

A PLAZA DESIGN TO PROMOTE SOCIABILITY FOR KANSAS STATE UNIVERSITY'S  
NORTH QUADRANGLE BASED ON OBSERVATIONAL ANALYSIS OF USER  
BEHAVIORS

by

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## Abstract

This thesis draws on observations of user behaviors in Kansas State University's North Quadrangle to propose a plaza design for a site within the quadrangle adjacent to Cardwell Hall. As a practical method for conducting environment-behavior research, the thesis gathered observations of moving and resting behaviors to understand the North Quadrangle's current usages. The observations of moving behaviors provided evidence for identifying potential spaces within the North Quadrangle where a plaza might be designed and built. In turn, observations of resting behaviors provided an understanding of sitting and standing behaviors in the North Quadrangle plaza.

In terms of research related to plaza behavior and design, the most significant work drawn upon was William Whyte's *The Social Life of Small Urban Spaces* (Whyte, 1980). According to Whyte, a plaza is sociable if large numbers of people are drawn to it informally in the course of their everyday activities and movements. In this regard, the design aim of the proposed plaza is to promote sociability within the North Quadrangle by attracting pedestrians traversing the North Quadrangle's busiest pathways and thus drawing them into the plaza. More specifically, to promote plaza sociability, the design makes use of the three most important plaza-design factors identified by Whyte: (1) location; (2) street-plaza relationship; and (3) seating. In other words, first, the plaza should be located near large pools of potential users; second, the plaza should be designed as an extension of the most heavily trafficked pathways; and third, the plaza should incorporate sitting opportunities for users via seating that is physically and socially comfortable.

The behavioral observations and guidance provided by the literature review have been used to generate twelve design guidelines on which the proposed plaza design is based. The

presentation of final plaza design incorporates explanations of these twelve guidelines followed by illustrated design schemes.

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# **Dedication**

To my mother and father.

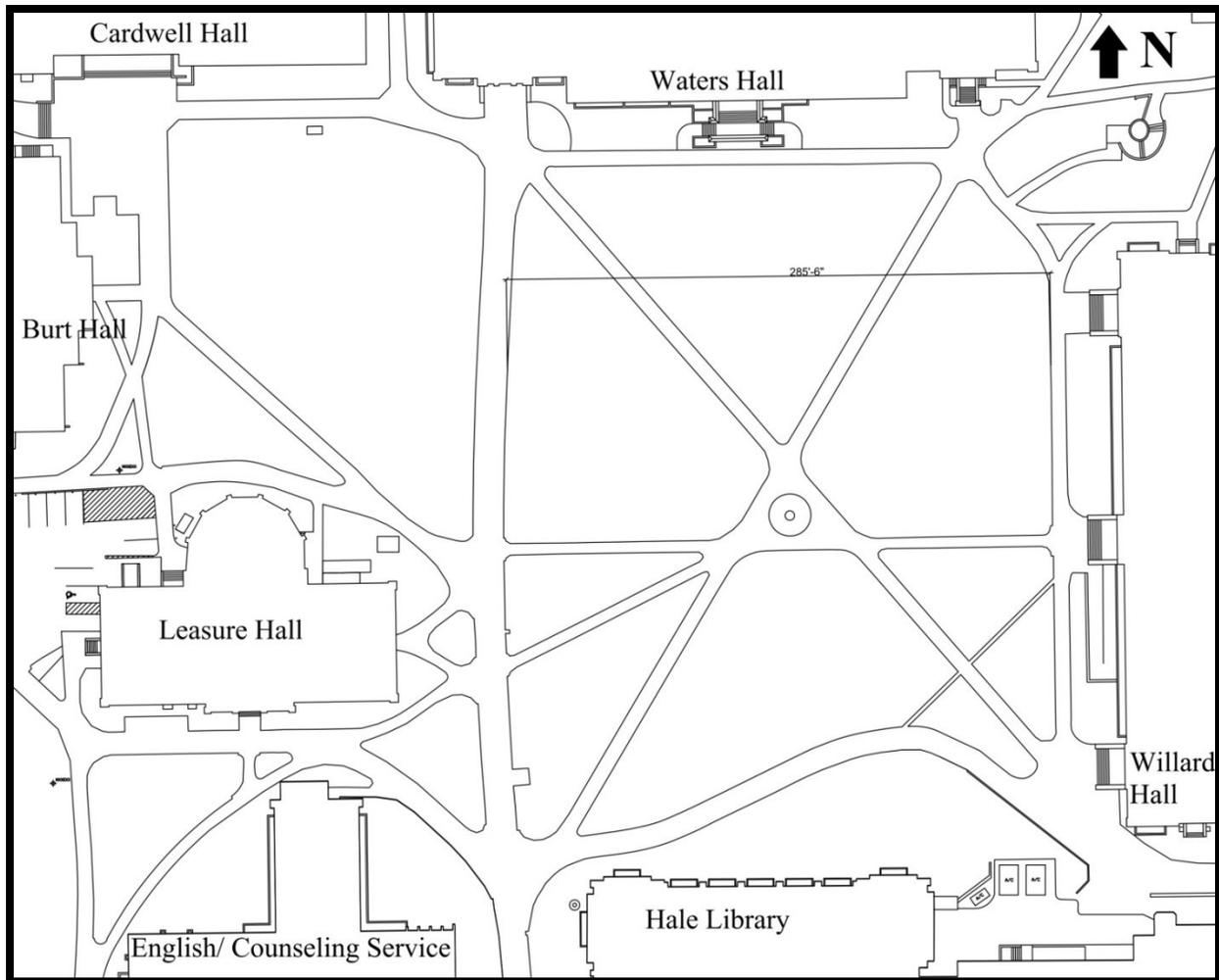
# **Chapter 1 - Introduction to the study of human behavior and the open spaces of Kansas State University**

This thesis studies Kansas State University's North Quadrangle to understand human behavior within the space and then develop a potential plaza design for a site within the quadrangle (figure 1.1). Observation of user behaviors in the quadrangle is central to my research and design. Categories of observation include, first, users moving through the space; and second, users involved in such "resting" activities as conversing, reading, smoking, talking on cell phones, and using other digital devices. Results from my observations are used to determine which sub-space in the North Quadrangle will be redesigned and what design features this "plaza" will include.

In terms of outline, the thesis is composed of two parts. The first part includes behavioral observations of the North Quadrangle, incorporating both users' "moving" and "resting" behaviors. The methodology for making these behavioral observations is discussed in greater detail in Chapter 3 on research methods. Drawing on the observational results, the second part of the thesis presents a design for one small plaza in the North Quadrangle. This design phase also draws on research findings on plaza use and design by such researchers as William Whyte, Clare-Cooper Marcus and Carolyn Francis, and Mark Francis and Stephen Carr. This work is reviewed in detail in a literature review presented in Chapter 2.

More specifically, this thesis report is arranged in five chapters which give a systematic knowledge of the research and design process. This first chapter presents the introduction to this thesis in terms of the nature of the research and the spaces observed. Chapter 2 is a literature review which discusses important works relevant to plaza design. Chapter 3 describes the

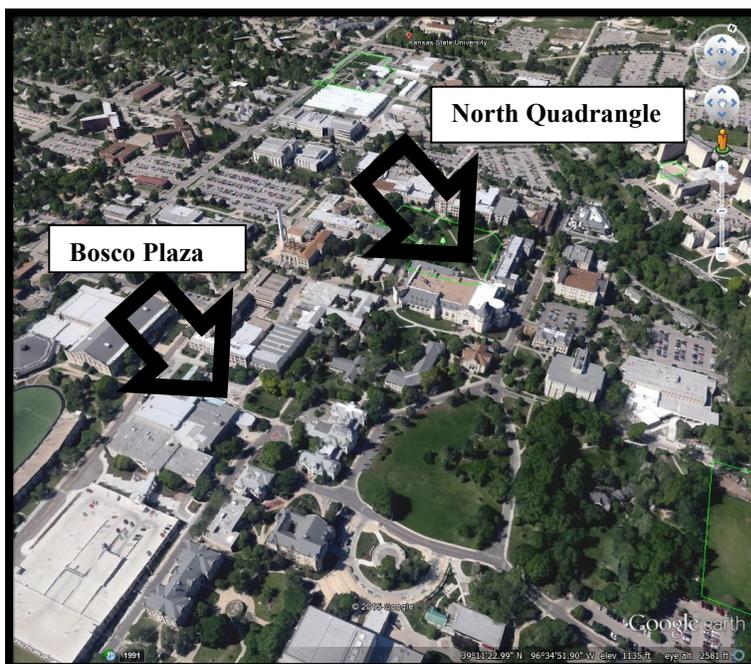
methodology implemented for the observational research. Chapter 4 includes the analysis of the results of the observations so that guidelines for a contextual design can be laid out. Chapter 5 justifies the design of the plaza via verbal and graphic explication along with discussion of the guidelines derived from this research-based design approach.



**Figure 1.1 Site map of the North Quadrangle with the surrounding buildings.**

## Introduction to the open spaces of Kansas State University

Founded in 1863, Kansas State University is a comprehensive research, educational, and public service institution with over 20,000 students (Namkang, 2004, p. 3). The campus is some 300 acres and contains a wide distribution of public spaces, two of which are recognized to contain the presence of large number of users (figures 1.2 and 1.3). These well-used spaces are, first, Bosco Plaza in front of the university's student union and, second, the North Quadrangle. The students, faculty, and staff are the users who make these open spaces of the campus a potential public place where different social activities can take place. Previous works (Chintala, 1996; Namkang, 2004) on the study of open spaces at Kansas State University have recognized Bosco Plaza, situated in the south western portion of the core campus, as one of the most important social spaces on campus. These researchers also contended that Kansas State University does not include enough open spaces which function as vibrant public spaces for students, faculty, staff, and visitors.



**Figure 1.2 Aerial view from the south of the campus.**

Chintala (1996) and Namkang (2004) argue that Bosco Plaza is lively mostly during special events; it is much less sociable for everyday campus use in terms of outdoor activities. According to these two studies, the plaza mostly seems to be used only as a channel for pedestrian circulation and is largely unused on regular weekdays. The two authors also suggest that Bosco Plaza is weak in terms of design features like street-plaza relationship, seating, and use of proper beckoning devices along the paths of maximum user flow (Chintala, 1996; Namkang, 2004, p. 169). Namkang concludes that sociability is a major factor in the success of urban open spaces and, although many design elements like seating, ledges, planters, and steps are present in Bosco Plaza, they do not contribute to its sociability because they do not meet the design requirements of a well-defined street-plaza relationship and well-designed seating (Namkang, 2004, pp.180-181).

Similarly, Chintala (1996, p. 3) highlights the following weaknesses of Kansas State University's open spaces:

1. Lack of optimum enclosure by adjoining buildings;
2. Poor transition from closed to open spaces;
3. 'Unstrategic' location of open spaces; and
4. Lack of proper relation with pedestrian walkways.

Furthermore, Namkang argues that Bosco Plaza was designed to fulfill architectural rather than human needs and demonstrates weaknesses that range from the overall plaza design to plaza details such as seating (Namkang, 2004, p. 2).

While a plaza design might possess or lack many features, this current thesis deals with specific design issues related with the North Quadrangle, especially its location in relation to major pedestrian pathways and issues related to seating amenities. Specifically, this study of the

North Quadrangle of Kansas State University emphasizes the following assumptions relevant to environment-behavior research:

1. The North Quadrangle is assumed to be a potential hub of the campus in terms of sociability as the space usually contains large numbers of users; and
2. Although the North Quadrangle contains sufficient users moving and resting, it lacks spaces where users can linger for longer periods of time.



**Figure 1.3 Aerial view from the south west of the North Quadrangle.**

Having described the main research and design aims of this thesis, I now provide a description of relevant literature on plaza design in Chapter 2. This literature review starts with a general discussion of public spaces and then examines the design of campus plazas and urban plazas in detail. William Whyte's argument on the most important design requirements in a plaza is the focus of my discussions in this literature research. In addition to the observational research which will be discussed in Chapters 3 and 4, this literature review is central for understanding the design requirements for the plaza I propose for the North Quadrangle.

## **Chapter 2 - Literature Review: Environment-Behavior Research Relating to Public Spaces and Plaza Design**

This literature review discusses environment-behavior research and focuses on public spaces, more specifically studies discussing plaza sociability. Environment-behavior research is an effective perspective from which to understand the ways humans behave in the environment and how the designed environment can be improved to provide better opportunities for human interaction. Different researchers have argued that human behavior in a public space depends on a variety of aspects ranging from morphological and spatial dimensions of the entire city to design qualities of specific environment.

Many works, such as Hillier and Hanson's *The Social Logic of Space* (1984), Bentley, Alcock, Murrain, McGlynn, and Smith's *Responsive Environments* (1985), Carmona's *Public Places Urban Spaces* (2010), and Mehta's *The Street* (2012) argue that appropriate spatial patterning of an urban place guides the proper use of public spaces. On the other hand, empirical studies conducted by Whyte in *The Social Life of Small Urban Spaces* (1980) and Marcus and Francis in *People Places* (1998) associate specific design qualities for public spaces with their effectiveness in any urban setting. From the work of these researchers, it is thus understood that the quality of a designed environment influences sociability in any public setting, and this relationship is the major focus of my literature review.

This chapter reviews literature relating to the study of the relationship between the environment and human behavior, focusing on the design qualities that affect sociability in a public space. The literature on plazas and other public spaces is large, and here I highlight work that most directly has value for my North Quadrangle analysis and design. The major focus of my literature review is to understand the design qualities and requirements that make a plaza

more welcoming, promote greater social activity, and attract a wide range of users who stay in the plaza for a prolonged period of time. I begin by reviewing work dealing with public spaces and sociability broadly through the work of Mark Francis and Stephen Carr on *Public Space* (1992). I then discuss literature on campus plazas by overviewing Clare Cooper Marcus and Carolyn Francis' *People Places* (1998). Finally, I review William Whyte's *The Social Life of Small Urban Spaces* (1980) and focus on his arguments regarding the design requirements of a sociable plaza. These design requirements deal with the following more specific themes: (1) plaza location; (2) street-plaza relationship; and (3) plaza seating.

### **Carr and Francis's studies on public spaces and plazas**

To understand the design qualities that affect sociability in a public space or a plaza, it is of primary importance to get a clear impression of public spaces. Kansas State University's North Quadrangle is an example of a public space, which Carr and Francis (1992, p. 3) define as "the stage upon which the drama of communal life unfolds..." In this definition, the authors give high importance to urban streets, squares, and parks which support valuable human behaviors. These authors especially emphasize the presence of large numbers of people using a public space informally, by which they mean unplanned, spontaneous open-space use. Carr and Francis also point out that open spaces are "built to provide for relaxation at lunch and social relief from isolating office work..." (ibid, p. 12). These activities can be especially significant in a campus setting where the primary purpose of using a plaza is often for lunch and for spending time with friends and acquaintances. This pattern may be especially true for a campus setting because the authors claim that a public space is a place where users can act more freely than when under constraints of home or workplace.

In their *Public Spaces* (1992), Carr and Francis contend that public spaces should be responsive; in other words, public spaces should provide comfort, relaxation, and active and passive engagement (ibid, p. 91). These qualities afford casual encounters in the course of daily life and work and bind people together. Furthermore, the authors claim that public spaces should reinforce personal and group life. They suggest that the user perspective has been neglected in both public space design and management. Often, the result is public spaces which are often unattractive and unused.

Carr and Francis' analysis of specific American plazas strengthens their more general assertions regarding unsuccessful and successful public spaces. For example, their discussion of the Boston City Hall Plaza concludes that the plaza is largely unsuccessful because it is only a circulation space and its physical design does little to hold users in the plaza and thus promote place vitality (ibid, p. 89). This plaza is designed in such a way that it is only a pass-through space and does not invite users to spend time. For example, the plaza's immovable concrete bollards are said to be uncomfortable and orient users away from activities which might be happening in the plaza. Similarly, the authors point out that there is a sunken sitting area in the plaza's southwest corner which is recessed and thus rarely used.

Carr and Francis also discuss successful plazas in terms of human use. For e.g., the authors overview research on San Francisco plazas (e.g., Linday, 1978) and explain that typically, the most favorite sitting places for most plazas in the city were located adjacent to major pedestrian flows and near well-used street corners. Similarly, an analysis of the steps of the main branch of New York City's Public Library demonstrated that these steps are a popular public space adjacent to an active sidewalk offering a good vantage point for people-watching. In

addition, these steps provide opportunities for sitting, standing, and reclining (Carr and Francis, p. 109), drawing many passersby and people who work nearby.

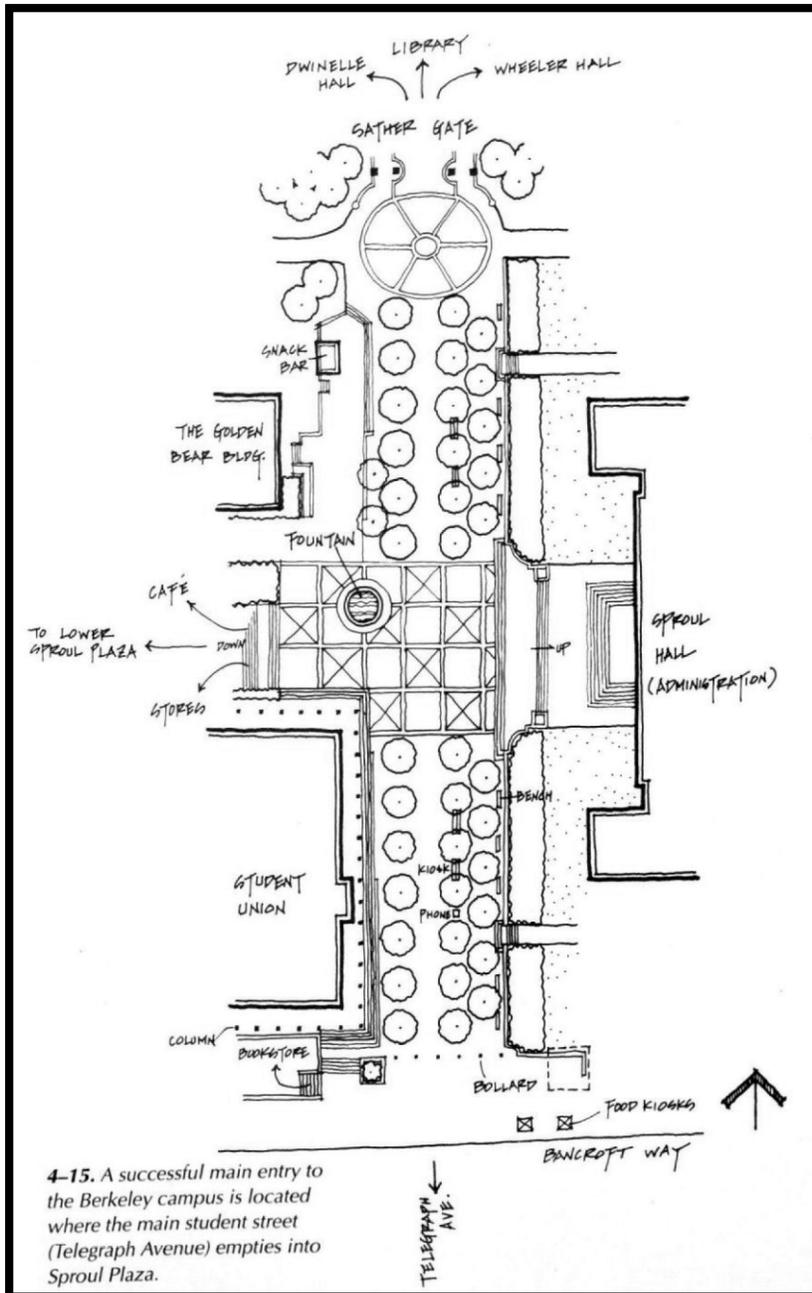
### **Marcus and Francis' study on campus plazas**

In addition to Carr and Francis's work, another important plaza study is Clare Cooper Marcus and Carolyn Francis' *People Places* (1998). These authors define a plaza as "a hard surfaced outdoor public space from which cars are excluded" (Marcus and Francis, 1998, p. 14). They argue that the main function of a plaza is to provide a setting for informal activities like strolling, sitting, eating, and observing. These activities satisfy the major aim of a well-designed plaza, which is to promote sociability. Marcus and Francis' chapter on "Campus Outdoor Spaces" is particularly important for my thesis because it includes a section on campus plazas and therefore will be helpful during the design phase of my thesis. More specifically, Marcus and Francis give helpful design recommendations based on their observational study of open spaces at the University of California at Berkeley and other universities in the United States. The authors' research on outdoor campus spaces indicates that places where students and staff can congregate, eat, relax, and watch other people are important in a campus plaza. The authors give main consideration to design of outdoor spaces as areas to be occupied rather than used only as only pass-through spaces.

Marcus and Francis provide design recommendations for campus plazas on the basis of: (1) spaces adjacent to specific buildings; (2) campus spaces used by everyone; (3) problems inhibiting campus outdoor use; and (4) campus wear and tear. With regard to my thesis, the authors' discussion of "Campus Spaces Used by Everyone" holds major significance and is thus described here in detail. This design recommendation states that there should be several "common turfs," which are the spaces between campus buildings not viewed as the territory of

any one specific building or department (ibid, p. 186). In relation to creating these common turfs, the authors put forward three important plaza design features which need consideration: (1) size; (2) location; and (3) spatial attributes. Each of these design features is now described in turn.

Marcus and Francis contend that large, hard surfaced spaces intended for special activities (for e.g., gatherings or rallies) look unused if unoccupied. Special attention should thus be given to their size. The authors suggest that to neutralize overly large plazas, the space can be made to seem smaller with a variety of plantings and paving. Furthermore, the authors highlight the importance of location because a well sited plaza is supported by many activities throughout the day from users of buildings like student unions, libraries, and administrative complexes. Thus, the location of a plaza with respect to spaces where there is a ‘parade of passersby’ assures that plaza users have much to observe (ibid, p. 188). In addition, the authors bring forward the importance of a plaza’s spatial attributes when they argue that a plaza should accommodate a variety of seating opportunities which attract a wide range of users. More specifically, Marcus and Francis discuss the following key aspects: seating should be present along paths of high pedestrian movement; there should be both formal and informal seating to accommodate uses that range from quiet study to people watching; users should be given a variety of seating possibilities, e.g., benches with and without backs, ledges, and fountain edges; and eateries should be present nearby.



**Figure 2.1 Plan of the Upper Sproul Plaza on Berkeley campus (from Marcus and Francis, *People Places*, 1998, p. 187).**

As a way to clarify the design considerations discussed above, Marcus and Francis include detailed studies of several plazas on the Berkeley campus. One of the studies relates to Sproul Plaza, a space that is overall axial in design. This plaza has trees along its sides creating a boulevard-like setting (figure 2.1) that then becomes a “fatter” space with a fountain surrounded

by low seats. This plaza is located at one of the major campus entries and is bounded by some of the most important campus buildings, including administration, student union, café, and student-support offices. This excellent location helps the plaza to generate significant user flow. In addition, the plaza's steps, kiosks, benches, and trees are located along these major pedestrian flows and provide comfortable places for students and other users to stop and watch the passersby. As such, the plaza becomes a kind of stage. In addition, the authors argue that eating provides many users with an excuse to be in public space while reading, studying, or simply watching the world go by (ibid, p. 189). This argument is strengthened by the authors' observation that food kiosks are one of the favorite areas for users in Sproul Plaza.

### **William Whyte's study on Plazas**

One of the most important studies in plaza design is William Whyte's *The Social Life of Small Urban Spaces* (1980). Whyte's findings are a result of empirical studies on why plazas work or don't work. For Whyte, a plaza works when it promotes sociability; in other words, a plaza should draw large number of people together *informally*. "Informal" here refers to users who are drawn automatically to the plaza without realizing it; a phenomenon that Whyte terms as 'impulse use' (Whyte, 1980, p. 57). In other words, the user enters that plaza via an impulse in the moment. The author contends that presence of people is what attracts other people, which further attract more people (ibid, p. 19). The major value of a public space in this sense lies in the fact that people can see and meet other people, interact, and engage in plaza life and activities as these events happen. Whyte ultimately arrives at three most important design features that mark successful sociable plazas: (1) location; (2) street-plaza relationship; and (3) seating. An explication of these three features is reviewed in detail below.

## ***1. Location***

A plaza should be a social space that consists of people being engaged in different activities like meeting, watching other people, and exchanging experiences. Whyte's assertion regarding the location of plazas starts with an assumption that people are not attracted to a plaza if it is not located properly. In other words, a successful sociable plaza is almost always located near large pools of potential users. Whyte states that plazas must be placed at most about three blocks to be effective, which is the distance most would-be users, are willing to travel by foot to reach a plaza (ibid, p.16). The presence of many people nearby, however, does not guarantee the success of a plaza. Whyte argues that a plaza should be located near high-density areas supported by mixed uses, especially employment and housing, such that there is a presence of many potential users. A mixture of activities like shopping, entertainment, and stores also contribute to a good plaza location. Whyte contends that a plaza well placed in a city, for example along bustling streets or street corners, has a chance of being more used and thus more sociable.

## ***2. Street-plaza relationship***

Another key design factor facilitating a sociable plaza according to Whyte is the relation of a plaza with the street. The front row of the plaza facing the street is a prime area in that one can watch the activities happening in the street sitting there: "the front ledge faces one of the best of urban scenes," he argues (ibid, p. 57). The author primarily contends that a plaza should be designed as an extension of the street such that "it's hard to tell where one ends and the other begins" (ibid). According to Whyte, design can facilitate impulse use through: (1) clear sightlines; (2) beckoning devices; and (3) uses that draw people.

Clear sightlines refer to the fact that people should be able to see the plaza clearly in order to use it. Generally, a plaza should not be more than three feet above or below street level

(ibid, p. 33). Beckoning devices like stairs, trees, and entrances play an important role in drawing people on sidewalks inside the plaza (ibid, p. 58). Plazas should also be supported by surrounding uses which attract potential users. Whyte argues that “storeless” facades are uninviting and dull in character. The author suggests that at least fifty percent of such frontages on the ground floor should house retail or food uses. This plaza feature is important in the sense that it improves the possibility of pass-through users being attracted to these facilities and thus being drawn to the plaza.

### ***3. Seating***

Seating is the third important element in a plaza, according to Whyte. The author begins by asserting that the front portion of any plaza which faces the major street should contain opportunities for people to sit and that design elements cannot induce people to come if there is no place to sit. More specifically, people tend to sit where there are places to sit (ibid, p. 28).

Whyte highlights the need of seating to be (1) physically and (2) socially comfortable. To be physically comfortable, seating must not be too high, too low, or too narrow. The major requirement is that one linear foot of seating must be provided for every thirty square feet of plaza space. Seating should be at least twelve inches high and deep enough for people to be able to sit; an optimum depth is sixteen inches for one sided; and thirty inches if both sides of the seating are usable. Whyte favors the idea of seating space which is accessible from both sides because the extra space will enhance the users’ social comfort, which he defines as “more space for individuals and groups to choose from” (ibid, p. 32). Whyte also observed that movable chairs are more flexible than fixed benches in terms of seating (ibid, p. 35). The main advantage of such movable chairs is the mobility and freedom for users in being able to choose a sitting place.

This literature review on public spaces, campus outdoor spaces, and plazas has given significant information on the design qualities that promote sociability and human interaction in a plaza. In regard to the literature review and the context of the North Quadrangle, the more important design considerations during plaza design are related to attracting passers-by and motivating them to stay for prolonged periods of time. The literature research has shown that the most effective ways to attract the passers-by is by locating the plazas centrally and maintaining a permeable street-plaza relationship (e.g., through the use of beckoning devices). In turn, the design of socially and physically comfortable seating and provision of amenities like fountains or food kiosks can make the plaza favorable for longer stays. Thus, having completed the literature research on design requirements in a plaza, the next chapter discusses the research methods adopted for conducting the empirical observation of users' moving and resting behaviors in the North Quadrangle.

## **Chapter 3 - Research methods for a behavioral analysis of users' moving and resting behaviors**

As described in the introduction of chapter 1, the major purpose of this thesis is to provide design solutions for the North Quadrangle of Kansas State University in the form of a sociable plaza. In this regard, the literature review of chapter 2 discussed some of the important design qualities required for a well-used plaza. This review also examined how successful sociable public spaces work and overviewed some important plaza design features. Implications based only on a literature review, however, are not sufficient to guide my North Quadrangle plaza design, since empirical behavioral research is required as well. Thus, to obtain a more realistic understanding of the real-world spaces in which I hope to facilitate plaza design, observation of users' behaviors in these spaces was conducted.

This observational research of users' behaviors gives a more accurate real-world understanding of the North Quadrangle's spaces and points to important design implications with regard to the proposed plaza. The behavioral observations of the North Quadrangle are divided into two major categories:

1. Behavioral observations of moving users; and
2. Behavioral observations of resting users.

Furthermore, the objectives of this behavioral analysis of users' movement and resting behaviors in the North Quadrangle are:

1. To acquire a general qualitative assessment of users' moving and resting patterns;
2. To record and analyze the nature of pedestrian movements in different pathways; and
3. To record and understand users' specific resting activities within the spaces.

Having discussed the nature and objective of the behavioral observation, it is now important to provide background information on how the methods for actual research were realized. The following section discusses the nature of environment-behavior research, primarily focusing on the different tools and techniques suggested by researchers in this interdisciplinary field. This discussion is followed by a pilot study of North Quadrangle's user behaviors conducted before the final observational research.

### **The nature of environment-behavior research**

Environment-behavior research constitutes a large, interdisciplinary field and there are many different methodological tools and techniques which can be implemented to conduct empirical research successfully. For this chapter on research methods, it is important to overview these techniques of conducting environment-behavior research relevant to this thesis.

Many researchers have produced significant works in the field of environment-behavior studies, which are beneficial in producing a systematic and logical research method and body of research. Two valuable overviews are Robert Sommer and Barbara Sommer's *A Practical Guide to Behavioral Research* (2002) and John Zeisel's *Inquiry by Design* (1988). In their work, Sommer and Sommer (2002) discuss specific research methods which can be implemented in environment-behavior studies, including observation, mapping and trace measures, experimentation, interviewing, questionnaires, case studies, standardized tests and inventories, and sampling. Similarly, in his *Inquiry by Design*, Zeisel (1988) discusses such methods as observation, focused interviews, and standardized questionnaires.

These different research methods have varying strengths and weaknesses and unique methodological value. For my thesis, observation of environmental behaviors is the most relevant and suitable research method for the following key reasons:

1. North Quadrangle provides a potential setting for observation of users being involved in various moving and resting behaviors;
2. A systematic observation schedule can be prepared to observe a wide variety of user behaviors in the course of the day;
3. Recommendations for improving the design of North Quadrangle's spaces can be directly related to the results of these systematic behavioral observations;
4. Behavioral observations can be actualized via behavioral mapping, which contributes to further design recommendations; and
5. Other methods like interviews, questionnaire surveys, and sampling, either cannot yield relevant data in this specific case, or require more time than is available for this study.

Thus, observation is the most effective tool to understand the behavior of users moving and resting in the North Quadrangle. According to Sommer and Sommer, observation is an ideal method for studying commonplace, unselfconscious, and nonverbal behaviors, such as movements, gestures, postures, or seating patterns (Sommer and Sommer, 2002, pp. 47- 48). If we follow these authors' classification, the specific type of observation conducted in this thesis can be labeled as *systematic observation*, which is described as 'being employed with prearranged categories that were arranged consistently' (ibid, p. 48). Since the observational research in this thesis does not focus on the behaviors of particular individuals, the method followed is more place-centered, and thus the observer is stationed to watch the moving and resting activities taking place within the North Quadrangle. These behaviors are largely repetitive and a good predictor of future environmental behaviors in the North Quadrangle.

In this thesis, observation was grounded in behavioral mapping of users' moving patterns. The researcher was a 'secret outsider'- in other words, an observer unobserved by the users in

their natural setting (Zeisel, 1988, p. 117). This thesis makes use of behavioral mapping so that North Quadrangle's pedestrian flows can be understood more thoroughly. According to Sommer and Sommer, behavioral mapping is particularly valuable for detailing users' locations and movements and how users distribute themselves in a particular area or location (Sommer and Sommer, 2002, p. 63). Behavior mapping contributes to the understanding of where and what environmental behaviors actually occur, which may be in conflict with what was designed for the space.

### **Examples of specific environment-behavior research methods**

Having discussed environment-behavior research methods broadly, I next review specific environment-behavior research relevant to my plaza design. A first important study is Mehta's *The Street* (2012), which presents an empirical study of human behaviors in three different Boston-area streets—Massachusetts Avenue in Cambridge, Harvard Street in Brookline, and Elm Street in Somerville. Although the study involved busy urban sidewalks rather than a campus setting, it is relevant to my thesis because Mehta focuses on the 'observation of social behaviors'. In his research, Mehta contends that the social behaviors form a basis for design (Mehta, 2012, p. 57). He argues that a wide range of social behaviors and activities taking place in any urban street (Table 3.1) can be developed into a more systematic typology. Thus, the author adopts observations and interview responses as his primary research method to produce a typology of social behaviors in the street, which he classifies as: (1) passive sociability; (2) fleeting sociability; and (3) enduring sociability (ibid, p. 98).

<b>Postures</b>
• Walking
• Ambling
• Standing
• Sitting
• Lying
• Sleeping
• Jogging/running
• Skateboarding
• Bicycling
<b>Behaviors and activities</b>
• Talking
• Eating and drinking
• Working (typically on a laptop)
• Reading
• Sharing time with family or friends (eating, drinking, socializing)
• Kissing and other intimate physical contact
• Cleaning and maintaining shop front and sidewalk
• Decorating- putting planters out, hanging planters, putting out advertising boards, changing signs, etc.
• Smoking
• Talking on a mobile phone
• Talking on payphones
• Playing a musical instrument
• Playing board games
• Panhandling
• Vending
• Greeting others on the street
• Taking pets for a walk
• Observing other people and activities
• Window-shopping
• Protesting
• Soliciting signatures for a petition
• Distributing flyers

**Table 3.1 Postures, behaviors, and activities observed on the street. Note that only the behaviors and activities of adults are listed (from Mehta, 2012, p. 99).**

*Passive sociability*, according to Mehta, fulfils the need of public space users to be in the presence of other users without seeking any direct verbal contact (ibid, p. 100). Such passive behaviors can relate to solitude, relaxing, spectating and displaying, or people watching. In

contrast, *fleeting sociability* involves the chance encounters in public space, leading to short-term conversation among the pedestrians in a relaxed and undemanding way (ibid, p. 106). This type of sociability occurs through exchanging gestures or short dialogues between neighbors, friends, acquaintances, or familiar faces in the street. Yet again, *enduring sociability* refers to an ‘active connection with companions, friends, and the community’ (ibid, p. 110). Mehta adds that such enduring behaviors are supported by streets or well-designed places that promote meaningful and intimate association among its users, with conversation being the most common social behavior.

Mehta uses the following research protocol to conduct his observational work:

1. Selection of seventy-eight block segments each fifteen to eighteen meters in length, across nineteen blocks in his three study sites;
2. An observation period between 7:00 am to 11:00 pm, each day of the week; and
3. Face-to-face interviews and surveys to understand pedestrians’ experience of the street.

Mehta’s method is systematic and presents a clear observational research procedure via behavioral mapping, which is the main method I use in my thesis. His work demonstrates that the quality of the designed environment can play a significant role in the way the users behave within a place. Through analysis of the three streets, Mehta concluded that streets ‘were perceived as a place of utility to support their everyday needs, and as a place to gather’ and depending on their background, the users had ‘different expectations from the street’ (ibid, p. 93).

### **Preparing a pilot study of North Quadrangle users’ moving and resting behaviors**

The study of environment-behavior research played an important role in determining the research method for my North Quadrangle study. As a practical starting point, I organized a pilot

study to aid the final observational research of North Quadrangle users' moving and resting behaviors. This pilot study was helpful in providing a preliminary sense of activities taking place in the North Quadrangle before more extensive, final observations were conducted (described in chapter 4). This pilot study assisted in identifying a systematic environment-behavior research method for the final observation in terms of: (1) preparing a base map; (2) locating the areas for observation; (3) selecting appropriate days and time-periods; and (4) observing and recording users' behaviors. A detailed explanation of the pilot study is discussed in the sections that follow.

### **Pilot study of the North Quadrangle users' moving behaviors**

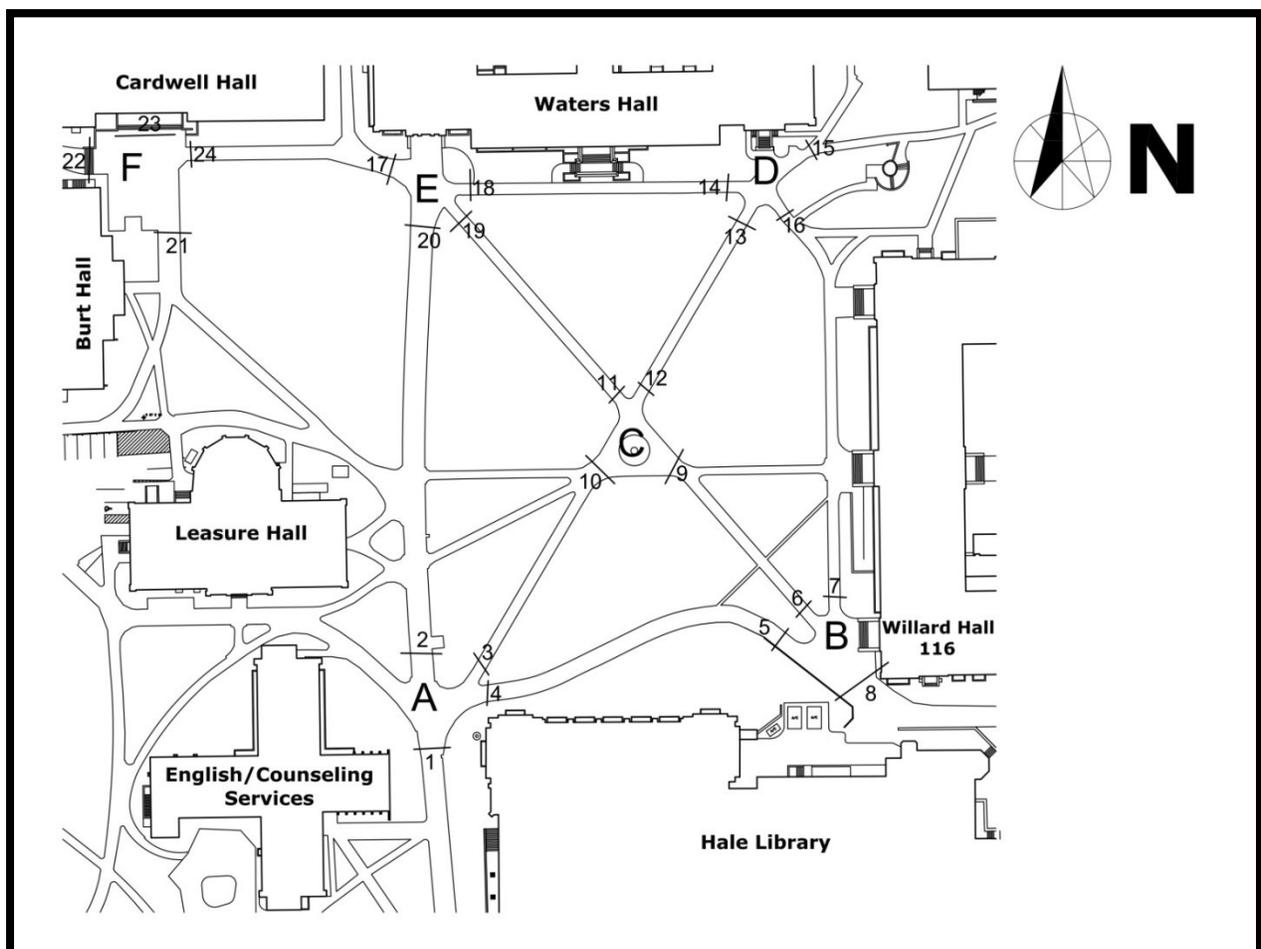
A pilot study to understand North Quadrangle users' movement activities was conducted from twenty past every hour to twenty eight past every hour from 12:20 pm to 4:28 pm on Thursday, September 25, 2014 and from 8:20 am to 11:28 am on Friday, September 26, 2014. The mean temperatures as recorded on those days were 65 degrees Fahrenheit and 64 degrees Fahrenheit, respectively. Two days were selected so as to study the movement patterns on two differently scheduled weekdays at different times of the day. Kansas State University follows a class schedule that allows for a ten-minute break between classes; this break runs from twenty past each hour to half-past each hour. Since there is a higher user presence during this break period, the time period chosen for observation was close to this break-time.

To conduct the empirical observations of the North Quadrangle for the pilot study, six areas were selected and identified as **A, B, C, D, E, and F** (see base map of figure 3.1). These six areas were selected because these locations are the major intersecting nodes mostly used by pedestrians for travelling to and from different destinations within or beyond the North Quadrangle. A vantage location was chosen during each observation period, so that each location gave a clear view of the areas being observed. Furthermore, these areas were sited such that each

has pathways that can be accessed from at least four directions. Thus, each pathway was marked with a chalk line to guide the counting of users moving (numbered 1 to 24 on the base map of figure 3.1). For ease of counting and to accommodate the proposed observation periods, adjacent areas were taken as pairs for each eight-minute observation period. The paired areas observed during each of these periods were **A** and **B**, **C** and **D**, and **E** and **F** (see figure 3.1).

This pilot study provided the following requirements regarding the structure of the more formalized final observational study of movement behaviors in the North Quadrangle:

1. Observations of pedestrian movement at different times of day in different areas is vital for understanding the variation in users' behaviors;



**Figure 3.1 Base Map of the North Quadrangle. Note the chalk lines numbered one to twenty-four which was referred for the observation.**

2. A week-long observational study based on a similar, systematically arranged research method has the potential to yield a conclusive understanding of North Quadrangle's user movements and thus potential site for the plaza; and
3. The most significant time period is between the ten-minute break when higher user activity is generated. Also, observing the time period from 9:20 am to 2:30 pm is sufficient to understand the variations in users' movement behaviors, since there is much less North Quadrangle weekday activity before or after these times.

### **Pilot study of users' resting behaviors**

The plaza which is located in front of the North Quadrangle's Cardwell Hall was observed informally at different times from 10:00 am to 1:30 pm on October 7, 2014 to understand North Quadrangle users' resting behaviors (area F in figure 3.1). This pilot study has assisted in the final observations of users' resting behaviors within the North Quadrangle in terms of the following points:

1. Finalizing the observation time periods;
2. Selecting specific locations for observation of resting behaviors within the North Quadrangle;
3. Specifying users' resting activities in relation to more specific behaviors like conversing, reading, or using digital devices; and
4. Recording users' resting behaviors in the form of a written summary of activities for each time period, which summarizes observations relating to resting behaviors.

## **Key discoveries from the pilot study and preparation of research method for final observational research**

The pilot study has assisted the final observational research of North Quadrangle users' moving and resting behaviors in terms of: (1) producing a strong framework for behavioral observation as a final research method and (2) providing justifications as to why this behavioral observation is effective for my study.

As discussed in previous sections of this chapter, this pilot study has assisted in creating a final research method which is based on more detailed behavioral observations of North Quadrangle users' moving and resting activities. The pilot study has confirmed that the final behavioral research follows a systematic procedure that emphasizes: (1) the use of a base map; (2) selection of appropriate days and time schedule; and (3) observation and recording via counting and behavioral mapping.

Furthermore, this pilot study has revealed important implications for the observations of North Quadrangle's moving and resting behaviors. The pilot study of North Quadrangle users' moving behaviors has determined that a specific site within this space can be selected for proposing a plaza based on detailed observational research. The pilot study demonstrated that counting and mapping pedestrians traversing through a certain area becomes crucial in determining the area's potential for being developed into a plaza. Similarly, the pilot study of North Quadrangle users' resting behaviors demonstrates a need for observing and mapping specific stationary activities in which users are involved. These plaza users are involved in various resting activities, either standing or sitting, both of which need to be observed and recorded during more thorough observations so as to assist in the design of the proposed plaza.

Having discussed these implications of the pilot study, I next discuss the research method for my more elaborate, formalized behavioral study of North Quadrangle's moving and resting behaviors.

### **A behavioral observation of North Quadrangle users' moving and resting activities**

The discussions relating to environment-behavior research and the pilot study indicate that the most suitable research method for my thesis is conducting behavioral observations of North Quadrangle users' moving and resting activities. The previous studies also provided significant information for a more detailed, formalized method for observational research. I discuss my research method in two parts:

1. A behavioral observation of North Quadrangle's moving users; and
2. A behavioral observation of North Quadrangle's resting users.

#### ***Behavioral observations of North Quadrangle's moving users***

The first type of observation is recording, via counting, the movement of pedestrians along the North Quadrangle's major pathways. The major objective of observing of pedestrian movements is to recognize and justify potential spaces within the North Quadrangle where a plaza can be designed and built. This section analyzes the results from the observations of pedestrian movement based on the following analyses:

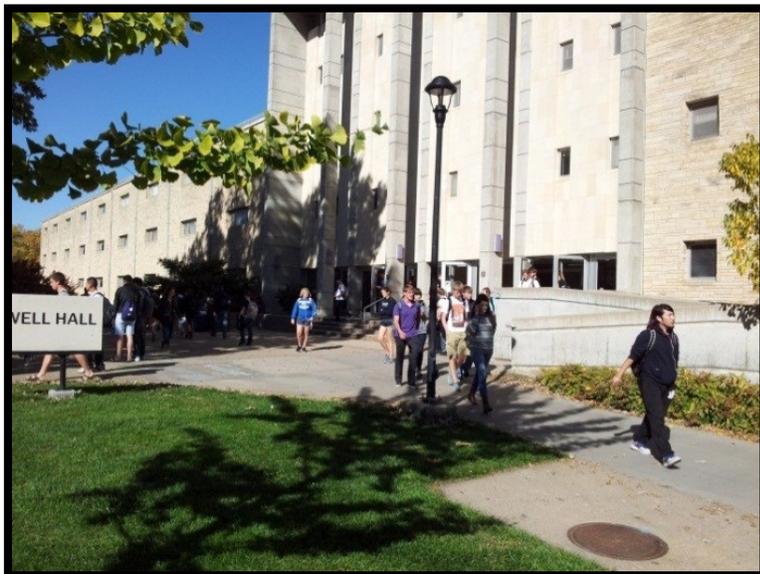
1. Analysis of cumulative user flow along different pathways on different days; and
2. Analysis of cumulative user flow at different times of day on different days.

More specifically, these data from the observation of pedestrian movement on different times of day on different days is helpful in generating information on the total number of users

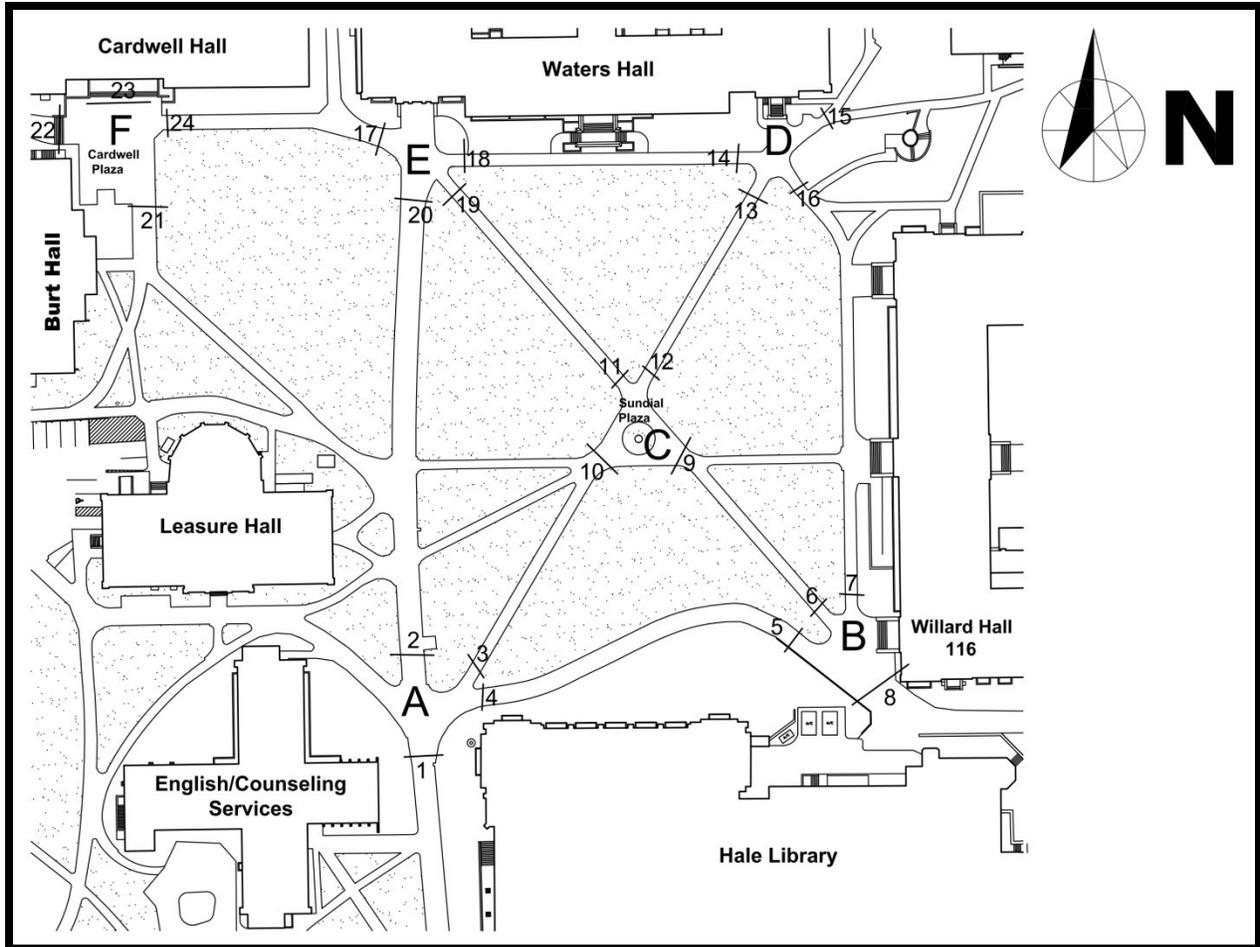
moving across the North Quadrangle at different times of day from mornings to afternoons. This data clarifies the number of users moving through the North Quadrangle along the course of the day and thus can indicate which area is more appropriate for a plaza design within the North Quadrangle.



**Figure 3.2 Pedestrian movements across area A.**



**Figure 3.3 Pedestrian movements across area F.**



**Figure 3.4 Final base map for the observation of North Quadrangle users' moving and resting behaviors.**

A final base map as seen in figure 3.4 was used for the final observation of users' movement patterns. To conduct the empirical observations of the North Quadrangle, six areas were selected and identified as **A, B, C, D, E,** and **F** (see the base map of figure 3.4). From the pilot study, it was confirmed that a study for the five weekdays from 9:20 am to 2:30 pm during the breaks is sufficient for the final observation. Thus, the behavioral observations of user movements in the North Quadrangle were conducted for a total of five weekdays, from Monday, October 6, 2014 to Friday, October 10, 2014. During these weekdays, regular classes were scheduled, and thus this observation schedule gave sufficient data on the pathways more or less

highly traversed. An observation schedule of five days was sufficient for understanding users' movement patterns and effectively documented any daily variations in movements. Weekends were not considered, since regular classes do not take place on these days and, as such, there is minimal weekend user presence on the North Quadrangle. The observations were conducted from eighteen to twenty six past every hour, Monday through Friday. These observations began each weekday at 9:18 am and ended at 2:26 pm. These time periods do not exactly match the ten-minute break between classes because it is expected that an increase in pedestrian movement begins a few minutes before classes end at twenty past the hour and then decrease a few minutes before next classes begin at half-past the hour.

The total number of moving users traversing a specific area in a specific time period was counted and recorded in a standardized form as illustrated in table 3.5. In addition to counting the number of pedestrians moving through each area, a flow diagram to illustrate North Quadrangle's movement patterns was also prepared (see figure 3.5), which indicates the nine pedestrian flows considered for the study of users' moving patterns. Different colors have been used to illustrate these pathways. This flow diagram assisted in the preparation of a "flow analysis diagram" based on major pedestrian pathways that portrays the estimated volume of North Quadrangle's pedestrian movement as will be explained more fully in chapter 4.

**Observation of people flow in the north quad**

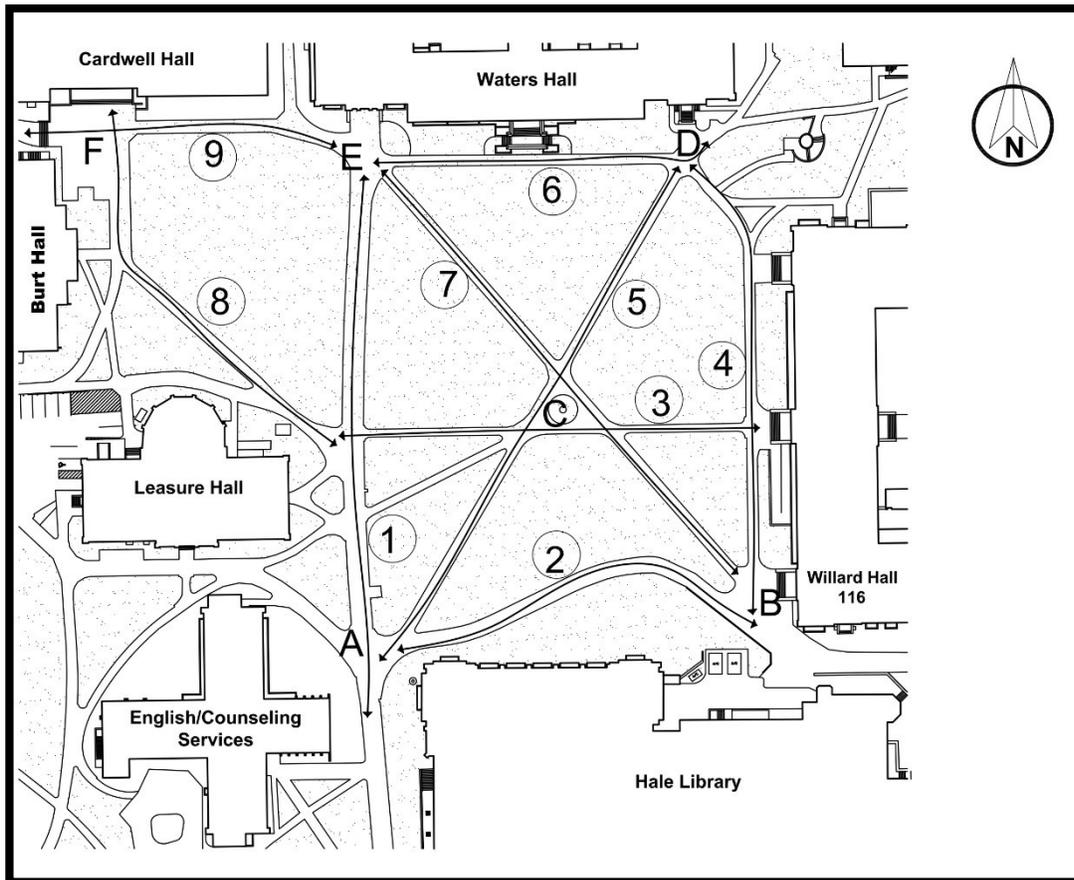
Observed by: Suttk Day/Date: 10/19/07

Observation area: (2, 10) Time: 9:18-9:26

Temperature: 53°F Sheet no: 1

Time	Line .9	Line .10	Line .11	Line .12	Line .13	Line .14	Line .15	Line .16	Total flow
:18-19									(17)
:19-20	→								(9)
:20-21	→								(11)
:21-22	→								(11)
:22-23	→								(11)
:23-24	→								(4)
:24-25	→								(5)
:25-26	→								(0)

**Table 3.2 Standardized observation form for counting moving users in the North Quadrangle.**



**Figure 3.5 Base map with nine pedestrian flow pathways.**

### ***Behavioral observations of North Quadrangle' resting users***

In determining ways to improve the North Quadrangle, it is also important to study the behavior of users at rest within the space. This data is important because understanding the specific behaviors of plaza users at rest should play a significant role in the design of North Quadrangle's plaza that promotes strong sociability. Furthermore, the study of resting behaviors relates to those features of a plaza that are responsible for drawing people into it informally and thus facilitate impulse use. More specifically, the data helps in a proper understanding of the design requirements via an account of specific resting activities in which North Quadrangle users are involved. Following the study of Namkang (2004, pp. 41 and 78), these resting activities are divided into two major categories:

- 1) Activities while sitting; and
- 2) Activities while standing.

Sitting users are expected to be involved in such specific activities as conversing, smoking, observing, reading, eating, and using cell phones and other digital devices. Similarly, standing users at rest are expected to be involved in such specific activities as conversing, smoking, and using cell phones and other digital devices. To conduct the final empirical observations of North Quadrangle's user behaviors, a space in front of Cardwell Hall was studied (see the base map in figure 3.4). For ease of understanding, this space is referred to as "Cardwell Plaza" (figure 3.6).



**Figure 3.6 Resting users at Cardwell Plaza.**

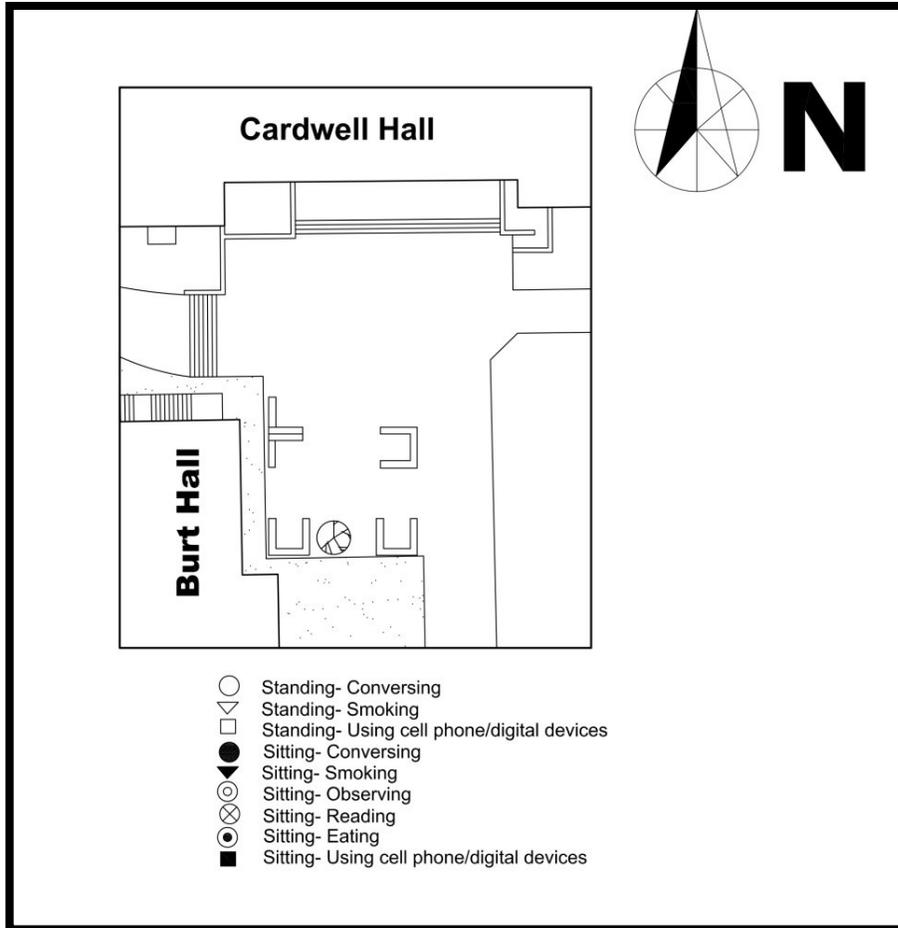
The observations of users' resting behaviors in the Cardwell Plaza were conducted for a total of four weekdays from Monday, October 17, 2014 to Thursday, October 20, 2014. The plaza was observed for six times each day, each period being ten-minutes long. This ten-minute observation period extended from fifteen past each hour to twenty five past each hour from 9:15 am to 2:25 pm, Monday to Thursday. These time periods were selected to accommodate the ten-minute break period between classes that occurs from twenty past each hour to half-past each hour. It was expected that pedestrian movement is highest during this ten-minute break, and therefore would generate highest number of stationary plaza users. The selected time periods do not exactly match the ten-minute break because it was assumed that the users involved in resting behaviors begin using the plaza a few minutes before classes end and remain for a few minutes before next classes begin.

The total number of users engaged in different resting activities was recorded in a summary table as seen in table 3.3. The data collected in this table gave detailed information on the North Quadrangle male and female users' resting behaviors in terms of specific activities

while sitting and standing. Male and female behaviors were recorded to identify the specific type of activities they are involved in and design such spaces where users of both genders feel comfortable to stay. These behaviors were also studied to recognize certain locations within the Cardwell plaza which were less or more highly used by the male and female users. The resting behaviors were recorded on the base map of Cardwell Plaza by plotting each user's specific sitting and standing activities (figure 3.7). Different symbols were used to represent specific activities in which the users were involved. To record more elaborated description of users' resting behaviors, the summary of user behaviors for each observation period was also documented in a separate paper.

Time Temp/Sky	Sitting												Standing						Total			
	Conversing		Smoking		Observing		Reading		Eating		Phone/Gadg		Conversing		Smoking		Phone/Gadg					
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female				
9:15-9:25																						(5)
10:15-10:25																						(16)
11:15-11:25																						(27)
12:15-1:15					#																	(5)
1:15-1:25					#																	(15)
2:15-2:25																						(22)

**Table 3.3 Standard observation form for counting users at rest in the North Quadrangle.**



**Figure 3.7 Base map for mapping resting users in Cardwell Plaza.**

This chapter has overviewed the research method for observations of North Quadrangle’s moving and resting behaviors. In the next chapter, I discuss the results from this observational research and discuss design implications for the plaza.

## **Chapter 4 - A behavioral analysis of the North Quadrangle's moving and resting users based on the observational research**

This chapter discusses the results from the behavioral observations of the North Quadrangle's moving and resting users. The chapter is divided into two sections, each following a similar method for analysis as discussed in chapter 3:

1. A behavioral analysis of the North Quadrangle users' moving activities; and
2. A behavioral analysis of the North Quadrangle users' resting activities.

The major aim of this chapter is to analyze the data obtained from the observational research conducted in the North Quadrangle. As explained in chapter 3, the behavioral analysis of the North Quadrangle's moving and resting users are based on a research procedure which incorporated:

1. Recording total number of users involved in the moving and resting activities via counting; and
2. Identifying users' movement and rest patterns via behavioral mapping.

As discussed in chapter 1, the major aim of this thesis is to propose plaza design for promoting the North Quadrangle's sociability, following systematic behavioral observations. As will be made clear in chapter 5, a careful analysis of the results obtained from these observations have played an important role in identifying significant design parameters for the North Quadrangle's plaza.

## **A behavioral analysis of the North Quadrangle users' moving activities**

As discussed in chapter 3, the behavioral analysis of the North Quadrangle's moving users is based on recording, via counting, the total pedestrians moving through the six areas identified within the space. These areas were observed for six eight-minute-long observation periods during each of the five weekdays. It has been discussed previously that there are three important kinds of data generated from the observations of the North Quadrangle's moving users:

1. Data describing cumulative pedestrian flows along different areas;
2. Data describing cumulative pedestrian flows along different pathways; and
3. Data describing cumulative pedestrian flows on different days and time periods.

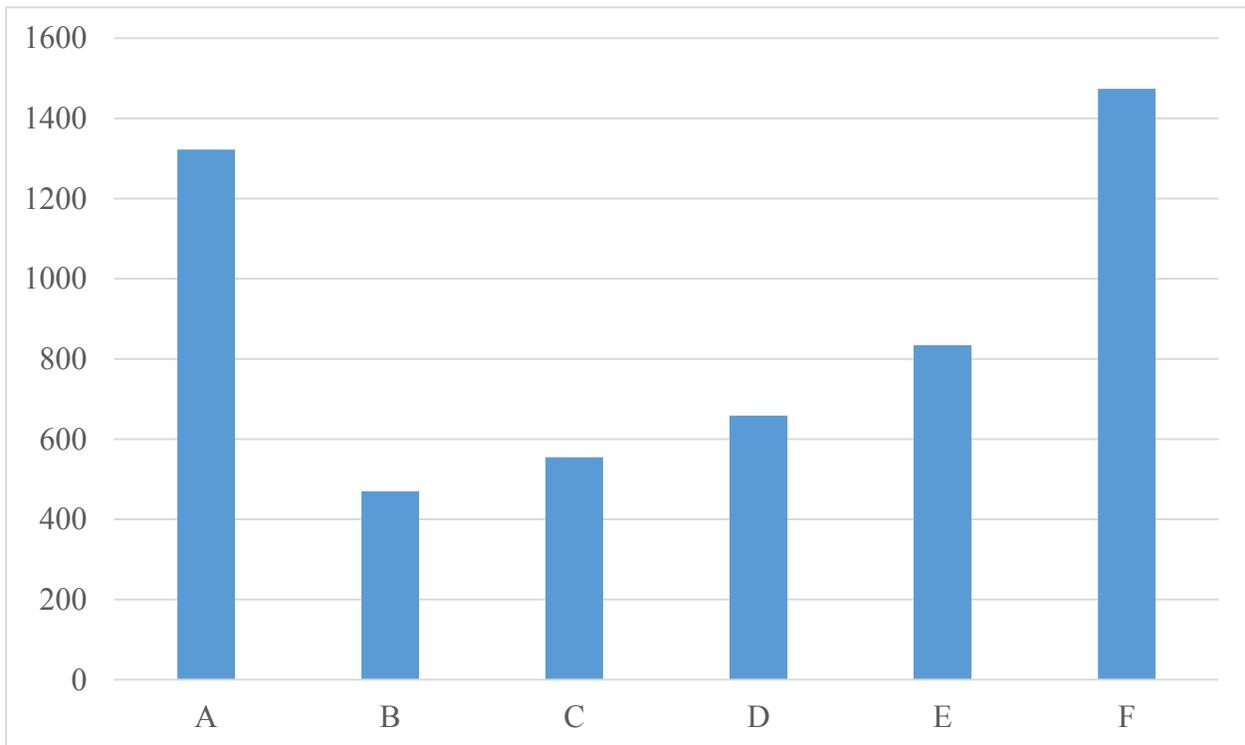
### ***Data describing cumulative pedestrian flows along different areas***

These cumulative pedestrian flows are important because they distinguish the paths that are less or more traversed by the North Quadrangle users, assisting in locating a site with the highest potential for sociable plaza design. As illustrated by table 4.1 and graph 4.1, the results of the North Quadrangle's moving observations indicate areas **A** and **F** involve the highest pedestrian flows. For the five weekdays observed, a total of 1322 users passed through area **A**, whereas a total of 1474 users passed through area **F**. In contrast, areas **D** and **E** involved only medium pedestrian flow. A total of 659 users moved through area **D** whereas a total of 834 users moved through area **E**. The lowest number of pedestrian flows occurred for areas **B** and **C**. A total of 470 users moved through area **B**, whereas a total of 555 users moved through area **C**. During the observational periods, it was noted that the movement pattern of the North Quadrangle's pedestrians varied because of two important reasons: (1) the location of different

buildings in which regular classes and other important activities occur; and (2) the time periods selected for the observation.

Area	Total pedestrian flows
A	1322
B	470
C	555
D	659
E	834
F	1474
<b>Total</b>	<b>5314</b>

**Table 4.1 Total users moving through the different areas in the North Quadrangle (for five weekdays).**



**Graph 4.1 Comparison of total users moving through the different areas in the North Quadrangle (for five weekdays).**

As indicated by table 4.1 and graph 4.1, areas **A** and **F** were marked by higher pedestrian flows because these areas include pathways which connect such important campus buildings as academic halls, administration, and student union (figures 4.1 and 4.2). These buildings involving greater student use are the most important destinations for many North Quadrangle users. Area **A** includes a pathway that connects the North Quadrangle with the student union building, one of the most prominent campus destinations. Similarly, area **F** is adjacent to the Cardwell Hall, which houses large lecture halls. Due to this high number of students attending classes in the Cardwell Hall, area **F** was associated with the highest pedestrian flows in the North Quadrangle.



**Figure 4.2 Pedestrian movement across area A.**



**Figure 4.1 Pedestrian movement across area F.**

Similarly, the total numbers of users moving through areas **D** and **E** was also associated with the location and functions of adjacent and nearby buildings. Area **D** is located towards the south eastern corner of the North Quadrangle. It was observed that pedestrians from farther east of the North Quadrangle passed through area **D** to reach other buildings located closer to the North Quadrangle. Similarly, area **E** is located close to areas **D** and **F**. For this reason, it is used by pedestrians moving through areas **A**, **D**, and **F**.

As illustrated by table 4.1 and graph 4.1, areas **B** and **C** involved the lowest pedestrian flows because the North Quadrangle's users did not traverse these areas frequently. Area **B** is located to the southeast of the North Quadrangle and linked with campus buildings farther east. Area **B** is traversed by few users, since they do not take the route from area **B** to reach buildings located closer to the North Quadrangle. Observations indicated that users of those two buildings closest to area **B** (Willard Hall and Hale Library) do not move through area **B** to enter these buildings because this area is associated with the back sides of those two buildings and not related specifically to their main entries. In turning to area **C**, one notes low aggregate numbers of pedestrians moving through this area. One of the buildings closest to area **C** (Willard Hall) has its rear entry facing the North Quadrangle and thus only a few students move through this space to enter the building.

### *Pedestrian flows along different pathways*

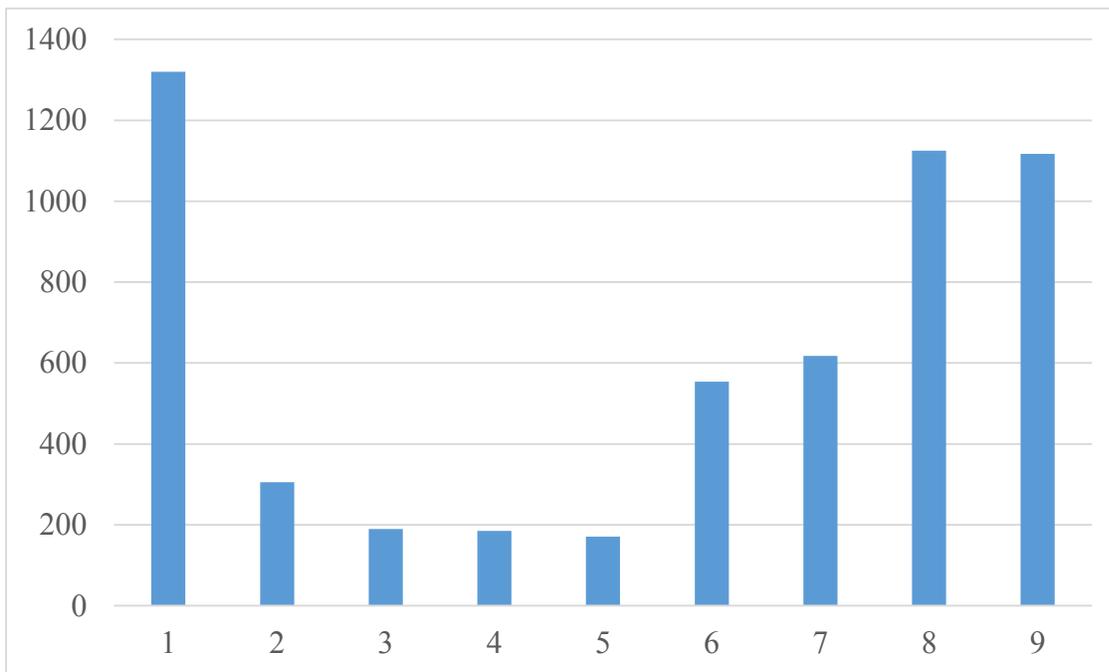
As described previously, the major purpose of observing the North Quadrangle's moving users is to assist in the selection of a potential site for plaza design. From the literature review, it was confirmed that selecting appropriate pathway(s) which convey higher pedestrian flows has the highest potential for locating a well-used plaza. The results obtained from observing the total number of pedestrians moving through the North Quadrangle however, does not provide sufficient evidence to persuasively suggest an appropriate site within the North Quadrangle for plaza design because an account of individual pathway measures is central for deciding appropriate plaza location.

For this reason, I prepared a pedestrian flow analysis diagram of nine pathways located within the North Quadrangle based on the total pedestrians passing through the six areas (table 4.2, graph 4.2, and figure 4.3). Each of these nine pathways involves a different behavioral

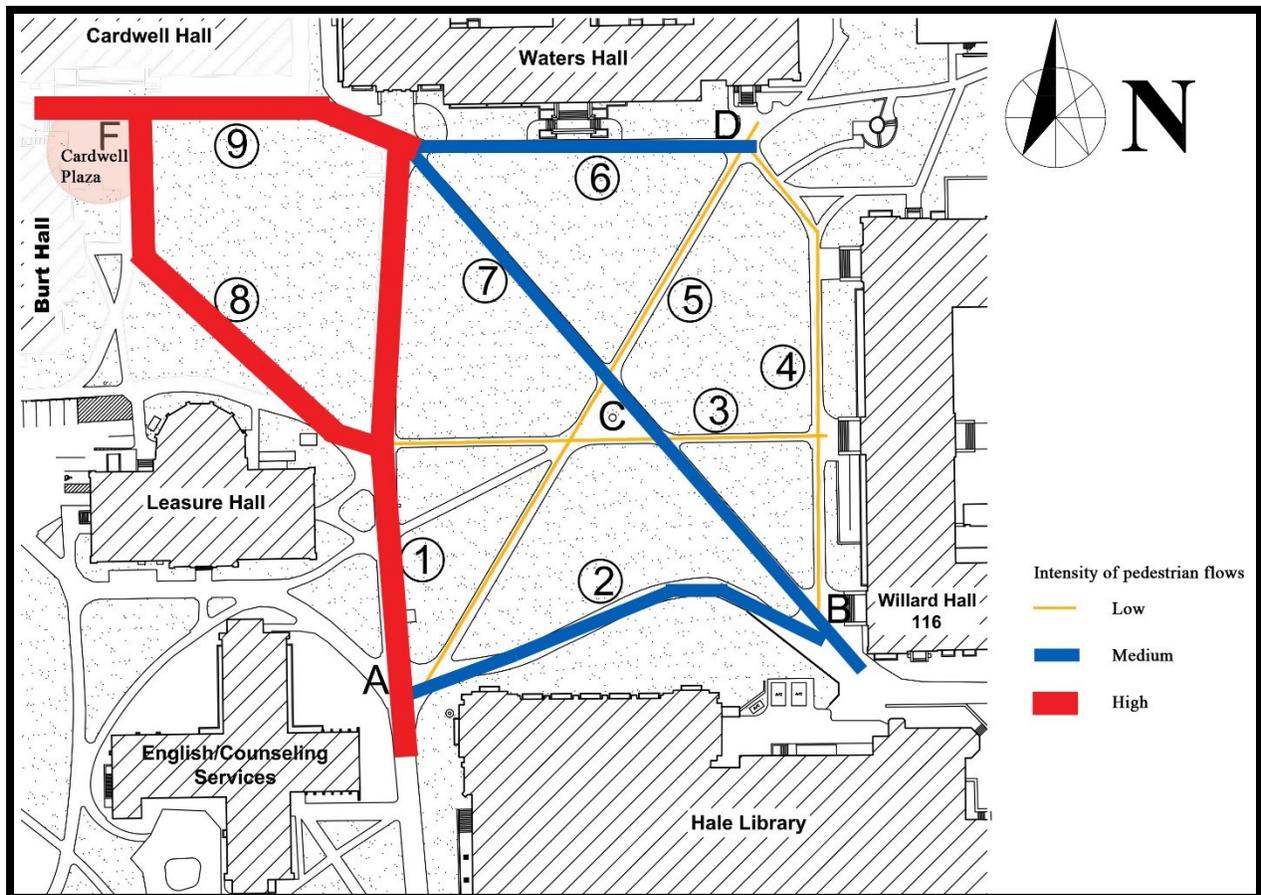
pattern observed for North Quadrangle's moving users. This flow analysis examines the intensity of pedestrians traversing each of the nine pathways in terms of higher, medium, and lower intensity. If the aggregate pedestrian flow for a particular pathway was more than 1000 pedestrians for the five weekdays observed, it was considered to be highly used. If the pathway had less than 500 users, it was considered to have a low intensity of use. This pathway data on intensity of pedestrian flows in the North Quadrangle has played a significant role in the selection of the most appropriate site for plaza design.

Path	Total pedestrian flows
1	1320
2	305
3	190
4	185
5	171
6	554
7	618
8	1125
9	1117

**Table 4.2 Total pedestrians moving through each pathway in the North Quadrangle (for five weekdays).**



**Graph 4.2 Total pedestrians moving through each pathway in the North Quadrangle (for five weekdays).**



**Figure 4.3 Intensity of pedestrian flows across different pathways of the North Quadrangle.**

Specifically, the results from North Quadrangle’s pedestrian flow analysis reveal that the highest numbers of pedestrians traversed pathways 1, 8, and 9. A total of 1320 pedestrians traversed pathway 1, whereas pathways 8 and 9 also had high user flow with a total of 1125 and 1117 users, respectively. On the other hand, pathways 2, 6, and 7 generated medium pedestrian flows with a total of 305, 554, and 618 users traversing these pathways. Yet again, pathways 3, 4, and 5 generated the lowest pedestrian movement with totals of 190, 185, and 171 pedestrians traversing these pathways, respectively.



**Figure 4.4 Pedestrian flows in pathway 1.**



**Figure 4.5 Pedestrian flows in pathway 8.**



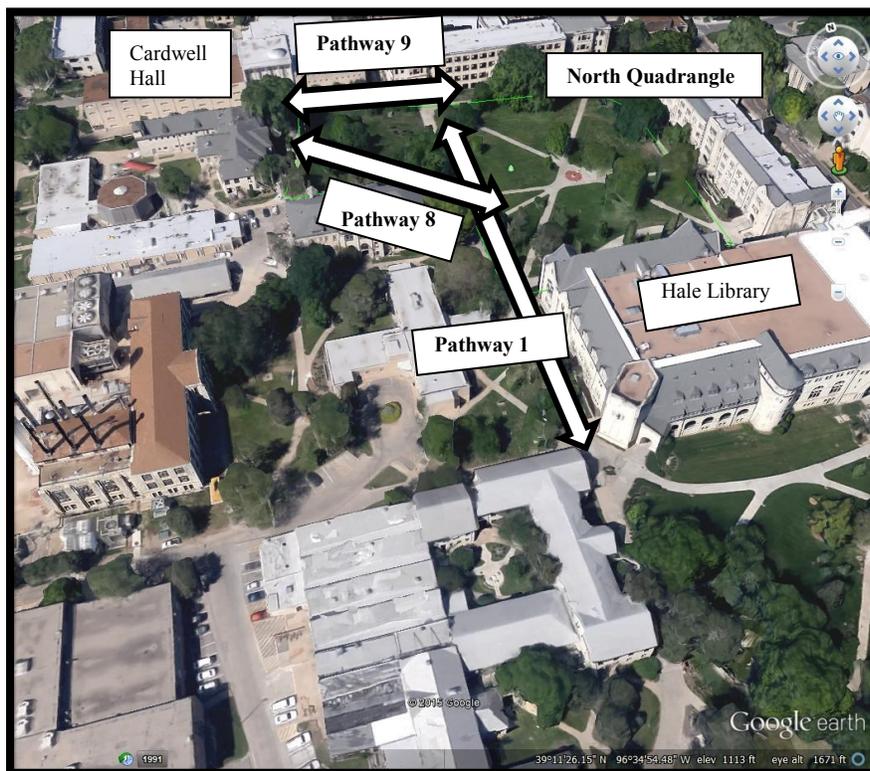
**Figure 4.6 Pedestrian flows in pathway 9.**

According to the results of these observations, pathways 1, 8, and 9 generated higher pedestrian movements of more than 1100 pedestrians in aggregate moving over each of these pathways, thus being the pathways with the highest potential for locating a plaza (figures 4.4, 4.5, and 4.6). Pathway 1 is indicated as the major pathway within the North Quadrangle in terms of moving users, since it connects the North Quadrangle with other important buildings on campus, including administration, academic halls, and the student union (figure 4.4). Pathway 1 extends from the southwestern end of the North Quadrangle (adjacent to the Hale Library) and extends to Waters Hall on the northeastern side of the North Quadrangle. Another pathway involving higher pedestrian flows is pathway 8 (figure 4.5). Pathway 8 diverges from pathway 1 and extends northwest toward the Cardwell Hall, mostly conveying high numbers of students who traverse between this building and area **A**. Similarly, pathway 9 also generates higher pedestrian flows and is used by high numbers of students who traverse between the Cardwell Hall and other areas of the North Quadrangle via area **E** (figure 4.6).

As illustrated by table 4.2, graph 4.2, and figure 4.3, pathways 6 and 7 generate only a medium amount of pedestrian movement. Most of the users from Cardwell Hall moving through area **E** turn to pathway 1, and thus pathway 6 generates only medium pedestrian flows. Pedestrians traversing pathway 6 move towards buildings farther east of the North Quadrangle via area **D**. Similarly, in regard to pathway 7, one notices that this route is mostly traversed by pedestrians who move between Cardwell Hall and other campus buildings located farther southeast of the North Quadrangle via areas **B** and **C**, thus generating a medium pedestrian flow.

In contrast, as illustrated by table 4.2, graph 4.2, and figure 4.3, pathways 2, 3, 4, and 5 generate the lowest numbers of pedestrian flows in the North Quadrangle. Each of these pathways are used by a total of less than 350 pedestrians. Most of the users moving through area

A traverse pathway 1, and a lower number of users turn to traverse pathway 2 that leads to area B. In examining pathways 3, 4 and 5, one notes that, although these pathways intersect at the center of the North Quadrangle, they involve lesser pedestrian movements. Pathway 3 originates from pathway 1 and leads to the rear entry of Willard Hall via area C, involving a lower number of pedestrian flows as discussed previously. Pathway 4 runs from the southeastern to the northeastern corner of the North Quadrangle. Most of the pedestrians moving through area D were observed to traverse pathway 6, with a lower number of pedestrians taking turns toward pathway 4. Furthermore, pathway 5 connects areas A and D, involving moderate pedestrian flows but generating lower pedestrian traffic because most of the users moving through area A traverse pathway 1, while a significantly fewer number take a turn toward area D via pathway 5.



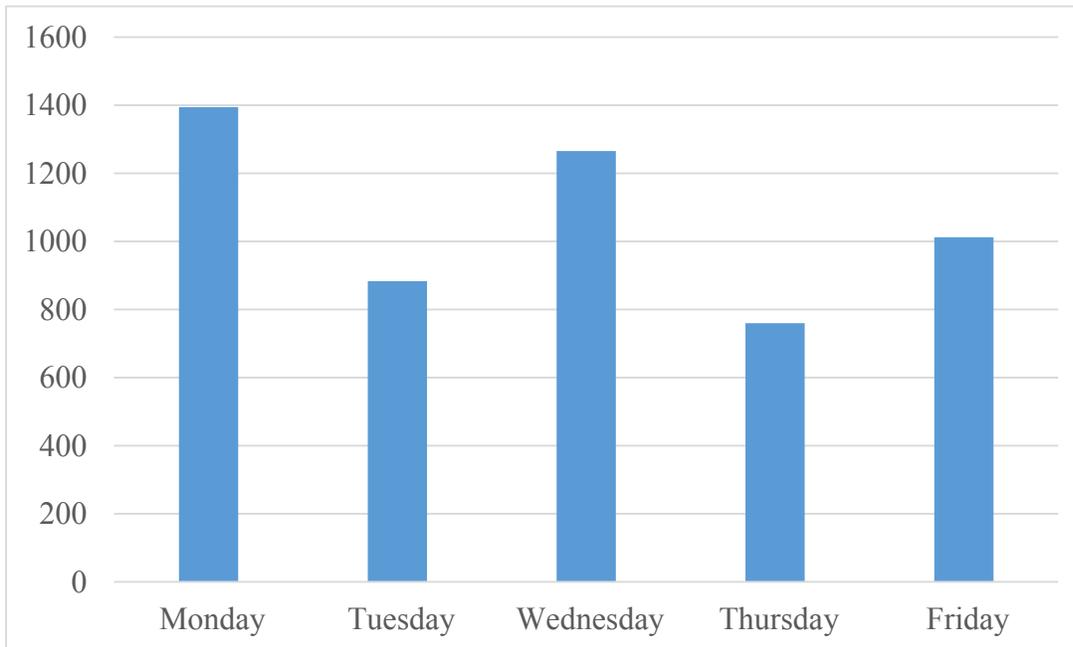
**Figure 4.7 Isometric view of the North Quadrangle portraying the most used pathways (1, 8, and 9).**

***Cumulative user flows for different days and different time periods***

Analysis of the North Quadrangle’s cumulative pedestrian flows along different pathways provided significant information for selecting a site with highest potential for plaza design in the North Quadrangle. This discussion is explained in two stages. First, the cumulative pedestrian flows for each day from Monday, October 6, 2014 to Friday, October 10, 2014 are discussed. This analysis is followed by a discussion of total pedestrian flows during each eight-minute-long time period from 9:18 am to 2:26 pm for the five weekdays of observations.

<b>Day</b>	<b>Total pedestrian flows</b>
<b>Monday</b>	1394
<b>Tuesday</b>	883
<b>Wednesday</b>	1265
<b>Thursday</b>	760
<b>Friday</b>	1012
<b>Total</b>	5314

**Table 4.3 Total North Quadrangle pedestrian flows for five weekdays.**



**Graph 4.3 Total North Quadrangle pedestrian flows for five weekdays.**

As indicated by table 4.3 and graph 4.3, the highest pedestrian flows occurred on Monday, October 6, when a total of 1394 users traversed across the North Quadrangle. Similarly, Wednesday involved the second highest user flow with 1265 users, followed by Friday, with a total of 1012 users. Tuesday and Thursday had lesser pedestrian movement with a total of 883 and 760 users. Although these variations of pedestrian flows on different days are not huge, there is a distinct pattern demonstrated for the five weekdays observed. The results in table 4.3 and graph 4.3 illustrate that pedestrian movements were consistently higher on Monday, Wednesday, and Friday as compared to pedestrian movements on Tuesday and Thursday.

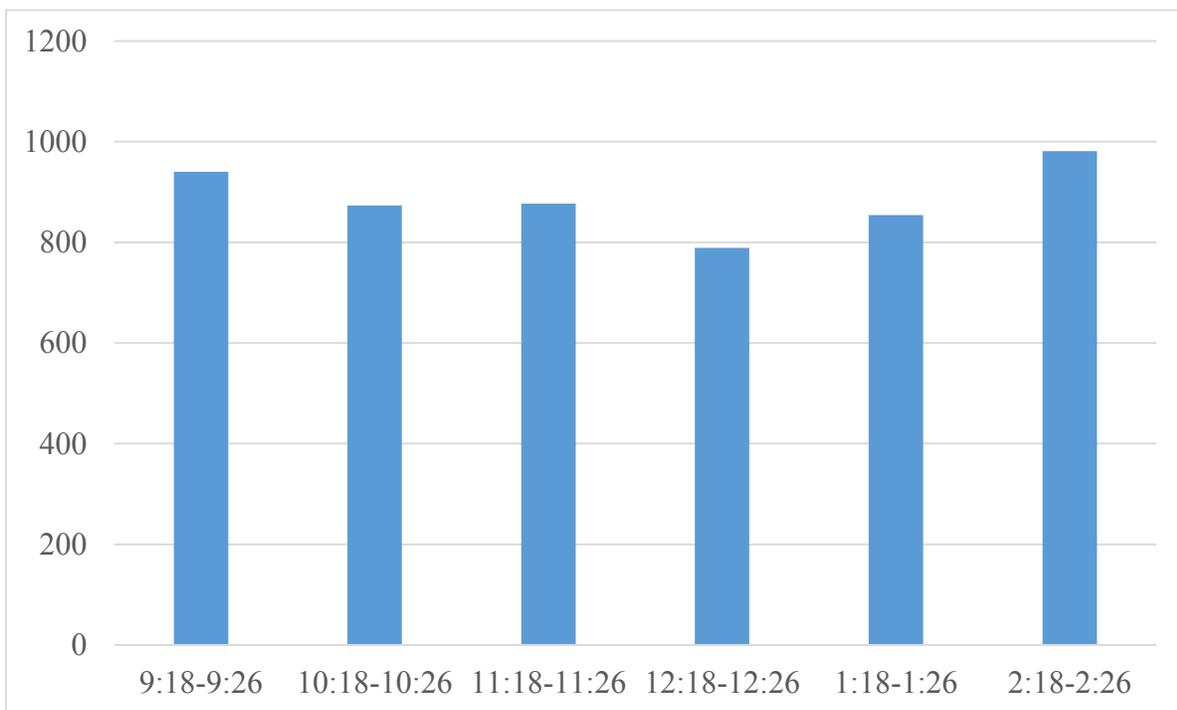
The major reason for this variation in user movements is probably the difference in scheduling of classes. More classes are scheduled on Monday, Wednesday, and Friday than on Tuesday and Thursday (Namkang, 2004, 61). In addition, classes on Monday, Wednesday, and Friday are fifty-minutes long, whereas classes on Tuesday and Thursday are an hour and fifteen minutes long. This difference in class lengths suggests that there is a difference in the total number of breaks between classes on the two differently scheduled groups of days, thus generating more users in the North Quadrangle on Mondays, Wednesdays, and Fridays.

In addition to the aggregate pedestrian flows for each weekday, the total aggregate pedestrian flows for each eight-minute-long observation period were also analyzed. As discussed previously, each observation period extended from eighteen past each hour to twenty six past each hour from 9:18 am to 2:26 pm. As illustrated in table 4.4 and graph 4.4, the pedestrian flows were higher during the early morning period from 9:18 am to 9:26 am (940 users) and the early afternoon period from 2:18 pm to 2:26 pm (981 users). The flow was slightly reduced to 873 users from 10:18 am to 10:26 am, increased slightly to 877 users from 11:18 am to 11:26 am, and then decreased to 789 users during the break hour from 12:18 pm to 12:26 pm. The flow

increased to 854 users from 1:18 pm 1:26 pm, and the highest pedestrian flow was observed during the early afternoon from 2:18 pm to 2:26 pm with a total of 981 users moving during this time period.

Time	Total pedestrian flows
9:18-9:26	940
10:18-10:26	873
11:18-11:26	877
12:18-12:26	789
1:18-1:26	854
2:18-2:26	981
<b>Total</b>	5314

**Table 4.4 Total North Quadrangle pedestrian flows for each observation period (for five weekdays).**



**Graph 4.4 Total North Quadrangle pedestrian flows for each observation period (for five weekdays).**

These results for cumulative pedestrian flows for different days and time periods indicate no significant variation in North Quadrangle users' moving behaviors. Total pedestrian flows for each weekday demonstrated that Monday-Wednesday-Friday flows are somewhat higher than Tuesday-Thursday flows, but do not indicate significant and practical implications for plaza design (table 4.3 and graph 4.3). Similarly, the results of total pedestrian flows for different observation periods suggest that there are two time periods with marginally high pedestrian flows, but this result does not provide a clear reason for these differences (table 4.4 and graph 4.4).

### ***Conclusions on the North Quadrangle's moving users***

The analysis of the results obtained from observing the North Quadrangle's moving users have provided significant information regarding the design of plaza, based on the degree of pedestrian flows. Analyzing the data of moving users along different areas and pathways have suggested that the sites adjacent to pathways 1,8, and 9 have the highest pedestrian flows and thus bear the potential of locating a plaza around them. On the other hand, the analysis of moving users on different days and time periods have suggested that the time period during the mid-morning and the lunch breaks are the most consistent for high pedestrian flows. Specifically, this result has assisted in determining the design features for the plaza in terms of seating requirements, as will be discussed further in chapter 5.

Having discussed the results of the North Quadrangle's moving users, I next discuss the results from the behavioral observations of the resting users in the Cardwell Plaza. Once this analysis is completed, I present the North Quadrangle's plaza design.

## **A behavioral analysis of North Quadrangle users' resting activities**

In addition to understanding the North Quadrangle users' moving behaviors, an analysis of the results obtained from observing the resting behaviors is also important to assist in designing the plaza. In this regard, Cardwell Plaza—an existing plaza located on the southwest corner of the North Quadrangle—was observed to understand how an existing mini-plaza facilitates the design requirements for its users (see figures 4.8 and 4.11). As discussed in chapter 3, the behavioral analysis of the North Quadrangle's resting users is based on observing and recording, via counting, the total users involved in various stationary activities.

The Cardwell Plaza was observed for six ten-minute-long observation periods during each of the five weekdays from Monday, March 30, 2015, to Friday, April 3, 2015. As discussed previously, the observations of resting behaviors have been divided into two categories:

1. Resting behaviors of users while sitting—for example, conversing, smoking, observing, reading, and using cell phones and other digital devices; and
2. Resting behaviors of users while standing—for example, conversing, smoking, and using cell phones and other digital devices.

This section analyzes the results from the resting observations based on the following analyses:

1. Analysis of cumulative resting users involved in different activities;
2. Analysis of cumulative resting users for different days and time periods; and
3. Analysis of cumulative male and female resting users.

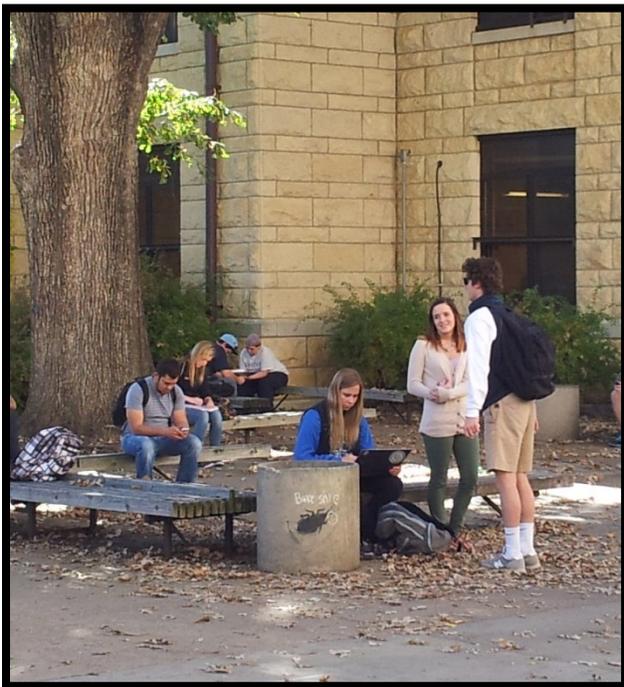
### *Cumulative resting users for different activities*

The analysis of results obtained from observing Cardwell Plaza's resting users is important because it clarifies the specific resting behaviors of the users involved in various stationary activities. As illustrated by table 4.5 and graph 4.5, Cardwell Plaza's two most dominant resting activities are conversing and using a cell phone or other digital device. For the five weekdays observed, a total of 160 users were involved in conversing, followed by a total of 99 users using phones and other digital devices. In contrast, only 70 users were observed smoking. The lowest numbers of users were involved in watching (25 users) and reading (16 users).

As discussed previously, the observations of Cardwell Plaza's resting behaviors were further categorized into various sitting and standing activities (figure 4.8). As illustrated by table 4.6 and graph 4.6, the highest numbers of users were engaged in standing and conversing (118 users) and sitting and using phones and other digital devices (75 users) (figures 4.9 and 4.10). In contrast, only a medium number of users were standing and smoking (48 users) or sitting and conversing (42 users). The lowest numbers of resting users were sitting and observing (25 users), sitting and smoking (22 users), standing and using phones and digital devices (24 users), or sitting and reading (16 users).



**Figure 4.8 Cardwell Plaza with high numbers of resting users.**



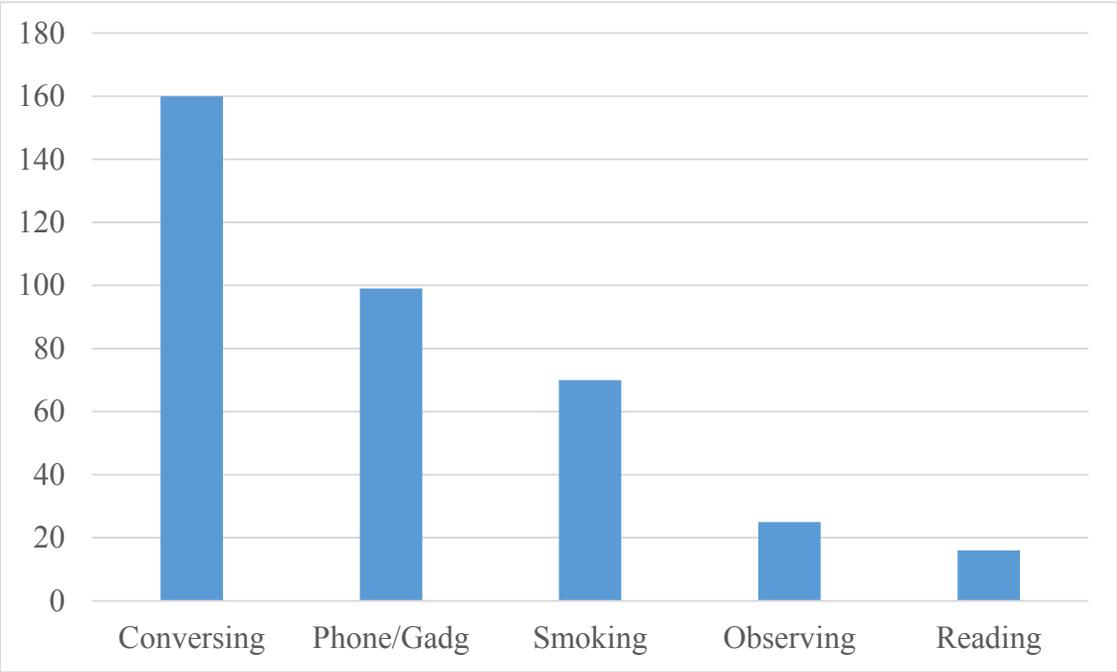
**Figure 4.9 Users sitting, standing, and conversing.**



**Figure 4.10 Users standing and conversing.**

Activity	Total resting users
Conversing	160
Phone/Gadgets	99
Smoking	70
Observing	25
Reading	16
Total users	370

**Table 4.5 Total Cardwell Plaza resting users involved in different activities (for five weekdays).**

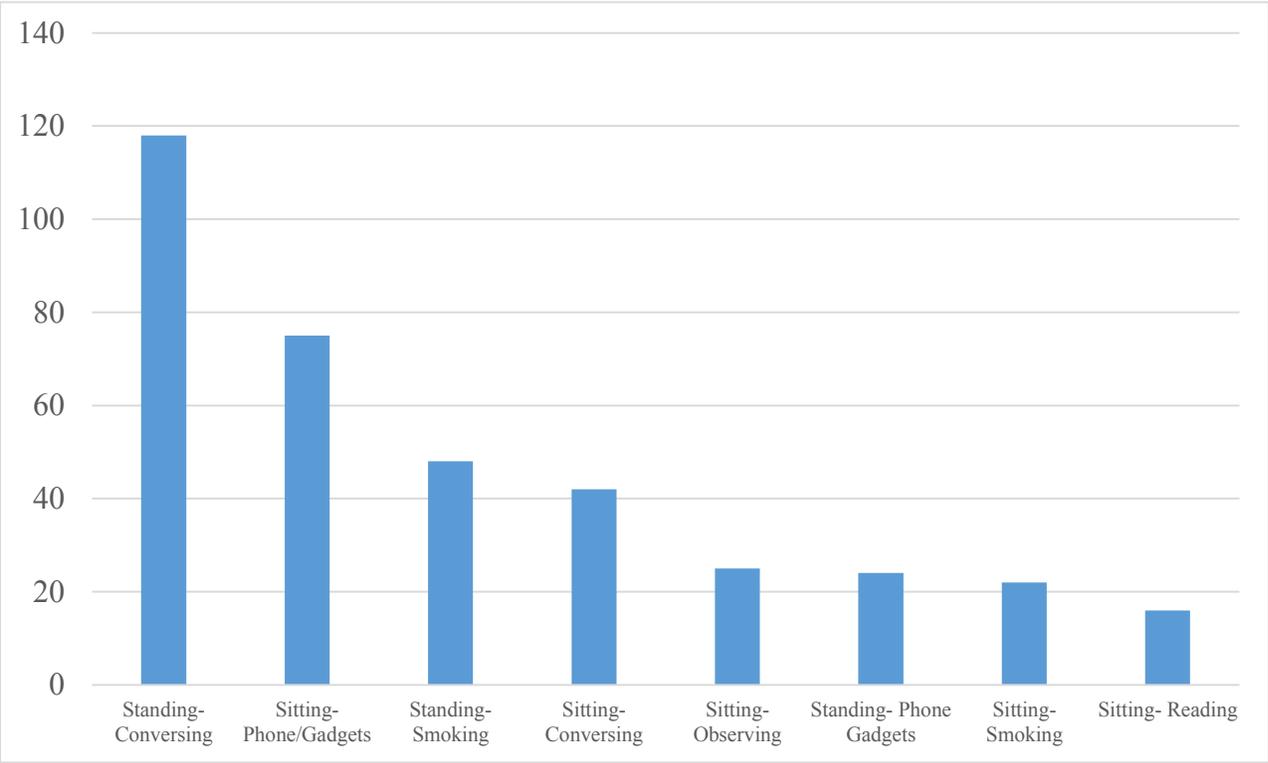


**Graph 4.5 Total Cardwell Plaza resting users involved in different activities (for five weekdays).**

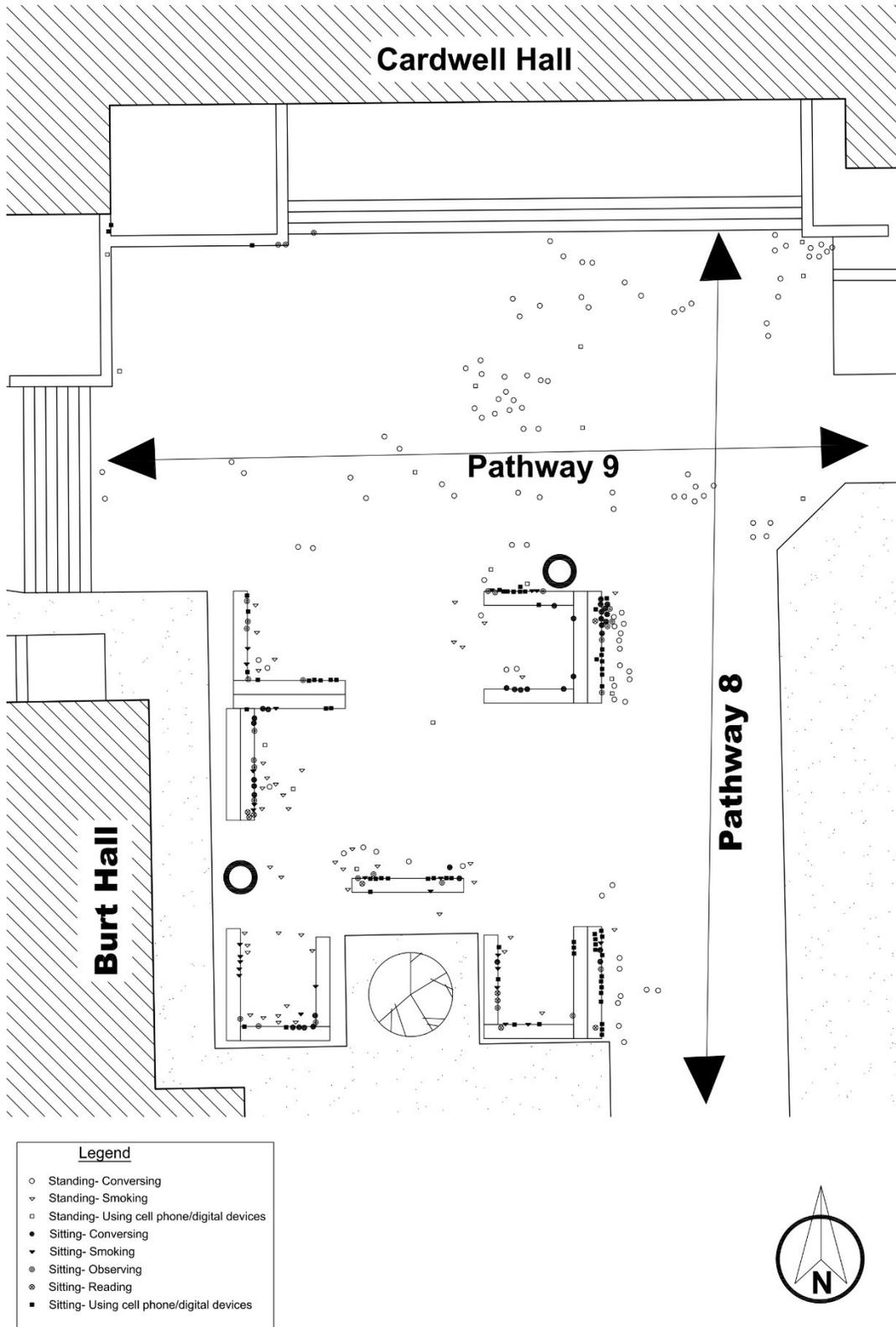
The analysis of results obtained from observing the resting users in Cardwell Hall, however, does not provide sufficient evidence to persuasively suggest appropriate design strategies for the North Quadrangle’s plaza design. In this regard, a behavioral mapping of Cardwell Plaza’s resting users for the five weekdays has provided significant information about the plaza’s most used spaces in terms of specific sitting and standing activities (Figure 4.11).

Activity	Total resting users
Standing—Conversing	118
Sitting—Phone/Digital Devices	75
Standing—Smoking	48
Standing—Conversing	42
Sitting—Observing	25
Standing—Phone/Digital Devices	24
Sitting—Smoking	22
Sitting—Reading	16

**Table 4.6 Total Cardwell Plaza resting users for specific sitting and standing activities (for five weekdays).**



**Graph 4.6 Total Cardwell Plaza resting users for specific sitting and standing activities (for five weekdays).**



**Figure 4.11 Behavioral mapping of sitting and standing users in Cardwell Plaza for the five weekdays observed.**

As illustrated by the cumulative behavioral map of figure 4.11, different sitting and standing activities show varied patterns of space uses and resting behaviors for the five weekdays observed. As discussed previously, the behavioral mapping illustrates standing and conversing being the most visible resting behaviors in Cardwell Plaza. The behavioral mapping suggests that standing-and-conversing behaviors occur in two major sub-spaces of the plaza. First, most of the standing-and-conversing users were observed in the spaces adjacent to the benches on pathway 8. Second, these users were observed scattered in the open space in front of Cardwell Hall's main entry. This particular phenomenon is mostly a result of chance encounters, since it was observed that these users prefer to stop and converse at the exact spot where they meet their acquaintances. On the other hand, another frequent resting activity in Cardwell Plaza was users sitting and using phones and other digital devices. These users mostly preferred sitting on the front benches along pathway 8 and on the central bench in front of the tree. Although most of these users were observed to be busy using their digital devices, the behavioral patterns demonstrate that their preference was toward sitting near the more active areas of the plaza.

In contrast, as illustrated by table 4.6, graph 4.6, and figure 4.8, there were only a medium number of standing-and-smoking users and sitting-and-conversing users in Cardwell Plaza. A high proportion of the standing smokers preferred to use the back space under the shade of a tree while they observed activities in the front areas adjacent to pathways 8 and 9. Most of the smokers stood isolated and remained concentrated around the two benches in front of Burt Hall. Furthermore, as the behavioral mapping suggests, most of the sitting-and-conversing users were concentrated on the front benches along pathway 8 where most of the activities occurred.

In contrast to these resting behaviors, users sitting and smoking, sitting and observing, sitting and reading, and standing and using digital devices were observed to be present in low

numbers. Similar to the standing smokers, most of the sitting smokers were concentrated within the back spaces of the plaza, away from other resting users. A distinct behavioral pattern was not observed for other activities with low involvement, so the behavioral pattern of these activities is not discussed.

### ***Cumulative resting users for different days and time periods***

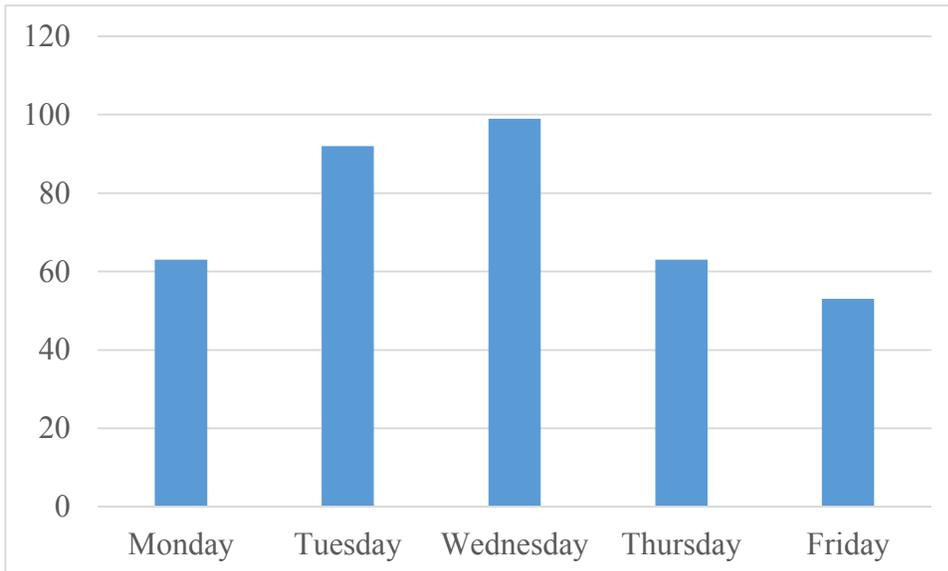
The major purpose of describing Cardwell Plaza's resting behaviors for different days and time periods is to understand the daily variation of users during different times of the day for the five weekdays observed. As illustrated in table 4.7 and graph 4.7, there is higher user presence during Tuesday and Wednesday whereas the user presence for Monday, Thursday, and Friday is comparatively lower. A total of 99 users were observed in Cardwell Plaza on Wednesday, followed by 92 users on Tuesday. A total of 63 users were observed on Monday and Thursday whereas Friday had the least number of user presence with 53 users.

There are two factors influencing the use of Cardwell Plaza for resting purposes: (1) the scheduling of classes; and (2) weather conditions. As discussed previously, the difference in scheduling of classes favor Monday, Wednesday, and Friday over Tuesday and Thursday in terms of higher pedestrian flows in the North Quadrangle and thus it affects the numbers of resting users in Cardwell Plaza. On the other hand, conditions in terms of condition of sky and wind during the observation periods are also responsible for the difference in total numbers of resting users. As illustrated by table 4.8, the average temperature for Monday was 61° F and the sky condition was cloudy, explaining the medium user presence on this day. For Tuesday, Wednesday, and Thursday, the average temperatures were 66° F, 55° F, and 61° F, respectively and the sky condition was sunny. Consequently, there was higher user presence on Tuesday and Wednesday. The reason for a lower user presence on Thursday, regardless of the favorable

weather, is possibly because of the fewer number of classes scheduled in Cardwell Hall on that day. Yet again, the average temperature on Friday was 46° F, and weather conditions were sunny but windy; thus the least number of resting users were present in Cardwell Plaza on this day.

Day	Total resting users
Monday	63
Tuesday	92
Wednesday	99
Thursday	63
Friday	53

**Table 4.8 Total Cardwell Plaza resting users for five weekdays.**



**Graph 4.7 Total Cardwell Plaza resting users for five weekdays.**

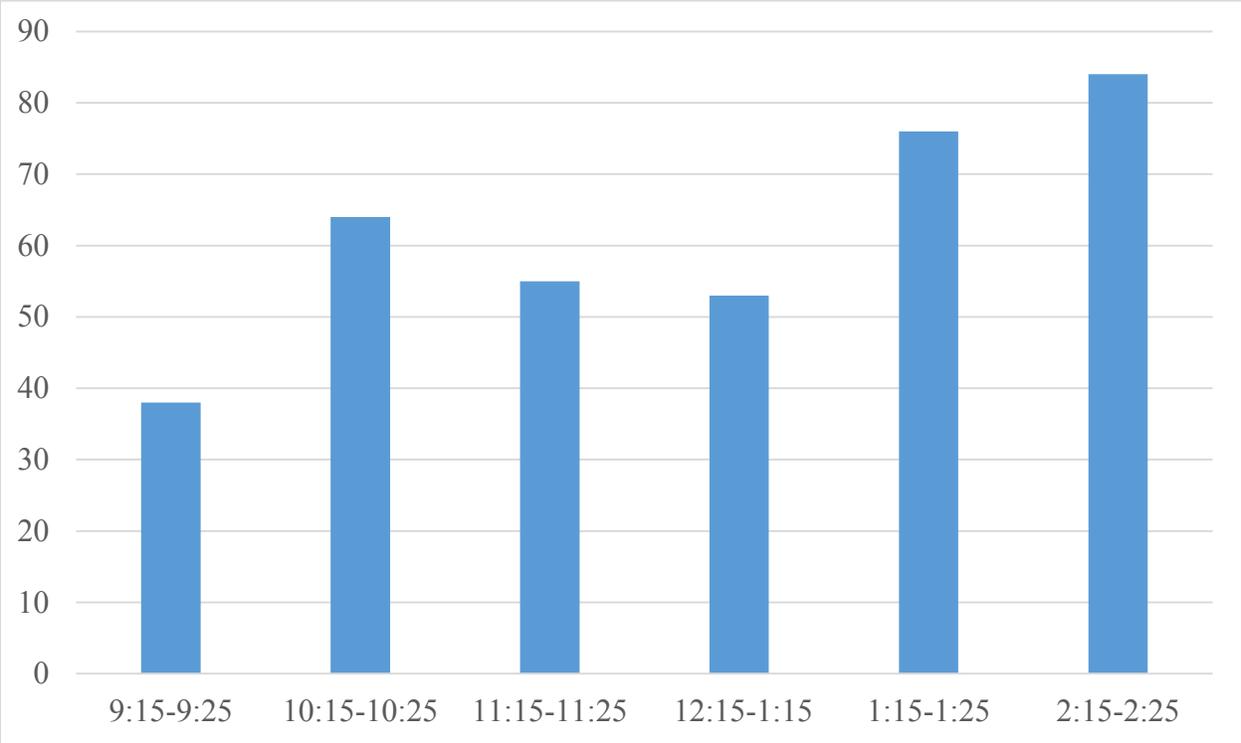
Day	Avg. Temp. (° F)	Sky Condition
Monday	61	Gloomy
Tuesday	66	Sunny
Wednesday	55	Sunny
Thursday	61	Sunny
Friday	46	Sunny

**Table 4.7 Temperature and sky condition of Cardwell Plaza for five weekdays.**

In addition to the aggregate resting users for each weekday, the total weekly aggregate resting users for each ten-minute-long observation period was also analyzed. As discussed previously, each observation period extended from fifteen past each hour to twenty five past each hour from 9:15 am to 2:25 pm. As illustrated in table 4.9 and graph 4.8, a low number of total weekly resting users were present during the early morning period from 9:15 am to 9:25 am (38 users). The user presence increased during the mid-morning period from 10:15 am to 10:25 am (64 users) and then decreased consecutively from 11:15 am to 11:25 am (55 users) and 12:15 pm to 12:25 pm (53 users). The presence of resting users increased to 76 users from 1:15 pm to 1:25 pm, and the highest user presence was observed during the early afternoon from 2:18 pm to 2:26 pm with a total of 84 users present in Cardwell Plaza during this time period.

<b>Time</b>	<b>Total resting users</b>
9:15-9:25	38
10:15-10:25	64
11:15-11:25	55
12:15-1:15	53
1:15-1:25	76
2:15-2:25	84
<b>Total</b>	<b>370</b>

**Table 4.9 Total Cardwell Plaza resting users for each time period (for five weekdays).**

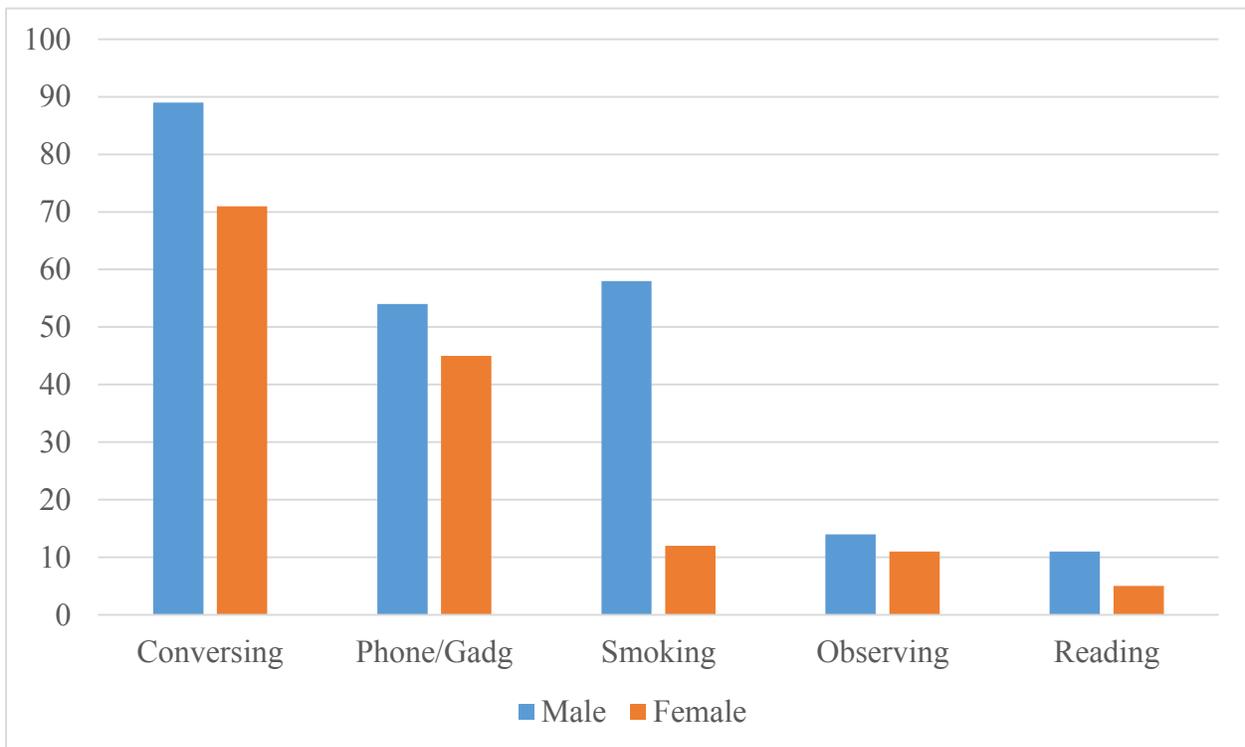


**Graph 4.8 Total Cardwell Plaza resting users for each time period (for five weekdays).**

Finally, the resting behaviors of male and female users in Cardwell Plaza were analyzed because this information helps in providing significant implications for the North Quadrangle's plaza design in terms of providing comfortable, sociable spaces. From the observations, it has been confirmed that both male and female users have a similar pattern of engagement in various sitting and standing activities, thus indicating that the specific resting activities are likely to draw similar numbers of male and female participation in the North Quadrangle's plaza design. Table 4.10 and graph 4.9 illustrates the weekly aggregate totals of male and female users involved in specific resting activities. The illustrations demonstrate that the highest numbers of male and female users are involved in conversation. The total numbers of male users engaged in conversation were 89 whereas the total numbers of female conversing users were 71. In contrast, only a medium number of male and female users were observed using their phones and other digital devices. A total of 54 male users and 45 female users were observed using their digital devices. On the other hand, high numbers of male users (58 users) were observed smoking whereas in contrast, only 12 female users were smoking. Other activities, such as, observing other users and reading involved a lower user engagement for both genders. A total of 14 male users and 11 female users were observing other people in the Cardwell Plaza whereas a total of 11 male users and 5 female users were reading.

	Conversing	Phone/Gadgets	Smoking	Observing	Reading	Smoking
<b>Male</b>	89	54	58	14	11	58
<b>Female</b>	71	45	12	11	5	12
<b>Total</b>	160	99	70	25	16	70

**Table 4.10 Total Cardwell Plaza male and female resting users involved in different activities (for five weekdays).**



**Graph 4.9 Total Cardwell Plaza male and female resting users involved in different activities (for five weekdays).**

### ***Conclusions on Cardwell Plaza's resting users***

The analysis of the results obtained from observing Cardwell Plaza's resting users has provided significant information regarding the design of North Quadrangle plaza. These results suggest that resting users are mostly engaged in standing and conversing or sitting and using phones and other digital devices. On the other hand, the analysis of resting users on different days and time periods has suggested that the time periods during the mid-morning and the early afternoons involve the greatest plaza use. Finally, the observations confirm that there is a similar pattern of plaza space use for both male and female users in terms of the various resting activities. Specifically, the results of this section have assisted in determining the location and nature of the various activity areas or sub-spaces within the plaza, as will be discussed further in chapter 5.

Having discussed the results of the North Quadrangle's moving users, the next chapter discusses design-guidelines for the North Quadrangle's plaza based on the literature review of chapter 2 and the analysis of behavioral observations in chapter 4. These design guidelines are followed by a design scheme for a North Quadrangle plaza.

## **Chapter 5 - Design Implications for the new North Quadrangle plaza**

This chapter presents design guidelines and a design proposal for a North Quadrangle plaza based on the literature review of plazas and behavioral analysis of users' moving and resting activities as discussed in chapters 2 and 4, respectively. As explained in chapter 2, the design for this plaza is based specifically on William Whyte's design features for a successful sociable plaza: (1) location; (2) street-plaza relationship; and (3) seating. In addition, the results from the analysis of North Quadrangle users' moving and resting behaviors in chapter 4 have been considered for the plaza design. In order to accomplish a systematic design process, the findings from the literature review and the analysis of chapter 4 have been arranged in terms of the three most important plaza design features, on the basis of broadest to the most detailed design guidelines.

As discussed in chapter 4, the North Quadrangle's pathways 1, 8, and 9 facilitate the highest user flows and thus have the potential for the location of a properly designed plaza (figure 5.1). Although pathway 1 contains the highest user flows, the plaza design has been proposed adjacent to pathways 8 and 9 because the proposed site (area **F** in figure 5.1) has close spatial links with the building entries of Cardwell Hall and the Burt Hall. Thus, there is not only a high amount of pedestrian flow through the space itself but also the presence of Cardwell Hall and Burt Hall users. On the other hand, Area **A**—the site through which pathway 1 passes—does not have a strong relationship with the entrances to the neighboring buildings of Hale Library, Leisure Hall, and the Counselling Services building. Thus, it has been concluded that area **F** is a more feasible location for a new North Quadrangle plaza than area **A**.

I call this new North Quadrangle space “new Cardwell Plaza,” which is designed on the basis of the twelve design guidelines laid out in table 5.1. Based on behavioral observations and on William Whyte’s three major design factors, the first four design guidelines are related to “location”; the next four are related to “street-plaza relationship”; and the final four are related to seating. These guidelines provide a major reference for the plaza design-scheme illustrated in the last part of this chapter.

<i>Design factor</i>	<b>Design guidelines for the new Cardwell Plaza design</b>
<i>Location</i>	1. Locate the plaza near the pathways within the North Quadrangle containing highest pedestrian flows and within close proximity to building entries.
	2. Define plaza boundaries to identify the total area of the plaza and confirm its presence as a distinct place.
	3. Specify plaza’s pathways and pedestrian streets, which should be easily recognizable visually and physically.
	4. Identify the most active potential zones around these intersections, considering easy accessibility to and from pathways.
<i>Street-plaza relationship</i>	5. Implement “impulse use”— i.e., draw passers-by inside the plaza informally through clear sightlines, beckoning devices, and other design elements facilitating impulse use.
	6. Develop the plaza pathways as articulated edges through the provision of seating, plantings, and other relevant design elements.

	7. As one means to facilitate potential triangulation, position a central water feature—water wall—to attract passers-by and visitors so they might spend a longer time in the plaza.
	8. Design the “zones” of the plaza as sub-spaces by considering the privacy of different users, seating requirements of sitting and standing users, and other relevant design needs.
<i>Seating</i>	9. Provide an acceptable amount of seating by satisfying Whyte’s requirement of at least one linear foot of seat per thirty square feet of plaza space.
	10. Consider physical comfort of plaza users through appropriately dimensioned seating and use of proper materials.
	11. Consider social comfort of plaza users through suitable allocation of seating with and without backs, provisions of variety of seating opportunities like benches, chairs, ledges, and stairs, and properly shaped seating for individuals and groups.
	12. Designate planters to function dually as seating spaces wherever possible.

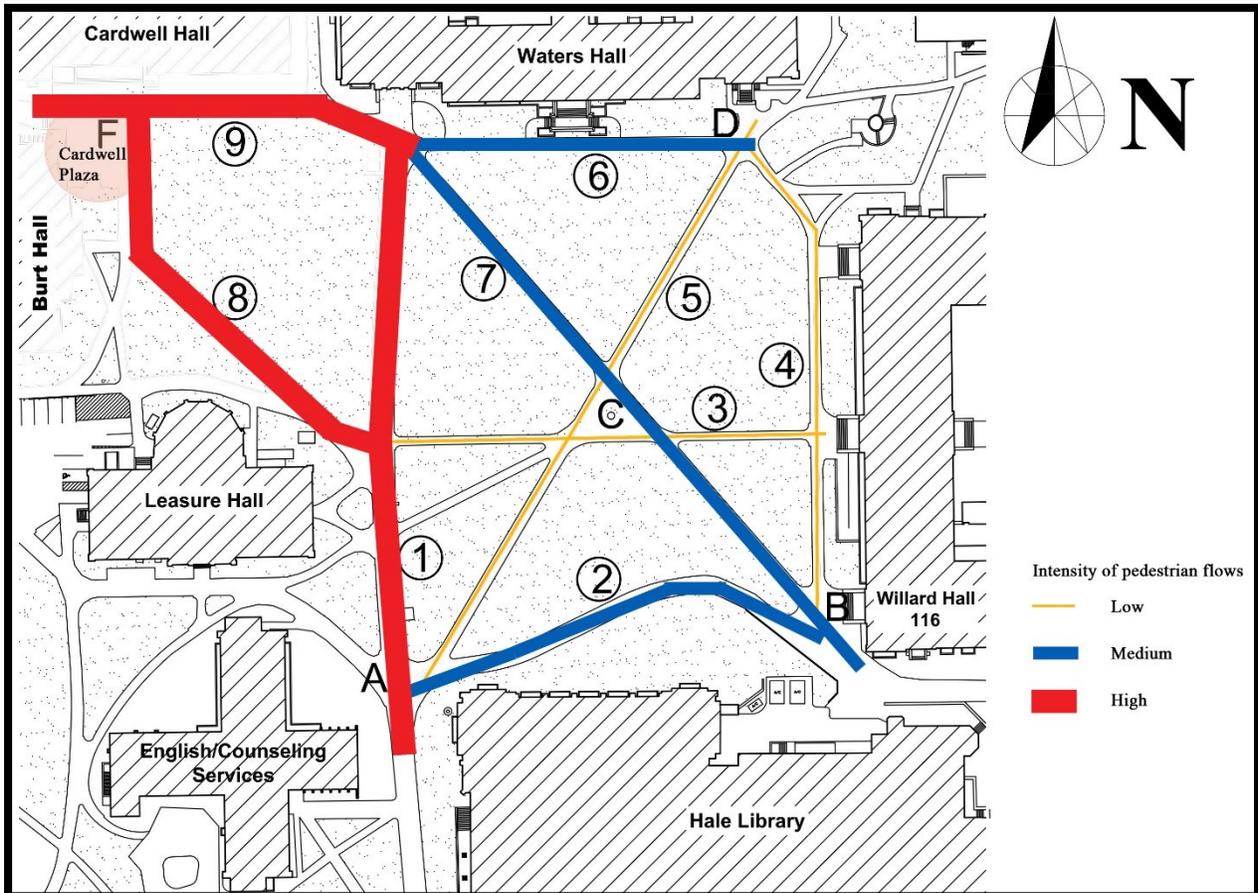
**Table 5.1 Twelve design guidelines for the new Cardwell plaza design.**

## Location

As explained in chapter 2, location is an important plaza design feature that promotes sociability and informal plaza use. William Whyte suggests that the potential users are not attracted to a plaza if it is not located properly. As discussed in chapter 4, the behavioral observations of the North Quadrangle's moving users determined that spaces adjacent to pathways 1, 8, and 9 contained the highest potential of being most used (figure 5.1). Thus, the new Cardwell Plaza has been proposed following these design guidelines related to its location:

- Locate the plaza near the pathways within the North Quadrangle (area F in figure 5.1) containing highest pedestrian flows; for the Cardwell site, this potential location is marked by the intersection of pathways 8 and 9 (guideline 1);
- Define plaza boundaries to identify the total area of the plaza and confirm its presence within the North Quadrangle as a distinct place (guideline 2);
- Specify the plaza pathways and pedestrian streets, which should be easily recognizable visually and physically (guideline 3); and
- Identify the most active potential zones around these intersections, considering easy accessibility to and from the pathways (guideline 4).

In this regard, the new Cardwell Plaza design of some 10,300 square feet is proposed on the northwestern corner of the North Quadrangle.



**Figure 5.1 Location of the Cardwell Plaza in relation to the pathways with highest pedestrian flows. Note the circled area F on the northwest side of the North Quadrangle which marks the location of the proposed new plaza.**

After establishing the location of the new Cardwell Plaza, its boundaries need to be properly identified so as to mark the total area of the plaza, strengthen its location within a larger space, and for it to be perceived as a distinct place (Marcus and Francis, 1998, p. 34). In addition, the proper use of design elements defining the plaza’s boundary should provide a sense of enclosure to the plaza space. The design features defining the plaza boundaries have been represented by two important considerations—welcoming entryways and articulated edges. In other words, the new Cardwell Plaza’s boundaries have been strengthened via design interventions of the three entrances and enclosing the open green lawn along the eastern edge of the plaza via seating and plantings.

As illustrated in figure 5.2, the Cardwell Plaza can be approached from two directions within the North Quadrangle and from one direction from the west of campus. First, these three entryways need proper design attention so that the passers-by are made aware of the transition from these pathways to the plaza. The design of the entryways incorporates use of seating along the edges, stone markers, plantings, different floor tiles, and trellised entryways (figures 5.3 and 5.4). Second, the edge of the plaza located east of pathway 8 and open to the green lawn of the North Quadrangle needs to be enclosed properly to set the plaza's eastern boundary. This design scheme is associated with the implementation of "articulated edges" through the use of seating and plantings that is explained in detail in the following section on "street-plaza relationship."

The third design guideline relates to specifying the plaza's internal pathways and pedestrian streets for circulation of moving users. As discussed previously, pathways 8 and 9 are the most traversed pathways and thus are the important pathways for the new Cardwell Plaza. In addition, observations have demonstrated that pedestrians use the space connecting pathway 8 with the western stairways as a short-cut route. Thus, this diagonal pathway has also been considered as an important route of circulation for the plaza design (figure 5.2).

Following the identification of plaza's internal pathways, the fourth guideline suggests that one of the plaza's major characteristics is recognizing the most active intersections where the pathways meet. These intersections play an important role in generating potential sub-spaces located in close proximity to the pathways. As illustrated in figure 5.2, three intersections that have been identified to generate six different "zones" for designing the sub-spaces that potentially facilitate different sitting and standing uses. The detailed explanations of these zones is discussed in the eighth guideline below.

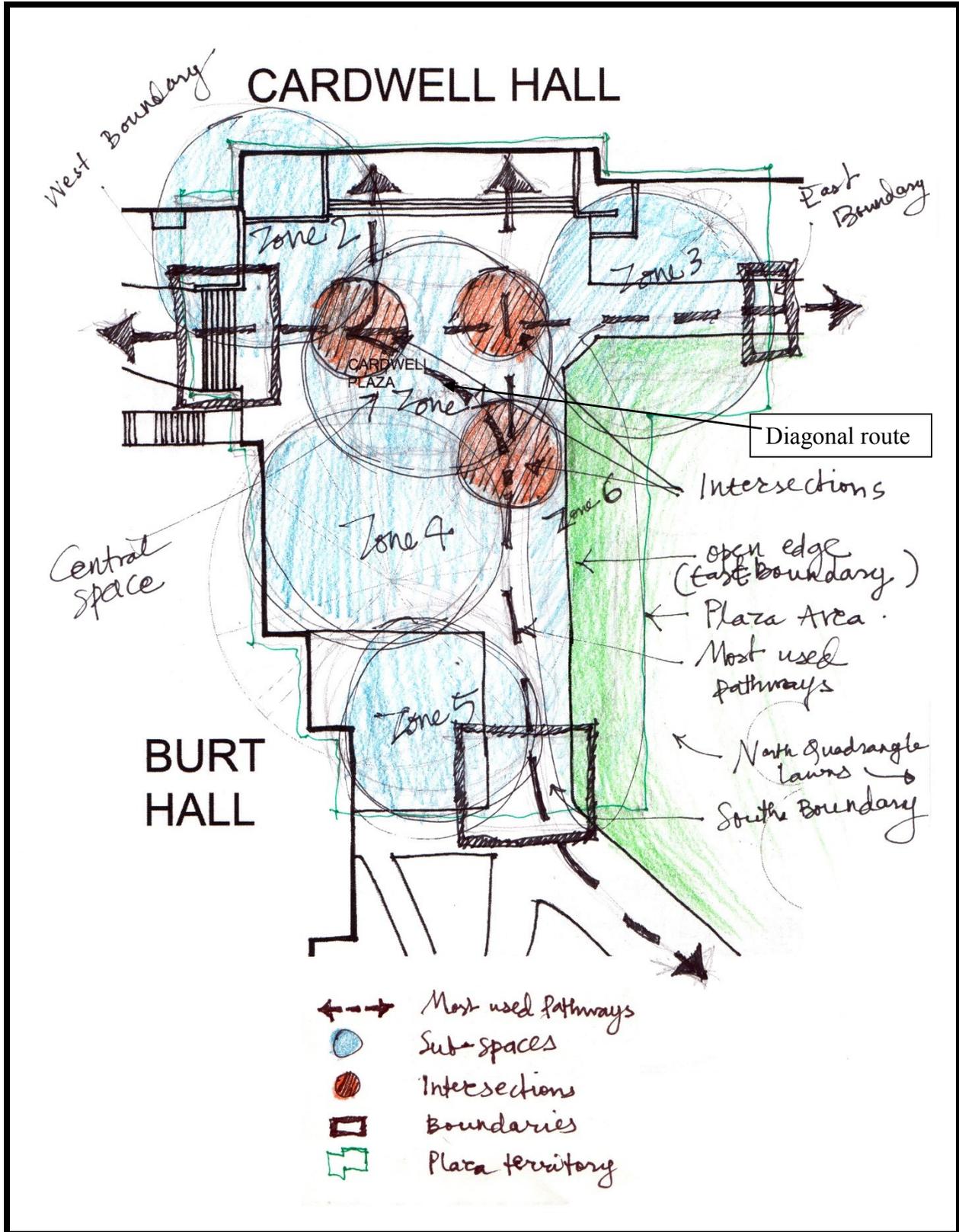
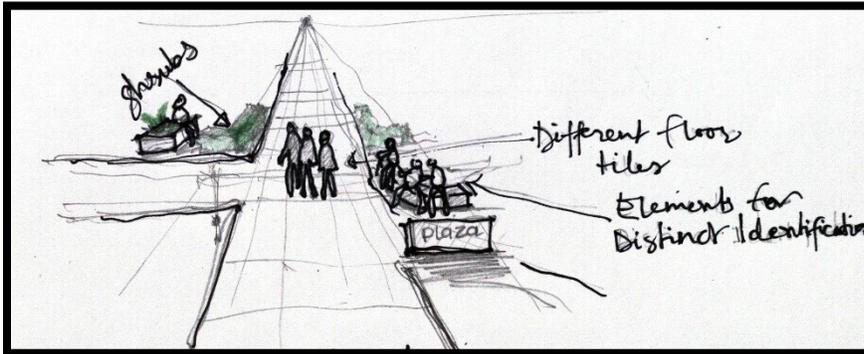


Figure 5.2 Design considerations related to the location of the Cardwell Plaza. Note the six zones, three intersections, three entrances, and three pathways.



**Figure 5.3 Conceptual drawing for the new Cardwell Plaza's western boundary. The design aim is to strengthen the potential user attractiveness of the new Cardwell Plaza via use of trellised entryway and seating to invite users inside the plaza.**



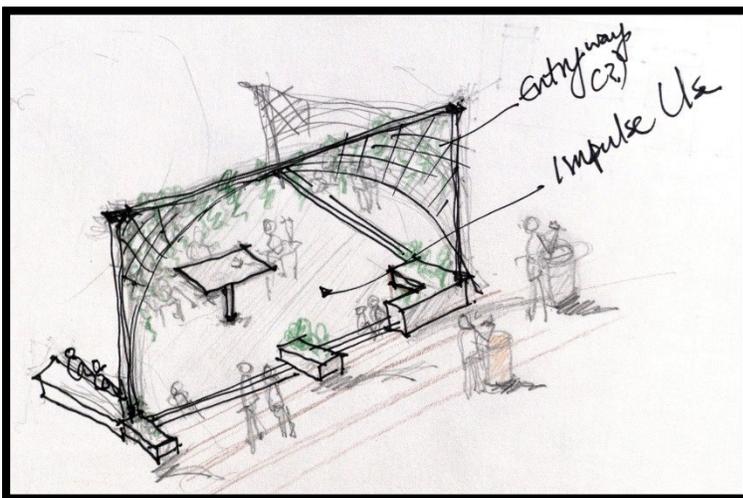
**Figure 5.4 Conceptual drawing for the new Cardwell Plaza's southern boundary. The design aim is to signify the entry to the plaza via use of stone markers and different floor tiles for pathways 8 and 9.**

### **Street-plaza Relationship**

Another key design factor facilitating a sociable plaza, according to Whyte (1980), is maintaining a proper relationship between plazas and the adjacent pathways or the streets. In other words, Whyte contends that a plaza should be designed as an extension of the sidewalk or street. The proposed plaza design incorporates four design guidelines (see table 5.1, fifth to eighth guideline) related to the street-plaza relationship:

- Implement “impulse use”— i.e., draw passers-by inside the plaza informally through clear sightlines, beckoning devices, and other design elements facilitating impulse use (design guideline 5);
- Develop the plaza pathways as articulated edges through the provision of seating, plantings, and other design elements (design guideline 6);
- As one means to facilitate potential triangulation, position a central water feature—water wall, to attract the passers-by and visitors so that they might spend longer time in the plaza (design guideline 7); and
- Design the “zones” as sub-spaces considering the privacy of different users, seating requirements of sitting and standing users, and other relevant design elements (design guideline 8).

As mentioned earlier, the fifth design guideline is related with implementing the idea of impulse use, which Whyte (1980, p. 57) describes as the phenomenon through which users are drawn to a plaza automatically without realizing it. In the new Cardwell Plaza design, impulse



**Figure 5.5 Conceptual drawing for promoting plaza “impulse use.” The design aim is to attract users via ‘graceful’ steps and planters with seating.**

use has been effectively incorporated by designing the seating and plantings adjacent to the pathways 8 and 9 (figure 5.5). The design facilitates impulse primarily through the two design features. First, it makes use of elongated steps with trellised entryways leading to elevated sub-spaces. Second, it makes use of seating with and without planters along the length of the pathways and also between the steps. The purpose of these design elements is to attract the passers-by to use the plaza for longer periods of time.



**Figure 5.6 Conceptual drawing illustrating articulated edges. The design aim is to create U-shaped seating along the east boundary adjacent to pathway 8 and incorporate the use of small trees and perhaps movable chairs to enclose the plaza.**

The use of articulated edges along the plaza's pathways is a design consideration related with impulse use but, in the proposed design, the strategy is also incorporated to enclose the eastern boundary of the plaza (figure 5.6). The eastern boundary of the plaza is open to the North Quadrangle and as a result, the space needs to be enclosed. In the proposed design, articulated edges have been attained via two specific design considerations: (1) U-shaped seating; and (2) small trees accompanied perhaps by movable chairs. The U-shaped seating facilitate both single and group users. The short trees provide shade to the would-be-users and contains movable chairs for users who want to spend time under the shade.

One of the most important design features in the proposed plaza is the presence of a water wall—a central water feature to promote triangulation. Whyte (1980, p. 94) describes triangulation as “the process by which some external stimulus provides a linkage between people and prompts strangers to talk to each other as though they were not.” Triangulation is an important design consideration to promote sociability and can be achieved through sculptures, water fountains, and so forth. The water wall in the proposed design consists of a setback for the water to flow and is accompanied by a space for standing users followed by ledges around for sitting users (figure 5.7). Also functioning as a central aesthetic element, and strategically located in front of the entrance to the Cardwell Hall, the water wall is physically and visually permeable from almost every area of the plaza.



**Figure 5.7 The plaza’s central aesthetic feature—the water wall.**

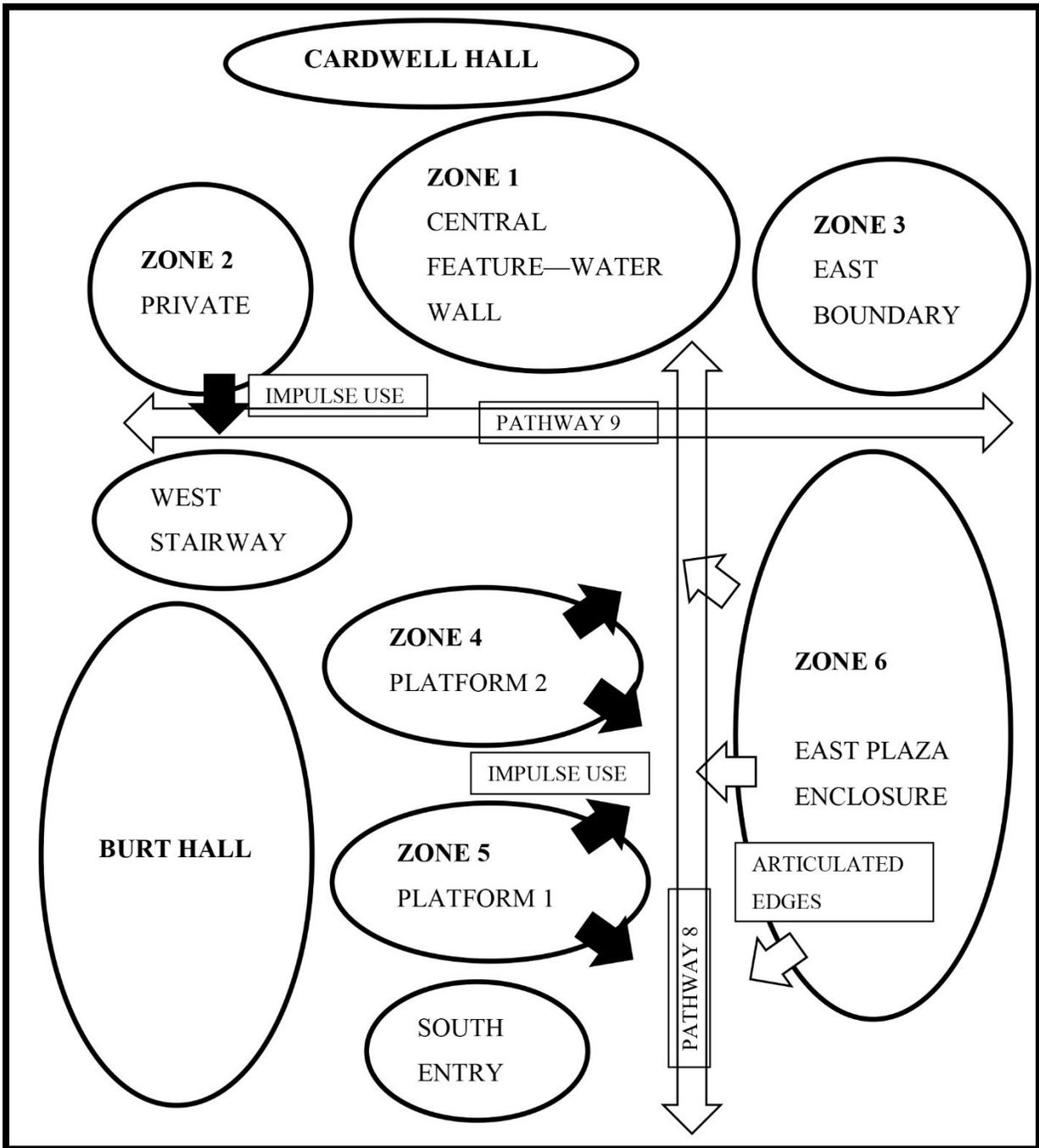
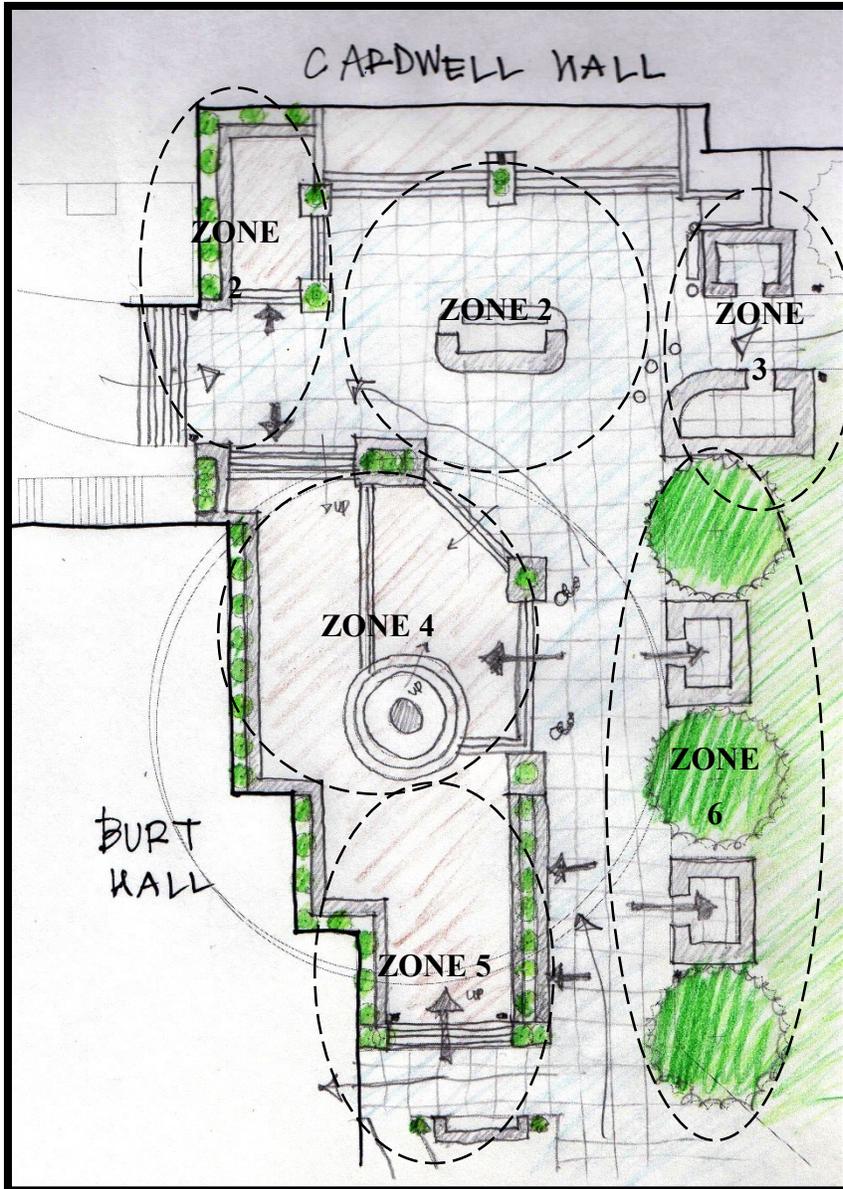


Figure 5.8 Bubble diagram for the new Cardwell Plaza using guidelines one to seven. Note the six zones developed as a part of the eighth guideline.



**Figure 5.9 Conceptual master design for the plaza using guidelines one to seven. Note that the different zones indicate different degrees of privacy and publicness.**

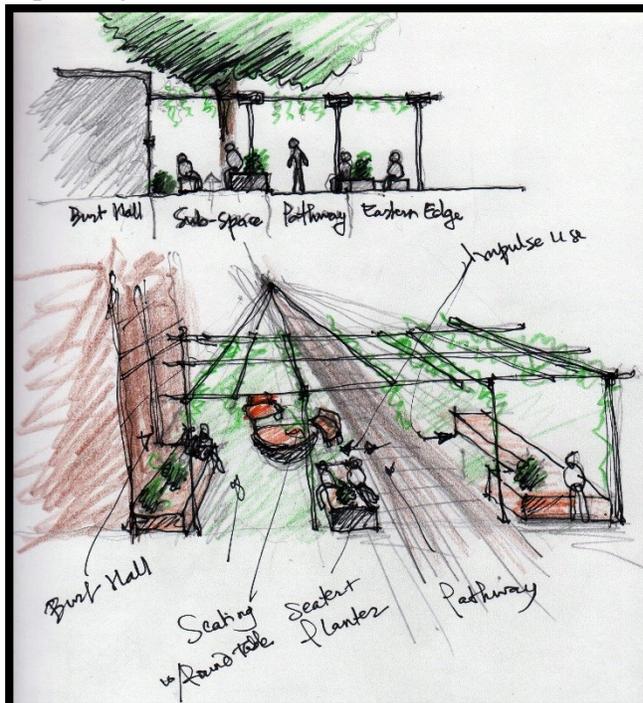
The eighth guideline deals with the detailed discussion of the development of “zones” as mentioned earlier in the fourth guideline and illustrated in figure 5.2. The flow diagram of figure 5.8 and the conceptual master design illustrated in figure 5.9 indicate how the previous seven guidelines have been utilized to prepare an illustrated layout for the proposed plaza. This plan and the conceptual “zoning” has assisted in confirming the roles of the different areas of the

plazas, primarily for facilitating the sitting and standing users. As discussed previously, the different sitting users could be involved in such activities as conversing, smoking, observing, reading, eating, and using phones and other digital devices. Similarly, the standing users could be involved in such activities as conversing, smoking, and using phones and other digital devices. The explanation of different zones and their roles with regard to seating, privacy, and other relevant design considerations are as follows:

- **Zone 1** is the central space of the plaza between the three pathway intersections. This zone consists of the water wall with seating. The aesthetic feature is positioned in front of the Cardwell so that it is easily accessible and visible from all areas of the plaza and close to the area of higher user concentration (figures 5.7 and 5.10). In addition, because of its location between the pathways, the zone defines a point of intersection for moving users and facilitates open spaces for standing users and passers-by moving between the Cardwell Hall and other spaces of the North Quadrangle.
- **Zone 2** is located in the northwest corner of the plaza immediately connected to the Cardwell Hall. It is a recessed sub-space next to the western boundary. The sub-space primarily consists of ledges with planters and tables and chairs on an elevated platform. This is one of the more secluded spaces in the plaza (figure 5.10).
- **Zone 3**, located to the east of zone 1, consists of a comparatively small sub-space which lies adjacent to pathway 9 on the east of the plaza. This space consists of the eastern boundary of the plaza and seating units in the form of benches with backrest so that the resting users can relax and observe the activity in the plaza. In addition, this space also contains bollards for standing users.



**Figure 5.10 Zone 1 and the spatial core of the new Cardwell Plaza. Also note zone 2 located on an elevated platform facilitated with seating and enclosed via trellis for improved sense of privacy.**



**Figure 5.11 Conceptual drawing for zone 5 and the southern entry. The design aim is to connect the southern end of the plaza with Burt Hall's entry and invite moving users to use the space via concrete ledges and tables with movable chairs.**

- **Zone 4** is the largest sub-space in the plaza and potentially supports the highest numbers of sitting users. This sub-space consists of tables with moving chairs for activities like using the cell phones and other digital devices, having lunch, reading, and being involved in conversation. It also consists of ledges with planters along the edges of the Burt Hall, specifically for sitting and standing users engaged in conversation. Square units of planters with seating are strategically located in between the stairs to provide seating options. On the transition space of zone 4 and zone 5, a circular-stepped seating element is designed which surrounds the tree currently present on site. Based on behavioral observations, this space would be used mostly by smokers.
- **Zone 5** is the southern sub-space of the plaza adjacent to the entry of Burt Hall and pathway 8. Similar to zone 4, this zone consists of tables with movable chairs and ledges with plantings. Being located in close proximity to the Burt Hall's entry, the sub-space has been designed to attract users moving to and from this buildings. Design elements of this sub-space include: provision of seating and a trellised entryway leading to a raised platform (figure 5.11). The eastern side of this sub-space along pathway 8 consists of ledges with plantings accessible from two sides.
- **Zone 6** forms the eastern enclosure of the plaza and is adjacent to one of the lawns of the North Quadrangle. This sub-space consists mostly of U-shaped seating and small trees forming articulated edges as discussed previously.

## Seating

Seating is the third most important plaza design factor, according to Whyte. The proposed plaza incorporates the following design guidelines related to seating (see table 5.1):

- Provide an acceptable amount of seating by satisfying Whyte’s requirement of at least one linear foot of seat per thirty square feet of plaza space (design guideline 9);
- Consider physical comfort of plaza users through appropriately dimensioned seating and use of proper materials (design guideline 10);
- Consider social comfort of plaza users through suitable allocation of seating with and without backrest, provisions of variety of seating opportunities like benches, chairs, ledges, and stairs, and properly shaped seating for individuals and groups (design guideline 11); and
- Designate planters to function dually as seating spaces wherever possible (design guideline 12).

The plaza covers an area of 10,300 square feet. According to Whyte’s requirement of at least one linear foot of seat per thirty square feet of plaza space, the minimum length of “sittable” spaces required is 330 feet. The design consists of at least 500 feet of sittable spaces, which is more than the required length of seating.

In examining in more detail the guidelines related to “seating”, one notes that the tenth guideline suggests that the physical comfort of plaza users need to be considered via appropriately dimensioned seating and use of proper materials. According to Whyte (1980, p. 112), the minimum width of seating for one-sided sitting is sixteen inches whereas the minimum width of seating for two-sided sitting is thirty inches. The design consists of extended ledges twenty inches deep with plantings for one way seating (figure 5.12). Similarly, the wooden

benches with backrest are twenty inches deep (figure 5.13). Ledges that can be used on two sides are thirty-six inches deep. On the other hand, stair steps or treads are only twelve inches deep, since they have to be suitable for both moving and resting users.



**Figure 5.12 Conceptual drawing illustrating sitting users in the extended ledges and movable chairs. The design aim is to facilitate plaza users with variety of seating options.**



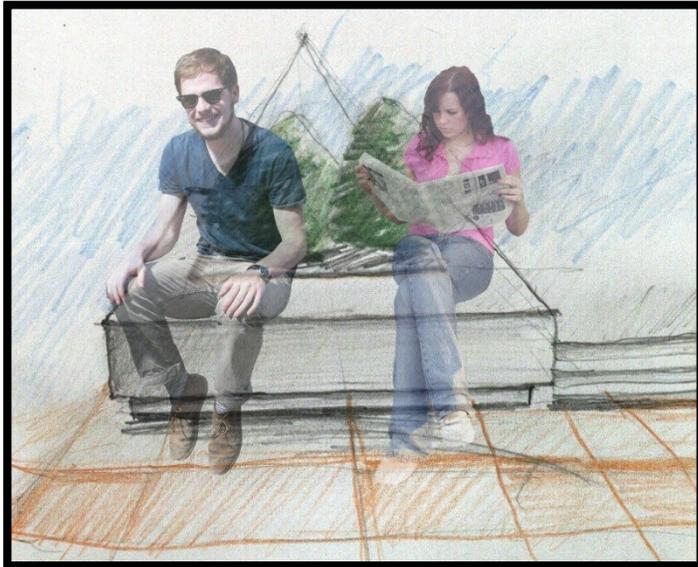
**Figure 5.13 Conceptual drawing illustrating sitting users in the wooden benches with backrest.**

The design also considers appropriate seating heights. According to Whyte, seating should be at least twelve inches high but not higher than thirty-six inches. The design incorporates variety of seat heights ranging from twelve inches to sixteen inches. The elongated ledges and benches are twelve inches high whereas the movable chairs and square ledges with plantings are sixteen inches high to provide different height options for different users. On the other hand, the steps are seven inches high to comfortably function dually for moving and resting users.

The social comfort of users have been considered via three important features: (1) seating types; (2) shapes; and (3) use of materials. The various types of seating used are ledges, benches, and movable chairs. Ledges have been mostly categorized as being with and without planters, whereas all of the benches have backrests. The plaza incorporates at least fifty chairs and at least ten tables. According to shape, the seating is categorized as: elongated, U-shaped, and circular. Elongated ledges with planters are placed along the edges of the buildings and close to pathways to promote “impulse use.” U-shaped seating are specifically placed on the eastern boundary and form the articulated edges. These seating units support single users and users in groups. The circular seating surrounding the tree also functions as steps sixteen inches wide. Finally, two specific materials are used for the seating: wood and concrete. Wooden benches and movable chairs provide warm texture and are ideal for most climatic conditions. On the other hand, concrete ledges and steps with pleasing texture support the idea of designing the plaza as a hard landscape along with providing a pleasing seating experience.

The final design guideline related to seating incorporates designating planters that function dually as seating spaces wherever possible. Plantings are important for the plaza for aesthetic purposes and to prevent it from looking “unused” during off-peak hours. In addition,

these planters have been designed in relation to the concrete ledges and represent the presence of soft landscaping (figure 5.14). These planters with seating are specifically used at the intersection of steps and are also placed along building edges.



**Figure 5.14 Conceptual drawing illustrating rectangular planters developed as seating.**

### **The completed new Cardwell Plaza design**

Figure 5.15 illustrates the finalized design of the new Cardwell Plaza. Considering the higher numbers of pedestrian flows to and from the Cardwell Hall via pathway 8, the major intent of this design is to attract pedestrians moving along this pathway. Similarly, users moving to and from the Cardwell Hall and pedestrians traversing across pathway 9 are also potential plaza users who need to be attracted to the plaza.

Pathway 8, which extends north-south across the plaza has played an important role in the plaza design. Pathway 8 is directly linked with the plaza zones of **1, 4, 5, and 6** (see figure 5.2 and the master design in figures 5.15 and 5.17). In this regard, the southern end which lies in zone **5** is considered as the main entry of the new Cardwell Plaza and signified via a trellised entryway. Wooden benches with backrests which can be occupied on both sides are placed on

the east of the Burt Hall close to the plaza entry. This seating is located close to the plaza entry and Burt Hall to facilitate users moving between the building entry and adjacent pathways.

Opposite to the seating is a stepped entry leading to elevated platforms.

One of the most important design features of the new Cardwell Plaza design is to promote “impulse use.” Several design interventions have been made on the west of pathway 8 (zone 4 and 5) to promote impulse use via: (1) planters with ledges; (2) wide steps representing entry to elevated platforms; and (3) bollards for standing users (figure 5.13). Providing the most seating opportunities within the plaza, the two raised platforms on the west edge of the plaza immediately adjacent to Burt Hall consists of planters with ledges and tables with movable chairs. Platform 1 is elevated fourteen inches from pathway 8 whereas platform 2 is elevated fourteen inches from platform 1 (see section in figure 5.16). The reason for elevating platform 2 higher than platform 1 is to create a secluded space at a higher level where users can watch but feel separated from the plaza’s more sociable activities. The ledges and tables with movable chairs present users with sitting opportunities for activities like conversing, reading, eating, and using cell phones and other digital devices. The intersection of the two platforms is marked by stepped-circular seating. Surrounding the large tree currently present on site and located on a lower level than platform 1, this area remains mostly shaded and protected, making it usable for smokers.

On the other hand, design interventions on the east of pathway 8 (zone 6) include: (1) benches with backrests; (2) short trees; (3) movable chairs; and (4) bollards for standing users (figures 5.18). The sitting opportunities and small trees are intended to allow users to spend more time in the plaza. These design elements also create a sense of enclosure for the plaza along its eastern boundary.

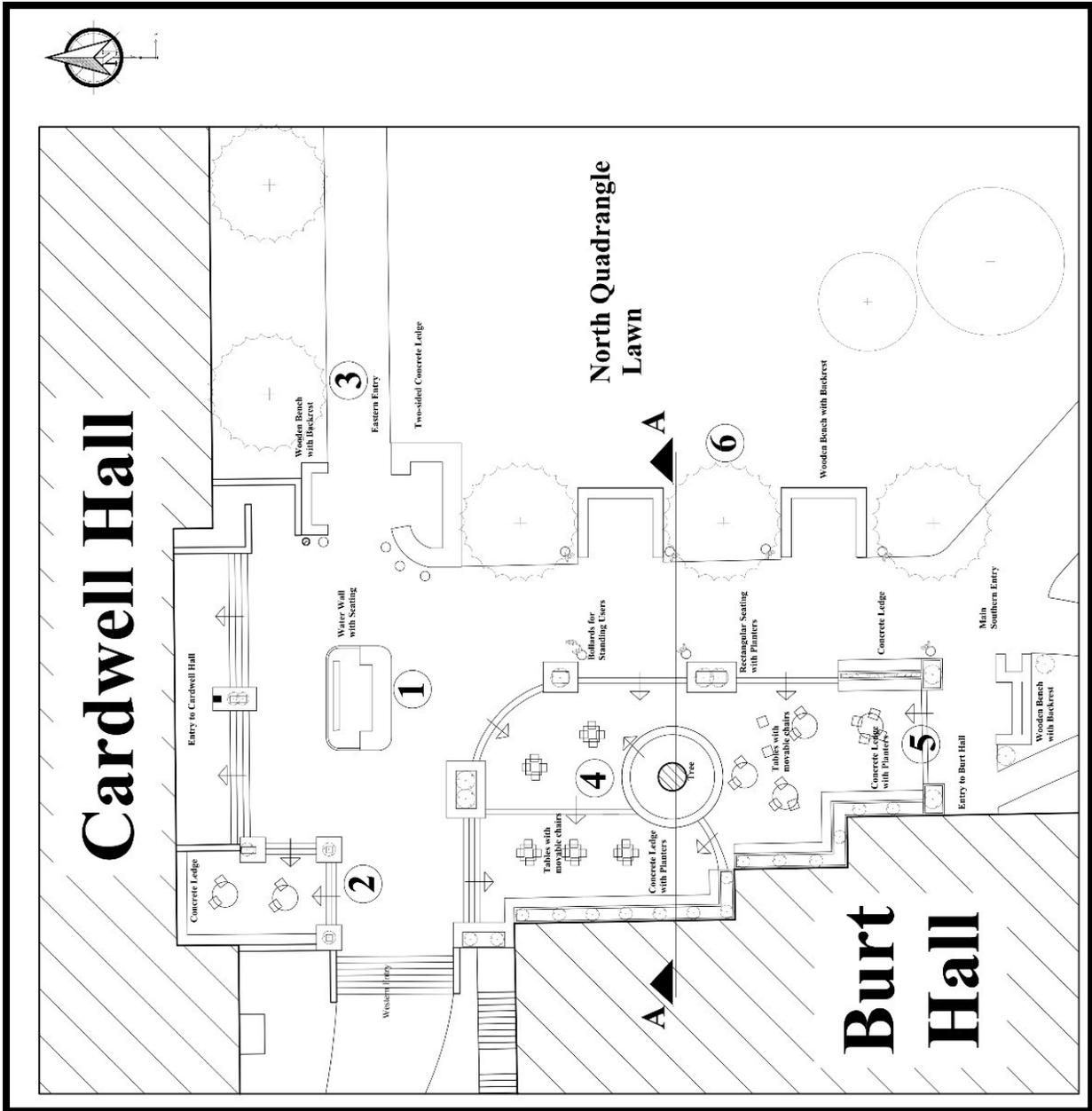


Figure 5.15 Master Design of the new Cardwell Plaza (scale 1"=16'-0").

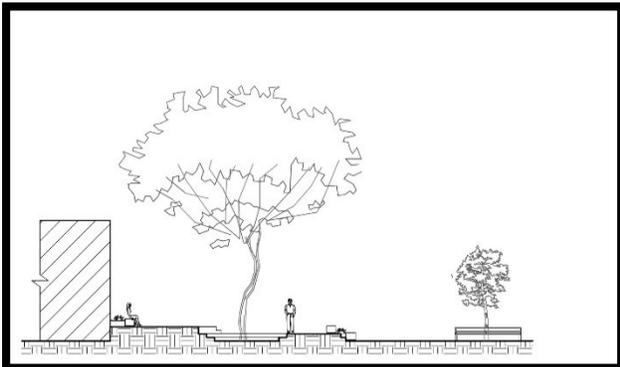


Figure 5.16 Section of the new Cardwell Plaza at A-A (refer figure 5.14).

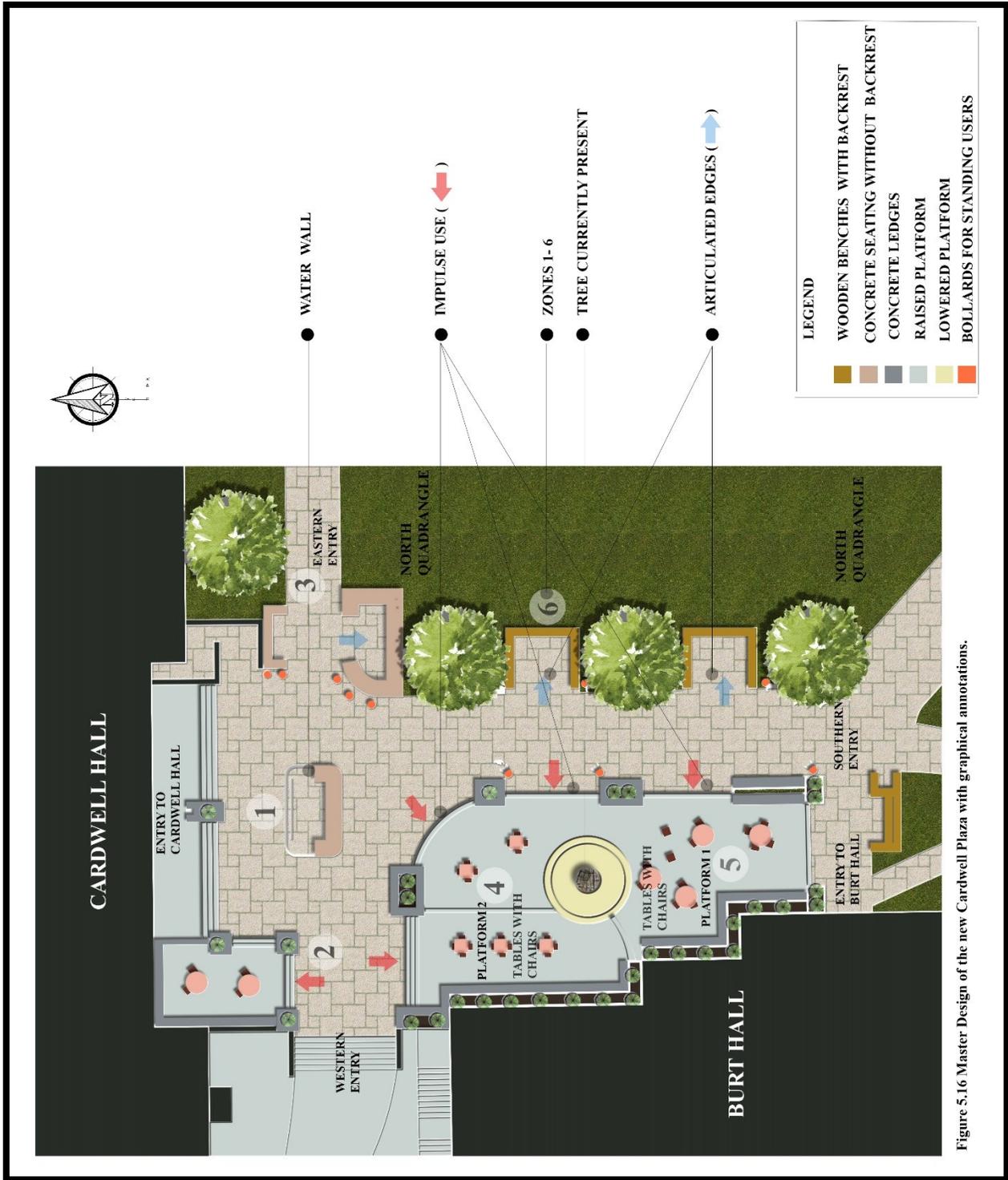


Figure 5.16 Master Design of the new Cardwell Plaza with graphical annotations.

Figure 5.17 Master Design of the new Cardwell Plaza with annotations and graphics. Note that the irregular shapes formed by the red dots represent zones one to six.

The northern end of platform 1 of Zone 4 has curved steps to facilitate user movement from pathway 8 to the west stairways (figure 5.19). Upon moving farther north via pathway 8, one reaches the intersection of pathways 8 and pathway 9—the spatial core of the plaza (zone 1). This spatial core contains the central water feature—a water wall representing the plaza’s focal point. The water wall is positioned such that it is visually and physically permeable from all areas of the plaza and includes seating for users who might enjoy sitting close to water. This water wall is nine feet high and includes a space of some fifty square feet close to the water wall for standing users.

The northwest corner of the plaza (zone 6), immediately adjacent to the Cardwell Hall is situated on an elevated platform. The stepped entry with seating on the sides is designed to invite users moving to and from the west stairways. Being located in the corner sheltered by trellis, this space offers users with a sense of privacy and enclosure. This space consists of planters with seating and tables with movable chairs to promote users to engage in various resting activities. On the other hand, the east entrance of the plaza along pathway 9 (zone 3) is the least redesigned space with seating with and without backrests and bollards against which standing users might rest.



**Figure 5.18** Rendered image illustrating the implementation of impulse use and articulated edges in the new Cardwell Plaza design.



**Figure 5.19** View of the plaza from the spatial core.

## Critically evaluating the research and design

The main purpose of this thesis was to understand sociability by conducting behavioral research and to propose a plaza design which could promote sociability in this North Quadrangle plaza. A plaza-related study was considered necessary because of the realization that Kansas State University requires properly designed open spaces which allow moving users like students, faculty, staff, and visitors to spend time outdoors. The behavioral research aimed to understand the patterns of user movement and rest within the North Quadrangle, leading to a more contextually-grounded plaza design. One of the most important reasons that a behavioral study leading to plaza design was important in the context of Kansas State University is because at present, the open spaces currently present on campus do not work well in terms of attracting and holding users. In addition, it has been assumed that the research and design will be able to offer higher sociability and thus attract more users. Such plazas as the one proposed will help make spaces like the North Quadrangle a more central social hub, sustaining a space with a strong sense of vitality and liveliness.

Chapter 5 presented the design for a North Quadrangle plaza based on twelve design guidelines as generated from literature research and the results of behavioral observations. The design specifically focused on three factors—location, street-plaza relationship, and seating—which were organized in terms of twelve design guidelines to provide a conceptual basis for the proposed design. These guidelines were primarily drawn from Whyte's *The Social Life of Small Urban Spaces* (Whyte, 1980). In addition, these guidelines were based on the findings of the observational research of moving and resting users in the North Quadrangle.

The major intention of the proposed plaza is to attract passers-by to use the plaza for longer periods of time. The design indicates how plaza sociability can be enhanced through careful design interventions that include, first, a proper consideration to the location of the plaza.

Important features associated with location of a plaza include: locating the plaza near pathways with higher user flows, defining plaza boundaries, specifying plaza pathways, and identifying the most active sub-spaces within the plaza. Second, the street-plaza relationship was enhanced and included, implementing “impulse use,” developing the plaza pathways as “articulated edges,” facilitating triangulation via central aesthetic elements, and properly designing the sub-spaces to facilitate various sitting and standing users. Seating features were incorporated to hold users in the plaza. These features included: providing acceptable amount of seating, considering physical and social comfort of plaza users, and designating planters to function dually as seating spaces wherever possible.

One significant shortcoming of the plaza design is that the twelve guidelines do not directly consider factors other than “location,” “street-plaza relationship,” and “seating.” Other design factors like microclimate, design policies and management, design for users of cell phones and other digital devices and plaza-furniture design have not been dealt with in detail, although these factors are also important for plaza design. This thesis, however, aims to inform the readers that focused research can inform critical aspects for a contextual design. The focus on only three design factors assisted in supplying the plaza design with a systematic research-based emphasis, adhering to the major theme of “sociability.” This systematic research has led to a better understanding of the design’s scope and also assisted in presenting the design as a purposeful conceptual project.

This thesis can be regarded as a point of departure for a more focused design intervention, since much effort has been given to the research; the proposed design is only a conceptual interpretation of that research. Although significant effort was given to prepare a comprehensive outline for a plaza design based on research findings, there is ample room for the

exploration of additional design elements potentially implementable in the plaza design. In addition, future researchers and designers can consider the thesis' research and design output—more specifically the twelve guidelines—for designing other plazas in the North Quadrangle or in relation to other campus open spaces to promote sociability.

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