4.0 Master Plan

4.1 *Site Organizational Concepts*

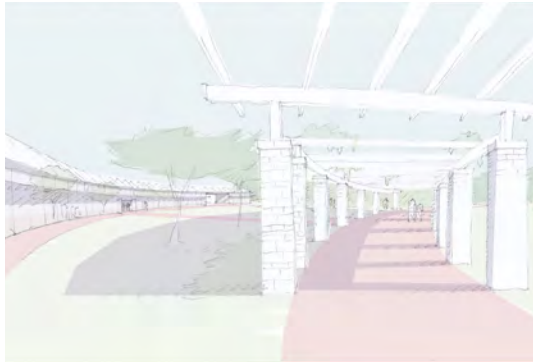
Through the workshops with the Core Team, OBS, OBG staff, and the public stakeholders, HGA explored a number of master plan alternatives. The three options shown describe the range of master plan possibilities that were discussed, and feedback was collected from the groups. Each of these discussions furthered the development of the master plan and helped to build consensus among the group.

Option A

- *Site organizational strategy: a 30' wide bar that fits between the existing lobby building and Atrium building. The bar acts as a spine upon which the new addition is supported.*

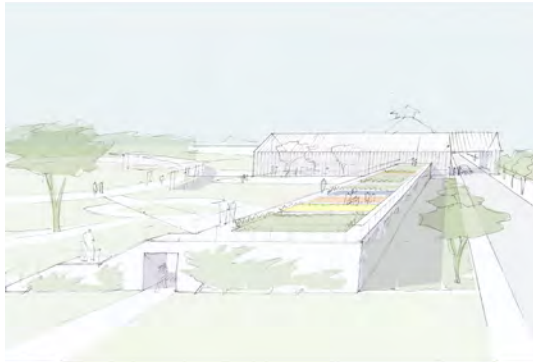
Option B

- *Site organizational strategy: a 36' wide curving bar that connects back to the existing Atrium building in plan and width. The curve mimics the winding garden paths and hugs the Event Garden.*



Option C

- *Site organizational strategy: reorient the main entry to align with the majority of parking with a 40' wide bar that connects to the Event Garden. This option reuses the least amount of existing building.*

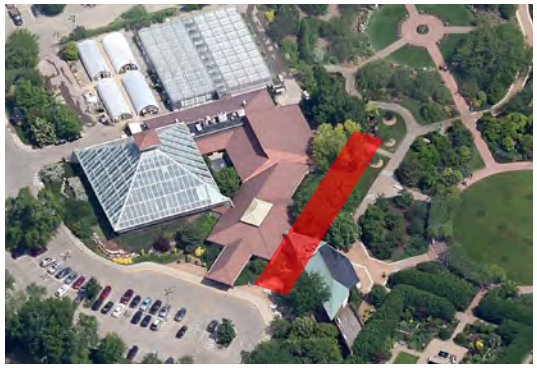


4.2 *Master Plan: Selected Option*

The master plan shown on the following pages represents the concept supported by the Core Team, OBS, and the public stakeholders that was presented at the final community meeting on May 20, 2013.

Key Elements

- New Lobby/Orangerie with prairie green roof
- New Education Wing with green sedum roof
- New Plant Show Hall
- New Greenhouse
- Existing facilities are maintained and renovated: Gift Shop expanded in place, Atrium building renovated for Library and Orientation Hall, Office expanded in place, and Headhouse replanned for greenhouse support only
- Secondary entrance connects to majority of parking
- Sustainable parking garden with permeable paving and bioswales
- Sugar Avenue defined and edge improved with neighborhood park
- Pedestrian and bicycle access to site improved

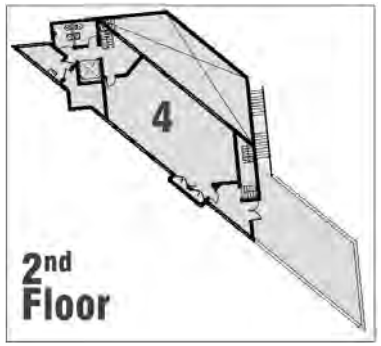


Site organizational strategy

Orangerie sketch

Floor Plan

1. Plant Show Space
2. Event Space
3. Education Wing
4. Meeting/Bride's Room
5. Library
6. Orientation Hall
7. Lobby/Orangerie
8. Gift Shop
9. Office
10. Conservatory
11. Headhouse
12. Greenhouse



N

Enlarged plan detail
4.2


PRODUCTION BENCHES 335 sf
6' ROLLING BENCH
6' FIXED BENCH
6' ROLLING BENCH
6' ROLLING BENCH
6' FIXED BENCH
6' ROLLING BENCH
MAIN AISLE
FILTER HOUSE
FILTER HOUSE
CHEM. 100 sf
STOR. 215 sf
HEAD HOUSE 2590 sf
SHIP./ RCV. 170 sf
MECH. 505 sf
LOUNGE 340 sf
PROG. ASSIST. 120 sf
CUST. SERV. 180 sf
ENTRY 120 sf
COURTYARD 1495 sf
BOLZ CONSERVATORY 9950 sf
STOR. 120 sf
CATER. STOR. 125 sf
SHOP 125 sf
MAINT. 120 sf
MAINT. 65 sf
MAINT. 65 sf
CATERING KITCHEN 440 sf
STOR. 210 sf
COOLER 90 sf
EVENT COMMONS 2995 sf
D&M/BR. FUT. 255 sf
D&M/BR. 255 sf
D&M/BR. 220 sf
WORK ROOM /COPIER 275 sf
COATS 155 sf
JAN.
ENTRANCE 120 sf
STOR. 395 sf
DIRECT. 180 sf
D&M/BR FUT. 65 sf
CNSV. 65 sf
CNSV. 65 sf
WOMEN 220 sf
COATS 220 sf
CONSERVATORY LOBBY 875 sf
TICKETING/ GIFT SHOP DESK 230 sf
GIFT SHOP STORAGE 395 sf
GIFT SHOP 1070 sf
OFFICE/ WORKROOM 260 sf
OUTDOOR SALES 1190 sf
LOBBY/ ORANGERIE 5230 sf
LIBRARY 985 sf
ORIENTATION HALL 1555 sf
OFFICE/ WORKROOM 155 sf
COATS 100 sf
PLANT SHOW SPACE 4100 sf
STOR. 145 sf

CONSTRUCTION PHASING DIAGRAMS

(1)

Phase 1 Construction

a. Maintain existing greenhouse. Construct two bays of new greenhouse.
b. Maintain existing library. Renovate new library location.
c. Maintain existing gift shop. Renovate orientation space for temporary gift shop location.
d. Maintain existing office. Construct Education Wing.

(3)

(2)

Phase 2 Construction

a. Move tropicals and orchids to completed greenhouse bays. Demolish existing greenhouse. Construct final bay of new greenhouse.
b. Move library into new location.
c. Move gift shop into temporary space. Renovate existing gift shop/lobby for new, expanded gift shop.
d. Move office into Education Wing for temporary location. Renovate existing office.

Phase 3 Construction

a. Move production to completed greenhouse bay.
b. Move gift shop into new, permanent location.
c. Move office into new, permanent location.

existing under construction new greenhouse
existing under construction new library
existing under construction temporary new gift shop
existing under construction temporary new office

SPACE NEEDS RESOLUTIONS

Proposed Gift Shop areas increase square footage by 820 sf and gains 117 lf of shelving/display. More daylight and an outdoor sales area will allow for the selling of more mission-focused items. Gift shop improves productivity with layout of adjacent and efficient support spaces. Gift shop will sell food sourced from local restaurants to provide this necessary amenity and support local businesses.

Proposed Greeter Desk has high visibility in new Lobby/Orangerie. Signage creates presence for Membership. Single location for Gift Shop/Greeter Desk increases staff efficiency.

Proposed Library areas increase square footage by 570 sf and gains 76 lf of shelving. Library improves productivity with support spaces. Ample multi-purpose reading/storytelling space has views to garden.

Proposed Office Space increases square footage by 1,855 sf and gains 9 desks for staff and volunteers. Larger group work areas and storage increase productivity. Lounge allows for personal storage space.

Proposed Maintenance Facilities and support increase square footage by 3,710 sf. New support facility north of the railroad increases back-of-house productivity.

Proposed Greenhouse increases square footage of plant benches by 24%. Modern systems improve plant production capability and energy efficiency. Cooler is added for bulb storage.

Proposed Headhouse space increases efficiency by the removal of unrelated functions. Potting area is expanded with adjacent storage and support functions.

Proposed Facility Circulation introduces clearer circulation routes for user groups by bringing like functions together to reduce the distance traveled, separating office functions from horticulture functions, improving the routes traveled for special events/plant shows, and adding an extra corridor to reduce the load on the administration hallway. The Children's Garden has been moved near the Education Wing.

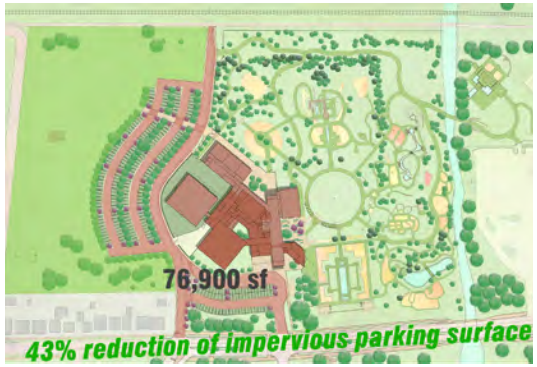
Proposed facility circulation

Site plan (existing building in dark red)

N

SITE ANALYSIS

Existing impervious parking surface



Proposed impervious parking surface

Parking

Bicycle connectivity

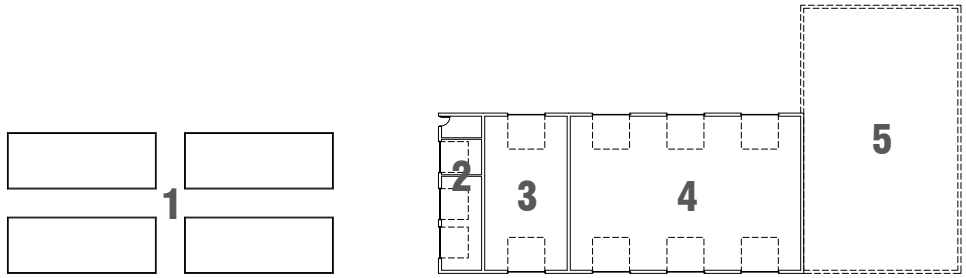
Pedestrian connectivity

*Phasing: Phase 2 expansion**

**diagram does not include Future Cold Storage north of railroad*

North of the railroad plan

1. Quonsets
2. Support Spaces
3. Heated Storage
4. Cold Storage
5. Future Cold Storage



The land north of the railroad tracks is owned by the City of Madison and is used by OBG for back-of-house functions. Currently, this area includes the plant nursery, compost area, leaf mulch area, Garver Feedmill, and Garver Cottage. The historic Garver Cottage was renovated in 2001 to house the Horticulture staff offices. This master plan accounts for the Horticulture staff to remain in the Garver Cottage with no further work being done to the building.

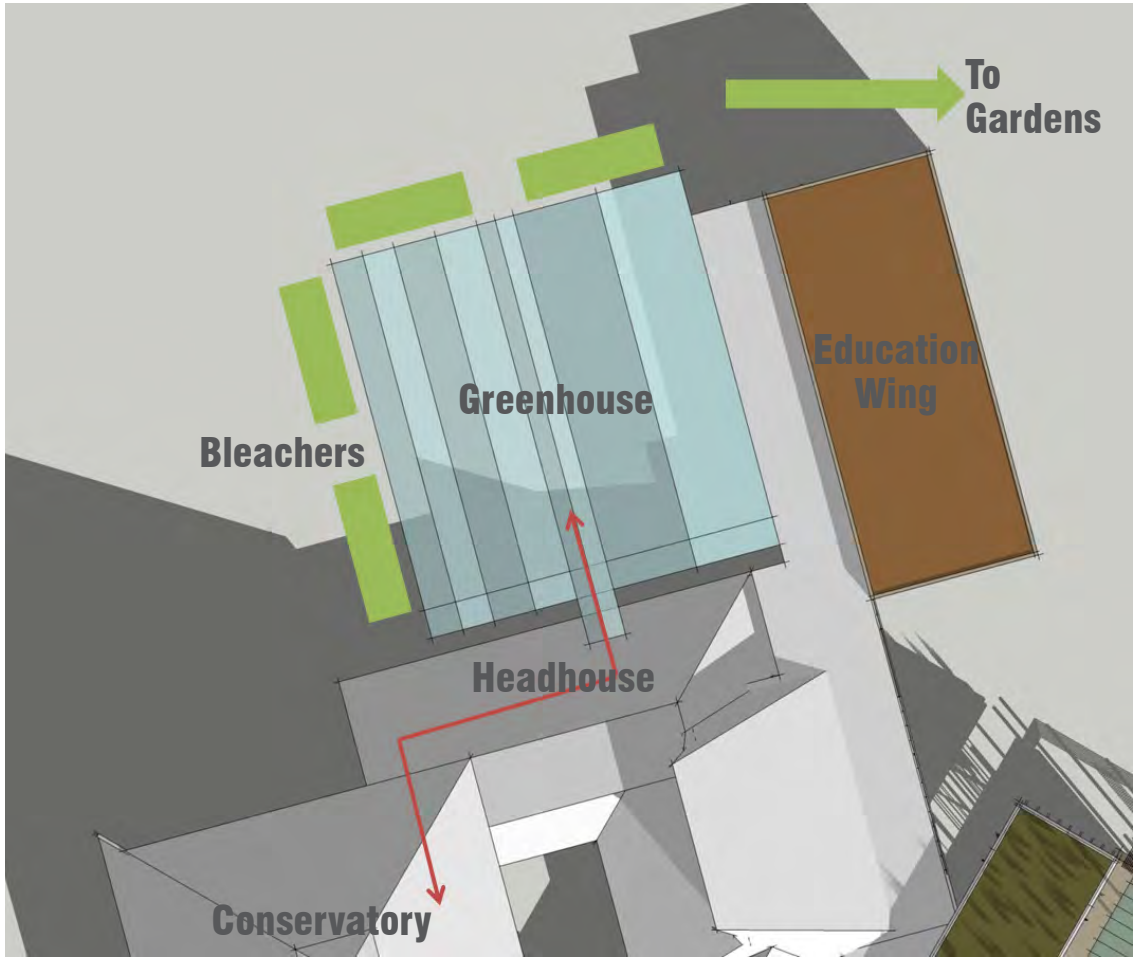
A feasibility study is currently underway by the City of Madison to examine the condition of the Garver Feedmill and its possible reuse/renovation. This area has been a topic under discussion for the neighborhood in the past years. Currently the northwestern portion of the Garver Feedmill is being used for OBG storage; however, due to the deteriorating nature of the feedmill, the storage is open to the elements. It is also not in shelving but rather on the ground, making the footprint of the space needed much larger than necessary. Because of the unknown future of the feedmill and Garver property, this master plan does not take into account for future reuse/renovation of the feedmill. It also does not include costs related to site improvements and fire access north of the railroad, due to the lack of a site master plan for this property. Therefore, to become independent of the Garver Feedmill when its future use is decided, the plan calls for a future cold storage area (#5 in plan diagram above) that will house the storage that is currently in the feedmill. With stacked storage, the size of the area will be able to be reduced.

Garver Cottage (Horticulture staff office)

Garver Feedmill

Garver Feedmill OBG storage

GREENHOUSE LOCATION: Existing Location Analysis



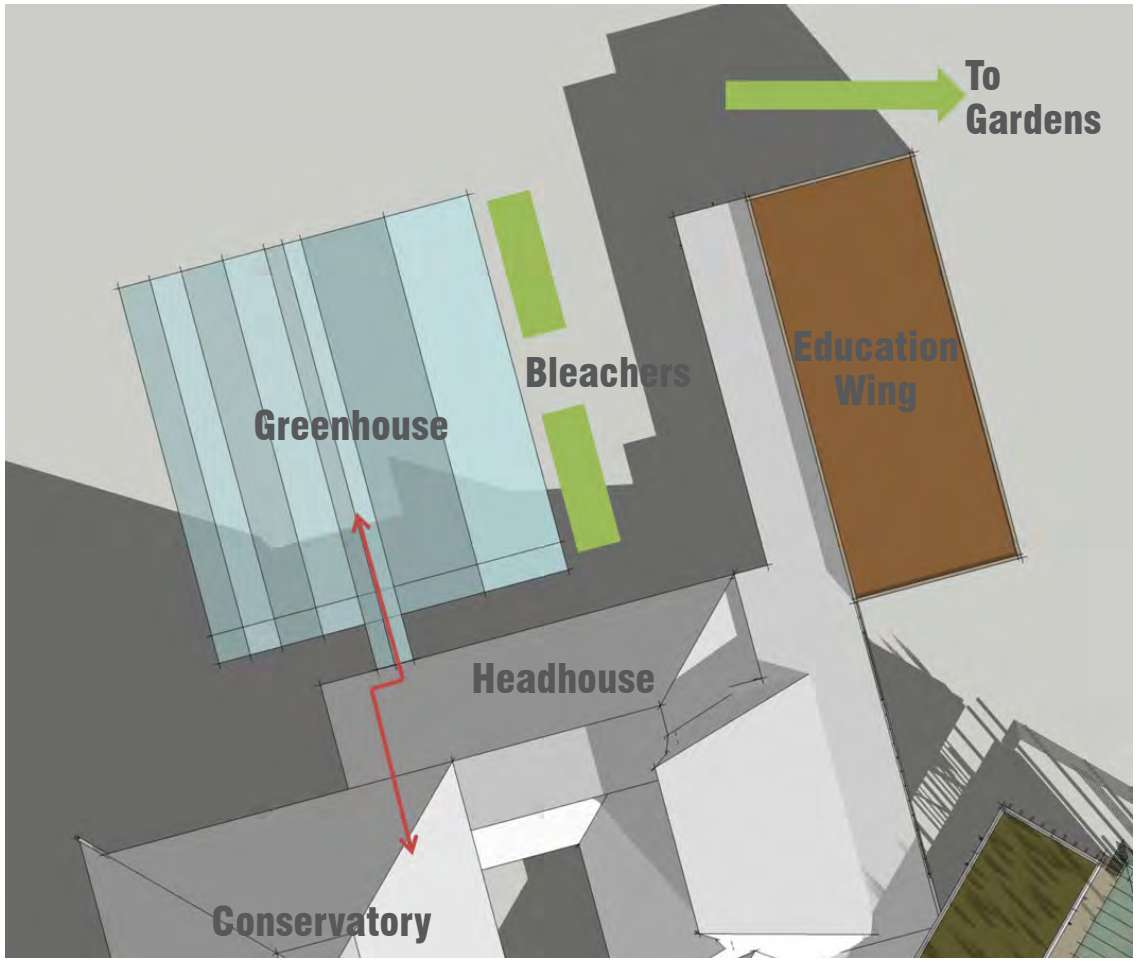
Advantages:

- Cost savings for salvaging existing greenhouse foundation and slab-on-grade
- Option to reuse some existing greenhouse columns

Challenges:

- Locked into existing European structural module making expansion difficult
- Existing interior foundations will dictate zone size
- Cutting and patching existing floor required to reconfigure and improve drainage
- New filter houses in close proximity to existing Headhouse
- Adjacent to proposed Education Wing – will shadow greenhouse during certain times of year
- Bleachers and cart loading area moves to north side of greenhouse (exhaust side) or west side of greenhouse (farther from gardens)
- Circulation path/traffic through Headhouse remains
- Phasing considerations

GREENHOUSE LOCATION: Proposed Location Analysis



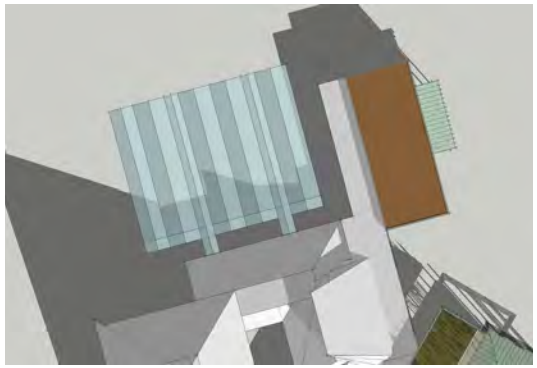
Advantages:

- Moves greenhouse away from existing and proposed buildings to maximize daylight
- Moves circulation corridor closer to Conservatory to minimize cross-traffic in Headhouse
- Creates exterior courtyard for bleachers and cart-loading on east side of greenhouse, closest to gardens
- Able to utilize a standard industry module to maximize efficiency of new structure and accommodate future expansion
- New drainage easily incorporated into new slab-on-grade
- Expansion options both east and west
- Slight increase in size and 24% increase in capacity due to standard module and efficient rolling bench system

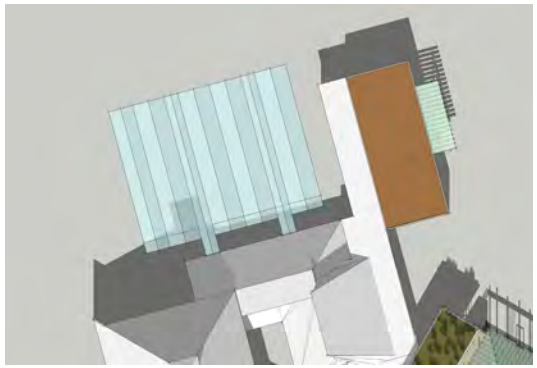
Challenges:

- Cost of new foundation & slab-on-grade
- Phasing considerations

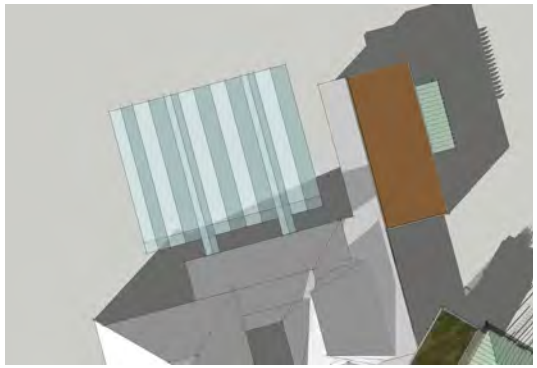
SHADOW STUDY: Winter Solstice



December 21 @ 9 a.m.



December 21 @ noon



December 21 @ 3 p.m.

SHADOW STUDY: Vernal Equinox

March 21 @ 9 a.m.

March 21 @ noon

March 21 @ 3 p.m.

All diagrams represent the Phase 2 buildout of the proposed greenhouse in new location

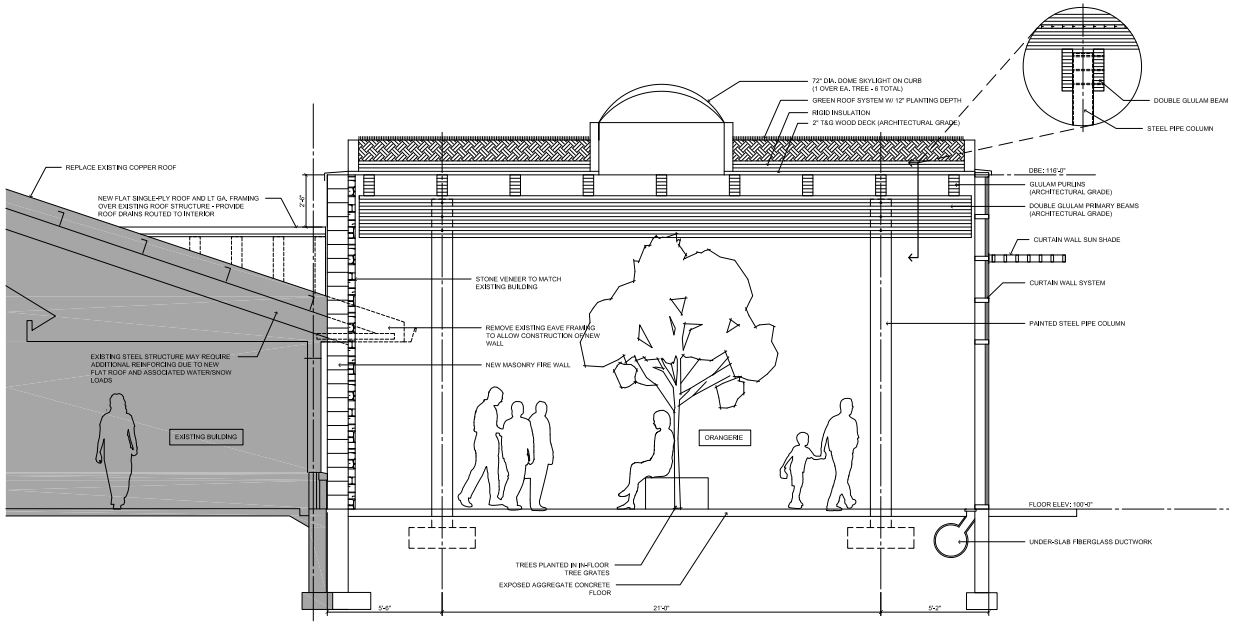
4.2.1 Building & Site Systems Concepts

STRUCTURE

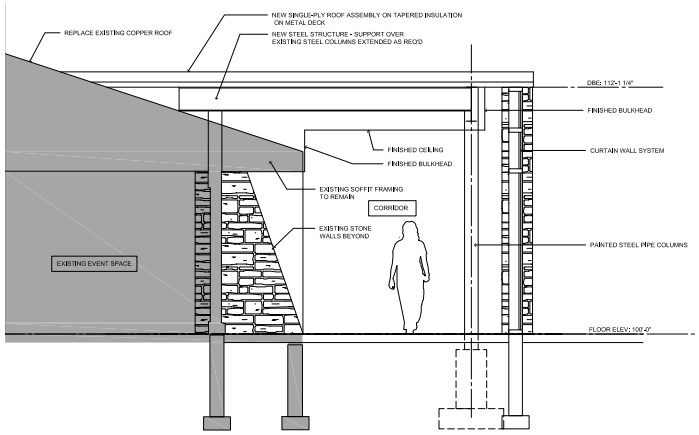
Lobby / Orangerie:
The proposed visitor spaces are conceived of as a combination steel and laminated wood framing system. Steel pipe columns will support laminated wood primary beams, which in turn support secondary laminated wood purlins and a tongue and groove wood deck. This is a robust structural system that is capable of the additional loading from the proposed green roof above. Visually, the laminated wood members reference the existing 1978 atrium building and serve to incorporate a natural and warm material into the project. A new masonry or concrete fire wall will establish the northwest wall of the lobby and will be required to be structurally independent from the existing building and new steel/wood frame.

Plant Show Hall:
This fully-glazed space will be supported by a combination of steel and laminated wood structural members. The structure will be designed to support a glazed wall and roof cladding system.

Link:
The new corridor constructed along the east facade of Evjue Commons will be a steel frame supported both on new exposed pipe columns and by the existing steel frame structure. The roof will consist of a single-ply roof membrane, tapered insulation, and metal deck.



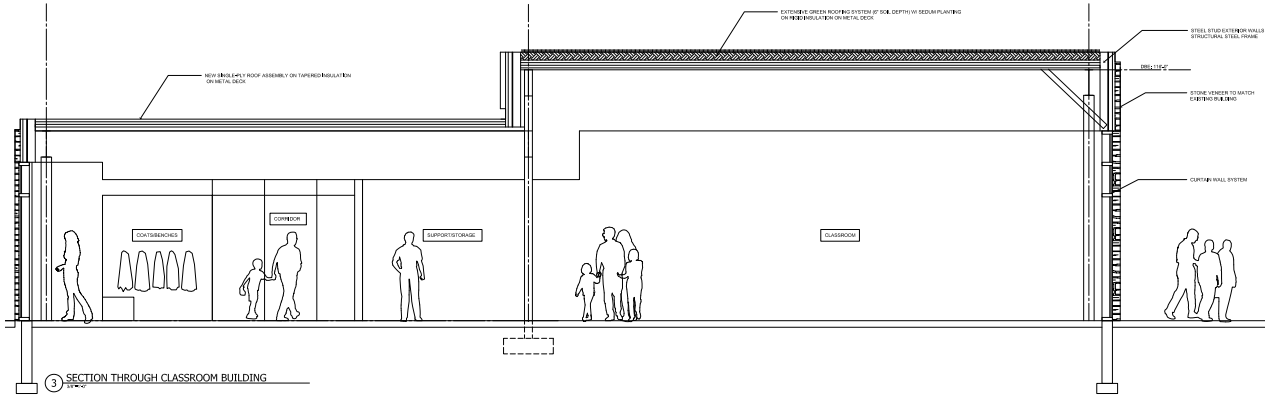
1 SECTION THROUGH ORANGERIE

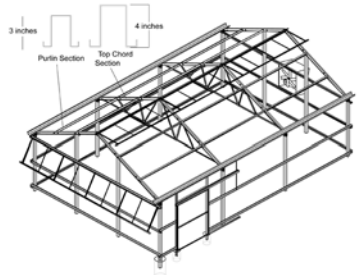


2 SECTION THROUGH NEW CORRIDOR

Education Wing:
The new Education Wing will consist of exposed steel pipe columns at exterior walls, steel roof beams, and metal roof deck. Solid exterior walls will be steel stud-framed and clad in full-depth masonry veneer.

Greenhouses:
The existing greenhouse structure will be removed and replaced with a similar pre-engineered framing system consisting of steel tube posts, steel primary trusses, and secondary purlins. Roof member profiles will incorporate integral channels for condensation drainage. A new frost footing, foundation wall, and concrete slab-on-grade will be required for the new proposed location.





Greenhouse framing diagram

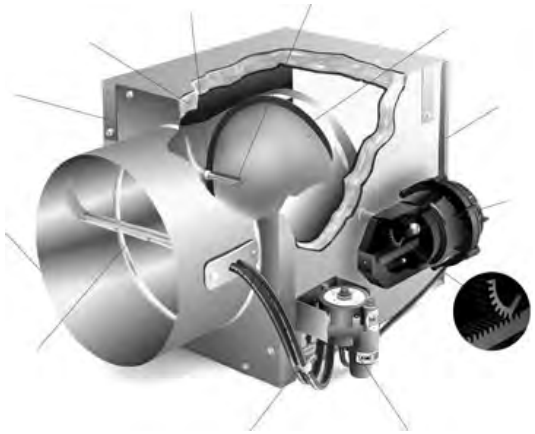
Challenges:
The proposed new additions tie into the existing building along its east and south-east facades. The existing roof structure and roofing at these areas will be required to be modified to allow for the new building tie-in. The design team was presented with concerns about the existing building re-roofing project on May 6th, by Paul Stauffer who attended the project core team meeting that day. HGA contacted Metal Design Corporation, installer of the new copper roof, and discussed the project with president Vicki Volenberg. Vicki explained that because the copper roofing panels are a continuous mechanically-seamed panel from eave to ridge, and because a double lock cleat is used to secure the bottom of each panel, there is no way to cut back a portion of the copper roof where the new membrane roof needs to connect and secure the edge with a new locked connection. It is also not possible to bend up panels against their seams to achieve a water-tight tie in of the new membrane proposed. Due to the mechanically bent seams of each panel, tie in of the new roof membrane will most likely require full removal and replacement of the copper panels in areas of interface. This strategy is accounted for in the project budget and estimates a replacement of 47% of the new copper roof. Also, where the proposed additions are taller than the existing roof, a structural analysis should be performed to determine impact of additional drifting snow. Some reinforcing of the existing structure may be required as a result. Overframing above these portions of existing roof could minimize the potential depth of drifting snow. Other challenges that need to be resolved as the design progresses are routing the existing storm-water lines and venting the existing roof at areas affected by the addition.

EXISTING MECHANICAL & ELECTRICAL UPGRADES

In July of 2009, the City of Madison contracted Michael Hein, PE of HEIN Engineering Group to perform an existing facility systems assessment and produce a series of upgrade options that could be considered to address equipment nearing the end of service life and improve overall efficiency. HEIN Engineering issued a seven-page report that summarized their findings and recommendations and included first cost estimates and annual energy cost estimates for each option presented. Upgrade options included the following:

- Option 1: Replace existing boilers with low-temperature condensing boilers
- Option 2: Replace existing hot water pumping with variable pumping
- Option 3: Replace existing air handler AH-1 and convert to VAV system with ventilation energy recovery.
- Option 4: Replace existing air handlers AH-2 & 3 and convert to VAV system with ventilation energy recovery.
- Option 5: Replace existing air-cooled condensers with new high efficiency units. (The condensor unit model was abandoned in lieu of chillers for this new addition.)
- Option 6: Greenhouse complex HVAC & temperature control upgrade
- Option 7: DDC building automation network
- Option 8: Domestic hot water upgrades
- Option 9: Lighting upgrades

During the current master planning process, HGA was informed by the City of Madison that HEIN Engineering is in the process of designing a systems upgrade for the existing facility that implements some of the recommendations included in their 2009 report. This upgrade will take effect in the near future. HGA will be working closely with the City of Madison and HEIN Engineering to ensure that any systems upgrades being designed account for proposed modifications and additions included in the master plan.



VAV box

low temperature condensing boiler

SYSTEMS DESCRIPTIONS FOR PROPOSED ADDITIONS

Proposed Mechanical System:

10.1 Heating and Cooling Systems Description

A. Hot Water Heating System

1. The existing hot water heating plant will serve the new addition.
2. The existing hot water heating plant will have space for a future boiler. If needed, a new AERCO 3.0 MBH boiler will be added to accommodate the heating load of the new addition.
3. The existing heating water system piping distribution will be extended to serve the new addition.
4. The existing heating system will provide hot water heat to the entire addition, serving air handling units, unit heaters, radiation and similar devices throughout the addition.

B. Chilled Water Cooling System

1. The existing chilled water cooling plant will serve the addition.
2. The existing chilled water cooling plant will have space for a future chiller evaporator. A new 60-ton air-cooled chiller with remote evaporator chiller barrels will be added to accommodate the cooling load of the new addition.
3. The existing chilled water cooling piping distribution will be extended to serve the new addition.
4. The existing chilled water system will provide chilled water cooling to the entire addition, serving air handling units throughout the addition.

C. The Education Wing of the new addition will be heated, cooled and ventilated by a variable air volume with reheat system. An indoor air handling unit of approximately 7,000 CFM supply air capacity will serve the system. The air handling unit will consist of return air inlet plenum, plenum type return fans in a fan array, relief air plenum including damper, mixing air plenum including dampers, air mixing blender, MERV 7 pre-filters, hot water heating coil, chilled water cooling coil, plenum type supply fans in a fan array, MERV 13 final filters and supply air discharge plenum. Each fan array shall be controlled by a single variable speed drive controller controlling multiple fan motors in the fan array. The hot water heating coil shall be piped with dedicated inline circulating pump.

D. The Plant Show space of the new addition will be heated, cooled and ventilated by a single zone, variable air volume system. An indoor air handling unit of approximately 8,500 CFM supply air capacity will serve the system. The air handling unit will consist of return air inlet plenum, plenum type return fans in a fan array, relief air plenum including damper, mixing air plenum including dampers, air mixing blender, MERV 7 pre-filters, hot water heating coil, chilled water cooling coil, plenum type supply fans in a fan array, MERV 13 final filters and supply air discharge plenum. Each fan array shall be controlled by a single variable speed drive controller controlling multiple fan motors in the fan array. The hot water heating coil shall be piped with dedicated inline circulating pump.

E. The Lobby/Orangerie space of the new addition will be heated, cooled and ventilated by a single zone, variable air volume system. An indoor air handling unit of approximately 7,500 CFM supply air capacity will serve the system. The air handling unit will consist of return air inlet plenum, plenum type return fans in a fan array, relief air plenum including damper, mixing air plenum including dampers, air mixing blender, MERV 7 pre-filters, hot water heating coil, chilled water cooling coil, plenum type supply fans in a fan array, MERV 13 final filters and supply air discharge plenum. Each fan array shall be controlled by a single variable speed drive controller controlling multiple fan motors in the fan array. The hot water heating coil shall be piped with dedicated inline circulating pump.

F. The new greenhouse will include a 2-zone heating system consisting of aluminum finned pipe under benches and second zone of aluminum finned pipe installed directly below the gutter lines. Pip-

ing will be tied back to the main building boiler equipment and regulated by valves and a new PC-based environmental control system. Active greenhouse cooling will consist of an evaporative cooling pad system located along one gable end of the structure. Exhaust fans located on the opposite gable end will serve to draw incoming air across the cooling pads. Supplemental HAF fans throughout the greenhouse will provide general air movement. Motorized ridge vents will allow for passive ventilation of the greenhouses. A cable-driven retractable heat-retention curtain system will be employed, allowing users a means to better retain heat within the greenhouses during nighttime hours. All greenhouse systems and motorized elements will be tied to and controlled by the environmental control system. Each greenhouse area will be zoned and controlled independently.

G. The current space plan proposes locating all three new air handling units noted above in a single mechanical room located in the new Education Wing and extending ductwork to the various areas served by each. A second strategy could be analyzed as the project progresses, and would involve locating a second mechanical room in closer proximity to the Lobby/Orangerie and Plant Show Hall space to house the units serving these spaces. This would require potential re-shuffling of programmed space, but could reduce ductwork runs.

H. All supply air serving the Plant Show will be ducted under floor from the mechanical room to Plant Show. Water use will be unpredictable based on the varied use of the space, so potential water infiltration into the duct system is a concern. To address this, the perimeter under floor ductwork will terminate in stainless steel grilles placed at the top horizontal surface of a 12" high continuous perimeter curb. All underground ductwork will be double wall insulated fiberglass reinforced plastic (FRP) duct for corrosion protection. Ductwork will be pitched to a clean-out location should water be advertently introduced to the system. Air circulation in the space will be addressed by incorporating ceiling-mounted fans.

I. All supply air serving the Lobby/Orangerie will be ducted under floor from the mechanical room to Lobby/Orangerie. All supply air will discharge through floor mounted supply air grilles along exterior walls of Lobby/Orangerie. Watering of tree planters in this space should be a controlled activity with limited potential for water or spray to infiltrate the floor grilles. All underground ductwork will be double wall insulated fiberglass reinforced plastic (FRP) duct for corrosion protection. Ductwork will be pitched to a clean-out location should water be advertently introduced to the system. Return grilles will be located high on opposing walls to promote air flow through space.

J. All return air from the Plant Show and Lobby/Orangerie will be ducted under floor from the mechanical room to respective space served. Underground return air ductwork will rise above finish floor in wall cavities to wall mounted return air grilles. All underground ductwork will be double wall insulated fiberglass reinforced plastic (FRP) duct for corrosion protection.

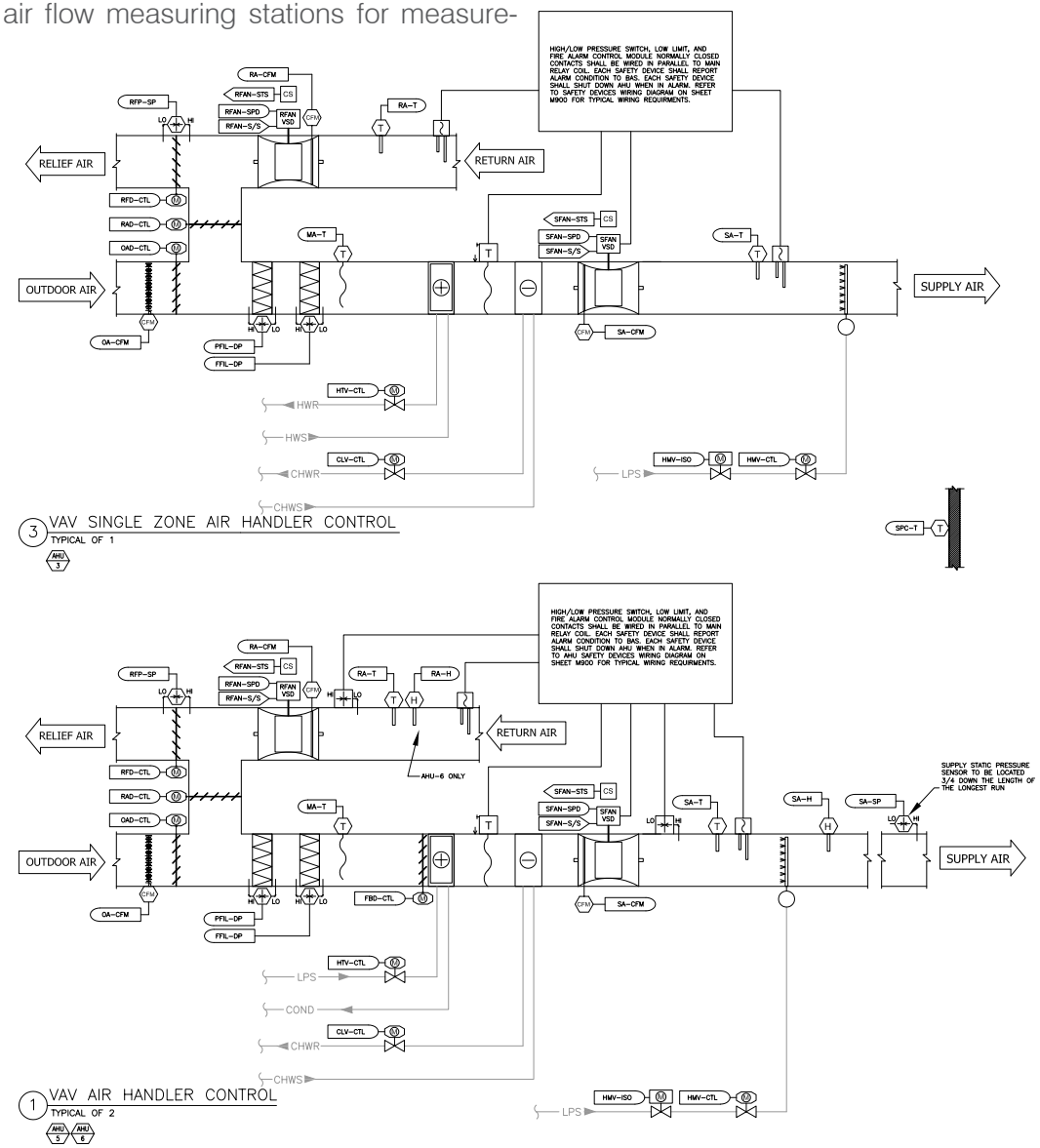
K. All return air will be fully ducted back to each air handling unit.

L. All Toilet Rooms, Janitor's Closets, and similar rooms will be exhausted. Based on preliminary analysis, incorporation of an air to air heat exchanger either as a wheel in the AHU or a separate plate exchanger is not recommended as it does not appear to offer the project a reasonable payback considering equipment and ductwork first costs. However, the City has noted that it is a standard and should be considered.

M. The Temperature Control system shall be the modification and extension of existing Honeywell Direct Digital Control (DDC) system, which is the standard for the City.

N. All new ventilation, heating and cooling systems will be controlled by the DDC system.

O. Supply, return and outdoor air intake for each air handling unit will be provided with air flow measuring stations for measurement and control of system air flow.



Proposed Electrical Service/Systems:

11.1 Electrical Project Scope

A. All electrical work associated with Olbrich Botanical Garden renovation and addition in the City of Madison, WI and site work associated with the project, unless listed below. Work includes interior and exterior demolition and renovation of the existing facilities while maintaining existing services to the facility while occupied.

B. Items currently not included in the scope of work:

1. Telephone System: Telephone hardware and electronics, cabling, faceplates, terminal blocks, termination and testing. The owner will perform this work under a separate contract. Pathways (conduit and cable tray), backboxes, and backboards are included as part of this project scope.
2. Data System: Data network electronics such as concentrators, switches, servers, uninterruptible power supplies, and other electronic equipment, as well as cabling, faceplates, patch panels, network equipment racks, terminations and testing is not included. The owner will perform this work under a separate contract. Pathways (conduit and cable tray) and backboxes are included as part

of this project.

3. Cable TV (CATV) System: VCR's, video signal processors, other electronics, as well as cabling, outlets, faceplates, are not included. The owner will provide this equipment. Video cabling pathways (conduit and cable tray), backboxes, and backboards are included as part of this project.
4. Security and Access Control Systems: Monitors, switchers, recorders, controllers, and other electronics, as well as cabling, outlets, faceplates, are not included. The owner will provide this equipment. Pathways (conduit and cable tray), backboxes, and backboards are included as part of this project.

11.2 Service and Low Voltage Distribution

A. The existing Conservatory facility electrical service consists of a 1600 ampere, 208Y/120V, 3-phase, 4-wire underground secondary electrical service from Madison Gas & Electric (MG&E) from an outdoor pad mounted transformer adjacent to the building.

B. The existing main service equipment installed circ. 1990 consists of a 1600A – 208Y/120V, 3-phase, 4-wire, switchboard manufactured by Square D – Power Style, with fusible switch main, cold-sequence MG&E approved CT/meter section and I-line molded case circuit breaker distribution. There are spaces present in the existing distribution section and the distribution bus was originally designed for future buss extension with modifications.

C. The remainder of the branch panelboard distribution is of similar vintage as the existing main switchboard.

D. The renovation/addition project will include provisions for a new free-standing main switchboard rated 2500A-208Y/120V, 3-phase, 4-wire, with 2500A/3P main circuit breaker located within a new Main Electrical Room. The main electrical room shall be designed within a 2-hour fire rated enclosure. Owner's Engineer with current HVAC renovation project has provided an assessment that the existing electrical service may not be suitable, in terms of capacity for future addition/renovation. However, recent request of MGE service demand history of the existing facility reflects a peak demand within the last 24 months of 166 kW. This would reflect an existing surplus capacity on the existing 1600A service that should be subject to a preliminary load study as facility renovation advances.

E. New 208Y/120V branch circuit panelboards will be located in dedicated, centrally located, branch panel electrical rooms in each wing, on each floor. No existing branch panelboards reuse is anticipated.

11.3 Emergency Power

A. General:

1. The existing building emergency power is currently supplied by an indoor emergency generator rated at 60kW – 208Y/120V, via as single 400A/3P, S/N automatic transfer switch manufactured by Onan-Cummins Power. The engine generator fuel source is natural gas and is located in the generator room adjacent to the main electrical room.
2. The existing generator will be replaced as its capacity is not suitable to support emergency and optional stand-by loads to maintain environmental conditions of the Conservatory botanical environments and the Greenhouses. In addition, the existing emergency distribution is co-mingled and this shall be segregated in accordance with codes enforced with separate distribution for both emergency and optional stand-by distribution.
3. A new outdoor, pad mounted, engine generator will be provided, supplying both emergency power distribution.
4. The existing emergency distribution is fed from a single transfer switch which will be removed. New transfer switches for life safety and optional stand by branch(es) will be provided.

5. The generator will not supply a fire pump.
6. The generator shall be located outdoors and the main emergency switchboard (min. 2-section) and automatic transfer switches shall be located within a 2-hour rated room separate from the normal power main distribution equipment.
7. Loads:

    a. Life safety branch: Provide single 3P/SN – 208Y/120V wall mounted, program transition automatic transfer switch to serve code required emergency egress lighting and exit signage, fire alarm and fire protection branch circuits.
    b. Optional Standby Equipment branch: Provide 3P/SN – 208Y/120V wall mounted. Program transition automatic transfer switch to service HVAC/plumbing equipment required to keep the botanical exhibit assets and building from damage.

11.4 Lighting Scope

A. In 2011, the entire facility underwent an interior lighting update. While the existing lighting is largely current cataloged product, it may not be appropriate for application in the renovation/addition. Therefore, lighting and lighting control systems appropriate for the task and design of the space will be selected. Ambient lighting levels will meet or exceed IES recommendations for illumination per space type.

B. Design will utilize energy efficient LED, T5, or T5HO fluorescent lamp technology and electronic ballasts. Lamp color temperature shall be either 4100k or 3500 degree Kelvin with a color rendering index (CRI) of 85 or better for general lighting applications.

C. Digital lighting controls (occupancy/daylight/low-voltage switch stations) shall represent the Basis of Design would include nLight digital dimming, lighting controls and lumen management on CAT-5 modular connected network.

D. Exterior Lighting Specifics:

1. Provide building / accent lighting: Each exit door shall have one, two (2) lamp, building mounted compact fluorescent luminaire.
2. Landscape Feature Lighting: Design unknown at this time.
3. Pedestrian Circulation Areas Lighting: Exterior shall be lit using 42" high bollards along sidewalks leading to entry canopy, spaced 15' on center, utilizing LED lamp sources.
4. Parking Lighting: Provide all new LED pole mount area lighting for the entire parking lot, including poured concrete pole bases and multi-level lighting controls.
5. All exterior lighting will be LED unless noted otherwise.

E. Emergency Egress Lighting:

1. Exterior: All exterior lighting at entrances/exits from the building will be circuited and controlled to serve as egress lights. All egress lighting shall be connected to the life safety circuit(s).
2. Interior: Egress lighting will be provided by fixtures connected to the life safety circuit where necessary to meet code requirements.

11.5 Systems Scope

A. Fire Alarm: The existing fire alarm system is not suitable for the scope of the future expansion and shall be completely replaced with a new addressable fire alarm and detection system with one-way voice EVAC capabilities.

B. Remove the existing fire alarm and detection system and provide new within project boundaries.

11.6 Voice/Data Systems

A. The voice/data cabling systems will be provided and installed by the owner. The contractor will provide empty boxes, conduit and sleeves to facilitate the voice/data

cabling. A typical voice/data outlet will have a two-gang box with a single gang faceplate and a 1" empty conduit routed to the accessible corridor ceiling.

B. Telecommunications Rooms:

1. There will be one Main Telecom room for the building. Telecommunications services to the building from the Owner's service provider will also terminate in this room.
2. There will be distribution telecom rooms (TR's) located in the building. Location and quantity will be subject to EIA/TIA cabling testing criteria.
3. The typical layout for each Telecom Room will be equipment racks located along the center of each room with front and rear vertical cable management between each rack and on each end of the row of racks. 12" wide cable tray will be installed over the racks and to the end wall.

C. Cable Tray:

1. 12" width, 4" inside loading depth, wire basket-type, chromed steel, NEMA 8C supported 8' on center.
2. The cable tray will installed along all of the major corridors through-out the building.

11.7 Audio/Visual Systems

A. The project budget estimate assumes approximately $15,000 for an A/V upgrade in the Event Space. The specifics of this upgrade have not been confirmed with the user group, so the cost may vary depending on the complexity of the system desired.

11.8 Construction Phasing Strategy

A. The building must remain occupied throughout the entire construction process. Work will need to be completed in phases to accommodate occupancy during construction. Temporary displacement of personal around the building may be required to facilitate installation of new work.

Proposed Plumbing/Fire Protection Systems:

10.1 Sanitary Sewer System

A. Sanitary Sewer

1. A new 4" sanitary sewer will be installed to serve all plumbing requirements of the new addition. The new sanitary shall route to the site and connect to an existing sanitary sewer in Sugar Avenue. The load of the new addition is approximately 80 DFU's.

    a. Addition investigation will need to be performed to validate a tie in connection for the new sanitary sewer.
    b. The Lobby/Orangerie shall utilize floor drains installed near the planters. These drains will collect any overspray from planters, any spills that occur in the lobby and any water from cleaning the floors.
    c. Drainage will be required in the Plant Show Space. The drainage shall be designed to meet the requirements of the users. This may require floor drains, trench drains or some combination.

10.2 Storm Sewer System

A. Storm Sewer

1. Roof drains will be utilized for the new addition which will utilize a flat roof. The existing downspouts will be adjusted/eliminated to splash on the new roof or be rerouted underground to the new addition. All storm water from the new and existing buildings will be collected and routed to the site rainwater harvesting system. See architectural plans for additional information on rainwater harvesting system location.

    a. Storm conductors shall be routed down in thickened walls or in column enclosures to the under-

ground.

10.3 Domestic Water System

A. Domestic Cold Water

1. An existing 4" domestic water service provides water to the current facility. Based on the estimated usage and domestic water loads of the existing and new facilities, this 4" water service will be adequate to feed the domestic water needs of the existing and new additions.
2. A connection point will need to be field verified on the existing domestic water system so an adequate size domestic water pipe serves the new addition requirements.

B. Domestic Hot Water

1. Due to the minimal load being added in the new addition and water hardness level, it has been recommended that the existing domestic hot water system be utilized to serve the new addition.

    a. A connection point will need to be field verified on the existing system so an adequate size domestic hot water pipe can be routed to the new addition.
    b. The new hot water piping will also need to tie into the existing hot water recirculation system.

C. Plumbing Fixtures

1. The fixtures provided in the new addition shall match the manufacturer and model of the recent Restroom Addition Project.
2. Exterior and interior hose bibb requirements need to be discussed with users in the next project phase to determine the facility needs. This would apply to all new spaces and the relocated greenhouse.

10.4 Fire Protection

A. General:

1. The following codes, standards, and guidelines will be used for design as applicable to or as directed by the authorities having jurisdiction:

    a. Wisconsin Administrative Plumbing Code, latest edition.
    b. NFPA Chapters 13, 101 and as referenced in the Wisconsin Building Code
    c. Requirements of Insurance Carrier.
    d. The codes, standards, and guidelines listed indicate recommended or minimum requirements. Based on input from Owner representatives and recommendations from HGA, minimum requirements or standards may be exceeded.

B. Wet Fire Protection System

1. The building is to be fully sprinklered in accordance with agencies listed above.
2. A new 6" fire protection service will be added to serve the requirements of the fire protection system.

    a. The system shall connect to the existing unused 6" stub located on the northwest of the green house, just off Sugar Ave.
    b. Fire protection contractor shall perform hydraulic calculations to determine the flow requirements of the facility.
    c. The fire protection contractor shall obtain recent flow test data or request a flow test be performed to determine the condition of the existing water utilities.

3. Quick response sprinkler heads will be used throughout the building.
4. Piping material shall be Schedule 40 steel pipe.

Proposed Project Site Improvements: The project will be adding new buildings and entrances to the facility. The main parking lot will not change in size or shape, but will get a new pavement and open graded stone base with the parking stalls being paved with pervious asphalt pavement. The western parking lot will be removed and reconfigured to follow the general shape of Sugar Avenue and is proposed to contain bio swales, open graded stone base, pervious asphalt pavement parking stalls and tree islands. The pervious pavement will drain into an underground drain tile system or the bio swales before entering the storm sewer system. This will allow for a higher quality and cleaner water being discharged to Starkweather Creek at a slower rate than current conditions.

Sanitary Sewer – the existing system will be maintained along with connecting the currently unused six-inch lateral for the new Education Wing located northwest of the green house area off of Sugar Avenue. In addition, the sewer system will need to be extended to provide service for the Quonset huts and building improvements north of the railroad tracks and east of the feed mill.

Water - the existing system will be maintained along with connecting the currently unused six-inch service for the new Education Wing located northwest of the green house area off of Sugar Avenue. The sizing for this service could be reduced if necessary. In addition, the water system will need to be extended to provide service for the Quonset huts and building improvements north of the railroad tracks and east of the feed mill.

Storm Sewer – In addition to the modifications noted above, the project proposes to install two 5000 gallon rain water harvesting tanks and a pumping system for reuse of rain water in the green house and conservatory areas to water plantings and other uses. The chilling pond for the ice rinks will need to be relocated to the west in an area west of the new western parking lot and some modifications to the existing storm sewer will be required to provide drainage. There will be a new storm sewer system installed as part of the Sugar Avenue improvements that will collect the drain tiles and overflow from the tanks before it drains to the north where it will connect to the City's system at an existing manhole. No work is planned to upgrade or modify the City's piping in either Atwood Avenue or along the Union Pacific Railroad/Capitol City Trail at this time.

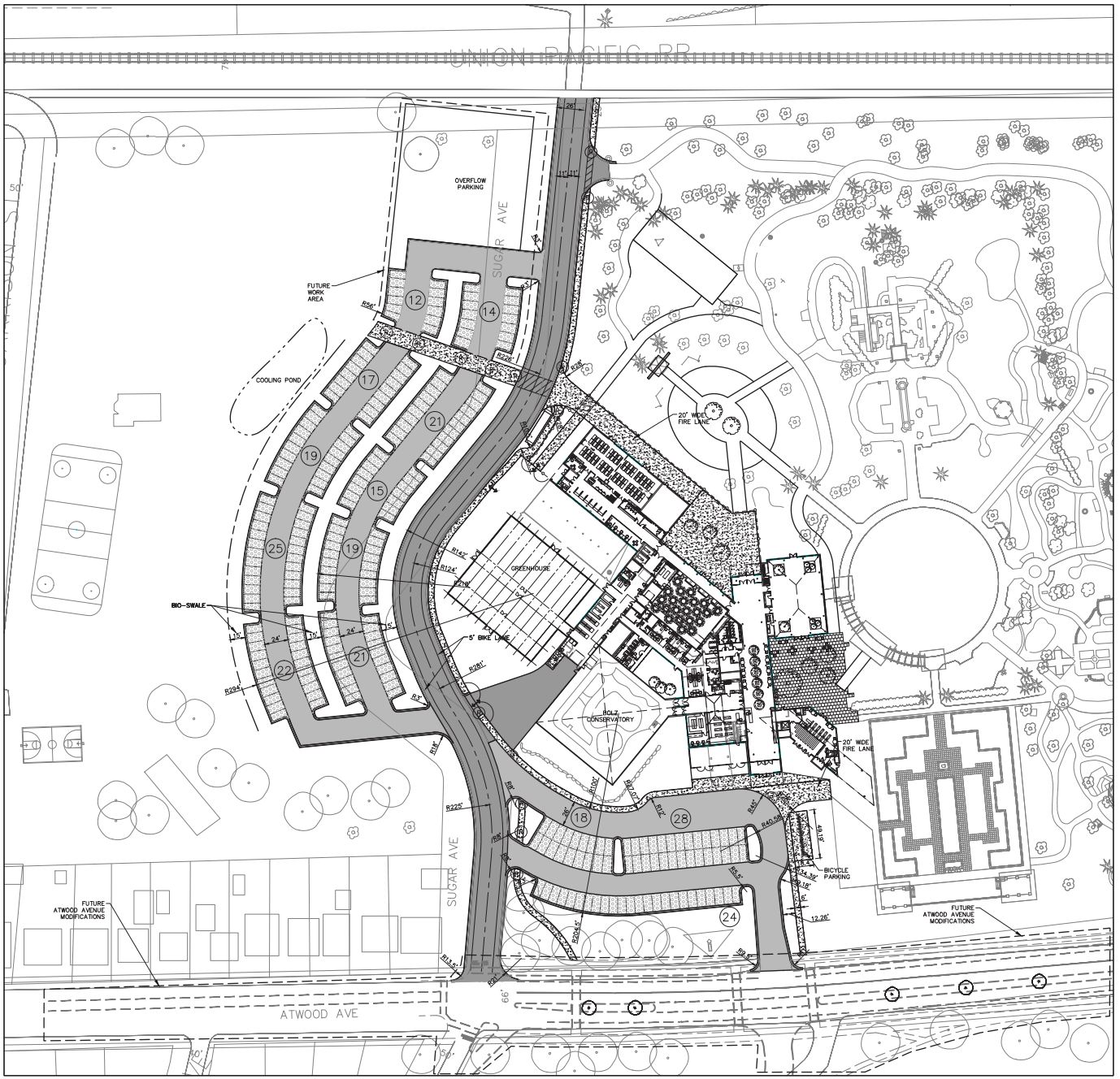
Sugar Avenue Improvements – the existing street will be reconstructed to a new alignment, which will require some modifications to the right of way mostly near the central segment as the curve will be flattened. The street will receive curb and gutter, storm sewer, five foot wide bike lanes on each side and a six foot wide sidewalk along the east side. The bike and pedestrian facilities provide a desired connection between the Capitol City Trail and improvements planned for Atwood Avenue as well as additional access to the garden facilities.

GENERAL NOTES

1. THE BASE SURVEY WAS PREPARED BY XXX IN XXX. ALL UNDERGROUND UTILITIES AND STRUCTURES HAVE BEEN SHOWN TO A REASONABLE DEGREE OF ACCURACY AND IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THEIR EXACT LOCATION AND TO AVOID DAMAGE THERETO.
2. REFER TO SHEET CXXX FOR BENCHMARKS, DATUM, AND TOPOGRAPHIC ELEMENTS.
3. CONTRACTOR SHALL VERIFY LOCATION OF PROPOSED WORK AND REPORT ANY DISCREPANCIES TO THE ENGINEER PRIOR TO COMMENCING WORK.

LEGEND

- –PROPOSED PERVIOUS ASPHALT PAVEMENT
- –PROPOSED PARKING LOT ASPHALT PAVEMENT
- –PROPOSED ROAD ASPHALT PAVEMENT
- –PROPOSED CONCRETE SIDEWALK
- –PROPOSED VERTICAL CURB
- (R) –PROPOSED ADA RAMP WITH TRUNCATED DOMES



1/C300 OVERALL LAYOUT PLAN 1" = 50'

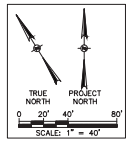
CITY OF MADISON
PARKS DEPARTMENT
OLBRICH BOTANICAL SOCIETY

SCHEMATIC DESIGN STUDY FOR:

OLBRICH BOTANICAL GARDENS

OLBRICH BOTANICAL GARDENS RENOVATION AND EXPANSION

3330 Atwood Avenue
Madison, WI 53704



REVISION HISTORY - THIS SHEET

Architecture | Engineering | Planning
Hammel, Green and Abrahamson, Inc.
333 East Erie Street
Milwaukee, Wisconsin USA 53202-0095
Telephone 414-276-4200 Facsimile 414-276-7734

GRAEF
5126 West Terrace Drive,
Suite 111
Madison, WI 53718-8346
608 / 242 1550
608 / 242 0787 fax

OVERALL LAYOUT PLAN

COMM. NO. 3374-001-00
SCALE
DATE
DRAWN

SCHEMATIC DESIGN

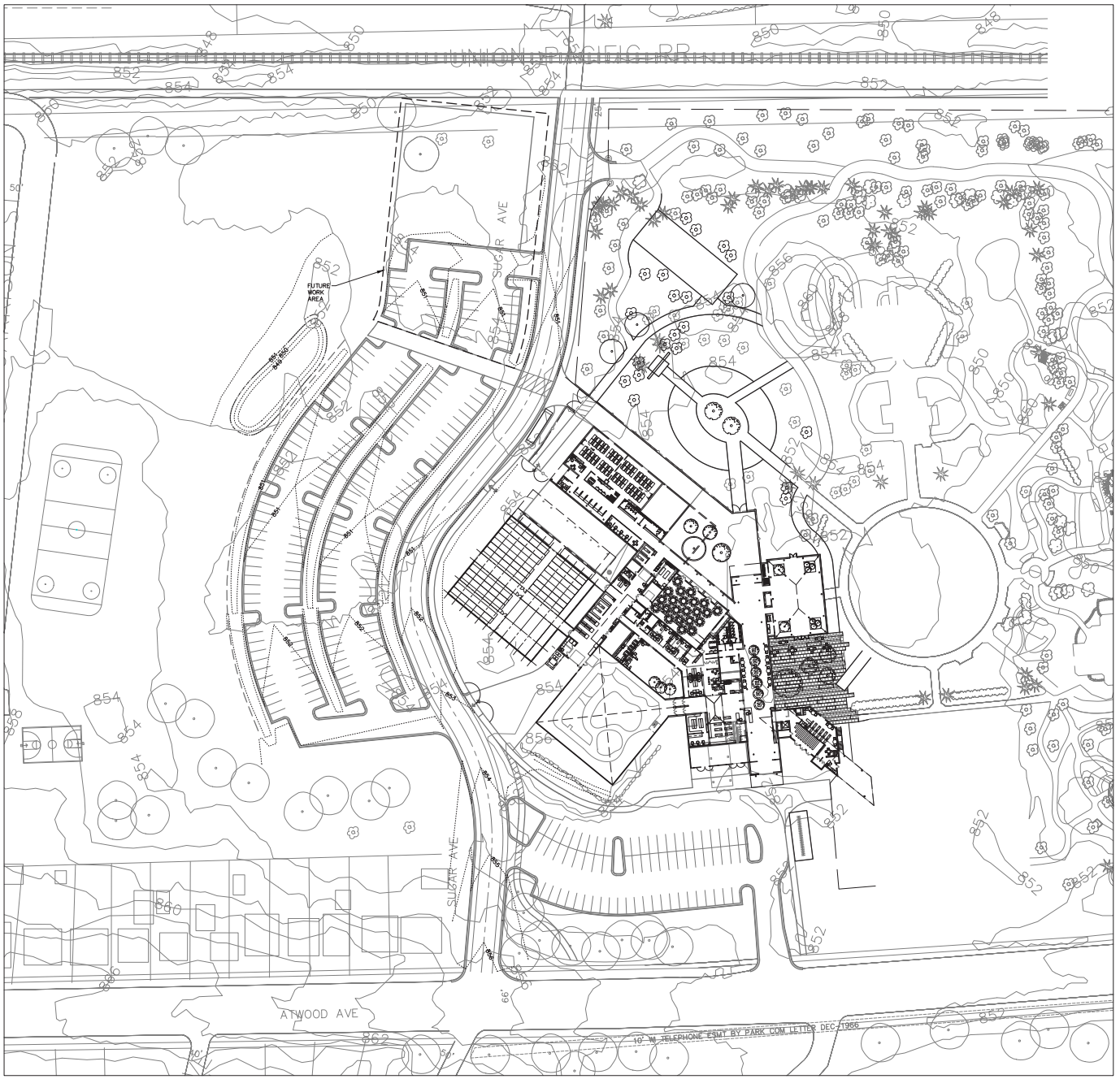
C300

LEGEND

–PROPOSED MAJOR CONTOUR

–PROPOSED MINOR CONTOUR

–EXISTING CONTOUR



XX/XX SITE DETAIL

N.T.S.

CITY OF MADISON
PARKS DEPARTMENT

OLBRICH BOTANICAL SOCIETY

SCHEMATIC DESIGN STUDY FOR:

OLBRICH BOTANICAL GARDENS

OLBRICH BOTANICAL GARDENS RENOVATION AND EXPANSION

3330 Atwood Avenue
Madison, WI 53704

TRUE NORTH
PROJECT NORTH
0 20' 40' 80'
SCALE: 1" = 40'

REVISION HISTORY - THIS SHEET

Architecture | Engineering | Planning
Hammel, Green and Abrahamson, Inc.
333 East Erie Street
Milwaukee, Wisconsin USA 53202-0095
Telephone 414-276-4200 Facsimile 414-276-7734

GRAEF
5126 West Terrace Drive,
Suite 111
Madison, WI 53718-8346
608 / 242 1550
608 / 242 0787 fax

OVERALL GRADING PLAN

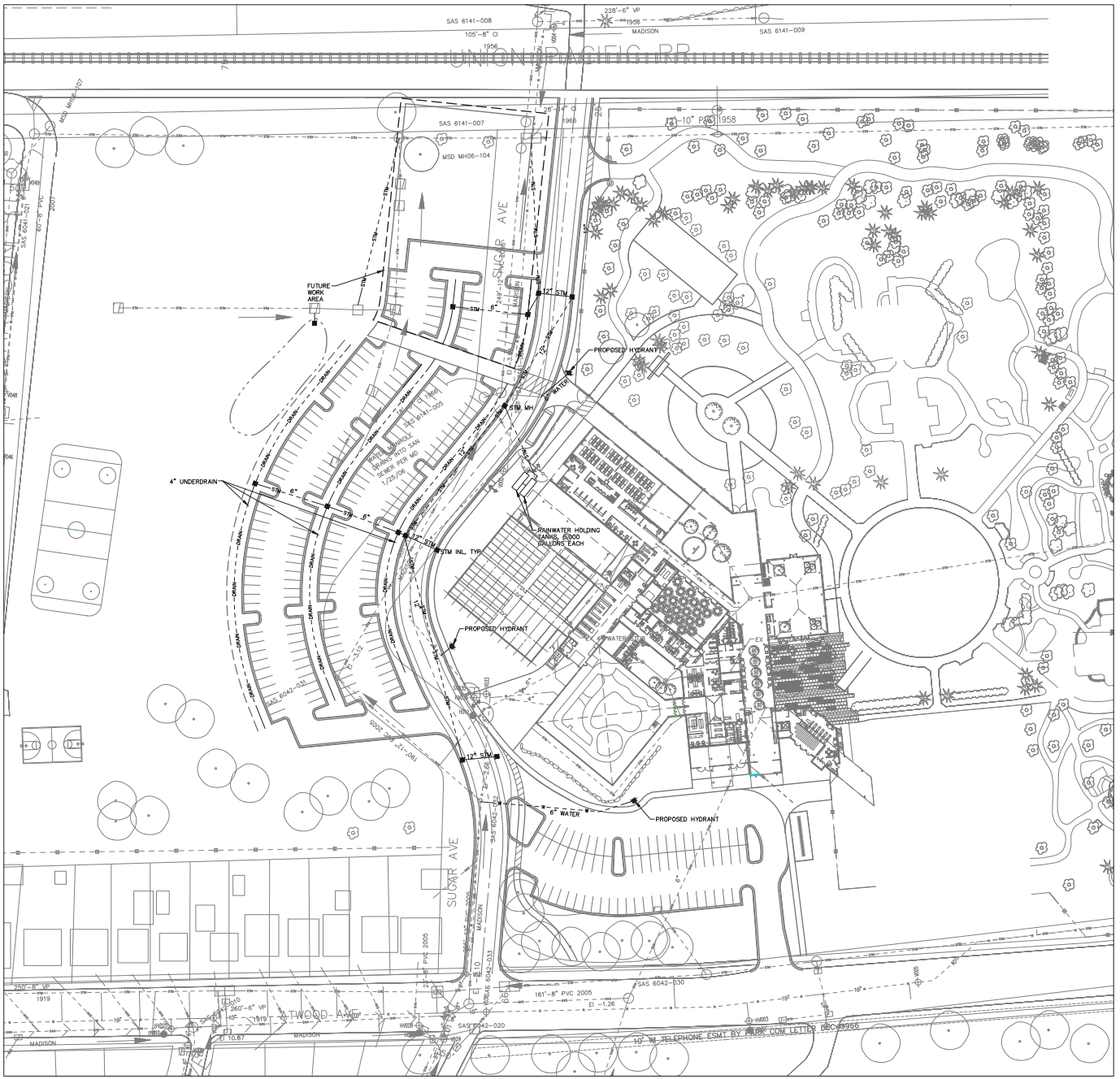
COMM. NO. 3374-001-00
SCALE
DATE
DRAWN

SCHEMATIC DESIGN

C400

LEGEND

- —STM— – – – – —PROPOSED STORM SEWER
- —SAN— – – – – —PROPOSED SANITARY SEWER
- —W— – – – – —PROPOSED WATER MAIN
- —E— – – – – —PROPOSED ELECTRICAL
- – – – – —EASE— —PROPOSED UTILITY EASEMENT
- — DRAIN— – – – —PROPOSED UNDERDRAIN
- —PROPOSED MANHOLE
- —PROPOSED CATCH BASIN
- —PROPOSED GATE VALVE
- —PROPOSED HYDRANT
- —PROPOSED UTILITY PLUG
- —STM— – – – – —EXISTING STORM SEWER
- —EXISTING STORM STRUCTURE
- —SAN— – – – – —EXISTING SANITARY SEWER
- —W— – – – – —EXISTING WATER MAIN



CITY OF MADISON
PARKS DEPARTMENT

OLBRICH BOTANICAL SOCIETY

SCHEMATIC DESIGN STUDY FOR:

OLBRICH BOTANICAL GARDENS

OLBRICH BOTANICAL GARDENS RENOVATION AND EXPANSION

3330 Atwood Avenue
Madison, WI 53704

TRUE NORTH
PROJECT NORTH
0 20' 40' 80'
SCALE: 1" = 40'

REVISION HISTORY - THIS SHEET

Architecture | Engineering | Planning
Hammel, Green and Abrahamson, Inc.
333 East Erie Street
Milwaukee, Wisconsin USA 53202-6095
Telephone 414.276.4200 Facsimile 414.276.7704

GRAEF
5126 West Terrace Drive,
Suite 111
Madison, WI 53718-8346
608 / 242 1550
608 / 242 0787 fax

OVERALL UTILITY PLAN

COMM. NO. 3374-001-00
SCALE
DATE
DRAWN

SCHEMATIC DESIGN

C500

4.2.2 *Applicable Codes & Regulations*

Applicable Codes:

Wisconsin Enrolled Commercial Building Code – IBC 2009 Edition
ICC International Existing Building Code – 2009 Edition
National Fire Protection Association, NFPA 101 Life Safety Code
Americans with Disabilities Act and ICC/ANSI A117.1
City of Madison – Zoning and Code of Ordinances

Zoning:

PR WP-08 – Parks & Recreation District (28.095) with Wellhead Protection District No. 8 Overlay (28.102(7)). Subject property falls within Zone B of the Wellhead Protection District.

- Setbacks: 30' from all property lines
- Maximum Height: 2 stories & 35' (max. height may be exceeded with conditional approval).
- Maximum Lot Coverage: 10%

Occupancy:

Existing: Non-separated occupancies consisting of Assembly A-2, Assembly A-3, Business B, Mercantile M, Storage S-1, Utility U.
New: Non-separated occupancies consisting of Assembly A-3, Business B, Educational E, & Utility U.

Energy Conservation:

Glazed structures excluded from IECC Compliance per SPS 363.002(2).

Fire Separation:

Proposed 2-hour rated fire walls in (2) locations (see Diagram (c)) to meet worst-case area limitations for non-separated occupancies. Aggregate width of openings through fire wall shall not exceed 25% of the total length of the fire wall and shall meet opening protective requirements of the code. An alternate configuration of fire walls is illustrated in Diagram (d).

Fire Access:

20' clear per IFC 503. See Diagram (a).

Allowable Height & Building Areas:
(see Diagram (c))

Area A = 13,883 s.f.
Allowable Area = 6000 + (6000*2) = 18000 s.f.

Area B (including future expansion) = 39,744 s.f.
Allowable Area = 9500 + (9500*.28) + (9500*3) = 40,600 s.f.

Allowable Height & Building Areas: (continued)

Area C (including future expansion) = 14,980 s.f.
Allowable Area = 8500 + (8500*.2) + (8500*3) = 35,700 s.f.

An alternate configuration of Buildings/Areas is illustrated in Diagram (d).

Building Height:

Highest Point Above Grade = 35'-0"

Number of Stories:

Existing Building - 2 stories
New Building - 1 story

Type of Construction:

Existing 1978 Building – Type V-B (wood construction)
Existing 1992 Addition - Type II-B
New Orangerie/Plant Show Hall - Type V-B (designed as part of same building as existing 1978 building).
New Education Wing Addition – Type II-B (designed as part of same building as existing 1992 addition)
New Greenhouse – Type II-B.
(Light-transmitting plastics allowed per IBC Chapter 26)

Fire Suppression:

NFPA 13 automatic fire protection system to be installed throughout existing and new building.

Classification of Work:

IEBC – Level 3 Alteration (chapter 8).

Sanitary Fixtures:

Utilizing ratios in IBC 2902.1 and occupant loads noted in Diagram (b):

Assembly A-2 – 200 occupants (100 male, 100 female) 1.33 male, 1.33 female
Assembly A-3 – 518 occupants (259 male, 259 female) 2 male, 3.98 female
Business B – 190 occupants (95 male, 95 female) 2.9 male, 2.9 female
Education E – 150 occupants (75 male, 75 female) 1.5 male, 1.5 female
Mercantile M – 35 occupants (18 male, 18 female) 0.04 male, 0.04 female
Storage/Utility – 32 occupants (16 male, 16 female) 0.16 male, 0.16 female

Total Required: 7.93 male – round up to 8. 9.91 female – round up to 10.

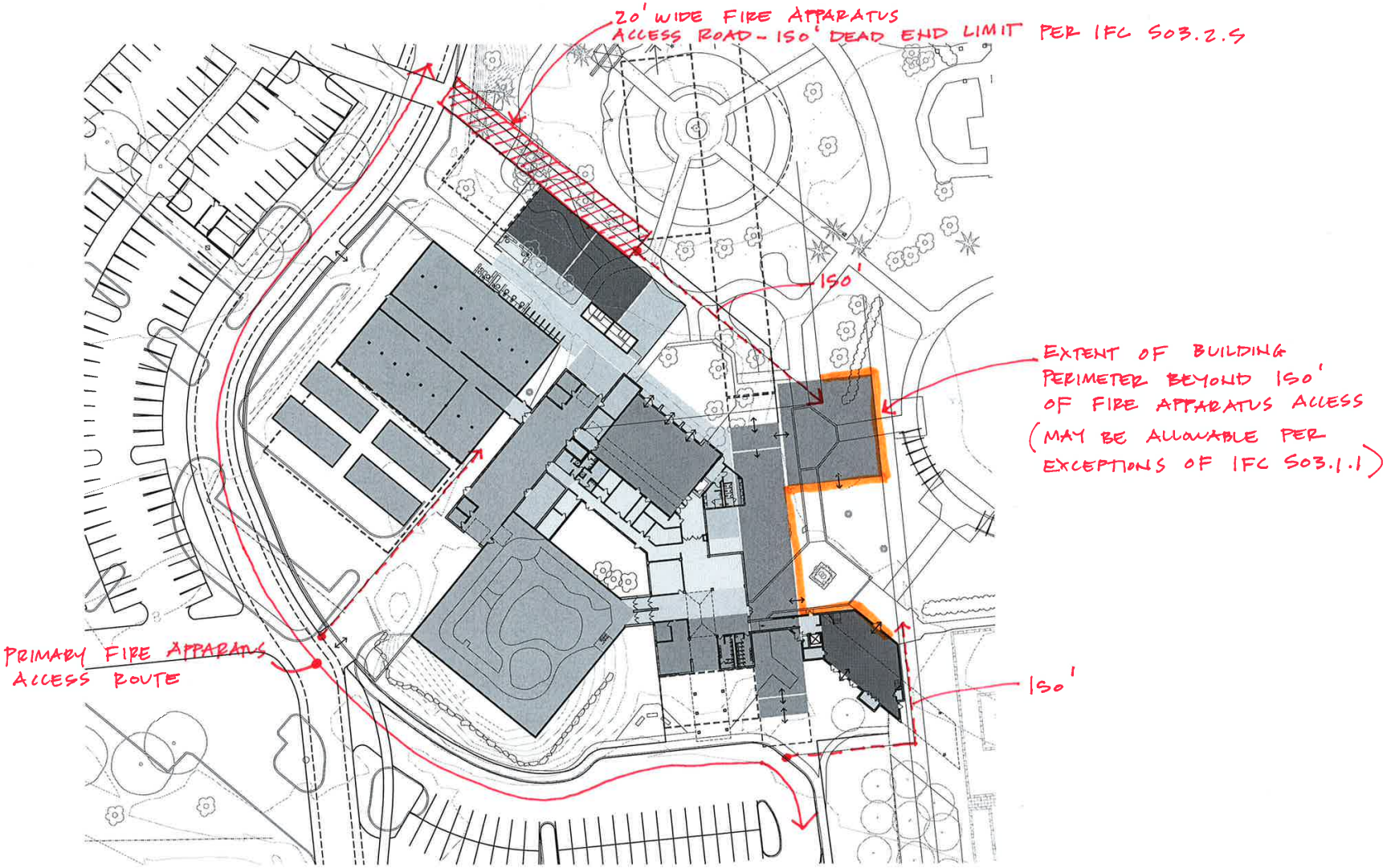


Diagram (a): Site fire access

Diagram (b): Occupant load count

Diagram (c): Proposed building / fire separation

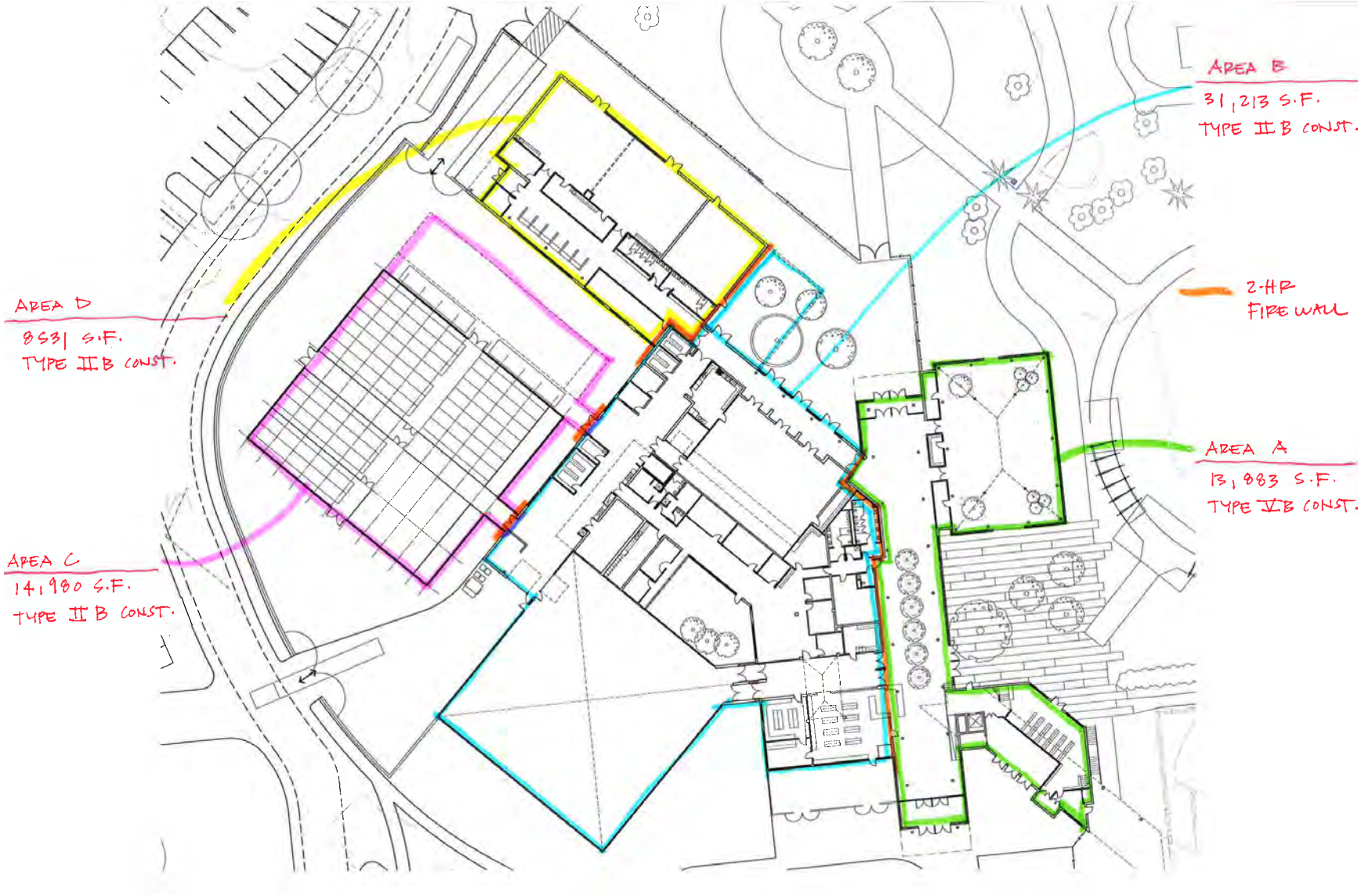


Diagram (d): Alternate building / fire separation

4.2.3 Renderings

Rendering (a): View of new courtyard, Plant Show Hall, Education Wing, and Lobby with green roofs and existing buildings

Rendering (b): View of new courtyard, Lobby, and Plant Show Hall

Rendering (c): View of new Lobby overlooking courtyard, Gardens, and Conservatory entry

Rendering (d): View of new Education Wing overlooking Children's Kitchen Garden

5.0 Project Budget & Phasing

5.1 *Project Cost Estimate*

HGA and KBS developed budget estimates based on the master plan design and on discussions with OBG staff, OBS members, and the City of Madison regarding the quality of the proposed development. The following total project cost figures include construction costs, contractor fees (including an estimating contingency and performance & payment bonds), and project soft costs (including A/E basic services, moveable equipment, and owner contingency) for the full scope of Phase 1 work as presented in the master plan.

Total Project gSF : 66,776

	Description	SF	COST	Fee Contingency Bond	Project Soft Costs	TOTAL	Cost/SF	Cost /gSF
New Construction								
	Education	9,735	2,030,034	137,941	650,392	2,818,367	289.51	42.21
	Visitor Facilities (Lobby, Plant Show)	12,605	4,287,102	291,309	1,373,523	5,951,934	472.19	89.13
	New Construction Cost	22,340	$ 6,317,136	$ 429,249	$ 2,023,916	$ 8,770,302	$ 392.58	$ 131.34
Reprogrammed Existing Space								
	Library / Orientation / Meeting / Brides	3,269	301,189	20,466	96,497	418,152	127.91	6.26
	Event Hall	3,000	94,573	6,426	30,300	131,299	43.77	1.97
	Gift Shop	2,032	335,219	22,778	107,399	465,397	229.03	6.97
	Service/Circulation	7,662	515,263	35,012	165,083	715,358	93.36	10.71
	Offices	3,911	269,461	18,310	86,331	374,101	95.65	5.60
	Reprogrammed Construction Cost	19,874	$ 1,515,706	$ 102,992	$ 485,609	$ 2,104,307	$ 105.88	$ 31.51
Existing Infrastructure								
	Add Sprinkler system to existing	22,867	91,634	6,227	29,358	127,219	5.56	1.91
	Upgrade existing locker room Finishes / ADA	478	54,571	3,708	17,484	75,763	158.50	1.13
	Upgrade finishes and AV for Event Space	3,000	127,000	8,630	40,689	176,319	58.77	2.64
	Upgrade finishes to 2nd floor Classroom / Brides	1,160	62,698	4,260	20,087	87,046	75.04	1.30
	Repair wood out door deck	1,025	61,138	4,154	19,588	84,879	82.81	1.27
	Utilities	3,683	396,880	26,968	127,154	551,002	149.61	8.25
	Deferred Maintenance - Conservatory	10,000	778,328	52,887	249,365	1,080,580	108.06	16.18
	Existing Infrastructure Construction Cost	32,867	$ 1,572,249	$ 106,834	$ 503,725	$ 2,182,808	$ 66.41	$ 32.69
Greenhouses								
	New Greenhouse	11,258	1,882,133	127,891	603,007	2,613,031	232.10	39.13
	Headhouse	3,304	184,120	12,511	58,989	255,621	77.37	3.83
	Quonset Greenhouses	3,456	221,366	15,042	70,922	307,331	88.93	4.60
	Greenhouse Construction Cost	14,562	$ 2,287,619	$ 155,444	$ 732,919	$ 3,175,982	$ 218.10	$ 47.56
Sustainable Features / Sitework								
	Sitework	215,093	157,328	10,690	50,405	218,424	1.02	3.27
	Paving	76,858	446,040	30,308	142,905	619,253	8.06	9.27
	Site Improvements	215,093	401,857	27,306	128,749	557,912	2.59	8.35
	Green Roofs	12,431	264,782	17,992	84,832	367,606	29.57	5.51
	Sugar Bike Path / Pedestrian Connection / Street	27,579	156,848	10,658	50,252	217,758	7.90	3.26
	Parking Lot -Bio Retention	21,746	108,730	7,388	34,835	150,954	6.94	2.26
	Rainwater capture/Treatment/holding /reuse	1	130,000	8,834	41,650	180,484		2.70
	Sustainable Construction Cost		$ 1,665,585	$ 113,176	$ 533,628	$ 2,312,390		$ 34.63

	Description	SF	COST	Fee Contingency Bond	Project Soft Costs	TOTAL	Cost/SF	Cost /gSF
"Across the Tracks" Elements								
	Heated Storage	2,611	127,939	8,693	40,990	177,622	68.03	2.66
	Cold Storage	3,730	220,070	14,954	70,507	305,531	81.91	4.58
	Site Improvements	1	155,786	10,586	49,911	216,283		3.24
	"Across the Track" Construction Cost	6,341	$ 503,795	$ 34,233	$ 161,408	$ 699,436	$ 110.30	$ 10.47
Master Plan 5-20-2013 Cost Breakdown								
	New Construction	22,340	$ 6,317,136	$ 429,249	$ 2,023,916	$ 8,770,302	392.58	131.34
	Reprogrammed Existing Space	19,874	$ 1,515,706	$ 102,992	$ 485,609	$ 2,104,307	105.88	31.51
	Existing Infrastructure	32,867	$ 1,572,249	$ 106,834	$ 503,725	$ 2,182,808	66.41	32.69
	Greenhouses	14,562	$ 2,287,619	$ 155,444	$ 732,919	$ 3,175,982	218.10	47.56
	Sustainable Features / Sitework	n/a	$ 1,665,585	$ 113,176	$ 533,628	$ 2,312,390		34.63
	"Across the Tracks" Elements	6,341	$ 503,795	$ 34,233	$ 161,408	$ 699,436	110.30	10.47
	TOTAL PROJECT	95,984	$ 13,862,090	$ 941,929	$ 4,441,206	$ 19,245,225	$ 200.50	$ 288.21
		impacted area						

FUTURE WORK:

	SF
Greenhouse Phase 2 Addition	3,505
Gift Shop Addition	1,860
Future Cold Storage	4,250
Garver Mill Building	?
Garden Pavillion	1,300
Garden Relocation/Restoration/or Development Beyond Construction Zone	
Window Replacement	
Additional 20 spaces parking and grading overflow area	

CLARIFICATIONS:

- Furniture Fixtures & Equipment are a part of soft costs
- Existing Utility Services are assumed to be adequete
- Fire Protection system for entire complex without Fire Pump
- Includes $125,000 Allowance for Generator for New Additions / Greenhouse
- Includes $100,000 Allowance for Increased Electrical Service Size for New Additions
- (etr) = Existing to Remain
- Bus Shelter is not included
- Atwood Road improvements are not included
- Construction start in the year 2013
- An escalation of 4% compounding would apply for each year after 2013

2014	$ 20,015,034
2015	$ 20,815,635
2016	$ 21,648,261

Estimate Summary

5.2 *Budget/Phasing Options*

In interest of fine-tuning the project budget to respond to the potential fundraising climate, HGA and KBS identified several project options that could be used to modify the total project cost. The worksheet below identifies three scenarios for Phase 1 that result in a range of total project cost. Costs for each line item include contractor fees, contingency, and owner soft costs.

Scenario A: $19,455,000 (high)
Represents full project scope including deferred maintenance, as estimated by KBS.

Scenario B: $16,152,000 (low)
Minimizes project scope by reusing existing greenhouse foundations, reducing quality of exterior materials, simplifying structural system, eliminating green roofs, reducing quantity of new quonsets, and limiting deferred maintenance.

Scenario C: $18,033,000 (mid)
Maintains full "new" project scope, but limits deferred maintenance of existing facility.

The fundraising outcomes and timing decisions will impact the phasing and scope of work.

Several options have also been discussed throughout the process as being deferred to a Phase 2 and have been identified accordingly in this worksheet.

		Total project cost	Aligns w/ CAS Estimate	Minimize Scope	Limit deferred maintenance	
	New Construction		Phase 1 - Scenario A	Phase 1 - Scenario B	Phase 1 - Scenario C	Phase 2
	Visitor Facilities (Lobby, Plant Show Hall)	$5,619,000	x	x	x	
	Education Wing	$2,560,000	x	x	x	
option	Reduce New Construction materials & structural system	-$416,000		x		
option	Gift Shop Addition	$516,000				x
	Reprogrammed Existing Space					
	Library/Orientation/Meeting/Bride's Room	$416,000	x	x	x	
	Evjue Commons & Support Areas	$121,000	x	x	x	
	Gift Shop	$458,000	x	x	x	
	Service/Circulation	$705,000	x	x	x	
	Offices	$361,000	x	x	x	
	Existing Infrastructure					
	Add sprinkler system throughout existing	$107,000	x	x	x	
	Upgrade existing locker room finishes/ADA	$75,000	x	x	x	
	Site utilities	$463,000	x	x	x	
	Deferred maintenance - HVAC system upgrade	$883,000	x	x	x	
option	Upgrade finishes and AV for Evjue Commons	$176,000	x			x
option	Upgrade finishes to 2nd floor Classroom/Brides Room	$87,000	x			x
option	Repair wood deck	$85,000	x			x
option	Deferred maintenance - Conservatory	$1,074,000	x			x
option	window replacement (estimated 85 windows @ $4000 ea.)	$455,000				x
	Greenhouses					
	New Greenhouse	$2,495,000	x	x	x	
	Headhouse renovation	$244,000	x	x	x	
	New Quonset Greenhouses (3456 sf)	$285,000	x	x	x	
option	Greenhouse - keep existing location/foundations/slab-on-grade	-$702,000		x		
option	Greenhouse - utilize polycarbonate roof cladding	-$124,000		x		
option	Greenhouse - Phase 2	$500,000				x
option	Quonsets - reduce by 1/2 (1700 sf)	-$104,000		x		
option	Quonsets - eliminate	-$285,000				
	Site/Sustainable Features					
	Site Clearing	$148,000	x	x	x	
	Paving (parking lot w/ 220 spaces)	$939,000	x	x	x	
	Site Improvements	$563,000	x	x	x	
	Green Roofs	$368,000	x	x	x	
	Sugar Bike Path / Pedestrian Connection / Street	$273,000	x	x	x	
	Parking Lot - Bio Retention	$119,000	x	x	x	
option	Rainwater capture / treatment / holding / reuse	$167,000	x		x	
option	Eliminate green roof in lieu of white membrane roof	-$368,000		x		
option	Garden Pavilion	$278,000				x
option	Children's Garden	$25,000				x
option	Garden Relocation/Restoration/Development beyond Construction Zone	$100,000				x
option	Parking Lot Expansion - 26 add'l paved spaces + overflow parking area w/ grass paving system	$332,000				x
	"Across the Tracks" Elements					
	Heated Storage	$163,000	x	x	x	
	Cold Storage	$285,000	x	x	x	
	Site Improvements	$216,000	x	x	x	
option	Future Cold Storage	$325,000				x
		Total	$19,455,000	$16,152,000	$18,033,000	$3,953,000
			HIGH	LOW	MID	

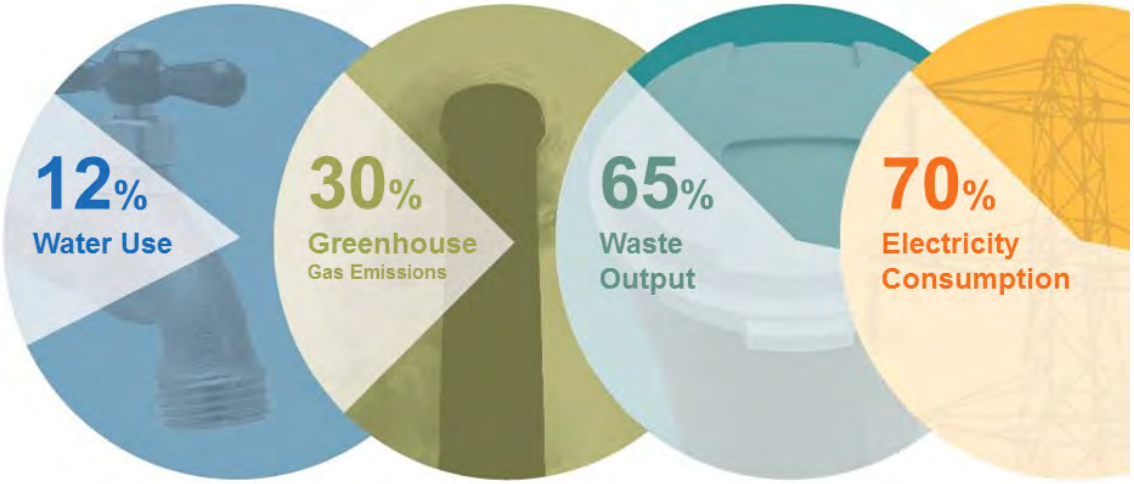
Cost range worksheet

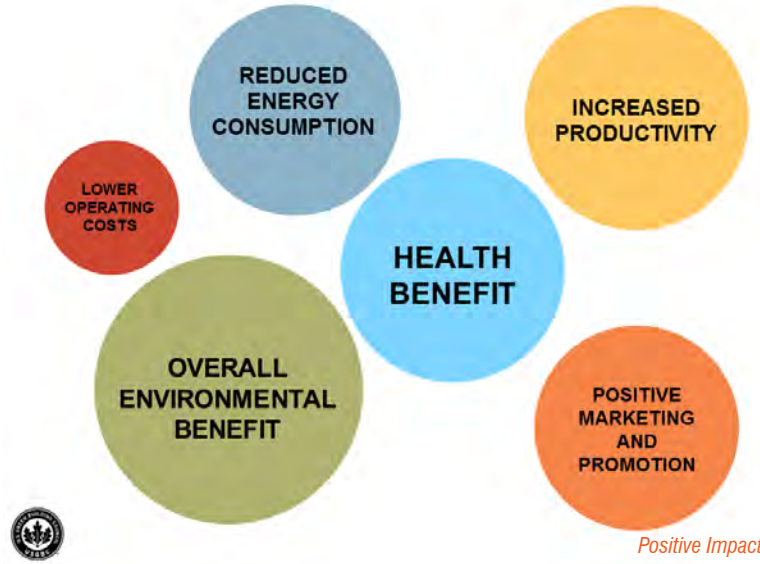
Project Budget & Phasing

6.0 Sustainability

6.1 *Sustainability Summary*

In total, buildings account for:





Positive Impacts of Sustainable Design

Sustainability is a key feature in both the Guiding Principles and Overall Project Goals, which were established by the Core Team. Throughout the master plan process, the design was formulated to incorporate relevant and effective sustainable strategies. These strategies were desired not only for the positive effects on the facility and ecosystem, but also to be used as demonstration tools by Olbrich Botanical Gardens in its values of serving the community and contributing to global solutions.

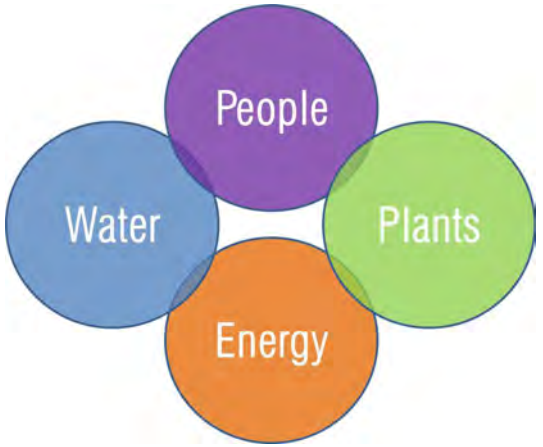
During a public meeting held on April 22, 2013, HGA presented project-specific sustainability concepts organized within a four-themed framework: water, plants, energy, and people. These concepts are viewed as integral to the proposed master plan and building design and will be developed further in future design phases.

OVERALL SUSTAINABILITY GOALS

Inspire and Instruct:
Olbrich Botanical Gardens are a resource for Wisconsin residents as they seek to learn best practices for Midwestern gardening and to be inspired to design and maintain beautiful gardens at their own homes and businesses. This ability to "Inspire and Instruct" in the area of sustainability could be a natural and powerful outgrowth of Olbrich's current role and should be a strong part of the design of the new facility and accompanying exterior surfacing and landscape.

Model Best Practices:
Olbrich Botanical Gardens are a leader in the peer group of gardens, natural history museums and other institutions dedicated to preserving, strengthening and promulgating public knowledge. As such, the role of modeling best practices for sustainability can be seen as a natural outgrowth of the OBG mission. Throughout this study the OBG Core Team and Stakeholders supported the idea of the project design embodying sustainable design practices as a way to model best practices for an institution devoted to the public.

Make a Positive Impact on the Watershed:
Throughout the planning process, the Starkweather Creek watershed was recognized as touchstone environmental condition that ties the neighborhood surrounding Olbrich together into a larger regional entity. The Creek itself bisects the Olbrich Botanical Garden site as it nears its terminus at Lake Monona. The Starkweather Creek Watershed is planned to anchor a linked public greenway over time. Clean-up of the waterway is important and steps should be taken to improve the quality of stormwater reaching the creek and the habitat of the lands surrounding it. While a full restoration of the creek is beyond the scope of this study, this critical site-specific element is a major element of focus for the design of the project.



PROJECT SPECIFIC STRATEGIES

Water - Specific Actions and Impacts

Design Actions:
- Green roof
- Permeable paving at parking lot
- Bioswales at parking lot
- Underground stormwater retention
- Capture rainwater

Impacts:
- Clean storm runoff through settling and filtering
- Detain rainwater past storm peaks
- Retain rainwater for landscape, greenhouse, and potable water uses

Plants - Specific Actions and Impacts

Design Actions:
- Green Roof
- Native plantings at parking area, courtyard, and prairie green roof

Impacts:
- Demonstrate viability, usefulness, and beauty of native plants
- Develop environments that support birds and insects
- Use bird-friendly design principles in structures
- Demonstrate two types of green roofs

OBG borders both sides of Starkweather Creek

Energy - Specific Actions and Impacts

Design Actions:
- Maximize reuse of heat generated in greenhouses and conservatory
- Incorporate daylight harvesting and high-performance exterior envelope
- Incorporate highly efficient heating, cooling and lighting systems

Impacts:
- Improved occupant comfort and control
- Reduce overall building energy needs and utility bills

People - Specific Actions and Impacts

Design Actions:
- Incorporate natural building materials such as wood and stone
- Maximize proximity to and views through windows
- Specify safe building products and finishes
- Incorporate dedicated bicycle and pedestrian routes, bicycle parking, and support facilities within building

Impacts:
- Increased user satisfaction and general sense of well-being
- Serve as a model and teaching tool for visitors

Natural materials in the Lobby/Orangerie with views to the Gardens

LEED (LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN)

As part of the master plan process, HGA reviewed LEED Certification as a possible path to measuring the level of sustainability achieved. LEED, a third-party green building certification program administered by the United States Green Building Council (USGBC), utilizes measurable criteria organized within five major categories, as well as a sixth "innovation" category to determine an overall score and associated rating level.

The project has some natural alignments with elements rewarded under the LEED Rating system, such as reuse of an existing site and building and location of a project near mass transit options. A preliminary look at how the proposed master plan aligns with LEED criteria revealed that a LEED Gold level is likely achievable. Additionally, LEED Platinum certification may be possible to achieve if steps are taken for aggressive reduction of energy consumption, use of repurposed materials and other steps. A closer analysis of the criteria as the design progresses will to validate the desired direction.

Whether OBG decides to pursue LEED Certification for its future projects is a choice that can be made in the future. However, as the master plan was developed, it was important to lay the groundwork for making smart choices for the facility and surrounding gardens based on sustainable design principles.

LEED Checklist Summary

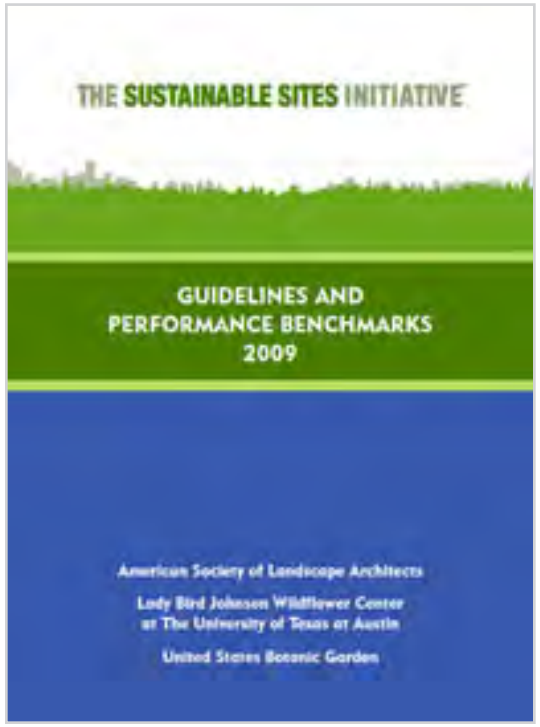
	LEED NC 2009 Section:	Available	Current "Likely" 4/22/13	Platinum Scenario
SS	Sustainable Sites	26	**22**	24
WE	Water Efficiency	10	**4**	6
EA	Energy and Atmosphere	35	**9**	16
MR	Materials and Resources	14	**8**	12
EQ	Indoor Environmental Quality	15	**11**	14
ID	Innovation and Design Process	6	**6**	6
RP	Regional Priority	4	**3**	4
	Total	**110**	**63**	**82**
	Need		**= Gold**	**80+**

Current Snapshot:
63 Likely
10 Not Likely
37 Need Investigation

Levels of achievement:
Certified = 40+
Silver = 50+
Gold = 60+
Platinum = 80+

SUSTAINABLE SITES INITIATIVE

The Sustainable Sites Initiative (SITES) was created to promote sustainable land development and management practices that can apply to sites with and without buildings, including the Olbrich Botanical Gardens site. SITES addresses increasingly urgent global concerns such as climate change, loss of biodiversity, and resource depletion. OBG can decide whether or not to pursue SITES certification in the next steps of the process.

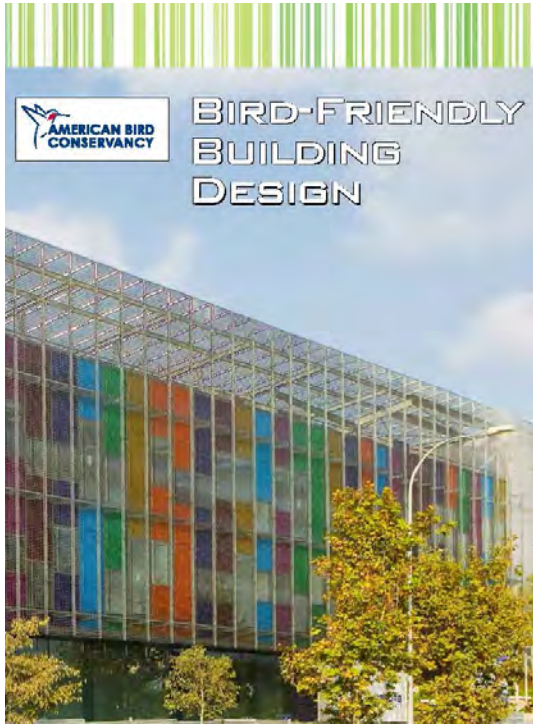


ABC BIRD FRIENDLY DESIGN GUIDE

An estimated 300 million to 1 billion birds die each year from collisions with glass on buildings, from skyscrapers to homes. Birds simply can't tell reflection from reality. Even if a bird flies away after striking a window, it may die elsewhere as a result of the collision.

A bird-friendly building is one where:

- At least 90% of exposed façade material from ground level to 40 feet (the primary bird collision zone) has been demonstrated in controlled experiments to deter 70% or more of bird collisions.
- At least 60% of exposed façade material above the collisions zone meets the above standard.
- There are no transparent passageways or corners, or atria or courtyards that can trap birds.
- Outside lighting is appropriately shielded and directed to minimize attraction to night migrating songbirds.
- Interior lighting is turned off at night or designed to minimize light escaping through windows.
- Landscaping is designed to keep birds away from the building's façade.
- Actual bird mortality is monitored and compensated for (e.g., in the form of habitat preserved or created elsewhere, mortality from other sources reduced, etc.).



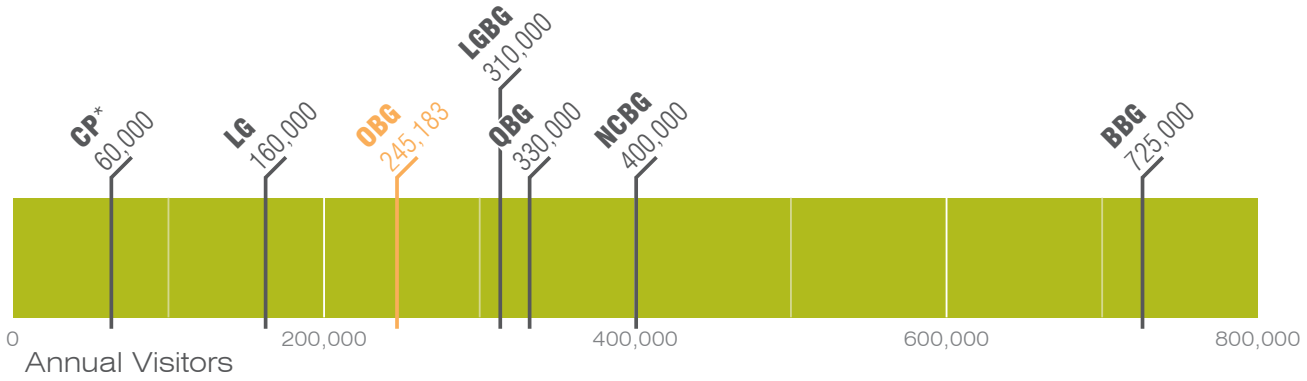
7.0 Benchmarking

7.1 *Benchmark Comparison*

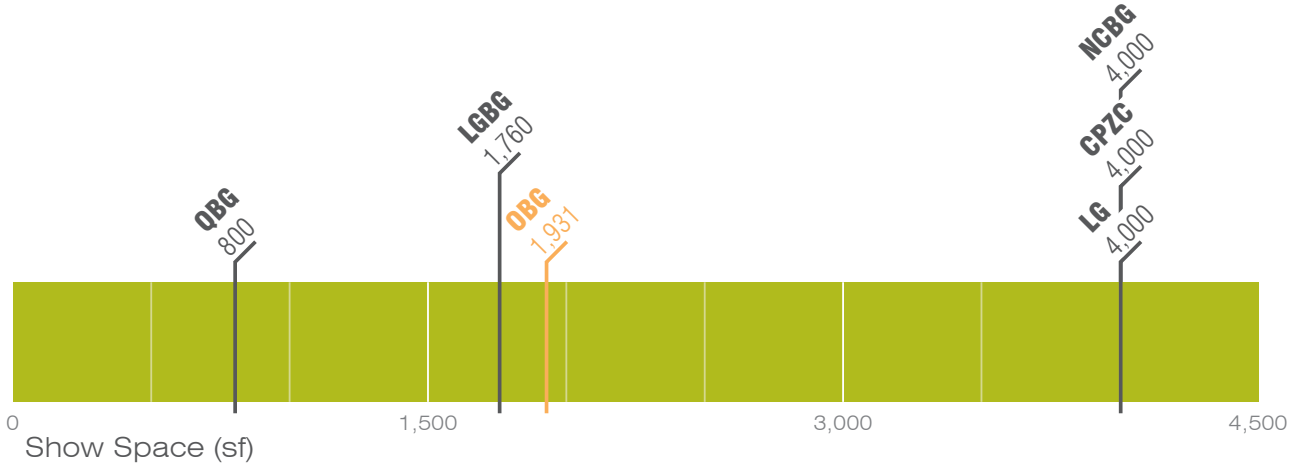
Garden facilities were benchmarked across the United States for education, public & visitor experience, and growing the gardens information and comparisons. These facilities were studied as inspirational peers.

Abbreviations

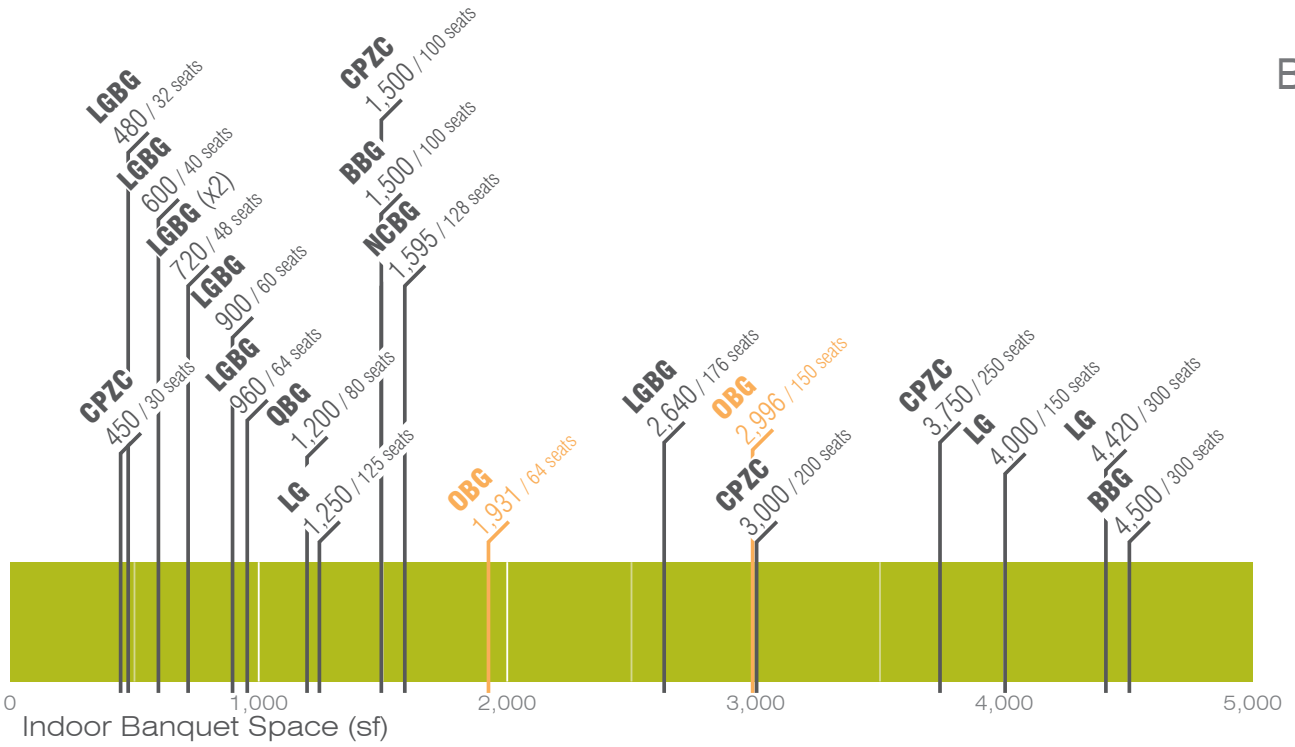
BBG Brooklyn Botanic Gardens
QBG Queens Botanic Gardens
LG Lauritzen Gardens
LGBG Lewis Ginter Botanical Gardens
CP Cornell Plantations
CPZC Como Park & Zoo Conservatory
NCBG North Carolina Botanical Garden
OBG Olbrich Botanical Garden



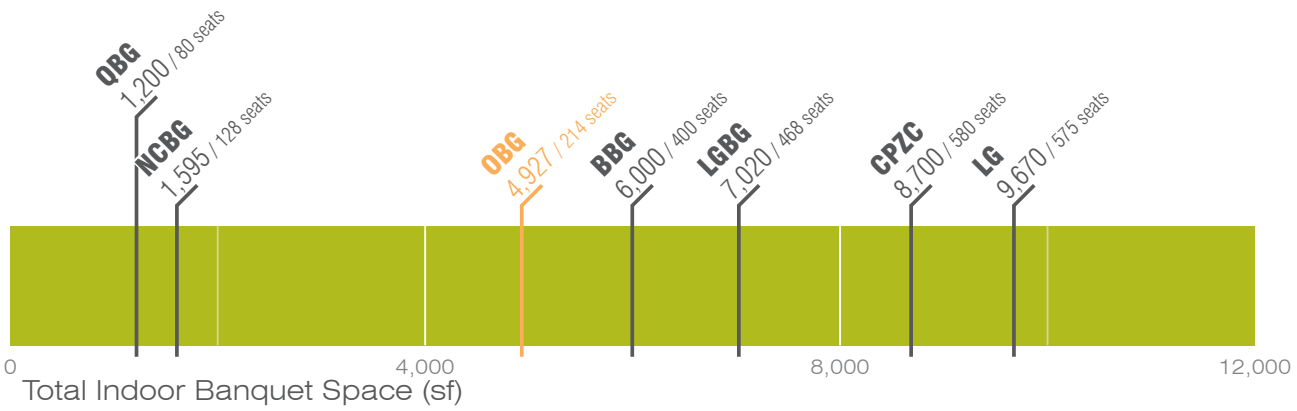
*only visitors to Welcome Center, not entire plantation
**CPZC: 1,900,000 annual visitors (includes zoo)



*BBG uses its many conservatory rooms/pavilions



*CP only has outdoor banquet space



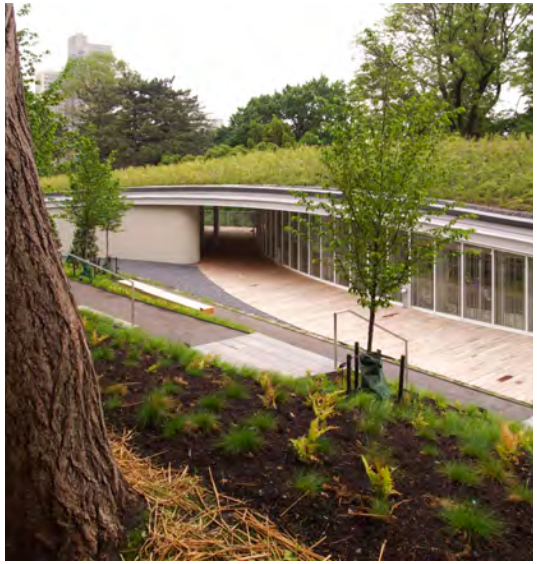
*CP only has outdoor banquet space

7.2 *Benchmarking Summary*

BROOKLYN BOTANIC GARDENS

Location:	Brooklyn, New York
Completed:	Summer 2012
Annual Visitors:	725,000
Gross Square Feet:	22,000 square feet
Construction Cost:	$28 million
LEED:	Platinum
Construction System	Steel frame with steel decking
Systems:	Geothermal heating and cooling

The architecture breaks the barrier of garden and building by having garden paths penetrate the building in numerous locations to blur the boundaries of indoors and outdoors. The lush green roof literally brings the garden on the building, leaving only the small area of copper roof at the street front to reveal the entrance. The curving form of the building mimics the curving garden pathways.



MISSION:

...to serve all the people in its community and throughout the world by:

Displaying plants and practicing the high art of horticulture to provide a beautiful and hospitable setting for the delight and inspiration of the public.

Engaging in research in plant sciences to expand human knowledge of plants, and disseminating the results to science professionals and the general public.

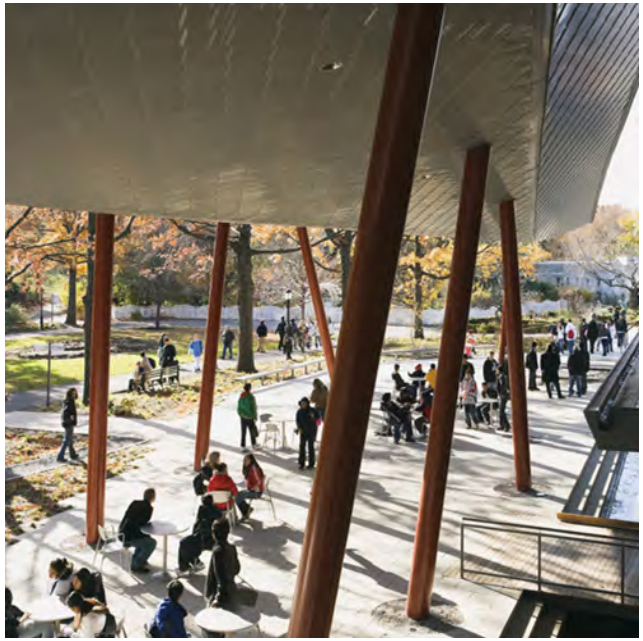
Teaching children and adults about plants at a popular level, as well as making available instruction in the exacting skills required to grow plants and make beautiful gardens.

Reaching out to help the people of all our diverse urban neighborhoods to enhance the quality of their surroundings and their daily lives through the cultivation and enjoyment of plants.

Seeking actively to arouse public awareness of the fragility of our natural environment, both local and global, and **providing information** about ways to conserve and protect it.

QUEENS BOTANICAL GARDEN

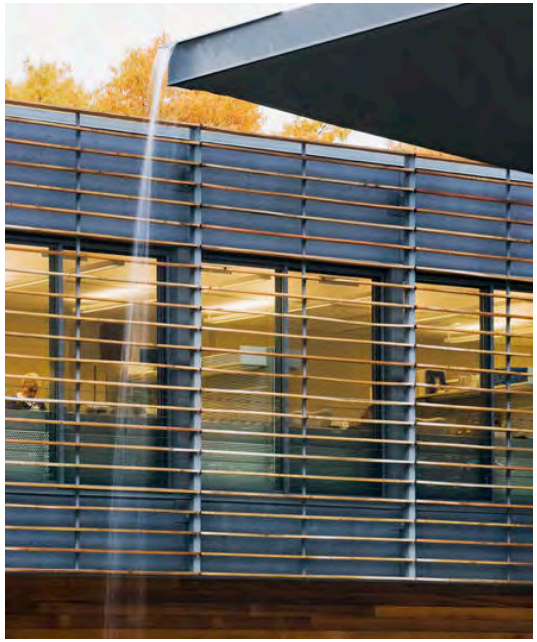
Location:	Flushing, New York
Completed:	September 2007
Annual Visitors:	330,000
Gross Square Feet:	15,831 square feet
Construction Cost:	$12 million (building and adjacent landscape)
LEED:	Platinum
Construction System	Steel piles, steel structure with pre-cast concrete planks, poured in place concrete
Systems:	Geothermal heating and cooling, 20% photovoltaic electrical, grey water system

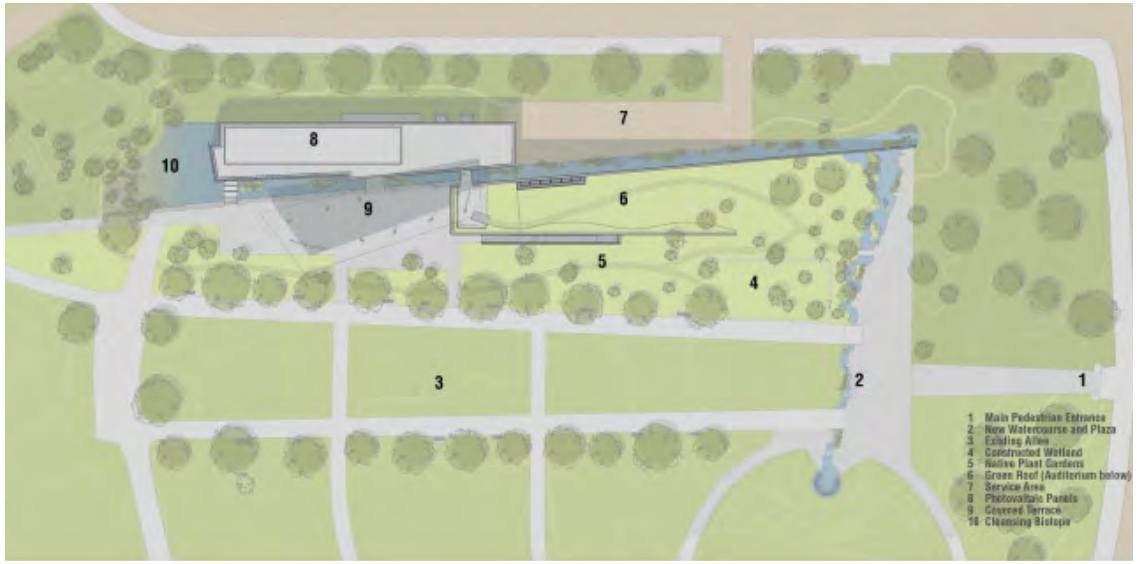


The Visitor Center was designed to showcase water management, landscape integration, and energy conservation and generation. Extensive bioswales and a green roof on the auditorium allow the project to manage all stormwater on site. A water channel, fed by rainwater that cascades off the roof canopy, cycles around the building and through the gardens.

MISSION:

Queens Botanical Garden is an urban oasis where people, plants and cultures are celebrated through inspiring gardens, innovative educational programs and demonstrations of environmental stewardship.





LAURITZEN GARDENS

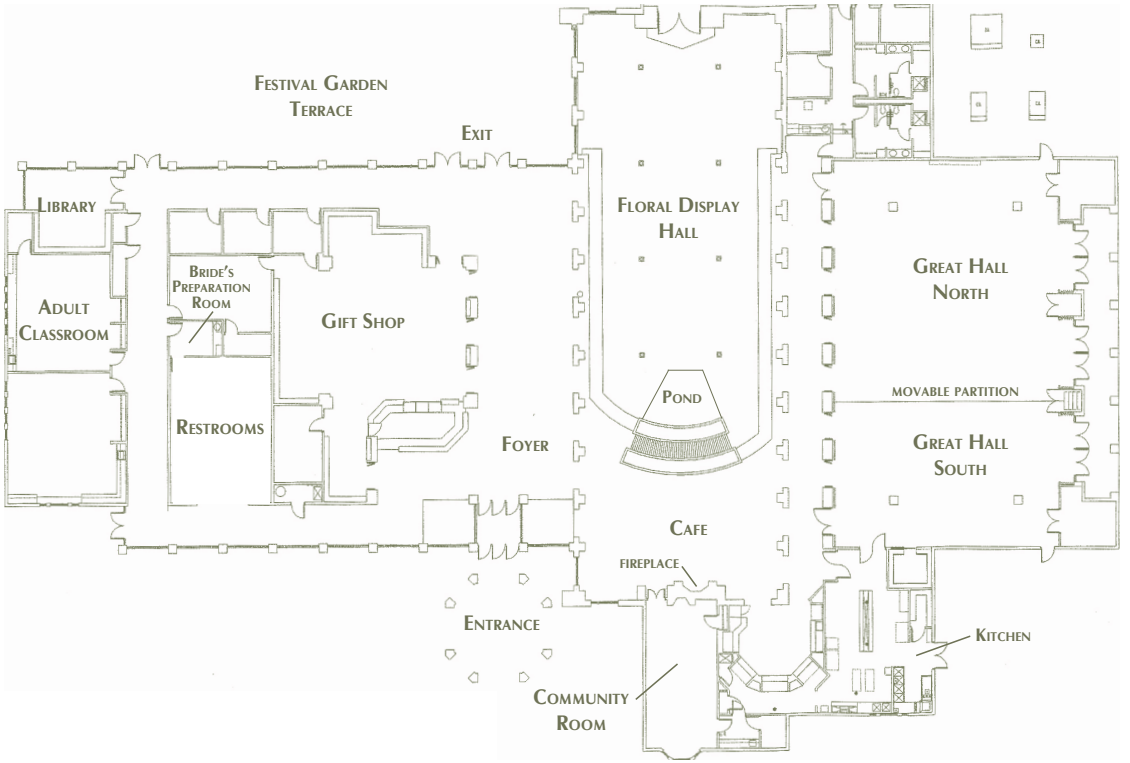
Location: Omaha, Nebraska
Completed: Fall 2001
Annual Visitors: 160,000
Gross Square Feet: 32,000 square feet
Construction Cost: not known
LEED: None
Construction System not known
Systems: not known

The Visitor and Education Center plan is organized in an efficient way. The front desk shares its function with the Gift Shop desk in order to share resources. The Floral Display Hall is open to the Cafe area so that during large events it can expand into the overflow space. The kitchen serves both the cafe and the Great Hall and has direct connections to the Great Hall and to outside.

MISSION:

Lauritzen Gardens is a living museum of unique four-season plant displays, maintained to the highest standards consistent with environmental stewardship. It provides memorable educational and aesthetic experiences for all.

Escape to an urban oasis of beauty and tranquility to experience the glory of the garden. Discover a hidden sanctuary in the heart of the city. Relax while cultivating your mind in this living plant museum, conveniently located in the beautiful riverfront hills.



LEWIS GINTER BOTANICAL GARDENS: Visitor Center

Location: Richmond, Virginia
Completed: 1999
Annual Visitors: 310,000
Gross Square Feet: 23,00 square feet
Construction Cost: $41 million
LEED: None
Construction System not known
Systems: not known

MISSION:

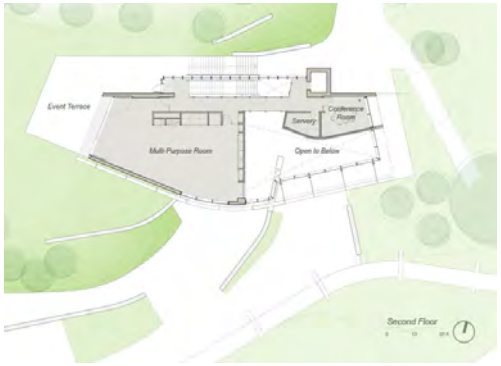
Lewis Ginter Botanical Garden enlightens and inspires its constituents through its outstanding botanical collections, horticultural displays and landscape design. We engage our constituents with the natural world through interpretation, programs, educational resources and outreach. We advocate for sustainability and stewardship of our planet.

VISION:

Through botanical, horticultural and educational excellence, Lewis Ginter Botanical Garden will reveal the unity and integration of human and plant life, celebrate the fundamental significance of the natural world, and enrich our community and beyond.

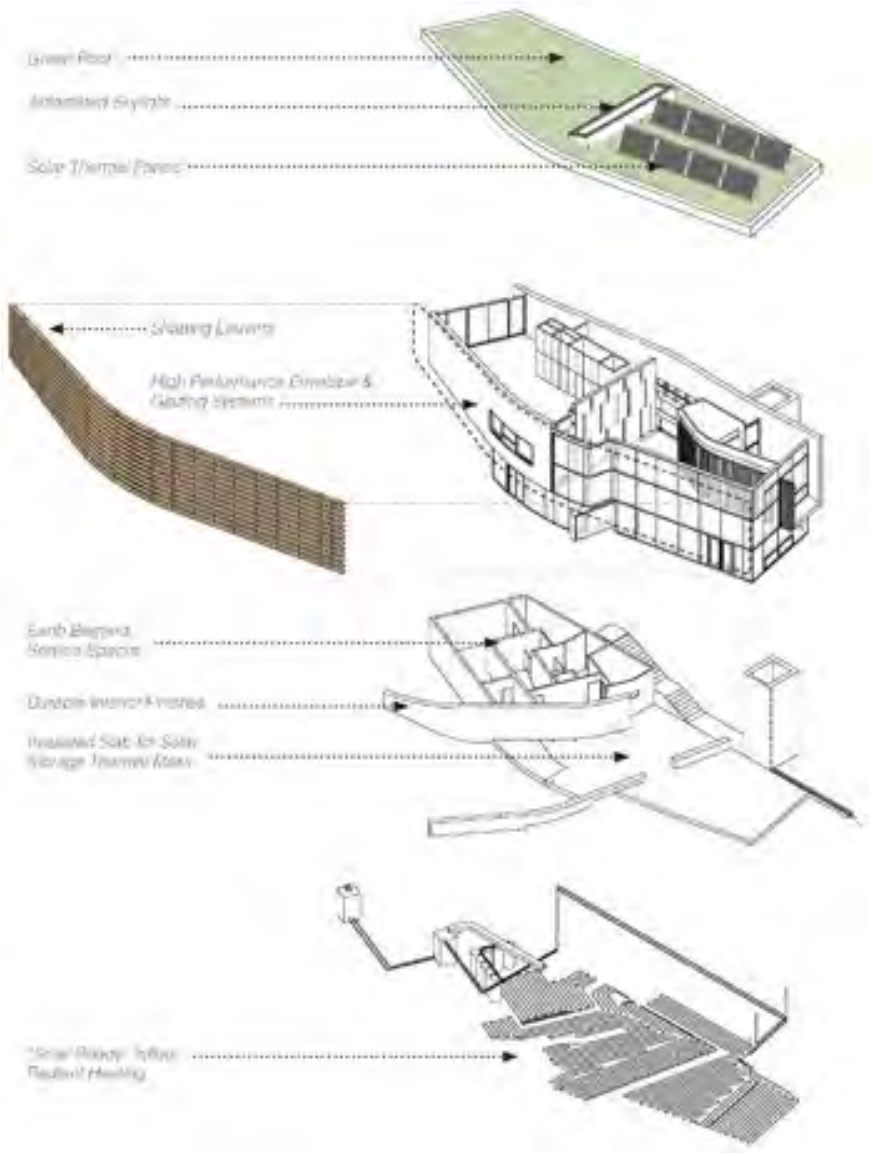
CORNELL PLANTATIONS: Nevin Welcome Center

Location: Cornell University, Ithaca, New York
Completed: January 2011
Annual Visitors: not known
Gross Square Feet: 5,900 square feet
Construction Cost: $5.68 million
LEED: Gold
Construction System not known
Systems: Living roof, solar panels (40-60% of heating), “free cooling” from vents



MISSION:

Our mission is to preserve and enhance diverse horticultural collections and natural areas for the enrichment and education of academic and public audiences, and in support of scientific research.

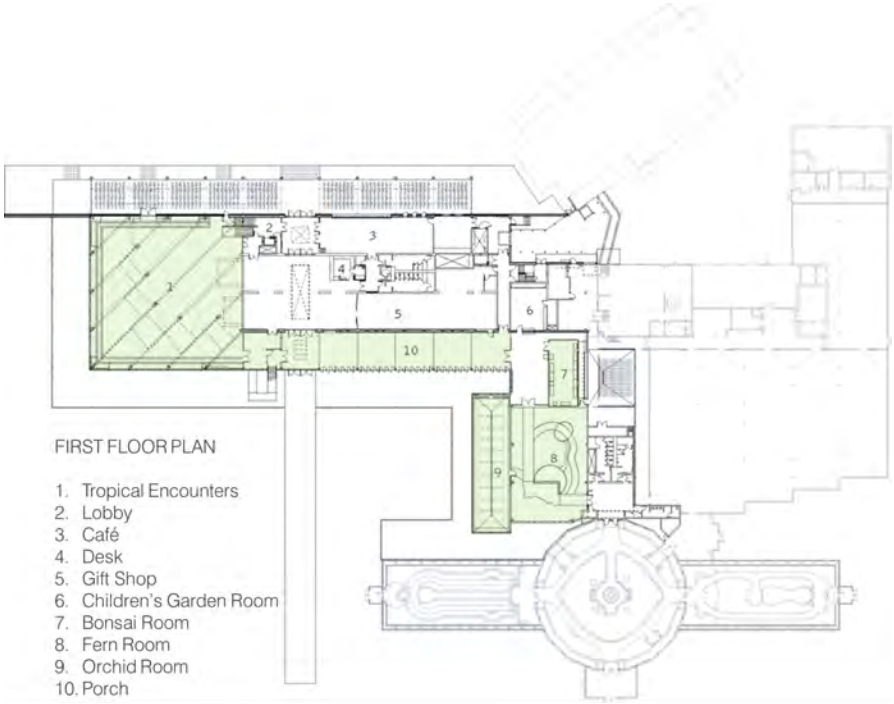


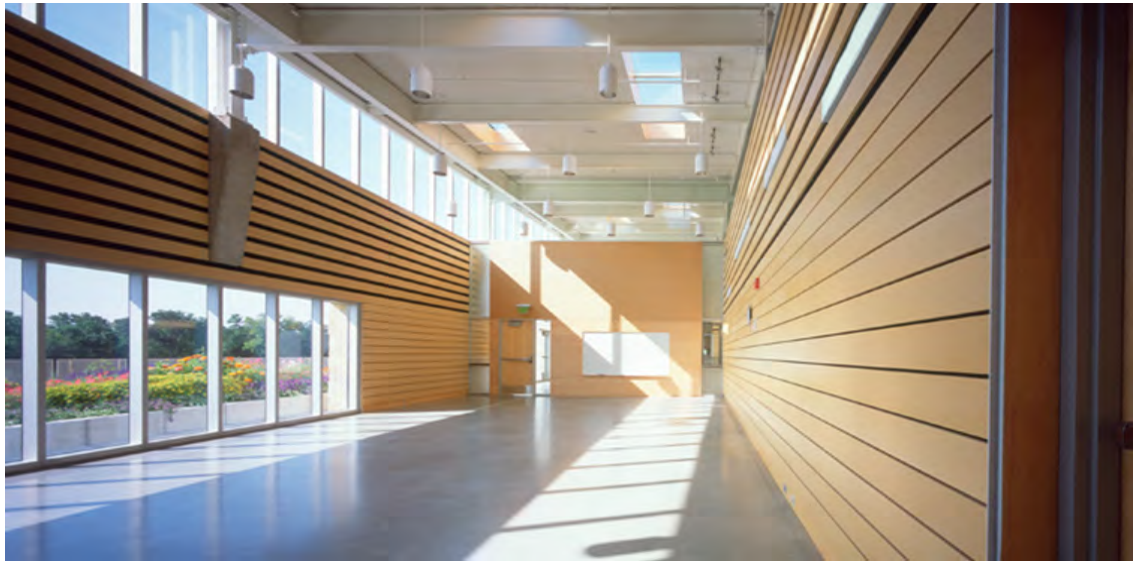
COMO PARK: Visitors and Education Resource Center

Location:	Como Park, St. Paul, Minnesota
Completed:	2004
Annual Visitors:	1.9 million (includes zoo)
Gross Square Feet:	69,373 square feet
Construction Cost:	$25.9 million
LEED:	None; similar to Silver
Construction System	Steel frame, glass, stone, galvanized steel panel cladding
Systems:	Evaporative cooling from reflective pools, passive shading, heat recovery from greenhouse heats building

MISSION:

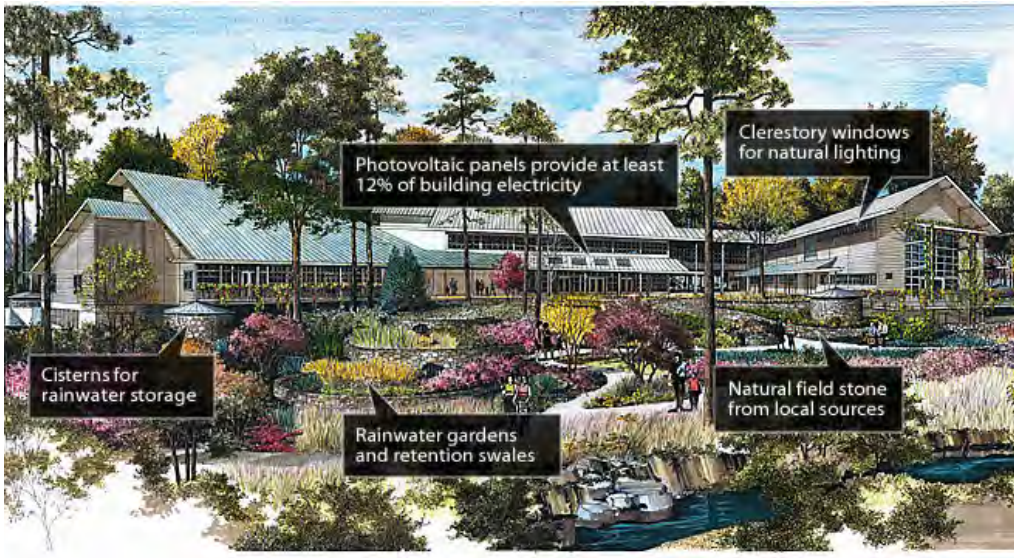
To inspire our public to value the presence of living things in our lives.





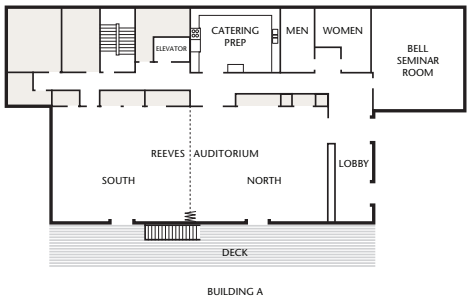
NORTH CAROLINA BOTANICAL GARDEN

Location: Chapel Hill, North Carolina
Completed: 2009
Annual Visitors: 400,000
Gross Square Feet: 29,656 square feet
Construction Cost: $12 million
LEED: Platinum
Construction System Steel frame
Systems: Photovoltaic panels, above- and below-ground rainwater cisterns, bioretention ponds, geothermal heating and cooling, natural lighting and ventilation, low-flow plumbing

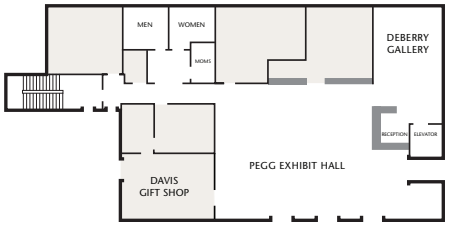


MISSION:

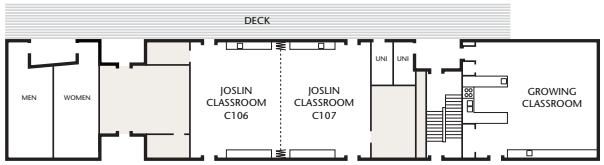
To inspire understanding, appreciation, and conservation of plants in gardens and natural areas and to advance a sustainable relationship between people and nature.



BUILDING A



BUILDING B



BUILDING C

MITCHELL PARK DOMES: Greenhouse Replacement, Milwaukee, Wisconsin

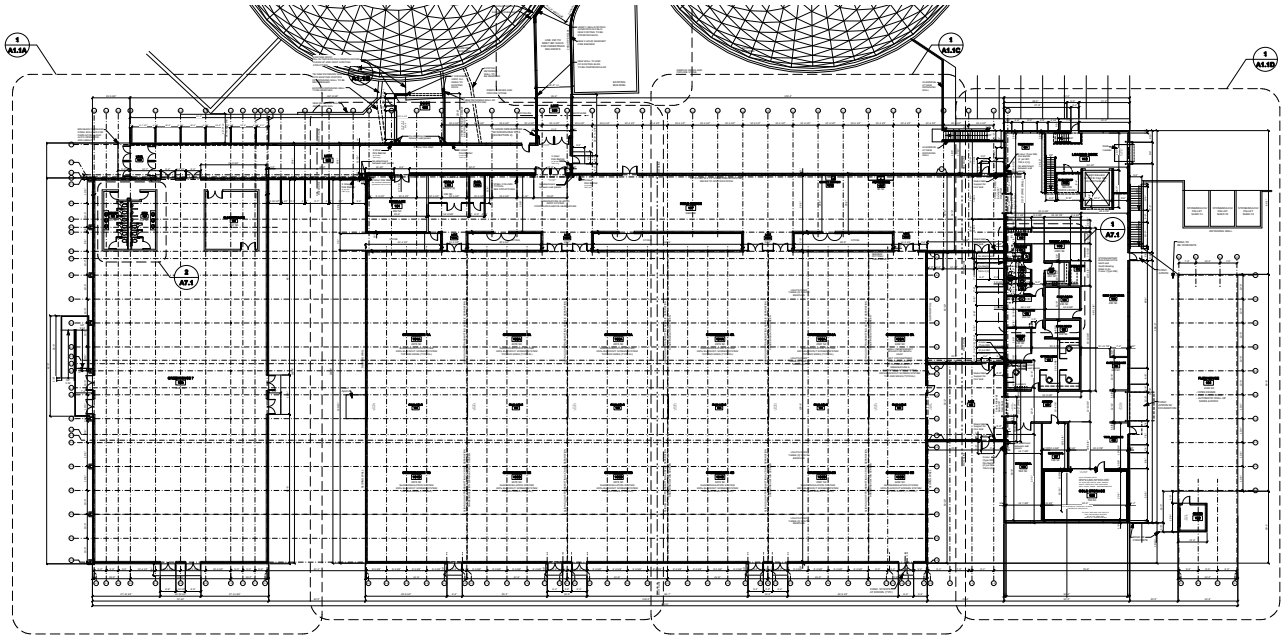
Mitchell Park Domes, a botanical conservatory owned and operated by the Milwaukee County Park System, is undergoing the construction of a new on-site state-of-the-art greenhouse addition that will result in 66,000 square feet of growing and support space. The addition is constructed on the east side of the existing conservatory buildings and consists of 28,000 s.f. of production greenhouse, a 9000 s.f. public showcase greenhouse, head house, service, and support spaces.

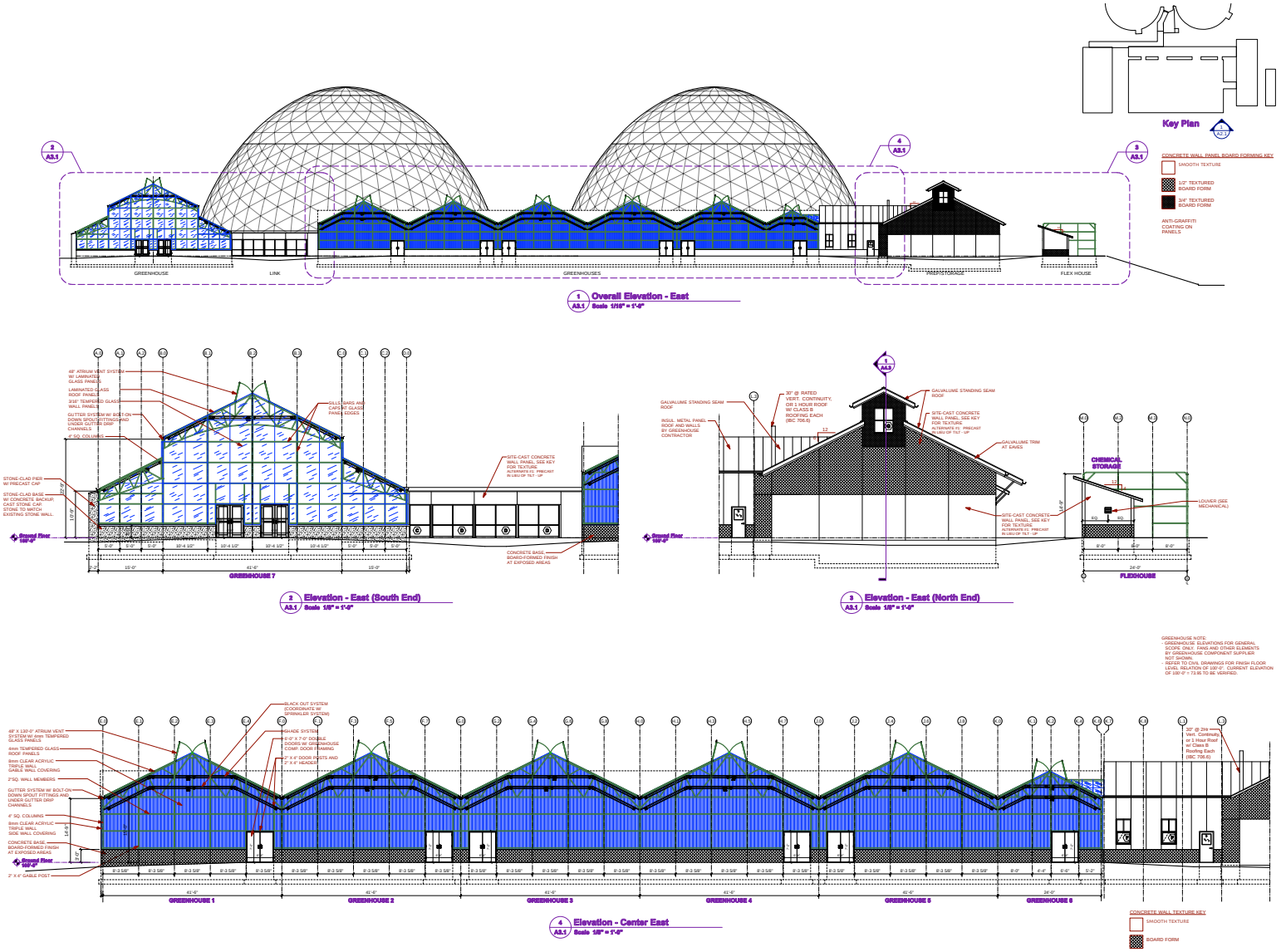
The production greenhouses are roofed in 4mm tempered single-pane glass panels and the exterior walls are clad in 8mm twinwall acrylic panels. The production greenhouses are organized within six gabled volumes and incorporate atrium-style ridge vents. The structure is sized and spaced to efficiently accommodate a rolling bench system that maximizes plant production. As non-laminated glass is used in the roof system, the production greenhouses are not open to public use.

The showcase greenhouse is designed for public use, and therefore incorporates laminated glass panels in the roof system. The exterior walls are clad with 3/16 single-pane glass. This greenhouse is also designed to accommodate a moveable bench system that maximizes plant space. Separate volumes within the showcase greenhouse contain public restrooms and storage/prep space.

The Mitchell Park Domes greenhouses incorporate dual-source heating from an in-floor radiant system as well as supplemental gas forced air heaters. This dual source strategy limits excessive BTUs near the plants roots, which could damage certain types of crops. A dedicated germination zone is also incorporated with a stand-alone boiler and under-bench heating.

Sustainable strategies incorporated include use of a retractable, dual layer thermal blanket used to retain heat during overnight hours, use of a stormwater harvesting system connected to the greenhouse gutters, and use of acrylic cladding that has a longer lifespan than an alternative polycarbonate panel.





NEW GREENHOUSE FACILITIES
MITCHELL PARK HORTICULTURAL CONSERVATORY GREENHOUSE
524 SOUTH LAYTON BOULEVARD, MILWAUKEE, WI 53215

MILWAUKEE COUNTY PARKS

Milwaukee County Dept. of Administrative Services
FACILITIES MANAGEMENT DIVISION
Architectural, Engineering & Environmental Services
CITY CAMPUS - 2711 W WELLS ST, 2ND FLOOR - MILWAUKEE, WI 53208

REVISIONS:

DATE: 10/31/2012
PROJECT: WP143-09451
SITE NO: 702
BUILDING NO: 4101

8.0 Appendix