Sustainable Landscape Master Plan

Onondaga Community College

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EDR

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1.1 Context

In 2006, the *American College & University President's Climate Commitment* (ACUPCC) submitted a challenge to all colleges and universities in the United States to reduce global warming emissions. In May 2007, Dr. Sydow joined the ACUPCC Leadership Circle by signing the Commitment. OCC has accepted the ACUPCC challenge to become climate neutral by adopting sustainable practices on all levels of operations and to integrate sustainability concepts and practices into their curriculum to better serve their students and meet their social mandate to help create a thriving, ethical, and civil society.

OCC is preparing a comprehensive institutional action plan to meet the goals of the ACUPCC. Immediate actions include adopting green standards for all buildings; investigating and adopting "green" options for the campus; and encouraging public transportation. In order to move forward on its commitment, OCC must take a hard look at how its facilities management and operations, campus landscape design, and landscape maintenance practices can play a role in forwarding the ACUPCC.

OCC's 2008–2013 Facilities Master Plan demonstrates OCC's ongoing commitment to sustainability and renewable energy. Building upon this commitment, this Sustainable Landscape Master Plan (hereafter referred to as the 'Plan') assesses the current situation, identifies areas for improvement, and establishes a framework of recommendations and action steps to get there.

Transitioning from conventional practices to "green" options for the campus calls for the development of sustainable landscape design and maintenance practices for the OCC campus. A healthy sustainable landscape will restore and enhance local ecosystems, which provide direct and indirect social benefits. In short, sustainable landscapes are compatible with the functionality of a college campus. The adoption of sustainable maintenance practices with the conversion of a homogenous campus

Benefits of a Sustainable Landscape Master Plan

- **Provide a visual planning tool locating current and future sustainable landscape practices.**
- **Provide a sustainable grounds and maintenance manual with guidelines for landscape changes and future maintenance needs.**
- **Reallocate time, money and resources spent on current unsustainable practices to new initiatives.**
- **Enhance the visual appeal of the campus and usability for all.**
- **Identify educational opportunities.**

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landscape to a more ecologically diverse landscape will provide holistic benefits to the college community as well as the surrounding and interconnected ecosystems. A sustainable landscape seeks to protect, restore, and enhance ecosystems that provide direct and indirect human benefits through services, such as food, water, timber, fiber, biochemicals, and energy. A sustainable landscape can provide the following "ecosystem service" benefits, which have been defined by the Sustainable Sites Initiative.

Existing campus footbridge

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1. Global Climate Regulation
Maintaining balance of atmospheric gases at historic levels, creating breathable air, and sequestering greenhouse gases.

2. Local Climate Regulation
Regulating local temperature, precipitation, and humidity through shading, evapotranspiration, and windbreaks.

3. Air and Water Cleansing
Removing and reducing pollutants in air and water.

4. Water Supply and Regulation
Storing and providing water within watersheds and aquifers.

5. Erosion and Sediment Control
Retaining soil within an ecosystem, preventing damage from erosion, siltation and compaction.

6. Hazard Mitigation
Reducing vulnerability to damage from flooding, storm surge, wildfire, and drought.

7. Pollination
Providing pollinator species for reproduction of crops or other plants.

8. Habitat Functions
Providing refuge and reproduction habitat to plants and animals, thereby contributing to conservation of biological and genetic diversity and evolutionary processes.

9. Waste Decomposition and Treatment
Breaking down waste and cycling nutrients.

The 12 ecosystem service benefits are derived from the 2008 Sustainable Sites Initiative™ Guidelines and Performance Benchmarks Draft. The Sustainable Sites Initiative™ is an interdisciplinary partnership working to transform land development and management practices, led by the American Society of Landscape Architects, the Lady Bird Johnson Wildflower Center, and the United States Botanic Garden. The Sustainable Sites Initiative's™ landscape criteria will be incorporated into the U.S. Green Building Council's (USGBC) LEED® Rating System.

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10. Human Health and Well-Being Benefits

Enhancing physical, mental, and social well-being as a result of interaction with nature.

11. Food and Renewable Non-Food Products

Producing food, fuel, energy, medicine, or other products for human use.

12. Cultural Benefits

Enhancing cultural, educational, aesthetic, and spiritual experiences as a result of interaction with nature.

1.2 Vision, Goals, & Objectives

A sustainable landscape master plan is very similar to a conventional master plan in that it provides the policies, goals and objectives to guide future landscape design and maintenance decisions. A critical distinction is that a master plan for sustainable landscapes also serves as the guidebook to transitioning toward a healthier campus with ecologically viable practices. This Sustainable Landscape Mater Plan provides a future landscape plan, recommends sustainable landscape practices, identifies implementation methods, and offers mechanisms for tracking progress.

OCC's overarching vision is a healthy, socially inviting, and aesthetically pleasing campus landscape, which contributes to the reduction of carbon emissions and serves as a living laboratory for environmental education for students, visitors, and the community-at-large.

The goals and objectives of this Plan are to:

1. Reduce and eliminate unsustainable landscape maintenance practices
    a. Increase the percentage of campus landscape to a self-sustaining landscape requiring minimal maintenance efforts.
    b. Reduce CO2 emissions, chemical applications, and water usage.

2. Increase the ecological significance within the campus landscape
    a. Create and increase native and/or adaptive habitats.
    b. Decrease invasive species and increase vegetative biodiversity.

3. Increase educational opportunities for sustainability
    a. Provide educational opportunities within the campus landscape
    b. Involve students, staff, faculty, and community members in hands-on sustainable landscape initiatives

4. Revitalize the campus into a sustainable landscape showcase
    a. Beautify and enhance the collegiate feel of the campus
    b. Ensure all future campus enhancements incorporate sustainability design and practices.
    c. Provide safe pedestrian, bicycle, and vehicular transportation routes.

Ultimately, this Plan outlines a methodology that when applied will enhance OCC's environmental, economic, and social sustainability.

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1.3 Planning Process

The planning process undertaken when developing this Plan involved input and ideas from several OCC stakeholders, including members of the Administration, the Facilities and Support Services, Public Safety, the Grounds Department, as well as students and faculty. The stakeholders provided a solid understanding of how the campus landscape is currently being used with insight as to how it could be improved. In addition to stakeholder meetings and interviews, the planning process included campus visits, reviews of existing campus plans, literature research, and an analysis of existing landscape conditions, maintenance practices, and aesthetics.

Student charrette

Some of the previous planning initiatives completed by OCC directly influenced this Plan's recommendations. Previous plan recommendations that related to sustainable landscapes or the human experience, and were aligned with OCC's overarching vision of sustainability, were incorporated herein. This Plan is not, however, a comprehensive summary of all such recommendations from the previous plans and studies, which included:

- *Facilities Master Plan,* May 2007. Prepared by JMZ Architects and Planners, P.C.
- *Development/ Feasibility Study: NYS Route 175 Property Adjacent to OCC Campus,* March 2006. Prepared by RZ Engineering, PLLC.
- *Parking and Sidewalk Master Plan,* September 2006. Prepared by Appel Osborne Landscape Architecture.
- *Athletic Facilities Master Plan & Conceptual Design,* March 2005. Prepared by Appel Osborne Landscape Architecture.
- *Evaluation of Campus-Wide Exterior Lighting System,* March 2005. Prepared by Barton & Loguidice, P.C.

1.4 Plan Components

This Plan is comprised of the following four sections: 1) introduction, 2) campus assessment of existing conditions, 3) recommendations for developing a sustainable campus landscape, and 4) implementation strategies, with important background resources located in the appendices. Accompanying this Plan is a Sustainable Landscape Maintenance Manual, which addresses how to implement, maintain, and troubleshoot the existing and proposed landscape elements. As a companion manual, the maintenance manual is intended to act as a field guide, providing guidance in the application of specific Plan recommendations for the OCC campus, to better ensure the Plan goals and objectives stated herein are achieved over time.

2 campus assessment

2.1 Landscape Categories

For this Plan, the campus is divided into two landscape management categories: 1) Open space and 2) Landscape structures and Infrastructure.

1. Open Space

The campus landscape, which is categorized as "open space" is comprised of mainly green or soft landscape elements. Open spaces on OCC's campus can be further organized into the following character areas:

- Greenspaces
- Forested areas
- Water management areas
- Athletic fields
- Future building sites

Pedestrian streetscape recommendation for Campus Corridor

2. Landscape Structures & Infrastructure

"Landscape structures and infrastructure" landscape types are comprised of hardscape elements, excluding all buildings. Landscape structures include the hardscape elements typically found in common areas adjacent to buildings. Landscape infrastructure encompasses circulation, utilities, signage, and waste management elements and facilities. Below is a list of landscape structures and infrastructure type found on the OCC campus.

Landscape structures

a. Plazas
b. Building roofs
c. Bus shelters
d. Building balconies

Landscape infrastructure

Circulation

a. Roadways
b. Walkways
c. Bikeways
d. Parking areas

Utilities

a. Water systems – storm, irrigation, water supply
b. Sewer systems – sanitary, storm
c. Energy systems – gas, electrical, steam
d. Communications – wireline, wireless, emergency
e. Lighting – pedestrian, vehicular, signage

Signage

a. Identification
b Regulatory
c. Wayfinding
d. Interpretative

Route 175 property forested area

Athletic field

Bus shelter and bicycle racks

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Campus pedestrian bridge

Wayfinding signage

Waste Management

a. Recycling

b. Solid

c. Compost

2.2 Campus Assessment

Below is a general overview of the OCC campus landscape and specific open space and landscape structures and infrastructure issues.

1. General Overview

OCC's entire campus is situated on the top of Onondaga Hill in Syracuse and is made up of approximately 270 acres and comprises three parcels of land. The main campus, which is the largest parcel, is bounded on the north by Route 173, on the south by Route 175, on the west by forested land (currently slated for a housing development), and on the east by vegetation encompassing a small wetland/pond system that obscures views of neighboring development. The main campus is predominantly lawn with tree clusters and ornamental plantings, paving, and buildings. The topography consists of gently rolling hills with a significant downhill slope to Route 173. From the top of Onondaga Hill in the main part of campus there are spectacular views looking north to the City of Syracuse. Strong northwest winter winds blow across campus during the winter months, which can cause whiteout conditions necessitating the closing of part of the campus loop road.

A steep gorge containing Furnace Brook runs from the south to the north through the main campus and outlets into Pogey Pond and a wetland system in the northwestern corner of campus. The gorge is heavily wooded with mature deciduous forest. An east-west building and pedestrian bridge crossing the creek bisects the north-south alignment of the gorge.

The two smaller parcels, both recent land acquisitions, are nearby but not adjacent to the main campus. The larger of the two parcels (the former Van Duyn Hospital property), approximately 40 acres, is located northeast of the main campus on the opposite side of Route 173 and is bounded by Velasko Road, Anthony Santaro Memorial Park, and a housing development. Two existing buildings, with lawn and mature trees front Route 173 and are slated for redevelopment by the college to house the adult education program and the Central New York Police Academy. The undeveloped land to the rear of the lot is forested with successional vegetation comprised of a few mature small stature trees, young trees and shrubs. The local high school cross-country team utilizes this area extensively for practices and competitions and has cleared trails for these purposes.

The smallest parcel, approximately fourteen acres, is located southwest of the main campus and is bordered by Route 175 to the south, a commercial development and college dorms to the east, Forested land of the main campus to the north, and a college facilities building and a cemetery to the west. Two branches of Furnace Brook cross the road into this parcel and flow south in a deep gorge and then merge into one stream through the main campus. The land surrounding the gorge is forested with mature deciduous forest. This forest stretches south towards Route 175, turning first to a planted evergreen forest, and then to mowed lawn before reaching Route 175. A house with a small driveway is located adjacent to Route 175. To the west, the land opens out to mature meadow with scattered mature evergreen trees. The quality of the forest and meadow on this parcel and the gorge ecosystem connection to main campus are exceptional and careful planning should be undertaken to preserve as much of the existing topography and vegetation as possible.

Soil types on campus are quite variable. The majority of central campus is built on well-drained, medium-acid to neutral pH silt loams. The area near the barn and to

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Trail in Van Duyn Hospital property forested area

the east is a gravelly fine sandy loam and the area near the dorms and Route 175 is poorly drained glacial till with a higher pH.

2. Open Space Issues

a. Greenspaces

Currently the primary vegetation type on campus is mowed lawn and unmanaged forest. The forest area is currently unmanaged, requiring no maintenance efforts. The mowed lawn, however requires significant maintenance effort and therefore, is the least sustainable plant community (although it does provide social gathering benefits). Approximately 55 acres on campus are mowed weekly. In 2008, from April to October, approximately 520 gallons of diesel fuel and 35 gallons of gasoline were used for landscape maintenance activities. This fuel usage amounts to over 12,000 pounds of CO2 emissions, which is equivalent to fuel usage for four airline round trips from Syracuse to London, England or for 15,000 miles driven in a 2005 Toyota Camry.

Route 175 property meadow

The gorge and edges of campus are well vegetated but the open lawn and parking areas are devoid of trees. The existing open areas are centered in the main campus, which experiences the heaviest use throughout the year. Consequently, due to the open landscape, building locations, and exposure to northerly winds, students, faculty, and visitors are frequently exposed to strong winds. In fact, the building alignment has encouraged a strong wind tunnel between Gordon Student Center and Whitney. Currently, outdoor teaching activities at OCC are not frequently pursued. Biology classes utilize outdoor areas for Amphibian investigations. The campus is rich with natural resources, from its water resources, forested areas and open space areas, and offers a diverse natural environment. There are wetland, riparian, and upland systems. Unfortunately, much of the upland habitat has been

altered during development and currently provides little or no habitat. Allowing the mowed lawn to revert to its natural vegetation (with minimal management) would add to the diversity of habitats on campus.

Impromptu gathering area

b. Water Management Areas

Stormwater ponds and culverts on campus are conventionally designed with no vegetative treatment other than lawn. Water quality and visual improvements could be made by allowing/encouraging the formation of a naturalized system.

2. Landscape Structures and Infrastructure Issues

a. Plazas and Bus Shelters

OCC currently has an insufficient number and variety of outdoor gathering spaces, such as plazas and social nodes. Currently, the quad is the primary social gathering space on campus. Although ample seating is provided, it is all stationary, unmovable seating. Built in the late 1960's and early 1970's, the quad is showing signs of concrete and brick failure and needs updating to enhance the student experience. The bus shelters are not large enough to encompass the volume of riders and the dorms and parking areas are void of gathering areas for outdoor socializing. Consequently, improvised gathering spaces happen in strategic locations throughout campus as students sit on curbs, walls and lawns. For an understanding of preferred locations and design of gathering spaces, just look to how the students are currently socializing.

b. Building Roofs and Balconies

The building roofs and balconies throughout the campus are underutilized in terms of providing opportunities for gathering places for views of the City of Syracuse and surrounding region. Some building roofs could be assessed for opportunities to develop rooftop gardens for function as well as aesthetic enhancement.

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Parking in restricted areas

Impromptu gathering area

c. Walkways and Bikeways

The fitness trail provides students and employees of the college with the opportunity to stay on campus to exercise outdoors and provides them with a way to explore the campus in a different way, seeing parts they might not normally experience. This is also a primary social network allowing people to exercise while talking or allowing for chance meetings on the trail. Currently, the fitness trail does not loop around the entire campus. In addition, the roadways do not have designated bicycle lanes.

d. Parking Areas

Parking areas have been added to provide adequate parking spaces and a more seamless arrival and departure. However, poor parking layout, orientation and topography causes confusion and reduces efficiency of finding parking. In addition, fire lanes and medians are used as parking spaces. Also, poor parking layout and parking in restricted areas makes snow plowing cumbersome.

e. Waste Management

A considerable amount of energy and time is expended on "picking-up" litter across the campus. The recycling and composting programs on campus have started to raise awareness of the sustainable initiatives at OCC. Having both compostable products in the dinning hall and an outdoor compost area allows students to understand the complete process, raises awareness of personal impact on the environment, and contribute to the college's overall sustainability program.

recommendations 3

3.1 Framework

This section consists of recommendations for developing a sustainable landscape for the OCC campus. The recommendations are divided into the two landscape management categories: 1) Open Space and 2) Landscape Structures and Infrastructure. A general overview of recommendations is provided, with detailed recommendations for each management category outlined in the following Recommendations Matrices. The Recommendations Matrices are keyed to two maps: Map 1 identifies Open Space areas and Map 2 identifies Landscape Structures and Infrastructure areas designated for sustainable initiatives. The companion Sustainable Landscape Maintenance Manual provides a discussion on how best to establish these various plant communities and their care.

These recommendations are provided to help OCC achieve its vision of establishing a healthy, socially inviting, and aesthetically pleasing campus landscape, which contributes to the reduction of carbon emissions and serves as a living laboratory for environmental education for students, visitors, and the community-at-large. Replacing conventional campus landscape plant communities, patterns, and practices with a diverse palette of plant communities and sustainable practices will best utilize the campus landscape in achieving climate neutrality and as an ecological resource for educational purposes.

As previously mentioned in Chapter 1, a sustainable landscape provides targeted ecosystem service benefits to the college if not also the surrounding neighborhoods. For ease of reference, each matrix includes the list of ecosystem service benefits and the anticipated benefit of each recommendation is identified. This cross referencing of the ecosystem benefits achieved with each recommendation will allow OCC to accurately record the sustainable actions undertaken by them. Ultimately, this will assist in tracking those practices, which generate fiscal efficiency in landscape maintenance for the college. This framework can be used when reporting sustainable

Diverse plant communities provide the following benefits:

a. Reduce fuel usage

b. Increase biologic diversity

c. Reduce water runoff

d. Increase teaching opportunities

e. Unify the three college properties

f. Beautify the campus and enhance its collegiate appearance

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actions to the American College & University President's Climate Commitment Action Plan.

3.2 Open Space

The dominant existing plant community on campus, which requires the most maintenance and energy use is the mowed lawn. To institute a more sustainable landscape and more diverse ecosystem on campus we recommend transitioning a majority of the lawn areas to the following plant communities (see Map 1):

Meadow recommendation for open spaces

- Low Grass (with and without trees)
- Meadow (with and without trees)
- Ornamental Planting
- Successional Forest
- Planted Forest
- Rain Garden
- Vernal Pool

More detailed recommendations on the transitioning of OCC's conventional collegiate landscape to a sustainable one are provided in the Open Space Recommendations Matrix. The master concept plan for open space areas is illustrated in Map 1. An overview of the purpose for and functionality of each above-recommended plant community is provided below.

1. Low Grass and Meadows

This Plan recommends that a significant amount of mowed lawn, the dominant existing plant community on campus, be allowed to transition into low grass or meadow. Fields of low grass and meadows are more sustainable than mowed lawn because they require less maintenance. Map 1 shows areas designated for low grass and meadow, with and without trees.

Sections of mowed lawn, which do not provide direct benefits of a social gathering place, are readily replaced with either low grass or meadow. Low grass areas have been selected along the road corridors and in areas adjacent to paths in order to provide a uniform appearance for these main corridors. In addition, the low grass areas provide a clean edge to adjacent meadow areas indicating care is regularly provided. It is also for safety/visibility. Lawns near buildings, along walks and roads

in the campus core, and major gateways have been chosen as opportunities to maintain existing lawns or transition to low grass with trees. Trees in low grass should be similar in shape and height and regularly spaced in order to provide a sense of order and rhythm for pedestrians and vehicles. Designated active recreational areas will remain as mowed lawns in order to best serve active play. OCC should work towards transitioning the low grass areas to a low growing variety of grass, such as a fescue, to further reduce the frequency of mowing required.

Overtime, the naturalized meadow will be the dominant vegetation type on campus,

Meadow (left) and rain garden (right) recommendations for open spaces

which will lead to greater energy savings from reduced mowing and will provide multiple ecosystem service benefits, such as air and water cleansing, erosion and sediment control, pollination, and bird and wildlife habitats. Lawns adjacent to existing forests and other locations, which are not frequently traversed by students, were selected for transitioning to a meadow with trees (see Map 1).

Most lawn areas can easily be transformed into meadow simply by ceasing mowing and allowing natural plant growth. Meadows typically only need one cutting per year instead of weekly mowing for six months per year. Fields of low grass also require less frequent mowing. The planting of trees within these areas should take into consideration snow management areas around parking lots and other areas of circulation. Signs alerting visitors that an area is becoming a sustainable meadow can help reduce questions and confusion and educate the community about the process. Additional information on low grass and meadow establishment methods are discussed in the maintenance manual.

Adding trees along the road will help slow traffic, beautify the campus, and if evergreens are carefully placed provide snow screens to increase road safety. Planting trees in parking lots will reduce summer heat while planting trees in the center of the campus will enhance the architecture, provide a sense of scale for the pedestrian and provide much needed heat and wind amelioration. Trees also enhance the collegiate appearance, making the campus look more like what is commonly thought of as a place of education. The east face of Whitney is a terrific example of how trees can enhance the architecture and make a building less intimidating in scale to the pedestrian.

2. Ornamental Plantings

Areas for additional ornamental plantings on campus are shown on Map 1. Ornamental plantings compliment the naturalized meadows by establishing a more formal

setting, provide shade, ameliorate wind, soften architecture, increase visual interest, and reduce the maintenance required for manicured lawn areas. Ornamental plantings containing herbaceous, shrub and tree plant material grouped in naturalized layers should be strategically located in highly utilized parts of the campus. The use of different species helps promote biodiversity and mitigates the potential loss of the entire inventory due to disease or insect infestation.

Specifically, a unified ornamental planting and paving plan would enhance the main campus axis corridor with an extension to the new playing fields. A master plan for this area and the quad should be undertaken to address specific plant community recommendations, including native and low maintenance ornamental grasses, perennials, shrubs and trees.

3. Successional and Planted Forests

Mature stands of trees provide numerous benefits and are also a hallmark of many college campuses. Forested areas were selected for the campus in areas that would benefit from windbreaks, a reduction of runoff, and an increase in visual interest (See Map 1). Also, an increase of forested areas on campus would provide ecosystem diversity for wildlife habitat and offer teaching opportunities. To enhance diversity, forest plant communities should differ from each other. It is also recommended that some forests develop successionally, allowing the college community to witness this natural process. Allowing plant communities to develop this way will reduce costs associated with the purchase of plant material. Additional information on successional and planted forests is discussed in the maintenance manual.

4. Vernal Pools and Rain Gardens

Map 1 shows the recommended locations of a vernal pool and a series of rain gardens along OCC Drive South. Rain gardens are also recommended for all wet lawn areas that receive significant water from road and parking area pavements. Vernal pools and rain gardens are recommended to diversify the campus plant and animal life and

treat surface water runoff. Planting rain gardens along the south entrance would mitigate stormwater runoff while adding visual appeal to the campus gateway.

Vernal pools and wetlands are a critical ecosystem component and provide a terrific learning opportunity for students. Relatively easy and inexpensive to construct, a vernal pool is a seasonal wetland that is wet in the spring and fall but dries up for part of the summer. It provides homes to amphibians and some specialized crustaceans and invertebrates. The USDA Forest Service publication 'A Guide to Creating Vernal Pools' is provided in the Appendix B: Sources and provides information on construction. The construction itself could be used as an educational workshop for the campus and greater community. Once constructed annual maintenance is explained in the companion maintenance manual.

Rain gardens treat stormwater by ponding water on the ground surface, allowing settling of suspended solids and sediment prior to entering the soil for filtration and pollutant removal. Rain gardens mitigate the amount of runoff from smooth, compact surfaces, such as roadways, roofs, sidewalks and parking lots. Rain gardens also support biodiversity, conserve water, increase groundwater renewal, reduce soil erosion from surface sheet flows, and improve aesthetics. Typically, a rain garden is an excavated shallow surface depression planted with native vegetation underlain by a sand or gravel infiltration bed. Trees and shrubs planted in rain gardens would assist in treating water and reduce runoff leaving the parking lots. Local materials, such as compost produced from the dining halls, plants from local nurseries, or gravel from local quarries can reduce the ecological footprint used in this application.

3.3 Landscape Structures & Infrastructure

The social benefits of a sustainable landscape are important factors for a college campus. In addition to improving the biodiversity of plant communities on campus,

attention should be given to the quality of social gathering opportunities as well as ease and safety of circulation throughout the campus. To that end, below are general recommendations on improving various elements throughout OCC's campus. More detailed recommendations can be found in the Recommendations Matrix and illustrated on Map 2.

1. Landscape Structures

a. Plazas

Plazas are fully or semi-enclosed outdoor gathering spaces surrounded mainly by buildings. Plazas provide a sense of place and promote interaction. Plazas act as a destination point within a larger setting, such as a college campus. The few existing plazas on the OCC campus are dominated by hardscape elements and generally have minimal landscaping. Some plazas have open sides, where a building does not enclose it. Trees should be incorporated to create a sense of enclosure, provide shading and/or snow screening. Sculpture can also provide closure and add a unique feature to the plaza. Other examples of defining features for a plaza include an exterior structure, such as a gazebo, kiosk, water fountain, flagpole, banners, or unit paving patterns. Incorporation of a bus stop and bicycle racks can help reinforce the plaza as a destination point within a campus. To help facilitate positive social interaction, all plazas should include, at a minimum, seating, lighting and trash/recycling receptacles.

Use of sustainable practices is encouraged for plaza features, such as permeable paving, LED or solar lighting, and recycled or renewable seating and receptacle materials. A series of plazas along the main walkway between Mawhinney Hall and the proposed Arena and Event Center will help create destination points for students, staff, and faculty. This east-west building and pedestrian corridor alignment should be strengthened with the location of future buildings and the development of an urban landscape core. A plaza between the Whitney building and

the gorge is suggested for a lawn amphitheatre classroom and gathering space. An enhanced plaza between Gordon Center and the gorge would provide a usable dining space and create a transition between the 'urban' area the college and the natural elements of the gorge. In front of the Health, Physical Education and Recreational building and the proposed Arena and Event Center a third plaza is recommended as the east terminus of the corridor. This plaza would serve as a transportation hub and a main destination point along the corridor.

Whitney Building Existing Conditions

Whitney Building Conceptual Planting

b. Green Roof

A green roof is a contained vegetation area on a roof. Green roofs provide multiple ecological and economic benefits, such as stormwater management, energy conservation, increased roof material lifespan, insect, bird and wildlife habitat, and pleasing aesthetics. In addition, green roofs can support the local production of herbs, flowers, and vegetables.

Green roofs are categorized into two systems: intensive and extensive. Intensive green roofs require deeper substrate layers, usually greater than 4 inches, and include a range of plant species from ground covers to trees. Intensive green roofs

Pedestrian streetscape recommendation for Campus Corridor

are generally limited to flat roofs and require heavy maintenance. Extensive green roofs require only a shallow substrate, generally less than 4 inches, and are limited to herbs, grasses, mosses, and drought tolerant succulents, such as Sedum. Extensive green roofs require minimal maintenance.

Green roof components include vegetation, a growing medium, a filter membrane, a drainage layer, and a waterproof and root repellant layer. Green roof systems can be individual components of a system installed separately or modular, with the growing media and plants, filter cloth, and drainage layers prepared in movable, interlocking grids.

c. Living Wall

A living wall is a system for vegetation to grow along an interior or exterior wall. Living walls improve air quality and thermal regulation, reduce noise pollution, and enhance the aesthetic beauty of an area. Living walls capture airborne pollutants and filter noxious gases and particulate matter. Living wall systems consist of vegetated panels, vertical modules, or planted blankets that are attached vertically to a structural wall or frame. Vegetation types used on the walls include groundcovers, ferns, low shrubs, perennial flowers or edible plants. Living walls require maintenance and varying levels of irrigation. Greywater from buildings can be used to irrigate a living wall system.

2. Landscape Infrastructure

a. Walkways & Bikeways

Providing pedestrians a safe walking environment with a human-scale relationship to the surrounding buildings and roadways is a vital component of a sustainable campus landscape. Highly used pedestrian corridors should include sidewalks, trees, seating, lighting, and wayfinding signage. Use of sustainable practices for pedestrian corridors is recommended, such as structural soil for trees planted in

Snow Removal Considerations

When implementing physical recommendations from this plan, consider any impacts to snow removal equipment usage or snow piling areas. Hire a consultant to assist the Grounds Department during the planning stage to improve snow removal efficiency.

Soil Protection in Construction Projects

Soil is a resource that must be protected and preserved. All construction projects should consider protection of existing soil in their contracts in order to eliminate the need for off-site soils to be brought to campus. Topsoil should be stripped and securely stockpiled using best management practices so it may be reused on site once construction is completed.

hardscape areas, permeable paving for the sidewalks, LED or solar lighting, and seating made of recycled materials. An enhanced walkway from Mawhinney Hall to the proposed Arena and Event Center is recommended to strengthen the core campus connection for the pedestrian. The creation of a master plan for the quad and this campus corridor should be a priority. A master plan would include a user needs assessment, an existing physical conditions assessment, two to three design alternatives, and a final plan showing the preferred alternative.

OCC's campus open space areas and road structure, especially Ransom Mackenzie East and West loop, afford the opportunity to enhance the recreational and commuter transportation options for students, staff, faculty, and community members. Map 2 locates the recommended additional fitness trails, seasonal paths, and bicycle path locations. In particular, expanding the pedestrian fitness trail to loop around Ranson Mackenzie West and East would create a full circuit around the main campus. Raised pedestrian medians at all locations where the trail crosses the road would assist in alerting drivers to pedestrian activity. In addition, bicycle lanes to provide safe bicycle conditions within campus are recommended. To accommodate bicycle lanes in both directions, the roadway width needs to be narrowed for vehicles, which in turn will aide in slowing traffic down. Additional bicycle parking facilities are recommended throughout the main campus. Seasonal paths to access natural areas on campus, such as Pogey Pond, the gorge, and the forested areas of the Route 175 property and the former Van Duyn Hospital property is recommended to enhance recreational and educational opportunities. General locations for the seasonal paths are recommended on Map 2. Specific path locations would need to be determined in the field. Safety concerns, such as emergency access to the gorge or unmonitored student gatherings in the forest areas or near Pogey Pond, would need to be addressed when implementing the seasonal paths.

b. Parking Areas

Poor parking layout is disorientating and reduces efficiency of arrival and first impressions. A parking lot redesign study and implementation program is recommended to alleviate layout issues and other issues such as strategic snow storage areas, parking conflicts in fire lanes and on medians, and difficult navigation within and between parking areas.

The following general guidelines for improvements should be incorporated into the parking lot redesign study: 1) use select islands, curbing, and stripping to define a logical layout; 2) eliminate odd shapes and curves, where possible; 3) provide select curbed islands with trees and connect parking lots to reduce isolated lots and confusing connecting drive lanes; 4) regrade lots as necessary to improve awkward sloped lots; 5) use select islands as rain garden areas to manage stormwater runoff within the parking lot areas; 6) enforce parking regulations to end frequent parking infractions on islands, lawns, in fire lanes and double parking; 7) identify places for snow storage to reduce vegetation damage and pedestrian conflicts; and 8) consider implementing a parking pass system that only allows parking in certain lots. These suggestions will assist in streamlining the parking program and ensure adequate convenient parking.

c. Permeable Paving

Permeable paving is a hard surface that allows stormwater to percolate into the ground instead of running off the surface. Permeable paving reduces stormwater runoff volume from paved surfaces, reduces pollutants transported through direct infiltration, and increases recharge through infiltration. Depending on the paving material, soil type, and rainfall, permeable pavers can infiltrate up to 80 percent of annual rainfall. Permeable paving is appropriate for pedestrian areas, such as walkways and plazas, and for low-volume, low-speed areas, such as driveways, parking stalls, and overflow parking areas. Permeable pavers may be used where

Existing permeable paving

underlying soils have a permeability of at least 0.3" per hour or provide permeable substrates.

Types of permeable paving materials include pervious concrete, porous asphalt, porous paving stones, Flexi-Pave made from recycled rubber tires, and manufactured "grass pavers" made of concrete or plastic. Permeable paving systems contain a durable, load bearing, pervious surface overlying a crushed stone base. To reduce heat islands (thermal gradient differences between developed and undeveloped areas) use paving materials with a Solar Reflectance Index (SRI) of at least 29.

Recurrent maintenance to clean the surfaces with a vacuum sweeper is recommended at least three times per year to avoid clogging the void spaces and joints between pavers. Minimal use of salt or sand during the winter months is also recommended.

d. Signage

e. Waste Management

Map 1: Open Space Recommendations

- Artificial Turf
- Lawn Recreation Area
- Low Grass
- Low Grass with Trees
- Meadow
- Meadow with Trees
- Ornamental Planting
- Successional Forest
- Planted Forest
- Rain Garden and Low Grass
- Vernal Pond
- Area and Events Center

Notes: Base Map: 1 ft. Resolution Orthoimagery, Year 2006.

Map 2: Landscape Structures and Infrastructure Recommendations

- Bicycle Path
- Seasonal Path
- Existing Fitness Trail
- Proposed Fitness Trail
- Campus Corridor Improvements
- Landscape Structure/Infrastructure

1. Bicycle Parking
2. Boardwalk & Covered Educational Platform
3. Parking Lot Redesign
4. Raised Pedestrian Median Crossing
5. Electric and Hybrid Preferential Parking Spaces
6. Pedestrian Streetscape
7. Gorge Trail Access
8. Improved Lighting
9. Campus Corridor Plazas (general location)
10. Indoor Living Wall
11. Green Roof Demonstration Area
12. Shade/Wind Barrier Structure on Terrace
13. Outdoor Terraced Classroom
14. Overlook/Picnic Area
15. Eliminate Right Turn Lanes
16. Educational Signage (example locations)
17. Covered Outdoor Educational Space
18. Updated Entry Signs, Lighting & Landscaping
19. Gathering Space

Notes: Base Map: 1 ft. Resolution Orthoimagery, Year 2006.

Recommendations Matrix: Open Space

Sheet 1 of 2

OPEN SPACE LANDSCAPE MANAGEMENT CATEGORY

reference Map 1

		RECOMMENDATIONS	TIMELINE				COST RANGE			ECOSYSTEM SERVICE BENEFITS										
			Continuous	1-2 years	2-5 years	5-10 years	Low	Medium	High	Global Climate Regulation	Local Climate Regulation	Air and Water Cleansing	Water Supply and Regulation	Erosion and Sedimnet Control	Hazard Mitigation	Pollination	Habitat Functions	Waste Decomposition & Treatment	Human Health & Well-Being Benefits	Food & Renewable Non-Food Products	Cultural Benefits
1	**Recreation Areas.**	Maintain manicured lawn areas for social & recreational activities	■				■												■		
2	**Meadow/Meadow with trees.**	Allow lawn areas to revert to successional meadow and establish tree clusters where noted.	■				■			■	■	■		■		■	■				■
3	**Meadow/Meadow with trees.**	Mow walking paths through meadow areas following established footpaths. Along walkways maintain open sight lines through tree areas for pedestrian safety.	■				■			■	■	■		■		■	■				■
4	**Successional Forest.**	Allow fringe areas and those noted on map to sucessionally mature into a forest.	■				■			■	■	■		■		■	■				
5	**Low Grass.**	Mow lawn less frequently creating a "low grass" area. Over time, replant areas with appropriate grass seed that stays low and does not require frequent mowing. Plant tree clusters where noted on Map 1.	■				■	■		■		■									
6	**Planted Forests.**	Create new forested areas with new tree plantings. Do not mow in these areas, allow meadow to form between trees. Along walkways, maintain open sight lines through tree areas for pedestrian safety.	■					■		■	■	■		■		■	■				
7	**Ornamental Plantings.**	Plant native and low maintenance ornamental plantings in the quad and campus corridor, and a few other heavily trafficked parts of campus as shown on map.	■					■			■			■	■	■	■		■		

OPEN SPACE LANDSCAPE MANAGEMENT CATEGORY reference Map 1		RECOMMENDATIONS	TIMELINE				COST RANGE			ECOSYSTEMSERVICE BENEFITS											
			Continuous	1-2 years	2-5 years	5-10 years	Low	Medium	High	Global Climate Regulation	Local Climate Regulation	Air and Water Cleansing	Water Supply and Regulation	Erosion and Sedimnet Control	Hazard Mitigation	Pollination	Habitat Functions	Waste Decomposition & Treatment	Human Health & Well-Being Benefits	Food & Renewable Non-Food Products	Cultural Benefits
8	**Educational opportunities.**	Use the newly acquired property along Route 175 for nature education and passive recreation.	■					■		■	■	■		■		■	■		■		■
9	**Sustainable Maintenance Practices.**	Train OCC grounds staff to adopt sustainable maintenance practices according to the Landscape Maintenance Manual.	■	■			■			■	■	■	■	■							
10	**Natural land use buffer.**	Establish 200' sustainable landscape buffer between adjacent property with proposed housing development.		■			■										■		■		■
11	**Tree Health Inventory Study.**	Inventory and study the health of all trees on the college campus. Include Bartlett Tree Inventory Criteria.		■			■				■						■				■
12	**Tree Health Inventory Study.**	Tag trees with names for an informal botanic garden.		■			■				■						■				■
13	**Vernal Pool.**	Create a vernal pool in Pogey Pond area for habitat expansion and for educational use.			■		■					■	■				■	■	■		■
14	**Landscape Maintenance**	Tracking greenhouse gas emissions from landscape operations will assist in the emissions inventory and reductions for the *American College & University Presidents Climate Commitment* initiatives. The Greenhouse Gas Protocol Initiative provides calculator tools (See Appendix B: Sources). Incorporate calculation process into coursework or Whole Earth Club activities.	■				■			■	■										■
15	**Athletic fields.**	Relocate athletic fields proposed for the property along Route 175 to the Van Duyn Hospital property. (see Figure A: Conceptual Site Plan for Vay Duyn Hospital Parcel.)			■			■											■		

Recommendations Matrix: Landscape Structures & Infrastructure

Sheet 1 of 5

		STRUCTURES AND INFRASTRUCTURE LANDSCAPE MANAGEMENT TYPE reference Map 2	TIMELINE				COST RANGE			ECOSYSTEM SERVICE BENEFITS											
		RECOMMENDATIONS	Continuous	1-2 years	2-5 years	5-10 years	Low	Medium	High	Global Climate Regulation	Local Climate Regulation	Air and Water Cleansing	Water Supply and Regulation	Erosion and Sedimnet Control	Hazard Mitigation	Pollination	Habitat Functions	Waste Decomposition and Treatment	Human Health and Well-Being Benefits	Food and Renewable Non-Food Products	Cultural Benefits
1	**Architectural Theme**	Future campus development including architecture, should incorporate sustainable principles.																			
2	**Rain Gardens**	Install rain gardens that connect with stormwater management system.																			
3	**Gathering Spaces**	Gathering spaces for each building should include covered or shaded sitting areas. Residence Halls A & B gathering spaces located in the back lawn areas. Residence Hall C gathering space incorporated as a student gathering space next to Whitney Center due to space limitations (see Figure B: Options 1 & 2).																			
4	**Bicycle Path**	Create a shared roadway/bicycle path by restriping all campus drives.																			
5	**Preferential parking**	Provide preferential parking for fuel efficient vehicles such as motorcyles, electric or hybrid parking.																			
6	**Educational Signage**	Develop an educational signage program to highlight the cultural, historic,and natural resources on campus.																			

STRUCTURES AND INFRASTRUCTURE LANDSCAPE MANAGEMENT TYPE (reference Map 2)		RECOMMENDATIONS	TIMELINE				COST RANGE			ECOSYSTEM SERVICE BENEFITS											
			Continuous	1-2 years	2-5 years	5-10 years	Low	Medium	High	Global Climate Regulation	Local Climate Regulation	Air and Water Cleansing	Water Supply and Regulation	Erosion and Sedimnet Control	Hazard Mitigation	Pollination	Habitat Functions	Waste Decomposition and Treatment	Human Health and Well-Being Benefits	Food and Renewable Non-Food Products	Cultural Benefits
7	**Bicycle racks**	Upgrade and add new bicycle racks that include rain shields and electric plug-ins for electric bicycles.																			
8	**Master Plan for campus quad/corridor**	Prepare a plan for the quad and campus corridor with emphasis on enhancing social gathering places.																			
9	**Campus lighting**	Improve lighting on pedestrian bridge. Update lighting styles for pedestrian areas avoiding off-site lighting and night sky pollution.																			
10	**Overlook area**	Create an overlook/picnic area in the birch tree grove.																			
11	**Vehicular traffic calming**	Eliminate two angled right turn lanes at the south campus entrance, increase traffic calming and improved pedestrian safety.																			
12	**Pedestrian Crossing**	Install raised pedestrian & bike crossings at recreational trail road crossings.																			

Recommendations Matrix: Landscape Structures & Infrastructure

Sheet 3 of 5

STRUCTURES AND INFRASTRUCTURE LANDSCAPE MANAGEMENT TYPE reference Map 2		RECOMMENDATIONS	TIMELINE				COST RANGE			ECOSYSTEM SERVICE BENEFITS											
			Continuous	1-2 years	2-5 years	5-10 years	Low	Medium	High	Global Climate Regulation	Local Climate Regulation	Air and Water Cleansing	Water Supply and Regulation	Erosion and Sedimnet Control	Hazard Mitigation	Pollination	Habitat Functions	Waste Decomposition and Treatment	Human Health and Well-Being Benefits	Food and Renewable Non-Food Products	Cultural Benefits
13	**Seasonal Path**	Develop a seasonal cross country trail for educational and recreational enjoyment of the natural areas on campus including the gorge.		■				■											■		■
14	**Campus Corridor**	Create a pedestrian streetscape including pedestrian paving and street trees. Extend current campus corridor to new athletic fields and adjust proposed Community Recreation Center to allow straight corridor access.		■				■			■						■		■		
15	**Campus Gateway**	Improve gateways with updated signs, lighting and sustainable landscapes Treat entries as gateways to the campus.			■		■	■													■
16	**Green Roof**	Install green roof retrofit demonstration areas.			■			■		■	■	■	■	■	■	■	■	■	■		■
17	**Shade and wind protection**	Install structure and planting for providing shade and wind barrier for terrace.			■			■			■	■				■			■		■
18	**Living Wall**	Install living wall in Gordon Center for indoor air quality improvements			■			■			■	■							■		■

	STRUCTURES AND INFRASTRUCTURE LANDSCAPE MANAGEMENT TYPE reference Map 2	RECOMMENDATIONS	TIMELINE				COST RANGE			ECOSYSTEM SERVICE BENEFITS											
			Continuous	1-2 years	2-5 years	5-10 years	Low	Medium	High	Global Climate Regulation	Local Climate Regulation	Air and Water Cleansing	Water Supply and Regulation	Erosion and Sedimnet Control	Hazard Mitigation	Pollination	Habitat Functions	Waste Decomposition and Treatment	Human Health and Well-Being Benefits	Food and Renewable Non-Food Products	Cultural Benefits
19	**Bus shelters**	Improve bus shelters to accommodate more people and align with campus unifying architectural theme.																			
20	**Bus shelters**	Add bus shelter on Van Duyn property.																			
21	**Bus shelters**	Review bus transit to understand commuter needs for hours of service, routes, seasonality and intermodal links (airports, intercity bus or rail, and bicycle trails.)																			
22	**On-campus biodiesel or electric bus**	Provide an on-campus biodiesel or electric bus for on-campus access between buildings and properties.																			
23	**Plazas**	Develop campus corridor plaza in front of the Health, Physical Education and recreational building and proposed Community Recreation Center. Relocate the existing sculpture, incorporate the bus shelter expansion and add a unique feature, such as a sundial.																			
24	**Plazas**	Create a plaza between between Gordon Center and the gorge for a paved dining area/gathering space and compost program area. Create a transition between urban and natural elements.																			
25	**Plazas**	Create a campus plaza between Whitney building and the gorge as an outdoor terraced classroom/ gathering space.																			

STRUCTURES AND INFRASTRUCTURE LANDSCAPE MANAGEMENT TYPE reference Map 2		RECOMMENDATIONS	TIMELINE				COST RANGE			ECOSYSTEM SERVICE BENEFITS											
			Continuous	1-2 years	2-5 years	5-10 years	Low	Medium	High	Global Climate Regulation	Local Climate Regulation	Air and Water Cleansing	Water Supply and Regulation	Erosion and Sedimnet Control	Hazard Mitigation	Pollination	Habitat Functions	Waste Decomposition and Treatment	Human Health and Well-Being Benefits	Food and Renewable Non-Food Products	Cultural Benefits
26	**Campus lighting**	Update lighting styles for pedestrian areas avoiding off-site lighting and night sky pollution.																			
27	**Fitness trail**	Expand fitness trail to complete a loop around the new Van Duyn campus and add fitness stations.																			
28	**Parking areas**	Prepare a master plan for campus parking program addressing such issues as efficiency, wayfinding and ease of plowing. Include rain gardens and permeable surface materials in new design to improve stormwater quality and quantity. Paving materials with a Solar Reflectance Index (SRI) of at least 29 should be used to reduce heat on paved surfaces.																			
29	**Outdoor Educational Platform**	Create covered outdoor gathering space for educational use. Install walking trails.																			
30	**Wetland boardwalk**	Create boardwalk and covered wetland platform for Pogey Pond for educational use.																			

implementation 4

4.1 Framework

This section consists of general implementation techniques for transitioning to a sustainable campus with a focus on four conceptual site plans for a few targeted sites on campus. The implementation techniques include the establishment of a Sustainable Landscape Stewardship Task Force, a Phasing Plan, an ecological footprint assessment tool, and educational initiatives.

1. Sustainable Landscape Stewardship Task Force

A Sustainable Landscape Stewardship Task Force (hereafter referred to as the Task Force) comprised of staff, administration, and faculty should be established and charged with the responsibility for carrying the Plan forward. In the future, a Sustainability Coordinator should be employed to head this task force and be charged with leading and managing the campus initiatives.

2. Phasing Plan

The first task for the Task Force should be the creation of a Phasing Plan to ensure that efforts on behalf of the college meet the goals established in this Plan. A Phasing Plan would provide a guide for how to move forward and prioritize projects based on available funding and personnel.

A Phasing Plan goal should be to engage all campus areas to some level of involvement. This will allow administration to strategically allocate economic resources and staffing as it relates to the academic calendar. It is highly recommended that these decisions be made with the input of those who will implement the work and that the focus is on incremental and sustainable changes so an achievable plan is accomplished.

When preparing the Phasing Plan, referencing the suggested timeline in the Recommendations Matrices will be particularly helpful. Each sustainable initiative

is allocated an implementation timeline: continuous, one to two years, two to five years, and five to ten years. The determination for the timeframe selected for each action was weighted against existing manpower, cost of implementation, and importance of implementation. Some items may have received more urgent status due to their safety implications or due to their potential for visual impact and providing widespread awareness of the initiatives. In addition, the cost range for each recommendation is estimated from low to high. Finally, the phasing plan should provide a method for measuring success, determine reporting frequency, and become an integral part the American College & University President's Climate Commitment Action Plan.

3. Ecological Footprint Assessment

Ecological footprints measure how fast we consume resources and generate waste compared to how fast nature can absorb our waste and generate new resources. Ecological footprints include physical needs, such as eating and driving to a place, and cultural needs, such as campus areas for living, studying and playing. The Earth takes approximately one year and four months to regenerate what humans use in a year. By assessing a community's ecological footprint locally, management and responsibility of ecological assets can occur individually and collectively. The following questions can be used in assessing or reducing an ecological footprint caused by implementing these recommendations:

- What natural resources are impacted for the good or service?
- Can recycled or existing materials be used instead of new materials?
- How much energy and materials are used to produce the good or service?
- How far does the good or service travel to and from the campus?
- Can local goods or services be used?
- How accessible in terms of ability to purchase is the good or service?
- What resources are consumed in installing the good or service?

- What resources are consumed to maintain the good or service?
- What resources are used in replacing the good or service?
- How often does the good or service need to be replaced?
- What resources are used during disposal of a good or service?
- What is the environmental impact of disposal?

Tracking greenhouse gas emissions from landscape operations will assist in the emissions inventory and reductions for the American College & University Presidents Climate Commitment initiatives. The Greenhouse Gas Protocol Initiative provides calculator tools (see Appendix B: Sources). On OCC's campus from April to October 2008, 518 gallons of diesel fuel and 33 gallons for gasoline were used by the Grounds Department for mowing and trimming activities. Tracking the gallons of diesel fuel and gasoline used during subsequent growing seasons will identify the amount of reduction in emissions from mowing and trimming activities.

4. Educational Opportunities

Every sustainable initiative in this Plan has a related educational opportunity. Students, faculty, staff, and community members can learn during the planning, implementation, and operational phases of each initiative. Educational opportunities can also be included in curriculum, extra-curricular activities, campus events, internships, service learning, and volunteering. Generating and implementation of educational opportunities should be a main focus of the Landscape Stewardship Task Force. Below are suggestions for coordinating educational opportunities directly connected with the recommended sustainable campus landscape.

a. Academic courses

Showcasing sustainable initiatives throughout the campus landscape will help professors and community organizations use the campus as a learning laboratory. For example, a demonstration green roof could be used in a structural course in the Architectural Technology program or as a stormwater-monitoring program for the Engineering Science program. Or, as mowing fuel usage is decreased with the reduction of lawn areas, engineering students could calculate the reduction of CO2 emissions. In addition, research to generate and test sustainable ideas can be developed within the learning landscape by professors, students and staff.

Multiple locations for covered outdoor educational spaces are recommended to maximize the campus landscape as a teaching resource, such as the amphitheatre classroom space along the main campus corridor and at the wetland boardwalk and platform located at Pogey Pond. In addition, as the campus transitions from lawn areas to more diverse plant communities, the entire campus can become a learning laboratory.

b. Student Orientation and Trash Awareness Week

Student orientation and residence hall activity times provide an opportunity to share OCC sustainable initiatives with students. Orientation leaders could discuss issues such as littering and smoking, and communicate sustainable practices for recycling and composting on campus. In addition, to help reduce current littering on campus, a trash awareness week during the fall semester could increase student responsibility for litter on campus.

c. Signage

Educational signage around campus to explain specific OCC sustainable initiatives will assist in informing students and visitors about OCC's sustainable commitment.

In addition to physical signs, a sustainable initiatives tour brochure should be developed for self-guided tours around campus. A virtual tour could be implemented on the OCC website as well.

d. Community Outreach

OCC has an opportunity to be a leader and community example for sustainable landscape initiatives in the region. To this end, community collaboration efforts should be a main focus for the Landscape Stewardship Task Force. The public's awareness of the College's sustainable initiatives may have a positive influence on prospective student's interest in attending the college. Involvement of students, such as representatives from the Whole Earth Club, will be critical to engaging the campus and regional community in OCC's sustainable initiatives. Also, during the construction process of some of these physical initiatives, OCC could provide an educational training session for community organizations during the construction process.

4.2 Concept Plans

Subsequent to establishing techniques for transitioning the campus to a sustainable landscape, four conceptual site plans were created for targeted campus areas. Each conceptual site plan incorporates principles supporting sustainable campus landscapes and planning. A summary description for each concept plan is provided below.

1. Site of old Van Duyn Hospital

The design challenge is to establish a sustainable approach to adaptively reusing this site for educational purposes. This newly acquired site has two existing buildings, a parking area, mowed lawn, and recreational trails. This design focused on restructuring the lawn area for athletic fields, providing outdoor gathering places

for students, and an improved parking area for students, faculty, and visitors for athletic events, with the expectation that shared parking will be practiced. Existing cross-country trails were expanded into the eastern part of the site to provide an opportunity for competitive athletic use such as cross-country meets. Extensive outdoor seating surrounding the historic stone building is proposed for outdoor educational and social use. In keeping with sustainable principles, this design focused on working with the existing landform with as little alteration as possible, preserving healthy mature trees, and interlacing recreational trails throughout the site to encourage a full integration of college life.

2. South Campus Entrance

The primary design intent for the college's South Campus Entrance is to establish a welcoming, inspiring, and aesthetically stimulating gateway with a sustainable landscape design. Two alternative designs were provided as illustrated in Figure B Options 1 & 2. The median and existing lawn are essentially transitioned into an ornamental garden and rain garden with a treed lawn framing the new meadowland. The lawn area between the residence halls A and B is restructured to accommodate a social gathering place for students. This is accompanied with seating areas at each dorm providing greater social opportunities and encouraging outdoor activity. The entrance drive leads directly to the Whitney building, which houses the student union as well as the President's office. This area is enhanced with an improved parking area and a new pedestrian plaza, which will provide a convenient outdoor reception area. The intersection of South Drive and Loop Road has received alternative design solutions as well as the main campus corridor. A description of the alternative conceptual intersection design solutions is provided below (see Figure C).

To maintain sustainability standards, proposed new outdoor patios and/or parking area should consist of permeable surfaces, the rain gardens and meadow will capture stormwater decreasing resulting runoff, and there will be new opportunities for walking and socializing in safe and aesthetically pleasing outdoor places.

3. OCC Drive South and Loop Road Intersection Concepts

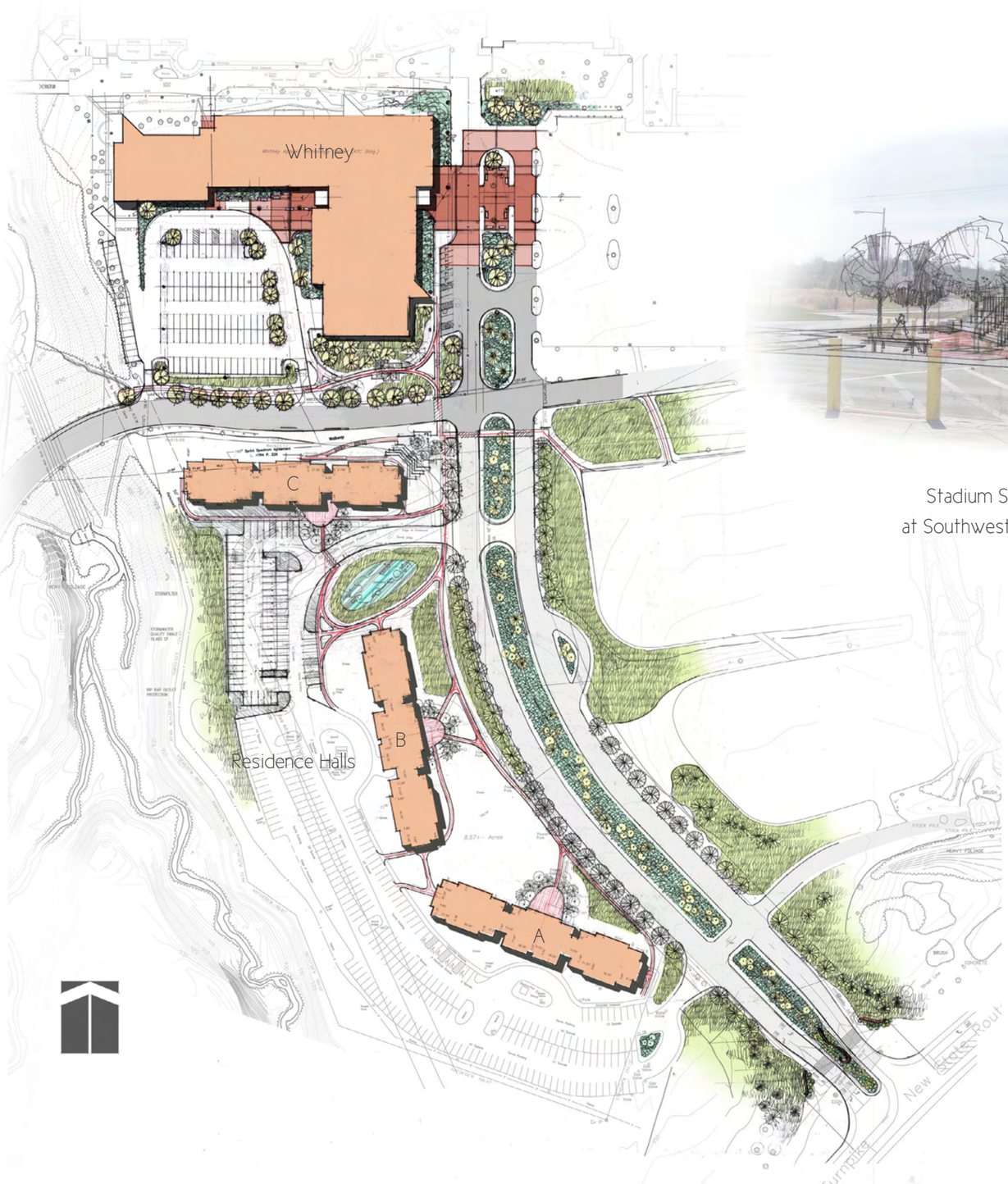
The existing intersection includes a right-turn-only lane, which accommodates vehicular movement to the potential detriment of pedestrian movement. The design challenge is to replace the existing right-turn-only lane with an alternative traffic calming option. Figure C illustrates two alternative options recently considered by the college. Option 1 incorporates a traditional four way stop utilizing removable bollards to allowing flexibility as to when and how the turn lane is used, with the goal of primarily retaining it for pedestrian use. Option 2 incorporates a roundabout. This would reduce driver confusion while allowing for a steady but calm flow of traffic. Gateway design elements reoccur in the roundabout island with plantings, water features, and black granite seat walls.

4. New Meadow Areas

Map 3 illustrates the total percentage of campus, which was mowed lawn before this Plan compared to the total percentage of mowed lawn after the 2009 implementation of this Plan's recommendations. The newly implemented meadow areas on campus during the 2009 growing season reduced significant time and resources spent mowing, enhanced visual variety, reduced stormwater runoff, and increased habitat opportunities on campus.

VanDuyn Hospital Site Conceptual Plan

Figure A:



Stadium Seating/Public Space
at Southwest Corner of Intersection

4

OCC South Campus Entrance Conceptual Plan

Figure B, Option 1:

Rte 175 Entrance Existing Conditions

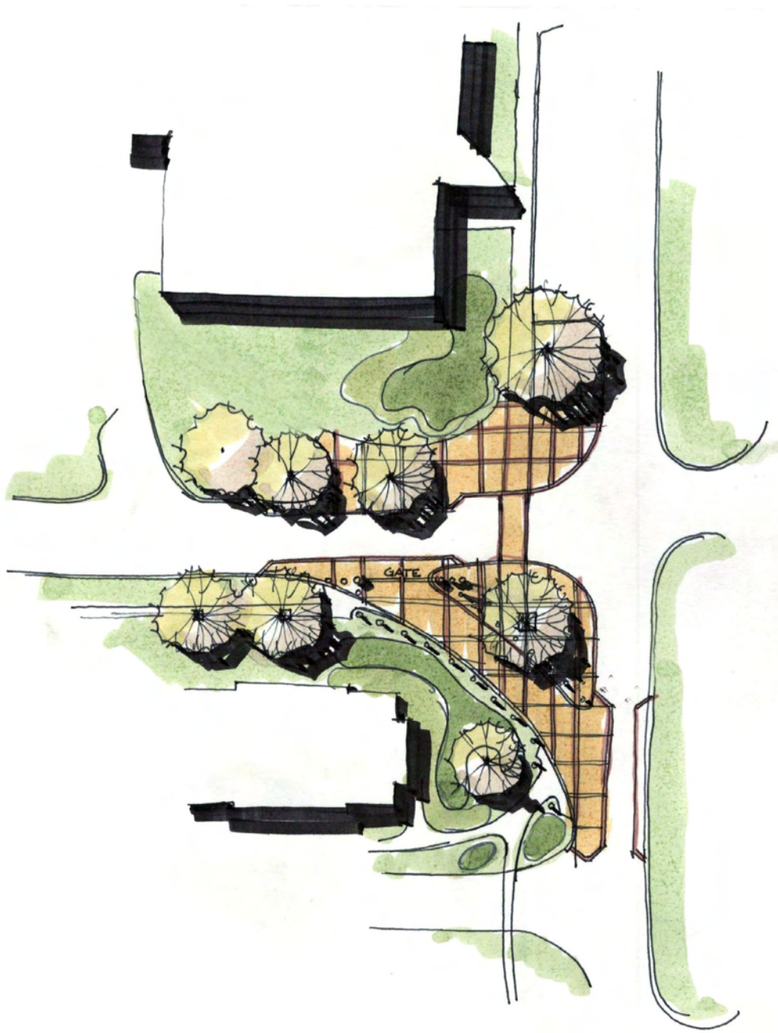
Rte 175 Entrance Conceptual Planting

OCC South Campus Entrance Conceptual Plan

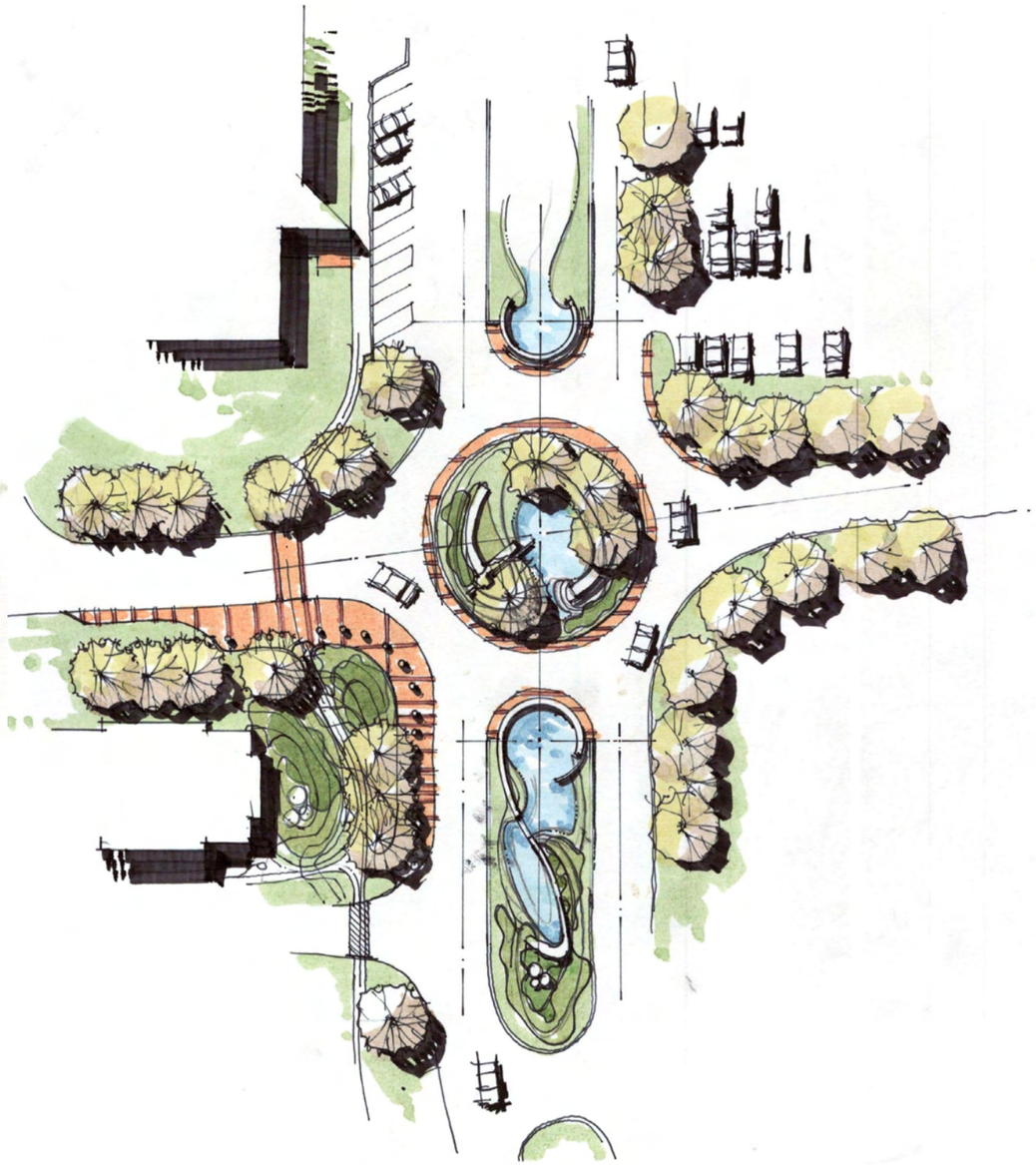
Figure B, Option 2:

OCC Drive South and Loop Road Intersection Conceptual Plans

Figure C:



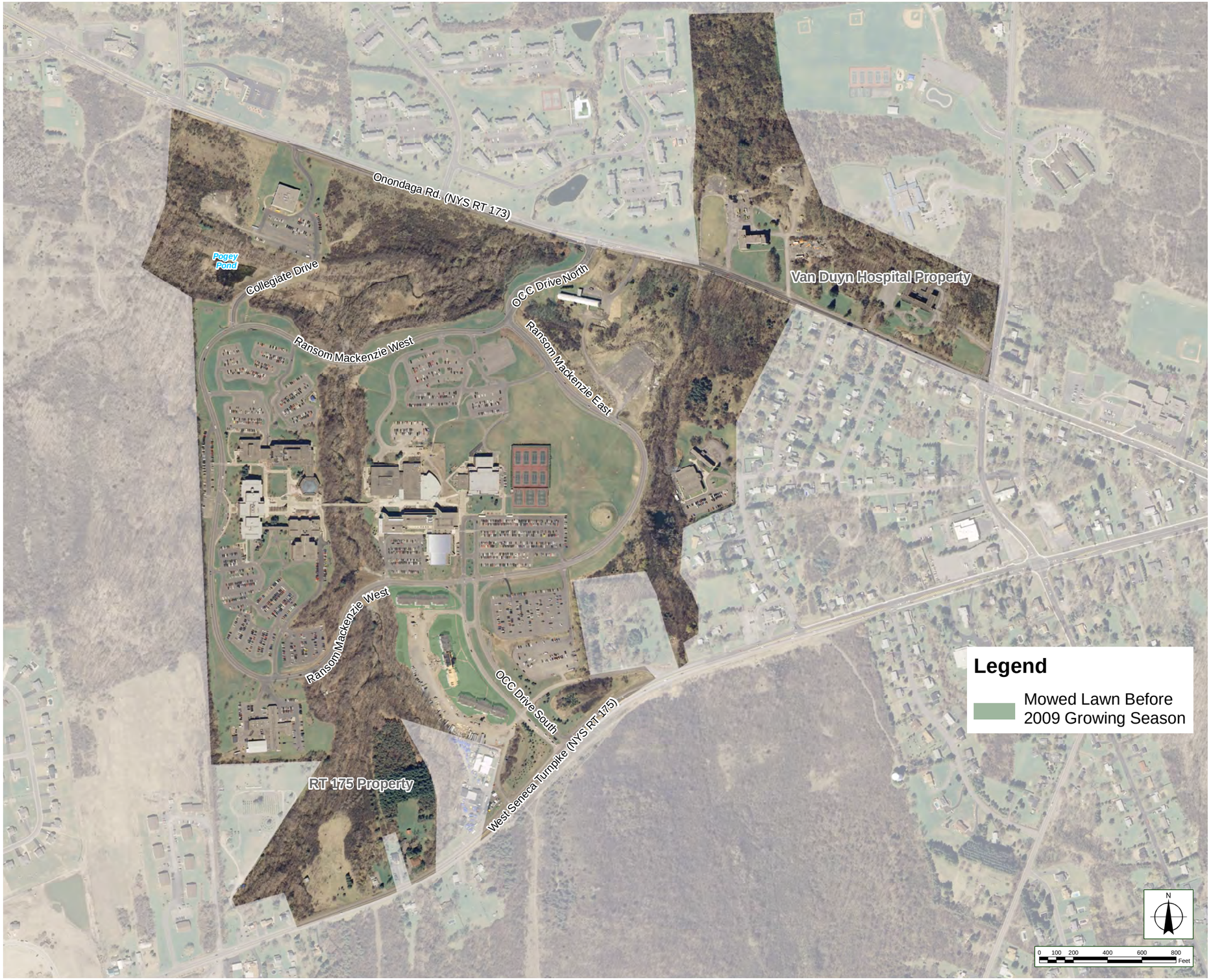
Option 1



Option 2

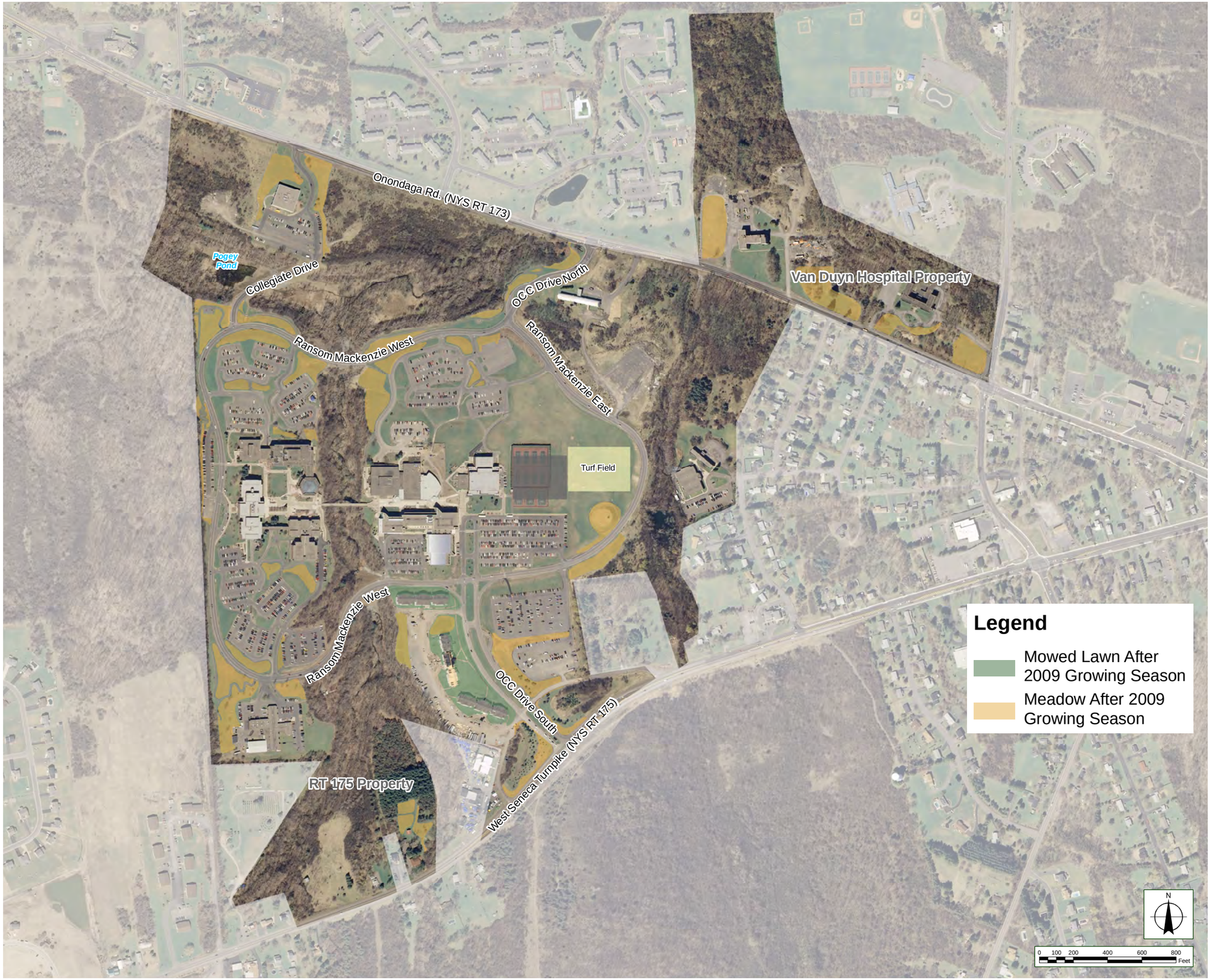
Mowed Lawn Before 2009 Growing Season

Figure D:



Mowed Lawn After 2009 Growing Season

Figure E:



appendix a: glossary a

Aquifer

An aquifer is an underground layer of water-bearing permeable rock or unconsolidated materials (gravel, sand, silt or clay) from which groundwater can be usefully extracted using a water well.

Atmospheric Gases

Atmospheric gases are the gases that make up air. The main gases are nitrogen and oxygen, which make up 78 percent and 21 percent of the volume of air respectively. The remaining one percent of the atmospheric gases is made up of trace gases. These include noble gases, which include argon, neon helium, krypton, and xenon. Hydrogen is also present in trace quantities in the atmosphere. The remaining trace gases include greenhouse gases, such as carbon dioxide, methane, nitrous oxide, water vapour and ozone.

Biochemicals

Biochemicals are the chemical compositions of living systems.

Biodiversity

Biodiversity is the variation of life forms within a given ecosystem, biome, or for the entire Earth.

Climate Neutral

Being climate neutral refers to achieving net zero carbon and other greenhouse gases emissions by balancing a measured amount of carbon released with an equivalent amount sequestered or offset. The amount of greenhouse gases released is measured in terms of their carbon dioxide equivalence. Institutions that have signed the American College & University Presidents Climate Commitment are committed to developing an institutional plan for becoming climate neutral.

a

CO2 Emissions

According to the Environmental Protection Agency (EPA), CO2 emission is carbon dioxide (CO2) emitting naturally through the carbon cycle and through human activities like the burning of fossil fuels.

Compaction

Compaction is the level of compression of a soil. Compaction can impede root growth, or can be used to stabilize soils to support buildings or roads.

Compost

Compost is partially decomposed organic plant and animal matter that can be used as a soil conditioner or fertilizer.

Ecosystem

An ecosystem is a natural unit consisting of all plants, animals, and micro-organisms (biotic factors) in an area functioning together with all of the non-living physical (abiotic) factors of the environment. An ecosystem is a completely independent unit of interdependent organisms, which share the same habitat.

Ecosystem Services

Ecosystem services are natural assets that provide a full suite of goods and services vital to human health and livelihood. Many of these goods and services are traditionally viewed as free benefits to society, or "public goods," such as wildlife habitat and diversity, watershed services, carbon storage, and scenic landscapes.

Erosion

Erosion is the wearing away of land surface by wind or water, intensified by land-clearing practices related to farming, residential, commercial, or industrial development, road building, or logging.

Evapotranspiration

Evapotranspiration is the process of evaporation by transpiration, in which the water contained in vegetation is converted to water vapor and evaporated through leaves.

Greenhouse Gases

Greenhouse gases are any gases that absorb infrared radiation in the atmospheres. Six gases recognized by the Kyoto Protocol are: carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6). Greenhouse gases are involved with the Earth natural greenhouse effect, which keeps the planet warmer than it would be without an atmosphere.

Green Roofs

A green roof is a roof of a building that is partially or completely covered with vegetation and soil, or a growing medium, planted over a waterproofing membrane.

Hardscape

Hardscape is any landscape feature that is not a plant or soil, such as retaining walls, sidewalks, decks, benches, and fences.

Heat Island

According to the Environmental Protection Agency (EPA), the term "heat island" describes built up areas that are hotter than nearby rural areas. Heat islands can affect campuses and communities by increasing summertime peak energy demand, air conditioning costs, air pollution and greenhouse gas emissions, heat-related illness and mortality, and water quality. Trees and vegetation provide a strategy for cooling urban climates through shading and evapotranspiration. Cool pavements with a Solar Reflective Index (SRI) greater than 29 can help to reject solar heat. Also, permeable paving can lower temperatures through evaporative cooling.

a

LED Lighting

A Light Emitting Diode (LED) is a semiconductor device, which converts electricity into light. White LED lamps consume less than a quarter of the electricity than fluorescent lighting does, and LED bulbs can last up to 50,000 hours.

Living Wall

A living wall is a system for vegetation to grow along an interior or exterior wall. Living walls improve air quality and thermal regulation, reduce noise pollution, and enhance the aesthetic beauty of an area.

Low Grass

Low grass is generic term for a grass species or mix of species (typically fescues) that naturally grow to a maximum height of approximately 6" tall. Because the grass only grows this tall, it does not need regular mowing to stay low, but does require mowing once a year.

Meadow

A meadow is a field vegetated primarily by native grasses, wildflowers and other non-woody plants. To maintain a meadow, woody vegetation must be eliminated either through yearly mowing or controlled burns every few years.

Ornamental Planting

A garden composed of plants that may include trees, shrubs, grasses, perennials, ground covers and flowering bulbs designed to enhance a space through the addition of color, texture, variety and sound. Plantings can be designed for specific functions such as to hide unattractive features in the landscape or to draw attention to architecture.

Permeable Paving

Permeable paving is a hard surface that allows stormwater to percolate into the ground instead of running off the surface.

Planted Forest

A restoration planting designed to introduce desired tree species and understory plants to a specific area.

Pollutants

Pollutants contribute to water and air pollution. Examples of water pollutants include: chemicals, such as oil, chlorine, cleaners, pesticides, and fertilizers; significant amounts of leaves and grass clippings; animal waste; soaps; detergents; trash; and air pollution. The six common air pollutants, according to the Environmental Protection Agency (EPA), are: particle pollution (often referred to as particulate matter); ground-level ozone; carbon monoxide (CO); sulfur oxides (SOx); nitrogen oxides (NOx); and lead (Pb). Many of the pollutants can harm animal and human health, and the environment.

Rain Garden

A rain garden is an excavated shallow surface depression planted with native vegetation underlain by a sand or gravel infiltration bed. Rain gardens treat stormwater by ponding water on the ground surface, allowing settling of suspended solids and sediment prior to entering the soil for filtration and pollutant removal. Rain gardens support biodiversity, conserve water, increase groundwater renewal, reduce soil erosion from surface sheet flows, and improve aesthetics.

Raised Pedestrian Median Crossing

A raised pedestrian median crossing is a raised barrier in the center portion of the roadway that can serve as a landing place for pedestrians who cross a street midblock or at an intersection location.

a

Silt
Silt is soil or rock derived granular material of a grain size between sand and clay. Silt may occur as a soil or as suspended sediment in a surface water body.

Siltation
Siltation is the deposition or accumulation of silt. Siltation can negatively influence aquatic habitat, water chemistry, and stream morphology and hydrology.

Soft Landscape Elements
Soft landscape elements are living materials such as plants and trees that form a landscape.

Successional Forest
Successional forests are areas where the natural replacement of tree species and understory plants occurs over time.

Sustainable Sites Initiative™
The Sustainable Sites Initiative™ is an interdisciplinary effort by the American Society of Landscape Architects, the Lady Bird Johnson Wildflower Center, and the United States Botanic Garden to create voluntary national guidelines and performance benchmarks for sustainable land design, construction, and maintenance practices.

Topography
Topography is the description of the Earth's surface shapes and features. For a specific site, topography is typically mapped in one, five, or ten foot elevation contour intervals, which can then be interpreted as regional land forms such as mountains, ridges, hills, ravines, slopes, depressions, rivers, bodies of water, and wetlands.

U.S. Green Building Council's (USGBC) LEED –NC

Leadership in Energy and Environmental Design Green Building Rating System for New Construction (LEED –NC) is a U.S. Green Building Council (USGBC) program designed to guide and distinguish high-performance commercial and institutional projects, including office buildings, high-rise residential buildings, government buildings, recreational facilities, manufacturing plants and laboratories.

Vernal Pond

A vernal pond is a seasonal wetland that is wet in the spring and fall but dries up for part of the summer. It provides habitat for amphibians and some specialized crustaceans and invertebrates.

Viewsheds

A viewshed is an area of land, water, or other environmental element that is visible to the human eye from a fixed vantage point. In planning, viewsheds tend to be areas of particular scenic or historic value that are deemed worthy of preservation against development or other change.

Water Management Areas

Water management areas are areas with created aquatic landscape elements with the intended function of stormwater treatment or flood attenuation.

Watershed

According to the Environmental Protection Agency (EPA), a watershed is the area of land where all of the water that is under it or drains off of it goes in to the same place.

b appendix b: sources

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appendix c: stakeholder meeting minutes

C

MINUTES OF MEETING

Date: October 8, 2008

Reference: OCC Sustainability Master Plan – Kick-off Meeting

EDR Project No. 08088

Present: Dr. Sydow, John Paddock, Steve Suarez, Jim Kelly and Rickey Jenkins of OCC
Jo Anne Gagliano, Sage Gerling and Shelley Norton of EDR

Comments:

Steve Suarez provided EDR with reports and plans including Master Plans, Arts Across Campus, and The Sustainability Report for their use. The Master Plan update has a sustainable section.

Dr. Sydow joined the meeting and discussed recent changes to and acquisitions to the Campus as well as her vision for a more sustainable campus (summary below).

A Master Plan was done in 2002. Since then, the College has started a $50,000,000 Capital Improvement Plan, moved the Children's Learning Center to allow program expansion, and increased its acreage from 184 to 230 acres by acquiring a 14 acre tract on Rt. 175 and the Old County Poor Farm off Onondaga Rd. The 14-acre tract is separated from the campus by a gorge. The Old County Poor Farm property has two vacant buildings and abuts Santaro Memorial Park. It is necessary to make the two new properties look and feel like the rest of the college.

Old County Poor Farm vision in the next 5-6 years:

- *Yellow Building to become Public Safety building with indoor firing range (soon).*
- *Enhance park-like feel and unify grounds – remove debris/concrete.*
- *Expand cross-country trails, link to Santaro Memorial Park and allow community recreation.*
- *Red Building to become Regional Community Learning Center for OCC and area colleges.*

14-acre tract off Rt. 175:

- *Investigate potential Federal Grants to build a bridge between the student housing and new property across the gorge. Consider pedestrian or vehicular accessibility.*

Additional campus visions:

- *Introduce nature into the Quad*
- *Initiate changes incrementally in phases*
- *Develop pedestrian favored circulation - avoiding vehicular conflicts*
- *Establish visual links between the existing campus and new properties*
- *Strive for low maintenance design solutions that provide beautification*
- *Strive to reduce the campus carbon footprint*

Steve suggested scheduling the first public campus-wide meeting on October 22nd because it is Campus Sustainability Day. EDR agreed to this date. Steve plans to send a broadcast email to invite the campus community and expects interest from the architecture professors, the Whole Earth

Club and Professor Peter Kraal in the biology department and those in the grounds department. The room where it will be held seats 100. EDR has been asked to give a 20-minute PowerPoint presentation using their interview materials as an introduction to the project. Participants will then be divided into 2 or 3 groups for discussion/participation.

Maps were reviewed and the new properties pointed out. A new housing development is under development adjacent to the west property line and will require a road right of way across OCC property. In exchange, a buffer could be required to screen the development. There was discussion regarding whether a recreational link between this development and the campus is desirable but nothing conclusive was decided.

Jim and Steve will conduct a campus tour for EDR on October 14th.

These meeting minutes have been prepared by **Shelley Norton** of Environmental Design & Research. If there are any discrepancies, please notify our office within three business days of receipt.

MINUTES OF DESIGN CHARETTE

Date: October 22, 2008

Reference: OCC Sustainable Landscape Master Plan

EDR Project No. 000

Present: Steve Suarez and Jim Kelly of OCC; Jo Anne Gagliano, Sage Gerling and Shelley Norton of EDR, members of OCC faculty, staff and student body

Small Group Comments:

Group 1 (architecture professors and student, biology professor, and grounds staff)-

1. Favorite places and places with potential:
   - Views (from buildings, from bridge)
   - 3rd floor of Whitney
   - View of woods from Ferrante
   - Natural parts of campus
   - Wetland at Coyne, pond, deer
   - Bridge- view of gorge, sound of water
   - Sculpture
   - Platform of greenspace adjacent to Whitney near gorge and bridge – no wind, quiet
   - North side of Gordon has great potential if a balcony or patio was added
   - Gordon and Whitney lack gathering spaces

2. Least favorite places:
   - Quad
   - Dumpsters – feral cats
   - Area around dorms – plant materials won't grow
   - Cross-walks
   - Smoking areas
   - West exit of Lot 13

3. Problems/Concerns:
   - Stacking of cars waiting to go to the grounds building
   - Pedestrian/Vehicle conflicts at housing
   - Adjust width of road – restripe to allow generous walking/bike path
   - Walks – consider winter conditions and providing separation from road for easier maintenance and safety. Wider walks in better locations.
   - Lack of walks require pedestrians to walk in the road or through parking drive lanes like at Whitney and SVC maintenance
   - Snow removal
   - Terrace on Whitney is very windy – umbrellas removed from seating area so now it's too sunny.

- Lack of walking path complete around campus

4. General comments:
   - Trash issue – student disrespect for campus
   - Smoking issues – students smoke in non-smoking areas, put out buts on no smoking signs. Non-smoking areas need enforcement.
   - Soil surrounding dorms is sub-soil, 2nd planting of trees right now (dying)
   - No curbs – narrow walks
   - Signage is too much – cluttered & overkill
   - Getting out the word – public knowledge about what changes are being made and what to expect.
   - Maintenance concerns – how to maintain without added time, grounds dept. spends a lot of time on moving and setting up equipment around campus.
   - New equipment and employee education required for changes to campus and new maintenance techniques
   - Concern for job loss if mowing is reduced
   - Compost area is unsightly and some of the bagged material gets left about and rots in the bags.
   - Safety concerns – regulations
   - Landscape fabric – no or yes

5. Wish list/challenge ideas:
   - Green roofs (idea was for Gordon to enhance view from Whitney)
   - Formalize compost area
   - Educational signs

6. User groups and courses to get involved in the educational process:
   - Student association and RA's
   - Whole Earth Club
   - Architecture Dept.

Group 2 (staff and professors)-

7. Favorite Places:
   - Indian ritual grounds inside new Seneca Turnpike property (where the two creeks meet)
   - Panoramic views from Whitney (third floor looking to the City)
   - The view from old Children's Learning Center picnic tables
   - Existing walking trail
   - The City view from the edge of the parking area in front of the new athletic fields
   - The view from backside of Ferrante looking toward the tree line to the west
   - Pond area between campus loop road and Coyne building (Biology classes use this, wildlife such as foxes and frogs observed)
   - Attractive entrance view from Route 175

8. Student "Hang out" Spots

- Hill outside Whitney Center facing Gordon
- Allée between quad and Gordon Student Center
- Outside areas near parking lot between Whitney Center and Health, Physical Education and Recreation Building

9. Problems:
   - Lack of recreational trail/sidewalk in a complete loop around campus.
   - Walking traffic flow issues.
   - Lack of pedestrian/bike connection between campus and the Old County Poor Farm property on Onondaga Rd.
   - Poor lighting and not enough call boxes along main quad path between bridge and Whitney and Mawhinney.
   - Speeding traffic from Service and Maintenance to Whitney and no sidewalk
   - Speeding traffic on loop road by new fields and no sidewalk
   - Upper area behind barn (across from new field)
   - Landscape around residence halls in poor condition
   - Shortage of athletic fields for different uses mainly in summer
   - Need more bus stop space in front of Mawhinney Hall
   - Underutilized areas and patio space west of the Student Center and east of Ferrante Hall by gorge
   - Onondaga Rd. entrance – right side hill and barn on left not aesthetically pleasing

10. Wish List – Challenge ideas:
    - Covered hang out areas
    - Large sundial (behind Coulter Library Building towards parking area)
    - Nature Trail (multiple areas)
    - Plant a tree for every parking space
    - Community vegetable garden – (New location: north of the Health, Physical Education and Recreation Building) (Current users/area: College for Living (Coyne Building)
    - Bike racks with rain shields (electric bikes paver source)
    - Bridge gateways – rain shield (future- provide power source for electric bikes)
    - Traffic speed calming
    - Bus stop more shelter
    - Restripe loop road to accommodate bicycle traffic
    - Varied landscaping for teaching/curriculum (For example create moss area east of the Ferrante building next to gorge.)
    - Use flat area on west side of Old County Poor Farm for athletic fields
    - Create bike path from Santaro Memorial Park through the Old County Poor Farm to campus
    - Utilize the water/mini gorge area located near the parking area of Coulter Library for walking/sitting areas/educational classes
    - Utilize land east of Coyne Hall

11. User groups and courses to get involved in the educational process:

- Ecology
- General Biology (seasonal difficulties)
- Whole Earth Club - composting

These meeting minutes have been prepared by **Shelley Norton and Sage Gerling** of Environmental Design & Research. If there are any discrepancies, please notify our office within three business days of receipt.

MINUTES OF DESIGN CHARRETTE

Date: February 3, 2009

Reference: OCC Sustainable Landscape Master Plan

EDR Project No. 08088

Present: Student representatives
Jim Kelly, OCC
Steve Suarez, OCC
Sage Gerling, EDR
Shelley Norton, EDR

Group Comments:

1. Favorite places:
   - Bridge is a hangout spot.
   - In Gordon Center.
   - Steps of Whitney across from Gordon Center, good place to play Frisbee and hacky sack.

2. Least favorite places:
   - Front entrance to Building A dormitory feels isolated and unwelcoming.
   - Too many smokers in front of Mawhinney Hall, quad area by Coulter Library, and between Gordon Center and the Bridge.
   - The quad by Ferrante Hall is an unused area, it has wifi but lacks tables, benches, and trees.

3. Problems/Concerns:
   - Parking lot east of OCC Drive South full by 9 AM.
   - Cars do not stop for pedestrians crossing Ransom Mackenzie East from the parking lot east of OCC Drive South.
   - Cafeteria lacks healthy food choices and is expensive.
   - Bridge needs to be covered for bad weather and needs to be better lit at night.
   - Rec room in Whitney lacks variety and is too far to walk to from the dormitories in cold weather.

4. General comments:
   - Dorm parking lot is the only hangout area, however, it lacks benches.
   - Students access the gorge west of the Building C dormitory.

5. Wish list/challenge ideas:
   - Outdoor gathering spaces with some shading (such as gazebo and trees) for each dorm building. Multiple seating areas and wifi for each, use side of building facing road not parking. Designate the areas as no smoking.

- Wifi at all outside gathering locations.
- Fishing pond with turtles.
- Benches east of Gordon Center.
- Gorge trails
- Shade for tables at overlook between Gordon Center and Health, Recreation, and Physical Education Building.

6. Suggestions for user groups and courses to get involved in the educational process during implementation and promotion of stormwater sustainable practices, such as a rain garden or green roof:
   - Civil engineering courses

These meeting minutes have been prepared by **Shelley Norton and Sage Gerling** of Environmental Design & Research. If there are any discrepancies, please notify our office within three business days of receipt.

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MINUTES OF MEETING

Date: March 26, 2009

Reference: OCC Sustainable Landscape Master Plan – draft review

EDR Project No. 08088

Present: Dr. Sydow, President, OCC
Bill Emm, OCC
Steve Suarez , OCC
Jim Kelly, OCC
John Paddock, OCC
Joe Kopec, OCC
Jo Anne Gagliano, EDR
Shelley Norton, EDR

Comments:

EDR informally presented the Draft Sustainable Landscape Master Plan and its content. Dr. Sydow asked questions for clarification and to focus the presentation on areas of particular interest. Comments from meeting attendees briefly summarized are:

1. Dr. Sydow expressed surprise and appreciation that habitat and human experience improvements were included in the plan.
2. Dr. Sydow expressed concern/questioned improving pollination opportunities on campus because it might exacerbate allergy suffering. It was agreed that plant selection should take allergies into account by limiting scents and recognizing that crop plants often have the worst allergy effects.
3. Dr. Sydow liked the recommendation for educational signage for gardens and plant communities including habitat information and the development of an educational walking tour.
4. EDR suggested inclusion of a glossary of terms in the plan and everyone agreed. EDR will provide Dr. Sydow with the glossary to facilitate her review of the plan.
5. Dr. Sydow requires more time for her review of the plan. EDR will continue to accept comments through the week of April 20th and will then finalize the Master Plan. Implementation of the draft plan will, however, begin immediately upon execution of the contract extension agreement.
6. EDR presented images of movable seating options in a campus setting. This met with enthusiastic conversation for how it might be used in OCC's quad area.
7. EDR was requested to elaborate on the nature center idea by reviewing recommendations in OCC's Facilities Master Plan.
8. The existing building on the newly acquired Rt. 175 property is under consideration for a demonstration green building. It was suggested that this be incorporated into EDR's Plan.

9. EDR was requested to elaborate on the possibilities for the Van Duyn Hospital property. EDR will add suggested playing field locations to the plan maps.
10. It was noted that the first draft of OCC's Sustainability Plan will be available on May 15th. EDR requests a copy when it is available.
11. It was agreed that determining the new mow line is a priority before mowing starts this spring. Marketing the idea on campus and installing temporary signs will be required. EDR will help determine the new mow lines.
12. It was decided that other plan recommendations, in addition to the mowing, should be made in one area first to see the results. The selected area encompasses the Rt. 175 campus entrance, OCC Drive South, the residence halls and the parking next to Whitney Hall.
13. Dr. Sydow was advised that EDR has been asked to work on a design for the parking and circulation outside of Whitney Hall.
14. Dr. Sydow indicated that she wants to proceed with the projects listed below.

Next steps:

1. EDR will provide an hourly rate not-to-exceed fee proposal as an extension to the current contract, including the following services:
    a. Map the new mow lines for the entire campus, set wire flags, meet with OCC to review the effect after mowing has occurred a couple of times, and GPS locate the final mow lines before fall. Steve Suarez anticipates that approximately 3-4 weeks remain before mowing commences for the season.
    b. Develop concept alternatives for the redesign of Whitney parking lot vehicular and pedestrian circulation including pedestrian crossings, sidewalks and the major road intersections.
    c. Develop concept alternatives for the area described in number twelve above. These designs should utilize recommendations in the plan including gathering spaces near the residence halls, bike lanes, bike parking and rain gardens.
    d. The MS4 mapping proposal dated March 6, 2009 already submitted, attached.

2. Formation of a Task Force for Sustainability. This will be directed by the executive council (campus Vice President's and Marketing). Bill Emm and the Facilities Department will work closely with them to implement the plan.
3. Joe Kopec will provide EDR with drawings/designs of the new road entry monuments.

These meeting minutes have been prepared by **Shelley Norton** of Environmental Design & Research. If there are any discrepancies, please notify our office within three business days of receipt.

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MINUTES OF MEETING

Date: April 2, 2009

Reference: OCC Sustainable Landscape Master Plan – review meeting

EDR Project No. 08088

Present: Amy Kremenek, OCC
Steve Suarez, OCC
Jim Kelly, OCC
John Paddock, OCC
Joe Kopec, OCC
Jo Anne Gagliano, EDR
Shelley Norton, EDR

Following is a summary of the discussion with Amy:

1. Amy's department is trying to infuse everything the college does with the college credo "Explore Discover Transform." Amy and EDR will identify places in the report to add this language (page 5 was identified in the meeting.)

2. Amy pointed to one of the report goals listed on page 8 of the report to "revitalize the campus into a sustainable landscape showcase" and stated her agreement with this goal. She pointed out that she has seen sustainable landscapes implemented in other cities but hasn't seen much happen in Syracuse. EDR agreed that this activity is limited locally. She went on to say that OCC has the opportunity to educate the community and help change local behavior. The college website and educational signs will be important tools in this endeavor. She is in full support of significant lawn mowing reductions this year. She is concerned that they are risking the credibility of their sustainability initiatives because of all the mowing done on campus.

3. She concurred with EDR's observations that there is not enough outdoor seating on campus and noted that there aren't any level play areas near the residence halls.

4. Parking is a primary concern for students. The addition of new parking has not eliminated student concerns, suggesting that it may be a perception problem, not a physical lack of parking spaces. Amy suggested that plan recommendations such as paths protected from the wind and improved parking layout might improve these perceptions.

5. The Van Duyn Hospital Property has a beautiful historic building. The college's intent is to highlight this architecture and history of the site. Amy suggested lighting be used to highlight the building face. When the building is refurbished, part of it will be used to display historic photos. The building will not be ready for occupancy for a couple of years. In the interim, it is important that the building and landscape look well maintained and occupied. There is

concern that if the current open space recommendations are put in place the property might look abandoned. It was generally agreed that the front yard should receive a more manicured treatment and that this might include mown lawn.

6. The user group for this building will be adult commuter students taking classes from various SUNY schools in the region. Outdoor seating should be provided. A detailed design of this area is not in EDR's current scope, but will be necessary.

The following course of action was suggested for marketing the upcoming landscape changes to the campus community:

1. The main focus will be on communications through the website. Scott from her department will take the lead.
2. Post images of sustainable design in buildings around campus showing examples of the proposed changes. She suggested using the perspective sketches from the EDR report as well as photos from other sites showing similar improvements. EDR will be informed as to what is needed.
3. Notify the College Board at their meeting in May about planned changes.
4. EDR will present the draft plan to the campus at an event during the Earth Day week. Steve Suarez suggested that Dr. Sydow open the meeting.

These meeting minutes have been prepared by **Shelley Norton** of Environmental Design & Research. If there are any discrepancies, please notify our office within three business days of receipt.

appendix d: u.s. green building council's leed® rating system

D

Sustainable Sites

SS Prerequisite 1: Construction Activity Pollution Prevention Required

Intent

Reduce pollution from construction activities by controlling soil erosion, waterway sedimentation and airborne dust generation.

Requirements

Create and implement an Erosion and Sedimentation Control (ESC) Plan for all construction activities associated with the project. The ESC Plan shall conform to the erosion and sedimentation requirements of the 2003 EPA Construction General Permit OR local erosion and sedimentation control standards and codes, whichever is more stringent. The Plan shall describe the measures implemented to accomplish the following objectives:

- ❑ Prevent loss of soil during construction by stormwater runoff and/or wind erosion, including protecting topsoil by stockpiling for reuse.
- ❑ Prevent sedimentation of storm sewer or receiving streams.
- ❑ Prevent polluting the air with dust and particulate matter.

The Construction General Permit (CGP) outlines the provisions necessary to comply with Phase I and Phase II of the National Pollutant Discharge Elimination System (NPDES) program. While the CGP only applies to construction sites greater than 1 acre, the requirements are applied to all projects for the purposes of this prerequisite. Information on the EPA CGP is available at: http://cfpub.epa.gov/npdes/stormwater/cgp.cfm.

Potential Technologies & Strategies

Create an Erosion and Sedimentation Control Plan during the design phase of the project. Consider employing strategies such as temporary and permanent seeding, mulching, earth dikes, silt fencing, sediment traps and sediment basins.

SS Credit 1: Site Selection
1 Point

Intent

Avoid development of inappropriate sites and reduce the environmental impact from the location of a building on a site.

Requirements

Do not develop buildings, hardscape, roads or parking areas on portions of sites that meet any one of the following criteria:

- ❑ Prime farmland as defined by the United States Department of Agriculture in the United States Code of Federal Regulations, Title 7, Volume 6, Parts 400 to 699, Section 657.5 (citation 7CFR657.5)
- ❑ Previously undeveloped land whose elevation is lower than 5 feet above the elevation of the 100-year flood as defined by FEMA (Federal Emergency Management Agency)
- ❑ Land that is specifically identified as habitat for any species on Federal or State threatened or endangered lists
- ❑ Within 100 feet of any wetlands as defined by United States Code of Federal Regulations 40 CFR, Parts 230-233 and Part 22, and isolated wetlands or areas of special concern identified by state or local rule, OR within setback distances from wetlands prescribed in state or local regulations, as defined by local or state rule or law, whichever is more stringent
- ❑ Previously undeveloped land that is within 50 feet of a water body, defined as seas, lakes, rivers, streams and tributaries which support or could support fish, recreation or industrial use, consistent with the terminology of the Clean Water Act
- ❑ Land which prior to acquisition for the project was public parkland, unless land of equal or greater value as parkland is accepted in trade by the public landowner (Park Authority projects are exempt)

Potential Technologies & Strategies

During the site selection process, give preference to those sites that do not include sensitive site elements and restrictive land types. Select a suitable building location and design the building with the minimal footprint to minimize site disruption of those environmentally sensitive areas identified above.

SS Credit 2: Development Density & Community Connectivity
1 Point

Intent

Channel development to urban areas with existing infrastructure, protect greenfields and preserve habitat and natural resources.

Requirements

OPTION 1 — DEVELOPMENT DENSITY

Construct or renovate building on a previously developed site AND in a community with a minimum density of 60,000 square feet per acre net (Note: density calculation must include the area of the project being built and is based on a typical two-story downtown development).

OR

OPTION 2 — COMMUNITY CONNECTIVITY

Construct or renovate building on a previously developed site AND within 1/2 mile of a residential zone or neighborhood with an average density of 10 units per acre net AND within 1/2 mile of at least 10 Basic Services AND with pedestrian access between the building and the services.

Basic Services include, but are not limited to:

1) Bank; 2) Place of Worship; 3) Convenience Grocery; 4) Day Care; 5) Cleaners; 6) Fire Station; 7) Beauty; 8) Hardware; 9) Laundry; 10) Library; 11) Medical/Dental; 12) Senior Care Facility; 13) Park; 14) Pharmacy; 15) Post Office; 16) Restaurant; 17) School; 18) Supermarket; 19) Theater; 20) Community Center; 21) Fitness Center; 22) Museum.

Proximity is determined by drawing a 1/2 mile radius around the main building entrance on a site map and counting the services within that radius.

Potential Technologies & Strategies

During the site selection process, give preference to urban sites with pedestrian access to a variety of services.

SS Credit 3: Brownfield Redevelopment
1 Point

Intent

Rehabilitate damaged sites where development is complicated by environmental contamination, reducing pressure on undeveloped land.

Requirements

Develop on a site documented as contaminated (by means of an ASTM E1903-97 Phase II Environmental Site Assessment or a local Voluntary Cleanup Program) OR on a site defined as a brownfield by a local, state or federal government agency.

Potential Technologies & Strategies

During the site selection process, give preference to brownfield sites. Identify tax incentives and property cost savings. Coordinate site development plans with remediation activity, as appropriate.

SS Credit 4.1: Alternative Transportation: Public Transportation Access

1 Point

Intent

Reduce pollution and land development impacts from automobile use.

Requirements

Locate project within 1/2 mile of an existing, or planned and funded, commuter rail, light rail or subway station.

OR

Locate project within 1/4 mile of one or more stops for two or more public or campus bus lines usable by building occupants.

Potential Technologies & Strategies

Perform a transportation survey of future building occupants to identify transportation needs. Site the building near mass transit.

SS Credit 4.2: Alternative Transportation: Bicycle Storage & Changing Rooms

1 Point

Intent

Reduce pollution and land development impacts from automobile use.

Requirements

For commercial or institutional buildings, provide secure bicycle racks and/or storage (within 200 yards of a building entrance) for 5% or more of all building users (measured at peak periods), AND, provide shower and changing facilities in the building, or within 200 yards of a building entrance, for 0.5% of Full-Time Equivalent (FTE) occupants.

OR

For residential buildings, provide covered storage facilities for securing bicycles for 15% or more of building occupants in lieu of changing/shower facilities.

Potential Technologies & Strategies

Design the building with transportation amenities such as bicycle racks and showering/changing facilities.

SS Credit 4.3: Alternative Transportation: Low Emitting & Fuel Efficient Vehicles

1 Point

Intent

Reduce pollution and land development impacts from automobile use.

Requirements

OPTION 1

Provide low-emitting and fuel-efficient vehicles for 3% of Full-Time Equivalent (FTE) occupants AND provide preferred parking for these vehicles.

OR

OPTION 2

Provide preferred parking for low-emitting and fuel-efficient vehicles for 5% of the total vehicle parking capacity of the site.

OR

OPTION 3

Install alternative-fuel refueling stations for 3% of the total vehicle parking capacity of the site (liquid or gaseous fueling facilities must be separately ventilated or located outdoors).

For the purposes of this credit, low-emitting and fuel-efficient vehicles are defined as vehicles that are either classified as Zero Emission Vehicles (ZEV) by the California Air Resources Board or have achieved a minimum green score of 40 on the American Council for an Energy Efficient Economy (ACEEE) annual vehicle rating guide.

"Preferred parking" refers to the parking spots that are closest to the main entrance of the project (exclusive of spaces designated for handicapped) or parking passes provided at a discounted price.

Potential Technologies & Strategies

Provide transportation amenities such as alternative fuel refueling stations. Consider sharing the costs and benefits of refueling stations with neighbors.

SS Credit 4.4: Alternative Transportation: Parking Capacity
1 Point

Intent

Reduce pollution and land development impacts from single occupancy vehicle use.

Requirements

OPTION 1 — NON-RESIDENTIAL

❑ Size parking capacity to meet, but not exceed, minimum local zoning requirements, AND, provide preferred parking for carpools or vanpools for 5% of the total provided parking spaces.

OR

OPTION 2 — NON-RESIDENTIAL

For projects that provide parking for less than 5% of FTE building occupants:

❑ Provide preferred parking for carpools or vanpools, marked as such, for 5% of total provided parking spaces.

OR

OPTION 3 — RESIDENTIAL

❑ Size parking capacity to not exceed minimum local zoning requirements, AND, provide infrastructure and support programs to facilitate shared vehicle usage such as carpool drop-off areas, designated parking for vanpools, or car-share services, ride boards, and shuttle services to mass transit.

OR

OPTION 4 — ALL

Provide no new parking.

"Preferred parking" refers to the parking spots that are closest to the main entrance of the project (exclusive of spaces designated for handicapped) or parking passes provided at a discounted price.

Potential Technologies & Strategies

Minimize parking lot/garage size. Consider sharing parking facilities with adjacent buildings. Consider alternatives that will limit the use of single occupancy vehicles.

SS Credit 5.1: Site Development: Protect or Restore Habitat
1 Point

Intent

Conserve existing natural areas and restore damaged areas to provide habitat and promote biodiversity.

Requirements

OPTION 1

On greenfield sites, limit all site disturbance to 40 feet beyond the building perimeter; 10 feet beyond surface walkways, patios, surface parking and utilities less than 12 inches in diameter; 15 feet beyond primary roadway curbs and main utility branch trenches; and 25 feet beyond constructed areas with permeable surfaces (such as pervious paving areas, stormwater detention facilities and playing fields) that require additional staging areas in order to limit compaction in the constructed area.

OR

OPTION 2

On previously developed or graded sites, restore or protect a minimum of 50% of the site area (excluding the building footprint) with native or adapted vegetation. Native/adapted plants are plants indigenous to a locality or cultivars of native plants that are adapted to the local climate and are not considered invasive species or noxious weeds. Projects earning SS Credit 2 and using vegetated roof surfaces may apply the vegetated roof surface to this calculation if the plants meet the definition of native/adapted.

Greenfield sites are those that are not previously developed or graded and remain in a natural state. Previously developed sites are those that previously contained buildings, roadways, parking lots, or were graded or altered by direct human activities.

Potential Technologies & Strategies

On greenfield sites, perform a site survey to identify site elements and adopt a master plan for development of the project site. Carefully site the building to minimize disruption to existing ecosystems and design the building to minimize its footprint. Strategies include stacking the building program, tuck-under parking and sharing facilities with neighbors. Establish clearly marked construction boundaries to minimize disturbance of the existing site and restore previously degraded areas to their natural state. For previously developed sites, utilize local and regional governmental agencies, consultants, educational facilities, and native plant societies as resources for the selection of appropriate native or adapted plant materials. Prohibit plant materials listed as invasive or noxious weed species. Native/adapted plants require minimal or no irrigation following establishment, do not require active maintenance such as mowing or chemical inputs such as fertilizers, pesticides or herbicides, and provide habitat value and promote biodiversity through avoidance of monoculture plantings.

SS Credit 5.2: Site Development: Maximize Open Space
1 Point

Intent

Provide a high ratio of open space to development footprint to promote biodiversity.

Requirements

OPTION 1

Reduce the development footprint (defined as the total area of the building footprint, hardscape, access roads and parking) and/or provide vegetated open space within the project boundary to exceed the local zoning's open space requirement for the site by 25%.

OR

OPTION 2

For areas with no local zoning requirements (e.g., some university campuses, military bases), provide vegetated open space area adjacent to the building that is equal to the building footprint.

OR

OPTION 3

Where a zoning ordinance exists, but there is no requirement for open space (zero), provide vegetated open space equal to 20% of the project's site area.

ALL OPTIONS:

- ❑ For projects located in urban areas that earn SS Credit 2, vegetated roof areas can contribute to credit compliance.
- ❑ For projects located in urban areas that earn SS Credit 2, pedestrian oriented hardscape areas can contribute to credit compliance. For such projects, a minimum of 25% of the open space counted must be vegetated.
- ❑ Wetlands or naturally designed ponds may count as open space if the side slope gradients average 1:4 (vertical: horizontal) or less and are vegetated.

Potential Technologies & Strategies

Perform a site survey to identify site elements and adopt a master plan for development of the project site. Select a suitable building location and design the building with a minimal footprint to minimize site disruption. Strategies include stacking the building program, tuck-under parking and sharing facilities with neighbors to maximize open space on the site.

SS Credit 6.1: Stormwater Design: Quantity Control
1 Point

Intent

Limit disruption of natural water hydrology by reducing impervious cover, increasing on-site infiltration, reducing or eliminating pollution from stormwater runoff, and eliminating contaminants.

Requirements

CASE 1 — EXISTING IMPERVIOUSNESS IS LESS THAN OR EQUAL TO 50%

Implement a stormwater management plan that prevents the post-development peak discharge rate and quantity from exceeding the pre-development peak discharge rate and quantity for the one- and two-year 24-hour design storms.

OR

Implement a stormwater management plan that protects receiving stream channels from excessive erosion by implementing a stream channel protection strategy and quantity control strategies.

OR

CASE 2 — EXISTING IMPERVIOUSNESS IS GREATER THAN 50%

Implement a stormwater management plan that results in a 25% decrease in the volume of stormwater runoff from the two-year 24-hour design storm.

Potential Technologies & Strategies

Design the project site to maintain natural stormwater flows by promoting infiltration. Specify vegetated roofs, pervious paving, and other measures to minimize impervious surfaces. Reuse stormwater volumes generated for non-potable uses such as landscape irrigation, toilet and urinal flushing and custodial uses.

SS Credit 6.2: Stormwater Design: Quality Control
1 Point

Intent

Limit disruption and pollution of natural water flows by managing stormwater runoff.

Requirements

Implement a stormwater management plan that reduces impervious cover, promotes infiltration, and captures and treats the stormwater runoff from 90% of the average annual rainfall[1] using acceptable best management practices (BMPs).

BMPs used to treat runoff must be capable of removing 80% of the average annual post development total suspended solids (TSS) load based on existing monitoring reports. BMPs are considered to meet these criteria if (1) they are designed in accordance with standards and specifications from a state or local program that has adopted these performance standards, or (2) there exists in-field performance monitoring data demonstrating compliance with the criteria. Data must conform to accepted protocol (e.g., Technology Acceptance Reciprocity Partnership [TARP], Washington State Department of Ecology) for BMP monitoring.

Potential Technologies & Strategies

Use alternative surfaces (e.g., vegetated roofs, pervious pavement or grid pavers) and nonstructural techniques (e.g., rain gardens, vegetated swales, disconnection of imperviousness, rainwater recycling) to reduce imperviousness and promote infiltration thereby reducing pollutant loadings.

Use sustainable design strategies (e.g., Low Impact Development, Environmentally Sensitive Design) to design integrated natural and mechanical treatment systems such as constructed wetlands, vegetated filters, and open channels to treat stormwater runoff.

1 In the United States, there are three distinct climates that influence the nature and amount of rainfall occurring on an annual basis. Humid watersheds are defined as those that receive at least 40 inches of rainfall each year, Semi-arid watersheds receive between 20 and 40 inches of rainfall per year, and Arid watersheds receive less than 20 inches of rainfall per year. For this credit, 90% of the average annual rainfall is equivalent to treating the runoff from:

(a) Humid Watersheds – 1 inch of rainfall;

(b) Semi-arid Watersheds – 0.75 inches of rainfall; and

(c) Arid Watersheds – 0.5 inches of rainfall.

SS Credit 7.1: Heat Island Effect: Non-Roof
1 Point

Intent

Reduce heat islands (thermal gradient differences between developed and undeveloped areas) to minimize impact on microclimate and human and wildlife habitat.

Requirements

OPTION 1

Provide any combination of the following strategies for 50% of the site hardscape (including roads, sidewalks, courtyards and parking lots):

❑ Shade (within 5 years of occupancy)

❑ Paving materials with a Solar Reflectance Index (SRI)[2] of at least 29

❑ Open grid pavement system

OR

OPTION 2

Place a minimum of 50% of parking spaces under cover (defined as under ground, under deck, under roof, or under a building). Any roof used to shade or cover parking must have an SRI of at least 29.

Potential Technologies & Strategies

Shade constructed surfaces on the site with landscape features and utilize high-reflectance materials for hardscape. Consider replacing constructed surfaces (i.e. roof, roads, sidewalks, etc.) with vegetated surfaces such as vegetated roofs and open grid paving or specify high-albedo materials to reduce the heat absorption.

2 The Solar Reflectance Index (SRI) is a measure of the constructed surface's ability to reflect solar heat, as shown by a small temperature rise. It is defined so that a standard black (reflectance 0.05, emittance 0.90) is 0 and a standard white (reflectance 0.80, emittance 0.90) is 100. To calculate the SRI for a given material, obtain the reflectance value and emittance value for the material. SRI is calculated according to ASTM E 1980-01. Reflectance is measured according to ASTM E 903, ASTM E 1918, or ASTM C 1549. Emittance is measured according to ASTM E 408 or ASTM C 1371. Default values for some materials will be available in the LEED for New Construction v2.2 Reference Guide.

SS Credit 7.2: Heat Island Effect: Roof
1 Point

Intent

Reduce heat islands (thermal gradient differences between developed and undeveloped areas) to minimize impact on microclimate and human and wildlife habitat.

Requirements

OPTION 1

Use roofing materials having a Solar Reflectance Index (SRI)[3] equal to or greater than the values in the table below for a minimum of 75% of the roof surface.

OR

OPTION 2

Install a vegetated roof for at least 50% of the roof area.

OR

OPTION 3

Install high albedo and vegetated roof surfaces that, in combination, meet the following criteria:

(Area of SRI Roof / 0.75) + (Area of vegetated roof / 0.5) >= Total Roof Area

Roof Type	Slope	SRI
Low-Sloped Roof	≤2:12	78
Steep-Sloped Roof	>2:12	29

Potential Technologies & Strategies

Consider installing high-albedo and vegetated roofs to reduce heat absorption. SRI is calculated according to ASTM E 1980. Reflectance is measured according to ASTM E 903, ASTM E 1918, or ASTM C 1549. Emittance is measured according to ASTM E 408 or ASTM C 1371. Default values will be available in the LEED for New Construction v2.2 Reference Guide. Product information is available from the Cool Roof Rating Council website, at www.coolroofs.org.

3 The Solar Reflectance Index (SRI) is a measure of the constructed surface's ability to reflect solar heat, as shown by a small temperature rise. It is defined so that a standard black (reflectance 0.05, emittance 0.90) is 0 and a standard white (reflectance 0.80, emittance 0.90) is 100. To calculate the SRI for a given material, obtain the reflectance value and emittance value for the material. SRI is calculated according to ASTM E 1980. Reflectance is measured according to ASTM E 903, ASTM E 1918, or ASTM C 1549. Emittance is measured according to ASTM E 408 or ASTM C 1371.

SS Credit 8: Light Pollution Reduction
1 Point

Intent

Minimize light trespass from the building and site, reduce sky-glow to increase night sky access, improve nighttime visibility through glare reduction, and reduce development impact on nocturnal environments.

Requirements

FOR INTERIOR LIGHTING

The angle of maximum candela from each interior luminaire as located in the building shall intersect opaque building interior surfaces and not exit out through the windows.

OR

All non-emergency interior lighting shall be automatically controlled to turn off during non-business hours. Provide manual override capability for after hours use.

AND

FOR EXTERIOR LIGHTING

Only light areas as required for safety and comfort. Do not exceed 80% of the lighting power densities for exterior areas and 50% for building facades and landscape features as defined in ASHRAE/IESNA Standard 90.1-2004, Exterior Lighting Section, without amendments.

All projects shall be classified under one of the following zones, as defined in IESNA RP-33, and shall follow all of the requirements for that specific zone:

LZ1 — Dark (Park and Rural Settings)

Design exterior lighting so that all site and building mounted luminaires produce a maximum initial illuminance value no greater than 0.01 horizontal and vertical footcandles at the site boundary and beyond. Document that 0% of the total initial designed fixture lumens are emitted at an angle of 90 degrees or higher from nadir (straight down).

LZ2 — Low (Residential areas)

Design exterior lighting so that all site and building mounted luminaires produce a maximum initial illuminance value no greater than 0.10 horizontal and vertical footcandles at the site boundary and no greater than 0.01 horizontal footcandles 10 feet beyond the site boundary. Document that no more than 2% of the total initial designed fixture lumens are emitted at an angle of 90 degrees or higher from nadir (straight down). For site boundaries that abut public rights-of-way, light trespass requirements may be met relative to the curb line instead of the site boundary.

LZ3 — Medium (Commercial/Industrial, High-Density Residential)

Design exterior lighting so that all site and building mounted luminaires produce a maximum initial illuminance value no greater than 0.20 horizontal and vertical footcandles at the site boundary and no greater than 0.01 horizontal footcandles 15 feet beyond the site. Document that no more than 5% of the total initial designed fixture lumens are emitted at an angle of 90 degrees or higher from nadir (straight down). For site boundaries

that abut public rights-of-way, light trespass requirements may be met relative to the curb line instead of the site boundary.

LZ4 — High (Major City Centers, Entertainment Districts)

Design exterior lighting so that all site and building mounted luminaires produce a maximum initial illuminance value no greater than 0.60 horizontal and vertical footcandles at the site boundary and no greater than 0.01 horizontal footcandles 15 feet beyond the site. Document that no more than 10% of the total initial designed site lumens are emitted at an angle of 90 degrees or higher from nadir (straight down). For site boundaries that abut public rights-of-way, light trespass requirements may be met relative to the curb line instead of the site boundary.

Potential Technologies & Strategies

Adopt site lighting criteria to maintain safe light levels while avoiding off-site lighting and night sky pollution. Minimize site lighting where possible and model the site lighting using a computer model. Technologies to reduce light pollution include full cutoff luminaires, low-reflectance surfaces and low-angle spotlights.