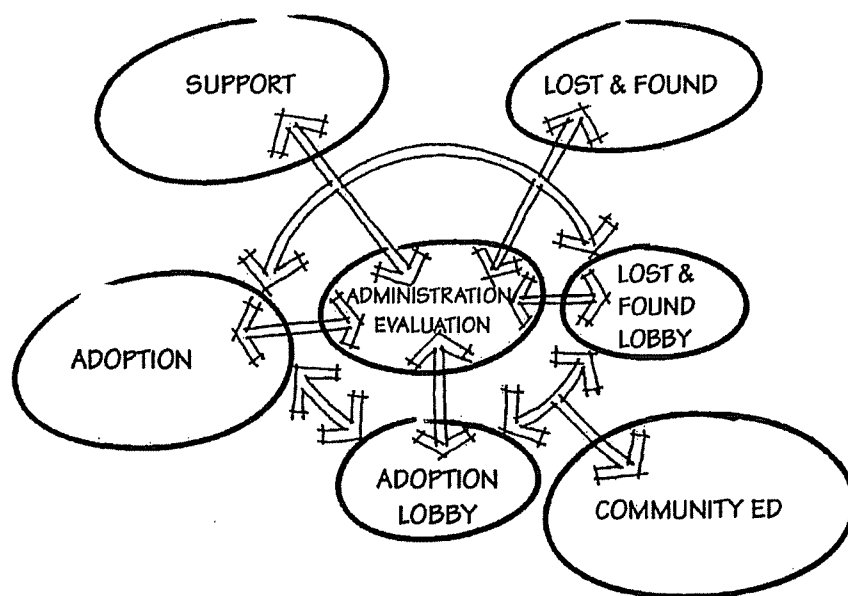
added to the outside of the diagram so as to avoid obstructing the flow of people, animals, and material between the basic organizational pieces. Often these additional ancillary neighborhoods occur as separate wings or pavilions of the building, sometimes on upper or lower floors. The biggest exception to this rule would be the introduction of a veterinary medicine module. In most cases, this should occur in the heart of the facility where it can be accessible from the lost-and-found, evaluation, support, and adoption modules.

One logical way to organize the expanded ancillary service model is as a pinwheel. In the pinwheel concept, the evaluation module remains central with the various services arrayed around the perimeter. A "race track" circulation corridor is often used to tie together all of the modules. This allows direct access to each of the modules without the need to circulate through individual areas.

As a variation on the pinwheel concept, it is also possible to organize the expanded ancillary service model into a more regimented and linear configuration while still maintaining the evaluation and administration module as the center. This linear scheme creates "boulevards" for public and staff circulation. The public boulevards allow for direct access to the shelter services along a client service mall, while the staff circulation patterns allow separation for "back of the house" functions and minimize public and staff conflicts.

Other Key Organizational Concepts

Having discussed the overall configuration and organization of a shelter, there are also a few other design concepts that you might find helpful:

Create a core service area.

All of the above diagrams are based on creating a core service area that is connected to the other
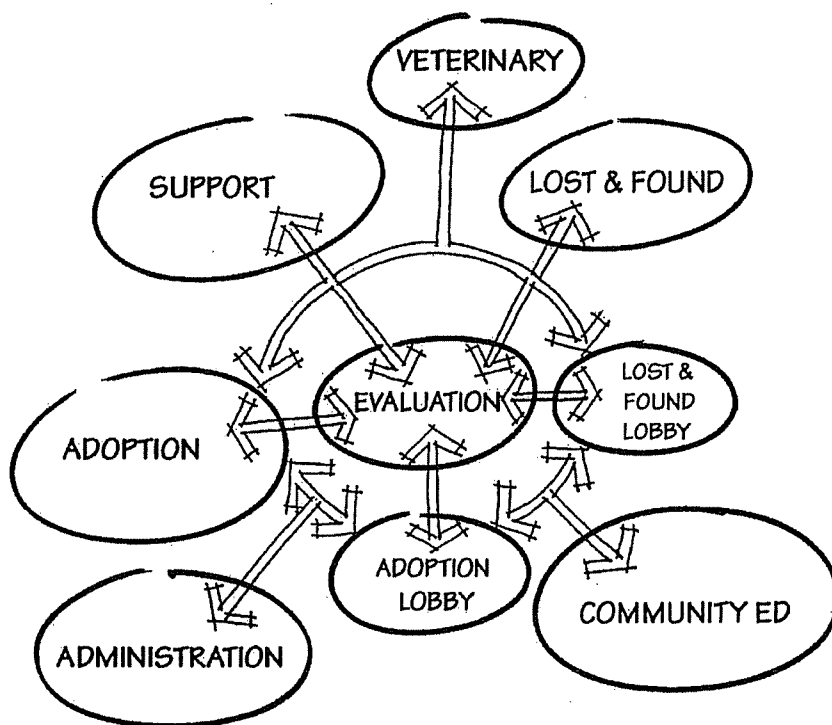
functions. This reduces circulation and duplication of equipment and staff and also streamlines operations. Even in the very largest facilities, it makes sense to create a core area that includes such services as material receiving and shipping, storage, food prep, utility, laundry, lockers, and grooming.

Create multi-purpose rooms.

In smaller facilities, focus on creating multi-purpose rooms and turning hallways into rooms. This helps to make the facility more flexible and space efficient, and can even help to cut back on staffing requirements.

Avoid conflicts of public and private circulation.

In an ideal world there is complete separation of public and private (or staff) circulation. With separation, animals can be received, processed, evaluated, and eventually placed for adoption without ever crossing through a public area. This provides better security for the animals and eliminates conflicts of staff and animals with the public.

Group similar functions into neighborhoods.

As facilities get larger, it usually makes sense to

think of grouping similar functions into "neighborhoods." This enables you to simplify circulation and and avoid conflicts. Neighborhoods are often grouped according to whether they are private or public.

Organize the circulation using "little streets" and "arteries."

Within neighborhoods, use multi-purpose rooms or rooms that are hallways to tie things together and cut down on the space devoted to circulation. Between neighborhoods, provide circulation arteries that are appropriately sized for the anticipated traffic flow.

Create special places.

Both within neighborhoods and along circulation arteries provide special places for staff, staff and animals, and the public to congregate. These special places should be directly off the circulation paths, not in the pathways themselves. These special places provide areas where the staff, the public, and/or the animals can spontaneously gather, interact, and perhaps exercise. These spaces can be landscaped lobbies, break rooms, conference rooms, or interactive education areas. They can also be exterior spaces like landscaped courtyards, play yards, memorial gardens, or park benches.

Flexibility and expansion

Design with an eye to flexibility and expansion. Where possible, don't box in any particular module, especially the ones that are most apt to grow. In this way you always have an "out" in the future.

Way Finding

In bigger, more complex facilities, it is important to think of how the public can find their way to the service they want. We call this "way finding." It is essentially the process of giving people the information they need to find their way. For example, in approaching a large facility that has owner relinquishment, veterinary medical care, adoption, administrative offices, and community outreach functions and modules, will it work better to have a single entrance with an array of choices once inside, or have five different doors all labeled as to their use? Limiting the number of exterior doors is helpful and less expensive than multiple entrances. Once inside the building via the main entrance, the public faces a "mall" where they can then look for the specific door or function they need.
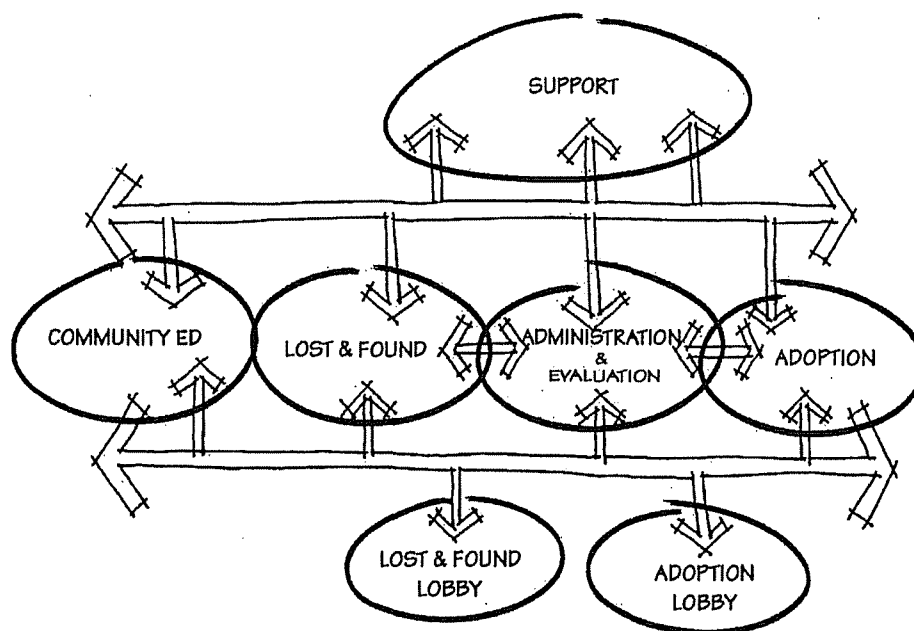
Animal Habitat Design

What is the ideal animal habitat for you? That depends on what you are trying to achieve and how much you are able to spend. Relying on a one-size-fits-all approach often means designing to the lowest common denominator rather than designing for the optimum benefit for a given type of housing.

The first step in your decision process is to establish a list of the individual uses you will have in your shelter. Holding for evaluation, adoption, lost and found, foster care, isolation, and medical wards may be some examples of your different housing needs.

Next, determine the requirements for each of the uses. You might decide that stainless-steel cages are the most suitable enclosures for medical wards and that real-life rooms are most effective for adoptions. You should consider a mix of enclosure types. Obviously housing needs for large aggressive dogs are entirely different than those for puppies. While a cat colony can work well for suitably socialized cats, individual enclosures are mandatory for loner cats. You may also decide that the appearance of a holding run is less important than the visual appeal of an adoption enclosure.

In the following text, we have begun the discussion of the design of animal habitats by exploring some of the larger concepts that are basic to the design of all animal habitats, regardless of the animal being housed. We then move to an exploration of some of the more technical aspects of run design and construction. Lastly, we have provided some quick, capsulized descriptions of alternative run configurations. Taken together, we hope this chapter will help you formulate an approach to creating animal habitats that are not just humane for the animals, but stimulating and supportive while still being efficient and effective.

Efficiency

Unfortunately, often the most pressing concern a shelter organization has is housing the maximum number of animals in a minimum amount of area to control construction costs. If this is the case, you will probably be trying to use a large number of cages, minimize the size of the runs, and develop run configurations that minimize the circulation and support area that surrounds the runs. Be careful when minimizing animal areas to be sure that you provide appropriately-sized housing based on the type of animal, size, and length of time the animal will spend in the area.

When it comes to the actual design of the run configuration, we have found that back-to-back runs with alternating service and public aisles are almost always the most space-efficient. This configuration will give you the highest possible ratio of space devoted to dogs versus circulation space. While each side of the run can be as small as 3 x 3 for smaller breed dogs, the more typical size is 4 x 6, and in some instances, 4 x 8. The downside to back-to-back runs with alternating aisles is no separation between public and staff and no separation between public and dogs. This cross traffic and immediate access to the animals can lead to situations where the public can get hurt, either by putting their hands in the runs or by meeting a dog that is being moved through the public aisles.

To optimize efficiency for caging, the best solution is to not decrease the size of the cages, but to increase the number of tiers. Obviously there is a limit to the number of tiers that are practical, but in rare instances we have resorted to doing as many as 4 or more tiers, with the idea that the very upper tiers are used for emergency overflow.

Controlling Noise, Cross Contamination, and Commotion

The other end of the spectrum from obtaining maximum efficiency is a need to control noise, cross contamination, and commotion. The more

animals you group in a room, and the less separation between the pubic, staff, and animals, the more efficient the plan will be. In contrast, if you want to move toward controlling noise and minimizing cross contamination and commotion, you will probably want to have smaller groupings of animals located in individual rooms. Some newer shelters have actually gone a step further and limited public access to these rooms. For example, at the Lollipop Farm shelter in Rochester, New York, the public can stroll down a corridor or "street" and look through windows into rooms with six to eight runs. If a person sees an animal they are interested in, then they go into the room with the actual runs. Access to the individual rooms can be either free to all those wanting to go in or controlled by staff. In any case, the smaller groupings of runs (optimally behind glass viewing walls) minimizes noise, cross contamination, and commotion. Applying this concept to the cat adoption area, the cat holding areas can be divided up into a number of smaller rooms controlling cross contamination and racket.

Controlling noise and cross contamination is a function of acoustic control assemblies and materials along with providing the necessary heating, ventilation, and air-conditioning systems. This is discussed in further detail in Chapter 3.2.

Optimum Viewing Experience

There are many ways to optimize the viewing experience for the public. We will outline four concepts that have been used effectively: glass versus fencing, real-life rooms, petting pens, and providing enough light.

Glass versus Fencing

On the most basic level, if you can eliminate fencing, be it chain link or stainless-steel bars, and substitute a glass enclosure, you can reduce the jail effect of the enclosure. A complete glass enclosure can also cut down on the transmission of noise and odor from the actual run to the public areas and

make for a more secure environment by removing the possibility of the public putting their hands into the enclosure. In some facilities, such as the original Dumb Friends League building in Denver, Colorado, the floor of the dog runs is approximately two feet higher than the floor of the public areas so the public is not looking down on the dogs.

Real-Life Rooms

In another variation of glass versus fencing, some facilities have gone to real-life rooms. These are glass-fronted rooms of approximately eight feet by ten feet minimum. Constructed like your typical apartment, but built so they can be hosed down. The floor finish can be any number of surfaces, such as stained concrete, tile, or epoxy flooring. The room should contain a floor drain. The animals, much like when they live at home, have to be walked regularly so they don't soil their apartments. The goal in constructing these real-life rooms is to create an environment that will condition the animal to its eventual home environment and also to create fun and inviting environments for the visiting public.

Petting Pens

Another way to create an optimum viewing experience is to utilize raised petting pens for small mammals, small dogs, and puppies. The floor of the pen is approximately two feet higher than the floor the public is walking on, but the top of the glassed-in pen is about chest height. This allows the public to reach into the pens and touch the animals.

Providing Light

In all of these examples, it is critical to provide plenty of light. In the retail industry, it has been proven that there is a direct correlation between light levels and sales. In traveling around the country, we have often heard shelter staff talk about the "black dog syndrome", i.e. the difficulty in placing black dogs. The more light you can put on an animal, the more likely you can encourage people to adopt it. Consider your climate when utilizing natural light and the placement of windows

and skylights in the animal areas. You do not want the passive solar heating areas in the kennels, you want it in the people spaces. Temperature for staff vs. animals is always a conflict. Attention must be paid when siting the building to natural light.

Minimizing Handling

Particularly in impound, quarantine, or medical isolation situations, it is often important to minimize handling of aggressive or contagious animals, both to minimize injury to the animals and staff and to minimize the transmission of contagious diseases. Caging should be designed so that animals can be moved from one enclosure to another without someone needing to get into the enclosure with the animal. Guillotine doors between runs can be a very effective device for moving dogs. Caging can be designed so food and water bowls can be removed without staff having to open the gates. Similarly, some of the newer cat condos have doors connecting adjacent cages so a feral cat can be moved from cage to cage without handling. It is also a good idea to include squeeze cages or gates as part of the animal holding areas. Runs in the impound areas should be equipped with lids, and gates to the runs should swing in, not out, to minimize the number of escapees.

Support Socialization

When discussing creating the optimum viewing experience, create animal environments that encourage appropriate socialization between animals and adopters. Socialization of animals is critical for those organizations that are providing long term care for animals. In addition to more real-life rooms, visiting rooms and outdoor visiting, play, and exercise yards all are a very important part of socializing animals with people. The other aspect of socialization is socialization between the animals themselves. In Europe, housing is provided as group runs for dogs in lieu of individual runs. Often these shelters for dogs include a number of large

rooms where as many as a dozen dogs live and play together. Typically, there is also a shelter staff-member who spends quite a bit of time in the rooms with the dogs. In this way dogs, which are pack animals, can develop their own social structure and hierarchy. Many European shelters have found these group runs to be a great way to minimize stress and conflict. In the case of group runs, we have designed them to have multi-levels and also to be irregular in configuration to create "defensible" spaces for the individual animals in the run. Group caging, or even cageless, environments for cats has also proven to be very effective. While cats are obviously not pack animals, they too quickly establish a social hierarchy that facilitates social interaction. In one small shelter, the cats live among the staff in the office area. These cats are only placed in cages at night or if they prove to be fractious.

Having given you an overview of the design concepts critical to creating the optimum animal habitat, let us now turn to some of the more technical aspects of designing animal caging and runs.

Cage Design

Conventional caging for small dogs and cats has traditionally been stainless-steel cages with stainless-steel gates. While durable and virtually maintenance free, these cages are not very appealing. They are dark, cold, and jail-like. There are many places in the typical shelter where the functional requirements of holding and maintaining animals takes precedence over visual appeal, but for the adoption or extended-care facilities, it is worth considering other alternatives.

Recently there has been a trend away from these stainless-steel cages and toward the glass-fronted, laminate-faced, double-sided cages often referred to as cat condos. The typical cat condo has a steel or aluminum grate on the side facing into the work or staff area, but on the side facing the public or an outside window, the cage has plexiglass. When used

for adoption housing, this enables the public to see into the cages without having to be in the area with the staff. When the cage is backed up against a window, such as might be found in an extended-care situation, it gives the animal lots of sunlight. When built with plexiglass to the back, the unit is typically permanently built into the facility. Unfortunately, this can make cleaning the cage problematic. Also, because the plexiglass scratches and discolors over time, the cage will ultimately need to be removed and replaced. As an alternative to this, cat condos can be installed on moveable carts that are parked against a glass wall that separates the work areas from the public areas. In this case, grates are on both faces of the cages. While not as visually appealing as the plexiglass, this solution is more durable and cleanable over time. As designed, these cages can actually be rolled to a cage washroom and be completely disinfected.

While the older cat condos were oversized (typically 30" wide by 30" high), came equipped with raised sleeping perches, and often had doors that could be opened between individual cages, the newer generation of cat condos also include smaller nooks that can be divided off, giving the cats places to sleep or a location for a litter box. These smaller, separate nooks are also handy when it comes to handling wild or aggressive cats, as the staff can herd the cat into the smaller area while cleaning the cage, and vice versa. Attention must be paid to the lighting of these condos. Cats, many times, choose to spend their time in the smaller, darker space, which results in the public having to search the cage for the occupant.

This double-sided cat condo concept can also be used for small dogs and small mammals.

Run Design

As with so many other things, cost, quality, and durability are directly related in construction. Your ideal . . . "I want an easy-to-clean, maintenance-free enclosure that will last forever," may well be at odds with economic reality . . . "I can't spend any money." Budget and life-cycle considerations need to be part of the process of establishing requirements for the enclosures. Determining budget constraints and prioritizing your needs, will help establish what materials, mechanical systems, and acoustic treatments will be available for the design of the enclosures.

With a roster of uses and requirements in hand, you're ready to ponder you design options. Design considerations for animal holding facilities can be divided into five areas:

- The actual enclosure
- Floor finishes
- The drainage system
- Cleaning systems
- Alternative run configurations

Enclosures

Generally, you can choose from three types of enclosures when developing the mix of housing you need:

Masonry Runs – The most familiar type of runs are constructed of concrete block. Block runs are durable and easily cleaned when painted with epoxy paint. They are quieter than modular metal or fiberglass runs. In addition, concrete block provides a relatively inexpensive solution for separating adjoining runs.

To keep tall dogs from fence fighting and from urinating on their neighbor, the walls should be a minimum of four feet high with some kind of panel fencing, metal rod panels, glass, or glass block along the top of the wall to a minimum six feet.

One variation of the concrete-block approach is to cover the surface of the demising wall with ceramic tile. This technique combines the durability of a concrete wall with a dressier finish. To ensure a well-finished look, trim and bullnose pieces should be used at all corners, top edges, and the base of the wall. The only drawback to this is cost. Ceramic tile can add as much as $4.00 a

square foot of wall area to the cost of a run.

Another way to construct an extremely durable finish is to use glazed concrete block. This is ordinary concrete block which has had a heavy ceramic glazing integrally attached to it through a sophisticated firing process. Once again, the drawback is cost.

In building concrete or glazed-block units, it works best to start the glazed block four inches above the floor and cove the epoxy flooring up the wall to the first horizontal joint. Full-width guillotine doors between back-to-back runs are a new experiment. In this case, you do not build a block wall dividing the back of one run from another, but instead have an upper fixed plastic panel with a full-width, operable panel below.

Glass block is quite expensive, but it is durable, easy to clean, and works well in run enclosures to create a more friendly environment.

Modular Runs – Generally, modular runs consist of an aluminum or stainless-steel frame with solid in-fill or cage rod in-fill panels. Advantages of these runs include:

- The variety of sizes and configurations allow an infinite number of combinations.
- The metal frame and in-fill system usually looks nicer than a concrete-block run. The panels can vary in color and configuration to provide visual variety.
- The system easily combines with raised-flooring systems to keep dogs off the run floor.

Depending on construction, delivery, installation, and other features, modular runs can range from $1,000 to $1,800 per run.

Real-Life Rooms – Because the animals housed are generally better trained and exercised on a regular schedule, they tend to be less stressed and less destructive. They also are able to relieve themselves regularly and seldom soil their rooms.

As a result, the rooms can be less abuse resistant and can be conventionally framed and then surfaced with combinations of cement board, ceramic tile, and epoxy painted gypsum board.

Panel Kennel Fencing – One of the oldest and most effective methods, the panel fencing system combines a cleaner chain-link with a galvanized metal frame that is smaller than that commonly found in chain-link cyclone fencing.

Unlike typical chain-link, the fabric of the panel system doesn't have any burrs, because the material is electro-galvanized, not hot-dipped. Furthermore, dogs can't climb it as easily as chain-link, because the gauge, or thickness, of the wire is smaller, and the spacing of the mesh tighter.

Finally, the fabric is laced to the framework more tightly than chain-link and is flush-welded without hub connections, which prevents dogs from getting caught on the edges. If separation between runs is important, panel fencing can be combined with concrete block partial-height walls or a solid galvanized metal panel.

Chain-Link Fencing _ Chain-link cyclone fencing is the most inexpensive, most readily available, and most often used type of run. There are several disadvantages, including burrs on the fabric, awkward frame construction, and poor attachment of the fabric to the frame.

Floor Finishes

The construction of the run and particularly the floor finish are critical to creating a durable and easily-maintained facility. The finish serves several functions for the run floor:

- It makes it impervious to moisture.
- It resists stains.
- It provides a neat appearance.
- It minimizes maintenance.

To accomplish these functions, you can choose your finish from the following materials, which are listed with their approximate costs:

- Stained, sealed concrete ($2.50/sq. ft.).
- Troweled-on epoxy or "Silikal" ($6.00 to

$9.00/sq. ft.).

• Tile ($7 to $12/sq. ft. and up).

Rather than base your decision solely on cost, consider the contractor's ability to satisfactorily install a particular type of flooring, the manufacturer's or supplier's ability to stand behind the material, and your life cycle cost, which is the cost to maintain and replace the material as required over the life of the installation.

A full discussion of the pros and cons of floor finishes can be found in Chapter 3.1, Selection of Materials.

Drainage Systems

The most contentious aspect of constructing a dog run is likely to be the drainage system. An effective system makes the runs easy to clean, using minimum staff time and effort. A requirement for any of these approaches is that the floor slope to the drain at a minimum of 1/4" per foot. We also suggest that you oversize both the drains and piping as a way of reducing long-term maintenance problems. Possibilities for drainage systems include:

Single drains in each run – This is the simplest solution and, in areas with fewer than a dozen runs, is often the least expensive. Generally, you set the drain to the corner at the back of the run and slope the floor a minimum of 1/4 inch per foot to the drain.

Unless you're using a raised-flooring system, you must install grates or covers over the drains to keep dogs from stepping into them. This specification requires that your staff pick up any solid waste before washing down the run.

A variation of this approach is to use a single drain at the intersection of four enclosures. This technique requires more careful construction sequencing, but can save on plumbing fixture costs.

A trench drain in the run – Here, a floor drain is located in the trench that runs through the back of the runs, offering a more space-efficient solution

than a drain behind the run. Like the flushing floor drain system, a water line is stubbed into either end of the trench, so that you can flush the trench itself. When solid wastes need to be washed down the drain, you simply open a valve. Although the floor drain can be expensive, it works very well provided you specify an adequately-sized line, and use a ball valve, which can be opened quickly. In another alternative to the flushing system, the trench drain is extended beyond the end of the bank of runs. When you need to flush the trench, you insert a hand-held hose.

To minimize cross-contamination between runs with this method, install a grate or raised-floor system to keep dogs out of the trench. Or, you might consider covering the trench with a raised-floor sleeping bench at the back of the run. There are several different types of raiser floor systems available on the market. The traditional system is vinyl covered expanded metal. While very durable and relatively inexpensive as compared to other systems, it is also very heavy, making lifting and cleaning of the racks problematic. An alternative is an extruded reinforced epoxy flooring system that is both very light and very durable. However, this product is very expensive.

Trenches are formed by a concrete subcontractor, or you can specify a prefabricated corrosion-resistant polymer concrete unit and grate. Either way, the trench usually is located at the back of the run, allowing a staff member standing in front of the run to chase the wastes into the trench.

The trench drains to a larger square catch basin, sometimes equipped with a basket to catch solids and toys. Usually this catch basin is equipped with a grinder or a flushing mechanism, although, for the most part, this is not necessary.

A trench drain located outside of the run – In a few instances, trench drains are located either behind or in front of runs instead of in the runs themselves. These trench drains can be either covered or uncovered depending on the situation.

While the prime advantage of a system like this is the accessibility to the trench drain itself, these systems have typically proven to be undesirable. It is difficult to chase wastes to the trench, and if the trench is located in front of the run, you inevitably end up having to step over or in the wastes being washed to the trench, or in the trench itself.

Cleaning Systems

Many new shelters have incorporated high-pressure cleaning systems. These systems with flow-monitoring injection pumps for chemical disinfectant have proven to be very effective in cleaning runs, cages, and equipment. The nice thing about these systems is the ability to use hot or cold water, with or without disinfectant, based on the situation or your personal preference. The majority of the systems let you select the type of water you want at the individual remote cleaning stations, meaning that you can be doing different things in different places in the facility. Quick disconnects used with spray wands or hose reels mounted to the ceiling make the spray-and-wash system easy to use.

The spray-and-wash system, because of its higher pressure, can be used to blow-away solid wastes in lieu of having your staff picking them up. Unfortunately, this process also blows the now water-borne solids around, contributing to a concern about water and air-borne propagation of disease and contamination.

The newer spray-and-wash systems are not as high a pressure as the more conventional Hotsy or steam cleaning systems that have been utilized in the past. This is a plus, because the older systems were of such high pressure that they were potentially injurious to people and animals, as well as damaging to painted surfaces over time.

In addition to a high-pressure cleaning system, it is still important to have domestic hot and cold water outlets located throughout the run areas for cleaning and refilling water bowls. In some facilities, we have seen multiple water outlets located overhead along the length of a bank of runs with quick disconnects. With the multiple outlets, it is possible to cut down on the length of hose that needs to be dragged along.

Alternative Run Configurations

Following are examples of a number of typical run configurations along with the pros and cons of each. Usually selecting a run configuration is the dynamic balance between the animal needs, the economics, i.e. space utilization and efficiency, and minimizing circulation conflicts. Rather than attempt to dictate which is the absolute best run configuration, we would suggest that you use these capsulized descriptions as a starting point in a discussion with your staff, board, and constituents.

Double-Stacked Runs – In this configuration two four-foot by four-foot runs are stacked on top of each other. While the double stacked solution is less than ideal in terms of accessibility, safety, and the runs can be relatively expensive to build because of the drainage system, this is a way to maximize the number of runs in a small area. The four-foot depth makes it possible to more easily reach the back of the run. Compared to the space available in a typical cage, the double-stacked runs can be an effective alternative, especially for small dogs.

Double-Loaded Aisle – A central aisle with runs to each side is the most space-efficient configuration possible. Unfortunately, the configuration does not lend itself to easily moving animals for cleaning the runs. The only solution is to locate a guillotine door between adjacent runs. However, you lose holding capacity as you move a dog to an adjacent run in order to clean. Because there is only one aisle, there is no possibility for segregating public from staff access. Consequently this configuration is typically limited to areas where public access is not required, such as medical holding.

Double Aisle and Back-to-Back Runs – This configuration with the back-to-back runs and an aisle that completely surrounds the runs feels much

less claustrophobic than the double-loaded aisle. With the runs back-to-back, it is possible to move the dogs from run to run for cleaning. Also, with the runs off of the outside wall, it is possible to more easily open up these walls to let in light. The downside of this configuration is the lack of separation between public and private access.

Indoor/Outdoor – Because of both the zoning restrictions in most municipalities and the limitations of having outdoor runs in many of the more wintery areas of the United States, it is usually not practical to have true indoor/outdoor runs. Instead, many contemporary shelters utilize a indoor/outdoor configuration that is entirely enclosed. The ability to access the run from either end, and the ability to move the dogs from indoor to outdoor while cleaning make this a very practical and efficient approach. In some recent plans, the small, conventional 16-inch by 24-inch guillotine door that is located between the indoor and outdoor areas has been replaced with a full-width guillotine door that affords the dog free and easy movement throughout the run when it is in the up position. In this configuration, it is possible to have the public circulating around the outdoor portions of the runs, while staff cleans and feeds using the indoor aisle.

In several shelters, the outdoor runs face each other across a raised planting bed with the staff areas to the outside and isolated from the public.

In yet another variation on this plan, other shelters have the public looking through glass walls into the room containing the indoor/outdoor runs. This eliminates the circulation and contamination conflicts of having both the public and staff/animals in the same room.

Feeding and Cleaning Alcoves – In a variation of the indoor/outdoor concept, shared feeding and cleaning alcoves have been created between adjacent runs. This enables you to maximize the size of the run where the dog spends the majority of its time. Like the indoor/outdoor configuration, the public circulates around the outdoor portions, while

staff access is from the indoor side.

Mini-Run Rooms – In this configuration, six to eight indoor/outdoor runs are grouped into a mini-run room. The public can either look into the room through glass walls or can step into the room with the outdoor runs. This plan has the added benefit of both minimizing commotion by having fewer animals in any given room and also controlling public access. In contrast to some of the other run configurations listed above, this configuration can take up a bit more space. Lollipop Farm is an example of a shelter that has recently utilized this configuration.

Real-Life Rooms – The eight-foot by ten-foot real-life room configuration, when compared to the more typical indoor/outdoor configuration, is actually surprisingly efficient in terms of space utilization. Additionally the real-life room configuration provides the animals with nearly twice as much useable space. This can be done because the duplicity of the private/staff aisle has been eliminated. Instead, all circulation occurs in the main aisle.

In contrast, the San Francisco shelter has both very wide street-like aisles that the public walks down, and large enclosed exercise/play yards behind the real-life rooms where the staff circulates. While making for a very wonderful and exciting animal environment, the additional space devoted to the public "streets" and also the enclosed exercise areas drives down the efficiency of this configuration.

Chapter 2: Implementation

Space Allocation and Capacity

One of the most vexing challenges you will face in launching a new facility is accurately predicting your immediate and long-term needs. Forecasting needs becomes increasingly difficult when moving from small facilities serving a stable population to regional shelters based in a rapidly growing area. Working with someone that is well versed in the requirements of shelter design can assist you in determining capacity and establishing a program that will provide you with the space and operational areas to support your programs.

Animal Capacity

The first big question is: How many animals are you going to have to handle? Fortunately, most shelter organizations have a track record that can be used to determine the number of animals they will need to accommodate as they move into the future. While straight-line graphs do not account for shifting demographics or for the effectiveness of animal control programs, they are a reasonably accurate method of anticipating future demands.

For a newly-founded organization without a track record to draw upon, the process of developing an accurate projection is dependent on collecting available statistics. Predicting capacity is based on the collective experience of the shelter community for situations similar to your own. As you might guess, this is not an exact science.

A number of different methods for evaluating statistics have been developed, but they all approach the problem in basically the same way, by projecting the numbers of animals received, held, and adopted based on the number of households or the total population in your service area.

Over the years, there have been a number of surveys conducted by a wide range of organizations attempting to determine the number of companion animals in the United States, in individual households, and in given geographic areas. Extrapolating the numbers of animals that are abandoned, relinquished, or removed by court order from the total numbers of households and animals is uncertain. Statistics also vary greatly between similar shelters due to a lack of standard records and variable community demographics.

For example, in 1996, the American Veterinary Medical Association conducted one of the most comprehensive surveys administered to date which projected that approximately 32 percent of the households owned dogs and 28 percent owned cats. They also projected that of the households that owned animals, the average was 1.7 dogs or 2.2 cats per household. However, if you look at the full range of nationwide surveys that were conducted between 1987 and 1994, the percentage of households with dogs ranged from a low of approximately 26 percent to a high of 42 percent. Obviously, there is no clear consensus.

With such an absence of accurate numbers upon which to rely, shelters have instead resorted to creating rule-of-thumb formulas that relate number of animals received to total human population. Again, there is a significant variation in these rules-of-thumb numbers, ranging from a low of 2 percent of the population to a high of 7 percent. There is, however, consensus that in less affluent, rural and inner city areas with very little animal rescue, shelter or control, the numbers are in the 7 percent and above range, and in relatively affluent suburban and metropolitan areas where there are active animal shelter organizations, the number is closer to

2 percent. Also, animals received per population is typically higher in the southeast and southwest areas of the country.

Provided you have either a historical perspective or have been able to develop a reasonable guesstimate based on available statistics, it is a reasonably straightforward process to determine the number of animals that will need to be housed. The actual percentages for your shelter will need to be determined based on your individual historical data and demographics. Among the factors to be considered are:

- Percent of stray animals received versus owner-relinquished animals received.
- Percent of dogs versus cats.
- Percent of animals euthanized.
- Average or required length of stay.
- Peak load multiplier.

Based on these projections, you will be able to anticipate the total size requirement for your facility to adequately care for these animals.

Dog Enclosures

Predicting the overall area that will need to be dedicated to housing requirements is dependent on establishing the type and sizes of enclosures necessary and multiplying the cumulative area of those enclosures by a "loading factor". Included in the loading factor are public and staff aisles as well as support and utility areas. Identifying the type of enclosure, circulation requirements, and cleaning systems you want to use is significant, because the loading factor can range from two to three times the size of an enclosure.

The floorplans shown in Chapter 4, beginning on page 78, show a range of alternate run configurations. Another way to figure the total number of square feet per run is to use a simple multiplier. For example, if a 4 x 12 enclosure (separated into two compartments by a guillotine door) takes about 100 square feet by the time you include aisle ways, 20 similar enclosures would take about 2,000 square feet.

Amazingly enough, a similar number of real-life rooms can be accommodated in the same gross square footage, because a greater percentage of the circulation space is dedicated to the rooms themselves.

Housing animals in cages versus runs is much more efficient. Assuming single loaded aisles (where cages do not face into other cages) and two tiers of cat sized caging, you would be able to house one cat per 10 square feet. Space requirements will approximately double if you are using cat condos to about one cat per 20 square feet.

Overall Facility Size

In many state-of-the-art facilities, the area devoted to animal housing for lost and found and adoption (exclusive of other animal types of holding) is as low as 30% of the total building area. This is because most current facilities are performing a wide variety of animal-related services for their community and need the facilities to support those programs.

The most feasible way to estimate facility size is to catalogue the rooms you need and assign sizes to them. Your requirements will shrink or grow depending on your programs and facility size.

Project Costs and Feasibility

We often find ourselves explaining why animal shelters are so costly. The reality is that these buildings are unique and complicated. They are individualized endeavors designed to a specific set of requirements. They combine the complexities of an education center, office building, hospital, and holding facility while adding the requirements of animal care and housing. Some projects begin with years of systematic planning, others in response to spur-of-the-moment opportunity, most with a combination of both. So how do you determine project cost and feasibility?

Hopefully, you have a vision of what you want your shelter to be. You have developed a program that allows you to forecast the size and quality of the building. The next challenge is to evaluate the economic feasibility of your proposal. This is a balancing act between project costs and your ability to raise funds.

The ideal situation is to be able to raise all the money you need to construct the facility and not have to borrow, but this is not always feasible. In some instances, we have seen organizations borrow funds in the form of industrial revenue bonds, from commercial banks, or even from their own endowment funds and then pay this money back over time, rather than try to raise the money before hand. Some organizations have reasoned that it is cheaper to borrow the money now than to postpone the project for several years and have increased construction and total project costs due to inflation. Regardless of the strategy your organization chooses, an endeavor as gigantic as building a new facility should not be taken lightly. It is important that you have a clear understanding of both your initial costs and your long-term obligations.

Most real estate developers use a formula called a PROFORMA to evaluate the initial feasibility of an investment. Simply put, it is a standard way of tallying costs and calculating the periodic cost, or "rent". For our purposes, rent is defined as the amount you pay on a monthly or yearly basis for your facility. Whether the money goes to pay off bonds, replenish endowment funds, or is retained for operational costs, the formula will provide you and your Board a system to evaluate the economic impact on your shelter.

A proforma is divided into four parts:

- Hard Costs – tangible assets, such as the land and the building.
- Soft Costs – services, such as architectural, engineering, legal, accounting, construction financing, and contingencies.
- Financing – principal and interest payments, and return on equity.
- Operating Expenses – taxes, insurance, utilities, maintenance, etc.

Hard and soft costs are tallied to produce total project cost. The cash that you have available to put into the project, i.e. your equity, is then subtracted from the total project cost to establish the amount of money you need to borrow or raise. By amortizing the pay back of the money you borrow over time, you can determine what your monthly payments will need to be. Finally your loan payments added to operating expenses, such as utility costs, insurance, and taxes, will give you the total amount you will have to pay for rent.

Hard Costs

Hard costs are the costs that are related to the actual physical construction, such as acquiring and improving the site and the construction of the building itself. Cash expended on hard costs reap hard, physical results.

As animal shelters continue to become more complex, the cost of these facilities continue to rise. The construction cost of shelters is about 50 percent greater than that of a typical office building.

Shelters have more individual rooms, more expensive floor and wall finishes, more cabinetry, more specialized equipment, many more plumbing fixtures, and much more complex heating, air-conditioning, and ventilation systems.

The national average construction cost in the year 2000 for an animal shelter is approximately $150 per square foot of building area, including average site development costs. But these are just the average costs. In total, the variation in costs from the least expensive to the most expensive can be as much as 50 percent. Also, construction costs, especially with a very strong economy, can climb steeply and will vary depending on:

Regional Variations – Whereas the average construction cost listed above is $150, the cost of construction varies across the country from a low of 74 percent in rural Alabama to a high of 136 percent in New York City based on data developed by the R.S. Means Company, a national clearinghouse for construction costs.

Size of Project – Square footage costs for smaller projects are greater than those for larger projects because overhead and mobilization costs are much the same regardless of the size of the project.

Inflation – Between the initial planning stage and the start of construction, there can be a time lag of two or more years as funding sources are secured. Unfortunately, even as you are attempting to assemble your project and acquire funding, inflation continues. According to R.S. Means, construction costs are increasing at a rate of six to nine percent per year, once again depending on the region in which you are located.

Contingency – Rather than lock into a specific construction cost per square foot, it makes sense to determine a target range that would take into account factors as diverse as variations in project size, anticipated project complexity, contractor availability and pricing methods, code requirements, availability of utilities, site

improvement, soil conditions, the price of labor, and a contingency factor for the unforeseen costs. For these reasons, it is recommended that, at minimum, you set a range that would be plus or minus five percent.

The following is a listing of typical hard cost categories:

> *Building construction*
>
> *Land acquisition*
>
> *Site development costs*
> - *Grading*
> - *Paving and sidewalks*
> - *Landscaping*
> - *Environmental hazard mitigation*
>
> *Road improvements*
>
> *Utility connections, upgrading, or extensions*
>
> *Equipment and caging*
>
> *Furnishings*
>
> *Signage*
>
> *Telephone, computer, and intercom*
>
> *Security systems*

Soft Costs

Soft costs are the often overlooked costs that individually are quite small. However, in the end, when all is added up, these incremental costs can determine the overall economic viability of a project. And because these costs are often overlooked, these are apt to be the most painful surprises. In contrast to hard costs, the soft costs usually are related to services that are being provided or the process of producing the project.

Soft costs include the following:

> *Financing fees*
> - *Loan origination*
> - *Processing fees*
> - *Construction loan versus permanent loan*
>
> *Planning, zoning, and design fees*
> - *Rezoning, platting and nonconforming uses, and special review document*

production

Planning, zoning, and building department
  processing and application fees

Legal fees

Design fees

Architectural

Structural

Mechanical

Electrical

Special consultants
  – Acoustic
  – Environmental

Civil engineering
  – Traffic studies
  – Drainage and retention

Landscape design

Construction management and estimating fees

Facilitator's fees

Development fees

Tap fees
  – Water and sewer

Testing
  – Environmental
  – Special inspections
  – Site and soil

Insurance (builder's risk)

Relocation costs
  – Moving
  – Stationery
  – Marketing Plans

Total Project Costs

While much of the previous discussion centered around the hard costs, it is important that you keep your focus on the total project costs. We have often seen tally for the total project costs to be half again as much as the building cost. This would mean that for a project with a building cost of $150 per square foot, you might expect an overall project cost to run in the $220 range based on average land costs and expenses.

Life-Cycle Costs

It is also important in planning your project budget to consider the long-term costs of your project. These costs include initial, utility, replacement, operation, and maintenance costs. While the focus on most projects is on minimizing the initial capital construction costs, it often makes sense to look at the long-term costs. This is particularly important when you look at interior building finishes (like floor coverings) and electrical and mechanical systems that impact long-term utility costs.

With your assessment of the facility program, project costs, and operational costs in hand, you will be ready to sell your vision of your shelter to the Board and the community.

The following proforma has been included as an example of how you can assemble individual line item project costs to determine overall project costs, and in turn your rent obligations.

Sample Proforma

Hard Costs

Land Costs	$ 750,000
Building Costs	
Building Sq. Ft.: 25,000	
Cost per Sq. Ft.: $150.00	
Total Building Costs	$3,750,000
Total Hard Costs	$4,500,000

Soft Costs

Architectural	$ 225,000
Engineering	
Civil (survey, soils, drainage)	$ 46,875
Environmental	
Structural	$ 46,875
Mechanical	$ 56,250
Electrical	$ 28,125
Regulatory and Utility	
Development fees	
Water / sewer tap fees	$ 15,000
Financing	
Appraisals	$ 6,000
Construction Loan	
Points: 1.00%	$ 37,500
Interest rate: 8.25%	$ 77,344
Permanent loan	
commitment: 1.50%	$ 56,250
Closing costs	$ 4,500
Contingency: 3.00%	$ 130,492
Total Soft Costs	$ 730,210
Total Project Costs	$5,230,210

Financing

Equity: 20%	$1,046,042
Permanent loan	
Loan amount	$4,184,168
Loan period in years: 20	
Interest: 8.25%	
Loan Payment per Month	$ 35,408
Loan Payment per Year	$ 424,901
Return on equity per Month	-0-

Operating Expenses (Per Year)

Real estate taxes	$ 60,000
(note: usually not paid by nonprofits)	
Building Insurance	$ 20,000
Utilities	$ 80,000
Maintenance	$ 40,000
Total Operating Expenses per Year	$ 200,000

REQUIRED CASH FLOW (RENT)

Per Month	$ 52,075
Per Year	$ 624,900

Build or Remodel

The first question a shelter organization often faces when it looks to build for the future is, "should we renovate and expand our existing shelter or build a new one?" The answer is seldom a simple yes or no.

Building a New Facility

A new facility inherently carries some risk, because you're moving the whole organization. The new location must support your organization's goals better than the existing site. The primary reason for moving a shelter is that the existing site is no longer adequate in size or the location no longer supports your needs.

For many facilities, renovating to a state-of-the-art shelter is more costly than new construction. Combine that reality with the disruption caused by construction during renovation, and you have to conclude that a new facility is the most logical option. We have found that it makes sense economically to build a totally new shelter on the same site as the existing one, then tear down the existing structure. Emotionally, tearing down an existing building can be difficult, but often the value is in the ground and not in the building itself.

Probably the biggest drawback to building anew is the cost and availability of ground. In many suburban and urban areas, appropriately zoned ground is prohibitively expensive or simply not available.

Fortunately, many shelters have a long-term working and/or contractual relationships with local municipalities. For these shelters, the solution is often to approach the local municipality about acquiring a piece of surplus ground for little or no cost or in exchange for services provided.

Building a new freestanding facility also has non-economic benefits. It sends a message to your community that you are committed to the community and that you are new, strong, vibrant, and growing. A new facility makes a statement about the strength of the organization and also the value you place on animals.

The greatest benefit in a new building is that you are not limited by the constraints of an existing structure. That greater flexibility means you can more easily adapt your facility to meet the needs your Board and staff have identified. For example, when remodeling the inefficiencies of trying to work around existing weight-bearing walls, plumbing, and mechanical systems force compromises that restrain your ability to create a logical and efficient design.

Remodeling Your Facility

However, if your shelter is relatively new and well designed, working with the existing building can be the logical choice. But before you make that decision, a number of questions need to be answered. For example, is there room on your site for expansion, parking, and circulation? Will your zoning allow you to expand? If you are a nonconforming use, most municipalities won't let you expand your facility. Have there been any new governmental restriction adopted since your building was constructed? Is the building structurally sound? Is the heating and air-conditioning system adequate and up to date? How about the existing electrical system?

Growth and increasing capacity are not always the impetus for renovation. The shelter may function adequately, but a change in philosophy may be the driver behind remodeling. Perhaps you may be moving away from warehousing animals toward a more pro-active relationship with your community. This will shift your emphasis toward educational, training, and office spaces. Changing technologies may need to be accommodated, necessitating the installation of computer, internet, and video cabling. You may be thinking of shifting

from traditional dog runs to real-life rooms, or from kennels to an adoption pavilion. For changes in direction such as these, the motivation is often to re-energize your organization and make it more effective, rather than to fix inadequacies.

An entirely different category of remodeling is the conversion of a building that was designed for a different use into an animal shelter. Obviously, some structures are more appropriate than others, and as a general rule, warehouse or big-box retail facilities are the easiest to convert. They have the advantage of large, wide-open spaces and high ceilings that allow for design flexibility.

However, remodeling these facilities can be expensive. All of the interior partitions, finishes, and building systems, such as electrical and HVAC will have to be added to this shell. If you are considering this approach, keep in mind that what you are buying is a building shell which represents only about one-third of the cost of construction.

Every shelter owes its existence to a unique combination of history, community, and circumstance. While the answer to whether it is a better idea to renovate or build a new building in peculiar to your individual circumstance, the evaluation process is similar, and often, when you have the details of an evaluation laid out in front of you, the answer becomes obvious.

Assembling Your Building Team

A successful shelter facility is the culmination of the unique abilities you and your design team bring to your project. You, as the owner, along with your architect, contractor, and banker each have responsibilities and expertise that contribute to the creation of a successful project.

The following describes the key functions for which each of the team members is responsible. At the end, you will find information on how to select an architect and contractor.

Owner's Responsibilities

As the owner, you are the ring master, coordinating the rest of the design team's tasks. You are also the one who is the initiator and the one who assigns responsibilities. The responsibility of the rest of the team is to support you and your program. In a sense, your job is to set up the framework in which the other team members will perform, and then monitor their performances to ensure that your needs and program are being met. Your specific responsibilities include:

- Verify the "buildability" of your site or expansion with local building and zoning officials.

- Select a qualified architect and contractor.

- Provide the architect with a well-developed and specific program, including objectives, schedule, space, and site requirements.

- Establish an overall budget, including reasonable contingencies, and provide this information to the architect and contractor.

- Work with your banker to arrange financing as necessary.

- Provide the architect with the necessary site information, including an accurate survey and soil report.

Architect's Responsibilities

The architect's responsibilities are essentially threefold: to translate your vision into a physical reality, to hold your hand and assist you through the construction process, and to monitor the construction to ensure that your project is built according to the construction documents. The architect's specific tasks include:

- Review the project, budget, and requirements to ascertain if the expectations are reasonable.

- Provide the owner with the necessary perspective regarding the veterinary industry to enable the owner to make the best market and trend related decisions.

- Create a design and prepare drawings illustrating project scope, character, and functional relationships for the project.

- Assist with the selection of materials and advise the owner on the technical aspects of the design, such as ergonomics, noise and odor control, life-cycle costing of materials, and aseptic environments.

- Provide a preliminary, probable construction cost.

- Prepare construction documents, consisting of drawings and specifications from which the contractor will bid and build the project.

- Assist in obtaining approvals from local municipalities.

- Assist in obtaining bids from contractors, selecting the contractor, and negotiating a contract for the work.

- Observe the construction to ensure that the project is being built in conformance with the construction documents.

- Serve as a conduit for communication between the owner and contractor, and provide an impartial interpretation of project requirements.

- Review submittals, approve pay requests, and assist with the final punch list on the project.

Contractor's Responsibilities

The contractor is responsible for transforming the design and technical requirements embodied in the architect's construction documents into a physical reality. To do this, the contractor is responsible for day-to-day management of the job, coordination with subcontractors and municipal agencies, life and safety issues, and monitoring construction costs. The contractor's specific tasks include:

- Develop an accurate and complete construction cost.

- Coordinate building permit approval and secure the permit.

- Understand the requirements of the construction documents and consult with the architect over any ambiguities.

- Develop a realistic construction schedule.

- Construct the project, including providing labor and materials.

- Coordinate and monitor the construction, including the subcontractor's work.

- Establish a management system that ensures quality control of the construction.

- Pay for taxes, permits, fees, and the work of the subcontractor.

- Coordinate with the owner regarding the take over and the move in of the building.

- Provide the owner with a one-year warranty for the work performed.

Banker's Responsibilities

In years gone by, the banker was not part of the original cast of primary players, but with the bank troubles of a few year ago, the banks have taken a much more active role in the planning and the construction of projects. The banker's specific tasks include:

- Review the financial viability of the project and the owner's financial capabilities.

- Confirm the financial viability of the contractor.

- Monitor the construction and approve pay requests.

Selecting an Architect

As the person who will help you turn your ideas into reality, your architect should challenge your preconceptions while not losing sight of the fact that he is designing for you and your needs. After the completion of the design stages, your architect will also serve as your agent in dealing with the various government agencies and the contractor, ensuring that you are receiving the quality of workmanship and materials that you have contracted for.

The American Institute of Architects has published a memo on "Selecting the Architect". Here are some of the most important points:

Experience – Look for a firm that will be able to show you projects of similar functional and design complexity. Select an architect who has the flexibility and imagination to provide you with the services that will best fulfill your needs.

References – Find out how prospective architects do business and how they responded to their clients' needs and expectations by talking with people on their reference list.

Fees – Request a proposal for services and fees. Nationally-known experts may charge more than inexperienced local architects. You will need to judge for yourself whether the experience and efficiency gained are worth the higher fee.

Rapport – Having personal confidence in and rapport with your architect are critical elements. Find an architect who you will enjoy working with throughout the life of your project.

Tell your architect what you expect, ask if you don't understand, and discuss your needs and the architect's motivations. The result will be a better and more successful project for both of you.

Selecting a Contractor

Selecting a qualified, competent, and fair contractor is easily as important as selecting an architect, and you are often looking for the same things. Your contractor must be creative, able to improvise construction solutions, and be responsive to your specific needs. A good contractor is flexible in scheduling of work, budget, or changes in the construction, dependable, qualified and above all else, "a straight shooter."

The contractor you select should be experienced in projects of similar scale, scope, and complexity. Rather than selecting a home builder or a corporate contractor, you should select someone experienced in building relatively small, light commercial projects.

Ask your potential contractor for a list of local references. Ideally, your contractor should be local and familiar with the subcontractors, the municipal agencies, and your bank. This will streamline the process. Any reputable contractor will have been in business for a number of years and will be able to provide you with a list of previous projects and clients that you may contact.

The contractor's construction cost must not only be competitive, but it also must be a real number. This means that the contractor's bid is well substantiated and that he is prepared to hold that number and not penalize you for any items that he missed, or that you might add. Check references and look for a history of projects with very few change orders.

If the contractor you select is financially strong,

he also will be less likely to misrepresent costs or attempt to take advantage of you. Ask for a financial statement and verify it with his bank. If he is not willing to share this information, you might want to consider another individual.

The Design and Construction Process

It takes time as well as money, and all aspects are influenced by your region.

> *"Do you really think we can be in by spring?"*
>
> *"Can't you do the drawings any faster?"*
>
> *"Why is the city approval taking so long?"*
>
> *"How long should it take for the contractor to give me numbers?"*

Hardly a day goes by when we aren't asked one of these questions. Usually we find ourselves saying, "It depends" because the answers are seldom simple.

Many in the shelter community have never been involved in the construction of a building before, and simply don't understand the process or the time involved in constructing a shelter. However, you should understand the design and construction process before you take the plunge. Why? Because it can easily take years to design, finance, and build a shelter, and everyone on the team needs to know the process, and when decisions and commitments will be necessary.

There are three distinct phases you should be familiar with: pre-design, design, and construction.

The Pre-Design Phase

The pre-design phase lays the groundwork for the project. It is the most overlooked phase, but it is also the most important, because everything done later is built upon this initial phase. The pre-design phase can take as little as a month or as long as several years. In an earlier chapter of the book, we talked about the Needs Assessment and Fund Raising Package. If you do these packages, they will occur in the pre-design phase of the work. There are four elements to the pre-design phase:

Research Time – This is time spent working with your board and architect developing a vision, a program, and feasibility studies. This is also the

time to talk with and visit other shelters to develop an understanding of the do's and don'ts of facility design.

Decision Time – It is important to factor in the time it will take you to make good, solid decisions. We find that most clients underestimate the time it will take to fully review design proposals, obtain approval from the Board, and make final decisions.

Approval Time – With each passing year, the time it takes to obtain even simple approvals from local government agencies increases. Unfortunately, the only thing you can do is be prepared. A qualified architect often can help prepare the right documents and drawings and will know how to submit these. And an architect can more easily speak "planner-ese" than a civilian. As a rule of thumb, expect at least six months for any type of rezoning approval.

Action Time – When it's time to act on a decision, such as purchasing a piece of property, it usually takes time to get the concerned parties to sign-off. We call this action time. You should figure that it will take a minimum of a few weeks for any significant contract to be reviewed and signed. This is a good time to order the site survey and soil report. This information prepares the way for the design phase and often turns up concerns that may affect your decision to purchase the ground or go ahead with the project.

The Design Phase

In our office, we typically divide the design phase into three processes: schematic drawings, design development drawings, and construction drawings. The schematic drawings are the initial drawings done by the architect to incorporate your ideas and requirements. The schematic drawings are developed into design development drawings that explore the building parameters so that construction drawings can be efficiently completed.

Schematic Drawings – These drawings lay out the basic configuration and image of the building. Often they are used by the owner to get preliminary pricing or to get governmental or financial approval. For the architect, they are the basic drawings that are, with refinement, later developed into the construction drawings. The actual time it takes for your architect to develop schematic drawings is dependent upon a realistic and well-thought-out program, the architect's ability to understand and translate your ideas onto paper, and the degree of familiarity the architect has with shelter design. If you are building a new shelter, it should take one to two months for you and your architect to work through the schematics and to get to the point where they are acceptable to you. Then the architect can begin on the design development drawings.

Design Development Drawings – These are the bridge drawings between the preliminary drawings and the construction drawings. Requirements for structural, mechanical, and electrical engineering are accommodated, and building sections, details, and materials are established in sufficient detail to efficiently commence the construction drawings.

Construction Drawings – When most people think of architects, they think of them bent over their desks scratching out drawings with ancient pens and T-squares. Although about half of the hours an architect puts into a project are invested in the construction drawing phase, this time is only a quarter of the total time needed for his services to complete a building project. During the construction drawing phase, the architect will create the drawings from which the contractor will bid and build your project. These drawings are the basis for your legal contract with a contractor. For a new building, it will take about three months to complete the construction drawings, including architectural, structural, mechanical, and electrical drawings and specifications.

The Construction Phase

The most exciting part of the project is the construction phase. After months of work, your ideas and research finally become reality. But before you can actually build your shelter, you will need to apply for the building permit. The length of time it takes to get a building permit will depend on your local governmental agency. You will find that applying for and receiving a permit will vary from one day in a small city or rural county to several weeks in a large metropolitan area.

Most clients feel they get the best prices on a project by having a select group of local contractors bid on the project. This is usually a good process, but it does take time. You should give contractors approximately three weeks to bid on a project. It will also take some time to evaluate the low bid and enter into a contract. A realistic time frame for the bidding phase, including contractor selection and finalizing a contract, would be approximately six weeks.

This is what you've been waiting for – construction! Time for construction will vary depending on the size and complexity of the shelter and also on the benevolence of Mother Nature. Construction of a new shelter may take eight months to a year. If you are located in the far north, building through the winter months can add still more time to this phase.

With construction completed, it is time to celebrate a job well done. Hopefully, you and your design team have created a project that will function smoothly, answer your needs, and be an asset to you and the community. Once you've moved in, it's a perfect time to begin your marketing plan, have an open house, welcome the community, and show off your new facility.

Outline of the Process and

Responsibilities Involved in Constructing a Project

Process	Responsible Party

Pre-Design

Obtain accurate and current site plan
    with easements, encumbrances, topography . . . . .Owner
Verify availability of utilities . . . . .Owner
Verify property is zoned correctly
    and compliant with other regulatory agencies,
    wetlands, flood plain, access, historic districts,
    overlay zones, and covenants . . . . .Owner
Verify that there are no hazardous materials on-site . . . . .Owner
Verify clear title to ground . . . . .Owner
Obtain soil report . . . . .Owner
Establish total project budget (including hard and soft costs) . . . . .Owner

Schematics

Prepare, review, and initial schematic design services contract . . . . .Owner/Architect
Provide architect with pertinent information regarding site and/or
    existing building . . . . .Owner
Develop program for project with space allocations . . . . .Owner/Architect
Produce schematic design documents, including
    plans, exterior elevations, site plan, and budget . . . . .Architect
Review plan for code compliance . . . . .Architect
Initiate conversations with local contractors . . . . .Owner
Secure preliminary financing commitment . . . . .Owner
Review anticipated work with local planning departments . . . . .Owner/Architect
Review and accept schematic design documents and budget . . . . .Owner
If required submit drawings for planning approval,
    facilitate submittal, and attend meetings . . . . .Owner (see Note 1)

Construction Documents and Specifications

Prepare, review, and initial contract for basic design services . . . . .Owner/Architect
Review project schedule and identify specific target dates . . . . .Owner/Architect
Produce construction drawings . . . . .Architect
    Secure services of structural, mechanical, and
    electrical consultants . . . . .Architect
Retain local architect to provide on-site coordination . . . . .Architect

Process	**Responsible Party**

Secure additional consultants as required:

Civil . . . . .Owner

Landscape . . . . .Owner

Interiors . . . . .Owner

Facilitator (building department application) .Owner

Other . . . . .Owner (see Note 2)

Set up conferences to review specific design requirements . . . . .Owner/Architect

Make decision regarding developing a pricing package . . . . .Owner/Architect

Retain local contractor to assist with pricing . . . . .Owner

Determine level of information required for pricing . . . . .Owner/Contractor

Produce pricing package . . . . .Architect

Price project . . . . .Contractor

Review and accept contractor's budget . . . . .Owner/Architect/Contractor

Make necessary decisions to maintain budget . . . . .Owner/Architect/Contractor

Review and accept construction documents prior to release . . . . .Owner/Architect

Interview contractors for bidding and building project . . . . .Owner

Retain Facilitator for building department application . . . . .Owner (see Note 3)

Contract Procurement (Bidding and Negotiation)

Invite contractors to bid project . . . . .Owner

Distribute sets of blueprints for bidding . . . . .Architect

Provide clarifications on drawings as required .Architect

Receive bids from contractor . . . . .Owner/Architect

Review bids and value engineer project to maintain budget . . . . .Owner/Architect/Contractor

Secure permanent financing, pay fees, obtain appraisal . . . . .Owner

Submit drawings to building department . . . . .Architect/Contractor

Respond to building department questions . . . . .Architect (see Note 4)

Submit drawings for final planning/utility approval as required . . . . .Owner

Construction

Prepare, review, and initial contract for construction . . . . .Owner/Contractor

Review schedule and establish key inspection and target dates . . . . .Owner/Architect/Contractor

Make application for utilities (gas, electric, water, sewer),
pay tap and utility fees . . . . .Owner

Obtain Builder's Risk insurance . . . . .Owner/Contractor

Construct project . . . . .Contractor

Review shop drawings forwarded from contractor . . . . .Architect

Coordinate additional owner-supplied systems, equipment
(signage, caging, medical gas and scavenger, x-ray, etc.) . . . . .Owner/Contractor

Process	Responsible Party
Review submittal of interior and exterior materials	Architect (see Note 5)
Observe construction	Architect (see Note 6)
Review schedule and budget during construction	Owner/Architect/Contractor
Review Pay Requests (monthly)	Architect
Reduce retainage if allowed by the contract	Owner/Architect
Inspect project for Substantial Completion	Owner/Architect
Obtain Certificate of Occupancy	Contractor
Turn over building to owner, including keying, warranties, lien waivers	Contractor
Release retainage	Owner/Architect

Post Occupancy Inspection (One year from move-in)

Walk through completed project to identify warranty items	Owner/Architect/Contractor

Additional Notes:

1) Submittal of documents for planning review typically requires a local planner or lawyer to expedite the process.

2) Examples would be planning, acoustic, or wetlands consultants.

3) In larger metropolitan areas, a facilitator may be necessary to expedite the processing of the building permit. The facilitator is typically retained by the owner directly.

4) The typical contract designates an allowance for design service costs incurred in response to building department processing.

5) In addition to the exterior materials that are selected by the architect and owner, the interior materials might be selected by an interior designer instead of the architect.

6) An out-of-state architect will typically retain a local architect to assist with construction observation.

Chapter 3: Technical Issues

Controlling Noise and Odor

People form lasting opinions based on first impressions. The opinions they have about your shelter may well be based on the smells and sounds that greet them when they step through the front door. Simply stated, if your shelter stinks, the public is apt to think the care you give the animals stinks! Why put yourself in a situation where you have to overcome negative first impressions?

Moreover, if you, your staff, and your volunteers have to work in an environment where you can't hear yourself think and where you are assaulted by odor, how can you expect to do the best work possible?

Noise Control

The five areas of focus when controlling noise in veterinary facilities are absorption, isolation, dissipation, masking, and the design of the HVAC system.

Absorption

The first line of defense in controlling noise is to absorb the noise as close to the source as possible. At the most basic level, if you can absorb the sound using sound baffles, absorbent wall panels, or acoustic tile ceiling, you can eliminate the situation before it becomes a problem. Unfortunately, the typical absorbent material is not very cleanable or durable, so you are faced with a dilemma. How do you absorb sound while providing a clean, aseptic environment? The solution is either to find materials that are durable and cleanable or to keep the absorbent materials up and out of the way where they won't absorb water or be damaged.

When looking at sound-absorbent materials, it is important to select a material with a high Noise Reduction Coefficient (NRC) rating. When you talk to your architect, contractor, or your building supply store, ask about the NRC rating of a material. The NRC numbers are based on testing conducted in laboratory situations to determine the absorbency of a material. For example, a ceiling tile with an NRC of .65 absorbs 65% of the reverberant noise that hits the tile. An NRC of 1.0 means it absorbs 100%. Ideally, you want to get as much material as is feasible into the runs with an NRC of approximately .75 to 1.0. The best way to do this is to use a perforated Mylar-faced acoustic ceiling tile with an NRC of .65, Mylar-faced sound baffles hung from the ceiling with an NRC of 1.0, and sound-absorbing, fabric-wrapped wall panels with an NRC of .85 to 1.0. In all of these cases, absorbent material should be installed where it is least likely to get wet or damaged.

Isolation

Even in the best case scenario, sound absorption is limited to reverberant sound (i.e. the sound that bounces back off of walls). The laws of physics and the practical limits of materials to absorb sound mean that you can absorb sound that bounces around a room, but you can't absorb all the sound as it is originally produced, be it by a barking dog or a shouting staff member. Therefore, the next goal is to isolate the sound before it causes problems. The best way to do this is to build your facility with sound walls and traps so that sound does not freely travel from the original source to the place where you don't want it.

In looking at the isolation of noise, there is a Sound Transmission Coefficient (STC) rating that is used to describe how much noise passes through a given wall, material, or assembly. The STC rating is equivalent to the number of decibels of sound that the assembly screens out. For example, a wall with

an STC of 45 means that it will screen out approximately 45 decibels of sound, or the equivalent of a normal person talking. To give some perspective, a dog barks in the range of 100 or more decibels. This means that to effectively screen out all sound from a run, you would need to build a wall with an STC of 100. On a practical level this is not feasible, but fortunately, it also isn't necessary. The highest effective STC that can be gained in a normal wall is approximately 55 to 65.

This is actually quite workable, because of the remaining sound that escapes, approximately 35 decibels, will be masked by normal background sound. For example, if you have a dog holding area located next to a client service mall, the noise above and beyond the 65 decibels that is screened will most likely be at least partially hidden by the routine noises and commotion occurring in the mall area. In contrast, if you were to locate animal enclosures next to an education room, you would still have a problem. The solution in this case is to add more layers of protection..

The simplest way to add another layer is to design your facility to include buffer zones. This may be a storage room, a corridor, or another ward space. Now, instead of having only one wall with the burden of stopping all the noise, you have additional rooms with additional sound-isolating walls.

The best way to design a high STC wall is to sit down with your architect, contractor, or accoustical engineers and learn from his expertise and experience. He or she will hopefully be able to outline an effective sound-absorbing wall that is relatively easy to build and also cost effective. We have included a listing of some typical wall assemblies that are commonly used along with their STC ratings. Once again, for the wall between the runs and the balance of the clinic, you are looking for a wall with an ideal STC in the range of 55 to 60.

- 2 x 4 stud wall with drywall both sides - STC of 35.

- 2 x 6 stud wall with staggered studs and two layers of drywall each side - STC of 58.
- 8" concrete block wall with the voids filled - STC of 55.
- 1/8" thick piece of glass (i.e. a window) - STC of 25.
- Typical solid-core wood or hollow-metal door - STC of 45.
- Typical hollow-core wood door - STC of 35.

In addition to creating a wall that has enough mass to isolate the noise, it is also very important to eliminate any holes through the wall or any paths where noise can "flank" the wall. For example, a two-inch square opening through a wall can completely negate the sound isolation capabilities of the balance of the wall! Going a little further with this concept, you can also see that a window in a wall or a door in a wall with a gap around it can significantly reduce the total effectiveness of the wall. Even the glass in a window or door can cause a dramatic leak, because the STC of single layer of glass is almost nil. If you want or need to have a glass window in a sound wall, your best solution is to have two layers of glass separated by a two-inch air space. This will give you an STC of about 45.

Another common mistake made when building sound-isolation walls is not extending the walls above the ceiling and making them tight to the roof deck. We have often walked into a facility where someone has built a super-duper sound wall, but forgotten about the sound going up and over the wall through the ceiling space. In this case, the sound can escape by flanking up and over the ceiling and then dropping back into the adjacent room, completely negating the time, effort, and money put into building the sound wall.

Dissipation

Another way to control noise is to allow it to dissipate. In a large room, noise can die off before it

hits a wall and bounces back. In the outdoors where there are no walls, sound will die off at the inverse square of the distance. Theoretically, this means that the sound will die off to nothing in a very short distance. Unfortunately, it is virtually impossible to create a room big enough for sound to die off naturally, but by increasing the height of a room and adding as much absorption as possible, you can move toward this goal. For this reason, we try to push the ceiling in the run and ward spaces up as much as possible. First, it diminishes sound bouncing off the ceiling, and second, it allows more room to locate absorbent wall and ceiling panels and baffles.

Masking

Masking is your last resort. Given that you can't absorb, isolate, or dissipate the noise, you can add background noise to cover up the problem. This may seem like you are giving in to the problem, but in truth, it is quite effective. Actual noise levels and the perception of them being a problem are often not directly related. The perception of a noise problem is very much based on the context within which people perceive the noise. On the most basic level, it's hard to hear a dog barking if you are located next to a airport runway. It is hard to be bothered by noise from an adjacent space if the noise in the space in which you are located is high. Muzak or a sound system can do a lot to mask noise coming from the animal areas. Likewise, it has been proven that music in the animal holding areas can actually calm the animals.

HVAC System Considerations

Heating, ventilation, and air-conditioning (HVAC) ducts that pass from one area to another can form a conduit for sound to travel. The simple solution is to eliminate ducts that pass from a noise source to a quiet place. This is often very workable because typically the different heating and ventilation zones coincide with the different sound control zones. But in the unfortunate case where a duct must pass from one zone into another, several things can be done to mitigate the problem. First, a sound attenuator can be installed in the duct directly at the penetration, but care should be taken to seal the joint between the wall and the sound attenuator. Second, a duct can be lined with acoustical lead to contain the sound within the duct system. With these two methods, noise within HVAC systems can be contained and managed from one sound area to another.

Odor Control

If uncontrolled noise can make your ears ring, uncontrolled smells can make your stomach roll. A place that is objectionable to your nose is not a nice place to visit or to work. If the public, your staff, and the volunteers can't wait to get away from your adoption areas, it will obviously hurt your ability to run a successful program.

A Clean Environment

On the most basic level, odor control can be best accomplished by eliminating the source. Frequent cleaning of the runs and cage areas is the first and most obvious step in the control of odor. Locating water hose bibs in convenient locations and using high-pressure hot-water spray and disinfectant systems can go a long way toward eliminating odors by washing away the wastes and bacteria that cause them. When you have the right cleaning tools and system easily at hand, the cleaning can be done quickly and effectively. Likewise, having an adequately-sized and well-designed floor-drain system in the runs can make the job of flushing wastes away much easier. Unfortunately, the run area is only one of many odor-producing areas. Many areas produce odor regardless of how clean you keep them, such as a bathing tub that is used for medicinal dips or a fecal sink in the lab. For these areas, it is a matter of getting rid of the unpleasant odor, not eliminating the source.

Ideally, you need to eliminate or contain the offending odor before it can spread to adjacent rooms. Because odors are typically airborne, controlling the flow of air supply and exhaust in a shelter will control most odors.

Fresh Air and Air Changes

The first thing you must do is provide enough fresh air into your facility. In many older facilities, it is common for the sake of efficiency and smaller utility bills to find minimal amounts of fresh air being introduced into the shelter. Instead, the heating and ventilation system is set to return and recirculate the air into the facility. This saves money, because the outside air that is being brought in does not have to be heated or cooled, but it does nothing to give the animals, staff, or public, any clean, fresh air. This type of system compounds odor problems by sucking them back into the system where they can be recirculated and pumped into other rooms.

Another similar problem is not having enough air changes. HVAC systems should provide a minimum of six to ten air changes per hour throughout the facility and more in some critical areas. This means that all the air in a room will be replaced on an average of every six to ten minutes. Specifically, we recommend the following air changes:

- Public areas: Provide a minimum of six to eight changes per hour, with slightly positive pressure.
- Adoption, relinquishment, lost-and-found, holding, grooming, and isolation areas: Exhaust should be 110 percent of air supplied to maintain negative pressure. Provide 10 air changes per hour.
- Veterinary Care: Provide a minimum of six to eight changes per hour.
- Surgery: Air supply should be 110 percent of exhaust to maintain positive pressure. Provide 95 percent filter for supply duct.

If you can provide these recommended air changes, and provide the recommended outside air levels, you will be well on your way toward eliminating odors.

Multi-zone System

Probably the most critical part of controlling odors, after maintaining recommended air changes, is having a multi-zone system. In a multi-zone system, you divide your building into separate zones, each being fed by a separate HVAC unit. This system allows you to group together rooms that have similar heating and cooling requirements or similar odor-producing potential. Your smelly rooms, like animal holding, grooming, and bathing areas can be grouped together in one zone. Public areas should be in another zone. The more distinct and separate each zone is, the more odor control you have. For that reason, you should be sure that your return air for a specific zone does not draw from an adjacent zone, crossing odors from one zone to another. The multi-zone system will also let you provide different amounts of air to different zones.

Positive and Negative Pressure

Another way to control odor is to create areas of negative and positive air pressure. To create negative pressure in a room, more air is exhausted than supplied. To create a positive pressure, the balance is simply reversed. Negatively-pressured rooms will contain odors, while an adjacent positively-pressured room will typically not allow air and odors to enter.

For example, if you introduce more air than you exhaust into the waiting area, it will keep odors from migrating from animal holding areas to public areas. Conversely, if you exhaust more air than you supply to the animal holding areas, you will draw additional clean air from the rest of the facility and keep the smelly air from migrating forward.

You can also use positive pressure to keep germs and contaminants out of specific rooms. For example, we supply more air into surgery than we

return. In this way, the surgery is positively pressured. In an isolation ward, we typically exhaust more air than we supply, assuring that contaminants do not migrate.

Exhaust the Air

The last way to control odor in your facility is to exhaust the dirty air. Your goal here is to exhaust the air before it becomes a problem. In designing a shelter, we recommend erring on the side of installing too many exhaust fans, rather than run the risk of not having enough. The additional expense of having a fan you don't use will be less than trying to add more fans as you discover odor problems. For that reason, we typically provide exhaust fans in the following areas.

- Dog holding areas - High volume and variable speed fans with 50 CFM per dog and eight air changes per hour is recommended; multi-speed minimum 500 CFM fan recommended.
- Cat holding areas - High volume and variable speed fans with eight CFM per cat and eight air changes per hour is recommended; multi-speed minimum 200 CFM fan recommended.
- Isolation - Vent directly to outside with a recommended minimum of eight air changes per hour; multi-speed 200 CFM fan recommended.
- Dark room - Exhaust fan with 90 CFM is recommended.
- Lab - A range hood over the sink is effective, especially for fecals; 150 CFM fan recommended.
- Grooming - Odors, heat build-up from dryers, and humidity can be problems. A minimum of eight air changes per hour is recommended; multi-speed minimum 300 CFM fan recommended.
- All bathrooms - Usually required by code; 90 CFM fan recommended.

Conclusion

In working toward controlling noise and odor problems, it is better to anticipate and plan ahead. Often in working up solutions to noise and odor issues, you can find an easy and simple design solution. For noise, you can absorb or isolate. For odors, you can isolate or exhaust.

With a little forethought, you can avoid creating noise and odor problems that will negatively impact your shelter. Do the necessary research to understand noise and odor problems and to engage a capable design and construction team that can assist you in developing solutions before you build. It's worth the investment.

Selection of Materials

The following is a listing of common finish materials we have used in animal shelters along with some helpful hints.

Effective Flooring Materials

The perfect flooring would have these characteristics:

- Pleasing visual impact.
- Durable.
- Easily cleaned.
- Resilient.
- Slip-resistant.
- Nonabsorbant to liquids and odors.
- Resistant to microbial growth.

No single flooring material is appropriate for use in all areas of an animal shelter, and no flooring material is a top performer in all of these categories, so choosing the best floor is a matter of balancing the requirements of specific areas with the cost and performance of available flooring materials.

Floor Tile

- Good material for front of facility.
- Durable and dressy.
- Can also be used in working portions of facility, but is tiring to stand on all day.
- Preferred floor material, because it requires minimum upkeep, such as damp mopping.
- 4" x 8", 8" x 8", and 12" x 12"
- Glazed and unglazed tile, brick plate, and paver tile. Check for slip resistance.

The main groupings of floor tile are porcelain tile, glazed tile, quarry tile, and ceramic tile.

Porcelain tile is made of fine porcelain clay, much like dinner plates. It is not a glazed product, but instead depends on the density of the clay to form an impermeable product. By varying the mix

and color of the clay, a range of attractive colors can be provided, but bright or primary colors are not available. Porcelain tile is also available in a range of textures to provide slip resistance. Supplier: Marazzi, Crossville, Graniti Fiandre.

Glazed floor tile is usually a less expensive product than porcelain tile. The clay in glazed tile is of a lesser quality than the porcelain, but the glazing provides an impermeable surface. Glazed tile comes in a full range of colors and textures, some of which are slip resistant. There are also glazed tiles that mimic the texture and color of porcelain tile. Supplier: Dal Tile, American Olean, Buchtail, Graniti Fiandre, Florida Tile.

Quarry tile is typically an unglazed tile product made of the same clay as the glazed floor tile. Like porcelain tile, the color and texture come from the actual clay itself, not the glazing. Therefore, the range of colors is relatively limited. Quarry tiles are typically more permeable than either porcelain or glazed tile. Quarry tile is often seen in fast-food restaurants and commercial kitchens. Supplier: American Olean.

Ceramic tile is typically used in baths and runs; unglazed 1" x 1" mosaic. Check tile for slip resistance and durability.Supplier: Dal Tile, American Olean, Buchtail, Graniti Fiandre, Florida Tile.

When installing any type of tile, it is very important that the subfloor does not flex. Be very careful applying quarry tile over wood frame floors.

Use epoxy stain-resistant grout, such as Laticrete Latapoxy SP-100 Epoxy Grout and Laticrete Adhesive #4237. Epoxy grout can be very difficult to install, so make certain that the tile installer has experience working with it.

See handbook put out by Tile Council of America, Princeton, New Jersey for application method over different substrates.

Vinyl Composition Tile

- Good all around, inexpensive material for the front and working portions of facility.
- Frequently used in human healthcare facilities.
- 9" x 9" and 12" x 12"

Probably the most inexpensive and durable flooring material. Can be prone to breakage and curling at edges of tile, but can easily be replaced. Cannot flash cove base. Joints are not chemically bonded or heat welded. Frequent waxing is required to keep the joints sealed. The new generation of tiles are asbestos free. Available in designer colors at cost premiums. Supplier: Armstrong, Azrock, Tarkett. Rubber tile is also available, but does not wear or keep as nicely. Also, it is more expensive.

Sheet Vinyl

- Very good material to use in the working portions of the facility.
- Very durable and clean, but until recently, not usually very visually appealing.

Prefer commercial grade .080" thick homogeneous PVC sheet vinyl flooring. Has no specific wear layer, but has pattern and material consistent through the product. Also available in stain-resistant grades and with non-metallic slip-resistant grit. Seams typically every six feet.

In the last few years, there has been a change in the type of adhesives used to glue this product. Unfortunately, the new adhesives are much more sensitive to the presence of water coming up through the slab. Because of this, it is imperative that you do a moisture test on your slab before applying the sheet goods. Also, you will find that felt-backed products, like Possibilities by Armstrong, are less sensitive to moisture in the slab than products without the felt backing, such as Medintech or the Forbo products.

Cost varies from reasonable ($2.50/sq. ft.) to astronomical ($6.00/sq. ft.).Supplier: Armstrong; Possibilities (non-homogenous PVC, but can be heat welded), Corlon (vinyl chips in clear vinyl with backing), and Crosswalk (laminated sheet vinyl with raised, textured disks). Tarkett; Acoustiflor (homogenous PVC with foam backing), Multiflor (homogenous PVC), Primo-Tek (homogenous PVC reinforced with polyurethane), Futur 2002 (homogenous PVC reinforced with polyurethane), and Safety (homogenous PVC with grit-impregnated surface). Forbo; Smaagard (homogenous PVC) and Krommerie Marmoleum (linoleum). Altro; Safety Flooring.

Seams can be chemically or heat bonded, but the chemical seams have a tendency to creep apart. Some materials cannot be installed over particle board without nullifying the warranty. Call for flashed cove base in order to cove material up wall in a seamless base.

Carpet

- Can be a very good material for front of facility.
- Needs regular professional cleaning. Often used in the office and behind the reception desk.

Nylon or new generation soil-resistant, nylon-like Antron III, Zefstron, Ultron, or Duotron is probably best choice for combined wear and soil resistance. If possible, choose a continuous filament and synthetic backing. Olefin and Polyester are also good choices for soil resistance. Tufted and/or textured loop preferred over cut pile. 1/8" gauge, min. 8.5 stitches per inch, 22 oz. per square yard minimum pile weight. "Heavy or Extra Heavy" traffic rating. For many manufacturers, their "Hospitality" line of carpets will offer better stain and wear resistance for the money. Otherwise, the carpets should be commercial quality, not residential. Supplier: see local distributors.

Carpet should be glued down without a pad. Two-foot square carpet tiles are also a viable alternative. Easy to replace stained sections, but replaced tiles have a different wear appearance.

Liquid Applied Epoxy

- Can be used in procedure and animal holding areas.

- Easily cleaned; no sealers or wax needed.

Two- or three-step trowel-applied epoxy resin flooring is seamless and can be formed up the wall as a base or wainscot. Obtaining an even slip-resistant finish that is easy to keep clean can be difficult. It is worth noting that the off gassing of the epoxy during the curing/drying process can be potentially dangerous if you or your animals are exposed to it for any length of time. Supplier: Dex-O-Tex, Cheminert, Neotex, Omnitech.

Surface preparation is critical! The floor should be bead blasted. Very good material if successfully applied, but improper installation and underslab water penetration can cause serious adhesion and blistering problems. Quality control (color, non-slip grit, and thickness) can be difficult.

MMA Flooring
(Liquid applied Acrylic Resin Flooring)

- Can be used in procedure and run areas.

- Easily cleaned; no sealers or wax needed.

- Cures quickly; solvent free.

Chemically bonds to concrete. More expensive than liquid-applied epoxy flooring, but because it is acrylic based, it has no noxious off gassing problems. Also, unlike the epoxy flooring, the acrylic forms a monolithic, chemical bond between layers. Fresh resin dissolves the surface of the cured material and cures with the fresh material. Even after years, new or additional coatings can be installed, with integrated surfaces added in the future. The grit or slip resistance is obtained through the use of acrylic color chips versus the sand that is used in the epoxy flooring.

Like the sheet vinyl products, epoxy and acrylic resin floors are very sensitive to moisture in the concrete floor to which they are bonded. For this reason, it is imperative that a moisture test is done before using this material. Supplier: Silikal North America.

Stained and Sealed Concrete

- Can be used in waiting area and throughout the facility.

- Can be a relatively low-cost alternative to a tiled floor.

- Can create an "antica roma" type of mottled or aged looking floor often seen in commercial and retail establishments.

- Requires resealing every few years, depending on traffic.

In this process, once the concrete has set, it is stained with a penetrating chemical stain. It is then sealed with a glossy sealer that is compatible with the stain. This glossy sealer is the wear layer and needs to be reapplied periodically. A dry-shake hardener can also be used to harden the concrete before sealing, but this increases the cost dramatically.

Because this is only a stain and sealer, any imperfections, discolorations, or cracks in the slab will read through to the finished floor. Supplier: Bowmanite Corporation, Madera, California; Patene Artectura.

Concrete Sealers, Colors, and Hardeners

- For use in animal holding and utility areas.

- A very good alternative to painting the concrete, because these materials actually bond with the substrate.

Penetrating sealers allow water vapor to escape. This is the only foolproof solution if moisture or hydrostatic pressure is present under the slab. Moisture trapped under most floor coatings will cause blistering and peeling.

All of these concrete sealers and hardeners are only as good as the slab. If the slab cracks, which it is prone to do, the surface becomes permeable. Where possible, set a structural slab and finish with

a non-structural topping slab, set to a cleavage membrane.

Sealers:
- Liquid-applied (sprayed-on) clear sealer.
- The most inexpensive floor sealer.
- Easily applied; needs to be reapplied every few years.

Supplier: Sonneborn; Kure-N-Seal. Master Builders; Masterseal.The Burke Company; Spartan-Cote, Cure-Seal-Hardener.

Sonneborn has a Gray Kure-N-Seal that will hide blemishes and will increase the reflectivity of the floor, making for a brighter room. This material should only be used on naturally colored concrete floors. Should be reapplied at end of job before turning the project over to the owner.

Chemical Hardeners

A colorless, aqueous hardening solution containing magnesium and zinc fluosilicate. Used to make the concrete slab less prone to chipping and spalding and to make a more impervious surface. In most cases, should be used in conjunction with a sealer. Supplier: Sonneborn; Lapidolith. The Burke Company; Burke-O-Lith.

Colored Concrete

Used to integrally color concrete, using alkali-resistant and fade-resistant pigments. Supplier: Davis Colors; True Tone Cement Colors.

Paint

Because we have often seen painted concrete floors fail in existing facilities, we would strongly recommend against using any kind of paint on floors, even chlorinated rubber, alkyd enamel, or epoxy.

Terrazzo

- Usable in all portions of facility.
- Can be both highly durable and very visually appealing.

- Can be very expensive.
- Can be tiresome to stand on all day.
- Is slippery when wet.

Because of the cost, it is unusual to find terrazzo floor finishes being used in contemporary shelters.

A terrazzo finish is made up of marble chips in a cement carrier, ground to a smooth and flush finish. Because any movement or cracks in the substrate will have a tendency to telegraph through the terrazzo, eliminating movement in the substrate is critical. Location of divider strips is also critical.

Interior Wall Finishes
Paint
Flat Latex

- Usable in office, reception, and waiting areas where cleaning the wall is not critical and a flat, warmer wall finish is desired.
- Use primer and one coat.

Washable Latex Semi-Gloss Enamel

- Usable throughout front and working portions of facility. Should not be used in ward and run areas.
- Washable, but not scrubbable. Should not be hosed down.
- Any semi-gloss or gloss paint is going to show more imperfections in the wall than flat paint.

Alkyd (Oil Base) Enamel

- Use where higher durability than latex enamel is required.
- Can be used in animal holding areas.• Can be used for painting metal with careful priming and degreasing beforehand.

- Use flat latex base primer coat and two coats odorless interior semi-gloss alkyd enamel.

Alkyd enamel paint has been the workhorse of the industry for many years, especially for painting metal surfaces. However, we have found that the new generation of aliphatic acrylic coatings are readily available, more durable, and cost the same or less than the better grades of alkyd enamel. For these reasons, we have switched over to the aliphatic acrylic coatings on all of our recent projects.

Aliphatic Acrylic and High Performance Urethane Coating

- Can be used on any exposed metal where subjected to harsh conditions.
- Available in a "direct to metal" and a "direct to rust" formulation. The "direct to rust" is the more high-performance material.
- Supplier: Pittsburgh Paints.

Epoxy Resin Flooring – on walls

- Epoxy resin flooring can also be used on wall surfaces if it is applied over a strong and stable sub-material like concrete block or plywood. Like the flooring, it is very durable and impervious to liquids.
- When it is used on a wall, and in conjunction with an adjacent floor, the epoxy resin flooring has the added benefit of creating a seamless joint where the wall and floor meet.
- Supplier: Dex-O-Tex, Cheminert, Neotex, Omnitech.

Epoxy Paint

- Can be used in animal holding areas.
- Very durable.

There are a multitude of one- or two-part and solvent- or water-based epoxy paints on the market. For most of our purposes, we have found the acrylic-epoxy water-based paint to be very workable. While this product is also available as a polyester-epoxy solvent-based paint, we have found the water-based product performs as well as the solvent-based. We regularly use it over concrete block in ward areas and runs. Supplier: Pittsburgh Paints; Pitt-Glaze 16 Line.

Epoxy Coatings

The next step above epoxy paint is a high-build semi-gloss polyimide-epoxy coating, often called "tile clad" or "high build" for short. This product is virtually indestructible. It is often used in food processing plants, laboratories, hospitals, and other places where a durable, highly stain- and chemical-resistant coating is required. This product is the best paint or coating that can be used in the run areas. Supplier: Pittsburgh Paints; Aquapon 2.8VOC 97-31 or 97-39.

Concrete Block Filler

- Any time you paint concrete masonry units, be sure to fill surface of block first.

Glazed Concrete Block and Structural Glazed Tile

- Very durable, maintenance-free material.
- Good material for animal holding areas.

While often lumped together and referred to generically as glazed block, there are actually two glazed block type products that we have used in building runs. The first is a concrete masonry unit with a baked-on acrylic coating and is usually referred to as glazed block. The other is a kiln-fired ceramic finish on a structural clay tile and is usually referred to as structural glazed tile. While these two products are virtually indistinguishable to the untrained eye, and for all practical purposes perform equally well in most situations, the structural glazed tile unit is slightly more durable because of the kiln firing. It also has more trim pieces and shapes available for forming terminations and wall caps, but is usually more expensive.

Both products can be set in typical masonry

mortar, but the finished joints should be dressed with epoxy grout to form a truly impervious total wall system. Supplier: Glazed Block: Spectra Group; Spectra-Glaze II. Trenwyth; Astra-Glaze-SW. Structural Glazed Tile: Elgin Butler Brick Company.

Glass Block

We have used glass block on several projects to build walls in the runs. Because the blocks are actually a heavy glass, they are durable, impervious to staining, and don't need to be painted! Like glazed block or glazed structural tile, they need to be grouted with epoxy grout to form joints as impervious to staining as the glass block units themselves. The only two drawbacks to glass block are the lack of glass block trim pieces to cap the ends or tops of the walls, and the difficulty of mounting fencing or gates to the glass block walls. For that reason, we have mixed concrete masonry units or glazed block with the glass block for transition and termination of the walls. Supplier: Pittsburgh Corning Glass Block.

Ceramic Tile

- Predominately used for backsplashes at counters, wainscoting, and shower enclosures in baths.

- Can also be used in animal holding.

- 4" x 4", 4" x 8" glazed wall tile. Tile should always be applied over water-resistant gypsum board or Tile Backer Board in damp areas.

- Coordinate setting and grouting method with substrate. See handbook published by Tile Council of America, Princeton, New Jersey.

- Supplier: Dal Tile, American Olean, Buchtail, Graniti Fiandre, Florida Tile.

Vinyl Wall Covering

- Use in front and working portions of facility.

- Use instead painting or wainscoting in medium traffic areas.

Minimum weight Medium Duty, Type II, 13 oz. per sq. yd. Vinyl coating not less than 7 oz. per sq. yd. Backing should be treated with mildew and germicidal additives. In areas that are subject to staining, use Stain Resistant Type II with "delustered clear polyvinyl fluoride film". Supplier: General Tire and Rubber; Genon Stardust Type II. B.F. Goodrich; Koroseal.

Protective Vinyl Wall Covering

In contrast to generic vinyl wall covering, protective vinyl wall covering is a heavy-duty semi-rigid vinyl wall covering that is available in thickness ranging from .028" to .250". Commonly referred to as Kydex, this material is resistant to hand carts and even forklifts when the heaviest material is specified. We often use Kydex as a wainscot, and in the thicknesses ranging from .060" to .080", it has proven to be resistant to dog scratching and gurneys or other portable equipment that is being moved. Kydex is usually applied directly over drywall, but in the more heavy duty applications it can be applied over plywood or particle board. Because it is flexible, it can also be formed around curves, and because it is textured, it does not show scratches. As an added benefit, Kydex, unlike glassboard, is available in a wide range of colors, trim pieces, corner guards, and rails that are compatible with most contemporary interior color schemes. Supplier: Kleerdex Company; Kydex.

Plastic Laminate Wall Covering

The counter top material generically referred to as Formica is called plastic laminate in the construction industry. We often use it over a plywood substrate to form a durable and visually pleasing wainscot in a room. Plastic laminate is available from a myriad of manufacturers in a seemingly limitless range of colors, textures, and

patterns. It is also available in abrasion-resistant grades. We have found that the best way to mask scratching is to use a plastic laminate that is a medium shade or patterned, rather than a very dark or very light color. Plastic laminate should be mounted to plywood, not drywall, because it can de-laminate from drywall over time. Supplier: Formica, Nevamar, Wilsonart.

Solid Surface Material

While the solid surface material that most people are familiar with is the original Corian by Dupont, there are now a range of solid surface materials that look like marble and granite. We have used a solid surface material at the reception counter to create a dressier, more upscale finish and have also used it to create nice, stone-like benches in waiting areas. Because it is the same material throughout its thickness, any scratches that may occur can be buffed out. Supplier: Wilsonart International; Avonite. Dupont; Corian. Nevamar; Fountainhead.

Glassboard

- Virtually indestructible fiberglass-reinforced plastic panel (FRP) can be used for wainscoting.

- Used extensively in commercial kitchens and food processing plants.

- Available in 4' x 8' panels, mar-resistant embossed surface. Limited number of pastel colors available.

- Supplier: Dyrotech Industries, Joliet, Illinois; Glassboard by Crane. Kemlite, Joliet, Illinois; Glasbord.

Corner Guards

- With experience, we have learned the desirability of corner guards on walls to guard against carts and dog leashes.

- Available in a myriad of sizes and colors,

including clear lexan. Surface-mounted vinyl/acrylic extrusions, 2" wide.

- Supplier: Construction Specialties, Inc.; Acrovyn. Tepromark International, Woodmere, New York; Tepromark.

Ceiling Finishes

Painted Drywall

- Can be used throughout facility.

- Does not allow flexibility or immediate access to space above ceiling.

- Lack of acoustical absorption can be a problem.

- More visually attractive than suspended acoustic tile.

- See Interior Wall Finishes, Paint.

Suspended Acoustic Tile

- In the public areas, use a designer series of tiles, either 2' x 2' regressed or shadow line or a patterned, molded, or high-profile tile.

- In the working areas of the facility, use a high-profile tile that has higher sound-absorbing abilities. (Noise Reduction Coefficient of .75 to .80 is possible.)

Economical tile ceilings that can be used in high-moisture areas, such as runs and grooming include: White Vinyl Faced "Mylar Face (Perforated) US Gypsum Ceiling Panels". Other options include foil-wrapped or ceramic-bonded tiles.

For the most part, water-felted panels are more durable and sag resistant than fiberglass panels. In high humidity areas, the size of the tile should be minimized to resist sagging.

Tiles with sealed edges and special back coatings are also available for clean-room ceilings, such as surgery areas. Supplier: US Gypsum Company, Owens Corning, Celotex, Armstrong.

Sound-Absorbing Materials

Spray-On Acoustic Sound-Absorbing Material

Spray-on acoustic sound absorbing material is available in two types: cellulose and cement. The cellulose material offers a Noise Reduction Coefficient of 1.0, but unfortunately it is not very durable. Except for rare occasions, we would not recommend its use in areas where people can jump up and touch it or where it might accidentally get hosed. It is also very porous, so it will absorb airborne moisture, organisms, or dirt. In contrast, the cement spray-on material offers an NRC of only .55 to .65, but it will stand up to abuse, including hosing. In either case, spray-on material can be applied over almost any kind of ceiling surface to at least partially offset noise problems. Supplier: Pyrok Inc.:Pyrok Acoustement 40.

Sound-Absorbing Wall Panels

- Cloth- or vinyl-wrapped sound-absorbing units (Noise Reduction Coefficient of .85).

- Available in a number of colors and materials.

- Can be used in any area requiring additional sound absorbing abilities. Should not be installed below 4'-0" in ward and run areas.

- Supplier: Armstrong; Soundsoak. Acoustiflex Corporation, Plainfield, Illinois; Softscape, Capaul. US Gypsum Company; Acoustone Space Units, Silent Auratone Panels.

Free-Hanging Sound Baffles

We have used free-hanging, nylon-faced or vinyl-faced sound baffles to mitigate sound in both the public and run areas of a facility. While the vinyl-faced baffles are available only in white, the nylon-faced are available in a range of colors. These 1" thick, 2' x 4' baffles can be hung from the ceiling or around the walls in a variety of configurations to provide sound control and visual interest. Supplier: Netwell Inc.; Gym Baffles.

Simple needs: You want to be warm when it's cold, cool when it's hot.

Simple needs require not-so-simple HVAC systems, but with the following basics of good mechanical system design, you and your architect can design an effective mechanical system.

The point of your mechanical system is to create a comfortable working environment, a comfort zone that is:

- 72 to 78 degrees Fahrenheit (62 to 68 degrees for animal spaces, which should be colder than people spaces);
- 20 to 60 percent humidity;
- 6 to 20 air changes per hour;
- Air velocity at head level of 10 to 50 feet per minute.

Several different systems can be used to successfully create this comfort zone. In an animal shelter facility, we would recommend that you use some form of forced-air system. A forced-air system can respond to your needs more quickly, and will help you more effectively control odors, as compared to a radiant heat system. Available forced-air systems include:

- Roof-Top Unit – This unit consists of a gas-fired furnace and refrigerant cooling. A roof-top unit will require a flat roof for placement.
- Two- or Four-Pipe Fan-Coil System – This unit consists of a gas-fired boiler and remote chiller. In a two- or four-pipe system, hot and cold water is run to fan-coil units, usually mounted above the ceiling in the individual rooms. Each fan-coil unit can provide either hot or cold air as required. A two- or four-pipe fan-coil system is probably the Cadillac of systems, but is not typically cost effective on small projects.
- Heat Pump – A heat pump system provides

refrigerant cooling, and by running the pump system in reverse, it can also heat. It is cost effective in temperate climates where air-conditioning is the primary use, but it should not be used in cold climates.

Your architect can help you decide which of these is most appropriate to your specific building design and local climate.

Beyond these basics, what are some of the other more specific animal shelter HVAC requirements? We will now look at creating an aseptic environment, controlling noise, providing housing for exotics, and conditioning the animal holding areas.

Aseptic Environment

The containment and control of dirty air are of critical importance in the design of a mechanical system for your shelter. There are two basic lines of defense; air pressure and filter systems.

Positive air pressure can be used to keep dirty air out of a surgery area. Negative air pressure can vent the isolation wards.

Filters are also very effective tools in creating aseptic environments. You can purchase filters based on the level or size of particulate that you want to screen. We usually use a 99 percent efficient filter on the air supply to the surgery suite and a 95 percent filter for the isolation ward supply duct. A 99 percent filter will screen out almost all significant particulates. However, it should not be added to an existing system, because it requires a larger fan unit to move air through the filter. Beyond the 99 percent efficient filters are HEPA (High Efficiency Particulate Airflow) filters. HEPA's remove virtually all contaminants including many viruses. They are often used in lab animal science facilities to isolate potentially contagious diseases. However, they are not usually used in shelters because they are costly.

Noise Control

The use of separate mechanical zones will also help you isolate noise. Separate zones will minimize crossover noises being transmitted through the ducts, and with separate zones, you eliminate having ducts passing from one zone into another. If you must have ducts cross over into another zone, we would recommend that you zigzag the ducts to create a sound trap. Then wrap this baffle in lead to dampen the sound. Ducts that do pass from one zone into another zone should also have sound attenuating mufflers built into them. These will cause a drop in pressure and should be studied by your mechanical consultant. Finally, the last way you can help control noise transmitted via the ducts is by having all your ducts lined with one inch of rigid insulation. This cuts down on crossover noise and insulates the ducts from thermal loss.

Environments for Exotics

With increasing frequency, we are seeing special environments being built for the housing of exotic animals. The wards for these animals require special venting and greater environmental control. We often use a radiant ceiling panel or wall unit to add the required heating capacity. A "reheat coil" set into the duct that supplies the exotic area is another way of providing custom heating for this specific environment. With any of these three solutions, you need to provide a thermostat in the exotic area to control your specific heating requirements.

Animal Holding Areas

Typically, the animal holding areas require the exhausting of a tremendous amount of air. Finding an efficient, cost-effective way to condition this air is imperative. Some alternatives to the typical forced-air system include:

- Unit Heater – This is an inexpensive, ceiling-hung, gas-fired unit used to marginally heat a space. A significant drawback is that fresh air circulation is not an integral part of the unit.

- Radiant Floor Heating – This system uses either low-voltage electricity or hot water piping. It is a good system for runs, because floors dry more quickly during cleaning and it is more comfortable for the animals to lie on a warm floor. Cost is an issue, because this system is installed in addition to the standard air-handling units that provide cooling and air circulation.

- Radiant Heater or Infrared Lamps – This is another marginal way to provide incidental heat. Radiant heating typically heats objects or animals in the space without heating the air. This can be an effective way of heating indoor/ outdoor runs in cold climates. The drawback is that mechanical systems need to be added for cooling and air circulation.

- Air-to-Air Heat Exchanger – A relatively expensive process for reclaiming the heat from the used air before it is exhausted. The exchanger effectively preheats the new air as it is drawn into the system. In cold climates, the payback is usually between five and eight years.

- Evaporative Cooler – This is sometimes referred to as a swamp cooler and is a very cost-effective alternative to refrigerant cooling. However, it should only be used in hot, dry climates.

Lighting

You may have superb staff and programs, a noise and odor free environment, and the ultimate colorful decor, but without adequate light, you're still working in a black hole.

Lighting affects your mood and how easily and effectively you perform your work. Inadequate lighting turns your shelter into a dull and dreary place. It can hide dark-colored animals in adoption areas and make them less adoptable.

Selecting lighting that is appropriate to the task contributes to work efficiency, accuracy, and reduced electric bills.

Seeing The Light

Proper visibility begins with providing the right amount of light. Not enough light and you can't see; too much light and you're blinded. How much is enough varies with the level and type of work or activity being performed in any given area. So how do you measure enough light?

First, some "enlightenment" on the terminology. Light levels are measured in foot-candles. Examples of typical requirements by activity include:

- General reading - requires 40 foot-candles of illumination.
- Detailed surgery - requires at least 125 foot-candles.
- Treatment, procedural, and retail areas - require 75 to 100 foot-candles. Studies show that increased lighting or highlighting stimulates buying.
- Exam rooms and offices - require 50 to 75 foot-candles.
- Reception areas - require 30 to 50 foot-candles.
- Animal holding and utility areas - require 20 to 40 foot-candles.

- Rest rooms – require 20 foot-candles.

To select the best lighting for your shelter, you'll need to consider such factors as highlighting, glare control, color correction, and efficiency.

Highlighting

You can use highlighting to reinforce subliminal messages in your shelter. For example, you might spotlight a cat play area, an interactive educational kiosk, or retail display. Highlighting allows you to keep the general room illumination at a comfortable level and simultaneously add punch to certain areas or items in the room.

With the low-voltage, tungsten halogen spotlights now available, you can create dramatic displays by very accurately pinpointing an item. Light can be thrown from across a room or from a high ceiling onto a specific display with virtually no spillage. These low-voltage lights put out a very pure light, which tends to make colors pop out at you.

Glare Control

Glare, light that streams directly into your eyes or bounces off items you're trying to see on your desk, tires and irritates your eyes. Combat glare by using light-control devices that provide "cutoff." If you screen the actual light source or light bulb using baffles, reflectors, or shades, you cut off these "sight lines." People who work on computers over an extended length of time require a glare-free environment.

Parabolic-lens fluorescent fixtures, which typically are two-by-four feet, and fit into suspended, acoustic-tile ceilings, help control glare. These fixtures are equipped with a reflective parabolic lens as opposed to the plain acrylic lens that traditional fluorescent fixtures have. The reflective baffles provide the desired cut-off while actually reflecting more of the light down to the

work surface. In the parabolic fixtures, three bulbs produce as much light as four bulbs in a traditional fixture.

A linear, indirect fluorescent system in which the lamps hang from the ceiling and face upward bounces the light off the ceiling. This system virtually eliminates all glare. Both the parabolic lens and the linear indirect systems are expensive, but cost efficient. By eliminating glare, you use less light and save energy in the long run.

Color Correction

For years, we've associated fluorescent lights with unnatural colors. Under fluorescent lamps, items seem to turn purple-green hues, creating an artificial and cold light.

In contrast, natural daylight and incandescent light throw a much warmer light, rendering colors closer to true hues. Although fluorescent lights are more cost-efficient, incandescent lighting creates a warmer, more comfortable atmosphere.

In fact, light that approximates the daylight spectrum has been shown to contribute to positive worker morale. For the best of both worlds, you might consider the new generation of color-corrected fluorescent lamps, which use a coating of rare-earth triphosphors to closely approximate the natural daylight spectrum of light. Several different color-corrected lamps are available, so you can choose your preferred color range. The SOEC 35 series by Philips, or comparable products, are top market choices.

Efficiency

Another significant aspect of lighting technology is energy efficiency. Lighting affords shelters the easiest way to reduce electrical demand. By using "daylighting", energy-efficient lamps and ballasts and lighting controls, you can reduce electrical loads, maintenance, and your utility bill.

Reducing ambient (general atmospheric or over-all) lighting and providing illumination levels specific to your task or area reduces cost. You can

provide accent lighting to add interest and provide high foot-candle lighting where it is needed, such as in a surgery suite. Not only will you save money, but you'll improve the visual quality of your space.

The new fluorescent fixtures available now throw much more light for the same amount of energy or less. New lights and technology on the market include:

- Compact fluorescent (CF) lamps color-correct close to the daylight spectrum, last more than 13 times longer than incandescent bulbs, and set in recessed, down-light fixtures. They reduce energy consumption by approximately 75 percent.

- Narrow-profile (T8) fluorescent lamps, which are also color correct, are used in two-by-four foot support and reflector units.

- Fluorescent lamps require a ballast to raise voltage levels high enough to force a current down the length of the lamp and control the amount of current. Energy-efficient electronic ballasts now available can reduce luminaire power consumption by up to 30 percent. Electronic ballasts operate at a higher frequency, which reduces the amount of current needed and the flicker associated with fluorescent lamps. They also have greater internal efficiencies reducing electrical losses and producing less heat, which translates into reduced cooling demands, another savings.

Such lighting configurations cost more initially, but don't be deterred. The lamps are more efficient and last longer, so you can recoup your investment in about one year through reduced electric bills.

By using occupancy sensors and energy management systems to turn lamps off when you don't need them, you can reduce your electrical requirements. Occupancy sensors detect when a person enters or leaves a space and turns lights off or on as needed. Studies show that if a person is gone for more than two minutes, it is cost effective to switch off the lights.

Energy management systems turn lights off and on at preset times, such as the beginning and end of the work day. Given that shelter work hours are demanding at best, these systems would probably work only in reception, retail, or consultation areas.

However, dimmable fixtures and dimming controls have become more reliable and offer increased savings over the on/off controls.

Daylighting

By using natural light, or daylighting, you can save money, increase psychological and environmental comfort for all who use your facility, and conserve resources.

Although the payback period for daylighting is about three years, the effect on higher staff productivity and satisfaction is immediate. A 1994 joint study by the U.S. Department of Energy and the Rocky Mountain Institute tracked eight lighting retrofit case studies and found worker productivity to have increased to six to sixteen percent with daylighting! They also documented higher occupant satisfaction, decreased absenteeism, and significantly increased sales.

The challenge in daylighting is to introduce an ample amount of daylight and avoid overheating and glare. You and your architect should work carefully to optimize light provided from the sky and control that which comes directly from the sun.

Direct sunlight entering a building must be diffused to reduce visual and thermal discomfort, glare problems, and ultraviolet light damage to fabrics and other materials. With the help of your architect and lighting consultant, you can diffuse the light or redirect it to the ceiling. Careful window selection can result in receiving the desired amount of light.

Daylighting strategies include:

- Clerestories, skylights, cupolas, and monitors (toplighting).
- Light shelves on the east, west, and south walls.
- Louvers and baffles.
- Vertical windows.
- Interior color selection (light colors work best).

Not only is sunlight beneficial to people, but it is beneficial to animals, which is certainly not news to you. Still, very few areas include even minimal amounts of sunlight! Skylights are an excellent way of providing controlled amounts of sunlight into the interior of buildings.

Chapter 4: Floor Plans

Humane Society of the Boulder Valley, Boulder, Colorado

This 32,000 square foot project is designed to wrap around the existing facility, allowing the existing facility to remain functional until the new one is operational. In a variation of the pinwheel concept, adoption, lost and found, and the veterinary clinic are arrayed along a client service mall. A staff circulation

corridor links all of the behind-the-scenes functions and effectively separates the public and private areas. The administrative and community education components of the program are upstairs, out of the way, but still accessible. The adoption areas include a number of rooms that can be used for group housing of animals, including cat colony rooms and dog play rooms. Outside of the adoption area, a glass-enclosed play area has also been constructed.

Dumb Friends League's Douglas County Shelter and Animal Control Facility
Castle Rock, Colorado

This 13,000 square foot facility is representative of a simple, space-efficient, linear configuration that incorporates all of the essential functions. In designing the animal adoption facilities, an emphasis was placed on creating animal habitats that balance animal needs, market effectiveness, and space efficiency. Because of this facility's relatively small size, the still significant animal capacity, and the community education component of this plan, this shelter could become a model for how to build a space-efficient yet effective facility to service a smaller urban or suburban population center.

COMMUNITY EDUCATION ENTRY

STOR.

WOMEN

MEN

ADMIN. OFF.

COMMUNITY ED. CLASSROOM

KITCHEN

RAMP DOWN

VISIT #1

VISIT #2

VISIT #3

VISIT #4

PUPPY ADOPTION

INDOOR PLAY YARD / DOG ADOPTION

VEST.

CAT ADOPTION

SMALL MAMMAL

SURGERY PREP

RECOVERY

PACK PREP

GROOMING

SURGERY

ADOPTION ENTRY

RETAIL

ADOPTION DESK

WORK

SHELTER MANAGER

MECH. / ELECT.

T.

DOG EXAM

DOG HOLD

ACO MANAGER

LOST & FOUND DESK

FOOD PREP

CAT ISO

DOG ISO

EMPLOYEE

LOST & FOUND ENTRY

NIGHT DROP

WORK

SMALL MAMMAL

ACO OFFICES

VEST.

CAT HOLD

CAT EXAM

CAT L & F

LAUNDRY

LOST & FOUND

DOG HOLD

EUTHANASIA

DOG QUAR.

CAT QUAR.

ACO HOLDING

CAT

JC

MATL. HAND.

COOLER

GARAGE

Eagle County Animal Control Shelter, Eagle, Colorado

This relatively small and utilitarian shelter shares a number of key design components with the other larger facilities shown here. For example, the glass-fronted cat condo/adoption area is virtually identical to the cat adoption areas in the Nebraska shelter. It also includes a training, education, and conference room which is open to the public.
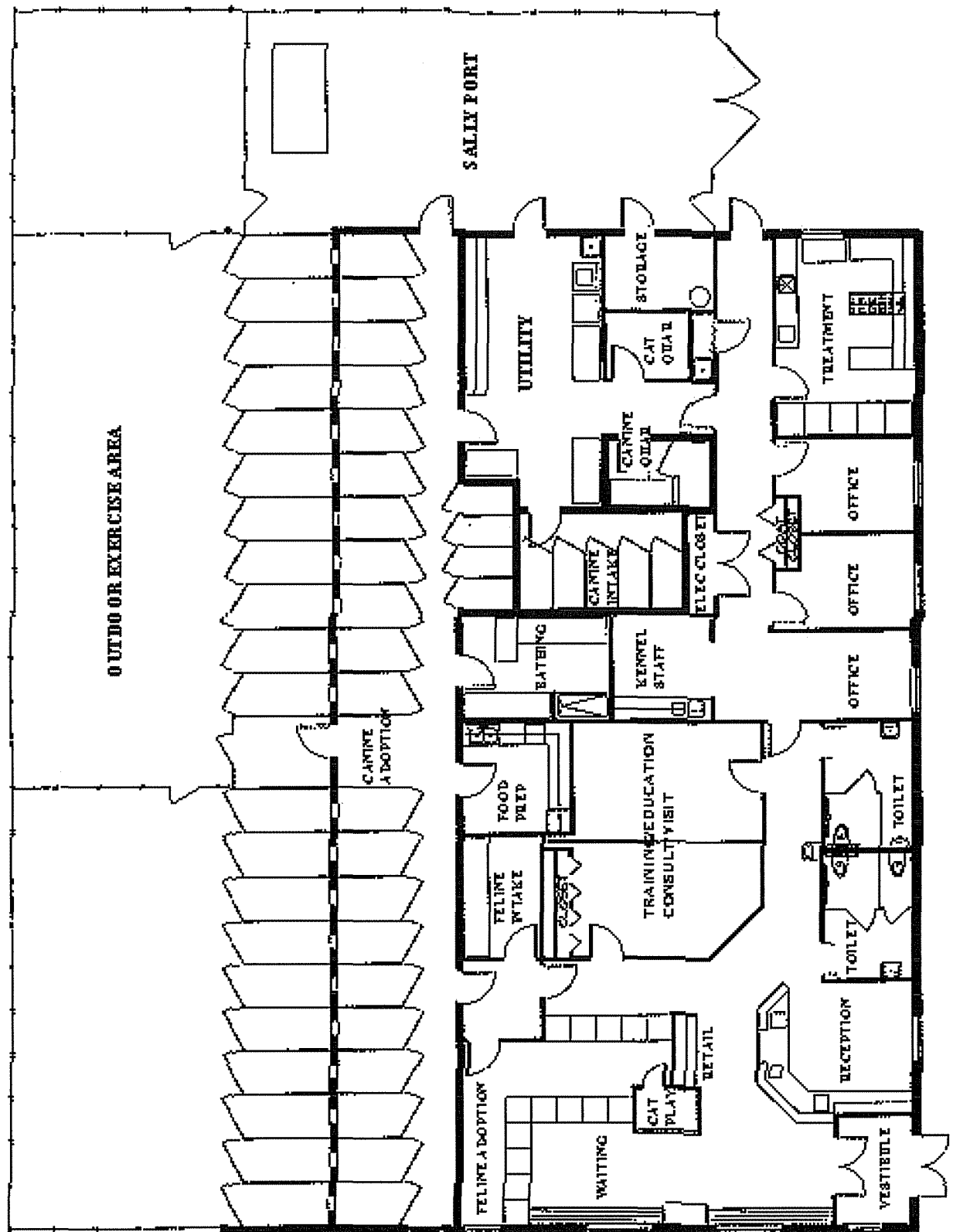
# Humane Society of the Pikes Peak Region, Colorado Springs, Colorado

(Diagram, page 82)

Because the new shelter was located on the same site as the original facility, it was necessary to phase the construction of this 46,000 square foot shelter. In phase one, the lobby and combined animal adoption and lost-and-found holding areas were constructed. In the second phase, the administrative, evaluation, program support, and building support functions followed. While a phased construction sequence is not ideal, this project proves that when necessary, it can be done.

In this facility, the public and private circulation areas are entirely separate and distinct, eliminating confusion and conflict. The shelter is built around the concept of glass-fronted, public atriums facing into the animal areas. In this way, the public can see the animals available for adoption without being in the same room with them. This concept was utilized in both the dog and cat adoption areas. Adoptable and lost-and-found animals are not separated. This allows the facility to be more flexible, because when lost-and-found animals finally become available, they have already had an opportunity to be seen, enhancing their chances for quicker adoption. The plan also features a dramatic and very visible cat play area as one of the first things you see as you approach the animal areas.

Western New England Medical Center for the Massachusetts Society for the Prevention of Cruelty to Animals, Springfield, Massachusetts

(Diagram, page 83)

This 45,000 square-foot facility combines a specialty referral veterinary medical facility with an animal shelter. While the shelter and the hospital operate as distinct and separate functions, they do share the use of the community education areas, administrative offices, and the entry lobby. In this way, they are able to eliminate the cost of duplicating these services. The shelter itself is a good example of how a plan can be simplified to minimize staff requirements and operational inefficiencies. The working areas of the shelter are all grouped around a utility and work area that is also the major circulation path through the shelter. The reception desk is placed to allow direct monitoring of the animals as well as public access into both the dog and cat adoption areas. The front lobby also features twin cat colony and play areas that provide both enticement and entertainment.
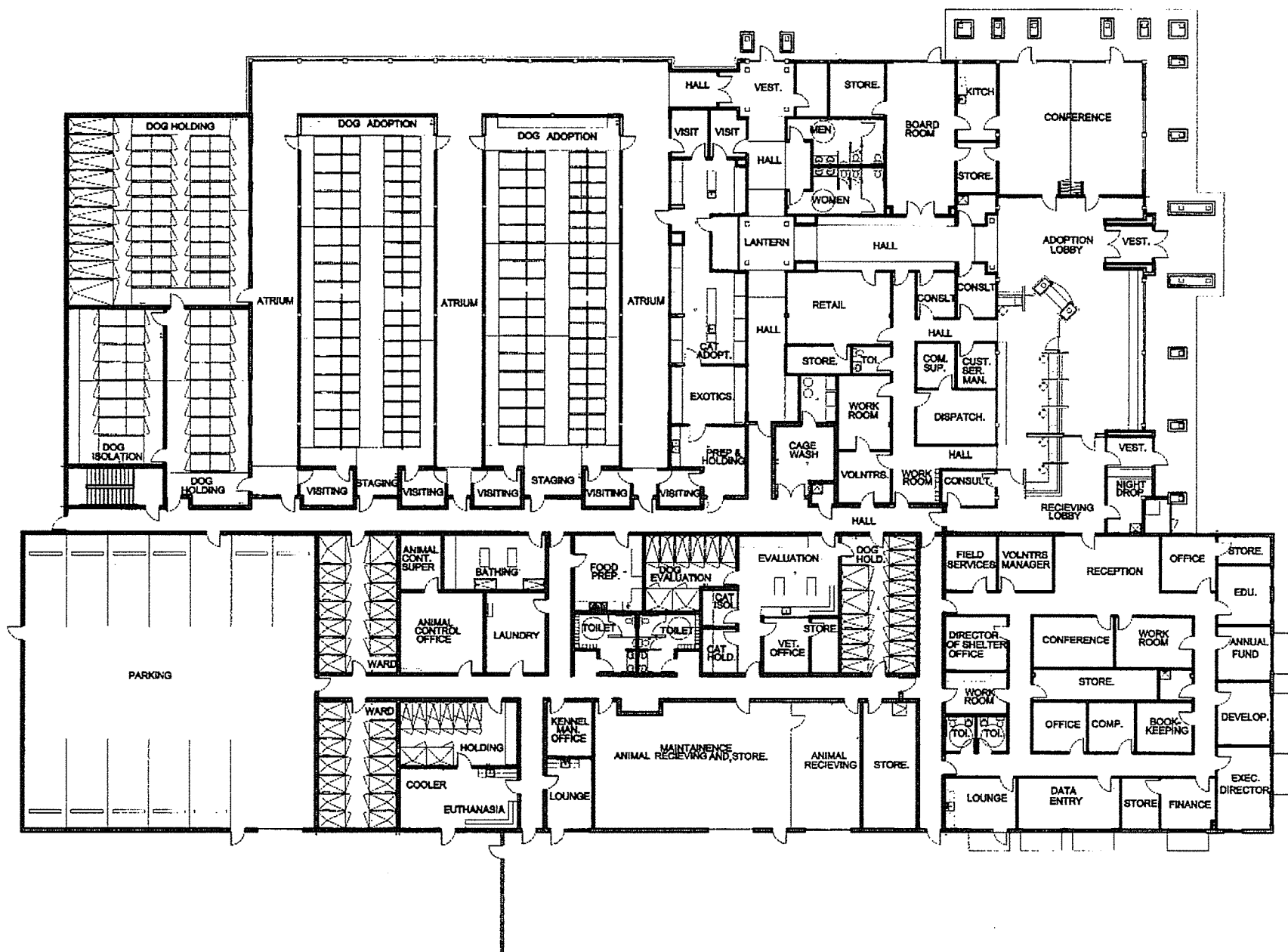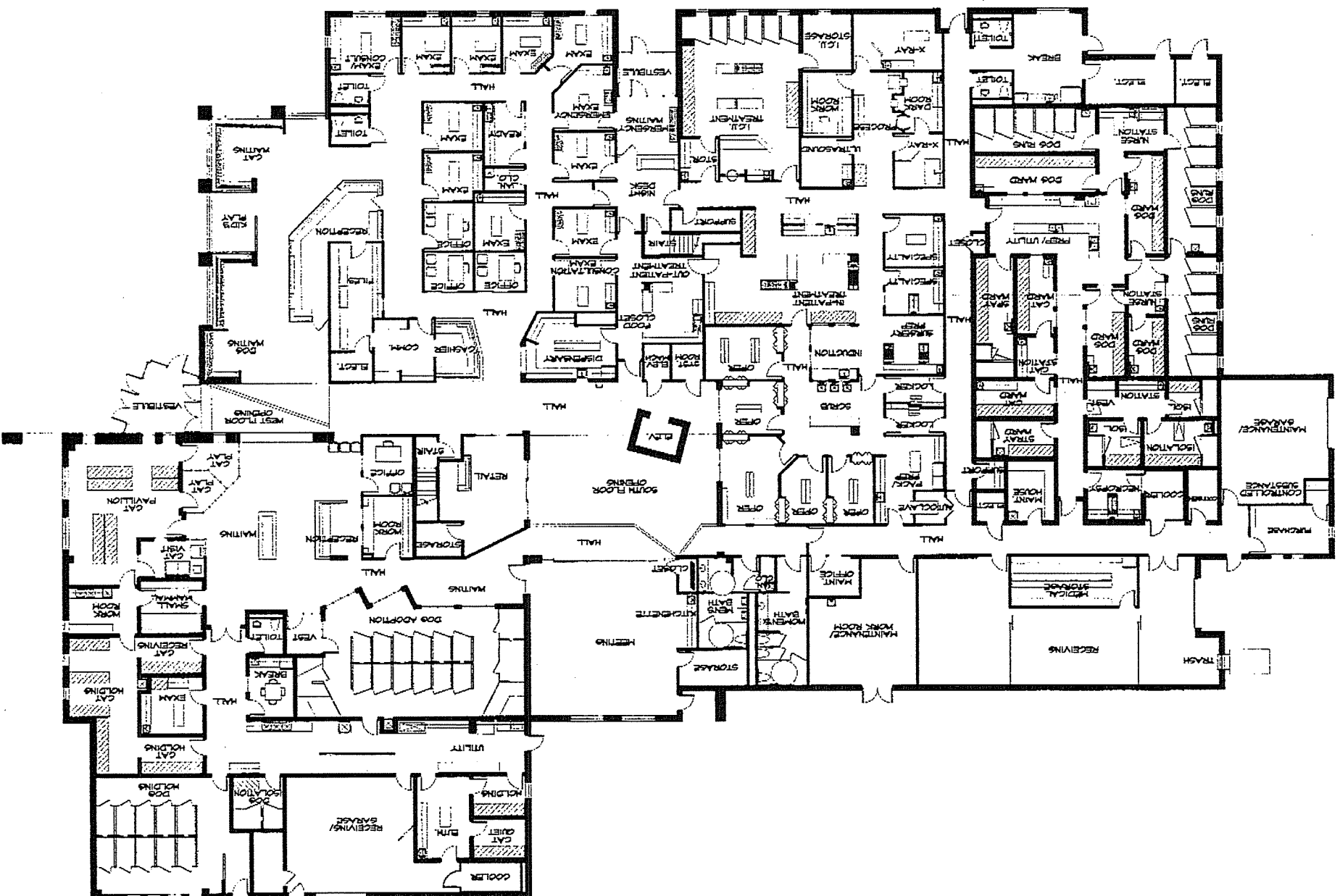
Nebraska Humane Society, Omaha, Nebraska

(Diagram, page 85)

Utilizing the shell of an existing 60,000 square-foot grocery warehouse building, a new and exciting state-of-the-art facility was constructed. While significantly larger than the Douglas County facility, this facility is linear in configuration. To the left of the plan is the lost-and-found lobby along with the animal receiving, processing, and support areas. To the right, the adoptable animals, retail, and community education facilities are arrayed around a generously-sized and skylit adoption lobby. Between the adoption and lost-and-found lobby, the shared administrative and evaluation areas are located. The dog adoption areas are particularly effective, because they are skylit and have large planting beds that screen the dogs from view of each other. As part of an emphasis on reaching out to the community, this facility includes a library/resource center, a small classroom, a conference center, and a dog obedience and training center.

Small Animal Shelter, Prototype

(Diagram, page 86)

Designed as a prototype for a small, rural animal control shelter, this facility incorporates the basic requirements of holding, separation, medical care, and adoption. Isolation and holding areas are provided for animals entering the facility along with a multiple-purpose examination/euthanasia room that will also serve for basic medical delivery. Adoption areas include a small "quiet room" for getting acquainted with potential adoptees, and separate cat, puppy, and dog adoption areas which help minimize stress for animals being held for longer periods of time.

EXERCISE YARD

PUPPIES

QUIET RM.

DOG ADOPTION/
IMPOUND

H.C. BATH

CAT
ADOPTION

FOOD PREP/
BATHING

MECH.

CAT ISO.

DOG ISO.

WAITING

RECEPTION

OFFICE

HOLDING

EXAM/ EUTH.

STORAGE