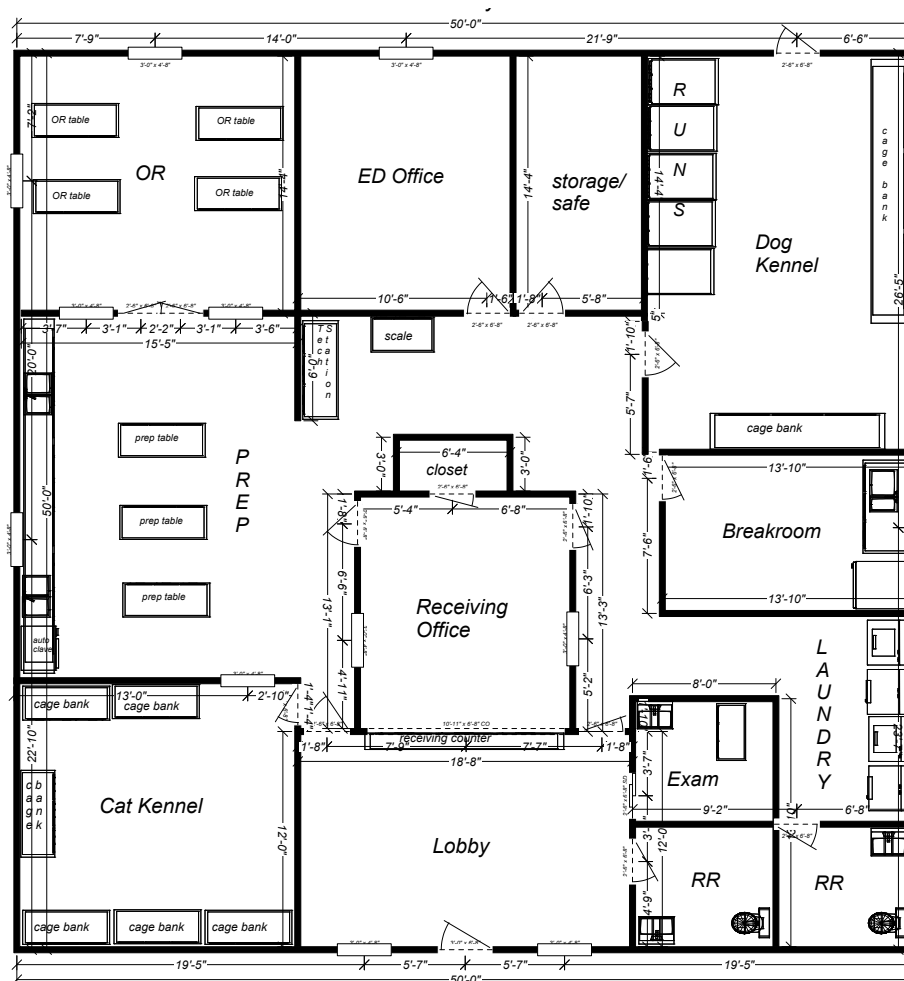


S/N Building & Equipment Resource Guide



Building Selection, Floor Plans, Remodeling, & Equipment Ideas
for High-Quality, High-Volume, Stationary Spay/Neuter Clinics

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Legal Disclaimer

This manual and the associated materials have been prepared as educational and informational material and should be used for information purposes only. They should not be considered legal advice or legal opinions on any specific matters. You should consult a consultant or attorney familiar with both federal and state legislation to assist you with any specific questions or issues. You are also advised to refer to current state and local publications to ensure your continuing compliance with state and local regulations. Please be sure to consult with your external consultants, legal counsel, or other experts prior to finalizing any decisions on policies and procedures in relation to the following.

Introduction

ASPCA Spay/Neuter Alliance (ASNA) is pleased to provide this resource guide for any organization in the process of remodeling and equipping a spay/neuter clinic.

A companion resource—the NSNRT *Equipment List*—is available on www.ASPCApro.org. Members of the ASNA's National Spay Neuter Response Team (NSNRT) will receive the same equipment list with the vendor prices included.

Building: Site Selection & Zoning

Considerations for Site Selection

- ▶ Accessibility—how easy will it be for your target public to get to your clinic? Is the location near a bus line (if applicable)?
- ▶ Safety—clinic should be in safe area for the public and your employees. You will have cash and controlled substances in the building.
- ▶ Transport—can your transport vehicle access highways and major roads?
- ▶ Other Vets—is the location too close to a private vet, possibly creating a conflict?
- ▶ Noise—will noise from the dogs be a nuisance to any connecting neighbors?
- ▶ Parking—do you have enough space to accommodate your percentage of public business? Remember that for next day release, you will have vehicle traffic for pick-up and new intake in a 1-1/2 hour window.

Zoning, Licensing & Inspections

You are responsible for researching and following any zoning, building code requirements and inspection requirements.

Thoroughly review your state's veterinary practice act:

- ▶ Who can own a vet practice? Some states require a vet own the practice.
- ▶ What inspections (from the state vet board) are needed prior to opening?
- ▶ Are there any requirements from the board that affect floor plan design, i.e., an exam room?
- ▶ Are there any special considerations as a spay/neuter facility? For example, in NC the clinic is considered a "limited service facility," and therefore must have a written agreement with a full service provider to offer services to our clients such as radiographs, blood chemistry, etc. This agreement must be publicly posted.
- ▶ What requirements are there regarding your policy for post-operative emergencies? This information must be posted in your lobby as well as provided on your voicemail.

Your city or state may require additional licensing such as a business/privilege license or drug/pharmacy license. The vet board may be able to advise on these issues.

The DEA has its own set of requirements. Your vet must obtain a DEA certificate from the Dept. of Justice. Your vet should also request DEA forms 222 as these are *required* to order morphine from your veterinary supplier.

State-level DEA departments may also have requirements. For example, NC requires a Controlled Substances Registration Certificate issued by the state Department of Health.

Building: Square Footage, Layout & Flow

Square Footage

We recommend 2,000 - 3,000 sq. ft for a 1-vet practice, and 3,500 - 5,000+ sq. ft. for a 2-vet practice. You should visit as many high-volume clinics as possible to see their floor plan and flow.

Layout Review

Note: The layout review is only available to members of the NSNRT.

ASNA for input and recommendations. Our recommendations will relate to flow for your clinic and compliance with the ASNA Veterinary Standards of Care. You will need to work with construction professionals to develop a complete set of construction plans and manage the renovations.

Flow

What do we mean by *flow*? Flow is the way patients, staff, and the public move through your building, during the intake/surgery/release process. Good clinic flow means less stress for the animals, less steps or repetition for your staff, and an efficient use of your clinic space.

Building: Ideal Floor Plans

This is a list of ideal components for a 1-Vet clinic:

ROOM	NEED TO HAVE	NICE TO HAVE	COMMENTS
Lobby	200-250 sq. feet is good for a 1-vet clinic with transport program. More needed for all-public schedule.	More sq. feet or divided lobby for dogs & cats. Separate door for aggressive dogs.	Consider clinic business - public vs. transport ratio. Lobby to accommodate check-in & release = up to 70 people in 1 hour for an all-public schedule on next day release. Also consider parking needs.
Reception	Counter & one desk	2-3 desks with phones/computers	Counter divides reception from lobby. 6' - 8' width allows for 2 lines of clients.
Exam	Required by most state's vet practice act. Exam table.	Sink - may be required also by practice act	Position next to lobby for convenience and to minimize exposure potential for sick animals. Can double as isolation when needed.
Restroom	Unisex bath that meets ADA specs	Second bath for staff, shower stall	Position one bath near lobby for client convenience.
Offices	ED or Mgr. private office	Private vet office	Good to have one extra office or workspace in reception for volunteers.
Laundry	1 W/D set. Pack laundry must be washed separately from kennel laundry	2+ W/D. Floor drain for mop buckets.	Residential or commercial machines. Laundry, packs and autoclave activities are often positioned near each other for efficiency. Can also use stackable W/D for pack laundry.
Pack Area	Sink, counter space	More counter space. Shelving	Sink to wash instruments & ultrasonic cleaner. Need counter space to assemble packs. Consider that autoclaves can generate extra heat when vented.
Prep	2 prep table, 2 anesthesia machine, counter space, sink.	Larger counter, extra storage space and double sink	250 sq ft good size for 1-vet practice. Double-lock drug safe in or near prep. Small phone/computer workstation. Refrigerator for meds. Good lighting and plenty of elec. outlets
Surgery	2 surgical tables + 2 anesthesia machines. Surgery is an enclosed room sep. from prep.	3 surgical tables + 3 anesthesia machines	Overall size: 250 sq feet. "Beach" is recovery mat, approx size: 6' x 4'. Good overhead lighting and plenty of elec. outlets. Surgery is adjacent to prep. Natural light is good and/or windows into prep.
Cat Room	Small exam table, 2 cage banks = 24 cages total	Extra space for supplies. Separate room for public vs. shelter cats	One 12-unit cage bank is 6' w x 5' 2" high. If cage banks face each other--must be at least 5' width apart to prevent disease spread. In-operable window is nice for added light.
Dog Room	Cage bank (17 cages) + 5 runs. Scale & small exam table.	Extra space for supplies. Separate room for public vs. shelter dogs	Cage bank is 14' long. Dog runs are 3' w x 4' d. If possible, position dog rooms where barking noise is minimal to surgery and cat rooms.
Other		Feral Room Break Room Isolation Hallways	Ideal to keep ferals separate from owned cats. Break room/lunch area for staff. Isolation cages somewhere in the bldg. Hallways used for moving carriers should be 4' wide

Building: Actual 1-Vet Clinic

5,000 sq. feet. Capacity 108+ cats and 39+ dogs. The extra cat capacity reflects the surgical demand in this part of the country.

Positive Aspects

Large lobby accommodates public appointments. Office space and storage, which some clinics lack. Large, open prep area outside OR.

“Perfect World” Changes

This clinic has all the items it needs.



Building: Actual 1-Vet Clinic

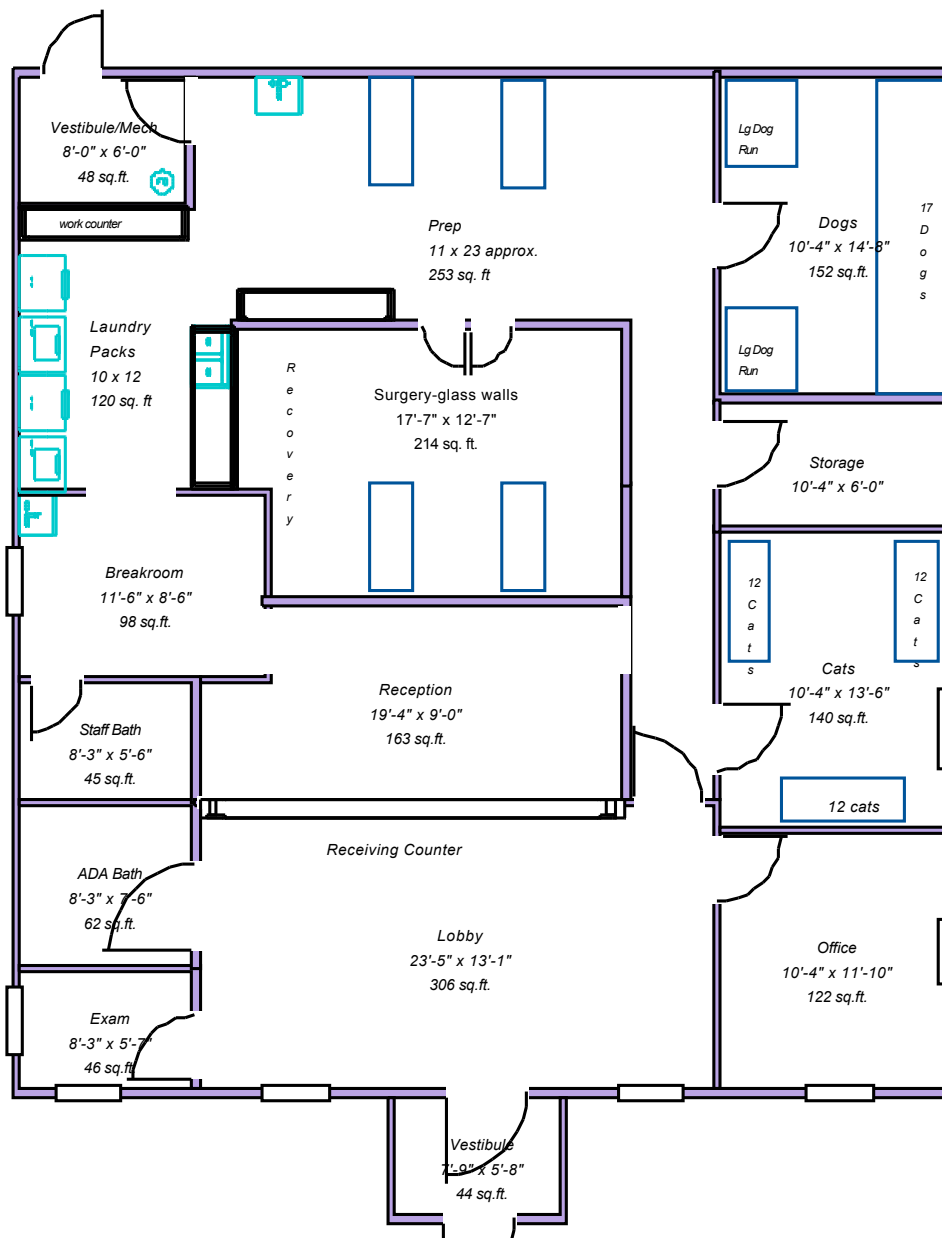
1,830 sq. ft. Capacity 36 cats and 19 dogs. This is a clinic built from scratch which is why the lesser square footage works. The extra cat capacity reflects the surgical demand in this part of the country.

Positive Aspects

Large lobby accommodates all public schedule. Natural light in cat kennel and glass walls (full and half walls) in surgery.

“Perfect World” Changes

Private office for veterinarian. More storage space



Building: Actual 2-Vet Clinic

2,500 sq. feet. Capacity: dogs 34; cats 72. Small, but efficient use of space.

Positive Aspects

Cats are away from dogs. Dogs are away from surgery (for noise). Transport can deliver dogs directly into kennel from back entrance. Community OR—both vets and staff can monitor beach and be aware of all aspects of flow.

“Perfect World” Changes

Separate space for feral cat kennel. Hallway between ED & Storage for transport to unload (so cats are not unloaded directly into dog kennel). More capacity for dog cages. Larger lobby (depends on public vs. transport). Isolation area. Laundry could be moved closer.



Renovations: Considerations

Please note: this is not an exhaustive list of considerations, but rather a FAQ summary

Flooring Materials

The flooring in your clinic must be non-porous (no carpet, wood). Options:

- ▶ Sealed Concrete:
 - ▶ Pros: Least expensive option.
 - ▶ Cons: Must be sealed yearly, leg fatigue for staff, slippery when wet, cleaning agents sometime react with sealer. Option to rough-up the surface to make less slippery.
- ▶ Commercial VCT Tile (Vinyl Composition Tile)
 - ▶ Pros: Relatively inexpensive, multiple color choices, very sturdy.
 - ▶ Cons: Must be stripped and re-sealed/waxed periodically. Multiple seams.
- ▶ Commercial Rolled Vinyl with heat sealed seams:
 - ▶ Pros: Moderately inexpensive, little maintenance. Purchase best quality you can afford.
 - ▶ Cons: Can stain, scratch, seams curl. Position floor seams away from high traffic areas.
- ▶ Epoxy:
 - ▶ Pro: Solid surface, any color, can add no-skid properties.
 - ▶ Cons: Very expensive; can scratch and dull surface; must be installed properly.
- ▶ Marble/Ceramic Tiles:
 - ▶ Pros: Nice aesthetics
 - ▶ Cons: Expense, slippery, multiple seams to maintain

Wall Coverings

Walls in prep, surgery and animal holding rooms should be able to withstand a moderate amount of water/scrubbing. While you will not be hosing the walls down, you will need to periodically deep clean.

- ▶ FRP (fiber reinforced plastic) panels can be installed over drywall. FRP is inexpensive but can scratch and has seams where panels adjoin.
- ▶ Glass—has the added benefit of visualization of flow.
- ▶ Epoxy Paint.

Placements of Surgical or Prep Tables

Most surgical tables are approximately 2' x 5'. Prep tables, depending on the style, are also 2' x 5'. When finalizing your remodeling plans, allow for at least 3' clearance for any walking patterns between tables (tables placed side by side) and a 4'- 5' central corridor if tables are placed on opposite walls. This provides good flow when staff is maneuvering larger dogs. Consider that anesthesia machines are at the head of the table (both surgery and prep)

and instrument trays at the foot of the table (surgery only). If the anesthesia machines are wall-mounted, the tables cannot sit flush to the wall due to the 6-8" clearance needed for the hoses.

Prep Table & Wet Table

Stainless prep tables can be purchased from restaurant supplier or your veterinary supplier (much less expensive from restaurant supplier). It is very nice to have prep tables with shelves underneath for extra storage. Wet tables are not needed for a spay/neuter clinic; they can be problematic to sanitize, a bit less stable for larger dogs and will be expensive to move if you want to reconfigure your prep area. It is a matter of preference and cost to install.

Surgical Lights

Calculate the location of your surgical light so that the electricians can correctly place the wiring. Lights are very heavy and must be mounted to the building frame so an extension rod is used to bring the lights to a useable level. Your contractor can determine the length of the extension rod to order with your from your equipment supplier. Specs for the surgical lights vary by brand/model, so verify with the manufacturer based on what you ordered. The standard equipment list calls for one surgical light which can be rotated/moved to direct light on each surgical table as needed. If you have the funds, you may choose to purchase a surgical light for each table.

Oxygen System

Contact a local oxygen supplier for pricing. Note that delivery and handling fees can add to your ongoing costs. Oxygen concentrators are an alternative to tanks but are more expensive to purchase. Verify that the pressure from the concentrator is high enough to support the vaporizer on your anesthesia machine. The standard pressure for tanked oxygen is 50 psi.

There are two types of oxygen tanks:

- ▶ “E” tanks are smaller tanks that hook directly to the anesthesia machines. These are less efficient; smaller tanks = more turnover = more deliveries. We suggest 6 at a time.
- ▶ “H” tanks are larger and more economical. We suggest 4 at a time.

You will purchase the oxygen lines and regulators from your supplier. It is often easier to also have the supplier install the lines to your tanks. You can set up the tanks in one of two ways:

- ▶ Place them all in prep or two in prep; two in surgery. Both H & E tanks should be held in a rack so there is no chance of them tipping over. Flexible hosing is then run to the anesthesia machines. You should check with your local building codes and veterinary practice act for allowable location of tanks and specific guidelines on type of hoses.
- ▶ House all your tanks in a central location and have the hoses/lines run to the anesthesia machines. If you choose to have central lines, the person who installs them must be licensed to do so (usually a plumber). Nice to have oxygen closet with exterior door so oxygen supplier can drop off tanks at anytime.

Autoclave

The autoclave on our equipment list requires a 220v outlet (see *right*). This machine weighs 175 lbs., is 20" H x 26" W x 35" D and comes with a metal stand. You may choose to place it on a counter instead. Different brands/models may have different plugs. The Tuttnauer 3870 is an x-large capacity (12-14 packs) with manual controls. ASNA has used this model for many years and found it to be reliable. Some clinics will also purchase a smaller model as a back-up.



Scavenger System

The scavenger is what exhausts the used anesthesia gas out of the building. The unit itself must be installed on an exterior wall for proper venting. Then your contractor (or a "handy-person") connects it to the anesthesia machines with PVC piping. Specific installation instructions are available from the mfg.

Doors

Order doors with windows whenever possible for good flow and safety. Where swinging doors are needed, "Eliaison" style is the best option. Do not use lever-style door handles on the inside of any animal holding rooms to prevent an animal that has escaped from its cage to enter other parts of the building

Floor Drains & Sinks

Sinks are needed in the prep area, in packs (for ultrasonic cleaner to drain and instrument cleaning) and perhaps in the exam room if required by your state practice act. Sinks are really not needed in the dog and cat kennels, but would be used if they were already there. A floor drain would be used in a utility/cleaning area to empty a mop bucket. Some organizations like to have drains in the animal holding areas but they are not a requirement and perhaps not worth the extra cost. There should be *no* drains or sinks in surgery.

Electrical Outlets

You should determine number and location of electrical outlets based on the equipment you will use in each room. Configure outlets based on your specific floor plan and equipment needs.

For example:

- Laundry/Pack Areas: Ultrasonic cleaner, Autoclave (220), Washer/Dryer outlets as needed
- Prep: Shop-vac, 1-2 clippers, microwave, baby-bottle warmers, rechargeable flashlight, pulse oximeters (battery-operated or electric), refrigerator, centrifuge, scale, extra prep lights (if overhead is insufficient), phone, computer
- Surgery: V-tray heaters, electric blanket (recovery mat), pulse oximeters (battery-operated or electric)

Equipment: Suppliers & Ordering

A few important notes about our equipment list and the ordering process:

- Anything on the equipment and consumables list with a √ must be in stock (or an equivalent item/quantity) on the first day you open;
- The equipment list shows all the items needed to open a clinic. We do not necessarily endorse each item as *the best*—only as a suggestion based on our experience. You are welcome to substitute depending on your vet's preference;
- Each January, we secure vendor quotes and are able to get discount pricing due to volume ordering. We send out a list with pricing that is available to all our NSNRT model clinics.
- Shipping charges are NOT reflected on the equipment list, as they vary widely;
- The *Miscellaneous* section on the equipment list are items available at WalMart, Office Max, Lowe's, etc. This is most of the miscellaneous items you will need, but there is no way for us to predict everything. You are also responsible for purchasing everything on the *Office Supply* section of the master list.
- You can purchase a microscope, or often you can get one donated. If donated, you will want one that has scanning power of 4x, 10x, and 40x;
- There are varying degrees of quality when it comes to surgical instruments. Indian/Pakistani are the cheapest and usually fine for towel clamps and spay hooks. A German mid-quality is good for thumb forceps, carmalts, criles and hemostats. A smart investment of instrument dollars will be with top quality needle holders and scissors. High-quality needle holders often have tungsten-carbide tips that can be replaced once worn. Check with your vet for their preferences.
- Once you have ordered your equipment and have delivery dates (cages, surgical tables, and autoclave often take the longest), then contact us to schedule your training. We cannot put your training on the calendar until you have ordered your equipment;
- If you are applying to the ASPCA for an equipment grant:
 - ▶ Make sure the equipment list is customized to your needs. Do not simply attach the standard list and then order different things;
 - ▶ Submit your grant at the point that your renovations are underway AND you anticipate opening within 6 months. Turnaround for the grant is usually two months;

Controlled Substances & the DEA

To order morphine, your vet must have their DEA registration with your clinic address, and must use a completed form 222. You will not be able to buy or transfer morphine from another practice. Your vet is responsible for the accounting (drug log) of all controlled substances ordered with their vet license number. If for any reason, the vet leaves your employ, the drugs remain in their possession regardless of who purchased them.

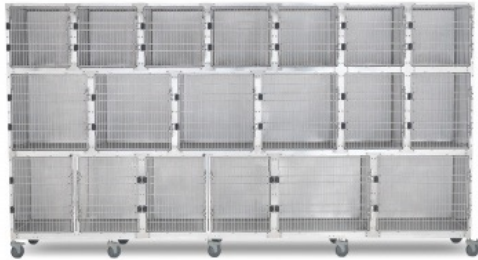
Rabies Tags

Rabies tags can be obtained from your consumable supplier of choice. Some states have generic ones from the epidemiology departments, but they would not display your clinic name/phone, and therefore are harder to trace.

Dog & Cat Cages

Cages and runs require assembly—it can often take 6+ hours. The manufacturers can provide technical support but are closed on weekends/holidays. The standard cage order on the ASNA equipment list:

- Dogs: 14' foot bank (17 cages)
- Dogs: 3-5 dog runs
- Cats: 18" x 18" cages. 24 total



17-Unit Dog Cage Bank (Standard Order)

Top row (7) 24x24 cages
 Middle row (4) 30x30 cages + (2) 24 x 30
 Bottom row (2) 36 x 30 + (2) 48 x 30 (double-doors)

Overall: 14' wide x 28" deep x 7' 8" high (including base)

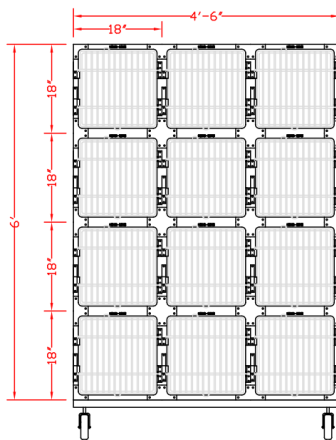


3' x 4' Dog Runs

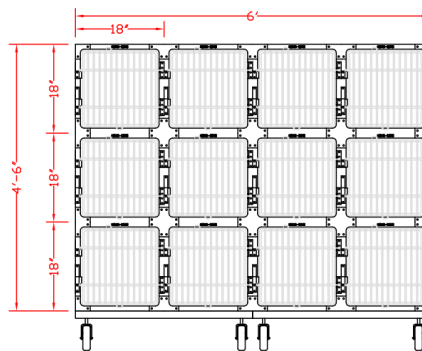
Standard equipment order is for five dog runs but some clinics will order less due to space constraints. ASNA uses runs which are raised off the floor (solid bottom) and do not have drains.

Other brands of runs sit directly on your floor and must have caulk around the bottom to prevent cross-contamination. Frequent re-caulking will be needed.

Runs can be grouped together or separately. If configured separately, be sure to account for extra needed side panels.



Configuration 1



Configuration 2

Cat Cages:

The standard order is for 24 cages. Select the configuration based on available wall space; keeping in mind that with *configuration 1*, it can be difficult to visualize the cats and get them in/out.



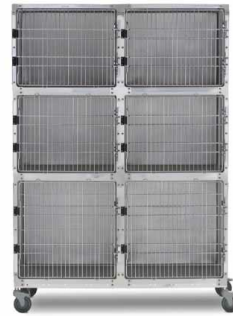
If you are remodeling your kennel rooms or building from scratch, consider recessing both dog and cat cages for less cleaning and no nooks where an escaped cat could hide. You can also elevate the cages on a platform so the bottom row is slightly higher.

Additional Cage Bank Sizes & Options

5-Foot Cages:



Top Row: 2 - 30''W x 30''H
Bottom Row: 2 - 30''W x 30''H



Top Row: 2 - 30''W x 24''H
Middle Row: 2 - 30''W x 24''H
Bottom Row: 1 - 30''W x 30''H DD

6-Foot Cages:



Top Row: 3 - 24''W x 30''H
Bottom Row: 2 - 36''W x 30''H



Top Row: 2 - 36''W x 30''H
Bottom Row: 1 - 72''W x 36''H DD

7-Foot Cages:



Top Row: 2 - 30''W x 30''H, 1 - 24''W x 30''H
Bottom Row: 1 - 48''W x 30''H DD, 1 - 36''W x 30''H



Top Row: 2 - 30''W x 30''H, 1 - 24''W x 30''H
Bottom Row: 1 - 36''W x 30''H, 2 - 24 x 30''H

8-Foot Cages:



Top Row: 4 - 24''W x 24''H
Bottom Row: 2 - 36''W x 30''H, 1 - 24''W x 30''H



Top Row: 4 - 24''W x 24''H
Middle Row: 2 - 36''W x 30''H, 1 - 24''W x 30''H
Bottom Row: 2 - 48''W x 30''H DD

9-Foot Cages:



Top Row: 3 - 36''W x 30''H
Bottom Row: 1 - 72''W x 36''H DD, 1 - 36''W x 36''H



Top Row: 2 - 30''W x 24''H, 2 - 24''W x 24''H
Middle Row: 2 - 30''W x 24''H, 2 - 24''W x 24''H
Bottom Row: 3 - 36''W x 30''H

Oxygen Concentrators for the HQHVSN Setting

Recently, oxygen concentrators have become very popular among the high-quality, high-volume spay/neuter (HQHVSN) clinic community. As an alternative to oxygen tanks, they provide convenience, reliability, increased safety benefits and overall cost-savings.

Below are several scenario considerations (with a comparison chart between oxygen concentrators and oxygen tanks overleaf) to help clinics when deciding which option might work best for them, and ensure the safety of their patients and staff:

Clinic Scenario #1: Limited Clinic Space & Unreliable Source of Bottled Oxygen

- If a clinic has limited space and can only handle a few oxygen bottles at a time, or if there are struggles with a vendor who constantly reschedules deliveries, an oxygen concentrator can be a very convenient alternative in providing oxygen on demand.
- Oxygen tanks are very dangerous to transport around the clinic and take up valuable space for secure and safe storage.
- Newer model oxygen concentrators are mobile and fit underneath anesthesia machines, which helps when space is at a premium. However, clinics should note that it will still be necessary to keep a few E-tanks onsite for backup purposes, and adequate storage for these should therefore be considered.

Clinic Scenario #2: Primarily Performs Spay/Neuter Surgeries with Limited Wellness

- Limited service clinics most likely only require a few individual oxygen concentrators.
- Full-service shelters or public clinics with oxygen recovery cages, ventilators (most ventilators require 35-65 psi for operation), and over four anesthesia machines should consider a larger investment. These clinics could purchase a centralized oxygen concentrator or, alternatively, use both bottled oxygen and oxygen concentrators.
- Released from the continual purchase of oxygen tanks, the return on investment for clinics using individual oxygen concentrators is typically one or two years.
- The centralized units are more expensive, with specialized needs.

Clinic Scenario #3: Teams with No Experience Using Oxygen Concentrators

- There is a learning curve to the safe operation of oxygen concentrators.
- Official channels are required to retrofit an oxygen concentrator to an existing anesthesia machine; it is not something clinics can choose to do themselves:
 - A certified technician is required to retrofit an oxygen concentrator to an existing anesthesia machine.
 - Certified technicians must also meet with staff to review the manufacturer's requirements for operation and the effects of working with lower oxygen flow rates to properly provide safe anesthesia.
- As such, consider purchasing newer models of anesthesia machines, which are available with both oxygen sources attached (oxygen concentrators and backup E-tanks), to provide safe and effective anesthesia.

Category	Oxygen Tank		Oxygen Concentrator	
	Pro	Con	Pro	Con
Expense	Cheaper start-up	Less cost-efficient, needs refills	More cost-efficient	More expensive start-up
Maintenance Requirements	Pure O ₂ is cleaner, so less wear & tear on vaporizer	-	-	Does not filter all debris from air, causing carbon build-up in vaporizer, requiring more frequent maintenance
	Check manifold, regulator & all fittings/hose connections for leaks every 1-2 weeks	-	-	Weekly cleaning of filter & vacuum exhaust vents; check for leaks in O ₂ hose & outlet connections weekly
Continuous Flow of O ₂	No electricity required	Limited amount of O ₂ (full E-tank provides ~5 hours of O ₂ at a flow rate of 2 LPM)	Infinite amount of O ₂	Requires electricity or batteries/ backup generator or E-tank
Adequate O ₂ Source	Regulated to ensure 99-100% O ₂ purity in each tank	-	-	Requires O ₂ monitor to ensure producing adequate O ₂ (typically produces high 80s-95% O ₂ purity)
Noise Level	Quiet	-	-	Loud
Heat Level	No effect on ambient environmental conditions	-	-	Generates heat & could be more taxing on AC equipment & electricity
Built-in Alarms	-	No - must watch tank gauge (alarms can be purchased at extra cost for most tank sizes)	Yes	-
Reliability	Certified & guaranteed O ₂ source	Highly-regulated	Safer, not regulated	Must follow manufacturer's recommendations to ensure adequate O ₂ produced
Storage/ Transport	-	Requires special storage/ transport conditions due to explosive fire hazard	No special requirements for storage/transport	-
Portability	Lighter E-tanks are portable	Awkward transport of tanks - drop hazard	Safe individual units, compact, fit under anesthesia machine	Requires power source
Exhausting (via Scavenger System)	Can turn O ₂ off, minimizing anesthetic gas exposure	-	-	Required to keep running, so potential for more anesthetic gas exposure
Flushing Ability	Quick & effective flushing ability for emergencies	-	-	Poor without backup E-tank (if 2 or more anesthesia machines are connected to same portable concentrator & one of the machines uses quick flush, 2 nd machine experiences a temporary loss of O ₂ flow)
Pressure	Distance from machine not an issue with high-pressure hoses	H-tanks require specialized high-pressure hoses	Individual units with direct contact to anesthetic machine	Loses pressure with longer distance designated tube length allowed for each machine to maintain efficacy
Sodasorb Maintenance (same for both)	One E-tank per machine; centralized H-tanks can provide O ₂ for many systems	Vaporizer only turned on when patient hooked up	Vaporizer only turned on when patient hooked up	O ₂ flow on constantly
Compatibility with Anesthesia Machines	Anesthesia machines are manufactured to receive pressurized O ₂ at 50 psi	-	Retrofit possible/newer models available with concentrator & E-tank attached, with auxiliary switch to change systems as needed (flush/power failure)	Requires certified technician to retrofit concentrator to existing anesthesia machine, as pressure is lower (20 psi)
Training	Staff experienced & well-trained on using E-tanks with anesthesia machines to proper anesthesia	-	-	Staff require re-training on operating with different O ₂ flow rates to provide proper anesthesia