A STUDY OF THEME PARK CIRCULATION CONCEPTS

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by
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*****

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1995
TO MY PARENTS

and

HONG
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Chapter I

INTRODUCTION

Stimulated by economic changes, the amusement industry has developed rapidly in many countries. According to IAAPA (International Association of Amusement Parks and Attractions), in 1991, the amusement industry experienced a 6.8 percent growth in attendance world-wide with a 9.4 percent growth in the Pacific Rim. Even mature markets, such as the United States and Europe, had growth rates of 3.9 percent and 2.0 percent. In 1993, the investment plan of the amusement industry exceed $1.2 billion, three times the amount reported in 1992. A survey regarding theme parks and attractions in Asia which was conducted by the Department of Hotel and Tourism Management, Hong Kong Polytechnic and University of Technology showed that “the growth rate in attendance (12.6 percent) is nearly double that of parks elsewhere in the world (6.8 percent).”
Theme park is defined as an amusement park either based on a theme over the whole park or with different themes in various parts of the same amusement park, and is one of the important components of amusement industry. Here, theme means creating by design and arrangement, as well as operation of physical elements in that area, "the atmosphere of another place or time" (Webster's Third New International Dictionary, p. 2370). Because the amusement industry is booming in some countries today, planning and design for theme parks is more important than ever.

Just like the circulatory system in the human body, the circulation systems in a theme park serves a key function, providing the necessary flows or movements that link all the patron's activity and support areas together. The system includes both pedestrian and vehicular movements. (Morrow, 1987 p. 62) It "can provide a visual feature, an overview of the park, a means of reducing footwork and a method of controlling the movement of visitors." (Wylson, 1992) Attractions can be easier to access and patrons can feel more satisfied if circulation is arranged properly. Also,
safety can be more easily assured if the circulation system is carefully planned and coordinated with attractions.

Circulation system includes not only those areas used by the public, but also the supply, maintenance, and service areas as well. However, because of restrictions created by available budget, time, and information, this study focuses only on patron related circulation.

Preliminary study of circulation layouts in theme parks find two circulation diagrammatic concepts: 1) The 'Hub-and-Spoke' concept has frequently been mentioned in available literature information (International Theme Park Services, Inc., 1994, HHCP Design International, Inc., 1994, Wylson, 1994, P. 153); 2) The 'Loop' concept was found in available theme park plans and bird's eye view perspectives as well as limited literature sources (Miles, 1994, Wylson, 1994, P. 153). Detailed description about 'Hub-and-Spoke' and 'Loop' circulation diagrammatic concepts are presented in the next chapter. This raised a fundamental question regarding circulation layout in theme parks: What are the advantages
and disadvantages of these two circulation diagrammatic concepts? Therefore, this study focuses on analysis of these two basic circulation theme park concepts.

The results of this study can be used to:

- Develop suggestions for theme park designers to determine circulation concepts in theme park planning and design;
- Evaluate existing theme park circulation systems;
- Develop references for circulation layout in parallel design fields;
- Inform the public of the basic idea of a theme park layout so that they are easily to orient themselves in theme park visitation.

1. **Study Assumptions**

   Although no two theme parks face exactly the same site conditions, economic factors, or programmatic requirements in establishing a circulation layout, it is assumed that: 1) circulation systems in theme parks reflect only a limited
number of diagrammatic concepts; 2) circulation layout is an important aspect and has sufficient universality in the planning and design in theme parks so that other theme park planners and designers may profit from this study.

2. **Purpose of the Study**

This study is not designed to provide definitive answers to the myriad planning and design questions concerning circulation layout in theme parks, rather, it is intended as a comparison of the two common circulation diagrams identified in preliminary study. The purposes of this study are:

1) To identify the factors which influence the selection and development of 'Hub-and-Spoke' and 'Loop' concepts in theme park planning and design.

2) To find the advantages and/or disadvantages of the 'Hub-and-Spoke' and 'Loop' concepts in application.

3. **Hypotheses**

It is hypothesized that:
1) Park management and operation are two of the most important factors when deciding whether to use the 'Hub-and-Spoke' or the 'Loop' concept in theme park planning.

2) The 'Loop' concept is most suitable in small parks, while the 'Hub-and-Spoke' concept tends to be used in medium and large theme parks. The size of a theme park is determined by two factors: park acreage and annual attendance.

4. Significance of the Study


Most articles about theme parks published in major professional journals (Funworld, Family Entertainment, Amusement Industry Abstract, and U. S. Amusement Consumer
Survey) deal with management, operation, or financing; however, through OSCAR (Ohio State Catalog for Automated Retrieval), a few books which appear to be related to this study were found.

Searching alternative resources such as professional reports and drawings (master plans, perspectives, conceptual design plans, analysis maps either published or released from appropriate publisher, design firm, company or person) yielded additional information. This allowed a more complete identification of concepts of circulation and the influential elements. The material is analyzed so that it may be easily understood and used in theme park circulation planning and design. Though not a goal of this study, this cataloging and recording of information is relevant to amusement industry needs and will serve as a planning and design reference for the field of Landscape Architecture.

5. Methodology and Results

In order to test the hypotheses of this study, a survey of the theme park planning and design community was used as the main method of developing meaningful data. In addition,
literature review and study of available professionally executed drawings of theme parks are used as supplementary research.

The thesis presents the result of the survey and professional drawings' analysis in text, diagram, and figure formats. Factors which influence the selection and development of 'Hub-and-Spoke' and 'Loop' concept were identified and the advantages and/or disadvantages of these two concepts were also presented.

The conclusion summarizes the findings and discusses the next steps recommended in theme park planning research. This study opens the way for improvement of theme park planning and design and for further study of the subject.
Chapter II

CIRCULATION DIAGRAMMATIC CONCEPTS

IN

THEME PARKS

In this chapter, two diagrammatic circulation concepts in theme parks are presented. These concepts were abstracted from two major sources: a) literature review, b) study of existing professional drawings. All information obtained through the literature review is from two main sources: a) books and periodicals which were located using MAGNUS (Mail and Group News Users System), OSCAR (Ohio State Catalog for Automated Retrieval), and interlibrary loans; b) professional reports from theme park design companies. Some circulation planning and design related issues are presented at the end of this chapter.

The literature regarding diagrammatic circulation concepts in theme parks is so limited that circulation
theories in parallel design fields were drawn from as references in determining the basic circulation concepts which might be used in theme parks.

2.1 Circulation Theories in Related Design Fields

Circulation refers to those flows or movements that link all the activity and support areas together. It includes both pedestrian and vehicular movements. Site planners may successfully organize circulation in formal or informal layouts that respond to the particular requirements of a site. (Morrow, 1987 p.62)

Gardner, J. and Heller, C. said:

The planner of an exhibition attempts to foresee people’s behavior and predict where they will hurry, stop, look, or drift on. His aim is to control the flow and arrest it where he wants; but controlling the flow does not mean that people are to be moved along predestinate grooves like trams or shuffled around hurdles like sheep. Ideally the planner is aiming to direct people’s movement in such a way that they see what there is to see with ease and in their own time. He must also ensure that the public does not get lost, tired, or bored with the whole affair.
Simonds concluded in *Landscape Architecture* (p. 201) that people were attracted to: the unusual, the admirable, the exotic, that which is impressive, the spectacular, that which is necessary, that which is bold, the weird, the appealing, that which is dramatic, etc. (Figure 2.1)

![Figure 2.1](image)

Factors which have a positive effect on movement
Source: *Landscape Architecture*, P.201, Simonds, 1983
He said the characteristics of pedestrian traffic "can best be understood by comparing them with those of a stream or river." "It tends toward the shortest distance, point to point." However, "When we are in a hurry, we tolerate few delays, but if moving leisurely we welcome deflection and distraction." (Figure 2.2)

Figure 2.2

Characteristics of pedestrian traffic
Source: Landscape Architecture, P. 209, Simonds, 1983
In the book *Site Planning*, Lynch discussed the pattern of several circulation systems:

- **Grid patterns**, which consists of a uniform, rectangular or triangular grid, are useful "where flows are shifting and broadly distributed." (Figure 2.3)

![Figure 2.3](image)

Grid circulation patterns  
Source: *Site Planning*, p.123, Lynch, 1973

- **Radial patterns**, in which circulation spreads out from a center, "is appropriate where flows have a common origin, interchange, or destination." "Rings may be added to the system to make a radioconcentric net ... The system may work well where the central flow is still predominant" and "allows bypassing movements as well." (Figure 2.4)

![Figure 2.4](image)

Radial circulation patterns  
Source: *Site Planning*, p.123, Lynch, 1973
Linear patterns, "may consist of a single line or a parallel series, to which all origins and destinations are directly attached. This is particularly useful where major flows run between two points rather than to or from a single point." (Figure 2.5)

![Figure 2.5](image)

Linear circulation pattern
Source: Site Planning, p.123, Lynch, 1973

In the book Road Form and Townscape, the author abstracted road systems into five network patterns: serial and radial, web, branching, and grid networks. (Figure 2.6)

Road forms are generally of two types: Loops and cul-de-sac.

Loop roads can start and end at the same location on the primary road. (Figure 2.7a) They can also start and end on a different position on the same primary road, (Figure 2.7b) or start on one primary road and end on another. (Figure 2.7c)
A cul-de-sac may simply be a short spur from a through road or it may branch out into a complex system. (Figure 2.7d)

![Serial, Radial, Web, Branching, Two-Directional Grid, Three-Directional Grid](image)

**Figure 2.6**

Network patterns of road system

Source: *Road Form and Townscape*, P.13-17, McCluskey, 1979
Alternatives of loop road
Source: Road Form and Townscape, P.62-63, McCluskey, 1979

One function of roads is to connect different spaces together. McCluskey (1979) classifies spaces into static space and dynamic space. A static space conveys a sense of rest and completeness; a dynamic space implies movement and change. A static space tends to be circular or square and is associated with 'place' and a dynamic space tends to be linear and associated with 'route'. Roads, which are routes, also have characteristics of places to a greater or less
degree. Slight alternation in the road width between buildings on opposite sides can have a marked effect on the local character of the road, whether brought about gradually or abruptly.

The linking of spaces can be carried out in a formal or an informal manner, (Figure 2.8a) The connections are serial, parallel, and multiple.(Figure 2.8b)

![Diagram](image)

2.8a Formal linking spaces

2.8b Serial connections

Parallel connections

Informal linking spaces

Multiple connections

Figure 2.8

Relationship between road system and space
Source: Road Form and Townscape, P.102, McCluskey, 1979
Although function is the most important aspect in a circulation layout, aesthetics is a consideration too. There are some basic elements that determine this aspect. In the book *Urban Design: Street and Square*, the author concluded:

Some of the concepts for the architectural composition, order, unity, balance, symmetry, scale, proportion, rhythm, contrast and harmony, are among the important tools used to define good architecture. These concepts overlap and are mutually reinforcing...... Individual concepts do not, or can not, stand alone... These concepts can be used to analyze the aesthetic qualities of urban form though they are not used in precisely the same way for large scale urban developments. These and other analytical concepts will be used to examine...... the design of street and square.

2.2 'Hub-and-Spoke' circulation concept in theme parks

Developed from Disneyland and adapted by other smaller theme parks like Kings Dominion in Virginia, USA, the layout of theme parks often follows the "Hub-and-Spoke" approach. (International Theme Park Services, Inc., 1994) The "Hub and Spoke" approach looks likes a bicycle wheel, the park is generally circular with a "spoke", or main entrance path (Disney’s Main Street USA, Kings Dominion’s International Street), leading to the theme park’s "hub", or visual
centerpiece (Disney’s Cinderella’s Castle, Kings Dominion’s Eifel Tower). Other “spokes”, or paths, lead from the visual centerpiece to the other themed areas.

The same concept can be found in HHCP Design International, Inc’s report. The company developed a “Huburb” concept, “it is a novel urban renewal design concept describing a hub, or center of activity, in an urban development that can bring new life and vitality to an area through a synergistic mix, mainly of commercial and entertainment functions.” The report said:

The “Huburb” model to mirror many of the distinctive elements in theme park planning and design, the most basic being the traditional “hub and spoke” concept, where anchor attractions are positioned at the end of “spokes” connected to a central “hub.” The hub is the point of visitor distribution for the anchor attractions, and the spokes funnel visitors to those attractions. (Figure 2.9)

For example, Main Street, USA at Walt Disney World’s Magic Kingdom serves as a feeder to the central hub (Cinderella’s Castle), where guests then choose to move into sub-theme zones, such as Adventureland, Frontierland, etc., which are connected to the hub by spokes for pedestrian circulation within the park.

The spoke of the hub, as applied to Huburbs or theme parks, not only serve as funnels for pedestrian traffic but also pull people through the entire Huburb, all the time exposing them along the way to secondary and tertiary commercial entertainment and retail elements that benefit from the enhanced exposure.

One of the basic premises of the hub and spoke concept is the separation and camouflaging of all
service areas and vehicular traffic from pedestrians. "As in theme parks, clear separation of visitors from the service facilities and from vehicular traffic is important to establish an enhanced quality of 'huburban' atmosphere. Everything is planned so as to maximize visitors' experiences and meet their needs."

Another essential theme park HHCP applied to the Huburb is the coordination, or theming, of all its elements -- such as landscape design, architecture, colorful graphics and special street furnishings or props -- to properties indigenous to the Huburb surroundings so as to develop "a special sense of place not usually seen in an urban setting."

![Diagram of Hub-and-Spoke circulation concept](image)

**Figure 2.9**

"Hub-and-Spoke" circulation concept in theme park planning
Source: HHCP Report and Portfolio, 1994, p.36

According to Chris Miles, principal of C.T.Hsu International, Inc., circulation plays an important role in
theme park layout. He also mentioned 'Hub-and-Spoke' as one of the major circulation diagrammatic concepts in theme parks. He said:

The Hub and Spoke layout is the most effective layout for a theme park given adequate ground. As at Disney's Magic Kingdom which is a sophisticated improvement on the first hub and spoke at Disneyland, the paths radiate out to individual districts like spokes of a bicycle. Each district is approximately the same size to account for equal visitor loading. The entertainment capacity units of all rides and attractions should be approximately equal.

Some planners named the 'Hub-and-Spoke' concept star diagram (Wylson, 1994, p.153), Figure 2.10

"Star" circulation diagram in theme park planning
Source: Theme Parks, Leisure Centers, Zoos and Aquaria
P.153 Wylson, 1994
2.3 'Loop' Circulation Concept in Theme Parks

The 'Loop' circulation diagrammatic concept is not described as much as 'Hub-and-Spoke' in available literature information. But this does not mean that 'Loop' concept is rarely used in theme park planning and design. The following theme parks are some examples which use 'Loop' concept.

Tivoli Gardens (Figure 2.11a) is a theme park "in the center of Copenhagen between the Central Station area and City Hall, reflect the character of the traditional European pleasure parks popular in the early 19th century". "...the main entrance leads into the avenue system that zigzags through the park tracing the line of the old fortifications. The main route taken by visitors leads to the central space with a large open-air auditorium, fountains and the concert hall." (Design for Leisure Entertainment, p.41) A diagrammatic circulation analysis plan of Tivoli is shown on figure 2.11b.

Figure 2.12a is the plan of Parc Asterix, a substantial theme park in France. "The plan of the park is based on a
loop configuration with a 'main street' as the lead-in."

(Theme Parks, Leisure Centers, Zoos and Aquaria, p. 28)

Figure 2.12b is the circulation diagrammatic analysis plan. The same analysis had been done on Majestic Hill Theme Park plan (Figure 2.13), National Custom Village plan (Figure 2.14), and Six Flags Great Adventure Plan (Figure 2.15).
Figure 2.11

Circulation system in Tivoli Gardens

Source: Design for Leisure Entertainment, p. 40
Figure 2.12

Circulation system in Parc Asterix

Source: Theme Parks, Leisure Centers, Zoos and Aquaria, p.28
Figure 2.13

Circulation system in Magnetic Hill Theme Park
Source: Myers Schmalenberger, Inc.
Figure 2.14

Circulation system in National Custom Village
Source: Architecture Review, Jan. 1993, p.29
Figure 2.15

Circulation system in Six Flags Great Adventure

Source: Myers Schmalenberger, Inc.
'Loop' circulation diagrammatic concept was also mentioned in the book *Theme Parks, Leisure Centers, Zoos and Aquaria* (Wylson, 1994, p. 153)

A simple park layout consists of a loop plan ... with entry through a range of ticket counts (relative to the number and in-flow of visitors); an orientation space to capture the mood and to include retail outlets, information and guests services; a circuit...pattern of features and an exit space to linger and shop at will. (Figure 2.16)

![Loop plan. Based on marine animal park Greece (Wylson-Watershed Consultants Ltd in conjunction with Safari Parks International).](image)

**Figure 2.16**

"Loop" circulation diagrammatic concept
Source: *Theme Parks, Leisure Centers, Zoos and Aquaria* P.153 Wylson, 1994

Chris Miles concluded:

A Loop circulation system is built on a primary path which radiates around the project, two thirds of the
way to the park perimeter. On the outside loop are larger rides and attractions, serviced from behind by a perimeter service road. On the inside are smaller attractions.

From the study of existing theme park plans and literature review, it is clear that 'Loop' circulation plays an important role in theme park planning and design.

2.4 Circulation Related Issues in Theme Park Planning

In order to assure attractions are easily identified, it is necessary to make circulation routes very clear. In the book *Design for Leisure Entertainment*, Wyelson said:

The predominant central walk, boulevard, piazza or 'main street' can provide a 'datum', giving access to specific areas. An elevated viewing platform can assist to obtain an image of the park layout, as the central walk at Pleasure Beach, Blackpool.

Alternatively a system of clearly visible landmark features, good signposting, coherent guide maps, can all assist to make the visitors confident. The movement of people can also be influenced by the ticket system... Access and exit points of individual attractions is important not only to the rate of flow through the attractions, but to the basic 'dynamic' of the park.

......

Within the park the sequence of spaces and location of relaxation nodes is important to the circulation pattern. Introvert and outward looking relaxation areas, continuity of vistas, total enclosure
to capture a particular ambiance, the use of neutral areas or scenic features to bridge from one ambiance to another - are all significant to the total character. Sound and light patterns are equally important; the quiet areas, the movement of crowds by creating an attraction such as a performance of music or an outdoor show; dynamic lighting, appropriate to activity areas that can enhance spaces and buildings in a manner synonymous with leisure; the night scene of a park in which the character of particular zones are re-created through the effect of artificial lighting.

Various circulation modes were used in theme parks. In the Magic Kingdoms of Disneyland and Walt Disney World, these modes "range from renovated historic steam engines, horse-drawn trams, to high-level monorails, skyway cable cars and the WED transport system." (Wylson, A., 1980 p.49)

Some design guidelines can be extracted from Theme Parks, Leisure Centers, Zoos and Aquaria. Special attention has been given to circulation and attractions layout through a theme park.

The ticketing and in-park purchasing must be relevant to local purchasing patterns. Methods of ticketing vary from a single ticket for all features in the park, to voucher tickets relating to particular rides.

The sequence and relationship of features is important to avoid congestion in any one areas of the park. To avoid disappointment there should be obvious alternatives to rides or principal attractions that could become over-subscribed.
The method of conveying people through the park, widths of routes and intersections are significant. The rate of in-flow must be accommodated to avoid bottlenecks. Cul-de-sac spaces should be avoided and particular attention should be given to intersections. A crossing of main pedestrian routes should have the routes clearly signposted and there should be sufficient space to allow people to intermingle. An intersection could be a feature taking advantage of a concentration of visitors.

It is advisable to avoid guesses extending into intersections. Lines of visitors waiting can be contained by railed queues in a zigzag layout, which can also promote socializing.

A theme park moves the visitors by conveyor to maintain the rate of flow and to avoid overcrowding the exhibit space. Visitors are then able to move at their own speed in the specialist display space and book/gift shop. In other parks, visitors have a choice of walking or (if distance is significant) being conveyed by mechanical transportation designed with a relevant theme.

In-park transportation systems are either at ground level, elevated above normal pedestrian level or are used to raise visitors up to a particular activity level. In many parks, there is a peripheral transportation system at ground level, and systems extending across the park are raised or bridged over by pedestrian routes. (Wylson, 1994, p 156)

2.5 Summary of This Chapter

Two basic circulation concepts in theme park planning seem to exist. It is necessary to point out that these diagrammatic concepts are abstract models and that "Hub-and-
Spoke and Loops may be incorporated together" (Chris Miles, 1994). The basic difference between 'Hub-and-Spoke' and 'Loop' is that the 'Hub-and-Spoke' concept has an important centerpiece ('Hub') and main patron flow goes to this centerpiece first then disburses to different but approximately equally sized theme zones. In the 'Loop' concept, patrons follow along main path ('Loop') or main paths ('Loops') around the park in a sequential experience. The key difference to patrons is some level of self-directed choice in the ordering of the theme park experience in the "hub-and-Spoke". In the loop system, choice is less available because of the linear organization of themed areas.

Figure 2.17 shows a combination of 'Hub-and-Spoke' and 'Loop'. In figure 2.17a, the primary circulation is 'Hub-and-Spoke' concept, while the secondary circulation is 'Loop' concept; in figure 2.17b, the primary circulation is 'Loop', while the secondary is 'Hub-and-Spoke'. If a theme park has a tertiary circulation, it should have the same alternatives too. However, no matter how many circulation
hierarchies a theme park has, the primary circulation system can be clarified into 'Hub-and-Spoke' or 'Loop'. Hence, the survey in next chapter only focuses on the primary circulation system in theme parks.

2.17a: Primary circulation: 'Hub-and-Spoke'

2.17b: Primary circulation: 'Loop'

Figure 2.17

Combination of 'Hub-and-Spoke' and 'Loop'
Chapter III

METHODOLOGY AND PROCESS

In this chapter, a detailed description of the main methodology and process used in this study, which is survey among experts in theme park planning and design profession, will be presented. This provides the basis for the analysis and explanation of results in the next chapter.

3.1 Survey Goals

Goals of this survey are:

- To identify the factors which influence the determining of the use of 'Loop' and 'Hub-and-Spoke' concepts in theme park planning;
- To find advantages and/or disadvantages of the 'Loop' and 'Hub-and-Spoke' concepts among theme park planning and design community;
3.2 Respondents' Selection

People who complete the questionnaire should be genuinely representative of the theme park planning and design community.

- **Professional experience**: Must have been involved in the design of at least ten theme park design experience.

- **Design credibility**: Must have at least 3 (three) of the 10 (ten) designed theme parks have been or are being built.

These qualification requirements will be obtained through analysis of responses to questions on the survey.

Eight or more than eight qualified respondents should complete this survey.

3.3. Develop Survey Questions

Survey questions were developed to reflect survey goals. The questions were modified and refined by thesis committee members and tested by two theme park planners
and/or designers. The formats of these question include: *Forced-choice questions* which produce survey data that are easier to process and interpret than those produced by the open-ended questions; *Open-ended questions* which make it possible for interested respondents to clarify earlier answers or contribute good ideas that the researcher might have overlooked.

These questions are arranged in the most logical order with questions on the same topic grouped together.

a. *Questions about factors that influence the decision to use the 'Loop' or the 'Hub-and-Spoke' concept in theme park planning*

Before any question was raised, it is necessary to have a look at theme park planning processes.

In the article *Appraising Theme Parks* (Roddewig, R. J., Schultz, S. P., and Papke, G., 1986), the authors thought "The essential elements of a theme park are the amusement and entertainment areas; administration, support, and
maintenance facilities; and parking lots. Some parks will also have areas set aside for expansion." Detailed administrative description is as below:

support, and maintenance areas are carefully separated and hidden away from the amusement area. Every effort is made to create a complete fantasy environment within the theme park, and the intrusion of maintenance vehicles and employee traffic is avoided whenever possible.

......

Parking lots occupy a great percentage of the land area at a typical theme park. Lots must be large enough to handle peak attendance comfortably.

......

Administration, maintenance, and support areas will include a variety of buildings and structures, many of basic industrial design. Office for administrative and supervisory staff, ride maintenance, off-season storage for rides, vehicle maintenance, food handling and storage, dry cleaning and laundry, machinery shops, carpentry shops, painting and decorating, greenhouses, landscaping equipment storage, open storage, employee locker rooms, employee cafeteria, employee training, and security are some of the functions that need to be accommodated in an administration and maintenance complex. Some parks have a central power plant.

A planning method using economic approach in theme park can be found in *Recreational Development Handbook* (Smart. J. E. and et al). The book said:

Based on properly prepared attendance projections, it is possible to predict, with reasonable accuracy, the daily and even hourly attendance patterns. With this information, skilled planners can then project
capacity requisites for peak days and design days... in a theme ride park, for example, patrons will expect a certain number of rides as proper value for the price of admission. This data will govern the number of ride units which must be installed...certain crowd-pleasing amenities along with necessary services must be provided.

The planning process that Landmark Entertainment Group uses, in amusement industry, whether it is a single themed attraction, an entire theme park, or a major destination resort were:

Concept This is the first step. Development of storyline as the overall vision of the project is established. The Master Plan is developed, and it combines the established creative concept with the particle requirements of circulation, capacity, infrastructure, phasing and budget. It becomes a guide for the entire development.

Schematic Design The concept is refined and scale drawings are developed. Technical design specifications are set. Preliminary Architecture and Engineering input is gathered. Budget and schedule is finalized.

Design Development Architectural drawings are completed. Working drawings, final scripts, art directors model, color and material selections, technical designs, show engineering completed. Bid packages submitted and selected.

Production Construction of buildings, production and manufacturing of show elements, Procurement, installation, programming, rehearsals, test & adjust for show systems, Field supervision, art direction and project management ensure continuity of design throughout.
The following is a description of park size and rides as well as attractions arrangement projection(s) from Chris Miles:

Public In Park Area
The park is a reflection in surface area of destinies of people. Although some Pacific Rim parks may be designed to accept densities of 2470 people/hectares, the average US park is designed to accommodate 1729 people per hectares. The internal surface area of the park is a measured response to the in park design day. This figure is the estimated average of the maximum attendance days in the year. Assuming that not all the attendance is in the park, Hsu International usually calculates 70% of the design day for 'in park' attendance.

If the park attracted fifty thousand people design day (50,000) then the in park area would be 50,000x70%=35,000. 35000/1729=20.24 HA.

Rides and Attractions
The mix of rides and attractions reflects the mix of attendance. Passive small rides for the young, fast active rides for teenagers and less active elements for adults and the old. The total capacity (per hour) is calculated by applying attraction turns per hour for every park visitor. In an unsophisticated attraction this may be as low as 0.9 attractions per hour. This latter number is multiplied by the hypothetical 35,000 attendance to produce an Entertainment Capacity Unit demand of 31,500. All carrying capacities of rides and attractions in a park are obtained from this calculation. An average of 1.8 attraction turns per hour is standard for US parks. European parks range from 1.3 to 1.8.

As stated in Planning Parks for People, successful planning consists of three ingredients. The first is
technical knowledge; The second consists of a is healthy
dose of common sense -- Planners should be able to explain
how and why their designs function as they do; and third, a
measure of creativity. (Hultsman, J., Cottrell, R., Zales-
Hultsman, W., 1987)

These three planning strategies had been demonstrated
in a theme park planning: the layout of attractions requires
technical knowledge of the rides, shows, and games. Some
planning guidelines, such as arranging anchors in different
parts so that patrons will take advantage of all the park is
judged by common sense. To generate a unique theme needs
creativity.

As a summary, some factors which influence a theme park
layout were found. They include: park size, site shape,
parking size, parking location, utilities, visual aesthetic,
programming, attraction mix, maintenance, management,
investment, future expansion, major attraction location,
attendance, average length of stay, theme zone separation,
patron’s safety, patron’s orientation, retail arrangement,
food and beverage arrangement. However, some important
elements which were listed in *Recreation Planning and Design* (Gold, 1983) were not mentioned above. Thus, a question to identify influential elements on the circulation layout is necessary. Furthermore, ranking on the identified influential elements is also important.

b) Questions regarding advantages and/or disadvantages of 'Hub-and-Spoke' and 'Loop' concepts

According to Gaston T. and Smith B. (1988, p 261), it is not very effective to ask direct questions in the survey. This comparison should be judged by 'number' or 'fact'. Hence, questions, such as "How many of the theme parks you have designed use 'Loop' or 'Hub-and-Spoke' concept" is better than those like "Do you use 'Hub-and-Spoke' more than 'Loop'". Sometimes, when information is not available for business reasons, this kind of 'direct question' has to be used in the survey.

A sample of survey questionnaire may be found in the appendix A.
3.4. *Survey Process*

a) *Find survey objects:*

A fax was sent to IAAPA (International Association of Amusement Parks and Attractions) on December 27, 1994. A consultant list was received 3 (three) weeks later. This list contained the names of IAAPA members who identified themselves as consultants to the amusement industry for the 1993-94 IAAPA Directory & Buyer’s Guide as July 31, 1993. The total number is 442. 58 of them clearly defined themselves as specializing in “planning, creating, and designing theme parks”. 22 of the 58 were “landscape and/or architectural firms specializing in theme park planning and design”

Checking with *Funworld*, the major professional magazine of amusement industry, and discussing with thesis committee members, 20 from 22 theme park planning and design companies and/or firms were selected. The names and a brief description introduction of the twenty selected survey objects may be found in appendix B.
b) Mail questionnaire to selected firms

A fax or a mail contained an introduction letter and a complete questionnaire was sent to selected companies on **February 20 and 28, 1995**.

The introduction letter includes:

- A statement of the purpose of the survey and the use to which the results will be put;
- Estimate how long it will take to complete the questionnaire;
- Mentions some good reasons that the respondent might want to devote that much time to such a worthwhile project.

A sample of introduction letter were list on appendix C.

c) Get response from selected companies.

Responses from surveyed companies had been received from February 25, 1995 to April 15, 1995. 50% selected companies responded this survey.

d) Sorting and analyzing the survey result.

This is described in detail in next chapter.
Chapter IV

RESULTS, ANALYSIS, DISCUSSIONS, CONCLUSIONS,

AND RECOMMENDATIONS

This chapter presented the survey results, analysis, and discussion in first section. Following this section, conclusions had been developed from the study. Recommendations for further study were presented in the last part.

4.1 Results of Survey, Analysis and Discussion

During February and March 1995, twelve responses to the three-page survey document were received from theme park planning and design companies all over the United States, eight of them (40% of total mailed out) are qualified to be used, providing a detailed portrait of the study, as well as some other circulation-related planning and design issues. Two of the remaining four refused to participate in the
survey, the other two responded in a means which made them unusable.

The following survey results consist of six sections organized by the six survey questions.

4.1.1 Question one

Question: What would you label A as and B as?

The purpose of this question was to determine the name(s) professionals assign to these two circulation systems. This can provide answers for two questions: First, Do circulation diagrammatic concepts A and B exist? Second, what are the name(s) for these concepts? The second question is intended to determine the different names design companies used for the same concept in order to eliminate inaccuracy in the following survey questions.

The results of the survey on question one are shown on figure 4.1.

For diagrammatic circulation concept A, 75% named it as Hub-and-Spoke, 25% named it other names; For circulation
diagrammatic concept B, 75% named it **Loop**, 12.5% did not answer this question, 12.5% named it other names.

Various names given for circulation concept A are: radial or complete; and for B, it’s names included circular and incomplete.

![Pie charts showing responses regarding names of two studied circulation concepts](image)

**Figure 4.1**

Responses regarding names of two studied circulation concepts

Analysis and discussion:

It is obvious that most theme park planners and designers are familiar with both the names and structures of
the 'Hub-and-Spoke' and 'Loop' circulation concepts. Therefore, the prediction that 'Hub-and-Spoke' and 'Loop' circulation concepts not only exist in theme parks but also are recognized by most theme park planners and designers is proved.

4.1.2 Question two

Question: Do you use either or both of these concepts in your design or planning? If no, what type(s) circulation system do you use in theme park design or planning? If yes, which of the following factors influence you in deciding to use concept A or B as your basic circulation diagram when you plan or design a theme park: topography, vegetation, weather, hydrology, water body, climate, park size, site shape, parking size, parking location, utilities, visual aesthetic, programming, attraction mix, maintenance, management, investment, future expansion, major attraction location, attendance, average length of stay, theme zone separation, patron’s safety, patron’s orientation, retail
arrangement, food and beverage arrangement, other. Which are the most critical factors?

The purposes of this question are:

1) To identify environmental, management, and patron, as well as economically related factors which influence the decision to use one of these two diagrammatic circulation concepts;

2) To identify the most critical factors;

3) To collect additional circulation concepts besides the 'Hub-and-Spoke' and 'Loop'.

The survey results on this question are:

**Result A:** All respond said they use both of these concepts in their theme park planning and design, 75% said they used some other circulation concepts too. However, only 25% diagrammed and labeled additional concepts they used (Figure 4.2).

Among all diagrammed and labeled concepts, the most often mentioned respondent's concept is the **combination** of 'Hub-and-Spoke' and 'Loop'.

Figure 4.2

Names and diagrams of additional circulation concepts in theme park planning

Result B: Twenty-six factors are listed in this question, they are organized into four categories: natural, common design considerations, management, and business.
For natural factors, the survey result is shown on figure 4.3:

![Bar chart showing percentages for various natural factors]

**Figure 4.3**

Consideration of natural factors in theme park planning and design

For common design consideration factors, the survey result is shown on figure 4.4
Figure 4.4
Consideration of design factors in theme park planning and design
For management factors, the survey result is shown on figure 4.5.

![Bar Chart for Management Factors]

**Figure 4.5**
Consideration of management factors in theme park planning and design

For business factors, the survey result is shown on figure 4.6.

![Bar Chart for Business Factors]

**Figure 4.6**
Consideration of business factors in theme park planning and design
Besides factors listed on question 2, some respondents also mentioned other influential factors when they decided to use 'Hub-and-Spoke' and 'Loop' circulation diagrammatic concepts. They were: number and type of sub-theme zones, type of central feature, location of entry front gate, existing site constraints, and guest comfort in orientation.

87.5% of respondents answered the question regarding the most critical influential factors. According to their answers, the most critical influential factors are: topography; vegetation; water body; park size; site shape; major attraction location; attraction mix; attendance; theme zone separation; patron's orientation, maintenance, average length of stay, and retail arrangement as well as food and beverage arrangement. Figure 4.7 shows the result.
Figure 4.7
Most critical factors
Analysis and discussion:

Among all twenty-six listed potential influential factors, those never mentioned by any respondents are: parking size and visual aesthetic. Those which were mentioned by 50% or more includes: topography; water body; site shape; future expansion; major attraction location; theme zone separation; attraction mix; and programming. The remaining sixteen factors were mentioned by less than 50% of the respondents.

None of the factor listed under natural consideration received 0%. This suggests all these natural factors need to be taken into consideration somehow when deciding to use either 'Hub-and-Spoke' or 'Loop' concept in theme park planning and design. Topography, an very essential element in all landscape architectural design, is recognized by 87.5% respondents as playing a role in determining the use of 'Hub-and-Spoke' or 'Loop'.

However, two factors listed under common design consideration, parking size and visual aesthetic, received a 0%. Visual aesthetic is so important in 'traditional'
landscape that much effort has been devoted to enhance the environmental, historic and aesthetic value of a project (Landscape Architecture, April 1995, p. 48). However, no respondents thought visual aesthetic had any influence on the planning of basic circulation pattern in theme park. Therefore, deterring to what degree visual aesthetic influences theme park planning or if it really is not considered at all needs further research.

Some factors only existing in theme parks received very high rates of response as important factors in the question. Major attraction location, theme zone separation, attraction mix and programming are recognized by most respondents as essential factors. This indicates that unique factors in theme parks (i.e. major attraction location, patron's orientation, etc.) are most critical factor in determining the basic circulation concept in the planning and design of a theme park.

However, park size only received 25% positive responds. Further analysis of the relationship between park size and the use of 'Hub-and-Spoke' and 'Loop' concepts is presented in the Analysis and Discussion section of question four.
The three factors under the business category did not receive a highly positive response. It seems likely that business did not have much influence on the selection of the circulation concepts in theme park. Actually, the influence of business lies in all aspects of a theme park, from patron satisfaction to park maintenance and management.

Among all fourteen most critical factors which were identified by some respondents (table 4.6), only one factor (major attraction location) received 50% of positive answers; patron’s orientation received 37.5%; five factors received 25%. The other seven factors received only 12.5% positive answers. One interesting thing is that although most respondents (87.5%) agreed that topography influences the selection of basic circulation concepts, only 12.5% think it is one of the most critically influential factors.

Some responds said they have some other circulation concepts in their theme park planning and design, figure 4.2 diagrams and labels these concepts.
4.1.3 Question three

Question: What type of circulation concept is more applicable to 1) revenue generation, 2) park maintenance, 3) park management, 4) patron distribution, and 5) patron orientation in park?

The purpose of this survey question is to collect comparative opinions from theme park planners and designers regarding three concerns: management, business, and patron. Results from this survey question are shown on figure 4.8.

A: Hub-and-Spoke  B: Loop

Figure 4.8
Comparative opinion on two circulation concepts
Analysis and discussion:

Figure 4.8 clearly suggests: 1) 'Hub-and-Spoke' has a positive relationship to revenue generation and patron distribution; 2) 'Loop' is a more applicable to park maintenance and management; 3) As to patron orientation in park, 'Hub-and-Spoke' and 'Loop' are almost the same.

The survey results do not provide any clues to the reasons for the responses. However, survey results of question 5 do suggest some explanations.

4.1.4 Question Four

Question: Please give the number of theme parks you have planned and/or designed using these criteria: 1) annual attendance, 2) developed park acreage, and 3) number of entrances.

This question was intended to provide information on two matters:

1) To collect statistic numbers so that hypothesis A, which suggests that circulation concept A is more applicable
to big parks while concept B is more applicable to small parks, can be tested. Annual attendance and developed park acreage are major elements in determining the scale of a theme park.

2) To find advantages and/or disadvantages of 'Hub-and-Spoke' and 'Loop' in park management. This purpose is based on the assumption that entrance is not only the key spot in the whole circulation system, but it is also an important aspect in park management. The fewer the number of entrances, the easier the management.

Results from this question are presented in figures 4.9, 4.10, 4.11 and 4.12.
Result 1: Annual attendance.

- Small park
  - Use other concepts
  - Use 'Loop' concept more than 'Hub-and-Spoke' concept
  - Use 'Hub-and-Spoke' concept more than 'Loop' concept

- Large park
  - Did not answer the question
  - Use 'Loop' concept more than 'Hub-and-Spoke' concept
  - Use 'Hub-and-Spoke' concept more than 'Loop' concept

Figure 4.9
Relationship between expected annual attendance and selection of circulation concept

Result 2: Developed park acreage.

- Small park
  - Use other concepts
  - Use 'Loop' concept more than 'Hub-and-Spoke' concept
  - Use 'Hub-and-Spoke' concept more than 'Loop' concept

- Large park
  - Did not answer the question
  - Use 'Loop' concept more than 'Hub-and-Spoke' concept
  - Use 'Hub-and-Spoke' concept more than 'Loop' concept

Figure 4.10
Relationship between park size and circulation concept
Result 3: Number of entrance.

![Pie charts showing percentage of use of one or two entrances.](image)

- Use A ('Hub-and-Spoke')
- Use B ('Loop')

Figure 4.11

Comparison of number of entrances to type of circulation system

Result 4: Percentages of using the 'Hub-and-Spoke' and the 'Loop' concept.

![Pie charts showing percentages of use in small and large parks.](image)

- Small park
- Large park

Figure 4.12

Percentages of using the 'Hub-and-Spoke' and the 'Loop' concept
Analysis and Discussion:

Table 4.8 shows that 25% of the respondents used the 'Loop' concept more than 'Hub-and-Spoke' concept in their small theme park planning and design, while the percentage using 'Hub-and-Spoke' and 'Loop' in large theme parks are the same. However, it is hard to say that the 'Loop' concept is more applicable to small theme parks than large parks because most respondents (75%) did not answer the question. The result coincides with the result of question 2: only 12.5% of the respondents indicated that park size is one of the influential factors in determining whether to use the 'Hub-and-Spoke' or 'Loop' concept.

The result suggests that park size has little influence on selection of circulation concept in theme parks was further demonstrated by Table 4.9. In both small and large parks, the percentage using the 'hub-and-Spoke' concept and the 'Loop' concept are the same. This result was also demonstrated by figure 4.12. While the previous diagram made comparisons by designers (respondents), figure 4.12 sorts the data by theme parks according to their size, and the
result shows that there is a more significant difference between the percentages of using the 'Hub-and-Spoke' concept and the 'Loop' concept in small parks. However, while the percentages for 'Hub-and-Spoke' and 'Loop' increases, 40% still use other circulation concepts for large parks.

Figure 4.11 reflects the relationship between the number of entrances and the circulation concept used in theme parks as determining by analysis of respondents answers. No matter what scale the park is, only 12.5% of the theme park planners responding put 2 or more entrances in a theme park. Probably, this is because more entrances create more problems for the management. However, it is clear that both concept work well with the fewest possible number of entrance.

4.1.5 Question Five

Question: In your opinion, what are advantages and disadvantages of these two circulation concepts?

This was intended to be an open-ended question. Survey respondents were encouraged to comment on the two
circulation concepts. The answers provided information for comparative analysis on the two concepts.

Results, analysis and discussion:

The advantages of the 'Hub-and-Spoke' concept appear to be:

- an increase in the visitor's length of stay, thus increasing revenue;
- exposing guests to revenue producing facilities more often, thus increasing per capita spending;
- letting revenue generating facilities concentrate at core (hub) or on a long spoke;
- generally orienting people and providing fast access to any attraction;
- providing flexibility in circulation patterns and giving the park patron the ability to revisit areas;
- providing a strong hub identity for the park;
- more evenly distributes visitors throughout the park;
• providing the most efficient guest loading of park;
• gives definitive sub-theme entry choice.

Advantages of the 'Loop' concept include:
• maintenance access is simplified with a perimeter loop;
• sequential guest circulation and experience;
• adapts most easily to contours;
• very easy to orient oneself and not miss an area;
• distance around main circulation route can be less than 'Hub-and-Spoke';
• main circulation can be 'stretched' into more of a free form.

Disadvantages of 'Hub-and-Spoke':
• access to facilities in the core must cross outer loop guest circulation;
• permits guests to bypass the core - staying on the perimeter;
• distribution of guests can be difficult given a flexible circulation pattern;
• difficulty in servicing central hub areas efficiently;
• requires at least three sub-theme zones;
• difficult to layout on a hilly site;
• a guest can miss an attraction;
• attraction areas must be designed to acknowledge hub;
• service routes become complicated;
• the spoke often requires the guests to retrace their steps, walking twice the distance to see each attraction.

Disadvantages of 'Loop':
• revenue facilities must be distributed in all zones, increased capital and operational cost;
• the loop without shortcuts increases distances between attractions;
• guests might use loop once or twice, arrive at the entrance and leave rather than use loop again.
• guests can only load the park in two directions from a single entry; the sides opposite the entry to the loop experiences delayed utilization; minimal guest circulation choice;
• if one area is chosen for repair, it cuts off major circulation;
• more difficult to establish a sense of orientation for guests.

4.1.6 Question Six

Question: General comments on circulation layout in theme parks.

Purpose: To find important issues in theme park circulation layout which had not been studied or mentioned in other section of the study.

The following comments came directly from survey respondents:
• Distribution of guests in terms of guest spending patterns in the most critical consideration - guests' satisfactions (i.e. ease of movement) is a close second. Ease of maintenance and operations; Degree of exposure to revenue facilities and placement of major attractions anchors will determine the profitability of the park facility;

• Guest should be allowed to move into the park quickly and efficiently to immediately active all areas of the park and its attractions;

• Circulation should be simple to follow with signage, landmarks, and continuity. Paths should be wide enough to other activities, i.e. resting, food carts, viewing areas, etc. Dead areas should be avoided because visitors won't always visit both ends.

• No matter what concept is used, major attractions should be evenly distributed.
4.2 Conclusions

The conclusions of this study are:

1) 'Hub-and-Spoke' and 'Loop' are most often used circulation concepts in small theme park planning and design, and are known by most theme park planners and designers. However, these two concepts are not the only ones used in theme park planning and design.

2) All natural factors influence the selection of the basic circulation concept in theme park planning and design, but only water bodies are considered as a critical factor;

3) No relationship was found between park size and the use of the two circulation concepts explained in this study. The hypothesis that the 'Hub-and-Spoke' concept is more applicable to large parks and 'Loop' is more applicable to small parks was not proved;

4) From this study, regardless the size of the park, both 'Hub-and-Spoke' and 'Loop' schemes tend to use only one entrance;

5) Visual aesthetic appears to have no influence in the selection of basic circulation patterns in theme parks;
6) Unique factors such as major attraction location, patron's orientation, etc. are most critical in deciding the basic circulation concept in the planning and design of a theme park. The hypothesis that management and operation are two of the most important factors in determining the use of 'Hub-and-Spoke' or 'Loop' concept in theme park planning is proved.

7) The 'Hub-and-Spoke' and 'Loop' concepts have different advantages and disadvantages. For instance, the 'Hub-and-Spoke' concept is more applicable to revenue generation and patron distribution, while 'Loop' is more applicable to park maintenance and management.

4.3 Recommendations for further study

4.3.1 Recommendation one

The available survey companies were limited and some recipients do not want to provide meaningful data because the amusement industry is a very competitive profession. Therefore, surveys may not be the best in this kind of
study. Interview with theme park planners and designers may be more applicable. Furthermore, to conduct successful study of this type, it would be extremely useful to have a network of contacts who are working in this field.

4.3.2 Recommendation two

My study provided one view of design related issues as provided by park planners and designers. In order to get more comprehensive understanding of the importance of design related issues, a follow-up study should focus on the attitudes of park managers and park users.

4.4.3 Recommendation three

The main purpose for establishing a theme park is to generate a profit through the provision of entertainment. A study should be done to determine described characteristics of theme parks. It would be desirable to answer questions such as: the influence of these characteristics of theme park planning and design; the difference of the planning and
design of a theme park and an 'ordinary' park; the role of landscape architecture in theme park planning and design.
Appendix A

A SAMPLE OF SURVEY QUESTIONNAIRE

A SURVEY OF
CIRCULATION SYSTEMS IN THEME PARKS

NOTE:
Circulation systems in this study only refer to patron related parts, and only focus on the primary path.

Using two circulation diagrammatic concepts identified in existing theme parks, please answer the following questions:

1. What would you label A as: ________ B as: ________

2. Do you use either or both of these concepts in your design or planning?  
   Yes or No

   If yes, please answer question 2.1a and 2.1b
   If no, please proceed to question 2.2
2.1a Which of the following factors influence you in deciding to use concept A or B as your basic circulation diagram when you plan or design a theme park?

1) Topography ( )
2) Vegetation ( )
3) Weather ( )
4) Hydrology ( )
5) Water body ( )
6) Climate ( )
7) Park size ( )
8) Site Shape ( )
9) Parking size ( )
10) Parking location ( )
11) Utilities ( )
12) Visual aesthetic ( )
13) Programming ( )
14) Attraction mix ( )
15) Maintenance ( )
16) Management ( )
17) Investment ( )
18) Future Expansion ( )
19) Major attraction location ( )
20) Attendance ( )
21) Average length of stay ( )
22) Theme zone separation ( )
23) Patron's safety ( )
24) Patron’s orientation ( )
25) Retail arrangement ( )
26) Food and Beverage arrangement ( )
27) other(s): ________________________________

2.1b Among all the factors listed in 2.1a, the most critical factors are: ________________________________

2.2 What type(s) circulation systems do you use in theme park design or planning? Please diagram and label.

3. What type of circulation concept is more applicable to:

1) revenue generation A or B
2) park maintenance A or B
3) park management A or B
4) patron distribution A or B
5) patron orientation in park A or B
4. Please give the number of theme parks you have planned and/or designed according to the following criteria:

<table>
<thead>
<tr>
<th>Basic Circulation Layout</th>
<th>A (#)</th>
<th>B (#)</th>
<th>Neither (#)</th>
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<tbody>
<tr>
<td><strong>Annual Attendance</strong></td>
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<td>less than 500,000</td>
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<td>more than 2,500,000</td>
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<td><strong>Developed Park Acreage</strong></td>
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<tr>
<td>Regular fantasy</td>
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<tr>
<td>Water park</td>
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<tr>
<td>Indoor theme park</td>
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<tr>
<td>(entertainment Center)</td>
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<td>Other (specify: )</td>
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<tr>
<td><strong>Park Location</strong></td>
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<td>North America</td>
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<td>South America</td>
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<td>Pacific Rim</td>
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<td>Other (Specify: )</td>
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<tr>
<td><strong>Visitation Pattern</strong></td>
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<tr>
<td>One time visit</td>
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<td>Multiple time visit</td>
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</tbody>
</table>
5. In your opinion, *Advantages* of concept A are:
   - 
   - 
   - 

*Advantages* of concept B are:
   - 
   - 
   - 

*Disadvantages* of concept A are:
   - 
   - 
   - 

*Disadvantages* of concept B are:
   - 
   - 
   - 

6. General comments on circulation layout in theme parks:
Appendix B

BRIEF DESCRIPTIONS OF SELECTED SURVEY COMPANIES

Backen Arrigoni & Ross, Inc.

Summary: Backen Arrigoni & Ross is a full-service, architectural, interior design and planning firm that has designed major site planning, TV and film facilities, housing, restaurants, wineries, offices and educational facilities. Major projects include work for Walt Disney Co. in Florida, Tokyo and Paris and George Lucas' Skywalker Ranch. The firm has four partners and a staff of 60.

Bruce D. Robinson

Summary: Bruce D. Robinson Architecture Design Inc. provides creative planning and design services to the international leisure and entertainment industry. BDRAD provides complete architectural, interior design, landscape, master planning, industrial design, graphics and signage design to create total entertainment environments. BDRAD projects include theme parks, waterparks, family entertainment centers, zoos and product design. The BDRAD team develops innovative and exciting concepts and makes them a reality.

C.T. Hsu International, Inc.

Summary: We specialize in master planning, architecture, interior design, landscaping for theme parks, attractions and leisure / hospitality. Clients include Walt Disney World, Universal Studios Florida, Florida Splendid China, the City of Orlando, Gardaland, Venezia Magica and many other international firms. We also offer full-service and design building.
Collins Entertainment Concepts

Summary: C.E.C. is a single source for consulting, design and fabrication for the entire amusement and leisure industry. We design theme parks, family fun centers, children’s fun centers, waterparks, museums and walk-through and ride-through attractions. We provide many services from pre-planning, various studies, design, theming, layout and design of specific attractions, dark rides, water flumes, lazy river rides and roller coasters. We design and produce all sorts of special effects, interactive exhibits and other visual displays. We also sell games, rides and other items, such as playgrounds and mini-webs.

David A. Price Associates

Summary: David A. Price Associates provides architectural, landscape architectural and planning services to a wide range of clients in the entertainment and recreational fields. The scope of services performed ranges from program analysis and preliminary design, to the preparation of working drawings and construction documents, as well as on-site supervision of construction. A highly qualified staff of supporting design talent and state-of-the art computer-assisted design equipment has been assembled to ensure optimum value for the design dollar.

Design & Production, Inc.

Summary: Design and Production, Inc. (D&P) is a full-service interpretive planning, design, engineering, fabrication and installation firm that, for 44 years, has provided exhibitions, shows, exhibits and world’s Fair pavilions for the entertainment and museum communities. Over the years, D&P has completed major projects throughout the U.S. and the world for clients including Walt Disney Imagineering, Universal Studios and Cedar Point.
DEVCO International, Inc.

Summary: DEVCO International, Inc. is a design/build consulting firm specializing in sports, recreation, leisure, resort, theme park and hotel/casino projects. Currently, DEVCO International, Inc. and its "world-class" associates are planning projects in Atlanta, Georgia; Hainan, People's Republic of China; Cape Verde Islands, West Africa; and the Victor Valley in San Bernardino County, California. These projects range from $100 million to over a billion dollars. Investor joint venture partners are currently being sought to participate. Each of the resort projects includes a minimum 27-hole Arnold Palmer P.G.A. golf course and, where possible, a Palmer International Academy of Golf.

Duell Corp./Designers of Entertainment Enterprises

Summary: The following are operating parks, designed in total by Duell Corp.: Six Flags Over Texas; Six Flags Over Georgia; Astroworld; six Flags Magic Mountain; Six Flags Great America; Hersheypark; Hershey Foods; Opryland, Nashville; Worlds of Fun, Kansas City; Carowinds, Charlotte; Libertyland, Memphis; Fun Factory Hawaii; and Tivoli Pier, Atlantic City. Duell Corp. has also been involved in the planning and design for these overseas parks; Reino Adventura, Mexico; Mosul Park, Bagdad; Whimsey, Hong Kong; Dunia Fantasi, Jakarta; Nippon Space Center, Japan; and Parc Asterix, France.

Ellerbe Becket, Inc.

Summary: Ellerbe Becket is the largest architectural and engineering company in the United States, with five offices throughout the U.S., and one office in Tokyo, Japan. The Leisure Entertainment division specializes in master planning, architecture, engineering and interior design. Recent project involvement includes Universal Studios Florida, Wakayama theme Park in Japan and the Wonderful World of Oz. Contact Gerald Simons or Jon Pugh.
HHCP Design International, Inc.

Summary: HHCP Design International is a 75-person international firm, specializing in the planning and creative architectural design of leisure projects beginning with land planning and conceptional master land use plans, through schematic design development. Well know projects include Disney American Adventure Pavilion, Sea World's Shamu stadium facility (Orlando), Fantasy Island-Sentosa Water Paradise (Singapore), Khimky City Park (outside Moscow), the Kia Pavilion at Expo 93 (Seoul, Korea) and the major new marine, sea-life park on Awaji Island, Japan.

Heery International, Inc.

Summary: Heery International, Inc. is a firm of architects, engineers and construction managers providing professional services to all areas of the theme park and waterpark industries around the world. Services range from master planning through design and construction management. Heery is headquartered in Atlanta and has offices throughout the United States.

Lifescapes, Inc.

Summary: This is an international theme park and resort landscape/architectural firm, specializing in creative and innovative designs. The firm is a state-of-the-art company, with design services fully operational on a CAD system, and principal involvement at all stages of project development. Some of out work includes Sea World in San Diego, Knott's Berry Farm, the Mirage Casino Resort and Treasure Island.

Dr. Larry L. Neal/University of Oregon
School of Architecture and Allied Arts

Summary: Leisure/Tourism is an off-shoot of the international network of leisure academic worldwide and practicing professionals involved in the theme park operations; namely-manage-ment and the sustained productivity of park operations' per-sonnal/year-round and
seasonal), international research, tourism destination promotion and environmental considerations in theme parks and other venues.

Planning Resource Group, Inc.

Summary: Planning Resource Group, Inc. (PRG), a planning and landscape architectural design firm, was created by the former Director and Chief landscape Architect for Disney and a team of several other talented professionals, committed to providing specialized and personalized services. PRG focuses on creating environments for public usage. The team at PRG has experience in a full range of planning, project programming and design services for hotels, interior-scaping (atriums, water features, etc.), planned-use developments, destination resort and convention facilities, parks and recreational facilities, theme parks and other projects for the leisure industry.

RTKL Associates, Inc.

Summary: We are architects, planners and landscape architects with emphasis on environmental graphics. We provide master planning, site development feasibility studies, architectural design and full-service graphic design to clients on an international basis. We have U.S. offices in Baltimore, Washington D.C., Dallas and Los Angeles. Our international offices are in Tokyo, London and Guadalajara, Mexico.

Sasaki Associate, Inc.

Summary: Sasaki Associates, Inc. is an international planning and design firm that provides consulting services to both public and private clients. Based in Watertown, Massachusetts the firm offers 40 years of experience in resort, recreational and entertainment-related developments. Sasaki's comprehensive services include planning, architecture, landscape architecture, urban design, civil engineering, interior and graphic design services.
Schrickel Rollins & Assoc., Inc.

Summary: Schrickel Rollins & Assoc. is a 40-member firm, specializing in park planning, civil engineering and landscape architecture. Since 1983, the firm has designed over 20 major waterpark rides or attractions in Texas, Nevada, Tennessee, Florida and Puerto Rico. Amusement clients include Wet’N Wild, Six Flags Theme Parks, Inc., Plaza Acuatica, State Fair of Texas and the Dallas Zoo.

Sugimuns & Associates/Architects

Summary: We are designers, landscape designers and architectural consultants to the theme park and recreation/hospitality industry. We provide comprehensive design, planning and concepts for park theming; design upgrade and modernization of old attractions and themed areas; and children’s attractions. The firm has an established track record for creative design and successfully constructing and implementing designs, on time and within budget.

Wimberly Allison Tong & Goo

Summary: Wimberly Allison Tong & Goo is an architecture and planning firm with nearly half a century of experience specializing in the design of leisure and entertainment facilities. With offices in Honolulu, Newport Beach, London and Singapore, WAT&G has successfully completed projects in over 50 countries, including The Lost City theme park in southern Africa and the Grand Floridian Beach Resort at Walt Disney World in Florida.

Wyatt Design Associates

Summary: Wyatt Design Associates provides master planning, architectural design, interior design and environment and ride theming for the entertainment and museum industries.
Appendix C

A SAMPLE OF INTRODUCTION LETTER FOR THE SURVEY

Dear Sir,

As a graduate student of the Department of Landscape Architecture of The Ohio State University, I am writing a thesis regarding Cirulation Systems in Theme Parks. This study is a comparative analysis and evaluation of circulation systems in theme parks. Part of the methodology of the study is a survey of recognized experts in theme park design and planning. As one of these experts, I ask your participation in the survey.

Response to the survey should only take a few minutes. There are six groups of questions. Please feel free to give any comments on either individual question or the survey itself.

You may return the survey by fax at 614-292-7106, attn. Jot D. Carpenter, or mail to: Prof. Jot D. Carpenter, FASLA, Knowlton School of Architecture, The Ohio State University, 190 W. 17th Avenue, Columbus, OH 43210. Please return the survey before March 15, 1995.

This is thesis based research and all information will be kept confidential. No respondent’s name or firm will be identified in the thesis. All respondents will receive a summary of the survey result as my appreciation for their cooperation.

Thank you for your time and attention, your input is essential to the success of my study.

Sincerely,

Yumin Li
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