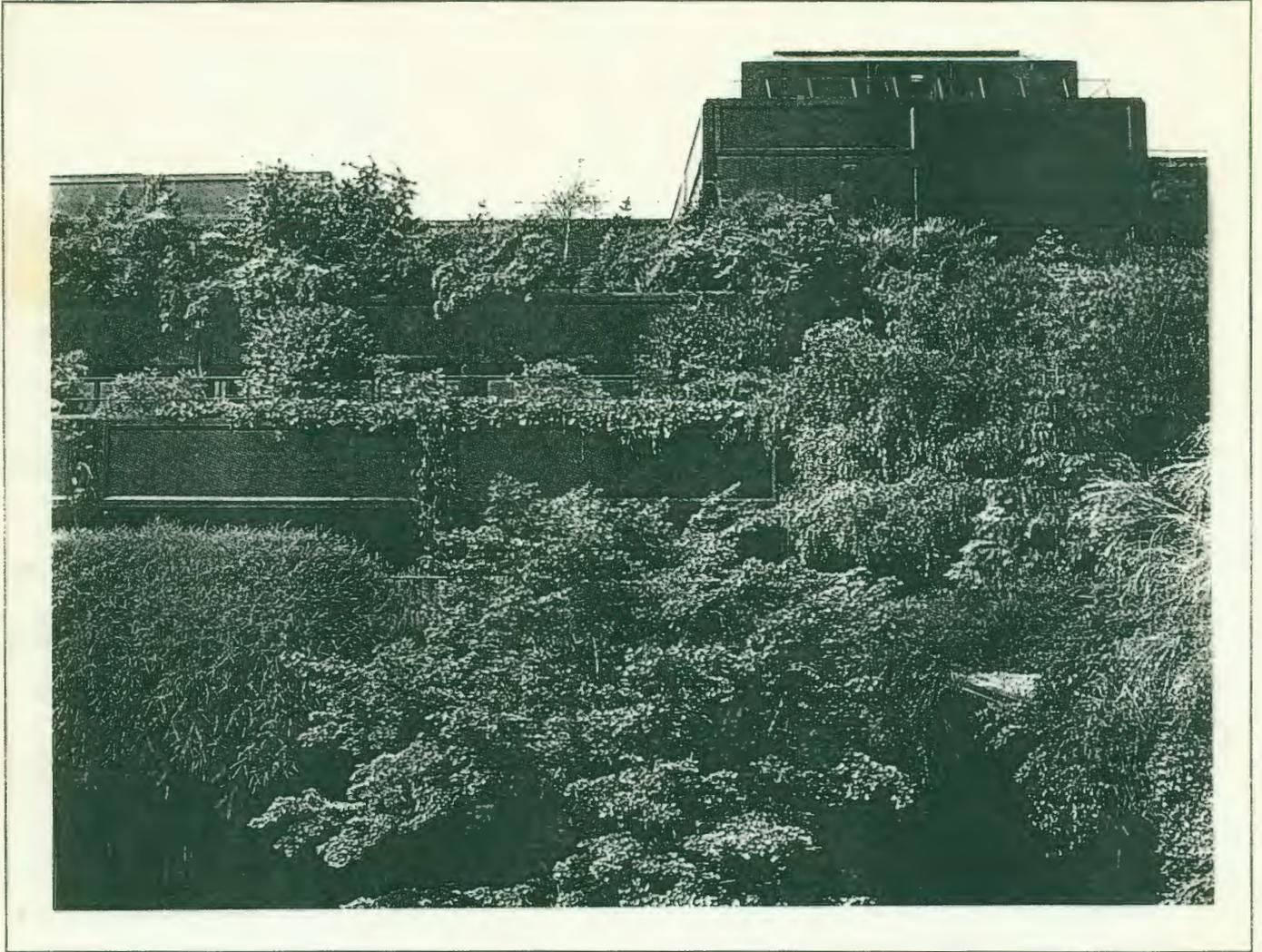


Green Roofs Unlimited



Project Proposal Presented By

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In Association with

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Introduction

As Portland's built environment becomes more dense, the need for urban green space is rapidly intensifying. By fostering a green-roof awareness throughout the City of Portland, the social and environmental negative externalities associated with the built environment will begin to be mitigated. Green roofs make use of an existing, underutilized spatial resource and at the same time make the urban environment a greener and healthier place to live and work.

While New Urbanists promote the benefits of a compact urban form, this dense style of development also creates various negative impacts which will undermine the benefits, and detract from the livability of Portland. These negative impacts can be divided into two areas, the social and natural environments. Socially, urban areas with insufficient greenspace do not allow city dwellers to enjoy the many benefits green areas offer. For example, a direct negative correlation is often identified between the level of urban green space and the degree of human stress. Whether at home or at work in the urban area, green roofs provide urbanites with easily accessible places in which to enjoy nature in the city.

Urban greenspace is instrumental in generating numerous environmental benefits. In recent years, Portland has been experiencing an increase in the number of air abatement days. An increased amount of urban vegetation will reduce the amount of airborne pollutants, thereby increasing the quality of air. Portland's maritime climate produces an average of thirty-six inches of rainfall annually, however, this year the city has already received fifty-four inches of rain. In 1990 there was an estimated 397,899,000 square feet of impervious surface in the city of Portland; currently it is estimated that impervious surfaces cover 583,900,000 square feet, an increase of 4,270 acres (BES, 1996). The combination of the high level of precipitation with the increasing amount of impervious surface area creates a significant number of problems. These problems range from flooding of streets and sidewalks to a stress on the city's combined sewer overflow (CSO) infrastructure, which results in the release of raw sewage into the Willamette River. The Bureau

of Environmental Services (BES) estimates an average of six billion gallons of sewage waste water is dumped into the Willamette each year. About 80 percent of this comes from storm water runoff. This environmental problem has been recognized by the Oregon Department of Environmental Quality (ODEQ) which has ordered the City of Portland to reduce CSO releases by 90 percent within the next 20 years.

Green roofs offer a practical method of addressing these and other problems found in an urban environment. Additional benefits resulting from green roofs include an increase in wildlife habitat, cooling of urban heat islands, buffering of noise and wind, an increase in property values, insulation of buildings, food production, and the building of community.

Green Roof Design Types

Green roofs consist of various styles and intended uses. The conventional rooftop garden is designed as a space which is utilized primarily for human enjoyment. These gardens are typically found on top of affluent residences which cater to a limited public. Contrasting this design is the eco-roof. Unlike conventional rooftop gardens, the eco-roof consists of a uniform layer of soil and vegetation, and its chief purpose is to mitigate environmental problems. There are countless hybrid designs which often incorporate aspects of the aforementioned concepts. For instance, a single roof may dedicate a percentage of its space to a conventional style, while another part of it is used for growing produce, and yet another area is covered with an eco-roof. This project will provide an objective analysis of various types of green roofs and their benefits.

General Planning Intentions

Our goal is to create a "green-roof culture" in the Portland area. The focus of this project is to analyze the concepts of green roofs as a common and acceptable idea throughout the Portland metro area., Our work will help identify the potential benefits of green roofs, and establish the momentum necessary to bring the concept of green roofs into everyday use. It is our intention to create a product that generates enough awareness of green roofs that decision makers respond by integrating the green roof concept into public policy.

Our product is primarily geared toward the needs of our advisory board members, including representatives of the Bureau of Environmental Services, Portland General Electric and Sustainable Portland Commission. These members are interested in the green roof concept as a means of mitigating environmental problems and maintaining the livability of the region through policy and programs.

The Resource Guide is included so that our work will have an immediate impact in the community by providing resources to developers and building owners who are interested in implementing a green roofs.

Specifically, our product will contain four sections that investigate and illustrate how green roofs will be a part of the urban landscape. We anticipate the four sections to include:

- *An inventory of existing conditions in downtown Portland.* This will give us an approximate square footage of existing rooftop space and existing urban green space in the downtown area. From this information, we can estimate the extent of potential social and environmental benefits.
- *An identification of benefits barriers, and alternatives.* This section will explore the extent of benefits that can be achieved through green roofs and investigate problems with implementation by finding ways to address them. Finally, by exploring alternative green roofs, we will determine the optimal environmental and social benefits derived from each garden type, while determining which garden type is appropriate for a specific structure.

- *A policy analysis of existing codes and recommendations.* This section will be completed to understand what policies currently exist, and what aspects of the policies motivate developers to use them. Understanding current policies will help guide us when making policy recommendations.
- An appendix that contains a *Resource Guide* to address questions, limitations, contacts, funding and other general information for implementing a green roof. This section will be done to offer potential users access to consolidated information concerning green roofs.

Scope of Work

The following is an outline of tasks, the methodology to be used, timeline and intermediate products to be completed en route to the final product of this planning project. Responsibility is assigned to particular group members for several of the main tasks. This designation indicates that this person will track the progress of this task and coordinate the workload for completing this particular task with the other group members.

1. Literature Review & Research

Our first step will include a literature review and background research regarding all aspects of green roofs in order to develop a solid knowledge base from which to work. This step is a very important aspect of this project as it will direct and inform latter stages of our work. The work that has been completed in this area thus far has added clarity to the challenges we face and has been used to scope out the remainder of the work program. The following topics will be the subject of the literature review and research:

- **Design and Function of the Green Roof.** Information regarding layout and use, the planting medium, drainage systems, alternative soils, plant species, maintenance, structural issues, and cost.
- **Environmental Benefits.** The extent of the benefits which can be achieved in the areas of air pollution, storm water runoff and habitat creation through the development of green roofs.
- **Social Benefits.** The societal effect of dense living and the benefits of providing greenspaces in the urban environment. And, examples of community development through involvement in the planning, construction and maintenance of rooftop gardens or other community greenspace.
- **Government Policies and Incentives.** Examples which encourage the development of rooftop gardens or other related amenities.

- **Code Requirements.** Building, fire and accessibility codes which may affect the feasibility of the development of a green roof.
- **Economic Issues.** Information regarding the effect of green roofs on marketability and property value, liability concerns, cost and funding sources.

Product: Summary Papers by Subject
 Responsibility: All group members
 Timeline: November 11, 1996 - January 20, 1997

2. Visit Existing Green Roofs in Portland, Seattle and Vancouver B.C..

Experiencing rooftop gardens firsthand will help us visualize what we are trying to accomplish and expose us to different garden designs and functions. Furthermore, through contact with users and owners we will begin to develop a network of people who can provide information and advice to us and future users of our document. The final document will include a list of contacts for information regarding green roofs.

Product: Written and Photographic Catalog of Green Roofs,
 Preliminary List of Contacts
 Responsibility: All group members
 Timeline: November 26, 1996 - January 6, 1996

3. Inventory of Existing Conditions - Rooftop Acreage & Urban Greenspaces

In order to estimate the extent of the benefits that can be achieved through policies that encourage green roofs, we will conduct an inventory of rooftop acreage. The inventory will be confined to a study area of Downtown Portland, which has been defined as I-405 to the Waterfront and north to Glisan. The inventory will be performed with the use of aerial photographs and/or 1:100 topographic maps with building footprints. Additionally, we intend to investigate the possibility of displaying the results of this inventory

in map form with the use of mapping software (ArcView) and the RLIS Lite database.

Along the same lines, we will conduct an inventory of urban greenspace in the study area, including existing green roofs, parks and open space, to further investigate the degree to which can improve environmental conditions and access to open space. This inventory will be performed with information from a catalog of Rooftop Gardens performed by BES, information from the Portland Parks Bureau and/or Metro and by visual inspection of aerial photographs.

Product:	Written Analysis of Results, Maps & Tables of Results
Responsibility:	Kevin Liburdy
Timeline:	January 6 - January 27, 1997
Hours of Work:	60 Hours

4. Expert Interviews

Working from an information base developed in the literature review and research, we will expand our understanding of the green roof concept through expert interviews. It has been our experience thus far that while there is a fair amount of general information regarding the green roof concept in the literature, there is not a lot of detailed or technical information available. Therefore, interviews will be directed at capturing the firsthand experience of people involved with green roofs or with knowledge of the environmental problems we are investigating.

The information collected from the expert interviews will be used to address perceived barriers to the development of green roofs and will be a major source of information used for the development of a list of design alternatives and their corresponding benefits and functions.

The extent of the expert interviews conducted will largely depend on the results of the literature and background research. However, we have identified the following interviewee types to direct our research:

- **Designers of Green Roofs.** Landscape Architects or Architects who have experience with green roofs for information regarding technical design issues such as layout and use, the planting medium, drainage systems, alternative soils, plant species, maintenance, structural issues, and cost.
- **Developers of Green Roofs.** Developers who are currently or were recently involved in a green roof project for information regarding the impetus for the project, marketability, and building design and cost issues.
- **Building Managers/Owners.** Managers at sites with green roofs for information regarding the impetus of the project, effect on value, liability issues, maintenance and use of the rooftop.
- **Environmental Scientists.** Hydrology, soils, water quality and air quality experts for information regarding the extent of environmental benefits in the areas of storm water runoff and water and air pollution which can be achieved through green roofs.

Product: Summary Papers of Interview Findings,
Addition to List of Contacts
 Responsibility: Stephanie Beckman
 Timeline: January 6 - February 3, 1997
 Hours of Work: 50 Hours

5. Feasibility Case Studies - Building Structure and Use

We will conduct four case studies of buildings to investigate the feasibility of developing green roofs on existing structures. The Case Studies will include an investigation of potential obstacles, such as accessibility and fire code requirements, liability and safety issues, and structural constraints, and an analysis of the appropriate green roof type and function for the building. The findings of the case studies will expose the extent of barriers

and potential solutions and provide the groundwork for the list of alternatives section of the final product

The buildings which are the subject of the case studies will be of residential, commercial/government, high rise office and industrial use and of different building structure types. We have identified some particular buildings and/or locations for the case studies, however arrangements have not been finalized. These buildings are:

- A mixed use loft in the Pearl District as the residential building.
- The Metro building for the government/commercial building.
- A high rise office building in the downtown area.
- An industrial building in the environmentally sensitive Columbia South Shore area.

Product: Summary Papers of Case Study Results
Responsibility: Sev Jones
Timeline: January 27 - February 24, 1997
Hours of Work: 75 Hours

6. Focus Groups and/or Interviews with Current and Potential Users of Rooftop Gardens

The purpose of contacting users is to determine how people use and maintain rooftop gardens, what they need and want from an urban greenspace and how a rooftop garden affects community dynamics. This information will be used in our discussion of the social benefits of green roofs and to develop a list of design alternatives.

We will contact current users, residents and employees, and potential users in order to get both the opinions of experienced users and those with a more unbiased viewpoint due to lack of exposure. Our preferred method of collecting this information is through focus groups. However, we recognize that due to time constraints and the difficulty of assembling focus groups we may have to resort to personal or small group interviews.

We are hoping to make contact with potential users at sites which are currently planning the development of a rooftop garden. We are aware of two locations, the Raphael House which is a shelter for battered women and the new Longhouse building at PSU. This presents a great opportunity to center many different aspects of our research around one project. The project would act as a case study of the development of a rooftop garden while at the same time giving us insight into the need for access to open space through contact with potential users. We intend to time our contact with potential users so that our findings can be passed on to the designer of the garden.

Product: Summary Papers of Findings,
Addition to List of Contacts
Responsibility: Connie Peters
Timeline: January 27 - February 24, 1997
Hours of Work: 45 Hours

7. Synthesize Information and Prepare the Final Document

By putting our findings in writing at each step of the process, the majority of our final document will be in written form when we reach the end of the planning process. In this step we will synthesize information and organize it in a coherent and usable manner.

The synthesis of information will result in several sub-products which will effectively make up a draft final document:

- Analysis of the extent of environmental and social benefits which can be achieved through green roofs.
- Identification of barriers to the development of green roofs and ways to address them.
- A list of alternatives for green roof design and function in relation to building type and an analysis of the environmental and social benefits associated with each alternative.
- Policy Analysis and Recommendations.

- Compilation of information to be included in the Resource Guide, including tips for the development of a green roof, a list of contacts and community resources, and funding ideas.

Responsibility: All Group Members
Timeline: February 24 - March 7, 1997
Hours of Work: 60 Hours

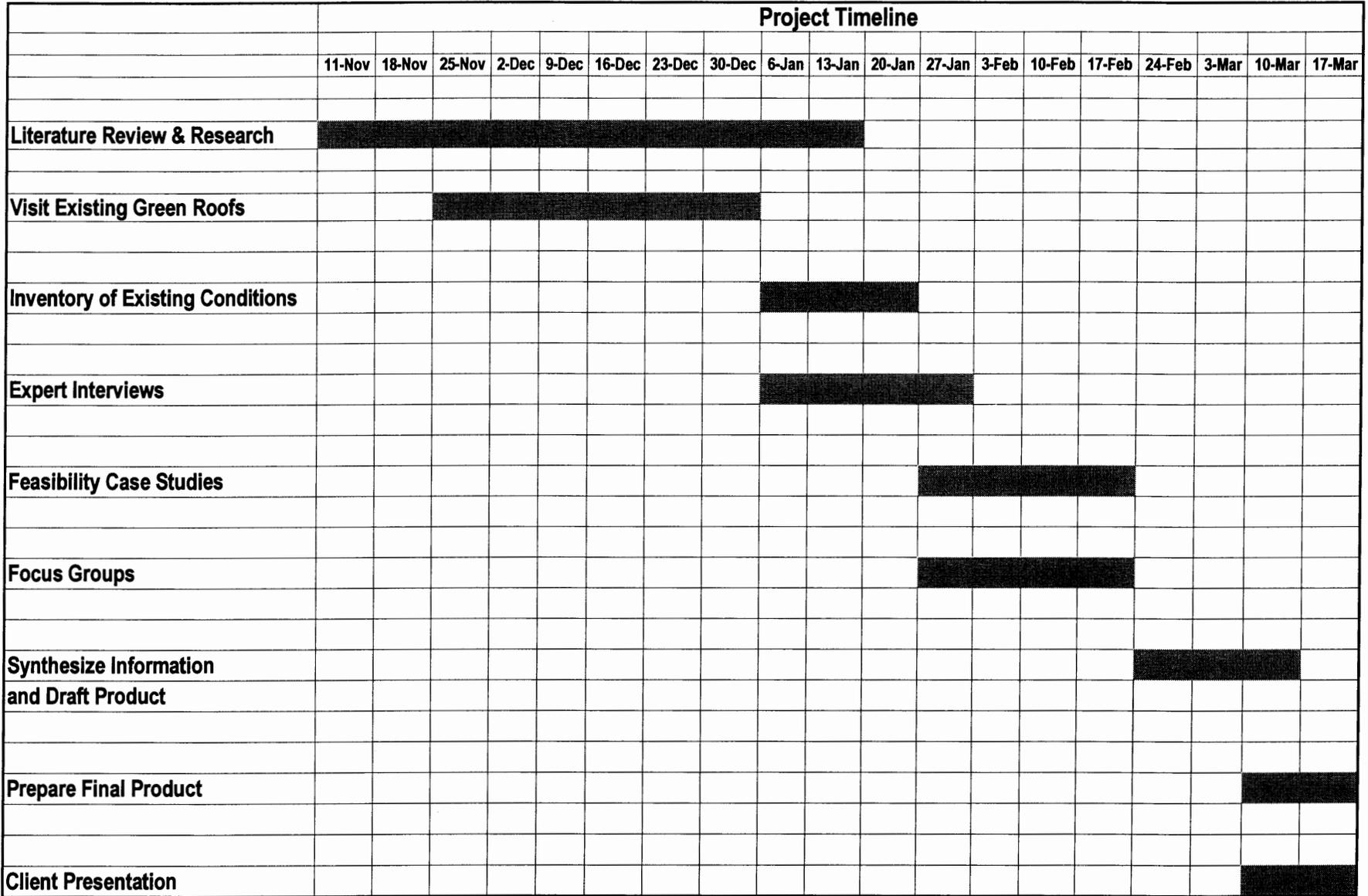
Final Product

Responsibility: All Group Members
Timeline: March 7 - March 19, 1997
Hours of Work: 60 Hours

8. Client Presentation

At the completion of this project we will present our findings and recommendations to our advisory board.

Responsibility: All Group Members
Timeline: March, 1997



Group Structure

Team principles: The project group agrees that an effort must be made to protect the natural environment, to increase sustainable lifestyles and to enhance the spirit and livability of communities. It is believed that these goals can be achieved through a planning process that remains open, inviting and interesting. Additionally, it is believed that this process should be fun and should satisfy the soul.

Decision making: The project group has chosen to distribute equal responsibility among each member, with no set hierarchy of leadership and all decisions being made at the agreement of the group as a whole. In the event that not all members are present to make a decision, those members who do participate in the decision making process will attempt to consider the values and interests of the member(s) who is/are not in attendance.

Workload: The project group's workload will be distributed as equally as possible. In the event that an individual *cannot* complete their share of the workload due to unforeseen events, that individual will promptly inform the group and contribute extra time working on the project at their earliest convenience. In the event that an individual *does not* complete their share of the workload for whatever personal reason, the other group members will not hesitate to comment on the situation and help to motivate that individual.

Communication and conflict resolution: It is expected and has been agreed upon that an open line of communication will exist between all project group members. All members are expected to both accept and provide constructive criticism, and conflicts will be resolved immediately through verbal communication in an open, honest manner. In the event that a personal conflict arises between two or more members, the conflict will be resolved by those individuals outside of the group setting. Following resolution of personal conflicts, individuals will be expected to inform the remainder of the group of the situation in order to maintain an environment of open and honest communication.

Relationship with the "Client"

Rather than developing our product for a single client, the project group formed a relationship with individuals representing three organizations. These individuals are considered to be an advisory group, and are working in conjunction with us to develop a product that will help them to satisfy the needs of the organizations which they represent. Wayne Lei, Director of Environmental Policy for Portland General Electric, represents both PGE and the Sustainable Portland Commission, a group which advises the Portland City Council on issues regarding sustainability and livability in the region. Tom Liptan of the Bureau of Environmental Services is advising the group on issues relating predominantly to storm water management. Both individuals and the organizations which they represent are interested in finding methods to address environmental concerns within the region. The project group will attempt to balance the interests of the advisory group with those of the students', as well as with the class requirements.

Needs and expectations: Following discussions between the project and advisory groups, it is believed that the interests of both groups are understood. Due to the project's recognized time limitation it is understood that the project group will be able to accomplish only a limited number of the advisory groups' objectives, while at the same time fulfilling the projects' goals.

In order to satisfy these objectives it is necessary to maintain an open line of communication between the project and advisory groups. Wayne Lei has volunteered to be the lead communicator for the advisory group and Sev Jones has been identified as the project group's lead communicator. Contact can be made via telephone and/or e-mail. Communications are not limited to the lead communicators as the students have all been encouraged to call, write or visit both Wayne and Tom.

When possible, Sev will get project group consensus prior to communicating with Wayne. However, in the event that group consensus cannot be achieved, Sev or any of the other project group members will attempt to take the values and interests of the group into consideration prior to making any decisions which will affect the group.

The project group also believes that it will be important to meet with the advisory group at least bimonthly, and based upon the meeting of 11/13/96 this should be easily accomplished. Additionally, Wayne has made it clear that PGE will provide financial backing to cover the costs of document production. And, although neither of the advisory group members are planners, per se, they are understanding of the planning process and are enthusiastic about complying with the AICP code of ethics.

Relationship with Class and Instructors

Class: The project group expects to communicate openly and frequently with classmates and hopes to not only provide, but also receive constructive criticism and ideas. The project group realizes the valuable resources that are available among classmates and is more than willing to take advantage of these resources. Additionally, the project group looks forward to leading a class session during the winter term and discussing the opportunities and hindrances that will have been experienced in the planning process.

Instructors: The project group expects to communicate frequently with professors, seeking insight, knowledge and fresh and challenging perspectives. Weekly meetings will be scheduled with the advisors in order to obtain feedback and advice.

Budget

While it is impossible to predict how much money will be needed to complete this process, we have estimated the projected costs involved. Along with the projected costs, we foresee there to be many hidden costs. Following is a tentative list of project related costs which we anticipate.

<u>Project Item</u>	<u>Projected Cost</u>
• TELEPHONE CALLS	\$80.00
• PHOTOCOPYING (not including final document)	\$20.00
• TRAVEL COSTS (road trips to visit other cities)	\$125.00
• SLIDES/PHOTOS, VISUAL AIDS	\$50.00
• GENERAL SUPPLIES (paper, pens, art supplies, books)	\$75.00
• FINAL DOCUMENTS	\$150.00
• HIDDEN COSTS	<u>\$100.00</u>
TOTAL:	\$600.00

While the estimated costs on this list are not to be taken as precise, the list enables us to begin planning ahead for potential financial obligations. Because of the inherent variations associated with project costs, we intend to periodically assess the financial demands and make necessary adjustments.

Personal Qualifications

Kevin Liburdy

This project is appealing because it allows me to focus on issues which are of great personal interest including environmental concerns, the livability of the city, and the enhancement of a sense of community. Although born and raised in a city, I have been fortunate enough to experience and enjoy the benefits of the natural environment, and feel that an effort must be made to reconnect residents of urban communities with nature. I am not only interested in determining if rooftop gardening can help with this re-connection, I am also excited about the possible environmental and social benefits associated with their implementation.

My undergraduate degree, a B.A. in Geography from the University of Washington, focused primarily on urban and social issues as well as on geographic information systems. After an initial interest in learning about GIS applications in planning, my focus in PSU's MURP program has shifted towards the study of transit oriented development and design. An internship with a small city government has enhanced my awareness of the significance of both the citizen involvement and comprehensive planning processes.

Stephanie Beckman

Personally, I have a strong attachment to both the natural environment and the urban environment. I love the activity and vitality of city life. However, I also long for the peace and beauty found in nature. These two attachments often come into conflict. Professionally, I believe in the benefits of dense development. However, I also recognize that this style of development has implications for the health of nature in the urban environment and in the region as a whole. I view this planning project involving green roofs as a small segment of the work which will help bridge the gap between the natural and urban environment which I witness in both my personal and professional life.

Before entering the Urban and Regional Planning program at PSU, I received a B.A. in History from Whitman College. I currently do planning work for an architecture and engineering firm where I have become familiar with the

development process. I have experience with interviewing and collecting information from internship experience and in my current position. I have solid writing and editing skills and I have strong skills in the area of idea formulation and development.

Connie Peters

I am enthusiastic about green roofs because I see the potential to both green the city, and make people aware of the benefits of a greener, healthier environment. Often people living in urban environments miss out on the benefits of the natural landscape. Green roofs are one way of bringing nature to urban dwellers. In addition to the human benefits derived from green roofs, the city as a whole will benefit from added habitat and cleaner air.

I have an undergraduate degree from the University of Montana in Political Science and I am pursuing a Masters in Urban and Regional Planning at Portland State University, with an emphasis on Environmental Planning. I completed an internship with Clackamas County, in which I synthesized eleven community visioning documents and prepared a final report. I also completed a summer internship with the Missoula, Montana Planning Department in which I worked on growth management issues and assisted in completing a comprehensive plan for Miller Creek, an outlying region in Missoula County.

Sev Jones

I am enthusiastic and optimistic about this project for a variety of reasons. To begin with, the topic of gardening has always intrigued me. While I have yet to start and maintain my own garden, I have developed an interest in gardening by having the opportunity to assist others with their gardens. Furthermore, I have gained a respect and appreciation for the various styles of gardens found throughout diverse cultures. Apart from my sheer attraction of gardens, I have developed an appreciation for environmental and community issues through a variety of methods. Various life experiences (e.g.: undergraduate degree in urban planning, personal interests of environmental issues, owning and operating a small business,

enrollment in this graduate program at PSU) have contributed to the developed of my knowledge and interest which will be beneficial to this project.

This project is based around the involvement of community. As the planning profession evolves, the need for capturing the community interest and involvement in planning issues is paramount. Community involvement is an integral aspect of PSU's planning department's curricula. Hence, I have been introduced to this notion in a course related framework. I look forward to the opportunity to implement this academic knowledge into a 'real-life' context. I look forward to all the challenges and rewards related to the development of this process and am excited to begin.