

Containment Challenges & Engineering Solutions for Low Containment

National Centers for Animal Health
Ames, Iowa
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NCAH Missions

- Conduct **basic and applied research** on selected diseases of economic importance to the U.S. livestock and poultry industries (ARS National Animal Disease Center).
- **Diagnostic testing, training, reference assistance, and production of reagents** . To protect the health of animals (APHIS National Veterinary Service Laboratories).
- **Ensure that veterinary biologics** available for the diagnosis, prevention, and treatment of animal diseases **are pure, safe, potent, and effective** (APHIS Center for Veterinary Biologics).

NCAH Site

Ames, Iowa

- 475 acre combined site
- 100 buildings
- BSL-2 & BSL-3 Laboratories
- BSL-2 Large Animal Facility
- BSL-3Ag Large Animal Bldg
- Adm & Support Facilities
- Central Utility Plant
- Wastewater Pre-treatment Plant
- Field barns & pastures

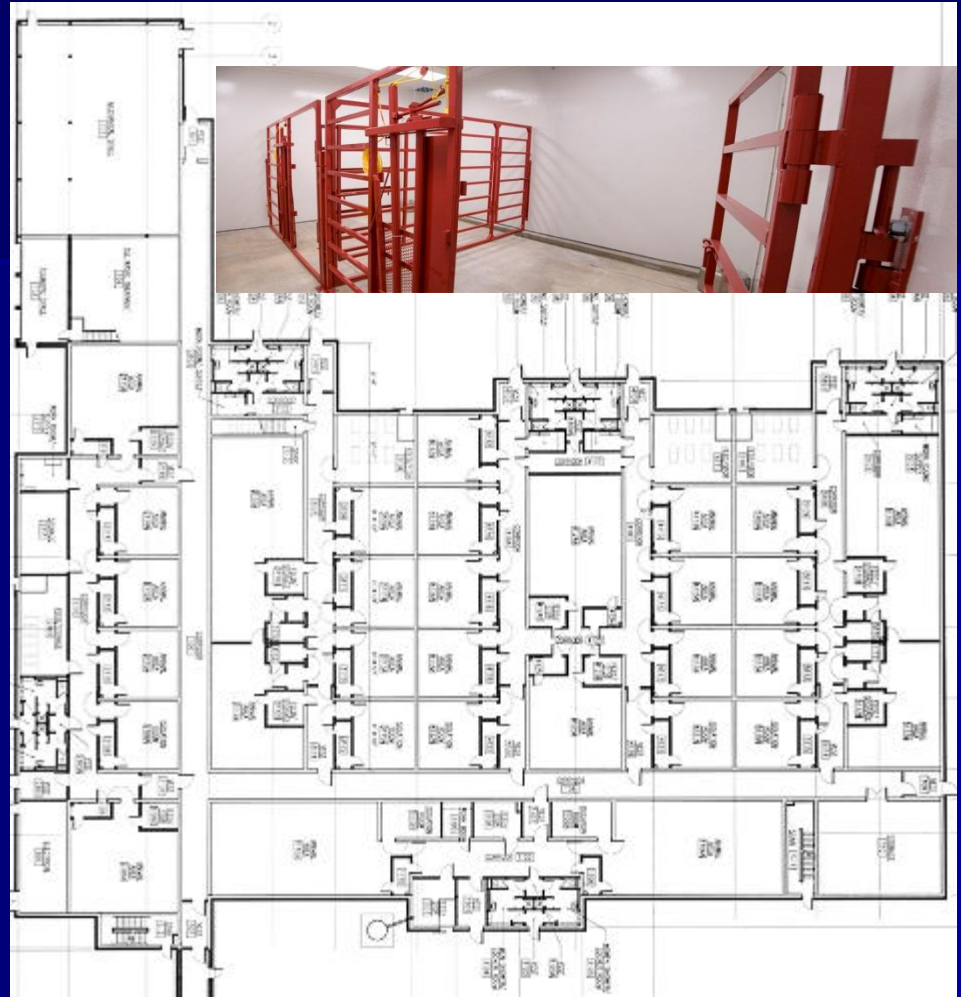


BSL-2 Large Animal Bldg



Features:

- 103K gsf
- Group housing rms
- 5 isolated suites w/
various rm sizes & #
- Each suite w/change
& shower, feed, work
rooms.
- Each animal room
has entry vestibule
- Painted steel animal penwork (semi-flexible)
- Manure to be washed down or scraped up



Features:

- Wastewater collection tank room for chemical pre-treatment
- Wastewater pumped to heat pre-treatment plant
- Steam & Chilled water supplied from Utility Plant
- HVAC provides directional air flow into animal rooms
- Fixed Ventilation (12 cph)
- Zone temperature control
- Animal rooms have hoisting hooks in ceiling for carcass handling
- Building corridors are connected to necropsy/incinerator facility



Budget Challenges

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Animal Care & Space Requirements

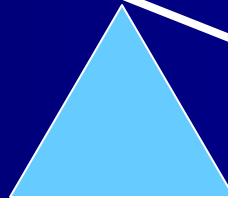
HVAC System Requirements

Flooring & Wall surfaces

Waste Management

Animal Rooms

Penwork



Budget Solutions

(Cuts to meet the budget \$\$)

- Cut the building size in $\frac{1}{2}$ and continue to use 2 existing animal buildings
- Accept fixed ventilation rates
- Accept zone temperature control
- Accept limited humidity control
- Accept sealed concrete vs high-quality floor finish

Engineering Solutions

- Sealed floors can be updated with high-quality finish in the future
- Pre-cast concrete & masonry walls & ceiling construction provided cost savings
- Painted animal penwork can be replaced with better quality in future (also will know what works)
- Wastewater chemical pre-treatment & pumping systems can be automated in future
- Large penthouse constructed on top of pre-cast structure provides space to add additional reheat coils and gain individual room temperature & humidity control

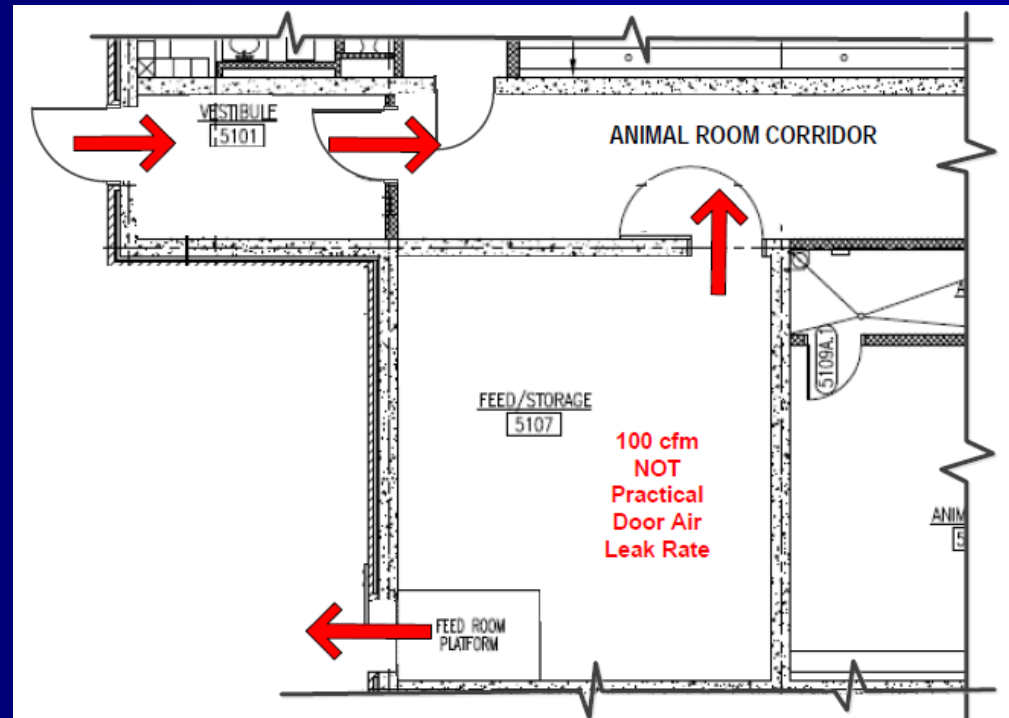
Operational Challenges

- **Waste Management in Animal Rooms**
 - Conventional floor drains with solids baskets
 - Manure scraping does not happen
 - All wastes are flushed down the drains
 - Wastewater system limits roughage in feed
- **Caretaker Comfort in the building**
 - Temperatures dictated by caretaker comfort
 - Design assumed warmer temperatures
 - Cooler temperatures raise the indoor humidity

Engineering Questions

Directional Air Flow

- 4'x7' walk doors
- 100 cfm leakage
- No door interlocks
- Sliding feed room door
- Feed room does

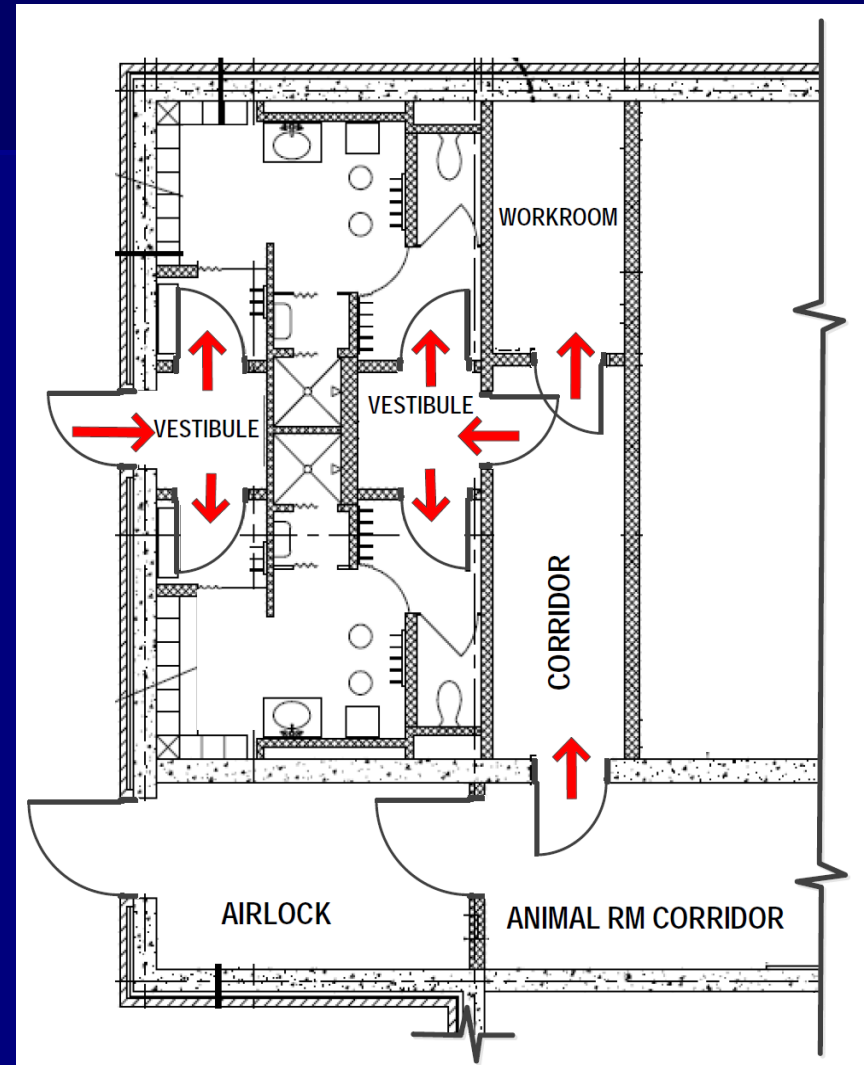


not have an airlock. When corridor door is open Rm air pressure = outside air pressure

Engineering Questions

Directional Air Flow

- Designer set-up
- Air flow from Animal Room
Corridor to Suite
Workroom &
Dressing Rooms?
- Exposed HVAC
ductwork in
change rooms –
get adjusted!



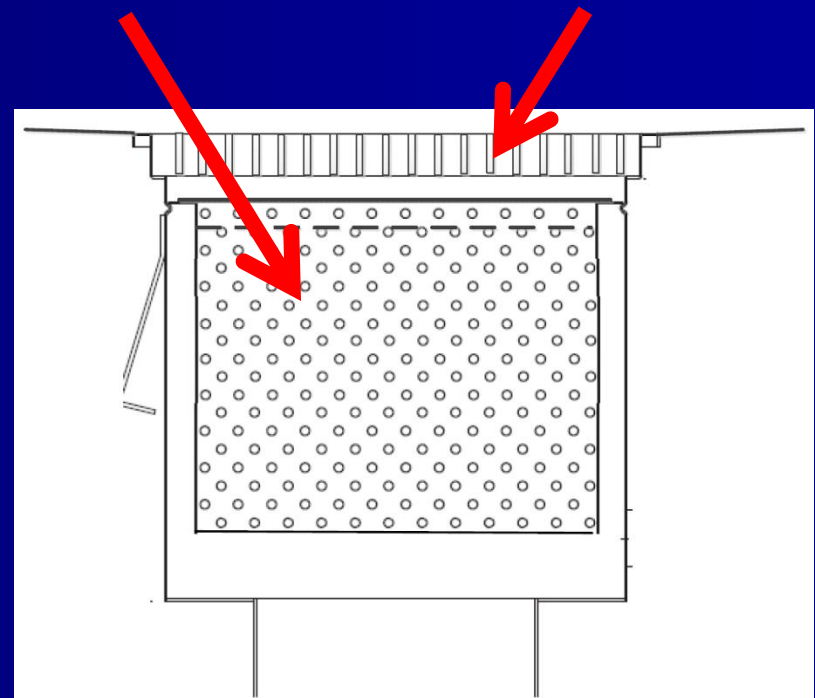
Unresolved Issue

Waste Management – Floor Drains

- Manure clogs filter basket
- Caretakers remove basket & wash manure (+) down the drain vs. scraping up solids

**REMOVABLE
FILTER BASKET**

LADDER GRATE



Future Engineering Changes HVAC Systems

- Add floor drains in the penthouse
- Add RH coils
- BAS controls
- Add SA & EA control valves
- Change SA & EA fan speed control from flow control to SP control (already done).



Future Engineering Changes

Waste Management – Piping Bends

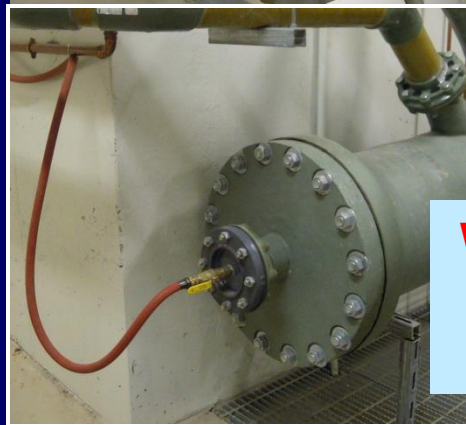
**Change
piping bends
to radius
that can be
cleaned with
jetting tool**



**Need dble
45° elbows
or sweep
bends**

Future Engineering Changes

Waste Management – Collect Tank



**Water hose set on timer
to operate 5am-11am
(Room washdown)**

- Change wastewater collection tank configuration
- Requires additional water to keep from clogging
- No real water savings (as est by designer).

Future Engineering Changes Waste Management – Pump Piping

- Waste transfer pump piping configuration packs solids into piping.
- Temporary relief by cycling between lead/lag/standby pumps daily.
- Will reconfigure piping with Y-Joints.



Thank you.

Overall Good Facility
Provides capability to improve
Similar problems to other facilities

