Appendix M
Recreation and Aesthetics

Fargo-Moorhead Metropolitan Area Flood Risk Management

Final Feasibility Report and Environmental Impact Statement

July 2011

US Army Corps of Engineers ®

Prepared by:
U.S. Army Corps of Engineers
St. Paul District
180 Fifth Street East, Suite 700
St. Paul, Minnesota 55101-1678

This page intentionally left blank

APPENDIX M – RECREATION and AESTHETICS

Fargo, North Dakota – Moorhead, Minnesota

1.1 PURPOSE

The purpose of this study is to quantify and evaluate recreational resources available to the residents of Fargo, North Dakota, and Moorhead, Minnesota and the recreation potential of the area. This study examines the recreation resources of the two cities and of the area readily accessible to the recreation users: i.e., the area of influence. This area of regional influence is held to recreation resources that can be reached within 1/2 hour or within a 25-mile radius of the population center.

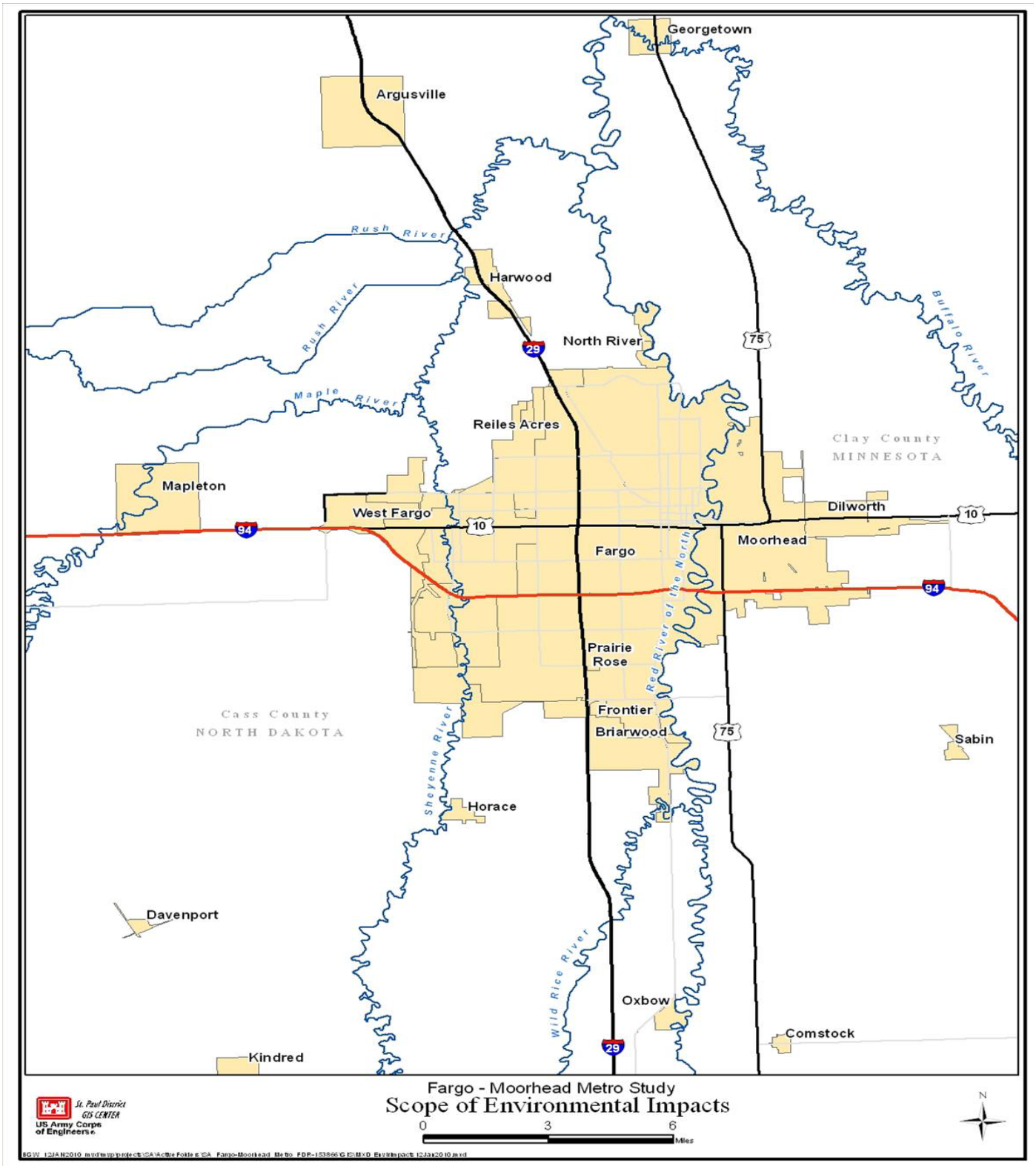
1.2 GENERAL

Fargo-Moorhead is located along the banks of the Red River of the North. The Wild Rice, Sheyenne, Maple and Rush Rivers in North Dakota and the Buffalo River in Minnesota also cross the study area. Fargo and Moorhead are on the west and east banks of the Red River of the North, respectively. The Red River of the North flows north approximately 453 river miles to Lake Winnipeg in Manitoba, Canada. The drainage area of the Red River of the North above the U.S. Geological Survey gauging station at Fargo is approximately 6,800 square miles, of which about 2,175 square miles do not contribute to runoff. Due to the large drainage area and the physiography and climate, these rivers tend to flood frequently. In 2009, the record-setting Red River of the North flood occurred on March 28th. This event was the maximum flood of record in Fargo and crested at a stage of 40.82 feet.

Fargo is the county seat of Cass County. With an estimated 90,599 people living in Fargo, (2000 Census) it is the largest city in North Dakota. Moorhead is the county seat of Clay County and is the largest city in northwest Minnesota with a population of 32,177 at the 2000 Census. Moorhead is bordered on the west by the Red River of the North and its twin city Fargo, North Dakota. On the east, Moorhead is bordered by Dilworth, Minnesota. Together along with West Fargo, North Dakota, the communities comprise the core of the Fargo-Moorhead Metropolitan Area. (The Census Bureau defines the Fargo-Moorhead Metropolitan Area as comprising all of Cass County, North Dakota and Clay County, Minnesota. The metropolitan area has an area of 7,278 km² (2,810 mi²), and its population, according to the 2000 census, was 174,367). The city's largest suburb of West Fargo has nearly doubled in the last six years and this trend is expected to continue.

In recent years, Fargo-Moorhead has seen relatively strong growth both in population and economic activity. Several businesses now have major operations in the community. It has also had consistently one of the lowest unemployment rates among metropolitan areas of similar size in the United States. This fact along with low crime rate has ranked Fargo on Money Magazine's annual list of most livable cities throughout the late 1990s and early 2000s.

Figure 1 – Project Market Area



The city of Fargo is the crossroads and economic center of a large portion of eastern North Dakota and a portion of northwestern Minnesota. Fargo is a retail, manufacturing, healthcare, and educational center for the region. Fargo is home to North Dakota State University. The city motto is "Gateway to the West" and was founded in 1871.

Fargo is a major transportation hub for the surrounding region. It sits at the intersection of Interstate 29 and Interstate 94. U.S. Highway 81 and U.S. Highway 10 also run through the community and is the home of a major airport. The BNSF Railway runs through the metropolitan area. Amtrak service is provided via the Empire Builder passenger train at the Fargo Amtrak station

Moorhead was platted in 1871 and a permanent name was assigned to the town on October 6, 1871. According to Moorhead's official city website, Moorhead is considered a transcontinental crossing. Interstates 94 and 29 intersect just west of the city limits. While distribution and transfer industries remain vital, education and service industries play an increasingly important role; Moorhead is home to Concordia College and Minnesota State University Moorhead.

1.3 CLIMATE

The study area is in a region classified as a sub humid to humid continental climate with cold winters and moderately warm summers. Rapid changes in daily weather patterns are common. Frequent passage of weather fronts and high and low pressure systems result in a wide variety of weather. The average temperature between November and March is below 32^{o} F, resulting in an average of 185 days per year at or below 32^{o}F. The average temperature of the warmest month, July, is 71.1^{o}F. The annual average normal temperature of 41.2^{o}F reflects the northern location of the study area. On an annual basis, the prevailing wind at Fargo is from the north and northwest. The average annual precipitation in the Fargo area is about 19.5 inches. Nearly three-fourths of the annual precipitation occurs between April and September, with the remainder occurring during the winter. The average annual snowfall is about 50 inches.

1.4 PHYSICAL GEOGRAPHY

The Red River of the North flows generally northward in the fertile Red River Valley, forming a meandering border between North Dakota and Minnesota. The river valley is the bed of the former glacial Lake Agassiz. At its maximum extent, Lake Agassiz was about 700 miles long, 200 miles wide and 650 feet deep. The Red River of the North drains into Lake Winnipeg, which is a remnant of Lake Agassiz. The characteristic fertile soil and exceptionally flat topography in this area are a result of its glacial history. The lack of significant areas of tree cover combined with the absence of vertical relief in the landscape can result in the wind becoming a major factor in outdoor activities of any kind. As a relatively young landscape there are a few small valleys (a few hundred yards wide) along the rivers and even smaller coulees carved by precipitation run-off and creeks. The last natural biota of the region was tall grass prairie; at present, land use is overwhelmingly agricultural.

1.5 EXISTING RECREATION

It is the mission of the Fargo Park District and Moorhead Parks and Recreation Division is to improve the quality of life for all its citizens by providing a comprehensive system of parks, recreation, cultural, and human service programs that encourage health, fitness, relaxation, and cultural enrichment, as well as providing opportunities for conservation, education, and community involvement. Fargo-Moorhead strives to preserve and enhance the land and facilities and look for ways to achieve greater recreational opportunities and connectivity between facilities.

1.5.1 Local Recreation Opportunities

The metropolitan area offers a wide variety of parks and recreational facilities for all ages. The area features neighborhood and regional public parks covering over 3,000 acres, 7 public golf courses within Fargo-Moorhead, and soccer and softball/baseball complexes. Biking and walking trails run for more than 99 miles throughout Fargo, Moorhead and West Fargo. The outdoor public recreation opportunities within Fargo-Moorhead include:

- Ball Fields
- Basketball Courts
- Bocce Ball Courts
- Cricket Field
- Skate Parks
- Sand Volleyball
- Tennis Courts
- Wading Pools
- Dog Parks
- Disc Golf
- Fishing
- Outdoor Skating Rinks
- Camping
- Picnic Shelters
- Neighborhood Parks

- Golf Courses:
  The Meadows, Village Green, Edgewood, El Zagal, Osgood, Prairiewood and Rose Creek

- Canoe landings:
  M.B. Johnson Park, Convent Landing and Dike East. Canoe and Kayak rentals are available through River Keepers at the S.S. Ruby pontoon dock.

- Cross Country Ski Trails:
  Fargo-Moorhead offers many groomed ski trails throughout the city: Edgewood Golf course, Dike East to Lindenwood Trail, Rose Creek Golf Course Trail, Prairiewood Golf Course, Woodlawn Park, Viking Ship/Riverfront Park, Gooseberry Park, River Oaks Park and M.B. Johnson Park.

- Multi-Use Trail System:
  The Fargo-Moorhead Park and Recreation District/Division along with Metro COG, strive to provide a comprehensive trail system for the community. This trail system not only provides a plethora of recreation opportunities but is vital to the metropolitan area's Short and Long-Range Metropolitan Transportation Plan as well as the Bicycle and Pedestrian Plan. The Fargo Park District's goal for the trail system is to provide safe and enjoyable trails for bicycle riders, walkers, runners, and in-line skaters. The trail system also has four bridges complementing the recreational trails. Three bridges connect the Fargo and Moorhead park systems over the Red River at Oak Grove, Lindenwood Park and Dike East. The bridges at Oak Grove and Lindenwood are typically in use June-February, weather permitting. The bridge at Dike East is typically in use June-October, weather permitting. The fourth bridge is over the Sheyenne River near Osgood and is open year round. Typical examples of a multi-use trail are the Red River Trail (approx. 5 miles) and the Milwaukee Trail (approx. 3 miles). These asphalt trails are scenic, popular and are used as both recreational and commuter routes for bicyclists.

- Regional/Community Parks:
  The Fargo-Moorhead area boasts of numerous parks. Below is a list of notable places of interest:

  M.B. Johnson
  M.B. Johnson Park is located on the north side of Moorhead along the Red River. The park is made up of approximately 106.6 acres consisting of a combination of mowed lawn area, wooded slopes approaching the river, and a wetland.

  Centennial
  Centennial Park is an athletic park located on both sides of 15th Avenue N approximately ½ mile east of CSAH 3. The park consists of baseball and softball fields, football fields and a newly constructed dog park.

  Viking Ship, Riverfront, Memorial and W. H. Davy
  These four parks connect along the riverfront on the north side of downtown Moorhead to create a large linear park area with a variety of facilities. One of the most heavily used facilities of this park system is the bike trail along the Red River.

  Woodlawn
  Woodlawn Park is located along the Red River immediately south of downtown Moorhead. The park is a very popular facility, mainly due to its Frisbee golf facility. A baseball diamond, wading pool, playground, tennis courts, and basketball court are also provided.

  Gooseberry Mound
  Gooseberry Mound Park, commonly known as Gooseberry Park, is also a large riverfront park. Two large picnic shelters and a large playground are the main attractions to this facility.

Horizon Shores
Horizon Shores Park is designed around a water feature. The water feature serves as storm water retention for the surrounding development. The water feature is split into three distinct segments by two collector streets that cross it.

Southside
Southside Park is located north of 40th Avenue S. and east of 20th Street S. This park consists of soccer fields, youth baseball diamonds, and picnic shelters, parking lots, bike trails and a 10-acre storm water retention pond.

Iwen
Iwen Park is located at 52ne Ave S and the Red River in Fargo. This park is a 9-hole disc golf course that is very popular.

Lemke
Lemke Park is located at 32nd Ave S along the Red River in Fargo. This park consists of a playground, outdoor skating and a warming house.

Lindenwood
Lindenwood Park is a popular park and is located at 5th Street S along the Red River in Fargo. This heavily wooded park provides camping and picnicking and has sports and multi-purpose fields, trails, concessions and restrooms.

Island Park
Island Park is located at 2ns Ave and 7th St S in Fargo. Along with trails, this park's attraction is its tennis courts and swimming pool. It also provides restrooms, concessions and picnic facilities.

Dike West
Dike West is a very popular skate board park located at 4th Street S along the Red River. This park also has basketball courts as well as concessions and a restroom facility. This park is also used for sledding during the winter months.

Trefoil
Trefoil Park in Fargo is a quiet park located on Elm Street along the Red River. It is a lovely park for picnicking and also has a multi-purpose trail.

Oak Grove
Oak Grove Park located on Maple St N along the Red River in Fargo consists of tennis, disc golf, horseshoes, picnic shelter, playgrounds and restroom facilities.

Elephant/ Percy Goodwin
Elephant Percy Goodwin Park in Fargo is located at 19th Ave and 3rd St N. This park provides multipurpose fields as wells as softball and baseball/youth fields. The park also consists of basketball courts, playground, and picnic and restroom facilities.

Trollwood
Trollwood Park located at Kandi Land and Elm St. N along the Red River in Fargo provides ample recreation including trails, a picnic shelter, playground, grilling and restrooms.

1.5.2 Regional Recreation Opportunities

Five area state parks provide year-round outdoor recreation activities within a short driving distance of Fargo Moorhead. Most state parks provide camping, swimming, boating/canoeing, fishing and hiking/biking/snowmobile trails.

1.5.2.1 Minnesota

- Buffalo River State Park (15 miles east of Fargo-Moorhead)
  This state park provides numerous trails that wind through one of Minnesota's finest and largest remnant prairies. It also includes a picnic area, swimming area and campground located in the hardwood forest along the Buffalo River.

- Itasca State Park (115 miles northeast of Fargo-Moorhead)
  Established in 1891, Itasca is Minnesota's oldest state park. Today, the park totals more than 32,000 acres and includes more than 100 lakes. Home to the source of the Mississippi River, this park has camping and lodging opportunities as well as trails, picnic areas and shelters, playgrounds, volleyball and swimming.

- Maplewood State Park (55 miles southeast of Fargo-Moorhead)
  Eight major lakes and many ponds offer water lovers places to swim, fish, boat, and simply relax. Lake Lida has a sandy beach and large picnic areas for visitors. Drive along the scenic route to observe the wildlife: the park is host to 150 bird species and 50 species of mammals. The extensive trail system attracts hikers, horseback riders, and cross-country skiers.

1.5.2.2 North Dakota

- Turtle River State Park (95 miles northwest of Fargo-Moorhead)
  Situated on the meandering Turtle River, Turtle River State Park is located in a beautiful wooded valley. Constructed in the 1930s by the Civilian Conservation Corps, the park offers year-round recreational activities, including camping, picnicking, fishing and trails for hiking, mountain biking and cross country skiing. Rustic group cabins can also be rented.

- Fort Ransom State Park (75 miles southwest of Fargo-Moorhead)
  North Dakota's homesteading heritage is preserved at Fort Ransom State Park. The park, nestled in the picturesque and heavily-wooded Sheyenne River Valley, officially opened in July 1979. This park is managed as a natural and scenic area, and is located on one of North Dakota's officially designated Scenic Byways and Backways. The park is open for camping and picnicking year-round. Canoeing and kayaking are popular during the summer while corrals and trails are provided for groups bringing in their horses.

1.6 PREVIOUS STUDIES/PLANS

Numerous studies of the Red River of the North have been undertaken to better understand the nature of the river and the impact of surrounding development upon the river and the resources and opportunities (including recreation) the River offers. Such studies include: The Red River Action Plan (1989), The Red River Visions Study (1989), Fargo Riverfront Development Master Plan (2002), Four-Community Sports Facility Framework Plan for the Metropolitan Area (2005), Metro Bike and Pedestrian Plan (2006), The Fargo-Moorhead Downtown Framework Plan Update (2007), the Regional Park Framework Plan for the City of Moorhead (2007) and The Red River Greenway Study (2008). While each study focused on specific topics and often focused along the River, most of the studies spoke of the community desire of more trails and connectivity.

1.7 PROJECT RECREATION

Project recreation design will provide four-season recreation features and amenities for the community and its visitors. This design will enhance the recreation opportunities of the region while preserving all existing recreation including fishing. Preliminary recreation design utilizes project flood control features: the diversion channel and the spoil for outdoor recreation purposes, as illustrated in sheets LS101 – LS106. The LPP diversion channel starts approximately 9 river miles south of the confluence of the Red River of the North and Wild Rice River, leads west toward the existing Horace to West Fargo diversion, then north around the Cities of Fargo and West Fargo, and ultimately re-enters the Red River of the North 8 river miles north of its confluence with the Sheyenne River. The alignment is approximately 36 miles long. Soil excavated to construct the channel would be piled and set back 50 feet from the top of the diversion channel to a maximum height of 15 feet. The soil disposal piles would be as wide as necessary to contain the excavated material. The spoil slopes were 1V on 7H and 1V on 10H for the diversion side and outside slopes, respectively. Portions of the soil disposal piles would be constructed to serve as levees when the water surface in the channel is higher than the natural grade.

Project recreation features and benefits include:

- Pedestrian/bicycle trails
- Horseback riding trails
- Cross Country Skiing
- Snowmobiling
- Parking for recreation users, including trailer parking areas
- 3 trailheads
- Interpretive Kiosks
- Picnic Areas
- Rest rooms
- Interpretive signage
- Historical Markers for relocated properties
- Wildlife viewing structures
- Fishing
- Benches

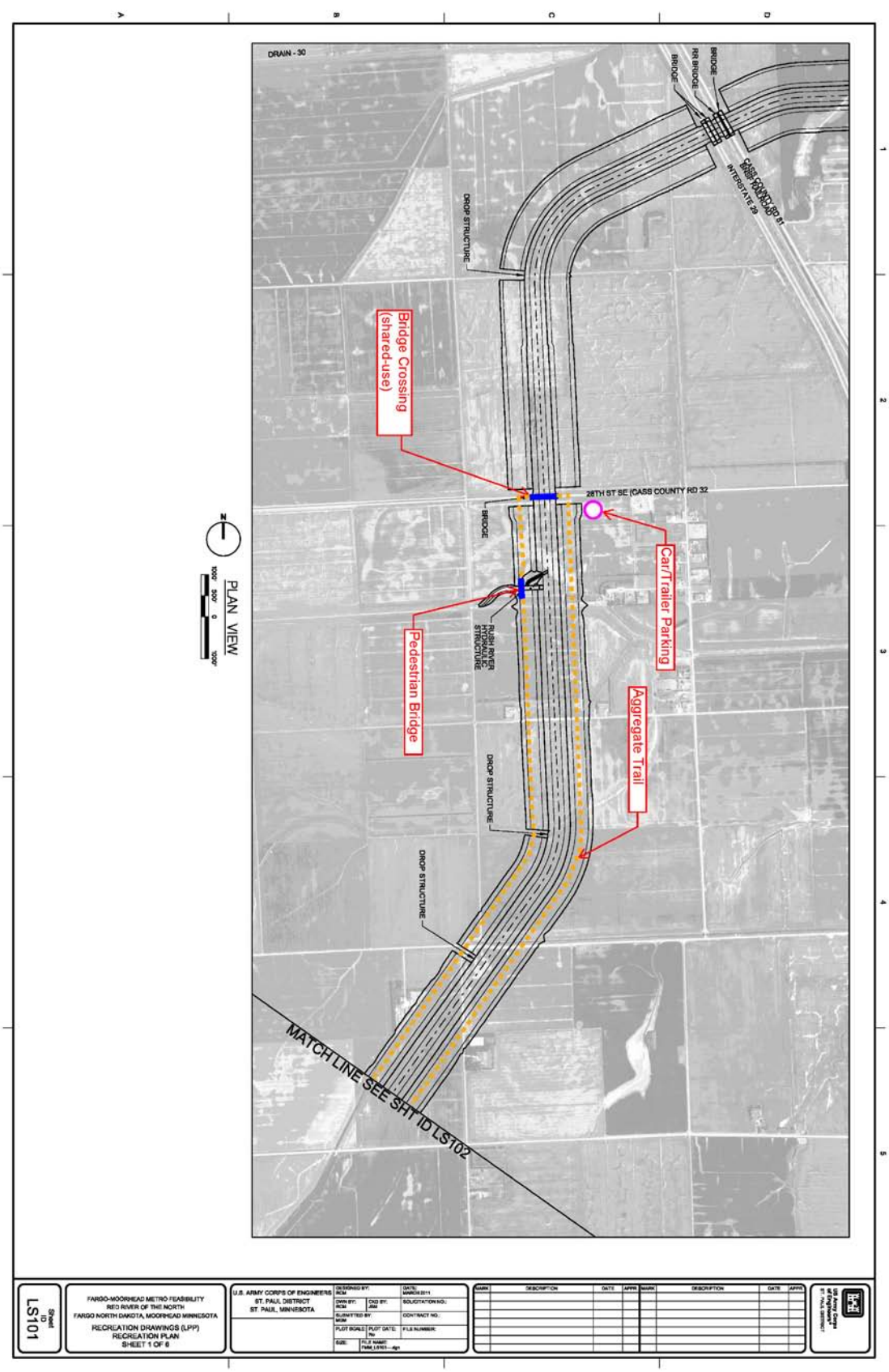
- Trees and landscaping
- Pedestrian bridges

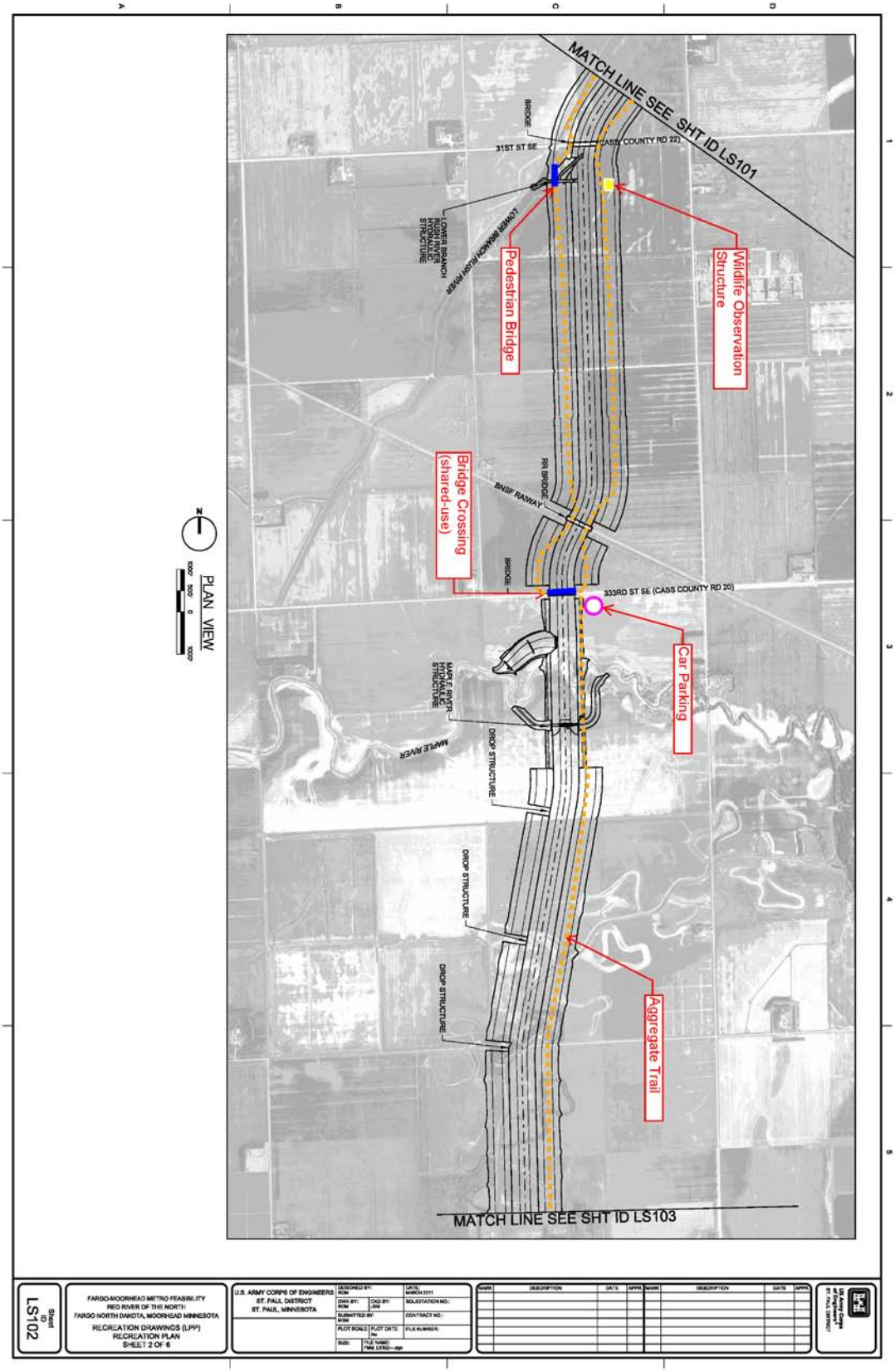
TRAILS: Conceptual recreation design for the project calls for one bituminous multipurpose trail loop and two aggregate multipurpose trail loops with a combined length of approximately 44-miles.

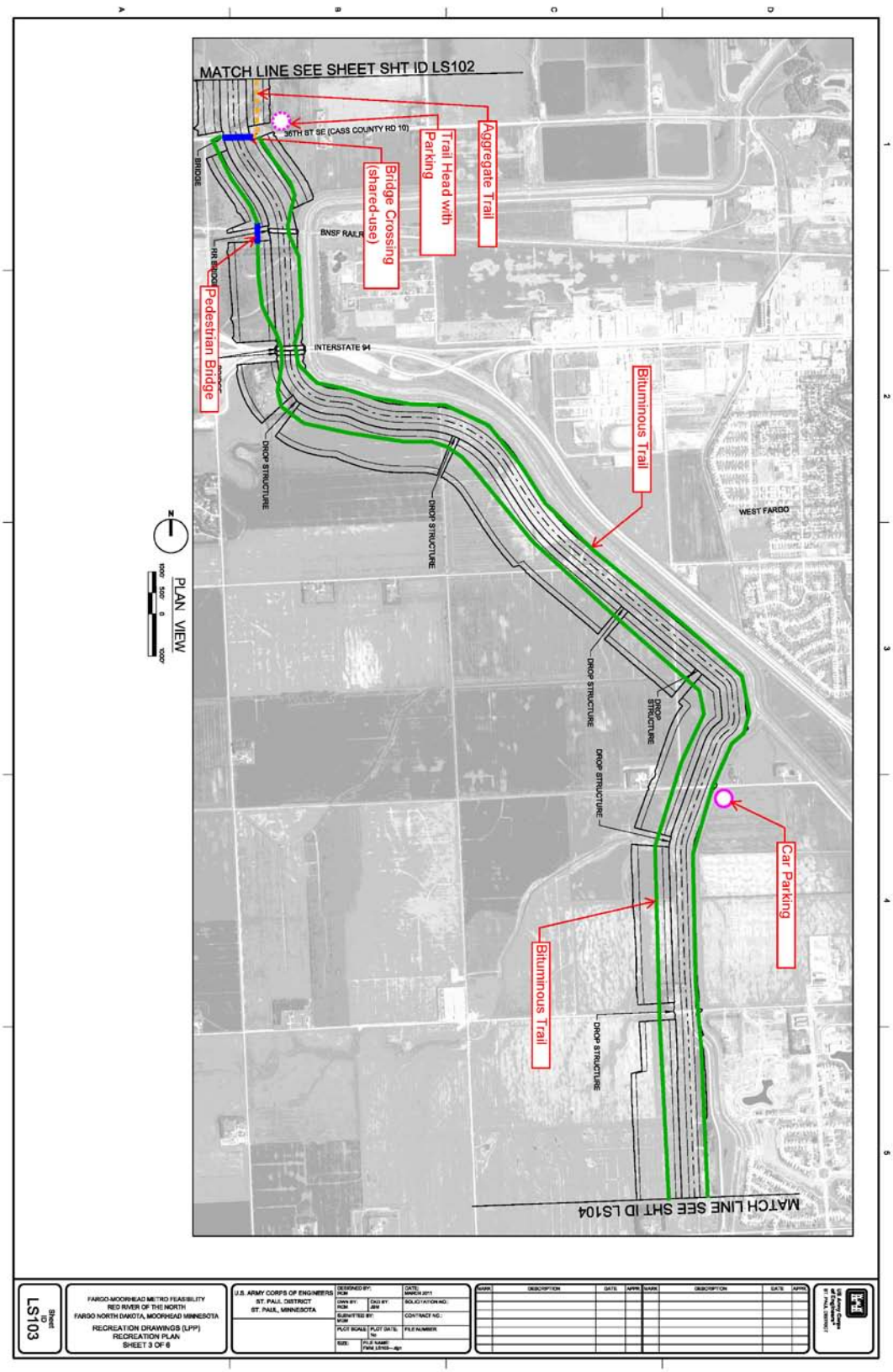
The bituminous multi-purpose trails will be 10-foot wide asphalt, situated on the banks or spoils of the diversion channel, and designed to be a trail system that will provide varying distances and aesthetic experiences to the users. This middle segment of trail starts at 36th Street SE and extends south to 44th Street SE and is approximately 19 miles in length. The bituminous trail crosses the diversion channel in two locations. The crossing at 36th Street SE will be a shared-use crossing and will have a trail head with parking while the 44th Street SE shared-use crossing will have a trail head with Car/Trailer parking. Additional parking will also be at 38th Street SE.

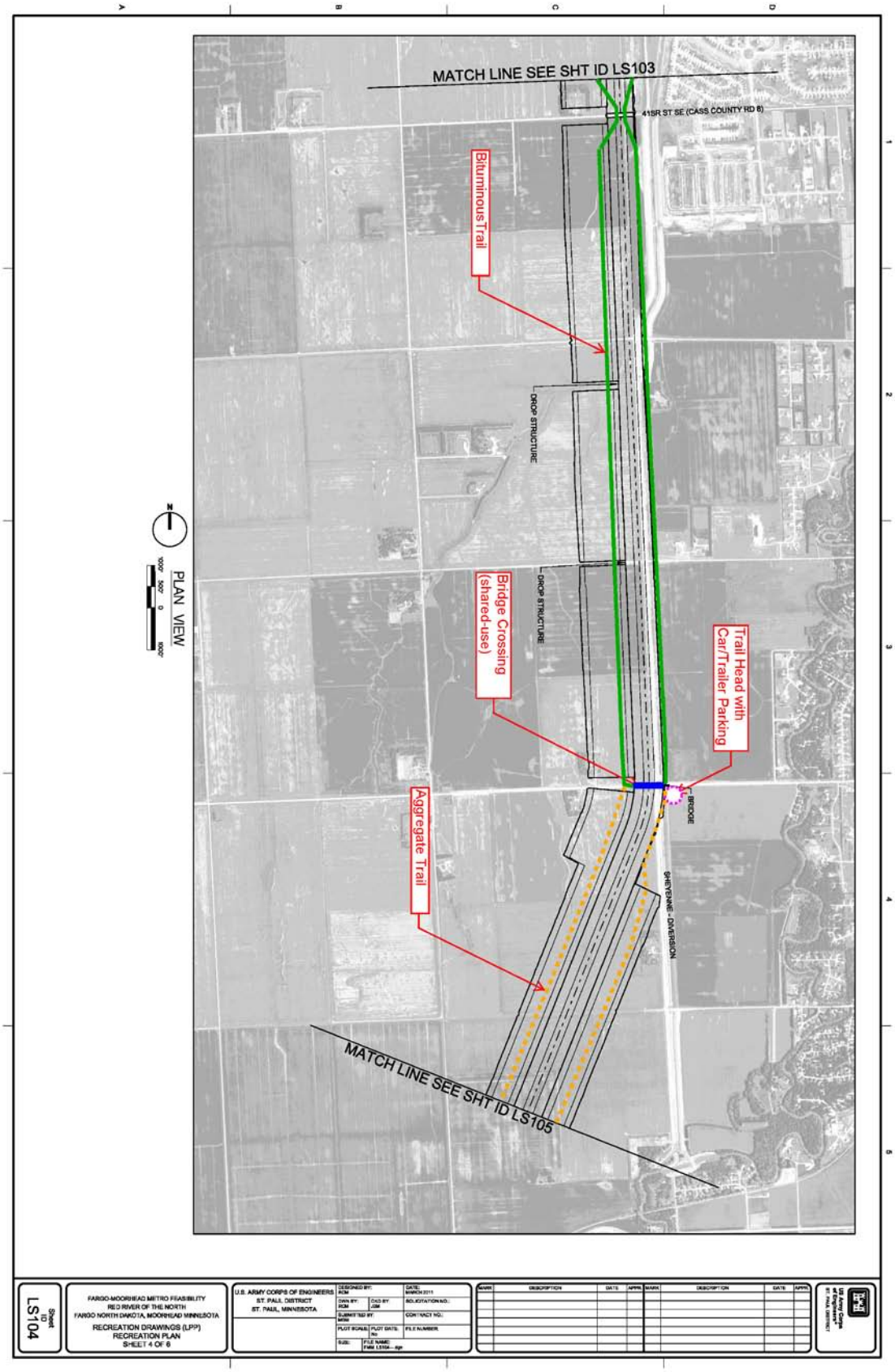
The aggregate multipurpose trails will be 10-foot wide compacted gravel. The north segment of aggregate trail will be an approximate 6-mile loop from 28th Street SE extending south to 31st Street SE. The trail would then continue along the east side of the diversion for approximately 5 miles to 36th Street SE. This north segment will have a pedestrian crossing at the Maple River and a shared-use crossing at 28th Street SE and 31st Street SE. It will also have Car/Trailer parking at 28th Street SE, Car parking at 31st SE and a wildlife observation structure at the Rush River. The south segment of the trail will start at 44th Street SE and will be a 4.5-mile loop extending south to 46th Street SE where there will be a shared-use crossing. The south Segment will continue for approximately 8.5 miles on the east side of the diversion until the diversion joins the Red River. Along this segment there will be a pedestrian bridge crossing for the Sheyenne River and for the Wild Rice River. There will be fishing structures adjacent the Wild Rice River as well as the Red River. These fishing structures will be rustic in nature and built into the shore protection to allow anglers access to the river. Car parking will be located at 48th Street SE and a trail head with Car/Trailer parking will be located at County Road 81.

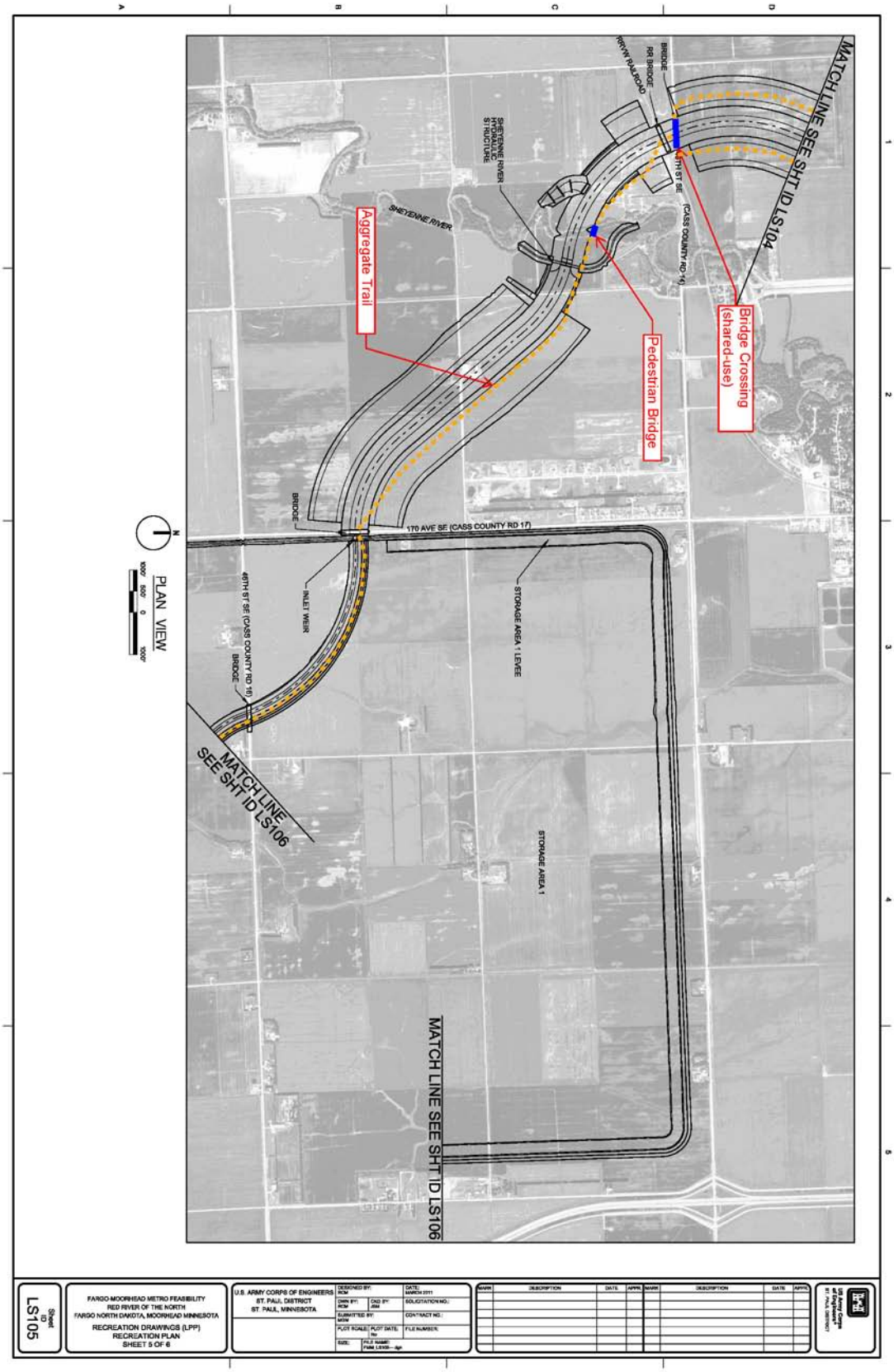
Along the entire trail, benches, trash receptacles and interpretive signage will be located approximately every mile to provide the trail users information about the wildlife, history, culture and ecology of the area as well as respite. The aggregate multipurpose trails and levee crests will be ideal for winter use by cross-country (XC) skiers and snowmobiling enthusiasts. These aggregate trails will also be ideal for horseback riders any time during the year. The entire 44-mile trail system will attract bicyclists, hikers, joggers, bird watchers and other outdoor wildlife enthusiasts. Support facilities for the trails include 3 trailheads, where rest rooms, potable water, picnic facilities, interpretive kiosks and parking are proposed. Landscaping of trees and shrubs at the trail heads are also proposed along with trees, native prairie grasses and forbs along the trail. All proposed recreation facilities will meet the guidelines for Americans with Disabilities Act (ADA) and the Architectural Barriers Act (ABA) as well as the final draft of the ADA-ABA Accessibility Guidelines for Outdoor Developed Areas.

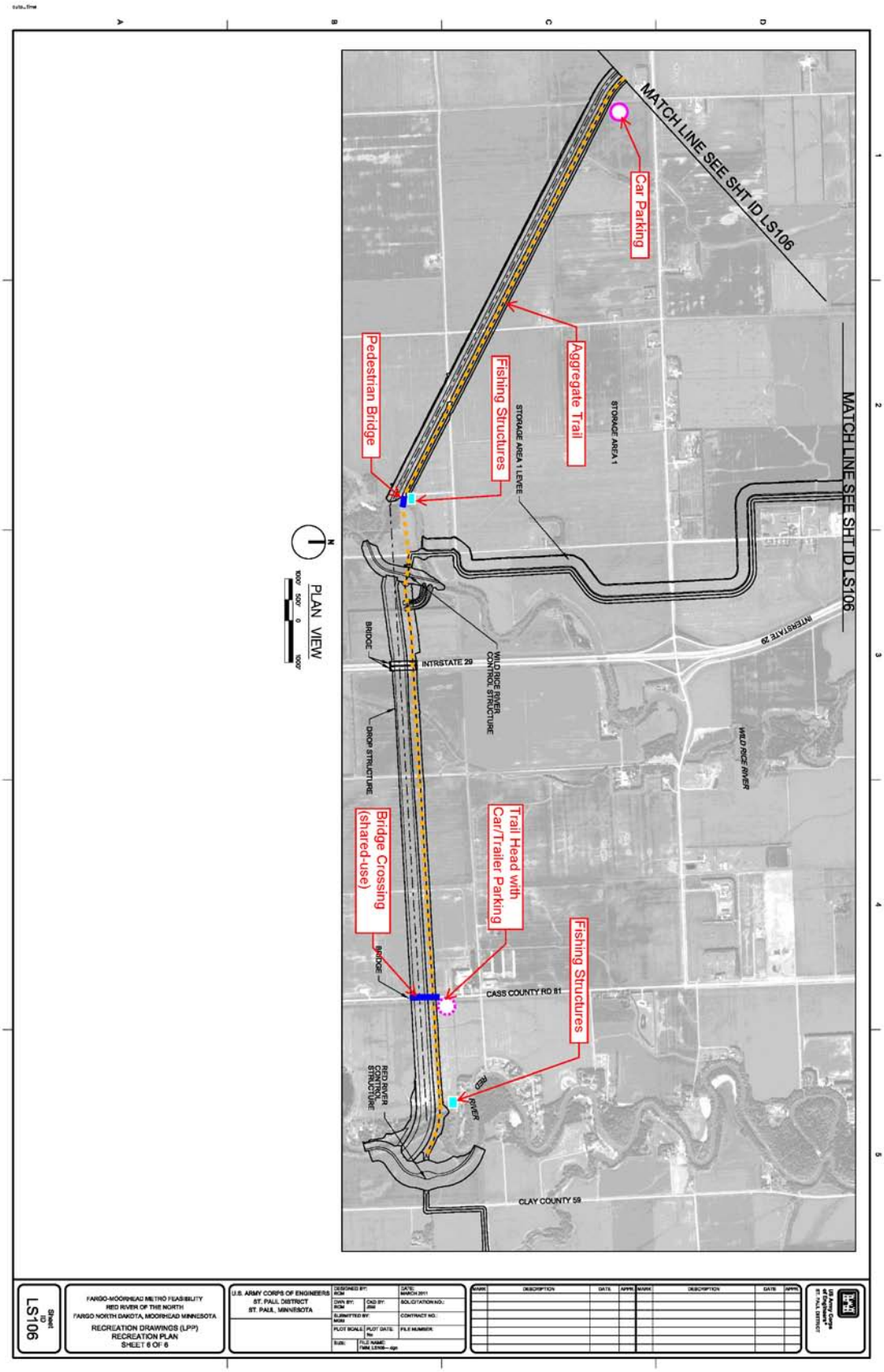

DRAIN - 30
BRIDGE
RR BRIDGE
BRIDGE
CASS COUNTY RD 81
INTERSTATE 29
DROP STRUCTURE
Bridge Crossing (shared-use)
28TH ST SE (CASS COUNTY RD 32
BRIDGE
Car/Trailer Parking
RUSH RIVER HYDRAULIC STRUCTURE
Pedestrian Bridge
Aggregate Trail
DROP STRUCTURE
DROP STRUCTURE
MATCH LINE SEE SHT ID LS102
N
1000'
500'
0
1000'
PLAN VIEW
FARGO-MOORHEAD METRO FEASIBILITY
RED RIVER OF THE NORTH
FARGO NORTH DAKOTA, MOORHEAD MINNESOTA
RECREATION DRAWINGS (LPP)
RECREATION PLAN
SHEET 1 OF 6
Sheet ID
LS101
U.S. ARMY CORPS OF ENGINEERS
ST. PAUL DISTRICT
ST. PAUL, MINNESOTA
DESIGNED BY: RCM
DRAWN BY: RCM
CHKD BY: JRM
SUBMITTED BY: WDM
DATE: MARCH 2011
SOLICITATION NO.:
CONTRACT NO.:
PLOT SCALE: 1to
PLOT DATE:
FILE NUMBER:
SIZE:
FILE NAME: FMM_LS101---dgn
MARK
DESCRIPTION
DATE
APPR
US Army Corps of Engineers ST. PAUL DISTRICT


MATCH LINE SEE SHT ID LS101
BRIDGE
31ST ST SE
CASS COUNTY RD 22)
LOWER BRANCH RUSH RIVER
LOWER BRANCH RUSH RIVER HYDRAULIC STRUCTURE
Pedestrian Bridge
Wildlife Observation Structure
Bridge Crossing (shared-use)
RR BRIDGE
BNSF RAIWAY
BRIDGE
333RD ST SE (CASS COUNTY RD 20)
Car Parking
MAPLE RIVER HYDRAULIC STRUCTURE
MAPLE RIVER
DROP STRUCTURE
DROP STRUCTURE
DROP STRUCTURE
Aggregate Trail
MATCH LINE SEE SHT ID LS103
N
PLAN VIEW
FARGO-MOORHEAD METRO FEASIBILITY
RED RIVER OF THE NORTH
FARGO NORTH DAKOTA, MOORHEAD MINNESOTA
RECREATION DRAWINGS (LPP)
RECREATION PLAN
SHEET 2 OF 6
U.S. ARMY CORPS OF ENGINEERS
ST. PAUL DISTRICT
ST. PAUL, MINNESOTA
Sheet LS102


MATCH LINE SEE SHEET SHT ID LS102
36TH ST SE (CASS COUNTY RD 10)
BRIDGE
BNSF RAILR
RR BRIDGE
INTERSTATE 94
DROP STRUCTURE
DROP STRUCTURE
DROP STRUCTURE
DROP STRUCTURE
DROP STRUCTURE
DROP STRUCTURE
WEST FARGO
Aggregate Trail
Trail Head with Parking
Bridge Crossing (shared-use)
Pedestrian Bridge
Bituminous Trail
Car Parking
Bituminous Trail
PLAN VIEW
MATCH LINE SEE SHT ID LS104
Sheet ID LS103
FARGO-MOORHEAD METRO FEASIBILITY
RED RIVER OF THE NORTH
FARGO NORTH DAKOTA, MOORHEAD MINNESOTA
RECREATION DRAWINGS (LPP)
RECREATION PLAN
SHEET 3 OF 6
U.S. ARMY CORPS OF ENGINEERS
ST. PAUL DISTRICT
ST. PAUL, MINNESOTA


MATCH LINE SEE SHT ID LS103
41SR ST SE (CASS COUNTY RD 6)
Bituminous Trail
DROP STRUCTURE
DROP STRUCTURE
Bridge Crossing (shared-use)
Trail Head with Car/Trailer Parking
BRIDGE
Aggregate Trail
SHEYENNE DIVERSION
MATCH LINE SEE SHT ID LS105
PLAN VIEW
FARGO-MOORHEAD METRO FEASIBILITY
RED RIVER OF THE NORTH
FARGO NORTH DAKOTA, MOORHEAD MINNESOTA
RECREATION DRAWINGS (LPP)
RECREATION PLAN
SHEET 4 OF 6
U.S. ARMY CORPS OF ENGINEERS
ST. PAUL DISTRICT
ST. PAUL, MINNESOTA
Sheet ID LS104


MATCH LINE SEE SHT ID LS104
Aggregate Trail
Pedestrian Bridge
Bridge Crossing (shared-use)
SHETENNE RIVER
SHETENNE RIVER DIVERSION STRUCTURE
RRVW RAILROAD
BRIDGE
RR BRIDGE
17TH ST SE
(CASS COUNTY RD 14)
BRIDGE
170 AVE SE (CASS COUNTY RD 17)
46TH ST SE (CASS COUNTY RD 16)
BRIDGE
INLET WEIR
STORAGE AREA 1 LEVEE
STORAGE AREA 1
MATCH LINE SEE SHT ID LS106
MATCH LINE SEE SHT ID LS106
PLAN VIEW
N
1000' 500' 0 1000'
LS105
FARGO-MOORHEAD METRO FEASIBILITY
RED RIVER OF THE NORTH
FARGO NORTH DAKOTA, MOORHEAD MINNESOTA
RECREATION DRAWINGS (LPP)
RECREATION PLAN
SHEET 5 OF 6
U.S. ARMY CORPS OF ENGINEERS
ST. PAUL DISTRICT
ST. PAUL, MINNESOTA


MATCH LINE SEE SHT ID LS106
Car Parking
Aggregate Trail
Fishing Structures
Pedestrian Bridge
STORAGE AREA 1 LEVEE
STORAGE AREA 1
MATCH LINE SEE SHT ID LS106
INTRSTATE 29
BRIDGE
WILD RICE RIVER CONTROL STRUCTURE
DROP STRUCTURE
WILD RICE RIVER
Bridge Crossing (shared-use)
Trail Head with Car/Trailer Parking
Fishing Structures
BRIDGE
CASS COUNTY RD 81
RED RIVER CONTROL STRUCTURE
RED RIVER
CLAY COUNTY 59
PLAN VIEW
N
1000 500 0 1000'
FARGO-MOORHEAD METRO FEASIBILITY
RED RIVER OF THE NORTH
FARGO NORTH DAKOTA, MOORHEAD MINNESOTA
RECREATION DRAWINGS (LPP)
RECREATION PLAN
SHEET 6 OF 6
U.S. ARMY CORPS OF ENGINEERS
ST. PAUL DISTRICT
ST. PAUL, MINNESOTA
DESIGNED BY: RCM
DATE: MARCH 2011
DWN BY: RCM
CKD BY: JSM
SOLICITATION NO.:
SUBMITTED BY: MGM
CONTRACT NO.:
PLOT SCALE:
PLOT DATE: No
FILE NUMBER:
SIZE:
FILE NAME: FMM_LS106---.dgn
MARK
DESCRIPTION
DATE
APPR.
Sheet ID
LS106

Platform Fishing Structure Example 1

Platform Fishing Structure Example 2

1.8 MINNESOTA STATE COMPREHENSIVE OUTDOOR RECREATION PLAN

The 2008-2012 Minnesota State Comprehensive Outdoor Recreation Plan (SCORP) states that its key uses are to:

- Establish outdoor recreation priorities for Minnesota that will help outdoor recreation and natural resource managers, the state legislature, and the executive branch make decisions about the state's outdoor recreation system.
- Set out criteria to allocate the federal Land and Water Conservation Fund investment consistent with the state's outdoor recreation priorities defined in this plan.

Within the document, four strategies are listed and outlined for the state. Developed by an advisory group of outdoor recreation professionals and natural resource leaders, they document and establish the priorities for protection of the state's natural resources and the development policy of state recreation projects and agendas. These strategies are based on one goal:

"Increase participation in outdoor recreation by all Minnesotans and Visitors."

The list of strategies was formulated to help increase participation in outdoor recreation, these four strategies are:

- Acquire, protect, and restore Minnesota's natural resource base, on which outdoor recreation depends. This includes obtaining prime outdoor recreation areas throughout the state prior to anticipated land use changes.
- Develop and maintain a sustainable and resilient outdoor recreation infrastructure.
- Promote increased outdoor recreation participation through targeted programming and outreach.
- Evaluate and understand the outdoor recreation needs of Minnesotans and the ability of Minnesota's natural resources to support those needs.

1.9 NORTH DAKOTA STATE COMPREHENSIVE OUTDOOR RECREATION PLAN

The 2008-2012 North Dakota State Comprehensive Outdoor Recreation Plan (SCORP) is the eighth update of the SCORP. It is a guide for developing and managing North Dakota's recreation base to determine future outdoor recreation priorities. The SCORP is prepared every five years using grant money from the Land and Water Conservation Fund (LWCF). To determine people's attitudes and interests a household survey was conducted via telephone interview between June 11 and June 25, 2007. Survey participants included 1,200 residents 18 years and older. A public workshop was also held in each of eight regions across the State.

The results from the household survey showed that North Dakotans participate in a total of 62 different outdoor recreation activities (not including consumptive activities such as hunting and fishing.) Of these 62 activities, walking, jogging, and hiking are the most popular with 86.5% of North Dakotans responding that they participate in those activities at least once a year with an average of 111 days per year. Pleasure Driving was the

second most popular with 71.8% participating and a frequency of 35 days/year. Picnicking was third at 68.7% participating with only an average frequency of 13 days/year and bicycling came in fourth in popularity with 58.8% participating and an average frequency of 57 days/year.

Fargo is located in Region 5. An outdoor recreation facility inventory was collected at the public workshops for all the regions. The proposed recreation plan for the North Dakota east Diversion would provide for 6 of the 10 Region 5 priorities shown in the list below; including 5 of the top 6. Based on the facility inventories completed by the individual workshop participants, the top Region 5 priorities are:

1. Trails
2. Playgrounds/Picnic Areas
3. Golf Courses
4. Open Space Parks
5. Sports Fields
6. Winter Sports Facilities
7. Sports Courts
8. Pools/Beaches
9. Public Use Areas
10. Pet Parks.

Based on the votes of individual participants, the top five overall challenges/issues/needs in the region are:
1. Public demand increasing while fees expected to remain the same or decrease
2. Lack of education/lack of self-discipline
3. Cost
4. Creating awareness of availability of areas
5. Proximity/location related to health & fitness

As noted above, many of the Region 5 priorities will be provided by the proposed recreation plan for the North Dakota east Diversion. Demand for these priorities is only being partially met. The proposed recreation plan will help fill this void. Current and future demand for the proposed activities is illustrated in Table 7.

1.10 2004 OUTDOOR RECREATION PARTICIPATION SURVEY OF MINNESOTANS – REPORT ON FINDINGS

This report identified the outdoor recreation participation tends and patterns of adult Minnesotans through surveys and evaluation of these surveys. This data gathering was then used to help meet the need of the most recent State Comprehensive Outdoor Recreation Plan; and to better understand the changing nature of outdoor recreation in Minnesota.

To collect data from adult Minnesotans on their outdoor recreation participation, a mail survey to 4400 Minnesotans was conducted in March 2004. The mail-survey sample was allocated to five regions, with 1200 allocated to the Twin Cities metropolitan area and 800 to each of the four non-metropolitan regions. This regional stratification is intended

to produce region-specific results. The mail survey achieved nearly a 60 percent overall return rate after three mailings. Because the response rate was not higher (not above 70 percent), a non-respondent telephone survey was conducted to evaluate nonresponse bias. The results of the nonresponse bias survey, along with statistics on demographic characteristics important to outdoor recreation participation, were used to adjust—through sample weighting—the mail survey responses.

The survey results showed that outdoor recreation is an important part of most Minnesotans' lives. Nearly 60% indicated that outdoor recreation is "very important" to their life. The main reason why people choose to recreate outdoors is to enjoy nature, while exercise and feeling healthier was second in ranking. One of the main barriers to outdoor recreation that respondents mentioned is time followed by outdoor pests and cost and effort.

Most of Minnesotans' outdoor recreation occurs near home and within the state. Just under 67% of all recreation use (hours) is within a half-hour drive from home. The leading activity for Minnesota adults—in terms of the number that participates annually—is walking/hiking outdoors for exercise or pleasure (54% of adults participate annually). This is followed by boating of all types, including fishing from a boat (43%), Swimming (41%), Driving for Pleasure (37%) and then Picnicking (36%).

Moorhead is located in the Northwest region and while it follows most of the statewide trends, it has more participation in fishing, hunting, and snowmobiling than the state average. The leading activity for Minnesota adults in the Northwest region— in terms of the number that participates annually —is walking/hiking outdoors for exercise or pleasure (48% of adults that participate annually). This is followed by boating of all types, including fishing from a boat (43%). Driving for pleasure is next (40%), followed by Swimming (37%) and then Fishing (35%). The proposed recreation plan for the North Dakota east Diversion plan would provide trail facilities accommodating the needs for walking/hiking, the most popular activity in the region, as shown in Table 7.

1.11 LONG-TERM NATIONAL TRENDS IN OUTDOOR RECREATION ACTIVITY PARTICIPATION---1980 TO NOW, A RECREATION RESEARCH REPORT IN THE IRIS SERIES, MAY 2009.

In the United States interview surveys are conducted to track outdoor recreation trends to help aid in recreation planning and development across the nation. According to the 1982-83 Nationwide Recreation Survey (NRS), (National Park Service, NPS, US Department of the Interior, 1986), the first recreation outdoor participation interview surveys were conducted in 1960 by the Outdoor Recreation Resources Review Commission and have been irregularly conducted since. The latest NRS was conducted by the NPS in 1982-83. In 1994, the name of NRS was changed to the National Survey on Recreation and the Environment (NRSE). Although the name has changed, the methodology of collecting the recreation activity participation data has remained consistent throughout the years. The outdoor recreation participation estimates from the 1982-83 NRS and the 2005-09 NSRE were compared to track recreation trends up to 2009 and used to produce the Internet Research Information Series (IRIS) report.

The findings in this report show that the most popular recreational activity is walking outdoors. Both the percentage of population and the number of participants have steadily increased over time since 1982-83. Following in terms of growth of number of participants is viewing or photographing wild birds, attending outdoor sports events, day hiking, attending outdoor concerts/plays/other events, and visiting outdoor nature centers. The next activities in terms of growth of number of participants are swimming in natural waters, sightseeing, bicycling, running or jogging, and picnicking. The next three activities involve use of motors and include boating, driving for pleasure, and driving off road. Four activities declined between 1982-83 and 2005-09---tennis, ice skating, cross-country skiing, and snowmobiling.

1.12 RECREATION BENEFIT ANALYSIS

The Fargo Park District and Moorhead Parks and Recreation Division have long recognized that open space and recreation are a valuable resource to the community. An analysis of current local recreation, local user counts and studies, SCORP information, recreational professionals input and available State and Federal recreation was accomplished. Multi-Use Trails leads the list of the most important facilities participated in and requested.

1.12.1 Recreation Benefits Without Trail and Site Facilities

Without the cost-shared trail, trail heads, and pedestrian/shared-use bridges, recreation in the project area would be limited to grass on the spoil areas. Due to the lack of access to the project without the proposed recreation features, no recreation activities are forecasted to occur. Therefore no benefits were found for without-project conditions.

1.12.2 Population Market Area

Populations and population projections for the Fargo Moorhead Area are from the 2000 US Census and McKibben Demographic Research (as cited in Fargo-Moorhead Metropolitan Council of Governments, 2008) The average urban area population growth rates from 2000-2007 is 14.7%. Growth for Fargo is 11.3 % and Moorhead is 9.7%. West Fargo, which is part of the Fargo Moorhead metropolitan area, has seen much more growth during the same time period. West Fargo's growth is 45.2%.

For the purpose of this study, the local communities of Fargo-Moorhead, including all of Cass and Clay County have been included in the Market Area population, see Table 1. The population projections for 2010-2030 as shown in Table 1a are from the 2008 Metro Profile. For the period of analysis beyond 2030, a linear extrapolation of the 2010-2030 population projections, assuming a constant rate of change, was applied. This extrapolation methodology has been used in previous studies for MVP and is an acceptable method of acquiring quantifiable data and would reflect the best available data. Population projections for 2039-2068 are also shown in Table 1a.

Table 1 – Market Area Population

Place	Base Population			Population Change		
	1990	2000	2007	1980-90	1990-00	2000-07
Cass County	102,874	123,138	142,042	16.6%	16.1%	14.7%
Clay County	50,442	51,229	56,894	2.2%	1.6%	11.1%
Regional Totals	**153,316**	**174,367**	**198,936**			
City of Dilworth	2,562	3,001	3,584	-0.9%	17.1%	19.4%
City of Moorhead	32,295	32,177	35,294	7.7%	-0.4%	9.7%
City of West Fargo	12,287	14,940	21,700	21.7%	21.6%	45.2%
City of Fargo	74,111	90,599	100,806	20.7%	22.2%	11.3%

Table 1a – Market Area Population Trends

Place	Population Predictions*							
	2010	2030	2019	2029	2039	2049	2059	2068
Cass County	150,550	193,700	169,968	191,543	213,118	234,693	256,268	275,685
Clay County	59,630	76,510	67,226	75,666	84,106	92,546	93,460	108,582
Regional Totals	**210,180**	**270,210**	**237,194**	**267,209**	**297,224**	**327,239**	**349,728**	**384,267**
City of Dilworth	3,920	5,210	4,501	5,146	5,791	6,436	7,081	7,661
City of Moorhead	36,890	49,110	42,389	48,499	54,609	60,719	66,829	72,328
City of West Fargo	24,430	30,040	26,955	29,760	32,565	35,370	38,175	40,699
City of Fargo	105,600	135,050	118,853	133,578	148,303	163,028	177,753	191,005

*Linear extrapolation of 2010-2030 population projections, assuming a constant rate of change for years 2039-2068.

1.12.3 Participation and Demand

The participation rate in per capita activity days for recreation activity was derived from reviewing the 2004 Outdoor Recreation Participation Survey of Minnesotans – Report on Findings. The rates used were taken from the Northwest region for users within ½ hour drive of home. Due to the current trends in Running/Jogging and discussions with local recreation experts, it was felt that the rate from the 2004 Outdoor Recreation Participation study was too low. The participation rate in per capita activity days for Running/Jogging was therefore derived from the Projections of Future Participation and Needs in Outdoor Recreation for North Dakota, October 1985. This rate for Region 5 was then interpolated using participation rate change from 1982-1983 to 2005-2009 from the Long-Term National Trends in Outdoor Recreation Activity Participation---1980 to Now, A Recreation Research Report in the IRIS Series. The participation rate change for all of the primary activities from 1999-2001 to 2005-2009 is also from the Long-Term National Trends in Outdoor Recreation Activity Participation---1980 to Now, A Recreation Research Report in the IRIS Series. The rate was calculated up to project year 2024. This rate was held constant for all project years beyond 2024. These participation rates are shown in Table 2.

Table 2 – Participation Rates (in Per Capita Activity Days) by Recreation Activity

Primary Activity	Rate of Change*	2004	2019	2024	2029	2039	2049	2059	2068
Walking/Hiking	10%	22.1	23.77	24.33	24.33	24.33	24.33	24.33	24.33
Running/Jogging	13%	4.09	4.49	4.62	4.62	4.62	4.62	4.62	4.62
Picnicking*	0%	2.32	2.32	2.32	2.32	2.32	2.32	2.32	2.32
Wildlife Viewing	18%	8.43	9.59	9.98	9.98	9.98	9.98	9.98	9.98
Fishing	7%	1.65	1.74	1.77	1.77	1.77	1.77	1.77	1.77
X-C Skiing	-40%	0.24	0.17	0.14	0.14	0.14	0.14	0.14	0.14
Snowmobiling	-26%	1.39	1.12	1.03	1.03	1.03	1.03	1.03	1.03
Bicycling**	7%	5.5	5.78	5.87	5.87	5.87	5.87	5.87	5.87
Horseback Riding	8%	0.34	0.36	0.37	0.37	0.37	0.37	0.37	0.37

* No data was available for Rate of Change
** Used Statewide Participation Rate

Projected demands for (proposed) project-supported recreation activities are given in Table-3. The projected public use demand (in activity days) is calculated using recreation activity participation rates (Table-2), population projections for the neighboring towns and cities, from Table-1a, recreation years and participation rates (per activity), and professional judgment in consultation with staff of the park and recreation departments of Fargo and Moorhead. The years for depicting projected growth were chosen to reflect a fifty-year project life. Tables 2, 3, 5a and Table 7 show 2019 as the first project year. This year is used in the tables to be conservative because this is the proposed first year after project completion.

Table 3 – Market Area Activity Days

Primary Activity:	Year:										
	2019	2029	2020	2021	2022	2023	2029	2039	2049	2059	2068
Market Area Population:	237,194	267,209	240,195	243,197	246,198	249,200	267,209	297,224	327,239	349,728	384,267
WalkingHiking											
Participation Rate	23.77	24.33	23.83	23.89	23.94	24.00	24.33	24.33	24.33	24.33	24.33
Activity Days/Year	5,639,056	6,501,744	5,723,817	5,808,914	5,894,345	5,980,111	6,501,744	7,232,072	7,962,400	8,509,605	9,350,023
Running/Jogging											
Participation Rate	4.49	4.62	4.50	4.51	4.53	4.54	4.62	4.62	4.62	4.62	4.62
Activity Days/Year	1,063,981	1,234,503	1,080,670	1,097,440	1,114,291	1,131,222	1,234,503	1,373,173	1,511,842	1,615,741	1,775,314
Picnicking											
Participation Rate	2.32	2.32	2.32	2.32	2.32	2.32	2.32	2.32	2.32	2.32	2.32
Activity Days/Year	550,289	619,924	557,252	564,216	571,179	578,143	619,924	689,559	759,193	811,368	891,499
Wildlife Viewing											
Participation Rate	9.59	9.98	9.63	9.67	9.71	9.75	9.98	9.98	9.98	9.98	9.98
Activity Days/Year	2,275,478	2,667,040	2,313,587	2,351,928	2,390,502	2,429,309	2,667,040	2,966,623	3,266,207	3,490,672	3,835,415
Fishing											
Participation Rate	1.74	1.77	1.74	1.74	1.75	1.75	1.77	1.77	1.77	1.77	1.77
Activity Days/Year	411,916	472,959	417,930	423,964	430,019	436,093	472,959	526,086	579,212	619,018	680,153
X-C Skiing											
Participation Rate	0.17	0.14	0.17	0.16	0.16	0.16	0.14	0.14	0.14	0.14	0.14
Activity Days/Year	39,849	38,478	39,776	39,690	39,589	39,473	38,478	42,800	47,122	50,361	55,334
Snowmobiling											
Participation Rate	1.12	1.03	1.11	1.10	1.09	1.08	1.03	1.03	1.03	1.03	1.03
Activity Days/Year	265,408	274,851	266,596	267,730	268,810	269,836	274,851	305,724	336,598	359,730	395,257
Bicycling											
Participation Rate	5.78	5.87	5.79	5.79	5.80	5.81	5.87	5.87	5.87	5.87	5.87
Activity Days/Year	1,370,119	1,568,113	1,389,669	1,409,275	1,428,936	1,448,653	1,568,113	1,744,256	1,920,399	2,052,376	2,255,071
Horseback Riding											
Participation Rate	0.36	0.37	0.36	0.36	0.36	0.36	0.37	0.37	0.37	0.37	0.37
Activity Days/Year	85,606	98,301	86,856	88,111	89,370	90,633	98,301	109,343	120,384	128,658	141,364

1.12.4 Estimate of Current and Future Usage of Proposed Activities

Lacking a comprehensive site design, tables 4-4a and 5-5a, establishing the maximum design capacity value for new trail oriented activities and site activities, is a conservative estimate based on a concept (Sheets LS101 - LS106). Satisfactory limits on site visitation, feature conflicts, and neighborhood impacts would be established during the design phase of the proposed project. Visitation, parking, etc., will be adjusted to minimize negative social effects and over-use. Annual Primary Activity Days were developed for the five trail oriented recreational activities as well as site activities listed in the tables below. For trail activities, this was done by multiplying (miles of trail) x (users per mile) x (turnover per day) x (weeks in a season) and divided by (weekend day use) x (recreation season use). For site activities, a similar formula is used to determine the maximum capacity, (supply of units) x (people per unit) x (turnover rate) x (weeks in a season) and divided by (weekend day use) x (recreation season use). These formulas determine the annual activity occasions which in turn is used to develop Annual Primary Activity Days as shown in Table 4a and 5a. Activity occasions per mile were based on carrying capacity guidelines in the "Optimum Recreation Carrying Capacity" developed for the U.S. Department of the Interior in 1977. The report recommends average densities of 21 to 25 bicycles per lane/per mile, 200 feet between joggers, one group of skiers every 2-½ miles, and 275 feet between Snowmobiles. The carrying capacity report addressed general hiking rather than urban walking. Carrying capacity guidelines from an earlier Minnesota SCORP (MN Departments of Natural Resources and Trade and

Economic Development, 1990) suggest an average of 24 bicycles per mile, and 29 walkers/joggers per mile. To be on the conservative side, 12 bicycles per mile and 25 walkers/joggers per mile were selected for use in Table-4.

A Primary Activity Day (or visitor day) is a standard unit of use consisting of a visit by an individual to a recreation area during a 24-hour period. People often engage in more than one activity occasion during any given recreational site visit. A person engaged in bicycling, walking/jogging, or picnicking, etc., tends to participate in more than one activity per day; they might also bird watch or photograph the outdoors on the same day. The Primary Activity Day therefore, is considered to consist of 1.25 activity occasions/day for most types of recreation. The Annual Primary Activity Days listed in Table 4a and Table 5a were derived from dividing the annual capacity in occasions by the activity day factor. This was necessary so as to avoid double counting of visitors engaging in more than one activity during the day. In the case of X-C Skiing and Snowmobiling, the activity day factor was only 1.0 because it was assumed that that activity would be the only activity for the day.

Based upon the growth in usage the Fargo-Moorhead area has seen in its current trail system annual visitation for walking, running, wildlife viewing, x-c skiing, snowmobiling, biking and horseback riding was projected at 40 percent of capacity the first year, 50 percent of capacity the second year, 60 percent capacity the third year, 80 percent capacity the fourth year and full capacity the fifth year.

Table 4 – Project Recreation Features: Maximum Capacity and Expected Use, New Trail System

Trail Activities, Design Capacity Values*

Primary Activity	(u)= Miles of Trail	(p) = Users per Mile	(t) = Turnover Rate	(s) = Weeks in Season	(w) = Weekend Day Use	(y) = Recreation Season Use
Walking/Hiking - soft trail	25	25	3	42	30%	70%
Walking/Hiking - paved	19	25	4	42	30%	70%
Running/ Jogging	44	25	3.5	42	30%	80%
Biking	44	12	4	25	30%	70%
X-C Skiing	20	12	4	13	50%	100%
Snowmobiling	44	19	4	13	50%	100%
Horseback Riding	25	4	4	42	40%	70%

*Capacity of Recreation Use in Activity Occasions = upts/wy

Table 4a – Estimated Annual Primary Activity Days, New Trail System

Project Recreation Trails:							
	Primary Activity						
	Walking/ Hiking - soft trail	Walking/ Hiking - paved	Running/ Jogging	Biking	X-C Skiing	Snowmobiling	Horseback Riding
Annual Capacity in Activity Occasions	375000	380000	673750	251429	24960	86944	60000
Activity Day Factor	1.25	1.25	1.25	1.25	1.00	1.00	1.25
Annual Primary Activity Days*	**300000**	**304000**	**539000**	**201143**	**24960**	**86944**	**48000**

* Annual Primary Activity Day numbers may contain rounding errors.

Table 5 – Project Recreation Features: Maximum Capacity and Expected Use, Site Activities

Recreation Other Than Trails, Resource Capacity

Primary Activity	Area Per Unit	Supply
Picnicking	40 sq ft	15 tables
Wildlife Viewing		2.5% of total use

Recreation Other Than Trails, Design Capacity Values*

Primary Activity	(u)= Supply of Units	(p) = People per Unit	(t) = Turnover Rate	(s) = Weeks in Season	(w) = Weekend Day Use	(y) = Recreation Season Use
Picnicking	15	4	2	18	30%	70%
Fishing	4	2	2	22	20%	65%
Wildlife Viewing	2.5					

*Capacity of Recreation Use in Activity Occasions = upts/wy

Table-5a shows estimated recreation site capacity, from Table-5, converted to Annual Primary Activity Days, by major recreation activities that would be supported by the project.

Table 5a – Estimated Annual Primary Activity Days, Site Activities

	Activity Occasions*	Conversion Factor	Activity Days (2019)	Activity Days (2020)	Activity Days (2021)	Activity Days (2022)	Activity Days (2023-68)
Picnicking	10,286	1.25	3,291	4,114	4,937	6,583	8,229
Fishing	2,708	1.25	866	1,083	1,300	1,733	2,166
Total Site Activity Days			4,158	5,197	6,237	8,316	10,395
Total Trail Activity Days			601,619	752,023	902,428	1,203,237	1,504,047
SUBTOTAL ACTIVITY DAYS			605,777	757,221	908,665	1,211,553	1,514,442
Wildlife Viewing**	2.5%	1.25	12,116	15,144	18,173	24,231	30,289
TOTAL ANNUAL PRIMARY ACTIVITY DAYS* **			**617,892**	**772,365**	**926,838**	**1,235,784**	**1,544,730**

*Capacity of Recreation Use in Activity Occasions = upts/wy
**2.5% of Total Activity Days for Site and Trail
***Annual Primary Activity Day numbers may contain rounding errors

1.12.5 Estimate of Current and Future Usage of Existing Activities

There are currently many miles of trails available to the public; however, for the purpose of this study, only 11 miles of bike trail was used, 25 miles of trail for walking and jogging and approximately 13 miles of x-c skiing. These trails were included in the study due to the similarities they have with the proposed trails; they are scenic, popular, in their own right-of -way and are used as both recreational and commuter routes for bicyclists.

These existing miles of trail supply some of the estimated demand from Fargo-Moorhead. Annual Primary Activity Days for bicycling, walking, jogging and x-c skiing on existing trails were derived using the capacity assumptions mentioned in 1.12.4 and shown in Table 4. This usage was assumed to be at the maximum capacity starting at project year 1 since they are established trails.

Table 6 – Project Recreation Features: Maximum Capacity and Expected Use, Existing Trail System

Trail Activities, Design Capacity Values*						
Primary Activity	(u)= Miles of Trail	(p) = Users per Mile	(t) = Turnover Rate	(s) = Weeks in Season	(w) = Weekend Day Use	(y) = Recreation Season Use
Walking/Hiking - paved	25	25	4	42	30%	70%
Running/ Jogging	25	25	3.5	42	30%	80%
Biking	11	12	4	25	30%	70%
X-C Skiing	13	12	4	13	50%	100%

*Capacity of Recreation Use in Activity Occasions = upts/wy

Table 6a – Estimated Annual Primary Activity Days, Existing Trail System

Project Recreation Trails:				
	Primary Activity			
	Walking/ Hiking - paved	Running/ Jogging	Biking	X-C Skiing
Annual Capacity in Activity Occasions	500000	382813	62857	16224
Activity Day Factor	1.25	1.25	1.25	1.0
Annual Primary Activity Days*	**400000**	**306250**	**50286**	**16224**

* Annual Primary Activity Day numbers may contain rounding errors.

1.12.6 Annual Recreation Benefits

Table-7 shows the projected recreation visitation over the life of the project. The design provides a positive social value in that less popular forms of recreation can also be supported and provided by the project's main features at little or no additional cost. Noting the excess demand for each activity, it is evident the project will provide a positive percentage of the market area recreation needs for years to come. Visitation growth of the project is tied to recreation activity growth as indicated by the Long-Term National Trends in Outdoor Recreation Activity Participation (2009) and the population growth expected for the region.

Recreation transfers to the proposed facilities from existing facilities must also be accounted for to avoid double counting of benefits. The net value of a transfer of use from one site to another is the difference in benefits per day for recreation at the two sites. Therefore, transfer demand was calculated for each primary activity. Transfer demand for horseback riding, snowmobiling, x-c skiing, picnicking, wildlife viewing and fishing were assumed to be 25% of the demand met by proposed activities. This percentage was based on discussions with staff from the Fargo and Moorhead park and recreation departments and planning departments (FMMS Non-Structural Alternatives Meeting, September 2009) and noting the existing recreation opportunities for these

activities are limited and therefore more new users would take advantage of the proposed facilities. The transfer demand for walking/hiking, running/jogging and biking was at a higher rate. Transfer demand for walking/hiking and running/jogging was assumed to be 75% of the demand met by proposed activities while transfer demand for biking was 80% of the proposed activity demand. This demand was also determined after talking to staff from the Fargo and Moorhead park and recreation departments and planning departments (FMMS Non-Structural Alternatives Meeting, September 2009). Currently, a large percentage of the population is already participating in these activities using existing facilities such as sidewalks, streets, trails etc. However, it is felt that a portion of these users would use a continuous trail system for recreating in a safer, more aesthetic setting, especially on the weekend and holidays. New demand was calculated by subtracting the transfer demand from the proposed activity demand for each primary activity.

Due to the large amount of unmet demand (other than X-C skiing), it is felt that all transfers will be replaced at existing facilities. Many of the transfers are assumed to be from ad hoc facilities such as city streets and sidewalks. Therefore demand met by existing facilities, as shown in Table 7, does not change because of transfers.

The numbers shown may be somewhat affected by final site design, as stated earlier. Other factors that could affect these values are: changes outside of the population value ranges estimated, enlarging the recreation sites and features, additional recreation features, climate change, or the addition of recreation features not supported by this project.

Table 7 – Project Recreation and Excess Demand

Primary Activity:		Year: 2019	2020	2021	2022	2023	2029	2039	2049	2059	2068
Walking/Hiking											
(Table 3)	Market Zone Demand	5,639,056	5,723,817	5,808,914	5,894,345	5,980,111	6,501,744	7,232,072	7,962,400	8,509,605	9,350,023
(Table 6a)	Demand Met by Ex Facilities	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000
	Remaining Demand	5,239,056	5,323,817	5,408,914	5,494,345	5,580,111	6,101,744	6,832,072	7,562,400	8,109,605	8,950,023
(Table 4a)	Demand Met by Proposed Facilities	241,600	302,000	362,400	483,200	604,000	604,000	604,000	604,000	604,000	604,000
	New Demand	60,400	75,500	90,600	120,800	151,000	151,000	151,000	151,000	151,000	151,000
	Transfer Demand	181,200	226,500	271,800	362,400	453,000	453,000	453,000	453,000	453,000	453,000
	Excess Demand	4,997,456	5,021,817	5,046,514	5,011,145	4,976,111	5,497,744	6,228,072	6,958,400	7,505,605	8,346,023
Running/Jogging											
(Table 3)	Market Zone Demand	1,063,981	1,080,670	1,097,440	1,114,291	1,131,222	1,234,503	1,373,173	1,511,842	1,615,741	1,775,314
(Table 6a)	Demand Met by Ex Facilities	306,250	306,250	306,250	306,250	306,250	306,250	306,250	306,250	306,250	306,250
	Remaining Demand	757,731	774,420	791,190	808,041	824,972	928,253	1,066,923	1,205,592	1,309,491	1,469,064
(Table 4a)	Demand Met by Proposed Facilities	215,600	269,500	323,400	431,200	539,000	539,000	539,000	539,000	539,000	539,000
	New Demand	53,900	67,375	80,850	107,800	134,750	134,750	134,750	134,750	134,750	134,750
	Transfer Demand	161,700	202,125	242,550	323,400	404,250	404,250	404,250	404,250	404,250	404,250
	Excess Demand	542,131	504,920	467,790	376,841	285,972	389,253	527,923	666,592	770,491	930,064
Picnicking											
(Table 3)	Market Zone Demand	550,289	557,252	564,216	571,179	578,143	619,924	689,559	759,193	811,368	891,499
(Table 5a)	Demand Met by Proposed Facilities	3,291	4,114	4,937	6,583	8,229	8,229	8,229	8,229	8,229	8,229
	New Demand	2,469	3,086	3,703	4,937	6,171	6,171	6,171	6,171	6,171	6,171
	Transfer Demand	823	1,029	1,234	1,646	2,057	2,057	2,057	2,057	2,057	2,057
	Excess Demand	546,997	553,138	559,279	564,597	569,914	611,695	681,330	750,965	803,139	883,271
Wildlife Viewing											
(Table 3)	Market Zone Demand	2,275,478	2,313,587	2,351,928	2,390,502	2,429,309	2,667,040	2,966,623	3,266,207	3,490,672	3,835,415
(Table 5a)	Demand Met by Proposed Facilities	12,116	15,144	18,173	24,231	30,289	30,289	30,289	30,289	30,289	30,289
	New Demand	9,087	11,358	13,630	18,173	22,717	22,717	22,717	22,717	22,717	22,717
	Transfer Demand	3,029	3,786	4,543	6,058	7,572	7,572	7,572	7,572	7,572	7,572
	Excess Demand	2,263,362	2,298,442	2,333,755	2,366,271	2,399,021	2,636,751	2,936,335	3,235,918	3,460,383	3,805,126

Table 7 Continued– Project Recreation and Excess Demand

Primary Activity:		Year: 2019	2020	2021	2022	2023	2029	2039	2049	2059	2068
Fishing											
(Table 3)	Market Zone Demand	411,916	417,930	423,964	430,019	436,093	472,959	526,086	579,212	619,018	680,153
(Table 5a)	Demand Met by Proposed Facilities	866	1,083	1,300	1,733	2,166	2,166	2,166	2,166	2,166	2,166
	New Demand	650	812	975	1,300	1,625	1,625	1,625	1,625	1,625	1,625
	Transfer Demand	217	271	325	433	542	542	542	542	542	542
	Excess Demand	411,050	416,847	422,665	428,286	433,927	470,793	523,919	577,046	616,852	677,986
X-C Skiing											
(Table 3)	Market Zone Demand	39,849	39,776	39,690	39,589	39,473	38,478	42,800	47,122	50,361	55,334
(Table 6a)	Demand Met by Ex Facilities	16,224	16,224	16,224	16,224	16,224	16,224	16,224	16,224	16,224	16,224
	Remaining Demand	23,625	23,552	23,466	23,365	23,249	22,254	26,576	30,898	34,137	39,110
(Table 4a)	Demand Met by Proposed Facilities*	9,984	12,480	14,976	19,968	23,249	22,254	24,960	24,960	24,960	24,960
	New Demand	7,488	9,360	11,232	14,976	17,437	16,691	18,720	18,720	18,720	18,720
	Transfer Demand	2,496	3,120	3,744	4,992	5,812	5,564	6,240	6,240	6,240	6,240
	Excess Demand	13,641	11,072	8,490	3,397	0	0	1,616	5,938	9,177	14,150
Snowmobiling											
(Table 3)	Market Zone Demand	265,408	266,596	267,730	268,810	269,836	274,851	305,724	336,598	359,730	395,257
(Table 4a)	Demand Met by Proposed Facilities	34,778	43,472	52,166	69,555	86,944	86,944	86,944	86,944	86,944	86,944
	New Demand	26,083	32,604	39,125	52,166	65,208	65,208	65,208	65,208	65,208	65,208
	Transfer Demand	8,694	10,868	13,042	17,389	21,736	21,736	21,736	21,736	21,736	21,736
	Excess Demand	230,630	223,124	215,564	199,255	182,892	187,907	218,780	249,654	272,786	308,313
Bicycling											
(Table 3)	Market Zone Demand	1,370,119	1,389,669	1,409,275	1,428,936	1,448,653	1,568,113	1,744,256	1,920,399	2,052,376	2,255,071
(Table 6a)	Demand Met by Ex Facilities	50,286	50,286	50,286	50,286	50,286	50,286	50,286	50,286	50,286	50,286
	Remaining Demand	1,319,833	1,339,383	1,358,989	1,378,651	1,398,367	1,517,827	1,693,970	1,870,113	2,002,090	2,204,785
(Table 4a)	Demand Met by Proposed Facilities	80,457	100,571	120,686	160,914	201,143	201,143	201,143	201,143	201,143	201,143
	New Demand	16,091	20,114	24,137	32,183	40,229	40,229	40,229	40,229	40,229	40,229
	Transfer Demand	64,366	80,457	96,549	128,731	160,914	160,914	160,914	160,914	160,914	160,914
	Excess Demand	1,239,376	1,238,812	1,238,304	1,217,736	1,197,224	1,316,685	1,492,828	1,668,971	1,800,947	2,003,642
Horseback Riding											
(Table 3)	Market Zone Demand	85,606	86,856	88,111	89,370	90,633	98,301	109,343	120,384	128,658	141,364
(Table 4a)	Demand Met by Proposed Facilities	19,200	24,000	28,800	38,400	48,000	48,000	48,000	48,000	48,000	48,000
	New Demand	14,400	18,000	21,600	28,800	36,000	36,000	36,000	36,000	36,000	36,000
	Transfer Demand	4,800	6,000	7,200	9,600	12,000	12,000	12,000	12,000	12,000	12,000
	Excess Demand	66,406	62,856	59,311	50,970	42,633	50,301	61,343	72,384	80,658	93,364

*Carrying capacity of proposed trail for cross country skiing of 24,960 annually is not expected to be met from the year 2023-2039 period of analysis because slight declines of participation rates are not offset by regional population growth.

1.12.7 Unit Day Values

The Unit Day Value (UDV) method was used to determine daily recreation benefits. This method was chosen because of the exhaustive amount of studies already done for the region specifically on recreation needs. The local planners and recreation experts were extremely knowledgeable and provided ample data regarding the existing recreation opportunities as well as needs and priorities for the Fargo Moorhead community. UDV was also chosen because the cost of recreation facilities is small in comparison to the overall cost - approximately 3 percent of the project cost – and will not influence the project plan selection. Because the total project annual visits are forecasted to be more than 750,000, the rationale behind the selection of the UDV method was coordinated with IWR (S. Cone, personal communication, March 5, 2010), and MVD (L. Kilgo, personal communication, March 3, 2010). The participation rates and total visitation vary significantly among the different proposed activities and therefore analyzing the activities separately resulted in a more accurate account of recreation benefits for the project. It should be noted that each of the primary activities are forecasted to have less that 750,000 annual visits.

Unit day values were developed for each primary recreational activity. This methodology relies on professional judgment to assign point values to five specific criteria:

- Recreation Experience—pertains to the availability and quality of activities on site.
- Availability of Opportunity—is specific to travel times and scarcity of activities.
- Carrying Capacity—concerns the level of site recreation development.
- Accessibility—pertains to the ease of access, specifically by automobile.
- Environmental—is specific to the aesthetic qualities of the site and surrounding areas.

The total points assigned are converted to a Unit Day Value, which is then applied to the estimated visitation to derive the overall benefits. The points were assigned to the primary activities listed in Table-7. These points were then converted to a Unit Day Value using "General Recreation" point-to-value data for Fiscal Year 2011, with a range for general recreation of $3.58 -$10.75, and specialized recreation $14.56 - $42.57.

This method is outlined in the *Economics Guidance Memorandum 11-03, Unit Day Values for Recreation, Fiscal Year 2011*. The table provided in the memorandum was adjusted from Table K-3-1, Federal Register Vol. 44, No. 242, p.72962, December 4, 1979, using the CPI factor.

Point assignment for General Recreation is assumed using parameters outlined in the memorandum and assumptions by a recreation professional. Points are adjusted, from a maximum assignment, by judgment factors set forth for each criterion. Maximum points vary according to the criteria as shown in Table 8-8b. As mentioned in 1.12.6, the Unit Day Values must also account for transfers. The Unit Day Values assigned for existing primary activities and the proposed primary activities are shown in Table-8 and 8a,

respectively. The Unit Day Values for transfers, the difference between the Unit Day Values for each existing and proposed Primary Activity, are illustrated in Table 8b.

Table 8 – Unit Day Values for Existing Activities

	Primary Activity								
Criteria and (Maximum Points)	Walking/ Hiking	Running/ Jogging	Picnicking	Wildlife Viewing	Fishing	X-C Skiing	Snowmobiling	Bicycling	Horseback Riding
Recreation Experience (30)	6	6	7	5	10	6	5	6	6
Availability (18)	3	3	3	3	5	3	7	7	7
Carrying Capacity (14)	12	12	6	6	4	4	4	6	4
Accessibility (18)	10	5	5	5	5	5	5	5	5
Environmental Quality (20)	4	4	8	4	10	10	4	4	4
Total Points Assigned (100)	35	30	29	23	34	28	25	28	26
Unit Day Values*	**6.05**	**5.38**	**5.31**	**4.90**	**5.92**	**5.24**	**5.04**	**5.24**	**5.11**
2011 UDV = $3.58 -$10.75									

Table 8a– Unit Day Values for Proposed Activities

	Primary Activity								
Criteria and (Maximum Points)	Walking/ Hiking	Running/ Jogging	Picnicking	Wildlife Viewing	Fishing	X-C Skiing	Snowmobiling	Bicycling	Horseback Riding
Recreation Experience (30)	10	10	10	3	7	7	10	10	10
Availability (18)	3	3	3	3	3	3	7	7	7
Carrying Capacity (14)	12	12	12	12	10	12	12	12	12
Accessibility (18)	10	10	10	10	10	10	10	10	10
Environmental Quality (20)	10	12	10	6	10	10	12	12	10
Total Points Assigned (100)	45	47	45	34	40	42	51	51	49
Unit Day Values*	**7.17**	**7.35**	**7.17**	**5.92**	**6.72**	**6.90**	**7.69**	**7.69**	**7.53**
2011 UDV = $3.58 -$10.75									

Table 8b – Unit Day Values for Transfer Activities

	Primary Activity								
Criteria and (Maximum Points)	Walking/ Hiking	Running/ Jogging	Picnicking	Wildlife Viewing	Fishing	X-C Skiing	Snowmobiling	Bicycling	Horseback Riding
Unit Day Values*	**1.12**	**1.97**	**1.86**	**1.02**	**0.80**	**1.66**	**2.65**	**2.45**	**2.42**
2011 UDV = $3.58 -$10.75									

1.12.8 Benefit Computation

Recreation benefits attributable to the proposed trail system were based on projected demand for the recreational activities listed in Table 7. These demand estimates over the period of analysis were used in conjunction with Unit Day Values developed for each of the recreational activities shown in Table 8a and 8b. Demand at each project year was multiplied by the appropriate Unit Day Value for each recreation activity. The value of the recreation activity at each project year was converted to a present worth value using a 4 1/8 percent annual interest rate. The sum of these present worth values, by recreational activity were converted to an average annual dollar value, given a 50 year project life and a 4 1/8 percent annual interest rate. Table 9 shows the Average Annual Benefit summary.

Table 9 – Project Recreation Average Annual Benefit

Walking	$1,490,287
Running	$1,674,699
Picnicking	$45,057
Wildlife Viewing	$133,285
Fishing	$10,641
X-C Skiing	$157,228
Bicycling	$689,625
Snowmobiling	$523,980
Horseback Riding	$281,291
TOTAL ANNUAL AVG BENEFITS	**$5,006,093**

The present value of estimated construction costs, contingencies, engineering, design, construction management, and interest during construction were calculated to be $33,148,000. This present value was amortized at 4 1/8 percent over the 50-year life of the project. The resulting annualized cost of $1,576,220 was added to the estimated annual operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) cost of $129,905 for a total annual cost of $1,706,125. The net annual benefits, or the annual benefits minus the annual costs, are $3,299,968. The benefit-cost ratio, or the annual benefits divided by the annual costs, was calculated to be 2.93. Therefore, the Fargo-Moorhead proposed recreation plan is economically justified. The Federal costs of the Fargo Moorhead flood damage reduction project with the recreation facilities would be approximately 3.8 percent greater than the Federal costs of the project without the recreation facilities, less than the 10 percent limit, in accordance with ER 1105-2-100.

1.13 REFERENCES

- Anderson, Randall S., Leitch, Jay A. October 1985. *Projections of Future Participation and Needs in Outdoor Recreation for North Dakota*. Agricultural Economics Report No. 205.

- City of Fargo, City of Moorhead, Fargo Park District, Fargo - Moorhead Metropolitan Council of Governments, Moorhead Parks and Recreation Division, National Audubon Society, River Keepers, US Army Corps of Engineers. Fargo, ND. September 1-2, 2009. FMMS Non-Structural Alternatives Meeting. Discussion on the opportunities for recreation with non-structural alternatives and what the community would like to see for recreation.

- Cordell, H. Ken, Green, Gary T., Betz, Carter J, USDA Forest Service, University of Georgia. May 2009. *Long-Term National Trends in Outdoor Recreation Activity Participation –1980 to Now, A Recreation Research Report in the IRIS*

Series. Retrieved on September 14, 2009, from http://warnell.forestry.uga.edu/nrrt/nsre/IrisReports.html.

- DH Research, the North Dakota Recreation and Parks Association and the North Dakota Parks and Recreation Department. December 2007. *The 2008-2012 North Dakota State Comprehensive Outdoor Recreation Plan*.

- Fargo-Moorhead Metropolitan Council of Governments. 2008. *2008 Metro Profile.* Retrieved on July 6, 2009 from http://www.fmmetrocog.org.

- Fargo - Moorhead Metropolitan Council of Governments. July 2009. Email from Mr. Justin Kristan. Documents regarding trails/shared use paths,

- Fargo - Moorhead Metropolitan Council of Governments. August 2009. Personal conversation with Mr. Justin Kristan. Conversation regarding recreation needs and opportunities for Fargo-Moorhead.

- Fargo - Moorhead Metropolitan Council of Governments. August 2009. Email from Mr. Justin Kristan. Information regarding 2006 Metro Bicycle and Pedestrian Plan.

- Fargo - Moorhead Metropolitan Council of Governments. January 2010. Email from Mr. Justin Kristan. Information on approximate trail mileage and user counts.

- Fargo Park District. December 2009. Email from Mr. Dave Leker. Information on existing picnic facilities.

- Institute for Water Resources, U. S. Army Corps of Engineers. March 5, 2010. Email from Mr. Steven Cone. Information regarding the implementation of UDV.

- Kelly, Tim, Office of Management and Budget Services, Minnesota Department of Natural Resources. January 2005. *2004 Outdoor Recreation Participation Survey of Minnesotans – Report on Findings*.

- Moorhead Parks and Recreation Division. January 2010. Email from Ms. Holly Heitkamp. Information on existing picnic facilities.

- Minnesota Departments of Natural Resources and Trade and Economic Development. 1990. *Minnesota's Outdoor Legacy: Strategy for the 90's. Statewide Comprehensive Outdoor Recreation Plan for 1990-1994.*

- Office of Management and Budget Services. Minnesota Department of Natural Resources. 2007. *The 2008-2012 Minnesota State Comprehensive Outdoor Recreation Plan.*

- River Keepers. August 2009. Personal conversation with Mr. Robert Backman. Conversation regarding history of the Red River of the North and needs and wants for recreation in Fargo-Moorhead.

- Urban Research and Development Corporation. 1977. *Guidelines for Understanding and Determining Optimum Recreation Carrying Capacity.* Prepared for the U.S. Department of the Interior.

- Urban Research and Development Corporation. July 1980. *Recreation Carrying Capacity Handbook – Methods and Techniques for Planning, Design, and Management*. Prepared for the U.S. Army Corps of Engineers.

- U.S. Army Corps of Engineers. April 22, 2000. *ER 1105-2-100, Planning Guidance Notebook.* Washington, D.C.

- U.S. Army Corps of Engineers. November 2010. *Economics Guidance Memorandum, 11-03Unit Day Values for Recreation, Fiscal Year 2011.*

- U.S. Army Corps of Engineers, Mississippi Valley Division Headquarters. March 3, 2010. Email from Mr. Larry Kilgo. Information regarding the implementation of UDV.

- U.S. Census Bureau. (2000). *American FactFinder fact sheet: Fargo, ND.* Retrieved on August 4, 2009, from http://factfinder.census.gov/home/saff/main.html?_lang=en.

- U.S. Census Bureau. (2000). *American FactFinder fact sheet: Moorhead, MN.* Retrieved on August 4, 2009, http://factfinder.census.gov/home/saff/main.html?_lang=en.

- U.S. Census Bureau. (2000). *Population Estimates: Metropolitan and Micropolitan Statistical Areas.* Retrieved on August 4, 2009, from http://www.census.gov/popest/metro/metro.html.

- U.S. Department of Interior, National Park Service. 1986. *1982-83 Nationwide Recreation Survey*. U.S. Government Printing Office publication 1986-491-070/40078. Retrieved on September 14, 2009, from http://warnell.forestry.uga.edu/nrrt/nsre/Nsre/nsre8283.html.