PAPIO-MISSOURI RIVER
NATURAL
RESOURCES
DISTRICT

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Programs, Projects & Operations Subcommittee Meeting
February 11, 2003
7:00 p.m.
Agenda

Programs, Projects & Operations

John Conley, Chairperson
Rich Jansen, Vice-Chairperson
Tim Fowler
Joe Neary
Rich Tesar

Alternate Members: Dick Connealy
Pete Rubin

Staff Liaison: Gerry Bowen
Jerry Herbster*
Ralph Puls
Paul Woodward

1. Meeting Called to Order – Chairperson John Conley

2. Quorum Call

3. Adoption of Agenda

4. Review and Recommendation on Lower Platte River and Tributaries Feasibility Study Report – Union Dike Component – Dick Taylor, Corps of Engineers

5. Review of Lower Platte River Cumulative Impact Study – Gerry Bowen and Steve Oltmans

   a. Draft Scope of Services with Corps of Engineers
   b. Cost Share Agreement between the Corps of Engineers and NE Game and Parks Commission
   c. Future Interlocal Agreement (will receive agreement at 2/6/03 meeting)

6. Review and Recommendation on West Papio Trail (72^{nd} – 36^{th} Streets, Papillion – Bellevue) T-21 Funding Resolution – Gerry Bowen

7. Review and Recommendation on Wetland Mitigation Bank Application and Guidelines – Paul Woodward

8. Other Items of Interest

9. Adjourn

MEMORANDUM TO THE PROGRAMS, PROJECTS AND OPERATIONS SUBCOMMITTEE:

SUBJECT: Union Dike Improvements Project Feasibility Study

DATE: January 27, 2003

BY: Martin P. Cleveland

Union Dike is a 9.5-mile long flood control dike, located along the east bank of the Platte River in Western Douglas County between Fremont and Valley. Union Dike has been operated and maintained by the Papio-Missouri River NRD since 1975. In 1991, the NRD improved (raised and broadened) the Dike via an Improvement Project Area to withstand the 100 year open water flood plus three feet of freeboard. This improvement project with a construction cost of $1.9 million dollars was funded via 90% local assessments and 10% NRD general funds.

In 1996, the Corps of Engineers completed a reconnaissance level evaluation of the flooding problems and potential solutions on the Lower Platte River. This study found that Union Dike was susceptible to overtopping during ice-affected floods. The study also found that raising Union Dike to provide a 100-year ice-affected level of flood protection was potentially feasible and recommended that a feasibility study be conducted. Subsequently, the Corps and NRD entered into a contract for Corps to prepare an initial assessment as the first phase of a feasibility study. The draft initial assessment report is attached. The overall conclusion is that the potential for an economically feasible improvement project, from a Federal perspective, is low (benefit cost ratio less than one).

The Study to date has been an initial assessment to determine if completion of a full feasibility study is warranted. Additional study could be conducted to refine project assumptions (e.g. levee design cross-section, real estate requirements, borrow sources, etc.) and address outstanding issues (e.g. environmental mitigation requirements, induced damages, land damages, etc.). This would result in more realistic cost estimates, benefits and the corresponding assessment of economic feasibility. However, based on the information developed for this initial assessment, the potential for a feasible flood damage reduction project that provides a minimum of a 100-year ice-affected flood protection is low.

It is Management's recommendation that the Subcommittee recommend to the Board that the Corps of Engineers' study of the feasibility of a Union Dike Improvement Project be terminated and that stakeholders be informed of the project's infeasibility at a public meeting.

Attachment

CC: Dick Taylor, Corps of Engineers

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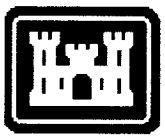
Union Dike Feasibility Study
Lower Platte River & Tributaries
Dodge and Douglas Counties, Nebraska

Initial Assessment Report

January 2003



US Army Corps of Engineers

Omaha District
Northwestern Division

SYLLABUS

An "initial assessment" of the flooding problem primarily in western Douglas County, Nebraska and the potential for a structural improvements project to the Union Dike levee system was conducted under the authority of the Lower Platte River and Tributaries Feasibility Study. The purpose of this assessment was to further evaluate the feasibility of improving Union Dike to reduce flood damages prior to proceeding into a full feasibility study. This approach provides both the Federal government and non-Federal sponsor with the information necessary to make a reasoned decision as to whether to complete the feasibility study.

This assessment found that the existing Union Dike levee provides a high degree of protection from open-water flood events and a significantly lower level of flood protection from ice-affected flood condition. The overall level of protection provided by Union Dike from both open-water and ice-affected floods limits the frequency of damaging floods and the corresponding magnitude of damages.

In order to reduce flood damages and provide a greater degree of flood protection to portion of western Douglas County, several alternatives for raising and improving Union Dike were considered. Based on the information developed for this initial assessment, the potential for a feasible flood damage reduction project that provides a minimum of a 100-year level of flood protection is low.

Additional studies could be conducted to refine assumptions and address outstanding issues. This will result in more reliable cost estimates, benefits, and the corresponding assessment of economic feasibility.

INITIAL ASSESSMENT REPORT
UNION DIKE FEASIBILITY STUDY

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DODGE AND DOUGLAS COUNTIES, NEBRASKA

INITIAL ASSESSMENT REPORT

INTRODUCTION

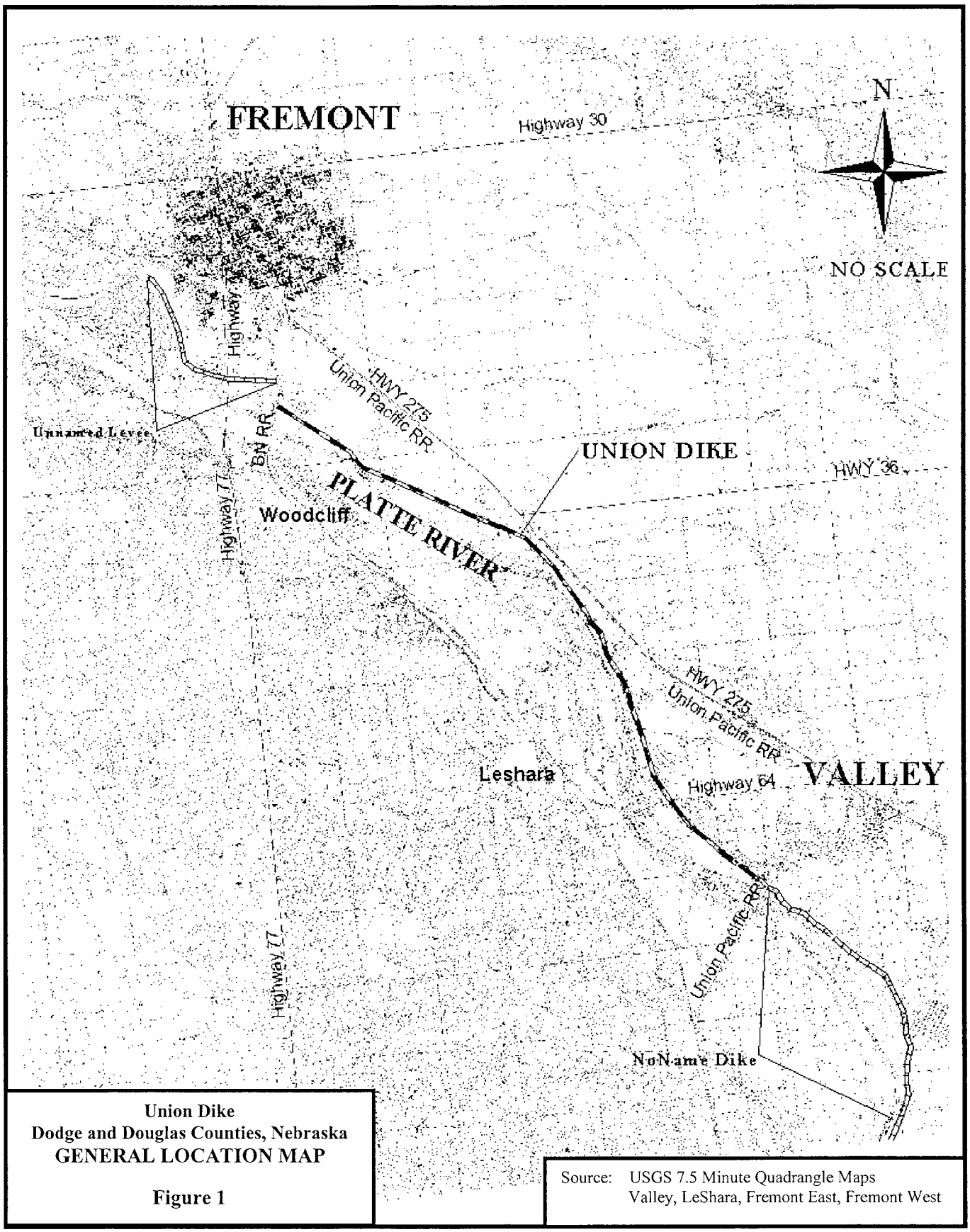
BACKGROUND

Union Dike is a levee that is located along the left (west) bank of the Platte River primarily in western Douglas County, Nebraska. The levee extends from the Union Pacific Railroad embankment southwest of Valley to the Burlington Northern Railroad line southeast of Fremont (See Figure 1). This levee provides the communities of Valley, Ginger Cove and other residential and agricultural areas in Douglas County some degree of protection from Platte River flooding. This stretch of the river has sustained heavy damages in past floods, most recently in 1978, from ice jam flooding, and to a lesser extent, open-water flooding.

In 1996, the Omaha District completed a reconnaissance level evaluation of the flooding problem and potential solutions along various reaches of the Lower Platte River and its tributaries (refer to the Reconnaissance Report, Lower Platte River and Tributaries, USACE, 1996). This reconnaissance study found that Union Dike was susceptible to overtopping during a low frequency ice-affect flood. The report also found that raising Union Dike to provide a 100-year ice-affected level of flood protection was potentially feasible and recommended that a feasibility study be initiated. The Omaha District subsequently entered into a feasibility cost sharing agreement with the non-Federal sponsor to perform feasibility studies at selected locations in the lower Platter River Basin, including the Union Dike reach of the Platte River. These studies are being conducted under the auspices of the Lower Platte River and Tributaries Feasibility study. The Papio-Missouri River Natural Resources District (PMRNRD) is the non-Federal sponsor for the Union Dike feasibility study.

STUDY AREA

The study area is generally located along the Platte River west of Omaha, Nebraska in western Douglas County and a portion of eastern Dodge County. The Platte River hydraulic studies extended from Nebraska Highway 92 at Venice to just downstream of Fremont and were concentrated on the left bank of the river. This study area includes the City of Valley and substantial agricultural land behind Union Dike.



Union Dike
Dodge and Douglas Counties, Nebraska
GENERAL LOCATION MAP

Figure 1

Source: USGS 7.5 Minute Quadrangle Maps
Valley, LeShara, Fremont East, Fremont West

STUDY AUTHORITY

This study was conducted under the authority of a resolution of the Committee on Public Works and Transportation of the United States House of Representatives, entitled "Lower Platte River and Tributaries, Nebraska, docket 2441," adopted 28 September 1994. Refer to Exhibit 1 for an excerpt from the authorizing legislation.

EXHIBIT 1

"Resolved by the Committee on Public Works and Transportation of the United States House of Representatives, that the Secretary of the Army, is requested to review the report of the Chief of Engineers on the Platte River, Colorado, Wyoming, Nebraska, published as House Document 197, Seventy-third Congress, Second Session, and other pertinent reports, to determine whether modifications of the recommendations contained therein are advisable at the present time, in the interest of flood control, environmental restoration, and other purposes along the lower Platter River and its tributaries from its mouth to Grand Island, Nebraska."

STUDY PURPOSE AND SCOPE

The purpose of this "initial assessment" is to further evaluate the flood problem and the feasibility of a structural flood damages reduction project along the Union Dike reach of the Platte River. Specifically, analyses were performed to further define the feasibility of improving the existing Union Dike to reduce flood damages by providing a minimum 100-year level of ice-affected flood protection. This "initial assessment" level of effort was requested by the non-Federal sponsor so that the cost and feasibility of the structural solution recommended in the reconnaissance study (i.e., improving Union Dike) could be more fully developed prior to proceeding further into the feasibility study. This approach provides both the Federal government and non-Federal sponsor with the information necessary to make a reasoned decision as to whether to complete the feasibility study.

As discussed in the following sections, only the analyses required to more firmly establish the feasibility of the project were performed. Additional detailed analysis and other work necessary to determine feasibility, and to satisfy Federal criteria for a feasibility study, was deferred to the full feasibility study, should the study progress to that point. For example, hazardous, toxic, and radioactive (HTRW) studies; induced stages and damages; interior drainage; and an environmental assessment were not performed and no topographic surveys were obtained. In addition, only limited analysis was performed in other areas, which include geotechnical engineering and real estate acquisition planning.

PRIOR STUDIES OR INVESTIGATIONS

•**Missouri River Basin Comprehensive Framework Study (1971).** The Nebraska Soil and Water Conservation Commission published a report titled "Land and Water Resources Problems and Needs" as Appendix C of *The Missouri River Basin Framework Study* in 1971. This study included an inventory of the then-current and anticipated water requirements and water-related problems of the State, including flooding. Appendix C reported that the great majority of flood damages in the State of Nebraska were agricultural. In the lower Platte River basin, 60 percent of the flood damages were from crop and pasture damage and 9 percent were from urban damages. The need for specific flood control projects was not addressed in the report.

•**Review Report, Platte River and Tributaries, Nebraska (1971).** The Corps of Engineers completed a study of the flood and related land and water resources problems of the Platte River Basin in 1971. This report evaluated a 26,700 foot long levee that would provide an approximately 50-year level of flood protection to portions of southern Fremont. Although this project could not be economically justified, the study noted that local flood protection and general river control will be needed in this area within for the foreseeable future.

The Union Dike reach of the Platte River in the vicinity of Valley was studied. Preliminary feasibility studies found that improvements to the existing levee could be economically justified. Approximately 11 miles of levee was proposed to be modified to provide a 100-year level of flood protection.

•**Report on the Platte River Basin, Nebraska Level "B" (1976).** The Missouri River Basin Commission published the *Report on the Platte River Basin, Level B Study* in 1976. This report formulated a comprehensive plan for conservation, development, and management of water and related land resources in the Platte River basin of Nebraska. The report found that Valley and Fremont were two communities that ranked high in potential flood losses. However, the report did not recommend local flood control projects for these two cities.

•**Platte River and Tributaries, Nebraska (1978).** A study was completed by the Corps of Engineers in 1978 as a follow-up to the Level B Study noted above. The Corps' study included a more detailed evaluation of projects recommended in the Level B Study. The study concluded that some projects should be completed under the Corps' Continuing Authorities Program, some projects were not feasible, and some were feasible but lacked public support.

•**Platte River and Tributaries, Draft Summary (1982).** In 1982, the Corps of Engineers published a draft report that reevaluated flood problems in the lower Platte River basin after severe ice-jam flooding in March 1978. As noted above, the 1978 report by the Corps concluded that no flood control improvements would be feasible in the lower Platte River basin. The study concluded that a levee protecting Fremont and reconstruction of Union Dike for an ice-affected 500-year level of protection were infeasible. However, reconstruction of Union

Dike along either its existing alignment or construction along a setback alignment to provide a 100-year ice-affected level flood protection was marginally feasible. The report also noted that a tie-back levee would be needed at the upstream end of Union Dike to fully protect Valley. A ring levee to protect Valley probably would have been feasible, but there was no public support for this plan.

•**Post Flood Report, Missouri River and Tributaries, Spring Flood 1984 (1984).** The Omaha District published a report in 1984 to document the hydrology and hydraulic conditions before, during, and after flooding that occurred in 1984. Limited information regarding flooding along the Platte River was provided

•**Platte River and Tributaries Study (1986).** The Omaha District published a reconnaissance level study in 1986 that reevaluated flood problems and opportunities within the multi-state Platte River Basin. This study relied heavily on previously studies completed by the Corps of Engineers. The report reiterated the findings of the 1982 Draft Summary Report that an improved Union Dike could be flanked at Fremont unless a tie-back levee was constructed near Fremont. Additional study of the flood problem and solutions in this area were not addressed in the report.

•**Union Dike Levee Improvement Project (1988-1990).** The Papio-Missouri River Natural Resources District retained HWS Technologies, Inc. to design improvements to Union Dike. The improvements consisted of raising the levee to provide a 100-year level of open-water flood protection, providing underseepage control measures, and flattening side slopes to improve embankment stability. Construction of the improvement project began in September 1989 and was completed in December 1990 at a cost of approximately $1.9 million.

•**Union Dike Public Law 84-99 Initial Eligibility Inspection Report (1992).** The Omaha District completed an initial eligibility inspection of Union Dike in 1992. The purpose of the inspection was to determine if the levee met the requirements for admittance into the Public Law (PL) 84-99 Rehabilitation Assistance Program for Non-Federal Flood Control Projects. The inspection found that the levee was in very good condition and that it was qualified for admittance into the program.

•**No Name Dike Public Law 84-99 Initial Eligibility Inspection Report (1993).** The Omaha District conducted an initial eligibility inspection of No Name Dike in 1993. The inspection found that the levee was in good condition and that it was qualified for admittance into the PL 84-99 program.

•**Interagency Hazard Mitigation Report (1993).** In April 1993, the President declared Nebraska a major disaster area due to severe storms and flooding. A report was subsequently prepared that identified a series of mitigation measures designed to help federal, state, and local governments prepare more effectively for future floods. The report recommended the Corps conduct studies on ice jam formation and mitigation. The report also recommended that a

comprehensive investigation of flood, erosion, and ice problems in the Lower Platte River basin be conducted.

•**Lower Platte River, Ice Jam Flooding (1994).** The Omaha District and the Cold Regions Research and Engineering Laboratory conducted an assessment of ice-jam flooding on the Lower Platte River from Columbus to its confluence with the Missouri River. Within this study area, the following seven sites were evaluated in detail: State Highway 79 at North Bend, Big Island at Fremont, west channel at Leshara, 1.5 miles north of the State Highway 64 bridge, State Highway 92 on the Platte River, the confluence of the Platte and Elkhorn Rivers, and the area from Genoa to Columbus on the Loup River. A map of recurring ice jam sites was developed for this study and is presented as Figure 2. The report noted that flood damages in the Valley-Fremont area were particularly severe when an ice jam overtopped and breached Union Dike.

•**The Great Flood of 1993, Post Flood Report (1994).** The Omaha District published a report in 1994 to document the hydrology and hydraulic conditions before, during, and after the major multi-state flooding that occurred in 1993. Limited specific information regarding flooding in the Platte River basin was provided

•**Lower Platte River and Tributaries, Reconnaissance Report (1996).** The Omaha District completed a reconnaissance level study of the lower Platte River basin in 1996. The area encompassed by the study extended from Grand Island, Nebraska to the mouth of the Platte River and included tributaries to the river. The report evaluated the flood threat and flood damage reduction measures for numerous communities within this reach.

The reconnaissance report concluded that a portion of Union Dike was not high enough to provide a 100-year ice-affected level of flood protection. This study also found that raising an approximately six-mile reach of the levee to provide a 100-year ice-affected level of protection was potentially feasible. The study recommended that a feasibility study be conducted for Union Dike to further evaluate the potential feasibility of a flood damage reduction project.

•**Post Flood and After Actions Report, 1997 Midwest Floods (1998).** The Omaha District prepared a report in 1998 that summarized the hydrology and hydraulic conditions before, during, and after the 1997 spring floods in the Upper Midwest. The report notes that ice jams were common in the Loup, Elkhorn and Platte Rivers beginning in mid-February but does mention any significant flooding on the Platte River.

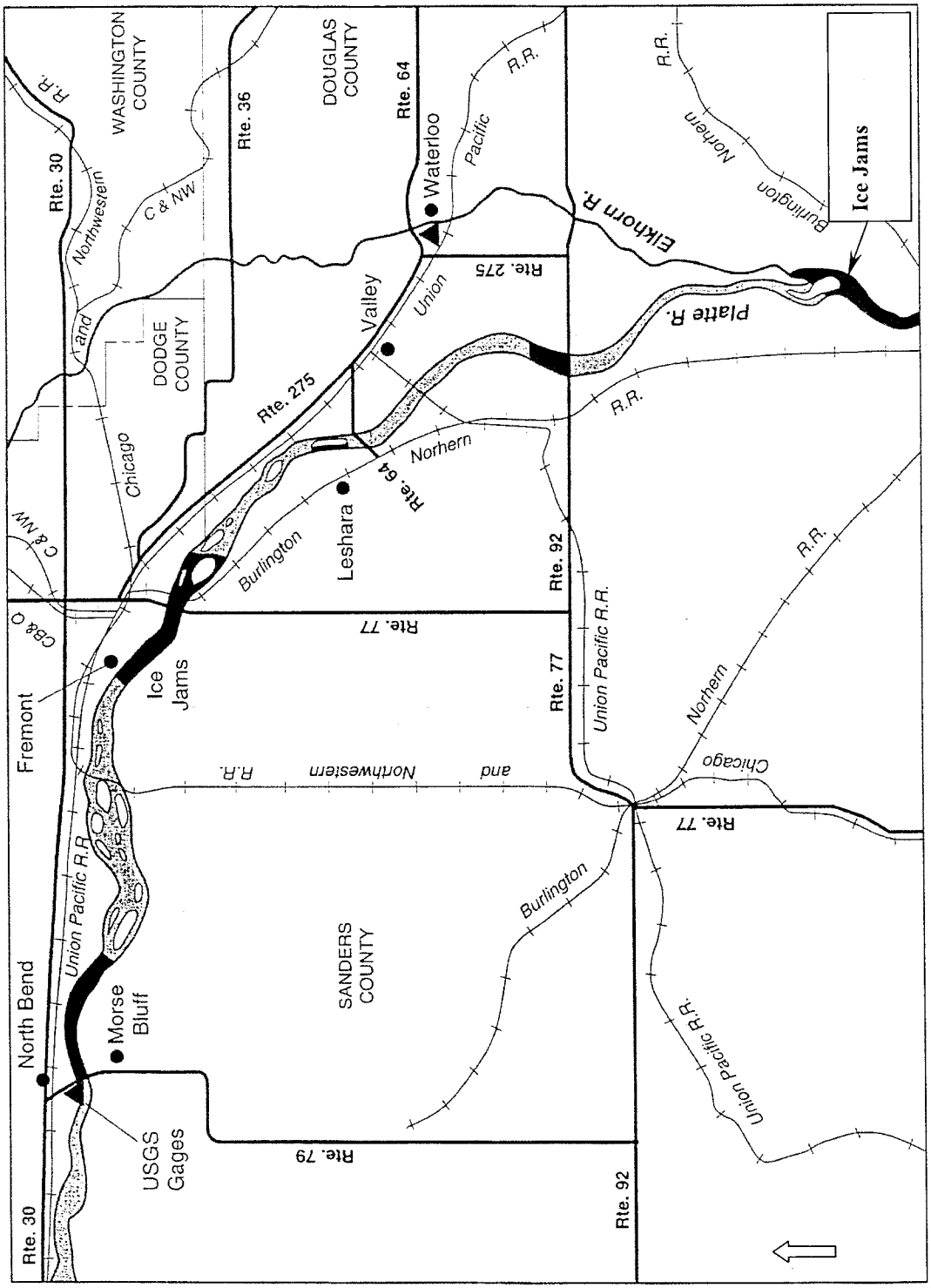


Figure 2. Identified Recurring Ice Jam Locations on the Plate River Between North Bend and Ashland.

•**Farmland, Fremont, and Railroad Drainage District Levee Public Law 84-99 Initial Eligibility Inspection Report (1993).** The Omaha District conducted an initial eligibility inspection of a levee that protects southern Fremont and Inglewood in 1999. The inspection found the levee to be in generally poor condition and ineligible for participation in the PL 84-99 program.

•**Water Quality Investigation, Lower Platte River Feasibility Study (1999).** A study to identify current and impending threats to the quality of drinking water supplies and to make recommendations to improve the protection of public and private water supplies in the Lower Platte River corridor was completed by the Corps in 1999. Flooding and flood control issues were not addressed in this study.

FLOOD INSURANCE STUDIES

The Federal Emergency Management Agency (FEMA) has published flood insurance studies (FIS) for the following locations that are located within or near the study area:

•**City of Valley, Douglas County (1979).** According to the FIS, low-lying areas of Valley are subject to periodic flooding caused by overflow of the Platte and Elkhorn Rivers. The most severe flooding has occurred in the early spring, as a result of snowmelt and heavy rains in conjunction with ice-jams on the Platte River. Although flooding from the Elkhorn River has occurred within Valley's extraterritorial area, there is no record of Elkhorn River floodwaters within the city limits proper. The hydraulic analysis conducted for the FIS assumed that Union Dike contained the 100-year open-water flood.

•**Dodge County (1997).** The Dodge County FIS was concerned with unincorporated areas of Dodge County and considered flooding from a number of sources including the Platte River. The study notes that future flooding from the Platte River due to ice blockage is highly probable.

•**Douglas County (1980).** The Douglas County FIS was concerned with unincorporated areas of Douglas County and considered flooding from a number of sources including the Platte River. The report notes that stages higher than the predicted 100-year open channel water-surface elevations have occurred due to ice jams.

EXISTING LEVEE SYSTEMS

There are three levee systems along the left bank of the Platte River that extend from just upstream of Fremont to a point well downstream from Valley (See Figure 1). These levees, Union Dike, No Name Dike, and the levee along the southern end of Fremont and Inglewood,

provide varying levels of flood protection to the communities of Fremont and Valley and other agricultural and rural areas. Each of these systems is briefly discussed below. There is also a series of levees on the right bank of the Platte River just downstream of Fremont.

Union Dike. Union Dike is an approximately 9.8 miles long levee and is located on the left bank of the Platte River. The levee extends from the Burlington Northern-Santa Fe Railroad embankment south of Fremont to the Union Pacific Railroad embankment southwest of Valley, Nebraska. The Papio-Missouri River Natural Resources District assumed the responsibility for operation and maintenance of Union Dike in 1975. This levee system was admitted into the Corps of Engineers Public Law 84-99 Flood Damages Rehabilitation Assistance Program in 1992 and is generally very well maintained and currently in excellent condition.

The Western Douglas County Drainage District initially constructed Union Dike in 1919. The 1979 FIS for Valley indicated that the primary purpose of the dike at that time was to provide flood protection to the Union Pacific Railroad tracks in the area. Currently, the levee provides flood protection to agricultural land and several communities including Valley and Ginger Cove in addition to the railroad line.

Since original construction, the levee has been modified or improved several times. In 1964, portions of the levee were rebuilt and other sections were raised and made wider. Additional low areas were filled in 1976. In 1978, an ice-jam at the river bend near Mercer caused overtopping of Union Dike and breaches in the dike at several places. These areas were subsequently repaired. As noted previously, the PMRNRD completed a major levee improvement project in 1990. These improvements consisted of improving the levee to provide a 100-year level of open-water flood protection, providing underseepage control measures (berms, relief wells, and trench drains), and flattening side slopes to improve embankment stability. There are also several gated culverts that convey interior drainage water into the Platte River. Sections of the riverbank along the levee are provided with various forms of erosion protection, including riprap, old car bodies, and hard points or small jetties. Construction plans and design information for the 1990 Union Dike improvement project are provided in Appendix A.

No-Name Dike. No-Name Dike is located immediately downstream of Union Dike and provides Valley some protection against backwater flooding from the Platte River. The PMRNRD improved the upstream segment of this levee from the Union Pacific Railroad tracks to Sokol Camp in the early 1990's. Similar to the Union Dike project, the No-Name Dike improvements consisted of raising the levee and constructing underseepage control berms. An approximately 90-foot wide seepage blanket was also placed along the entire riverward length of the improvements. Construction plans and design information for the No Name Levee improvement project are provided in Appendix A.

The No-Name Dike levee system was admitted into the Corps of Engineers Public Law 84-99 Flood Damages Rehabilitation Assistance Program in 1994. This levee is generally well maintained and currently in good condition.

Farmland, Fremont and Railroad Drainage District Levee. A levee maintained by the Farmland, Fremont and Railroad Drainage District is located immediately upstream of Union Dike. This levee provides some level of flood protection to the communities of Inglewood and Fremont and prevents smaller flood events from flanking the upstream end of Union Dike.

In 1999, the Corps of Engineers inspected the levee system and determined that it was ineligible for participation in the PL 84-99 program. The inspection found that the levee was not well maintained and was in generally poor condition. The Omaha District is currently evaluating the feasibility of improving this levee system to reduce flood damages in the Fremont area.

Right Bank Levees. A series of sand berms and levees are located on the right bank of the Platte River across from Union Dike. These levees begin with a ring levee around the Woodcliff development just east of Highway 77 and then extend downstream past Valley. The levees do not form a continuous system line of protection due to breaks and other gaps and were found to be in poor condition that last time that they were inspected by the Corps of Engineers.

FLOOD PROBLEM

GENERAL HISTORY OF FLOODING

Flooding on the Lower Platte River is usually long in duration and involves large contributing areas and great volumes of water. Union Dike is located along a reach of the Platte River that is subject to frequent and severe flooding. Historically, the most severe flooding has been caused by ice-affected flow conditions. Ice-affected flow conditions may be the result of floating ice cover, floating ice, or grounded ice jams. Recurring ice jams occur at a number of locations on the Lower Platte River including the west Platter River channel at Leshara, near Big Island at Fremont, and at the Highway 92 bridge as shown on Figure 2. A view of such an ice jam that occurred at the Highway 92 bridge in February 2000 is provided in Photo 1.

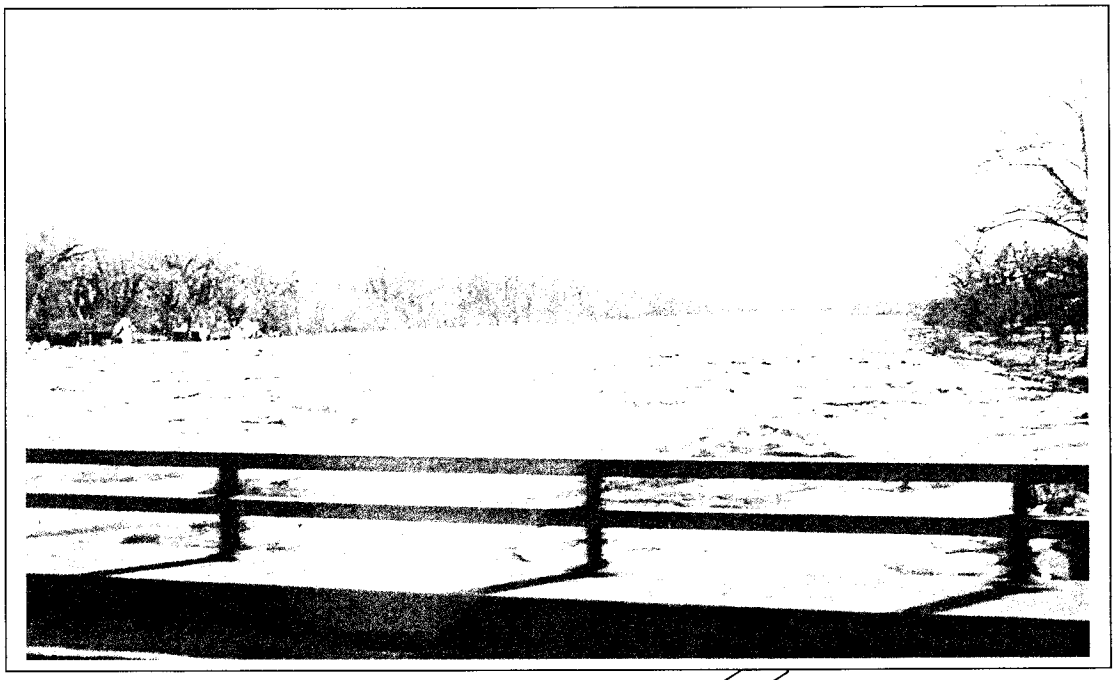


Photo 1. View of ice-jam on the Platte River looking upstream from the Highway 92 bridge. (Feb 2000)

When river channels are obstructed by ice, the river stages for a given discharge may be significantly higher than for the same discharge during open water flow conditions. These higher stages may be due to any or all of the following factors depending on the ice conditions involved: water displacement, increased flow resistance, and decreased flow area in the channel. In general terms, ice-jams essentially block or reduce the passage of water resulting in higher water levels upstream from the blockage. A summary of flooding along the Platte River in the vicinity of Union Dike is provided below. Note that most of the flooding is ice jam related.

Flood of March 1929. An ice jam flood was reported in 1929 in the Valley area. No additional information is available on this flood event.

Flood of 28 February through 2 March 1948. Moderate flooding occurred along the Platte River from the mouth of the Loop River to the vicinity of Venice. Flooding was caused by several ice jams in the Platte River, which blocked flow in the channel. During this event, a locally built left-bank levee near Mercer was breached. Water poured through this break, overtopped the Union Pacific Railroad embankment and Highway 275, and followed these obstructions into Valley flooding a considerable portion of the town. The total area flooded was estimated at 11,500 acres.

Flood of 28 March through 2 April 1960. Climatic conditions in mid-March changed rapidly from record breaking cold to above freezing temperatures, which resulted in rapid snowmelt and ice jams. Major flooding on the Platte River downstream from Columbus began on March 28 and continued for more than one week. The communities of North Bend and Valley experienced major damage after portions of Union Dike were overtopped and breached. This ice-affected

flood was an approximately 60-year event. Photographs 6 and 7 show the extent of the flooding in the Fremont area.

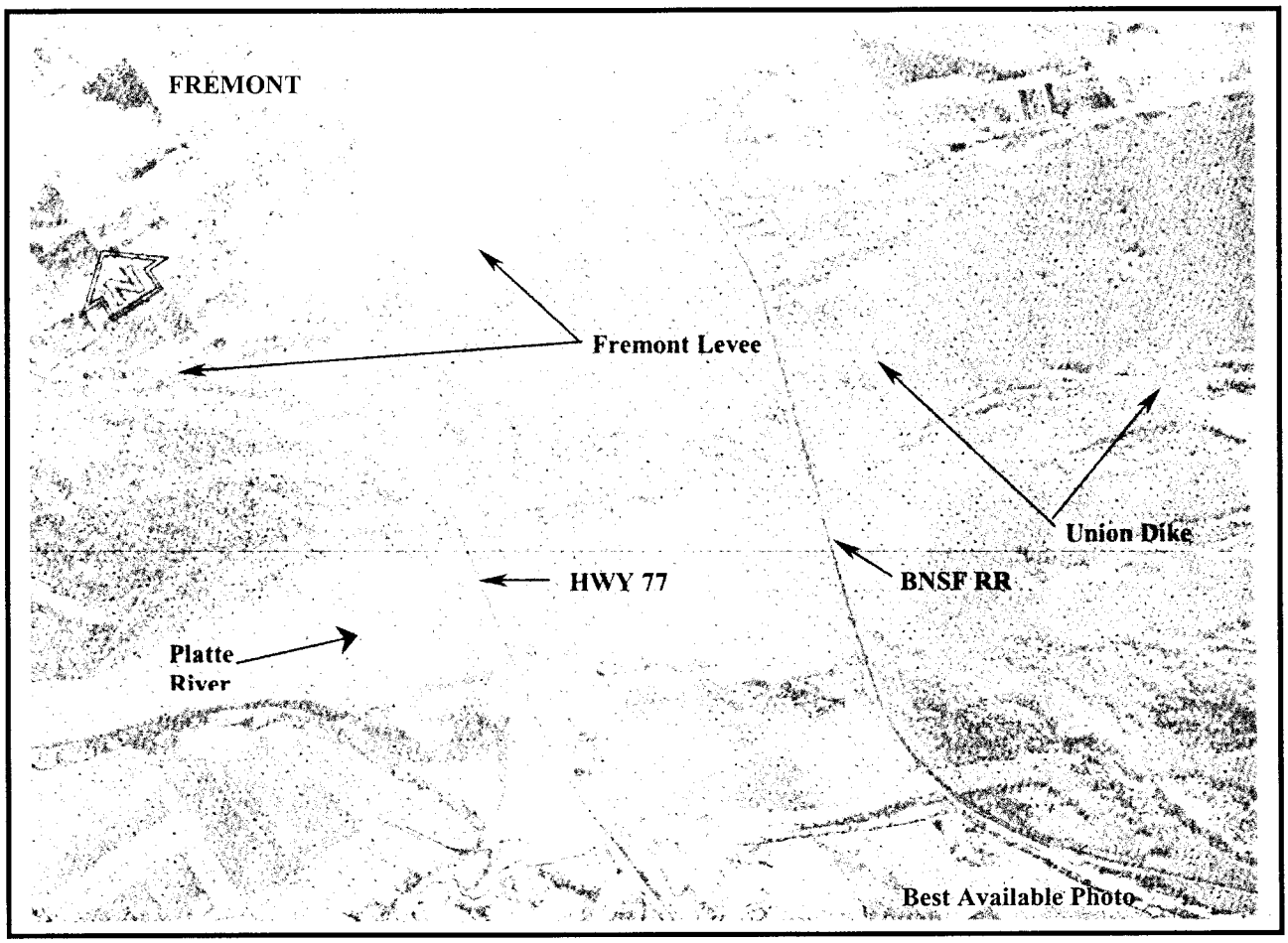


Photo 2. March 1960 Platte River Flood at Fremont. Note that Union Dike was breached and landward areas inundated by floodwaters.

Flood of 24 March through 26 March 1962. During the night of March 24, an ice jam formed about four miles west of Valley and forced the Platte River out of its banks. Approximately 90 percent Valley was flooded after Union Dike was breached (See Photo 3).

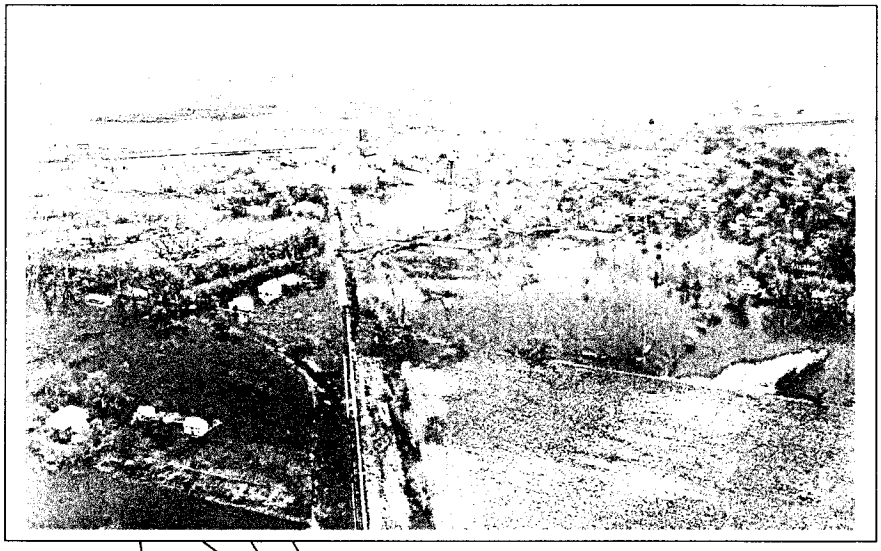


Photo 3. View of flooding in Valley during the 1962 Platte River flood event.

Flood of March 1978. The 1978 flood was similar to the 1960 flood in cause and effect. Ice jams backed up floodwaters, resulting in the overtopping and failure of numerous levees. This included a major failure of levees near North Bend and the failure of Union Dike. (See Photo's 4 and 5). Floodwaters caused extensive damage, estimated in excess of $15 million, in Valley and other areas protected by the levee. The Union Pacific Railroad tracks behind Union Dike were damaged during this flood event. No data on the dollar value of damages to the tracks was available.

Photo 4. View of breaks in Union Dike during the 1978 ice-jam flood event.

Photo 5. View of the ice jam on Platte River adjacent to Union Dike. Note water overtopping the levee.

Flood of March 1979. A large ice jam reportedly formed in the west channel of the Platte River upstream from Highway 64. A right bank levee failed and the Leshara Area was flooded.

Flood of February 1980. An ice jam occurred in the Woodcliff area and initially caused lowland flooding. However, extensive flooding was realized after a levee failure in this area.

Flood of February 1982. An ice jam formed in the west channel of the Platte River and flood waters flowed through the previously noted 1979 levee breach, which had not been repaired.

Flood of February 1984. An ice jam caused overflows into lowlands near Leshara.

Flood of February 1986. The Woodcliff area experienced flooding after the levee near Leshara failed. Floodwaters entered the area through the previous breach, which had never been fully repaired. Water reportedly was within three feet of the top of Union Dike, with some ice being pushed onto the top of the levee.

Flood of March 1993. Flooding occurred along the right bank near Leshara after the levee was overtopped in several locations. Large sheets of ice were reportedly shoved onto the top of Union Dike.

Flood of January and February 1996. An early winter breakup caused an ice jam to form near the Woodcliff residential area. No flooding was reported in this area, but several right bank cabins south of Fremont were flooded.

EXISTING CONDITIONS

As discussed previously, Union Dike was improved by the PMRNRD in 1990 to increase the level of flood protection provided by the levee system. At that time, the levee was designed for a 100-year open water flood event. Currently, the Federal Emergency Management Agency's (FEMA) National Flood Insurance Program (NFIP) considers ice-affected flow conditions, in addition to open-water flow conditions, to determine river stages and corresponding flood hazard area for Flood Insurance Rate Maps. The current levee system does not provide a 100-year level of flood protection as discussed in the following sections.

Platte River Discharges. Discharge-frequency relationships developed for the *Lower Platte River, Nebraska, Flood Insurance Study (USACE 1998)* were used in this analysis. Discharges at different recurrence intervals (i.e., flood events) were identified for both the ice season (January 1 through March 31) and the open-water season (April 1 through December 31) and are presented in Table 1. The combined discharge-frequency relationship for the open-water and ice seasons is shown in Table 2. These tables provide the peak Platte River discharges for the 10-, 50-, 100-, and 500-year flood events. A detailed discussion of discharge-frequency relationships and probability analysis is provided in Appendix B.

TABLE 1
LOWER PLATTE RIVER
DISCHARGE FREQUENCY RELATIONSHIPS

Recurrence Period	Annual Flood Event Probability	Discharge (cfs) Ice Season	Open-Water Season
10-Year	10%	48,100	49,400
50-Year	2%	93,700	78,800
100-Year	1%	121,100	93,500
500-Year	0.2%	210,000	133,000

TABLE 2
LOWER PLATTE RIVER
COMBINED DISCHARGE FREQUENCY RELATIONSHIPS

Recurrence Period	Annual Flood Event Probability	Discharge (cfs)
10-Year	10%	62,000
50-Year	2%	106,000
100-Year	1%	132,000
500-Year	0.2%	220,000

Platte River Flood Profiles. Hydraulic modeling was performed for the Union Dike reach of the Platte River to determine the water surface profiles for various flood events considering both open water and ice-affected (e.g., ice jam) conditions. This analysis, which utilized the

discharge-frequency relationships provided above, is summarized below. Refer to Appendix C for additional information.

The existing conditions water surface profiles for open-water flows for various flood events are provided on Plates C-7 through C-9 in Appendix C. The top of levee profile for Union Dike is provided on Plates C-12. A comparison of the levee crest and 100-year open water surface elevations indicates that the existing levee system has less than three feet of freeboard along some reaches and less then two feet of freeboard in several locations (See Table 3). Freeboard is the difference in height between the levee's crest and a given water level surface elevation at a specific location and is an important consideration when determining the level of protection afforded by a levee system, as discussed in the following section.

The ice-affected analysis considered the impacts of an ice jam that began upstream from the Highway 64 bridge at Valley. The selected ice-jam location is close to the location of an ice jam that occurred in 1978 that resulted in the overtopping of Union Dike and caused extensive flooding. The ice-affected water surface profiles for a given flow frequency were significantly higher than those computed for the same flow frequency for open water conditions. At many locations in the study reach, the ice-affected water surface profiles were several feet higher than the corresponding open water profiles as shown in Table 3. Based on conditions just upstream of the assumed ice jam location, Union Dike would begin to be overtopped by an approximately 30-year ice-affected flood. Table 3 provides the theoretical ice-affected flood elevation and levee freeboard. Note that the theoretical freeboard is determined assuming that the floodwater is confined or "held back" by a levee. In cases where there is a negative freeboard, which is the case along most of Union Dike, the floodwater will actually spill over the levee. Consequently, the actual existing conditions ice-affected flood elevations will be less than indicated because the levee will be overtopped.

TABLE 3
COMPARISON OF 100-YEAR OPEN-WATER AND ICE-AFFECTED FLOOD PROFILES TO THE EXISTING UNION DIKE TOP ELEVATION

FIS Cross Section	Existing Levee Top Elevation	Open Water Flood Elev.	Open Water Freeboard (ft)	Ice-Affected Flood Elev.	Ice-Affected Freeboard (ft)
245200	1149.3	1147.5	1.8	1151.3	-2.0
245575	1149.9	1148.0	1.9	1151.4	-1.5
246900	1151.4	1149.0	2.4	1152.7	-1.3
248500	1151.0	1150.3	0.7	1154.1	-3.1
250275	1155.3	1151.2	4.1	1155.1	0.2
251875	1158.9	1152.3	6.6	1156.1	2.8
253000	1159.8	1153.3	6.5	1157.0	2.8
254325	1157.8	1154.8	3.0	1158.0	-0.2
255500	1158.2	1156.4	1.8	1158.7	-0.5
256675	1160.3	1158.0	2.3	1159.6	0.7
258375	1161.6	1159.5	2.1	1162.2	-0.6
260100	1163.1	1160.9	2.2	1165.4	-2.3
261900	1165.5	1161.7	3.8	1166.4	-0.9

TABLE 3 (CONT.)

COMPARISON OF 100-YEAR OPEN-WATER AND ICE-AFFECTED FLOOD PROFILES TO THE UNION DIKE TOP ELEVATION

FIS Cross Section	Existing Levee Top Elevation	Open Water Flood Elev.	Open Water Freeboard (ft)	Ice-Affected Flood Elev.	Ice-Affected Freeboard (ft)
263700	1167.1	1162.8	4.3	1167.2	-0.1
268950	1172.4	1168.8	3.6	1172.5	-0.1
265575	1169.0	1165.1	3.9	1168.5	-0.5
267250	1170.5	1167.3	3.2	1170.8	-0.3
270850	1173.8	1170.4	3.4	1174.0	-0.2
272700	1175.0	1172.2	2.8	1176.0	-1.0
274700	1176.3	1174.0	2.3	1177.9	-1.6
276600	1177.9	1175.1	2.8	1179.0	-1.1
278675	1178.8	1176.7	2.1	1180.4	-1.6
280300	1180.1	1178.5	1.6	1181.7	-1.6
282300	1182.3	1180.1	2.2	1183.0	-0.7
284200	1183.6	1181.5	2.1	1184.2	-0.6
286250	1185.3	1183.3	2.0	1186.3	-1.0
287350	1187.4	1184.6	2.8	1188.2	-0.8
288425	1188.7	1186.1	2.6	1190.2	-1.5
290350	1191.2	1188.2	3.0	1192.9	-1.7
292100	1191.5	1190.0	1.5	1194.8	-3.3
294300	1194.5	1191.7	2.8	1196.4	-1.9
295800	1196.5	1192.7	3.8	1196.8	-0.3

Flood Protection Provided by Union Dike. A risk-based analysis was performed to assess the degree of protection afforded by the existing Union Dike levee system. This type of analysis considers the uncertainties in hydrologic and hydraulic conditions to determine the probability that a levee can pass various flood events without overtopping. The analysis is also based on the conditions at an index station, which was selected at a location upstream of Highway 64 (river station 260100) where ice jams have historically occurred. The level of protection provided at each index station could vary. Given the length of this levee system, multiple index stations will be evaluated to determine the controlling station if additional analyses are pursued.

For this study, the probability that the existing levee could pass the 100-year flood event without being overtopped at the index station was analyzed for the following conditions:

- Floods occurring during the rainfall season with open-water conditions.
- Floods occurring during the snowmelt season with open-water conditions.
- Floods occurring during the snowmelt season with ice-affected conditions.
- Composite flood (i.e., the weighted average of the three conditions described above).

The 100-year composite flood was used as the baseline for this analysis because this is the flood frequency utilized in FEMA's NFIP to define flood hazards areas and was the controlling condition.

As shown in Table 4 and discussed in Appendix B, the analysis indicates that Union Dike is currently able to pass the 100-year summer open-water flood nearly 100% of the time without

being overtopped at the index station. However, the levee provides a limited degree of protection against 100-year ice-jam floods. For this type of event, there is a 12% probability that the levee can pass the 100-year flood without being overtopped at the index station. In other words, there is an 88% probability that the levee will be overtopped during a 100-year ice-jam flood. The probability that the levee could currently pass the composite 100-year flood event (i.e., weighted average of the winter conditions as discussed in Appendix B) without being overtopping is approximately 53%. Note that for this analysis, the levee was assumed to be structurally sound for water levels up to the levee crest (See Appendix D).

TABLE 4
UNION DIKE
FLOOD PROTECTION PROVIDED UNDER EXISTING CONDITIONS
AT THE INDEX STATION (RIVER STATION 260100)

Condition	Probability of Passing 100-Year Flood
Winter Ice-Jam[1]	12%
Winter Open-Water[2]	90%
Summer Open-Water	99.9%
Composite	52.6%

[1]Occurs 48% of the Time, [2]Occurs 52% of the Time

In order for a levee to be certified under the Federal Emergency Management Agency's National Flood Insurance Program as providing protection from a 100-year flood event, the levee must have a minimum of 3 feet of freeboard above the 100-year water surface elevation. This freeboard requirement is utilized to account for uncertainties in the hydrologic and hydraulic conditions and resulting water surface elevations. As indicated in Table 3, the existing levee system does not provide the required level of freeboard. Consequently, the existing levee system is not certified as providing a 100-year level of flood protection.

When a risk-based analysis is performed, FEMA utilizes a dual criterion that considers both freeboard and the probability that the levee can pass a 100-year flood without overtopping. In general, in order for a levee to be certified by FEMA it must have a minimum of two (2) feet of freeboard above the 100-year flood elevation when the probability of passing the 100-year flood without overtopping is 95% or greater. Alternatively, if the probability of passing the 100-year flood is between 90% and 95% the levee must have a minimum of three (3) feet of freeboard. As shown in Table 4, at the index station the levee has an approximately 53 percent probability of passing the 100-year composite flood, which is below the minimum reliability requirement.

Flood Damages. A determination of the expected annualized cost of flood related damages under existing conditions was conducted for this study. This analysis focused on the residential, commercial, and industrial land uses and corresponding physical damages at and near Valley and the subdivisions of Ginger Cove and Ginger Woods, both of which are located near the levee. Damage to public facilities such as parks, utilities, highways and bridges was also considered as were the costs associated with flood fighting, cleanup, emergency actions, and other flood related activities. Repair time, detour, and delay costs associated with flooding of the Union Pacific Railroad line in the area were also evaluated. Since the majority of flooding is expected in the winter months, damage to crops is not expected to be significant and was not included in the analysis. Land damages due to erosion and sediment deposition was also not considered. A detailed discussion of the analysis assumptions and methodology is provided in Appendix E.

Costs associated with Union Pacific Railroad repair time, detours, and delays are highly subjective due to uncertainty related with the length of time that the tracks will be out of service and the extent of damages that may be incurred during a flood event. During the 1978 flood event, portions of the tracks in this area were damaged. The damaged areas were reportedly repaired and improved. Cost information from the 1978 track outages was not available. For this assessment, two scenarios were considered to develop a range of potential costs associated with railroad repair time, detours, and delays. The first scenario considered only the costs associated with detours and delays due to water inundating the tracks, which precludes train usage. The second scenario includes the detour and delay costs for the period that the tracks would be inundated from Scenario 1 and assumed that the tracks would be out of service an additional four days to allow for repairs. Costs of railroad detours and delays were based on a report prepared by the Union Pacific Railroad staff in 2000 detailing the cost of detours and delays resulting from a derailment near Valley in 2000. As shown in Table 5, the average annual costs associated with railroad repair time, detours, and delays is significant and can have a material bearing on the economic feasibility of a project.

TABLE 5
AVERAGE ANNUAL RAILROAD
REPAIR TIME, DELAY, AND DETOUR COSTS

Scenario	Annual Ave. Cost
1) Detour and Delay Costs	$15,200
2) Detour, Delay, and **Repair Time** Costs	$51,400

The various flood damage costs, including the railroad repair time, delay, and detour costs, were incorporated into the risk-based analysis to develop an estimate of the expected average annual flood damages, as shown in Table 6. As noted previously, the majority of the damages are related to ice-jam flooding because the existing levee provides a high degree of protection against open-water flooding.

TABLE 6
AVERAGE ANNUAL PHYSICAL DAMAGES AND RAILROAD
REPAIR TIME, DELAY, AND DETOUR COSTS

Scenario	Annual Ave. Damages
1) Physical Damages and RR Detour and Delay Costs	$238,000
2) Physical Damages and RR Detour, Delay, and **Repair Time** Costs	$274,000

FLOOD DAMAGE REDUCTION MEASURES EVALUATION

GENERAL

The purpose of this assessment is to further evaluate the feasibility of improving Union Dike to reduce flood damages. A primary objective of the improvement project is to remove the areas landward of the levee from the 100-year floodplain. For this assessment, only improvements to the existing levee system were considered. Other potential structural or non-structural alternatives to reduce flood damages were not evaluated.

The analyses that were conducted were limited to the critical aspects required to evaluate the economic feasibility of improving the existing levee system. Detailed analyses and other work necessary to fully determine the feasibility of a project and to satisfy Federal criteria for a feasibility study was deferred. For example, induced damages determination, interior drainage analysis, and an environmental assessment were not performed. In addition, only preliminary levels of analyses was performed for geotechnical engineering, real estate acquisition, and other aspects of the project.

PRELIMINARY PLAN

General. The preliminary plan consists of improving Union Dike to increase the level of flood protection provided, thereby reducing flood damages. The improvements would generally consist of raising the existing levee along its entire reach, which is approximately 10 miles. The extent to which the levee would be raised is dependent on the level of flood protection required, as discussed in a following section. Other features of the levee system that require improvement include the underseepage protection measures (e.g. seepage berms and toe drains), interior drainage structures, and riverbank erosion protection. In addition, closure structures will be needed where the levee crosses Highway 64 and the UPRR tracks near Valley. Closure structures are temporary structures that are erected immediately prior to flood events to close "low" spots along a levee so that the system provides a continuous level of flood protection. In addition to improving the existing levee, the upstream and downstream tie-offs will need to be constructed or improved. Tie-off issues are discussed in more detail below. Construction is

expected to occur predominantly on the landward side of the levee to minimize encroachment into the Platte River's floodway and to limit any potential impacts to environmentally sensitive areas (e.g., wetlands). The source(s) of borrow material for levee construction was not determined. However, it was assumed that pervious borrow material for seepage berm improvements will be obtained from areas immediately adjacent to the levee. Impervious materials for raising the levee embankment were assumed to be located at a distant borrow source. Additional discussion on assumed levee cross sections utilized for generation of earthwork quantities is provided is Appendix D.

Tie-off Improvements. As noted above, improved or newly constructed upstream and downstream tie-offs for Union Dike are required in order to provide the desired level of flood protection. At the upstream end, Union Dike currently ties into the Burlington Northern Railroad embankment near Fremont as shown in Figure 1. The south Fremont levee begins near this point and extends upstream approximately 2.5 miles. This levee is not well maintained and does not provide the level of flood protection needed to prevent floodwaters from flanking Union Dike and flooding otherwise protected areas behind the proposed improved levee system. In order to prevent this from occurring, either the existing south Fremont levee system needs to be improved to provide a higher level of flood protection or a new tie-off levee or structure needs to be constructed. The location of a new upstream tie-off structure was not determined for this study. However, the elevation of BNSF railroad embankment decreases as it progresses from the river towards Fremont, with the lowest portion located at the southern edge of Fremont. In the event of a large flood event, this is the location where floodwaters would cross the railroad embankment and flank Union Dike. Although the need for an upstream tie-off is recognized, no detailed costs or preliminary plans for such an upstream tie-off were developed. The Corps of Engineers is currently conducting a flood damages reduction study to evaluate the flood problem and potential solutions for the communities of Inglewood and Fremont. Improving the existing levee in southern Fremont is one measure being considered. The results of that study will have a direct bearing on the upstream tie-off needs for Union Dike.

Currently, the downstream end of Union Dike ties into the Union Pacific Railroad embankment just southwest of Valley as shown in Figure 1. No-Name levee begins at this point and extends downstream. In order to prevent backwater flooding in portions of Valley, a portion of No-Name Dike will need to be improved and utilized as a trailing levee. Downstream trailing levees are common features of flood damage reduction projects in areas with limited topographic relief. Approximately 2,200 feet of No-Name Dike beginning at the railroad embankment and extending downstream to Sokal Camp needs to be improved. The improvements to No-Name Dike would be similar to those of Union Dike (i.e., raising the levee, expanding seepage control berms, etc). As noted previously, a closure structure is needed across the Union Pacific Railroad embankment because it is lower than the proposed levee profile at this location.

Alternatives and Level of Protection. Various levee raise alternatives were evaluated using the risk-based analysis approach to determine the level of flood protection that they would afford with respect to the baseline 100-year composite flood (i.e., includes ice-affected conditions) at

the index station. Based on this analysis, the three levee raise alternatives provided below were selected for additional analysis.

Alternative 1. A 3 foot raise at the index station, which has an **89% probability** of passing the 100-year composite flood without overtopping and 2.2 feet of freeboard above the 100-year composite flood elevation.

Alternative 2. A 4 foot raise at index station, which has an **96% probability** of passing the 100-year composite flood without overtopping and 3.1 feet of freeboard above the 100-year flood composite elevation.

Alternative 3. A 5 foot raise at index station, which has a **99% probability** of passing the 100-year composite flood without overtopping and 3.9 feet of freeboard above the design 100-year composite flood elevation.

Note that the levee raises indicated above (i.e., 3, 4, and 5 feet) correspond to the height that the levee would be increased at the index station only (see Appendix B and C). The existing Union Dike levee is irregular in height and level of protection. Consequently, the actual levee raise height will vary along the levee's alignment and depends on the existing crest elevation compared to the required levee profile. Refer to Plate C-12 in Appendix C for profiles of the top of the existing levee and for the three levee raise alternatives.

Of the three alternatives listed above, both Alternative 2 and Alternative 3 meet FEMA's NFIP probability and freeboard requirements for certification of a levee as providing protection against a 100-year composite flood, which is the minimum desired level of protection for this project. If either of these alternatives were implemented, areas landward of the improved levee system could be removed from the 100-year floodplain. Although more limited improvements to the levee, such as the smaller levee raise proposed in Alternative 1, would provide greater flood protection and reduced flood damages as compared to existing conditions, the area landward of the levee system would remain in the 100-year floodplain.

Environmental Issues. Formal coordination with the United States Fish and Wildlife Service (USFWS) and the Nebraska Game and Parks Commission (NGPC) was initiated during this assessment. The USFWS and NGPC provided their preliminary views of the likely beneficial and adverse impacts on the potential levee improvement project (Refer to Appendix F for copies of the two letters).

The USFWS indicated that the project may have a direct adverse impact to riparian woodlands, grasslands, and wetlands, and the wildlife species associated with these habitats and that any loss of such habitats should be mitigated. The USFWS noted that potential adverse impacts to threatened and endangered species (bald eagle, least tern, and piping plover) and other migratory bird species could be minimized by scheduling construction activities to avoid the nesting period of these birds. The USFWS also expressed concern related to the cumulative

impact that existing and potential levee improvement projects could have on the lower Platte River. The Service also noted that the direct, indirect, and cumulative impacts of any changes in channel geomorphology on nesting least terns and piping plovers (e.g., loss of sandbar habitat) should be assessed.

The NGPC also expressed concern for the potential impacts to state or federal threatened and endangered species in the project vicinity (i.e, pallid sturgeon, lake sturgeon, least tern, piping plover, sturgeon chub, bald eagle, and western prairie fringed orchid). The NGPC recommended a comprehensive cumulative impact study of the lower Platte River be conducted to address the effects of current and proposed levee projects. The NGPC further recommends that such a study be completed before future flood control projects on the lower Platte River valley are approved.

Based on the comments provided by the USFW and NGPC it is anticipated that detailed studies of impacts to fish and wildlife resources resulting from a Union Dike levee raise will be required and that these impacts may be found to be significant, even though project activities can be scheduled to avoid the nesting periods of birds. The concerns raised by the USFWS and NGPC and the mitigation required at another project along the Platte River make it very likely that habitat mitigation or improvements will be required as part of the project. The form and extent of any mitigation activities is not known at this point in the project.

Cultural Resources. Formal coordination with the Nebraska State Historical Society (NSHS) and Native American Tribes was initiated during this assessment. The NSHS issued an opinion that the area does not contain any recorded historical resources (See Appendix G for a copy of the NSHS letter). To date, no adverse comments have been received from Native American Tribes (See Appendix G for copies of letters). There is not anticipated to be any significant cultural resources issues with this project. However, a more detailed cultural resources evaluation and coordination with stakeholders will need to be conducted ff the project proceeds.

Lands, Easements, Relocations, Right-of-way and Disposal Areas. The Papio-Missouri River Natural Resources District currently has permanent easements from the landowners for the existing Union Dike levee (See drawings in Appendix H). For the baseline construction cost estimated discussed below, it was initially assumed that no additional land will be required outside of the existing project limits for construction of the improvements. However, the cost of this land is included as a project cost. Additional real estate acquisition planning will be required if additional studies are pursued. The analysis is required to determine property requirements based on detailed levee design and the configuration of upstream and downstream tie-offs determined. Acquiring additional land will increase the real estate costs to the project.

Baseline Construction Cost Estimates. Preliminary estimates of the construction cost for the three levee raise alternatives discussed above were developed. In each estimate, the earthwork related activities are the most significant cost item associated with a levee raise. Earthwork quantities (e.g., pervious and impervious fill materials) were generated based on limited

topographical information and preliminary design and technical analysis. For example, a detailed geotechnical engineering study was not performed to determine the extent of underseepage control system modifications that would be needed. However, for cost estimating purposes it was assumed that the seepage berms and other underseepage control features would need to be improved (e.g., raised) proportional to the amount of the levee raise. The location and ownership of the borrow source(s) for the project also has not been determined. Consequently, assumptions were made related to haul distance, material cost, royalty fees, etc. The pervious material was assumed to be available from areas adjacent to the site whereas impervious material was assumed to be obtained from a distant borrow source. To account for these and other uncertainties (e.g., real estate costs, closure structure costs, etc) various contingencies were included in the baseline cost estimates.

The baseline cost estimates for the three alternatives provided in Table 7 do not include the cost of several items that may need to be included in the final cost of a project. These items include the cost for mitigating adverse impacts resulting from the project, constructing an upstream tie-off, and the purchase of additional real estate. Potential costs for these items are addressed in the sensitivity analysis below.

TABLE 7
BASELINE CONSTRUCTION COST ESTIMATES[1]

Alternative	Total Cost
Alt 1) 89% probability of passing the 100-year composite flood without overtopping	$5.8 million
Alt 2) 96% probability of passing the 100-year composite flood without overtopping	$6.8 million
Alt 3) 99% probability of passing the 100-year composite flood without overtopping	$8.3 million

[1] Does not include all potential project implementation costs.

Alternative 2 Construction Cost Estimate Sensitivity Analysis. The baseline cost estimate for Alternative 2, which provides the minimum desired level of flood protection, was revised by utilizing several less conservative assumptions related to material haul distance, royalty fees, and compaction rates. As shown in Table 8, the revised estimate is significantly lower than the original baseline cost estimate. The two baseline estimates provide a range for the potential cost of a levee project (Alternative 2) excluding the cost of environmental mitigation, induced damages mitigation, upstream tie-off construction, and additional real estate acquisition.

TABLE 8
ALTERNATIVE 2[1]
BASELINE CONSTRUCTION COST ESTIMATES

Estimate	Estimated Cost
Baseline-Original	$6.8 million
Baseline-Revised (Less conservative assumptions)	$5.5 million

[1]96% probability of passing the100-year composite flood without overtopping. Does not include all potential project implementation costs.

In order to further assess the potential cost for implementing Alternative 2, conceptual costs were assigned to the environmental mitigation, induced damages mitigation, upstream tie-off construction, and additional real estate acquisition items. These costs were then added to the original and revised baseline estimates to develop a range of project implementation costs, which is presented in Table 9.

The cost of environmental mitigation could be significant based on experience from previous levee projects planned or constructed along the Platte River and on the comments received by the USFWS and NGPC for this project. For example, the environmental conservation and mitigation measures planned for the proposed Western Sarpy/Clear Creek levee project, which is located downstream of Union Dike, are estimated to cost approximately $3 million (as of August 2002). Environmental mitigation costs for this project are not anticipated to be that great but could easily be in the $250,000 to $500,000 range. The form, extent, and preliminary cost of any such mitigation measures will not be known until the issues raised by the NGPC and USFWS are addressed.

In general terms, induced damages refer to damages that occur as a result of the project. For example, if a levee raise results in increased river stages that materially increase flood damages on other property(s), the affected property owner(s) may be compensated if a "real estate taking" has occurred. The determination of whether or not induced damages and a taking has occurred and to what extent can be a very complicated process. If a taking occurs, compensation can take many forms including the purchase of flowage easements, modifications to affected structures, buyouts, etc. For Union Dike, the 100-year combined stage will increase approximately 0.5 foot at the index cross section if the project is constructed. There would be no increase in stage for less frequent events, such as a 10-year flood. Based on this information, there is the potential for induced damages within the study reach. The actual magnitude of costs associated with mitigating induced damages has not been determined. For preliminary estimation purposes, it was assumed that induced damages mitigation would cost between $100,000 and $250,000. However, actual mitigation costs could exceed this amount.

The construction of an upstream tie-off for Union Dike is necessary to complete the levee system. The cost to improve the south Fremont levee system to provide a 100-year level of

protection will likely exceed several million dollars. It is possible that potential future improvements to the levee in southern Fremont by others will complete the tie-off as a separate project. The Omaha District is currently conducting a study to assess the feasibility of improving this levee system. If the south Fremont levee is not improved or the improvements do not occur within the timeframe required for a Union Dike improvement project, a new tie-off structure will need to be constructed. It is assumed that the cost of any tie-off structure could be significant. For conceptual estimating purposes, it was assumed will be in the range of $250,000 to $500,000. However, actual costs for an upstream tie-off could easily exceed these figures. There is also the potential to incur additional real estate costs.

The conceptual costs estimates for the noted items are provided in the Table 9 and illustrate the affect of these costs may have on overall project implementation cost. Note that the upper end of the conceptual cost estimates for the various items was added to the original baseline estimate to provide an upper bound. Similarly, the lower end of the conceptual cost estimates for the various items was added to the revised baseline estimate to provide a lower bound.

TABLE 9
ALTERNATIVE 2[1]
POTENTIAL RANGE OF CONSTRUCTION COST

Estimate	Estimated Cost
Baseline-Original	$6,800,000
-Environmental Mitigation	$ 500,000
-Induced Damages Mitigation	$ 250,000
-Upstream Tie-Off Construction	$ 500,000
-Additional Real Estate Acquisition	$ 200,000
TOTAL	**$8.25 million (Upper Bound)**
Baseline-Revised	$5,500,000
-Environmental Mitigation	$ 250,000
-Induced Damages Mitigation	$ 100,000
-Upstream Tie-Off Construction	$ 250,000
-Additional Real Estate Acquisition	$ 25,000
TOTAL	**$6.125 million (Lower Bound)**

[1]96% probability of passing the100-year flood without overtopping
NOTE: These are preliminary cost estimates and should be construed as such.

Following completion of the cost estimates provided above, costs were developed for an alternative levee cross section that maximized the use of pervious soils that could be obtained immediately adjacent to the site. In order to use these soils for the levee raise, the landward side slopes for the design embankment cross-section were flattened from 1 Vertical on 3 Horizontal to 1 Vertical on 4 Horizontal and an impervious riverside facing was used to minimize through seepage. Although the total volume of material required for this alternative cross section was greater the original cross section, more of the material could be obtained closer to Union Dike. This minimizes the volume of impervious material that would be obtained from a distant borrow

source, which is relatively costly. A preliminary cost estimate for Alternative 2 using this modified cross section was approximately $5.3 million, which is $200,000 less than the revised baseline estimate discussed above of $5.5 million. This difference is not considered significant given the level of uncertainty related to these estimates.

Economic Feasibility. In order for a project to be economically feasible from a Federal perspective, the benefits derived from the project must be greater then the implementation costs. In other terms, the benefit cost ratio (BCR) must be greater than 1.0. The benefits are derived from the amount of flood damages prevented by the project. These include reduction in damages to structures, contents, and appurtenances, and to public facilities such as utilities and transportation infrastructure; reduction in emergency, evacuation, and cleanup costs; avoided costs of emergency levee repairs; and avoided costs of railroad repairs, detours and delays. Other benefits can include the reduction in flood insurance costs. For the three alternatives evaluated, annual project benefits ranged from approximately $365,000 to $398,000. Refer to Appendix E for a detailed discussion of project benefits and a breakdown of project costs and benefits for each alternative.

Table 10 below provides a summary of the BCRs for the three levee raise alternatives evaluated using the baseline construction cost estimates. For each alternative, BCRs are provided for both sets of assumptions made regarding average annual physical damages and railroad repair time, delay, and detour costs (i.e., scenario 1 and 2 as described previously). This analysis illustrates the range of possible BCRs that could be reasonably expected for a flood damages reduction project.

TABLE 10
SUMMARY OF BENEFIT-COST RATIOS
FOR
ALTERNATIVES 1 THROUGH 3 USING ORIGINAL BASELINE COST ESTIMATES

Original Baseline Estimates	BCR Scenario 1	BCR Scenario 2
Alt 1) 89% probability of passing the 100-year composite flood without overtopping	0.85	0.93
Alt 2) 96% probability of passing the 100-year composite flood without overtopping	0.78	0.84
Alt 3) 99% probability of passing the 100-year composite flood without overtopping	0.68	0.73

Scenario 1) Physical Damages and RR Detour and Delay Costs
Scenario 2) Physical Damages and RR Detour, Delay, and Repair Time Costs

As discussed previously, the potential costs for implementing a levee project that would have a 96% probability of passing the100-year flood without overtopping (Alternative 2) were revised to utilize different assumptions and include additional costs. The BCRs for the different Alternative 2 estimates were developed to provide additional information on the potential

economic feasibility of a project. As shown in Table 11, the BCRs range from approximately 0.7 to 1.0.

TABLE 11
SUMMARY OF BENEFIT COST RATIOS
FOR
ALTERNATIVE 2 COST ESTIMATES

Estimate	BCR Scenario 1	BCR Scenario 2
Baseline-Original w/other potential costs ($8.25 m)	0.64	0.70
Baseline-Original w/ no addition costs ($6.8 m)	0.78	0.84
Baseline-Revised w/other potential costs ($6.125 m)	0.86	0.93
Baseline-Revised w/ no addition costs ($5.5 m)	0.96	1.04

The highest BCR ratio was slightly greater than 1.0 and was derived from the lowest cost and highest benefit assumptions. Under this "best case" situation, Alternative 2 just meets the requirements for economic justification (i.e., BCR $\geq$ 1). However, the actual costs of the project are likely to be greater than the lowest cost estimate, which would result in a BCR of less than 1.0.

CONCLUSIONS

The existing Union Dike levee provides a high degree of protection from open-water flood events and a significantly lower level of flood protection from ice-affected floods. The overall level of protection provided by Union Dike from both open-water and ice-affected floods limits the frequency of damaging floods and the corresponding magnitude of damages.

In order to further reduce flood damages and provide a greater degree of flood protection to portion of western Douglas County, several alternatives for raising and improving Union Dike were considered. Based on the information developed for this initial assessment, the potential for a feasible flood damage reduction project that provides a minimum of a 100-year level of flood protection is low.

Additional studies could be conducted to refine project assumptions (e.g., levee design cross section, real estate requirements, borrow sources, etc.) and address outstanding issues (e.g., environmental mitigation requirements, induced damages, land damages, etc.). This will result in more reliable cost estimates, benefits, and the corresponding assessment of economic feasibility.

Bibliography and References

Federal Emergency Management Agency, Flood Insurance Study, County of Douglas, Nebraska, July, 1980

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USACE, Omaha District, Reconnaissance Report, Lower Platte River and Tributaries, Nebraska, April 1996

USACE, Omaha District, Post-Flood and After Action Report, 1997 Midwest Floods, 1998

USACE, Omaha District, Water Quality Investigation, Lower Platte River Feasibility Study, 1999

MS. MALMQUIST: I would like to call this hearing to order. I would like to call to order the public hearing on -- the February 11th hearing of the Union Dike Improvement Project area. Welcome, this evening, this is a hearing by the Natural Resources District as a sponsor of getting the improvement project area together and the assessment and your interest in hearing what we're trying to accomplish out here and your concerns and interest in getting the improvement accomplished and we're here to listen and the director is here with us this morning.

I'm Gayle Malmquist, I'm the chairperson of the Papio Natural Resources District. With me tonight is Rich Tesar, who's a director, also, from the Papio Natural Resources and from this area. Rosemary Ridenour, Bill Latka, Doctor Robert Sorensen in the back row, Merle Andersen, Leonard Gramlish and Don Bartling.

You have with you the agenda for the process that we will follow this evening. There are some legal things as far as proof of publication and we have introductory comments and explanation by our staff and an the consultant as to what our project is and what it entails.

Hopefully many of your questions with regard to the project, itself, and how the assessment has been

it's built on that front lot, presumably this special assessment enhances the value of both equally and makes them both capable of sustaining the same structure. Part of the value of a piece of real estate is the ability to sustain a structure. So, there isn't a ready answer to your question, number 1 you just can't do it, legally, and secondly, historically, specials are always based on the unit basis.

MR. WIEKHORST: My question was a two-part question and that is construction of this project will be based on one large lump sum project or the individual smaller concept for some of the local fellows around here. We have probably seven or eight local contractors who have showed interest in this project and I would like to ask you questions, will this be one large project that some fellow from Kansas City is going to swing in and take because it's too big for the local guys or is it to be something that everybody will be able to partake in?

MR. OLTMANS: Mr. Petermann.

MR. PETERMANN: We really haven't made that decision at this point. The only thing I could say is that it would be a competitive bid situation and it's packaged -- it could be a couple components -- my guess right now it would be as one major project and potentially subbed out to various contractors.

MR. WIEKHORST: My second and final question and I'll leave you guys alone tonight, and that's on the contingency fees and the engineering fees on this project that's listed in the back of your handout. Were those competitively bid for the engineering fees and would it be in-house or a private firm being used for the engineers on the project?

MR. OLTMANS: Mr. Petermann.

MR. PETERMANN: The district has specific guidelines for selecting consulting engineers that meet with State statute standards and it's a competitive process and we did follow that. The final design will be done by a consultant that did the study, not in-house, it will be done by HWS.

MR. OLTMANS: Thank you, sir. Richard Knowlton, Junior, then Clarence Kahlandt.

MR. KNOWLTON: Rick Knowlton, I live at 203 South East Street and I would like to know will our flood insurance go down or cancel or what?

MR. OLTMANS: The question by Richard is will our flood insurance go down and I'll call Mr. Martin Cleveland to answer that question.

MR. CLEVELAND: I guess I'll keep it simple. At this point in time I would have to say no, there's an outside chance that we can convince the federal

people to consider lowering the insurance or eliminating the insurance, but it's an outside shot at best.

MR. OLTMANS: Director Tesar.

MR. TESAR: I can add to that. We would intend after, if you have about a five-year history of success with this dike and I, of course, anticipate success with this dike or it wouldn't be built, that we would then go to FEMA and say based on the five-year history, if you cannot eliminate the flood insurance quite frankly we don't feel you'll ever eliminate the need for insurance, because you are still living in a floodplain, but we would attempt to get your rates reduced, your classification lowered to a -- if you had the necessity to have flood insurance that the dollar amount would be actually decreased.

MR. KNOWLTON: Thanks.

MR. OLTMANS: Mr. Petermann.

MR. PETERMANN: I was going to mention in relation to that, we had that question asked, and it's a good one, and I think it's a goal that would be a wise one for you to pursue and the district to pursue in the future. But I think one thing we do need to keep in mind, that as Rick mentioned, we are in a floodplain and although we would like to see flood insurance go away, it's a lot like other insurance that we we carry on our

home and that's fire insurance. We have done about everything we can according to the code, putting good wiring in our house and putting in insulation that doesn't burn, to keep the grass around our house mowed so the weeds on fire next door won't burn our house down, we have smoke detectors and everything but we still carry fire insurance just for that one possible chance, that most of us probably will not see, but we want to protect against, and we'll pay it willingly, we're glad the fire did not occur and we're glad to pay it as long as the fire did not occur and that's really the bottom line when it comes to flood insurance here, we hope we can get the insurance rates reduced but it is something that's part of the area.

MR. OLTMANS: Nancie Lahr is after Clarence. Clarence.

MR. KAHLANDT: Clarence Kahlandt, I live south of Valley, I'm a farmer. First of all, I can't go along with your plan because we have been flooded too many times down there in which the dike has been broke south of where you are speaking of. We have no protection below that. I would like to see some kind of plan drawed up, where you folks would go on south to Highway 92, so that we can all that is assessed in this area get some protection. The second question that I want to ask you, is this a tax deductible dike where we can take this off

UNION DIKE IMPROVEMENT PROJECT
FACT SHEET

History

Union Dike was constructed in 1919 by the Western Douglas County Drainage District. The Papio Natural Resources District assumed maintenance of the levee in 1975 and expended more than $800,000 through 2000. From 1913 through 2000, the area experienced 13 open water floods and 8 ice jam floods. A flood in March 1978 caused more than $60 million in damages to property in Valley and western Douglas County.

Project Description

Union Dike is a 9.8-mile levee along the east bank of the Platte River from approximately Fremont to Valley. Improvements raised the dike to three feet about the 100-year flood level in five critical areas that were below that level. The base of the dike also was substantially broadened for its entire length to help insure that the dike can withstand the enormous force generated by high water in the Platte River.

The project created 24 acres of wetlands. It included the construction of Platte River Landing, a river-access recreation area immediately south of Highway 64 during 1991.

Cost

The cost of Union Dike improvements was $1,872,000 with 10 percent of the construction and inspection costs paid by the Papio-Missouri River NRD and the remainder by the benefited landowners. This cost was approximately 19 percent lower than originally projected, which resulted in significant savings to benefited landowners through lower assessments.

The $50,000 recreation area development was paid entirely by the Papio-Missouri River NRD.

The NRD also spent more than $100,000 on designing dike improvements and will perpetually maintain the dike at an estimated cost of $33,000 annually.

OVER 180 ACRES OF FREE RIGHT-OF-WAY EASEMENTS WERE SECURED FROM 15 LANDOWNERS.

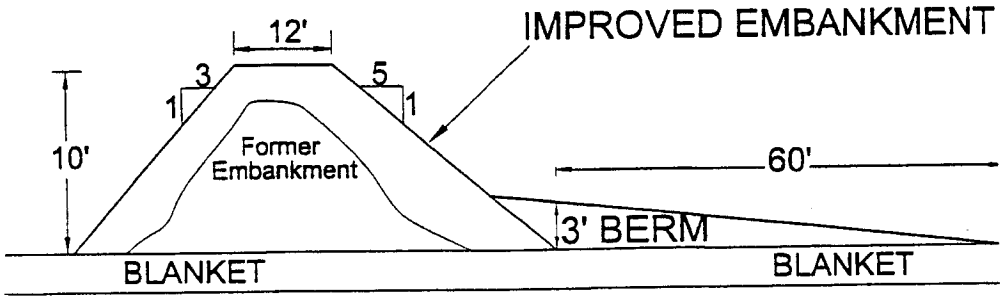
Benefits

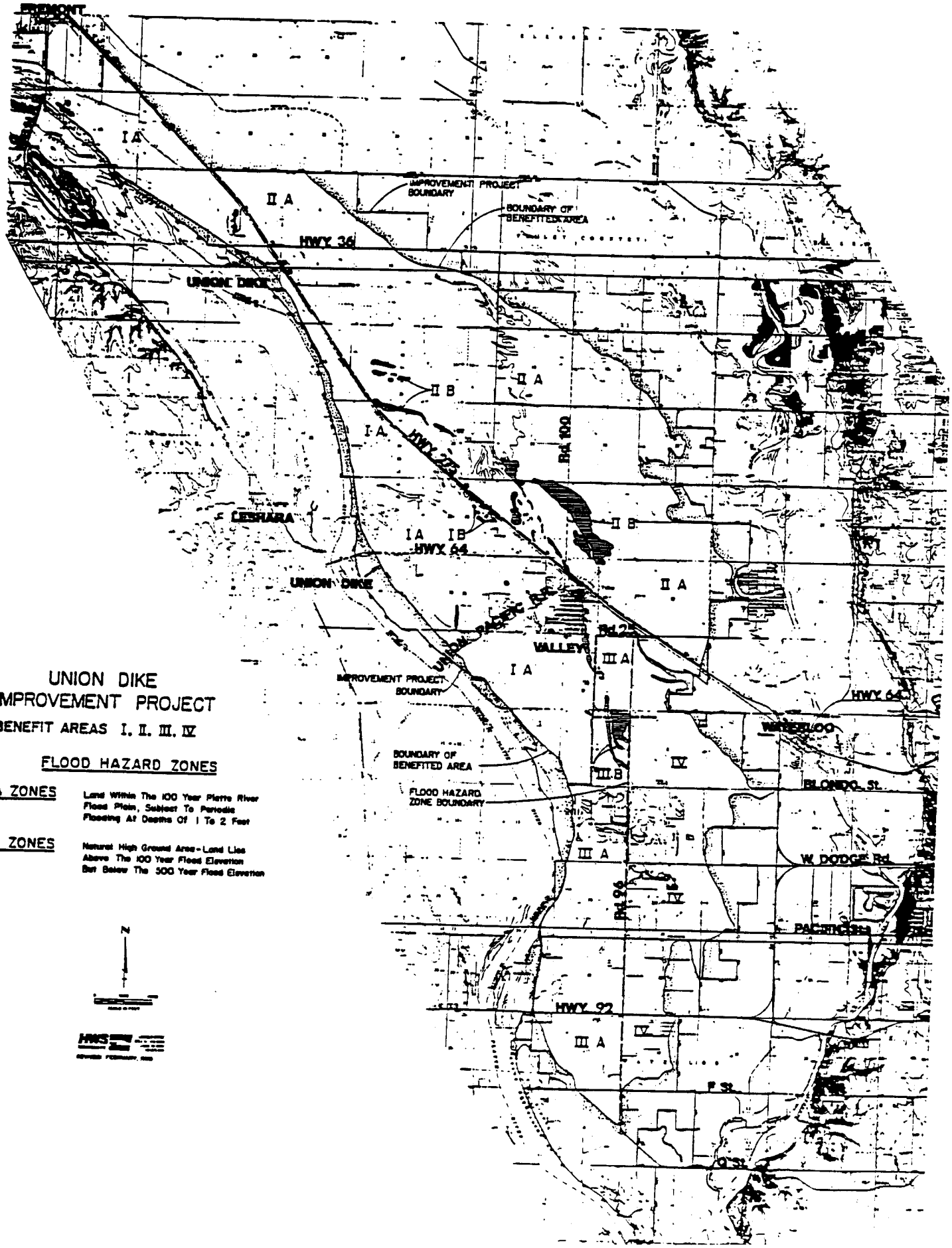
23,000 acres of land, including the City of Valley, numerous industries and commercial enterprises, agricultural land and transportation routes now receive increased protection from disastrous flooding such as occurred in March, 1978.

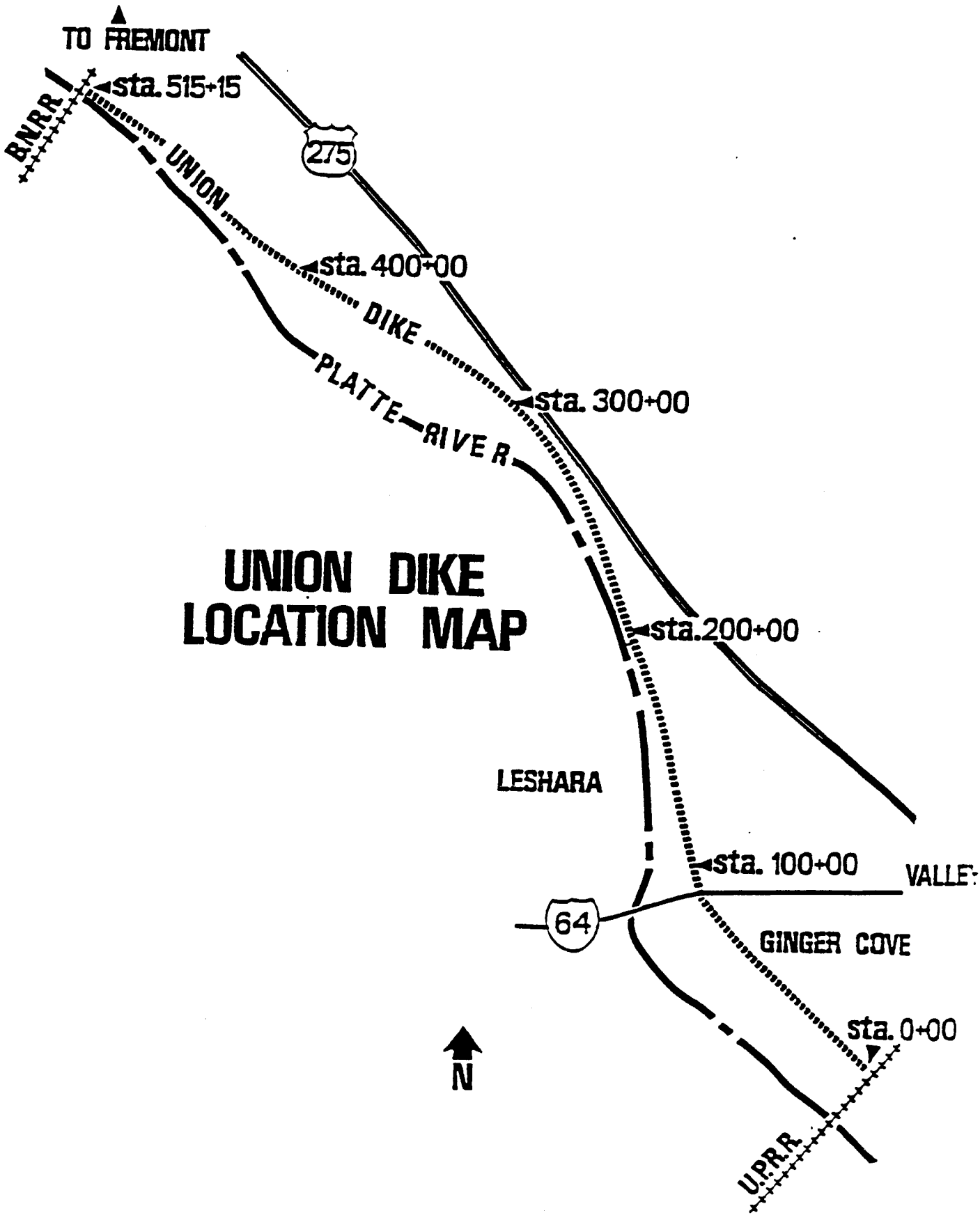
PROJECT CONSTRUCTION - SEPTEMBER, 1989 TO DECEMBER, 1990
ASSESSMENTS TO LANDOWNERS - MARCH, 1991
DESIGN BY HWS TECHNOLOGIES, INC
CONTRACTOR - NEGUS-SWEENIE, INC

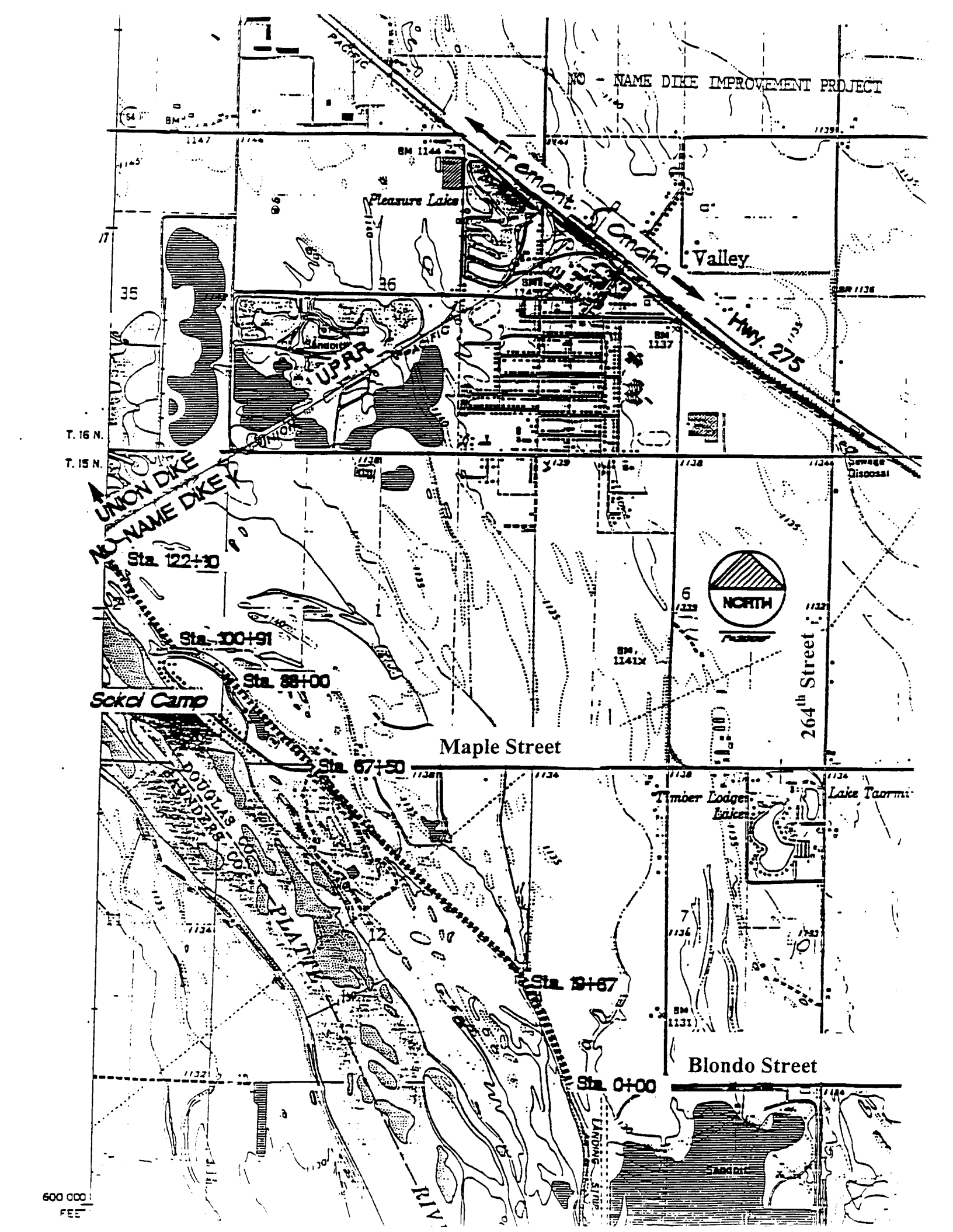
UNION DIKE IMPROVEMENT PROJECT

TYPICAL DIKE CROSS SECTION WITH SHORT BERM



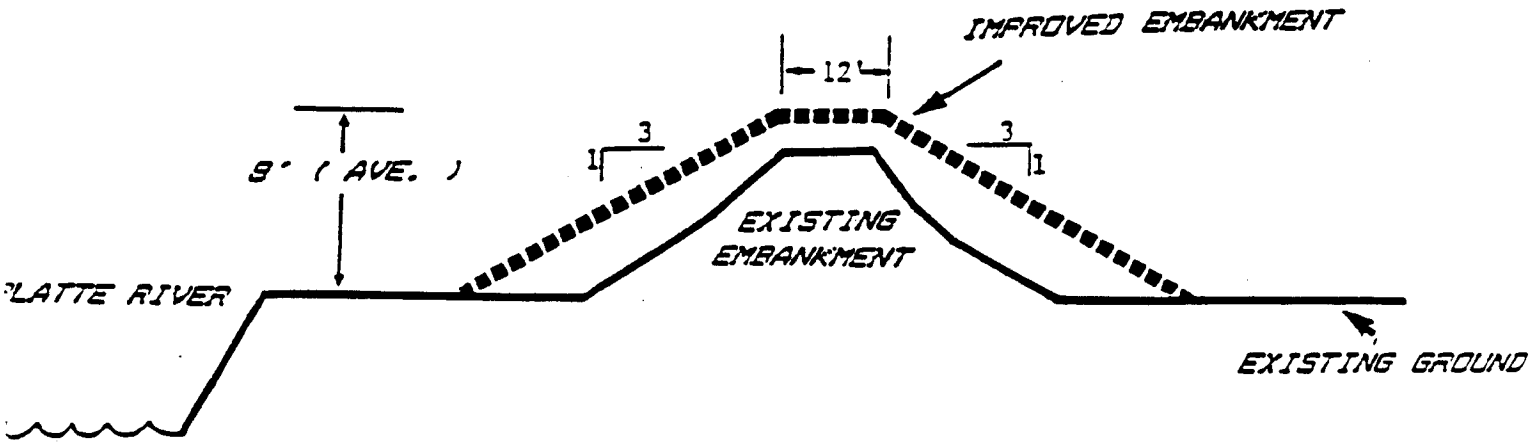

FREMONT
I A
II A
IMPROVEMENT PROJECT BOUNDARY
BOUNDARY OF BENEFITTED AREA
HWY 36
UNION DIKE
II B
II A
I A
Rd 100
HWY 30
LESHARA
I A I B
HWY 64
II B
UNION DIKE
II A
Rd 2
VALLEY
III A
I A
IMPROVEMENT PROJECT BOUNDARY
HWY 64
WATERLOO
BOUNDARY OF BENEFITTED AREA
III B
IV
BLONDO ST.
FLOOD HAZARD ZONE BOUNDARY
III A
W. DODGE Rd.
Rd 96
PACIFIC
HWY 92
III A
F ST.
UNION DIKE
IMPROVEMENT PROJECT
BENEFIT AREAS I. II. III. IV
FLOOD HAZARD ZONES
A ZONES
Land Within The 100 Year Platte River Flood Plain, Subject To Periodic Flooding At Depths Of 1 To 2 Feet
B ZONES
Natural High Ground Area - Land Lies Above The 100 Year Flood Elevation But Below The 500 Year Flood Elevation
N


TO FREMONT
sta. 515+15
B.N.R.R.
UNION
275
sta. 400+00
DIKE
PLATTE RIVER
sta. 300+00
UNION DIKE
LOCATION MAP
sta. 200+00
LESHARA
sta. 100+00
VALLEY
64
GINGER COVE
sta. 0+00
N
U.P.R.R.


NO - NAME DIKE IMPROVEMENT PROJECT
Fremont, Omaha & Valley
HWY. 275
Pleasure Lake
UPRR
T. 16 N.
T. 15 N.
UNION DIKE
NO-NAME DIKE
Sta. 122+30
Sta. 100+91
Sta. 88+00
Sokol Camp
Maple Street
Sta. 67+50
264th Street
Timber Lodge Estates
Lake Taomi
DOUGLAS COUNTY
PLATTE
Sta. 19+67
Blondo Street
Sta. 0+00
NORTH
600 000
FEET

NO NAME DIKE IMPROVEMENT PROJECT

TYPICAL DIKE CROSS-SECTION



NO SCALE

SCOPE OF WORK
SECTION 22 STUDY
LOWER PLATTE CUMULATIVE IMPACT STUDY
PHASE I

January 7, 2003

I. INTRODUCTION: This study is the first phase of a multi-phase cumulative impact study for a reach of the lower Platte River. This phase of the study will be completed under the Corps of Engineers Planning Assistance to States Program, commonly referred to as the Section 22 Program. Section 22 of Public Law 93-251 authorizes the Corps of Engineers to cooperate with states in the preparation of comprehensive plans for development, utilization and conservation of the water and related resources of drainage basins located within the boundaries of the state and submit to Congress reports and recommendations with respect to appropriate Federal participation in carrying out the plan. This study will be conducted by the Omaha District of the U.S. Army Corps of Engineers and will be cost shared with 50 percent of the cost provided for by the federal government and 50 percent provided by the study sponsor.

The proposed study reach is on the Lower Platte River from the mouth of the Loup River at Columbus to the mouth of the Platte River at the Missouri River. The area of focus will be within the 100-year flood plain limits on both sides of the river, however, areas outside of that limit that impact the focus area will also be considered in the study.

II. BACKGROUND. The Lower Platte River in Nebraska has experienced many changes over the years due to development in and adjacent to the flood plain. Inventories of various developments, or modifications associated with these changes, have been addressed in specific reports generated by multiple agencies and stakeholders within the basin; however, this information has not been combined to determine cumulative effects of these changes. Recently, the Nebraska Game and Parks Commission (NGPC) and the U.S. Fish and Wildlife Service (FWS) have expressed interest in forming a committee to develop and execute a study to determine the cumulative effects of past, present, and reasonably foreseeable future actions along the lower Platte River. In addition, the U.S. Army Corps of Engineers (COE) is currently performing Flood Damage Reduction studies at various locations in the study reach (Lower Platte General Investigation, Schuyler, Fremont, and Union Dike).

III. OBJECTIVES.

This effort will be the first phase of a multi-phase effort to address cumulative impacts in the noted study reach. A summary description of the preliminarily identified phases of study follows:

Phase 1: Development of the framework, scope, and initial objectives of the study.

Phase 2: Collection, compiling, and analysis of existing data collection, and the refinement of study objectives and scope for later phases of study.
Phase 3: Future conditions evaluations, and development of recommendations.

Phase 1 is focused on developing the framework and scope of work for the overall cumulative impact study. This effort will consist of:

- Determination of study goals and framework
- Identification of stakeholders
- Development of a list of existing information
- Development of a preliminary estimate of total study cost and duration
- Identification or responsibilities of various stakeholders

IV. PHASE I STUDY TASKS .

1. Meeting One – Committee Kickoff Meeting – This meeting will be held in Lincoln. The purpose of this meeting will be to assemble the initial stakeholders and begin to discuss the framework, goals and outcomes of the proposed study. Prior to this meeting, the stakeholders should perform an inventory search of studies related to the Platte River in the study area. This meeting will accomplish the following:

- Discussion of goals and objectives of the proposed study.
- Develop an outline/framework for the entire study.
- Identify other stakeholders that may be asked to participate on the committee or will be invited to future meetings.
- Discuss initial products to be developed that will aid in the study effort, e.g. inventory of existing features and structures within the study area (bank stabilization, bridges, species habitat areas, flood control structures, etc).

Attendees expected at the meeting are the USACE, NGPC, USFWS, Lower Platte South NRD, Lower Platte North NRD, Papio-Missouri NRD, Nebraska Department of Roads, and Nebraska Department of Natural Resources.

2. Meeting Two – This meeting will be held in Lincoln. The purpose of this meeting will be to draft a general outline/scope of the overall study and its product, discuss what contributes to the final product. Also, the group will separate the overall study into phases; number to be determined. Attendees will include the USACE, NGPC, USFWS, Lower Platte South NRD, Lower Platte North NRD, Papio-Missouri NRD, Nebraska Department of Roads, and Nebraska Department of Natural Resources.

3. Meeting Three – This meeting will be held in Lincoln. This meeting will be a continuation of efforts initiated in the first two meetings. It will scope the work in detail for the next phase for the cumulative impacts study. Attendees include the USACE, NGPC, USFWS, Lower Platte South NRD, Lower Platte North NRD, Papio-Missouri NRD, Nebraska Department of Roads, and Nebraska Department of Natural Resources.

4. Meeting Four – This meeting will be held in Lincoln. This meeting will be a continuation of efforts started in the first three meetings. It will scope the work in detail for the next phase for the cumulative impacts study. Attendees will include the USACE, NGPC, USFWS, Lower Platte South NRD, Lower Platte North NRD, Papio-Missouri NRD, Nebraska Department of Roads, and Nebraska Department of Natural Resources.

5. Literature Search – Each stakeholder/agency shall research their records and identify reports, drawings, documents, GIS, and other information or data that may be applicable to this study. A list of documents from each agency shall be compiled and sent to john.a.palensky@usace.army.mil. At a minimum, the following information should be noted for each document:

- Title
- Author
- Date
- Geographic Location
- Form (e.g., report, photographs, drawings, etc.)
- Format (Electronic or hardcopy)
- Brief summary of contents (e.g., two or three sentence description of the document)

6. Scoping – The stakeholder group shall work together to develop an outline for a proposed cumulative study and prepare a scope of services for the subsequent study phases. Each stakeholder should examine what their goals are for a cumulative study and, working with the other stakeholders, goals would be developed for the overall study effort. Once these goals are identified, the efforts shall be organized in a logical sequence and separate phases. The phases may be identified based upon specific data needs, available funding, and priority.

Lower Platte Cummulative Impacts Study Committee 26-Dec-02

Task	Description	Labor (hours)	Corps	In-Kind (See Note 2)
1	Meeting One (See Note 1)		30	10
2	Meeting Two		30	10
3	Meeting Three		30	10
4	Meeting Four		30	10
5	Literature Search		30	10
6	Develop Scope of Services			50
	Planning Staff		60	
	Biologist		40	
	Hydraulic/Hydrology/Flood Plain		50	
7	Develop Map Product			
	GIS/Mapping		30	10
	Subtotal Labor (hours)	440	330	110
	Labor Rate ($/hour)	$90	$90	$90
	Subtotal Labor Cost	$39,600	$29,700	$9,900
	Project Management	$0		$0
	Total Labor Cost	$39,600	$29,700	$9,900
	Misc Cost	$0	$300	$100
	Total Project Cost	**$40,000**	**$30,000**	**$10,000**
	Percent of Total Project Cost		75	25

Note 1: Assume USACE will have three participants.

Note 2: In kind credit for sponsor is approximately 25% of total study cost. Actual sponsor cost will exceed amount shown. Amount shown is for estimating purposes only.

Note 3: Total Study cost is $40,000. Cost Share is $20,000 Fed and $20,000 non-Fed. The Section 22 Program limits the amount of in kind to 25% of the overall study cost, therefore the non-Federal in kind credit is $10,000 and the cash contribution is $10,000.

PAPIO NATURAL RESOURCES DISTRICT meeting held at 7:30, February 11th, 1988 at the Valley Theater, Valley, Nebraska.

COST-SHARE AGREEMENT
BETWEEN
THE U.S. ARMY CORPS OF ENGINEERS
AND
NEBRASKA GAME AND PARKS COMMISSION
FOR PLANNING ASSISTANCE

LOWER PLATTE RIVER CUMULATIVE IMPACT STUDY
PHASE I

THIS AGREEMENT, entered into this _____ day of _____, 2003, by and between the United States of America (hereinafter called the "Government"), represented by the Contracting Officer executing this Agreement, and the Nebraska Game and Parks Commission, hereinafter called the "Sponsor").

WITNESSETH, THAT

WHEREAS, Section 22 of the Water Resources Development Act of 1974 (Public Law 93-251), as amended, authorizes the Secretary of the Army, acting through the Chief of Engineers, to assist the States, their subentities, and federally recognized Indian Tribes in the preparation of comprehensive plans for the development, utilization, and conservation of water and related land resources; and

WHEREAS, Section 319 of the Water Resources Development Act of 1990 (Public Law 101-640) authorizes the Secretary of the Army to collect from non-Federal entities fees for the purpose of recovering approximately fifty (50) percent of the cost of the program in fiscal year 1993 and beyond; and

WHEREAS, the Sponsor has reviewed the State's comprehensive water plans and has identified the need for planning assistance as described in the scope of work incorporated into this Agreement; and

WHEREAS, the Sponsor has the authority and capability to furnish the cooperation hereinafter set forth and is willing to participate in study cost-sharing and financing in accordance with the terms of this Agreement;

NOW, THEREFORE, the Parties agree as follows:

ARTICLE I - DEFINITIONS

For the purpose of this Agreement:

1. The term "study costs" shall mean all disbursements by the Government pursuant to this Agreement, whether from Federal appropriations or from funds made available to

the Government by the Sponsor. Such costs shall include, but not be limited to, labor charges; direct costs; overhead expenses; supervision and administration costs; contracts with third parties, including termination or suspension charges; and any termination or suspension costs (ordinarily defined as those costs necessary to terminate ongoing contracts or obligations and to properly safeguard the work already accomplished) associated with this Agreement.

2. The term "study period" shall mean the time period for conducting the study, commencing with the execution of this Agreement and ending when the final report is submitted to the Sponsor.

ARTICLE II - OBLIGATION OF PARTIES

1. The Government, using funds and/or in-kind services contributed by the Sponsor, and appropriated by the Congress, shall expeditiously prosecute and complete the study within six (6) months from the date of this Agreement, substantially in compliance with the scope of work attached as Appendix A and in conformity with applicable Federal laws and regulations and mutually acceptable standards of engineering practice.

2. The Government shall contribute in cash approximately fifty (50) percent of the total study cost. The sponsor shall contribute in cash approximately (25) percent and in in-kind services approximately (25) percent, for a total contribution of approximately (50) percent of the total study cost. The total study cost is currently estimated to be **$40,000,** as specified in the cost estimate, attached as Appendix B. Tasks to be performed by the sponsor as credit for in-kind services and costs are detailed in the scope of work and cost estimate, Appendix A and Appendix B, respectively. The Sponsor agrees to provide a check in the amount of **$10,000**, which shall be made payable to **FAO, USAED, Omaha**, prior to any work being performed under this Agreement.

3. No Federal funds may be used to meet the Sponsor's share of study costs under this Agreement unless the expenditure of such funds is expressly authorized by statute as verified by the granting agency.

4. Before any Party to this Agreement may bring suit in any court concerning any issues relating to this Agreement, such Party must first seek in good faith to resolve the issue through negotiation or other form of nonbinding alternate dispute resolution mutually acceptable to the Parties.

5. This Agreement shall terminate at the completion of the study period; provided that, prior to such time and upon thirty (30) days' written notice, either Party may terminate or suspend this Agreement without penalty.

6. In the event that any (one or more) of the provisions of this Agreement is found to be invalid, illegal, or unenforceable by a court of competent jurisdiction, the validity of

the remaining provisions shall not in any way be affected or impaired and shall continue in effect until the Agreement is completed.

7. This Agreement shall become effective upon the signature of both Parties.

FOR THE SPONSOR: **FOR THE CORPS:**

By: _____ By: _____

Title: _____ Title: Contracting Officer

Date: _____ Date: _____

Memo to the Programs, Projects, and Operations Subcommittee

Subject: West Papio Trail

Date: January 22, 2003

From: Gerry Bowen

The Department of Roads (DOR) has approved the West Papio Trail Project (Bellevue to Papillion segment) for T-21 funding in the amount of $500,000. An agreement with the Department of Roads (NDOR) is necessary to finalize the cost share award.

The NDOR agreement requires approval of the Board (see attached resolution).

It is recommended that the Subcommittee recommend to the Board that the General Manager be authorized to execute an agreement with the Nebraska Department of Roads for T-21 funding in the amount of $500,000 for the West Papio Trail (Bellevue to Papillion).

PAPIO-MISSOURI RIVER
NATURAL
RESOURCES
DISTRICT

8901 S. 154TH ST.
OMAHA, NE 68138-3621
(402) 444-6222
FAX (402) 895-6543

PAPIO-MISSOURI RIVER
NATURAL RESOURCES DISTRICT
BOARD OF DIRECTORS RESOLUTION
February 13, 2003

WHEREAS, the Papio-Missouri River Natural Resources District wishes to enter into an agreement with the State of Nebraska Department of Roads to construct a concrete recreational trail between Bellevue (36th Street) and Papillion (72nd Street) along the West Branch Papillion Creek, with funds made available through STP Enhancement Program funds, and

WHEREAS, the federal share payable shall be a maximum of thirty-eight (38) percent of the eligible costs thereof, up to a maximum payment from federal funds of $500,000, and

WHEREAS, the Papio-Missouri River Natural Resources District shall be responsible for approximately $664,450, which is estimated to be the District's 62% matching share of eligible project costs, and

WHEREAS, the Papio-Missouri River Natural Resources District has agreed to place in its fiscal budget said amount, and

NOW, THEREFORE BE IT RESOLVED BY THE PAPIO-MISSOURI RIVER NATURAL RESOURCES DISTRICT, that the District enter into an agreement with the State of Nebraska Department of Roads for the construction of a concrete recreational trail between Bellevue(36th Street) and Papillion (72nd Street) along the West Branch Papillion Creek; that this project be constructed under the designation of Project Number STPB–77(46), State Control Number 22113, and that the terms and conditions as contained in the agreement with the with the Nebraska Department of Roads are hereby approved and that the Chairperson is hereby authorized to execute said agreement.

PASSED AND APPROVED this 13th day of February, 2003.

The undersigned hereby certifies that the above and foregoing is a true and correct copy of the motion duly adopted by the Board of Directors of the Papio-Missouri River Natural Resources District at a duly convened meeting held on the 13th day of February 2003.

_____
Richard W. Jansen, Secretary
Papio-Missouri River Natural Resources District

Exhibit "B"

Exhibit "C"

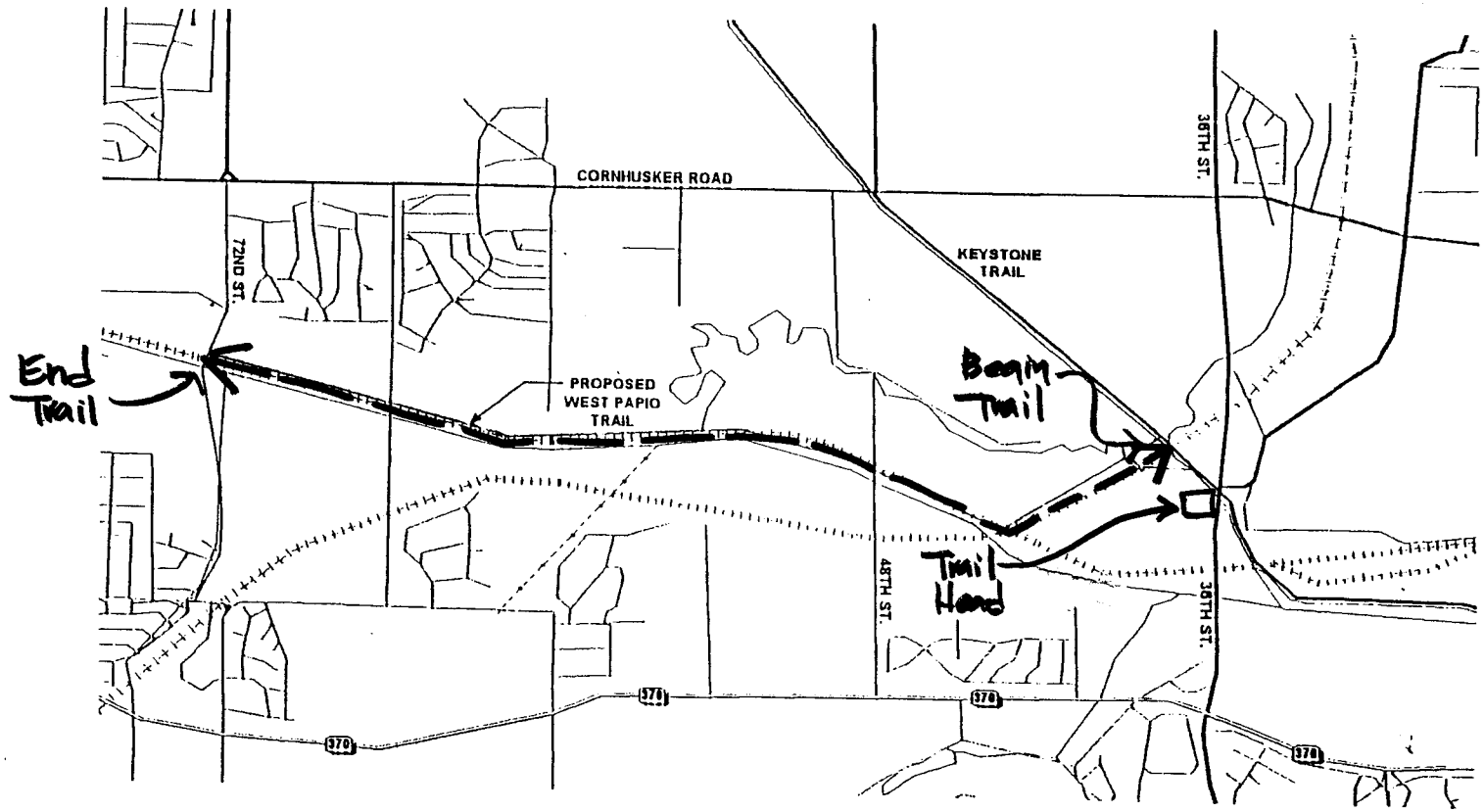


FIGURE NO. 1

Memorandum

To: PPO Subcommittee
From: Paul Woodward, Water Resources Engineer
Date: February 3, 2003
Re: Wetland Mitigation Banking Policy and Procedure

In response to discussion at the January 7, 2003 Programs, Projects, and Operations Subcommittee, District staff has prepared and attached additional draft language to Policy 17.35, a draft application form and a draft application and approval procedure that can be used to apply for wetland bank credits.

District expenses and proposed prices for wetland credits were also discussed at the previous subcommittee meeting. A summary of the District's expenses to develop and construct Rumsey Station are again attached. Also included is the summary of contacts made to different state and national wetland bank representatives that was handed out at the January meeting.

The two main criteria for assistance in the wetland mitigation banking program are: 1) impacted wetlands must be located within District boundaries and 2) that mitigation must be authorized by the U.S. Army Corps of Engineers (USACE). District responsibilities are recorded in the policy according to requirements in the Wetland Mitigation Banking Instrument report dated April of 2000. Specific responsibilities of the applicant are listed in the draft policy and are supplemented by the detailed application and approval procedure noted above.

In conclusion, a price per credit still needs to be adopted by the Board along with additional criteria and responsibilities contained in a revised Policy 17.35. The expense summary for Rumsey Station shows a total cost incurred by the District of $350,000 or approximately $35,000 per acre. Staff believes that an additional 50% over expenses should be added to the price for wetland bank credits in order to provide funds to acquire land and develop future wetland banking sites. For example, this would equate to charging 1.5 times the total expenses or $52,500 per credit at Rumsey Station (1.5 x $35,000 = $52,500)

Staff recommends that the subcommittee recommend to the Board that a price per credit be set at $52,500 for the Rumsey Station Wetland Mitigation Bank Site and that revisions to District Policy 17.35 be adopted as attached herein.

17.35 District Programs - Wetlands Mitigation Banking. The Wetlands Mitigation Banking Program is an authorized program of the District. The Wetland Banking Program is designed to utilize the benefits provided by District projects that create wetlands. Wetlands created by District projects will act as credits in a bank to be used to compensate (mitigate) for wetlands that are adversely impacted or destroyed. These credits can then be sold to other agencies, sold to private individuals or used by the District. This program will be administered by management according to a Mitigation Bank Review Team (MBRT) approved Banking Prospectus, General Banking Instrument and individually approved Site Banking Instruments.

Deleted: offset

Deleted: Corps of Engineers

A. Criteria for Assistance

1. Impacted or destroyed wetlands must be located within District Boundaries.

2. All impacts must be authorized by obtaining a permit under Section 404 of the Clean Water Act.

B. District Responsibilities

1. Establish and/or maintain aquatic habitat through restoration, creation, enhancement, and/or preservation at wetland mitigation bank sites owned or managed by the District and approved by the MBRT.

2. Maintain each wetland mitigation bank site in accordance with established maintenance criteria until requirements for closure of the bank are met or it is determined that long-term maintenance is necessary.

3. Perform all necessary monitoring and prepare an annual report in order to demonstrate compliance with success criteria established in the Banking Instrument.

4. Maintain an accounting procedure that documents the activity of all mitigation bank accounts.

5. Obtain all appropriate environmental documentation, permits, or other authorizations needed to establish and maintain the Bank.

6. Establish a total price for each wetland mitigation bank site equal to one hundred and fifty percent (150%) of the cost required to acquire, develop, maintain, and monitor each wetland site.

C. Applicant Responsibilities

1. Submit an application on a form provided by the District, and,

   a. Submit a 404 permit application which includes an initial identification and/or delineation of the wetlands proposed to be impacted or destroyed.

b. Deposit funds in a escrow account in the amount and as specified by the District to pay for the credits applied for. These funds will be reimbursed to the applicant with interest if the application is denied for any reason.

2. Receive approval from the U.S. Army Corps of Engineers for the use of wetland mitigation bank credits prior to obtaining a Section 404 permit.

3. Provide District a copy of an approved 404 permit.

[Adopted May 9, 1996, Revised February 3, 2003]

17.35.A.

PAPIO-MISSOURI RIVER NATURAL RESOURCES DISTRICT

8901 S, 154TH ST
OMAHA, NE 68138-3621
(402) 444-6222
FAX (402) 895-6543

WETLAND MITIGATION BANKING
APPLICATION FOR CREDIT

Applicant: _____

Address: _____

City: _____ Zip Code: _____

Applicant Representative: _____ Phone: _____

Impacted Wetland is located in: Section _____ Township _____ Range _____

Attached:

☐ 404 Permit Application including Wetland Identification and/or Delineation

Size of Wetland Impacted (Acres in hundredths): _____

Wetland Bank Site: Rumsey Station

Price per Credit: _____

Total Credits Applied For: _____

Total Price: _____

The undersigned does hereby apply for Wetland Mitigation Bank credit and agrees to comply with all requirements of the District's Program and agrees to pay total price indicated above.

Applicant Signature_____ Date: _____

Title _____

Approved by the Papio-Missouri River NRD in accordance with District Policy 17.35

P-MRNRD Signature _____ Date: _____

Title _____

17.35.B.

PAPIO-MISSOURI RIVER
NATURAL
RESOURCES
DISTRICT

8901 S, 154TH ST
OMAHA, NE 68138-3621
(402) 444-6222
FAX (402) 895-6543

APPLICATION AND APPROVAL PROCEDURE

1. The applicant shall determine whether proposed activity (building, filling, drainage work, etc.) will impact a regulated wetland or waters of the Unites States. This determination needs to be made by a qualified professional in consultation with the Regulatory office of the U.S. Army Corps of Engineers (USACE).

2. If wetlands are impacted, applicant must contact the Regulatory office of USACE, to obtain a Section 404 permit application and indicate interest in using a Papio-Missouri River NRD (P-MRNRD) wetland banking site as mitigation.

3. Applicant must contact the P-MRNRD and obtain a copy of an "Application for Credit" form along with information on available banking site(s) and price(s).

4. The applicant must file a completed 404 permit application with USACE which indicates their intent to use credit from a P-MRNRD wetland bank site to mitigate for proposed impacts.

5. The applicant will provide the P-MRNRD with a copy of the 404 permit application.

6. The USACE will determine if designated P-MRNRD wetland banking site is acceptable mitigation for the impacted wetland. This will entail consultation with the P-MRNRD and the applicant.

7. The USACE will notify the P-MRNRD and applicant of the approval or denial to use a P-MRNRD wetland banking site as mitigation.

8. Applicant will file a completed "Application for Credit" with the P-MRNRD and place appropriate funds (Total Price) in escrow with the District. Applicant's signature is required.

9. The P-MRNRD will approve or deny the "Application for Credit" and notify the applicant and USACE of such approval or denial. If approved, the District will provide a copy of the signed "Application for Credit" to the applicant and USACE. If denied, funds in escrow will be returned to the applicant with interest.

10. USACE will publish required notice of intent to issue the 404 permit.

11. USACE will approve or deny 404 permit and notify applicant and NRD of such approval or denial. If approved, USACE will provide a copy of the approved permit to the P-MRNRD and applicant. If denied, funds in escrow will be returned to the applicant.

12. The P-MRNRD will report an accounting of credits used and available in the Wetland Mitigation Bank on an annual basis.

RUMSEY STATION EXPENSE SUMMARY

EQUIPMENT		
District Equipment	$21,594.78	
Rental Equipment	$21,000.00	
SUBTOTAL		**$42,594.78**
ENGINEERING		
Rumsey Station	$19,964.00	
Wetland Banking Instrument	$19,200.00	
Future Monitoring (3 years)	$15,000.00	
SUBTOTAL		**$54,164.00**
MATERIALS		
Hancor Pipe	$415.00	
Fence	$2,813.67	
Seed	$1,485.00	
SUBTOTAL		**$4,713.67**
PERSONEL		
SUBTOTAL		**$33,568.85**
PROPERTY		
Westgate Plaza	$21,450.00	
Meisingers	$51,816.00	
Woodle	$4,430.00	
SUBTOTAL		**$77,696.00**
MAINTENANCE		
Annual	$2,000.00	
Assume 5.0% for annual inflation rate over 50 years		
SUBTOTAL		**$95,238.10**
TOTAL EXPENSE		**$307,975.40**

ASSUME 10 ACRES OF WETLANDS IS 10 CREDITS AND THAT THE DISTRICT
WILL RECEIVE 15% OF THE CREDIT THIS YEAR AND THE FOLLOWING 85% IN THREE YEARS.

15% of Total Expense	$46,196.31	
85% of Total Future Expense	$303,042.01	
PRESENT WORTH OF WETLAND BANK		**$349,238.32**
COST PER WETLAND BANK CREDIT		**$34,923.83**

WETLAND BANK CONTACT SUMMARY

By Paul Woodward, P-MRNRD Water Resources Engineer
January 7, 2003

1. **City of North Platte, NE Wetland Mitigation Bank Program**– North Platte, Nebraska – January 3, 2003 - Service area within the Platte Basin

   Bob Keller
   City of North Platte
   211 W 3rd ST
   North Platte, NE 69101
   (308) 535-6724 x 222

   - ❑ Bob said that the city has currently created a 25 acre site in two phases. The first phase of 13 acres cost the city nearly $346,000, and the second costs around $258,000. He said that their prices will be based on their costs, along with monitoring and future maintenance. Bob didn't think that the city planned to make exceptions for larger mitigation needs or for rural land as opposed to urban. They are anticipating developing hundreds of acres with their new mechanical water treatment systems and they have used some of the available bank to mitigate for a Wal-Mart site.

2. **G. William Coulthard Wetland Mitigation Bank** – Modale, Iowa – December 24, 2002 - 38 acres in service area that includes lands along the Missouri River basin in southwestern Iowa.

   David Thien, Farm Manager
   Agent for Bank Sponsor
   Thien Farm Management, Inc.
   101 East Graham Ave. Suite 1
   Council Bluffs, IA 51503
   tfminc@thienfarm.coxatwork.com

   - ❑ David responded in via email and stated that their current price is $30,000 per acre credit for developers and highway construction needs. He would also consider selling credits to farmers for agricultural development for around $5,000 to $6,000 per credit, but would prefer selling it at the higher rate. He also said that if a developer needs a large number of credits, a reduced price may be considered.

3. **Warm Springs Wetland, LLC** – Park County, Colorado – December 31, 2003 - 200 acre wetland serving an area that includes the Upper South Platte and South Platte Headwaters.

   Mr. Skyler DeBoer
   Warm Springs Wetland, LLC
   2730 Snowmass Creek Road
   Snowmass, CO 81654
   bigsky@aspeninfo.com

- ❑ Skyler responded via telephone and informed me that wetland prices in the Colorado area surrounding Denver were primarily based on competition. He quoted two nearby competitors at approximately $85,000 per credit. He continued to tell me that his company was charging $75,000 per credit for requests less than or equal to one (1) acre and around $65,000 per credit for request more than one (1) acre. Skyler thought that these prices were probably based on the anticipated expenses that a consumer might incur having to mitigate for a wetland on-site.

4. **Minnesota Board of Water and Soil Resources** – St. Paul, Minnesota – January 6, 2003 - State agency that manages numerous different wetland banks throughout Minnesota.

   Bruce Sandstrom
   Minnesota Board of Water and Soil Resources
   One West Water Street, Suite 200
   Saint Paul, MN 55107
   bruce.sandstrom@bwsr.state.mn.us

   - ❑ Bruce informed me of the system set up in Minnesota for Wetland Banking. To summarize, the state registers and keeps track of wetland banks in separate areas throughout Minnesota. Every bank sponsor sets their own price for their wetland. However, Bruce did approximate that prices paid in the seven county metro area of Minneapolis\St. Paul have been running from $18K to $25 K per acre and prices outside the metro area go for about $6,000 to $10,000 per acre. He also generalized that credits usually run from 3 to 5 times the price of the underlying land value.

5. **Arkansas Wetland Mitigation Bank Program** – Little Rock, Arkansas – January 6, 2003 - A state-wide government agency that creates, operates, and maintains a Wetland Mitigation Banking Program.

   Ken Brazil, Engineer Supervisor
   Arkansas Soil and Water Conservation Commission
   Attention: Water Management Division/Water Rights
   101 East Capitol Avenue, Suite 350
   Little Rock, Arkansas 72201
   Phone: (501) 682-3985
   E-mail: ken.brazil@mail.state.ar.us

   - ❑ Ken responded to me in an email message and I called him to follow up. In his message, Ken informed me that the state sets the price to cover their start-up, operation, and maintenance costs associated with the individual bank site. In my conversation with Ken, I discovered that they currently have one 330 acre site in SE Arkansas that is a mix of wetlands and uplands for which they receive 1 credit for every 4.2 of their 330 acres. He explained that their approximate costs for the site were approximately $2500 an acre, or $10500 per credit. We discussed price differences for urban versus rural land, and he said that the goal of the state was to simply recover their costs with a base fee, but they would sell it to anyone for this price.