CSU.VTH MASTERPLAN AND NEW BUILDING EXPANSIONS
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Architecture Design Studio - 5140/41 - Fall 2011
Laboratory Typologies, Mobile Veterinary Clinics - There are many different scales of mobile veterinary clinics; from a smaller RV conversion, to a larger goose-neck trailer, to the largest size semi-trailer vehicle that a typical road can accommodate. Regardless of size, these vehicles share the common purpose of bringing excellent veterinary healthcare to the patient.

Precedents:

Sources:

- fig. 1 & 2 - www.aroundtownvet.com
- fig. 3 - www.scswraps.com/copper-spring-ranch-trailer-wrap
- fig. 4 - www.equinechronicle.com/health/ask-the-vet/at-your-servie-equine-sports-medicine.html
- fig. 5 - www.gehealthcare.com/euen/mammography/images/camioninterieur.jpg
- fig. 6 - www.westernhorsereview.com
Laboratory Typologies, Mobile Veterinary Clinics - The Copper Spring Ranch of Bozeman, MT has constructed a very comprehensive approach to their mobile veterinary services for equine sports medicine. The team travels in a 48-foot long by 8.5-foot high custom designed Sundowner trailer equipped as an on-site clinic. The trailer includes a 14-foot long living quarters section that serves as an office area for record-keeping and client consultation, a four-foot mid-tack area houses storage areas for equipment, and a 22-foot long by 8.5-foot high workspace in the rear of the trailer has a stainless steel utility sink as well as stainless steel and aluminum counter and cupboard space.

Programmatic breakdown of equine specific mobile veterinary clinic.

Sources:
fig. 1 - www.scswraps.com/copper-spring-ranch-trailer-wrap
Laboratory Typologies, Mobile Veterinary Clinics - The components of the trailer are organized in such a way that specific circulation patterns and levels of mobility are utilized. The primary user of the space is ultimately the horse, however the owner of the horse and the veterinarian have to move and utilize the space as well.

**Analysis >**

**Precedent**

**mobile veterinary clinics**

**programming / requirements**

**components / organization**

**technology / systems**

**Hierarchy of Spacial Use**

**Function Circulation**

**Scales of Mobility**

Above: The majority of the circulation space for the clinic is actually located outside of the trailer. The horse and its owner approach the rear entrance doors, load, then turn, and finally exit through the same rear doors.

**Sources >**

fig. 1 - www.copperspringranch.com


fig. 4 - www.equinechronicle.com/health/ask-the-vet/at-your-servie-equine-sports-medicine.html
Laboratory Typologies, Mobile Veterinary Clinics - The general tools utilized within a mobile veterinary clinic are somewhat universal to all veterinary practices, however the more specific and complex tools take on a heightened level of mobility. The MRI can be contained within its own trailer and equine standard tools such as Shockwave Therapy, Digital Ultrasound, Endoscopy, and Digital Radiography can all be isolated on their own mobile carts.

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<th>Types of equipment utilized within mobile equine veterinary clinic.</th>
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Above: A high field (1.5T) Magnetic Resonance Imaging (MRI) unit in a uniquely designed and outfitted custom coach which provides equine specialists with state of the art diagnostic capabilities. Equine Veterinarians have largely been denied MRI services for their patients because of the expense of MRI systems and other associated costs, which do not allow them to purchase MRI systems for use in their offices. MREquine custom-made coaches provide mobile High Field MRI for veterinarians and their clients. High Field MRI is a valuable diagnostic imaging system that allows veterinarians to find problems that cannot be found with x-ray or ultrasound.

Top left: Shockwave Therapy is a treatment that is used to treat orthopedic problems such as bone fractures and meniscal disease.

Top right: Endoscopy and Gastroscope equipment is used to examine and diagnose upper gastrointestinal conditions and provide images of the esophagus and stomach.

Bottom left: Digital Ultrasound enables us to evaluate soft tissue such as tendons and ligaments, to identify injuries and evaluate the progress of healing.

Bottom right: Digital Radiography provides a high quality image of primarily bones but may be used in diagnosing some soft tissue problems.

Sources:

- fig. 1, 2, 3, & 5 - www.mrequine.com
- fig. 4 & 6 - www.veterinary-imaging.com
- fig. 7 - www.equineshockwave.com/shockwavehorses.html
- fig. 8 - www.carolinaequinehospital.com/digital-ultrasound
- fig. 9 - www.townsvillevetclinic.com.au
• Decentralize site functionality and parking
• Condense secondary supporting facilities
• Create central quad with multiple inputs
• Allow for future research buildings
Existing/Proposed Masterplan:

- Minimize and condense secondary structures
- Primary client inputs close to main site access
- Larger, more structured campus space (semi-public)

Analysis:

fig. 1 - existing spacial hierarchy/axis
fig. 2 - proposed spacial hierarchy/axis
Existing/Proposed
Masterplan >

- Minimize and condense secondary structures
- Control public user interface
- Create interplay of functional programs
- Expand campus research facilities

Analysis >

fig. 1 - existing building functions
fig. 2 - proposed building functions
- Primary circulation circumnavigates and penetrates site
- Secondary circulation reduced to parking and service corridors
- More dynamic user interface accessing central quad
- Separate equestrian and small animal care client inputs
- Confined animal circulation throughout campus

**Analysis >**

**fig. 1 - existing vehicular/human/animal circulation**

**fig. 2 - proposed vehicular/human/animal circulation**
- Expand semi-public campus space
- Condense private space while retaining public interface
- Retain primary public space along main site access

**Fig. 1 - existing public/private spaces**

**Fig. 2 - proposed public/private spaces**
Existing/Proposed Masterplan >

- Focus on user circulation toward central quad
- Allow for direct access routes to main building entry
- Secondary building entry reduced to service corridors
- Decentralize parking for multiple site inputs

Analysis >

fig. 1 - existing primary/secondary building entries  
fig. 2 - proposed primary/secondary building entries
- Increase greenspace and vegetation
- Structured vs. organic landscaping
- Utilize fencing for wayfinding and animals on display

fig. 1 - existing vegetation/fencing/water storage/drainage
fig. 2 - proposed vegetation/fencing/water storage/drainage
fig. 1 - Proposed Master Plan
PHASE C. PROGRAMMING
Proposal by Sean M. McMurray and Matt Latham

College of Architecture and Planning . University of Colorado Denver
Architecture Design Studio . 5140/41 . Fall 2011
Critical Care Program

The majority of space within the Critical Care Center consists of holding stalls for both inpatient and outpatient uses. There is also holding capability for mare and foal birthing and the more serious neuro disorder patients. Along with various administrative and nursing staff functions that will be housed in this facility, basic treatment and endoscopy will be available as well.

fig. 1 - list of proposed space needs for Critical Care, diagram of primary and secondary spaces, and circulation

fig. 1 - Shows the space needs and their graphic square footages, their importance level and adjacencies, and the primary and secondary circulation that will take place within.
Sports Medicine Program

The Sports Medicine Center is programmed to be a stand-alone facility that houses all necessary functions within. The horses that will be utilizing this facility will primarily be athletes and will be in need of care for sport related injuries rather than sickness related issues. The breezeway becomes an important part of the facility as it ties together the various functions and allows for vehicle access for not only patient trailers, but the ambulatory division of the program as well.

fig. 1 - list of proposed space needs for Sports Medicine, diagram of primary and secondary spaces, and circulation

fig. 1 - Shows the space needs and their graphic square footages, their importance level and adjacencies, and the primary and secondary circulation that will take place within.
Surgery and Imaging Program

The circulation between the various technological services within the Surgery and Imaging Center became the primary driver for spatial organization. The diagnostics, preparation, surgery, and recovery sequence for a horse creates central loop of circulation that all other functions are housed around.

**Program/Proposal >**

**Analysis/Proposal >**

**Analysis >**

**Notes >**

Fig. 1 - Shows the space needs and their graphic square footages, their importance level and adjacencies, and the primary and secondary circulation that will take place within.

**Fig. 1 -** List of proposed space needs for Surgery and Imaging, diagram of primary and secondary spaces, and circulation.
Proposed Building Placement within Master Plan

With the southeastern section of the proposed master plan reserved for future equine development, different arrangements of the programmatic clusters emerge. All of the below options reflect a need for building penetrations within the site and separation of public and private space.

fig. 1 - Mater Plan and subsequent building organization

fig. 1 - Shows the space reserved space for future equine development. The (3) subsequent key plans show how the separate equine facilities can be organized on the allotted land.
Version A represents a linear approach to the (3) separate equine centers. Circulation through and access to all functions are understood in a linear fashion. Administrative and educational spaces are housed on the second floor which provides some height to an otherwise horizontal arrangement.

fig. 1 - Surgery and Imaging is located at the center of the arrangement such that Sports Medicine and Critical Care will have easy access to the core.
Version B represents a curved approach to the (3) separate equine centers. Circulation through and access to all functions are understood through the vehicle accessible breezeway through the interior of the buildings and the site as well. The Surgery and Imaging Center is removed however from this configuration as the housing stalls and minor treatment functions dominate the primary building. Administrative and educational spaces are similarly housed on the second floor of Surgery and Imaging, which provides some height to this arrangement.

fig. 1 - Surgery and Imaging is located apart from Sports Medicine and Critical Care, which are attached and contiguous through the housing stalls.
Version C represents a combination of A and B were the (3) separate equine centers are connected through a combined breezeway, but have a more integrated functionality. Circulation through the functions is more evenly divided between north-south and east-west. The Surgery and Imaging Center is still relatively removed from Sports Medicine and Critical Care, but connected through key corridors. Administrative and educational spaces are housed on the second floor of Surgery and Imaging and extend over Sports Medicine.

fig. 1 - Surgery and Imaging, Sports Medicine, and Critical Care are connected in a triangular fashion and connected through key corridors for integrated circulation.
This version of the Master Plan takes into account the integrated program development and building placement on the site. It also takes into account the construction phasing that will need to be handled to allow existing structures and functions to remain while the new ones are being built. The detail views are provided to show conceptual space ideas and materiality for the new campus, movement is arranged such that they read in a contiguous manner throughout.

fig. 1 - The new equine facilities are placed such that the existing facilities can remain while the new one are being constructed.
Further development and refining of the programmatic layout of the Equine Critical Care Facility has lead to a simplification in functional clustering and circulation. Two main axis remain and the majority of space is arranged to facilitate high density housing of horses. The concept behind this building thus becomes the conveyance of a sense of enclosure.

**Equine Critical Care**

- In and Out-patient housing stalls
- Strong linear progression through breezeway
- Motorized doors positioned on each side of drive
- Strong sense of sealed enclosure

**fig. 1** - Rough layout of space and circulation with a distilled elevation to convey materiality.

**fig. 1** - The door and sense of entry and exit becomes the main element to convey enclosure.
In keeping in formal kind with Critical Care, the Surgery and Imaging facility relies on a similar structural system, but is larger and more expansive. The refined program and circulation allow for connection to the breezeway that connects to Critical Care and the housing of the patients. The technical manner of the functionalities suggests an overall theme of transparency, not only literally with the MRI, CT and X-Ray machines, but figuratively through teaching and knowledge sharing.

fig. 1 - Rough layout of space and circulation with a distilled elevation to convey materiality.

fig. 1 - The transparent glass entry and facade become the main element that convey a sense of transparency.
Unlike the patients that will be using the Surgery/Imaging and Critical Care Facilities, the patients of the Sports Medicine Facility will not necessarily be infirm and will be mobile. Similarly, mobility is the key to their successful treatment. Ambulatory functions and preventative maintenance services will be offered as the typical stay of an inpatient should be relatively short. This all conveys a sense of movement that resonates throughout.

**Concepts >**

**Equine Sports Medicine**
- stand-alone facility that retains integration with critical care and surgery/imagining
- housing for injured horses vs. ill horses
- linear connection to campus bridal path
- focused around the movement and athleticism of horses
- adjacent to equine quad

**Sketches >**

fig. 1 - Rough layout of space and circulation with a distilled elevation to convey materiality.

**Notes >**

fig. 1 - The open porch and sequential screening pattern along the North-South bridal path become the main elements that convey a sense of movement.
Photo 1 represents a formal and spatial precedent for a veterinary teaching university. While photos 2, 3, 4 and 5 show specific elements, both refined and vernacular, that are incorporated into my design. Each element is used in order to aid conceptual development of each individual building.

Fig. 1 - Materiality and Structural Systems Precedent

Fig. 1 - The series of (7) photos represents the collective feelings that are being portrayed by the selected Materiality and Systems.
fig. 1 - Phase D Presentation Board
Fig. 1 - This iteration of the plan for Surgery and Imaging reflects the correct circulation and space requirements. The necessary space for Surgery and Imaging grows from the adjacency diagrams when correct animal and human circulation are factored in. The progression of induction, surgery and subsequent recovery of the horse is paramount and can be seen in the double corridor that separates imaging from surgery. There are (2) separate wings proposed in this plan separated by the vehicular breezeway.
While Critical Care, Isolation, and Sports Medicine all consist primarily of stalls for boarding the horses, administrative and treatment functions must be housed within the facilities as well. The forms of the buildings are driven by the necessary circulation paths and large blocks of repeatable program within.

**Concepts >**

**Sketches >**

**Notes >**

fig. 1 - This iteration of the plan for both Critical Care and Isolation reflect the correct circulation and space requirements.

fig. 2 - This iteration of the plan for Sports Medicine reflects the correct circulation and space requirements.
The rainscreen system that is utilized on the grouping of equine buildings was inspired by the Muybridge Film, “Horse in Motion” and is derived from the various movement patterns or gaits that a horse commonly sustains. Below is illustrated the movement pattern of a horse during a normal walk. The number and order in which the hoofs impact the ground is conveyed with the amplitude of the strike as well. All motion patterns are taken over (1) full stride of the horse, which consists of (8) separate phases. To Follow will be a horse traveling at an unsynchronized trot and at a transverse gallop.

**Concepts >**

**Sketches >**

**Notes >**

fig. 1 - The illustrated motion of a horse’s stride can be broken down into 8 phases, each one of these phases is represented by a 12’ x 12’ panel that is placed on the facade of the building.
The splay systems that are utilized in the grouping of square buildings are inspired by the Mayan bridges, “noses in motion” and as derived from the various movement patterns utilized by athletes. The internal structure of the system mirrors the external pattern of a horse during a normal walk. The number and order in which the hooves impact the ground is controlled by the amplitude of the strike as well. All motions patterns are taken over a full stride of the horse and are recorded in the pattern phases. To eliminate vibrations, the walk is supported at final and at a two-wheelegallop.
The final floor plans take into account both horse and human circulation and are placed on the site to maximize land usage and connectivity to the overall campus. Critical Care and Surgery and Imaging are connected and accessible from the main entrance via the breezeway. The sports Medicine Facility is accessible from the private rear entrance where other ambulatory functions are housed. All buildings front on either the round equine plaza or the subsequent equine quad.
When this critical gait has been reached by a moving horse, there are never four feet on the ground simultaneously and the pattern of the supporting limbs reaches the limit beyond which full static or standing stability is no longer possible. Each limb is on the ground 5/8 of a complete cycle and there is one-quarter cycle difference in phase between successive limbs and one-half cycle between limbs on the two sides of the body.

When the gait of the moving horse changes from a walk to a trot, a phase difference of one-quarter of a cycle between successively moving limbs is no longer maintained. The characteristic feature of a trot is a progressive reduction in the phase difference between fore limb and the ipsilateral hind limb. In a fully synchronised trot, a fore limb and the contralateral hind limb are completely in phase, and the body is supported on the two diagonal pairs of limbs alternately with intervening periods when all feet are off the ground.

The distinctive feature of a gallop is partial synchronisation of the two fore and two hind limbs. A horse performs what is known as a transverse gallop, which is different from the rotatory gallop performed by a canine. In a transverse gallop either the right or the left feet can lead, and the horse can change the leading foot whilst in motion. The distinctive feature of the horse’s gallop is that in phase 3, all four feet are off the ground. While the horse has taken off with its left fore foot, it lands on its right hind foot and creates an asymmetrical gait.
The parti diagrams are meant to represent the simple and pure form of each separate building. The functions housed within have lead to the operative word association and that word has in turn lead to a formal gesture that suggests the presence of that word. The red dotted lines illustrate the location of the subsequent panneling system and its placement on the buildings exterior. Each system reacts uniquely with its specific building and plays to emphasize the operative word associated with that building.

fig. 1 - Parti diagrams and panel system for building exterior

fig. 1 - The parti diagrams show how the panneling system works with each separate building
fig. 1 - (3) different horse gait systems manifest in the rainscreen
The exterior walls rely on the overall structural grid that is established by the rigid frame steel beams and columns. Steel girts are attached to the outer edge of this grid and the exterior non-bearing walls are then attached to these girts. The wood screen is connected to these girts as well via bolts and brackets.

fig. 1 - Typical exterior wall section

fig. 1 - The exterior walls hang off of the structural grid of steel beams and columns, the wood screen is also attached to this grid.
fig. 1 - Final Model
fig. 1 - Final Model