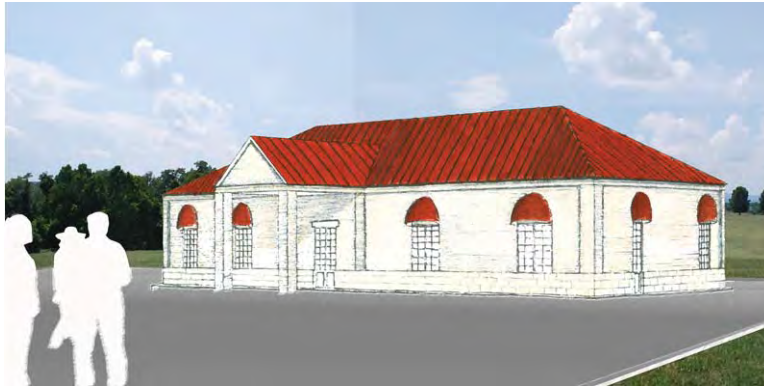


# Bedford Elks Lodge Conceptual Design



*Prepared by the Community Design Assistance Center  
for the Bedford Elks Lodge #2844, Bedford, Virginia*

*March 2011*

# Project Team

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Kim Steika	Landscape Architecture Project Coordinator
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The Community Design Assistance Center (CDAC) is an outreach center for the College of Architecture and Urban Studies and Virginia Tech that assists communities, neighborhood groups and non-profit organizations in improving the natural and built environment, through design, planning and research. Through the integration of the learning and working environment, the Center will execute projects that link instruction and research and share its knowledge base with the general public.

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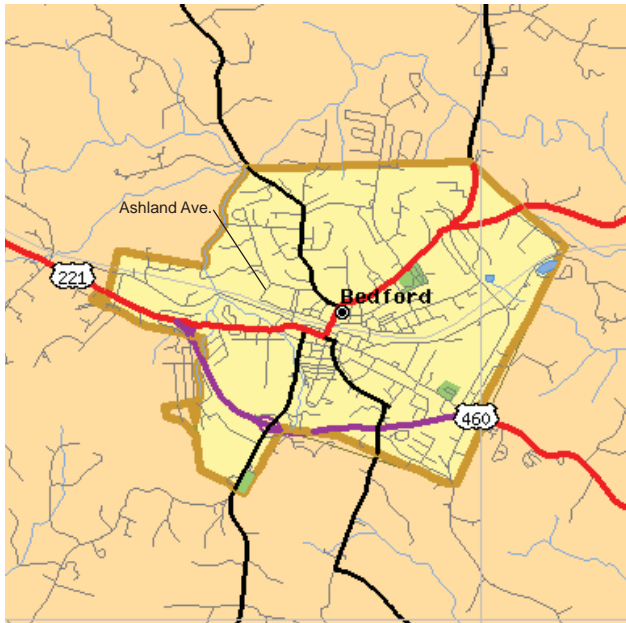
# Acknowledgements

C.L. Bohannon	PhD Candidate, Landscape Architecture, Virginia Tech
Mark Bratton	Executive Chef, West End Market, Virginia Tech
Carl Breitingner	Member, Building Committee & Bedford Elks Trustee
Dick Turpin	Chair, Building Committee
Jimmy English	Building Code Officer, City of Bedford
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Steve Somick	Design Technician, Anderson and Associates, Inc., Blacksburg, VA
Randall Spencer	Chef and Owner, Blue Ridge Mountain Catering, Blacksburg, VA

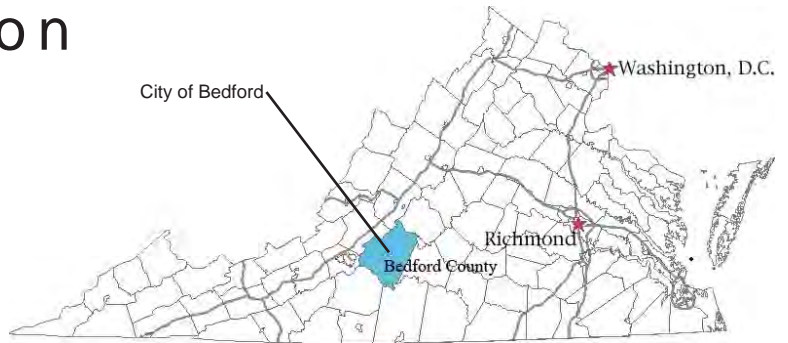
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# Project Description



Map showing the City of Bedford



Map showing Bedford County within Virginia



Aerial showing site and adjacent streets

The Elks Lodge #2844 of Bedford, Virginia hired the Community Design Assistance Center (CDAC) to develop a conceptual architectural design and site plan for a new Elks lodge. The Bedford Elks recently purchased a 5 acre parcel that is adjacent to the National Elks Home to build their new lodge. Due to the site's close proximity to the grand and iconic National Elks Home, members desire the new lodge to reflect the architectural style of the National Home, while maintaining their spacial needs and budget as well as their own distinct identity.

The Bedford Elks envision their new building to be capable of a variety of uses. A large banquet hall that would be functional as a meeting place for lodge members as well as a transformable space for producing revenue through event rental is desired. In addition, the lodge should contain a kitchen capable of serving the banquet hall, an Elks Room for members only, and office space.

The site boasts an excellent view of the Blue Ridge Mountains as well as the National Elks Home, and a building that takes advantage of these views is desired. The Elks envision the new lodge to be a place for daily business as well as special events and would like to create a destination within the community.



Panorama of Bedford Elk's project site, with the National Elks Home in the background.

# Design Process



*The CDAC team and members of the Board of Trustees review design concepts at an early meeting.*



*Kristin Fields presents conceptual architectural plans to the Building Committee during a meeting in November 2010*

The CDAC design team began the project with a site visit in July 2010 to meet with the Building Committee and to view the site. The CDAC team returned in August to spend some additional time on site collecting soil samples, identifying existing features, and touring several facilities in Lynchburg that the Bedford Elks' Building Committee had identified as architectural examples to consider (see *Case Studies* for additional information).

Following the initial meetings, the CDAC team worked on analysis of soils, views, sun angles, and hydrology of the site and also researched materials and case studies for the architectural design. These findings, as well as preliminary architectural design concepts, were presented in September to the Building Committee and additional members of the Bedford Elks Lodge.

Following the initial presentation, the Building Committee requested the site design concepts be modified to reflect two building footprints: an 'L Shaped' alternative and a rectangular alternative. From these ideas the CDAC team modified the footprints and also developed two parking and site alternatives for the Elks Lodge. These new concepts were presented to the Building Committee and Jimmy English, the Bedford City Building Code Officer, in November 2010. The CDAC design team revised the concepts based on feedback from this meeting and presented the design ideas to the Bedford Elks on December 10th, 2010. These drawings were then displayed for all the Bedford Elk members to review and comment at the December 19th, 2010 Bedford Elks Christmas Party.

Comments from the December 10th presentation and December 19th public display were compiled. The CDAC team refined the two site and building concepts based on these comments and presented final conceptual designs on February 4th, 2011.

This final report was prepared to document the conceptual design process and describe the design ideas presented and discussed throughout the course of the project.



# Site Inventory & Analysis



*CDAC team members Kristin Fields and Arian Korkuti walk the site during the initial visit.*



*View of the National Elks Home, immediately adjacent to the Bedford Elks' site.*

The CDAC team conducted a site analysis of various conditions of the site that are pertinent to the development of the new Elks lodge. The following descriptions outline the outcomes of that analysis. Supporting drawings can be found following the descriptions.

## *Soils:*

Soil samples were taken from 6 points on the site to determine pH levels. The soil pH ranges from 5.20 to 5.72 on the site. The full lab report from the soil test can be found in Appendix A.

## *Hydrology and Slope:*

An analysis of hydrologic flows and slopes was conducted on the site. Generally water is flowing toward the SW corner of the property, which suggests a potential location for future stormwater management. There is an approximate grade increase of 3-4 feet between Ashland Avenue and the flat portions of the site which is something to be noted for potential entrances and building location, as well as sight lines. A large and relatively flat area (highlighted in yellow on page 9) is noted as a good area for locating the building and parking lot in an effort to reduce grading.

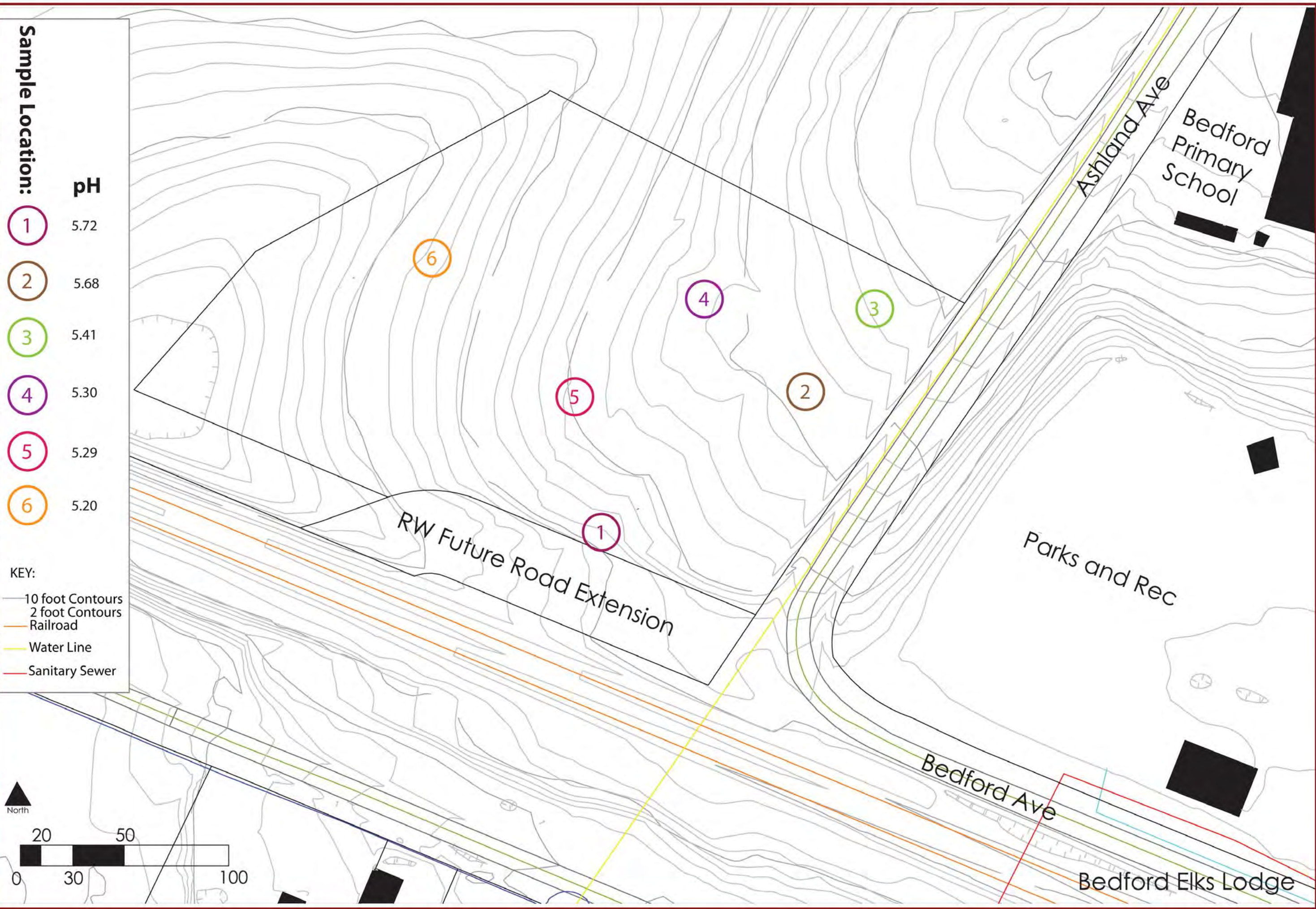
## *Views:*

The site has spectacular views to the west and northwest of the Blue Ridge Mountains and the National Elks Home, which can be seen in Image 3 on the 11x17 pullout on page 10. Image 1 depicts the view driving along Bedford and Ashland Avenues. Rail lines border the southern edge of the site and are slightly buffered by a tree line which can be seen on the left of Image 1 and in Image 2. There is a concern about noise from the railroad and this should be considered in design strategies.

## *Sun Study:*

A sun study allowed the team to analyze the position of the sun in relation to the site and the future building. The sun has a wide range of paths that it takes throughout the year that affect the light and the heat of a building. For example, there could be a considerable amount of heat gain inside the building from the strong southern and western sun depending on the amount of building that is exposed to it and what the building is made of. During the winter months, such heat gain could be favorable, but during summer months it could be unbearable. At the same time, the team had to balance this with views and the amount of natural light that is allowed into the building.

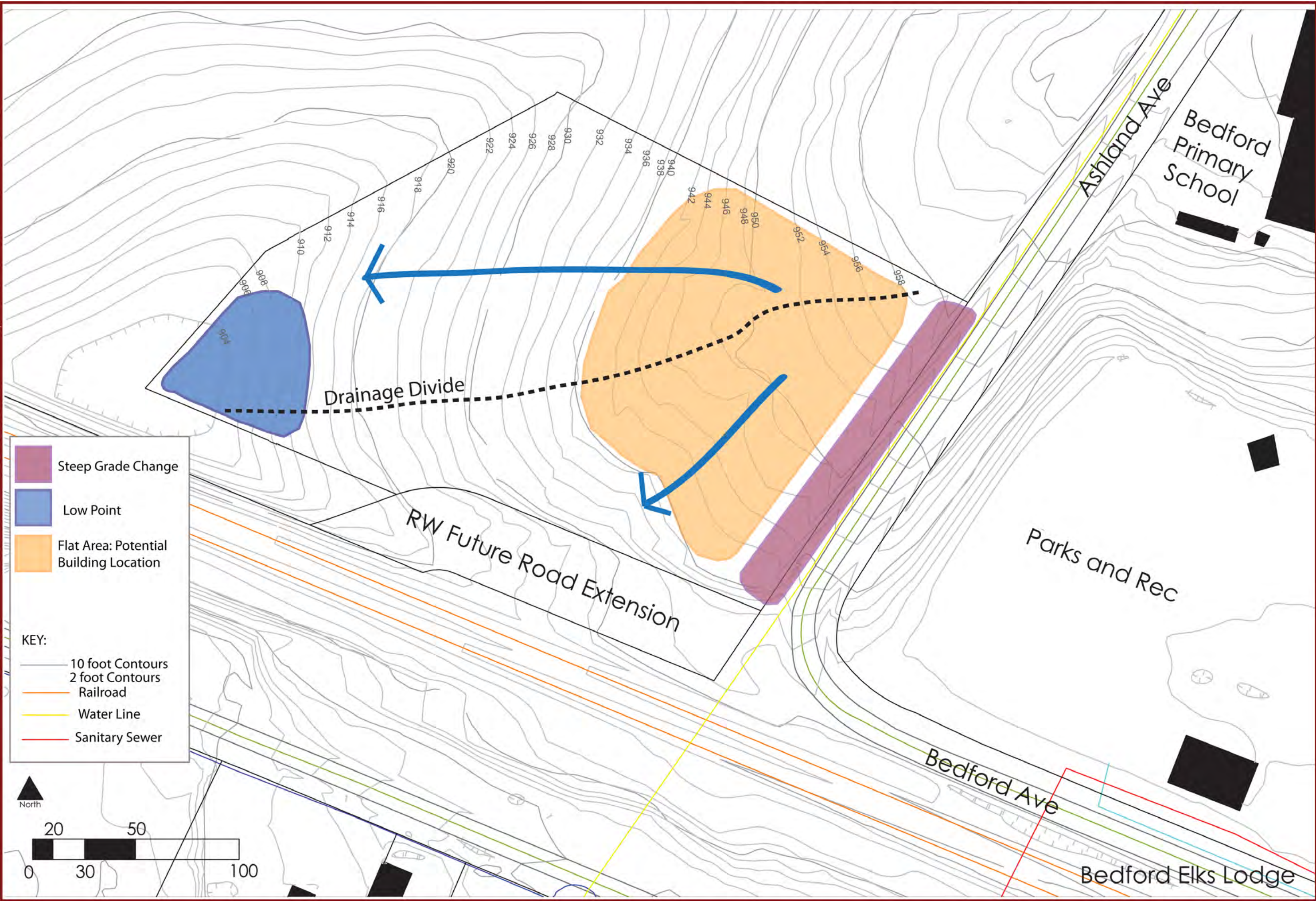




bedford elks  
soil pH map

Disclaimer: This drawing is conceptual and was prepared to show approximate location and arrangement of site features. It is subject to change and is not intended to replace the use of construction documents. The client should consult appropriate professionals before any construction or site work is undertaken. The Community Design Assistance Center is not responsible for the inappropriate use of this drawing.





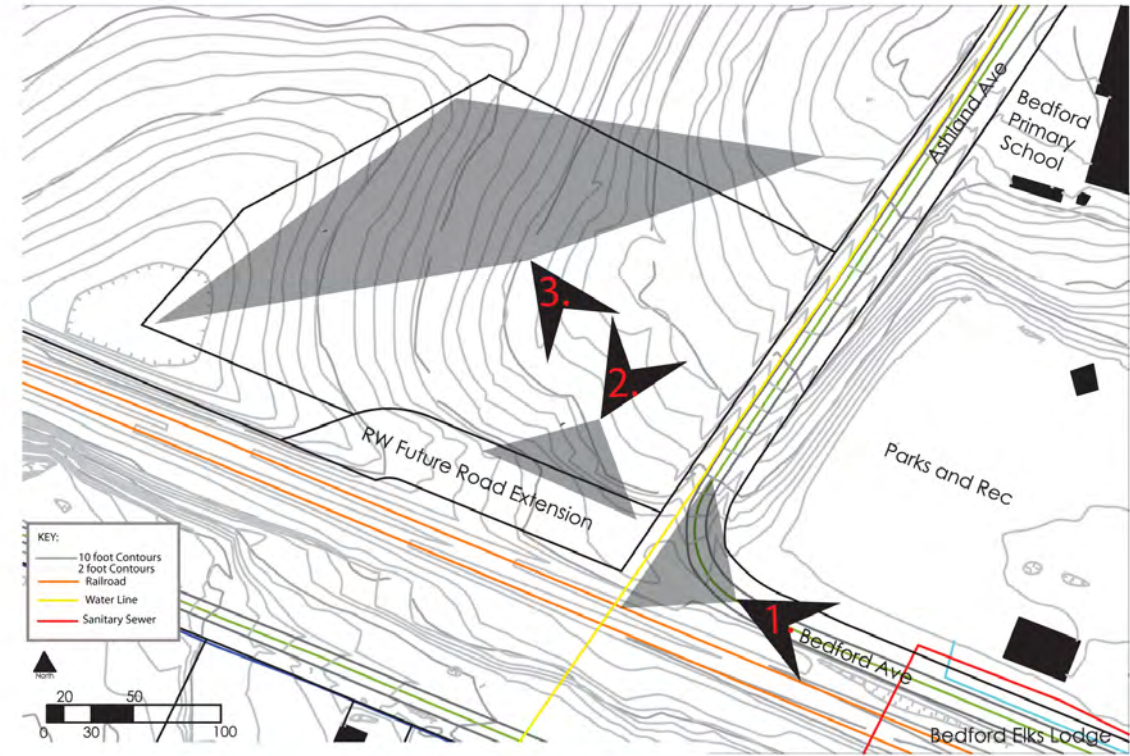
**bedford elks**  
hydrology and slope



1.



Bedford Avenue toward site



2.



Toward railroad tracks

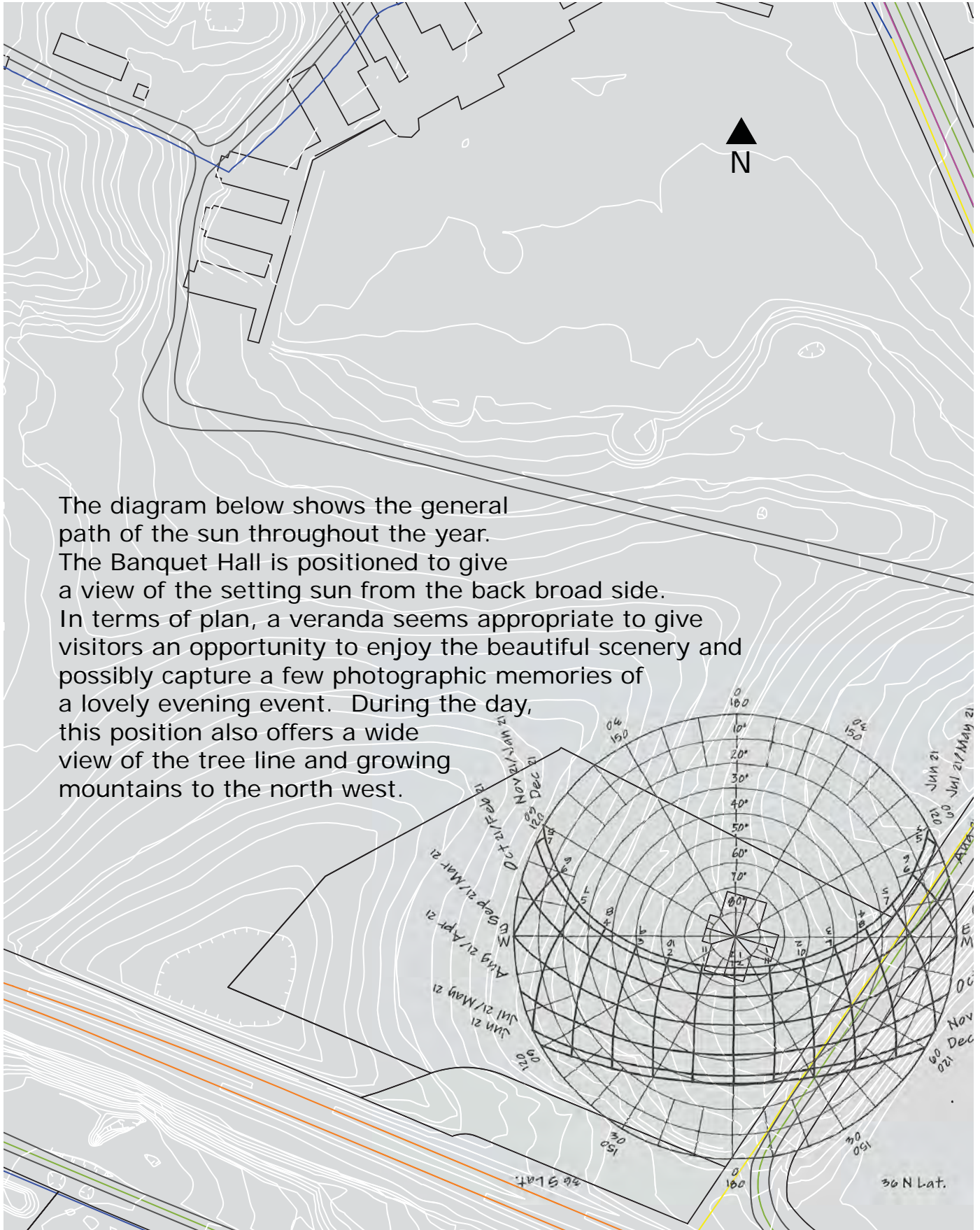
3.



Views of mountains and Bedford Elks home

bedford elks  
viewsheds





# Case Studies



*CDAC team member Arian Korkuti (r) discusses kitchen specifications with chef Randy Spencer.*



*The Bedford Montessori School was one of the buildings the CDAC team visited with the Bedford Elks Building Committee.*

The CDAC team investigated several case study facilities as part of the design development process. The team visited five facilities in the Bedford-Lynchburg area with the Bedford Elks Building Committee. These sites were identified by the Elks as examples for discussion in relation to their proposed Lodge. The first facility toured was the Bedford Visitors Center. The Center contains one meeting room for 80 people that can be rented out for small receptions, business meetings, and various other presentations or gatherings. One of the employees informed us that they receive many requests for a hall that can hold 200 to 300 people for rent in the area, but that there really is no room like that currently available in Bedford County.

Next, the CDAC team and the Elks visited the Montessori School in Bedford. This building has a similar portico and turn around for vehicles that was requested by the committee for their lodge. The inside of the building was also very nice architecturally, having deep skylights in one of the school rooms that brought in additional natural light for the children's activities. The size of the building itself was much too small in scale compared to the square footage required for the Elks Lodge.

After this, the group went to the American Legion building in Lynchburg. The primary entrance is located in the front of the building for guests using the banquet hall; the secondary entrance, located on the side, is reserved for Legion members and their guests. This entrance leads directly into the members bar at the back of the building. The bar was somewhat cramped with tables, but the committee members were particularly interested in having a bar that could be used by Elks from all over. They were also interested in having "slot machines" like the Legion bar had for the use of members. We were told that the gambling machines brought in quite a bit of revenue for the American Legion. From here we were led through a cramped hallway, past the bathrooms, and into the banquet hall. This hall was approximately the same size as the hall requested by the Elks for their building. The American Legion also had a kitchen that had recently been upgraded to a commercial grade kitchen. The Legion members informed us that most of the cost went to retrofitting a very complex hood over the kitchen stoves. We were also shown a couple of smaller meeting rooms off to the side of the hall that were primarily used for American Legion meetings.

The final building visited was the Moose Lodge, a much larger facility than the Bedford Elks are looking to build. Before entering the building it was noted that the exterior material, Dryvit, had begun to chip away in certain places. The entry leads to a large open room that has a few pool tables to the left and a small gathering place to the right, for eating and drinking mostly from the on-site kitchen. Directly in front of the entrance and toward the back of the room is a long sunken bar. The counter wraps around almost the entire sunken floor with a small space in the back with a ramp to allow for things to be rolled down into the bar area. The bar tender complained that there is not a direct connection from the bar to the kitchen so he had to walk back and forth frequently, which was inefficient. A large kitchen exits on the first floor between the bar area and the banquet facility. Downstairs there is a large open room with many tables used for bingo games. The banquet hall, bingo room, and the bar and pool areas of the building all had large round smoke filters suspended from the ceilings due to a smoke friendly policy for the Moose Lodge members. The basement ceiling tiles had quite a bit of water damage from leaking Dryvit. One of the members of the facility said that if they had to build the building again they probably would not have used Dryvit as the exterior material due to water infiltration and termite infestations which were primarily caused by improper installation.

The place of particular importance that the client emphasized was their long-term desire for a commercial kitchen. To better understand a day-to-day kitchen operation from a Chef's point of view, the CDAC team visited with two chefs at two dining facilities in Blacksburg. The first visit was at the Wikiteria Café, located at Virginia Tech Corporate Research Center. The team met with Randall Spencer, head Chef at Wikiteria Café and owner of Blue Ridge Mountain Catering. As suspected, layout plays an important role in a Chef's functions. The order in which each piece of equipment is planned should be based in a series on a Chef's routine actions, according to Randall. The distance between appliances that are located across from each other is also key to a successful kitchen.

The CDAC team also visited West End Dining Hall at Virginia Tech and met with Executive Chef, Mark Bratton. During our extensive tour Mark explained the structural organization and the layout of the dining stations and other kitchen areas. Mark's broad knowledge in regard to functionally well laid out commercial kitchens was valuable to the CDAC team. Mark mentioned that typology of appliances plays an important role in a well designed commercial kitchen. For instance, Mark noted that gas ranges are much preferred by chefs over electric ranges. Mark also reconfirmed what the CDAC team had deduced in regard of electrical and air-conditioning systems - that in a kitchen, they need particular attention. In this case the air duct system was separated from the rest of the building.

The information gleaned from these tours helped shaped the conceptual designs - helping the CDAC team increase the level accuracy in regard to conceptual layout which is mainly based on daily chef's operations. The accuracy is also based on specific types of appliances. In the proposed concepts, the commercial kitchen starts as space that supports catering, which at a second phase is to be furnished with all the necessary equipment. The electrical, exhaust and air conditioning systems should be put in place to support the Bedford Elks long term goal of a commercial kitchen during the initial construction phases of the Bedford Elks Lodge, as it is both difficult and expensive to retrofit for a commercial kitchen once a kitchen is already constructed.





*Bedford County Welcome Center - porch and courtyard*



*Bedford County Welcome Center - view to D Day Memorial*



*Bedford Montessori School - front entry*



*Classroom with skylights inside the Bedford Montessori School*



*Club members bar room at the American Legion in Lynchburg*



*Large multi-purpose space at the American Legion building*



*Moose Lodge in Lynchburg*



*Dining area for club members at the Moose Lodge*



*Wash sinks and additional refridgeration storage at the Wikiteria Café in Blacksburg*



*Kitchen in the Wikiteria Café*



# Preliminary Design Concepts

During the design process the CDAC team presented at three meetings, first on September 20, 2010 to the Building Committee and select members of the Bedford Elks Lodge. This meeting outlined initial building concepts and the site analysis. Refer to Appendix B for a full description of the meeting and the concepts presented.



Ashleigh Marshall, Kristin Fields, and Arian Korkuti discuss preliminary plans at the meeting on 9-20-10



Michael Haynes, Bob Humphreys, and Carl Breiting review plans on 9-20-10.

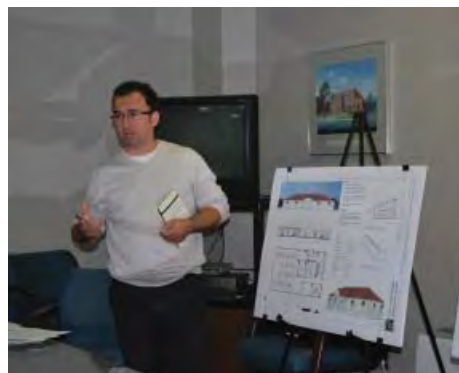


Dick Turpin, Grazia Apolinales, Jimmy English, Kim Steika, and Sue Montgomery discuss options for the site plan on 11-5-10.

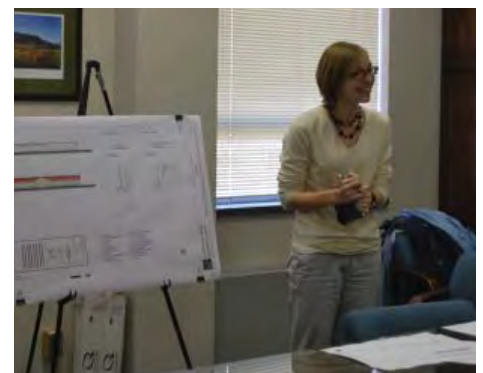
On November 5, 2010 the CDAC team presented revisions and further project development to the Building Committee and Jimmy English, the Bedford County Building Code Officer. The purpose of the presentation was to receive feedback from local City officials and determine if the direction of the project was in line with building and zoning requirements. Two building plans, an “L-shaped” building and a rectangular building were presented, along with two alternatives for the parking lot. See Appendix C for the drawings that were presented and notes from the meeting.



Ashleigh Marshall presents site plans to committee members on 11-5-10.



Arian Korkuti presents a rectangular hipped roof building concept to the committee on 11-5-10.



Kristin Fields presents an 'L-Shaped' building concept to the committee on 11-5-10.

On December 10, 2010 the CDAC team presented another group of revisions, taking into consideration the comments from Jimmy English, as well as the interests of the Building Committee. Present at the meeting were the Building Committee and select members of the Bedford Elks Lodge. The concepts presented at this meeting were also displayed at the Elks Lodge Christmas party, and comments were received from other organization members and relayed to the CDAC team via Dick Turpin. More information on these concepts can be found in Appendix D.

# Final Conceptual Master Plan



*CDAC team member Arian Korkuti describes different roof options for the rectangular building - Building Concept Two.*



*Bedford Elks members review the final design concepts and the study model.*

Based on feedback from the client, the CDAC design team revised the concepts presented in December and prepared final conceptual alternatives for both the site plan and the building design. Two final concepts were prepared for both the site and structure. These concepts are described below and are accompanied by supporting drawings (11x17 pullouts).

## *Site Plan Alternatives*

**Concept One:** The rectangular building footprint is reflected in this concept, and the parking is kept in a tighter formation in an effort to reduce impervious area, grading, and cost. In order to accommodate RV parking, alternative striping is proposed on the southern and eastern edges of the lot. Water and electrical hookups are provided in the median and the spaces would only be used at times when the normal parking spaces were not being used. Using the double striping method will reduce initial cost and allow for an additional RV lot to be constructed in a future phase if that is desired.

A large, open grass space is provided in front of the building, per the client's request for no tress blocking the view of the building from the entrance. Flag poles and 10 parking spaces are included in the area to make use of extra space and increase efficiency.

Spaces for foundation landscape plants are provided to create a welcoming entrance to the building along the portico to be used for tour bus drop off. A stormwater swale is sited on the southern edge of the site and is designed to flow through the landscape into a larger retention pond, in a way that is functional and aesthetically pleasing.

**Concept Two:** Here the 'L-Shaped' building footprint with the half basement is shown. In order for there to be access to the basement, the dumpsters were moved further back on the site and a lower parking and service lot is provided. Retaining walls will be necessary to accomplish this lot and a sidewalk on the northern edge is required for ADA accessibility.

The parking lot design on Site Plan Concept Two limits the amount of parking on the front of the building by only having a large grass space adjacent to the portico and by wrapping the parking around to the southern side of the building. A separate lot is provided for RV parking as was requested by the client in comments during the design development phase. A long drive is required to reach the lot and a connection with the future road right-of-way would be required in order to have the pull-through RV parking that was requested. If angled spaces are used and backing up is permitted for RV parking, a turn around may be achievable, which would eliminate the need for the connection with the future road. However, for ease of maneuvering and safety, requiring RVs to back up is not recommended.

Stormwater is handled in a more traditional manner with a naturalized swale on the southern side of the lot. Sheet flow could be caught in this area and then directed into the larger ponding area shown on the plan. The area will also integrate a berm and trees to help minimize sounds from the railroad.

A covered pavilion is located at the back of the building in this plan, but is easily accessible from the lower basement lot as well as from the reception area of the building.

**Supporting Drawings:** The section drawings on pages 21-22 show the relationship of the pavilion to the stormwater swale, a basic idea of how the basement access would function, and the relationship of the two stormwater options with the edge of the parking lot.

A simple plant palette is also noted, mainly addressing plants that would be appropriate for the stormwater management areas. For a more detailed plant palette refer to Appendix H.



- |                              |                                |  |
|------------------------------|--------------------------------|--|
| 1 Elks Lodge                 | 6 Tour Bus Drop Off            | 11 Potential Connection with Future Road |
| 2 Outdoor Pavilion           | 7 Dumpster and Basement Access | 12 Entrance Sign                         |
| 3 Terrace                    | 8 ADA Ramp to Basement         | 13 Landscape Berm                        |
| 4 Stormwater Treatment Cells | 9 Flag Poles                   | 14 RV Hookup and Waste Disposal          |
| 5 Stormwater Pond            | 10 RV Parking Lot              |  |



## bedford elks

### site plan concept one

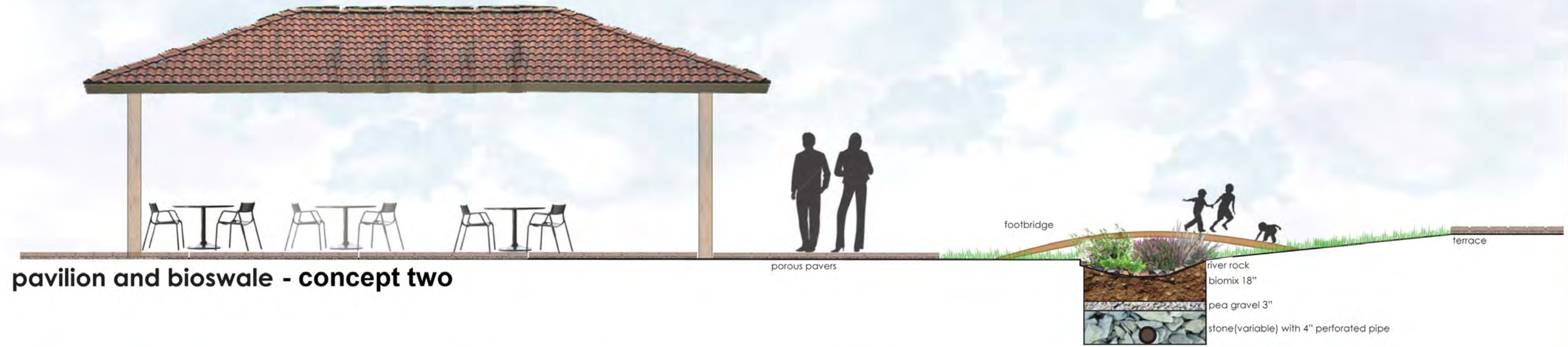
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- |                                     |  |   |
|-------------------------------------|--|---|
| <b>1</b> Elks Lodge                 | <b>6</b> Tour Bus Drop Off                             | <b>11</b> Grass Paver Reinforcement           |
| <b>2</b> Outdoor Pavilion           | <b>7</b> Dumpster and Service Access                   | <b>12</b> Potential Connection to Future Road |
| <b>3</b> Terrace                    | <b>8</b> Entrance Sign                                 | <b>13</b> Landscape Berm                      |
| <b>4</b> Stormwater Treatment Cells | <b>9</b> Flag Poles                                    |   |
| <b>5</b> Stormwater Pond            | <b>10</b> Future Golf Cart Connection to National Home |   |







pavilion and bioswale - concept two

basement access - concept one





## plant palette:

### trees



Witchhazel  
*Hamamelis virginiana*



Purple Leaf Plum  
*Prunus cerasifera*



Chinese Elm  
*Ulmus parvifolia*



Sugar Maple  
*Acer saccharum*

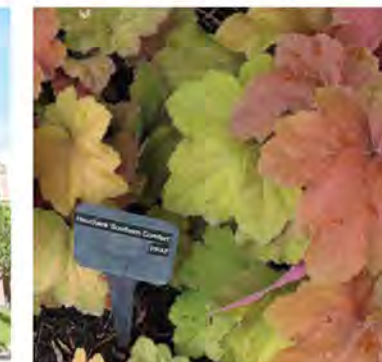
### stormwater plantings



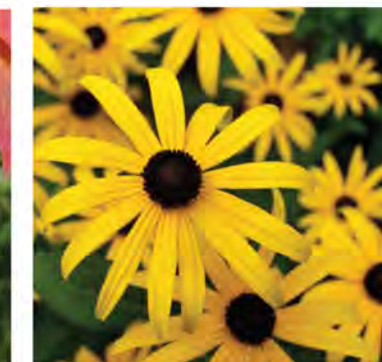
Purple Coneflower  
*Echinacea purpurea*



Joe Pye Weed  
*Eupatorium maculatum*



Alumroot "Coral Bells"  
*Heuchera villosa*



Black Eyed Susan  
*Rudbeckia hirta*



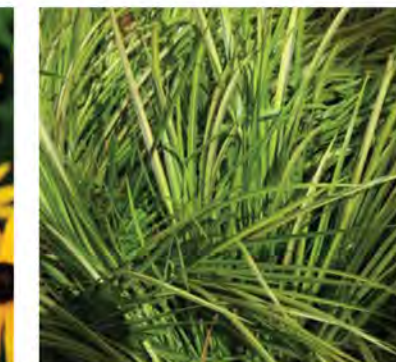
Swamp Milkweed  
*Asclepias incarnata*



Oakleaf Hydrangea  
*Hydrangea quercifolia*



Bigroot Geranium  
*Geranium macrorrhizum*



Sweet Flag Grass  
*Acorus gramineusogon*



# Final Conceptual Master Plan, cont.



*CDAC team members Ashleigh Marshall (l), Kristin Fields (c), and Arian Korkuti (r) at the final presentation.*



*CDAC Director Elizabeth Gilboy (standing) welcomes all to the final presentation of design concepts.*

## *Building Concept Alternatives*

### Concept One

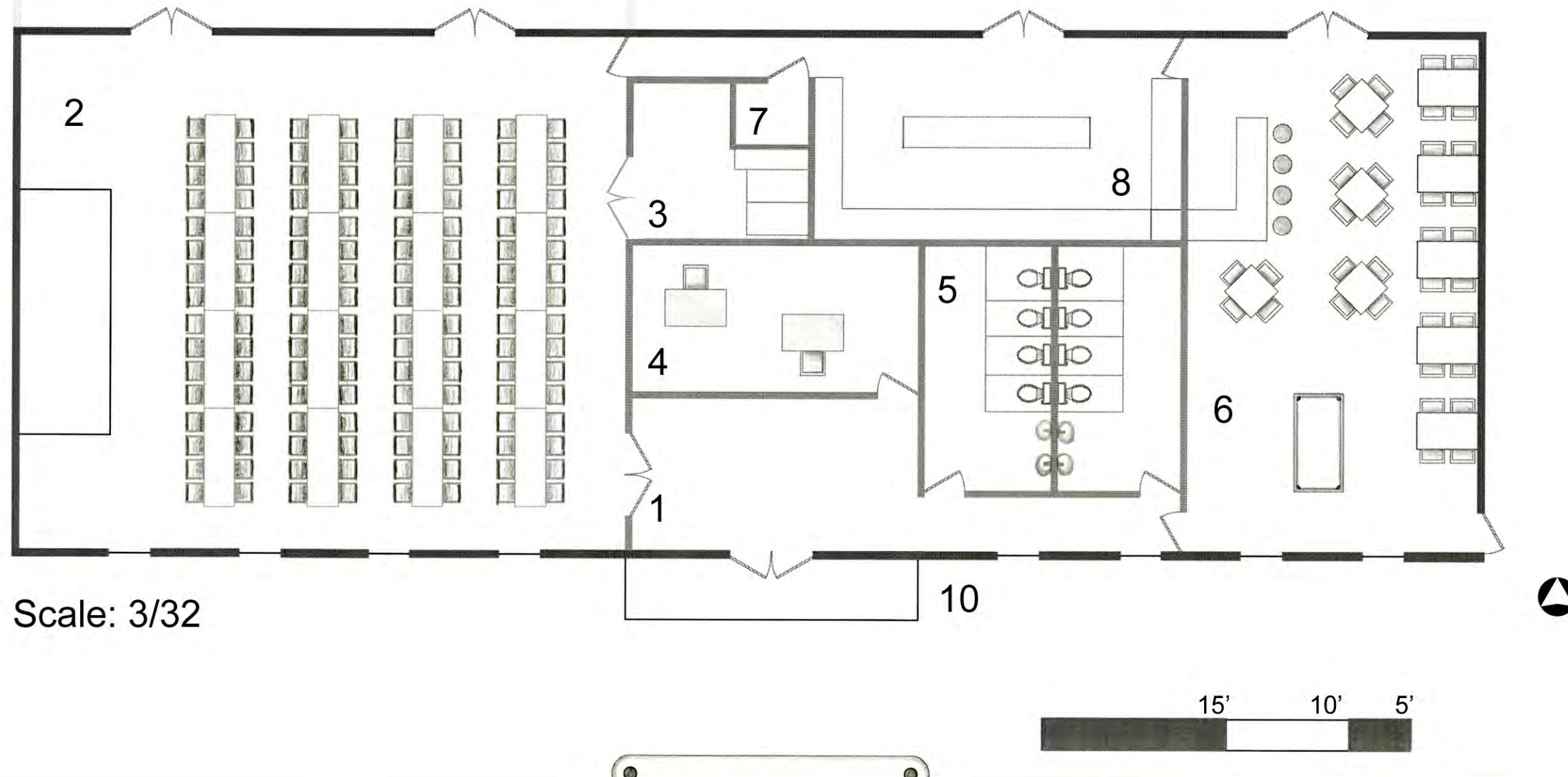
The final design for Concept One is a long rectangular building containing the banquet hall for approximately 150 people on the south side and the Elks room on the north side, with the rest of the programmatic elements sandwiched in between. Entry is through a tall portico, which allows buses and other vehicles to pull under for drop off. Guests are received by a spacious entry room with plenty of wall space for the display of awards or artwork. Directly off of this entry room is an office for the Secretary. To the left is the banquet hall, to the right is a short hallway. The bathrooms are located along the left wall of the hallway which terminates at the Elks lounge. Behind the bathrooms and the office is the kitchen which can be accessed by the banquet hall, the lounge, and the outdoor walkway. The second phase of construction would be an extension of the banquet hall to the west, increasing the capacity to 300 people. A basement has been added under the Elks room and the supporting facilities to take advantage of the plumbing for the bathrooms and kitchen. This allows plumbing to easily be added to the basement for bathrooms or other water needs if the basement were used for fundraising events, such as bingo, or even for meetings and gatherings of the Elks Lodge when the upstairs rooms are not available. The basement could also be reserved for mechanical space and extra storage for various objects, such as tables, chairs, decorations, or even kitchen supplies. There is vehicular access to the basement in the back of the building for dropping off supplies or people. It was mentioned that in future plans the placement of the Elks room and the banquet hall could be switched in order to make access to the basement flow better with the natural terrain.

### Concept Two

In Concept Two, the proposed Elks lodge is a compact building which is located parallel to Ashland Avenue and is slightly pushed back towards the site's sloping terrain. Both reception hall and Elks lounge areas take great advantage of the panoramic views. Locally available masonry is the building material of choice, positively influencing in building's durability, thermal, and acoustic values.

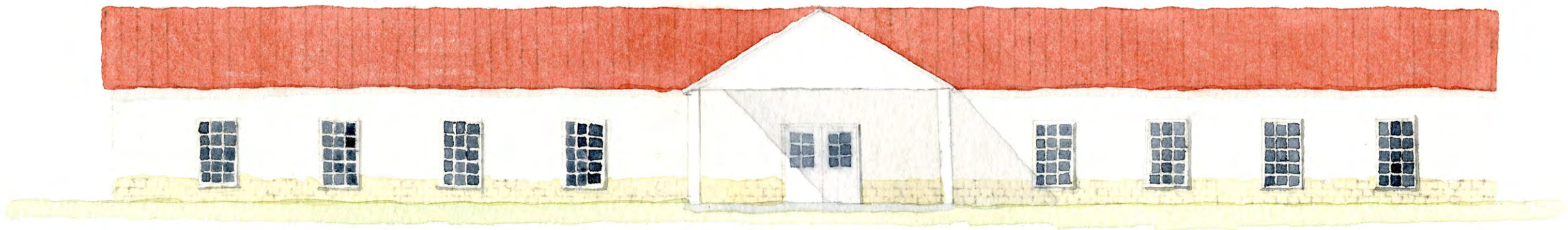
Concept Two's program is based on function. The kitchen and restrooms are strategically placed to offer service to both the reception hall and Elks Lounge areas. Furthermore, mechanical systems supporting these areas are placed within the same core quarter, and are accessible through a rear entrance.

An entry canopy supports the height and width of a tour bus and leads to the entry hall, which is centrally located . The entry houses a wardrobe on the right, and is the main entry to both the reception hall on the left and the office, restrooms, and the Elks bar/lounge area on the right.



1. Entry Foyer 12' 6" x 23' 4" (291.66 sq. ft)
2. First Phase Banquet Hall 42' x 50' (2100 sq. ft)
3. Storage 12' 8" long dimension (148 sq. ft)
4. Office 12' x 23' (276 sq. ft)
5. Bathrooms (430.5 sq. ft)
6. Elks Club Room 42' x 23' 9" (997.5 sq. ft)
7. Mechanical Room 5' x 6' (30 sq. ft)
8. Kitchen 16' 6" x 30' (495 sq. ft)
9. Second Phase Banquet Hall 50' x 90' (4500 sq. ft)
10. Elks Lodge 42'x120' (5040 sq. ft)
11. Phased Elks Lodge 7440 sq. ft

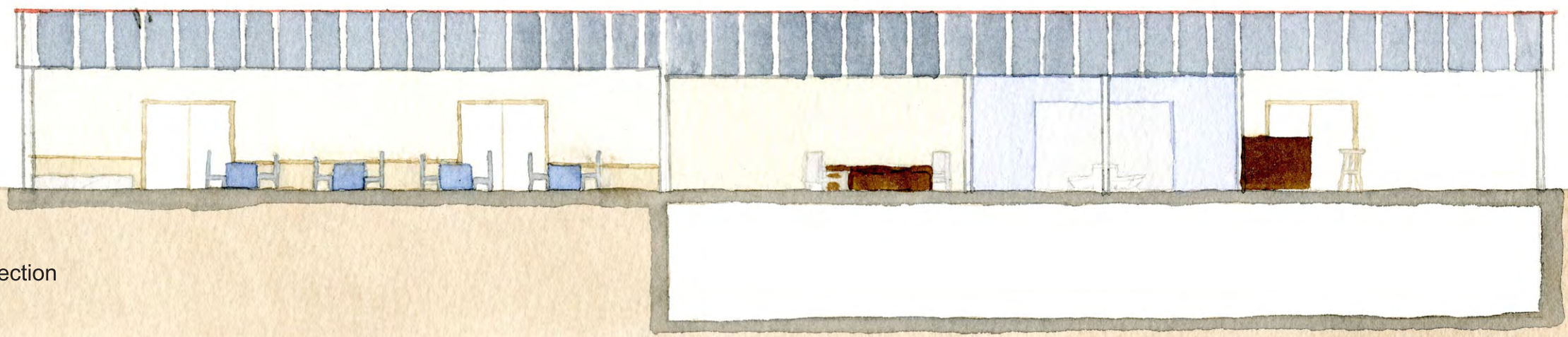




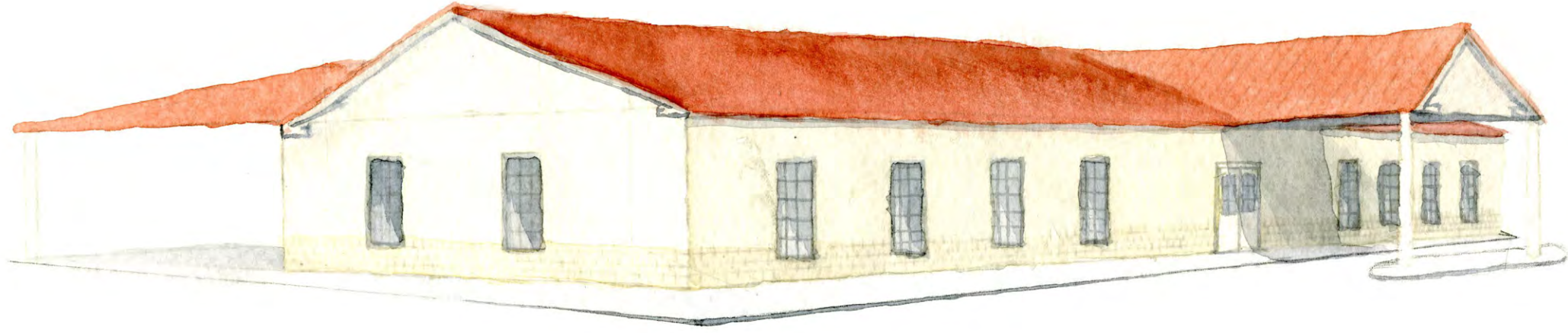
Elevation  
Scale: 3/32" = 1'

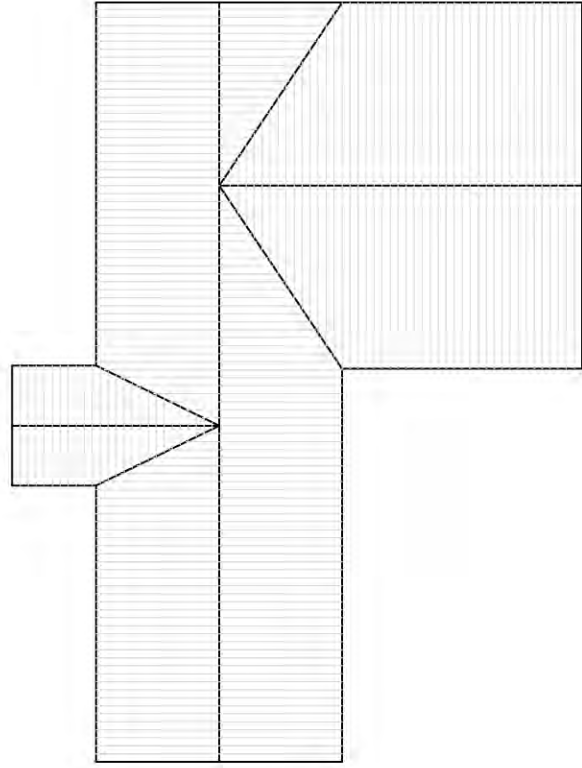


Section

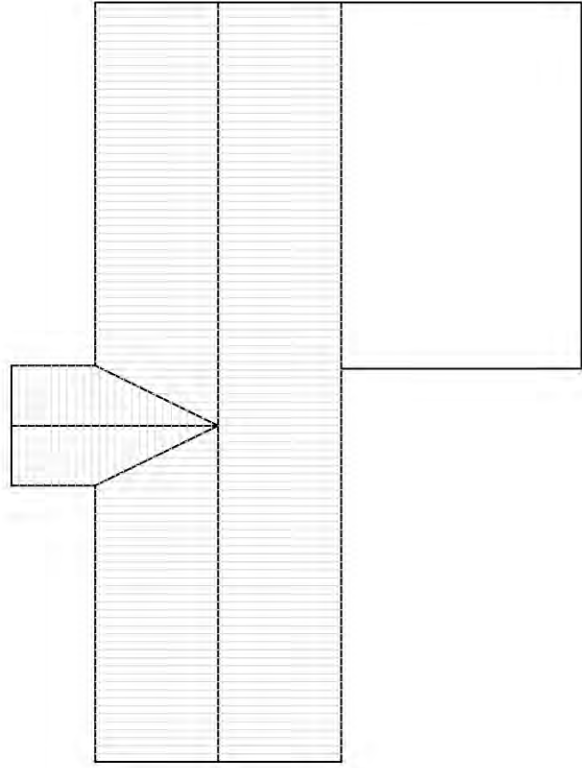
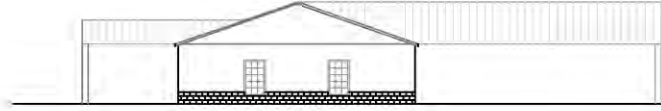




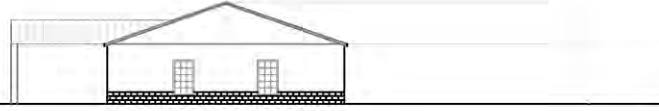




Roof Option A



Roof Option B







elevation  
3/16" = 1' - 0"



general building plan  
3/16" = 1' - 0"

**Plan Key:**

1. portico	25.5' x 17.4' (443.7 sq ft)
2. entry hall / lobby	15.1' x 20.7' (312.6 sq ft)
3. office	21.6' x 14.7' (313.2 sq ft)
4. conference area	19.4' x 14.7' (285 sq ft)
5. bar / lounge	19.4' x 38.5' (746.9 sq ft)
6. kitchen	15' x 32.5' (487.5 sq ft)
a. cooking island, b. reach-in freezer,	
c. dish/washing area, d. walk-in fridge	
7. reception hall	51.5' x 53.5' (2755 sq ft)
8. restrooms	10' x 20' each (400 sq ft)
9. janitorial equipment area	10' x 6' (60 sq ft)
10. mechanical room	6.5' x 6' (39 sq ft)
11. storage	6' x 20' (90 sq ft)
12. coats room	5' x 14.5' (73 sq ft)
13. extra storage room	4.5' x 6' (27 sq ft)
14. extra storage room	3.7' x 7' (29.5 sq ft)
15. extra storage room	3.7' x 7' (29.5 sq ft)





general building plan

3/16" = 1' - 0"

Plan Key:

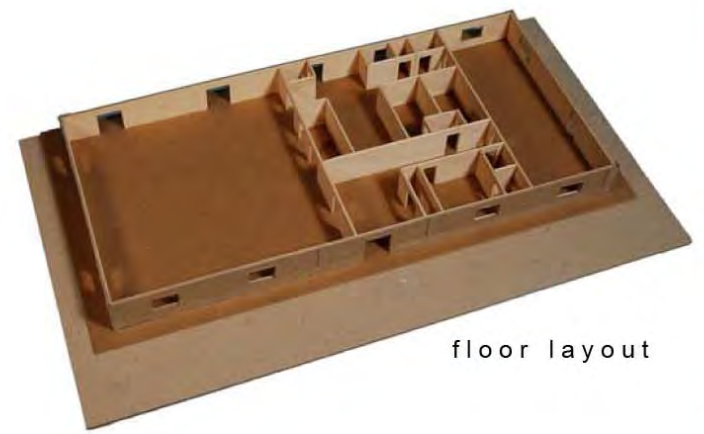
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14. extra storage room	3.7' x 7' (29.5 sq ft)
15. extra storage room	3.7' x 7' (29.5 sq ft)



hipped roof



gabled roof



floor layout

# Conclusion

The design alternatives, models, and depth of design investigation during the design process by the CDAC team position the Bedford Elks to move forward with fundraising, professional construction drawings, and implementation of a new lodge. This lodge will be an asset for both the Bedford Elks members and the community at large, providing a gathering space for functions and social interactions.

During all the phases of this project, the CDAC team has considered both the Elks Lodge's strong tie to the National Elks Home and the Elks Lodge's own individuality as a local organization. This connection and individuality are expressed through various elements around the building. Choices of proper volumetric relationships, durable materials, and a well balanced and harmonious building, should carry through to implementation.



# Appendices

*A: Soil Testing*

*B: Initial Concepts Presentation, (September 20, 2010)*

*C: Review Meeting with Jimmy English, (November 5, 2010)*

*D: Concept Refinement Presentation, (December 10, 2010)*

*E: Truss Information*

*F: Alternative Energies*

*G: Materials Palette*

*H: Plant Palette*

*I: AutoTurn Analysis*

*J: Tree Topping*

# Appendix A: Soils Lab Report

RESEARCH

25 Aug 2010

VIRGINIA COOPERATIVE EXTENSION  
SOIL TESTING LABORATORY

Person Submitting Samples:  
STEIKA KIM  
COMMUNITY DESIGN 0450

911  
Unit: VPI & SU CAMPUS

LABORATORY RESULTS

Sample ID	Lab ID	pH	BpH	P	K	Ca	Mg	Zn	Mn	Cu	Fe	B	mg/kg		ppm						
													EST.	CRC	Acidity	Base Sat	Ca Sat	Mg Sat	K Sat	OM	SS
1	36352	5.72	6.21	5	26	591	112	3.9	3.1	0.3	16.8	0.2	5.1	22.3	77.7	58.3	18.1	1.3	1.3	5.8	
2	36353	5.68	6.15	2	14	394	65	4.5	2.8	0.2	24.5	0.2	4.0	36.9	63.1	48.9	13.3	0.9	4.1	4.1	
3	36354	5.41	6.15	3	18	300	60	4.0	3.6	0.2	37.5	0.1	3.5	42.1	57.9	42.5	14.0	1.3	4.3	4.3	
4	36355	5.30	6.14	3	25	229	50	1.6	2.6	0.3	50.8	0.2	3.2	48.9	51.1	36.1	12.9	2.0	4.7	4.7	
5	36356	5.29	6.06	4	48	362	81	3.9	4.6	0.2	63.3	0.2	4.6	43.8	56.2	39.1	14.5	2.6	5.7	5.7	
6	36357	5.20	6.07	3	43	387	102	3.0	3.5	0.2	32.6	0.2	4.8	40.5	59.5	39.9	17.4	2.3	5.2	5.2	

Left: A full soils testing lab report from the Virginia Cooperative Extension Office

Below: Field key used for collecting soil samples.



# Appendix B: *Initial Concepts*

## *Presentation*

*September 20, 2010*

The CDAC team presented initial design concepts to the Elks Building Committee on September 20, 2010 at the National Elks Home in Bedford Virginia. The goal of the meeting was to discuss two initial building concepts and the site analysis developed by the team. Present at the meeting were CDAC team members, Elizabeth Gilboy, Kim Steika, Arian Korkuti, Kristin Fields, and Ashleigh Marshall. Building Committee members, Carl Breitingner, Sue Montgomery and Dick Turpin, and Elk members Michael Haynes, Charlie Oliver, Bob Humphreys, Earl Agee, and John Owen.

The first part of the presentation consisted of review of the site analysis, which is outlined on pages 7-11. There were discussions about the desire to preserve the views on site and utilize them as a tool for marketing rentals of the new building. Concerns about the railroad, stormwater management, preserving the existing trees and ingress/egress were discussed. Two initial building concepts were presented next.

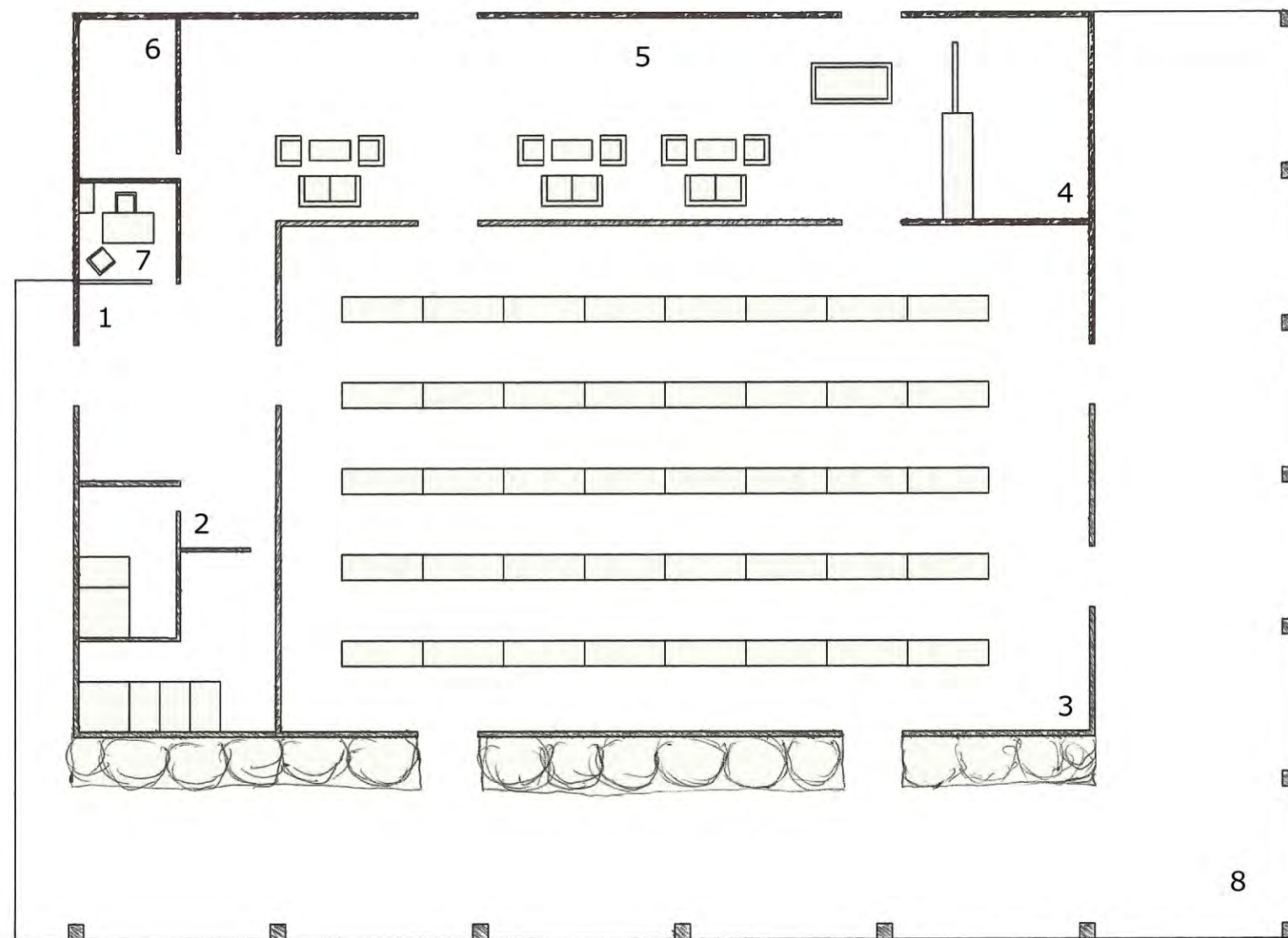
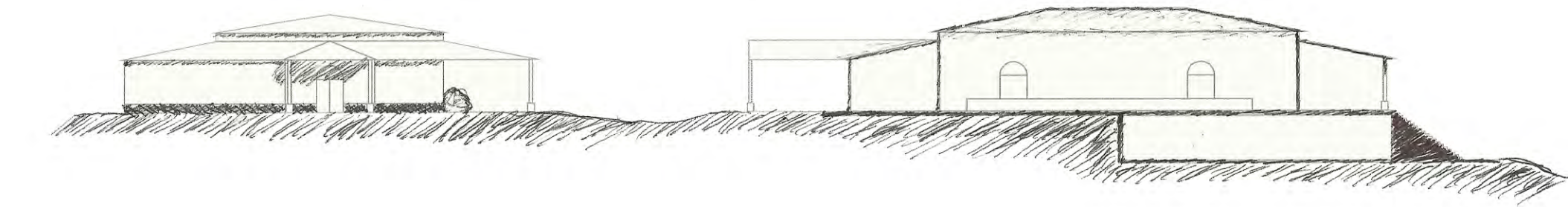
Initial Concept One is a compact rectangular building oriented with the long side containing the Elks lounge facing the railroad tracks in order to create a sound buffer between the noise of the railroad tracks and the banquet hall. By facing the short side to the West, the banquet hall is mostly protected from the heat and glare of the low setting sun. Eventually the roof was extended past the banquet hall to create a symmetrical roof line and overall composition. Because of the symmetrical roof, the central roof of the banquet hall could be separated and lifted to create clerestory windows bringing extra light into the deep interior space. The roof extension covers a wide walkway that wraps around the side of the building to the back veranda that can also be accessed by the banquet hall and the Elks lounge. The veranda also has a railing and staircase that leads down to the half basement and its own open veranda that reconnects to the downward slope of the landscape.

Initial Concept Two takes account of the hill, and the panorama from which the typology of the building is derived. The building stands on a plinth and its volumes are placed in symmetrical hierarchy. This relationship is played throughout the building, inside out. Ceiling height changes according to the purpose of each of the volumes. Programmatically, canopy and entry hall are of the same width and higher than the side wings, splitting the building in two parts. Canopy, which allows for a tour bus to go through, leads to the entry hall. This is the first interior space that the visitor encounters, opening up to the reception hall, the largest of the volumes and the heart of the building, and the utilitarian spaces on both sides. The reception hall leads to the belvedere, and opens up to the beautiful panorama, and it offers space for a number of 250 - 300 guests depending on the type of events. The entry hall, on the right, leads to a wardrobe, pool room, and turns to the Elks bar/lounge area which offers seating space for 25-30 guests. The commercial grade kitchen is located at the end of the bar/lounge and serves both, this area and the reception hall. The entry hall, on the left, leads to building's office, conference room, and turns towards the restrooms. A space that serves as storage in support of the reception hall is located at the very end of the corridor.

Elks lodge reflects the strong relationship to the National Home of Elks which is also part of the building's backdrop, in the use of materials and other parallels. Light color brick, locally available, offers great potential in regard to similarities, such as uniformity in texture and color when seen from

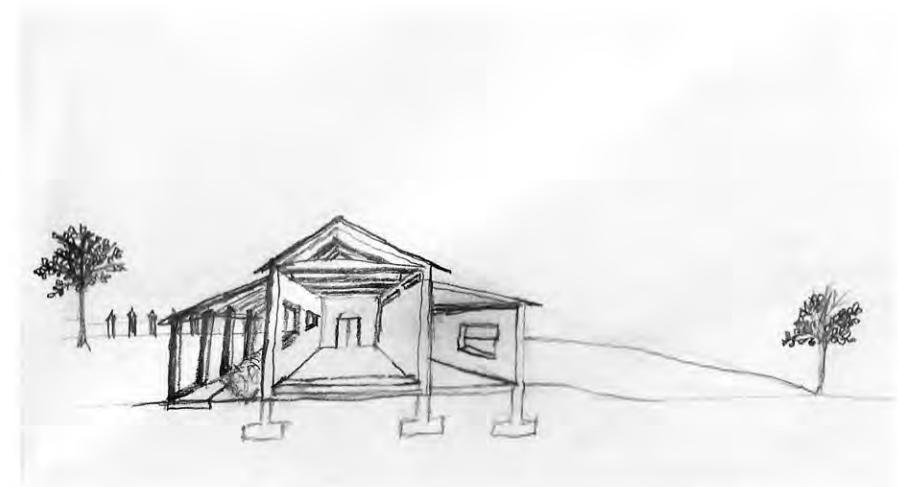


a distance, and well organized patterns once being close to it. It includes the character of the niches and arched windows, similar to the window awnings at the National Home of Elks complex. The design is suitability to possibilities such as gain of alternative energy through use of solar panels and/or geothermal technology.



Plan  
Scale: 3/32" = 1'

- |                       |                             |
|-----------------------|-----------------------------|
| 1. Entry Foyer 20x20  | 5. Elks Area 20x90          |
| 2. Bathrooms 24x20    | 6. Storage 15x10            |
| 3. Banquet Hall 50x80 | 7. Secretary's Office 10x10 |
| 4. Kitchen 20x13      | 8. Wrapping Porch           |



bedford elks  
initial concept one

cd community design  
cd assistance center  
College of Architecture and Urban Studies  
Virginia Polytechnic Institute and State University

9.20.2010  
Disclaimer: This drawing is conceptual and was prepared to show approximate location and arrangement of site features. It is subject to change and is not intended to replace the use of construction documents. The client should consult appropriate professionals before any construction or site work is undertaken. The Community Design Assistance Center is not responsible for the inappropriate use of this drawing.

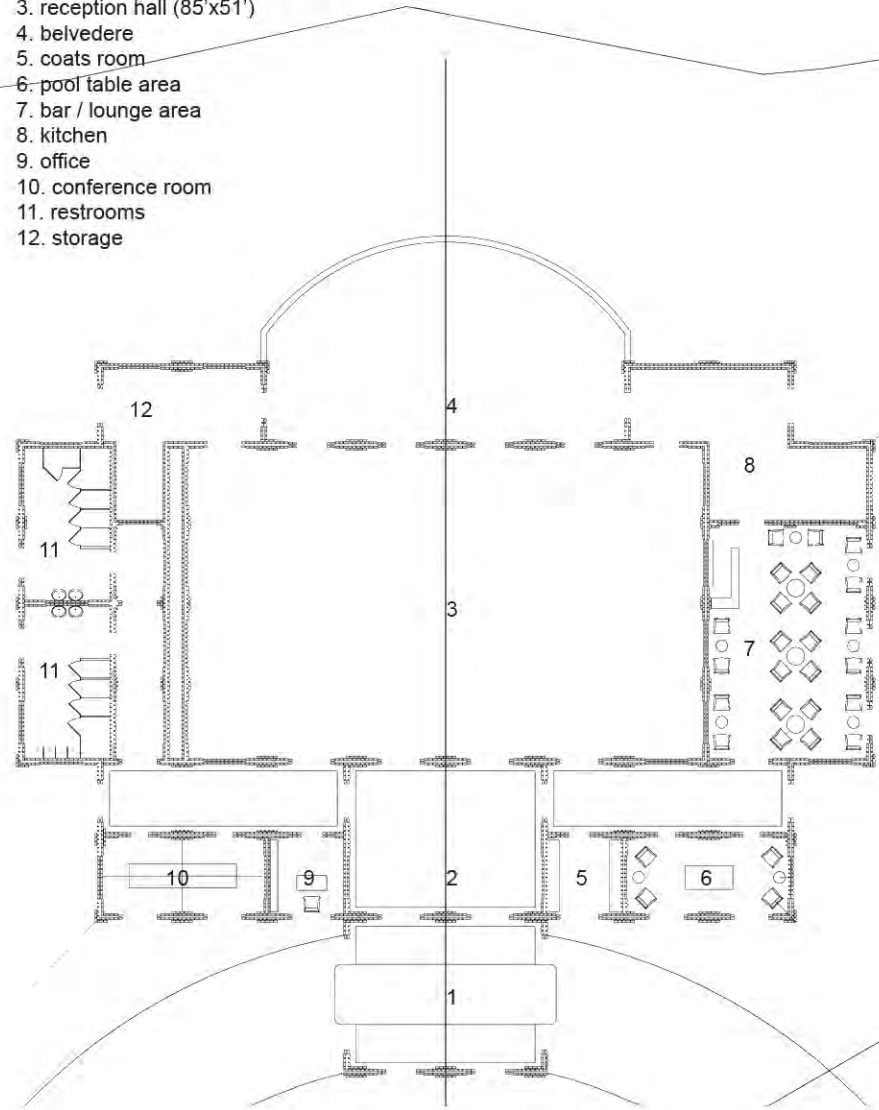




plan

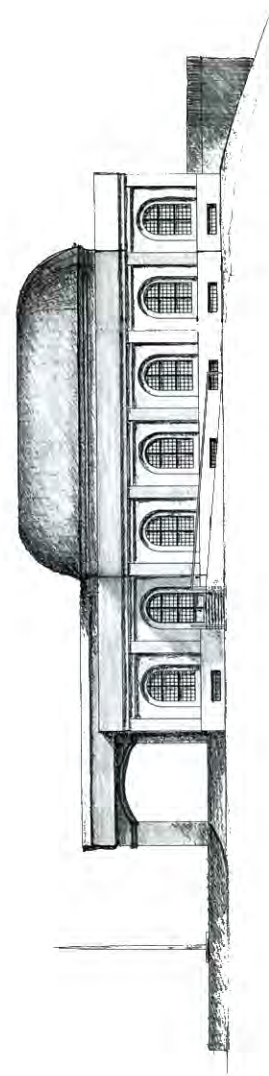
scale 1/32" = 1'-0"

1. canopy (to support a tour bus 37'x10'x10')
2. entry hall
3. reception hall (85'x51')
4. belvedere
5. coats room
6. pool table area
7. bar / lounge area
8. kitchen
9. office
10. conference room
11. restrooms
12. storage



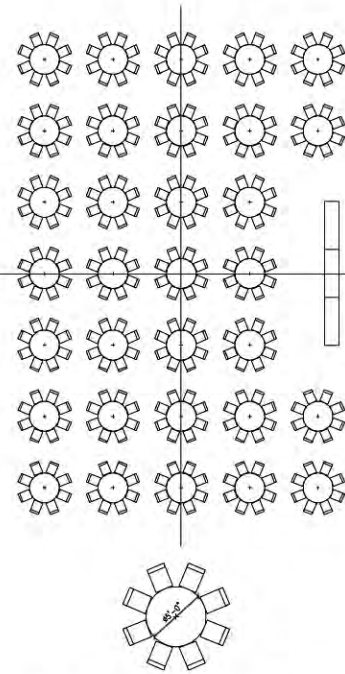
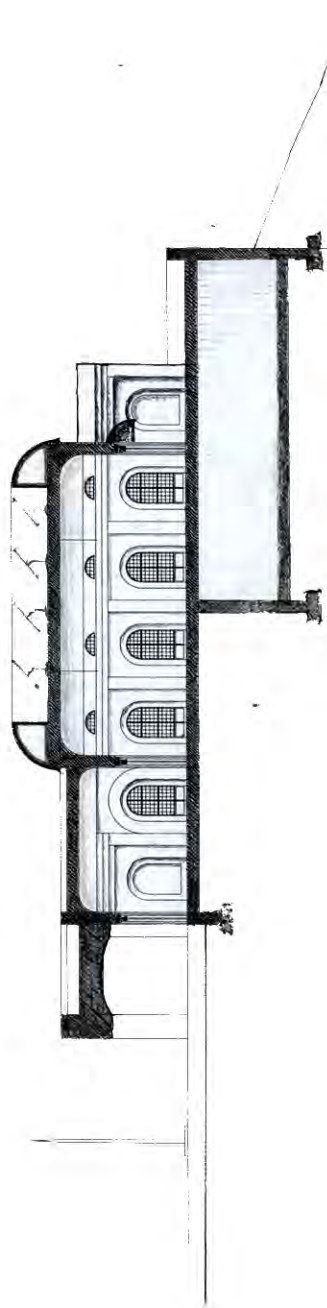
elevation

scale 1/32" = 1'-0"

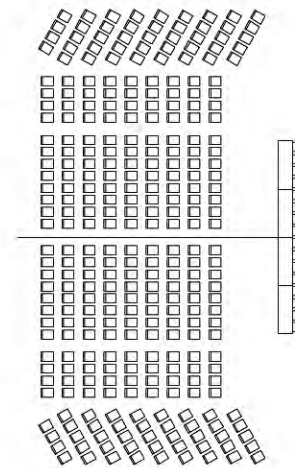


section elevation

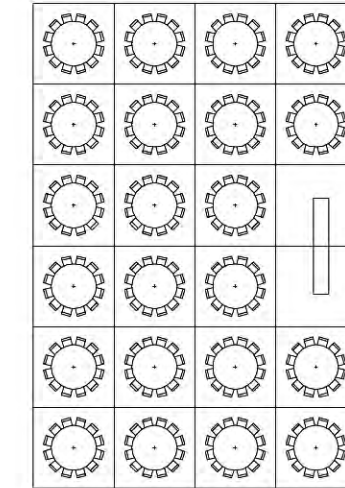
scale 1/32" = 1'-0"



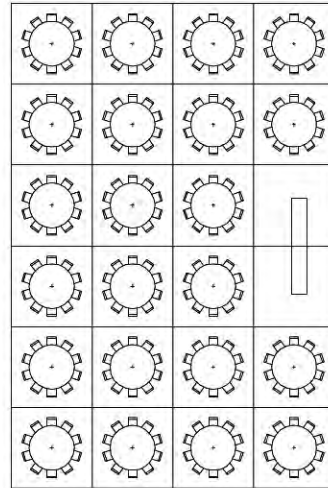
9 x 32 round tables = 288 seats



304 seats



12 x 22 round tables = 264 seats



10 x 22 round tables = 220 seats



# Appendix C: *Review Meeting with Jimmy English*

November 5, 2010

Following the initial meeting the CDAC team revised concepts based on comments and site plans were developed. This meeting was intended to be a discussion among the Committee, CDAC team, and Jimmy English to answer questions about zoning, building code, and other requirements to ensure development of the most efficient conceptual plans. Present at the meeting were CDAC team members, Elizabeth Gilboy, Kim Steika, Arian Korkuti, Kristin Fields, Ashleigh Marshall, and Grazia Apolinales. Building Committee members, Carl Breitingner, Sue Montgomery and Dick Turpin and Bedford Building Inspector, Jimmy English

The first part of the presentation consisted of two preliminary site plans, addressing ideas for the flow of the parking lot, locating space for RV parking, ideas for the landscape of the facility, parking and ADA requirements, and ingress/egress.

**Site Plan Concept One** addressed having a tour bus drop off, and a separate lot for RV parking. The Elks view the RV parking as a way of creating revenue for the organization. Water, sewer and electrical hookups would be provided. A terrace extending off of the reception hall is show. This would be a way of extended the event space outdoors and maximizing the rental property.

**Site Plan Concept Two** does not include the RV parking and shows the 'L-shaped' building footprint. A terrace at the back of the building also provides the extended event space and is oriented to maximize views of the surrounding landscape.

Two building concepts were also presented. The new concepts placed higher emphasis on economy and phased building construction. For **Concept One** this resulted in a long rectangular building with the banquet hall turned ninety degrees so that the short side faces south allowing for the rest of the building program to come off of the northern short side. This placement eliminates long stretches of unusable hallway space. The kitchen is placed horizontally in the back to provide easy access to both the banquet hall and the Elks lounge, each of which is directly next to one of the short sides. The back wall of the kitchen is placed up against the Secretary's office and the two bathrooms. Because the back bathroom walls are connected to the kitchen, it is most likely that the sinks will be placed along this wall to keep the plumbing localized. The entrances to the bathrooms face the short hallway that extends from the large entryway to the Elks Lounge. The lounge consists of many tables, a bar, a pool table, and probably game machines for the use of Elks Club members. Finally, there is space behind the banquet hall that is reserved for its future expansion to hold 300 people total for events. This space could be addressed one of two ways. During the first phase of construction, the second phase could be completely ignored creating just one building under one roof, or the roof of the second phase banquet hall could be constructed with supporting columns and no infill walls. This would create an outdoor covered patio that could also be rented out for summer events or could be included in the rental of the indoor banquet space as an extra fee. The patio could be used as extra rental space until the money is raised to wall it in and build a separate outdoor shelter.

In **Concept Two**, the Elks Lodge progressed in to a unified shape. The building has a pitched roof, which has to be further determined whether hipped or gabled. Locally available, sixty foot-span wood trusses are used for the roof design. Dominance of building's volume is brought gradually down to a human scale by elements such as canopy's dropped height, awnings, and main entrance. Four courses of split-face concrete block are succeeded by light color brick, both used as outer layer in the exterior wall. The outside symmetry of the building is not fully played inside. Programmatically the building is split in two parts. The entry hall leads on the left at the reception hall with dimensions of 52' x 54' providing space for 183 guests (based on 15 sq. ft. per person), and on the right to the office space, restrooms, conference room, turning towards Elks bar/lounge area. Centrally located towards the back is the core of the building's systems and spaces that mainly necessitate them; kitchen, restrooms, bar/counter areas. This specific layout allows for both sides, reception hall, and Elks lounge areas to take advantage of the commercial grade kitchen and restroom services. Volumetrically, the reception hall and Elks lounge areas allow for higher ceilings.

This concept offers the possibility of considering one phase construction of the building due to its compactness. The building's dimensions are 113.5' x 56' at circa 6400 sq. ft.. Should it be necessary the reception hall could be extended another 25' at the rear end at a second construction phase.

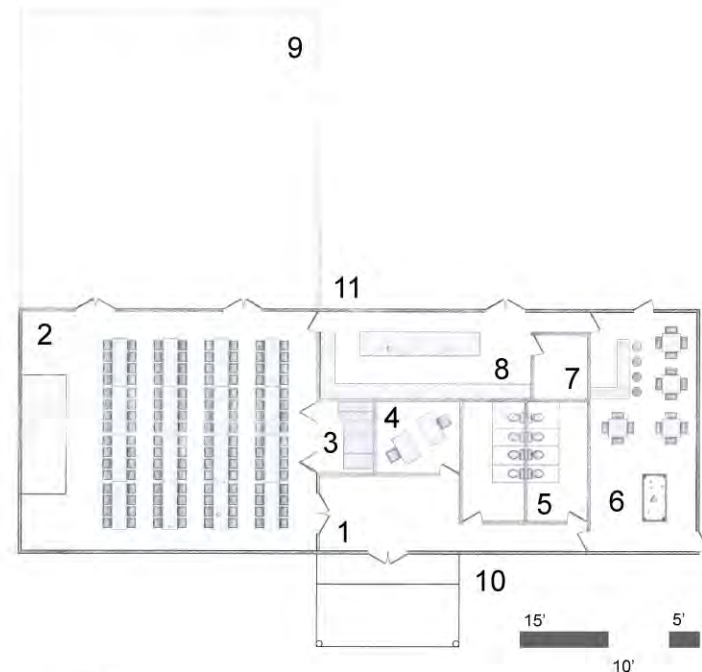
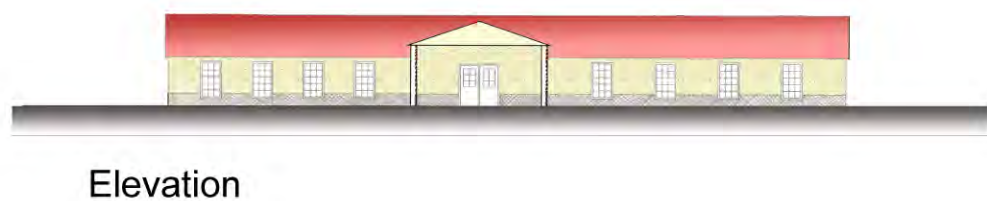






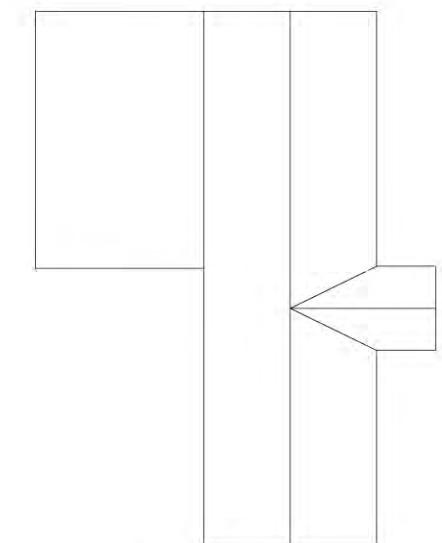




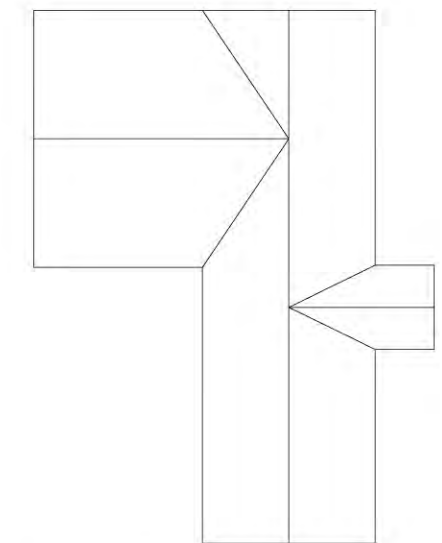


Scale: 1/32" = 1'

Phase 1 Option A



Phase 1 Option B



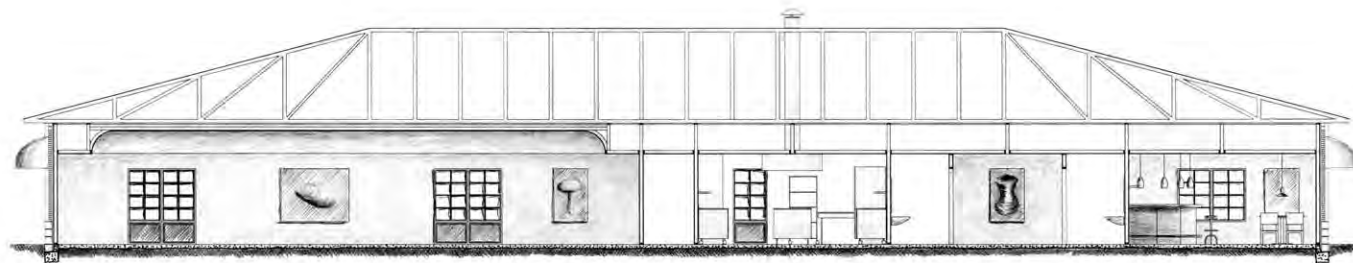
- |                              |                                |
|------------------------------|--------------------------------|
| 1. Entry Foyer               | 12' 6" x 23' 4" (291.66 sqft)  |
| 2. First Phase Banquet Hall  | 41' x 50' (2050 sqft)          |
| 3. Storage                   | 12' x 9' 6" (114 sqft)         |
| 4. Office                    | 12' x 13' 10" (166 sqft)       |
| 5. Bathrooms                 | 20' 10" x 20' 6" (427.08 sqft) |
| 6. Elks Club Room            | 41' x 17' 9" (727.75 sqft)     |
| 7. Mechanical Room           | 9' x 10' 8" (96 sqft)          |
| 8. Kitchen                   | 14' 6" x 35' 3" (511.13 sqft)  |
| 9. Second Phase Banquet Hall | 50' x 90' (4500 sqft)          |
| 10. Elks Lodge               | 41' x 114' (4674 sqft)         |
| 11. Phased Elks Lodge        | 7174 sqft                      |



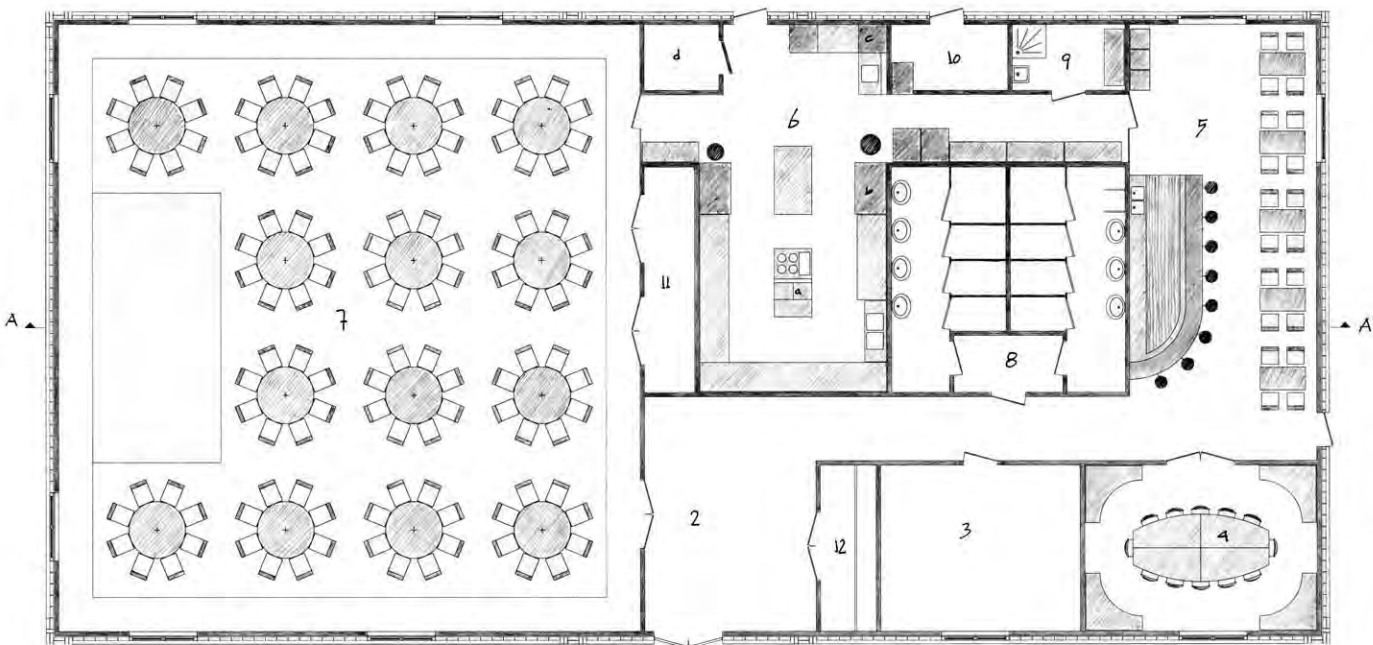




longitudinal elevation



A-A section - elevation



plan

#### Key Factors:

- building dimensions 113.5' x 56' (6356 sq. ft.)
- centralized functional areas (easy to maintain / operate)
- club room could be closed off from the rest of the building, should the reception hall be rented
- area dedicated to commercial kitchen offers ample and flexible space, which would at first serve for catering support, and could be upgraded to a commercial kitchen at a second phase
- reception hall maximum occupancy is 183 people, based on 15sq. ft. per person.

#### Building Materials:

- possible use of 60' span wood truss for the roof system
- wall composition, outer brick layer and inner gypsum board insulated layer, offer proper thermal acoustical qualities

note: generally, materials being considered are economical and environmentally friendly

#### Plan Key:

1. portico 23' x 15' (345 sq ft)
2. entry hall / lobby 15' x 21' (315 sq ft)
3. office 17.5' x 14.5' (254 sq ft)
4. conference area 20.5' x 14.5' (297 sq ft)
5. bar / lounge 16.5' x 30' (495 sq ft)
6. kitchen 16.5' x 32.5' (536 sq ft)
  - a. cooking island, b. reach-in freezer,
  - c. dish/washing area, d. walk-in fridge
7. reception hall 51.5' x 53.5' (2755 sq ft)
8. restrooms 10' x 20' each (400 sq ft)
9. janitorial equipment area 10' x 6' (60 sq ft)
10. mechanical room 10.5' x 6' (63 sq ft)
11. storage 4.5' x 20' (90 sq ft)
12. coats room 5' x 14.5' (73 sq ft)

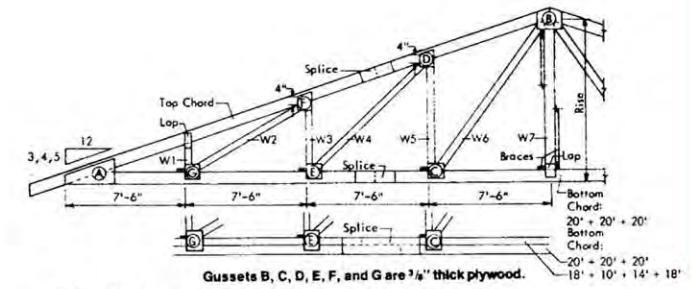


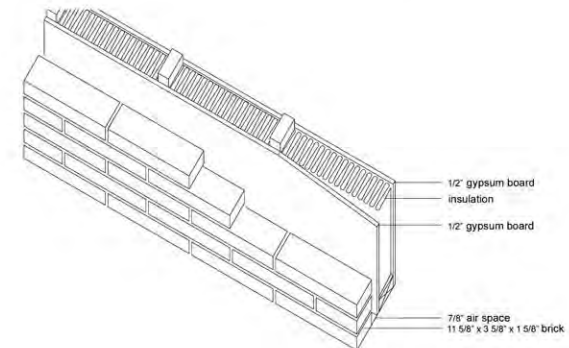
Table of lengths

Roof Slope	Rise	Top Chord	W1	W2	W3	W4	W5	W6	W7
3/12	7'-6"	20' + 12"	2'	8'	4'	9'	6'	11'	8'
4/12	10'-0"	20' + 12"	3'	9' + 8"	5'	11' + 10"	8' + 7"	12' + 11"	10'
5/12	12'-6"	20' + 13"	3'	10' + 9"	6' + 5"	12' + 11"	10' + 9"	14' + 13"	13' + 12"

source: midwest plan service, ames, iowa

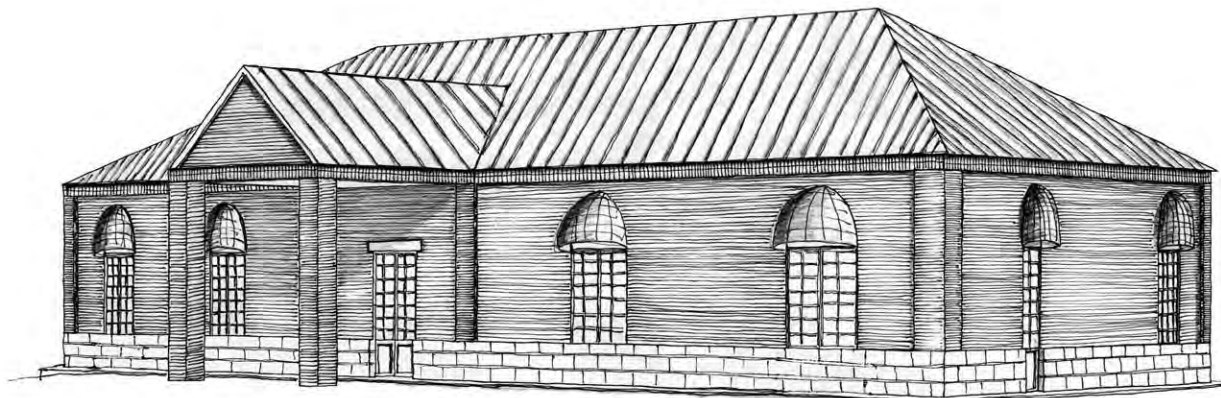
60' span 6 - web truss

detail is included as an example only and is not intended to serve as a construction detail



exterior wall composition

detail is included as an example only and is not intended to serve as a construction detail



perspective

bedford elks  
concept two

community design  
assistance center



College of Architecture and Urban Studies  
Virginia Polytechnic Institute and State University

nov. 05, 2010

disclaimer: This drawing is conceptual and was prepared to show approximate location and arrangement of site features. It is subject to change and is not intended to replace the use of construction documents. The client should consult appropriate professionals before any construction or site work is undertaken. The Community Design Assistance Center is not responsible for the inappropriate use of this drawing.



# Appendix D: *Concept Refinement Presentation*

December 10, 2010

Based on comments from the November meeting with Jimmy English, the CDAC team further revised the plans and presented them at a meeting on December 10, 2010. Present at the meeting were CDAC team members, Elizabeth Gilboy, Kim Steika, Arian Korkuti, Kristin Fields, Ashleigh Marshall, Building Committee members, Carl Breiting, Sue Montgomery and Dick Turpin Michael Haynes, Charlie Oliver, Bob Humphreys, and Earl Agee. Once again the presentation began with two site plans, and conceptual stormwater management sketches.

**Site Plan Concept One** addressed an 'L-shaped' building, without RV parking. A service area for maintenance and dumpsters is provided on the Northern side of the building. Areas for tour bus drop off and flag poles are provided at the entrance of the building. An outdoor space is designed around an additional covered pavilion space, provided for picnics and other events. The stormwater concept utilizes a series of cells collecting runoff from the roof and drains within the parking lot. It is envisioned that the cells would be formal on the patio and transition into a more informal dry creek bed along the southern side of the pavilion and eventually transition into a stormwater pond for storage.

**Site Plan Concept Two** provides a similar parking and service structure to that of concept one, but also has an additional lot for RV parking. The stormwater landscape is less formal than the first and provides a more naturalized landscape plan. A meandering swale functions in the same way as the first concept, only in a more naturalized manner. By showcasing the stormwater management in the immediate landscape of the site, the plan is more efficient because it is not only beautiful, but functional as well.

The **Stormwater Concepts** page shows a conceptual section of how the two ideas would function above and below ground. The top section reflects that of concept One and the bottom shows Concept Two. Both alternatives look at using structured soil layers as a way of filtering and reducing stormwater runoff on the site. These methods are alternatives to the more traditional stormwater pond, and provide a way to enhance the landscape of the site while also managing the stormwater changes that will be created by the new impervious surfaces.

Following the site plans, two building concepts were presented. **Concept One** for December 10th included some minor adjustments to the Concept from November. Jimmy English had suggested that the men's bathroom be moved to the back of the entry hall where the office had been. The office was then moved next to the Elks room and enlarged.

In **Concept Two**, programmatically a controlled entrance was introduced at the Elks lounge area, and the conference room was transformed into a flexible multipurpose area. The building's width was increased to 116', and more storage space was gained from the kitchen in favor of the reception hall.



- 1 Elks Lodge
- 2 Outdoor Pavilion
- 3 Terrace
- 4 Stormwater Treatment Cells
- 5 Stormwater Pond
- 6 Tour Bus Drop Off
- 7 Dumpster and Service Access
- 8 Entrance Sign
- 9 Flag Poles
- 10 Future Golf Car Connection to National Home
- 11 Grass Paver Reinforcement
- 12 Potential Connection to Future Road



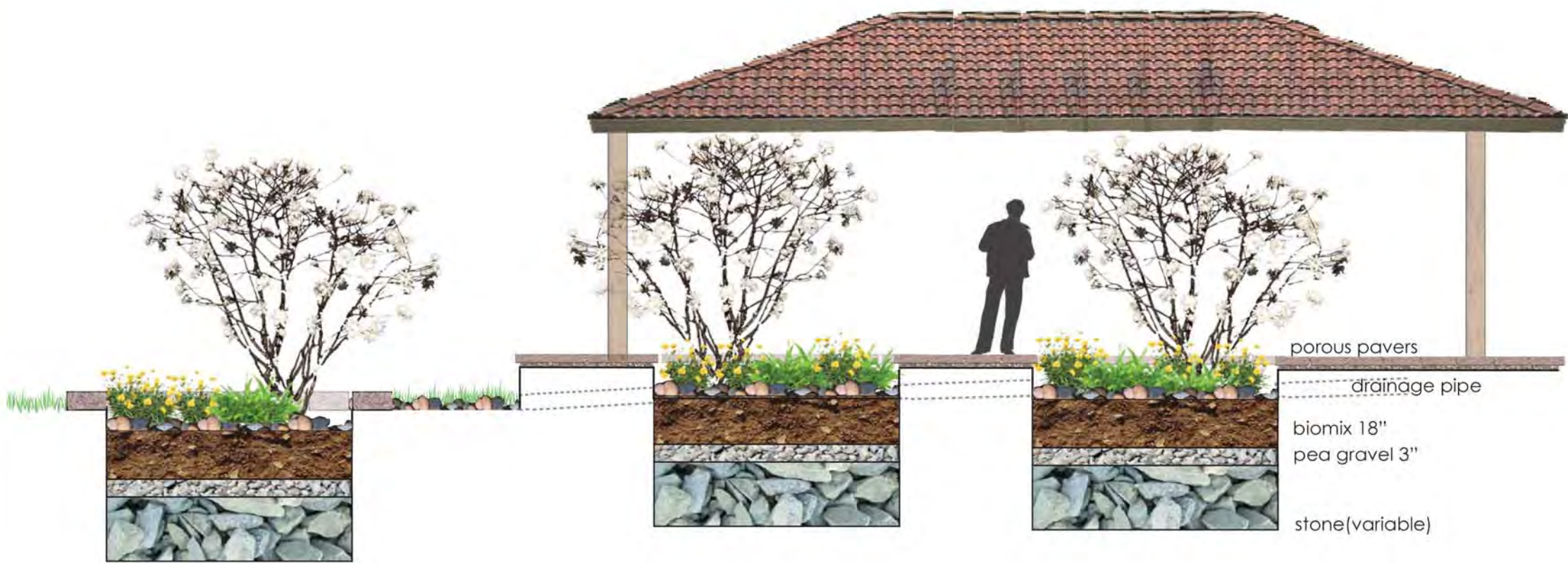


- 1** Elks Lodge
- 2** Outdoor Pavilion
- 3** Terrace
- 4** Stormwater Treatment Cells
- 5** Stormwater Pond
- 6** Tour Bus Drop Off
- 7** Dumpster and Service Access
- 8** Entrance Sign
- 9** Flag Poles
- 10** Future Golf Car Connection to National Home
- 11** RV Parking Lot
- 12** Dump Station
- 13** Grass Paver Reinforcement
- 14** Potential Connection to Future Road

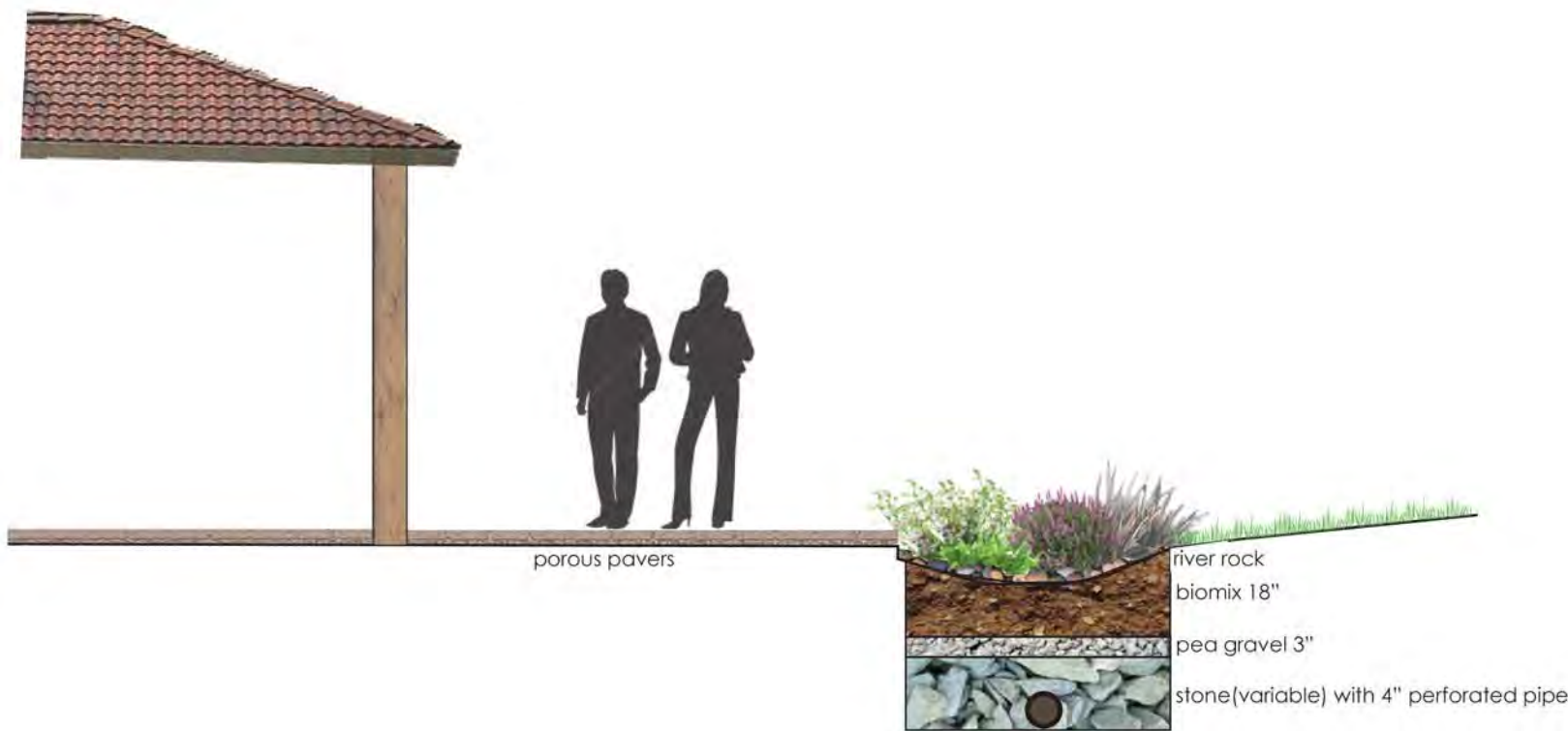




Stormwater Option 1

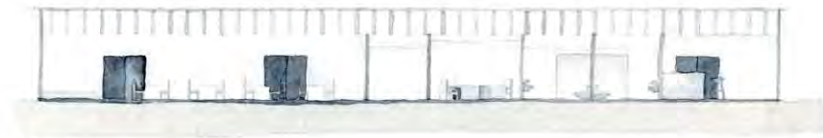


Stormwater Option 2





Section



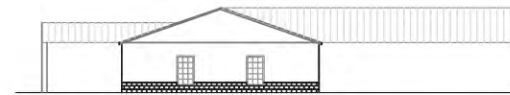
Perspective



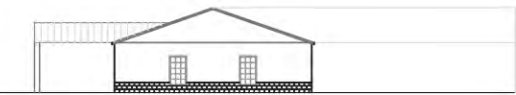
Elevation



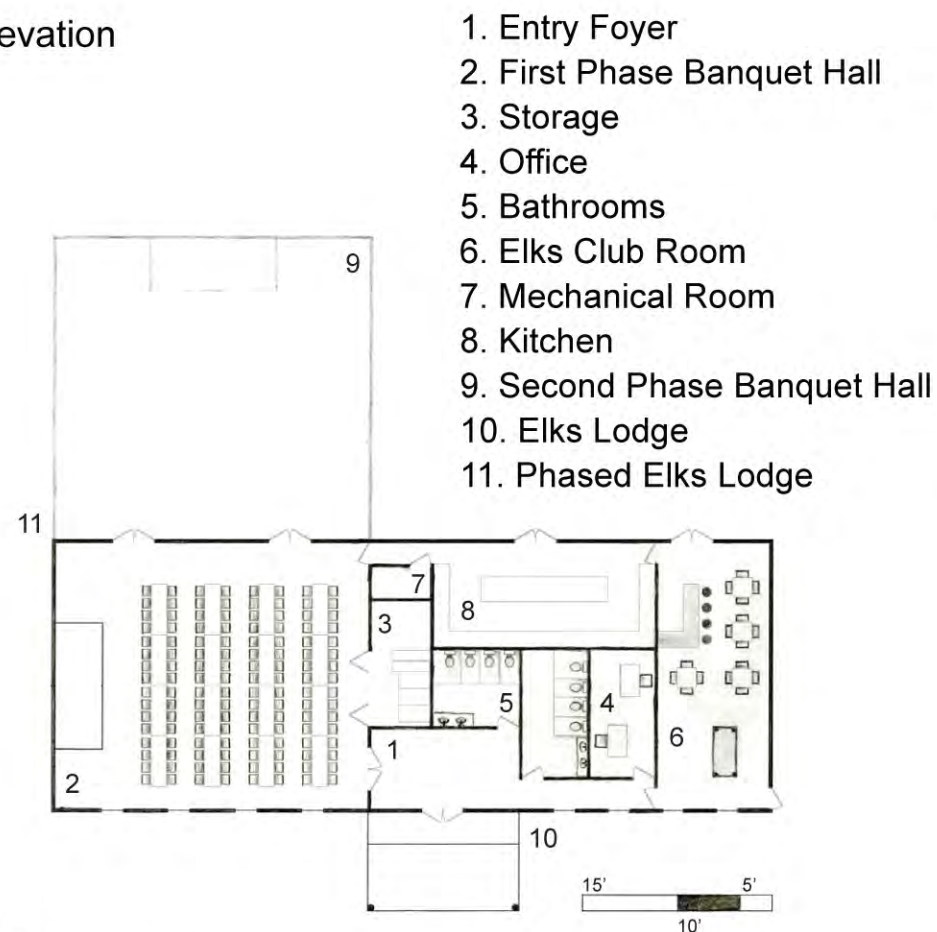
Roof Plan A



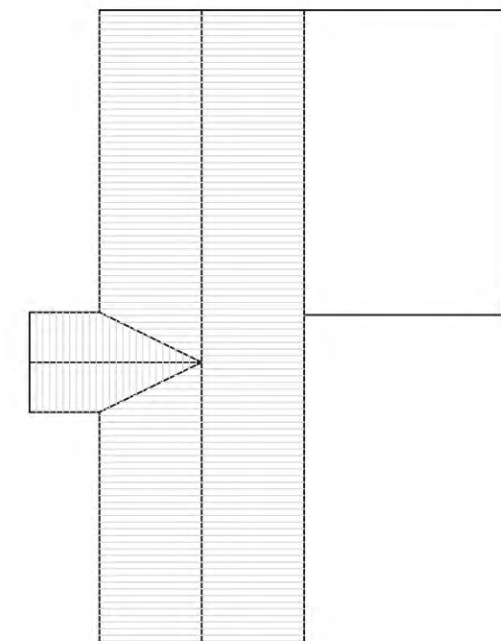
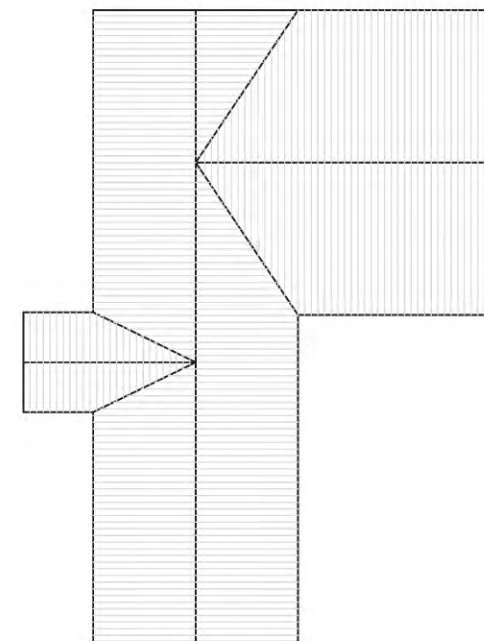
Roof Plan B



Plan  
Scale: 1/32" = 1'



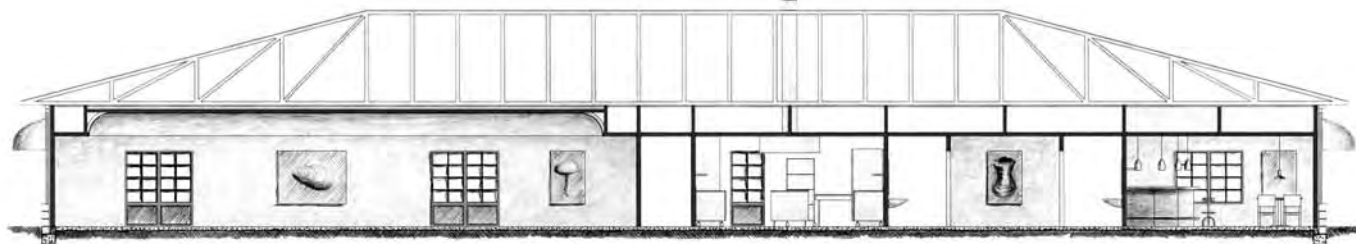
1. Entry Foyer 12' 6" x 23' 4" (291.66 sq. ft)
2. First Phase Banquet Hall 42' x 50' (2100 sq. ft)
3. Storage 19' 10" x 9' 4" (185 sq. ft)
4. Office 20' x 10' (200 sq. ft)
5. Bathrooms (362 sq. ft)
6. Elks Club Room 42' x 17' 9" (745.5 sq. ft)
7. Mechanical Room 5' x 9' 4" ( 45.33 sq. ft)
8. Kitchen 16' 6" x 35' (577.5 sq. ft)
9. Second Phase Banquet Hall 50' x 90' (4500 sq. ft)
10. Elks Lodge 42'x114' (4788 sq. ft)
11. Phased Elks Lodge 7188 sq. ft



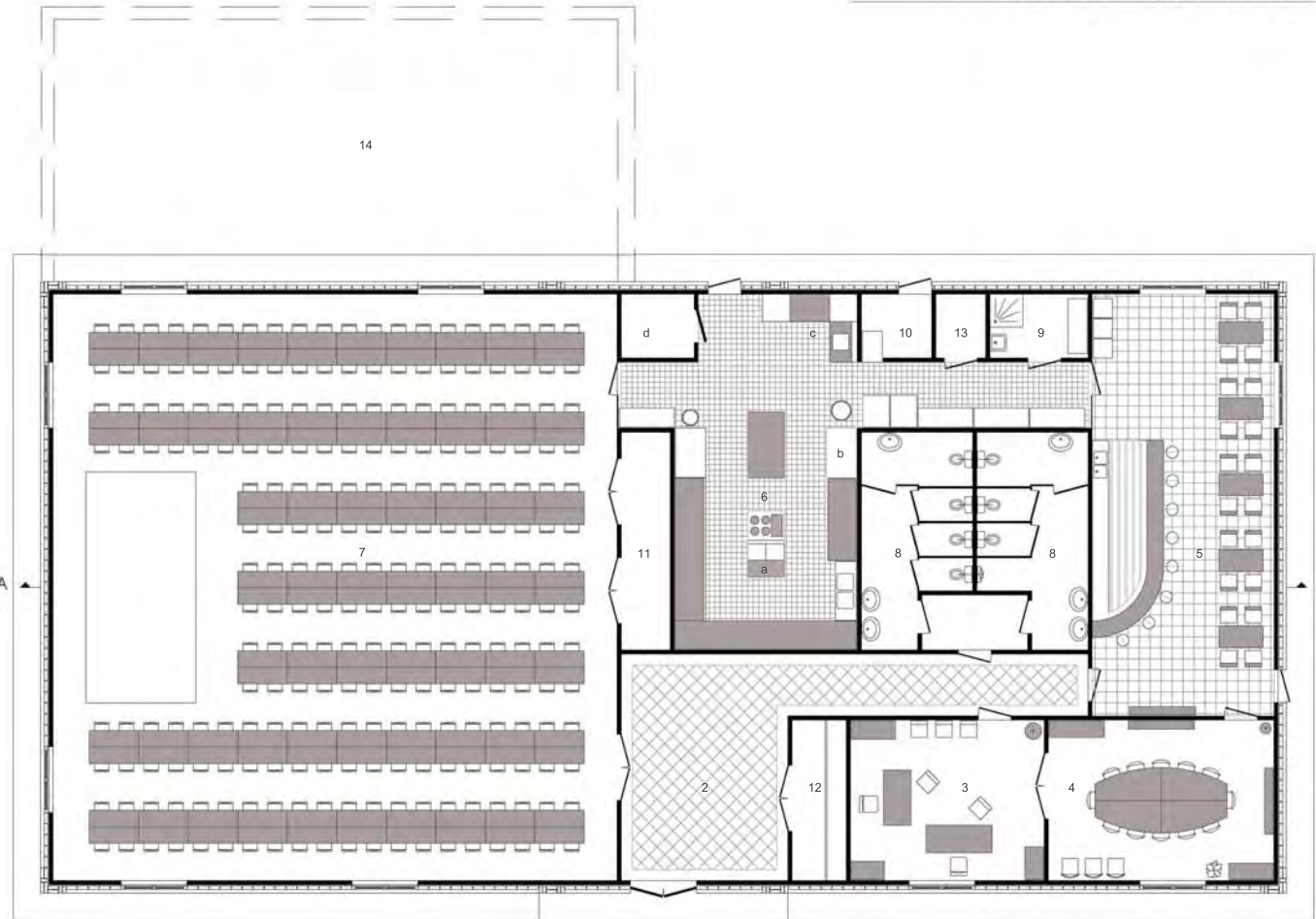




longitudinal elevation



A-A section - elevation



general building plan

reception hall - layout plan  
this setting would allow for 122 tables of 54" x 18" and a total of 244 seats

**Key Factors:**

- building dimensions 113.5' x 56' (6356 sq. ft.)
- phase II reception hall addition 51.5' x 25' (1287.5 sq.ft.)
- total area after phase II 7643.5 sq.ft.
- centralized functional areas (easy to maintain / operate)
- club room could be closed off from the rest of the building, should the reception hall be rented
- area dedicated to commercial kitchen offers ample and flexible space, which would at first serve for catering support, and could be upgraded to a commercial kitchen at a second phase

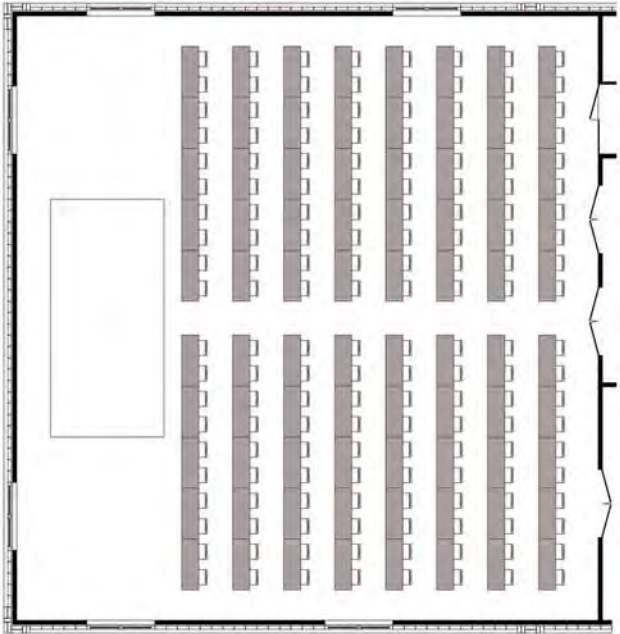
**Building Materials:**

- possible use of 60' span wood truss for the roof system
- wall composition, outer brick layer and inner gypsum board insulated layer, offer proper thermal acoustical qualities

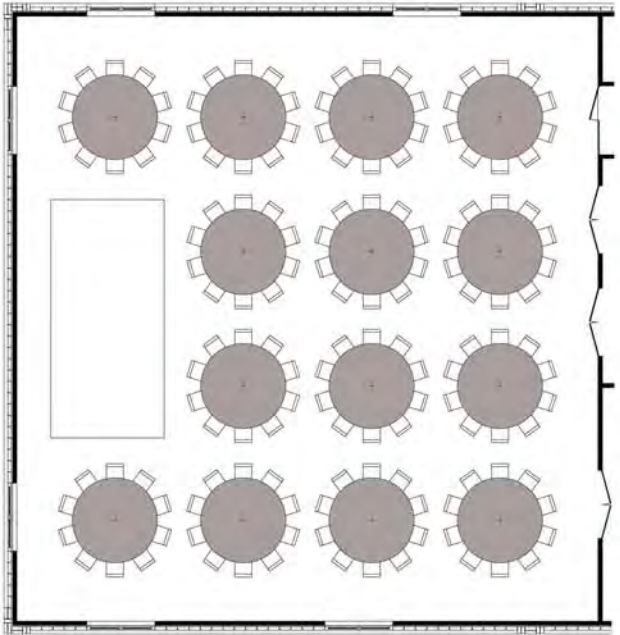
note: generally, materials being considered are economical and environmentally friendly

**Plan Key:**

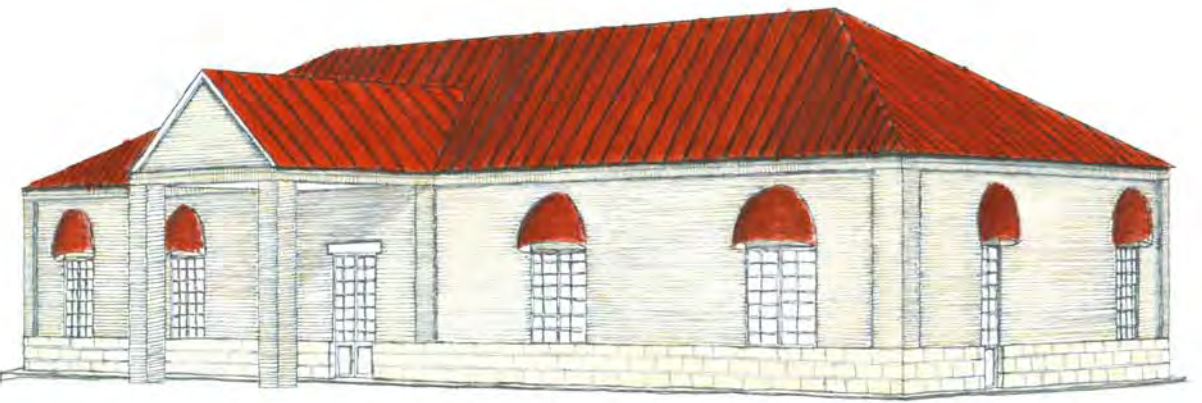
- |  |                            |
|--|----------------------------|
| 1. portico                                       | 23' x 18' (414 sq ft)      |
| 2. entry hall / lobby                            | 15' x 21' (315 sq ft)      |
| 3. office  | 17.5' x 14.5' (254 sq ft)  |
| 4. conference area                               | 20.5' x 14.5' (297 sq ft)  |
| 5. bar / lounge                                  | 16.5' x 30' (495 sq ft)    |
| 6. kitchen                                       | 16.5' x 32.5' (536 sq ft)  |
| a. cooking island, b. reach-in freezer,          |                            |
| c. dish/washing area, d. walk-in fridge          |                            |
| 7. reception hall                                | 51.5' x 53.5' (2755 sq ft) |
| 8. restrooms                                     | 10' x 20' each (400 sq ft) |
| 9. janitorial equipment area                     | 10' x 6' (60 sq ft)        |
| 10. mechanical room                              | 6.5' x 6' (39 sq ft)       |
| 11. storage                                      | 4.5' x 20' (90 sq ft)      |
| 12. coats room                                   | 5' x 14.5' (73 sq ft)      |
| 13. extra storage room                           | 4.5' x 6' (27 sq ft)       |
| 14. phase II reception hall addition 25' x 51.5' | (1287.5 sq ft)             |



reception hall - classroom layout plan  
this setting would allow for eighty 54" x 18" tables and a total of 160 seats



reception hall - round tables  
this setting would allow for fourteen tables with a diameter of 92" and a total of 140 seats



perspective

bedford elks  
concept two

community design  
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12.10.10

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## Appendix E: *Truss Information*

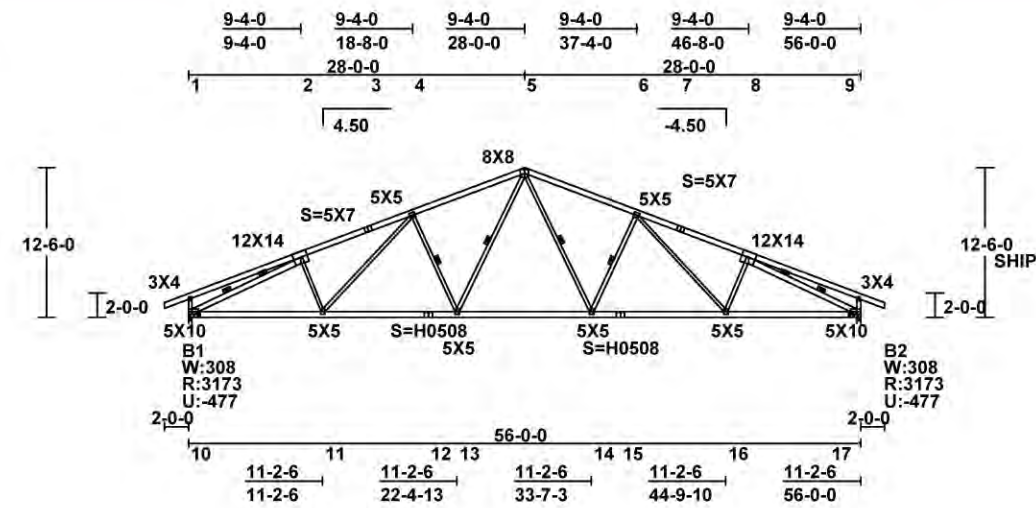
The CDAC team met with Gary Saunders, president of TimberTruss Housing Systems, Inc., located in Salem VA to explore wood truss options, associated costs, and transportation feasibility evaluation. Mr. Saunders introduced the CDAC team to a variety of truss systems, and general ideas in regards of cost and transportation feasibility.

To more specifically answer CDAC's questions, engineers at TimberTruss Housing Systems, Inc. provided the CDAC team with accurate information for truss designs and costs for Concepts One and Two.

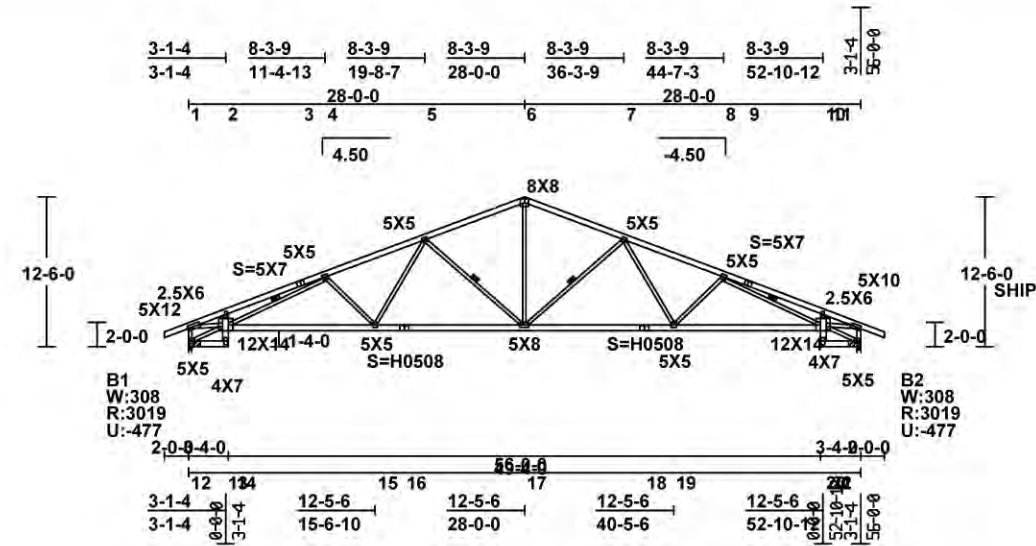
Design and cost evaluation for a singular truss for Concept One and Concept Two can be found on the following page.



concept two

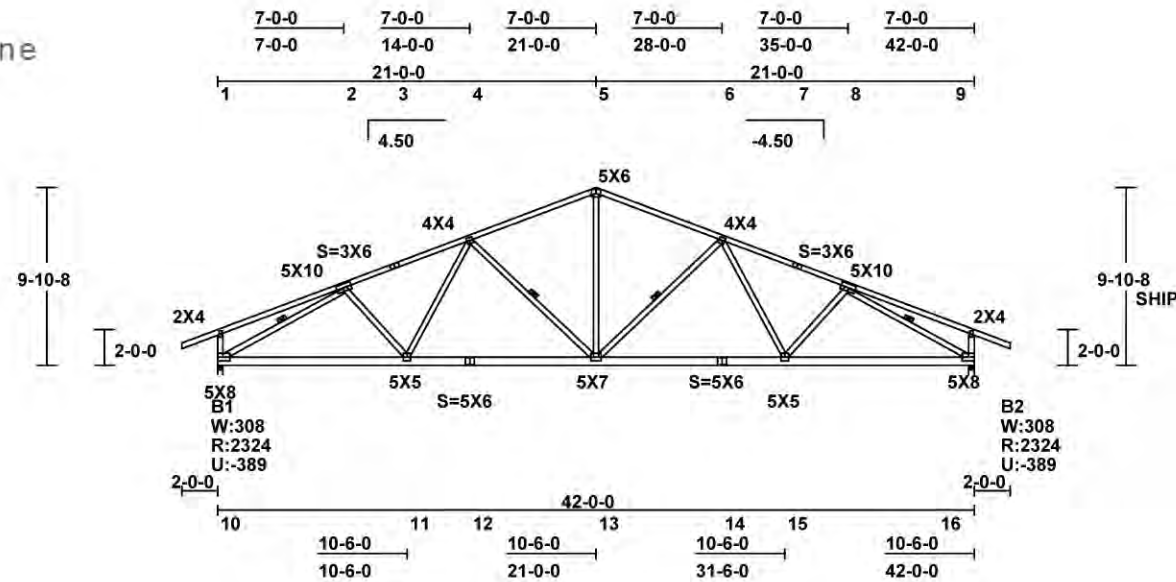


UNIT \$	QTY	TRUSS ID	SPAN	PITCH	OVERHANGS
185.33		T1	56' 0" 0	4.50/0.00	24.00/ 24.00
			SIZE 6/6		
		2' 0" 0			

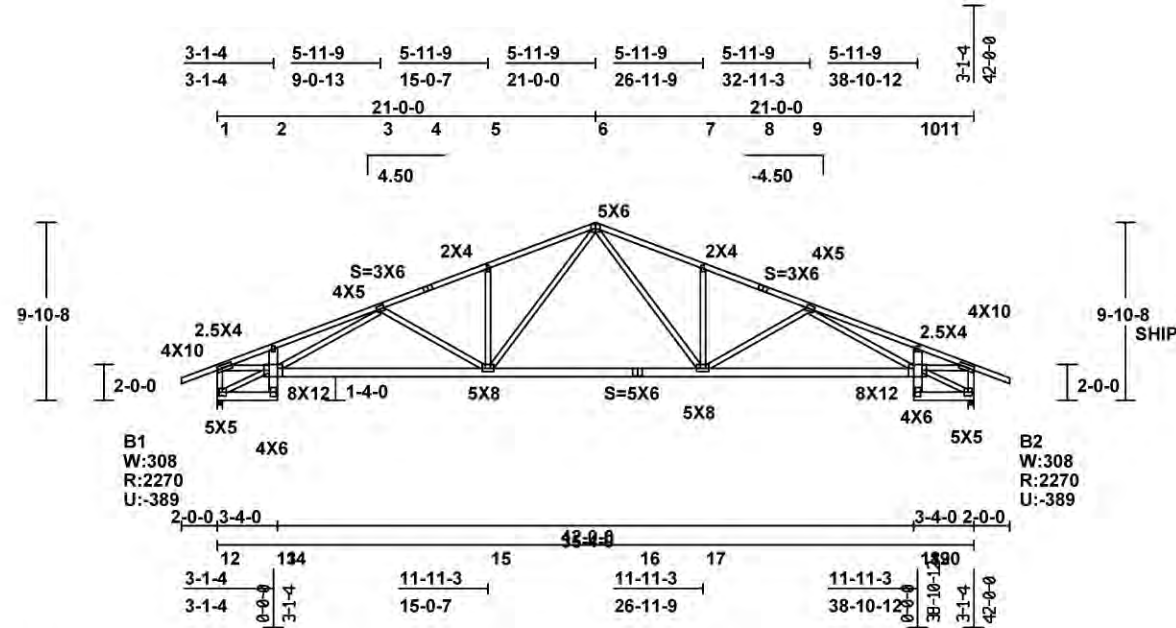


UNIT \$	QTY	TRUSS ID	SPAN	PITCH	OVERHANGS
214.90		T1	56' 0" 0	4.50/0.00	24.00/ 24.00
			SIZE 6/6		
		2' 0" 0			

concept one



UNIT \$	QTY	TRUSS ID	SPAN	PITCH	OVERHANGS
118.17		T2	42' 0" 0	4.50/0.00	24.00/ 24.00
			SIZE 4/6		
		2' 0" 0			



UNIT \$	QTY	TRUSS ID	SPAN	PITCH	OVERHANGS
144.72		T2	42' 0" 0	4.50/0.00	24.00/ 24.00
			SIZE 4/6		
		2' 0" 0			



Timber Truss  
525 McClland St.  
Salem, VA 24153-0996  
540-387-0273



## Appendix F: *Alternative Energy*

The Bedford Elks asked the CDAC team to consider the use of alternative energy in design concepts. After evaluating a variety of options, one of the most viable ideas appears to be solar panels.

The 11x17 pullout on the following page demonstrates the course of solar energy gained through the type of solar panel shown. The solar panels could be applied directly on the surface of the hipped or gabled roofs.





<http://www.nellis.af.mil/pressroom/newsroom/photos/070713-A-48518-001.jpg>  
nellies air force base - photovoltaic panels



<http://www.whowhere.com/>  
sun hours / day zone map

## Tilt Angle

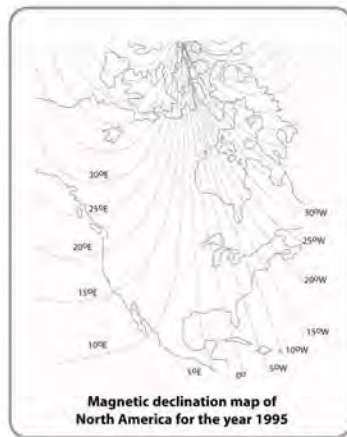
To capture the maximum amount of solar radiation over a year, the solar array should be tilted at an angle approximately equal to a site's latitude, and facing within 15° of due south. To optimize winter performance, the solar array can be tilted 15° more than the latitude angle, and to optimize summer performance, 15° less than the latitude angle. At any given instant, the array will output maximum available power when pointed directly at the sun.

To compare the energy output of your array to the optimum value, you will need to know the site's latitude, and the actual tilt angle of your array—which may be the slope of your roof if your array is flush-mounted. If your solar array tilt is within 15° of the latitude angle, you can expect a reduction of 5% or less in your system's annual energy production. If your solar array tilt is greater than 15° off the latitude angle, the reduction in your system's annual energy production may fall by as much as 15% from its peak available value. During winter months at higher latitudes, the reduction will be greater.

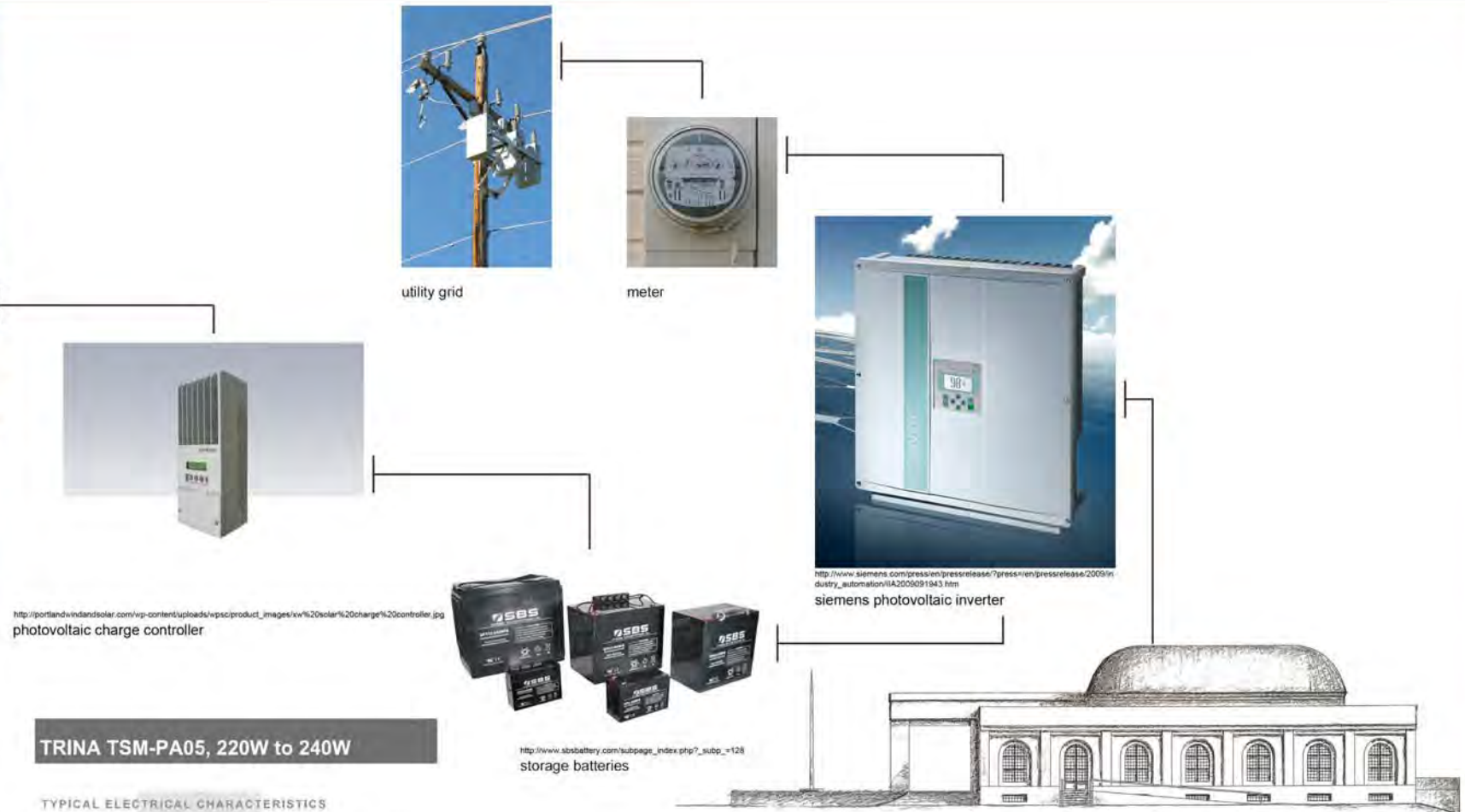
## Azimuth Angle and Magnetic Declination

If a south-facing roof is unavailable, or the total solar array is larger than the area of a south-facing roof section, an east or west-facing surface is the next best option. Be aware that solar power output decreases proportionally with a horizontal angle, or "azimuth," greater than 15° from due south. The decrease in annual power output from a latitude-tilted east or west-facing array may be as much as 15% or more in the lower latitudes or as much as 25% or more in the higher latitudes of the United States. Avoid directing your tilted solar panels northwest, north or northeast, as you'll get little power output.

Magnetic declination, the angle difference between magnetic south and true solar south, must also be taken into account when determining proper solar array orientation. If a magnetic compass alone is used to determine where to point the array, you may not capture the maximum amount of solar radiation. For a general view of the magnetic declination field lines in North America, see the map on the right.



Magnetic declination map of North America for the year 1995



## TRINA TSM-PA05, 220W to 240W

TYPICAL ELECTRICAL CHARACTERISTICS				
Type	TSM-PA05	220	230	240
Max-Power	P <sub>mp</sub> (W)	220	230	240
Power Tolerance	(%)	±3	±3	±3
Max-Power Voltage	V <sub>mp</sub> (V)	29.8	30.0	30.8
Max-Power Current	I <sub>mp</sub> (A)	7.39	7.66	7.84
Open-Circuit Voltage	V <sub>oc</sub> (V)	36.8	37.0	37.5
Short-Circuit Current	I <sub>sc</sub> (A)	8.00	8.16	8.38
Max-System Voltage	(VDC)	600		
Cell Efficiency	η <sub>c</sub> (%)	15.1	15.8	16.4
Module Efficiency	η <sub>m</sub> (%)	13.4	14.1	14.7
Number, type and arrangement of cells	60 pcs, Multi-Crystalline Silicon (6x10)			
Cell Size	6" x 8"   150mm X 150mm			
No. of Bypass Diodes	(pcs.)	3		
Max. Series Fuse	(A)	14		
P <sub>mp</sub> Temperature Coefficient	(%/°C)	-0.45		
I <sub>sc</sub> Temperature Coefficient	(%/°C)	0.05		
V <sub>oc</sub> Temperature Coefficient	(%/°C)	-0.36		
NOCT- Nominal Operating Cell Temperature	(°C)	47±2		

MECHANICAL CHARACTERISTICS	
Cable type, Diameter and Length	3.31mm <sup>2</sup> (12AWG), UL Certified
Type of Connector	Tyco
Dimension A*B*C	1650*992*46 (mm)   64.96*39.05*1.81 (in.)
Weight	19.5 Kg   43 lb
No. of Draining Holes In Frame	2
Glass: Type and Thickness	High Transmittance Low Iron, Tempered Glass 3.2 mm   0.12"

PACKAGING CONFIGURATION	
Packing Configuration	20 pcs./box
Quantity/Pallet	1 box / pallet
Loading Capacity	520 pcs/40ft or 120 pcs/20ft

ABSOLUTE RATINGS	
Dielectric Insulation Voltage	(VDC) 3000 max.
Operating Temperature	(°C) -40~+85
Storage Temperature	(°C) -40~+85

\*STC Conditions(1000W/m<sup>2</sup>, 1.5 AM and 25°C Cell temperature)

TrinaSolar

SMA

Model: 2809680

Price: \$29,895.00

This Solar Sky Grid-tie System combines forty-four 220-watt Trina modules and two SMA SB6000US Grid-tie inverters to give your home or business 9,680 watts of solar power. Complete with 100m extension cables, disconnects and a wiring diagram, you'll be ready to use the power from the sun in no time.

With the Solar Sky Grid-tie System 9,680 watts a lot of the hard work has already been done for you. Virtually maintenance-free with an expected life of over 30 years, your investment will increase in value every time electricity rates go up.

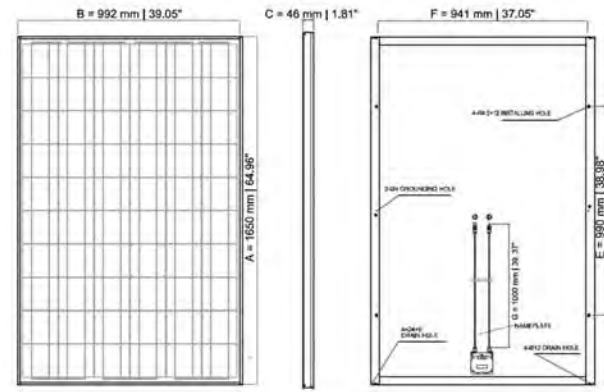
Please note: Racks are not included in this package.

This system qualifies for a Federal Tax Credit of 30% of the installed cost!

Back to all Grid-tie solar power solutions

System	Array Size STC / PTC**	Price Per Watt	Monthly Output Based on 5 hrs sun a day	# of Solar Panels	Inverter	Product Number
F						9680

## DIMENSIONS



Dimensions A*B*C	1650*992*46 (mm)   64.96*39.05*1.81 (in.)
Installation Hole E*F	941*990 (mm)   37.05*38.96 (in.)
Cable Length G	1000 (mm)   39.37 (in.)

solar sky gridtie system 9680 watts

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assistance center



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Virginia Polytechnic Institute and State University

bedford elks - lodge  
concept two

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aug - 31 - 2010



## Appendix G: *Materials Palette*

During all the design phases, the CDAC team carefully considered various building construction, thermal, and acoustic materials. Identification of equipment and their organization based on daily use routines was also considered. This was an important factor in the interior layout of specific areas such as the commercial kitchen.

The following 11x17 demonstrates the proposed color palette of the proposed brick to be used as building material. The same folio shows images of the specific model of appliances, dimensions of which were use as support for the kitchen design.





Alpine



Asheville



Auburn Hills



Autumn Sunset



Blueridge Mountain



Buff Colorado Rumbled



Calico Rock



Canyon Springs



Cape Cod



Cardiff Grey



Choc Brown Antique



Cumberland Pass



Durango



Fort Sumter



Gray Mist



Highland Gray



Kennewick



Kings Canyon



Marble Falls



Monte Carlo



Mossy Oak



Norfolk



Old Smokey



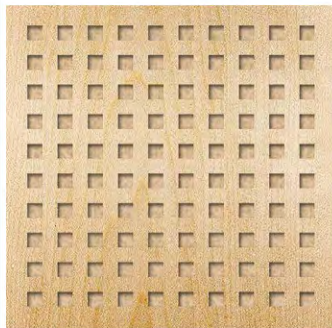
Oyster White



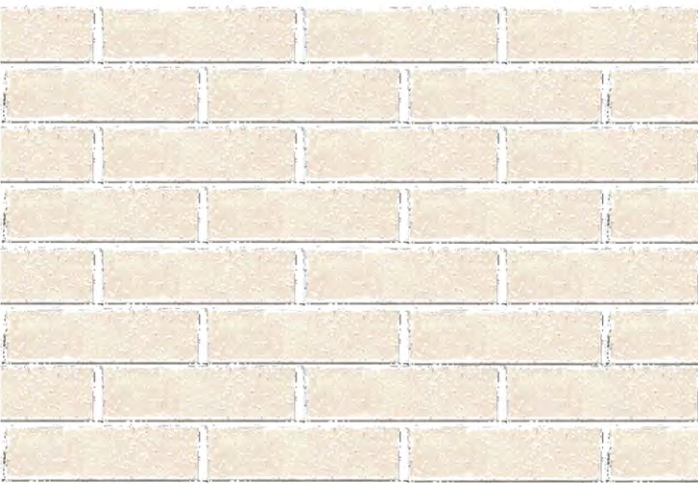
Prescott Valley



Valley Mist



ceiling acoustic perforated panel



Glacier White



arched ceiling



cove ceiling



reach - in fridge



walk - in fridge



range



range



dishwasher



warmer



community design  
assistance center

College of Architecture and Urban Studies  
Virginia Polytechnic Institute and State University

bedford elks

building materials + commercial kitchen appliances 12. 10. 10

disclaimer: This drawing is conceptual and was prepared to show approximate location and arrangement of site features. It is subject to change and is not intended to be used for construction. The Community Design Assistance Center is not responsible for the inappropriate use of this drawing.



# Appendix H: *Plant Palette*

## Foundation Plantings



**Boxwoods (*Buxus* sp.):** Low growing evergreen shrub. Below are three different globed-shaped species examples with similar height and spread.

-Height: 2'-3'

-Spread: 2'-3'

***Buxus* 'Wilson'** – Northern Charm boxwood

-Dark green foliage

***Buxus* 'Green Gem'** – Green Gem boxwood

- Kelly Green foliage

***Buxus* 'Green Velvet'** – Green Velvet Boxwood

- Bluish-green foliage



**False Cypress (*Chamaecyparis* sp.):**

Offering unique color and texture options.

***Chamaecyparis pisifera* 'Cream Ball'** – Cream Ball Sawara False Cypress

-Height: 2'-3'

-Spread: 2'-3'

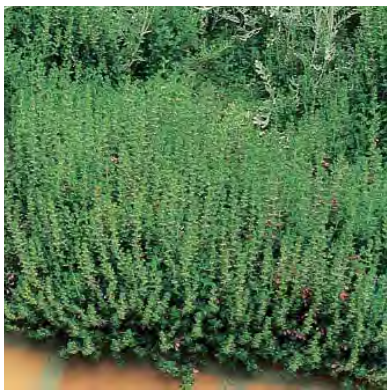
-Light creamy green

***Chamaecyparis pisifera* 'filifera mops'** –

Goldmop Threadleaf Sawara False Cypress

-Height: 2'-3'

-Spread: 2' – 3'



**Creeping Germander (*Teucrium***

***chamaedrys* 'Prostratum')** Glossy, green foliage with a spreading habit. Evergreen unless winter is severe.

-Height: 2 to 6"

-Spread: 12"

-Bloom: purple flowers, spring/summer

-Low maintenance



**Coral Bells (*Heuchera* sp.):** Heuchera comes in many different colors; very interesting foliage with small flowers. Would be ideal for the low growing areas in the front of the building.

-Height: 12-18"

-Spread: 12-18"

-Bloom: Late spring/early summer

-Attracts hummingbirds

-Low maintenance

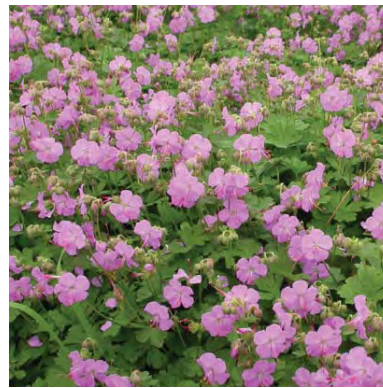
-Drought tolerant





**Green and Gold (*Chrysogonum virginianum*):** Semi-evergreen herbaceous perennial.

- Height: 6-9"
- Spread: 6-9"
- Bloom: Golden yellow star-shaped flower in spring and sporadically in the summer
- Needs well drained soil and prefers partial shade



**Biokovo geranium (*Geranium x cantabrigiense* 'Biokovo'):** Flowering perennial that tolerates full sun to partial shade. Foliage is aromatic, with a velvety texture. Attracts butterflies, birds, and bees.

- Height: 12-18"
- Spread: 24-36"
- Bloom: Pale pink/white flowers late spring through mid-summer



**Daffodils (*Narcissus* sp.):** Perennial bulb

- Height: depends on cultivar
- Spread: depends on cultivar
- Bloom: Flowers are usually yellow or white. Blooms in early spring.
- Foliage: strap-like green foliage



**Lavender (*Lavandula angustifolia*):** Small herbaceous semi-evergreen perennial with an upright clump habit. Prefers full to partial sun.

- Height: 1.5'
- Spread: 1.5'
- Bloom: blue-purple, lavender, violet-blue, or white-pink, depending upon cultivar from late June to early August
- Very Fragrant





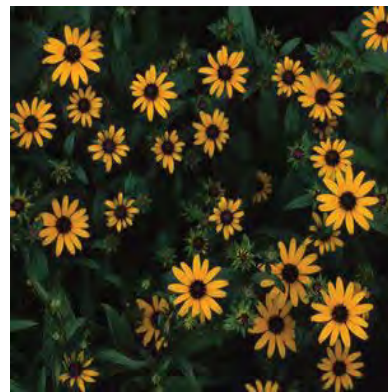
**Autumn Joy Sedum (*Sedum 'Autumn Joy'*):** Hardy and deciduous perennial with winter value

- Height: 18-24"
- Spread: 18-24"
- Bloom: Opens pink and matures to copper color. Bloom time ranges from August to September/November



**Purple Coneflower (*Echinacea purpurea 'Kim's Knee High'*):** Bright, long flowering perennial.

- Height: 1-2'
- Spread: 1'
- Bloom: Purple-pink petals with orange centers, blooming from June through September
- Native to the U.S.
- Attracts butterflies and bees



**Orange Coneflower (*Rudbeckia fulgida var. sullivantii 'Goldsturm'*):** Bright, long flowering perennial.

- Height: 18-24"
- Spread: 18-24"
- Bloom: Yellow flowers from July through September
- Native to the U.S.



## Trees



**Purple Leaf Plum:** A moderate to fast growing beautiful small tree with brilliant purple foliage. It is relatively short lived and is known to be susceptible to pest problems. If this is a concern, consider substituting with 'Forest Pansy' Redbud.

- Height: 15-25'
- Spread: 15-20'
- Form: Upright/vase shape
- Bloom: White/light pink, fragrant flowers in early April
- Deciduous



**Red Maple (*Acer rubrum* 'October Glory'):**

A fast growing, tough tree. 'October Glory' is recommended for its outstanding fall color.

- Height: 40-50'
- Spread: 25-35'
- Form: Symmetrical oval/round shape
- Bloom: Showy red flower in the spring
- Fruit: Red, showy fruit
- Deciduous



**Littleleaf Linden (*Tilia cordata***

**'Greenspire'):** add text

- Height: 40-50'
- Spread: 35-45'
- Form: Pyramid in youth; oval at maturity
- Bloom: Green/yellow to gold in the early summer
- Deciduous



**Chinese Elm (*Ulmus parvifolia* 'Allee'):** A beautiful, graceful tree.

- Height: 40-50'
- Spread: 40'
- Form: Round-headed tree with pendulous branches
- Bloom: Yellow-green inconspicuous flowers appearing August to September
- Fruit: Red-green, ripens in September-October
- Deciduous





**American Hornbeam (*Ostrya virginiana*):**

Handsome and hardy small to medium tree; makes excellent growth once established

- Height: 25-40'
- Spread: 15-25'
- Form: Ovate to pyramidal, rounded when older
- Bloom: Male flowers are catkins
- Fruit: Nutlet enclosed in hop-like sac
- Deciduous



**Winter King Hawthorn (*Crateagus virdis* 'Winter King'):**

Small ornamental tree. This cultivar is selected for its excellent form and large, red fruit.

- Height:
- Spread:
- Form: Rounded habit with vase-like branching structure
- Bloom:
- Fruit: Bountiful white flowers in early to mid May
- Deciduous, but with excellent winter value because of the berries



**Seedless Sweetgum (*Liquidambar styraciflua* 'Rotundiloba'):**

Lovely medium to large tree with beautiful, glossy star-shaped leaves that turn deep purple in the fall.

- Height: 50-70'
- Spread: 35-45'
- Form: Pyramidal
- Deciduous
- Excellent fall color



**Concolor Fir (*Abies concolor*):**

Evergreen tree that can tolerate of most climates and city conditions. Consider planting near Winter King Hawthorn for interesting winter color contrast of berries and evergreen foliage

- Height: 50-75'
- Spread: 20-30'
- Form: Pyramidal
- Evergreen





**Foster Holly (*Ilex x attenuata* 'Fosteri'):**

Small evergreen with red berries

- Height: 15-25'
- Spread: 8-12'
- Form: Pyramidal
- Fruit: Heavy berry production that persists into the winter
- Evergreen

**Bio-retention Plantings: Perennials & Grasses**



**Black-eyed Susan (*Rudbeckia hirta*):**

Colorful edge plant for bioretention areas.

- Height: 3'
- Spread: 2'
- Form: Loose
- Bloom: Summer to mid-autumn  
persists into the winter
- Full sun to light shade
- Deadhead spent flowers to prolong blooming
- Choose cultivar that is a true perennial



**Garden Sage (*Salvia nemorosa***

**'Ostfriesland'):** Colorful edge plant for bioretention areas.

- Height: 1-1.5'
- Spread: 1'
- Form: Upright
- Bloom: Purple flower spikes in summer  
persists into the winter
- Full sun, well drained soils
- Perennial



**Fringed Sedge (*Carex crinita*):** Vibrant green plant that does well in lower/wetter areas

- Height: 3-4'
- Spread: 3-4'
- Form: Generally upright, cascading
- Bloom: May through July
- Wet soils
- Perennial





**Creeping Jenny (*Lysimachia nummularia* 'Aurea')**: Lime green foliage throughout the growing season.

- Height: 3-6"
- Spread: 1-1.5'
- Form: Spreading groundcover
- Bloom: Yellow flowers early summer
- Full Sun to part shade
- Medium to wet soils
- Perennial



**Bigroot Geranium (*Geranium macrorrhizum*)**: good upper edge plant

- Height: 1'
- Spread: 1.5-2'
- Form: Pyramidal
- Bloom: Magenta flowers late spring through early summer
- Red fall foliage
- Well drained soils
- Full sun to part shade
- Perennial



**Purple Coneflower (*Echinacea purpurea* 'Kim's Knee High')**: Bright, long flowering perennial. Best on upper edge of bioretention areas.

- Height: 1-2'
- Spread: 1'
- Bloom: Purple-pink petals with orange centers, blooming from June through September
- Full sun
- Well-drained soils
- Attracts butterflies and bees
- Perennial



**Cinnamon fern (*Osmunda cinnamomea*)**: Lovely green foliage.

- Height: 3-4'
- Spread: 2-3'
- Bloom: Rust spike
- Sun to partial shade
- Moist to wet soils
- Perennial



## Bio-retention Plantings: Trees & Shrubs



**Witch Hazel (*Hamamelis virginiana*):** Small tree or shrub

- Height: 10-15'
- Spread: 10-15'
- Bloom: Fragrant yellow flower that blooms in October and November
- Showy, yellow fall foliage
- Sun to partial shade
- Moist soils
- Deciduous



**Redoiser Dogwood (*Cornus sericea*):**

Loose, multi-stemmed shrub

- Height: 5-9'
- Spread: 5-10'
- Bloom: Small white flower in early summer
- Purple to reddish fall foliage
- Bright red twigs and bark making for interesting winter value
- Fast growing
- Sun to partial shade
- Tolerates wet and dry sites
- Deciduous



**Sweet Pepper Bush (*Clethra alnifolia*):**

Fragrant multi-stemmed shrub

- Height: 5-8'
- Spread: 4-6'
- Form: Upright
- Bloom: White, fragrant flowers in July and August
- Sun to partial shade
- Prefers moist, acidic soils
- Deciduous



**Serviceberry (*Amelanchier canadensis*):**

Multi-stemmed large shrub or small tree

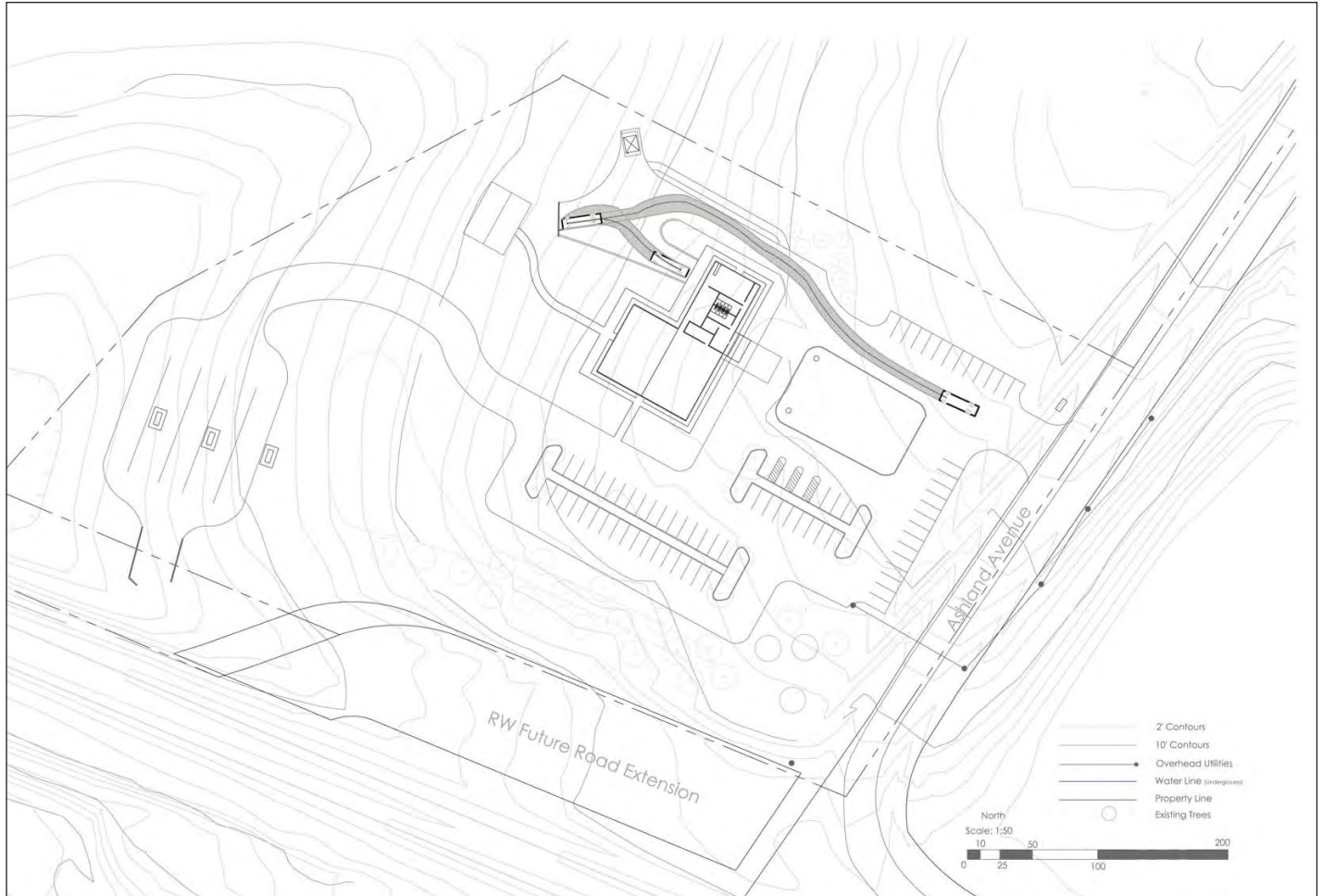
- Height: 6-20'
- Spread: 15-20'
- Form: Pyramidal
- Bloom: White flowers in late March
- Fruit: Sweet, red edible fruit
- Sun
- Prefers wet sites
- Transplants easily
- Deciduous



# Appendix I: *AutoTurn Studies*

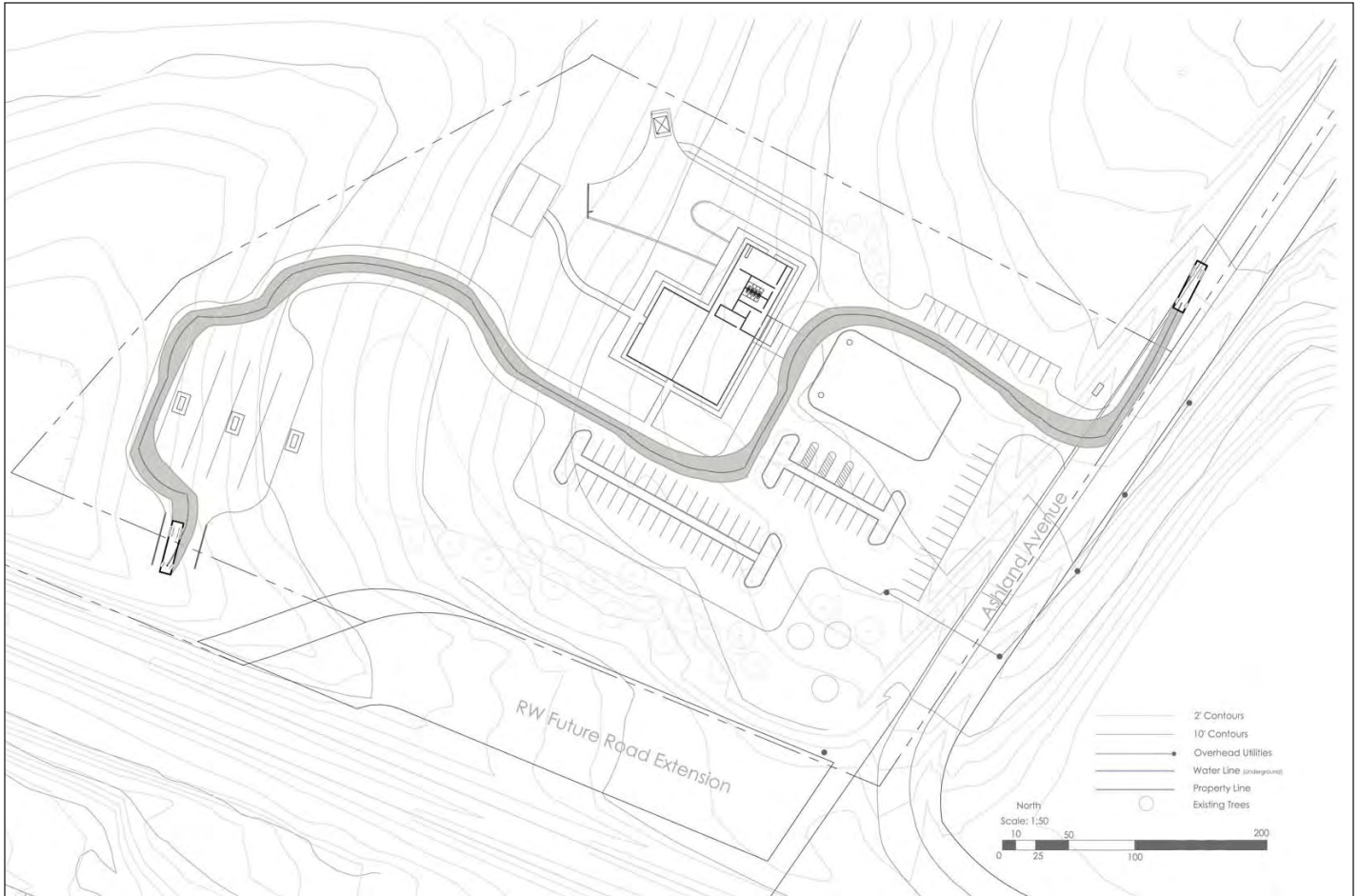
The CDAC team worked with staff at Anderson and Associates, Inc. (Blacksburg, VA) to conduct AutoTurn studies on the parking lot designs for both Concepts One and Two. The following pages highlight the AutoTurn studies conducted for each concept. The gray line represents the maximum width of clearance needed for the specified vehicle to maneuver through the space. A brief description of each study can be found under the diagrams.

## *Concept One*



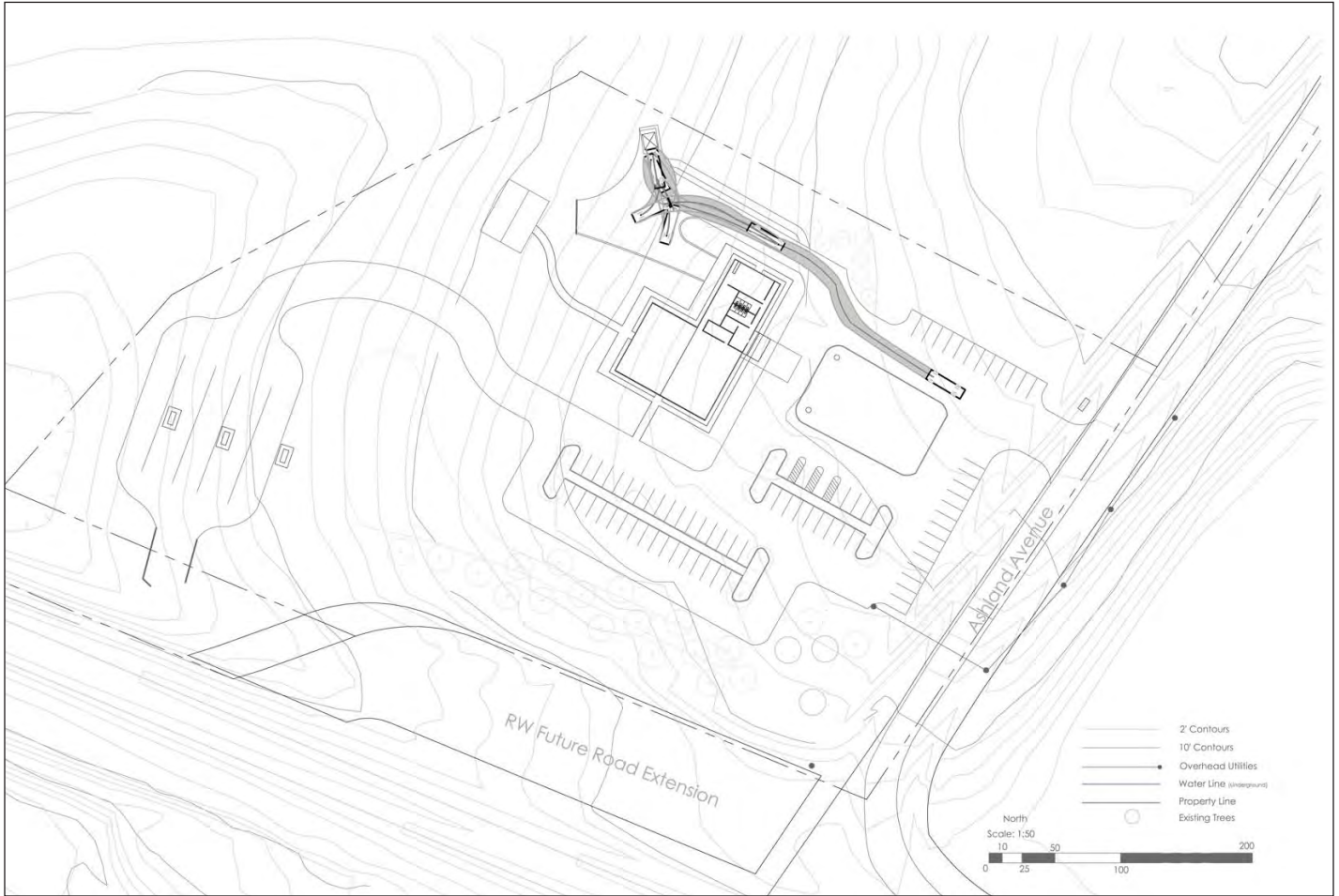
This diagram examines how a large catering truck would maneuver the site to access the kitchen from the rear.





This diagram examines an RVs ability to enter the site and travel to the proposed RV parking area.





This diagram looks at a front loading trash truck's ability access the dumpster and exit the site.

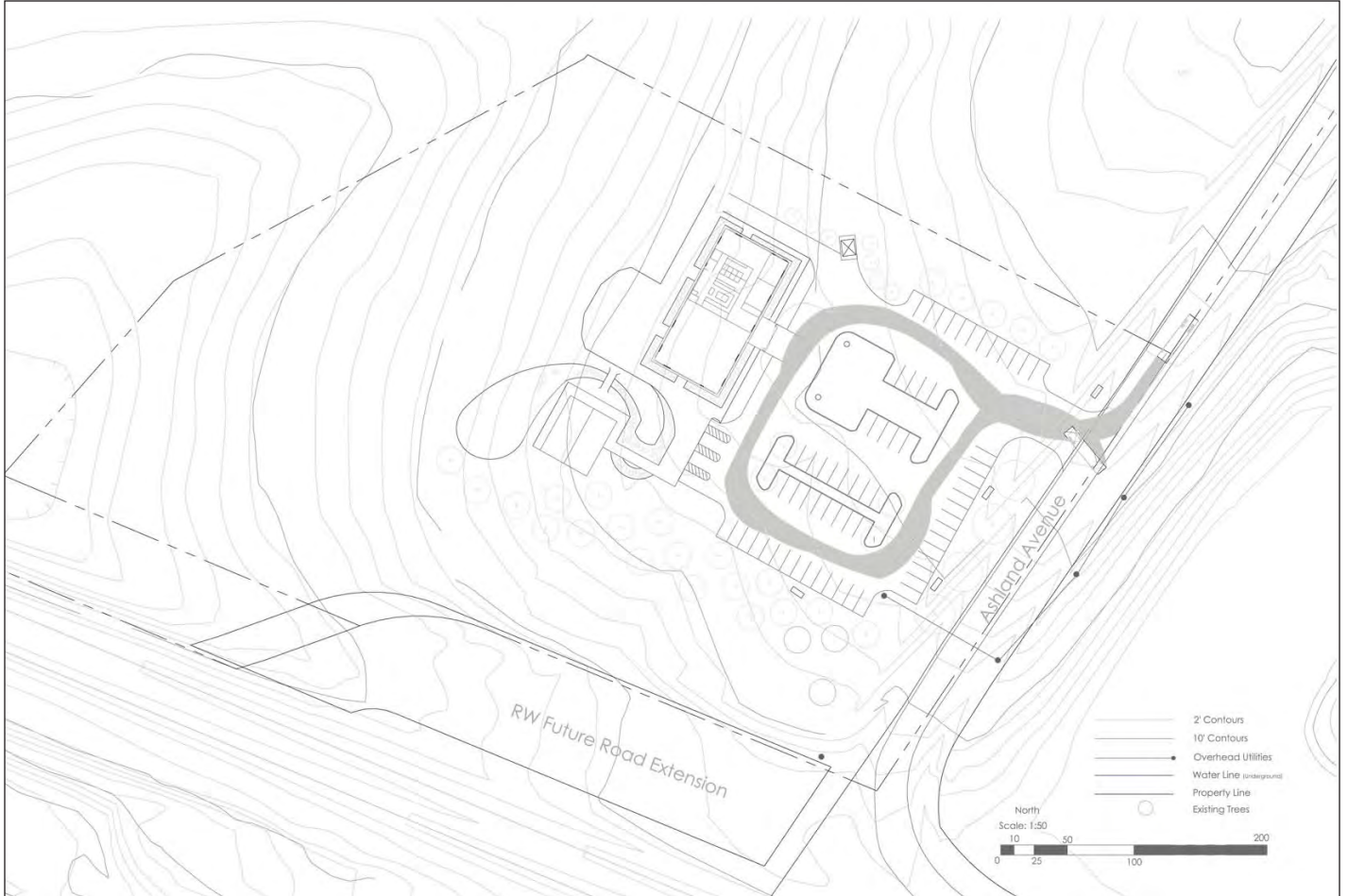


Concept Two



This diagram examines a tour bus' ability to enter the site, utilize the covered drop off, and exit the site.





This diagram examines a tour bus' ability to enter the site, utilize the covered drop off, and exit the site taking a broader path through the parking lot.



# Appendix J: *Tree Topping*

A successful anti-tree topping campaign, **Experts Agree - Don't Top Your Tree**, was developed by the Missouri Department of Conservation to offer scientific information and helpful visuals to debunk frequent myths regarding perceived positive effects of tree topping. This presentation has been adapted and used in states across the U.S., including Virginia. Topping can be described as the indiscriminate cutting back of tree branches to stubs or lateral branches that are not large enough to assume the terminal role. Other names for topping include "heading," "tipping," "hat-racking," and "rounding over."

A topped tree is not a positive thing. Rather, a topped tree is more susceptible to disease and decay, needs more costly maintenance than a properly pruned tree, and loses its aesthetic qualities. A tree's lifespan may be reduced by topping, its branches may be more prone to breakage, and new growth will be weak. When choosing to plant a tree, consider the tree's spatial needs (height and width) at maturity, what obstacles it may encounter (overhead utilities, adjacent structures or signs, etc.) and then choose an appropriately sized species accordingly. Should pruning work need to be done, an International Society of Arboriculture (ISA) certified arborist should be contacted.

**The Only Thing  
Tree Topping Reduces Is  
Your Property Values.**



**A topped tree is not only ugly, it's a liability.** Many people believe that topping a tree - drastically cutting back mature limbs to reduce its height - makes a tree less dangerous. They could not be more wrong.

A topped tree is more susceptible to disease and decay which may weaken it and lead to early death - making it more likely to cause property damage.

Also, a topped tree will eventually need more costly maintenance than a tree that has been properly pruned, not to mention that topping destroys the tree's natural beauty and reduces property values for the entire neighborhood.

You can protect your home and its value by hiring only professional arborists. To find one near you, or for more information, call your local forestry agency.



For additional information about avoiding tree topping, visit the following websites:

- [www.mocommunitytrees.com](http://www.mocommunitytrees.com)
- [www.moreleaf.org](http://www.moreleaf.org)
- [www.righttreerightplace.com](http://www.righttreerightplace.com)
- [www.mdc.mo.gov/forest/urban/](http://www.mdc.mo.gov/forest/urban/)