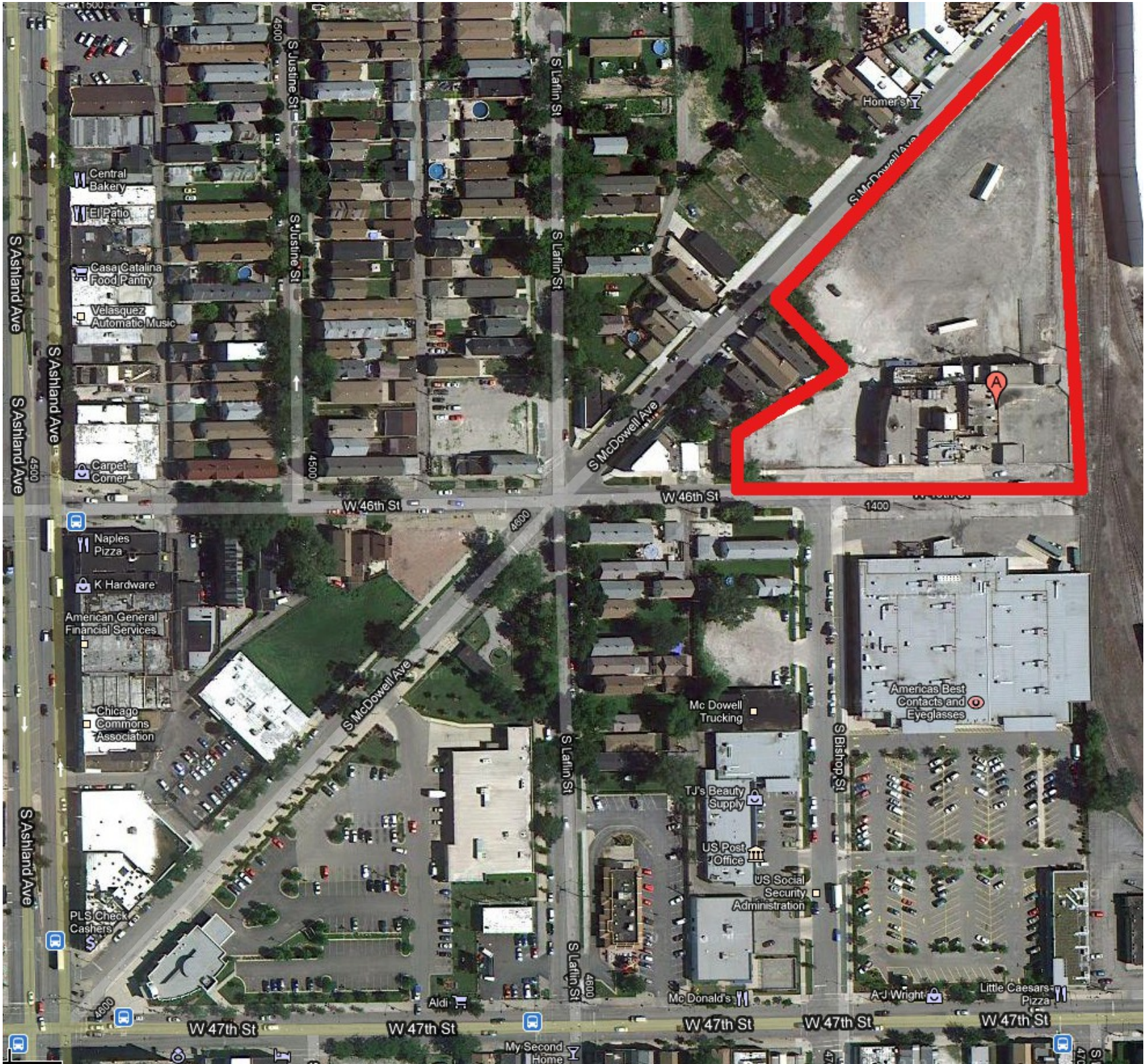
IPRO336: Implementing The Plant Chicago

- 17 Students
- 5 Majors(CS,ArchEng,Arch,CPE,ChemE)
- 4 sub-groups
  - Agricultural Systems
  - Computer Control Systems
  - Architecture
  - Anaerobic Digester

The Plant Chicago
http://plantchicago.com

- Combine vertical farming and industrial reuse
- Closing waste/energy loops through industrial ecology
- Building Acquired July 2010
- 93k sq-ft former meatpacking plant in Union Stockyards


S Justine St
S Laflin St
S Ashland Ave
S McDowell Ave
Homer's
Central Bakery
El Patio
Casa Catalina Food Pantry
Velasquez Automatic Music
Carpet Corner
W 46th St
Naples Pizza
K Hardware
American General Financial Services
Chicago Commons Association
Mc Dowell Trucking
Americas Best Contacts and Eyeglasses
S Bishop St
TJ's Beauty Supply
US Post Office
US Social Security Administration
PLS Check Cashers
Aldi
Mc Donald's
A-J Wright
Little Caesars Pizza
W 47th St
My Second Home
A
4500
4600
1400

History: 3rd Semester IPRO

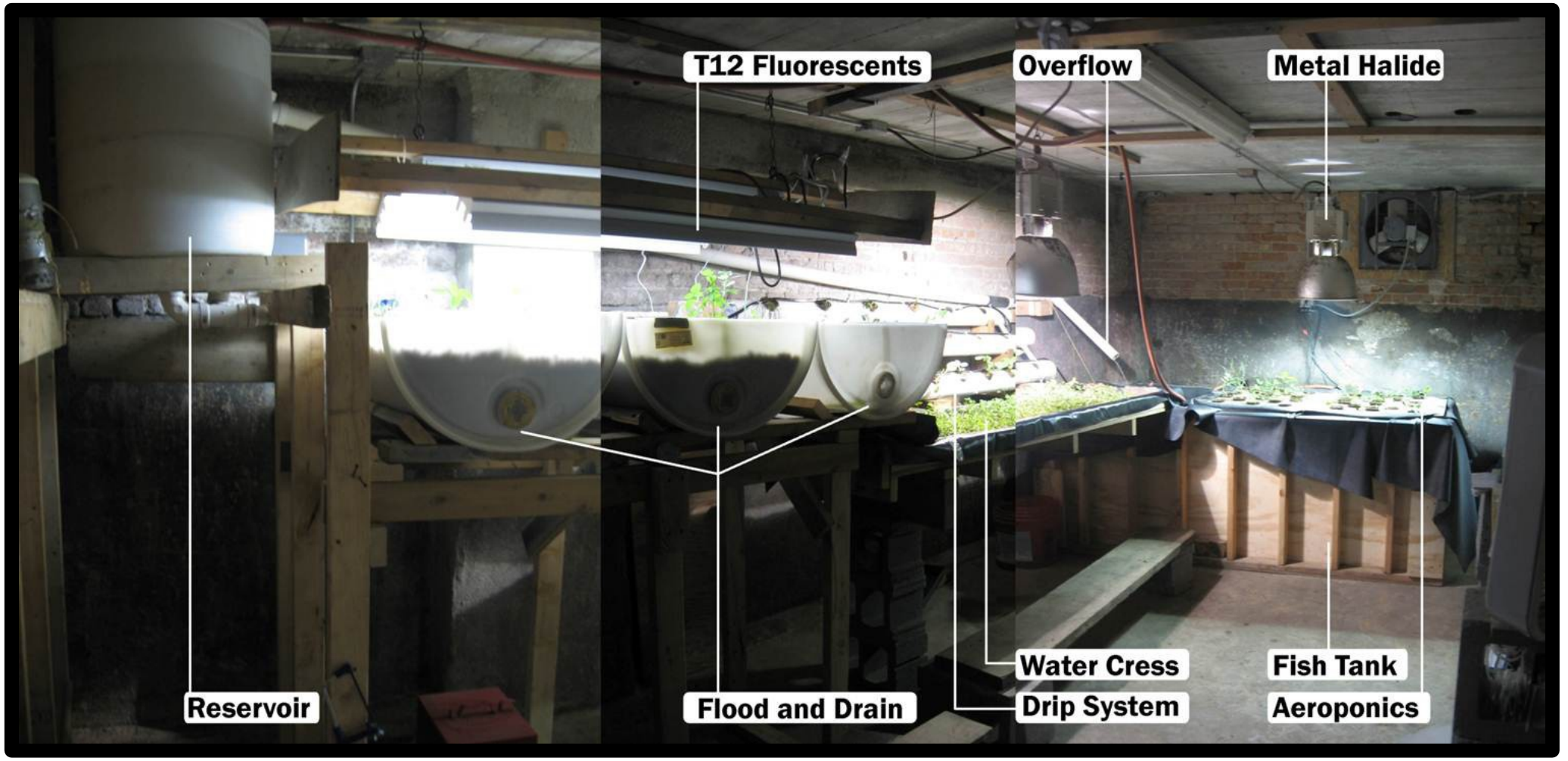
- 1st Fall 2009:Research
  - Potential Agricultural systems
  - Control system requirements
  - How to use building
- 2nd Spring 2010:Prototyping
  - Prototype aquaponics system and control system
  - Research on anaerobic digester
- Summer/Fall 2010:Implementation
  - Acquired building
  - Design/built 1st production aquaponics system
  - Design control system framework

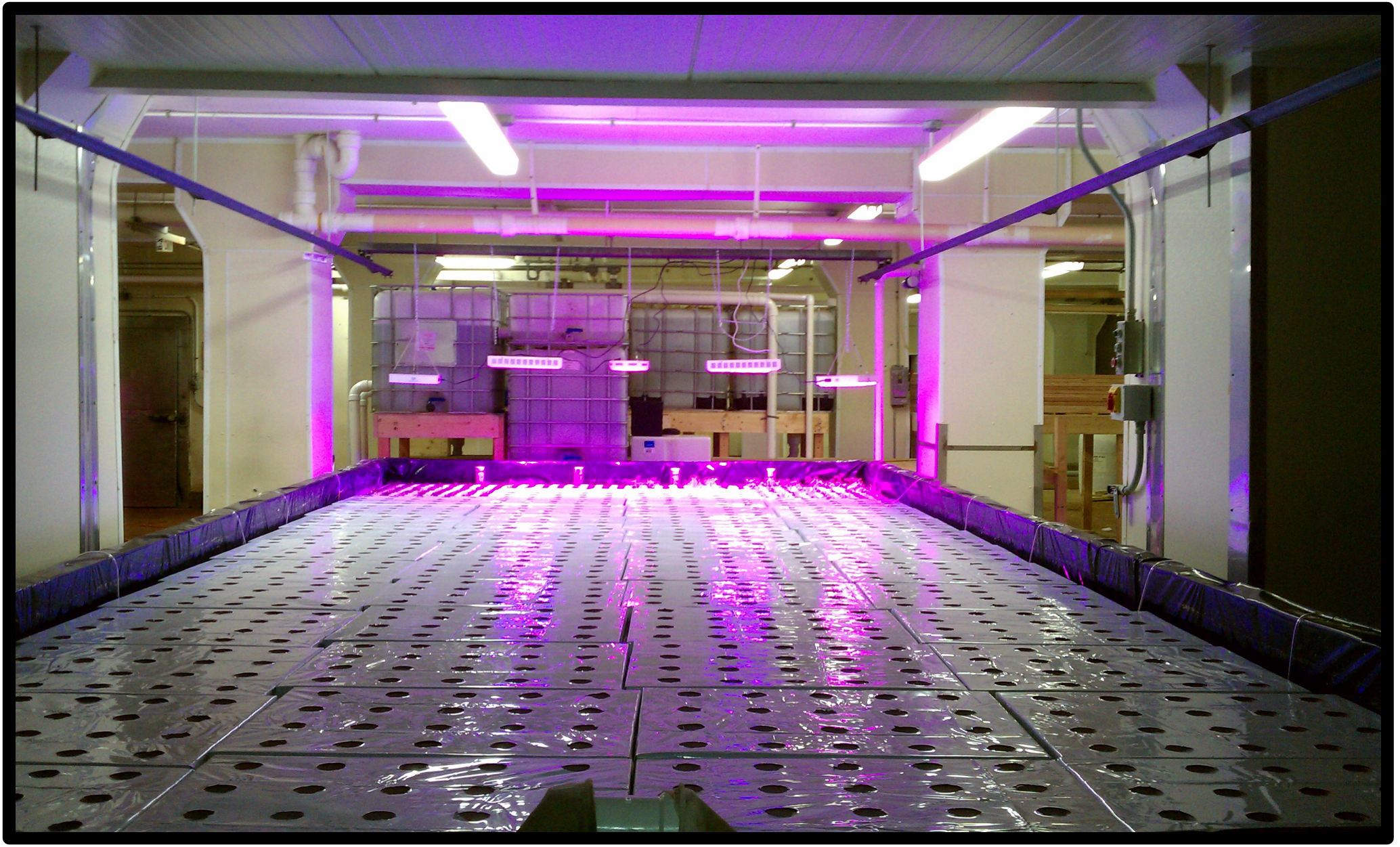
This Semester

- Bring aquaponics system #1 to production status
- Build systems #2,3
- Implement control system framework
- Design green roof and entrance/lobby
- Prototype anaerobic digester

Agricultural Systems: Aquaponics

- Combination of recirculating Aquaculture and Hydroponics
  - Aquaculture: farming aquatic organisms
  - Hydroponics: soilless plant culture
- Combination minimizes waste and simplifies operations


T12 Fluorescents
Overflow
Metal Halide
Reservoir
Flood and Drain
Water Cress
Drip System
Fish Tank
Aeroponics

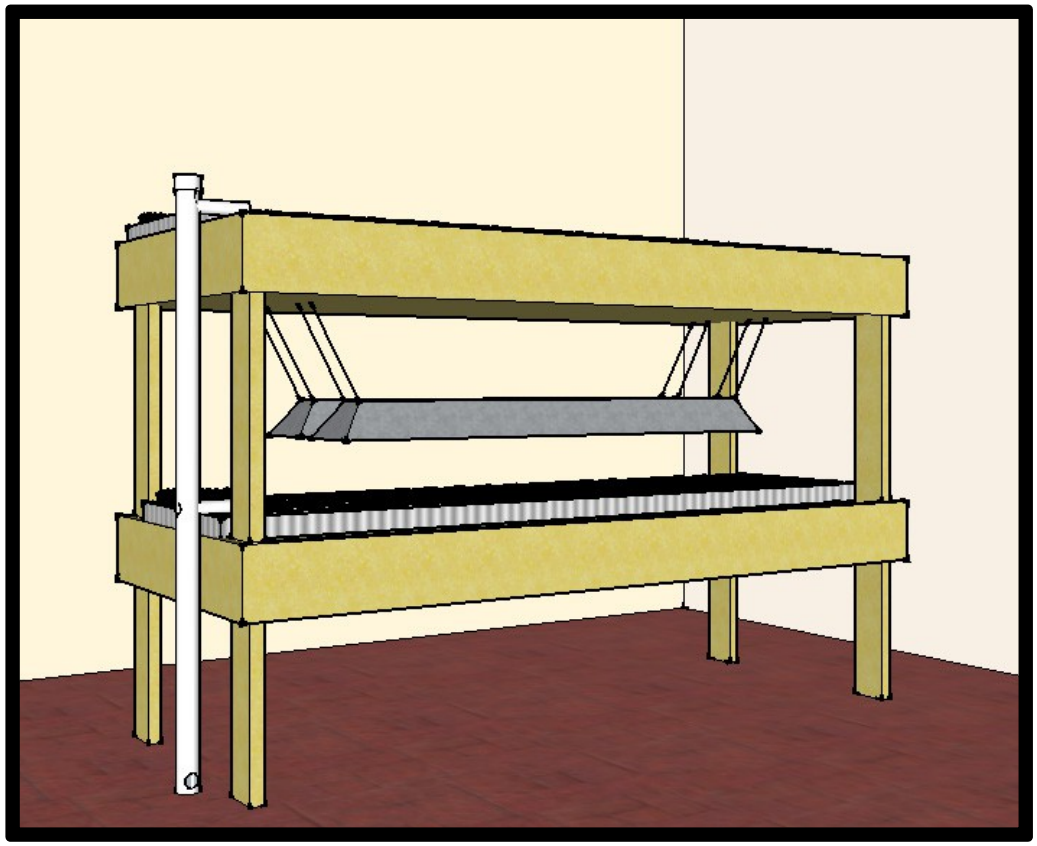



EXIT

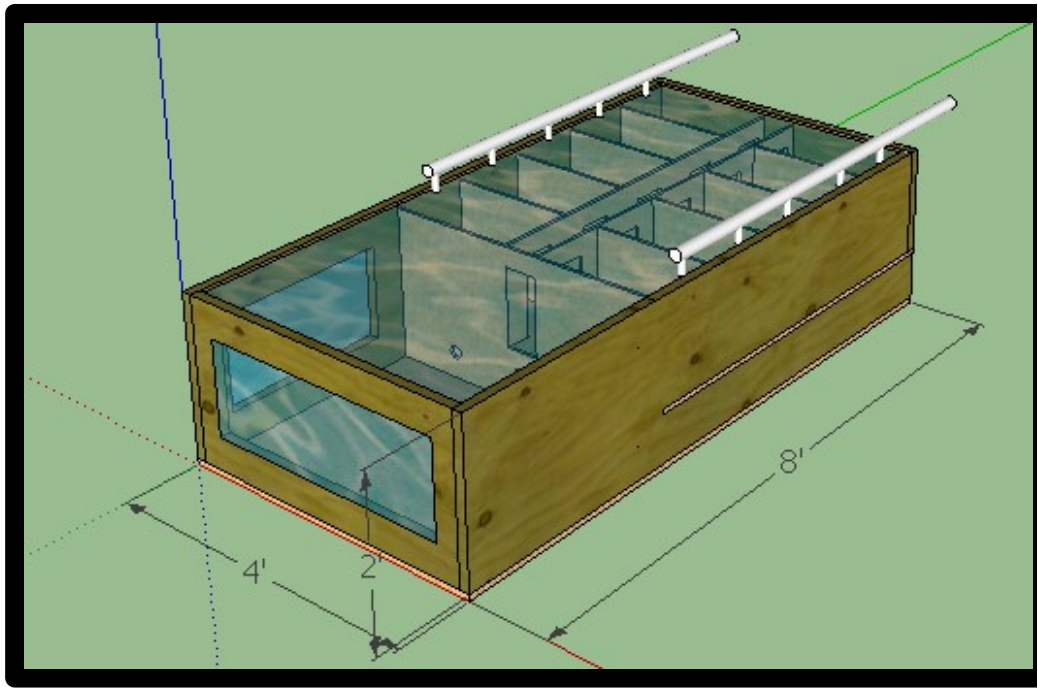
This semester:

- Bring system #1 to production status
- Build Systems #2,3
- System Modeling

Germination System



Fish Breeding System

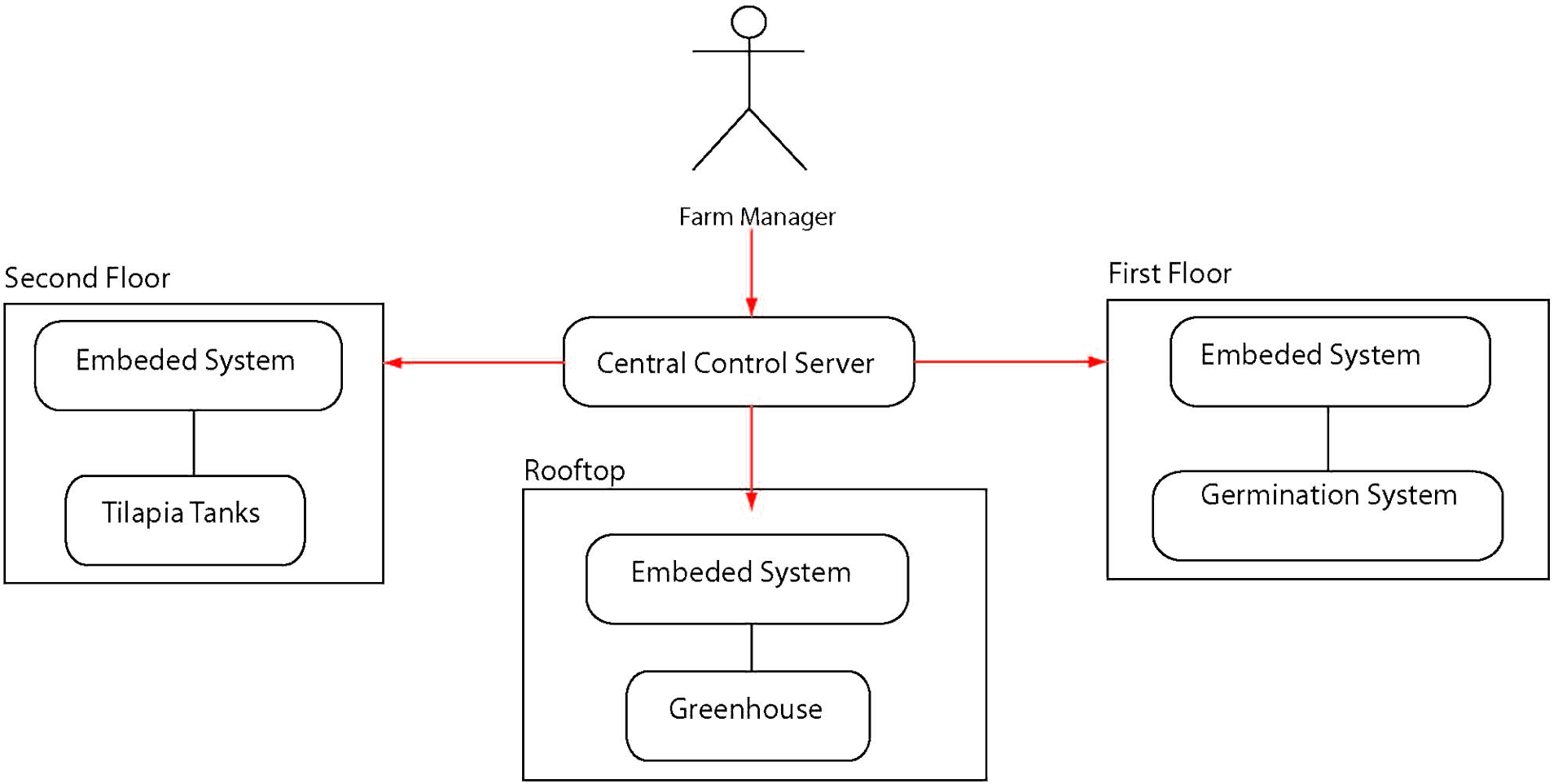


Computer Control Systems: System Goals

- Maintenance
  - Control environment variables
  - Monitor equipment health
- Evolution
  - Gather operational data
  - Facilitate system modeling and experimentation
  - Identify correlations and trends(data mining)

Control System Architecture

- Distributed Embedded System
- Generalized to apply to other applications

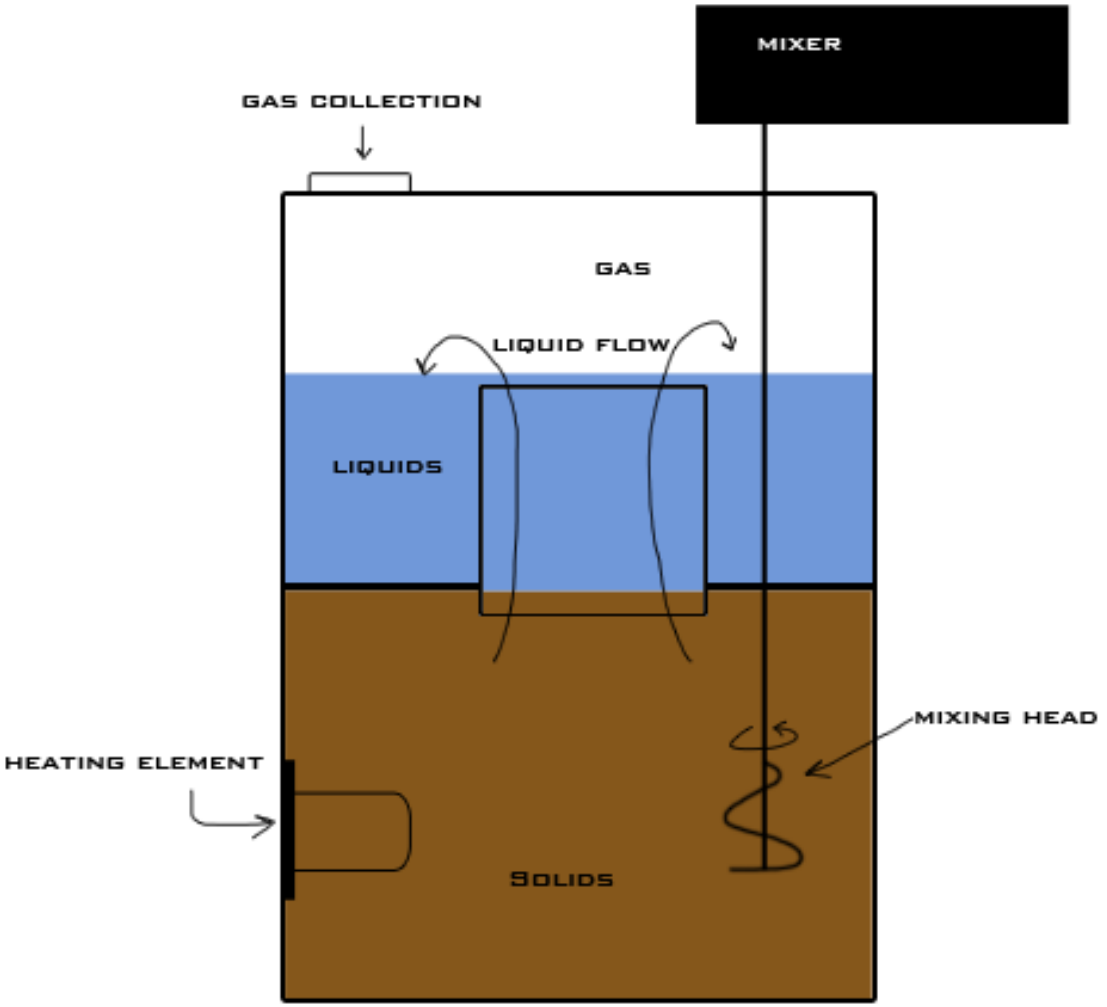


This Semester:

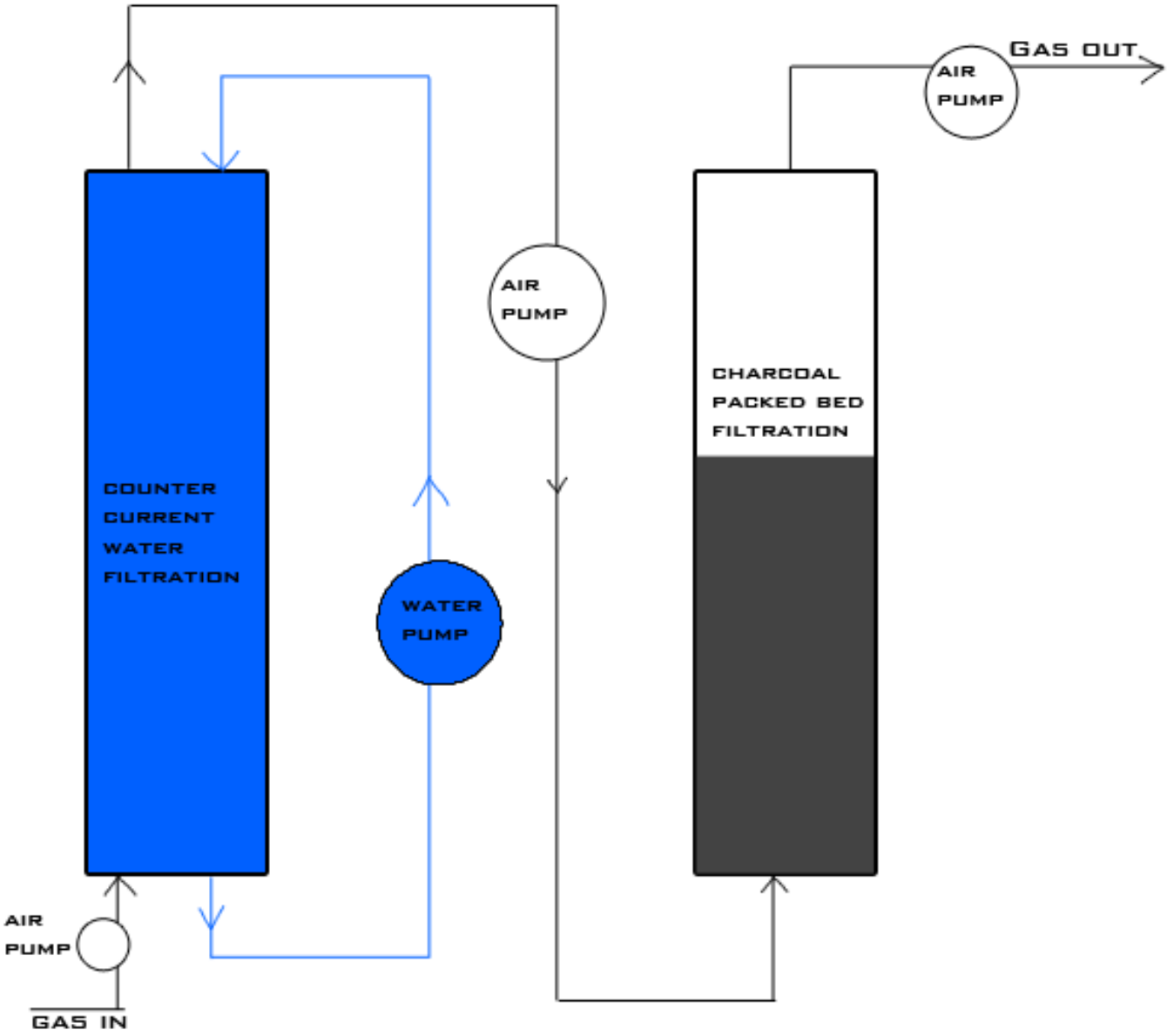
- Implement control system framework
  - (paper under submission to 2011 ICCPS WiP session)
- Integrate sensors into framework
  - PH
  - Dissolved Oxygen
  - Oxidation Reduction Potential
  - Photosynthetic Active Radiation
- Deploy to aquaponics System #1
- Deploy to anaerobic digester prototype

Anaerobic Digester Group

Prototype Digester Diagram

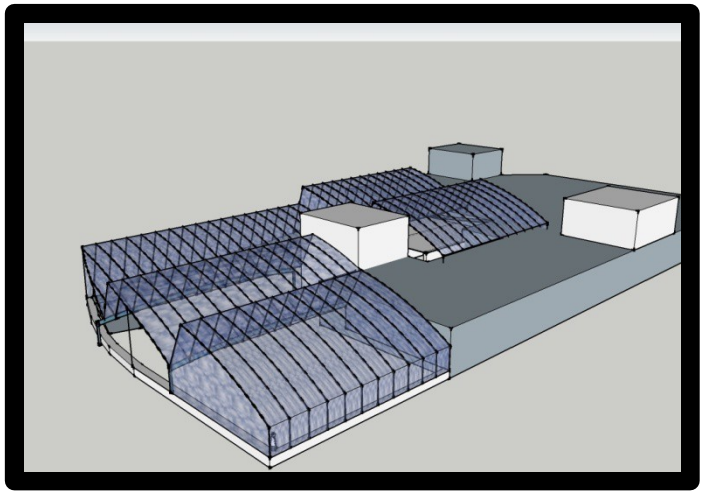


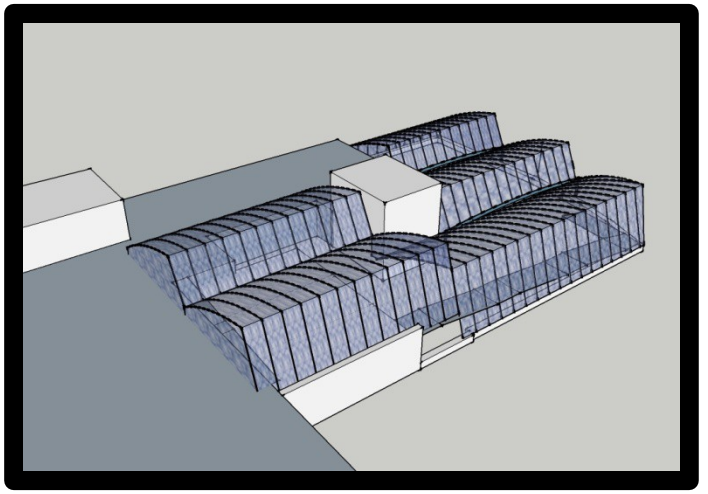
Gas Filtration Diagram

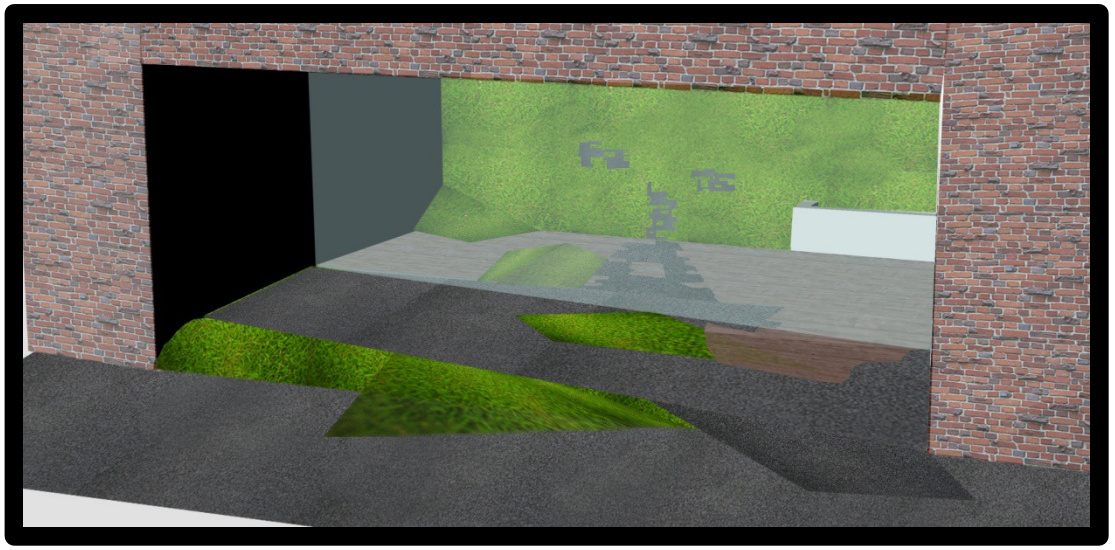


Digester Prototype

Green House and Green Wall Design Attempts







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