GBRMC

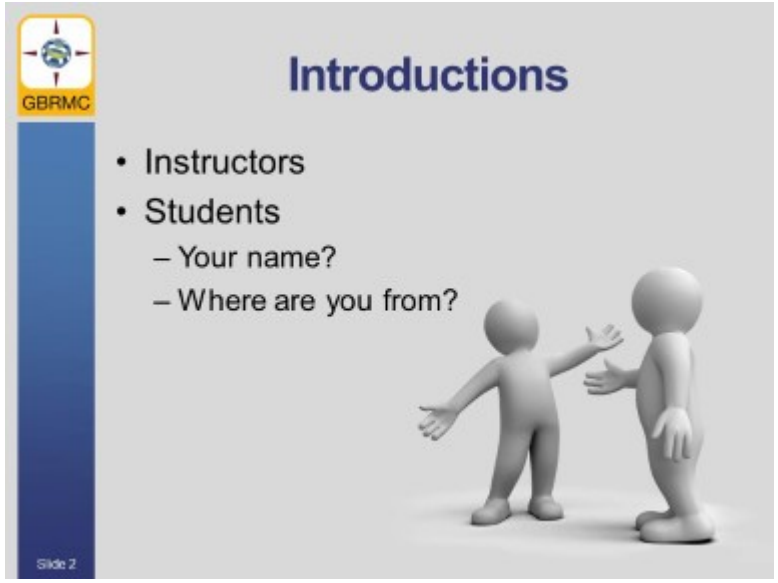
# Programming and Pre-Design

## Student Guide

2013

GLOBAL BIORISK MANAGEMENT CURRICULUM


Programming and Pre-Design
GLOBAL BIORISK MANAGEMENT
CURRICULUM
GBRMC


GBRMC
Introductions
• Instructors
• Students
– Your name?
– Where are you from?
Slide 2

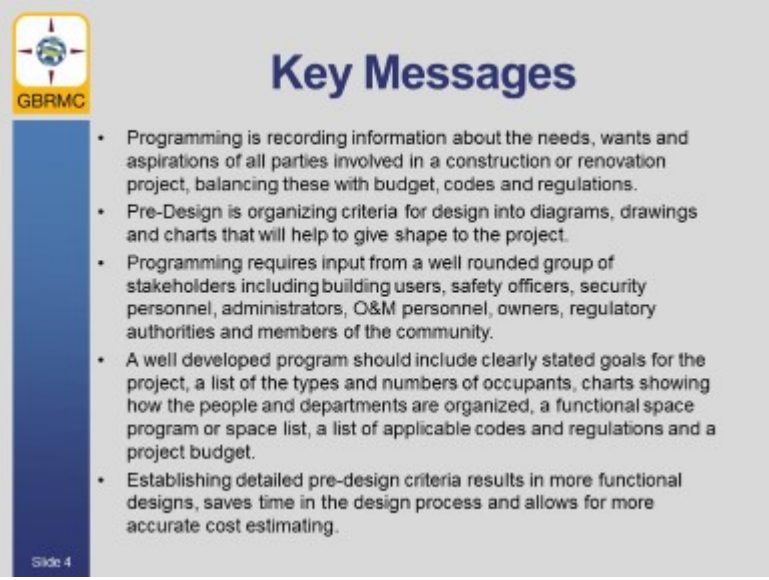
# Action Plan

| By the end of this lesson, I would like to: | | | | | |
|---|---|---|---|---|---|
| KNOW | | FEEL | | BE ABLE TO DO | |

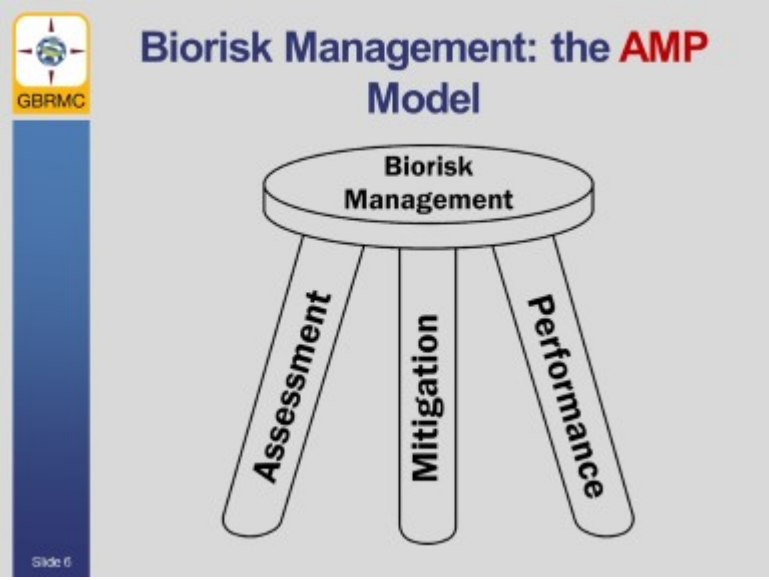
*Your learning doesn't stop with this lesson. Use this space to think about what else you need to do or learn to put the information from this lesson into practice.*

| What more do I need to know or do? | How will I acquire the knowledge or skills? | How will I know that I've succeeded? | How will I use this new learning in my job? |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

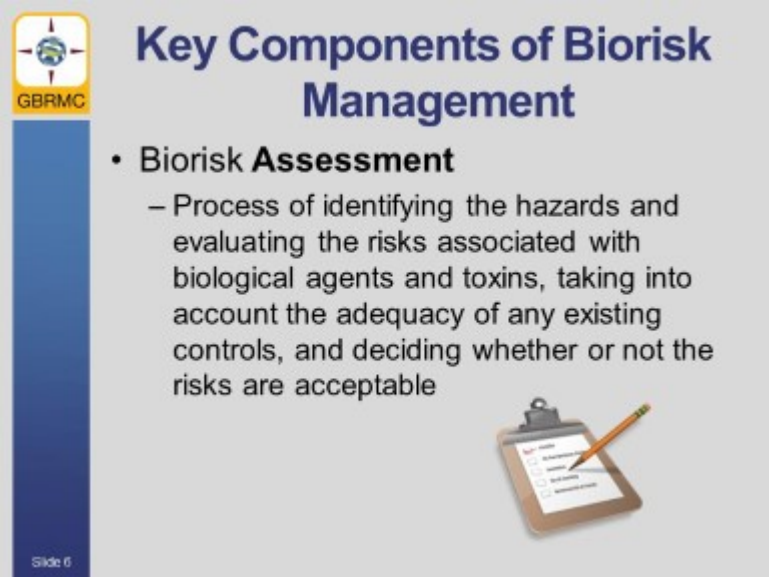
*Use space on back, if needed*


GBRMC
Key Messages
• Programming is recording information about the needs, wants and aspirations of all parties involved in a construction or renovation project, balancing these with budget, codes and regulations.
• Pre-Design is organizing criteria for design into diagrams, drawings and charts that will help to give shape to the project.
• Programming requires input from a well rounded group of stakeholders including building users, safety officers, security personnel, administrators, O&M personnel, owners, regulatory authorities and members of the community.
• A well developed program should include clearly stated goals for the project, a list of the types and numbers of occupants, charts showing how the people and departments are organized, a functional space program or space list, a list of applicable codes and regulations and a project budget.
• Establishing detailed pre-design criteria results in more functional designs, saves time in the design process and allows for more accurate cost estimating.
Slide 4

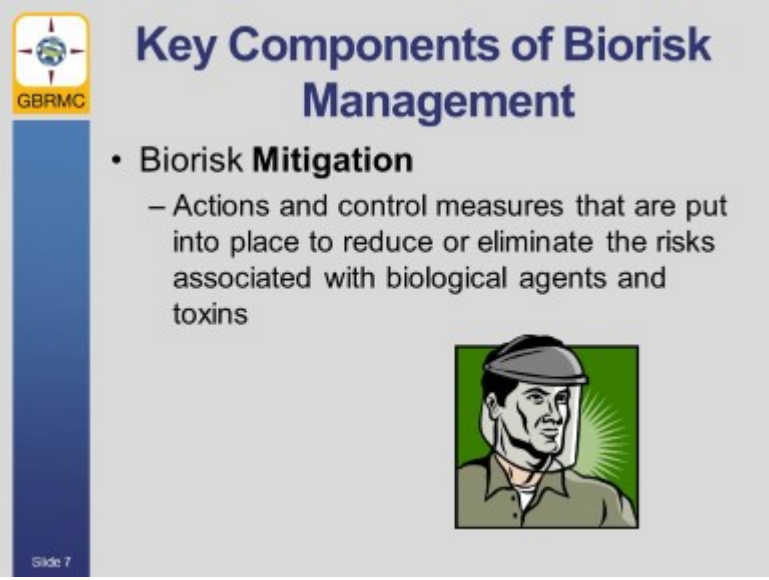
Notes:


GBRMC
Biorisk Management: the AMP Model
Biorisk Management
Assessment
Mitigation
Performance
Slide 6

Notes:


GBRMC
Key Components of Biorisk Management
• Biorisk **Assessment**
– Process of identifying the hazards and evaluating the risks associated with biological agents and toxins, taking into account the adequacy of any existing controls, and deciding whether or not the risks are acceptable
Slide 6

Notes:


GBRMC
Key Components of Biorisk Management
• Biorisk **Mitigation**
– Actions and control measures that are put into place to reduce or eliminate the risks associated with biological agents and toxins
Slide 7

Notes: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Key Components of Biorisk Management
• Biorisk **Performance**
– Improving biorisk management by recording, measuring, and evaluating organizational actions and outcomes to reduce biorisk.

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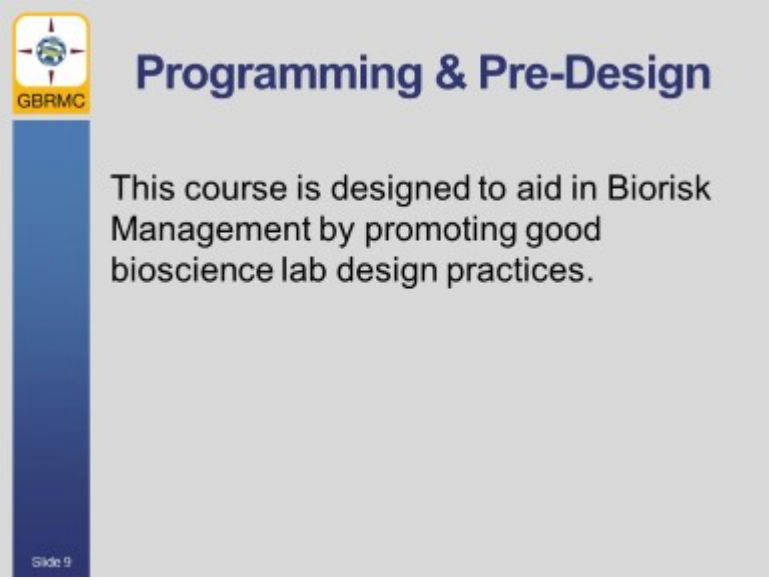
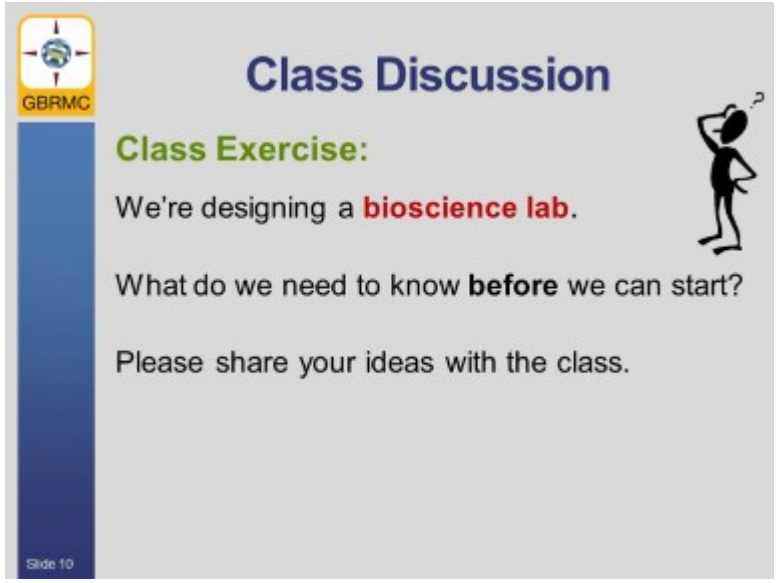
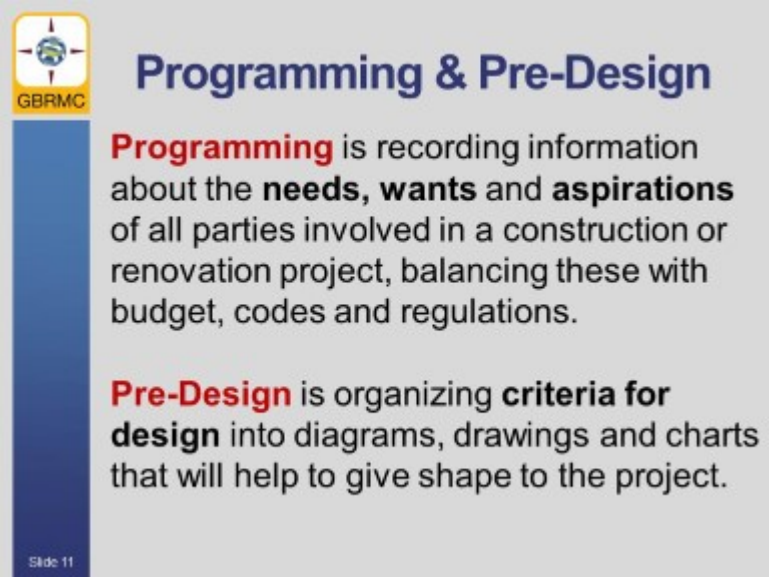

GBRMC
Programming & Pre-Design
This course is designed to aid in Biorisk Management by promoting good bioscience lab design practices.
Slide 9

Notes:




What do we need to know before we start?


GBRMC
Programming & Pre-Design
Programming is recording information about the needs, wants and aspirations of all parties involved in a construction or renovation project, balancing these with budget, codes and regulations.
Pre-Design is organizing criteria for design into diagrams, drawings and charts that will help to give shape to the project.
Slide 11

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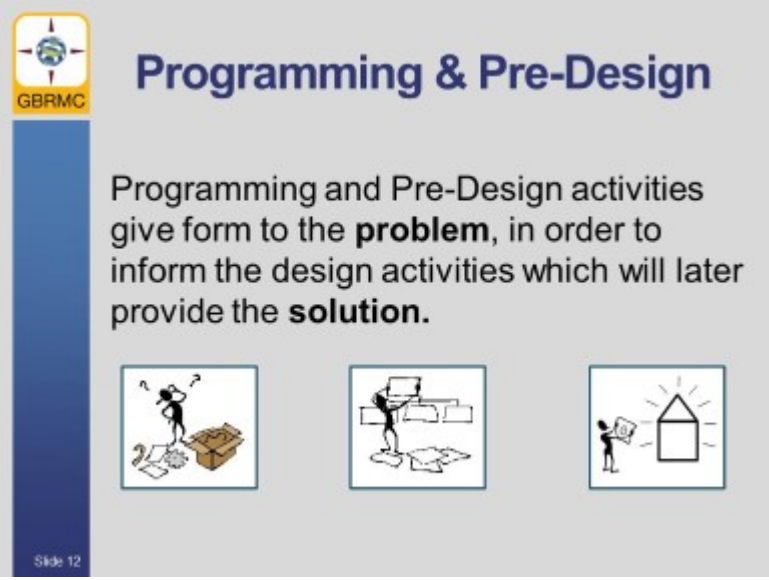
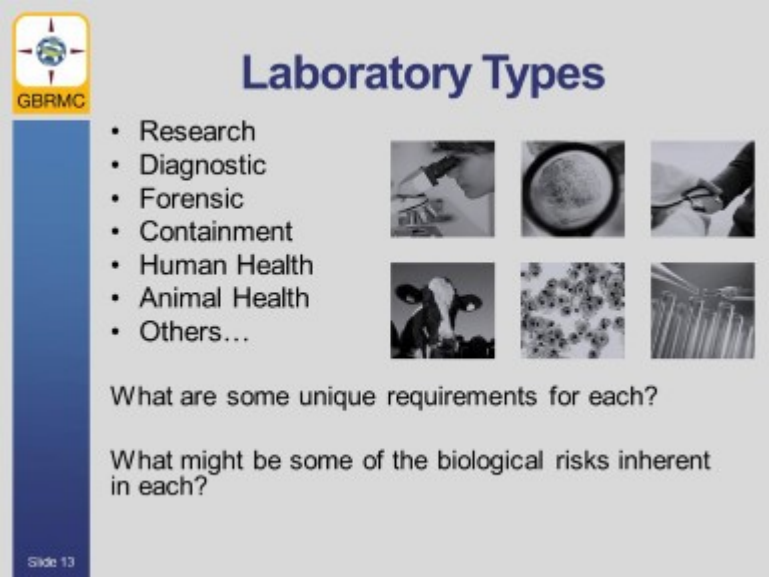
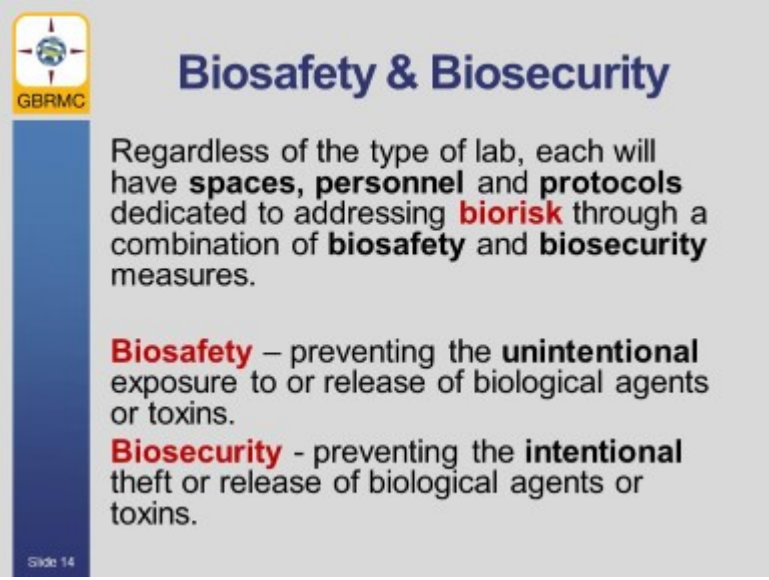



Think about how programming and pre-design activities differ from design.

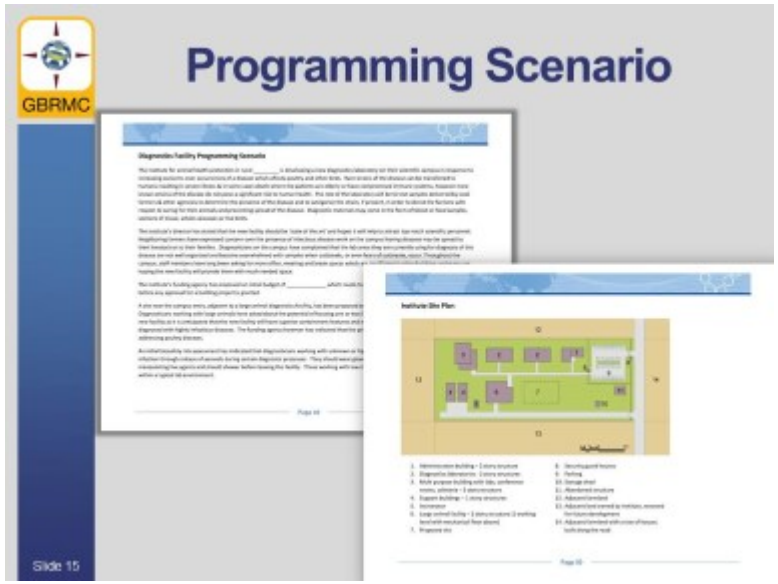



What are some unique programmatic requirements for these lab types?

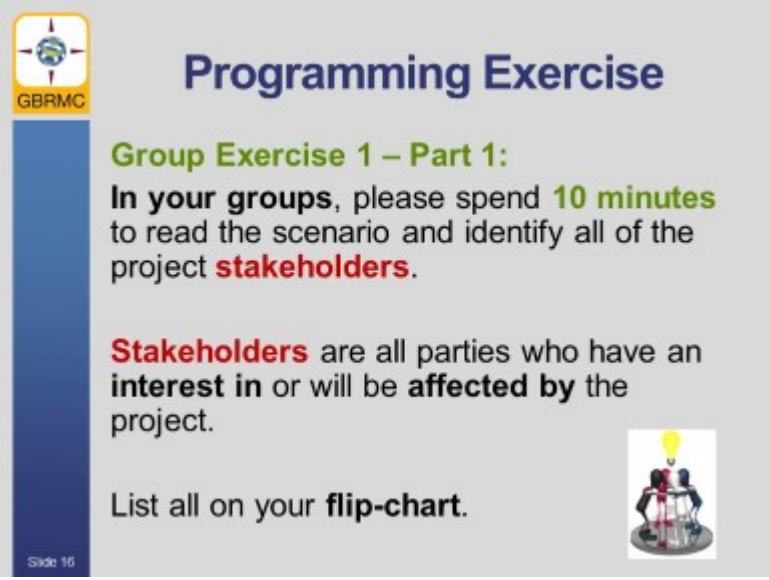
What are some of the inherent risks?


GBRMC
Biosafety & Biosecurity
Regardless of the type of lab, each will have spaces, personnel and protocols dedicated to addressing biorisk through a combination of biosafety and biosecurity measures.
Biosafety – preventing the unintentional exposure to or release of biological agents or toxins.
Biosecurity - preventing the intentional theft or release of biological agents or toxins.
Slide 14

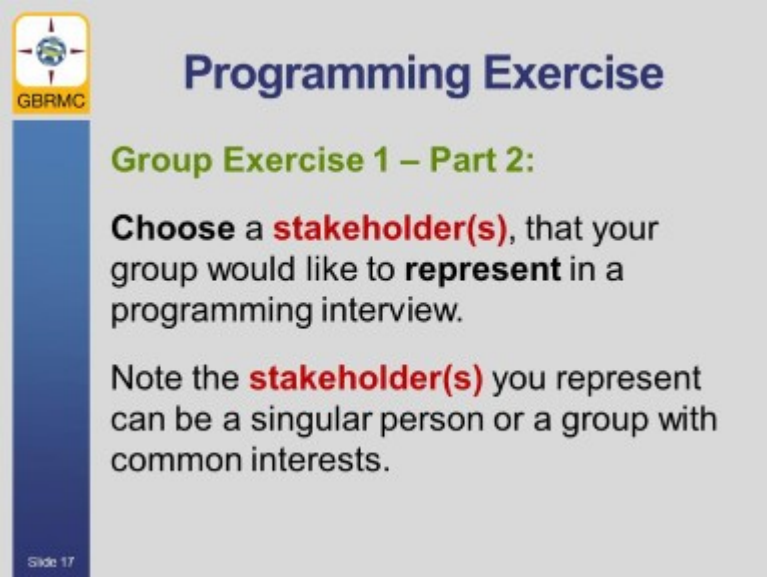
Notes:



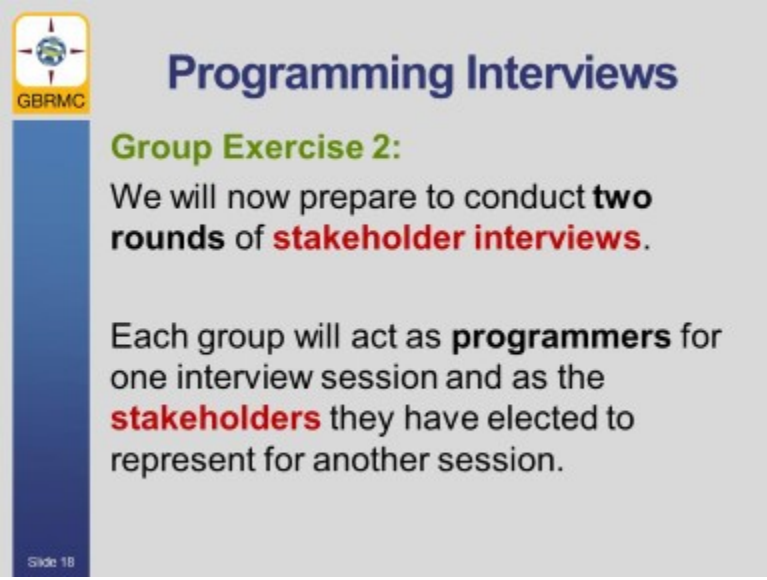

Programming scenario – included at the end of this guide.




Who are the stakeholders in the programming scenario (diagnostics lab) project?




Which stakeholder will your group represent?

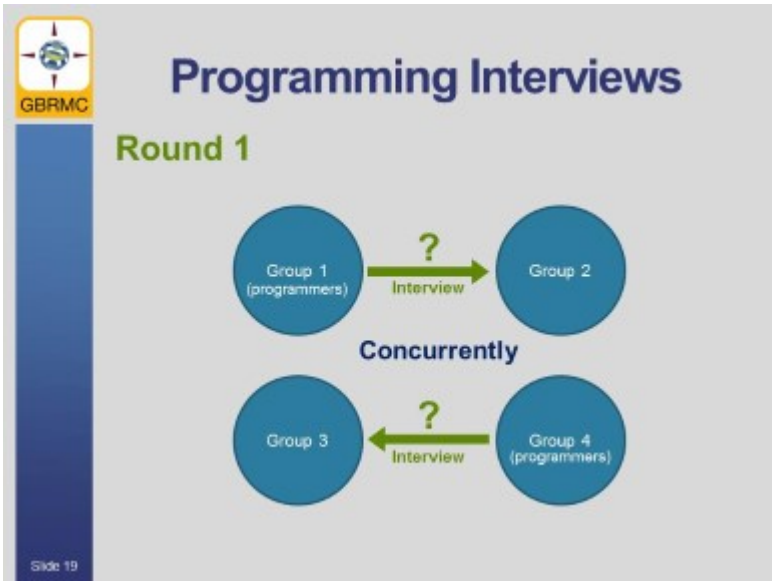



***Group Activity 1 Part 2 – Choose a Stakeholder(s) to Represent***

Identify your group. What is your number? _____

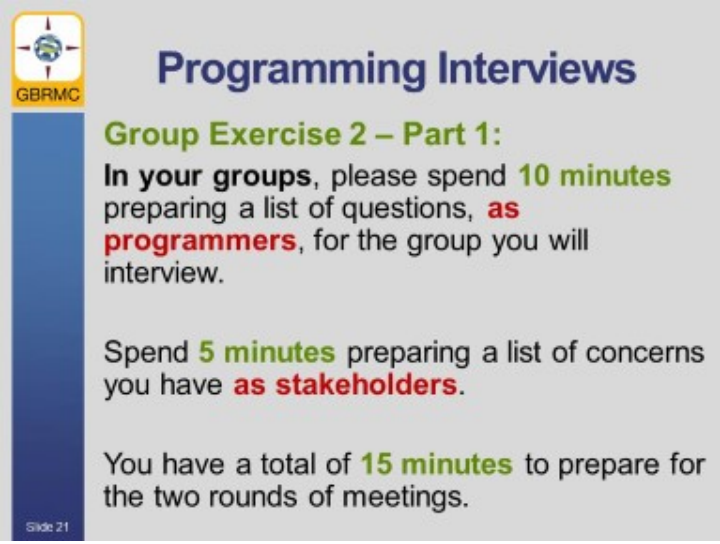
Who will your group *represent* or *interview* in Round 1?

Who will your group *represent* or *interview* in Round 2?


GBRMC
Programming Interviews
Round 1
Group 1 (programmers)
?
Interview
Group 2
Concurrently
Group 3
?
Interview
Group 4 (programmers)
Slide 19


GBRMC
Programming Interviews
Round 2
Group 1
Group 2 (programmers)
Interview
?
Concurrently
?
Interview
Group 3 (programmers)
Group 4
Slide 20

## *Group Activity 2 Part 1 – Preparing for Programming Interviews*




Use this page to record the questions you want to ask of the stakeholders you will interview.

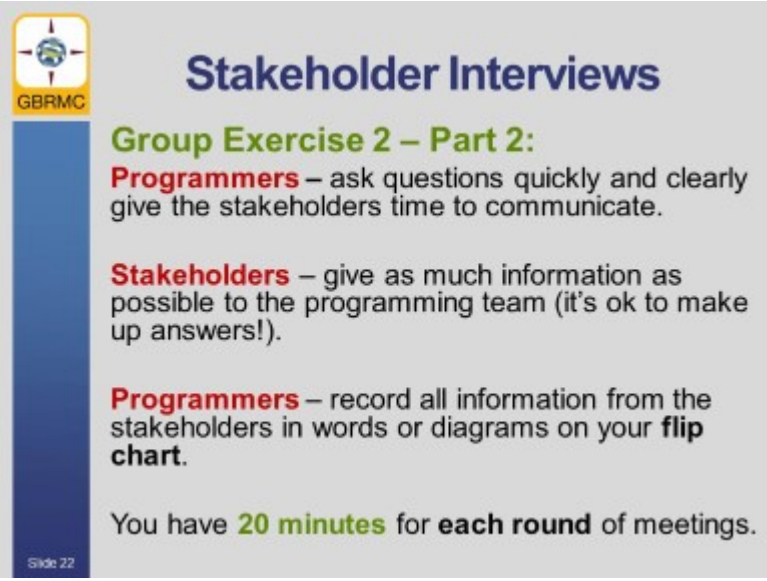
Group to be interviewed

## *Group Activity 2 Part 1 – Preparing for Programming Interviews*

Use this page to record the concerns of your own group.

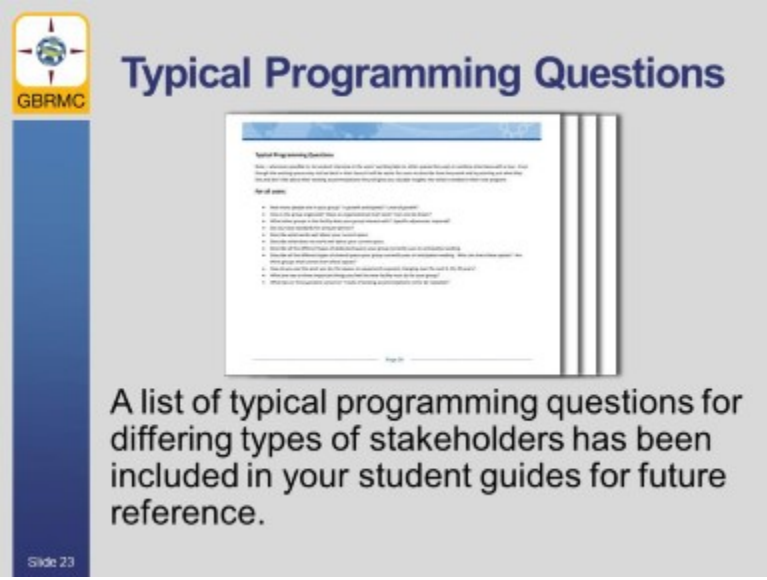
Stakeholder(s) we represent:

Use the following pages to record the needs, wants and aspirations of the stakeholders you are interviewing. Note that someone in your group should be recording the main points on your flip chart.

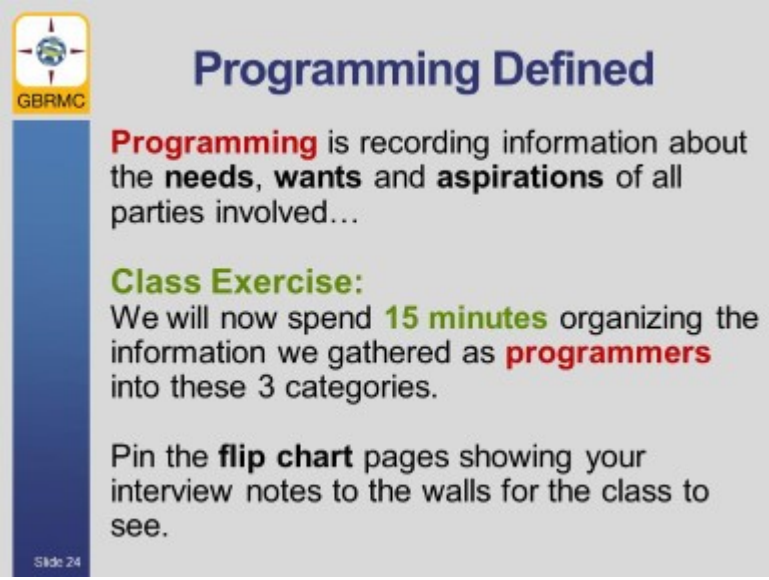



***Group Activity 2 Part 2 – Programming Interviews***

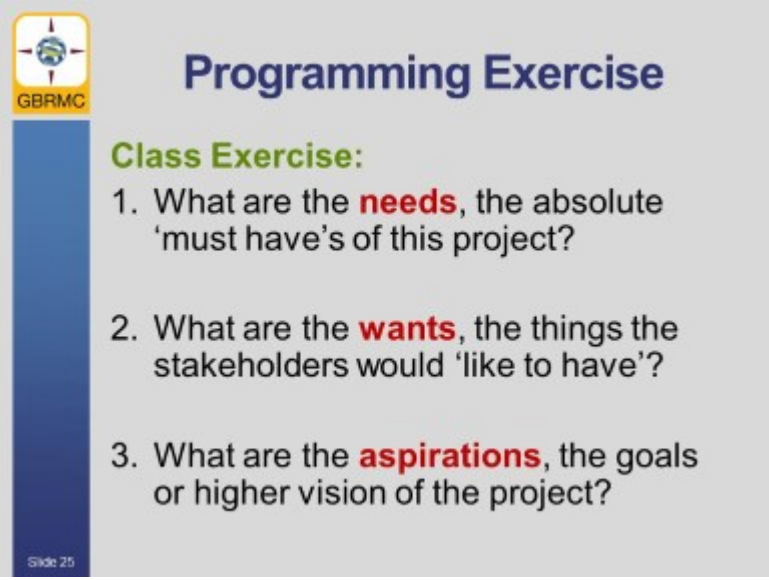
Group interviewed:



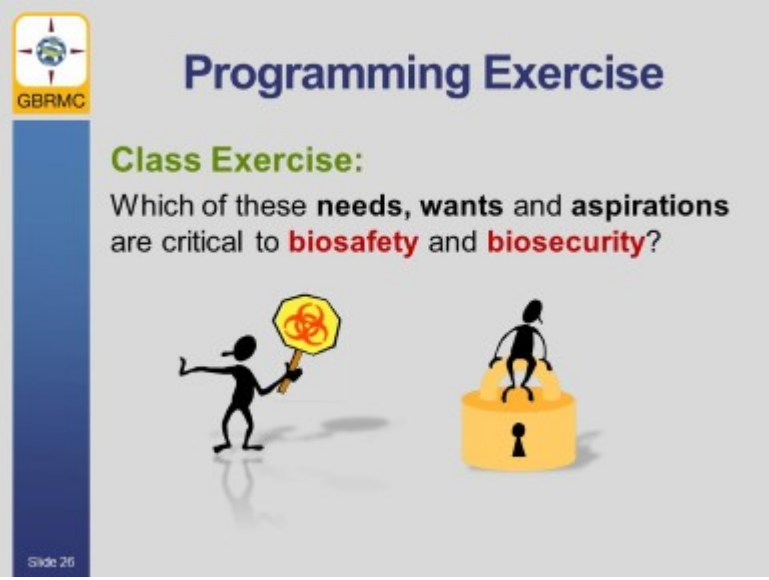

You may wish to use this page to record important questions you want to remember to ask in future programming discussions.


GBRMC
Programming Defined
Programming is recording information about the needs, wants and aspirations of all parties involved…
Class Exercise:
We will now spend 15 minutes organizing the information we gathered as programmers into these 3 categories.
Pin the flip chart pages showing your interview notes to the walls for the class to see.
Slide 24

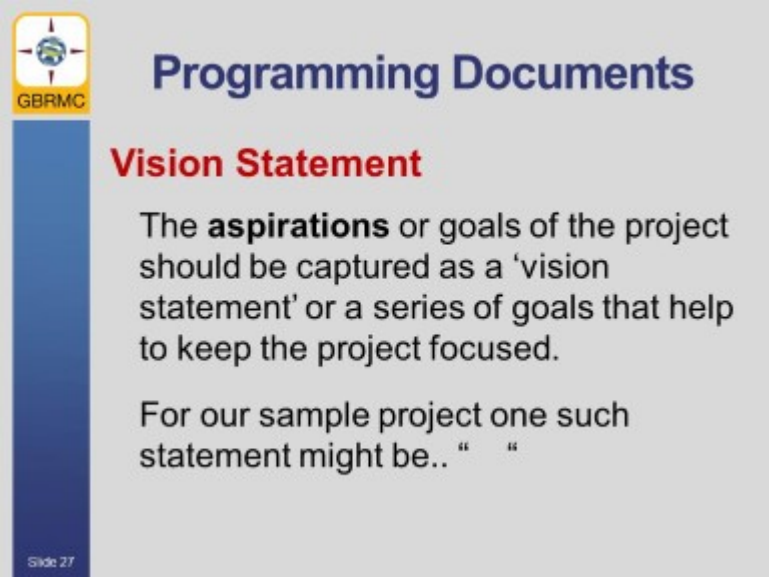
Notes:


GBRMC
Programming Exercise
Class Exercise:
1. What are the needs, the absolute 'must have's of this project?
2. What are the wants, the things the stakeholders would 'like to have'?
3. What are the aspirations, the goals or higher vision of the project?
Slide 25

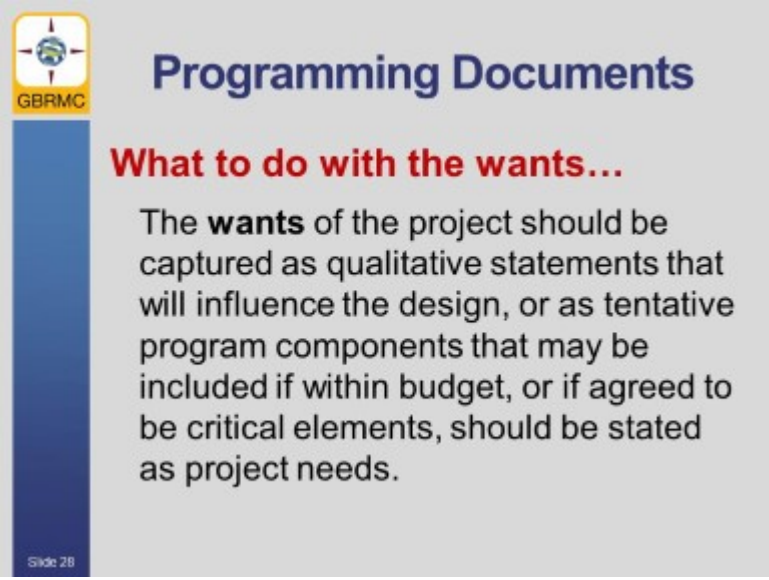
Notes:




What were some of the needs, wants or aspirations related to biosafety and biosecurity?

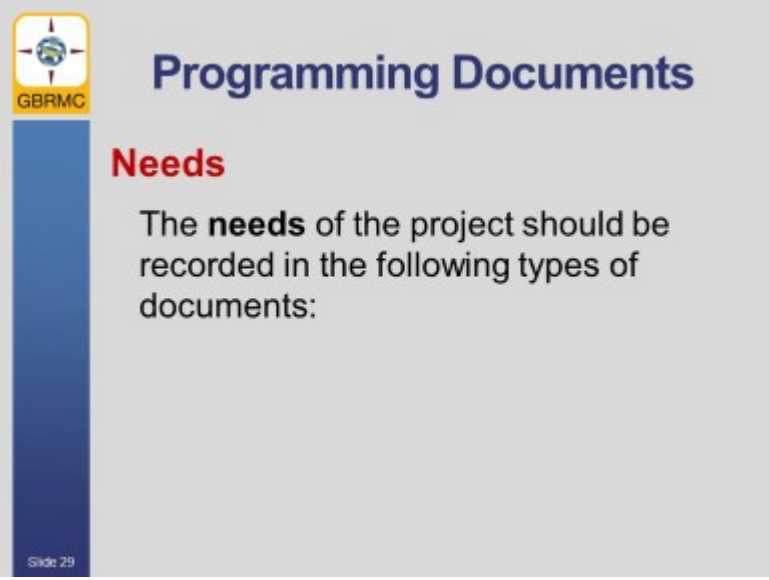



What might be the vision statement, or goal statement(s) of our programming project?



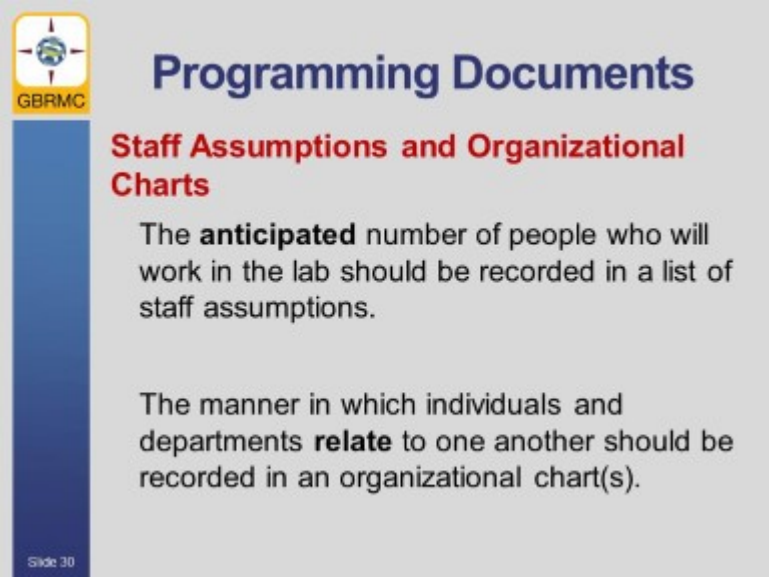

What are some of the wants you heard in your stakeholder interviews?

How would you record this information?




What are some of the needs you heard in your stakeholder interviews?

How would you record this information?


GBRMC
Programming Documents
Staff Assumptions and Organizational Charts
The anticipated number of people who will work in the lab should be recorded in a list of staff assumptions.
The manner in which individuals and departments relate to one another should be recorded in an organizational chart(s).
Slide 30

Notes:

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## Programming Documents

### Staffing Assumptions

| Department | Staff role | # |
|---|---|---|
| Poultry diagnostics | Department head | 1 |
| " " | Senior diagnosticians | 3 |
| " " | Diagnostic Technicians | 15 |
| Veterinary care | Veterinarian | 1 |
| " " | Veterinary Technicians | 4 |
| Biosafety | Facility Safety Officer | 1 |
| Administration | Administrative assistants | 2 |
| O & M | Facility manager | 1 |
| " " | Technicians | 4 |
| Total Staff | | 32 |

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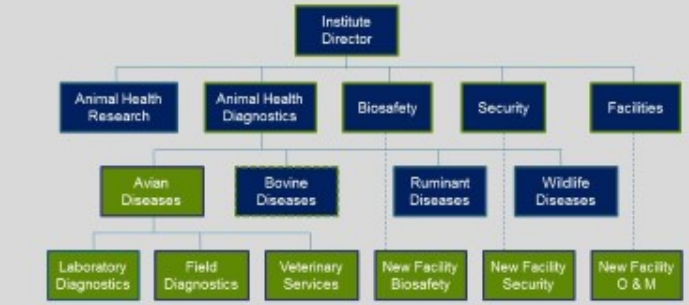
## Programming Documents

### Organizational Chart

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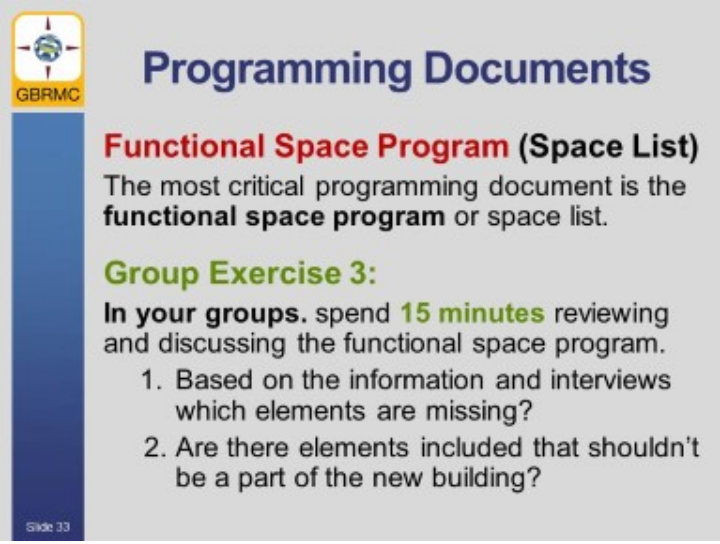
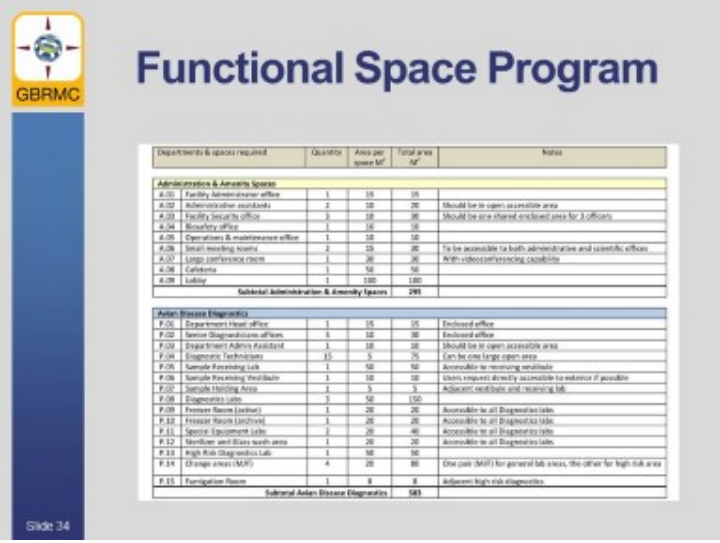
Notes:

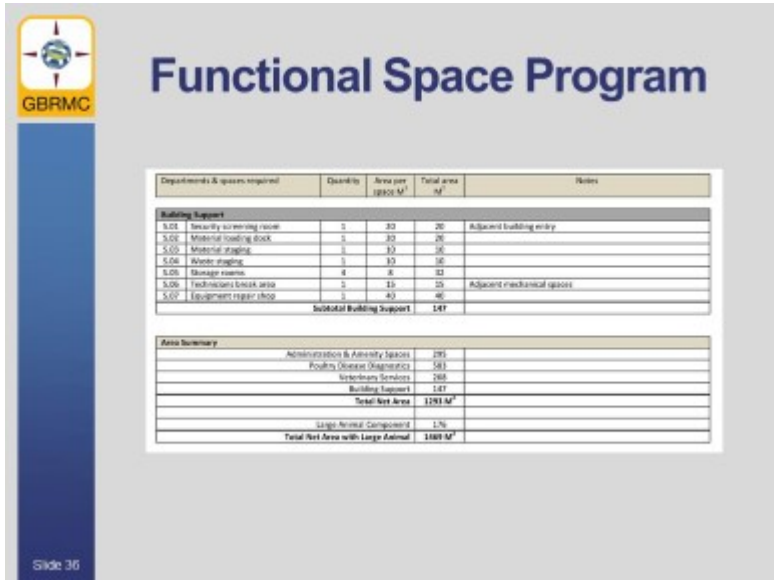


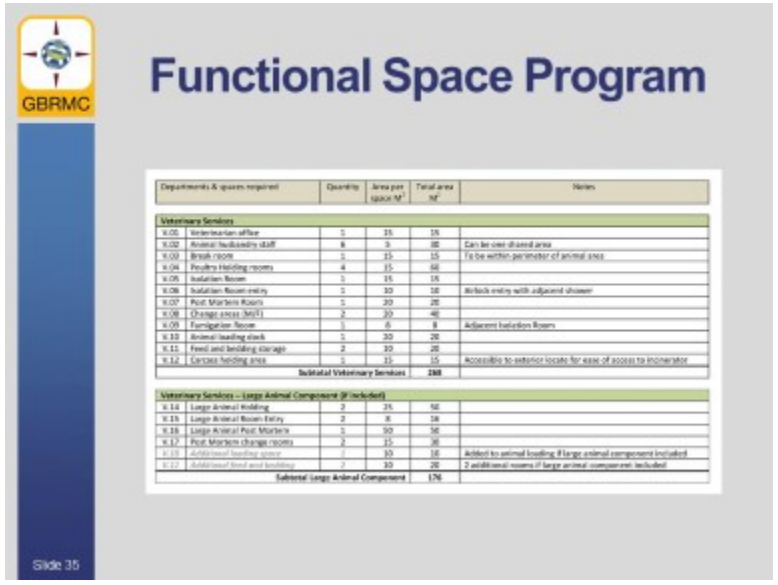



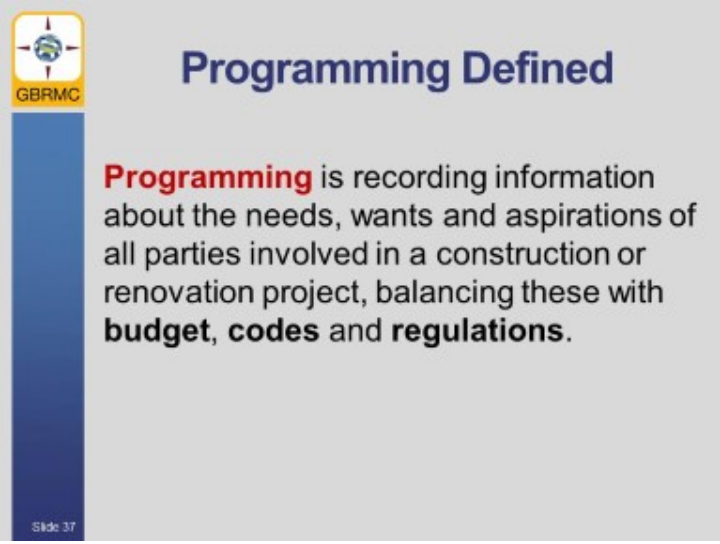

Functional space program is included at the end of this guide.

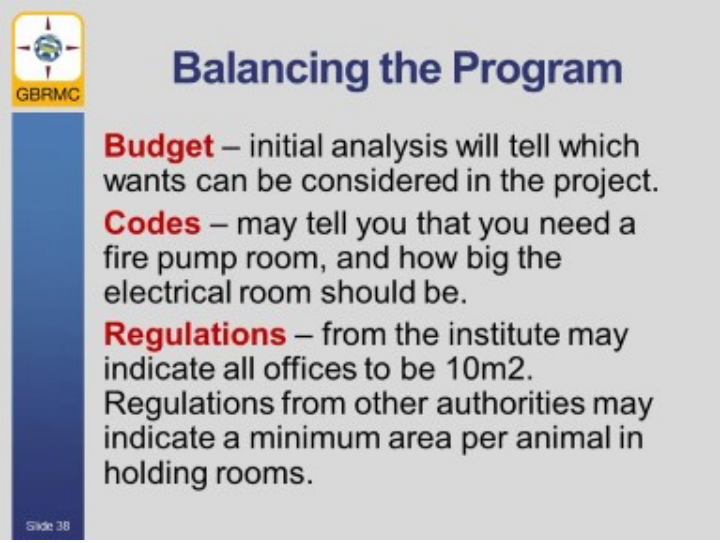
Which elements are missing?

Are there elements included that shouldn't be there?

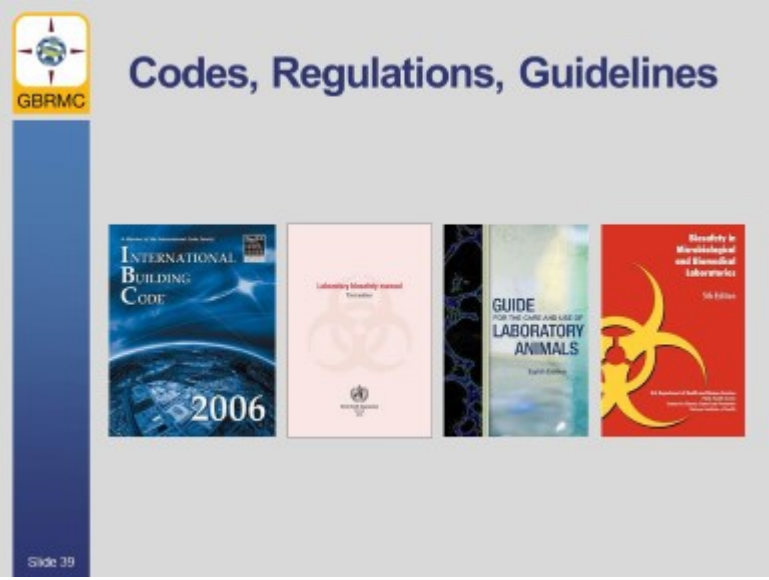

GBRMC
Functional Space Program
Slide 36


GBRMC
Functional Space Program
Slide 35

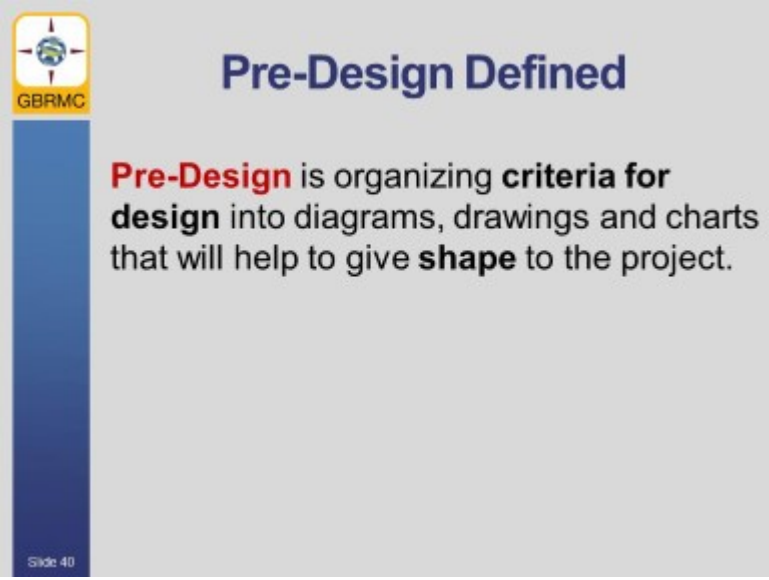

GBRMC
Programming Defined
Programming is recording information about the needs, wants and aspirations of all parties involved in a construction or renovation project, balancing these with budget, codes and regulations.
Slide 37


GBRMC
Balancing the Program
Budget – initial analysis will tell which wants can be considered in the project.
Codes – may tell you that you need a fire pump room, and how big the electrical room should be.
Regulations – from the institute may indicate all offices to be 10m2. Regulations from other authorities may indicate a minimum area per animal in holding rooms.
Slide 38

Notes:




What are some of the regulations particular to your area or situation?


GBRMC
Pre-Design Defined
Pre-Design is organizing criteria for design into diagrams, drawings and charts that will help to give shape to the project.
Slide 40

Notes:

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## Pre-Design Documents

### Relationship Diagrams

It is critical to record and verify the required adjacencies and relationships described by the building users or managers **prior** to embarking upon the design process. This allows both the design team, and the users to come to agreement upon which relationships will be given priority, eventually giving shape to the project.

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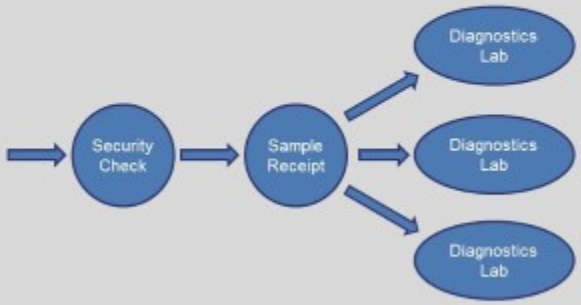
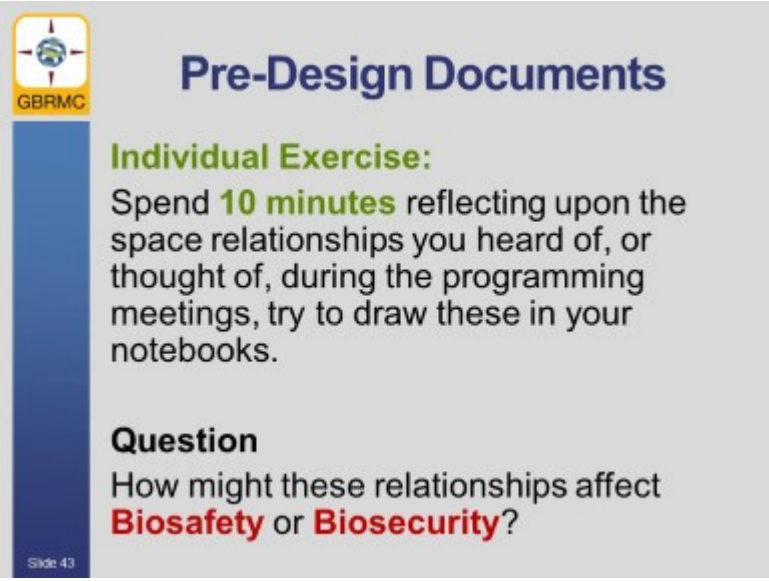
## Pre-Design Documents

### Relationship diagram example




Slide 42

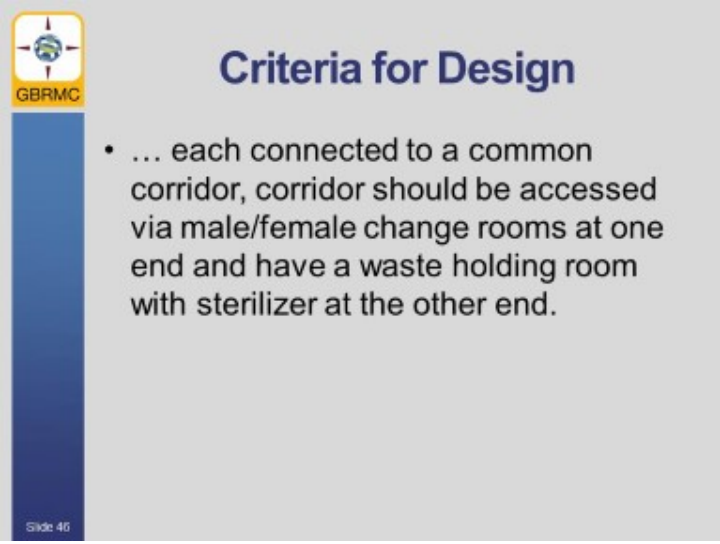
Notes:

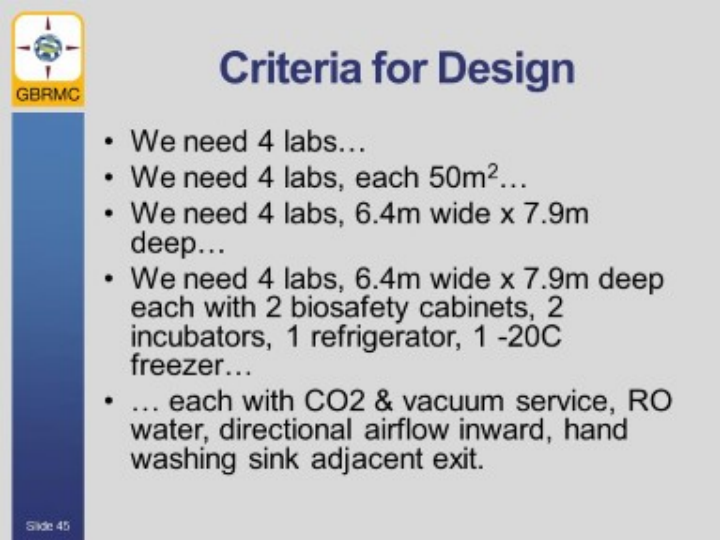



What are some of the critical relationships you heard of or thought of? Use this and the following pages to diagram the relationships.

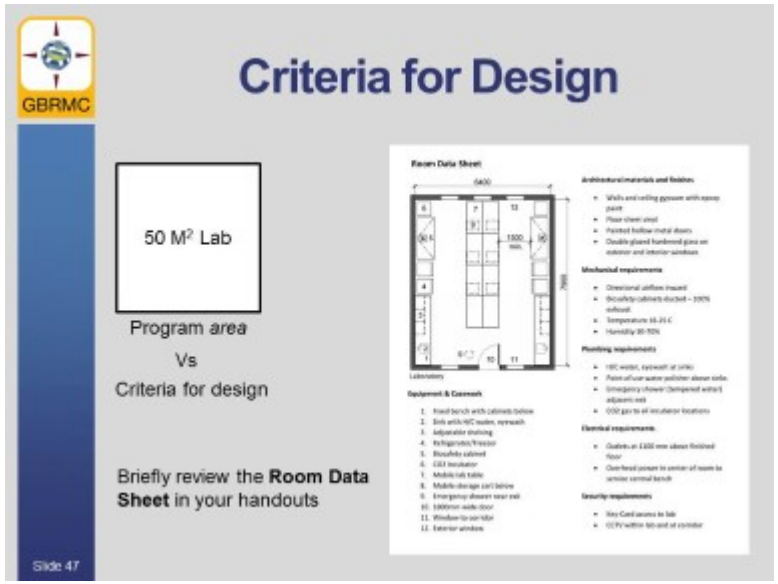

GBRMC
Criteria for Design
Pre-Design is organizing criteria for design into diagrams, drawings and charts that will help to give shape to the project.
Pre design drawings can record not only the 'big picture' relationships required in the facility, but also a 'detailed picture' of the facility components.
Slide 44

Notes:

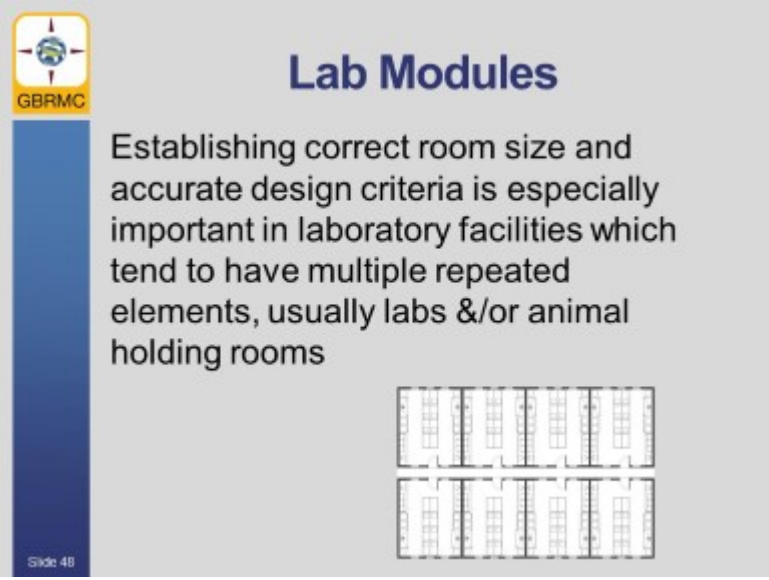

GBRMC
Criteria for Design
• … each connected to a common corridor, corridor should be accessed via male/female change rooms at one end and have a waste holding room with sterilizer at the other end.
Slide 46


GBRMC
Criteria for Design
• We need 4 labs…
• We need 4 labs, each 50m2…
• We need 4 labs, 6.4m wide x 7.9m deep…
• We need 4 labs, 6.4m wide x 7.9m deep each with 2 biosafety cabinets, 2 incubators, 1 refrigerator, 1 -20C freezer…
• … each with CO2 & vacuum service, RO water, directional airflow inward, hand washing sink adjacent exit.
Slide 45

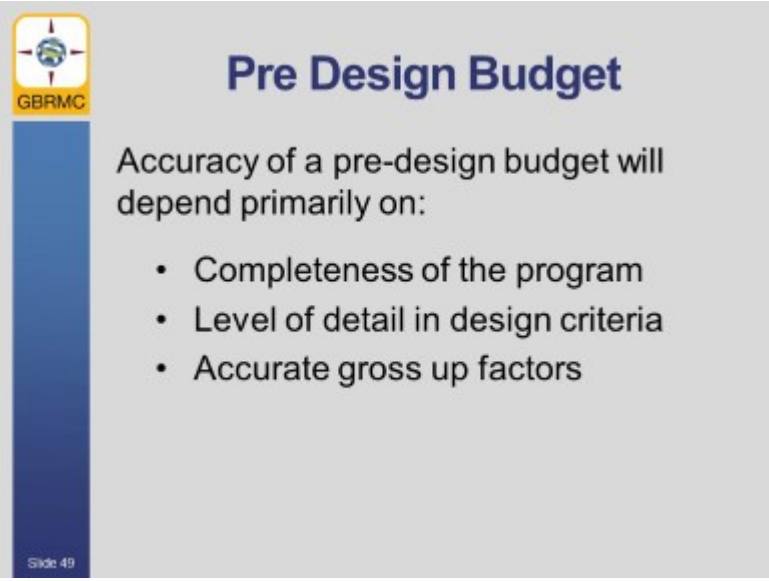
Notes:



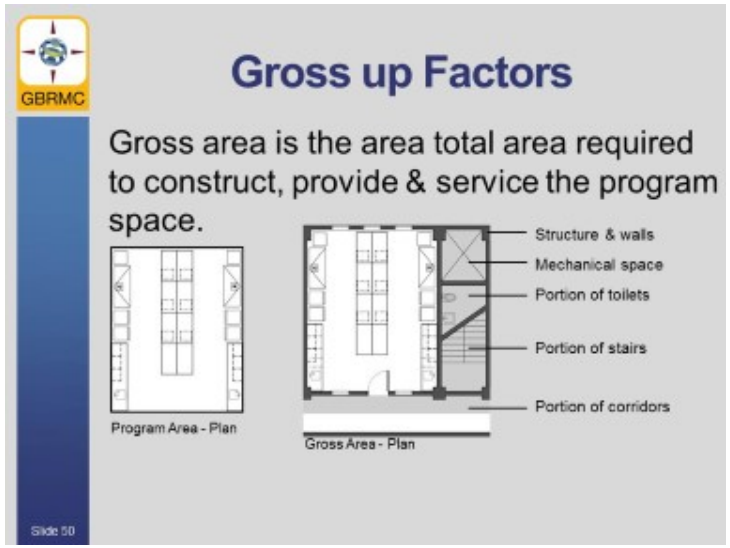

A copy of the room data sheet is included at the end of this guide.

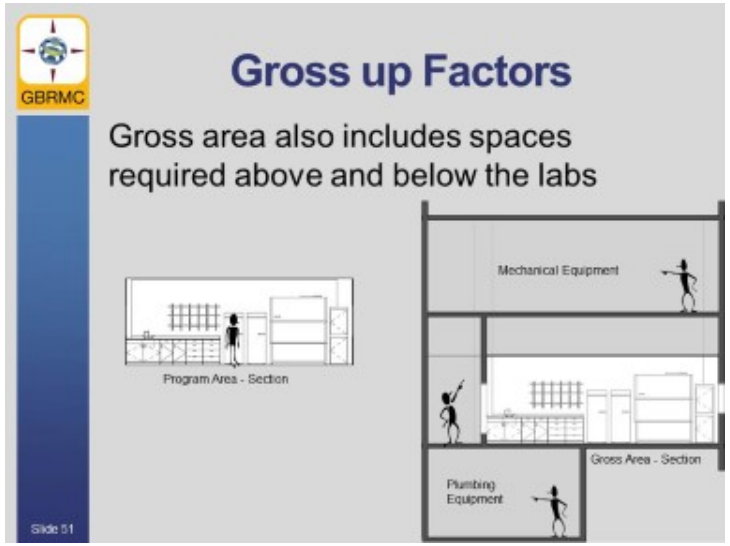

GBRMC
Lab Modules
Establishing correct room size and accurate design criteria is especially important in laboratory facilities which tend to have multiple repeated elements, usually labs &/or animal holding rooms
Slide 48

Notes:

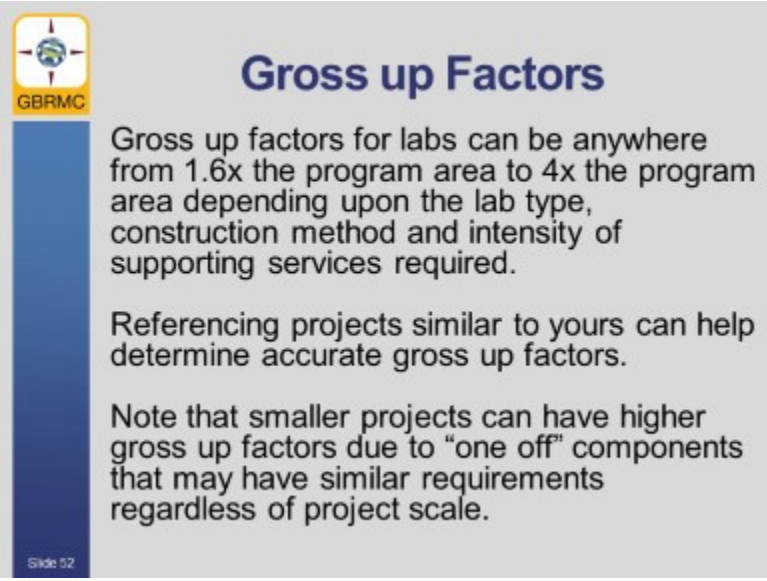

GBRMC
Pre Design Budget
Accuracy of a pre-design budget will depend primarily on:
• Completeness of the program
• Level of detail in design criteria
• Accurate gross up factors
Slide 49

Notes:

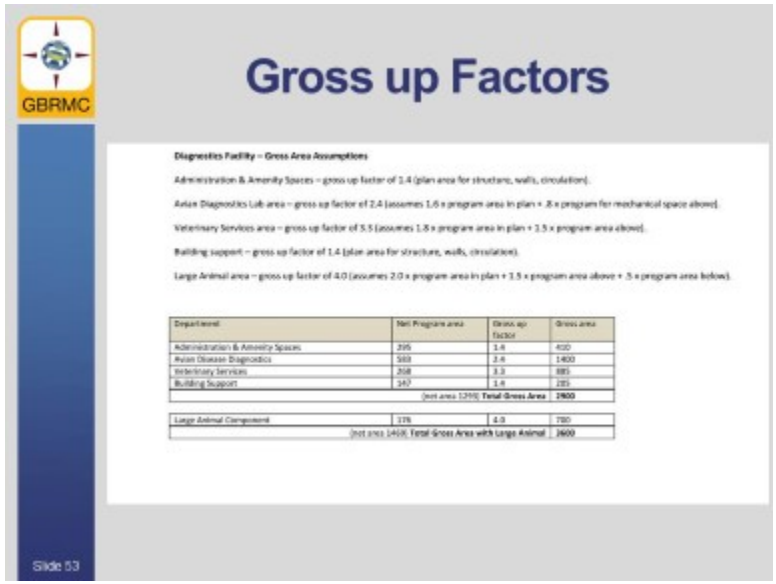

GBRMC
Gross up Factors
Gross area is the area total area required to construct, provide & service the program space.
Structure & walls
Mechanical space
Portion of toilets
Portion of stairs
Portion of corridors
Program Area - Plan
Gross Area - Plan
Slide 50


GBRMC
Gross up Factors
Gross area also includes spaces required above and below the labs
Program Area - Section
Mechanical Equipment
Gross Area - Section
Plumbing Equipment
Slide 51

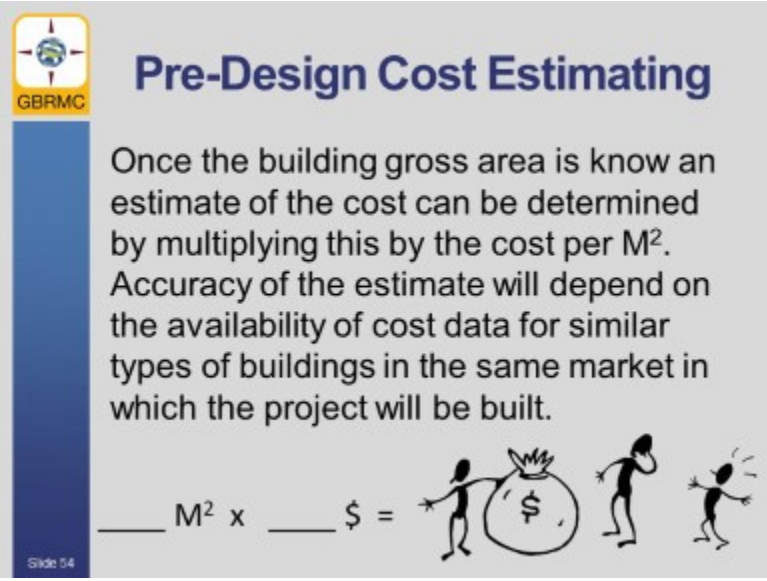
Notes:


GBRMC
Gross up Factors
Gross up factors for labs can be anywhere from 1.6x the program area to 4x the program area depending upon the lab type, construction method and intensity of supporting services required.
Referencing projects similar to yours can help determine accurate gross up factors.
Note that smaller projects can have higher gross up factors due to "one off" components that may have similar requirements regardless of project scale.
Slide 52

Notes:



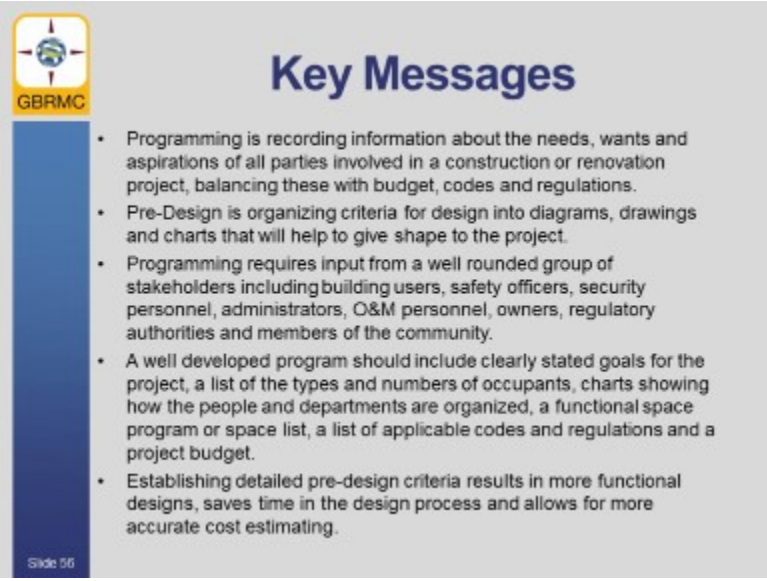

Notes these gross up factors are included with the Functional Space Program at the end of this guide.


GBRMC
Pre-Design Cost Estimating
Once the building gross area is know an estimate of the cost can be determined by multiplying this by the cost per M2. Accuracy of the estimate will depend on the availability of cost data for similar types of buildings in the same market in which the project will be built.
____ M2 x ____ $ =
Slide 54

Notes:


GBRMC
Review
To wrap-up, let's discuss what we learned about Programming & Pre-Design
What did we learn?
What does it mean?
Where do we go from here?
Slide 55

Notes:




- Programming is recording information about the needs, wants and aspirations of all parties involved in a construction or renovation project, balancing these with budget, codes and regulations.
- Pre-Design is organizing criteria for design into diagrams, drawings and charts that will help to give shape to the project.
- Programming requires input from a well rounded group of stakeholders including building users, safety officers, security personnel, administrators, O&M personnel, owners, regulatory authorities and members of the community.
- A well developed program should include clearly stated goals for the project, a list of the types and numbers of occupants, charts showing how the people and departments are organized, a functional space program or space list, a list of applicable codes and regulations and a project budget.
- Establishing detailed pre-design criteria results in more functional designs, saves time in the design process and allows for more accurate cost estimating.

*Remember your action plan!*

# Action Plan

| By the end of this lesson, I would like to: | | | | | |
|---|---|---|---|---|---|
| KNOW | | FEEL | | BE ABLE TO DO | |

*Your learning doesn't stop with this lesson. Use this space to think about what else you need to do or learn to put the information from this lesson into practice.*

| What more do I need to know or do? | How will I acquire the knowledge or skills? | How will I know that I've succeeded? | How will I use this new learning in my job? |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

*Use space on back, if needed*


Thank You!
Don't forget to complete your evaluation!
GBRMC
GLOBAL BIORISK MANAGEMENT
CURRICULUM

## Reference Materials for Further Study


A Design Guide for Energy Efficient Research Laboratories. Website. http://ateam.lbl.gov/Design-Guide/

ASHRAE Laboratory Design Guide. 2002. Ian B.D. McIntosh, Chad B. Dorgan, Charles E. Dorgan. American Society of Heating, Refrigerating and Air Conditioning Engineers.

Biosafety in Microbiological and Biomedical Laboratories (BMBL) 5th Edition, 2009. U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institutes of Health. Available online at: http://www.cdc.gov/biosafety/publications/bmbl5/

Building Type Basics for Research Laboratories. 2nd Edition, 2001. Daniel D. Watch, Stephen A. Kliment, Perkins & Will. John Wiley & Sons, Inc.

CWA 15793, CEN Workshop Agreement, Laboratory Biorisk Management. 2011. European Committee for Standardization. Available online at:
ftp://ftp.cenorm.be/CEN/Sectors/TCandWorkshops/Workshops/CWA15793_September2011.pdf

Guide for the Care and Use of Laboratory Animals. 8th Edition, 2011. Institute for Laboratory Animal Research, National Research Council of the National Academies. The National Academies Press.

International Building Code. 2006 International Code Council. Available online at:
http://publicecodes.cyberregs.com/icod/ibc/2006f2/index.htm

Laboratory Biosafety Manual. 3rd Edition, 2004. World Health Organization. Available in multiple languages online at:
http://www.who.int/csr/resources/publications/biosafety/WHO_CDS_CSR_LYO_2004_11/en/

Laboratory Biosecurity Handbook. 2007. Reynolds Mathewson Salerno, Jennifer Marie Guadioso. CRC Press.

Laboratory Design Guide. 3rd Edition, 2005. Brian Griffin. Architectural Press, Elsevier.

NFPA 45: Standard on Fire Protection for Laboratories Using Chemicals. 2011. National Fire Protection Association. Available online at: http://www.nfpa.org/

Problem Seeking: An Architectural Programming Primer. 5th Edition, 2012. William M. Peña, Steven A. Parshall. John Wiley & Sons, Inc.

Whole Building Design Guide. Website. http://www.wbdg.org/

## Typical Programming Questions

Note – whenever possible try to conduct interview in the users' working labs (or other spaces they use) or combine interviews with a tour. Even though the existing spaces may not be ideal in their layout it will be easier for users to describe how they work and by pointing out what they like and don't like about their existing accommodations they will give you valuable insights into what is needed in their new program.

## For all users:

- How many people are in your group? Is growth anticipated? Level of growth?
- How is the group organized? Does an organizational chart exist? Can one be drawn?
- What other groups in the facility does your group interact with? Specific adjacencies required?
- Do you have standards for area per person?
- Describe what works well about your current space.
- Describe what does not work well about your current space.
- Describe all the different types of dedicated spaces your group currently uses or anticipates needing.
- Describe all the different types of shared spaces your group currently uses or anticipates needing. Who can share these spaces? Are there groups that cannot share these spaces?
- How do you see the work you do, the spaces or equipment required, changing over the next 5, 10, 20 years?
- What are two or three important things you feel the new facility must do for your group?
- What two or three greatest concerns? Faults of existing accommodations not to be repeated?

## For facility directors and leaders:

- What is your overall vision for the project?
- How is the new facility intended to advance the work you do?
- How will this new facility fit into your campus/organization? Describe, in broad terms, the work your organization does, and the part of that work this new facility is intended to support.
- What is the overall structure of your organization? Do organizational charts exist? Can they be drawn?
- What are the elements the facility must include? May include? Should include if economically feasible? In other words what are the absolute necessities, and what are the 'nice to have' components?
- How do you see the group utilizing this facility growing over the next 5, 10, 20 years?
- How will the whole campus/organization grow over the next 5, 10, 20 years?
- How many staff is the facility intended to accommodate? Today? In future?
- Should the facility be planned for expansion?
- What are your greatest hopes for the project? Greatest concerns?

## For diagnosticians:

- Include “all users” questions +
- Describe number and type of samples received per day/month/year.
- What types of disease or toxin does your group investigate?
- What are the risks involved in working with these agents?
- Are samples received taken from animals, humans or both?
- Are live animals diagnosed in the facility? Which species? In what numbers?
- If live animals diagnosed do diagnosticians work with animals or does a separate group take care of animal husbandry and all animal manipulations? (see also questions for veterinarians and animal husbandry)
- If live animals housed in the facility what is the ideal relationship between the labs and the animal areas?
- Describe as much as possible the process of receiving, processing, storing, disposal, of samples including equipment used at each stage of the process.
- If human samples received are these delivered? Or do patients come to lab?
- Does the lab receive, or anticipate, surges of samples due to outbreaks?
- Samples received centrally or per lab?
- How are unknowns dealt with?
- Describe any containment equipment (biosafety cabinets, isolators, sterilizers) your group utilizes or requires.
- What measures are, or should be in place, to prevent cross contamination?
- What measures are, or should be in place to prevent theft or accidental loss of sample material?
- What measures are, or should be in place to secure diagnostic information?
- How is access to the lab controlled? Currently? Ideally?
- What safety precautions to users take? PPE (personnel protective equipment) worn? Vaccinations required?
- Does all the work have the same level of risk? Or are some parts higher risk than others? Describe how you think the work should be separated if different levels exist.
- How many users work together in one area? Currently? Ideally?
- What precautions are currently taken for dealing with spills or accidental exposures? Are emergency eyewashes, showers, alarms (audio/visual) required in the lab(s)? Or adjacent the lab(s)?
- How do you communicate with those outside the lab? Under normal conditions? Under emergency conditions? If a spill has occurred, how are others notified to help or to stay out?

## For researchers:

- Include “all users” questions +
- What types of disease or toxin does your group investigate?
- What are the risks involved in working with these agents?
- How many studies are carried out per year?
- Does the research involve animal subjects? Which species? In what numbers?
- If live animals utilized do researchers work with animals or does a separate group take care of animal husbandry and all animal manipulations? (see also questions for veterinarians and animal husbandry)
- If animals utilized for research what is the ideal relationship between the labs and the animal areas?
- Does the research involve volunteer subjects/patients?
- Describe as much as possible your experimental process including equipment used at each stage, the preparation of agents/toxins for use and the storage of biological or toxic materials during and after the study is complete.
- Do laboratory &/or equipment requirements change with different stages of the work?
- Describe any containment equipment (biosafety cabinets, isolators, sterilizers) your group utilizes or requires.
- What measures are, or should be in place, to prevent cross contamination?
- What measures are, or should be in place to prevent theft or accidental loss of research materials?
- What measures are, or should be in place to secure research information?
- How is access to the lab controlled? Currently? Ideally?
- What safety precautions to users take? PPE (personnel protective equipment) worn? Vaccinations required?
- Does all the work have the same level of risk? Or are some parts higher risk than others? Describe how you think the work should be separated if different levels exist.
- How many users work together in one area? Currently? Ideally?
- What precautions are currently taken for dealing with spills or accidental exposures? Are emergency eyewashes, showers, alarms (audio/visual) required in the lab(s)? Or adjacent the lab(s)?
- How do you communicate with those outside the lab? Under normal conditions? Under emergency conditions? If a spill has occurred, how are others notified to help or to stay out?

## For veterinarians and animal husbandry:

- Include “all users” questions +
- Describe the numbers and species of animals your group currently works with? How will these change with the new facility?
- Do animal numbers/space requirements change over the period of a study? At different times of year?
- What diseases or toxins are the animals in your care exposed to? Include those agents studied for research or diagnostics work, as well as other diseases that may be problematic for the species.
- How will the animals be housed? Loose in the room? In cages open to the air? In isolators with controlled airflow?
- How does your group work with the researchers/diagnosticians in the facility?
- Describe your daily routine in working with the animals. Describe work with each species separately if multiple types.
- What types of procedures are carried out? Are these done in the holding room? Or a separate procedure room? How should the procedure rooms relate to the holding areas?
- Are surgeries performed? Post mortem work?
- Do animals survive beyond the studies? If so how are they cared for?
- If euthanized, or deceased from disease or toxic exposure, how are carcasses disinfected and ultimately disposed of?
- How often are holding rooms cleaned? Decontaminated? How often are cages changed? Describe the procedures for all of these.
- What are the space requirements for each species? Specific temperature, humidity, lighting requirements?
- What are the risks involved in working with these species and the diseases they are infected with (or toxins exposed to)?
- What measures are, or should be in place, to prevent cross contamination?
- Is a clean/dirty corridor system desirable?
- What safety precautions to users take? PPE (personnel protective equipment) worn? Vaccinations required?
- How is access to the animal area controlled? Currently? Ideally?
- Is access restricted to certain areas once inside the animal area?
- What precautions are currently taken for dealing with accidents or exposures? Are emergency eyewashes, showers, alarms (audio/visual) required?
- How do you communicate with those outside the lab? Under normal conditions? Under emergency conditions? If an exposure has occurred, how are others notified to help or to stay out?

## For biosafety officers:

- Which diseases or toxins are examined in the facility? What are the risks involved with each?
- Describe the safety precautions, PPE (personnel protective equipment) worn by users, and facility containment features required for working with each.
- If possible map out the protocols currently utilized on a plan or diagram. What works well? What could be improved in the new facility? How can the facility design help to enforce protocols?
- Where are users trained in biosafety protocols? Is a dedicated lab used for this? Or a working lab? If a working lab does it need special features specifically for training?
- Describe the process or processes for decontaminating laboratories and animal areas. Which are done on a daily basis? Weekly? Annually?
- Are labs shut down for decontamination and testing on a regular basis?
- Are there systems in the lab that require continuous operation to maintain safety for users and/or the environment?
- Describe any containment equipment (biosafety cabinets, isolators, sterilizers) utilized or required in the new facility.
- Describe any problems with cross contamination or lab acquired infections your institute has had in the past. How can the facility design help to prevent these?
- Describe how spills and other accidents or emergencies are dealt with. Describe any past events that should be considered.
- Describe any vaccination or health monitoring programs run or anticipated at the facility. Do these require dedicated spaces in the building?
- How is safety in the labs/animal areas monitored? What can the new facility do to support this?
- Do security systems keep track of who is in the labs at all times?

## For biosecurity officers:

- Which diseases or toxins are examined in the facility? What are the risks involved with each?
- Describe security measures in place, or anticipated, to maintain security of biological or toxic materials used or stored in the facility. Include measures to protect against internal as well as external threats.
- How is access to the site controlled and monitored?
- How is access to the building controlled and monitored?
- How is access to secure lab areas controlled and monitored? Are there different levels of security within different lab areas? How are dangerous materials (toxins or biological agents) secured within the lab areas? Are freezers/fridges/cabinets locked and monitored within the labs?
- How do security officers respond to alarms in labs? To other threats? Describe any past events that should be considered.

## For facility managers, operations and maintenance staff:

- Describe how your staff work with your current buildings, are there individuals dedicated to certain facilities? Or does one group take care of all facilities?
- Will staff be located in this building? Describe requirements for any offices, break areas, change rooms, repair shop or storage spaces.
- Describe the daily, weekly, monthly and yearly maintenance activities carried out your existing or a similar facility comparable to the new project.
- Describe the process or processes for decontaminating laboratories and animal areas. Which are done on a daily basis? Weekly? Annually?
- Are labs shut down for decontamination and testing on a regular basis?
- Are there systems in the lab that require continuous operation to maintain safety for users and/or the environment? Describe any system redundancies your current facilities have. Which are anticipated at the new facility?
- Describe any containment equipment (biosafety cabinets, isolators, sterilizers, HEPA filters, effluent treatment) utilized or required in the new facility.
- Describe maintenance and testing, certification procedures for the above systems.
- Describe any maintenance issues or system failures experienced on other facilities that should be considered in the new design.
- Are maintenance staff members required to enter lab or animal areas or can most maintenance be done from outside these spaces? Are there areas where this approach can be improved?
- Are there existing systems on the site/campus that will support the new facility? (Emergency power generators, steam supply, chilled water etc.) If so what is the condition of these systems? What is the capacity? Do any require upgrading to support the new project?

## Stakeholders to consider:

- Diagnosticians, Researchers, Veterinarians and other scientific personnel
- Support staff
- Staff in neighboring facilities on same campus or within same organization who may occasionally use shared areas in the facility
- Facility Directors and Administrators
- Funders
- Biosafety officer(s)
- Security officer(s)
- Operations and maintenance staff
- Regulatory authorities
- Community
- Health, Safety & Security organizations serving the community (fire department, police, nearby hospitals)
- Other design/engineering team members involved in project
- Master plan designer if applicable

## Diagnostics Facility Programming Scenario

The institute for animal health protection in rural _____ is developing a new diagnostics laboratory on their scientific campus in response to increasing concerns over occurrences of a disease which affects poultry and other birds. Rare strains of the disease can be transferred to humans resulting in severe illness & in some cases death where the patients are elderly or have compromised immune systems, however most known strains of the disease do not pose a significant risk to human health. The role of the laboratory will be to test samples delivered by local farmers & other agencies to determine the presence of the disease and to categorize the strain, if present, in order to direct the farmers with respect to caring for their animals and preventing spread of the disease. Diagnostic materials may come in the form of blood or fecal samples, sections of tissue, whole carcasses or live birds.

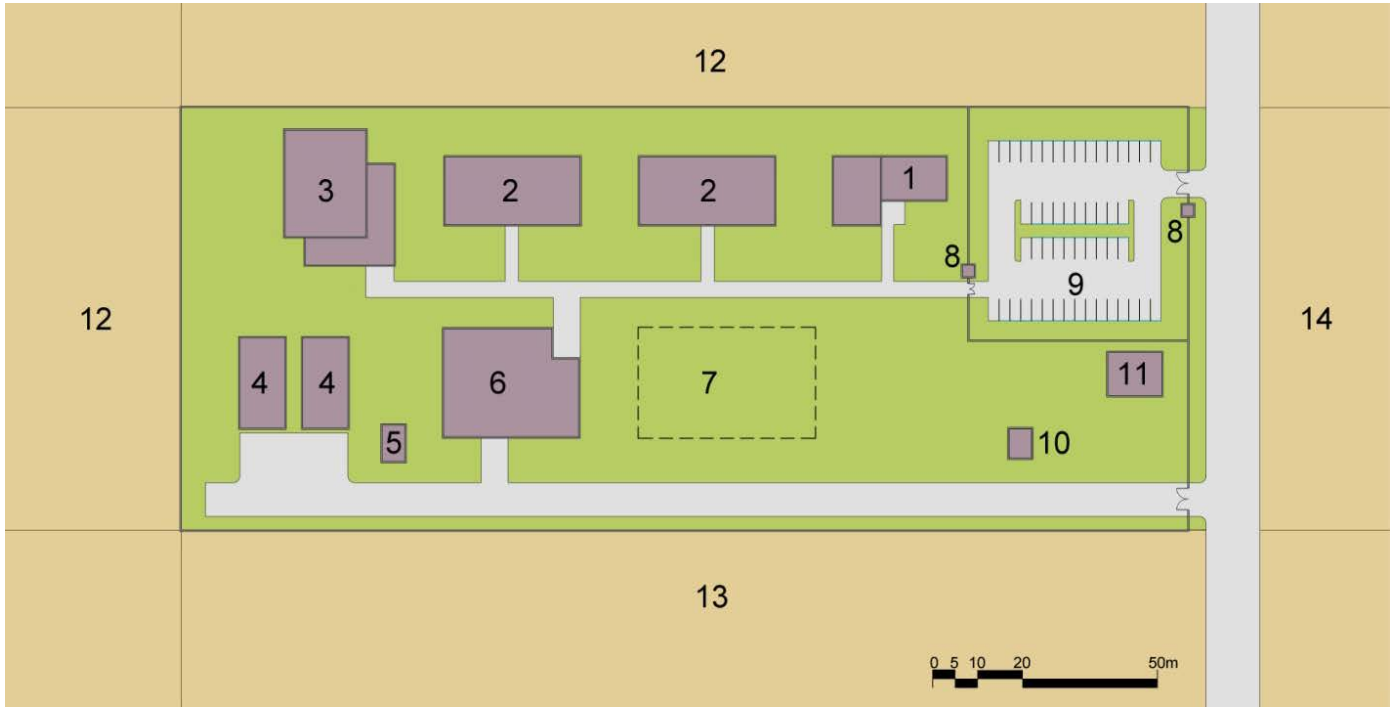
The institute's director has stated that the new facility should be 'state of the art' and hopes it will help to attract top notch scientific personnel. Neighboring farmers have expressed concern over the presence of infectious disease work on the campus fearing diseases may be spread to their livestock or to their families. Diagnosticians on the campus have complained that the lab areas they are currently using for diagnosis of this disease are not well organized and become overwhelmed with samples when outbreaks, or even fears of outbreaks, occur. Throughout the campus, staff members have long been asking for more office, meeting and break spaces which are insufficient in other buildings and many are hoping the new facility will provide them with much needed space.

The institute's funding agency has proposed an initial budget of _____ which needs to be confirmed with a pre-design estimate before any approval for a building project is granted.

A site near the campus entry, adjacent to a large animal diagnostics facility, has been proposed as the best location for the building. Diagnosticians working with large animals have asked about the potential of housing one or two large animals (goats or cattle up to 500kg) in the new facility as it is anticipated that the new facility will have superior containment features and might be appropriate for larger animals diagnosed with highly infectious diseases. The funding agency however has indicated that the project funds need to be primarily focused on addressing poultry diseases.

An initial biosafety risk assessment has indicated that diagnosticians working with unknown or high risk strains of the disease may be at risk of infection through release of aerosols during certain diagnostic processes. They should wear gloves, body and respiratory protection when manipulating live agents and should shower before leaving the facility. Those working with low risk strains or inactivated materials can work within a typical lab environment.

## Institute Site Plan




1. Administration building – 2 story structure
2. Diagnostics laboratories - 2 story structures
3. Multi purpose building with labs, conference rooms, cafeteria – 3 story structure
4. Support buildings – 1 story structures
5. Incinerator
6. Large animal facility – 2 story structure (1 working level with mechanical floor above)
7. Proposed site
8. Security guard houses
9. Parking
10. Storage shed
11. Abandoned structure
12. Adjacent farmland
13. Adjacent land owned by institute, reserved for future development
14. Adjacent farmland with a row of houses built along the road

## Diagnostics Facility - Functional Space Program

| | Departments & spaces required | Quantity | Area per space $M^2$ | Total area $M^2$ | Notes |
|---|---|---|---|---|---|
| **Administration & Amenity Spaces** | | | | | |
| A.01 | Facility Administrator office | 1 | 15 | 15 | |
| A.02 | Administrative assistants | 2 | 10 | 20 | Should be in open accessible area |
| A.03 | Facility Security office | 3 | 10 | 30 | Should be one shared enclosed area for 3 officers |
| A.04 | Biosafety office | 1 | 10 | 10 | |
| A.05 | Operations & maintenance office | 1 | 10 | 10 | |
| A.06 | Small meeting rooms | 2 | 15 | 30 | To be accessible to both administrative and scientific offices |
| A.07 | Large conference room | 1 | 30 | 30 | With videoconferencing capability |
| A.08 | Cafeteria | 1 | 50 | 50 | |
| A.09 | Lobby | 1 | 100 | 100 | |
| | **Subtotal Administration & Amenity Spaces** | | | **295** | |
| **Avian Disease Diagnostics** | | | | | |
| P.01 | Department Head office | 1 | 15 | 15 | Enclosed office |
| P.02 | Senior Diagnosticians offices | 3 | 10 | 30 | Enclosed office |
| P.03 | Department Admin Assistant | 1 | 10 | 10 | Should be in open accessible area |
| P.04 | Diagnostic Technicians | 15 | 5 | 75 | Can be one large open area |
| P.05 | Sample Receiving Lab | 1 | 50 | 50 | Accessible to receiving vestibule |
| P.06 | Sample Receiving Vestibule | 1 | 10 | 10 | Users request directly accessible to exterior if possible |
| P.07 | Sample Holding Area | 1 | 5 | 5 | Adjacent vestibule and receiving lab |
| P.08 | Diagnostics Labs | 3 | 50 | 150 | |
| P.09 | Freezer Room (active) | 1 | 20 | 20 | Accessible to all Diagnostics labs |
| P.10 | Freezer Room (archive) | 1 | 20 | 20 | Accessible to all Diagnostics labs |
| P.11 | Special Equipment Labs | 2 | 20 | 40 | Accessible to all Diagnostics labs |
| P.12 | Sterilizer and Glass wash area | 1 | 20 | 20 | Accessible to all Diagnostics labs |
| P.13 | High Risk Diagnostics Lab | 1 | 50 | 50 | |
| P.14 | Change areas (M/F) | 4 | 20 | 80 | One pair (M/F) for general lab areas, the other for high risk area |
| P.15 | Fumigation Room | 1 | 8 | 8 | Adjacent high risk diagnostics |
| | **Subtotal Avian Disease Diagnostics** | | | **583** | |

## Diagnostics Facility - Functional Space Program (continued)

| | Departments & spaces required | Quantity | Area per space $M^2$ | Total area $M^2$ | Notes |
|---|---|---|---|---|---|
| **Veterinary Services** | | | | | |
| V.01 | Veterinarian office | 1 | 15 | 15 | |
| V.02 | Animal husbandry staff | 6 | 5 | 30 | Can be one shared area |
| V.03 | Break room | 1 | 15 | 15 | To be within perimeter of animal area |
| V.04 | Poultry Holding rooms | 4 | 15 | 60 | |
| V.05 | Isolation Room | 1 | 15 | 15 | |
| V.06 | Isolation Room entry | 1 | 10 | 10 | Airlock entry with adjacent shower |
| V.07 | Post Mortem Room | 1 | 20 | 20 | |
| V.08 | Change areas (M/F) | 2 | 20 | 40 | |
| V.09 | Fumigation Room | 1 | 8 | 8 | Adjacent Isolation Room |
| V.10 | Animal loading dock | 1 | 20 | 20 | |
| V.11 | Feed and bedding storage | 2 | 10 | 20 | |
| V.12 | Carcass holding area | 1 | 15 | 15 | Accessible to exterior locate for ease of access to incinerator |
| | **Subtotal Veterinary Services** | | | **268** | |
| **Veterinary Services – Large Animal Component (if included)** | | | | | |
| V.14 | Large Animal Holding | 2 | 25 | 50 | |
| V.15 | Large Animal Room Entry | 2 | 8 | 16 | |
| V.16 | Large Animal Post Mortem | 1 | 50 | 50 | |
| V.17 | Post Mortem change rooms | 2 | 15 | 30 | |
| *V.10* | *Additional loading space* | *1* | 10 | 10 | Added to animal loading if large animal component included |
| *V.11* | *Additional feed and bedding* | *2* | 10 | 20 | 2 additional rooms if large animal component included |
| | **Subtotal Large Animal Component** | | | **176** | |

**Diagnostics Facility - Functional Space Program (continued)**

| Departments & spaces required | | Quantity | Area per space $M^2$ | Total area $M^2$ | Notes |
|---|---|---|---|---|---|
| **Building Support** | | | | | |
| S.01 | Security screening room | 1 | 20 | 20 | Adjacent building entry |
| S.02 | Material loading dock | 1 | 20 | 20 | |
| S.03 | Material staging | 1 | 10 | 10 | |
| S.04 | Waste staging | 1 | 10 | 10 | |
| S.05 | Storage rooms | 4 | 8 | 32 | |
| S.06 | Technicians break area | 1 | 15 | 15 | Adjacent mechanical spaces |
| S.07 | Equipment repair shop | 1 | 40 | 40 | |
| **Subtotal Building Support** | | | | **147** | |

| **Area Summary** | | |
|---|---|---|
| Administration & Amenity Spaces | 295 | |
| Poultry Disease Diagnostics | 583 | |
| Veterinary Services | 268 | |
| Building Support | 147 | |
| **Total Net Area** | **1293 $M^2$** | |
| | | |
| Large Animal Component | 176 | |
| **Total Net Area with Large Animal** | **1469 $M^2$** | |

**Diagnostics Facility – Gross Area Assumptions**

Administration & Amenity Spaces – gross up factor of 1.4 (plan area for structure, walls, circulation).

Avian Diagnostics Lab area – gross up factor of 2.4 (assumes 1.6 x program area in plan + .8 x program for mechanical space above).

Veterinary Services area – gross up factor of 3.3 (assumes 1.8 x program area in plan + 1.5 x program area above).

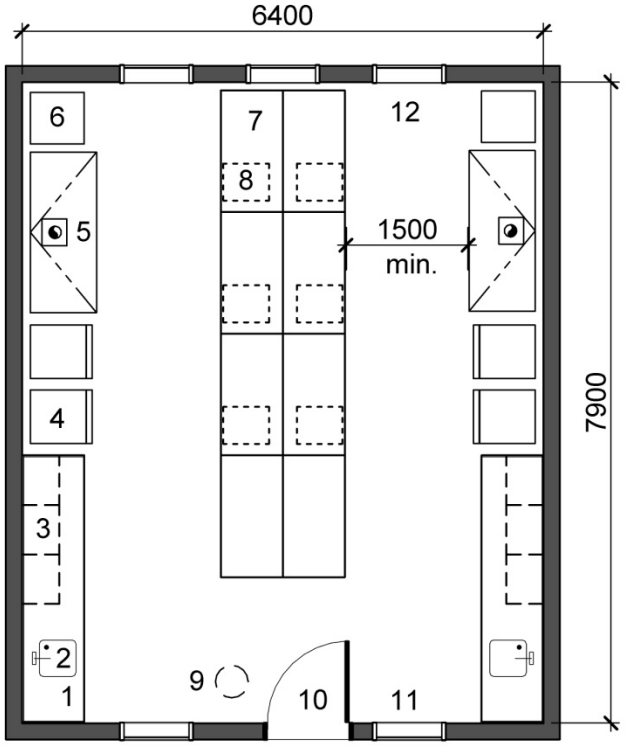
Building support – gross up factor of 1.4 (plan area for structure, walls, circulation).

Large Animal area – gross up factor of 4.0 (assumes 2.0 x program area in plan + 1.5 x program area above + .5 x program area below).

| Department | Net Program area | Gross up factor | Gross area |
|---|---|---|---|
| Administration & Amenity Spaces | 295 | 1.4 | 410 |
| Avian Disease Diagnostics | 583 | 2.4 | 1400 |
| Veterinary Services | 268 | 3.3 | 885 |
| Building Support | 147 | 1.4 | 205 |
| (net area 1293) **Total Gross Area** | | | **2900** |

| | | | |
|---|---|---|---|
| Large Animal Component | 176 | 4.0 | 700 |
| (net area 1469) **Total Gross Area with Large Animal** | | | **3600** |

## Room Data Sheet




Laboratory

**Equipment & Casework**

1. Fixed bench with cabinets below
2. Sink with H/C water, eyewash
3. Adjustable shelving
4. Refrigerator/Freezer
5. Biosafety cabinet
6. CO2 incubator
7. Mobile lab table
8. Mobile storage cart below
9. Emergency shower near exit
10. 1000mm wide door
11. Window to corridor
12. Exterior window

**Architectural materials and finishes**

- Walls and ceiling gypsum with epoxy paint
- Floor sheet vinyl
- Painted hollow metal doors
- Double glazed hardened glass on exterior and interior windows

**Mechanical requirements**

- Directional airflow inward
- Biosafety cabinets ducted – 100% exhaust
- Temperature 18-25 C
- Humidity 30-70%

**Plumbing requirements**

- H/C water, eyewash at sinks
- Point of use water polisher above sinks
- Emergency shower (tempered water) adjacent exit
- CO2 gas to all incubator locations

**Electrical requirements**

- Outlets at 1100 mm above finished floor
- Overhead power in center of room to service central bench

**Security requirements**

- Key-Card access to lab
- CCTV within lab and at corridor