COMMISSARY DESIGN: A TALE OF TWO COMMISSARIES

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"It [is] the best of times, it [is] the worst of times," to paraphrase Charles Dickens. Designing a commissary is one of the most important and long lasting effects a commissary manager and/or nutritionist can have on a nutrition program. While specific details will vary by institution and by program, the basic considerations are similar. Experiences during planning and construction at Dallas Zoo and Virginia Zoo will provide practical examples of some of those considerations.

Through the design (and/or renovation) process, it is important to invest time and effort to review the technical drawings at each phase of the project. Although commissary managers and nutritionists are not architects, engineers, nor construction managers, in many cases the most valuable contribution is an eye for detail and a clear knowledge of the "end goal." Given the current financial situation faced by most zoos, "value engineering" or the reduction of cost by the reduction of the project size or scope, is a fact of life. A new commissary facility (and/or a renovation) is likely a once in a career event for most, and due effort should be invested to ensure the final product is workable for present and projects future operations.

Site location and budget will most likely be determined by your institution and will set basic parameters for construction (how much space is available, funds available, etc).

Dallas Zoo: The William M. Beecherl Animal Nutrition Center (ANC) at the Dallas Zoo (Figure 1) is located in what is becoming the Service Center Complex that will eventually house trades shops, facilities offices, and the warehouse in addition to the Nutrition Center. The final budget was $1.4 million, funded by a large bequest from the late William M. Beecherl and a generous grant from The Eugene McDermott Foundation. The facility is designed to handle the diets for the roughly 2000 animals at the Dallas Zoo and the 8100 animals at the Dallas Aquarium at Fair Park.

Virginia Zoo: The Zoo designed and built a combined veterinary hospital and commissary, called the Animal Wellness Campus. The budget for the total project was $4 million, with most of the funds coming from the City of Norfolk. The commissary portion of this project budget was $1.1 million (Figure 2). The facility is designed for food storage and diet preparation for a collection of 500 animals.

The design of the interior of the building is where much of the interaction with architects and builders will occur. Storage needs, work spaces, materials flow, food safety, staff safety and public visibility impact the design of each individual facility. Most architect and builders experience new commissary facilities as infrequently as zoo staff, so it is through these interactions that the true needs of the facility can be related.

Storage Space

The need for storage space (and the amount of space needed) will be based on whether the operation is centralized or de-centralized, and the prevailing purchasing strategy (smaller purchases vs. larger purchases). However, the utility of planning adequate storage space can also influence the future purchasing strategy in the same way, and lead to cost savings (ample space for bulk purchases at lower costs can offset cost for increased space).

Dry Food Storage. If the animal collection plan is defined, project ahead for collection growth (via storage space) as accurately as possible. If not, examine average product usage and plan to be able to store a 6 month stock of each reasonably held item. This is especially true for bagged feeds where most are rarely stored for more than 3- 4 months. Floor space can be maximized by installation of a warehouse style racking system with 2 or more levels of pallet storage, if ceiling height allows. The design of the racking system will determine the type of equipment you will need to handle the materials. Height and turning radius of the equipment should be considered as this area is planned. Allow space for smaller or canned dry items or containers of open feed on shelves. Determine whether you want grocery items and small dry items like supplements stored in the large dry feed area or in a separate room. Will you be weighing feed in this room? If so allow space for tables and electrical for scales. Do not forget to plan for an additional 6 inches of space around the edges of the room for air flow (at minimum).

Dallas Zoo: There was no long-range collection plan to enable estimation of future needs, however a recent large exhibit addition essentially doubled the quantity of food used. That number was doubled, given that there remains room to expand and add exhibits on zoo grounds. This created a 1900 square foot area with two levels of racking allowing storage of 72 pallets of feed. Flexibility of the space was increased by allowing placement of pallets directly on the floor as opposed to on a lower deck of the racking system. Aisle space was limited, so a straddle "walkie stacker" was the best option for handling pallets. Open bags of feed are stored in containers on shelves. Since opening, a table and scales have been added for weighing in this room. Small grocery items and vitamins are stored in a separate storage room.

Virginia Zoo: The dry goods storage room (279 square feet) was designed to hold 10 pallets, single stacked, directly on the floor. There is a double door (6' wide, 7 feet 10 inches tall) that opens onto the 60' long loading dock, to allow ease of unloading trucks into the room via a pallet jack. The inside door opens into the main kitchen area, to allow product flow. Small grocery items, vitamins, formulas, etc are stored in a separate room.

Cooler. Consider the quantity of produce used weekly as well as the number of deliveries per week preferred. Is space needed for browse? Will meat, fish and prey items be thawed in the same space as produce or in a separate cooler? Is storage space necessary for prepared diets? How much space is needed for pre-processed items used in diets such as fruit or greens mixes? Account for storage space of current quantities, then include the long-term collection plan if that information is available. Factor in any alterations in use of containers for diet preparation and delivery.

Dallas Zoo: In addition to the cooler, a 250 square feet thaw room adjoins the freezer. This doubled the amount of cooler space (584 square feet total) available compared to the previous facility. Meat, fish and prey items are thawed on wheeled carts designed for bread racks which allow for proper rotation as well as easy movement in and out of the thaw room.

Plastic flip top containers are used for each animal area's prepared diets in place of the reused produce boxes previously employed for the purpose.

Virginia Zoo: A single cooler of 182 square feet was placed with both inside and outside door access (one door to loading dock, one door to inside hallway) to allow ease of product flow. Meat thaw will be kept physically separate from produce in the same physical space by storing meat on carts or speed racks. In this way the product can be easily moved into and out of the cooler (from the freezer) for use, cleaning, and sanitation.

Freezer. As with dry storage, length of time between deliveries must be considered. Whether items will remain palletized or will be stored on shelves or in wheeled bins must also be thought out. Accessibility to the freezer should be considered (do you have to navigate through the inside of the building to get to the freezer or is there ready outside access). If there is outside access, is there a provision in place to maintain internal temperature when the door is opened?

Dallas Zoo: The facility allows storage of three months of each of all fish and meat items (850 square feet), however orders are timed so a six month supply can be shipped. This provides for saving on freight as well as consolidating staff time needed for unloading.

Virginia Zoo: The facility was designed such that the freezers and cooler space have both inside and outside (to the loading dock) access doors. This readily allows loading into and unloading out of these areas. The facility has two freezers (each 182 square feet). Each should allow a combination of between 5-10 pallets of frozen goods, plus additional frozen storage of items on racks. The condensing units for the equipment are conveniently staged on the dock.

Other. Consider space for infrequently used equipment or enrichment items. Include space for storage of operating and cleaning supplies. Based on whether the operation is centralized or de-centralized, container storage space can be a consideration.

Dallas Zoo: There is a designated location for storing and charging the walkie stacker. Infrequently used items for enrichment projects are stored in a designated location. A utility closet with mop sink allows for cleaning supply storage.

Virginia Zoo: A 163 square foot room allows for storage of dry and canned goods, containers, and other items. It has one access door to the main corridor of the space, and the room is outfitted with a rack system to allow variable use of space.

Work Space

Kitchen. The number of diets prepared and work stations needed will drive the design. Centralized with many small diets or simply portioning large amounts? Will your preferred equipment be large enough to sit on the floor or do you need to plan counter space for them? Do you need scales for each work station on floor or counter (and what capacity scales are most useful in the area)? How will you manage the ingredients for each diet? Do you want shelves under work tables? How will diets be packaged and transported (plastic bags, paper bags, containers)? Do you want sinks near each work station or is along the wall sufficient? How many sink compartments are needed to manage your sanitation program? Allow room for growth and plan with the ability to be flexible in positioning of work stations if possible. Do you plan on using computers or touch screens for diets either now or at a later date? Include cabling or the ability to add this cabling as the building is constructed. You can almost never have too many GFCI outlets.

Dallas Zoo: The prep kitchen is 1500 square feet, nearly triple the size of the previous facility. A back to back E design was chosen where a large sink separates the work areas on each side. The end table of each of the main work stations has the ability to be moved, allowing flexibility in the coming years. In addition to those four work stations, there are 3 other areas where staff can prepare food.

Virginia Zoo: The prep area is 336 square feet. The main working surface runs around the outer perimeter of the room, with one main table in the center. A sink (handwashing) is also contained on the perimeter. The perimeter space also includes a stove for cooking items. Because the space was designed to be viewed by the public, several large windows run the length of the prep kitchen. The activities in the space will be interpreted for the public.

Staff. Office space needed will depend on whether the commissary manager / nutritionist is housed in the building or has an office located elsewhere. Supervisory staff should be housed in the building. If possible, provide desk space for staff to work on projects and access computers. Break and meeting space should also be planned. A lobby or entry is helpful since it prevents visitors from walking directly into food areas. If a laboratory is part of the facility, proper separation of that part of the operation from the food handling portion must be considered.

Dallas Zoo: Prior to construction of the ANC, office space consisted of a computer in the diet prep area. The supervisor now has a separate office with computer and the keepers have 3 desks with a single computer. All computers access a shared server. A break room with a basic kitchen and table for meetings completes the staff space. Staff space totals 550 square feet.

Virginia Zoo: Over 100 square feet of office space is included just off the main food prep area for the manager and staff. This allows proximity to not only the daily operation, but also to the main corridor leading from the dock (shipping and receiving purposes).

Materials flow

Receiving. The dock should allow for both semis and smaller trucks to back up, so a dock leveler is strongly recommended. Ensure sufficient space for large trucks to turn around and back in. Ensure the dock is of sufficient size (length and width) to allow manipulation of loaded pallets. A covered dock allows food to be received in any weather without exposing it to the elements. An indoor receiving area allows for staging of large deliveries. Hallways and doors should be wide enough to safely accommodate pallet jacks, if full pallets will be moved through the building. Height of doorways should be ample to allow clearance of pallets, forklifts, and other equipment.

Dallas Zoo: Two dock levels allow semis and smaller trucks separate spaces. A covered dock area can be utilized quickly if needed. Indoor receiving (732 square feet) allows staging of both incoming products and outgoing diets.

Virginia Zoo: There is over 100 linear feet of total dock space along two sides of the building. The loading dock is 60 feet long and spans the entire back of the commissary space. It includes door access to the dry feed storage area, both freezers, the cooler and the main entrance corridor. A second point of egress is located along the perpendicular side of the building, with immediate access to the main corridor and dishwashing room.

Accessibility. Your design should include direct access off the dock to storage or ensure hallways are wide enough to accommodate pallets. Ensure doorways are wide enough to accommodate a loaded pallet with room on each side for overhanging boxes or bags, and above clearance.

Dallas Zoo: Doorways and hallways are 5-7 ft wide to allow pallets that are stacked with product over the pallet itself to fit, a feature lacking in the previous facility. Space is provided in the prep kitchen to allow a loaded pallet jack or stacker to turn 90 degrees and move directly from the dock into the freezer without impacting operations.

Virginia Zoo: The main corridor of the commissary is in a "L" shape, that allows movement through the building from both outside service doors. The freezers, cooler, and dry feed storage area have both inside and outside access (doors at opposite ends). The outside access doors are equipped with plastic curtains to maintain temperatures, minimize condensation, and minimize pests when the doors are being used.

Diets. Flow of prepared diets should be assessed. Do you deliver or do keepers pick up diets? How do you load vehicles? How will you handle containers returning from animal areas? Place dishwashing area so you do not bring dirty dishes through prep area. If you have a dishwashing machine and/or will have a high humidity dish space, consider a special ventilation system to make this space workable.

Dallas Zoo: Nutrition keepers deliver diets to the door of each animal area daily and pick up used containers. Used containers go from the delivery vehicle into the dish room located directly off the dock.

Virginia Zoo: The keepers pick up their diets and drop off their empty dishes at the commissary daily. Containers that are returned to the commissary are processed in the dishwashing room before being returned to service.

Food Safety

Whenever possible, proteins should be thawed separately from produce. Ideally, a separate work station and utensils for meat, fish, prey items should be provided. Work stations should have impermeable surfaces. Floors should be coved where they meet the wall, and have a continuous surface with no cracks or breaks to allow accumulation of debris. Floors should be able to be washed and have proper drainage. Walls should be washable. Proper consideration should be given to the method of sanitation used for containers and food prep utensils. If no dishwasher is to be included in the facility, a 3 compartment sink or sinks should be included for proper manual sanitation. A plan for pest control should be implemented as soon as the building is occupied.

Dallas Zoo: A separate table and sinks are utilized for meat, fish and prey related diets. Work tables are stainless steel. In the food prep area and dish room floors are poured concrete covered with a slip resistant polymer coating. Walls are Fiber-reinforced plastic (FRP) panels.

Virginia Zoo: There are 4 different food preparation table areas included in the main kitchen space, so preparation of meat, fish, and produce can all be managed separately (with separate utensils). All surfaces are stainless steel for easy disinfection. The floor is poured concrete with an epoxy surface and three layers of urethane finish to provide an impermeable finish that is easy to clean. Where the floor meets the wall, the epoxy and urethane is extended 4" up the wall to provide a sealed finish. Just inside the main entrance door is the dishwashing room. Cleaning of all utensils and food dishes is accomplished using an industrial dishwashing

machine. It also is set up with a three bottom sink to allow for cleaning, rinsing and sanitizing within the same space and also allows for cleaning of dishes from animals areas prior to entry into the main food prep area. A special vent system in this room allows for humidity control, and drains in the floor allow it to be cleaned top to bottom.

Staff Safety

Slip/fall hazards, proper equipment for moving loaded pallets and efficient movement of packaged food items both into and out of all areas should be assessed during the building process to ensure keeper safety during daily operations.

Visibility

The ability for the public to view your operation will impact the design. What are management expectations? Are there things you do not want public to see or areas you want to feature? Should there be planned displays or activities at certain times?

Dallas Zoo: Visibility is through guided tours only. A large window in the lobby looks over the kitchen for waiting guests.

Virginia Zoo: Because the entire Animal Wellness Campus is visible to the public from the outside, windows are positioned to allow the visitors to watch the operation. The operations in the commissary will be interpreted via signage as well as audio/visual monitor displays.

Budget Realities

More than likely budget revisions will be part of the building experience. Think creatively. Equipment can be rented through a separate company and the cost spread out over several years if there is not adequate immediate funding. Donors can be found for big (and small) items or included in a fund, which allows flexibility. Office furniture can be expensive, so look at discount and assemble it yourself stores.

Conclusions

For both zoos used as examples in this paper, these projects created far better spaces than either had previously. Each institution's experience is going to be different and have its own set of challenges. Involvement in the planning and design process is key to meeting the needs of your operation, as is constant monitoring during the construction process. Not every zoo will have a chance to create a new commissary during the careers of many of their staff, and if the opportunity arises, a once in a lifetime approach can be a useful tool.

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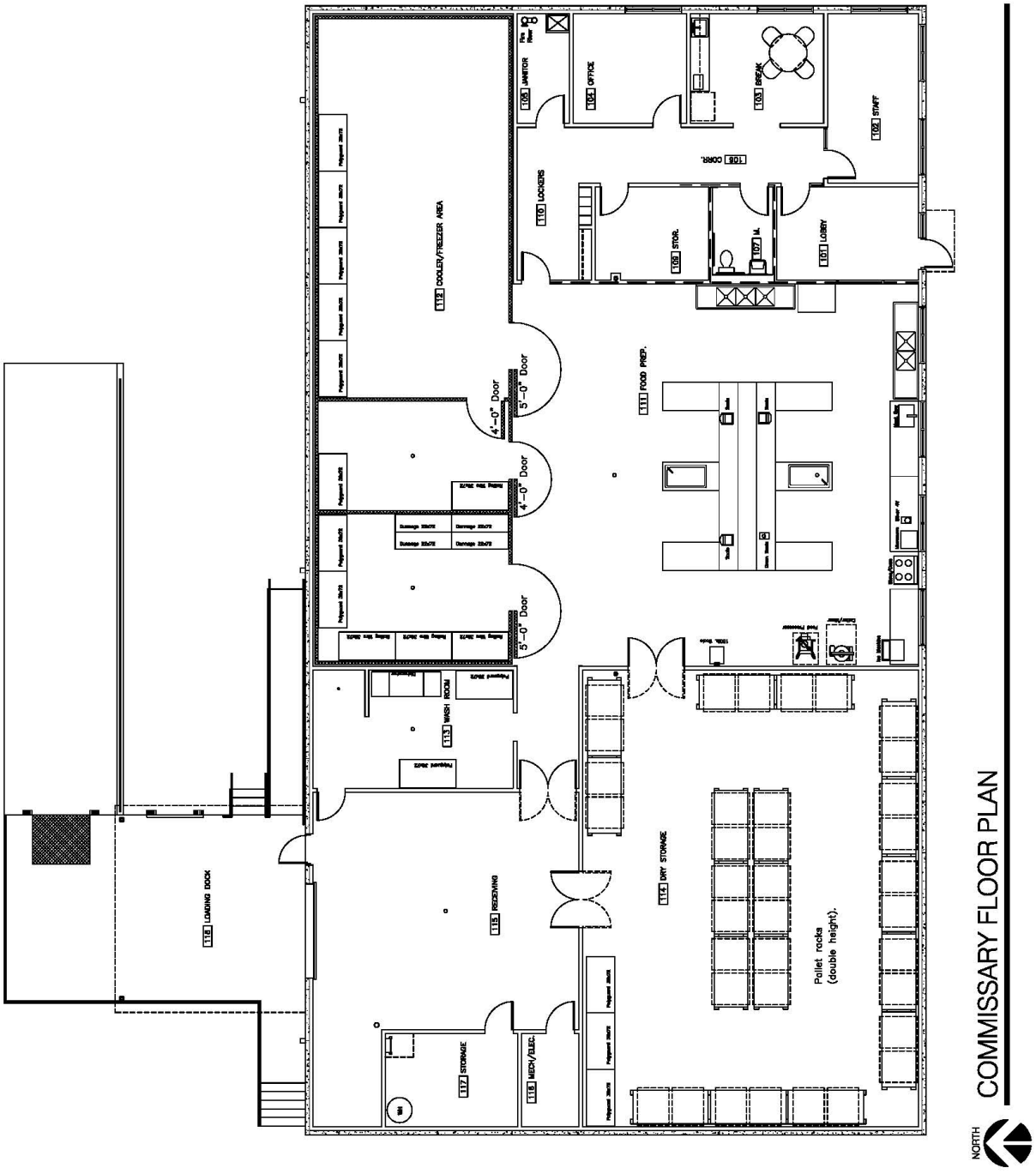

Figure 1. Floor plan of the William M. Beecherl Animal Nutrition Center at the Dallas Zoo.

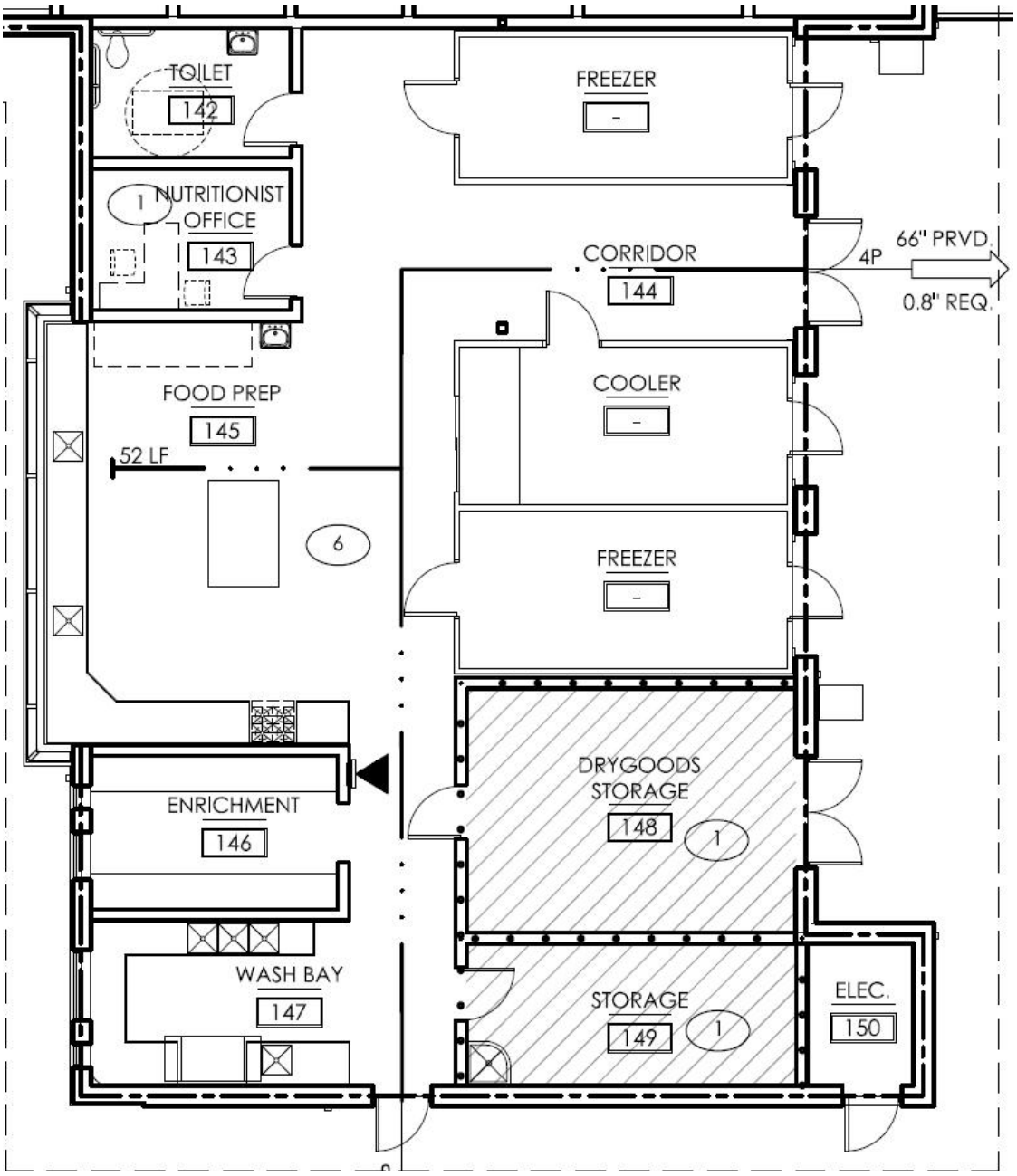

Figure 2. Floor plan of the Commissary section of the Animal Wellness Campus at the Virginia Zoo.