

A CONCEPTUAL MASTER PLAN for the BEDFORD YMCA

Bedford, Virginia

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Acknowledgements

The CDAC team would like to extend our gratitude to the Bedford YMCA family for your responses and input into this project. Thank you to all the students, staff, and board members who participated in the workshops and presentations.

We also would like to express our sincere appreciation to Charles A. Evans, Vice President of Coleman-Adams Construction, Inc. and Don Slusher of Slusher Engineering and Surveying Company, for their assistance in helping us obtain base map and topographic information for the site.

Table of Contents

I.	Project Description.....	1
II.	Design Process.....	2
III.	Site Analysis.....	3
IV.	Participatory Meetings.....	6
V.	Preliminary Design Options.....	12
	A. Design Theme: Mind, Body, and Spirit.....	14
	B. Preliminary Conceptual Plan I.....	16
	C. Preliminary Conceptual Plan II.....	18
VI.	Final Conceptual Master Plan.....	20
VII.	Conclusion.....	29
VIII.	Appendix: Sustainable Storm Water Management.....	31

11x17 Plate Index

Plate 1: Site Analysis Plan.....	4
Plate 2: Site Photographs.....	5
Plate 3: Site Panoramas.....	6
Plate 4: Sports Courts Board.....	8
Plate 5: Skate Park Board.....	9
Plate 6: High Ropes Course Board.....	10
Plate 7: Storm Water in the Landscape.....	11
Plate 8: Concept Diagram.....	16
Plate 9: Preliminary Conceptual Plan I.....	18
Plate 10: Preliminary Conceptual Plan II.....	20
Plate 11: Final Master Plan.....	23
Plate 12: Sustainable Development Diagram.....	30

I. Project Description

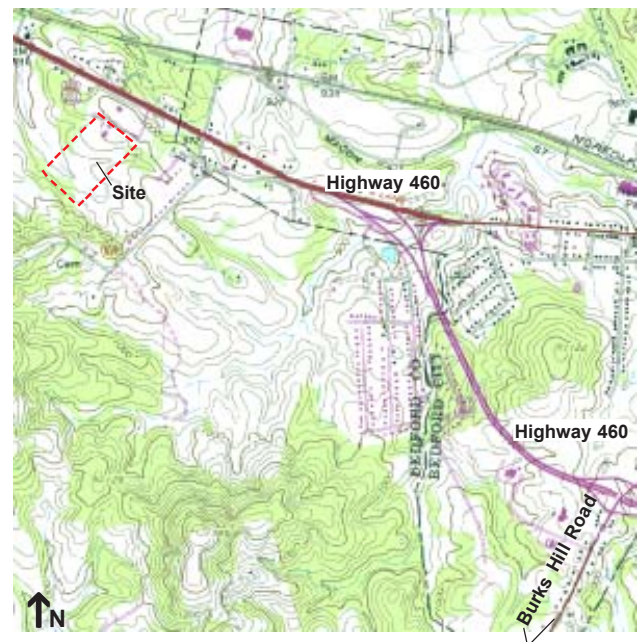
The Community Design Assistance Center (CDAC) was asked by the Bedford Area YMCA to develop a conceptual site master plan for their current and future facilities. The Bedford Area YMCA is currently located on nearly 30 acres of land, just off of U.S. Route 460, a few miles outside of the City of Bedford. It has the possibility of acreage growth of up to an additional 50 acres, pending the YMCA's ability to purchase neighboring property. The Bedford Area YMCA describes itself as one of the few places in the community that is truly for everyone. It focuses on fostering self-esteem, self-reliance, and a commitment to community. The YMCA currently offers programs in aquatics, youth sports, adult wellness, senior programs, youth-at-risk, and childcare.

The YMCA is currently in the process of increasing their opportunities for people to participate at the facility. It will soon be expanding its existing structure, with the addition of a 12,000 square foot gymnasium, a second indoor pool, several multi-use/fitness rooms, a new building entrance, nursery, and office space. Future growth plans include the development of a low ropes, high ropes and team building course; a separate 6,000-9,000 square foot child care center; an outdoor skate park; outdoor sports courts; and a large playground. There is also the potential to develop a small conference/retreat center, an outdoor education center, an outdoor pool, additional playing fields and a teen center.

The Community Design Assistance Center prepared a conceptual master plan that included the aforementioned features. The CDAC design team strove to create an overall unification of the elements and features on the site, while simultaneously creating and maintaining areas of separate use for distinct age groups and events (i.e. day camp users verses daily use by members; youth center verses child care area). The conceptual master plan is a long-range goal for the Bedford YMCA and explores the possibilities of the site. This report documents the design process, summarizes the participatory workshops, describes the conceptual master plan, and includes reductions of design work.



State context map



Area context map



A view of the southern portion of the Bedford YMCA site.

II. Design Process

The project began with a guided tour of the site by Bedford YMCA Executive Director/CEO Mary Jo Boone. The CDAC design team discussed the possibilities of the site with Mary Jo, noted areas where high and low ropes course elements had already been installed, and photographed the site. Obtaining complete topographic information for the site proved to be quite a challenge, as a large portion of the property is currently covered in dense briars, making it costly to survey. Although both Coleman-Adams and Slusher Engineering and Surveying Company were able to provide information for a good portion of the site, the design team was left to interpolate the far, eastern portion of the property.

The Bedford YMCA staff and Board of Directors played an integral role in the development of the conceptual master plan. The CDAC design team gathered their input on the project by conducting two participatory meetings. The first meeting presented the design team's findings from the site inventory and analysis, as well as examples of sports courts, skate parks, and storm water management strategies. The CDAC design team presented two preliminary conceptual plans at the second participatory meeting. From this point, ideas were refined, placement of elements adjusted, and a final conceptual master plan was prepared. This final master plan, accompanied by supporting drawings and a design model was presented at a public meeting in August 2003.



Executive Director Mary Jo Boone points out potential areas for the high ropes course.



CDAC student designer, Amol Deshpande, talks to Bedford YMCA staff about the site.



CDAC staff member Ok-Hyun Lee prepares the model of the site.

III. Site Analysis

Using a survey map provided by Slusher Engineering and Surveying Company of Bedford, Virginia as a base map, the CDAC team conducted a site analysis. The site analysis drawing on the following page identifies the location and condition of buildings, play spaces, site elements, and vegetation. The drawing also denotes key viewsheds that occur on the site. A series of photographs of the existing conditions of the site can be found immediately after the site analysis drawing. Notes from the site analysis are as follows:

- Entry from 460 needs to be enhanced with vegetation and signage to create a distinct sense of entry into the YMCA.
- A definite entry sequence is needed to give a sense of “entry” to the site.
- Parking should be rearranged in a more functional layout while still remaining aesthetically pleasing.
- There is an opportunity to create a strong visual connection to the church just off the site proper.
- Soccer fields need to be rearranged to better fit more age groups (U6-U14).
- The eastern portion of the site is the most favorable location for the conference center.
- A storm water management strategy needs to be implemented to preserve the stream and to accommodate the increase in runoff that will be created by new development.



CDAC staff member Amol Deshpande tests out the low ropes course during the site analysis visit.

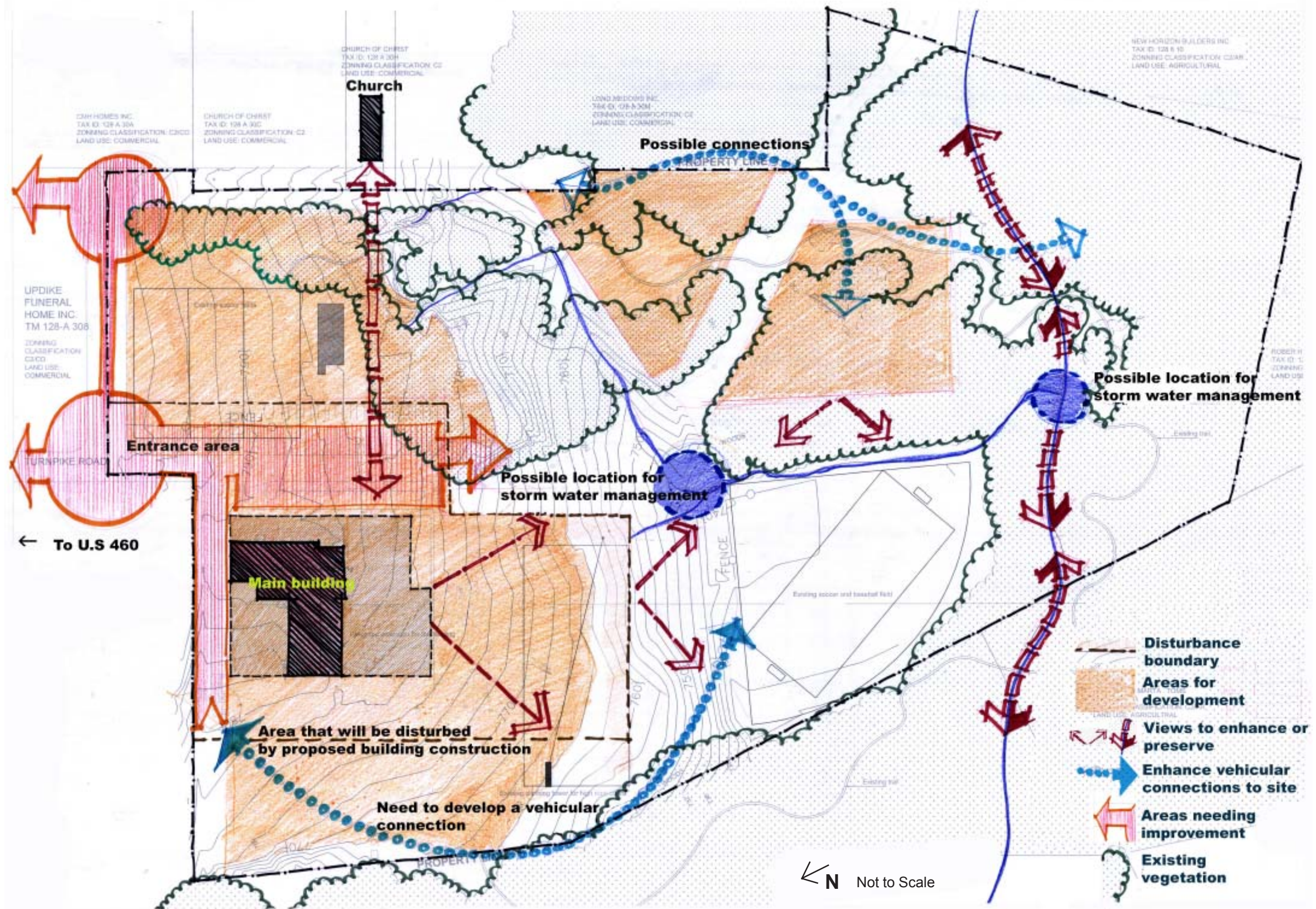


Project Coordinator Kim Watson points out possible routes for walking trails.



CDAC staff members Kim Watson and C.L. Bohannon examine the area adjacent to the YMCA building.

Site Analysis



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Site Photographs



1



2



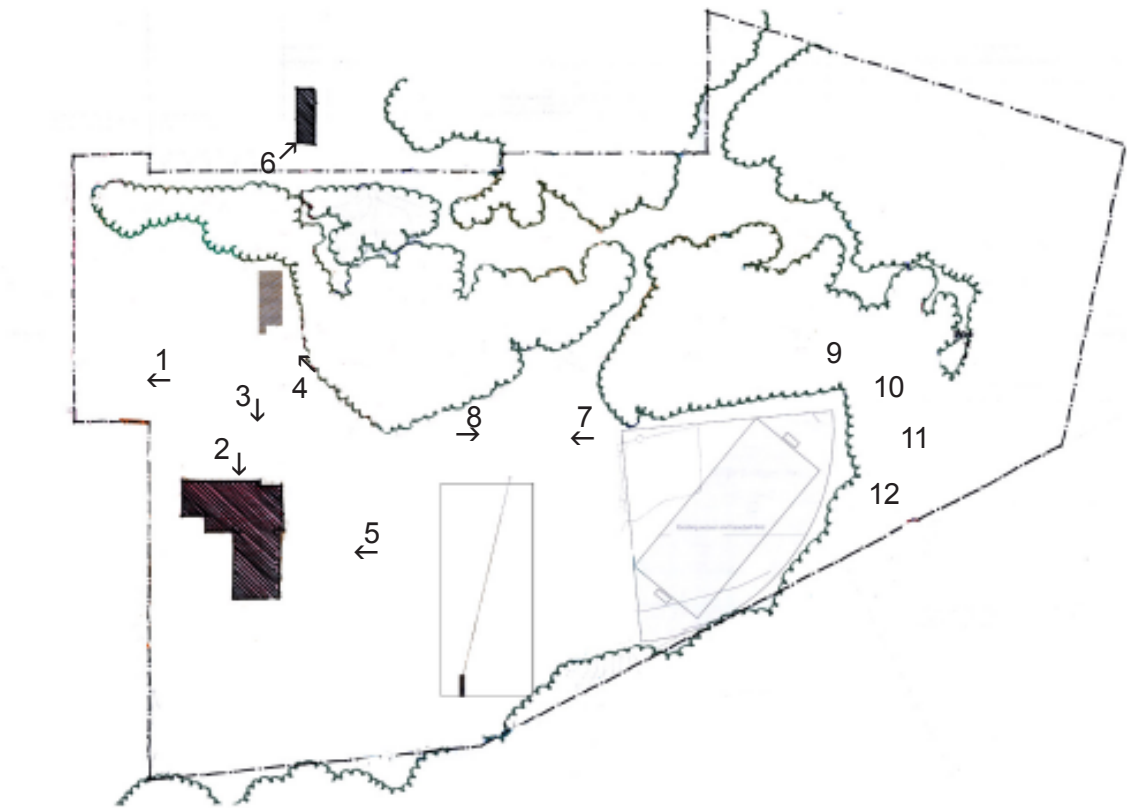
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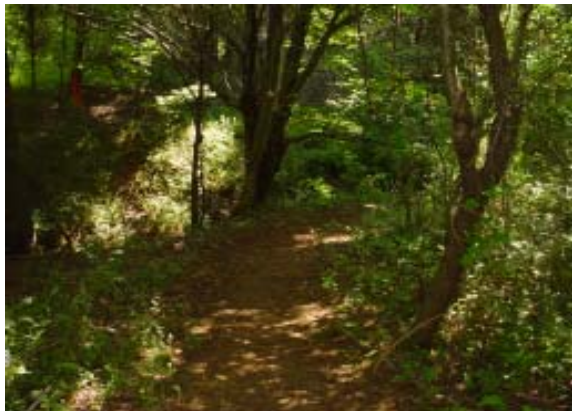
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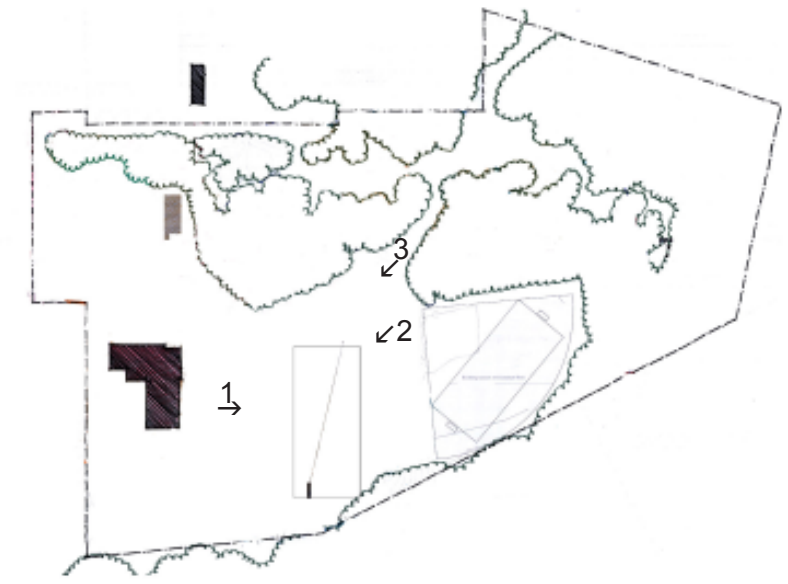


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Site Photographs



1



2



3

IV. Participatory Meetings

The CDAC design team conducted two participatory meetings to gather information and discuss design ideas with the board and staff of the Bedford YMCA. The major role of these meetings was to clarify the needs, suggestions, and concerns of the YMCA Board of Directors and staff. A brief agenda as well as the results of the meetings are described below.

Participatory Meeting #1:

The first participatory meeting was held on February 13, 2003. It focused on presenting site analysis and inventory information as well as gathering feedback from the YMCA board members. Information covered in the meeting included:

- Presentation of multipurpose sports courts concepts
- Presentation of skate park research and images
- Presentation of high ropes course information
- Mapping exercise with board members to obtain a better understanding of their “vision” for the Bedford YMCA.

The members of the YMCA Board of Directors were extremely energetic and had very insightful comments for the design team. They made it clear that both the function and goal of the master plan were to be long range and visionary. There was some discussion about the placement of the child care facility on this site or another site. Some board members felt quite strongly that it should be placed on the YMCA site. Board members commented on where they felt the conference center would be best located. They also communicated that a skate park was a low priority to them in the overall development of the site. Finally, the board members asked the design team to look at the site and maximize the use of the land, in terms of increasing the number of athletic fields and the amount of usable space.



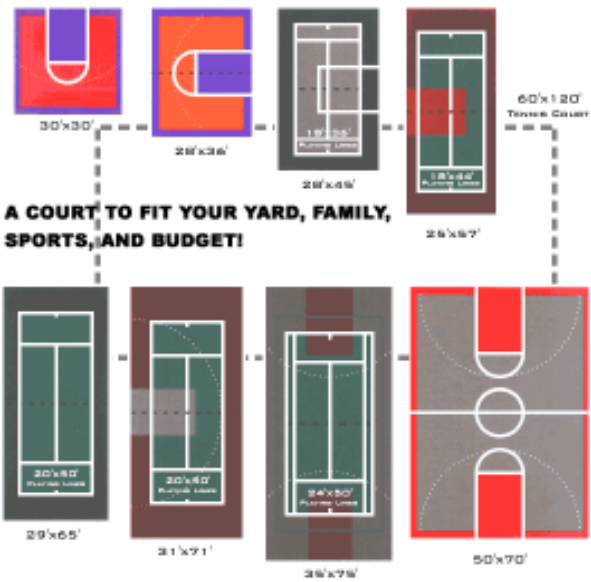
Bedford YMCA staff members discuss possibilities for the site with the CDAC design team.

An additional meeting was held on February 25, 2003 at the request of YMCA Executive Director/CEO Mary Jo Boone, since only a few members of her staff were able to attend the first presentation. The second meeting consisted of a re-presentation of the material discussed at the first meeting. The staff gave the CDAC design team a more hands-on approach as to where they thought certain site elements should be placed.

The YMCA staff felt the skate park was an important feature in the master plan and requested that it remain. Staff members also clarified the placement of the existing high ropes course and the amount of clearance and open space needed around it for the YMCA to receive certification for the course. The pullouts on the following pages capture the information presented on sports courts, skate parks, ropes courses, and storm water in the landscape.

“Concrete may be great for building roads and bridges, but it was never intended as a safe, high-performance surface for playing sports. In fact, playing on concrete or asphalt surfaces can often do lasting damage to the joints, ligaments, muscles, and bones of athletes of all ages. The Sport Court® Game Court & flooring suspended surface was designed with OrthoCush™ system. The OrthoCush™ system allows for Lateral Forgiveness™ with quick side-to-side movements with reduced stress to the knees and ankles. The suspended design provides protection against lower back and skeletal trauma. SPORT COURT® flooring has been orthopedic bio-mechanics-tested and proven to provide protection against injury” (<http://www.sportcourtgamecourt.com/safety.html>).

Multi-Purpose Sports Courts



All images taken from www.sportcourtinc.com

Skateboarding is found to be one of the fastest growing sports in the US. Today, more than 11 million skateboards are ready for use throughout the United States as skateboarding enjoys continued popularity with young people around the world. Skating is currently the 6th largest sport and is ranked 3rd among those ages 6-18. American sports data estimates some 9.3 million skateboards take to USA streets and skate ramps at least twice a week.

Skaters are talented athletes deserving the same treatment that youth who play other sports receive. Building a skateboard park is no different than building a basketball court or baseball field. It's about fulfilling the recreational needs of the kids. Studies show that skateboarding injuries are lower than that of other youth oriented sports.

- Skatepark Demographics
- 74% male / 26% female
 - Primary users are between the ages of 12 and 16
 - 61% have been riding between 1 — 4 years

- Skatepark Facts
- More than 600 skateparks were built during 2001 in the U.S.
 - There have been more skateparks built in the last three years than in the previous twenty
 - 75% of communities that built a skatepark said that the park produced a significant reduction in the street skating problem
 - 94% of communities agreed that their skatepark was a benefit to the community
 - 50% of communities who built a skatepark have plans to build another

- Rider Facts
- More than 9.3 million skateboarders will take to the streets in the U.S. this year
 - In 2001, more people over the age of 7 participated in action sports than baseball, soccer, softball, volleyball, tennis or football (nearly 21,000,000).
 - During the last ten years, no sport had a larger increase in participation among users age 7 and older than skateboarding (a 106.3% increase)
 - Skateboarding is the third largest sport for participants between ages 6-18
 - Skateboarding is the sixth largest participant sport in the U.S.
 - 1 in 10 U.S. teenagers owns a skateboard
 - In 2001 female participation in skateboarding increased 23.7%

Information taken from www.skatepark.org

Why Build a Skate Park?



Images courtesy of American Ramp Company



3-D designs courtesy of Land Image Landscape Architects

What is a High Ropes Course?

The High Ropes Course consists of a number of separate challenges, varying in height and difficulty typically situated in a park-like setting among tall trees or poles. High ropes course challenges or elements vary from balance beams to cable crossings to complex climbing structures. A well-designed high ropes course will have a number of options so each participant can choose their level of challenge. As participants climb the high challenges, they are attached to a safety rope and belayed similarly to rock climbing.

A high ropes course is a unique and challenging way to promote team development and individual growth among participants of all ages and abilities. The elements of the high ropes course provide a forum for participants to explore and enhance their sense of self worth through the accomplishments they obtain, both individually and as a team. The elements range in difficulty from those that are designed for beginners to elements that will challenge the most athletic participant in the group.

High Ropes Course



Photos taken from: http://www.castlecreekinn.com/california_ropes_course.htm and <http://www.adventureassoc.com/ropes-courses/ropes-course-challenge.html>

Storm Water in the Landscape

The images on this page show some artistic examples of how storm water in the landscape can be highlighted aesthetically and playfully as opposed to concealing it and piping it off-site as quickly as possible.



Participatory Meeting #2:

The CDAC design team held a second participatory meeting on June 5, 2003 to present two alternative conceptual master plans for the site and discuss them with Bedford YMCA staff and board members. The design team presented a detailed analysis that discussed the vegetation, circulation (both pedestrian and vehicular), visual aesthetics, and the effects of proposed development on the existing landform.

Attendees discussed the aspects of the two design alternatives that they preferred. From these comments the design team learned the desired siting of the conference center, teen center, and child care center. The team determined where parking was needed and how the best vehicular and pedestrian circulation routes could be established. The design team was especially pleased that the YMCA Board and staff enthusiastically embraced the storm water management ideas for the site. These ideas are addressed briefly in the final conceptual master plan section and are elaborated upon more fully in the Appendix.



C.L. Bohannon and Amol Deshpande talk with board members about the two conceptual master plan alternatives.

V. Preliminary Design Options

After completing the site analysis and gathering feedback from YMCA staff and board members, the CDAC design team prepared two conceptual designs. These design alternatives focused on the theme “recreation in a park-like setting” for the YMCA facility. Similar issues identified and addressed in each concept are as follows:

1. Enhance the Entry: The entry sequence to the YMCA lacks a definite identity. It also lacks a hierarchy of pedestrian vs. vehicular space. Currently, visitors to the Bedford YMCA have no indication as to when they have officially entered the YMCA site. Visitors also have to wind their way through parked cars to reach the main entry to the YMCA building. There are no defined or separated spaces between pedestrian and vehicular circulation.



The current main entry to the Bedford YMCA lacks definition.

2. Create Visual Connectivity: The proposed additions to the YMCA building need to have strong visual and physical connections to the rest of the site. YMCA board members indicated there may be plans to construct a glass wall on the southern side of the building addition, opening up views into both the building and the landscape. Plantings need to be added around the building as well, to better integrate the site elements and create a more enjoyable space.



The southern side of the YMCA building looks stark and uninviting.

3. Increase Spatial Definition: The design team noticed that the upper part of the site, across from the YMCA building, needed to be a zone of vibrance and diversified activity. There are many design opportunities to create different areas of activity on the site, through both the type of activities that are planned to occur in different spots as well as through additional plantings to delineate different areas of usage.



The northeast corner of the YMCA property is currently an undefined, open space surrounded by roads.

4. Maximize Potential of Under-utilized Areas:

The corridor between the upper and lower areas of the YMCA complex needs to be exciting, educational, and enjoyable for visitors of all ages. Currently, it is overgrown and bisected by a sewer line running through the site. By identifying what can be removed (scrubby vegetation), what should be screened (sewer line), and what can be utilized as a main feature in this section of the site, the area can be transformed.



Scrubby vegetation and bumpy topography characterize the corridor leading from the current athletic fields to the low ropes course.

5. Maximize Usable Space: The “big knoll” is an interesting site feature that will have to be graded down to allow for more sports fields. By taking advantage of the already necessary cut and fill of the landscape that will be necessary to accommodate the building addition, an amphitheater can be created as a side result of changes in topography.



The “big knoll” will make an excellent amphitheater for viewing games or for other functions on the YMCA site, such as concerts.

6. Utilize Natural Beauty of the Site: The southern portion of the site will be an integral part of the concept: “Mind, Body, and Spirit”. The meandering stream, the healthy hardwood trees, and the delicate vegetation, such as ferns, in this area help to create a place conducive to reflection.



Sunlight filters through the tree covered trail in the southern portion of the YMCA site.

A. Design Theme: Mind, Body, and Spirit

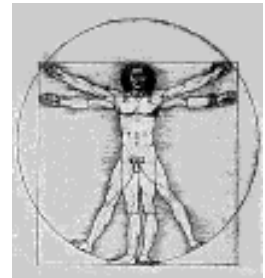
Both conceptual plans shared the same larger vision, which was taken from the YMCA's mission and holistic approach to serving individuals in the community. The concept, "mind, body, and spirit", sought to look at the landscape holistically, with different areas of the site addressing each component while maintaining an overall unity and cohesiveness in the design. The site has qualities and areas that can assist in the development of mental, physical, and spiritual attributes of the users.

Mind refers to the educational aspect of human development. The landscape design can create spaces that foster "inquisitiveness" in people about their surrounding environment. **Body** refers to the physical attributes of human health. The design will embrace existing and developed facilities that will help structure a strong physical character. **Spirit** refers to the aspects of human development that give peace of mind and replenish mental health. The landscape design articulates areas of the site which helps to seclude the human mind and emerge one into the "realm of nature".

The pullout on the following page diagrammatically divides the site into areas that address each aspect of the theme.



mind

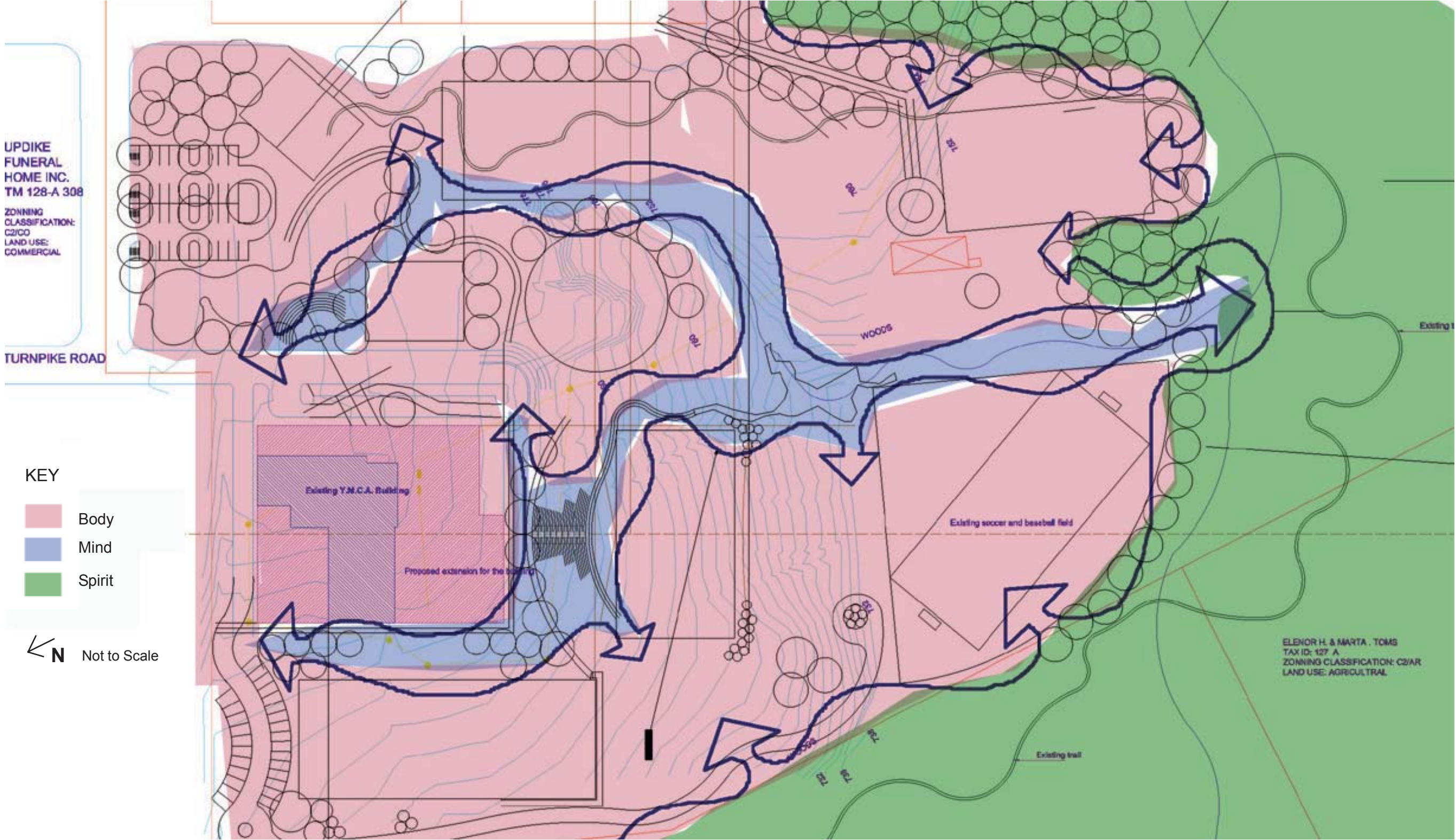


body



spirit

*Images taken from: www.spirihealth.com/
hive-mind.com/mindgames/ and
www.lycaeum.org/graphics/art/bengvall/spiritual-vacation.jp*



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

B. Preliminary Conceptual Plan I

Although Preliminary Conceptual Plans I and II focus on similar design issues, they suggest different ways to implement the improvements. Concept I places high activity areas, such as the basketball courts and the skate park immediately across from the YMCA building. Additional parking is proposed just off of the small road connecting the YMCA site to the church. Pedestrian trails are threaded throughout the site, while parking is kept on the periphery. An emergency access road is sited near the existing soccer/softball field.

A main focus of Conceptual Plan I is an elaborate storm water system. This proposed system harnesses roof runoff into an amphitheater with a water feature. The tiered basins of the water feature contain gravel as well as a drain in each basin, to ensure standing water does not linger after a rain event and to maintain an aesthetically pleasing appearance when the basins are empty.

The water moves from the basins, continuing to travel down the site, through a vegetated, riparian buffer, and into a wetland area before entering the existing on-site stream. The vegetated buffer and plantings in the wetland area act to mitigate erosion and stabilize the soil. The plantings also intercept and purify some of the water before it reaches the stream.



Examples from the Lady Bird Johnson Wildflower Center in Austin, TX showing how rooftop rain water can be harvested.



Not to Scale

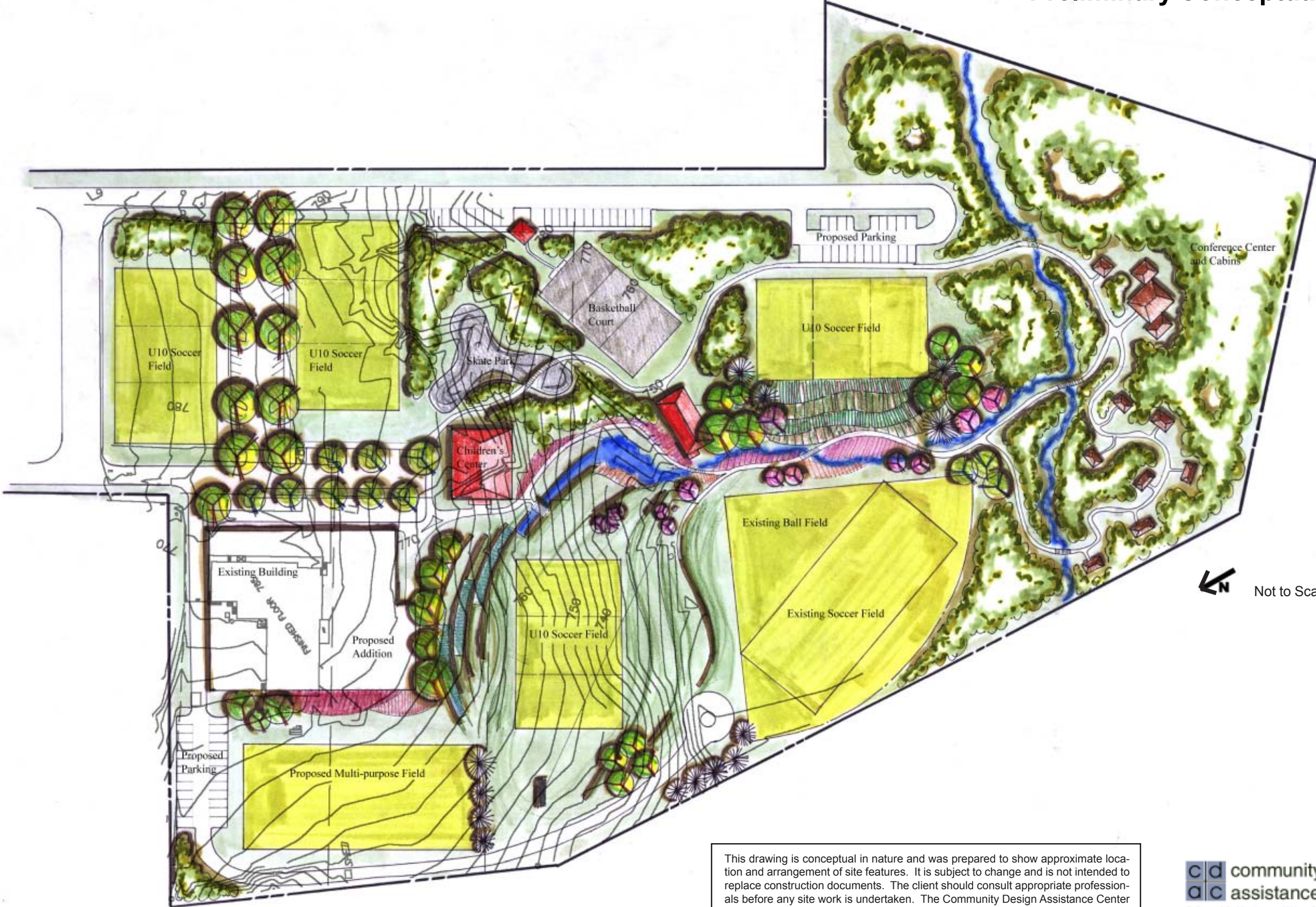
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C. Preliminary Conceptual Plan II

Preliminary Conceptual Plan II differs from Conceptual Plan I in several ways. It sites two athletic fields directly across from the YMCA building. The fields are separated by a proposed road that provides visitors with parking and creates a fluid circulation pattern in the northeast section of the site. Conceptual Plan II also proposes a skate park, but the park is tucked behind the child care center.

The highlight of Conceptual Plan II is a conference and retreat center, along with cabins and a system of pedestrian trails to connect the two. The conference center is sited in a way that would allow conferences to coincide with other planned YMCA activities without interference.

Preliminary Conceptual Plan II



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VI. Final Conceptual Master Plan

The CDAC design team took the comments they received from the second presentation and refined the two design alternatives into one final conceptual master plan. The final master plan incorporates the storm water management ideas and network of trails from Preliminary Conceptual Plan I and the parking and conference center from Preliminary Conceptual Plan II. Included in the plan are a teen center, a child care center, a skate park, additional soccer and multi-purpose fields, basketball courts, an outdoor amphitheater, and a public plaza and seating wall. Design issues addressed in the final master plan are:

- Grading
- Storm water runoff
- Increased number of athletic fields
- Vehicular access and parking
- Pedestrian circulation
- Sense of place and regional identity

These issues were addressed based on the concept of “Mind, Body, and Spirit” to create a destination for all ages in a park-like setting at the Bedford YMCA facility.

Grading:

The site analysis indicated that there will be substantial changes in the existing land form due to the proposed building and construction of new playing fields and site elements. Through the site analysis, the design team identified areas that could be developed to accommodate new facilities and athletic fields. The proposal of the U10¹ soccer fields between the existing softball field and proposed extension played a major role in the construction of the grading plan. The steep slope between this U10 soccer field and the proposed building was used to create an amphitheater. The grading plan revealed a valley, which became a “valley of flowers” along the central visual access of the site.

Storm Water Runoff:

The proposed development on the site is expected to reduce natural ground cover by a large percentage. Also, the new athletic fields and impervious surfaces in the form of roof tops, parking lots, and roads will increase storm water run-off from the site into the stream that runs through the site. The increased storm water will increase the erosion



Sketch of proposed parking lot with porous pavers.

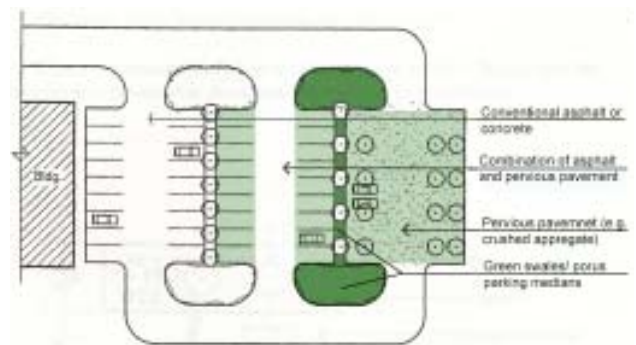


Diagram showing different approaches to paving in parking lots.



The proposed stream takes storm water through the “valley of flowers” before it enters the existing stream on site.

and sediment loads in the stream, which will further endanger the habitat of the wildlife and vegetation along the stream corridor. Thus, storm water management has been a central aspect of the design. Within the design, the amphitheater utilizes the run-off from the roofs and athletic fields and makes it into a central feature that flows through the “valley of flowers” into an aesthetically pleasing bio-retention pond. This helps to reduce the velocity and volume of the discharge from the site. To reduce the amount of impervious surface, the parking spaces are proposed to be constructed of porous paving material.

¹U10” means “under 10” years of age and refers to the size soccer field that applies to that age group for league soccer.

Increased number of athletic fields:

At the second workshop, the board members vocalized the importance of an increased amount of soccer fields for the YMCA facility. The design team emphasized the multiple uses of athletic fields by using a U8 size soccer field as a module. Three U8 soccer fields can form one U10 size soccer field. The design team was able to meet the need of three U10 size soccer fields and ten U8 sized soccer fields.

Vehicular access and parking:

The master plan recognizes the need of a decentralized parking scheme, which minimizes the impact on the landscape. This scheme will also provide more direct access to most of the elements of the site.

Pedestrian circulation:

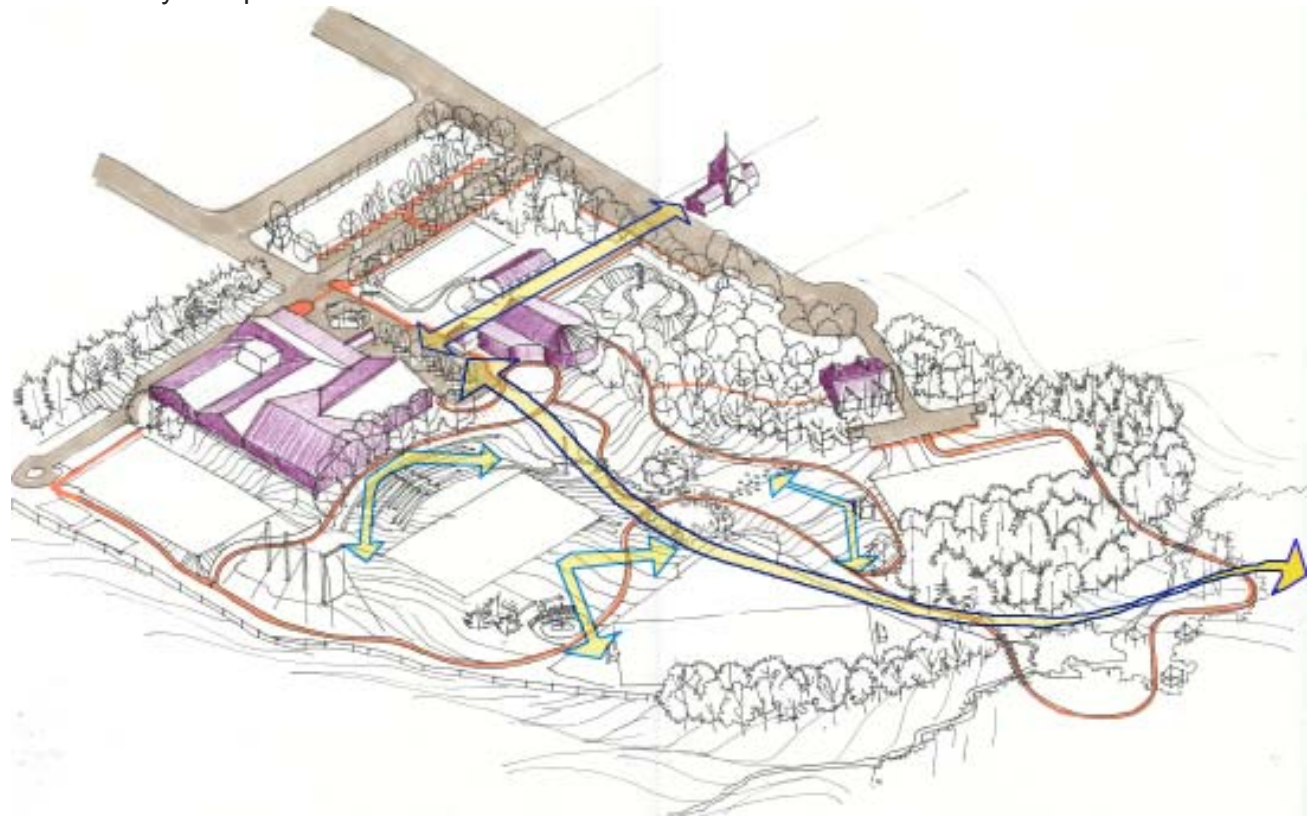
The pedestrian circulation on the site consists of two types of paths. The first type is a 8-10' wide biking/jogging path that can also accommodate emergency vehicles. The second type is a 5-6' wide pedestrian pathway. These two path types form a trail network connecting all the facilities within the proposed master plan. They also add to the variety of experiences offered to the visitor.



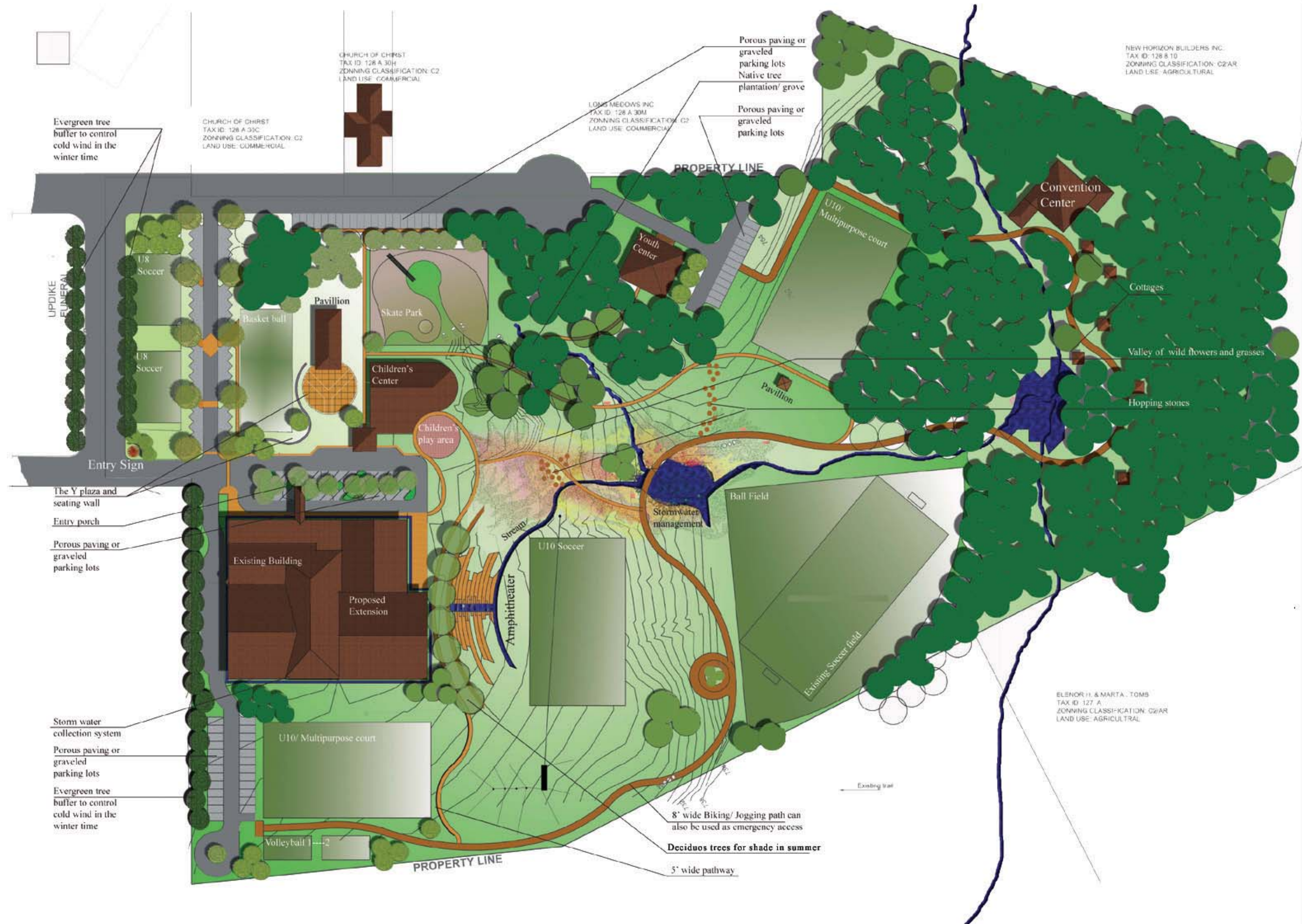
Aerial perspective showing the site developed according to the master plan.

Sense of Place:

The proposed master plan creates a new identity for the Bedford YMCA by providing a wide range of activities and experiences related to the mind, body, and spirit. The master plan now transforms the existing facility into a rejuvenated health facility within a park-like setting.



The thin orange line indicates the major vehicular and pedestrian circulation routes. The larger yellow arrows indicate important views on the site.



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SCALE: 1" = 50'

BEDFORD Y.M.C.A. - MASTER PLAN CENTRAL DISTRICT BEDFORD COUNTY, VIRGINIA

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

Details of the Final Conceptual Master Plan



Entrance Area:

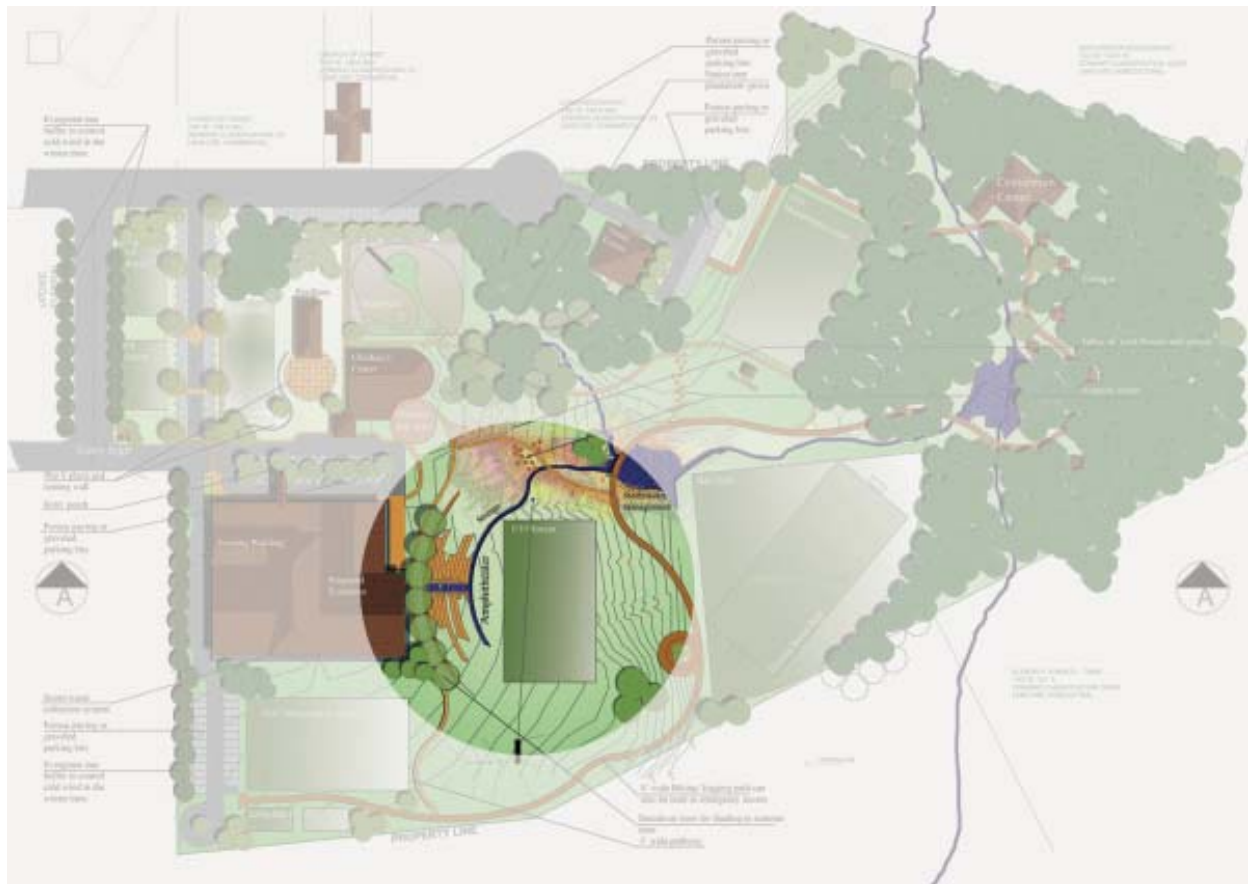
Currently, there is no clear sense of entry or arrival onto the YMCA site. The design team felt that creating a defined sense of entry was both quite important and quite easy to remedy. The conceptual master plan proposes the addition of an entry sign to aptly welcome visitors to the Bedford YMCA. The vehicular circulation within the entry sequence is improved by providing additional access between the entry road and the church road, with angled parking along it. The parking in front of the main building is designated as short term parking and handicapped parking. A porch structure has also been proposed to be attached to the main building creating a welcoming experience.

The “Y” plaza in front of the pavilion creates an ideal environment for the interaction between children and also their parents. It also can host a variety of functions and festivals to foster social interaction.

The seating wall along the plaza provides a waiting place for parents. The skate park provides a place for kids to enjoy one of the fastest growing sports, within a safe environment. The pathway along the children’s center and skate park forms a strong visual and physical connection with the church facility along the other side of the street. The children’s center uses the existing road as infrastructure; it also commands a beautiful view of the lower portion of the site. The children’s center also has a strong connection to the main building as well as to the children’s play area.



Perspective sketch of the Y Plaza and the enhanced visual connection to the church.



Amphitheater:

The amphitheater is a direct response to the changing landform due to the proposed building and soccer field. The circular form grabs the land and starts the perpetual movement of the user through the site. The deconstructed circular form provides an opportunity to sit either on the paved surface or lawn. The water running through a series of terraced pools forms the central feature of the amphitheater revealing the run-off from the rooftop of the main building.



Sketch of amphitheater and water feature.

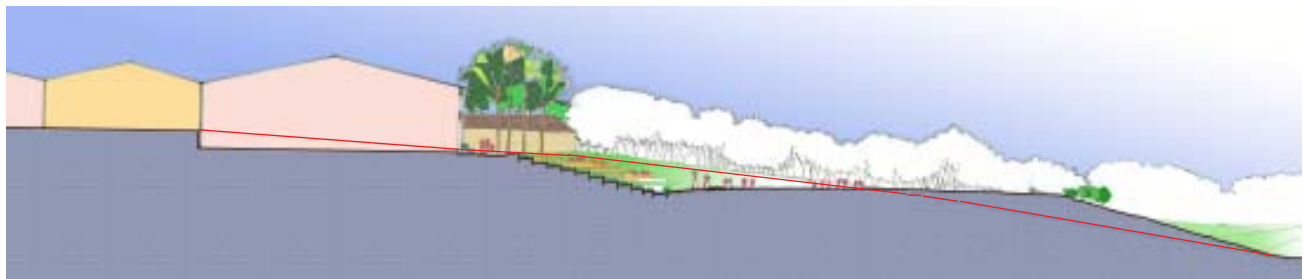


Valley of Flowers:

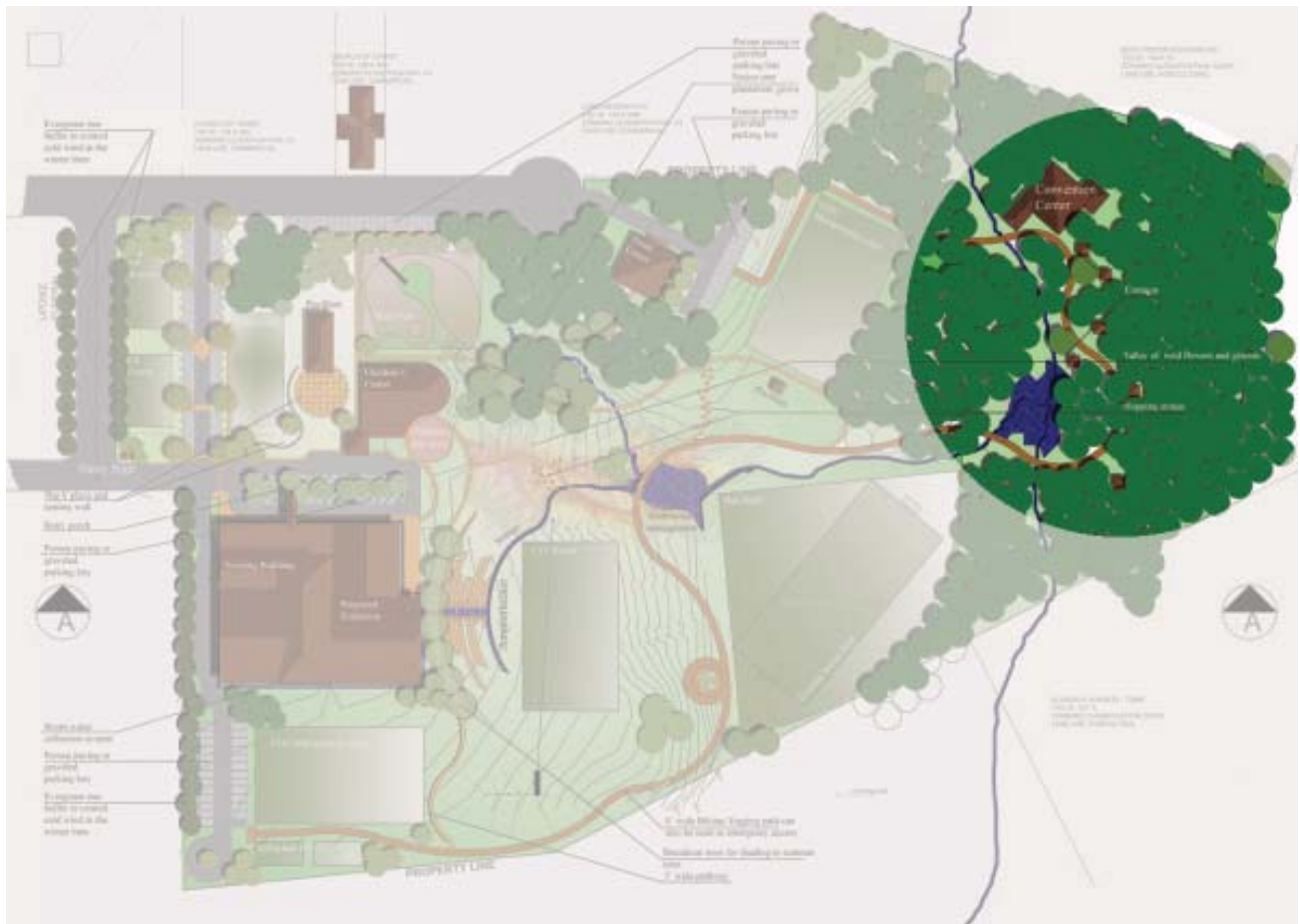
The valley of flowers is an erosion control agent that is composed of native grasses and flowering vegetation. The valley of flowers forms a strong connection between the children's center and the stream that runs through the site. This site element provides a nice contrast with its surrounding area in terms of seasonal color, texture, and form.



Sketch showing the "valley of flowers".



This section shows generally how the grading of the site will change after the building additions. The thin red line shows the existing grade. The dark black line show the grade after cut and fill, to create an amphitheater and an additional playing field.



Lower Portion:

The portion of the site across the stream with its deep wooded and secluded feel, best serves the needs of the convention center and cottages. This area can be used to house conferences, special interest groups, and summer camp. The master plan responds to the natural topography of this area and strives to be sensitive to the important ecological functions that are occurring in this section of the site.



The existing scrubby, low area on the site is transformed into an interpretative wetland. The sewer line bisecting this portion of the site is used as an inspiration to create a whimsical design vernacular of stepping stones in what becomes a children's play area.

VII. Conclusion

Through the information gathered from the site analysis, the participatory workshops, and the feedback from presentations, the CDAC design team was able to develop a conceptual master plan that highlights the natural beauty of the land, increases opportunities for multiple age and user groups to engage in activities in the site, and attempts to cultivate a development that is sustainable. The YMCA site can be developed in such a way as to maximize the site's recreational potential without simultaneously degrading the natural integrity and fragile ecosystems that exist on the site. The diagram on the following page highlights some of the primary ways that this can be done.

The Bedford YMCA should take advantage of opportunities to passively utilize solar energy, such as using evergreen trees to buffer cold winds and deciduous trees to shade buildings in the summer and welcome sunlight in the winter. A strong effort should be made to preserve the ecology of the site and manage storm water in an interesting, educational, effective, and aesthetic way. Using pervious paving, collecting roof water, and intercepting run-off before it reaches the stream are all ways in which that can be done. The Bedford YMCA should take every opportunity to use native plant species when adding vegetation. The YMCA could couple local experts with interested youth to develop and administer a forest management plan for the site.

The CDAC design team hopes that this master plan and the broader concepts presented within it will serve as a guide to the successful development of the Bedford YMCA site.

Sustainable Development Diagram

Evergreen trees to buffer cold winds

Use gravel or pervious paving to increase infiltration and reduce the need for an extensive drainage system

Plant small deciduous trees to welcome sun light

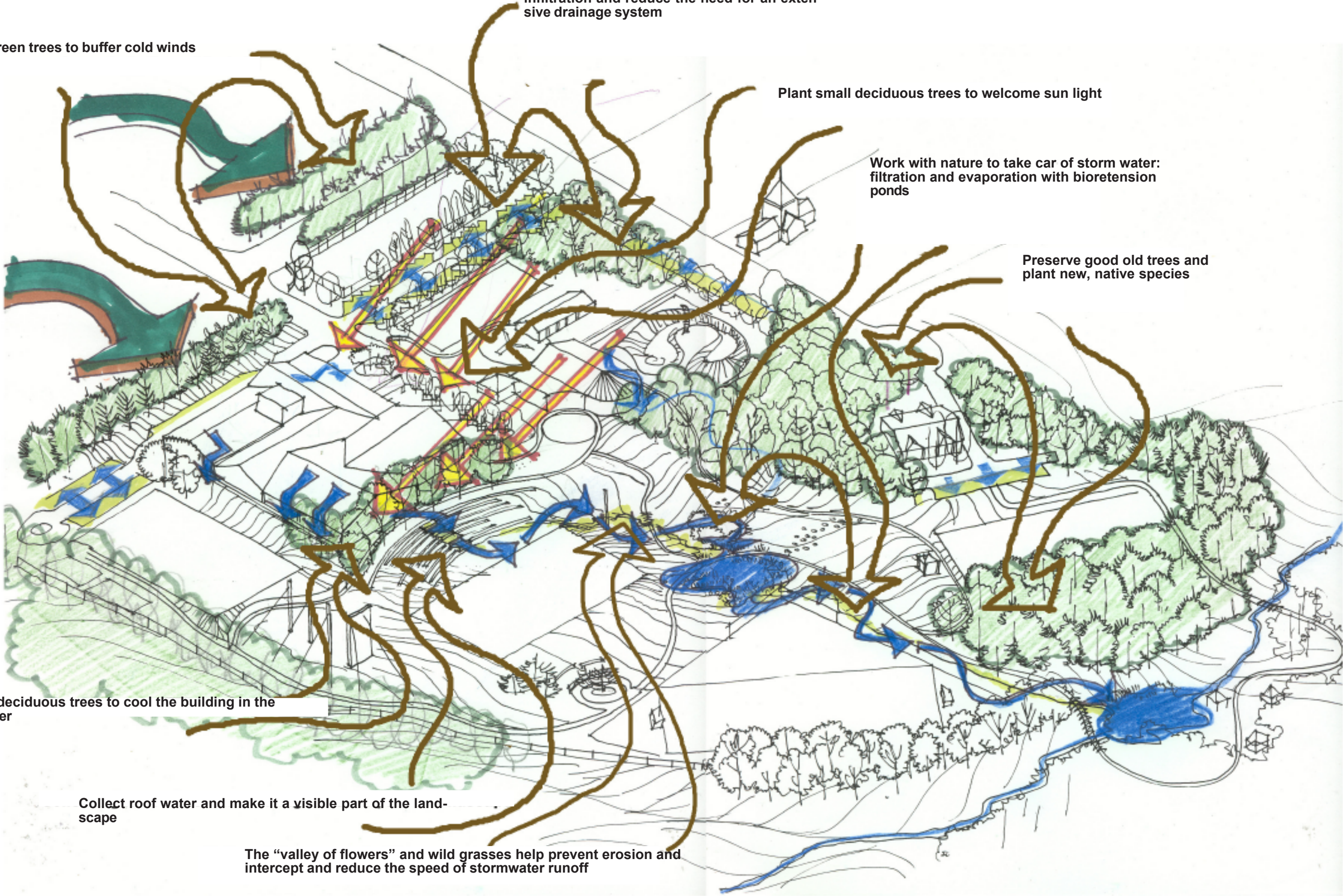
Work with nature to take car of storm water: filtration and evaporation with bioretention ponds

Preserve good old trees and plant new, native species

Plant deciduous trees to cool the building in the summer

Collect roof water and make it a visible part of the landscape

The “valley of flowers” and wild grasses help prevent erosion and intercept and reduce the speed of stormwater runoff



IV. Appendix: Sustainable Storm Water Management

Alterations to an environmental system will create changes in how the ecosystem handles water and water filtration. Developed land creates storm water that can cause problems if not addressed properly at the outset.

There are three basic water problems that developments create. These problems relate to storm water runoff, heightened water temperature, and increased water pollutants. When land is developed the storm water that once seeped in the ground or nourished vegetation now confronts rooftops, roads, paved parking lots, and other impervious surfaces. These surfaces deflect the water and create runoff. A large volume of runoff results in a loss of ground-water recharge and purification. It also can result in other problems such as flooding. “By one recent estimate, conversion of woodlands to high density residential and commercial uses cause an eleven to nineteen fold increase in direct storm water runoff, with a corresponding 11–100 percent loss of natural ground water recharge” (Ewing, 107).

Impervious surfaces add pollution to storm water. Because this storm water is often not able to seep into the ground, the polluted water runs into streams, rivers and other sources without ever being filtered. Runoff not only adds pollutants to large water supplies, it contains sediments that one may not normally associate with pollution that nonetheless adversely impact an ecological environment. Toby Toubier states, “Sediments destroy spawning grounds for fish and alter the species composition of the fish population. Sediments also reduce light penetration and thereby alter ecological balance of the streams” (Toubier, 8).

In addition, as Mr. Toubier points out impervious surfaces can affect the temperature of storm water. He states, “Increases in temperature of runoff from hot pavements is also a form of runoff pollution. A study of Long Island found that storm water runoff may increase temperature by 10-15 degrees Fahrenheit” (Toubier, 8).

Some Suggestions:

The goal of sustainable storm water management is to “minimize overall impervious land coverage and maximize infiltration” (Richman, 6).

The first step in tackling storm water management is to address infiltration. As Mr. Ewing points out in his book *Best Development Practices: Doing the Right Thing and Making Money at the Same Time*, “Infiltration is the first line of defense in storm water management. Ideally, at least the ‘first flush’ (first inch) of storm water will be retained and recharged. This alone will largely solve the storm water balance problems created by land development” (110).

When creating an infiltration system, one key is to create as natural of a system as possible. The more natural the system, the more valuable it will be for wildlife and water quality. For example, heavily vegetated swales are superior to grassy swales, wet ponds superior to dry ponds, and a combination of marsh and open water is superior to open water alone.

Wet Ponds:

Wet ponds are storm water detention basins that contain water year-round as opposed to “dry” storm water ponds where the water quickly drains away. Wet ponds are appropriate for storm water drainage in a development or project with a drainage area greater than approximately 2 acres, but are more cost effective for drainage areas greater than 10 acres.

Wet ponds can be an attractive and useful addition to a development with opportunities for use as a recreational site. For example, wet ponds can be used for bird watching, fishing or boat-



“Natural” retention areas

ing. In addition a pedestrian or bicycle trail can be added that circles the pond. An article at the end of the appendix highlights a well-designed wet pond in a commercial/residential development in Austin, Texas.

For risk management, basin areas are often fenced. A more aesthetic alternative would be to place vegetation around the basin. Surface area must equal 1 percent of the drainage area for high pollutant removal. For example, 100-acre drainage area would require a 1 acre wet pond. From an environmental perspective, there is no question that permeable pavements are beneficial. Generally, porous pavements cost about 10 percent more than conventional pavements. Open-celled pavements are more expensive still. When porous pavements are part of an overall storm water system; however, their ability to substitute for storm drains can make them 12 to 38 percent less expensive than conventional paved surfaces. Porous asphalt and porous concrete are strong enough for use in walkways, parking lots and low-volume roads.

By eliminating impervious surfaces whenever it is practical, the amount of storm water runoff on

a site is reduced. Even breaking up the impervious surfaces where possible will increase filtration and decrease storm water runoff.

Parking Lots:

Parking lots are often large impervious surfaces that create high volume of storm water runoff. Because parking lots typically yield a lot of automobile pollutants and other contaminants such as road salt, the runoff created by parking lots is also disproportionately polluted. Consequently parking lots can be the environments worst enemy.

Fortunately, parking lots can be designed to increase permeable surfaces, slow water down,



Lagoon helps moderate temperature



Detention basin



Permeable, green parking options



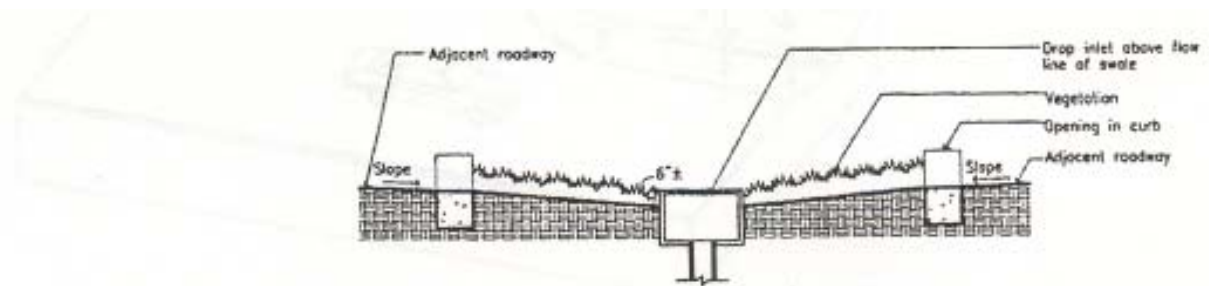
Natural-looking wet pond.

and redirect water to swales. There are four basic goals in designing an environmentally sensitive parking lot:

1. Disconnect large impervious surfaces
2. Slow water down
3. Redirect water into vegetated areas
4. Introduce permeable pavements where appropriate

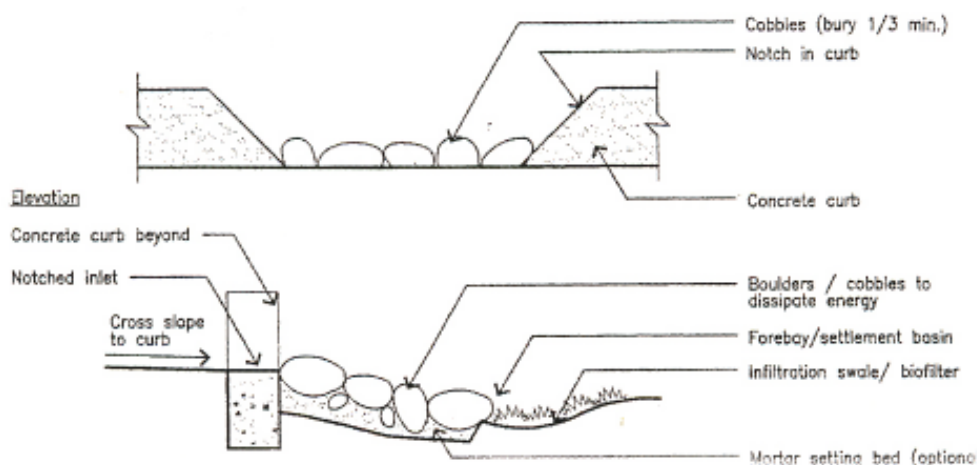
Creating “hybrid” parking lots can reduce the overall impervious surface coverage of typical double loaded parking lot by 60 percent. In addition, they can avoid the need for underground systems. Differentiation between aisles and stalls can mitigate the overall visual impact of the parking lot. Hybrid parking lots are aesthetically more interesting than typical parking lots too.

When designing hybrid parking lots, keep permeable pavement areas relatively flat (slope less than 5 percent). Stall markings can be indicated with wood headers laid in a field of permeable pavement, change in unit pavers’ color, concrete bands or pavement marker depending on the material used.



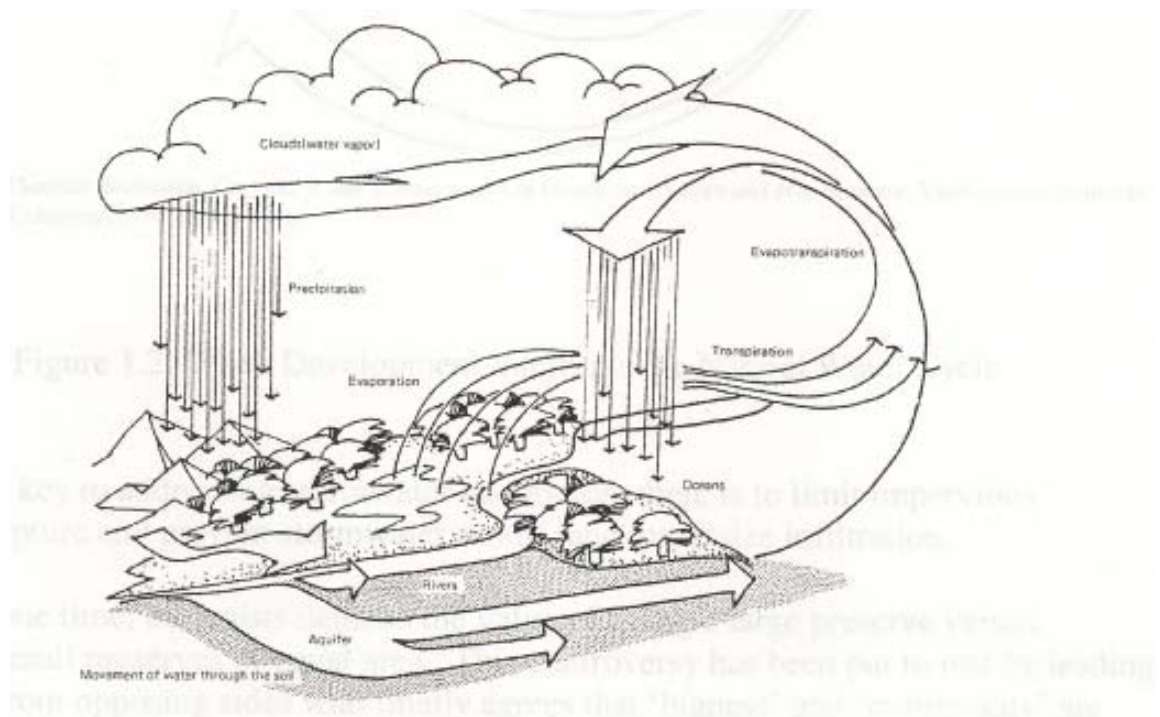
(Source. Tom Richman & Associates, Camp Dresser & McKee, Ferguson, Bruce, Design Artefact, *Start at the Source*, Forbes, New York, 1999, p.118.

Concave parking medians



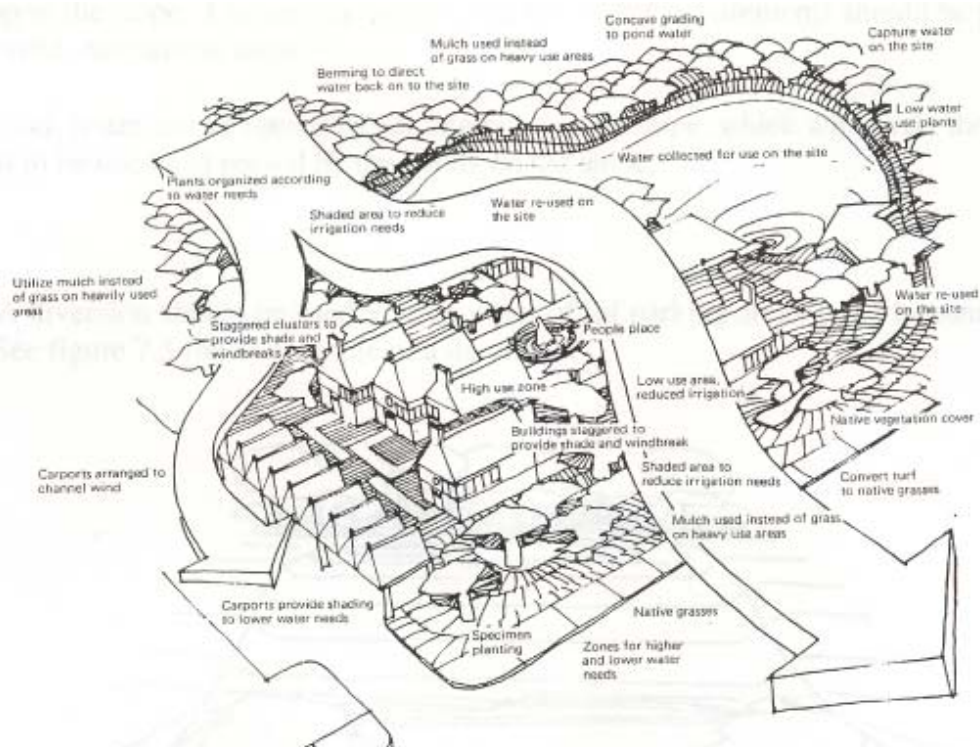
(Source. Tom Richman & Associates, Camp Dresser & McKee, Ferguson, Bruce, Design Artefact, *Start at the Source*, Forbes, New York, 1999, p.115.

Figure 4.9. Urban curb/Swale System



(Source: Robinette, Gary O., *Water Conservation in Landscape Design and Management*, VanNostrand Reinhold Company, New York, 1984).

Figure 1.1. Natural Water Cycle



(Source: Robinette, Gary O., *Water Conservation in Landscape Design and Management*, VanNostrand Reinhold Company, New York, 1984, p.127).

Figure 7.2. Trapping Moisture by Design

Works Cited in Appendix

Ewing, Reid. H. Best Development Practices: Doing the Right Thing and Making Money at the Same Time. American Planning Association, Chicago, IL, 1996.

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