

WATER THEME PARKS:
Guidelines for Waterslide Developments

A Practicum

submitted to the Faculty of Graduate Studies
in Partial Fulfillment of the Requirements for the
Degree of Master of Landscape Architecture

prepared by

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BY

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Abstract

The aim of this study is to discuss the importance of recreation and to explore the concept of water based recreation. The general topic is Water Theme Parks with particular emphasis placed on the waterslide component and its various adaptations. This report will serve as an information source for planners, landscape architects and entrepreneurs interested in pursuing the concept of water oriented recreational facilities, in specific, waterslides.

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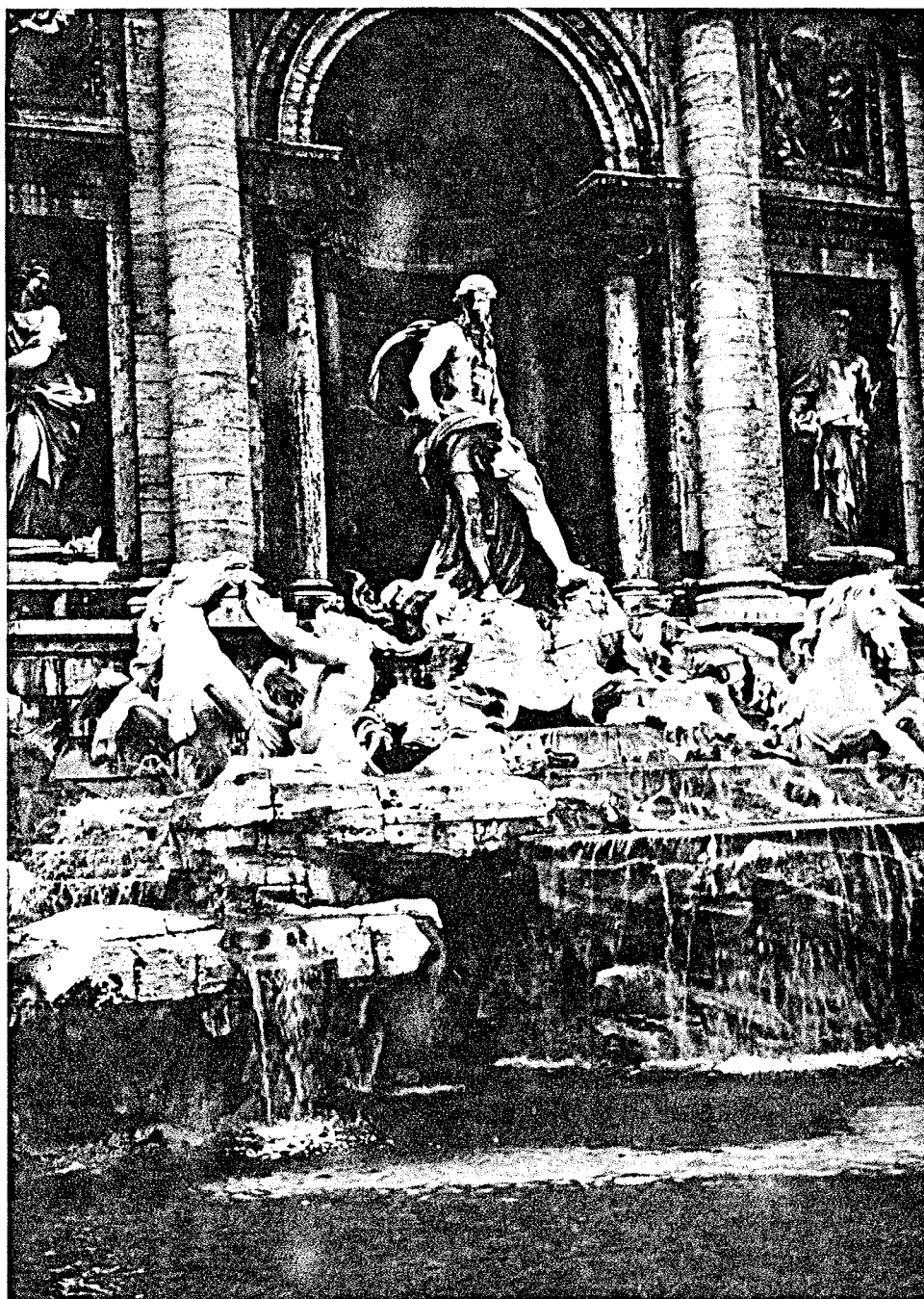
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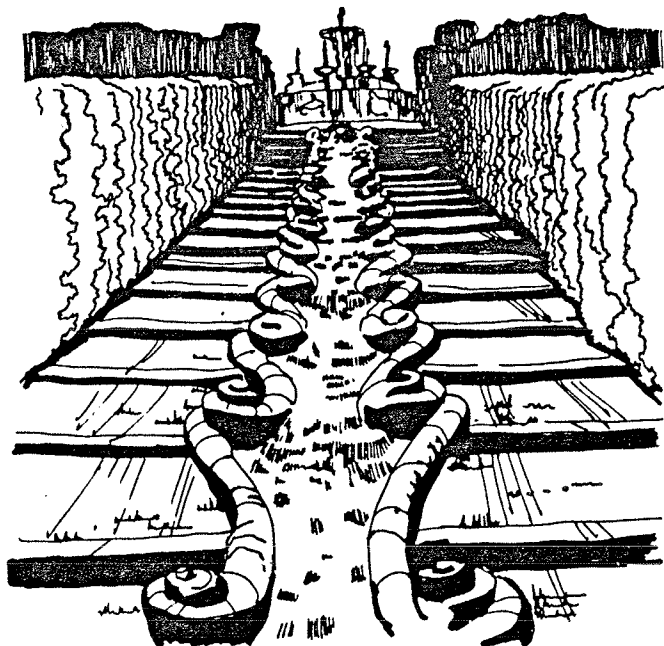
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1. INTRODUCTION : HISTORICAL USE OF WATER

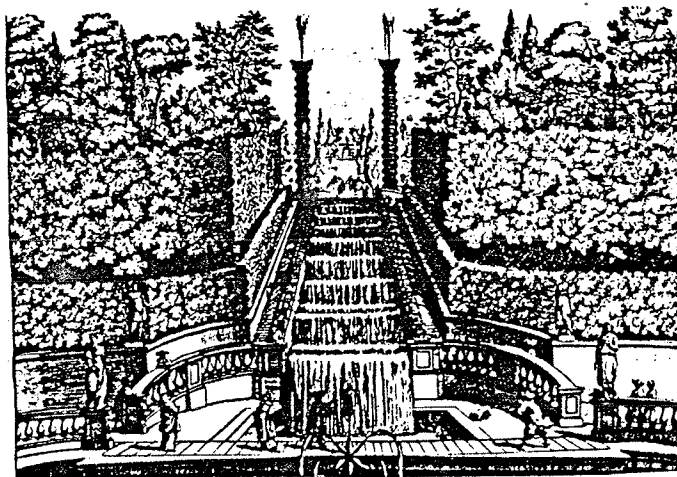


Trevi Fountain, Rome



2-27. Water channel at Villa Lante, Bagnaia.

fig. 1 Water Channel: Villa Lante, Bagnaia, Italy



... The Water Stairway Villa Aldobrandini. The columns spout water that travels downward in spiral channels around the face of the columns. (From Falda's *Le Fontane di Roma*, 1675)

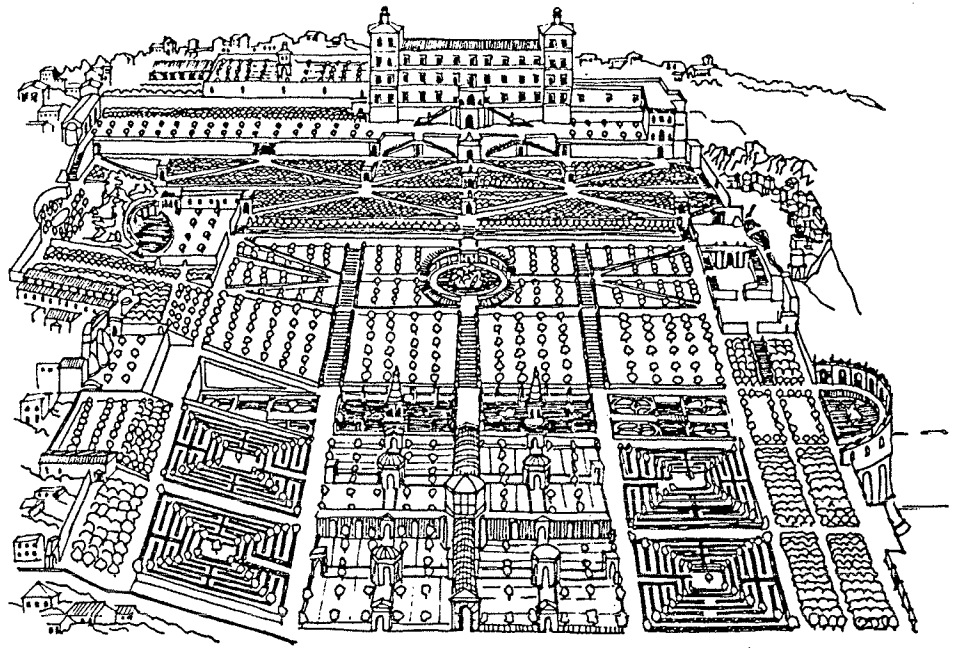
fig. 2 Water Stairway: Villa Aldobrandini, Frascati, Italy

1.0 INTRODUCTION: Historical Use of Water

Water has always been a fascination to man. Historically, he has had the desire to control and manipulate water. Poets and sculptors of the past created ideal images of water, rock and plant forms which gave form and quality to the environment. (fig.1 & 2)

Formal European gardens used shallow pools of water as reflecting pools to accent a building or landscape or to create a cool retreat. In ancient Egyptian gardens, decorative ponds and canals not only provided visual aesthetics, but also served as irrigation channels and storage ponds for raising fish. Garden ponds similar to the Egyptian water basins were constructed by the Babylonians and Assyrians. For example, the Hanging Gardens of Babylon, created by Nebuchadnezzar about 605 B.C., contained intricate irrigation conduits and decorative fountains.

The word "fountain" originally referred to a spring of water. Many springs in Greece were developed into very elaborate covered and piped fountains, often with temples built in close proximity. In Callirrhoe, Athens, a magnificent spring was built around 560-510 B.C. which directed water into nine outlets of bronze lion heads with water jetting from the mouths. The importance of water in Greece around 150 A.D. is revealed in the statement by Pausanians who proclaimed that no place deserved to be called a "city" that did not display a major fountain.¹ Pressurized



2-32. Villa d'Este, Tivoli in the 17th century.

fig. 3 Villa d'Este: Tivoli, Italy (p. 35 Campbell)

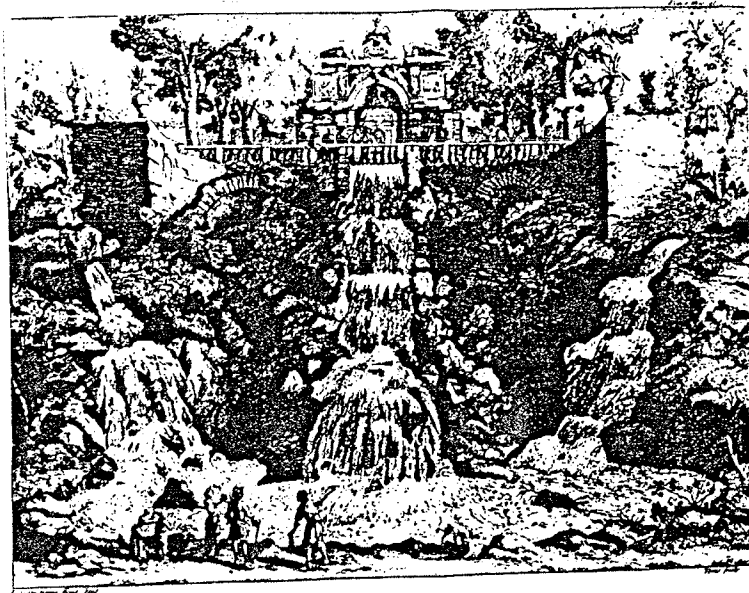


fig. 4 Water organ, Villa d'Este: Tivoli, Italy (p. 39 Campbell)

water systems, aqueducts, town squares, and ingenious fountains were built by the Hellenistic civilization which began with Alexander the Great. Many of the mechanical devices associated with fountains, including the practical jokes and water organs, originated in Hellenistic Greece. One famous Greek, Hero of Alexandria, illustrated the use of boiler steam and compressed air to open temple doors, make bird ornaments whistle, figures move, and trumpets blow. These devices were of a very complex hydraulic nature and were prototypes for other water gardens such as Italy's Villa d'Este in the 16th century. (fig.3 & 4)

Water was similarly a very important part of life in Ancient Rome. In the fourth century A.D. there were 1,212 public fountains, 11 great Imperial thermae (private bathhouses) and 926 public baths.² The origin of the Water Theme Park concept for recreational use can be linked to the days of early Rome. Water was used and displayed in many magnificent villas and public baths.

One important example of this form of "water park" was the "Aqua Sulis" of Bath, England constructed by the Romans around 54 A.D. This public facility had a huge hot bath 80 feet in length, 40 feet wide and almost 6 feet deep. The "King's Spring" and two other naturally heated springs, supplied water at a half million gallons per day at a temperature of 120° F (48° C)³ A circular pool 33 feet in diameter, the King's Bath, and two smaller rectangular baths, completed this remarkable public bathing establishment.

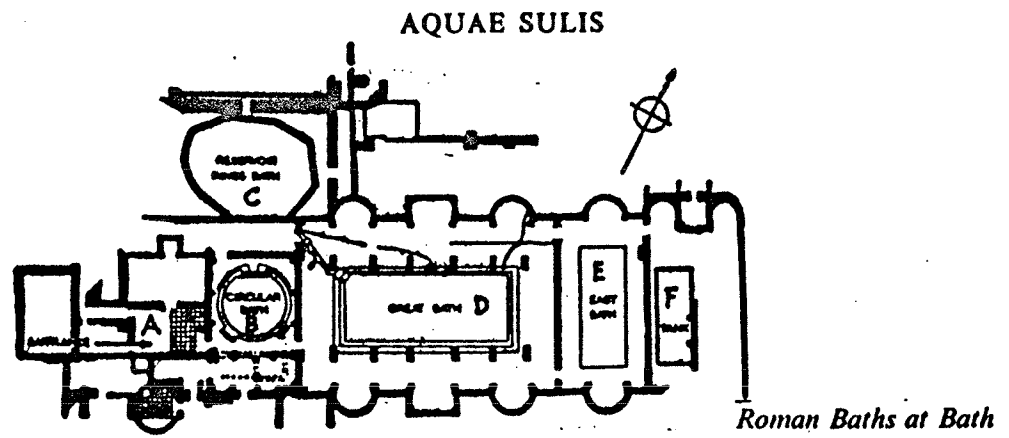


fig. 5 Plan of Aquae Sulis: Bath (p. 19 L. Wright)

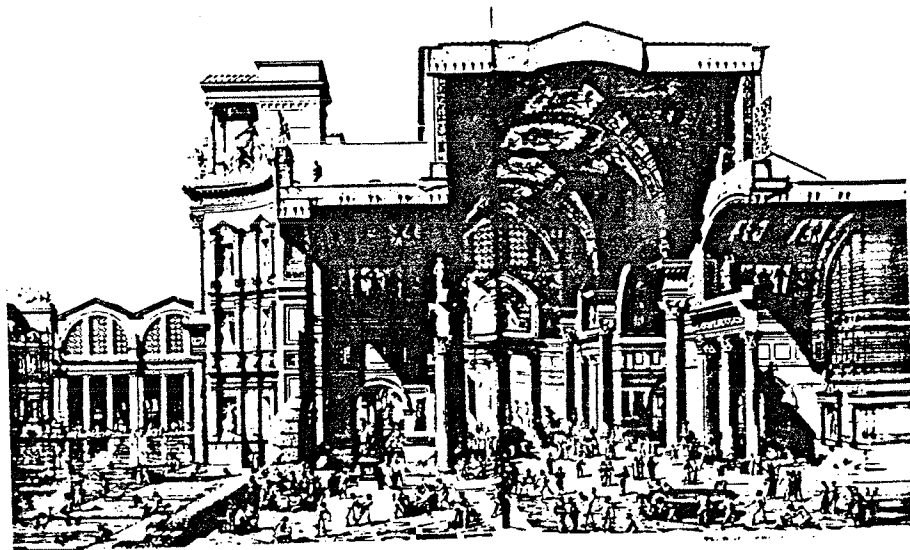


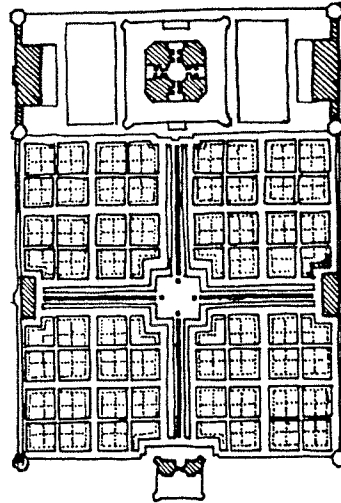
fig. 6 Aquae Sulis: Bath (p. 22 & 23, Butti)

(fig.5 & 6)

The Roman bath was the focus of communal life. Public bathing was considered a basic social duty. The size and splendor of the public baths can be seen in the Baths of Diocletian, Rome. This Water Theme Park was reported as being capable of serving 3,200 people at one time.⁴ Plunge baths, steam baths and shallow cold baths for use after the series of hot and tepid baths, were all a part of the bathing experience.

Outside of Rome, lavish villas were built for Roman aristocrats and rulers to escape the summer heat and congestion. Many of these villas contained pools, fountains, baths and decorative canals. One such villa was Hadrian's villa at Tivoli constructed from 125 to 136 A.D. Here a vast complex of baths and pools were utilized for leisure and recreational use. Some private villas even provided small baths suspended by ropes from the ceiling in which the patron, usually an Emperor, could rock and roll. These "pensiles balneae" show man's desire to fully experience the movement and feel of water.

The Islamic cultures established the fine art of using a minimum amount of water to maximize its advantages. Their successes are seen in the gardens of India, Pakistan, the middle East, northern Africa, Spain and Portugal. Water was usually the main feature of their garden designs with religious symbolism apparent in each. In the traditional Persian garden, four essential elements were included:



2-5. Plan of Taj Mahal gardens.

fig. 7 Taj Mahal Gardens: Agra, India. (p. 19 Campbell)

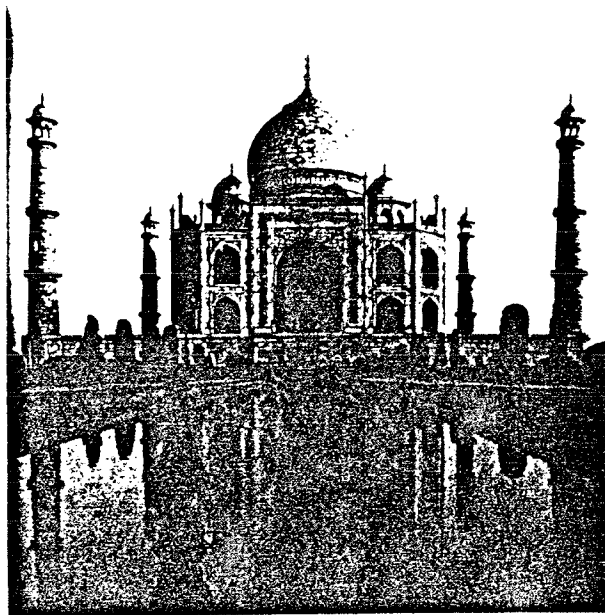
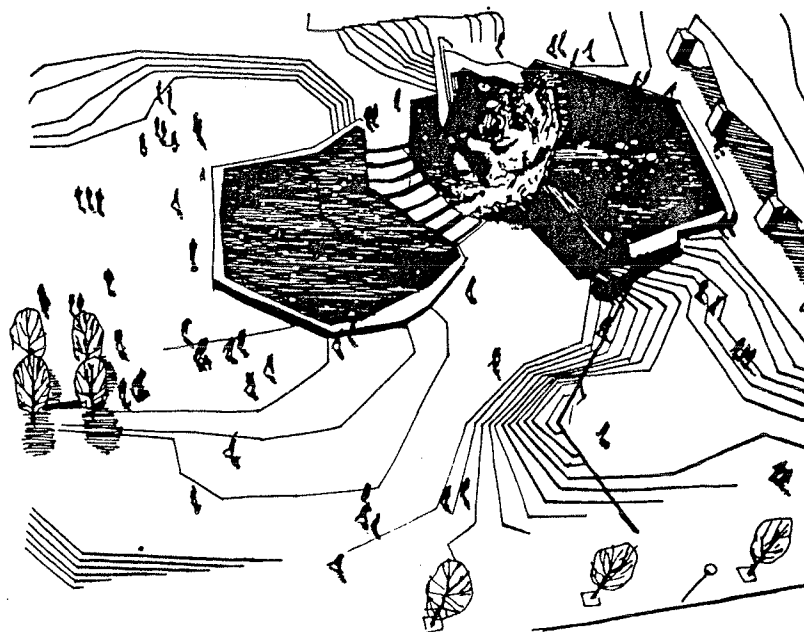


fig. 8 Taj Mahal: Agra, India (p. 87 Travel & Leisure)

water, shade trees, flowers and music. The water created sounds, provided visual aesthetics and was also used for irrigation. The source of water was abundant mountain springs. The water was stored in large tanks or holding ponds and channeled down through various levels of terraced gardens into rectangular pools with jets in the shape of lotus buds. Two of the Persian water gardens still in use today are Archibal and Verinag near Lake Dal. These were constructed in the 17th century and display the extravagant use of water in features like the great cascade of 70 feet in width. These water palaces along Lake Dal were called "baghs" and were adorned with terraces, falls, pools, various water features and flower beds. Shalimar Bagh and the Taj Mahal garden are other examples of the extensive use of water. (fig.7 & 8)

Man's association with water has never been a passive one. From the days of ancient Rome to modern Japan, public baths have been social centers for people to meet, talk and be among one another. Today our socializing is still hinged on being with other people, to watch and be watched, and to meet and interact. In addition, modern man remains fascinated by water as indicated by the focus upon urban fountains and ornamental pools. (fig.9) The equivalent of yesterday's public baths and villas can be seen in today's contemporary Water Theme Parks. The prolific use and display of water lures people into experiencing the sight, sound, feel and movement of the water.



3-10. Lovejoy Plaza and Fountain, Portland, Oregon, Lawrence Halprin & Associates.

fig. 9 Contemporary Urban Water Feature: Portland, Oregon
(p. 55 Campbell)

Water has continued to play an important role in our lives from ancient times to today. We have gone through various stages of using it extravagantly and proudly, to capturing it and conserving it. Water has been used for accent, cooling, storage, display, socializing, leisure and recreation. Today we bathe in it, drink it, look at it, play in it, and use it in one way or another every day. The following chapter explores the qualities of water and how we can experience its beauty.

2. WATER: ITS QUALITIES & OUR ATTRACTION TO IT



Oregon Coast

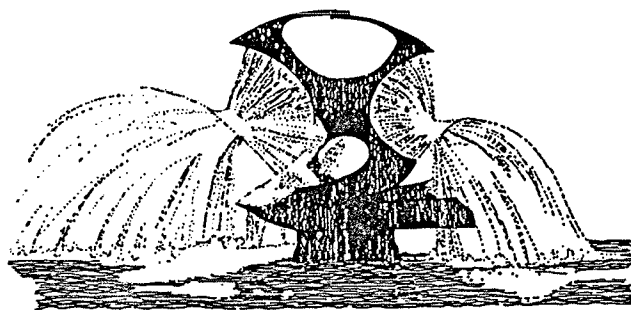
2.0 WATER: Its Qualities & Our Attraction To It

Water is one of the most vital elements to basic life.⁵ We are dependent upon air, sun, soil and water and cannot live with any of these elements missing.

Water is perhaps one of the most beautiful and intriguing elements of all. With its ability to change in color, form and movement, water becomes somewhat mysterious and unpredictable. Its richness in diversity is appealing and inviting to the human eye. Water's ability to change from calm to excitement, and gloom to brilliance, gives it a sense of character and personality.

Water goes through various stages of freedom, movement and captivity. As a spring it jumps, spurts and gurgles. It then moves into a stream flow and into a river until it is captured in a lake or pond or even the ocean. Water can also be put to work in irrigation channels, reservoirs and turbines. It can be formed into pools and basins and forced through fountains and sprinklers to create a variety of exciting shapes. Consequently, water can assume many different personalities. It can be calm, tranquil and peaceful or extravagant, magnificent or even devious.

Water has many qualities. These include appearance, variety, intrigue, presence, movement, color, absorption, reflectance, unity, sound and feel. The following descriptions further explore these interweaving aspects of water.



3-40. Kinetic Sculpture Fountain by Naum Gabo, London, England.

fig. 10 Water Movement (p. 67 Campbell)

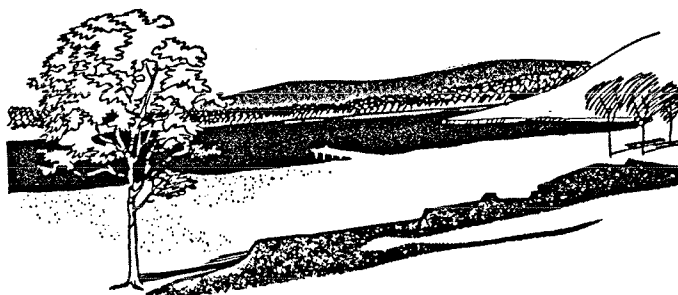


fig. 11 Water Color (p. 235 Litton)

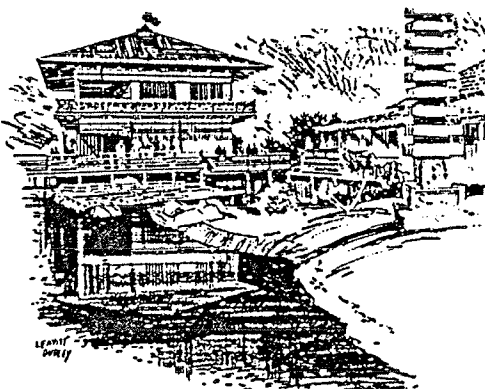


fig. 12 Water Reflectance (Leavitt Dudley)

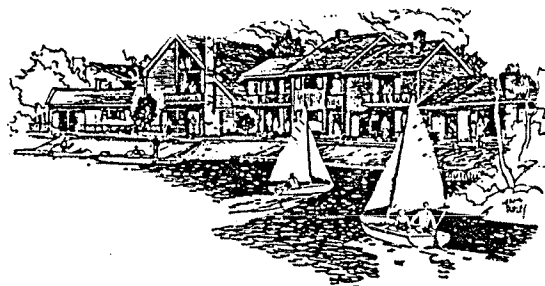


fig. 13 Water Variety (Leavitt Dudley)

Movement: Water in movement is a most exciting quality. It is a visible discharge of energy. Movement creates sounds ranging from a gentle trickle to a loud powerful roar.

The natural forces of wind and gravity act upon water, giving it life and character. Water movement can be seen in rapids, waterfalls, streams, rivers, chutes and cascades. Water can ripple, wave, bubble, churn, roll and meander. Mechanical forces can also create water movement in fountains, falls and channels. (fig.10)

Color: Water by itself is colorless. It does, however, have the capacity of taking on color through suspended material, bottom composition or container color, turbidity, reflection of surrounding objects, shade, sun and sky. (fig.11)

Reflectance: Water is nature's mirror of the landscape. Inverted images appear on the surface reflecting the surroundings. (fig.12)

Variety: Water can express variety through its movement, color, reflectance and the form of its edges or container. Variety provides richness and visual stimulus to the

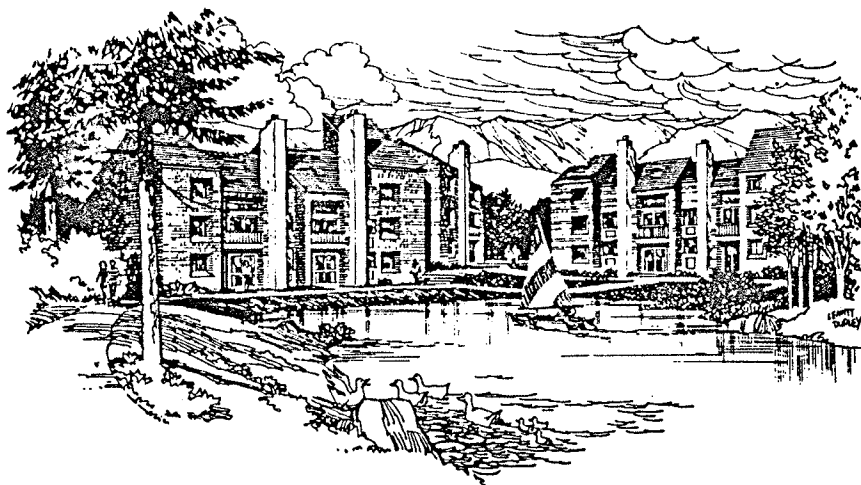
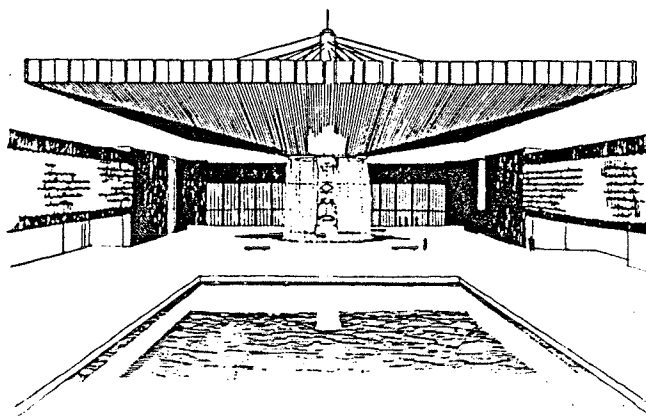


fig. 14 Water Sound (Leavitt Dudley)



3-18 Water as a focal point: Central Patio, National Museum of Anthropology, Mexico City, Pedro Ramirez Vázquez, architect

fig. 15 Water as a Focal Point (p. 58 Campbell)

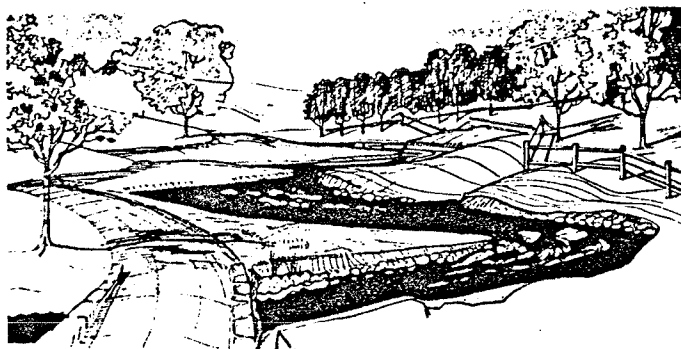


fig. 16 Water Unity (p. 203 Litton)

observer. (fig.13)

Sound:

A multitude of sounds can be produced by water as it flows over and around obstructions, as it falls over rock and sprays in the air. Water crashes into the shore in huge waves and laps gently on pond edges. It gurgles and trickles or splashes and foams. The sounds of water add life and vitality to a space. (fig.14)

Focus:

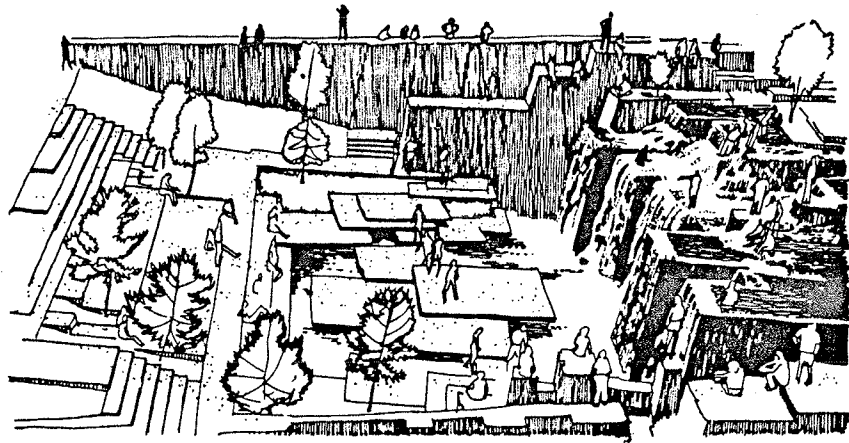
Water can be used in the landscape as a focus or accent. It can be a contrasting element to accent a building or view, and it can also serve as a linking element from one space to another. (fig.15)

Unity:

Water can be a unifying element through the continuity and cohesiveness of form, image or sound. It can have unity in movement as in a stream and unity in a calm state as in a lake or pool. A stream or a river can change its character many times within its course, but it maintains its unifying quality by its continuity. (fig.16)

Feel of Water:

One of our deepest needs in our sensory experience of water is to feel it. We have a natural urge to look, listen to, and physically touch that which we explore. If we cannot experiment or play with an object,



3-9. Auditorium Forecourt Fountain in Portland, Oregon, Lawrence Halprin & Associates.

fig. 17 Feel of Water (p. 55 Campbell)

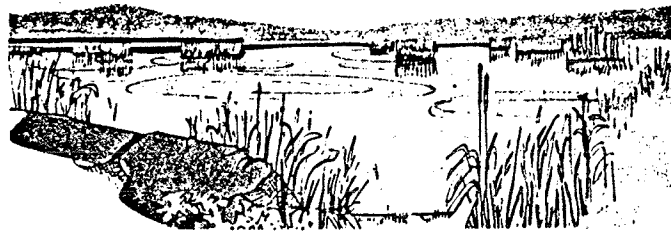


fig. 18 Water in Repose (p. 226 Litton)

we are cut short of totally experiencing it. Who can resist, on a hot summer day, dangling weary, hot feet into a cool pond or gently spraying fountain. (fig.17)

Water in Repose: Calm waters are usually associated with contemplation, meditation, poetry and music. Quiet ponds, pools and lakes are settings for love or laziness, a place for recharging and rejuvenating the inner self. (fig.18)

The numerous qualities of water make it a unique and irreplaceable resource. With its charm and interest, water captures the attention and fascination of many unsuspecting viewers.

Equally important, water also plays a vital role in a diverse range of recreational pursuits. We swim, ski, sail, snorkel, scuba dive, wade, and play in water to our heart's content. One of the most enjoyable things to do with water is play in it. As G.A. Jellicoe said: "Water as a plaything is like nothing else on earth."⁶

The following chapters explore how we are using water as a "plaything" in our leisure time today. Attention is focused on contemporary water-based recreation facilities. It is important, however, to first discuss leisure and the value of recreation in our society.

3. LEISURE & RECREATION:

THE IMPORTANCE OF THE RECREATION
EXPERIENCE



Shek Lei, Hong Kong

3.0 LEISURE & RECREATION: The Importance of the Recreational Experience

- A. Leisure - derived from the Latin word "licere" meaning to be permitted, also derived from the French word "loisir" meaning free time.⁷

Leisure constitutes freedom of time and attitude, freedom from work and a free will. Leisure is a block of time in which a person is able to do what he or she chooses - to create, to play, to seek enrichment and satisfaction. As Socrates said, "Leisure is the best of all possessions."⁸

Leisure is the time that an individual has to dispose of in whatever way he or she sees fit. What a person does during leisure time affects what he or she is or becomes.⁹ It reflects their interests, personality and character. Leisure is almost always thought of with a very positive attitude and it is assumed that there will be a reward or benefit from it.

Leisure can be used for relaxation, activity, release, or passive enjoyment. Relaxation as a form of leisure is the temporary cessation from exertion. Most people need to stop their work at some time during the day and try to relax. Leisure can thus be used as a time for recuperation, for a renewal of self.

Activity as a form of leisure is always chosen for enjoyment. The selected activities allow improvement of a person's abilities resulting in pleasure and enjoyment. A person who has taken part in renewal or rejuvenating leisure

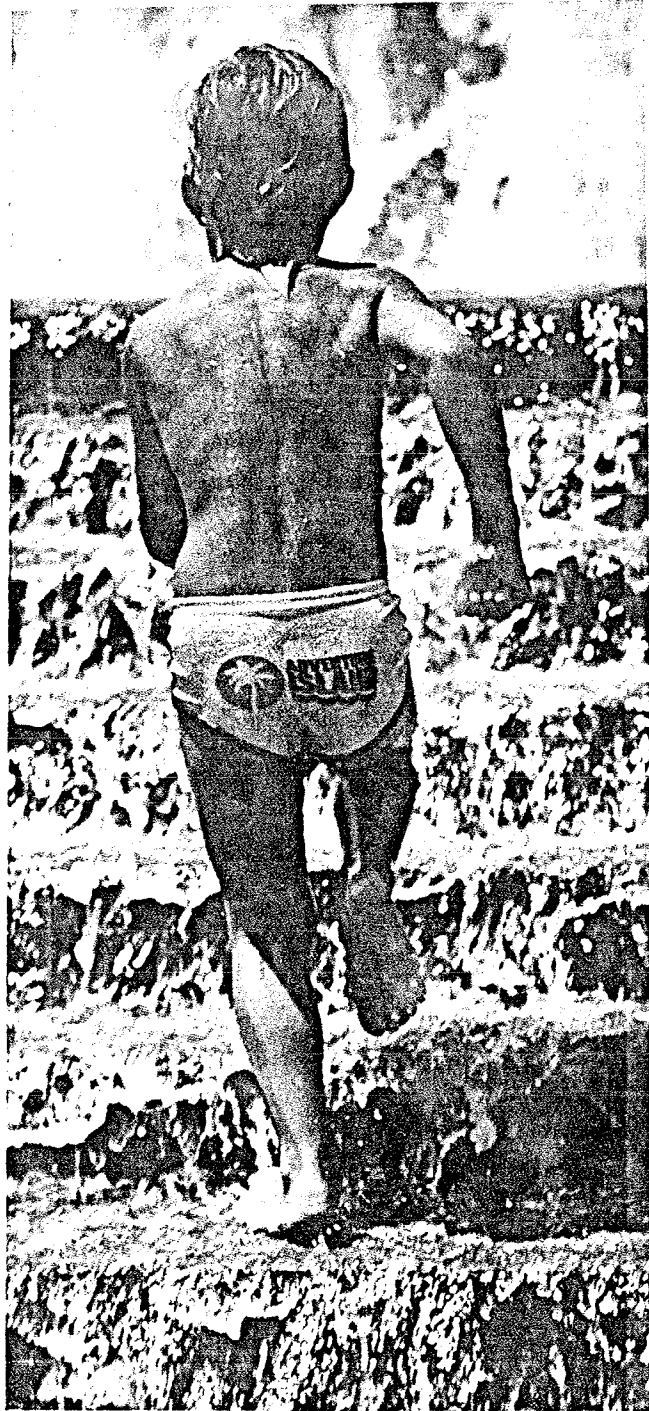


fig. 19 Leisure Activity

activities discards the frustrations of the day, becomes refreshed and looks forward to new experiences with heightened energy and enthusiasm. (fig.19)

In brief, leisure can provide many opportunities for satisfaction and fulfillment. When individuals learn to regularly free themselves from the cares and responsibilities of daily life, they can begin to discover new and refreshing experiences that enhance the quality of life.

- B. Recreation - derived from the Latin word "recreatio" meaning restoration and recovery.¹⁰

Recreation is any activity or experience that is chosen voluntarily for pleasure or to satisfy certain personal needs.¹¹

The word recreation can be read as re-creation, to re-create oneself physically, psychologically, spiritually, or mentally, to become refreshed and enriched. Recreation allows individuals to become revitalized and ready to cope with daily trials and routines. Recreation can also be considered a crucial and integral part of human existence that is woven through and around other human activities such as working, learning, performing social duties, eating, drinking and sleeping."¹²

Recreational activity is increasingly being recognized as an important feature in enhancing a person's life. There is great value in spending leisure time in some form of recreational pursuit. Recreational experiences are those activities which are voluntarily entered into for pleasure during leisure.¹³ Recreational experiences aim to restore the individual to a state of well-being. These activities can be spontaneous and provide the freedom from constraints of everyday life. The participant has the opportunity to learn, develop skills, to enhance the sense of personal worth and to discover potential.

The recreational experience also encompasses a broad continuum of diverse activities. This can range from a



fig. 20 High-Use, Man-made Recreation Facility: "Wild World",
Largo, Maryland

wilderness experience in backpacking to participating in a high use, man-made facility such as an amusement park. Recreation can therefore mean many things to many people.

The aim of this study is to focus on the segment of the continuum that deals with man-made indoor and outdoor water-based recreation facilities. (fig.20)

3.1 Trends

"The trend toward personal health and fitness is increasing."¹⁴ Accordingly, activities that maintain health and provide social contacts should receive greater emphasis. Ten years ago Canada was rated as one of the least fit nations in the world. Today jogging, aerobics and fitness centers are common leisure time activities. The PARTICIPaction movement has played an important role in increasing the public's awareness of the importance of personal fitness.

The PARTICIPaction Organization is an independent, non-profit organization devoted to the promotion of physical activity and fitness in Canada. It is a communications agency which uses innovative mass-marketing techniques to promote positive behavioral changes of lifestyle to improve the health, vitality, self-image and social environment of the country. PARTICIPaction has had tremendous influence in transforming the fitness issue into a major national campaign. Today in urban and rural areas the message presents fitness in a positive and reinforcing image.

Canada's growth rate has been estimated to reach 11% over the next decade.¹⁵ This means from 1981 to 1991, an increase from 24.3 million to 27 million is expected. It has also been estimated that by the end of this century, 90% of the population will live in major urban centers.¹⁶ The implications of this are that as population growth increases,



fig. 21 Entertainment Park: "Kings Island", Ohio (p. 39 Finlayson)

the demand for recreation opportunities will rise proportionally and that land for urban parks and recreational developments should be designated now.

In the past, urban parks were designed as passive, self-entertaining places where resting, reading, picnicking and suntanning were the common types of activities pursued. The occasional frisbee or ball throwing games were the most active types of endeavours. Recently, studies on the non-use of public parks reveal that this type of leisure time amenity is no longer appropriate in today's society.¹⁷ People are looking for more active entertainment parks that stimulate the senses and provide a diversion or means of escape from the pressures of the real world. (fig.21)

Automation and technological changes influence our lifestyle by decreasing the amount of physical exertion required to complete daily tasks. This creates a need for recreational facilities that encourage active participation. Racquetball, tennis clubs, health and fitness spas, amusement and theme parks continue to increase in popularity. People spend significant amounts of their incomes on these types of activities.¹⁸ Individuals, however, are also becoming more cautious of where and how they spend their discretionary money. People seek quality recreation facilities where they get the most value for their dollar. This means families will choose the type of recreation facility that accommodates the needs of each family member. Individuals will choose the type of facility that has variety and entertainment that will



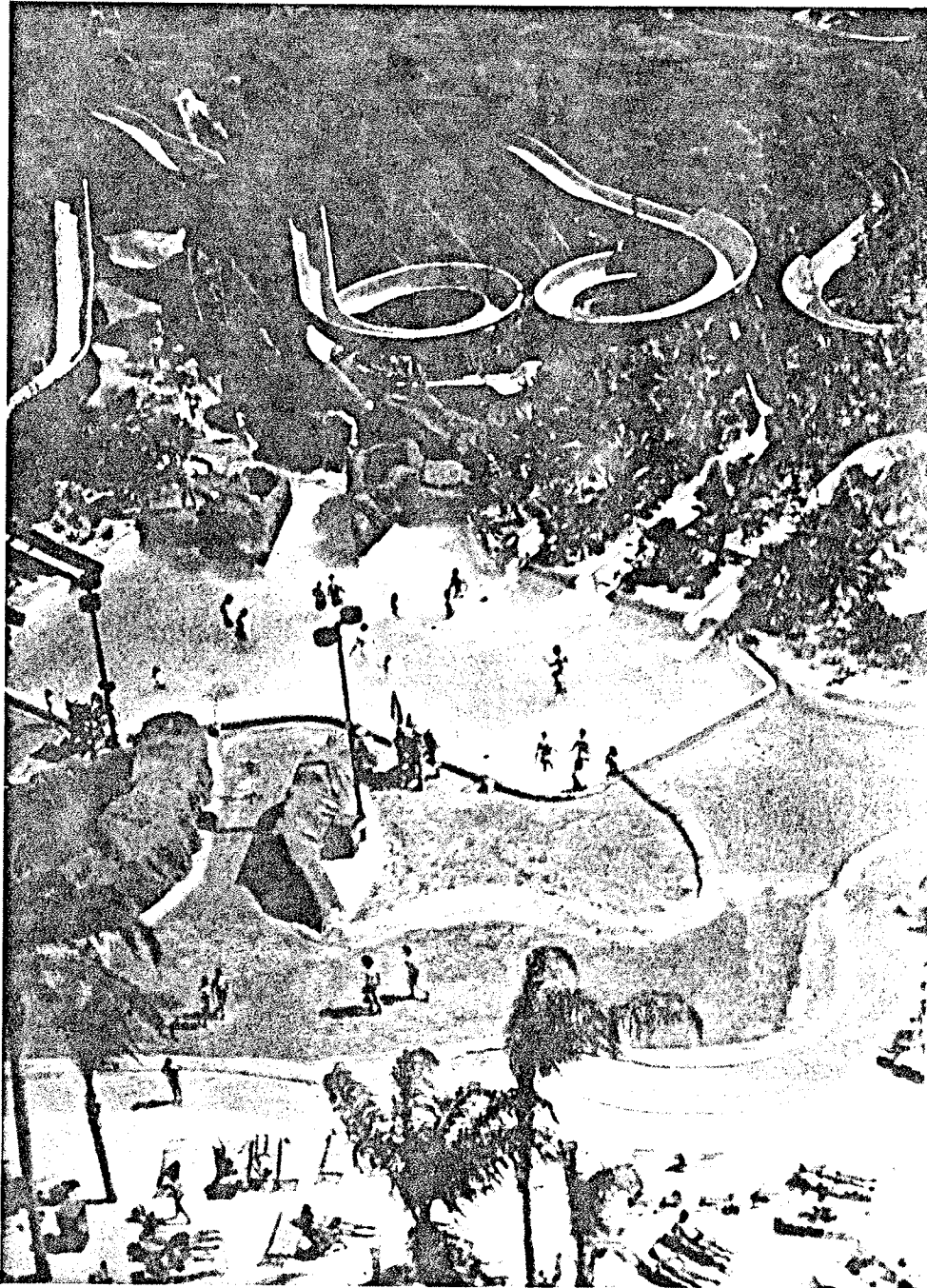
fig. 22 Water Theme Park: "Wet'n Wild", Orlando, Florida

satisfy various leisure needs and desires. What is needed is a comprehensive family entertainment park that offers passive and active recreational features for people of all ages. This area is where Theme Parks can play an important role. They can offer a variety of recreational amenities to entertain people of all ages. Time spent at a Theme Park can range from a short two-hour visit to an all-day event. It can be an ideal destination park that offers overnight accommodation and food services, or it can be a local attraction in the center of a city.

Theme Parks range from zoos and safaris to amusement parks with giant roller coasters and exciting mechanical rides. The theme can be educational in nature or recreational and fitness oriented. One of the most popular Theme Parks in Europe and the United States is the Water Theme Park. These vary in size and character but are all based on various forms of water recreations. (fig.22)

The following chapter reviews these specific water-based recreation activities and describes the concept of the Water Theme Park with its various components.

4. WATER THEME PARKS



Adventure Island, Tampa, Florida

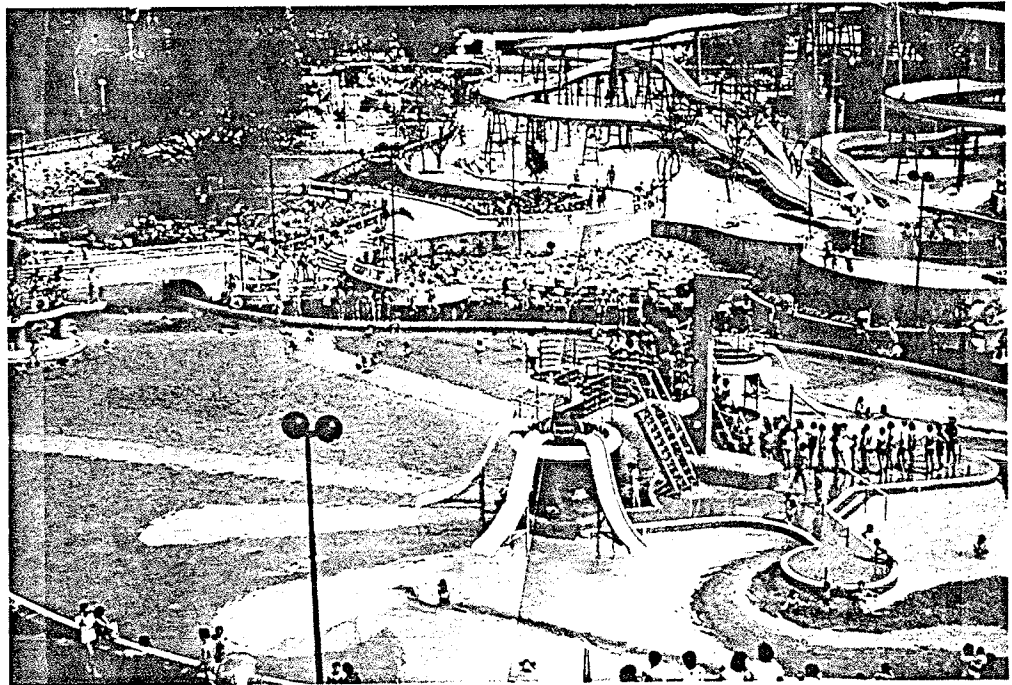


fig. 23 Leisure Pool: "Ocean Park", Hong Kong

4.0 WATER THEME PARKS

Modern society remains as fascinated with water as the early Romans and Greeks. The increase of leisure opportunities and recreation needs will continue to generate this fascination for water-based facilities, in particular Water Theme Parks.

Urban-based recreational amenities have been changing significantly in the past five years. Traditionally a swimming pool was the main component of an urban-based recreation amenity. The swimming pool was invariably designed primarily for competition swimming. As a secondary use the pool was open to the public for recreational swimmers. Research has shown that in most public training pools the average recreational swimmer uses the pool for twenty minutes or less and leaves the facility promptly after. These conventional air-tight, light-proof, rectangular pools do not have the type of environment that is conducive to fun, relaxation or leisure.

The concept of leisure pools is rapidly gaining popularity in Canada and the United States. It originated in Europe with free-form pools that offer generous shallow areas for water play and adequate deck space that allows patrons to sit, lie, socialize and spend more time relaxing and enjoying the activities.¹⁹ (fig.23) The pool environment is accented with natural light, tropical plants, music, deck chairs, color and pattern. Water jets, water slides and hot tubs are



fig. 24 Wave Pool: Southland Leisure Center, Calgary, Alberta

typical recreational amenities offered at a leisure pool. The pool itself is often a wave pool that produces artificial waves generated by compressed air in a wave-making machine. (fig.24) Fifteen minute intervals of waves followed by fifteen minutes of calm waters creates a most unique swimming experience. Waves crashing into the shallow end of the pool (zero depth) simulate the visual and acoustic qualities of a beach resort setting.

Leisure pools cater to family users and passive recreators much more successfully than the conventional training pools. This concept of leisure pools has in fact been so successful that it has expanded into the development of entire parks that focus on water-based recreation. These Water Theme Parks are rapidly becoming one of the most popular recreational amenities in the world. Places such as South Africa, Mexico, Holland, France, the United States and Canada have developed imaginative and delightful Water Theme Parks.

A Water Theme Park can be described as "an innovative combination of water oriented activities which emphasize active participation. Typically, the three major recreation components in the Water Theme Park are a wave pool, various types of waterslides, and a children's water play area."²⁰

A wave pool or waterslides often serve as the anchor attraction of a Water Theme Park. A wave pool can draw visitors from a primary market of regional scale, and can handle a high capacity of users. It also has a significant

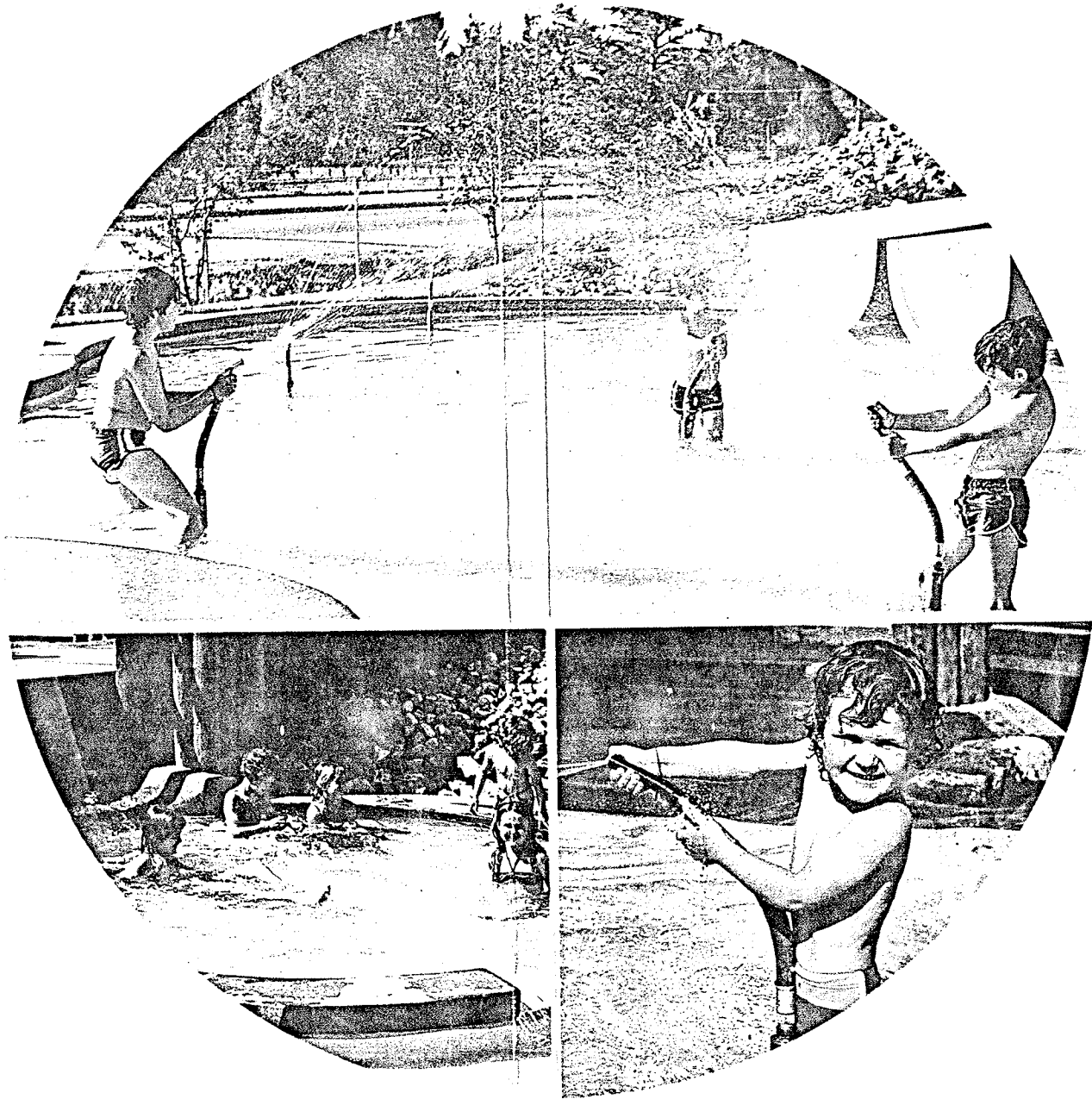


fig. 25 Childrens Water Play Areas: "Wild Waters", Kelowna, B.C.

impact on visitors' length of stay which is a positive feature in Water Theme Parks.

The waterslides are a unique facility that entertain people of all ages. They have the distinct advantage that they can be added in increments and in various forms as additional capacity is required. They can be arranged in a variety of configurations: spiral slides, straight speed slides, drop slides, tube slides, ramp slides, and inner tube slides. The straight slides are often called Kamakazie or Bonsai slides and the inner tube slides are usually called the River Ride.

Children's play areas are basic components of a Water Theme Park as they reinforce the appeal of the park to the family market. Facilities often provided are water guns, water jets, fountains, splash pools, small slides and various types of playground equipment. (fig.25)

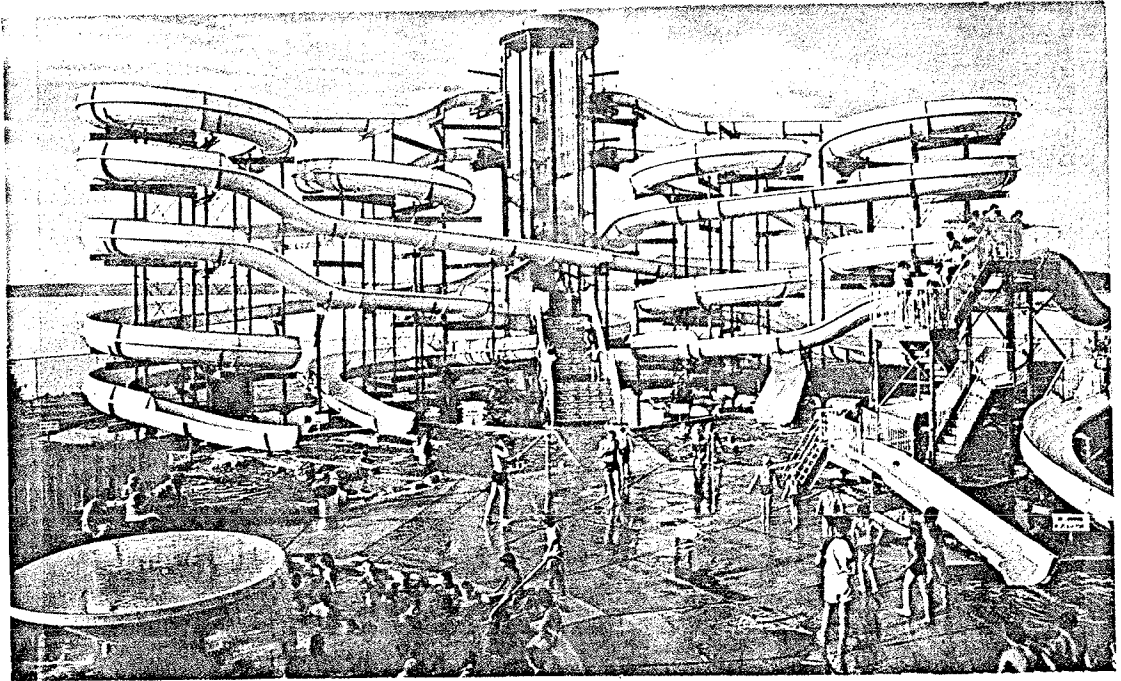
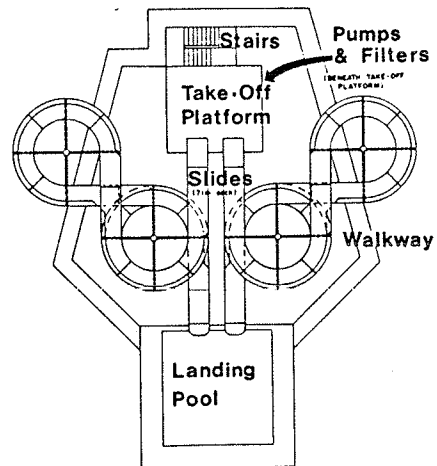
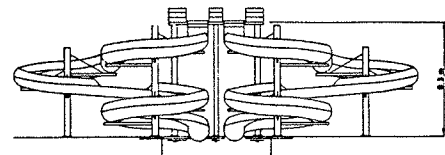


fig. 26 Waterslides: "Wild Rapids", Sylvan Lake, Alberta



PLAN



ELEVATION

fig. 27 Typical Waterslide Layout (Big Country Waterslides, Vernon, B.C.)

4.1 Water Slides

Waterslides are the most common anchor attraction at today's Water Theme Parks. "A waterslide is a recreational device which incorporates a flume of fibreglass construction. The flume is elevated at one end with a fall of approximately one in ten. The flume can vary in length to whatever the designer or owner desires. It can be straight, or curved to fit the landscape. The flume is flooded with water at the top end to a depth of approximately 3 inches and the water cascades down the flume and carries with it the patron waiting to participate in a thrill ride."²⁴ The molded fibreglass units fit together in many different ways to form varying curves and dips. (fig.26) The flumes are smoothly contoured and range from 8 to 12 feet in length and are 3 1/2 feet wide. In cross-section they are U-shaped and approximately 3 feet deep. (fig.27) Water pumped down the flumes is usually 2 1/2 to 3 inches deep and ranges in temperature from 78° F to 82° F (25.5° C to 27.7° C). The water is captured at the bottom of the slides in a landing pool and is recycled through filters and heaters and is pumped back up to the top of the slide. The length of run varies from 300 feet to 500 feet with an overall vertical drop from the top of the slide to the landing pool ranging from 30 to 60 feet. In terms of user capacity, each slide can handle approximately 450 sliders per hour.

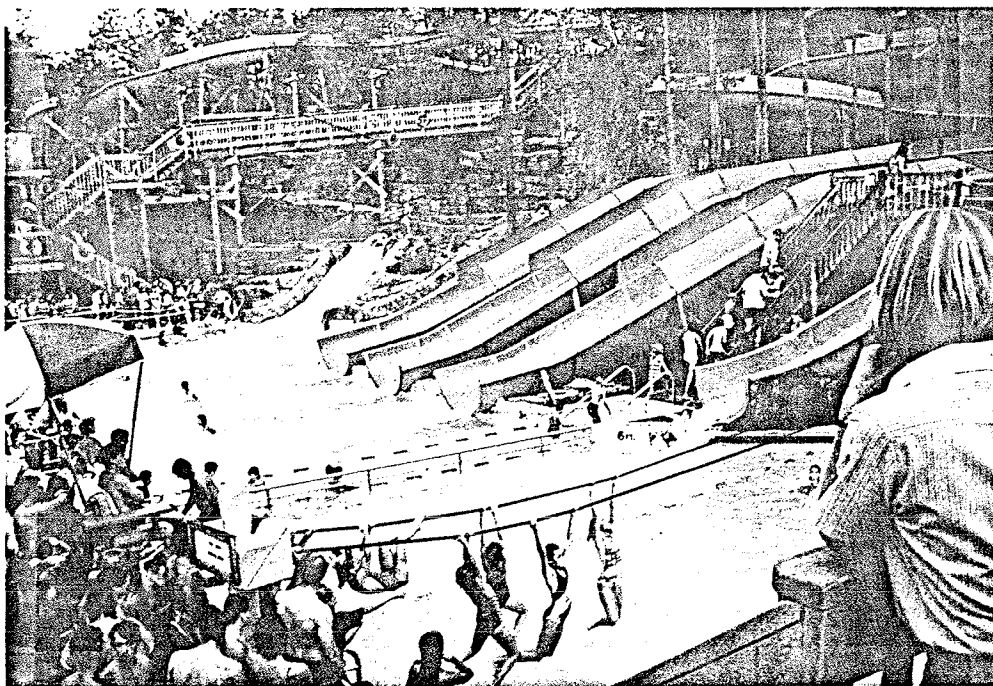


fig. 28 Waterslide Park: "White Water Atlanta", Branson, Missouri

4.1.1 Origin of Waterslide Concept:

In North America the waterslide concept originated in the United States and progressed to Canada along the West Coast to British Columbia. (fig.28) The Okanagan Valley became the hot spot for outdoor waterslides as it is a very popular tourist area in the summer. The fad then took hold in eastern Canada where there is a higher population base and more potential users. This is where the all-encompassing Water Theme Park/Family Recreational Park, really became established in Canada. With more people and money to support a waterslide facility, there was the opportunity to create a larger, more comprehensive Water Theme Park with additional recreational facilities other than just a waterslide. Activities such as bumper boats, wind surfing, wave pool, mini golf, go carts, tennis, shuffleboard, camping, picnicking, fishing and amusement rides were incorporated to attract people of all ages and interests. More recently the waterslide phenomenon has entered the prairie provinces but on a smaller scale than in either the United States or eastern Canada. This is primarily due to budget constraints, smaller population base and harsher climate. Of greatest popularity in the prairie provinces is the waterslide facility itself, both indoor as well as outdoor. The indoor slides are gradually becoming a more desirable facility because of the prairie climate and the need for year-round recreational facilities. At present, however, there are more outdoor waterslides available to the general public than

indoor slides. Indoor Waterslides have nevertheless been built into existing hotels and some leisure centers. This has been done on a very small scale but so far has proven to be a very successful venture. Waterslides have also been built into community shopping malls as a special attraction to shoppers and children.

4.1.2 Users:

One of the most unique features of a waterslide facility is the fact that it caters to a wide spectrum of users. People from toddlers right through to seniors can partake in and enjoy the excitement of a waterslide park. It takes no special skill or state of physical fitness to ride down a waterslide or to simply play in the various water features. People of all ages can enjoy the experience of sliding down a refreshing bubbly river of water. Even disabled people can ride down the slides. Blind, deaf, mentally and physically disabled people can go with friends and enjoy the experience of water and motion. As well, people who can't swim can still use a waterslide because the landing pools are only 3 to 4 feet deep. Seniors up to 80 and 85 years have been reported numerous times to be regular users of waterslides. A waterpark is therefore the one type of recreational facility that the whole family can go to and spend an entire day, each doing their own preferred activity. The teenagers can use the hot dog Kamakazie slides, the adults and seniors on the regular twisters, the children on

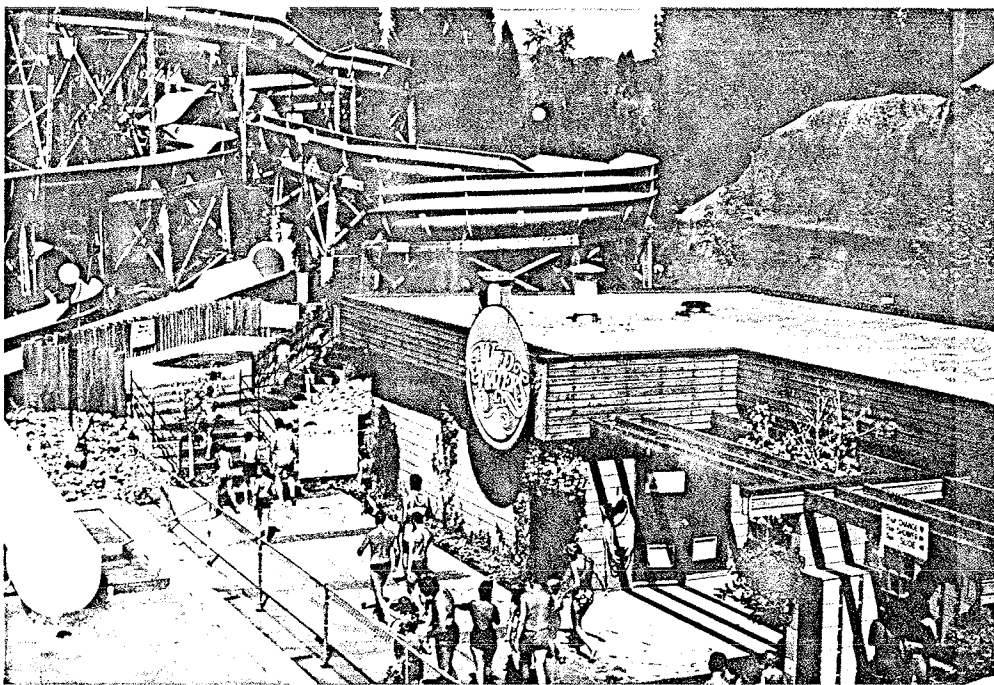


fig. 29 Outdoor Waterslides: "Wild Waters", Kelowna, B.C.

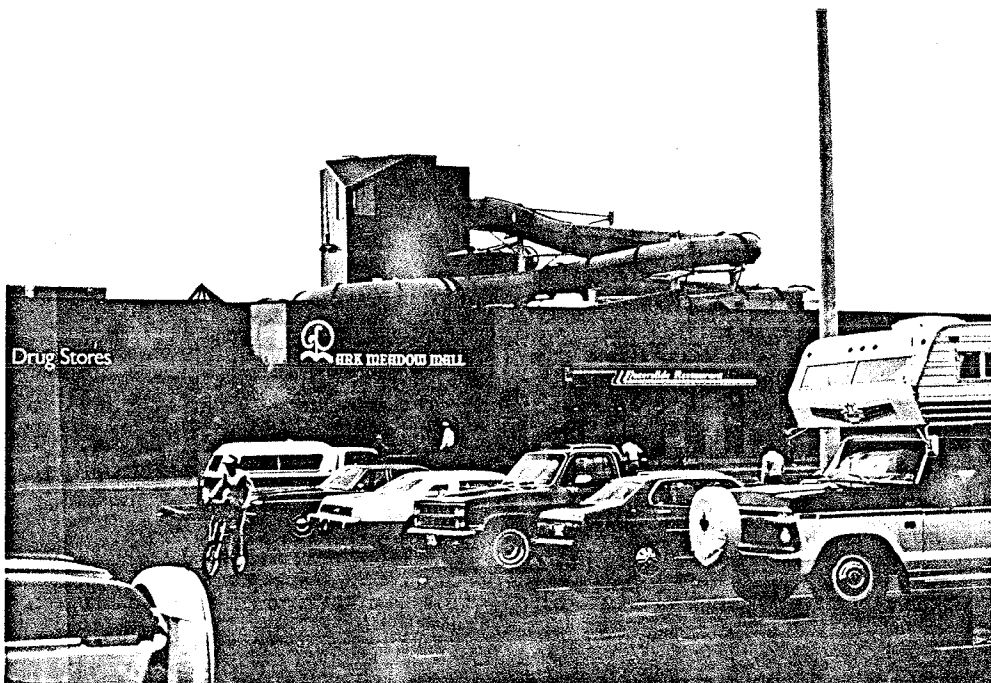


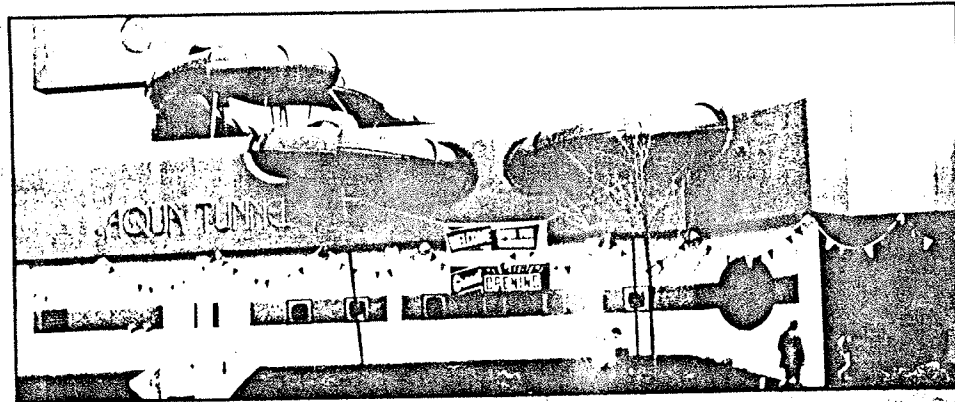
fig. 30 Indoor Waterslides: Park Meadow Mall, Lethbridge, Alberta

the kiddie slides, and the toddlers in the wading pools and water play areas. Furthermore, there's the hot tub for those who just want to relax. Passive activities like eating, watching and resting can also be enjoyed at a waterpark, either indoors or outdoors. A waterslide facility can consequently accommodate the whole spectrum of user market by providing opportunities for stimulation, relaxation, variety and a break from the rigors of urban living.

4.1.3 Types of Adaptations:

A waterslide is a very versatile recreational amenity. It can be built indoors or outdoors, (fig.29) it can be built on a hill, a tower, or both, it can be incorporated into an existing building or built into a new structure. It can be part of a hotel, shopping mall, or a leisure center. The slide itself can be open or enclosed as a tube slide to operate in any climatic condition. (fig.30)

Some climates are too hot, cold or rainy to provide enough operating days to make a profit with outdoor waterslides. This is where the indoor waterslides have a distinct advantage. They solve the problem of lost revenue during uncomfortable weather conditions and also during the off-season from September to May. Tube slides have the advantage that they can be kept warm in the winter and cool in the summer, a totally controlled environment. This unique year-round recreational experience can therefore be provided for people living in northern latitudes. Although indoor



TUNNEL IN THE SKY. A science-fiction appearance gives the Aqua Tunnel an irresistible appeal to visitors of the Jantzen Beach Center in Portland, Oregon. The two-lane tubular slide, manufac-

tured by ET Industries, Vancouver, Washington, was completed in December of last year. The company offers both 40" and 56" diameters.

fig. 31 Tube Slides: Jantzen Beach Center, Portland, Oregon (p. 22 April-May/84 News Splash)

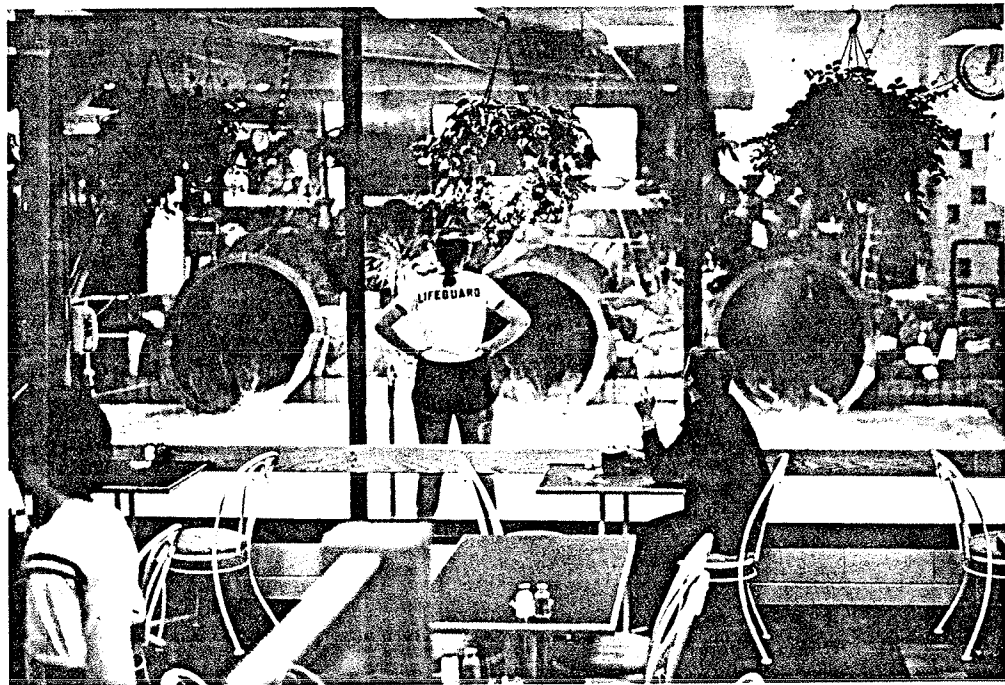


fig. 32 Indoor Waterslides & Restaurant: Lethbridge, Alberta

waterslides cost more in capital and operational expenditures, the income averaged over twelve months instead of three can potentially exceed three times the normal gross of an outdoor waterslide facility.

Shopping centers offer an excellent opportunity to integrate commercial services with recreational amenities. The multiple use of shopping malls can create a social, commercial and leisure focus to the community.²² Shopping mall developers are always looking for ways to draw people to their mall besides a variety of shops. They look for attractions that families will enjoy. The latest trend that is developing is to create shopping malls as family entertainment centers. Indoor waterslides are a high-impact facility that can easily be incorporated into malls and provide a special attraction.

One of the first waterslides built into a shopping mall was in Portland, Oregon. (fig.31) The waterslide facility, built in 1982, is adjacent to a restaurant with enclosed waterslides starting above the rest of the mall, wrapping down around the restaurant and then into the landing pool area next to the restaurant. Translucent slides and a large viewing window allow people to watch the fun and excitement as they eat. (fig.32) These enclosed tube slides have rapidly increased in popularity in the past few years and can be found in various locations in Canada, the United States and Europe.

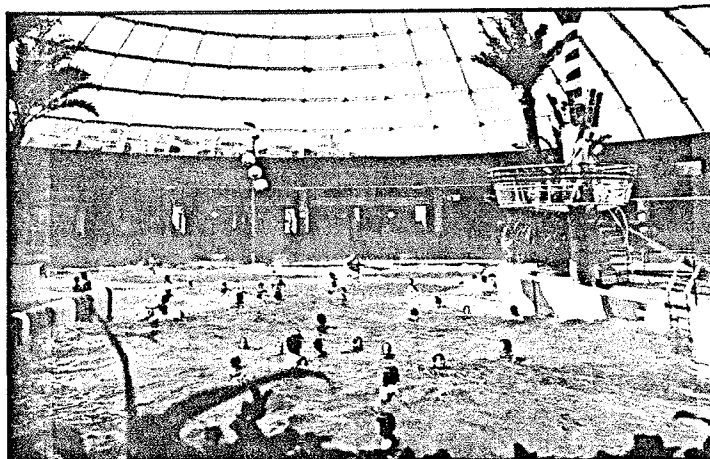
One problem the indoor water slide industry has to

overcome is the psychological barrier of people associating "bathing suit" sports with sunny days. Research at various waterparks has shown direct correlations between attendance and cloudiness and attendance and temperature.²³ People have developed the attitude that water sports are only for sunny, warm summer days. One answer to this problem is to aggressively promote the facility for use from September to May. Promotional packages such as party reservations, half-price days, group discounts, two-for-one fares, and various contests can attract large crowds if promoted through newspaper ads, radio commercials and word of mouth. Once people become accustomed to the idea of water-oriented recreation year round, indoor facilities at shopping malls, hotels and leisure centers will become even more popular recreational amenities

Indoor waterslides can also serve as a primary attraction at a hotel that provides a unique recreational experience along with accommodation. The slides can be the determining factor that influences people to choose one hotel over another.

The slides can be enclosed tube slides, standard open slides, or one of each to create interest and variety. They can be incorporated into the existing pool facility or a building extension can be constructed next to the recreational area.

Leisure centers also have great potential for the addition of waterslides. At Celebrity Sports Center in



WAVES UNDER GLASS. A dome with a diameter of 145 feet encloses a wave and activity pool, waterslides and swirpools at De Mirada Bad Leisure Center in Amsterdam, Netherlands.

fig. 33 De Mirada Bad Leisure Center: Amsterdam, Netherlands (p. 14, June/84 News Splash)

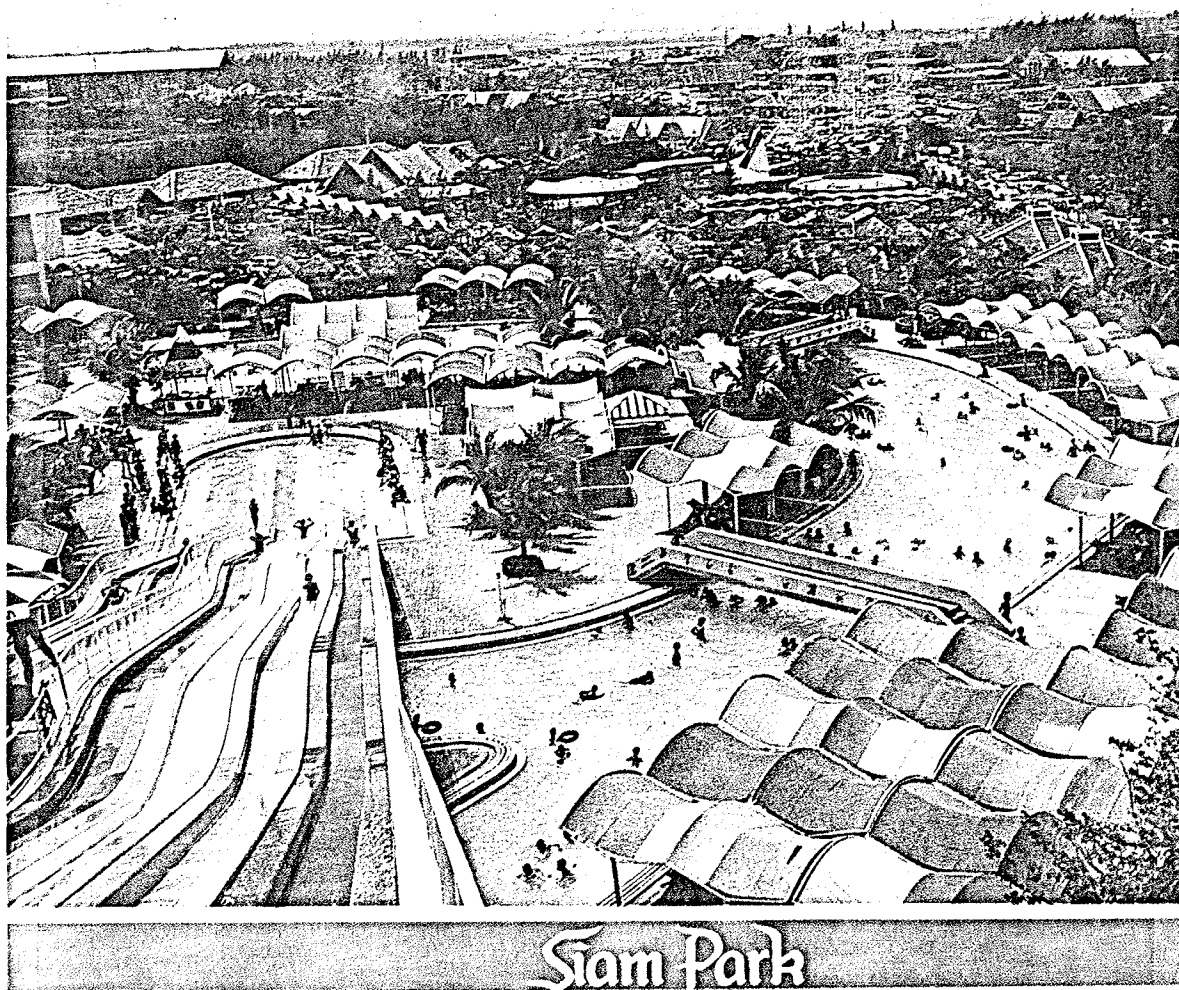


fig. 34 "Siam Park", Bangkok, Thailand (cover page, June/84 News Splash)

Denver, Colorado, an enclosed tubular waterslide was added to the existing swimming pool in 1982. Two of the slides start above the pool building in a six-storey enclosed tower, then twist and turn, enter the building, and splash down into the pool. Attendance multiplied and revenues increased 70% after the installation of the waterslides.²⁴

In Germany and Sweden waterslides and wave pools have been added to many leisure centers. In 1982 a low profile slide which fit into confined areas was developed. This allowed slides to be installed into tight areas such as school swimming pools and existing leisure centers. The popularity of indoor waterslides is confirmed by the fact that over 50 waterslide and wave pool installations have been completed in Germany and Holland and 132 wave pools have been installed in central Europe.²⁵

The De Mirada Bad Leisure Center in Amsterdam is considered to be one of the most enjoyable recreational facilities in the Netherlands. It encompasses waterslides, a wave pool, spray mists, jet streams, swirlpools, solariums and many other amenities. (fig.33)

Outdoor waterslides have also been developed to many different levels. Bangkok, the capital of Thailand, has one of the largest outdoor water parks in Asia. (fig.34) The park opened in 1981 and had an initial cost of over \$22 million.²⁶ It covers an enormous expanse of 150 acres and includes a 21-meter-high surf slider waterslide, a 16,000 square meter wave pool, waterfalls, fountains, pools, and a

man-made fresh water lake. With packed white sand at the shallow ends, the pools resemble natural beach shores of a tropical island resort. Exclusively landscaped gardens create a unique setting for water play. Siam Park also offers an amusement park, a bird aviary, an open zoo, a wax museum, a 180 degree theatre, picnic area, campground and a mini-train which travels the entire 150 acre site. This park was the site for Expo '83 and also displays an authentically restored area called "Old Time Bangkok" which depicts the city as it used to be.

Waterslides are going up all over the world. In Japan wave pools have been around for more than twenty years. In the sixties, the world's largest astrodome was built in Hachijai, near Tokyo. The formal name was Summerland but the Japanese call it surf-a-torium because of the indoor surfing pool. The five-storey dome was constructed of glass and steel and housed teahouses, trees, rides, dancing, swimming and surfing. Two large wave generators created three-foot waves at the end of the pool that cascaded across the pool to a simulated beach at the opposite end.

On a smaller scale, in western Canada, outdoor waterslides have been constructed on natural and man-made hills, on tower structures, and various combinations. At White Waterslide Park in Penticton, British Columbia, the slides were erected on a steel tower structure and then backfilled with soil to create the appearance of being anchored into the ground and to provide some topographic

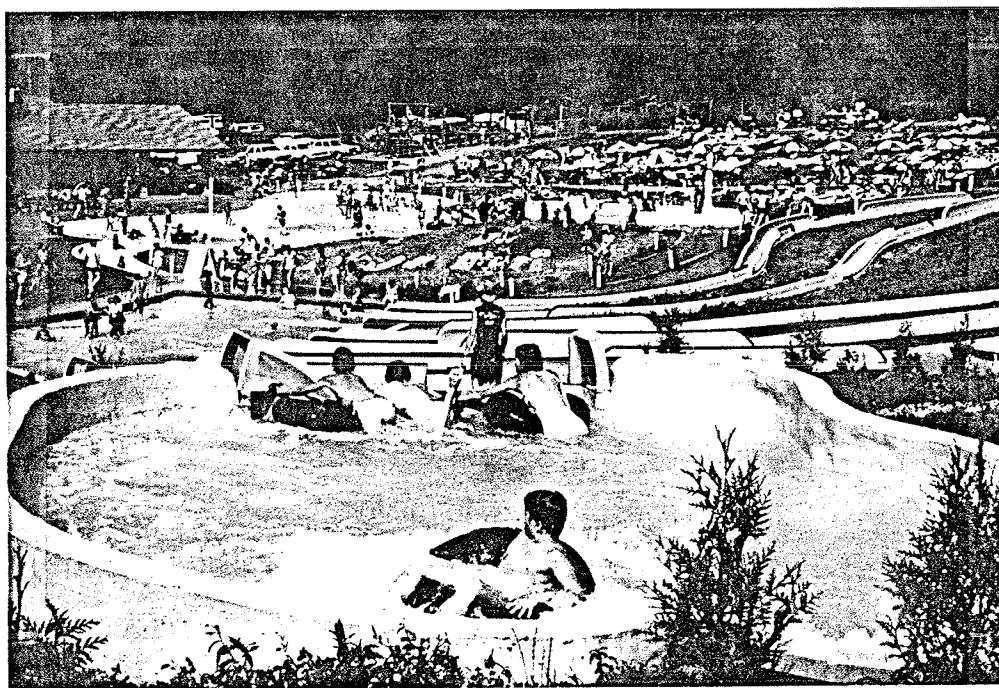
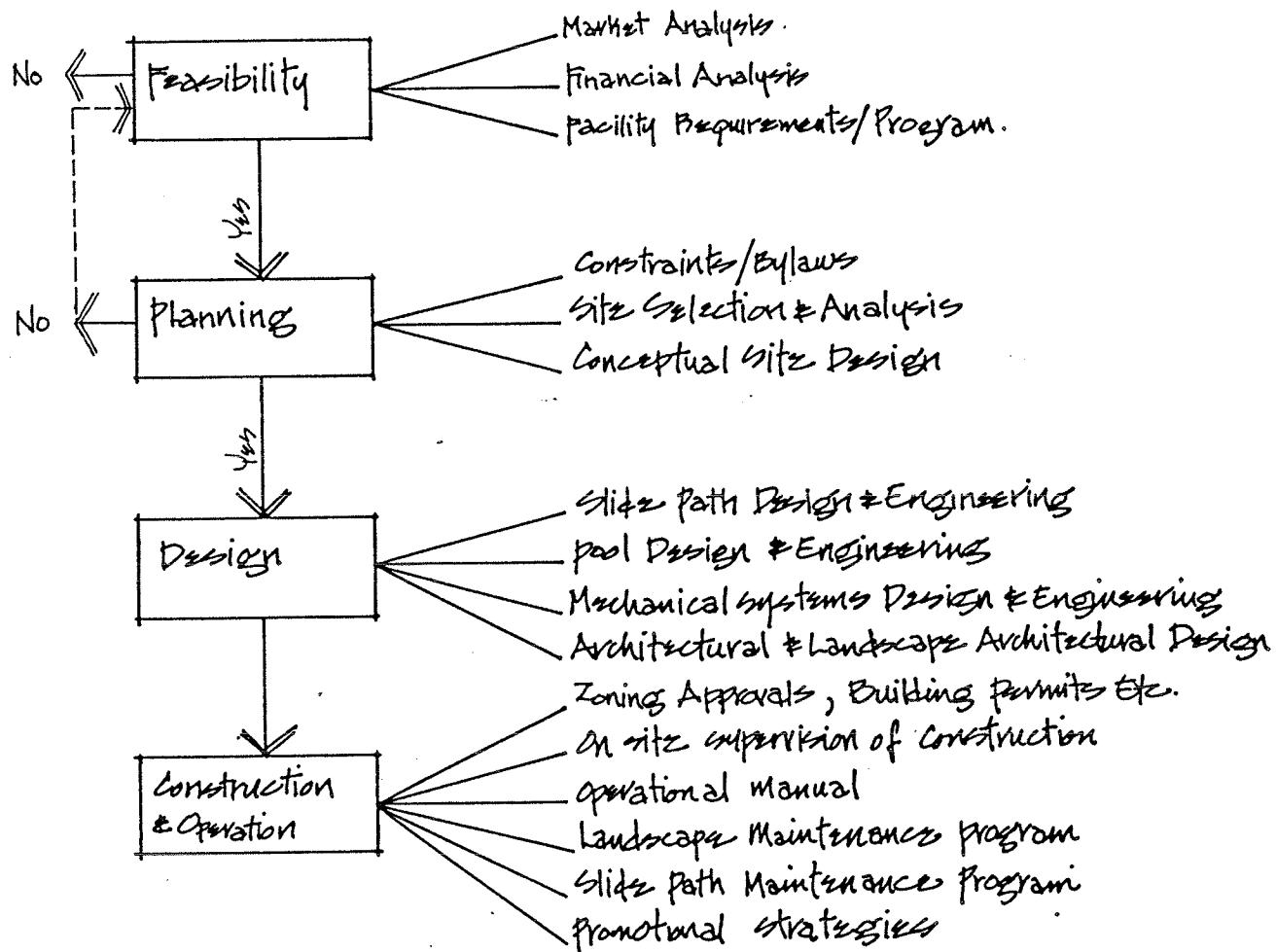


fig. 35 Outdoor Waterslide Park: "Trans-Canada Waterslides",
Chilliwack, B.C.

relief. At Wonderful Waterworld, also in Penticton, a unique hill complex was constructed with the slides riding on top of the hill and also going through various parts of it to create a cave-like effect. This added variety and intrigue with the slides disappearing and twisting around the hills. Trees, shrubs, vines and ground cover helped to conceal scaffolding, hold down the surface soil, and create an attractive environment to play in.

Waterslides can be built into the existing landscape and blend into natural topographic features. One example of this is in Westbank, British Columbia, near Kelowna. A narrow, gently-sloping ravine provides an excellent opportunity to construct a "river ride" slide down the center of the ravine. Normal water flow was re-routed at the top of the ravine to allow the river ride slide to be installed. People riding this slide sit in an inflated inner tube and are carried down a rushing river of water that flows over a series of cascades and pools. The natural ravine and surrounding vegetation creates an exciting visual and physical experience.

The waterslide enthusiasm is certainly world-wide. Whether indoors or outdoors, small scale or large, waterslides provide people with an opportunity to experience water, motion and excitement in many creative and unique environments. (fig.35)



Water Slide Development Process Chart.

fig. 36 Waterslide Development Process Chart

4.2 Feasibility of a Waterslide Facility

In order to determine whether a waterslide park will be successful and a worthwhile venture it's necessary to undertake a market analysis or feasibility study. The potential market of waterslide users has to be considered by looking at population figures, the tourist market, trends, competing facilities, and the demand for water oriented recreation.

A feasibility study is an effective technique for gathering information, analyzing it, and answering questions such as: how can we serve the recreational interests of this community, what is needed, what is affordable, and what are the wishes of the community.²⁷ Feasibility studies are also used when facility-related issues are at hand: how much will this project cost, will it meet the needs of the community and is it feasible. Alternate ways of solving the problem are examined, and on the basis of cost and effectiveness, recommendations are formulated. In exploring how better opportunities for leisure activities can be provided, the study looks at existing activities, facilities and patterns of use.

The basic objectives of a feasibility study are: to identify the needs of the community and determine how to meet these needs now and in the future, to analyze the condition and use of existing local and regional facilities, and to recommend the most effective investment of funds to meet

these needs. All necessary information is gathered and presented to provide a solid base on which to make the best decisions.

In summary, factors to consider when undertaking a feasibility study include:

- . use (seasonal or year-round)
- . facility requirements
- . benefits to the community
- . sites (evaluations of potential sites
- . costs
- . funding
- . management and programming
- . population data such as age, sex, ethnic origins, occupations, income and education levels of potential market area
- . activity patterns and preferences (passive, active, team sports, individual fitness)
- . population growth projections
- . local and regional settlement patterns
- . school growth projections, and
- . economic growth projections.²⁸

In determining the feasibility of a waterslide facility, financial considerations must always receive special attention. Development costs, operational costs, and sources of financing must be examined prior to investment. A careful analysis of the operational costs for the first five years is very important.

Operational costs are ongoing obligations and can exceed initial capital expenditures. Operating cost projections illustrate the funds and personnel necessary to maintain the facility. Maintenance costs include:

- . fuel and utilities (gas, electricity and water)
- . cleaning supplies and staff
- . first aid supplies and staff
- . security (lighting and staff)
- . repair of equipment, roads, sidewalks, buildings, etc., and
- . numerous other responsibilities.

Capital costs are the initial expenditures in designing and implementing the project. These include:

- . acquisition of land (surveys of potential sites, soil, and water testing, land purchase, and legal costs)
- . Professional Consulting fees
- . construction contract
- . site preparation (includes cost of utility service hook-up, site drainage, landscaping, parking areas, fencing, exterior lighting)
- . furnishings and equipment
- . maintenance supplies and other sundry materials
- . project manager
- . administration and legal costs (advertising, postage, accounting, and fees for preparing

legal documents.²⁹

Sources of funding should be carefully evaluated. Sufficient funds must be available at appropriate times as it is essential for meeting construction deadlines. Sources of supplementary financing should be explored. Federal and provincial government grants, municipal funds, service clubs and commercial support can be pursued to raise initial capital monies. User revenues, debt financing, joint development and operation agreements, and advertising arrangements can also be used to assist in the financing of a waterslide facility.

Revenues are generated by facility rentals, food and beverage concessions, admission fees, memberships, joint-use agreements, advertising space, equipment rental, sales and service, and vending and game machines.

It is also important to note that a waterslide facility or a water theme park can be built in phases. This is usually related to availability of funds and amount of use the facility is anticipated to receive.

A feasibility study provides the necessary information to make an accurate decision on the investment of a particular facility and to permit financing. Once the decision is made for the venture, it is then time for an action plan.

4.3 Planning of a Waterslide Facility

Once there is an understanding of the feasibility of a waterslide park the next crucial items to look at are site selection, and site analysis or building analysis depending on whether it is to be an indoor or outdoor facility.

Factors for an exterior site to be considered are:

- size and ownership of selected site/sites
- surrounding land use
- complementary land users (e.g. commercial and recreational)
- accessibility
- traffic generation
- on-site parking
- visibility
- public transportation
- orientation
- topography and drainage
- soils
- water table
- water source

For an indoor facility, factors to be considered are:

- location
- surrounding use
- nearby amenities
- accessibility
- parking

- public transportation
- visibility
- building condition, its stability and life expectancy
- building characteristics such as height, number of floors, windows, etc.

Another important factor to consider in the planning stages of both types of facilities is zoning bylaws. This should be investigated in the early stages because having zoning changes made could easily take up to two and three years in length.

Support services that should be provided in a typical waterslide facility are:

- food and beverage facilities
- change and washrooms
- showers
- lockers
- first aid facilities
- merchandising, such as a gift shop

Planning a waterslide facility is a creative exercise that involves more than simply collecting and arranging a number of objects. It is an art that requires innovative and imaginative ways of integrating the components. A facility that is attractive and intriguing as well as functional will be more successful than one that has been quickly thrown together. Also, a facility that offers more than one activity has a greater potential for long-term success.

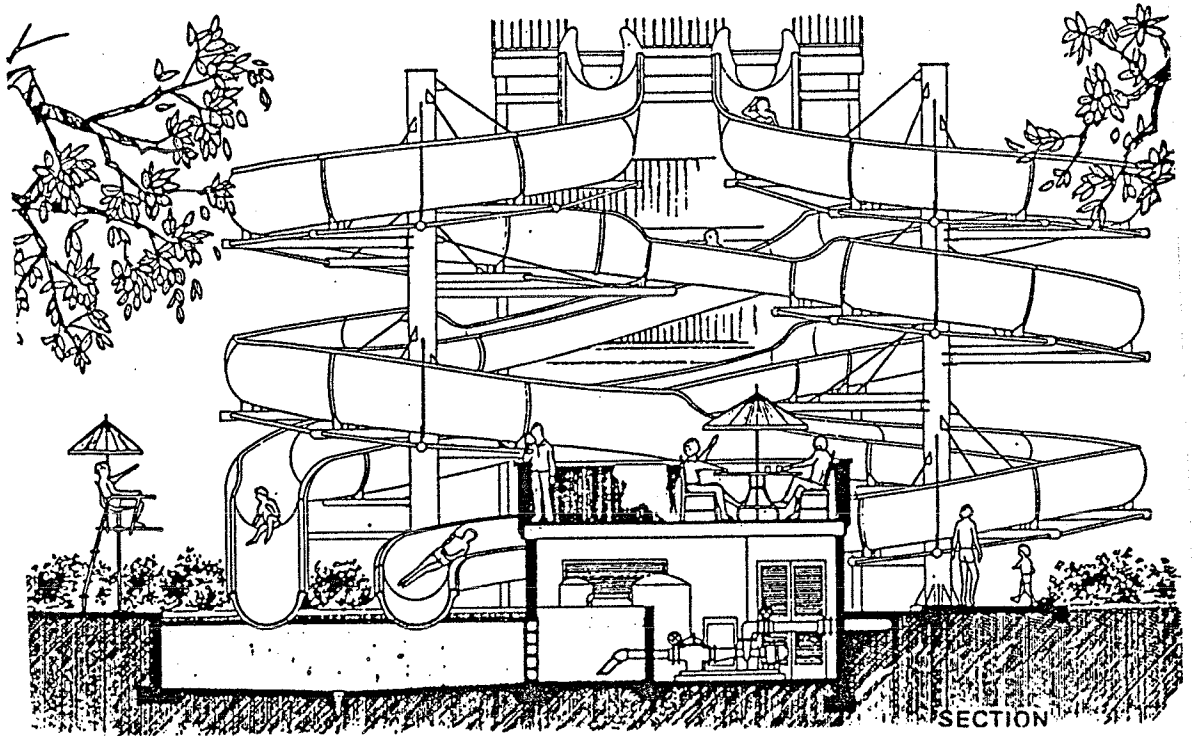


fig. 37 Typical Waterslide Facility (Water Forms Canada Ltd.,
Kitchener, Ontario)

Providing alternate activities broadens the range of users that can be accommodated and as a result increases the potential for additional revenue.

4.4 Multiple Use Recreation Facility

In order for a water park to be a long-lasting and successful operation, additional facilities other than the waterslides must be provided. If there is a variety of activities, both passive and active, for people to become involved in, then the experience will be a much fuller and satisfying one. This will encourage people to come back again and again. Actual provision of additional activities should be prefaced upon demand, alternatives and location.

One of the most popular secondary activities at a waterslide park is mini golf. This has proven to be quite successful and is a good alternative because it is the type of sport that can be enjoyed even if you have very little skill or talent. It's also the type of facility that can be accommodated indoors or outdoors.

Other activities that are very common in a multiple use recreation facility are pinball and video machines. When these are set aside in their own designated area, they do serve as a good alternate activity at a Water Theme Park.

The hot pools, wading pools, and leisure pools are also a necessity at a Water Theme Park. Without these alternate activities, a Water Theme Park just isn't complete. Water play areas are another excellent feature for children and adults.

Bumper boats are another common recreational activity at a Water Theme Park. They are available in children and adult



BINGEMAN PARK

fig. 38 "Bingeman Park", Kitchener, Ontario



fig. 39 "Adventure Island", Tampa, Florida



sizes. They provide a good complementary activity and entertain people of all ages. Bumper boats can be operated in a separate pool or tank, or in a roped-off section of a larger lake. They can also be owned and controlled by a separate investor who leases an area from the Water Park.

Another recreational feature that is ideal to have associated with a Water Theme Park is a campground. This facility is a great way to capture the tourist market. It is a good promotional package to offer family entertainment and accommodation all in one. Parents camping at the Water Park can send their children to the slides for the day or afternoon and quietly relax while the lifeguards and pool attendants supervise their children.

Other recreational amenities often provided at water parks are playgrounds, volleyball courts, ball throwing tents, and go carts. Frequently these are privately owned concessions on adjacent properties.

In eastern Canada and the United States, water parks have truly become multiple-use recreation facilities. For example, Bingeman Park near Kitchener, Ontario is a family resort and amusement park. (fig.38) It has camping, hiking, canoeing, fishing, mini golf, driving range, playfields, go carts, bumper boats, roller skating, restaurant and wave pool, not to mention the waterslides and speed slides. At "Adventure Island" in Tampa, Florida a lush, tropical paradise was created at Busch Gardens near the downtown of the city. The 10-acre oasis offers waterslides, wave pool,

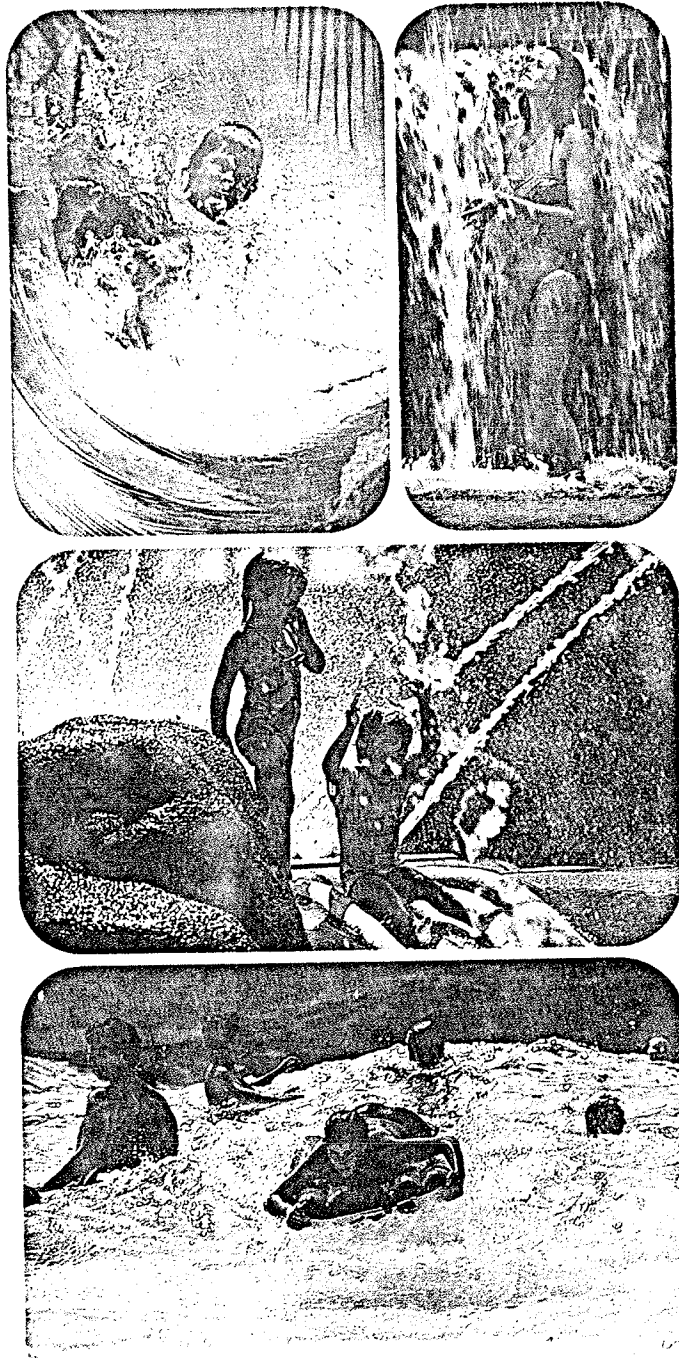


fig. 40 Multiple Use Water Theme Park: "Oceans of Fun", Kansas City

waterfalls, diving cliffs, swimming ponds, cable slides, sand beaches and palm trees. (fig.39) "Oceans of Fun" at Kansas City is another Water Theme Park that offers a wide variety of recreational activities. Here they have wind surfing, paddle boats, row boats, kayaks, water playgrounds and water cannons in addition to the wave pool and waterslides. (fig.40)

A multiple use recreational facility appeals to a broad market segment by providing additional recreational pursuits and by creating an interesting and exciting place to spend time in.

4.5 Implementation and Operation

It is important to maintain high standards for the implementation and operation of any waterslide facility. Criteria should be established to ensure proper construction techniques and an acceptable measure of yearly management. Recommendations for this category include the following:

- . the designer of the water park should maintain regular on-site supervision of construction. This is most crucial in the installation of the waterslides themselves. A 1/4" error in the elevation at the bottom of the slides could compound itself to being several feet out by the time the slide units reach the top. Even 1/8" misalignment of two slide units can make a very rough seam to patrons' bare elbows and backs when sliding down the flumes. The designer should keep regular contact with all phases of construction of the park to ensure the overall concept is maintained and quality and image is not lost in careless construction techniques.
- . an operational manual should be formulated to guide managers and various staff in proper procedures of operating a waterslide park. The success of any waterslide park can easily fall short due to poorly trained and inexperienced staff.
- . a landscape maintenance program should be established whether it is interior or exterior landscaping. The



fig. 41 Park Mascot "Bubbles": "Atlantis World of Water", Vernon, B.C.

quality and health of the plants on site create an image and uniqueness of each Water Park and can actually reflect the attitude of the people responsible for maintaining the park. Plants add a special attractiveness and create a pleasant atmosphere to spend time in. A strict maintenance program is necessary to keep the plants tidy and healthy.

- . a slide path maintenance program should be enforced. Each day the runs should be swept and checked for abnormalities. The joints need regular sanding and buffing to keep them smooth and safe. Even though the slide units are bolted and glued together, there is still room for slight movement between the pieces over time.
- . promotional strategies should be used to advertise the facility and bring more people to the park. Group discounts, after-hour specials, half-price days, two-for-one fares, give-away tickets on radio stations, mail-out brochures with coupons, and radio, television and billboard ads are a few examples of marketing techniques. Even gimmicks such as themed mascots are good publicity for the facility. (fig.41) Providing group rates encourages schools, churches, youth organizations, athletic clubs, and local and regional corporations to use the facility. At Fox Fire Resort in Milton, West Virginia, 70% of their

week-end business comes from company picnics.³⁰ Also, events such as contests, Junior Olympics, charities and concerts can create a broad public awareness of the facility.

4.6 What Makes a Good Waterslide Facility

Many factors contribute to making a good Water Park. One very important element is variety. If there is a variety of slides and activities to choose from, it makes the experience much more interesting and also extends the length of time that patrons spend at the park. This also provides the opportunity for individuals to discover something new about the park on consecutive visits. Lack of variety can create boredom and prevent people from coming back to that particular park.

The number of slides also contributes to a good waterslide experience. The standard number for an indoor facility is two and an outdoor facility is four. Increasing these numbers adds to the excitement and intrigue of mastering each ride and knowing how to best ride it.

Attractiveness is another factor that makes a good waterslide facility. There are many features that contribute to the overall attractiveness of the site. It ranges from well thought out detailing in edges, railings, walking surfaces, etc., to attractiveness of site furnishings such as benches, tables, umbrellas, planters, garbage cans and fences. Planting arrangements, building style and colors also add to the attractiveness of a water park.

Cleanliness is a very important feature to consider. A well planned and designed water park can lose much of its appeal if it is unkempt. The most important place to keep

clean is the change rooms. Dirty, slippery floors and messy change rooms can actually deter people from coming to the park. Also if the grounds are cluttered with garbage and debris, people tend to lose respect for the place and are actually influenced to abuse the facilities.

Accessibility and site identification should also be examined. If adequate signs, roads, bicycle and pedestrian ways and vehicle parking are not provided, it can not only be inconvenient but as well unsafe for people coming and using the park. In order to capture the tourist market, accessibility, site identification, and parking must be carefully considered.

One of the most important factors in making a successful waterslide park is to be sure it is planned where there is a large enough population base to support it and that the market is not already saturated. Tourism does contribute to the success, but the factor that keeps the facility going is a large population base.

Safety should always be kept in mind when planning and designing a waterslide facility. A park that gets a bad reputation for being unsafe soon loses customers. Fear of being hurt on the slides or any other activity in the park is a big deterrent to people of all ages. The facility must be equipped with proper non-slip walking surfaces, handrails and guards where necessary, safe parking and drop off areas, proper slopes and turning radius on the slides, risers on the appropriate places on the slides, and supervisors and

lifeguards at the pools and beginning of rides. Safety must be considered in every area of the park.

Ease of circulation is another important factor. This includes pedestrian circulation on the site and vehicular circulation in the parking lot and access roads. Clear, direct circulation allows for ease of maneuverability from one activity to another.

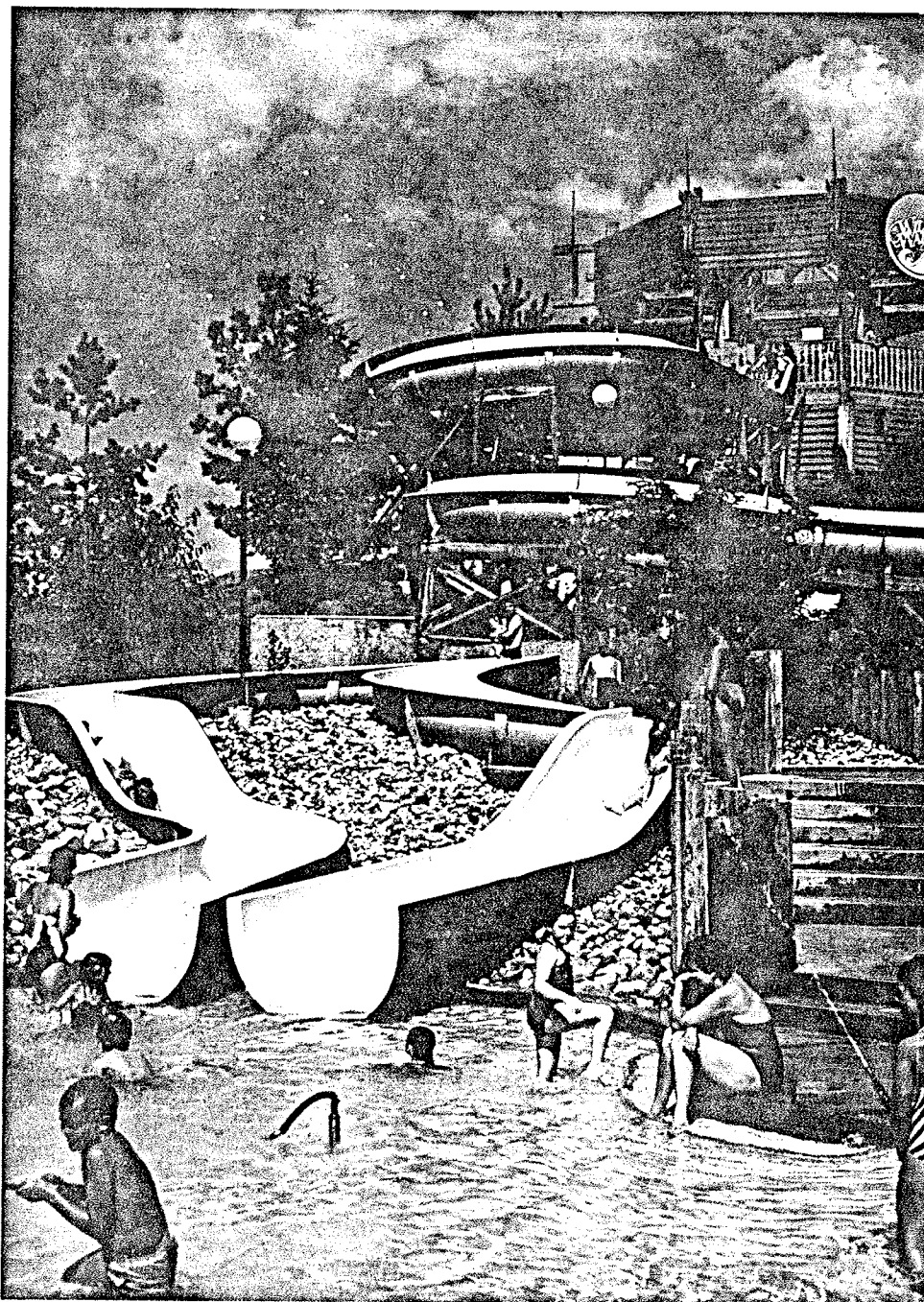
Friendliness of staff is another important quality of a water park. Although it is difficult to "design" friendliness it is something that can be set as a goal in the philosophy of the operational manual. A manager who encourages his staff to be friendly to the patrons has more than profit on his mind, he strives for customer satisfaction. And if a customer is satisfied, he or she will come back.

For the users, two of the most important features that encourage individuals to come back to the park are exciting rides and uniqueness. If people had fun on the rides and in the park, they will want to come back and try it again and again.

A waterslide facility can be an exciting place to enjoy many recreational experiences. Proper planning and design procedures are essential to ensure the success of any waterslide facility. To assist in the planning, design, maintenance and operation of a waterslide facility, the following two chapters outline various comprehensive guidelines to consider for indoor and outdoor waterslide facilities.

5. DESIGN GUIDELINES

FOR OUTDOOR WATERSLIDE PARKS



Wild Waters, Kelowna, B.C.

5.0 DESIGN GUIDELINES for OUTDOOR WATERSLIDE PARKS

This chapter contains a set of design guidelines formulated to assist planners, landscape architects and engineers in planning, designing, and maintaining a waterslide facility. These are intended to be used as a basis upon which to make planning and design decisions.

The recommendations are based on field research of 19 outdoor waterslide parks and 7 indoor waterslide facilities in Manitoba, Saskatchewan, Alberta and British Columbia. Accordingly, these guidelines are directed towards waterslide developments ranging from 1 to 25 acres in Western Canada. The field research was conducted in the summer of 1984 and included interviews with planners, landscape architects, engineers, designers, manufacturers, managers and patrons of the waterslide facilities. Personal observation, evaluation questionnaires, and actual use of the facilities also assisted in formulating these guidelines. In addition to the field research, various Manitoba standards were also reviewed. It is important to consult local and provincial standards on building codes, swimming pool regulations, amusement park standards and the public health act for detailed by-laws particular to each province.

All data gathered in the field research has been summarized into five matrices (charts) to graphically illustrate the findings. (see Appendix A). The categories surveyed and guidelines developed are as follows:

- planning & design
- operation, maintenance & safety
- mechanical systems
- support services
- user profile & supplementary recreational amenities

Under each matrix heading, specific issues are listed for all parks surveyed.

Average dimensions and the most common features of each park researched were identified and used as the base for developing the guidelines. The matrices were used to display the survey information in a clear and concise manner. An objective evaluation was then made of each survey issue, which led to a further refinement of the guidelines. The format corresponds to the headings of the matrices. Items under these headings are sub-categorized into planning, design, maintenance and safety considerations.

These guidelines cannot answer all the design questions for all locations as each site has its own unique opportunities and constraints. A detailed site analysis of each individual site is necessary to evaluate opportunities and constraints. This will assist in determining if a waterslide development can be accommodated on the selected site. Preliminary questions that need to be addressed during this analysis include:

- is this site on a major traffic route?
- is this site in a destination area?
- where are the people coming from?

- what is the market area?
- what is the competition?
- is the site serviced?
- are any off-site improvements necessary?
- whose responsibility are off-site improvements?
- are zoning changes necessary?
- is there an abundant water source?
- can the site accommodate ample parking?
- what are the climatic considerations?

These guidelines are therefore to be used as general recommendations. There are no absolute rights or wrongs for waterslide development. There are always trade-offs and compromises that must be balanced. For instance, the site may have a south exposure (as recommended) but may not be on a major traffic route (as recommended). These issues have to be weighed to arrive at the most appropriate decision for each unique site situation. Additional development strategies and design detailing must be considered in order to correct an otherwise negative site feature.

In the field research, it was evident that significant contrasts existed between each of the waterslide facilities in the way each was planned, built and maintained. This has immediate and long-term implications from a design, maintenance, operation and financial point of view. A good designer has a crucial role to play in the quality and success of a waterslide park.

Site design is too often careless, monotonous and

unattractive. The tendency to "rubber stamp" building plans and site layouts is uncreative and ignores uniqueness or special features of each site. For instance, views to some distant significant landscape feature are often just as important as views of the waterslide complex from a major traffic route.

Last-minute design decisions and piecemeal efforts do not produce a product that has harmony and unity. Factors that should be considered by the designer include proportion, density, shape, duration, rhythm, pattern and linkage.

Particular site details that must be considered include detailing of edges, variation of textures, coordination of colors, choice of site furnishings, consideration of views and vistas, provision of shade and wind protection. A good designer can creatively combine all factors involved to produce the most appropriate design for each unique site. A Landscape Architect's expertise lies in the orchestration of the physical environment to accommodate a variety of human activities and enjoyment.

5.1 Planning & Design Issues for OUTDOOR Waterslide Parks

- 5.1.1 Acreage Requirements
- 5.1.2 Site Requirements
- 5.1.3 Parking
- 5.1.4 Hill Construction
- 5.1.5 Tower Construction
- 5.1.6 Stairs
- 5.1.7 Slide Runs
- 5.1.8 Pools
- 5.1.9 Walkways
- 5.1.10 Administration/Service Building
- 5.1.11 Observation Area
- 5.1.12 Picnic Area
- 5.1.13 Signage
- 5.1.14 Site Furnishings
- 5.1.15 Plant Materials

5.1.1 Acreage Requirements

planning & design considerations:

- . in the parks researched the average number of acres in use was 10 acres. The range was from 2.3 acres to 25 acres. The twenty-five acre park included a man-made lake for bumper boats and wind surfing.
- . to avoid crowding of activities and site congestion, it is recommended to provide a minimum of 4 acres to accommodate the basics of a waterslide development (adult and kiddie slides, landing pools, hot pool, picnic area, pump house, administration/service building and parking). Speed slides and a river ride (inner tube slide) should be included in a waterslide park, but do not necessarily have to be part of the initial

phase of the development.

- . over 5 acres is preferable to allow supplementary recreational amenities such as bumper boats, mini golf, volleyball, horseshoe pits, and playground units. Additional acreage also provides more picnic sites and overflow parking areas.
- . it is also recommended that space be reserved for future expansion for other miscellaneous large scale recreational amenities such as a campground, driving range, go carts or dune buggy tracks, etc.
- . if the site is not serviced with a municipal sewage system, other forms of waste disposal such as a sewage lagoon, septic field or holding tanks should be planned. If a sewage lagoon is required, additional acreage should be acquired to ensure adequate distance is maintained from the park activity area. The lagoon should be located down-wind of the park complex and away from major sight lines. Refer to local health and safety standards for further details for servicing requirements in the chosen area.
- . accessibility to the site is an important planning consideration. The parcel of land should be easily accessible from major traffic routes. Where possible, existing roads should be utilized for access onto the site to reduce overall construction costs.

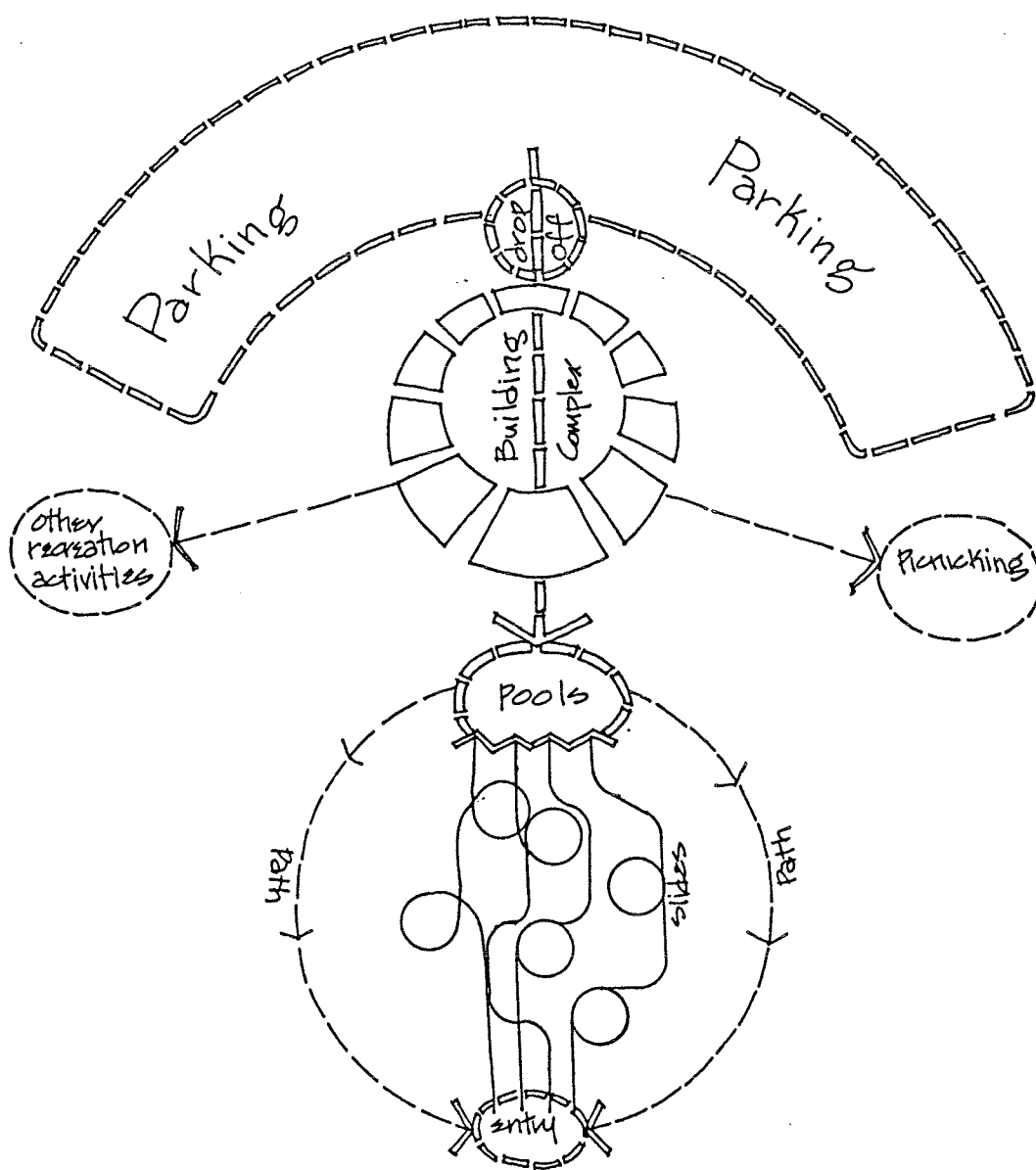


fig. 42 Functional Relationship Diagram

- . it is recommended to provide approximately 3 acres of on-site parking immediately adjacent to the administration/service building to reduce walking distance and provide easy access to the park. (fig.42) In the field research, the area for parking ranged from 1.2 to 4.4 acres. Parking for cars, buses and recreational vehicles should be provided within this area.

5.1.2 Site Requirements

planning & design considerations:

- . an essential site feature is an adequate water supply. In the parks visited, sources of water included wells, municipal water supply, an irrigation district pipeline and a lake. The two most common sources of water were the municipal water system and wells. It is therefore necessary to examine the potential site for an adequate source of water supply prior to any site selection.
- . visibility is an important feature of a water park site. Although it is not crucial to be able to see the park from major traffic routes, it certainly increases the impact of the park on the general public. High visibility of at least a portion of the park, landmarks and clearly identifiable signage or logos can increase public

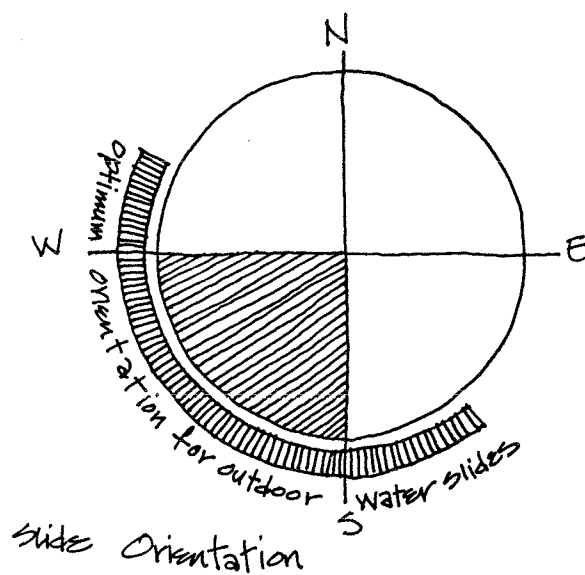


fig. 43 Slide Orientation

awareness of the park.

- . topography and drainage of the site must also be examined to ensure problems such as flooding, ponding and erosion can be avoided or at least kept to a minimum.
- . adjacent land use to the waterparks researched included agriculture, recreation, residential, highway commercial transportation corridor, and open space (flood plain, parks, open space reserve). The most compatible types of land uses were highway commercial transportation, agriculture and open space. Highway commercial and transportation are preferable primarily due to the high degree of public exposure in those areas and less conflicts of land use.
- . for additional information on site requirements see chapter 4, item 4.3 Planning of a Waterslide Facility.
- . the best orientation for the waterslides is south, south-west, or west facing. This exposure to the sun helps heat water in the slides and provides longer hours of sunlight for early evening use.
(fig.43)
- . existing tree stands and natural vegetation can enhance the site and should be integrated into the overall development. Existing plantings can also provide immediate wind buffers and shade.

safety considerations:

. surrounding land uses that are not recommended include:

- heavy industrial such as chemical and manufacturing plants.
- ecologically sensitive areas such as sand dunes, marshes or wildlife sanctuary
- odor producing industries such as sanitary landfill site, meat processing plant or saw mill
- dust producing industries such as open pit mines and quarries
- noise and air polluting industries such as airports and major truck routes
- industries that pollute ground water.

. it is recommended to keep all development away from unstable slopes.

. off-site improvements such as turning lanes and channelization of major roads and intersections should be provided to prevent traffic tie-ups and potentially dangerous traffic conditions. Control lights should be installed at major intersections and railway crossings.

. it is important to review the possibility and costs of any off-site improvements prior to investment. An agreement should be established between the developer and the municipal

authorities to determine the financial responsibility for such improvements.

5.1.3 Parking

planning & design considerations:

- . as previously mentioned in 5.1.1, it is recommended that waterslide parks provide approximately 3 acres of parking immediately adjacent to the administration service building. An overflow parking area should be reserved for long weekends, holidays and future expansion.
- . special parking spaces and safe drop-off areas for handicapped patrons should be provided.
- . parking should be provided for cars, campers, trailers, buses and bicycles.
- . all parking lots should accommodate two-way traffic and drive through circulation space.
- . a passenger loading and drop-off area should be located within 50 feet of the park entrance and should be separate from major parking lot circulation.
- . for proper drainage, parking lots should be designed with a slope no less than 2% and no greater than 5%
- . parking stalls for handicapped patrons should be 12'6" (3.8 m.) in width and located at a point closest to the entrance.³¹
- . shade trees should be planted throughout the

parking area to provide at least 30% shade in the parking lot.

maintenance & safety considerations:

- . unpaved parking lots should be regularly graded to repair potholes, ruts and uneven surfaces that cause excessive pooling of rain water and create uncomfortably bumpy roads.
- . unpaved parking lots should use a dust abatement material such as calcium chloride or road oil to reduce dust levels in the air. Calcium chloride acts as a sealer and can be used as a base for future asphalt surface the following year.³²
- . elements such as wheel stops, bollards or fences should be used in unpaved parking lots to designate parking areas.
- . clear directional signs should be used to indicate traffic circulation, bicycle and pedestrian ways, handicap parking and speed limits.
- . landscape elements in the parking lot such as plant materials and land forms should be designed to avoid visual obstruction to drivers and pedestrians.

5.1.4 Hill Construction

planning & design considerations:

- . the minimum area required for the construction of a typical 50' hill with 6:1 side slopes is 5 acres. The front face of the hill should be

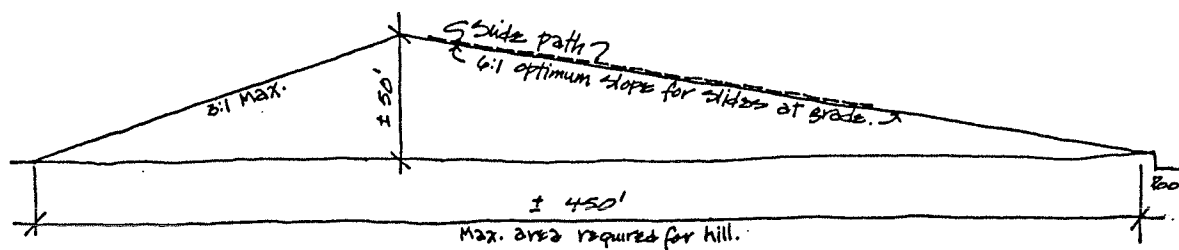


fig. 44 Hill Shapes: Slides Installed at Grade

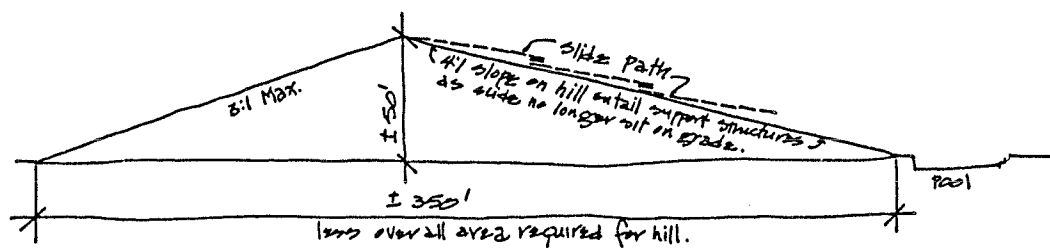


fig. 45 Hill Slopes: Scaffolding on Hill

maintained at 6:1 slope to allow the slides to be installed at grade. The back side of the hill can be at a steeper slope depending upon the angle of repose for the particular soil type. (fig.44)

- . steeper slopes require less area but scaffolding is necessary to maintain an overall slide gradient of 9% to 10%. (fig.45)
- . an additional acre is required for the pools, picnic area, concession, change rooms, first aid room, office, staff room and pump house.
- . one major planning consideration is source of soil to construct the hill. Transporting costs, labour, material and equipment costs should be reviewed to determine the feasibility of hill construction. One possible source of soil is a lake excavation.
- . a soils engineer should be contacted to determine the necessary construction considerations for the particular soil type in each area. For instance, the soil type dictates the shape of the hill and the appropriate construction techniques.
- . in the parks researched the average time span for construction was 4 months. This included installation of the slides, pools, pathways, administration building and pumphouse. It is recommended to construct the hill after the snow has melted in spring and no risk of frost is expected. Fall construction should start no later

than 2 months prior to freeze-up.

- . the average height of a man-made hill in the field research was 54 feet (approx. 16.5 m). This allows for runs of approximately 400 feet (122 m) in length. Longer runs require additional hill height and slide units, which increases capital costs. A 50'-60' hill (15-18 m) can accommodate satisfying slide runs of 350' to 450' (106-137 m) in length and keep capital expenditures to a minimum.
- . scaffolding and tower structures can be used as supplementary support systems for spirals and drop sections that occur along the slide paths.
- . on-site drainage swales should be attractively designed to appear as part of the landscape. Surface water should be diverted away from the pools and activity areas. The entire site should be maintained as dry as possible.

maintenance & safety considerations:

- . one factor to monitor closely is hill settlement. Slides should be checked regularly for buckling and pressure points due to hill settlement. Movement of slide units puts stress on the slides and can create uneven seams.
- . surface stabilization is a major concern as surface erosion and run-off can accumulate in the pools, creating serious filter and water quality

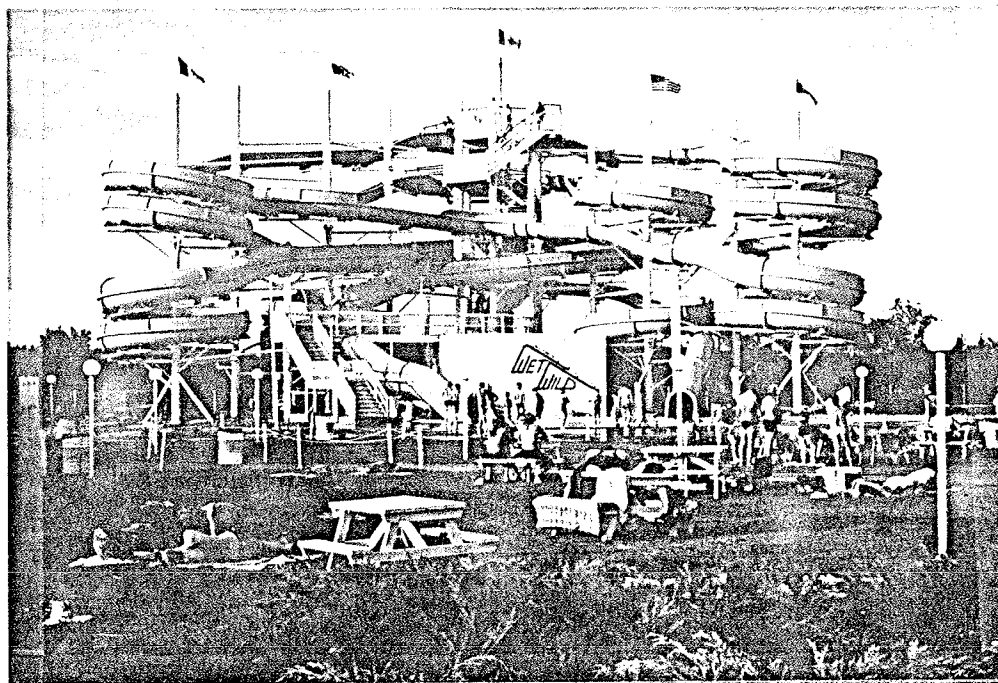
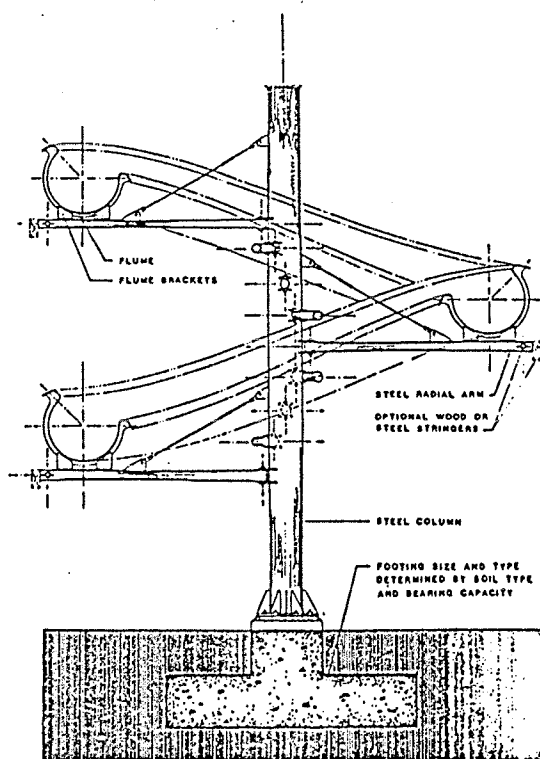
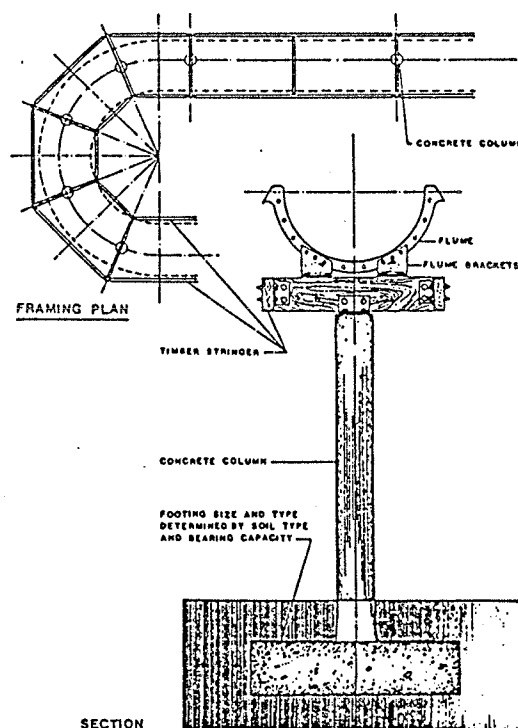


fig. 46 Waterslides on Towers: "Wet'n Wild", Lockport, Manitoba



STRUCTURE
RADIAL ARM SUPPORT SYSTEM
ON 180 THRU 280 CURVES



STRUCTURE
CONCRETE COLUMN AND TIMBER
STRINGERS

fig. 47 Tower Structure: Steel Column (Water Forms Canada Ltd.

fig. 48 Tower Structure: Concrete Column (Water Forms Canada Ltd.
Kitchener, Ontario)

problems. Also, soil erosion around the flumes can quickly undermine the slides by washing out the sand bedding materials. It is recommended to establish a ground cover plant material on the hill immediately after installation of slides.

- . hill failure was a problem at only one park. This was due to constructing the hill in improper weather conditions and using moist clay, which prevented proper compaction. To prevent hazards such as this, ensure that the construction season is properly planned, hill base is carefully prepared and soil is well compacted and not oversaturated with water.
- . ensure any cracks or fissures are inspected by a qualified soil engineer, dug out, filled and recompacted promptly.
- . it is recommended that qualified supervisors oversee and regularly inspect construction of the hill to ensure proper compaction and construction techniques during this critical phase of park development.

5.1.5 Tower Construction

planning & design considerations:

- . a waterslide tower can be built on a minimum area of 10,000 square feet (929 m) including the landing pool. (fig.46)

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DB I.D. 1-190

TOTAL LENGTH OF SLIDE IS 191.3052 FT.

SLOPE OF SLIDE IS 9.2074 PERCENT

REFERENCE STARTING ANGLE OF 90.0000 DEGREES

ITEM#	PART#	TYPE OF PIECE	COORDINATES AT END OF PIECE		
			X	Y	Z
0	0	START OF SLIDE	0.0000	-1.0000	-1.0000
1	2	10 FT. ST.	0.0000	8.9579	-0.0831
2	8	3 FT. TRANS.	0.0000	11.9452	0.1919
3	1	6 FT. ST.	0.0000	17.9200	0.7420
4	4	45' L. 10 FT.	-2.9297	24.9930	1.4654
5	4	45' L. 10 FT.	-10.0027	27.9227	2.1887
6	4	45' L. 10 FT.	-17.0757	24.9930	2.9120
7	4	45' L. 10 FT.	-20.0054	17.9200	3.6354
8	4	45' L. 10 FT.	-17.0757	10.8470	4.3587
9	4	45' L. 10 FT.	-10.0027	7.9173	5.0821
10	4	45' L. 10 FT.	-2.9297	10.8470	5.8054
11	4	45' L. 10 FT.	-0.0000	17.9200	6.5288
12	4	45' L. 10 FT.	-2.9298	24.9930	7.2521
13	4	45' L. 10 FT.	-10.0027	27.9227	7.9754
14	1	6 FT. ST.	-15.9775	27.9227	8.5255
15	4	45' L. 10 FT.	-23.0505	24.9929	9.2489
16	4	45' L. 10 FT.	-25.9802	17.9199	9.9722
17	4	45' L. 10 FT.	-23.0504	10.8470	10.6956
18	4	45' L. 10 FT.	-15.9774	7.9172	11.4189
19	1	6 FT. ST.	-10.0027	7.9173	11.9690
20	4	45' L. 10 FT.	-2.9297	10.8470	12.6924
21	4	45' L. 10 FT.	-0.0000	17.9200	13.4157
22	4	45' L. 10 FT.	-2.9298	24.9930	14.1390
23	4	45' L. 10 FT.	-10.0028	27.9227	14.8624
24	8	3 FT. TRANS.	-12.9901	27.9227	15.1374
25	3	15 FT. V.D.	-27.6519	27.9226	19.5001
26	9	ENTRY POOL	-36.6140	27.9226	21.0001

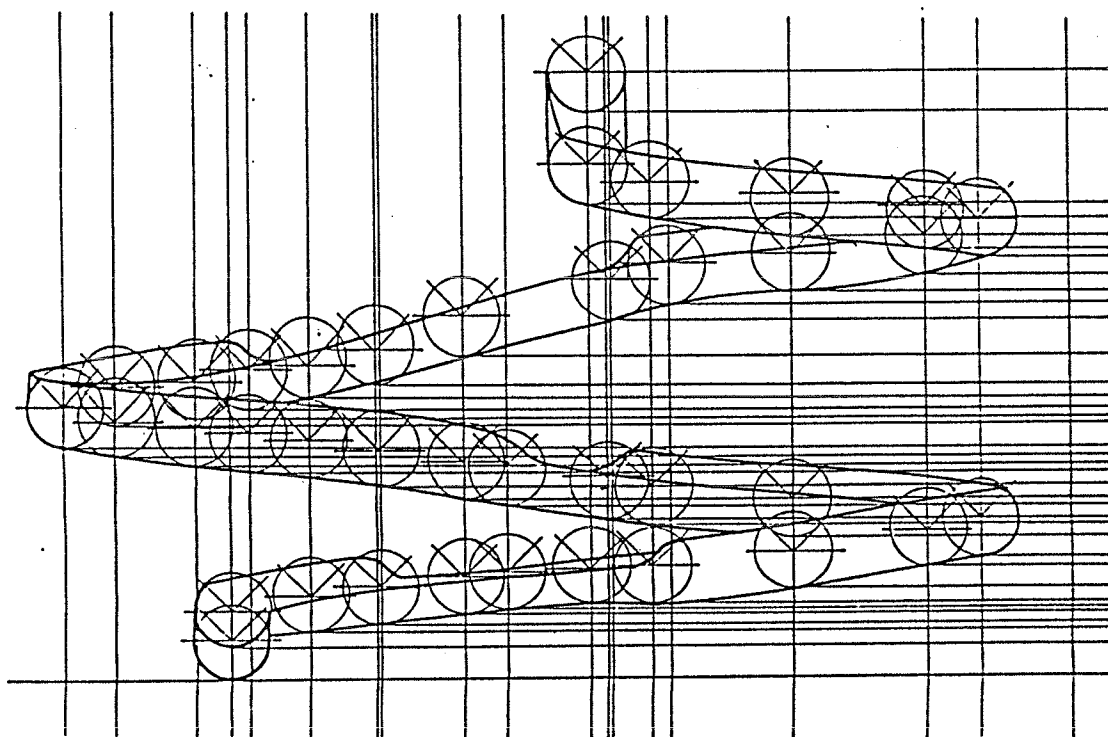


fig. 49 Computer Slide Path Layout (Water Forms Canada Ltd.
Kitchener, Ontario)

- . in the parks visited, the average height for outdoor waterslide towers was 52 feet from the pool deck up to the slide entries. This allows for runs ranging from 350' to 500' in length.
- . the basic components for the tower include vertical steel or concrete columns for the basic structure, cantilevered braces with cradles to hold the slides, and concrete piles or footings to support the tower. (fig.47 & 48)
- . one adaption of a tower structure is to backfill the center of the structure with soil to create the visual effect of the slides being on a hill. This helps to make the tower appear more stable and the height less intimidating.

maintenance & safety considerations:

- . all steel components should be undercoated and painted to prevent rusting and corrosion.
- . all bolts should be galvanized and connections should be inspected seasonally for tightness, wear or damage.
- . all waterslide paths on tower structures should be engineered using a computer to give x, y and z co-ordinates to pin-point flume locations, supports and joints. This is most critical in tower construction because all flume sections must fit together in the precise locations. (fig.49)
- . all tower elements, including the slides, should

be grounded in case of lightning strikes.

- . the tower should not be located near power, gas, or any other utility lines.

5.1.6 Stairs

planning & design considerations:

- . when stairs are the main access up to the slide entries, all local building codes and safety standards should be met. Exterior stairs are usually not as steep as interior stairs. Wider treads and lower risers are recommended for user safety.
- . stairs for a waterslide facility can be constructed of various materials including wood, steel or concrete.
- . it is recommended that stair treads be between 11"-14 1/2" deep (28-37 cm) and risers be between 4"-6 1/2" high (10-17 cm).³³ The width of the staircase should be a minimum of 3.3 feet wide (1m) to allow people to pass by slower patrons.
- . all steps in a series should be uniform with the maximum rise between landings at 7.5 feet (2.2 m). Each landing should be 5 feet (1.5 m) in length.
- . double handrails should be provided, one at 3 feet (.9 m) and the other at 2'-4" (.7 m). Handrails should be 1 1/2" to 2" in diameter and capable of supporting 250 pounds.³⁴
- . stairs should be free of lips and overhangs.

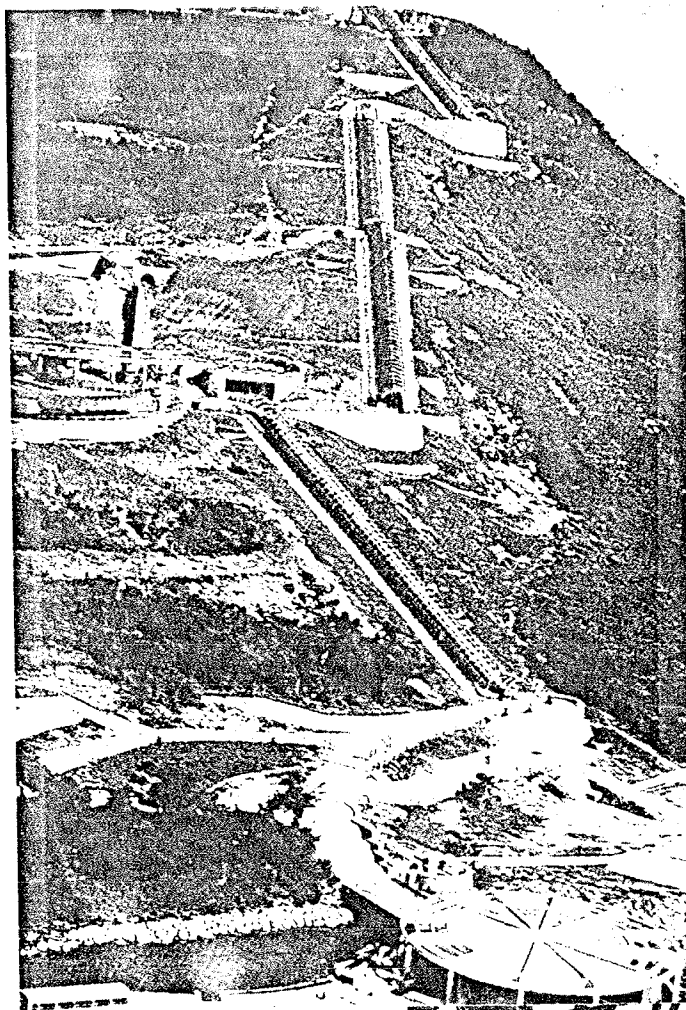
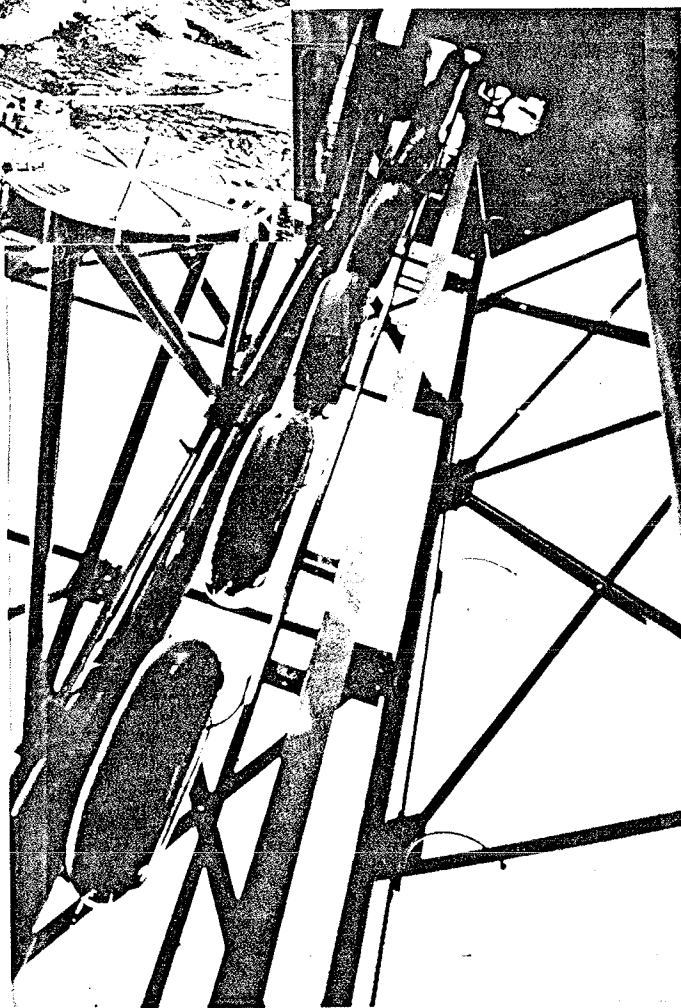


fig. 50 World's
Longest Outdoor

Escalator:
"Ocean Park"
Hong Kong

fig. 51 Tubulator:
"Wild Rapids", Sylvan
Lake, Alberta



- . the following formula for calculating stair dimensions can be used: twice the riser plus the tread = 26; thus for a 6 inch riser, $6 \times 2 = 12$, subtracted from 26 = 14 inch tread.³⁵ (15 cm x 2 = 30, subtracted from 66 = 36 cm tread).
- . stairs should be swept and mopped daily to keep surface clean and dry. The treads should have a 1% pitch to drain excess water.
- . stairs should be surfaced with a mildew-resistant material to reduce deterioration.

maintenance & safety considerations:

- . stairs should be surfaced with a non-slip material or have non-slip adhesive strips on the treads.
- . alternative access such as elevators or escalators could be considered for disabled patrons and also when heights are excessive. For example, at "Ocean Park" in Hong Kong the world's longest outdoor escalator transports patrons up an extensive hillside to various activity areas of the park. (fig.50) Another form of automated access up to the slide entries is the "Tubulator" at Wild Rapids Waterslide Park in Sylvan Lake, Alberta. Inner tubes from the River Ride slide are transported from the landing pool area up to the slide entries by a conveyor system thus eliminating the congestion of patrons carrying inner tubes up the stairs. (fig.51)

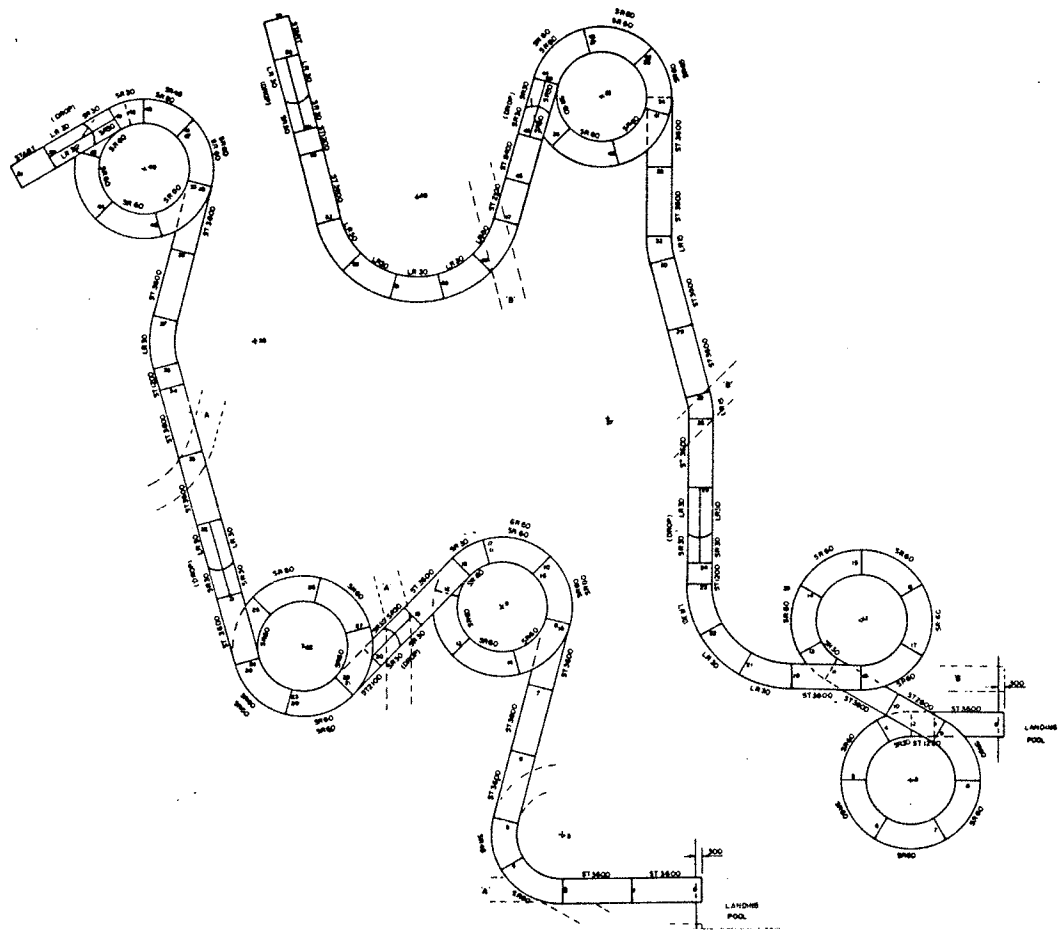
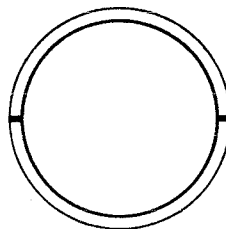


fig. 52 Slide Path Layout (Big Country Water Slides, Vernon, B.C.)

AQUA FLUME



TYPICAL SECTION

- | | |
|---------------|---|
| CONSTRUCTION: | <ul style="list-style-type: none"> - SANITARYWARE GELCOAT - LIGHT STABLE TRANSLUCENT RESIN - HEAVY DUTY FIBERGLASS LAYUP |
| SECTIONS: | <ul style="list-style-type: none"> - START BOX - STRAIGHTS - CURVES - DROPS |
| COLOUR: | <ul style="list-style-type: none"> - MULTI-CHOICE |

fig. 53 "Aqua Flume" Tube Slides (Big Country Water Slides, Vernon, B.C.)

5.1.7 Slide Runs:

planning & design considerations:

- . in the field research the length of runs ranged from 350 feet to 500 feet with the average length at 388 feet (approx. 118 m). (fig.52)
- . all slides were constructed of molded fibreglass flumes glued and bolted together on site.
- . slide units are available in three basic forms: a curve, a drop, and a straight section. Slides are also available in tunnel sections. (fig.53)
- . the average number of adult slides per park was four. The range was 2 to 7 slides per park with 80% of the parks offering 4 adult slides.
- . the average number of intermediate slides was 2 per park. The range was 0 to 3 with 42% of the parks offering intermediate slides.
- . the average number of kiddie slides was 2 per park. The range was 1 to 5 with 100% of the parks offering this amenity. These are an essential element in a waterslide park. It is recommended that a children's water play area be incorporated in the kiddie slide area for additional recreational use. Elements such as water guns, fountains, bubblers and sprays should be provided to create a variety of recreational experiences.
- . the average number of river rides was one per park. The range was 1 to 2 river rides per park

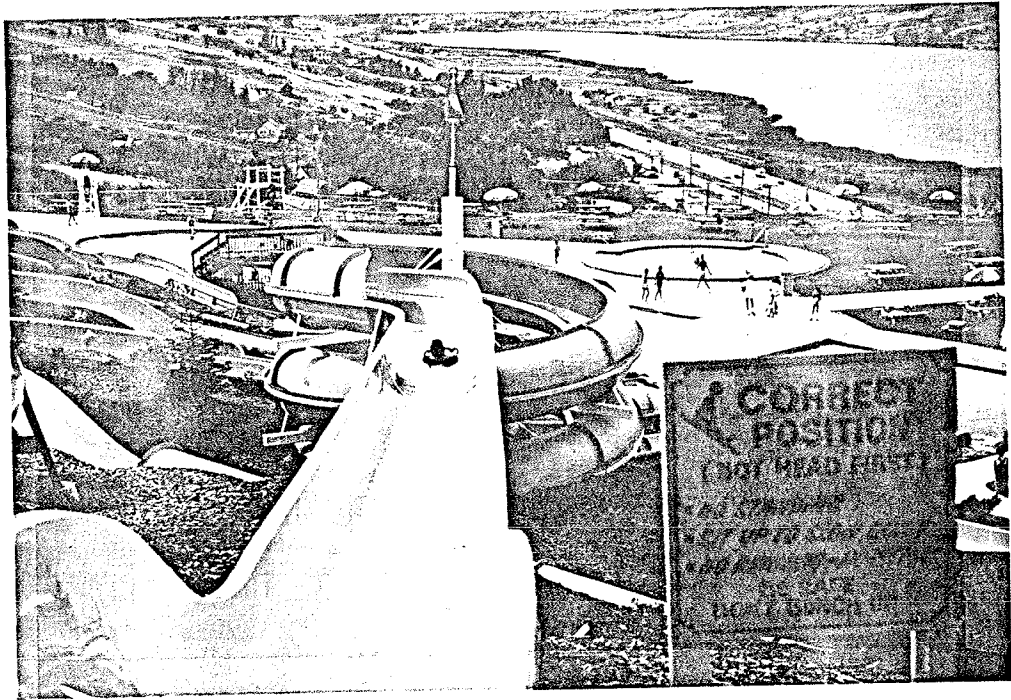


fig. 54 Adult Slides: "Atlantis World of Water", Vernon, B.C.

with 68% of the parks offering a river ride. This feature was reported as being the most popular ride of all in each park.

- . the average number of speed slides was 2 per park. The range was 0 to 3 with 21% of the parks offering speed slides.
- . the average number of ramp slides was 1 per park. The range was 0 to 2 with 37% of the parks offering a ramp slide.
- . adult slide runs should be a minimum of 350 feet (107 m) in length for optimum patron enjoyment.
- . a minimum of 4 adult slides should be provided at each park to create interest and variety. Adding to this number increases the attraction of the park and can potentially increase the patron's length of stay. (fig.54)
- . intermediate slides are attractive alternatives for youngsters who find the kiddie slides too slow and the adult slides too challenging. As well, Parents are able to ride down the intermediate slides with the children as well, which can be reassuring to apprehensive youngsters. A minimum of 2 intermediate slides should be provided to offer patrons a wider choice in sliding experiences and to provide a faster turn around for use of slides.
- . it is recommended that a minimum of 2 kiddie

slides be provided at all parks with 3 or 4 being preferable. A water play area that includes items such as fountains, sprays, bubblers, water guns or toys, and a shallow wading area should be provided in close proximity to the waterslide area, but no closer than 15 feet (4.5 m) to the slide exits.

- . kiddie slides are typically narrower and shorter (60 feet or 18 m) than adult or intermediate slides. The width is usually approximately 2.75 feet (84 cm) and the depth is usually 18 inches (45 cm). Curved sections are available in 15°, 30° and 45° for kiddie slides as well as 12' (3.6 m) drop sections and straight sections similar to the adult slides.
- . intermediate slides are usually shorter versions of adult twisters.
- . all slides have entry sections at the beginning of the slides where the water enters the flumes. These sections are relatively level to allow patrons to step into the flume and then safely sit on the slide and push off.
- . a river ride is a major attraction to a waterslide park and appeals to the whole family. River ride components are available in sections approximately 8 feet (2.4 m) long with 15°, 25 foot radius curves and two special components for draining the water called drop sections.

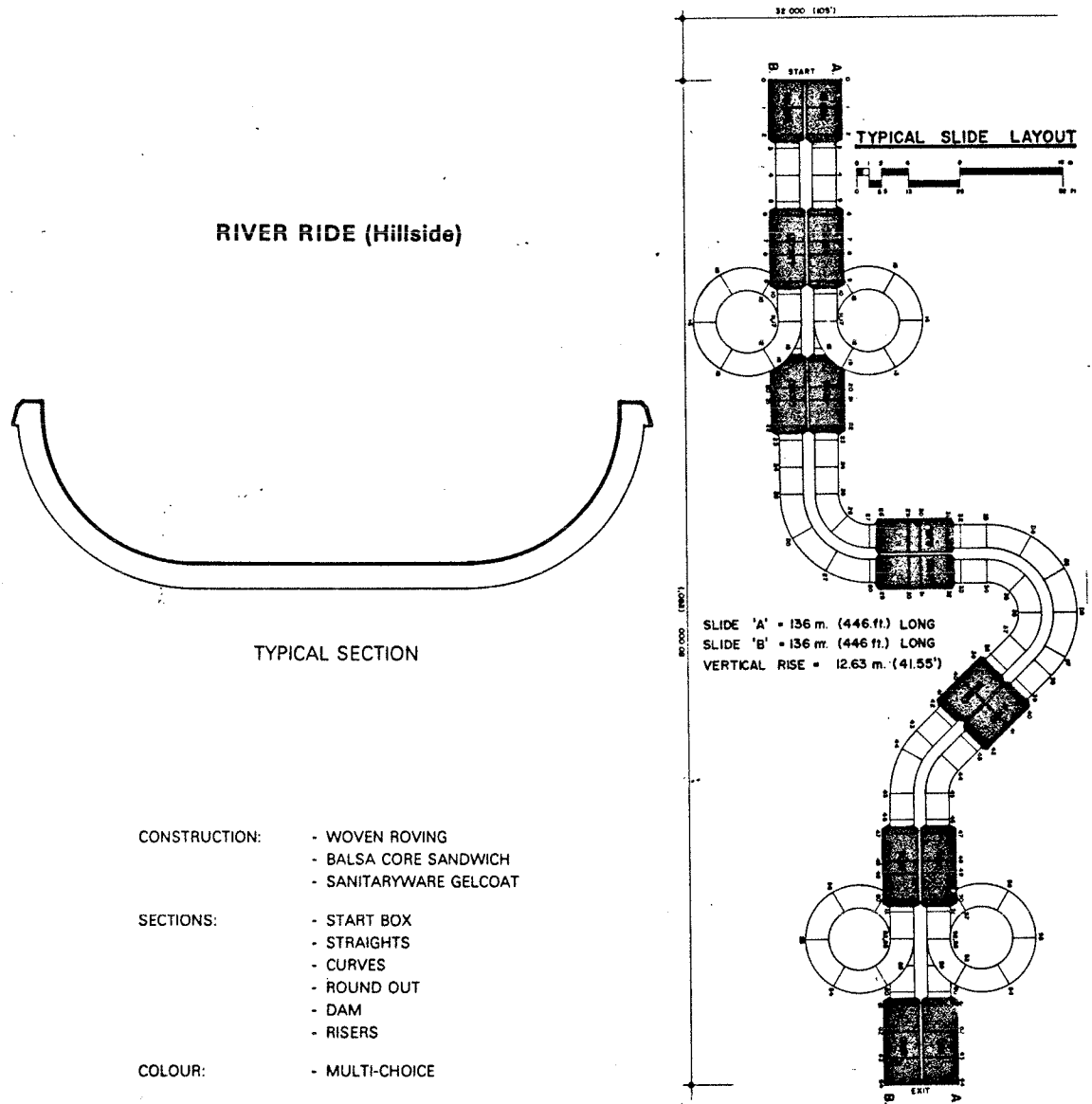
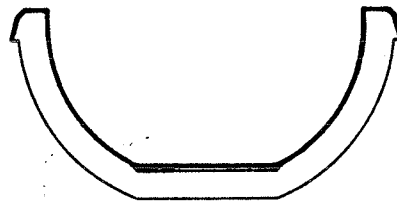


fig. 55 River Ride Cross-Section & Layout

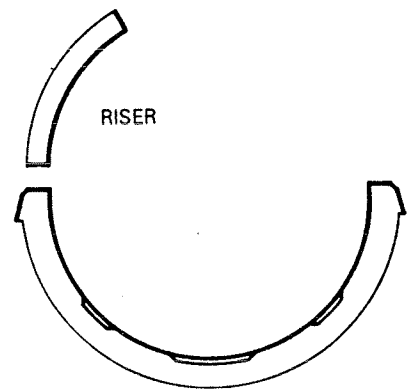
(Big Country Water Slides,
 Vernon, B.C.)

- . the optimum slope of a river ride is 25% with drop sections being no steeper than 45° . The maximum length of the pools after the drop sections is 15 to 20 feet (4.5 to 6 m). The pools may be slightly tilted at 3% slope.
- . the width of the ride should be no less than 8 feet (2.4 m) to accommodate patrons on inflated truck size inner tubes. The average length of river rides is approximately 270 feet (82 m) on a 45-foot hill (14 m). (fig.55)
- . newer types of river rides combine drops and pools with curved spirals for quicker and more diverse rides.
- . speed slides are an important attraction for teenagers and adults who are looking for a high speed thrill ride. The minimum number of speed slides is 2 with an average length of 350 feet (107 m). The run-out distance should be approximately 100 feet (30 m) and can be in a shallow flume rather than a pool. (fig.56)
- . all slides should be constructed of professionally manufactured reinforced fibreglass units with approved colored gelcoat surface for maximum durability and weatherability.
- . all slide units should be professionally installed by an experienced contractor using accurate survey techniques and equipment to ensure conformance to

BONZAI FLUME**TYPICAL SECTION**

- CONSTRUCTION:**
- WOVEN ROVING
 - Balsa CORE SANDWICH
 - SANITARYWARE GELCOAT
- SECTIONS:**
- START BOX
 - STRAIGHT
 - ROUND DOWN
 - ROUND OUT
 - RUN OUT
 - TRANSITION
 - 90° ROUND DOWN
- COLOUR:**
- MULTI-CHOICE

fig. 56 Speed Slide Cross-Section

**FLUME TYPICAL SECTION**

- CONSTRUCTION:**
- WOVEN ROVING
 - Balsa CORE SANDWICH
 - SANITARYWARE GELCOAT
- SECTIONS:**
- START BOX
 - STRAIGHTS
 - HELIX CURVES
 - DROP
 - ROUND OUT
 - END SPOUT
 - 90° ROUND DOWN
 - END CAPS
 - RISERS
- COLOUR:**
- MULTI-CHOICE

fig. 57 Riser Cross-Section

(Big Country Water Slides, Vernon, B.C.)

the slide path design.

- . all slide units should be bolted together with joints sanded smooth and sealed against leaks.
- . curved units are usually available in 15, 22.5, 30, 45, and 60 degree sections with 7.5' to 21' radii (2.2 m to 6.4 m) to the center line of the slide.
- . slide units are usually available in 4 foot (1.2 m) widths and lengths ranging from 34 to 165 feet (.91 to 4.8 m), and can be custom built for special situations. The average depth of the components is approximately 2.25 feet (68 cm).
- . all slides have end components that avoid rough edges and give the slide a finished appearance at the pool.
- . the river ride has a special end component called a round out to level the slide angle to that of the water.

maintenance & safety considerations:

- . all slide joints should be inspected daily prior to opening of the park. Rough joints should be smoothed and buffed to prevent cuts and scrapes on patrons using the slides.
- . bolts should be checked for tightness and failures where leaks or rough seams occur. Repairs should be undertaken immediately upon report.
- . slide runs should be swept daily prior to opening

of park.

- . slides may also be waxed several times a season to increase speed and maintain finish.
- . risers should be installed on the outside top of curved units or where water loss may be a problem
- . risers are usually 1.5 feet (46 cm) in height and are prefabricated to fit all twister and river ride components. (fig.57)
- . an overall slope of 9% to 10% should be maintained on all adult slide runs. A slope of 12-15% should be maintained on the kiddie slides.
- . drop sections should be no steeper than 45 degrees to prevent jarring and hard landings.
- . spirals should be at a steeper slope (approximately 10%) to prevent slowing down.
- . a minimum separation of 4.5 feet (1.37 m) should be maintained where slides cross over each other.
- . a minimum horizontal distance of 10' (3m) should be maintained between the slides at slide exits into the landing pool.

5.1.8 Pools

planning & design considerations:

- . at a typical waterslide facility, the following pools are recommended:
 - landing pool for adult slides
 - landing pool for intermediate slides

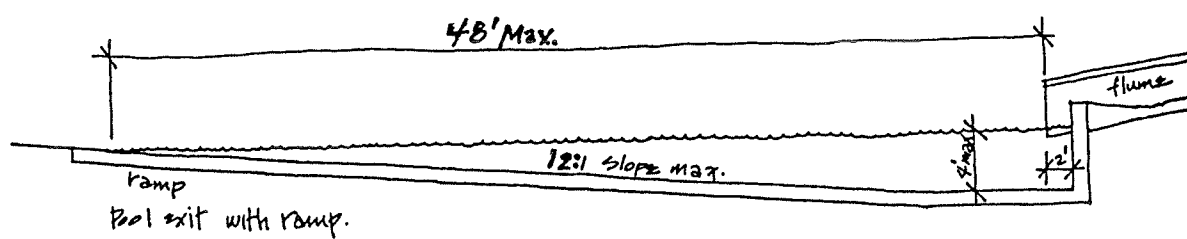


fig. 58 Landing Pool: No stairs

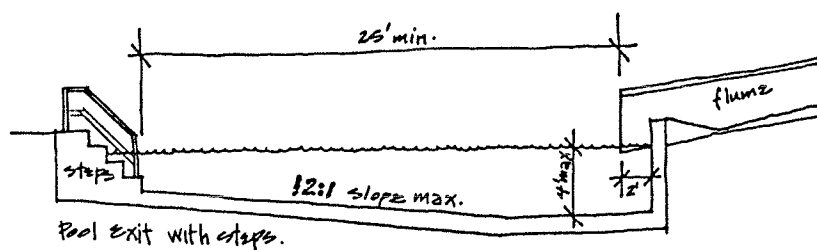


fig. 59 Landing Pool with stairs

- landing pool for kiddie slides
 - landing pool for river ride
 - hot pool for relaxation and warming up
 - leisure pool for passive swimming and cooling off
 - children's water play pool/pools for variety and entertainment for children and adults
- . pools can be made of steel with vinyl sides, formed concrete or gunite concrete. Gunite concrete allows for more creative pool shapes and cheaper construction costs but must be constructed carefully to prevent uneven surfaces. Gunite also tends to leach calcium into the water.³⁶
- . it is recommended to slope the landing pool floor up to the deck at 12:1 slope³⁷ rather than using stairs. (fig.58) This allows for ease of exit for both abled and disabled individuals. This requires extra width of the pool that should be provided for. Grab bars should be located at the pool edge to accommodate disabled people and individuals who have difficulty leaving the pool.
- . when stairs are used as exit from the landing pools (fig.59) all steps should have marker strips at the top that are clearly visible through the water. Also a double handrail that will accommodate adults and children should be provided to assist individuals in climbing the stairs. The

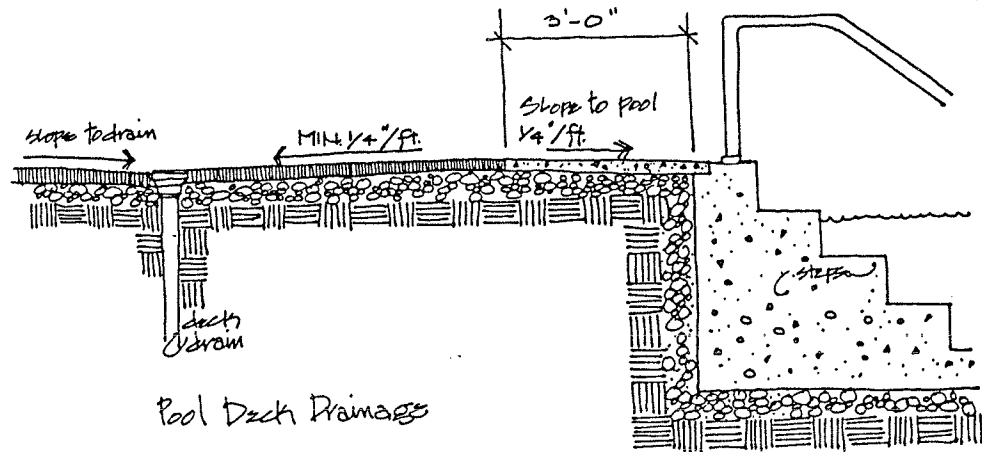


fig. 60 Deck Drainage

lower section of the handrail should be 2'4" (.7 m) for children and the top section should be 3 feet (.9 m) in height for adults. The diameter of the handrail should be 1 1/2" to 2" (4 to 5 cm) in diameter and capable of supporting 250 pounds (114 kg).³⁸ The recommended material for handrails is stainless steel. This provides optimum strength and is rust proof.

- . all pools should have underwater and area lighting for safe twilight and evening use.
- . the initial 3 feet (1 m) of the deck surrounding the pools should drain toward the pools at a slope of 1/4" per foot (.6 cm to 30 cm) to catch the water shed as patrons leave. The remainder of the deck area should drain away from the pools to keep debris such as grass or soil out of the pool water. (fig.60)
- . a deck drainage system should be used to eliminate standing water. Surface water on the deck areas should be collected by deck drains and not directed onto grass or shrub areas as treated water easily kills vegetation.
- . depths of water should be indicated on the decking surface in metric and imperial measurements.
- . in the parks visited the average depth for the adult slides landing pool was 3.6 feet (1 m). The range was from 3 to 4.5 feet (.91 m to 1.4 m). It

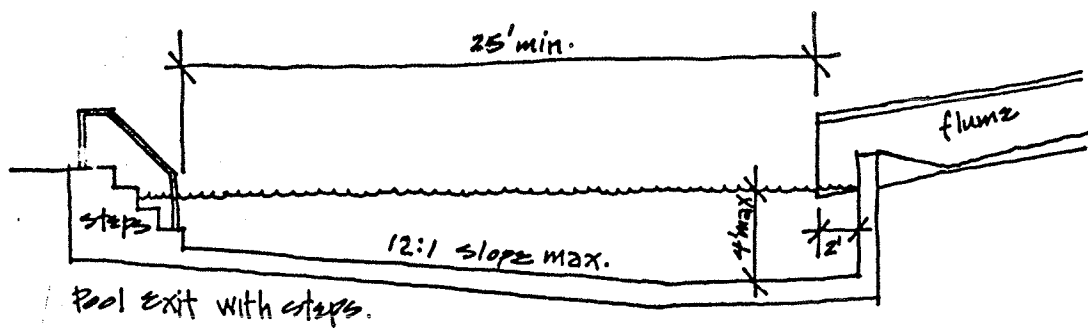


fig. 61 Landing Pool Dimensions

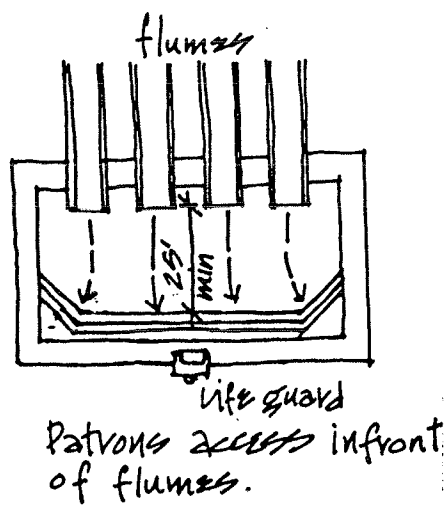


fig. 62 Exit from Landing Pool

is recommended that the landing pool for the adult slides be a minimum of 3.8 feet deep (1.2 m) with a maximum depth of 4.3 feet (1.3 m).

- . children's play pools should be no deeper than 18" (.45 m) and toddler's pools no deeper than 6" (.15 m). Water should be recirculated and disinfectant added automatically at all times the pool is in use.³⁹
- . a shaded area should be readily available for young children as they can easily overheat when exposed to prolonged periods of direct sunlight.
- . river ride pools can be shallower, 3 1/2 feet maximum (1 m) and kiddie pools a maximum of 2 feet (.6 m).

maintenance & safety considerations:

- . it is recommended that the hot pool and landing pools be covered with an insulated pool blanket to assist in retaining heat in the water overnight.
- . pools should have cracks grouted and be repainted annually.
- . slides should be fastened to the landing pool wall at exits and sealed to prevent water loss.
- . the pool floors should be vacuumed daily prior to opening
- . it is recommended that the distance from the slide exits to the far edge of the landing pool be a minimum of 25 feet (7.6 m). (fig.61) In the field

research the average distance was 36 feet (11 m) for safe landing space.

- . access out of the landing pool should be directly in front of the slide exits and not off to the sides, to prevent patrons from walking or swimming in front of adjacent slides. (fig.62)
- . the floor surface of all pools should be coated with a non-slip epoxy paint or equivalent.
- . anti-slip deck surfacing should be used around the perimeter of all pools.

5.1.9 Walkways

planning & design considerations:

- . in the field research the most common material used for walkways up to the slides was concrete. Asphalt was the only alternative material and was used in 37% of the parks. With concrete, it is recommended to use a fine grooved texture on the surface to help prevent slipping with wet feet.
- . walkways and patio areas around the administration building and pool area can use a combination of materials. In the field research, materials such as paving stone, outdoor carpet and concrete were used in attractive colors and combinations. Durability, appearance, safety, maintenance and economy should be considered when choosing a paving material. Low initial cost should not be the only deciding factor. For example,

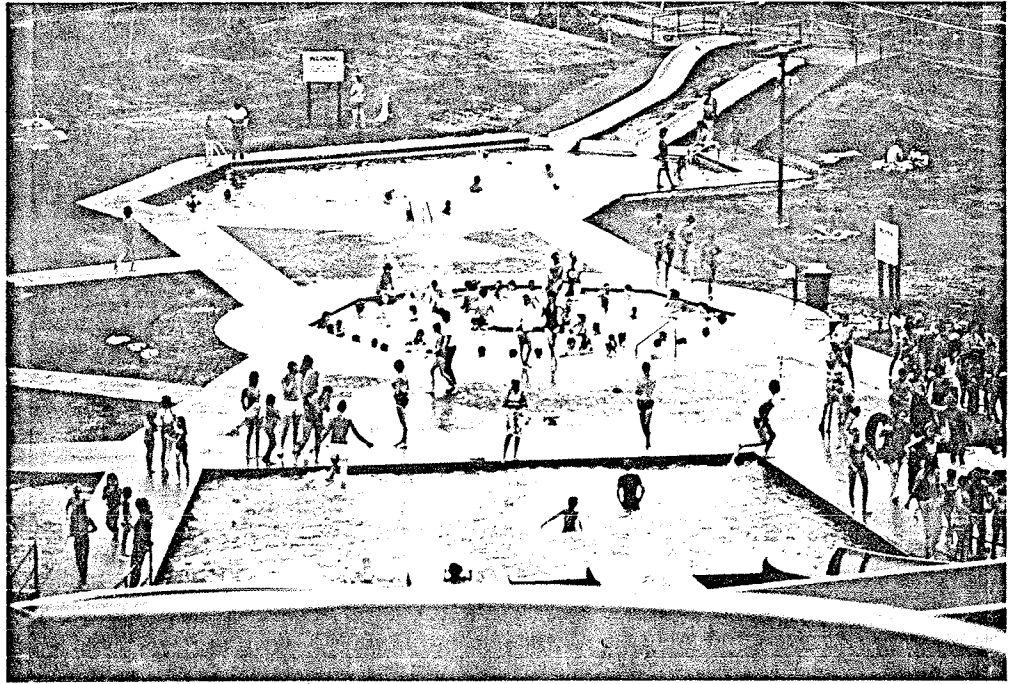


fig. 63 Paving Variation: "Wild Slides", Regina, Saskatchewan

interlocking paving is more costly than asphalt, but on a long-term basis it is more durable, it withstands frost heaving, it can be reused, the paved area can easily be enlarged or reduced, and it is available in many different colors and designs. A diversity of paving types, textures and colors can often add visual interest to the site. (fig.63)

- . paving textures should be used to delineate changes of grade, stairs, ramps, intersection of walks and locations of special information.
- . walkways for disabled access should be at least 5 feet (1.5 m) wide. Gates and entrances should be a minimum of 2'6" (.7 m) in width and ramps should be provided at all level changes.⁴⁰
- . curbs should be graded at passenger loading zone in parking lot to provide ease of access onto the walkways.
- . slopes for walkways to the top of the slide should be no greater than 10% for general public access and no greater than 15% for short walks with breaks in grade.⁴¹ If handicapped access is to be provided, walkways should be no greater than 5% with a five foot (1.5 m) rest area every 100 feet (30 m).⁴²
- . where ramps are necessary on site, the minimum slope is 8.33% for a distance of 30 feet (15 m).

A minimum level area of 5 feet (1.5 m) should be provided before all steep ramps.⁴³

- . for general site walkways the recommended slope is 2 to 3 per cent with the maximum at 5 per cent.

maintenance & safety considerations:

- . walkways should be washed down and cleaned daily to remove dirt and dead grass, etc. which might make them slippery and would contaminate pool water.
- . areas of settlement should be patched so as to avoid drainage problems and standing water.
- . light colored surface materials for walkways and decks should be used to prevent excessive amounts of heat absorption that make walking in bare feet uncomfortable.
- . when asphalt is used, it is recommended to coat the surface with a reflective material such as concrete dust or non-slip reflective paint. Colored pavement could also be used to reduce the amount of heat absorption on the asphalt.
- . walkways should have firm and consistent nonslip surfaces for walking and moving wheeled vehicles and joints should be less than 1/2 inch (1.5 cm) wide.⁴⁴
- . wheel stops should be placed near hazardous areas and should be 2 to 3 inches (5 to 8 cm) high and 6 inches (15 cm) wide. Breaks should be provided

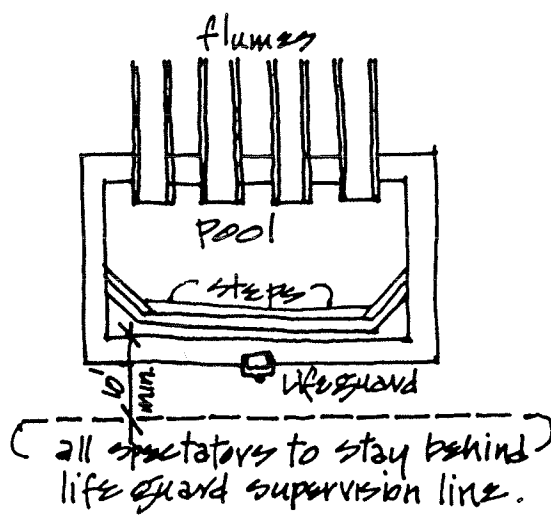
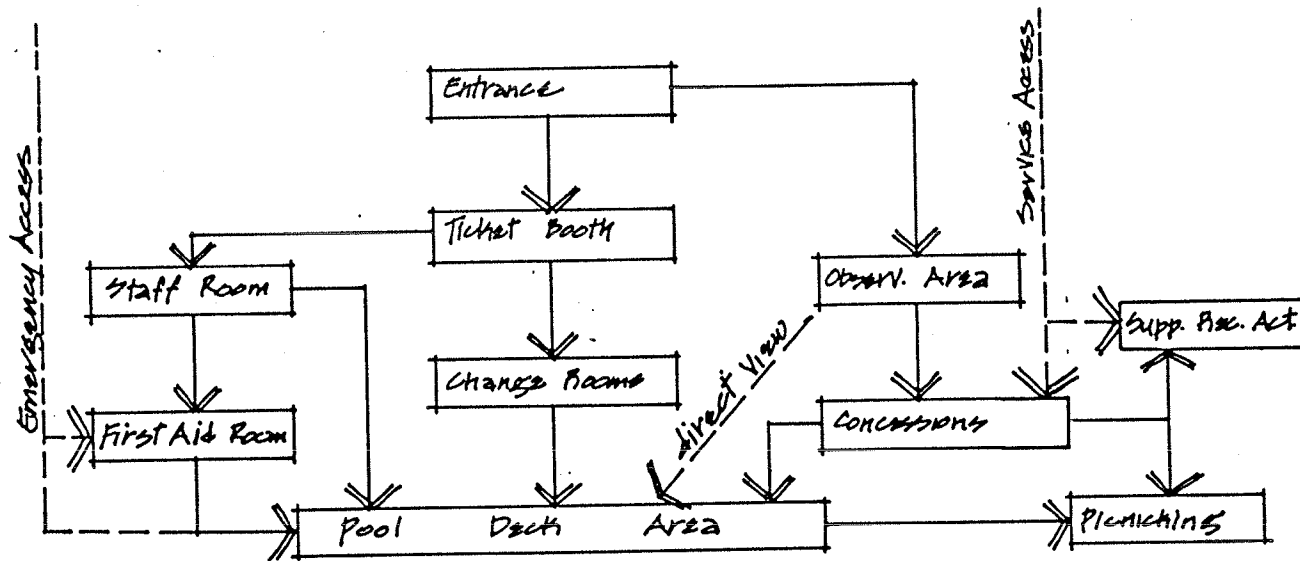


fig. 64 Supervision Boundary

every 5 to 10 feet (1.5 to 3 m) for surface drainage.⁴⁵

- . lines should be painted on the deck in front of all pool exits and users required to stay behind them so as to allow lifeguards unrestricted access. (fig.64)



Administration/Service Building Flow Chart.

fig. 65 Administration Building Flow Chart

5.1.10 Administration Building/Service Building

planning & design considerations:

- . it is recommended that the main administration building house the first aid room, staff room, office entrance, cashier booth, change rooms, sales area (e.g. gift shop) and food and beverage concession. (fig.65)
- . the size of the administration area excluding the change rooms should be approximately 500 square feet (47 m^2) consisting of a manager's office, first aid room, staff area including ticket counter and staff washrooms.
- . separate access to the manager's office and the first aid room should be provided. The first aid room should consist of an area for a cot, sink and storage of first aid supplies, approximately 55 square feet (5 m^2).
- . the pump house or mechanical room is often located in a separate structure on site but can also be accommodated in the administration building to reduce building construction costs.
- . access by service vehicles should be carefully considered to accommodate deliveries, garbage removal and maintenance equipment.
- . the average size of the administration building in the parks researched was 3,200 square feet. The

range was from 2,000 square feet to 7,500 square feet. Eighteen out of nineteen administration buildings were constructed of concrete block with variations in exterior finish. Paint, grooved textures, stucco and graphics were used to accent the building and make it more attractive. It is recommended that the exterior finish be aesthetically treated to enhance the environment of the park. Variations in roof treatment such as clay tiles, asphalt shingles or cedar shakes could also increase the appeal of the park.

- . park entrance control is a major consideration when designing the administration building. The entrance gate should be centrally located with the ticket booth clearly visible. Pedestrian exit traffic should be separate from the flow of pedestrians entering the park. One way turnstiles are essential for park entry control.

maintenance & safety considerations:

- . stairs should be avoided near the administration building and major circulation routes around the perimeter of the building kept as level as possible (2% slope).
- . all walking surfaces should have non-slip surfaces and proper drainage to avoid pooling of water (minimum slope 2%).
- . entire building including entrance gate should

employ security devices to prevent unauthorized entrance to the park and building after hours and during off-season.

- . a vehicle entry gate should be located to allow emergency vehicles access to the pool area at any time, with minimum disruption to patrons.

5.1.11 Observation Area

planning & design considerations:

- . the observation area should be located to overlook the landing pool activity zone and should be positioned with the sun at the back to avoid reflected glare off the pool water.
- . it is recommended to locate the observation area near the food concession.
- . entrance to the park through the observation area should be strictly prohibited with the use of elements such as fences, screens, railings or major elevation changes.
- . the observation area should be accessible by all individuals including children, seniors and the disabled.
- . the observation area should provide benches, bleachers or lounge chairs for spectators. It is recommended to provide back rests on all seating arrangements.
- . it is recommended to provide at least 50% shade

through the use of elements such as umbrellas, canopies, trellis or trees.

- . when handrails are used in front of the observation area, use heights and members that will not obstruct the major view for individuals sitting in a wheelchair or on the seating provided.
- . a minimum of two public pay phones should be provided within 100 feet (30 m) of the observation area. At least one phone should be accessible for use by the disabled and children, and should be no greater than 4 feet (1.2 m) in height.⁴⁶ Braille instructions, volume control and push button dials should be used.
- . a drinking fountain should be provided at the observation area or within a minimum distance of 50 feet (15 m). Two nozzles should be provided, one at 33 inches (.8 m) high for children and wheelchair users, and one at 38 inches (1 m) high for adults.⁴⁷ Hand levers should be used and a drained paved area of at least 20 inches (.5 m) be provided to avoid mud and puddles.

maintenance & safety considerations:

- . seasonally check all surfaces for wear; re-finish, repaint or re-surface materials that show excessive wear.
- . use non-slip walking surfaces

- . use surface materials that do not get uncomfortably hot in sun.
- . railing width should be small enough to protect young children from falling through.

5.1.12 Picnic Area

planning & design considerations:

- . it is recommended to provide a minimum of 1.5 acres for picnicking. At the parks researched the average area for picnicking was 2 acres. The largest area reported was 15 acres which included picnicking adjacent to a man-made lake.
- . the picnic area should be located within view of the waterslide activity but not within major circulation routes.
- . a separate area should be designated for organized group picnics. This area should include gas barbeques for rent and a standpipe for drinking water and a separate parking lot adjacent to the picnic area. Rental of the area should include access to the waterslides.
- . picnic tables should be provided at a ratio of 16 tables per acre for general public use and 25 tables per acre for group use.⁴⁸
- . both picnic areas should provide shade through the use of elements such as umbrellas, trees, gazebos or canopies, and wind protection through the use

of elements such as fences, walks, shrub and tree plantings or tarps.

- . a standpipe for drinking water should also be provided in the general public picnic area at a ratio of one per acre.
- . open play space areas should be provided for informal games such as frisbee and ball throwing.
- . color is an important consideration in any design and adds to the character of the environment. It is recommended to use a color scheme that is complimentary to the site and adds quality and vitality to the environment.
- . picnic tables should be in character with the park theme. Similar materials, color and design details found throughout the park should be used. Picnic tables should not be permanently fixed to a specific location so as to allow greater flexibility of use.
- . picnic tables should be a minimum of 36 inches wide, 48 inches long and 29 inches in height from the ground to the table top to accommodate disabled users.
- . garbage receptacles should be provided for every 4 tables and should also be in character with other site furnishings such as tables, signs and light fixtures.

maintenance & safety considerations:

- . garbage receptacles should be emptied daily.
- . when umbrellas are used, it is recommended to remove the umbrellas each evening and store indoors to prevent unnecessary weathering of materials and potential vandalism. An alternative is to rent the umbrellas to park patrons and collect a deposit on them which will be reimbursed upon return of each umbrella after use.
- . all picnic tables should be inspected daily for damages and be repaired as necessary. When wooden table tops or benches are used, seasonally sand and resurface to prevent unnecessary injuries.
- . charcoal barbeques should not be allowed in the park to prevent fires on site and avoid the problem of charcoal disposal.
- . the use of glass objects such as bottles, cups or dishes should be prohibited on the entire site to prevent injuries from breakage.

5.1.13 Signage

planning & design considerations:

- . signs are a necessary feature in a waterslide park. They identify specific places and functions, indicate rules and regulations, and give routing information. Signs should be used only where necessary. Site design should be clear enough to indicate intentions of traffic movement



fig. 66 Park Identification Signs

and use.

- . legible, easily understood signs are an important feature in maintaining control and order. It is recommended that signs use dark colored letters on a light colored background. Black on white or yellow produces the most legible color combination.⁴⁹
- . signs should be used to identify areas not accessible to the disabled.
- . material choice for signs includes routed wood, plexiglass-wood-steel combination, or precast exposed aggregate concrete. The most commonly used material for parks is routed wood. It has design flexibility and can be constructed by local firms. If paints or stains are used, it requires regular maintenance. (fig.66)
- . plexiglass-wood-steel combination can be used for the park advertising sign. It should be set on concrete piles and supported within steel girders.
- . precast exposed aggregate concrete can be used for signs when that image is carried out through the park. These signs require concrete foundations.

maintenance & safety considerations:

- . signs should be inspected seasonally for fading of lettering and general condition. Repainting and general repairs should be completed prior to opening date of the park. See Appendix D for

typical signage requirements.

5.1.14 Site Furnishings

planning & design considerations:

- . site furniture should be durable and visually complimentary to the overall site. Signs, tables, benches, garbage receptacles, lights and bollards should be carefully integrated into the landscape design by using similar materials and detailing found throughout the site.
- . site furniture should be located just off the major circulation routes so as not to obstruct pedestrian traffic. Key locations include waiting areas, arrival points and viewing places.

maintenance & safety considerations:

- . site furnishings are obvious targets for vandalism. Product durability and replacement costs should be considered when choosing these elements.
- . bollards & fences should be used in areas where vehicular circulation is not permitted but pedestrian circulation is. For example, pedestrian and bicycle pathways in the parking lot can be protected through the use of bollards. Night lighting can be designed into the bollards and provide additional pedestrian safety. Lighting levels should be from 1/2 to 5 foot

candles, depending on the degree of pedestrian traffic in the area.⁵⁰

5.1.15 Plant Materials

planning & design considerations:

- . it is recommended that built-in irrigation systems be installed in all shrub and lawn areas prior to planting.
- . when slides utilize a hill, ground cover should be used to stabilize surface soil. Vines and natural grasses or ground covers that require no mowing and provide adequate surface coverage are preferred.
- . trees should not be planted near the south side of the landing pool, where they will create unwanted shade.
- . it is recommended that plants be selected on the basis of the amount and type of maintenance they will each require.
- . it is recommended that a balance of hard surfaces be combined with plant materials to create interest and different opportunities for sunbathing. Long term benefits of low maintenance landscaping can outweigh the initial capital expense of hard-surfaced areas. It is important to strive for a balanced combination of hard surface materials especially near the

administration building, pool and water play areas.

- . grass or trees should never be located directly adjacent to the pool areas as they could potentially pollute the water, be destroyed by the chemicals in the water, or turn into mud holes from all the traffic .
- . plant materials that are hardy for the particular climate zone should be selected.
- . for steep slopes, it is recommended to use terracing, retaining walls, stone, or rip rapping. Plants that require low maintenance and a covering mulch should be used on the terraces.
- . low solid plantings of trees and shrubs, both deciduous and coniferous, are the most effective for wind barriers.
- . specially shaped and textured deterrent paving should be used to discourage pedestrians and drivers away from planting beds or other areas where access is to be discouraged.
- . tree grids or grates should be used around trees in walkways, deck areas and near automobile traffic areas.
- . slide splash areas such as at tight curves and river ride drop sections should be landscaped with material other than plants. Treatment such as rock or gravel should be substituted for plants

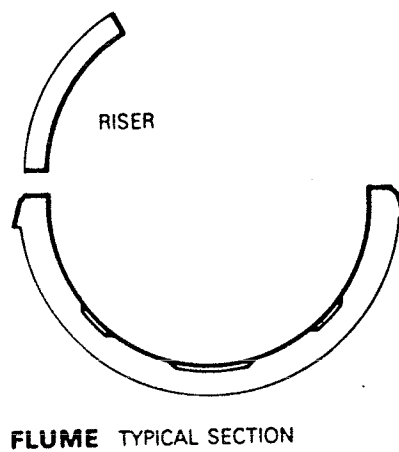


fig. 67 Riser on Flumes (Big Country Water Slides, Vernon, B.C.)

thus eliminating chlorine damage on plant material. High density plantings should be placed adjacent to these areas to soften the visual impact.

- . risers should be placed on flumes in areas where excessive water is splashed out of the slides to protect the plant material. (fig.67)
- . use plants that are most tolerant to chlorine spray exposure (see Appendix C). Plants with the highest degree of tolerance should be used in the most exposed areas such as near the flumes and pools, and plants with moderate tolerance should be used in less exposed areas.
- . prune, fertilize and water plants that are injured and monitor closely for insects and diseases that attack weakened plants.
- . an experienced arborist should evaluate each planting situation to determine proper treatment of damaged plants.

maintenance & safety considerations:

- . the most important maintenance consideration is regular watering. Be sure all trees, shrubs and ground covers receive regular watering, especially in hot, dry weather.
- . insect control is of primary concern as well. Regular inspections of plant materials should be undertaken to ensure health and longevity. When

insects or diseases are found, ensure proper treatments by an authorized nursery person or plant specialist.

- . low maintenance landscaping is less expensive to maintain and will retain its aesthetic appeal and value throughout the years. It is recommended to use ground cover that requires no mowing in areas such as on the waterslide hill, between the slides, and under the tower structure.
- . lawn maintenance can be reduced by the extensive use of larger planting beds for trees and shrubs and paving materials.
- . grassed slopes should be no steeper than 33.3% (3:1) to allow for maximum ease of mowing.⁵¹
- . tall deciduous plants should never be planted near flumes as leaves and twigs could easily disrupt filtration systems.
- . plant materials should not be placed where visibility of activity areas is obstructed from park supervisory staff.
- . plants with thorns should never be used near high-use areas and plants with poisonous berries should never be used anywhere on site.
- . tree branches should be pruned to a minimum of 6.5 feet (2 m) to avoid eye injury.
- . plants that produce fruit should not be used near walkways to prevent slippery surfaces and cleanup

problems from dropped fruit. They should also not be planted near the pools or flumes to avoid filtration and water quality problems.

5.2 Operation, Maintenance & Safety Issues for OUTDOOR Waterslide Parks

- 5.2.1 Hours of Operation
- 5.2.2 Entrance Receipt
- 5.2.3 Communication System
- 5.2.4 Lifeguards
- 5.2.5 Slide Attendants/Supervisors
- 5.2.6 Height Restrictions
- 5.2.7 Emergency Access
- 5.2.8 Security

5.2.1 Hours of Operation

planning & design considerations

- . in the parks researched the hours of operation included:

10:00 a.m. - dusk

10:00 a.m. - 8:00 p.m.

10:00 a.m. - 9:00 p.m.

10:30 a.m. - 8:30 p.m.

- . the most common time span was 10:00 a.m. - 8:00 p.m. This was primarily due to climatic conditions. In most locations in western Canada the air temperature drops significantly after 8:00 p.m. which creates uncomfortable conditions for bathing suit sports. Attendance drops and operational costs exceed revenue generated during the later hours.
- . in planning the hours of operation for a particular park, it is recommended that climatic factors be taken into consideration. Morning and

evening temperatures, sunrise and sunset, and seasonal breezes affect personal comfort. These factors should be analyzed to assist in determining the optimum hours of operation for each park and its specific location.

- . it is recommended to post the hours of operation at all major access points and in a conspicuous location within the pool area.

maintenance & safety considerations

- . for parks that choose to remain open after sunset, automatic lighting should be provided throughout the park at a minimum of 5 foot candles at ground level. 52 Areas that should be illuminated include:

-
- walkways
 - slide entries
 - the overall slide path area
 - pool deck areas
 - pool waters
 - picnic areas
 - in and around administration building
 - passenger loading zone
 - parking lot
 - major intersection into park property
 - . instantaneous emergency lighting should be provided for evening use in case of accident on

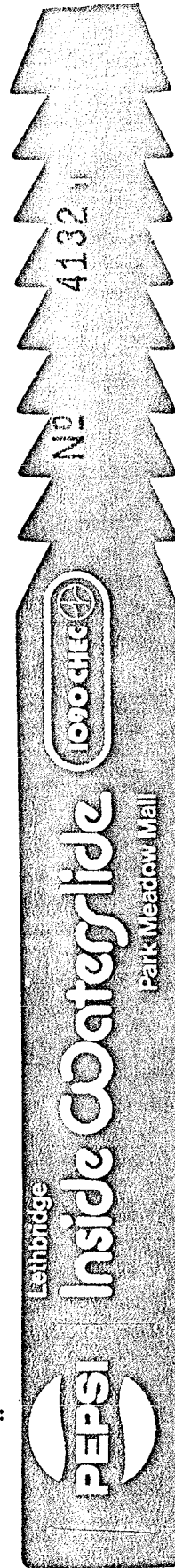


fig. 68 Plastic Wristband:

"Inside Waterslide",
Lethbridge, Alberta

5.2.2 Entrance Receipt

planning & design considerations

- . in the field research the most common means of identifying paid customers was a hand stamp. Seventy-eight per cent of the parks used this method while 22 per cent used a wristband. One park used handstamps for patrons using all the facilities and a wristband for those who wished to picnic and use the hot pool only.
- . when a wristband is used, it is recommended to use a water resistant material that will not scratch or gouge the flumes and is clearly visible on the wrist. (fig.68) Each day a new color, style or code should be used to prevent reuse of wristbands on following days.
- . when a hand stamp is used, it is recommended to use a water resistant ink that will endure one day of sliding. Colored ink or invisible ink (visible under a black light only) may be used. Some parks stamp patrons hands only if they choose to leave the park and return later. Entrance through the control gates for the first time can require no stamp when paying and passing through a turnstile is strictly monitored.
- . it is recommended that a turnstile control gate be used at the cashier booth to help prevent

unauthorized entrance to the park.

5.2.3 Communication System

planning & design considerations:

- . in the field research, methods of communication between staff members included:
 - radios (walkie talkies, air phones, headphones, telephones, transmitters)
 - loudspeakers
 - hand signals
 - loud voices
- . the most common method of communication was a radio system. Lifeguards, supervisors, first aid personnel, the pumphouse operator and the park manager should all have access to a reliable communication system.
- . a P.A. (public announcement) system should be distributed throughout the pool and slide area and Administration building for announcements, messages, or warnings to the park patrons. The broadcasting equipment should be centrally located in the office, staff room, or ticket booth.

maintenance & safety considerations:

- . all walkie talkie and battery operated systems should be recharged daily.
- . a visual sight line should be established from the slide entries to the landing pool for visual access and ease of communication.

5.2.4 Lifeguards

planning & design considerations:

- . in the field research, in parks that used all lifeguards and no supervisors, the average number of total lifeguard staff was 24 with 11 on duty at one time.
- . in the parks that used both lifeguards and supervisors, the average number of total lifeguard staff hired was 10 with 4 on duty at one time. The total number of supervisors hired was 11 with 5 on duty at one time.
- . it is recommended to employ one senior lifeguard to hire, organize training, schedule and oversee lifeguard duties.
- . three lifeguards should be responsible to oversee job duties and ensure safety personnel are fulfilling the job requirements.
- . it is recommended that all lifeguards rotate positions throughout the park every hour and ensure safety standards are maintained.
- . all lifeguard staff should wear uniforms at all times while on duty. This helps to reinforce the park image and induce public respect.
- . it is recommended that a minimum of 5 safety personnel be on site at one time (assuming 4 adult slides, one kiddie slide landing pool and no river



fig. 69 Lifeguard at Kiddie Landing Pool: "Fun Mountain", Winnipeg, Manitoba.

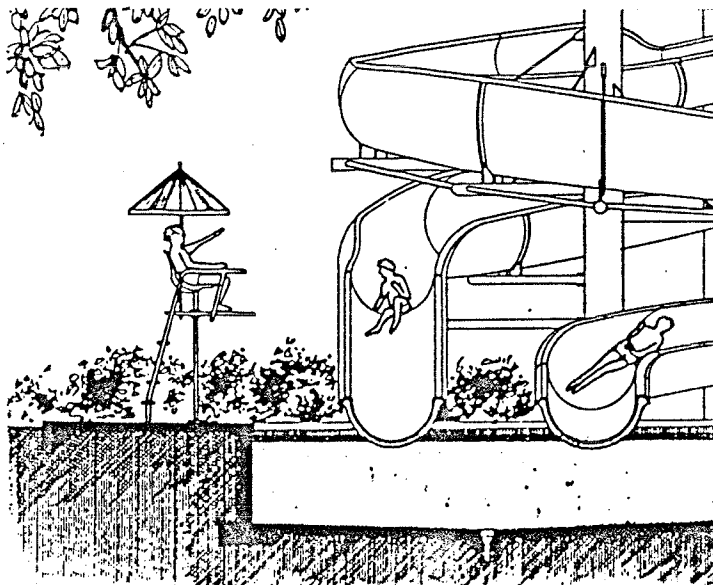


fig. 70 Lifeguard at Adult Landing Pool (Water Forms Canada Ltd., Kitchener, Ontario)

ride):

- one lifeguard at kiddie slides landing pool at all times when the slides are in operation. (fig.69)
- one lifeguard at the entry area for the adult slides at all times
- at least one slide attendant/supervisor per every two slides at adult slide entries
- at least one lifeguard per two slides at the landing pool for the adult slides (fig.70)
- if a river ride and speed slides are offered, a minimum of one person at the top and bottom of each slide type is recommended (total 4).

maintenance & safety considerations

- . lifeguards should inspect all lifesaving equipment daily.
- . lifeguards should organize a communication system which will tie into the communication network of the park.
- . lifeguards should daily inspect slide joints prior to park opening.
- . it is recommended that all lifeguards sustain national standards and first aid qualifications.
- . seventy-nine per cent of the parks required the lifeguards to have attained the National Lifesaving qualifications. Twenty-one per cent of the parks required Bronze Medallion or Bronze

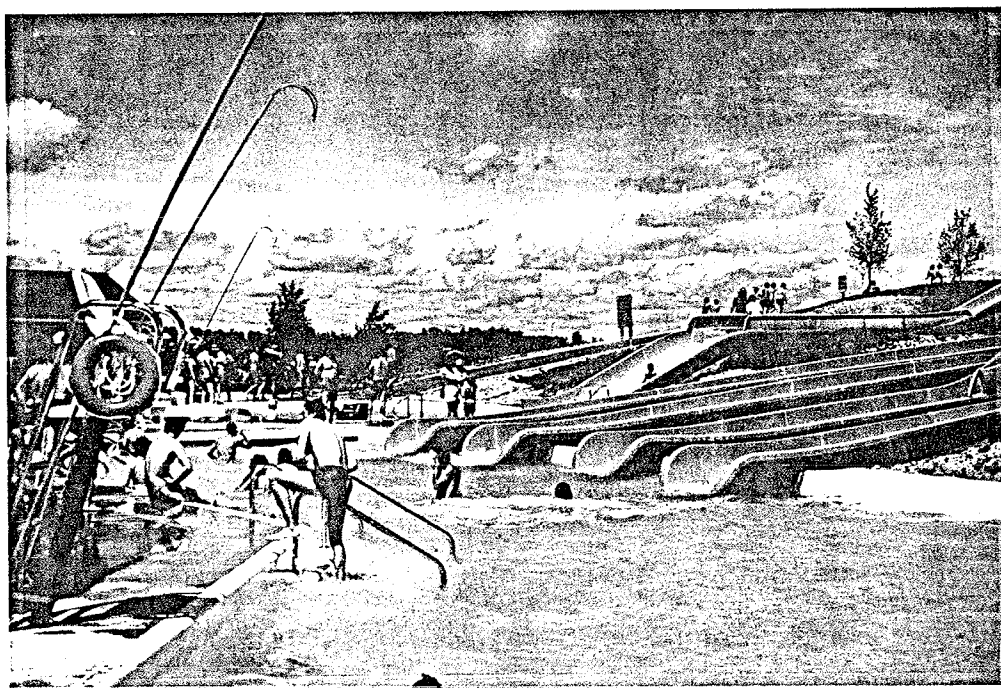


fig. 71 Lifeguard Safety Equipment: "Fun Mountain", Winnipeg, Man.

Cross and a First Aid CPR Certificate.

. it is recommended to provide the following first aid items in close proximity to the pool area for lifeguard and first aid personnel:

- "1" spine board with attached adjustable straps
- 2 blankets
- 12 safety pins
- 1 pair splinter tweezers, blunt nose
- 1 pair of scissors, approximately 4 inches (10 cm)
- First Aid Manual⁵³
- assorted dressings, bandages and antiseptics

. at the pool side, it is recommended to have at least:

- "one non-conductive reaching pole at least .8 feet (3.6 m) in length, and
- one lightweight buoyant throwing device securely attached to a rope of a length at least equal to the width of the pool."⁵⁴ (fig.71)

. lifeguards should regularly practice emergency situation drills.

5.2.5 Slide Attendants/Supervisors

planning & design considerations:

. in the parks researched 82% employed both lifeguards and supervisors or slide attendants. The average number of slide attendant staff was 11 with an average of 5 on duty at one time.

- . the major responsibility of the slide attendants is to control access onto the slides and to supervise patron behaviour on the slides and in the line-up. The supervisors are to space the riders on the slides in intervals and communicate potential problems to the lifeguards at the landing pool.
- . all slide attendants should wear identifiable uniforms at all times while on duty. This helps to reinforce the park image and induce public respect.
- . it is recommended to install control gates, hand levers or bars at the slide entries to formalize entrance onto the slides.
- . adjustable shade devices should be provided at all slide entries for the slide attendants.

maintenance & safety considerations:

- . in the parks researched the most common ratio for number of supervisors per slide was one supervisor for every two slides at the beginning of the runs. This functions well when slide entries are side by side, but when entries are not adjacent it is recommended to use one supervisor for each slide.
- . it is recommended that slide attendants possess Bronze Medallion or Bronze Cross qualifications and a First Aid CPR Certificate.
- . at least one lifeguard should be posted at the

slide entry area in the event of sunstroke and other casualties.

5.2.6 Height Restrictions

planning & design considerations:

- . height restrictions are used to identify children too small to stand with their heads above water in the landing pools. The combined effects of strong turbulence and the approximate 3.5 feet (1.1 m) water depth in landing pools can make it difficult for young children to move out of the way of other sliders.
- . four out of 17 parks researched (24%) enforced height restrictions. Three parks required patrons to be at least 42 inches (1 m) in height in order to use the adult slides and one park required patrons to be 48 inches (1.2 m) in height to use the adult slides. The alternative usually offered was for the youngsters to ride down the slides on their parent's (or guardian's) lap, or simply to stay on the intermediate and kiddie slides.
- . most parks researched (76%) did not enforce height restrictions. It was up to the discretion of parents, lifeguards and supervisors to determine the capability of individuals to ride the slides and quickly exit from the landing pool.
- . height restrictions were usually enforced at the

kiddie slides. Individuals taller than 48 inches (1.2 m) were not allowed to use the kiddie slides in order to reserve that area for younger children.

- . when enforcing height restrictions it is recommended to clearly advertise this rule and to graphically indicate the required height with the use of a colored line, railing or element that outlines the dimension.

maintenance & safety considerations:

- . all signs should be kept in legible form at all times. Painting and repairs should be regularly maintained.
- . the most critical factor in determining if an individual can use the adult slides is whether he/she can quickly and confidently exit from the landing pool and not get trapped in water currents. The ability to swim is only necessary when the depth of the landing pool is deeper than chin height of the individual.

5.2.7 Emergency Access

planning & design considerations:

- . it is recommended to have direct on-site access to the pool deck area for emergency vehicles such as an ambulance or first aid vehicle. This access should also accommodate fire trucks, maintenance

and service vehicles.

- . the emergency access should be a minimum of 10 feet (3 m) in width.
- . ensure no shrub beds, planters, walls, fences, bicycle racks, benches, garbage receptacles, sign posts or other site furnishings are located in the pathway of the emergency access.
- . ground surface should be firm to support heavy vehicles or paved with a hard surface material. Grade should be no less than 2% for proper drainage and no steeper than 5% for vehicle access.

maintenance & safety considerations:

- . the emergency access should always be kept clear of vehicles, obstructions and debris.
- . locks should be checked daily to ensure ease of opening in case of emergency.
- . signs should be placed at the emergency access clearly indicating no parking in front of the access.

5.2.8 Security

planning & design considerations:

- . various forms of security measures can be implemented. These include:
 - fencing
 - night lights

- night guards
 - alarms
 - guard dogs
 - . it is recommended that fencing and lighting always be used for park security. Additional methods could be implemented to achieve optimum surveillance.
 - . the entire waterslide and pool area should be enclosed with a fence of at least 6 feet (1.8 m) in height, with access only through the gates.⁵⁵ It is recommended to use a high security chain link fence.
 - . the fence should have a lockable gate at least 6 feet (1.8 m) in height.
-
- . when chain link is used, the mesh size should not exceed 2.1 inches (5.5 cm) and the wire should be at least 9 guage for maximum strength against vandalism and break-ins.⁵⁶
 - . when materials other than chain link are used, the outside surface of the fence and gate should be free of ledges or hooks that could provide foot or toe holds to people trying to illegally enter the park.

maintenance & safety considerations:

- . security systems should be inspected daily to ensure adequate protection.

5.3 Mechanical Systems for OUTDOOR Waterslide Parks

- 5.3.1 Water Source, Quality & Treatment
- 5.3.2 Pumps & Pipes
- 5.3.3 Heating System
- 5.3.4 Temperature of Water
- 5.3.5 Outfall
- 5.3.6 Sewage System

5.3.1 Water Source, Quality & Treatment

planning & design considerations:

- . it is essential to determine a reliable source of water prior to development. In the field research, sources of water included wells, the municipal water system, a lake, and a local irrigation system. The most common water source was from the municipal distribution system. This was used in 47% of the parks, and wells were used in 35% of the parks.
- . water quality should be tested prior to development. Water hardness, high mineral content, silt particles, algae and iron in water can create expensive operational and maintenance procedures. Water which is too hard requires water softening equipment, high mineral content can affect the transparency of water in the pools, silt particles and algae affect water transparency and color and also increases the load on filtration systems, and a high iron content in water stains pools, slides, fountains, sinks and

toilets and can also affect the taste of water.

- . one important factor to take into consideration when wells are selected as the water source for the pools and slides is that well water is very cold and requires substantial heating to bring it up to comfortable temperatures for swimming.
- . all pool water should be physically and chemically treated. Debris should be removed through filtration, and purification should be attained through chemical treatment.
- . it is recommended that the water turnover rate in modified swimming pools be at least 4 times the total water volume in a 24-hour period.⁵⁷ For landing pools, a 6-hour turnover rate is acceptable.⁵⁸
- . chemical treatments of chlorine can be applied through the use of chlorine gas, liquid or granule. The most efficient treatment, chlorine gas, requires the least amount of handling and is easy to automate. In the field research 63% of the parks used chlorine gas, 25% used liquid chlorine and 19% used a granular chlorine. All operators surveyed reported that chlorine gas is the superior system and is the most economical. However in gas form it is also the most potentially dangerous form of chlorine. (see safety considerations this item.)

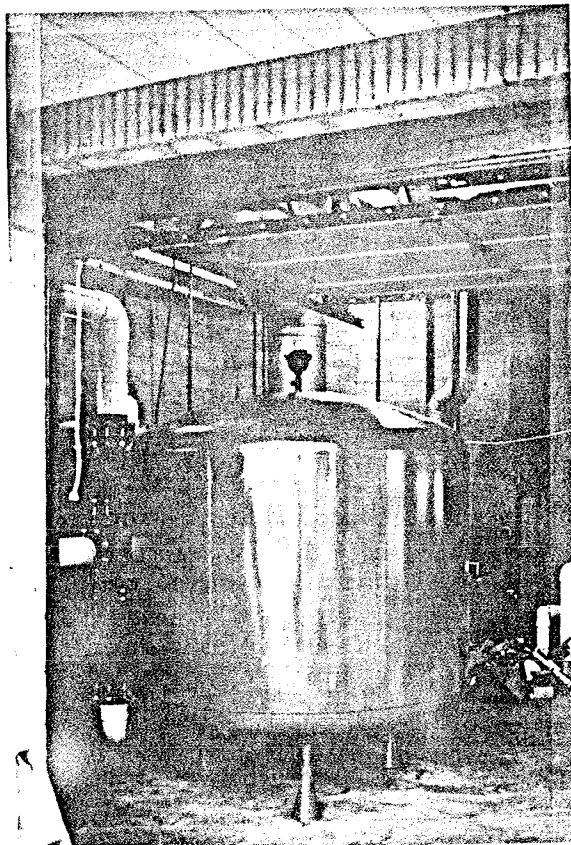
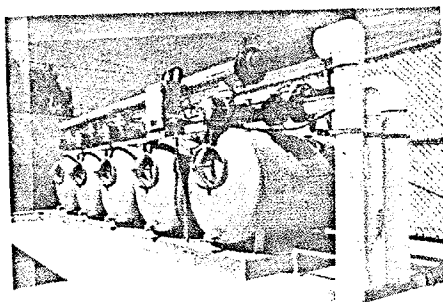


fig. 72 Sand Filters

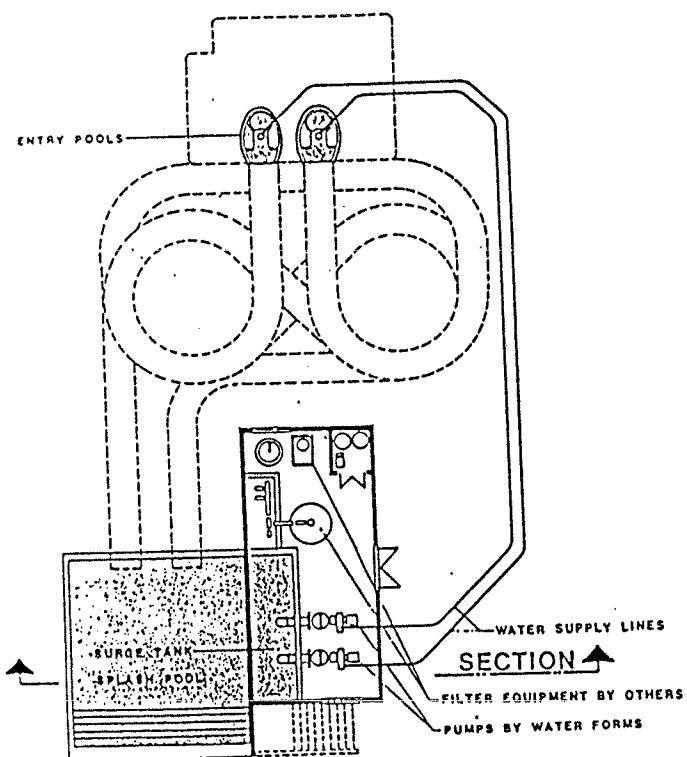


fig. 73 Surge Tank (Water Forms Canada Ltd., Kitchener, Ontario)

- . two recommended filtration systems are 1) high vacuum sand HVS (fig.72) and 2) diatomaceous earth system DES. In the parks researched, 73% used HVS filters and 27% used DES.
- . each filter should have reverse flow cleaning features for backwashing and be adequately sized to filter the pools in less than 2 hours.
- . water for backwashing filters could be obtained from the pools or from a holding tank. Using water from a holding tank eliminates the need to add fresh water to the pool which would require additional heating and chlorination. It may however, be desirable to backwash with water from the landing pool, and thus lower the pool water level prior to the pumps being turned off. Otherwise water in the slides could overflow the pool.
- . where large volumes of water enter the pool after the pumps are shut off, an overflow tank or "surge" tank will be required. (fig.73)
- . a pool vacuum should be provided to clean the pool bottom daily.
- . water skimmers should be incorporated into the pool design to filter off surface water and debris. These filters should be located at operating water level when slides are functioning opposite the slide drop points.

maintenance & safety considerations:

- . it is recommended to maintain the hydrogen ion concentration of the pool water within the range of pH 7.2 to pH 7.8.⁵⁹ Local Health Authorities should be consulted to determine standards for the particular area.
- . the bacteriological quality of the pool water should be less than one faecal coliform organism per 100 ml, as determined by the membrane filtration technique.⁶⁰
- . it is recommended to maintain water clarity such that from the pool deck a black disc 6 inches (15 cm) in diameter on a white background can be seen on the pool bottom at the deepest point.⁶¹
- . test kits should be available at the pools to measure pH and disinfectant residual, total dissolved solids (T.D.S.) and alkalinity and calcium hardness. Employees should be trained for proper use of the equipment.
- . it is recommended to circulate water in all pools sufficiently enough to eliminate dead water areas.
- . water is lost daily through evaporation, splashing, and is carried on patrons each time they leave the pool. Direct sunlight and frequent winds can also increase this water loss. In the parks researched, the average amount of water loss per day was 4100 gallons. The range was from 2000

- to 8000 gallons per day. It is important to anticipate using additional water each day to make up for this type of loss.
- . "all chemical and filtration equipment should have a built-in monitoring system that sounds an alarm in the lifeguard or manager's offices in the event of any malfunctioning of the systems.
 - . all mechanical systems for chlorine gas operation should be enclosed in a separate airtight, fire-proof room.
 - . the gas chlorination room should be located above ground level with only one door, and that door should open outwardly and directly to the outdoors.
 - . the gas chlorination room should contain emergency mechanical ventilation to take suction at floor level and room air and discharge it directly to the outdoors, away from the air intake structures and occupied areas. This emergency ventilation should be capable of producing 30 air exchanges per hour.
 - . the gas chlorination room should have all openings (other than those for ventilation), exits and entrances sealed with elastomeric caulking compound.
 - . in case of an emergency, self-contained respiratory protective equipment should be

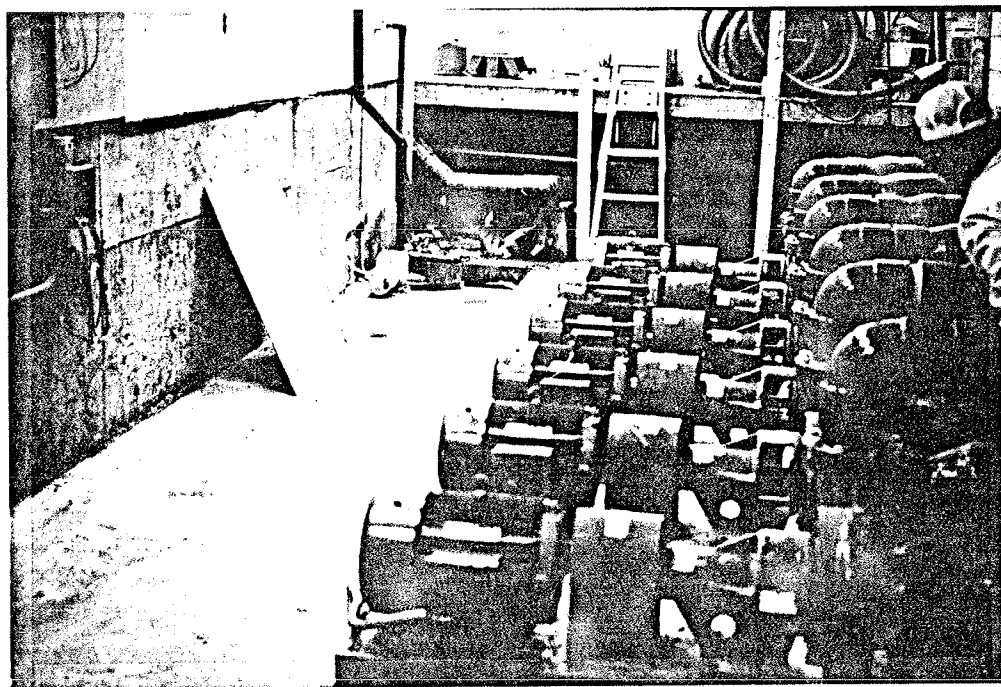


fig. 74 Electrically Driven Pumps: "Fun Mountain", Winnipeg, Manitoba

provided and located outside the chlorination room. This includes: chemical goggles, a two-piece rubber suit, rubber boots and rubber gloves.

- . it is recommended to lock the gas chlorination room at all times. The key should be available only to staff members trained in handling chlorine gas.
- . the chlorine room should be equipped with a view window.
- . when recirculating pumps have been shut down, the chlorinator should automatically cease operation.
- . panic hardware should be provided on the door of the gas chlorination room to permit emergency access to the outdoors."⁶²
- . the chlorination facility should be located downwind from areas of the park complex that have the most people congregated.

5.3.2 Pumps & Pipes

planning & design considerations:

- . in the field research various types of motors were used to operate the water pumps. These included:
 - electrically driven pumps (fig.74)
 - natural gas engine
 - propane engine
 - internal combustion
- . heat exchangers should be adapted to the natural

gas, propane and combustion motors to capture heat released through the exhaust system. This heat can then be recirculated to heat the water in the pools, slides and showers and administration buildings.

- . the most efficient and inexpensive system to operate the pumps was natural gas powered internal combustion engines. This, however, depends on the availability and cost of alternative energy sources.
- . a typical mechanical set-up should include:
 - engine and gear head (if natural gas is used)
 - motor with breaker panel (if electrical is used)
 - water pump
 - sump brackets
 - pool screen
 - pipe connections to entry boxes
 - balancing valve controls
 - heat exchangers and storage tanks (if natural gas is used)
 - pool filters
- . it is recommended to use vertical turbine pumps capable of delivering 1000 gpm to each slide plus bypass water for heater filter.⁶³ For the typical 4-slide operation, four 1,000 gpm pumps would be required.
- . when combustion engines are used, it is

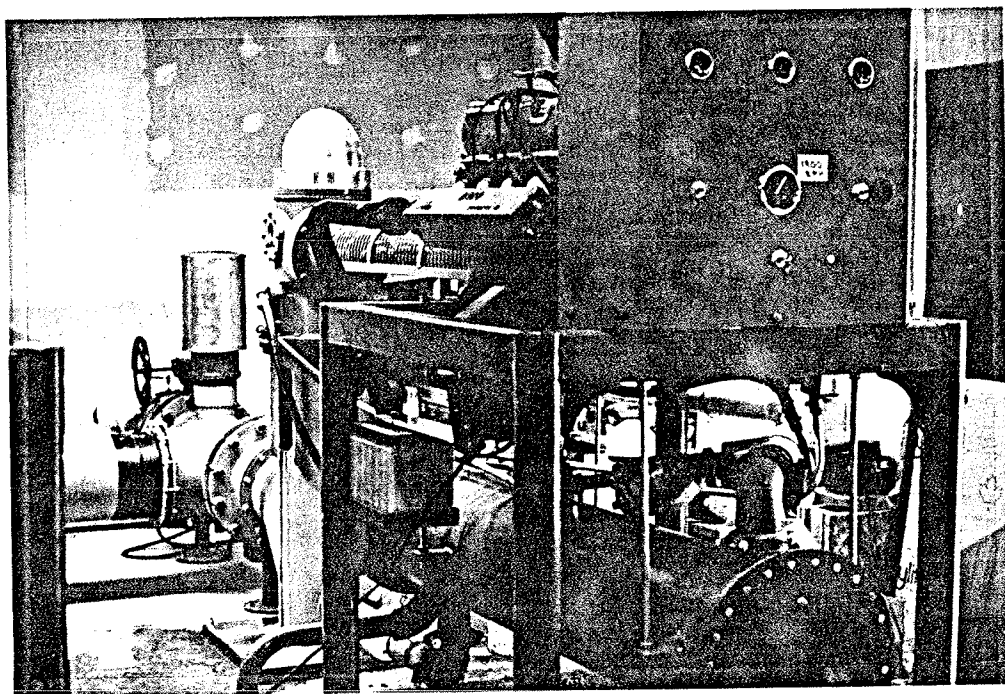


fig. 75 Heat Exchanger on Combustion Engine: "Splashdown Park",
Tsawwassen, B.C.

recommended to adopt heat exchangers to cool the motors and use the heat for heating the water. The recommended fuel for operating these engines is natural gas.

- . in the field research 100% of the parks used polyvinylchloride (PVC) pipes to transport the water up to the slide entries. It is recommended to use steel pipes and fittings immediately off the pumps and in areas where settlement may occur.

5.3.3 Heating System

planning & design considerations:

- . various types of heating systems for the slide and pool water have been reported to be successful.

These include:

-
- natural gas furnaces
 - propane furnaces
 - heat exchangers on combustion engines (fig.75)
 - heat exchangers on furnaces
 - solar heating devices
 - . the most costly forms to date are propane and electric heat. These are recommended only for sites which are not serviced with natural gas.
 - . natural gas was the most commonly used fuel for the heating system.
 - . heat exchangers are a very efficient means of heating pool water. Heat given off the water pump motors can be captured and used as the major

source of heat for water in the park complex. A 50% write-off can be attained in Canada by using waste heat.⁶⁴ Provincial tax is exempt in British Columbia on all waste heat recovery equipment.

- . it is recommended to use a boiler for water heating. The boiler should be designed to be compatible with the specific type of engine. Engine exhaust can be used to heat the water for showers, pools and slides at no cost.⁶⁵ When electrically driven pumps are used, the water can be heated by natural gas, propane or electricity.
- . solar heating devices to date are relatively rare but have potential. Once installed, solar heating can be the most economical way to heat the water. It is recommended to explore available solar heating systems that could be adapted to the overall mechanical system.
- . the heating system is located in the main mechanical room or in a separate pumphouse building. The size of space required depends on the type of mechanical system used. In the field research the space ranged from 600 square feet (56 m²) to 1000 square feet (93 m²) with the average at approximately 800 square feet (74 m²). (See Appendix A for survey results.)

5.3.4 Temperature of Water



fig. 76 Escape from the Heat: "Wild Waters", Kelowna, B.C.

planning & design considerations:

- . a very important feature of a waterslide park is comfortable water temperature in the slides and all the pools. Too hot or cold water can discourage patrons from coming back to a particular park. In very hot weather it is important to keep the water temperature slightly cooler than the air temperature to offer patrons relief from the heat. (fig.76) Likewise, on cool days the water temperature should be maintained slightly warmer than air temperature to help prevent chills and encourage people to use the facility.
- . for information on heating systems for water, see item 5.3.3.
- . in the field research the average temperature of water in the adult landing pool was 77° F (25° C). The range was from 72-82° F (22.2-27.7° C). The temperature in the slides is usually slightly cooler due to heat loss of the water when sheeting down the slides.
- . the average temperature of water in the hot pool was 101° F (38.3° C) with a range of 95-105° F (35-40.5° C).

maintenance & safety considerations:

- . temperature in the hot pool should never be greater than 105° F (40.5° C) and patrons should

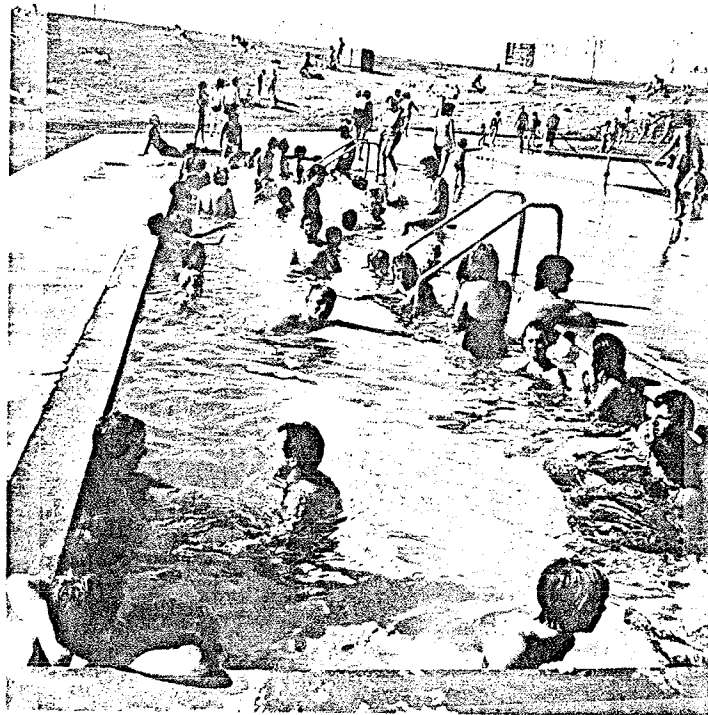


fig. 77 Hot Pool: "Surf Sity", Calgary, Alberta

not be allowed to stay in the hot pool for longer than 20-minute intervals. (fig.77)

- . a clock and warning sign should be displayed within 10 feet (3 m) of the hot pool to instruct patrons on the maximum length of stay in the hot pool, and should be clearly visible from all points in the hot pool.

5.3.5 Outfall

planning & design considerations:

- . it is essential to plan an outfall system for disposing of waste water when cleaning out the pools or backwashing the filters. In the field research various methods included: a reservoir, a ditch, creek or river, the ground surface, the sewage system, and a septic field. A settling tank or dechlorination tank was usually necessary to filter and treat the water prior to disposal into the system. Some of the parks that used a reservoir recycled the water once it had settled and purified. The most common means of disposing of waste pool water was through the municipal sewage system. Most parks were required to dechlorinate and settle the water prior to disposal in these systems.

maintenance & safety considerations:

- . when a reservoir is used for the outfall, it is

recommended to secure the area with the use of fencing, berming or plantings to prevent public access. The reservoir should be screened from the major park activity but visual access for maintenance and safety personnel should be provided from at least one area of the park.

- . it is recommended that all parks settle and dechlorinate waste pool water prior to disposal into any sewage system.

5.3.6 Sewage System

planning & design considerations:

- . in the parks researched the various sewage systems included: holding tanks, a septic field, a lagoon, and the municipal sewage system. The most common method used was the existing municipal sewage system. When this was not accessible, the most common alternative was a septic field.
- . local authorities should be consulted for design specifics on sewage lagoons, septic fields and other sewage systems.
- . septic fields and sewage lagoons should be located downwind and downstream from the park complex and should be visually screened from major site lines.

5.4 Support Services for OUTDOOR Waterslide Parks

- 5.4.1 Change Room/Washrooms
- 5.4.2 Clothing Storage
- 5.4.3 Food & Beverage Services
- 5.4.4 Souvenir/Gift Shop

5.4.1 Change Rooms/Washrooms

planning & design considerations:

- . change rooms should be located in the main administration/service building in close proximity to the entrance gate.
- . the change room should include washroom facilities sufficient to serve anticipated park capacity. Consult local health authorities for regulations.
- . mens change rooms should include a washroom area consisting of toilets, urinals, sinks and hand dryers and a change area with seating and showers.
- . womens change rooms should consist of a washroom area with toilets, sinks and hand dryers and a change area with change cubicles, seating, hair dryers and showers.
- . both rooms should have a storage area for janitorial supplies.
- . the average maximum user capacity of the parks researched was 3,000 people per day.
- . in the field research, 59% of the parks provided indoor showers and 41% provided outdoor showers.
- . the average number of indoor showers in the ladies

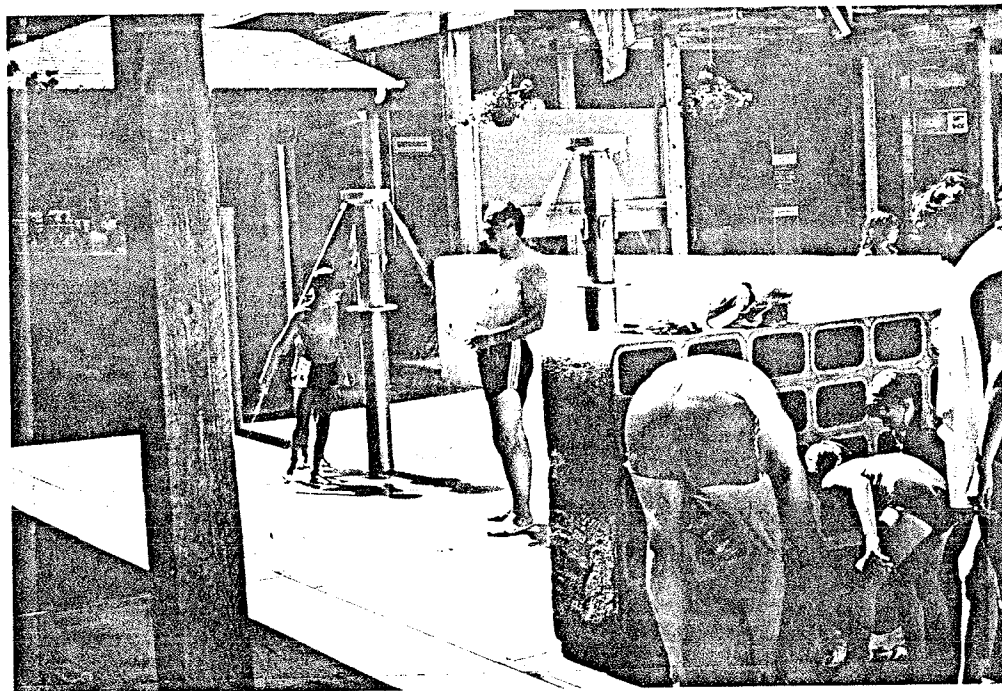


fig. 78 Outdoor Shower Poles: "Wonderful Water World", Penticton, B.C.

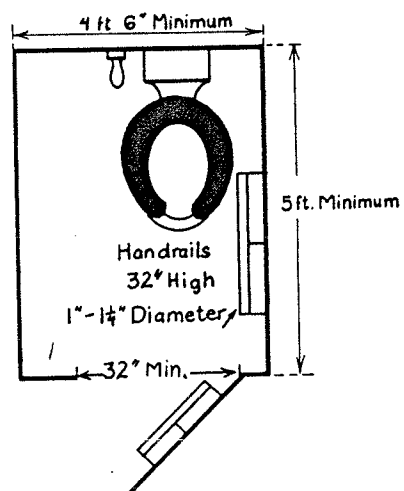


fig. 79 Toilet Stall for Disabled Users (p. 8 Manitoba Dept. of Fitness)

- change room was 6 and the average number of showers in the mens change room was 4.
- . the average number of outdoor showers was 10. These were usually located on poles in the deck area near the entrance to the change rooms. (fig.78) Occasionally showers were located on an exterior wall of the change rooms.
 - . change rooms should be partitioned so as to provide complete privacy for users of toilets and showers.
 - . the mens and ladies change rooms should be completely separated by a wall from floor to ceiling and the entrance to each change room should be prominently marked for each sex.
-
- . washroom facilities for spectators and park patrons should be located in the main administration/service building. Washrooms for spectator use should be located within 100 feet (30 m) of observation area.
 - . for spectator use, it is recommended that a minimum of one toilet and one sink in the mens and ladies washrooms be provided.
 - . the toilet stall for disabled users should be a minimum of 4.5 feet (1.4 m) wide and 5 feet (1.5 m) deep.⁶⁶ (fig.79)
 - . very little or no standards exist at present for waterslide parks in Western Canada. Water Parks

are a relatively new public recreational amenity and do not conform to the health standards for swimming pools. One waterslide park in Manitoba used washroom standards for the local airport as a guide to determine washroom facility numbers and area. This decision was justified by stating that the airport user demand was similar to that of the park. The Public Health Act standards could, however, be used as a guide for indoor facilities. In either case, it is necessary to consult local health authorities for recommendations of areas and quantities of washroom facilities for park patrons.

- . in the field research the average number of toilets in the ladies change room was 6. The average number of toilets in the mens change room was 4 with an average of 3 urinals.
- . the average number of sinks in both ladies and mens change rooms was 4 each.
- . the average number of change stalls in the ladies change room was 6. In 82% of the parks, no change stalls were provided in the mens change room. In the parks that did provide mens change stalls, the average was 2.

maintenance & safety considerations:

- . it is important to keep change room and washroom areas clean, sanitary and in good condition.

- . it is recommended to provide adequate supplies of hand soap, hand towels, shower soap, and toilet paper at all times.
- . floors should be concrete or easily cleaned tile that can be hosed down.
- . toilet and shower stall partitions should have enamel finishes that can be easily painted to cover graffiti.
- . benches should be heavy construction timbers, attached directly to the walls so that mopping underneath is not impeded by legs.
- . a water spigot with key control should be provided in each change room for washing down floors at the end of the day.
- . the floors of the change rooms should be finished with a durable, non-slip finish to help prevent accidents. Floors should be gently sloped towards floor drains (1/4 inch per foot) to remove excess water.
- . floors should be mopped regularly to keep the surface as dry as possible.
- . showers should have fixed shower heads, automatic timers and temperature controls to prevent burns.

5.4.2 Clothing Storage

planning & design considerations:

- . various forms of clothing storage included:

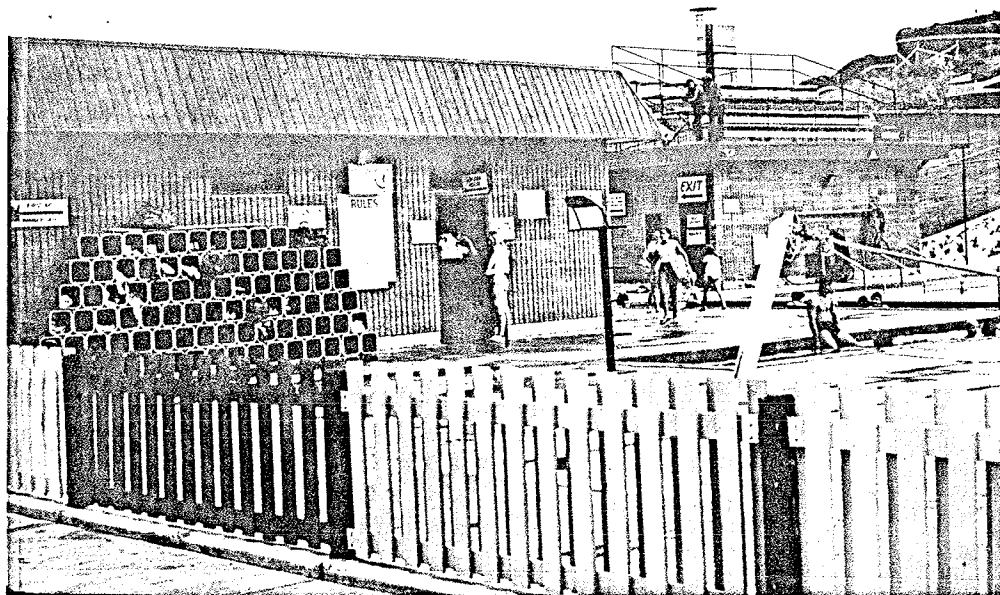


fig. 80 Basket Rentals & Cubicals for Clothing Storage: "Riverside Waterslides", Medicine Hat, Alberta

- coin lockers
 - supervised basket rental
 - open cubicles
- . in the parks researched, the most common system was coin lockers (55%). Basket rentals were also quite popular (42 %) and were often used along with the lockers. Open cubicles were provided as a supplement in 37% of the parks, but offered no supervision or security system. (fig.80)
- . it is recommended to locate clothing storage adjacent to the change rooms. In the field research, 63% of the parks located the clothing storage outdoors, 19% located it indoors and 19% provided clothing storage in both.
-
- . it is recommended to provide high quality coin operated lockers just outside the change rooms.

maintenance & safety considerations:

- . a sign should be posted at the unsupervised clothing storage stating the management is not responsible for lost or stolen articles.

5.4.3 Food & Beverage Services

planning & design considerations:

- . the food concession area should be approximately 700 square feet (61 m²) and should consist of service and food preparation areas plus a large storage area.

- . necessary equipment would include a deep fryer, fridges or coolers, freezer, grills, stoves, ice cream machines, sinks, drink machines with compressed air bottles.
- . in the field research, some parks leased the food concession services including the provision of equipment to a private operator. This is an effective management strategy and is recommended where the market is large enough to support an independent operation.
- . food items typically served at a waterslide park include:
 - fast foods such as hamburgers, hot dogs and french fries and submarine sandwiches
 - specialty items such as chicken and pizza
 - beverages such as pop, juice and coffee
 - frozen treats such as ice cream, fudgesicles and popsicles.
 - assorted packaged candies, popcorn, etc.
- . it is recommended to provide a food service window for people using the public observation area.
- . a system for lining up, ordering and receiving food should be designed for efficiency of service to patrons.
- . when cooking ventilation systems are not desired, due to cost or health code requirements, other types of cooking equipment such as a microwave

oven and a wiener cooker unit can be used.

- . access for garbage collection should be quick and easy without obstructing traffic. The large truck-emptied bins are preferable.

maintenance & safety considerations:

- . the food concession should always be kept in a clean and sanitary condition which meets all local public health standards.
 - . all local specifications for fire, safety and health standards should be adhered to. This includes ventilation for cooking equipment, proper fire-rated building materials, and fire fighting equipment such as a fire extinguisher and smoke detectors.
-
- . if a grill and deep fat fryer are used, an approved exhaust fan should be used.
 - . screening of service windows may be required to keep out flying insects
 - . to prevent accidents, no glass or breakable containers should be used in the food concession or anywhere on site.

5.4.4 Souvenir/Gift Shop

planning & design considerations:

- . it is recommended to provide a novelty shop that sells souvenirs, gifts and miscellaneous items. In the field research all but one water park

offered this service.

- . the gift shop should be approximately 400 square feet (37 m²) in size and consist of display counters, change booths, staff ashroom and cashier station at the exit.
- . the gift shop should be centrally located in the administration building and should be high profile for patrons entering and leaving the park.
- . the gift shop should be accessible to the observation area if possible.
- . in some of the parks, the only exit from the park was through the gift shop. This was to maximize the exposure of the gift shop and therefore increase sales. This system should be carefully considered and is not recommended. It is an unnecessary road block to patrons wanting to leave the park more directly. With pedestrian traffic always exiting through the shop, many problems can arise. These include water and dirt being tracked into the store, items getting knocked off shelves, shoplifting taking place, and general confusion and noise which can discourage customers from spending time and money in the store.
- . an important design consideration for the gift shop is to establish an image for the shop. It should have some identity, e.g. rustic, nautical, teen/rock, family, discount, contemporary, or

exclusive. It is necessary to determine what is appropriate for the particular park and its market. The theme should be consistent with the character of the park. Conflicting images tend to create uncertainty in some shoppers.

- . the shop is the display setting for the articles and should be designed for clear presentation and also customer comfort. The customer should always feel at ease while browsing.
- . items typically sold in a gift shop include:
 - T-shirts and summer tops
 - shorts and bathing suits
 - towels and hats
 - cups, pens and souvenir spoons
 - buttons, posters and decals
 - postcards, pens, maps and films
 - sun glasses and tanning lotion
 - brochures and other miscellaneous items.
- . the park logo or mascot decal should appear on at least 50% of the store merchandise to advertise the park and serve as souvenirs.
- . lighting in the store should be bright enough to clearly see all merchandise and should be at a comfortable level to induce shopping. Natural daylight is preferable to artificial light only.
- . visual access to the waterslide area is also desirable.

- . the gift shop should be acoustically separated from the noisy exterior environment.
- . a separate entry to the exterior of the park should be provided for employees and to make restocking easier.

maintenance & safety considerations:

- . one of the most important daily maintenance tasks in operating a gift shop is cleanliness. Clean fixtures, floors, dressing rooms and merchandise reflect a very positive attitude of the shop staff and contribute to the overall image of the store. Customers can very quickly be discouraged from buying items sitting on dusty shelves or finding a souvenir mug that has a dead fly inside.
-
- . another daily maintenance exercise is to make sure every single item has a price tag on it or a sign on the shelf indicating the price of groups of items.

5.5 User Profile & Supplementary Recreational Amenities for OUTDOOR Waterslide Parks

- 5.5.1 Patrons
- 5.5.2 User Preferences
- 5.5.3 Alternative Activities
- 5.5.4 Handicap Accessibility

5.5.1 Patrons

planning & design considerations:

- . it is recommended to plan the waterslide park to serve a broad range of patrons from toddlers to seniors. In the field research the age range of patrons using the slides was from one to eighty-seven years old.
- . a waterslide park should cater to families, offering a variety of activities for the various age groups, e.g. a children's water play area for toddlers, kiddie slides for young children, intermediate slides for older children and seniors, adult slides and a river ride for teens and adults, and a hot tub and picnic areas for everyone.
- . once the basic facilities for families are provided, the age groups to focus on are the teens and thrill seekers. This is where speed slides and thrill rides come into play. It is recommended to seasonally add something new and exciting to entertain this demanding group.

- . for recommendations on additional supplementary recreational amenities, see item 5.5.3.
- . waterslide facilities should aim to serve all clients, both abled and disabled individuals. Disabled people should be allowed to achieve self-sustained participation in leisure-time activities and encouraged to become active, stay healthy, and enjoy leisure pursuits. Inappropriate planning has too often segregated disabled people. It should be remembered that they have a right to participate in as many recreational activities as other citizens. For additional planning and design considerations for disabled patrons, see item 5.5.4.

maintenance & safety considerations:

- . in British Columbia the Elevating Devices Branch has established three major rules for riding a waterslide. These are:
 - patrons should always ride down slides with feet first
 - patrons should always go down the slides one at a time, no "chains".
 - patrons should never intentionally stop in the slides.
- . it is recommended that all provinces adopt these three basic rules above for patron safety at waterslide parks. In addition to these rules, it



fig. 81 Adult Supervision of Children in Hot Pool: "Wild Waters",
Kelowna, B.C.

is also recommended to enforce the following regulations:

- street clothing with metal clasps or rivets that could gouge or scratch the slides should not be allowed (e.g. blue jean cut-offs).
- age restrictions should be established for the use of the hot pool (e.g. children under 10 years not allowed unless accompanied by an adult). Underwater visibility is often obscured in hot pools due to water turbulence and crowded conditions. This makes lifeguard supervision difficult and decreases child safety. (fig.81)
- all patrons should shower before using the slides and pools.
- ~~at the river ride landing pool each patron~~
should pass on the inner tube to the first person waiting in line.
- a formalized stacking area should be established at the river ride landing pool for receiving inner tubes.
- a formalized stacking area should be enforced at the entrances of all slides. This can be accomplished through the use of elements such as ropes, railings or bollards.
- slide attendants should space riders on all slides according to speed and size of patron.
When a slide attendant is not present, a clearly



fig. 82 Slide Attendant at River Ride: "Wild Slides", Regina, Sask.

identifiable flag should be located at the side of the slide to indicate to following patrons when the slide is clear enough to proceed.

- for "kamakazie" or speed slides, patrons should wait until the previous rider is at the bottom of the slide.
- at all landing pools, no patrons should cross the path of adjacent slide exits.
- loitering in the landing pools should not be allowed at any time while the slides are in operation. Patrons should move out of the way immediately upon entering the landing pool.
- height restrictions should be enforced on the river ride (e.g. no person shorter than one and a half times the diameter of the inner tube should use the slide).
- slide attendant should space the patrons on the river ride so as to avoid congestion in the pools. (fig.82)
- patrons should not be allowed to loiter in any of the river ride pools.
- patrons should not be allowed to kneel or attempt to stand on the river ride inner tubes.
- running starts and jumping on slides should not be permitted.
- riding on knees or standing in slides should not be allowed.

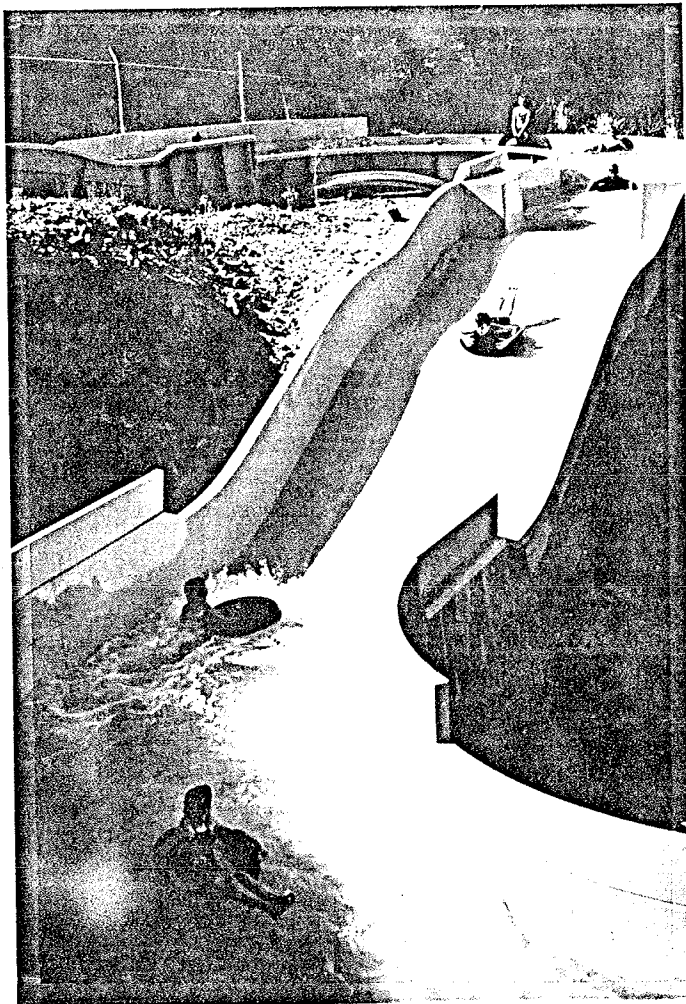


fig. 83 River Ride Slides: "All Fun", Victoria, B.C.

- patrons should be encouraged to keep arms in and not try to hold the edges of the slides.

5.5.2 User Preferences

planning & design considerations:

- . in the field research the busiest time of the day was the afternoon. The busiest time of the season was July and August, particularly the August long weekend
 - . Special events such as speed contests, mini music concerts and half-price days are effective techniques in drawing crowds to the park and should be provided on weekdays and in the evenings when attendance is typically lower.
-
- . in the parks that offered a "River Ride" inner tube slide, the favourite slide was always the River Ride even over the fastest adult twister. It is recommended to provide a well-engineered river ride, designed specifically for each site, to offer variety and excitement at the park.
(fig.83)

5.5.3 Alternative Activities

planning & design considerations:

- . in order to create an interesting and enjoyable water park, it is recommended to provide additional recreational amenities. Other

water-oriented activities could include:

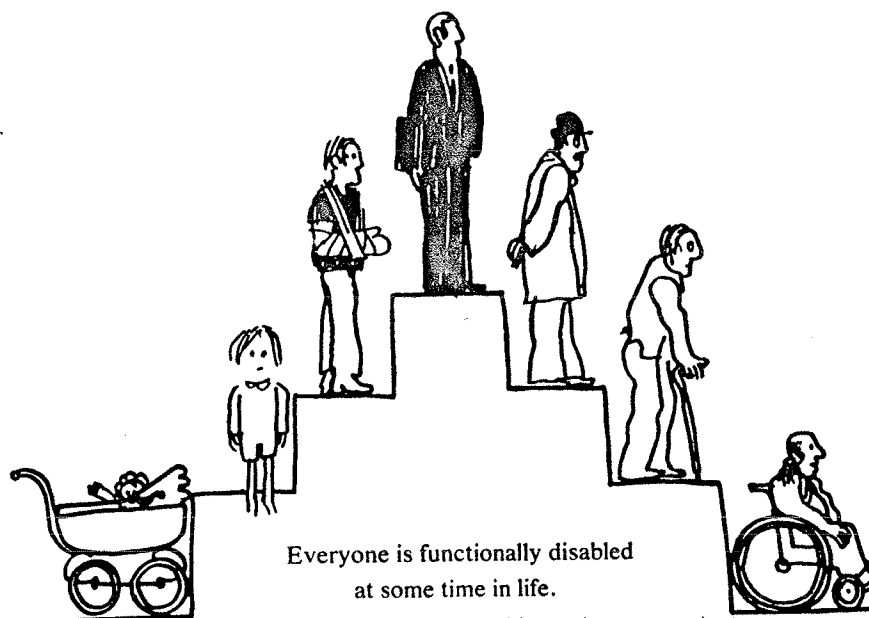
- bumper boat (adult and children's sizes)
 - wind surfing
 - canoeing or kayaking
 - paddleboats or rowboats
 - swimming
- . bumper boats are a versatile facility that can be operated in an above-ground pool structure or on a lake. They are available in children's sizes and adults and can be easily adapted to most sites. They are often operated as a private concession within the park.
- . wind surfing, canoeing and boating are each complimentary activities at a water park, but can only be accommodated on a lake of 10 acres (4 ha) minimum.
- . it is also recommended to provide more passive activities that appeal to seniors or people not wishing to slide. These could include
- horseshoe pits
 - mini golf
 - relaxing in hot tub
 - picnicking
 - suntanning
 - leisure swimming
- . of the above list, the most common supplementary recreational activity in the parks researched was

mini golf. Most parks charged a separate fee for this game and reported it to be a successful venture. Mini golf is a game that can be played by many different age groups with almost any level skill and still be enjoyed. It is therefore a recommended supplementary amenity.

- . playground units, ball throwing games, video or pinball machines and volleyball are also useful amenitiy facilities. Video or pinball machines were provided at 90% of the parks researched. The average number of machines per park was 15. These were always very popular with the patrons and are recommended to be included in a waterslide park.
- . a campground is an excellent facility to offer in conjunction with a waterslide park. It is recommended to reserve space for a campground or locate the park near an existing campground. In the field research, 80% of the parks offered nearby camping or were planning to offer it in the following year.

5.5.4 Handicap Accessibility planning considerations:

- . in the field research, over 80% of the parks regularly received disabled patrons. This included blind, deaf, physially and mentally disabled people. It is therefore recommended to



reprinted from: Barrier Free Programme, New Zealand Crippled Children Society

fig. 84 Recognition of Disabled Individuals (p. 23 Hickman)

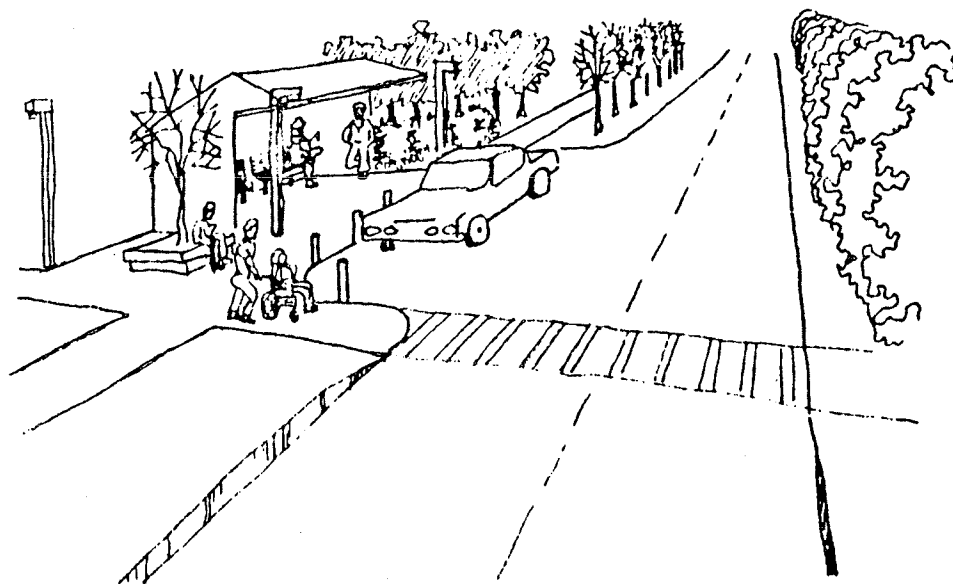


fig. 85 Passenger Drop-off Area (p. 34 Baker)

- accommodate disabled patrons whenever possible.
- . virtually everyone will experience some physical disability at some point in their life, whether temporary or permanent.⁶⁷ (fig.84) In Canada, one person in seven has a permanent physical disability and when temporary impairments are included, this figure is much higher.⁶⁸
 - . too frequently disabled people are denied access to leisure facilities because they are designed in a way that makes use extremely difficult if not impossible for individuals who cannot see well, hear well, or who are not completely mobile.
 - . a public facility should be accessible to everyone. Waterslide parks can be designed to accommodate various disabled users. Areas for consideration include: the parking lot, entrance gate, change rooms, pools, pathways and ramps.

design considerations:

- . parking lot:
 - "special parking spaces for the disabled should be provided near the main entrance to the facility. Spaces should be nearly level, hard surfaced, and 12 feet wide (3.6 m). Easily identifiable signs should designate them as reserved for physically disabled people.
 - a drop-off area should be provided directly next to the main park entrance. (fig.85) This should



fig. 86 International Symbol of Access (p. 14 Hickman)

allow

both cars and buses to stop without disrupting the regular flow of traffic.

- curbs should be cut at all intersections and ramps should be provided when stairs are used.

(see last item this section for slopes and details on ramps)

- curbs or wheel stops throughout the parking lot should be in a contrasting color to the parking surface to increase visibility.
- bollards in the parking lot should be spaced 3 feet (1 m) apart to allow wheelchairs to pass through.

. entrance gate:

-
- where turnstiles are used at entrance and exits, alternative access should be provided. Entrance ways should be a minimum of 2 feet 8 inches wide (81 cm) and accessible at sidewalk level or by a ramp.
 - the main entrance should clearly display the international symbol of access which is used to notify physically disabled that they will have reasonable freedom of movement within the park complex. (fig.86)
 - an information station that provides raised-line maps for blind or partially blind patrons should be located at the entrance area

- ticket windows, telephones, drinking fountains, concession stands and vending machines should all be at a convenient height for use by a person in a wheelchair. These elements should not protrude out into circulation space to avoid hazards to visually impaired individuals who may use a cane to detect obstacles at floor level only.

. change rooms:

- the distance from the main park entrance to the change rooms should be as short as possible and should have no changes in elevation.
- where elevation changes do occur, contrasting surface textures and colors should be used to warn people of the change.
- the doors to the change rooms should be in a contrasting color to the surrounding walls. Whole tones should be used to aid people with low vision.
- signs on change room doors should be 8 inches (20 cm) high in sharply contrasting colors to the doors. They should be at eye level and made of non-glossy material to avoid reflection and glare.
- all doors should open with minimum effort and be slow closing to permit uninterrupted access by a disabled person. A single door should be used

and should be at least 2 feet 6 inches (76 cm) wide.

- the surfaces throughout the change room should be non-slip and non-abrasive to avoid injury to extra sensitive skin often found on disabled people.
 - the toilet stall for wheelchair access should be at least 4 feet 6 inches (1.3 m) wide and 5 feet (1.5 m) deep. The door should swing outwards and be at least 32 inches (81 cm) wide and an L-shaped handrail 32 inches (81 cm) high and 1 1/2 inches (4 cm) in diameter should be provided.
 - extra large size lockers 5 feet 9 inches (1.8 m) tall should be provided for storage of equipment such as crutches, braces, and prosthetic devices
 - controls for the showers should be located 3 feet (1 m) from the floor and positioned to the side of the shower head spray.
 - thermostatic controls and mixing valves should be built into the showers to avoid burns on people who have a delayed reaction time or who have a loss of the tactile sense.
- . pools:
- the surface of the pool deck should be a non-slip, non-abrasive texture and should change colors 2 feet (61 cm) from the pool edge to warn

people with visual impairments of the water's edge.

- signs by the pool (directions, depths, or rules) should be in print at least 2 inches (5 cm) high and in contrasting colors to enable visually impaired people to be fully informed.
- storage space for wheelchairs should be provided near the leisure pools (hot pool, swimming pool, water play area).
- to prevent bruises and abrasions on disabled people entering or exiting the pools, a covered rubber mat should be placed on and secured to the edge of the pools.
- all pools should slope up to the shallow end instead of using stairs. Slopes should not exceed a rise of 1:9 in the water.
- when stairs are used, risers should be no greater than 5 inches (13 cm) and should be at least 14 inches (36 cm) deep and approximately 3 feet 6 inches (1 m) wide. The stairs should be a contrasting color to the pool walls and floor. Two handrails approximately 2 feet 8 inches (81 cm) apart and 2 feet 8 inches (81 cm) high, should be provided.
- if a pool for leisure swimming is provided, it should be at least 4 feet (1.2 m) deep to allow a disabled adult enough buoyancy to swim without

scraping their feet.

- water temperature in the landing pools and leisure pools should be between 78° F and 84° F (25.5° C and 28.8° C) for optimum patron comfort.
- all pool sides and floors should be non-skid, non-abrasive material. Distinct colors on pool floors should designate drastic changes in depth.

. pathways:

- major circulation pathways should be a minimum of 6 feet (1.8 m) wide to allow two wheelchairs to pass.
- pathways should be no greater than 5% slope, with 3% being more feasible. Pathways with a 5% slope should have a 5 foot (1.5 m) rest area every 100 feet (30 m).
- for parks operating after dusk, lighting of at least 5 foot candles at ground level should be provided along pathways.
- wheel stops 2 inches high (5 cm) and 6 inches wide (15 cm) should be placed near hazardous areas. Breaks for drainage should be provided every 5 to 10 feet (1.5 to 3 m)
- abrupt changes of grade, stairs, ramps, path intersections and locations of special information should be indicated by textured paving in

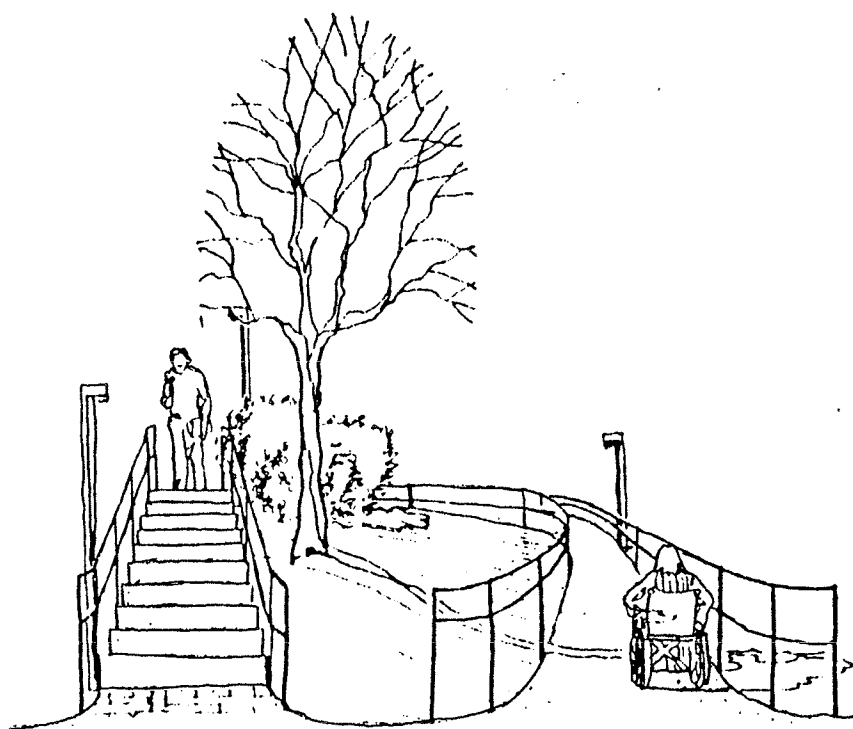


fig. 87 Ramp Alternative (p. 32 Baker)

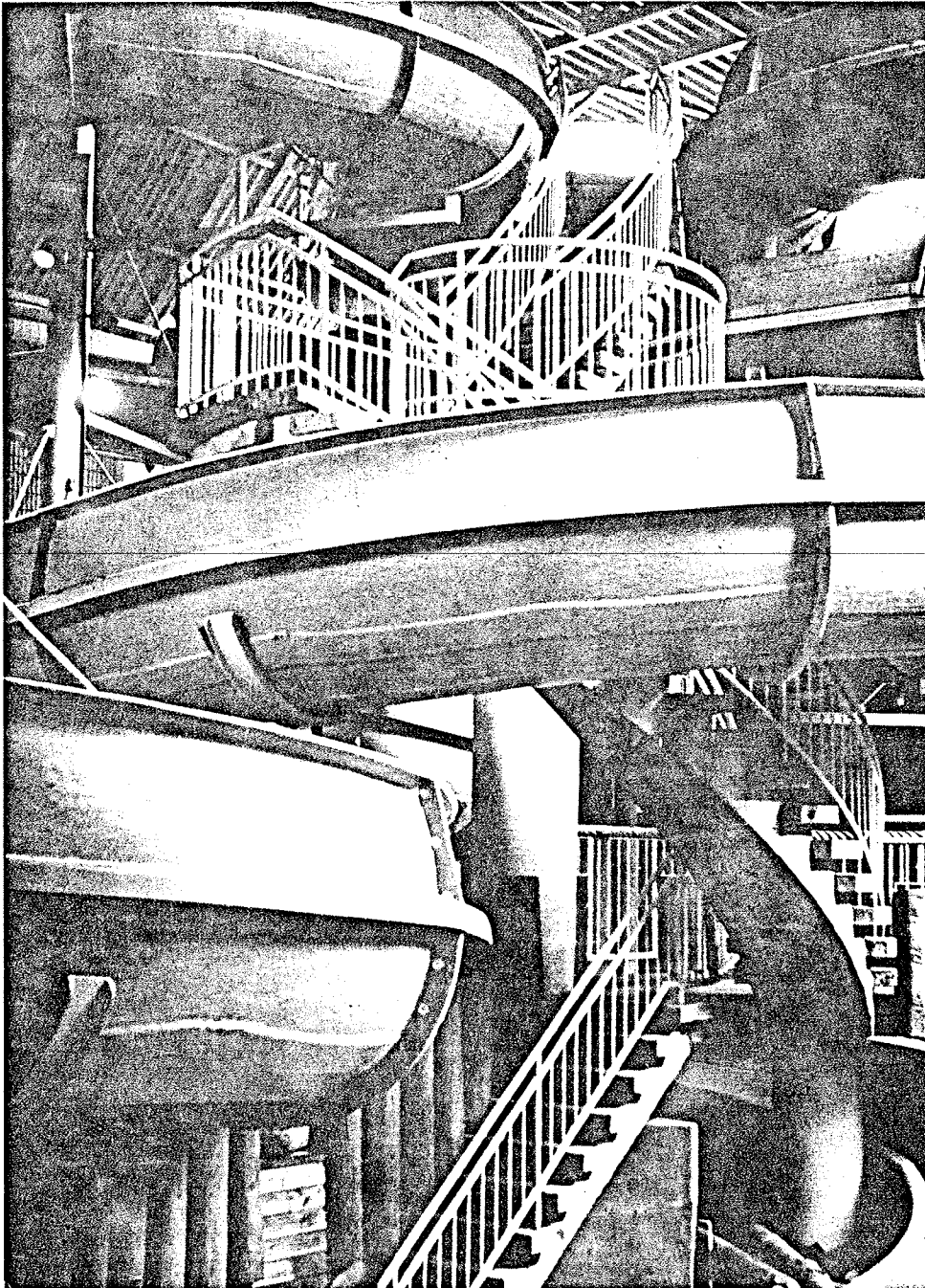
the path.

. ramps:

- ramps should be no greater than 8.33% and no longer than 30 feet (9 m). A minimum level distance of 5 feet (1.5 m) should be provided before steep ramps.
- one-way ramps should be at least 3 feet wide (1 m) and two-way ramps should be 6 feet (2 m). A textural warning should be placed before the top and bottom of all ramps. (fig.87)
- double handrails should be provided on both sides of ramps. The lower handrail should be 2'-4" (71 cm) and the top rail should be 3'-0" (91 cm) in height and extending 18 inches (46 cm) across the landing."⁶⁹

6. DESIGN GUIDELINES

FOR INDOOR WATERSLIDE FACILITIES



The Oasis River Country, Sheraton Cavalier, Saskatoon, Sask.

6.0 DESIGN GUIDELINES for INDOOR WATERSLIDE FACILITIES

This chapter is a brief summary of the indoor waterslide facilities researched. Most guidelines for outdoor waterslide parks are similar to indoor facilities. Items that are specific to indoor facilities are discussed under the appropriate headings.

These recommendations are based on field research of seven indoor waterslide facilities in Western Canada. The field research was conducted in the summer of 1984 and included interviews with planners, engineers, designers, manufacturers, managers and patrons of the waterslide facilities. Personal observation, questionnaires, and actual use of the facilities also assisted in formulating these guidelines. In addition to the field research, various Manitoba standards were reviewed to establish the guidelines for Manitoba. It is important to consult local and provincial standards on building codes, swimming pool regulations, amusement park standards and the Public Health Act for detailed by-laws particular to each province.

All data gathered in the field research has been summarized in chart form to graphically illustrate the findings (see Appendix A). Categories surveyed and guidelines developed are as follows:

- planning & design
- operation, maintenance and safety
- support services

- user profile and supplementary recreational amenities.

Under each category in the charts, specific issues are listed for each park. These charts provide a summary of relative information upon which the following planning & design guidelines were based.

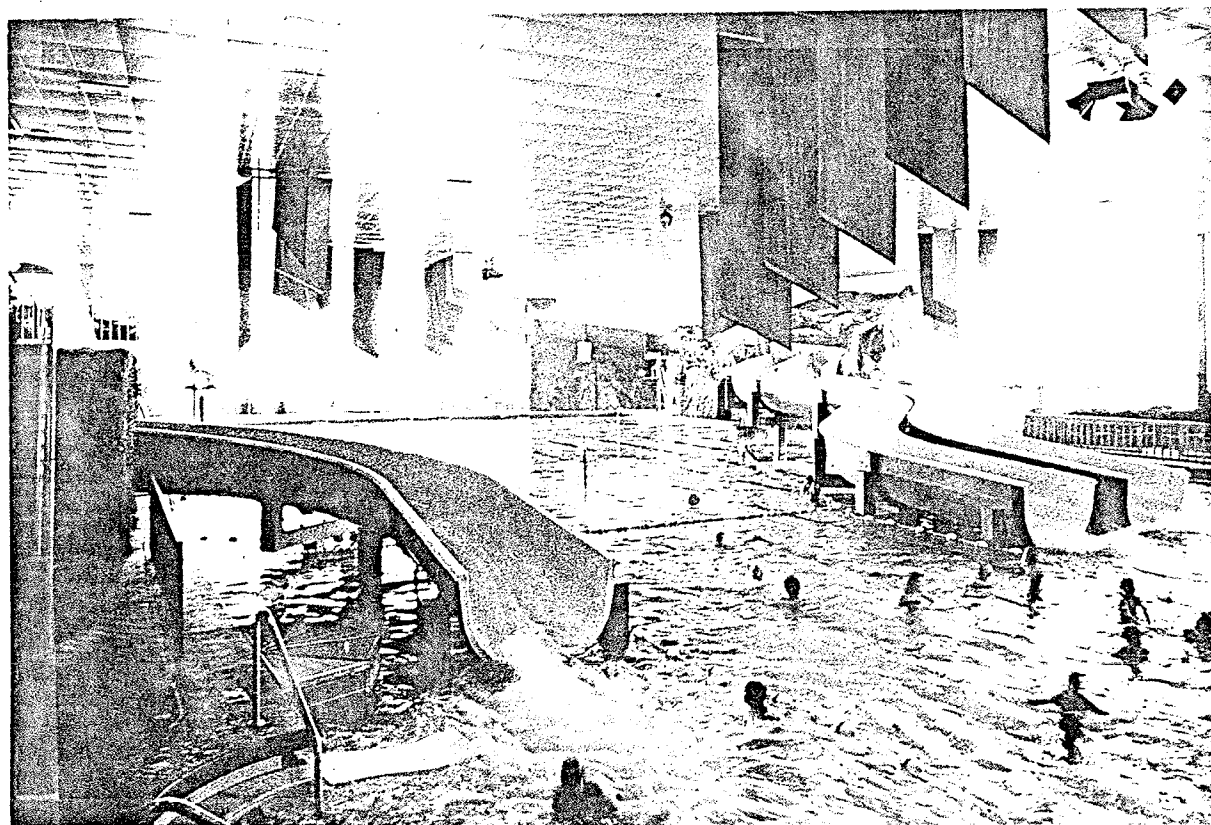


fig. 88 Waterslides & Swimming Pool Combination (Cover Page April-May/84 News Splash)

6.1 Planning & Design Issues for INDOOR Waterslide

Facilities

6.1.1 Tower Construction

6.1.2 Slide Runs

6.1.3 Pools

6.1.4 Stairs

6.1.1 Tower Construction

- . a tower structure can be integrated into an existing building, incorporated into a building extension, or designed into the original building plans.
- . waterslide towers can be adapted to new or existing developments such as shopping malls, hotels and leisure centers. (fig.88) For one-storey buildings the slides should be enclosed tube slides to allow year-round use of the facility.
- . in the field research, the types of adaptations included four building additions, and three facilities designed into the original building plans. The average time span for construction was 4 months. The type of developments the waterslides were associated with were two shopping malls, one motel and four hotels. All facilities were in use year-round.
- . in the field research, all waterslides were

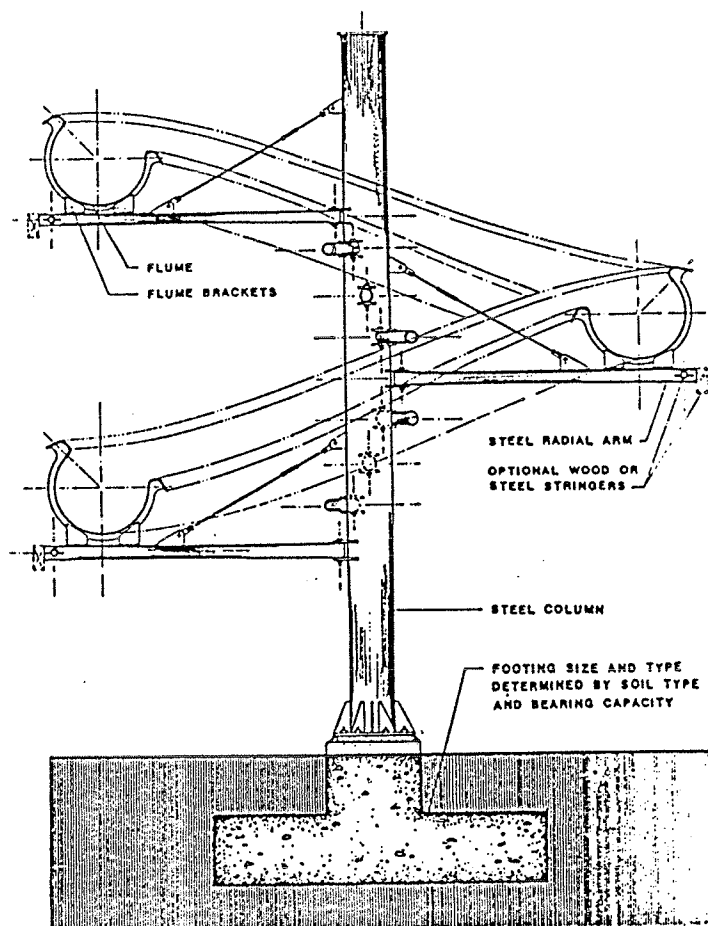


fig. 89 Typical Tower Structure (Water Forms Canada Ltd, Kitchener, Ont.)



fig. 90 Translucent Waterslides (p. 9 April-May/84 News Splash)

supported by a steel tower structure. The average height from the landing pool deck up to the slide entries was 42 feet (12.8 m). The range was from 30 feet (9.1 m) to 55 feet (16.8 m).

- . the average floor area required for two indoor waterslides with one landing pool is 7,200 square feet (570 m²). Additional space is required for a hot pool, leisure pool, seating areas, food and beverage services, washrooms and mechanical equipment. In developments other than hotels, additional space for change rooms is required. All elements should be organized to create a sense of openness and freedom of movement throughout the facility.

- . the main components for the tower structure includes vertical steel or concrete columns, cantilever braces with cradles to hold the slides, and concrete piles or footings to support the towers. (fig.89)
Refer to item 5.1.5 for further details.

6.1.2 Slide Runs

- . in the field research, all slides were constructed of fiberglass with a smooth, colored gelcoat surface. One facility is using translucent fibreglass flumes that allow additional light to diffuse through. (fig.90)
- . the most common type of slide was the open slide. This was primarily due to the type of development

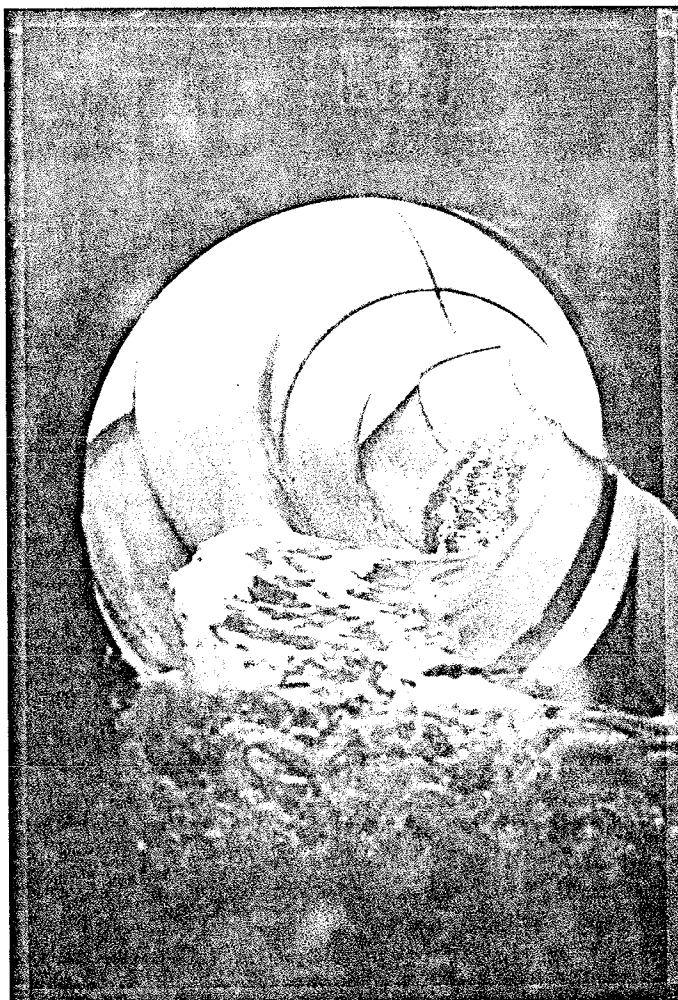


fig. 91 Tube Slides: "Lethbridge Indoor Waterslides", Lethbridge,

Alta.

the slides were in. Most waterslides were totally enclosed in a building and did not require weather protective tube slides. However, one advantage of an enclosed tube slide is that it controls noise levels in the overall waterslide and pool complex. (fig.91)

- . in the field research, the average number of slides per facility was 2. The range was from one to three.
- . the average number of drops per slide was 1, with a range from 1 to 3. Drop sections lose approximately 5 feet (1.5 m) of vertical height. When more than one is used, additional overall tower height is required or a shorter ride results.
- . the average length of runs was 300 feet (91 m). The range was from 250 feet (76 m) to 380 feet (116 m).
- . for open slides, risers should be installed on the outside top of curved units or where water loss may be a problem. Risers are usually 1.5 feet (45 cm) in height and are prefabricated to fit all slide components.
- . an overall slope of 10% should be maintained on the slides to prevent slowing down. On spirals, the slope should be increased to 11% or 12% as friction is greater in these areas. See item 5.1.7 for additional recommendations.

6.1.3 Pools

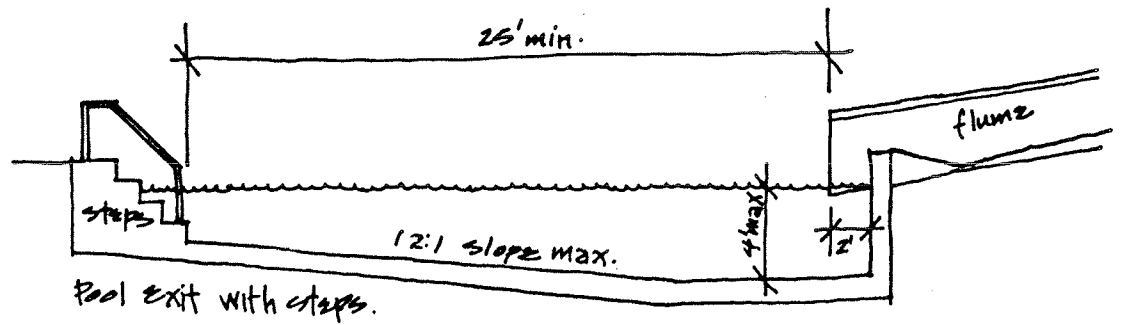


fig. 92 Landing Pool Dimensions.

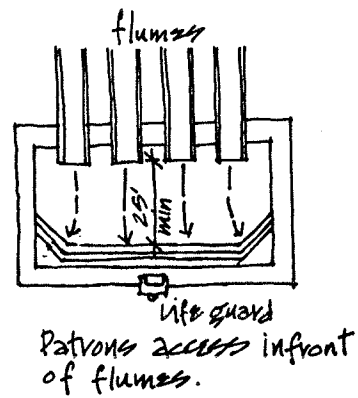


fig. 93 Landing Pool Exit

- . pools that should be provided at an indoor waterslide facility include:
 - landing pool
 - hot pool
 - leisure pool
 - children's water play pool/pools
- . leisure pools and play pools are important features due to fewer slides at most indoor waterslide facilities.
- . in the facilities visited the average depth for the adult slides landing pool was 3.8 feet (1.16 m). The range was from 3 to 4.5 feet (.9 m to 14 m). It is recommended that the landing pool for the adult slides be a minimum of 3.8 feet deep (1.2 m) with a maximum depth of 4.3 feet (1.3 m).
- . all pools should have underwater lighting for lifeguard supervision.
- . it is recommended that the distance from the slide exits to the edge of the landing pool be a minimum of 25 feet (7.6m). In the field research the average distance was 17 feet (5 m), but was found by managers to be too short and resulted in scrapes and bruises. (fig.92)
- . access out of the landing pool should be directly in front of the slide exits and not off to the sides, to prevent patrons from walking or swimming in front of adjacent slides. (fig.93)



fig. 94 Stairs: "The Oasis River Country", Saskatoon, Saskatchewan

- . decks should drain towards the deck drains or pools at a slope of 1/4" per foot (.6 cm - 30 cm). Refer to item 5.1.8 for additional recommendations.

6.1.4 Stairs

- . all stair designs should conform to the provisions of local building codes and safety standards.
 - . stairs can be constructed of various materials including wood, steel or concrete. For design details see item 5.1.6, previous chapter.
 - . alternative access up to the slide entries should be provided for disabled patrons. At "Water Works" in the Renaissance Hotel, Saskatoon, Saskatchewan, a see-through elevator provides such a service
-

6.2 Operation, Maintenance & Safety Issues for INDOOR Waterslide Facilities

- 6.2.1 Hours of Operation
- 6.2.2 Communication System
- 6.2.3 Lifeguards

6.2.1 Hours of Operation

- . in the field research the hours of operation included: 10 hours per day, 13 hours per day and 14.5 hours per day. The most common time span for daily operation was 10 hours. Winter weekday hours were often shorter than summer hours. (For example, the facility would open at noon instead of 9:00 or 10:00 in the morning.)
- . the means of identifying paid customers was either a wristband (for facilities in shopping malls) or the patron's signature and room number (for facilities in hotels).
- . at indoor waterslide facilities that charge by the ride, a reusable and transferrable wristband is often used. The band usually has a series of plastic tabs that are taken off one at a time by the slide attendant just prior to the patron sliding down the flumes. A typical wristband offers 15 rides for a set price.

6.2.2 Communication System

- . in the facilities researched, the means of communication between staff members included:

- a radio system (walkie talkies, headphones, telephones or intercom).
 - loud speakers
 - hand signals
 - loud voice.
- . the most common method of communication was hand signals and a loud voice.
 - . it is recommended to use a radio system when the slides are supervised at the top. This allows the lifeguard at the landing pool to notify the slide supervisor at the top of any problems at the pool. Further sliding can be stopped until the problem is rectified. Slide supervisors at the top can also warn the lifeguard of potential problems when patrons carelessly go down the slides.

6.2.3 Lifeguards

- . in the field research the average number of total lifeguard staff hired was 6 with a range from 1 to 12. The average number of lifeguards on duty at one time was 2 with a range from 1 to 13.
- . it is recommended to have at least 2 lifeguards on duty at once. This allows for supervision of the slides and pools.
- . in the field research lifeguards were required to have a Bronze Medallion or Bronze Cross and a First Aid Certificate in order to be qualified to handle potential emergencies.

- . the average number of supervisors hired was 3 in total with 1 on duty at a time. It is recommended to have at least 1 supervisor at the slide entries to control access onto the slides and to control patron behaviour on the slides.
-

6.3 Mechanical Systems for INDOOR Waterslide Facilities

- 6.3.1 Water Source, Quality & Treatment
- 6.3.2 Pumps, Pipes & Other Mechanical Components
- 6.3.3 Heating System
- 6.3.4 Temperature of Water

6.3.1 Water Source, Quality & Treatment

- . all indoor waterslide facilities researched used the city water system as the source of all water. No problems in receiving an adequate supply of water were reported.
- . the only problems with water quality were two reports of water being hard and requiring softening.
- . the average amount of water loss through splash and evaporation per day as 750 gallons.
- . types of chlorination systems used were chlorine gas, liquid or granule. The most common system used was liquid chlorine.
- . all facilities used high vacuum sand (HVS) filters.
- . for indoor waterslides where water temperatures in winter are much higher (especially tube slides that are partially outdoors), the water turnover rate should be similar to a spa pool, 1/2 hour to 45 minutes.⁷⁰

6.3.2 Pumps, Pipes & Other Mechanical Components

- . in the field research all indoor facilities used polyvinyl chloride PVC pipes to carry the water from the pipes up to the slide entries.
- . for recommendations see item 5.3.2, previous

chapter.

6.3.3 Heating System

- . types of water heating systems used were natural gas, propane or solar. The most common system used was natural gas heaters.
- . for recommendations see item 5.3.3.
- . the average size of the mechanical room was 575 square feet (53 m^2). This housed the filters, pumps, water heaters and chlorination equipment.
- . when pool water was to be drained, the outfall was the city sanitary system.

6.3.4 Temperature of Water

-
- . the average temperature of water in the landing pool was 82° F (28° C). The range was from 78° F to 88° F (25.5° C to 31° C). Water temperature is often in the cooler range for the summer ($78^{\circ} \text{ F}/25.5^{\circ} \text{ C}$) and warmer for the winter ($88^{\circ} \text{ F}/31^{\circ} \text{ C}$).
 - . the average temperature of water in the hot pool was 102° F (38.8° C) with a range from 100° F to 104° F (37.7° C to 40° C).

6.4 Support Services for INDOOR Waterslide Facilities

- 6.4.1 Washrooms
- 6.4.2 Food & Beverage Services
- 6.4.3 Observation Area
- 6.4.4 Interior Quality

6.4.1 Washrooms

- . in the field research the average number of sinks in the ladies washroom was 1, toilets 2, change stalls 2, and showers 2.
- . in the mens washroom the average number of sinks was 1, toilets 1, urinals 1, change stalls 0, and showers 2.
- . in shopping mall waterslide facilities, lockers and mens and ladies change rooms were provided. In hotel waterslide facilities only washroom facilities were provided. Changing and clothing storage were to be in each patron's hotel room. This helps to deter people who are not registered hotel guests from using the facility for free and it also reduces the amount of space required to operate the facility.
- . local health authorities should be consulted for regulations on public washroom facilities.

6.4.2 Food & Beverage Services

- . fast food and conventional food was available at most indoor facilities.
- . liquor service was occasionally available. When

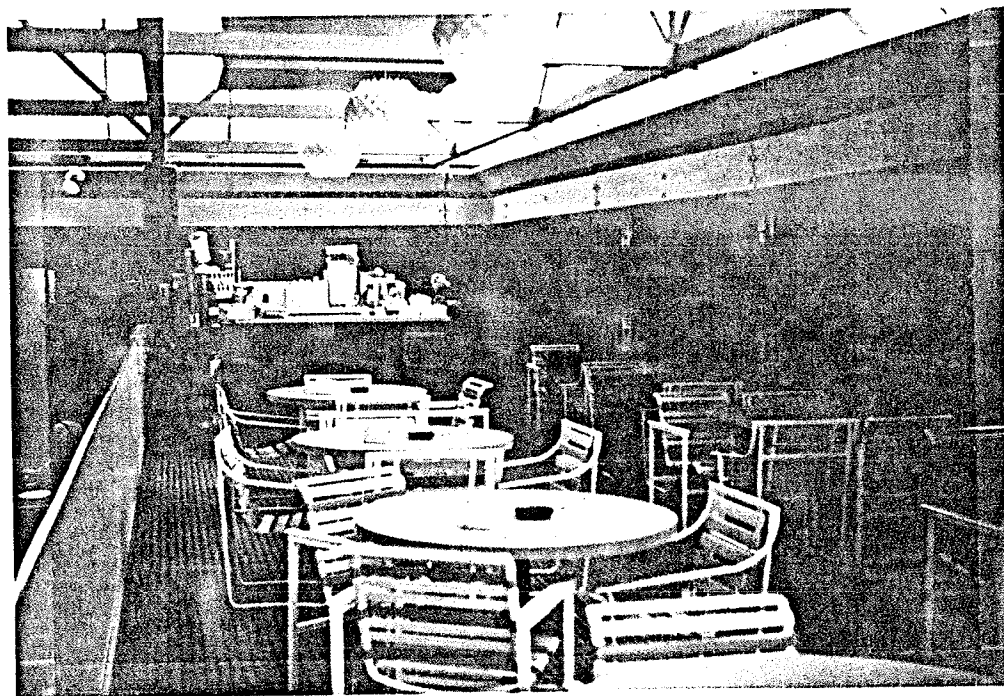


fig. 95 Food & Beverage Service: "The Oasis River Country"
Saskatoon, Saskatchewan

liquor service is provided it is recommended to design a specific area for patrons to sit. Railings, walls, partitions or level changes should be used to enclose the seating area. (fig.95) A wide view of the area should be maintained.

6.4.3 Observation Area

- . an observation area for the public should be provided. An "air lock" should be created to prevent drafts in the pool area and control humidity in the viewing area.
- . viewing windows should be kept clean and free of condensation to allow unobstructed view of the pool area.
- . tempered safety glass should be used on all viewing windows in case of accidents.
- . it is recommended to locate the observation area close to a food services area.

6.4.4 Interior Quality

- . consideration should be given to the quality and image of the interior environment of the overall facility. Natural daylight should be integrated into the space to create a bright and more open outdoor atmosphere. Lighting quality and quantity for each area should be carefully planned. For example, high activity areas such as the slides and landing pool area could receive the highest

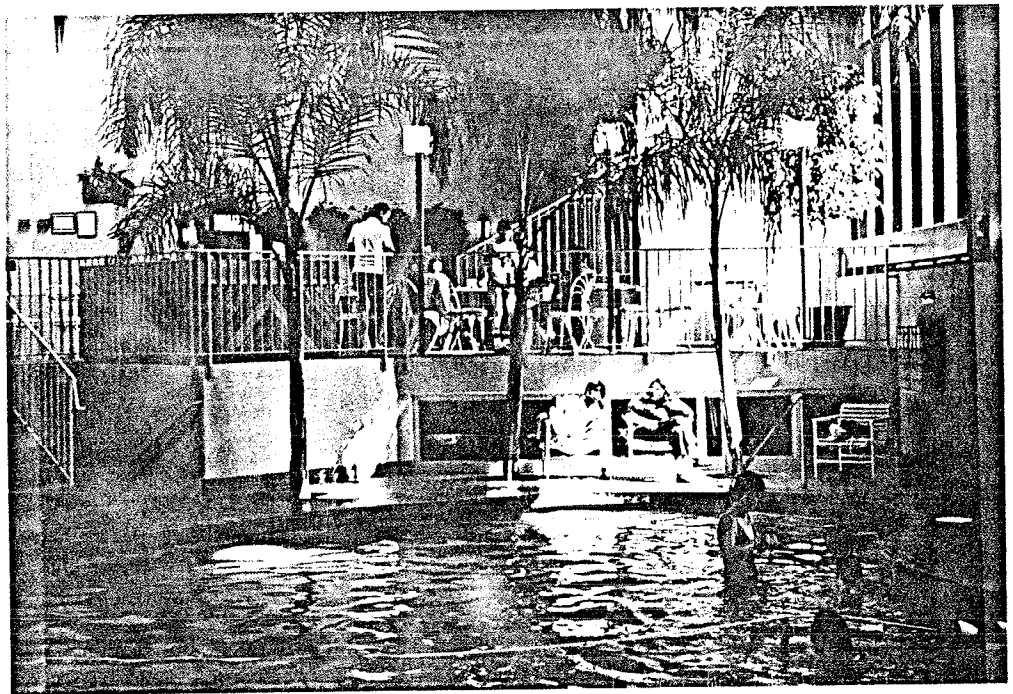


fig. 96 Indoor Tropical Plants: "The Oasis River Country",
Calgary, Alberta

intensity of lighting while the more passive areas such as the hot pool could receive lower intensity and different hues of lighting. A balance of warm and cool lighting should be provided to offer visual relief.

- . indoor tropical plants should be used to enhance the environment and add color and life to the spaces. Plants can add a special quality to the facility and create a specific theme or image. (fig.96)
 - . color should also be considered for an indoor waterslide facility. A color scheme should be planned to ensure harmony of all interior elements. Color creates visual interest and can enliven an environment or induce psychological responses such as excitement or calmness.
-

6.5 User Profile & Supplementary Recreational Amenities for INDOOR Waterslide Parks

- 6.5.1 Patrons
- 6.5.2 User Preferences
- 6.5.3 Alternative Activities

6.5.1 Patrons

- . for waterslide facilities in hotels, families are the primary patrons. For waterslide facilities in shopping centers, the primary patrons are teens.
- . for shopping center facilities, the minimum threshold of trade area population to support an indoor waterslide complex is 100,000 with the optimum being 150,000.⁷¹

6.5.2 User Preferences

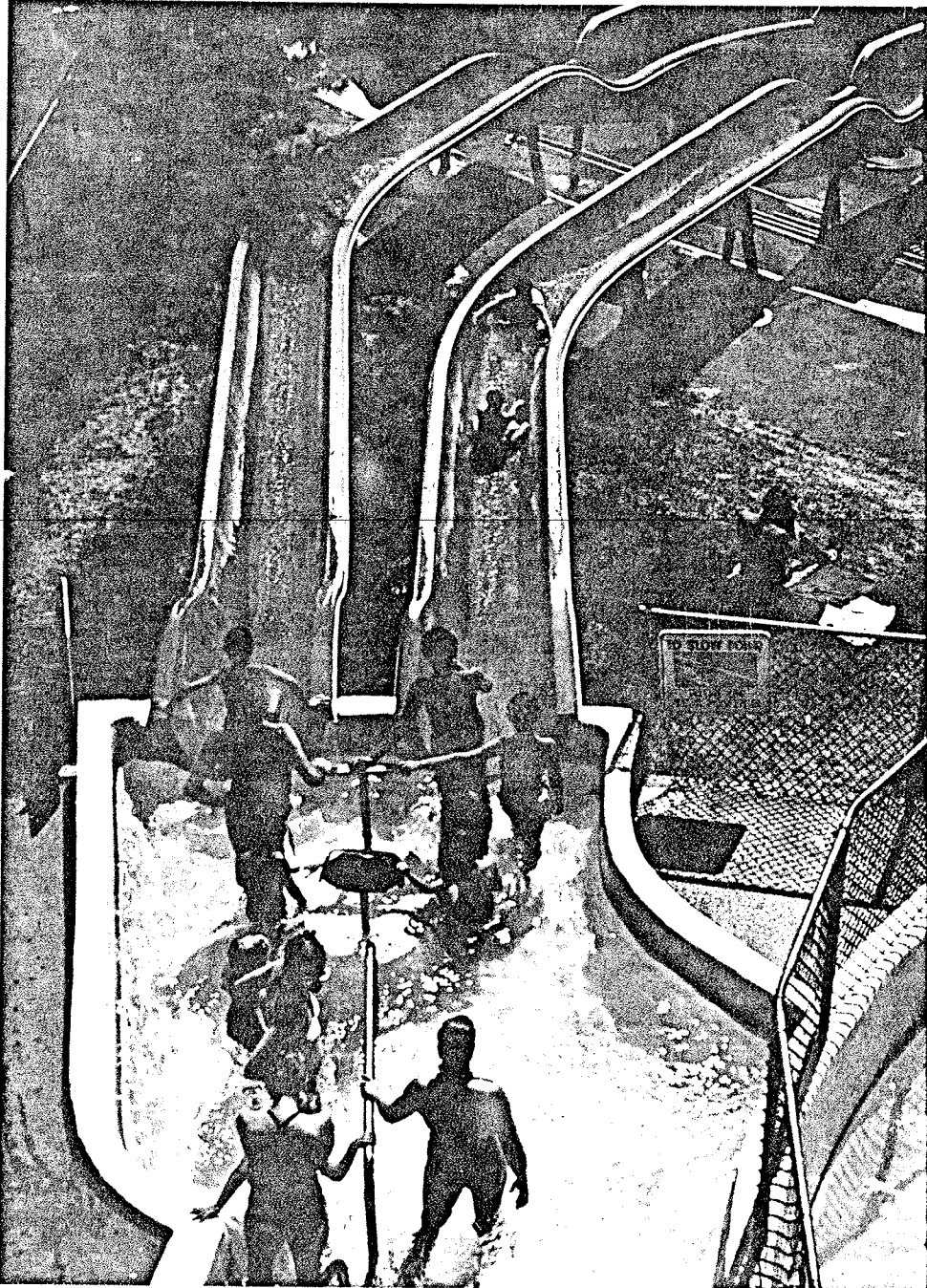
- . the average length of stay at an indoor waterslide facility is 1.5 hours.
- . the busiest time of day is the afternoon and evenings. Weekends are usually the busiest time of the week.
- . the busiest time of the year for shopping mall facilities is the summer.

6.5.3 Alternative Activities

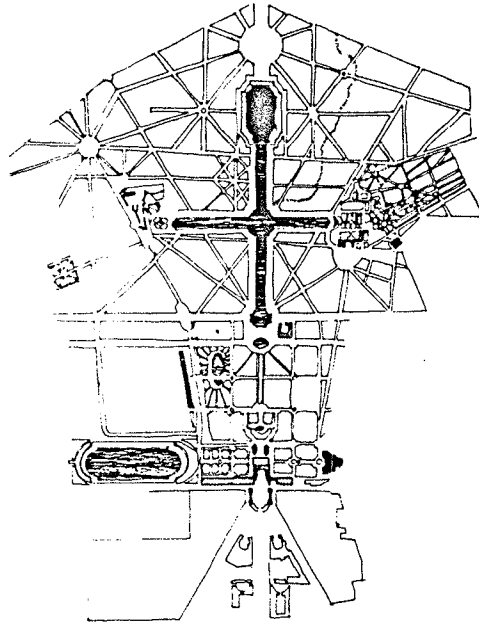
- . in the field research, supplementary amenities included:
 - children's water play area
 - hot pools

- playground units
 - video and pinball machines.
 - . over 70% of the facilities provided video or pinball machines. These were usually in a separate room adjacent to the pool or lounging areas.
 - . water play areas are an essential feature and should be provided.
 - . a hot pool was usually provided and had an average user capacity of 12. Age and time limits should be enforced for hot pools. Underwater visibility is often obscured in a hot pool due to water turbulence and crowded conditions. This makes lifeguard supervision difficult and decreases patron safety.
-

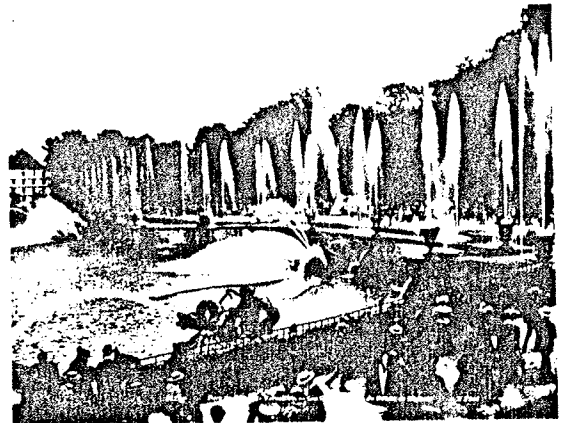
7. SUMMARY



Wild 'n' Wet, Westbank, B.C.



2-48 Plan of Versailles



2-50, 2-51, and 2-52. Fountains of Versailles (Photos courtesy H. Roger-Viollet, Paris)

fig. 97 Plan of Versailles, France (p. 44 Campbell)

fig. 98 Fountains of Versailles, France (p. 45 Campbell)

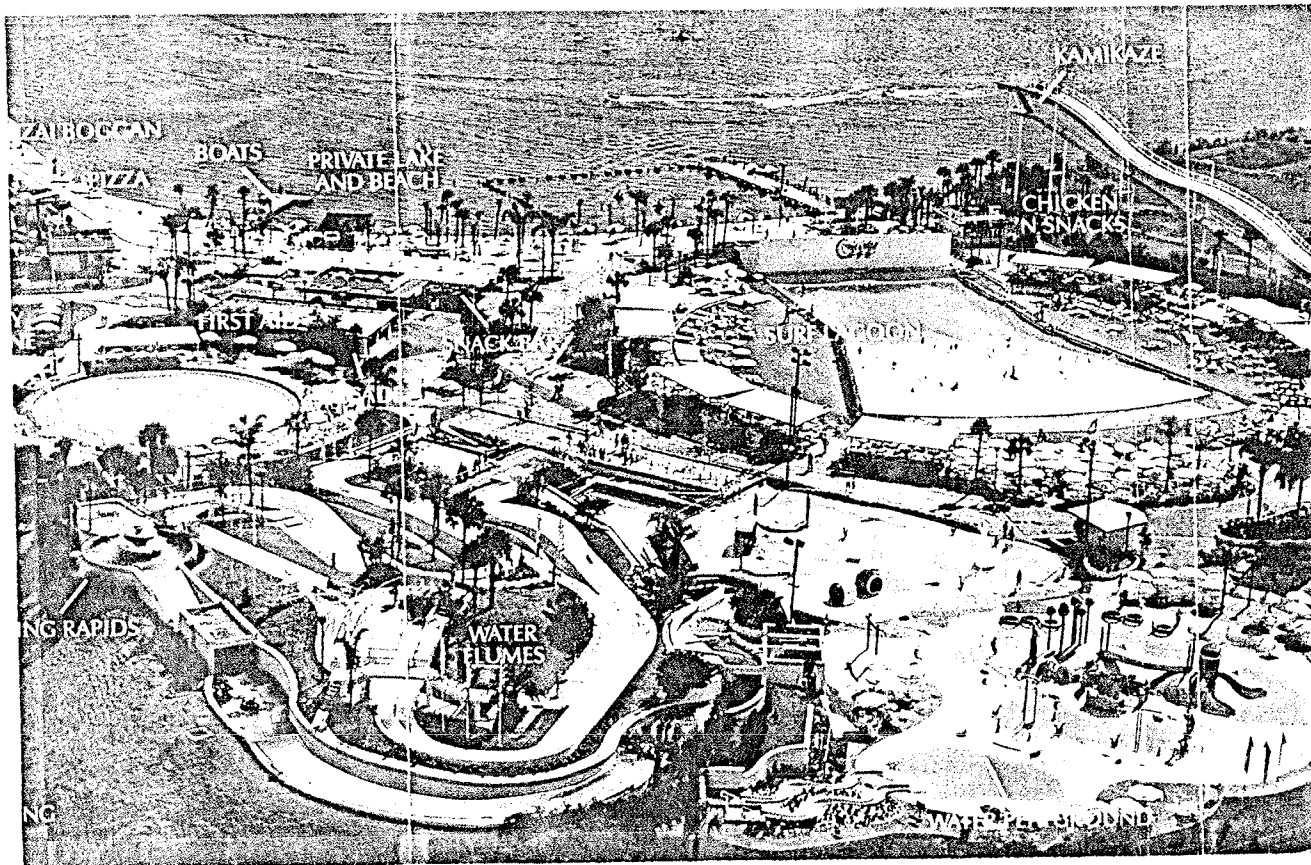


fig. 99 Contemporary Water Theme Park: "Wet'n Wild", Orlando, Florida

7.0 SUMMARY

The Water Park concept has existed since the historic days of Versailles in France (fig.97 & 98) and the Roman public baths. Water Theme Parks have varied in form from picturesque gardens with magnificent fountains and waterworks, to elaborate public bathing establishments for relaxing, exercising and socializing.

Today, we continue to use water for leisure, recreation and socializing. Contemporary Water Theme Parks include wave pools, hot pools, leisure pools, waterslides, bumper boats and many other water-related activities. The emphasis is currently on active participation in the water parks as a means of escape from the pressures of daily living. The Water Theme Park of today is a fantasy-oriented facility for pure pleasure and diversion. (fig.99)

Fantasy-oriented recreation is exciting and stimulating for people who prefer challenge and excitement in their leisure. Water Theme Parks can provide opportunities for interaction, excitement and challenge. There is a sense of adventure, identity, movement and interest. Water Theme Parks can provide a diversity of creative features that entertain people of all ages.

When planning a water park facility an immediate goal to strive for is to provide quality recreational opportunities for the changing needs of people, focusing on priorities and lifestyle, and accommodating senior citizens, physically and



fig. 100 Relaxation & People Watching: "White Water Atlanta",
Branson, Missouri

mentally disabled people wherever possible.

A recreational facility should provide a sequence of views and sensations. Each space that is created should serve a particular function. Site quality is achieved when the sum total of all the connected spaces produces an overall positive reaction.

Flexibility is an important feature at a Water Theme Park. Space should be reserved for future expansion and renovation. Waterslides have the advantage that they can be changed in configuration and new slides can be added. This helps to keep up with the changing demands of the users and changes in technology. One important factor to give serious consideration to is "arm chair" or passive activities. Not everyone is out for an active physical workout when they go to a Water Park. Relaxation is an important aspect of leisure time and should not get lost in the excitement of speed slides and river rides. People enjoy sitting, watching and relaxing just as much as taking part in the activities. (fig.100)

Each Water Theme Park has its own unique personality. One specific technique, activity or theme that is a complete success at one park may not work for all parks. It is only a skillful integration of market, facilities and user data, together with the designer's imagination, that determines the success of each particular park. Any strategy that extends patrons' length of stay, comfort and interest will prove to increase the value of the investment to the developer as well

as increase satisfaction of the users. It is predicted that in the future private concessionaires will provide community and regional theme or Amusement parks on public land.⁷²

"The demand for new rides at both new and existing parks will continue to accelerate. Manufacturers will be called upon to provide more and more thrill in speed slides and inner tube rides. The immediate challenge is to engineer and construct those rides so that safety is not compromised."⁷³ New smoother surfaces have recently been developed by manufacturers to create more exciting slippery rides. Other technological advances include visual effects such as three-dimensional movies projected on a large screen at the edge of a Wave Pool. Movies like "Jaws" and "The Creature From the Black Lagoon" are shown with the prehistoric creature from the Black Lagoon coming right into the half-million gallon wave pool. As the creature fills the giant screen with his three-dimensional presence, the audience screams in sheer terror at the reality of the illusion.

Leisure and recreational facilities can provide opportunities for people to begin to explore various aspects of life outside the work place. Water Theme and Waterslide Parks are one example of how planners and designers can provide a place and means by which individuals can seek enjoyment and self-discovery. Facilities such as these can encourage people to participate in physical activity and interact with each other.

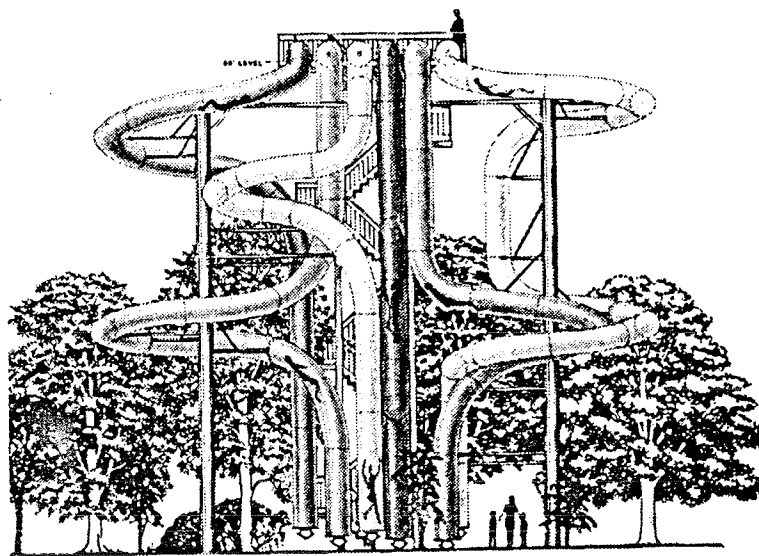


fig. 101 "The Black Hole", Hydrotube (p. 1, July-August/84
News Splash)

Future research of waterslide parks could examine user behavior patterns in outdoor and indoor waterslide facilities. An in-depth study of user needs and preferences could give new insight to water park design. Future studies could also be directed towards searching for alternative uses of outdoor waterslide parks in winter. At present, outdoor waterslide parks lose revenue eight months of the year simply because they offer no alternative use in winter. Additional research could possibly provide an answer to this problem.

New technologies need to be explored to offer rides and activities that entertain and satisfy the unquenchable desire to discover something new. To stand still in the waterslide story is as good as a closed book. There is always a new slide on the horizon. (fig.101)

APPENDICES

APPENDIX A

Appendix A

The following tables are a summary of the field research data. These matrices correspond to information stated in Chapter 5.0 and 6.0 Design Guidelines. This information was used as a base for developing the guidelines. An objective evaluation was made of each survey issue, which led to the refinement of the guidelines.

The field research consisted of surveying 19 outdoor waterslide parks and 7 indoor waterslide facilities in Manitoba, Saskatchewan, Alberta and British Columbia. The field study was conducted in the summer of 1984 and included interviews with planners, landscape architects, engineers, designers, manufacturers, managers and patrons of the waterslide facilities.

Park Name & Location	Approx. acres in use	Winter use	Plans for future expansion	Type of construction: hill(s), tower(s), existing slope(s), scaffold(s)	Time span for construction (in months)	Approx. overall height from pool deck to slide entries (in feet)	Settlement problems: yes, no, surface erosion(s)	Type of slides: fiberglass(s), concrete(s), foam lined(s)	Average length of runs (in feet)	Number of adult slides	Average number of spirals per slide	Average number of drops per slide	Number of intermediate slides	Number of kiddie slides	River rider: yes, no, future(s)	Ramp slide	Speed slide	Type of pool: concrete(s), vinyl liner(s), other	Type of walkways: asphalt(s), concrete(s)	Type of deck at slide entries: concrete(s)	Approx. size of administration building (in square feet)	Building construction: concrete blk. (C), wood frame(s)	Approx. number of parking stalls or area (in acres)	Surrounding land use: agriculture(s), recreation(s), residential(s), transportation(s), floodplain(s), highway corridor		
All Fun Waterslides & Recreation Park, Victoria, B.C.	4	NO	YES	E+T	5	54	NO	F	450	1	2	4	1	0	5	1	1	3	C	C	C	2400	C	1 ac.	.5	R+H
Atlantis World of Water Vernon, B.C.	16.5	NO	YES	E+T	4	50	S	F	350	4	1	2	1	2	2	1	1	NO	C	A	W	3000	C	300	1.5	A+C
Battlefords Superslide North Battleford, Sask.	15	NO	YES	E	4	40	S	F	400	4	2	2	1	0	2	2	1	2	C	C	C	4500	C	500	4.0	F
Bonzai Waterslide Park Calgary, Alta.	2.3	NO	NO	E+T	3	45	NO	F	350	4	2	3	1	0	3	1	NO	NO	C	A	W	2000	C	200	.25	C+R
Fun Mountain Water Slide Park Winnipeg, Man.	25	NO	YES	H+S	4	50	YES	F	400	4	2	2	1	0	3	1	NO	NO	C	A	W	4300	C	400	150	A+R
Riverside Waterslides Medicine Hat, Alta.	17	NO	YES	E	4	82	NO	F	500	4	2	2	1	3	3	F	NO	NO	C	C	C	2000	C	224	2.0	C+R
Splashdown Park Delta, (Tsawwassen) B.C.	4.5	NO		T	3.5	52	YES	F	400	4	2	2	1	2	3	1	2	NO	C	C	W	6500	S	350	1.0	A
Surf City Calgary, Alta.	5	NO	YES	H	4	45	S	F	350	5	2	2	1	0	2	1	NO	NO	C	A	C	4200	C	400	1.0	A+R
Trans-Canada Waterslides Chilliwack, B.C.	10	NO	NO	H	4	60	NO	F	400	4	2	2	1	3	2	1	NO	NO	C	A	A	4000	C	600	.25	R+H
Wet 'n' Wild Lockport, Man.	4.5	NO	YES	T	3	55	NO	F	450	4	3	2	1	0	1	NO	1	NO	C	A	C	3600	C	450	1.5	A
White Water Slide/Park Penticton, B.C.	10	NO		T+H	3.5	55	S	F	350	4	2	2	1	0	3	NO	NO	NO	C	C	W	3000	C		.02	H,R,C
White Water Slide/Park Salmon Arm, B.C.	10	NO	YES	T+H		55	NO	F	350	4	2	2	1	0	2	NO	NO	NO	C	C	W	3000	C	160	.02	C
Wet 'n' Wild Westbank, B.C.	14	NO	NO	E	3	54	S	F	350	2	2	2	1	2	2	1	NO	2	C	A	C	2500	C	400	2.0	R+H
Wild Rapids Waterslide Park Sylvan Lake, Alta.	2	NO		T		48		F	350	4	2	2	0	0	2	2	NO	2	C	C	C	2800	C		.04	R
Wild Slides Regina, Sask.	10	NO		H		45		F	400	4	2	2	1	2	2	1	NO	NO	C	C	W	2000	C	228	1.0	RAC
Wild Waters Waterslide & Drive In, Radium, B.C.	7.2	NO	YES	H	3	45	NO	F	350	4	2	2	1	0	2	1	1	NO	C	C	C	2000	C	250	.25	R
Wild Waters Waterslide Park Kelowna, B.C.	7	NO		H+S		60		F	400	4	2	2	1	0	3	NO	NO	NO	C	C	W	2500	C	183	1.0	R+T
Wild Waters Waterslide Theme Park, Edmonton, Alta.	3.5	NO	YES	H	3	50	S	F	350	4	2	2	1	2	1	1	1	NO	C	C	C	1000	C	250	1.0	C+R
Wonderful Water World Penticton, B.C.	6	NO	YES	H+S		45	NO	F	400	7	2	2	1	3	2	F	NO	NO	C	C	W	2500	C	375	.11	C+R
Average/Most Common	9	NO	YES	H+S	4	52	NO	F	387	4	2	2	1	2	2	1	1	2	C	C	W	3358	C	312	1.7	R+C

OUTDOOR WATER SLIDE PARKS

Planning & Design Issues

OUTDOOR WATER SLIDE PARKS Planning & Design Issues

Park Name & Location	Approx. operational cost; min. # of patrons per day	Admission price for adult all day on weekends	Hours of operation: 10am-5pm (H), 10am-7pm (H), 10am-9pm (H), 10:10am-1:10pm (H)	Landscape irrigation: built-in (B), 10am-5pm (H), 10am-7pm (H), 10am-9pm (H), 10:10am-1:10pm (H)	Solar blankets on pools: hot pool (H), manual (M)	Entrance receipt: hand stamp (H), wristband (W), ticket (T)	Number of lifeguards: total	Qualifications for lifeguards on site at one time	Number of supervisors/attendants: total	Number of supervisors/attendants: national (N), bronze (B), first aid (F)	Any major accidents	Communication system: radios (R), speakers (S), hand signals (H)	Height restrictions (in inches)	Emergency access	Security: lighting (L), guards (G), alarms (A), dogs (D)	Approx. distance from slide exits to landing pool edge (in feet)	Depth of main landing pool (in feet)	Location of first aid room: admin. building (A), other (O)	Location of staff room and office: admin. building (A), other (O)		
All Fun Waterslides & Recreation Park, Victoria, B.C.	200 \$10.00	B	B	H	H	20	12	N	0	0	1ea.	QJE	R	No	YES	L+G	25	4	A	A	
Atlantis World of Water Vernon, B.C.	200 \$8.00	B	B	No	H	6	2	N	15	6	1per 2	4	No	R+S	No	YES	L+G	25	4	A	A
Battlefords Superslide North Battleford, Sask.	\$8.00	D	B	No	H	10	5	B+F		6	1per 2	2	No	H	No	YES	L+G	25	3.7	A	A
Bonzai Waterslide Park Calgary, Alta.	\$8.00	B	M	H	W	7	2	N			1per 2		No	R	No	YES	L	25	3.5	A	A
Fun Mountain Water Slide Park Winnipeg, Man.	500 \$8.00	A	M	H+K	H	25	8	N,B,F	3	2	1ea.	7	1WJ	R+H	48"	YES	L+G	30	4	A	O
Riverside Waterslides Medicine Hat, Alta.	400 \$8.00	C	D	No	H	9	4	N	7	7	1per 2		QJE	S	No	YES	L+D	25	4	A	A
Splashdown Park Delta, (Tsawwassen) B.C.	200 \$9.00	D	B	H	W	14	4	N	18	6	1per 2		No	R	No	YES	L+G	30	3.5	A	A
Surf City Calgary, Alta.	\$8.00	B	B	No	H	4	2	N	6	3		2	No	S	No	YES	L+G	40	4.5	A	A
Trans-Canada Waterslides Chilliwack, B.C.	350 \$8.00	B	NoNE	No	H	22	11	N	0	0			No	R	42"	YES	L+G	40	3	A	A
Wet 'n' Wild Lockport, Man.	350 \$8.00	A	M	H	W+H	5	5	N		4	1ea.	2	No	R+H	42"	YES	L+G	15	3	A	A
White Water Slide/Park Penticton, B.C.	\$7.50	C	B	H	W	2	1				1ea.		No	R	No	YES		20	3.5	A	A
White Water Slide/Park Salmon Arm, B.C.	200 \$6.00	B	B	H	H	6	4	N+F	12	4	1ea.	2	No	R	No	YES	L	30	3.2	A	A
Wet 'n' Wild Westbank, B.C.	200 \$7.75	B	B	No	H	6	3	N	4	2	1per 2	2	F+W	R	No	YES	L+G	60	4.5	A	A
Wild Rapids Waterslide Park Sylvan Lake, Alta.	\$10.00	B		H	W											YES		20	3.5	A	A
Wild Slides Regina, Sask.	\$6.00	A		No	H	21	7	B+F	24	8	1per 2	10	No	R+S	No	YES	L+G	20	4	O	O
Wild Waters Waterslide & Drive In, Radium, B.C.	150 \$8.00	D		A	H	8	4	B		2	1per 2	1	No	R	No	YES	L	40	4	A	A
Wild Waters Waterslide Park Kelowna, B.C.	\$7.25	B		H												YES		25	3	A	A
Wild Waters Waterslide Theme Park, Edmonton, Alta.	\$6.50	B		H	H	30	11	N	0	0			No	S	No	YES	L+A	20	3.5	A	A
Wonderful Water World Penticton, B.C.	250 \$7.50	C	B	H	H	7	4	N	7	4	1per 7		No	R	42"	YES	L+G	50	3	A	A
Average/Most Common	225 \$8.00	B	B	H	H	12	5	N	11	5	1per 2	3	No	R	No	YES	L+G	30	3.6	A	A

OUTDOOR WATERSLIDE PARKS

Operation, Maintenance & Safety Issues

OUTDOOR WATERSLIDE PARKS Operation, Maintenance & Safety Issues

Park Name & Location	Size of pumps (in horse power)	Pumping capacity of pumps	Type of pipes: polyvinylchloride(PVC), steel(S)	Filters: high vacuum sand(HVS), diatomaceous earth(DMS)	Average temp. of water in landing pool(°F)	Average temp. of water in hot pool(°F)	Source of water: well(W), municipal(M), lake(L), irrigation district(I)	Water quality: good(G), hard(H), silty(S), off color(O), very cold(C)	Problems with water supply	Approx. amount of water loss per day (in gallons)	Joined pools	Surge tank	Pool deck drainage: away from pool(A), into pool(I)	Chlorination system: gas(G), liquid(L), granule(Gr)	Drainage swales	Approx. size of pump house (in square feet)	Water heating system: nat.-gas(G), propane(P), exchanger(E), solar(S)	Average system: municipal(M), holding tank(B), ground(G), sewer(S), creek(C), holding tank(H)	Outfall: reservoir(R)
All Fun Waterslides & Recreation Park, Victoria, B.C.			PVC	HVS	75	100	W	H	No	YES	No	A	Gr	No	600	P	S	C	
Atlantis World of Water Vernon, B.C.			PVC	HVS	76	102	I	O	No	YES	YES	A	Gr		600	Gr	S	S	
Battlefords Superslide North Battleford, Sask.			PVC	DES	78	98	M	O	No	2500	YES	YES	A	Gr	YES	2000	Gr	H	S
Bonzai Waterslide Park Calgary, Alta.	4000	PVC, S	HVS	80	102	M	Gr	No	5000	No	No	A	L	YES	1400	Gr	M	S	
Fun Mountain Water Slide Park Winnipeg, Man.			PVC	HVS	80	100	W	C	No	YES	YES	A	Gr	YES	1400	P	L	R	
Riverside Waterslides Medicine Hat, Alta.	45		PVC	HVS	72	104	M	H	No	8000	No	No	A	Gr	YES	625	Gr	M	C
Splashdown Park Delta, (Tsawwassen) B.C.		16000	PVC	HVS	76	98	M	Gr	No	YES	No	A	L	YES	2000	Gr	S	C	
Surf City Calgary, Alta.		400	PVC	HVS	80	98	L	Gr	No	6000	YES	No	A	Gr	YES	1500	P	H	R
Trans-Canada Waterslides Chilliwack, B.C.		8000	PVC	DES	76	103	W	Gr		5000	YES	YES	A	Gr	YES	4000	Gr	S	
Wet 'n' Wild Lockport, Man.	50		PVC	HVS	78	95	W	C	No	2000	YES	No	A	L+Gr	No	1300	Gr	S	R
White Water Slide/Park Penticton, B.C.		6000	PVC, S	HVS	82	100	M	S		6000	No	YES		Gr	YES	600	Gr+E	M	S
White Water Slide/Park Salmon Arm, B.C.			PVC	HVS	82	104	M	Gr	No		No	YES	A	L	YES	1000	Gr+E	M	S
Wet 'n' Wild Westbank, B.C.	40		PVC	HVS	80	100	W	Gr	once		No	No	A	Gr	No	1000	Gr	S	S
Wild Rapids Waterslide Park Sylvan Lake, Alta.			PVC		72	105	L		No	YES	YES	A		YES			M		
Wild Slides Regina, Sask.			PVC	DES	76	102	M	O		1200	YES	YES	I	Gr	YES	800	Gr	H	R
Wild Waters Waterslide & Drive-In, Radium, B.C.	50	2000	PVC	DES	72	102	M	S+G	SAME	1200	No	YES	A	Gr	YES	800	P	M	Gr+S
Wild Waters Waterslide Park Kelowna, B.C.			PVC		77	102					YES			YES		Gr	M		
Wild Waters Waterslide Theme Park, Edmonton, Alta.	110		PVC	DES	82	98	W	Gr		YES	YES	A	Gr	YES	1000	Gr	H	R	
Wonderful Water World Penticton, B.C.	30	3000	PVC		80	104	M	O		No	YES	A		YES	950	Gr	M	H+S	
Average/Most Common	55	5000	PVC	HVS	77	101	M	Gr	No	4100	YES	YES	A	Gr	YES	1269	Gr	M	S

Mechanical Systems

OUTDOOR WATERSLIDE PARKS

Mechanical Systems

OUTDOOR WATERSLIDE PARKS

Park Name & Location

	Shower: indoor(I), outdoor(O)	Number of sinks in ladies change room	Number of sinks in mens change room	Number of toilets in ladies change room	Number of toilets in mens change room	Number of urinals in mens change room	Number of change stalls in ladies change room	Number of change stalls in mens change room	Number of showers in ladies change room	Number of showers in mens change room	Clothing storage: supervised lockers(L), lockers(U), cubicles(C)	Gift shop: yes, no, future plans(F)	Concession food: fast food(F), conventional (C)	Cooking facilities: grill & deep fryer(G), microwave(M)	Food concession under separate management	Rent swim suits
All Fun Waterslides & Recreation Park, Victoria, B.C.	0	4	4	4	4	4	0	0	0	12	BLC	B	YES	F	C	No
Atlantis World of Water Vernon, B.C.	1	4	4	4	4					0	LIC	0	YES	F	G	No
Battlefords Superslide North Battleford, Sask.	1	6	4	6	3	3	13	1	2	2	0	BLC	B	YES	F	G
Bonzai Waterslide Park Calgary, Alta.	1	3	3	5	2	3	0	0	6	5	0	B	1	No	F	G
Fun Mountain Water Slide Park Winnipeg, Man.	0	6	5	8	5	2	0	0	0	0	12	BHL	0	YES	F	G
Riverside Waterslides Medicine Hat, Alta.	1	2		5			2				0	BLC	B	YES	F	G
Splashdown Park Delta, (Tsawwassen) B.C.	0	4					0	0			8	L	0	YES	F	G
Surf City Calgary, Alta.	1	7	6	7	6		6		6	6	0	B	1	YES	F	G
Trans-Canada Waterslides Chilliwack, B.C.	1	8		7	5		13		16		0	L		YES	F	G
Wet 'n' Wild Lockport, Man.	0	3	2	6	3	3	5	0	0	0	12	B	1	YES	F	G
White Water Slide/Park Penticton, B.C.	0	3	3	5	3	3	4	0	0	0	6	L	0	YES	F	G
White Water Slide/Park Salmon Arm, B.C.	0	4	4	4	4		2	0	0	0		L	0	YES	F	M
Wet 'n' Wild Westbank, B.C.	1	5	5	7	4		3	3	3	3	0	L	0	YES	F	G
Wild Rapids Waterslide Park Sylvan Lake, Alta.	1										0	L	0	YES	F	G
Wild Slides Regina, Sask.	1										0	L	1	YES	F	G
Wild Waters Waterslide & Drive In, Radium, B.C.	1	5	5	8	4	6	16	0	6	6	0	LIC	0	YES	F	M
Wild Waters Waterslide Park Kelowna, B.C.	0											LIC	0	YES	F	G
Wild Waters Waterslide Theme Park, Edmonton, Alta.	1	3	3	6	4	2	10	0	3	2	0	L	0	YES	F	
Wonderful Water World Penticton, B.C.	0										8	BLC	0	YES	F	G
Average/Most Common	1	4	4	6	4	3	6	0	6	4	10	L	0	YES	F	G

Support Services

OUTDOOR WATERSLIDE PARKS

OUTDOOR WATERSLIDE PARKS

User Profile & Supplementary Recreational Amenities

Park Name & Location		Average age of patrons: wide range (W), teens (T), families (F)	Oldest regular patron	Handicapped: blind (B), deaf (D), physically disabled (P), mentally disabled (M)	Average length of stay (in hours)	Busiest time of day: morning (M), afternoon (A), evening (E)	Favorite time of season: June (J), July (J), August (A)	Overall development costs (in million \$)	Mini golf: yes, no, future plans (F)	Go-karts: yes, no, future plans (F)	Volleyball: yes, no, future plans (F)	Badminton	Trampolines	Horseshoe pits	Playground units: yes, no, future plans (F)	Ball throwing games: yes, no, future plans (F)	Video/pinball games: number of machines	Campground: yes, no, future plans (F)	Bumper boats	Children's water play area	Hot pool	User capacity
All Fun Waterslides & Recreation Park, Victoria, B.C.	W	83	M+P	4.5	A		F	3	YES	YES	No	No	No	No	YES	32	YES	No	YES	1	125	
Atlantis World of Water Vernon, B.C.	F+T	70		4.5	A		R	2+	No	No	YES	No	No	YES	YES	F	4	No	No	YES	1	100
Battlefords Superslide North Battleford, Sask.	F	70	M	6	A		F+R	2	F	No	No	No	No	No	No	YES	F	No	YES	1	75	
Bonzai Waterslide Park Calgary, Alta.	T	70	ALL	3	A		F+R	1	No	YES	No	No	No	No	No	18	No	No	YES	1	85	
Fun Mountain Water Slide Park Winnipeg, Man.	F	70	D+P	4.5	A	J, A	R	1.6	No	No	YES	No	No	YES	YES	No	12	YES	YES	No	1	50
Riverside Waterslides Medicine Hat, Alta.	W	84	B+P	6	A	J, A	F	3	YES	YES	YES	No	No	YES	No	8	No	No	YES	1	200	
Splashdown Park Delta, (Tsawwassen) B.C.	W	65	ALL	4	A		F	2+	No	No	No	No	No	No	No	YES	YES	No	YES	1	120	
Surf City Calgary, Alta.	W	70	B+M	4	A	J, A	F+R		No	No	No	No	No	No	No	No	F	No	No	1	100	
Trans-Canada Waterslides Chilliwack, B.C.	W+T	87	ALL	6	A	A	R	1.8	YES	No	No	YES	No	No	YES	No	24	YES	No	YES	1	250
Wet 'n' Wild Lockport, Man.	W+F	80	P+M	5	A	J, A	F	1.6	F	No	No	No	YES	No	No	No	25	No	YES	YES	1	75
White Water Slide/Park Penticton, B.C.		82			A	A	F	1.6	No	No	No	No	No	No	No	YES	YES	No	YES	2	40	
White Water Slide/Park Salmon Arm, B.C.	W	82	ALL	5	A	J, A	F		YES	No	No	No	No	No	No	15	No	No	YES	2	20	
Wet 'n' Wild Westbank, B.C.	W	75	ALL	5	A	A	R	1.9	No	No	No	No	No	No	No	12	YES	No	YES	1	120	
Wild Rapids Waterslide Park Sylvan Lake, Alta.					A		R		YES	YES	No	No	No	No	No	YES	YES	No	No	1	75	
Wild Slides Regina, Sask.	W	70			A		F+R		YES	YES	No	No	No	No	No	20	YES	No	No	1	125	
Wild Waters Waterslide & Drive In, Radium, B.C.	W+T	75	B	4	A	J, A	R	1.7	No	No	YES	No	No	No	No	9	YES	No	No	1	200	
Wild Waters Waterslide Park Kelowna, B.C.					A		F		YES	No	No	No	No	No	No	8	YES	No	YES	2	50	
Wild Waters Waterslide Theme Park, Edmonton, Alta.	T+W	80	ALL	4	A		R		No	No	YES	No	No	No	No	YES	YES	No	YES	1	125	
Wonderful Water World Penticton, B.C.	W	80	ALL	6	A		F	2.5	YES	No	No	No	No	No	No	No	YES	No	YES	1	200	
Average/Most Common	W	76	ALL	5	A	J, A	R	2.0	YES	No	No	No	No	No	No	15	YES	No	YES	1	112	

Facility Name & Location

Atlantis Indoor Waterslides Pembina Village Mall Winnipeg, Man.	6100	YES	YES	D	4	55	T	T	360	2	2	3	4.5	C	C	C+3	B
Indoor Waterslide Imperial 400 Motel Saskatoon, Sask.		YES	YES	A		30	F	O	200	1	2	0	3	C	R	B	M
Lethbridge Waterslides & Restaurant, Park Meadow Mall Lethbridge, Alta.		YES	NO	A	4	45	F	T	380	3	3	2	3.5	C	C	S+1C	S
The Oasis River Country Sheraton Cavalier Hotel Calgary, Alta.		YES	NO	D	4		F	O	250	2	2	1	4	C	T	C	H
The Oasis River Country Sheraton Cavalier Hotel Saskatoon, Sask.		YES	NO	A			F	O	300	2	2	1	4	C	P	C	H
Water Works Waterslides Renaissance Hotel Saskatoon, Sask.		YES	NO	D	4	30	F	T+O	250	2	2	1	3.6	C		C	H
Water World Oasis Travel Lodge Hotel Medicine Hat, Alta.	3000	YES	NO	A	5	48	F	O	300	2	2	1	4	C		S	H
Average/Most Common	4850	YES	NO	A	4	42	F	O	300	2	2	1	3.8	C	C	C	H

Planning & Design Issues

INDOOR WATERSLIDE FACILITY

INDOOR WATERSLIDE FACILITY

Operation, Maintenance &
Safety Issues

Facility Name & Location	Approx. operational cost	Admission price for adult all day on weekends	Hours of operation: 10 hrs/day(A), 13 hrs/day(B), 14.5 hrs/day(C)	Solar blankets on pools: hot pools(H), landing pool(L), leisure pool(P)	Entrance receipt: hand stamp(H), wristband(W), ticket(T), name & room(R)	Number of lifeguards: total	Number of lifeguards on duty at one time	Qualifications for lifeguards: nationals(N), bronze(B), first aid(F)	Number of supervisors/attendants: total	Number of supervisors/attendants on site at one time	Any major accidents	Communication system: radios(R), speakers(S), hand signals(H), voice(V)	Height restrictions (in inches)	Emergency access	Security: locked doors(L), guards(G), alarms(A), dogs(D)	Approx. distance from slide exits to landing pool edge (in feet)		
Atlantis Indoor Waterslides Pembina Village Mall Winnipeg, Man.	\$5.00/ 15 rides \$2000 MTH.	A	L+P	W	5	2	N+F	2	1	1	1	1	No	R	No	YES	L	26
Indoor Waterslide Imperial 400 Motel Saskatoon, Sask.	Hotel guest			N	1	1	B+F	0	0	0	1	1	No	V	No	YES	L	15
Lethbridge Waterslides & Restaurant, Park Meadow Mall Lethbridge, Alta.	\$4.50/ 15 rides	B	H	W	7	2	B+N	3	1	1	1		No	R	No	YES	L+G	15
The Oasis River Country Sheraton Cavalier Hotel Calgary, Alta.	Hotel guest	A+B	No	N			B	4	2	1	1		No	H+V	No	YES	L	20
The Oasis River Country Sheraton Cavalier Hotel Saskatoon, Sask.	Hotel guest	A+B	No	N	12	3	B				1		No	H+V	No	YES	L	20
Water Works Waterslides Renaissance Hotel Saskatoon, Sask.	Hotel guest	C	No	N			B	8			1		YES	H+V	No	YES	L	12
Water World Oasis Travel Lodge Hotel Medicine Hat, Alta.	guest or \$3.00		No	N			F	2	2		1	1	No	S	No	YES	L	13
Average/Most Common	guest or \$4.80	A	No	N+W	6	2	B+F	3	1	1	1	1	No	H+V	No	YES	L	17

Facility Name & Location

Atlantis Indoor Waterslides Pembina Village Mall Winnipeg, Man.	7	800	PVC	HVS	78 S 88 W	None	C	No	No	1000	No	A	L	525	G+S	C	S
Indoor Waterslide Imperial 400 Motel Saskatoon, Sask.			PVC	HVS			C	No	No		No	A	L	200	G	C	S
Lethbridge Waterslides & Restaurant, Park Meadow Mall Lethbridge, Alta.		1800	PVC	HVS	84	102	C	H	No	500	No	A	L	1000	G	C	S
The Oasis River Country Sheraton Cavalier Hotel Calgary, Alta.			PVC	HVS	82	104	C	No	No		No	A	L	1000	G	C	S
The Oasis River Country Sheraton Cavalier Hotel Saskatoon, Sask.	25		PVC	HVS	85	104	C	No	No		No	A	Gr	1000	G	C	S
Water Works Waterslides Renaissance Hotel Saskatoon, Sask.	3		PVC	HVS	80	102	C	No	No		No	A	Gr	200	G	C	S
Water World Oasis Travel Lodge Hotel Medicine Hat, Alta.			PVC	HVS	78	100	C	H	No		YES	A	G	100	G	C	S
Average/Most Common	12	1500	PVC	HVS	82	102	C	No	No	150	No	A	L	575	G	C	S

Mechanical Systems

INDOOR WATERSLIDE FACILITY

Facility Name & Location

Facility Name & Location	Number of sinks in ladies washroom	Number of sinks in mens washroom	Number of toilets in ladies washroom	Number of toilets in mens washroom	Number of urinals in mens washroom	Number of change stalls in mens washroom	Number of change stalls in ladies washroom	Number of showers in mens washroom	Number of showers in ladies washroom	Clothing storage: supervised baskets(B), lockers(L), cubicals(C)	Concession food: supervised baskets(B), fast food(F), conventional(C)	Liquor service	Food concession under separate management	Rent swim suite
Atlantis Indoor Waterslides Femina Village Mall Winnipeg, Man.	3	3	3	3	2	3	0	3	3	L F+C	No	YES	No	
Indoor Waterslide Imperial 400 Motel Saskatoon, Sask.										B	No		No	
Lethbridge Waterslides & Restaurant, Park Meadow Mall Lethbridge, Alta.	2	1	3	3		3	0	3	3	L C	No	YES	YES	
The Oasis River Country Sheraton Cavalier Hotel Calgary, Alta.	1	1	1	1		1	0	0	0	Hotel Rooms	YES		No	
The Oasis River Country Sheraton Cavalier Hotel Saskatoon, Sask.	1	1	1	1		0	0	0	0	Hotel Rooms	F	YES	No	No
Water Works Waterslides Renaissance Hotel Saskatoon, Sask.	1	1	2	1	1	0	0	2	2	Hotel Rooms	F+C	YES	No	No
Water World Oasis Travel Lodge Hotel Medicine Hat, Alta.	2	2	1	1		1	1			L	No		YES	
Average/Most Common	1	1	2	1	1	2	0	2	2	L + Hotel Rooms	F+C	No	No	No

Support Services

INDOOR WATERSLIDE FACILITY

Facility Name & Location

Atlantis Indoor Waterslides Pembina Village Mall Winnipeg, Man.	T			1.5	A+E	B	F	.6	No	No	YES	No	0
Indoor Waterslide Imperial 400 Motel Saskatoon, Sask.	F				A+E				No	No	No	1	8
Lethbridge Waterslides & Restaurant, Park Meadow Mall Lethbridge, Alta.	T	70	B+P	1.5	A+E		F	.8	1	No	No	1	6
The Oasis River Country Sheraton Cavalier Hotel Calgary, Alta.	F				A+E		F	1.0	15	No	YES	2	15
The Oasis River Country Sheraton Cavalier Hotel Saskatoon, Sask.	F	80		4.0	A+E		F	1.0	1	YES	YES	2	12
Water Works Waterslides Renaissance Hotel Saskatoon, Sask.	F	80	P	1.5	A+E		O		9	No	YES	1	15
Water World Oasis Travel Lodge Hotel Medicine Hat, Alta.	F			1.5	A+E		F	.6	10	No	YES	1	15
Average/Most Common	F	77	B+P	1.5	A+E		F	.8	7	No	YES	1	12

INDOOR WATERSLIDE FACILITY
User Profile & Supplementary
Recreational Amenities

APPENDIX B

World-wide Locations of Water Theme Parks include:

Aruba	Australia
Bavaria	Canada
Colombia	England
France	Germany
Greece	Holland
Hong Kong	Israel
Italy	Japan
Malaysia	Mexico
New Zealand	Puerto Rico
Singapore	South Africa
Spain	Sweden
Thailand	The Phillipines
United States	Venezuela

Outdoor Waterslide Parks in Western Canada include:

All Fun Waterslides & Recreation Park R.R. 6, Horden Road Victoria, B.C.	Atlantis World of Water Box 1600 Vernon, B.C. V1T 8C2
Battlefords Superslide King Hill North Battleford, Sask.	Bonzai Waterslide Park 8307 Horton Rd. S.W. Calgary, Alberta
Fun Mountain Waterslide Park #6 Donald Winnipeg, Manitoba	Kamloops Water World Slides Trans Canada Highway Kamloops, British Columbia
Riverside Waterslides #9 Ross Heights Court Medicine Hat, Alberta	Splashdown Park 4799 Hwy. #17 Delta, B.C.
Surf Sity 219 Falshioe Way N.E. Calgary, Alberta T3J 2B3	Trans-Canada Waterslides Hwy. #1 & No. 9 Intersection Chilliwack, B.C.
Wet 'n' Wild Waterslides Lockport, Manitoba	White Water Slide/Park 1 - 282 Waterford Avenue Penticton, B.C.
White Water Slide/Park Box 21 Salmon Arm, B.C.	Wild 'n' Wet Box 799 Westbank, B.C. VOH 2A0
Wild Rapids Waterslide Park Box 539 Sylvan Lake, Alberta TOM 1Z0	Wild Slides #1 Dunn Place Regina, Saskatchewan
Wild Waters Waterslides & Drive Inn Box 476 Radium, B.C. VOA 1M0	Wild Waters Waterslide Park Hwy. 97 North at McCurdy Road Kelowna, B.C.
Wild Waters Waterslide Theme Park Hwy. #16 & Winterburn Road Edmonton, Alberta	Wonderful Waterworld 225 Yorkton Avenue Penticton, B.C. V2A 3B3

Indoor Waterslide Facilities in Western Canada include:

Atlantis Indoor Waterslides
Pembina Village Mall
Winnipeg, Manitoba

Indoor Waterslide
Imperial 400 Motel
Saskatoon, Saskatchewan

Lethbridge Waterslides
& Restaurant
Park Meadow Mall
1702 - 23 Street North
Lethbridge, Alberta
T1H 5B3

The Oasis River Country
Sheraton Cavalier Hotel
2620 - 32 Avenue N.E.
Calgary, Alberta
T1Y 6B8

The Oasis River Country
Sheraton Cavalier Hotel
612 Spadina Cres. E.
Box 4005
Saskatoon, Saskatchewan
S7K 3T1

Water Works Waterslides
Renaissance Hotel
Saskatoon, Saskatchewan

Water World Oasis
Travel Lodge Hotel
Medicine Hat, Alberta

APPENDIX C

Chlorine Tolerance of Plants

At present, limited information is available on chlorine tolerance of plants. Some research has been done on salt tolerance of plants in boulevard and roadside plantings. It is assumed that the effects of repeated salt exposure to plants is comparable to the effects of repeated chlorine exposure. Therefore the plants that show the most tolerance to salt spray should also be most tolerant to chlorine exposure.

Water supply to the plants is limited when high levels of salt are in the soil. This is due to an increase in the osmotic level of the soil. Potassium and calcium levels within the plant may also decrease with high sodium levels which alter the plant's mineral nutrition balance. Salt spray causes dessication of foliage and stems when cell water moves from the plant to the salt concentration on the plant. Protein synthesis, RNA, and metabolic activity are suppressed.

Studies by Lumis, Hofstra and Hall of Guelph, Ontario University conclude that spruce trees with wax-covered needles and deciduous trees with resinous or submerged buds are resistant to salt spray.⁷⁴ The greater the amount of wax, or bluer the spruce, the more resistant it is.

This conclusion is also supported by M.A. Dirr, who adds that several plants possess highly specialized salt secreting glands which help to remove excess salts from the tissues.⁷⁵ Plants in the Euphorbiaceae and Frankeniaceae families as well as the Tamarix plant possess these glands.⁷⁶

The assumption that can be drawn from this information is that chlorine exposure and salt exposure likely have very similar effects on plants. The following lists established by Lumis, Hofstra and Hall, illustrate the sensitivity rating of roadside trees and shrubs to aerial

drift of salt.⁷⁷ This study was conducted in the Guelph-Toronto-Hamilton area of eastern Canada and therefore reflects plants found in that region. Plants that are hardy for western Canada, particularly Manitoba, include those in zone 1 to 3b. (fig.102) The following map indicates plant hardiness zones for the prairie provinces.

Sensitivity Ratings:

- . ratings of 1 indicate no twig dieback or needle browning of conifers and no dieback, tufting or inhibition of flowering of deciduous plants.
- . ratings of 5 represent complete branch dieback and needle browning of conifers, and complete dieback evidence of previous tufting and lack of flowering of deciduous species. Under severe conditions plants rated 5 will eventually die.
- . ratings of 2, 3 and 4 encompass slight, moderate and extensive graduations of the above symptoms.

<u>COMMON NAME (SPECIES)</u>	<u>SENSITIVITY RATING</u>	<u>PLANTING ZONE</u>
<u>DECIDUOUS TREES</u>		
Norway maple (<i>Acer platatanoids</i> L.)	1	4
Horse-chestnut (<i>Aesculus hippocastanum</i> L.)	1	2b
Tree of heaven [<i>Ailanthus altissima</i> (Mill.) Swing]	1	4
Cottonwood (<i>Populus deltoides</i> Bart.)	1	2
Black locust (<i>Robinia pseudoacacia</i> L.)	1	5
Sugar maple (<i>Acer saccharum</i> March)	1-2	4
Shagbark hichory (<i>Carya ovata</i> (Mill.) K. Koch	1-2	5
Honey locust (<i>Gleditsia triacanthos</i> L.)	1-2	4b
Black walnut (<i>Juglans nigra</i> L.)	1-2	3b

<u>COMMON NAME (SPECIES)</u>	<u>SENSITIVITY RATING</u>	<u>PLANTING ZONE</u>
English walnut (<i>Juglans regia</i> L.)	1-2	4
Choke cherry (<i>Prunus virginiana</i> L.)	1-2	2
Red oak (<i>Quercus rubra</i> L.)	1-2	3
Silver maple (<i>Acer saccharinum</i> L.)	2	3b
White Ash (<i>Fraxinus americana</i> L.)	2	4
Poplar (<i>populus</i> spp.)	2	2
Black willow (<i>Salix nigra</i> Marsh)	2	4
Mountain ash (<i>Sorbus</i> spp.)	2	2,3
White elm (<i>Ulmus americana</i> L.)	2	2
Chinese Elm (<i>Ulmus pumila</i> L.)	2	2b
Red maple (<i>Acer rubrum</i> L.)	2-3	3
White birch (<i>Betula papyrifera</i> Marsh)	2-3	2
Grey birch (<i>Betula populifolia</i> Marsh)	2-3	3
Catalpa (<i>Catalpa speciosa</i> Warder)	2-3	5b
Lombardy poplar (<i>Populus italica</i> Muench)	2-3	3
Pear (<i>Pyrus</i> spp.)	2-3	2b
Sasswood (<i>Tilia americana</i> L.)	2-3	2b
Crabapple (<i>Malus</i> spp.)	3	2b
Sharptooth aspen (<i>Populus gradidentata</i> Michx.)	3	2b

<u>COMMON NAME (SPECIES)</u>	<u>SENSITIVITY RATING</u>	<u>PLANTING ZONE</u>
Trembling aspen (<i>Populus tremuloides</i> Michx.)	3	1
Weeping golden willow (<i>Salix alba</i> 'Tristis' Gaud)	3	2b
Apple (<i>Malus</i> spp.)	3-4	2b
Bur oak (<i>Quercus macrocarpa</i> Michx.)	3-4	2
Hawthorn (<i>Crataegus</i> spp.)	4	2
Manitoba maple (<i>Acer Negundo</i> L.)	4-5	2
Allegheny serviceberry (<i>Amelanchier laevis</i> Wieg.)	4-5	4
White mulberry (<i>Morus alba</i> L.)	4-5	4
Beech (<i>Fagus gradifolia</i> Ehrh.)	5	4

DECIDUOUS SHRUBS

Siberian pea-tree (<i>Caragana arborescens</i> Lam.)	1	2
Quince (<i>Cydonia oglonga</i> Mill.)	2-3	5
Honeysuckle (<i>Lonicera</i> spp.)	1-2	2, 2b, 3
Staghorn sumac (<i>Rhus typhina</i> L.)	1-2	3
Japanese lilac [<i>Syringa amurensis japonica</i> (Maxim.) Fr. & Sav.]	1-2	2
Common lilac (<i>Syringa vulgaris</i> L.)	1-2	2b
Russian olive (<i>Elaeagnus angustifolia</i> L.)	1-3	2b
Mockorange (<i>Philadelphus</i> spp.)	1-3	3, 3b, 4

<u>COMMON NAME (SPECIES)</u>	<u>SENSITIVITY RATING</u>	<u>PLANTING ZONE</u>
European cranberry-bush (<i>Viburnum opulus</i> L.)	1-3	3
Burningbush (<i>Euonymus alata</i> (Thunb.) Sieb.)	2	3
Forsythia (<i>forsythia</i> x <i>intermedia</i> Zab.)	2-3	6
Privet (<i>Ligustrum</i> spp.)	2-3	5
Speckled alder (<i>Alnus rugosa</i> (Du Roi) Spreng.)	3	4
Flowing quince (<i>Chaenomeles speciosa</i> Nakai)	3-4	5b
Gray dogwood (<i>Cornus racemosa</i> Lam.)	3-4	2b
Beauty-bush (<i>Kolkwitzia amabilis</i> Graebn.)	3-4	5b
Bumalda spirea (<i>Spirea</i> x <i>bumalda</i> Burv.)	3-4	2
Red Osier dogwood (<i>Cornus stolonifera</i> Michx.)	4-5	1b
CONIFERS		
Blue spruce (<i>Picea pungens</i> 'Glauca' Reg.)	1	2
Jack Pine (<i>Pinus banksiana</i> Lamb.)	1-2	2
Mugo pine (<i>Pinus mugo</i> Turra.)	1-2	2
Tamarack (<i>Larix laricina</i> (Du Roi) K. Koch)	2	2
Austrian pine (<i>Pinus nigra</i> Arnold)	2	5
Juniper (<i>Juniperus</i> spp.)	2-3	2, 2b, 5
Norway spruce (<i>Picea abies</i> (L.) Karst.)	3	2b
White cedar (<i>Thuja occidentalis</i> L.)	3-4	3

<u>COMMON NAME (SPECIES)</u>	<u>SENSITIVITY RATING</u>	<u>PLANTING ZONE</u>
Yew (<i>Taxus</i> spp.)	4	3,4,5
White spruce [<i>Picea glauca</i> (Moench) Voss]	4-5	1b
Red pine (<i>Pinus resinosa</i> Ait.)	4-5	2b
Scots pine (<i>Pinus sylvestris</i> L.)	4-5	2b
Hemlock (<i>Tsuga canadensis</i> L.)	4-5	4
White pine (<i>Pinus strobus</i> L.)	5	3

APPENDIX D

Typical Signage Requirements at a Waterslide Facility include:

1. Highway Identification and Traffic signs.
 2. Park/Facility Identification sign.
 3. Entry Kiosk sign
 - rates
 - group rates
 4. Rules and Regulations such as:
 - no alcoholic beverages allowed on the premises
 - no pets permitted on the premises
 - no glass containers allowed on the premises
 - no running on pool deck areas
 - no person shall engage in play or behaviour dangerous to other patrons.
 - barbeques and open fires prohibited.
 - no person infected with a communicable disease or having open sores on their body shall enter the water.
 - the user shall not pollute the water in the pools in any way.
 - all persons using the pools must have a shower prior to entering the pool area.
 - please use the washrooms.
 - personal floatation devices are not allowed.
 - no food or beverages allowed in pool or on pool deck.
 - please obey the lifeguards.
 - for your health, we suggest that you not remain in the hot tub longer than 10 minutes.
 - please put all garbage in containers provided.
 - . The Management is not responsible for any lost or stolen articles.
 - . Lockers are provided for your convenience.
 - . The Management does not take responsibility for any injuries incurred while using these facilities or while on the park grounds.
 - . In the event of an electrical storm, heavy rains or high winds, the park may be required to temporarily cease operation.
 - . The Management does not assume any responsibility for any circumstance beyond its control which may necessitate the closure of this facility.
5. Hours of Operation

6. Park Information

7. Ride Information such as:

- please ride flumes on your back or in a sitting position only.
- one rider at a time.
- ride feet first only.
- keep hands and arms in.
- clothing with rivets or belts is not allowed.
- please proceed only after the person before you has passed the marker.
- please move out of the way as quickly as possible after entering landing pool.
- slides for children are located in the Kiddie Pool.

8. General Site Signs:

- a) Lockers - instructions for use.
- b) Restrooms/Change House - Mens/Womens
- c) First Aid/Lost & Found
- d) Information
- e) Telephone - Emergency Numbers, etc.
- f) Pool Depth Signs (on deck).
 - no diving
- g) Video Arcade
 - regulations
- h) ~~Fast Food Concession/Identity~~
 - menu
 - prices
 - hours of operation
- i) Lake Shore Signs
 - non-supervised Beach/Swimming Prohibited.

9. Ride Identification Signs

FOOTNOTES

FOOTNOTES

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