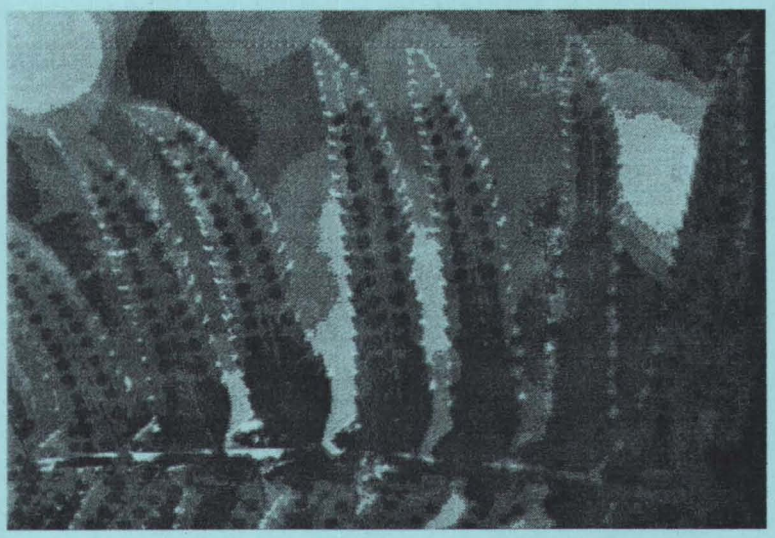


Oxbow Regional Park Master Plan

October 1997

Metro Regional Parks and Greenspaces

ACKNOWLEDGMENTS

METRO

Mike Burton, Executive Officer

Metro Council

Jon Kvistad, Presiding Officer
Patricia McCaig, Ruth McFarland, Susan McLain,
Don Morisette, Lisa Naito, and Ed Washington

Regional Parks and Greenspaces Department

Charles Ciecko - Director
Jane Hart - Project Manager
Dan Kromer - Manager, Operations & Maintenance Division
Nancy Chase - Manager, Planning & Capital Development Division
Deb Scrivens - Education Coordinator
Julie Weatherby - Community Programs & Events Coordinator

Oxbow Park Staff

Jim Lind - Regional Park Supervisor
Bill Doran - Park Ranger
Mike Spencer - Park Ranger
Phil Underwood - Park Ranger

Project Advisory Committee

Byron Ball - Sandy High School
Jeff Beals - Boy Scouts of America
Paul Box - Park Neighbor
Glenyce Demsem - Park Neighbor
Ernie Drapela - Oregon Recreation Trails Advisory Council, Gresham
Nick Galash - Northwest Steelheaders
Keith Jensen - Alder Creek Kayak
Bob Ratcliffe - Bureau of Land Management
Dimitri Stankevich - YMCA Camp Collins

OXBOW REGIONAL PARK
MASTER PLAN

Prepared for
Metro Regional Parks and Greenspaces Department

Prepared by
J.D. Walsh & Associates, P.S.
Jim Walsh, Rod Wojtanik,
Doug Lee, and Suzanne Bachelder

Associated Consultants
J.C. Draggoo & Associates
Jerry Draggoo
J.T. Richard Architect
Tim Richard
Wallis Engineering
Bob Wallis & Patrick Tanner
Athay & Associates
Ron Athay
Ayn Shlisky Ecological Consulting
Ayn Shlisky
Dean Apostol - Landscape Architect
Dean Apostol
Esther Lev Environmental Consulting
Esther Lev
Lora Gale Interpretation
Lora Gale
Patrick B. Kelly Consulting Engineers
Patrick B. Kelly
Phillip Williams & Associates, Ltd.
Kevin Coulton

Funding for this Master Plan was
provided by the following agencies:

United States Fish & Wildlife Service
Oregon Parks & Recreation Department
Metro Regional Parks and Greenspaces Department

October 1997

Printed on Recycled Content Paper

Table of Contents

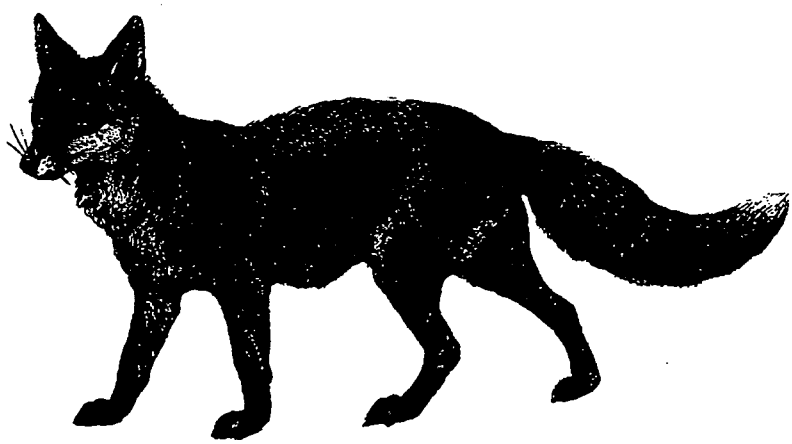
List of Figures & Tables

List of Figures

LIST OF FIGURES - cont.

LIST OF TABLES

Executive Summary



EXECUTIVE SUMMARY

Executive Summary

Oxbow Regional Park lies in the geographic heart of the Sandy River Gorge. The Sandy River's natural beauty and pristine values were formally recognized in 1973 when Governor Tom McCall issued a proclamation designating 12.5 miles of the Sandy River between Dodge Park and Dabney State Park as a State Scenic Waterway. In 1988, the same stretch of river received federal Wild and Scenic River designation. In 1993, The Bureau of Land Management (BLM) published the "Sandy Wild and Scenic River and State Scenic Waterway Management Plan". BLM's Management Plan identifies three public access portals where recreational opportunities should be provided within the designated wild and scenic corridor. Oxbow Regional Park is the largest and most centrally located portal.

The steep forested canyon and the meandering Sandy River forms the unique natural setting of the park. The park, over 1040 acres in size, is made up of properties owned by Multnomah County, Bureau of Land Management, Oregon Department of Fish and Wildlife and Metro. Metro's management of the properties for park purposes is through lease agreements. YMCA Camp Collins, The Nature Conservancy and private parties own adjacent parcels.

Since 1963, the park has been providing recreation in a natural setting including camping, picnicking, water access for boating, fishing and swimming. There are also extensive trails for hiking, wildlife observation and environmental education. Over 219,046 recreation users visited the park in 1996.

Years of providing recreational opportunities to the public has caused 'wear and tear' on the park's infrastructure and facilities. In addition, there are no flush toilets in the park. Infrastructure upgrades and facility improvements are necessary to continue to provide safe, quality recreation experiences for the public.

Funding for some of the critical capital improvements has been made possible through the successful passage of the Open Spaces, Parks and Streams Bond Measure in 1995. The Oxbow Regional Park Master Plan is needed to ensure that improvements are located to protect natural resources, are provided in the most cost effective manner, blend with the natural character of the park, and are responsive to the desires of park visitors.

Master Plan Development and Implementation

The Master Plan is intended to guide future management and development of Oxbow Regional Park. Through an extensive public involvement process, a Master Plan has been prepared addressing the park and park user needs. The Master Plan addresses the park in regards to the natural Sandy River setting, the existing conditions, and the appropriate improvements and enhancement of Oxbow Regional Park. The following are key management objectives of the Master Plan:

- Metro, in coordination with other public and private agencies, should expand its role in recreational management in the Sandy River Gorge. Suggested areas of expanded involvement include providing management and operational services for Dabney State Park and Dodge Park and management of river recreation between those parks.
- As an important segment within the larger Wild and Scenic Sandy River Management Area, the natural habitat of the park is to be maintained and/or enhanced. Based on the quality of the habitat and terrain, the Master Plan identifies approximately 90% of the existing park to remain in its natural condition.
- The Master Plan is intended to maintain the "natural timeless" recreational experience. The existing area of intensive recreation use, which is only approximately 10% of the total park area, will not be enlarged, but will be utilized more efficiently.
- The existing park activities (picnicking, camping, hiking, river access, environmental education, etc.) are to be maintained. The Master Plan envisions a modest 1% increase in peak time capacity.
- The park properties on the north and east side of the river will be retained as an important part of the natural habitat corridor within the Sandy River Gorge. The Master Plan limits use and access to these areas to approximately current levels.
- The Ancient Forest area will be preserved and continue to be utilized for wildlife habitat, ecological studies and the opportunity for park visitors to experience an Ancient Forest.
- The Elk Meadow will continue to be managed to attract migratory elk.

The Master Plan implementation includes the following improvements:

- Recreate 20 overnight campsites in the existing campground.
- Encourage greater seasonal use of the campground by providing overnight structures in twelve of the 20 restored campsites.
- Reconfigure picnic areas to increase group picnicking capacity by 30%. A total of six shelters (4 replacement & 2 additional) plus four shelterless reservable areas are planned.

- Enhance group camping areas by redesigning sites for more efficient use.
- Upgrade the existing water and electric utilities.
- Replace pit toilets with flush toilets in primary park use areas, up-grade pit toilets to a vault design in secondary park use areas and provide showers in camping areas.
- Realign the road system and reallocate parking to provide a safer and more aesthetically pleasing park setting.
- Renovate park entrance arrival area including new ticket booth, new office building, public restroom facility and orientation kiosk.
- Develop an Environmental Education building to facilitate expanded educational programming.
- Install irrigation system for major turf areas to reduce fire danger, reduce maintenance costs, and conserve water.
- Expand environmental education and interpretation programs.
- Upgrade existing boat ramp to provide universal access to fishing opportunities.
- Trail reconstruction and rehabilitation.

INTRODUCTION

INTRODUCTION

Study Purpose

The purpose of the study is to prepare a master plan that will guide the future management and development of Oxbow Regional Park.

Location

Oxbow Regional Park is located in Multnomah County, Oregon approximately eight miles east of the City of Gresham. The park is situated adjacent to the Sandy River approximately ten miles upstream from the confluence with the Columbia River (see Figure 1).

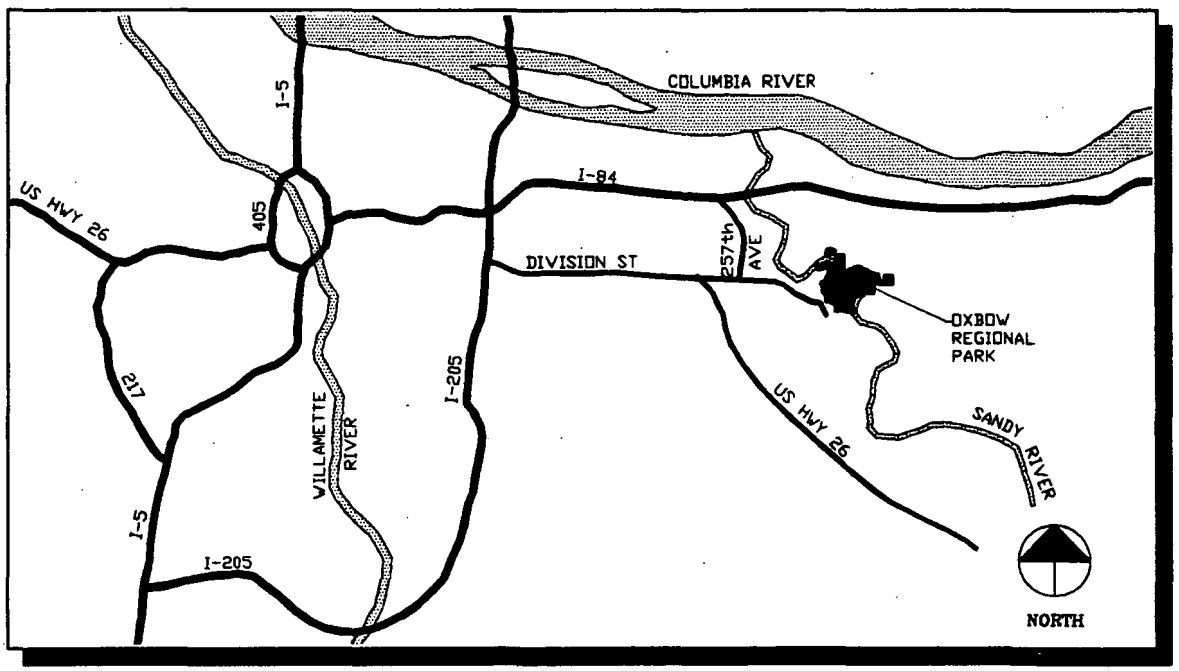


Figure 1 - Vicinity Map

■ Planning

Sandy River Setting

To understand and properly plan for Oxbow Regional Park it is necessary to consider the park in the larger context of the Sandy River. Oxbow Regional Park lies in the geographic heart of the Sandy River Gorge. The Sandy River's natural beauty and pristine values were formally recognized in 1973 when Governor Tom McCall issued a proclamation designating the 12.5 miles of the Sandy River between Dodge

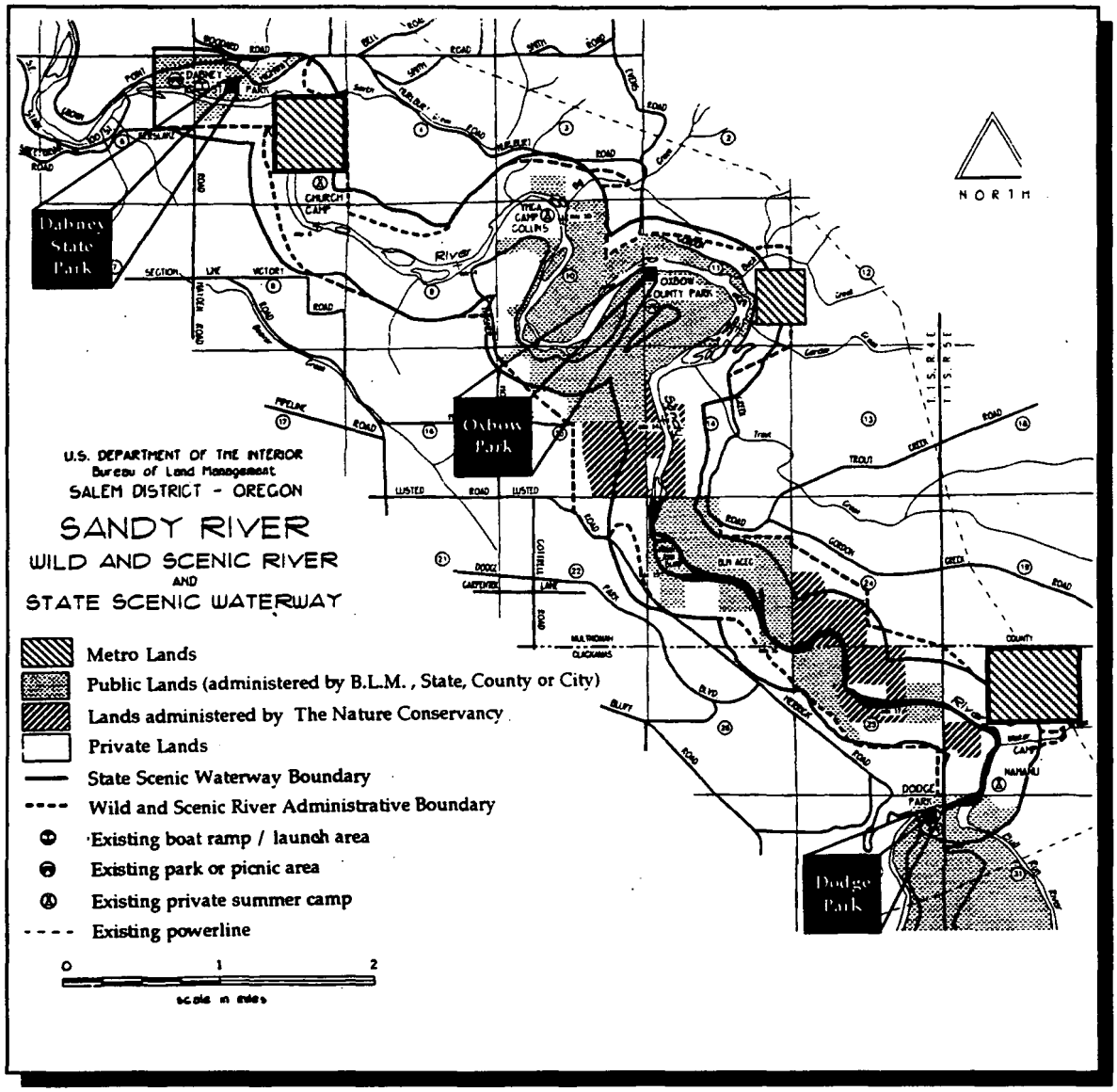


Figure 2 - Regional Ownership Map **© Metro**

Map Compliments of Bob Ratcliffe, Bureau of Land Management - Salem District

and Dabney State Park as a State Scenic waterway. In 1988, the same stretch of river received federal Wild and Scenic River designation. In 1993, The Bureau of Land Management (BLM) published the Sandy Wild and Scenic River and State Scenic Waterway Management Plan. Management of this area is a multi-agency cooperative effort. The objective of the adopted management plan and other supportive policies and regulations is to preserve and enhance the outstandingly remarkable values which led to the state and federal designations. These values include recreation, wildlife, scenic, water quality, geology, fisheries, cultural, and botanical and ecological. Oxbow Regional Park is located in the heart of the 12.5 mile Wild and Scenic River segment and subject to the applicable regulations. The Appendix contains exerpts from BLM's management plan including a summary of agencies and their role in management, management goals, standards and guidelines, and a schedule of planned acitivities and cost estimate.

Substantial areas within the Sandy River Wild and Scenic Area have historically been in public ownership. In support of the Sandy River Wild and Scenic concept, public agencies and The Nature Conservancy have been acquiring additional properties. As part of Metro's Open Spaces, Parks and Streams Bond Measure approved by voters in May 1995, funds were allocated to acquire approximately 1,000 additional acres within the Sandy River Gorge. Land purchases in the Sandy River Gorge are primarily for the purposes of protecting fish, wildlife and scenic resources, and water quality. The Master Plan deals only with the 1,040 acres which comprise Oxbow Regional Park. The current land ownerships, from Dabney State Park to Dodge Park, are illustrated on Figure 2.

Cultural Resources

Prior to the European settlement of the area, the Sandy River area was inhabitated by early Native American people. Evidence suggests that Chinook people utilized the areas near the river for seasonal camps related to hunting and gathering food.

In the late 1800's, homesteaders settled on properties adjacent to the Sandy River Gorge for farming and grazing. Other settlers bought land from the O & C Railroad Company. Timber harvest and gravel extraction also were important economic activities in the area.

The Sandy River Rail Line was built in 1909 to service the Bull Run Water system construction project. Recreationalists utilized the transportation to enjoy Dodge Park and the Sandy River until 1931,the year the rail line closed.

The State of Oregon Cultural Resource Inventory has been examined to locate any known archaeological or historic sites within the Oxbow Regional Park property. To date, no cultural resources have been recorded for Oxbow Regional Park or the adjacent properties.

■ Public Involvement

Oxbow Regional Park has been a popular park facility since the early 1960's. Local residents, longtime users, and agencies committed to managing the Sandy River Wild and Scenic River Area are deeply concerned about the future of the park. Meeting the needs and the concerns of these stakeholders as well as those of the general citizenry of the region was the prupose of the following public involvement activities:

- Distribution of an on-site customer survey.
- Creation of a mailing list of local property owners and interested citizens.
- Establishment of an independent Project Advisory Committee; (4) review meetings held, including a site tour to receive appropriate comments and planning input.
- Design Charettes (2) held with stakeholders to determine opportunities, constraints, appropriate uses, level of use and prefered major design approach.
- Citizen outreach with meeting notices and press releases about planning process and meeting times.
- Community meetings (2) to receive input on project direction and concept design. Public testimony and handout questionaire forms were utilized for public input.
- Meetings with citizens as requested.
- Distribution of draft Master Plan for public review and comment.
- Presentation of the draft Master Plan to Metro Regional Parks and Greenspaces Advisory Committee (citizen testimony invited).
- Presentation of the final draft Master Plan to Metro's Regional Facility Committee (citizen testimony invited).
- Presentation of the final Master Plan to the Metro Council (citizen testimony (invited).
- Distribution of the adopted Master Plan to agencies and interested citizens.

Public involvment information, Project Advisory Committee and public meeting summaries are provided in Appendix A.

■ Mission Statement / Project Goals

The following mission statement and project goals were identified by staff, Project Advisory Committee and Charette participants to guide the development of this plan and management of Oxbow Regional Park.

Mission Statement

Oxbow Regional Park is an important component within the larger Scenic Sandy River Management Area and, in this context, the role of the park is to maintain and enhance the natural qualities of the Sandy River Gorge while offering public access for appropriate natural resource dependent recreation and educational opportunities.

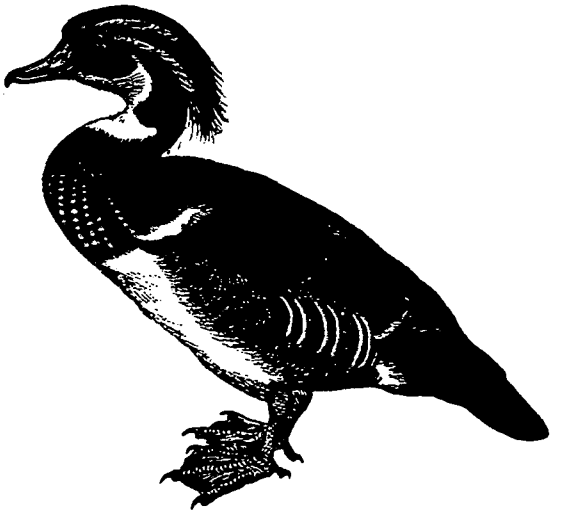
Project Goals

A. Preserve and enhance the park's natural resources to promote:
- Healthy ecological communities.
- Diverse wildlife populations.
- Fish spawning and rearing habitat.
- Quality settings for educational and recreational opportunities such as picnicking, camping, non-motorized boating, angling, swimming, biking, wildlife observation, equestrian, etc.

B. Provide appropriate recreational and educational opportunities to promote:
- High quality recreational experience that is safe, aesthetically pleasing, sustainable and compatible with the natural setting.
- Revenue generation to help support maintenance and operation of the park's facilities, programs and natural resources.
- Access to the Sandy River for fishing, water contact (wading, swimming, sunbathing), outdoor education, and to the Sandy River Gorge for non-motorized boating.
- Visitor awareness, understanding and appreciation of the park's natural system.

C. Provide infrastructure to achieve:
- Quality recreational and educational experiences.
- Efficient operation and maintenance of the facility.
- Compliance with code requirements.
- Balanced use throughout the year.
- Protection of natural resources.

EXISTING CONDITIONS



EXISTING CONDITIONS

Existing Park

Oxbow Regional Park is located within the Sandy River Gorge in Multnomah County, Oregon. It is approximately 1,040 acres in size and has been identified in the Metropolitan Greenspaces Master Plan as a regionally significant natural area. The Metropolitan Greenspaces Program Data Analysis, concluded that the Sandy River is notable for it's numerous oxbows, forested slopes, and native salmon and steelhead populations. Oxbow Regional Park was identified as one of the most natural urban parks in the state; it includes 3.6 miles of designated State Scenic and Federal Wild and Scenic River. The steep forested canyon and the meandering Sandy River forms the unique natural setting of the park. The park itself is made up of properties owned by Multnomah County, Bureau of Land Management, Oregon Department of Fish and Wildlife (ODFW) and Metro. Management of the properties for park purposes by Metro is through lease agreements. In addition, YMCA Camp Collins, The Nature Conservancy and private parties own adjacent parcels (see Figure 3).

■ Land Use

Land uses adjacent to Oxbow Regional Park include residential, agricultural and forest uses. In addition, YMCA Camp Collins operates a youth camp on adjacent property (see Figure 3).

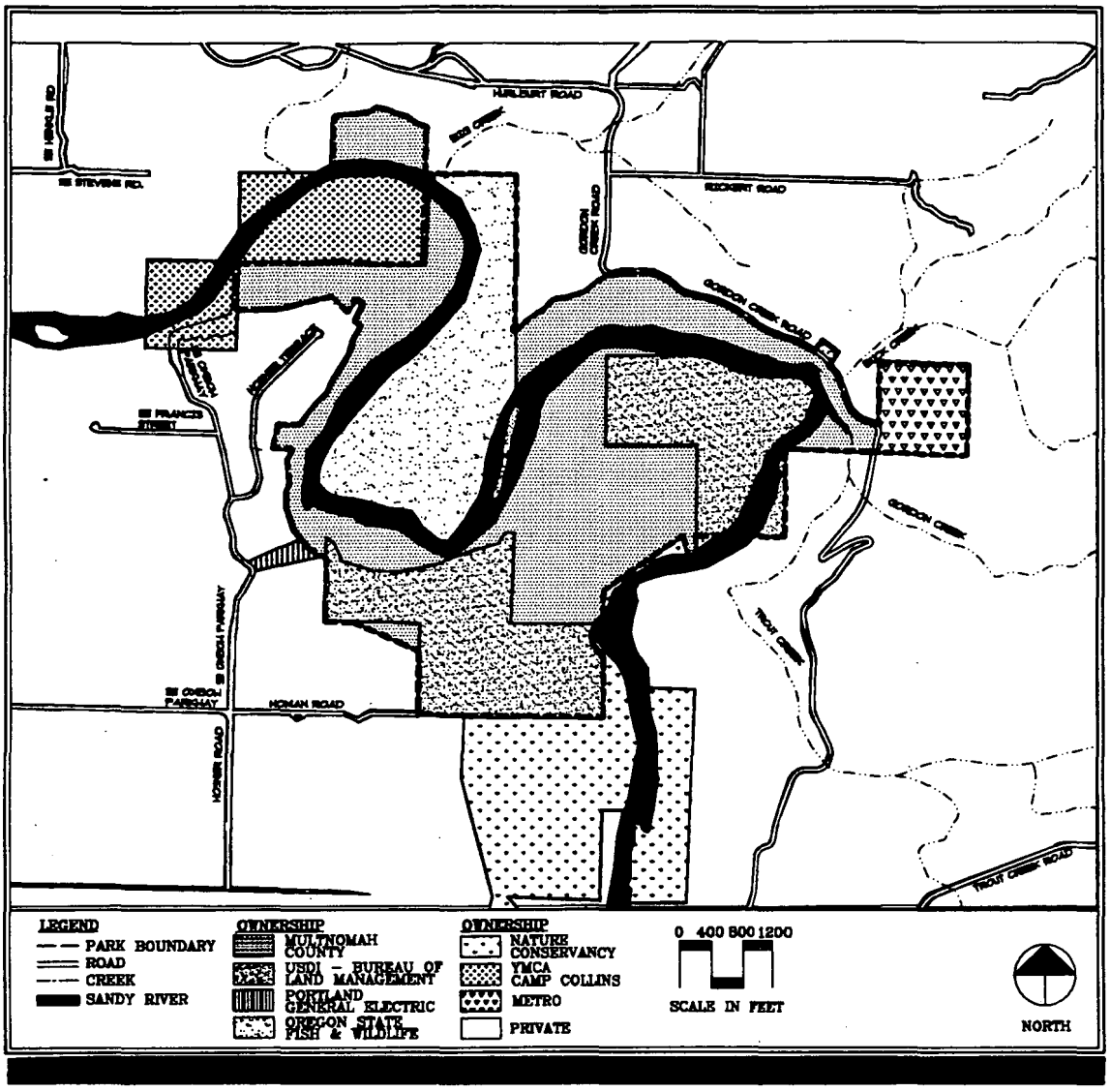


Figure 3 - Local Ownership For Oxbow Regional Park and Vicinity **© Metro**

■ Zoning

Oxbow Regional Park and the surrounding land areas are controlled by the land use regulations of Multnomah County. The City of Gresham Building Department provides support services to administer code compliance and the issuance of building

permits. The current zoning districts are listed below and are shown in Figure 4.

RR-Rural Residential
MUA 20 - Multiple Use Agricultural (20 acre)
EFU - Exclusive Farm Use
CFU - Commercial Farm Use

The park lies within the Wild and Scenic Sandy River boundary. The areas within these boundaries are designated as lands of Significant Environmental Concern (SEC). This designation applies additional protective measures for this natural resource area. Additional information regarding the land use regulations is included in Appendix B.

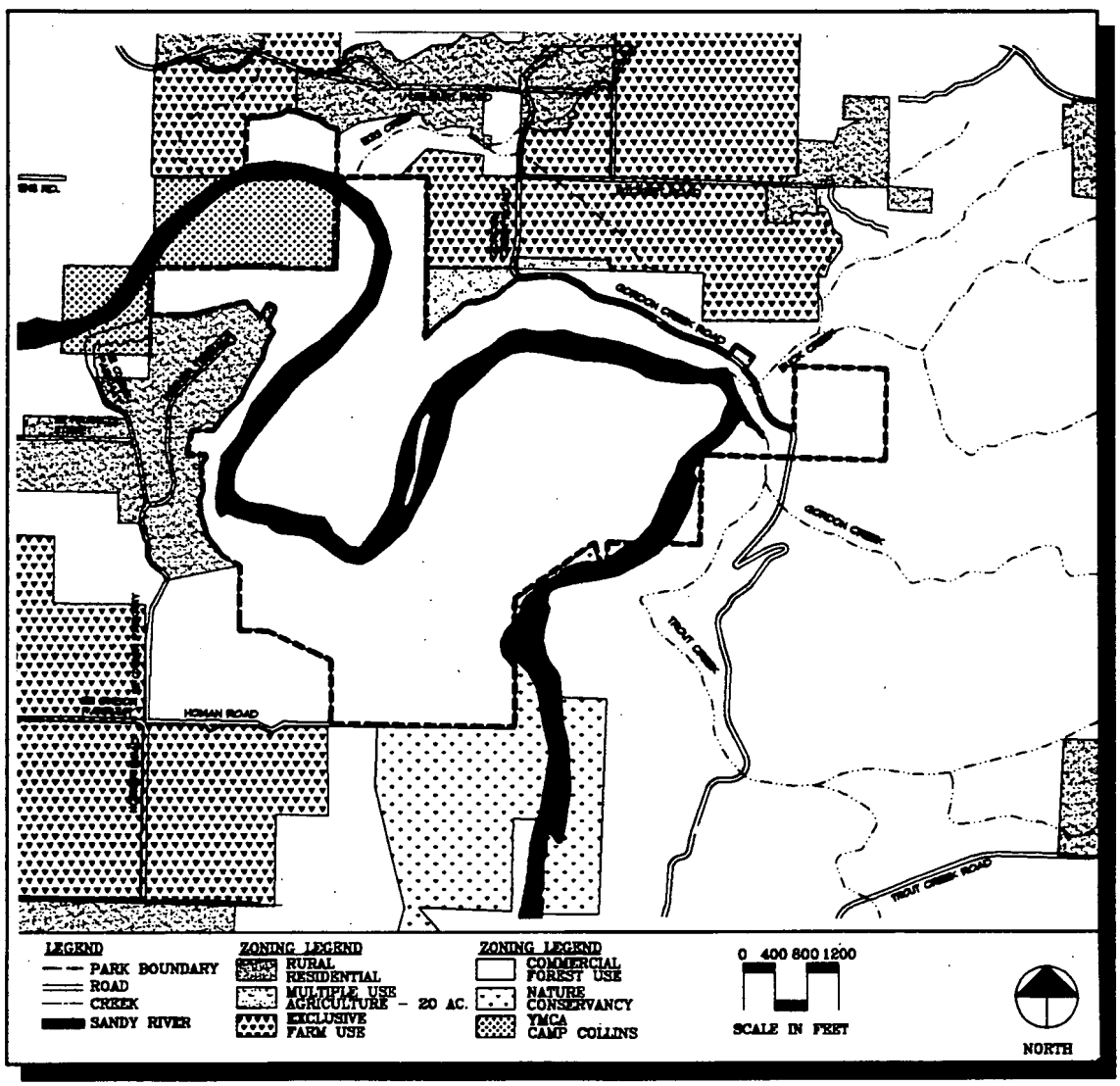


Figure 4 - Zoning For Oxbow Regional Park and Vicinity © Metro

Sandy River Hydrology

The Sandy River is located on the west side of the Cascade mountain range. The Sandy River and its tributaries drain an area of 508 square miles. The headwaters originate from the Reid and Sandy Glaciers on the west face of Mt. Hood and flow approximately 55 miles west and north to the confluence with the Columbia River. Oxbow Regional Park is located in the downstream quarter of the watershed between 10 and 13 miles from the Sandy River's confluence with the Columbia River. Annual precipitation ranges from 40-inches at the river mouth to 110-inches in the headwaters of the basin. Major tributaries include the Bull Run, Zigzag, and Salmon Rivers (see Figure 5).

Three significant instream water developments are located within a 15-mile stretch upstream of Oxbow Regional Park: Marmot Dam, owned and operated by Portland General Electric (PGE), a fish hatchery run by ODFW and the City of Portland's municipal water supply facilities. Marmot Dam is a diversion facility, its upstream effects are apparently only a few hundred yards. Up to 600 cubic feet per second (cfs) of water can be diverted from the dam through a series of flumes and tunnels to Roslyn Lake, where it serves a 22,000 kilowatt power plant. The diverted water returns to the Bull Run River and ultimately the Sandy River at Dodge Park, where the Bull Run and Sandy Rivers merge. The fish hatchery located near Cedar Creek, just north of the City of Sandy and downstream from Marmot Dam, has a negligible effect on Sandy River flows. The Bull Run watershed provides the vast majority of water for the municipal needs of the City of Portland and many surrounding communities. Major storage reservoirs and transmission and hydroelectric facilities are located along the Bull Run River.

The upper reaches of the Sandy River and its trubutaries flow through rolling mountainous terrain falling 1,600 feet in the first 13 miles. The upper river is characterized by narrow chutes and boulder-choked channels. The middle portion of the river from the confluence of the Zigzag River (River Mile (RM) 42) to Marmot Dam (RM 30), flows through a wider river valley with a moderate gradient. Below Marmot Dam the river descends into narrow and incised bedrock gorges with a moderate to steep gradient of over 40 feet per mile to an elevation of 200 feet at the mouth of the Bull Run River near Dodge Park (RM 18.5).

The lower 12.5 mile designated segment lies 6 miles upstream from the river's mouth and includes the Sandy River Gorge. This 800-foot deep gorge is heavily forested and, although considerably shorter in length, exhibits characteristics similar to the much larger Columbia River Gorge. Within the gorge, the river flows past low elevation old growth forests, riparian woodlands and fern and moss-laden cliffs. At the gorge's lower end, the Sandy meanders through two large "oxbows" and begins to widen, having large gravel bars, shallow riffles and few rapids.

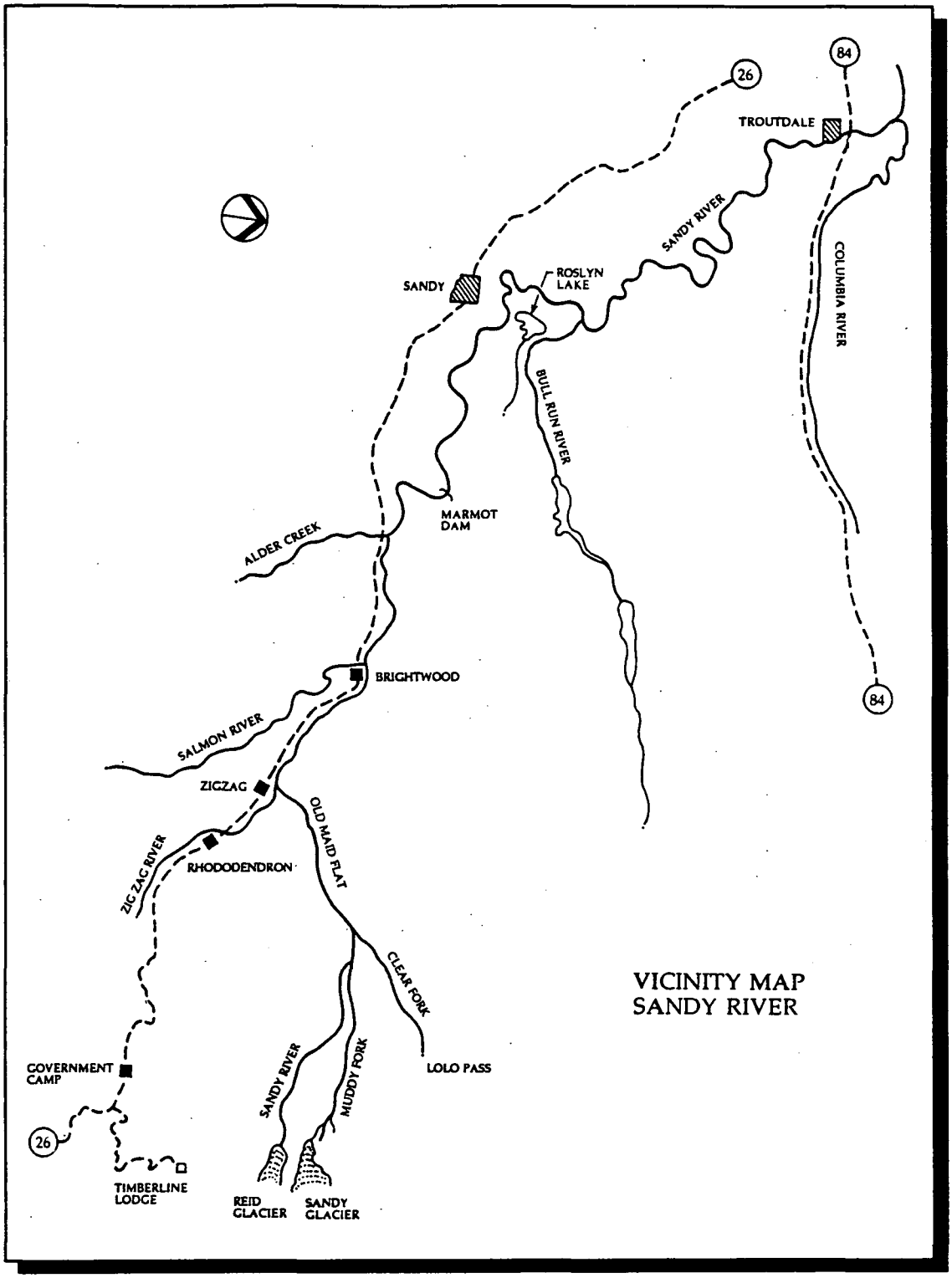


Figure 5 - Sandy River Vicinity Map

Compliments of Oregon State Highway Division, Parks & Recreation Section Scenic Waterway Study, 1972

A large supply of sediment is discharged to the river from the steep upper reaches in the watershed and from bank erosion along the river itself. The sediments slowly move down the river and through the river meanders in Oxbow Regional Park during seasonal floods. The slope of the river gradually flattens in a downstream direction and one of the first relatively low gradient river sections occurs along the Oxbow Regional Park river reach. River flows are less capable of moving sediments through these lower gradient stretches of river than through the steeper river reaches. Sediment deposition and bank erosion can become more pronounced in these low gradient areas (see Figure 6).

Lewis and Clark passed by the Sandy River in 1805 during their trip along the Columbia River and noted in their journals the large quantities of sand at the mouth of the river. The river was named Quicksand River and is believed to have been shortened to Sandy River sometime in the 1840's. The river has a rich history of commer-

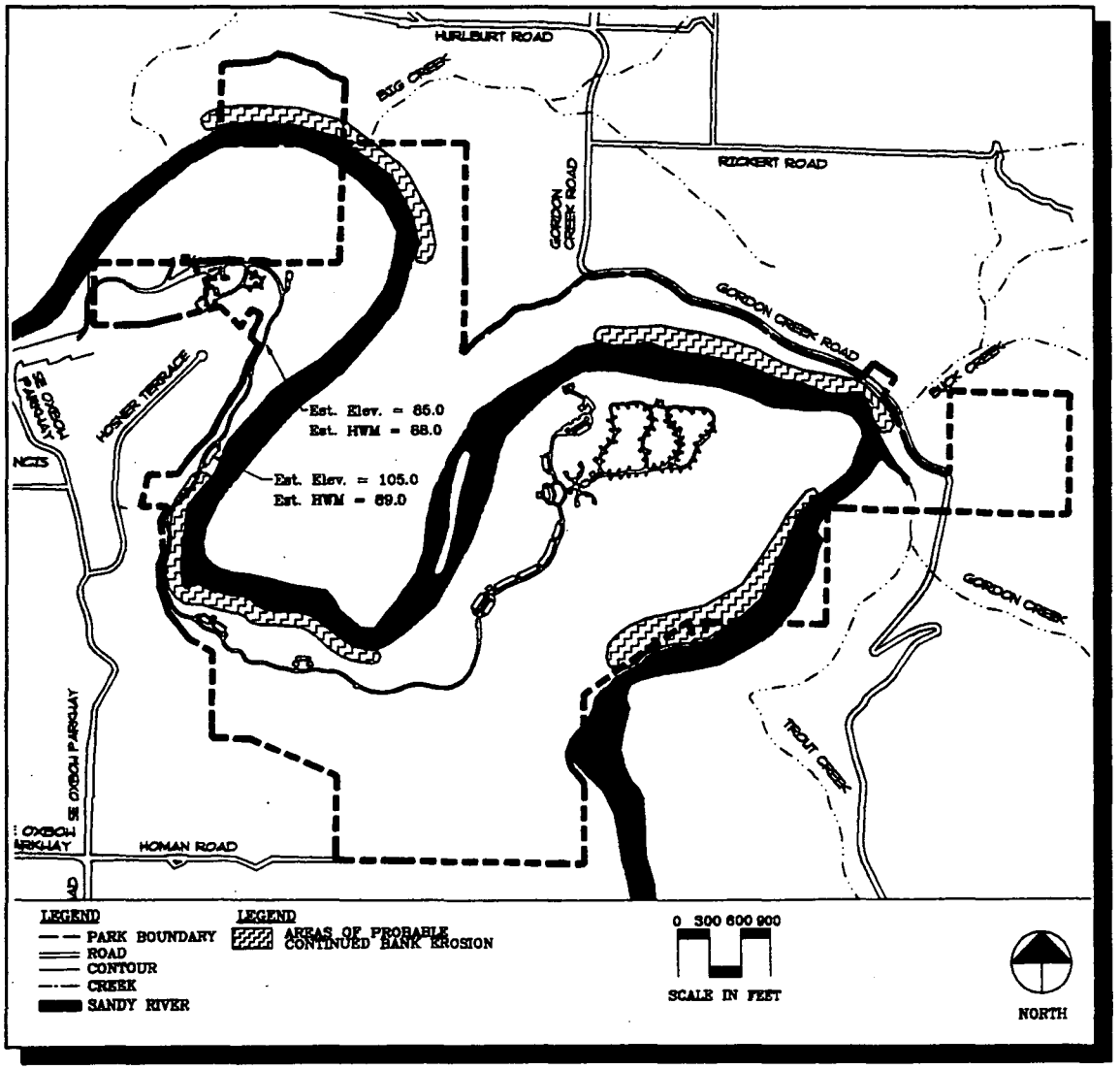


Figure 6 - Areas of Erosion & Flooding In Oxbow Regional Park © Metro

cial smelt fishing from the turn of the century to the 1970's. The torturous meanders, fluctuating flows and swift currents of the river presented continuous challenges to the use of the river for floating logs between the 1890's and the 1920's.

Historic maps, prepared from field surveys (as early as 1855) and aerial photographs (taken in the early 1900's, 1950's and 1970's), show a dynamic river constantly changing course. The February 1996 flood was one of several large floods in this century that have changed the river alignment by eroding and reshaping riverbanks, and moving river sediments downstream. The debris that is deposited on river banks and lowlands after a flood underscores the river's connection to it's floodplain.

The dynamic nature of the Sandy River brings special considerations to resource management and enhancement of natural features within the park. Change resulting from erosion and deposition is a natural condition along a large river like the Sandy. Human interventions to protect or enhance natural features must be done in a manner that acknowledges these processes and respects the historic extent of flooding and river channel changes within the park. The river serves as the primary attraction for public recreation in the park. Therefore, park facilities built for river access and in floodplain areas should be implemented in a way that respect and take into consideration the inevitable changes and natural power of the river.

■ Geology

The geologic conditions of Oxbow Regional Park and the lower Sandy River typify glacial and volcanic deposition and activity found west of the Cascade Range (BLM, 1992 & Peck, 1960). At least two million years ago, as the Cascade Range steadily uplifted, the Sandy River carved through alluvial deposits to expose layers of sediment, volcanic ash and lava belonging to the four major formations found from Dodge Park to Dabney State Park (see Figure 7) (BLM, 1992). Oxbow Regional Park and the Sandy River Gorge contain significant geological formations including volcanic deposits from the Old Maid Eruptive Period which occured from 1760 A.D. to 1810 A.D. (BLM, 1992 & Cameron and Pringle, 1991). From the last glacial period (about 12,000 years ago) to present there have been three major eruptive periods: the Timberline Eruptive Period (1800 to 1400 years before present), the Zigzag Eruptive Period (600 to 400 years before present) and the Old Maid Eruptive Period (1760 A.D. to 1810 A.D.). Deposits from all three periods are found along the Sandy River, but the Sandy River Gorge contains very thick deposits from the most recent period, the Old Maid (BLM, 1992). During the eruptions of the Old Maid Period, lava fell onto the slopes of Mount Hood and mixed with snow and ice and produced lahars (mudflows) which entered the headwaters of the White, Salmon, Zigzag and Sandy Rivers. These lahars deposited large amounts of debris which immediately began to be eroded and transported downstream as sediment. This sediment filled the Sandy River Gorge to a depth of 45 feet. There are remnants of this valley fill in the upper terraces of Oxbow Regional Park.

Three bedrock formations are exposed within the park boundaries; these are, from oldest to youngest: The Sandy River Mudstone formation (SRM); the Troutdale formation (TF) and the Estacada formation (EF). Below an elevation of approximately +140 feet above mean sea level (MSL), the park area is covered with recent alluvial deposits, slope colluvium and landslide debris. In the following paragraphs, each of the geologic units is described sequentially by age, beginning with the oldest unit.

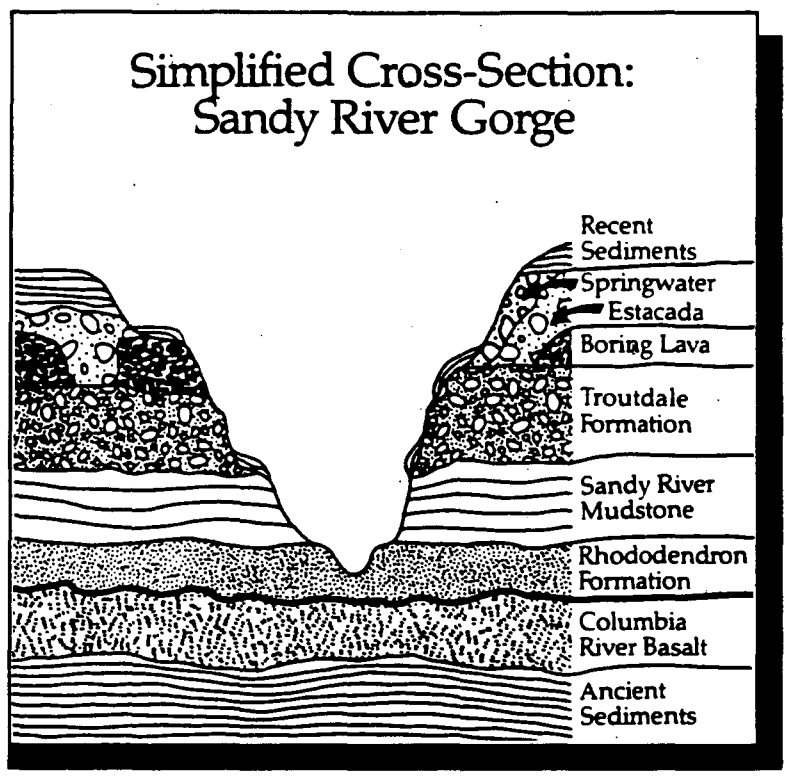


Figure 7 - Geologic Cross-Section of the Sandy River Gorge **© Metro**

Map Compliments of Bob Ratcliffe, Bureau of Land Management - Salem District

Sandy River Mudstone (SRM)

The Sandy River Mudstone (SRM) is exposed at the site below the following approximate elevations: +200 feet MSL in Sections 10 (SE corner) and 15; slightly higher (elevation +250 feet MSL) in Section 14; and slightly lower (elevation +150 to +175 feet MSL) in the eastern portion of Section 10. The variation in elevation is due in large part to the 2% westerly dip of the formation; erosion of the original surface and covering by colluvium and slide debris may also obscure the top of the SRM. The thickness of the SRM is estimated at 400 feet in the Oxbow Regional Park area based on a water well log at YMCA Camp Collins. The greatest exposed thickness

of the SRM is between +200 and +300 feet MSL at a location 2 to 3 miles southeast of the park in the valley of Bear Creek.

The Sandy River Mudstone consists mainly of lake-deposited beds of silt or very fine sand. Hence, the units comprising the formation are classified as mudstone, siltstone, claystone and very fine sandstone. A thin lapilli tuff (a consolidated pyroclastic rock with particles in the 2 to 64 millimeter diamater range) exists about 100 feet below the top of the formation. Because the SRM is relatively impermeable, it forms a barrier to downward percolating groundwater; and the faces of most bluff exposures are wet throughout the year.

Relatively rapid weathering of the SRM causes the unit to be susceptible to slumping (rock falls and slope movement or landsliding). That condition resulted in several landslides in the park last winter. The weathering and slumping causes undermining and periodic slumping of the overlying Troutdale formation. Hence, considerable slide debris with numerous cobble and boulder sized rocks is present along the toe of the slopes in the park.

Troutdale Formation (TF)

The Troutdale formation (TF) overlies the SRM and the top of the formation extends to as high as approximately elevation +600 feet MSL in the Oxbow Regional Park vicinity. Its maximum thickness within the park is approximately 450 feet; the minimum occurs below the Estacada formation on the top of Alder Ridge. The TF is comprised of sandstone and conglomerate formed from deposits made by a great piedmont fan from the Pleistocene age (approximately 2 million years before present).

The Troutdale formation, particularly the sandstone and conglomerate units, is well cemented; the cementing agent consists mainly of clay minerals. Some of the sandstone layers, because of their composition, decompose and weather relatively rapidly. Hence, the TF is subject to localized slumping and rock falls.

Estacada Formation (EF)

The Estacada formation (EF) is present in the park below a 2,000 foot long by 700 to 800 foot wide portion of Alder Ridge; it is also present at the top of the park ridge on the north side of the Sandy River. This formation is approximately 100 feet thick and generally consists of sand in the lower half and cobble gravel and bouldery cobble gravel in the upper portion. The formation is estimated to be late Pleistocene in age (i.e. more than 8,000 years old). Due to the granular nature of the formation, and its relatively young age, slumping or landsliding in the formation is rare except as the result of slumping in the underlying Troutdale and Sandy River Mudstone formations.

Recent Deposits

Below approximately elevation 100 feet, the park area is covered by deposits of recent (Holocene) age. These recent deposits consist mainly of silt and granular soils deposited by the Sandy River, i.e., alluvial deposits. Near the toe of slopes that extend above elevation 100 feet are deposits resulting from deterioration of the bedrock formations above. These include colluvium and landslide debris deposits consisting of silt through boulder size material.

■ Soil Conditions

Based on Soil Conservation Service (SCS) maps for the site area, near-surface soils (i.e., the upper 5 to 6 feet) in Oxbow Regional Park are predominately silty sand and sand. The upper 12 to 15 inches is typically very dark brown and very dark grayish brown silty fine to medium sand; below 15 inches is dark gray course and medium sand to a depth of 60 inches or more. Rapid permeability and slight erosion hazard further characterize the soil. Adjacent to the Sandy River are deposits of well rounded sand, gravel, cobbles, stones and boulders derived from basalt or andesite. Deposits of slope colluvium and landslide debris are present on the steep slopes along the river. These are well drained soils consisting of, in general, approximately 12 inches of very dark brown to dark grayish brown sandy silt or clayey sandy silt overlying dark yellowish brown to brown mixture of sand, gravel, cobbles and boulders (SCS reports indicate that 65 percent of this layer is gravel and cobbles). The SCS also indicates that permeability in the colluvium and landslide debris materials is moderate to slow, that runoff is slow to rapid, and erosion hazard is slight to high. Another comment by the SCS report is that these deposits are subject to slope movement during high rainfall periods.

Site Reconnaissance Observations

Following the February 1996 flood, park staff observed 22 landslides in the park; 3 of major proportions. The major landslides occurred in the Troutdale and Sandy River Mudstone formations (see Figure 7 & 8). Slide #1 is located on the maintenance access road to Alder Ridge and appears to be associated with a natural process. Slides #2 and #3 are located 0.75 road miles in from the park entrance station. Slide #2 involves the park road and extends toward the river. Slide #3 is adjacent to #2 on the north and extends considerable distance upslope.

Slide #3 occurred in both the Troutdale and Sandy River Mudstone formations and may have been partly the result of concentrated stormwater drainage from uphill sources. The slide area has experienced some erosion and sloughing since the remedial measures were taken but does not appear to threaten the park road at this time. Surface drainage improvements completed to date at this location will reduce or eliminate the kind of erosion damage that has occurred in this area below the road.

Slide area #2 adjacent to Slide #3 is nearly 250 feet wide and extends 10 to 15 feet (at maximum) above the road. It appears that the road movement (i.e., the slide) is related to poor surface water drainage from the area uphill of the slide and the fact that this section of the road is on a man-made fill up to 12 or 14 feet thick constructed on what appears to have been a relatively steep sloping original ground surface. Park staff confirmed that several breaks in the park's main water line have occurred in this area over a period of 10 years.

There were no signs of other unstable slope conditions (landslides) on or immediately adjacent to the park road. In addition, the erosion of slopes above and below the road has not been a significant problem except near Slide #3. Although erosion by the Sandy River is an on-going geologic process, there do not appear to be any

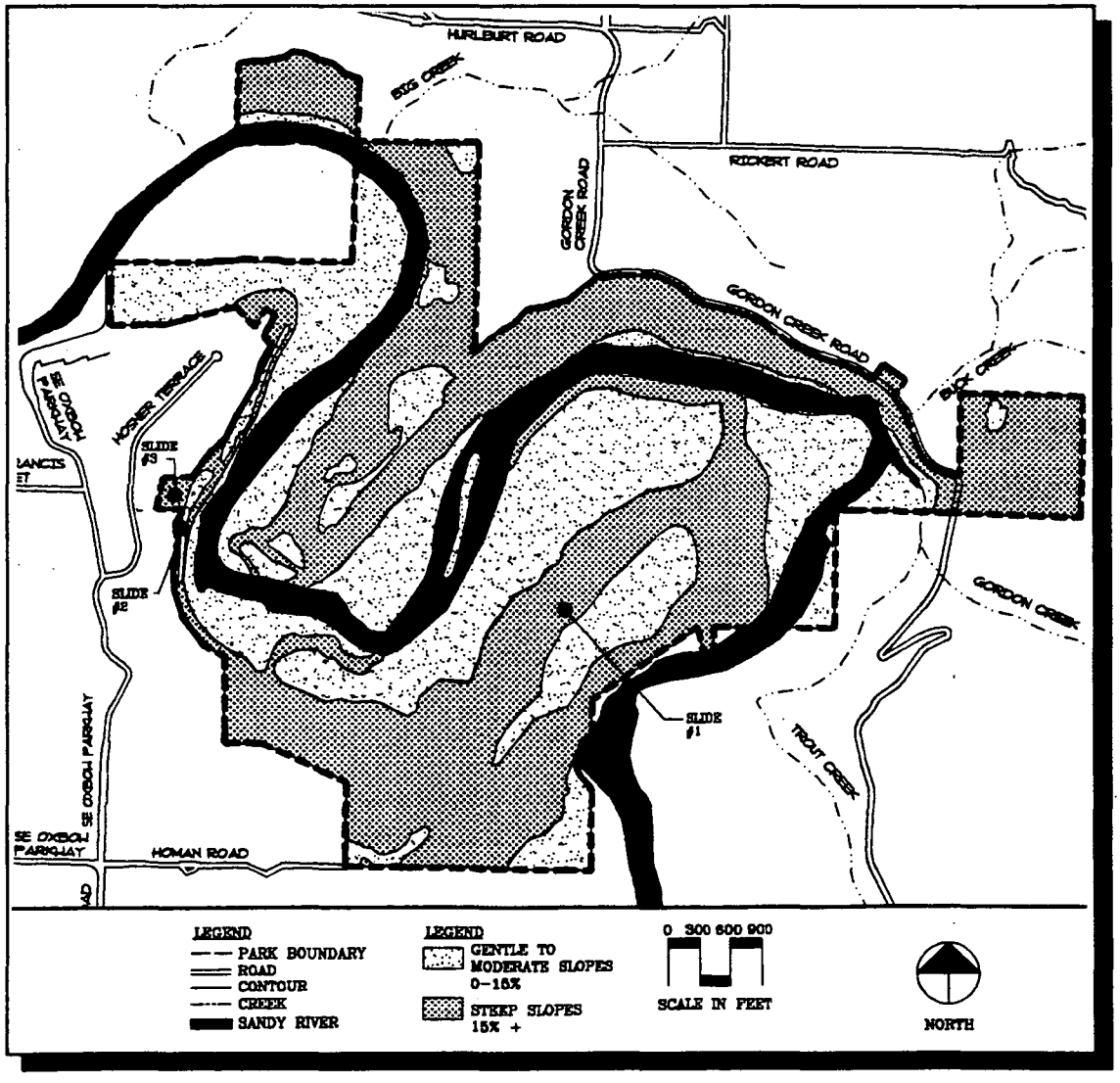


Figure 8 - Land Slides and Slope Analysis Map For Oxbow Regional Park **© Metro**

river slope areas near the park road that would be considered active at this time.

An area of overhanging Troutdale formation rock is visible across the access road from the park pump house at an estimated elevation of 150 feet MSL. The overhang appears to be above the contact between the Troutdale and Sandy River Mudstone formations.

Just outside the park, an area of hillside above the road is active from time to time. On occasion, slides in this area have blocked access to the park and YMCA Camp Collins.

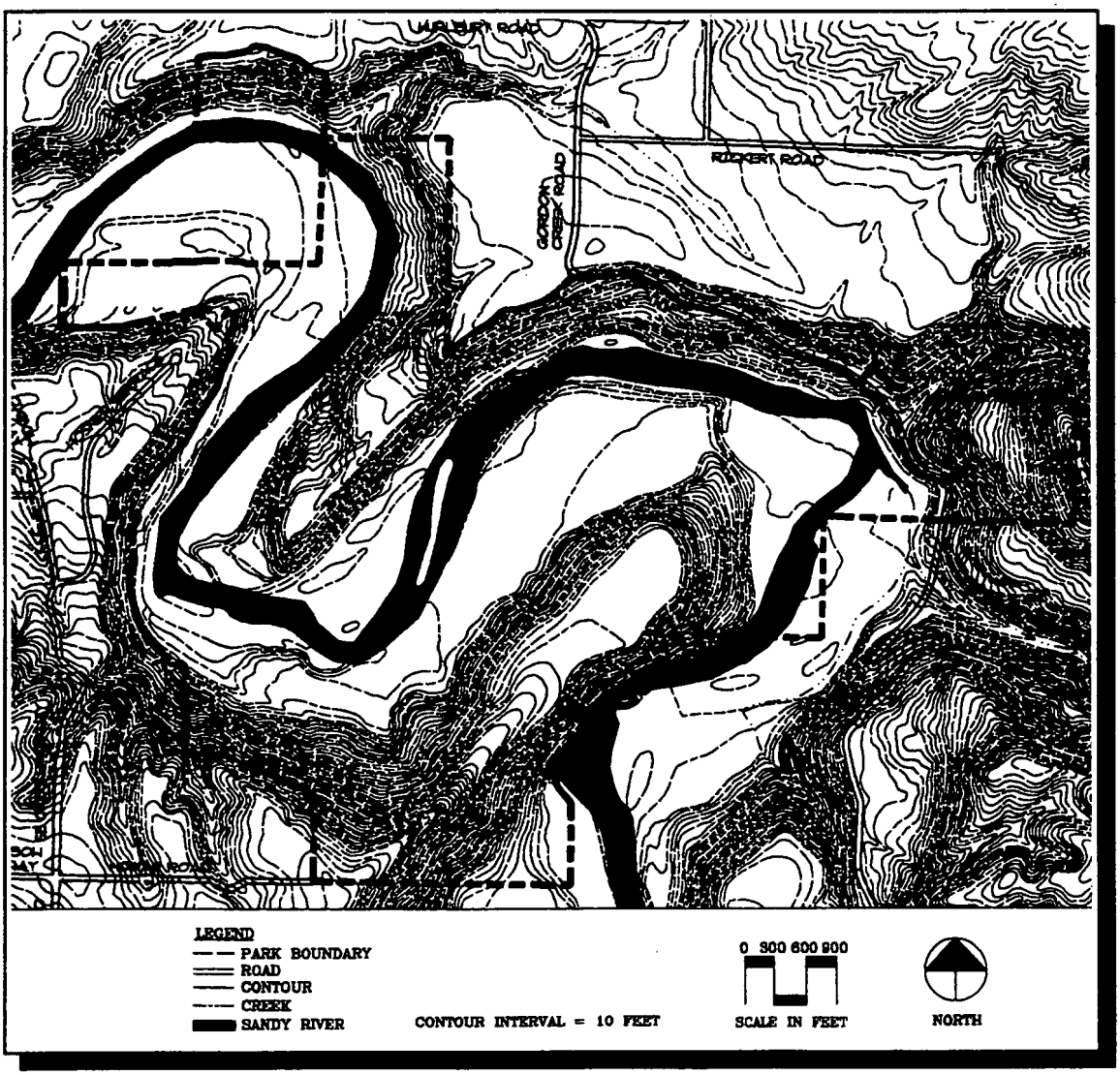


Figure 9 - Slope Map For Oxbow Regional Park and Vicinity © Metro

■ Vegetation Communities

Six primary vegetation types or seral stages currently exist within Oxbow Regional Park: late seral western hemlock forest (ancient forest), mid-seral western hemlock forest, early seral western hemlock forest (red alder-bigleaf maple forest), meadow, flood plain riparian forest and altered rural residential/agricultural sites. Figure 10 illustrates the location of these vegetation types and seral stages within the park boundaries. Appendix E provides scientific names for the plant species discussed below and the full technical report.

Late Seral (Ancient) and Mid-Seral Western Hemlock Forests

Late seral, 300+ year old western hemlock forest covers 160 acres of the north facing slopes of Oxbow Regional Park on the south side of the Sandy River from approximately the pump house east to the existing group picnic areas A and B. Predominant tree species in this forest include Douglas-fir, western hemlock and western red cedar. A smaller area of late seral forest occurs farther to the east, on the southern edge and south of the campground. Mid-seral western hemlock forests (approximately 100 years of age) can be found on steeper northwest and southeast facing slopes, on broad flats on the south side of the Sandy River, and on steeper west, southeast and south facing slopes on the north side of the Sandy river not occupied by hardwood flood plain riparian forest or red alder-bigleaf maple forest.

The late and mid-seral forests of Oxbow Regional Park consist of a complex network of the western hemlock/swordfern-oxalis and western hemlock/dwarf Oregon grape/swordfern plant associations (Halverson et al. 1986). These plant associations generally represent warm, moist, low to mid-elevation sites within the western hemlock zone. In general, the western hemlock/dwarf Oregon grape plant association is found on steep and somewhat unstable slopes, and the western hemlock/swordfern-oxalis plant association is found on flatter slopes, alluvial areas or moist toe slopes.

Early to Mid-Seral Western Hemlock Forest (Red Alder-Bigleaf Maple Forest)

Red alder-bigleaf maple forests occur on upland, northwest facing slopes and ridges south of the Sandy River, and on upland west and south facing slopes north of the River within Oxbow Regional Park (see Figure 10). These forests represent an early to mid-seral, harvest-initiated stage of the western hemlock/swordfern-oxalis and western hemlock/dwarf Oregon grape/swordfern plant associations. They are mostly dominated by an overstory canopy of red alder and bigleaf maple, with seedling to pole-sized Douglas-fir, western hemlock and western red cedar subordinate in the understory. North of the Sandy River, some of these sites have greater conifer development, and may have early mature Douglas-fir, western hemlock and/or western red cedar individuals co-dominating the overstory along with red alder and bigleaf maple. Understory shrubs and herbs are similar to those found in later seral stages, as described above.

Upland Meadow

A 10 acre upland meadow known as Elk Meadow is located on Alder Ridge in the southeast portion of the park (see Figure 10). It was created in 1995 through clearing and grass seeding, and is surrounded by red alder-bigleaf maple forests.

Flood Plain Riparian Forest

Riparian vegetation occupies the flood plains within the park. Vegetation on these sandy, alluvial, frequently disturbed sites includes: black cottonwood, Douglas-fir, western red cedar, red alder, Oregon ash, bigleaf maple, willow and grass species, and equisetum. Introduced exotic/noxious plant species include scotch broom, Himalayan blackberry, reed canary grass, Canadian thistle, and more recently, Japanese knotweed.

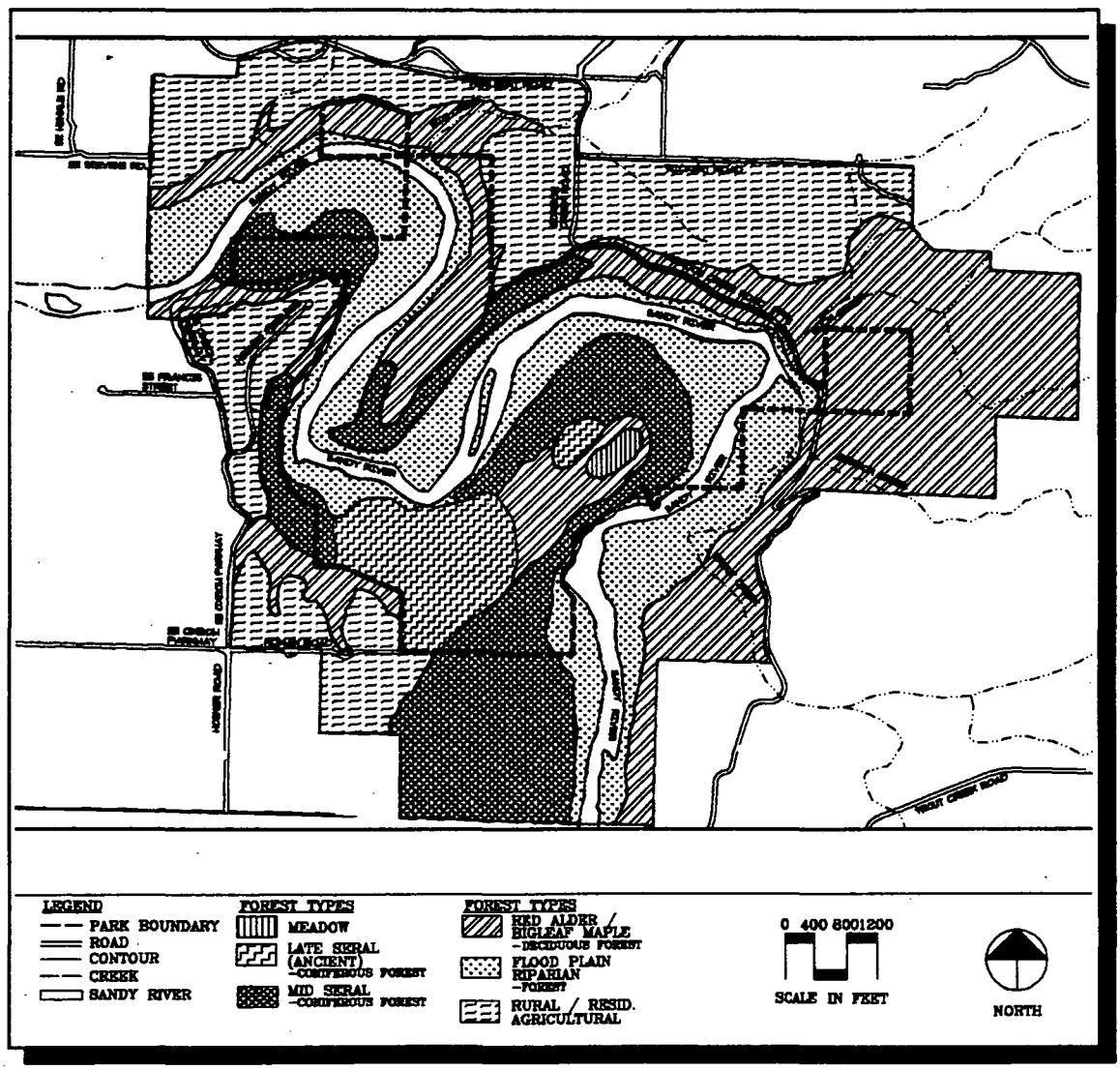


Figure 10 - Vegetation Communities For Oxbow Regional Park and Vicinity © Metro

■ Fish and Wildlife Habitat and Usage

Natural Area and Wildlife Habitat Quality

The Sandy River Gorge offers relatively protected, natural habitats in an area and region where disturbance factors to wildlife are high (BLM,1992). The quality of a natural area as habitat for wildlife species is very much linked to its size. Wildlife require structure in their habitat, including large trees, snags, downed and dead wood, water, and a wide range of plant species at all canopy levels (Ambuel and Temple, 1983). Within a natural area, each wildlife species has a unique set of habitat requirements, an ecological niche consisting of preferred conditions within the physical environment as well as with its interaction with other species. In order to maintain viable populations of wildlife species, ample resources and adequate environmental conditions must be present to provide for reproduction, foraging, resting, cover and dispersal of animals at a variety of scales across space and time (Morrison, Marcot and Mannan, 1992). Sufficient amounts, types, and arrangements of resources must provide for the needs of reproductive individuals on daily, seasonal and yearly bases. Habitat also must be well distributed and connected over a broad geographic area to allow breeding individuals to interact within and among populations.

The diversity and quantity of habitat types within Oxbow Regional Park provides suitable habitat conditions for most fish and wildlife species found in northwestern Oregon between the Willamette Valley and the western crest of the Cascade Mountains. In addition, the park's 1,040 acres are connected to the larger landscape of the Sandy River watershed, linking Mt. Hood to the Columbia River.

The resources within the park boundary provide the requirements for many of it's wildlife residents and seasonal visitors. However, some of the medium and large size mammals that have been observed in Oxbow Regional Park, (i.e. elk, bobcat, cougar and black bear) have larger home ranges and are dependent upon connections to the larger landscape.

Fisheries

Fish habitat in the Sandy River system is considered good to excellent. The Sandy River, with its cold water and substrates of gravel and large-sized cobbles, provide ideal conditions for the spawning and rearing of anadromous and resident fish species. Major tributaries, including Gordon and Trout Creek, also provide important additional spawning habitat (BLM, 1992). This quality of habitat supports anadromous fish species that provide near year-round angling opportunities for anglers in the Oxbow Regional Park area. In addition, some resident species are available year-round to provide angling opportunities for persons who just "want

to catch a fish". Table 1 includes a list of fish species known or believed to be present in the Sandy River.

The Orgeon Department of Fish and Wildlife (ODFW) has managed the Sandy River in a manner that maximizes an angler's opportunity to catch a salmon or steelhead. Hatchery fish, with different timing than the River's wild fish, have been introduced to increase avaiability. Hatchery planting has been shifted to the lower river in places with easy public access (such as Oxbow Regional Park) which results in a concentration of returning fish in those same areas.

Winter steelhead, consisting of both wild and hatchery stocks, are probably the most popular game fish in the Sandy River. The Sandy River has been consistently ranked as one of the top producers of winter steelhead in the state of Oregon. Oxbow Regional Park is a primary angling area for this species. The months of December

Table 1
Fish Species Known or Believed to be Present in the Sandy River

Common Name	Scientific Name
Pacific Lamprey	Entosphenus tridentatus
Sea Run Cutthroat Trout	Oncorhynus clarki clarki
Steelhead (Rainbow) Trout	O. mykiss
Coho Salmon	O. kisutch
Chinook Salmon	O. tshawytscha
Sucker spp.	Catostomus spp.
Northern Chiselmouth	Aerchellus alutaceus
Northern Squawfish	Ptychocheilus oregonensis
Dace	Rhinichthys spp.
Carp	Cyprinus carpio
Sculpin spp.	Cottus spp.
Columbia River Smelt	Thaleichthys pacificus
Brook Trout	Salvelinus fontinalis
Mountain Whitefish	Prosoplum williamsoni
American Shad	Alosa sapidisuima

Information Source: The Oregon State Fish and Game Commission

through February are generally recognized as prime winter steelhead times at Oxbow Regional Park. A boat ramp and four miles of river frontage within the park boundaries provide abundant angling opportunities. Total run size averaged 11,670 fish between 1978 and 1990, falling below 8,900 fish only twice. Harvest averaged 8,716 fish during the same period. From 1991 through 1994, the total run averaged only 6,361 fish. Harvest declined to an average of 4,522 fish during this period.

Summer Steelhead

Summer steelhead are an introduced species in the basin. The upper Sandy River produces a higher catch of this species than the Oxbow Regional Park area because these fish enter the river system beginning as early as March and spend months in the upper watershed before spawing in the fall. During good run years, summer steelhead fishing in the park provides excellent recreation as the fish make their way upstream. A majority of the summer steelhead pass through the park during the months of April through June. However, reports of summer steelhead being caught in the park throughout the summer and into the fall is not uncommon. The ten year average harvest for summer steelhead for run years 1983-1984 is 4,723. However, harvest has declined recently which parallels declining trends in adult returns.

Fall Chinook

Fall chinook are a naturally reproducing mix of both wild and hatchery stocks. These stocks have some recreational value for anglers but they provide a far more important purpose at Oxbow Regional Park for their educational value as observable wildlife. These fish enter the park area in September and usually begin spawning in shallow riffles by the first of October. Five areas within Oxbow Regional Park are closed to angling to protect the fish. A large percentage of park visitation during the last half of September and all of October is dependent upon salmon viewing opportunities. This run has remained stable the last several years with an average of 1,500 fish returning each year.

Spring Chinook

Spring chinook are indigenous to the Sandy River but the current stock inhabitating the River is believed to be mostly of hatchery origin. Peak movement of spring chinook into and through Oxbow Regional Park occurs from April through June. These fish provide some of the best sport because of their size and renowned fighting ability. This fishery has grown in recent years after introduction of the Willamette stock into the system. The estimated annual return to the Sandy River averaged 2,056 for run years 1980-84, 2,005 for run years 1985-89 and 5,118 for run years 1990-94. This is one species that seems to be on the increase.

Coho Salmon

Coho salmon, consisting of a late returning native stock and an early returning hatchery stock, are currently on a severe decline. When the return numbers were high this was an extremely popular fishery, contributing significantly to Oxbow Regional

Park visitation especially during the month of September. Coho salmon angling on the Sandy River has been closed for the past two years. Escapement of the late returning winter stock has declined to an average of 784 for the five year period 1991-95. Only 220 fish returned in 1993. Historically, 10,000 to 15,000 wild coho returned to spawn each fall. The early returning run of hatchery coho has also been hard hit. Less than 500 fish have returned to the hatchery each of the past two years, less than adequate to meet egg taking goals.

Resident fish such as rainbow trout and cutthroat trout are native to the system but are available in extremely limited quantities in the Oxbow Regional Park area. Northern chiselmouth suckers, northern squawfish and mountain whitefish provide some recreational opportunities, especially for the younger visitor.

As the above discussion indicates, there has been a decline in the numbers of most species of salmon and steelhead returning to the Sandy River over the last several years. This decrease mirrors the decreases seen in runs returning to rivers throughout much of the Northwest. Figure 11 compares the amount of returning winter steelhead to the lower Sandy River between the months of December and February to the number of cars entering the park during that same time. Car counts entering Oxbow Regional Park during the months of December through February was 10,820 in run years 1978-82 when winter steelhead returns annually averaged about 13,050. However, when the average annual winter steelhead return declined to 7,372 during run years 1991-93 the average December through February car count declined to

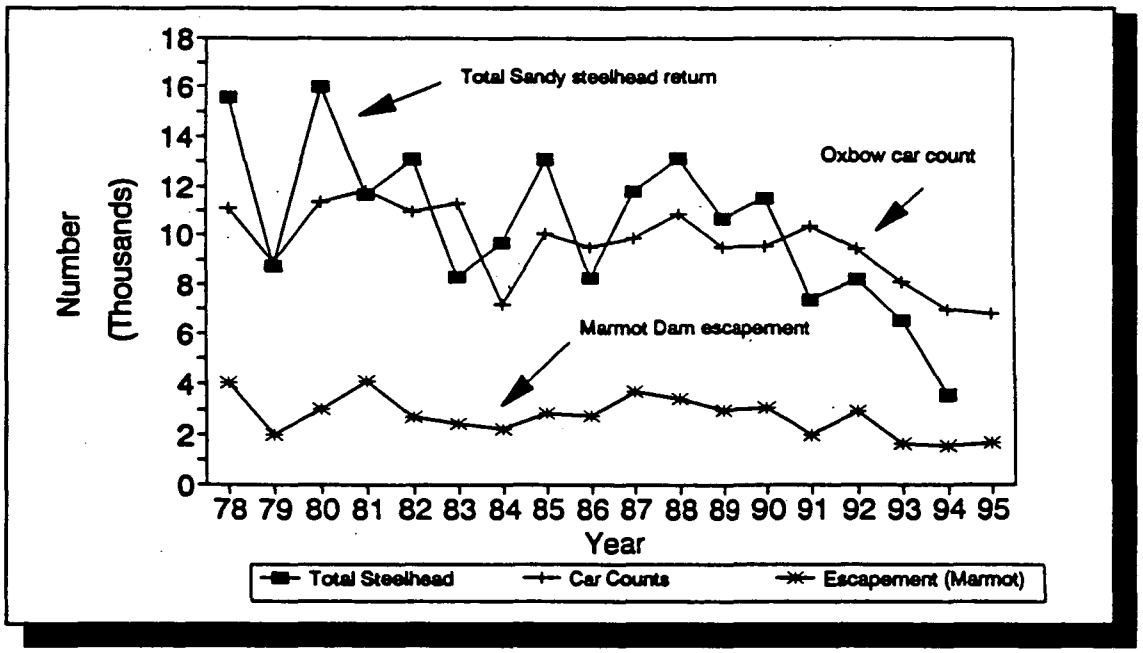


Figure 11 - Oxbow Regional Park Car Counts and Total Winter Steelhead Returns to Sandy River **© Metro**
Compliments of Oregon Department of Fish and Wildlife, Fish Management Plan, 1997

6,859. The total winter steelhead returns for 1994-95 are presently unknown, but preliminary reports indicate a significant decline. There are relatively few public access locations for salmon and steelhead angling in proximity to the Portland metropolitan area and the angling season is limited to certain times of the year. Angling activities for salmon and steelhead appears to be affected by run strength; that is, more anglers head for the river when they know a strong run of fish has returned. A return to healthy numbers of salmon and steelhead is of great importance at Oxbow Regional Park since it is one of only three public access portals on the lower Sandy River serving the nearby metropolitan area.

Wildlife Species, Habitat Types and Vegetation Communities

Habitat types found in the study area include deciduous, coniferous and mixed forest in various successional stages, riparian, river and upland meadow. Unlike the primarily edge forest habitats of much of the Metro region, Oxbow Regional Park has large areas of contiguous forest creating large patches of interior forest which, in turn, creates specific habitat for some wildlife species.

Table 2 shows wildlife groups and their preferred vegetation communities within Oxbow Regional Park. Generalized wildlife groups were developed to represent the habitat requirements and activities of the bird, mammal, reptile and amphibian species found or expected to occur within the park. Species with similar habits were organized together in groups.

Appendix F provides a list of the species likely to be found within Oxbow Regional Park. In addition to species name, the occurrence level, time of year found in the park and activities are also shown. This list may not include all the wildlife species that have been observed in the park.

Many of the wildlife species observed at Oxbow Regional Park utilize more than one of the habitat types or vegetation communities described in this section. The following are descriptions of each of the habitats types and the wildlife species most commonly associated with them.

Riparian Forest and Floodplain

The Sandy River provides excellent anadromous fish habitat. In addition, the river, riparian zone and canyon provide hunting and nesting habitat for hawks, owls, eagles, osprey and heron. Kingfisher, mergansers, dippers and other waterfowl and shorebirds are common. River otter, mink, flying squirrel, beaver, raccoon, coyote, fox, and black-tail deer are also common along the Sandy River Gorge. Elk, bobcat, cougar and black bear are occasional visitors to the Sandy River and its adjacent riparian habitats, probably using the river as their travel corridor.

Buck and Gordon Creeks, two of the healthiest creek systems in the metropolitan area, enter the Sandy River within Oxbow Regional Park. They provide important corridors which link Oxbow Regional Park and the Sandy River Gorge to vast public lands on Larch Mountain. Trout, steelhead and salmon are known to inhabit their cool shaded waters. Deer and elk are common along the creeks, as well as dippers in swifter sections of the stream. Mergansers, kingfishers and woodpeckers are commonly observed.

Western Hemlock Forest
The late and mid seral hemlock forests of Oxbow Regional Park are large enough blocks of habitat to provide some interior forest habitat. In the Pacific Northwest, "edge effect" is commonly assumed to occur 150m (500 ft) into forest patches from a forest-opening interface (Diaz and Apostol 1992). That part of the forest not influenced by edge is considered interior forest habitat. Examples of species tending to occur in portions of forest far from edges (interior areas) or those requiring large trees, snags, dead downed material include the varied thrush, owls, pileated woodpeckers, salamanders and newts. Bear, cougar and other medium to large size carnivores also utilize this vegetation community.

Red Alder-Bigleaf Maple Forest
The red alder-bigleaf maple community within Oxbow Regional Park is in an early successional phase and will gradually change to mixed coniferous forest and eventually a conifer dominated forest. Edge loving species that live in a variety of habitats, which feed within the upper and mid-canopy, and ground feeders are found in the red alder-maple forest. Many of the common song birds are found in this habitat including flycatchers, wrens, towhees, warblers and orioles.

Upland Meadow
This vegetation community was recently created at the park. It offers an open grassland, previously limited within the park. Elk and deer, small mammals, rapters and passerines use this area to forage for food.

Considering the amount of human use experienced by the park, the overall ecological condition of the vegetation and associated wildlife species within the park appears to be healthy. There is a diversity of seral/structural stages providing horizontal landscape diversity while maintaining a block of ecologically significant late seral forest (ancient forest). However, exotic/noxious plant species occur in all areas of the park. In some areas such plants may physically displace native species, reducing native biodiversity. The exotic/noxious plants that have been observed in the park are identified in Appendix E.

Table 2
Wildlife Groups and Significant Habitat Types

Wildlife Group	Late/Mid Seral	Alder-Bigleaf Maple	Riparian	Meadow
Waterfowl	N	N	P	N
Cavity Makers	P	S	L	N
Cavity Users	P/S	S	S	N
Open-Area Raptors	L	L	L	P
Forest Raptors	P	S	L	N
Forest Dependent				
-Canopy Users	P	S	L	N
-Midstory Users	P	S	S	N
-Understory Users	P	P	S	N
-Edge Dependent	S	P	P	N
-Interior -Dependent	P	L	N	N
Meadow Dependent				
-Ground Users	N	N	L	P
Small Mammals	S	S	P	S
Small Carnivores	P	P	P	L
Large Carnivores	P	S	P	N
Ungulates (Hooved Mammals)	S	P	P	S
Bats	P	P	P	N
Amphibians	P	P	S	L
Reptiles	L	L	S	P

P-Primary Habitat
S-Secondary Habitat
L-Limited Use
N-Not an Important Component

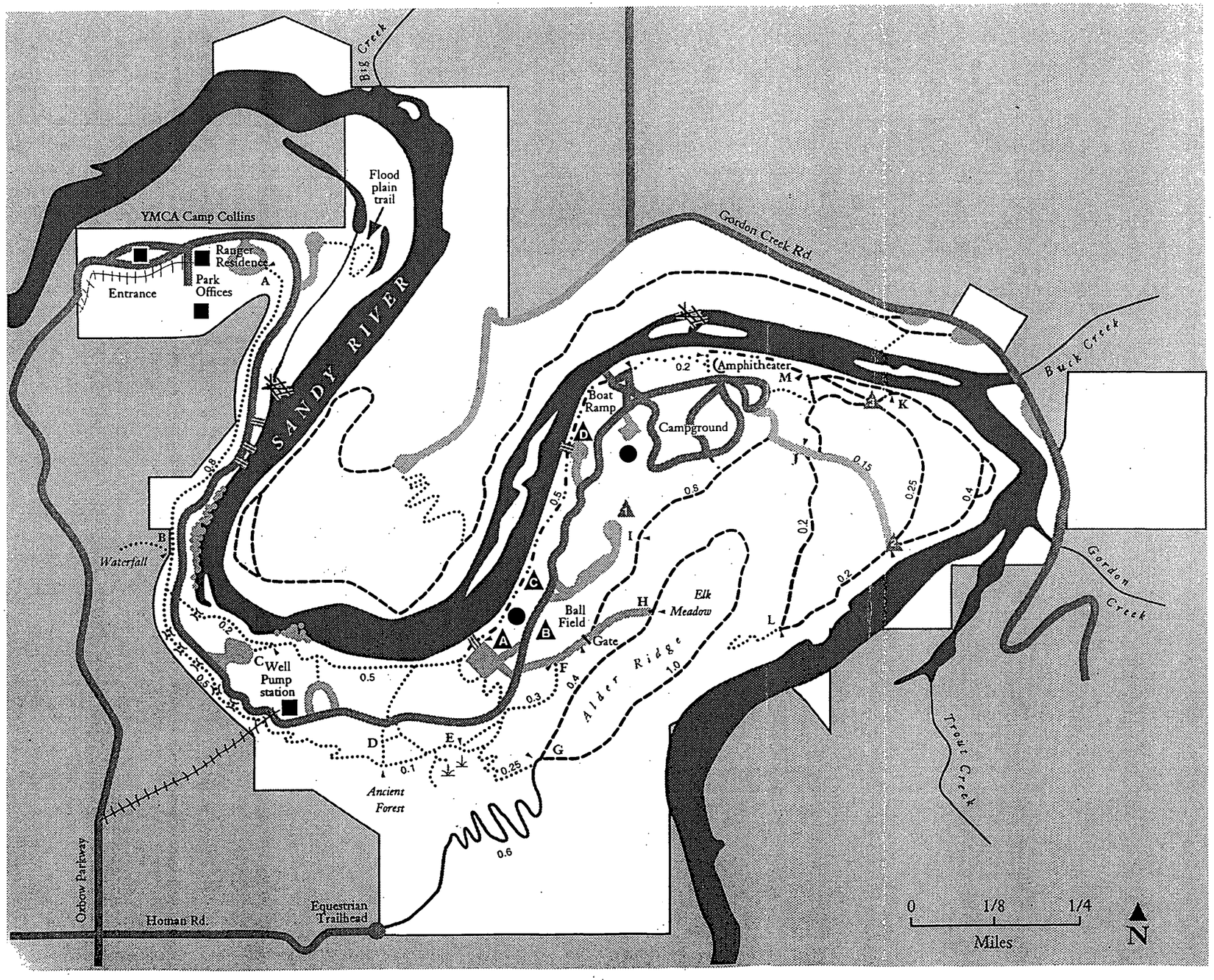
Existing Park Use

The primary reasons people visit Oxbow Regional Park are to relax and enjoy the outdoors. The features that most attract the visitor to the park are the river, the scenery and the natural setting. Currently, the park offers a broad spectrum of recreational uses. Figure 12 shows the current use areas, existing facilities, road alignment and trail network. The type of uses and current facilities are noted in Table 3.

Table 3
Existing Recreation Amenities

Recreation Use	Number of Facilities	Support Structures
River Activities - swimming - waterplay - fishing - river rafting - boating	4 miles of River Frontage	- beach area - boat ramp (1) - car/trailer parking (104) - handicap fishing (1) - hardened access points (5) - information kiosk (1)
Group Day Use - group picnics	4 Areas Group Picnic Area A, B, C, & D	- shelters (4) - parking spaces (234) - picnic tables under shelter (72) - user capacity (326) - picnic tables outside shelter (29) - user capacity (234) - horseshoe pits (4) - pit toilets (8)
Individual / Family Day Use (non-reservable picnic areas)	Dispersed throughout park	- parking spaces (387) - picnic tables (106) - horseshoe pits (3) - play ground (2) - informal ball field (1) - volleyball (2) - pit toilets (17) - information kiosk (1)
Overnight Camping - group sites - individual sites	3 group areas 45 individual sites	- shelters (3) - parking spaces (165) - picnic tables (74) - horseshoe pits (1) - pit toilets (16) - information kiosk (1)
Hiking / Walking Equestrian / Bicycle	12 miles trail 4 miles road	Trails: - asphalt (150 ft.) - gravel surface (2 miles) - bark dust, chip (10 miles) - foot bridges (6, 110 ft.) - board walk (100 ft.) - equestrian parking (10)
Nature / Interpretive Programs	Access to Natural Area	- 'Ancient Forest' Tours - salmon walks - nature tours - school field trips - wildlife viewing - amphitheatre

Existing Facilities at Oxbow Regional Park



- Group picnic area
- Group camping area
- Children's play area
- Building
- Hardened river access
- 0.5 — Distance between points
- A - M — Trail markers
- Bridge
- Log jam
- River boulders
- Wetlands
- Pedestrians only
- Pedestrians and bicycles only
- Pedestrians and horses only
- Pedestrians, bicycles and horses
- Paved road
- Gravel road

Note: Water supply line parallels entire length of interior paved road.

Underground electric cable parallels interior paved road from well pump station to group picnic area A.

METRO

Figure 12

■ Park Attendance

Current annual attendance for the last three years at Oxbow Regional Park is in the range of 218,000 visitors (see Table 4A). Table 4A also shows the greatest amount of visitation occurs in the months of May, June, July and August. Total visitation was 215,691 during the fiscal year of 1995-96. This total represents an average of 3.5 persons per vehicle along with an additional 20% for people entering the park from all monitored and unmonitored access points. The six peak months (May-October) generate about 72% of the annual use at the park.

- Average peak month activity: 27,058 visitors
- Average non peak month activty: 11,486 visitors

Table 4A
Park Visitation for Oxbow Regional Park**
1992-1996

Month	1992 Visitation	1993 Visitation	1994 Visitation	1995 Visitation	1996 Visitation	Average
January	15,212	13,306	13,969	10,618	9,522	12,525
February	11,651	9,265	6,577	7,862	2,432	7,557
March	13,596	11,298	13,524	13,877	18,325	14,124
April	15,271	12,499	15,137	13,877	15,884	14,534
May	33,533	22,764	22,529	30,576	21,244	26,129
June	28,409	20,252	20,773	24,385	28,229	24,409.6
July	39,875	27,602	46,418	36,632	46,684	39,442.2
August	37,822	34,129	28,216	28,762	31,542	32,094.2
September	16,321	21,386	16,598	19,048	17,254	18,121.4
October *	22,756	21,563	19,328	22,618	16,489	20,550.8
November	6,518	4,385	5,525	4,961	6,023	5,482.4
December	11,441	8,627	10,169	8,034	5,418	8,737.8
Total	251,870	207,077	218,764	217,570	219,046	222,865.4

* Salmon Festival average attendance is 9,000 visitors over one weekend.
** A 20% increase has been added to the entrance counter number. This number accounts for visitation from five unmonitored access points.

Total attendance in the last five years (see Table 4A) has remained in the 200,000 plus range. As shown in Table 4A, visitation during the winter months of December, January and February decreased approximately 55% between 1992 and 1996. As previously discussed and shown in Figure 11, a direct correlation can be seen between the decrease in return of winter steelhead and park visitors during those months. In part, due to the decline in anadromous fish resources nearly 72% of park use now occurs in the peak season (May to October) and 28% in the winter. This compares to the past years when 35-40% of park use occurred in the winter season.

Table 4B
Summary of Visitation by Month
Fiscal Year 1995-1996

Month	Total Vehicles	Total Visitors
July	8,722	36,632
August	6,848	28,762
September	4,535	19,048
October *	5,385	22,618
November	1,181	4,961
December	1,913	8,034
January	2,267	9,522
February **	579	2,432
March	4,363	18,325
April	3,782	15,884
May	5,058	21,244
June	6,721	28,229
Total	51,354	215,691

* The Salmon Festival average attendance is 9,000 visitors over one weekend.
** Park closed from February 7th to February 23rd due to flooding.

■ Analysis of Oxbow Customer Survey

During the summer and fall of 1995 an on-site customer survey was completed. Summer interns distributed questionnaires to park visitors during the months of July, August and again in October during the Salmon Festival. A total of 68 Salmon Festival participants and 166 July/August participants completed the survey. Questions ranged from multiple choice options to open-ended responses.

While the number of completed questionnaires is less than needed for an accurate sampling and the responses were only for a short duration of the year, the survey does provide good insight into the values, interests and needs of the summer visitors.

Some of the specific findings in the survey were:

- **Nearly 40% of the visitors originate from outside Multnomah County.**
- **A third of the visitors were visiting the park for the first time, while over 20% of the visitors have been visiting it for 10 years or more.**
- **Approximately 62% of the visitors visit the park more than once a year while 16% visit the park more than 10 times a year.**
- **Nearly 90% of the visitors use the park during the summer season compared to 13% during the winter. About a third of the visitors use Oxbow Regional Park in the spring and fall seasons.**
- **The primary reasons people visit Oxbow Regional Park are to relax and enjoy the outdoors.**
- **The features that most attract the visitor to the park are the river, the scenery and the natural setting.**
- **When asked what additional facilities or amenities should be developed at Oxbow Regional Park, the most frequently cited responses were flush toilets, and indoor shower facilities in the campground.**
- **When asked what type of camping should be provided at Oxbow Regional Park, a majority of the respondents (55%) preferred to see semi-primitive camping.**
- **In general, a majority of the visitors rated the amenities and services at Oxbow Regional Park as good to excellent.**

A summary of the survey results is included in Appendix I.

■ Existing Educational Programs

Environmental Education

For the last 12 years, the Oxbow Regional Park staff has been educating the regional community on the fish, wildlife and vegetation communities within Oxbow Regional Park. Programs have grown with over 7,000 people directly participating (24,000 contact hours) in environmental education related programs annually. The following programs are currently offered at the park:

School Field Trips

- Approximately 4,000 students per year.
- Mid-September through mid-November; mid-April through mid-June.
- 30-60 children (one bus load per day), Monday through Friday.
- Field trips have been conducted for all grade levels: preschool, elementary (including migrant summer schools), middle and high school, community college and universities.
- Teacher training programs have been conducted for two school districts and Outdoor School staff.
- Demand for school programs is double what is currently being provided.
- Volunteer naturalist training programs have been conducted for 50 volunteer naturalists who help lead school/group field trips.

Group Field Trips

Field trips have been conducted for a variety of groups including the Northwest Service Academy, Boy Scouts, Girl Scouts, Western Forestry Association, 4-H, Bonneville Power Administration, Mensa, Saturday Academy, Oregon Trout, Cultural Homes International, Northwest International Study Exchange, Oregon Natural Resource Council, Friends of Trees, and many more.

Natural History Classes

Depending on the season, natural history classes are offered to the general public including:

- Animal tracking.
- Wildlife watching.
- Wildflower identification.
- Outdoor survival.
- River exploration.
- Salmon viewing.
- Ancient forest walk.
- Native American arts.
- Discovery days.

Camp Fire Programs

A series of evening Camp Fire programs are presented throughout the summer months. These programs include:

- Slide shows.
- Story telling.
- Music and magic shows.

Sandy River Raft Trips

During the early summer months, Sandy River raft trips are offered to the general public.

Salmon Festival

During the fall salmon spawning period, an annual festival is held at the park. The Salmon Festival originated in 1985 and has become one of the premier annual events at the park and in the region. Attendance typically runs over 9,000 visitors for the weekend. Normal Salmon Festival events include:

- Guided walking tours of the salmon spawning areas.
- Guided walking tours of the Ancient Forest.
- Salmon bake and other foods.
- Educational and craft displays.
- Music.

In addition to the previously mentioned programs and events, many other organizations use Oxbow Regional Park for educational purposes, independently of Metro Parks hosted programs, including: Multnomah County Outdoor School, the Metro Washington Park Zoo, Portland State University Outdoor Program, Portland Audubon, and others.

Existing Trails

The trail system within Oxbow Regional Park is one of the major recreation features. Many of the park users come to the park specifically to enjoy the natural setting by utilizing the trail network. The trails are utilized extensively for the outdoor education and interpretion programs. Currently within the park there are over 12 miles of trails. Figure 12 illustrates existing trails at the park. Hikers utilize all trails while mountain bike and equestrian use is limited to a portion of the trails.

Trail widths vary from approximately four feet to one foot. Surfacing varies from compacted crushed rock to natural chip and duff surfacing.

The park has several trail bridge structures. They have been constructed by park staff. Two basic types of bridges have been used. One type is constructed from a flattened log with a hand rail on one side. This type of bridge is appropriate for non-accessible trails in the forest setting. The other type of bridge structure is constructed from dimensional lumber and decking. These bridges have handrails where required and can be made "accessible" as needed.

In 1992, the park staff formulated a trails advisory committee to evaluate the existing trails and recommend improvements. The committee recommended trail use designations that are shown in Figure 12.

During the master planning process, it has been noted that some of the existing trails are in need of corrective measures. It should be understood that an inventory of site specific problems on each of the trails is beyond the scope of this Master Plan. Based on observations made by consultants, and input from the staff and the public, the following are important issues for consideration:

- Erosion is occuring along some trails due to the lack of adequate drainage.
- In the Ancient Forest area, there is evidence of root compaction as well as degradation of the trail edges.
- The swamp area located in the center of the Ancient Forest (south of the park road) is being impacted by social trails.
- Wet soils and pooling water make some trails difficult to use during certain times of the year.

■ Park Facilities

Structures

The facilities at Oxbow Regional Park were constructed between 1960 and 1990 (see Figure 12). Current park operations and maintenance activities fully utilize all existing structures. The facilities have served the park well, but are currently in need of repair, upgrade or replacement.

Facilities were first constructed at Oxbow Regional Park in the early 1960's. Several of these structures are still in service today. They include the two timber frame shelters located at Group Camps 2 and 3, and two A-frame shelters located at Group Camp 1 and Group Picnic Area D. These structures have been maintained over the years, but they are currently in poor condition. They have outlived their useful life expectancy and are in serious need of replacement.

Other park facilities were constructed in the early 1970's. These buildings include the park office, maintenance shop and ranger's residence. They are wood frame structures with board and batten siding, wood windows and raised seam metal roofing. An addition has been added to the park office providing an enlarged ranger's office and staff work area. The addition has plywood and batten siding and aluminum windows. The mainenance shop has been sub-divided to provide office and storage space for the park interpretive staff. The ranger's residence is a three bedroom/one bath ranch style floor plan. It has the only flush toilet in the park.

The entry fee booth is basically a plywood shed located at the entry to the park. It has a concrete slab floor, wood frame walls with plywood siding, aluminum windows and cedar shake roofing. All park visitors must stop at the fee booth. Although this building is fairly functional, it is not aesthetically pleasing. A new fee booth incorporated into a gateway structure will improve the overall first impression of the park and create a sense of arrival.

Group picnic shelters A, B, and C were constructed in the early 1980's. They have concrete slab floors, timber posts, truss roof framing, and cedar shake roofing. The timber posts sit directly on the concrete slab and have been exposed to surface water. Several of these posts have areas of rot. The picnic shelters are heavily used for group gatherings. They should be replaced and upgraded to better serve their function.

The water storage reservoir and pump house were constructed in the late 1960's. The building has a concrete foundation, sub-grade holding tank, concrete floor, steel posts with concrete block infill, and a flat roof with glue laminated beams and timber decking.

A new truck barn/maintenance shop was constructed in the mid 1980's. This build-

ing has a slab on grade floor, wood frame walls with plywood and batten siding, steel doors and frames, gable truss roof framing and composition shingle roofing. This facility is in very good shape and provides flexible maintenance and construction areas.

During the construction of the 1960's, four structures were relocated from the entry road area to the service yard. They were used by the youth crews that did the initial clearing and construction of the park. Four of these structures are small single story wood frame "cabins" with wood floor framing, cedar shingle siding and roofing. A fifth structure is a two-story cabin. It has a concrete foundation and slab floor, wood frame walls with staggered cedar shake siding and a gable roof with cedar shake roofing. These buildings are currently used for miscellaneous storage and maintenance funtions, but have outlived their useful life expectancy.

The service yard serves many functions. Maintenance shop buildings form two sides of the main large gravel service area. This is where the park garbage is collected and transferred. Seven 4' X 6' dumpsters and many plastic trashcans are kept in this area. The service yard also includes wood storage and splitting areas and vehicle and equipment storage. The wood storage shelter is a pole building which is in great need of repair or replacement. It currently has blue plastic tarp roofing. Wood storage and processing requires a large area.

The park currently does not have public or staff flush toilets. Lavatories and wash basins do not exist. Pit toilets are utilized throughout the park (44 stalls). The majority of these structures have concrete floors, plywood and 2x2 walls and corrugated fiberglass roofs. Most of these structures date from the 1960's and are in serious need of replacement.

The four pit toilets at the public campground are pre-fabricated structures with two accessible toilet rooms. They have wood frame walls with plywood siding, wood frame roof structure with cedar shake roofing. The interior is lined with fiberglass surfacing. These pit toilets do not have holding tanks. They are approximately 17 years old.

A small amphitheater is located adjacent to the public campground. It has half-log benches with a wood frame projection screen/backdrop structure. The structural integrity of the log benches has been weakened by extensive insect damage and rot.

There are three information kiosks. At the park office and campground there are displays constructed from log posts and wood framing. A radial structure is located adjacent to the boat launch area. It has wood posts and wood framing with six display panels. The display panels have plexiglass protective covering.

See Appendix K for complete inventory of individual structures.

■ Utilities

Existing Water Facilities

Source

The existing source of supply consists of a single, 12" diameter well casing, approximately 107 foot completion depth, constructed in 1964. The existing 5 HP submersible well pump provides for delivery of 125 gallons per minute (gpm) to the adjacent reservoir. The existing well and pumping station are located in the central part of the park (see Appendix H for complete report).

Water Quality - The results of previous testing are as follows:

1. Iron & Manganese - The water test showed elevated levels of iron and manganese. The presence of this condition in potable water creates the potential for several undesirable effects. Precipitation of these metals alters the appearance of the water, turning it a turbid yellow-brown to black. In addition, deposition of these precipitates will cause staining of plumbing fixtures and laundry. These elements are also associated with microbial growths within the distribution system. Resuspension of precipitated sediments or sloughing of microbial growth may result in intermittent high turbidities. In concentrations greater than several milligrams per liter, these metals will impart a taste described as metallic, astringent, or medicinal.

2. Hardness & Aggressiveness - This water has a moderate hardness and is non-aggressive to asbestos-cement pipe.

3. Bacterial - Bacterial testing for the water system has been satisfactory. There are no known sources of potential contamination within the immediate well vicinity.

Treatment

The only treatment currently in use is disinfection using liquid sodium hypochlorite by means of a small chemical metering pump in the pump house. Due to the elevated levels of iron and manganese, it is difficult to maintain required detectable chlorine residuals throughout the water system, particularly during periods of low demand.

Storage

The system has a single, below-grade, concrete reservoir located beneath the pump house. The total storage capacity is 31,000 gallons with an operating volume of 28,000 gallons. The high iron and manganese concentrations result in oxidation and precipitation within the reservoir. The accumulated materials on the floor and walls must be removed every other year to avoid adverse water quality. The storage reservoir is in good condition.

Booster Pumping

A pair of 6" vertical turbine pumps deliver water from the reservoir to the distribution system. One pump operates continuously regardless of actual water demand. The second pump will start automatically if the first pump cannot meet demand. A pressure relief bypass back to the reservoir provides for constant flow through the pumps during periods of low demand. While this system provides an easy pump operating environment it consumes an excessive amount of power. A secondary effect is that the water in the storage reservoir becomes warm after continuous pumping. The original water system included a separate high pressure booster pumping system to supply water to the Alder Ridge and Horse Camp area. This system has reportedly never functioned well and has not been in service for over 20 years.

Distribution

The existing water system provides a supply of water throughout all developed areas of the park. The actual location and configuration of the distribution system is unknown due to inadequate maps. The main supply pipes are 6" Asbestos Cement (AC) pipe. The condition of the water mains is generally good with the system experiencing minimal water loss. The water chemistry is non-aggressive with respect to AC pipe, resulting in a remaining pipe life of 20-50 years or more. AC pipe is susceptible to fracture during ground movement with breaks occurring every one to two years in slide areas.

Current Services

The water system presently serves the park office, picnic areas, boat ramp, 45 camp sites and three group camps. Service throughout the park is provided by 4 frost-proof water spigots, 75 seasonal water spigots and 7 "fire hydrants." The hydrants have 1.5" outlets and serve primarily for water system flushing rather than fire protection.

Existing Water Records and Operation

The water system is managed by a certified water operator and an uncertified assistant. Operating records include the following items: water production (daily), chlorine residual (daily at pump house, once a month at 5 locations), and water temperature (weekly). Other operating conditions are also noted in the pump house log including irrigation activity, water line breaks, distribution system flushing, pump changeovers, and power outages. A certified testing laboratory is under contract to collect bacterial samples quarterly and nitrate/nitrite samples annually. Tables included in Appendix H summarize water production. Water demand has been essentially unchanged in recent years with most water being used for irrigation purposes. During the summer months, irrigation use is heaviest on weekdays, while non-irrigation use is highest on the weekends.

Neighboring Utilities

The YMCA Camp Collins operates a separate water system immediately north of the Park headquarters. Due to the proximity, this system was investigated for potential coordination of water systems facilities. TheYMCA Camp Collins water system consists of a single, geothermal (72 degrees) artesian well with a capacity estimated to be at least 60-100 gpm.

Historically this well has had a static pressure of 10 pounds per square inch (psi) and a free-flowing production of over 200 gpm. However, the artesian flows declined to approximately 40 gpm in early summer of 1996 and then to zero flow in early September. YMCA Camp Collins recently replaced its centrifugal pump with a submersible pump to increase the source reliability. The capacity of the new pump is approximately 60 to 80 gpm at normal service pressures. The pumping system includes two 520 gallon hydropneumatic tanks, but has no storage facilities. The distribution system consists of a single three inch pipe supplying all of the YMCA Camp Collins facilities. The water quality of this source appears comparable overall to that available in Oxbow Regional Park. The source is warm and old lab results indicated elevated levels of fluoride (4.12 parts per million (ppm)). Results of an October, 1996 analysis indicated a level of 3.4 ppm. Oregon Administrative Rules (OAR 333-061-0030) require special notification when floride levels exceed the primary maximum contaminant level (mcl) for fluoride (4.00 ppm) and for secondary levels (2.00 ppm). A separate fire protection pump draws water from the YWCA Camp Collins swimming pool for distribution through a looped 4" water line system throughout the YWCA Camp Collins Headquarters area.

Irrigation System

Currently, all park turf areas are manually irrigated during the summer months. Irrigated green lawns provide park patrons a pleasant, comfortable recreation setting. In addition, the supplemental moisture is a first line deterrent to fires.

Irrigation is accomplished by manual connections of hoses with sprinklers to seasonal water spigots. Considerable staff time is consumed in setting out hoses and sprinklers and moving them periodically throughout the day. The irrigation water coverage is not uniform because the staff is involved in various other park activities.

Sanitary System Planning

Existing Sanitary Facilites

Existing sanitary facilites consist of pit toilet installations throughout the park and a conventional on-site sewage system for the ranger residence. The breakdown by type of structure is as follows: 7 double stool and 30 single stool.

Existing Operations

The existing systems function with minimal personnel requirements. The pits must be periodically pumped to remove accumulated materials.

Electrical System

Entry Arrival Maintenance Area

The existing service into the entry arrival maintenance area is a single-phase overhead 7,200 volt line. A single 120/240 volt pole mounted transformer serves each of the several buildings. A two-phase (12,470 volt) line serves the adjacent YMCA Camp Collins (secondary voltage 120/240V, 3-phase, "open delta"). The transformer at the ranger's residence could be increased in size to serve an added building.

Pumphouse Area

The Oxbow Regional Park pumphouse is served overhead with a two-phase feeder. Power extends underground from the last pole (and meter) to the park pumphouse. The pump runs as 240 volt, 3-phase, open delta. The primary feeder from the pole to the pump transformers (two 240 volt pad mounted transformers) run through two underground vaults, each with a load break tap system.

■ Roads and Parking

Roads

Vehicle access to the park is via Oxbow Parkway, a two lane asphalt surfaced road. This road continues approximately two and one-half miles through the park to provide access to the lower park area including the campground and boat ramp. Oxbow Parkway and the first mile of roadway within the park (approximately at Dismal Swamp) are under the jurisdiction and maintenance of Multnomah County. The remaining road and parking areas within the park are the exclusive responsibility of Metro's Regional Parks and Greenspaces Department.

Homan Road / Oxbow Parkway Intersection

At the first community meeting, it was noted that the main intersection adjacent to the park, Homan Road and S.E. Oxbow Parkway, is dangerous. Many near mishaps have occured due to poor visability and excessive speed. Multnomah County Department of Transportation is reviewing the intersection to determine what corrective changes, if any, should be made.

Parking

Vehicle parking is provided throughout the park primarily as gravel spaces directly off the access road. Approximately 890 spaces are available within the park. Throughout the park, vehicle access is controlled by the use of wood posts and concrete bumper stops placed along the edges of the road and parking areas.

Up to 10 horse trailer rigs park on the road and right-of-way near the equestrian trailhead at the end of Homan Road. The parking surface is neither level nor wide enough to safely accomodate the rigs. Drainage is also a problem during certain times of the year.

Boat Ramp

The existing boat ramp consists of a small asphalt turnaround with a concrete sloping ramp providing river access. Vehicles with trailers utilize the ramp to launch or pick up boats. Smaller kayaks and rafts are launched from the adjoining beach areas. The boat ramp is also a primary access point to the river for non-motorized boating and water activities such as swimming, wading and fishing. A concrete universal access fishing pier is located near the boat ramp. However, during the recent flooding, the main river channel shifted to the north, leaving the present universal access fishing area only functional during high water periods.

■ Operating Budget

The table below shows the annual operating budget for Oxbow Regional Park for the last six years starting with the 1991-92 fiscal year.

Table 5
Comparison of Operating Budgets- Fiscal Years
1991-92 to 1996-1997
Oxbow Regional Park

Fiscal Year	Operating Budget	Percentage Difference
1991-1992	$322,215	-
1992-1993	$362,257	+12.4%
1993-1994	$427,636	+18.0%
1994-1995	$399,372	-6.6%
1995-1996 (1)	$426,809	+6.8%
1996-1997 (2)	$433,282	+2.2%

(1) Budgeted
(2) Budgeted

Based on the table above, the operating budget from the fiscal year 1991-92 to 1995-96 has increased by 32.5%. This is equivalent to an average annual increase of 6.5%. While the straight line projection method of analysis implies a steady but moderate growth, the actual growth rate has occurred more sporadically. The most significant increases occurred between the fiscal years 1991-92 and 1993-94 when several capital improvement projects occurred including roof replacement for the office, shop and ranger residence. This was followed by a 6.6% decrease in the fiscal year 1994-95 and an average increase in the fiscal year 1995-96. While the 1996-97 operating budget is an estimated amount, it reflects a 2.2% increase, which is lower than the five year average of 6.5%.

■ Study Findings

Natural Resources

The Metropolitan Greenspaces Master Plan (1992) identifies Oxbow Regional Park as a greenspace of regional significance and calls for development of a master plan as a primary strategy for balancing public use with protection of the natural values of the park.

The Sandy River's natural beauty and pristine values were formally recognized in 1973 when Governor Tom McCall issued a proclamation designating 12.5 miles of the Sandy River between Dodge and Dabney State Park as a State Scenic Waterway. In 1988 the same stretch of river received federal Wild and Scenic River segment of the Sandy River.

In 1993 the Bureau of land Management (BLM) published the Sandy Wild and Scenic River and State Scenic Waterway Management Plan. The development and operation of Oxbow Regional Park should be consistent with BLM's Plan.

Funds for acquisition in the Sandy River Gorge are available from Metro's Open Spaces, Parks and Streams bond measure. The goal of the acquisition program for the Sandy River Gorge is to complement the BLM Management Plan and protect biological linkages for the protection of fish, wildlife habitat, water quality, geologic, scenic, and recreation values.

Metro Regional Parks and Greenspaces Department should continue to be involved in natural resource management issues related to lands outside the park when they have the capacity to impact recreation resources and experiences within the Sandy River Gorge.

The natural character of the park and the Sandy River Gorge should be maintained.

A park user survey revealed that the features that most attract the visitor to the park are the river, the scenery and the natural setting.

To protect natural resources, recreation facilites should be concentrated in areas currently developed and maintained for recreational activities.

Invasive plant species should be eliminated or controlled to maintain native plant diversity.

Park visitors are causing damage to the river bank in a number of locations. Efforts should be undertaken to control this problem.

Certain areas of the park and the Sandy River Gorge are geologically unstable. Park improvements should avoid these areas to the greatest extent possible.

Recreation

The Oregon Outdoor Recreation Plan (1988-1993) reports that Oregonians have an increased preference to recreate in an attractive, natural environment under uncrowded non-stressful conditions.

Natural resource dependent recreational opportunities should be a primary focus at the park.

Park visitation trends show a decrease in winter (non-peak) visitors. This trend follows along with the Oregon Department of Fish and Wildlife fish catch statistics. Due in part to the decline in anadromous fish resources, nearly 75% of park use now occurs in the peak season (May - October) and 25% in the winter compared to past years when 35 to 40% of park use was in the off-season.

Park visitors desire additional recreational facilities to enhance camping, individual and group picnicking, trails and educational use.

There is significant demand throughout the region for reservable picnic shelters and picnic areas. As of June 2, 1997, 54,000 potential park users have been turned away due to limited availability of reservable shelters and picnic areas at Metro Parks.

Recreational use on the north and east properties should be limited to dispersed recreation activities such as hiking and angling access.

Recreational management of the designated 12.5 mile segment of the Sandy River lacks integration and coordination. Metro should consider cooperative agreements with the State Parks, BLM and City of Portland to improve management of natural resources and recreational facilities.

Education

Environmental education and interpretation services should be expanded at Oxbow Regional Park to enhance urban resident's understanding and appreciation of natural resources and to foster a stewardship ethic.

An environmental education center should be developed to facilitate expanded educational programming.

The Diack family has made significant contributions to Oxbow Regional Park, the Sandy River Gorge and the enhancement of environmental education throughout Oregon. Specifically, Arch and Fran Diack were instrumental in the creation of Oxbow Regional Park in the early 1960's when they donated 12 acres to Multnomah County for inclusion in the park, donated 160 acres in the Sandy River Gorge to the Nature Conservancy, effectively advocated for designation of the Sandy River as a component of both the State Scenic Waterway Program (1973) and the National Wild and Scenic River System (1988) and created, through a generous donation, the Diack

Ecology Education Fund which helps finance outdoor ecology education projects throughout the State.

Existing Park Facilities

Some existing park infrastructure and facilities have reached their useful life expectancy and should be renewed, replaced, and upgraded.

As park improvements are phased in during master plan implementation, new and upgraded facilities should comply with the Americans with Disabilities Act.

General park capacity should be maintained but parking spaces should be redistributed to enhance operation efficiency and recreational experiences.

Results from a park user survey show that flush restrooms and indoor shower facilities are the two most desired park amentities.

The existing water supply is high in iron and manganese and should be treated or replaced by an alternative water source.

The existing "accessible" fishing area is functional only during high water periods due to flood damage. Adjustments should be considered to enhance its functionality.

Some trails in the park are in need of repair.

The horse trailer/vehicle parking area along Homan Road is neither level or wide enough to safely accomodate combination trailer/vehicle rigs.

Maintainance yard improvements are needed to facilitate safer, more efficient operation and maintenance activities.

An automated irrigation system should be installed in developed areas of the park to create fire breaks and minimize operation and maintenance costs.

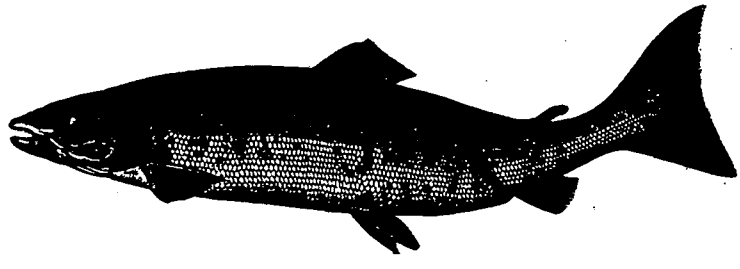
Funding

$1.25 million of Open Spaces, Parks, and Streams bond measure funds is available to begin master plan implementation.

Approximately $200,000 has accrued in an environmental education center fund. This seed money can be used to leverage additional grants and donations for project implementation.

With the exception of the environmental education center, full implementation of this master plan will not increase full time staffing requirements. However, increase in park use over time may justify additional staffing support.

Master Plan



MASTER PLAN

Introduction

During the Master Planning process for Oxbow Regional Park, a broad range of ideas were considered. Through input from the design charettes, Project Advisory Committee, community meetings, public agencies, Metro staff and the consultant team, these ideas have been shaped into a Master Plan that will guide the future management and development of the park. Key management objectives of the Master Plan include the following:

- Metro in coordination with other public and private agencies should expand its role in recreation management in the Sandy River Gorge. Suggested areas of expanded involvement include providing management and operational services for Dabney State Park and Dodge Park and management of river recreation between these parks.

- As an important segment within the larger Scenic Sandy River Management area, the natural qualities of the park should be maintained and enhanced. Based on the quality of the habitat and terrain, the Master Plan identifies approximately 90% of the existing park to remain in a natural condition (see Figure 13).

- The Master Plan is intended to maintain the "natural timeless", recreational experience. The existing area of intensive recreation use, which is only approximately 10% of the total park area, will not be enlarged but will be utilized more efficiently (see Figure 13).

- The current park activities (picnicking, camping, hiking, river access, environmental education, etc.) are to be maintained. The Master Plan envisions a more balanced use throughout the year.

- The park properties on the north and east side of the river will be retained as an important part of the natural corridor within the Sandy River Gorge. The plan limits use and access in these areas to current levels.

- The Ancient Forest area will be preserved and continue to be utilized for outdoor educational, hiking and wildlife observation uses.

- The Elk Meadow will continue to be managed to provide forage for elk and other wildlife.

This chapter explains the Master Plan features in greater detail. The existing park areas will be enhanced by providing improved, accessible facilities including:

- Flush toilets with on-site wastewater disposal systems.
- Showers in camping area.
- Environmental Education building.
- Enhanced group picnic area with replacement and new picnic shelters.
- Upgraded water and electrical systems.
- Automatic irrigation system for major turf areas.
- Park office, ticket booth, and arrival area.
- Recreated campsites with overnight structures.
- Enhanced group camping areas.

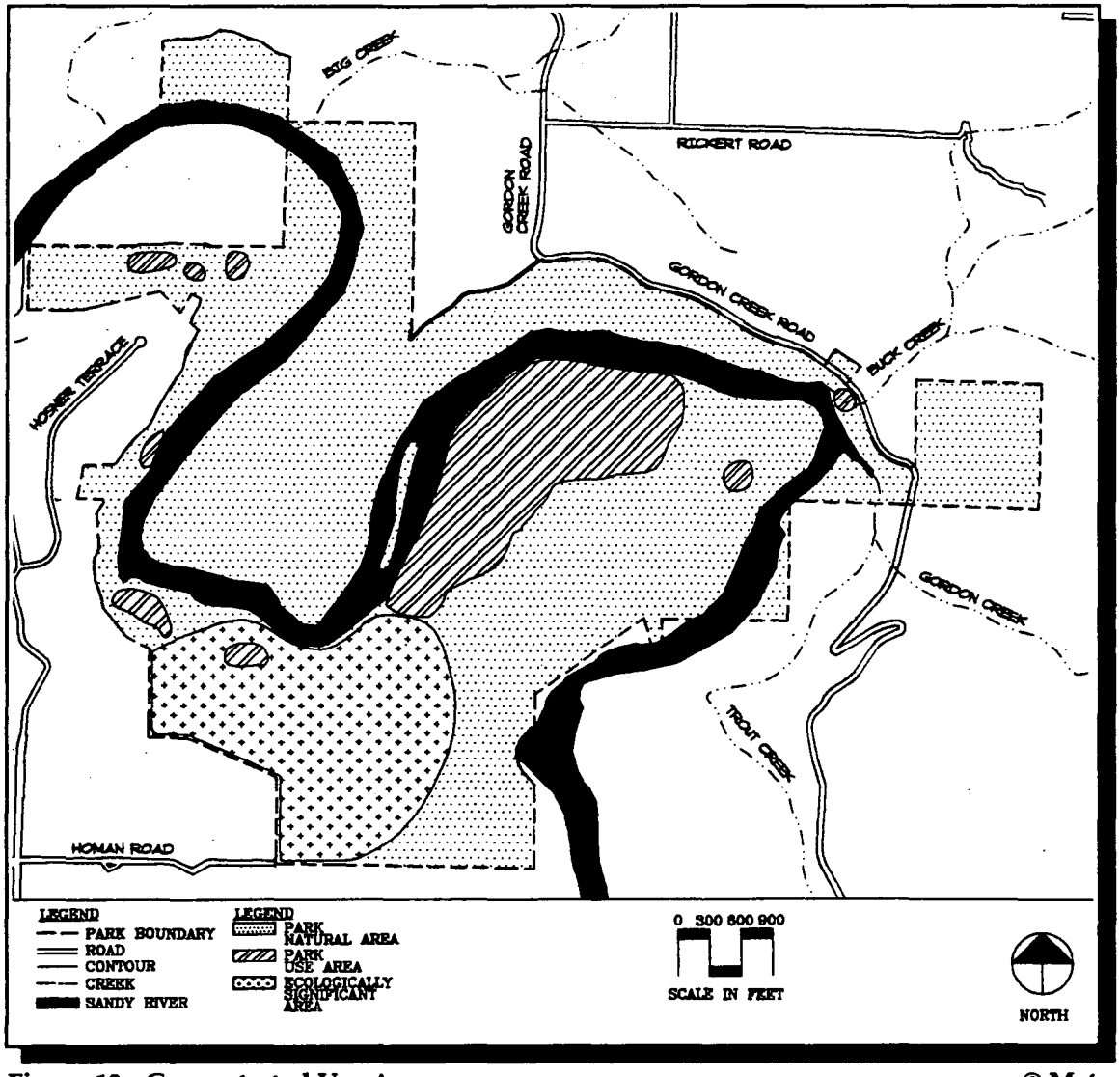


Figure 13 - Concentrated Use Areas **© Metro**

■ Sandy River Wild & Scenic Management

It is recommended that Metro, working in coordination with other public and private agencies, expand it's management role in the Sandy Wild and Scenic River to improve the recreational opportunities, provide integrated management and enhance natural resource values of the Sandy River Gorge. The suggested areas of expanded involvement are recommended to include:

Public Recreation Facility Management

Provide management and operational services for Dabney State Park, Oxbow Regional Park, and Dodge Park.

Typical services may include:

- Daily operations and maintenance.
- Environmental education and interpretive programs.
- Long range planning and recreation development.

Benefits:

- Potential for improved and expanded recreational experience.
- Single source for public information and use reservations.
- Uniform system of regulations and fees.
- Uniform signage.
- Uniform policing program.
- Potential cost savings through improved efficiencies.
- Coordinated recreation planning and development (This approach will allow the most appropriate uses to be developed for each site while insuring a coordinated approach for recreation on the three major Sandy River portal areas).

Sandy River Gorge

Assist in developing and implementing programs to enhance the Sandy River Gorge.

Typical programs may include:

- Environmental education and interpretive programs.
- Restoration projects.
- Vegetation management (noxious weed control, restoration plantings).
- Nuisance management for both private and public lands (control of trespassing, vandalism, littering, inappropriate use).

Benefits

- Improved wildlife habitat and plant communities.
- Improved public relations.
- Improved user experience.
- Integrated law enforcement problems.

■ Master Plan Overview

The Master Plan (illustrated in Figure 14) addresses the major areas and features of the park. The following is a brief summary of the improvements proposed in the Master Plan:

(A) ENTRY INTERSECTION
An improved information sign will replace the existing one at the intersection of SE Oxbow Parkway and Homan Road to inform visitors of park rules, fees, and recreation opportunities.

(B) ENTRANCE GATE / ARRIVAL AREA
The design for the entry arrival area is intended to provide the park visitor with a more convenient, user friendly entrance sequence. In addition to the basic ticket booth, an adjacent space will provide park patrons with orientation information, telephones, restrooms and additional emergency contact capabilities.

(C) PARK SUPERVISOR'S RESIDENCE / MAINTENANCE AREA
The existing maintenance area will be visually screened from the visitor entry. The maintenance access drive is relocated to the east side of the park supervisor's residence to improve circulation patterns. A new office and other buildings will be added to support the operation of the park. The adjacent area east of the park supervisor's residence will be utilized as an overflow camping area.

(D) FLOOD PLAIN TRAIL HEAD
The Flood Plain Trail Head is intended to continue to be a small day use space and a trail head for the adjacent flood plain.

(E) ROAD CORRIDOR (B) Entrance Gate/Arrival Area to (G) Dismal Swamp
The road from the park entry (B) to Dismal Swamp (G) will be restored along the edges with native vegetation. Except for selected areas, most of the random parking and picnic tables will be relocated. Lawn and gravel areas will be replaced with native vegetation plantings.

(F) 'HOSNER HOLE' RIVER ACCESS / INTERPRETIVE VIEWPOINT
This area will continue to offer bank access for fishermen as well as a take out point for the in-park float trips. A small number of picnic tables will be provided for day use as well as vault toilets. To the south, at the landslide area, the existing parking and picnic facilities will remain. A new interpretive view point of the river will be located at the south end of this area.

(G) DISMAL SWAMP DAY USE AREA

The Dismal Swamp area is intended to continue as a turfed day use area with access to the river. In addition, this area is intended to be a major trail head for hikers providing access to the main park trail system. Typical improvements will include: parking, vault toilets, picnic tables, and trail orientation signs.

(H) ANCIENT FOREST PRESERVE

In the metropolitan area, the 160+ acre Ancient Forest within Oxbow Regional Park is a unique example of this stage of forest development. As a resource for educational purposes and research, this area has tremendous value. The Master Plan envisions that this area will be preserved and continue to be utilized for educational, hiking and wildlife observation uses.

(I) ENVIRONMENTAL EDUCATION AREA/MULTI-USE STRUCTURE

A new building is proposed to be located just to the east of the Ancient Forest area on the edge of the main river terrace. The structure will provide for environmental education needs including multi-purpose rooms, offices, storage and other support spaces. In addition, the building will provide opportunities for lecture and meeting spaces, events, a casual lounging space and restroom facilities for general park users. The building will be named in memory of Arch and Fran Diack, benefactors of the park.

(J) GROUP DAY USE AREA

The group day-use area is focused on providing facilities for group picnics. In a setting of green lawns and native trees, areas of various size will be available for rent. Shelters, with electricity and water, are proposed to be developed. Other proposed improvements include: parking, picnic tables, lawn game areas, play areas and restrooms facilities.

(K) INDIVIDUAL / FAMILY DAY USE AREA

The intent of this area is to provide picnic areas available for use by individuals, families and small groups. This area is conveniently located close to the river access area at the boat ramp. Typical improvements will include: parking, picnic tables and restrooms.

(L) ACCESS ROAD AND TURNAROUND

This portion of the existing road is proposed to be relocated to the south side of the river terrace, to reduce traffic and parking conflicts with pedestrians. A turnaround is proposed near the entrance to the camping facilities to help eliminate random traffic in overnight areas of the park. With the installation of orientation and directional signage, the turnaround will also provide a major point for park user orientation. Roads will be relocated to allow for vehicular traffic to enter and exit the campground at the same location. This will help separate camping vehicle traffic from family picnic spaces and boat ramp traffic.

(M) RIVER ACCESS (Boat Ramp)

The existing access road and boat ramp will remain. This area will continue to be one of the primary access points to the river for boaters, anglers, water recreation, and wildlife observation. Improvements will focus on upgrading functional and aesthetic qualities. An interpretive display will acquaint park visitors with river safety and fishery resource issues.

(N) GROUP CAMPING AREAS

Two smaller group camping areas are proposed to replace one larger existing group camp area. These 'for rent' facilities will be designed to be flexible allowing a portion or all of the space to be occupied by a single group. Typical improvements will include: parking, camping spaces, fire rings, picnic tables, and restrooms with showers. In addition, one of the two existing walk-in group camp areas will be retained.

(O) CAMPGROUND

The existing campground road system is proposed to be reorganized to allow for two one-way loops. This arrangement is more efficient by allowing for increased camp sites numbers while decreasing vehicle traffic by individual spaces. The redesigned campground will include: 44 upgraded camp sites, (5 will be cluster camp sites - 2 sites per cluster), 16 new individual camp sites, new parking spaces, and restrooms with showers. A long range component of the 16 new individual campsites is to provide 4 to 12 overnight structures similar to yurts or small cabin structures.

⟨1⟩ East-Side Park Properties

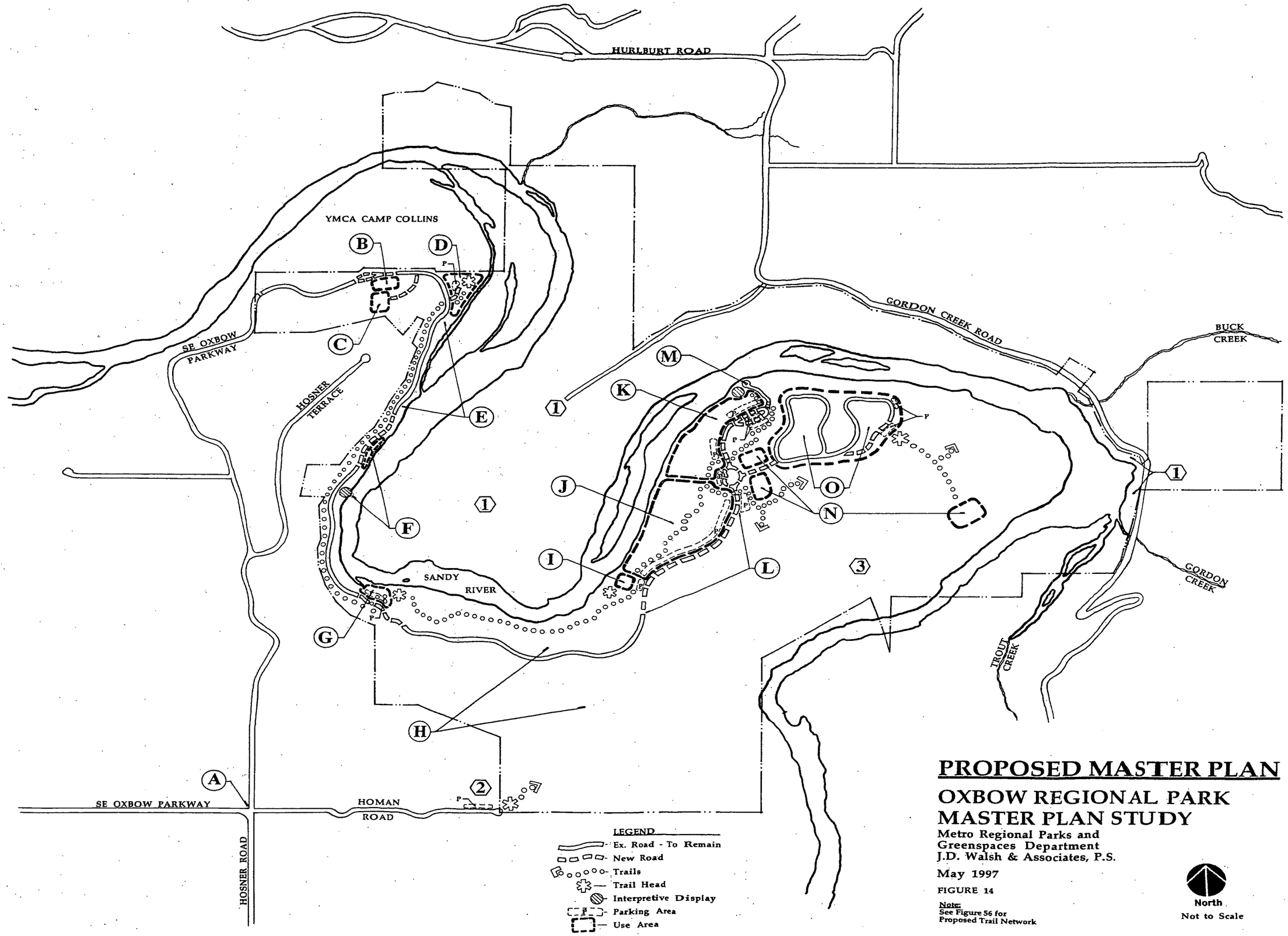
The properties on the north and east side of the river will be retained as an important part of the natural corridor within the Sandy River Gorge. The current river access near Buck Creek will remain with limited parking in a designated area. Unlawful parking along the road will continue to be controlled by towing and parking citations. The existing access off Gordon Creek Road to the forested north area will remain for dispersed fishing and trail use. However, seasonal closures may be implemented during summer months for fire safety purposes. Corrective measures to the existing fire road and trails will be required.

⟨2⟩ Homan Road Equestrian Access

The existing parking area and trail head at the end of Homan Road will continue to be the primary access point into the park for equestrian users. This area will allow for the parking of vehicles and trailers (limit of six).

⟨3⟩ Elk Meadow / Forest Preserve

The forested areas of the park will be retained. The meadow will continue to be managed to attract elk and other wildlife. Trails will continue to be avail able for hiking and equestrian use.



PROPOSED MASTER PLAN

OXBOW REGIONAL PARK MASTER PLAN STUDY

Metro Regional Parks and Greenspaces Department
J.D. Walsh & Associates, P.S.

May 1997

FIGURE 14

Note:
See Figure 56 for Proposed Trail Network

North

Not to Scale

■ Master Plan - Development Features

To complement the overall Master Plan, additional narrative, support information and illustrative materials have been prepared. These materials have been arranged by the major area headings (A - O) previously described in the Master Plan. The intent of these support materials is to further define and describe the scope, nature, quality and intent of the proposed improvements. The following is a more detailed description of the proposed improvements for the major areas of the park.

Ⓐ Entry Intersection

Improved information and directional signage will be installed at the intersection of SE Oxbow Parkway and Homan Road to inform visitors of park rules, fees, and recreation opportunities.

Information and Directional Signage

Media: One Information Sign
Discussion: Modified bulletin board designed with text size to be read from a car. Park welcome with key regulatory messages: RV's under 35 ft. welcome / entry fee/ no guns, no pets. River graphic icon and graphics of recreation opportunities to be found at Oxbow Regional Park.

Ⓑ Entrance Gate/Arrival Area

The design for the entry arrival area is intended to provide the park visitor with a more convenient and user friendly entrance sequence. A new fee booth and entry gates are to be relocated approximately 20 feet inside the existing gate. Moving the ticket booth allows free access to YMCA Camp Collins service drive. It also allows the gates to be placed on the entry side of the ticket booth for greater security. Additional screening (short fences, native plant materials) along the north side of the road will help to visually separate the park from YMCA Camp Collins. In addition to the basic ticket booth, an adjacent space will provide park patrons with orientation information, telephones, restrooms and additional emergency contact capabilities. A new orientation shelter will be constructed as a feature of this space.

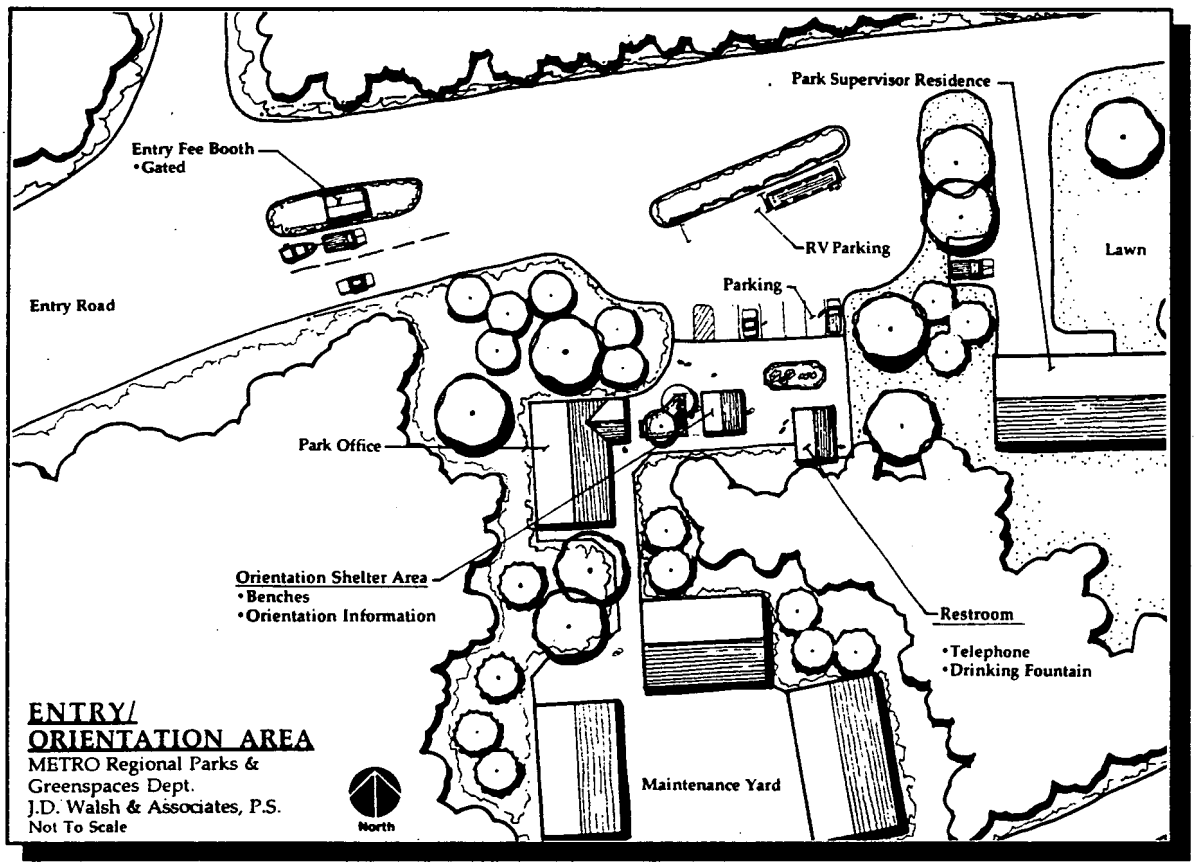


Figure 15 - Entry / Orientation Area © Metro

Entry Fee Booth 160 s.f. (10'x16')

The entry fee booth, like the other proposed park structures will be constructed of simple rugged materials (Figure 16). Round river rock will be utilized for the build-

ing base as well as the gate entry posts. Wood siding, wood windows and metal roofs are typical materials to be used.

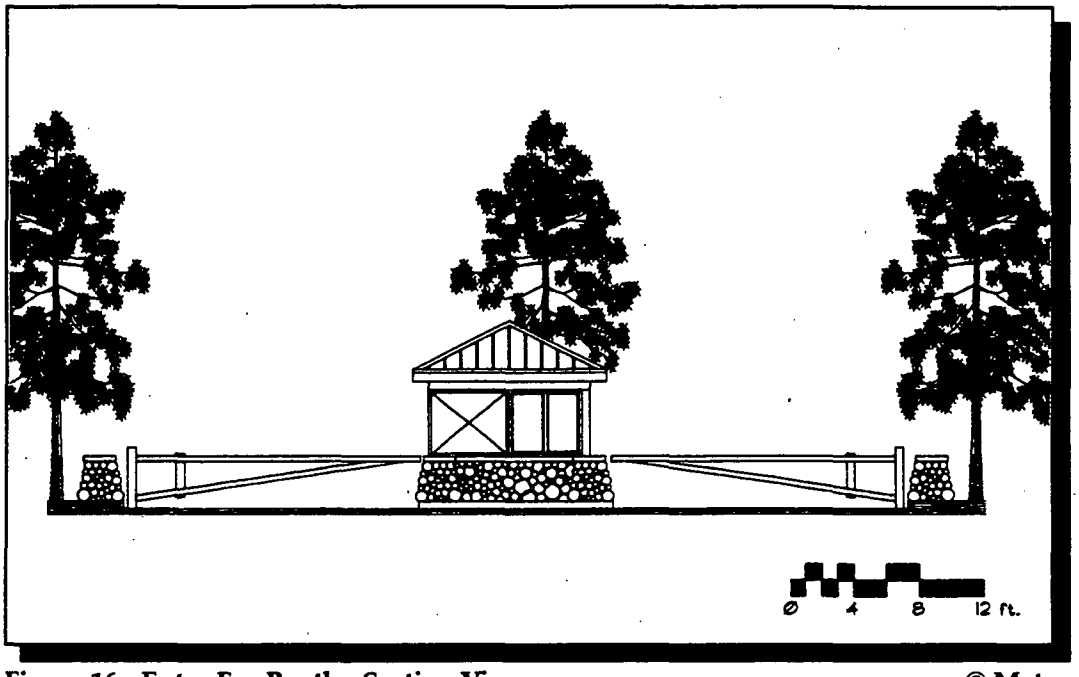


Figure 16 - Entry Fee Booth - Section View © Metro

New Fee Booth Structure with Staff Office / Work Space

- Accessible facility
- Desk space for two employees, telephone, computer terminal.
- Pass through windows for collecting entry fees and distribution of park information.
- Cash register & park information storage.
- Drop safe for entry fee deposit by staff, as fees accumulate.
- Shutters and alarm for night security.
- Allow for installation of security camera to record arriving and departing vehicles.
- Entry drive should allow for double lanes.
- Paving should allow vehicles to turn around if not entering park, or to return into park.

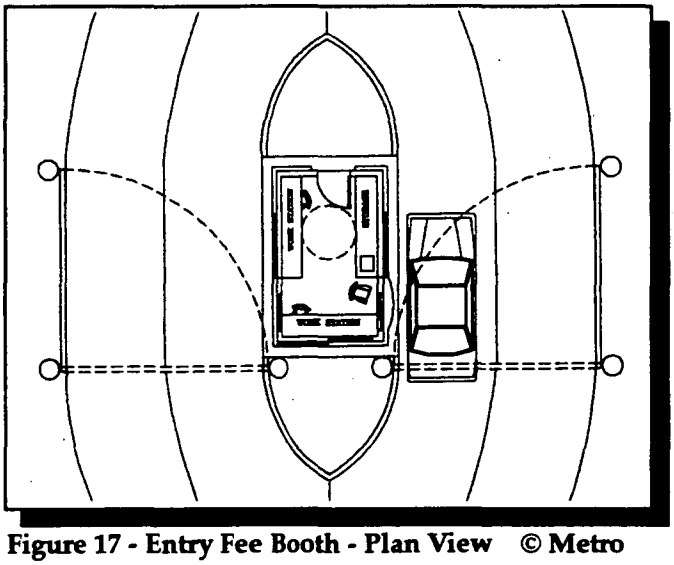


Figure 17 - Entry Fee Booth - Plan View © Metro

Park Office 1,040 s.f.

The front entry sequence will contain a new park office. The park office will serve as the work space for the park staff as well as a 'First-Aid' location for park staff and visitors. The following is the proposed program:

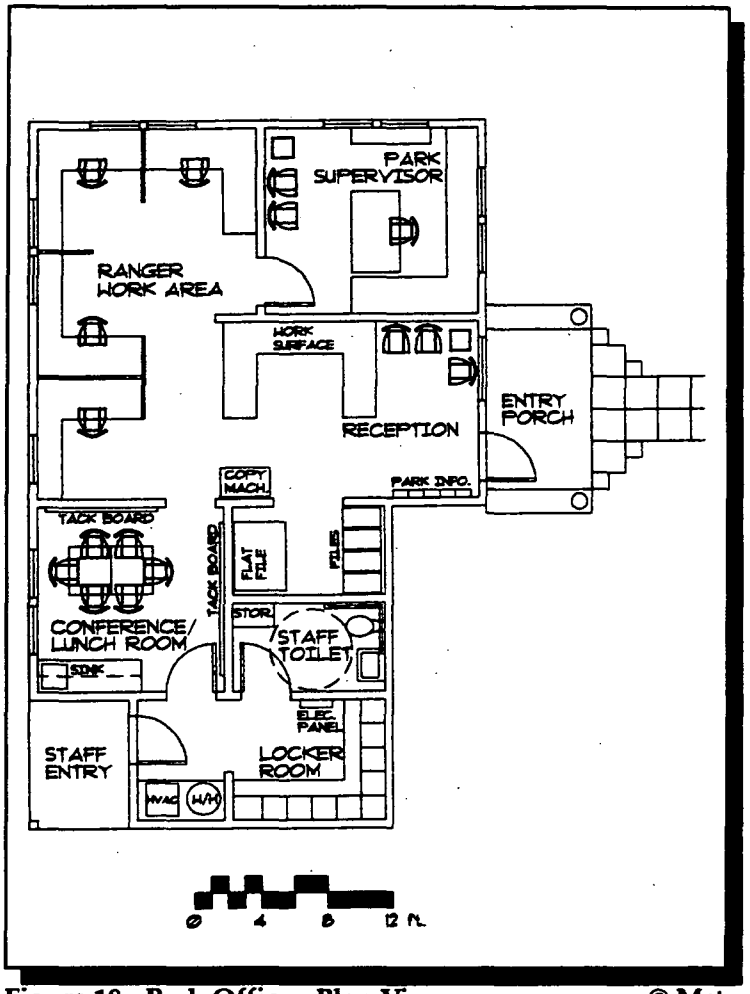


Figure 18 - Park Office - Plan View © Metro

Public Entry / Reception 168 s.f. (14' x 12')

- Small entry area for public interface. Accessible from park entry / orientation area.
- Limited public access.
- Reception desk & staff work area.
- Photocopier, fax machine, etc.

Park Supervisor's Office 168 s.f. (12' x 14')

- Private office space for Park Supervisor.
- Desk and computer work area, visitor seating/meeting area, telephone, files and storage.

Ranger's Office 336 s.f. (14' x 24')

- Shared office area with 4 separate work stations; 3 full time staff, 1 shared by seasonal staff.
- Computer terminals, telephones, files and storage.

Conference / Lunch Room 120 s.f. (10' x 12')

- Multi-use space for staff meetings and work sessions.
- Staff lunch and break area.
- Separate from staff work areas so scheduled breaks do not disturb office staff functions.
- Sink, counter, refrigerator, microwave.

File / Storage 60 s.f.(6' x 10')

- Drawer files, flat files for maps, reference books, document storage.

Locker Room 80 s.f. (8' x 10')

- Lockers for full time and seasonal staff.
- Drying area for raingear and boots, adjacent to staff entry toilet areas.

Staff Toilet Room 60 s.f. (6' x 10')

- Accessible toilet and unisex lavatory.

Mechanical Room / Staff Entry 48 s.f. (6' x 8')

- HVAC equipment and water heater.

Figure 19 - Park Office - Front Elevation **© Metro**

Visitor Orientation Area

The visitors orientation area is where the park user first encounters various information regarding recreation opportunities available within the park. This space is utilized for displays and orientation information which will orient the user to the various use areas and educational elements of Oxbow Regional Park. A pay phone will be available in this area.

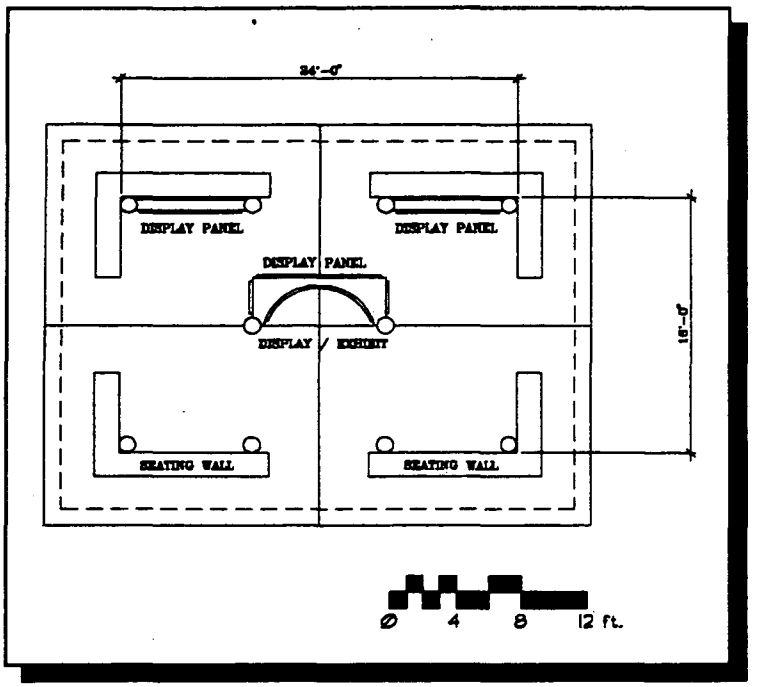


Figure 20 - Orientation Shelter - Plan View © Metro

Orientation Area 384 s.f.(16' x 24')

- Covered area for the display and distribution of park information,maps,recreation opportunities, natural resources, reservation information, special events and planned activities schedule.

Entry/Orientation Interpretation

Theme: Oxbow Regional Park is the heart of the Sandy River Gorge, where the river meanders to connect ancient forests, fish, wildlife, and people.

Media: Two interpretive panels, one 'you are here' map, one regulatory sign and a sculptural element.

Discussion: One general park welcome interpretive panel to provide a brief slice of forest, salmon and wildlife themes to "whet the visitor appetite" for exploring Oxbow Regional Park.

One sign containing 'you are here' map.

One recreation opportunity interpretive panel: This will target individual audiences and suggest what there is to see and do (i.e. angler, boater, swimmer, hiker, family picnic, etc.).

One regulatory sign for modular international symbols with positively written key regulatory messages located near road and readable from a car.

Sculptural element(s) to communicate the 'web of life' linking river, salmon, forest and wildlife.

Other possible Interpretive Elements:

Brochure box for distribution of park brochures.

Figure 21 - Orientation Shelter - Front Elevation © Metro

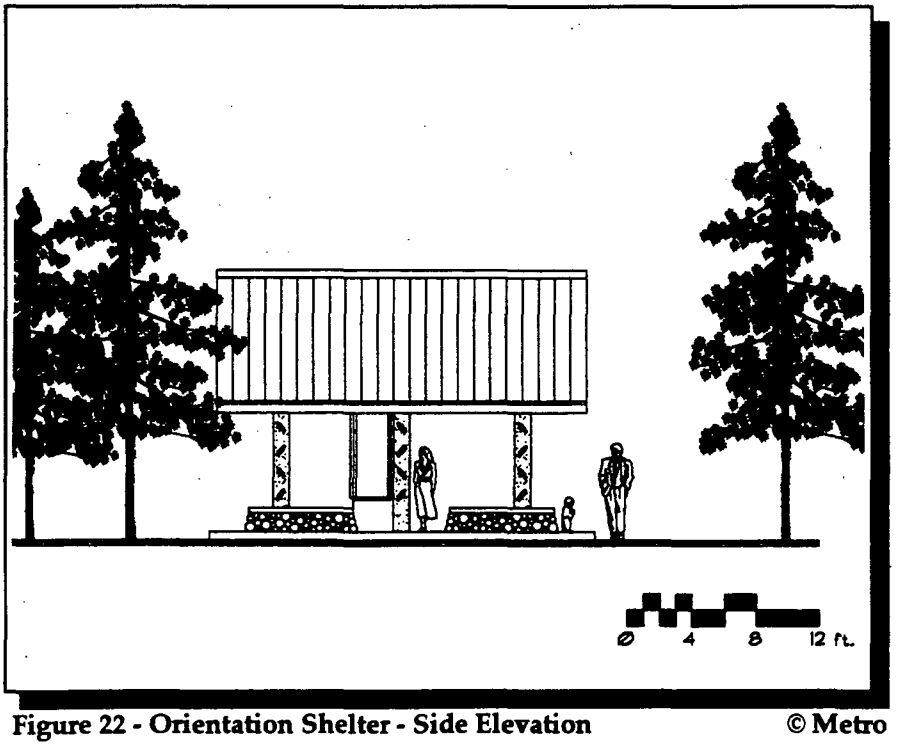


Figure 22 - Orientation Shelter - Side Elevation © Metro

Restroom Facilities

For the convenience of park patrons, a small restroom facility is planned for the entry / arrival area.

Public Restrooms 256 s.f. (16' x 16')

- 2 accessible, single occupancy, unisex toilet rooms. 80 s.f. ea(8' x 10')
- Toilet, lavatory and baby change table.
- Electric hand dryers (no paper towels).
- High and low venting for natural convection.
- Freeze protected for winter use.
- Cold water.
- Plumbing chase. 96 s.f. (16' x 6')
- Pay telephone.
- Covered outdoor area. 96 s.f. (16' x 6')

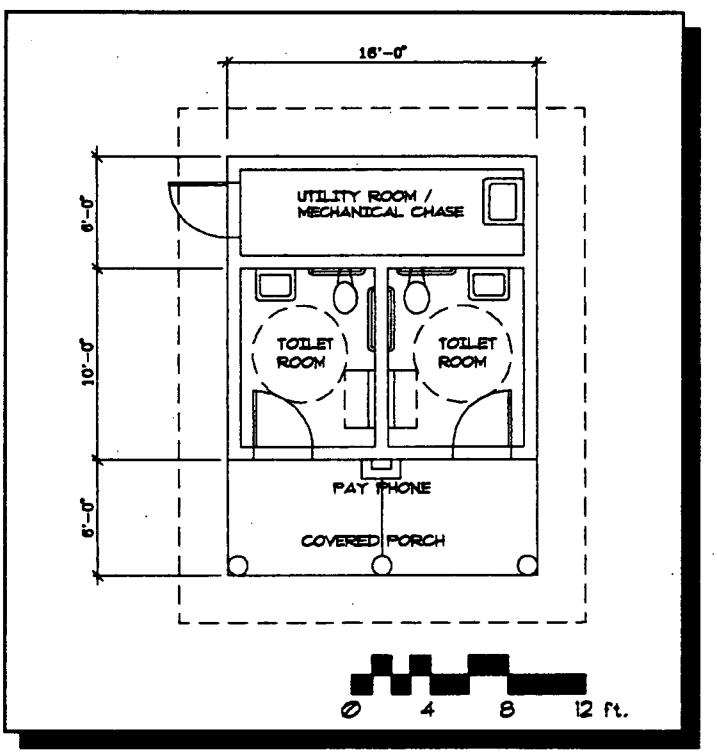


Figure 23 - Two Unit Restroom - Plan View © Metro

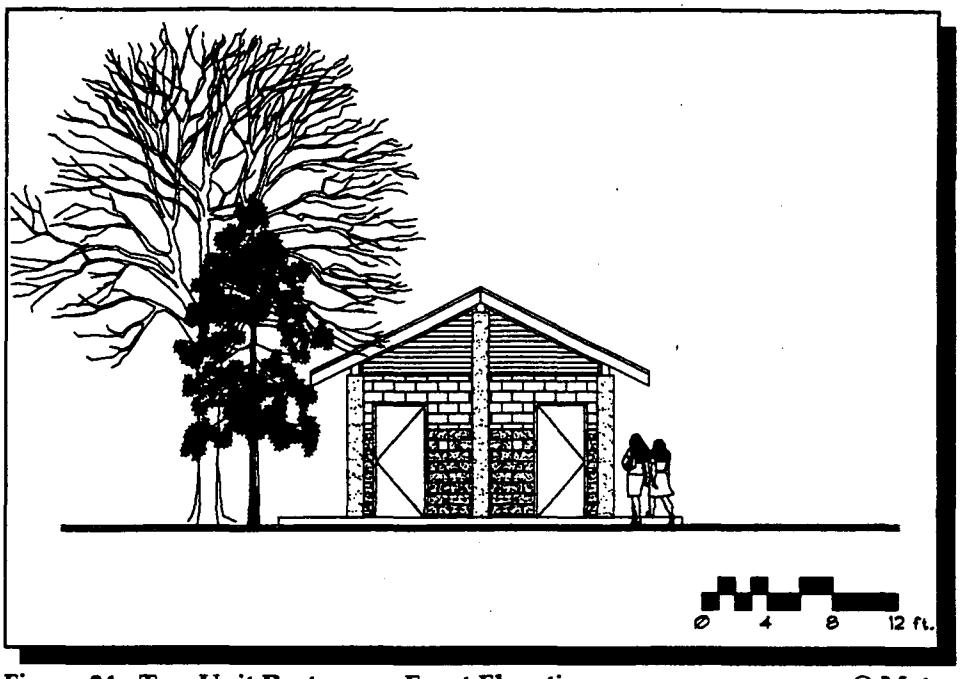


Figure 24 - Two Unit Restroom - Front Elevation © Metro

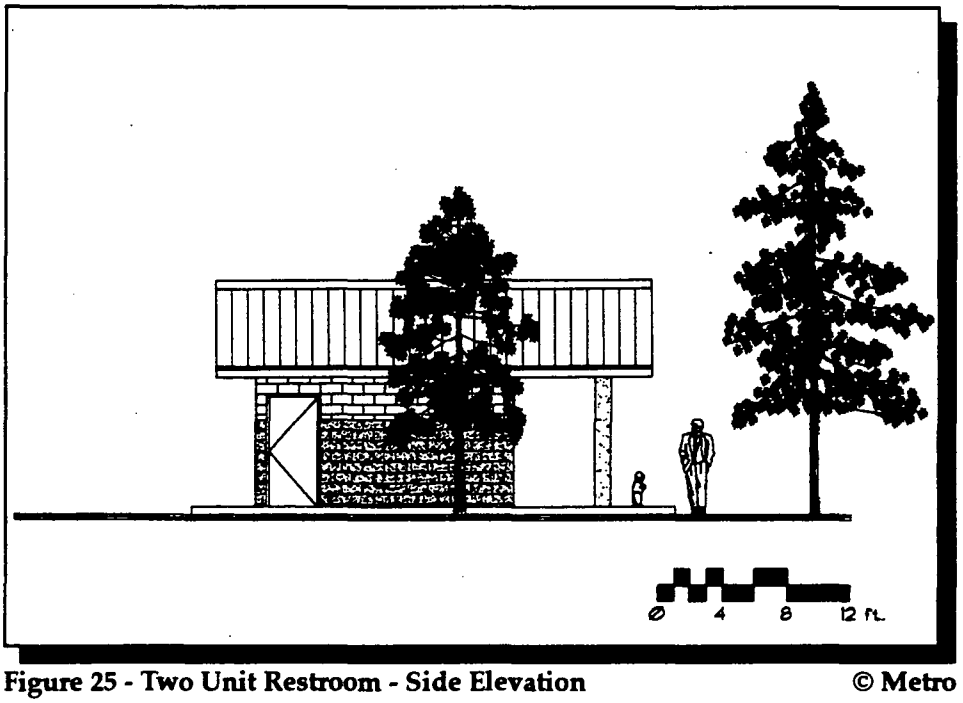


Figure 25 - Two Unit Restroom - Side Elevation © Metro

© PARK SUPERVISOR RESIDENCE / MAINTENANCE AREA

The maintenance access drive will be relocated to the east side of the supervisor's residence to improve circulation patterns. The existing maintenance area will be visually screened from the visitor entry. Additional low shrub plantings between the entry area and the park supervisor's residence will provide further separation and privacy while maintaining visual contact. The adjacent area east of the park supervisor's residence will be utilized as an overflow camping area with six additional camp sites.

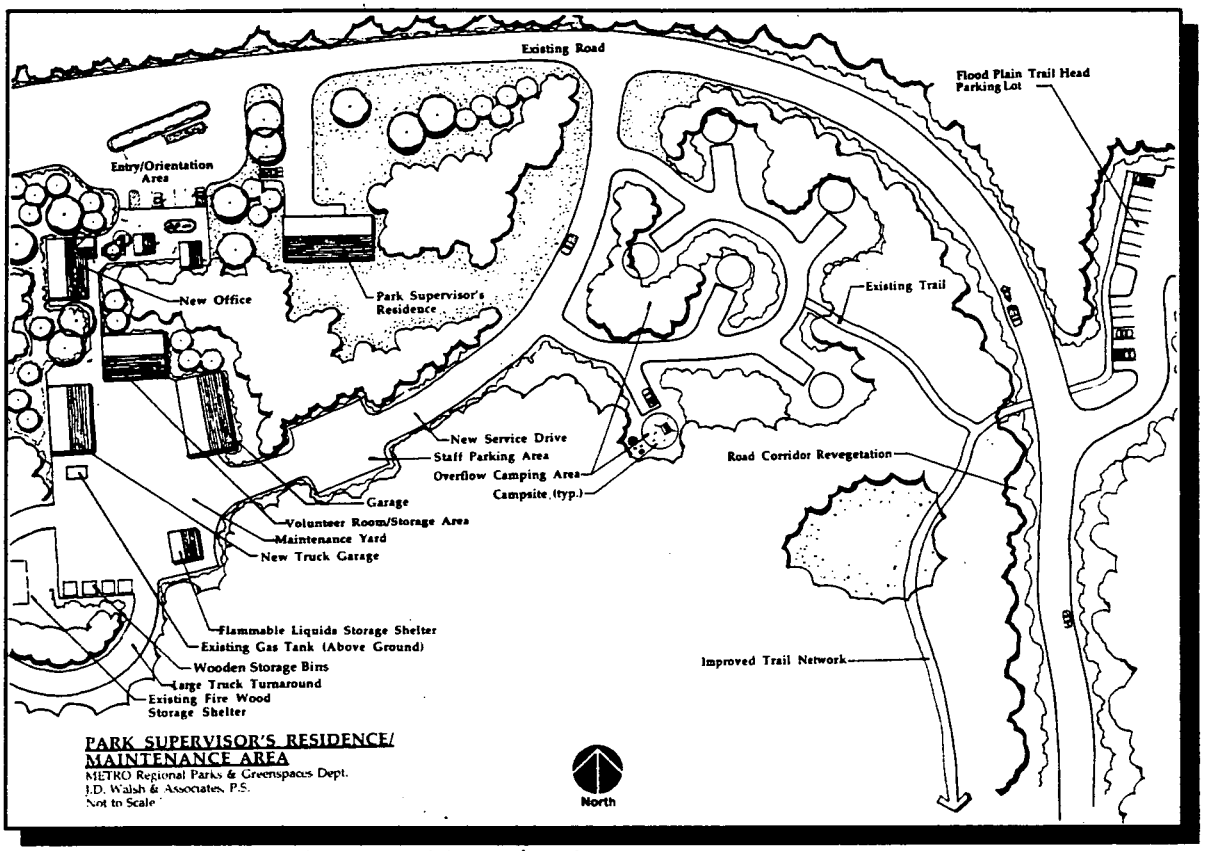


Figure 26 - Park Supervisor's Residence / Maintenance Area

Maintenance Area

Within the existing maintenance area a number of building and maintenance yard improvements are identified as noted below:

Maintenance Yard

- Improved access road with loop turnaround for large trucks with trailers.
- Truck and equipment parking.
- Employee parking (12-14 spaces).
- Remove wooden storage cabins and miscellaneous discarded materials.
- Install wash rack for cleaning equipment.

New Truck Garage **1860 s.f. (30' x 62')**

- Metal pole building with gravel floor and roll up doors, wooded sides
- Unheated work areas, dry storage area for sweeper, log splitter, tractor, equipment, tools and material storage.
- Security systems.
- Incorporate tool and equipment storage currently housed in existing storage cabins.

Garage (Existing) **1860 s.f. (30' x 62')**

- Secure and enclosed, unheated truck garage for park vehicles.
- Possibly weatherize 1 bay of existing truck garage for use as shop expansion; until new shop is constructed. Provide heat and power.

Flammable Liquids Storage Building (Pre-Fabricated) **120 s.f. (10' x 12')**

- Code required storage building for fuel and chemical storage.
- Pre-fabricated structure.
- Location for emergency eye wash station.

Repair & Enlarge Existing Fire Wood Storage Shelter **800 s.f. (20' x 40')**

- Screened / ventilated shelter for up to 100 cords of wood.
- Area for wood splitting (typically wood is purchased pre-split).

Volunteer Work and Storage Areas/Operation and Maintenance Work and Storage Area (Existing) **1,056 s.f.**

One half of the area serves diverse and varied volunteers (individuals and groups) that assist staff with park maintenance and construction projects. These groups include high school students, retired adults, participants in community mental health programs and others. Some groups work independently, others work with park staff. Schedules vary greatly, some groups come once or twice a week, others are annual or short term projects. The other half serves as storage and work space for operations and maintenance staff.

Volunteer Area

- Check in area for arriving park volunteers; scheduling and project information.
- Lunch/break area.
- Shared work surfaces and/or group table.
- Drying area for raingear and boots.
- Storage area for tools to be used by volunteer groups.
- Work area for small construction or repair projects.

Operation and Maintenance Area

- Check in area for arriving park volunteers; scheduling and project information.
- Secure, heated storage for miscellaneous tools.
- Work bench for small repairs.

Overflow Camping Area

- Loop road with six camp sites.
- Each camp site contains: 1 gravel parking space, 1 table, 1 fire ring, and 1 barbeque.
- The restroom at the entrance area will service the overflow camp sites.
- Potable water will be available.

Ⓓ FLOOD PLAIN TRAIL HEAD

The Flood Plain Trail Head (formerly called Picnic Area 1) is intended to continue as a small day use space and a trail head. For driver safety, the entry driveway has been realigned. Vehicles will enter and exit at the same location with an improved line of sight. A parking area will be defined and the excess areas currently used for random parking will be restored with natural vegatation. The open meadow will remain a play area.

Program description:

- Parking, 15 gravel surface spaces.
- Open lawn recreation space.
- One unisex toilet (vault type).
- Picnic tables (approximately 6 tables).
- Trail directional sign.

Ⓔ ROAD CORRIDOR

The road corridor from the (B) Entrance Gate/ Arrival Area to (G) Dismal Swamp Day Use Area will be restored along the edges with native vegetation. Except for selected areas, most of the random parking and picnic tables will be relocated. Lawn and gravel areas will be restored with native vegetation plantings. Metro should seek partnerships with volunteer organizations to achieve this component.

Ⓕ 'HOSNER HOLE' RIVER ACCESS / INTERPRETIVE VIEWPOINT

This area will continue to offer bank access for anglers, as well as a take out point for the in-park float trips. A small number of picnic tables will be provided for day use. Parking spaces adjacent to the existing road will provide parking for this area.

To the south, at the landslide area, the existing parking and picnic facilities will remain. A new interpretive view point of the river will also be located at the south end of this area.

Program Description:

- Parking, 30 gravel surface spaces.
- Two unisex toilets (vault type) in one structure.
- Picnic tables (approximately 6 tables).
- River bank access.
- ADA parking at interpretive viewpoint.
- One interpretive panel.
- Wildlife track sculptural element.

River Overlook / Interpretive Viewpoint

Interpretation

Sub-theme: The Sandy River has formed and shaped Oxbow Regional Park via catastrophic events and the steady forces of gravity and erosion.
Media: One interpretive panel, wildlife track sculptural element.
Discussion: The preferred site offers views across the river to sandy beaches and an oxbow curve of the river. It is located in conjunction with angler parking, at an existing road slide. A panel mounted horizontally allow visitors to read and look out at the river. The panel interprets the geographic history of the Sandy River and the hydrologic forces which shape and form Oxbow Regional Park. An aerial photo or map would provide a good perspective of river oxbows.

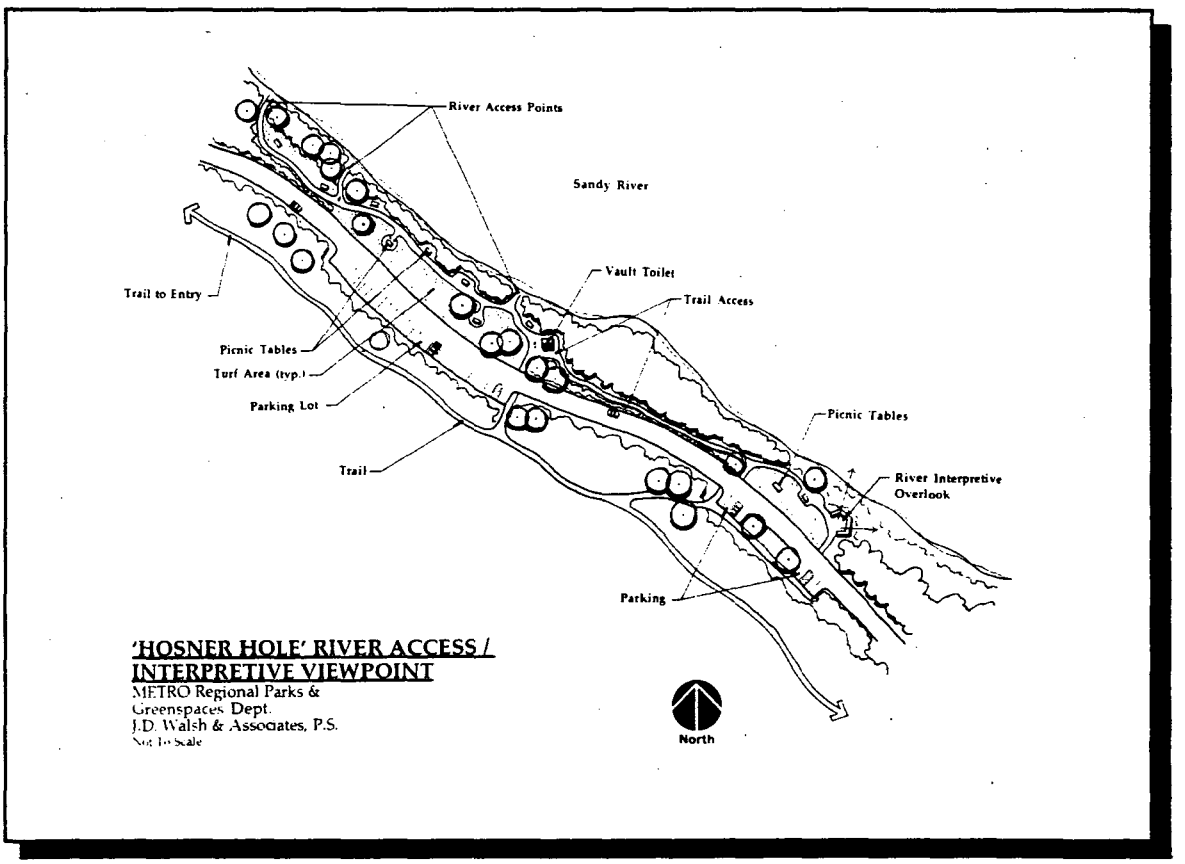


Figure 27 - 'Hosner Hole' River Access / Interpretive Viewpoint **© Metro**

Ⓖ DISMAL SWAMP DAY USE AREA

The Dismal Swamp area is intended to continue as a day use area with access to the river. The grass area on the river side of the road is to remain with picnic and recreation activities. The existing road may be relocated to the south to consolidate all parking on the river side of the road.

The existing lawn and parking areas on the south side of the road will be removed in order to restore a wetland in conjunction with Happy Creek.

At the edge of the Ancient Forest, the small creek overflows across the road during flooding conditions. High water flows will be directed into the restored wetland.

In addition, this area is intended to be a major trail head for hikers providing access to all of the main park trails.

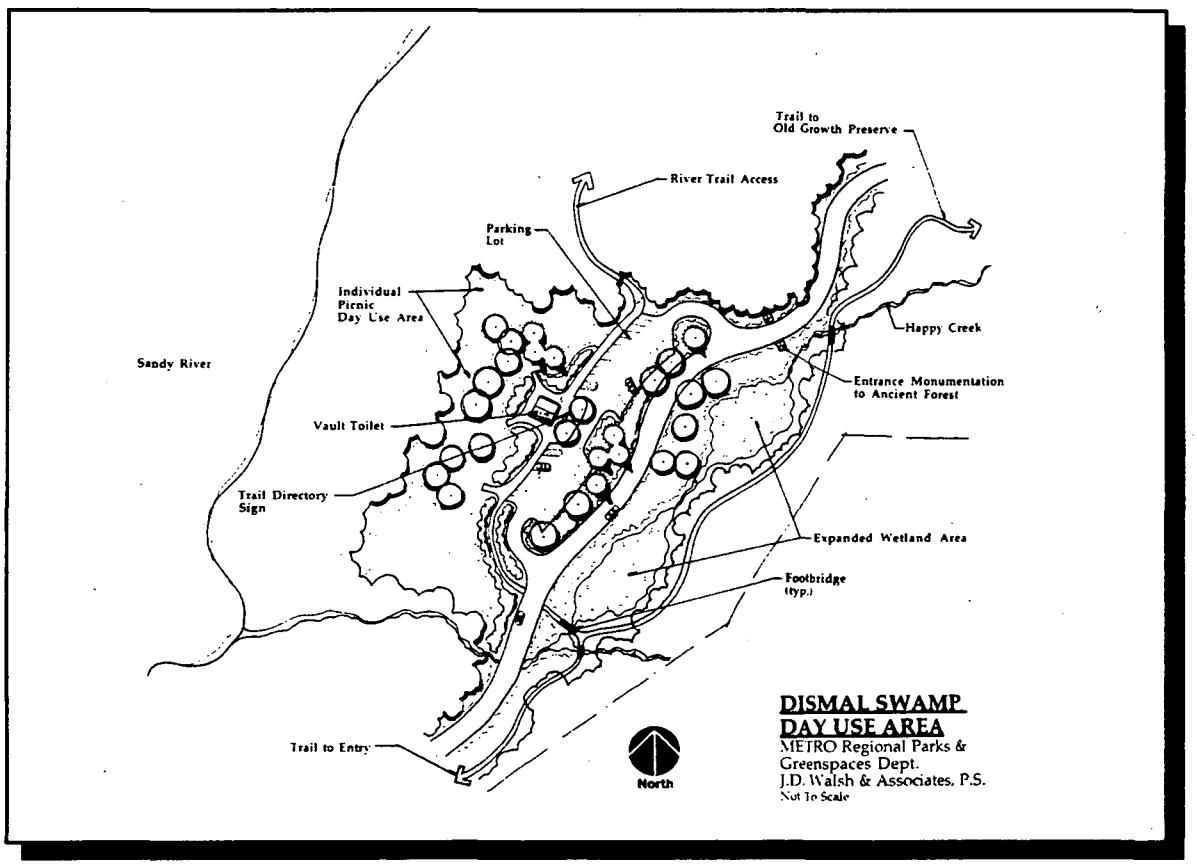


Figure 28 - Dismal Swamp Day Use Area **© Metro**

Program Description:

Day use space/trail head.

- Parking, 45 gravel surface spaces.
- Open lawn recreation spaces (irrigated).
- Three unisex toilets (vault type) in two structures.
- Picnic tables (approximately 21 tables).
- One information sign board with 'you are here'. map, ancient forest trail map.
- Wetland and Happy Creek restoration.

Trail Orientation

An information signboard will include a 'you are here' map and a detailed map of the trails in the Ancient Forest. Self-guiding Ancient Forest tour brochures may be available in a brochure box at the signboard. A sign on the board will direct disabled visitors requiring hardened surface access to the Ancient Forest to the barrier-free loop trail beginning at the environmental education center.

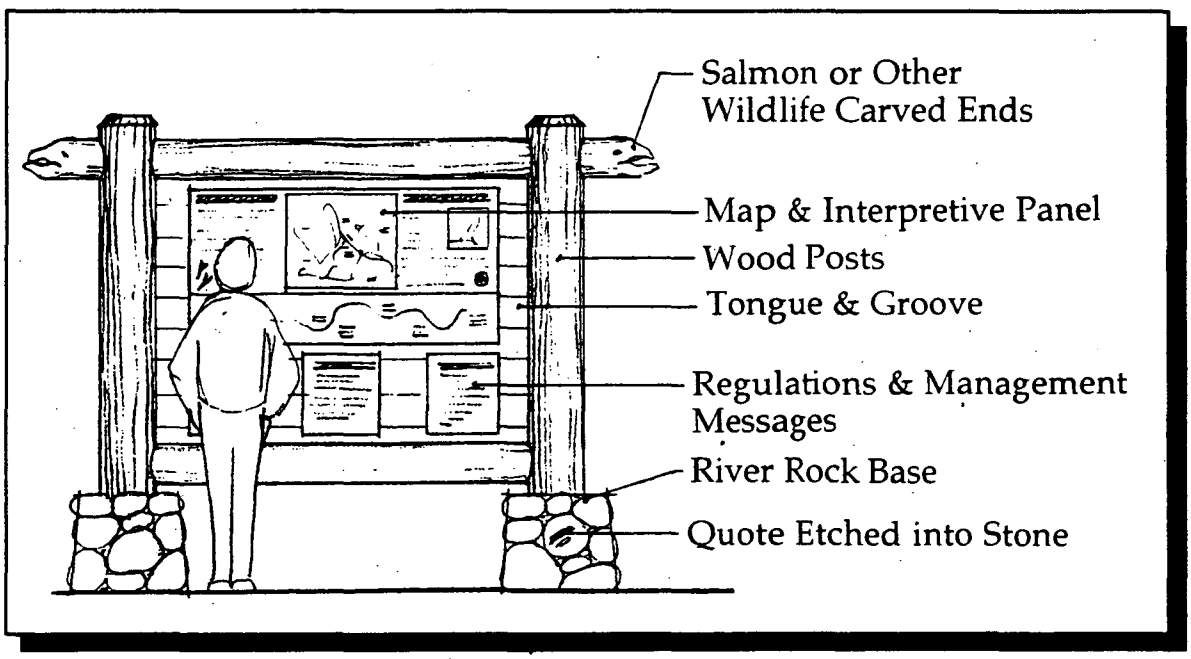


Figure 29 - Information Signboard / Interpretive Display **© Metro**

Ⓗ ANCIENT FOREST PRESERVE

The 160+ acre Ancient Forest Preserve inside Oxbow Regional Park is the closest example of this stage of forest development, within the metroploitan area. This area is unique and has tremendous value as a resource for education and research. The Master Plan envisions that this area will be preserved and continue to be utilized for educational, hiking and wildlife observation uses.

At the entry to the Ancient Forest, the proposed river rock pillars will act as a monument to alert park patrons to the special corridor.

Similar to the entry road, it is intended that the random parking and picnic areas will be removed from along the road and be restored with native vegetation.

Access will be retained to the existing pumphouse and a minimal number of parking spaces will be retained for maintenance vehicles. The pumphouse loop road will no longer provide a through access.

① ENVIRONMENTAL EDUCATION AREA

As previously discussed, environmental education is an important aspect of current park patrons' use and enjoyment of the park. During the master planning process, considerable emphasis was placed on making environmental education and natural resource interpretation a major feature of the Oxbow Regional Park experience.

The focus of this activity will be a new building and associated outdoor gathering areas located just to the east of the Ancient Forest Preserve. This site was chosen because of its proximity to abundant natural resources including the Sandy River, Ancient Forest and Alder Ridge. This central location optimizes the potential learning experience for children bussed to the site from local schools. From this location, outdoor educational activities can be complemented with indoor presentations. The location also affords easy access for park users in the main activity areas. The structure will provide for environmental education needs including multi-purpose rooms, offices, storage and other support spaces. In addition, the building will provide opportunities for lecture and meeting spaces, events, a casual lounging space and restroom facilities for general park users.

A special feature associated with the environmental education area will be the development of a barrier-free interpretive trail in the adjacent Ancient Forest Preserve. A short (1/8 mile) loop will provide park users with an introduction to unique qualities of the Ancient Forest Preserve.

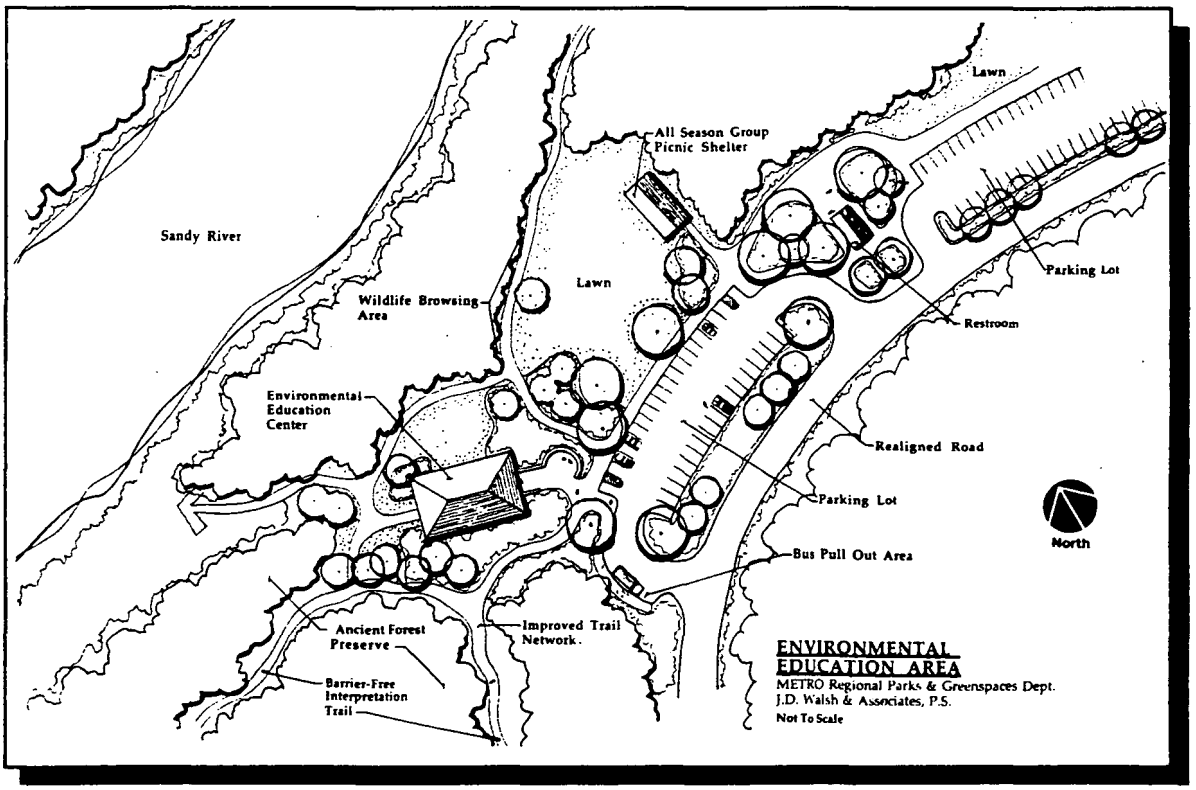


Figure 30 - Environmental Education Area © Metro

Environmental Education Center 4892 s.f.

Entry (2 @ 96 s.f. ea.) 192 s.f.
- Main building access.

Hearth / Displays / Reference Library 384 s.f.
- Access to building functions.
- Provide separation / security for after hours events and uses.
- Small sitting area with Fireplace or Stove (Wood or LP Gas)
- Small area for reference books and support materials.

Naturalist Office 192 s.f. (12' x 16')
- Private office space for Park Naturalist w/ desk and computer work areas, visitor seating / meeting area, telephone, files and storage.

Classroom / Multi-Purpose Area 1344 s.f.
- 60 student capacity, desks, chairs, etc. (65 people @ 20 s.f. each)
- Sub-dividable.
- Marker board, tack surfaces, slide screen and educational material storage.
- Counter with sinks.
- Coat pegs / dry off area.
- Large window areas, low enough for children to look out.

Classroom Storage (2 @ 144 s.f. ea.) 288 s.f.
- Storage area for 60 chairs (adult and primary), 10 tables, AV carts, etc.

Small Group Areas (2 @ 144 s.f. ea.) 288 s.f.
- Small group study areas, 15 student capacity, possible identities such as "Fox Den",etc. Small scale spaces, fun environments for study.
- Adjacent to classroom or sub-area of classroom.

Discovery Room / Central Circulation 648 s.f.
- Interactive displays and exhibits for educational use.
- Hands on activities and investigations.

Study Collection / Support Facilities 216 s.f.
- Work table / counters, storage drawers, cabinets, freezer, etc.

Volunteer Room 192 s.f. (12' x 16')
- Meeting / work room for volunteer naturalist(s).
- Work surfaces / table and counter area with sink.

Work Room / Study Area 120 s.f.
- Slide File, light table, etc.
- Work surfaces / table and counter area with sink.

Restrooms 576 s.f.
- Accessible restroom facilities with multiple fixtures, hot and cold water. (Women = 2 WC's, 2 lavs, Men = 1 WC, 1 Urinal, 2 lavs)
- Electric Hand Dryers, trash receptacle.
- Baby change table.
- Access from inside and outside of building.

Janitor Closet 30 s.f.
- Storage for cleaning equipment and supplies.
- Mop sink, mop and broom hooks, storage shelves.

Mechanical Room 96 s.f.
• HVAC equipment, water heater, electrical and telephone panels.
Covered Entry Terraces (Front & Back)* 1440 s.f. (720 s.f. ea.)
• Outdoor covered areas for building entry, outdoor study area, lunch
Class Room Terraces (2 @ 360 s.f.)* 720 s.f.
* Square footage is not included in total building square footage.

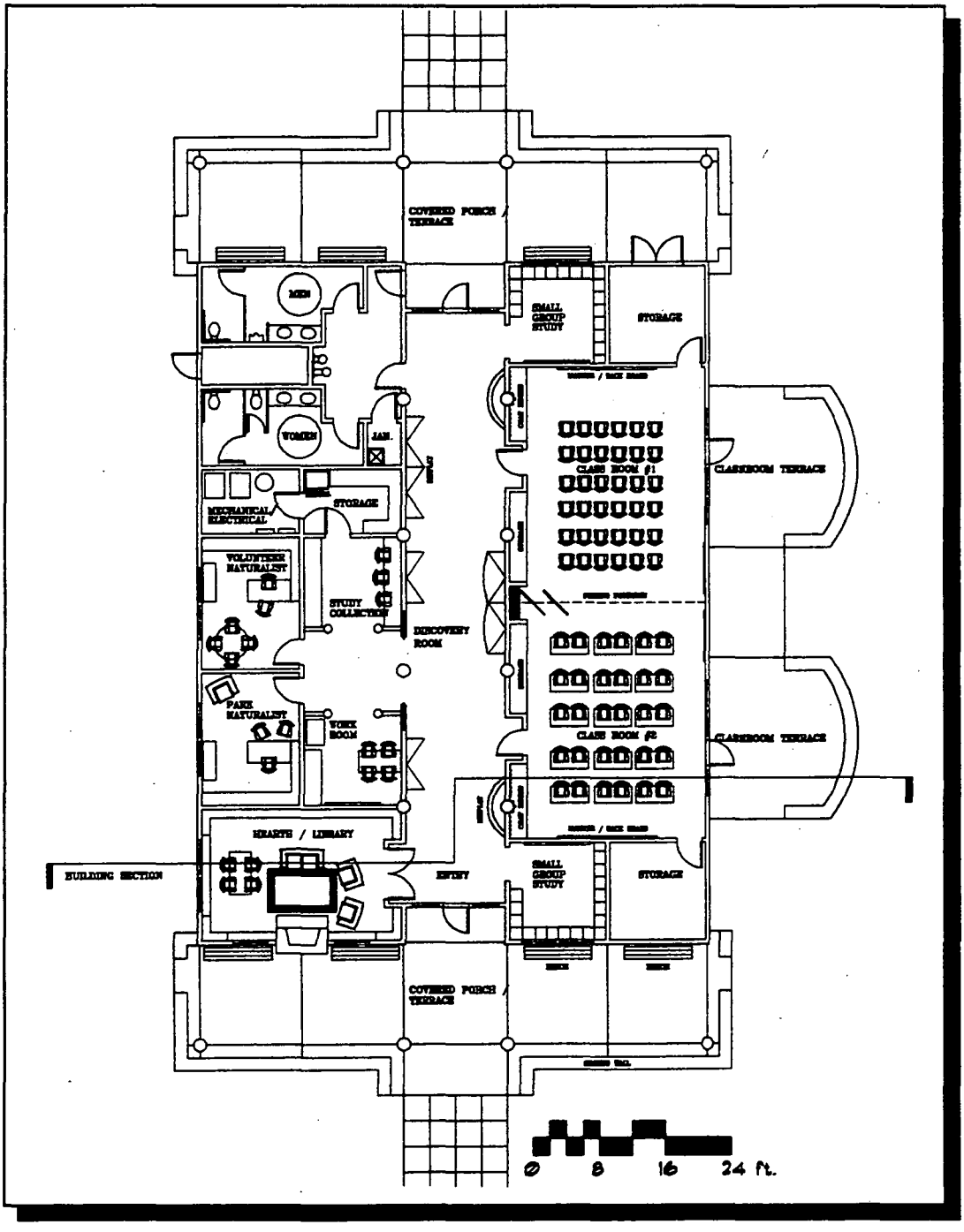


Figure 31 - Environmental Education Center - Floor Plan © Metro

Figure 32 - Environmental Education Center - Entry Elevation © Metro

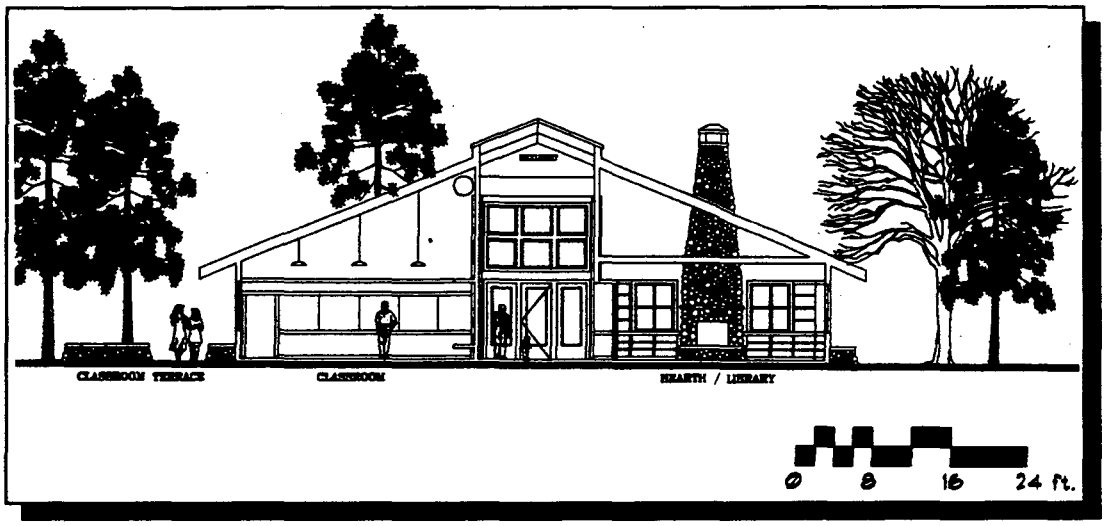


Figure 33 - Environmental Education Center - Building Section © Metro

Interpretation

The environmental education center should be named in honor and commemoration of the Diack family for their outstanding contributions to the creation of Oxbow Regional Park, protection of the Sandy River Gorge and enhancement of environmental education opportunities for children throughout the State of Oregon.

Facility Interior Themes: The major theme and five sub-themes (discussed on pages 102 through 107 ahead in the Interpretive Program/Signage section) will be expressed in interior exhibitory.

Facility Exterior Sub-theme: Tracks and traces reveal the secret lives of animals.

Media: Interior interpretive exhibits, 'you are here' map on exterior patio, outdoor scultpural elements.
Discussion: The outdoor interpretive area would be interactive and aimed primarily at children and their families. This could be an orientation to wildlife and river themes and offer osprey stories and views of the river. A wildlife tracking game would be designed as a treasure hunt. Bronze track casts could offer children an opportunity to stand in the track of a mountain lion or other wildlife. Large track boxes could be set up to observe tracks along wildlife paths.

Ancient Forest Barrier-Free Interpretive Trail - 1/8 mile loop

Interpretation

Sub-theme: Oxbow Regional Parks' Ancient Forest offers a precious pocket of habitat for a unique community of life.
Media: Five interpretive panels, including one map of Ancient Forest trails.
Discussion: The information board offers maps, introduces interpretive trails and orients visitors to hiking trails. Five interpretive trail panels are located along short accessible loops to immerse visitors in the Ancient Forest story. Also offered are several benches at points for solitude.

Ⓙ GROUP DAY USE AREA

The group day use area is focused on providing facilities for group picnics. The existing park road will be relocated to the southern perimeter of the group day use area. As a result, traffic and parking conflicts will be reduced and the area will be more efficiently used for picnicking activities. In a setting of green lawns and trees, various size areas will be available for rent. The intent is to cater mainly to smaller groups of 200 and less.

The existing shelters will be gradually replaced with new shelters. A total of 6 shelters are proposed that would accomodate up to 464 picnickers under shelters. Table 6 outlines the proposed shelter and use areas. The numbers correspond to the shelters and the areas illustrated in Figure 34 below. The shelters would have food preparation areas including counters, sinks, barbecues and electrical service. Shelter #1 is also to be constructed for winter use by having a wood fireplace and removable window panels for rain and wind protection. Also, four additional group picnic areas (without shelters) will be available for rent. These areas could accomodate up to 280 additional picnickers.

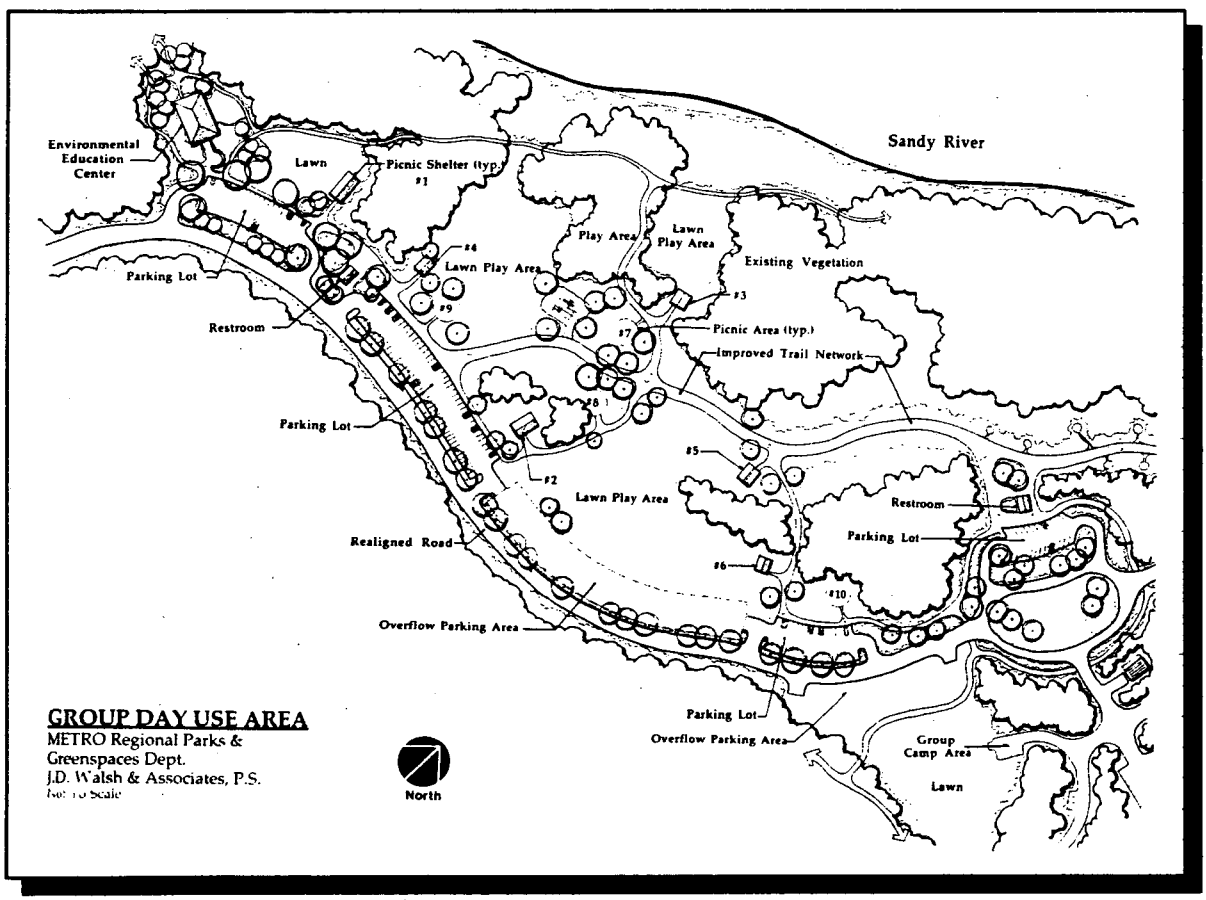


Figure 34 - Group Day Use Area - Plan View

The information signboard currently at the park office will be relocated near the restroom at the east end of the group day use area.

Program Description:

- Parking (total of 302 parking spaces).
  - Asphalt Paved (39)
  - Gravel Surfaced (112)
  - Overflow on Grass (151)
- Picnic shelters (6).
- Restrooms - (2 flush type structures with 6 unisex units each).
- Information signboard with a 'you are here' map.
- Picnic tables (approximately 93).
- Open picnic areas (four).
- Play areas.
- Open lawn play areas (irrigated).

Table 6
Proposed Group Picnic Facilities for
Oxbow Regional Park

	New Group Picnic Area	Tables Under Shelter	Capacity	Shelter (sq. ft.)	Tables Outside of Shelter	Capacity	Area Capacity	Proposed Parking Base
	Shelter #1	18	144	1600				
	Shelter #2	12	96	1152				
	Shelter #3	7	56	576				
	Shelter #4	7	56	576				
	Shelter #5	7	56	576				
	Shelter #6	7	56	576				
Sub-Total	**6**	**58**	**464**				**464**	
Open Area	Area #7				12	96		
	Area #8				12	96		
	Area #9				7	56		
	Area #10				4	32		
Sub-Total					**35**	**280**	**280**	
Total							**744**	**302**

Picnic Shelters:

New Group Picnic Shelters (Summer Style):

- Open air shelters with slab on grade floors, accessible from parking areas and main trail systems.
- Roof structure on structural post and beam system.
- Movable picnic tables.
- Electrical outlets and lighting.
- Food preparation space (counter and sink).
- Barbeque under shelter for food cooking.

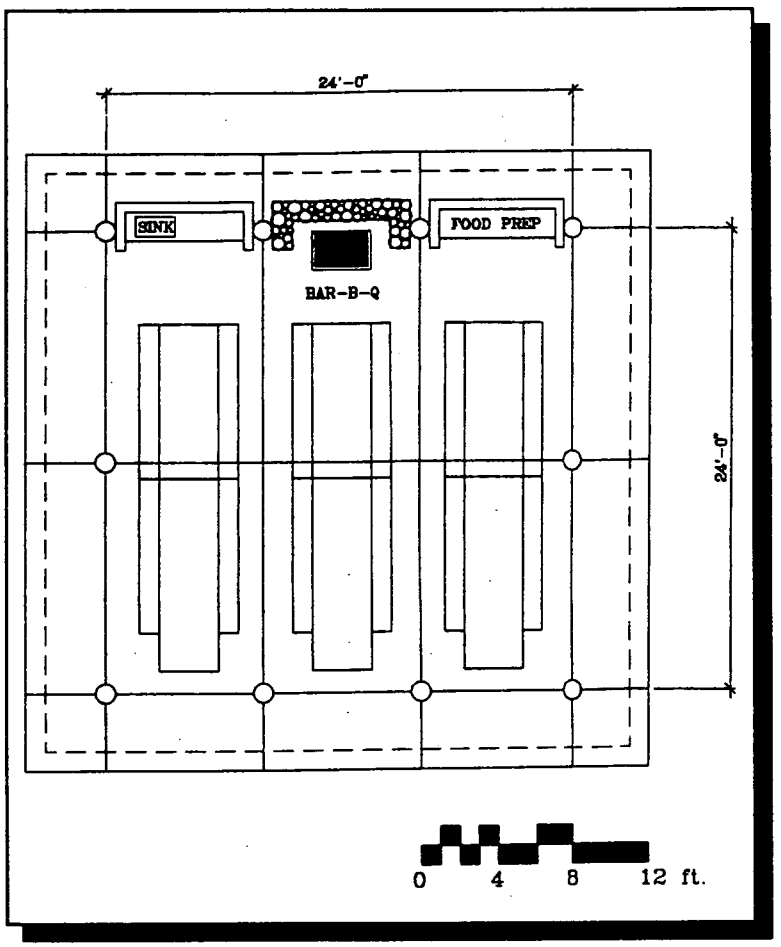


Figure 35 - Small Group Picnic Shelter - Plan View © Metro

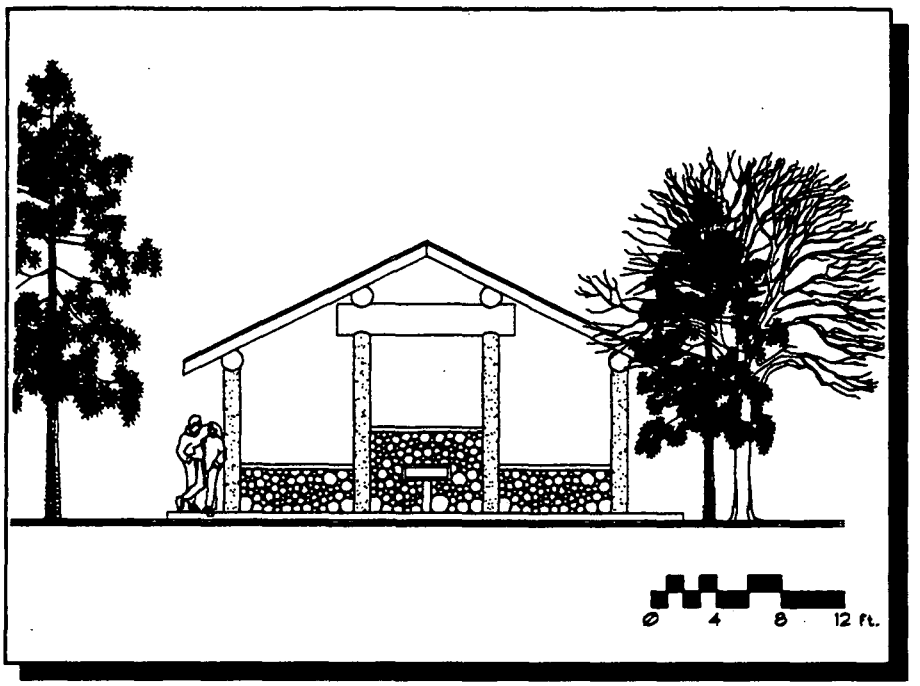


Figure 36 - Group Picnic Shelter - Elevation © Metro

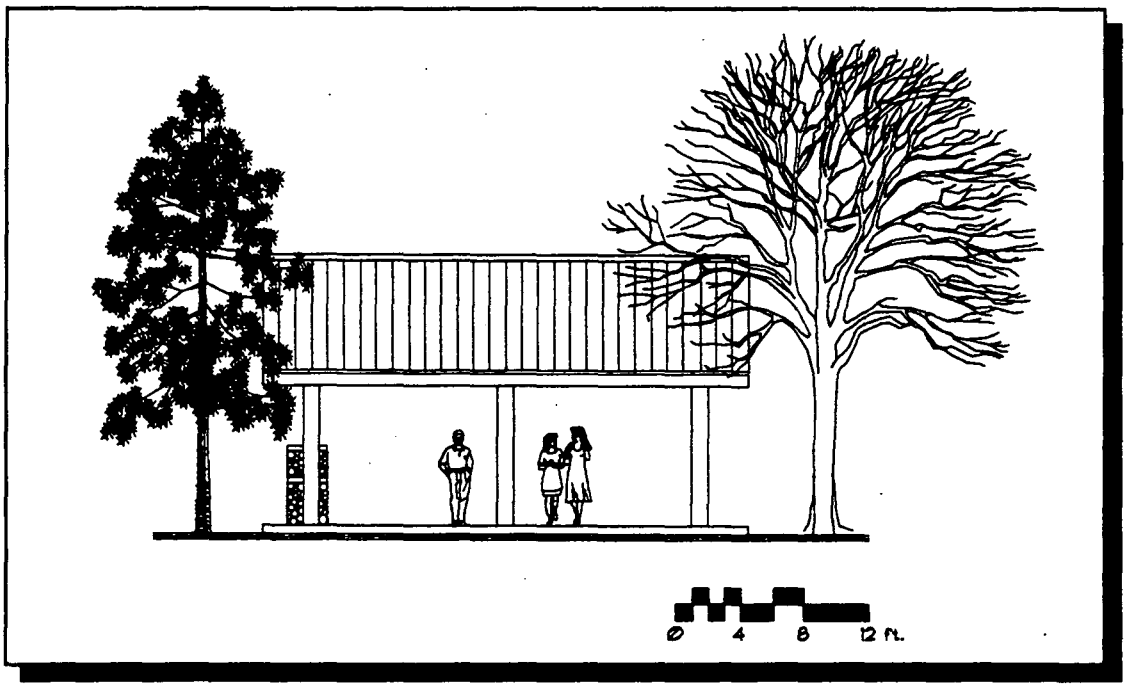


Figure 37 - Group Picnic Shelter - Side Elevation © Metro

Enclosed Group Picnic Shelter (Winter Style) 1@ **1600 s.f. (40'x 40')**
- 144 Person Occupancy

- Open air shelters with slab on-grade floors, accessible from parking areas and main trail systems.
- Roof structures on structural post and beam system.
- Half walls and infill panels.
- Movable picnic tables.
- Electrical outlets and electrical lighting.
- Fireplace structure.

Figure 38 - Enclosed Shelter - Elevation **© Metro**

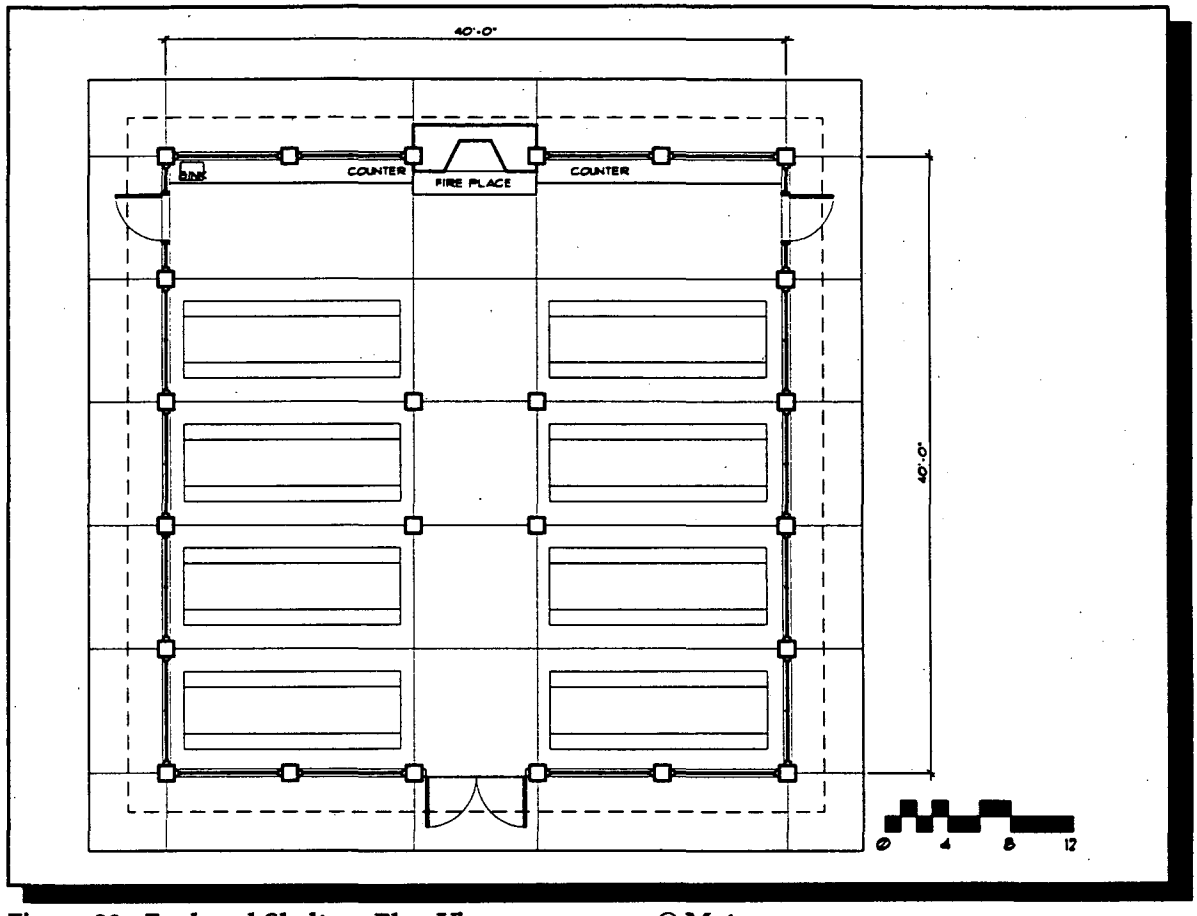


Figure 39 - Enclosed Shelter - Plan View **© Metro**

Ⓚ INDIVIDUAL / FAMILY DAY USE AREA

The intent of this area is to provide non-reservable picnic areas open for use by individuals, families and small groups. The picnic sites displaced along the entry road and the Ancient Forest will be relocated to this area. The total number of parking and table spaces available to individuals will remain the same as the existing conditions. This area is conveniently located close to the river access area. A new restroom with flush toilets will be constructed to serve picnickers and the river access boat ramp. An existing information signboard will be relocated from the campground area and placed near the restroom. A 'you are here' map will be mounted on the signboard.

Program Description:

- Parking (total parking 307 spaces).
  - Asphalt Surface (59)
  - Asphalt Surface - Vehicle w/ Boat Trailer (21)
  - Gravel Surface (57)
  - Overflow on Grass (170)
- Picnic tables (approximately 35 tables).
- Restrooms (1 flush type structure w/ 6 unisex units; 1 unisex vault toilet).

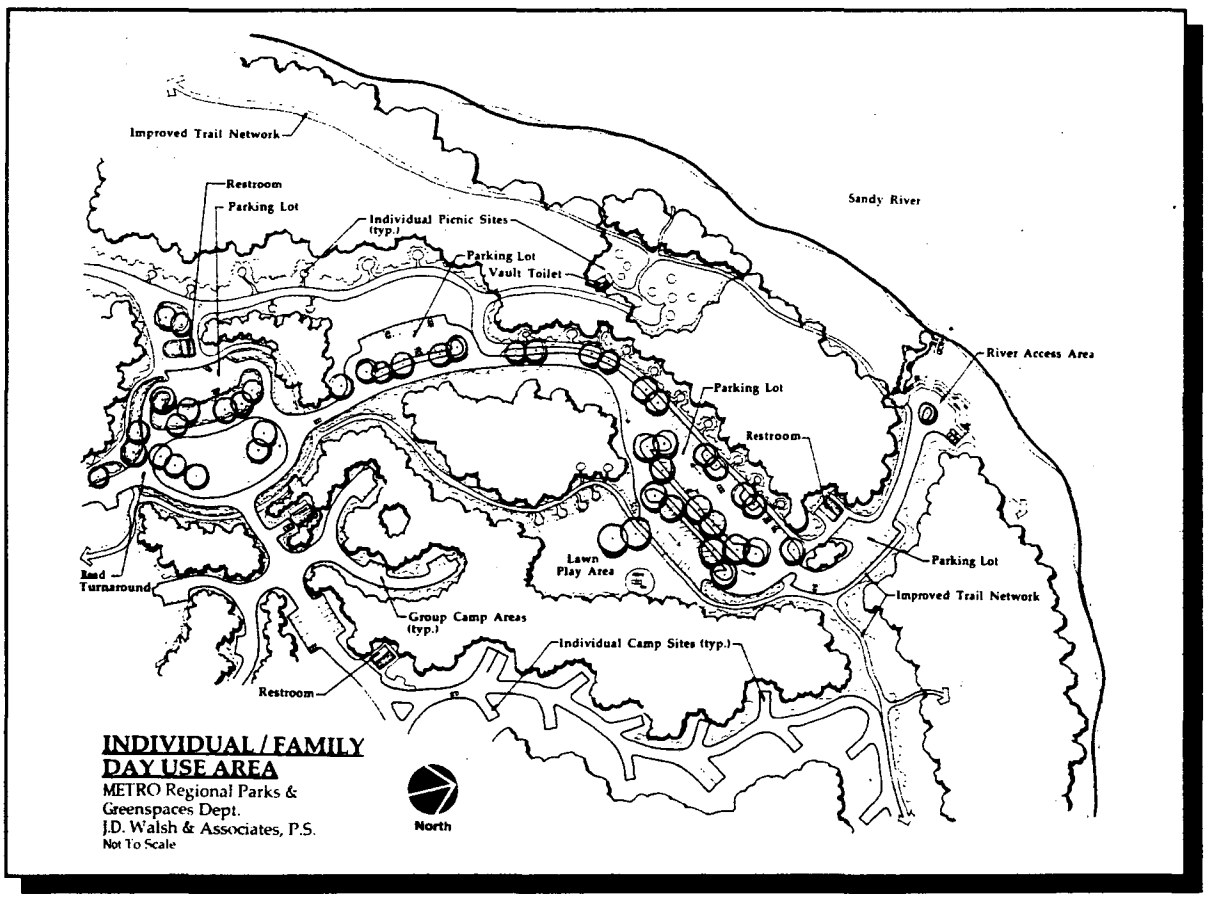


Figure 40 - Individual/Family Day Use Area - Plan View © Metro

Park Unisex Restrooms:

Public Restroom Facilities (Flush Type):

- Accessible single occupancy toilet rooms, multiple units for seasonal flexibility. **8' x 10' each plus chase**
- Slab on grade, masonry walls, wood roof system with metal roofing.
- Wall hung toilet, lavatory, floor drain, stainless fixtures.
- Tempered mirrors, electric hand dryers, baby change table (no paper towels).
- Electric lighting and ventilation.
- Freeze protection at some locations.

Six Single Occupancy Units with Chase **624 s.f. (24' x 28')**

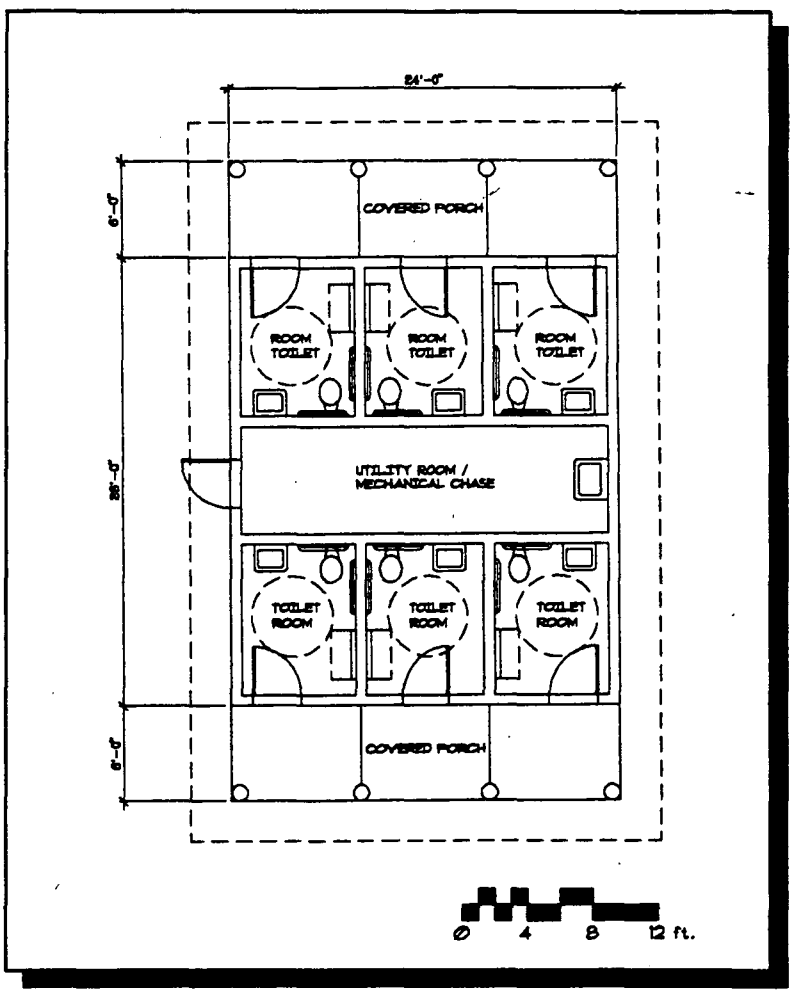


Figure 41 - Six Unit Restroom (Flush Type) - Plan View © Metro

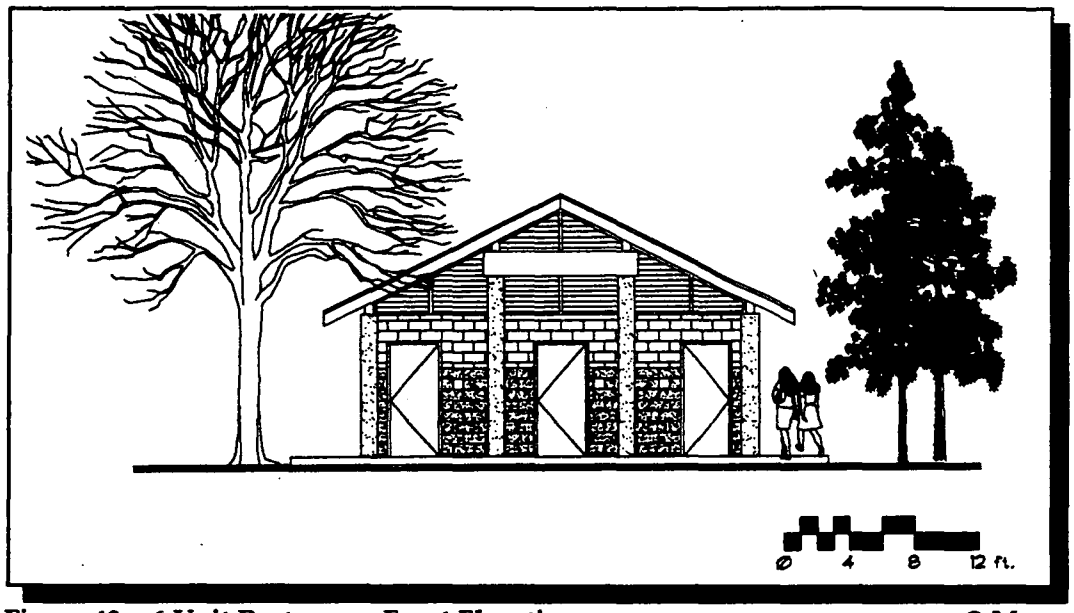


Figure 42 - 6 Unit Restroom - Front Elevation © Metro

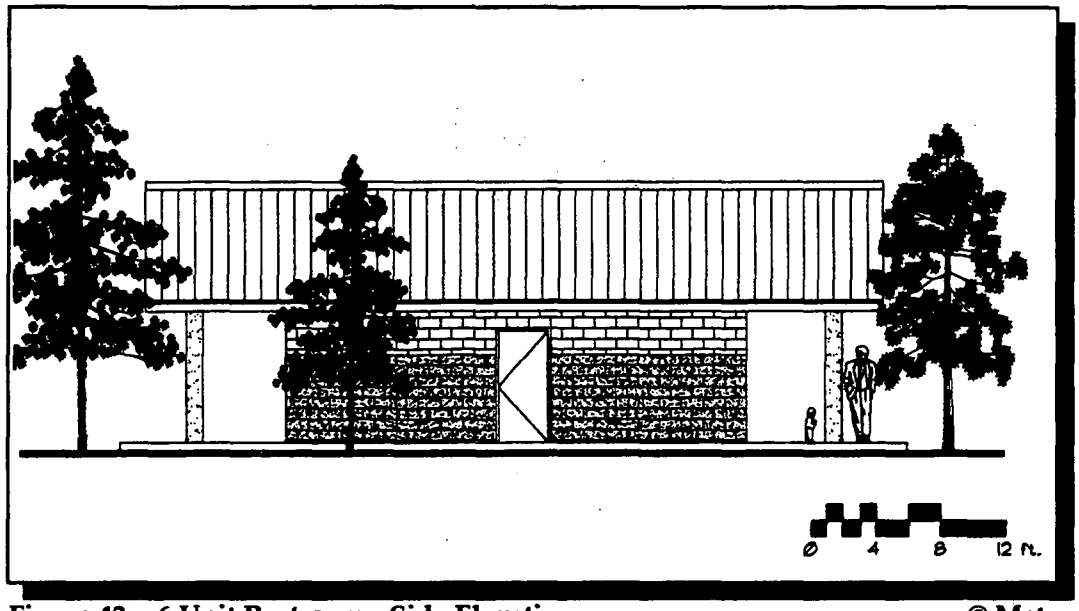


Figure 43 - 6 Unit Restroom - Side Elevation © Metro

Public Restroom Facilities (Vault Type)

- Accessible single occupancy toilet rooms, multiple units for seasonal flexibility.
- Slab on grade with pre-fabricated or site built structure.
- Tempered mirrors, baby changing table.
- Electric lighting, natural ventilation.

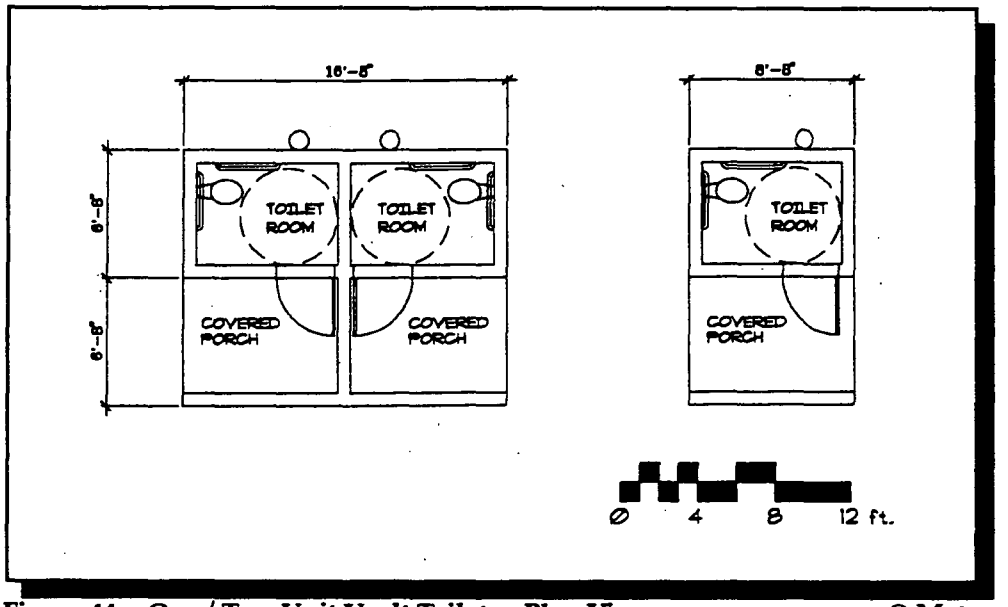


Figure 44 - One / Two Unit Vault Toilets - Plan View © Metro

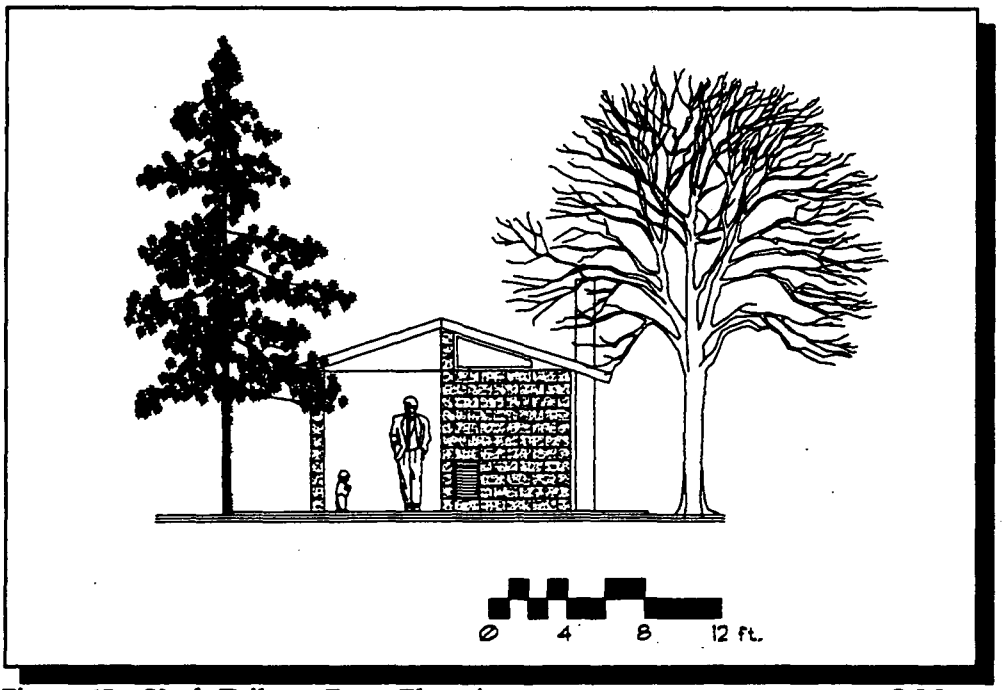


Figure 45 - Vault Toilets - Front Elevation © Metro

Ⓛ ACCESS ROAD AND TURNAROUND

The road is proposed to be relocated to the south side of the river terrace, to reduce traffic and parking conflicts with park user. A turnaround is proposed at this point to help eliminate random traffic in other areas of the park. The well signed turnaround will also provide a major point for park users to orient themselves. Roads have been relocated to allow for camping traffic to enter and exit the camping area at one location. This will help separate camping vehicle traffic from individual picnic spaces and the boat ramp traffic.

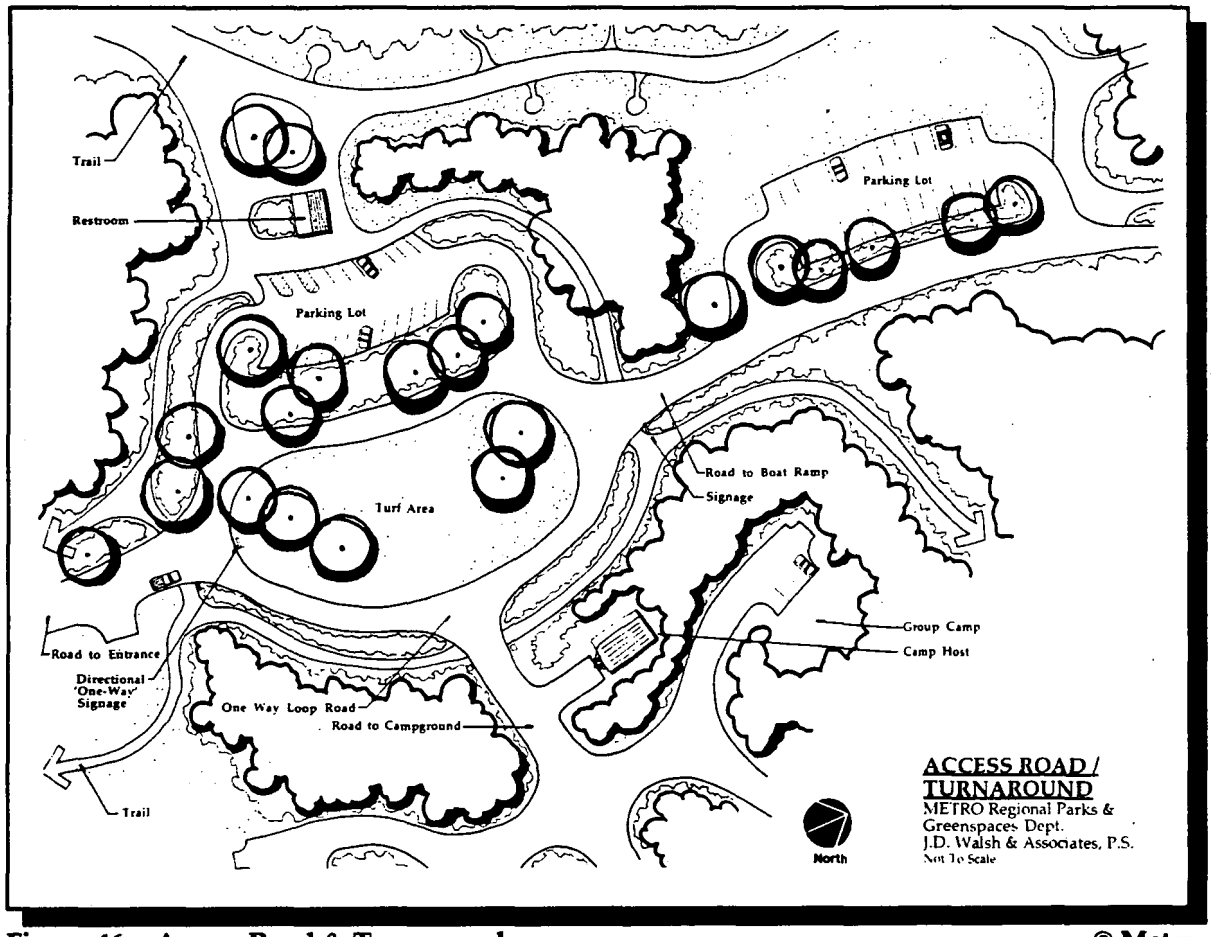


Figure 46 - Access Road & Turnaround **© Metro**

Ⓜ RIVER ACCESS AREA (Boat Ramp)

The river access point will continue to provide for boat launching and pick-up, angler access, and water contact for swimming, sunbathing, etc. An interpretive area is proposed to be developed at this area to aquaint park users with the river, salmon, and boating safety. In addition, terraced areas are planned which will allow easier access to the river while making the area more aesthetically pleasing.

Program Description:

- Parking (2 accessible paved spaces, all other vehicles will park at the top of the boat ramp access drive).
- Interpretive view point.
- Beach Access Terraces.
- Handicap fishing access.

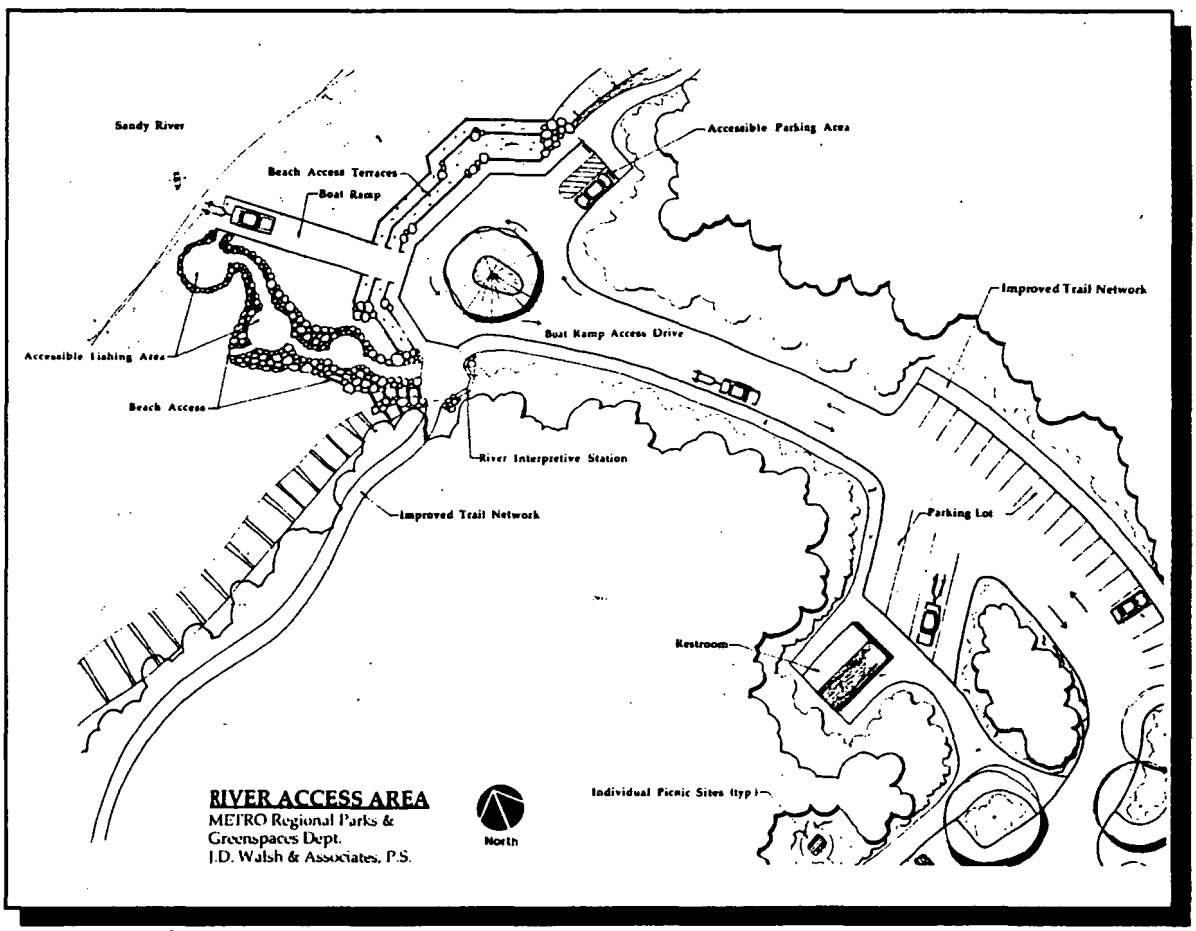


Figure 47 - River Access Area (Boat Ramp) © Metro

Interpretation

Sub-theme: Since the ice age, Chinook salmon return to their ancestral spawn ing grounds within Oxbow Regional Park, inspiring celebration, participating in the web of river life, and bringing fertility to the soil with their decaying bodies.
Media: Four interpretive panels, tactile elements, and multi-lingual water safety / regulatory messages.
Discussion: The interpretive panels would be on a rock wall that would nestle into the hill at the bottom of the boat ramp, next to the trail junction which leads downriver. A separate sign with creative regulatory and safety messages will be sited in visible location where people gather near the beach. This sign will have a standardized safety message with an international sysmbol relating to water hazards.

The four interpretive panels will tell salmon and fisheries stories through the seasons, through the ages. Use of historic fishing and river flood photos should be utilitized to talk about the fishing regulations and the changing nature of river currents and obstacles. History is popular with visitors who will often bring visiting family to look at historic photos or "record fish caught", etc.. Sculptural pieces could offer a more ceremonial aspect of the story. Tactile pieces of life size bronzed or conrete salmon and the rest of life phases imbedded in concrete and mounted along Cascadian style stone walls are some possible design solutions.

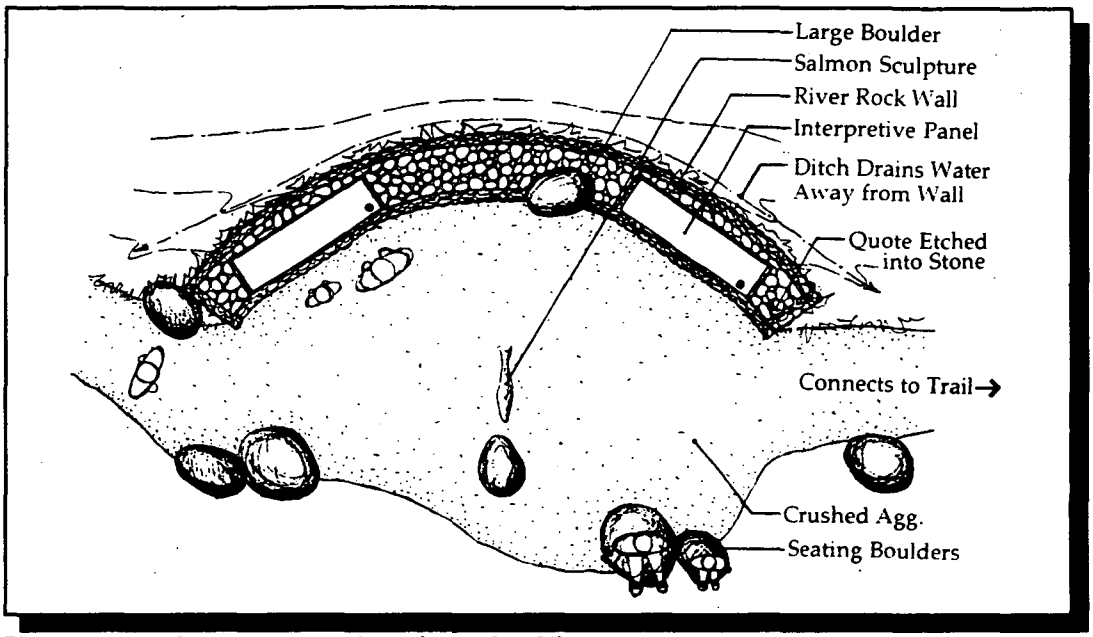


Figure 48 - Salmon Interpretive Site - Plan View **© Metro**

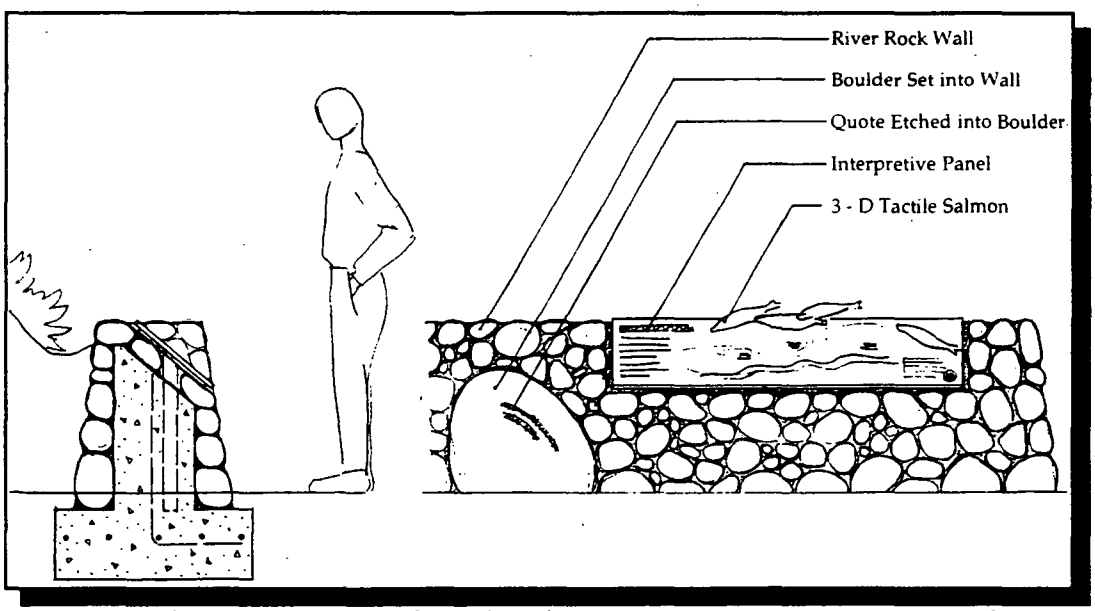


Figure 49 - Salmon Interpretive Site - Elevation **© Metro**

(N) GROUP CAMPING AREAS

Two group camping areas are proposed to be developed to accommodate approximatley 60 people in each area. These 'for rent' facilities will be designed to be flexible, allowing all or only a portion of the space to be occupied by a single group. A third group camp area is proposed as a 'walk-in' only site.

Program Description:

- Group Camping Areas (3 areas with 4-5 parking spaces and up to 20 people at each camp). Each camp provides a fire ring, picnic table, barbeque and parking spaces.
- Restrooms (shared with camping areas; unisex vault and flush type with showers).
- Shelters (may be added to facilitate winter use).
- Parking of 14 additional spaces provided for group members off main camp entry road.

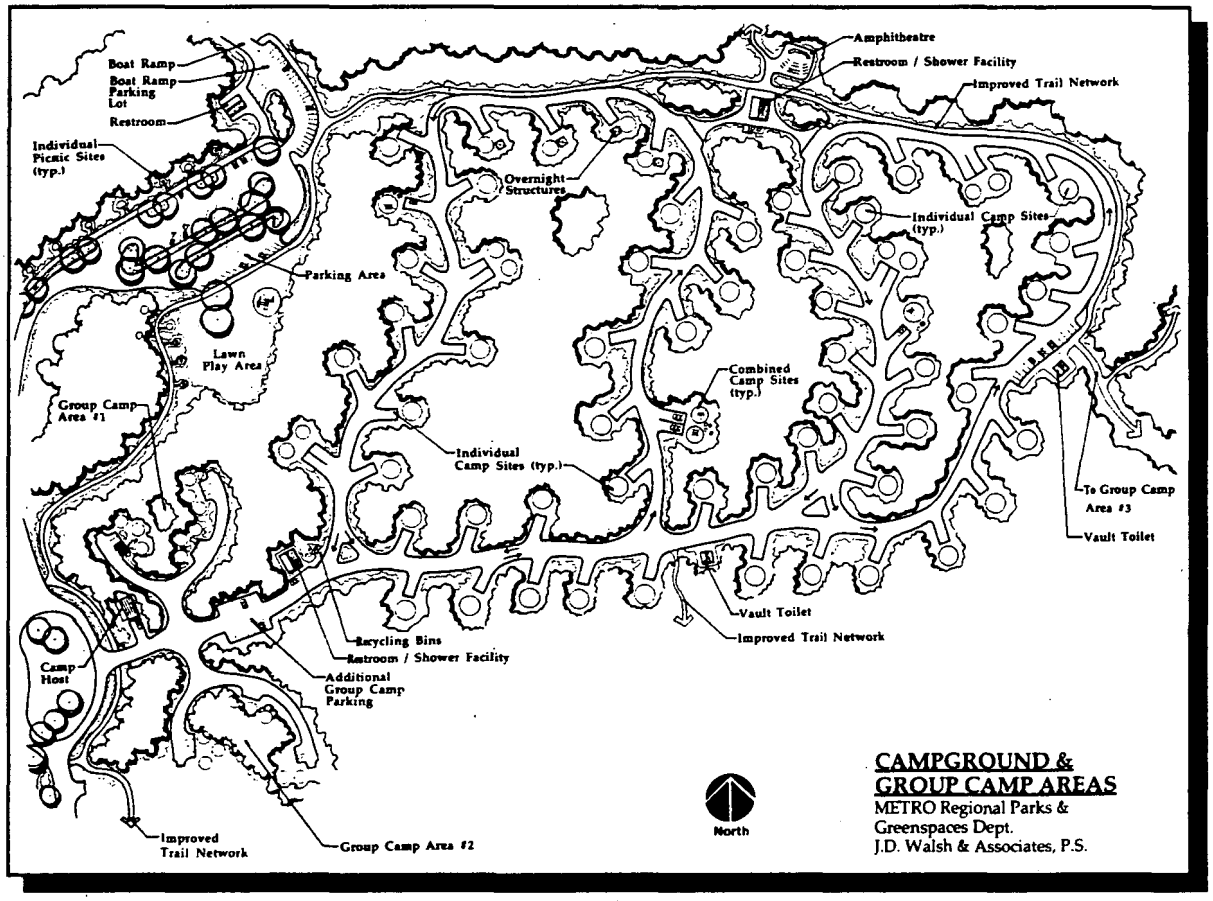


Figure 50 - Group Camp & Campground Area - Plan View © Metro

⓪ CAMPGROUND

The Master Plan concept for the campground is to retain the "semi-primitive" camping experience. Camp sites are to be located a minimum of 100' apart which is the standard for a 'Roaded Natural' setting . The 'Roaded Natural' setting is based on the Recreation Opportunity Spectrum established by the USDA Forest Service. Under story vegetation is to be retained or restored in order to provide privacy. Facilities will be rustic in character. Full hook-up services for RV vehicles will not be provided. However, restrooms with flush toilets and showers will be provided.

A site will be developed for a "camp host" near the campground entrance area. The volunteer "camp host" will assist the staff in managing the campground operations. The existing campground road system is proposed to be reorganized to allow for two one-way loops. This arrangement is more efficient by allowing for increased camp site numbers while decreasing vehicle traffic by the individual spaces. Also, during low use periods, a portion of the sites can be closed. The redesigned campground will include: approximately 44 upgraded camp sites and 16 new camp sites. Of the total sixty sites, five will become cluster camp sites (2 sites per cluster). These sites, which are now extremely close together, will now be rented as five combined-family or clustered sites. The long range plan is to provide 4 to 12 overnight structures similar to yurts or small cabin structures. These structures would replace individual camp spaces.

The Master Plan proposes that operational activities should be reviewed and, if appropriate, modified. Activities to review should include:

- Campground managed by a private concessionaire.
- Campground fees collected primarily at the park entry feebooth.
- Firewood, and possibly other items, to be sold by a private concessionaire or non-profit organization.
- Garbage collection provided by a private concessionaire. Convert from individual garbage cans located throughout the park to dumpsters, in wooden enclosures, positioned in key locations.

Program Description:

- Individual camp sites (55)
  - parking space (2 gravel spaces per site)
  - amenities include: fire ring (1), barbeque (1), and table (1)
- Cluster camp sites (5)
  - parking space (4 gravel spaces per site)
  - amenities include: fire ring (1), barbeque (1), and tables (2)
- Overnight Structures (4-12)
  - would replace individual campsites
  - amenities include: fire ring (1), barbeque (1), and table (1)

- Restrooms
  - (2) Flush type structures w/ 3 unisex units
  - (3) Vault type structures w/ 2 unisex units
  - 5 unisex showers at each flush type structure
- Understory plantings for privacy
- Trail improvements

Interpretation

Media: A 3-sided kiosk will be relocated from the boat ramp to the amphitheatre area for the benefit of the visitors using the campground and group camp areas.
Discussion: This structure offers maps, interpretive information, orients visitors to hiking trails, provides information on camping rules and regulations and announces nightly programs found at the camp amphitheater.

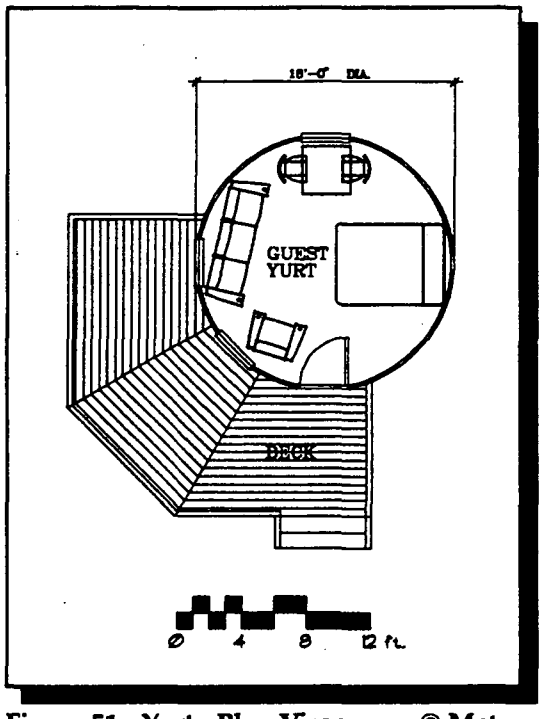


Figure 51 - Yurt - Plan View © Metro

Yurts

Overnight structures, or yurts (Year-round Universal Recreational Tent), are facilities which will accomodate use when a more 'refined' camping or inclement weather camping experience is desired. The State of Oregon Parks Department has had an extremely positive response to their installation of yurts in many of their coastal, and other inland, parks. The yurts have proved to be popular due to their 'cozy' feel and the ability to camp during all months of the year.

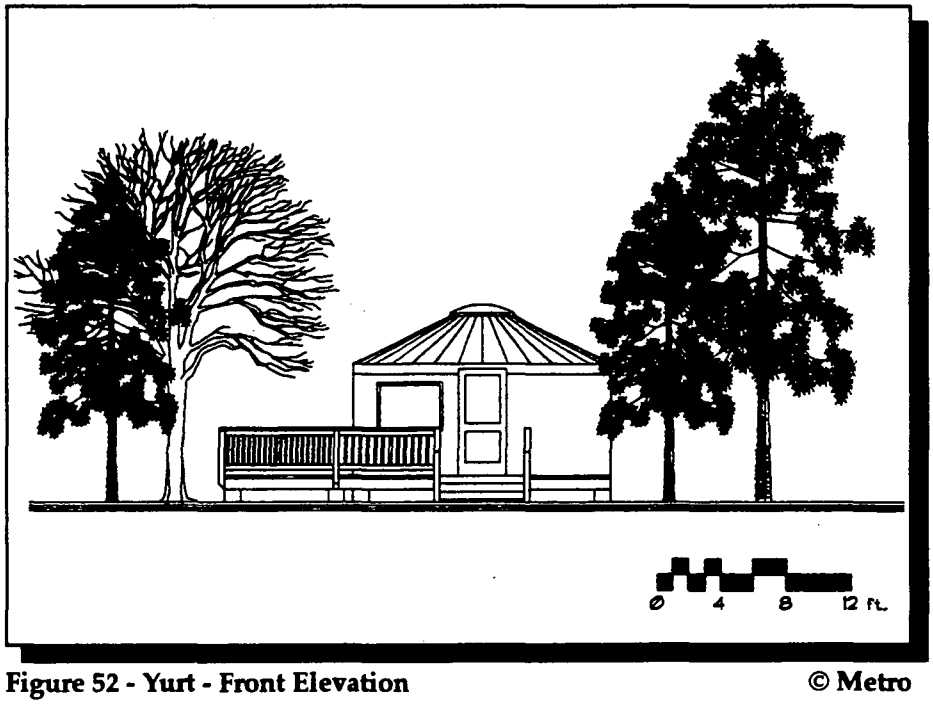


Figure 52 - Yurt - Front Elevation © Metro

Campground Restroom / Shower Facilities (Flush Type):

- Three accessible single occupancy toilet rooms, multiple units for seasonal flexibility. **8' x 10' each**
- Slab on grade, masonry walls, wood roof system with metal roofing.
- Wall hung toilet, lavatory, floor drain.
- Tempered mirrors, electric hand dryers, baby change table (no paper towels).
- Electric lighting and ventilation.
- Freeze protection at some locations.
- Five accessible shower rooms w/ pay shower. **8'x10' each**

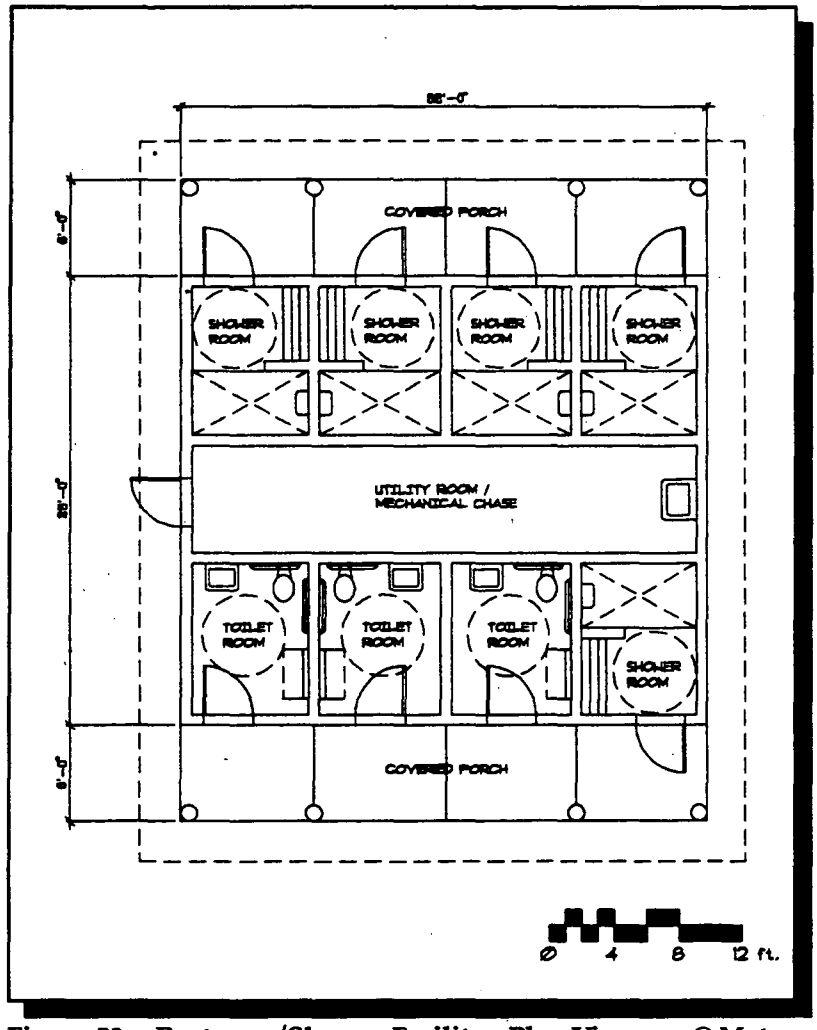


Figure 53 - Restroom/Shower Facility - Plan View **© Metro**

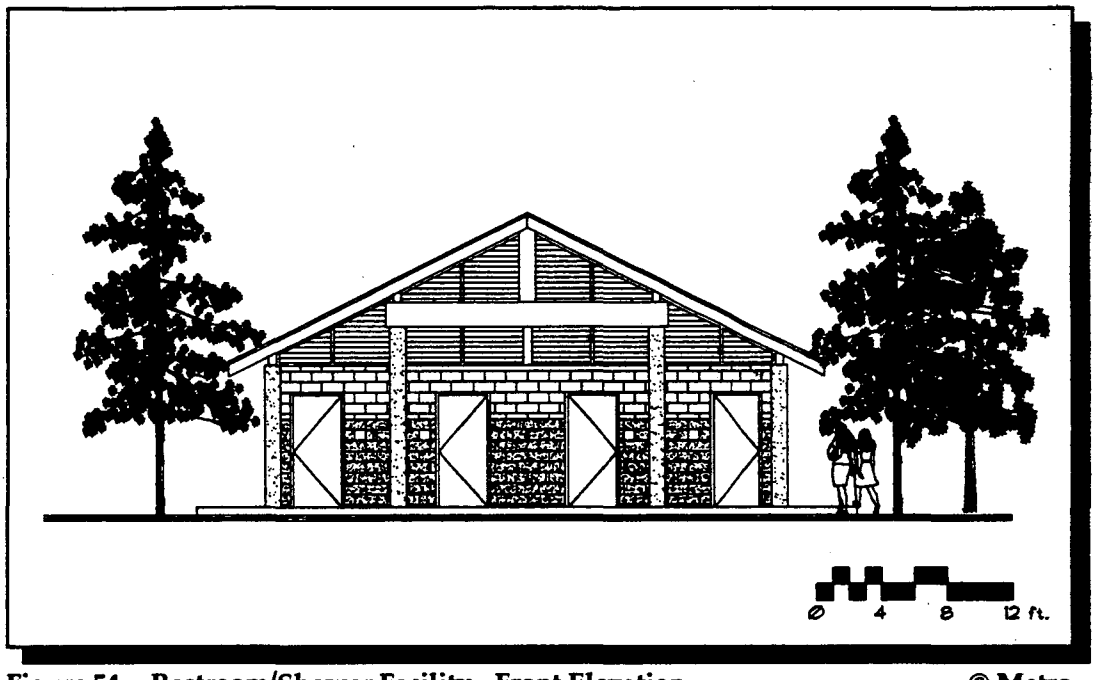


Figure 54 - Restroom/Shower Facility - Front Elevation © Metro

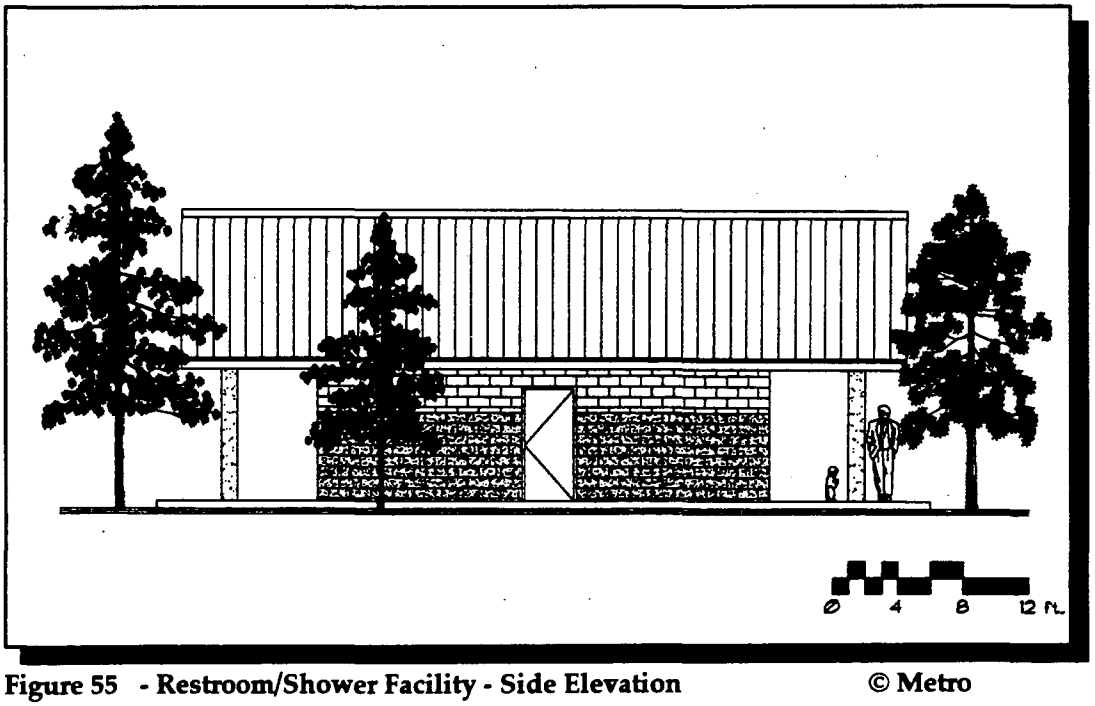


Figure 55 - Restroom/Shower Facility - Side Elevation © Metro

■ INTERPRETIVE PROGRAM / SIGNAGE

Introduction

The proposed interpretive program is intended to encourage fun and new interpretive experiences for visitors at Oxbow Regional Park.

Oxbow Regional Park has amazing stories to tell us of a majestic river, spawning salmon, an ancient forest and all the life in between. Interpretation recommended in this narrative proposes new self-guided experiences to offer all visitors a basic introduction to these stories. Visitors are attracted to Oxbow Regional Park by the Sandy River's outstanding natural beauty and scenic setting. Interpretation in this plan is consistent with retaining this majestic setting.

Site parameters, an overview of neighboring facilites, key issues relating to interpretation, a further discussion of interpretive media recommendations and a complete interpretive narrative for Oxbow Regional Park are located in Appendix G.

Overall Interpretive Planning Goals

- Provide improved visitor orientation.
- Offer self-guided interpretive opportunities in order to introduce a majority of visitors to key Oxbow Regional Park features and stories.
- Provide facilities to serve current educational programs and increase use during off-season months.
- Provide quality interpretation and educational media and experiences to increase visitor appreciation and sensitivity to Oxbow Regional Park's river and forest environment and the importance of this habitat to fish, wildlife and people.
- Provide educational opportunities which also promote visitor self-discovery, contemplation and appreciation of the surrounding natural beauty.
- Promote respectful attitudes and behavior toward Oxbow Regional Park in order to maintain the integrity of the natural environment and visitor services it provides.
- Enhance and increase visitor enjoyment of Oxbow Regional Park by providing barrier-free, interpretive opportunities.
- Demonstrate excellence in design and construction of interpretive sites and facilities to blend with the natural setting.

Visitor Objectives

The following objectives outline the intended visitor experience for interpretive facilities, media and programs related to the rich natural history of Oxbow Regional Park. These should answer, "What do we want to encourage visitors to know, feel, and do while at Oxbow ?."

Knowledge

Visitors should have the opportunity to know:

River

Oxbow Regional Park is the heart of the Sandy River Gorge, where the river meanders to connect forest, wildlife and people.

The wild and free flowing Sandy River is part of an intricate web of life.

The special qualities of the Sandy River have been nationally recognized in its' designation as a National Wild and Scenic River.

The drinking water for most Portland residents originates within the 508 square mile watershed of the Sandy River.

Salmon

Salmon serve as barometers of watershed health.

In an age old cycle, fall Chinook return to their spawning grounds within Oxbow Regional Park bringing nutrients as they link ocean to river to forest.

There are several physical characteristics of the Sandy River which are critical to survival of salmon.

Ancient Forest

Oxbow Regional Park's ancient forest is a remnant pocket of habitat for a unique array of life which exhibits fantastic and interesting relationships.

A Pacific Northwest ancient forest can be recognized by the presence of certain physical characteristics.

Wildlife

Oxbow Regional Park is a crossroads, corridor and contiguous habitat for a wealth of wildlife.

Tracks and traces reveal the secret lives of animals.

People and wildlife have been coming to Oxbow Regional Park for thousands of years.

Oxbow Regional Park's plant, fish and wildlife occupants are a valuable part of Oregon's heritage and are protected by laws.

General Orientation

There are specific locations to easily explore and learn more about Oxbow Regional Park's forest, river, salmon and wildlife stories.

Attitudes

Visitors should have the opportunity to feel:

A sense of discovery , adventure and solitude in exploring the Ancient Forest, and sections of the Sandy River within the park.

A sense of awe in walking exploration of the Ancient Forest.

A sense of excitement in searching for wildlife and their signs.

A sense of encouragement to slow down, let go of busy agendas and patiently observe the wild spirit of nature.

Actions

Visitors will have the opportunity to:

Be oriented by a map, directional information and interpretive messages to self-discover the stories of Oxbow Regional Park.

Use interpretive media to successfully locate key river and forest features as well as evidence of fish and wildlife inhabitants.

Self-explore Oxbow Regional Park to observe fish, birds and wildlife in natural settings.

Celebrate the return of the salmon each fall and commemorate year round their contribution to the richness of river, forest and human culture.

Easily access an interpretive trail to explore the Ancient Forest.

Overlook the Sandy River and utilize self-guided media to be introduced to the

river's constantly changing personality and the wealth of life it supports. Participate in a naturalist conducted activity such as campfire talk or hike to learn the rivers' hidden stories.

Leave trees, rocks and other fish and wildlife homes in place and discourage others from vandalizing natural resources.

Participate in environmental education or interpretive programs to learn more in-depth information.

Interpretive Themes

The following major theme and five supporting sub-themes propose a message organization for Oxbow's most significant stories to be told through self-guided media.

Major theme

Oxbow Regional Park is the heart of the Sandy River watershed, where the river meanders to connect ancient forests, fish, wildlife and people.

This is the big picture story that conveys the river personality observable within Oxbow Regional Park. The Sandy Rivers' natural beauty and pristine values have been formally recognized in its' designation and protection as a National Wild and Scenic River. The river bisects the park on its journey from the Cascade Mountains to the gateway of the Columbia River Gorge. The park lies in the geographic heart of the Sandy River Gorge. Ancient forests grace the banks of the river. River oxbows are notorious for their rich fish and wildlife personality and Oxbow Regional Park is no exception. The park is less than an hours drive from the homes of more than a million people, and the Sandy River watershed provides drinking water for much of the region.

Sub-theme

The Sandy River has formed and shaped Oxbow Regional Park via catastrophic events and the steady forces of gravity and erosion.

The Sandy River is fed by glaciers on the eastern flanks of a volcano. At the upstream end of the park, the river flows break free of the canyon to bend and meander, forming oxbows. Over eons, the river has carried huge floods of sand and rock from the volcano, and created the terraces that form Oxbow Regional Park. The park is a participant in the rivers' sudden catastrophic events, including volcanic floods and hundred year floods.

Sub-theme

Tracks and traces reveal the secret lives of animals.

The Sandy River offers a contiguous corridor of habitat from glacier to it's mouth at the Columbia River. The river corridor and surrounding forests offer connected habitat for many species that is critical to their survival. Oxbow Park is an entryway to a wildlife corridor that extends to the Cascade Mountains. It is a magic door to wildness, supporting a wealth of wildlife populations including cougar, bear, mink, river otter, beaver, red fox, flying squirrel, and osprey. This story focuses on the natural history and behavior of the various wildlife inhabitants by encouraging visitor exploration of animal signs and tracks. In order to read the subtle signs left by animals, visitors must be encouraged to slow down and detach from hurried agendas to be open to subtle and unexpected discoveries.

Sub-theme

Oxbow Regional Parks' ancient forest offers a precious pocket of habitat for a unique community of life that is in fast decline.

One hundred sixty acres of Pacific Northwest ancient forest grace the banks of the Sandy River within Oxbow Regional Park. This forest offers the largest, easily accessible example of old-growth in the region. Visitors find themselves surrounded by large trees and the sky becomes layered with branches of the forest canopy. Here visitors observe large diameter trees, huge nurse logs and search for the unique diversity of insects, plants, birds, amphibians and a myriad of micro invertebrates to be found here. This is the story about how an old forest functions. The forest structure and physical characteristics of forest inhabitants are given focus through ecological relationships, such as dependence on large diameter trees, long life of standing "dead but life giving" trees, how trees "comb" moisture from the sky and the interactions between all that live here from microrhizza to mushroom, flying squirrel to winter wren.

The Oxbow ancient forest story also includes the river relationship with the forest and how both are influenced by the other. Water quality, temperature and salmon habitat are all affected by the presence of the forest. The forest in turn is affected by the river through periodic flooding. The on-site interpretive story should avoid text book or museum depth of information and rather focus on what is observable and site specific to the ancient forest inhabitants of Oxbow Regional Park.

Sub-theme

Since the ice age, Chinook salmon return to their ancestral spawning grounds within Oxbow Regional Park, inspiring celebration, participating in the web of river life, and bringing fertility to the soil with their decaying bodies.

Chinook salmon have returned to this Pacific Northwest river for many thousands of years, bringing life from the ocean and adding fertility to the volcanic soil with their decaying bodies. Here people can witness their ancient procreation ritual and learn what salmon need to continue to thrive in this environment. Visitors have an exciting opportunity to observe salmon in their natural habitat and learn about their life cycle.

The story of salmon includes messages currently given in guided talks and in "School of Fish" presentations on migration, spawning behavior and related adaptations. It includes ecology of fish stocks, and importance of water quality and healthy riparian and river systems. An attempt should be made to discuss salmon from a seasonal approach to make the story interesting for those who visit during the winter, spring and summer months.

The relationship of salmon within the river web of life is also a focus of this theme to connect salmon to aquatic insects, osprey and other birds, and other fish and wildlife who inhabit the river. The more detailed story of the river used with educational groups communicates that the river is full of tough yet fragile life forms, detailed and interesting to look at, that form an intricate web of life connecting plants, insects, fish and wildlife.

Sub-theme

Descendants of the first peoples in North America made seasonal camps on the terraces of the Sandy River. Using ingenious and artful tools, these people gratefully harvested the rich resources of berries, redcedar bark and wild game.

Human eyes were first laid on the land which is Oxbow Regional Park many thousands of years ago. This story will be told partly in self-guided displays but mostly in live programs, both at the environmental education center. Current hand-on programs in which visitors use and make indigenous artifacts will be continued and expanded. These programs give visitors a chance to interact with the park resources while exploring a different cultural viewpoint, that of tribal hunter-gatherers.

■ Trail Network

Trails

The trail system within Oxbow Regional Park is one of the major recreation features. Many of the park users come to the park specifically to enjoy the natural setting by utilizing the trail network.

Based on recommendations of the 1992 Trails Advisory Committee and provisions related to the Master Plan, a trails map is illustrated in Figure 56. The trails map incorporates existing trails and provides for an additional main looped trail route in the group and individual day use areas. As noted on the trails map, there are three levels of trail accessibility. These levels include: easy, moderate, and difficult.

During the master planning process, it has been noted that the existing trails are in need of corrective measures. It should be understood that an inventory of site specific problems on each of the trails is beyond the scope of this Master Plan. Based on observations made by consultants, and input from the staff and the public, the following are recommendations:

- A funding and work program needs to be adopted to insure trails are brought up to acceptable standards and are consistently maintained.

- In the Ancient Forest area, there is evidence of root compaction, degradation of the trail edges and social trails in the swamp area. These problems should be addressed.

- Erosion is occuring on trails due to the lack of adequate drainage provisions. Improvements need to be made to redirect water away from the trail surface or to allow water to drain.

  Typical techiques may include:
  - Aspahlt or compacted gravel surfacing (easy trails)
  - Uphill ditches with culverts under trails or lead off ditches
  - Crushed rock base (3-6") with filter fabric and with surface rock (3/4" minus) on top
  - Wood split plank puncheon walkways
  - Wood walkways raised above grade
  - Rock or log water bars across trails to direct water off trail surface
  - Barriers (rock and log) along edges of switchback trails

- The following trail standards should be utilized where appropriate:

All-Abitlities Recreation Trail Classification

Category	Easy-1	Moderate-2	Difficult-3
Width (min.)	48"	36"	28"
Running Slope	5%	8.3%	+12.5%
Max. Slope	10%	14%	20%
(for a dist. of)	50'	50'	5'
Passing Space Interval (max.)	20'	300'	400'
Rest Area Interval (max.)	400'	900'	1200'
Surfacing	Asphalt & Compacted Gravel	Gravel & Native Material	Native Material

BIG CREEK
SANDY RIVER
GORDON CREEK ROAD
RICKERT ROAD
GORDON CREEK ROAD
BUCK CREEK
SANDY RIVER
HOSNER TERRACE
SE OXBOW PARKWAY
SANDY RIVER
SANDY RIVER
GORDON CREEK
TROUT CREEK
Possible Future Trail Extension To Nature Conservancy Properties
SE OXBOW PARKWAY
SE OXBOW PARKWAY
HOMAN ROAD

LEGEND

- PARK BOUNDARY
- ROAD
- SANDY RIVER
- CREEK
- TRAIL HEAD
- INTERPRETIVE STATION

TRAIL KEY

- PEDESTRIAN ONLY
- PEDESTRIAN & BICYCLE ONLY
- PEDESTRIAN & HORSE ONLY
- PEDESTRIAN, HORSE & BICYCLE
- EMERGENCY & MAINTENANCE ACCESS

ALL-ABILITIES RECREATION TRAIL CLASSIFICATION

CATEGORY	EASY-①	MODERATE-②	DIFFICULT-③
WIDTH (MIN.)	48"	36"	28"
RUNNING SLOPE	5%	8.3%	+12.5%
MAX. SLOPE (FOR DIST. OF)	10% 50'	14% 50'	20% 50'
PASSING SPACE INTERVAL (MAX.)	200'	300'	400'
REST AREA INTERVAL (MAX.)	400'	900'	1200'
SURFACING	ASPHALT & COMPACTED GRAVEL	GRAVEL & NATIVE MATERIAL	NATIVE MATERIAL

NORTH

0 300 600 900

SCALE IN FEET

FIGURE 56 - TRAILS MAP

■ Habitat Enhancement

As discussed in the previous section, the overall existing condition of vegetation within Oxbow Regional Park appears to be healthy. The current balance of human uses and the landscape appears to be capable of supporting viable populations of resident species native to the area. However, to protect and enhance the existing habitat, a number of corrective and preventative measures should be implemented. The following is a list of issues which should be addressed:

Potential conflicts:

- Increased access or use of the Ancient Forest or Elk Meadow may limit or impact wildlife use of these areas.

- The flood plain area is utilized by many mammals. Some of these species are very sensitive to human presence. Therefore, no new trails or development should occur in this area.

Enhancement:

- The current river access points in the main portion of the park require corrective measures and re-vegetation to prevent erosion and maintain vegetation diversity. Limiting human access by placing natural rocks and logs and replanting open areas will help alleviate some random access points. Hardening of some access points by installing concrete open-block with sand or gravel to develop a firm walking surface may help areas where foot traffic is eroding loose soils. The bank upstream from the boat ramp will require an engineering appraisal. Techniques to consider would be the placement of filter fabric "pillows" planting each layer with willow cuttings and placement of tree root diversion barriers.

- An effective integrated noxious weed management program for the park, consistent with any current state or county policies should be developed and implemented. Exotic/noxious plant species occur in some areas of Oxbow Regional Park physically displacing native species, which reduces native bio-diversity (see Appendix E for suggested guidance on developing a weed management program).

- Retaining the Elk Meadow in a healthy meadow condition will require periodic maintenance. Mowing and fertilization of the meadow will help minimize potential for exotic/noxious plant species invasion.

- The drainage in the Dismal Swamp area has been altered due to flooding and various corrective measures. There is an opportunity to restore wetlands and correct the current flooding problems.

- Along the entry and Ancient Forest road corridors, the existing gravel parking areas are to be removed and re-vegetated with native vegetation.

- The Douglas-fir forest within and surrounding the campground area may benefit from modest thinning. Providing more light into the campground will allow the understory vegetation to grow more vigorously and provide additional privacy between camp sites.

Monitoring:

- Establishment of a long-term vegetation and wildlife monitoring program to evaluate the overall health of the ecosystem and changes in vegetation assemblages, plants, amphibian and reptile, mammal and bird species occurrences and numbers is recommended. An assessment of the ecosystem should be evaluated in order to determine whether management of specific habitats needs to be undertaken at the park. This effort should be undertaken in conjunction with local high schools, community colleges and universities.

Utilities

See Appendix H for a complete technical report.

Water system

Projected Water Demands

Projections of future water demand have been prepared based on past water consumption patterns and proposed facility modifications. Existing water consumption is dominated by irrigation use during the summer months. The installation of flush toilets and limited shower facilities will significantly increase the need for potable water supply. Projections of annual, peak month, and peak day demand have been based on previous visitor and camper records and the number of parking spaces and camping sites to be provided. The projected loading factors are conservative (high) to ensure adequate supply is available to meet peak load demands.

The proposed showers in Oxbow Regional Park are intended for limited use, primarily by overnight campers. Limited use will be encouraged through their location in the vicinity of the campground, proposed installation of pay-per-use controls, and the use of low-flow showerheads.

Projected Irrigation Needs

Projections of future irrigation use have assumed the installation of automatic, timed sprinkler systems. Previous peak month irrigation demands averaged approximately 100,000 gallons per day applied during the weekdays only. The new irrigation systems should reduce water consumption due to more efficient applications; however, total irrigation water demands might increase due to an increase in the irrigated area. Timers may be set to provide for night-time application which will reduce the losses due to evaporation as well as displace the demand to the period when potable demands are lowest.

The proposed irrigation of the day use areas covers approximately 10 acres with an estimated peak weekly requirement of 2" of water for approximately 10 to 16 weeks a year. This equals an estimated weekly irrigation demand of 544,000 gallons. The required water supply depends on the frequency and duration of irrigation application. Assuming application only on the nights before weekdays to limit interference with day-time activities will require sprinkling 14.5 hours/day over five nights based on the existing well pump capacity of 125 gallons per minute.

Summary of Recommended Water System Improvements

Table 7 summarizes the capital and annual costs, advantages and disadvantages associated with three alternatives for water source improvements at Oxbow Regional Park. A detailed alternatives discussion is contained in Appendix H. The recommended water source option for Oxbow Regional Park is continued use of the existing well with the addition of iron and manganese treatment. This well has a reliable

water quantity in excess of projected needs and with treatment can provide the highest quality water available. The continued use of the existing reservoir is also recommended. The existing booster pumping system should be improved to provide for intermittent operation only as demands in the system require. Distribution system improvements include mapping and evaluation of existing facilities along with anticipated replacement of 80% of the existing valves. Additional distribution lines will be necessary to provide service through the proposed campground loop and for the automated irrigation. Water meters should be installed at all points of use to allow monitoring of water demands and loading to wastewater systems. Operational improvements include preparation of a cross-connection control program, consideration of a back-up power supply, and continued training opportunities for the water system operator.

Table 7
Summary of Alternatives for Water Source Improvements for Oxbow Regional Park*

Aspect	Alt. 1 - YMCA Camp Cullen Well	Alt. 2 - Iron/Manganese Treatment for Oxbow Well	Alt. 3 - No Change to Water Source
Capital Cost	$80,000	$120,000	$0
Annual Operation and Maintenance Costs	$5,000	$10,000	Difficult to Estimate: $5,000 to $10,000
Advantages	• Lower capital and annual costs • No water right	• Independent Supply • Good source capacity • Best water quality	• Independent supply • Good source capacity • No capital cost • Extensive historical record of system
Disadvantages	• Limited source capacity so irrigation well required • High fluoride and potential for excessive fluoride (costly treatment) • Coordination among two systems • Limited historical system operation record	• Operation of Iron/ Manganese treatment • Highest capital and annual costs	• High annual cost due to continued water quality problems • Public dissatisfaction with color of water • Staining of restroom fixtures

* Table 7 does not include irrigation costs; see Appendix M for breakdown of irrigation costs for each area.
** includes cost of required irrigation well

SANITARY SYSTEM FACILITIES

See Appendix H for a complete technical report.

General Considerations

The construction of modern flush toilet facilities was a high priority according to a survey of park users and questionnaire received during the master planning process. Provision of limited showering facilities was also desirable to enhance the level of service for camp ground users. Potential on-site sanitary sewer systems should provide for treatment and disposal of the wastewater generated while being protective of the environment, reliable, and cost effective with respect to capital investment, operating cost, and expected useful life.

The surface soils in Oxbow Regional Park are predominately silty-sand and sand and these soils are well suited for the installation of a conventional on-site wastewater systems. The use of a pressurized drain field for wastewater distribution will reduce the potential impacts by providing even hydraulic loading throughout the application area. More intensive processes for wastewater treatment and disposal such as conventional mechanical treatment plants are not appropriate for a recreational facility and have not been considered. Analysis has been limited to on-site sewage systems.

It is desirable to provide convenient access to unisex toilet facilities (see Table 8) for the park's users so a combination of conventional septic systems and vault toilets is proposed. The limited use of vault toilets will provide for a balance between the high construction cost of conventional systems and the higher operational cost of vault toilets.

The basic on-site sewage treatment system consists of a septic tank for primary treatment and separation of wastewater solids followed by a drainfield for subsurface treatment and infiltration. Conventional on-site systems (see Table 9) are well suited for Oxbow Regional Park given the suitability of soils at Oxbow Regional Park for conventional systems and the successful use of these systems for YMCA Camp Collins. A pressurized drainfield system may be considered. This modification provides for more consistent application as discussed above.

Important considerations for the development of conventional on-site systems include the design wastewater flows and availability of sites for drainfields and replacement areas. The existing park provides significant areas of open space ideally suited for construction of drainfields. The drainfield and replacement reserve areas must be protected from activities such as vehicle traffic, which could impair the soil's ability to provide effective treatment. It is possible that for one or more of the proposed restroom sites that the location of a drainfield area will not be immediately available. It is possible to pump the wastewater to locations in the near vicin-

ity where such sites may be located. The use of multiple on-site systems, one per source of wastewater, provides for flexibility of operations when one system may be out of service for routine maintenance repairs, or to allow the drainfield to rest. The normal weekly and seasonal variation in wastewater flows will automatically provide for routine recovery of infiltration and treatment capabilities and should extend the useful life of the drainfields.

The on-site systems will require only limited resources for operation and should provide reliable and effective treatment. The septic tanks will require periodic monitoring to measure the accumulated solids to allow for pumping as needed. The volume of materials to be pumped should be less than that found in the existing pit toilets as the tanks will provide for more effective reduction in the volume of materials through natural decomposition and through normal discharges to the drainfield.

The proposed facilities will still include the installation of 8 unisex vault toilet systems in areas where they will provide convenient access and the anticipated demands do not warrant investment in installation of conventional septic systems. The proposed vault toilet locations will not include placement inside setbacks from the river or the existing well. The locations should also readily provide the required 4' separation from groundwater. The existing pit toilet located within the flood plain (Group Camp 3) will be removed. The proposed locations all presently have truck access which will allow for removal of accumulated wastes as necessary.

Greywater disposal systems will be necessary for the sink installations proposed for the group picnic shelters and camp sites. The shelter systems should provide a receiving chamber, settling chamber, and either a seepage chamber or disposal trench. The greywater systems for the new camp sites should be designed to eliminate clogging and backup problems and be clearly marked to discourage disposal of inappropriate wastes.

Projected Wastewater Flows

Estimates of wastewater flows have been based on the guidelines in the Oregon statutes for on-site systems. These flow values are not simply measures of hydraulic flows, but also include an adjustment factor for the anticipated strength of the wastewater.

Design of on-site facilities is based on the peak daily flow values. Wastewater loadings at Oxbow Regional Park will vary widely both on weekly and seasonal cycles. This will result in much lower average rates over the long-term. It is proposed that the wastewater treatment facilities be generally designed based on the peak month loading values plus extra total capacity for all systems to account for uncertainty in the actual allocation of the wastewater flows among the various systems. Providing 50% excess capacity over the design value month peak actually results in total flows equal to the peak day estimates. To further provide for moderation of peak flow and allow for routine resting and recovery of the subsurface infiltration surface, the following design criteria are proposed: construction of multiple drain fields to allow intermittent application among them, monitoring ports to allow observation of ponding due to reduced infiltration, effluent filters in the septic tanks to reduce solids carryover, pressurized distribution to ensure even dosing, and hour meters on the dosing pumps to allow for monitoring of total loading to each bed so they may be cycled regularly. Water meters should also be installed on all facilities which discharge to the on-site systems to allow for measurement of the actual flows to the drainfield. These measures should ensure that the systems are capable of providing for peak day loadings in excess of the design values and allow for recovery of the systems for long lifetime.

Wastewater System Installations

The locations of the proposed wastewater facilities will depend on the actual locations of the restroom facilities and the location of areas well-suited for drainfields. The allocation of the design loadings were based on estimated loadings to each facility according to the following factors: seasonal variation in demand, potential for high peak demand loadings, parking availability and level of use in the area, and the number of toilets and showers to be served. Overall, the values were based on peak monthly design flows plus 50% for a total park watewater capacity equal to the estimated peak day demand. Estimates of drainfield area have been based on a soil classification A, 2' wide trenches 8' on center with the intervening space representing the reserve drainfield area.

Table 8
Summary of Other Wastewater Systems for Oxbow Regional Park

Location	Unisex Restroom Vault Toilet Per Unit
Flood Plain Trail Head	1
'Hosner Hole' River Access	2
Dismal Swamp Day Use Area	2 1
Individual/Family Day Use Area	1
Campground (Two Sites)	2 2
Group Camp 2	2
Total	8 structures

Table 9
Summary of Conventional On-Site Wastewater System Installation for Oxbow Regional Park

Location	Flush Restrooms/ Showers	Design Flow (gal/day)	Drainfield Area (ac)
Park Office	1 Unisex/0	1,000	.06
Arrival Area Restroom	2 Unisex/0	3,000	0.18
Environmental Education Center	2 women & 2 men	4,000	0.24
Group Picnic Area	6 Unisex/0 6 Unisex/0	3,000 3,000	0.18 0.18
Boat Ramp	6 Unisex/0	5,000	0.31
Group CampGround	3 Unisex/5	7,000	0.43
Campground	3 Unisex/5	7,000	0.43
Total	2 Mens' 2 Womens' 27 Unisex Restrooms 10 Unisex Showers		

Electrical System

The existing primary metering will not meet the needs of extending services beyond the well pump. Secondary metering will be required at each new pad mounted transformer. The existing high-voltage line can be tapped at the first vault and run back to the new toilet at the west end of the developed area. The high-voltage line can also be tapped at the vault at the well pump to run to the east. A vault with tap capabilities is required each 400-500 feet. New transformers with meters will be placed at toilets, environmental education building, host site, and yurts. Refer to Sheet E1 (in the Appendix J) for layout details. Sheet E1 shows both new and old roads. It is the intent to run the high-voltage line along the old road bed as this is a more direct route.

Phone Service

Phone service is currently limited to the upper entry area. As facilities are developed underground phone service should be provided for the environmental education building and the camp host site. A public pay phone should also be provided at the entry to the campground.

ADA Compliance

All new park improvements must meet the requirements of the American with Disabilities Act (ADA). As phased improvements are made throughout the park, it is recommended that accessibility be incorporated into the design revisions. Recommended special provisions may include:

- Additional handicap parking spaces at the lower portion of the River Access Area(Boat Ramp).
- An accessible fishing area as an extension to the existing area.
- Accessible trail systems at varying ability levels.
- Fully accessible Ancient Forest loop trail.
- Assisted listening devices for amphitheater, park programs, tours, etc.
- Existing play areas revised to meet current standards.
- Accessible picnic and camp areas to include all shelters.

Parking

As noted in the description of the Master Plan components, parking has been distributed throughout the park in proportion to the anticipated uses. Table 10 outlines the existing and proposed parking in each of the major areas of the park.
The following are important points:

- Overall parking in Oxbow Regional Park has been increased by approximately 1.3%.
- The Master Plan has shifted parking away from the entry corridor and the Ancient Forest area to the lower terrace area.
- Of the 902 spaces shown in the Master Plan, 527 are designated permanent parking spaces and the remaining 375 spaces are overflow parking.

Overflow parking will be provided in large turf areas.

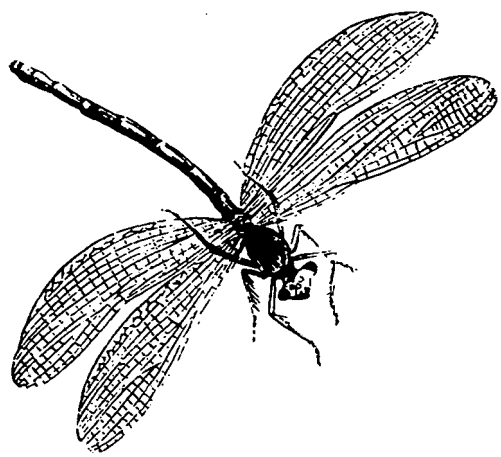
- Designated parking areas off the main road will enhance the aesthetic quality of the park while increasing safety for park users.
- Vehicle/horse trailer parking on the north side of Homan Road, near the existing equestrian trailhead, should be widened to safely accomodate parking of 6 vehicles with trailers. Work with Multnomah County Transportation Department for road and right-of-way improvements.

Table 10
Existing / Proposed Parking for
Oxbow Regional Park

	Location of Existing Parking	Parking # to Remain	Parking # to Relocate	# to Add	Total Parking	% Change
Entry Area	7D	7	-	-	7	0%
Flood Plain Trail Head	22D	15	-	-	15	0%
Horner Hole Area	15R 36D	30	-21	-	30	-12%
Upland Swamp Area	14R 50D	45	-19	-	45	-22%
'Ancient Forest'	3R 70D	0	-73	-	0	-18%
Individual Day Use/Boat Ramp	72R 202D	72 202		+33	307	+11%
Group Picnic	234D	234	-	+68	302	+23%
Overflow Camping	10	6	-4	-	6	-40%
Campground	90	90	-	+40	130	+45%
Group Camp Rowing #1	45	40	-5	-	40	-11%
Walk-in Camp	15D 5R	20	-	-	20	0%
Total	890	761	-122	+141	902	+13%

Existing Parking Breakdown
R = River Use Parking
D = Individual Day Use Parking

IMPLEMENTATION



IMPLEMENTATION

Finance

The financial aspects for the recommended Master Plan improvements have been projected. The following are summaries of anticipated operating expenses and revenue. A preliminary cost estimate for individual Master Plan components is contained in Appendix M.

Although the consultant team has been diligent in reviewing the existing and proposed financial implementation of the Master Plan improvements, it should be realized there are a wide range of variables which may influence the actual financial outcome.

The proposed Master Plan improvements will be achieved in phases and as funding becomes available.

OPERATING COST / REVENUE

The following is an analysis of potential costs and revenues for Oxbow Regional Park when all of the recommended improvements are made. A summary of the costs and revenue projections are shown below in Table 11. The assumptions and background information used to calculate each line item is found in Appendix I. The costs and revenue items are based on fiscal year 1996-1997 dollars.

Table 11
Summary of Potential Operating Costs and Revenue
Oxbow Park Master Plan

Budget Item	1996-97 Year	Forecasted Year
Revenue	$140,925	$220,776
Operating Cost	$347,864	$375,546
Net Operating Deficit	$206,939	$152,270
Deficit Rate	59.5%	40.8%

POTENTIAL OPERATING REVENUE

A breakdown of the potential operating revenue from program fees is summarized in Table 12 below. Appendix I contains a list of the assumptions and calculations for each program. Table 12 does not list other resources such as Glendoveer Golf Course receipts, Oregon RV Registration Fee revenue, and the County Marine Fuel Tax. These items come to the County as lump sums and are distributed to individual parks depending upon need. However, a breakdown of these fees is shown in Appendix I.

Table 12
Summary of Potential Operating Revenue
Oxbow Park Master Plan

1996-97 Revenue Source	Forecasted Budget	Revenue (1)
Program Fees		
Entry Fees	$70,055	$81,326
Camping Fees	$25,612	$46,200
Environmental Education Programs	$18,576	$27,800
Group Reservation Fees (Shelters)	$12,925	$25,800 (2)
Group Reservation Fees (Open Areas)	-	$2,400 (2)
Firewood Sales	$5,365	-
Yurts	-	$18,250
Shower Revenue	-	$9,100
Miscellaneous Revenue	$1,110	$1,400
Total	$140,925	$220,776

(1) Based on 2nd year of operation with all improvements completed.
(2) Includes $3 entry fee.

POTENTIAL OPERATING COST

A summary of the potential operating cost for Oxbow Park is shown below in Table 13. The appendix contains a list of the assumptions and calculations for each cost item. For personnel costs, the current budget was used as the base. From this, time savings and increases were calculated based on the new facilities added to the park. This analysis is found in Appendix I.

Table 13
Summary of Potential Operating Cost
Oxbow Park Master Plan

Cost Item	1996-97 Budget	Forecasted Cost
Personnel Costs (1)	$266,082	$273,096
Office Supplies	$1,395	$2,000
Park and Equipment Supplies	$12,096	$17,000
Merchandise for Sale (Food)	$4,700	$5,200
Training Costs	$1,105	$1,400
Utilities	$14,082	$19,100
Maintenance Services	$1,124	$3,850
Printing / Communications	$2,050	$4,100
Payment to other Gov't. Agencies	$45,230	$49,800
Total	$347,864	$375,546

Costs based on 1997 dollars. Inflation and potential labor rate increases are not included

■ Project Phasing

The available construction capital for initial development from the 1995 Bond Measure is limited to approximatley $1.25 million. Although a very significant investment, it represents only 15% of the capital required to fully implement the Master Plan improvements. Therefore, a phased development will be required. In addition, Metro has established a special fund for the planning and development of the Environmental Education Center. Currently there is approximately $200,000 available and plans are underway to raise the remaining needed funding within 3 to 5 years. The size and functions of the Environmental Education Center will be closely scrutinized prior to final design and engineering. Wherever possible, park staff and volunteers will perform some of the less technical construction activities to offset implementation costs. Activities may include grading, planting, turf installation and maintenance yard clean up.

To avoid closure of the park, a development sequence will be utilized to minimize access closures and disturbance to existing facilities. Also, work will be scheduled to avoid peak season use of the park.

As a rule, old facilities will be demolished only as new facilities are added. Over time, most if not all of the existing pit toilets will be removed. During removal, earth pits should be filled with granular fill, covered with soil and revegetated.

The consultant team, in coordination with Metro staff and the Project Advisory Committee has formulated a tentative development program which is subject to change. The anticipated approach is outlined in the following three phases.

Phase I Improvements: Years 1-2

The initial focus will be to upgrade the basic park infrastructure to include the water system (potable and irrigation), electrical system, and septic drainfields to service Phase I restrooms. This phase would provide new restrooms in the campground (Area N) with flush toilets and showers and a new restroom building at the park entry (Area B). Development of the entry area restroom should be coordinated with the design of other entry area improvements. Following infrastructure improvements, the main park road will be relocated between Group Picnic Area A and the turnaround. The road relocation would include the development of new parking areas, modifications of the existing road to a trail/service road, and the necessary revisions to grass areas. In addition, the new group camp area south of the turnaround and the campground would be developed.

Also at the entry area, six overflow campsites would be established.

In addition, a number of existing structures will need to be removed or improved to comply with safety and current building codes. The following is a list of Phase I improvements:

- Construction design and engineering for Phase I improvements
  - Incorporate interpretive media and trail improvement design where relevant
- Site development/clearing for Phase I improvements
- Electrical upgrades
  - Main line
  - Vaults
  - Transformers
- Water system upgrades including irrigation separation
- Entry / Maintenance Area
  - Restroom
  - Overflow camp sites
  - Maintenance yard clean-up
- Road Realignment
  - Area from Picnic Area A to turnaround
  - Remove Group Camp 1 shelter
  - Rough in parking areas
  - Clear areas for future phases
- Ballfield relocation
- Develop Group Camp Area 1 (south of turnaround)
- Campground development
  - Restrooms/showers
  - Host site
  - Additional campsites
  - Reconfiguration of existing campsites
  - Build road from turnaround to campground entrance
- Fundraising for Environmental Education Center

Note:
Temporary relocation/discontinuation of use may result from Phase I improvements.

Phase I Permits

Proposed Phase I improvements will require compliance with a number of agency permitting requirements. The following is a brief summary of the anticipated Phase I permitting requirements:

Site Work:

- Wetlands delineation
- Corps of Engineers - Fill Permit

- State of Oregon - Fill Permit
- Multnomah County Transportation - Right-of-Way Permit
- Multnomah County- Significant Environmental Concern Permit

Utilities

- Electrical Coordination with Portland General Electric requirements
- State And National Plumbing Codes

Buildings

- Multnomah County Building Permits
- State and National Building Codes

Phase II Improvements: Years 3-4

Phase II improvements would concentrate on revenue generating facilities including picnic shelters and group camping areas. The following is a list of Phase II improvements:

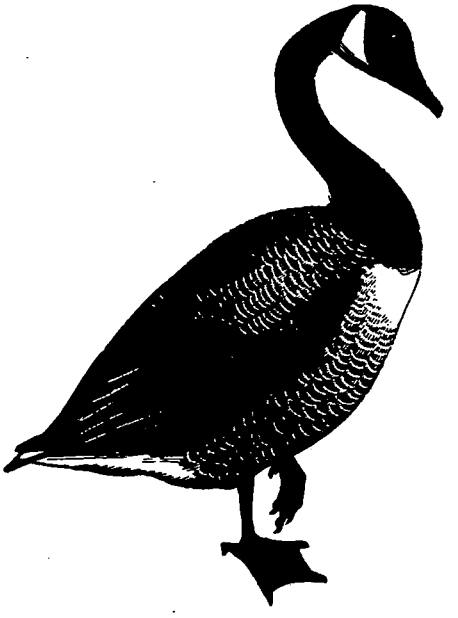
- Construction design and engineering for Phase II improvements
  - Incorporate interpretive media and trail design where relevant
- Site development / clearing for Phase II improvements
- Entry Area
  - Entry booth and gates
  - Relocate maintenance road
- Group Day Use Area
  - Shelters
  - Uncovered picnic areas
  - Restrooms
- Group Camping Areas
  - New group camping area 2 (north of turnaround)
- Individual / Family Day Use Area
  - Reconfigure Picnic Area D
  - Restrooms
- Irrigation installation
- Trail upgrades where necessary

Phase III Improvements: Years 5-10

The continued improvements of the park will be dependent upon available resources. The general strategy will be to first implement revenue producing facilities (i.e. camping areas, group picnic areas and related improvements) and then proceed with improvements area by area to develop general park improvments. The following is a list of Phase III improvments:

- Construction design and engineering for Phase III improvements
  - Incorporate interpretive media design where relevant
- Site development / clearing for Phase III improvements
- Entry Area
  - Office
  - Orientation shelter
  - Residence driveway relocation
  - Maintenance yard improvements
- Road Corridor
  - Restore road edges from Entry Area to Dismal Swamp
- Flood Plain Trail Head
  - Vault toilet
  - Parking
- Hosner Hole River Access/Interpretive Viewpoint
  - Vault toilet
  - Parking
  - Picnic areas
  - Interpretive media
- Dismal Swamp Day Use Area
  - Vault toilet
  - Parking
  - Interpretive media
- Environmental Education Center (may occur during Phase II if funding available)
  - Ancient Forest barrier-free interpretive trail (1/8 mile loop)
- River Access Area (Boat Ramp)
  - Parking
  - Interpretive media
- Group Camp 3 redevelopment
- Homan Road equestrian access improvements

BIBLIOGRAPHY



BIBLIOGRAPHY

Ambuel, B. and S.A. Temple. 1983. **Area-dependent Changes in the Bird Communities and Vegetation of Southern Wisconsin Forests.** Ecology 65(5): 1057-1068.

Ciecko, Charles. 1981. **A Teaching Guide to Oxbow Regional Park.** Multnomah County Department of Environmental Services, Portland, Oregon.

Cameron, Kenneth A. and Patrick T. Pringle. 1991. **Prehistoric buried forests of Mount Hood.** Oregon Geology, Vol. 53, No. 2, pgs. 34-43.

Diaz, Nancy and Dean Apostol. 1993. **Forest Landscape Analysis and Design.** USDA Forest Service Pacific Northwest Region R6 ECO-TP-043-92, Oregon.

Morrison, Michael L., Bruce G. Marcot, and R. William Mannan. 1992. **Wildlife Habitat Relationships.** University of Wisconsin Press, Madison, Wisconsin.

Peck, D.L. 1960. **Cenozoic Volcanism in the Oregon Cascades.** U.S. Geological Survey Professional Paper 400-B.

Ratcliffe, Robert. 1992. **Sandy Wild and Scenic River and State Scenic Waterway Management Plan Environmental Assesment.** USDI Bureau of Land Management, et al. Salem District, Clackamas Resource Area, Oregon.

Ratcliffe, Robert. 1993. **Sandy Wild and Scenic River and State Scenic Waterway Management Plan.** USDI Bureau of Land Management, et al. Salem District, Clackamas Resource Area, Oregon.