

Lab Exercise #1

“Discovering Precedent, Site, and Program”

For this lab exercise assignment you will investigate the influence of building program, site features and climate have on site selection and building form. You have been assigned a building type, a city, and a surrogate site (one that looks exactly like your assigned site, but is conveniently located at East City Park in Moscow, ID).

- ◆ computer-based climate analysis,
- ♥ a real or virtual visit to your surrogate site,
- ♠ building siting, and
- ♠ the thermal zoning and thermal needs of your assigned building.

Your Lab Exercise presentation will consist of six parts:

- | | |
|--|---------|
| (1) Introduction—climate, site, building type, group members | [1 pts] |
| (2) Climate analysis [Question A] | [5 pts] |
| (3) Site analysis [Question B] | [4 pts] |
| (4) Building Placement [Question C] | [4 pts] |
| (5) Thermal Zoning [Question D] | [4 pts] |
| (6) Conclusion | [2 pts] |

[Up to 5 additional points may be awarded based on the quality and clarity of your presentation. Total possible points=25.]

Investigation questions:

- (A) What design strategies are appropriate for your climate?
- (B) What microclimatic advantages and disadvantages does your site have?
- (C) What are the best places to place the building on your site?
- (D) How can the spaces in your building be grouped for similar thermal needs?

Use appropriate methods to investigate each of these questions.

You will present your Case Study in lab on **September 21** as a digital slide show, limited to 20 slides and 15 minutes. Points [2 pts] are deducted for exceeding these limits.

Suggested methods (use those appropriate to your Case Study):

Question A—How can your design respond to climate?

(1) Use *Climate Consultant* to analyze your assigned climate. Document your findings by sending screen captures [file/print selection (full window or graphic panel) file/print (to clipboard)] to a graphics program and **annotating** the pertinent outputs—pointing out the climatic assets and liabilities for your site. Use at these plots:

Sun Chart

☒ Analyze both Winter/Spring & Summer/Fall (print it out and use it with your site model *InsideOut* B1.3)

Time Table Plot

☒ Time Table Plot. Identify your heating and cooling months.

Psychrometric Chart and Design Guidelines

☒ Select heating months (as discovered from Time Table plot). Indicate the 3 most appropriate passive heating strategies for your building and site.

☒ Select cooling months (as discovered from Time Table plot). Indicate the 3 most appropriate passive cooling strategies for your building and site.

Wind Wheel

☒ Examine different hours and months based on your building's heating and cooling seasons and on its scheduled times of use. Is there a diurnal wind shift? Are there seasonal wind shifts? (use this data to draw seasonal windflows— *InsideOut* B1.2)

Custom Plot 1

☒ Create your own plot of Dry Bulb Temperature (Hourly Average) vs Relative Humidity (Hourly Average)—plot this data on the bioclimatic chart—*InsideOut* B1.1)

Question B—How can site microclimates affect your design?

(1) Visit your surrogate site. Use SiteX-1 as a guide to your site investigation.

(2) Document your site visit as suggested in SiteX-1 or SiteX-1 Virtual.

(3) Make a physical or Sketch-Up model of your assigned site. Site map with contours is provided. Do *InsideOut* exercises B1.1-B1.5.

Question C—Where should you site the building for daylighting and energy savings?

(1) Use the information you generated for Questions A and B above to guide you in site selection. Explain your selection rationale. Use *InsideOut* B1.6 as a guide.

Question D—How can the spaces in your building be grouped for similar thermal needs?

(1) Do *InsideOut* exercises C1.1 & C1.2 to determine your building's thermal zones. Try to elegantly minimize the number of zones.

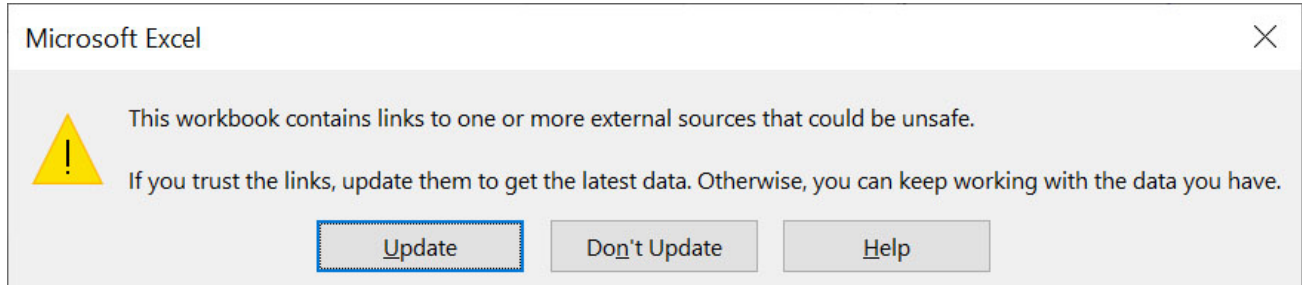
(2) Use the Balance Point spread sheet [BPgraph] to determine the expected thermal needs for each zone of your building. **[Right, do the spread sheet for each zone!]** Instructions are in the Vital Signs Building Balance Point Resource Package, "The Balance Point as a Design Tool," pp 12-36, Linked to the course web site.

(3) **[Alternative hand method]**, which may take longer but may be less frustrating: Do *InsideOut* exercises C1.3-C1.5 to determine the balance point temperatures of your building's thermal zones.]

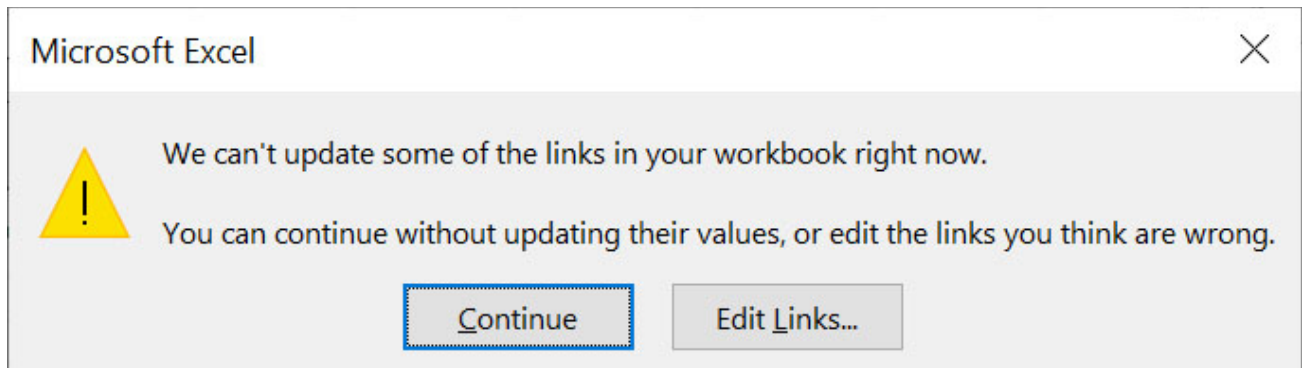
(4) Do *InsideOut* exercise C1.6 to help determine appropriate design strategies.

Balance Point spreadsheet tips.

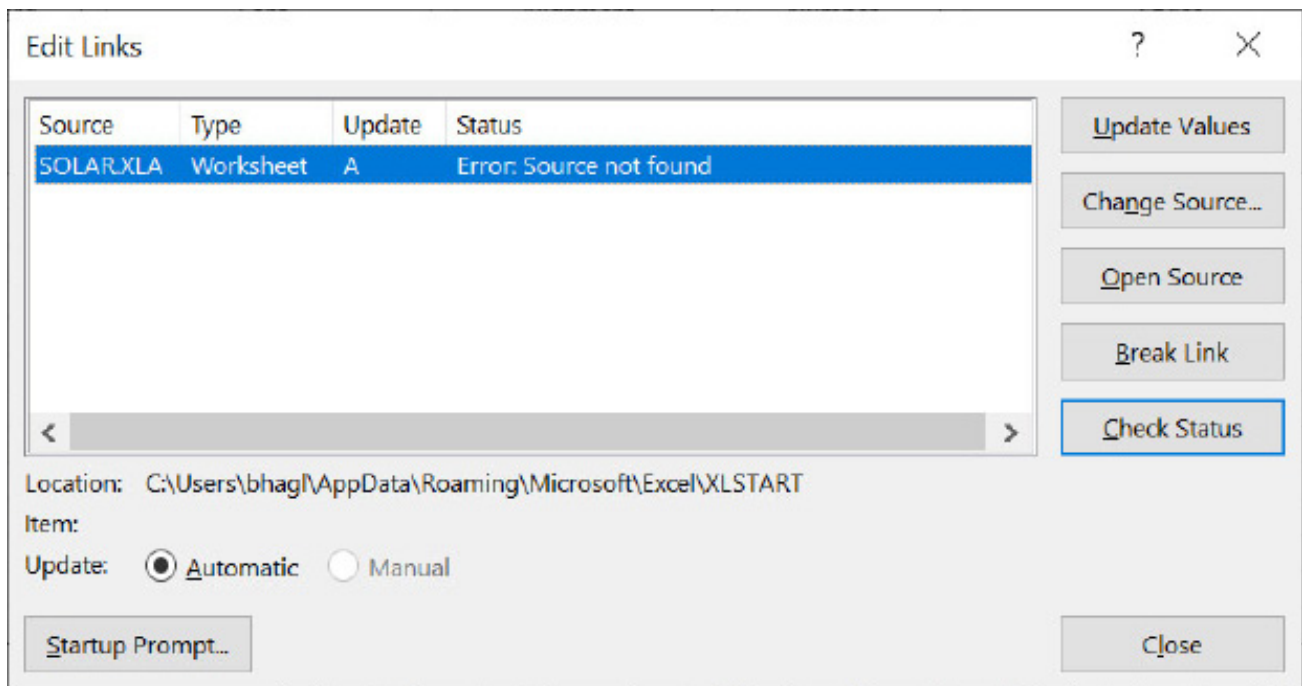
The Balance Point spreadsheet is a set of three *Excel* files that you must download to your computer. I put the 3 files on my desktop. To use the spreadsheet open BPgraph in *Excel* and enable editing. The first time you open it it will give you an error message. Choose to Update.



Then you'll get this one, choose Edit Links.



And finally, this one, choose Change Source then find and select Solar.xla.

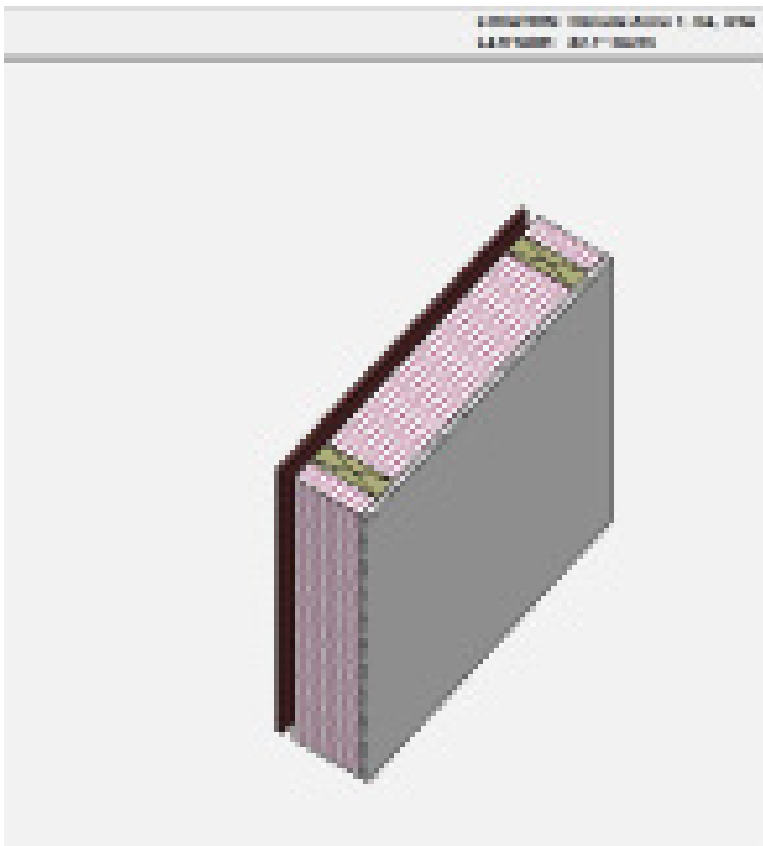
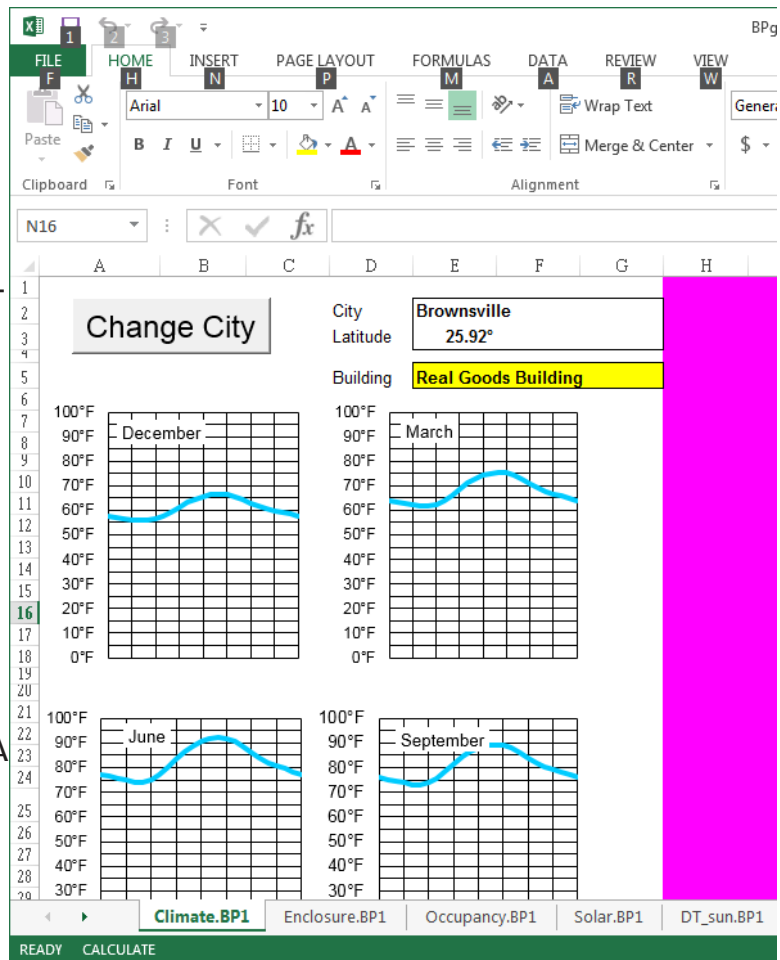


When you're done save the BPGraph.xls file.

To set up analysis of your building, you must first specify the climate. Start with the Climate.BP1 tab in BPgraph (see below), then click the "Change City" box. A list of available cities will appear, choose the right one! Then you need to file save BPgraph—the latitude and maybe the outdoor temperature plot will be updated. You're set to go!

The highlighted (in yellow) fields in the first four tabs are the ones for which you need to supply new data. If you don't know what to enter, don't change the data, the defaults are set to code.

The *Opaque* program from UCLA can help you calculate R- and U-values for walls and roofs. Your wall section could look somewhat like the one below when complete:





Discovering Site

Your assigned Site is one of four parcels (NW, NE, SW, or SE) on the map above of East City Park, located on East Third Street in Moscow. Each parcel is approximately 310' by 190'. If you are in Boise, you may use the site on the next page in Julia Davis Park. When you construct your site model, be sure to model the trees as well as the topography, but you can choose whether or not to model the buildings.

For the laboratory exercise you will transport (virtually or mentally) your assigned site to your assigned climate. Compensate for the difference in latitude between the Moscow site and your assigned climatic setting when making field measurements.

The detailed site plans are linked to the ESC web page.

Discovering Program

Your assigned Program is one of the four buildings introduced on the four pages after the Julia Davis Park site.

JULIA DAVIS PARK SITE (OUTLINED IN GREEN)



A COMMERCIAL BUSINESS SCHOOL

ADMINISTRATIVE OFFICES:

Accountant
4 Instructors
President
Secretary/receptionist

CLASSROOMS:

2 Computer rooms with 12 stations each
Lecture room with seating for 50
Seminar room with round table/seating for 12

SERVICE:

Janitor's closet
Lunchroom
4 Gender-neutral bathrooms
Patio

EQUIPMENT:

4 digital projectors
6 Personal computer systems for staff
2 Photocopy machines
6 Vending machines
2 Water cooler/drinking fountains

PARKING:

6 Employee spaces
30 Student spaces

OCCUPANCY:

2 Classes of 12 each + staff; Monday–Friday; 9 a.m.–5 p.m.
4 Classes of 12 each + staff; Monday–Friday; 7 p.m.–10 p.m.
4 Classes of 12 each + staff; Saturday; 8 a.m.–5 p.m.

A REGIONAL BUS TERMINAL

Business office
Freight office
Lobby/waiting room
Manager's office
2 Private bathrooms
2 Public bathrooms
Reception room
Snack bar
Ticket office
Outdoor waiting shelters for local buses

EQUIPMENT:

2 Cash registers
2 Coffee urns
2 Electric typewriters
3 Micro-computers
Public address system
Small commercial kitchen
6 Vending machines

PARKING:

Automobile passenger drop-off area
2 Local bus stops
10 Public spaces
4 Regional bus spaces

OCCUPANCY:

Average 20 people/hour waiting; 6 a.m.–1 a.m.
Peak hours: average 80 people/hour; 7 a.m.–9 a.m.; 5 p.m.–8 p.m.

A SUPERMARKET

Bakery
Butcher shop
Sandwich shop
Cart storage area
6 Checkout stations
Employee lounge
Floor manager's office
2 Private bathrooms
Shelving bay (7,000 ft²)
Storage
Store manager's office
Walk-in cold storage room
Outdoor eating area

EQUIPMENT:

Baker's oven
Beverage cooler (25 lineal feet)
6 Cash registers/computers
Coffee urn
Dairy cooler (25 lineal feet)
Freezer (50 lineal feet)
Meat cooler (25 lineal feet)
Meat cutter and slicer
Personal computer

PARKING:

2 Cart return enclosures
50 Patron spaces
Service dock
15 Staff spaces
Bicycle parking

OCCUPANCY:

Staff; daily; 7 a.m.–8 a.m.; 11 p.m.–2 a.m.
Public; 8 a.m.–11 p.m.

A 24-HOUR EMERGENCY MEDICAL CLINIC

- Business office
- 2 Doctors' offices
- 3 Examination rooms with half-baths
- Janitor's closet
- Nurses' office
- Reception desk
- Staff lounge with half-bath
- Supply storage room
- Waiting room
- X-ray room
- Outdoor patio associated with lounge

EQUIPMENT:

- Coffee maker
- 3 computer systems
- Range cook-top
- 2 Refrigerators, one each in storage area and lounge
- Stereo and intercom system
- 4 Surgical lighting systems
- X-ray equipment

PARKING:

- Ambulance access
- Drop-off area
- 10 Patient spaces
- 10 Staff spaces

OCCUPANCY:

- 1 Receptionist, 12 patients/hour, 4 nurses, 16 family members/hour average, 2 doctors, 1 bookkeeper; 8 a.m.–8 p.m.
- 2 Patients/hour, 2 nurses, 1 janitor, and 2 family members/hour average, 1 doctor; 8 p.m.–8 a.m.