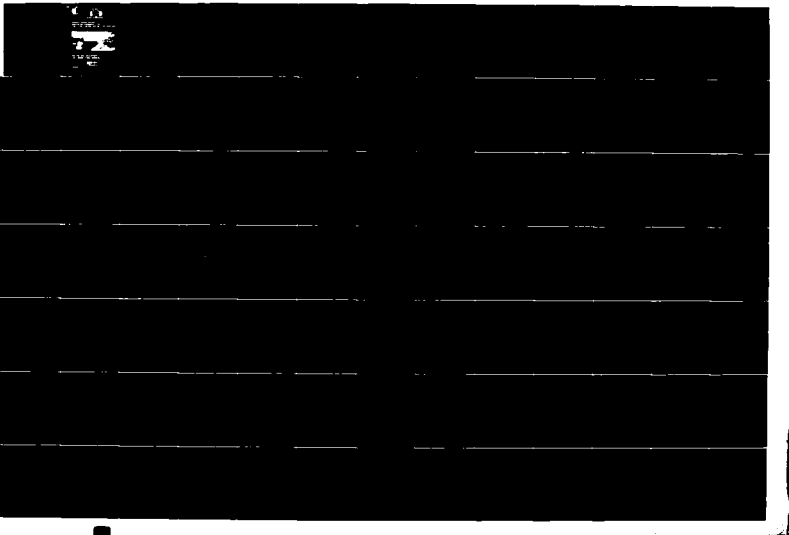
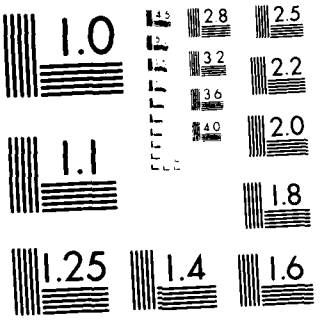
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RED AND RED LAKE RIVERS AT EAST GRAND FORKS, MINNESOTA

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The East Grand Forks General Reevaluation is a study of flood problems at East Grand Forks, Minnesota. This report brings together engineering, economic, and environmental information and analyzes a wide range of structural and nonstructural measures for their merit in reducing flood damages at East Grand Forks. Levees were identified as the only structural measure capable of significantly reducing flood damages at East Grand Forks. The report recommends detailed design studies of a plan which includes levees in combination with nonstructural measures to include floodproofing, acquisition/relocation, floodplain zoning, flood warning and forecasting, flood insurance, and an emergency plan of action.

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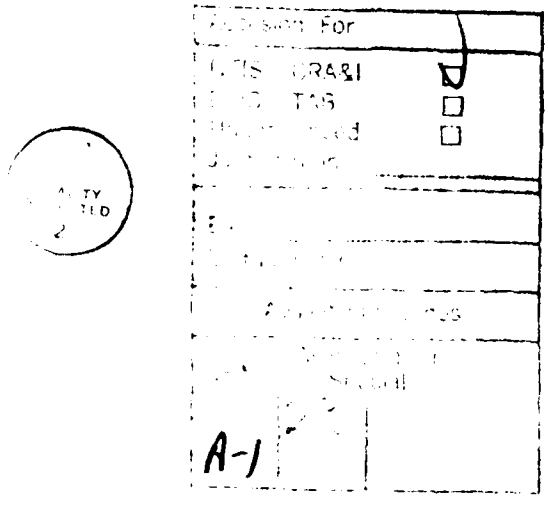
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REPLY TO
ATTENTION OF:

GENERAL REEVALUATION
FOR FLOOD CONTROL AND RELATED PURPOSES
RED AND RED LAKE RIVERS AT
EAST GRAND FORKS, MINNESOTA

SUPPORTING DOCUMENTATION



NOVEMBER 1984

EAST GRAND FORKS, MINNESOTA
GENERAL REEVALUATION
SUPPORTING DOCUMENTATION

SYLLABUS

This supporting documentation contains the detailed support studies used to reach the findings and recommendations contained in the main report.

EAST GRAND FORKS, MINNESOTA
GENERAL REEVALUATION
SUPPORTING DOCUMENTATION

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EAST GRAND FORKS, MINNESOTA
GENERAL REEVALUATION

SUPPORTING DOCUMENTATION
HYDROLOGY

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HYDROLOGY

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SUPPORTING DOCUMENTATION
HYDROLOGY

CLIMATE

The climate at East Grand Forks, Minnesota, is characterized by wide variations in temperature with moderate precipitation. The average annual temperatures for various locations within the basin are shown in the following table. The average length of the growing season is about 126 days.

Average annual precipitation at East Grand Forks is approximately 20 inches. Most of this precipitation occurs during the frost-free part of tne year, from May through August. Spring snowmelt, especially when accompanied by rainfall, causes serious flood problems within the basin.

Mean Annual and Extreme Temperatures for
Red River of the North Basin Above East Grand Forks

Station	Years of Record[1]	Mean Annual	Temperature (°F) Maximum	Minimum
Fargo, North Dakota	98	40.7	114	-48
Crookston, Minnesota	90	39.9	106	-51
Ada, Minnesota	88	39.7	111	-53
Hillsboro, North Dakota	74	40.8	115	-40
Wahpeton, North Dakota	87	42.8	109	-44

(1) Through 1980.

DRAINAGE AREA

The U.S. Geological Survey (USGS) gage[1] is located on the Red River of the North, approximately 298 miles above the river's mouth at Lake Winnipeg in Manitoba, Canada. The drainage area at the gage is approximately 30,100 square miles. This drainage area was divided into two parts: contributing (effective) drainage area and noncontributing (includes closed basins) drainage area. The effective drainage area was also divided into two parts, primary and secondary drainage areas. These areas are defined as follows:

a. Primary contributing drainage area is that area with a direct water course to the main stem of the river.

b. Secondary contributing drainage area is that area which begins to contribute when a flood of about 50-year frequency occurs. For this area, some amount of initial loss should be applied in addition to a lag time which is dependent on the distance from the main stem. The 50-year frequency flood was chosen as a limit because most of the observed floods are below the 50-year level. The boundary between primary and secondary contributing areas was determined by assuming the secondary contributing area to be inclosed by a 5-foot contour line on 7.5-minute series topographic maps.

c. The noncontributing drainage area is that area which does not contribute to flow, and is similar to the term "closed area" as used by the USGS. The noncontributing area is assumed to be inclosed by a 10-foot or more contour line on the 7.5-minute topographic map.

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(1) The USGS gage refers to USGS Gage No. 050825000 at Grand Forks, North Dakota, on the Red River of the North between the cities of Grand Forks, North Dakota, and East Grand Forks, Minnesota. All further references will be made to the city of East Grand Forks, Minnesota, with the understanding that the gages official location is Grand Forks, North Dakota.

The drainage areas as used in this study are listed on the following table. These drainage areas were obtained from other studies and, in some cases, are only approximate. Detailed studies have not been completed for all of the subbasins at this time.

Drainage Areas Above East Grand Forks, Red River of the North

Location	Drainage Area in Square Miles				
	Primary +	Secondary =	Effective	Noncontributing	Total
Below Lake Traverse	1,160	--	1,160	--	1,160
Local at Wahpeton	1,020	--	1,020	--	1,020
Ottertail below Orwell	245	--	245	1,585	1,830
Wild Rice at Abercrombie, ND	1,370	120	1,490	590	2,080
Local at Fargo	710	--	710	--	710
Sheyenne River Basin					
Above Kindred	2,680	1,770	4,450	4,350(2)	8,800
Local at West Fargo	70	--	70	--	70
Maple at Mapleton	1,250	130	1,380	70	1,450
Rush at Amenia	116	--	116	--	116
Buffalo at Dilworth	840	200	1,040	--	1,040
Wild Rice at Hendrum	1,400	200	1,600	--	1,600
Local at Halstad(1)	1,924	--	1,924	--	1,924
Goose at Hillsboro	1,040	50	1,090	110	1,200
Red Lake River Basin					
Above High Landing	350	--	350	1,950	2,300
Thief at Thief River Falls	140	820	960	--	960
Clearwater at Red Lake Falls	1,220	150	1,370	--	1,370
Local at Crookston	575	75	650	--	650
Local at East Grand Forks(3)	1,820	--	1,820	--	1,820
Total	17,930	3,515	21,445	8,655	30,100

(1) The local drainage area at Halstad includes the Elm River.
(2) Includes the closed basin of Devils Lake.
(3) The local drainage area at East Grand Forks includes the Marsh and Sandhill Rivers.

RUNOFF AND STREAMFLOW DATA

Streamflow data are currently being obtained by the USGS at several gaging stations for the drainage area above East Grand Forks. In addition, the Corps maintains stations at Baldhill Dam, Lake Traverse, Orwell Dam, and Red Lake Dam, wnile the National Weather Service maintains many staff gages throughout the basin for use during periods of flooding. Records for East Grand Forks are available from April 1882 to present.

Streamflow is low during the winter season; some of the rivers and streams above the USGS gage have no flow for long periods during the winter months. The streamflow rises in late March and April, usually reaching the highest flow of the year in April. The flow then recedes slowly throughout the summer until fall when the flow is again rather low. The average discharge of the Red River at East Grand Forks is 2,535 cfs. Extremes in recorded flow have varied from about 85,000 cfs in 1897 to 1.8 cfs in 1977. The low flow in 1977 was caused by unusual regulation during the repair of the dam at Grand Forks.

HISTORICAL FLOODS AND RAINFALL EVENTS

Flooding at East Grand Forks generally occurs in the early spring, caused by the sudden melting of unusually heavy snowfall, heavy spring precipitation or a combination of the two factors. Since the beginning of the period of record in 1882, only two flood events exceeding a stage of 40 feet at Grand Forks have occurred later than April. The first of these occurred in 1950 when floodwaters were receding from a flood stage of 43.9 feet that had been reacned in April. An early May blizzard caused the river stage to rise again, cresting at 45.6 feet. On 14 July 1975, the river crested at 43.1 feet, following a heavy rainfall in southeastern North Dakota during late June and early July.

The timing of flood crests is a significant factor in the severity of the flood hazard at East Grand Forks. The drainage basin is divided between that of the Red Lake River to the east and the Red River to the south of the city. In the past, the Red Lake River has been responsible for up to 40 percent of the flood flow at East Grand Forks.

Little data are available for floods at the USGS gage prior to 1882. However, flooding is known to have occurred in 1848, 1851, 1852 and 1853. The 1853 flood is estimated to have reached a flood stage of 52 feet above the current USGS gage. The worst floods known occurred in 1824, 1825 and 1826. The 1826 flood reached a stage of 66 feet near Pembina. Floodwaters did not recede until late July, and even the bison were reported to have disappeared from the area.

The highest recorded flood occurred in 1897 witn a stage of 50.2 feet at the USGS gage. This flood was caused by the melting of snowfall that accumulated as a result of several severe winter blizzards. Floodwaters reportedly inundated a strip of land 30 miles wide and 150 miles long.

More recently, the 1979 flood was preceded by winter snowfall and spring rains that were 160 percent above normal. About 54 incnes of snow fell in the East Grand Forks area, and melting did not begin until the second week of April, about a month later than normal. Temperatures rose to 50° - 60°F on April 16, causing a rapid snowmelt. During the week prior to this rise in temperature, the basin received up to 1.5 inches of rainfall. The resulting runoff caused a flood stage of 48.8 feet at the USGS gage.

Other major floods are summarized in the following table.

Major Floods at East Grand Forks Since 1882

Rank	Stage	Year	Peak Discharge (cfs)
1	50.2	1897	85,000
2	48.81	1979	82,000
3	48.0	1882	75,000
4	45.73	1978	54,200
5	45.69	1969	53,500
6	45.61	1950 (May)	54,000
7	45.55	1966	55,000
8	45.5	1893	53,300
9	44.92	1965	52,000
10	43.8	1950 (April)	43,800
11	43.3	1975 (April)	42,600
12	43.08	1975 (July)	42,700

FLOOD PROBABILITY

The Grand Forks frequency curve in this study was obtained from the Red River Main Stem study. One purpose of the main stem study was to develop frequency curves for Red River main stem stations using all available data, thereby developing frequency curves which are consistent along the main stem. A brief description of how the analysis was conducted is shown below.

The methods used in computing the frequency curves followed those given in Water Resources Council (WRC) Bulletin No. 17A, "Guidelines for Determining Flood Flow Frequency." This included the use of expected probability (Pn), and Weibull plotting points. Two computer programs were used in the calculations, "Flood Flow Frequency Analysis," and "Regional Frequency Computation." The stations and period of record used in the analysis are given in the following table.

Stations and Periods of Record Used in the Red River Main Stem Analysis

Station Name	Station Number	Period of Record
Wahpeton, ND	515	1897, 1942-1979
Fargo, ND	540	1882, 1897, 1902-1979
Halstad, MN	645	1882, 1893, 1897, 1942-1979
Grand Forks, ND	825	1826, 1852, 1882-1979
Drayton, ND	920	1936, 1937, 1941-1979
Emerson, Manitoba	1025	1826, 1852, 1913-1979

The mean logs, standard deviations, equivalent lengths of record, and the computer program used in the final analysis for the six main stem stations used in the analysis are listed below. As noted in the table, the Regional Frequency Program was used in three cases since this resulted in the longest equivalent length of record while maintaining an acceptable correlation coefficient.

Mean Logs, Standard Deviations, and Equivalent Lengths of Record

Station	Station Number	Mean Log	Standard Deviation	Equivalent Length of Record	Computer Program: Regional Frequency	Computer Program: Flood Flow Frequency
Wahpeton	515	3.252	0.374	88	X	
Fargo	540	3.4754	0.4383	98		X
Halstad	645	3.873	0.393	96	X	
Grand Forks	825	4.1558	0.3911	154		X
Drayton	920	4.220	0.360	96	X	
Emerson	1025	4.2973	0.3302	154		X

In addition to the six stations used in the analysis, a frequency curve was also computed for Oslo, Minnesota. This curve was developed from the other stations using general relations.

A tabulation of frequency data and discharges of selected frequencies for the seven stations is given in the following table.

Frequency Curve Data, Red River of the North, USGS Gaging Stations

Station	Station Number	Mean Log	Standard Deviation	Adopted Skew	Equivalent Length of Record (yrs)	Discharge in cfs Exceedence Frequency in Percent (Return Period in Years) 10 (10)	2 (50)	1 (100)	0.2 (500)
Wahpeton, North Dakota	515	3.252	.374	-.19	88	5,350	9,800	12,000	18,600
Fargo, North Dakota	540	3.475	.438	0.0	98	11,100	24,900	33,300	60,800
Halstad, Minnesota	645	3.873	.393	-.19	96	23,600	45,000	56,000	87,000
Grand Forks, North Dakota	825	4.156	.391	-.2	154	45,000	84,900	106,000	161,000
Oslo, Minnesota	(1)	-	-	-	-	45,700	85,400	106,500	161,300
Drayton, North Dakota	920	4.220	.360	-.203	96	48,000	87,000	107,000	162,000
Emerson, Manitoba	1025	4.297	.330	0.0	154	53,800	99,000	122,000	193,000

(1) Discontinued, discharges from general relations.

In addition to the annual series, a partial duration series was also computed for Grand Forks. The 100 largest independent peak flows, in order of magnitude, were assigned the same plotting points that were assigned to the annual observed peak flows as shown on the following table. The partial duration series curve was drawn graphically from the plotting points and coincides with the annual series at an exceedence frequency of about 27 percent.

The annual series with plotting points and confidence limits is shown on Plate 1. The annual series and partial duration series curves for the partial duration series curve are shown on Plate 2.

As stated above, these curves were computed using Pn and Weibull plotting points since they were developed for design purposes. They are <u>not</u> the administratively agreed to discharges currently being used for floodplain management purposes. The administrative discharges do <u>not</u> meet Corps criteria for project design.

Since the methods for computing frequency curves have been updated by WRC Bulletin No. 17B, the data given in the table on page A-8 were compared to data using Bulletin 17B. For Grand Forks, there was no change in the frequency curve. As in the case of the other main stem stations, the difference was so small that it was considered to be insignificant. Therefore, the data, as presented below, are still the adopted values for the Red River main stem stations.

Plotting Positions for Adopted Frequency Curve
of Annual Instantaneous Peak Flows at Grand Forks, North Dakota

Rank	Water Year	Flow in cfs	Weibull Plotting Position	Rank	Water Year	Flow in cfs	Weibull Plotting Position
1	1826	135,000	.0065	51	1949	15,200	.5014
2	1852	95,000	.0129	52	1902	15,000	.5115
3	1897	85,000	.0211	53	1957	14,700	.5215
4	1979	82,000	.0311	54	1953	14,600	.5315
5	1882	75,000	.0411	55	1936	14,500	.5415
6	1966	55,000	.0512	56	1901	14,000	.5515
7	1978	54,200	.0612	57	1919	13,600	.5615
8	1950	54,000	.0712	58	1941	13,400	.5715
9	1969	53,500	.0812	59	1964	13,200	.5815
10	1893	53,300	.0912	60	1885	13,040	.5915
11	1965	52,000	.1012	61	1928	12,200	.6015
12	1975	42,900	.1112	62	1921	11,500	.6115
13	1883	38,600	.1212	63	1973	11,200	.6215
14	1947	35,000	.1312	64	1942	11,000	.6315
15	1948	34,200	.1412	65	1963	10,800	.6415
16	1974	34,100	.1512	66	1886	10,600	.6515
17	1904	33,000	.1612	67	1927	10,600	.6615
18	1972	31,400	.1712	68	1944	10,400	.6715
19	1907	30,400	.1812	69	1932	10,400	.6815
20	1920	30,300	.1912	70	1940	10,000	.6915
21	1916	29,000	.2013	71	1925	9,690	.7015
22	1967	28,200	.2113	72	1954	9,620	.7115
23	1943	28,200	.2213	73	1930	9,610	.7215
24	1906	27,600	.2313	74	1968	9,420	.7315
25	1962	26,600	.2413	75	1909	9,260	.7415
26	1952	23,900	.2513	76	1899	9,000	.7515
27	1970	23,700	.2613	77	1914	8,240	.7615
28	1951	23,600	.2713	78	1926	7,720	.7715
29	1976	23,600	.2813	79	1958	7,500	.7815
30	1892	23,000	.2913	80	1887	7,300	.7915
31	1946	22,000	.3013	81	1939	6,720	.8015
32	1917	21,600	.3113	82	1938	6,660	.8117
33	1896	21,600	.3213	83	1959	6,300	.8217
34	1915	21,500	.3313	84	1891	6,000	.8317
35	1956	21,400	.3413	85	1912	4,730	.8417
36	1945	21,300	.3513	86	1895	4,500	.8517
37	1884	20,600	.3614	87	1918	4,460	.8617
38	1908	20,500	.3714	88	1955	4,380	.8717
39	1888	19,000	.3814	89	1937	4,180	.8817
40	1922	19,000	.3914	90	1960	4,000	.8917
41	1903	18,800	.4014	91	1911	3,520	.9017
42	1910	18,500	.4114	92	1890	3,470	.9117
43	1913	17,200	.4214	93	1961	3,400	.9217
44	1960	17,200	.4314	94	1934	3,210	.9317
45	1929	17,100	.4414	95	1889	3,000	.9417
46	1905	16,800	.4514	96	1935	2,920	.9517
47	1894	16,450	.4614	97	1924	2,530	.9618
48	1923	16,200	.4714	98	1977	2,190	.9718
49	1971	15,800	.4814	99	1898	2,000	.9818
50	1955	15,400	.4914	100	1931	1,650	.9918

NOTE - Plotting positions based on 154 years (H) and 3 high values (X).
Weight (W) for systematic values = 1.5510.

Discharge-frequency curves were computed for the Red River near [illegible] just upstream of the mouth of the Red Lake River and for the Red Lake River at Crookston and at East Grand Forks. In addition, a supplemental frequency curves were also computed for Grand Forks for peak flows on the Red River above the Red Lake River and for the Red Lake River at East Grand Forks. The coincidental frequency curves were used to determine the starting backwater elevations at Grand Forks for peak flows on the Red River above the Red Lake River and the Red Lake River at East Grand Forks. The methods used to compute the frequency curves are given below.

The discharge-frequency curve for the Red Lake River at Crookston was developed using WRC Bulletin 17B for the period of record of 1941 to 1979. These data were then correlated to Grand Forks using Appendix 7 of Bulletin 17B. The correlation extends the Crookston peak flow record from 39 years to an equivalent length of 134 years. The table on page A-15 lists the frequency data and discharges of selected frequencies, and the following table lists the Weibull plotting points for the annual series based on the correlation with Grand Forks. A partial duration series was also computed for Crookston. The 39 largest independent peak flows, in order of magnitude, were assigned the same plotting points that were assigned to the annual series. The partial duration series curve was drawn graphically from the plotting points and coincides with the annual series at an exceedence frequency of about 11 percent. Discharge-frequency curves for Crookston for the annual series and the partial duration series curve are shown on Plate 3. A mean daily frequency curve was also developed using the same methods which were used for the instantaneous values but was for comparison with data for the Red Lake River at East Grand Forks. The table on page A-15 lists the frequency data and discharges of selected frequencies.

Calculation Table for Adopted Frequency Curve
of Annual Instantaneous Peak Flows at Brookston, Minnesota

Rank	Water Year	Flow in cfs	Weibull[1] Plotting Position	Rank	Water Year	Flow in cfs	Weibull[1] Plotting Position
1	-	-	.0113	51	1963	6820	.5014
2		-	.0213	52	1926	6500	.5115
3	1969	25400	.0311	53	-	-	.5215
4	1950	24400	.0411	54	1907	6330	.5315
5	-	-	.0511	55	1952	6320	.5415
6	1973	21300	.0612	56	-	-	.5515
7	1966	21000	.0712	57	1941	6190	.5615
8	1965	19400	.0712	58	1940	6000	.5715
9	1967	19300	.0812	59	1938	5910	.5815
10	1897	18900	.0912	60	1923	5820	.5915
11	1979	18100	.1012	61	-	-	.6015
12	1962	16700	.1112	62	1944	5770	.6115
13	-	-	.1212	63	1959	5630	.6215
14	1974	16400	.1312	64	1964	5550	.6315
15	1916	15900	.1412	65	1960	5520	.6415
16	1975	15600	.1512	66	1917	5480	.6515
17	1971	15300	.1612	67	-	-	.6616
18	1919	14900	.1712	68	1954	5330	.6616
19	1972	14700	.1812	69	1902	5170	.6816
20	1906	14600	.1912	70	1973	4960	.6916
21	1956	14000	.2013	71	1930	4770	.7016
22	1904	13700	.2113	72	1936	4540	.7116
23	1970	13300	.2213	73	1905	4490	.7216
24	1951	12600	.2313	74	1932	4390	.7316
25	1976	12500	.2413	75	1925	3910	.7416
26	1947	12400	.2513	76	1937	3750	.7516
27	1955	12400	.2613	77	-	-	.7616
28	1957	11800	.2713	78	1909	3680	.7716
29	1968	11100	.2813	79	1911	3620	.7816
30	-	-	.2913	80	1977	3440	.7916
31	1949	10700	.3013	81	-	-	.8016
32	1978	10700	.3113	82	1958	3370	.8117
33	1945	9520	.3213	83	1939	3050	.8217
34	1926	9520	.3313	84	1921	2990	.8317
35	1943	9420	.3413	85	-	-	.8417
36	-	-	.3513	86	1914	2630	.8517
37	-	-	.3614	87	-	-	.8617
38	1948	9130	.3714	88	1953	2560	.8717
39	-	-	.3814	89	1935	2490	.8817
40	1946	8020	.3914	90	1912	2120	.8917
41	1962	8730	.4014	91	-	-	.9017
42	1901	7920	.4114	92	1918	1950	.9117
43	1960	7800	.4214	93	-	-	.9217
44	1927	7700	.4314	94	1934	1490	.9317
45	1929	7620	.4414	95	1961	1450	.9417
46	1928	7500	.4514	96	-	-	.9517
47	-	-	.4614	97	1933	1440	.9618
48	1975	7170	.4714	98	1924	1140	.9718
49	1942	7000	.4814	99	-	-	.9818
50	1922	6901	.4914	100	1931	1030	.9918

(1) Plotting positions based on 100 years of record and 2 high values (25,400 and 24,400 cfs) in 1969 and 1950.

Note: Flow values in bold type are peak flows as noted above.

The discharge-frequency curve for the Red Lake River at East Grand Forks was determined by a ratio of drainage areas between Crookston and East Grand Forks. The concept of a drainage area transfer is valid for use in this basin since the increase in drainage area is only about 10 percent, with this drainage coming in uniformly along the Red Lake River. The drainage area is 5,280 square miles at Crookston and 5,750 square miles at East Grand Forks. Based on experience in this basin, an exponent of 0.6 was applied to the ratio of drainage areas to develop the East Grand Forks curve. The East Grand Forks discharge-frequency curve is presented on Plate 4. The table on page A-15 lists the discharges of selected frequencies. Using flows which were routed from Crookston to East Grand Forks on the Red Lake River, a mean daily discharge curve was also computed using Bulletin 17B for the period 1903 to 1979, 77 years. These data were then correlated to Grand Forks using Appendix 7 of Bulletin 17B. The table on page A-15 lists the frequency data and discharges of selected frequencies.

A discharge-frequency curve was developed for the Red River just upstream of the mouth of the Red Lake River using Bulletin 17B and correlating to Grand Forks. The basic flow data were developed by routing the 77-year record of 1903 to 1979 from Crookston downstream to the Grand Forks gage and subtracting it from the Grand Forks flows to determine peak flows upstream of the Red Lake River. On the Red River, the difference between instantaneous and mean daily flows is so small that the mean daily flows for the Red River above the Red Lake River will be treated as instantaneous peaks. The table on page A-15 lists the frequency data and discharges of selected frequencies. Plate 5 shows the discharge-frequency curve for the Red River above the Red Lake River.

Coincidental frequency curves for Grand Forks were computed by the following method. The flows which occurred at Grand Forks when peaks occurred on the Red River above the Red Lake River and on the Red Lake River at East Grand Forks were identified. This resulted in two sets

of flows for 77 years, 1903 to 1979, at Grand Forks. Bulletin 17B was then used to compute frequency curves for both sets of flows. These curves were then correlated to the peak flow data at Grand Forks. The resulting curves can then be used to determine flows at Grand Forks when peak flows occur on the Red River above Red Lake River and on the Red Lake River at East Grand Forks. The table on page A-15 lists the frequency data and discharges of selected frequencies. Plate 6 displays the coincidental flows at Grand Forks for the case when the peak is on the Red River above the Red Lake River and Plate 7 displays the coincidental flows at Grand Forks for the case when the peak is on the Red Lake River at East Grand Forks. The above method was checked by computing the exceedence probability for one discharge value for each curve by integration of the bivariate normal distribution. The results agreed very well with the above method.

An example of how each curve can be used is as follows:

1. Using the data from the table on page A-15, for a 1-percent chance peak on the Red River above the Red Lake River of 86,700 cfs, the coincidental flow at Grand Forks would be 113,000 cfs. The resulting flow on the Red Lake River at East Grand Forks would be 113,000 cfs - 86,700 cfs = 26,300 cfs.

2. Using the data from the table on page A-15, for a 2-percent chance peak on the Red Lake River at East Grand Forks of 33,700 cfs, the coincidental flow at Grand Forks would be 84,900 cfs. The resulting flow on the Red River above the Red Lake River would be 84,900 cfs - 33,700 cfs = 51,200 cfs.

Frequency Curve Data, Red and Red Lake Rivers

Location	Adopted Mean Log	Adopted Standard Deviation	Adopted Skew	Equivalent Length of Record (yrs)	Discharge in cfs — Exceedence Frequency in Percent (Return Period in Years) 10 (10)	2 (50)	1 (100)	0.2 (500)	Type of Flow
Red Lake River at Crookston	3.8354	0.3592	-0.40	124	19,200	32,000	37,900	52,500	Instantaneous(1)
	3.7949	0.3697	-0.43	125	17,900	30,100	35,600	49,200	Mean Daily(1)
at E. Grand Forks	-	-	-	-	20,200	33,700	39,900	55,300	Instantaneous(2)
	3.7927	0.3860	-0.43	126	18,700	32,100	38,300	53,600	Mean Daily(3)
Red River above Red Lake River	3.9768	0.4324	-0.20	144	33,700	68,000	86,700	141,000	(4) (3)
Coincidental Flows at Grand Forks for Peak on:									
Red River above Red Lake River	4.1125	0.4242	-0.21	150	44,800	89,000	113,000	180,000	- (3)
Red Lake River at E. Grand Forks	4.0672	0.4432	-0.26	141	42,400	84,900	108,000	172,000	- (3)

(1) Gaged data, Bulletin 17B, correlated to Grand Forks.
(2) Drainage area transfer method.
(3) Routed data, Bulletin 17B, correlated to Grand Forks.
(4) Instantaneous peak same as mean daily peak.

UNIT HYDROGRAPHS

In accordance with EM 1110-2-1405, "Flood Hydrograph Analysis and Computations," unit hydrographs were developed for the effective drainage area above Grand Forks. For some areas, this included developing two unit hydrograpns per area, one for tne primary drainage area and one for the secondary drainage area.

In general, the primary and secondary unit hydrographs were developed by the following methods. A single unit hydrograph was developed using established procedures. The key part in computing the single unit hydrograpn was to choose a flood in which the secondary drainage area contributed. Then, taking into consideration the basin characteristics and the relative volumes of tne primary and secondary unit hydrographs, the single unit hydrograph was divided into primary and secondary unit hydrographs. For drainage areas for which no flood was found which could adequately show the secondary drainage area, a flood was chosen to show the primary drainage area only, and a synthetic method was used to develop the secondary unit hydrographs from the primary unit hydrograph taking into consideration the basin characteristics. If these two methods could not be used, tne unit hydrograpns were developed by using synthetic methods to develop the total unit nydrograpn first. After this was done, the primary drainage area unit hydrograph was developed synthetically by removing the secondary areas from the area being considered. Tne difference between the total and primary unit hydrographs is the secondary hydrograph.

The characteristics of tne secondary drainage area cause it to start contributing to the main stem later than the primary drainage area. This time lag depends on the location of the secondary area with respect to tne nearest main water course, the primary drainage area, and on storage losses such as potholes, marshes, ponds, etc. The first lag is called the location lag. It is shown by delaying the starting time of the secondary unit hydrograph. Not all of the unit hydrographs

for secondary drainage areas have a location lag since some secondary areas are located relatively close to a main water course. The location lag will remain the same for all floods.

The second lag is called the storage lag and is derived during the computation of runoff by adding the storage losses to the losses which were established for computation of runoff from the primary area. The time needed to fill the storage areas of the secondary drainage area can vary from flood to flood. Hence, the storage lag continuously changes according to the rate at which runoff occurs, which is itself dependent on such variables as temperature, soil moisture, etc.

The following table contains the unit hydrographs used in this study. Because the storage lag is specific for each flood, only the location lag is shown on the secondary unit hydrograph. The primary unit hydrographs are the 125 percent unit hydrographs or are unit hydrographs developed from synthetic methods and are being considered to be equivalent to 125 percent unit hydrographs. The secondary unit hydrographs have not been peaked since the nature of the secondary drainage area precludes this.

(Continued)

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0	0	10	50	115	155	240	370	560	590
410	420	400	350	295	245	200	150	120	100
85	67	56	45	35	28	25	18	14	12
10	8	5	4	2	0	0	0	0	0

520	1130	2140	3180	5500	8140	9250	8030	2140	1500
1090	765	560	360	205	150	155	90	60	47
52	25	16	10	6	0				

0	0	0	0	0	4	10	45	95	155
225	270	250	210	175	140	110	85	70	50
15	10	10	20	10	12	5	5	0	1

255	215	1021	1000	1050	501	350	240	121	71
11	20	14	0						

9755	9055	9515	7505	5355	7215	9700	9225	515	0

(Continued)

(Continued)

(Continued)

(Continued)

(Continued)

PROBABLE MAXIMUM PRECIPITATION AND SNOWMELT

The standard project flood for East Grand Forks was developed from the probable maximum flood as explained in the following paragraphs. This was necessary since for large areas snowmelt is very important and EM 1110-2-1411 does not take snowmelt into account.

The probable maximum precipitation, PMP, for the area above the USGS gage was developed using the procedures and data presented and described in Hydrometeorological Report No. 48 (HMR No. 48), "Probable Maximum Precipitation and Snowmelt Criteria for Red River of the North above Pembina and Souris River above Minot, North Dakota," dated May 1973.

In order to find the most critical centering of the PMP for the area above the USGS gage, a PMP was computed for several different subareas. Only the 15 March PMP's were computed since it has been determined from other studies in this area that the 15 March storm is the most critical season for this area.

In order to compute snowmelt, it was also necessary to use EM 1110-2-1406, "Runoff from Snowmelt," dated 5 January 1960. Assuming that the snowmelt will take place during a rain-free period and that the area being studied can be classified as an open, flat area, having less than 10 percent forest cover, equation 25, paragraph 4-08, of the said EM was used for the snowmelt computations:

$$M = k'(0.00508Ii)\ (1-a) + (1-n)\ (0.0212T'a - 0\ 84) + N(0.029T'c)$$
$$+ K(0.0084V)\ (0.22T'a + 0.78T'd)$$

Air temperatures, dew point temperatures and wind speeds were obtained from HMR No. 48 for use in this equation.

PROBABLE MAXIMUM RUNOFF

In computing the probable maximum runoff, it has been assumed that the antecedent conditions will be highly conservative. The initial losses for the basin were assumed to be zero for the primary areas and equal to 3 inches for the secondary areas during the 15 March storm. The uniform loss rates were determined after careful analysis of available data to be equal to 0.02 inch per hour for the 15 March storm.

The snowmelt runoff was computed using the guidelines set forth in EM 1110-2-1406. Based on these guidelines, it was assumed that the snowpack was dry at 32°F at the start of the snowmelt, 10 days before the PMP storms. The first portion of the snowmelt is considered to be absorbed by the snowpack, with up to 10 percent of the water equivalent depth of the snow being absorbed. Any additional snowmelt, plus the melted water contained in the snow, becomes free water on the ground surface. It has been assumed in this study that the snowmelt computed for the total area above East Grand Forks would be representative of all subareas, and so was used for all centerings of the PMP's. The 24-hour snowmelt values were changed to 12-hour values by using the method given in EM 1110-2-1406.

The rainfall runoff was computed by subtracting the uniform loss rate from the PMP values. These 6-hour values were then transformed into 12-hour values by adding the first 6-hour value to the second 6-hour value, etc. The rainfall runoff depth is very dependent on drainage area size. It was, therefore, necessary to compute the rainfall excess caused by different centerings of the PMP storms. The volume of the rainfall excess of the area over which the storm is centered was subtracted from the volume of the storm which was centered over the total area. The difference, or residual, was then applied uniformly to the remaining area. This method allows the total volume of rainfall excess for the areas above East Grand Forks to be maintained.

It was found that the most critical probable maximum flood occurred for a centering of the storm over the area extending from Halstad to Wahpeton. This area did not include the drainage basins of the Sheyenne River and the Wild Rice River in North Dakota. This centering best reflects the relatively long times of concentration for the other tributaries above the USGS gage, such that a concentrating of flows tends to occur resulting in the most critical PMF peak. The total combined snowmelt and rainfall excess in 12-hour periods for application to the unit hydrographs for the most critical centering is given in the following table.

Total Runoff Available for Unit Hydrographs
15 March Storm Centered Over Halstad to Wahpeton

12 Hour Period	Runoff in Inches			
	Area Above Halstad to Wanpeton		Remaining Area above East Grand Forks	
	Primary	Secondary(1)	Primary	Secondary(1)
0 to 8	0.00	0.00	0.00	
9	.22	0.00	.22	0.00
10	.07	0.00	.07	0.00
11	.35	0.00	.35	0.00
12	.25	0.00	.25	0.00
13	.51	0.00	.51	0.00
14	.59	0.00	.59	0.00
15	.64	0.00	.64	0.00
16	.90	.53	.90	.53
17	.77	.77	.77	.77
18	1.72	1.72	1.72	1.72
19	.36	.36	.36	.36
20	.57	.57	.57	.57
21	.36	.36	.43	.43
22	.64	.64	.60	.60
23	1.29	1.29	.95	.95
24	4.34	4.34	1.38	1.38
25	.29	.29	.24	.24
26	.20	.20	.16	.16
Total	14.07	11.07	10.71	7.71

(1) Secondary drainage area storage losses of 3.0 inches have been subtracted.

PROBABLE MAXIMUM FLOOD

Probable maximum flood (PMF) hydrographs were computed for primary and secondary drainage areas above the USGS gage. The PMF hydrographs were developed by applying the total runoff available to the computed unit hydrographs. Routing and combining of these developed flood hydrographs were accomplished by use of HEC-1, "Flood Hydrograph Package," dated 28 July 1982. Routing constants were developed from investigations of past events and data obtained from other studies. The PMF for the most critical centering is listed in Table 12. This table shows the flows from subareas within the total area above the USGS gage, at the USGS gage, and the total flows at the USGS gage.

STANDARD PROJECT FLOOD

The standard project flood (SPF) for East Grand Forks was developed using the guidelines presented in paragraph 2-04 of EM 1110-2-1411, which state that the SPF usually equals 40 to 60 percent of the PMF with 50 percent considered to be representative of average conditions. Using HEC-1, 50 percent of the flow for each subarea above the USGS gage were computed. This results in an SPF peak of 169,000 cfs at the USGS gage which is 48.3 percent of the PMF peak at the USGS gage. The fact that the SPF peak is not 50 percent of the PMF peak is a reflection of the basin characteristics such as three reservoirs within the basin. Plate 8 displays the SPF at the USGS gage.

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
PERIOD	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
17	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
18	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
22	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
23	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
25	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
26	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
27	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
28	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
31	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
32	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
33	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
34	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
35	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
36	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
37	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
38	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
39	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
40	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
41	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
42	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
43	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
44	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
45	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
46	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
47	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
48	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
49	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
50	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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12					
51	193955.41	215.55	1671.81	1675.39	21
52	179710.35	155.57	1300.50	1294.02	21
53	166904.90	116.24	1450.75	1490.12	17
54	154745.05	91.27	1520.73	1471.05	17
55	143576.57	80.55	1173.58	1503.51	15
56	132055.72	70.04	1082.95	1201.71	16
57	123187.30	62.43	920.52	1171.25	15
58	114524.29	50.52	863.52	1790.51	12
59	106195.57	41.03	756.55	1425.95	11
60	98714.97	46.00	733.81	1150.00	10
61	91791.40	40.00	691.35	967.22	9
62	85343.55	40.00	655.59	850.10	9
63	79304.11	40.00	606.57	847.29	8
64	73614.19	40.00	569.65	797.26	7
65	68276.08	40.00	533.93	82.54	7
66	63258.61	40.00	501.42	52.58	6
67	58502.00	40.00	475.17	21.00	6
68	54102.99	40.00	440.01	21.00	5
69	50152.72	40.00	407.27	21.00	5
70	46444.50	40.00	370.22	21.00	5
71	43065.45	40.00	337.05	21.00	4
72	39945.30	40.00	311.54	21.00	4
73	37221.00	40.00	276.30	21.00	4
74	34719.40	40.00	250.60	21.00	3
75	32401.71	40.00	231.69	21.00	3
76	30239.95	40.00	216.16	21.00	3
77	28214.56	40.00	202.39	21.00	3
78	26307.05	40.00	190.51	21.00	2
79	24520.01	40.00	178.94	21.00	2
80	22847.12	40.00	167.29	21.00	2
81	21282.15	40.00	156.77	21.00	2
82	19819.00	40.00	146.44	21.00	2
83	18454.05	40.00	136.95	21.00	2
84	17184.07	40.00	127.98	21.00	1
85	16004.21	40.00	119.86	21.00	1
86	14909.01	40.00	111.80	21.00	1
87	13891.68	40.00	104.41	21.00	1
88	12945.95	40.00	97.51	21.00	1
89	12066.52	40.00	91.03	21.00	1
90	11249.56	40.00	85.00	21.00	1
MAX	244249.14	341110.29	9250.51	4952.15	55
MIN	2500.00	40.00	11.20	21.00	0
AVE	108900.90	8493.05	2043.55	1154.15	1

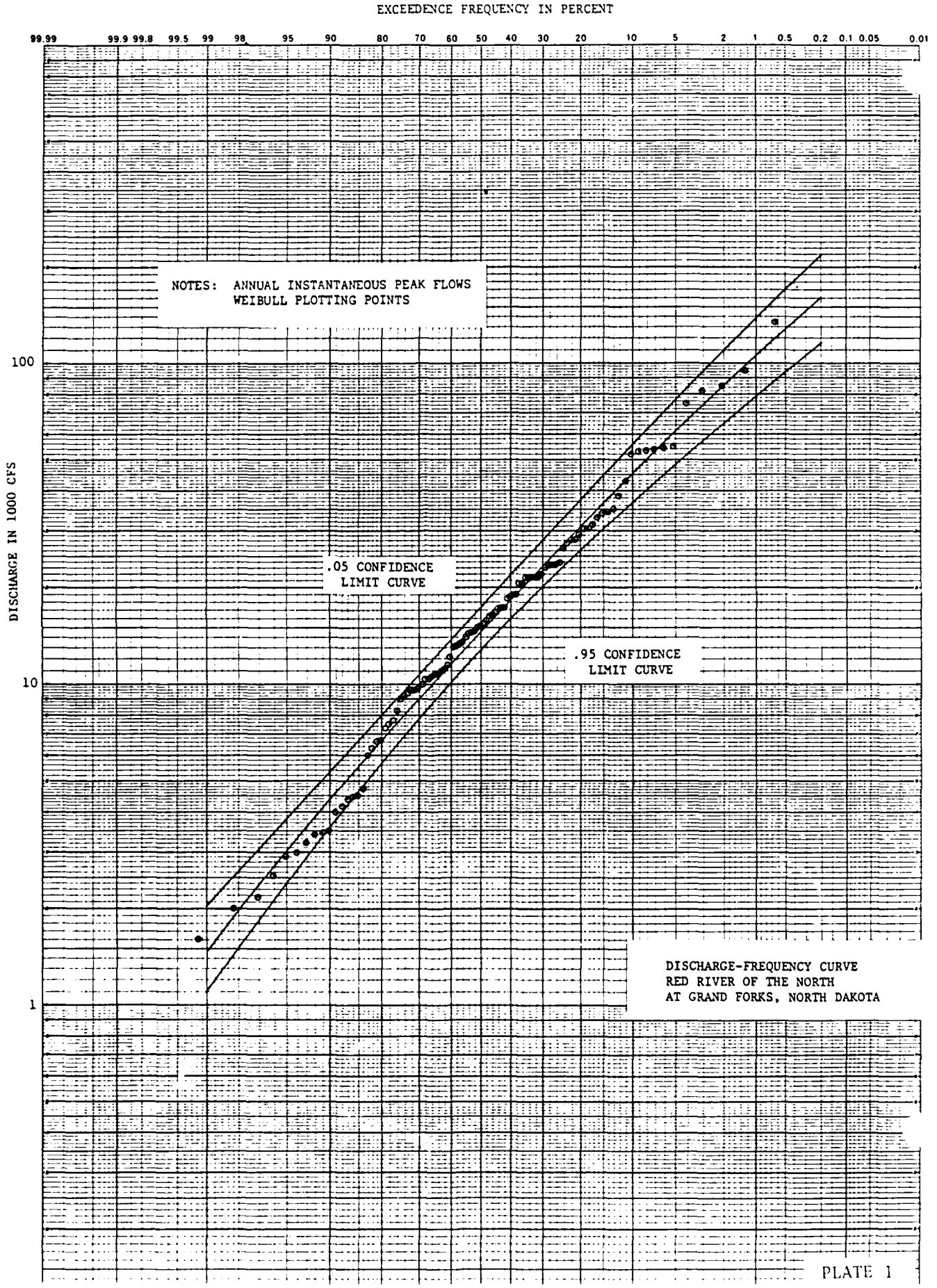

EXCEEDENCE FREQUENCY IN PERCENT
99.99
99.9
99.8
99.5
99
98
95
90
80
70
60
50
40
30
20
10
5
2
1
0.5
0.2
0.1
0.05
0.01
DISCHARGE IN 1000 CFS
100
10
1
NOTES: ANNUAL INSTANTANEOUS PEAK FLOWS
WEIBULL PLOTTING POINTS
.05 CONFIDENCE
LIMIT CURVE
.95 CONFIDENCE
LIMIT CURVE
DISCHARGE-FREQUENCY CURVE
RED RIVER OF THE NORTH
AT GRAND FORKS, NORTH DAKOTA

PLATE 1

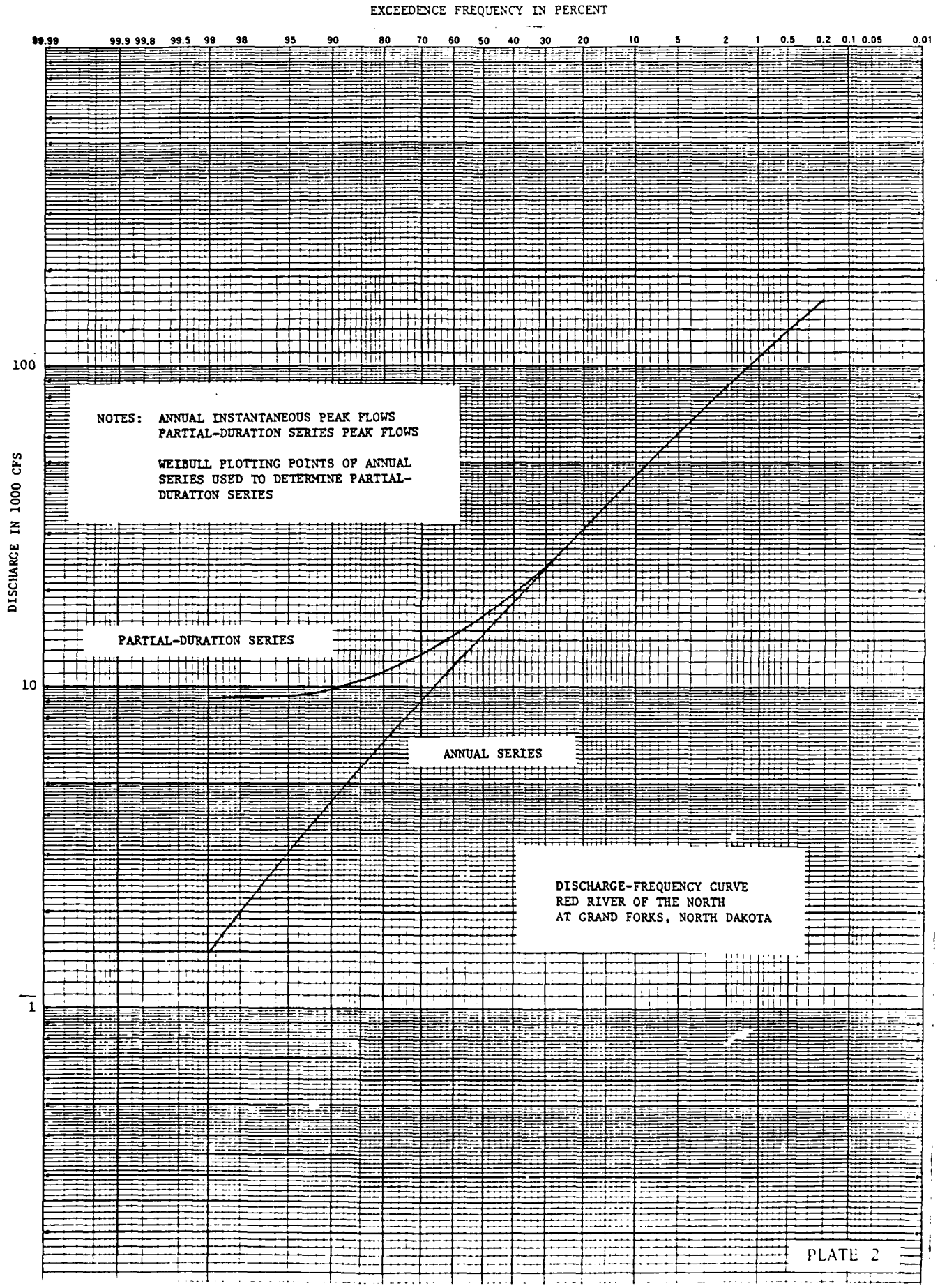

EXCEEDENCE FREQUENCY IN PERCENT
99.99
99.9
99.8
99.5
99
98
95
90
80
70
60
50
40
30
20
10
5
2
1
0.5
0.2
0.1
0.05
0.01
DISCHARGE IN 1000 CFS
100
10
1
NOTES: ANNUAL INSTANTANEOUS PEAK FLOWS
PARTIAL-DURATION SERIES PEAK FLOWS
WEIBULL PLOTTING POINTS OF ANNUAL SERIES USED TO DETERMINE PARTIAL-DURATION SERIES
PARTIAL-DURATION SERIES
ANNUAL SERIES
DISCHARGE-FREQUENCY CURVE
RED RIVER OF THE NORTH
AT GRAND FORKS, NORTH DAKOTA

PLATE 2

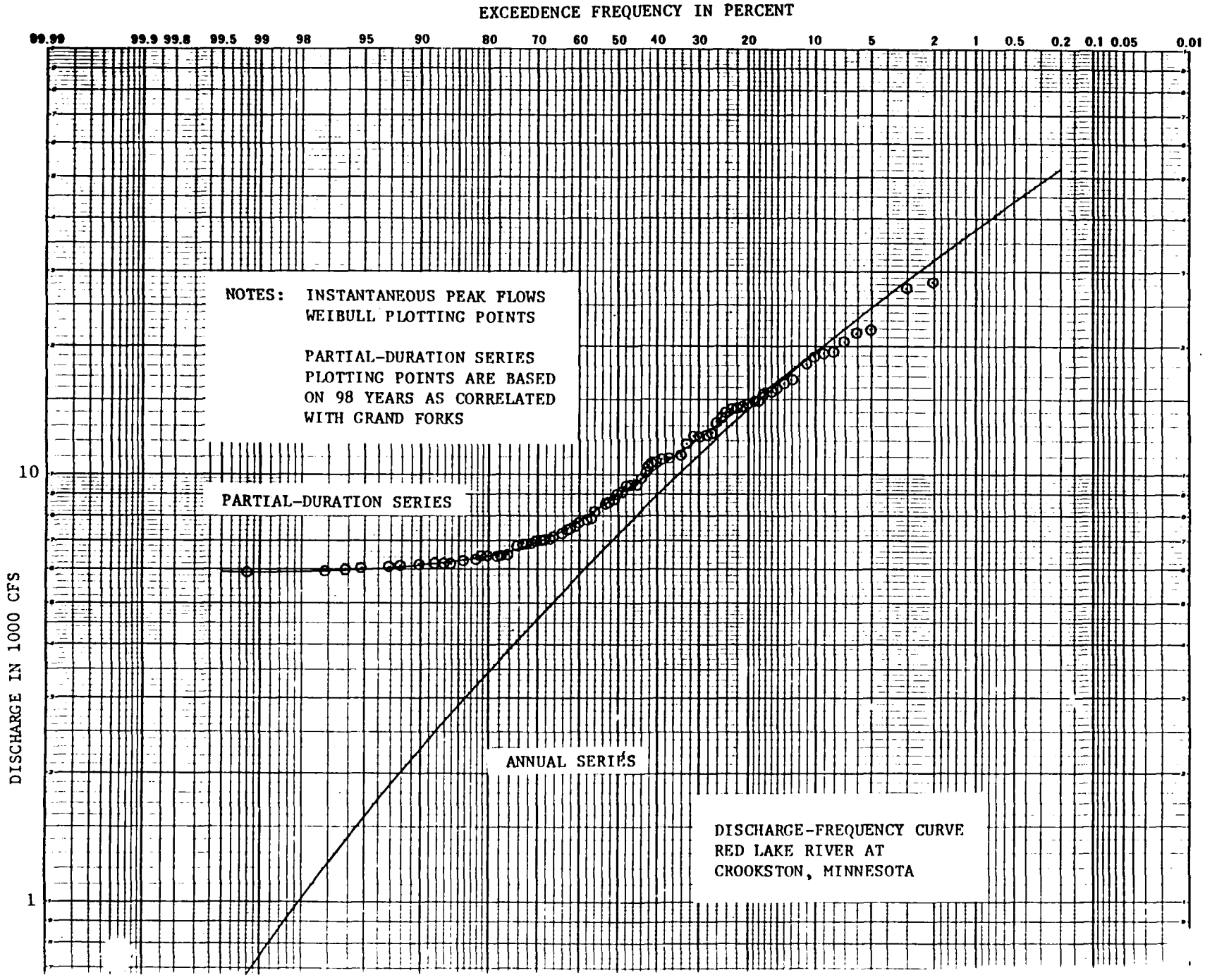

EXCEEDENCE FREQUENCY IN PERCENT
99.99
99.9
99.8
99.5
99
98
95
90
80
70
60
50
40
30
20
10
5
2
1
0.5
0.2
0.1
0.05
0.01
NOTES: INSTANTANEOUS PEAK FLOWS
WEIBULL PLOTTING POINTS
PARTIAL-DURATION SERIES
PLOTTING POINTS ARE BASED
ON 98 YEARS AS CORRELATED
WITH GRAND FORKS
PARTIAL-DURATION SERIES
ANNUAL SERIES
DISCHARGE-FREQUENCY CURVE
RED LAKE RIVER AT
CROOKSTON, MINNESOTA
DISCHARGE IN 1000 CFS
10
1

PLATE 5

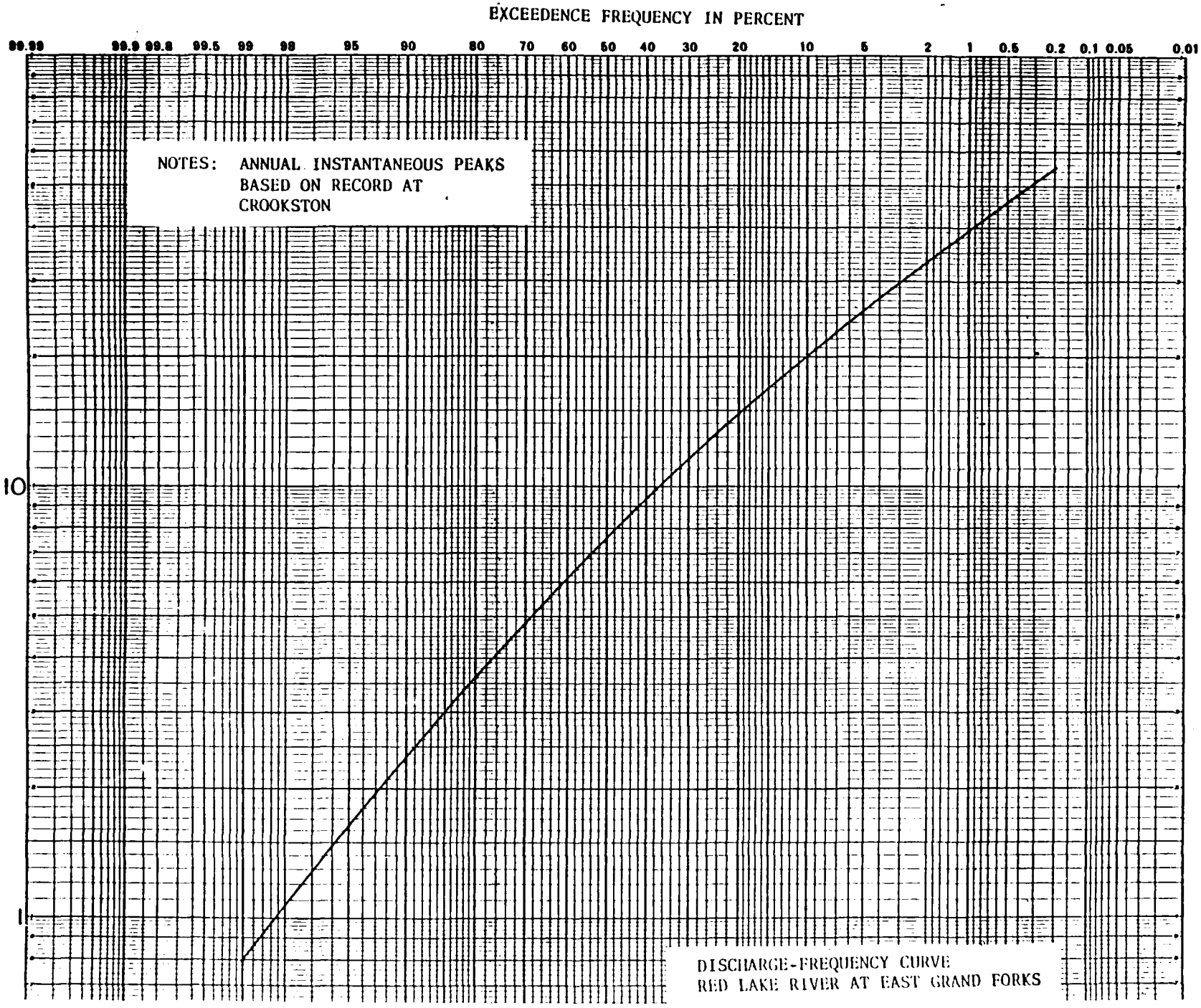
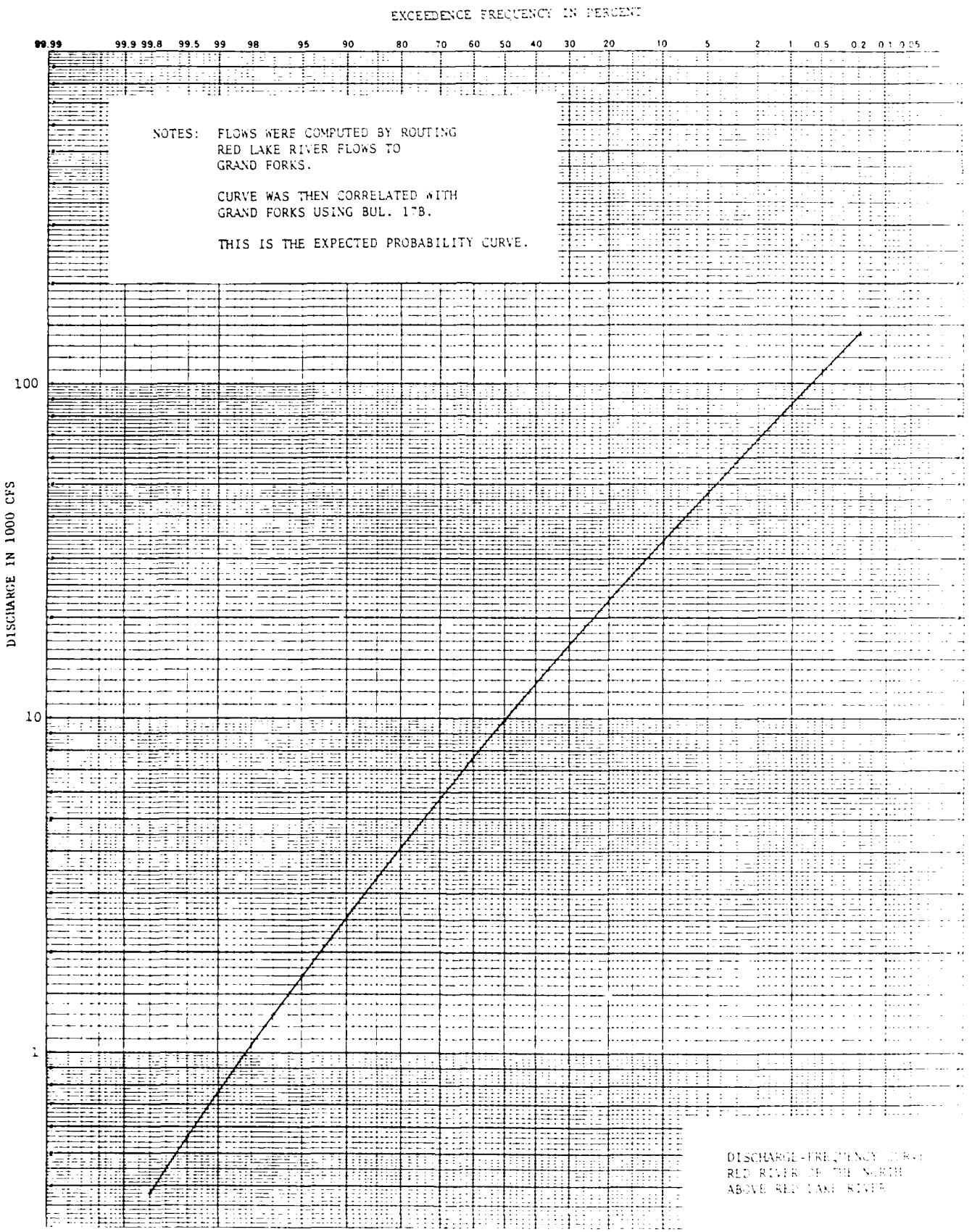
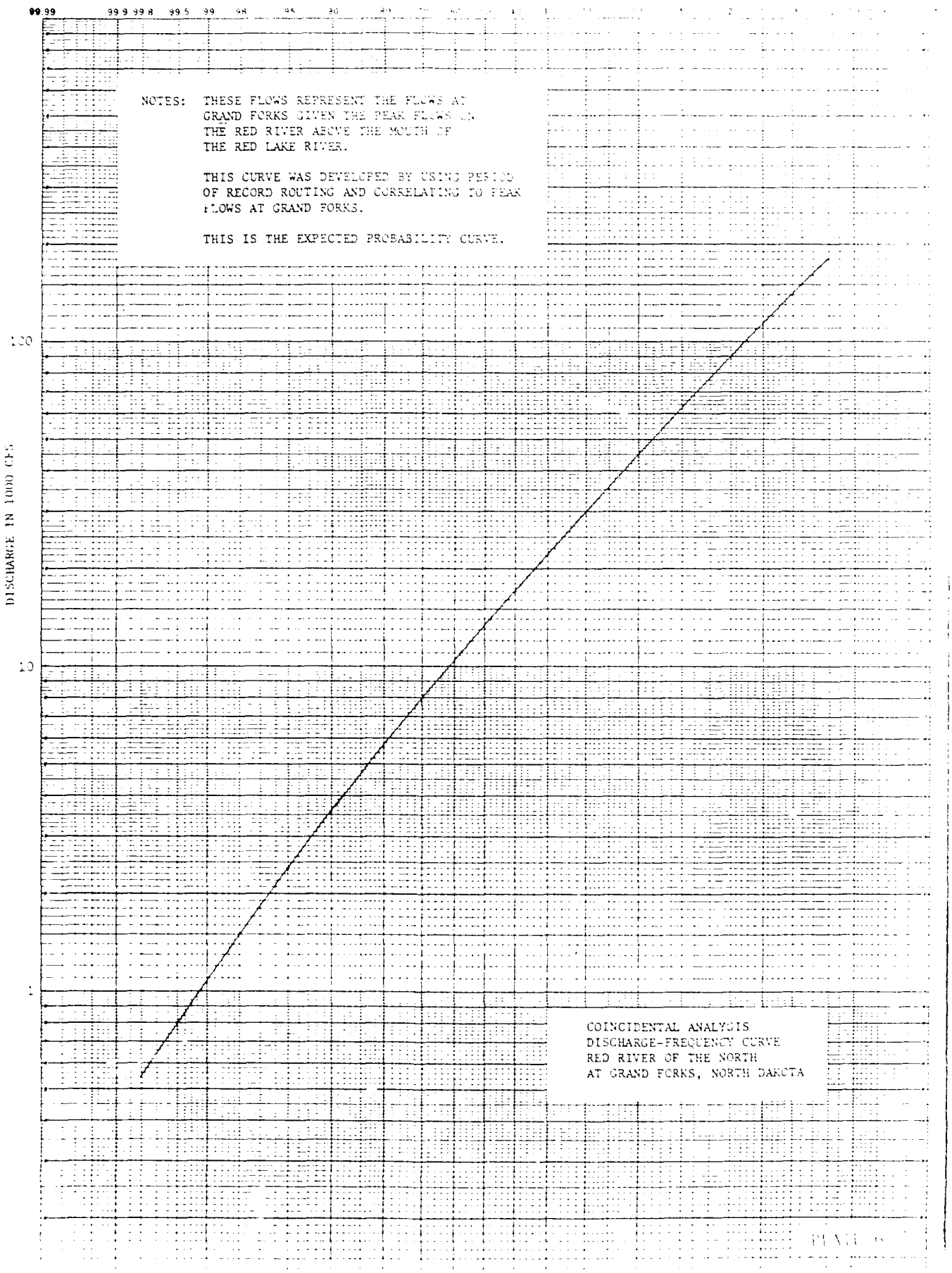
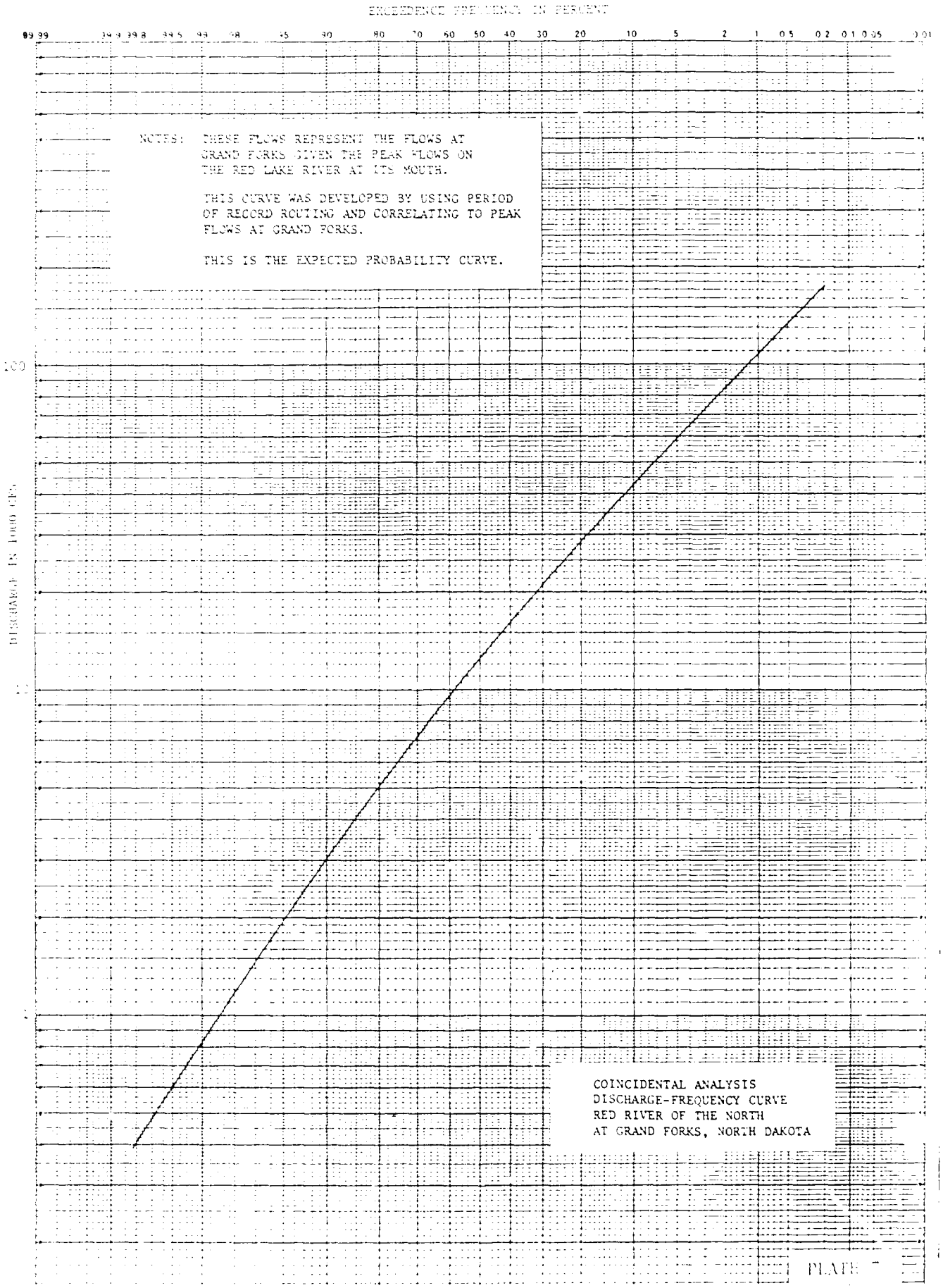
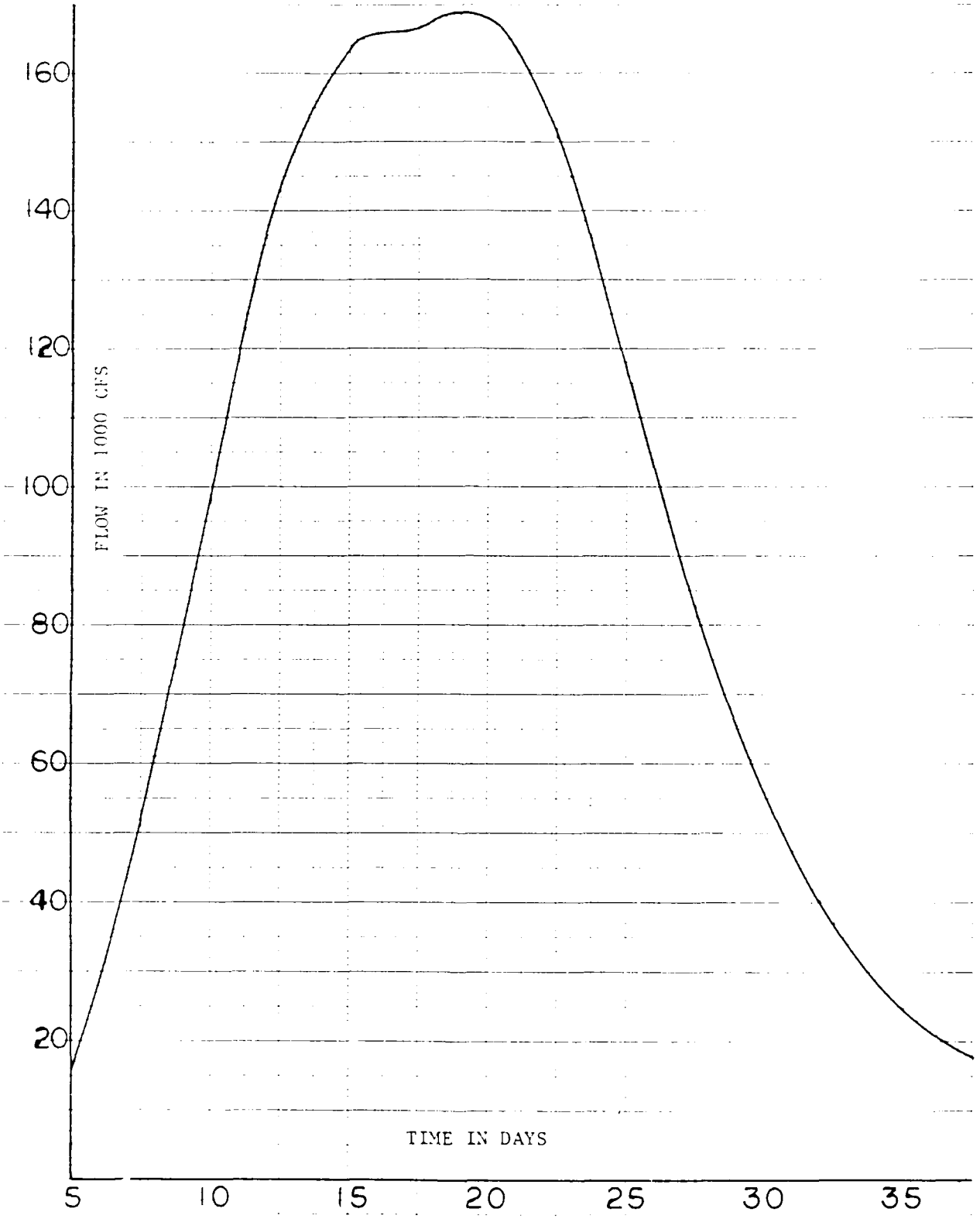

EXCEEDENCE FREQUENCY IN PERCENT
99.99
99.9
99.8
99.5
99
98
95
90
80
70
60
50
40
30
20
10
5
2
1
0.5
0.2
0.1
0.05
0.01
NOTES: ANNUAL INSTANTANEOUS PEAKS BASED ON RECORD AT CROOKSTON
DISCHARGE IN 1000 CFS
10
1
DISCHARGE-FREQUENCY CURVE
RED LAKE RIVER AT EAST GRAND FORKS

PLATE 4


EXCEEDENCE FREQUENCY IN PERCENT
99.99
99.9
99.8
99.5
99
98
95
90
80
70
60
50
40
30
20
10
5
2
1
0.5
0.2
0.1
0.05
NOTES: FLOWS WERE COMPUTED BY ROUTING RED LAKE RIVER FLOWS TO GRAND FORKS.
CURVE WAS THEN CORRELATED WITH GRAND FORKS USING BUL. 17B.
THIS IS THE EXPECTED PROBABILITY CURVE.
DISCHARGE IN 1000 CFS
100
10
1
DISCHARGE-FREQUENCY CURVE
RED RIVER OF THE NORTH
ABOVE RED LAKE RIVER


99.99
99.9 99.8 99.5 99 98 95 90
NOTES: THESE FLOWS REPRESENT THE FLOWS AT GRAND FORKS GIVEN THE PEAK FLOWS AT THE RED RIVER ABOVE THE MOUTH OF THE RED LAKE RIVER.
THIS CURVE WAS DEVELOPED BY USING PERIOD OF RECORD ROUTING AND CORRELATING TO PEAK FLOWS AT GRAND FORKS.
THIS IS THE EXPECTED PROBABILITY CURVE.
100
10
1
DISCHARGE IN 1000 CFS
COINCIDENTAL ANALYSIS
DISCHARGE-FREQUENCY CURVE
RED RIVER OF THE NORTH
AT GRAND FORKS, NORTH DAKOTA


EXCEEDENCE FREQUENCY IN PERCENT
99.99
99.9
99.8
99.5
99
98
95
90
80
70
60
50
40
30
20
10
5
2
1
0.5
0.2
0.1
0.05
0.01
NOTES: THESE FLOWS REPRESENT THE FLOWS AT GRAND FORKS GIVEN THE PEAK FLOWS ON THE RED LAKE RIVER AT ITS MOUTH.
THIS CURVE WAS DEVELOPED BY USING PERIOD OF RECORD ROUTING AND CORRELATING TO PEAK FLOWS AT GRAND FORKS.
THIS IS THE EXPECTED PROBABILITY CURVE.
100
DISCHARGE IN 1000 CFS
COINCIDENTAL ANALYSIS
DISCHARGE-FREQUENCY CURVE
RED RIVER OF THE NORTH
AT GRAND FORKS, NORTH DAKOTA
PLATE



ADOPTED STANDARD PROJECT FLOOD
RED RIVER OF THE NORTH AT
EAST GRAND FORKS, MINNESOTA

PLATE 8

EAST GRAND FORKS, MINNESOTA
GENERAL REEVALUATION

SUPPORTING DOCUMENTATION
HYDRAULIC DESIGN

SUPPORTING DOCUMENTATION
HYDRAULIC DESIGN

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SUPPORTING DOCUMENTATION
HYDRAULIC DESIGN

DESCRIPTION OF PROJECT

Existing conditions water surface profiles and preliminary hydraulic designs for the NED plan, the 1-percent chance flood, the standard project flood and the evaluation of various measures are presented. The measures include: the authorized project consisting of a levee system, diversion of the Red Lake River, and nonstructural measures.

EXISTING CONDITIONS WATER SURFACE PROFILES

GENERAL

Water surface profiles for the Red River of the North at East Grand Forks were developed for the 10-, 2-, 1-, 0.2-percent annual chance, standard project and probable maximum flood events. The downstream end of the study area is located at river mile 287.83, downstream of the mouth of the Grand Marais Coulee.

The study extends through the cities of Grand Forks and East Grand Forks to river mile 304.08.

Water surface profiles for the Red Lake River at East Grand Forks were developed for the 10-, 2-, 1-, 0.2-percent annual chance, standard project and probable maximum flood events. The study limit extends from the mouth at East Grand Forks to river mile 27.76 near Fisher, Minnesota.

Water surface profiles for the Grand Marais Creek were developed for 6,500 cfs, the 1-percent annual chance flood and for the 1-percent

annual chance flood plus 6,500 cfs events. The creek was studied from river mile 10 to mile 42.05 at the Red Lake River.

GEOMETRIC DATA

Red River of the North cross section data were developed from field surveys used for the 1974 Grand Forks-East Grand Forks floodway study. Cross sections for the Red River main stem, surveyed in November 1977, were used as needed. Additional updated cross sections for all bridges, the USGS gage site and the low-head dam on the Red River were surveyed in the fall of 1979. The updated cross sections and the 1974 cross sections were merged to provide a study limit from river mile 287.83 to mile 304.08. A total of 69 cross sections was used for the Red River main stem. A summary of HEC-2 input geometric data is listed in tables B-1A and B-1B for the cross sections from river mile 295.7 to river mile 304.08.

Cross sections for the Red Lake River from the mouth to Fisher, Minnesota, were surveyed in January 1981. A total of 26 cross sections, which includes the water supply dam at mile 0.17, was used for the Red Lake River. A summary of HEC-2 input geometric data is shown in table B-1C.

Cross section data and associated HEC-2 model, developed by Wehrman, Chapman and Associates, were used to study the Grand Marais Creek from the downstream limit to the backwater effect of the Red River 1-percent annual chance flood event to the Red Lake River. A total of 93 cross sections was used in the HEC-2 model for Grand Marais Creek.

Cross sections for the Red River and Red Lake River are shown in plan view on plate B-1. Detailed topography for the study area, a scale of 1 inch = 100 feet with 2-foot contour intervals, was obtained during the study. The new topography was used to verify overbank data and levee alignments.

BRIDGE CHARACTERISTICS

Bridge data are shown in table B-5. There are two railroad bridges and three highway bridges across the Red River of the North. The Highway 220 bridge is the only Red Lake River crossing in East Grand Forks.

METHOD OF COMPUTATION

Water surface profiles were computed using the Hydrologic Engineering Center's generalized computer program HEC-2 (723-X6-L202A). Water surface profiles were computed using guidance in reference 2.

STAGE AND GAGING HISTORY

Records of river stage and discharge on the Red River of the North have been maintained since 1882. Early observations were taken on a non-recording gage which was relocated several times from 1882 to November 1933. From October 1926 to November 1933, staff gages were located near the present gage site. Between November 1933 and April 1965, a recording gage was located 0.3 mile upstream from the present gage site. The present USGS gaging station is in the old Grand Forks sewage treatment plant at river mile 295.7. The equipment is a continuous water stage recorder with bubble gage attachment. The reference datum is 778.35 feet, National Geodetic Vertical Datum of 1929.

A list of historic flood stages is given in tables B-2A through B-2C. The flood stages are those recorded at the gage site and datum then in use. Because of the changed gage locations, a series of corrections for the 1912 to 1929 adjustment, zero datum and elevations must be applied to all pre-1965 data to obtain the stage and elevation information at the present gage site at mile 295.70.

ELEVATION-DISCHARGE RATING CURVE

The elevation-discharge rating curve previously developed for the Red River of the North at Grand Forks (plate B-2) was derived by utilizing existing USGS data, as shown in tables B-4A and B-4C, inclusive. This curve, which incorporates the results of a 1974 interagency agreement, was the administratively agreed upon elevation of 829.0 for a discharge of 89,000 cfs. However, since the 1979 flood, the discharges for the 1897, 1882, 1852 and 1826 floods have been revised.

The discharges for 1882 and 1897 have been changed as follows:

Year	Previous Value in cfs	Revised Value in cfs
1882	68,800	75,000
1897	80,000	85,000

Additionally, the 1979 flood discharge was recorded as 82,000 cfs at a maximum stage of 48.81. The 1979 flood provides one recent additional point in analyzing high flow data.

Above 55,000 cfs, two distinct rating curves can be drawn. The first is based on the interagency agreement and associated hydrology. The second is based on updated hydrology, observed 1979 flood data, correlation with downstream hydraulic characteristics and a numerical analysis of all available recorded data.

The recorded high water stages for 1881 and 1897 remain unchanged. However, increasing the discharges for these events tends to pull the high end of rating down when compared to the administratively adopted curve.

The Red River of the North main stem was extensively modeled in 1978 through 1981 using the HEC-2 computer program. The reach between Oslo

(river mile 271.2) and Grand Forks (river mile 296) was calibrated to the floods of 1969 and 1978 and verified to the 1979 flood. Calibration of the Emerson to Drayton and Drayton to Oslo reaches was also made to the 1969 and 1978 floods. With well-defined USGS and COE elevation-discharge rating curves at each end of the three reaches, a correction curve to vary Manning's "n" value as a function of discharge was developed for each reach. Similar curves resulted for the Emerson to Drayton and the Drayton to Oslo reaches. However, in matching the administrative rating curve at Grand Forks, the resultant correction curve is dissimilar. This curve implies that the relative roughness increaseswith discharge and depth of flow. However, if the updated hydrology and historic data are used, a correction curve very similar to the other two reaches results as shown on plate B-3. These three similar curves all show that the relative roughness decreases with flow depth, which is consistent with the hydraulic theories being used. The validity of the administratively-adopted rating curve is questionable under such conditions.

Records of river stage and discharge on the Red River of the North have been maintained since 1882. Early observations were taken on a non-recording gage at the Northern Pacific railway bridge (river mile 297.55). The actual gage was relocated several times at this location between 1882 and 1926. From October 1926 to November 1933, staff gages were located near the gage site at river mile 296. Between November 1933 and April 1965, a recording gage was located at river mile 296.0, 0.3 mile upstream from the present gage site. The present reference datum is 778.35 feet in the National Geodetic Vertical Datum of 1929.

In order to transfer historic flood stage data to the present USGS gage site at river mile 295.7, a series of corrections must be properly applied. These corrections must be used to account for differences between the 1912 and 1929 general adjustments, reference datum

differences, and a fall correction to account for river slope between gage locations. These corrections and net adjustments are listed as follows:

Period	Datum Correction	Fall Correction	Net Adjustment to Mile 295.7
1882-1926	+0.5	-1.4	-0.9 foot
1927-1964	None	-0.02	-0.02 foot
1965-present	None	None	None

In relating historic flood stages to the present site, it is not uncommon to see one or both of the correction factors disregarded. This is easily done because all of the historic stages are related to a reference elevation of 778.35. Without applying the proper corrections, the historic data can be used incorrectly.

The relationships between river stage and discharge are thoroughly discussed in reference 12. Numerical methods to analyze stage-discharge data and development of stage-discharge rating curves are covered in this publication.

For that part of the rating curve under consideration, above 55,000 cfs, the floodplain flows begin to dominate the stage-discharge relationships. In a generalized form:

$$\text{Discharge} = a(\text{stage} - \text{gage zero})^b$$

where "a" and "b" are station parameters to be determined by a non-linear least squares method or by log-transformation.

A numerical analysis of the historic stage-discharge data transferred to river mile 295.7 was made using Corps Program M0001 (reference 11). The historical data consist of 102 stage-discharge data points. The

computer program computes the equation for the line to be plotted based on the type of curve fit requested.

Using the guidance discussed in reference 12, the power and natural log functions were used to analyze the data. For that part of the curve under consideration, above 55,000 cfs, the natural log and power functions give very similar results.

In addition to the numerical analysis, plotting the historical data on log-log paper and using the method of visual estimation can produce satisfactory results (reference 12). The results of both methods were in good agreement.

The results of the analysis indicate that the interagency administrative elevation of 829.0 for a discharge of 89,000 cfs is about 1 foot too high for design purposes. The results of the reevaluation indicate an elevation of 827.85 is more appropriate. The natural log function generates an equation of the form:

$$Y = A + B(\mathrm{Ln}X)$$

where:

$$A = -92.019833$$
$$B = 12.417163$$

In this case X = discharge in cfs, Y = stage in feet, and the gage zero is 778.35 feet (NGVD 1929).

Using the natural log function equation and the 1972 interagency rating curve extension, flood stages were computed for various events as shown below:

Event	Discharge in cfs	Interagency Stage	Revised Stage
1-percent chance flood (admin.)	89,000	50.65	49.50
Standard Project Flood	169,000	57.55	57.45
PMF	375,000	N/A	67.35

The reevaluation indicates that a revision of the elevation-discharge rating curve for design purposes is needed. For the hydraulic analysis, the following method was used to determine starting water surface elevations at the USGS gage sites for flows from 0 to 55,000 cfs. The existing rating curve can be used with confidence. For flows greater than 55,000 cfs, the water surface elevation at the gage site is computed by the following formula:

$$Y = A + B(LnX)$$

or:

$$\text{Elevation} = \text{gage zero} + A + B(LnX)$$

where:

A = -92.019833

B = 12.417163

X = Discharge in cubic feet per second

Y = Stage in feet

Gage zero = 778.35

The design rating curve is shown on plate B-4.

HISTORIC WATER SURFACE PROFILES

High water profiles have been recorded at Grand Forks-East Grand Forks for the recent major floods. Seventeen high water reference points have been established within the study reaches, as shown in table B-3.

Historic flood profiles have been developed from the observed data. Interpolated high water profiles developed for the HEC-2 model calibration are shown in tables B-4A and B-4B.

HEC-2 MODEL CALIBRATION

Calibration of the HEC-2 model for the Red River of the North was accomplished for the 1974 floodway study (reference 1). The updated bridge, dam and cross section, and discharge data were added. The model was then adjusted slightly to recalibrate the 1969 historic flood profile. Verification of the recalibration was made by computing profiles for the 1978 and 1979 flood profiles. The model was able to reproduce the observed high water profiles for the 1969, 1978 and 1979 flood events within 0.3 foot. The permanent flood control works at Grand Forks and the emergency levee systems at Grand Forks and East Grand Forks were used to determine the effective flow limits for model calibration. Effective flow limits for events greater than the 1979 flood event (82,000 cfs) were determined by inspection of topographic maps, aerial flooded area maps and consideration of floodplain hydraulic characteristics.

MANNING'S ROUGHNESS VALUES AND TRANSITION LOSS COEFFICIENT

Calibration of the HEC-2 model was accomplished by adjusting Manning's "n" until the computed profile matched the recorded 1969 flood high water profile. Manning's "n" and transition loss coefficient were then verified by comparing the computed profiles for the 1978 and 1979 flood events to the respective recorded high water profiles. Manning's "n"

values and transition loss coefficients for the 1-percent chance flood and the standard project flood are shown in tables B-13A through B-13F, inclusive.

STARTING WATER SURFACE ELEVATIONS

Starting water surface elevations for the Red River of the North began at the USGS gage site at river mile 295.7. Starting water surface elevations for profiles farther downstream were derived from a detailed HEC-2 analysis completed for the Red River of the North Main Stem Study in December 1980. For existing and with-project conditions profiles, computations began at the USGS gage site at mile 295.7. Only for the evaluation of the Grand Marais Creek was it necessary to begin the backwater computations at river mile 287.83.

WATER SURFACE PROFILES

Water surface profiles for the Red River of the North and the Red Lake River were developed using the flood events and discharge data listed in tables B-6A and B-6B. Development of the discharges used and the coincidental flow analyses are discussed in Appendix A. For the Grand Marais Coulee, the 1-percent annual chance flood discharge of 3,540 cfs was used. Water surface profiles are shown in tables B-7A through B-11C, inclusive.

THE NED PLAN

GENERAL

Plans for the NED event, the one-percent annual chance flood and the standard project flood are discussed in the main report. The plans contain levees/floodwalls/closures as a flood control measure. The NED plan uses the levee alignment discussed in the main report.

DEGREE OF PROTECTION

The level of protection for the NED plan will provide protection for events up to and including the 0.30-percent annual chance flood event without freeboard. When freeboard is included, protection up to the 0.11-percent annual chance flood event is provided by the top of levee profile.

PROJECT IMPACTS

The levees considered would be designed for 3 feet of freeboard at the downstream end of the project in accordance with guidance in references 3 and 8. The Red River of the North and Red Lake River flooded outlines for the 1-percent chance flood and the standard project flood events for with-project conditions are shown in the main report.

The line of protection for the levees is also shown. The areas within the levees would not be flooded for events less than or equal to the design flood. Backwater computations for with- and without-project conditions show that the water surface elevations are about one-half foot lower for a with-project condition compared to the without-project condition. The reason for this difference is that for without-project conditions, the existing emergency levees and structures in the floodplain govern the overbank roughness and effective flow limits. The emergency levee alignment is very similar to the authorized plan alignment. The levee alignment recommended in the main report is significantly landward of the existing emergency levee alignment(s).

LEVEE ALIGNMENT ANALYSIS

A floodway study was accomplished for the city of Grand Forks, North Dakota, in 1974 (reference 1) for floodplain management purposes. The 1974 study documented effective flow limits and levee alignments for the 1972 interagency 1-percent, 0.2-percent chance and standard project flood events. These effective flow limits and levee alignments were verified and used to define effective flow limits for the levee alignment(s) considered for current design purposes. Along the Red River of the North, the levees extend from river mile 295.77 to river mile 299.6. On the Red Lake River, the levees extend from river mile 0.1 to river mile 3.1.

WATER SURFACE PROFILES

Water surface profiles for with-project conditions were computed for the NED plan, the 10-, 2-, 1-, 0.2-percent annual chance flood events and for the standard project and probable maximum flood events. Discharges used to compute design water surface profiles are shown on table B-6B. Water surface profiles for the NED plan, the 1-percent chance flood and the standard project flood are shown on plates B-5 and B-6. The profiles are also shown in tabular form in tables B-7A through B-7C, inclusive. Water surface profiles for the 10-, 2-, 1- and 0.2-percent annual chance, standard project and probable maximum floods are shown in tabular form in tables B-11A through B-11C, inclusive. Based on District experience and observations during historic floods, all water surface profiles assumed a 25-percent reduction in waterway opening at all bridges.

MANNING'S ROUGHNESS VALUES AND TRANSITION LOSS COEFFICIENTS

Manning's "n" values for the NED plan are shown in tables B-12A through B-12C, inclusive. Adjustment of the calibration "n" values was accomplished by multiplying all "n" values by 0.8. Plate B-3 was used to select the appropriate adjustment factor.

TOP OF LEVEE PROFILES

The top of levee profile for the NED plan was developed in accordance with Civil Works Bulletin 54-15 (reference 4) and EM 1110-2-1601

(reference 8). The top of levee profile was developed by computing a water surface profile for a discharge whose stage is 3 feet above the design water surface profile. This water surface profile in turn was slightly modified to produce the top of levee profile. The top of levee profile is shown on plate B-5 and plate B-6 and in tabular form in tables B-7A through B-7C, inclusive.

FREEBOARD

The proposed freeboard for the earth levee is 3 feet at the downstream end of the project and 3.5 feet at the upstream end of the project based on guidance provided in reference 8. In cases of overtopping, experience has shown that it is better to have a levee fail on the downstream end of a project rather than on the upstream end (reference 3).

VELOCITIES

Channel and overbank velocities for the NED plan, the 1-percent annual chance and standard project flood events are shown in tables B-14A through B-14C, inclusive.

Velocities - Red River of the North

Channel and overbank velocities for with-project conditions for the NED plan flood event, 1-percent annual chance flood and the standard project flood are shown in tables B-14A and B-14B. For the NED plan flood, channel velocities range from 2.8 feet per second to 6.9 feet per second, and overbank velocities range from 0.3 foot per second to 1.7 feet per second. For the 1-percent annual chance flood, channel velocities range from 3 feet per second to 7.6 feet per second, and overbank velocities range from 0.3 foot per second to 2 feet per second. For the standard project flood, channel velocities range from 3.2 feet per second to 10.7 feet per second, and overbank velocities range from 0.5 foot per second to 2.6 feet per second.

Velocities - Red Lake River

Channel and overbank velocities for with-project conditions for the NED plan flood event, 1-percent annual chance flood and the standard project flood are shown in table B-14C. For the 1-percent annual chance flood, channel velocities range from 1.1 feet per second to 3.6 feet per second, and overbank velocities range from 0.3 foot per second to 0.8 foot per second. For the standard project flood, channel velocities range from 1.5 feet per second to 4 feet per second, and overbank velocities range from 0.3 foot per second to 1.1 feet per second.

EROSION PROTECTION

Flow velocities of a potentially erosive nature occur in isolated areas for the plan considered. Design of erosion protection works will be undertaken in the next phase of study.

FLOODWALLS

The locations requiring floodwalls are shown in the main report.

HIGHWAY AND RAILROAD CLOSURE STRUCTURES

Closure structures will be provided for all highways and railroads where road and/or track raises are not possible without causing problems to the operation of these facilities. Approximately 8 closures would be necessary. Preliminary analysis and experiences with previous flood emergencies indicate that a minimum of 3 to 5 days warning is available to initiate actions to make the necessary closures. The location of the closure structures is shown in the main report.

CHANNEL STABILITY

A qualitative evaluation of the Red River of the North and Red Lake River was accomplished using historic and recent maps of the study area (references 4, 5, 6 and 7). The Red River of the North exhibits a sinuosity of about 1.4 in the study area. The Red Lake River has a sinuosity of about 1.8 in the vicinity of East Grand Forks. Based on maps dating back to 1918, there does not appear to be any major lateral migration of the river channels. The plans considered for flood control at East Grand Forks do not include any cutoffs or other structural measures which would have adverse effects. No adverse impact on channel stability due to the project is anticipated. Future studies will be conducted in accordance with guidance stated in reference 9.

ALTERNATIVE MEASURES

GENERAL

Alternative measures are discussed in the main report. Hydraulic analysis was accomplished for consideration of diverting some of the Red Lake River flows by way of the Grand Marais Creek.

GRAND MARAIS CREEK DIVERSION

General

Hydraulic analyses of the considered Grand Marais Creek diversion were accomplished by using an existing HEC-2 model developed by Wehrman, Chapman and Associates for the 1-percent annual chance flood event for the Grand Marais Creek. Existing conditions and proposed modifications to the creek were considered in the diversion analyses.

Existing Conditions

For existing conditions, flows from the Red Lake River begin to enter the Grand Marais Creek at an elevation of approximately 830.5. This corresponds to a Red Lake River discharge of about 17,500 cfs, somewhat less than the 10-percent annual chance flood for the Red Lake River. The Burlington Northern railroad tracks and U.S. Highway 2 cross the creek at the upstream end. Two box culverts at these crossings limit the inflow to about 500 cfs. Along the length of the creek, there are 23 road crossings consisting of culverts and small bridges with limited capacities.

Diversion Features

To divert flows from the Red Lake River through the Grand Marais Creek, a Red Lake River control structure, channel modifications and bridge/culvert replacements on the Grand Marais Creek would be required. The control structure would have a crest elevation of 838 and be located downstream of the Grand Marais Creek. This condition would limit the 1-percent annual chance flood event stage at Fisher, Minnesota, to a half-foot increase above existing conditions. On the creek, 10 miles of channel excavation were considered from the Red Lake River, excavating downstream. Bridges would be modified to provide a waterway opening of about 2,700 square feet.

Water Surface Profiles

Water surface profiles for the Grand Marais Creek for various conditions were analyzed to assess impacts and benefits at East Grand Forks. Profiles were computed for the 1-percent annual chance flood on the Grand Marais Creek plus 5,000 cfs, 10,000 cfs, 15,000 cfs and 20,000 cfs, as shown on plate B-7.

Water surface profiles were also computed for three considered operational plans which diverted 6,500 cfs from the Red Lake River. The plans considered were:

Plan A

No channel improvement or bridge modifications on the Grand Marais Creek (i.e., existing conditions). Red Lake River control structure at a crest elevation of 842 and a pool elevation of 846.

Plan B

With channel improvements and bridge modifications on the Grand Marais Creek. Ten lineal miles of channel modifications and bridge waterway openings increased to 2,700 square feet, with an invert eleva-

tion under the bridges of about 829. The Red Lake River control structure at a crest elevation of 838 and a pool elevation of 842.

Plan C

No channel improvements on Grand Marais Creek. U.S. Highway 2 and railroad bridges near Fisher modified for a waterway opening of 2,700 square feet, and invert elevations of about 829. The Red Lake River control structure at 841 and a pool elevation of approximately 845.

The computed water surface profiles are shown on plate B-8.

Impacts at East Grand Forks

The impact of diverting flows from the Red Lake River by the Grand Marais diversion lowers the flood stage at East Grand Forks. Plate B-9 shows the stage reduction in feet as a function of the percent of Red Lake River flows diverted at various locations. If all of the Red Lake River flows could be diverted for the 1-percent annual chance flood, a maximum stage reduction of 4.3 feet could be realized at the mouth of the Red Lake River. At the USGS gage site, a reduction of 3.2 feet was computed. However, only 6,500 cfs from the Red Lake River could be diverted from a practical standpoint, since damages could result at Fisher if stages were significantly increased on the Red Lake River.

REFERENCES

1. U.S. Army Corps of Engineers, St. Paul District, Grand Forks, North Dakota, and East Grand Forks, Minnesota, Type 19 Flood Insurance Study, 1974.

2. U.S. Army Corps of Engineers, HEC-2, "Water Surface Profiles," User's Manual, The Hydrologic Engineering Center, August 1979.

3. U.S. Army Corps of Engineers, Civil Works Engineers Bulletin 54-15.

4. P.T. Simons and Forest V. King, U.S. Department of Agriculture, Bulletin No. 1017, "Report on Drainage and Prevention of Overflow in the Valley of the Red River of the North," 31 March 1922.

5. U.S. Geological Survey, Department of the Interior, Grand Forks, Quadrangle, 7.5 Minute Series (topograhic) 1963 - Photo revised 1979.

6. U.S. Geological Survey, Department of the Interior, Grand Forks Quadrangle, Scale 1:62,500, 1938.

7. U.S. Army Corps of Engineers, Progressive Military Map, Grand Forks Quadrangle, Scale 1:62,500, Office of Chief of Engineers, 1918.

8. U.S. Army Corps of Engineers, EM 1110-2-1601, "Hydraulic Design of Flood Control Channels," 1 July 1970.

9. U.S. Army Corps of Engineers, EC 1110-2-241, "Draft Chapters of Sedimentation Manual," Office of the Chief of Engineers, Washington, D.C., 31 January 1983.

10. U.S. Army Corps of Engineers, St. Paul District, "Flood Control Definite Project Report on Red River of the North at Grand Forks, North Dakota-East Grand Forks, Minnesota," May 1953.

11. U.S. Army Corps of Engineers, Computer Program 704-F3-R0010, "CURVEFIT" - General Purpose Statistical Analysis and Curve Fitting Program - M0001, Waterways Experiment Station, Vicksburg, Mississippi, February 1978.

12. Jansen, P. Ph., "Principles of River Engineering, The Non-Tidal Alluvial River," Pitman Publishing, Ltc., 1979.

TABLE B-1A

RED RIVER OF THE NORTH AT GRAND FORKS,ND AND EAST GRAND FORKS,MINNESOTA

EAST GRAND FORKS FLOOD CONTROL - GENERAL REFORMULATION STUDY

SUMMARY OF HEC2 MODEL GEOMETRIC DATA

CROSS SECT NR	RIVER MILE	CHANNEL LENGTH (FEET)	THALWEG ELEV	LEFT BANK ELEV	LEFT BANK STA	RIGHT BANK ELEV	RIGHT BANK STA	CHANNEL TOPWID (FEET)	SECTION TOPWID -TOTAL-
7790	295.70	422	773.15	824.86	50000	816.72	50760	760	4488
62	295.83	686	775.55	819.25	50000	813.45	50491	491	9650
7800	296.00	898	774.20	825.91	50000	817.77	50760	760	4488
7810	296.10	520	781.59	811.15	50000	816.95	50514	514	9500
7820	296.10	18	792.01	811.15	50000	816.95	50514	514	9500
7830	296.10	15	792.01	811.15	50000	816.95	50514	514	9500
7840	296.11	18	781.59	811.15	50000	816.95	50514	514	9500
59	296.22	575	773.65	811.15	50000	816.95	50514	514	9500
57	296.41	1016	775.65	813.85	50000	811.85	50531	531	9100
56	296.55	740	781.65	814.85	50000	816.35	50408	408	8300
55	296.65	528	776.35	818.65	50000	818.65	50470	470	7800
53	296.85	1056	773.75	810.75	50000	807.65	50288	288	7400
7910	296.92	370	779.60	812.60	50000	810.10	50700	700	7200
7911	296.95	158	780.60	825.00	50000	827.50	50850	850	5000
7912	296.96	50	780.60	825.00	50000	827.50	50850	850	5000
51	297.01	250	772.15	809.75	50000	810.00	50480	480	6800
50	297.11	528	770.95	808.25	50000	818.45	50576	576	6900
49	297.20	475	775.50	807.20	50000	817.90	50555	555	7103
47	297.38	950	778.10	825.00	50000	822.50	50682	682	7700
7920	297.52	740	774.60	831.80	50000	830.80	50665	665	7750
7921	297.55	158	774.60	831.80	50000	830.80	50665	665	7750
7922	297.55	10	774.60	813.50	50000	810.00	50550	550	7020
7930	297.58	148	777.50	813.70	50000	822.40	50600	600	8200
7931	297.60	150	777.50	813.70	50000	822.40	50600	600	8200
7932	297.62	60	777.50	813.70	50000	811.90	50450	450	3200
44	297.65	204	772.40	816.10	50000	809.10	50513	513	8300
7940	297.72	370	777.60	805.90	50000	810.50	50600	600	6950
7941	297.74	105	777.60	805.90	50000	810.50	50600	600	6950
7942	297.75	17	776.50	812.20	50000	816.20	50650	650	4400
42	297.82	405	776.10	819.80	50000	810.10	50533	533	6801
7950	298.00	951	780.90	820.10	50000	804.50	50450	450	7150

TABLE B-1B

RED RIVER OF THE NORTH AT GRAND FORKS,ND AND EAST GRAND FORKS,MINNESOTA

EAST GRAND FORKS FLOOD CONTROL - GENERAL REFORMULATION STUDY

SUMMARY OF HEC2 MODEL GEOMETRIC DATA

CROSS SECT NR	RIVER MILE	CHANNEL LENGTH (FEET)	THALWEG ELEV	LEFT BANK ELEV	LEFT BANK STA	RIGHT BANK ELEV	RIGHT BANK STA	CHANNEL TOPWID (FEET)	SECTION TOPWID -TOTAL-
7960	298.09	475	776.00	811.50	50000	809.70	50650	650	7120
7961	298.10	34	780.00	826.60	50000	821.90	50840	840	2750
39	298.13	158	776.40	818.20	50000	820.40	50516	516	7100
37	298.32	1003	777.10	820.40	50000	813.70	50704	704	7516
35	298.45	686	776.30	822.80	50000	815.50	50640	640	7950
34	298.53	422	778.00	821.70	50000	816.70	50633	633	7950
33	298.62	475	780.00	816.30	50000	817.60	50650	650	8131
32	298.70	422	766.00	815.10	50000	818.20	50750	750	7921
31	298.82	634	777.40	820.00	50000	817.30	50832	832	8100
29	298.99	897	778.20	816.40	50000	821.70	50555	555	8581
27	299.17	950	777.70	819.10	50000	818.70	50606	606	8795
25	299.34	898	779.30	814.50	50000	814.70	50615	615	8850
23	299.55	1109	778.40	815.30	50000	812.50	50576	576	9300
22	299.70	792	777.10	813.20	50000	813.80	50520	520	10300
21	299.96	1373	777.30	822.20	50000	821.10	50630	630	10800
20	300.18	1162	776.00	817.30	50000	818.10	50609	609	9700
19	300.40	1163	780.80	820.70	50000	819.80	50571	571	9700
18	300.63	1214	777.30	815.00	50000	822.40	50600	600	11180
16	301.12	2587	780.20	811.10	50000	812.70	50483	483	9600
15	301.37	1320	778.70	816.70	50000	820.90	50543	543	10800
14	301.61	1267	773.30	817.40	50000	819.70	50557	557	11000
12	302.13	2746	778.90	818.30	50000	820.00	50700	700	11600
11	302.38	1320	778.60	815.40	50000	815.40	50613	613	12500
9	302.88	2640	778.10	823.40	50000	821.00	50601	601	13200
8	303.09	1110	772.30	811.70	50000	817.40	50547	547	10200
5	303.83	3907	778.20	823.70	50000	826.30	50751	751	6850
4	304.08	1320	778.10	819.20	50000	823.70	50553	553	7200

TABLE B-10

RED LAKE RIVER AT EAST GRAND FORKS,MN TO FISHER, MINNESOTA

EAST GRAND FORKS FLOOD CONTROL - GENERAL REFORMULATION STUDY

SUMMARY OF HEC2 MODEL GEOMETRIC DATA

CROSS SECT NR	RIVER MILE	CHANNEL LENGTH (FEET)	THALWEG ELEV	LEFT BANK ELEV	LEFT BANK STA	RIGHT BANK ELEV	RIGHT BANK STA	CHANNEL TOPWID (FEET)	SECTION TOPWID -TOTAL-
100	.03	150	780.66	802.54	50000	798.44	50247	247	1839
200	.14	600	778.36	803.56	50000	802.46	50156	156	1346
250	.16	100	781.70	803.16	50000	802.06	50149	149	1371
275	.17	50	794.00	803.16	50000	802.06	50149	149	1371
285	.17	15	794.00	803.16	50000	802.06	50149	149	1371
300	.20	135	780.20	802.15	50000	800.65	50190	190	1397
350	.23	150	783.46	803.57	50000	800.57	50170	170	1325
360	.27	236	781.00	805.00	50000	801.50	50150	150	905
370	.27	1	781.00	805.00	50000	801.50	50150	150	905
380	.29	66	781.00	805.00	50000	801.50	50150	150	905
390	.29	1	781.00	805.00	50000	801.50	50150	150	905
400	.52	1248	777.53	802.29	50000	804.39	50162	162	2379
500	.72	1034	779.82	804.75	50000	803.35	50200	200	1983
600	1.07	1878	781.44	806.49	50000	808.19	50270	270	3933
700	1.48	2166	785.41	818.62	50000	807.02	50240	240	1453
800	1.93	2350	784.68	806.94	50000	812.64	50313	313	3096
900	2.13	1050	783.81	804.23	50000	804.63	50183	183	4294
1000	2.93	4253	782.99	803.95	50000	803.35	50153	153	5538
1100	5.21	12000	782.92	803.64	50000	791.62	50136	136	7247
1200	8.27	16200	786.17	821.01	50000	812.61	50313	313	8204
1300	10.93	14000	789.27	810.08	50000	816.18	50210	210	7312
1400	14.54	19060	791.10	814.52	50000	807.85	50316	316	6423
1500	16.26	9080	795.40	811.34	50000	808.84	50240	240	5096
1600	18.93	14120	796.03	812.03	50000	814.53	50166	166	6065
1700	23.01	21540	801.65	813.22	50000	815.22	50194	194	4030
1800	27.76	25060	805.02	814.12	50000	814.82	50159	159	3063

TABLE B-2A

RED RIVER OF THE NORTH AT EAST GRAND FORKS, MINNESOTA

HISTORICAL DISCHARGE-STAGE DATA

STAGE RECORDED AT GAGE AND ZERO DATUM IN USE FOR YEAR ANNOTATED

YEAR	MONTH	DAY	FLOW IN CFS	STAGE IN FEET	GAGE RIVER MILE
1852	5		95000	51.2	
1882	4	18	75000	48.0	297.55
1883	4	26	38600	42.2	297.55
1884	4	16	20600	31.1	297.55
1885	4	17	13040	23.1	297.55
1886	5	3	10800	20.6	297.55
1887	4	15	7300	16.3	297.55
1888	4	19	19000	29.5	297.55
1889	4	1	3000	12.0	297.55
1890	4	15	3470	10.6	297.55
1891	4	13	6000	17.7	297.55
1892	4	17	23000	33.4	297.55
1893	4	24	53300	45.5	297.55
1894	4	24	16450	26.9	297.55
1895	4	6	2000	9.9	297.55
1896	5	30	21600	32.0	297.55
1897	4	10	85000	50.2	297.55
1898	4	14	4500	15.0	297.55
1899	4	17	9000	20.9	297.55
1900	4	10	4000	13.2	297.55
1901	4	7	14000	26.3	297.55
1902	3	30	15000	26.0	297.55
1903	4	11	18800	28.0	297.55
1904	4	27	33000	40.65	297.55
1905	5	16	16800	26.11	297.55
1906	4	18	27600	36.0	297.55
1907	4	7	30400	39.95	297.55
1908	4	11	20500	32.8	297.55
1909	7	30	9260	18.8	297.55
1910	3	22	18500	30.7	297.55
1911	6	12	3520	10.7	297.55
1912	4	8	4730	12.73	297.55
1913	4	8	17200	26.7	297.55
1914	6	16	8240	17.5	297.55
1915	7	3	21500	30.8	297.55
1916	4	23	29000	41.0	297.55
1917	4	6	19800	33.9	297.55
1918	3	28	4480	11.3	297.55
1919	7	8	13600	23.2	297.55
1920	3	31	30300	41.0	297.55
1921	4	10	11500	20.9	297.55
1922	4	11	19000	28.72	297.55
1923	4	22	16200	26.6	297.55
1924	5	2	2530	8.3	297.55
1925	6	12	9690	19.0	297.55

TABLE B-2B

RED RIVER OF THE NORTH AT EAST GRAND FORKS, MINNESOTA

HISTORICAL DISCHARGE-STAGE DATA

STAGE RECORDED AT GAGE AND ZERO DATUM IN USE FOR YEAR ANNOTATED

YEAR	MONTH	DAY	FLOW IN CFS	STAGE IN FEET	GAGE RIVER MILE
1926	3	28	7720	18.1	297.55
1927	4	13	10600	21.7	296.00
1928	4	2	12200	21.8	296.00
1929	3	24	17100	28.3	296.00
1930	4	7	9610	18.9	296.00
1931	4	10	1630	6.48	296.00
1932	4	10	10400	22.07	296.00
1933	4	3	4380	15.18	296.00
1934	4	12	3210	10.02	296.00
1935	3	29	2930	13.07	296.00
1936	4	18	14500	25.0	296.00
1937	5	4	4180	11.57	296.00
1938	5	12	6600	15.49	296.00
1939	4	6	6720	20.13	296.00
1940	4	18	10000	21.8	296.00
1941	4	12	13400	27.86	296.00
	6	15	8700	19.9	296.00
1942	4	5	11000	24.1	296.00
	5	5	10800	21.31	296.00
	6	15	5540	13.41	296.00
	9	4	4740	11.9	296.00
1943	4	12	28200	38.16	296.00
	6	10	14100	25.09	296.00
1944	8	13	10400	19.79	296.00
1945	3	29	21300	32.0	296.00
1946	3	27	22000	33.23	296.00
1947	4	21	35000	40.71	296.00
	6	21	19000	29.0	296.00
	7	20	5570	13.3	296.00
1948	4	16	34200	41.68	296.00
1949	4	10	15200	29.11	296.00
	6	4	13500	24.01	296.00
	7	15	5630	13.63	296.00
1950	5	12	54000	45 61	296.00
	4	25	43800	43.97	296.00
	7	1	13500	23.08	296.00
1951	4	12	23600	33.52	296.00
1952	4	20	23900	33.6	296.00
	7	7	9330	18.57	296.00
	7	23	9360	18.62	296.00
1953	6	25	14600	24.63	296.00
	4	2	6070	14.03	296.00
	6	6	9150	17.97	296.00
1954	4	15	9620	18.63	296.00
	6	17	4720	11.9	296.00
1955	4	10	15400	26.17	296.00

TABLE B-2C

RED RIVER OF THE NORTH AT EAST GRAND FORKS, MINNESOTA

HISTORICAL DISCHARGE-STAGE DATA

STAGE RECORDED AT GAGE AND ZERO DATUM IN USE FOR YEAR ANNOTATED

YEAR	MONTH	DAY	FLOW IN CFS	STAGE IN FEET	GAGE RIVER MILE
1956	4	23	21400	32.43	296.00
	5	14	8050	17.53	296.00
	6	9	5540	13.48	296.00
1957	7	2	14700	24.67	296.00
	4	1	5350	13.45	296.00
	4	26	10800	20.3	296.00
	9	6	8830	18.04	296.00
1958	7	9	7500	16.03	296.00
1959	4	6	6300	16.1	296.00
1960	4	12	17200	28.88	296.00
	4	30	5830	13.97	296.00
1961	3	28	3400	9.75	296.00
1962	6	16	26600	35.45	296.00
	4	21	17900	30.97	296.00
	5	29	24700	33.88	296.00
	7	14	22000	31.38	296.00
1963	4	11	10800	21.23	296.00
1964	4	19	13200	22.71	296.00
1965	4	17	52000	44.92	296.00
1966	4	4	55000	45.55	295.70
	5	3	17700	29.44	295.70
1967	4	4	28200	37.5	295.70
	4	25	27300	37.5	295.70
1968	6	11	9420	20.03	295.70
1969	4	16	53500	45.69	295.70
1970	4	28	23700	34.28	295.70
1971	4	.1	15800	27.86	295.70
1972	4	17	31400	38.5	295.70
1973	3	20	11300	27.32	295.70
1974	4	19	34300	40.25	295.70
1975	7	14	42800	43.08	295.70
1976	4	3	23600	34.58	295.70
1977	4	10	2190	8.71	295.70
1978	4	11	54200	45.73	295.70
1979	4	23	82000	48.62	295.70
1980	4	6	22000	31.01	295.70
1981	7	1	6170	14.68	295.70

TABLE B-3

RED RIVER OF THE NORTH AT GRAND FORKS-EAST GRAND FORKS

HIGH WATER MARK FIELD DATA LOCATIONS

REFERENCE POINT NUMBER	RIVER MILE	CROSS SECTION NUMBER	1950 HW ELEV	1965 HW ELEV	1966 HW ELEV	1969 HW ELEV	1975 HW ELEV	1978 HW ELEV	1979 HW ELEV
R34K	287.83	7200						818.43	819.53
R34F	290.63			820.28		821.18		819.99	821.89
R34E	292.72					822.32		822.25	824.45
R34I	293.78							822.38	825.62
R34D	295.02							824.25	826.65
R34	295.70	7790		823.27	823.90	824.04	821.55	823.97	827.15
R34	296.00	7800	823.80						
R33	295.79	7900							
R32	296.95	7911				824.38	822.13	824.66	827.63
R31	297.55	7921				825.30	822.18	825.38	828.55
R30	297.61	7931				825.42	822.49	825.32	829.03
R29	297.75	7941				825.76	822.71	825.39	829.43
R28	298.10	7961				826.17	822.82	825.56	829.56
R27F	298.82	31					823.01	826.10	830.15
R27E	299.34					827.16	823.61	826.82	831.42
R27D	300.18					827.47	823.86	826.71	831.28
R27C	301.12	16		827.06		827.56	824.16	827.05	830.65
R27B	300.99						824.48	827.56	831.64
R27AD	304.85								831.53
R27AA	312.19							833.01	837.01

TABLE B-4A

RED RIVER OF THE NORTH AT GRAND FORKS-EAST GRAND FORKS

HIGHWATER PROFILES FOR HEC2 MODEL CALIBRATION

ELEVATIONS MARKED WITH AN ASTERISK (*) ARE OBSERVED ELEVATIONS
ALL OTHER ELEVATIONS ARE INTERPOLATED FROM HIGH WATER PROFILES

CROSS SECTION NUMBER	RIVER MILE ABOVE MOUTH	1969 HIGH WATER MARK ELEV	1975 HIGH WATER MARK ELEV	1978 HIGH WATER MARK ELEV	1979 HIGH WATER MARK ELEV
* 7790	295.70	824.04	821.55	823.94	827.15
62	295.83	824.08	821.60	824.04	827.20
* 7800	296.00	824.12	821.69	824.14	827.27
7810	296.10	824.14	821.74	824.20	827.31
7820	296.10	824.15	821.74	824.21	827.32
7830	296.10	824.15	821.74	824.21	827.32
7840	296.11	824.15	821.75	824.21	827.32
59	296.22	824.18	821.79	824.26	827.35
57	296.41	824.23	821.88	824.36	827.42
56	296.55	824.27	821.94	824.44	827.48
55	296.65	824.30	821.99	824.49	827.51
53	296.85	824.35	822.08	824.60	827.59
7910	296.92	824.37	822.12	824.64	827.62
* 7911	296.95	824.38	822.13	824.66	827.63
7912	296.96	824.39	822.13	824.67	827.64
51	297.01	824.47	822.14	824.73	827.72
50	297.11	824.62	822.15	824.85	827.87
49	297.20	824.76	822.16	824.96	828.01
47	297.38	825.04	822.17	825.17	828.29
7920	297.52	825.25	822.18	825.19	828.50
* 7921	297.55	825.30	822.18	825.20	828.55
7922	297.55	825.31	822.19	825.21	828.56
7930	297.58	825.35	822.31	825.25	828.75
* 7931	297.60	825.40	822.43	825.30	828.94
7932	297.62	825.42	822.49	825.32	829.03
44	297.65	825.52	822.56	825.34	829.15

TABLE B-4B

RED RIVER OF THE NORTH AT GRAND FORKS-EAST GRAND FORKS

HIGHWATER PROFILES FOR HEC2 MODEL CALIBRATION

ELEVATIONS MARKED WITH AN ASTERISK (*) ARE OBSERVED ELEVATIONS
ALL OTHER ELEVATIONS ARE INTERPOLATED FROM HIGH WATER PROFILES

CROSS SECTION NUMBER	RIVER MILE ABOVE MOUTH	1969 HIGH WATER MARK ELEV	1975 HIGH WATER MARK ELEV	1978 HIGH WATER MARK ELEV	1979 HIGH WATER MARK ELEV
7940	297.72	825.71	822.68	825.38	829.37
* 7941	297.74	825.76	822.71	825.39	829.43
7942	297.75	825.77	822.71	825.40	829.44
42	297.82	825.85	822.74	825.43	829.46
7950	298.00	826.06	822.79	825.52	829.48
7960	298.09	826.17	822.82	825.56	829.50
* 7961	298.10	826.18	822.83	825.57	829.56
39	298.13	826.19	822.84	825.59	829.58
37	298.32	826.27	822.88	825.73	829.74
35	298.45	826.33	822.91	825.82	829.84
34	298.53	826.37	822.93	825.88	829.91
33	298.62	826.41	822.96	825.95	829.98
32	298.70	826.45	822.98	826.01	830.05
* 31	298.82	826.50	823.01	826.10	830.15
29	298.99	826.60	823.11	826.21	830.29
27	299.17	826.71	823.21	826.32	830.44
25	299.34	826.82	823.30	826.43	830.58
23	299.55	826.95	823.42	826.56	830.76
22	299.70	827.04	823.50	826.66	830.88
21	299.96	827.20	823.65	826.68	831.10
20	300.18	827.47	823.86	826.71	831.28
19	300.40	827.48	823.93	826.79	831.41
18	300.63	827.51	824.01	826.87	831.56
* 16	301.12	827.56	824.16	827.05	831.63
15	301.37	827.90	824.33	827.30	831.67
14	301.61	828.00	824.48	827.56	831.70
12	302.13	828.30	824.75	827.83	831.91
11	302.38	828.40	824.89	827.97	832.05
9	302.88	828.60	825.15	828.23	832.30
8	303.09	828.80	825.26	828.34	832.42
5	303.83	829.20	825.65	828.73	832.80

TABLE B-5

RED RIVER OF THE NORTH AND RED LAKE RIVER AT EAST GRAND FORKS, MINNESOTA

BRIDGE DATA SUMMARY

BRIDGE LOCATION	RIVER MILE	CROSS SECTION NUMBER	NET WATERWAY OPENING (SQ FT)	THALWEG ELEV	LOW CHORD ELEV	LENGTH IN FEET	PIER DATA		
							QTY WIDTH IN FT	MAIN CHANNEL SPACING IN FT	OVER BANK SPACING IN FT
US HIGHWAY 2 AT GRAND FORKS	296.95	7912	26738	780.6	830.9	1261	3 AT 6 9 AT 2	280	64
NORTHERN PACIFIC RAILROAD BR	297.55	7922	16925	774.6	827.2	650	1 AT 25 3 AT 12 14 AT 1	106.5	15
DEMERS AVENUE	297.61	7932	14475	777.5	826.2	600	1 AT 4	280	
GREAT NORTHERN	297.73	7942	20415	777.6	828.5	1054	12 AT 1 2 AT 25 3 AT 10 1 AT 6 8 AT 4	90	46
MINN AVENUE BR (POINT BR)	298.10	7961	20678	780.0	832.4	840	3 AT 4 9 AT 1	120	48
MINN HIGHWAY 220 RED LAKE RIVER	.39	370	20680	781.0	831.3	975	7 AT 3 2 AT 4.5 2 AT 4	150	70

TABLE B-6A

RED RIVER OF THE NORTH AND RED LAKE RIVER AT GRAND FORKS-EAST GRAND FORKS

COINCIDENTAL PEAK FLOW DISCHARGES
PEAK ON THE RED RIVER ABOVE THE RED LAKE RIVER
USED FOR WATER SURFACE PROFILE COMPUTATIONS
EXISTING AND PROPOSED CONDITIONS
ALL FLOWS IN CUBIC FEET PER SECOND

LOCATION	10-PCT CHANCE FLOOD	2-PCT CHANCE FLOOD	1-PCT CHANCE FLOOD	0.2-PCT CHANCE FLOOD	SPF	PMF	NED PLAN	TOP OF LEVEE DESIGN
RED RIVER OF THE NORTH AT USGS GAGE SITE	44800	89000	113000	180000	169000	350000	119500	152000
RED RIVER OF THE NORTH ABOVE MOUTH OF RED LAKE RIVER	33700	68000	86700	141000	140000	290000	94500	118000
RED LAKE RIVER	11100	21000	26300	39000	29900	60000	25000	34000

NOTE: THE SPF AND PMF ARE CENTERED ABOVE EAST GRAND FORKS.
THIS CONDITION DOES NOT REPRESENT THE WORST CASE FOR THE RED LAKE RIVER.

NOTE: THESE ARE THE COINCIDENTAL DISCHARGES AT GRAND FORKS ON THE RED RIVER OF THE NORTH AND AT EAST GRAND FORKS ON THE RED LAKE RIVER FOR PEAK FLOWS ON THE RED RIVER OF THE NORTH ABOVE THE MOUTH OF THE RIVER.

TABLE B-68

RED RIVER OF THE NORTH AND RED LAKE RIVER AT GRAND FORKS-EAST GRAND FORKS

PEAK FLOW ON THE RED LAKE RIVER AT EAST GRAND FORKS
USED FOR WATER SURFACE PROFILE COMPUTATIONS
EXISTING AND PROPOSED CONDITIONS
ALL FLOWS IN CUBIC FEET PER SECOND

LOCATION	10-PCT CHANCE FLOOD	2-PCT CHANCE FLOOD	1-PCT CHANCE FLOOD	0.2-PCT CHANCE FLOOD	SPF	PMF	NED PLAN	TOP OF LEVEE DESIGN
RED RIVER OF THE NORTH AT USGS GAGE SITE	42400	84900	108000	172000	169000	350000	119500	152000
RED RIVER OF THE NORTH ABOVE MOUTH OF RED LAKE RIVER	22200	51200	68100	116700	140000	290000	94500	118000
RED LAKE RIVER	20200	33200	39900	55300	29000	60000	25000	34000

NOTE: THE SPF AND PMF ARE CENTERED ABOVE EAST GRAND FORKS.
THIS CONDITION DOES NOT REPRESENT THE WORST CASE FOR THE RED LAKE RIVER.

NOTE: THESE ARE THE COINCIDENTAL DISCHARGES ON THE RED RIVER OF THE NORTH AT GRAND FORKS AND ON THE RED RIVER OF THE NORTH ABOVE THE RED LAKE RIVER FOR FLOWS ON THE RED LAKE RIVER AT EAST GRAND FORKS.

TABLE B-7A

RED RIVER OF THE NORTH AT GRAND FORKS-EAST GRAND FORKS
EAST GRAND FORKS FLOOD CONTROL - GENERAL REFORMULATION STUDY JANUARY 1984

DESIGN WATER SURFACE PROFILES AT EAST GRAND FORKS

WITH PROJECT CONDITIONS

CROSS SECT NR	RIVER MILE ABOVE MOUTH	THALWEG ELEV	BRIDGE MIDSPAN LOW CHORD	BRIDGE MIDSPAN DECK	NED PLAN ELEV	TOP OF LEVEE ELEV	1-PCT CHANCE FLOOD ELEV	SPF ELEV
7790	295.70	773.15			831.50	834.50	830.24	835.80
62	295.83	775.55			831.42	834.68	830.17	835.63
7800	296.00	774.20			831.66	834.91	830.39	835.95
7810	296.10	781.59			831.55	835.04	830.28	835.80
7820	296.10	792.01			831.47	835.04	830.20	835.72
7830	296.10	792.01			831.48	835.05	830.21	835.73
7840	296.11	781.59			831.60	835.05	830.33	835.85
59	296.22	773.65			831.77	835.21	830.48	836.06
57	296.41	775.65			832.06	835.47	830.76	836.38
56	296.55	781.65			832.08	835.66	830.77	836.40
55	296.65	776.35			832.12	835.79	830.82	836.41
53	296.85	773.75			832.14	836.06	830.84	836.36
7910	296.92	779.60			832.47	836.20	831.16	836.69
7911	296.95	780.60	830.90	837.40	832.49	836.20	831.18	836.73
7912	296.96	780.60			833.03	836.20	831.59	837.44
51	297.01	772.15			833.00	836.27	831.57	837.38
50	297.11	770.95			833.10	836.40	831.66	837.50
49	297.20	775.50			833.13	836.53	831.68	837.52
47	297.38	778.10			833.25	836.77	831.79	837.64
7920	297.52	774.60			833.39	837.00	831.95	837.77
7921	297.55	774.60	827.20	831.20	833.41	837.00	831.96	837.79
7922	297.55	774.60			833.96	837.00	832.59	838.30
7930	297.58	777.50			834.01	837.06	832.65	838.33
7931	297.60	777.50	826.20	831.00	834.03	837.10	832.67	838.35
7932	297.62	777.50			833.99	837.22	832.67	838.26
44	297.65	772.40			834.19	837.43	832.88	838.47
7940	297.72	777.60			834.41	837.91	833.08	838.74
7941	297.74	777.60	828.50	832.00	834.42	838.12	833.08	838.75
7942	297.75	776.50			835.06	838.12	833.91	839.33
42	297.82	776.10			835.28	838.30	834.13	839.56
7950	298.00	780.90			835.38	838.75	834.21	839.64

TABLE B-7B

RED RIVER OF THE NORTH AT GRAND FORKS-EAST GRAND FORKS
EAST GRAND FORKS FLOOD CONTROL - GENERAL REFORMULATION STUDY JANUARY 1984

DESIGN WATER SURFACE PROFILES AT EAST GRAND FORKS

WITH PROJECT CONDITIONS

CROSS SECT NR	RIVER MILE ABOVE MOUTH	THALWEG ELEV	BRIDGE MIDSPAN LOW CHORD	BRIDGE MIDSPAN DECK	NED PLAN ELEV	TOP OF LEVEE ELEV	1-PCT CHANCE FLOOD ELEV	SPF ELEV
7960	298.09	776.00			835.54	839.00	834.37	839.86
7961	298.10	780.00	832.40	840.40	835.85	839.00	834.64	840.33
39	298.13	776.40			835.82	839.01	834.61	840.33
37	298.32	777.10			836.05	839.10	834.83	840.59
35	298.45	776.30			836.09	839.15	834.87	840.62
34	298.53	778.00			836.12	839.19	834.90	840.65
33	298.62	780.00			836.15	839.23	834.94	840.68
32	298.70	766.00			836.21	839.26	834.99	840.74
31	298.82	777.40			836.22	839.32	835.01	840.75
29	298.99	778.20			836.24	839.39	835.02	840.77
27	299.17	777.70			836.29	839.47	835.06	840.80
25	299.34	779.30			836.35	839.54	835.13	840.85
23	299.55	778.40			836.43	839.63	835.21	840.96
22	299.70	777.10			836.49	839.70	835.26	841.04
21	299.96	777.30			836.63		835.39	841.17
20	300.18	776.00			836.75		835.52	841.29
19	300.40	780.80			836.78		835.55	841.30
18	300.63	777.30			836.89		835.65	841.41
16	301.12	780.20			837.02		835.78	841.49
15	301.37	778.70			837.10		835.87	841.58
14	301.61	773.30			837.21		835.97	841.66
12	302.13	778.90			837.46		836.22	841.90
11	302.38	778.60			837.56		836.32	842.01
9	302.88	778.10			837.65		836.41	842.08
8	303.09	772.30			837.74		836.51	842.12
5	303.83	778.20			838.00		836.77	842.32
4	304.08	778.10			838.10		836.87	842.40

TABLE B-7C

RED LAKE RIVER AT GRAND FORKS-EAST GRAND FORKS
EAST GRAND FORKS FLOOD CONTROL - GENERAL REFORMULATION STUDY JANUARY 1984

DESIGN WATER SURFACE PROFILES AT EAST GRAND FORKS

WITH PROJECT CONDITIONS

CROSS SECT NR	RIVER MILE ABOVE MOUTH	THALWEG ELEV	BRIDGE MIDSPAN LOW CHORD	BRIDGE MIDSPAN DECK	NED PLAN ELEV	TOP OF LEVEE ELEV	1-PCT CHANCE FLOOD ELEV	SPF ELEV
100	.03	780.66			835.73	838.86	834.54	840.11
200	.14	778.36			835.72	838.86	834.53	840.10
250	.16	781.70			835.72	838.86	834.53	840.10
275	.17	794.00			835.72	838.86	834.53	840.10
285	.17	794.00			835.72	838.86	834.53	840.10
300	.20	780.20			835.72	838.86	834.53	840.10
350	.23	783.46			835.73	838.86	834.54	840.11
360	.27	781.00			835.73	838.86	834.54	840.11
370	.27	781.00	831.30	837.30	835.72	838.86	834.53	840.10
380	.29	781.00			835.72	838.86	834.54	840.10
390	.29	781.00			835.76	838.89	834.56	840.13
400	.52	777.53			835.77	838.91	834.57	840.14
500	.72	779.82			835.80	838.95	834.59	840.17
600	1.07	781.44			835.80	838.96	834.60	840.17
700	1.48	785.41			835.82	839.00	834.61	840.18
800	1.93	784.68			835.85		834.64	840.20
900	2.13	783.81			835.85		834.64	840.20
1000	2.93	782.99			835.89		834.67	840.23
1100	5.21	782.92			836.00		834.76	840.29
1200	8.27	786.17			836.14		834.87	840.37
1300	10.93	789.27			836.39		835.08	840.51
1400	14.54	791.10			836.67		835.33	840.67
1500	16.26	795.40			836.76		835.40	840.72
1600	18.93	796.03			837.04		835.63	840.88
1700	23.01	801.65			838.43		836.83	841.86
1800	27.76	805.02			839.79		838.05	842.83

TABLE B-8A

RED RIVER OF THE NORTH AT GRAND FORKS-EAST GRAND FORKS

WATER SURFACE PROFILES FOR COINCIDENTAL PEAKS AT EAST GRAND FORKS

EXISTING CONDITIONS PROFILES WITH 25-PERCENT BRIDGE PLUGGING AT ALL BRIDGES

CROSS SECT NR	RIVER MILE ABOVE MOUTH	THALWEG ELEV	BRIDGE MIDSPAN LOW CHORD	BRIDGE MIDSPAN DECK ELEV	10-PCT CHANCE FLOOD ELEV	2-PCT CHANCE FLOOD ELEV	1-PCT CHANCE FLOOD ELEV	.2-PCT CHANCE FLOOD ELEV	SPF ELEV	PMF ELEV
7790	295.70	773.15			821.50	827.84	830.80	836.60	835.80	844.80
62	295.83	775.55			821.51	827.80	830.71	836.36	835.58	844.10
7800	296.00	774.20			821.63	827.99	830.92	836.67	835.86	844.82
7810	296.10	781.59			821.61	827.93	830.83	836.56	835.75	844.68
7820	296.10	792.01			821.55	827.85	830.75	836.48	835.67	844.58
7830	296.10	792.01			821.55	827.85	830.75	836.48	835.67	844.58
7840	296.11	781.59			821.64	827.98	830.89	836.62	835.80	844.75
59	296.22	773.65			821.72	828.12	831.05	836.85	836.02	845.20
57	296.41	775.65			821.87	828.37	831.31	837.18	836.33	845.81
56	296.55	781.65			821.90	828.41	831.35	837.26	836.40	846.02
55	296.65	776.35			821.99	828.48	831.40	837.26	836.40	845.98
53	296.85	773.75			822.05	828.43	831.25	836.92	836.08	845.20
7910	296.92	779.60			822.23	828.90	831.83	837.66	836.80	846.21
7911	296.95	780.60	830.90	837.40	822.25	828.94	831.87	837.77	836.89	846.59
7912	296.96	780.60			822.26	828.96	832.31	838.56	837.67	847.64
51	297.01	772.15			822.26	828.91	832.24	838.39	837.51	847.13
50	297.11	770.95			822.32	829.02	832.35	838.52	837.64	847.31
49	297.20	775.50			822.35	829.06	832.37	838.53	837.64	847.27
47	297.38	778.10			822.45	829.23	832.57	838.87	837.95	848.20
7920	297.52	774.60			822.60	829.46	832.80	839.15	838.21	848.74
7921	297.55	774.60	827.20	831.20	822.60	829.48	832.82	839.17	838.23	848.77
7922	297.55	774.60			822.61	830.23	833.56	839.94	838.98	849.94
7930	297.58	777.50			822.65	830.33	833.66	840.07	839.10	850.17
7931	297.60	777.50	826.20	831.00	822.67	830.35	833.68	840.09	839.12	850.20
7932	297.62	777.50			822.67	830.53	833.62	839.94	838.99	849.92
44	297.65	772.40			822.79	830.69	833.77	840.11	839.15	850.17
7940	297.72	777.60			822.90	830.92	834.06	840.52	839.54	850.83
7941	297.74	777.60	828.50	832.00	822.90	830.93	834.07	840.53	839.54	850.85
7942	297.75	776.50			822.92	831.30	835.00	841.14	840.18	851.51
42	297.82	776.10			823.10	831.60	835.07	841.20	840.23	851.59
7950	298.00	780.90			823.20	831.72	835.17	841.43	840.43	852.16

TABLE B-88

RED RIVER OF THE NORTH AT GRAND FORKS-EAST GRAND FORKS

WATER SURFACE PROFILES FOR COINCIDENTAL PEAKS AT EAST GRAND FORKS

EXISTING CONDITIONS PROFILES WITH 25-PERCENT BRIDGE PLUGGING AT ALL BRIDGES

CROSS SECT NR	RIVER MILE ABOVE MOUTH	THALWEG ELEV	BRIDGE MIDSPAN LOW CHORD	BRIDGE MIDSPAN DECK ELEV	10-PCT CHANCE FLOOD ELEV	2-PCT CHANCE FLOOD ELEV	1-PCT CHANCE FLOOD ELEV	.2-PCT CHANCE FLOOD ELEV	SPF ELEV	PMF ELEV
7960	298.09	776.00			823.28	831.87	835.34	841.64	840.66	852.49
7961	298.10	780.00	832.40	840.40	823.28	831.89	835.62	842.10	841.14	853.26
39	298.13	776.40			823.27	831.85	835.59	842.09	841.12	853.40
37	298.32	777.10			823.44	832.07	835.80	842.35	841.39	853.79
35	298.45	776.30			823.48	832.10	835.82	842.36	841.40	853.79
34	298.53	778.00			823.53	832.16	835.87	842.40	841.45	853.85
33	298.62	780.00			823.57	832.21	835.91	842.44	841.50	853.89
32	298.70	766.00			823.62	832.26	835.96	842.49	841.55	853.95
31	298.82	777.40			823.64	832.28	835.98	842.52	841.58	853.98
29	298.99	778.20			823.67	832.29	835.98	842.51	841.57	853.98
27	299.17	777.70			823.73	832.33	836.00	842.53	841.58	854.00
25	299.34	779.30			823.82	832.44	836.09	842.58	841.64	854.00
23	299.55	778.40			823.90	832.54	836.19	842.74	841.80	854.34
22	299.70	777.10			823.96	832.60	836.25	842.80	841.86	854.40
21	299.96	777.30			824.08	832.74	836.37	842.93	842.00	854.60
20	300.18	776.00			824.21	832.88	836.50	843.06	842.14	854.75
19	300.40	780.80			824.28	832.89	836.48	843.02	842.09	854.63
18	300.63	777.30			824.41	833.07	836.67	843.26	842.34	855.05
16	301.12	780.20			824.58	833.23	836.78	843.34	842.43	855.08
15	301.37	778.70			824.68	833.32	836.86	843.41	842.50	855.14
14	301.61	773.30			824.79	833.44	836.98	843.57	842.66	855.45
12	302.13	778.90			825.01	833.70	837.22	843.87	842.97	855.95
11	302.38	778.60			825.10	833.79	837.32	844.01	843.12	856.20
9	302.88	778.10			825.26	833.90	837.40	844.07	843.18	856.25
8	303.09	772.30			825.37	834.01	837.47	844.09	843.20	856.25
5	303.83	778.20			825.68	834.30	837.69	844.25	843.37	856.36
4	304.08	778.10			825.83	834.42	837.78	844.31	843.44	856.42

TABLE B-8C

RED LAKE RIVER AT GRAND FORKS-EAST GRAND FORKS

WATER SURFACE PROFILES FOR COINCIDENTAL PEAKS AT EAST GRAND FORKS

EXISTING CONDITIONS PROFILES WITH 25-PERCENT BRIDGE PLUGGING AT ALL BRIDGES

CROSS SECT NR	RIVER MILE ABOVE MOUTH	THALWEG ELEV	BRIDGE MIDSPAN LOW CHORD	BRIDGE MIDSPAN DECK ELEV	10-PCT CHANCE FLOOD ELEV	2-PCT CHANCE FLOOD ELEV	1-PCT CHANCE FLOOD ELEV	.2-PCT CHANCE FLOOD ELEV	SPF ELEV	PMF ELEV
100	.03	780.66			823.38	832.03	835.52	841.88	840.87	852.85
200	.14	778.36			823.36	832.01	835.49	841.83	840.84	852.78
250	.16	781.70			823.37	832.01	835.50	841.84	840.85	852.80
275	.17	794.00			823.36	832.01	835.49	841.84	840.85	852.80
285	.17	794.00			823.36	832.01	835.49	841.84	840.85	852.80
300	.20	780.20			823.38	832.04	835.53	841.88	840.88	852.85
350	.23	783.46			823.39	832.05	835.54	841.90	840.89	852.88
360	.27	781.00			823.39	832.05	835.54	841.89	840.88	852.87
370	.27	781.00	831.30	837.30	823.39	832.05	835.52	841.88	840.88	852.86
380	.29	781.00			823.39	832.05	835.53	841.89	840.88	852.86
390	.29	781.00			823.39	832.06	835.56	841.92	840.90	852.89
400	.52	777.53			823.40	832.07	835.58	841.94	840.91	852.93
500	.72	779.82			823.44	832.11	835.62	841.98	840.94	852.97
600	1.07	781.44			823.45	832.12	835.62	841.99	840.94	852.98
700	1.48	785.41			823.47	832.14	835.64	842.00	840.95	852.97
800	1.93	784.68			823.51	832.18	835.67	842.04	840.98	853.02
900	2.13	783.81			823.52	832.18	835.68	842.04	840.98	853.02
1000	2.93	782.99			823.58	832.24	835.72	842.07	841.00	853.04
1100	5.21	782.92			823.73	832.37	835.83	842.15	841.05	853.08
1200	8.27	786.17			823.93	832.52	835.95	842.24	841.10	853.13
1300	10.93	789.27			824.30	832.83	836.21	842.41	841.22	853.20
1400	14.54	791.10			824.89	833.21	836.53	842.60	841.36	853.28
1500	16.26	795.40			825.11	833.34	836.62	842.67	841.40	853.31
1600	18.93	796.03			825.61	833.72	836.93	842.92	841.56	853.51
1700	23.01	801.65			827.65	835.46	838.44	844.28	842.46	854.30
1800	27.76	805.02			829.78	837.14	839.89	845.57	843.37	855.20

TABLE B-9A

RED RIVER OF THE NORTH AT GRAND FORKS-EAST GRAND FORKS

WATER SURFACE PROFILES FOR COINCIDENTAL PEAKS AT EAST GRAND FORKS

WITH PROJECT CONDITIONS PROFILES WITH 25-PERCENT BRIDGE PLUGGING AT ALL BRIDGES

CROSS SECT NR	RIVER MILE ABOVE MOUTH	THALWEG ELEV	BRIDGE MIDSPAN LOW CHORD	BRIDGE MIDSPAN DECK ELEV	10-PCT CHANCE FLOOD ELEV	2-PCT CHANCE FLOOD ELEV	1-PCT CHANCE FLOOD ELEV	.2-PCT CHANCE FLOOD ELEV	SPF ELEV	PMF ELEV
7790	295.70	773.15			821.50	827.84	830.80	836.60	835.80	844.80
62	295.83	775.55			821.51	827.81	830.73	836.42	835.63	844.28
7800	296.00	774.20			821.63	828.02	830.96	836.77	835.95	845.10
7810	296.10	781.59			821.60	827.93	830.84	836.61	835.80	844.85
7820	296.10	792.01			821.55	827.85	830.76	836.53	835.72	844.74
7830	296.10	792.01			821.55	827.85	830.77	836.55	835.73	844.78
7840	296.11	781.59			821.64	827.98	830.89	836.66	835.85	844.90
59	296.22	773.65			821.72	828.11	831.05	836.89	836.06	845.36
57	296.41	775.65			821.88	828.38	831.33	837.23	836.38	845.94
56	296.55	781.65			821.90	828.40	831.35	837.26	836.40	846.00
55	296.65	776.35			821.99	828.47	831.39	837.27	836.41	845.98
53	296.85	773.75			822.06	828.53	831.41	837.22	836.36	845.83
7910	296.92	779.60			822.22	828.83	831.73	837.55	836.69	846.05
7911	296.95	780.60			822.23	828.85	831.76	837.59	836.73	846.24
7912	296.96	780.60	830.90	837.40	822.24	828.87	832.22	838.31	837.44	847.11
51	297.01	772.15			822.25	828.86	832.19	838.24	837.38	846.88
50	297.11	770.95			822.30	828.94	832.28	838.37	837.50	847.15
49	297.20	775.50			822.32	828.98	832.31	838.40	837.52	847.18
47	297.38	778.10			822.42	829.10	832.42	838.54	837.64	847.51
7920	297.52	774.60			822.56	829.28	832.58	838.67	837.77	847.71
7921	297.55	774.60	827.20	831.20	822.57	829.30	832.59	838.69	837.79	847.74
7922	297.55	774.60			822.57	830.06	833.21	839.19	838.30	848.41
7930	297.58	777.50			822.62	830.14	833.26	839.22	838.33	848.45
7931	297.60	777.50	826.20	831.00	822.64	830.16	833.28	839.24	838.35	848.49
7932	297.62	777.50			822.64	830.38	833.26	839.15	838.26	848.39
44	297.65	772.40			822.77	830.58	833.47	839.37	838.47	848.63
7940	297.72	777.60			822.86	830.76	833.67	839.65	838.74	849.11
7941	297.74	777.60	828.50	832.00	822.87	830.77	833.68	839.66	838.75	849.13
7942	297.75	776.50			822.88	831.13	834.61	840.20	839.33	849.69
42	297.82	776.10			823.09	831.55	834.83	840.43	839.56	849.96
7950	298.00	780.90			823.19	831.65	834.91	840.52	839.64	850.08

TABLE B-9B

RED RIVER OF THE NORTH AT GRAND FORKS-EAST GRAND FORKS

WATER SURFACE PROFILES FOR COINCIDENTAL PEAKS AT EAST GRAND FORKS

WITH PROJECT CONDITIONS PROFILES WITH 25-PERCENT BRIDGE PLUGGING AT ALL BRIDGES

CROSS SECT NR	RIVER MILE ABOVE MOUTH	THALWEG ELEV	BRIDGE MIDSPAN LOW CHORD	BRIDGE MIDSPAN DECK ELEV	10-PCT CHANCE FLOOD ELEV	2-PCT CHANCE FLOOD ELEV	1-PCT CHANCE FLOOD ELEV	.2-PCT CHANCE FLOOD ELEV	SPF ELEV	PMF ELEV
7960	298.09	776.00			823.27	831.78	835.06	840.72	839.86	850.45
7961	298.10	780.00	832.40	840.40	823.27	831.80	835.33	841.18	840.33	851.22
39	298.13	776.40			823.26	831.76	835.30	841.19	840.33	851.44
37	298.32	777.10			823.43	831.98	835.50	841.43	840.59	851.81
35	298.45	776.30			823.47	832.02	835.54	841.47	840.62	851.85
34	298.53	778.00			823.52	832.06	835.57	841.49	840.65	851.87
33	298.62	780.00			823.56	832.10	835.60	841.52	840.68	851.90
32	298.70	766.00			823.60	832.15	835.65	841.58	840.74	851.98
31	298.82	777.40			823.62	832.17	835.66	841.58	840.75	851.97
29	298.99	778.20			823.65	832.18	835.67	841.60	840.77	852.03
27	299.17	777.70			823.72	832.24	835.72	841.64	840.80	852.07
25	299.34	779.30			823.79	832.32	835.78	841.69	840.85	852.08
23	299.55	778.40			823.87	832.39	835.85	841.79	840.96	852.32
22	299.70	777.10			823.92	832.44	835.90	841.87	841.04	852.51
21	299.96	777.30			824.04	832.58	836.02	842.00	841.17	852.66
20	300.18	776.00			824.17	832.72	836.13	842.10	841.29	852.76
19	300.40	780.80			824.25	832.76	836.16	842.12	841.30	852.79
18	300.63	777.30			824.36	832.87	836.25	842.22	841.41	852.92
16	301.12	780.20			824.53	833.03	836.37	842.30	841.49	852.95
15	301.37	778.70			824.63	833.12	836.45	842.39	841.58	853.11
14	301.61	773.30			824.74	833.24	836.55	842.47	841.66	853.19
12	302.13	778.90			824.96	833.49	836.77	842.69	841.90	853.43
11	302.38	778.60			825.06	833.59	836.86	842.80	842.01	853.57
9	302.88	778.10			825.22	833.70	836.95	842.87	842.08	853.64
8	303.09	772.30			825.33	833.81	837.03	842.90	842.12	853.65
5	303.83	778.20			825.64	834.11	837.27	843.09	842.32	853.80
4	304.08	778.10			825.79	834.23	837.37	843.17	842.40	853.88

TABLE B-9C

RED LAKE RIVER AT GRAND FORKS-EAST GRAND FORKS

WATER SURFACE PROFILES FOR COINCIDENTAL PEAKS AT EAST GRAND FORKS

WITH PROJECT CONDITIONS PROFILES WITH 25-PERCENT BRIDGE PLUGGING AT ALL BRIDGES

CROSS SECT NR	RIVER MILE ABOVE MOUTH	THALWEG ELEV	BRIDGE MIDSPAN LOW CHORD	BRIDGE MIDSPAN DECK ELEV	10-PCT CHANCE FLOOD ELEV	2-PCT CHANCE FLOOD ELEV	1-PCT CHANCE FLOOD ELEV	.2-PCT CHANCE FLOOD ELEV	SPF ELEV	PMF ELEV
100	.03	780.66			823.36	831.94	835.24	841.00	840.11	850.94
200	.14	778.36			823.35	831.93	835.23	840.99	840.10	850.93
250	.16	781.70			823.35	831.92	835.23	840.99	840.10	850.93
275	.17	794.00			823.35	831.92	835.23	840.99	840.10	850.93
285	.17	794.00			823.35	831.92	835.23	840.99	840.10	850.93
300	.20	780.20			823.37	831.93	835.23	840.99	840.10	850.93
350	.23	783.46			823.37	831.94	835.24	841.00	840.11	850.94
360	.27	781.00			823.38	831.94	835.24	841.00	840.11	850.93
370	.27	781.00	831.30	837.30	823.38	831.94	835.23	840.98	840.10	850.92
380	.29	781.00			823.38	831.94	835.23	840.99	840.10	850.93
390	.29	781.00			823.38	831.95	835.27	841.03	840.13	850.96
400	.52	777.53			823.39	831.96	835.28	841.05	840.14	851.00
500	.72	779.82			823.42	832.00	835.32	841.09	840.17	851.04
600	1.07	781.44			823.43	832.01	835.32	841.10	840.17	851.05
700	1.48	785.41			823.46	832.04	835.35	841.11	840.18	851.05
800	1.93	784.68			823.49	832.07	835.38	841.15	840.20	851.10
900	2.13	783.81			823.50	832.07	835.38	841.16	840.20	851.11
1000	2.93	782.99			823.56	832.13	835.43	841.19	840.23	851.13
1100	5.21	782.92			823.72	832.28	835.55	841.29	840.29	851.19
1200	8.27	786.17			823.96	832.46	835.71	841.41	840.37	851.26
1300	10.93	789.27			824.33	832.79	835.99	841.62	840.51	851.36
1400	14.54	791.10			824.92	833.17	836.32	841.85	840.67	851.46
1500	16.26	795.40			825.14	833.30	836.41	841.93	840.72	851.50
1600	18.93	796.03			825.64	833.68	836.73	842.20	840.88	851.73
1700	23.01	801.65			827.67	835.43	838.28	843.67	841.86	852.71
1800	27.76	805.02			829.79	837.12	839.76	845.04	842.83	853.79

TABLE B-10A

RED RIVER OF THE NORTH AT GRAND FORKS-EAST GRAND FORKS

WATER SURFACE PROFILES FOR RED RIVER OF THE NORTH PEAKS AT EAST GRAND FORKS

WITHOUT PROJECT CONDITIONS PROFILES WITH 25-PERCENT BRIDGE PLUGGING AT ALL BRIDGES

CROSS SECT NR	RIVER MILE ABOVE MOUTH	THALWEG ELEV	BRIDGE MIDSPAN LOW CHORD	BRIDGE MIDSPAN DECK ELEV	10-PCT CHANCE FLOOD ELEV	2-PCT CHANCE FLOOD ELEV	1-PCT CHANCE FLOOD ELEV	.2-PCT CHANCE FLOOD ELEV	SPF ELEV	PMF ELEV
7790	295.70	773.15			821.40	827.26	830.24	836.02	835.80	844.80
62	295.83	775.55			821.41	827.22	830.16	835.80	835.58	844.10
7800	296.00	774.20			821.52	827.42	830.36	836.10	835.86	844.82
7810	296.10	781.59			821.50	827.35	830.28	836.00	835.75	844.68
7820	296.10	792.01			821.45	827.28	830.20	835.92	835.67	844.58
7830	296.10	792.01			821.45	827.28	830.20	835.92	835.67	844.58
7840	296.11	781.59			821.53	827.41	830.33	836.05	835.80	844.75
59	296.22	773.65			821.60	827.54	830.49	836.28	836.02	845.20
57	296.41	775.65			821.74	827.79	830.75	836.61	836.33	845.81
56	296.55	781.65			821.77	827.83	830.79	836.68	836.40	846.02
55	296.65	776.35			821.85	827.90	830.84	836.69	836.40	845.98
53	296.85	773.75			821.90	827.87	830.71	836.38	836.08	845.20
7910	296.92	779.60			822.07	828.32	831.27	837.10	836.80	846.21
7911	296.95	780.60	830.90	837.40	822.08	828.35	831.31	837.20	836.89	846.59
7912	296.96	780.60			822.09	828.37	831.70	837.98	837.67	847.64
51	297.01	772.15			822.09	828.33	831.63	837.82	837.51	847.13
50	297.11	770.95			822.15	828.44	831.74	837.96	837.64	847.31
49	297.20	775.50			822.17	828.47	831.76	837.97	837.64	847.27
47	297.38	778.10			822.27	828.64	831.96	838.30	837.95	848.20
7920	297.52	774.60			822.40	828.87	832.18	838.57	838.21	848.74
7921	297.55	774.60	827.20	831.20	822.41	828.89	832.20	838.59	838.23	848.77
7922	297.55	774.60			822.41	828.90	832.96	839.34	838.98	849.94
7930	297.58	777.50			822.45	829.00	833.06	839.47	839.10	850.17
7931	297.60	777.50	826.20	831.00	822.47	829.02	833.08	839.49	839.12	850.20
7932	297.62	777.50			822.47	829.42	833.04	839.35	838.99	849.92
44	297.65	772.40			822.57	829.59	833.19	839.51	839.15	850.17
7940	297.72	777.60			822.67	829.82	833.47	839.91	839.54	850.83
7941	297.74	777.60	828.50	832.00	822.68	829.83	833.48	839.92	839.54	850.85
7942	297.75	776.50			822.69	829.86	834.31	840.53	840.18	851.51
42	297.82	776.10			822.86	830.17	834.38	840.60	840.23	851.59

TABLE B-10B

RED RIVER OF THE NORTH AT GRAND FORKS-EAST GRAND FORKS

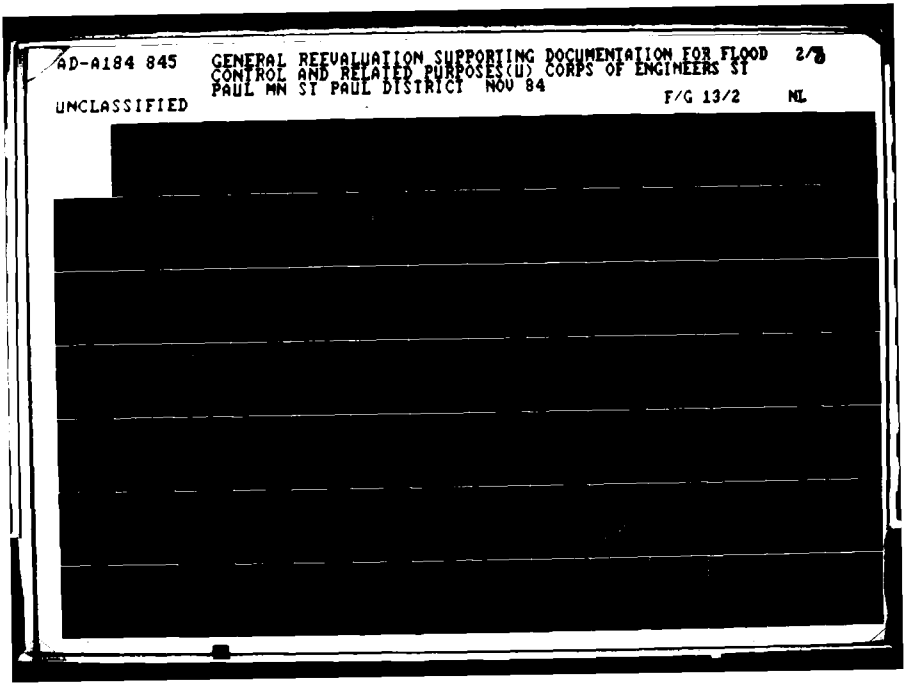
WATER SURFACE PROFILES FOR RED RIVER OF THE NORTH PEAKS AT EAST GRAND FORKS

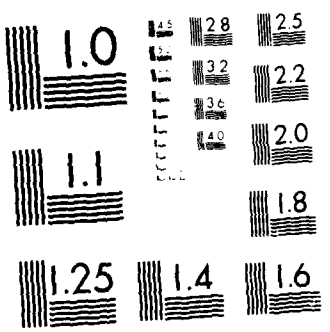
WITHOUT PROJECT CONDITIONS PROFILES WITH 25-PERCENT BRIDGE PLUGGING AT ALL BRIDGES

CROSS SECT NR	RIVER MILE ABOVE MOUTH	THALWEG ELEV	BRIDGE MIDSPAN LOW CHORD	BRIDGE MIDSPAN DECK ELEV	10-PCT CHANCE FLOOD ELEV	2-PCT CHANCE FLOOD ELEV	1-PCT CHANCE FLOOD ELEV	.2-PCT CHANCE FLOOD ELEV	SPF ELEV	PMF ELEV
7950	298.00	780.90			822.95	830.30	834.48	840.81	840.43	852.16
7960	298.09	776.00			823.04	830.48	834.67	841.04	840.66	852.49
7961	298.10	780.00	832.40	840.40	823.04	830.49	834.95	841.52	841.14	853.26
39	298.13	776.40			823.03	830.44	834.91	841.50	841.12	853.40
37	298.32	777.10			823.20	830.71	835.15	841.78	841.39	853.79
35	298.45	776.30			823.24	830.74	835.17	841.79	841.40	853.79
34	298.53	778.00			823.30	830.82	835.22	841.84	841.45	853.85
33	298.62	780.00			823.34	830.88	835.27	841.89	841.50	853.89
32	298.70	766.00			823.38	830.93	835.32	841.94	841.55	853.95
31	298.82	777.40			823.41	830.97	835.35	841.97	841.58	853.98
29	298.99	778.20			823.44	830.97	835.34	841.96	841.57	853.98
27	299.17	777.70			823.50	831.02	835.37	841.98	841.58	854.00
25	299.34	779.30			823.59	831.16	835.47	842.05	841.64	854.00
23	299.55	778.40			823.68	831.28	835.58	842.21	841.80	854.34
22	299.70	777.10			823.73	831.35	835.64	842.28	841.86	854.40
21	299.96	777.30			823.86	831.51	835.77	842.43	842.00	854.60
20	300.18	776.00			824.00	831.69	835.91	842.57	842.14	854.75
19	300.40	780.80			824.07	831.71	835.90	842.53	842.09	854.63
18	300.63	777.30			824.20	831.91	836.10	842.78	842.34	855.05
16	301.12	780.20			824.38	832.10	836.23	842.88	842.43	855.08
15	301.37	778.70			824.48	832.22	836.32	842.96	842.50	855.14
14	301.61	773.30			824.59	832.35	836.45	843.13	842.66	855.45
12	302.13	778.90			824.82	832.65	836.70	843.45	842.97	855.95
11	302.38	778.60			824.92	832.76	836.81	843.60	843.12	856.20
9	302.88	778.10			825.08	832.89	836.89	843.67	843.18	856.25
8	303.09	772.30			825.19	833.02	836.98	843.70	843.20	856.25
5	303.83	778.20			825.52	833.36	837.23	843.87	843.37	856.36
4	304.08	778.10			825.66	833.50	837.33	843.95	843.44	856.42

AD-A184 845 GENERAL REEVALUATION SUPPORTING DOCUMENTATION FOR FLOOD CONTROL AND RELATED PURPOSES(U) CORPS OF ENGINEERS ST PAUL MN ST PAUL DISTRICT NOV 84 2/3

UNCLASSIFIED F/G 13/2 NL





MICROCOPY RESOLUTION TEST CHART

TABLE B-10C

RED LAKE RIVER AT GRAND FORKS-EAST GRAND FORKS

WATER SURFACE PROFILES FOR RED RIVER OF THE NORTH PEAKS AT EAST GRAND FORKS

WITHOUT PROJECT CONDITIONS PROFILES WITH 25-PERCENT BRIDGE PLUGGING AT ALL BRIDGES

CROSS SECT NR	RIVER MILE ABOVE MOUTH	THALWEG ELEV	BRIDGE MIDSPAN LOW CHORD	BRIDGE MIDSPAN DECK ELEV	10-PCT CHANCE FLOOD ELEV	2-PCT CHANCE FLOOD ELEV	1-PCT CHANCE FLOOD ELEV	.2-PCT CHANCE FLOOD ELEV	SPF ELEV	PMF ELEV
100	.03	780.66			823.12	830.63	834.83	841.25	840.87	852.85
200	.14	778.36			823.11	830.61	834.81	841.22	840.84	852.78
250	.16	781.70			823.11	830.62	834.82	841.23	840.85	852.80
275	.17	794.00			823.11	830.61	834.81	841.23	840.85	852.80
285	.17	794.00			823.11	830.61	834.81	841.23	840.85	852.80
300	.20	780.20			823.12	830.64	834.84	841.26	840.88	852.85
350	.23	783.46			823.12	830.64	834.84	841.27	840.89	852.88
360	.27	781.00			823.13	830.64	834.84	841.27	840.88	852.87
370	.27	781.00	831.30	837.30	823.13	830.64	834.84	841.26	840.88	852.86
380	.29	781.00			823.13	830.64	834.84	841.26	840.88	852.86
390	.29	781.00			823.13	830.65	834.86	841.29	840.90	852.89
400	.52	777.53			823.13	830.66	834.87	841.30	840.91	852.93
500	.72	779.82			823.15	830.69	834.90	841.33	840.94	852.97
600	1.07	781.44			823.16	830.70	834.90	841.33	840.94	852.98
700	1.48	785.41			823.18	830.72	834.92	841.34	840.95	852.97
800	1.93	784.68			823.20	830.74	834.94	841.37	840.98	853.02
900	2.13	783.81			823.21	830.75	834.94	841.37	840.98	853.02
1000	2.93	782.99			823.24	830.79	834.97	841.39	841.00	853.04
1100	5.21	782.92			823.34	830.89	835.06	841.45	841.05	853.08
1200	8.27	786.17			823.48	831.02	835.14	841.51	841.10	853.13
1300	10.93	789.27			823.72	831.27	835.34	841.64	841.22	853.20
1400	14.54	791.10			824.14	831.60	835.58	841.79	841.36	853.28
1500	16.26	795.40			824.30	831.70	835.65	841.84	841.40	853.31
1600	18.93	796.03			824.67	832.02	835.89	842.03	841.56	853.51
1700	23.01	801.65			826.21	833.52	837.08	843.04	842.46	854.30
1800	27.76	805.02			828.03	835.04	838.28	844.05	843.37	855.20

TABLE B-11A

RED RIVER OF THE NORTH AT GRAND FORKS-EAST GRAND FORKS

WATER SURFACE PROFILES FOR RED RIVER OF THE NORTH PEAKS AT EAST GRAND FORKS

WITH PROJECT CONDITIONS PROFILES WITH 25-PERCENT BRIDGE PLUGGING AT ALL BRIDGES

CROSS SECT NR	RIVER MILE ABOVE MOUTH	THALWEG ELEV	BRIDGE MIDSPAN LOW CHORD	BRIDGE MIDSPAN DECK ELEV	10-PCT CHANCE FLOOD ELEV	2-PCT CHANCE FLOOD ELEV	1-PCT CHANCE FLOOD ELEV	.2-PCT CHANCE FLOOD ELEV	SPF ELEV	PMF ELEV
7790	295.70	773.15			821.40	827.26	830.24	836.02	835.80	844.80
62	295.83	775.55			821.41	827.23	830.17	835.85	835.63	844.28
7800	296.00	774.20			821.52	827.43	830.39	836.18	835.95	845.10
7810	296.10	781.59			821.49	827.35	830.28	836.03	835.80	844.85
7820	296.10	792.01			821.44	827.27	830.20	835.95	835.72	844.74
7830	296.10	792.01			821.45	827.27	830.21	835.97	835.73	844.78
7840	296.11	781.59			821.53	827.40	830.33	836.08	835.85	844.90
59	296.22	773.65			821.60	827.53	830.48	836.30	836.06	845.36
57	296.41	775.65			821.74	827.79	830.76	836.63	836.38	845.94
56	296.55	781.65			821.76	827.81	830.77	836.65	836.40	846.00
55	296.65	776.35			821.85	827.88	830.82	836.67	836.41	845.98
53	296.85	773.75			821.91	827.94	830.84	836.63	836.36	845.83
7910	296.92	779.60			822.05	828.24	831.16	836.95	836.69	846.05
7911	296.95	780.60	830.90	837.40	822.07	828.26	831.18	836.99	836.73	846.24
7912	296.96	780.60			822.08	828.27	831.59	837.71	837.44	847.11
51	297.01	772.15			822.08	828.26	831.57	837.64	837.38	846.88
50	297.11	770.95			822.13	828.34	831.66	837.77	837.50	847.15
49	297.20	775.50			822.15	828.38	831.68	837.79	837.52	847.18
47	297.38	778.10			822.24	828.50	831.79	837.93	837.64	847.51
7920	297.52	774.60			822.37	828.68	831.95	838.06	837.77	847.71
7921	297.55	774.60	827.20	831.20	822.38	828.70	831.96	838.08	837.79	847.74
7922	297.55	774.60			822.38	828.71	832.59	838.59	838.30	848.41
7930	297.58	777.50			822.42	828.80	832.65	838.61	838.33	848.45
7931	297.60	777.50	826.20	831.00	822.44	828.83	832.67	838.64	838.35	848.49
7932	297.62	777.50			822.44	829.28	832.67	838.55	838.26	848.39
44	297.65	772.40			822.55	829.50	832.88	838.76	838.47	848.63
7940	297.72	777.60			822.64	829.67	833.08	839.04	838.74	849.11
7941	297.74	777.60	828.50	832.00	822.65	829.68	833.08	839.05	838.75	849.13
7942	297.75	776.50			822.66	829.71	833.91	839.62	839.33	849.69
42	297.82	776.10			822.85	830.13	834.13	839.84	839.56	849.96

TABLE B-11B

RED RIVER OF THE NORTH AT GRAND FORKS-EAST GRAND FORKS

WATER SURFACE PROFILES FOR RED RIVER OF THE NORTH PEAKS AT EAST GRAND FORKS

WITH PROJECT CONDITIONS PROFILES WITH 25-PERCENT BRIDGE PLUGGING AT ALL BRIDGES

CROSS SECT NR	RIVER MILE ABOVE MOUTH	THALWEG ELEV	BRIDGE MIDSPAN LOW CHORD	BRIDGE MIDSPAN DECK ELEV	10-PCT CHANCE FLOOD ELEV	2-PCT CHANCE FLOOD ELEV	1-PCT CHANCE FLOOD ELEV	.2-PCT CHANCE FLOOD ELEV	SPF ELEV	PMF ELEV
7950	298.00	780.90			822.94	830.24	834.21	839.94	839.64	850.08
7960	298.09	776.00			823.02	830.40	834.37	840.15	839.86	850.45
7961	298.10	780.00	832.40	840.40	823.02	830.41	834.64	840.62	840.33	851.22
39	298.13	776.40			823.01	830.37	834.61	840.62	840.33	851.44
37	298.32	777.10			823.19	830.62	834.83	840.88	840.59	851.81
35	298.45	776.30			823.23	830.67	834.87	840.92	840.62	851.85
34	298.53	778.00			823.28	830.72	834.90	840.94	840.65	851.87
33	298.62	780.00			823.32	830.77	834.94	840.98	840.68	851.90
32	298.70	766.00			823.37	830.83	834.99	841.04	840.74	851.98
31	298.82	777.40			823.39	830.85	835.01	841.05	840.75	851.97
29	298.99	778.20			823.42	830.87	835.02	841.07	840.77	852.03
27	299.17	777.70			823.50	830.94	835.06	841.11	840.80	852.07
25	299.34	779.30			823.57	831.03	835.13	841.15	840.85	852.08
23	299.55	778.40			823.64	831.12	835.21	841.26	840.96	852.32
22	299.70	777.10			823.70	831.18	835.26	841.35	841.04	852.51
21	299.96	777.30			823.82	831.34	835.39	841.48	841.17	852.66
20	300.18	776.00			823.96	831.51	835.52	841.60	841.29	852.76
19	300.40	780.80			824.04	831.56	835.55	841.62	841.30	852.79
18	300.63	777.30			824.15	831.69	835.65	841.72	841.41	852.92
16	301.12	780.20			824.33	831.88	835.78	841.81	841.49	852.95
15	301.37	778.70			824.44	831.99	835.87	841.90	841.58	853.11
14	301.61	773.30			824.55	832.13	835.97	841.99	841.66	853.19
12	302.13	778.90			824.78	832.41	836.22	842.22	841.90	853.43
11	302.38	778.60			824.87	832.53	836.32	842.34	842.01	853.57
9	302.88	778.10			825.04	832.66	836.41	842.41	842.08	853.64
8	303.09	772.30			825.15	832.79	836.51	842.45	842.12	853.65
5	303.83	778.20			825.48	833.13	836.77	842.65	842.32	853.80
4	304.08	778.10			825.63	833.28	836.87	842.74	842.40	853.88

TABLE B-11C

RED LAKE RIVER AT GRAND FORKS-EAST GRAND FORKS

WATER SURFACE PROFILES FOR RED RIVER OF THE NORTH PEAKS AT EAST GRAND FORKS

WITH PROJECT CONDITIONS PROFILES WITH 25-PERCENT BRIDGE PLUGGING AT ALL BRIDGES

CROSS SECT NR	RIVER MILE ABOVE MOUTH	THALWEG ELEV	BRIDGE MIDSPAN LOW CHORD	BRIDGE MIDSPAN DECK ELEV	10-PCT CHANCE FLOOD ELEV	2-PCT CHANCE FLOOD ELEV	1-PCT CHANCE FLOOD ELEV	.2-PCT CHANCE FLOOD ELEV	SPF ELEV	PMF ELEV
100	.03	780.66			823.10	830.55	834.54	840.41	840.11	850.94
200	.14	778.36			823.10	830.54	834.53	840.40	840.10	850.93
250	.16	781.70			823.10	830.54	834.53	840.40	840.10	850.93
275	.17	794.00			823.10	830.54	834.53	840.40	840.10	850.93
285	.17	794.00			823.10	830.54	834.53	840.40	840.10	850.93
300	.20	780.20			823.11	830.55	834.53	840.40	840.10	850.93
350	.23	783.46			823.11	830.55	834.54	840.41	840.11	850.94
360	.27	781.00			823.11	830.55	834.54	840.40	840.11	850.93
370	.27	781.00	831.30	837.30	823.11	830.55	834.53	840.39	840.10	850.92
380	.29	781.00			823.11	830.55	834.54	840.40	840.10	850.93
390	.29	781.00			823.11	830.56	834.56	840.42	840.13	850.96
400	.52	777.53			823.12	830.57	834.57	840.44	840.14	851.00
500	.72	779.82			823.14	830.60	834.59	840.47	840.17	851.04
600	1.07	781.44			823.15	830.60	834.60	840.47	840.17	851.05
700	1.48	785.41			823.16	830.63	834.61	840.48	840.18	851.05
800	1.93	784.68			823.19	830.65	834.64	840.51	840.20	851.10
900	2.13	783.81			823.19	830.65	834.64	840.51	840.20	851.11
1000	2.93	782.99			823.23	830.70	834.67	840.53	840.23	851.13
1100	5.21	782.92			823.34	830.81	834.76	840.60	840.29	851.19
1200	8.27	786.17			823.49	830.95	834.87	840.68	840.37	851.26
1300	10.93	789.27			823.74	831.21	835.08	840.84	840.51	851.36
1400	14.54	791.10			824.16	831.54	835.33	841.01	840.67	851.46
1500	16.26	795.40			824.32	831.64	835.40	841.06	840.72	851.50
1600	18.93	796.03			824.68	831.96	835.63	841.25	840.88	851.73
1700	23.01	801.65			826.22	833.44	836.83	842.30	841.86	852.71
1800	27.76	805.02			828.03	834.95	838.05	843.34	842.83	853.79

TABLE B-12A

RED RIVER OF THE NORTH AT EAST GRAND FORKS, MINNESOTA

EXISTING AND PROPOSED CONDITIONS

MANNING'S ROUGHNESS VALUES AND TRANSITION LOSS COEFFICENTS
FOR THE NED PLAN DESIGN WATER SURFACE PROFILE

CROSS SECTION NUMBER	RIVER MILE ABOVE MOUTH	LEFT OVER BANK "N"	CHANNEL "N"	RIGHT OVER BANK "N"	CONT COEF HEC2 CCHV	EXP COEF HEC2 CEHV
7790	295.70	.083	.034	.083	.1	.3
62	295.83	.083	.034	.083	.1	.3
7800	296.00	.083	.034	.083	.1	.3
7810	296.10	.071	.022	.071	.1	.3
7820	296.10	.071	.022	.071	.1	.3
7830	296.10	.071	.022	.071	.1	.3
7840	296.11	.071	.022	.071	.1	.3
59	296.22	.071	.032	.071	.1	.3
57	296.41	.071	.033	.071	.1	.3
56	296.55	.075	.033	.075	.1	.3
55	296.65	.075	.033	.075	.1	.3
53	296.85	.075	.033	.075	.1	.3
7910	296.92	.075	.033	.075	.1	.3
7911	296.95	.075	.033	.075	.1	.3
7912	296.96	.075	.033	.075	.1	.3
51	297.01	.083	.035	.083	.1	.3
50	297.11	.083	.035	.083	.1	.3
49	297.20	.083	.035	.083	.1	.3
47	297.38	.083	.035	.083	.1	.3
7920	297.52	.075	.034	.075	.5	1
7921	297.55	.075	.034	.075	.5	1
7922	297.55	.075	.034	.075	.5	1
7930	297.58	.075	.034	.075	.5	1
7931	297.60	.075	.034	.075	.5	1
7932	297.62	.075	.034	.075	.5	1
44	297.65	.075	.034	.075	.5	1
7940	297.72	.075	.034	.075	.5	1
7941	297.74	.083	.034	.083	.5	1
7942	297.75	.083	.034	.083	.5	1
42	297.82	.083	.034	.083	.5	1
7950	298.00	.083	.034	.083	.5	1

TABLE B-12B

RED RIVER OF THE NORTH AT EAST GRAND FORKS, MINNESOTA

EXISTING AND PROPOSED CONDITIONS

MANNING'S ROUGHNESS VALUES AND TRANSITION LOSS COEFFICENTS
FOR THE NED PLAN DESIGN WATER SURFACE PROFILE

CROSS SECTION NUMBER	RIVER MILE ABOVE MOUTH	LEFT OVER BANK "N"	CHANNEL "N"	RIGHT OVER BANK "N"	CONT COEF HEC2 CCHV	EXP COEF HEC2 CEHV
7960	298.09	.083	.034	.083	.5	1
7961	298.10	.083	.034	.083	.5	1
39	298.13	.083	.034	.083	.5	1
37	298.32	.083	.036	.083	.1	.3
35	298.45	.083	.036	.083	.1	.3
34	298.53	.083	.036	.083	.1	.3
33	298.62	.083	.036	.083	.1	.3
32	298.70	.083	.036	.083	.1	.3
31	298.82	.083	.036	.083	.1	.3
29	298.99	.083	.036	.083	.1	.3
27	299.17	.083	.036	.083	.1	.3
25	299.34	.108	.039	.108	.1	.3
23	299.55	.108	.039	.108	.1	.3
22	299.70	.108	.039	.108	.1	.3
21	299.96	.108	.039	.108	.1	.3
20	300.18	.066	.040	.108	.1	.3
19	300.40	.066	.040	.108	.1	.3
18	300.63	.066	.040	.108	.1	.3
16	301.12	.108	.040	.108	.1	.3
15	301.37	.108	.040	.108	.1	.3
14	301.61	.108	.039	.108	.1	.3
12	302.13	.108	.039	.108	.1	.3
11	302.38	.108	.039	.108	.1	.3
9	302.88	.108	.039	.108	.1	.3
8	303.09	.108	.039	.108	.1	.3
5	303.83	.108	.039	.108	.1	.3
4	304.08	.108	.039	.108	.1	.3

TABLE B-12C

RED LAKE RIVER AT EAST GRAND FORKS, MINNESOTA

EXISTING AND PROPOSED CONDITIONS

MANNING'S ROUGHNESS VALUES AND TRANSITION LOSS COEFFICENTS
FOR THE NED PLAN DESIGN WATER SURFACE PROFILE

CROSS SECTION NUMBER	RIVER MILE ABOVE MOUTH	LEFT OVER BANK "N"	CHANNEL "N"	RIGHT OVER BANK "N"	CONT COEF HEC2 CCHV	EXP COEF HEC2 CEHV
100	.03	.083	.033	.083	.1	.3
200	.14	.083	.033	.083	.1	.3
250	.16	.083	.033	.083	.1	.3
275	.17	.083	.033	.083	.1	.3
285	.17	.083	.033	.083	.1	.3
300	.20	.083	.033	.083	.1	.3
350	.23	.083	.033	.083	.1	.3
360	.27	.083	.033	.083	.3	.5
370	.27	.083	.033	.083	.3	.5
380	.29	.083	.033	.083	.3	.5
390	.29	.083	.033	.083	.3	.5
400	.52	.083	.033	.083	.1	.3
500	.72	.083	.033	.083	.1	.3
600	1.07	.083	.033	.083	.1	.3
700	1.48	.083	.033	.083	.1	.3
800	1.93	.083	.033	.083	.1	.3
900	2.13	.083	.033	.083	.1	.3
1000	2.93	.083	.033	.083	.1	.3
1100	5.21	.100	.036	.100	.1	.3
1200	8.27	.100	.036	.100	.1	.3
1300	10.93	.083	.035	.083	.1	.3
1400	14.54	.100	.038	.100	.1	.3
1500	16.26	.133	.040	.133	.1	.3
1600	18.93	.133	.041	.133	.1	.3
1700	23.01	.133	.041	.133	.1	.3
1800	27.76	.133	.041	.133	.1	.3

TABLE B-13A

RED RIVER OF THE NORTH AT EAST GRAND FORKS, MINNESOTA

EXISTING AND PROPOSED CONDITIONS

MANNING'S ROUGHNESS VALUES AND TRANSITION LOSS COEFFICENTS
FOR THE ONE-PERCENT ANNUAL CHANCE FLOOD EVENT

CROSS SECTION NUMBER	RIVER MILE ABOVE MOUTH	LEFT OVER BANK "N"	CHANNEL "N"	RIGHT OVER BANK "N"	CONT COEF HEC2 CCHV	EXP COEF HEC2 CEHV
7790	295.70	.082	.034	.082	.1	.3
62	295.83	.082	.034	.082	.1	.3
7800	296.00	.082	.034	.082	.1	.3
7810	296.10	.070	.022	.070	.1	.3
7820	296.10	.070	.022	.070	.1	.3
7830	296.10	.070	.022	.070	.1	.3
7840	296.11	.070	.022	.070	.1	.3
59	296.22	.070	.032	.070	.1	.3
57	296.41	.070	.033	.070	.1	.3
56	296.55	.074	.033	.074	.1	.3
55	296.65	.074	.033	.074	.1	.3
53	296.85	.074	.033	.074	.1	.3
7910	296.92	.074	.033	.074	.1	.3
7911	296.95	.074	.033	.074	.1	.3
7912	296.96	.074	.033	.074	.1	.3
51	297.01	.082	.034	.082	.1	.3
50	297.11	.082	.034	.082	.1	.3
49	297.20	.082	.034	.082	.1	.3
47	297.38	.082	.034	.082	.1	.3
7920	297.52	.074	.034	.074	.5	1
7921	297.55	.074	.034	.074	.5	1
7922	297.55	.074	.034	.074	.5	1
7930	297.58	.074	.034	.074	.5	1
7931	297.60	.074	.034	.074	.5	1
7932	297.62	.074	.034	.074	.5	1
44	297.65	.074	.034	.074	.5	1
7940	297.72	.074	.034	.074	.5	1
7941	297.74	.082	.034	.082	.6	1
7942	297.75	.082	.034	.082	.6	1
42	297.82	.082	.034	.082	.6	1
7950	298.00	.082	.034	.082	.6	1

TABLE B-13B

RED RIVER OF THE NORTH AT EAST GRAND FORKS, MINNESOTA

EXISTING AND PROPOSED CONDITIONS

MANNING'S ROUGHNESS VALUES AND TRANSITION LOSS COEFFICENTS
FOR THE ONE-PERCENT ANNUAL CHANCE FLOOD EVENT

CROSS SECTION NUMBER	RIVER MILE ABOVE MOUTH	LEFT OVER BANK "N"	CHANNEL "N"	RIGHT OVER BANK "N"	CONT COEF HEC2 CCHV	EXP COEF HEC2 CEHV
7960	298.09	.131	.041	.131	.1	.3
7961	298.10	.131	.041	.131	.1	.3
39	298.13	.131	.041	.131	.1	.3
37	298.32	.082	.035	.082	.1	.3
35	298.45	.082	.035	.082	.1	.3
34	298.53	.082	.035	.082	.1	.3
33	298.62	.082	.035	.082	.1	.3
32	298.70	.082	.035	.082	.1	.3
31	298.82	.082	.035	.082	.1	.3
29	298.99	.082	.035	.082	.1	.3
27	299.17	.082	.035	.082	.1	.3
25	299.34	.107	.039	.107	.1	.3
23	299.55	.107	.039	.107	.1	.3
22	299.70	.107	.039	.107	.1	.3
21	299.96	.107	.039	.107	.1	.3
20	300.18	.066	.039	.107	.1	.3
19	300.40	.066	.039	.107	.1	.3
18	300.63	.066	.039	.107	.1	.3
16	301.12	.107	.039	.107	.1	.3
15	301.37	.107	.039	.107	.1	.3
14	301.61	.107	.039	.107	.1	.3
12	302.13	.107	.039	.107	.1	.3
11	302.38	.107	.039	.107	.1	.3
9	302.88	.107	.039	.107	.1	.3
8	303.09	.107	.039	.107	.1	.3
5	303.83	.107	.039	.107	.1	.3
4	304.08	.107	.039	.107	.1	.3

TABLE B-13C

RED RIVER OF THE NORTH AT EAST GRAND FORKS, MINNESOTA

EXISTING AND PROPOSED CONDITIONS

MANNING'S ROUGHNESS VALUES AND TRANSITION LOSS COEFFICENTS
FOR THE STANDARD PROJECT FLOOD EVENT

CROSS SECTION NUMBER	RIVER MILE ABOVE MOUTH	LEFT OVER BANK "N"	CHANNEL "N"	RIGHT OVER BANK "N"	CONT COEF HEC2 CCHV	EXP COEF HEC2 CEHV
7790	295.70	.072	.030	.072	.1	.3
62	295.83	.072	.030	.072	.1	.3
7800	296.00	.072	.030	.072	.1	.3
7810	296.10	.061	.019	.061	.1	.3
7820	296.10	.061	.019	.061	.1	.3
7830	296.10	.061	.019	.061	.1	.3
7840	296.11	.061	.019	.061	.1	.3
59	296.22	.061	.028	.061	.1	.3
57	296.41	.061	.029	.061	.1	.3
56	296.55	.065	.029	.065	.1	.3
55	296.65	.065	.029	.065	.1	.3
53	296.85	.065	.029	.065	.1	.3
7910	296.92	.065	.029	.065	.1	.3
7911	296.95	.065	.029	.065	.1	.3
7912	296.96	.065	.029	.065	.1	.3
51	297.01	.072	.030	.072	.1	.3
50	297.11	.072	.030	.072	.1	.3
49	297.20	.072	.030	.072	.1	.3
47	297.38	.072	.030	.072	.1	.3
7920	297.52	.065	.030	.065	.5	1
7921	297.55	.065	.030	.065	.5	1
7922	297.55	.065	.030	.065	.5	1
7930	297.58	.065	.030	.065	.5	1
7931	297.60	.065	.030	.065	.5	1
7932	297.62	.065	.030	.065	.5	1
44	297.65	.065	.030	.065	.5	1
7940	297.72	.065	.030	.065	.5	1
7941	297.74	.072	.030	.072	.6	1
7942	297.75	.072	.030	.072	.6	1
42	297.82	.072	.030	.072	.6	1
7950	298.00	.072	.030	.072	.6	1

TABLE B-13D

RED RIVER OF THE NORTH AT EAST GRAND FORKS, MINNESOTA

EXISTING AND PROPOSED CONDITIONS

MANNING'S ROUGHNESS VALUES AND TRANSITION LOSS COEFFICENTS
FOR THE STANDARD PROJECT FLOOD EVENT

CROSS SECTION NUMBER	RIVER MILE ABOVE MOUTH	LEFT OVER BANK "N"	CHANNEL "N"	RIGHT OVER BANK "N"	CONT COEF HEC2 CCHV	EXP COEF HEC2 CEHV
7960	298.09	.115	.036	.115	.1	.3
7961	298.10	.115	.036	.115	.1	.3
39	298.13	.115	.036	.115	.1	.3
37	298.32	.072	.031	.072	.1	.3
35	298.45	.072	.031	.072	.1	.3
34	298.53	.072	.031	.072	.1	.3
33	298.62	.072	.031	.072	.1	.3
32	298.70	.072	.031	.072	.1	.3
31	298.82	.072	.031	.072	.1	.3
29	298.99	.072	.031	.072	.1	.3
27	299.17	.072	.031	.072	.1	.3
25	299.34	.094	.034	.094	.1	.3
23	299.55	.094	.034	.094	.1	.3
22	299.70	.094	.034	.094	.1	.3
21	299.96	.094	.034	.094	.1	.3
20	300.18	.058	.035	.094	.1	.3
19	300.40	.058	.035	.094	.1	.3
18	300.63	.058	.035	.094	.1	.3
16	301.12	.094	.035	.094	.1	.3
15	301.37	.094	.035	.094	.1	.3
14	301.61	.094	.034	.094	.1	.3
12	302.13	.094	.034	.094	.1	.3
11	302.38	.094	.034	.094	.1	.3
9	302.88	.094	.034	.094	.1	.3
8	303.09	.094	.034	.094	.1	.3
5	303.83	.094	.034	.094	.1	.3
4	304.08	.094	.034	.094	.1	.3

TABLE B-13E

RED LAKE RIVER AT EAST GRAND FORKS, MINNESOTA

EXISTING AND PROPOSED CONDITIONS

MANNING'S ROUGHNESS VALUES AND TRANSITION LOSS COEFFICENTS
FOR THE ONE-PERCENT ANNUAL CHANCE FLOOD EVENT

CROSS SECTION NUMBER	RIVER MILE ABOVE MOUTH	LEFT OVER BANK "N"	CHANNEL "N"	RIGHT OVER BANK "N"	CONT COEF HEC2 CCHV	EXP COEF HEC2 CEHV
100	.03	.082	.033	.082	.1	.3
200	.14	.082	.033	.082	.1	.3
250	.16	.082	.033	.082	.1	.3
275	.17	.082	.033	.082	.1	.3
285	.17	.082	.033	.082	.1	.3
300	.20	.082	.033	.082	.1	.3
350	.23	.082	.033	.082	.1	.3
360	.27	.082	.033	.082	.3	.5
370	.27	.082	.033	.082	.3	.5
380	.29	.082	.033	.082	.3	.5
390	.29	.082	.033	.082	.3	.5
400	.52	.082	.033	.082	.1	.3
500	.72	.082	.033	.082	.1	.3
600	1.07	.082	.033	.082	.1	.3
700	1.48	.082	.033	.082	.1	.3
800	1.93	.082	.033	.082	.1	.3
900	2.13	.082	.033	.082	.1	.3
1000	2.93	.082	.033	.082	.1	.3
1100	5.21	.082	.035	.082	.1	.3
1200	8.27	.082	.035	.082	.1	.3
1300	10.93	.082	.034	.082	.1	.3
1400	14.54	.098	.038	.098	.1	.3
1500	16.26	.131	.039	.131	.1	.3
1600	18.93	.131	.041	.131	.1	.3
1700	23.01	.131	.041	.131	.1	.3
1800	27.76	.131	.041	.131	.1	.3

TABLE B-13F

RED LAKE RIVER AT EAST GRAND FORKS, MINNESOTA

EXISTING AND PROPOSED CONDITIONS

MANNING'S ROUGHNESS VALUES AND TRANSITION LOSS COEFFICENTS
FOR THE STANDARD PROJECT FLOOD EVENT

CROSS SECTION NUMBER	RIVER MILE ABOVE MOUTH	LEFT OVER BANK "N"	CHANNEL "N"	RIGHT OVER BANK "N"	CONT COEF HEC2 CCHV	EXP COEF HEC2 CEHV
100	150	.072	.029	.072	.1	.3
200	600	.072	.029	.072	.1	.3
250	100	.072	.029	.072	.1	.3
275	50	.072	.029	.072	.1	.3
285	15	.072	.029	.072	.1	.3
300	135	.072	.029	.072	.1	.3
350	150	.072	.029	.072	.1	.3
360	236	.072	.029	.072	.3	.5
370	1	.072	.029	.072	.3	.5
380	66	.072	.029	.072	.3	.5
390	1	.072	.029	.072	.3	.5
400	1248	.072	.029	.072	.1	.3
500	1034	.072	.029	.072	.1	.3
600	1878	.072	.029	.072	.1	.3
700	2166	.072	.029	.072	.1	.3
800	2350	.072	.029	.072	.1	.3
900	1050	.072	.029	.072	.1	.3
1000	4253	.072	.029	.072	.1	.3
1100	12000	.086	.031	.086	.1	.3
1200	16200	.086	.031	.086	.1	.3
1300	14000	.072	.030	.072	.1	.3
1400	19060	.086	.033	.086	.1	.3
1500	9080	.115	.035	.115	.1	.3
1600	14120	.115	.036	.115	.1	.3
1700	21540	.115	.036	.115	.1	.3
1800	25060	.115	.036	.115	.1	.3

TABLE B-14A

RED RIVER OF THE NORTH AT EAST GRAND FORKS, MINNESOTA

WITH PROJECT CONDITIONS

CHANNEL AND OVERBANK VELOCITIES IN FEET PER SECOND

		NED PLAN			1-PERCENT ANNUAL CHANCE FLOOD			STANDARD PROJECT FLOOD		
CROSS SECT NR	RIVER MILE	LEFT OVER BANK	CHANNEL	RIGHT OVER BANK	LEFT OVER BANK	CHANNEL	RIGHT OVER BANK	LEFT OVER BANK	CHANNEL	RIGHT OVER BANK
7790	295.70	.47	3.96	.86	.42	3.87	.83	.76	4.64	1.11
62	295.83	.98	5.54	1.32	.92	5.38	1.26	1.38	6.77	1.74
7800	296.00	.45	4.48	1.06	.39	4.36	1.02	.81	5.35	1.40
7810	296.10	.92	6.21	.92	.90	6.07	.88	1.18	7.27	1.23
7820	296.10	1.08	6.90	1.15	1.06	6.77	1.10	1.34	7.94	1.47
7830	296.10	1.08	6.88	1.10	1.05	6.75	1.05	1.34	7.90	1.41
7840	296.11	.92	6.20	.95	.89	6.06	.91	1.18	7.27	1.26
59	296.22	1.23	5.75	1.15	1.18	5.63	1.10	1.58	6.64	1.52
57	296.41	.98	4.72	1.20	.94	4.63	1.16	1.29	5.44	1.50
56	296.55	1.03	5.58	1.18	.99	5.50	1.13	1.33	6.27	1.50
55	296.65	.89	5.51	1.14	.84	5.40	1.09	1.22	6.31	1.48
53	296.85	1.02	6.85	1.59	.98	6.69	1.53	1.39	8.03	2.03
7910	296.92	.92	4.66	1.21	.87	4.52	1.16	1.29	5.71	1.62
7911	296.95	.61	4.49	1.14	.56	4.37	1.10	.93	5.43	1.45
7912	296.96	.62	4.40	1.12	.57	4.29	1.09	.93	5.30	1.43
51	297.01	.93	5.26	1.41	.90	5.11	1.35	1.25	6.47	1.83
50	297.11	.76	4.87	1.07	.71	4.74	1.02	1.09	5.96	1.45
49	297.20	.78	5.14	1.18	.73	5.01	1.12	1.14	6.27	1.57
47	297.38	.73	5.12	1.08	.67	5.01	1.02	1.14	6.11	1.46
7920	297.52	.47	4.69	.50	.41	4.56	.43	.87	5.74	.90
7921	297.55	.47	4.69	.50	.41	4.55	.43	.87	5.74	.90
7922	297.55	1.16	5.60	1.29	1.07	5.48	1.20	1.72	6.56	1.83
7930	297.58	.87	5.43	.99	.81	5.29	.92	1.30	6.50	1.41
7931	297.60	.87	5.42	.99	.81	5.28	.92	1.30	6.49	1.41
7932	297.62	1.24	6.08	1.24	1.17	5.93	1.17	1.73	7.23	1.73
44	297.65	.85	5.29	1.47	.80	5.14	1.41	1.21	6.44	1.89
7940	297.72	.81	4.44	1.24	.78	4.30	1.20	1.11	5.45	1.57
7941	297.74	.74	4.49	1.13	.71	4.35	1.10	1.02	5.53	1.43
7942	297.75	1.05	5.19	1.75	.99	5.02	1.69	1.49	6.00	2.11
42	297.82	.56	4.55	1.29	.52	4.39	1.24	.88	5.44	1.61
7950	298.00	.72	5.33	1.56	.67	5.14	1.50	1.08	6.30	1.90

TABLE B-14B

RED RIVER OF THE NORTH AT EAST GRAND FORKS, MINNESOTA

WITH PROJECT CONDITIONS

CHANNEL AND OVERBANK VELOCITIES IN FEET PER SECOND

		NED PLAN			1-PERCENT ANNUAL CHANCE FLOOD			STANDARD PROJECT FLOOD		
CROSS SECT NR	RIVER MILE	LEFT OVER BANK	CHANNEL	RIGHT OVER BANK	LEFT OVER BANK	CHANNEL	RIGHT OVER BANK	LEFT OVER BANK	CHANNEL	RIGHT OVER BANK
7960	298.09	.42	3.29	.92	.38	3.07	.86	.63	4.18	1.18
7961	298.10	.61	3.66	.67	.56	3.42	.62	.90	4.63	.97
39	298.13	.52	4.54	.72	.48	4.27	.66	.77	5.42	.97
37	298.32	.60	3.30	.53	.55	3.11	.48	.84	3.96	.77
35	298.45	.61	3.48	.99	.56	3.29	.93	.87	4.15	1.26
34	298.53	.53	3.38	.93	.48	3.18	.87	.79	4.08	1.20
33	298.62	.38	3.25	.88	.34	3.05	.82	.65	3.97	1.15
32	298.70	.33	2.79	.73	.31	2.62	.68	.54	3.47	.98
31	298.82	.46	2.89	.80	.41	2.71	.74	.71	3.61	1.07
29	298.99	.74	3.60	.77	.69	3.40	.71	.99	4.34	1.05
27	299.17	.65	3.64	.62	.59	3.43	.57	.91	4.39	.87
25	299.34	.57	3.56	.64	.53	3.35	.59	.82	4.44	.87
23	299.55	.55	3.60	.65	.51	3.40	.61	.76	4.35	.83
22	299.70	.59	3.72	.40	.55	3.53	.37	.78	4.30	.59
21	299.96	.44	3.41	.56	.40	3.25	.53	.63	3.87	.71
20	300.18	.99	2.78	.51	.93	2.64	.48	1.25	3.25	.65
19	300.40	.90	3.38	.48	.84	3.22	.45	1.18	3.88	.64
18	300.63	.95	3.09	.33	.90	2.95	.32	1.17	3.48	.47
16	301.12	.70	3.71	.61	.66	3.52	.57	.85	4.41	.80
15	301.37	.72	3.77	.42	.68	3.59	.39	.89	4.31	.62
14	301.61	.61	3.68	.37	.57	3.50	.34	.80	4.25	.55
12	302.13	.40	3.01	.49	.38	2.87	.47	.54	3.46	.62
11	302.38	.27	2.63	.48	.26	2.53	.46	.38	2.87	.56
9	302.88	.29	3.48	.47	.26	3.38	.45	.45	3.56	.56
8	303.09	.42	3.35	.48	.50	3.21	.45	.45	3.72	.62
5	303.83	.41	3.48	.56	.37	3.35	.51	.60	3.92	.74
4	304.08	.49	3.65	.64	.46	3.52	.60	.65	4.10	.81

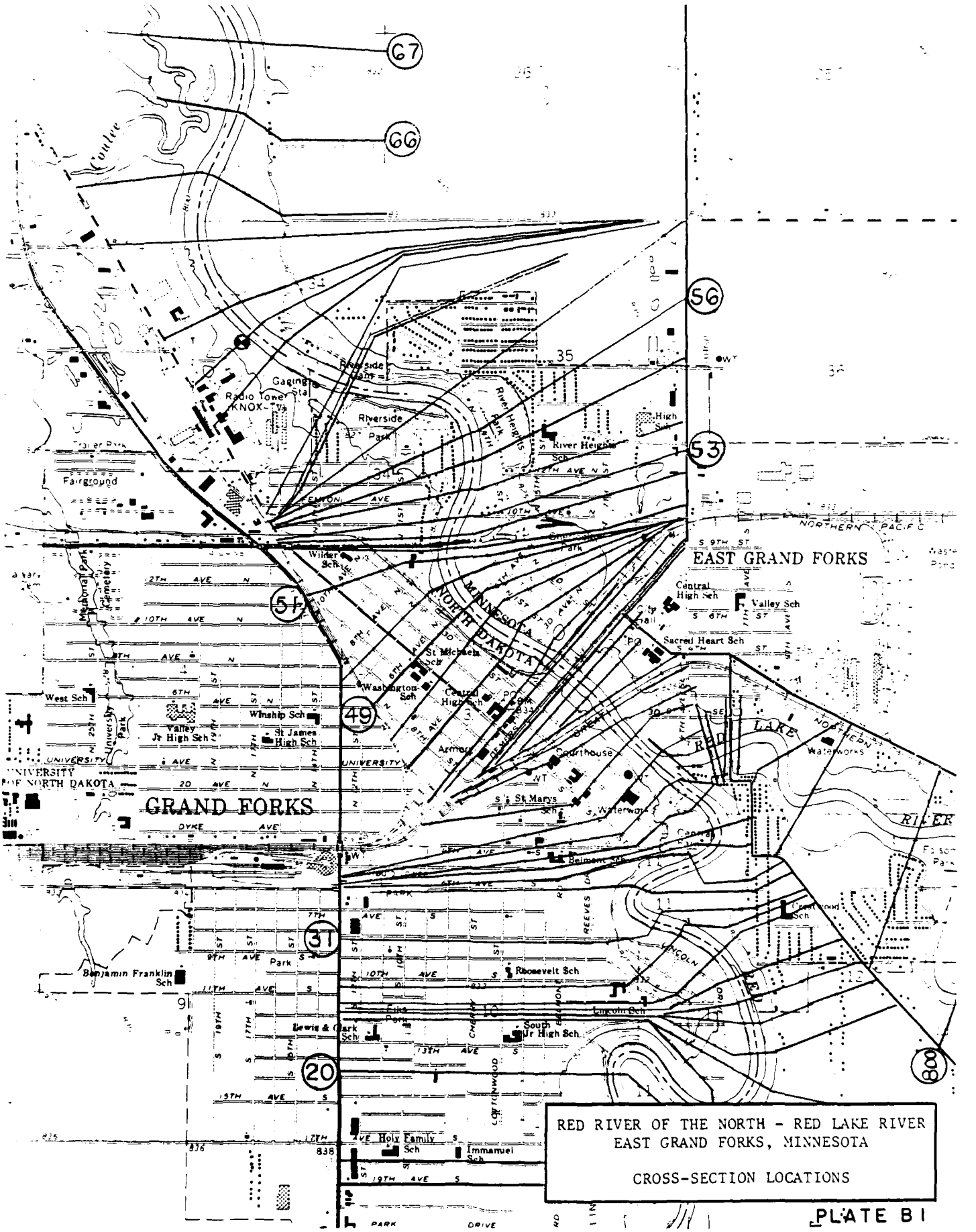
TABLE B-14C

RED LAKE RIVER AT EAST GRAND FORKS, MINNESOTA

WITH PROJECT CONDITIONS

CHANNEL AND OVERBANK VELOCITIES IN FEET PER SECOND

		NED PLAN			1-PERCENT ANNUAL CHANCE FLOOD			STANDARD PROJECT FLOOD		
CROSS SECT NR	RIVER MILE	LEFT OVER BANK	CHANNEL	RIGHT OVER BANK	LEFT OVER BANK	CHANNEL	RIGHT OVER BANK	LEFT OVER BANK	CHANNEL	RIGHT OVER BANK
100	.03	.28	1.21	.35	.30	1.29	.37	.31	1.27	.38
200	.14	.52	1.92	.44	.56	2.06	.47	.55	1.94	.48
250	.16	.51	2.01	.44	.54	2.16	.47	.54	2.03	.48
275	.17	.59	2.12	.51	.63	2.28	.54	.61	2.11	.54
285	.17	.59	2.12	.51	.63	2.28	.54	.61	2.11	.54
300	.20	.44	1.86	.46	.47	1.99	.49	.47	1.91	.48
350	.23	.45	1.78	.50	.48	1.91	.53	.48	1.83	.52
360	.27	.54	1.99	.60	.57	2.13	.64	.59	2.07	.64
370	.27	.55	2.49	.67	.58	2.61	.74	.69	2.48	.75
380	.29	.55	2.49	.67	.58	2.61	.74	.69	2.48	.75
390	.29	.54	1.99	.60	.57	2.13	.64	.59	2.07	.64
400	.52	.50	1.99	.40	.54	2.14	.43	.52	1.98	.43
500	.72	.38	1.36	.29	.40	1.45	.30	.39	1.38	.32
600	1.07	.31	1.57	.31	.33	1.69	.34	.30	1.50	.30
700	1.48	.38	1.63	.45	.41	1.75	.48	.42	1.65	.47
800	1.93	.22	1.25	.30	.24	1.35	.32	.22	1.22	.31
900	2.13	.36	1.69	.28	.40	1.83	.31	.34	1.55	.28
1000	2.93	.34	1.78	.49	.38	1.93	.53	.30	1.62	.43
1100	5.21	.23	1.36	.32	.27	1.47	.34	.18	1.31	.32
1200	8.27	.30	1.79	.40	.32	1.92	.44	.21	1.68	.27
1300	10.93	.53	2.21	.43	.57	2.37	.48	.38	2.00	.25
1400	14.54	.31	1.15	.20	.33	1.23	.21	.30	1.08	.19
1500	16.26	.30	1.49	.29	.31	1.59	.31	.32	1.51	.30
1600	18.93	.66	3.27	.57	.70	3.49	.60	.71	3.35	.61
1700	23.01	.59	2.78	.50	.62	2.94	.53	.62	2.86	.55
1800	27.76	.47	2.53	.56	.49	2.66	.59	.50	2.62	.60



RED RIVER OF THE NORTH - RED LAKE RIVER
EAST GRAND FORKS, MINNESOTA

CROSS-SECTION LOCATIONS

PLATE B1

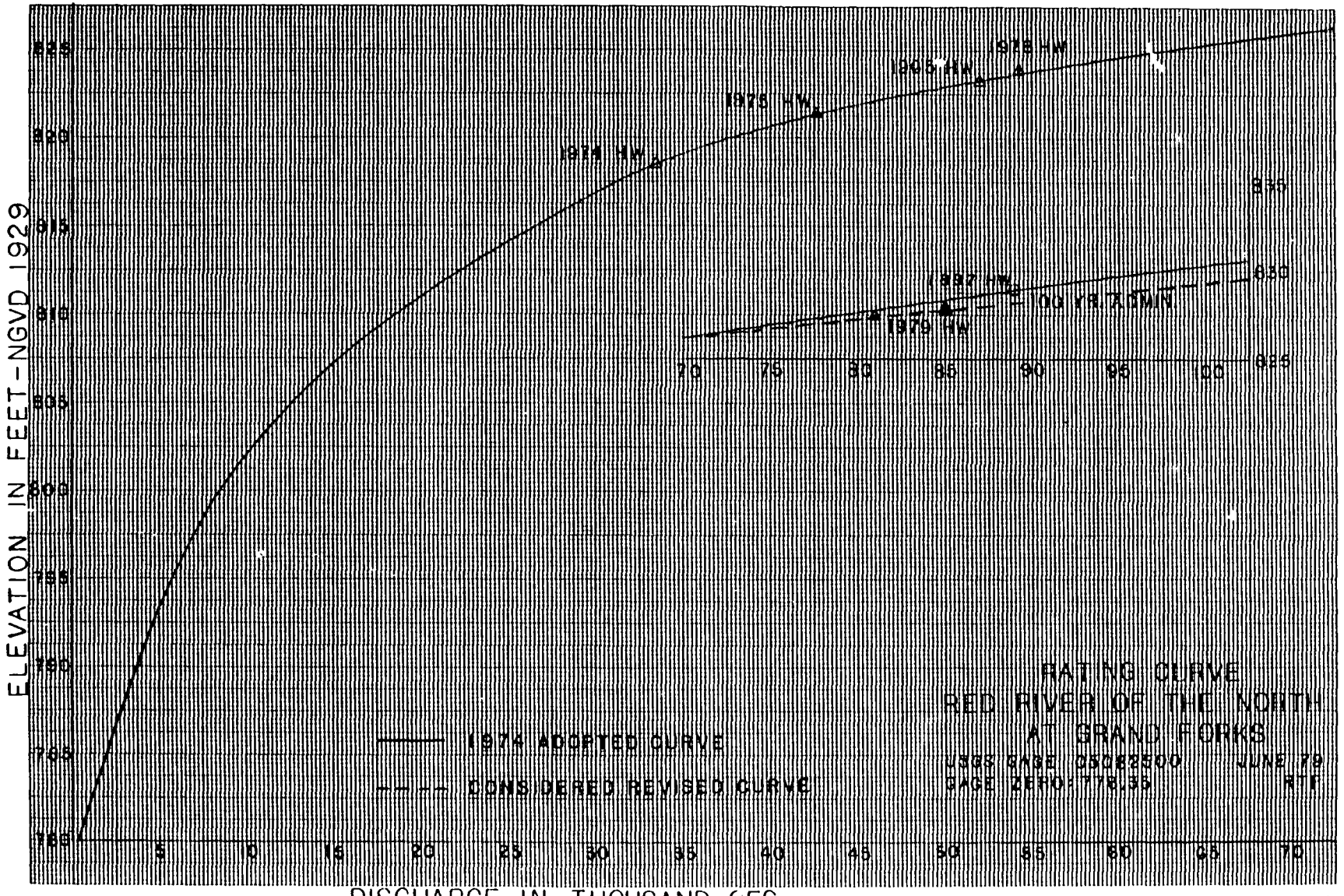

ELEVATION IN FEET-NGVD 1929
DISCHARGE IN THOUSAND CFS
1974 HW
1975 HW
1965 HW
1918 HW
1952 HW
1979 HW
100 YR 7-DAY
1974 ADOPTED CURVE
CONSIDERED REVISED CURVE
RATING CURVE
RED RIVER OF THE NORTH
AT GRAND FORKS
USGS GAGE 05082500 JUNE 79
GAGE ZERO: 778.35 RTF

PLATE B2

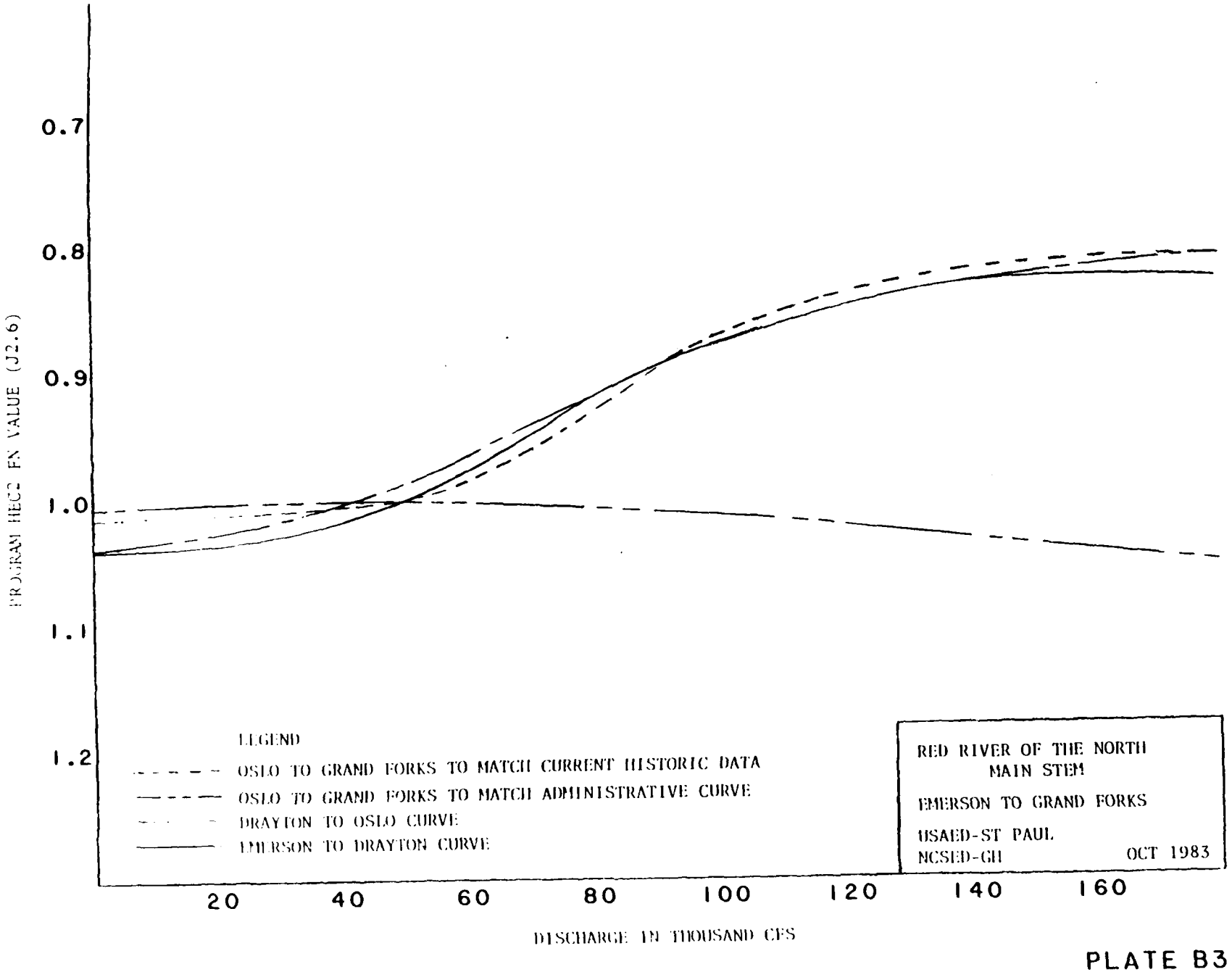

0.7
0.8
0.9
1.0
1.1
1.2
PROGRAM HEC2 FN VALUE (J2.6)
LEGEND
OSLO TO GRAND FORKS TO MATCH CURRENT HISTORIC DATA
OSLO TO GRAND FORKS TO MATCH ADMINISTRATIVE CURVE
DRAYTON TO OSLO CURVE
EMERSON TO DRAYTON CURVE
RED RIVER OF THE NORTH
MAIN STEM
EMERSON TO GRAND FORKS
USAED-ST PAUL
NCSED-GH
OCT 1983
20
40
60
80
100
120
140
160
DISCHARGE IN THOUSAND CFS

PLATE B3

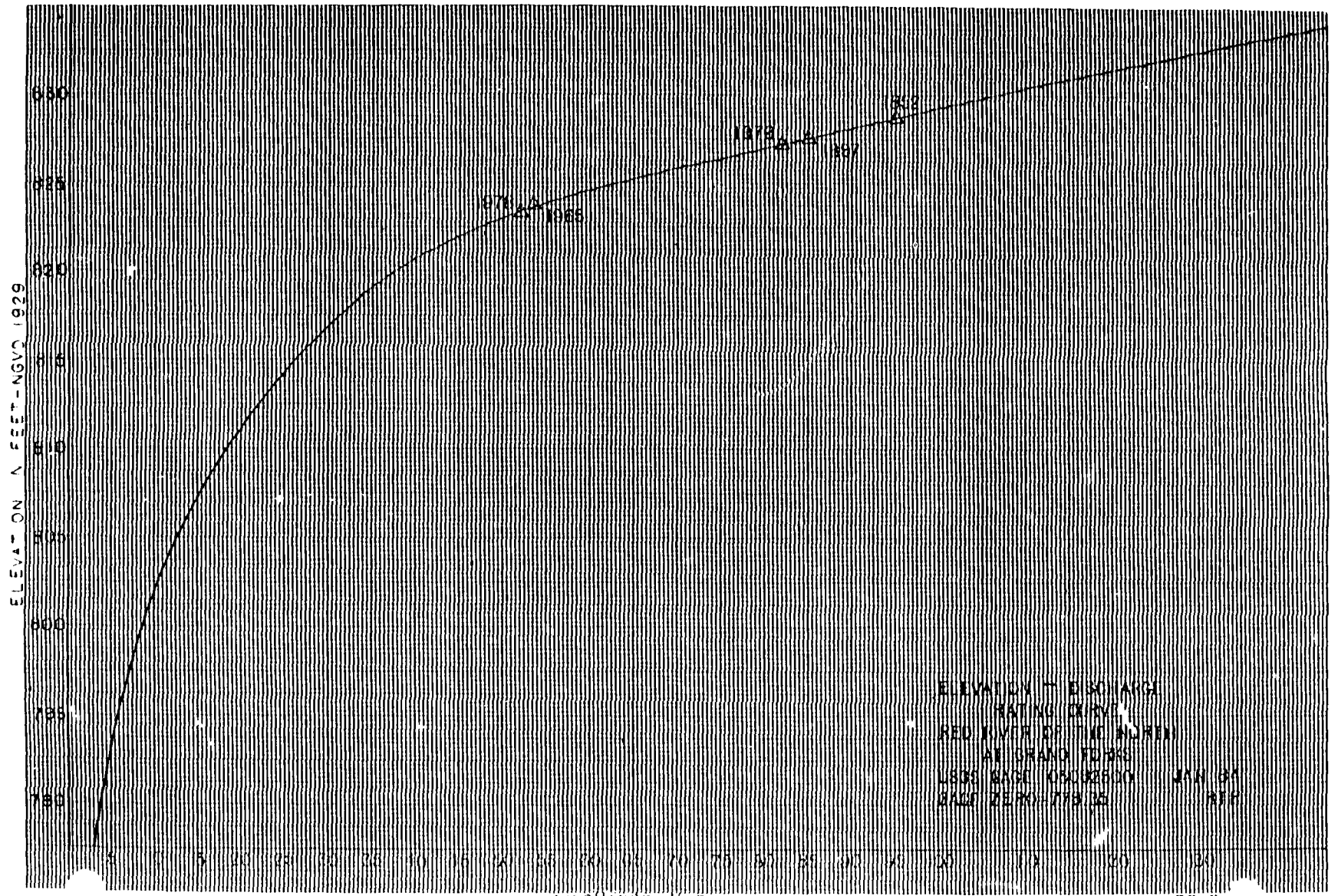

ELEVATION IN FEET-NGVD 1929
DISCHARGE IN THOUSAND CFS
1952
1913
1907
1974
1965
ELEVATION - DISCHARGE
RATING CURVE
RED RIVER OF THE NORTH
AT GRAND FORKS
USGS GAGE 05082500 JAN 64
DATE ZERO 779.35 REF

PLATE B-

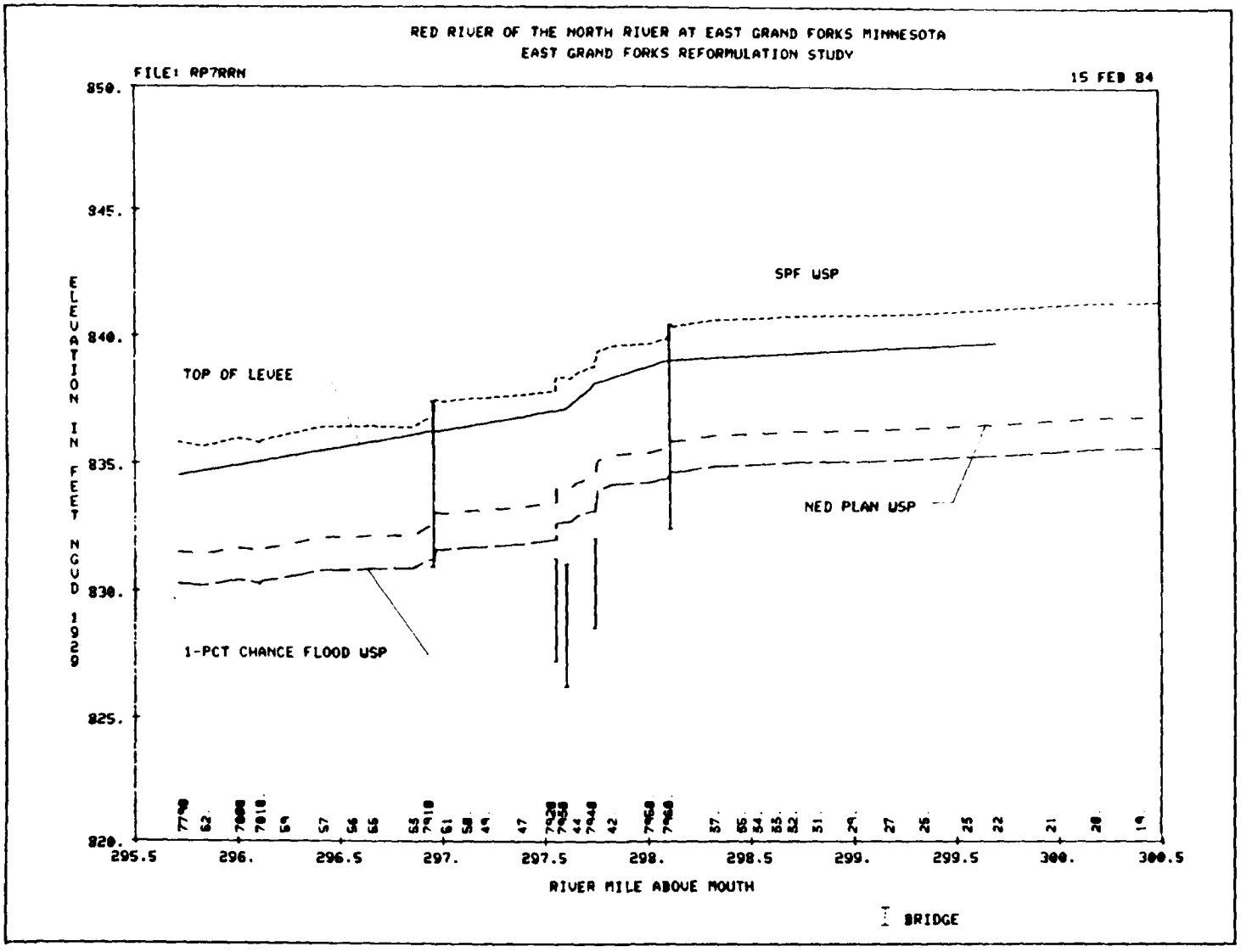

RED RIVER OF THE NORTH RIVER AT EAST GRAND FORKS MINNESOTA
EAST GRAND FORKS REFORMULATION STUDY
FILE: RP7RRN
15 FEB 84
ELEVATION IN FEET NGVD 1929
850.
845.
840.
835.
830.
825.
820.
SPF USP
TOP OF LEVEE
NED PLAN USP
1-PCT CHANCE FLOOD USP
295.5
296.
296.5
297.
297.5
298.
298.5
299.
299.5
300.
300.5
RIVER MILE ABOVE MOUTH
BRIDGE

PLATE B5

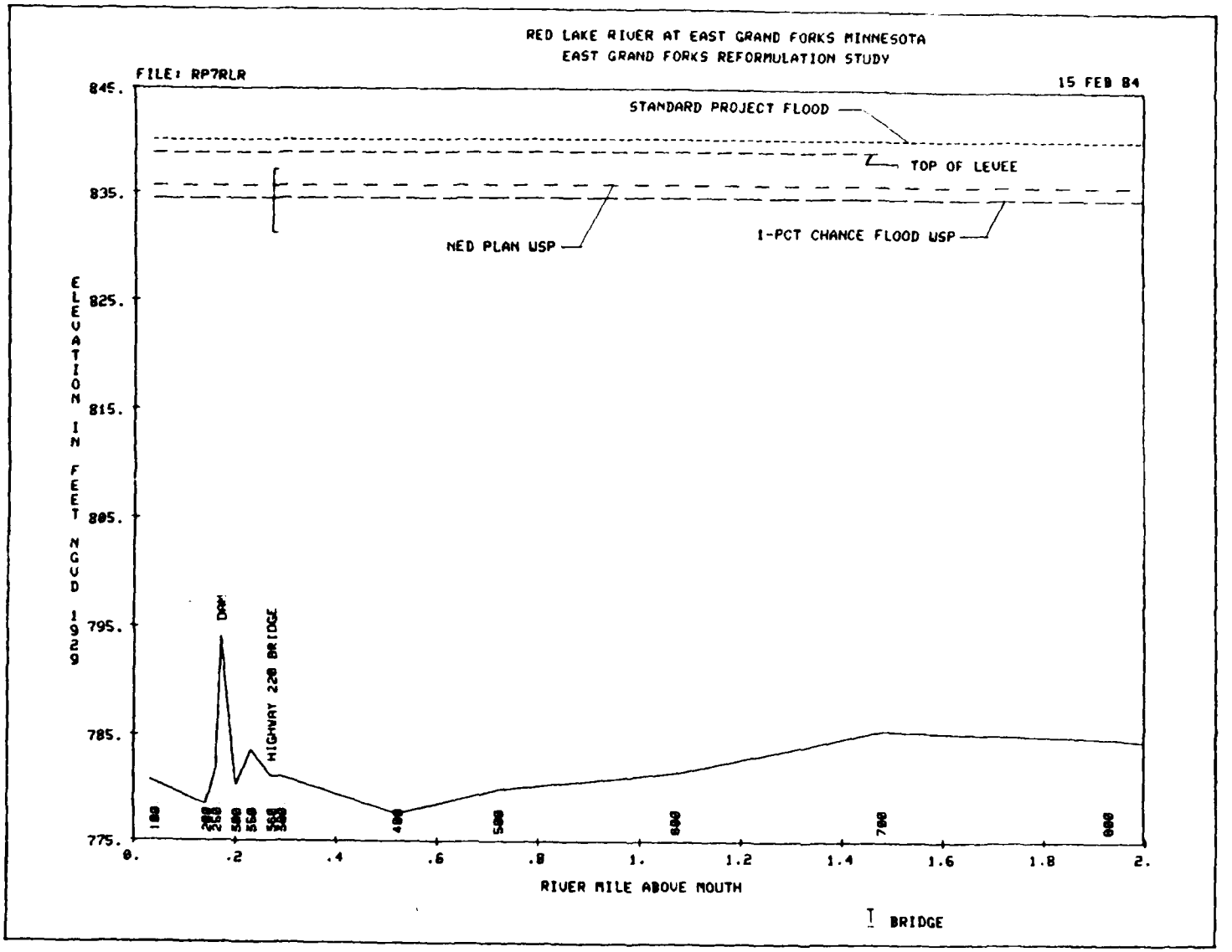

RED LAKE RIVER AT EAST GRAND FORKS MINNESOTA
EAST GRAND FORKS REFORMULATION STUDY
FILE: RP7RLR
15 FEB 84
STANDARD PROJECT FLOOD
TOP OF LEVEE
NED PLAN USP
1-PCT CHANCE FLOOD USP
ELEVATION IN FEET NGVD 1929
845.
835.
825.
815.
805.
795.
785.
775.
DAM
HIGHWAY 220 BRIDGE
0.
.2
.4
.6
.8
1.
1.2
1.4
1.6
1.8
2.
RIVER MILE ABOVE MOUTH
BRIDGE

PLATE B6

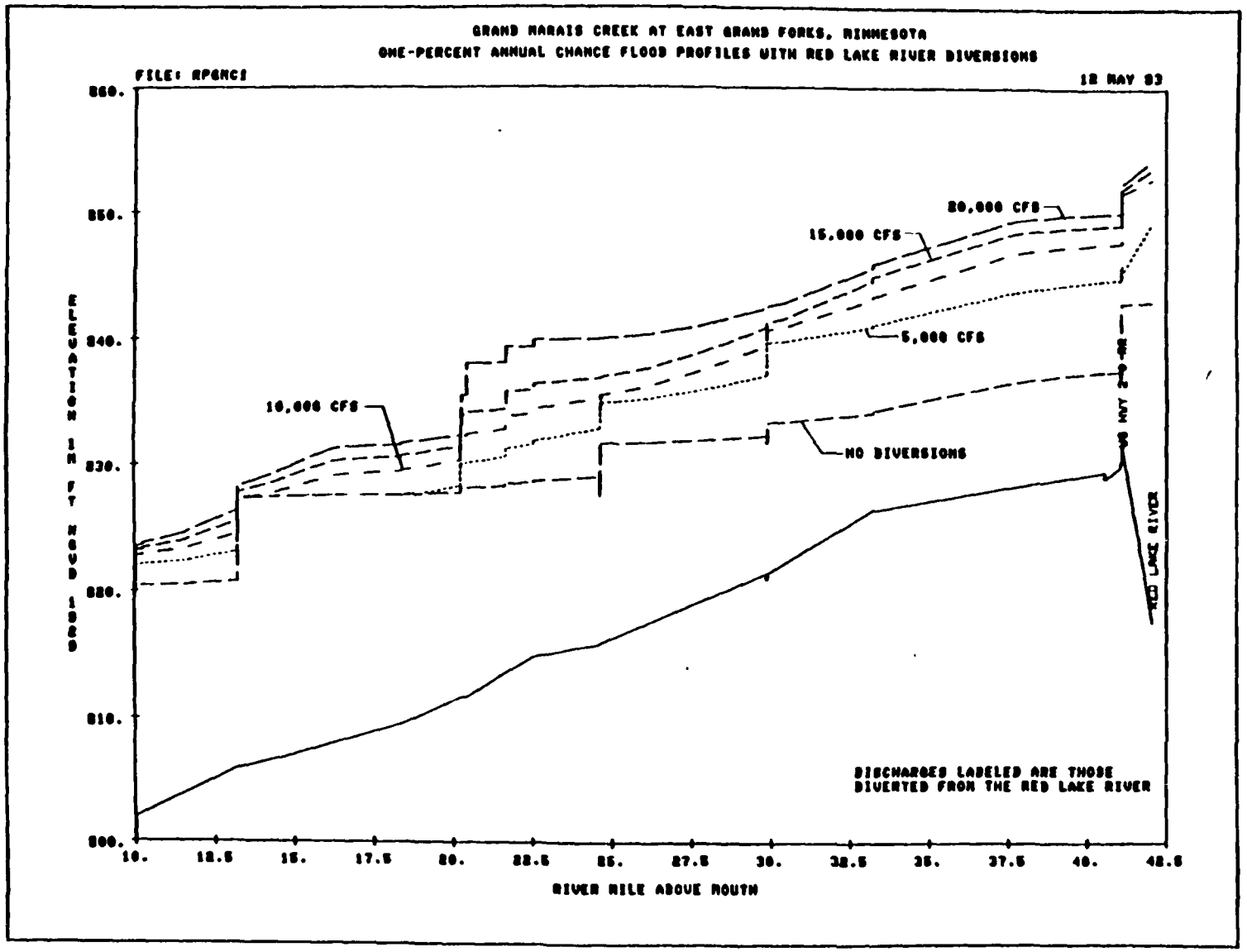

GRAND MARAIS CREEK AT EAST GRAND FORKS, MINNESOTA
ONE-PERCENT ANNUAL CHANCE FLOOD PROFILES WITH RED LAKE RIVER DIVERSIONS
FILE: RPGNCF
12 MAY 83
860.
850.
840.
830.
820.
810.
800.
20,000 CFS
15,000 CFS
10,000 CFS
5,000 CFS
NO DIVERSIONS
US HWY 2
RED LAKE RIVER
DISCHARGES LABELED ARE THOSE
DIVERTED FROM THE RED LAKE RIVER
10.
12.5
15.
17.5
20.
22.5
25.
27.5
30.
32.5
35.
37.5
40.
42.5
RIVER MILE ABOVE MOUTH

PLATE B7

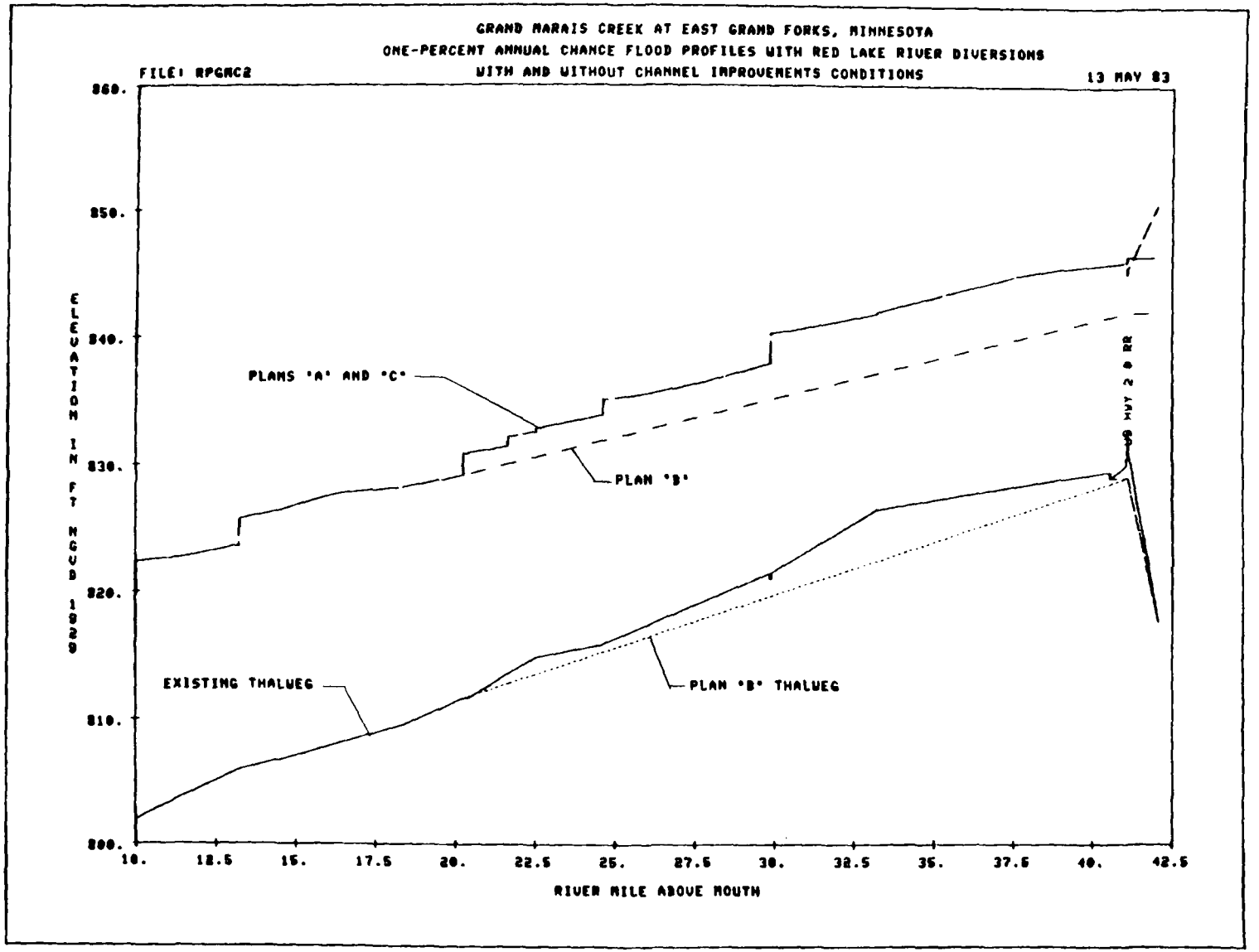

GRAND MARAIS CREEK AT EAST GRAND FORKS, MINNESOTA
ONE-PERCENT ANNUAL CHANCE FLOOD PROFILES WITH RED LAKE RIVER DIVERSIONS
WITH AND WITHOUT CHANNEL IMPROVEMENTS CONDITIONS
FILE: RPGRC2
13 MAY 83
860.
850.
840.
830.
820.
810.
800.
ELEVATION IN FT NGVD 1929
PLANS "A" AND "C"
PLAN "B"
MAY 2 @ RR
EXISTING THALWEG
PLAN "B" THALWEG
10.
12.5
15.
17.5
20.
22.5
25.
27.5
30.
32.5
35.
37.5
40.
42.5
RIVER MILE ABOVE MOUTH

PLATE B8

EAST GRAND FORKS, MINNESOTA
GENERAL REEVALUATION

SUPPORTING DOCUMENTATION
GEOTECHNICAL DESIGN

SUPPORTING DOCUMENTATION

GEOTECHNICAL DESIGN

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Number	
1	Stability, Right Bank, Red River of the North Downstream of Sorley Bridge
2	Boring Logs 80-1M to 80-4M
3	Boring Logs 80-5M to 80-9M
4	Boring Logs 80-10M to 80-12M
5	Borings M-2 to M-12, excluding M-4
6	Auger Boring Logs A-2 to A-6
7	Foundation Problem Areas

SUPPORTING DOCUMENTATION
GEOTECHNICAL DESIGN

GENERAL

The Red River Valley is not a true river valley but a nearly level, featureless plain that was once the bottom of glacial Lake Agassiz. Lake Agassiz was formed when an ice barrier to the north obstructed the flow of the Red River of the North during the last glacial recession from the region about 9,000 years ago. This flat plain is broken by the sinuous channel of the Red River of the North flowing north between the cities of Grand Forks, North Dakota, and East Grand Forks, Minnesota.

SOIL EXPLORATION

For the Definite Project Report prepared in May 1953, 10 machine and 5 hand-auger borings were made. For the present study, 12 machine borings were made, and a slope indicator was installed.

FOUNDATION SOILS

The foundation soils at East Grand Forks consist of an upper zone of lacustrine soils that were deposited in glacial Lake Agassiz, a zone of lake-washed glacial sediments, and a zone of glacial till that underlies the lake-washed sediments and overlies the bedrock. In addition, fluvial soils are found within the meander belts of rivers as a result of river erosion and subsequent deposition. The soils are similar to those throughout the Red River Valley and are not unique to the East Grand Forks area.

Significant fluvial deposits are found only within the meander belt where they may be as much as 50 feet thick. These sediments consist

generally of silty clays, but it is common to find lenses of silt and sand, especially on the Red Lake River.

The lacustrine soils, which at East Grand Forks extend from the lake plain ground surface to depths of about 80 feet, are notorious throughout the Red River Valley because of their history of problems with both structure stability and slope stability. The lacustrine soils consist basically of two units. The upper unit is a laminated clay and silt, whereas the lower unit is a moderately overconsolidated, highly plastic, dark gray clay with no apparent bedding. The lower unit has high liquid limits, high natural water contents, and low dry densities, and it tends to form slickensided planes of failure. Experience indicates that the lower lacustrine unit is the major contributor to slope stability problems throughout the Red River Valley.

Glacial deposits underlie the lacustrine sediments throughout the Red River Valley. The upper portion of these sediments has been washed and mixed with the lower lacustrine sediments. The transition from lacustrine sediments to till is broad and gradual. The glacial deposits are more stable than the overlying lacustrine sediments.

EXISTING RIVERBANK STABILITY PROBLEMS

The rivers that have formed since the drainage of glacial Lake Agassiz have eroded into the lacustrine deposits to depths sufficient to create unstable or only marginally stable riverbanks throughout the Red River Valley. Such conditions exist in East Grand Forks, where the rivers have eroded about 50 feet into the lacustrine deposits.

The scarp of riverbank slides is frequently located in the secondary riverbank 100 to 400 feet or more from the edge of the river, with the toe in the river near the opposite riverbank. Because of the depth of the lacustrine deposits and because the slides may extend several

hundred feet along the riverbank, the slides normally contain massive amounts of material. Fortunately, rapid slides involving sudden, large, horizontal and vertical displacements are not common. Normally the slides develop slowly, with visible cracks developing at the scarp before any apparent vertical or horizontal displacements occur. Although ultimate displacements may become large, the displacements normally occur as a series of small movements spread over a relatively long period of time. Such movements normally do not create concern among local interests until the movements damage structures or utilities. When damage does occur, it normally leads to costly, intermittent repairs, followed eventually by abandonment.

Failure of the existing riverbanks frequently occurs without any apparent increase in riverbank loading. The failures indicate that in many cases the stability of the riverbank is so marginal that minor changes in existing conditions are sufficient to initiate failure. Such changes may include changes in groundwater level, changes in the water content of the riverbank soils, erosion in the existing river channel, and a lower than normal river level. Because of the unstable or marginally stable riverbanks, there have been numerous cases throughout the Red River Valley where sliding has been initiated, or existing slides have been aggravated, by placing a relatively small load on the riverbank. Examples of such loads are emergency levees or other fills that are placed either along the top or riverward of the secondary riverbank. These examples generally occur where the river abuts the edge of the meander belt. Where the river is well within the meander belt, greater loadings generally are required to initiate failure.

ENGINEERING CHARACTERISTICS OF LAKE AGASSIZ DEPOSITS

Examination of past slope failures has shown that in almost all cases the problems can be traced to the lower unit of the lacustrine deposits. This layer characteristically has liquid limits that are

generally greater than 70 percent, moisture contents generally greater than 50 percent, and is moderately overconsolidated.

Standard laboratory shear tests of samples obtained from the lower lacustrine unit show that the material reaches peak strength at very low (1 to 2 percent) strain and that a large reduction in strength occurs at higher strains. This is in contrast to the more general case where soil strengths tend to increase up to 10, 15, or even 20 percent strain. The laboratory shear strength of the lower lacustrine unit is known to be sensitive to both sample size and strain rate. The laboratory shear strength is significantly higher than the shear strength obtained by back-calculating along known, in-situ failure surfaces. Selecting strength values for the lower lacustrine unit, as well as values for other soils in the profile, requires consideration of strain compatibility of the soils, and good judgment based on past experience.

SHEAR STRENGTH PARAMETERS

Many problems are associated with determining realistic shear strength parameters for the Lake Agassiz deposits. Recently, the ultimate or work-softened strengths have been used in selecting design parameters. The results of this method have not been acceptable. Investigation of existing slides indicates that, without exception, movement is confined to an area well riverward of where analyses suggest is most critical. In addition, back-calculating along an observed failure surface results in shear strength values considerably less than those observed in testing. Therefore, a significant difference exists in the strength of a sedimentary unit depending on whether it is a failed or an unfailed portion of this deposit. As a result of this phenomenon, a differentiation has been made between disturbed and undisturbed deposits. Disturbed strengths were determined by back-calculating along known or estimated failure planes for each section. This method then uses the existing slope geometry as a large in-situ shear strength

test. Strengths for the undisturbed portion of the slope were taken from triaxial tests using the strain equilibrium method. Analyses using strains of 2-1/2, 5, and 10 percent in the undisturbed portions were performed, with the 5 percent strain giving the best results.

STABILITY ANALYSIS

Slope stability was analyzed using Corps of Engineers' Program I0013 that applies the method presented in EM 1110-2-1902, 1 April 1970. The end of construction condition was evaluated. The impervious nature of the soils and slow recession of floods minimize the chance of sudden drawdown failure.

Stability analysis was performed immediately downstream of Demers Avenue and on both sides of the Red Lake River immediately upstream of the dam. Location of the flood barrier was determined by adjusting the distance from the river to determine an acceptable factor of safety in terms of both circular and generalized failure surface calculations. Locations for 100-year and standard project flood protection levels were found to share nearly the same riverward toe.

The effects of unloading riverward of the flood barrier were investigated, with unloading having the greatest impact where the foundation elevation is high. In some areas, unloading allows the barrier to be shifted riverward 50 to 150 feet. Riverbank unloading will be considered in future stability studies to minimize the number of homes and businesses to be left outside the flood barrier.

DETERMINATION OF STUDY ALIGNMENT

The flood barrier alignment proposed in the 1953 Definite Project Report was reevaluated using current exploration, testing, and analytical knowledge to determine its stability, and was found to be unacceptable. On-site inspection verifies this conclusion as three

unstable areas are evident along the proposed 1953 alignment. Further evidence showing the inadequacies of the 1953 alignment can be obtained by studying records of the Grand Forks levee system, which was constructed in 1954. The design of the Grand Forks levee is similar to the 1953 design of the East Grand Forks levee. During the construction of the Grand Forks levee, a major slide occurred requiring a major alignment shift landward with a substitution of floodwall for the levee. In another area the levee is 1.9 feet lower than the design elevation. The reason for this deformation is undetermined.

The alignment recommended is based on the stability analysis performed for this report. Setback distances, with satisfactory factors of safety, were determined for the three cross sections and applied to appropriate segments of the barrier. In areas of known slides, additional setback distances were applied to compensate for the weakened soils.

EXISTING FLOOD EMERGENCY LEVEES

The stability analysis performed indicates that complete removal of the existing levee material would minimize the setback distance. For this reason, all current and future stability studies will assume that the emergency fill will be removed. It is anticipated that all material removed from the existing embankment and from areas of riverbank unloading will be suitable for levee fill for new construction.

CONSOLIDATION

Consolidation data for the Lake Agassiz deposits is not currently available. For that reason, no settlement analysis was prepared for this report. Past experience has generally shown that settlement is not a serious problem along the Red River of the North. However,

consolidation tests and calculations will be programmed in the general design memorandum (GDM) phase to evaluate the impacts on utility lines left under the final levee alignment.

SEEPAGE

The impervious nature of the soils in the area precludes seepage problems.

SLOPE PROTECTION

Grass will protect levee slopes from erosion. It may be necessary to use riprap or some other more positive method around local sources of turbulence such as bridges or outlets.

FUTURE INVESTIGATIONS AND STUDIES

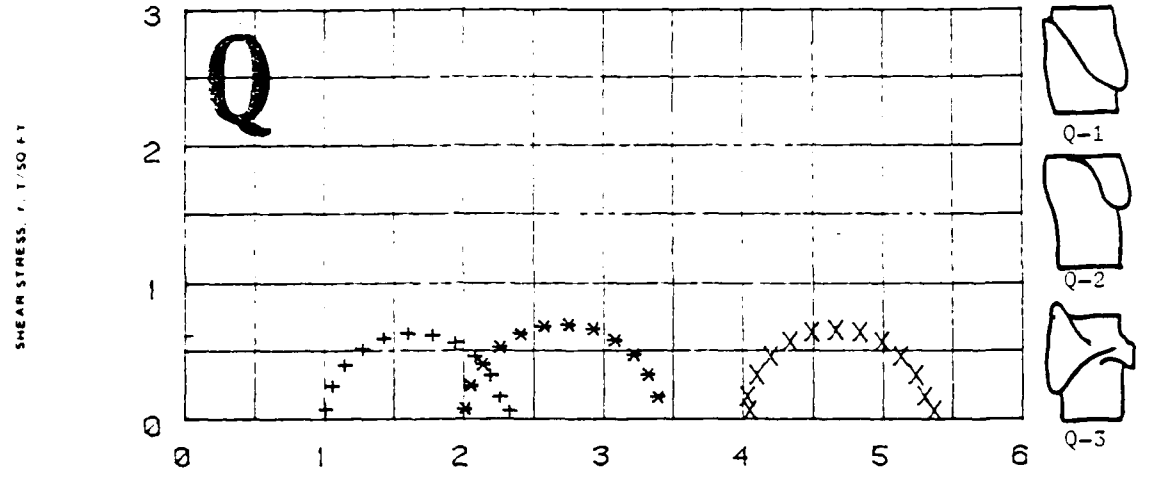
Stability analysis thus far has been limited to areas where the foundation elevation is high. A greater concentration of effort is needed in these areas. An example is where the levee intersects U.S. Highway 2.

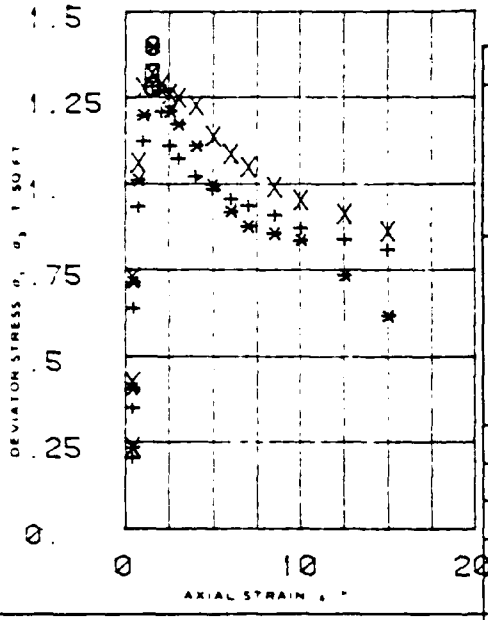
It can be argued that much of the soil profile used in analysis was assigned shear strengths near the resistance value that would be obtained using a residual strength analysis. Because of the strain incompatibility of undisturbed soils and the presence of disturbed materials within the embankment, consideration should be given to pursuing a residual strength analysis with a reduced factor of safety. Likewise, reducing the normal required factors of safety for a conventional analysis should also be considered. In areas where significant bank unloading is used, the stability analysis should be based on effective stress design in lieu of total stress design. In

select areas of instability, full-scale test-fills (levees) with proper monitoring may merit attention in the GDM phase or during project construction.

Parametric studies should also be performed in the GDM phase to evaluate the impacts on factor of safety for sliding in relation to the long (700-foot) failure arc and/or plane. The effects of such factors as side force assumptions and the shape of the failure plane may significantly alter the apparent computed factor of safety.

As a result of the sensitivity and the uncertainties in assessing the stability and determining a final alignment of the East Grand Forks levee, it is proposed to program $180,000 in the GDM phase to cover future geotechnical investigations and design. Such studies would include drilling, testing, analysis, and other parametric studies of the math model used to compute stability. Prior to the start of expenditures for the geotechnical investigation and design, it is proposed to convene a 2-day field trip for higher authority to visit and inspect past levee activity along the Red River of the North. The field trip will provide considerable insight into the bank instability problems and the design issues involved in planning high levees along the riverbank.





SPECIMEN NO			1	2	3
INITIAL	WATER CONTENT, %	w_o	55.2	57.2	55.6
	DRY DENSITY LB/CU FT	γd_o	66.5	65.9	66.3
	SATURATION, %	S_o	97.	99.	97.
	VOID RATIO	e_o	1.53	1.56	1.54
BEFORE SHEAR	WATER CONTENT, %	w_c	56.5	58.6	55.5
	DRY DENSITY LB/CU FT	γd_c	66.5	66.1	66.6
	SATURATION, %	S_c	99.	100.	98.
	VOID RATIO	e_c	1.53	1.55	1.53
	FINAL BACK PRESSURE T SQ FT	u_b	0.	0.	0.
MINOR PRINCIPAL STRESS, T SQ FT		σ_3	1.	2.	4.
MAXIMUM DEVIATOR STRESS T SQ FT		$(\sigma_1 - \sigma_3)_{max}$	1.28	1.4	1.32
TIME TO $(\sigma_1 - \sigma_3)_{max}$ MIN		t_f	4	4	4
ULTIMATE DEVIATOR STRESS, T SQ FT		$(\sigma_1 - \sigma_3)_{ult}$	.811	.619	.863
INITIAL DIAMETER IN		D_o	1.4	1.4	1.4
INITIAL HEIGHT IN		H_o	2.98	2.98	2.99

CONTROLLED: Strain TEST

DESCRIPTION OF SPECIMENS

LL 87 PL 25 PI 62 G_s 2.7 TYPE OF SPECIMEN UNDISTURBED TYPE OF TEST Q

REMARKS Gray, brittle, medium consistency, medium strength @ PL, dull shine, slow shake reaction, some calcium modules and 3/4" rocks present.

PROJECT EAST GRAND FORKS FLOOD CONTROL

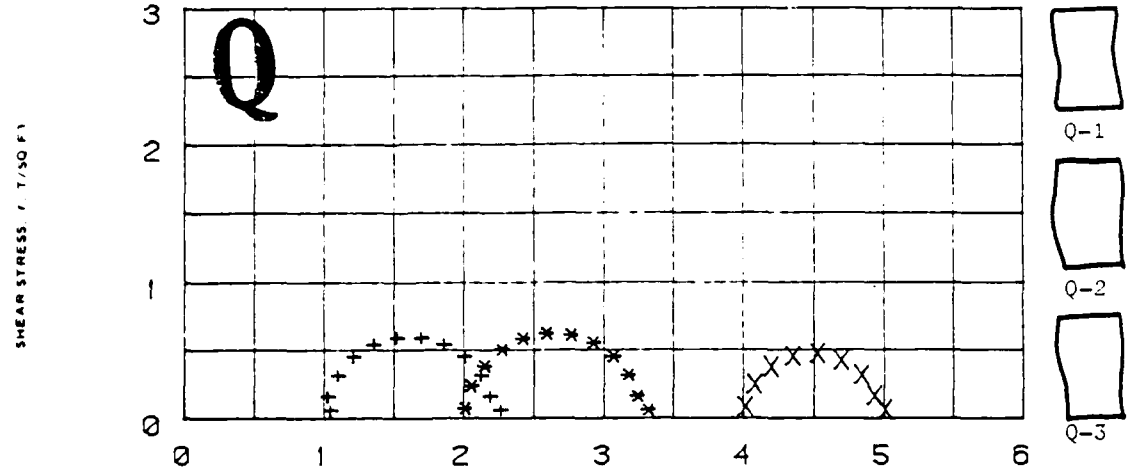
BORING NO 80-1MU SAMPLE NO 4

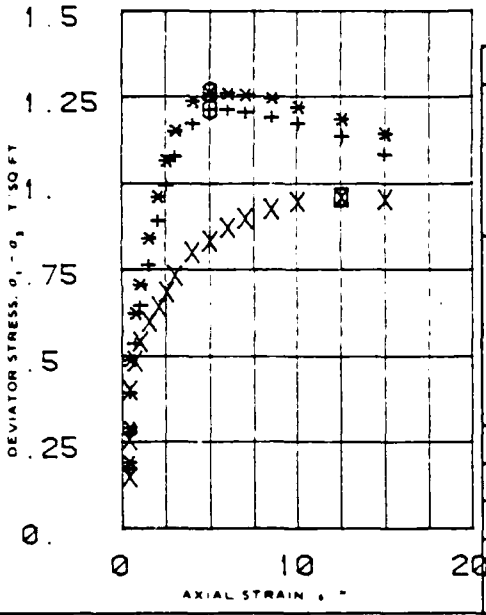
DEPTH ELEV 55.0-57.0

LABORATORY 81/82 DATE 15 MAY 1981

TRIAXIAL COMPRESSION TEST REPORT

ENG FORM NO 2089 REV JUNE 1970 PREVIOUS EDITION IS OBSOLETE TRANSLUCENT EM 1110-2-1906 Figure 1





SPECIMEN NO			1	2	3
INITIAL	WATER CONTENT, %	w_o	22.7	22.8	22.6
	DRY DENSITY, LB/CU FT	γ_{d_o}	103.8	103.3	104.6
	SATURATION, %	S_o	98.	98.	99.
	VOID RATIO	e_o	.62	.63	.61
BEFORE SHEAR	WATER CONTENT, %	w_c	22.3	23.1	21.4
	DRY DENSITY, LB/CU FT	γ_{d_c}	103.9	103.6	106.1
	SATURATION, %	S_c	97.	99.	96.
	VOID RATIO	e_c	.62	.63	.6
	FINAL BACK PRESSURE, T SQ FT	u_o	0.	0.	0.
MINOR PRINCIPAL STRESS, T SQ FT		σ_3	1.	2.	4.
MAXIMUM DEVIATOR STRESS, T SQ FT	$(\sigma_1 - \sigma_3)_{max}$		1.22	1.26	.96
TIME TO $(\sigma_1 - \sigma_3)_{max}$, MIN		t_f	10	11	26
ULTIMATE DEVIATOR STRESS, T SQ FT	$\sigma_1 - \sigma_3$		1.09	1.15	.954
INITIAL DIAMETER, IN		D_o	1.41	1.4	1.4
INITIAL HEIGHT, IN		H_o	2.97	2.98	2.98

CONTROLLED- strain TEST

DESCRIPTION OF SPECIMENS

LL 33 PL 14 PI 19 G_s 2.7

REMARKS Gray, brittle, medium consistency, medium strength @ PL, dull shine, slow shake reaction. Gravelly material near top was discarded.

TYPE OF SPECIMEN UNDISTURBED TYPE OF TEST Q

PROJECT EAST GRAND FORKS FLOOD CONTROL

BORING NO 80-1MU SAMPLE NO 5

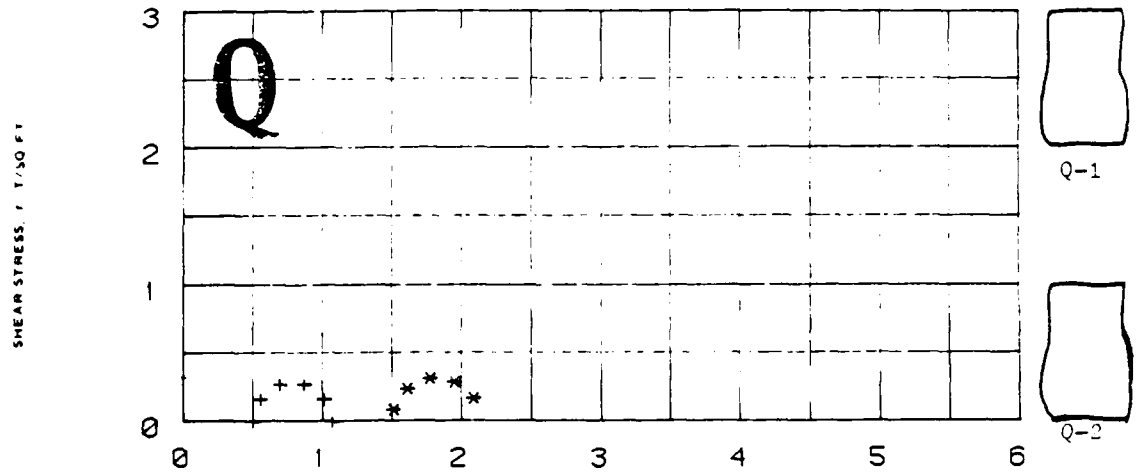
DEPTH ELEV 80.0-82.0

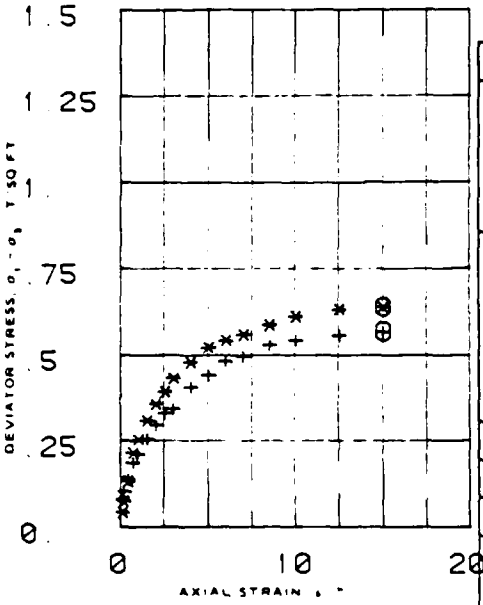
LABORATORY 81/82 DATE 15 MAY 198[illegible]

TRIAXIAL COMPRESSION TEST REPORT

ENG FORM NO 2089 PREVIOUS EDITION IS OBSOLETE TRANSLUCENT (EM 1110-2-1906)

Figure 2





SPECIMEN NO			1	2		
INITIAL	WATER CONTENT, %	w_o	27.8	28		
	DRY DENSITY LB/CU FT	γ_{d_o}	97.9	97.1		
	SATURATION %	S_o	100.	100.		
	VOID RATIO	e_o	.72	.74		
BEFORE SHEAR	WATER CONTENT, %	w_c	26.4	27.3		
	DRY DENSITY LB/CU FT	γ_{d_c}	98.1	97.3		
	SATURATION %	S_c	99.	100.		
	VOID RATIO	e_c	.72	.73		
	FINAL BACK PRESSURE, T/SQ FT	u_b	0.	0.		
MINOR PRINCIPAL STRESS, T/SQ FT		σ_3	.5	1.5		
MAXIMUM DEVIATOR STRESS T SQ FT	$(\sigma_1 - \sigma_3)_{MAX}$		.567	.64		
TIME TO $(\sigma_1 - \sigma_3)_{MAX}$ MIN		t_f	28	29		
ULTIMATE DEVIATOR STRESS, T SQ FT	$(\sigma_1 - \sigma_3)_{ULT}$		.567	.64		
INITIAL DIAMETER IN		D_o	1.4	1.4		
INITIAL HEIGHT IN		H_o	2.95	2.96		

CONTROLLED- Strain TEST

DESCRIPTION OF SPECIMENS

LL 33 PL 16 PI 17 Gs 2.7

TYPE OF SPECIMEN UNDISTURBED TYPE OF TEST Q

REMARKS Brown, brittle, soft consistency, low strength @ PL, dull shine, slow shake reaction.

PROJECT EAST GRAND FORKS FLOOD CONTROL

BORING NO 80-3[illegible] SAMPLE NO 1

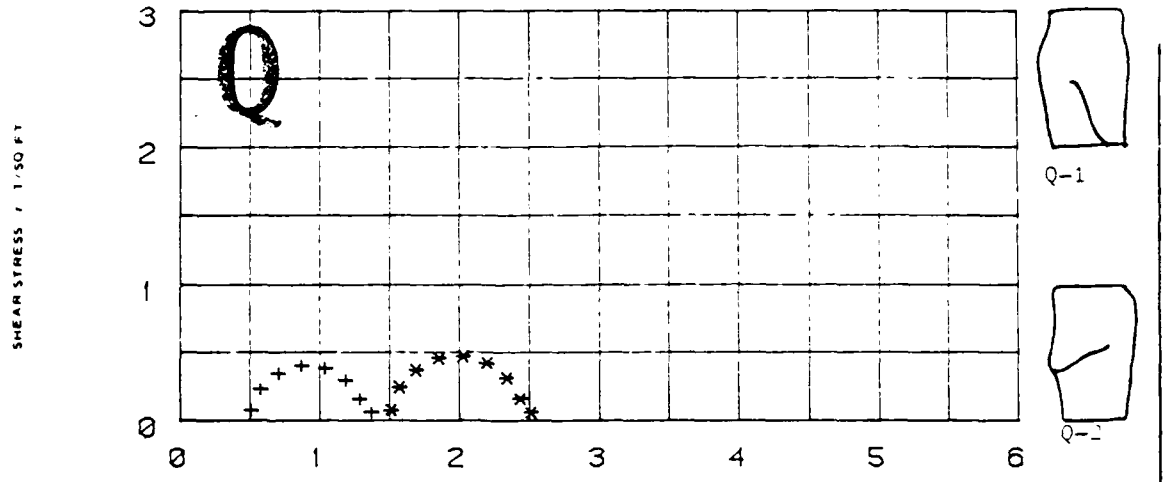
DEPTH ELEV 25.0-27.0

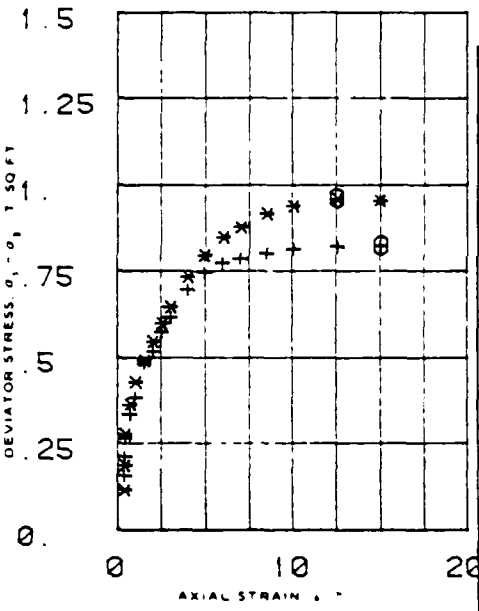
LABORATORY 81/82 DATE 15 MAY 1981

TRIAXIAL COMPRESSION TEST REPORT

ENG FORM NO 2089 REV JUNE 1970 PREVIOUS EDITION IS OBSOLETE TRANSLUCENT (EM 1110-2-1906)

Figure 3





SPECIMEN NO			1	2		
INITIAL	WATER CONTENT %	w_o	33.1	32.8		
	DRY DENSITY LB/CU FT	γ_{d_o}	88.3	88.6		
	SATURATION %	S_o	98.	98.		
	VOID RATIO	e_o	.91	.9		
BEFORE SHEAR	WATER CONTENT %	w_c	32.4	32.3		
	DRY DENSITY LB/CU FT	γ_{d_c}	88.6	88.8		
	SATURATION %	S_c	97.	97.		
	VOID RATIO	e_c	.9	.9		
	FINAL BACK PRESSURE T SQ FT	u_o	0.	0.		
MINOR PRINCIPAL STRESS, T SQ FT		σ_3	.5	1.5		
MAXIMUM DEVIATOR STRESS, T SQ FT	$(\sigma_1 - \sigma_3)_{max}$		.825	.983		
TIME TO $(\sigma_1 - \sigma_3)_{max}$ MIN		t_f	29	30		
ULTIMATE DEVIATOR STRESS, T SQ FT	$(\sigma_1 - \sigma_3)_{ult}$		.825	.957		
INITIAL DIAMETER IN		D_o	1.4	1.38		
INITIAL HEIGHT IN		H_o	2.97	2.97		

CONTROLLED- Strain TEST

DESCRIPTION OF SPECIMENS

LL 50 PL 17 PI 33 Gs 2.7 TYPE OF SPECIMEN UNDISTURBED TYPE OF TEST Q

REMARKS Black, gray, and brown, brittle, low strength @ PL, dull shine, slow shake reaction, strong odor with iron staining present.

PROJECT EAST GRAND FORKS FLOOD CONTROL

BORING NO 80-3MW SAMPLE NO 2

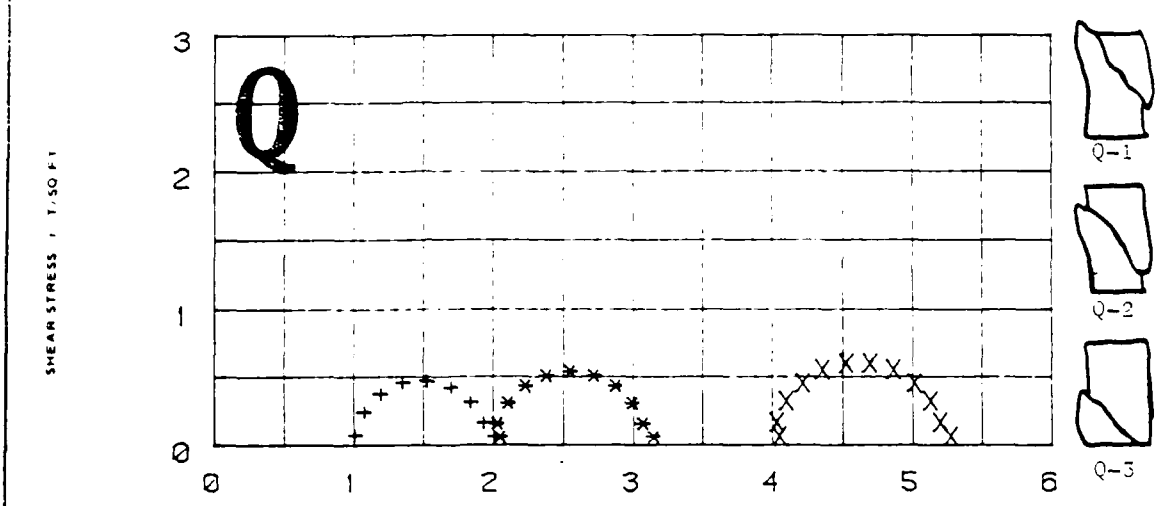
DEPTH ELEV 35.0-36.6

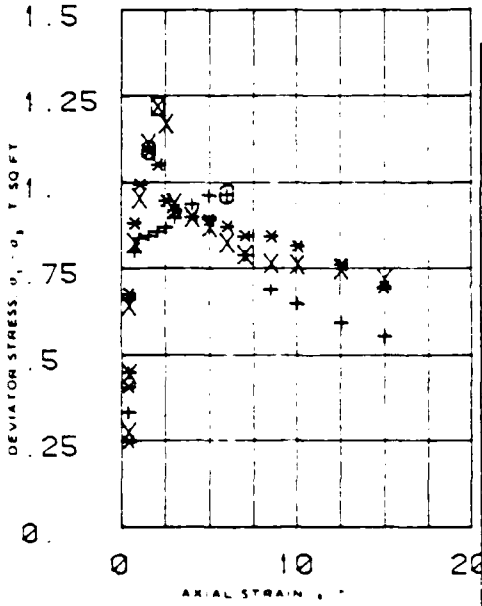
LABORATORY 81/82 DATE 15 MAY 1981

TRIAXIAL COMPRESSION TEST REPORT

ENG FORM NO 2089 REV JUNE 1972 PREVIOUS EDITION OBSOLETE TRANSLUCENT (EM 1110-2-1906)

Figure 4





SPECIMEN NO			1	2	3
INITIAL	WATER CONTENT %	w_o	67.2	67.2	67.6
	DRY DENSITY LB/CU FT	γ_{d_o}	59.3	59.3	59.1
	SATURATION %	S_o	99.	98.	98.
	VOID RATIO	e_o	1.84	1.84	1.86
BEFORE SHEAR	WATER CONTENT %	w_c	67.3	66.3	66.5
	DRY DENSITY LB/CU FT	γ_{d_c}	59.3	59.4	59.5
	SATURATION %	S_c	99.	97.	98.
	VOID RATIO	e_c	1.84	1.84	1.84
	FINAL BACK PRESSURE T SQ FT	u_o	0.	0.	0.
MINOR PRINCIPAL STRESS, T SQ FT		σ_3	1.	2.	4.
MAXIMUM DEVIATOR STRESS, T SQ FT		$(\sigma_1 - \sigma_3)_{max}$	.966	1.09	1.22
TIME TO $(\sigma_1 - \sigma_3)_{max}$ MIN		t_f	11	4	5
ULTIMATE DEVIATOR STRESS, T SQ FT		$(\sigma_1 - \sigma_3)_{ult}$	.557	.699	.719
INITIAL DIAMETER IN		D_o	1.4	1.4	1.4
INITIAL HEIGHT IN		H_o	2.97	2.98	2.98

CONTROLLED: strain TEST

DESCRIPTION OF SPECIMENS

LL 114 PL 28 PI 86 Gs 2.7 TYPE OF SPECIMEN UNDISTURBED TYPE OF TEST Q

REMARKS: Gray, brittle, medium consistency, medium strength @ PL, dull shine, no shake reaction.

PROJECT: EAST GRAND FORKS FLOOD CONTROL

BORING NO 80-3MU SAMPLE NO 3

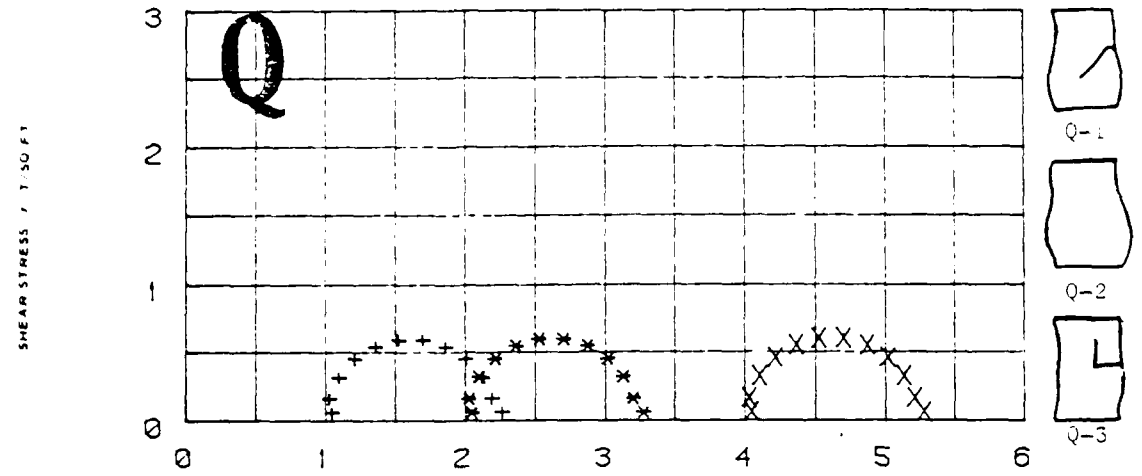
DEPTH FT 55.0-56.9

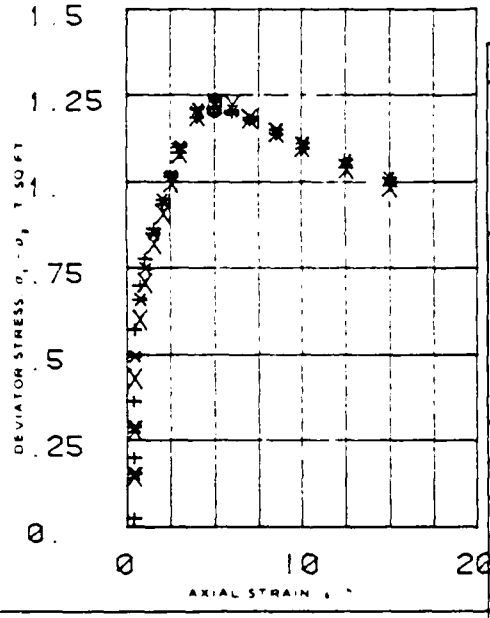
LABORATORY 01/02 DATE 15 MAY 1981

TRIAXIAL COMPRESSION TEST REPORT

ENG FORM NO 2089 REV JUNE 19?? PREVIOUS EDITION IS OBSOLETE TRANSLUCENT EM 1110-2-1906

Figure 5





SPECIMEN NO			1	2	3
INITIAL	WATER CONTENT %	w_o	31.1	30.4	30.7
	DRY DENSITY LB CU FT	γ_{d_o}	90.6	91.5	92.3
	SATURATION %	s_o	97.	97.	100.
	VOID RATIO	e_o	.86	.84	.82
BEFORE SHEAR	WATER CONTENT %	w_c	30.8	30.3	30.5
	DRY DENSITY LB CU FT	γ_{d_c}	90.6	91.7	92.7
	SATURATION %	s_c	97.	98.	100.
	VOID RATIO	e_c	.86	.84	.82
	FINAL BACK PRESSURE T SQ FT	u_o	0.	0.	0.
MINOR PRINCIPAL STRESS T SQ FT		σ_3	1.	2.	4.
MAXIMUM DEVIATOR STRESS T SQ FT		$(\sigma_1 - \sigma_3)_{max.}$	1.22	1.22	1.23
TIME TO $(\sigma_1 - \sigma_3)_{MAX.}$ MIN		t_f	10	11	9
ULTIMATE DEVIATOR STRESS T SQ FT		$(\sigma_1 - \sigma_3)_{ult.}$	.992	1.01	.986
INITIAL DIAMETER IN		D_o	1.39	1.4	1.41
INITIAL HEIGHT IN		H_o	3.00	2.98	2.95

CONTROLLED- strain TEST

DESCRIPTION OF SPECIMENS

LL 49 PL 14 PI 35 G_s 2.7

REMARKS Gray, brittle, medium consistency, medium strength @ PL, gloss shine, some calcium nodules, coarse sand and gravel present.

TYPE OF SPECIMEN UNDISTURBED TYPE OF TEST Q

PROJECT EAST GRAND FORKS FLOOD CONTROL

BORING NO 80-3MU SAMPLE NO 4

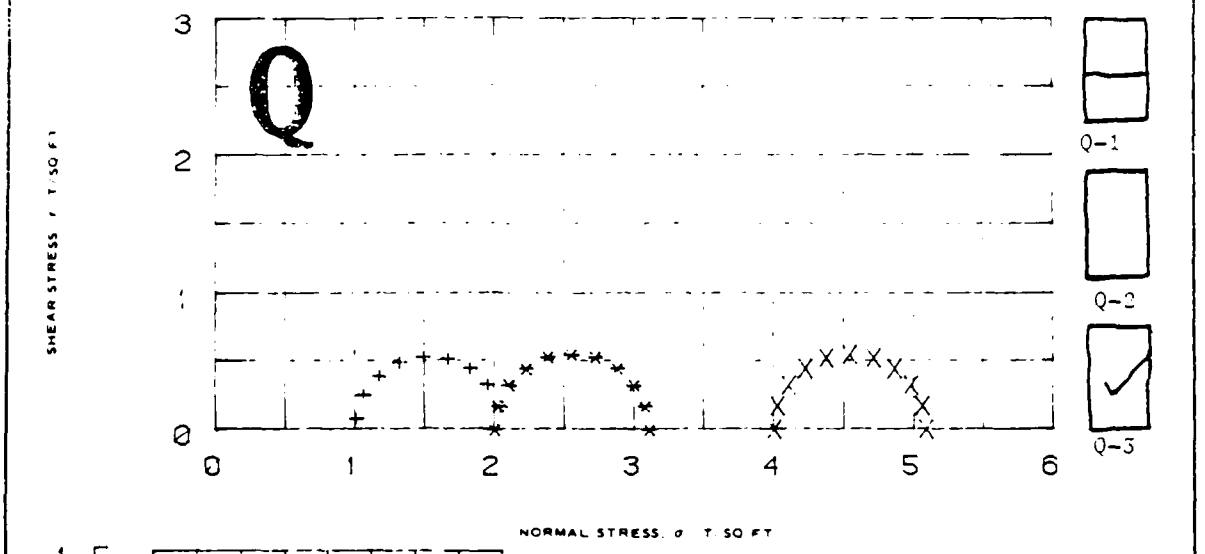
DEPTH FEET 75.0-76.9

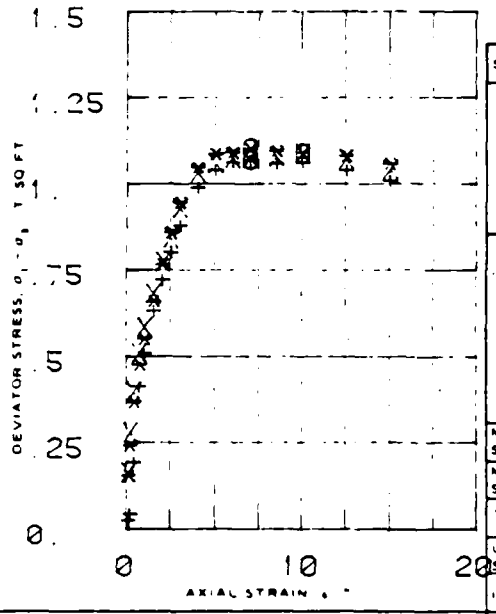
LABORATORY 81/82 DATE 15 MAY 1981

TRIAXIAL COMPRESSION TEST REPORT

ENG FORM NO 2089 REV JUNE 1970 PREVIOUS EDITION OBSOLETE TRANSLUCENT EM 1110-2-1906

Figure 6





SPECIMEN NO			1	2	3
INITIAL	WATER CONTENT %	w_o	25.2	24.6	24.6
	DRY DENSITY LB/CU FT	γ_{d_o}	98.4	100.4	100.
	SATURATION %	S_o	96.	98.	97.
	VOID RATIO	e_o	.71	.68	.69
BEFORE SHEAR	WATER CONTENT %	w_c	25.8	24.3	24.5
	DRY DENSITY LB/CU FT	γ_{d_c}	98.4	100.6	100.5
	SATURATION %	S_c	98.	97.	98.
	VOID RATIO	e_c	.71	.68	.68
	FINAL BACK PRESSURE, T SQ FT	u_o	0.	0.	0.
MINOR PRINCIPAL STRESS, T SQ FT		σ_3	1.	2.	4.
MAXIMUM DEVIATOR STRESS, T SQ FT	$(\sigma_1 - \sigma_3)_{max}$		1.07	1.1	1.09
TIME TO $(\sigma_1 - \sigma_3)_{max}$, MIN		t_f	13	14	18
ULTIMATE DEVIATOR STRESS, T SQ FT	$(\sigma_1 - \sigma_3)_{ult}$		1.01	1.06	1.04
INITIAL DIAMETER, IN		D_o	1.39	1.4	1.4
INITIAL HEIGHT, IN		H_o	2.97	2.98	2.99

CONTROLLED-strain TEST

DESCRIPTION OF SPECIMENS

LL 42 PL 14 PI 28 Gs 2.7

TYPE OF SPECIMEN UNDISTURBED TYPE OF TEST Q

REMARKS Gray, brittle, medium consistency, medium strength @ PL, dull shine, slow shake reaction, some gravel present.

PROJECT EAST GRAND FORKS FLOOD CONTROL

BORING NO 80-3MU SAMPLE NO 5

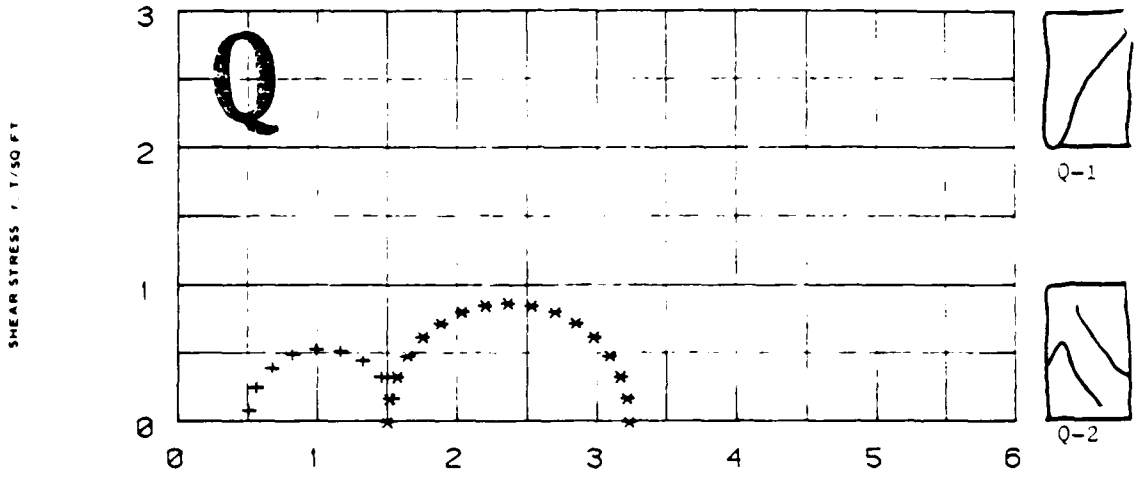
DEPTH ELEV 95.0-96.8

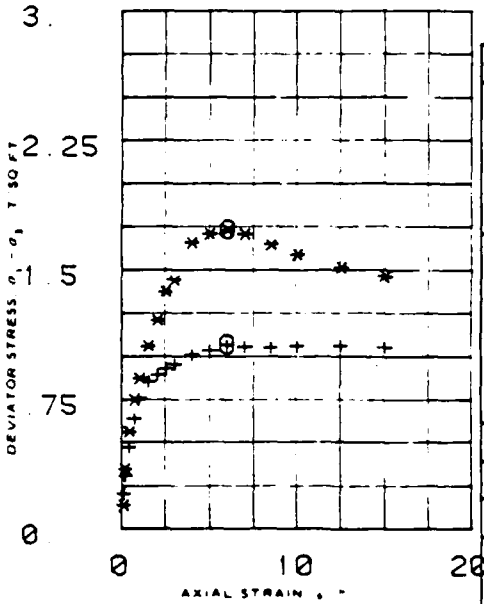
LABORATORY 81/82 DATE 15 MAY 1981

TRIAXIAL COMPRESSION TEST REPORT

ENG FORM NO 2089 REV JUNE 1970 PREVIOUS EDITION IS OBSOLETE TRANSLUCENT EM 1110-2-1906

Figure 7





SPECIMEN NO			1	2		
INITIAL	WATER CONTENT %	w_o	39.	38.8		
	DRY DENSITY LB CU FT	γ_{d_o}	81.6	81.8		
	SATURATION %	s_o	99.	99.		
	VOID RATIO	e_o	1.07	1.06		
BEFORE SHEAR	WATER CONTENT %	w_c	38.4	38.3		
	DRY DENSITY LB CU FT	γ_{d_c}	81.6	81.8		
	SATURATION %	s_c	97.	98.		
	VOID RATIO	e_c	1.07	1.06		
	FINAL BACK PRESSURE T SQ FT	u_o	0.	0.		
MINOR PRINCIPAL STRESS T SQ FT		σ_3	.5	1.5		
MAXIMUM DEVIATOR STRESS T SQ FT		$(\sigma_1-\sigma_3)_{max}$	1.07	1.73		
TIME TO $(\sigma_1-\sigma_3)_{max}$ MIN		t_f	13	13		
ULTIMATE DEVIATOR STRESS T SQ FT		$(\sigma_1-\sigma_3)_{ult}$	1.05	1.47		
INITIAL DIAMETER IN		D_o	1.39	1.39		
INITIAL HEIGHT IN		H_o	2.99	2.98		

CONTROLLED- strain TEST

DESCRIPTION OF SPECIMENS

LL 68 PL 22 P 46 Gs 2.7 TYPE OF SPECIMEN UNDISTURBED TYPE OF TEST Q

REMARKS Gray and brownish gray, brittle, medium consistency, medium strength @ PL, gloss shine, no shake reaction. Q-1 material uniform, Q-2 matl. has calcium deposits.

PROJECT EAST GRAND FORKS FLOOD CONTROL

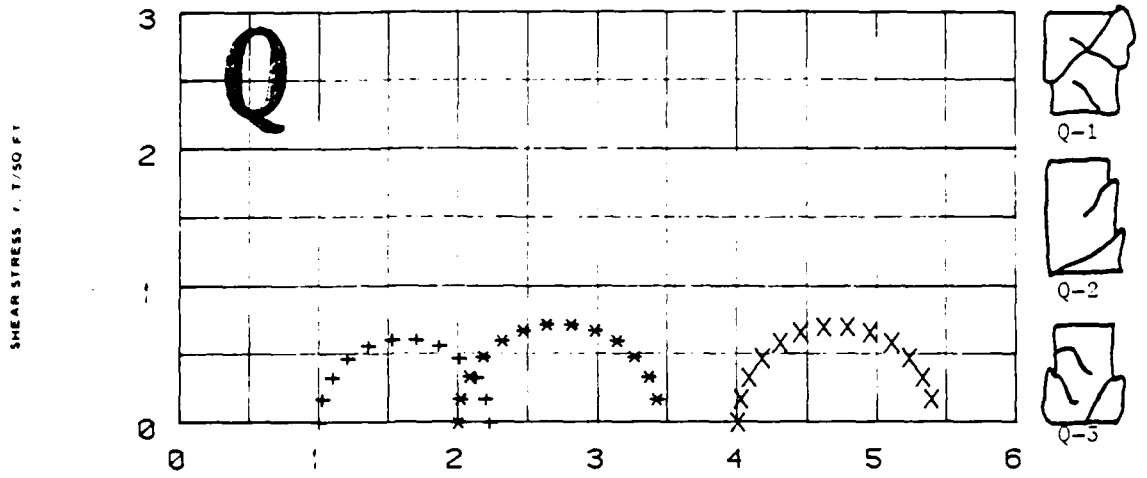
BORING NO 80-6MU SAMPLE NO 1

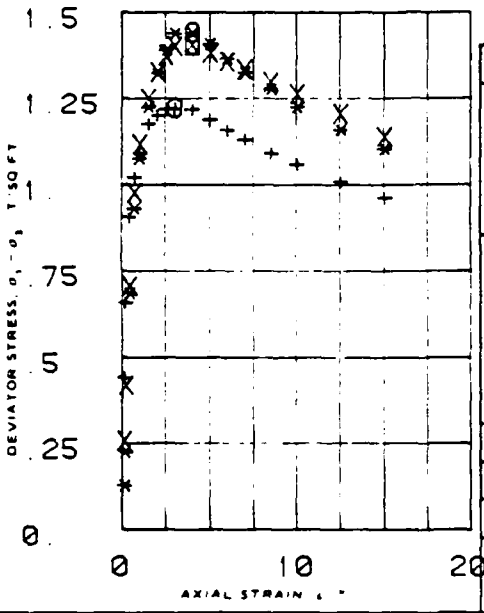
DEPTH FEET 31.0-31.9

LABORATORY 81/82 DATE 15 MAY 1981

TRIAXIAL COMPRESSION TEST REPORT

ENG FORM NO 2089 REV JUNE 1970 PREVIOUS EDITION IS OBSOLETE TRANSLUCENT EM 1110-2-1906 Figure 8





SPECIMEN NO			1	2	3
INITIAL	WATER CONTENT, %	w_o	48.8	47.8	48.4
	DRY DENSITY LB/CU FT	γ_{d_o}	73.4	74.	73.6
	SATURATION %	S_o	100.	100.	100.
	VOID RATIO	e_o	1.3	1.28	1.29
BEFORE SHEAR	WATER CONTENT %	w_c	47.9	47	47.3
	DRY DENSITY LB/CU FT	γ_{d_c}	73.4	74.9	74.4
	SATURATION %	S_c	100	100.	100.
	VOID RATIO	e_c	1.3	1.25	1.27
	FINAL BACK PRESSURE, T SQ FT	u_o	0.	0.	0.
MINOR PRINCIPAL STRESS, T SQ FT		σ_3	1.	2.	4.
MAXIMUM DEVIATOR STRESS T SQ FT	$(\sigma_1 - \sigma_3)_{max}$		1.22	1.44	1.41
TIME TO $(\sigma_1 - \sigma_3)_{max}$ MIN		t_f	7	8	9
ULTIMATE DEVIATOR STRESS, T SQ FT	$(\sigma_1 - \sigma_3)_{ult}$		.964	1.11	1.14
INITIAL DIAMETER IN		D_o	1.39	1.39	1.39
INITIAL HEIGHT IN		H_o	3.00	2.99	2.98

CONTROLLED- strain TEST

DESCRIPTION OF SPECIMENS

LL 118 PL 28 PI 90 Gs 2.7

TYPE OF SPECIMEN UNDISTURBED TYPE OF TEST Q

REMARKS Gray, brittle, medium consistency, medium strength @ PL. Top 3" had wax infiltration and was discarded.

PROJECT EAST GRAND FORKS FLOOD CONTROL

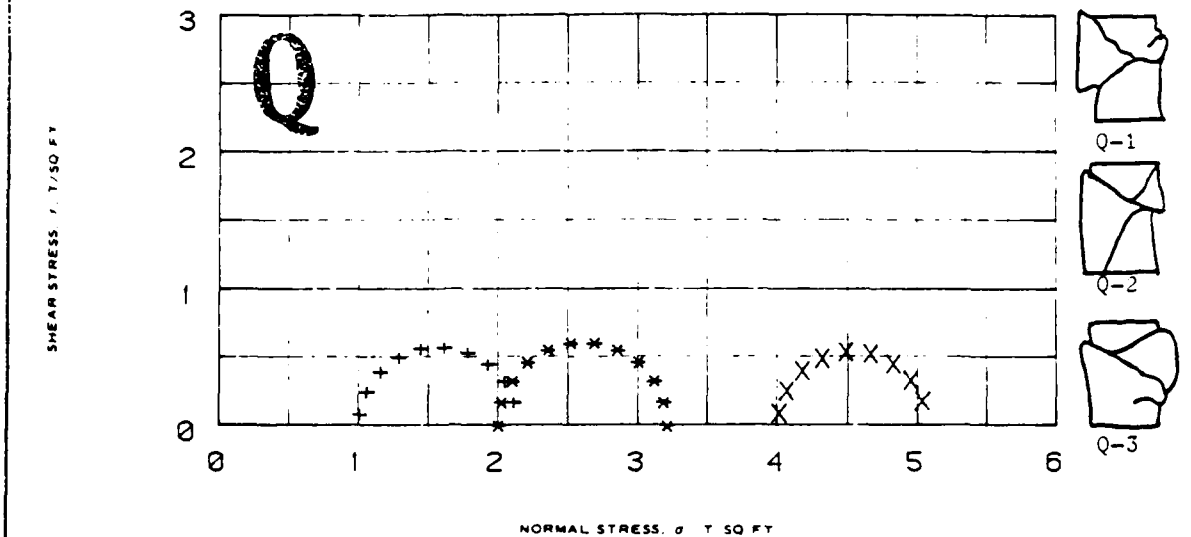
BORING NO 80-6MU SAMPLE NO 2

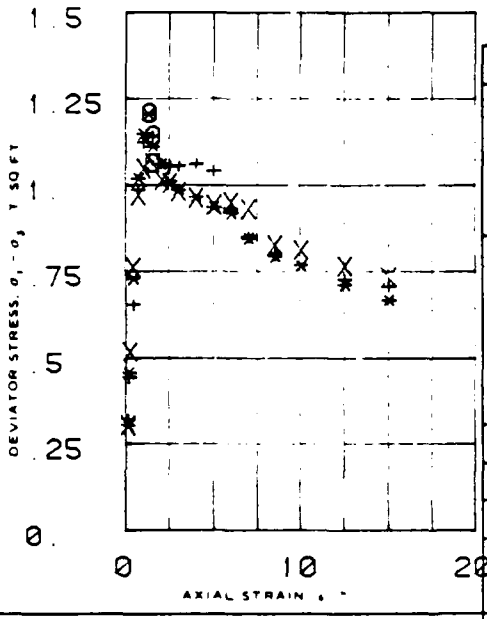
DEPTH ELEV 40.0-42.0

LABORATORY 81/82 DATE 15 MAY 1981

TRIAXIAL COMPRESSION TEST REPORT

ENG FORM NO 2089 REV JUNE 1970 PREVIOUS EDITION IS OBSOLETE TRANSLUCENT (EM 1110-2-1906) Figure 9





SPECIMEN NO			1	2	3
INITIAL	WATER CONTENT %	w_o	72.	72.1	72.2
	DRY DENSITY LB/CU FT	γ_{d_o}	57.5	57.3	57.5
	SATURATION %	S_o	100.	100.	100.
	VOID RATIO	e_o	1.93	1.94	1.93
BEFORE SHEAR	WATER CONTENT %	w_c	71.7	71 7	71.6
	DRY DENSITY LB/CU FT	γ_{d_c}	57.5	57.3	57.5
	SATURATION, %	S_c	100.	100	100
	VOID RATIO	e_c	1.93	1.94	1.93
	FINAL BACK PRESSURE T SQ FT	u_o	0.	0.	0.
MINOR PRINCIPAL STRESS T SQ FT		σ_3	1.	2.	4.
MAXIMUM DEVIATOR STRESS T SQ FT	$(\sigma_1 - \sigma_3)_{MAX}$		1.14	1.21	1.06
TIME TO $(\sigma_1 - \sigma_3)_{MAX}$ MIN		t_f	3	2	3
ULTIMATE DEVIATOR STRESS, T SQ FT	$\sigma_1 - \sigma_3$ ult.		.709	.668	.733
INITIAL DIAMETER IN		D_o	1.41	1.41	1.41
INITIAL HEIGHT IN		H_o	2.96	2.96	2.96

CONTROLLED- Strain TEST

DESCRIPTION OF SPECIMENS

LL 129	PL 26	PI 103	Gs 2.7	TYPE OF SPECIMEN UNDISTURBED	TYPE OF TEST Q

REMARKS Gray, plastic, medium consistency, sensitive upon remolding, high strength @ PL, slow shake reaction, slightly calcareous. Torvane = 0.50 T/SF.

PROJECT EAST GRAND FORKS FLOOD CONTROL

BORING NO 80-6MU SAMPLE NO 3

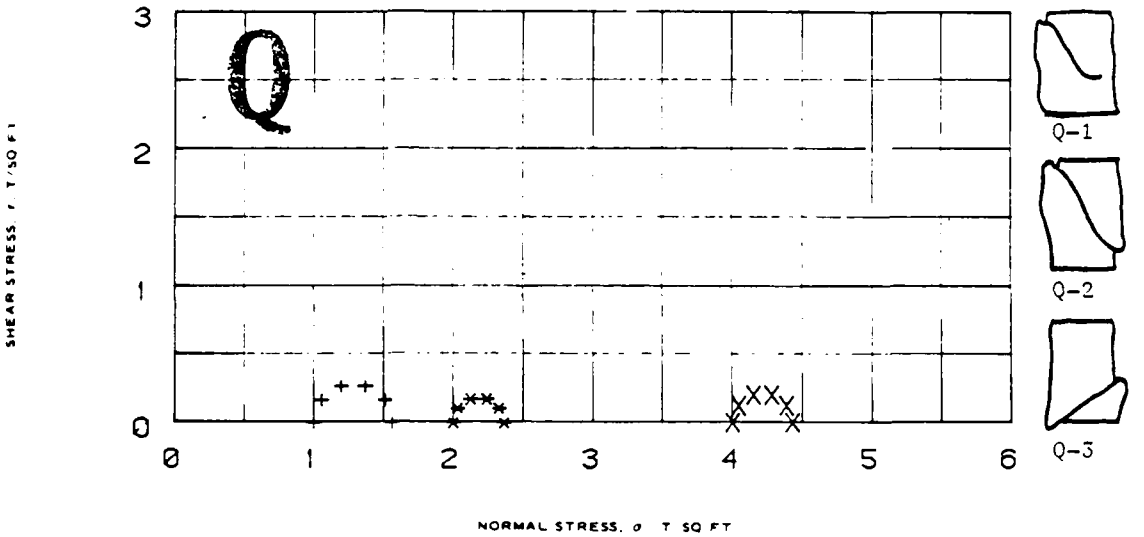
DEPTH ELEV 55.0-57.0

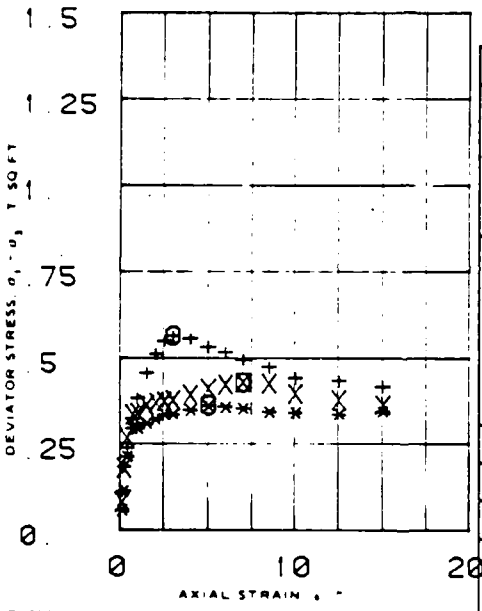
LABORATORY 81/82 DATE 15 MAY 1981

TRIAXIAL COMPRESSION TEST REPORT

ENG FORM NO 2089 REVISED JUNE 1970 PREVIOUS EDITION OBSOLETE TRANSLUCENT EM 1110-2-1906

Figure 10





SPECIMEN NO			1	2	3
INITIAL	WATER CONTENT, %	w_o	57.6	53.6	57.7
	DRY DENSITY LB/CU FT	γ_{d_o}	65.6	68.1	65.7
	SATURATION, %	S_o	99.	98.	100
	VOID RATIO	e_o	1.57	1.48	1.57
BEFORE SHEAR	WATER CONTENT, %	w_c	58.3	55.7	58.4
	DRY DENSITY LB/CU FT	γ_{d_c}	65.6	68.1	65.8
	SATURATION, %	S_c	100.	100.	100.
	VOID RATIO	e_c	1.57	1.48	1.56
	FINAL BACK PRESSURE, T SQ FT	u_o	0.	0.	0.
MINOR PRINCIPAL STRESS, T/SQ FT		σ_3	1.	2.	4.
MAXIMUM DEVIATOR STRESS, T SQ FT		$(\sigma_1 - \sigma_3)_{max}$	.563	.364	.428
TIME TO $(\sigma_1 - \sigma_3)_{max}$, MIN		t_f	6	10	13
ULTIMATE DEVIATOR STRESS, T SQ FT		$(\sigma_1 - \sigma_3)_{ult}$	.418	.538	.364
INITIAL DIAMETER, IN		D_o	1.38	1.39	1.38
INITIAL HEIGHT, IN		H_o	2.98	2.97	2.98

CONTROLLED-strain TEST

DESCRIPTION OF SPECIMENS

LL 79 PL 24 PI 55 G_s 2.7 TYPE OF SPECIMEN UNDISTURBED TYPE OF TEST Q

REMARKS Gray, brittle, soft consistency, gloss shine, no shake reaction, slightly calcareous, slight odor.

PROJECT EAST GRAND FORKS FLOOD CONTROL

BORING NO 80-6MU SAMPLE NO 4

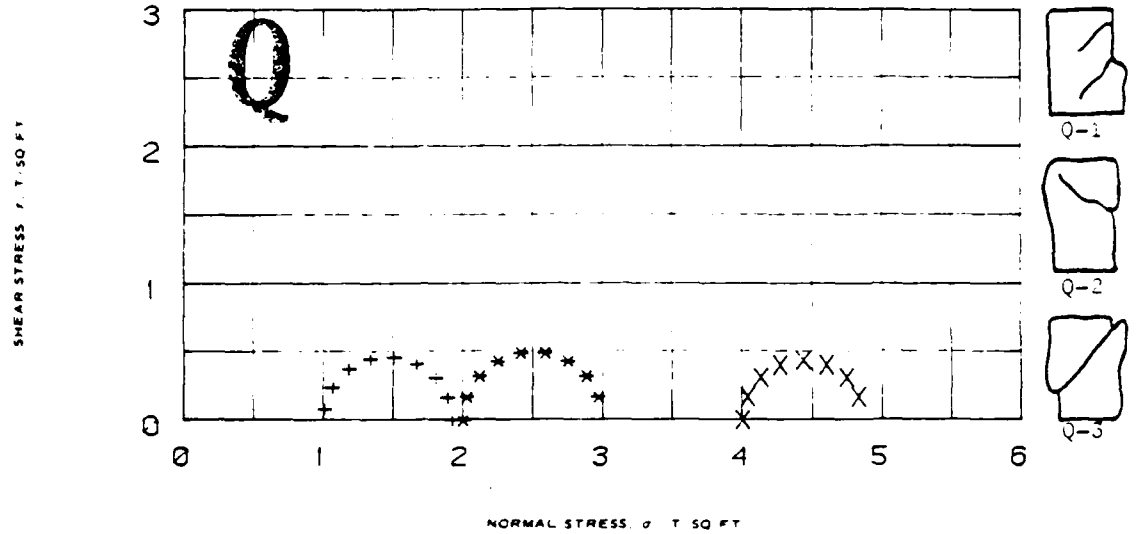
DEPTH ELEV 70.0-71.0

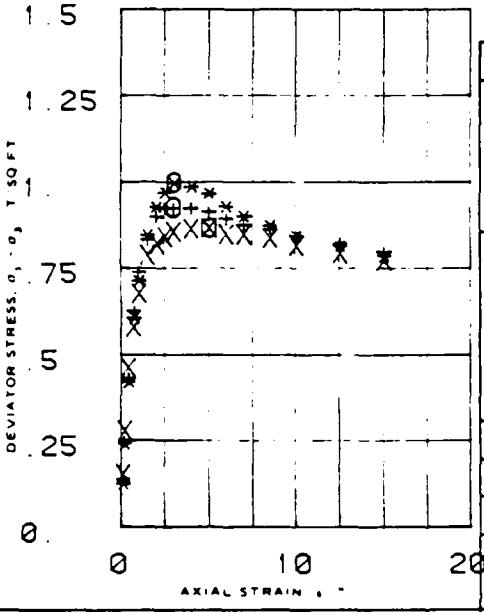
LABORATORY 81/82 DATE 15 MAY 1981

TRIAXIAL COMPRESSION TEST REPORT

ENG FORM NO 2089 REV JUNE 1970 PREVIOUS EDITION IS OBSOLETE TRANSLUCENT (EM 1110-2-1906)

Figure 11





SPECIMEN NO			1	2	3
INITIAL	WATER CONTENT %	w_o	36.7	35.3	37.3
	DRY DENSITY LB/CU FT	γ_{d_o}	84.3	84.7	83.3
	SATURATION %	S_o	99.	96.	98.
	VOID RATIO	e_o	1.	.99	1.02
BEFORE SHEAR	WATER CONTENT %	w_c	36.4	36.4	36.8
	DRY DENSITY LB/CU FT	γ_{d_c}	84.3	84.7	83.6
	SATURATION %	S_c	98.	99.	98.
	VOID RATIO	e_c	1.	.99	1.02
	FINAL BACK PRESSURE T SQ FT	u_o	0.	0.	0.
MINOR PRINCIPAL STRESS, T SQ FT		σ_3	1.	2.	4.
MAXIMUM DEVIATOR STRESS T SQ FT	$(\sigma_1 - \sigma_3)_{max}$		.924	.998	.865
TIME TO $(\sigma_1 - \sigma_3)_{max}$ MIN		t_f	6	7	10
ULTIMATE DEVIATOR STRESS, T SQ FT	$(\sigma_1 - \sigma_3)_{ult}$		.799	.787	.772
INITIAL DIAMETER IN		D_o	1.39	1.38	1.38
INITIAL HEIGHT IN		H_o			

CONTROLLED- strain TEST

DESCRIPTION OF SPECIMENS

LL 58 | PL 15 | PI 43 | G_s 2.7 | TYPE OF SPECIMEN UNDISTURBED | TYPE OF TEST Q

REMARKS Gray, brittle, medium consistency, medium strength @ PL, dull shine, no shake reaction, slightly calcareous.

PROJECT EAST GRAND FORKS FLOOD CONTROL

BORING NO 80-6MU | SAMPLE NO 5

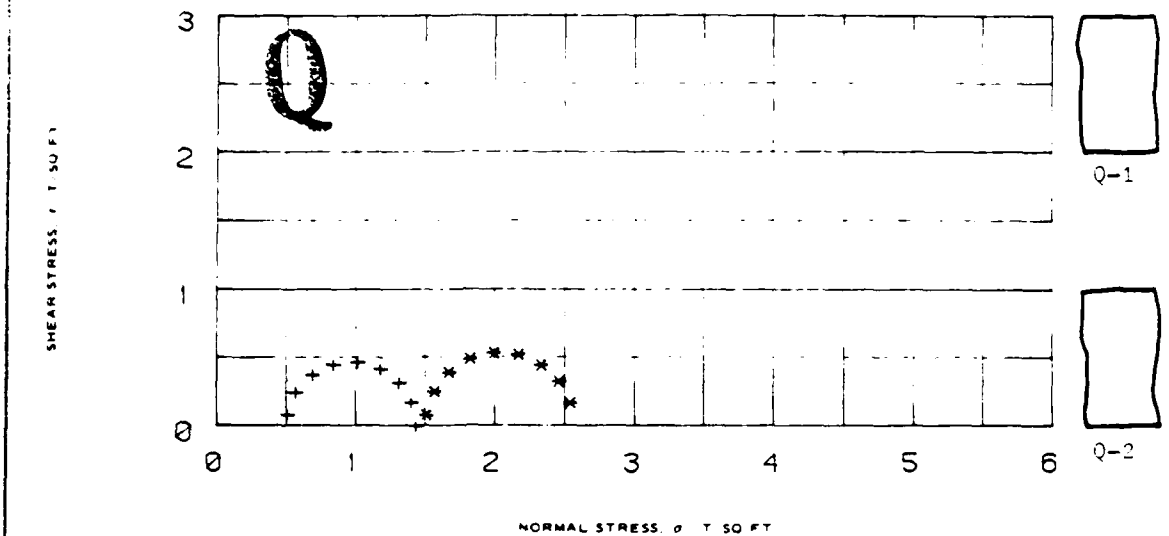
DEPTH ELEV 80.0-81.9

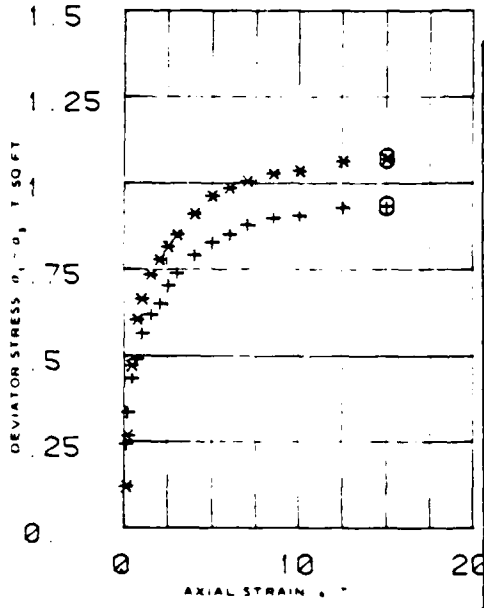
LABORATORY 81/82 | DATE 15 MAY 1981

TRIAXIAL COMPRESSION TEST REPORT

ENG FORM NO 2089 REV JUNE 1970 PREVIOUS EDITION OBSOLETE TRANSLUCENT EM 1110-2-1906

Figure 12





SPECIMEN NO			1	2		
INITIAL	WATER CONTENT %	w_o	31.6	32.5		
	DRY DENSITY LB/CU FT	γ_{d_o}	90.2	89.1		
	SATURATION %	S_o	98.	99.		
	VOID RATIO	e_o	.87	.89		
BEFORE SHEAR	WATER CONTENT %	w_c	33.2	32.7		
	DRY DENSITY LB/CU FT	γ_{d_c}	90.2	89.1		
	SATURATION %	S_c	100.	99.		
	VOID RATIO	e_c	.87	.89		
	FINAL BACK PRESSURE T SQ FT	u_b	0.	0.		
MINOR PRINCIPAL STRESS, T SQ FT		σ_3	.5	1.5		
MAXIMUM DEVIATOR STRESS T SQ FT		$(\sigma_1 - \sigma_3)_{max}$	.935	1.07		
TIME TO $(\sigma_1 - \sigma_3)_{max}$ MIN		t_f	29	28		
ULTIMATE DEVIATOR STRESS, T SQ FT		$(\sigma_1 - \sigma_3)_{ult}$	.935	1.07		
INITIAL DIAMETER IN		D_o	1.38	1.38		
INITIAL HEIGHT IN		H_o	3.00	3.00		

CONTROLLED- strain TEST

DESCRIPTION OF SPECIMENS

LL 73 PL 25 PI 48 Gs 2.7 TYPE OF SPECIMEN UNDISTURBED TYPE OF TEST Q

REMARKS Gray, brittle, medium consistency, dull shine, no shake reaction, slightly calcareous.

PROJECT EAST GRAND FORKS FLOOD CONTROL

BORING NO 80-8NU SAMPLE NO 1

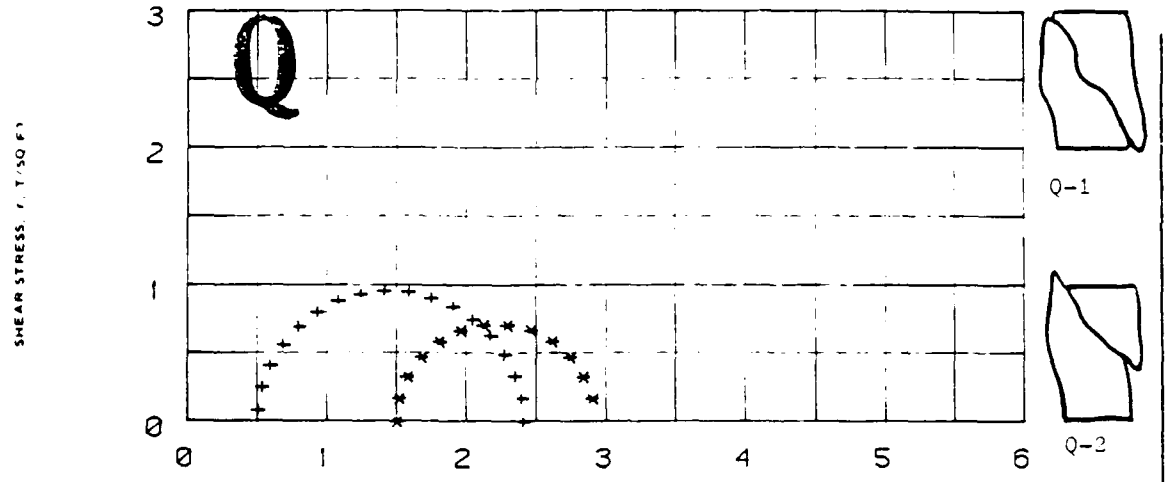
DEPTH ELEV 10.0-12.0

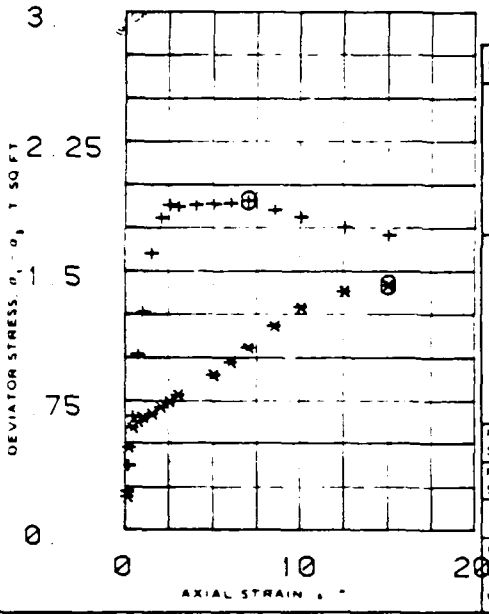
LABORATORY 81/82 DATE 15 MAY 1981

TRIAXIAL COMPRESSION TEST REPORT

ENG FORM NO. 2089 REV JUNE 72 PREVIOUS EDITION IS OBSOLETE TRANSLUCENT EM 1110-2-1906

Figure 13





SPECIMEN NO			1	2		
INITIAL	WATER CONTENT %	w_o	33.7	34.9		
	DRY DENSITY LB/CU FT	γ_{d_o}	87.6	86.7		
	SATURATION %	S_o	98.	100		
	VOID RATIO	e_o	.92	.94		
BEFORE SHEAR	WATER CONTENT %	w_c	32.7	34		
	DRY DENSITY LB/CU FT	γ_{d_c}	87.6	86.8		
	SATURATION %	S_c	95.	97.		
	VOID RATIO	e_c	.92	.94		
	FINAL BACK PRESSURE T SQ FT	u_o	0.	0.		
MINOR PRINCIPAL STRESS, T SQ FT		σ_3	.5	1.5		
MAXIMUM DEVIATOR STRESS T SQ FT	$(\sigma_1 - \sigma_3)_{max}$		1.91	1.42		
TIME TO $(\sigma_1 - \sigma_3)_{max}$ MIN		t_f	16	30		
ULTIMATE DEVIATOR STRESS, T SQ FT	$(\sigma_1 - \sigma_3)_{ult}$		1.71	1.42		
INITIAL DIAMETER IN		D_o	1.38	1.4		
INITIAL HEIGHT IN		H_o	3.00	3.00		

CONTROLLED- strain TEST

DESCRIPTION OF SPECIMENS

LL 69 PL 20 PI 49 Gs 2.7

TYPE OF SPECIMEN UNDISTURBED TYPE OF TEST Q

REMARKS Mottled gray and brown, brittle, medium consistency, medium strength @ PL, gloss shine, slow shake reaction, highly calcareous with iron staining present.

PROJECT EAST GRAND FORKS FLOOD CONTROL

BORING NO 80-8MW SAMPLE NO 2

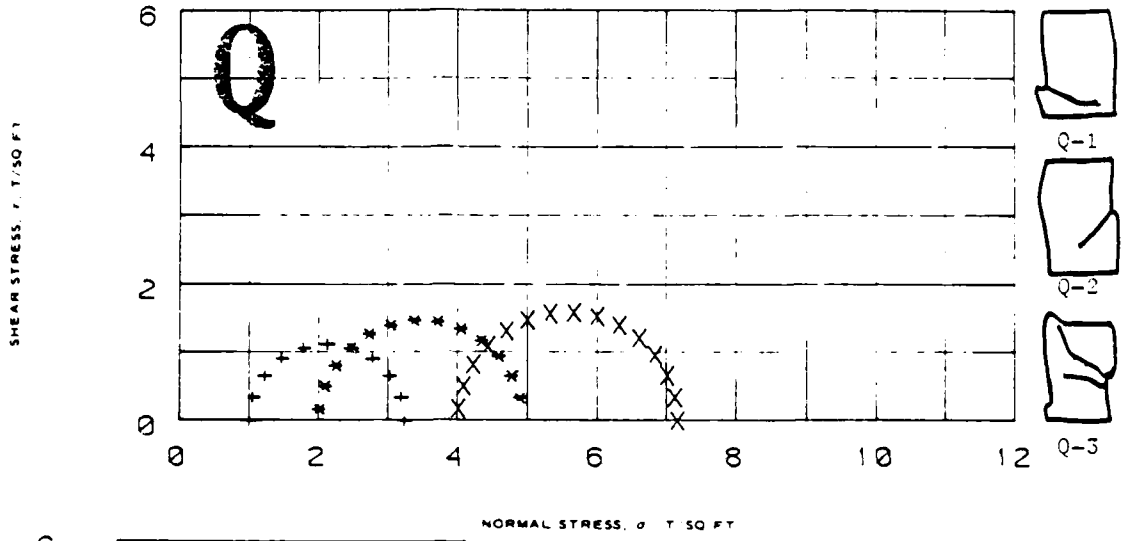
DEPTH ELEV 25.0-27.0

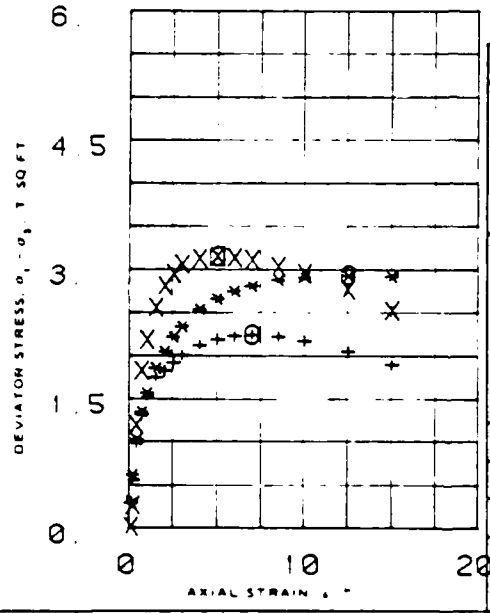
LABORATORY 81/82 DATE 15 MAY 1981

TRIAXIAL COMPRESSION TEST REPORT

ENG FORM NO 2089 REV JUNE 1970 PREVIOUS EDITION IS OBSOLETE TRANSLUCENT (EM 1110-2-1906)

Figure 14





SPECIMEN NO			1	2	3	
INITIAL	WATER CONTENT %	w_o	31.5	31.6	31.7	
	DRY DENSITY LB/CU FT	γ_{d_o}	86.9	89.6	88.1	
	SATURATION %	S_o	91.	97.	94.	
	VOID RATIO	e_o	.94	.88	.91	
BEFORE SHEAR	WATER CONTENT %	w_c	29.5	31.4	30.2	
	DRY DENSITY LB/CU FT	γ_{d_c}	87.2	89.9	89.2	
	SATURATION %	S_c	85.	97.	92.	
	VOID RATIO	e_c	.93	.87	.89	
	FINAL BACK PRESSURE T SQ FT	u_o	0.	0.	0.	
MINOR PRINCIPAL STRESS, T SQ FT		σ_3	1.	2.	4.	
MAXIMUM DEVIATOR STRESS T SQ FT	$(\sigma_1 - \sigma_3)_{MAX}$		2.24	2.95	3.15	
TIME TO $(\sigma_1 - \sigma_3)_{MAX}$ MIN		t_f	15	28	15	
ULTIMATE DEVIATOR STRESS, T SQ FT	$\sigma_1 - \sigma_3$		1.91	2.92	2.52	
INITIAL DIAMETER IN		D_o	1.39	1.39	1.4	
INITIAL HEIGHT IN		H_o				

CONTROLLED- strain TEST

DESCRIPTION OF SPECIMENS

LL 70 PL 20 PI 50 Gs 2.7

TYPE OF SPECIMEN UNDISTURBED TYPE OF TEST Q

REMARKS Dark gray with light gray streaks of silty material, brittle, medium consistency, medium strength @ PL, gloss shine, slow shake reaction. Q-3 had considerably more silt.

PROJECT EAST GRAND FORKS FLOOD CONTROL

BORING NO 80-8MU SAMPLE NO 3

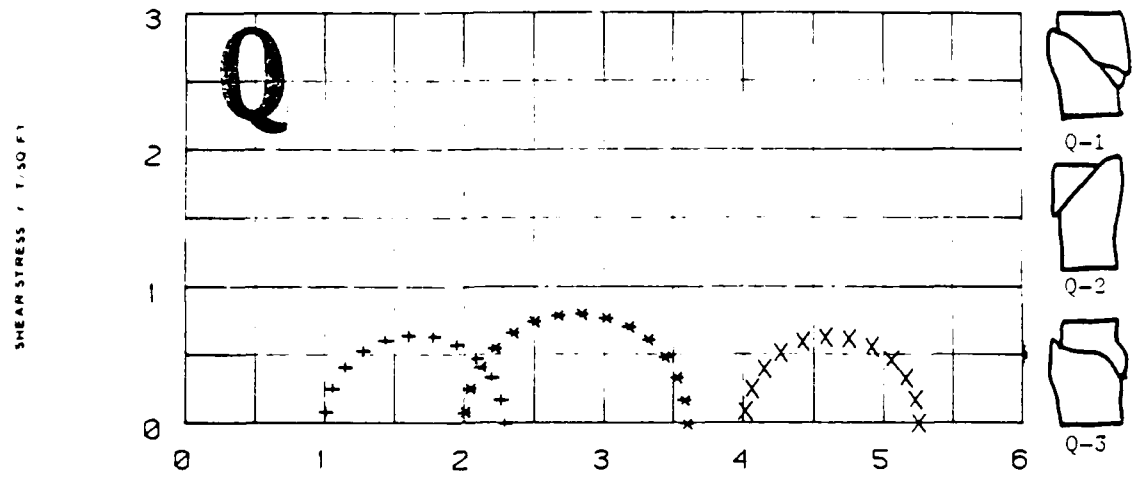
DEPTH ELEV 40-42.0

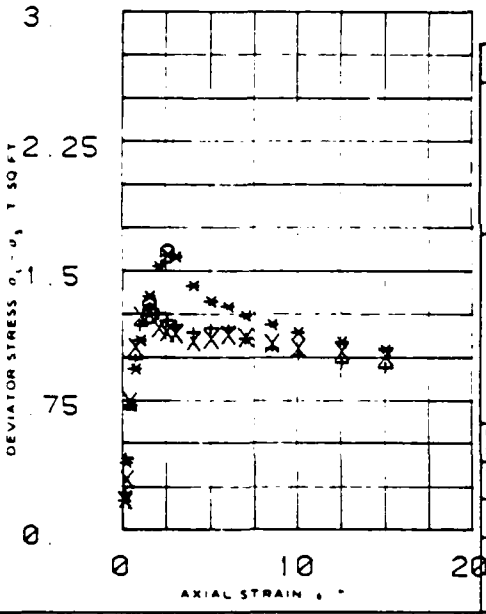
LABORATORY 81/82 DATE 15 MAY 1981

TRIAXIAL COMPRESSION TEST REPORT

ENG FORM NO 2089 REV JUNE 1972 PREVIOUS EDITION IS OBSOLETE TRANSLUCENT (EM 1110-2-1906)

Figure 15





SPECIMEN NO			1	2	3	
INITIAL	WATER CONTENT %	w_o	45.4	49	48.7	
	DRY DENSITY LB/CU FT	γ_{d_o}	73.4	71.8	71.4	
	SATURATION %	S_o	95.	98.	97.	
	VOID RATIO	e_o	1.5	1.55	1.56	
BEFORE SHEAR	WATER CONTENT %	w_c	49.8	49.4	50.5	
	DRY DENSITY LB/CU FT	γ_{d_c}	73.4	71.8	71.7	
	SATURATION %	S_c	100.	99.	100.	
	VOID RATIO	e_c	1.5	1.55	1.55	
	FINAL BACK PRESSURE, T SQ FT	U_o	0.	0.	0.	
MINOR PRINCIPAL STRESS, T SQ FT		σ_3	1.	2.	4.	
MAXIMUM DEVIATOR STRESS, T SQ FT	$(\sigma_1 - \sigma_3)_{max}$		1.29	1.6	1.25	
TIME TO $(\sigma_1 - \sigma_3)_{max}$ MIN		t_f	4	5	4	
ULTIMATE DEVIATOR STRESS, T SQ FT	$(\sigma_1 - \sigma_3)_{ult}$		.945	1.85	1.	
INITIAL DIAMETER IN		D_o	1.58	1.59	1.58	
INITIAL HEIGHT IN		H_o	3.00	3.00	2.98	

CONTROLLED- strain TEST

DESCRIPTION OF SPECIMENS

LL 77 PL 22 PI 55 Gs 2.7

TYPE OF SPECIMEN UNDISTURBED TYPE OF TEST Q

REMARKS Gray, plastic, medium consistency, medium strength @ PL, gloss shine, no shake reaction

PROJECT EAST GRAND FORK FLOOD CONTROL

BORING NO 80-8MU SAMPLE NO 4

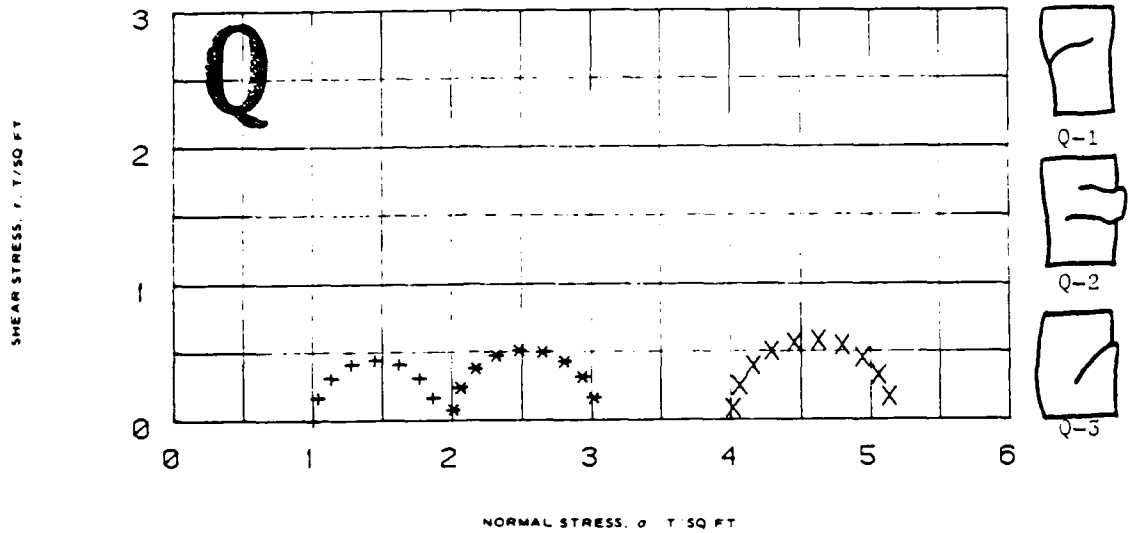
DEPTH ELEV 50.0-52.0

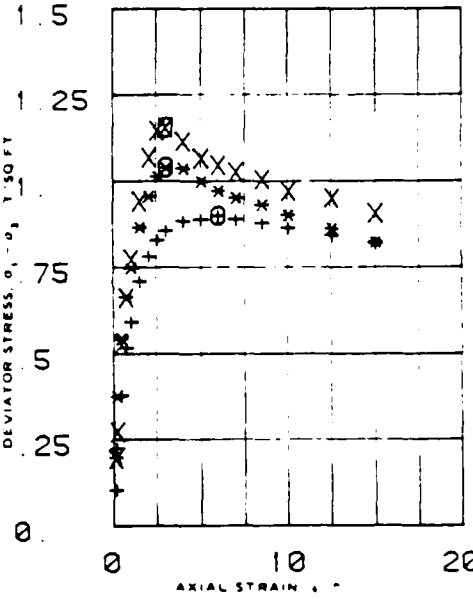
LABORATORY 81/82 DATE 15 MAY 1981

TRIAXIAL COMPRESSION TEST REPORT

ENG FORM NO 2089 REVISED 1970 PREVIOUS EDITION IS OBSOLETE TRANSLUCENT

(EM 1110-2-1906) Figure 16





SPECIMEN NO			1	2	3
INITIAL	WATER CONTENT %	w_o	32.8	33.2	31.8
	DRY DENSITY LB/CU FT	γ_{d_o}	89.	88.3	90.2
	SATURATION %	S_o	99.	99.	99.
	VOID RATIO	e_o	.89	.91	.87
BEFORE SHEAR	WATER CONTENT, %	w_c	32.5	33.1	32.3
	DRY DENSITY LB/CU FT	γ_{d_c}	89.	88.3	90.5
	SATURATION %	S_c	98.	98.	100.
	VOID RATIO	e_c	.89	.91	.86
	FINAL BACK PRESSURE T/SQ FT	u_o	0.	0.	0.
MINOR PRINCIPAL STRESS, T/SQ FT		σ_3	1.	2.	4.
MAXIMUM DEVIATOR STRESS T SQ FT	$(\sigma_1 - \sigma_3)_{max}$		.899	1.04	1.16
TIME TO $(\sigma_1 - \sigma_3)_{max}$ MIN		t_f	12	6	7
ULTIMATE DEVIATOR STRESS, T SQ FT	$(\sigma_1 - \sigma_3)_{ult}$		.82	.825	.905
INITIAL DIAMETER IN		D_o	1.37	1.39	1.4
INITIAL HEIGHT IN		H_o	3.00	2.99	2.99

CONTROLLED- strain TEST

DESCRIPTION OF SPECIMENS

LL 54 PL 15 PI 39 Gs 2.7 TYPE OF SPECIMEN UNDISTURBED TYPE OF TEST Q

REMARKS Gray, plastic, soft consistency, sensitive upon remolding, medium strength @ PL, gloss shine, slow shake reaction.

PROJECT EAST GRAND FORKS FLOOD CONTROL

BORING NO 80-8MU SAMPLE NO 5

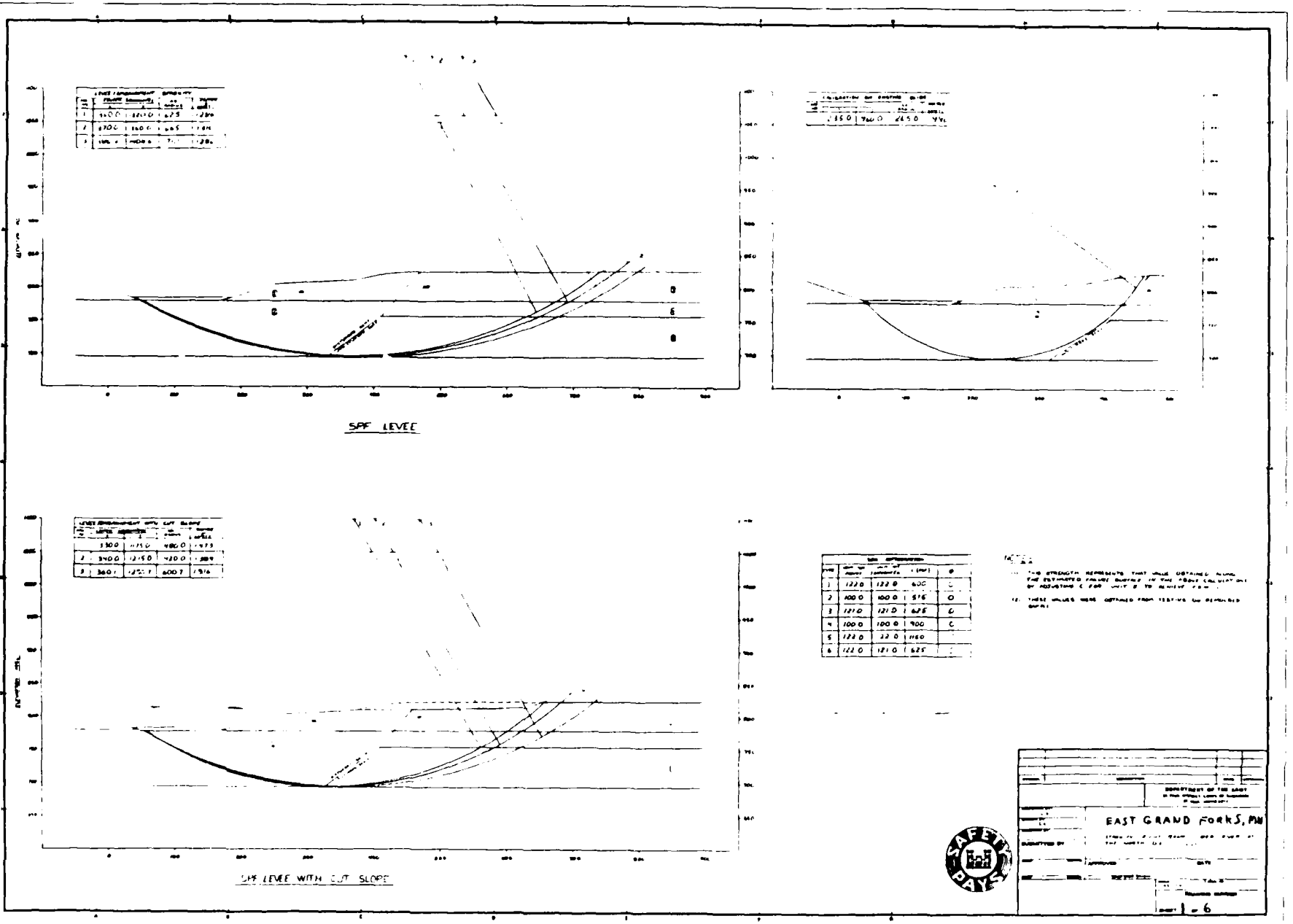
DEPTH ELEV 60.0-62.0

LABORATORY 81/82 DATE 15 MAY 1981

TRIAXIAL COMPRESSION TEST REPORT

ENG FORM NO 2089 REV JUNE 1970 PREVIOUS EDITION IS OBSOLETE TRANSLUCENT EM 1110-2-1906

Figure 17

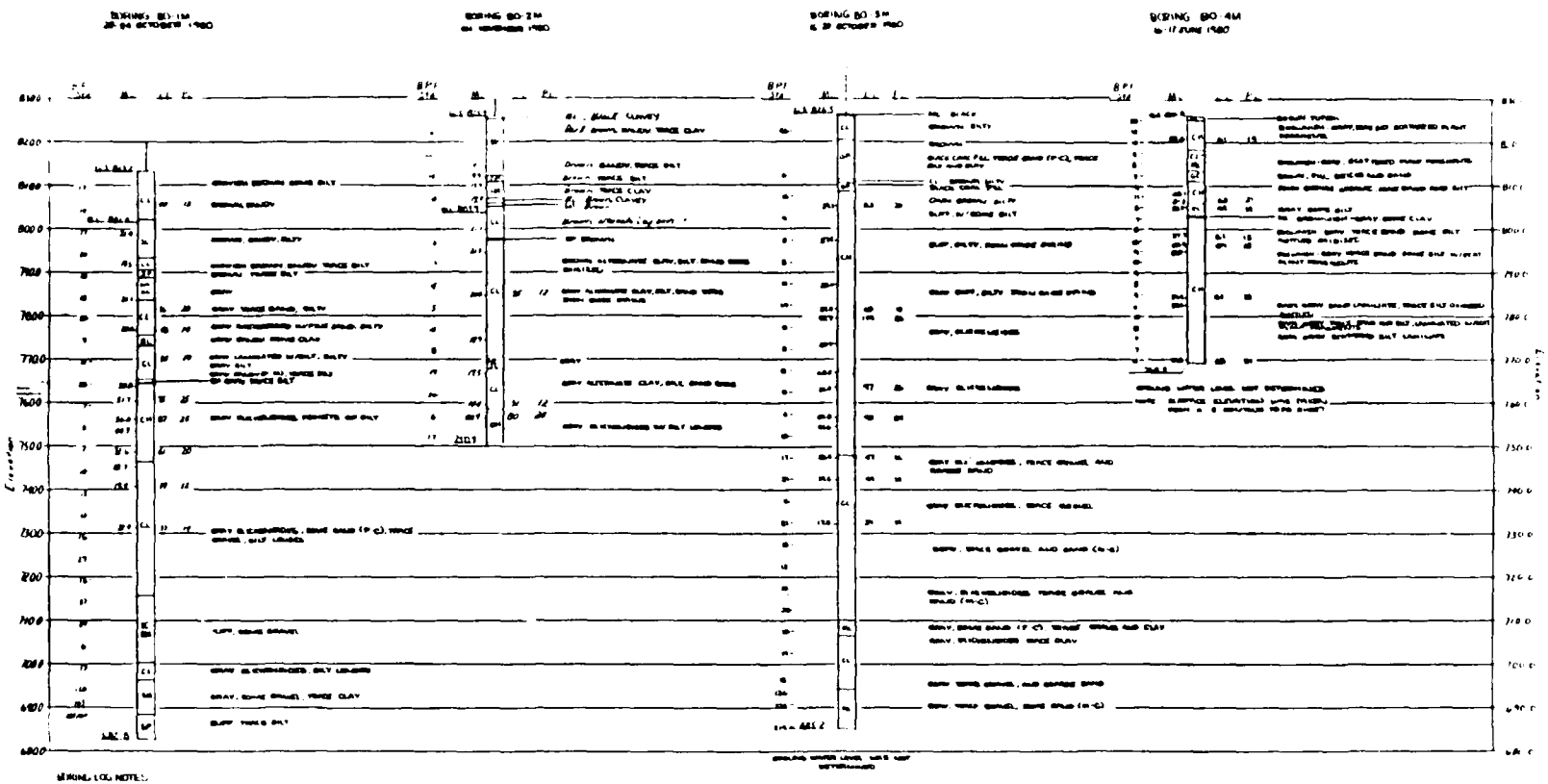


SPF LEVEE

SPF LEVEE WITH CUT SLOPE

EAST GRAND FORKS, MN

1 - 6

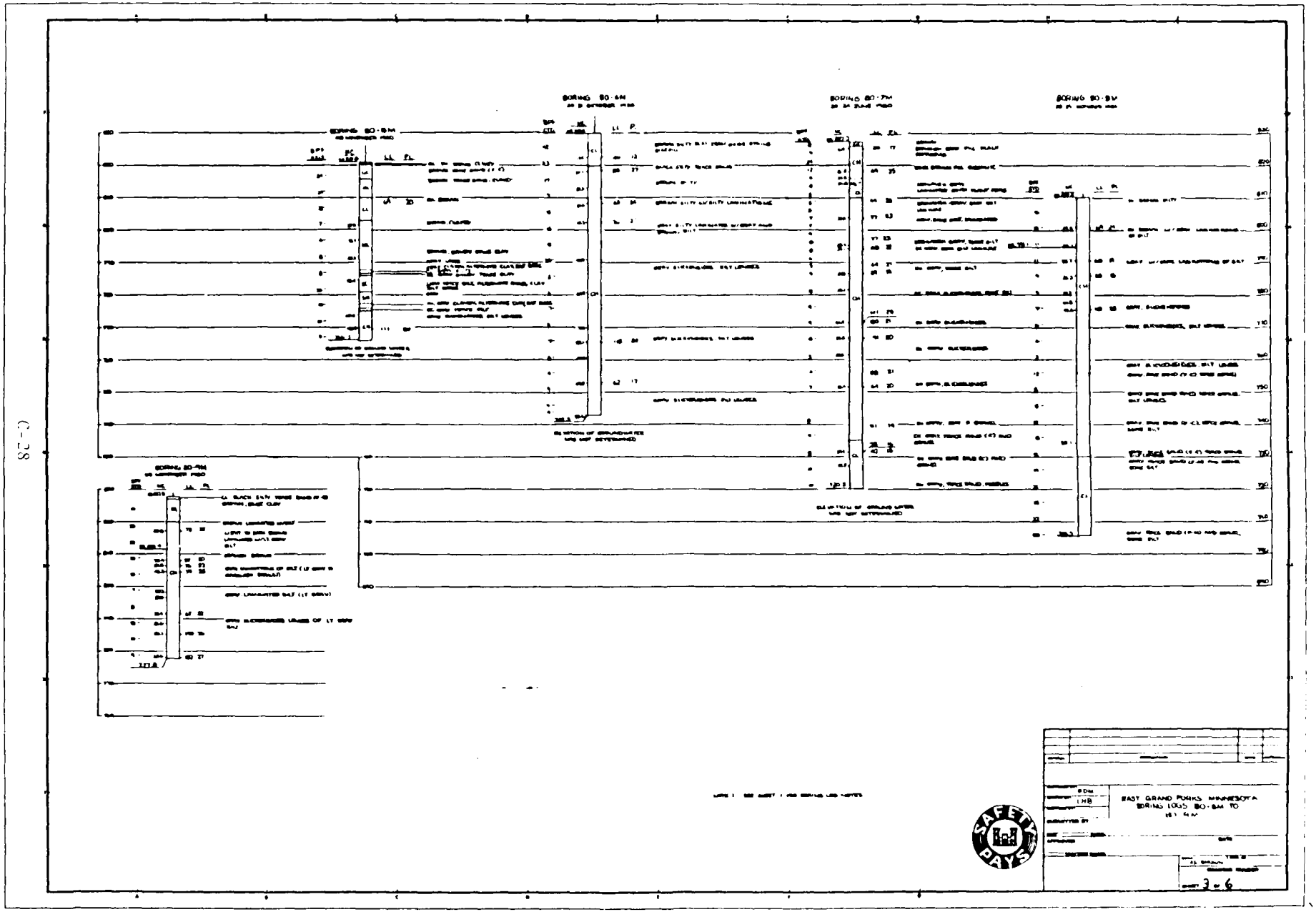


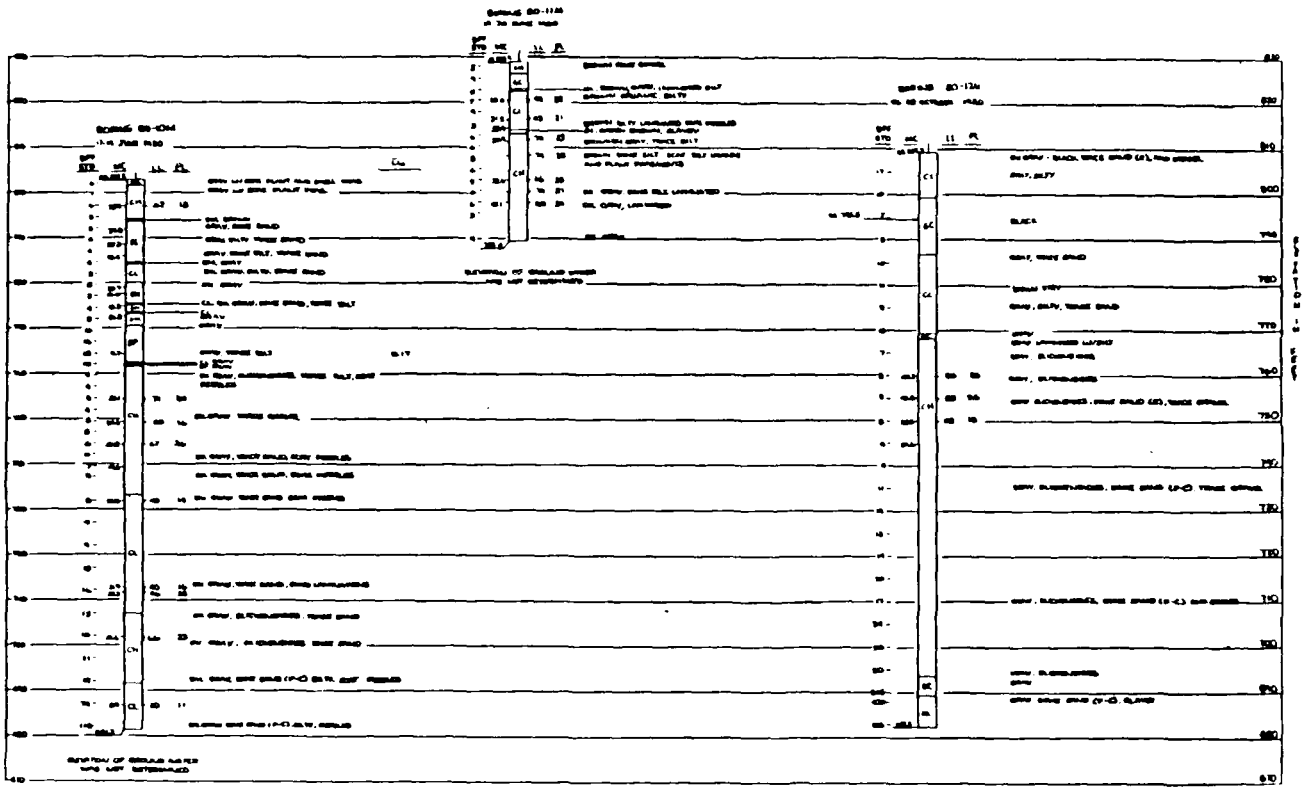
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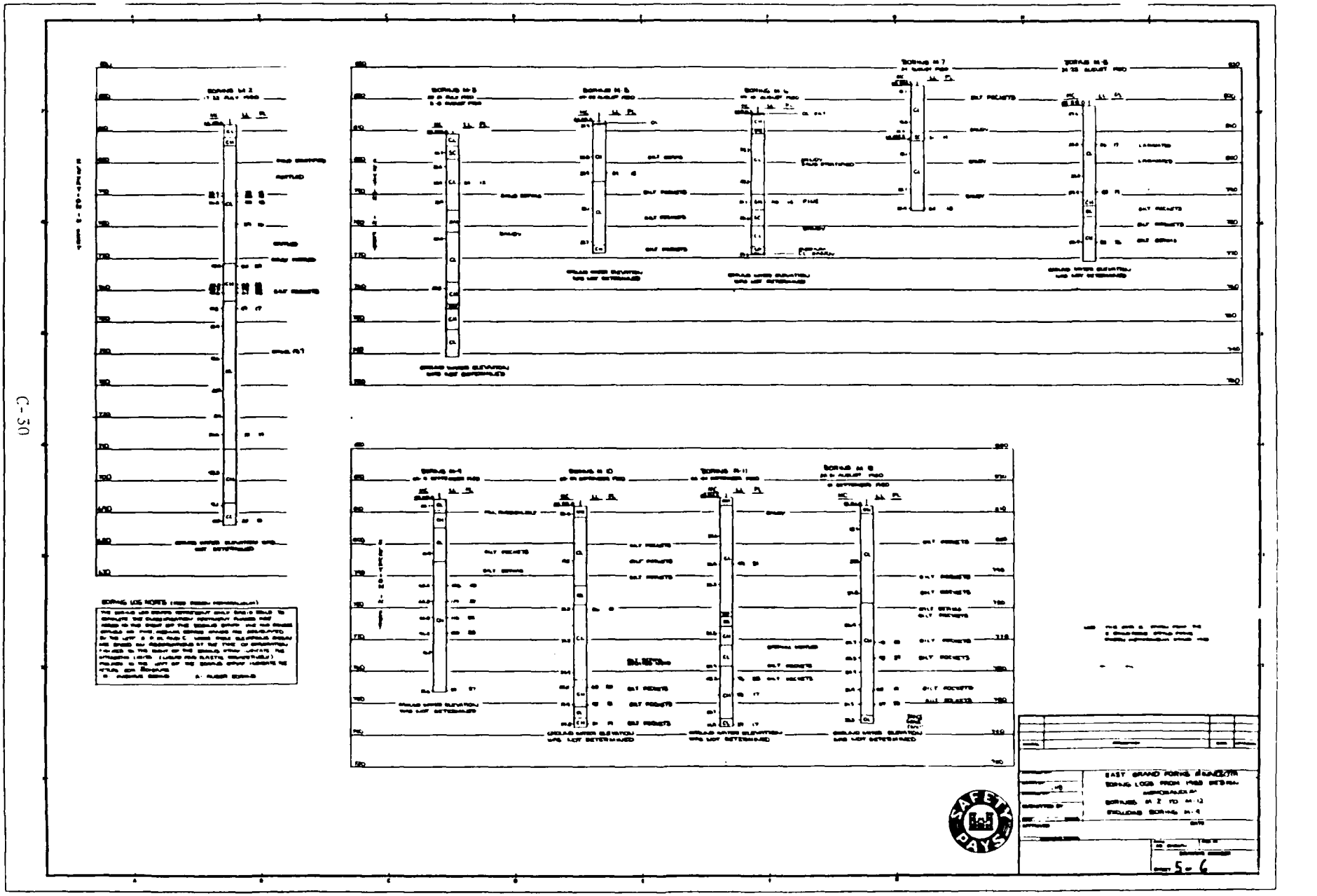
EAST GRAND FORKS, MINNESOTA
BORING LOGS BO 1M TO BO 4M

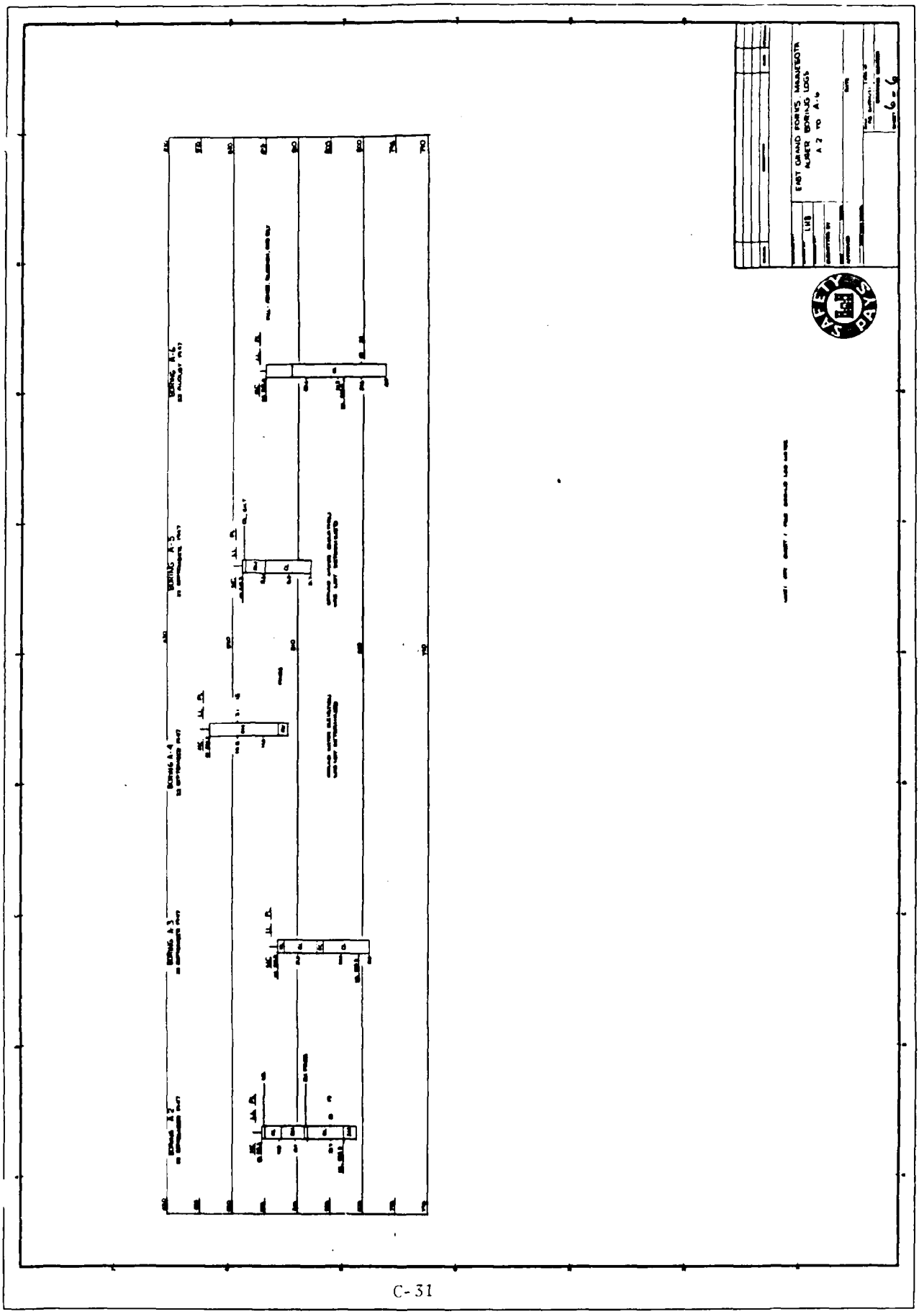
SAFETY PAYS

2 - 6


BORING BO-6M
BORING BO-7M
BORING BO-8M
BORING BO-9M
SAFETY PAYS
EAST GRAND FORKS, MINNESOTA
BORING LOGS BO-6M TO
BO-9M
3 - 6






EAST GRAND FORKS, MINNESOTA
ALBERT BORING LOGS
A-2 TO A-6
SAFETY PAYS

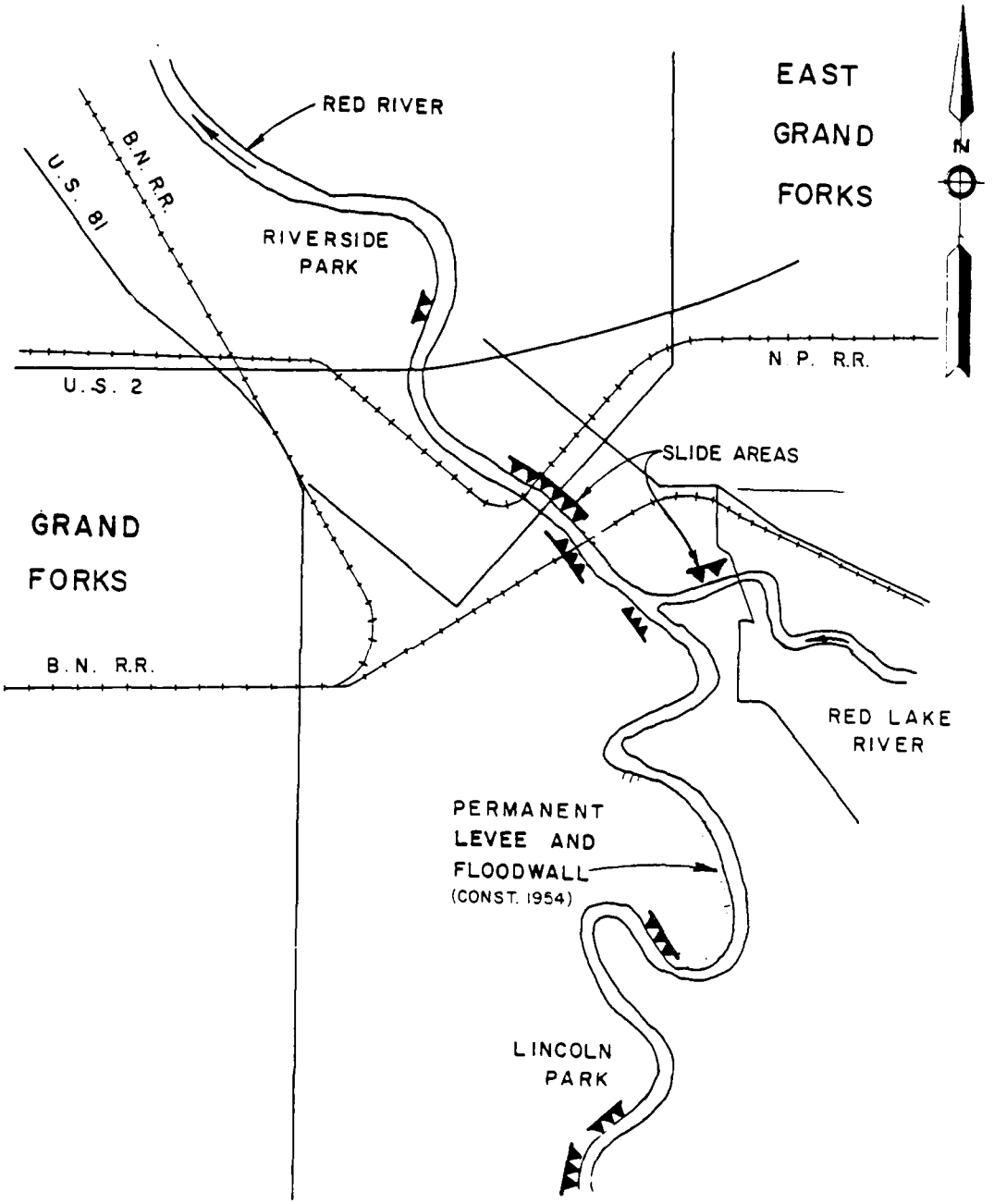

RED RIVER
B.N. R.R.
U.S. 81
RIVERSIDE PARK
EAST GRAND FORKS
N
N. P. R.R.
U.S. 2
SLIDE AREAS
GRAND FORKS
B.N. R.R.
RED LAKE RIVER
PERMANENT LEVEE AND FLOODWALL
(CONST. 1954)
LINCOLN PARK

PLATE 7

EAST GRAND FORKS, MINNESOTA
GENERAL REEVALUATION

SUPPORTING DOCUMENTATION
INTERIOR FLOOD CONTROL

INTERIOR FLOOD CONTROL

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D-6	Elevation-Damage Curve, Area 6
D-7	Elevation-Damage Curve, Northwest (NW) Development
D-8	Point Rainfall Depth vs. Duration
D-9	Point Rainfall Depth vs. Frequency

INTERIOR FLOOD CONTROL

EXISTING CONDITIONS

DESCRIPTION OF WATERSHEDS AND DRAINAGE PATTERNS

The city of East Grand Forks consists of two major land areas; namely, the area north of the Red Lake River and the area south of the Red Lake River. Each of the two major areas was originally evaluated for several proposed plans; however, the area south of the Red Lake River was eliminated from further consideration because no feasible structural plan could be identified. The area north of the Red Lake River was divided into seven areas, with one area further subdivided. Each of these areas is delineated on plate D-1 and further defined in the following paragraphs.

Area 1 consists of the 55.1-acre area bounded by the Great Northern Railroad tracks on the north and the proposed levee on the west, south and east. This area is further subdivided as shown on plate D-1. Runoff from area 1A generally occurs from north to south to the line of protection. Area 1B runoff flows along the levee from the southeast to the northwest. Area 1 is relatively flat with elevations ranging from a high around 836 along the railroad tracks to a low of about 820 along the levee. Land use in area 1A is almost entirely residential while area 1B is about 60 percent undeveloped, with the remainder being light industrial.

Area 2 includes the 234.2-acre area between the Northern Pacific and Great Northern Railroad tracks, east of high ground along Central Avenue and west of high ground near the American Crystal Sugar Company ponds. Runoff in area 2 flows in a southwesterly direction and is

aided by two storm sewer systems which discharge to the south into the Red Lake River. Area 2 is very flat with elevations varying from a high of about 835 in the northeast corner to a low of about 831 in the southwest corner. Residential and light industry are the major land uses.

Area 3 consists of the 68.9-acre area that contains the main business district of East Grand Forks. The area is bounded by the Northern Pacific Railroad tracks along the northwest side, the proposed levee along the southwest side and high ground near Central Avenue along the east side. Runoff from area 3 occurs in a southwesterly direction and is aided by two storm sewer systems that discharge into the Red River of the North. Area 3 slopes very gently to the southwest with elevations ranging between about 832 in the northeast corner and about 826 along the proposed levee. Land use consists entirely of commercial and residential development.

Area 4 includes the 20.2-acre area bounded by the Northern Pacific Railroad tracks to the southeast and the proposed levee on the southwest. On all other sides, the area is delineated by high ground and existing storm sewer systems. Area 4 runoff generally flows from north to south and is aided by a storm sewer system that discharges into the Red River of the North. Elevations in the area vary from about 826 in the north to about 821 in the south. All of area 4 is residentially developed.

Area 5 consists of the 258.0-acre area located north of the Northern Pacific Railroad tracks and east of the proposed levee. Runoff from area 5 generally occurs from east to west and is aided by an existing storm sewer along Gateway Drive that discharges into the Red River of the North. Area 5 is relatively flat with elevations ranging from about 834 in the eastern portion to about 820 along the proposed levee.

Land use is predominantly residential with a small amount of light industry in the eastern portion.

Area 6 includes the 463.7-acre area bounded by high ground on the west, south and east and the proposed levee on the west and north. Area 6 runoff flows from the northeast to the southwest and is aided by a storm sewer system that discharges into the Red River of the North near 15th Street NW. The area is very flat with elevations varying between about 834 in the northeast corner and about 827 along the levee in the southwest corner.

The Northwest Development consists of about 215.8 acres bounded by the proposed levee on the south, west and north and by high ground along Eighth Avenue NW on the east. Runoff from the Northwest Development area generally occurs from north to south and is aided by two extensive and three small storm sewer systems. The Northwest Development area is relatively flat with elevations ranging from about 832 in the northeast corner to about 827 along the south levee. At present, land use in the area is 50 percent residential, with the remaining portion being either open or agricultural.

PONDING AREAS

There is one potential ponding site available. Sherlock Park, in area 5, will be used as a temporary ponding area. About 43.0 acre-feet of storage is available below the apparent zero damage elevation of 818.0.

FUTURE DEVELOPMENT

According to a development plan supplied by the city of East Grand Forks, all undeveloped areas, other than those specifically set aside as parks, playgrounds, etc., will be developed during the next 50 years. For areas 2 and 5, the remaining open areas will be developed

with light industry. Any remaining undeveloped areas in the north and east portions of area 6 and the Northwest Development will be residentially developed. Much, if not all, of the commercial and industrial development will be agriculture support businesses. Agriculture support development, such as implement dealers, manufacturing firms, etc., is generally not as dense and impervious as regular commercial and industrial development; therefore, runoff will not be as high as usually expected from commercial and industrial development.

ELEVATION-DAMAGE RELATIONSHIPS

For the purpose of defining flood damages from interior runoff, an elevation-damage curve was developed for each of the eight interior watersheds shown on plate D-1. The curves, as shown on plates D-3 through D-6, are based on October 1983 price levels and conditions. The zero damage elevations for each area is as follows:

Area	Zero Damage Elevation
1A	826.0
1B	833.5
2	832.0
3	823.0
4	819.0
5	818.0
6	825.0
NW	828.0

RAINFALL DATA

The 1-, 2-, 3-, 6-, 12-, 24-, 48-, and 96-hour duration rainfall depths for the 100-, 50-, 20-, 10-, 4-, 2- and 1-percent exceedence frequency and standard project storms at East Grand Forks were obtained from the

National Weather Service Technical Reports Nos. 40 and 49, "Rainfall Frequency Atlas of the United States" (references a and b)*. Rainfall-depth-duration-frequency relations were determined from these data and are presented on plates D-8 and D-9. The standard project storm for the East Grand Forks area was developed in accordance with criteria presented in EM 1110-2-1411 (reference c) and is also shown on plate D-8. Accumulated 96-hour hypothetical rainfall amounts and incremental rainfall amounts for the 50-, 20-, 2- and 1-percent storms are presented in tables D-1 and D-2.

UNIT HYDROGRAPHS

Unit hydrographs for the interior watersheds were developed using the Soil Conservation Service (SCS) method in the HEC-1 computer program. The watershed characteristics required to generate these unit hydrographs are shown in table D-3. Surface cover, watershed length and slope were obtained from USGS quad sheets and detailed topography of the area. Lag time (L) was calculated using the following formula found in SCS Technical Release (TR) No. 55 (reference d) as equation 3-2:

$$L = \frac{\ell^{0.8}(S+1)^{0.7}}{1900\ Y^{0.5}}$$

*All references appear in the final section of the supporting documentation.

where:

L = lag in hours

ℓ = hydraulic length of watershed in feet

$S = \frac{1000}{CN} - 10$ (CN is the SCS curve number)

Y = average watershed land slope in percent

Curve numbers were obtained from table 2-2 in TR-55 and adjusted to high antecedent moisture conditions (AMC III).

RUNOFF HYDROGRAPHS

Runoff hydrographs for each of the 8 watersheds were generated using the SCS method in the HEC-1 computer program. First, the program takes the hypothetical hyetographs and develops rainfall excess hyetographs by applying the selected losses. Losses were determined using a function based on the SCS curve number. The runoff hydrographs are then obtained by applying the rainfall excess hyetographs to the unit hydrographs described in the preceding paragraph. Runoff hydrographs were developed for the 50-, 20-, 2- and 1-percent hypothetical storms.

SEEPAGE

Because of the very high clay content of the foundation materials and the extremely low permeability of the clay, seepage is considered to be negligible.

INTERIOR FLOOD CONTROL PLANS

GENERAL

For the area north of the Red Lake River, the required interior flood control facilities consist of four gravity outlets, a ponding area, three pumping stations and seven intercepting storm sewer sections. The locations of the proposed interior flood control facilities, such as gravity outlets, intercepting storm sewers, etc., required are shown on plate D-2 and defined in table D-4.

DESIGNATED PONDING AREAS

The designated ponding area for area 5 is shown on plate D-2 and is defined in the Ponding Areas paragraph on page D-3. The location, estimated surface area in acres and estimated storage in acre-feet for the ponding area are shown in table D-4.

PUMPING STATIONS

As shown on plate D-2, pumping stations required for removal of storm-water would be located in areas 1A, 3 and Northwest Development. Pumping station 1A would be located along the proposed levee west of Central Avenue. Pumping station 3 would be located along the proposed floodwall north of Demers Avenue. Pumping station Northwest Development would be located along the proposed levee just southwest of the intersection of River Road, 17th Street NW and 12th Avenue NW. The required capacity for each of the pumping stations is shown in table D-4. All pumping stations would discharge over the top of the levee or floodwall into the gate well of the adjacent gravity outlet. Criteria for design of the pumping stations are presented on page D-8.

PLAN OF OPERATION

During low river gravity flow conditions, the sluice gates at outlets 1A, 3, 5 and Northwest Development would be open. Runoff from areas 1B and 2 would be carried to outlet 1A by the 78-inch RCP intercepting storm sewer. A 36- and 42-inch RCP (reinforced concrete pipe) intercepting storm sewer located along the inside toe of the proposed levee west of Central Avenue would carry runoff from a low point in area 1A to outlet 1A. The combined runoff from areas 1A, 1B and 2 would discharge into the Red Lake River through outlet 1A. Two separate intercepting storm sewers, one a 42-inch RCP and the other a 66-inch RCP, carry runoff from area 4 and an existing storm sewer in area 3, respectively, to outlet 3. The combined runoff from areas 3 and 4 would discharge into the Red River of the North through outlet 3. Runoff from area 5 would flow overland and through an existing storm sewer into the proposed ponding area in Sherlock Park. From the ponding area, the runoff would discharge into the Red River of the North through outlet 5. A 96-inch RCP intercepting storm sewer would carry runoff from area 6 to the Northwest Development outlet. In the Northwest Development area, runoff would flow to the Northwest Development outlet in a 60-inch RCP intercepting storm sewer located along the inside toe of the proposed levee next to the Red River of the North. The combined runoff from area 6 and the Northwest Development area would discharge into the Red River of the North through the Northwest Development outlet.

During flood periods when the Red River of the North and the Red Lake River rise, the sluice gates at outlets 1A, 3, 5 and Northwest Development would be closed. The gates at the entrance to pumping stations 1A, 3 and Northwest Development would be opened and the pumps activated. In area 5, runoff would be stored in the ponding area in Sherlock Park.

Should the interior water level (pond level) rise 1 foot or more above the current river stage, the gravity outlets would be temporarily opened. When the interior pond level receded to the same level as the river, the gravity outlets would then be closed.

DESIGN CRITERIA

DESIGN OF INTERCEPTORS AND GRAVITY OUTLETS

Gravity outlets and interceptors for the East Grand Forks area are designed for the 1-percent chance rainfall event. Procedures outlined in EM 1110-345-283 and TM 5-820-4 (references e and f) provide the basis for the hydraulic design of the interceptors and gravity outlets. The interceptors and gravity outlets are to be reinforced-concrete pipe with their design based on a Manning's "n" of 0.014. K_e is assumed to be 0.2 for manhole entrances and 0.5 for both concrete headwall entrances and flared-end sections. The outlets would be furnished with safety guards at inlet and outlet ends to improve safety and reduce debris deposition in pipes. All gravity outlets would be equipped with a sluice gate(s) in the gate well at the flood barrier. Supplemental emergency gates on gravity outlets would be provided if necessary.

PUMPING REQUIREMENTS

The capacity of the pumping station is based on the expected peak runoff from a 20-percent rainfall event coincident with Red River of the North and Red Lake River flood stages. Although this provides a conservative design, a 20-percent rainfall event was used until an economic formulation can be done in future design studies. If ponding is available, the capacity of the pumping station is adjusted accordingly. As stated earlier on page D-5, seepage is considered to be negligible. Pumping stations are to be designed in accordance with EM 1110-2-3101, EM 1110-2-3102 and EM 1110-2-3105 (references g, h and

i). Minimum dimensions and layout of the pumping stations should be based on the appropriate sump dimension chart presented in the Hydraulic Institute Standards (reference j).

FUTURE STUDIES

During design studies, the interior flood control facilities required for the selected plan will be refined. Detailed information about existing storm and sanitary sewers will be acquired from the city of East Grand Forks. Storage routings will be performed to determine the optimum size for the gravity outlets and interceptors. An elevation (stage)-duration curve will be developed for the Red River of the North and Red Lake River. This curve will be used in conjunction with a probabilistic rainfall-streamflow analysis that will be performed to determine the most cost effective size of pumping stations. The damage-elevation relationships included in this report will also be used in this analysis. Also to be considered during future studies will be the possibility of adding or eliminating gravity outlets and combining pumping stations via intercepting storm sewers.

REFERENCES

a. National Weather Service Technical Report No. 40, "Rainfall Frequency Atlas of the United States," May 1961.

b. National Weather Service Technical Report No. 49, "Two- to Ten-Day Precipitation for Return Periods of 2 to 100 Years in the Contiguous United States," 1964.

c. EM 1110-2-1411, "Standard Project Flood Determinations," (Civil Works Engineer Bulletin No. 52-8, March 1952).

d. Soil Conservation Service Technical Release No. 55, "Urban Hydrology for Small Watersheds," January 1975.

e. EM 1110-345-283, "Drainage and Erosion Control Structures for Airfields and Heliports."

f. TM 5-820-4, "Drainage and Erosion Control, Drainage for Areas Other than Airfields," (EM 1110-345-284).

g. EM 1110-2-3101, "Pumping Stations - Local Cooperations and General Considerations."

h. EM 1110-2-3102, "General Principles of Pumping Station Design and Layout."

i. EM 1110-2-3105, "Mechanical and Electrical Design of Pumping Stations."

j. Standards of the Hydraulic Institute, Twelfth Edition (1969).

The following references, although not specifically referred to, were also used in the development of the interior flood control plan.

k. EM 1110-2-1601, "Hydraulic Design of Flood Control Channels."

l. EM 1110-2-1601, "Hydraulic Design of Reservoir Outlet Works."

m. TM 5-820-1, "Drainage and Erosion Control, Surface Drainage Facilities for Airfields and Heliports."

n. "Hydraulic Charts for the Selection of Highway Culverts," Hydraulic Circular No. 5, U.S. Department of Transportation, Federal Highway Administration, April 1977.

Table D-1 - Accumulated 96-Hour Hypothetical Rainfall Amounts

Rainfall Duration in Hours and Minutes	Rainfall Frequency in Percent			
	50	20	2	1
0 10	0.55	0.75	1.18	1.30
0 20	0.77	1.07	1.70	1.98
0 30	0.87	1.25	2.06	2.29
0 40	0.94	1.38	2.29	2.53
0 50	1.00	1.47	2.48	2.74
1 00	1.06	1.56	2.65	2.96
1 10	1.08	1.58	2.67	2.99
1 20	1.09	1.60	2.69	3.02
1 30	1.10	1.61	2.71	3.04
1 40	1.12	1.63	2.76	3.09
1 50	1.14	1.67	2.81	3.14
2 00	1.15	1.68	2.85	3.18
2 10	1.17	1.72	2.88	3.22
2 20	1.19	1.75	2.91	3.26
2 30	1.20	1.78	2.93	3.30
2 40	1.22	1.80	2.97	3.34
2 50	1.24	1.82	3.01	3.38
3 00	1.25	1.83	3.05	3.41
3 10	1.27	1.86	3.09	3.46
3 20	1.29	1.88	3.13	3.50
3 30	1.30	1.90	3.16	3.54
3 40	1.32	1.93	3.19	3.58
3 50	1.33	1.95	3.22	3.61
4 00	1.34	1.97	3.25	3.64
4 10	1.36	1.99	3.28	3.67
4 20	1.38	2.01	3.31	3.70
4 30	1.39	2.02	3.33	3.73
4 40	1.40	2.04	3.36	3.76
4 50	1.41	2.06	3.39	3.79
5 00	1.42	2.07	3.41	3.82
5 10	1.44	2.09	3.44	3.85
5 20	1.46	2.11	3.46	3.88
5 30	1.47	2.13	3.48	3.90
5 40	1.48	2.14	3.51	3.93
5 50	1.49	2.15	3.54	3.96
6 00	1.50	2.16	3.57	3.98
12 00	1.72	2.46	4.03	4.49
18 00	1.84	2.62	4.30	4.79
24 00	1.94	2.76	4.50	5.00
48 00	2.24	3.22	5.35	5.90
72 00	2.42	3.50	5.80	6.45
96 00	2.60	3.74	6.20	6.90

Table D-2 - Incremental Rainfall Amounts

Rainfall Distribution in Hours and Minutes	Rainfall Frequency in Percent			
	50	20	2	1
Rainfall by 10-minute increments during maximum 6-hour accumulation				
Hr. Min. - Hr. Min.				
0 00 - 0 10	0.01	0.01	0.02	0.02
0 10 - 0 20	0.01	0.01	0.02	0.02
0 20 - 0 30	0.01	0.01	0.02	0.03
0 30 - 0 40	0.01	0.01	0.02	0.03
0 40 - 0 50	0.01	0.02	0.03	0.03
0 50 - 1 00	0.01	0.02	0.03	0.03
1 00 - 1 10	0.01	0.02	0.03	0.03
1 10 - 1 20	0.01	0.02	0.03	0.03
1 20 - 1 30	0.02	0.02	0.03	0.03
1 30 - 1 40	0.02	0.02	0.03	0.04
1 40 - 1 50	0.02	0.02	0.03	0.04
1 50 - 2 00	0.02	0.02	0.04	0.04
2 00 - 2 10	0.02	0.02	0.04	0.04
2 10 - 2 20	0.02	0.03	0.04	0.04
2 20 - 2 30	0.02	0.03	0.05	0.05
2 30 - 2 40	0.06	0.09	0.17	0.21
2 40 - 2 50	0.07	0.13	0.23	0.24
2 50 - 3 00	0.22	0.32	0.52	0.68
3 00 - 3 10	0.55	0.75	1.18	1.30
3 10 - 3 20	0.10	0.18	0.36	0.31
3 20 - 3 30	0.06	0.09	0.19	0.22
3 30 - 3 40	0.02	0.04	0.05	0.05
3 40 - 3 50	0.02	0.03	0.04	0.05
3 50 - 4 00	0.02	0.03	0.04	0.04
4 00 - 4 10	0.02	0.02	0.04	0.04
4 10 - 4 20	0.02	0.02	0.03	0.04
4 20 - 4 30	0.02	0.02	0.03	0.04
4 30 - 4 40	0.02	0.02	0.03	0.03
4 40 - 4 50	0.01	0.02	0.03	0.03
4 50 - 5 00	0.01	0.02	0.03	0.03
5 00 - 5 10	0.01	0.02	0.03	0.03
5 10 - 5 20	0.01	0.02	0.03	0.03
5 20 - 5 30	0.01	0.01	0.02	0.03
5 30 - 5 40	0.01	0.01	0.02	0.03
5 40 - 5 50	0.01	0.01	0.02	0.03
5 50 - 6 00	0.01	0.01	0.02	0.02
Rainfall by 6-hour increments during maximum 24-hour accumulation				
0 00 - 6 00	1.50	2.16	3.57	3.98
6 00 - 12 00	0.22	0.30	0.46	0.51
12 00 - 18 00	0.12	0.16	0.27	0.30
18 00 - 24 00	0.10	0.14	0.20	0.21
Rainfall by 24-hour increments during maximum 96-hour accumulation				
0 00 - 24 00	1.94	2.76	4.50	5.00
24 00 - 48 00	0.30	0.46	0.85	0.90
48 00 - 72 00	0.18	0.28	0.45	0.55
72 00 - 96 00	0.18	0.24	0.40	0.45

Table D-3 - Interior Watershed Characteristics

Section	Area Acres	Area Sq. Mi.	Average Watershed Slope in Percent	Watershed Length Feet	Lag Time L-Hours	Ratio Impervious	SCS Curve Number CN
1A	40.4	0.063	0.80	1,500	0.30	0.35	93
1B	14.7	0.023	0.12	1,300	0.79	0.15	90
2	234.2	0.366	0.10	4,000	1.88	0.35	93
3	68.9	0.108	0.24	2,500	0.76	0.55	95
4	20.2	0.032	0.12	1,400	0.74	0.35	93
5	258.0	0.403	0.22	6,200	1.88	0.30	92
6	463.7	0.725	0.12	5,700	2.27	0.35	93
NW	215.8	0.337	0.13	4,000	1.72	0.30	92

Table D-4 - Required Interior Flood Control Facilities
Area North of the Red Lake River

Gravity Outlets

Location	Design Capacity in cfs	Size and Type	Approximate Length in feet
Central Avenue (1a)*	250	84" RCP	400
Demers Avenue (3)	189	72" RCP	400
10th Street NW (5)	85	60" RCP	1,500
NW Development (NW)	603	2-84" RCP	500

Intercepting Storm Sewers

1B and 2 to Outlet 1A	242	78" RCP	1,900
1A to Outlet 1A	31	36" RCP	400
1A to Outlet 1A	38	42" RCP	450
4 to Outlet 3	42	42" RCP	550
3 to Outlet 3	147	66" RCP	600
6 to Outlet NW	378	96" RCP	1,700
NW to Outlet NW	118	60" RCP	2,700

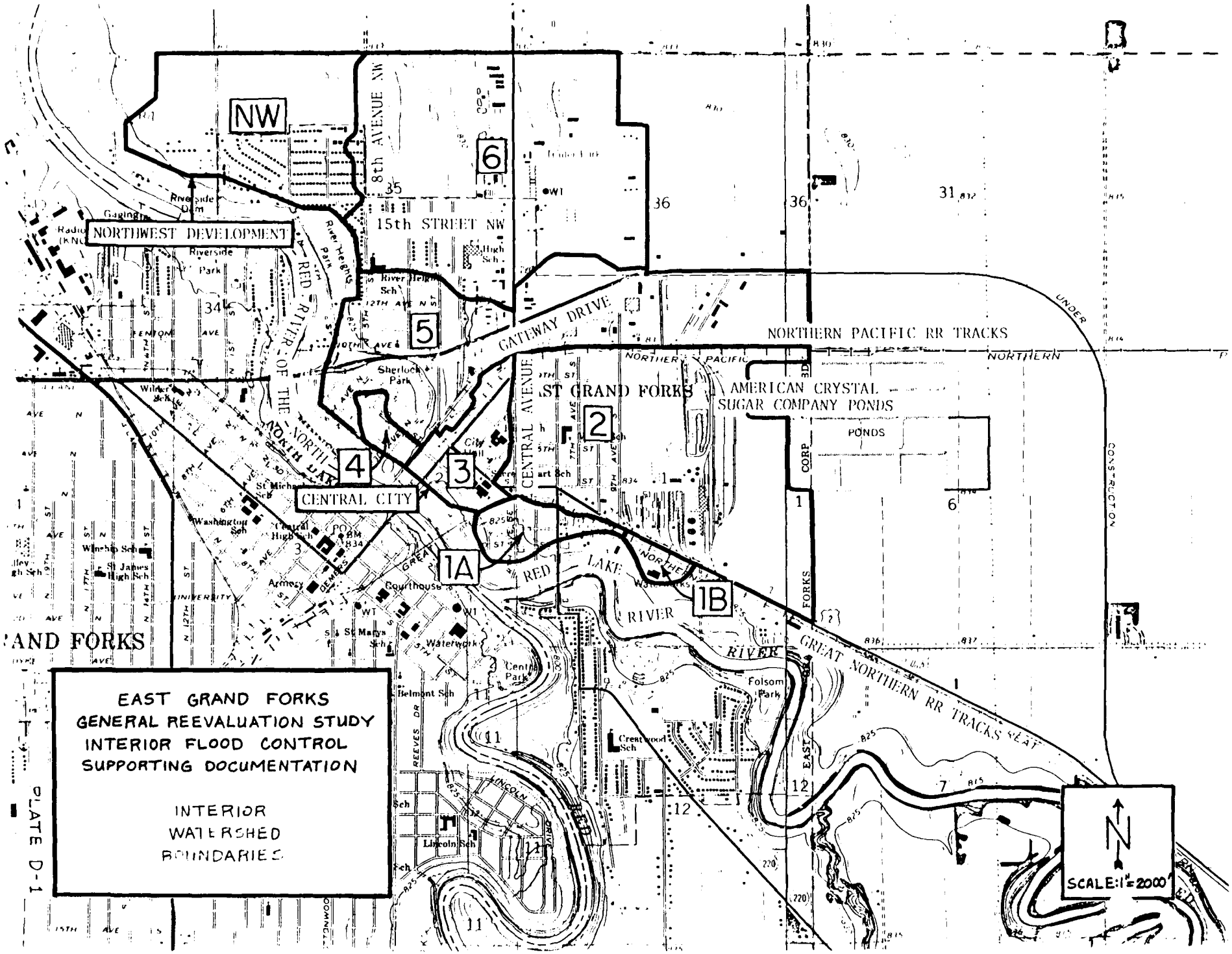
Ponding Area

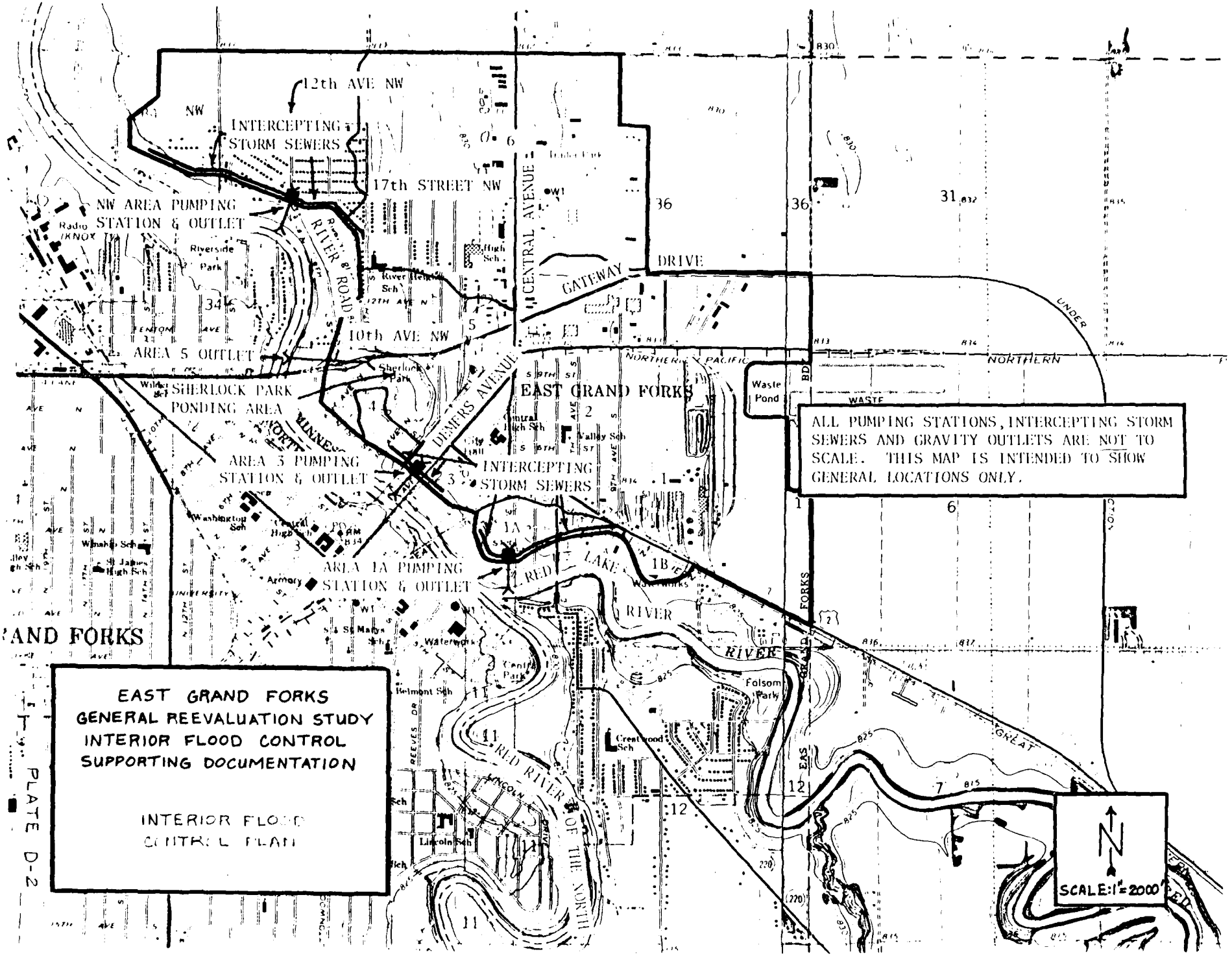
Location	Estimated Surface Area in acres	Estimated Storage in acre-feet
Sherlock Park	16.1	43.0

Pumping Stations

Location	Design Capacity in cfs	Required Capacity in gpm
Central Avenue (1A)	138	62,000
Demers Avenue (3)	107	48,000
NW Development (NW)	329	148,000

*Numbers and/or letters in parentheses represent the area in which these features are incorporated.


NW
6
8th AVENUE NW
15th STREET NW
NORTHWEST DEVELOPMENT
Riverside Park
RED RIVER OF THE NORTH
5
GATEWAY DRIVE
NORTHERN PACIFIC RR TRACKS
Sherlock Park
CENTRAL AVENUE
EAST GRAND FORKS
AMERICAN CRYSTAL SUGAR COMPANY PONDS
PONDS
2
4
3
CENTRAL CITY
1A
1B
RED LAKE RIVER
GREAT NORTHERN RR TRACKS
Folsom Park
Courthouse
Waterworks
Central Park
Belmont Sch
Lincoln Sch
Crestwood Sch
EAST GRAND FORKS
GENERAL REEVALUATION STUDY
INTERIOR FLOOD CONTROL
SUPPORTING DOCUMENTATION
INTERIOR
WATERSHED
BOUNDARIES
PLATE D-1
SCALE: 1" = 2000'


12th AVE NW
INTERCEPTING STORM SEWERS
17th STREET NW
NW AREA PUMPING STATION & OUTLET
Radio KNOX
RIVER ROAD
CENTRAL AVENUE
GATEWAY DRIVE
10th AVE NW
AREA 5 OUTLET
SHERLOCK PARK PONDING AREA
DEMERS AVENUE
EAST GRAND FORKS
NORTHERN PACIFIC
NORTHERN
Waste Pond
WASTE
ALL PUMPING STATIONS, INTERCEPTING STORM SEWERS AND GRAVITY OUTLETS ARE NOT TO SCALE. THIS MAP IS INTENDED TO SHOW GENERAL LOCATIONS ONLY.
AREA 3 PUMPING STATION & OUTLET
INTERCEPTING STORM SEWERS
AREA 1A PUMPING STATION & OUTLET
RED LAKE RIVER
RIVER
FORKS
GRAND FORKS
EAST GRAND FORKS
GENERAL REEVALUATION STUDY
INTERIOR FLOOD CONTROL
SUPPORTING DOCUMENTATION
INTERIOR FLOOD CONTROL PLAN
PLATE D-2
RED RIVER OF THE NORTH
SCALE: 1" = 2000'

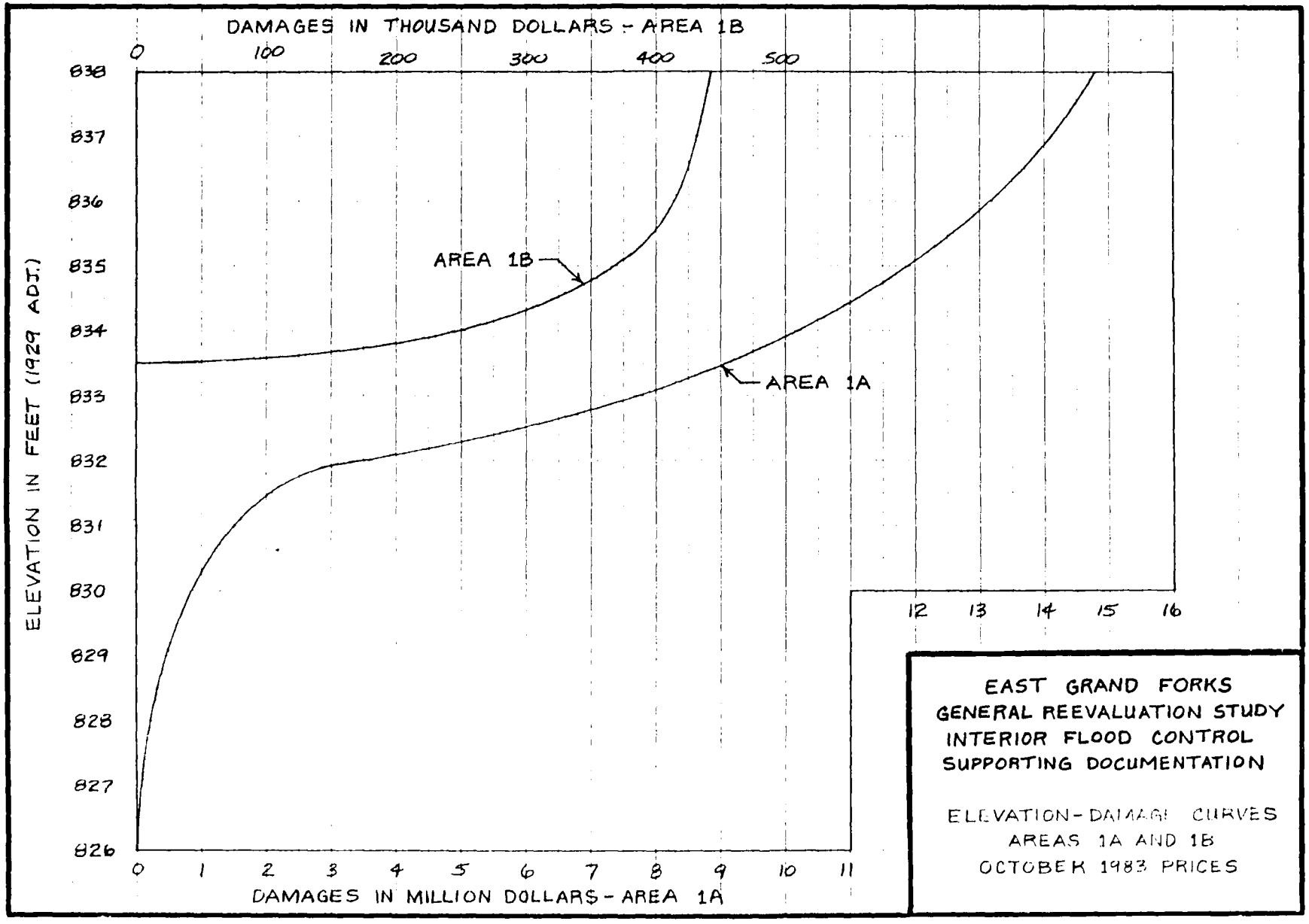

DAMAGES IN THOUSAND DOLLARS - AREA 1B
0
100
200
300
400
500
ELEVATION IN FEET (1929 ADJ.)
838
837
836
835
834
833
832
831
830
829
828
827
826
AREA 1B
AREA 1A
12
13
14
15
16
0
1
2
3
4
5
6
7
8
9
10
11
DAMAGES IN MILLION DOLLARS - AREA 1A
EAST GRAND FORKS
GENERAL REEVALUATION STUDY
INTERIOR FLOOD CONTROL
SUPPORTING DOCUMENTATION
ELEVATION - DAMAGE CURVES
AREAS 1A AND 1B
OCTOBER 1983 PRICES

PLATE D-3

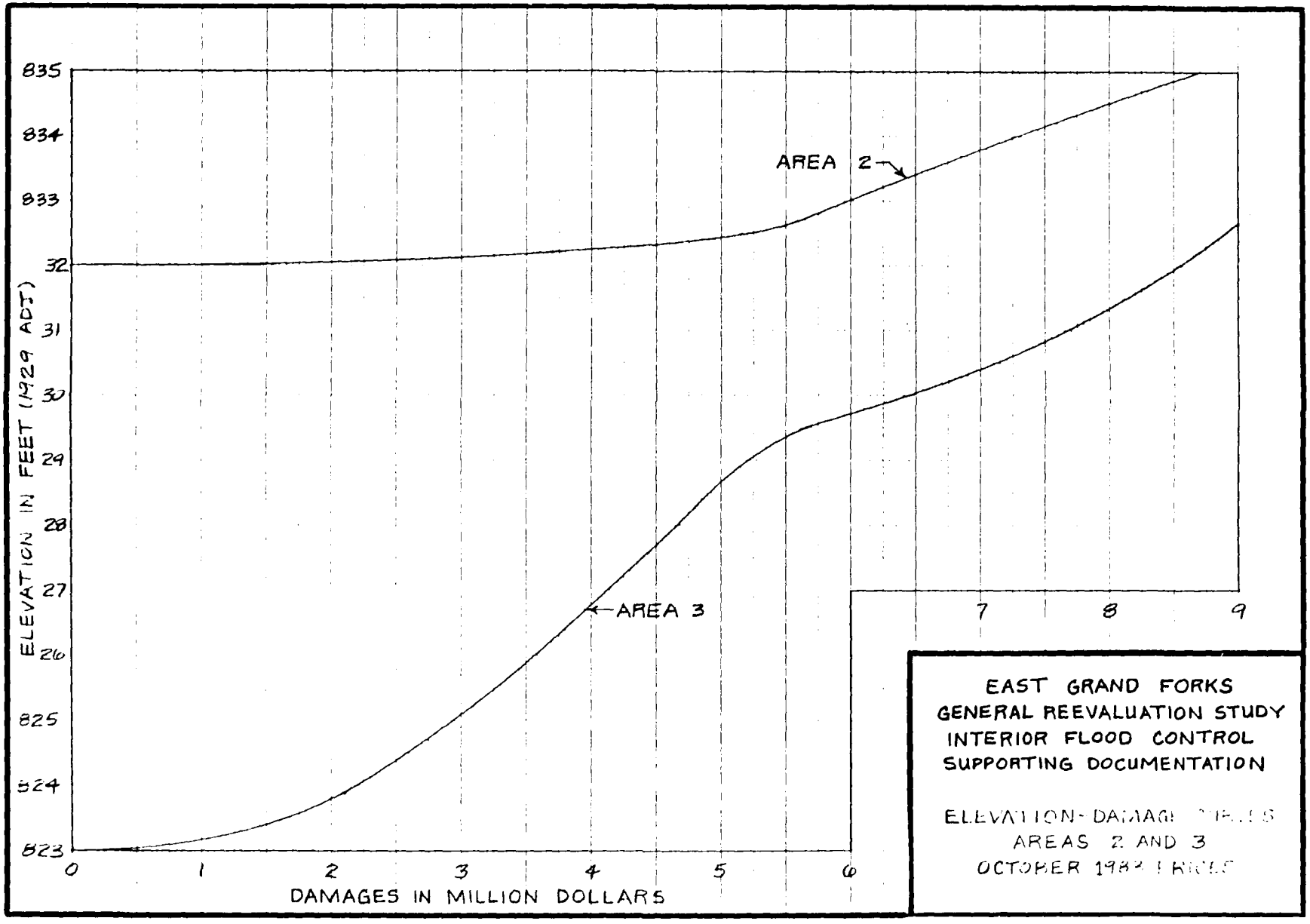

835
834
833
32
31
30
29
28
27
26
825
824
823
ELEVATION IN FEET (1929 ADJ)
AREA 2
AREA 3
0
1
2
3
4
5
6
7
8
9
DAMAGES IN MILLION DOLLARS
EAST GRAND FORKS
GENERAL REEVALUATION STUDY
INTERIOR FLOOD CONTROL
SUPPORTING DOCUMENTATION
ELEVATION-DAMAGE CURVES
AREAS 2 AND 3
OCTOBER 1982 PRICES

PLATE D-4

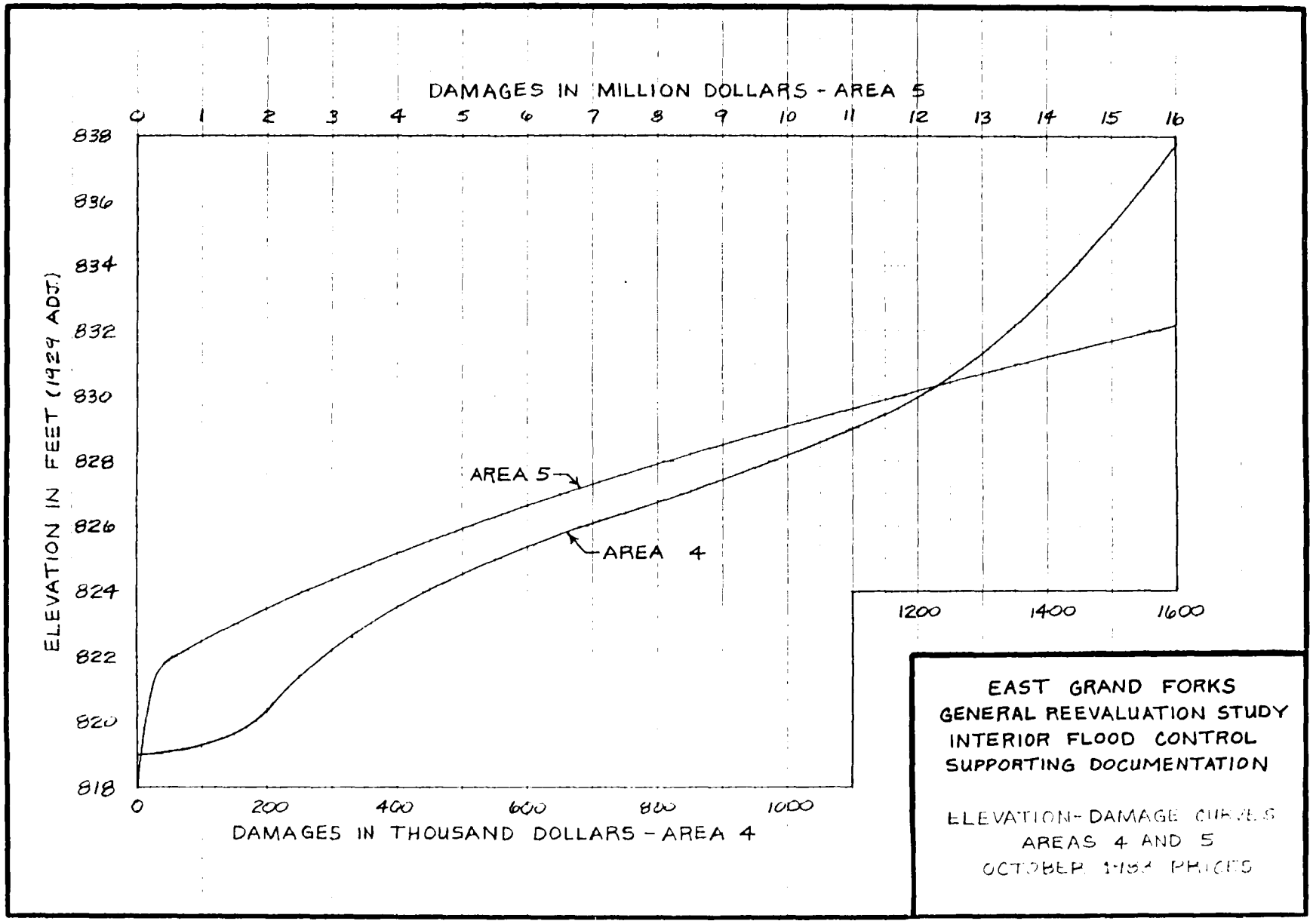

DAMAGES IN MILLION DOLLARS - AREA 5
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
ELEVATION IN FEET (1929 ADJ.)
838
836
834
832
830
828
826
824
822
820
818
AREA 5
AREA 4
1200 1400 1600
0 200 400 600 800 1000
DAMAGES IN THOUSAND DOLLARS - AREA 4
EAST GRAND FORKS
GENERAL REEVALUATION STUDY
INTERIOR FLOOD CONTROL
SUPPORTING DOCUMENTATION
ELEVATION-DAMAGE CURVES
AREAS 4 AND 5
OCTOBER 1984 PRICES

PLATE D-5

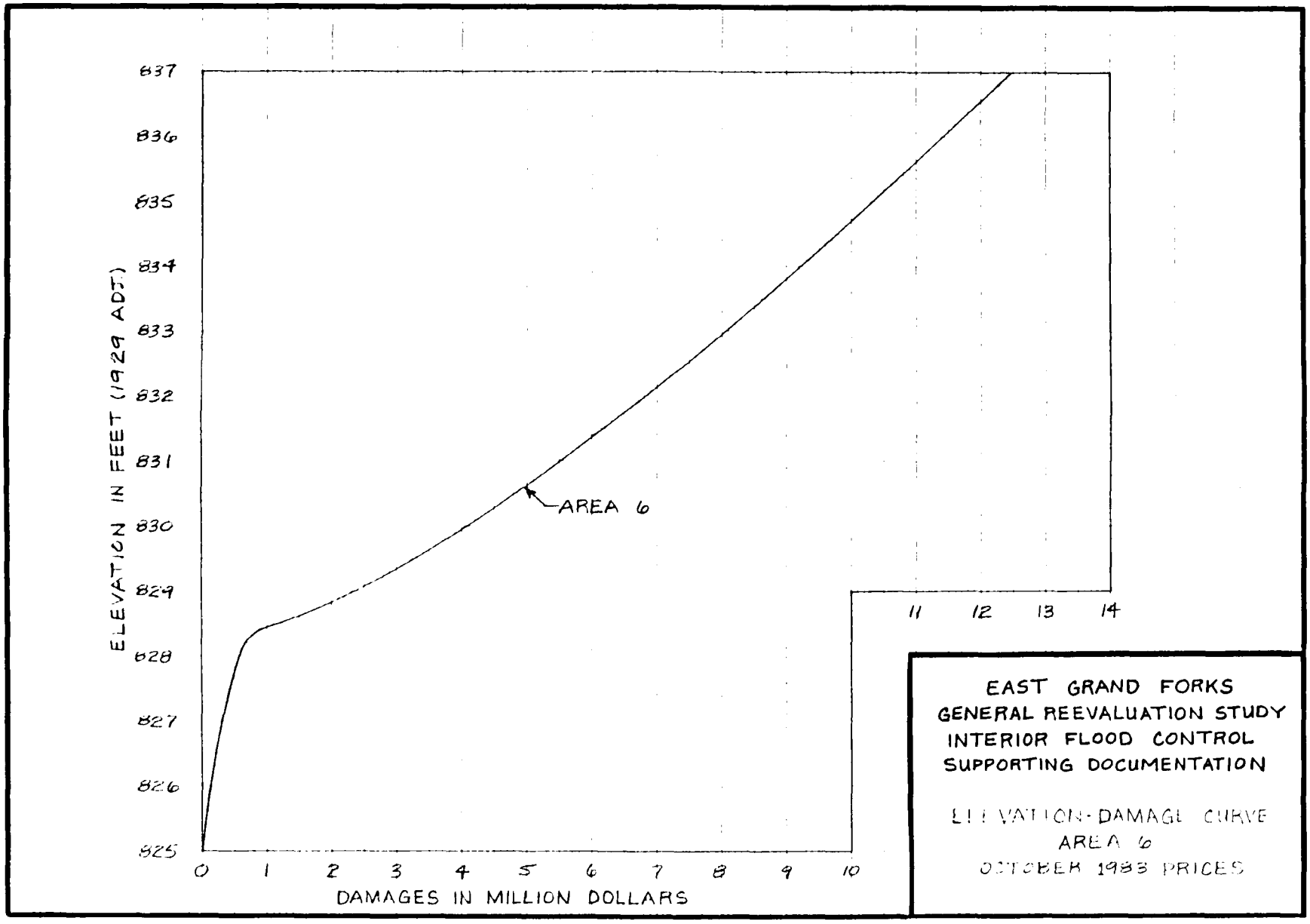

837
836
835
834
833
832
831
830
829
828
827
826
825
ELEVATION IN FEET (1929 ADJ.)
AREA 6
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
DAMAGES IN MILLION DOLLARS
EAST GRAND FORKS
GENERAL REEVALUATION STUDY
INTERIOR FLOOD CONTROL
SUPPORTING DOCUMENTATION
ELEVATION-DAMAGE CURVE
AREA 6
OCTOBER 1983 PRICES

PLATE C-7

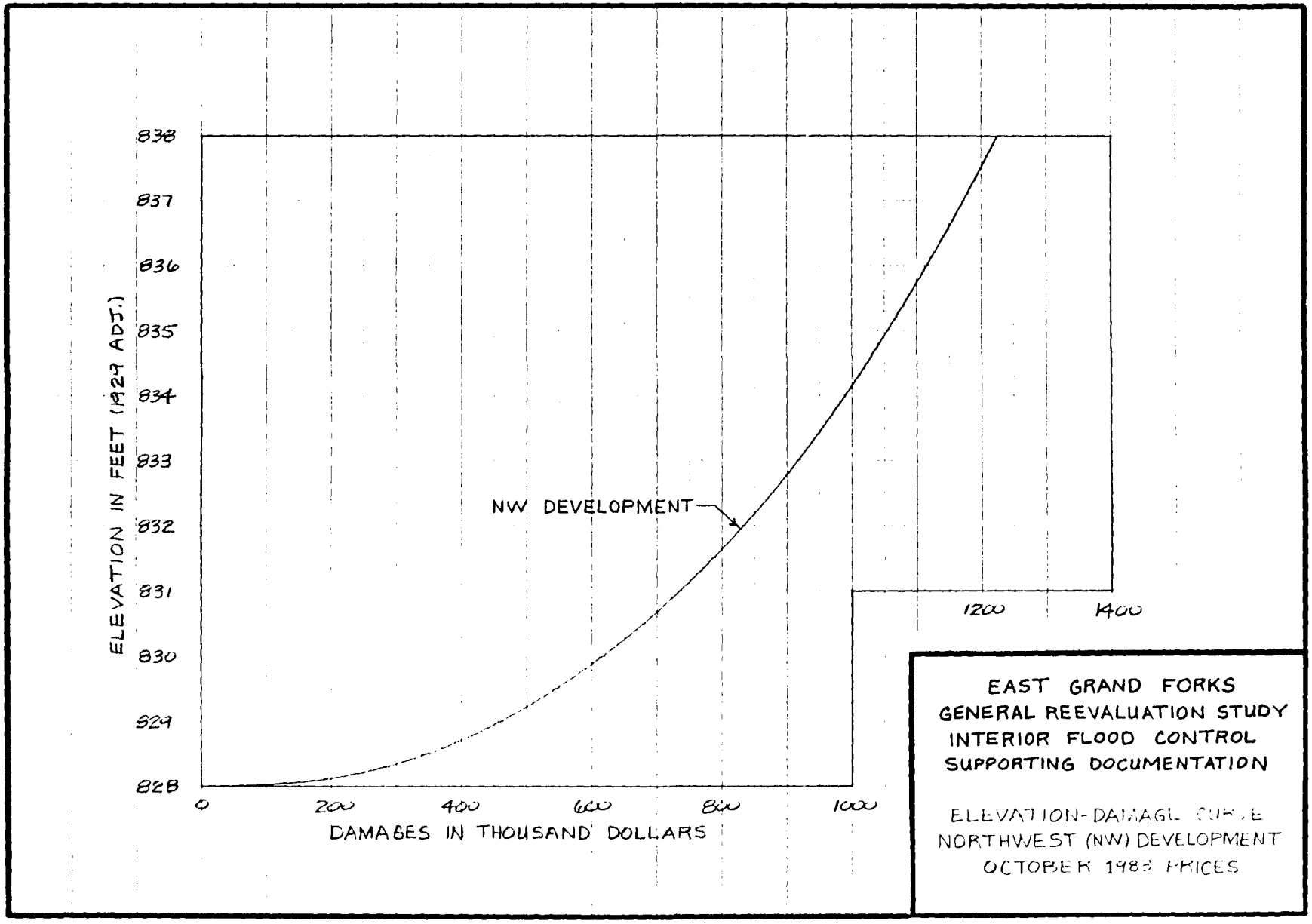

838
837
836
835
834
833
832
831
830
829
828
ELEVATION IN FEET (1929 ADJ.)
NW DEVELOPMENT
0
200
400
600
800
1000
1200
1400
DAMAGES IN THOUSAND DOLLARS
EAST GRAND FORKS
GENERAL REEVALUATION STUDY
INTERIOR FLOOD CONTROL
SUPPORTING DOCUMENTATION
ELEVATION-DAMAGE CURVE
NORTHWEST (NW) DEVELOPMENT
OCTOBER 1983 PRICES

PLATE D-7

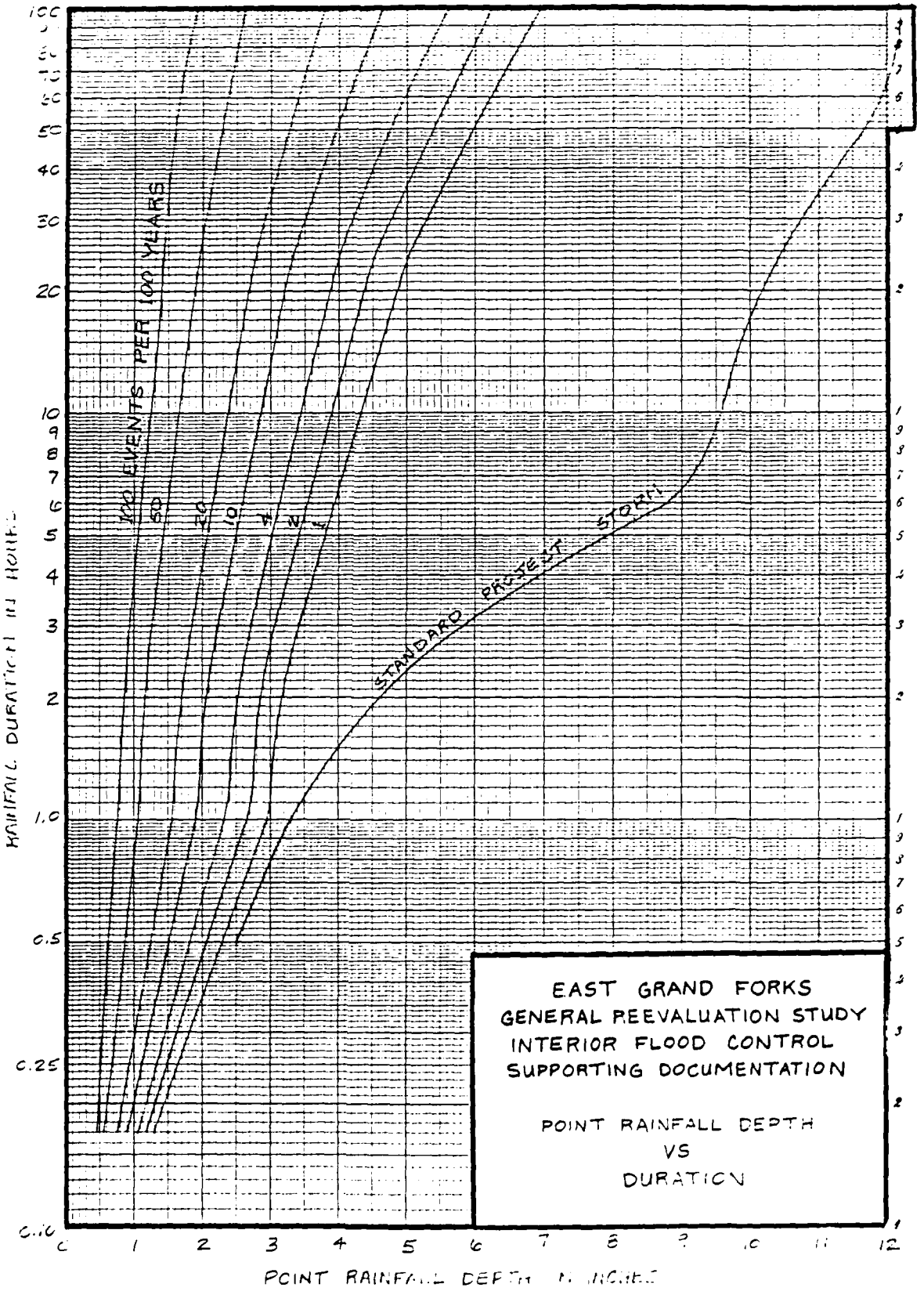

100 EVENTS PER 100 YEARS
50
25
10
5
2
STANDARD PROJECT STORM
RAINFALL DURATION IN HOURS
100
90
80
70
60
50
40
30
20
10
9
8
7
6
5
4
3
2
1.0
0.5
0.25
0.10
0
1
2
3
4
5
6
7
8
9
10
11
12
POINT RAINFALL DEPTH IN INCHES
EAST GRAND FORKS
GENERAL REEVALUATION STUDY
INTERIOR FLOOD CONTROL
SUPPORTING DOCUMENTATION
POINT RAINFALL DEPTH
VS
DURATION

PLATE D-8

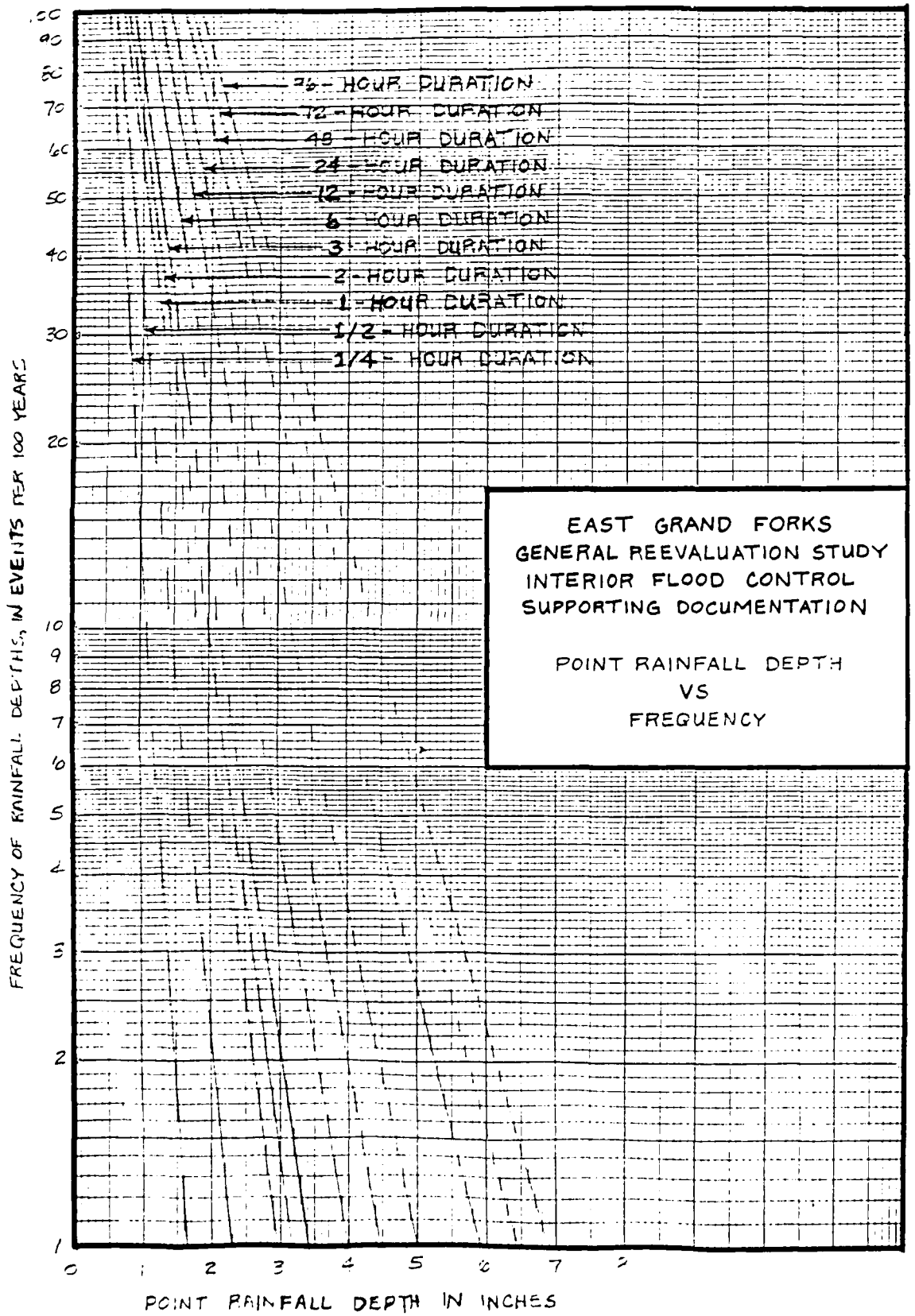

96 - HOUR DURATION
72 - HOUR DURATION
48 - HOUR DURATION
24 - HOUR DURATION
12 - HOUR DURATION
6 - HOUR DURATION
3 - HOUR DURATION
2 - HOUR DURATION
1 - HOUR DURATION
1/2 - HOUR DURATION
1/4 - HOUR DURATION
EAST GRAND FORKS
GENERAL REEVALUATION STUDY
INTERIOR FLOOD CONTROL
SUPPORTING DOCUMENTATION
POINT RAINFALL DEPTH
VS
FREQUENCY
FREQUENCY OF RAINFALL DEPTHS, IN EVENTS PER 100 YEARS
POINT RAINFALL DEPTH IN INCHES

PLATE D-9

EAST GRAND FORKS, MINNESOTA
GENERAL REEVALUATION

SUPPORTING DOCUMENTATION
DESIGN AND COST

EAST GRAND FORKS, MINNESOTA
GENERAL REEVALUATION
SUPPORTING DOCUMENTATION

DESIGN AND COST

TABLE OF CONTENTS

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COST ESTIMATE	E-1
FUTURE STUDIES	E-5

TABLE

Engineering Cost Estimate for Levee/Floodwall and Related Components North of the Red Lake River	E-2

PLATES

Number	Description
1	General Plan, Index, Legend
2	Alignment and Typical Levee Section
3	Alignment and Typical Floodwall Sections
4	Alignment and Typical Closure Structure
5 thru 13	Recommended Plan Alignment

EAST GRAND FORKS, MINNESOTA
GENERAL REEVALUATION

SUPPORTING DOCUMENTATION
DESIGN AND COST

DESIGN

The recommended plan consists of earth levees, floodwalls, road and railroad closure structures, temporary freeboard barriers, and an interior drainage system. The project alignment and features are shown on the plates at the end of this section.

COST ESTIMATE

Estimated costs in this supporting documentation are based on unit prices adjusted to reflect average bid prices received on comparable work done by the St. Paul District.

The estimated first costs for the NED plan are given in the following table. The costs are at January 1984 price levels.

Engineering Cost Estimate for Levee/Floodwall and Related Components North of the Red Lake River

Feature	Unit	Quantity	Unit Price	Total
Federal Costs				**22,440,000**
Levees and Floodwalls				$6,055,000
Levees				(842,000)
Clearing	Acre	8	1,100.00	8,800
Stripping	C.Y.	20,400	2.75	56,100
Inspection Trench	C.Y.	40,700	4.40	179,080
Embankment	C.Y.	273,800	1.30	355,940
Topsoil	C.Y.	14,300	5.50	78,650
Seeding	Acre	26	880.00	22,880
Contingencies				140,550
Bank Unloading				(472,000)
Excavation	C.Y.	178,300	1.65	294,195
Fill	C.Y.	16,300	1.00	16,300
Stripping	C.Y.	9,400	2.75	25,850
Topsoil	C.Y.	7,920	5.50	43,560
Seeding	Acre	15	880.00	13,200
Contingencies				78,895
Emergency Levee Removal				(348,000)
Excavation	C.Y.	127,000	1.65	209,550
Stripping	C.Y.	10,800	2.75	29,700
Topsoil	C.Y.	7,200	5.50	39,600
Seeding	Acre	13	880.00	11,440
Contingencies				57,710
Floodwalls				(3,455,000)
5 Feet High	L.F.	200	320.00	64,000
7 Feet High	L.F.	670	400.00	268,000
9 Feet High	L.F.	410	540.00	226,800
10 Feet High	L.F.	140	600.00	84,000
11 Feet High	L.F.	160	740.00	118,400
13 Feet High	L.F.	450	860.00	387,000
14 Feet High	L.F.	180	920.00	165,600
15 Feet High	L.F.	740	980.00	725,200
16 Feet High	L.F.	800	1,040.00	832,000
Contingencies				574,000
Closure Structures				(749,000)
40x7' High (Street)	Job	Sum	***	36,000
40x16'	Job	Sum	***	172,000
90x6'	Job	Sum	***	67,000
40x12'	Job	Sum	***	146,000
40x8'	Job	Sum	***	43,000
40x8' High (RR)	Job	Sum	***	43,000
40x7' High (Street)	Job	Sum	***	36,000
90x7' High (RR)	Job	Sum	***	81,000
Contingencies				125,000

Engineering Cost Estimate for Levee/Floodwall and Related Components North of the Red Lake River (Continued)

Feature	Unit	Quantity	Unit Price	Total
Levees and Floodwalls (Continued)				
Road Raises				(199,000)
Gravel Road Raise 1.5'	L.F.	1,900	30.00	57,000
Gravel Road Raise 1.0'	L.F.	1,250	22.00	27,500
Gravel Road Raise 1.0'	L.F.	3,700	22.00	81,400
Contingencies				33,100
Drainage Facilities				**$5,315,000**
Central Avenue				(1,345,980)
84" Gatewell	Job	Sum	***	38,500
84" Sluice Gate	Each	1	30,000.00	30,000
Pumping Station (62,000 GPM)	Job	Sum	***	462,000
84" R.C.P.	L.F.	400	235.00	94,000
78" R.C.P.	L.F.	1,900	220.00	418,000
42" R.C.P.	L.F.	450	115.00	51,750
36" R.C.P.	L.F.	400	71.00	28,400
Contingencies				223,330
DeMers Avenue				(792,000)
72" Gatewell	Job	Sum	***	33,000
72" Sluice Gate	Each	1	22,000.00	22,000
Pumping Station (48,000 GPM)	Job	Sum	***	352,000
72" R.C.P.	L.F.	400	200.00	80,000
42" R.C.P.	L.F.	550	115.00	63,250
66" R.C.P.	L.F.	600	185.00	111,000
Contingencies				130,750
10th Street Northwest				(305,400)
60" Gatewell	Job	Sum	***	22,000
60" Sluice Gate	Each	1	15,400.00	15,400
60" R.C.P.	L.F.	1,500	145.00	217,500
Contingencies				50,500
Northwest Development				(2,871,620)
84" Gatewell (Twin)	Job	Sum	***	49,500
84" Sluice Gate	Each	2	30,000.00	60,000
Pumping Station (148,000 GPM)	Job	Sum	***	1,083,500
84" R.C.P. (Twin - 500' each)	L.F.	1,000	235.00	235,000
96" R.C.P.	L.F.	1,700	275.00	467,500
66" R.C.P.	L.F.	2,700	185.00	499,500
Contingencies				476,620

Engineering Cost Estimate for Levee/Floodwall and Related Components North of the Red Lake River (Continued)

Feature	Unit	Quantity	Unit Price	Total
Utilities				$1,385,000
Waterlines				(336,000)
6" Pipe	L.F.	5,350	33.00	176,550
10" Pipe	L.F.	1,000	40.00	40,000
Checkvalves (Including Manholes)				
6"	Each	8	1,980.00	15,840
8"	Each	2	2,200.00	4,400
10"	Each	2	2,750.00	5,500
12"	Each	5	2,970.00	14,850
16"	Each	1	5,170.00	5,170
18"	Each	1	6,270.00	6,270
Contingencies				67,420
Sanitary Sewer Lines				(1,049,000)
Manholes	Each	22	1,760.00	38,720
8" P.V.C.	L.F.	3,100	41.00	127,100
12" P.V.C.	L.F.	900	42.00	37,800
15" P.V.C.	L.F.	3,600	43.00	154,800
21" P.V.C.	L.F.	600	47.00	28,200
30" Force Mains	L.F.	700	50.00	35,000
16" Force Mains	L.F.	500	22.00	11,000
4" Force Mains	L.F.	500	22.00	11,000
Gate Valves (Including Manholes)				
30"	Each	2	9,460.00	18,920
16"	Each	1	5,940.00	5,940
Three Lift Stations	Job	Sum	***	325,500
Plug Existing Lines	Job	Sum	***	46,750
Contingencies				208,270
Total Construction Costs				11,820,000
Engineering and Design				1,467,000
Supervision and Administration				938,000
Recreation Facilities (See breakdown in Recreation Supporting Documentation)				215,000
Real Estate (See breakdown in Real Estate Supporting Documentation)				8,000,000

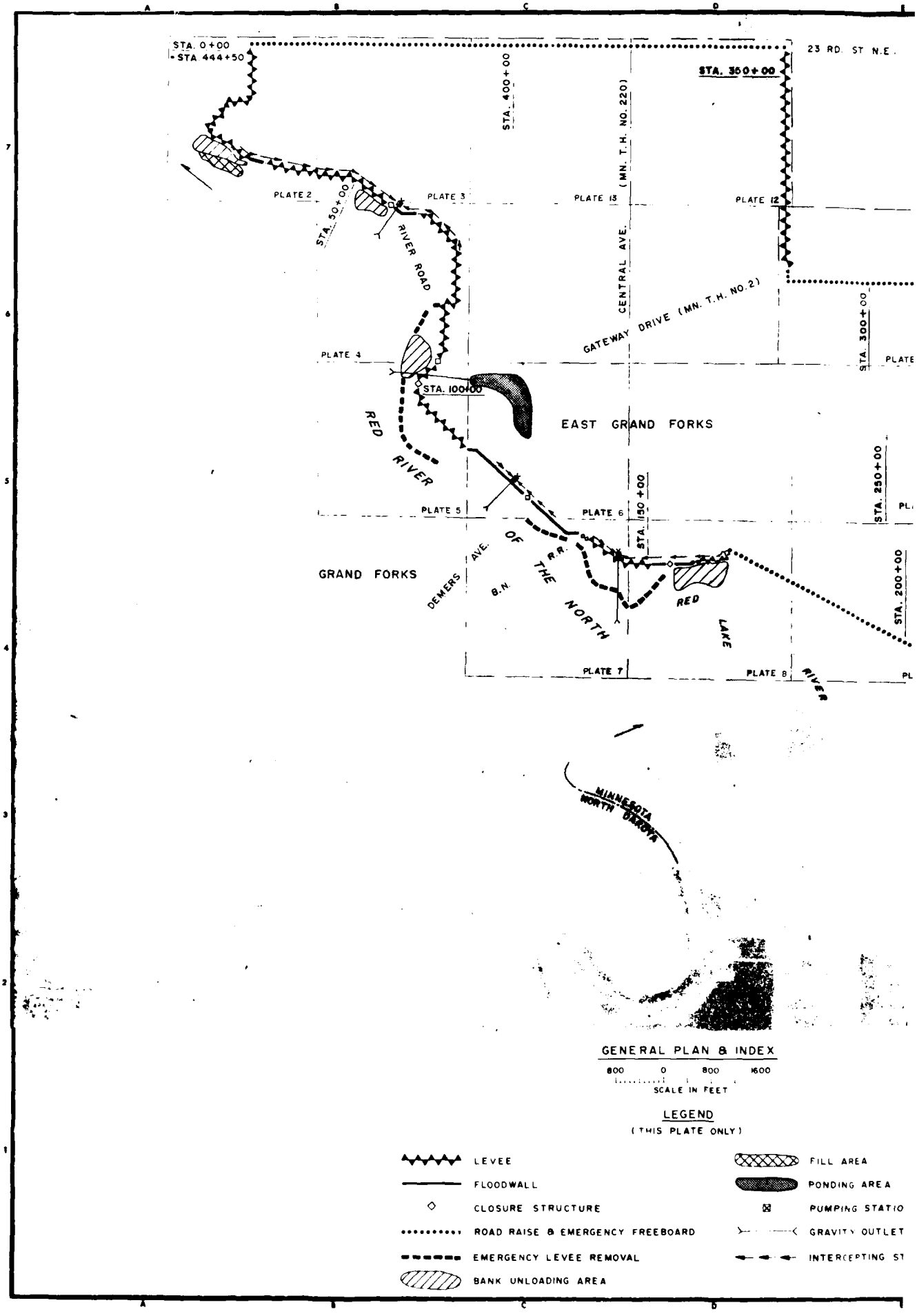
FUTURE STUDIES

The following items will be studied in greater detail during the General Design studies.

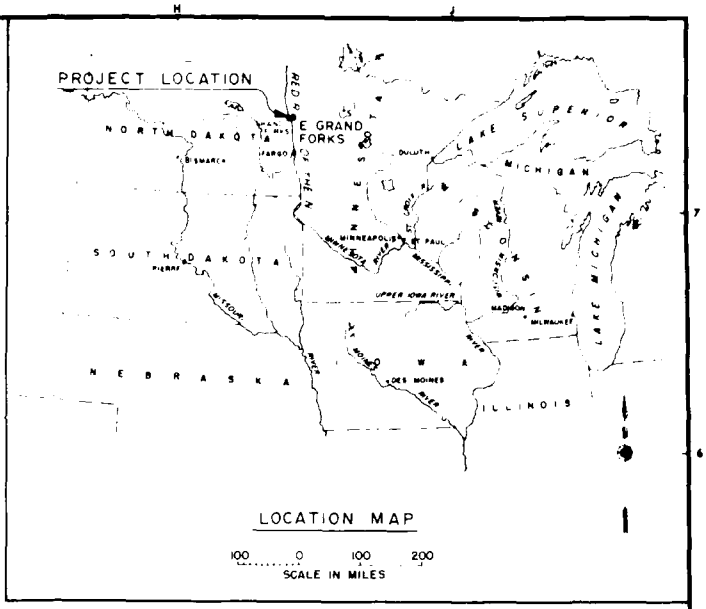
- o Architectural, mechanical, electrical, and structural design for the pumping stations and structural design for the floodwalls and closure structures. Supporting information such as design criteria, loading conditions, soil parameters, structural materials, and typical design computations will be included.

- o The alignment of existing storm sewers, sanitary sewers, water lines, gas lines, and power lines will be obtained from the city of East Grand Forks. A more refined analysis will be made to determine the types of modifications required to the existing utilities.

- o Commercial structures will be analyzed on an individual basis to determine which, if any, can be floodproofed.


STA. 0+00
STA 444+50
23 RD. ST N.E.
STA. 350+00
STA. 400+00
(MN. T.H. NO. 220)
CENTRAL AVE.
PLATE 2
PLATE 3
PLATE 13
PLATE 12
STA. 50+00
RIVER ROAD
GATEWAY DRIVE (MN. T.H. NO. 2)
STA. 300+00
PLATE 4
STA. 100+00
EAST GRAND FORKS
RED RIVER
STA. 250+00
PLATE 5
PLATE 6
STA. 150+00
GRAND FORKS
DEMERS AVE.
B.N. R.R. OF THE NORTH
RED LAKE RIVER
STA. 200+00
PLATE 7
PLATE 8
MINNESOTA
NORTH DAKOTA
GENERAL PLAN & INDEX
800 0 800 1600
SCALE IN FEET
LEGEND
(THIS PLATE ONLY)
LEVEE
FLOODWALL
CLOSURE STRUCTURE
ROAD RAISE & EMERGENCY FREEBOARD
EMERGENCY LEVEE REMOVAL
BANK UNLOADING AREA
FILL AREA
PONDING AREA
PUMPING STATIO
GRAVITY OUTLET
INTERCEPTING ST

ST N E



STA 300+00

PLATE 11

STA 250+00

PLATE 10

STA 200+00

PLATE 9

GENERAL LEGEND

820	CONTOUR
835 27	FIELD ELEVATION
835 3	PLOTTER ELEVATION
	LEVEE
	FLOODWALL
	CLOSURE STRUCTURE
	BANK UNLOADING AREA
	FILL AREA
	BANK MOVEMENT AREA

NOTE PLATE NUMBERS REFER TO DETAILED PLANS OF THE AREAS ENCLOSED IN DASHED LINES

AREA

NG AREA

ING STATION

TY OUTLET

CEPTING STORM SEWER

DRAWING INDEX

PLATE NO	DESCRIPTION
1	GENERAL PLAN, INDEX & LEGEND
2	ALIGNMENT & TYPICAL LEVEE SECTION
3	ALIGNMENT & TYPICAL FLOODWALL SECTIONS
4	ALIGNMENT & TYPICAL CLOSURE STRUCTURE
5	ALIGNMENT
6	-
7	-
8	-
9	-
10	-
11	-
12	-
13	-

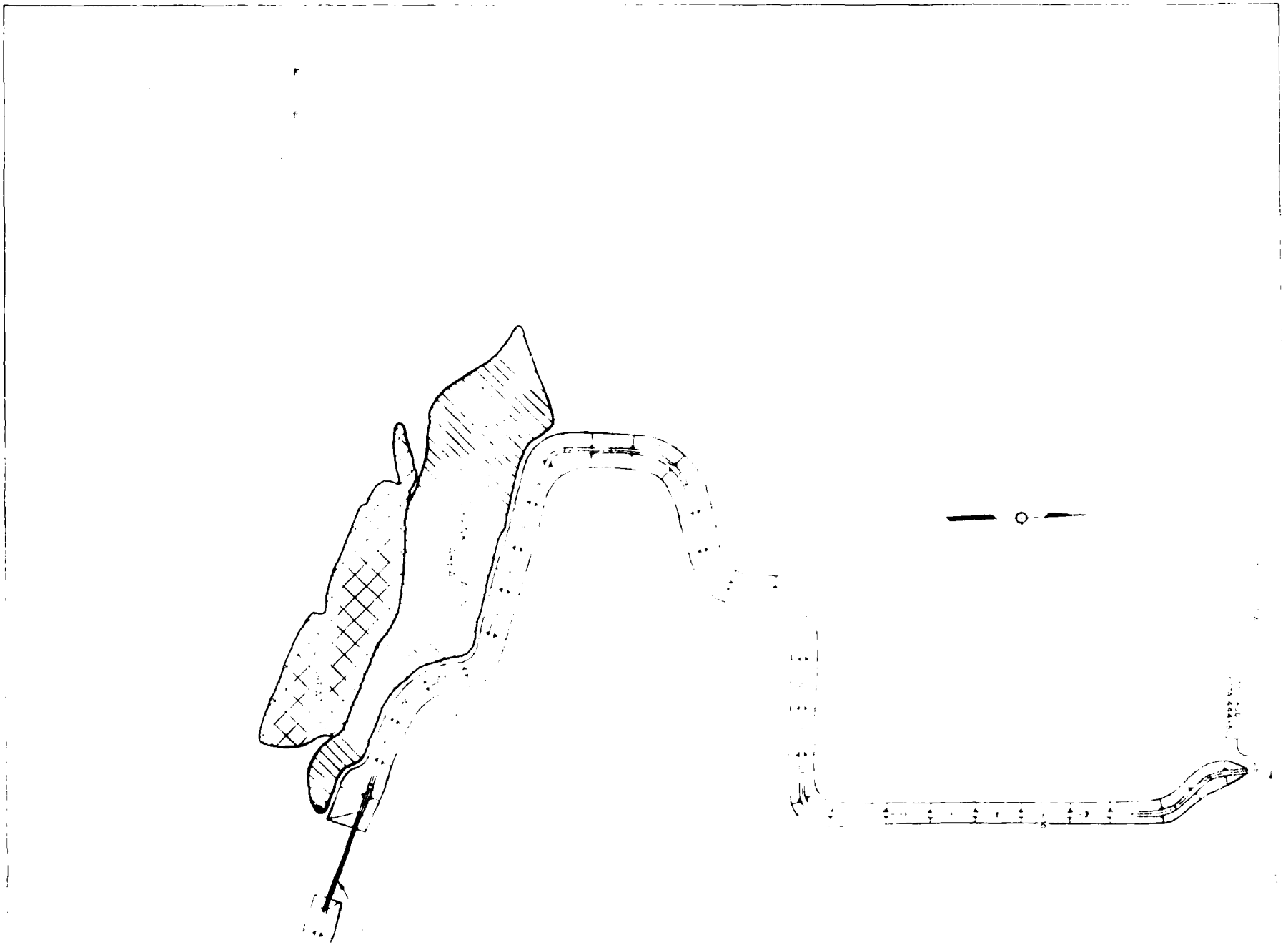
GENERAL REEVALUATION STUDY
FOR FLOOD CONTROL
AT
EAST GRAND FORKS, MINNESOTA

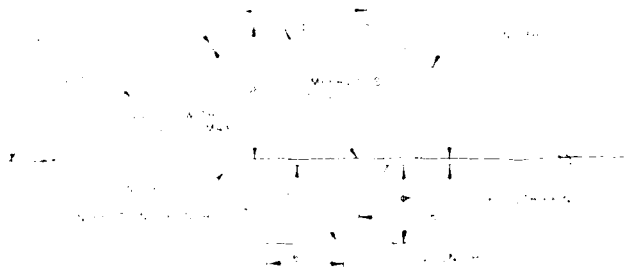
RECOMMENDED PLAN

GENERAL PLAN, INDEX, LEGEND

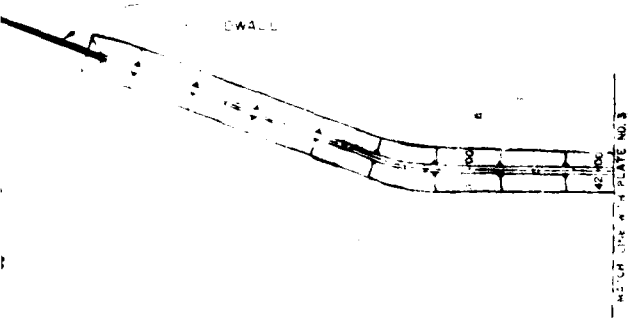
U. S. ARMY CORPS OF ENGINEERS
ST. PAUL DISTRICT MARCH 1984

PLATE 1



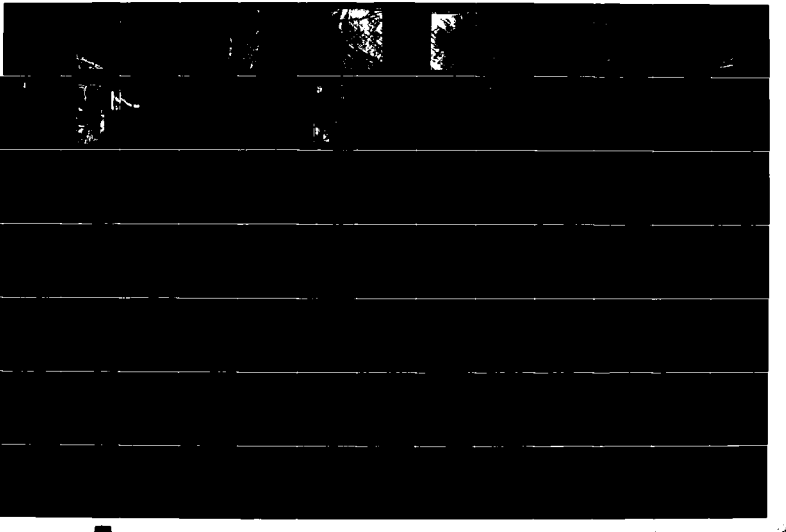


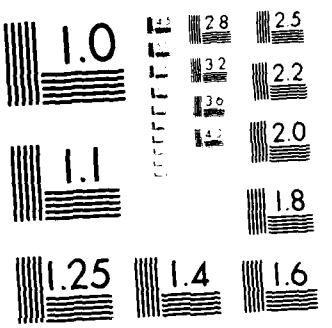
TYPICAL LEVEE SECTION



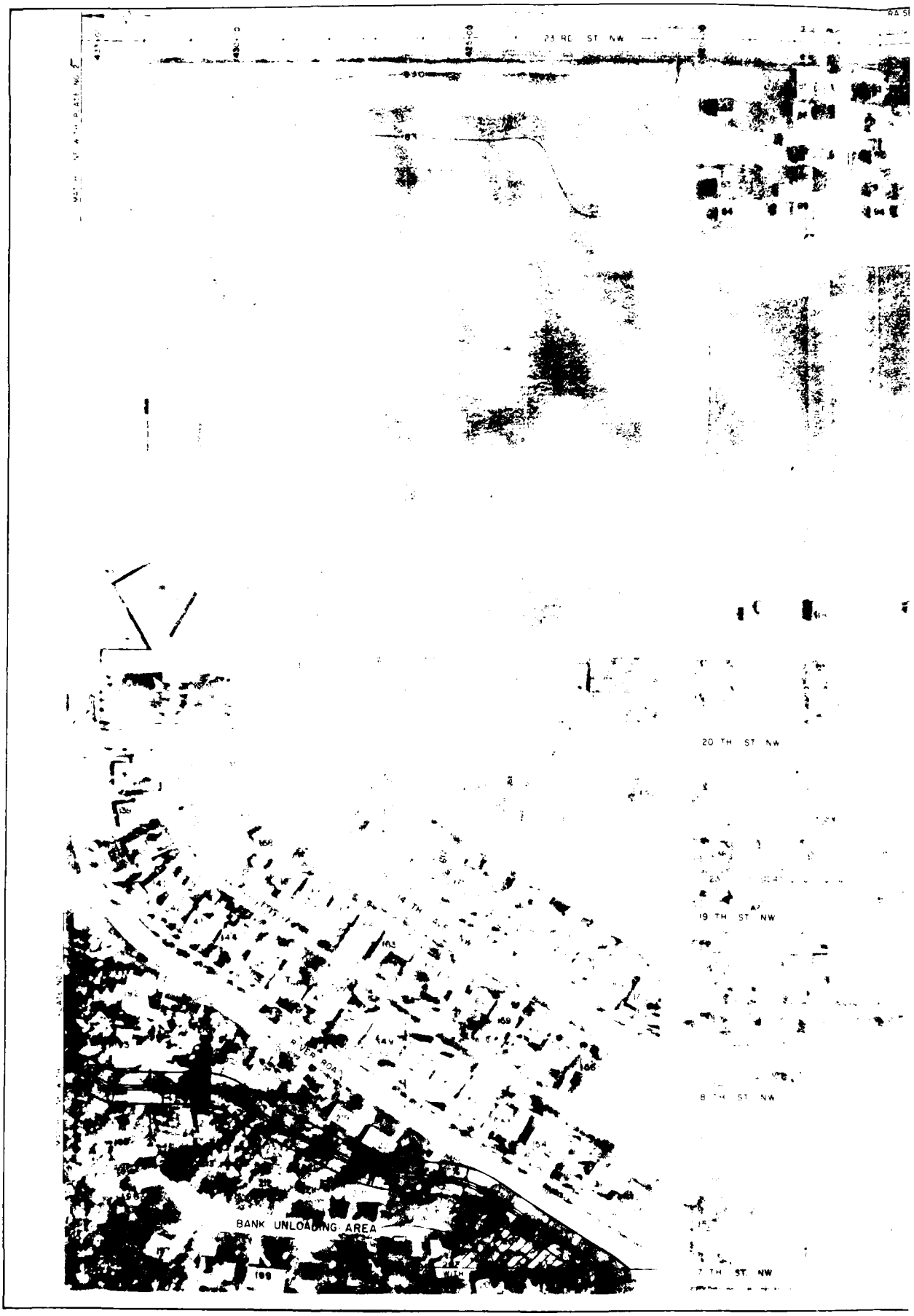
AD-A184 845 GENERAL REEVALUATION SUPPORTING DOCUMENTATION FOR FLOOD CONTROL AND RELATED PURPOSES(U) CORPS OF ENGINEERS ST PAUL MN ST PAUL DISTRICT NOV 84 3/8

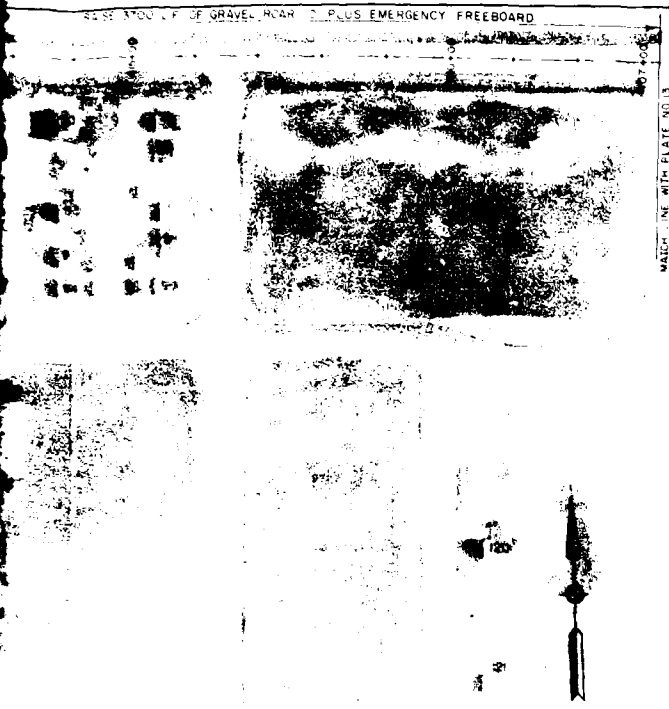
UNCLASSIFIED F/G 13/2 NL

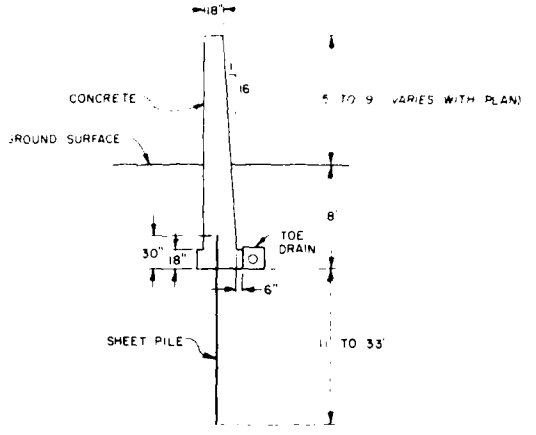




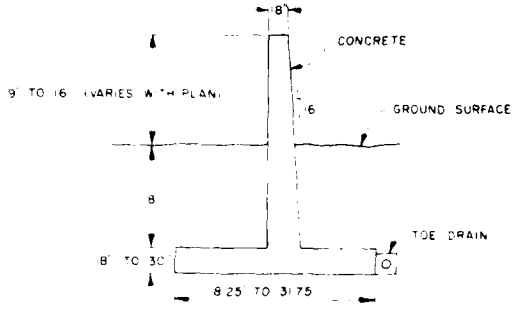
MICROCOPY RESOLUTION TEST CHART


23 RD ST NW
20 TH ST NW
19 TH ST NW
8 TH ST NW
7 TH ST NW
BANK UNLOADING AREA





TYPICAL I-WALL SECTION
EXPOSED HEIGHT = 9' OR LESS
NOT TO SCALE



TYPICAL T-WALL SECTION
EXPOSED HEIGHT = GREATER THAN 9'
NOT TO SCALE

REFERENCES	PLATE NO
GENERAL PLAN, INDEX & LEGEND	1
TYPICAL LEVEE SECTION	2
INTERIOR DRAINAGE DETAILS	8, APPENDIX C

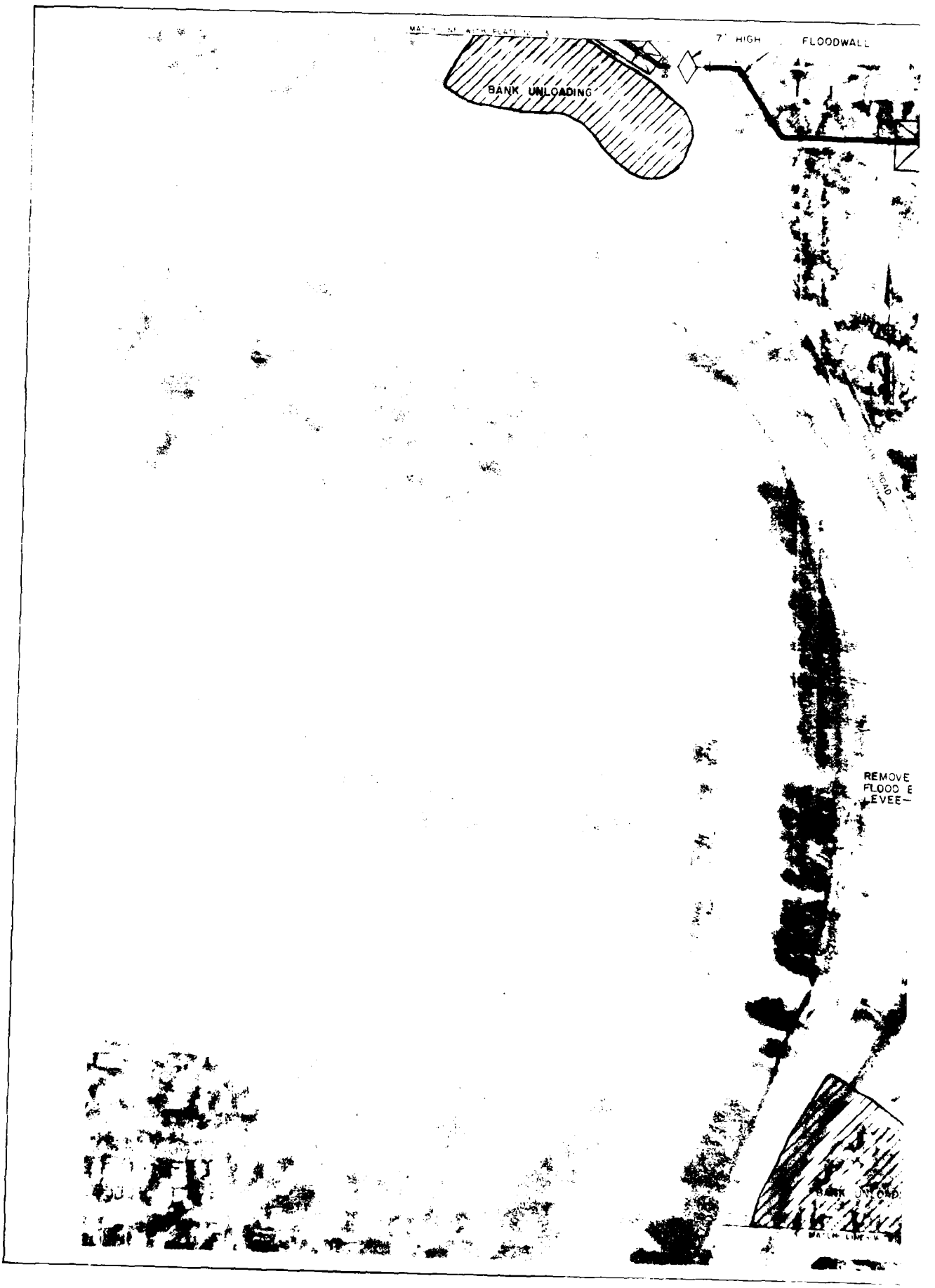
GENERAL REEVALUATION STUDY
FOR FLOOD CONTROL
AT
EAST GRAND FORKS, MINNESOTA

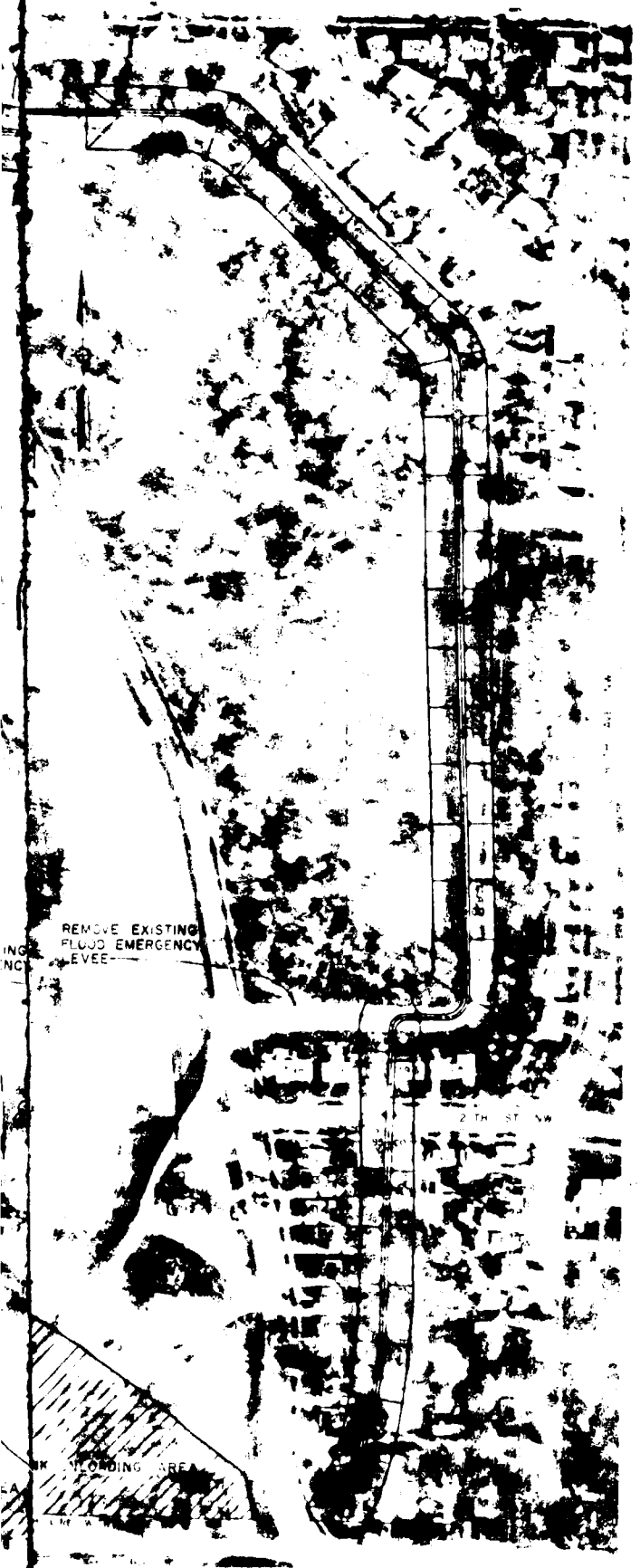
RECOMMENDED PLAN

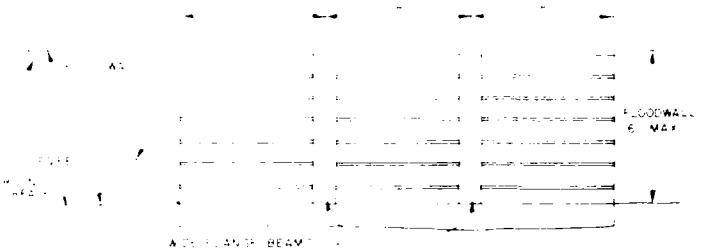
ALIGNMENT & TYPICAL I-WALL SECTIONS

U. S. ARMY CORPS OF ENGINEERS
ST. PAUL DISTRICT MARCH 1984

PLATE 3


7' HIGH
FLOODWALL
BANK UNLOADING
REMOVE
FLOOD E
LEVEE





TYPICAL STOPLOG CLOSURE (RAILROAD OR HIGHWAY)

HEIGHT VARIES WITH PLAN

NOT TO SCALE

REFERENCE	PLATE NO.
[illegible] PLAN INDEX & LEGEND	
[illegible] LEVEE SECTION	2
[illegible] FLOODWALL SECTIONS	3
[illegible] DRAINAGE DETAILS	IN APPENDIX "D"

GENERAL REEVALUATION STUDY

FOR FLOOD CONTROL

AT

EAST GRAND FORKS, MINNESOTA

RECOMMENDED PLAN

[illegible]

U. S. ARMY CORPS OF ENGINEERS

ST. PAUL DISTRICT MARCH 1984

PLATE 4

BANK UNL
REMOVE
FLOOD EM
LEVEE



REFERENCES — PLATE NO.

GENERAL PLAN, INDEX & LEGEND	1
TYPICAL LEVEE SECTION	2
TYPICAL CLOSURE STRUCTURE	4
INTERIOR DRAINAGE DETAILS	1 & APPENDIX "D"

GENERAL REEVALUATION STUDY
FOR FLOOD CONTROL
AT
EAST GRAND FORKS, MINNESOTA

RECOMMENDED PLAN

ALIGNMENT

U. S. ARMY CORPS OF ENGINEERS
ST. PAUL DISTRICT — MARCH 1984

PLATE 5


GATEWAY DRIVE (MINN. T.H. NO. 2)
5TH AVE NW
6TH AVE NW
FLOODWALL
ABANDONED RAILROAD LINE
4TH ST NW
3RD ST NW
2ND ST NW
3RD AVE NW
OBSERVED BANK MOVEMENT AREAS
12' HIGH
DEMERS AVE
FLOODWALL
MATCH LINE WITH PLATE NO. 2



REFERENCES	PLATE NO
GENERAL PLAN, INDEX & LEGEND	1
TYPICAL LEVEE SECTION	2
TYPICAL FLOODWALL SECTIONS	3
TYPICAL CLOSURE STRUCTURE	4
INTERIOR DRAINAGE DETAILS	I & APPENDIX 'D'

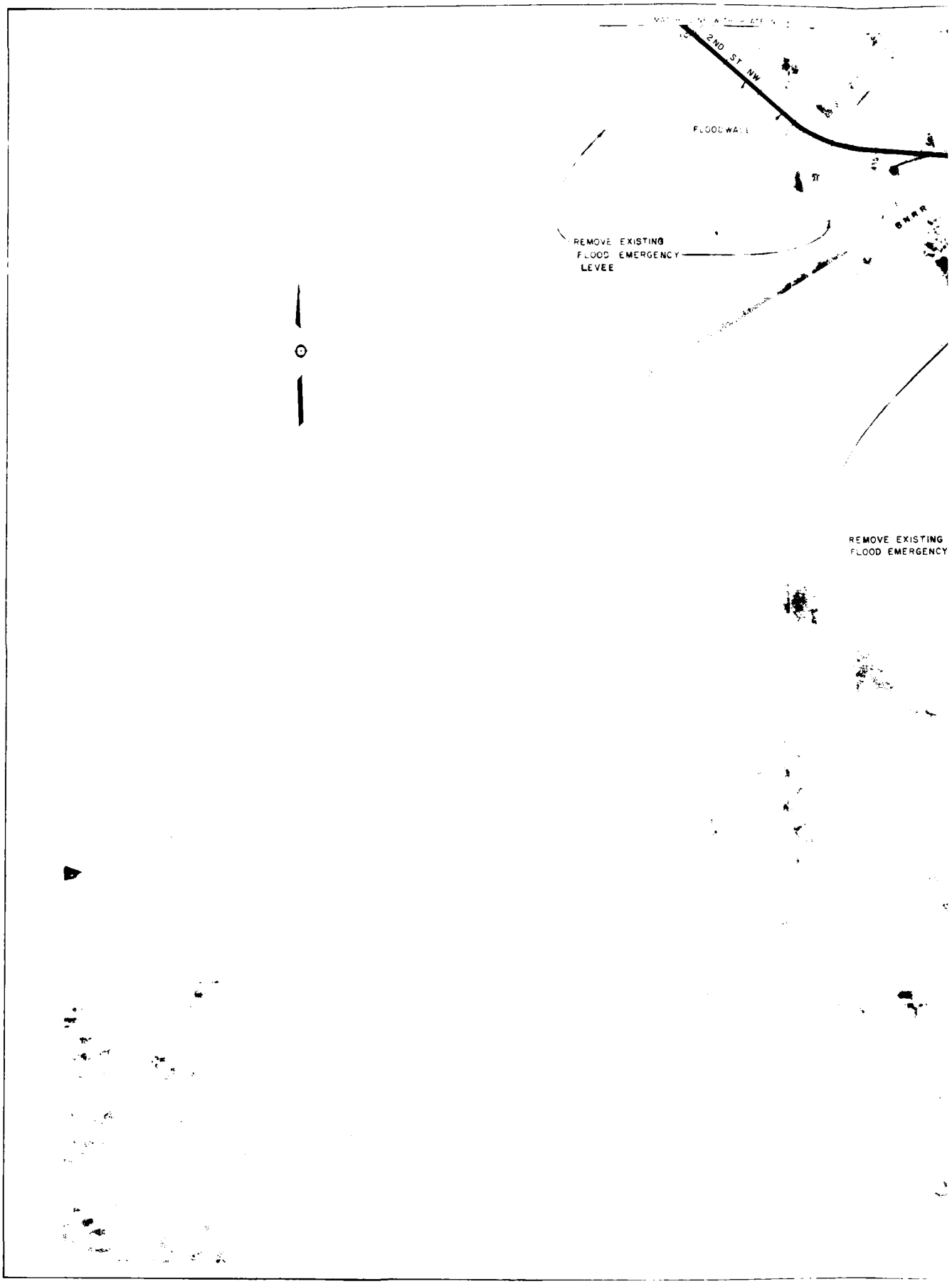
GENERAL REEVALUATION STUDY
FOR FLOOD CONTROL
AT
EAST GRAND FORKS, MINNESOTA

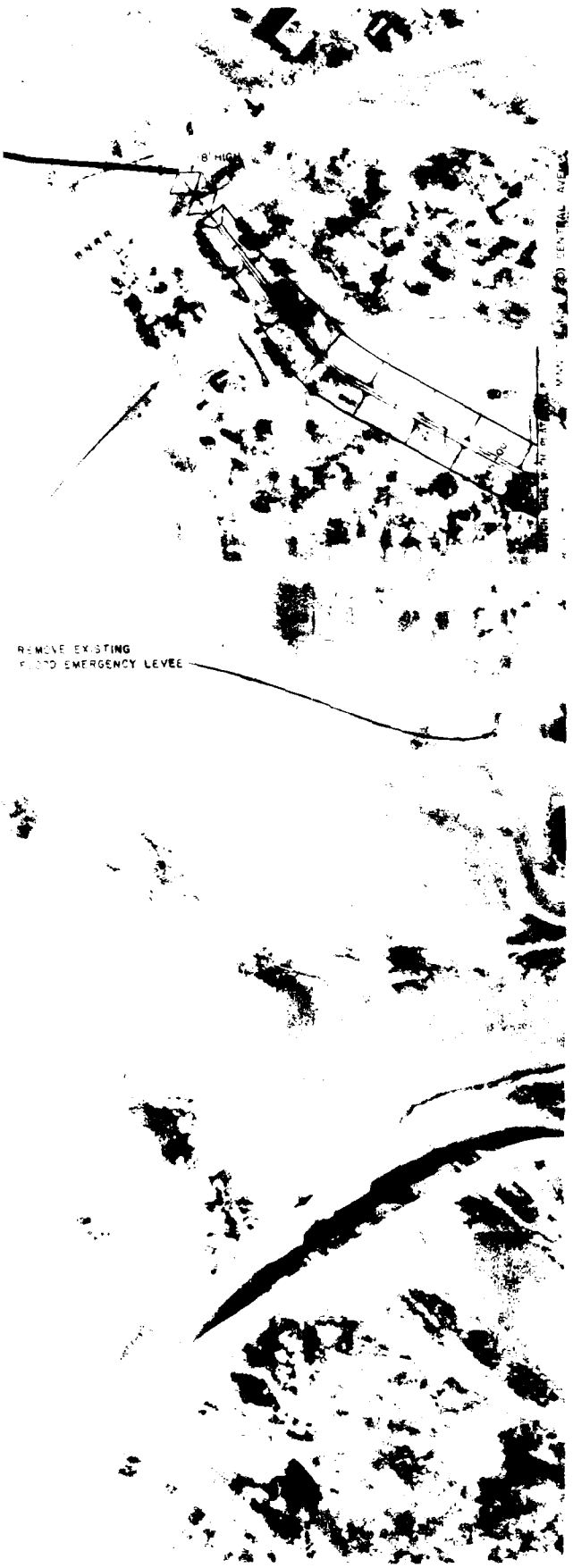
RECOMMENDED PLAN

ALIGNMENT

U. S. ARMY CORPS OF ENGINEERS
ST. PAUL DISTRICT
MARCH 1984

PLATE 6


2ND ST NW
FLOODWALL
REMOVE EXISTING
FLOOD EMERGENCY
LEVEE
REMOVE EXISTING
FLOOD EMERGENCY



REFERENCES	PLATE NO
GENERAL PLAN, INDEX & LEGEND	1
TYPICAL LEVEE SECTION	2
TYPICAL FLOODWALL SECTIONS	3
TYPICAL CLOSURE STRUCTURE	4
INTERIOR DRAINAGE DETAILS	18 APPENDIX "D"

GENERAL REEVALUATION STUDY

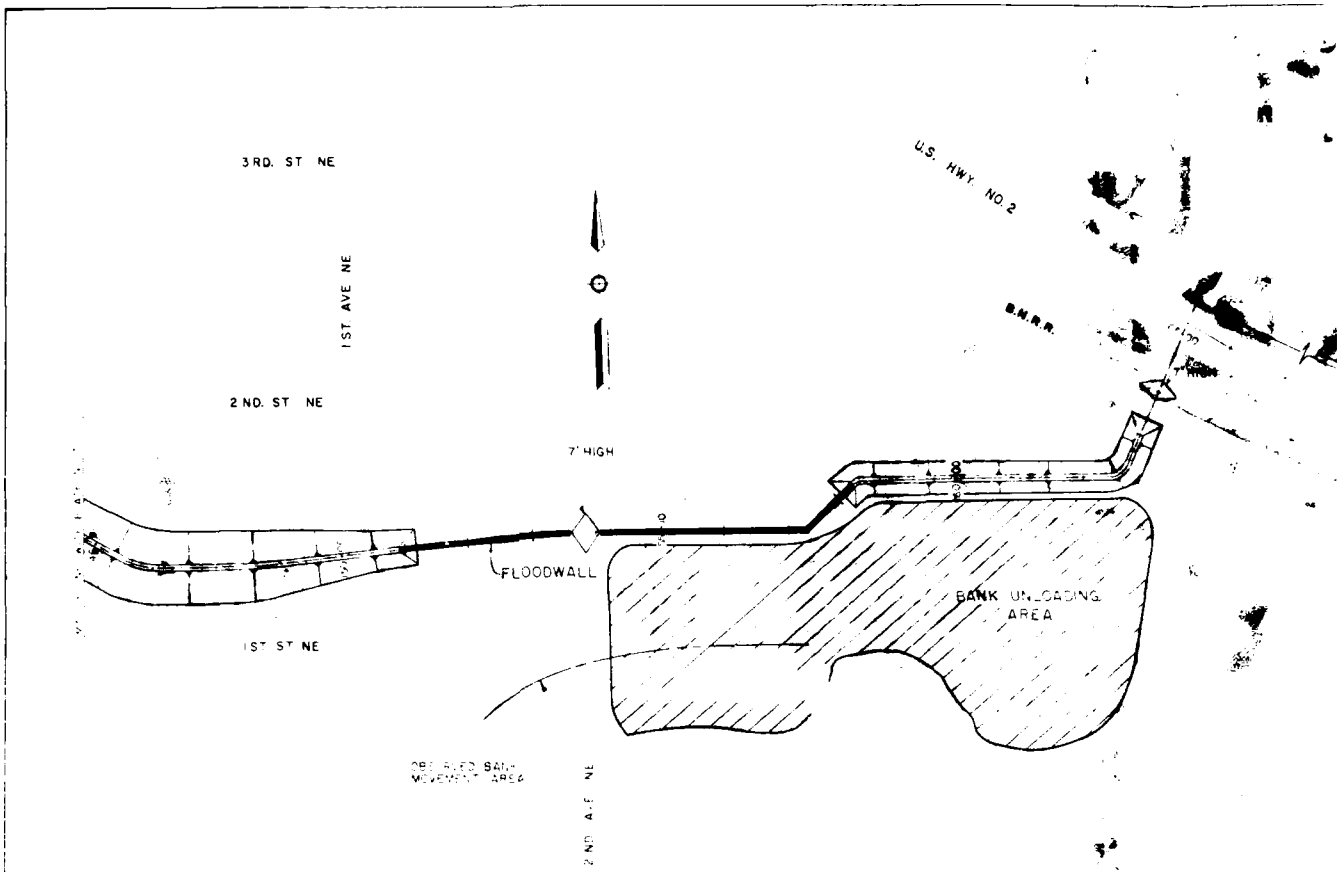
FOR FLOOD CONTROL

AT

EAST GRAND FORKS, MINNESOTA

RECOMMENDED PLAN

MAR M 344



1

REMOVE EXISTING FLOOD EMERGENCY LEVEE





REFERENCES

	PLATE NO
GENERAL PLAN, INDEX & LEGEND	1
TYPICAL LEVEE SECTION	2
TYPICAL FLOODWALL SECTIONS	3
TYPICAL CLOSURE STRUCTURE	4
INTERIOR DRAINAGE DETAILS	IN APPENDIX D

GENERAL REEVALUATION STUDY

FOR FLOOD CONTROL

AT

EAST GRAND FORKS, MINNESOTA

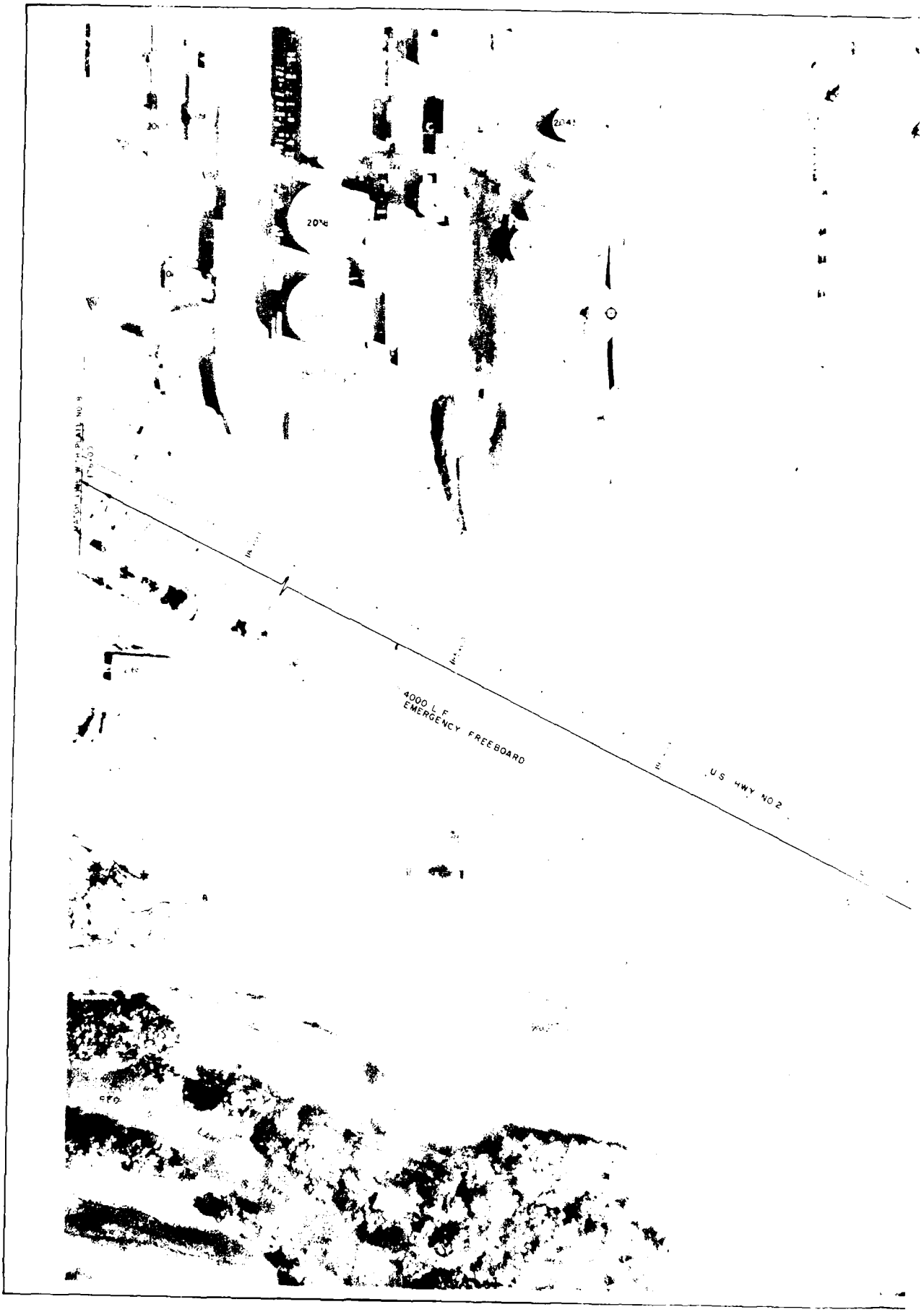
RECOMMENDED PLAN

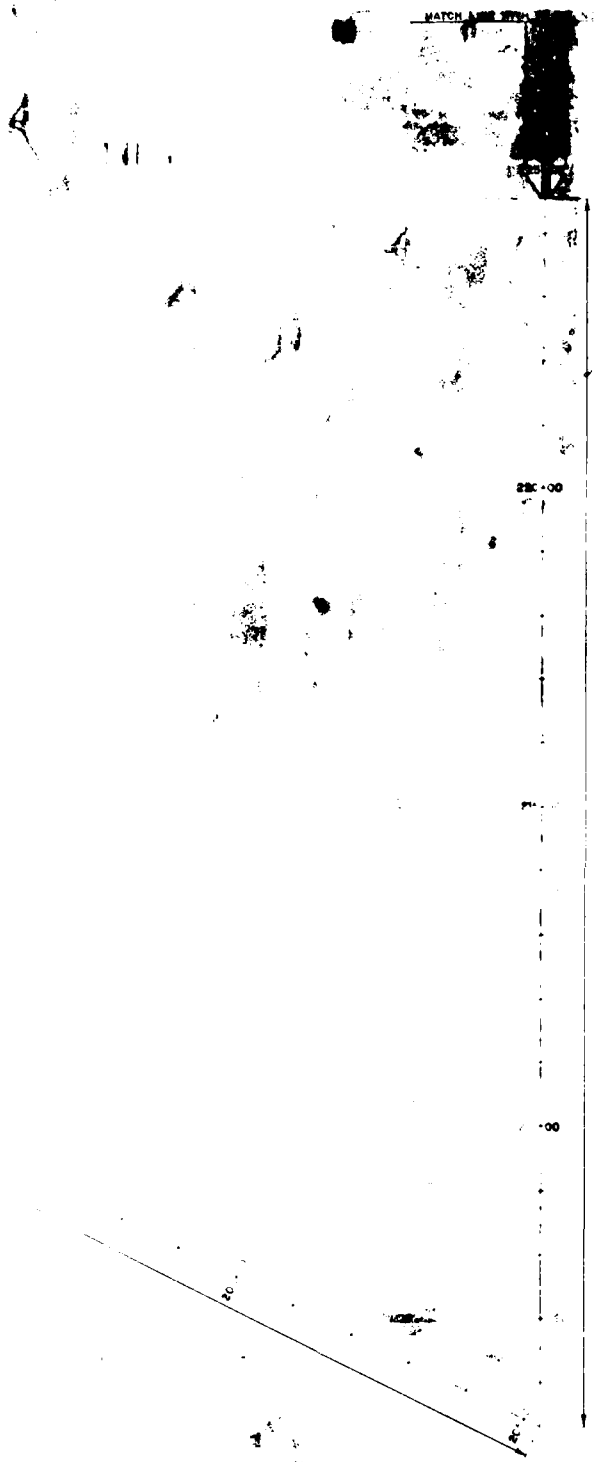
U.S. ARMY CORPS OF ENGINEERS

ST. PAUL DISTRICT

MARCH 1984

PLATE 5


4000 L.F.
EMERGENCY FREEBOARD
U.S. HWY NO. 2



REFERENCES

	PLATE NO
GENERAL PLAN, INDEX & LEGEND	1
TYPICAL LEVEE SECTION	2

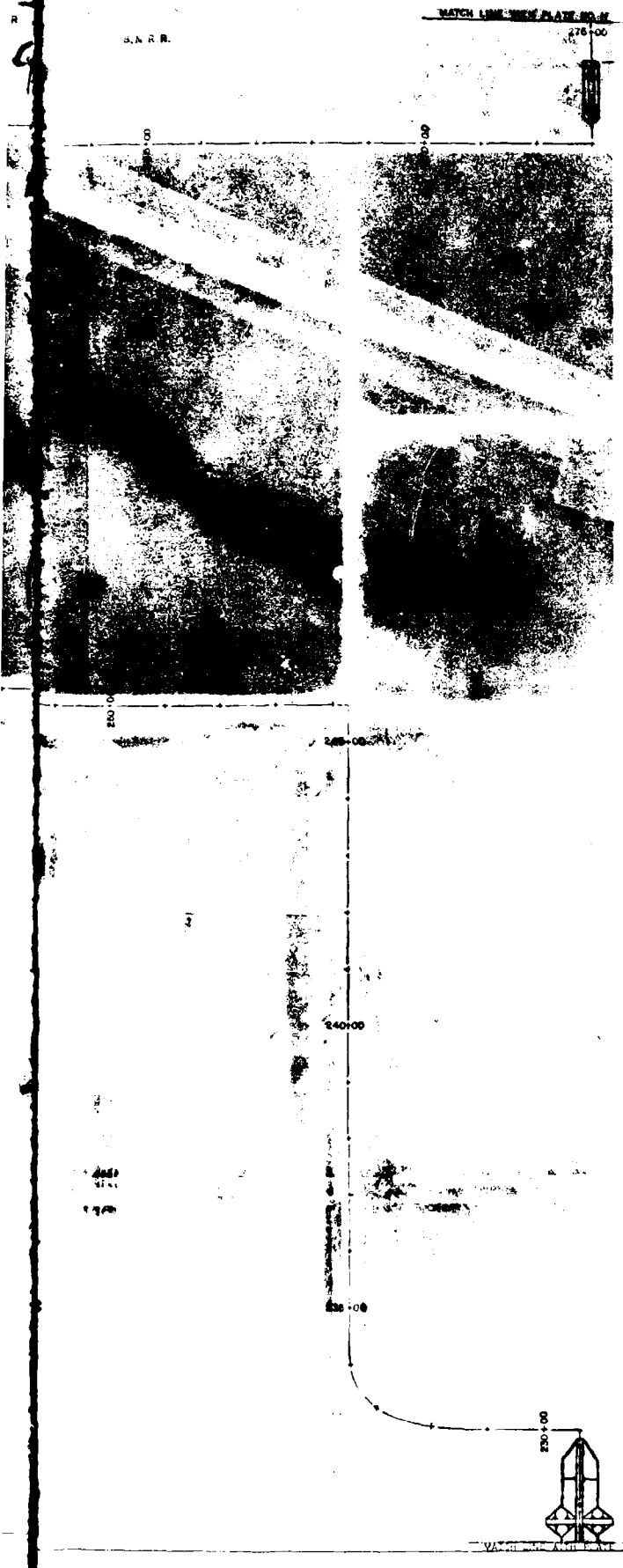
GENERAL REEVALUATION STUDY
FOR FLOOD CONTROL
AT
EAST GRAND FORKS, MINNESOTA

RECOMMENDED PLAN

U.S. ARMY CORPS OF ENGINEERS
ST. PAUL DISTRICT MARCH 1984

PLATE 9





REFERENCES	PLATE NO
GENERAL PLAN, INDEX & LEGEND	1
TYPICAL LEVEE SECTION	2

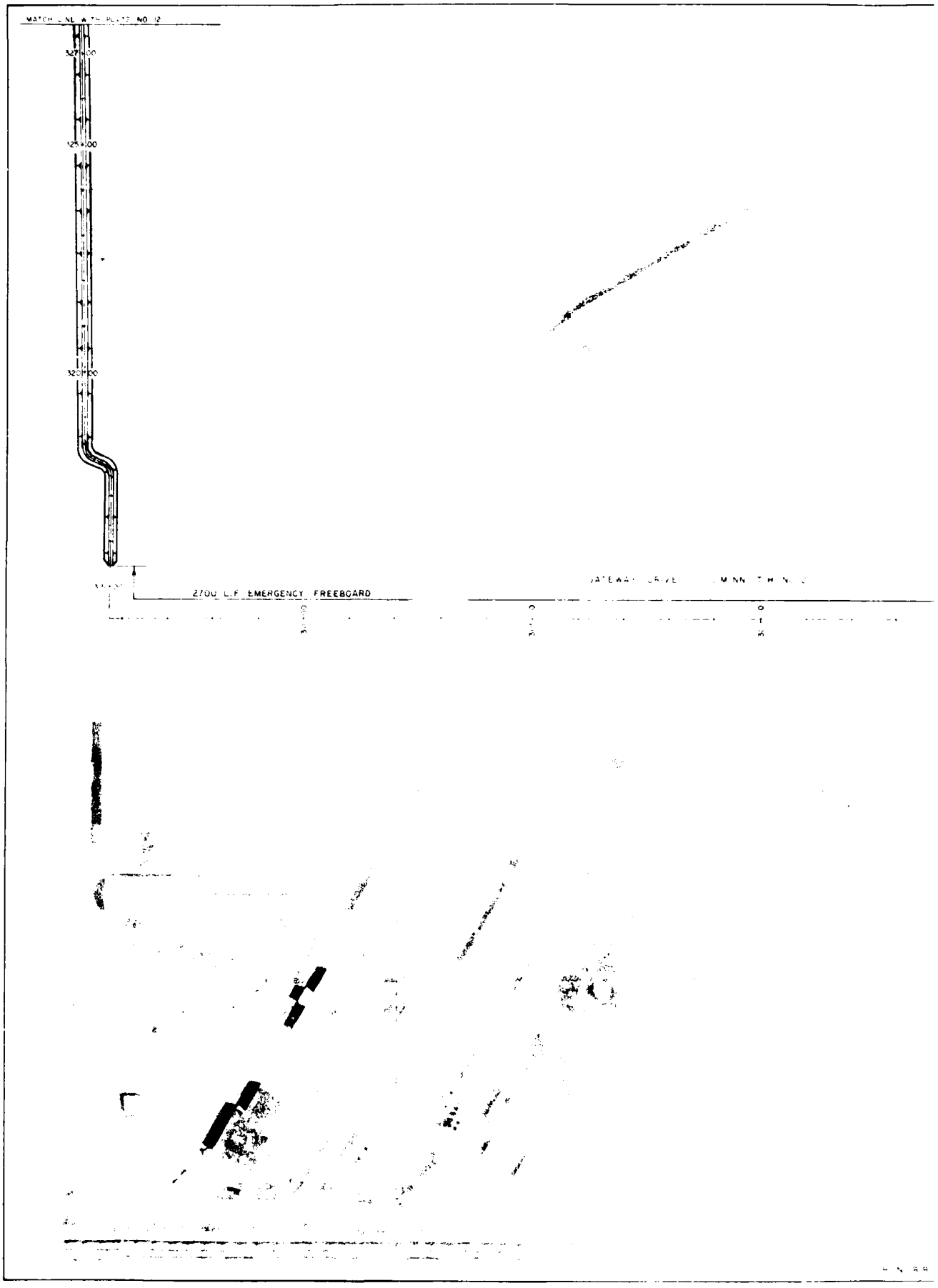
GENERAL REEVALUATION STUDY
FOR FLOOD CONTROL
AT
EAST GRAND FORKS, MINNESOTA

RECOMMENDED PLAN

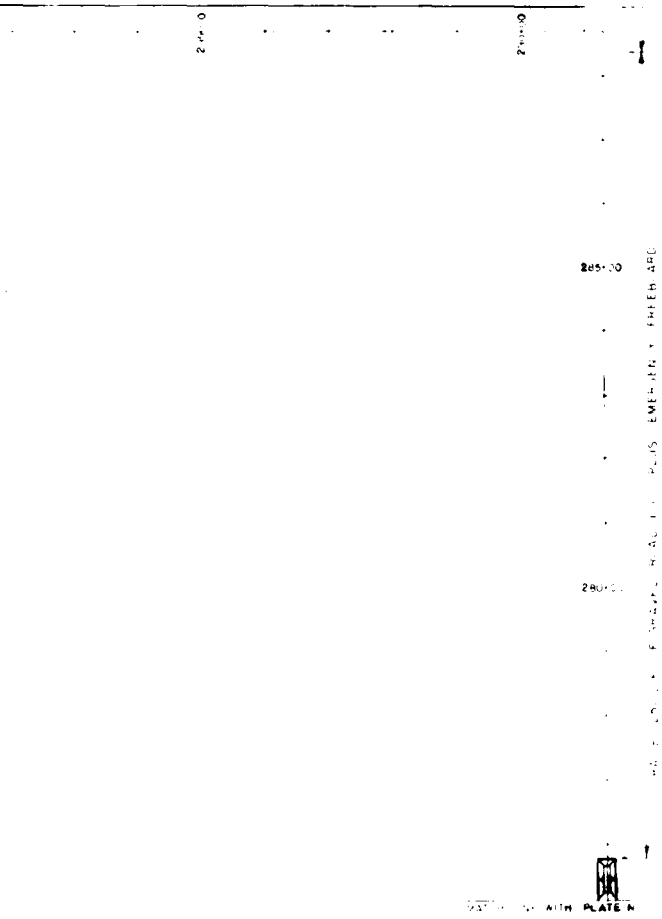
ALIGNMENT

U. S. ARMY CORPS OF ENGINEERS
ST. PAUL DISTRICT
MARCH 1984

PLATE 1C


MATCH LINE A-A' PLATE NO. 12
327+00
325+00
320+00
2700 L.F. EMERGENCY FREEBOARD





REFERENCES

GENERAL PLAN, NEAR B[illegible] LEGEND
TYPICAL LEVEE SECTION

PLATE NO.

2

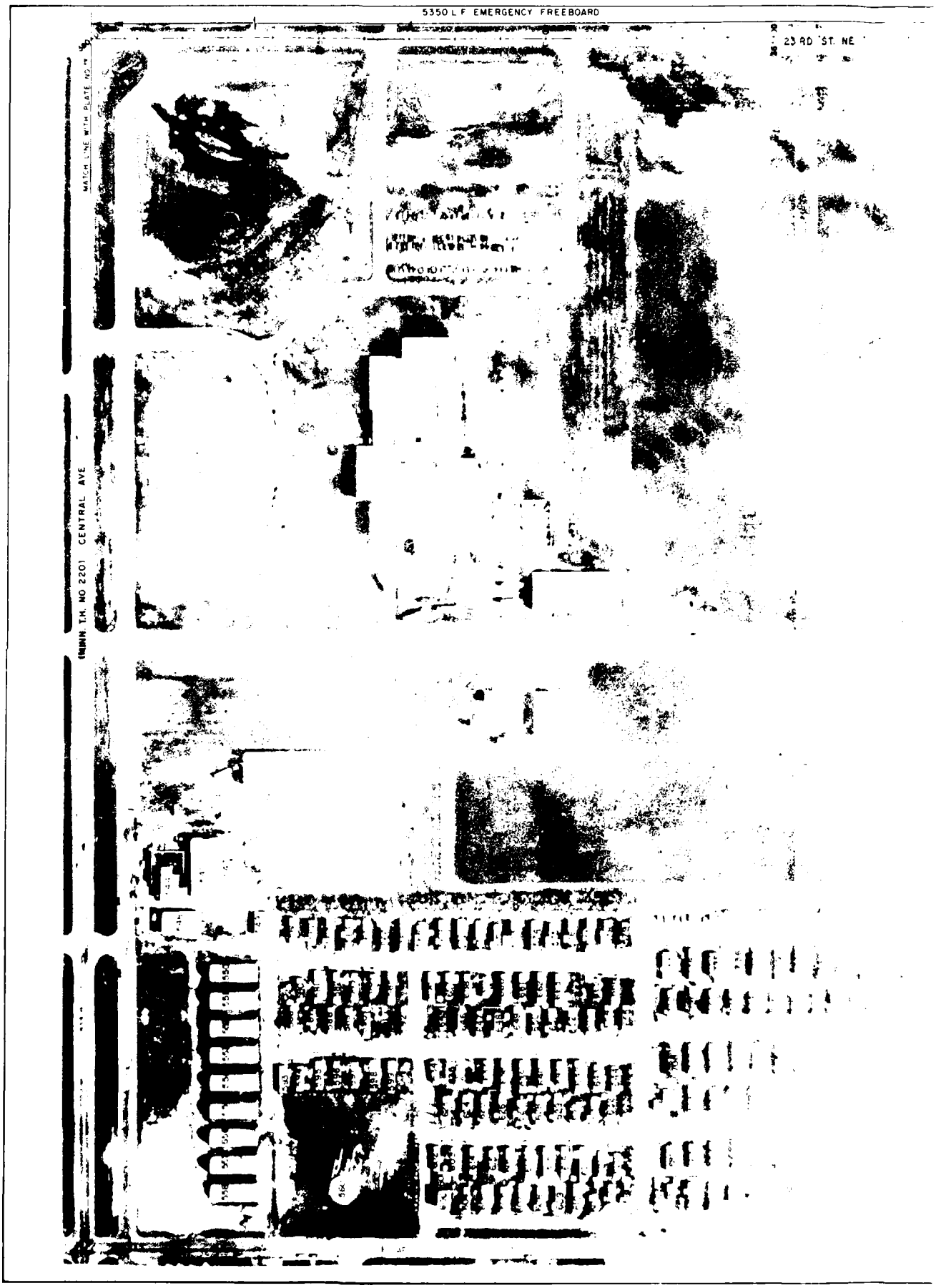
GENERAL REEVALUATION STUDY
FOR FLOOD CONTROL
AT
EAST GRAND FORKS, MINNESOTA

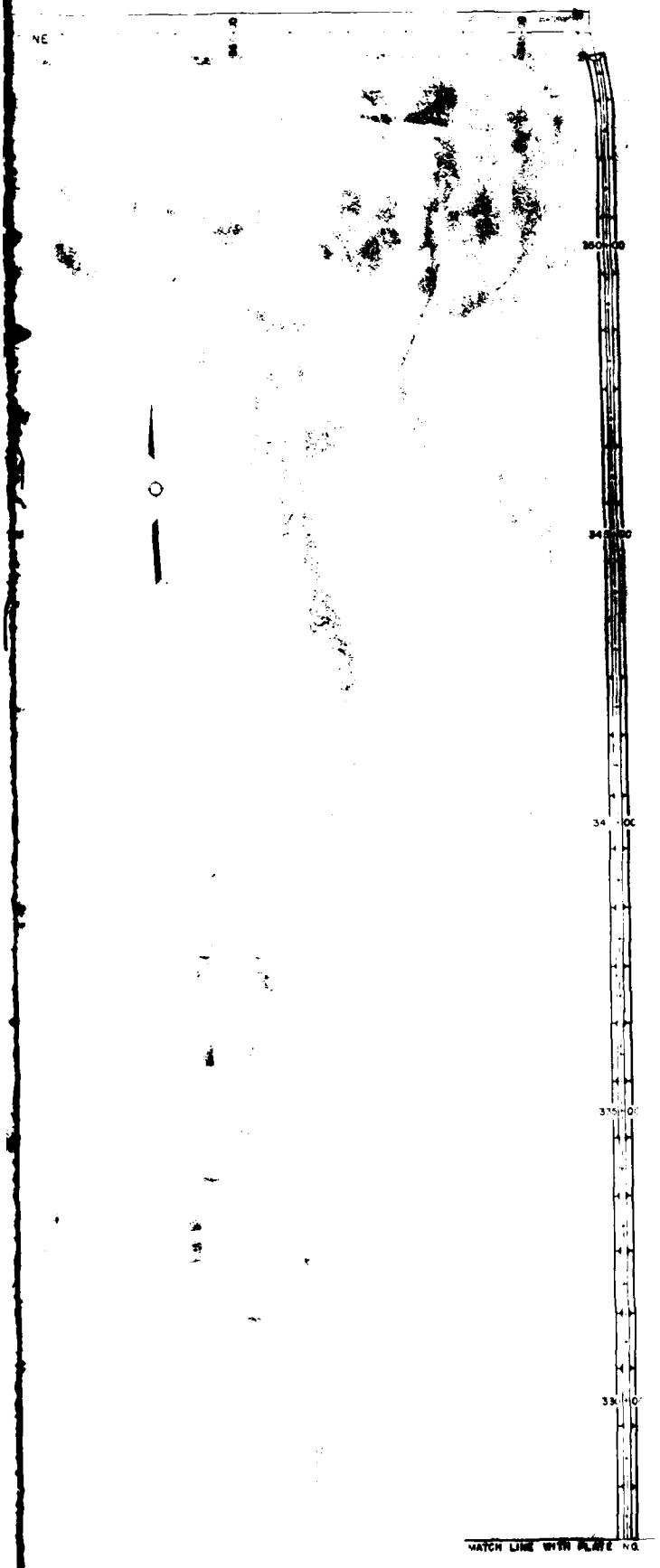
RECOMMENDED PLAN

ALIGNMENT

U.S. ARMY CORPS OF ENGINEERS
ST. PAUL DISTRICT MARCH 1984

PLATE


5350 L F EMERGENCY FREEBOARD
23 RD ST. NE
MATCH LINE WITH PLATE NO 11
(NUMN. T.H. NO 2201 CENTRAL AVE



REFERENCES

	PLATE NO.
GENERAL PLAN, INDEX & LEGEND	1
TYPICAL LEVEE SECTION	2

GENERAL REEVALUATION STUDY

FOR FLOOD CONTROL

AT

EAST GRAND FORKS, MINNESOTA

RECOMMENDED PLAN

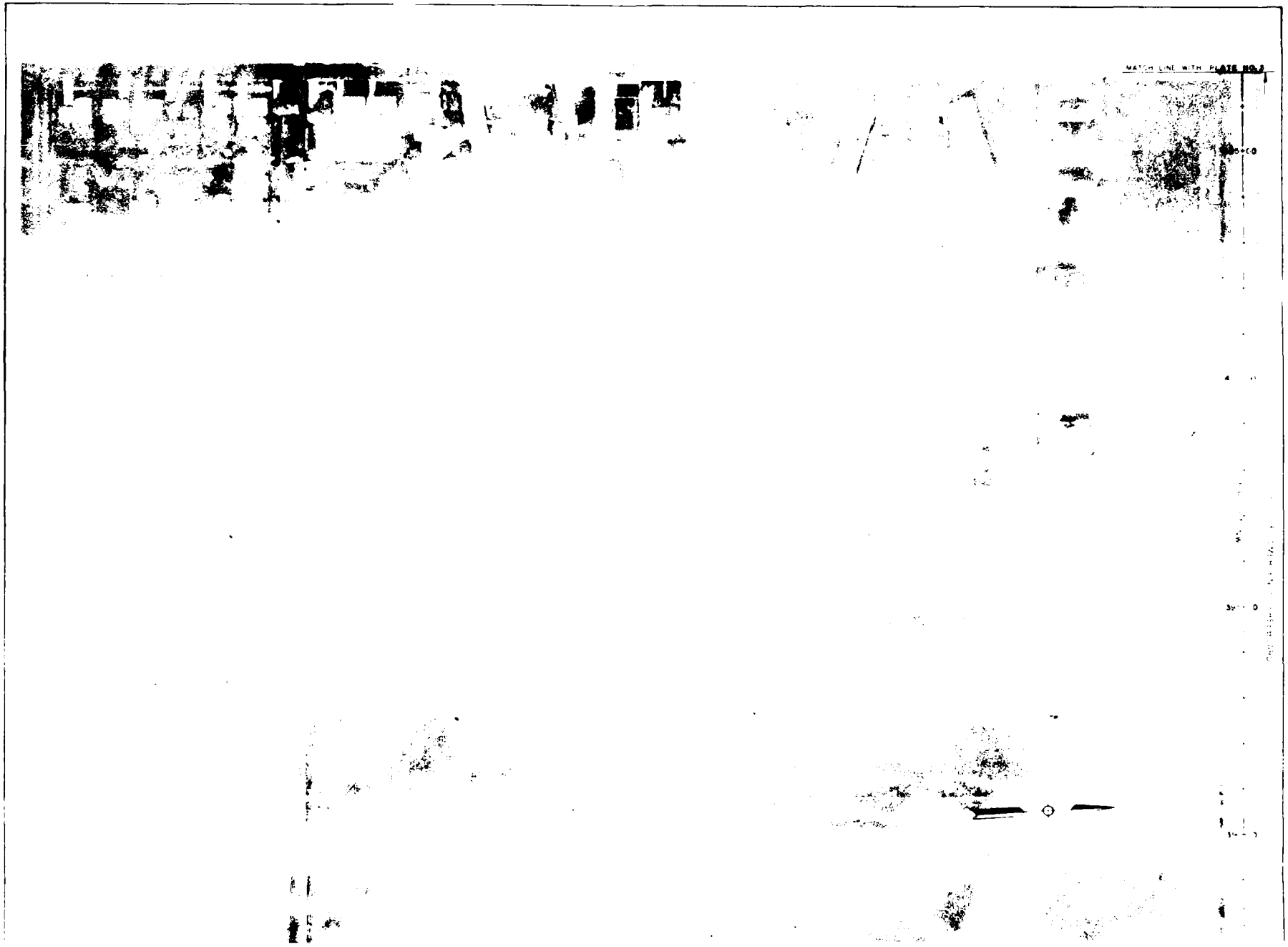
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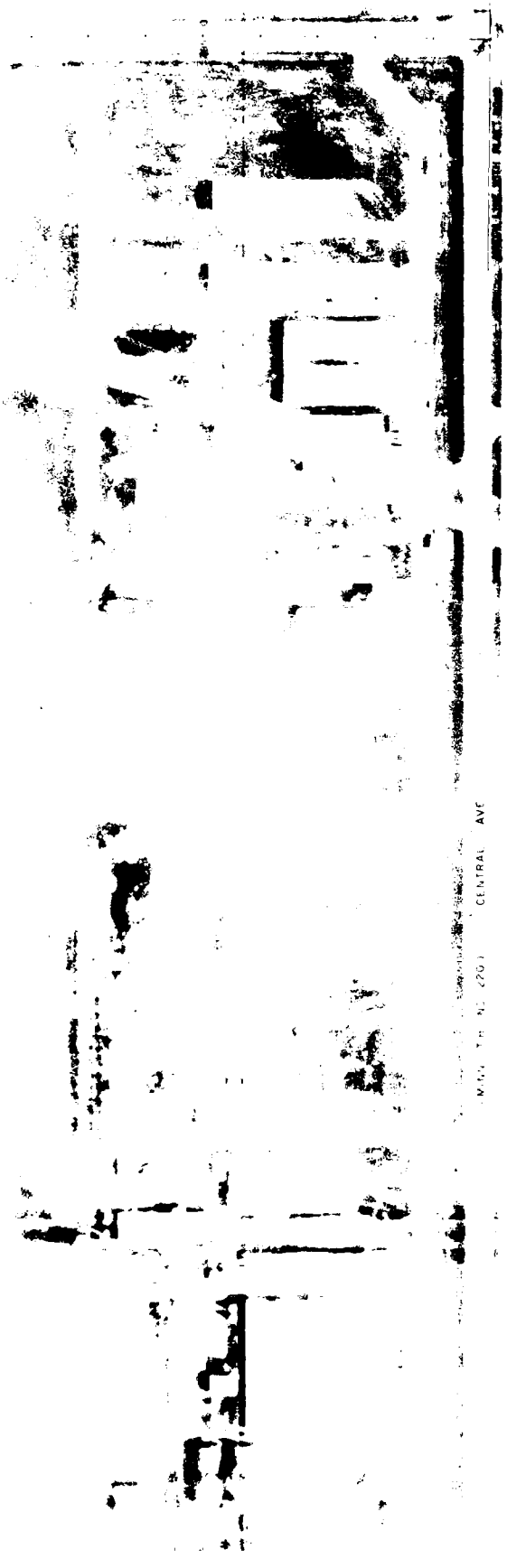
U.S. ARMY CORPS OF ENGINEERS

ST. PAUL DISTRICT

MARCH 1984

PLATE 3


MATCH LINE WITH PLATE NO. 2



REFERENCES

GENERAL PLAN, INDEX & LEGEND

PLATE NO

GENERAL REEVALUATION STUDY

RECOMMENDED PLAN

ALTERNATIVE

U.S. ARMY ENGINEER DISTRICT

FT. PAYNE, DISTRICT

MARCH 1988

PLATE 3

*U.S. GPO: 564-055/10045

EAST GRAND FORKS, MINNESOTA
GENERAL REEVALUATION

SUPPORTING DOCUMENTATION
ECONOMIC ANALYSIS

EAST GRAND FORKS, MINNESOTA

GENERAL REEVALUATION

SUPPORTING DOCUMENTATION

ECONOMIC ANALYSIS

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SUPPORTING DOCUMENTATION
ECONOMIC ANALYSIS

INTRODUCTION

This supporting documentation describes the benefits and costs of the recommended flood control project at East Grand Forks, Minnesota. The plan includes a levee and acquisition measures protecting the area of the city north of the Red Lake River. The levee would be built to the 230-year level of protection (0.43 percent chance flood) and acquisition would include 107 residences and businesses located between the river and the levee. The following economic assumptions were used in this analysis: a 100-year life, a base year date of 1990, discount rates of 3-1/4 and 8-1/8 percent, October 1983 prices, and the base-line hydraulic and economic condition of no credit given to the emergency levee. A sensitivity analysis is presented in the supporting documentation which includes an emergency levee analysis, a deptn damage analysis, a break-even analysis, and an optimum benefit analysis. It also lists the potential damages for different flood events.

Two levees are analyzed in this report, one protecting the area north and the other protecting the area south of the Red Lake River. Standard project flood (SPF) protection and 100-year flood protection were analyzed for each area. Protection was also optimized to yield the national economic development (NED) plan.

The levee in the area south of the Red Lake River was not feasible, primarily because it cannot be constructed close enough to the river to protect the most frequently flooded structures and because several higher valued structures would have to be acquired for the levee. Permanent evacuation of some structures in this area did prove to be economically feasible, as did permanent evacuation of those structures

in the northern reach between the river and the levee. The city was not interested in acquiring any property in the southern reach as part of the total plan.

Damage-frequency curves for each plan were drawn using the water surface profile from the 1984 HEC-2 runs and from flood damages determined by a field survey of the structures. The water surface profiles assume the East Grand Forks emergency levee is in place without the project. The water surface profile would drop with the project in place and the emergency levees removed because the permanent levee is farther from the river. This drop in water surface elevation would be approximately 6 inches for the 100-year flood.

Flood damages for the study area have been estimated using a data base collected from 1981 to 1984. This information was collected by inventory, interview, and survey. An inventory of all floodplain structures in East Grand Forks was compiled in 1981. Building valuations, ground surface elevations, and first-floor elevations were recorded at that time. This information was then used with the St. Paul District depth-damage computer program to determine damages at various elevations.

Commercial, industrial, and public damages in East Grand Forks were evaluated through direct interview with commercial and industrial establishments and city officials. Damages were determined at several elevations on each structure, and cumulative damages were associated with each flood depth.

REACH DELINEATION

For this analysis, East Grand Forks was divided into two economic reaches. The north reach is the area north of the Red Lake River. The northern portion of this reach is primarily a residential area which has no emergency levee protection and receives some basement flooding

at the 5-year flood level. The southern portion of this reach is now located behind the emergency levee and receives damages to residences and to commercial, industrial, and public structures. Without the emergency levee, the area would receive damages during the 3-year flood. The south reach, or "The Point" reach, is located south of the Red Lake River. This area contains mainly residential structures, but also some commercial and public structures. Some basements are flooded during the 7-year flood.

FLOOD DAMAGES

Damageable property in East Grand Forks can be designated as properties found inside, under, and outside of the proposed levee alignment. The damageable property inside the levee would be protected by the levee. Damageable property under the proposed levee would have to be acquired with the project, and damageable property outside of the levee would have to be protected by a nonstructural measure. The following table allocates damages from several potential flood events. Damages are divided into two categories, residential and commercial. Commercial damages also include industrial damages and damages to public properties.

Reach	Relationship to the levee	Damages to East Grand Forks Potential flood events 5-year	10-year	25-year	50-year	100-year	500-year	SPF
Commercial								
North	Protected	0	0	1,652,000	5,943,000	14,763,000	51,184,000	140,542,000
	In the path	0	0	61,000	105,000	138,000	152,000	177,000
	Outside	0	0	1,635,000	3,376,000	4,883,000	5,509,000	6,551,000
South	Protected	0	0	0	3,000	6,000	74,000	331,000
	In the path	-	-	-	-	-	-	-
	Outside	0	0	256,000	442,000	576,000	716,000	959,000
Residential								
North	Protected	478,000	1,560,000	7,378,000	14,240,000	17,152,000	18,921,000	29,437,000
	In the path	109,000	324,000	722,000	877,000	1,018,000	1,228,000	1,508,000
	Outside	198,000	585,000	1,111,000	1,371,000	1,599,000	1,740,000	2,101,000
South	Protected	0	108,000	1,839,000	3,501,000	5,107,000	8,120,000	13,255,000
	In the path	0	121,000	322,000	527,000	613,000	962,000	1,229,000
	Outside	0	179,000	559,000	996,000	1,358,000	1,773,000	2,403,000
North Total		785,000	2,469,000	12,559,000	25,912,000	39,553,000	78,734,000	180,316,000
South Total		0	408,000	2,976,000	5,469,000	7,660,000	11,645,000	18,177,000
Grand Total		785,000	2,877,000	15,535,000	31,381,000	47,213,000	90,379,000	198,493,000

NUMBER OF RESIDENTIAL AND COMMERCIAL UNITS

The 500-year floodplain contains 2,477 units. The alignment would protect 1,655 of them. The levee alignment would not protect 740 units, 574 in the south reach and 166 in the northern reach. In addition, 82 residential structures are under the proposed levee alignment and would have to be removed for the project. The following table shows a breakdown by structural location and category.

Number of Residential and Commercial Units and their Relationship to the Levee.

Category	Protected	Taken by Levee	Outside
North reach			
Commercial	112	1	33*
Residential	1,543	81	133
South reach			
Commercial	0	0	16
Residential	0	0	558
Total			
Commercial	112	1	49
Residential	1,543	81	691
Grand Total	1,655	82	740

*33 businesses are in 14 buildings.

THE FLOODPLAIN ACREAGES

Approximately one-third of the city is in the 100-year floodplain and subject to floodplain regulations. This accounts for about 40 percent of the structures in the city. Without the project, 565 acres of land would be in the floodplain. With the project, 275 acres would remain in the floodplain. These acreages are summarized below.

East Grand Forks Floodplain Area Subject to Regulation

Condition	North Reach	South Reach	Total
Without plan	314	251	565
With plan	24	251	275

FUTURE CONDITIONS

Population in the city is expected to increase to 9,759 by the year 2000. This projection was determined by using a program from the Institute for Water Resources called A Guide to the Use of the IWR Interactive Ratio Forecasting Program. The Basic Ratio Method was used comparing East Grand Forks with the SMSA moderate change-in-share forecast.

Future population in the area is expected to increase at a moderate rate. The U.S. Bureau of the Census reported an increase in population from 7,607 to 8,537 from 1970 to 1980, respectively. Some of this increase, however, is due to annexation. East Grand Forks is in Polk County, which is expected to have a stable population through the rest of the century. The State Demographer's Office listed the 1980 county population at 34,844 and estimated the 2000 population at 35,234. The 100-year floodplain area in the city is now almost completely developed. The 1980 OBERS listed a population for the SMSA of 101,000

in 1978 and projected a population of 115,453 in 2000 assuming a moderate change in share. This would be a population change of 14 percent for the SMSA. The following table shows the historic population and the projected increase in the population of the city, the SMSA and Polk County.

Historic Populations And Population Forecasts For East Grand Forks, SMSA, And Polk County

Year	East Grand Forks	SMSA	Polk County
1960	6,998	85,000	36,182
1970	7,607	96,000	34,435
1980	8,537	101,000	34,844
1985	8,843	104,617	34,872
1990	9,234	109,245	35,093
1995	9,496	112,349	35,302
2000	9,759	115,453	35,234

Without the project in place, a further decline in the value of land is expected in the portion of the city within the 100-year floodplain. This area is subjected to floodplain ordinances and also has the potential to receive damages due to a failure of the emergency levee. Any population shifts and growth will occur in the northeastern and southern portions of the city outside of the floodplain. Some commercial strip development is already beginning to occur in that area. Industry will probably shift to the east along the Red Lake River. Some residential growth can be expected without the project; however, residential development will occur outside of the floodplain.

With the project in place, the number of structures in the 100-year floodplain and behind the levee may remain constant or increase slightly; however, the old downtown commercial area may be more intensively used in the future. Structures not protected by the levee

would be acquired. Most of the individuals and businesses relocated are expected to remain in East Grand Forks; however, some may move to North Dakota. According to a Corps survey, 70 percent of the businesses moved by a project will likely stay within East Grand Forks. The city is considering a shopping center east of the White Mart and just outside of the Federal Emergency Management Agency (FEMA) 100-year floodplain. Many of the businesses acquired by the project could move into this area.

East Grand Forks has an advantage for industrial development over Grand Forks because of a more reliable water supply. Grand Forks now purchases some of its water from East Grand Forks. The source of this supply is the Red Lake River.

FUTURE FLOOD DAMAGES

Future changes in flood damages can be divided into two categories--residential and commercial. Residential damages are increased by the affluence factor, which is a projected rate of increase in damageable contents over time. Commercial damages are projected to remain constant over time because the number of commercial structures in the floodplain is not expected to change. Affluence factor increases cannot be used in determining future growth in commercial damages because of the lack of empirical evidence of the relationship of affluence changes and growth of damages.

An analysis of residential damages showed that there was no difference between the value of contents in the homes near the river and the homes away from the river. Theoretically, the content value portion of total value could increase nearer the river due to a decreased structural value. The affluence factor does not appear to be affected by any potential flooding. The major reason that it increases over time is due to the general increased affluence of the population over time.

No increase in the numbers of structures in the floodplain is projected with the project because the floodplain is now full. With a floodplain ordinance in effect in one-third of the city, this could result in a decrease in flood damages in the future when older structures are removed and not replaced with newer ones built above the floodplain. However, no noticeable change in the number of structures in the floodplain has occurred since the city received floodplain status in 1977. No noticeable decline is expected in the next 20 years.

The average market value per residential structure in the 500-year floodplain is $40,300. The average content value is about $10,100 based on an estimated content value of 25 percent of the value of the structures. (A comparison of the Depth Damage Table and actual values was made on page F-28.) During the 500-year flood in East Grand Forks, 2,477 residential structures are expected to receive damages. The value of existing residential structures and contents in the 500-year floodplain is shown in the following table.

Value of Residential Structures in East Grand Forks
500-year Floodplain

Number of structures	Total market value		Average value per structure	Average value of contents
	Structure	Contents		
2,477	$99,800,000	$25,018,000	$40,300	$10,100

The OBERS regional projections for per capita income were used as the basis for increasing the real value of residential contents. As the affluence factor increases, the value of residential contents will also increase. The value of the residential contents is projected to increase with the per capita income growth rate until it reaches a maximum level of 75 percent of the value of the structure. This increase is the maximum allowable by regulation; the actual increase,

however, would continue if this regulation were not in place. The projected maximum level of 75 percent is expected to occur by the year 2032. After 2032, the value of contents will be held to that maximum level for this analysis.

OBERS (1980) data project per capita income to grow from $4,500 to $13,600 from 1978 to 2030. This is an increase of 3.0 in 52 years and equals a compound growth rate of per capita income of 2-1/8 percent per year. This number is found by obtaining the compound growth rate which most nearly equals 3.0 in 52 years. The present value of the contents is estimated at $10,100 which is 25 percent of the structural value and by regulation cannot increase past $30,300 or 75 percent or past a factor of 3 (75 divided by 25 equals 3). The following table shows these relationships.

Growth of Per Capita Income and Residential Content Value

Growth rate of OBERS per capita income	
Year	Per capita income
1978	$ 4,500
2030	13,600

$30,300 divided by $10,100 equals 3.0 in 52 years = a growth rate of 2-1/8 percent.

The St. Paul District's depth-damage study has shown damages to contents and structures divided into 40 percent and 60 percent, respectively. Content damages can then increase at a rate of 2-1/8 percent as shown on the following table. This future damage information was used in the Expected Annual Damage computer analysis.

Growth of Residential Content Value at a Rate of 2-1/8 Percent

Year	Years from present	Growth index
1983	0	1.0
Project 1990	10	1.2
2000	17	1.4
2036	53	3.0
2043	60	3.0

Growth will maximize in the year 2036.

AVERAGE ANNUAL DAMAGES

Average annual damages were determined using the expected annual damage program. Results were obtained for the three reaches, two interest rates, and two damage categories: (1) residential and (2) commercial, industrial and public. The following table summarizes the average annual damages for the authorized and current interest rates.

Average Annual Damages Without Project in East Grand Forks		
Category	3-1/4 percent	8-1/8 percent
Commercial		
North reach	$ 997,900	$ 997,900
South reach	42,000	42,000
Subtotal	1,039,900	1,039,900
Residential		
North reach	1,714,100	1,524,700
South reach	487,100	436,500
Subtotal	2,201,200	1,961,200
Total damages		
North reach	2,712,000	2,522,600
South reach	529,100	478,500
Grand total	3,241,100	3,001,100

Average annual benefits were estimated for the levee alignments. The following table summarizes benefits from the EAD output plus half of the 3 feet of freeboard protection.

Category	Average Annual Benefits from the Levee					
	3-1/4 percent			8-1/8 percent		
	100-year	230-year*	SPF	100-year	230-year*	SPF
Commercial						
North reach	$660,000	$724,000	$732,000	$660,000	$724,000	$732,000
South reach	1,000	1,000	1,000	1,000	1,000	1,000
Residential						
North reach	1,139,000	1,469,000	1,479,000	972,000	1,266,000	1,273,000
South reach	297,000	297,000	397,000	258,000	258,000	347,000
Total						
North reach	1,799,000	2,193,000	2,211,000	1,632,000	1,990,000	2,005,000
South reach	298,000	298,000	398,000	259,000	259,000	348,000

* This is the NED protection level for the north reach. The south reach, however, was infeasible at all levels of protection.

All residual damages are assumed to be accounted for with the SPF level of protection plus freeboard. Residual damages behind the levee are shown on the following table.

Average Annual Residual Damages in the Areas Protected by the Levees

	3-1/4 percent			8-1/8 percent		
Category	100-yr	NED	SPF	100-yr	NED	SPF
Commercial						
North reach	$196,000	$43,000	0	$196,000	$43,000	0
South reach	0	0	0	0	0	0
Residential						
North reach	345,000	75,000	0	281,000	61,000	0
South reach	87,000	19,000	0	71,000	15,000	0
Total						
North reach	541,000	118,000	0	477,000	104,000	0
South reach	87,000	19,000	0	71,000	15,000	0

COST ESTIMATES FOR THE LEVEE

Levee costs include construction and real estate costs. Real estate costs are $4.5 million for the north reach and $3 million for the south reach. Average annual levee costs assume an average annual operation and maintenance cost of $30,000 and a 3-year construction period which distributes costs at 20 percent the first year, 30 percent the second year, and 50 percent the third year.

Folding sidewalk floodwalls were considered for the east side of the south reach. Folding floodwalls are a cheaper alternative measure, but they are structurally feasible only to the 100-year protection level. For protection greater than the 100-year level, only a more expensive levee is feasible, which gives a greater net loss than the folding floodwalls. Therefore, 100-year protection is the optimum level in the south reach.

First costs for the north and south reaches are shown in the following table.

First Costs for the Levees

Feature	North Reach			South Reach	
	1% Protection	0.3%* Protection	SPF Protection	1% Protection	SPF Protection
Engineering and design	$1,467,000	$1,467,000	$1,467,000	$ 800,000	$ 800,000
Levees/floodwalls/ roads/closures	2,718,000	5,235,000	5,830,000	2,096,000	3,066,000
Interior drainage/ pumping	5,315,000	5,315,000	5,315,000	3,159,000	3,159,000
Removal of emergency levee/bank unloading	820,000	820,000	820,000	358,000	358,000
Relocation of utilities	1,385,000	1,385,000	1,385,000	413,000	413,000
Real estate	4,480,000	4,500,000	4,500,000	3,719,000	3,719,000
Beautification	450,000	450,000	450,000		
Total costs	16,635,000	19,172,000	19,767,000	10,545,000	11,515,000

* This is the NED protection level.

Average annual levee costs do not include relocation assistance costs. These are considered replacement-in-kind and are not included in the benefit-cost ratio. Average annual levee costs for the north and south reaches are shown in the following table.

Average Annual Levee Costs

	3-1/4 percent			8-1/8 percent		
Reach	100 year	NED plan	SPF	100 year	NED plan	SPF
North reach	$568,000	$662,000	$685,000	$1,430,000	$1,660,000	$1,718,000
South reach	363,000	----	400,000	860,000	----	941,000

The benefit-cost ratio for the north levee is above one at both the 3-1/4 and 8-1/8 percent interest rates. The benefit-cost ratio for the south levee is below one at both interest rates. The following table summarizes the analysis.

Benefit-Cost Ratios for the Levees

	3-1/4 percent			8-1/8 percent		
	100-year	NED	SPF	100-year	NED	SPF
North Levee						
Average annual benefits	$1,799,000	$2,193,000	$2,211,000	$1,632,000	$1,990,000	$2,005,000
Average annual costs	568,000	662,000	685,000	1,430,000	1,660,000	1,718,000
Benefit-cost ratio	3.0	3.2	3.1	1.14	1.2	1.17
Net benefits	1,231,000	1,531,000	1,526,000	202,000	330,000	287,000
South Levee						
Average annual benefits	298,000		398,000	259,000		348,000
Average annual costs	363,000		400,000	860,000		941,000
Benefit-cost ratio	0.78		0.95	0.29		0.35
Net benefits	-65,000		-2,000	-601,000		-593,000

STRUCTURES FEASIBLE TO ACQUIRE

The number of structures feasible to acquire was determined on a preliminary basis for this stage of analysis. The information needed to determine the feasible structures is: Benefits = average annual damages. Costs = structural value + contingency. Salvage values and contingency are both assumed to be 20 percent and therefore cancel each other.

In East Grand Forks, 107 residential and commercial units were found feasible to acquire. Average annual damages and benefits are $587,000. First costs of these structures are $7,350,000. Annualized at 8-1/8 percent interest, costs are $590,000. Annualized at 3-1/4 percent, the project costs $265,000, as shown in the following table.

Benefit and Cost Breakdown for the Area Outside of the Levee

o First costs break down as follows:

Feature	Amount
Structural	$ 5,730,000
Land	970,000
Removal	200,000
Beautification	450,000
Total	7,350,000

o The costs break down by category:

Category	First costs	Annual costs at 3-1/4 percent	Annual costs at 8-1/8 percent
Residential	$5,019,000	$180,000	$400,000
Commercial	1,881,000	69,000	155,000
Beautification	450,000	16,000	35,000
Total	7,350,000	265,000	590,000

o The damages break down by category:

Category	Annual damages and benefits
Residential	$448,000
Commercial	139,000
Total	587,000

Interest rates do not affect this benefit category since no future benefits were taken. However, interest rates affect costs.

The benefit-cost ratio at 3-1/4 percent is 2.2 and the ratio at 8-1/8 percent is 1.0.

Floodproofing was also analyzed for the area outside of the levee. No structures were found feasible to floodproof to tne 100-year level. Another factor to consider is the value of the vacant land. This land would be used for open space and recreation for the city. The recreation supporting documentation lists the major value of the area as coming from the 5 miles of trails that would be included in the area. The appendix lists average annual benefits of $135,400 at 3-1/4 percent and $109,000 at 8-1/8 percent. The costs are listed at $23,200 for 3-1/4 percent interest and $40,000 for 8-1/8 percent interest, along with operation and maintenance costs of $8,500 per year. The recreation benefit-cost ratio is 4.3 at 3-1/4 percent and 2.2 at 8-1/8 percent.

If recreation benefits and costs are added to acquisition benefits and costs, the benefit-cost ratio would increase to 2.4 at 3-1/4 and to 1.09 at 8-1/8 percent interest as shown in the following table.

Benefit-Cost Ratio for the Area Outside of the Levee

Item	3-1/4 percent	8-1/8 percent
Annual Damages	$587,000	$587,000
+ Recreation Benefits	135,400	109,000
= Total Annual Benefits	722,400	696,000
Annual Costs	265,000	590,000
+ Recreation Costs	31,700	48,500
= Total Annual Costs	296,700	638,500
Benefit-Cost Ratio	2.4	1.09

OTHER BENEFITS

Other benefit categories include reduction in the costs of administration of flood control policies and the changes in property values. Location benefits were also looked at and were determined not to be appropriate for East Grand Forks, since the floodplain is now essentially full and no changes in land use behind the proposed levee are projected.

The benefits for the reduction in flood insurance administration costs are estimated to be $10,200. The cost per policy is $42 per year nationally. According to FEMA, 243 homes in East Grand Forks currently have policies ($42 X 243 = $10,200).

Change in property value to the city is the sum of the increased value of the 100-year floodplain minus the decreased value of the land outside of and under the levee plus the increased value of the land behind the levee and outside of the 100-year floodplain. The third category is due to the increased demand from the people and businesses relocated out of the floodplain and behind the levee. This benefit is due to restoration of land values and is above and beyond structural flood benefits.

The property value inside of the 100-year floodplain and behind the levee is expected to increase by 15 percent. This rough value came about after discussions with city assessors and real estate appraisers in Grand Forks and East Grand Forks. Residential and commercial property totaling 126 acres would be removed from floodplain status. The property has an average value of $40,000 per acre; thus, the benefits would be $756,000 ($40,000 per acre X 15 percent X 126 acres = $756,000 increase). This annual value would be $61,800 at 8-1/8 percent interest and $26,500 at 3-1/4 percent.

The property value loss to the area outside of the levee is $48,800 at 8-1/8 percent and $28,000 at 3-1/4 percent interest. This assumes a 100-percent decline in property value of the 24 acres outside and the 7 acres under the project levee. This 31-acre area is now valued at only $32,000 per acre because a portion is not protected by the existing levee. The value of the area is assumed to decline to zero, however, some recreation credit was given in the previous section.

- $32,000 X 31 = $992,000
- $992,000 X 0.08128 = $80,600
- $992,000 X 0.035 = $34,700

Property value increase to the 500-year residual floodplain area which is the area behind the levee and outside of the 100-year floodplain is $3,600 at 8-1/8 percent interest and $1,500 at 3-1/4 percent. This increase is due to the people and businesses relocated by the project moving into this area. The total number of residential and business units removed by the project is 172. Twenty of these may find locations within the former 100-year floodplain. Seventy percent of the structures are expected to relocate within the city (see Social Supporting Documentation). A local real estate appraiser estimated an increase in the value of the area due to increased demand of 5 percent to $46,000 per acre. Thus, total changes equal $44,000.

- 172 structures X 70 percent = 120 structures
- 120 structures - 20 structures in the 100-year floodplain = 100 structures
- 100 structures divided by 5 structures per acre = 20 acres
- 20 acres X $2,200 value increase = $44,000

- $44,000 X 0.08128 = $3,600

- $44,000 X 0.035 = $1,150

The other benefit categories show an increase of $45,600 at 8-1/8 percent and $18,400 at 3-1/4 percent interest as shown in the following table.

Other Benefit Categories

Item	8-1/8 percent	3-1/4 percent
Administrative flood insurance cost savings	$10,200	10,200
100-year floodplain property value increase	80,600	34,700
Property value loss to the area outside	-48,800	-28,000
500-year residual floodplain	3,600	1,500
Total	45,600	18,400

BENEFIT AND COST SUMMARY

The benefit-cost ratio totals 3.1 at 3-1/4 percent and 1.22 at 8-1/8 percent interest for the levee and relocation in the north reach of East Grand Forks as shown in the following table.

Summary of Benefits and Costs

Item	3-1/4 percent	8-1/8 percent
Benefits		
Levee	$2,193,000	$1,990,000
Acquisition	587,000	587,000
Recreation	135,400	109,000
Flood insurance	10,200	10,200
Land value restoration	8,200	35,400
Total	2,933,800	2,731,600
Costs		
Levee	662,000	1,660,000
Acquisition	265,000	590,000
Recreation	31,700	49,000
Total	958,700	2,299,000
Benefit-cost ratio		
Total benefits	2,933,800	2,731,600
Total costs	958,700	2,299,000
Ratio	3.1	1.2
Net benefits	1,975,100	432,000

SENSITIVITY STUDIES

The project was analyzed for its sensitivity to credit for emergency levees, any future depth-damage analysis changes, interest rate changes, changes in level of protection, and different flood risks.

EMERGENCY LEVEE ANALYSIS FOR ECONOMIC CREDIT

The East Grand Forks emergency levee was analyzed to determine the flood benefits that the community derives from it. The levee can be divided into two reaches as shown in the Geotechnical Supporting Documentation. Reach 1 begins south of Hill Street and continues south to Second Avenue NE. Reach 2 begins north of Hill Street and continues north to River Heights Park. The levee is divided into two reaches because the ground along Hill Street is higher. Water would have to reach an elevation of 830 or a frequency of 2 percent to cross from one reach to the other.

Reach 1 contains 90 percent of the total project damages. The lowest permissible top of freeboard elevation is 823 which is slightly above the 10-percent flood. Thus, the levee would protect hardly any of this area when subtracting 3 feet from the top of freeboard to the top of the certifiable levee. The 3 feet of freeboard is an estimate determined from the hydraulic studies.

Reach 2 contains about 10 percent of the total project damages. The lowest permissible top of freeboard elevation is 828 which is approximately the 30-year flood. If 3 feet of freeboard is subtracted from the top of the levee, the frequency would be at the 20-year flood.

A summary of the effects on the benefits of the emergency levee is shown on the following table.

Benefits of the Plan with Credit to the Emergency Levee

Item	3-1/4 percent	8-1/8 percent
Levee benefits without emergency levee benefit reduction	$2,193,000	$1,990,000
Emergency levee benefit reduction	-108,000	-98,000
Other benefits	740,800	741,600
Total benefits	2,825,800	2,633,600
Levee costs	662,000	1,601,000
Other costs	296,700	638,500
Total costs	958,700	2,239,500
Benefit-cost ratio with credit to the emergency levee		
Levee benefits alone	3.3	1.24
Total benefits	2.9	1.18

DEPTH-DAMAGE ANALYSIS

The owners of five homes were interviewed to determine the level of damages that they would receive during two flood events. This information was compared with the St. Paul District depth-damage table to assess the accuracy with which damages are counted. The five homes had values of $15,000, $20,800, $26,500, $39,000, and $55,000. They were not selected at random. They were selected to give a range in value and location. Two were located on "The Point" and three were in the northern reach. Two were inside and three were outside of the 100-year floodplain. The homes were inventoried for a flood that would fill the basement and for a flood 2 feet above the first floor. All of the homes had basements. The information gathered from the interviews is shown in the following table.

Actual Expected Damages Compared to the Depth-Damage Table for Five East Grand Forks Structures(1)

House No.	House value	Basement flooding		First-floor of 2 feet flooding	
		Actual flooding expected	Depth-damage table	Actual flooding expected	Depth-damage table
1(F)	$15,000	$6,500 (68% greater)	$ 3,860	$10,100 (32% greater)	$7,600
2	20,800	7,500 (49% greater)	5,040	11,300 (11% greater)	10,200
3	26,500	6,800 (3% less)	7,040	15,000 (13% greater)	13,300
4(F)	39,100	12,200 (3% greater)	11,860	21,500 (9% greater)	19,700
5	55,000	22,300 (33% greater)	16,740	28,700 (5% greater)	27,300
Total	$156,400	55,300 (24% greater)	44,540	86,600 (11% greater)	78,160

(1) Damages are the replacement value of the item. No damages were included for any potential structural collapse.

(F) These two homes are in the 100-year floodplain.

INTERNAL RATE OF RETURN

The internal rate of return where the benefit-cost ratio is 1.0 is at a 9-percent discount rate, as shown in the following table.

Internal Rate of Return at 9 Percent

Benefits	Amount	Costs	Amount
Levee	$1,951,000	Levee	$1,838,000
Acquisition	575,000	Acquisition	683,000
Recreation	54,500	Recreation	29,000
Flood insurance	10,200		
Property value changes	18,000		
Total	2,608,700		2,550,000

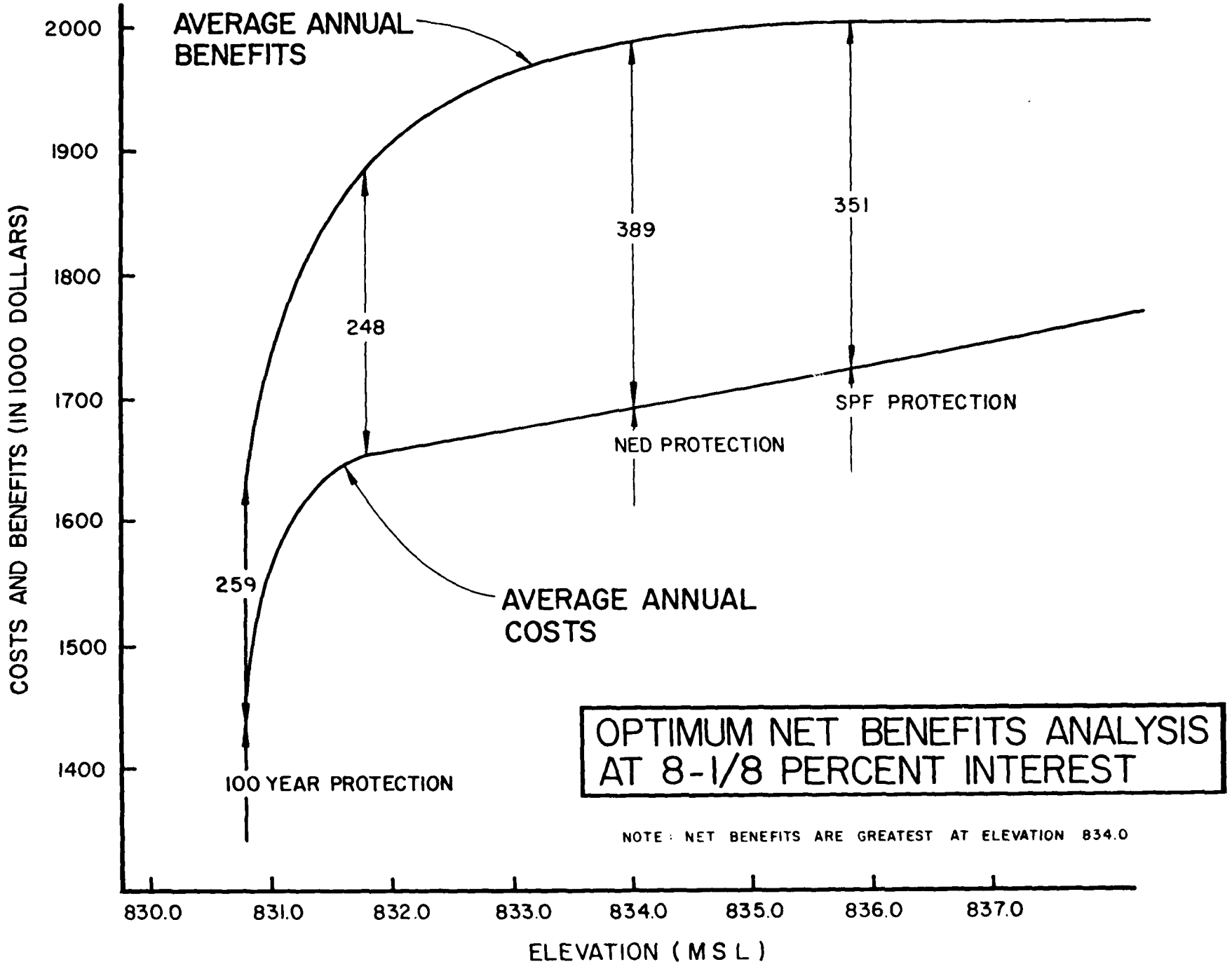
The benefit-cost ratio = $\frac{\$2,608,700}{2,550,000}$ = 1.02

OPTIMUM BENEFITS

The optimum net benefit for the levee is at elevation 340.0 at the gage or a frequency of about 0.25 percent. Net benefits for the levee maximize at $389,000. Average annual benefits increase greatly from the 100-year protection level to the NED level of protection as a sharply increasing number of commercial businesses experience flooding.

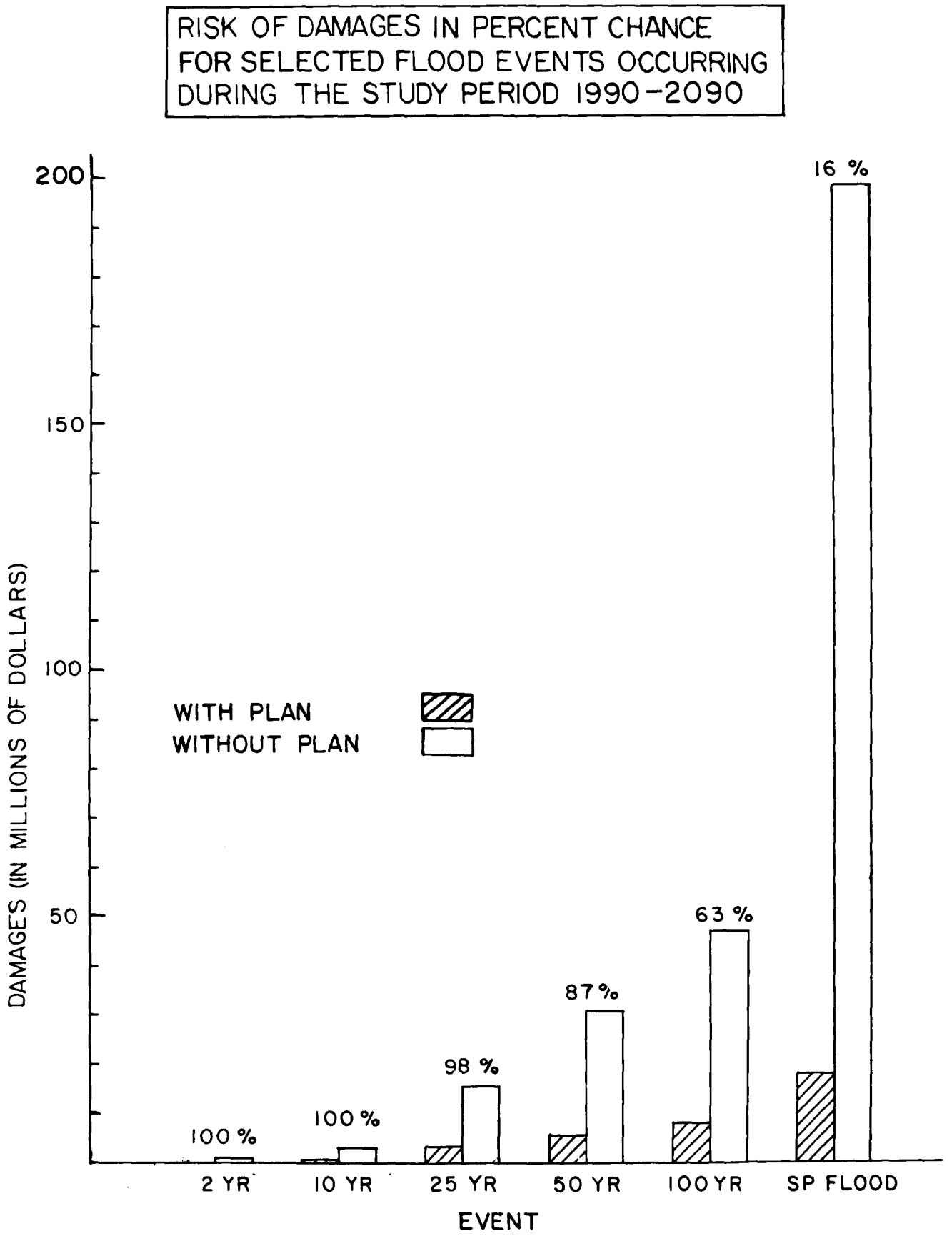
Average annual benefits increase slowly from the NED level of protection to the SPF level of protection. The major reason is that the SPF flood is within the NED levee freeboard. Freeboard benefits were taken for all of the protection levels except for the SPF level. The damage curve was not extended past the SPF level of protection. Another reason for the slow increase in benefits is that almost the entire city is flooded from a 0.25 percent event.

Costs increase sharply from elevation 830.8 (the 100-year flood) to 831.8 because of road raises required. Additional increases in elevation do not increase the costs as drastically once the property is acquired and the foundation is in place. The following table shows the optimum net benefits analysis.


AVERAGE ANNUAL BENEFITS
2000
1900
1800
1700
1600
1500
1400
COSTS AND BENEFITS (IN 1000 DOLLARS)
248
389
351
259
SPF PROTECTION
NED PROTECTION
AVERAGE ANNUAL COSTS
100 YEAR PROTECTION
OPTIMUM NET BENEFITS ANALYSIS AT 8-1/8 PERCENT INTEREST
NOTE : NET BENEFITS ARE GREATEST AT ELEVATION 834.0
830.0
831.0
832.0
833.0
834.0
835.0
836.0
837.0
ELEVATION (M S L)

SUSCEPTIBILITY TO DIFFERENT FLOOD RISKS

East Grand Forks is now susceptible to flooding at various frequencies. The city would continue to be flooded in "The Point" reach with the project in place. The following graph shows flooding potential to East Grand Forks.


RISK OF DAMAGES IN PERCENT CHANCE
FOR SELECTED FLOOD EVENTS OCCURRING
DURING THE STUDY PERIOD 1990-2090
200
150
100
50
DAMAGES (IN MILLIONS OF DOLLARS)
WITH PLAN
WITHOUT PLAN
100 %
100 %
98 %
87 %
63 %
16 %
2 YR
10 YR
25 YR
50 YR
100 YR
SP FLOOD
EVENT

HISTORIC FLOODING

The largest flood in the city's history occurred in 1897. Under present conditions, this flood would have caused $32,000,000 worth of damages. The latest flood occurred in 1979 and caused $8,887,000 worth of damages. The following table summarizes historic flooding.

Major Historic Floods

Year	Damages under present conditions without a flood fight	Actual damages under historic conditions including the flood fight
1979	$23,600,000	$8,887,000
1978	7,700,000	92,000
1975 July	2,400,000	358,000
1975 April	2,300,000	489,000
1969	7,700,000	103,000
1966	7,300,000	600,000
1965	6,000,000	772,000
1950	7,300,000	662,000
1897	32,000,000	N/A

EXECUTIVE ORDER 11988, FLOODPLAIN MANAGEMENT, MAY 24, 1977

The objective of Executive Order 11988 is to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of the base floodplain and to avoid direct and indirect support of development in the floodplain whenever there is a practicable alternative. In accordance with Corps regulation 1165-2-26, the Corps is required to:

- o Avoid development in the base floodplain unless it is the only practical alternative.

- o Reduce the hazard and risk associated with floods.

- o Minimize the impact of floods on human safety, health, and welfare.

- o Restore and preserve the natural and beneficial values of the base floodplain.

Discussion of these points follows:

The plan which is being considered in this analysis includes both a levee measure and an acquisition measure. The levee is not expected to induce development in the base floodplain because the area is now fully developed. However, the downtown area is expected to be more intensively used with a permanent levee in place. The acquisition measure would remove development from the base floodplain and relocate it outside. The working papers discussed several alternative plans including a project in the south reach. None of these plans were feasible at 8-1/8 percent interest.

Hazardous risk, and the impact on safety, health, and welfare, would be reduced by the project. The project would protect for the 0.3-percent flood plus freeboard. This would reduce most impacts of flooding to the area.

The project is not expected to hurt the natural and beneficial resources of the area. No increases in development in the base floodplain are expected to take place. Natural values can potentially be enhanced in the area between the river and the levee after the acquisition of this area's structures.

EAST GRAND FORKS, MINNESOTA
GENERAL REEVALUATION

SUPPORTING DOCUMENTATION
REAL ESTATE

EAST GRAND FORKS, MINNESOTA
GENERAL REEVALUATION
SUPPORTING DOCUMENTATION

REAL ESTATE

The proposed project would require acquisition of approximately 84 acres in perpetual easements and fee by the local sponsor. The easement areas would include about 51 acres of residential land, 3.5 acres of golf course land, 14.5 acres of low wooded lands and 15 acres of commercial/industrial land. The easement interests to be acquired are fee, a perpetual flood protection levee easement, a perpetual easement to occasionally overflow and revegetate, and a perpetual borrow easement.

The project would affect approximately 245 owners and require relocation of 201 residential owners, 20 commercial owners, 7 residential tenants and 11 commercial tenants. The estimated costs of acquiring the necessary real estate are:

Lands, improvements, and damages	$9,330,000
Contingencies	1,100,000
Public Law 91-646 relocation payments	3,400,000
Administrative costs	670,000
Total	14,500,000

Of the total project costs, approximately $4,500,000 is associated with the structural portion of the project and $10,000,000 is for the nonstructural portion.

3. Real estate estimates for alternatives not selected:

NORTH OF THE RED LAKE RIVER - 100-YEAR

Lands, improvements, and damages	$9,270,000
Contingencies	1,100,000
Public Law 91-646 relocation payments (200 residential owners, 7 residential tenants, 20 commercial owners, and 11 commercial tenants)	3,360,000
Administrative costs (est. 224 owners)	670,000
Total	14,400,000

Structural at $4,300,000 Nonstructural at $10,100,000

SOUTH OF THE RED LAKE RIVER - SPF

Lands, improvements, and damages	$7,170,000
Contingencies	880,000
Public Law 91-646 relocation payments (146 residential owners)	2,260,000
Administrative costs (est. 217 owners)	590,000
Total	10,900,000

Structural at $3,560,000 Nonstructural at $7,340,000

SOUTH OF THE RED LAKE RIVER - 100-YEAR

Lands, improvements, and damages	$6,320,000
Contingencies	800,000
Public Law 91-646 relocation payments (137 residential owners)	2,120,000
Administrative costs (est. 204 owners)	560,000
Total	9,800,000

Structural at $3,490,000 Nonstructural at $6,310,000

EAST GRAND FORKS, MINNESOTA
GENERAL REEVALUATION

SUPPORTING DOCUMENTATION
SECTION 221 AGREEMENT

DEPARTMENT OF THE ARMY
NORTH CENTRAL DIVISION, CORPS OF ENGINEERS
536 SOUTH CLARK STREET
CHICAGO, ILLINOIS 60605

NCDRE-A 2 April 1975

SUBJECT: Agreement for Local Cooperation - Flood Control Project - Red River of the North Drainage Basin, East Grand Forks, Minnesota

HQDA (DAEN-REA-P)
WASH DC 20314

1. Inclosed are the following:

a. Section 221 Agreement (Public Law 91-611) executed on behalf of the City of East Grand Forks, Minnesota and the District Engineer, St. Paul District, as Contracting Officer.

b. Attorney's Certificate from City Attorney of East Grand Forks, Minnesota, certifying review of the agreement.

c. A certified copy of the resolution, authorizing officials of East Grand Forks to enter into Local Cooperation Agreement.

2. The agreement by the Local Interest is tendered at this time to avoid expiration of Project Authority. By enactment of Section 205 of the Flood Control Act of 1970, Public Law 91-611, approved 31 December 1970, Congress extended the authorization in Section 203, Act of June 30, 1948, and Section 204 of the Act of May 17, 1950, of the project for Local Protection of East Grand Forks, Minnesota, to 17 April 1975. An adequate Section 221 agreement containing Local Assurances satisfactory to the Secretary of the Army must be signed on behalf of the Secretary by that date.

3. It is recommended that the agreement be approved. Four (4) copies are required at this level.

FOR THE DIVISION ENGINEER:

3 Incl (quint)
as

H. E. KENDALL
Chief, Real Estate Division, NCD

DAEN-REA-P (2 Apr 75) 1st Ind
SUBJECT: Agreement for Local Cooperation - Flood Control Project - Red River of the North Drainage Basin, East Grand Forks, Minnesota

DA, Office of the Chief of Engineers, Washington, D. C. 20314 9 Apr 75

TO: Division Engineer, North Central

1. Subject agreement has been reviewed and is acceptable.

2. By virtue of a delegation of authority from the Secretary of the Army dated 1 August 1972, I have executed the subject agreement.

FOR THE CHIEF OF ENGINEERS:

3 Incl
wd 1 cy all incl

EDWARD GOMEZ
Acting Director of Real Estate

NCDRE-A (2 Apr 75) 2nd Ind
SUBJECT: Agreement for Local Cooperation - Flood Control Project - Red River of the North Drainage Basin, East Grand Forks, Minnesota

DA, North Central Division, CE, Chicago, Illinois 60605 16 April 1975

TO: District Engineer, St. Paul

1. Executed agreement is returned herewith in triplicate.

2. One fully executed copy should be furnished to the City of East Grand Forks, Minnesota.

FOR THE DIVISION ENGINEER:

3 Incl
wd 1 cy all incl

J. D. GORDON
Acting Chief,
Acquisition Branch

AGREEMENT BETWEEN

THE UNITED STATES OF AMERICA

AND

THE CITY OF EAST GRAND FORKS, MINNESOTA

FOR

LOCAL COOPERATION AT

RED RIVER OF THE NORTH DRAINAGE BASIN AT

EAST GRAND FORKS, MINNESOTA

This Agreement entered into this [illegible] day of [illegible], 1975 by and between the United States of America (hereinafter called the "Government"), represented by the Contracting Officer executing this Agreement, and the City of East Grand Forks, Minnesota, (hereinafter called the "City"),

WITNESSETH THAT:

WHEREAS, Congress enacted the Flood Control Act of 1948, approved 30 June 1948, authorizing construction of flood protection works in the Red River of the North drainage basin, North Dakota, South Dakota and Minnesota, which said authorization included flood protection works affecting the City; and

WHEREAS, the aforesaid act of Congress authorized the appropriation of funds for partial accomplishment of the overall drainage basin flood protection plan; and

WHEREAS, the aforesaid Act of Congress authorized the drainage basin flood protection works as set forth in the report of the Chief of Engineers

dated 24 May 1948 appearing in House Document Numbered 149, 81st Congress, 1st Session; and

WHEREAS, Congress enacted the Flood Control Act of 1950, approved 17 May 1950, which authorized completion of the plan for flood protection works in the Red River of the North drainage basin as approved by the aforementioned Flood Control Act of 1948; and

WHEREAS, the Flood Control Act of 1948 provided that non-Federal interests furnish assurances satisfactory to the Secretary of the Army agreeing to provide certain items of local cooperation; and

WHEREAS, Section 201 of the Flood Control Act of 1948 provided that unless the aforementioned assurances, satisfactory to the Secretary of the Army were furnished within a five (5) year period from the date the Department of the Army notified local interests in writing of the requirements of local cooperation and such assurances, satisfactory to the Secretary of the Army, were not provided within the specified five (5) year period, the project authorization shall thereby expire; and

WHEREAS, the notice in writing of the Department of the Army to the City, setting out the requirements of local cooperation was dated 26 October 1956; and

WHEREAS, the said assurance was not furnished within the aforementioned five (5) year period, and

WHEREAS, by Section 205 of the Flood Control Act of 1970, Public Law 91-611, approved 31 December 1970, Congress extended that part of the flood protection works affecting the City, to 17 April 1975 whereby local interests could furnish the assurance of local cooperation satisfactory to the Secretary of the Army; and

WHEREAS, Congress enacted Public Law 91-646, approved 2 January 1971, entitled the"Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970; and

WHEREAS, Section 221 of aforementioned Flood Control Act of 1970 provides, among other things, that any agreement covering the requirements of local cooperation must be entered into with the Secretary of the Army; and that any such agreement shall be enforcible in the appropriate District Court of the Government; and

WHEREAS, the City hereby represents that it has the authority and capability to furnish the non-Federal cooperation required by the Federal legislation authorizing the flood protection works, and by other applicable law.

NOW, THEREFORE, the parties agree as follows:

1. The City agrees that, in consideration of the Government commencing construction of the flood protection works at East Grand Forks, Minnesota, at the earliest permissible date, substantially in accordance with the Flood Control Act of 1948, and other applicable law, it will fulfill the requirements of non-Federal cooperation specified in the aforesaid legislation, to wit:

a. Provide without cost to the Government all lands, easements, rights-of-way and spoil disposal areas necessary for the construction and subsequent maintenance of the proposed channel and levee improvements, when and as required;

b. Hold and save the Government free from damages due to the

construction and subsequent maintenance of those works, except for damages due to the fault or negligence of the Government or its contractors;

c. Maintain and operate all of the channel and levee improvement works after completion in accordance with regulations prescribed by the Secretary of the Army;

d. Make at their (City's) own expense all necessary changes to utilities, highways, and bridges, including approaches;

e. In acquiring lands, easements, rights-of-way and spoil disposal areas necessary for the construction and subsequent maintenance of the flood protection works, the City will comply with the applicable provisions of the "Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970", Public Law 91-646, approved 2 January 1971.

2. The City agrees to furnish a right-of-entry to the Government covering the lands, easements, rights-of-way and spoil disposal areas required to perform the flood protection works, prior to the date the Government advertises for bids to perform such works; and further, the City hereby grants and conveys to the Government the right to enter upon, at reasonable times and in a reasonable manner, the lands, easements, rights-of-way, and spoil disposal areas which the City owns or controls, for access to the flood protection works, following their completion, for the purpose of inspection. In the event such inspection shows that the City for any reason is failing to maintain the said works in accordance with the aforementioned agreement and has persisted in such failure after a reasonable notice in writing by the Government delivered to the City or its designated representative, then and in that event, maintenance of the flood protection

works by the Government shall not operate to relieve the City of responsibility to meet its obligation as set forth in this Agreement, or to preclude the Government from pursuing any other remedy at law or equity.

3. This Agreement is subject to the approval of the Secretary of the Army or his designated representative.

IN WITNESS WHEREOF, the parties hereto have executed this contract as of the day and year first above written.

THE UNITED STATES OF AMERICA

By _____
MAX W. NOAH
Colonel, Corps of Engineers
District Engineer
Contracting Officer

CITY OF EAST GRAND FORKS, MINNESOTA

By Laurence E. Harvey
Mayor

APPROVED:

E. COHEN
Acting Director of Real Estate

For the Secretary of the Army

ATTEST:

By D E Mack
~~City~~ Clerk - Treasurer

ATTORNEY'S CERTIFICATE

I, Robert A. Matt, City Attorney for the City of East Grand Forks, Minnesota, hereby certify as follows:

a. That I have carefully examined the foregoing document entitled "Agreement Between The United States of America and The City of East Grand Forks, Minnesota For Local Cooperation At Red River of The North Drainage Basin At East Grand Forks, Minnesota".

b. That the City of East Grand Forks is a municipal corporation, organized and existing in accordance with the statutes of the State of Minnesota.

c. That the City Council, the governing body, of East Grand Forks authorized and directed that the aforementioned document be fully executed on the part of the City as attested by the certified copy of the adopting resolution attached to the said Agreement.

d. That in my examination of the said Agreement, I also examined Public Law 91-611, approved 31 December 1970, giving particular attention to Section 221 thereof, and am of the opinion that the City of East Grand Forks has the required authority and the financial capability to meet the requirements of the said Flood Control Act of 1948, as well as the provisions of Public Law 91-611.

e. That it is my considered opinion that the aforesaid Agreement, when fully executed by the parties thereto, will become a binding contract subject to the laws of the United States of America and the State of Minnesota.

Dated March 27 1975

By _____
Robert A. Matt
City Attorney
City of East Grand Forks, Minnesota

CERTIFICATE

I, D. E. Mack, Clerk-Treasurer of the City of East Grand Forks, Minnesota, hereby certify that the attached Resolution is a true and exact copy of a Resolution passed by the City Council of the City of East Grand Forks, Minnesota, at a Special meeting of said Council held at the Memorial City Hall in said City on March 27, 1975, the original of which said Resolution is now on file in this office.

Dated this 27th day of March, 1975.

SEAL

D E Mack, Clerk-Treasurer
City of East Grand Forks, Minnesota

RESOLUTION

Alderman Gandy, supported by Alderman Schue, introduced the following Resolution and moved its adoption:

WHEREAS, The United States of America has submitted to the City of East Grand Forks a certain Agreement pertaining to flood protection improvements on the Red River of the North at East Grand Forks, Minnesota; and

WHEREAS, Under said Agreement the City of East Grand Forks has certain obligations and responsibilities, which will necessitate financial commitments and expenditures on the part of the said city with respect thereto; and

WHEREAS, The City Council of the City of East Grand Forks, Minnesota, understands the responsibilities of the city, which include right of way acquisition, relocation responsibilities pursuant to United States Public Law 91-646, and maintenance responsibilities, once the project has been completed, and all responsibilitie of the city, as outlined in said Agreement.

NOW, THEREFORE, BE IT RESOLVED, By the City Council of the City of East Grand FORKS, Minnesota, that the Mayor and Clerk-Treasurer of the City of East Grand Forks Minnesota, are hereby authorized and directed to execute on behalf of the said city of East Grand Forks, Minnesota, that certain instrument titled " AGREEMENT BETWEEN THE UNITED STATES OF AMERICA AND THE CITY OF EAST GRAND FORKS, MINNESOTA, FOR LOCAL COOPERATION AT RED RIVER OF THE NORTH DRAINAGE BASIN AT EAST GRAND FORKS, MINNESOTA

BE IT FURTHER RESOLVED, That the Clerk-Treasurer provide the United States Government with three certified copies of this Resolution, transmitting the same to the proper party representing the United States of America.

Voting Aye: Rabby, Wold, Mongeon, Schue, Gandy, Murray

Voting Nay: None

Absent: Staves

The President declared the Resolution passed.

Attest: Passed: March 27, 19

D E Mack
Clerk-Treasurer

Paul E Gandy
President of Council

I nereby approve the foregoing Resolution this 27th day of March 1975.

Murray L Warmes
Mayor

EAST GRAND FORKS, MINNESOTA
GENERAL REEVALUATION

SUPPORTING DOCUMENTATION
SECTION 215 AGREEMENT

DRAFT AGREEMENT
UNDER SECTION 215
OF PUBLIC LAW 90-483
FLOOD CONTROL PROJECT
CITY OF EAST GRAND FORKS, MINNESOTA

THIS AGREEMENT, entered into this _____ day of_____ ____, by and between the United States of America (hereinafter referred to as the "GOVERNMENT") represented by the Chief of Engineers, U.S. Army, and the City of East Grand Forks, Minnesota (hereinafter referred to as the "COOPERATING AGENCY):

WHEREAS, a flood control project (hereinafter referred to as the "AUTHORIZED PROJECT") at East Grand Forks, Minnesota, and in Polk County, Grand Forks and Rhinehart Township, described in House Document No. 185-81-1, 30 June 1948, 17 May 1950, 31 December 1970; and "Draft General Reevaluation Report for Flood Control and Related Purposes, Red and Red Lake Rivers at East Grand Forks, Minnesota, March 1984"; and

WHEREAS, the Cooperating Agency has proposed to perform certain work which falls within the work required under the Authorized Project; and

WHEREAS, Section 215 of Public Law 90-483 (42 U.S.C. 1962d-5a) provides that the Secretary of the Army, acting through the Chief of Engineers, may enter into an agreement to reimburse the costs of certain work accomplished by local interests which later is incorporated into an authorized project, when it is determined that such reimbursement is in the public interest; and

WHEREAS, such agreements may provide for a reduction in the amount of contribution required from local interests in lieu of reimbursement for costs incurred; and

WHEREAS, the Secretary of the Army, acting through the Chief of Engineers, has determined that crediting the Cooperating Agency for the cost of the work accomplished in this instance is in the public interest; and

WHEREAS, Section 221 of Public Law 91-611, approved 31 December 1970, provides that construction of any project shall not begin until the non-Federal interest has entered into a written agreement with the Secretary of the Army to furnish its required cooperation for the project; and further that every such agreement shall be enforceable in the appropriate District Court of the United States; and

WHEREAS, an agreement pursuant to Section 221 of Public Law 91-611 was made with the Secretary of the Army and Cooperating Agency on 27 March 1975; and

WHEREAS, Congress enacted Public Law 91-646, approved 2 January 1971, entitled the "Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970",

NOW THEREFORE, it is agreed between the Government and the Cooperating Agency that:

ARTICLE 1 - Work to be Accomplished

The work to be accomplished consists of the following in the Project Area as defined in the aforementioned Government "Draft General Reevaluation Report for Flood Control..., March, 1984":

1. Acquisition of houses and commercial buildings (with land and any other improvements and easements), clearance of foundations and any buildings not suitable for relocation, and landscaping of such cleared areas.

2. Acquisition of relocation sites/buildings (or purchase of site and construction of new buildings) for City Shop and City Library purposes, subject to approval of both City and Government. Clearance of present library and City Shop buildings and landscaping of those sites.

3. Administrative, legal, planning, and any other sundry costs related to the above two work items.

The proposed work is generally in accordance with the recommendations of the District Engineer contained in the "Draft General Reevaluation Study for Flood Control and Related Purposes, Red and Red Lake Rivers at East Grand Forks, Minnesota, March 1984". All work eligible for crediting shall be accomplished in conformance with plans and specifications approved by the U. S. Army Corps of Engineers.

ARTICLE 2 - Manner of Performing the Work

Work shall be performed by the Cooperating Agency. Necessary engineering and design shall be accomplished by the Cooperating Agency or by its Architect-Engineer Consultant. Construction shall be accomplished by securing competitive bids, by advertising, for all work to be performed by contract, or, with the approval of the Government, the Cooperating Agency may perform the work with its own forces.

ARTICLE 3 - Review of Design and Inspection

Before beginning work, the designs, detailed plans and specifications, estimates, and arrangements for prosecution of the work shall be made available to the District Engineer, U.S. Army Engineer District, St. Paul, for review and approval. Any subsequent changes in the plans and specifications for the work or in the method of accomplishment shall be submitted to the District Engineer for review and prior approval. The District Engineer or his designee is authorized to inspect the work at any and all times.

ARTICLE 4 - Basis of Determining Credit

The total credit applied against the local cash contribution share of the project shall be eighty percent (80%) of the work items identified in Article 1 related to nonstructural actions and one hundred percent (100%) of cost of the work items identified in Article 1 related to structural actions.

ARTICLE 5 - Limitations on Reimbursement

(a) The cost of any work undertaken by the Cooperating Agency before the effective date of this agreement shall not be credited against the local contribution requirement.

(b) No amount shall be credited until the District Engineer, U.S. Army Engineer District, St. Paul, has determined that the work has been performed in accordance with the agreement.

(c) This agreement shall not be construed as (1) authorizing the Government to assume any responsibilities placed upon the Cooperating Agency or any other non-Federal body by the conditions of project authorization, (2) committing the Government to credit the Cooperating Agency if the Authorized Project is not undertaken or is modified so as to make the work performed by the Cooperating Agency no longer applicable, or (3) committing the Government to credit the Cooperating Agency for the cost of any portion of the constructed improvement determined by the Government at the time of reimbursement, to be unsuitable for incorporation into the Authorized Project because of inadequate maintenance.

(d) There will be no credit for work which does not conform to the description set forth in Article 1 above.

(e) The amount of credit to the Cooperating Agency for the work described herein shall in no event exceed one million dollars ($1,000,000.00).

(f) The amount of credit to the Cooperating Agency is not subject to interest charges, nor is it subject to adjustment to reflect changes in price levels between the dates of completion and reimbursement.

(g) Reimbursement for the work performed by the Cooperating Agency shall be dependent upon the appropriation of funds applicable thereto or funds available therefore, and shall not take precedence over other pending work of higher priority at the same or other improvement projects.

ARTICLE 6 - Expiration of Agreement

This agreement shall expire and become null and void if the work described herein is not undertaken within three (3) years of the effective date of this agreement and, unless extended by the Government, completed within two (2) years thereafter.

ARTICLE 7 - Prosecution of Work by Contract

In the event the Cooperating Agency prosecutes the work herein by contract, all bids received and the proposed provisions of any contract shall be subject to review by the Government prior to award. Any such contract shall contain all applicable provisions required by Federal law and regulations including, but not necessarily limited to, applicable labor and equal opportunity provisions.

ARTICLE 8 - Local Cooperation

The Cooperating Agency agrees to comply with the items of local cooperation set forth below to the extent that these requirements are applicable to this portion of the overall project.

(a) Provide without cost to the United States all lands, easements, and rights-of-way necessary for construction of the project.

(b) Hold and save the United States free from damages due to the construction works except for damages due to the fault or negligence of the United States or its contractors.

(c) Maintain and operate all the works after completion in accordance with regulations prescribed by the Secretary of the Army.

(d) Make all necessary relocations and alterations of buildings, utilities, highway bridges, sewers, and related facilities, except as otherwise provided.

(e) Prevent any encroachments which would reduce the flood-carrying capacity of the levee on the Red or Red Lake River.

(f) Provide guidance and leadership in preventing unwise future development of the floodplain by use of appropriate floodplain management techniques to reduce flood losses.

(g) Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, approved 2 January 1971, in acquiring lands, easements, and rights-of-way for construction and subsequent maintenance of the project and inform affected persons of pertinent benefits, policies, and procedures in connection with said Act.

(h) Comply with Section 601 of Title VI of the Civil Rights Act of 1964 (P. L. 88-352) and Department of Defense Directive 5500.11 issued pursuant thereto and published in Part 300 of Title 32, Code of Federal Regulations, in connection with the construction, operation, and maintenance of the project.

ARTICLE 9 - Examination of Records

(a) The Cooperating Agency agrees that the Comptroller General of the United States or any of his duly authorized representatives shall, until the expiration of three (3) years after final reimbursement under the agreement, have access to and the right to examine any directly pertinent books, documents, papers, and records of the Cooperating Agency involving transactions related to this agreement.

(b) The Cooperating Agency further agrees to include in all its contracts hereunder a provision to the effect that the Contractor and all subcontractors agree that the Comptroller General of the United States or any of his duly authorized representatives shall, until three (3) years after final payment under the contract or subcontract, have access to and the right to examine any

directly pertinent books, documents, papers, and records of such Contractor or subcontractor involving transactions relating to the contract or subcontract. The term "subcontract" as used in this clause excludes (1) purchase orders not exceeding $2,500.00 and (2) subcontracts or purchase orders for public utility services at rates established for uniform applicability to the general public.

(c) The periods of access and examination described in (a) and (b) above for records which relate to (1) litigation or the settlement of claims arising out of the performance of this contract or (2) costs and expenses of this contract to which exception has been taken by the Comptroller General or any of his duly authorized representatives shall continue until such litigation, claims, or exceptions have been disposed of.

ARTICLE 10 - Officials Not to Benefit

No member of or any delegate to Congress or Resident Commissioner shall be admitted to any share or part of this agreement or to any benefit that may arise therefrom, but this provision shall not be construed to extend this agreement if made with a corporation for its general benefit.

ARTICLE 11 - Covenant Against Contingent Fees

The Cooperating Agency warrants that no person or selling agent has been employed or retained to solicit or secure this agreement upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee, excepting bona fide employees or bona fide established commercial or selling agencies maintained by the Cooperating Agency for the purpose of securing business. For breach or violation of this warranty, the Government shall have the right to annul this agreement without liability or, in its discretion, to subtract from the reimbursement price the full amount of such commission, percentage, brokerage, or contingent fee.

ARTICLE 12 - Equal Opportunity

The Cooperating Agency hereby agrees that it will incorporate or cause to be incorporated into any contract for construction work, or modification thereof as defined in the Regulations of the Secretary of Labor at 41 CFR Chapter 60, which is paid for in whole or in part with funds obtained from the Federal Government pursuant to a grant, contract, loan, insurance, or guarantee, or undertaken pursuant to any Federal program involving such grant, contract, loan, insurance, or guarantee, the following Equal Opportunity clause:

During the performance of this contract, the Contractor agrees as follows:

(1) The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Contractor will take affirmative action to ensure that applicants are employed and that employees are treated during employment without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to, the following: employment upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training

including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

(2) The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment witnout regard to race, color, religion, sex, or national origin.

(3) The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding a notice to be provided advising the said labor union or workers' representatives of the Contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(4) The Contractor will comply with all provisions of Executive Order 11246 of 24 September 1965, as amended by Executive Order 11375 of 13 October 1967, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(5) The Contractor will furnish all information and reports required by Executive Order 11246 of 24 September 1965, as amended by Executive Order 11375 of 13 October 1967, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(6) In the event of the Contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of 24 September 1965, as amended by Executive Order 11375 of 13 October 1967, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11375 of 13 October 1967, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(7) The Contractor will include the portion of the sentence immediately preceding Paragraph (1) and the provisions of Paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order 11246 of 24 September 1965, as amended by Executive Order 11375 of 13 October 1967, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance: provided, however, that in the event a Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the Contractor may request the United States to enter into such litigation to protect the interests of the United States. The applicant further agrees it will be bound by the above Equal Opportunity clause

with respect to its own employment practices when it participates in federally assisted construction work provided that, if the applicant so participating is a State or local government, the above Equal Opportunity clause is not applicable to any agency, instrumentality, or subdivision of such government which does not participate in work on or under the contract. The applicant agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of Contractors and subcontractors with the Equal Opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance. The applicant further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of 24 September 1965, as amended by Executive Order 11375 of 13 October 1967, with a Contractor debarred from, or who has not demonstrated eligibility for, Government contracts and federally assisted construction contracts pursuant to the Executive Order and will carry out such sanctions and penalties for violation of the Equal Opportunity clause as may be imposed upon Contractors and subcontractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D, of the Executive Order. In addition, the applicant agrees that, if it fails or refuses to comply with these undertakings, the administering agency may take any or all of the following actions: cancel, terminate, or suspend in whole or in part this grant (contract, loan, insurance, guarantee); refrain from extending any further assistance to the applicant under the program with respect to which the failure or refusal occurred until satisfactory assurance of future compliance has been received from such applicant; and refer the case to the Department of Justice for appropriate legal proceedings.

ARTICLE 13 - Inspection and Maintenance

The Cooperating Agency hereby grants and conveys to the Government the right to enter upon, at reasonable times and in a reasonable manner, the Project lands which the Cooperating Agency owns or controls, including those lands for access purposes, for the purpose of inspection and for the purpose of repairing and maintaining the Project, if such inspection shows that the Cooperating Agency for any reason is failing to repair and maintain the Project in accordance with the assurances set forth herein and has persisted in such failure after a reasonable notice in writing by the Government delivered to the Cooperating Agency, then, and in that event, repair and maintenance by the Government shall not operate to relieve the Cooperating Agency of responsibility to meet its obligations as set forth in this agreement, or to preclude the Government from pursuing any other remedy at law or equity.

ARTICLE 14 - Effective Date

This agreement shall take effect when executed on behalf of the United States of America.

CITY OF EAST GRAND FORKS, MINNESOTA

Dated _____ By _____
Louis A. Murray, Mayor

By _____
Gary Sanders, City Engineer

Approved as to legality:

By _____
Robert A. Matt
City Attorney

UNITED STATES OF AMERICA

By _____
J.K. BRATTON
Lieutenant General, USA
Chief of Engineers

Dated _____

CERTIFICATE OF AUTHORITY

I, Robert A. Matt, do hereby certify that I am the City Attorney of East Grand Forks, that the City of East Grand Forks is a legally constituted public body with full authority and capability to perform the terms of the agreement between the United States of America and East Grand Forks in connection with the East Grand Forks Flood Control Project, and to pay damages, if necessary, in the event of the failure to perform in accordance with Section 221 of Public Law 91-611 and that the person who has executed the contract on behalf of East Grand Forks has acted within his statutory authority.

In Witness Whereof, I have made and executed this Certificate this _____ day of _____.

_____

City Attorney, City of East Grand Forks

East Grand Forks City Council Proceedings

Alderman Wogaman, supported by Alderman LaFave, introduced the following resolution and moved its adoption:

WHEREAS, A Flood control project involving the United States of America and the City of East Grand Forks, Minnesota, is in the draft stages; and

WHEREAS, The City of East Grand Forks proposes to perform certain work which falls within the work required under the proposed flood control project; and

WHEREAS, The Secretary of the Army, acting through the Chief of Engineers, may enter into an agreement to reimburse the costs of certain work accomplished by the city which later is incorporated into the flood control project, when it is determined that such reimbursement is in the public interest, or in lieu thereof may provide for a reduction in the amount of contribution required from the city in lieu of reimbursement for costs incurred; and

WHEREAS, The Secretary of the Army, acting through the Chief of Engineers, has determined that crediting the city for the cost of the work the city proposes to do is in the public interest, and has submitted an Agreement for the United States Government by the Chief of Engineers, U.S. Army, and the City of East Grand Forks to execute, *wherein the United States of America agrees to so reimburse the said city for the cost of* any such work the city perform.

NOW, THEREFORE, BE IT RESOLVED, By the City Council of the City of East Grand Forks, Minnesota, that the Mayor and Clerk-Treasurer are authorized and directed to execute said Agreement for and on behalf of the said city.

Voting Aye: Mongoven, Wogaman, Gorman, Gander, Stauss, LaFave

Voting Nay: None

Absent: Hanson

The President declared the Resolution passed.

EAST GRAND FORKS, MINNESOTA
GENERAL REEVALUATION

SUPPORTING DOCUMENTATION
SOCIAL

EAST GRAND FORKS, MINNESOTA

GENERAL REEVALUATION

SUPPORTING DOCUMENTATION

SOCIAL

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EAST GRAND FORKS, MINNESOTA
GENERAL REEVALUATION
SUPPORTING DOCUMENTATION

SOCIAL

GENERAL

Social analysis was conducted to assist in developing the most socially acceptable plan and to publicly disclose the social impacts of plans investigated. The analysis included a profile of the existing social resources; an attitudinal survey of city residents; interviews with the affected businesses; and a series of meetings to develop scenarios of the city's most probable future. Reports on the methods and findings of these efforts are included in this supporting documentation.

EAST GRAND FORKS GENERAL REEVALUATION

SUPPORTING DOCUMENTATION

SOCIAL

APPENDIX A

EAST GRAND FORKS SOCIAL PROFILE

SOCIAL

SUPPORTING DOCUMENTATION

APPENDIX A

EAST GRAND FORKS SOCIAL PROFILE

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APPENDIX A
EAST GRAND FORKS SOCIAL PROFILE

INTRODUCTION

East Grand Forks, a city in northwestern Minnesota, is about 72 miles south of the Canadian border and directly across the Red River of the North from Grand Forks, North Dakota. Situated at the junction of the Red and Red Lake Rivers, East Grand Forks is exposed to frequent flooding from both rivers.

In response to local requests for solutions to the flood problem, the St. Paul District, Corps of Engineers, initiated this study of the flood problem and possible alternative solutions.

As part of the flood control study, the St. Paul District has prepared the social profile in this appendix. This appendix is divided into two major sections. The first section focuses on the socio-economic environment of East Grand Forks and includes historical information, population trends, the economy and employment, housing, and services available in the community. The second section investigates the social impact of the proposed flood control project.

SOCIO-ECONOMIC ENVIRONMENT

HISTORY

During the early period of white settlement after the Civil War, the East Grand Forks area was populated by traders and trappers. The community was known as Nashville, named after the local fur trader and mail carrier, William C. Nash.

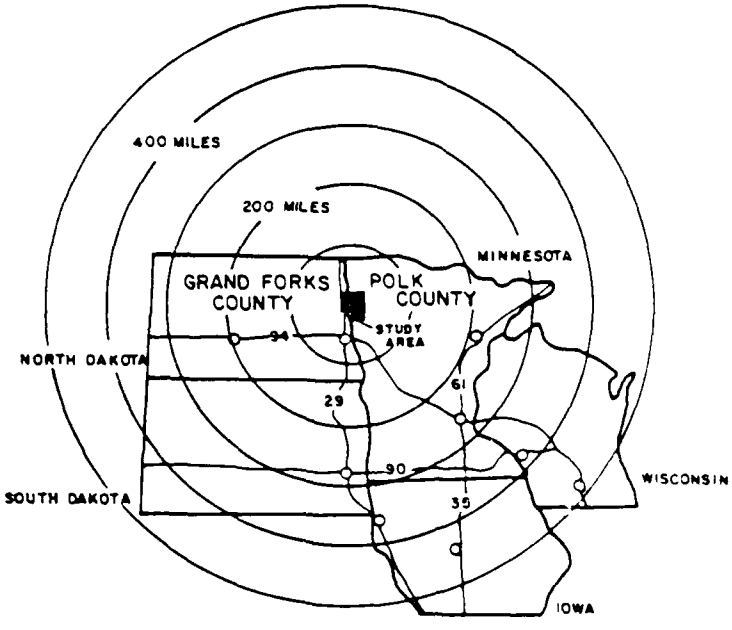
A tent housed the first store on the banks of the Red River in 1871. After the establishment of the local post office in 1873, Nashville was renamed East Grand Forks.

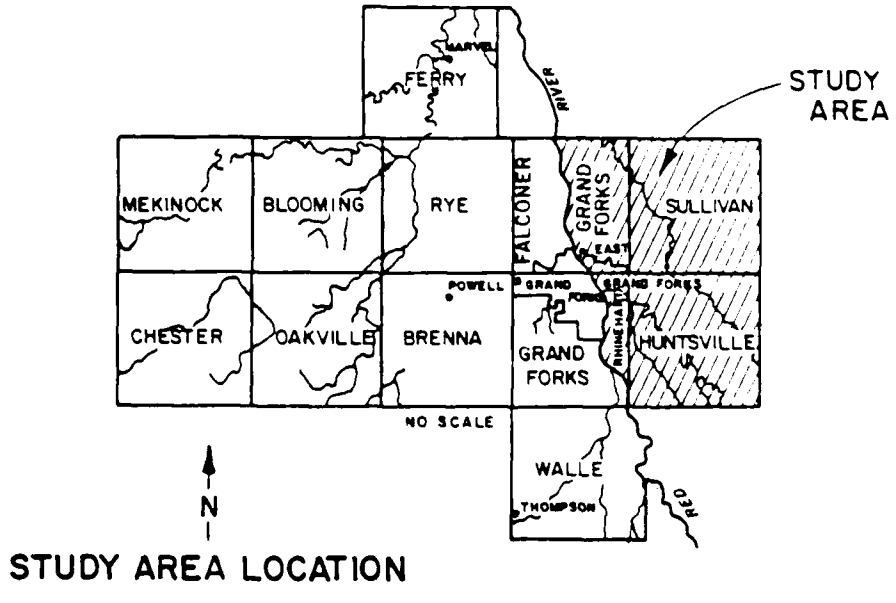
The St. Paul, Minneapolis and Manitoba Railroad (Great Northern Railroad) extended its rail service to the community in 1881. The subsequent population increase caused a building boom, and in 1887 East Grand Forks was incorporated. The Grand Forks-East Grand Forks area has since developed into one of the Nation's most productive agricultural areas.

POPULATION TRENDS

East Grand Forks is located in Polk County and is the only city in the study area (figure 1). The townships of Grand Forks, Huntsville, Rhinehart, and Sullivan are also in the study area.

EAST GRAND FORKS
MINNESOTA
FLOOD CONTROL STUDY





STUDY AREA LOCATION

FIGURE 1

Table 1 illustrates population totals for Polk County, East Grand Forks, and the four townships in the study area for 1960, 1970, and 1980. During this 20-year period, the population of Polk County decreased 3.7 percent.

TABLE 1
1960, 1970, AND 1980
POPULATIONS
POLK COUNTY, MINNESOTA

Place	1960	1970	1980	% Change 1960-70	% Change 1970-80	% Change 1960-80
Polk County	36,182	34,435	34,844	-4.8	1.2	-3.7
East Grand Forks	6,998	7,607	8,537	8.7	12.2	22.0
Huntsville Township	457	461	535	0.9	16.1	17.1
Grand Forks Township	259	357	275	37.8	-23.0	6.2
Rhinehart Township	220	416	98	89.1	-76.4	-55.5
Sullivan Township	207	213	218	2.9	2.3	5.3

SOURCE: U.S. Census Bureau

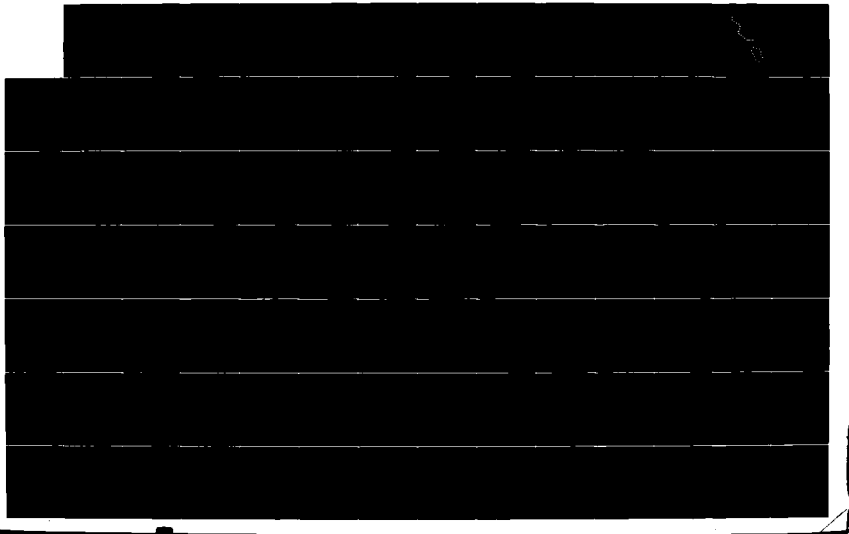
The 12.2 percent increase in the city of East Grand Forks and the 23.0-percent and 76.4-percent decreases in Grand Forks and Rhinehart Townships during the 1970 to 1980 period suggest the migration of the study area population to larger cities. The decline in population of these two townships can be attributed to current farming trends in the area: farms are increasing in size while decreasing in number. With the number of farms decreasing, residents are migrating to larger cities for employment opportunities.

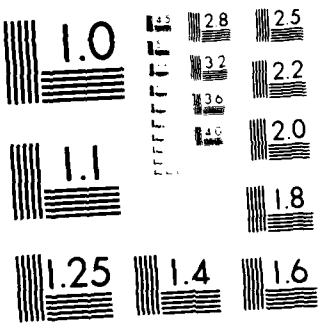
ECONOMY/EMPLOYMENT

East Grand Forks, Minnesota, and Grand Forks, North Dakota, form a [illegible] regional trade center. The cities are an example of a metr[illegible] working together while servicing the respective States of e[illegible] is a significant force in East Grand Forks, and the University [illegible]

AD-A184 845 GENERAL REEVALUATION SUPPORTING DOCUMENTATION FOR FLOOD CONTROL AND RELATED PURPOSES(U) CORPS OF ENGINEERS ST PAUL MN ST PAUL DISTRICT NOV 84 1/8

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MICROCOPY RESOLUTION TEST CHART

and the Air Force Base are significant in Grand Forks. Agriculture plays an important role in the area economy. The diversity of the area produces a relatively stable local economy.

Agriculture

The flat, former glacial lakebed that forms the Red River Valley makes it one of the Nation's most productive small grain, potato, and sugar beet areas. Over 40 percent of all economic activity in the East Grand Forks area is directly related to agriculture.

Commercial/Industrial

Manufacturing enterprises in East Grand Forks include processing plants for locally-grown grain, potatoes, and sugar beets. One of the major employers is the American Crystal Sugar Company, with 200 employees. Five firms perform various potato processing and related warehousing functions. Old Dutch Foods employs 40 area residents.

Retail

In Polk County, food stores, auto dealers, and service stations dominate the retail trade, accounting for 52 percent of total county retail sales in 1972.

Other

Located approximately 10 miles from East Grand Forks, the Grand Forks Air Force Base contributes to the economy of the Grand Forks-East Grand Forks metropolitan area.

HOUSING

Total housing units for East Grand Forks and Polk County in 1960, 1970, and 1980 are shown in table 2.

TABLE 2

1960, 1970, AND 1980

HOUSING UNITS

POLK COUNTY AND EAST GRAND FORKS

Place	1960	1970	1980	% Change 1960-70	% Change 1970-80	% Change 1960-80
Polk County	12,159	11,456	13,659	-5.8	19.2	12.3
East Grand Forks	2,038	2,282	3,467	11.9	51.9	70.1

SOURCE: U.S. Census Bureau

In East Grand Forks, 37.5 percent of the housing units were constructed before 1940. The distribution of sound and deteriorating structures suggests that development of the city has generally followed a concentric zone pattern, expanding from the central core areas toward the outer fringe areas.

Two facilities provide low-cost housing for senior citizens in East Grand Forks: Sunshine Terrace and Town Square.

EDUCATION

East Grand Forks Independent School District 595 includes seven schools: three elementary, a junior high, a senior high, one vocational center, and a vocational technical institute providing cooperative high school and post-high school training.

Sacred Heart parochial (Roman Catholic) schools provide elementary and high school education.

College-level educational opportunities are available at the University of North Dakota in Grand Forks and at the University of Minnesota Technical College and a community college in Crookston, Minnesota.

Educational attainment levels in the Polk County and East Grand Forks areas are 9.2 and 12.1 years, respectively. As a comparison, the median school years completed in Minnesota are 12.2.

Table 3 reflects present enrollment for the 1982-83 school year for East Grand Forks.

TABLE 3
EAST GRAND FORKS SCHOOL DISTRICT 595
AND EAST GRAND FORKS PAROCHIAL SCHOOLS

	CAPACITY	PRESENT ENROLLMENT (9/82)
East Grand Forks 595		
Central Junior High	650	467
Senior High	600	491
Crestwood Elementary	350	300
River Heights	350	292
Valley Elementary	350	300
Area Vocational Technical Institute (AVTI)	600	510
Red River Vocational Center	300	290*
East Grand Forks Parochial		
Sacred Heart Grade School	730	254
Sacred Heart High School	300	160

* Present enrollment includes East Grand Forks Senior and Sacred Heart High School students

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The Red River Vocational Center student count includes students enrolled at East Grand Forks Senior High and Sacred Heart High School. The center operates as a community cooperative education facility.

GOVERNMENT

The East Grand Forks political structure operates under a mayor-council form of government. Traditionally, mayors are presiding officers of their city councils; however, in East Grand Forks, the seven-member council appoints its own president who functions as a mayor. Council members are elected every 4 years, while the mayor is elected for a 2-year term.

Major city governmental departments include the Administration, Municipal Court, School System, Police and Fire, and Recreation. Primary sources of revenue for East Grand Forks city operations include property taxes, various fees and miscellaneous taxes, Federal/State allotments, and utility assessments and revenues.

COMMUNITY SERVICES

Communication

East Grand Forks has one weekly newspaper, The Exponent.

Radio station KRRK broadcasts 24 hours daily with a broadcasting range of 120 miles. The University of North Dakota sponsors KFJM, a radio station featuring noncommercial broadcasting from sunrise to sunset. Three other radio stations serve the area.

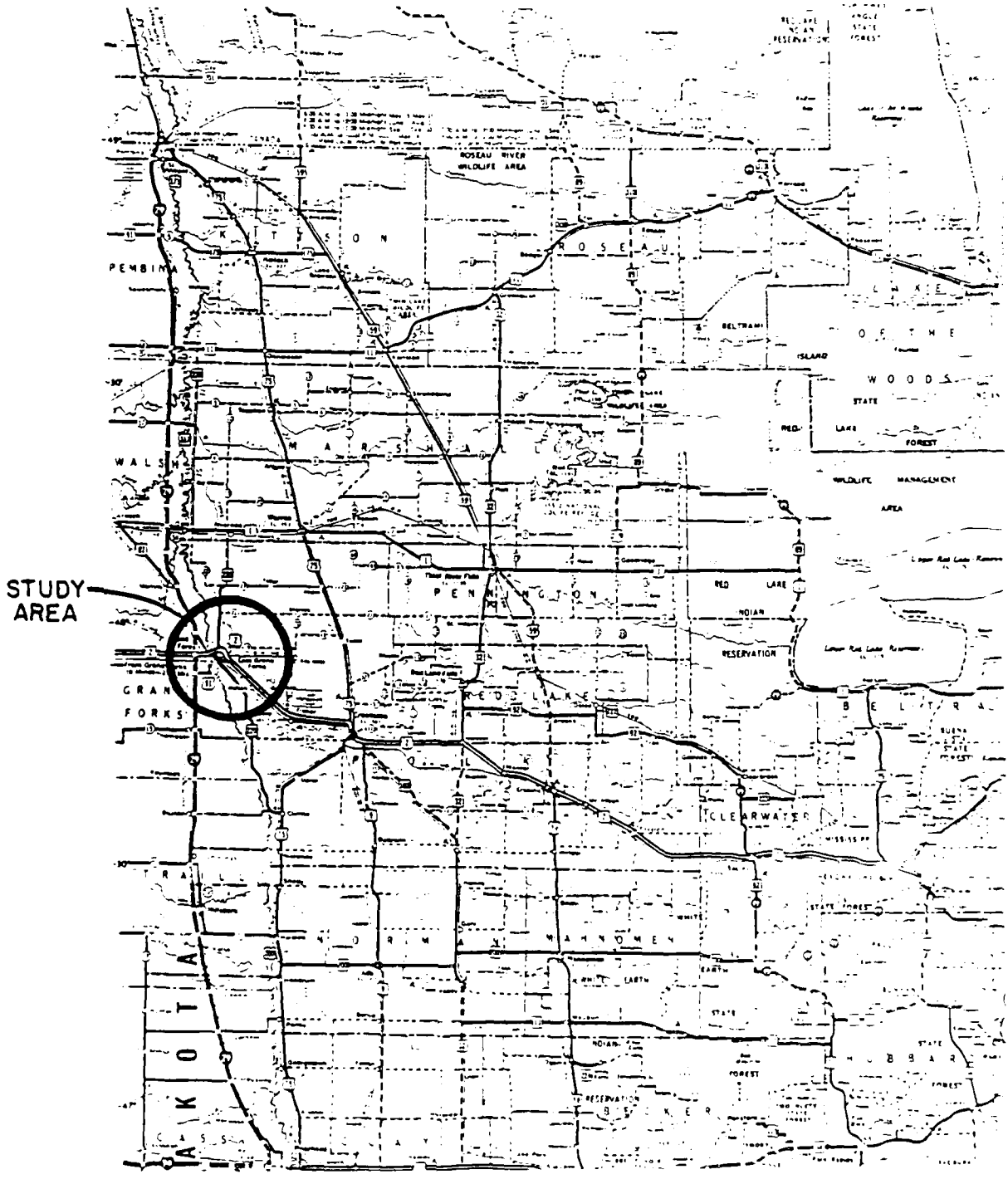
Five television channels are available for residents' viewing. Telephone service is available through Northwestern Bell Telephone Company.

Transportation

Located at the junction of U.S. Highways 2 and 220, East Grand Forks is across the Red River of the North from Grand Forks, North Dakota (see figure 2). During periods of flooding, the link between East Grand Forks and Grand Forks

is frequently interrupted. Transportation within East Grand Forks, especially in the Point area, is disrupted by flooding from the Red Lake River even with the new bridge.

TRANSPORTATION SYSTEM



I-A-1

FIGURE 2

Access to Interstate Highway I-29 near Grand Forks provides area residents a convenient route north to Canada and south to Mexico. U.S. Highway 2 is the east/west route in the northern part of the United States, spanning the Nation from Portland, Maine, to Spokane, Washington. Commercial airline service is available at Grand Forks International Airport, 7 miles from East Grand Forks.

Utilities

Electric power for East Grand Forks residents is supplied by the East Grand Forks Water and Light Department. Natural gas service is supplied by Northern States Power Company. The Red Lake River is the source of the water supply. A wastewater treatment system with a 336-acre lagoon located 3-1/2 miles north of the city services both residential and industrial users.

Public Safety

The city Police Department services an area of approximately 6 square miles with five radio-equipped vehicles. The department has 18 employees: an Acting Police Chief, juvenile officer, detective, patrol officers, and office administrator.

The Fire Department, with 12 regular firefighters plus 42 volunteers (paid on-call) provides fire protection for East Grand Forks and the surrounding rural area.

The East Grand Forks flood-fight plan was developed through the coordinated efforts of the city's Civil Defense Director and City Engineer under contract with the St. Paul District, Corps of Engineers. The Fire Chief, serving as Civil Defense Director with the assistance of Fire Department personnel, implements the plan during flood emergencies.

Health Care Facilities

United Hospital is located in Grand Forks, North Dakota, just across the river from East Grand Forks. This 300-bed facility employs 1,200 (full- and part-time) employees; 120 doctors, 950 nurses, and miscellaneous other personnel compose the staff. St. Luke's Hospital in Fargo, North Dakota, is available for complicated treatment referrals.

Care for the elderly in the area is provided by the Good Samaritan Nursing Center. Dedicated in 1965, the nursing center was completed in 1975. Community residents raised a major portion of the cost of the 119-bed facility.

SOME SOCIAL IMPACTS OF THE PROPOSED FLOOD CONTROL PROJECT

The profile of the East Grand Forks study area social environment in this appendix provides an overall view of the community. To reach a better understanding of the impact of the proposed project on various neighborhoods, the following comparison of areas outlines certain characteristics, using aggregate block data from the 1980 U.S. Census.

Limitations are inherent in most data sources. The use of aggregate block data permits a general description of the study area at the block level of analysis. Compilation of data from a door-to-door survey plus an exact levee/floodwall alignment would benefit this analysis by providing more detailed information, but such detailed study is not appropriate at the present stage of the flood control study.

The data available for the study were selected from the 1980 U.S. Census Subject Characteristics. This source provides, among others, the following block statistics for the city of East Grand Forks: population, residents 65 years and older, owner-occupied housing units, one unit and 10 or more units at an address, and mean owner's value.

From this framework of subject characteristics, additional characteristics were generated to further define the social character of the study area, such as percent of senior citizens in blocks and mean owner's value grouped according to flood control classification.

This analysis provides information about the characteristics of the areas affected by the proposed levee/floodwall alignment, providing a base of information for decision-makers.

The first part of this section explains the methodology used to determine what the social impacts of the proposed project might be in the East Grand Forks area. The second part outlines the method of classification used to designate impacted blocks within the city. The third part presents the findings of the social impact analysis.

METHODOLOGY

Statistics used in this analysis are derived from the 1980 U.S. Census, Characteristics of Population and Housing Units, by Blocks for Polk County, Minnesota, compiled by the U.S. Department of Commerce, Bureau of the Census.

East Grand Forks is part of the Grand Forks, North Dakota-Minnesota, Standard Metropolitan Statistical Area (SMSA: an urbanized area with at least 50,000 inhabitants that includes one or more central counties containing the area's main population concentration). Block statistics were used to analyze the social impact of a proposed flood control project in the East Grand Forks area. The analysis with the Statistical Package for the Social Sciences (SPSS), Version 8.0, used Breakdown and Crosstabulation programs.

METHOD OF INITIAL CLASSIFICATION OF IMPACTED AREA

The city of East Grand Forks consists of 135 blocks. The blocks were identified with three designations: 0, 1, and 2. The designations were determined from the preliminary alignment of the proposed levee/floodwall.

Those blocks designated as classification 0 are areas where the levee/floodwall is to be constructed. Those blocks identified as classification 1 include areas that would not be protected after the project is constructed. The remainder of the blocks, designated as classification 2, are areas to be protected by the project (see figure 3).

CLASSIFICATION OF IMPACTED AREA

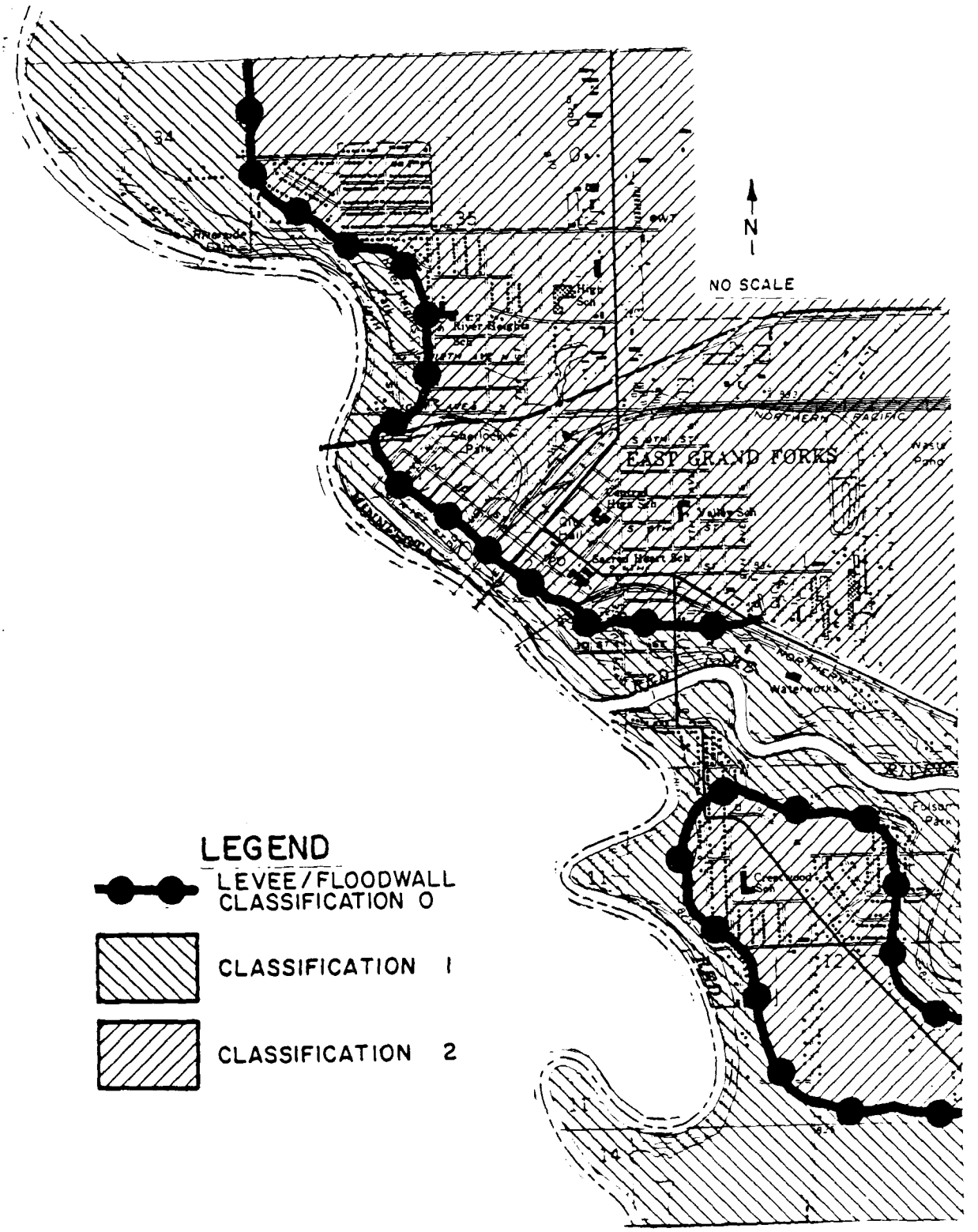


FIGURE 3

To determine the classification of each block (0, 1, 2), two types of maps were used: maps with structure numbers along the levee/floodwall alignment and maps with block numbers. Classification 0 (housing units to be removed and residents relocated) was developed by identifying blocks with structures affected by the alignment. The complete block was classified 0, even if only one structure required removal, because of the nature of the aggregate block data used for analysis. No estimate could be made for blocks partially affected since census data is provided for complete blocks only. Therefore, the blocks classified 0 will reflect higher housing unit counts than actually required to be removed for the project. For a breakdown by classification of selected social characteristics, see table 4.

TABLE 4

BREAKDOWN BY CLASSIFICATION

	CLASSIFICATION GROUP			EGF
	0	1	2	City
Characteristic	(Relocated)	(Unprotected)	(Protected)	Totals
Population	1,424	1,310	5,803	8,537
Blocks	21	17	97	135
Housing units-owned	404	317	1,216	1,937
Housing units-rented	36	110	919	1,065
Total housing units	463	465	2,539	3,467
Single family	431	367	1,174	1,972
10 units and over	0	33	722	755
Owner's value (mean)	$46,500	$38,900	$35,800	$37,800
Head of household with:				
Individual member	55	79	576	710
Single head	24	39	187	250
Individuals 65 and over	98	88	772	958

FINDINGS

Classification 0: Relocated

This designation represents 21 blocks containing 463 housing units[1] occupied by 1,424 residents. These housing units will be removed and residents relocated in preparation for the project construction. Owner-occupied housing units within the 21-block area have a mean owner value[2] of $46,500.

Classification 1: Unprotected

Seventeen blocks with 465 housing units having 1,310 residents are in the area near the river. These housing units will not be protected by the installation of the levee/floodwall. The mean value of these owner-occupied housing units is $38,900.

Classification 2: Protected

The remaining 97 blocks (with 2,539 housing units and 5,803 residents) will be protected by the levee/floodwall project. The mean value of owner-occupied housing units is $35,800.

(1) A house, apartment containing rooms, or a single room occupied as separate living quarters.

(2) Data presented for owner-occupied one-family units reflect the respondent's estimate of the selling price of the property if it were for sale. The mean value was computed by dividing the sum of the values by the number of owner-occupied units for which value is shown, resulting in a block value.

EAST GRAND FORKS GENERAL REEVALUATION

SUPPORTING DOCUMENTATION

SOCIAL

APPENDIX B

EAST GRAND FORKS FLOOD PROTECTION OPINION SURVEY

SOCIAL

SUPPORTING DOCUMENTATION

APPENDIX B

EAST GRAND FORKS FLOOD PROTECTION OPINION SURVEY

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APPENDIX B

EAST GRAND FORKS FLOOD PROTECTION OPINION SURVEY

EXECUTIVE SUMMARY

To summarize information which is particularly important for policy decisions, these data show that:

1. Flooding is costly for East Grand Forks:

a. Flooding is seen as a serious threat to the city, especially in terms of economics and safety.

b. During floods, residents experience many costly and disruptive effects.

c. After floods, there are economic costs of flooding as residents pay for flood insurance, move, and modify their property.

2. Flood awareness is inaccurate:

a. 20 percent of the floodplain residents are not aware of it.

b. Some parts of town are not widely recognized as being in the floodplain.

c. Residents want more information about the project.

3. East Grand Forks has drawing power despite floods:

a. The majority of people who moved here as adults were aware of the flood threat.

b. If residents had to move as a result of the project, 57-68 percent would stay within the city.

4. The project has support and also some concerns:

a. Most people prefer new levees/floodwalls, but only by a 24-percent margin.

b. Strongest support is from residents who are aware they live in the floodplain.

c. Concerns about flood protection measures center on property values, safety, and aesthetics.

d. Homes outside the levee should be treated as part of the plan.

EAST GRAND FORKS FLOOD PROTECTION OPINION SURVEY

INTRODUCTION

The East Grand Forks Flood Protection Opinion Survey was administered in October 1982 by the Corps of Engineers. The purpose of this survey was to establish a representative data base that would reflect public opinion in East Grand Forks on flood-related issues. A confidential questionnaire (exhibit 1) was used to collect public attitudes and concerns related to the following issues from 97 respondents: the seriousness of flooding in East Grand Forks; past flooding experiences and flood prevention attempts; potential flood damage reduction measures; and social, economic, and recreational values. The survey findings are being considered as the Corps of Engineers attempts to find the best solution to the East Grand Forks flooding problem.

Some of the major findings are listed here; they are explained more fully in the body of this report. The respondents as a whole agree that flooding poses a serious problem for the city of East Grand Forks, and 78 percent have personally experienced direct or indirect flooding problems while they have lived in the city. The respondents do not have a firm idea of which parts of the community are actually at risk; for example, 45 percent of those living on blocks within the 100-year floodplain answered that they do not feel their homes are subject to flooding.

If a flood control project were implemented, respondents feel that those affected would be most concerned about safety, distance, appearance (if a levee is built), and equitable economic compensation for any property involved. There is no decisive agreement among the respondents about which of the proposed flood reduction alternatives would be a good solution or about who should pay for it, but those who believe that their homes lie in the floodplain show strong support for a levee, while those who do not believe their homes lie in the floodplain show weaker support for a levee. Forty-six

percent of the respondents say they are not currently receiving sufficient information about the East Grand Forks study. Those who are not receiving sufficient information want to be kept informed through brochures and public meetings as well as through newspapers, radio, and television.

I. THE EXTENT TO WHICH FLOODING IS CONSIDERED A PROBLEM

The first section of the survey was designed to find out how serious the flooding problem in East Grand Forks is considered. Respondents showed strongest agreement with the statement that flooding poses "a very serious threat to the economic well-being of this part of Minnesota." The average opinion score was 1.77 on a scale where 1 indicated "strongly agree," 2 "agree," 3 "neutral," 4 "disagree," and 5 "strongly disagree."* The respondents also agree with the statements that "peoples' lives and safety are threatened by floods in East Grand Forks" (the average score was 1.96) and that "flooding is one of the most serious problems in the area" (the average score was 2.02).

In regard to current flood protection in the region, respondents disagreed with the statement that the protection is adequate (the average score was 3.47). When the four questions in this section are considered as a whole (by scaling the four questions in the same direction), the general opinion of the respondents is that flooding is a serious problem in East Grand Forks. The combined average score in response to the four questions was 2.20, slightly lower than full agreement.

In addition to giving their attitudes on the seriousness of flooding in East Grand Forks, respondents listed actual flooding problems they experienced while living in the city. Seventy-eight percent of the respondents have experienced some flood-related problems while they have lived in East Grand

*Average scores are the most important single measure to consider here, although there may be many people expressing other ("more" and "less") opinions.

Forks. The most frequently mentioned problems are cracks in basement walls, floors, or foundations (27 percent); transportation disruption (52 percent); income lost because of missed work or business closings (31 percent); and anxiety (29 percent). The average number of problems mentioned by each respondent was three.

II. PERCEPTIONS ABOUT ACTUAL FLOODING CONDITIONS

It is clear that the respondents consider flooding in East Grand Forks a serious problem. Their opinions are based on their experience with flooding, as well as on their perceptions about the flooding problem in general.

These perceptions, however, may not be consistent with the actual flooding conditions that the community faces. Evaluating the accuracy of respondents' opinions about actual flooding conditions was another goal of the survey.

Respondents were asked to assess their residential floodplain "status" by answering whether or not they felt their homes would be subject to flooding. Thirty-nine percent of the respondents did not answer correctly. Of those who answered incorrectly, 12 percent feel that their homes are subject to flooding even though they do not live in the floodplain, and 27 percent believe their homes are not subject to flooding even though they live on blocks in the floodplain.

When the sample is regrouped according to whether or not the respondents live on blocks in the floodplain, it is clear that there is greater misperception by those who live inside the floodplain than by those who live outside it. Of those living outside the floodplain, 70.6 percent answered correctly, whereas 54.9 percent of those living inside the floodplain answered correctly. These results mean that 45.1 percent of the sample members who live in the floodplain do not believe that they are subject to flooding.

In addition to seeking perceptions about respondents' personal situations, the survey also sought perceptions about how flooding would affect the city of East Grand Forks.

To discover these perceptions, respondents were asked how often they felt that six well-known buildings would flood in an average lifetime. The buildings were chosen for their diversity of geographic location and flooding frequency. The number of respondents answering correctly ranges from 30 percent to 55 percent. Some thought the risk of flooding was worse than it actually is (overestimation) and some thought it was less (underestimation). The breakdown of results, including "direction" of error, is in the following table.

ACCURACY OF PERCEPTION ABOUT SOME BUILDINGS IN EAST GRAND FORKS

Building	Correct Answers	Underestimation of Problem (Percent)	Responded Correctly (Percent)	Overestimation of Problem (Percent)
Sunshine Terrace	11-20 floods	59.5	40.5	--
City Hall	1-2 floods	31.7	30.5	37.8
American Crystal Sugar	0 floods	--	51.3	48.7
Whitey's	3-10 floods	11.9	54.8	33.3
VoTech	0 floods	--	55.1	44.9
Eagles	3-10 floods	16.4	55.3	28.2

III. PROTECTION AGAINST THE FLOODING PROBLEM

Another important goal of the survey was to identify attitudes and concerns related to protection against the flooding problem in East Grand Forks.

Protection measures taken in the past 5 years were examined first. Of the respondents, 54.6 percent participated in emergency flood fighting, 16.5 percent purchased flood insurance (10.6 percent currently carry coverage), 9.3 percent moved to higher elevations, 5.2 percent built a levee around their property, and 8.2 percent floodproofed or modified structures.

Respondents were also asked their opinions on some of the flood damage reduction alternatives being considered by the Corps of Engineers. Since the questions varied in the number of possible responses, the figures used here have been standardized to a scale of 0 to 4 for comparison, with 4 indicating more concerns mentioned. There was not a great deal of difference among the respondents in response to the various alternatives, but the levee/floodwall proposal drew the greatest average concern response of 2.0. Floodplain zoning received an average of 1.9 responses. Removal of homes received an average of 1.8 responses. Flood proofing received an average of 1.8 responses.

A different way of analyzing these concerns is to group responses into concern "types" rather than project alternatives. Again, responses have been standardized to a 0 to 4 scale for comparison. "Economic" concerns received the highest response level, 2.4 responses; "aesthetic" concerns, 1.9; "disruption" concerns, 1.4; and "social" concerns, 1.1.

Specifically, for a levee/floodwall, over half of the respondents said they would be concerned about its appearance, safety during floods, and impact on property value.

If the home were to be removed, majority concerns would be getting a fair price for property and moving expenses, and the high cost of financing a new home.

Majority concerns related to floodplain zoning were the change in market value of property and the increased difficulty of selling property.

Floodproofing concerned over half of the people in terms of the appearance of the home and change in market value.

Respondents were also asked which flood reduction proposals they would consider acceptable and who should be responsible for funding a project. Permanent new levees and floodwalls would be acceptable to 56.7 percent of the respondents. Present city levees, combined with emergency flood fighting and flood forecasting (as in 1979) would be acceptable to 33.0 percent. Relocating the most-frequently flooded structures and flood insurance plus flood zoning were each acceptable to 24.7 percent. Raising and/or floodproofing the most-frequently flooded structures would be acceptable to 19.6 percent.

Permanent new levees and floodwalls were the most commonly chosen flood reduction proposal (56.7 percent), but support for a levee is much stronger for those respondents who feel they live in the floodplain (80 percent support) and weaker for those who do not feel they live in the floodplain (41 percent support). (This correlation is statistically significant at a 99 percent confidence level.)*

If a levee were constructed to protect East Grand Forks, some homes would be left unprotected. As a solution to this problem, 53.6 percent of the respondents feel the Federal government should purchase the structures, 37.1

*"Statistical significance," as used in this report, simply means that the relationship discussed for the sample (97 persons) can probably also be found in the city of East Grand Forks as a whole. That is, there is a very good chance (99 out of 100) that the relationship between (a) knowing you live in the floodplain, and (b) supporting the levee, will also be true for the rest of the citizens.

percent feel the city should purchase the structures, 18.6 percent think the owners should be required to move, and 11.3 percent think nothing should be done.

Respondents were also asked on whom the burden of funding for flood protection in East Grand Forks should fall. As with the question regarding flood reduction proposals, the respondents checked the options they felt would be acceptable. The responses show that 39.2 percent feel it should be paid for by the persons protected, 26.8 percent feel it should be paid for by all persons in the protected neighborhood, 34.0 percent feel that all East Grand Forks taxpayers should pay, 16.5 percent feel all Polk County taxpayers should pay, 21.6 percent feel all Minnesota taxpayers should pay, and 38.1 percent feel a project should be paid for by all U.S. taxpayers.

IV. STUDY INFORMATION AND PUBLIC PARTICIPATION

In order to improve the public participation process, respondents were asked how they are receiving information about the East Grand Forks study and if they feel the information they are receiving is adequate. Among the respondents, 73 percent have read news articles, 44 percent have discussed it with family or friends, 24 percent have talked with officials, 18 percent have attended meetings, and 1 percent have written letters. Although 54 percent of the respondents feel they have been receiving adequate information, 46 percent do not feel they have been receiving enough information.

There is a correlation between satisfaction with information being received and whether the respondents feel they live in the floodplain. Respondents who think that they live in the floodplain are more likely to be dissatisfied with the information they are receiving (61 percent say they are not receiving enough information). Those who do not think they live in the floodplain are more likely to be satisfied (65 percent say they are receiving enough information). (This correlation is statistically significant using the criterion of a 95-percent confidence interval.)

To determine how the dissemination of information can be improved, respondents were also asked how they would like to be kept informed about the study. The most popular media mentioned are newspapers (57 percent) and radio and TV (43 percent). These information sources were mentioned equally by respondents, regardless of whether the respondents feel they receive enough information. The other two sources of information that respondents want are brochures (41 percent) and public meetings (25 percent).

A statistically significant relationship exists in the preference for these two sources, however. Brochures and public meetings are more strongly desired by people who feel that they are not receiving enough information but are less strongly desired by those who feel that they are receiving adequate information. Newspapers, radio, and TV are the most popular overall choices for the continuing flow of information, but the people who do not currently receive enough information more strongly desire brochures and public meetings.

V. METHODOLOGY

Sampling and Administration

Data for the East Grand Forks Flood Protection Opinion Survey were collected through the use of a confidential, mailed questionnaire. The survey was administered in October 1982 and was completed by 58 percent of the sample members (97 respondents).

The original sample of 225 East Grand Forks households was randomly selected, using random number tables, from the Grand Forks Regional Telephone Directory. The final sample size was 168. The reduction in sample size was primarily the result of rural residents who were listed with city phone numbers, people who moved from the city, and sample members who died.

A draft of the questionnaire was presented in East Grand Forks in September 1982. A stratified-random procedure was used to select test-blocks that represented diversity among demographic traits such as age distribution and

socioeconomic status. Several changes were made in the questionnaire to improve the clarity of the questions. Several of the questions in the final draft of the survey were also used previously in a questionnaire that had been distributed at public meetings in East Grand Forks.

The package that the sample members received in the mail included a cover letter of explanation, the questionnaire itself, a mailing envelope, and a follow-up postcard with the respondent's name on it. To insure the confidentiality of the responses, respondents' names were not written on the questionnaire. To confirm that they had returned their questionnaire, respondents mailed (separately) the follow-up postcard in addition to their completed questionnaire.

Follow-up reminders were used to encourage all sample members to respond to the study. Two follow-up letters were sent: one was sent after 1 week to all in the sample; the second was sent the third week to those who had not yet confirmed their response. Follow-up phone calls were made in December to those who had not yet responded. As a result of the phone calls, extra copies of the questionnaire packet could be sent to those who had lost or never received theirs, and verification of the status of those persons no longer living in the city could also be made.

Representativeness of the Respondents

A comparison of the characteristics of individuals who responded with the characteristics of the entire population of East Grand Forks can lead to insight about how representative the actual responses are.

The group of respondents, for example, contains a higher percentage (21.5 percent) of people over the age of 64 than does the community as a whole (around 15 percent). The respondents consist of a disproportionate number of males (73 percent male, 27 percent female), an anticipated result primarily due to the sampling frame. The respondents also have more years of education compared to the community: 54 percent of the respondents have completed 4

years of high school as their highest level of education, compared to 33 percent in the community. In both the response sample and community, 12 percent have completed some college without getting a 4-year degree. Over 17 percent of the respondents have a 4-year degree, compared with 9 percent in the community.

Those who have responded also rank higher in occupational status (as measured by Hollingshead's Index) than does the community as a whole. Of the respondents, 41.5 percent fit in the managerial, professional, and administrative categories, compared to 20 percent in the community; 37 percent of the respondents fit in the clerical, technical, and skilled employee categories, which is the same percentage as in the entire community; and 25 percent of the respondents fit in the semiskilled and unskilled categories, compared to 43.0 percent in the community.

A slightly greater number (10.6 percent) of the respondents currently carry flood insurance, compared to the community figure of 9.7 percent).

The response rate also differed between the three "divisions" within East Grand Forks: River Heights, the central area, and "the Point." Responses from rural residents were accepted, but those rural residents who did not respond were dropped from the sample. Because 36 percent of the rural residents responded, tney form 10.3 percent of the total respondents.

Participation in the survey, by area, is shown in the following table.

SAMPLE AND PARTICIPATION, BY AREA OF EAST GRAND FORKS

Area	Number in Original Sample	Number Moved, Deceased, Etc.	Number in Final Sample	Number of Responses	Response Rate (Percent)
River Heights	102	28	74	37	50
Central East Grand Forks	56	9	47	25	53
The Point	39	2	37	25	68
Outside City Limits*	28	18	10	10	36
Total	225	57	168	97	58

* Responses were accepted from persons with East Grand Forks phone numbers but with residences outside the city limits. Those in this group who did not respond, however, were dropped from the sample.

Residents of the River Heights area accounted for the largest portion of the final sample (44 percent), and also the largest portion of actual responses (38.1 percent). Residents of the Point, who formed a smaller portion of the total sample (25.8 percent), showed the greatest participation, with 68 percent of the members of the final sample from that part of town responding.

Analysis of results obtained from the East Grand Forks Flood Protection Survey used SPSS (Statistical Package for the Social Sciences), version 8.0.

EAST GRAND FORKS FLOOD PROTECTION OPINION SURVEY

Questions 1 through 10 ask your opinions about the seriousness of flooding in East Grand Forks and about floods that you may have experienced.

For questions 1 through 4, please circle the word that best indicates your opinion about the seriousness of the flooding problem in East Grand Forks, in general.

1. Flooding in East Grand Forks is a very serious threat to the economic well-being of this part of Minnesota	47.4% Strongly Agree	★ 34.0% Agree	12.4% Neutral	6.2% Disagree	0 Strongly Disagree
2. Peoples' lives and safety are threatened by floods in East Grand Forks	37.1% Strongly Agree	★ 42.3% Agree	8.2% Neutral	12.4% Disagree	0 Strongly Disagree
3. Most of the towns on the Red River of the North already have adequate flood protection	2.1% Strongly Agree	15.8% Agree	24.2% Neutral ★	48.4% Disagree	9.5% Strongly Disagree
4. Flooding is one of the most serious problems in this area	28.9% Strongly Agree	★ 49.5% Agree	13.4% Neutral	7.2% Disagree	1.0% Strongly Disagree

★ = AVERAGE

5. There are city levees in some parts of East Grand Forks. If those levees did not exist, would you say that you would be living in the floodplain (that is, might your home be subject to flooding)? _____ yes _____ no

(Respondents' answers)	41.1%	58.9%
(Actual percentages, according to blocks included in floodplain)	59.8%	40.2%

6. For each building, circle how many times it might be flooded in an average lifetime if the city levees did not exist:
See graph on page ___

Building	Times it might be flooded			
Sunshine Terrace	0	1-2	3-10	11-20
City Hall	0	1-2	3-10	11-20
American Crystal Sugar	0	1-2	3-10	11-20
Whiteys	0	1-2	3-10	11-20
Vo-Tech	0	1-2	3-10	11-20
Eagles Club	0	1-2	3-10	11-20

7. Have you experienced flood problems since living in East Grand Forks?
78% yes 22% no

8. Which of the following have you experienced in your present residence because of floods? (Check all that apply.)

26.8% cracks in basement walls, floor, or foundation

16.5% cracking or settlement in yard

16.5% water damage to house or structure

9.3% water damage to contents (furniture, appliances, personal effects, etc.)

17.5% storm water backup

16.5% sanitary sewer backup

11.3% evacuation from home

51.5% transportation disruption

30.9% lost income because of missed work or business closings

1.0% bodily injury

28.9% anxiety, mental distress

13.4% disruption to your property by emergency flood fighting

15.5% lowered property values

_____ other: _____

_____ none

9. What action, if any, have you taken in the last 5 years to lessen the threat of flooding? (Check all that apply.)

54.6% participated in any type of emergency flood fighting

16.5% bought flood insurance

9.3% moved to higher elevation

5.2% built levee around property

8.2% floodproofed or modified structure

_____ none of the above

_____ does not apply: not in floodplain

10. If you moved to East Grand Forks as an adult, were you aware of potential flood problems when you moved? 35.1% yes 28.7% no 36.2% does not apply

(Of those who have moved to East Grand Forks as an adult 55% yes, 45% no)

Questions 11 through 17 ask your opinions on some of the alternative measures for flood damage reduction being considered by the Corps of Engineers.

Although you may never be affected personally by any of these alterantive measures, please answer each question as if it applied to you. Your answers will help us to understand what most people might be concerned about.

11. If a new levee or floodwall were built near your home, what major concerns would you have? (Check all that would apply.)

49.5% its distance from the home

24.7% its visibility from the home

53.6% its appearance

53.6% the type of construction (concrete floodwall or earthen levee)

70.1% safety during floods

29.9% impact on activities around the home

64.9% impact on property value

_____ other: _____

12. If your home had to be removed because of a flood protection alterantive, what would be your biggest concerns? (Check all that would apply.)

82.5% getting a fair price for your property and moving expenses

43.3% finding a good neighborhood to move to

49.5% locating a suitable house or apartment to live in

16.5% maintaining old friendships after moving

17.5% finding good schools for your family

[illegible]% high cost of financing a new home

_____ other: _____

13. If your home had to be removed because of flood protection alternative, where would you prefer to live instead? (Check all that would apply.)

19.6% the central area of East Grand Forks

23.7% the Point (or Crestwood) area of East Grand Forks

38.1% the River Heights area of East Grand Forks

22.7% outside of East Grand Forks, but still in Polk County

25.8% the Grand Forks area of North Dakota

4.1% other: _____

14. If floodplain zoning (that is, restrictions on building in flood area) were actively enforced in East Grand Forks, what would be some of your major concerns? (Check all that would apply.)

40.2% slowing of economic development

52.6% making it harder to sell property

61.9% change in market value of property

35.1% deterioration of neighborhoods

_____ other: _____

15. If your home were floodproofed (for example, if it were elevated or provided with basement closures), what would be your greatest concerns? (Check all that would apply.)

59.8% appearance of the home

59.8% change in market value

28.9% change in use of the home

[illegible]% disruption during construction work

____ other: _____

16. If a permanent levee is constructed to protect East Grand Forks, some homes will be outside the levee (that is, unprotected from the river by the permanent levee). What do you think should be done about this? (Check all that would apply.)

11.3% Nothing, it is the owners' problem.

18.6% Require the owners to move to a protected area.

37.1% The City should buy the properties from the owners and remove the structures.

53.6% The Federal Government should buy the properties from the owners and remove the structures.

____ other: _____

17. Who should help pay for whatever flood protection East Grand Forks receives? (Check all that apply.)

39.2% all persons whose property is protected

26.8% all persons in the general neighborhood that is protected

34.0% all East Grand Forks taxpayers

16.5% all Polk County taxpayers

21.6% all Minnesota taxpayers

38.1% U.S. taxpayers

____ other: _____

See discussion on p. ——

As a Federal agency, the Corps of Engineers must consider the impacts that its projects may have on prehistoric and historic resources. To help us collect as much information as possible, please answer questions 18 through 21.

18. Do you know of any areas in East Grand Forks where you can find Indian arrowheads, pottery, flakes, bones, or other artifacts? If so, please describe the location and the type of artifacts.

19. Which houses or buildings do you feel may be architecturally or historically important in East Grand Forks? Please give the addresses or building names.

20. Do you know of any people living in East Grand Forks who are considered local historians or arrowhead collectors? If so, please give their names, addresses, and phone numbers so that we can contact them to help our cultural resources study. (This information will only be used by our archeologists during this study.)

21. If you have information about these cultural resources and are willing to talk with our archeologists, please check the first item on the accompanying postage-paid postcard so that we may contact you.

See discussion on p. ——

The city may have an opportunity to add areas and facilities to its park system as part of the flood control project. Questions 22 and 23 deal with recreation in East Grand Forks.

22. If the city decides to expand its park system, what facilities or areas do you think should be developed? (Check all that apply.)

39.2% hiking trails	22.7% flower gardens	40.2% fishing areas
41.2% picnic areas	30.9% play areas	43.3% campgrounds
____ nature trails	18.6% ball fields	____ other
16.5% skating areas	14.4% tennis courts	10.3% nothing needed

23. How could the city's present park system be improved? (Check all that apply.)

19.6% larger facilities

14.9% greater variety of activities

17.5% better maintenance

13.1% better locations

____ other: _____

20.6% nothing needed

Questions 24 through 35 will help us know basic information (age, education, occupation, and similar information) about residents of the East Grand Forks area.

24. Do you own or rent your present residence? 83.0% own 17.0% rent

25. Is your present residence best described as a (check one):

81.9% single-family dwelling

12.8% multiple-family dwelling

4.3% mobile home

1.1% other: _____

26. Do you carry flood insurance? 10.6% yes 89.4% no

If you do not carry insurance, why not? (Check all that apply.)

43.3% not required

3.1% did not know it was available

18.6% only buy it if a flood is predicted

14.4% too expensive

17.5% not important

_____ other: _____

27. Your age at your last birthday: average 50.0 years sex: 26.9% female 73.1% male

28. How long have you lived in the Grand Forks-East Grand Forks area?
agerage: 29.3 years

29. Please indicate how many years of formal schooling you have received:

elementary/junior high/senior high for a total of _____ years

college/university for _____ years

industrial/technical/trade school for 12.4% ~~years~~ had some.

business/secretarial school for 93% ~~years~~ had some.

other: _____ for _____ years

Years Completed	Number
0-8	16.3%
9-11	7.6%
12	46.8%
Some College	11.9%
4 yrs College	5.4%
Post Grad	12.0%

30. Your current occupational status (check one):

62.8% employed for pay or self-employed

5.3% homemaker

1.1% temporarily unemployed

2.1% student

26.6% retired

Those listing both were coded retired.

1.1% disabled

_____ other: _____

31. This question deals with your usual primary occupation. If you are retired, disabled, or temporarily unemployed, please answer for the occupation you normally were in.

NON-FARMERS

What is (was) the title of your primary occupation? _____

What do (did) you actually do in that job? _____

What type of business do (did) you work for? _____

What do (did) they make or do? _____

_____

Do (did) you own this business?
_____ yes _____ no

FARMERS

How many acres do (did) you farm?
_____

About what percent of your household income comes (came) from farming? _____%

Do (did) you:

_____ own the land you farm?

_____ rent/lease the land you farm?

_____ rent/lease your land for others to farm?

32. We wish to know more about the groups and organizations to which people in this area belong. Please check the types of groups to which you belong:

62.9% church-affiliated groups

20.6% civic organizations

3.1% environmental groups

10.3% farm organizations

35.1% fraternal groups

5.2% hobby or garden clubs

20.6% labor unions

2.1% literary, art, or study groups

2.1% nationality groups

5.2% political clubs

11.3% professional or academic societies

3.1% school fraternities or sororities

10.3% school service groups

15.5% service clubs

20.6% sports groups

29.9% veterans groups

2.1% water resources groups

6.2% youth groups

_____ any other groups _____

_____

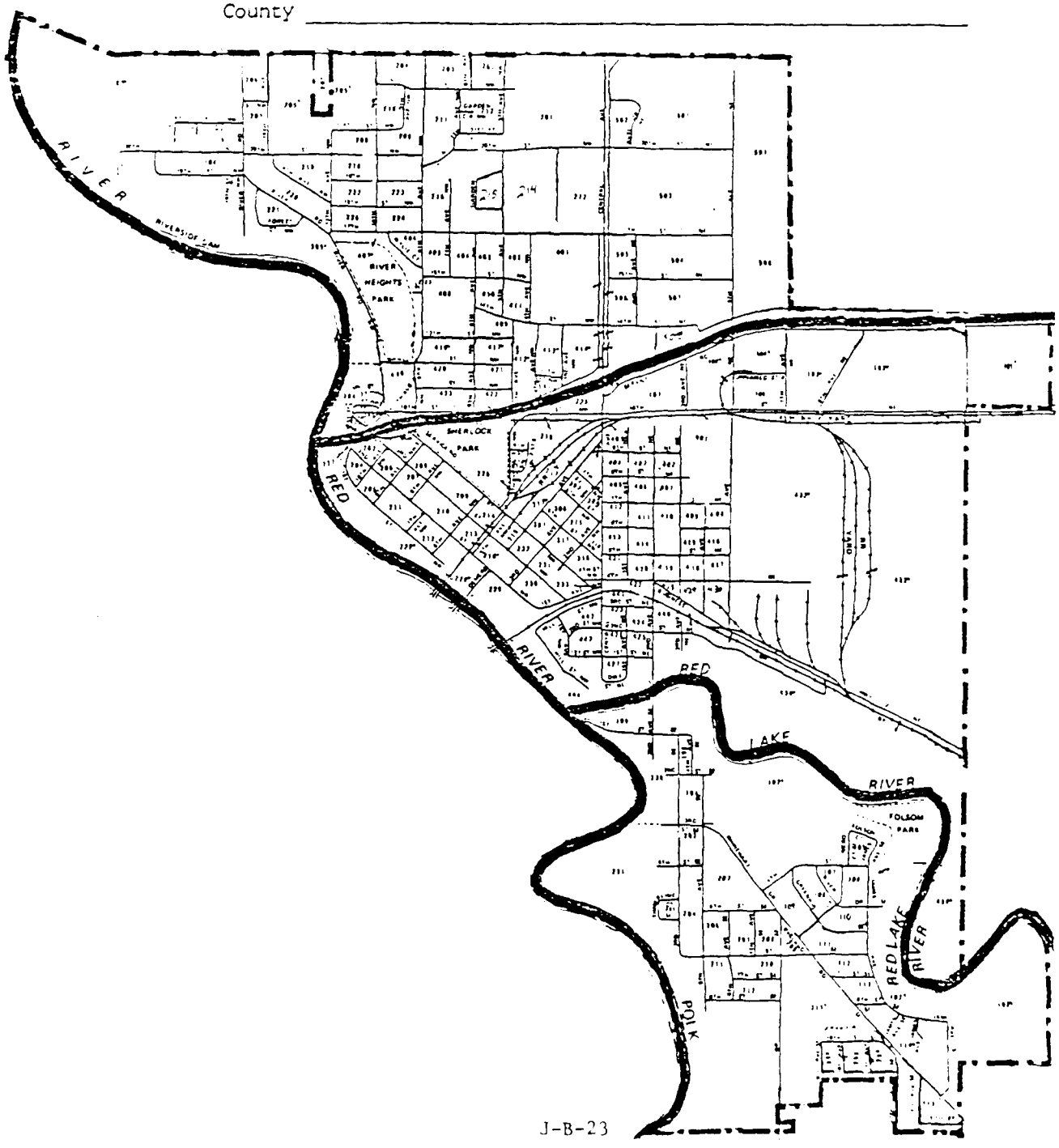
33. On the map on this page, a "Census Block Number" has been colored. Have we correctly marked the area in which you live? _____ yes _____ no

If an incorrect area is colored, please circle the correct Block Number on the map, or write in your address here (for block verification purposes only):

Street _____

City/Township _____

County _____



Questions 34 through 36 attempt to discuss how well people are being informed about the East Grand Forks study and how the Corps of Engineers can improve the public participation process.

34. How actively involved have you been with the East Grand Forks flood control study? (Check all that apply.)

73.2% reading news articles

--.3% discussing it with family or friends

23.7% talking with officials

17.5% attending meetings

1.0% writing letters

_____ other: _____

35. Are you receiving enough information about the Corps of Engineers East Grand Forks flood control study to satisfy your interest? 54.2% yes 45.8% no

36. How would you like to be kept informed about this study?

24.7% public meetings

56.7% newspaper

42.3% radio and TV

41.2% brochures

_____ other: _____

37. After the 1978 and 1979 floods, many people expressed their frustration and need for a more permanent solution to the city's flood problems. What do you think would be a good solution to East Grand Forks' flooding problem? (Check all that apply.)

56.7% permanent new levees and floodwalls

33.0% present city levees, combined with emergency flood fighting, and flood forecasting (as in 1979)

24.7% relocating most-frequently flooded structures

19.6% raising and/or flood proofing most-frequently flooded structures

24.7% flood insurance and floodplain zoning

_____ other: _____

38. Additional comments:

Additional comments are submitted on the following pages.

Thank you for answering this questionnaire. Your assistance will help us to select the best flood protection alternative for your community. Please mail this questionnaire back in the postage-paid envelope, and please also mail back the postcard separately so that we can check your name off our follow-up list.

ADDITIONAL COMMENTS RECEIVED ON THE FLOOD PROTECTION SURVEY

FLOOD EXPERIENCE

- I was flooded in 78 and 79 because a garage in the basement let water in. This house was 3 years old when I bought it in 1977 (never been flooded). I grew up in Grand Forks and know of flooding problems (1965 & 66)! WHY was a basement garage allowed here? I have since removed the garage door - (cement) blocked up the opening and back-filled with dirt to alley (riverside) AT MY EXPENSE!

- If one of present so called dikes (which are not designed for the job) breaks, this whole area will be a floodplain!

- Water treatment plant was subjected to water discharge problems, additional pumps had to be put on line to send water out of plant in the treatment procedure due to water level of river in 1979.

- I lived at home with my mother in 1950 who was a widow and it was heartbreaking to see the flooding come up twice in two weeks and put 32 inches of water on the main floor and stay that way for two weeks. It ruined the plaster, hardwood floors, doors, furnace, and in general made a mess of everything. It took 5 years to get everything back to a general living condition. At that time nothing was done to prevent flooding of the deep north end of town; you either moved upstairs or moved out. The only people concerned were the people who lived there. This should not just concern the people of East Grand Forks but all the county along the Red River and the rivers that flow into it.

- In spring of 1979 flood, I slipped a disc in my back and had to have surgery. I lost months of work. This happened sandbagging the dikes.

o I helped fight the flood of 1979. Permanent (new and larger) levees are very badly needed. Although the flood fighting was very well organized, it was difficult to keep ahead of the water.

CAUSES

o The Red Lake and Red River bottoms are so full of dead trees and silt that the levees have to continually be built higher to allow the same amount of water to flow through. Silt and sludge formerly dumped in the river by former methods of water treatments are still a problem.

o One of the issues raised in this survey, the economic effect upon East Grand Forks. The economic base in East Grand Forks and of the entire area of NW Minnesota is that of agriculture. By rapidly passing water around East Grand Forks it will cause wholesale flooding of surrounding agriculture land. Therefore, it will only cause more economic hardship to East Grand Forks and surrounding community. Why should we, who are living close to the Red River, keep bearing the brunt of the burden of flooding that is caused by landowners many miles away who continue to build more ditches to rid themselves of unwanted water in the spring?

o I do not have the formal education that most of you have. I spent my first 21 years on farms in Thief River Falls, came here towards end of dust bowl era. I vividly remember North Dakota from those days. Look at North Dakota now with all its shelterbelts while North Minnesota is constantly clearing submarginal land to cultivation and very few shelterbelts being planted. Most of our water problems originate in Minnesota almost 100 miles away with all its ditching. Look at Thief River Falls with its drinking water problem a few years back - reservoir filled with mud and

muck. They bought a used pumper and were cleaning out the muck from the bottom of the channel until the Government EPA stopped them - such stupidity.

IDEAS

- One possible permanent solution may be to dredge out the marais from west to Fisher, Minnesota, to north of East Grand Forks. This could divert most of the flood water from the Red River of the North. Secondly, do not allow the farmers to drain their fields when there is a possible flood. Thirdly, Minnesota and North Dakota should cooperate on number two. Four, build a dam east of Crookston. Five, stop the Minnesota Highway Department from building unneeded replacement bridges in and east of East Grand Forks.

- What should be done here and elsewhere along the river? The river should be pumped out - the muck and where banks have slid in - removed - straighten most hairpin bends, because this river flows north with ice into somewhat colder temperatures. Force shelterbelt plantings.

- As is they have built up the banks and the river with its water to such a high elevation during a flood most of it is above ground - 50 feet is tops otherwise it can come in by the back door.

- Red Lake River comes from the Red Lakes and Betromis State Forest check dams - have been out since 1950's in the forest.

- In addition, the further north the Red River goes, the worse the flooding gets. By the time it crosses into Canada, <u>they</u> receive the brunt of the water. If we <u>are</u> the good neighbors we <u>say</u> we are, we'd better control the flooding down here - after all, the majority of our flood is manmade!

- We hope North Dakota and Minnesota are working on the flood control issue as a joint committee/task force!!

- If the Corps comes along and wants to put in an ugly cement flood wall I will be angry as Hell.

GENERAL

- I feel East Grand Forks has done a pretty good job of protecting its residents from floods. Having lived in Grand Forks, I've found East Grand Forks to be much better. Keep up the good work.

EAST GRAND FORKS GENERAL REEVALUATION
SUPPORTING DOCUMENTATION

SOCIAL

APPENDIX C
AFFECTED BUSINESSES IN EAST GRAND FORKS

SOCIAL

SUPPORTING DOCUMENTATION

APPENDIX C

AFFECTED BUSINESSES IN EAST GRAND FORKS

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APPENDIX C

AFFECTED BUSINESSES IN EAST GRAND FORKS

PURPOSE OF THE STUDY

The City of East Grand Forks has suffered from a steady decline in its business community for several decades, worsened recently by competition from Grand Forks, the general economic conditions, and flood-related effects. Efforts to renew the central business district have been mainly unsuccessful, and some believe that certain endeavors have been counterproductive (such as the closure of Demers Avenue).

Because of this declining health of the business community, both the city and the Corps were very concerned about the impact of the flood control project on the business community. Removal of the threat of flooding would provide an unusually attractive locational benefit to businesses. Removal of floodplain restrictions would allow construction and improvements which presently are not permitted. However, removal or isolation of some of those businesses which still exist could possibly end East Grand Forks' existence as an independent city, leaving it as a noncommercial suburb to Grand Forks.

If the businesses affected by the project relocated in Grand Forks, or simply went out of business, there would be negative effects to the State in terms of tax revenue, and to the city in terms of lost jobs, lessened availability of goods and services, a greatly weakened tax base, and a blighted or abandoned commercial area. Knowing what the affected businesses might do, knowing the size of those potential impacts, and knowing business concerns about the project could provide the basis for the city to make necessary plans and decisions related to the flood control project. Providing this information was the purpose of this study.

METHODOLOGY

Thirty-six businesses in the affected area were personally interviewed during July 1983. Interviews averaged 20 minutes in length. The list of businesses was determined originally from earlier Corps records, and it was modified in

Public facilities (the library and city shop and maintenance buildings) were not contacted as it was known that the city had not yet made plans for those facilities.

The interview schedule consisted of highly structured questions, both closed- and open-ended. It was pretested in the office but not in the field. Plans for the study were coordinated with the city and the Chamber of Commerce.

FINDINGS

1. Present Conditions and Future Expectations - The affected businesses all lie very close to the rivers; most are located on the downtown blocks on either side of Demers Avenue, on the river side of 2nd Street Northwest. Several properties on these blocks have been vacant for about a year, accounting for 43 percent of the city's commercial vacancies (in terms of square feet). The importance of the businesses surveyed is reflected by the number of jobs they provide, their payroll, and income.

TABLE 1. AFFECTED BUSINESSES:
EMPLOYEES and PAYROLL

Number of Businesses	36
Number of Employees	424
Number of East Grand Forks-resident Employees	168
Annual Payroll	$2,868,000

Average gross income per year was reported by categories:

TABLE 2. AFFECTED BUSINESSES:
AVERAGE GROSS INCOME PER YEAR

Affected Businesses			
Number	Percent[1]	Average Gross Income Per Year	
2	6%	0-	$25,000
2	6%	$25,000-	$50,000
8	24%	$50,000-	$100,000
10	30%	$100,000-	$250,000
6	18%	$250,000-	$500,000
3	9%	$500,000-	$750,000
2	6%	$750,000-	$1,000,000

[1] Based on 33 businesses reporting income.

The businesses were asked several questions about their future plans. Almost all expected to be in the same location (88%), in the same type of business (100%), and either the same size (31%) or larger (64%). One firm expected to be smaller and one anticipated closing.

2. Preferences - Several questions of a hypothetical or "what if" basis asked what the company's preferences would be if it were necessary to choose between moving and floodproofing, and if it were necessary to move.

When given the forced choice between moving and floodproofing, the majority (66%) preferred to move. Many believed that floodproofing would be impossible for their situation; this opinion kept some businesses from selecting floodproofing as their preference, although they did not wish to move.

In response to open-ended questions about where they would prefer to go if they had to relocate, a majority (65-71%) of businesses reported they would try to remain in East Grand Forks. A significant loss (30-36%) would occur due to business closings and moves to Grand Forks, however.

TABLE 3. RELOCATION PREFERENCES
OF AFFECTED BUSINESSES

65%	East Grand Forks only
15%	close
15%	North Dakota only
6%	uncertain

Within East Grand Forks, those preferences can be further broken down. The strip development along Highway 220N was seen as providing an attractive location for many businesses relying on high traffic, and many also mentioned remaining in the downtown area. Businesses were able to mention more than one location of interest, in this question:

TABLE 4. RELOCATION PREFERENCES WITHIN
EAST GRAND FORKS

28%	Highway 220N
17%	Downtown
8%	Business Highway 2
3%	The Point
3%	Highway 2 West

3. Concerns - Concerns about floodproofing focused on access - could the business be reached - and on adequacy - would it be truly effective. Although many businesses were concerned with the appearance of a floodwall on 2nd Street Northwest, aesthetic considerations of floodproofing seemed relatively unimportant. This may simply be due to the conviction that floodproofing is virtually impossible.

TABLE 5. FLOODPROOFING CONCERNS
OF AFFECTED BUSINESSES

45%	35%	Accessibility
	10%	Daily Operations
	28%	Adequacy
49%	21%	Not Feasible
7%		Aesthetics

The questions about moving primarily elicited the overwhelming concern with "location, location, and location", for most commercial or retail businesses. A few operations have site-specific requirements, and a few mentioned costs as an important constraint. Only 1 business (3%) mentioned taxes as an important concern.

TABLE 6. RELOCATION CONCERNS OF AFFECTED BUSINESSES

75%	Access
33%	Location
28%	Parking
19%	Building-Specific Conditions
19%	Site-Specific Conditions
17%	Customers/Clients
17%	Costs
6%	Near home
3%	Taxes

While conducting the interviews with the businesses in East Grand Forks, assorted comments were included in the conversations. These comments provide an additional, broad perspective of this commercial community. The comments have been separated into four categories: general project attitudes, politics, engineering, and economic concerns for East Grand Forks.

The general attitudes generated by the project are diverse. The scale of the project is considered "awesome." "That would be a disaster." "There is no way to move Whitey's." On a more supportive note, one business said that they were sick of the floods and might even consider some type of cost sharing in order to get flood protection. Another business said that they were in favor of a project and wouldn't resist any plans.

The comments related to the political systems were directed at the Corps of Engineers. One business maintained that the Corps is all talk and a project will never go through. Another business said, "When the Corps comes through - you either go or you don't", implying that the locals will not have much say in any Corps project.

One downtown business expressed concerns with the engineering aspects of the project. They claimed that, if the present levee on the north side of Demers Avenue were built properly, no businesses would get flooded.

Most comments and concerns dealt with the economy of East Grand Forks. Many businesses were concerned about the viability of the city and felt that they "might as well just let it flood" instead of constructing the project. Others said, "They'd have to buy us out - they couldn't just leave us out here! They should just let the whole thing flood if they can't protect us all." Some businesses had concerns that "the project would kill the downtown." Another business said, "If they put a dike through, we know that there will be nothing here (downtown)."

PROJECT IMPACTS ON BUSINESS

The effect of the project on the business community can be evaluated through the knowledge acquired by these interviews, and through an understanding of Federal laws, regulations and policies.

At present, there is no certainty that any agency (Federal, State or local) will be willing or financially able to move those businesses on the unprotected side of the proposed levee/floodwall. If the businesses were left in place, with the present emergency levee removed, there would be

extensive damage from almost any flood. Much of the damage would not be repairable, due to Federal flood insurance regulations limiting the investment which can be made in the floodplain. Property values would decline in anticipation of this situation, and would decline drastically after a flood. Following the flooding of unprotected structures it is unlikely that essential city services would continue to be provided to the area, and blight is a reasonable expectation. As this downtown area is East Grand Forks' "front door" to much of its region, such a blighted appearance would have a significant impact on the ability of the rest of the city to attract business. The need to properly plan for this area's disposition, and for the restructuring of the community, is being communicated to the city and to State, regional, and other Federal agencies.

Assuming that this problem is resolved and all affected businesses are removed, they can relocate wherever they are able to. The only data available on where that might be is the information collected during these interviews. Although the business people gave thoughtful responses, it must be kept in mind that they had little time in which to think about and respond to rather unprecedented questions. Therefore, the data are only a first indication of what businesses would eventually decide to do, if faced with this situation. Using this data, we find that East Grand Forks can expect to retain 22-24 (65-71%) of the affected businesses, lose 5 to 7 (15-21%) to business closings, and lose another 5 to 7 (15%-21%) to North Dakota (see table 7).

TABLE 7. EAST GRAND FORKS
BUSINESS PLANS: SUMMARY

		DESTINATIONS			
	TOTAL	EGF	CLOSE	ND	UNCERTAIN
COMMERCIAL/INDUSTRIAL					
# Businesses (1)	34	22 (65%)	5 (15%)	5 (15%)	2 (6%)
# Employees (1)	413	273 (66%)	99 (24%)	35 (8%)	6 (1%)
# East Grand Forks-resident employees	187	138 (74%)	30 (16%)	15 (8%)	4 (2%)
Annual Payroll(1)	$3,202,476	$2,300,496 (72%)	$439,980 (14%)	$390,000 (12%)	$72,000 (0.2%)
Income Category:(2)					
0-$100,000	11	4 (13%)	3 (9%)	2 (6%)	2 (6%)
$100,000-500,000	16	12 (38%)	2 (6%)	2 (6%)	0
$500,000-$1,000,000	5	5 (16%)	0	0	0

(1) Based on 34 businesses reporting.

(2) Based on 32 businesses reporting.

The businesses which plan to remain in East Grand Forks account for more than their fair share of East Grand Forks-resident employees, payroll, and income. Retaining these larger and presumably stronger firms will be very important to East Grand Forks' survival as a city.

However, there are still two major questions for East Grand Forks: Will enough businesses remain? Will their new locations optimize the pattern of business activity in East Grand Forks? These are important questions which are only beginning to be addressed by city, State, and regional interests. An additional question could be asked: Will removal of East Grand Forks' "front door" business area be harmful to the Grand Forks downtown area? This issue has not yet been addressed.

In conclusion, the majority of affected businesses would probably remain somewhere in East Grand Forks, but major planning efforts need to be accomplished before the political decision-making process proceeds.

Date_____
Interviewer_____
ID_____
Time_____

BUSINESS OCCUPANTS INTERVIEW

Are you aware that the City and Corps are studying possible flood control measures? It looks as though the most feasible solution will be a permanent levee and floodwall. We don't know just where it will run, but we do know that it will have to be further from the river than the emergency levee is now. This means that some businesses and homes will be in its way, or may not be protected.

The City and the Corps are both concerned about businesses in this area. Although a new levee is only a possibility, for the future, we want to talk now to business people. Do you have a few minutes to talk now?

1. Does _____ own or rent this building you're in?
   _____ OWN (SKIP TO #3)
   _____ RENT/LEASE
   _____ OTHER: _____
   _____ DK (SKIP TO #3)

2. We should probably talk to the owner then, too. Could you please tell me who that is?
   NAME: _____
   ADDRESS: _____
   TELEPHONE: _____

3. (SKIP IF GOVT) Is this business a Large Corporation, a Small Business Corporation, a Partnership, or a Proprietorship?
   _____ GOVERNMENT
   _____ LARGE CORPORATION
   _____ SMALL BUSINESS CORPORATION
   _____ PARTNERSHIP
   _____ PROPRIETORSHIP
   _____ OTHER: _____
   _____ DK

4. And, so I have my records straight, what is your title with the company?

   _____

****

5. We need an idea of how large your company is. How many people work here, as of July 1?
   _____

6. Is that about your usual workforce?
   _____ Y (SKIP TO #9)
   _____ N
   _____ DK (DETERMINE PROPER RESPONDENT, AND TERMINATE INTERVIEW)

7. How many usually do work here? _____

8. Why is there that difference? _____ _____

   _____

9. What is your average monthly payroll? $_____/mo

10. And can you estimate about what percent of your employees live in East Grand Forks?
_____%

11. Based upon the last 3 years, can you give me the letter (HAND CARD) that represents your average annual gross income?

12. Looking out to the next five years or so, would you expect the company to get larger or smaller?
_____ LARGER
_____ SAME
_____ SMALLER
_____ OUT OF BUSINESS
_____ OTHER: _____

13. Why is that? _____

_____

_____

14. And do you expect the company to be in the same location?
_____ Y (SKIP TO #16)
_____ N
_____ DK

15. Why is that? _____

_____

16. And do you anticipate the type of business will be the same, in 5 years?
_____ Y (SKIP TO #18)
_____ N
_____ DK

17. Why is that? _____

_____

18. What was it about this site that made the business locate here originally? _____

_____

_____

_____

****

19. If the company had to be either moved or floodproofed, as part of the flood control project, which do you think the company would prefer?

_____ MOVED
_____ FLOODPROOFED
_____ OTHER: _____

20. Why would that be? _____

_____

_____

21. If only floodproofing were feasible at this location, what would be important concerns to your company? _____

_____

_____

22. And if only moving were feasible at this location, what would be important concerns to the company? _____

_____

_____

____TAXES	____SUPPLIES	____ACCESS	____QUALITY OF LIFE
____COSTS	____EMPLOYEES	___PARKING	____CLOSE TO HOME
____STATE GOVERNMENT	____WATER SUPPLY	____CUSTOMERS/CLIENTS	____FLOODPLAIN STATUS
____LOCAL GOVERNMENT	____TRANSPORTATION	____BUILDING	____OTHER_____
____BUSINESS CLIMATE			
____REGULATIONS			

****

23. If the company couldn't remain here, what do you think it would do?

_____ MOVE
_____ GO OUT OF BUSINESS (TERMINATE INTERVIEW)
_____ OTHER: _____

_____

24. Where would it move to, as a first choice? _____

_____

25. Why there? _____

26. What about a second choice location? _____

27. Why do you think there? _____

****

Thank you for your help. This will help both the City and the Corps know how to proceed.

Do you have any questions for me? Thanks again; goodbye.

Finish Time _____

Total Time _____

Interruptions? _____

Attitude toward:

Interviewer? _____

Items? _____

Project? _____

EAST GRAND FORKS BUSINESSES INTERVIEWED (JULY 1983)

Name	Address	Phone	ID Number
Jack Anderson Painting Co.	230 3rd Avenue SE	773-0997	2189
Dave's Apco, Inc.	Business Highway 2	773-2437	2746
Eagle's Club	101 1st Street SE	773-0132	2752
Valley Dairy - Store No. 7	142 3rd Avenue SE	773-7255	2758
Point Liquors	304 1st Street SE	773-3644	2759
Stadem, Dr. Paul	407 2nd Street NW	773-7474	5140
Dietrich Sewing Center	407 2nd Street NW	773-1922	1514B
Stylistics Beauty Salon	119 Demers Avenue	773-3459	1514C
Antique Lounge	117 Demers Avenue	773-0347	1515A
Brownie Cleaners	115 Demers Avenue	773-1183	1515B
Whitey's Cafe	109 Demers Avenue	773-9021	1517
Mike's Pizza Palace	105 Demers Avenue	773-2479	1518
Duling Optical	112 Demers Avenue	773-3411	1519B
Harry P. Larson Insurance Agency	124 Demers Avenue	773-0777	1520A
Lincoln National Life Insurance Co	124 Demers Avenue	773-1111	1520B
American Federal Savings and Loan	124 Demers Avenue	773-9711	1520C
Masse, Leonard and Skeen	124 Demers Avenue	773-9729	1520D
Gerald Lucke, CPA	124 Demers Avenue	773-7411	1520E
Brady and Martz, CPA	124 Demers Avenue	773-3414	1520F
Midwest Vision Center	309 2nd Street NW	773-2711	1521A
Osmundson, Dr. R.J., DDS	313 2nd Street NW	773-0842	1521C
Advance Office Supply	305 2nd Street NW	773-3421	1521D
Matt, Robert, Attorney	315 2nd Street NW	773-0333	1521E
Red River Shoe Repair	311 2nd Street NW	773-7019	1521B
Vaaler Insurance	317 2nd Street NW	773-1712	1521G
Galstad, Irwin M., DDS	315 2nd Street NW	773-9788	1521G
McDonald, James S., DDS			

Name	Address	Phone	ID Number
Ferguson, Ivan, P.A.	307 2nd Street NW	773-2323	1221H
Center Theater	301 2nd Street NW	773-3162	1522A
Golden Cue Billiard Lounge	303 2nd Street NW	773-3589	1522B
American Legion Post #157	211 2nd Street NW	773-1129	1524
Nelson, Calvin, Painting	101 1st Street NE	773-0088	2112
Kenny's Auto Service	116 2nd Avenue NE	773-0122	2151
Spud Bar and Lounge	217 2nd Street NE	773-9000	2155
Jabs Contracting	309 2nd Street NE	775-3888	2159
Porta Mix Concrete, Inc.	Business Highway 2	773-3636	2167
Wy's Garden Center	Business Highway 2	773-0185	2170

EAST GRAND FORKS GENERAL REEVALUATION

SUPPORTING DOCUMENTATION

SOCIAL

APPENDIX D

FUTURES MEETINGS/WORKSHOPS

MOST PROBABLE FUTURE

EAST GRAND FORKS, MINNESOTA

CONTRACT DACW37-83-M-2140

MARCH 1984

SOCIAL

SUPPORTING DOCUMENTATION

APPENDIX D

FUTURES MEETINGS/WORKSHOPS

MOST PROBABLE FUTURE - CONTRACT DACW37-83-M-2140

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A. INTRODUCTION

The general purpose of the contract with SYNERGY was to provide facilitation of three public workshop/meetings with selected city officials, business leaders, other community groups, and general publics.

The contractor would review CORPS and CITY goals and objectives for each meeting, design the most applicable meeting process to achieve those goals, objectives, and meeting products, and then serve as meeting leader or facilitator at each of the three meetings.

In the larger context, the general purpose of the meetings was to allow the community to develop a scenario of its future. This future scenario would be used by the CORPS to determine the "future social conditions" with and without a flood control project. In addition, it was hopeful that a secondary purpose would be completed in that the community would have a better defined "futures scenario" that would facilitate its decision in whether or not to accept and implement the recommendation of the flood control study.

B. MEETING GOALS

The goals of the three meetings were as follows:

MEETING #1 - 17 October 1983

a. Develop list of goals for the community.

b. Define problems and opportunities related to those goals.

c. Establish some priority of these goals.

MEETING #2 - 14 November 1983

a. Develop goals, problems, and opportunities in detail.

MEETING #3 - 21 November 1983

a. Establish final priority of goals.

b. Development of objectives and strategies to feasibly accomplish the goals.

c. Design action plan of next steps in the planning process.

C. CONSULTANT'S ROLE

The consultant's role throughout the process was to provide expertise as it related to group process, meeting setup, and activity designs for meeting product delivery. In addition, the consultant was a source of information on other similar processes used by other agencies and groups. The CORPS representative would assist in the meeting process as needed, be the contact person for media inquiries about the CORPS project, policy, or technical questions, and serve as liaison between city officials and the contractor.

With the assistance of the CORPS representative, the contractor or CORPS representative would contact the city clerk and several other key officials prior to each meeting. These meetings were to review and obtain general consensus as to specific meeting goals and objectives and current conditions that might relate to the study project.

The city officials were to be full participants in the process and be fact persons for specific issues as questions arose during the meetings.

D. GENERAL COMMENTS

Following are general comments about the process utilized, group reaction, media coverage, general observations, and product and goal completion.

Meeting #1

The first meeting utilized a nominal group process (see Appendix 1c and 1g) as the primary meeting format throughout the evening. There was a short presentation at the beginning of the meeting which defined that evening's goals, objectives, and work products, as well as instructions about the meeting process that would be utilized.

The group responded favorably to the new and different meeting style with no objections to breaking into small groups. Occasionally there was some confusion with the small group activities as the five steps were carried out. However, between the contractor and tne CORPS representative, any confusion was clarified as the groups progressed through the exercise. Enthusiasm for the task at hand, cooperative discussion, and voluntary recording or scribing was the general pattern of the participants. All persons in each group participated. There were approximately 45-55 people in the first session. There was good pre-meeting publicity through the East Grand Forks Exponent and the Grand Forks Herald and information informally and formally sent by the CORPS and City of East Grand Forks to preselected community leaders.

The media was represented by the local Grand Forks television and radio stations and newspaper persons from both The Exponent and Herald. Both newspaper writers participated in the meeting process. The TV

personnel were very cooperative during the process and did not get in the way of the ongoing nominal group process. They seemed to enjoy filming the active and colorful format. The end result of the TV effort was a 60-second tape/narrative in the #6 news position on that evening's 10 p.m. news broadcast. In addition, the two newspapers had extensive coverage in the next issues.

The meeting objective of obtaining a list of prioritized community goals was achieved (see Appendix 1e).

Several individuals made a point of talking to the contractor after the meeting. Basically, all of them enjoyed the "new-to-them" format, appreciated the listening and understanding provided by the facilitator, and were somewhat surprised by the amount of information generated by this process in such a short time. Finally, several other participants appreciated the "justice" of this type of meeting in which all were allowed to contribute without domination by certain individuals.

Meeting #2

The second meeting utilized several small group processes with two opportunities for full group participation. The second meeting participants were those community leaders and city officials who had been preselected, plus any publics who continued their participation from the first meeting. Pre-meeting publicity was generally poor compared to Meeting #1. Several individuals did not receive summary information from the first meeting. In fairness, however, all participants who wanted to be informed were to sign an attendance list at the end of Meeting #1. There was no way of knowing whether their failure to sign up or an oversight by the CORPS was the reason they did not receive their information packets. Attendance was approximately 27-30 persons. The group continued to willingly participate in several activities designed to review and set priorities on the previous meeting's goals, to develop a list of obstacles, and to make short team reports (see Appendix 2d). The goals for Meeting #2 were achieved. In addition, individual participants were asked to contact five people during the interim before Meeting #3 and obtain some verification of the city's goals and priorities and any additional suggestions (see Appendix 2g). This action was a brief attempt to enlarge the "sample" of the community. During the meeting, the group broke into three teams to work on the primary goal statements: "Retail Business," "Industry and Manufacturing," and "Flood Control/Traffic Patterns" (see Appendix 2e).

There was continued press coverage. Television crews filmed the evening's activities and conducted interviews with the contractor, CORPS representative, city officials, and several participants. There was following issue coverage by both newspapers. Again, The Exponent reporter was an active participant in the meeting process and team activities. Besides completing the goals and objectives of Meeting #2, the groups were able to develop in some detail some of the obstacles listed during Meeting #1.

Meeting #3

Again, the third meeting was basically a combination of small group team activities, large group review and discussion, small group review session, and a final large group exercise for developing implementation plans. There were approximately 20-24 attendees. Publicity for the final meeting was the weakest of the three. There was no TV coverage, although there had been a longer TV feature prepared for viewing during the week between Meeting #2 and Meeting #3. Both newspapers had reporters covering the meeting. Again, The Exponent writer was a full participant also. The contractor could find no announcement of the meeting in the Grand Forks Herald. There were excellent post-meeting summaries of Meeting #1 and Meeting #2 in The Exponent and Herald.

The hours for the final meeting were extended from the normal 7-9:30 p.m. schedule to a closing of 10 p.m. This extension was necessary because of the larger number of tasks needed to complete the meeting goals. No notice of the change or objections were voiced by the attendees. Team members were now given a choice to move to any working group where they felt their resources would be needed to develop implementation strategies. In the previous two meetings, people were asked to stay with their original teams. The goals for Meeting #3 were accomplished with enthusiasm, interest, and a real sense of ownership exhibited by a majority of those attending. After the meeting, at least half of the attendees made a point to thank the facilitator for the process used throughout the meetings, for the lack of bias, and commented on the exciting potential exhibited by what could be accomplished if the city took action. Finally, they expressed their pleasure that the city would use this type of solicitation process to include members of the public, not just "politicians and those in power". Most people expressed a willingness to take some individual action to continue this particular effort. Some said they would talk to others personally, review the final report with various groups, contact people by phone, or present the final report to their own groups or constituents.

E. GENERAL REPORT RECOMMENDATIONS

1. Contract Requirements (3.02)

"Report summarizing the items developed in each of the meetings. Present conclusions and recommendations on the quality and usefulness of the information developed in determining future social conditions, and general impressions and recommendations for future action."

2. Items Developed in Each Meeting

a. Meeting goals and objectives.

b. Agenda.

c. Team tasks and work products expected.

d. Team or group information.

e. Final group products.

f. Miscellaneous information developed during each meeting.

g. Supplemental information.

3. Conclusions and recommendations on quality and usefulness of the developed information in determining future social conditions

Since no planner or city official is other than an individual "valuer" based upon personal preference, if they are to undertake community goal planning, the process must be open to the total spectrum of values inherent within the community. The key element of dealing with these values sets of information is to be open to all initially, to develop some process to get a weighting or priority established, and to develop implementation strategies and illustrate benefits and costs. So, in terms of "is the information of quality", the answer has to be 'yes', since the information was gathered from only those who have the values-centered information about their community.

The information developed as a result of these meetings served three basic functions and accomplished two additional informal goals.

The obvious function of general goal development was achieved by using a good cross section of the community. While there were not large numbers present, or a "measurable sociological legitimate sample" represented, a broad spectrum of values positions was expressed. In viewing the raw data generated by the nominal group process in Meeting #1 (see Appendix 1d and 2d), values positions such as ECONOMICS (local-regional), SOCIAL (quality of life, family), and ENVIRONMENTAL (protection of land and water resources, water quality) were expressed. There was an obvious skew toward local control, private enterprise, and self-sufficiency. Certainly the city has an excellent idea of what values are valued and in which priority. Also, they know what should be the primary thrust of the local institutions in terms of carrying out those values. In essence, while the goals or values statements are general in nature, they do give direction to "futures planning assumptions".

Secondly, the identification of problems and obstacles to reaching those goals served a useful function or purpose of confirming what many at the decision-making level knew already. While not new, the verification of perception is a helpful planning tool.

Thirdly, the development of strategies to implement the goals and the resultant priority settings established very clearly where/how people wanted to use their limited resources. This final

functional result is to me the most valuable as resource availability continues to diminish while demand increases. The public throughout the country has been forced, in the last 3-4 years, to begin to make major decisions in how continuing limited resources will effect their future. Those situations run the gamut from revenue shortfalls through developable land to shortages of potable water.

With priorities defined, values identified, and goals established, the decision of trade-offs is facilitated, even if the city does not want to continue the "community involvement process--future planning". The city now needs to develop some detailed futures scenarios, based on these goals, with more detail to the benefits and costs of those choices. Just a mere extrapolation of the past will really not suffice as the planning mode. People need to be involved in the analysis of the benefits and costs so that they know the impacts of their (or city) decisions.

Two additional purposes were accomplished as a result of this process. Public awareness and education occurred in terms of the flood control study and the thoughts of others about what would be an acceptable future condition(s). Informal dialogue, team discussions, and answered questions all served to update people on the proposed plan (CORPS study) and highlighted the decision dilemmas as to what was at stake to turn down or accept the CORPS recommendation. However, with many there still is a large data gap about the study. More information must be presented to the more general at-large public.

Finally, the process developed a sense of ownership in defining future conditions. People began to realize that there was a larger degree of consensus to the direction the city needs to take. While there are obviously some continued conflicts on how, at least there is general agreement in the three primary goal areas: Retail Business, Industrial/Manufacturing, and Flood Control/Traffic Patterns.

While I will mention it in some detail in the recommendation section, the city/participants must broaden their "numbers" of publics to verify and gain concurrence of priorities and to obtain new suggestions. The public tends to shy away from the more generic-conceptual planning stages and turns up in droves when one gets to the specific-location action steps. However, East Grand Forks, through a series of interventions, needs to verify the products of this planning stage.

As a general impression, I believe the participants in the process benefited in terms of volumes of information generated in a short period of time (a mixed blessing), a consensus of future goals, awareness of the information gap about the flood control study, and what it would take to reach the desired futures.

It was refreshing to see the willingness to cooperate, not argue, taking of responsibility by individuals for their actions, and an articulation of their concerns and suggestions without a lot of defensive behavior.

During the first meeting I was a bit concerned and apprehensive about the impression being created by the table of city personnel and those who work closely together. The joking, laughter about "inside" stories, and general behavior tended to communicate "nonseriousness" to other groups in the room about the task at hand, the evening's objectives, and the process as a whole. Fortunately, as the group broke up into various others in the remaining two meetings, the individuals' total participation in the rest of the activities tended to dispell most of that initial image.

The contractor might have more details more frequently as to where the tasks or evening's goals fit within the whole process. There was not enough time set aside for total group give-and-take discussions. I have an ambivalence about requesting so much work in such a short time versus longer time to develop more details during the team activity periods. The CORPS representatives have been extremely competent in building a good CORPS/Public-City relationship. This was achieved by their openness to others' points of view, willingness to listen, assertiveness to present a clear articulate answer, either when requested by someone or when they felt the need to elaborate or contribute. The contractor was very aware of coming into a community where there was a positive ongoing relationship between the community and the CORPS, even though the community may not like the study's recommendation. All team members, especially the sociologist, have obviously built this relationship by their behavior and actions.

Finally, while there are a lot of benefits to the process, the danger is that once this ownership and direction are established jointly, the city cannot capriciously and arbitrarily go off in another planning direction. The one key element that seemed missing to me was leadership to continue this process from someone within the city structure. While all the East Grand Forks personnel were valuable and willing participants, I wonder if the process will continue when the CORPS and SYNERGY's leadership function stops. That specific authority and initiated leadership role must commence immediately and can no longer be a "followership" role.

4. Recommendations

a. This final report and all Appendix items should be given to each past participant in the process.

b. Some person must be specifically responsible to follow-up this project by monitoring the action plans (see Appendix 4e) and reconvening the group for further action.

c. An endeavor must be made to inform citizens in detail about the flood control study and its recommendations--Not through another public meeting!

d. A broader spectrum of "publics" must be informed of this project and current results. It is essential to solicit new ideas, suggestions, and confirm current priorities.

e. An all-day Saturday session should be held at ATVI. This session would review reactions to the report, display information (Item 4) from additional publics, and develop in-depth detailed strategies, cost/benefit data, and allocate resources for carrying out goals.

f. Publicity and credit given to those who have participated in the process to date.

g. Some type audiovisual presentation be developed for use in disseminating the report and processing information to additional groups.

h. A network of facilitators, information centers, and group leaders be utilized in continuing the "futures" planning effort.

i. Inform SYNERGY of the continuing outcomes and evolving developments.

j. The city make a decision shortly on the CORPS flood control project recommendations by using a continued committee/community involvement approach, other than the standard formally structured public meeting.

A P P E N D I X 1

FIRST MEETING

1a

GOALS/OBJECTIVES OF MEETING

1. To identify future conditions for the community of East Grand Forks.
2. To identify current obstacles (problems) that impede reaching those conditions.
3. To identify some potential solutions to overcome obstacles.

1b

AGENDA

7:00	~~Introduction to task and purpose of evening.~~
7:20	Small groups work.
8:20-25	Break.
8:25	Large group--ranking and instructions for last two steps.
8:25 – 9:20	~~Small teams--task.~~
9:20	~~Post results--questions about process~~.
9:30	Close--

1c

5 STEPS TO NOMINAL GROUP PROCESS

1. Silent Generation

   a. Write your response to question.
   b. No discussion yet.

2. Round Robin Recording (listing)

   a. Each person one idea at a time.
   b. Recorders list alphabetically.
   c. No discussion--just list until all "pass".

3. Serial Discussion

   a. Clarify--explain if needed.
   b. Look for direct duplication.
   c. Discuss for next step of ranking.

4. Individual Ranking

   Will explain.

5. Group Ranking

QUESTION: #1 TASK

Picture East Grand Forks 20 years from now--what should be happening?

How would it be?

What should it look like?

Try and be specific--

About 10-15 minutes to write on sheets of paper.

1d

SMALL GROUPS

RESPONSES TO QUESTION: #1 TASK

	Total Points
A. Population area--15,000. More industry. Business retail center.	34
B. Better traffic routes.	24
C. ~~More of a bedroom community.~~ Better streets, parks services, etc.	18
D. ~~Expand industrial park.~~	
E. Better inform/educate the public living in East Grand Forks vs. North Dakota--cost, etc.	28
F. Keep good education system.	17

DREAMS

A. Fill all vacant buildings.

B. Fill White Mart parking lot every day.

C. Fill industrial park.

D. Better land use planning.

E. Airport.

F. Race track--horse.

G. Flood control.

H. Open Demers.

I. Walk/bike way along the river.

1d (continued)

		Total Points
A.	Better economic climate.	5
B.	E. Grand Forks & Grand Forks work closely together (states).	
C.	Bus service.	
D.	Improve streets.	6
E.	Elevators and potato warehouses removed to industrial areas!	5
F.	Support basic retail needs.	2
G.	Residential values equal to Grand Forks.	5
H.	Riverside-park-recreational area.	
I.	Diverse industrial and retail business climate.	4
J.	Incorporate surrounding township into planning & zoning for future growth.	8
K.	Retail in clusters--industrial secluded but accessible.	
L.	All electrical power underground.	2
M.	Cut taxes.	12
N.	Residential in P.U.D.	
O.	Landscape in advance.	
P.	Good business district.	
Q.	Water problem (river) solved.	8
R.	Move 20 miles east.	
S.	Park-like--airy. Retain quality of life.	1
T.	Place that provides industrial retail base & affordable residential area.	4
U.	Attractive--parks,	1

1d (continued)

		Total Points
A.	Overall city--business and residential--should be well kept and attractive.	8
B.	Recreational opportunities (parks, etc.), indoor swim pool.	
C.	More housing.	
D.	Updated and permanent flood control.	22
E.	More industry--businesses.	5
F.	Self-contained city--own stores, industry, hospital, banks, entertainment, etc., facilities. Physical center of city--businesses close-knit group interested in the development of city and activities.	15
G.	Local support of local merchants.	5
H.	Improved sense of community pride and feeling.	6
I.	More industry and more businesses but centrally located business area and an area of concentrated industry.	14
J.	More people involvement in community affairs and development. (Community people seem to have such scattered interest--border-town illness).	5
K.	Redevelopment of run-down areas and relocation of other facilities or areas.	3
L.	Minnesota tax relief that would encourage individuals and businesses--and industry to stay in Minnesota and encourage others to come to Minnesota.	4
M.	Good city government and capable people to run it.	3
N.	New name of city.	

1d (continued)

		Total Points
A.	Good climate to attract business.	40
B.	Expanded industrial area.	21
C.	Business district to be located Hwy 220N & Hwy 2E.	6
D.	More processing plants to handle RRV products.	7
E.	Indoor running track.	
F.	Promote new business with easy access to center area.	5
G.	No flood problems.	17
H.	Industrial center for Ag-related industries.	12
I.	Dome over entire city.	
J.	No need of Grand Forks as far as business is concerned.	3
K.	NE rental areas decrease & residential areas prevail.	
L.	Open up gambling like good ol' days.	
M.	Indoor pool.	2
N.	Revitalize business district.	6
O.	Race tracks, casino & convention/visitors center.	
P.	Be larger than Grand Forks.	
Q.	Stronger public & private education.	5
R.	Recreational area utilizing the Red & Red Lake rivers.	1
S.	Bike trail throughout town.	3
T.	Steadily decreasing per capita income.	
U.	Center for international marketing.	4
V.	Historical center downtown.	
W.	Airport.	

(continued)

1d (continued)

		Total Points
X.	Higher % of townhomes to single family homes.	
Y.	Senior citizens' center.	
Z.	Metropolitan transit system.	/
aa.	Wind turbine electrical generation farm.	
bb.	Hydroelectric power plant.	
cc.	Spillway on riverside dam.	
dd.	Dredge Red River.	
ee.	Garbage-burning power plant.	
ff.	Sugar beet plant converted to bio-mass processing plant.	2
gg.	Center for the performing arts.	/
hh.	Auto city services.	

1d (continued)

		Total Points
A.	Better lighting--city streets & industrial area.	4
B.	Full development of shopping center in downtown area.	11
C.	Rejuvenate downtown area.	12
D.	Open DeMers Ave.	2
E.	Invite more manufacturing & industry.	16
F.	Offer more services for area farmers.	3
G.	Encourage small businesses--both present & new.	14
H.	Have a traditional downtown area.	3
I.	Encourage growth in population.	11
J.	Better parking.	0
K.	Maint.--police, fire, water, sanitation, & education services--with population growth.	0
L.	Combine indoor Olympic swimming pool & auditorium.	4
M.	Have a tent & trailer campground.	5
N.	Tear down apartments in ~~flood area.~~ blighted area.	2
O.	~~Retain educational facilities & standards with the population growth.~~	4
P.	Have testing & development for new uses--AG. products.	5
Q.	Remove old & obsolete buildings on DeMers.	0
R.	Large office building & people to fill it.	0
S.	Permanent flood control without removing housing or businesses.	9
T.	Rebuild what was destroyed by the white elephant.	

1d (continued)

		Total Points
A.	Need family residential rental units with playground & off-street parking.	1
B.	~~Need auditorium added to school.~~	
C.	Need new retail business--for added tax base. (Examples: clothing/shoe stores.)	19
D.	Need citizen cooperation--working together (i.e., new hockey rink).	5
E.	Easy flowing--centralized traffic--open DeMers & protect residential.	12
F.	Increase population (12,000). Help AUTI become largest in Minn.	2
G.	Be certain all dwellings are built to standards.	
H.	~~Attract good clothing/shoe store.~~	
I.	Build auditorium.	12
J.	Build auditorium & indoor swimming pool at High School.	4
K.	Build another East Grand Forks motel.	3
L.	Emphasize positive publicity--(not negative).	1
M.	Encourage city officials to be knowledgeable and to communicate effectively--get more people involved!	4
N.	Expand industrial park to 10 solid businesses including agriculture processing.	2
O.	More specific zoning--R-1, R-3, etc.	
P.	Expand cooperation with UND--reciprocity.	
Q.	Develop tax breaks for new business & individuals.	8
R.	Continue good city parks--develop all parks.	
S.	~~Develop R/Heights park.~~	
T.	~~Attract more agriculture processing plants.~~	

(continued)

1d (continued)

		Total Points
U.	Expand computer education.	
V.	Continue excellence in East Grand Forks schools.	5
W.	Provide opportunities for East Grand Forks youth to stay.	1
X.	Continue ecumenical spirit in East Grand Forks.	
Y.	Encourage community pride.	1
Z.	Keep attractive utility rates.	2
aa.	~~Traffic patterns S/B developed to protect residential areas.~~	
bb.	Mark lot lines with permanent markers.	
cc.	Continue to support existing businesses.	
dd.	Develop volunteer programs.	
ee.	Develop day care centers.	
ff.	Attract more non-liquor businesses.	4
gg.	Explore public bussing.	4
hh.	~~Build future bridges so river can be seen when crossing.~~	
ii.	Create walking path along river.	
jj.	Create a community attraction.	

Continue excellence in schools.	5
Attract more non-liquor businesses.	4
Explore p.	4

1d (continued)

	Total Points
A. ~~Need more retail outlets.~~ ~~stores~~	
B. Develop Kimbles outlots. Problem running street.	5
C. Population 20-30,000 people.	
D. Develop large industrial park.	4
E. Have our own airport.	2
F. ~~Create more jobs.~~	
G. ~~More industry for more jobs.~~	
H. Move whole town out of flood plain.	9
I. ~~Complete retail and industrial business & public services.~~	
J. More land for parks of family recreational type.	2
K. Completely independent with sufficient retail & industry, public facilities & service for more jobs.	18
L. ~~Senior citizen center.~~	
M. Exclusive plans for celebrating centennial & promoting East Grand Forks.	
N. Domed city.	
O. Complete flood protection.	10
P. ~~Population 25,000.~~	
Q. Better clean-up for the city.	
R. District heating system using garbage.	2
S. Make rivers more attractive.	2
T. ~~City protected from flooding.~~	
U. ~~We should have a large industrial park.~~	

(continued)

1d (continued)

		Total Points
V.	Larger library--more schools.	
W.	Historical center.	
X.	Community hospital & medical center.	13
Z.	Little or no unemployment!!	
aa.	Dial-a-ride. Better transportation (buses, taxi, mass transit).	10
bb.	Exclusive tourist attraction for summer & winter.	
cc.	Rename city--Nashville of the North.	
dd.	Rocket port for outer space travelers.	
ee.	Family caring for our seniors.	
ff.	More community involvement & awareness.	
gg.	Covered swimming pool. Community center development with senior center centrally located.	6
hh.	Affordable housing.	8

SMALL GROUPS - TOP FIVE

1. Updated permanent flood control.
2. Self-contained city--own stores, industry, health care facilities, banks, entertainment--physical center of city--close-knit group of business & industrial people.
3. More industry and business.
4. Overall city--business and residential should be well kept, well-planned, and attractive.
5. Improved sense of community pride and concern.

1. Completely independent with sufficient retail & industrial businesses, public facilities & service for more jobs.
2. Community hospital & medical center.
3. Better transportation (mass transit), buses, taxies.
4. Complete flood protection.
5. Move entire town out of flood plain.

1. Cut taxes.
2a. Incorporate surrounding townships into planning & zoning.
2b. Good business district.
3. Bus service.
4. Improve residential & economic values.
5. Replace/move potato & elevators to industrial area.

1. Attract new retail businesses--clothing, shoe, etc.
2. Create easy flowing traffic--open DeMers--protect residential areas from heavy traffic.
3. Build auditorium at High School.
4. Develop tax breaks for new business.
5. tie { Encourage citizen cooperation projects.
5. tie { Continue excellence in East Grand Forks schools.

1. Invite more manufacturing & industry.
2. Encourage small businesses--both present & new.
3. Rejuvenate downtown area.
4. Full development of shopping center in downtown area.
5. Encourage population growth.

1. Population area--15,000. More industry. Business retail center.
2. Better traffic routes.
3. Better educate or inform the public.
4. Better streets, parks, services.
5. Keep good education system.

1. Good climate to attract business.
2. Expanded industrial area.
3. No flood problems.
4. Industrial center for AG-related industries.
5. More processing plants to handle R.R.V. products.

SUMMARY SHEET IN PRIORITY ORDER

		Points
1.	Good climate to attract business	52
2.	Population area--15,000. More industry. Business retail center	34
3.	Completely independent with sufficient retail and industrial businesses, public facilities & service for more jobs	25
4.	Encourage population growth	23
5.	Encourage small businesses--both present & new	21
6.	No flood problems	21
7.	Updated permanent flood control	20
8.	Expanded industrial area	16
9.	Industrial center for AG-related industries	15
10.	Move entire town out of flood plain	13
11.	Good business district.	13
12.	Community hospital & medical center	12
13.	Better educate or inform the public	11
14.	Overall city--business and residential should be well kept, well planned, and attractive	11
15.	Self-contained city--own stores, industry, health care facilities, banks, entertainment--physical center of city--close-knit group of business & industrial people	11
16.	Develop tax breaks for new business	10
17.	Invite more manufacturing and industry	9
18.	Create easy flowing traffic--open DeMers--protect residential areas from heavy traffic	9
19.	Cut taxes	9
20.	Better traffic routes	9
21.	Rejuvenate downtown area	8
22.	Keep good education system	7
23.	Better transportation (mass transit), buses, taxies	7
24.	Encourage citizen cooperation projects	7
25.	More processing plants to handle R.R.V. products	6
26.	Build auditorium at High School	6
27.	Complete flood protection	4
28.	Incorporate surrounding townships into planning & zoning	4
29.	More industry and business	3
30.	Continue excellence in East Grand Forks schools	2
31.	Full development of shopping center in downtown area	2
32.	Improved sense of community pride and concern	2
33.	Bus service	1
34.	Attract new retail businesses--clothing, shoes, etc.	0
35.	Improve residential & economic values	0
36.	Replace/move potato & elevators to industrial area	0
37.	Better streets, parks, services	0

1f

EAST GRAND FORKS - 20-YEAR GOALS
(As Developed 10-17-83)

GOAL: MORE BUSINESS (95 POINTS)

Items	Rank	Points
Good climate to attract business	1	52
Develop tax breaks for new business	16	10
Invite more manufacturing and industry	17	9
Attract new retail businesses--clothing, shoes, etc	34	0
Encourage small businesses--both present & new	5	21
More industry and business	29	3

GOAL: INDUSTRY (37 POINTS)

Items	Rank	Points
Expanded industrial area	8	16
Industrial center for AG-related industries	9	15
More processing plants to handle R.R.V. product	25	6

GOAL: DOWNTOWN (23 POINTS)

Items	Rank	Points
Rejuvenate downtown area	21	8
Full development of shopping center in downtown area	31	2
Good business district	11	13

GOAL: POPULATION GROWTH (57 POINTS)

Items	Rank	Points
Population area--15,000. More industry. Business retail center	2	34
Encourage population growth	4	23

GOAL: SELF SUFFICIENCY (58 POINTS)

Items	Rank	Points
Completely independent with sufficient retail and industrial businesses, public facilities and service for more jobs	3	25
Self-contained city--own stores, industry, health care facilities, banks, entertainment--physical center of city--close-knit group of business and industrial people	15	11
Build auditorium at High School	26	6
Community hospital and medical center	12	12
Incorporate surrounding townships into planning and zoning	28	4

GOAL: COMMUNITY PRIDE (20 POINTS)

Items	Rank	Points
Overall city--business and residential should be well kept, well planned, and attractive	14	11
Improve residential and economic values	35	0
Improved sense of community pride and concern	32	2
Encourage citizen cooperation projects	24	7
Replace/move potato and elevators to industrial area	36	0

GOAL: TRANSPORTATION (26 POINTS)

Items	Rank	Points
Better streets, parks, services	37	0
Better traffic routes	20	9
Create easy flowing traffic--open DeMers--protect residential areas from heavy traffic	18	9
Better transportation (mass transit), buses, taxies	23	7
Bus service	33	1

GOAL: EDUCATION (20 POINTS)

Item	Rank	Points
Continue excellence in East Grand Forks schools	30	2
Keep good education system	22	7
Better educate or inform the public	13	11

GOAL: TAXATION (9 POINTS)

Items	Rank	Points
Cut taxes	19	9

GOAL: FLOOD CONTROL (58 POINTS)

Items	Rank	Points
No flood problems	6	21
Move entire town out of flood plain	10	13
Update permanent flood control	7	20
Complete flood protection	27	4

1f (continued)

DEPARTMENT OF THE ARMY
ST PAUL DISTRICT CORPS OF ENGINEERS
1135 U S POST OFFICE & CUSTOM HOUSE
ST PAUL MINNESOTA 55101

REPLY TO
ATTENTION OF:

Thank you for participating in the city future meeting on October 17. You helped generate 156 future goals -- some humorous, and most ambitious. The seven groups' lists of priority goals is attached.

Also attached is a list of goals, clustered by what type of goal is represented. My clustering is not perfect, but the main points stand out: economic goals dominate (with over half of the votes), and both city self sufficiency and flood control also seem important.

These goals will be the starting point for work at the final two city future meetings. City leaders will be discussing obstacles to reaching the goals, and strategies for achieving them.

Thanks again for your help in this process of outlooking East Grand Forks' future.

Sincerely,

2 Attachments

SUZANNE GAINES
Sociologist

for city letterhead – to the 50 "leaders"

1f (continued)

If you were one of the 50 citizens who participated in the first city future meeting (October 17), you know what a variety of ambitious goals we envisioned. Those goals reflecting various aspects of economic development were given over half of the "votes" cast at the end of the evening; self sufficiency, flood control, and community pride were also supported - see the attached list.

Whether or not you attended that meeting, you are invited to participate in the last two city future meetings. We will be moving from these general 20-year goals for the city to a more specific look at the obstacles we face, and at strategies for reaching our goals.

Because you represent some important aspect of community life in East Grand Forks - business, relion, education, and so on - we urge you to make the time to attend these final meetings.

Monday	7:00 p.m.	November 14	City Hall
Monday	7:00 p.m.	November 21	City Hall

Mayor and City Council
City of East Grand Forks

NOMINAL GROUP

SMALL GROUP PROCESS FOR IDENTIFYING PROBLEMS AND POSSIBLE SOLUTIONS

GROUP SIZE

There has been considerable research on the effectiveness of groups of different sizes. The ideal group size is in the vicinity of 6-9 persons. As the number increases in a group some participants will "drop out" and participate minimally. This increases the likelihood that the group will be dominated by the stronger personalities. The group begins to break into "leaders" or "followers", and the chances of polarization increase. Naturally, there are other pressures to increase group size--the need for representativeness, the availability of meeting rooms, the availability of facilitators, etc.--but whenever possible, group size should be limited to the 6-9 range.

THE NEED FOR TECHNIQUES

The obvious question is: "Why the need for special techniques? Can't a small group of people just sit around and talk?" Of course they can, particularly if they are friends who share a somewhat similar perspective on an issue. But, if the participants are strangers, or if they take opposing sides on an issue, then more may be accomplished if some simple techniques are employed.

Some people are very slow to participate with strangers or with people they believe will be very critical of their comments. In addition, this climate of discomfort runs counter to the climate of psychological security that is necessary for creativity. Creativity, by its very nature, means trying out new ideas. This requires taking a risk that others may disapprove of the ideas. This is possible for many people only in a group where "permission" is granted to consider new and different ideas. Most people must be comfortable before they will really open up in a group. Since this is difficult to achieve in a group of strangers, or a group with strongly opposing viewpoints, small group techniques are designed to create the "permission" for people to participate openly and share their creative ideas. These techniques can reduce the period of discomfort and move the group quickly into productive work. In fact, work teams and groups of friends which are supposedly comfortable in working together will often find their effectiveness increased by using these techniques.

1g (continued)

The two techniques which we will concentrate on in this workshop--Nominal Group Process and Brainstorming--solve the problem of creating a climate of psychological safety, but in two different ways.

NOMINAL GROUP PROCESS

The Nominal Group Process was designed based on research which suggests that individuals generate more creative ideas and information when they work in the presence of each other, but do not interact. According to this research, when people interact in groups, they are more likely to react to each other's ideas rather than come up with new ideas or consider new dimensions of the problem.

The procedure for Nominal Group Process is as follows:

1. Opening Presentation

   After an initial presentation explaining the Nominal Group Process, the audience is divided into small groups of 6 to 9 participants.

2. Staff and Advance Preparation

   Each group is assigned a Facilitator and Recorder. Prior to the meeting, these staff persons will put up four sheets of newsprint, and also have felt-tipped pens, scratch paper, pencils, and 3 x 5 cards ready for use.

3. Introductions

   The Facilitator will introduce himself/herself and invite everyone in the group to do the same.

4. Posing the Question

   The Facilitator will then present the group with a pre-developed question, such as: "What are the water problems in the James River study area which affect you?" The Facilitator will write the question at the top of one of the flip-chart sheets.

5. Generating Ideas

   Participants are provided with paper or file cards and asked to write on the paper all the answers they can think of to the questions posted. Their notes will not be collected, but will be for their own use. Time: 5-10 minutes.

6. Recording Ideas

   Each person, in turn, is then asked for one idea to be recorded on the newsprint. The idea will be summarized by the Recorder on the

1g (continued)

newsprint as accurately as possible. No discussion is permitted. Participants are not limited to the ideas they have written down, but can share new ideas that have been triggered by others' ideas. Anyone can say "Pass" without giving up their turn on the next round. The process continues until everyone is "passing". Alphabetize the ideas on the list: A-Z, AA-ZZ, etc.

7. Discussion

Time is then allowed for discussion of each item, beginning at the top of the list. The discussion should be aimed towards understanding each idea, its importance, or its weaknesses. While people can criticize an idea, it is preferable that they simply make their points and not get into an extended argument. Move rapidly through the list as there is always a tendency to take too long on the first half of the list and then not be able to do justice to the second half. Time: 40-60 minutes.

8. Selecting Favored Ideas

Each person then picks the ideas that he/she thinks are the most important or best. Instructions should be given to pick a specific number, such as the best five, or the best eight. These ideas should be written on a slip of paper or 3 x 5 card, one idea per card. They may just want to record the letter of the item on the list (A, F, BB, etc.) or a brief summary, so that they don't have to write out the entire idea. Time: 5 minutes.

9. Ranking Favored Ideas

Participants then arrange their cards in preferential order, with the ones they like the most at the top. If they have been asked to select eight ideas, then have them put an "8" on the most favored and number on down to a "1" on the least favored (the number will change with the number of ideas selected). A score sheet should then be posted which contains all the alphabet letters used in the listing.

Then the participants read their ratings (". . . R-6, P-2, BB-8 . . .") which are then recorded on the score sheet. When all the scores have been shared, then tally the score for each letter of the alphabet. The highest scoring item can be shown as #1, etc. Post the rankings for the top 5-7 items, depending on where a natural break occurs between high scores and low scores. Time: 5 minutes.

10. Discussion of Results

The participants may then want to discuss the results. Someone may point out that two very similar items "split the vote", and were they to be combined, they would constitute a single priority item. If the group as a whole wants to combine them, this is acceptable. It should be pointed out, though, that an analysis will be made of all the results, not just the priority items. Time: 5 minutes.

1g (continued)

TOTAL PROCESS TIME: 1½-2 hours, plus time for opening presentation.

USES OF NOMINAL GROUP PROCESS

If the full Nominal Group Process is utilized as indicated above, the cumulative time of opening presentation, Nominal Group Process, and reports back to the total group (assuming a larger audience has been divided into small groups) would probably mean a total time of 2½-3 hours. This would be the equivalent of an entire evening meeting. It is possible, however, to utilize portions of the process. For example:

- Everyone in an audience can be asked to generate ideas on 3 x 5 cards. The ideas can then be given an initial ranking by the number of times an idea occurs (although this may not be a measure that an idea is good, but simply that a number of people are aware of it).

- After a series of alternatives has been presented (along with some time for discussion), the participants can rank the alternatives on 3 x 5 cards and a tally developed for the group. This runs the danger of appearing to be a vote which may be misleading, unless the audience is very representative; but the same danger is inherent any time a ranking process is used.

Nominal Group Process can be used for problem identification, for generating solution elements, and also for identifying impacts of alternatives. It must be understood--and this should be stressed to participants--that all the ideas generated require subsequent detailed staff analysis. It is also important that this analysis be communicated to participants as soon as it is available, with opportunities provided for them to respond to the analysis.

One danger of Nominal Group Process--or any complicated small group technique--is that the public may feel "processed", rather than included. If, for example, there was a great deal of animosity towards the study, then it might be wise to allow this feeling to be "ventilated" to the total audience so that the breakdown into small groups and use of the Nominal Group Process is not seen as an effort to control, manipulate, or "divide and conquer".

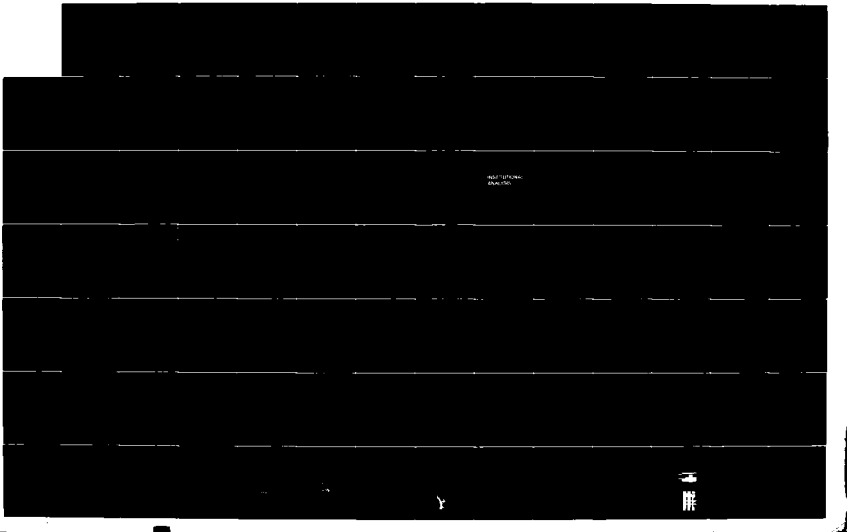
APPENDIX 2

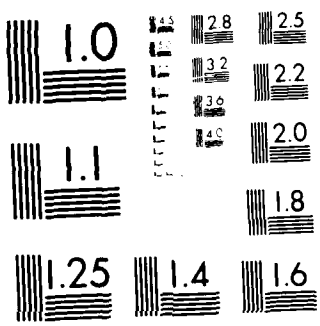
SECOND MEETING

November 14, 1983

AD-A184 845 GENERAL REEVALUATION SUPPORTING DOCUMENTATION FOR FLOOD CONTROL AND RELATED PURPOSES(U) CORPS OF ENGINEERS ST PAUL MN ST PAUL DISTRICT NOV 84 5/5

UNCLASSIFIED F/G 13/2 NL





MICROCOPY RESOLUTION TEST CHART

2a

GOALS AND OBJECTIVES OF MEETING

1. Develop general goal statements from:
   a. First meeting's information.
   b. This group's priority list.
2. Specify obstacles to/from reaching the identified goals.

NO PROBLEM SOLVING YET!

2b

AGENDA

7:00	Review of evening's goals and objectives.
7:10	Setting priorities on items from prior workshops (individuals and groups here).
7:35	Review of Final Priority List and Instructions for Team Tasks.
7:50-9:05	TEAM TASKS.
9:05-9:25	TEAM REPORTS.
9:30	CLOSE & NEXT STEPS.

2c

TASK #1

Take the items (a through bb) and review them for yourself.

Set the items in priority order, as you see them. While some may seem redundant, please do your best.

#1 is most important, 2 = 2nd, etc., . . . through 28th.

Keep them lettered in your priority order; then give 28 points to your most important down--27 points to 2nd--to least important = 1 point.

Then bring your list up front for scoring.

TASK #2 - SECOND MEETING

Specify the goal: How many? What kind? Where? When?

Specify Obstacles: Past, present, future?

Legal, economic, politics, attitudes, physical?

What else?

2d

ITEMS FROM WORKSHOP 1

a. Permanent flood control.
b. Self-contained/self-sufficient city.
c. More industry/manufacturing.
d. More retail business.
e. Well-kept--planned city.
f. Sense of community pride and concern.
g. Self-sufficient facilities and services.
h. Community hospital and medical center.
i. Better transportation.
j. Move entire town out of flood plain.
k. Cut taxes.
l. Incorporate surrounding townships into pl and zoning.
m. Good business district.
n. Bus services.
o. Improve residential and economic values.
p. Replace/move potato elevators to ind. area.
q. Create easy flowing traffic pattern.
r. Open DeMers, protect residential areas from heavy traffic.
s. Build auditorium at high school.
t. Develop tax break for new business.
u. Encourage citizen cooperation project.
v. Continued excellence in EGF schools.
w. Rejuvenate downtown.
x. Full development of shopping center downtown.
y. Encourage population growth.
z. Better educate and inform publics.
aa. Industrial area for AG-related businesses.
bb. Processing plant for RRV products.

2d (continued)

SCORING ON ITEMS a - bb

a.	186	212	~~408~~
b.	168	194	362
c.	238	287	~~525~~
d.	279	280	~~509~~
e.	192	180	372
f.	166	133	299
g.	140	203	343
h.	102	111	213
i.	93	106	199
j.	75	85	160
k.	107	198	305
l.	109	152	261
m.	235	257	~~492~~
n.	153	96	249
o.	182	172	354
p.	119	109	228
q.	184	205	~~389~~
r.	105	111	216
s.	159	197	356
t.	160	145	205
u.	143	153	296
v.	165	206	371
w.	188	172	360
x.	177	178	355
y.	151	111	262
z.	131	106	237
aa.	221	249	~~470~~
bb.	212	178	~~390~~

2d

GOAL: More Industry & Mfg.

KINDS

1. Flour mills
2. Potato processing
3. Malting barley
4. Sunflower processing
5. Waste by-product plant
6. Certified seed processing
7. Manufacturing agriculture related equipment
8. Electronic/robotic inst. service

WHEN 1984

WHERE Industrial Park E.G.F.

HOW MANY As many as possible (8 in next 16 years)

OBSTACLES

High corporate taxes

High workmans comp.

High personal income tax

High property tax

Transportation

Climate

Well defined industrial park

Utilities

2d (continued)

GOAL: Retail Development (Districts)

WHERE

Downtown - Service Type Business

(+) Existing Businesses

(-) Flood Problem Area
Traffic Flow

Hwy 2.220 N.

GOALS (3-5 Years)

- Re-develop Hwy 220 N. to retail businesses
- Comprehensive study and plan for 220 N. retail development
- Re-locate light industrial business
- Revitalize downtowns (GF & EGF)
- Detail study & then plan

LONG-TERM GOALS

- Relocate or tear down blighted industrial buildings to make room for retail
- Force development of B-N property

OBSTACLES TO RETAIL DEVELOPMENT

- Lease arrangements of B-N properties discourage development
- Lack of available competitively priced land for development
- Lack of traffic - downtown
- Lack of drawing power
- Low density of existing retail stores
- Traffic pattern moving to west
- Inconsistent land use plan
- Downtown flood problems
- Competition from Columbia & South Forks malls

2d (continued)

GOAL: Flood Control

GOALS:

1. Permanent 100 year protection
2. Immediate decisions
3. Relocate downtown (business district)
4. Education

OBSTACLES:

#1 - A. Money
B. Public opposition
C. Limit growth
D. Bad public image
E. Public education (lack of)
F. Grand Forks & Watershed involvement
G. Lack of agreement

#2 - A. Corps of Engineers
B. Politics
C. Lack of agreement

#3 - A. Loss of business to Grand Forks
B. Money
C. Location
D. Loss of historical buildings
E. City planner
F. Lack of agreement

2d (continued)

GOAL: Improve Traffic Patterns

GOALS:

1. City planner
2. Open Demers Avenue
3. Widen 220 North (left-hand turn lanes)
4. Establish criteria for placement of stop signs
5. Open 20th Street N.W. to 220 North
6. Main artery to connect north - south

OBSTACLES:

#1 - A. Money
B. Manpower

#2 - A. Agreement with developer
B. Owners & tenants
C. Pedestrian crossing

#3 - A. State Highway Department
B. Money

#4 - A. Everyone wants one
B. Uninformed citizens

#5 - A. Local objection
B. Money

#6 - A. Local objection
B. Money
C. Railroad

2e

TOP SEVEN ITEMS

1. More industry and manufacturing.
2. More retail business.
3. Good business district.
4. Industrial area for AG-related business.
5. Permanent flood control.
6. Processing plant for RRV products.
7. Create easy flowing traffic pattern.

2f

1. What did other people think about our goals?

   Goals: Improve Traffic Patterns.
   Flood Control.
   Retail Development.
   More Industry and Manufacturing.

2. Which of the obstacles we identified are controllable by us? Non-controllable?

   Obstacles: See attached.

3. Tonight's work:

   Identify
   Screen
   Prioritize } Strategies

4. Wrap-up: What's the next step?

2g

INDIVIDUAL'S 6-PERSON SURVEY-RATING

Rating Top 7 - 20 Year Goals

11/14 1

A Perm. Flood Control ✓
Q Create Easy flowing Traf, Open DeMers Ave. & Control Heavy Traffic in Residential Area ✓
AA Industrial Area for AG & Related Industries
C more Industry/Mfgg. ✓
BB Processing plant for RRV - products

Retired / AG-related business

11/10 2

Q Open DeMers, Control Hvy traffic in Residential Area - create easy flowing Traffic ✓
C More Industry / & Manufacturing
AA Industrial Area for AG & Related Industry
BB Processing plant for RRV - products
A Perm Flood Control

Professional

11/16 3

D more Retail Business
M Good Business List
Q Create easy flowing traffic - Open DeMers & Control Hvy Traffic in Residential area
A Perm. flood control
BB Processing Plant for RRV - products

Employed in Retail

11/8 4

Build Auditorium near U.S. or Civic Center
Q Open DeMers Ave - create easy flowing Traf -
A Perm. flood Control
AA Industrial Area for Ag & related industries
C More Industry & Mfg ✓
BB Processing Plant for RRV - - Products

Specific planning for ***

Executive

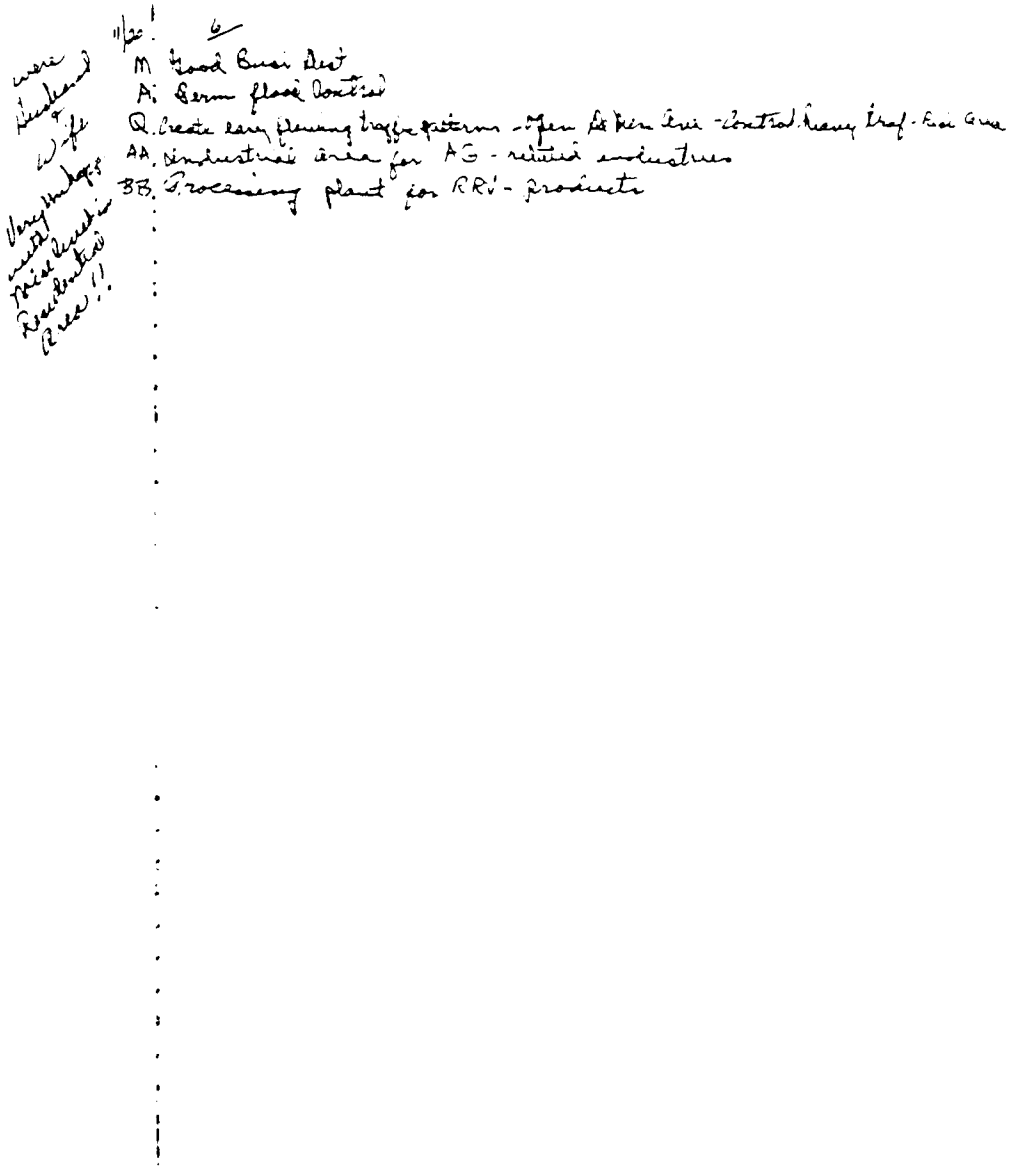
11/16 5

Q create Easy flowing Traffic - Open DeMers Ave. Control Heavy Traffic in Residential area
A Perm. flood control. ✓
C More industry & manufacturing
AA Industrial Area for AG & related industries
BB Processing plant for RR Valley products

Husband

(over)

2g (continued)



A P P E N D I X 3

THIRD MEETING

November 21, 1983

3

NOTICE

If you obtained ratings from people during the time since our last meeting, please post* the results on the sheets we have provided.

*Before the meeting starts.

1. Put individual rankings beside the listed items.
2. Write the suggestions on the other charts--please write large enough for the whole group to be able to see.

ITEM	RANKING
More Industry and Manufacturing	2 2 4 3 4 4 4 2 2
More Retail Business	1 1 2 1 3 1 1
Good Business District	1 1 4 3 5 1 3 1
Industrial Area for AG-Related Business	2 1 2 1 2 2 5 3 2 4
Permanent Flood Control	3 5 5 3 5 6 1
Processing Plant for RRV Products	5
Create Easy Flowing Traffic Patterns	3 3 5 6 6 6 6 4 2 2

3a

GOALS AND OBJECTIVES OF TONIGHT'S MEETING

1. Review goals, list of obstacles from previous meeting.
2. Record other publics' information, ideas, and priorities.
3. Develop strategies to meet goals.
4. Formulate next active steps of the process needed to carry out goals.

3b

MONDAY, 11-21 AGENDA

6:45 - 7:00	Post Results of Survey.
7:00 - 7:15	Introductions: SYNERGY--Tonight's Activities and Tasks.
7:15 - 7:20	Instructions Task 1.
7:20 - 8:00	Team Task 1.
8:00 - 8:10	Instructions Task 2.
8:10 - 8:30	Group Task 2.
8:30 - 8:35	Break and Add Survey Information.
8:35 - 8:40	Instructions Task 3.
8:40 - 9:30	Task 3.
9:45 - 9:55	Group Discussion and Decision for Next Steps - Task 4.
10:00	Close.

3c

TASK #1

Take last week's team information on goals and obstacles:

1. Finish obstacles list, if needed.
2. Add list of "what's going for us" items.
3. Identify those obstacles and benefits that are within your control to change, modify, or add to.

Report back at 8:00.

TASK #2

As a group, we will brainstorm strategies that could assist in reaching the goals of our 3 top items. Brainstorming will be 5 minutes on each item. In brainstorming, any idea is legitimate, so no verbal/nonverbal evaluations, please.

TASK #3

You select which of the teams you wish to work with. Then, each group is to take the brainstorm ideas and past goals and obstacles/benefits lists and screen the strategies and set priorities, timing, and other additional terms for each strategy you feel can work; i.e., short-term--1 year, mid-term--2 to 5 years, long-range--6 to 20 years.

TASK #4

As a group, identify and discuss what are to be the next action steps in this "futures" process. Who will do them and by when? What are you willing to do next? Or what are you not willing to do next?

3d

1. TEAM REPORT: RETAIL BUSINESS

Goals (3-5 years)

Redevelop Highway 220N to retail businesses.

Comprehensive study and plan for 220N retail development.

Relocate light industrial business.

Revitalize downtowns (GF & EFG).

Detailed study and then plan.

Long-Term Goals

Relocate or tear down blighted industrial buildings to make room for retail.

Force development of B-N property.

3d (continued)

OBSTACLES TO RETAIL DEVELOPMENT

NC - Lease arrangements of B-N properties discourage development.

PC - Lack of available competitively priced land for development.

PC - Lack of traffic--downtown.

C - Lack of drawing power.

C - Low density of existing retail stores.

PC - Traffic pattern moving to west.

C - Inconsistent land use plan.

C - Downtown flood problems.

NC - Competition from Columbia and South Forks malls.

C - Tax disparities (U.S. & N.D.).

C - Lack of variety of stores.

RETAIL DEVELOPMENT (DISTRICTS)

WHERE

DOWNTOWN--Service Type Business

(+) Existing businesses.

(-) Flood problem area traffic flow.

Hwy 2 and 220N.

3d (continued)

WHAT'S GOOD

Sunday opening.

Large trade area (100,000+).

Area economy--fair to good.

Conservative, hardworking people.

Good city and business relationship.

Good streets, parking (no cost).

Good schools, AVTI.

Relatively low-cost utilities (electricity, water) and services.

Varied and relatively new churches--schools.

Strong demand for AG-industry supplies.

Special tax incentives.

Adequate and reliable work force.

Nearby medical services.

Low crime rate.

3d (continued)

RETAIL BUSINESS

- ✓ Hire a planner.
- ✓ Solve flood problem.
- ✓ Establish recruitment program.
- ✓ Procure land for shopping center.
- Contest for developing downtown.
- Give problem to current retail business owners.
- ✓ Buy out White Mart.
- Get plan from UND grad school--free.
- Recruit GEMCO.
- ✓ Develop public support.
- Bring back slot machines.

RETAIL BUSINESS

- P - Provide tax incentives--S.T.
- ✓ - Provide financing for citizen lobbying in legislature.
- ✓ - Provide bus service.
- ✓ - Improve traffic flow.
- P - Tax incentives for businesses needed--S.T.
- ✓ - Low interest rehab/remodel loans.
- ✓ - Develop unique downtown (like historic re-creation).
- ✓ - Work with G.F. downtown area.
- ✓ - Publicize quality of life.

3d (continued)

RETAIL

ST - Clean up Holiday Mall.

MT - Convert parking lot downtown to retail space (2nd floor).

ST - More lobbying involvement.

ST - Business tax incentives.

LT - Bus service (city-wide).

MT - Encourage downtown businesses to upgrade appearance--low interest loans.

MT - Encourage specialty shops.

ST - Develop public support.

ST - Establish recruitment program.

LT - Flood control--downtown.

MT - Procure land for shopping center.

3d (continued)

2. TEAM REPORT: MORE INDUSTRY AND MANUFACTURING

Specify the goal.

KINDS

1. Flour Mills.
2. Potato Processing.
3. Malting Barley.
4. Sunflower Processing.
5. Waste By-Product Plant.
6. Certified Seed Processing.
7. Manufacturing AG-related Equipment.
8. Electronic/Robotic Inst. Serv.

WHEN? *1984 to 2000.*

WHERE? Industrial Park--E.G.F.

HOW MANY? As many as possible (8 in next 16 years).

OBSTACLES

PC - High corporate taxes.
PC - High workman's compensation.
PC - High personal income tax.
C - High property tax.
N - Transportation.
N - Climate.
C - Well-defined industrial park.
C - Utilities.
C - Lack of "sales package" for city.

3d (continued)

IN OUR FAVOR

C 1. Trained labor force (UND and AVTI).

C 2. Aggressive and resourceful labor force.

C 3. Modern and efficient farming.

C 4. Strong recreational draw.

C 5. Excellent available medical and shopping facilities.

C 6. Aggressive community.

C 7. Aggressive and competitive financial institutions.

C 8. Excellent school system.

C 9. Good, clean city.

C 10. Good city services.

C 11. Immediate availability of industrial space.

C 12. Good telephone communications.

C 13. Available housing.

PC 14. Border city tax credits.

3d (continued)

INDUSTRY AND MANUFACTURING

Develop sales package.

Out-of-state advertising.

Contact people to invest.

Develop market for sunflower oil products.

Give tax break to new industry.

Declare public holiday.

Work with government.

Give land away.

No special assessments.

City lease land.

Get rid of RR.

Contact specific corporations.

No corporate taxes.

Encourage students to stay.

Increase population.

City provide free water.

Encourage employment.

Provide low interest money.

3d (continued)

INDUSTRY AND MANUFACTURING

- ✓ Hire a lobbyist.
- ✓ City planner.
- ✓ Actively solicit firms to locate here.
- ✓ Lower utility rates.
- ✓ Work with farm organizations/groups.
- Encourage greater participation in both political parties.
- No real estate taxes.
- ✓ Utilize Senior Citizen talent in selling E.G.F.
- Assist in training work force.
- Lower personal income tax.
- ✓ Lower electric rates.
- Provide free investigative trips.
- ✓ Individual revenue bonds.

3d (continued)

IMMEDIATE STRATEGIES

1. Have Chamber of Commerce develop sales package.
2. Secure commitment for city services.
3. Work with Water and Light Commission on incentive rates.
4. Involve local legislators in our strategies.
5. Evaluate Senior Citizen talent.
6. Develop marketing program.
7. Voice our opinions regarding legislation through MACI.
8. Have city officials approve city planner position.

MEDIUM-TERM STRATEGIES

1. Expand Industrial Park.
2. Continue marketing plan.
3. Utilize IDR bonds.
4. Expand training through AVTI.
5. Involve local legislators in our concerns.
6. Work with State Department of Economic Development.

3d (continued)

3. TEAM REPORT: TRAFFIC

Goals:

1. City Planner.
2. Open DeMers Avenue.
3. Widen Hwy 220 North (left-hand 220 turn lanes).
4. Establish criteria for placement of stop signs.
5. Open 20th Street NW to 220 North.
6. Main artery to connect North-South.

Obstacles:

1.	a.	Money.	WOC
	b.	Manpower.	
2.	a.	Agreement with developer.	NOC (but?)
	b.	Owners and tenants.	
	c.	Pedestrian crossing.	WOC
3.	a.	State Highway Department.	NOC?
	b.	Money.	WOC?
	c.	Too narrow.	WOC
4.	a.	Everyone wants one.	WOC
	b.	Uninformed citizens.	
5.	a.	Local objection.	WOC
	b.	Willingness to commence.	
	c.	Money.	
6.	a.	Local objection.	WOC
	b.	Money.	
	c.	Railroad.	NOC?

3d (continued)

TRAFFIC PATTERNS

Hire City Planner.

✓ Work with State Highway Department.

Work with GF on proposed new bridge.

✓ Move heavy truck traffic out of downtown.

✓ Draw map of city streets showing proposals--for input.

✓ Patronize city busses.

TRAFFIC PATTERNS

~~Buy out White Mart.~~

✓ Develop plan with conditions now on DeMers.

✓ Work with businesses on DeMers and 220.

✓ Hold block parties. }
✓ Temporary closings. }

Peripheral parking with walkways.

~~Use extra phone button for survey of plans.~~

~~Give problem to computer club.~~

3d (continued)

WHAT'S GOING FOR US

TRAFFIC

1. Cooperation of elected officials.
2. Good basic street system.
3. Street system adequate for present population.
4. Cooperation with Grand Forks.
5. Public support and interest.

A. BUSINESS

1. Develop plan with current businesses in Mall to open DeMers Avenue (short-term).
2. Work with businesses city-wide (downtown and 220 N.) to help develop traffic patterns (short-term).
3. Redirect heavy truck traffic out of downtown area (mid-term).
   a. Work with State Highway Department--help with truck problems.
4. Implement use of city buses and educate public to use buses.

B. RESIDENTIAL

1. Draw map of city streets showing proposals--for input by public (mid-term 5+).
2. Block parties and temporary closings (3 to 4 blocks) for public education (mid-term 5).
3. Education of public on use of bus system (short-term).

3d (continued)

4. TEAM REPORT: FLOOD CONTROL

Goals:

1. Permanent 100-year protection.
2. Immediate decisions.
3. Relocate downtown (business district).
4. Education.

Obstacles:

1. a. Money. PWOC
   b. Public opposition.
   c. Limit growth. WOC
   d. Bad public image.
   e. Public education (lack of).
   f. Grand Forks and watershed involvement.
   g. Lack of agreement.

2. a. Corps of Engineers.
   b. Politics.
   c. Lack of agreement.

3. a. Loss of business to Grand Forks.
   b. Money.
   c. Location.
   d. Loss of historical buildings.
   e. City Planner.
   f. Lack of agreement.

4. a. Slow process.
   b. Participation low.
   c. Lack of publicity.

3d (continued)

GOING FOR US

FLOOD CONTROL

1. Flood plan.
2. Public participation (support).
3. Practical experience.
4. Federal/State/County help.

FLOOD CONTROL

Present choice of definite plans to citizenry.

Advertise accomplishments.

Enforce floodplain regulations.

Limit future expansion in flood area.

Give water to G.F.

Build a bypass.

Provide public education.

Work with G.F.

Purchase city-wide flood insurance.

Relocate entire town.

Revise the floodplain.

Phase in permanent flood control.

3d (continued)

FLOOD CONTROL

Meet COE half way.

Issue bond.

Move some of the houses.

Don't do anything.

Remove existing dikes.

Turn plan down and buy B/C in future.

Hire City Planner.

Raise existing dikes.

Make a huge lake to take water.

More publicity on consequences/benefits if we don't.

Develop more cooperation with watershed districts.

Let it flood.

Flood-proof existing structure.

Use Votech class project.

3d (continued)

Have definite plan presented and publicized by Corps of Engineers and city officials.

a. Block/ward parties.
b. Educate/publicize schools.
c. TV, radio, news media.
d. Telephone chain calls.

Goals:

1st year

1. Educate public on alternatives.
    a. Permanent diking.
    b. No diking.
    c. Compromise on dike location between Corps/City desires.
    d. Move entire city (split vote of group).
2. Go with plan desired by citizens and Corps.
3. Start purchase/relocation of some houses/businesses in critical areas.
4. Develop better cooperation between city and watershed districts/Grand Forks.
5. City purchase flood insurance for entire area (split vote).

2-5 years

1. If permanent diking is option selected, develop financing plan and funding.
2. Continue relocation of houses/businesses in critical areas.
3. Continue informing public of each decision and progress.
4. Continue flood insurance.
5. Start building dike.

6-20 years

If permanent dike is selected by citizens, then complete permanent diking system.

3e

NEXT STEPS

			PERSON RESPONSIBLE [VOLUNTEER]
1.	Develop report.		SYNERGY
2.	Make random call to build awareness level.		
3.	Review report with legislator.		DON
4.	Review report with Economic & Planning/Development.		DEED
5.	Publish Summary - ?	FULL REPORT PRODUCTION	SYNERGY
6.	Send Summary to Planning Commission.	Review potential	ELLIS
7.	Send Summary to City Council.	implications	S.G./RON
8.	Get some feedback (reaction). Review for change. Implement some recommendations.		
9.	Let City Council set up next steps.		
10.	Review with Chamber of Commerce.		DON
11.	Give media coverage.		TOM/LIZ
12.	Review with Retail Business Group (220 No.).		DICK
13.	Meet again after Planning Commission--Chamber/City and review comments.		STEVE
14.	Talk to others--individual efforts.		
15.	Organize block meetings.		
16.	Present to "Seniors" group.		
17.	Present to service clubs.		
18.	Present to churches.		
19.	Present to lodges.		

EAST GRAND FORKS, MINNESOTA
GENERAL REEVALUATION

SUPPORTING DOCUMENTATION
INSTITUTIONAL ANALYSIS

St. Paul District
U.S. Army Corps of Engineers
St. Paul, Minnesota

Contract No.:
DACW37-82-M-1891

INSTITUTIONAL ANALYSIS

EAST GRAND FORKS, MINNESOTA

Arndorfer Associates
Apple Valley, Minnesota

September, 1982

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EXECUTIVE SUMMARY

STATEMENT OF PURPOSE

The purpose of the East Grand Forks, Minnesota institutional analysis is to present a detailed, concise and highly focused analysis of the institutional possibilities for implementing flood control measures in the city. Structural and nonstructural flood control alternatives under consideration include four analyzed herein: 1) levees and floodwalls; 2) zoning; 3) permanent evacuation; and 4) floodproofing. Each are examined in terms of legal, financial, attitudinal and experiential capabilities of organizations potentially responsible for implementation. The remaining two alternatives, insurance and emergency operations, are already established within the institutional structure. They are a part of the no action alternative, which is specifically not included in the analysis (Appendix A, Scope of Work).

It is important to keep in mind that the ultimate flood control plan may actually be a combination of these alternatives. For example, the levee and floodwall alternative requires some relocation of businesses and families displaced to make room for the levee or floodwall. Further, regulation and zoning of the residual floodplain is also necessary. Based on past experience, one alternative is rarely implemented alone.

STUDY AREA

East Grand Forks is in northwestern Minnesota directly across the Red River of the North from Grand Forks, North Dakota. Together, East Grand Forks and Grand Forks serve as a market, retail and service center for the surrounding agricultural-based economy. East Grand Forks is the smaller of the two urban areas. The city, which lies at the confluence of the Red and Red Lake Rivers, has a population of approximately 8,500.

METHODOLOGY

Primary data for this analysis was collected by telephone interview using a standardized questionnaire. The contractor interviewed the highest accessible officer in each organization at the local level with knowledge of issues pertinent to the study. In the larger state and Federal agencies, where responsibilities and programs of interest to this study were delegated to specific Departments or Bureaus, the Manager of the Department or Bureau was interviewed.

LEVEES AND FLOODWALLS

The City of East Grand Forks and the Red Lake Watershed District both have legal authority to construct levees and floodwalls. Financing of the local share can be provided by a bond issue to be paid off by an ad valorem tax. The city's level of bonding is presently sufficiently low for funding to be realistic. East Grand Forks has been extensively involved in the construction of emergency levees and presently are maintaining those levees. With that experience, the city believes that it can honor its operations and maintenance responsibilities by using either its own staff or consultants.

Interrelations required by this alternative include permit approval for construction and operation and maintenance activities by the Red Lake Watershed District and the Minnesota Department of Natural Resources (DNR). In financing the local share, the city would work directly with a bonding consultant; no state approvals or review is required.

The levee and floodwall alternative can be implemented within the existing institutional framework. This alternative has widespread local and regional support. That support is directly related to the number of structures protected, given the final, agreed upon levee alignment, which was not available for this study.

ZONING

Flood plain zoning is already implemented in East Grand Forks. However, enforcement has been characterized by the DNR as lax. The city acknowledges enforcement gaps and attributes them to insufficient staff and a recognition of the adverse effects strict enforcement has on the community. Local informants feel that restriction of development leads to businesses leaving the community because of a lack of available land and tax differential between Minnesota and North Dakota.

Present zoning restriction and enforcement involves interaction between the city and the DNR. The DNR monitors compliance with state and Federal regulations and, in turn, report to the Federal Emergency Management Agency.

The only institutional deficiency existing is the reluctance of local officials to rigidly enforce flood plain zoning.

PERMANENT EVACUATION

Permanent evacuation of families and businesses from the 100-year floodplain would involve approximately one-third of the 3471 housing units in the city. Minnesota statutes provide for relocation projects conducted by either the city or the Housing and Redevelopment Authority of East Grand Forks. Financing the project can be in part by a local bond issue. However, the community would require financial assistance from the State Planning Agency or the U. S. Department of Housing and Urban Development. The city has experience with relocations, but this alternative is more than twenty times greater than previous efforts.

In implementing this alternative, the city would work with the Corps and the Office of Local Government of the Minnesota Department of Energy, Planning and Development. The Office of Local Government is assuming responsibility for administering the HUD Community Development Block Grant Program for small cities in Minnesota during FY 1983.

Institutional deficiencies include insufficient local funds and inadequate staff. Both deficiencies can be filled by funding provided by state or Federal agencies, although there are significant program and funding cuts at both levels.

There is very little local support for this alternative. Local and regional agencies predict widespread exodus from the community and state if it is implemented.

FLOODPROOFING

Floodproofing of individual businesses and residences is a permitted structural improvement under the existing Flood Plain Zoning Ordinance. Consequently, no legal impediments exist. Financially, the alternative demands little from the city beyond additional technical staff. The city has some experience with floodproofing, but this alternative far exceeds local experience.

Institutional deficiencies relate to staff level and possibly the level of technical expertise. The DNR feels, generally, that there is insufficient technical knowledge at the local level in Minnesota. Interaction between the city, DNR and possibly the Corps could fill this possible void.

There is very little local or regional support for the alternative because of the low value of the structures involved and because of the perception of some local and state officials that floodproofing too often fails to achieve its purpose.

EAST GRAND FORKS, MINNESOTA
INSTITUTIONAL ANALYSIS

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September 1982

INTRODUCTION

STATEMENT OF PURPOSE

The purpose of the East Grand Forks, Minnesota institutional analysis is to present a detailed, concise and highly focused analysis of the institutional possibilities for implementing flood control measures in the city. Structural and nonstructural flood control alternatives under consideration include four analyzed herein: 1) levees and floodwalls; 2) zoning; 3) permanent evacuation; and 4) floodproofing. Each are examined in terms of legal, financial, attitudinal and experiential capabilities of organizations potentially responsible for implementation. The remaining two alternatives, insurance and emergency operations are already established within the institutional structure. They are a part of the no action alternative, which is specifically not included in the analysis (Appendix A, Scope of Work).

It is important to keep in mind that the ultimate flood control plan may actually be a combination of these alternatives. For example, the levee and floodwall alternative requires some relocation of businesses and families displaced to make room for the levee or floodwall. Further, regulation and zoning of the residual floodplain is also necessary. Based on past experience, one alternative is rarely implemented alone.

STUDY AREA

East Grand Forks is in northwestern Minnesota directly across the Red River of the North from Grand Forks, North Dakota. Together, East Grand Forks and Grand Forks serve as a market, retail and service center for the surrounding agricultural-based economy. East Grand Forks is the smaller of the two urban areas. The city, which lies at the confluence of the Red and Red Lake Rivers, has a population of approximately 8,500.

Flood control alternatives under investigation, if implemented, have the potential of affecting other institutions in or near the study area. These include Polk County, the Red River Water Management Board, and the Red Lake River Water District. Each of these and other institutions will be described in greater detail in this report.

AVAILABLE DATA

General background data concerning the project and alternatives under study are contained in Plan of Study, Red River of the North at East Grand Forks, Minnesota (1980) and the Grand Forks - East Grand Forks Urban Water Resources Study (1978) prepared by the St. Paul District, Corps of Engineers. More specific institutional data are available from three institutional analyses prepared for the St. Paul District.

The Grand Forks - East Grand Forks Urban Water Resources Study: Institutional Analysis (1977) contains a descriptive inventory of organizations germane to this study. The study also provides some data on legal authorities, although details of the legal mandates were objtained from Minnesota Statutes. Within the data framework provided by this study, two other St. Paul District studies, An Institutional Study for the Pembina River and Park River at Grafton, North Dakota (1982) and Institutional Analysis.

Flood Control Study for the Upper Minnesota River Basin, Minnesota - South Dakota (1980), supplemented data concerning the state and Federal institutions pertinent to the study.

The previous institutional analyses and Minnesota Statutes provided information concerning legal mandates, financial capability and jurisdictions.

In this way the studies influenced subsequent primary data collection. But, these studies lacked the requisite specificity to predict institutional financial, attitudinal and experiential capabilities for the four alternatives studied herein. These details were gathered through telephone interviews.

ASSUMPTIONS

The assumptions underlying this report include:

1. The alternatives contained in the Plan of Study and as explained by the staff of the St. Paul District are accurately described as they will be implemented.
2. The powers, capabilities, interests and interactions reported during the telephone interviews actually reflect the true role of the organizations.

METHODOLOGY

A review of existing data and legal authorities constituted the first step in the study. Relevant federal, state and local organizations were jointly identified by the St. Paul District and the contractor. During conduct of the study additional agencies were added to the interview list when it became apparent that they could be intimately involved in at least one of the alternatives included in the study.

Primary data for this analysis was collected by telephone interview using a standardized questionnaire. The contractor interviewed the highest accessible officer in each organization at the local level with knowledge of issues pertinent to the study. The lowest level interviewed was one senior technical person. In the larger state and Federal agencies, where responsibilities and programs of interest to this study were delegated to specific Departments or Bureaus, the Manager of the Department or Bureau was interviewed.

Secondary data, provided by agency officials, were used to validate the interview data. Thus, the research approach was empirical and quantitative to the fullest extent possible, consistent with the general research design specified in the Scope of Work.

REPORT CONTENT

The remainder of this analysis is presented in four chapters plus Appendixes. The four chapters are: Institutional Analysis of

- Levees and Floodwalls,
- Zoning,
- Permanent Evacuation, and
- Floodproofing.

Each of these chapters are divided into three subsections.

The first subsection analyzes in detail those capabilities required of some non-Corps entity to implement the measure. An example is the capacity to acquire lands, rights-of-way and easements for a structural alternative. The second subsection discusses the organizations that are most able to meet the required capabilities, in terms of their past experience, their legal and financial status, and their attitudes toward implementation of the measure. Interrelations between Federal, state and local agencies comprise the third subsection. The fourth subsection identifies expected institutional deficiencies and perceived opportunites for overcoming them; that is, the required capability missing and modifications to the system that would correct the dificiency.

Finally, the Appendixes contain the scope of work, the questionnaire and the resume of the person responsible for the analysis and conclusions in the report.

ORGANIZATIONS INTERVIEWED

Representatives of the following institutions were interviewed by telephone during the conduct of the study:

Federal
- U. S. Department of Housing and Urban Development

State
- Minnesota Department of Energy, Planning and Development
- Minnesota Department of Natural Resources

Regional
- Lower Red River Water Management Board
- Red Lake Watershed District

Local
- Polk County Assessor (Zoning Officer)
- East Grand Forks City Clerk
- Assessor/Building Inspector
- Housing and Redevelopment Authority

In addition, the Minnesota League of Municipalities provided details of municipal powers granted under Minnesota statutes. The State Auditor's office provided budget and bonding data for the study.

INSTITUTIONAL ANALYSIS OF THE LEVEE AND FLOODWALL ALTERNATIVE

REQUIRED CAPABILITIES

The first alternative being considered by the Corps to reduce flood damage at East Grand Forks is to construct levees and floodwalls. In order for the Corps to cost share in the construction of levees and floodwalls, there are three legal requirements of a public local entity:

- provide all project lands, rights-of-way and easements,
- operate and maintain the levees during the project life, and
- hold the Federal Government harmless.

These three requirements can be restated as a series of capabilities required of the City of East Grand Forks or other political units with jurisdiction over the area. The first group of capabilities are the required legal authorities:

- construct, or cooperate in the construction of levees and floodwalls,
- purchase lands and easements for construction,
- power of condemnation for levee and floodwall construction, and
- assume responsibility for all claims arising from the operation and maintenance of the levee and floodwall system.

In addition to the legal authorities, there are three financial capabilities. The local sponsor must have the capability to:

- acquire lands and easements,
- provide the local share of the cost of construction, and
- provide requisite operation and maintenance.

Beyond the legal and financial capabilities, the local sponsor would also need to possess, or be able to obtain, these functional capabilities:

- technical expertise,
- experience,
- equipment, and
- staff

to operate and maintain the levees and floodwalls.

To these legal, financial and functional capabilities, one additional capability is added:

- the ability to maintain public support for the project in order to assure that the local sponsor meets the continued legal, financial and technical responsibilities.

In short, there must be sufficient public support to assure that all local responsibilities will be met through the life of the project.

In addition to these capabilities, the levee and floodwall alternative requires permanent evacuation of families and businesses to acquire the requisite right-of-way. This aspect is discussed in detail in Chapter 4 of the report.

EXISTING INSTITUTIONAL CAPABILITIES

Legal

The City of East Grand Forks possesses the legal authority to construct levees and floodwalls by virtue of its Home Rule Charter. Section 1.02, Power of the City, states: "The city shall have all powers which it may now or hereafter be possible for a municipal corporation in this state to exercise in harmony with the constitutions of this state and of the United States" (p. 1). Chapter 458.32 of Minnesota Statutes (1980) grants the power to construct levees to cities of the first class (Minneapolis, St. Paul and Duluth). East Grand Forks has that authority by virtue of Section 1.02, therefore. The city also has the authority to be involved in levee systems extending beyond its corporate limits through joint power authority granted cities. The city could contract with the county, the Soil and Water Conservation District and the Red Lake Watershed District for these purposes. There is ample precedent for this including Rochester, Minnesota.

In addition to the city, the Red Lake Watershed District has the authority to construct levees as granted under Chapter 112 of Minnesota Statutes. The district, which includes the drainage area of the Red Lake River, the Grand Marais River and several smaller tributaries which flow directly to the Red River, is granted broad water-resource related powers including construction of dams, levees and floodwalls, and channelization projects. The major objective is water management and providing for orderly use and development of the resources.

Legal authority to acquire, by purchase or condemnation, project lands for rights-of-way and easements are specifically granted to East Grand Forks through Section 1.02 of its Charter by virtue of Chapter 458.32 of Minnesota Statutues and also to the Red Lake Watershed District in Chapter 112. These same chapters also permit the city and the district to hold the Federal Government harmless.

The legal authority to meet the three financial capabilities required of the local sponsor also exist for both the city and the watershed district within the legislative mandates cited in the previous paragraph. These powers include taxation and bonding for land acquisition, construction costs and operation and maintenance activities. In addition to these institutions, the Lower Red River Water Management Board has funding capability, although it has never funded a levee project before. Also empowered by Chapter 112, the Management Board is compose of eight Chapter 112 Watershed Districts which are tributary to the Red River in Minnesota and extend from Breckenridge to the Canadian border. The Board has taxation authority under Chapter 112. Funds are appropriated by the Board which is composed of one elected representative from each Watershed District. Revenue generated by the 2 mill ad valorem tax is split into two parts. One half remains with the Watershed District and one half is pooled and allocated by the Management Board.

Financial

Final cost estimates for the levee and floodwall alternative and determination of the local share are not yet available. Therefore, it is not possible to draw definitive conclusion concerning ability to provide the local share. But legal authority is only one aspect of financial capability; the ability to finance the project is also dependent upon the financial health of the

local sponsor. Statutes provide for local funding; state funding requires specific action by the legislature. This discussion focuses on local sources.

Under Minnesota Statutues, funding for levees and floodwalls is by bonding to be paid by a special tax assessment. While there is a statutory limit of 6.67 percent of total assessed valuation on General Obligation bonding, there is no limit on special assessments. Even so, examining the indebtedness of East Grand Forks provides one measure of fiscal health. Table 1 presents the total indebtedness of the community as of 31 December 1981.

TABLE 1
EAST GRAND FORKS BONDS OUTSTANDING[1]
31 DECEMBER 1981

Type of Bond	Amount
General Obligation	$1,690,000[2]
Special Assessment	5,990,000
Revenue	1,205,000
Refunding	1,975,000
Highway Aid	200,000
TOTAL	$11,060,000

[1]Source: State Auditor's Office, 1982.
[2]The general obligation bond limitation for the city is $1.9 million.

The $11,060,000 total indebtedness equals a per capita indebtedness of $1,345.66 (based on an estimated 1981 population of 8,219). This compares with a total annual per capita revenue of $542.03. Over the last four years, total bonded indebtedness of the city has decreased by 12.8 percent (Office of the State Auditor, Economic Vitality, p. 5).

Another measure of the fiscal health is the city's bond rating established by Moody's. Table 2 indicates that the city's rating of Baal is in the lower 30 percent of cities in Minnesota over 2,500 populaiton. A spokesperson for the State Auditor's office expressed the view that the rating was typical of a city of that size in Minnesota.

Thus, while a definitive conclusion is not possible, it would appear that special assessment bonding is realistic for this alternative. It should also be pointed out that the city anticipates that implementation of this alternative will increase total assessed valuation in the city. The reason for this is that housing improvements and construction of new units are anticipated after the levees are in place, since housing maintenance now is being deferred. (Such development may be incompatible with EO 11988 which states that to the extent possible, the Corps will avoid inducing development in the base floodplain unless there is no practicable alternative. However, under Minnesota statutes, the DNR has no practical mechanism for preventing induced development behind levees.) Local officials anticipate

TABLE 2
MOODY'S BOND RATINGS OF MINNESOTA CITIES[1]

Rating	Number	Percent
AAA	2	1.4
AA1	1	0.7
AA	11	7.4
A1	18	12.2
A	72	48.6
BAA1	24	16.2
BAA	15	10.1
BA	5	3.4
TOTAL	148	100.0

[1]Source: Office of the State Auditor, 1982. Bond ratings are maintained only for communities with recent bonding activity. Therefore, not all cities have current ratings.

improvement to occur behind the levees. This leads to a favorable increase in the tax base and makes it easier for the city to meet its debt commitments.

East Grand Forks is not the only potential local sponsor. The Red Lake Watershed District stated that it has the authority to sponsor the project. The district has the capability to levy a special assessment on the property protected by the levee in the same manner as the city of East Grand Forks. The district would assume the responsibilities only if the city requested it to do so.

Experience

The city of East Grand Forks appears to possess the requisite capability with respect to experience. It is presently maintaining the emergency levees that exist in the community. However, premanent levees and floodwalls are likely to require maintenance activites that are more extensive and complex than now. However, local informants were confident that the city's Highways and Streets Department possessed sufficient experience to meet the responsibilities. The reasons given for that position were that the city has been intimately involved in constructing and repairing emergency levees during and after past flood emergencies. Further, the city has used its earthmoving equipment for precisely these purposes. While the workload and budget requirements would increase, local informants see no significant difficulty given the local commitment to the levee alternative.

Attitudes

The levee and floodwall alternative is the one preferred by all local and regional officials interviewed. Based on their responses, this alternative is the only one that will receive widespread public support. There was unanimous agreement that the levee alternative was the one for implementation. Any other alternative under study would irreparably harm the city in their view. This point will be discussed in the chapters on zoning, relocation and floodproofing.

One local informant expressed concern for the number of structures that would be taken for this alternative. That person stated a desire for the use of floodwalls whereever possible to minimize the number of structures taken. The preferred levee alignement was as close to the river as possible.

INTERRELATIONS

It is appropriate to discuss the interrelations that are required if the levee and floodwall alternative is implemented. These interrelations are categorized as legal, financial and technical.

Legal interrelations involve the Corps, Minnesota DNR, the Red Lake Watershed District and the city of East Grand Forks. Polk County will also be involved if levees extend beyond the city limits.

Permits for levee construction are required by the Corps, Minnesota DNR and the Red Lake Watershed District. Each of these institutions have the authority to review and approve the details of construction.

In financing the project, the city of East Grand Forks needs no approvals beyond the city. No state agency will be involved in review or approval of the bond issue, beyond the standardized fiscal reports to the State Auditor. The city uses a private bond consultant for the actual bond issue. If the Red Lake Watershed District was the local sponsor, The same process would be followed, except that the Lower Red River Water Management Board would also pass on the issue.

The Red Lake Watershed District indicated that levees and floodwalls would not adversely affect any of their other water resource projects along the Red Lake River and its tributaries. The Lower Red River Water Management Board concurred in this opinion. That institution felt that any effects would be restricted to the immediate East Grand Forks area.

In performing operation and maintenance activities, East Grand Forks would be the probable responsibile agency, no matter who financed the project. The Red Lake Watershed District has no experience in levee operation and maintenance and has no particular desire to do so. Technical assistance could be provided by the DNR and the Corps, with the Corps likely providing the bulk of assistance.

INSTITUTIONAL DEFICIENCIES

There appear to be no existing deficiencies among the institutions that would adversely impact the implementability of the levee and floodwall alternative. Legal authority clearly exists. Insofar as the financial requirements are understood locally, it appears that local funding is possible. Because of the long history of flooding and floodfighting, the community believes that it possesses the requisite level of technical expertise, the equipment and staff to safely operate and maintain the levees and floodwalls.

INSTITUTIONAL ANALYSIS OF THE ZONING ALTERNATIVE

REQUIRED CAPABILITIES

Use of flood plain zoning to control further development is the second alternative analyzed in this report. In order for zoning, a long-term solution, to be used East Grand Forks would be the responsible local governmental unit. Legal and financial requirements for this alternative include:

- capability to zone the lands subject to flooding,
- authority to enforce zoning regulations, and
- sufficient budget allocation to maintain stafff and support requirements.

Beyond these legal and financial requirements, the city would also need these functional capabilities:

- technical expertise, and
- experience

with flood plain zoning enforcement.

There are two additional requirements for the local interests:

- alternative areas to develop in or adjacent to East Grand Forks, and
- the ability to maintain a viable, cohesive local community as businesses and families are displaced through zoning restrictions.

That is, zoning restricts structural improvements, ultimately leading to abandonment. When families and businesses move from the floodplain, they must have both the land and the impetus to remain in East Grand Forks. While Federal agencies maintain a perspective broader than local or regional, the local interests and the state have a narrower view.

EXISTING INSTITUTIONAL CAPABILITIES

Minnesota statues, Chapter 462.357 provides general zoning authority for municipalities. The authority extends two miles from existing corporate limits into adjacent unincorporated areas. In addition, Chapter 104.04 and 104.07 provide for the adoption and enforcement of flood plain zoning regulations.

East Grand Forks has had regulations in effect since 1977. According to the DNR, the regulations are consistent with state and Federal programs. The applicable state programs are defined in "Statewide Standards and Criteria for Management of Flood Plain Areas in Minnesota" (NR 85 to NR 93). The flood plain regulations are incorporated into the community's overall zoning ordinance. Therefore, technically, variances are permitted; actually, no variance can be issued which alters the base-flood elevation requirements.

Enforcement of the regulations has been described as "lax" (DNR) and "moderate" (city). The reason given was that one-third of the city is in the floodplain and local interests want to see the city grow, not stagnate. The city seems to help developers by bending the rules. This leads the DNR to conclude that enforcement is sporadic and not consistent.

Part of the enforcement problem may also be the result of cuts in staff and budget. The city's tax revenues are increasing at a rate below the inflation rate. The building inspector and assesssor's office is composed of two professionals and one administrator/clerk. The staff is currently working nights and weekends to complete its work; consequently, it feels that it cannot enforce all regulations to the letter of the law.

For 1981 salaries in the assessor's office were cut by $16,180, but this has more implications for assessing than for zoning enforcement. Overall, the city is having to cut services. User fees appear to be the only way to generate more revenues for basic services. Even so, local informants anticipate future budget cuts in all areas.

It is apparent that the city does possess the technical expertise and experience to enforce the flood plain zoning regulations. It has been directly involved with enforcement since 1977. Problems identified above relate to the commitment of the city rather than to the quality of the staff.

There seems to be a general belief that pressures to restrict development leads to businesses and families moving out of the community. Local, regional, state and Federal informants feel that pressure to move families and businesses from the floodplain may lead to exodus from East Grand Forks. The State Auditor's Office cited the documented case at Moorhead where businesses forced to move relocated in Fargo, North Dakota, for tax and other financial reasons. HUD officials expressed a similar concern. Local and regional informants believe that this is the case at East Grand Forks as well. Reasons given for this include: 1) the lack of available and developable lands, and 2) tax structure differential between Minnesota and North Dakota. To the local informants, displacement means exodus more often than not. This is a real disincentive to strict flood plain zoning enforcement.

As a final note, the State Planning Agency is presently conducting a study of this border phenomenon. While the study is not now available, future projects located in border communities may find the report useful.

INTERRELATIONS

Flood plain zoning implementation and enforcement is the result of FEMA, DNR and East Grand Forks cooperation. FEMA funds the development of the technical study. A consultant or another Federal or state agency actually performs the study. FEMA and the DNR cooperate to assure that the technical study meets both Federal and state accuracy criteria. East Grand Forks then passed the restrictions based on the technical study. The city has little to say about the base-flood elevations established for the community. Changes to the elevations must be approved by both DNR and FEMA. Beyond the degree of enforcement, there is little option for East Grand Forks. Even there the DNR conducts periodic review of enforcement. One of these reviews led to two meetings in the last year and one-half to resolve problems with enforcement.

INSTITUTIONAL DEFICIENCIES

There are no existing deficiencies in legal authority to enforce the flood plain zoning restrictions. The only deficiencies appear to be the result

of perceived adverse effects to the community's tax base when restrictions are rigidly applied.

INSTITUTIONAL ANALYSIS OF THE PERMANENT EVACUATION ANLTERNATIVE

REQUIRED CAPABILITIES

The third alternative under discussion is permanent evacuation. This alternative is inherent in the levee and floodwall alternative discussed in Chapter 2 where it is necessary for right-of-way and easement acquisition. Permanent relocation is also being considered as a separate solution for flood damage reduction. The only difference in terms of requisite capabilities lies in the magnitude of the relocation and concomitant commitment of local resources.

In order to conduct a permanent evacuation project, a political unit must be empowered by statute with the the legal authority to:

- purchase structures and lands for this specific purpose, and
- use the power of condemnation when necessary.

In addition to the legal authority, there are two financial capabilities:

- to provide the requisite level of staff to operate the program, and
- purchase the large number of properties located on the 100-year floodplain.

Beyond these, the implementing institution must possess, or be able to obtain, these functional capabilities:

- technical expertise,
- experience, and
- staff

to conduct the permanent evacuation program within the constraints established by the program.

Finally, local support for the program will likely be absent unless these requirements are met:

- alternative areas to develop in or adjacent to East Grand Forks, and
- the ability to maintain a viable, cohesive local community as businesses and families are displaced through the evacuation.

These latter two capabilities appear to be particularly important in the specific case of East Grand Forks because of the potential for exodus of families and businesses to North Dakota.

EXISTING INSTITUTIONAL CAPABILITIES

Permanent evacuation from a floodplain is a permissable community redevelopment activity under Minnesota statutues. Chapter 462.415, the Municipal Housing and Redevelopment Act, empowers municipalities to institute and fund housing redevelopment projects. Chapter 472 provides for the formation of a Redevelopment Authority. The authority is funded by a special assessment levied by the community. As a special assessment, the tax and bonding does not fall under the community's tax limit. The authority does not, by statute, have the power to condemn, unless the municipality specifically grants the power to the authority.

East Grand Forks has created the Housing and Redevelopment Authority of East Grand Forks. The organization has existed for 12 years; the executive director also serves as Community Development Director for the city. The staff is composed of one housing specialist, one community development official and three support personnel. Staffing is adequate for its present level of work, but a redevelopment coordinator has recently been laid off. Funding from the U. S. Department of Housing and Urban Development (HUD) grants keeps the organization functioning. As grants increase, staffing increases.

The Authority possesses the power to purchase structures and lands for specific purposes established by the city. The city has extended the Authority the power to condemn in the past. If the permanent evacuation alternative was implemented, the city would have to extend condemnation power to the Authority, or it would have to acquire the properties itself.

The Authority has the power to issue bonds under Chapter 472.09. However, neither the city not the Authority would be able to fund the entire evacuation alone; it would require state or Federal assistance. Both the Corps and HUD have funding programs for such a purpose. The HUD program is scheduled to be passed to the state Department of Energy, Planning and Development, Office of Local Government during FY 1983. That agency will adminster the small cities program in Minnesota (small cities are under 50,000 population). All Federal regulations will remain in force. The only change will be in priority. HUD seemed to favor slum and blight rehabilitation over public facilities and economic development. The state intends to weight these three areas equally for funding purposes. The program will continue to be focused on low and moderate income communities.

Presently, the Authority does not believe that it has the requisite staff to implement this alternative. In the 1970s it had supervised the relocation of approximately 50 families and 31 businesses during an 18 month period. However, at that time, there was a full-time rehabilitation specialist working with the executive director in coordinating activities.

Based on past experience accumulated by the city during urban renewal and flood-damage relocations, there seems to be adequate local experience. Additional manpower, with a high level of experience, is required for a project of any magnitude. Since the number of units involved in the relocation cannot be identified at this time, guidelines can be presented here which will define the magnitude of local requirements.

HUD uses a rule of thumb that one experienced professional can handle approximately 50 relocations per year. Local informants indicate that approximately one-third of the 3471 (U. S. Bureau of the Census, 1981) housing units in East Grand Forks are located in the floodplain. If more than 1150 units are relocated, exclusive of businesses, the alternative far exceeds the capacity and experience of the local authority. HUD further considers more than 50 relocations to be significant for a city the size of East Grand Forks. HUD does believe, however, that the local officials possess the expertise and that additional staff is available in the geographical area.

Beyond the legal, financial and technical capabilities, implementation of permanent evacuation requires continued viability and vitality in order to have local support. There are factors which make this alternative difficult to implement.

First, alternative areas for development in East Grand Forks are limited, and largely prime farmlands. Thus, corporate limits will need to be extended along with considerable capital investment in the requisite city services. City informants expressed concern for the loss of their existing investment in the municipally-owned water, sewer and electricity facilities already in place. These costs coupled with relocation costs are believed to provide a serious strain on the city's resources.

In addition to these considerations, the local community, the Office of the State Auditor and HUD all pointed to an alleged pattern of exodus out of state. Under HUD policies relocation projects include allowing families and businesses to move to the location of their choice. These organizations each expressed the view that some families and businesses will opt to move to Grand Forks, North Dakota. Reasons given were the differing tax structure (most often) between the states and the greater amenities offered by the larger city. Local informants cite the general absence of doctors and lawyers in East Grand Forks as evidence; all doctors and nearly all attorneys are now located in North Dakota. Consequently, local officials fear that relocation will cause large-scale flight to North Dakota. While this is not necessarily a concern when viewing the effects from a National or regional perspective, such views likely have a definite impact on the implementability of this alternative. Local support is questionable.

According to HUD, further considerations that affect the size of the project include the local housing vacancy rate, the housing market, income and interest rates. Only the local housing market is perceived to be no problem. The vacancy rate in East Grand Forks is presently approximately 4-5 percent. This is down from last year's peak rate of 18 percent. (The change is attributed to the seasonal influx of college-aged students). The vacancy rate indicates the order of magnitude of relocations possible in an orderly manner. Additionally, a large percentage of families displaced are likely to have marginal income. It will be difficult for these families to enter the housing market at present interest rates even with the relocation assistance allowance provided by Federal regulations (HUD, 1979). Under these circumstances, extant regulations require governmental provision of "last resort replacement housing". In brief, this includes rehabilitation or addition to an existing dwelling; a replacement housing payment; construction of new housing; relocation (and rehabilitation) of a replacement dwelling; or the purchase of land and/or dwelling for sale to, lease to, or exchange with a displaced person (HUD, 1979). This could materially affect the cost of the alternative. The exact effect cannot be estimated without identification of the housing units and families specifically involved.

INTERRELATIONS

Interrelations required under the permanent evacuation alternative are in a state of transition. Applications filed before the October 1982 deadline will be handled by HUD. The state will assume responibility for applications filed after that period. Thus, East Grand Forks will be working with the Office of Local Government. The interrelation takes the form of grant application, review, program review and technical assistance.

INSTITUTIONAL DEFICIENCIES

Existing deficiencies appear to be centered on the current level of staffing and the question of funding. Both issues can be solved if there are sufficient grant funds available when the project is implemented. Modification to the existing institutions is not necessary.

No agency expressed support for this alternative. The city and the Lower Red River Water Management Board expressed the view that relocation, as the the sole alternative, was not acceptable.

INSTITUTIONAL ANALYSIS OF THE FLOODPROOFING ALTERNATIVE

REQUIRED CAPABILITIES

The final alternative analyzed in this study is floodproofing individual structures. Floodproofing is normally only economically feasible for relatively high value structures. It is sometimes used as one part of an overall flood-damage reduction program which would also include relocation and zoning enforcement.

In order for floodproofing to be a viable alternative, East Grand Forks must have the following:

- o legal authority to permit floodproofing as a legitimate structural improvement within the limitations of the flood plain zoning restrictions.
- o financial capability to assist local businesses and families in implementing the program, and
- o sufficient experienced, technically competent staff to implement the program on a large scale.

The last capability appears to be the most important for this alternative.

EXISTING INSTITUTIONAL CAPABILITIES

As stated previously, the city is empowered to institute flood plain zoning under Chapter 104 of Minnesota Statutues. The Chapter further empowers the Minnesota DNR to promulgate regulations implementing the the act. Those regulations (NR 85-93 cited previously) recognize floodproofing as a legitimate structural improvement on floodplain structures. Further, East Grand Forks has incorporated floodproofing within its ordinance. Thus, there are no legal impediments to implementing the alternative. It should be pointed out, however, that FEMA and the DNR maintain differing positions on floodproofing. While Minnesota accepts it, FEMA does not. However, in Minnesota, FEMA has deferred to the state.

Cost to the city (or other) government for implementing this alternative is perceived to be low. The private land and building owners normally bear the bulk of the cost. The requisite city financial commitment is limited to appropriating sufficient funds to maintian a technically knowlegeable staff. Local officials believe that this can be done by adding one additional position to the assessor/building inspector's office.

The city does have experience with floodproofing. A few homes have been floodproofed in East Grand Forks. But this alternative would require a change in emphasis from almost incidental to a large-scale involvement.

The city sees its technical role as limited to inspection through the building permit process to assure compliance with the regulation. The DNR, however, feels that technical assistance needs to be provided to land and structure owners. It sees that as a problem. The DNR and the University of Minnesota have held seminars around the state which local officials and some consultants attended to discuss the state regulations and technical alternatives available. But, while the DNR was unable to

discuss East Grand Forks specifically, the informant felt that it was difficult to convey to local officials the requisite level of technical expertise under the existing program.

INTERRELATIONS

If this alternative was implemented, then the existing interaction between the city and DNR would continue. However, at least initially, the fequency of interaction will increase. Once the program is established and the community has the requisite level of technical expertise, the frequency of interaction would likely revert to its existing level. Presently, DNR conducts what amounts to a compliance, or program, audit approximately once per year. The audit is essentially a review of the manner in which flood plain regulations are implemented by the city.

INSTITUTIONAL DEFICIENCIES

It appears that East Grand Forks lacks the requisite technical staff to implement a large-scale floodproofing program. Local informants state that the present staff of the assessor/building inspector's office has difficulty completing all of its present assignments within the normal work week. Because of the number of structures located on the floodplain, additional staff in the department appears necessary. Presumably, the additional staff would require at least some technical training.

It would seem that the Corps of Engineers could assist the local community in implementing this alternative. This could be done by providing technical assistance which complements that provided by the DNR.

Another deficiency is the lack of local support for this alternative. Local informants feel that this is not workable because of the large number of low-value homes involved. The capital outlay required is likely to exceed the financial capability of the owners or would not provide a sufficiently high annual rate-of-return to justify the expenditure. This is compounded by the belief that floodproofing too often fails to achieve its purpose.

The city, the Housing and Redevelopment Authority, and the Lower Red River Water Management Board feel that the alternative would not work as the sole alternative.

REFERENCES REVIEWED

Booth, Walter S., 1980: Booth's Town and City Manual for the State of Minnesota. 56th Edition.

Brady, Martz & Associates, 1982: Independent Auditor's Report, City of East Grand Forks, Minnesota.

East Grand Forks, Undated: Charter.

Minnesota Department of Natural Resources, 1981: Flood Hazard Mitigation, East Grand Forks, Minnesota. 35 pp. plus Appendixes.

Minnesota Office of the State Auditor, 1980: Revenue, Expenditures and Debt of the Cities in Minnesota.

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State of Minnesota, 1980: Minnesota Statutes.

U. S. Army, Corps of Engineers, 1977: An Institutional Analysis of the Lower Sheyenne River Basin. 93 pp. plus Appendixes.

_____, 1979: Grand Forks - East Grand Forks Urban Water Resource Study, Institutional Analysis. pp. 191-278.

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_____, 1980: Plan of Study, Red River of the North at East Grand Forks, Minnesota.

_____, 1982: An Institutional Study for the Pembina River and Park River at Grafton, North Dakota. pp. 49-57.

U. S. Department of Housing and Urban Development, 1979: Relocation and Real Property Acquisition. Handbook 1376.1.

SCOPE OF WORK FOR
INSTITUTIONAL ANALYSIS
EAST GRAND FORKS, MINNESOTA

1.00 Introduction

1.01 Project Description. The St. Paul District, Corps of Engineers, is conducting a flood control study for East Grand Forks, Polk County, Minnesota. Flood damage reduction measures being considered include levees/floodwalls, zoning, permanent evacuation, floodproofing, insurance, and emergency operations. (For more information, see Plan of Study, Red River of the North at East Grand Forks, Minnesota.)

1.02 Contract Purpose. The purpose of this contract is to obtain a Contractor who will use both extant and original data to perform a detailed, concise, and highly focused analysis of the institutional possibilities for implementing specific flood damage reduction measures. Each component will be analyzed by the Contractor in terms of the legal, financial, attitudinal, and experiential capabilities of those organizations possibly responsible for its implementation.

1.03 Product. The Contractor will produce a report (detailed in Section 2.00, below) analyzing the capacity of present institutional arrangements in the study area to successfully implement the local requirements for the following flood damage reduction measures: levees/floodwalls, zoning, permanent evacuation, and floodproofing. Deficiencies will be clearly noted in this report, as will opportunities for modified institutional arrangements to meet such deficiencies.

2.00 REPORT REQUIREMENTS

2.01 Structure of the Report. The Contractor's report will consist of, in the following order, these sections: Executive Summary, Table of Contents, Introduction, Institutional Analyses of Components 1 through 4, Conclusions and Recommendations, Bibliography, and Appendixes. The expected content of these sections is discussed below.

2.02 Executive Summary. A brief summary of major conclusions and recommendations, with a brief recapitulation of supporting data and analysis, this section must be able to function as a separate document.

2.03 The Table of Contents. The table of contents will present all major sections and subsections in outline format with appropriate page numbers.

2.04 Introduction. The introduction must include but need not be limited to a brief description of each of the following: (1) the study area, (2) the purpose of the contract, (3) type of data available and limitations on its use, (4) assumptions unique to this particular investigation, (5) general methodology used, and (6) content and purpose of each major section.

2.05 Institutional Analyses of Measures. Each of the four measures must be discussed in a separate section of the Contractor's report; each section must contain three subsections.

(1) The first subsection will analyze in detail those capabilities required of some non-Corps entity to implement the measure (such as "financial capacity to acquire lands, rights of way, and easements" for levees/floodwalls or "legal authority to issue and enforce zoning ordinances" for zoning). The list of capabilities is provided as Attachment 1 to this scope of work.

(2) The second subsection will discuss the organizations most able to meet the required capabilities, in terms of their past experience, their legal and financial status, and their attitudes toward implementation of the measure.

(3) The final subsection will identify expected institutional deficiencies and perceived opportunities for overcoming them: what required capability seems to be missing, and how might the institutional system be modified to address this deficiency?

2.06 Bibliography. To document compliance with accepted practices in contemporary organizational research, the bibliography will cite all referenced materials and works used in executing this contract.

2.07 Appendixes. At a minimum, the appendixes will contain this scope of work and vitae for the persons responsible for analysis and conclusions in the report.

3.00 METHODOLOGICAL REQUIREMENTS

3.01 Research Personnel Required.

a. Project Manager. The person who is responsible for and directly involved in the management and performance of the contract should have the following characteristics: (1) direct experience in management and performance of related social sciences research for 5 years, including 3 years experience with applied studies; (2) direct experience in managing and/or conducting three studies of the type described by this scope of work, and (3) a full-time employee of the Contractor.

b. Technical Staff. The senior technical specialist should have an advanced degree (or equivalent) in the field of sociology or a related social science, with 3 years of experience in applied social research. This person must be a full-time employee of the firm and must be familiar with institutional analysis. The technical staff must have experience with similar applied social research contracts.

c. Support Staff. The Contractor must have adequate support staff (e.g., secretarial, editorial, graphics) to perform the studies required by this scope of work.

3.02 Data Sources. In addition to information in the Plan of Study, a descriptive inventory of organizations is available in Kannowksi (1977). Most data will be collected by the Contractor through interviews of representatives from the appropriate organizations. (At a minimum, the Contractor must contact the relevant offices of the U.S. Department of Housing and Urban Development, State of Minnesota, Polk County, City of East Grand Forks, Lower Red River Water Management Board, and Red Lake River Water District.) The Contractor will reference other documents, newspaper archives, and other organizations as necessary for accuracy, thoroughness, and clarity. Relevant legislation is cited in other Institutional Analyses, as referenced in 5.00.

3.03 General Research Style. The Contractor must become thoroughly grounded in both the available data and the components being analyzed, must carefully construct analytic links in the chain of logic, and must report the same with clarity and specificity. The Contractor must avoid generalities and unsubstantiated claims. Any biases on the Contractor's part must be controlled during both analysis and reporting stages.

3.04 Presentation Format. The Contractor must present information primarily in a narrative text. Tables and figures will be used as appropriate in the Contractor's report to clarify or support the text, and these must be readily reproducible by standard reproduction equipment. The title page of the report will indicate the source of funds used to conduct the work, the contract number, the name of the Principal Investigator, and the date. Text material must be typed on 8½- by 11-inch bond paper with a 1½-inch margin on the left and bottom, and 1-inch margins on the top and right.

4.00 CONTRACT ADMINISTRATION

4.01 Contract Supervision. The extent and character of the work to be accomplished will be subject to the general supervision, direction, control, and approval of the Contracting Officer or his/her designee.

4.02 Contractor Responsibility. The Contractor will furnish the labor, supplies, and equipment needed to complete the study and to produce the report as outlined in this scope of work.

4.03 Checkpoint Meetings. Two telephone checkpoint meetings will be held to direct study investigations and to maintain study progress. These meetings will be scheduled for the following milestones at the Contracting Officer's discretion:

a. One week after contract initiation. This meeting will be to verify the Contractor's understanding of the flood damage reduction measures and to discuss the Contractor's analysis plans.

b. One week after the draft report has been received by the Contracting Officer. This meeting will review comments on the draft and verify the Contractor's plans for responding to those comments.

The Contractor will be required to prepare a brief memo for record after each checkpoint conference, summarizing the material discussed and conclusions drawn. This memo will be submitted to the Contracting Officer for approval one week after the meeting.

4.04 Time Schedule. The milestones and study schedule for the Contractor's work are as follows:

a.	Receipt of executed contract	0 days
b.	Checkpoint meeting 1	7 days
c.	Submittal of draft report	35 days
d.	Checkpoint meeting 2	42 days
e.	Submittal of final report	52 days

4.05 Progress Report and Vouchers. Progress reports must accompany the Contractor's vouchers for payment. Each progress report will include a listing of tasks completed, a reference to maintenance of the program schedule identified below, and an estimated percent of work completed. Complete justification will be necessary to support requests for reimbursement not in line with the reported percentage of work completed.

4.06 Report Submission. The Contractor will submit four copies of the draft report. The Contractor will submit one original and 15 copies of the final report, which will include appropriate revisions in response to the Contracting Officer's comments on the draft.

4.07 Release of Material. Neither the Contractor nor his/her representatives will release or publish any sketch, photograph, report, or other material of any nature obtained or prepared under this contract without specific written approval of the Contracting Officer.

5.00 REFERENCES

Kannowski, Paul B. Grand Forks-East Grand Forks Urban Water Resources Study: Institutional Analysis. Research Report No. 21, August 1977. Institute for Ecological Studies, University of North Dakota, Grand Forks, N.D.

St. Paul District, U.S. Army Corps of Engineers. An Institutional Study for the Pembina River and Park River at Grafton, North Dakota. January 1982. (pp. 49-57.)

St. Paul District, U.S. Army Corps of Engineers. Institutional Analysis. Flood Control Study for the Upper Minnesota River Basin, Minnesota-North Dakota. August 1980.

St. Paul District, U.S. Army Corps of Engineers. Plan of Study, Red River of the North at East Grand Forks, Minnesota. September 1980.

EAST GRAND FORKS
INSTITUTIONAL ANALYSIS

1. BACKGROUND/INDIVIDUAL DATA

Interviewer____

a. Agency Name:
b. Office/Branch:
c. Address:

Date_____

Time_____

City/State/Zip

d. Name of Respondent: Title: E_A_Ot_

e. Is this job your primary employment? Y_N_
If NO - What is your primary employment?

f. How many years have you been working for this organization? ___Years.

2. STAFF COMPOSITION/EXPERTISE

a. What is the staff size of this organization [department, office], in full time equivalents? __FTE.

b. What are the basic areas of your organization's staff expertise?

Area	FTE	Area	FTE

c. Approximately how many FTE employees serve primarily in each area?

d. Do you feel that your organization has adequate staff to accomplish its work? Y_N_.

If NO. How does this lack of adequate staff affect your organization?

e. Do you expect a change in the number of employees over the next two years? Y_N_.

If Yes. Explain how it will change.

f. How will this change affect your organization?

3. JURISDICTION (for non-political units only)

What is the jurisdictional level of your organization?

International	State	Municipal
National	Regional	Town
Multistate	County	Other _____

4. FINANCE

Next are a series of questions related to your organization's finances.

a. Do you feel that your organization has sufficient funding to conduct its work? Y_N_.
If NO. Which areas need additional funding?

b. Have you experienced budget cuts in the last two years? Y_N_.

[If Yes] Cause:

c. In what areas have you to cut back because of the budgetary cuts or problems?

d. Do you expect future budgetary cuts or problems? Y_N_.

e. How will these cuts affect your present functions?

f. If your organization needs additional funds, how can they be obtained?

5. MAJOR OBJECTIVES

What are the major objectives set by your organization?

a.

b.

c.

d.

e.

6. EXISTING EMERGENCY LEVEES

a. During past flood events, emergency levees have been constructed in East Grand Forks. To your knowledge, are these levees maintained? Y_N_.

If YES, What organization conducts that maintenance?

NOW I WANT TO ASK A SERIES OF QUESTIONS CONCERNING FOUR ALTERNATIVES BEING CONSIDERED IN THE EAST GRAND FORKS FLOOD CONTROL STUDY. THE FOUR ALTERNATIVES ARE: levees and floodwalls, zoning, permanent relocation, and floodproofing.

7. The first alternative that I want to discuss is the construction of levees and floodwalls in East Grand Forks. If levees and floodwalls were the selected alternative, would your organization become involved in any of these activities:

a. Acquiring lands or easements for rights-of-way? Y_N_.
If YES:
1) Do you have the power of eminent domain for this purpose? Y_N_
2) Would you work with any other agencies in acquiring these lands/ Y_N_.

3) Which ones?

Agency	Interaction	Required by Law

4) Could you explain how your organization works with these organizations?
5) Is that interaction required by law?

b. If levees and floodwalls were the selected alternative, the Corps of Engineers' regulations require that a local agency share in the cost and provide lands for the levees and floodwalls. Is your agency willing to provide all or part of the local share? Y_N_DNK_

Comments/Conditions:

1) If NO, Who do you think should cost share?
2) If YES, How would funds be raised for the local share?

3) If YES, Would you work with any other organizations in arranging the funding? Y_N_.
4) If YES, which ones?

Agency	Interaction	Required by Law

5) Could you eplain how you work with these organizations?
6) Is that interaction required by law?

c. If levees and floodwalls were built, a local agency will be required to assume operation and maintenance responsiblities. Is your agency willing to assume the operation and maintenance responsibility? Y_N_DNK_Cooperate_

If YES:
1) Which department of this organization would likely be responsible for [cooperating with] O & M activities?
2) Could you describe the staff of that department?

Expertise	Number	Expertise	Number

3) Would you work with any other organizations in arranging the funding? Y_N_.
4) Which ones?

Agency	Interaction	Required by Law

5) Could you explain how you work with these agencies?
6) Is that interaction required by law?
7) To your knowledge, does this department have any experience in O & M of levees and floodwalls? Y_N_DNK_

d. Does your organization feel that levees and floodwalls are a publically acceptable alternative? Y_N_.
e. Does your organization feel that levees and floodwalls are a politically acceptable alternative? Y_N_.
f. Would this alternative have any workload impacts on your organization? Y_N_.
If YES. Describe those impacts.

g. Would this alternative have any workload impacts on your organization? Y_N_.
If YES. Describe those impacts.

h. Are there any modifications to the levee and floodwall alternative that would make it more acceptable to your organization? Y_N_.
Describe:

7. The second alternative that I want to discuss is the use of floodplain zoning to restrict further development in areas subject to flood. Presently, a Flood Plain Zoning Ordinance is in force in East Grand Forks. Does your organization have any involvement with that ordinance's enforcement or implementation? Y_N_.
[If No, go to Q. 7k]
If YES:

a. Does your organization have legal authority to zone lands within East Grand Forks or Polk County? Y_N_Rec_Coop_.
b. Does your organization have legal authority to enforce zoning ordinances? Y_N_Rec_Coop_.
c. Does your organization have the authority to recommend or approve variances to the Flood Plain Zoning Ordinace? Y_N_.
d. Do you work with other agencies in administering the zoning ordinance? Y_N_.
e. Which ones?

Agency	Interaction	Required by Law

f. Could you explain how you work with these organizations?
g. Is that interaction required by law?
h. Which department of this organization is responsible for [cooperating with] zoning enforcement?
i. Could you describe the staff of that department?

Expertise	Number	Expertise	Number

j. To your knowledge, how many years of experience does this department have in administering the Flood Plain Zoning Ordinance? __Years.
k. Does your organization feel that the flood plain zoning alternative is publically acceptable? Y_N_.
l. Does your organization feel that the flood plain zoning alternative is politically acceptable? Y_N_.

m. Would this alternative have any workload impacts on your organization? Y_N_.
If YES, Describe those impacts.

n. Would this alternative have any budget impacts on your organization? Y_N_.
If YES, Describe those impacts.

o. Are there any modifications to the levee and floodwall alternative that would make it more acceptable to your organization? Y_N_.
Describe.

8. The third alternative that I want to discuss is the use of permanent relocation, that is, to move all residences and businesses out of the area subject to flooding to higher ground in or near the city. If that alternative were accepted, would your organization have any involvement with the relocation process? Y_N_/
[If NO, go to Q. 8g].

If YES:

a. Does your organization have the authority to purchase, condemn or otherwise acquire structures under a relocation program? Y_N_.
b. Does your organization have the financial capability to conduct a relocation project? Y_N_Part_
c. Who does, or who do you think should, provide the funds for a permanent relocation project?
d. Which agencies would you cooperate with in implementing the permanent relocation?

Agency	Interaction	Required by Law

e. Could you explain how you work with these organizations?
f. Is this interaction required by law?
g. Does your organization feel that permanent relocation is a publically acceptable alternative? Y_N_.
h. Does your organization feel that permanent relocation is a politically acceptable alternative? Y_N_.
i. Would this alternative have any workload impacts on your organization? Y_N_
If YES, Describe those impacts:

j. Would this alternative have any budget impacts on your organization? Y_N_.
Describe those impacts.

k. Are there any modifications to the permanent relocation alternative that would make it more acceptable to your organization? Y_N_.
Describe:

9. The fourth alternative that I want to discuss is the use of floodproofing around individual structures. Floodproofing is normally only feasible around high value structures. If that alternative were selected, would your organization have any involvement with implementing floodproofing? Y_N_.
[If NO, go to Q. 9j].

If YES:

a. Does your organization have any experience with floodproofing structures? Y_N_.
If YES, Describe:

b. Does, or would, your organization's involvement in floodproofing include assisting home or business owners in financing floodproofing costs for their structures/ Y_N_/
If YES, Describe:

c. Does your organization have any experience with floodproofing structures? Y_N_.

d. Will your agency have the technical capability to assist local home and business owners with floodproofing their structures? Y_N_.
If YES, Describe:

e. Do you know of any local or state agency that has been involved in floodproofing in or near East Gand Forks or Polk County? Y_N_.
If YES, Which organizations?

f. Do you work with other agencies in administering the floodproofing program? Y_N_.

g. Which ones?

Agency	Interaction	Required by Law

h. Could you explain how you work with these organizations?

i. Is that interaction required by law?

j. Does your organization feel that floodproofing is a publically acceptable alternative? Y_N_

k. Does your organization feel that floodproofing is a politically acceptable alternative? Y_N_.

l. Would this alternative have any workload impacts on your organization? Y_N_.
If YES, Describe those impacts:

m. Would this alternative have any budget impacts on your organization? Y_N_.
If YES, Describe those impacts:

n. Are there any modifications to the floodproofing alternative that would make it more acceptable to your organization? Y_N_.
Describe:

ORGANIZATIONS COMMENT:

Is there anything else that you would like to tell me or any questions that I can try to answer for you?

THANK YOU VERY MUCH FOR YOUR COOPERATION.

Time:_____
Length of Interview: _____
Mode of Interaction: _____
Interruptions:

Any Salient Factors Affecting the Interview:

DAVID J. ARNDORFER, PH. D.

FIELDS OF COMPETENCE

Social impact assessment; institutional analyses; social surveys; computerized questionnaire analysis; environmental impact studies; experimental design; parametric and non-parametric inferential statistical methods; benefit analyses; recreational demand, use and needs investigations using surveys, passive observations, aerial observation and remote sensing techniques.

EXPERIENCE SUMMARY

Experienced in social profiles and assessments, institutional analyses, social surveys and literature searches for various river, harbor, flood control and transportation projects. Environmental impact assessment of harbor, transportation and recreational activities. Developed recreational use measurement with particular emphasis on user surveys and passive observations, use of 35mm and 8mm photography documentation of use as applied to river and lake shorelines.

CREDENTIALS

Ph. D. 1971 - Louisiana State University
Geomorphology and Marine Science

B. S. 1967 - Portland State University

1977 - University of California, Berkeley
Workshop on Survey Administration

EMPLOYMENT HISTORY

1981 - Present ARNDORFER ASSOCIATES
1974 - 1981 Roy F. Weston, Inc.
1971 - 1974 University of Wisconsin, Oshkosh

KEY PROJECTS

Developed social profiles and impact assessments for three proposed harbor and three beach erosion projects on Western Lake Superior for the St. Paul District, Corps of Engineers.

Conducted an institutional analysis of county and community governments along the Upper Mississippi River System. Administrative structure, relationship to other agencies, and concerns toward river resources were determined.

Designed the social impact section for a major EIA for remedial action at 2 radioactive waste disposal sites in St. Louis, MO. Conducted for DOE.

Conducted a study of social impacts associated with dredged material disposal for Rock Island District, Corps of Engineers.

Developed a survey and questionnaire analysis of residents of the English Coulee portion of Grand Forks, ND. The St. Paul District, Corps of Engineers sponsored the study.

Performed a literature search for the Prairie du Chien, WI Post Audit Study for the St. Paul District, Corps of Engineers.

As part of a detailed EIA, a comprehensive social and economic profile of the Duluth-Superior region was developed for the expansion of the Burlington Northern Taconite Transshipment Facility. Details of demographics, housing, employment/unemployment, community services, education and community structure were included. An economic multiplier analyses was used to establish economic effects.

A detailed social profile and impact analysis was developed for Ortran's Coal Transshipment Facility in Superior, Wisconsin. The detailed analysis was very similar to that prepared for the Burlington Northern Taconite Facility.

A detailed social profile and impact assessment was developed for Two Harbors and Lake County, Minnesota as part of a detailed EIA. The assessment included demographics, housing, land use, education, employment/unemployment and community services.

The impacts on transportation systems, community services and employment/unemployment were determined for a grain elevator in Savage, Minnesota. The Grain Terminal Association was the client.

Conducted a personal interview survey of riparian landowners along 30 miles of the Lower Saint Croix River. Used aerial observations and 8mm cameras to determine the contribution of each type of user to total boating. Conducted for the Minnesota - Wisconsin Boundary Area Commission.

A regional mailed survey and 8mm photography were used to determine demand for berthings on Western Lake Superior and Lake Pepin. Benefit analyses were calculated for the St. Paul District, Corps of Engineers.

Conducted 6 additional recreation studies for the St. Paul District, Corps of Engineers. The studies were surveys of private commercial interests in 3 states, hunters in North Dakota, and boaters near Trempealeau, WI and 3 other studies.

Conducted additional recreation studies for IWR, The City of Chicago, the Omaha and the Rock Island Districts, Corps of Engineers.

EAST GRAND FORKS, MINNESOTA
GENERAL REEVALUATION

SUPPORTING DOCUMENTATION
RECREATION AND LANDSCAPE BEAUTIFICATION

EAST GRAND FORKS, MINNESOTA
GENERAL REEVALUATION
SUPPORTING DOCUMENTATION

RECREATION AND LANDSCAPE BEAUTIFICATION

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BACKGROUND PAPER

SUPPORTING DOCUMENTATION

RECREATION AND LANDSCAPE BEAUTIFICATION

INTRODUCTION

This supporting documentation analyzes the effects of the flood control measures on existing and potential recreational opportunities and on the aesthetic environment. The measures are also evaluated to determine which measures could be implemented to visually enhance the project area. Much of the evaluation was conducted for the General Reevaluation Working Papers report dated August 1983. See exhibit A to this supporting documentation.

Two significant changes in recreational opportunities have occurred at the golf course and Rivers Edge Park since preparation of the earlier working papers. The proposed golf course expansion is now a reality. An additional nine holes are being constructed riverward of the original nine holes. The city of East Grand Forks has made a grant application to fund the construction of a proposed 25-unit campground in Rivers Edge Park. The development would include water and sewer lines and a boat launching ramp on the Red River.

FLOOD CONTROL ALTERNATIVE MEASURES

Various levee, floodwall and evacuation measures were evaluated for this report. The recommended plan basically consists of levees, floodwall, and evacuation of the floodplain in the northern part of the city with no evacuation of properties in "The Point" or southern part of the city. The three levels of protection presented vary in height but not in alignment. A detailed description of the alternative measures is contained in the main report. In general, properties not protected by the levees and floodwall would be acquired.

EFFECTS ON RECREATION

The three levels of protection offered by the alternative measures would result from varying the height rather than the alignment of the levees and floodwall. Therefore, the effects on recreation of the alternative measures are similar. The following paragraphs describe effects, beginning at the downstream (northern) end of the project.

The levee would tie into high ground adjacent to the golf course. The proposed alignment would run along the edge of the course, separating the course from the residential areas. It appears that the levee would have minimal adverse effects on the course. Two areas of particular concern are the stretch where the levee passes near the clubhouse and the site of the course expansion. A beneficial effect of the levee would be the physical boundary it provides.

Moving south, the levee would encroach on the existing wooded areas. At River Heights Park, the levee would follow the existing emergency levee alignment. The proposed levee would have a much wider base and result in the loss of some trees. There would be no displacement of recreation facilities.

From River Heights Park toward downtown, the alignment would be through a residential area. The homes left unprotected would be removed, leaving a large area available for recreation. Dike Park, a small park near the emergency levee, would probably be relocated. The park facilities consist of play equipment.

A floodwall is proposed in the central business district. The alignment would be one block farther from the river than the existing emergency levee. Although the height of the wall depends on the level

of protection, it would be approximately 12 feet high.

South of the downtown area, the proposed alignment would extend through Griggs Park, affecting about half of the park. Facilities in the park include a hockey rink and playground equipment. The hockey rink would have to be relocated.

No structural measures are proposed for "The Point" area of East Grand Forks. The property acquired for the flood control project would add to the existing open space.

In summary, the proposed flood control project would affect recreation in two ways. First, existing recreation areas would be adversely affected to varying degrees at the golf course, River Heights Park, and Griggs Park. Second, the levees would offer opportunities for trail activities and associated developments, a beneficial effect. Acquisition of the unprotected properties would result in the addition of approximately 55 acres to the city's open space system. The lands acquired are considered project lands (nonstructural portion) and would be available for cost-shared recreational developments. While these additional lands are considered a beneficial effect, the additional maintenance costs to the city offset some of the benefits.

PROPOSED RECREATIONAL DEVELOPMENTS

The conceptual plan of development contained in the supporting documentation describes a network of trails both on and off the levees. The plan was prepared under the assumption that project lands would be limited to levee rights-of-way. The city was interested in developing trails for jogging, skiing, biking, etc. The plan of development focused on trails due to the lack of developable project lands.

The recommended flood control plan presented in this report is a

combination of structural and nonstructural measures. The resulting project lands are much greater in extent than was assumed in the earlier reports. While this report focuses primarily on the trail system, other justified developments could be constructed. Potential recreation developments will continue to be evaluated in subsequent planning and design phases.

The recreational plan of development presented in this report is based on the following:

- Local residents' desires for fishing areas, campgrounds, trails, picnic areas, and play areas.

- The city's desire to minimize maintenance requirements.

- The city's desire to pursue recreation developments as proposed in the earlier reports.

By implementing the recommended flood control plan, the city would have an expanded open space corridor along the Red River from the golf course on the north to the confluence of the Red Lake River on the south, then continuing along the Red Lake River. There would be no change to the existing open space areas in "The Point" or southern part of the city. Given the city's concern about significantly increasing maintenance costs, it is unrealistic to assume development of the entire corridor. Rather, development should be concentrated in certain areas, with the remainder being natural areas. A trail system would link the various areas.

The following paragraphs briefly describe one potential recreational development scenario. A more complete description can be found in the attached exhibit. This description is not all inclusive, and facilities could be added or deleted during subsequent planning and

design phases.

The northern end of the project, from the golf course to River Heights Park, would remain in a relatively natural state. In areas where structures are removed, some infill planting should be done, and natural succession/invasion should be allowed to occur. A tailwater fishing area should be developed at the dam on the Red River. Venicle access and parking should be provided. Picnic areas could be developed in this area. Just south of River Heignts Park would be a large unloaded area that could be developed as part of the project. Possibilities range from open play areas and ball fields to picnic areas to revegetation as a natural area.

In the area between the Highway 2 bridge and the abandoned railroad bridge to the south, a large number of residences would be removed. Many of the existing trees and shrubs could remain. The area could be managed as a passive recreation area and be allowed to become a natural area.

The DeMers Avenue area is important for the city. A floodwall could provide flood protection in this reach with a number of commercial buildings removed. The city would like to maintain the open space area as a large, well-groomed park. The floodwall would have a textured pattern for aesthetic purposes. See tne figure on page 113 of the main report for an artist's conception of the area.

The city is planning to develop a campground and boat launch in Rivers Edge Park. The development would be outside the flood control project limits and not be affected. However, adjacent project lands could be developed to complement the campground. For example, a fishing area could be developed next to the dam on the Red Lake River. Adjoining project lands could provide for access and parking.

The entire open space corridor would be interconnected by a trail system. The trails would provide opportunities for hiking, skiing, jogging, and bicycling. Some of these trails could be on project lands.

Under the recommended plan, no flood control measures would be implemented in "The Point" or southern area of the city. The conceptual recreation plan had trails developed in conjunction with the proposed levee system. The city could pursue development of a trail system that would link with the system proposed north of the Red Lake River. There would be no recreational cost sharing between the city and the Corps for this part of the system.

A major consideration in development of the open space area is public safety. Besides being safe to use, the facilities and area must be designed to provide for ease of surveillance/access by public safety officials. It is not the intent of the recreational development plan to create remote, inaccessible areas that may foster undesirable activities.

ECONOMIC JUSTIFICATION

Exhibit A indicated that a trail system would be economically justified. Given the reduction in total length of levees but an increase in project lands due to the nonstructural measures, the trail system would still be economically justified.

No recreation plans were developed having facilities such as ball fields, tot lots, or picnic areas on project lands. Facilities in addition to trails could be provided if they were economically justified. Future planning efforts will be directed at exploring potential recreational developments on project lands.

LANDSCAPE BEAUTIFICATION

Exhibit A contains considerable information on measures that could be undertaken. The information is still valid.

In general, three criteria apply when choosing plant material for a particular site. First, the plants must be easy to maintain. A major concern of the city is holding down maintenance costs. Therefore, perhaps the most important criterion would be to select plants which are suitable to the site and require minimal pruning, etc. Second, the aesthetic characteristics of the plant materials must be considered. The third criterion is the wildlife value of the plant materials in terms of cover and food. The relative importance of the latter two criteria would depend on the site. For example, in the Demers Avenue area, the aesthetics would be important. However, attracting wildlife would add to the overall appeal of the area.

SUPPORTING DOCUMENTATION
RECREATION AND LANDSCAPE BEAUTIFICATION

APPENDIX
BACKGROUND PAPERS

RECREATION AND LANDSCAPE BEAUTIFICATION

APPENDIX

BACKGROUND PAPER

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EAST GRAND FORKS GENERAL REEVALUATION WORKING PAPERS
SUPPORTING DOCUMENTATION - RECREATION AND LANDSCAPE BEAUTIFICATION

INTRODUCTION

AUTHORITY

The Flood Control Act of 1944, as amended, and the Federal Water Recreation Act of 1965 (Public Law 89-72) demonstrate the intent of the Federal Government to encourage local units of government to participate in recreation development at Federal water resource projects. The city of East Grand Forks, Minnesota, requested that the Corps of Engineers include potential recreation developments as part of the proposed flood control project. The St. Paul District has discussed the possibility of Federal participation with the city of East Grand Forks and coordinated development of the plans with the city.

PURPOSE

This working paper evaluates available recreation resources in East Grand Forks; projects future public use demands, supply, and needs; addresses flood control measures/exterior impacts on recreation; addresses beautification measures; and illustrates a conceptual plan for development of water oriented outdoor recreation activities.

REFERENCES

The following regulations of the Chief of Engineers were used as guidance in determining recreation development cost sharing with the city and in preparing the proposed concept plan.

ER 1105-2-20 Project Purpose Planning, Guidance (1/82)
EP 1110-1-3 Flood Tolerance Plant Species (1/80)
EM 1110-2-400 Recreation Planning and Design Criteria (9/71)
ER 1110-2-400 Design of Recreation Sites, Areas and Facilities (7/72)
ER 1120-2-400 Recreation Resources Planning (11/71)
ER 1165-2-400 Recreational Planning, Development and Management Policies (8/70)

BACKGROUND INFORMATION

PROJECT DESCRIPTION

East Grand Forks is located in western Polk County in northwestern Minnesota (see figure 1). The city is situated in the valley of the Red River of the North (Red River) approximately 298 miles above the river's mouth.

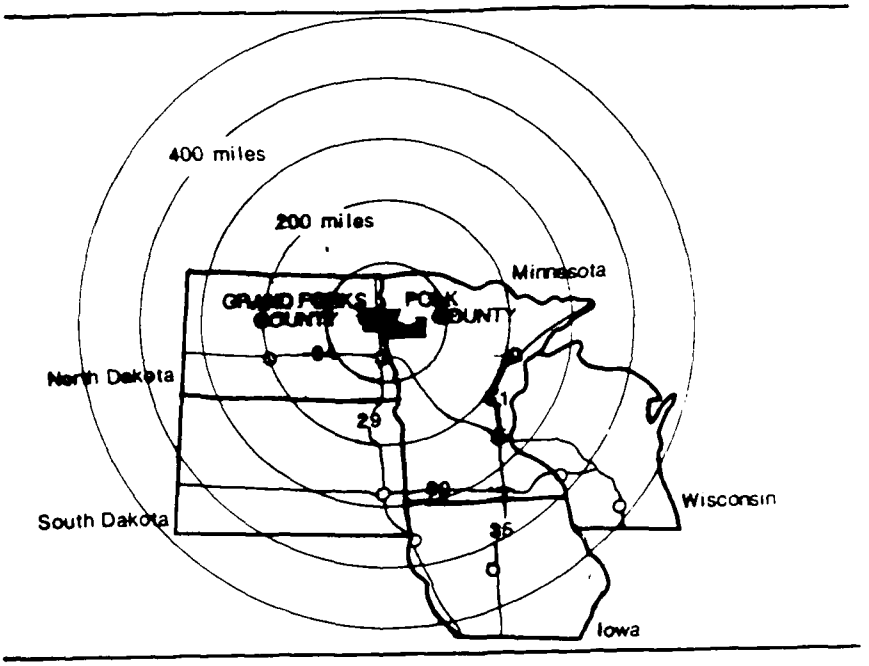


Figure 1 - Location Map

Two major drainage sources converge in the East Grand Forks (Minnesota)/Grand Forks (North Dakota) vicinity. These are (1) the Red Lake River and (2) the Red River of the North and Grand Marais Creek. The floodplains of these two drainage sources are susceptible to frequent and coincidental flooding which affects downtown commercial areas, residential neighborhoods, and agricultural lands (see figure 2). The floodplain of the Red River is about 0.6 mile wide; the Red Lake River floodplain is approximately 0.5 mile wide. Lesser locally significant streams include Heartville Creek and the Grand Marais which crosses the eastern part of the study area and enters the Red River downstream of East Grand Forks.

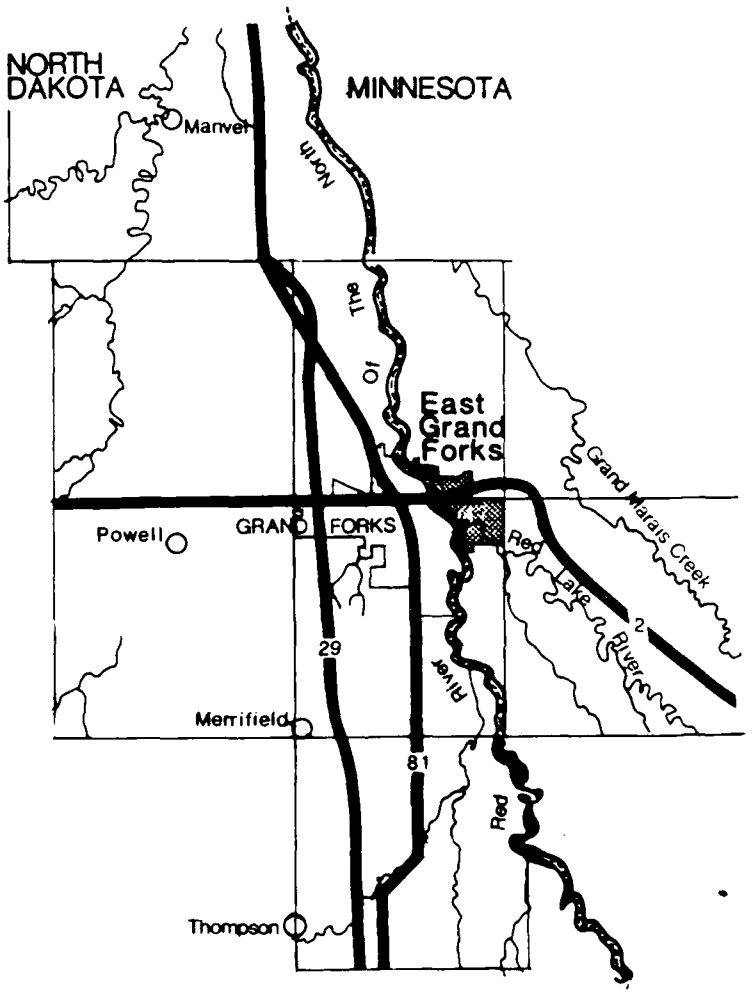


Figure 2 - Regional Location

EXISTING RECREATION FACILITIES

East Grand Forks has 11 city parks with a combined area of approximately 146 acres (see exhibit 2). In addition, the city has a civic recreation center, three play fields at elementary schools, and a 0.25 mile running track and four tennis courts at the senior high school. The city has leased land to the Valley Golf Association which has developed a nine-hole golf course open to the public. Figure 9 shows existing recreation facilities for each of the city's major activity areas.

According to the Background Information Appendix of the Grand Forks-East Grand Forks Urban Water Resources Study, July 1981, East Grand Forks has a population of approximately 9,000. The relationship of parkland to population indicates that East Grand Forks has an average of approximately 1 acre of park area for every 66 people. This compares favorably with the national standard of 1 acre per 100 people.

FACTORS AFFECTING RECREATIONAL DEVELOPMENT

GENERAL

The Background Information Appendix of the Corps of Engineers' Urban Water Resources Study provides detailed data on physiographic, biological, and cultural factors. This information was developed to assist local interests in a variety of water resource and related land resource areas, including water supply, wastewater management, flood control, navigation, shoreline erosion, and recreation. The plans illustrated in this appendix concentrate on recreation-oriented aspects. The concepts use existing physiographical, biological, and cultural factors as a resource upon which recreation and landscape beautification measures would be based.

PHYSIOGRAPHY

Physiographic conditions include geology, mineral resources, soils, water resources, and climate. The Red River basin is one of the world's most productive agricultural areas. The area's fertility is the result of glacial drift remaining from 70,000 years of glacial action. The last glacier retreated approximately 12,000 years ago, leaving rich sediments of clay and silt over 98 percent of the region.

The only significant mineral deposits are sand and gravel which are of glacial origin. Production is geared for local use.

Soil on the North Dakota side of the Red River is primarily medium and moderately fine-textured lake sediments. Soils on the Minnesota side consist of fine textured prairie soils and deep black soil found on glacial lake clay and rich silt.

Orientation, soil condition, vegetation, and slope are site conditions which affect the capability of various areas to support recreation-related activities/facilities.

Figure 3 shows that the soil associations in East Grand Forks are Beardon-Glyndon, Fargo-Hegne, and Cashel-Fairdale-Zell. Figure 4 suggests the limitations of each association to support recreation based on texture, drainage quality, slope, and location.

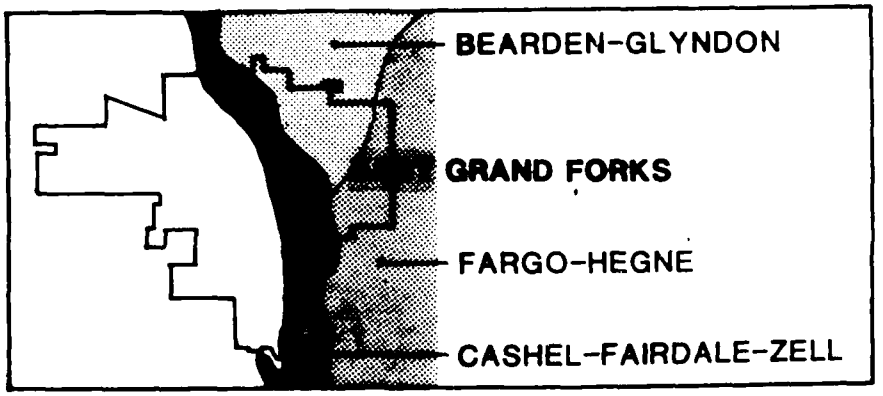


Figure 3 - Soil Map

	Bearden-Glyndon Association	Fargo-Hegne Association	Cashel -Fairdale-Zell Association
Texture	Moderately Fine To Medium	Fine	Loam to Silty Clay
Drainage	Poorly Drained	Poorly Drained	Moderately Well Drained
Slopes	2%+	0-2%	Steep River Bank Slopes to Flat Lowlands
Limitations	Early Spring Wetness, Surface Drainage Req.	Poor Surface Drainage	Periodic Flooding Of Lowlands
Capability to Support Recreation	Medium	Low	High
Location	North & Central Sections	South & Eastern Sections	River Floodplain

Figure 4 - Soil Associations

Figure 5 illustrates the capability of various percentage slopes to support recreational activities.

	Capability To Support Recreation		
	0-5% Slope	6-19% Slope	20%+ Slope
Picnicking	High	Medium	Low
Boating Access	Low	High	Low
Playground	High	Low	Low
Organized Athletics	High	Low	Low
Parking	High	Medium	Low
Driving	High	Medium	Low
Hiking	High	High	Low
Sightseeing	High	High	High
Cross-country Skiing	Low	High	Medium
Snowmobiling	High	Medium	Low
Biking	High	Medium	Low

Figure 5 - Slope Capability

The Red River of the North and the Red Lake River are the most significant surface water resources in the area. No natural lakes or wetlands exist in the study area, although a 180-acre man-made lake exists at Kellys Slough National Wildlife Refuge.

Water quality is directly affected by streambank erosion, agricultural practices, and effluent disposal by upstream communities.

The downtown area of East Grand Forks is frequently affected by indirect flooding (sewer backup and basement flooding). Approximately 1,000 structures in the city are subject to flooding.

Water management activities are accomplished through the coordinated efforts of Federal, State and local agencies. A variety of studies and flood control projects impacting recreation-related activities have been proposed. Completed flood control measures affecting East Grand Forks include reservoir/lake storage, drainage and land reclamation, stream channelization, and levee construction projects. East Grand Forks has floodway zoning and is developing floodplain regulation. The Red Lake River and the Red River of the North offer the only water-based activity areas in East Grand Forks and, as such, are major recreational resources.

The East Grand Forks region has a climate characterized by wide fluctuations in temperature, light to moderate precipitation, plentiful sunshine, and almost constant air movement. Average precipitation during April, May, and June is 7.50 inches compared to less than 2 inches for the winter months. The average yearly snowfall is 34.9 inches. Precipitation during the summer months averages 7.88 inches. The first frost of fall usually occurs in mid-to-late September. The average frost penetration is 4.5 feet, with an extreme of about 7 feet. Total precipitation for October, November, and December is 2.77 inches.

BIOLOGY

Following the retreat of the glaciers from the valley, the former Agassiz Lake plain area was covered by extensive forest. The heavy forest was replaced by prairie vegetation with oak savanna forests. This drier prairie ecosystem remained relatively undisturbed until the mid-1800's when pioneers began to settle in the East Grand Forks-Grand Forks area. Northern floodplain forests consisting primarily of poplar, basswood, willow, and elm have dominated the rivers' edges.

By 1870 settlers had altered the ecotone to the extent that open prairies were being cultivated, and bison, which were earlier a principal food source for Native Americans, were practically extinct. In spite of lumbering activity along the rivers' edges, the original floodplain forest species remain relatively intact.

Although the majority of the area's original bluestem prairie is gone, native grasses survive along roadsides, in game management areas, and on tracts of land administered by the University of North Dakota. Moist lowlands and deep ravines offer protection and good growing conditions for big bluestem, switch grass, Indian grass, and wild rye. Little bluestem, needlegrass, and June grass are mixed in with silverberry and other small shrubs. This vegetation offers protection to a variety of mammals and prairie birds including Hungarian partridge, prairie chickens, and sharp-tailed grouse.

Mature stands of northern floodplain forest along the banks of the area's rivers and streams are dominated by bur oak, hackberry, American elm, basswood, and green ash. Smaller trees and shrubs comprise the understory. This habitat provides food and cover for cottontail rabbits, deer, squirrels, wood ducks, and associated species.

The urban environment, except that immediately along the rivers, offers little significant vegetative diversity.

Figure 6 illustrates the comparison between existing vegetation and recreational activities appropriate to the project. Figure 7 is a composite resource compatibility matrix.

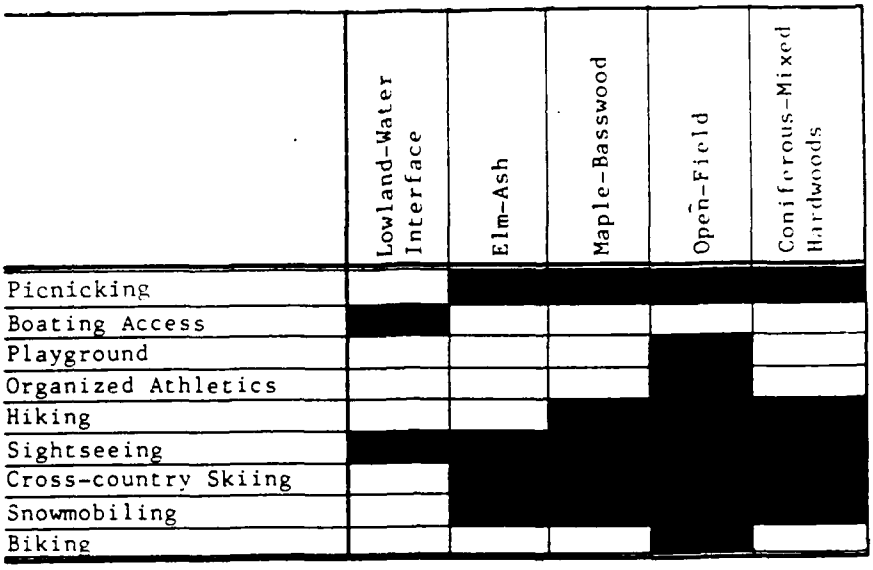


Figure 6 - Vegetative Capability

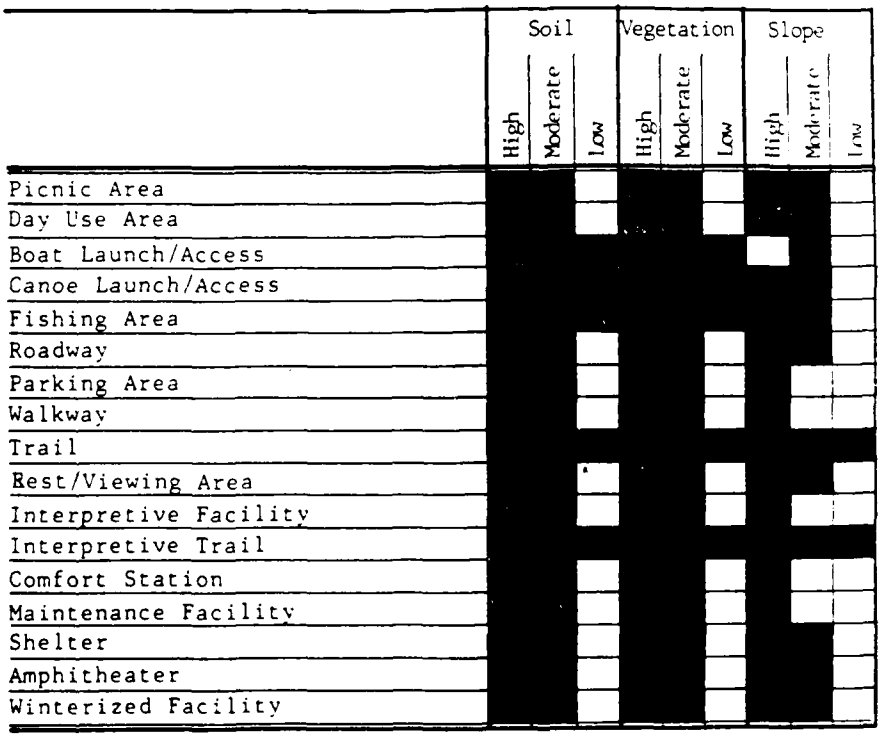


Figure 7 - Resource Compatibility

A variety of mammals, fish, birds, and reptiles inhabit the East Grand Forks area. Abundant mammals include red squirrel, red fox, masked shrew, meadow jumping mouse, striped skunk, and raccoon.

Redhorse sucker, black bullhead, burbot, and freshwater drum are hardy species of the Red River. Rock bass and crappies are the principal sport fish. Walleye and northern pike are limited in the Red River because of a lack of spawning areas. Walleye, carp, and redhorse sucker are common in the Red Lake River's upper reaches.

Within the floodplain forest a variety of birds are commonly sighted including the mourning dove, great horned owl, common crow, woodpecker species, yellow-bellied sapsucker, yellow warbler, grosbeak, and scarlet tanager. Common birds in the urbanized habitat include western kingbird, mourning dove, brown thrasher, American robin, yellow warbler, common grackle, chipping sparrow, purple martin, and house sparrow.

Three reptiles -- the snapping turtle, painted turtle and western plains garter snake -- are commonly found in the East Grand Forks area. Toads, salamanders, and frogs are the most common amphibians.

CULTURAL ELEMENTS

The earliest record of human occupation in the valley dates back to 8000 B.C. Early nomadic bands of people were followed by hunters who returned to the valley after a 2,500-year drought. From 1200 B.C. to A.D. 500 there is no evidence of human occupation, although there are signs to suggest that human activity occurred in the valley during that time.

European explorers and traders arrived in the early 17th century. They were met by a number of Indian groups including the Bungi, Hidatsa, and Dakota. Later groups in the forested portion of the Red River Valley included the Dakota, Sioux, and Assiniboine. The area was initially claimed by the French from whom the land was bought in 1803 as part of the Louisiana Purchase.

East Grand Forks has a population of approximately 9,000. Population distribution by age groups is discussed in the Updated Land Use Plan for the city of East Grand Forks (10/78). The heaviest concentrations occur in the following age groups: 16 to 24, 6 to 15, and 25 to 34. Composite projections for 1990 and 2000 suggest that East Grand Forks' resident population will be 10,737 and 12,376, respectively (according to the Background Information Appendix). Extrapolated projections for 2010, 2020, and 2030 are 14,403, 16,800, and 19,475 (see figure 8). The area's history offers the user population a resource upon which to develop a cultural/recreational theme.

SUMMARY

The factors affecting recreational development - physiography, biology, and cultural elements - are interdependent. These factors offer significant opportunities for recreation and landscape beautification measures when used as resources and incorporated as design considerations in the development of the flood control project.

RECREATION MARKET, SUPPLY, DEMAND, AND NEED

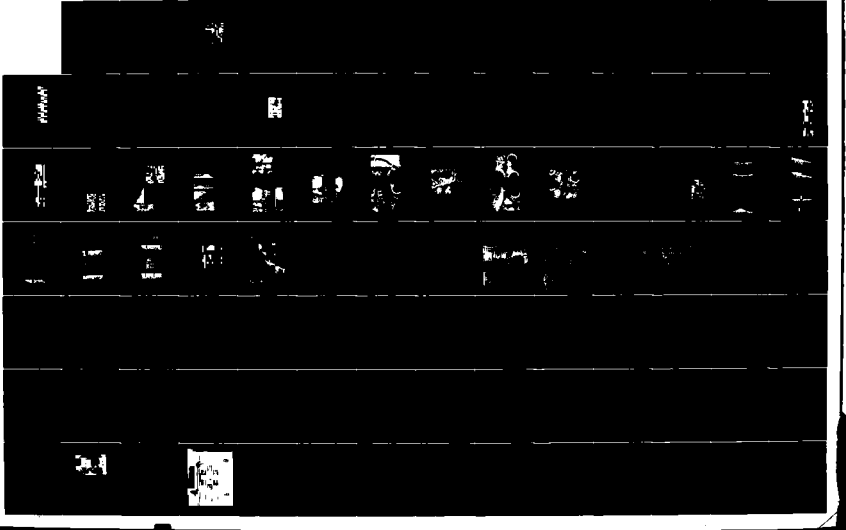
GENERAL

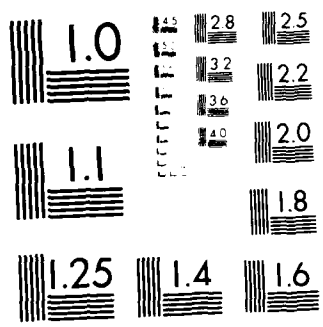
Urban growth and the increased leisure time of an expanding population indicate that greater emphasis on parks, open spaces, and natural areas is needed.

A breakdown of existing public open space for East Grand Forks is illustrated in figure 9. According to the East Grand Forks Parks and Recreation Department, the city has approximately 146 acres of dedicated parkland.

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MICROCOPY RESOLUTION TEST CHART

MARKET

For this study, the market area is defined as the area from which 85 percent of the total day-use visitation can be expected to occur. Based on the Grand Forks-East Grand Forks Urban Water Resources Study Leisure Time Analysis, the zone of influence includes 14 townships which comprise Grand Forks County and Polk County. The existing recreation market area population, as well as the projected population through 2030, is derived from the University of North Dakota's Demographic Analysis and Population Projections.

The population distribution (see figure 8) of East Grand Forks is approximately 20 percent that of Grand Forks and approximately 13 percent of the combined total population of both counties. Projections indicate that this relationship will remain unchanged through the year 2000. East Grand Forks' population is projected to increase to 14 percent of the total study area population in 2010 and remain constant through 2030.

	1980	1990	2000	2010	2020	2030
Total Study Area	69676	80139	91098	104310	119435	136753
Grand Forks	45409	53545	62128	72296	83976	97351
East Grand Forks	9279	10737	12376	14463	16800	19475

Figure 8 - Population Projections

SUPPLY

The following figure illustrates currently available recreation opportunities, based upon information provided in planning documents prepared for East Grand Forks. A facilities inventory prepared by the Parks and Recreation Department in December 1982 is included as exhibit 2. To date, no Land and Water Conservation Funds (LAWCON) have been used by East Grand Forks to implement open space improvements.

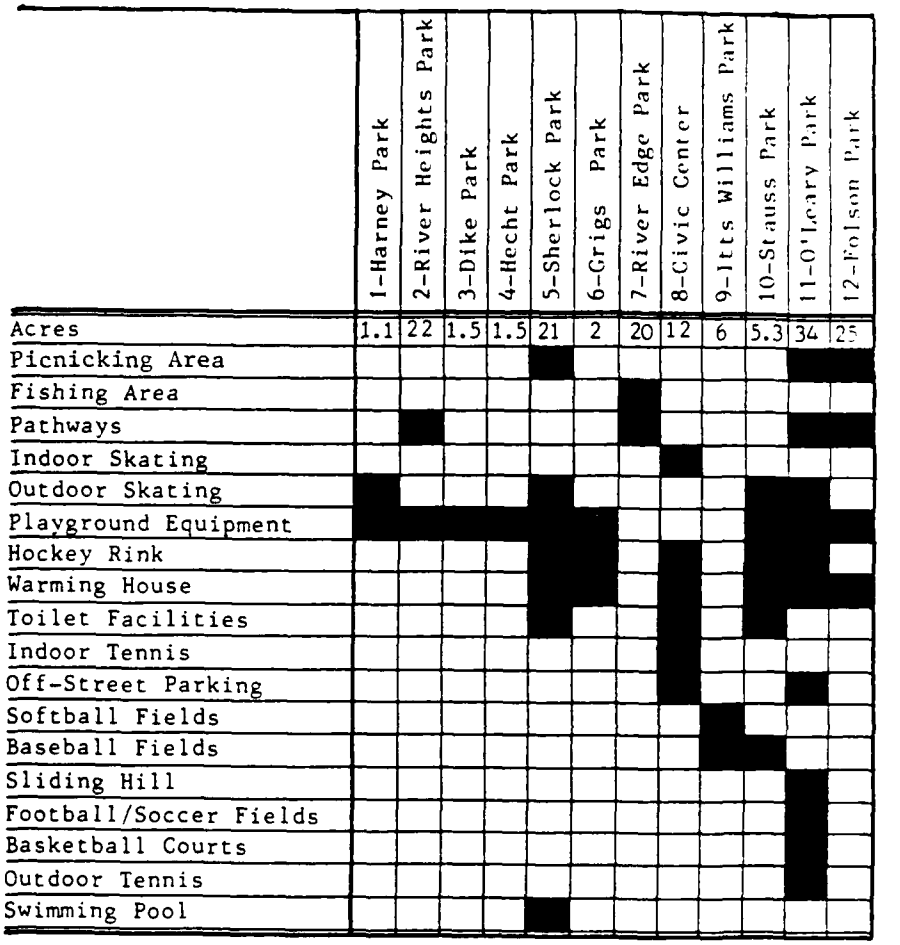


Figure 9 - City Parkland and Recreational Facilities

Current recreational use of project lands allows for informal and generally unstructured activities. The following list of parks and facilities currently available to the residents of East Grand Forks describes the variety of recreational opportunities offered by the city.

Harvey Park - A small neighborhood park located at 19th Street NW and 12th Avenue NW. It contains playground equipment, and a small skating rink is erected in the winter.

River Heights Park - Located on both sides of River Road. The park lies in the floodplain between 17th Street NW and 11th Street NW and floods frequently. The park is heavily wooded and has a small playground.

Dike Park - A small neighborhood park located at the northwestern end of 1st Street NW.

Hecht Park - Located on 10th Street NW between 3rd and 4th Avenues NW. It has a small playground.

Sherlock Park - A fully developed facility offering year-round activities. It is located just north of the downtown business district along 4th Street NW.

Griggs Park - Located at 2nd Street NW and Central Avenue. It serves the neighborhood between the Burlington Northern south tracks and the Red Lake River.

River Edge Park - Floodway land between the Red Lake River and the Red River. Park development is limited because of the frequent flooding. One section of the park begins to the north side of the Red Lake River by the bridge at 2nd Avenue NE and follows the dike and both rivers to 2nd Avenue NW. The other section of the park is the city owned portion of the floodway on the south side of the Red Lake River beginning at the west end of O'Leary Park and following the river to the west to the bridge at 1st Street SE.

Itts Williams Park - Located at 15th Street NE and 5th Avenue NE. It has two baseball/softball diamonds.

Stauss Park - Located at 7th Street NE and 5th Avenue NE.

O'Leary Park - The city's largest park, located at Highway 220 South and 4th Street SE. It offers full service year-round recreational opportunities.

Folson Park - Located adjacent to O'Leary Park at the east end of 4th Street SE along the Red Lake River. It lies in the floodplain and is susceptible to flooding.

The Civic Recreation Center - Located at 15th Street NE and 2nd Avenue NE. It has off-street parking for 750 cars. The center has artificial ice facilities for skating and is also used for indoor tennis, dances, display shows, and other public functions.

Three elementary schools, one public senior high school, and the Valley Golf Association provide additional recreational facilities to the community.

The East Grand Forks Parks and Recreation Department has submitted a 5-year capital improvement plan which addresses proposed development for a number of the city's facilities. The cost of improvements is projected to total $785,700. A breakdown of costs/items for facility improvements and miscellaneous development is shown in exhibit 3.

DEMAND

The supply of facilities for the following activities is inadequate.

- Picnicking
- Bicycling
- Snowmobiling
- Ice skating
- Sledding
- Tennis
- Fishing

This determination is based on (1) the market inventory of existing recreational facilities for Grand Forks-East Grand Forks (1975); (2) data illustrated in exhibit 2; (3) total demand; (4) available facilities; and (5) standards developed by the National Recreation and Park Association.

Sufficient facilities exist to support the following:

- Playing outdoor games
- Golf
- Ice hockey

Because either activity occasions data or standards are not available, no need has been determined for the following:

- Hiking/walking
- Canoeing
- Cross-country skiing

As part of the flood control project, the city has the opportunity to upgrade and/or add areas and facilities to its park system. Based on a Corps of Engineers questionnaire, residents of the city responded to the survey in the following manner.

"If the city decides to expand its park system, what facilities or areas do you think should be developed?"

FACILITY/AREAS	PERCENT FAVORING
Hiking trails	39.2
Picnic areas	41.2
Nature trails	32.0
Skating areas	16.5
Flower garden	22.7
Play areas	30.9
Ball fields	18.6
Tennis courts	14.4
Fishing areas	40.2
Campgrounds	43.3
Nothing needed	10.3

Figure 10 - Facility Developments Desired

"How could the city's present park system be improved?"

IMPROVEMENTS	PERCENT FAVORING
Larger facilities	18.6
Greater variety activities	34.0
Better maintenance	17.5
Better location	7.2
Nothing needed	29.9

Figure 11 - Improvement Methods

The largest percentage of the city residents favored greater opportunities in the development of campgrounds, picnic areas, fishing areas, and trails. Campgrounds would not normally be provided as a component of the flood control project. Therefore, emphasis is placed on the other three areas as part of the conceptual recreation plan.

Projections through 2030 suggest that demand will increase for all activities. Although adequate facilities currently exist for playing outdoor games, golf, and ice hockey, indications are that facilities will be insufficient in the future.

Total activity will continue to increase with bicycling having the greatest demand. Playing outdoor games is the next activity followed by picnicking, golf, fishing, tennis, ice skating, snowmobiling, ice hockey, sledding, hiking, and canoeing.

Based on current projections, the need for facilities in East Grand Forks will approximate 13 to 14 percent of the facilities projected in the Energy Conservation and Recreation appendix to the Urban Water Resources Study (see figure 12).

	1980	1990	2000	2010	2020	2030
Picnicking Tables	132	168	203	278	353	410
Bicycling/Walking Trail Miles	4	7	10	11	12	13
Snowmobiling Trail Miles	4	4.5	5	6.3	7	7.6
Ice Skating Rinks	1	1.4	2	3.5	4.6	5.7
Sledding Acres	10	13	15	19	22	25
Tennis Courts	1	3	7	14	20	27
Fishing Acres	1406	1665	1923	2300	2626	2865
Playing Outdoor Games - Acres	0	1	2.1	5	7	9
Golf Courses	0	<1	<1	<1	1	1.1
Ice Hockey Rinks	0	<1	<1	2	3	5

Figure 12 - Facilities

AGENCIES

Agencies and institutions responsible for assisting with recreation planning in the East Grand Forks area include:

- East Grand Forks Parks and Recreation Department
- East Grand Forks School District
- Heritage Conservation and Recreation Service
- Minnesota Department of Natural Resources
- Polk County Commission
- Corps of Engineers, St. Paul District

NEED

Projected need is assessed by subtracting demand from supply. The East Grand Forks Recreation Facility Study, prepared by the Recreation Administration, University of North Dakota, in 1977, recommended the development of water-based facilities to improve the appearance and provide greater use of floodplain areas. In an effort to increase the ratio of parkland to population, the recreation facility study also suggested that the city: (1) increase budgetary allotments for maintenance and development; (2) acquire land in the extreme north and south areas of the northeastern segment of the city; (3) provide 6 percent of landowners' total gross acreage in new subdivisions for parks with a minimum of 2 acres; (4) develop a tot lot and park between 8th and 9th Streets at 10th Avenue North to beautify the entrance to the city; and (5) develop marked bike routes through the city, as well as bike and hiking trails paralleling the Red River of the North and Red Lake River.

FLOOD CONTROL MEASURES

Flood control measures considered for East Grand Forks include levee construction, channelization, upstream reservoirs, and diversion. Channelization and reservoirs were determined to be inappropriate solutions. Diversion was ruled out, since it proved to be not cost effective. Levee construction is the technique selected as most beneficial. Considerations associated with levee development are floodplain zoning, floodproofing, and evacuation. None has a negative effect on recreational development.

Plans are currently being developed and refined by the Corps of Engineers to maximize floodproofing benefits and minimize disruption to existing and/or potential recreation sites. By using a combination of the approaches discussed above, river access and the open space system should be maintained and enhanced through the innovative design and construction of floodwalls and levees. Floodwalls, especially in the downtown area, should be developed carefully to be both functional and attractive. Measures to create and

implement an aesthetically pleasing floodwall might include height and scale variation, texture, color, pattern, form, planting, and relationship to other downtown area streetscape elements.

Potential trails could benefit from any future alternatives because hiking, biking, and snowmobiling trails could be provided on the crest of the levees. The trails should be coordinated with levee construction and included as a cost of the project. The levee side slopes might also be used for snow sledding, tubing, and practice skiing if they are not too steep.

Unloaded areas should be minimally developed because old levee alignments in these areas are geotechnically sensitive. Low activity recreation development in these outdoor areas could include unstructured open space such as ball fields. Levee borrow areas should be reviewed to ensure that they are not within identified potential recreation sites and do not adversely affect those sites.

CONCEPT PLAN FOR DEVELOPMENT

COMPREHENSIVE CONCEPT PLAN

The comprehensive scheme on plate 1 shows a linear park-like system which links existing open spaces and publicly used lands along three river reaches through East Grand Forks. The schematic suggests the type and variety of recreational and landscape beautification improvements that are possible. Specific design solutions should be developed when the city, as a non-Federal sponsor, and the Federal Government enter into a cost sharing agreement. Plate 1 illustrates the conceptual alignment of the flood control structures as determined by the Corps of Engineers. The overall reach of the Red River of the North along the western city limit is approximately 4.3 miles. Approximately 2.1 miles of the Red Lake River run through the city.

The area of study comprises three reaches along the length of these two rivers. Reach A (River Heights Park zone) occupies the northwestern portion

of the city. Reach B (River Edge Park zone) includes the central business district. The southern limits of the city make up reach C (O'Leary/Folson Park zone).

The linear earthen flood barrier in reaches A and B is approximately 13,600 feet long and generally parallels the Red River from the southern limit of the central business district north to the Valley golf course in the northwestern corner of the city. The O'Leary/Folson Park zone, in reach C, is protected by a ring levee about 2.6 miles in circumference.

Reach A

The conceptual levee alignment through reach A would impact River Heights Park as well as portions of the residential area within the zone. The existing floodwall lies between the Red River and River Road. Its new location is along the western limits of the park.

Reach B

The city's downtown area is significantly affected by the alignment of the floodwall through the commercial business district. The levee alignment through River Edge Park moves north and east. As a result, the surface area of Griggs Park is reduced.

Reach C

No parkland in the western half of reach C is impacted negatively although a number of residences would be affected. Folson Park in the northeastern section of reach C borders the western and southern shores of the Red Lake River. This park is primarily open space located between a residential area and the natural wooded shoreline. The areas affected include a large open tract of land through which the levee is proposed and an outdoor ice rink.

CONCEPTUAL OPEN SPACE SUMMARY

Overall, no significant adverse impacts to parkland would occur as a result of the conceptual alignment. However, river access and use could be restricted at a number of locations. The flood control plan offers potential benefits including new river access points and potential trails for hiking, biking, and cross country skiing. While no major acreage is either lost or gained, the conceptual levee alignment would incorporate site development modifications. This reorganization should allow for a clearer pattern of pedestrian, vehicular, and service circulation.

The aesthetic qualities of parks and open space within the study area may be altered on a short-term basis by changes in topography, loss of vegetation, and new levee/wall alignments. The long-term result, however, may prove more beneficial from both a functional and visual aspect.

Landscape development, site furnishings, and beautification measures will be implemented as the existing flood control structures are replaced by the new levee alignment.

The extent of site improvements will depend upon (1) the city's recreation demand vs facilities ratio, (2) funding, and (3) the length, type, and location of flood control measures instituted by the Corps of Engineers.

DEVELOPMENT CONCEPTS

The conceptual framework plan includes River Heights Park zone, River Edge Park zone, and O'Leary/Folson park zone. A typical site within each zone has been selected for concept design. Corps of Engineers assistance may include participation in the development of walking/biking trails, landscape beautification, site furnishings, and related outdoor recreation facilities. Plate 1 - Recreational Development concept - indicates the relationship of each zone/reach to the others within the context of a comprehensive open space system.

Reach A takes on a passive, natural character. Reach B, the central business district, has a downtown community flavor. Reach C is oriented toward active recreation. The most visibly consistent element throughout the project, in addition to the levee, is the trail system. Each of the three reaches is linked by a network of looped trails. The 8-foot wide limestone aggregate trails serve a multiple function combining bicycle and pedestrian paths. The trail system would also serve as a maintenance/emergency access road for the flood control project. The exact location of this trail system would depend on the final levee alignment and available right-of-way.

The conceptual limits of the levee are illustrated on plate 1. The trail is located on top of the levee and/or along alignments that provide visual interest through open spaces within the floodplain. Access to the pathway system is provided at key points along the levee. These access points generally occur where an existing road or pathway intersects the flood control structure.

Based on demand, supply, existing site conditions, and aesthetics, a variety of activities and facilities appear desirable as part of the development. Conceptual plans for recreation-related features and beautification measures which could be incorporated into the flood control project are illustrated on plates 2, 3, and 4. Those zones and the facilities and activities associated with each are identified in figure 13. Priority ratings for the facilities and/or activities are shown below. The facilities are compatible with resource management objectives and engineering and operational constraints.

	Priority Rating		
	High	Medium	Low
Entry Point Signage	■		
Entry Point Planting	■	■	
Levee Access Point	■		
Levee Access Point Signage		■	■
Levee Access Point Planting		■	
Levee Buffer Planting	■	■	
Upgrading River Heights Park	■	■	
Nature Interpretive Trail		■	■
Golf Course Connection			■
Upgrading Fishing Areas		■	
Parking Area(North)		■	■
Parking Area(C.B.D.)		■	
Parking Area(South)			■
Pull-Off Parking		■	■
Picnic Tables,Firegrates, etc.			■
Upgrading River Edge Park	■	■	
Benches	■	■	
Amphitheater		■	■
C.B.D. Trail Linkage	■	■	
Parkway Drive Upgraded		■	
Parkway Drive Introduced		■	
Ice Skating Area		■	■
Lighting			■
Directional Signage	■	■	
Bridge Access		■	
Boat Ramp Upgraded		■	
Upgrade O'Leary,Folson Park Area		■	■
Pathway	■		
Erosion Planting		■	
In-Fill Planting	■	■	
Link To Existing Open Space		■	■
Bike Racks		■	■

Figure 13 - Priority Matrix

RIVER HEIGHTS PARK ZONE

River Heights Park zone runs approximately from 17th Street NW on the north to Minnesota Trunk Highway 21 on the south and from the Red River on the west to 8th Avenue NW on the east. Currently, the levee alignment follows the river in the southern portion of the zone. The revised levee is located farther east and meets the existing, to be upgraded, levee at 12th Street NW. River

Road bisects River Heights Park. It is the only existing stretch of roadway into East Grand Forks which provides a major driving surface through city parklands.

The concept delineated on plate 2 provides two points of access to the park area - the first is located on 12th Street NW and is an at-grade entry; the second is located at Lees Place and is ramped access over the levee. The second connection suggests a link, not only to the surrounding neighborhood, but also to River Heights Elementary School and the high school via 14th and 15th Streets NW.

Pull-off parking bays would be provided along a segment of River Road. An upgraded roadbed and parking lot would be developed at the fishing area just north of the sluiceway/dam.

Entry signs, directional signs, and information displays would be located at appropriate sites along the pathway.

Existing vegetation would be supplemented by new planting to satisfy aesthetic, functional, and maintenance considerations. Infill planting and seeding would restore areas where replacement flood control structures are contemplated.

The area between River Road and the Red River would accommodate primarily unstructured open play area with some picnic facilities and lead to an interpretive trail terminating at the expanded golf course in the city's northwest corner. The park area east of River Road would be dedicated to passive activities and woodland picnic sites.

RIVER EDGE PARK ZONE

The area illustrated on plate 3, River Edge Park zone, is in reach II and is located along the southwestern periphery of the central business district. It runs approximately from Demers Avenue on the north to the intersection of the

Red River of the North and the Red Lake River on the south and from the Red River on the west to Central Avenue on the east.

This zone is distinguished from the others by its proximity to the downtown commercial areas of both East Grand Forks and Grand Forks. The potential relocation of the levee in this area would not impact the existing open space along the river so much as it would alter the complexion of the downtown. The shift in alignment would be to the north and east from 1st Street NW to 2nd Street NW north of the Great Northern Railway bridge and east from the existing parkland to 1st Avenue NW through the southern half of Griggs Park.

The concept plan illustrates a parallel set of trails - one along the river and another toward downtown along an upgraded thru-road and bypass which would link the southeast corner of downtown to the street and Central Avenue. Major pedestrian access is provided at Demers Avenue and at 1st Street NW one block south of the realigned levee through Griggs Park.

An informal amphitheater and central gathering area of outdoor civic functions is suggested near the existing parking lots in the vicinity of the intersection of 1st Street NW and the Great Northern Railroad tracks. An open play area is located south of the railroad bridge, and picnic facilities are shown at two locations in the park.

Further design development should consider greater pedestrian access to the water, especially for fishing in the areas upstream of dam structures, and access to boat and canoe launching areas. The city Parks and Recreation Department suggested a pedestrian crossing over the Red River, possibly at the dam, or on a new pedestrian bridge designed in such a manner as not to impede floodwater flow.

Plant material massings would be located to screen undesirable views, accent positive vistas, create focal interest, supplement existing vegetation, and restore areas damaged during the construction of the new levee.

O'LEARY/FOLSON PARK ZONE

Zone C comprises two parks and accounts for more than 30 percent of the East Grand Forks' total parkland. O'Leary Park, a portion of which is shown on plate 4, is approximately 34 acres. Folson Park, contiguous with O'Leary Park, is located farther to the east and is 25 acres.

That portion of the O'Leary/Folson Park zone illustrated on plate 4 is bounded by the Red River on the west and O'Leary Park warming house/proposed ice rink on the east. The levee alignment shown includes approximately the NW one-quarter of the total circumference.

The land west of the north-south levee alignment is agricultural. Other lands are primarily residential except for the property on which Crestwood Elementary School is located and the O'Leary Park recreation area to the northeast. There is currently no permanent flood control structure in this area.

Because of the significant amount of existing parkland, playfield, and other associated recreational development, the scheme for this area suggests minimal development other than the trails and the planting, signs, and site furnishings at key areas including access points, viewing/rest areas, and the warming house.

Using the conceptual schemes for each of the three zones, the following associations have been developed as appropriate relationships between activities/facilities and specific land use/locations within the flood control project area.

The combination of landscape beautification measures, site furnishings (exhibit 1), flood control structure design treatment, and activity/facility development provides a comprehensive recreation design concept.

Activity / Facility / Land use / Location	Roadway Access	Pathway Access	Parking Available	Shoreline Access	Cultural/Historical Area	Wildlife Habitat	Levee	Floodplain	Dry Side of Levee
Picnic Area	■	■	■	■	■	□	■	■	■
Day Use Area	■	■	■	■	■	□	■	■	■
Boat Launch/Access	■	□	■	■	□	□	□	■	□
Canoe Launch/Access	■	■	■	■	□	□	□	■	□
Fishing Area	■	■	■	■	□	□	□	■	□
Roadway	■	□	□	□	□	□	■	■	■
Parking Area	■	■	■	□	□	□	□	■	■
Walkway	■	■	■	■	■	□	■	■	■
Trail	■	■	■	■	■	■	■	■	■
Rest/Viewing Area	■	■	■	□	■	■	■	■	□
Interpretive Facility	■	■	■	□	■	■	□	□	■
Interpretive Trail	■	■	■	■	■	■	■	■	■
Landscape / Beautification	■	■	■	■	■	■	■	■	■
Maintenance Facility	■	□	■	□	□	□	■	□	■
Shelter	■	■	■	■	■	■	■	■	■
Amphitheater	■	■	■	□	□	□	■	■	■
Winterized Facility	■	■	■	■	□	□	■	■	■

Figure 14 - Facility Associations

CORPS POLICY

The Corps of Engineers is authorized by Federal law to assist and participate with local sponsors in providing outdoor recreation facilities and water resource projects. Current authorities, policies, and guidelines regulate the extent to which the Corps can participate on project related lands. At flood protection projects, participation is limited to certain water-oriented outdoor recreation facilities. On nonproject related lands, the Corps of Engineers can cost share only those facilities/activities that affect public health and safety.

Project related lands are defined as lands necessary to promote proper flood control functions. Project lands would be those used for the (re) construction of the levee and floodwall. This study illustrates conceptual plans for public use development in addition to federally constructed flood control measures to provide suggestions to the city of East Grand Forks for potential cooperative development.

The recreation related features proposed in the plan of development are intended to enhance the project's visual image, ensure public safety and security, and increase functional aspects within the project limits.

Plates 2, 3 and 4 and the figures in the site furnishings section suggest relationships among various recreational developments and site furnishings. The following figure indicates proposed quantities within each of the three reaches shown on plate 1.

	Reach A	Reach B	Reach C
Benches*	18 units	20 units	37 units
Signage*	20 units	25 units	49 units
Walking / Biking Trail	2.7 mile	1.8 mile	4.8 mile

* includes units approximately 8' either side of levee/or trail within project area.

Figure 15 - Quantities

RECREATION ECONOMIC JUSTIFICATION

POTENTIAL VISITATION

As proposed, the trail system would provide for many types of recreational opportunities, such as bicycling, walking, jogging, and skiing. It is difficult to estimate the future use of the trail system due to a lack of current participation data for the potential uses. For example, jogging has become a significant recreational activity in the past 5 years. Most

currently used recreation surveys were conducted before jogging became popular. Hence, any participation data derived from those surveys would greatly underpredict jogging activities. Of all the potential activities, bicycling has what is considered to be the most reliable per capita use rates.

For this report, it will be assumed that bicycling is the only trail activity and that all of the benefits of the trail system would be from bicycling. This assumption would use the trail activity requiring the most expensive treadway and greatly underestimate total trail use. The results would be a cost estimate that would represent the complete trail system and a benefit estimate significantly less than could be reasonably expected.

The 1979 Minnesota Statewide Comprehensive Outdoor Recreation Plan (SCORP) estimated a per capita use rate for bicycling of 13.4 in 1985 in the East Grand Forks region. The rate increases to 14.0 in 1990 and 14.9 in 1995. The per capita use rate means that, on the average, everyone in the region would go bicycling 14 to 15 times each year.

It is assumed that one-third of the bicycling occasions would occur on the trail system. A review of trail activities indicates the trail use (bicycling, walking, etc.) is the primary activity, with an occasional secondary activity such as picnicking. Therefore, it is assumed that one-half of the trail users would engage in more than one activity during a day's use of the trail system. For this report, a visitor day equals 1.5 activity occasions. Figures 15A and 15B show the projected visitation over the life of the project.

	1985(2)	1987(3)	1990	1995	2030	2085
Population(1)	10,000(4)	--	10,737	11,600(4)	19,475	--
Per capita use rate	13.4	--	14.0	14.9	15.0	--
Activity occasions	134,000	134,000	150,300	172,800	292,000	292,000
Trail system activity occasions	0	44,700	50,100	57,600	97,300	97,300
Visitor days	0	29,800	33,400	38,400	64,900	64,900

(1) From figure 8.
(2) Initial year of project construction.
(3) Project completed.
(4) Interpolated from figure 8.

Figure 15A - Projected Visitation

The average annual visitation would be approximately 57,000 visitor days.

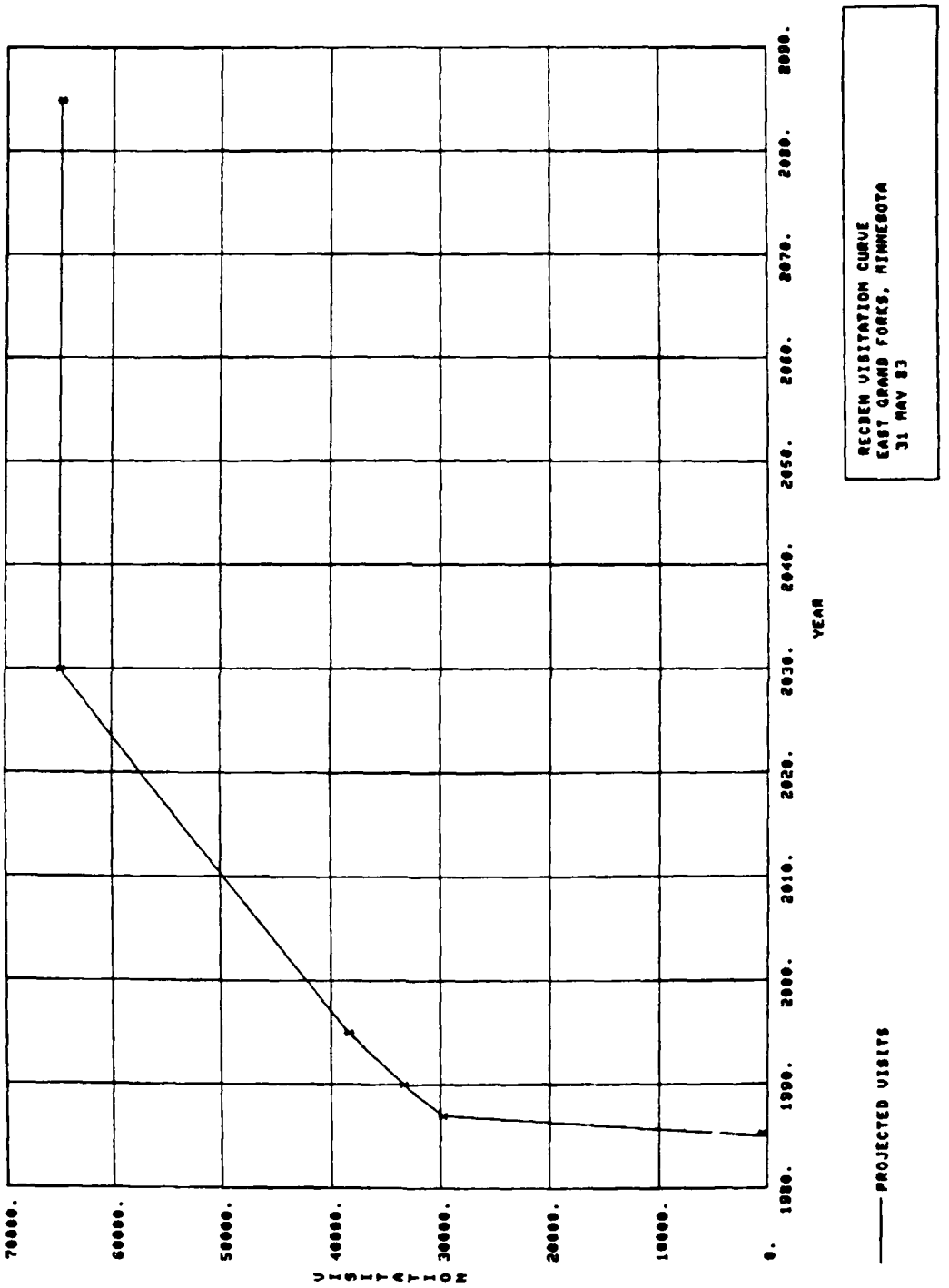


Figure 15B - Recben Visitation Curve

The trail system as conceptualized in this report would be approximately 10 miles long. This equals the projected demand for bicycle trails in the year 2000 (see figure 12). The demand for trails is projected to increase to 13 miles in the year 2030.

The instant design load per mile of trail projected for the year 2030 is within the generally accepted trail design limits.

RECREATION BENEFITS

The benefits attributable to recreation were derived based on the guidance contained in ER 1105-2-300, NED Benefit-Cost Analysis, dated 15 July 1980. As no regional models are available, the unit-day methodology was used. The following is a summary of the criteria and the point values assigned.

Criterion 1 - Recreation Experience Total points - 30
The trail system would offer opportunities for several activities and provide for access to several others.
Points assigned - 8

Criterion 2 - Availability of Opportunity Total points - 18
Within the market area, there is not another trail system as extensive as the proposed system.
Points assigned - 8

Criterion 3 - Carrying Capacity Total points - 14
The trail and its amenities would be designed to current standards and would accommodate the project use.
Points assigned - 7

Criterion 4 - Accessibility Total points - 18
The trail system would be very extensive, with relatively easy access from anywhere within East Grand Forks.
Points assigned - 12

Criterion 5 - Environmental Quality Total points - 20

The trail system parallels the river. The river corridor would be relatively attractive. The levees and floodwalls would distract to some minor extent.

Points assigned - 6

Total points assigned - 41

Estimated day use value - $2.84

Using standard discounting procedures and a 100-year project life, the estimated average annual recreation benefits would be:

$135,400 at 3 1/4 percent, original project interest rate

$110,900 at 7 7/8 percent, current interest rate

COSTS

A construction cost estimate for the trail system is based on the following assumptions:

Item	Unit Cost	Units	Total Cost
Trails (8-foot wide, bituminous)	$27,000/mile	10 miles	$270,000
Signs along the trails	500/mile	10 miles	5,000
Benches along the trails	1,000/mile	10 miles	10,000
Landscaping	15,000	1 job	15,000
Subtotal			300,000
Contingencies (20 percent)			60,000
Total			360,000
Engineering and design (10 percent)			36,000
Supervision and administration			33,000
Total construction costs			429,000

The estimated construction cost for the system, including contingencies and engineering and design, is $430,000.

The trail system would require some maintenance. It is estimated that the maintenance cost per visitor day would be $0.30. The average annual maintenance costs would be $17,100.

The average annual cost is the sum of the average annual maintenance costs and the annualized construction costs. At a 3 1/4 percent interest rate, the

average annual construction costs would be $14,600; at 7 7/8 percent, the average annual construction costs would be $33,900.

The average annual costs at 3 1/4 percent would be $31,700. At 7 7/8 percent, they would be $48,500.

BENEFIT-COST RATIO

The benefits of the recreation project must be greater than the costs if the Corps is to work with a local sponsor to develop the project.

At 3 1/4 percent interest rate, the benefit-cost ratio would be:

$135,400 - $31,700 = 4.27

At 7 7/8 percent interest rate, the benefit-cost ratio would be:

$110,000 - $48,500 = 2.27

Given that the costs would be for a complete trail system and the benefits were determined for only a portion of the potential users, it would appear that recreation development would be economically justified.

COST SHARING POLICY

One objective of the Corps of Engineers is to identify recreation opportunities associated with Corps water resource projects and to implement such recreational developments with the assistance of non-Federal sponsors such as the city of East Grand Forks. The intent of this objective is to preserve, enhance, and create opportunities for public enjoyment and use.

At flood control projects, recreation and beautification development must be on lands acquired by the local interests for the basic project purpose. The level of recreation development generally cannot increase the Federal project

cost by more than 10 percent. All general recreation facilities such as trails, picnic areas, boat launching ramps, fishing docks, and associated support facilities can be considered for inclusion in the recreation plan. Facilities normally provided by the private sector cannot be included for Federal funding (see exhibit 4).

Federal funding of recreation facility development is limited to no more than 50 percent of the initial construction cost. The remainder should be provided by the non-Federal sponsor at the time of construction. In addition to agreeing to share in the initial costs, the non-Federal sponsor(s) must operate and maintain the recreation facilities for the life of the project and keep them open to the public.

Any recreation development associated with Corps projects in East Grand Forks should be cost shared and operated by the city. Therefore, implementation of a recreation plan is at the option of the city. As more detailed planning reports are prepared, a draft cost-sharing contract is coordinated and, ultimately, a final cost-sharing contract should be signed by the non-Federal sponsor. The sponsor may withdraw from implementing project recreation measures up to the time of bids for construction.

LANDSCAPE BEAUTIFICATION MEASURES

The Corps of Engineers is committed to working with the city of East Grand Forks to develop functional, attractive, and innovative measures that harmonize basic construction projects with the landscape. The intent of this objective, which is reinforced by Public Law 91-190, is to identify, coordinate, and implement measures which will lead to aesthetically sensitive projects in which the public may take pride.

POLICY

Corps policy dictates that, where human safety and structural integrity are not compromised and effective maintenance of the project is not impaired,

appropriate landscape plantings (trees, shrubs, vines, and grasses) will be incorporated into the design of floodwalls, levees, and dam embankments. For this project, where maintenance of the completed project will be the responsibility of the city of East Grand Forks, the landscape plantings should be coordinated. For example, in areas where significant loss of vegetation and wildlife cover may occur due to construction, the planting plan should make every effort to replace the materials destroyed. Techniques such as innovative geometry, material selection, and use of color and surface textures offer effective environmental enhancement. Such measures should be incorporated when addressing aesthetic treatment of floodwalls and stop log structures. Landscape treatment at walls also softens the image.

Development of the flood control project may produce some visual disruptions. A variety of measures can be taken to minimize negative impacts. The type and scale of landscape architectural beautification measures could depend upon:

- The level of visual impacts resulting from the basic project.
- The public exposure/visibility of the visual disruptions.
- The interest and participation of the city of East Grand Forks in incorporating measures that would minimize visual impacts.

Of these factors, the interest and involvement aspect is the most important consideration in the development of a visually pleasing project. For purposes of cost allocation, any additional measures should be considered part of the basic project.

PLANT MATERIALS

The plant materials shown in figure 16 have been identified primarily for their hardiness to the region, growth/tolerance requirements, and aesthetic qualities. An important consideration in species selection and plant material massing is site restoration and supplemental revegetation. This is especially

true in unloaded areas where grades and soil weight may be altered due to new levee alignment and significant earth movement.

The plant material vocabulary and the site furnishings are intended to be used as a guideline. Specific plans can be developed as appropriate.

S- 15 to 30' O- Oval M- 30 to 45' R- Round L- 45'+ P- Pyramidal	Size	Drought Tolerant	Moisture Tolerant	Shade Tolerant	Fall Color	Form	High pH Tolerant	Fruit/Flower
Marshall Seedless Ash Fraxinus pennsylvanica lanceolata	L	■	■	■	■	O	■	
American Linden Tilia americana	L		■	■		O		■
Silver Maple Acer saccharinum	L		■	■	■	O		
Common Hackberry Celtis occidentalis	L	■	■		■	R	■	■
Weeping Willow Salix alba tristis	M		■			O		
River Birch Betula nigra	M		■	■	■	O		
Red Maple Acer rubrum	L		■	■	■	O		
Ponderosa Pine Pinus ponderosa	M	■				P	■	
Scotch Pine Pinus sylvestris	L					P		
Dolgo Crab Malus 'Dolgo'	S		■			R		
Russian Olive Eleagnus angustifolia	S	■	■			R	■	■
Amur Maple Acer ginnala	S	■	■		■	O		■

Figure 16 - Trees and Overstory Vocabulary

	Size	Drought Tolerant	Moisture Tolerant	Sun Tolerant	Shade Tolerant	Fall Color	Form	Fruit/Flower	High pH Tolerant
Red Twigged Dogwood Cornus stolonifera	M		■	■	■	■	S	■	
Yellow Twig Dogwood Cornus stlonifera flaviramea	M		■	■	■	■	S	■	
Tatarian Honeysuckle Lonicera tatarica	M			■	■		U	■	
Smooth Sumac Rhus glabra	L	■				■	I	■	
Peking Cotoneaster Cotoneaster acutifolia	L			■		■	S	■	
Vanhoutte Spirea Spiraea van houttei	M			■			U	■	
American Elder Sambucus canadensis	L		■		■		U	■	
Golden Mockorange Philadelphus x virginalis	M	■	■	■	■	■	O	■	■
Japanese Barberry Berberis thunbergii	S	■	■	■	■	■	S	■	
Flowering Plum Prunus triloba multiplex	L			■			U	■	■
Canaert Juniper Juniperus virginiana 'Canaerti'	M			■			U		
Mugho Pine Pinus mugo	S			■			G		
Maney Juniper Juniperus chinensis 'Maneyi'	S			■			S		
Andorra Juniper Juniperus horizontalis 'Andorra'	S			■			S		
Highbush Cranberry Viburnum trilobum	M		■	■		■	G	■	
Pussy Willow Salix caprea	L		■	■			U		
Crown Vetch Coronilla sp.	G			■	■		S	■	
Fleeceflower Polygonum reynoutria	G			■			S	■	

S- Spreading
U- Upright
I- Irregular
G- Globe
O- Open

S- 0-3'
M- 3-8'
L- 8'+
G- Groundcover

Figure 16 - Trees and Overstory Vocabulary (continued)

Of the plant materials identified for the East Grand Forks region, different types of vegetation can satisfy various functions/aesthetic needs. Materials should be planted where they can be most effective.

A significant method of beautifying the areas within the flood control project is to develop and implement a comprehensive, coordinated planting scheme. Among other aspects, appropriate planting provides: shade, seasonal color, fruit and cover for wildlife, visual buffering, focal accent, erosion control, slope/levee stabilization, and microclimatic control. These considerations are illustrated in the Plant Materials Selection figure and in figures 19-24. For example, red osier dogwood, when used in combination with sod or prairie grasses at the edge of overstory massing, could provide cover and food for wildlife, act as a screen/buffer planting, provide focal point and backdrop attraction, and aid in erosion control. It is most appropriate when used at rest/viewing areas and along pathway/levee edges.

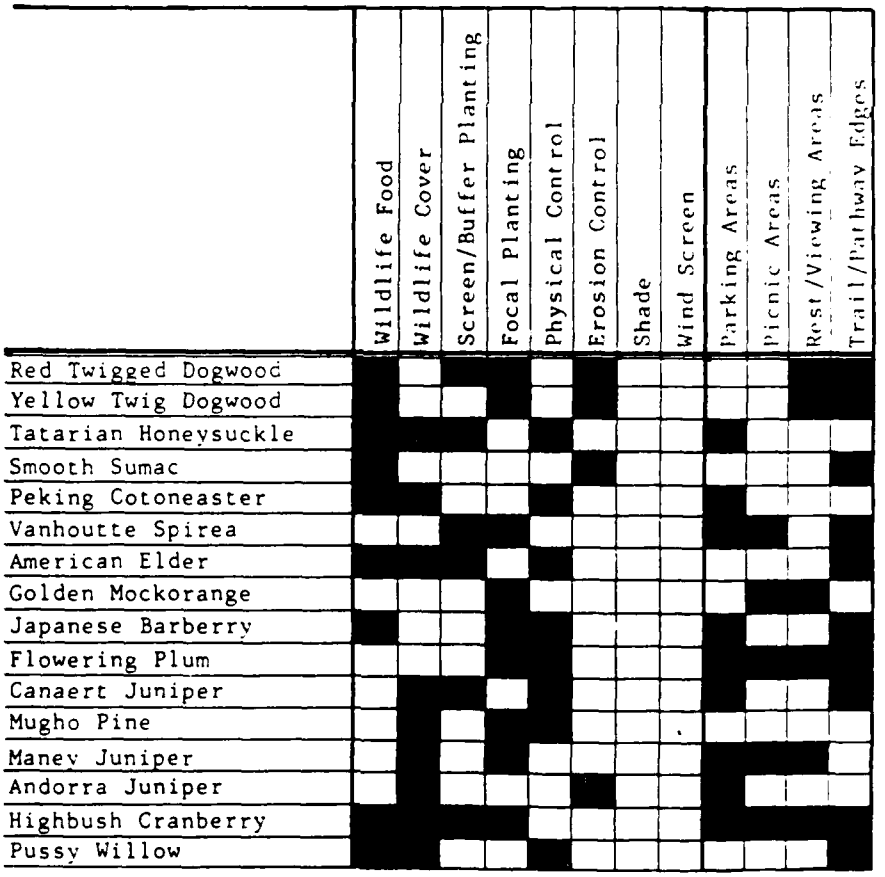


Figure 17 - Plant Characteristics

	Wildlife Food	Wildlife cover	Screen / Buffer Planting	Focal Planting	Physical Control	Erosion Control	Shade	Wind Screen	Parking Areas	Picnic Areas	Rest / Viewing Areas	Trail / Pathway Edges
Crown Vetch		■		■		■			■		■	■
Fleeceflower				■		■			■		■	
Marshall Seedless Ash							■		■		■	
American Linden							■		■	■	■	■
Silver Maple							■			■	■	
Common Hackberry							■		■	■	■	
Weeping Willow	■	■		■			■			■	■	■
River Birch				■							■	■
Red Maple				■			■		■	■	■	■
Ponderosa Pine	■	■	■					■	■	■		■
Scotch Pine	■	■	■					■	■	■		■
Tamarac	■	■	■					■				■
Dolgo Crab	■			■					■	■	■	
Russian Olive		■	■		■							
Amur Maple		■	■	■	■				■	■	■	■

Figure 17 - Plant Characteristics (continued)

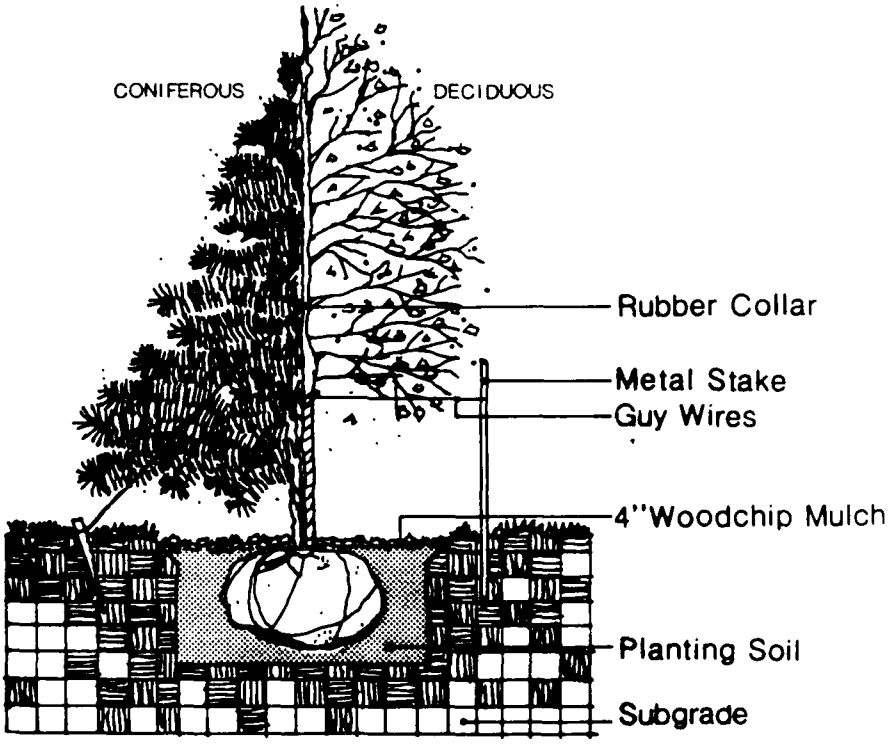
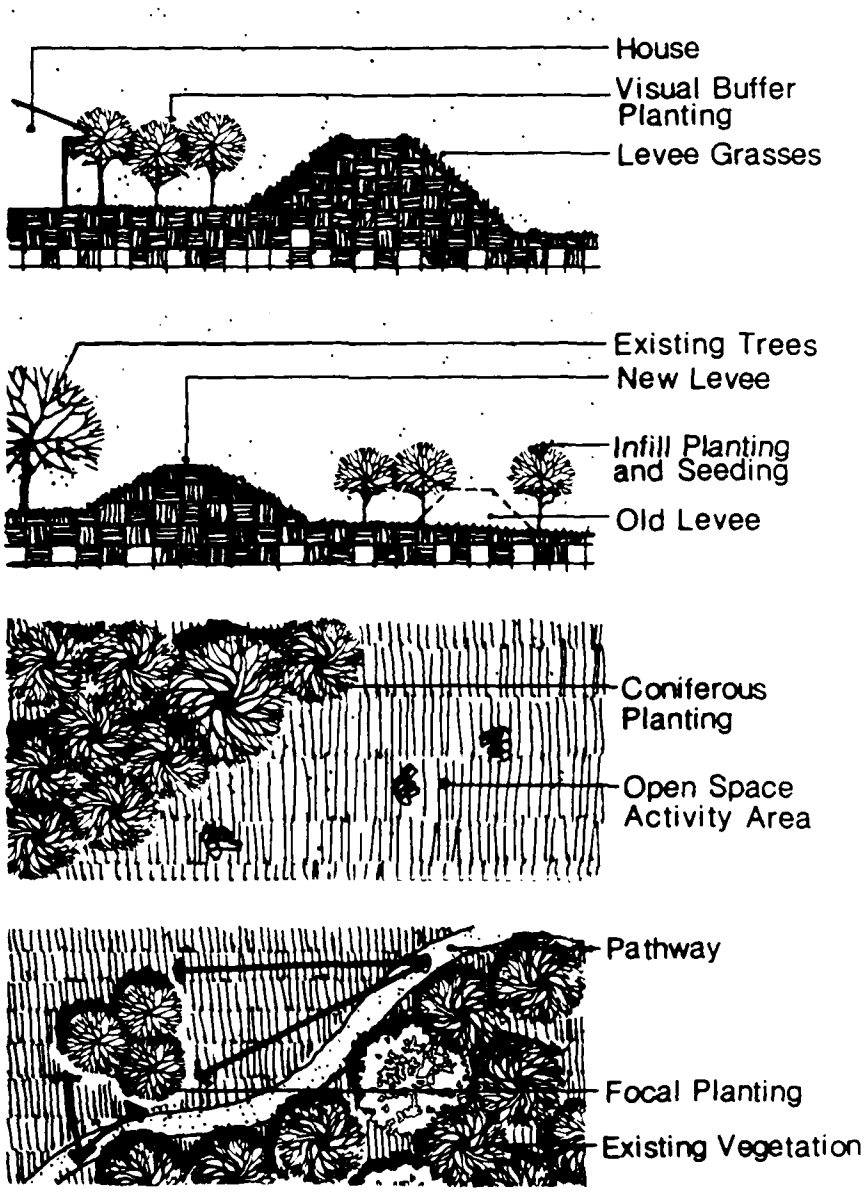
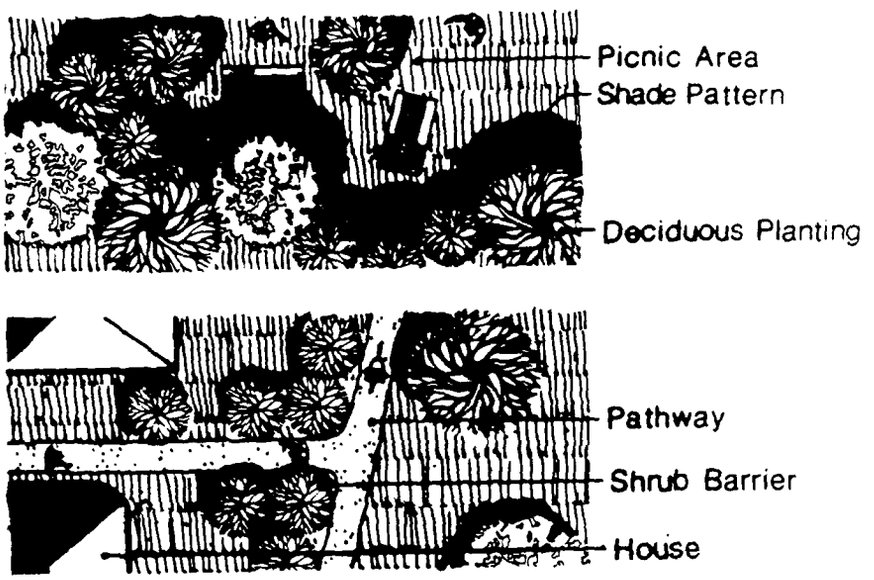


Figure 18 - Typical Planting Detail

Figures 19 through 24 illustrate a number of the concepts discussed in this section which could easily be implemented. Planting should not be placed indiscriminately and generally not on the levee. Materials selected should be of reasonable size - coniferous trees in the 6- to 8-foot high range and deciduous materials not less than 2 1/2 inches caliper. Plates 2, 3, and 4 show typical plant massing associations.



Figures 19 - 24 - Plant Massing Concepts



Figures 19 - 24 - Plant Massing Concepts (continued)

The levee/street crossing treatment illustrated in figure 25 would be used in areas with less frequent flooding. Interim methods such as sandbags might be used to stem the flow of water during flooding. The flood control structure in this case would not be very high. Signs, specimen planting for accent, a change in driving surface texture, and bollards could provide the visual control and awareness necessary to avoid potential conflicts between motorists and pedestrians.

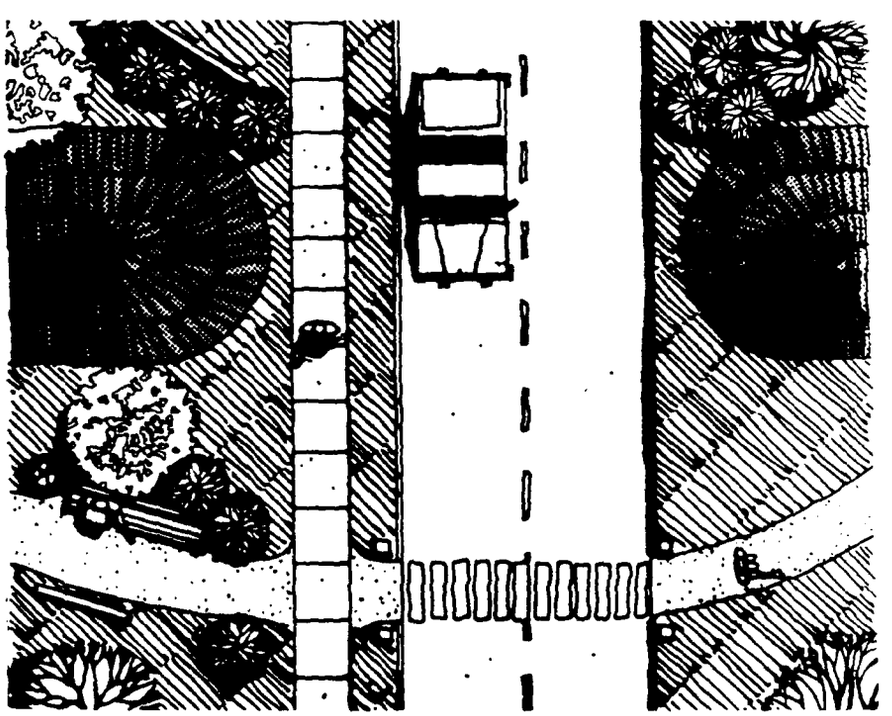


Figure 25 - Levee Treatment

In certain areas, higher levees would be required to control floodwaters where streets intersect the flood control structure. This case is shown in figure 26. The device used to control flooding could be concrete piers constructed on either side of the berm. These piers would be designed so that, at the appropriate time, stop logs could be inserted into grooves cast into the concrete and walls. These could be treated similar to the floodwalls in the downtown area so that they were both functional and aesthetically pleasing. The planting concepts and crosswalk situation for stop log treatment would be the same as those described in figure 25.

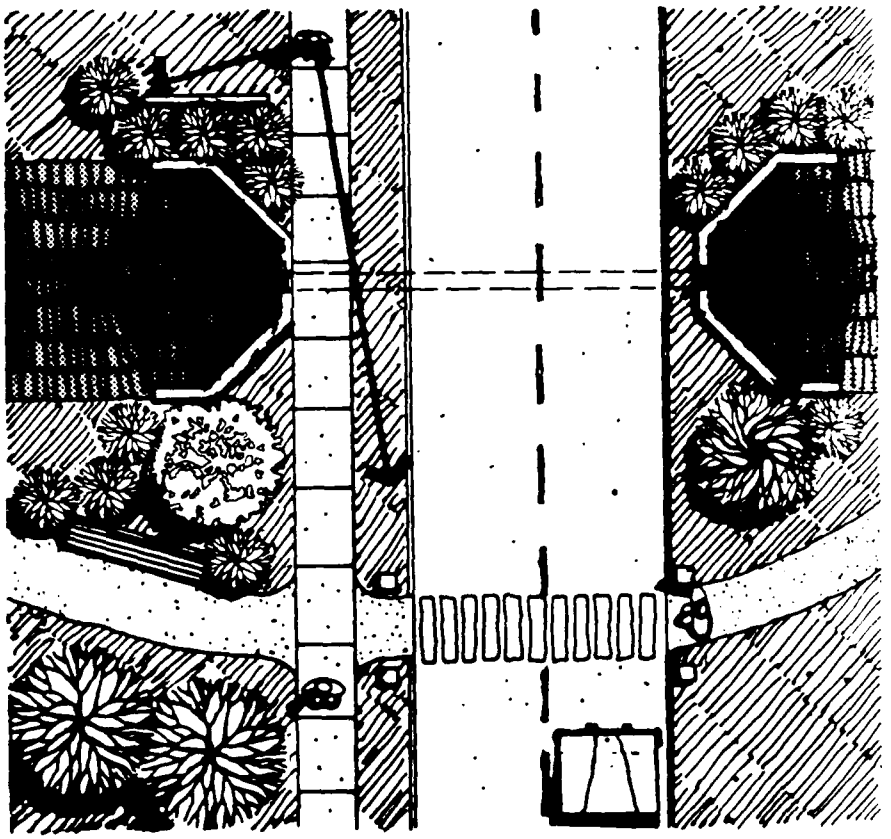


Figure 26 - Stop Log Treatment

Pedestrian, cyclist, and service access points to the levee should be carefully sited. Where access is appropriate a ramped approach not exceeding 8 percent would be preferable. Clear sight lines, smooth transition of materials, and signs, as illustrated in figure 27, provide the most functional access.

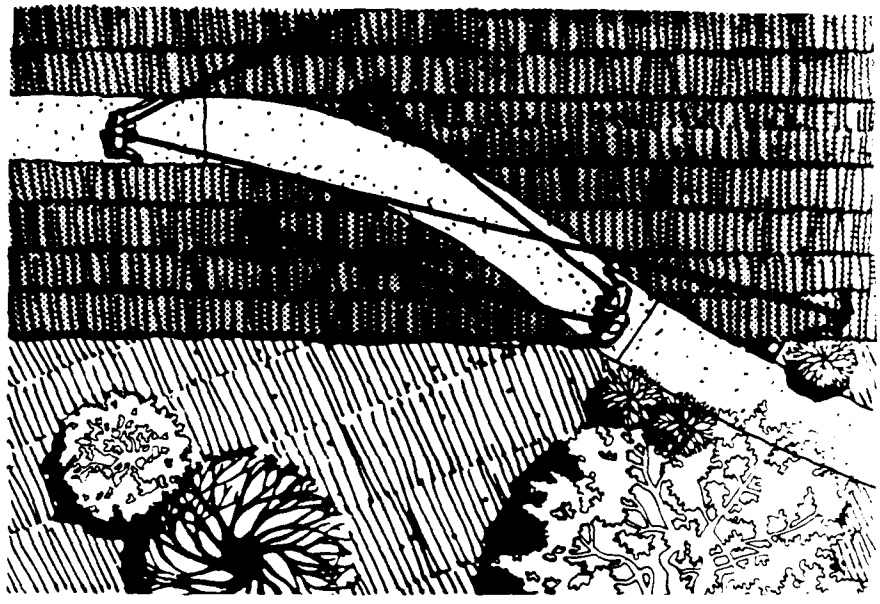


Figure 27 - Ramp Access

Street crossings in areas not requiring flood control measures should be kept simple. Signs, texture change, safety bollards, curb ramps, and secure sight lines clearly define these crossings as shown in figure 28.

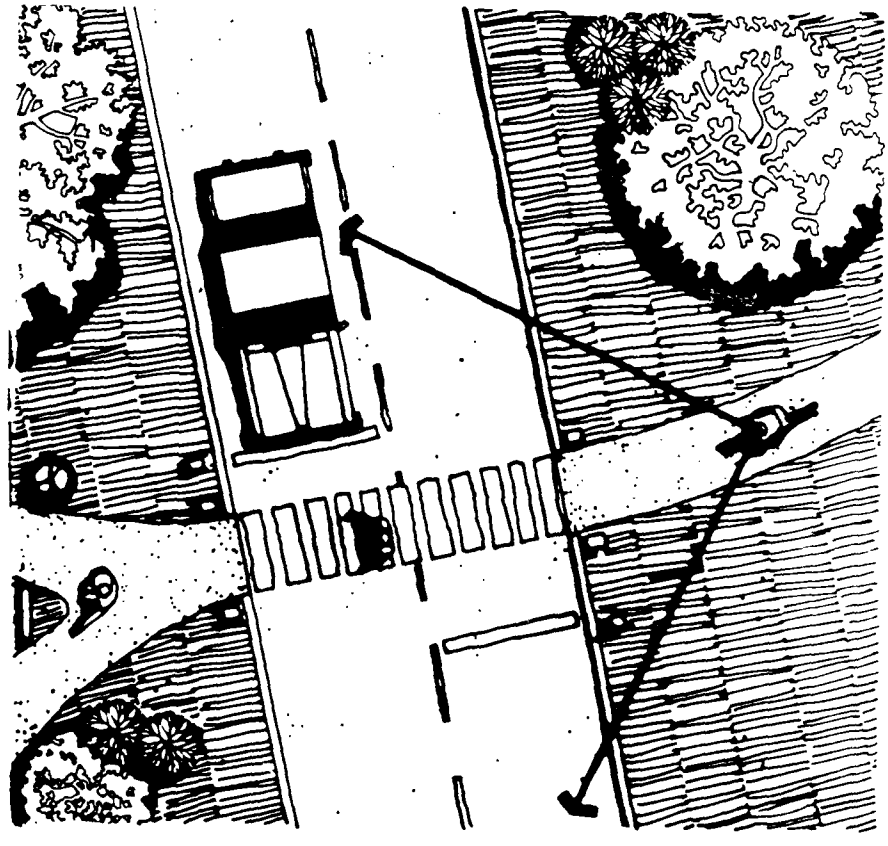


Figure 28 - Crosswalk

Paths through a wooded area (illustrated in figure 29) could provide visual interest and serve a practical purpose of grade transition by aligning walkways in a meandering fashion. This concept takes advantage of views, maintains existing stands of vegetation, and reduces the potential for erosion in floodplain areas.



Figure 29 - Pathway Treatment

In situations that offer exceptional vistas, or where rest areas would be appropriate, benches could be placed at viewing areas along paths. In the case shown in figure 30, the path is widened and a trash receptacle has been placed alongside the bench to accommodate bicyclists, hikers, and other pedestrians.

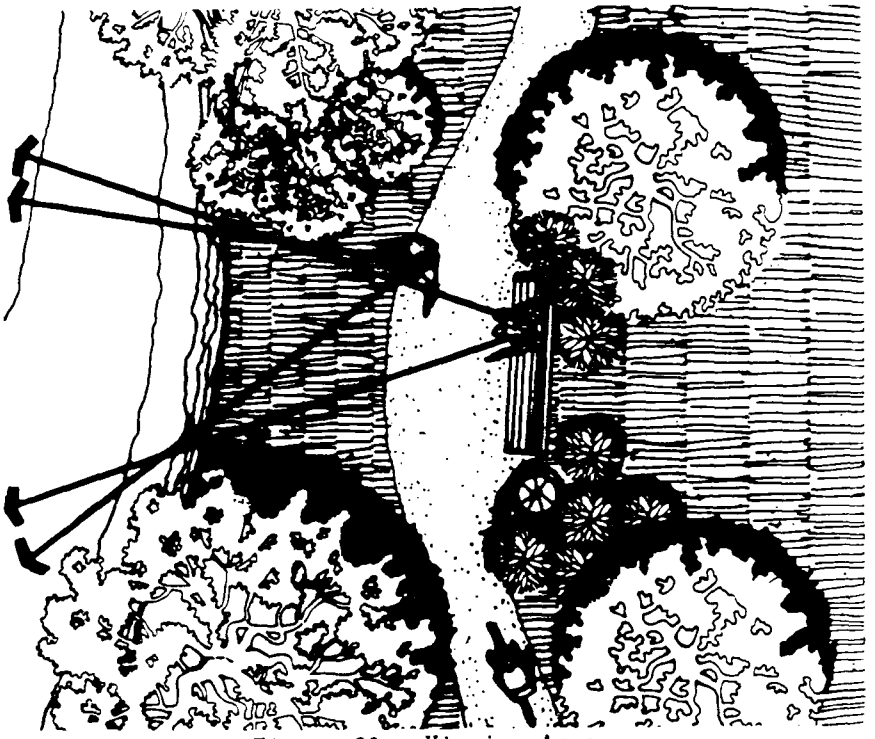


Figure 30 - Viewing Area

Figure 31 illustrates a pathway intersection or entry point. A major informational/directional sign is appropriately located. The path is widened to accommodate pedestrian movement. Seating is provided, and planting is strategically placed to be both functional and aesthetic.



Figure 31 - Entry Point

In areas where roadways have been upgraded, it might be advisable to occasionally locate pull-off parking bays at selected points. Figure 32 illustrates the relationship of a small, sensitively located parking bay and a portion of a picnic area and a pathway alignment. Every effort should be made to disrupt the existing character and natural environment as little as possible.

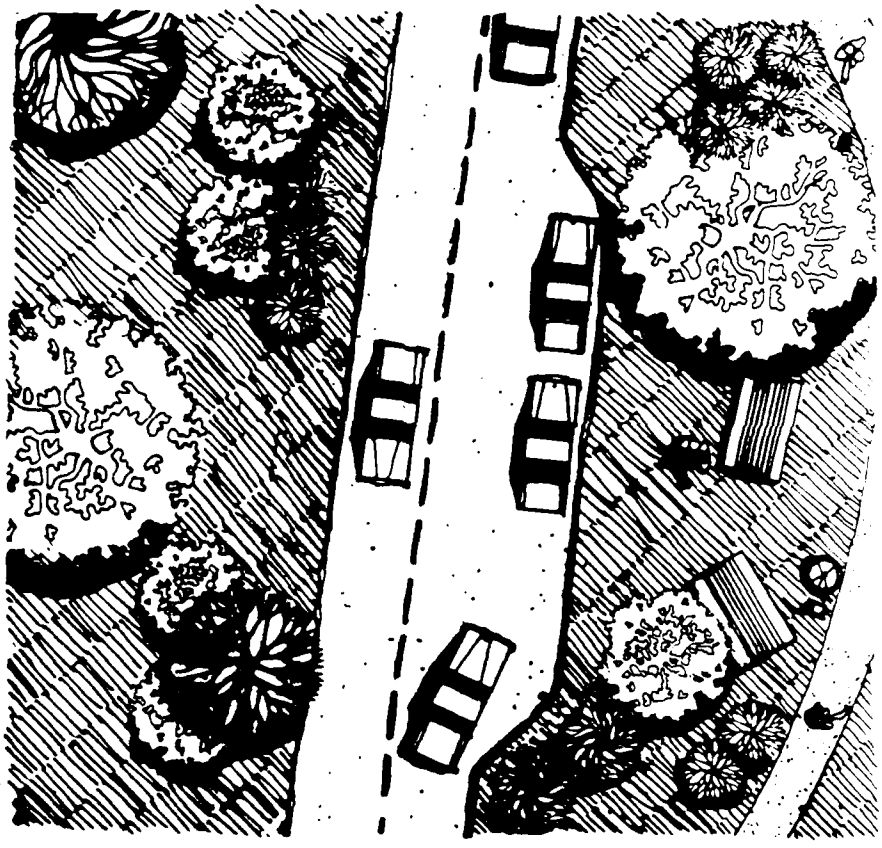


Figure 32 - Picnic Pulloff

COST ESTIMATE

The costs associated with landscape beautification measures are shared between the Corps and the local sponsor. The percent share is determined by the percent share of the project feature with which the measure is associated. For example, landscaping associated with a floodwall would be cost shared at the same percentage as the floodwall. Landscaping at a recreation area would be cost-shared under the recreation formula (50-50). Generally, between 3 and 5 percent of total project costs are allocated to landscape beautification measures.

It is very difficult to develop an accurate cost estimate at this stage in the planning process due to a lack of detail. Detailed planting plans are generally developed during the feature design phase.

To develop a rough cost estimate, the following assumptions were used:

- Plantings paralleling the levee (both sides) would cost approximately $15 per linear foot.

- Mass plantings and infill plantings associated with the unloaded areas, a moderate level of planting, would cost $15,000 per acre.

Given approximately 10 miles (52,800 feet) of levees and floodwalls and approximately 35 acres of unloaded areas, the estimated landscape beautification costs would be $1,317,000.

It must be stressed that these costs are only a very rough estimate. A more accurate, detailed estimate can be developed only when more data are available. Factors that would significantly influence the costs include the final alignments, the desires of city officials and local residents, the acreages to be planted, and the desired plant species availability and cost.

EXHIBIT 1 SITE ELEMENTS FURNISHINGS

Conceptual plans have been developed for each of the three reaches within the city of East Grand Forks. In addition to landscaping, site furnishings sould be included as part of the landscape beautification and recreation effort. Figure 33 identifies possible site elements and suggests the variety of materials and surfaces of which they could be constructed. Material selection and element location should be coordinated on-site to ensure the most functional and visually pleasing results.

Figure 33
Furnishings / Materials Matrix

	Wood	Metal	Concrete	Bituminous	Gravel	Sand	Woodchips	Turf	Plexiglass
Roadways			■	■	■				
Pathways				■	■				
Trails					■		■		
Parking Areas				■	■				
Rest/Viewing Area					■		■	■	
Picnic Areas	■	■							
Firegrates		■	■						
Lighting	■	■							■
Signage	■	■							■
Trash Receptacles	■	■							
Benches	■	■							
Ramps				■	■		■		
Bollards	■								
Bicycle Racks	■								
Open Fields						■		■	
Amphitheater	■							■	

The following figures illustrate proto-typical situations and site elements within the project area. For example, pedestrian / bike paths are shown as eitht foot wide. The standard cross section would include 4" of crushed limestone over a 4" aggregate base (see figure 34).

Upgraded road beds should be 24 feet wide with two foot gravel shoulders and pitch to drain naturally. the roadbed surface would be 3" of asphalt over a 6" aggregate bed overlaying compacted subgrade as illustrated in figure 35.

Figure 34
Pathway

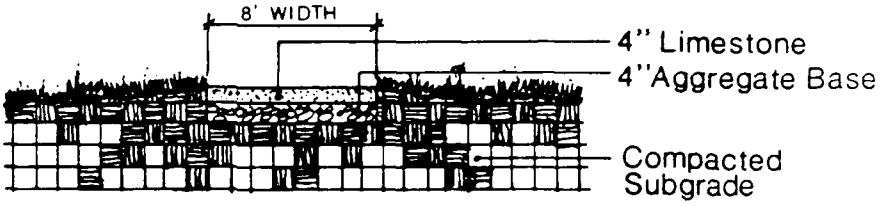
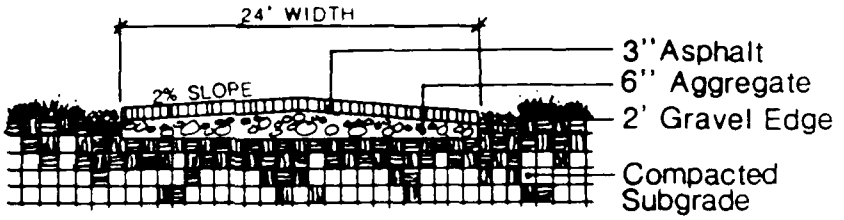


Figure 35
Roadway



In areas other than the flood control structure, berms may be utilized to direct traffic, screen undesirable views, alter micro climatic conditions, provide interest and topographical relief and to delineate activity areas. The maximum side slope suggested for earth berms would be a 1 foot rise for every 3 feet of horizontal run (see figure 36). Place berms in such a manner so as not to impede the flow of floodwaters.

The amphitheater element incorporated in Zone F and illustrated in figure 37, should appear to blend naturally into the landscape, and should provide minimal resistance to the flow of water during period of high water. 12" x 12" timbers could be staked into the side slope of the existing levee to provide seating.

The existing fishing area in the River Heights Park Zone should be upgraded. A paved road and re-organized parking area would reduce negative environmental impacts such as erosion. Rip rap, in the form of boulders, might be added to the shoreline to create a safer and more aesthetic area (see figure 38).

Figure 36
Earth Berm



Figure 37
Amphitheater

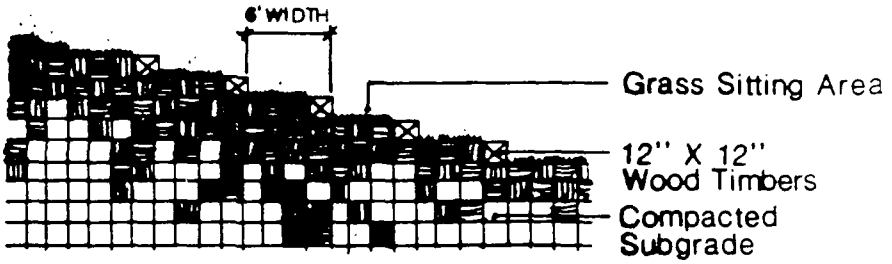
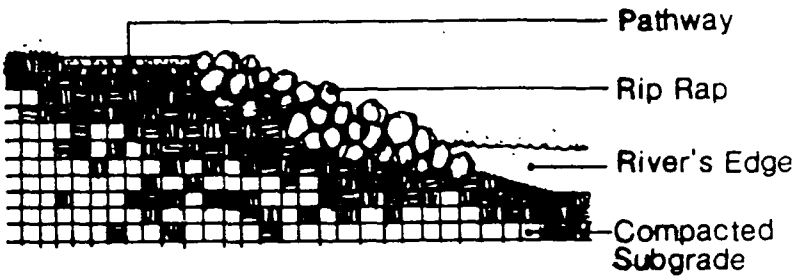


Figure 38
Shoreline RipRap



Park benches throughout the project area (see figure 39) would create a pleasant feeling. The location of wooden benches at key areas would have to be determined on a site by site basis. Backless benches could be utilized with picnic tables and should have the same natural character. In addition, trash receptacles (figure 40) should be sturdily constructed, aesthetically appealing, and located in areas where the general public might gather. Receptacles should be easily accessible to service vehicles.

Figure 39
Park Bench

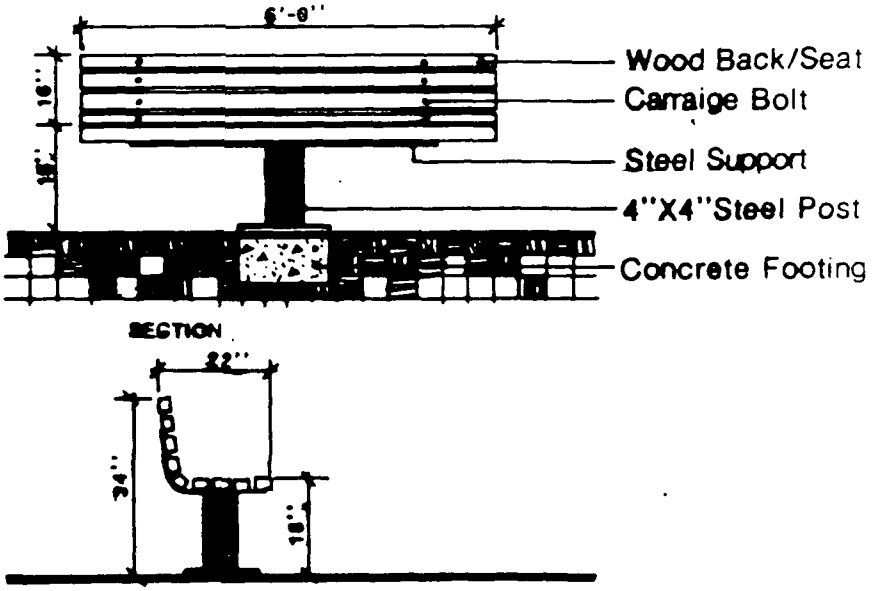
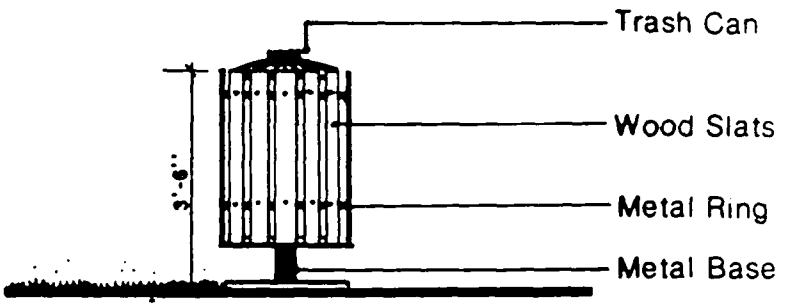


Figure 40
Trash Receptacle



6" x 6" treated wooden timbers called bollards (figure 41) are a landscape element that may be used in conjunction with signage to provide safety and direction to both the pedestrian and the automobile.

Signage could be an important visual/functional element throughout the project area. Four basic sign types would be appropriate. Figure 42 is a bollard/interpretive sign which could be inconspicuously placed in natural areas adjacent to the pathway. Figure 43 is an illustration of a directional sign. The eight foot height allows for standard directional signage as well as custom informational signage to be applied on a 4" x 4" wood post.

Figure 43 is an illustration of a directional sign. The eight foot height allows for standard directional signage as well as custom information to be applied on a 4" x 4" wood post.

Area entrance signs and larger scale information / directional signage is conceptually illustrated in figures 44 and 45.

Figure 41
Bollard

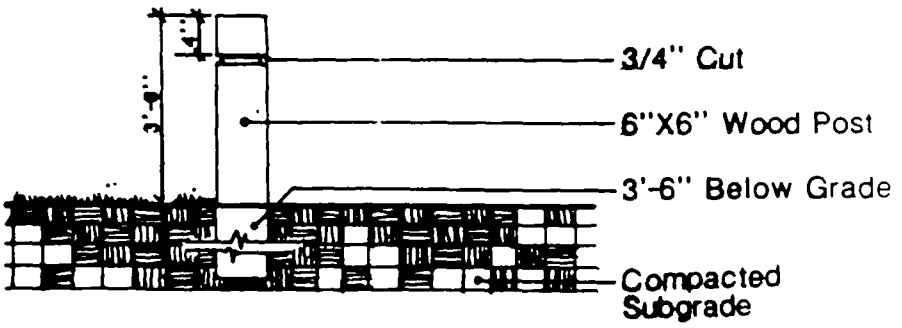


Figure 42
Bollard/Sign

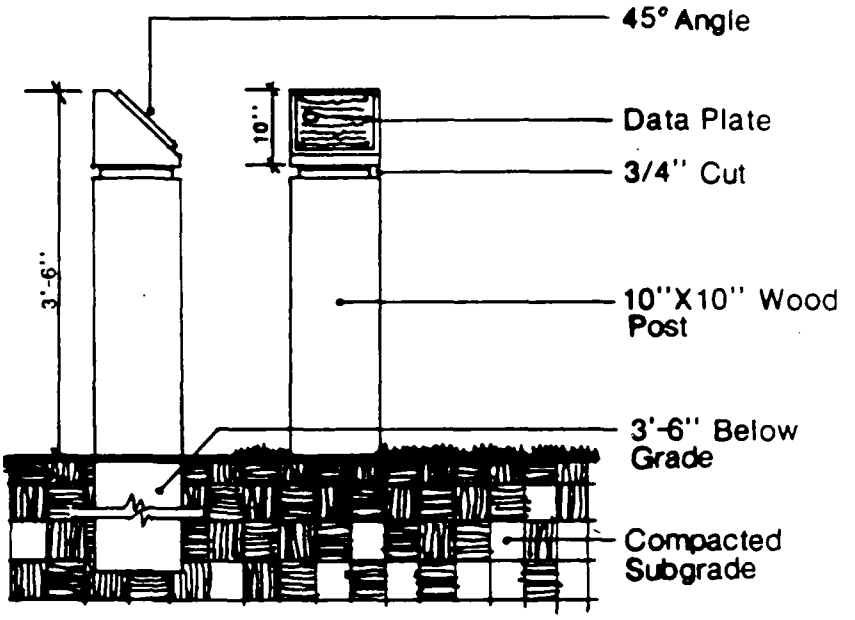


Figure 43
Directional Sign

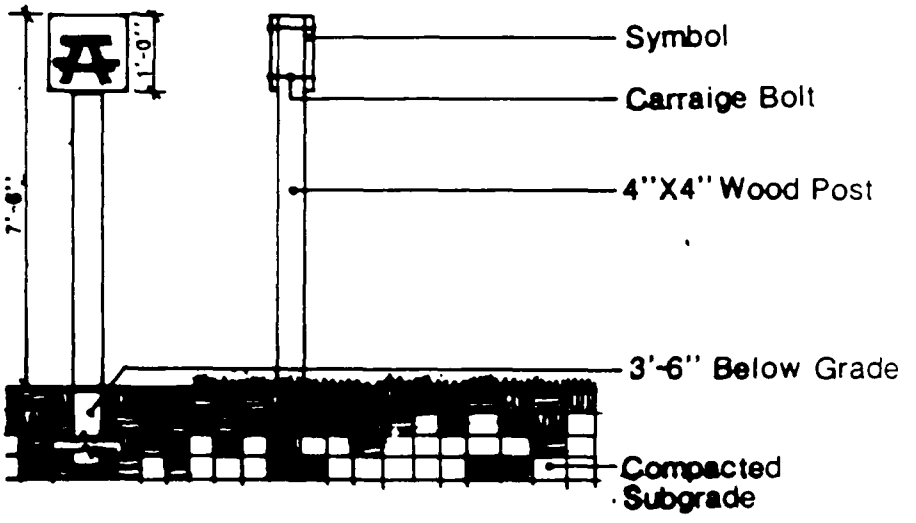


Figure 44
Entry Sign and
Concept Logo

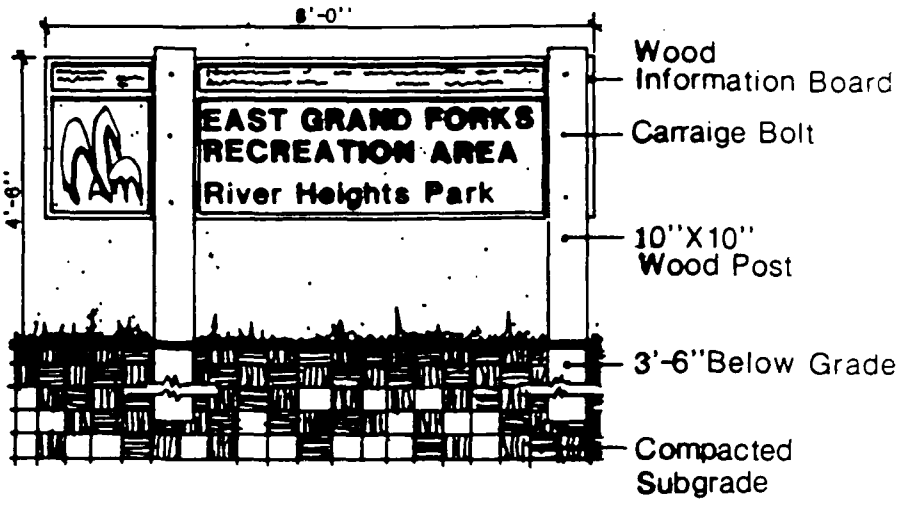


Figure 45
Informational Sign

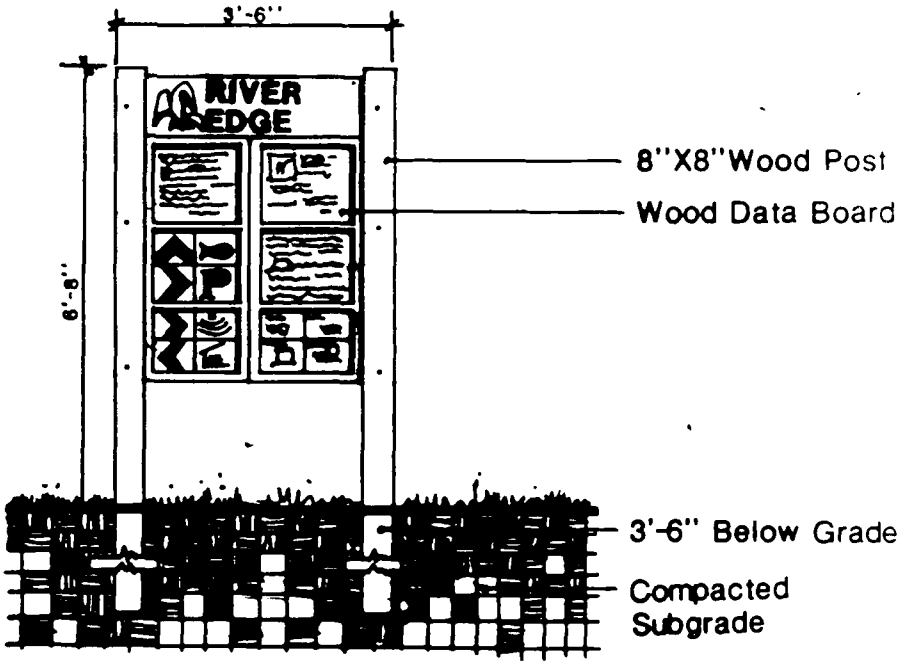
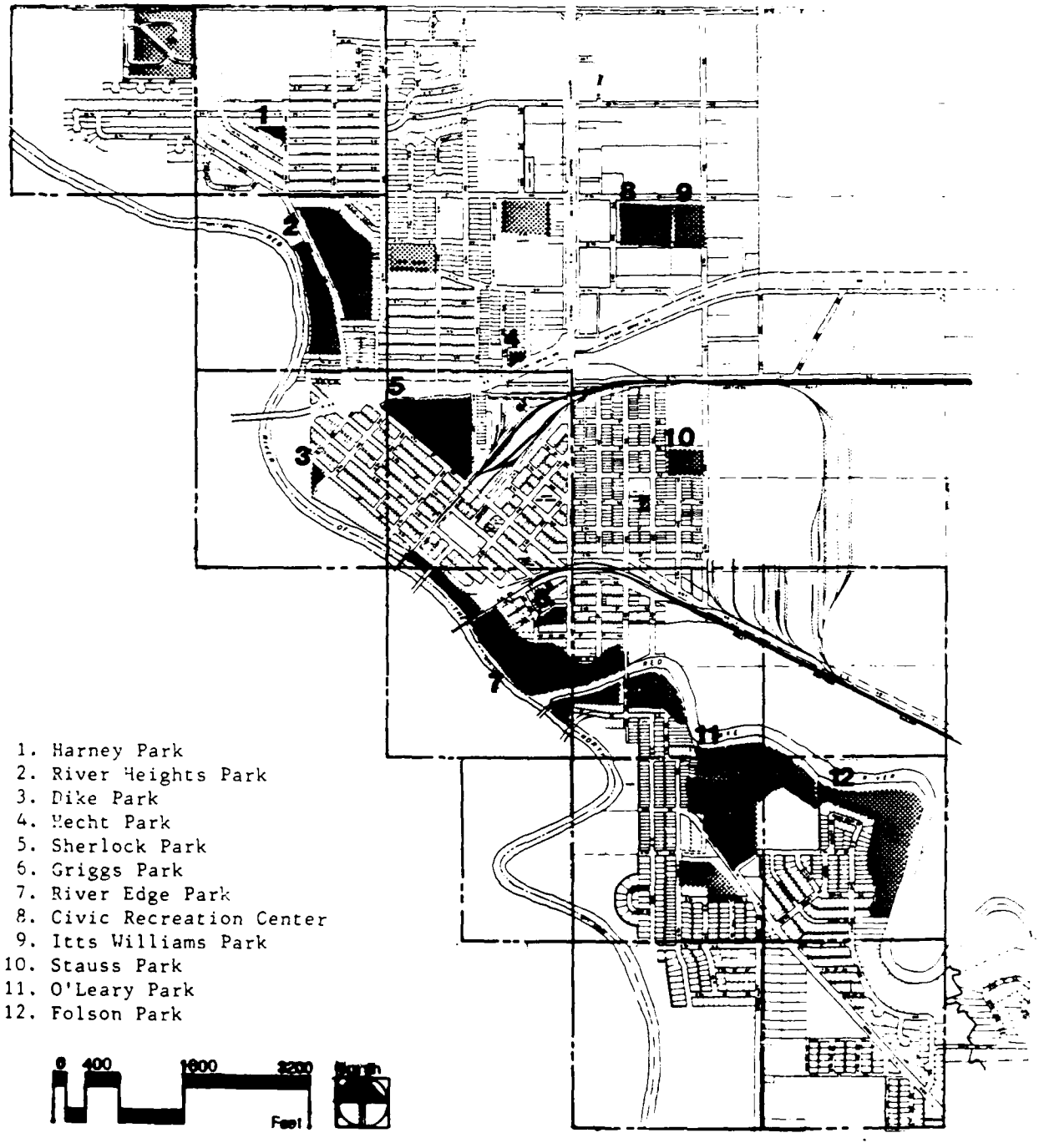


EXHIBIT 2 EAST GRAND FORKS FACILITIES INVENTORY (12/82)

Classifications	Civic Center	Sherlock	River Heights	Harney	Stauss	Folson	Grigs	River Heights School	O'Leary	Lawonn Property	Floodway	Add'l Floodway	Dyke Park	Hecht	TOTALS
Acreage	12	20½	22	1.12	5.3	25.4	2		33.9	1.2	38	20	1.5	1.5	184
Hockey	■				■	■	■	■							5
Skating	■			■	■	■	■	■					■		7
Indoor Rec.	■														1
Tennis								4							4
Toilets		■			■	■									3
Picnic Areas		■				■							■		3
Flower Garden	■	■													2
Playfield		■		■			■	4					■		8
Swimming Pool		■													1
Wading Pool		■													1
Outdoor Shelters		4				1									5
Heated Shelters		1			1	1	1	1							5
Fireplaces		10	2			3			10						25
Swings		16	8	7	8	16	4		8				1	1	55
Slides		3	1	2	2		1		2				1	1	13
Miscellaneous Equipment		7		4	6		1		3				1	1	23
Picnic Tables		40			1	2	1		7						51
Baseball	2				1			2							5
Bleachers	4				1										5

EXHIBIT 2 EAST GRAND FORKS FACILITIES / OPEN SPACE SYSTEM



1. Harney Park
2. River Heights Park
3. Dike Park
4. Hecht Park
5. Sherlock Park
6. Griggs Park
7. River Edge Park
8. Civic Recreation Center
9. Itts Williams Park
10. Stauss Park
11. O'Leary Park
12. Folson Park

EXHIBIT 3 CAPITOL IMPROVEMENTS PLAN

Year	Approximate Cost
RIVER HEIGHTS PARK:	
1983 - Install exercise track including 20 stations with signs.	12,000.
1984 - Build shelter	4,000.
1985 - Install new playground equipment including volleyball, merry-go-round	10,000.
1986 - Install running surface for exercise track.	36,000.
1987 - Install lights around exercise trail.	15,000.
TOTAL	$ 77,000.
SHERLOCK PARK:	
1983 - Vac-All truck. Shared cost with Street Dept.	60,000.
1984 - Repair main flower bed drainage.	14,000.
1985 - Amphitheater development with benches and walkway.	50,000.
1986 - Remove posts in park. Curb & gutter.	25,000.
1987 - Finish curb and gutter from 1986.	25,000.
TOTAL	$174,000.
RIVER EDGE PARK:	
1983 - Road and site work.	3,500.
1984 - Water and sewer.	7,200.
1985 - Grinder pump.	5,400.
1986 - Trailer house for bathrooms and showers.	12,000.
1987 - Pincnic tables, grills, playground.	7,000.
TOTAL	$ 35,000.
CIVIC CENTER:	
1983 - Repair and replace footings.	2,000.
1984 Waterproof and drain tile east side of building.	25,000.
1985 - Seal exterior of building. Repaint.	15,000.
1986 - Repair and replace overhead door.	2,000.
1987 - Install tile in dressing rooms.	4,500.
1988 - Drainage improvements.	8,000.
1989 - Install watering system.	4,500.
TOTAL	$ 58,000.

ITTS WILLIAMS PARK:

1983 - Install playground equipment.	6,000.
- Pave parking lots; install lighting	278,000.
1984-1988 - Spread payment of item 2 above.	
TOTAL	$284,000.

STAUSS PARK:

1983 - Baseball field restoration.	3,500.
1984 - Build new storage shed.	4,000.
1985 - Buy new bleachers.	6,400.
1986 - Build two softball diamonds.	10,000.
1987 - Fence softball diamonds.	9,000.
TOTAL	$ 32,900.

O'LEARY PARK:

1983 - Tear down brown shed. Build new garage.	8,000.
1984 - New playground equipment.	8,000.
1985 - Build new shelter.	4,500.
1986 - Underground sprinkler.	6,000.
1987 - Add heat and insulation to quansette.	10,000.
TOTAL	$ 36,500.

FOLSON PARK:

1983 - Renovate shelter and picnic area.	2,500.
1984 - Floodproof warming house.	15,000.
1985 - Build two softball diamonds.	10,000.
1986 - Fence diamonds.	9,000.
1987 - Install six sets of bleachers.	6,000.
TOTAL	$ 42,500.

GOLF COURSE:

1983 - Clear area for park and parking.	5,000.
1984 - Install road and parking.	18,000.
1985 - Install lighting for park.	10,000.
1986 - Install playground equipment.	6,000.
1987 - Install shelter.	3,400.
TOTAL	$ 42,400.

V.F.W. ARENA:

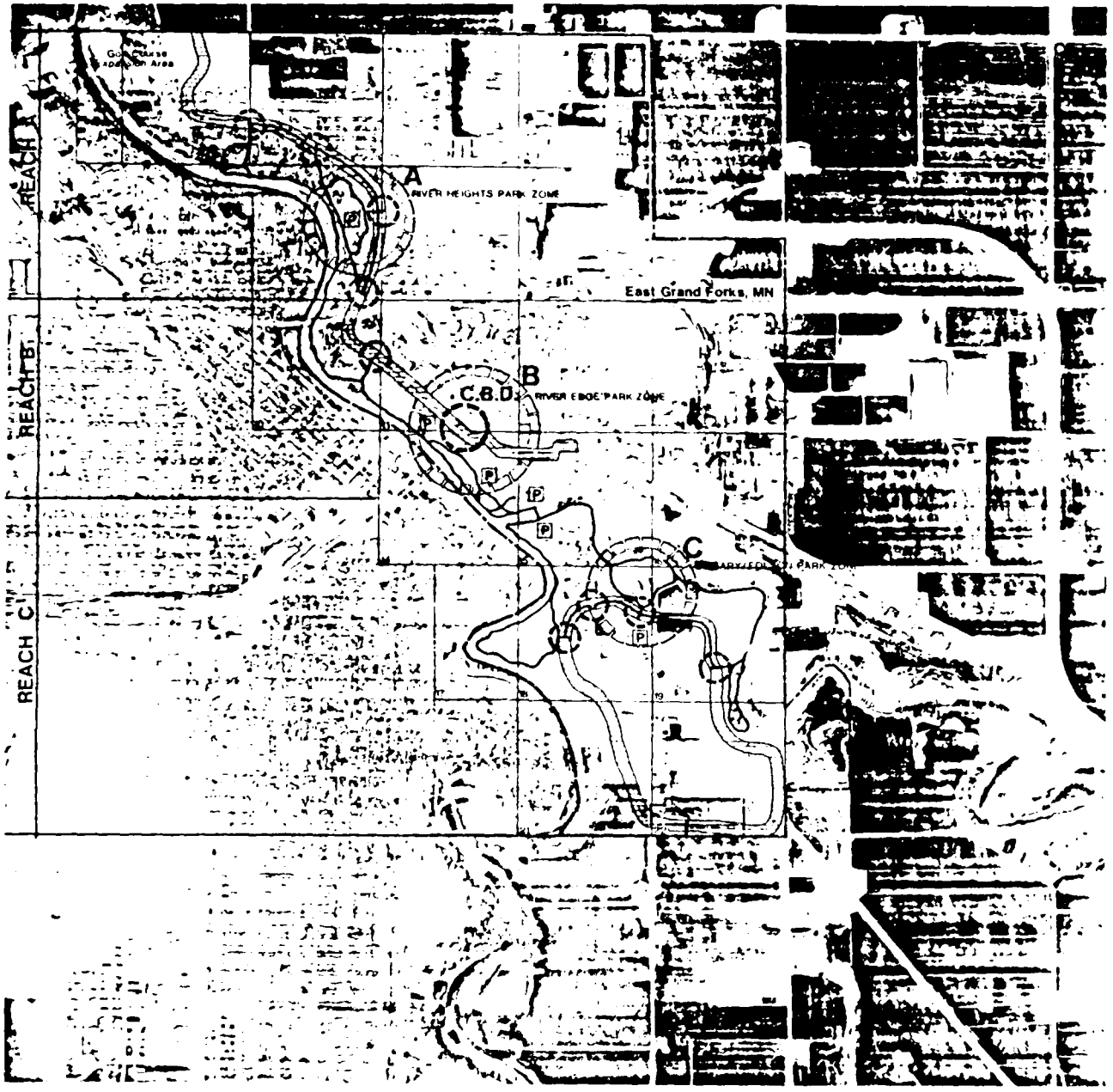
1983 - Install watering system.	4,000.
1984 - Repair Zamboni room.	5,000.
1985 - Pave behind Zamboni room.	10,000.
1986 - Install interior running track.	25,000.
1987 - Finish payment on running track.	25,000.
TOTAL	$ 69,000.

RESURRECTION CEMETARY	$ 15,000.
SWIMMING POOL	$ 48,300.
MISCELLANEOUS	$ 19,500.

EXHIBIT 4 EXCLUDED FACILITIES

Facilities which are not eligible for Federal financial assistance in the recreational development at local projects are listed below:

1. Boats, motors and attendant storage and repair facilities.
2. Mechanical boat launching devices.
3. Supply stores, restaurants and snack bars.
4. Bait and tackle shops.
5. Oil and gasoline dispensing and storage facilities.
6. Motels.
7. Hotels.
8. Cabins.
9. Bicycle and attendant storage and repair facilities.
10. Horses, riding stables and corrals.
11. Boat docks, piers, and similar facilities for long-term berting or mooring of pleasure boats. (This does not include courtesy docks provided in conjunction with public launching ramps).
12. Administrative buildings, operations personnel residences, visitor centers (other than information kiosks), amphitheaters, stadiums, shower buildings and exhibit halls.
13. Decorative fountains and statuary.
14. Decorative lakes or ponds for recreation or aesthetic reasons.
15. Elaborate playground equipment such as spray pads, wood and stone replicas of forts, castles, etc.
16. Decorative promenades or boardwalks.
17. Bleachers and dugouts.
18. Tennis courts and other courts.



East Grand Forks General Reevaluation Study

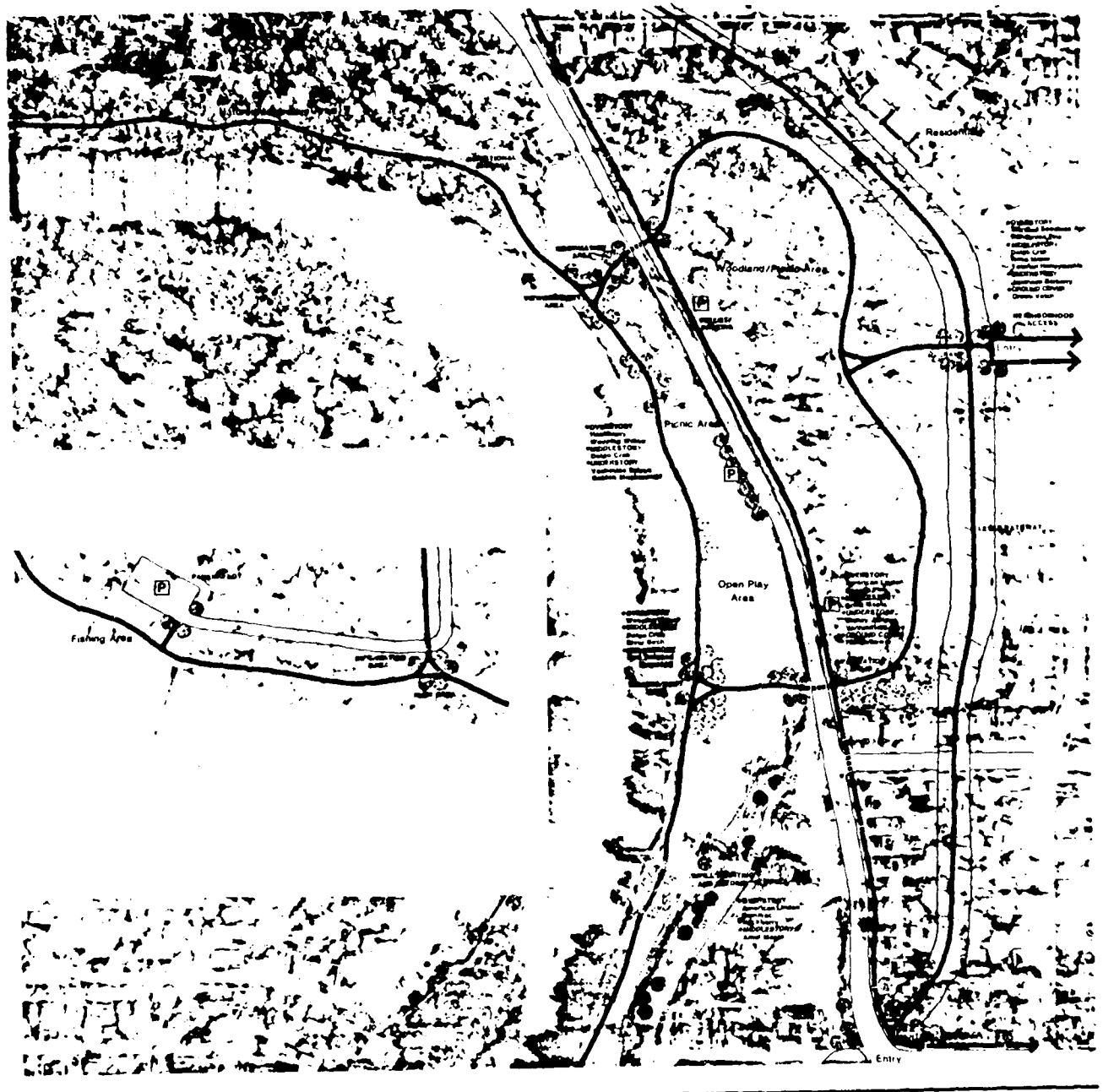
PLATE 1

RECREATIONAL DEVELOPMENT CONCEPT

- TRAIL NETWORK
- CONCEPTUAL LEVEE ALIGNMENT
- MAJOR NODE
- ENTRY POINT
- P — PARKING AREA
- AERIAL PHOTO NUMBER
- CITY LIMITS
- C.B.D. — CENTRAL BUSINESS DISTRICT
- A — RIVER HEIGHTS PARK ZONE
- B — RIVER EDGE PARK ZONE
- C — O'LEARY/FOLSON PARK ZONE

East Grand Forks
General Reevaluation Study

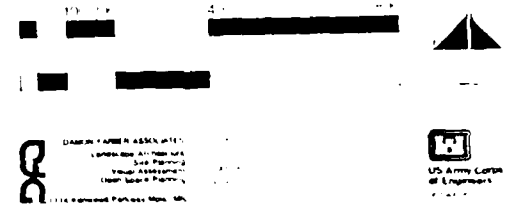
PLATE 2

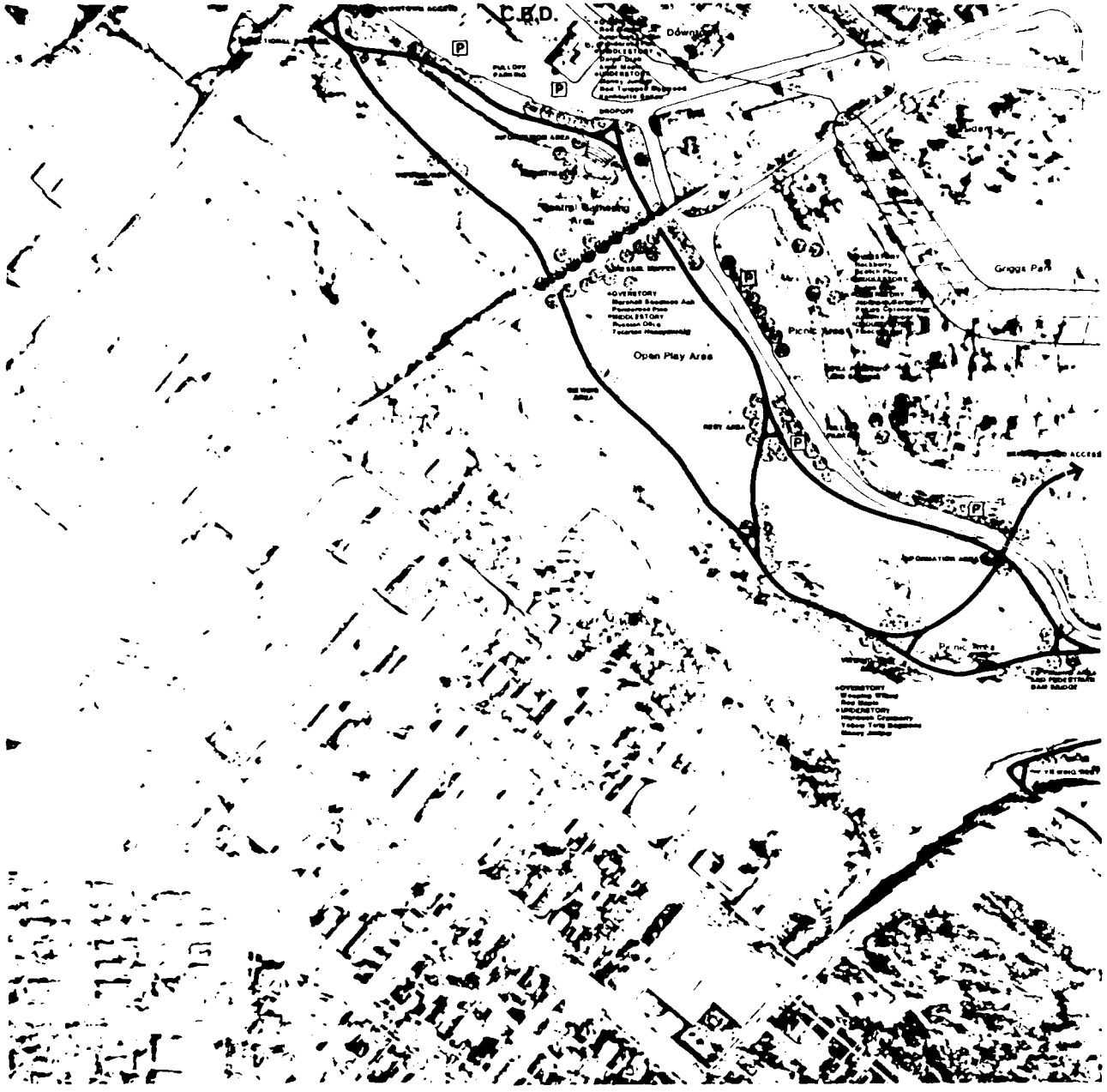


RIVER HEIGHTS PARK ZONE

- PATHWAY
- CONCEPTUAL LEVEE ALIGNMENT
- OLD LEVEE LOCATION
- PARKING AREA
- PARKWAY ROAD
- CONCEPTUAL PLANTINGS
- EXISTING SIDEWALK
- PEDESTRIAN CROSSWALK





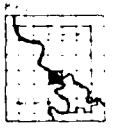


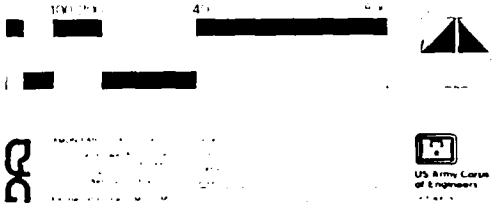
East Grand Forks General Reevaluation Study

PLATE 3

RIVER EDGE PARK ZONE

- PATHWAY
- CONCEPTUAL LEVEE ALIGNMENT
- OLD LEVEE LOCATION
- PARKING AREA
- PARKWAY ROAD
- CENTRAL BUSINESS DISTRICT
- CONCEPTUAL PLANTINGS
- PEDESTRIAN CROSSWALK

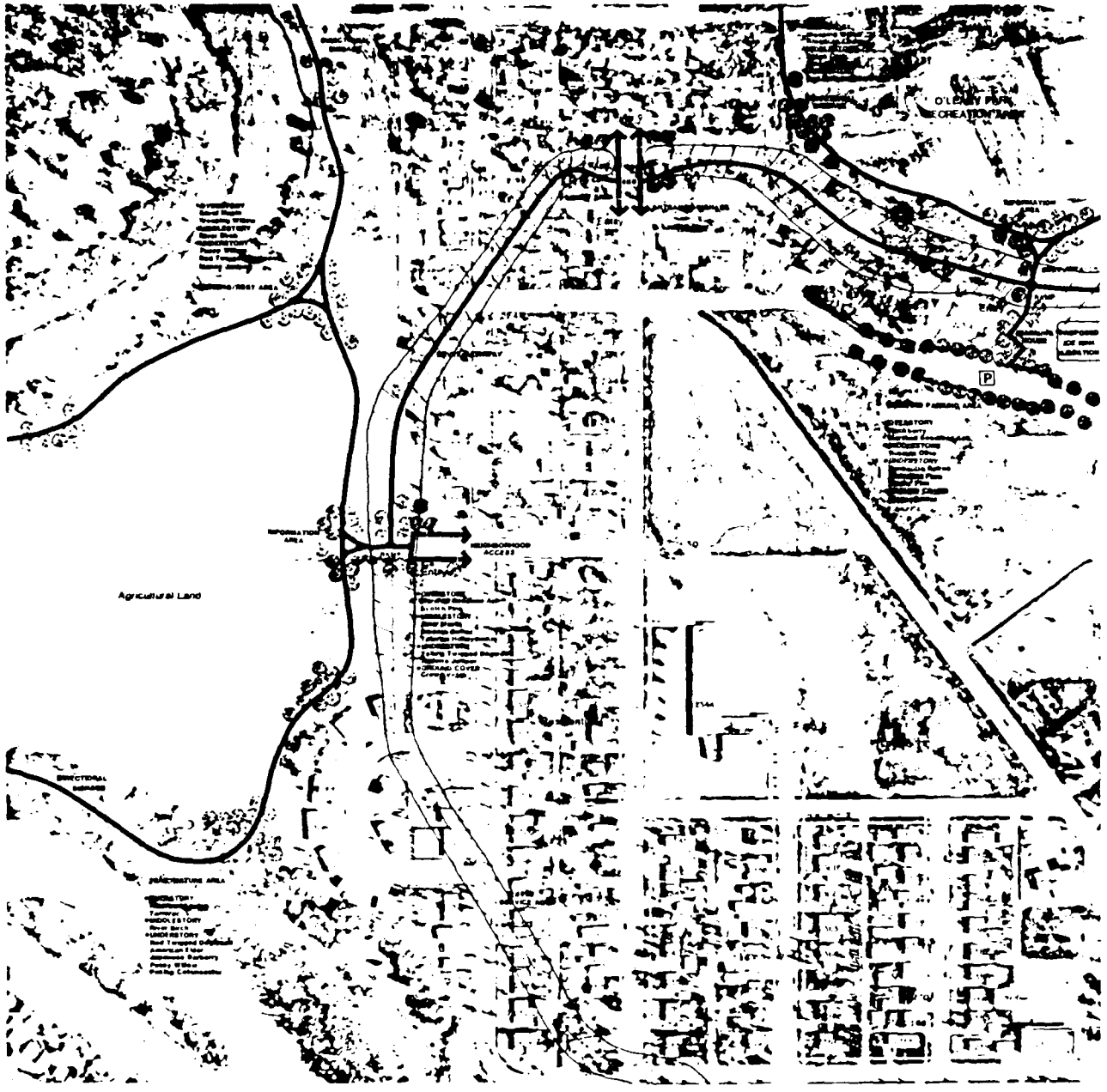




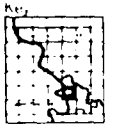
East Grand Forks General Reevaluation Study

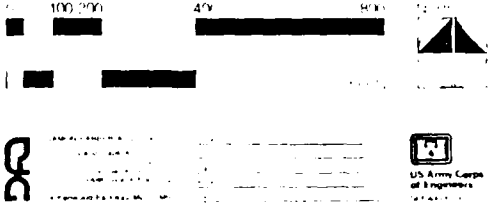
PLATE 4

O'LEARY/FOLSON PARK ZONE



- PATHWAY
- CONCEPTUAL LEVEE ALIGNMENT
- PARKING AREA
- CONCEPTUAL PLANTINGS
- EXISTING SIDEWALK
- PEDESTRIAN CROSSWALK





EAST GRAND FORKS, MINNESOTA
GENERAL REEVALUATION

SUPPORTING DOCUMENTATION
ASSESSMENT OF EMERGENCY FLOOD BARRIER

EAST GRAND FORKS, MINNESOTA
GENERAL REEVALUATION
SUPPORTING DOCUMENTATION

ASSESSMENT OF EMERGENCY FLOOD BARRIER

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EAST GRAND FORKS, MINNESOTA
GENERAL REEVALUATION
SUPPORTING DOCUMENTATION

ASSESSMENT OF EXISTING EMERGENCY FLOOD BARRIER

DESCRIPTION OF FLOOD BARRIER

The existing emergency levee system at East Grand Forks is approximately 1.8 miles long and can be divided into two separable reaches. The levees were constructed in 1965 and have been raised, reinforced, and extended during subsequent flood activities.

REACH 1

Reach 1 of the emergency levee system is located near the confluence of the Red Lake River with the Red River of the North. The levee is approximately 0.5 mile long and extends from 200 feet southwest of the junction of Second Avenue NE and First Street NE to the closure at Hill Street NW. The alignment of the levee is approximately parallel to the adjoining river, with the toe of the embankment located a minimum of 40 feet from the bank of the Red Lake River and 350 feet from the bank of the Red River of the North.

The existing levee is characterized by two levee configurations. Segment A, shown on figure 1, extends from approximately 200 feet southwest of the junction of Second Avenue NE and First Street NE to the junction of Dike Street and Central Avenue. It has a top width of 9 to 12 feet, a 1V on 2.5H landward slope, a 1V on 2.6H riverward slope, and a height of 8 to 12 feet. Segment B, extending from the junction of Central Avenue and Dike Street to the closure at Hill Street NW, has a top width of 12 to 20 feet, a 1V on 2.6H landward slope, a 1V on 2.6H to 1V on 3H riverward slope, and a height of 6 to 18 feet. The natural ground elevation along the Reach 1 levee

alignment varies from elevation 830, 200 feet from Second Avenue NE, to 820, approximately 400 feet from Second Avenue NE. The ground remains relatively uniform at elevation 820 to within 100 feet of Hill Street NW where it gradually rises to elevation 824.5 at tne Hill Street closure.

REACH 2

Reach 2 of tne emergency levee system is approximately 1.4 miles long and extends from tne Great Northern Railroad embankment to the northwest corner of River Heights Park where the levee abuts nign ground. The levee alignment parallels the Red River from the Great Northern embankment to where it crosses River Road NW. North of River Road NW, the levee is located on the south and west sides of River Heights Park.

The existing levee is characterized by five different typical sections.

- o Segment C, which extends from the Burlington Northern Railroad embankment to approximately 200 feet south of Demers Avenue, has a top width of 10 to 12 feet, a 1V on 2.7H landward slope, a 1V on 3H riverward slope, and a height of 7 to 11 feet. Approximately 200 feet north from the Burlington Northern Railroad embankment, a gravel road passes through the levee at elevation 824.

- o Segment D extends from 200 feet south of Demers Avenue to tne abandoned Burlington Northern Railroad bridge. It has a top width of 2 to 8 feet, a 1V on 2.5H landward slope, a 1V on 2.5H riverward slope, and a height of 1 to 3 feet. The Demers Avenue closure is at elevation 825. From the abandoned Burlington Northern bridge to a point 650 feet downstream, approximately at Seventh Street NW, no levee currently exists. From Seventh Avenue NW to 10th Avenue NW, the levee is located on the riverward side of the houses abutting the west side of First Street NW.

- Segment E, which extends from Seventh Avenue NW to River Road, has a top width of 6 to 12 feet, a 1V on 2.5H to 1V on 3H landward slope, a 1V on 2.3H to 1V on 3H riverward slope, and a height of 4 to 15 feet. At the corner of 11th Street NW and Second Street NW, the landside toe of the levee has a 2- to 3-foot near-vertical face to provide clearance for the roadway. Where River Road NW crosses the levee alignment, the minimum road surface elevation is 820. From River Road NW the levee extends 400 feet east and then 1,100 feet north to where it abuts high ground.

- The first 400 feet, Segment F, has a height of 6 to 10 feet, a top width of 10 to 12 feet, a 1V on 3H landward slope, and a 1V on 2.5H riverward slope with a 12- to 14-foot wide dirt road located 6 to 8 feet below the top of the levee.

- The remaining 1,100 feet, Segment G, has a top width of 8 to 10 feet, a 1V on 3H landward slope, a 1V on 2.25H riverward slope, and a height of 10 to 15 feet. A 12-foot wide dirt road crosses the levee in the northeast corner of River Heights Park at elevation 823.

The natural ground elevation along the reach 2 levee alignment varies from elevation 824 at Seventh Street NW to elevation 820 at Ninth Avenue NW. From Ninth Avenue NW to the northeast corner of River Heights Park, the ground elevation varies from 820 to 818. The ground elevation at the northeast corner of River Heights Park rises rapidly from elevation 820 to 826.

GEOTECHNICAL EVALUATION OF EXISTING BARRIER

The following geotechnical evaluation was accomplished primarily for economic analysis. It should not be considered a comprehensive geotechnical engineering evaluation of the existing barrier for

assessing the reliability of the barrier for future floods. The basic objective of the evaluation is to establish the lowest probable damage stage for the existing flood barrier. The probable damage stage is defined as the lowest river stage (flood elevation) at which interior flood damages are likely to occur if there is no significant human intervention. The evaluation is based primarily on past experience with emergency levees as well as on several questionable assumptions. This results in an increase (to an unknown extent) in the level of risk associated with the existing barrier when compared to the level or risk associated with a flood barrier designed and constructed to current Corps of Engineers criteria.

The geotechnical evaluation of the existing flood barrier at East Grand Forks was based on the assumptions listed below.

a. The barrier is not being certified as providing any assured level of permanent protection.

b. The evaluation is for the existing (as is) condition, with reasonable human intervention permitted only in the freeboard range.

c. The existing barrier does not have to satisfy any factor of safety criteria.

d. Ownership, maintenance, and operational procedures are not important.

e. Experience with emergency levees constitutes an adequate basis for judging the probable performance of the existing barrier. Detailed subsurface investigation and soil design analyses are, therefore, not required.

f. Existing provisions for interior drainage are not important and do not need to be evaluated.

g. Since impervious fill was used to construct the existing flood barrier, a levee section having an 8-foot top width and 1V on 2-1/2H side slopes can be considered an adequate levee cross section, and it can be used as the template for evaluating the existing flood barrier.

h. The placement of sandbags and/or earth fill within the freeboard range at road closures represents a reasonable level of human intervention.

Data used to evaluate the existing barrier include topographic maps from air photos taken in 1979, 13 borings taken for the feasibility report, a field inspection of the East Grand Forks levee system, and selected levee cross sections obtained during the field inspection (see figures 2 through 6).

A well-maintained grass cover exists on the levee, except for about 70 feet of levee beneath the Highway 2 bridge, and provides an acceptable level of erosion protection. The levee is constructed of fat (CH) clays with minor amounts of silt and is not readily erodible. The foundation soils beneath the levee consist of the lacustrine deposits of historic glacial Lake Agassiz. These deposits generally consist of an upper unit of laminated clay and silt and a lower unit of moderately overconsolidated, highly plastic, dark gray clay with no apparent bedding. The lower unit has high liquid limits, high natural water contents, and low dry densities, and it tends to form slickensided planes of failure.

Experience indicates that the lower lacustrine unit is the major contributor to the riverbank slope stability problems that exist throughout the Red River Valley. The scarps of riverbank slides are

generally located in the secondary riverbank 100 to 300 feet or more from the edge of the river, with the toes located in the river near the opposite riverbank. The slides frequently occur without any readily apparent change in loading condition and generally contain a massive amount of material. Fortunately, rapid slides involving sudden, large horizontal and vertical displacements occur relatively infrequently.

Usually the slides develop slowly, with visible cracks developing at the scarp prior to any readily apparent vertical or horizontal displacements.

Although ultimate displacements may become large, the displacements usually occur as a series of small movements spread over a relatively long period of time. Two such slow moving slides, encompassing the existing levee, were noted during the field inspection. One slide includes essentially all of levee Segment D and the other involves the upstream end of levee Segment A.

Slope movements have also occurred (or are occurring) in the area between Segments D and E where no levee currently exists. During floods, levee fill is placed in that area only on an as-needed basis, and it is removed as soon as possible in order to reduce slope movements.

For the following evaluation, it was assumed that no new slope failures encompassing the existing barrier will develop. This is a very questionable assumption because of the borderline stability of the existing riverbanks in the area.

The levee and its foundation are penetrated by many pipes. All appear to be gated, in some form, except for 3- to 6-inch diameter pipes located at the riverside toe of the levee at Ninth Avenue NW. Evaluation of the existing levee cross section was by the template method. For this, a template, described in assumption g., is fit

within the levee section. The maximum top of template elevation, corresponding to the maximum permissible top of freeboard and probable flood damage stage, is determined without the template protruding beyond the limits of the existing levee fill.

The following table summarizes the probable flood damage stage and the maximum permissible top of freeboard elevation at potentially critical locations along the existing flood barrier. It is reasonable to assume that sandbags or earth fill would be placed in the freeboard range for the road closures listed.

Comparison of Probable Damage Stage and Top of Freeboard Elevation at Selected Locations

Location	Probable Flood Damage Stage	Maximum Permissible Top of Freeboard Elevation
Reach 1		
Segments A and B		
Levee from Second Avenue NE to Hill Street NW	828	828
Road closure at Hill Street NW	824.5	828
Reach 2		
Segment C		
Road closure 200 feet north of Burlington Northern Railroad embankment	824.0	828
Segment D		
Levee 100 feet upstream of Demers Avenue	824	824
From the abandoned Burlington Northern bridge to Seventh Avenue NW	823	823
Segment E		
Levee from Seventh Avenue NW to River Road NW	824	824
Road closure at River Road NW	820	826
Segment G		
Road closure at levee from River Road NW to the northeast corner of River Heights Park	823	825

Because of the assumptions made for the evaluation, especially the assumption that no new riverbank slope failures will develop, reliance on the existing barrier to the elevation given in the preceding table involves significantly greater risk than would be associated with a flood barrier designed and constructed to current Corps of Engineers criteria. Assuming reasonable maintenance, no new riverbank slope stability failures, and no overtopping, the probable life of the existing barrier should be equal to the life of the proposed project.

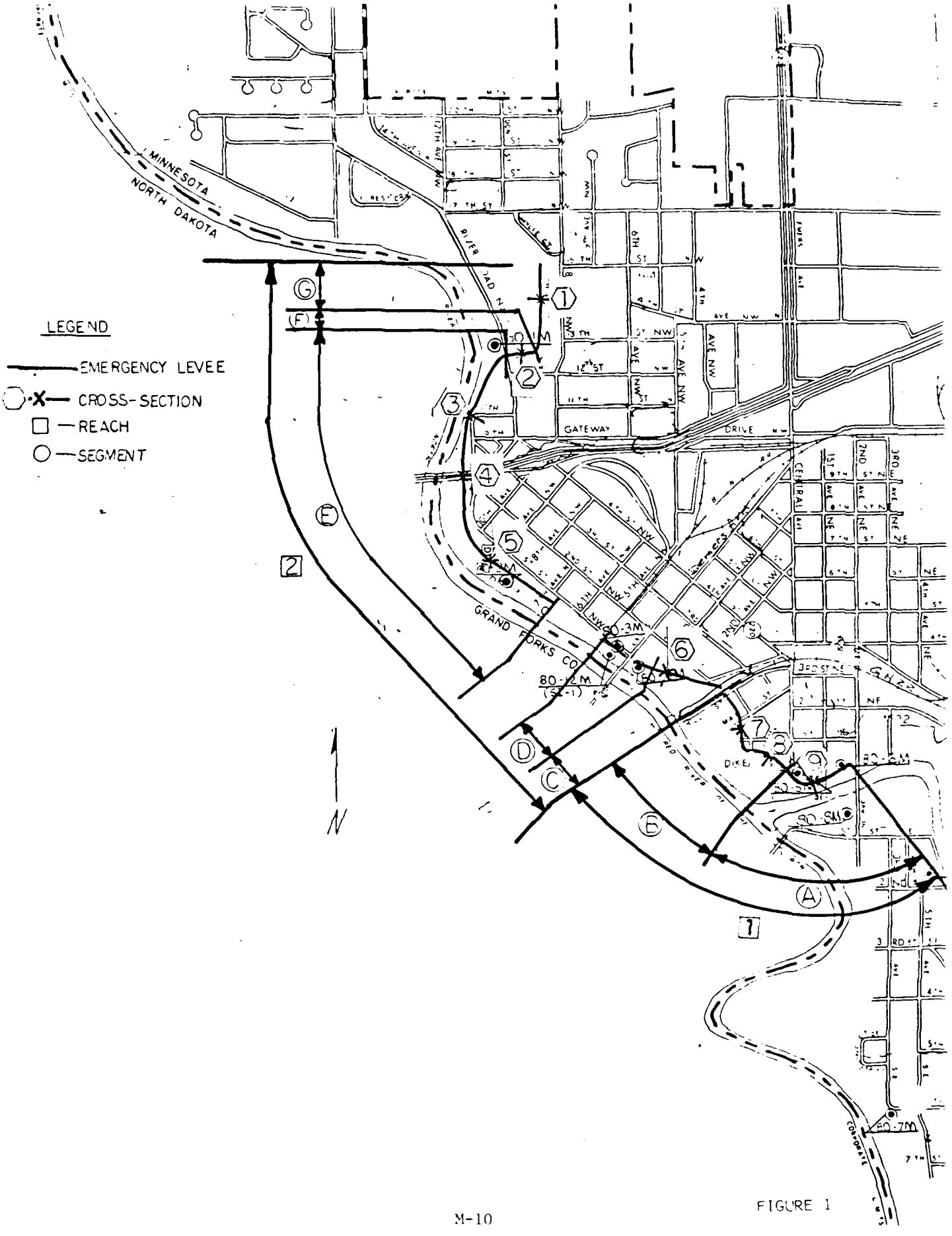

LEGEND
EMERGENCY LEVEE
CROSS-SECTION
REACH
SEGMENT
MINNESOTA
NORTH DAKOTA
GATEWAY
DRIVE
GRAND FORKS CO
DIKE
80-1M
80-3M
80-5M
80-6M
80-7M
N

FIGURE 1

S3 84 HG
Graph Paper
DIRECT FROM CODE B FOR CO., NORWOOD, MASS. 02062
PRINTED IN U.S.A.

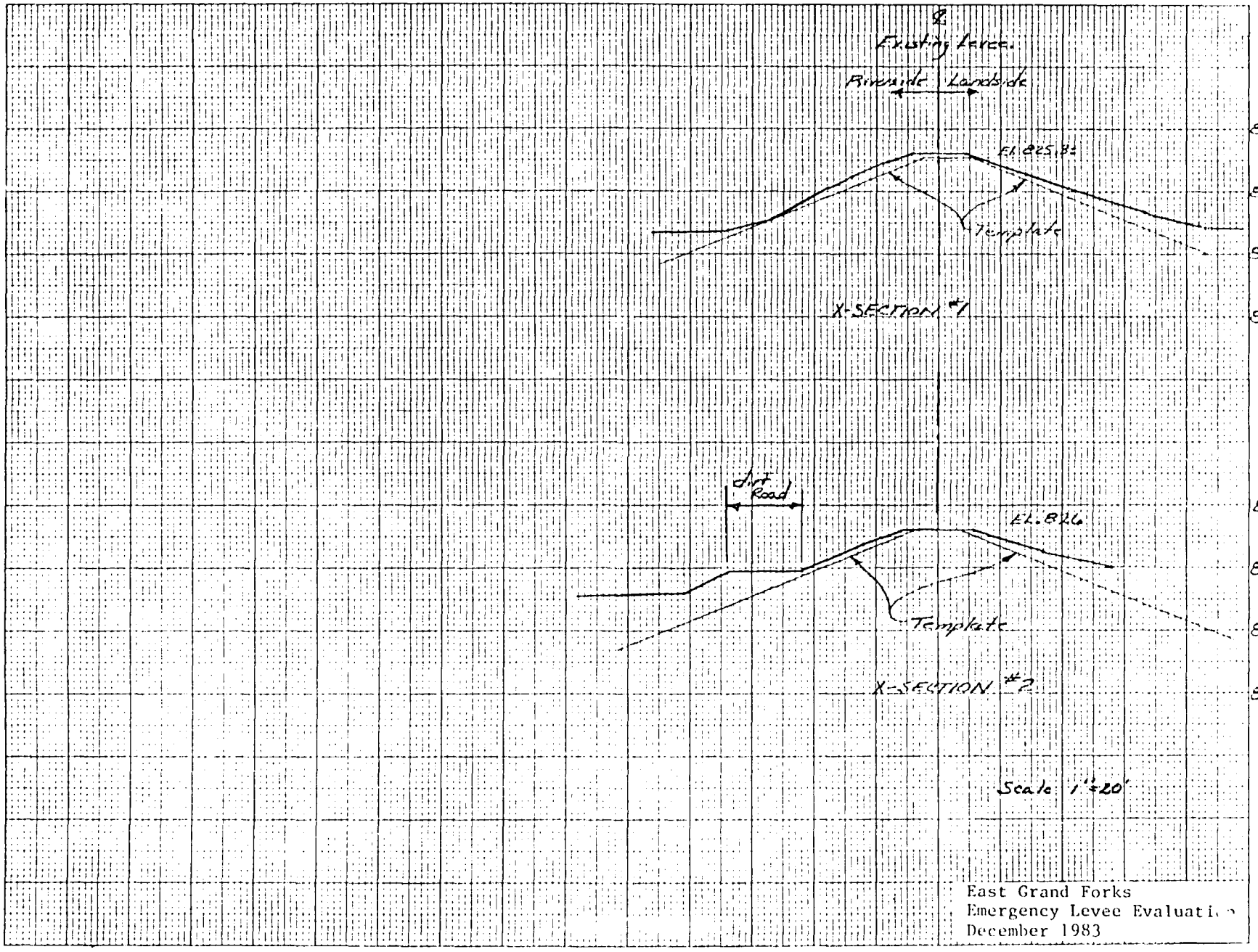
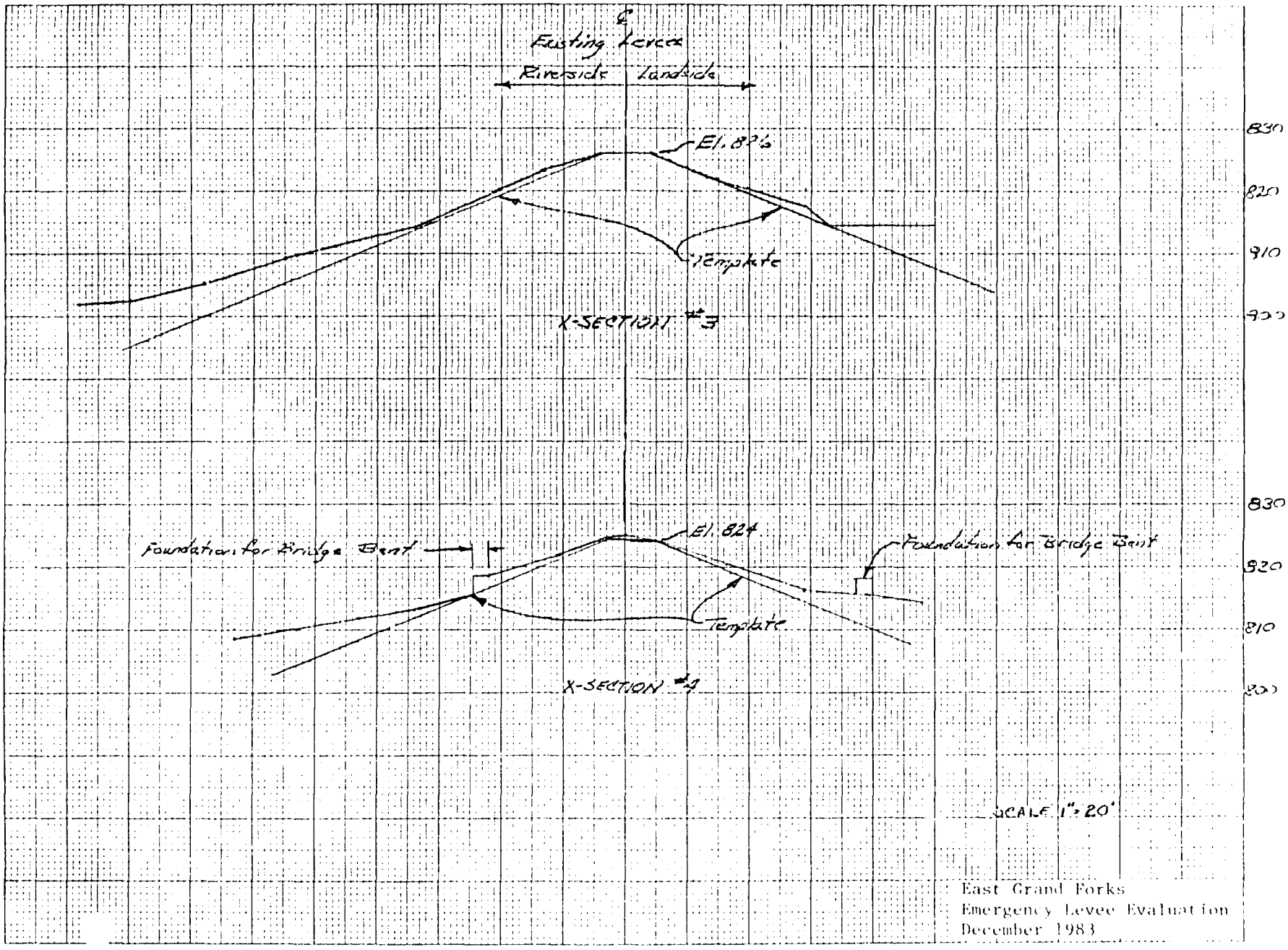


FIGURE 2



East Grand Forks
Emergency Levee Evaluation
December 1983

FIGURE 3

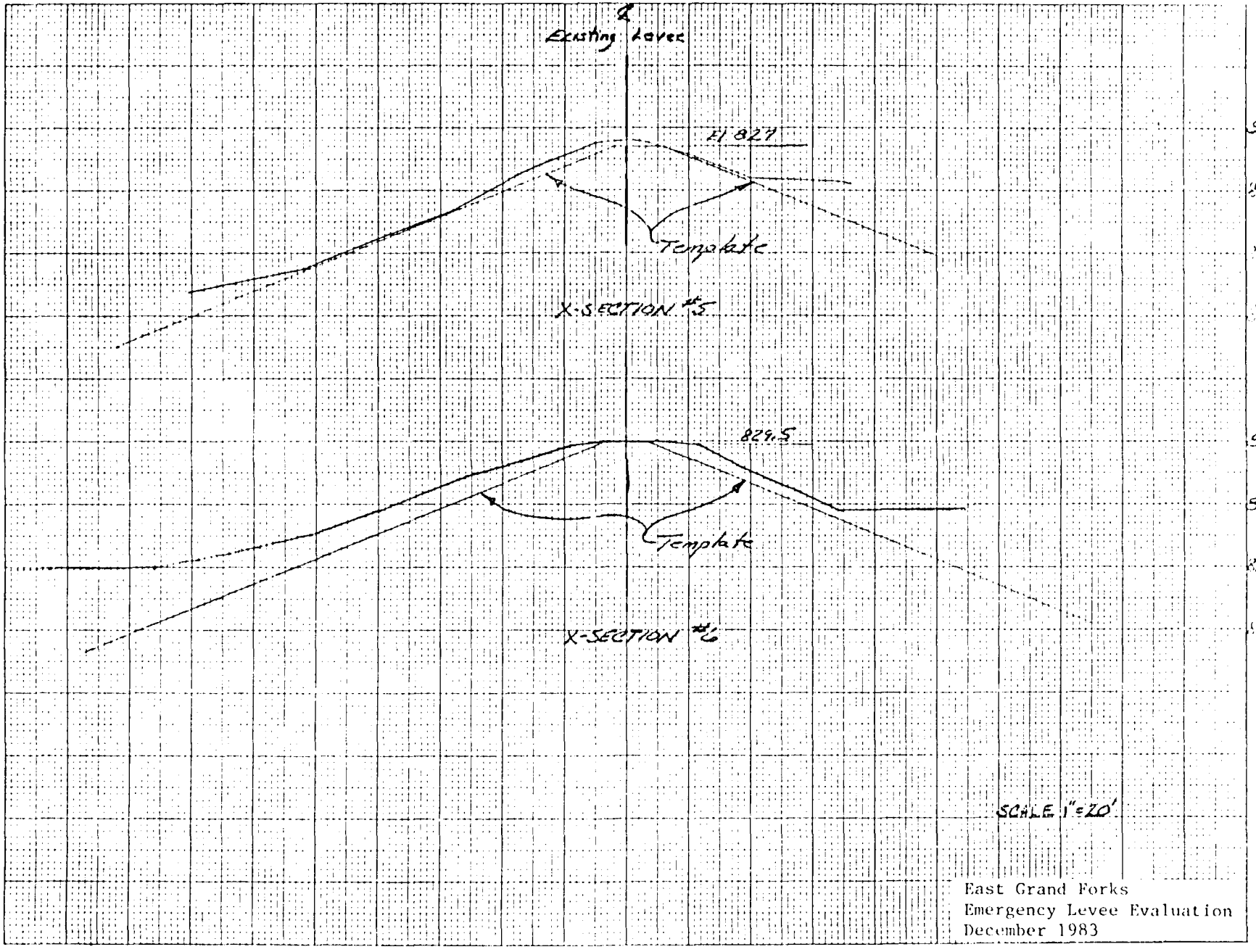
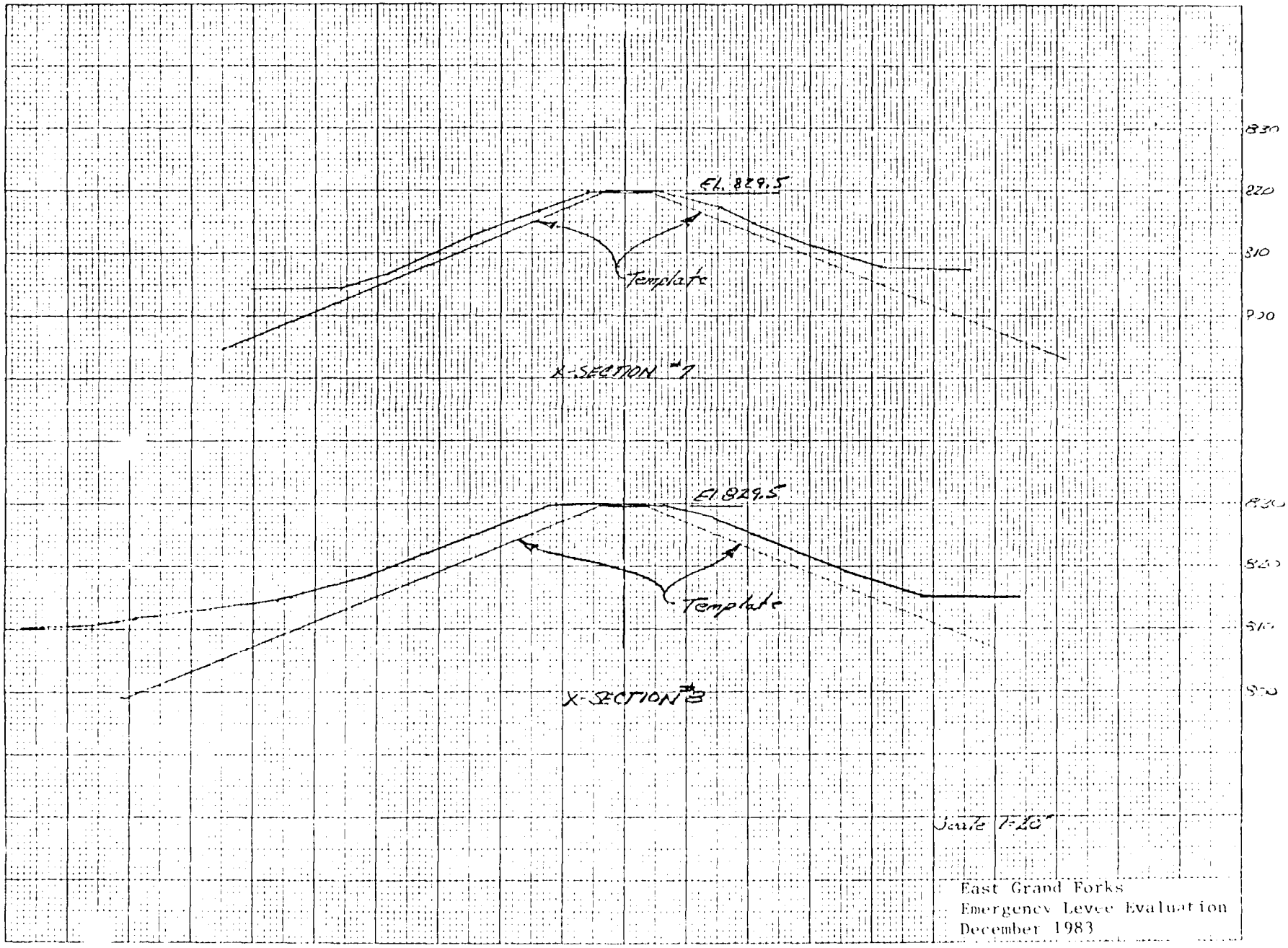
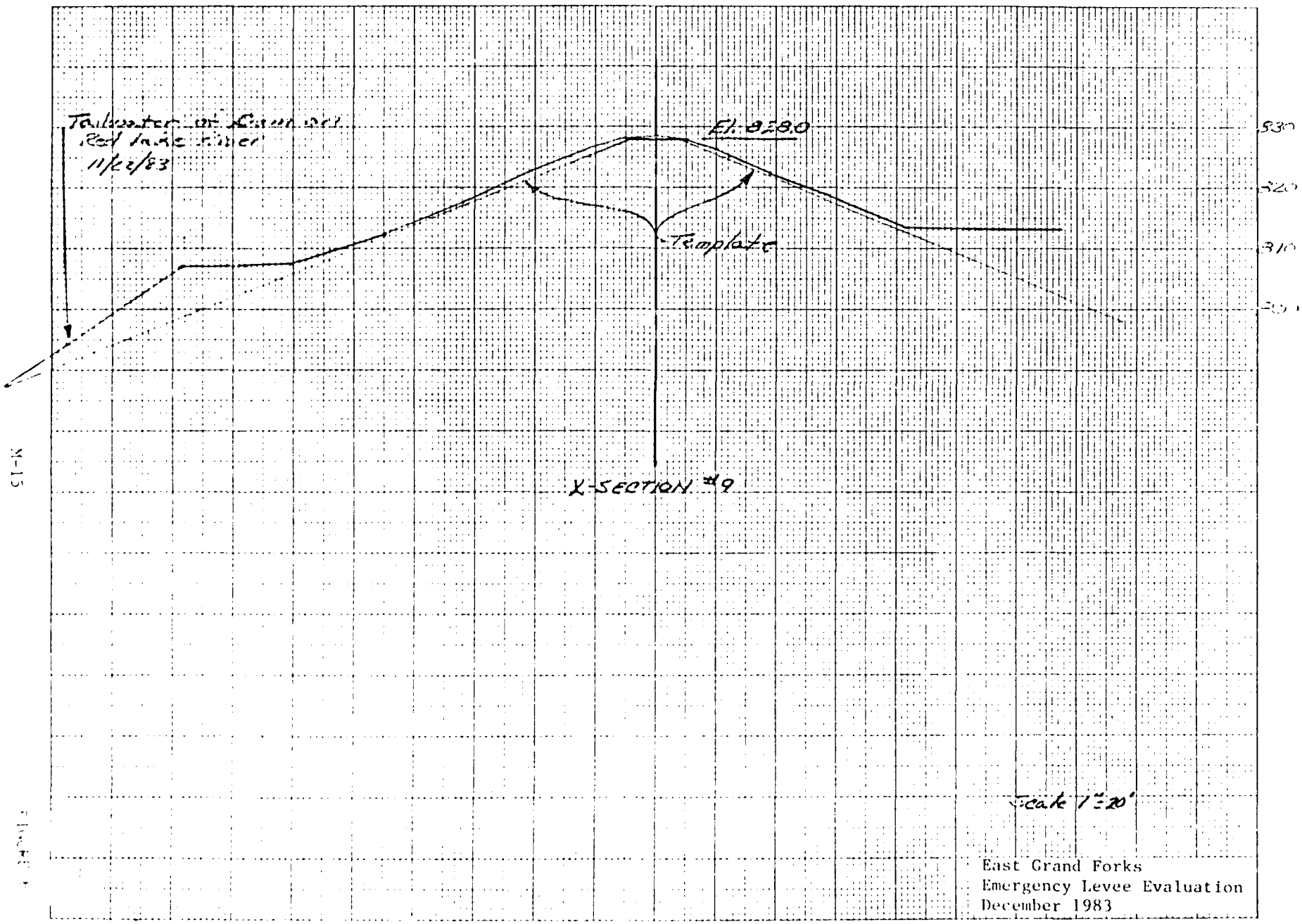

Existing Levee
El 827
Template
X-SECTION #5
829.5
Template
X-SECTION #6
SCALE 1"=20'
East Grand Forks
Emergency Levee Evaluation
December 1983

FIGURE 7



East Grand Forks
Emergency Levee Evaluation
December 1983

FIGURE 5


Tailwater at Lower Red Lake River
11/22/83
El. 838.0
Template
X-SECTION #9
Scale 1"=20'
530
520
510
East Grand Forks
Emergency Levee Evaluation
December 1983

HYDROLOGY AND HYDRAULIC EVALUATION OF EXISTING BARRIER

GENERAL DESCRIPTION OF DRAINAGE AREA

East Grand Forks is located in the bed of the former glacial Lake Agassiz. As the glacier receded, the lake drained and the Red River of the North was formed. The Red River flows generally northward forming a meandering border between North Dakota and Minnesota.

The Red River Valley has an exceptionally mild slope. The south-north axis of the bed of glacial Lake Agassiz has a gradient of about 1-1/2 feet per mile. As a result of meandering, the river at East Grand Forks has a channel gradient of about one-half foot per mile.

FLOODS AND FLOOD CHARACTERISTICS

In the Red River basin, frequent flooding of the tributaries and the main stem affects much of the Red River Valley floor, the bed of the historic glacial Lake Agassiz. Two types of flooding occur. The usual type is associated with streambank overflow. Another type is caused by overland runoff from snowmelt and/or heavy rainfall entrapped by plugged culverts and ditches within sections of land bounded by raised roadways. The water accumulates, overflows the roadways when it has reached sufficient depth, and inundates sections of land as it moves overland until reaching stream channels. The larger floods which have caused most of the urban damages in the Red River basin have, in general, resulted from streambank overflow primarily during spring snowmelt.

Major floods occurred at East Grand Forks in 1824, 1825, 1826, 1848, 1851, 1852, 1853, 1882, 1897, 1950, 1965, 1966, 1969, 1978, and 1979. These floods occurred during the spring principally from snowmelt with some contribution from rainfall and backwater effects from the adjacent rivers. The flood levels at East Grand Forks were at high levels for several weeks during these major events. The summer of 1975 experienced a flood stage of 43.1 feet at the USGS gage site caused by runoff from heavy rainfalls.

CLIMATOLOGY

The climate at East Grand Forks, Minnesota, is characterized by wide variations in temperature with moderate precipitation. The average annual temperatures for various locations within the basin are shown in Table B. The average length of the growing season is about 126 days.

Average annual precipitation at East Grand Forks is approximately 20 inches. Most of this precipitation occurs during the frost-free part of the year, from May through August. Spring snowmelt, especially when accompanied by rainfall, causes serious flooding problems within the basin.

Table B

Mean Annual and Extreme Temperatures for Red River of the North Basin above East Grand Forks

Station	Years of Record(1)	Mean Annual	Temperature (°F) Maximum	Minimum
Fargo, N.D.	98	40.7	114	-48
Crookston, N.D.	90	39.9	106	-51
Ada, MN	88	39.7	111	-53
Hillsboro, N.D.	74	40.8	115	-40
Wahpeton, N.D.	87	42.8	109	-44

(1) Through 1980.

FLOOD STAGE-FREQUENCY RELATIONSHIP

The water surface profiles for the Red River of the North at Grand Forks-East Grand Forks have a greater slope when compared to upstream and downstream reaches. The Red Lake River water surface profiles are of a much milder slope, being affected greatly by backwater effects from the Red River of the North. The flood stage-frequency data for East Grand Forks is listed in Table C. The derivation of this relationship is discussed in greater detail in the Hydraulics and Hydrology Appendices.

Table C

Flood Stage-Frequency Relationship at East Grand Forks, Minnesota

At the USGS gage site at River Mile 295.7

Recurrence Interval in Years	Flood Stage in Feet	Elevation in Feet (NGVD 1929)
500	56.9	835.2
200	53.9	832.4
100	51.7	830.0
50	49.0	827.3
25	46.8	825.1
20	46.5	824.8
10	43.7	822.0
5	38.9	817.2

RELIABILITY OF FLOOD FORECASTS

The advance notice and reliability of flood forecasts depends on the sources of the flood threat and the timing of the peak flows for the Red Lake River and the Red River of the North. At higher discharges, the Red River tends to dominate flow conditions at East Grand Forks. The advance notice for high water due to conditions upstream on the Red River would likely be on the order of a week or more. Flood threats from overland runoff in the immediate vicinity of Grand Forks-East Grand Forks are more likely to be on the order of 1 to 3 days. The reliability of the flood forecasts for East Grand Forks has been and will most likely continue to be extremely good. The city of East Grand Forks can be expected to take emergency actions once the forecast is for river levels above flood stage.

FREEBOARD REQUIREMENTS

It has been general practice in the design of levees to provide freeboard allowance above the design water surface profiles. These freeboard allowances have not been standardized, but the minimum values most commonly adopted by the Corps of Engineers have been 2 feet for agricultural levees and 3 feet for urban flood protection structures. As discussed in EM 1110-2-1601 and Civil Works Bulletin 54-14, freeboard allowance should not be an arbitrary number added on to levee design height. Freeboard allowance should be considered for each separate project based on the following factors:

a. the reliability of the gage data and the hydraulic analysis;

b. potential wind and wave set ups;

c. channel restriction and expansions;

d. channel velocities;

e. flood frequency stage variations in the water surface profile; and,

f. risk of loss of life and catastrophic damage should the levees fail.

Based on the long flood duration, potential significant blockages of the bridges, uncertainties of Red River and Red Lake River peak flow timing and wave action from wind, and the high degree of urbanization, a 3-foot levee freeboard criteria was selected.

ELEVATION-DISCHARGE RELATIONSHIPS

Elevation-discharge relationships for each of the reaches shown on figure 1 is presented on figure 2. The area between reaches D and E has been designated reach X for hydraulic analysis purposes. The relationships shown in figure 2 are based on a condition where the existing levees were considered effective. This condition produces a method to view each separate reach at the weak link in the system. A summary of elevation-discharge-frequency relationships is presented in table D.

RISK AND HAZARD OF A POTENTIAL LEVEE FAILURE

The risk and hazard associated with the potential levee failure at East Grand Forks varies from one reach to another as shown on table D. There would be primarily property damage with potential for loss of life or catastrophic damages depending on the reach. A summary of risk and hazard information, top of permissible levee elevation (based on geotechnical analysis), and water surface elevation for 3 feet of freeboard are shown in table D.

CUMULATIVE PROBABILITY OF LEVEE OVERTOPPING

A study of cumulative probability for levee overtoppping was conducted in accordance with procedures presented in Appendix 10 "RISK" of the Water Resources Council Bulletin 17B dated September 1981. This appendix describes the recommended procedures for estimating the risk incurred when a location is occupied for a period of years. As used in this guide, risk is defined as the probability that one or more events will exceed a given flood magnitude within a specified period of years. The results of the cummulative probability for levee overtopping are listed in table E.

INDIVIDUAL REACH SUMMARIES

The summaries for each of the reaches designated for the existing levee analysis are discussed separately for existing and future hydrologic and hydraulic conditions.

Reach A

Based on the maximum permissible top of freeboard elevation of 828 recommended in the geotechnical evaluation, the highest level of credit for the existing barrier should be elevation 825. This is the considered point of incipient flow into the area landward of the Reach A existing barrier system. As shown in table D, the considered point of incipient flow has a recurrence interval of 12 years.

Reach B

Based on the maximum permissible top of freeboard elevation of 828 recommended in the geotechnical evaluation, the highest level of credit for the existing barrier should be elevation 825. This is the considered point of incipient flow into the area landward of the Reach B existing barrier system. As shown in table D, the considered point of incipient flow has a recurrence interval of 12 years.

Reach C

Based on the maximum permissible top of freeboard elevation of 828 recommended in the geotechnical evaluation, the highest level of credit for the existing barrier should be elevation 825. This is the considered point of incipient flow into the area landward of the Reach C existing barrier system. As shown in table D, the considered point of incipient flow has a recurrence interval of 14 years.

Reach D

Based on the maximum permissible top of freeboard elevation of 824 recommended in the geotechnical evaluation, the highest level of credit for this reach should be the existing controlling ground elevation of 824. Failure of the existing levee in this reach would reduce the level of protection to an event with a recurrence interval of approximately 14 years.

Reach X

There is no existing barrier in this reach. Without human intervention, the point of incipient flow into this area occurs at an elevation of 823, which has a recurrence interval of 10 years. Once the water surface approaches an elevation a few feet or so below the typical ground elevation, human intervention is highly probable. As in previous flood emergencies, construction of an emergency levee in this reach is almost a certainty. This reach is a bank unloading area. Failure of any future emergency levee in this reach would reduce the level of protection to the controlling ground elevation in the reach.

REACH E

Based on the maximum permissible top of freeboard elevation of 824 recommended in the geotechnical evaluation, the highest level of credit for the existing barrier should be elevation 821. This is the considered point of incipient flow into the area landward of the Reach E existing barrier system. As shown in table D, the considered point of incipient flow has a recurrence interval of 7 years. The reach affords the least amount of protection for the conditions stated.

REACH F

Based on the maximum permissible top of freeboard elevation of 826 recommended in the geotechnical evaluation, the highest level of credit for the existing barrier should be elevation 823. This is the considered point of incipient flow into the area landward of the Reach F existing barrier system. As shown in table D, the considered point of incipient flow has a recurrence interval of 11 years.

REACH G

Based on the maximum permissible top of freeboard elevation of 825 recommended in the geotechnical evaluation, the highest level of credit for the existing barrier should be elevation 822. This is the considered point of incipient flow into the area landward of the Reach G existing barrier system. As shown in table D, the considered point of incipient flow has a recurrence interval of 9 years.

CONCLUSIONS

The existing levees at East Grand Forks are in physically separate reaches. However, as in recent past floods, human intervention is a certainty and the use of sandbag closures at roadways and the construction of additional emergency levees would make the levees perform as one system.

On the basis of the top of freeboard elevations recommended in the geotechnical evaluation and allowing for the recommend 3 feet of freeboard, the highest level of credit for the existing barrier system should be at an elevation of 821 in Reach E. As shown in table D, the corresponding recurrence interval is 7 years. Based on table E, there is a 54 percent cumulative probability that a flood event having a recurrence interval of 7 years will occur in a 5-year time interval and a 77 percent cumulative probability that a flood event having a recurrence interval of 14 years will occur in a 20-year time interval.

Table D

Summary of Elevation-Discharge Frequency Relationships

Item Number	Item	Levee Reach Designation A	B	C	D	X	E	F	G
1	HEC2 Cross Section Numer	7950	42	44	7922	47	53	55	56
2	Top of Existing Levee Elevation in Feet	830	830	828	826	N/A	828	827	826
3	Maximum Permissible Top of Levee Elevation in Feet	828	828	828	824	823	824	826	825
4	Maximum Permissible Water Surface Elevation in Feet	825	825	825	824	823	821	823	822
5	Discharge in cfs at Maximum Permissible Water Surface Elevation	51300	51800	53300	52500	45000	39000	47500	43500
6	Flood Frequency in Percent for Discharge in Item 5 (1)	8	8	7	7	10	14	9	11
7	Typical Landward Ground Elevation in feet	821	820	821	824	823	816	821	820
8	Head of Water on Levee for Water Surface at Top of Existing Levee	9	10	7	2	0	12	6	6
9	Risk and Hazard with Water Surface at Top of Existing Levee	High	High	High	Low	Low	High	High	High
10	Head of Water on Levee for Water Surface at Maximum Permissible Water Surface Elevation	4	5	4	0	0	5	2	2
11	Risk and Hazard with Water Surface at Maximum Permissible Water Surface Elevation	High	High	High	Low	Low	High	Low	Low

(1) Recurrence interval is a function of flood frequency, expressed as follows $RI = \frac{1}{freq}$; where the frequency is expressed as a decimal. An example would be a 14 percent frequency which is equivalent to an $RI = \frac{1}{.14} = 7$ years.

Table E

Cumulative Probability of Levee Overtopping or Failure
For Existing Levees at East Grand Forks, Minnesota

Recurrence Interval (in years)	Risk for Given Time Interval in Percent				
	5-year	10-year	20-year	50-year	100-year
2	97	100	100	100	100
3	85	98	100	100	100
5	67	89	99	100	100
7	54	79	95	100	100
8	49	74	93	100	100
9	45	69	91	100	100
10	40	65	88	99	100
11	38	61	85	99	100
12	35	58	82	99	100
13	33	55	80	98	100
14	31	52	77	98	100
15	29	50	75	94	100
20	22	40	64	92	99
25	18	34	56	87	98
50	10	18	33	64	87
100	5	10	18	39	63

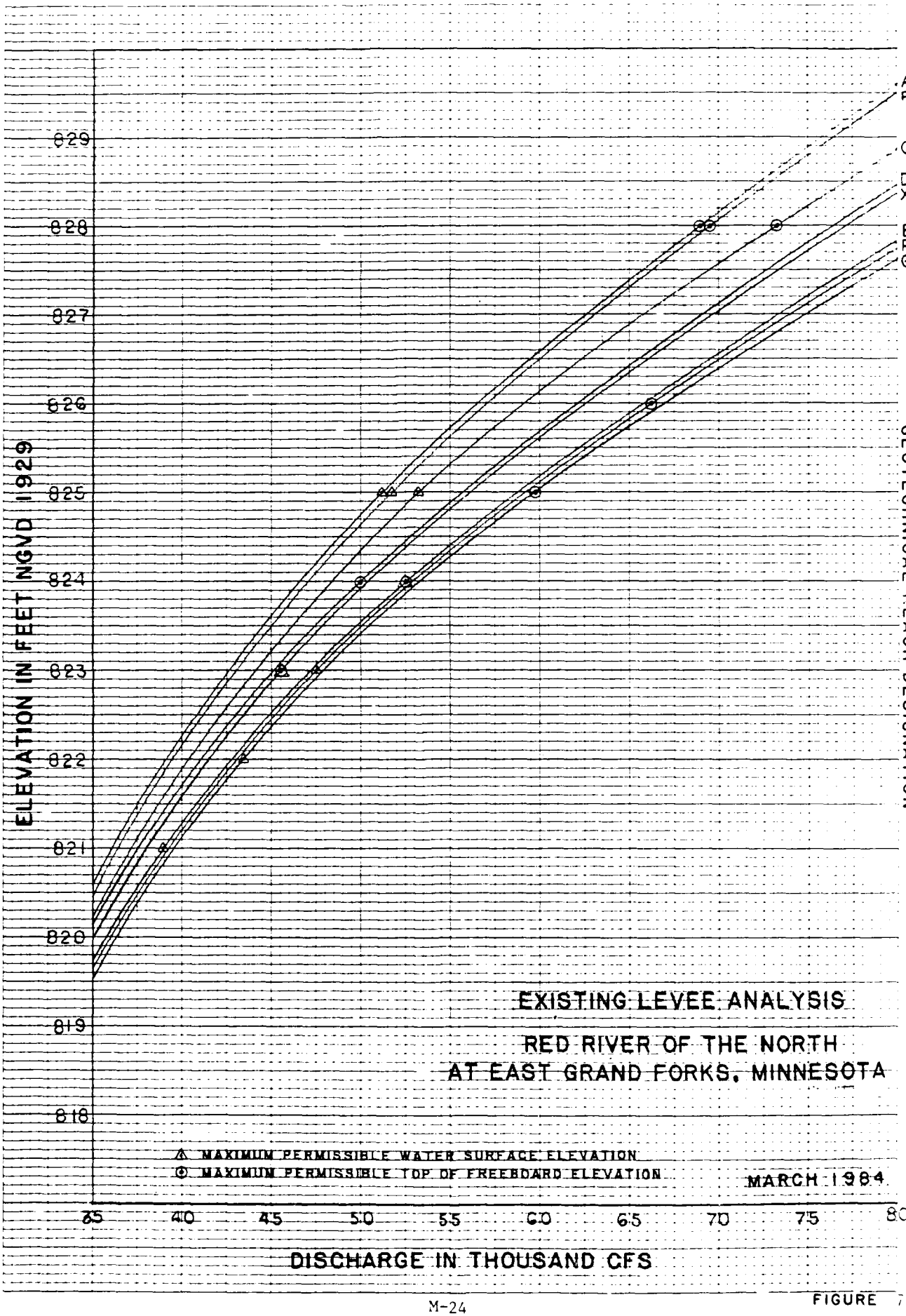

ELEVATION IN FEET NGVD 1929
829
828
827
826
825
824
823
822
821
820
819
818
A
B
C
DX
EL
G
GEOTECHNICAL REACH DESIGNATION
EXISTING LEVEE ANALYSIS
RED RIVER OF THE NORTH
AT EAST GRAND FORKS, MINNESOTA
△ MAXIMUM PERMISSIBLE WATER SURFACE ELEVATION
⊙ MAXIMUM PERMISSIBLE TOP OF FREEBOARD ELEVATION
MARCH 1984
35
40
45
50
55
60
65
70
75
80
DISCHARGE IN THOUSAND CFS

FIGURE 7

EAST GRAND FORKS, MINNESOTA
GENERAL REEVALUATION

SUPPORTING DOCUMENTATION
PUBLIC INVOLVEMENT

SUPPORTING DOCUMENTATION

PUBLIC INVOLVEMENT

TABLE OF CONTENTS

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Publications	N-4
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Evaluation	N-6

APPENDIXES

APPENDIX A - CHRONOLOGY OF SIGNIFICANT MEETINGS AND EVENTS

APPENDIX B - SIGNIFICANT NEWS CLIPPINGS, PUBLIC NOTICES AND PROGRESS REPORTS

APPENDIX C - LIST OF INDIVIDUALS AND GROUPS RECEIVING THE DRAFT GENERAL REEVALUATION AND SUPPLEMENT TO ENVIRONMENTAL IMPACT STATEMENT FOR FLOOD CONTROL AND RELATED PURPOSES, RED AND RED LAKE RIVERS AT EAST GRAND FORKS, MINNESOTA

SUPPORTING DOCUMENTATION
PUBLIC INVOLVEMENT

PUBLIC INVOLVEMENT PROGRAM

Citizen interest in water and land resource planning and the desire to take part in the planning process have made public involvement an integral part of the Corps planning process. This increased citizen interest requires that the citizens, the city, and the Corps be willing to communicate with each other. Once effective communication is established, common goals can be defined, conflicts resolved, and agreement reached on proposed solutions to the problems.

The public involvement program for East Grand Forks is designed to establish this communication between the Corps and interested publics during the conduct of the study. The main objective of the public involvement program is to actively involve the public in the study to ensure response to the public needs and preferences to the maximum extent possible.

The more specific objectives of the public involvement program are to:

1. Open and maintain channels of communication with the public.

2. Build public confidence and trust in the planning process and procedures and in the individuals doing the study.

3. Solicit the public's comments on and views and perceptions of problems, needs, alternative solutions and related impacts, and any recommendation for Federal action.

4. Give full consideration to public needs and preferences in the planning process.

5. Provide definite channels through which the study participants can obtain information on public goals and priorities regarding planning alternatives.

6. Coordinate the study with water resource and related land resource planning of all Federal, State, and local agencies.

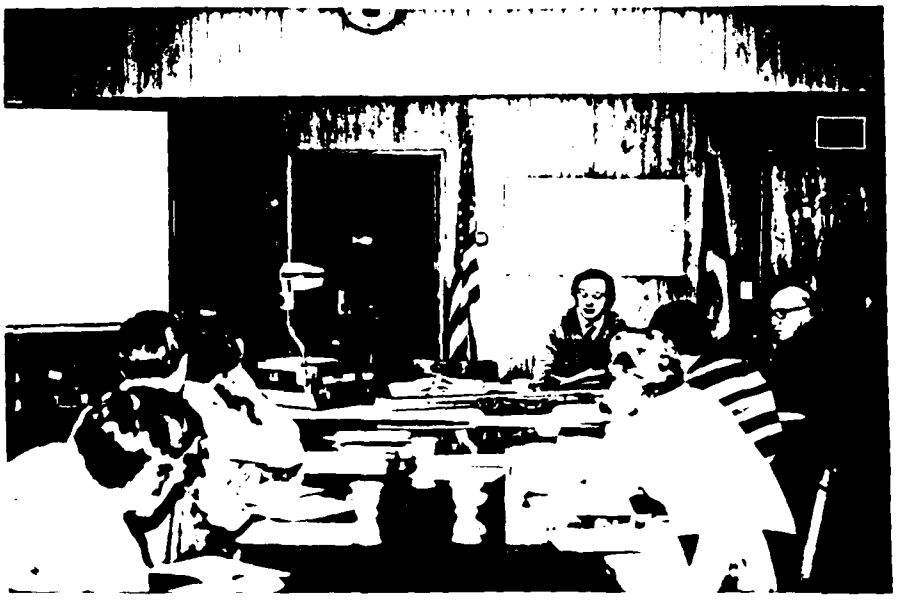
7. Encourage public understanding of Federal, State, regional, and local responsibilities, authorities, and procedures in conducting the study and implementing any recommendations.

The public involvement methods used in carrying out the public involvement program are discussed in the following paragraphs.

MEETINGS WITH THE PUBLIC

The public involvement activities for East Grand Forks began in November 1979 with a meeting with the interim Flood Control Committee appointed by the mayor (see appendix A). Additional meetings have been and will be held with this committee; city staff; other local, regional, and State agencies; and interested publics as necessary during the study. Persons attending these meetings have discussed the various alternatives under consideration, including engineering, economic, environmental and social aspects, and community views on their effectiveness and acceptability.

In addition to meetings with the city staff and the flood control committee and less formal meetings with neighborhood groups, two public meetings were held on 5 November 1980 and 11 October 1983. One additional meeting will be held following the preparation of the draft reevaluation report to ensure that interested parties are given a chance to present their views and suggestions in a public forum. Input from the community through these and other meetings will be critical to the success of the study.



Public Meeting Photo

FORMAL STUDIES

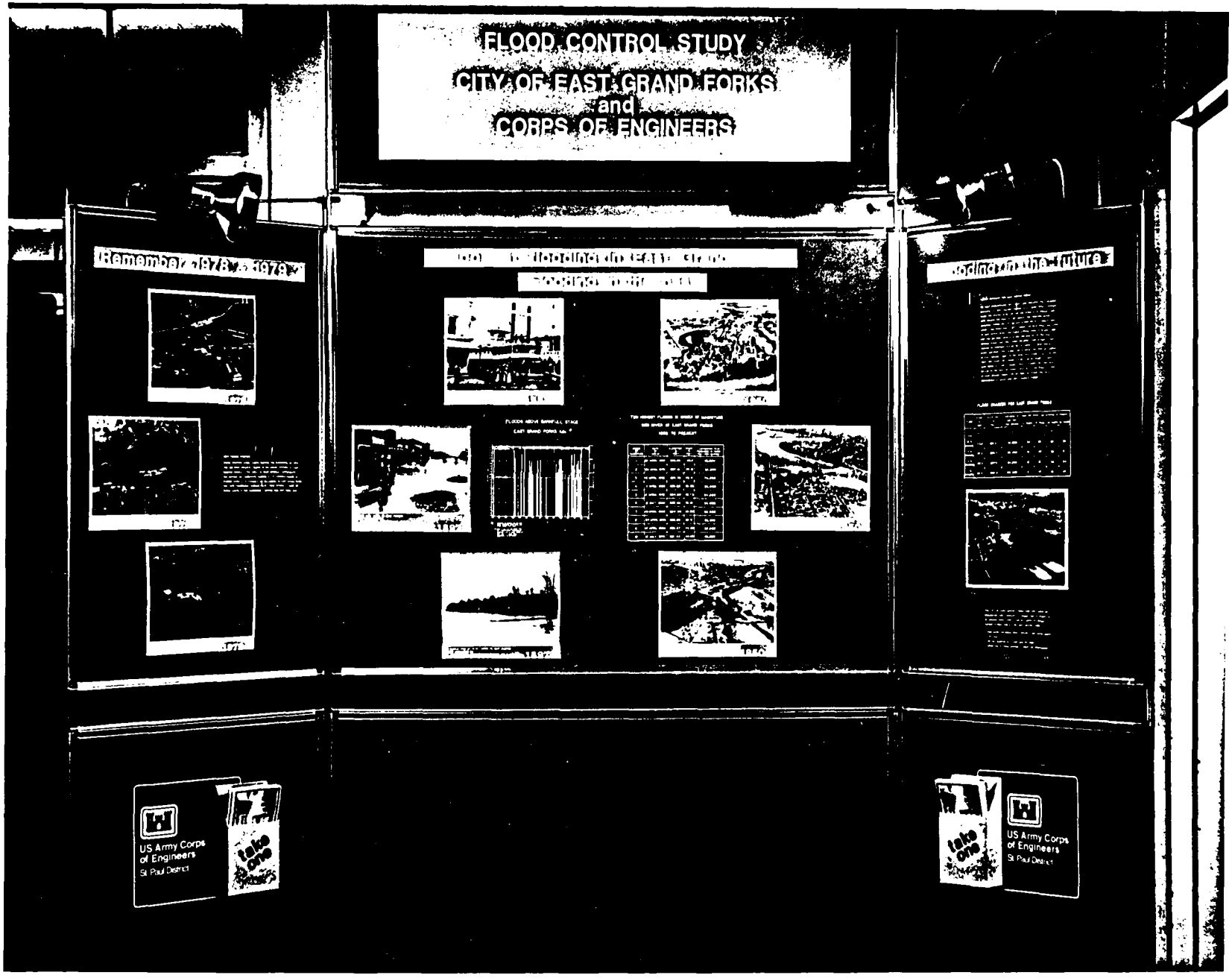
In support of the public involvement program, the following studies were useful: the social assessment and analysis, institutional analysis, residential and commercial surveys, and questionnaires received from workshops and meetings to monitor the effectiveness of the public involvement program. The value of using the information obtained through these analyses is threefold: (1) it helped to identify the local interest groups which may be invited to participate in the planning stages; (2) it facilitated obtaining public input by more accurately measuring the frequency and diversity of public opinion on problems and needs; and (3) it more precisely measured the effectiveness and accuracy of information dissemination to affected agencies and the public.

PUBLICATIONS

A major element of the public involvement program is the dissemination of information to the public concerning the study and its results. This information has been disseminated by press releases, news articles, public notices, progress reports, working papers, reports, and public information brochures mailed to affected areas. In addition, every effort has been made to provide timely written or telephone responses to affected citizens, groups, and interests. Appendix B contains several newspaper articles, public notices, and progress reports pertinent to this study. Further written responses are contained in the correspondence section (appendix C).

DISPLAY

A display was prepared and exhibited in city hall, as well as in other meeting places, to assist the city in visually explaining the flood problem and to serve as a reminder and focus for discussion of flood problems (see photo below). The display contained the following: pictures of recent floods which identified the flood outline; pictures of significant historical floods, including a graph documenting all past floods of record and a table documenting information on the 10 highest floods of record; a table displaying the future risk (in percent chance) of a selection of flood events; brochures for take-home use of the current city flood emergency plan of action; and a copy of the most recent documents prepared as part of the study for review at city hall.


FLOOD CONTROL STUDY
CITY OF EAST GRAND FORKS
and
CORPS OF ENGINEERS
US Army Corps of Engineers
St Paul District
take one
US Army Corps of Engineers
St Paul District
take one

Public involvement methods have been modified during the study to meet the specific needs of the public and to better fulfill the public involvement objectives described above. The design of the public involvement program is intended to be dynamic so that it can be adjusted to meet unanticipated changes in the situation of the affected public. As an example, an unanticipated problem occurred in October 1983 when the city and the Corps determined they were unable to reasonably define the "future" of the city. Without this future, the Corps was unable to compare with-flood plans to without-flood plans to identify the advantages and disadvantages of each. A series of "futures" meetings was scheduled by the city to develop a picture of what East Grand Forks should look like in the next 20 years. The Corps involvement was discouraged to facilitate local citizen formulation of the future. The Corps provided a professional non-Corps facilitator to assist the city. The city arranged to have approximately 50 key citizens from varied professional backgrounds identify the future. The summary of the futures meeting is contained in the social supporting documentation.

EVALUATION

The specific objectives of the public involvement program have been met with varying degrees of success. Interagency coordination (#6) has been effectively conducted, with excellent cooperation from other agencies. Channels for public communication (#1 and #5) have been established, with progress reports, comment forms, meetings and workshops, and local contact persons; these channels have been heavily used by some of the public and doubtlessly underused by others. The public's views have been solicited (#3) and incorporated into the planning process (#4), where technical constraints permitted. The objectives most difficult to achieve, or to evaluate, have been building trust (#2) and encouraging understanding (#7) of the planning process. As the adverse impacts of the project become understood, individuals who feel their interests may be harmed will understandably

feel aggrieved by these results. That will often be translated into a sense of confusion about policies ("why does the project have to provide that level of protection?"), distrust of technical information ("the levee could be built closer to the river without failing"), or distrust of the planning process itself ("we can do it better ourselves"). There is no certain way to encourage people to agree with policy or technical information which may harm their personal interests. However, candid and early disclosure of such impacts has been emphasized by the public involvement program, in an effort to generate confidence in the integrity of the Federal/city study.

SUPPORTING DOCUMENTATION

PUBLIC INVOLVEMENT

APPENDIX A

CHRONOLOGY OF SIGNIFICANT MEETINGS AND EVENTS

APPENDIX A

CHRONOLOGY OF SIGNIFICANT MEETINGS AND EVENTS

5 November 1980 Public Meeting

General Public Comments:

- The water we receive here is everybody's in the basin above us.
- Channelizing Grand Marais Creek would destroy the wildlife habitat.
- You can only pile dirt so high because the ground seems to swallow it up. I would like to see water storage for flood control.
- Drainage of wetlands and interbasin transfer of water have led to increased flooding.
- By resolution, the residents along Grand Marais Creek are against using the creek as a diversion.
- Dredging the Red River of the North would solve the problem.

Questionnaire:

The majority of those attending the meeting were from the Grand Marais Creek area, and their concerns and suggestions reflect this fact. The suggestion that water be held back in the upper reaches of the rivers flowing into the Red River was repeated by those people filling out the questionnaire. The methods suggested were: holding the water on farmland; developing dams and impoundments; and controlling ditching, land clearing, and wetland drainage.

In summary, it appears that a Grand Marais diversion alternative is socially unacceptable at this time, even if it proves to be feasible from an engineering perspective. This opinion may be altered, however, if it can be shown that those living along the Marais would not be greatly affected.

18 November 1980

- The Minnesota Department of Natural Resources was requested to participate in the study to develop a flood hazard mitigation plan.

- Open meeting format was adopted for all future meetings.

13 January 1981

- Red Lake Watershed District - Mr. Oliver Dahle presented its role in assisting East Grand Forks in flood damage reduction.

- Plans of the watershed district to provide upstream storage were discussed.

25 February 1981

- Identification and discussion of existing flood damage reduction measures and their advantages and disadvantages.

23 March 1981

- Completion of discussion of advantages and disadvantages of existing flood damage reduction measures.

21 April 1981

- Discussion of the advantages and disadvantages of other structural and nonstructural flood damage reduction measures.

8 June 1981

- Completion of discussion of advantages and disadvantages of structural and nonstructural flood damage reduction measures.

- Members were requested to identify a city levee alignment based on their knowledge of the area.

25 January 1982

- Previous studies show that upstream dams and reservoirs are not economically feasible.

- Analysis of Grand Marais Coulee diversion measure showed no economic feasibility. Conclusion: No diversion measure was feasible for East Grand Forks. No further study was recommended.

- Economic evaluation of channel modification measures. No further study recommended.

- Concluded that levees were the only feasible structural measure available for flood damage reduction.

5 March 1982

- Presentation of the final slide-talk show as part of the flood emergency plan of action.

- o Preliminary economic results indicated tnat levees were feasible at the authorized and current interest rates.

30 March 1982

- o Public meeting to review initial conceptual levee alignment.
- o Concerns expressed:
  - Participants identified new areas of known foundation instability.
  - Current levees lie on top of the current levee alignment.
  - Several participants were concerned about the appearance of the levee; that is, the Point will look like a crater or ring levee.
  - How much did the emergency flood fight cost?
  - Who will pay (local) for the project?
  - What is the impact of levees upstream and downstream of the area?
  - What is the effect of levees on Heartville Creek?
  - Access over/under Great Northern Bridge.
- o Questionnaire was handed out.

9 July 1982

- o Meeting with city to discuss recreation supply, needs, and opportunities.

30 July 1982

- o City of East Grand Forks provided data collected by its staff on utilities, lands, easements, rights-of-way, structures, foundation and embankments, and future developments.

Fall 1982

- o Flood protection opinion survey conducted (see Social Supporting Documentation - appendix B).

6 October 1982

- o One on one meeting with city officials to discuss area foundation problems based on more detailed analysis of soil boring data. City staff informed that alignment 1 was not engineeringly feasible. Alignment 2 was feasible based on the need for more data.

- o City officials' concerns were:

  - Alignment 2 would not be economically feasible/must be set back.
  - 400 structures not protected.
  - Costly impact on city utilities.
  - Feasibility of relocation in areas not protected.
  - Availability of assistance to the acquisition areas.
  - Disposition of emergency levee.
  - Feasibility of raising water supply reservoirs to stabilize foundation problems.

19 October 1982

- o Suggestion of alignment corridor.

- o Final alignment will lie somewhere in corridor.

- o Alignment changes/foundation problem still preliminary.

- Concerns:

  - When is the best time to inform citizens? - When all data are available in a report.
  - What will the city do with floodplain lands? - Floodplain use.
  - Maintenance of the traffic patterns.
  - Keeping alignment on high ground paralleling existing roadways. City of East Grand Forks provides an alternative city alignment --Alignment 3 with modification.
  - Feasibility of eliminating all structures on river side of system rather than floodproofing them.
  - Feasibility of floodproofing commercial structures outside the levees.
  - Gradient difference of 6 feet on standard project flood through town.
  - City would like flood protection for the water treatment plant and access road.

22 December 1982

- Installation of display at city hall depicting flood area problem.

- Review of recreation plan for East Grand Forks.

March 1983

- U.S. Fish and Wildlife Service and Minnesota Department of Natural Resources given proposed level one alignments for review and assessment of impacts on natural resources

April 1983

- Tour of project area with U.S. Fish and Wildlife Service representative.

18 May 1983

- o Review of flood protection opinion survey - residential areas.

5-8 July 1983

- o Business survey of affected area (Social Supporting Documentation - appendix C).

18-19 July 1983

- o Interagency coordination meeting and briefing on opinion survey and affected business survey.

2 August 1983

- o Review of flood protection opinion survey - commercial/industrial areas.

- o Meeting with key assistance organizations to identify and discuss areas of assistance that may be needed to implement measures and plans.

August 1983

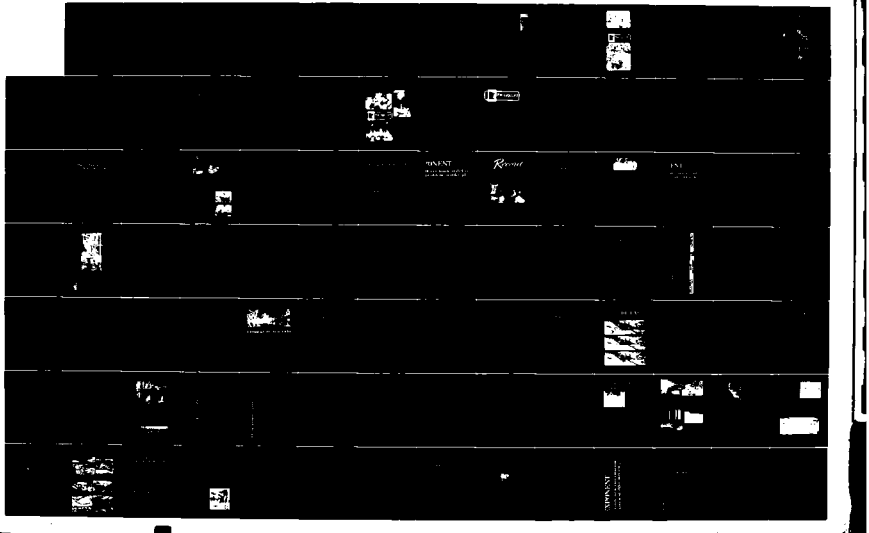
- o Distribution of working papers to locals and higher authorities.

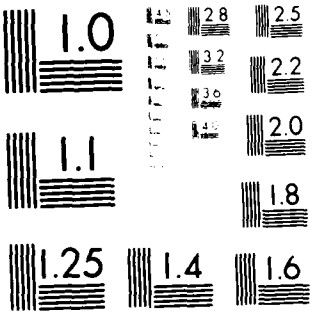
9 September 1983

- o Meeting with city officials to develop a public information strategy for informing residents on study status.

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MICROCOPY RESOLUTION TEST CHART

22 September 1983

- o Meeting witn city officials to review comments on August 1983 working papers.

- o Concerns were:

  - Federal and non-Federal cost of measures and plans and the city's ability to provide the local snare.
  - Can tne city's costs for actions taken now be applied to tne final cost sharing formula for the recommended project?

October 1983

- o Progress report discussing who is involved in the study, tne flood problem, possible solutions, issues and concerns, what citizens nave said, and upcoming events.

6 October 1983

- o Training of aldermen and designated assistant or facilitator and recorder for upcoming workshop.

- o Assignment of rules and development of an agenda for the workshop.

11 October 1983

- o Public workshop to: inform residents of the study status; scope and identify significant issues, desires, and needs; obtain comments, views, and suggestions; and provide focus toward selection of a "best plan".

17 October 1983

- o City Futures Meeting 1: facilitated by a representative of Synergy. About 50 key citizens participated in developing a picture of "what East Grand Forks should be in 20 years."

14 November 1983

- o City Futures Meeting 2: facilitated by a representative of Synergy; 15 key citizens prioritized goals and developed detailed problems and opportunities around those goals.

21 November 1983

- o City Futures Meeting 3: objectives and strategies were developed to accomplish the city's goals by about 12 key members of the community. The next step in pursuing tne goals was discussed and committed to.

December 1983

- o Progress report which summarized workshop, questions and concerns, and defined city's future based on futures meetings.

7-9 December 1983

- o Display of East Grand Forks flood problems at International Water Summit Conference in Grand Forks, North Dakota.

12 December 1983

- o City Futures Draft Report summarizing the three meetings was mailed to all participants.

January 1984

- Proposed final alignment given to U.S. Fish and Wildlife Service for review and evaluation.

19 January 1984

- Coordination meeting with the Minnesota Department of Natural Resources.

24 January 1984

- Coordination meeting with Minnesota Department of Energy and Commerce Department.

2 February 1984

- Coordination meeting with State Historic Preservation Officer to establisn survey requirements for Environmental Impact Statement compliance.

15 February 1984

- Meeting to bring city staff, councilmen, and the Mayor up to date on the study findings and the recommended plan; discuss the public involvement activities through November 1984; provide the city the opportunity before the draft report goes out to provide input; and discuss any unresolved questions concerning the recommended plan. City wanted recreation measure in the plan and deletion of the evacuation of 14 residential and 3 commercial properties on the Point.

March 1984

- Draft report forwarded to study team for internal review and comments prior to official public release scheduled for June 1984.

14 August 1984

- Meeting with city council and flood control committee to discuss comments on March draft report and develop a public involvement program for remainder of study.

29 August 1984

- Meeting at the request of Congressman Arlan Stangeland to discuss study results with city officials and the Minnesota Department of Natural Resources, and Federal Emergency Management Agency.

SUPPORTING DOCUMENTATION
PUBLIC INVOLVEMENT

APPENDIX B
SIGNIFICANT NEWS CLIPPINGS, PUBLIC NOTICES, AND PROGRESS REPORTS

SUPPORTING DOCUMENTATION

PUBLIC INVOLVEMENT

APPENDIX B

SIGNIFICANT NEWS CLIPPINGS,

PUBLIC NOTICES, AND PROGRESS REPORTS

SIGNIFICANT NEWS CLIPPINGS

Lookin' for an ounce of prevention

Flood fighting not the cure

By Jim Durkin
Herald Staff Writer

For folks who live along the Red River, flooding ranks right up there with death and taxes. It's inevitable.

None of the plotting done between now and next year's thaw will keep the river in its banks.

So, Orley Gunderson, a veteran of flood fighting in East Grand Forks, says plans should be made to fight it as effectively as possible.

Enforcement terms slow standardizing dikes, 1B

"I've gone to lots of meetings since the flood last spring," said Gunderson, who is the city's civil defense director. "I was very optimistic that it would be possible to work out a long-range solution to the flood problem.

"Now, after all the meetings, it appears to me it isn't possible for legislators to comprehend our problems. They can't come up with the legislation they have to come up with in regards to laws and funding we need for a long-range plan," he said. "I'm very discouraged. I really am.

"What it's going to take is a disaster like we had in 1826 (when the river crested at 53.3 feet.) That's terrible to say, but I honestly believe that is what it will take," he said. "When we have a flood where it's necessary for all the people in Grand Forks and East Grand Forks to evacuate, then maybe we'll be able to get the millions of dollars necessary to build a few dams or do whatever else might have to be done.

"As far as prevention, I've given up. I'm very pessimistic about ever coming up with some type of long-range plans," Gunderson said. "The government apparently is content to pay us for damages after the flood. That's easy to get. We're experts at filling out forms to get that kind of money. The thing of it is, that money would go a heck of a long way toward some type of preventive measures, but they're apprehensive about doing that."

Local officials from both sides of the river have been spending most of their time since last spring's flood, reporting and getting paid for flood damage. Gary Sanders of Floan-Sanders Inc., a local engineering firm, says people in his office have been making damage survey reports for both cities since May.

Thus far, about $1 million has been approved by the federal government to help pay the cost of repair and flood-fighting efforts in East Grand Forks.

That figure is about $1.3 million in Grand Forks. The Grand Forks Park Board and University of North Dakota have also been approved for some aid.

So, many of the damages from the last flood are being paid for and repaired — just in time for next year.

Gunderson says that since prevention measures are hard to accomplish, preparation is the way to go.

Please see PREVENTION, 9A



Orley Gunderson: pessimisti about flood prevention

Prevention

(Continued from Page 1)

"The main thing we're doing now is writing a flood-fighting manual," he said. "We're documenting what we did last spring. We're looking at the different alternatives we have at different levels of a flood in specific areas of the city. When the river hits anywhere from 46 to 54 feet, we'll know what we have to do."

The manual also will spell out such things as chain of command, communications, authorization of expenditures — in short, everything flood fighters in EGF will need to know.

"I don't know how thick the manual will be. 50 pages, 100 pages, whatever it takes. I hope we're going through an exercise in futility. I hope we never have to use it. But I know we will," Gunderson said.

"It may not happen next year, it may be 10 years or five years before we have another major flood. But it's going to happen sometime. In order to fight any flood, you've got to have a plan and be organized. This plan will give us some idea of where we're going."

In Grand Forks, there isn't any such detailed plan. That is mostly because there isn't a city civil defense coordinator.

Officials are making plans to hire a coordinator and drawing up a flood fighting manual will probably be among his first assignments.

Currently, various departments (such as street, police and fire) in the city have certain things they do at certain times, but there is no coordinated plan, said Keith Johnson, assistant city engineer.

"We all know what we have to do when the river reaches certain levels," he said.

Some areas of Grand Forks have undertaken projects which should help eliminate some problems residents faced last year. Johnson said there were three major projects underway.

He pointed to a road on South 30th Street near 14th Avenue South which was raised three to four feet in some areas and also paved. That should help act as a dike and prevent some of the water from the English Coulee from flooding the Westward Acres area.

Also, they're putting flap gates on the storm sewer system which drains into the coulee in the area. They are expected to prevent the water from backing up.

The area between the Memorial Gardens cemetary and University Park should also have added protection next year. Johnson said a small dike near the cemetary is almost completed. It will stop overland water which comes from the County Fairgrounds and Gateway Drive from running into the area.

Flap gates are also being installed on the storm sewer which drains water from that area into the coulee.

The joints in a concrete portion of dike in the Lincoln Drive area will also be repaired before spring, Johnson said.

"Those are some of the areas where it was fairly obvious after last spring's flood that something must be done," Johnson said.

He added that several other areas of the city which may need additional flood protection are still being studied by the U.S. Army Corps of Engineers. City officials will get an update on that study at meetings this week.

A major diking project in the Riverside Park area will not be completed until citizens of the area decide how they want to do it. The folks who live in the area will have to pay for the project through special tax assessments.

"We've pretty much done what we could with the time, funds, plans and resources available. We haven't eliminated the sandbag yet, but I don't suppose we ever will."

EGF flood plan unveiled – for next time

By Darrel Kochler
Herald Staff Writer

Battling floods has become a tradition in East Grand Forks, where officials have put their flood-fight plan on paper.

At a meeting of city officials and flood fighters Tuesday, Orley D. Gunderson, city civil defense director, unveiled a 500-page flood fight plan which will aid volunteers when the next big flood hits.

It's an almost annual task local residents were spared this year.

Gunderson, who spearheaded the 1978 and 1979 efforts that kept the Red and Red Lake Rivers at bay, said the city had operated without a plan for years.

Following the infamous flood of 1979, the U.S. Army Corps of Engineers asked the city to prepare a flood fight plan and the corps would help reimburse the cost.

Gunderson and Gary Sanders of Floan Sanders, consulting engineers for the city of East Grand Forks, developed the plan.

"There are flood evacuation plans, but no real flood fight plans with few exceptions," said Gunderson, who is assistant director of the East Grand Forks Area Vocational Technical Institute.

The corps provided East Grand Forks with 2.45 million sandbags, 205 rolls of plastic film and 16 pumps during the 1979 flood.

These materials were used to build 960 feet of new levee and upgrade 18,480 feet of temporary diking.

Following the flood, the corps contacted Gunderson in the summer of 1979 and asked him to develop the plan. The plan would cover pre-flood, current-flood and post-flood activities.

The loosely-bound volume contains 23 areas in writing for future volunteers who may not have experience.

Gunderson said the 1978 flood, his first as civil defense director, gave him the knowledge to successfully battle the even bigger 1979 flood.

After getting the initial material, Gunderson spent two months outlining and putting the plan together with information and comments supplied by the corps' St. Paul office.

Gunderson said the plan will be rewritten following the next big flood.

"One of the first things we want to do after the next big flood is have the volunteer leaders go over the various sections and tell us what worked and what didn't," Gundersen said.

Gunderson said future flooding "will be more severe and it will be more frequent. This is the trend."

Gunderson said that in case of another big flood, like that of 1979, he is concerned whether or not there would be the needed manpower.

"I'm really wondering if we will find the people to stop a 50-foot flood," he said. "We may have to go to more clay fill rather than sandbags. I just don't know," he said.

During the 1979 flood, East Grand Forks received much assistance from Grand Forks. Of the 1,000 people who patrolled dikes, 900 were from Grand Forks.

Gunderson said that as Grand Forks puts together its own flood plan, it is only natural that those residents put their efforts into saving their own city.

Red River level continues to drop slowly

The Red River continued its slow drop in Grand Forks overnight, reaching 28.62 feet at 8 a.m. today.

Bob Nordlund, hydrologist for the National Weather Service in Fargo, said the Red should drop below flood stage — 28 feet — sometime today or early Thursday.

A slight rise was reported in the Red Lake River at Crookston, Minn., at 8 a.m. today. That reading was 12.2 feet, up from 11.02 feet Tuesday morning.

The rise could be due in part to ice action which causes river levels to fluctuate.

An increased flow of Red Lake River water into the mainstem could slow the drop in Grand Forks.

Grand Forks was the only point on the Red River at flood stage today.

Nordlund said the river is dropping to the south of Grand Forks. Halstad, Minn., reported 16.1 feet at 8 a.m. today. That compares to 17.67 feet Tuesday.

No reading was available from Oslo, Minn., today, however, the Red was below flood stage at that point.

None of the tributaries to the north — the Park, Snake or Pembina rivers — were causing any problems and most were dropping. However, the Two Rivers at Lake Bronson, Minn., rose slightly due to a release from a dam.

Today's 8 a.m. reading at Drayton, N.D., on the Red, was 28.7 feet. Flood stage there is 32 feet.

Pembina, N.D., has yet to report in this flood season.

Sunday's Grand Forks crest figure has been corrected to 31.01 feet from the 31.03 feet listed earlier, according to the U.S. Geological Survey in Grand Forks.



THE CITY'S EMERGENCY PLAN OF ACTION was presented by Civil Defense Director Dr. Orley Gunderson, standing. Others at the head table were: Gary Sanders of Floan-Sanders, Inc., Lyle H. Eisert-Polk County CD Director; Mayor Louis A. Murray, LtCol. Steve Draper, St. Paul District, Corps. of Engineers and Thomas Raster, St. Paul, COE.

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Emergency Plan of Action

The City's Emergency Plan of Action (Flood Fight Plan) was unveiled Monday at a meeting of city leaders/officials in the Eagles Aene. The Plan defines the roles and responsibilities of the Civil Defense (CD) Director, the CD Committee and its 23 units which can be organized for flood fight purposes (or other emergency purposes, such as a tornado disaster).

The Plan emcompasses the knowledge and expenence gained by community citizens in flood fighting over the last thirty years. It attemps to anticipate problems and project possible solutions thereto – prior to a flood, during, and after. The plan was written by Civil Defense Director Dr. Orley Gunderson and the Consulting firm of Floan-Sanders, Inc. under a contract of the U.S. Army Corp of Engineers.

Implementation of the Plan requires the continued support of community and area citizens – it also requires a change in normal operations as pointed out in Section 00-08 "Coordination/Governance.

"Coordination is the 'key' to the success or failure of a flood fight. In normal, nonemergency times, overall coordination of the city is not relevant as the various community/city organizations (schools, fire department, Area Vocational Technical Institute (AVTI), police department, businesses, churches, street and sewer department, water and light department, ect.) can carry out their activities in large measure independent of one another.

However, during a flood emergency all the resources of the city must be utilized for flood fight activities. Volunteers and organizations suddenly become involved in activities which are nontraditional and foreign to them. The service units of city government, such as police, fire, street and sewer, water and light, etc., have new duties which are beyond their capabilities. They must have additional resources (Coast Guard, National Guard, Army Corps of Engineers, etc.,) to cope with their added responsibilities.

Dike patrol, sandbag production, food services, sandbag dike construction etc., are all functions which must be performed by hundreds, and in some cases, thousands of persons who never worked together before. All this activity requires a coordinative mechanism. The coordinative mechanism under which all activities are planned and managed is provided by the East Grand Forks Civil Defense Committee. The Civil Defense Director and Committee obtains, allocates, and distributes resources during a flood emergency.

Prior to the declaration of a flood emergency, the City Council governs all flood fight efforts. When city government (City Council) determines that the flood emergency presents problems beyond the resources and capabilities of city employees and city resources, a 'Flood Emergency' is officially declared by the City Council. At this point, the Civil Defense Comittee 'takes over' and manages (not governs). City Council meetings are not held during a flood emergency unless there is a need to formally obtain a legal vote on a flood related matter/problem.

The management of a flood fight SHOULD NOT and and CANNOT be directed by Council members who have been elected to a political office. A flood fight involving the efforts of thousands of volunteers and mobilized resources from the entire state SHOULD NOT and CANNOT be managed by votes taken around a City Council table. The Civil Defense Director must work with the Council and the Civil Defense Committee Unit Chiefs in a nonpolitical setting."

The Civil Defense Units consist of: Flood Headquarters and Fiscal Services (Dave Mack-Chief); Enginnering (Jim Gander); Street & Sewer Systems (Ed Osowski) Electricity and Water Distribution (Jerry Nepple); Public Information (Louis Murray); Supply/Manpower Resources Management (David Eikenes); Communications (Ivan Ferguson), Dike Patrol (Angie Keller), Food Services (Darlene Enright/Pat Leonard), Sand Bag Production (Russell

(Continued on Page 6)

Plan of Action

CONTINUED FROM PAGE 1

H Beier); Sandbag Distribution & Transportation (Jay Croy); Sandbag Construction (John Tack); Law Enforcement & Traffic Control (Dick Wald); Fire Protection (Dan Formato); Warning (Dick Wald); Evacuation (Dan Formato); Emergency Medical Services (Bill Cummings); Health Services (Dr. Jim Leigh); Shelter/Emergency Housing/Welfare Services (Ellis Larson); Search & Rescue (Dan Formato); Missing Persons (Dick Wald) and Morgue & Burial (Ken Stennes).

Civil Defense Director Gunderson advises community citizens to familiarize themselves with the Emergency Plan (the 300 plus page document is available for review at the Clerk-Treasurer's Office, City Hall) and that they should acquire "Flood Insurance" in those areas prone to flooding. He further indicated that the plan will be continually reviewed and revised as the community fights future floods – it is anticipated that it will take a major catastrophe, such as a dike failure and the subsequent loss of lives, before remedial flood control action (such as a dam, water impoundment areas, drainage control, etc.) is taken, to prevent floods in the Red River Valley.

It was pointed out at the meeting that the EGF Flood-Fight Plan is one-of-a-kind in the country and will undoubtedly be utilized by flood-prone communities throughout the nation as a guideline in developing their own emergency plans.

EDITOR'S NOTE: While the Plan is "Flood" oriented, as pointed out, it's applicable to other emergency situations–such as a tornado disaster requiring the evacuation of the city. For your information, we are including the evacuation safety rules/routes found in the plan. The rules are as follows (the routes are outlined in a map on page 6).

EVACUATION SAFETY RULES

1. Before making any last-minute preparations, be absolutely certain you have time. If advised to evacuate, do so immediately. Don't wait until the last minute to leave, hoping to save your possessions. Save your life.

2. Move quickly and calmly. Don't take chances. Getting safely to higher ground or away from the area is your first consideration.

3. Keep your radio turned on and located where you can hear it.

4. Know where you are going before you leave. Civil Defense officials will establish shelters in public buildings. If you do not know the location of public shelters, listen to your radio for evacuation instructions. Evacuation routes explained on radio must be used. Other "short cuts" may be blocked, washed away, have downed power lines, or interfere with evacuation routes for other areas.

5. If you have limited time for evacuation preparations, take only family medicines, blankets, and a battery-powered radio with you. If you have time to gather supplies, take with you:

a. Protective clothing, especially water-repellent outer garments and footwear; several blankets.
b. Flashlights and batteries; battery-powered radio.
c. Personal hygiene items.
d. Infant supplies.
e. Important documents and papers.
f. Drinking water in plastic bottles; other liquids.
g. Emergency supplies of ready-to-eat foods.
h. Necessary prescription drugs or medicines (such as heart medication or insulin).

6. If you are certain you have time before you leave your house:

a. Turn off utilities.
b. If flood waters threaten, open basement windows to let water in and equalize pressure.

7. Lock your home when you leave it.

8. As you travel, listen to the radio; watch for:

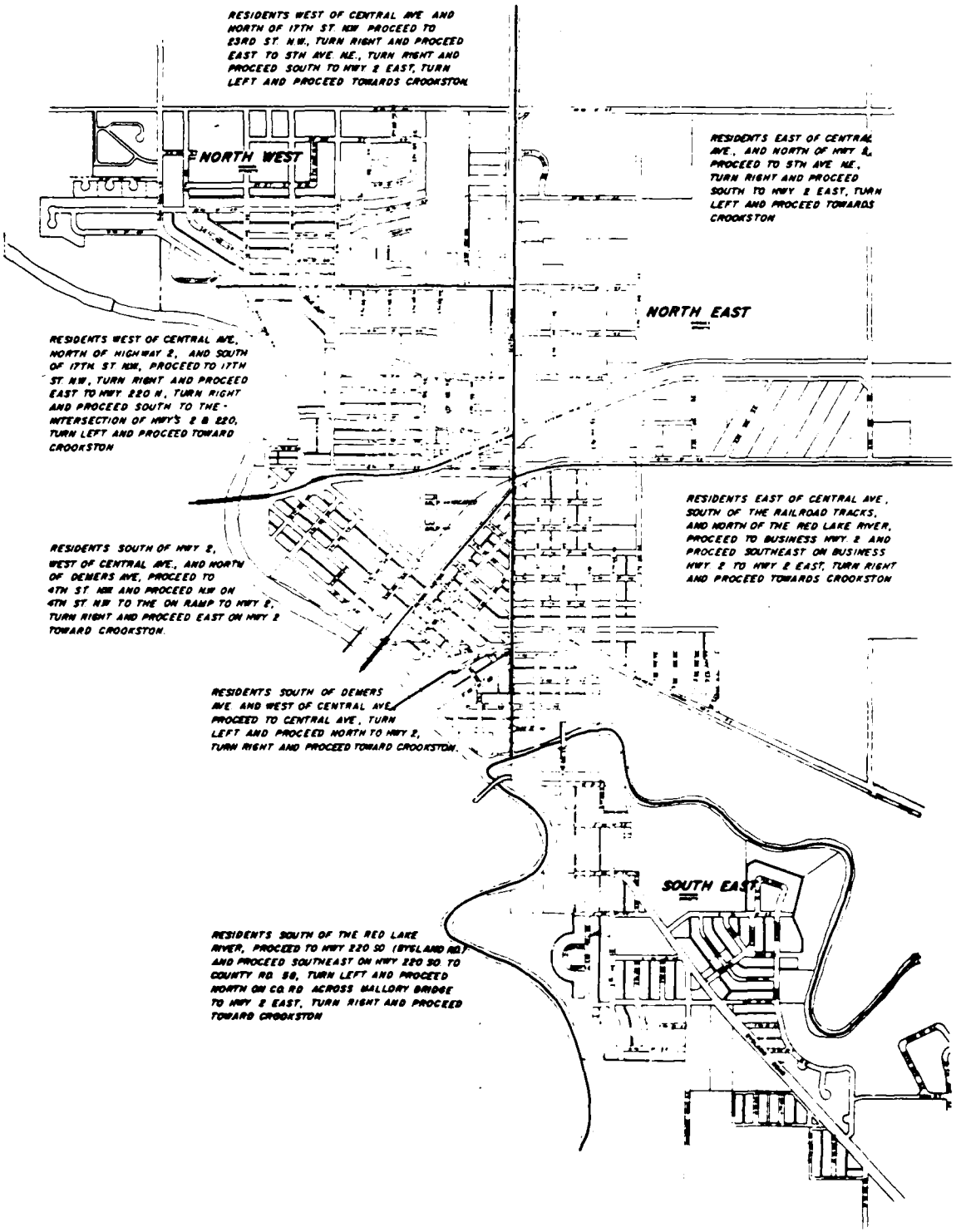
a. Washed out bridges or roads.
b. Undermined roadways.
c. Downed power lines.
d. Floating hazards.

9. Do not drive over flooded roads. Flood currents are strong, and cars and people are easily washed away.

10. After reaching public or other shelter, report to the East Grand Forks Police Department that your home has been evacuated.

EVACUATION PLAN BY ROADWAY

APPENDIX XVII-1





Sister Judy Whitacre inspects one of the cracks in the convent countryside

Photography: Vickie Kettlewell

Landslide threatens Crookston convent

It's not the Lord's fault — 'He won't permit St. Joe's to go down'

By Ryan Bakken
Herald State Editor

CROOKSTON, Minn. — Fingering her rosary, Sister Paula Marie remembered when she first felt something was awry.

"About a week ago, the road felt bumpy," said the 80-year-old resident of St. Joseph's Provincial House.

That road — and about three acres surrounding it — is now about 15 feet lower than a week ago. The drop has slowed, but no one is sure when it will stop.

Watching the slow-moving landslide, Sister Paula Marie looked worried, but she spoke with confidence. "The Lord won't permit St. Joe's to go down."

The last dropoff is about 150 feet from the home for 35 nuns, most of them retired. The last slide hasn't moved any closer since Saturday.

"The area keeps cracking up more and more, and keeps dropping, but the area hasn't become any bigger," she said. "We used benches as a marker on Saturday."

The earth is dropping — but also moving toward the Red Lake River. The force has pushed up an island in the middle of the river, about 100 feet from the slide. The sliding area, one mile east of here, looks like a victim of a small earthquake, with cracks five feet deep in some spots.

St. Joseph's caretaker Ralph Hagen noticed the first crack Thursday night. He notified utility companies Friday morning. Northwestern Bell and Otttertail Power Co. were still working Tuesday afternoon, moving poles and underground cable.

"When they built this place 22 years ago, the engineers said the land under the building was as stable as any in the valley," Hagen said. "Of course, the land in the valley isn't all that stable."

Hagen has been constantly checking the grounds and building for signs of stress. He has found none.



The shifting earth has become a 'tourist attraction' along U.S. Highway 2

The northern edge of the fault is only 30 feet from the westbound lane of U.S. Highway 2. But the Minnesota Department of Transportation hasn't panicked yet.

"We will just wait and see what happens," said Donald Meyer, district superintendent. "We don't know what to do to stop it if it hasn't stopped yet. We will have to fill in the depression when it settles. If more land breaks off closer to the driving lane, we'll have to call in some expertise."

Don Nolting, engineer with Widseth, Smith and Nolting, the city's consultants, doesn't know when the movement will stop.

"There's a plane in there someplace, but it would be quite a job to find it," Nolting said.

Similar slides usually stabilize within a week, he said. The pushed-up river bottom won't affect the city's water supply.

Landslides along the Red Lake River near here aren't new. Forty years ago, a massive slide happened four miles upstream from this site. Two years ago, a slide just west of the American Crystal Sugar plant covered five acres.

We talked to a woman who lived across the river from here," said Sister Paula. She said they moved about 25 years ago because the bank was sliding then.

The slippage has been slow, undetectable by the naked eye. But visits eight hours apart show a change, Sister Judy Whitacre said.

"Parts of it feel like a sponge when you're walking on it," she said. "The other day, a chunk fell off when I was walking on it. I just about jumped out of my shoes."

We've got a lot of old gals living here and they were scared at first, concerned about their home. But now they're more interested than anything else.

Grand Forks Herald September 30, 1980

By [illegible]
Herald Staff Writer

The only thing all of East Grand Forks' flood plan a Red River flood is a pile of studies about how to control one.

The stack grew even higher Monday when the U.S. Army Corps of Engineers presented the city with its latest study.

City officials will organize a flood committee and hold a public meeting on the study in about a month.

Monday's report was made by the corps' St. Paul district. It presents several long-range alternatives.

• Authorized plan. This project calls for raising and widening 7,600 feet of emergency levee, 1,500 feet of concrete floodwall between Third Avenue North and the old Northern Pacific railroad bridge north of DeMers Avenue, interior drainage works, a ramp over the levee at North Fourth Street and utility relocations.

The Minnesota Department of Natural Resources contends the authorized plan is not adequate.

It is called an authorized plan because it was authorized by Congress in 1958. The city had decided in the 1950s not to pay its share of costs, so the project was never built. Severe floods in the 1960s and late 1970s prompted reconsideration.

• Modified authorized plan. The project differs from the authorized plan in that relocation and replacement of the emergency levee would be necessary between Third and Seventh avenues north and a concrete floodwall would be added toward the river side of North First Street.

Martin McCleery of the corps said, however, that this plan's benefit cost ratio would not be feasible.

Both of the above plans would protect the city from a flood with a 1.5 percent chance of occurring during any given year.

• Upstream diversion. The diversion plan involves raising the levees in the modified authorized plan about 1.6 feet and lengthening them about 1,200 feet.

The project would be more expensive than the authorized plan, but it would provide a higher level of protection.

The next three plans would protect the city from a flood with a 1 percent chance of occurring during any given year.

• South plan. This project would protect new developments south of the authorized project's limits. The plan includes [illegible] feet of levee, 1,450 feet of concrete floodwall, 3,1[illegible] feet of road raise in three sections and two closures [illegible] Minnesota Avenue and Sixth Avenue SE, together with utility relocations and interior drainage works.

• North plan. This project would protect new developments north of the authorized project. The plan includes 1,[illegible]9 feet of railroad road and 2,[illegible] feet of levee together with utility relocations and drainage work.

Preliminary cost estimates are about $7[illegible] million for the authorized plan, $8[illegible] million for the modified plan and $8[illegible] million for the upstream diversion plan. The south plan would cost about $6 million and the north plan more than $1 million.

Those figures are two years old. More precise estimates will be available next March, McCleery said.

The plans rely heavily on federal money, with state and local governments paying the rest.

The study also cites the possibility of increasing Red Lake River flows into Grand Marais Creek with a diversion near Fisher, Minn.

The diversion would be 10 miles [illegible] from the junction of [illegible] and the East branch of the Red Lake River [illegible] the Red River at Grand Forks-East Grand Forks.

The diversion would reduce flood damages in Grand Forks and East Grand Forks and it would [illegible] the need for levees by dropping flood stages.

But the diversion would affect about 100 households outside of East Grand Forks and disrupt transportation. Because Grand Forks would receive benefits, that city and the state of North Dakota would be expected to share the costs.

Flood damages to areas next to Grand Marais Creek would be aggravated.

East Grand Forks and Crookston, Minn., officials had hoped a proposed reservoir near Huot, Minn., would help control floods. The study says, however, the reservoir would not help East Grand Forks and that project would not be economically feasible.

Grand Forks Herald/Monday, October 6, 1980

Part of St. Vincent dike falls into the Red River

By Darrel Kreibler
Herald Staff Writer

ST. VINCENT, Minn. — A portion of the earthen dike along the Red River here has collapsed.

About 100 yards of the dike has caved in and large fissures 10 feet deep have appeared along the entire length of the collapsed section.

The collapsed dike poses a serious problem for residents next spring if there's a flood.

Kalvin Sylvester Hallock, Minn., Kittson County Civil Defense director, has inspected the dike and is seeking state aid for repairs.

A possible source of aid is the U.S. Army Corps of Engineers. Attempts to reach the corps to repair the dike have failed.

Low chances of getting either state aid or help from the corps are expected, however.

The best source might be the governor's office which maintains a special fund for such emergency situations.

The earthen dike was built by St. Vincent residents in the 1960s and has been built up twice by the Army Corps — in 1975 and 1979.

A house located near the collapsed portion may have to be purchased before repair work can start.

Flood Control Meeting, Nov. 5

Have you and your neighbors wondered what is being done about the flooding problem in the community. The Flood Control Committee and the U.S. Corpos of Engineers will be presenting a summary of the flood problems and some possible solutions (e.g. Grand Marias Diversion) at a public meeting to be held Wednesday, November 5, at the Regency Inn.

The meeting will begin at 7:30 p.m. sharp. It will include a slide presentation summarizing the Flood Control Committee's and the Corps' planning efforts to date followed by a general discussion giving attendees a chance to express their concerns, views, and suggestions.

S.R. Draper, Lt. Col, Acting District Engineer, CE has pointed our that the time for analyzing East Grand Forks' flood problems is now. He further indicated that appropriate funds for this study, and their need to hear your views at this meeting is important to the the Corps can consider them in the early stage of planning.

Citizens committee

Flood control body chosen

A citizens flood control advisory committee that will help the Army Corps of Engineers plan permanent flood control projects for East Grand Forks was officially named by city aldermen at their Thursday meeting.

Many of the persons named have served before on similar flood-control bodies but were never officially appointed by the council. At a meeting earlier this month between Martin R. McCleery, a representative of the Corps district office in St. Paul, and city officials, it was deemed important that the committee be officially appointed.

Named to the 12-man committee were: Mayor Louis Murray; Alderman Jim Gander, president of the city council; Ed Osowski, city superintendent of streets, sanitation and sewers; Police Chief Richard Wald; Fire Chief Dan Formato Jr.; Alderman Al LaFave;

City Atty. Robert Matt; Gary Sanders, consulting engineer for the city; City Clerk-Treasurer Dave Mack; the new city civil defense director when he is named; and two citizens recommended by the East Grand Forks Chamber of Commerce — Robert Peabody, chamber president, and Mel Johnson.

At McCleery's request, the local committee will sponsor an open meeting at 7:30 p.m. Nov. 5 at the Regency Inn to provide an opportunity for East Grand Forks residents to offer their views on long-range protection possibilities.

McCleery has prepared a design memorandum to spur new planning that reviews alternatives proposed earlier for East Grand Forks.

But, he has said that the earlier proposals need to be re-evaluated to determine their effectiveness in reducing flood damage here in light of updated data obtained after the 1978 and 1979 spring floods.

Both the corps' district engineer and McCleery are expected to be at the Nov. 5 meeting to answer questions.

Public hearing set on flood planning

East Grand Forks area citizens are encouraged to attend a Wednesday, Nov. 5, meeting and to make known their suggestions, their opinions on past proposals, and express concerns they may have about future permanent flood control work that might be undertaken in the city.

The 7:30 p.m. public meeting will be held at the Regency Inn. It is being sponsored by the East Grand Forks Flood Control Committee.

A slide presentation, summarizing the planning work done earlier by the Army Corps of Engineers in conjunction with the city's earlier flood control committees, will open the meeting.

Then, the meeting will be opened for general discussion.

The Army Corps of Engineers was granted new funding by Congress in 1979 to prepare an advance engineering and design study for consideration of permanent flood control measures to protect East Grand Forks.

As a result of the funding, Martin R. McCleery from the Corps' St. Paul District Office, who is the designated engineer for project development in the city, has visited here twice during October to encourage the local committee to call a public meeting.

McCleery and Jim Graham, sociologist on the study team, say that any plans the Corps has at this point for specific flood control projects "are only conceptual . . . There is nothing in concrete at all at this point . . . We have no recommended alternatives."

"We are at the very beginnings of a new planning process," McCleery says. "We are looking at a long process of discussions and exchange of ideas . . . (and), while we are the planning agency, the basic decisions on what ultimately will be built will have to come from the (local flood control) committee. That committee will be relying heavily on input from all interested citizens."

They emphasize that they will keep East Grand Forks residents informed of all phases of the development of new plans.

Lt. Col. S.R. Draper, acting district engineer at the St. Paul office, stresses that the time for analyzing the city's flood problems is now and that it is important that local citizens provide the Corps with views right from the start of the new planning effort.

N-B-11

Diversion plan attracts attention

Grand Marais Creek flood project upsets rural landowners

By Sue Ellyn Scaletta
Herald Staff Writer

They sat in silence while U.S. Army Corps of Engineers spokesmen explained plans for a study of measures to reduce flooding in East Grand Forks.

They listened quietly to the part about diverting Red Lake River water into the Grand Marais Creek near Fisher, Minn. to lower the urban flood level.

Then some 150 rural landowners made it clear that their neighborly concern does not extend to having their farmland flooded to protect the city.

The scene was a public hearing held by the corps to hear opinions of a proposed study to examine several alternatives for long-range flood protection in East Grand Forks. But a show of hands indicated that virtually everyone attending was primarily concerned with the proposed Grand Marais diversion.

Petitions signed by 594 residents of seven rural townships protest the proposal because such a diversion ultimately might cause an overflow of floodwater onto adjacent land.

The diversion would be about 10 miles upstream from the junction of the Red River of the North and the Red Lake River at East Grand Forks.

It would reduce flood damage in Grand Forks and East Grand Forks, according to a corps report, by dropping the flood stage. But it would affect about 100 households in rural areas. About three square miles of farmland would be subject to potential overflow of floodwater.

Corps representative David Haumerson explained that a sort of easement called a "flowage right" is purchased from any landowner potentially subject to such an overflow.

But the farmers were not comforted. About a dozen spoke up to say it would devalue their farmland, threaten crops and endanger wildlife along the Grand Marais.

"We are sympathetic to our East Grand Forks neighbors," said Robert McWalter speaking on behalf of a group of the landowers. "But when it comes to turning the Grand Marais into a bypass and seeing our farmland devalued and ruined we say 'no.'"

Speaking for Huntsville Township residents, Keith Driscoll added, "We sure don't like this idea. First we get this (he waved a yellow-bound report entitled "Plan of Study"). It talks about the possibility of a Grand Marais diversion. Then we get this (he waved a similar blue-bound volume). It has maps. Seems it gets closer and closer and we don't have anything to say about it. That's kind of scary."

Corps planner Martin McCleery explained that the two volumes were a first and second draft of the same plan. "The maps were added as we got more information," he said. "The plan is still in concept. It certainly can't be implemented without consulting you people."

Nearly everyone who spoke asked the corps to study reduction of flooding by slowing spring flood drainage into the river. The phrase "hold the water on the land," was used repeatedly.

Please see PLAN, 8A

Plan

(Continued from Page 1)

Corps Major Arthur McKee said after the meeting that the opposition expressed would influence the corps recommendation on the proposal.

"Anything like this takes local support — what I've seen tonight indicates that kind of support for this project would not be forthcoming."

McKee added that if the project were considered the only viable alternative the corps might try to persuade the landowners to their side.

McCleery said measures to be studied include:

• Using a plan authorized in 1953 by Congress but never implemented because East Grand Forks government could not pay its share of the cost. The project would widen 7,600 feet of emergency levee and 1,500 feet of concrete floodwall between Third Avenue North and the old Northern Pacific Bridge. A ramp over the North Fourth Street levee would be built and utilities would be relocated. Corps officials said Wednesday the current cost estimate of that project is $7 million.

• Modification of the authorized plan including relocation of the emergency levee and construction of a concrete floodwall toward the river side of North First Street.

• Upgrading the modified plan to raise dikes about 1.6 feet and lengthen them about 1,200 feet. Corps officials said both those proposals probably would carry an unfeasible cost benefit ratio. They are estimated at $10 million and $11 million respectively.

• A south plan to protect new develops south of the authorized project limits. It would include 8,000 feet of new levy and 1,400 feet of concrete floodwall, 3,100 feet of raising roads utility relocation and closures at Minnesota Avenue and Sixth Avenue SE. Preliminary cost estimate is $6 million.

• A north plan to protect new development north of the authorized project. It involves 1,800 feet of raised road and 2,800 feet of levee along with utility reconstruction. It would cost more than $1 million.

The study, to be financed by the federal government, will be completed in 1984, McKee said.

The design phase would be finished in 1986. If Congress approves federal funding and state and local cost sharing is obtained construction would be finished by 1990.

Rural Residents Oppose Grand Marais Diversion



Keith Driscoll Appeared Before The Flood Control Panel Monday Evening

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U S Army Corps of Engineer Representatives (l-r) Martin McCleery, Dave Haumusen, Major Arthur McKee, Mayor Louis A Murray and Flood Committeeman Robert E Peabody



Maurice E. Bushaw

The flood control meeting held Wednesday evening was mostly attended by rural residents who opposed a plan for the diversion of water through the Grand Marias as a means of controlling floods affecting the community and Grand Forks, ND. Keith Driscoll, one of many rural spokesmen, pointed out that a petition had been signed by 594 residents opposing the use of the Grand Marais for diversion of flood waters as a solution to East Grand Forks/Grand Forks flood problems. He, and other attendees, suggested that the U S Army Corps of Engineers consider the retention of water at its original sources as a possible solution we don't mind holding water on our own farm land, but we're tired of having to hold water from that of other lands throughout the Red Lake Red River Basin

Other speakers asked the Corps representatives to consider action on stopping the clearing of land, the filling-in of natural ponds/reservoirs and the control of ditching/diking activities throughout the Basin as a means of stemming flood waters throughout the area.

U.S. Army Corps of Engineer representatives pointed out that the purpose of the meeting was to hear as they had from the public on possible solutions to the flood problem – that no specific action was contemplated at the time – it would be 1986 before solutions would be defined and probably 1990 before any action thereon will be completed - dependent upon Federal funding procedures.

The public hearing was conducted at the Regency Inn and was hosted by the U.S. Army Corps of Engineers and EGF Flood Control Committee

Marais residents opposed to diversion

Some 213 persons, most of them residents or having other interests in property along the Grand Marais Coulee east of the city, attended a public meeting held by the East Grand Forks Flood Control Committee, Nov. 5 at the Regency Inn.

Nearly all who spoke were firmly opposed to further consideration of a proposal that the Marais be developed as a major diversion channel for Red Lake River waters when floods threaten the City of East Grand Forks.

Many of the speakers, including an Oslo farmer, a state legislator, and an East Grand Forks resident, as well as many of the Marais-land people, urged that more attention be given to programs for holding water back on rural lands when flood conditions threaten.

Quiet for the most part, the audience repeatedly responded with applause to this proposal whenever it was mentioned.

Robert McWalter of Huntsville Township, told the flood control committee and representatives present from the Army Corps or Engineers, which is providing planning expertise for the committee, "We want to work with you residents of East Grand Forks (on flooding problems) . . . but there is a point at which we have to say 'no' and that is when you consider the Grand Marais as a diversion or a bypass."

McWalter said petitions have already been circulated among Marais area landowners and that 594 residents in seven townships — Fisher, Nisbet, Sullivan, Esther, Northland, Huntsville and Grand Forks — have signed them.

A proposal for the development of an area plan for controlled runoff was made by McWalter as the best answer to the city's flood threats.

James Lambert of Esther Township said, "The problem is that they have been cutting down many more trees and draining many more sloughs than should have been."

Iner Quern of Higdem township, said 400,000-acre feet of water could be contained in the Red Lake River basin by a well-planned series of small holding ponds. "Why don't we pursue such projects . . . Why don't we go after it?" he asked.

Speaking positively of the great help area farm marshes used to be in holding back spring runoffs and heavy rains, Morris Bushaw, who farms near Oslo, added, "You can pile dirt up just so high and build dikes all you want to . . . but sooner or later you're always going to have to let the water through, somewhere sometime."

Present from the Corps' St. Paul District Office were Maj. Arthur J. McKee, executive officer, David Haumersen, chief of the advance planning section, and Martin McCleery, project engineer for the East Grand Forks study.

Responding at various times to comments by speakers from the floor to add current information or answer queries put to them, Haumersen and McCleery emphasized with regards to the pleas for water retention programs in the rural areas:

- The current study program the local flood control committee has just started will consider a number of proposals made in years past — such as the one for using the Grand Marais as a diversion channel — but is many months away from making any hard decisions about which one or ones it might want to include in a final plan for East Grand Forks flood control projects.

- The federal monies provided the Corps of Engineers for the new study now underway do not include anywhere near the amount of money it would take to make a full basin study of where and what kind of retention structures would be required to hold waters from the Red Lake River and the Red River in sufficient quantities to protect East Grand Forks.

- For the necessary studies and designing of a myriad of small holding devices on rural lands, area farmers and the city would have to turn to county and or state government programs for assistance because the corps is authorized to work only with "permanent" types of flood control structures.

Asked what state programs the Minnesota Legislature might have to offer in this regard, State Rep. Tony Stadum of Ada, a farmer and Independent-Republican serving District 2A, indicated he supported rural retention projects, also.

He added that recent legislative sessions have been taking steps to strengthen local watershed districts and make them more responsive in assisting with area water problems.

Maj. McKee noted that the study program probably would not be finished until 1984.

The study phase, Haumersen explained, includes three stages: a) a review of past proposals and updating of applicable data, b) the analysis of viable alternatives and c) deciding on a final plan.

Phase II would be concerned with design work, which could take until 1986, and Phase III would deal with actual construction, which would be completed about 1990.

Four major areas of study the local committee will be concerned with, McCleery said are: a) recent major flooding and the new data they have brought to engineers' attention, (b) earth movements in and about the East Grand Forks area, (c) the false sense of security many city residents have in existing levees and flood protection structures and (d) the continual rising costs expended by local, state and federal government in combatting flood emergencies in the city.

During the 1979 flood here, McCleery noted, "2.5 million sandbags and the work of thousands of people (mostly volunteers) were required to protect the community. 1,000 feet of new levee was constructed and 18,500 feet of old levee was upgraded at a flood emergency expense of $1 million.

"Over $8.8 million in damages were sustained and $5.1 million in damages were prevented as a result of emergency work," he said.

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City Proposed to be DNR:

Flood 'Test' Community

The possibility of East Grand Forks becoming a "test" community under a Hazardous Mitigation Assistance (HMA) Program was discussed at a special meeting of the Flood Control meeting Tuesday evening.

Pat Bloomgren, Department of Natural Resources (DNR) representative, informed the committee that DNR is looking for a community to participate in a program that would stress "non-structural" activies to reduce losses (monetary and life) due to floods such as witnessed by the community over the years. She pointed out that federal/state assistance to communities that have had repeated cases of flood losses may not be forthcoming in the future without the latter taking some plan of action to assure that: zoning ordinances are enforced to prevent the construction of buildings within the flood plain; that existing structures within the flood plain are looked at in view of their removal therefrom and that residents are advised of the necessity of obtaining Flood Insurance and are informed of what action they should take to protect their lives and property from flood losses (non-structural activities vs. "structural" activities such as permanent dikes).

The Committee in turn, informed Bloomgren, that they were interested in participating in the HMA program (To prepare a Plan of Action) and look forward to DNR's selection of East Grand Forks as a "test" community. In other action, the committee heard from U.S. Army Corps of Engineer representative Martin McCleery who:

* Informed the group that a survey team would be taking elevations along the Grand Marias and Red Lake River to update existing data, and

* Advised the Committee that it would probably be February 1984 before any final action (report) would be prepared to alleviate the flood situation affecting the community and that it would be January 1987 before any contruction activities thereon would be started.

Flood committee talks "measures"

In their monthly meeting with Martin McCleery, study manager for the Army Corps of Engineers, members of the East Grand Forks Flood Control Committee, Monday, discussed measures that might be used in an overall program of flood damage reduction.

McCleery defined 16 measures and the advantages and disadvantages of each as it applies to the East Grand Forks area and its flood problems in his presentation.

The measures are: dams and reservoirs; levees, floodwalls and closures; channel work: diversion; watershed treatment; flood forecasting and warning systems; temporary and permanent evacuation of property; floodproofing; removing substandard structures subject to repeated flood damage and converting the areas to open space uses only, floodplain zoning; establishir. subdivision regulations to in sure that new land uses are compatible with the severity of known flood hazards; building codes; development policies for uses of floodplain areas; tax adjustments that discourage land development in flood hazard areas; flood insurance; and emergency operations.

McCleery asked committee members to give him their opinions about the advantages and disadvantages of each of these measures as a preparatory step to formulating, by this fall, a specific plan that includes all measures believed to be most effective in providing flood protection.

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APRIL 23, 1981

Flood control ideas discussed with McCleery

Dams, reservoirs, permanent levees, floodwalls, closures, channel cleanouts, diversions and watershed district projects [illegible]he flood control measures [illegible]ssed Tuesday when [illegible]ers of the East Grand Forks Flood Control Committee held their monthly meeting with Martin McCleery.

McCleery, study manager for the Army Corps of Engineers, has had the local committee discussing advantages and disadvantages of various flood control measures for three meetings as preparation for designing an overall flood control master plan for the city.

The measures discussed Tuesday are all ones that East Grand Forks has not been using or depending on in recent years.

In each discussion, committee members have been asked to think of the advantages and disadvantages of each measure from a city government point of view. Tuesday's meeting spelled out a number of disadvantages.

Dams and reservoirs constructed on rivers and major tributaries that feed ground[illegible]rs running into East Grand [illegible] maybe helpful much of [illegible]me in storing large quantities of water. But there are times, discussion noted, when extremely heavy rains fall on saturated ground. Reservoirs then, would not help and could complicate a flood threat.

So-called "permanent" levees, floodwalls or closures do not offer permanent protection. Each of them will be overtopped at some future date, McCleery said. The big question is how many decades or centuries one might adequately serve before it is topped.

Jim Gander, city council president, noted the lack of solid subterranean footing along the river banks in this area make it difficult to maintain large, heavy structures. "We could not just put these large structures in and leave them. We would have continual maintenance expense with them . . . plus the maintenance of accompanying equipment like pumps and electrical gear," he added.

Gary Sanders, consulting engineer for the city, also cited difficulties, because of the way in which such large structures are designed, of adding to the top of levees when floodwaters threaten to top them.

Extensive cleaning out and widening of the Red River channel in this vicinity, in order to speed the flow of floodwaters past East Grand Forks, was

Please see FLOOD, Page 3

seriously studied in the mid-1950s, according to McCleery. Even then, the cost of such work in relation to the relief it could be expected to provide made this measure unfeasible, he added.

Gander noted again the unstable conditions of the subterranean ground along the Red River banks and said major dredging of the Red would likely result in severe damage to many buildings in the city from a shifting of their foundations.

Sanders underscored the increased dangers that would be inflicted on communities downstream by channelization work.

Diversion of Red Lake River floodwaters through the Grand Marais Coulee to bypass East Grand Forks and empty into the Red River a few miles further north was opposed by large numbers of Marais residents at a public hearing held last November at the Regency Inn.

Besides the strong record already on file labeling this diversion measure "socially unacceptable" to Marais residents, McCleery said there is a big question many have about the cost feasibility of such a measure.

He noted Army Corps offices in St. Paul are currently working on a study of the economic impact of such a diversion, seeking to show how the dollar value of property saved in East Grand Forks by such a diversion would compare to the dollar value of property losses that it would inflict on Marais landowners.

There is a big question if such a diversion would take care of sufficient amounts of water to provide East Grand Forks with considerable savings in property losses, McCleery indicated.

Sanders again questioned the propriety of "Passing our water problems onto others . . . even though that's how we get a lot of ours."

Some Marais area residents attending the meeting decried the State of Minnesota's failure to stringently control farm ditching in noting the excessive amounts of floodwaters that come from farms to the east and simply flow crosscountry over the flat lands of the Red River Valley.

Measures watershed districts may take to try and control flooding in the Red River Valley were criticized as often being ineffectual because they deal with water problems that should be approached and dealt with on a river basin basis.

Flood Prone Areas to be Surveyed

As part of the Flood Control Study, representatives of the St. Paul District Corps of Engineers in the Minnesota Department of Natural Resources will be conducting a survey of homes within the city during the weeks of July 20th and 27th.

The purpose of the survey is to gather possible flood damage data through elevation analysis.

If you have any questions concerning the survey, contact Dave Mack, Clerk-Treasurer (Tel: 773-2483) or talk to one of the field representatives who will be in your area.

The RECORD
East Grand Forks, MN
Friday, July 17, 1981
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EAST GRAND FORKS EXPONENT
October 22, 1981

FLOOD CONTROL: CITY ELECTION CAMPAIGN ISSUE
November 3, 1981

Candidates get public review

The appearance before the Chamber of Commerce by the candidates in the Nov. 3 East Grand Forks city election Monday noon at the Eagles Club failed to turn up any burning new issues for this fall's campaign.

Instead, the nine candidates, who made three-minute presentations to the luncheon gathering of about 60 chamber members and others, dealt with the subjects of tightened city finances, flood control needs, the Minnesota tax disadvantages for businesses, and the idea of re-opening DeMers Avenue to through traffic.

The order of the formal presentations was determined by lot.

The first of the mayor candidates was incumbent Louis Murray. "I like being mayor," he said, explaining that he gets satisfaction from helping people and working for the community. In his retirement, he said, he can be a full-time mayor.

"I'm proud of East Grand Forks," he said, adding that those in city government are "honest beyond reproach."

He said East Grand Forks is a national model for flood-fighting, has excellent services and parks. The new arena under construction in O'Leary Park, he said, is being built without a bond issue and the community "should get down on our knees and thank the Blue Line Club."

Mayor candidate Robert Gaddie said he had no criticisms of city government and that his candidacy was based on three reasons, all dealing with business improvements.

They included that he would like to see a clothing store in East Grand Forks as a part of increased business offerings; that a small clinic be started and a doctor be recruited to the city, and the need for more tax and business dollars to stay in East Grand Forks.

"There is nothing finer than the city services and people of East Grand Forks," he said. And, concerning proposals to re-open DeMers, he added, "There is no way to re-open DeMers. It was a bad thing when it was done and it's too bad."

Ronald Olson, who followed Gaddie, countered that DeMers "can be re-opened — if both parties agree. And, there can be pressure brought to bear. If we do it collectively, it can be done."

He called the closing of the avenue "the right thing at the time" but said it has "been proven to be wrong."

"I think I can prove to be a good mayor," he said.

Alderman-at-large candidates — incumbent Paul Hanson and challengers Steve Gorman and Roland Flattum-Riemers, all residents of the "northside" — continued on the same issues.

All three mayor candidates are city natives.

Gorman said the establishment of permanent flood control structures is the number one priority item facing the city and tied it closely to his second main issue, an effort to attract new businesses and industries.

"We can't very well begin to encourage new businesses to locate here until we can promise them substantial protection against periodic heavy flooding," he said.

"In the highly competitive battle with our (North Dakota) neighbors for new businesses," Gorman added, "We're at the edge of getting something done to better our (bargaining) position.

"We have to be in better touch, continual touch with St. Paul, with officials there, with departments there, and with our legislators there to get the job done."

Hanson, as a member of the city council finance committee, warned the city is going to have to make some cuts in services in the years immediately ahead to maintain a balanced budget and added, "I believe I have some good ideas on just how this can be done."

A member of the council's parks and recreation committee, also, he helped launch the winter basketball program for third, fourth, fifth and sixth grade girls and boys and was a founder of the East Grand Forks Boosters Club. He told the luncheon audience, "We are second to none in the State of Minnesota with our youth programs in this city and I will continue to work to keep it that way."

He had similar words of praise for this city's fire department and stated he would "definitely support" efforts to move ahead with a proposal

Please see CANDIDATES, Page 3

Candidates

Continued from Page 1

to build an area senior citizens building in East Grand Forks.

To improve efficiency in city operations and communications between city officials and city employees, Hanson said he would work to establish a program requiring city department heads to meet at least once-a-month with their employees.

To help expand the East Grand Forks business community, Flattum-Riemers suggested two points: (1) establishment of an effective inter-city bus system between Grand Forks and East Grand Forks and (2) establishment of a basic, small-to-begin-with, airport facility east of the city.

"I like to ask 'why?' and 'how come?' whenever I hear of another government program," he said, in complaining that the elevator addition to city hall to make city council chambers accessible to handicapped citizens still does not offer the ready access it was built to provide.

Flattum-Riemers also contends that East Grand Forks violates state open meetings laws when its civil service board holds closed meetings.

Jim Mongoven, incumbent alderman in the 4th Ward, who is unopposed for re-election, noted he has served in the post since 1970 and added, "I enjoy the job and intend to continue doing the best job I can of representing the people of my ward."

Only two of the four candidates running for alderman in the 2nd Ward appeared at the luncheon. They were Dale Helms and Karl Lindquist.

Helms said he is running because several ward residents asked him to run for the job four years ago and again this year.

"I'm not going to stand here and tell you how I would save the city so much money because I wouldn't be able to do it alone. That's a job that will take the combined efforts of the city council, city employees and all city residents pulling together," he said.

Lindquist said he is not convinced the city will have to cut services because of expected declines in federal and state financial aids in the years ahead. "The answer maybe for us to seek out more efficient ways of doing things," he proposed.

He said he is a candidate because he believes East Grand Forks is "a great place to live and I think it should be preserved...I believe I have the qualifications to help do this."

Lindquist opened a law practice here about a year ago after graduating from the UND Law School in 1980. He also teaches part-time in the management department of the UND College of Business and Public Administration. One of the courses he teaches is corporate finance. He also holds a bachelors degree in mechanical engineering from the University of Minnesota and masters degree in business administration from the University of Northern Iowa.

Responding to criticism he is a "professional student," Lindquist cited the employment background he has compiled along with his schooling. He worked as manager of a plant in Minneapolis that manufactured hockey sticks and later as director of engineering for Waterloo Industries in Iowa, a firm that manufactured tool chests, tool cabinets and other products.

Incumbent Al LaFave, who was out of town, and Mike Ivey, 2nd Ward candidates, were not present.

None of the candidates were asked any questions from the audience.

GRAND FORKS HERALD - January 26 1982

EGF flood control unit hears study

By Kim Yeager
Herald Staff Writer

The news Martin McCleery brought Monday to the East Grand Forks Flood Control Commmittee probably is heartening for Fisher, Minn., area landowners.

He told those present his findings more or less "rule out" the plan to divert Red Lake River water into Grand Marais Creek near Fisher to lower the urban flood level.

McCleery is a U.S. Army Corps of Engineers representative and project manager of a study to recommend by October 1984 long-range flood protection measures for East Grand Forks.

Fisher area residents weren't happy with the suggested diversion. They worried it would devalue farmland, threaten crops and endanger wildlife along the Grand Marais.

But in a preliminary analysis presented Monday night, McCleery told committee members the idea could work, but it isn't cost-effective.

"The Grand Marais coulee diversion, as a single flood-control measure, cannot completely solve East Grand Forks' flood problem," McCleery read. Other measures, including levees, would be required even if the diversion is used.

"I think what we're showing here is that it won't work . . . it costs too much," he said, pointing out one of the diversion alternatives.

It outlined replacement of 12 road bridges or culvert crossings and one railroad bridge, and improving 10 channel miles. This would divert about one-third of the Red Lake River when it and the coulee are at the level of flow that occurs during a 100-year flood.

The cost: An estimated $36.3 million, McCleery said, with benefits from the 1.3-foot water level decrease to be about $421,000 a year.

"There's absolutely no way that there's any federal interest in that type of a project," McCleery said.

In 1980, 594 residents of seven rural townships signed petitions protesting the proposal because the diversion could cause an overflow of floodwater to adjacent land.

An earlier corps report showed about 100 rural households could be affected and about three square miles of farmland could flood because of the potential overflow.

The diversion would be about 10 miles upstream from the junction of the Red River of the North and the Red Lake River at East Grand Forks.

In addition to the idea of improving the coulee to aid diversion of the water, McCleery reviewed four other alternatives.

Similarly, he declared them not cost-effective, although one plan, calling for minimal bridge modifications and channel improvements could divert 6,500 cubic-feet-per-second flow from the Red Lake River, which could result in a ½-foot decrease in the 100-year flood stage.

This plan "could provide a significant reduction in peak flood stages in East Grand Forks without impacting upstream areas," McCleery's report said.

Another alternatives, which would decrease the annual flood stage at East Grand Forks by ½ foot, also would raise the 100-year flood level at Fisher by 4 to 5 feet and require a 4,000-by-8-foot levee to protect Fisher homes.

Some area homeowners present objected to the diversion on that point.

McCleery said next he'll study the possibility of a series of levees in East Grand Forks as a measure to combat flooding.

EAST GRAND FORKS EXPONENT - January 28, 1982

Marais bypass, river work not the answer

By themselves, neither utilization of the Grand Marais Coulee as a diversion for Red Lake River overflow nor enlarging the channel and clearing the overbanks along the Red River would provide major flood relief for East Grand Forks. At least, not in an economically feasible manner.

These are the results of studies presented to members of the East Grand Forks Flood ontrol Committee Monday by artin McCleery, study manager for the Army Corps of Engineers.

In each case, the formal study declares that the flood protection measure reviewed may have some feasibility "only in combination with other measures such as (the building of) levees" in or near East Grand Forks.

Enlarging the Red River channel was considered previously by the corps of engineers in a 1953 study, according to McCleery.

The 1953 study considered removing timber and underbrush along a 16-mile stretch of the river extending through the metro area of Grand Forks and East Grand Forks and reaching out 150 feet on each side of the river. It also included enlarging the river channel one and a half miles below the Red Lake Dam and for six miles upstream.

"Hydraulic studies showed that a (flood-level) stage reduction by such channel clearing would not exceed a maximum of .4 of a foot; that the cost was not justified; that the extensive clearing (of the banks and neighboring land) was unfavorable to land owners and would result in right-of-way and acquisition problems; that future maintenance (plans) would not be acceptable to local interests; that the river banks were extremely unstable, making excavation a hazardous undertaking. The study recommended no further consideration of this measure," according to McCleery's review.

The 1981 study of the Red River in the Grand Forks — East Grand Forks area considered "extensive widening and deepening measures in combination with two channel cutoffs across meanders...The plan required a finished channel bottom width of 1,200 feet to (allow for passage of) the 100-year flood discharge and extensive modification to all road and rail bridges. In addition, there would be significant environmental effect because the designed channel would require removal of most forest cover along the river," states the review.

McCleery's conclusion after his review of the previous studies of proposals to clear the Red River banks and deepen and/or widen its channel reads: "Channel modifications as a single flood-damage reduction measure for East Grand Forks is not economically, environmentally or socially feasible."

A number of different approaches to utilizing the Grand Marais Coulee as a diversion for Red Lake River overflow are considered in that study.

One considers the improvements that would have to be made along the coulee if it were to carry one-third of the overflow from the Red Lake River at a time when both the coulee and the river were hit by a 100-year flood. Required would be 10 miles of channel improvement, including a 200-foot wide bottom, numerous cutoffs,the replacement of 12 road bridges or culvert crossings and one railroad bridge. Total first costs of this plan are estimated at $36,314,000 and the resulting average annual economic benefits from the 1.3-foot decrease in the 100-year flood stage at East Grand Forks would be about $421,000.

"A comparison of benefits with costs yields an unfavorable benefit-cost ratio of .2," McCleery concludes.

Also considered were two proposals to forego any improvements along the coulee or make only very minimal ones and build a diversion structure that would increase the 100-year flood-level at Fisher by half a foot.

The crest of such a diversion structure could not be higher than 838 feet and, if no improvements were made along the coulee, such a structure could divert 1,000 cubic-feet-per-second (cfs) at a time when the 100-year flood was running. This would reduce the flood stage at East Grand Forks by only one-tenth of a foot, which is insignificant.

Coulee improvements that would be needed to raise the amount of the diversion to 6,500 cfs during a 100-year flood would require a minimum of 10 miles of channel improvements and the modification of 13 bridges and road crossings. The existing coulee bottom would be dropped five additional feet, a bottom width of 150 feet would be maintained, with a 1-on-3 side slope.

Total first costs of this plan are estimated at $10,432,000 and the corresponding average annual economic benefits accruing to East Grand Forks from the resulting one-half-foot decrease in the 100-year flood-stage would be about $488,100. This yields an unfavorable benefit-to-cost ratio of .6, McCleery concludes.

Instead of making channel improvements, if the diversion crest elevation was raised to open at 842 feet, then a diversion of 6,500 cfs could still be realized and result in a decrease of half of foot in the flood stage at East Grand Forks.

However, such an increase in the height of the crest elevation of the diversion structure would raise the flood stage at Fisher for the 100-year flood by from four to five feet and require the construction of 4,000-foot-by-8-foot-high levy to protect Fisher property, according to McCleery's study.

"A comparison of benefits to cost yield a marginally favorable benefit-cost ratio of 1.1," he notes in discussing this plan.

In concluding his formal study of Grand Marais Coulee diversion proposals, McCleery states, "No Grand Marais coulee alternative can completely solve East Grand Forks flooding problem. At best, (the plan which calls for building a diversion structure with a crest elevation of 842 feet) may have feasibility but only in combination with other measures such as levees."

THE Record

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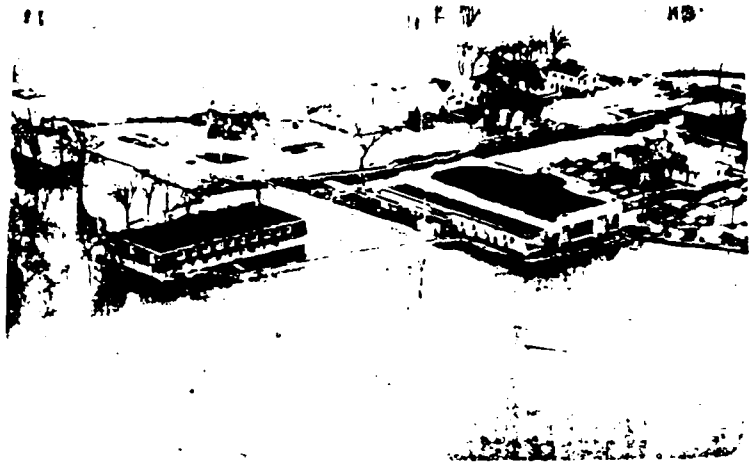
Grand Marais Flood Diversion Out

The possible use of the Grand Marais coulee as a diversion of Red Lake River flood flow to protect the Greater East Grand Forks area was all bout " ruled-out" in a study conducted by the U S Army Corps of Engineers and reported upon by their representative Martin McCleery (St Paul District) at a Flood Control meeting here Monday evening

McCleery indicated that the Corps had studied the feasibility of passing flows through the 23 mile coulee to reduce flood damages here and found that the Grand Marais diversion on either an improved or unimproved basis was either "insignificant" "not economical" or posed flood threats to residents within the Fisher area (The Corps of Engineers preliminary analysis of the Grand Marais diversion accompanies this article)

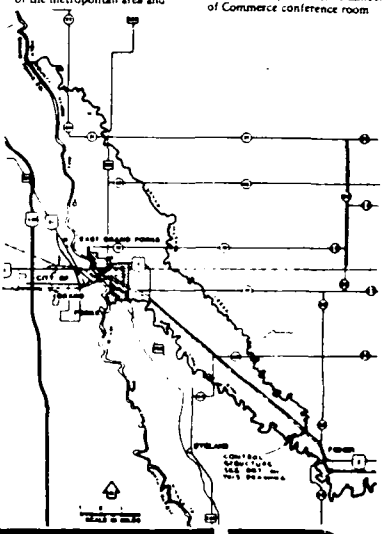
The Corps also studied the possibility of clearing the Red River of the North channel of trees and snags (also reported in this issue) within a 16 mile area of the metropolitan area and determined that "channel modification as a single flood damage reduction measure is not economically environmentally or socially feasible"

As the reports were presented and discussed it became more apparent that the construction of "permanent dikes" within the metropolitan area was the most important possible solution to flood control problems within the immediate area Such construction of levees would entail the relocation of several households within the community and the question aroused as to the cost-benefit ratios would be under such circumstances and how the city could possibly pay for such a project The proposal to construct levees within the metropolitan area will be discussed at the next Flood Control meeting to be held February 25th at 7 30 p m in the Chamber of Commerce conference room



Do You Remember?

The 1979 Flood of the Century - The Apartment Complex on the left received considerable structural damage as flood waters of the Red Lake River (background) and Red River of the North (foreground) raised at their confluence on the Minnesota Point The Red River of the North crested at 49 09 feet on Thursday April 26



East Grand Forks Phase I GDM

Grand Marais Coulee Diversion Measure

Preliminary Analysis Jan 1982

General

Grand Marais Coulee begins near the Red Lake River at Fisher Minnesota and extends northwesterly 23 imeal miles to its intersection with the Red River 10 niles downstream of East Grand Forks as shown in igure 1 The coulee with a total drainage area of 275 square miles has a meandering drainage course with a total channel length of 42 4 miles Typical channel width and depth upstream of road crossings are about 220 and 6 feet respectively The average channel width is 150 feet The coulee is crossed by 28 bridges and culverts with numerous drainage ditches entering along its main course

Land use along the coulee is almost entirely agricultural with scattered residential clusters Agricultural practices extend up to the natural channel along a major portion of the coulee while other agricultural areas are separated from the coulee by narrow intermittent strips of riverine woodland wetland and or pasture Numberous small slack water pools are located along the coulee downstream of the U S Highway 2 crossing Natural flows vary from little or no flow during late summer and winter to an estimated 3,540 cfs during a 1-percent chance flow at the Minnesota State Highway 220 bridge crossing north of East Grand Forks. Hydraulic studies indicate an existing bank full channel or zero damage flow capacity of about 2,950 cfs The current channel is servely restricted by numerous small bridges and culvert crossing and scattered areas of trees, shrubs, and cattail marshes

The coulee supports a variety of small mammals, amphibians, and water fowl Beaver are present along the lower reaches Several species of duck, song and shorebirds use the slack water pools for feeding, nesting and resting areas

Utilization of Grand Marais Coulee for Flood Control

During high flood flows on the Red Lake River overflows have entered the coulee Locals have suggested using the coulee, improved or unimproved, to pass a designated portion of Red Lake River flood flows through the coulee which in turn would reduce flood stages and damages in East Grand Forks, Minnesota

Prior Studies - Improvements to Coulee

Prior studies evaluated the feasibility of passing flows through the coulee by improvements to the coulee The analysis indicated that an improved channel with a 150-foot bottom width and will all bridges sized to the channel cross section and areas of heavy shrubs and trees removed would have a bank full capacity of 7,500 cfs

Peak flows greater than 7,500 cfs would exceed bank-full capacity and result in inundation and damage to several adjacent farmsteads The provision of additional overflows from the Red Lake River without widening and bridge modification would raise flood levels along the coulee

Improvements to divert 10,500 cfs (approximately 1/3 the Red Lake River flow) from the Red Lake River at its 1-percent chance flow into the coulee at its 1-percent chance flow would require ten miles of improved channel with a 200-foot bottom width together with numerous cutoffs. Also required would be the replacement of 12 road bridges or culvert crossings and 1 railroad bridge Total first costs for this plan was estimated at $36,314,000 or an annual cost of $2,503 000 Corresponding average annual benefits from the 1 3 foot decrease in the 1-percent flood stage at East Grand Forks US 65 gage would be approximately $421,000 A comparison of benefits with costs yields an unfavorable benefit-cost ratio of 0 2

Ongoing Studies - No Improvements to Coulee

As the current study progressed it was suggested that an unimproved coulee along with a diversion structure on the Red Lake River may be a practical measure for reducing flood damages at East Grand Forks The concept was to allow overflows to seek the natural floodplain of the coulee without modifying the bridges or channel along the coulee or if necessary make only minumum modifications

The analysis considered

(1) Sizing a diversion structure creating no more than a ½ foot increase in the 1-percent flood level at Fisher, Minnesota when the 1-percent flood is occurring on the Red Lake River and coulee

(a) What is the impact on flood levels as a result of no modification to the coulee?

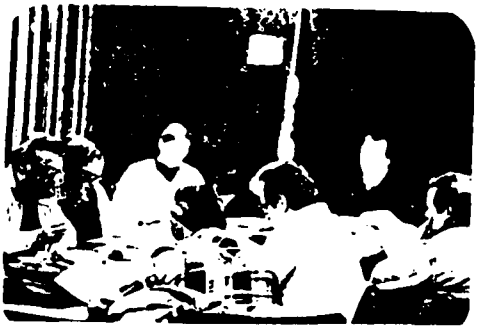
(b) What is the impact by adding in a minimum amount of channel improvement and providing bridges at road crossing on the channel?

(2) Sizing (raising) the diversion structure to di-

(Continued on Page 5)



Martin McCleery of the U.S. Army Corps of Engineers (St. Paul District) upper left met with members of the Flood Committee Monday evening Mayor Louis Murray Civil Defense Director (Fire Chief) Dan Formato Street Superintendent Ed Osowski, are pictured with McCleery above



Grand Marais

(Continued from Page 1)

vert 6500 cfs during the 1-percent chance flood on the Red Lake River and coulee

(a) What is the impact on flood levels with no modification to bridges along the coulee?

(b) What is the impact on flood levels with modification to Burlington Northern railroad bridge and U.S. Highway 2 crossing?

PLAN 1A (Figure 1)

By limiting an increase in the 1-percent chance flood to ½ foot at Fisher, Minnesota the elevation of the crest of the diversion structure cannot exceed 838 feet. Without improvements along the coulee 1,000 cfs could be diverted at the time when flows along the Red Lake River and coulee were at the 1-percent chance flows. This would reduce flood stages at East Grand Forks by 0.1 feet. It became obvious that without modification to the coulee or the river are estimated at 10,432,000 or an annual cost of 795,961. Corresponding average annual benefits from the ½ foot decrease in the 1-percent flood stage at East Grand Forks gage would be approximately $488,100. A comparison of benefits with cost yields an unfavorable benefit cost ration of 0.6

PLAN 2A & 2B (Figure 3 & 4)

This evaluation looks at the feasibility of raising the elevation of the diversion structure above the 838 crest elevation to achieve a diversion of 6,500 cfs when the 1-percent chance flood was occurring on Red Lake River and coulee. A diversion crest elevation of 842 would be required if no improvements were made along the coulee. With improvements to the railroad bridges and U.S. Highway 2 crossing a crest elevation of 841 would be necessary. These increase in the crest elevation would raise the 1-percent floodplain at Fisher, Minnesota by 4.5 feet and require a 4,000 foot by 8 foot high levee to protect homes in Fisher. Costs for plan 2A are estimated at $6,015,000 or an annual cost of $458,944. Corresponding average annual benefits for the ½ foot decrease in stage at East Grand Forks would be approximately $88,100. A comparison of benefits with cost yield a marginally unfavorable benefit cost ration of 1.1. Plan 2B had costs estimated at $7,231,000 or an annual cost of $551,725 with an unfavorable cost benefit ratio of 0.9.

SUMMARY

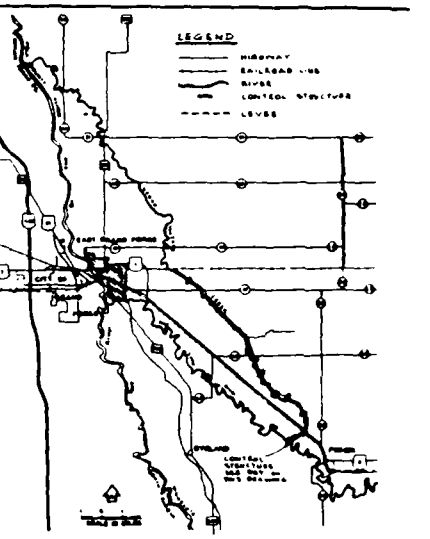
The Grand Marais coulee diversion, as a single flood control measure, cannot completely solve East Grand Forks flood problem. Other measures including levees at East Grand Forks will be required.

Without significant modification, the coulee's existing physiography provides essentially no capacity to pass excess Red Lake River flows. A diversion structure alone (Plan 1A) cannot pass sufficient flows through the coulee without being raised to an elevation where flood levels would significantly impact the upstream areas to include the communities of Fisher and Crookston, Minnesota. A diversion structure in combination with bridge modifications (Plan 2A & 2B) along the coulee again, cannot pass sufficient flows to significantly reduce flood damages at East Grand Forks without impacting upstream areas. However, at the expense of economic feasibility and substantially high economic, environmental and social costs, a diversion structure in combination with channel modification and bridge and road crossing modification (Plan 1B) along the coulee could provide a significant reduction in peak flood stages in East Grand Forks without impacting upstream areas. This plan is not in the Federal interest. No Grand Marais coulee alternative can completely solve East Grand Forks flooding problem. At best, plan 2A may have feasibility but only in combination with other measures such as levees.

ing of the diversion structure significant flows cannot be passed.

PLAN 1B (Figure 2)

This evaluation looked at the feasibility of passing flows with minimal modification to bridges and maximum channel improvements along the coulee. To divert 6,500 cfs from the Red Lake River at its 1-percent chance flow into the coulee at its 1-percent chance flow would require a minimum of 10 miles of channel improvements and the modification to 13 bridges and road crossings. The existing channel would be excavated approximately 5 feet below the current channel bottom maintaining a 150 foot bottom width with 1 on 3 side slope. Total first costs for this plan

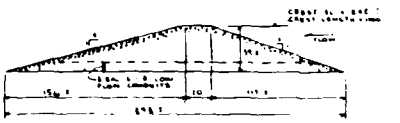


PLAN 1A



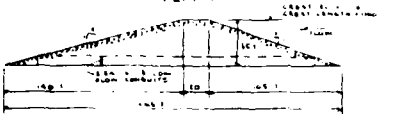
CONTROL STUCTURE DETAIL

PLAN 2A



CONTROL STUCTURE DETAIL

PLAN 1B

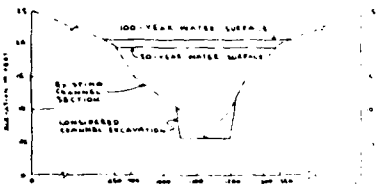


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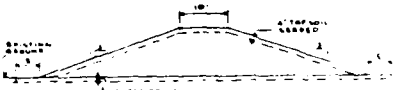
PLAN 2B



CONTROL STUCTURE DETAIL



TYPICAL CHANNEL EXCAVATION SECTION



TYPICAL LEVEE DETAIL

THE Record

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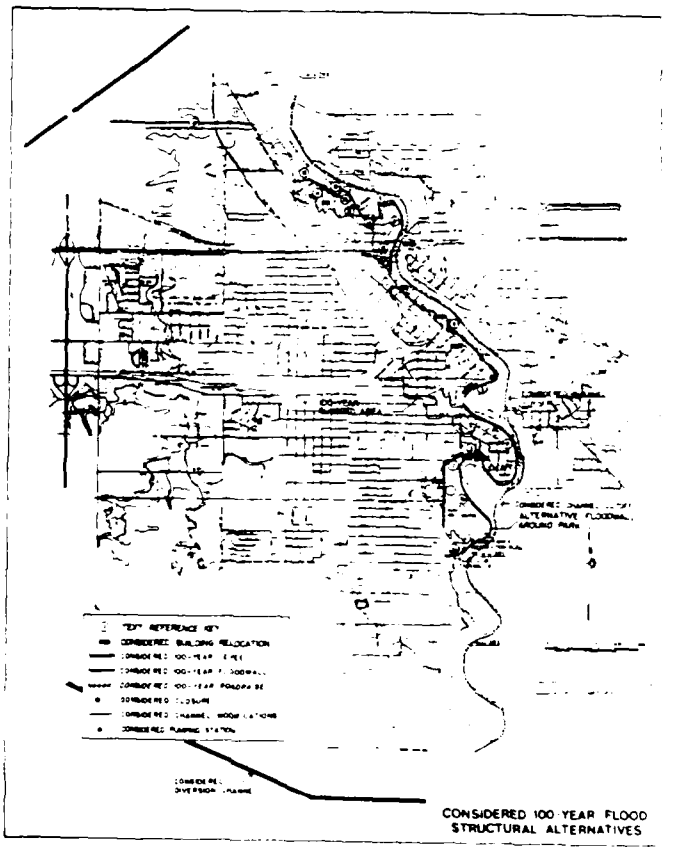
Higher, Longer, and Stronger

We don't know why, but each time we hear a discussion of how to solve flood control problems within the Valley the answer always comes back "Build Your Dikes Higher Longer and Stronger."

True, we have heard discussions about the proposed Huot Dam(ed) project impoundment areas flow impediments throughout the Red Lake-Red River of the North Basin but each time such projects are discussed they are found to be so bound up in the bureaucracy of Federal State of Minnesota and State of North Dakota Basin authorities and conservation districts watershed districts that if the deluge of just the paperwork involving reports, studies suits and countersuits, were to be casted upon the Red River Valley waters – we would be up to our ears in three-ring binders and bound documents that would make the 100 Year Flood look like a trickle from a stream.

At such times we can not help but wonder what happended to Congressman Stangeland's House of Representative Sub-Committee findings (results) and the suggestion that a "Super-Board" be created to solve the flood control problems throughout the Valley.

We guess they still studying [illegible] of the study made to determine the feasibility of controlling floods within the Valley and until their report of the report based upon the *initial report is released* – everyone along the Valley will continue to solve their flood control problems with higher, longer and stronger dikes.



CONSIDERED 100 YEAR FLOOD STRUCTURAL ALTERNATIVES

FIGURE

East Grand Forks Phase I GDM

Channel Modification

Preliminary Evaluation Jan 1982

The feasibility of this measure was put into perspective by Simons and King about 1950 (1). They estimated that by clearing a strip of primary over bank 150 feet wide on each side of the channel with the channel completely clear of trees and snags that a stage reduction of 5 feet was possible if done for the entire length of the Red River of the North.

The Corps in its 1953 study (1) considered a channel clearing and enlargement measure in conjunction with the authorized project. The measure consisted of removing timber and underbrush from a 16 mile reach extending through the metropolitan area 150 feet on each side of the channel and enlarge the channel 1.5 miles below the Red Lake dam and upstream a distance of 6 miles. Two advantages were identified provision of a larger floodway for passage of ice, and reduced flood stages. The study concluded that ice in the reach did not affect peak stages of flooding as a result of a fairly direct channel through the city and a wide floodplain immediately below the city. Hydraulic studies showed that a stage reduction by channel clearing would not exceed a maximum of 0.4 feet the cost was not justified the extensive clearing was unfavorable to land owners and would result in right of-way and acquisition problems that future maintenance problems would not be acceptable to local interests that the excavated material was unsuitable for levee embankment and the river banks were extremely unstable making excavation a hazardous undertaking. The study recommended no further consideration of this measure.

The Corps 1981 study (2) reanalyzed several possible modifications of the Red River channel through the Grand Forks-East Grand Forks area. One plan included extensive widening and deepening measures in combination with two channel cutoffs across meanders as shown in Figure 1. The plan required a finished channel bottom width of 1200 feet to pass the 100-year flood discharge and extensive modification to all road and rail bridges. In addition, there would be significant environmental effect because the designed channel would require removal of most forest cover along the river. Channel modification was not considered further in this study.

SUMMARY

Channel modification, as a single flood damage reduction measure for East Grand Forks is not economically, environmentally or socially feasible based on previous studies. At best it may have some limited application in combination with other measures such as levees.

(1) U.S. Army, Corps of Engineers, St. Paul District, "Flood Control Definite project report on the Red River of the North at Grand Forks, North Dakota and East Grand Forks, Minnesota," May 1953.
(2) U.S. Army, Corps of Engineers, St. Paul District, "Grand Forks, East Grand Forks and Red River below Wahpeton, North Dakota Flood Control Appendix," May 1981.

EAST GRAND FORKS EXPONENT - March 4, 1982

Front Page

May be 'economically feasible'.

Diking plan under study

An initial analysis by Army Corps of Engineers offices, which was described as "very preliminary and conceptual," indicates it may be economically feasible for East Grand Forks to obtain flood protection by building permanent dikes and levees.

This was the word Martin McCleery, St. Paul, study manager for the Corps, brought to a meeting of the East Grand Forks Flood Control Committee last Thursday.

McCleery brought with him two sets of maps prepared by Corps offices, both of which show very tentative plans for the construction of several miles of permanent earth levees and a few concrete flood walls.

Combined with the raising of some road and street levels and temporary sandbagging in spots, the flood walls and earth levees would provide a protective ring around the whole of the city — including all of the northside and The Point areas.

One set of maps portrayed construction that would be needed to protect the city from that level of flooding that could be expected here once every 100 years. Preliminary cost figures for this project — for construction and for purchase of land, easements and rights-of-way - total $12 to $14 million.

The second set portrays the construction needed to protect the city from levels of flooding that might occur between 100 and 500 years. Called the "Standard Flood Protection Project," and the one the Corps would tend to favor, this program carries preliminary cost estimates of from $15 to $17 million for construction work and the purchase of land, easements and rights-of-way.

The preliminary cost figures are based on October 1981 price levels, McCleery noted.

In addition to the initial costs of construction and obtaining land, easements and rights-of-way, he noted operation and maintenance costs annually for such protection could range from $40,000 to $60,000.

He said the community would be expected to bear the costs of obtaining land, easements and rights-of-way and, "under President Carter's Administration, the Corps would have paid 75 percent of the construction cost. What portion the Corps will pay under the Reagan Administration we don't know yet. We are still waiting for direction."

Going over one of the sets of maps with committee members, page by page, McCleery said:

- The permanent dirt levees will be composed primarily of Red River Valley clay.
- Where levees and floodwalls run near the Red River or the Red Lake River, the Corps has a general policy of locating them 400 feet from the river channel.
- In a number of locations, where permanent levees were near the river, he and local committee members questioned whether sub-soil foundations

See DIKING, Page 3

iking—

Continued from Page 1

were strong enough to bear the weight of permanent levees without developing ground slippage.

- There is need for more precise assessments of where East Grand Forks' potential future developments are going to be located.
- There must be more thought given to protecting the city water plant.
- There is a question whether the current bridge over the Red Lake River should be removed or not.

McCleery scheduled his next meeting with the local committee for 7 p.m. Thursday, March 25, and said most of that session will deal with further discussion of the preliminary maps in an effort to reach conclusions about many of the questions raised.

He and committee members strongly urge residents and business operators in East Grand Forks to study the maps (available in City Clerk-Treasurer Dave Mack's Office) before March 25 and come to that meeting with suggestions and questions.

"We need considerable local input on these proposals at this time. I can't stress that too strongly," McCleery said.

Also at the meeting, McCleery gave the committee a preview of a colored slide presentation, prepared by the Corps, with recorded narration, entitled "East Grand Forks Flood Emergency Plan of Action."

It is based essentially on the flood fighting manual prepared by Orley Gunderson, former Civil Defense director, and Floan-Sanders, the city's consulting engineers.

McCleery encouraged showing of the program to local audiences in the ensuing weeks, before the flood season, as an explanation of what steps citizens should be taking on their own to prepare for possible flood emergencies and what work they can expect the city's flood fighting organization to handle.

Two sets of the slides and the narration are available in Dave Mack's Office for showing by service clubs, church groups, veterans posts, fraternal groups, auxiliaries and other organizations.

PONENT

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River bank stability problem in dike plan

Underground faults along the Red River and on both sides of the Red Lake River could be the most difficult and costly hurdle if East Grand Forks were to move ahead with permanent floodwalls and levees.

The point was made repeatedly Tuesday night when the East Grand Forks Flood Control Committee held a second meeting to d advantages and disadvantages of bui permanent protection against flood...g.

According to Martin McCleery, study manager for the Army Corps of Engineers, St. Paul Division, the erection of a ring dike around the entire city — comprised of both concrete floodwalls and several miles of permanent earth levees, raised roadways — appears the most feasible method of flood protection. The project would require only minor sandbagging at several points.

By "feasible," McCleery said he meant both economically and engineering-wise. Later discussion Tuesday, though, pointed out the difficulty of finding a solid base to carry the load of the levees over an extended period of time and that the problem could make the project "unfeasible."

Residents whose property would be taken totally or partially for a ring dike project were encouraged by 18 aerial maps brought to the meeting by McCleery.

The maps lined the wall of the meeting room, with each showing the proposed levee, floodwall or raised-road alignment as currently planned, along with alternative locations. After giving the about 30 residents a worksheet to note their complair ' a chance to study the maps, McClee nt over an hour reviewing the maps _ etail and answering questions.

He said the preparation of the preliminary and "highly conceptual" alignments of the diking had use the rule-of-thumb guidelines that would place 400 feet from the river banks in an effort to find solid footing.

In his map reviews, he explained the size and scope of the proposed levees which would range from 19 feet about city streets at some points in the northwest area of the city and be about 10 feet about streets in the O'Leary Park area on the Point.

McCleery noted several times that new information concerning underground faults could force the floodwall location further inland.

Committee members also pointed out other sites of underground faults if the dike system is built to heights that would protect the city against 100 to 500-year flooding.

Nearly all of that information would mean that the structures would have to be moved farther from the banks and would affect more homes and businesses. With current funding policies for Corps of Engineers projects, it would also mean that local government would have to bear additional costs of obtaining lands, easements, rights of way for a project.

Current cost estimates for property acquisitions under the preliminary plan, McCleery said, range from $2 million to $5 million.

City Council President Jim Gander cited evidence that an underground fault would prevent Rudh Brothers Furniture from being protected by a permanent floodwall in the downtown area. As first proposed, the floodwall would be built along the west side of Mike's Pizza and extend southeast to the area of the city garage.

He questioned the same floodwall because it would knock out the underpass near the city garage that becomes an important intra-city access from north to south when long Burlington Northern coal trains block other crossings.

Other points made by McCleery, committee members and citizens included:

- During high-water periods, the storm sewers serving protected areas would drain run-off waters into Sherlock Park park as a temporary storage pond.
- The Corps of Engineers anticipates increased river heights in the future, in part, because seven of the city's highest recorded flood levels have occurred since 1950.
- The costs of floodfighting in East Grand Forks in terms of money spent on corps assistance and the costs incurred by the city alone in the 14-year period from 1965 to 1979 has totaled $4.5 million. This total, McCleery said, does not include costs paid indiviually by residents and businesses for protection or repairs, nor does it include the dollar value of the thousands of hours of volunteer labor.
- Still a major, unsolved problem is how to measure growth of the city to the north, south and east in planning a ring dike.
- The preliminary nature of the proposal now being considered was underscored when McCleery reponded to a question about the timetable leading up to construction. He said:

... Current studies of possible "best solutions" to the flood problem will continue until October, 1984. By that deadline, city government and the Corps of Engineers should be jointly prepared to recommend to Congress a feasible project for flood protection.

... The joint recommendation, if approved by Congress, would be granted funding for three more years of study and cost development. At the end of the three-year study period, in 1987, the city would be asked to commit itself to proceeding with the plan.

... If the city did commit itself then, construction could be completed by the earl 1990s.

THE Record

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A PROPOSED FLOOD CONTROL Dike/Levee was presented to the Flood Control Committee Tuesday evening by project manager, Martin McCleery, U.S. Corps of Engineers. The proposed system would include a ring dike around the city with existing structures being moved which will affect approximately 40 homes and a few businesses (mostly from Rudh Brothers/Mike's Pizza on DeMers Ave. and the west side/river side 1st and 11th Streets NW and dike construction along 3rd Ave. SE). The estimated cost of the project is from 10 to 17 million dollars with the hope that the Federal government will contribute up to 75% of the expected cost. The proposed flood control systems may be reviewed at the Clerk/Treasurer's office, Memorial City Hall, during normal working hours; comments thereon should be presented to the Flood Control Committee.

EAST GRAND FORKS EXPONENT

FRONT PAGE

OCT. 14, 1982

Army Corps plans survey on flood controls for city

A cross-section of East Grand Forks residents will receive questionnaires from the St. Paul District office of the Army Corps of Engineers beginning next week concerning possible flood-control measures that might be taken in the city.

City Clerk-Treasurer Dave Mack asks all residents who receive the questionnaires to take the time to fill them out and mail them.

He said the questionnaires are an authorized part of the current long-range study being constructed by the corps to determine the most acceptable, cost-efficient engineeringly feasible, and effective flood control control program for the city.

The questionnaire answers will be used by the corps to better understand concerns regarding:

- Construction of levees or floodwalls.
- Zoning requirements for flood protection.
- Insurance protection against flood losses.
- Emergency flood fighting programs.
- Relocation of buildings out of flood plain areas.

Also sought is a better understanding of how residents feel about changes in existing neighborhoods, aesthetics, and safety features; the of the cost of various methods of improving flood control; and the effect of projects on real estate taxes and property values.

The survey seeks only voluntary participants. Completed questionnaires will not be signed.



Money talk

State Auditor Arne Carlson, seated right, talked with East Grand Forks Alderman-at-Large Steve Gorman this week while on visit of area municipalities. Listening behind are Paul Damrow, left, a state fiscal analyst, and City Clerk-Treasurer Dave Mack.

State Auditor says city is strong despite economy

Visiting in East Grand Forks Tuesday to review the fiscal profile his office had prepared of the city, State Auditor Arne Carlson spoke at length with four city officers about economic problems the city faces as a Minnesota community on the North Dakota's border.

Lamenting that state legislators in recent years "have been far too narrow-minded and selfish in their approach to problems," Carlson said, "There is a crying need for more problems to be approached with a view for the state as a whole.

"The 1983 Legislative session is going to have to take a hard new look at the state's relations with its municipalities. I would hope that it makes this a priority issue," he added.

"East Grand Forks, like other border communities, faces economic problems and stresses that are beyond the control of individual cities," he said, while urging that the city and other Red River Valley area communities "broaden your coalition" to take in Iowa and Wisconsin border communities as well to strengthen their legislative influence.

He also suggested that efforts be undertaken jointly by border communities to get many of the existing state controls now placed on municipal governments in this state removed.

Speaking with Steve Gorman, alderman-at-large; George Wogaman, 5th Ward; Mayor Louis Murray and Clerk-Treasurer Dave Mack, Carlson said he will be a member of a state task force now being established by Kent Eklund, state commissioner of economic development, to try and shape legislation that will assist Minnesota border communities.

Carlson stopped here on a current tour he is making of municipalities to review with officials in each a four-year fiscal profile his office has prepared for each. The profiles cover a five-year span — 1976-1980 — but the year 1977 is omitted.

The profile, which Carlson hopes each municipality will seek to keep updated, will help local aldermen, city clerks, treasurers and department heads to more accurately identify, measure, understand and solve local fiscal problems.

Paul Damrow, analyst for the fiscal profile program, said it is important to study data for a multi-year period rather than to try and make major decisions based on studies of one or two years alone.

"There are variables, such as special assessments or grants, that show large increases one year and decreases the following year that should not necessarily be cause for alarm. The fiscal profile provides a framework for assembling and analyzing information over a period of several years that provides one with a more accurate pattern of revenues and expenditures," Damrow added.

Carlson inserted, "When public officials can monitor debt service payments, enterprise funds, revenues and expenditures and other financial indicators, over a period of years, they will be able to identify areas of current or approaching fiscal stress."

In going over the initial fiscal profile prepared for East Grand Forks, Carlson and Damrow cited as strengths of this city:

- A vast improvement in investment earnings. "In fact, your investment interest earnings are in keeping with the money markets and other comparable forms of investments."
- Actual revenue in both the general and special revenue funds exceed budgeted amounts. "This, to us, indicates good budgeting procedures on the revenue side."
- "It is obvious that you have a well-run electric distribution utility as it shows a very strong profit performance. And large contributions from the utility profits are made to the general fund.
- "Although we cannot determine the capital outlay needs for the electric utility, it appears that there is a steady pattern of capital outlay on fixed assets. This becomes even more important when replacement or repair costs are expensive and some cities find they have had to borrow money at high interest rates for repairs or replacements.

"The figure for the per capita debt burden may be misleading. We understand from (Mack) that 75 percent of the total bonded indebtedness, as of December 1980, is for special assessments (on real estate) and is not a burden on all city taxpayers."

A number of special assessment taxes are to pay off comparatively low-interest bonds and that many of these will be paid up within four years.

In further discussion of special assessment taxes, Mack told the visitors that real estate developers, who have erected homes and buildings in both Grand Forks and East Grand Forks, are making their annual payments in Grand Forks, where there is now a 20 percent penalty for nonpayment.

Carlson said the city's undesignated general fund balance may not be enough to offset impending cutbacks in state and federal sources of revenue. "I would like to recommend that you look closely at your budget-making process for general and special revenue fund expenditures, as actual expenditures have consistently been over the budget projections," he added.

The major reason for the excess of expenditures in the 1976-80 period was the $1,059,000 flood costs the city incurred in the spring of 1979, according to Mack.

In the areas of health, parks, recreation and library services, East Grand Forks increased expenditures only 34 percent over the five-year period, Damrow said, "You have maintained fiscal control in these categories very well."

Carlson said Minnesota is the first state in the nation to provide its municipalities with the data offered them through the fiscal profile program and that cities can use this data as a basis for improving their future fiscal planning.

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APRIL 21, 1983

Mayors to 'aid' in flood battle

The mayors of cities along and near the Red River are the basis of a new division of the International Coalition for Land and Water Stewardship in the Red River Drainage Basin.

The division, which is expected to greatly increase the political clout of the coalition in seeking federal support for water control projects, was formed Saturday at Regency Inn, East Grand Forks.

The session, to which all mayors along the Red from Minnesota and North Dakota and from the province of Manitoba were invited, preceded the annual meeting of the coalition.

After reviewing the flood problem, the 42 persons attending, who represent either the municipalities along and near the river or are members of the coalition, voted unanimously in support of the new division.

Prior to the show of hands vote, Iner Quern, an Oslo area farmer and long-time flood control advocate, was among the speakers.

He said, "We, as members of the International Flood Coalition, are hoping to get you involved in our effort for flood control because you represent the largest group of individuals living along the main stem of the Red River.

"The cities you represent have had millions of dollars in losses, not to mention the emotional and physical stress and strain inflicted on you and your citizens."

And, he continued, "We need federal funding and we need it now. I think we've paid for water control, but our tax money has been used to build water control structures in other parts of the country (instead).

"This is where we need the help of mayors in the Red River basin, because, you the mayors, represent the majority of the people and people represent votes, and votes are what politicians cater to. We need your political influence on our state and national politicians."

Quern proposed also the development of a meeting with mayors, governors, and federal representatives at which "we can relate to them the seriousness of our problem and our need for federal funding now."

Arranging that meeting is to be one of the first goals of the new division.

Canadian coalition members and reeves (mayors) at the session related that they have had the same lack of influence problem in dealing with provincial and federal levels of government. And, they called for the same type of meeting at which they could point out the seriousness of the flood problem and the need for funding for controls on tributaries.

The flood problem, Gary Phillips, executive director of the Red River Valley Heritage Society at Moorhead, said, "is solvable" and if the drainage basin were located in just one state "it probably would have been solved long ago."

He said, "Our problem isn't as much one of flooding as it is one of state and international borders."

Another issue, which also received two-country support, involved the proposed location of a hazardous waste site on state-owned land near Stephen. In that regard, the coalition was directed to prepare a resolution opposing that location because of its threat to ground waters and drinking supplies.

Several of the representatives called also for stronger Canadian objection to the site, terming it another Garrison Diversion controversy.

The session with the mayors was chaired by Moorhead Mayor Morris Lanning. East Grand Forks Mayor Louis Murray and Grand Forks Mayor H. C. (Bud) Wessman were participants as was Oslo Mayor Bud Mondry.

The coalition was formed at Fargo following the 1979 flood and has individual boards representing Minnesota, North Dakota and Manitoba. It has also since involved church leaders and the RRV Heritage Society.

The coalition's objectives involve grass roots involvement, education, the moral perspective of the care of natural resources, unity, and the promotion of water controls.

A slide show, "I Am the Red River of the North," was given its premiere showing as a part of the annual meeting of the coalition. Speakers then were Albert St. Hilare, St. Jean, Man., president of the Manitoba

See MAYORS, Page 2

Mayors

Continued from Page 1

coalition; David Harrison, a water management specialist with the Hubert H. Humphrey Institute of Public Affairs; and Wessman.

St. Hilare reviewed flood control problems in Manitoba and reported on activities of the coalition group there.

Harrison told the group that any project "must start from the bottom up, rather than from the top down." He is promoting the establishment of a national water policy that would give more control to local government.

Wessman told the group that "cities and local units of government (regardless of the involvement of state and federal levels) will always have a responsibility to do what they can." He said, too, that a number of local projects, such as that underway on the English Coulee, "will have an impact."

Information on membership is available from Lance Yohe, Perley, the international president; Moorhead Mayor Morris Lanning, or from Gary Philips of the RRV Heritage Society, Moorhead.

Planners frustrated by lack of the facts

The difficulty of trying to reach decisions without having all the facts has frustrated the East Grand Forks Planning Commission.

Take two examples from last week's meeting.

Farmers Co-op Marketing Association (Farmsco) is considering the construction of two new elevators, each 55 feet high, at its complex on DeMers Avenue.

Ellis Larson, commission secretary, brought that advance information along with word that the construction would require a variance from city codes that call for a set-back of at least 50 feet for such structures.

He added, "There is absolutely no way that can be done on the site the elevator has there now" and suggested that the commission might want to weigh the matter carefully in view of recent discussions by other city government bodies concerning the use of that DeMers Avenue area for relocation of downtown firms that might be forced to move if and when a permanent dike is constructed.

Supporting Larson's concern, Matt Linzbach, commission chairman, reminded, "Decisions we make today on this body will affect this city 15 to 20 years hence. It's time we start recognizing that we don't have a pretty city in the commercial areas and that blight, once started, spreads so easily."

But, Ray Solum, who had served as commission chairman for several years, challenged the inference that there should be consideration for not issuing the variance to a well-established firm.

And, he minced few words in criticizing other government agencies that fail to provide the planning commission with information needed to carry out the planning function.

"I read the Exponent. I read other papers. I read the background information Ellis provides us. And, I listen to what others on government bodies tell me and discuss when I'm with them and all I know is some scuttlebutt that some Army Corps of Engineers representatives were here recently to meet with a number of East tion that was all stamped 'Not for Public Release.'"

Solum said he was never invited to such a meeting.

He also had harsh words for the Business Rejuvenation Board (BRB) and its policy of withholding the names of applicants seeking the two percent interest loans and other interest reduction benefits for expansion, relocation, renovation or purchase of equipment.

"We have not been provided directly with any of this rather current information from the Army Corps of Engineers regarding its plans for permanent diking proposals and we have no knowledge of where these local people who are getting public monies to help their business: s are going to move to, or what businesses they are involved in, or exactly how they are going to use this *money*... And, you expect us to recommend withholding a variance from a well-established local business?" Solem asked.

Commission member Ken Connette supported Solum, citing the importance of the expanded facilities and the scope of the project.

In other business, Steve Gorman, alderman-at-large, president of the chamber of commerce, and the city council's representative in meetings with Moorhead, Breckenridge and Dilworth concerning special programs for border cities, appeared before the commission to discuss the designation of "target" areas.

Target areas are those portions of the city that would be best suited for commercial and/or industrial siting. The planning commission was asked earlier this summer to began work on recommendations that the council could use in making a final decision on those areas for inclusion in an application, due Aug. 31, for special state aids.

The four cities had been advised earlier that their applications could include some target areas that were less than the 100-acre minimum and that they could be amended for later expansion.

In his message to the commission last week,

Planners

Continued from Page 1

Gorman said the Minnesota Department of Energy, Planning and Development will require complete designation of all target areas in the initial application. There are to be four areas, each with a minimum of 100 acres, or three, each with a minimum of 133.3 acres.

The commission was also told by Donald Eloan, who serves as a consulting engineer to the commission, said that two proposed target areas discussed earlier are slightly more than 100 acres but that they could be reduced, or expanded, to fit the requirements. One of these is about 115 acres and includes areas on both sides of U.S. Highway 2 extending east from Minn. 220 (Central Avenue) and including the new industrial park.

The other target area, about 104 acres, includes property on both sides of Minn. 220, extending north from U.S. 2.

Discussion centered on a third area that takes in all of downtown plus an area along the south side of DeMers Avenue. This area includes 107 acres but could be altered if a permanent dike is built.

If the application is approved, East Grand Forks could receive $1.8 million in tax credits over seven years for use in attempts to retain business, encourage new business development and expansion, and attract business from other states. Businesses locating in a target area would be in the best position to qualify for the tax benefits.

Linda Jeffrey, vice chairman of commission, asked Gorman about the time schedule for dike construction. He responded that the decision of whether or not the city will apply to Congress for the project will be made in early 1986.

"Whether or not Congress would approve our program and how long it would take for a decision to be reached are two other questions," he added.

"How can we make decisions on a seven year program like this without knowing until then the answers to the dike question?" Mrs. Jeffrey asked.

A consensus was eventually reached that, if the council is convinced that a considerable part of the downtown area would have to be surrendered because of flood plain regulations and dike construction, the BN properties northwest of DeMers could be included in the downtown target area.

But, because businesses in that area could have problems in trying to buy the land, Linzbach and Connette indicated that they would favor instead the relocations of downtown firms to areas along Business Highway 2.

Grant request aimed at flood work

The East Grand Forks citizens advisory committee that has been meeting to select civic projects that could be completed with the aid of a three-year federal Community Development Small Cities grant voted last week to throw its support behind a one-year program aimed at starting an on-going flood control effort.

The eight members present of the 11-member Community Development Advisory Committee listened, before they voted, to a forceful presentation by Steve Gorman. He urged, "We should be doing something now at the local level about houses and businesses still located in the 'flood plain' and 'flood fringe' areas of this city."

Because East Grand Forks has what state and federal offices consider only "temporary" dikes, Gorman noted one-third of the city's population and one-fifth of its structures are subject to Minnesota Department of Natural Resources (DNR) regulations that prohibit rebuilding homes and businesses in the flood plain, if they are destroyed, and which severely limits the extent to which owners of homes and businesses in flood fringe areas may go in renovating or adding to their structures.

He stressed that the threat of flooding has increased dramatically in recent decades – "We have had 15 floods here since 1960" – and noted that the costs of flood damage have skyrocketed.

The Federal Emergency Management Agency (FEMA), which administers the national flood insurance program, spent $4.9 million on claims in the city after the 1979 flood and the damages to East Grand Forks in terms of lost business, the estimated value of thousands of hours of volunteer labor and costs of local government caused by that flood reached $8.9 million.

The Red Lake River and Red River basins combined drain 40,000 square miles of land before they meet in the cities of Grand Forks and East Grand Forks, Gorman underscored.

The Army Corps of Engineers has been involved since 1980 in a multi-phase flood-control study for East Grand Forks which currently involves best solutions. It is anticipated that the corps will announce its decision this fall endorsing construction of permanent dikes around the city to offer the best protection, Gorman indicated.

If permanent diking is the recommendation and the city council votes (in 1986) not to undertake such a program, the city would be cut off in future years from several sources of the federal aid it has received in the past in its flood battles. If permanent diking is the corps recommendation and the city council votes to ask for Congressional funding to help finanace the diking, Gorman anticipates the location of dikes will require the demolition of several business buildings and residences.

"While federal monies may be available to help pay for the dike construction, heavy costs will be imposed on the city for the acquisition of property and the relocation of businesses and homes," he warned.

Gorman suggested asking for a Community Development Small Cities Grant that would be a "single purpose grant for one year" to enable East Grand Forks to begin an annual program of clearing from flood-prone areas substantially-marginal housing and business places, moving some houses and businesses and moving some families to different housing.

He suggested a request be included, also, for funding of a necessary study of business places and housing that are located in this city's flood-prone areas.

Early in the meeting, Don Schneider, executive secretary for the committee, cautioned committee members that they should keep in mind, in making their selection of projects, to pick ones that would be likely to stir the interest of state officials who administer the federal funds.

He noted that only 39 of 162 Minnesota communities that sought funds a year ago received grant and that, though East Grand Forks was one of them, it had asked for $1.4 million for a three-year program and was granted $480,000 for a one-year program.

In this vein, Gorman asked committee members to bear two things in mind in making their selection: (1) What is the single-most important problem facing the city and (2) what will likely have the greatest appeal to state officials reviewing the grant applications.

He cautioned the biggest single problem facing East Grand Forks is the need to lower local taxes by expanding existing businesses and bringing in new businesses, which in turn will create more jobs and bring more families here. "The flood problems we face today, especially with existing state laws, are a major deterrent to such business expansion," he said.

His proposal for a one-year single purpose grant, Gorman maintained would:

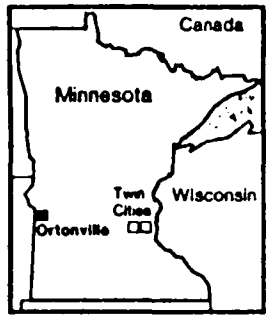
- Boost the city's economic recovery.
- Improve the economy of the city generally and help create new jobs, be of direct benefit to several low-to-moderate-income families and also benefit low-to-moderate-income families who reside in flood-prone areas.
- Remove unsafe conditions that now exist.
- Remove blighted conditions in the city and prevent the development of other blight areas.
- Demonstrate that city government and residents are pledged to work for reduced flood damages in the future.

Gorman was asked if, since he is an alderman-at-large, president of the chamber of commerce, and a member of a number of city council committees, he was representing any particular body in his appearance before the committee. He responded that he was not.

The committee endorsed the proposal, quietly laid aside a sheet with 29 other suggested projects, and approving a motion by Brian Erickson to recommend Gorman's proposal to the city council.

For a one-year, single-purpose program, Schneider said maximum that could be asked is $600,000. The motion calls for such an amount to include:

- $45,000 for updating the city's existing comprehensive guide plan and necessary study for the preparation of a new plan for the relocation/clearance of housing and commercial buildings from the flood corridor.
- $150,000 to provide two percent loans to businesses to assist them in relocating.
- $400,000 for acquisition or moving of structures, relocation of homes and businesses (including money for acquiring sites for relocation) and clearance costs for property acquired.



A 'shot in the arm' for Ortonville?

"You had to be impressed with the effort made by a city that size."
—Mark Dayton

Town of 2,250 could become 'enterprise zone'

By Paul Levy
Staff Writer

Ortonville, Minn.
Fourteen percent of Ortonville households are listed below the poverty level, compared with slightly over 11 percent nationally. The nonfarm per capita income is under $6,000. In the past 18 months, 227 people in this community of 3,250 have lost jobs.

Some businesses have threatened to cross the South Dakota border, which runs along the edge of town; others have ceased operation.

"Ortonville needed a shot in the arm," LaVaile Berkner, a board member of the Ortonville Development Corp., said Wednesday. "Naturally, we'd rather have these businesses here where money can be spent and jobs can be created. But there was no reason to expand here — not when our neighboring state had sales- and property-tax write-offs. It was just too costly."

Ortonville's shot in the arm may have come this week in its tentative selection by Mark Dayton, Minnesota Energy and Economic Development commissioner, as one of six border cities to share in $10 million in tax breaks as "enterprise zones."

The smallest of the six cities, Ortonville will receive $181,000 if its selection becomes final. That money, said Berkner, would discourage businesses from moving to South Dakota, while encouraging the growth of new business in Ortonville.

Dayton's recommendations will go to the five-member Legislative Advisory Commission, chaired by Gov. Rudy Perpich. Dayton is required by state law to make the final decision by Oct. 30.

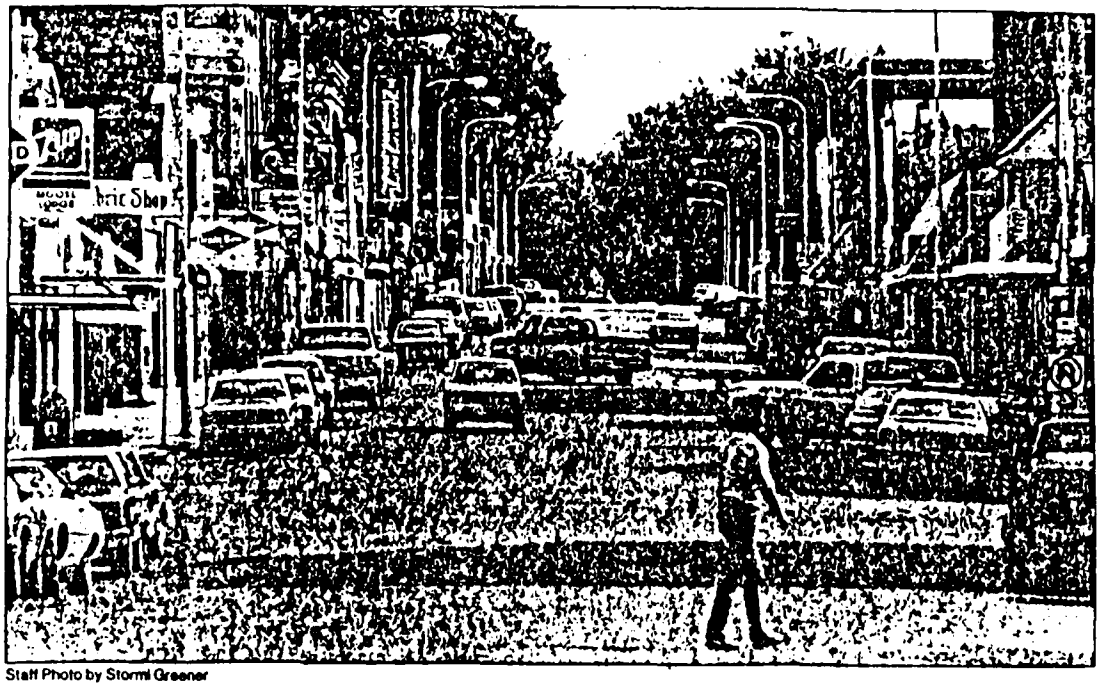
In addition to the border cities (which include Duluth, Moorhead, Breckenridge, East Grand Forks, Dilworth), five other areas were tentatively designated for the aid. They are in Minneapolis, St. Paul, Mountain Iron, Virginia, Mankato and Thief River Falls.

The cities will be able to use the money for a variety of tax breaks: corporate credits for new jobs, a sales-tax exemption on construction materials, and property tax breaks for new or existing businesses.

Ortonville officials have some ideas about which businesses might be helped.

■ The city would like to revive the Ortonville Otter Tail Power Plant, which once generated $165,000 in tax revenue and employed 25. It could supply steam power for other

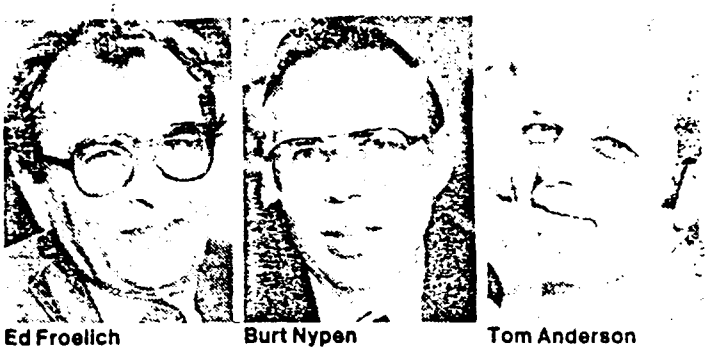
Ortonville continued on page 6B


Staff Photo by Stormi Greener

The main street of Ortonville, Minn.

N-B-36

1 of 2 pages



Ed Froelich Burt Nypen Tom Anderson

Ortonville Continued from page 3B

businesses," said Ed Froelich, Ortonville civic and commerce director. "Now it's collecting mothballs."

■ Morris Rod Weeder, which manufactures farm equipment, employed 100 people two years ago. Now, it employs 11, said Froelich. "They have a plant in Minot, N.D., but we want to keep them here."

■ The local Min-Dak Beverage, Inc., plant employs 62 and may add 40 employees, said Berkner. The company could expand at its plant in Watertown, S.D., but a tax break could be an incentive for expansion in Ortonville, he said.

■ Rausch Granite officials have talked about moving to South Dakota because expansion in Ortonville would be too costly, said Berkner. Other businesses, such as the Big Stone Power Plant and two trucking companies, have already moved, board members said.

As distressing as the business losses are the numbers of young people who have moved away from Ortonville, board members said. When Burt Nypen became superintendent nine years ago, Ortonville had 1,300 students. Now, there are 800, he said. By comparison, the city's population decreased by 120 over the same period.

Many ex-students have told Nypen they would like to stay in Ortonville, but they move to the Twin Cities to seek work. As a result, Ortonville's population seems to be aging, which does not help the town's chances of attracting new business.

The tax breaks could change all that, board members say.

"The major impact of this program is going to be the encouragement of new industry, which will increase our tax base," said Tom Anderson, president of Ortonville's Tri-County Bank. "In that respect, we can help every industry in the community.

"We're talking two to three years before we can start building and maybe five to seven years before th full impact will hit. But the encouragement $181,000 could give our present industry will be felt immediately."

Of those cities selected, Ortonville rated second in factors of economic distress, Dayton said in a telephone interview. Yet, although few involved dispute Ortonville's economic needs, its candidacy for the tax breaks may be challenged, he said..

A 1983 law provides $32 million in tax incentives for businesses in so-called "enterprise zones," which include border towns at an economi disadvantage compared with neighboring cities in the next state. That law was intended for cities bordering North Dakota, said Dayton.

Duluth, if Dayton makes its selection final, will absorb $6.6 million of the $10 million in tax breaks deemed for border cities. The four northwestern border cities — Moorhead ($2.1 million in tax breaks), East Grand Forks ($608,092), Breckenridge ($278,439) and Dilworth ($184,129) — have already expressed displeasure at the inclusion of Duluth and could do the same to Ortonville, said Dayton.

Ortonville qualified because it was a border city contiguous with a city from another state, Dayton said. (Duluth Mayor John Fedo said his city also met all the regulations, because it has lost business to Wisconsin and has had extreme unemployment problems.)

But part of Ortonville's success, said Dayton, lay in its application for aid.

"We were very impressed with the thoroughness of the application," said Dayton. "You had to be impressed with the effort made by a city that size."

EAST GRAND FORKS EXPONENT - October 6, 1983

Corps of Engineers to report on study

East Grand Forks property owners and other residents are encouraged to attend a public information workshop to be conducted by the U.S. Army Corps of Engineers at 7:30 p.m. Thursday, Oct. 11, at the AVTI.

The workshop will include a general informational meeting regarding the status of the studies which have been under way since 1980 by the St. Paul District in an attempt to identfy the best method of flood damage reduction for the city.

Following the report, those attending will be asked to divide into neighborhood groups to view plans and express their individual reaction to proposals for permanent levees and floodwalls in the city.

The "scoping" workshops are required by the federal Council on Environmental Quality. "Scoping" is defined as the process of identifying and focusing on issues and the range of those issues.

Citizens attending will come together at the close of the evening for a general session where the concerns and questions of the workshops will be summarized.

Grand Forks Herald

Section B — Friday, October 7, 1983

Murray files for 7th term as EGF mayor

By Liz Fedor
Herald Staff Writer

East Grand Forks Mayor Louis Murray filed Thursday for re-election to a seventh term.

Murray, 70, said he decided to run for another two-year term because he is in good health and loves the job.

"I'm retired and I can devote full-time to it. I feel well-qualified and I certainly have the experience," he said.


Murray

An East Grand Forks native, Murray started his career in public service as a municipal judge, later serving 12 years in the Minnesota Senate and two terms in the state House.

Murray is known for his sense of humor and one-liners. Asked whether he would do much campaigning, he said, "I campaign 365 days a year." Asked whether his high name identification in the community would be an asset for him, he replied, "In some quarters."

And, "I haven't been in jail recently."

If he wins another term, Murray said he would work to open up DeMers Avenue in front of the Holiday Mall, institute a long-term flood control plan, and continue efforts to spur economic development in the city.

Murray, 445 River Drive S.E., said, "I don't want to perpetuate myself in office, but I do feel I have some of the highest qualifications."

Murray retired in 1976 after a lengthy career with the Burlington Northern railroad. Now he operates Inner City Protection Agency, a private guard service.

He is married, has six children and 11 grandchildren, and is commander of the Veterans of Foreign Wars Post 3817.

Grand Forks Herald, Saturday, October 8, 1983

EGF to study flood plan Tuesday

By Liz Fedor
Herald Staff Writer

A flood-fighting plan being considered by East Grand Forks officials could force dozens of people out of their homes, force Whitey's Cafe to make way for a levee and force city residents to spend millions of dollars.

Whether the community should proceed with these measures and others to fight future floods is a question city residents will be asked during a public meeting Tuesday night.

Representatives from the U.S. Army Corps of Engineers will outline four flood-fighting plans now being studied during a 7:30 p.m. meeting in the East Grand Forks Area Vocational Technical Institute. Each plan includes construction of levees, which are permanent earthen structures with a concrete flood wall.

These plans would call for relocating businesses and homes. All of the options would cost several million dollars.

Martin McCleery, Corps project manager, will explain the flood plans, then citizens will break into small groups by wards to give their opinions to council members.

Mayor Louis Murray said the city will decide by 1986 whether to go ahead with one of the comprehensive flood-fighting plans. Construction of levees would be costly, Murray said, because it likely would require some businesses and homeowners to relocate.

Corps staff members have interviewed 34 business owners who have buildings in the proposed levee construction areas. Owners of 65 percent of those businesses (22 companies) indicated they would continue doing business in East Grand Forks. Survey results showed that five businesses would close, five would move to North Dakota, and two others would have an uncertain fate.

Some of the DeMers Avenue businesses that could be affected by levee construction include Whitey's Cafe, Mike's Pizza and the vacant Rudh Brothers furniture store.

Corps officials say they are attempting to help East Grand Forks residents find a plan that will significantly reduce flood damage caused by the Red and Red Lake Rivers, and give the city the opportunity to grow in population and business development.

Channel modification, diversions, upstream dams and tributary reservoirs have been studied and rejected as good solutions to the city's flood control problems, according to Edward Rapp, a Corps district engineer.

"Ongoing engineering, economic and environmental planning studies indicate that levees are the only structural measures capable of significantly reducing flood damages," Rapp said.

Civil Defense Director Dan Formato said the city has made no final decisions on implementing a flood control plan.

Grand Forks Herald Wednesday October 12 1983

EGF flood plan draws opposition

By Liz Fedor
Herald Staff Writer

A flood-fighting plan that proposes construction of permanent levees in East Grand Forks neighborhoods and business districts was opposed by a majority of city residents who attended a public meeting Tuesday night.

Many of the 75 residents attending the meeting own homes or businesses near the Red and Red Lake rivers where levees could be built.

Several of these residents, particularly in Ward 4, told city officials and the U.S. Army Corps of Engineers representative that the city should maintain its current practice of putting an emergency plan into action when floods occur.

The Ward 4 residents who expressed skepticism over the corps plans included City Attorney Robert Matt. He told a small group of his neighbors: "I'm cynical. I can't help it. Me, I lose my home and I lose my office both."

Matt's home at 919 First St. N.W. and law office at 315 Second St. N.W. are both located near the proposed levee construction.

So is Maureen Sweet's home. If a levee is built, her house at 711 First St. N.W. would be between the river and levee. She figures she would have to move, and she does not want to leave the home she has lived in 10 years. During the 1979 flood, she said she participated in sandbagging operations. She thinks the community can withstand other floods with the effort demonstrated during the last major flood. "Everybody pulled together. It was a good feeling," Sweet said.

Please see FLOOD PLAN, 5A

Flood plan

Continued from Page 1A

Many of the people at the meeting Tuesday night in the East Grand Forks Area Vocational Technical Institute agreed with Sweet. They do not want to leave their homes or relocate their businesses for levee construction. They want to know what levees would do for the city, who would pay for them, and how they would affect the property tax base in the long run.

Martin McCleery, corps project manager, said the purpose of the meeting was to explain the plans to residents, get their reactions and listen to their questions.

A final decision on whether to build levees in East Grand Forks will not be made until 1986, he said, and the corps cannot force the city to build levees if residents do not want them. But if the city wants to proceed with making engineering plans to construct levees, McCleery said a decision should be reached by October 1984.

A local flood committee, headed by Mayor Louis Murray, has been working with corps personnel to develop some permanent flood-fighting plans.

The early reaction to those plans Tuesday night was not positive. In Ward 1, council member Lynn Stauss reported that his constituents questioned the need for the levees, how relocation efforts would affect the community, and how the project could be financed. Already, he said, people with property near the proposed levees have a difficult time trying to sell property. Summing up several comments, he said, "Is East Grand Forks going to survive?" That question got applause from the audience.

The corps estimates that the federal government's contribution for a levee system would be between $10.7 million and $21.6 million, while the local and state portion of the cost could run as high as $11.6 million.

The city's last major flood in 1979 reached an elevation of 48.61 feet. A levee 52.5 feet high would protect residents from a 100-year flood, but the corps is studying levees up to 57.4 feet.

The levees, permanent earthen structures with a concrete floodwall, would be placed much farther from the riverbank than emergency dikes. That means many people would have homes or businesses between the river and the levees. Those people could leave their homes and companies by accepting compensation or have their buildings relocated to another part of the city.

Greg Stennes, co-owner of Whitey's Cafe, would be in this situation. Under some versions of the levee proposals, Whitey's would be left unprotected from a flood, because it would be located between the Red River and the new levees.

Stennes said he does not want to try to move Whitey's. "I'm opposed to being placed on the outside of any dike." This summer, Stennes filed an application to get Whitey's listed on the National Register of Historic Places. If he gets such a designation, Stennes hopes it would force the city or corps to ensure that his bar-restaurant would get some type of flood protection.

After the meeting, McCleery said the unfavorable reaction to the plans did not surprise him. He said the meeting was held to raise questions, and now corps staff will try to come up with some answers about how a levee system might be implemented.

In remarks to the residents, he said, "You were lucky in 1978. You were lucky in 1979." But, he added, no one can determine how long the city's luck and emergency flood-fighting efforts can hold out without being supplemented by permanent levees.

EAST GRAND FORKS EXPONENT - October 18, 1983

Levee plans not popular at meet

The "best possible" flood control program for East Grand Forks — the result of three years of planning by the St. Paul District of the Corps of Engineers — didn't get a very good rating from the citizens who participated in the informational meeting on that subject Tuesday night at the AVTI.

The four proposals, which the corps says are feasible from an engineering standpoint and have a satisfactory cost-vs.-benefits ratio, would combine permanent levees in conjunction with other measures. And, they would leave a number of businesses and homes — anywhere from 64 to 410 — on the non-protected side of those structures.

Although less than 100 residents turned out, the reaction they gave to the four different plans was colder than dike patrol duty at 2 a.m. on a late March morning.

Several city officials, including Council President Jim Gander, Alderman-at-Large Steve Gorman, Third Ward Alderman Duane Fettig and Clerk-Treasurer Dave Mack, predicted that a council vote this week on any of the four proposals would be unanimous against them.

The first of the four plans outlined by Martin McCleery, corps study manager, calls for construction of permanent levees that would be setback from the river 300 feet and more. Existing dikes would be removed and the earth from them used where possible in the new levees. Buildings and homes outside the levees would be provided transportation and utilities access during non-flood periods.

The second plan matches the first except that buildings outside the levees would be flood-proofed if that cost did not exceed the cost of possible flood damages.

In the third plan, also basically the same, buildings outside the levees would be acquired and relocated if acquistion costs did not exceed the cost of possible flood damages.

And, in the fourth proposal, also basically the same, buildings outside the levees would be acquired and relocated on the same cost-damages criteria.

The estimated federal cost (levee construction) ranges from $10.7 to $21.6 million.

Generally, the federal government would pay for the cost of levee construction, with the city to pay for property acquisition and relocation.

Estimated costs to the City of East Grand Forks range from $9.8 to $11.6 million through the four plans.

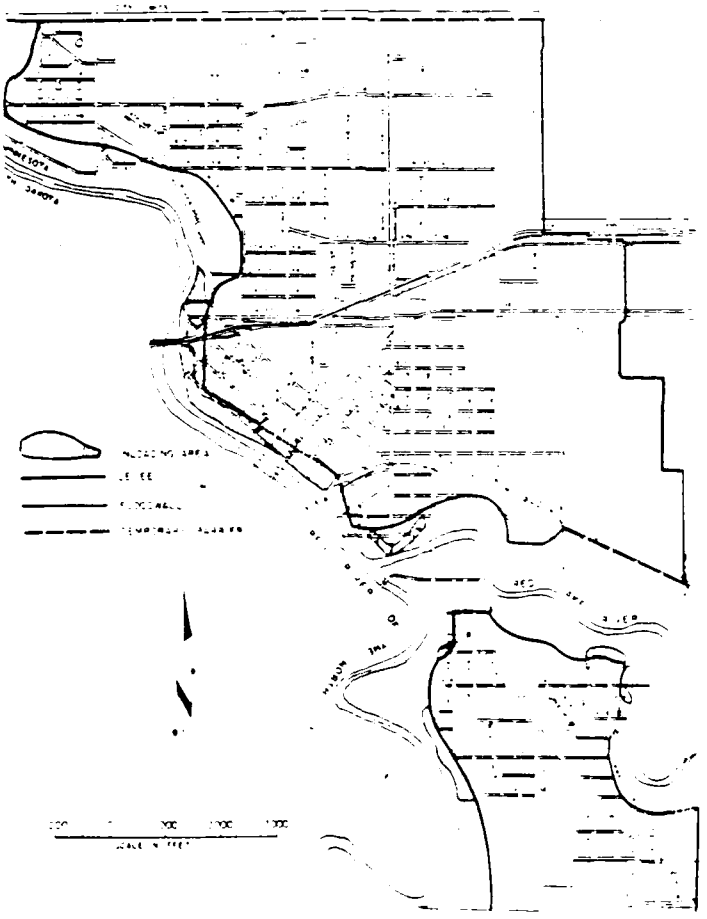
In its announcement of the workshop, the corps said, "The basic need is a plan which will significantly reduce flood damages and afford the City of East Grand Forks the opportunities for continued growth and development.

Planning studies have analyzed a wide range of structural and nonstructural measures for their merit in reducing flood damages. Structural measures analyzed and dropped from further study include upstream dams and tributary reservoirs, diversions and channel modification."

The corps maintains that structural measures are the only means capable of reducing damages.

Three levee alignments and routings were a part of the plans. A fourth alignment, which would protect many more buildings and homes, was abandoned because its closer proximity to the rivers put the

Please see LEVEES, Page 2



Levees

Continued from Page 1

levees on ground deemed unable to support them.

The routing the corps prefers is the one most removed from the rivers and the one that would take the most homes and businesses. Alignments closer to the rivers might prove feasible but need further study, McCleery says.

In reporting on the individual ward meetings held after the initial explanation of the proposals, residents made their feeling known. The issues and concerns raised included:

- Amazement that the corps would spend the time and money for a study of protective measures for East Grand Forks, a city of 8,500, and drop further attempts to do the same for the over 40,000 residents of Grand Forks, saying projects there were not economically feasible.
- That the city council would not vote on whether or not it wants to ask Congress for aids to construct a levee system until late 1986 and that construction wouldn't be completed until after 1990 — a time period that just keeps reminding people that the city has a flood potential and tends to decrease property values.
- That consideration of a levee program for homes that might be placed on the riverside of structures would lead to questions about whether or not property owners should even provide routine maintenance.
- Gary Sanders, city consulting engineer, noted that the corps has one study underway that would not provide any protection for the Point area.
- Lynn Jabs, a contractor, was critical of the corps, Minnesota Department of Natural Resources and bodies such as the Lower Red River Management Board for not working together for long-range programs designed to hold the water at its source throughout the Red and Red Lake river watersheds.

"We've drained marginal farm land again and again. We need more coordination and better communication between federal and state agencies," he said.

- Alderman Lynn Stauss, who presided at the First Ward meeting, noted a concern that there would be a considerable loss of income to the city if residents did not maintain their properties, or if values where reduced because they would be left unprotected in a levee project.
- Should not Grand Forks be studied and considered for possible impacts from an East Grand Forks levee system before a decision is asked.
- Fettig noted that constituents of his ward should be concerned, even if their properties are not immediately affected, because of the assessments for the local share of the project that they might have to assume.

Copies of the working papers and maps are [illegible] available for inspection at the clerk-treasurer's office in city hall.

EGF residents look to the future

By Liz Fedor
Herald Staff Writer

East Grand Forks residents looked 20 years into the city's future Monday night. They decided what they want most are conditions to attract businesses and jobs.

About 50 people gathered in the Area Vocational Technical Institute to create an image of what East Grand Forks should become. Some of those brainstorms - a rocket port for outer space travelers, gambling and casinos - did not make it on the final priority list. But city leaders got a clear signal that its residents want more retail and industrial businesses, less reliance on their sister city Grand Forks, a population of about 15,000 people and effective flood control measures.

Monday's meeting was sponsored by city officials and the U.S. Army Corps of Engineers, who have designed some flood-fighting plans for the city.

Bill Wiedman, a consultant from Tulsa, Okla., hired by the corps, conducted the meeting. But Wiedman said, "We are not here to talk about flood control tonight."

Most people did not spend much time talking about floods. They split into small groups of five to seven people and told each other how they want their city to change.

Georgeina Hagen, 710 Central Ave. N.E., said the city needs many more retail stores. Council member Jim Mongoven, 709 N.W. Fourth St., said he wants to see development of the industrial park. A few people toyed with the idea of putting a dome on their city, but that future-oriented idea did not make the list of five finalists.

Some people want specific buildings or facilities for the city - an airport, senior citizens center, community hospital, historical center, a racetrack and center for performing arts.

Others are looking for an improved sense of community pride, greater opportunities for their children and lower taxes.

All of these ideas will be given to city leaders, who will meet Nov. 14 and 21 to set some priorities for the city's direction.

Generally, business development was important to most of the participants. Several people want more retail stores so they can buy clothing and shoes in their own town, instead of going to Grand Forks to shop. Others favor more agriculture-related industries and processing plants for Red River Valley products.

Economics is at top of city's priority list

Most of those attending a public workshop on the question of how they would like East Grand Forks to be in 20 years apparently agree with the emphasis that city government, chamber of commerce and state legislatures have placed on the need for an improved economic base.

Thirty-five suggested goals for the city were gleaned from workshop participants, who met in seven small groups to discuss suggestions and to compile a listing of their top choices.

Each of the more than 50 participants were then allowed to cast weighted ballots on the final listing of 35, giving their first choice five points, their second four points, etc.

One-half, or five of the top 10 suggestions in the final balloting on the 35 suggestions called for improving the city's commercial and/or industrial base.

They included:

- Develop a favorable climate to attract business and industry (52 points).
- "Become an independent city, with sufficient retail and industrial businesses, public facilities and services to create more jobs (25 points).
- Encourage small business to locate in the city—both present and new (21 points).
- Establish an expanded industrial area (16 points).
- Establish an industrial center for ag-related industries (15 points).

The second and fourth suggestions each called specifically for growth in the city's population. Twenty-seven points and second-place were captured by a statement that the city should "have a population of 15,000, with more industry and business."

"Work to encourage population growth" received 23 points and fourth-place in the final balloting.

Two other top-10 suggestions called for having the flood-threat potentials largely eliminated. One states, "Have no flood problems." The other says, "Update permanent flood controls."

The 10th-ranking suggestion, which garnered 13 points, urges, "Move the entire town out of the flood plain."

The workshop was conducted by Bill Wiedman who owns a firm that specializes in encouraging and gaining individual participation and input at public gatherings.

The suggestions will be reviewed by city government and other community leaders at follow-up meeting scheduled for Nov. 14 and 21.

City candidates give views on top issues

EDITOR'S NOTE: candidates in the Nov. 8 City lection, who face opposition, ave been asked to relate their iews on the issues facing East rand Forks city government ow and in the future and to ive their proposed solutions

Incumbent candidates who re running without opposition i this election are Alderman-l Large Jim Gander, First ard Alderman Lynn Stauss od Fifth Ward Alderman eorge Wagaman They were d included in the nestionaire

urray — Bimler

Mayor (1 year term)

Challenger is Clint Bimler, of 714 11th St NW He is an mployee of White Glove aintenance of Grand Forks d works in the White Mart in e Holiday Mall A 1960 graduate of Senior High, he is the son of Matthew and Marie Bilmer

"I would work to establish beet truck routes for these trucks to use entering and leaving East Grand Forks, especially those coming here from North Dakota I would not allow beet trucks on DeMers Avenue at all These heavy trucks damage the streets and cause a hazard for local drivers and pedestrians in town

I support the opening of DeMers through the Holiday Mall parking lot and have some different ideas on how to make this route better for both drivers and mall customers

I am for the installation of permanent dikes I would seek aid from the state as well as help from (federal government) to make this a reality The expense in terms of human life and property damage is too great a threat if we delay replacing our present temporary dikes and have to depend on them in another spring like 1979 We may not be so lucky a second time in avoiding a loss of life or in obtaining all the volunteer help we did The age of our temporary dikes may make them (more susceptible) to breaks and much more of a risk The federal flood insurance program is reducing coverage most of the basement damages will no longer be covered and is raising the amount of deductibles

"I have lived here all my life I want only the best for this town I realize the present mayor has done a fine job However, we need a new face with new ideas"

Incumbent is Louis Murray, 70, of 445 River Drive SE, who is seeking election to his seventh consecutive two-year term and ninth term overall as mayor A native of East Grand Forks, he has been a municipal judge and an alderman at large He served 12 years in the Minnesota Senate and two two-year terms in the Minnesota House Married and father of six grown children, he is a retired railroad conductor and a former manager of an off sale liquor store He presently owns a private security agency and is commander of VFW Post 3817

"We must continue to cooperate with our chamber of commerce to obtain and distribute funding to assist floundering and new businesses to thrive in our city Thanks to State Sen Roger Moe, we have rescued most of the Border Cities money to help with these programs

"Now, we must continue our active interest in other state legislation to help draw new businesses here i.e. lowering our excessive taxes on residential property and restructuring our state's workers' compensation system To carry out these aims, we plan to represent East Grand Forks at the legislative sessions as often as we can

"Within a few years, East Grand Forks may well be the best lighted city in a large area Our Water, Light and Power Commission has already started on a program of installing good lighting on every major entrance to our town and around public areas where large crowds congregate, such as schools, churches, the AVTI, arenas, parks, the downtown and North 220 A well-lighted city is not only an attractive one but a safer one, also

"We have been improving the looks of our city through a purposeful beautification program, that includes street improvements, park expansion and improvements, expanded public gardens and the movement of or demolishing of rundown housing

"Our elected and appointed city officials are efficient concerned and honest I compliment the city council and our department heads for their sensible conduct of city operations We have excellent people manning our police, fire and parks and recreation departments

"I feel it is incumbent upon myself and all city officials to strive to provide those facilities needed to keep our children genuinely interested in and occupied in pursuing wholesome activities"

LaFave — Helms — Grantham

Alderman Ward 2 (2 year term)

Allen LaFave, 58, of 2 1st St NW, is seeking election to the position he held in 1979-1981 He ran second in a field of four candidates in his first bid for re election in the fall of 1981

Born and raised in the Second Ward, he was the first to file when filings opened this fall A retired furniture mover, he says he can devote full time to the job of being an alderman He currently is first vice commander of American Legion Post 157, is a life member of the VFW and DAV and never missed a council meeting during his four years as an alderman

"If we don't act now, we will soon be referring to East Grand Forks as 'Ghost Town USA' I would like to see more emphasis placed on attracting industries and businesses here that would process more of the agricultural products that surround us in this Red River Valley I would also work to try and help Old Dutch process a greater variety of potato products

"Another thing I would like to explore is the possibility of using the federal government Economic Development Administration (EDA) grant for $501,000 to buy the Holiday Mall shopping center complex

See CANDIDATES, Page 2

OVER 40 YEARS OF COMMUNITY SERVICE
(Political Advertisement Prepared & Paid for by Louis A. Murray, East Grand Forks)
Re-Elect: MAYOR LOUIS A. MURRAY

THE RECORD SPEAKS FOR ITSELF
Be Sure to Vote on Nov. 8

Candidates

(Continued from Page 1)

Then the city would collect the rents from businesses that would locate there as well as open up the Myers Avenue through that parking lot which the city has been trying to do for some time.

A further development of Two Rivers Park as well-developed site offering full facilities for travelers and vacationing families who travel with campers is another goal I would pursue as a means of bringing more downtown customers into the community. The city already has the property for this and it wouldn't take much to develop it.

Rodney B. Graham, 37, of 618 Central is a self-employed printer who operates his business at his home. He has been a resident of East Grand Forks for 15 years and is making his first run for elective office.

Residents along the Red River near downtown East Grand Forks are understandably worried about the proposed location of permanent dikes and a hold is a hot board item of the Red. I share their concern. I feel forcing people to move out of their businesses or homes, possibly out of this area, just for more flood protection is wrong. Because of urban renewal here in the '60's, many downtown businesses closed and others moved out of town. It seems likely that dislocating many businesses to make way for this dike project will have the same outcome.

There is a warm spot in my heart for this fine community. There is a genuine community pride here. For years, I have noticed how lawns are kept neatly trimmed, houses are kept in good repair. When I have called the police, they have responded very quickly. When my furnace caused the fire department's rescue unit, they arrived almost before the phone was hung up. Our streets are swept clean in summer and the snow is promptly removed in winter. My garbage is even picked up regularly. These things happen because of the people who live here. I don't want to see any more of them be made to leave.

A possible alternative I would explore would be reservoirs along the length of the river. This is an effort that would have to be a joint venture between Minnesota and North Dakota. If the excess runoff and melt were contained and then released gradually, there could be a potential irrigation benefit for farmers.

Dale Stumpf, Helma, 31, of 817 2nd Ave. N.E. has his business, Stumpf's Automotive Repair, located in the ward and has lived in the Second Ward for 11 years. He ran third in a field of four candidates for alderman in this ward in the fall of 1981.

He did not respond to the request for comments.

Fetting — Hansen

Alderman Ward 1 race on

Challenger is Mike Hansen

Hansen, 28, of 358 Kennedy Drive, who served two years of an unexpired term as a permanent alderman, would be Dale J. Fetting's opponent for the post of Third Ward alderman. A native of East Grand Forks and graduate of Central High School here, he is an officer at First Lutheran Church and a faculty member at the local AVTI. A former member of the East Grand Forks School Board, he has helped develop youth athletic and activities programs. Hansen presented the following 9-points positions:

1. Business Attraction—Develop attractions now for more retail businesses and additional attractions soon to bring here industries and businesses here by offering tax breaks. Develop programs to encourage local residents support for local businesses.

2. Combined senior citizens center (the arts center and civic auditorium)—Senior citizens are in need of a facility for meetings, social events and recreational activities. Presently our seniors must go to Grand Forks for many of these. It is possible the city working with the local school board as a joint venture could develop one large facility that could accommodate senior citizens programs and provide a fine arts facility and auditorium.

3. Industrial Park—An industrial park is needed to bring in industry and create jobs in our community. But it should be done with as much state and federal assistance as possible.

4. Youth Center—A youth center or youth canteen is needed for handicapped and non-handicapped youths who are not involved in sports oriented programs. This could be done by utilizing some of our present facilities.

5. DeMers Avenue—The opening of DeMers Avenue will help create more traffic in the downtown area and thus increase business economics and attract new business in that area. But this should be executed with no expense to local taxpayers or businesses. State assistance in the funding of this project is possible.

6. Flood Control—A flood control plan that is permanent and that does not require the relocation of 330 homes and businesses is needed. A diversion plan is the most feasible and permanent plan possible.

7. Neighborhood Crime Watch—A program is needed to reduce increasing crime in our area due to present economic conditions. Programs of this type are working successfully in other areas with the cooperation of local citizens and police departments.

8. Planning and Zoning—The present commission is doing an excellent job, but longer-range and more consistent planning for the future is very important so as not to create future problems similar to those presently being experienced in the north end of our city.

9. Adult Education—With the demand for tech and computer training for the rapid changes in industry, we should support our school district and AVTI in the development of an extensive well-planned, adult-education program.

10. Sports and Recreation Programs—East Grand Forks is second to none in facilities and sports programs and we must continue to support and promote our present system with as much volunteer work and financial assistance as we have in the past.

Incumbent Duane Fetting, 43, 1324 8th Ave. N.W., is seeking election to his second four-year term. A private agriculture consultant and a former teacher in District 595, he first ran for the Third Ward alderman's office in the fall of 1979. During his first term as alderman, Fetting served as member of the city council's personnel, parks and recreation, streets and sanitation, maintenance, civil defense and health committees and has been the council liaison on the city library board.

The present economic situation in East Grand Forks is serious but it was not precipitated by the lack of planning and hard work by East Grand Forks citizens. Border Cities legislation is a valiant effort by dedicated border cities officials and legislators to create a workable system for improving the business future in border cities. This legislation is an example of concern, hard work, team work and lobbying that has produced results.

Ultimately, to obtain and maintain a competitive edge over North Dakota, we must decrease state income taxes on businesses and change our states workers compensation program. This needs to become a major task of East Grand Forks voters—to let your state legislators know repeatedly that you want these changes and less state spending. When all is said and done, this is the only way to overcome our economic plight.

Greater cooperation between Grand Forks and East Grand Forks, I believe, is inevitable and imperative in the future. I foresee cities such as these being declared exempt taxes by both state governments so they can share common tax bases, schools, industrial parks, flood protection and other community services. Community pride does not have to be sacrificed through such cooperation. Instead it should enhance the pride and successes of both communities.

Regards permanent dikes and the opening of DeMers Avenue, I am confident we will have both. I anticipate a compromise will be reached with the Army Corps of Engineers on the location of permanent dike walls and such a dike system will be erected to protect the city.

I ran for office four years ago because I was upset about the increasing traffic and apartment expansion in the north side. Since then no new apartment complexes have been built, though some developers tried. The residents of the Third Ward are not against growth per se. But they are fed-up with hasty, haphazard development of apartments that are maintained at a sub-standard level, overcrowded streets, traffic from more people and are tired of run-down apartments and all the related problems these.

Additionally, I vandalism fear of your children's safety, stealing, trash and fire hazards and garbage-littered grounds are just some of the conditions neighbouring homeowners face.

The people in the Third Ward, fourth and fifth wards are not just looking to maintain the status quo in the deterioration of their neighborhoods. They are seeing now a definite reversal of a bad trend and they have found the first requisition department of purchases that are manufactured in a sub-standard way. Every week I hear from more people and are tired of run-down apartments and all the related problems these.

Additionally, I vandalism fear of your children's safety, stealing, trash and fire hazards and garbage-littered grounds are just some of the conditions neighbouring homeowners face.

The people in the Third, fourth and fifth wards are not just looking to maintain the status quo in the deterioration of their neighborhoods. They are seeing now a definite reversal of a bad trend and they have found the first requirement necessary to achieve improvements—the renewal and turning interest of many of their fellow homeowners in seeing something positive done. They are families who have invested most of their savings in their homes and don't want to see that lifelong investment threatened any more.

A comprehensive zoning and planning program is needed to insure property separation in the future, and the citizens of affected neighborhoods must be guaranteed ample advance time and information about prospective rezoning and planning changes to enable them to react effectively.

Small concrete dike idea proposed as Corps plan alternate

A proposal calling for the erection of concrete dikes about three feet high in many areas of the city has been put forth as a possible alternative to the Army Corps of Engineers current proposal for bigger, heavier dikes built one or more blocks away from the rivers.

City Council President Jim Gander outlined the proposal at the Oct. 27 council meeting as a more economical program than the Corps' over $3 million proposal.

Gander, whose backyard runs down to the banks of the Red River, noted that the proposal would enable many more homes and business buildings to remain and that they would have some protection, rather than to be left on the outside of the dike system proposed by the Corps.

His suggestion is that, on those lots bordering the Red or Red Lake rivers, where there is no diking now or where engineers have determined that the existing dikes are not dependable, that individual property owners install or have installed, on proper footings, a 3-foot concrete wall. An approved walk-through gateway could be allowed if the owner wants to

See DIKE PLAN, Page 2

Dike plan

Continued from Page 1

continue using the area outside the wall.

Gander believes, for many homeowners, the cost would be only $300 to $400.

The gateways would have to be equipped with doors that city officials could order closed during times of flood emergencies.

Gander said the Corps office in St. Paul wants city residents to come up with alternative suggestions and he gained council consensus for Gary Sanders, the city's consulting engineer, to prepare some supporting data and submit this proposal.

"This suggestion may not be workable at all but I want to put forth in the hope that it will spur thinking and discussion and many more suggestions by our citizens," Gander said.

At 2nd public meet

Workshop prunes city goals to four

The second in a series of public-participation workshops attempting to establish major goals for East Grand Forks' development in the ensuing 20 years consolidated and pruned a list of 30 suggestions into four Monday in city hall.

The list of 30 suggested goals was prepared by the consulting firm, which is conducting the workshops, from a municipal goal list of 35 suggestions compiled at the first meeting Oct. 17 by over 50 residents.

At Monday's meeting, attended by some 25 city government, community and business leaders, a list of four major goals was agreed upon:

•Attract and establish more industrial and manufacturing firms.

•Improve and expand the city's retail business operations.

•Improve flood protection devices and programs for the city.

•Improve the patterns of traffic flow to aid city retail businesses and to protect residential areas from heavy traffic.

Workshop participants then divided into small groups to attempt to designate more specifically what goals should be sought under each heading, considering such questions as what kind, how many, where and when.

The group considering the establishment of more industrial and manufacturing firms:

•Specified, under manufacturing firms, those that would produce planting, harvesting and other heavy and medium-size equipment for farm operations, as well as high-tech types of plants producing robotic instrument equipment for agricultural processing plants for certain farm operations and for the medical field.

•Specified the processing of Red River Valley agricultural products, flour mills, malting barley plants, potato and sunflower processing plants, plants that would use the waste materials from other plants to create its own product, and certified seed processing operations.

This group specified a goal of establishing two such manufacturing and industrial type plants in East Grand Forks every two years to total eight at the end of 16 years.

"We favor an orderly, sustained, on-going process of development rather than a rush of new plants and manufacturing concerns that would overwhelm the city's ability to provide proper utilities, housing, schools and other necessary community services," said Ron England, spokesman for the group.

Obstacles that will have to be overcome before industries and manufacturing plants would locate here, the group anticipates, include: Minnesota's high workman's compensation rates, high corporate income taxes, high corporate property taxes, high state personal income taxes, inadequate transportation services, climate and the ability of city utility services to keep up with the demands of such growth.

The group considering improvements and expansion of the city's retail business:

•Specified as short-term goals (to be met in three to five years): (1) the re-establishment of 2nd North as an essentially retail business center by relocating the light industrial businesses that are there now and (2) the improvement of the city's original downtown area by working more closely with downtown Grand Forks efforts to improve its attractiveness as a shopping district.

•Specified as long-term goals: (1) move or tear down the blighted buildings in the downtown area to make room for more retail businesses and (2) force the development of Burlington-Northern properties that occupy several blocks in the downtown area.

Major obstacles the group sees to the improvement of the city's downtown business area are the threat of flooding and existing traffic flow problems.

Other obstacles group members see as frustrating the growth of retail businesses in this city are: Inconsistant interpretations of the city's existing landuse plan; existing lease arrangements some businesses and industries have with Burlington-Northern; lack of available, competitively-priced land for new or expanding businesses to purchase; and a lack of downtown traffic.

The final workshop session, scheduled for 7 p.m. Monday, Nov. 21, in the City Hall basement, will deal with obstacles and ways to overcome them. This meeting will be open to the public.

The Exponent/Thursday, November 23, 1983

Obstacles to goals discussed at meet

The third in a series of public participation workshops designed to establish major goals for East Grand Forks' development in the next 20 years concentrated Monday on ways to overcome obstacles to the four main goals agreed upon earlier.

About 30 city government, community and business leaders, meeting in small-group sessions, each dealing with one of the four goals, attempted to develop strategies and prioritize them into those which could be started immediately, those to be done in two to five years, and those to be accomplished over a six to 20-year period.

The four main goals, agreed to at the second meeting in the series on Nov. 14, are:

- Improve flood protection devices and programs.
- Improve and expand the city's retail business community.
- Attract and establish additional industrial and manufacturing firms.
- Improve traffic flow to aid retail growth and protect residential areas from heavy traffic.

At the conclusion of Monday's third session, Bill Wiedman, who was employed jointly by the city council and Army Corps of Engineers to conduct the three workshops, has a number of volunteers when he asked for persons to be responsible for follow-up actions.

Suzanne Gaines, a corps employee, said summaries of the workshop actions will be mailed to city aldermen, other office heads, state legislators serving East Grand Forks, city planning and zoning commissioners, the chamber of commerce, and the Highway 220 North Merchants Association.

Ron England agreed to lead a discussion with aldermen at a city council meeting after the conclusion of the workshops have been studied; Steve Gorman, chamber of commerce president, will lead a discussion by the organization; Richard Wiley will lead discussion with the 220 merchants, and Ellis Larson, executive secretary of the planning commission, will discuss the conclusions with the body.

Don Schneider, executive director of the Housing and Redevelopment Authority and coordinator of Community Development projects in the city, volunteered to brief members of the State Department of Energy and Economic Development on the findings.

Flood grant request eyed

A proposal that the City of East Grand Forks apply for a Community Development Small Cities Development Grant (SCDG) to move or remove homes and businesses in the flood plain and flood fringe areas of the city got a lot of discussion at Tuesday night's council meeting.

Eight of the 11 members of the city's Community Development Advisory Committee, meeting in July, had voted unanimously in favor of applying for a grant to initiate an annual program of clearing substantially margin housing and firms and of moving other homes and businesses from flood-prone areas.

At that meeting, Alderman-at-Large Steve Gorman said the biggest single problem facing the city is the need to lower local real estate taxes by expanding the business base to create more jobs and bring new families to the city. "The flood problems we face, especially with existing state law, are a major deterrent to business expansion," he said then.

Because of the "temporary dikes" in the city, he said, one-third of the population and one-fifth of all structures are subject to the Minnesota Department of Natural Resources (DNR) regulations that prohibit the rebuilding of homes and commercial properties in the flood plain and severely limiting the extent to which renovations and additions to those structures can be made.

Gorman also said the threat of flooding has increased. "We have had 15 floods since 1960," he noted, while pointing out that flood damage costs have skyrocketed.

The Federal Emergency Management Agency (FEMA), which administers the national flood insurance program, spent $4.9 million on claims in the city after the 1979 flood. Damages to the city in terms of lost business, volunteer labor, and costs incurred by city government, increased the cost to $8.9 million.

The St. Paul District of the Army Corps of Engineers has been involved in a multi-phase flood control study since 1980 and at a public meeting in October, discussed four proposals for permanent flood controls. Each of the four would combine permanent levees with other measures and would leave a number of homes and businesses — anywhere from 64 to 410 — on the non-protected side of levees.

Generally, the federal government would pay the cost of the levee construction with the city liable for property acquisition and relocation in those plans. Estimated costs to the city range from $9.8 million to $11.6 million.

Against this background, Don Schneider, director of the Community Development programs, proposed Tuesday that the the city seek $700,000 small cities grants in each of the next five years.

If the total of $3.5 million were received through the Minnesota Department of Energy and Economic Development (DEED), the state agency that administers such grants, Schneider says a project could be started to remove most homes and businesses from the critical areas. It would also provide for an updating of the plan to include consideration for permanent diking and development of a relocation plan for 34 businesses and 201 homes that would be affected by construction of a permanent dike.

Schneider said he believes the city has a 50-50 chance of getting the first year grant for such a program. The first year money, he said would pay for a planner to complete a relocation plan, start acquisiton of deteriorated or vacant commercial property, update the comprehensive guide plan, begin acquisition through voluntary sales of relocation sites for homes and businesses, and begin acquisition of homes through voluntary sales and the relocation of families in areas critical to improvement of the temporary dikes or the possible construction of permanent levees.

Both Gary Sanders, city consulting engineer, and Gorman told concerned homeowners Tuesday that the thrust of the program proposed by Schneider seeks to assist families and businesses that would be in the way of... or on the unprotected side... of a permanent levees that might be constructed, or any improvements in the temporary dike system.

Please see GRANT, Page 2

Grant

Continued from Page 1

Council President Jim Gander said the plan, if the grant is approved, would enable the city to take some worthwhile steps to improve the existing dike system.

Alderman Lynn Stauss, however, spoke against a part of the proposal that proposes the removal of the former downtown Piggly Wiggly store building, 413 2nd St. NW. "It's too good a structure. If your plan is to simply make it another parking lot, we have too many parking lots downtown now. I'd much rather see that building restored and used."

Aldermen instructed Schneider at the close of the discussion to replace the Piggly Wiggly building with a proposal to take three homes on 1st Street NW, more of the former Rudh Brothers Furniture store building, and the current city maintenance shop.

Any possible application for SCDG monies must be submitted before Feb. 1 and the subject will get more consideration at the council's Jan. 19 meeting.

EGF council seeks state grant to fight floods

By Liz Fedor
Herald Staff Writer

The East Grand Forks City Council voted Thursday to seek $515,000 in state grant money for flood-fighting purposes.

The money would be used to help the city develop a plan and take steps to protect itself from a 100-year flood.

Eight houses along First Street Northwest would be purchased and some relocated so the city can construct a stable, permanent dike in the area, according to Community Devleopmet Director Don Schneider

Buying the residential property and relocation sites would cost an estimated $320,090. In the grant application, the city states it would use $40,000 to buy the western 20 feet of the vacant Rudh Brothers furniture store at 102 DeMers Ave.

About $80,000 would be spent on hiring a consultant to update the city's comprehensive guide plan, develop a housing relocation plan and find an alternative to the U.S. Army Corps of Engineers permanent flood protection plan.

The application approved Thursday is scaled down from a $700,000 proposal discussed at the Jan. 3 council meeting. The old proposal contained more acquisitions of homes and businesses.

About a dozen people attended Thursday's meeting, but only a few asked questions about the meaning of the grant application.

Council member Steve Gorman explained that the grant application does not mean the city will accept the comprehensive, permanent levee plan proposed by the corps. "I don't think there's any support on the council for the corps plan," Gorman said, because it would be devastating for the city.

Council president Jim Gander said the city wants to strengthen its temporary dike network by removing some trouble spots that will continue to create problems. "Now the money is available and we thought it would be smart to upgrade," Gander said.

The Minnesota Energy and Economic Development Department is expected to select grant recipients by April 30.

In other action, the council:

• Approved a 5 percent 1984 pay increase for city police officers. Members granted 5 percent to 10 percent increases for eight non-union city personnel.

• Set Feb. 7 as the council meeting to take testimony on a proposed city bus system. About 25,000 passengers could be expected to ride the bus in a year, according to city consulting engineer Gary Sanders. It would cost the city about $18,800 to subsidize a transportation system that would pick up riders on swings through the north and south ends of the city.

About 80 people would ride the bus each day, which would run for 12 hours, six day a week. Fares would be 70 cents, but reduced rates would be available for the elderly.

Federal and state governments likely would contribute $43,000 to operate the buses, Sanders said, while riders would probably pay $10,000 in fares during the first year.

• Decided to accept more applications from businesses who want tax breaks through the border city program. Companies who already have applied will be asked to provide more financial information. Businesses who want to get border aid can file applications with the city by Feb. 10. The council will hold a public hearing March 15 to discuss the applications. A hearing will be held soon, so the city can implement the program for taxes payable in 1984.

• Appointed Mark Brickson to a three year term on the Library Board

N-B-52

EAST GRAND FORKS EXPONENT - January 26, 1984



These homes on 1st Street NW would be removed to allow construction of a permanent earth dike in the area of "Jordahl's Corner" if the city's grant application is approved. In all, eight homes would be removed from the vulnerable area.

Flood grant is sought

East Grand Forks aldermen have authorized the city to apply for a $515,000 grant to assist in the mitigation of flood damages and accomplishing improvements on the city's present protective dike system along the Red and Red Lake rivers.

The money is being sought from the federal government's Community Development *Small Cities Program*, which is administered by the Minnesota Department of Energy and Economic Development (DEED).

Don Schneider, supervisor of Community Development projects in the city, says the work that would be undertaken, if grant is awarded, would be the types of projects that:

•The city itself will have to undertake eventually if current negotiations with the Army Corps of Engineers fail to produce a mutually-acceptable plan for the construction of a more permanent diking system that could be built with financial assistance authorized by Congress.

•The Corps of Engineers and the city will be doing if the city council and the corps eventually reach agreement on a new diking system for this city.

Discussion on Jan. 19, which was a continuance of a public hearing held Jan. 3, emphasized that the projects would be geared to improving the present earth-dike system so it can withstand up to a "100-year" flood.

The corps of engineers currently wants to install a more permanent dike system that will withstand all but the worst flood anticipated here each 500 years.

Schneider, who prepared the grant application, included the following breakdown of how the $515,000 might be used:

•$40,000 for acquisition and clearing of the west 20 feet of the former Rudh Bros. Furniture Building, 102 DeMers Ave. NW. The Rudh firm used a combination of older buildings and the west 20 feet originally was a separate store. This structure needs to be entirely removed so that, in the case of a flood as serious as that of 1979, more adequate temporary diking may be built to protect the downtown area, Schneider notes.

•$320,000 for acquisition of eight homes and the relocation of the families so stable permanent earth dike could be erected at the west end of 6th Avenue NW.

Known as the "Jordahl Corner", this area sits on a major underground fault in the river bank, Schneider notes. During recent floods, temporary diking has had to be erected at what is "the most severe" weak spot in all of the city's dike system.

Permanent diking has never been built because it would have to be located on the sites of houses at 508, 514, 522, 601, 605 and 609 on 1st Street NW. The home at 602 1st St. NW would

See FLOOD GRANT, Page 2

Flood grant

Continued from Page 1

also have to be acquired to enable the intersection of 6th Avenue and 1st Street to be relocated.

•$35,000 for construction of the earth dike in the Jordahl Corner area and to relocate roadways as needed. This work would be coordinated with the corps of engineers, the Minnesota Department of Natural Resources, the federal agency that administers the national flood insurance program, and other state and federal agencies, Schneider notes.

•$40,000 for administrative costs associated with the grant.

•$80,000 for a professional planning consultant to carry out a three-phase program.

That program would include:

•Development of a long-range relocation plan for residences, public facilities and businesses now located in what are considered floodways or flood-fringe areas.

•Updating the comprehensive guide plan (land-use plan) for East Grand Forks. The last one was updated in 1978.

•Develop and coordinate a permanent flood protection plan for the city that would be acceptable to both the corps of engineers and a majority of city residents.

At both public hearing sessions, Schneider placed emphasis on the importance of being able to hire a planning consultant and get work on these three projects started.

His application resume notes that planning "would provide the city guidance on:

"(1) How the city should proceed with its planning and zoning development efforts in the immediate years ahead.

"(2) How it can protect itself against 100-year-level floods and what houses, public facilities and businesses (if any) should be relocated to enable the city to relocate and/or construct better diking to better protect the city at the 100-year flood level.

"(3) A relocation guidance plan that would detail where houses, public facilities and businesses could most suitably be relocated, along with cost estimates of such relocations.

"This planning work would be coordinated," Schneider plans, "with the corps of engineers, the Minnesota Department of Natural Resources (DNR), the Federal Emergency Management Agency (FEMA, which administers the national flood insurance program) and other state and federal agencies as necessary."

Schneider anticipates it will be April 30 before the state announces recipients of these 1984 SCDG funds.

Corps plan doesn't call for south EGF levee

By Mike Brue
Herald Staff Writer

East Grand Forks' south side would not be enclosed by a permanent levee in the U.S. Army Corps of Engineers' draft proposal for flood protection.

But the preliminary plan will call for at least $20 million in levee construction around the city's north side, which would require the removal of 172 homes and commercial buildings.

The city's share would total at least $7.1 million, Corps officials said.

All downtown structures west of First Street Northwest, including Whitey's restaurant and American Federal Savings and Loan, would be razed under the plan.

The levee alignment can't be changed, or moved closer to the Red River, without losing Corps support and federal financing, project manager Martin McCleery told city officials Wednesday.

The American Federal building and homes in the Forest Court area could be left outside the levee if the city thought best.

The building could be flood-proofed, although "it's going to look funny" outside the levee, McCleery said. The Forest Court area would be more vulnerable to flooding and would require other flood-fighting measures.

Saying there will be time and opportunity for further discussion, city officials recommended Wednesday that those structures be planned for removal. The officials included Mayor Louis Murray and members of the City Council and the city's flood protection committee.

"I've gotten you up to the point where we have identified the plan," McCleery said. "Things are going to start speeding up. We're down to the push-and-shove, I guess."

The city will receive the draft report in June, he said, after Corps officials have reviewed recommendations. The report will be explained at public hearings in June.

In August, the city will be asked to decide whether to approve the project in principle, McCleery said. Actual construction would not begin until 1987, after design work, plans and specifications have been completed.

The Corps determined that a levee around the city's south side, or Point neighborhood, can't be justified economically, because too many homes would have to be acquired.

Instead, the agency concluded that 17 structures could be removed and relocated outside the 100-year flood plain used by the Federal Emergency Management Agency to guide flood insurance regulations. Some of the structures possibly could be flood-proofed, Corps officials said.

Please see LEVEE,
Back page of this section

Levee

Continued from Page 1A

Those buildings include the the Eagles Club, Dave's Apco service station and Point Liquors. The homes are scattered in smaller groups.

A 100-year flood plain is land where the statistical probability of being inundated during a given year is 1 percent. The south side contains 251 acres that fall within the 100-year flood plain.

"We want to be assured that if we flood-proof that area with federal funds, it meets Corps criteria," McCleery said.

But Gary Sanders, the city's consulting engineer, said home acquisition and relocation "would be a disaster" if only some homes are purchased. Many Point residents would be upset, he said.

Sanders said the Point homeowners are eligible for federal flood insurance, anyway. The city would have to pay 20 percent of the relocation costs. Other city officials sided with Sanders.

Most of the north side levee would consist of a permanent earthen structure, but parts — especially in the downtown area — would consist of concrete flood walls.

Current emergency levees built closer to the Red River would be removed, and the area would be leveled and rezoned. McCleery said matching federal grants for recreational uses in the flood plain are available. The city also might want to dedicate part of the area to natural habitat and save on maintenance costs, he said.

Without levee protection, McCleery said, East Grand Forks property damage could reach $50 million in a 100-year flood and $30 million in a 50-year flood. With the protection, the Corps estimates damage would be $10 million in a 100-year flood. With the work, a 50-year flood would not cause significant property damage.

"Without the project," McCleery said, "you're forced to reconstruct your community over a period of time, maybe 50 years," along Minnesota Highway 220. The levee would help stimulate development and increase property values within its boundaries, he said.

McCleery brought along photographs of East Grand Forks that were partially painted to demonstrate how the new levee might change the city's appearance in the downtown area. The photos included a broad park area along the river, with a boat landing and tennis courts, and even new retail buildings along the Burlington Northern railroad right-of-way leading to Highway 220.

McCleery said the drawings were based on comments from past public meetings about future city expansion. City officials asked McCleery to touch up the photo further to show, among other things, DeMers Avenue running through the Holiday Mall parking lot.

City officials are unsure how the city's levee costs would be divided among residents. The levee also would force other major changes in traffic patterns and development in the city, they said.

The levee would benefit the Point area and the city of Grand Forks by widening the Red River flow area during a flood and dropping the flood elevation about half a foot, McCleery said.

East Grand Forks has applied for $515,000 in state grant money for flood-fighting purposes. Part of the money would be used to find an alternative to the Corps plan. But McCleery said it probably could be used as part of the city's share of the Corps project.

The Minnesota Energy and Economic Development Department is expected to select grant applicants by April 30.

In 1980, the Corps studied the flood plain in Grand Forks and concluded it couldn't provide federal assistance for protective projects on the west side because it wouldn't be economically justifiable.

Grand Forks Herald

Established June 26, 1879

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our opinion

EGF should save Whitey's

Tear down Whitey's? You have *got* to be kidding.

But no, alas. The United States Army Corps of Engineers is not noted for a sense of humor — nor for any sense of history or community. The Army has told East Grand Forks it can build a $20 million dike that would wipe out 172 homes and businesses. All the commercial buildings west of First Street Northwest would be razed — including Whitey's Cafe, the famed eating and drinking establishment described by historical researcher Norene Roberts as "the last surviving link with the early history of East Grand Forks as a center of gambling and liquor in the lower Red River Valley . . . ."

The Army's proposal, as presented last week by city and federal officials, appears to be a take-it-or-leave-it proposition. If East Grand Forks doesn't like it, tough.

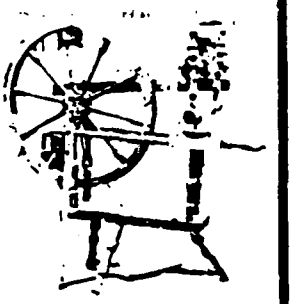
Something has to be done. Only three feet of sandbags atop the current dike held back the 1979 flood, and there is a question about the strength of the dike.

But it just can't be right to gut the downtown district and wipe out pleasant residential streets. It will not be progress for East Grand Forks to lose Whitey's; a relocated Whitey's won't be the same or as good. And it sure isn't right for the Army to act is if U.S. "Unconditional Surrender" Grant were in charge of negotiating flood projects.

East Grand Forks should enlist the Minnesota congressional delegation to prevail on the Army for another plan.

Save Whitey's!

Homespun



On the subject of flood protection, which has gotten a lot of publicity of late, I find it strange that just the East Side of the river is getting all the attention and concern.

Publicity on the subject has tended to put EGF in a bad light in comparison to Grand Forks. But, it is Grand Forks that, according to the Corps of Engineers, can't be protected on the basis of cost vs. benefit guidelines.

The Point Area of EGF was recently put into the same situation as Grand Forks (of being not worth protecting), but I find solace in the fact that if the water ever rises to the point of running through my basement windows there, it will be above the door knob on Norby's...

Until week No. 243, this is Homespun.

Warren Strandell

The Exponent Thursday February 23 1984

Still takes 172 properties

Corps' latest plan cuts cost, severs Point

A considerably lower city cost estimate and an increase tempo for local decision-making highlight the latest Army Corps of Engineers preliminary plan for East Grand Forks flood protection.

A major feature of the latest proposal is that it does not propose to erect either earth or concrete leveees, built to corps standards, anywhere in the Point area of the city. Corps reasoning is that a levee there cannot be justified economically because too many homes would have to be acquired.

This is a key factor in the reduction of the estimated costs for levee construction, the purchase and clearing of land and easements and rights-of-way procurement that the city would have to provide from earlier estimates of $11.6 million to roughly $7.1 million.

The latest plan was presented Thursday to a meeting of city council members and members of the city's flood control committee by Martin McCleery, study manager for the Corps of Engineers District Office in St. Paul.

For city areas north of the Red Lake River, the latest proposal calls for installing about $20 million worth of earth and concrete levees, and the removal of 172 homes and commercial buildings.

All present downtown structures on the west side of 2nd Street NW would be razed. Included would be: American Federal, Whitey's Cafe, Mike's Pizza, Fall Building, Somm Office Building, American Legion Post, public library, city maintenance shop and the building housing Golden Cue Billards and Center Cinema theater.

McCleery said corps studies are at the point where the city can no longer ask for levee alignment (location) the height of the levees or the areas where earth or concrete levees would be built.

The levee alignment cannot be changed or moved closer to the Red River in any area without losing corps support for the overall project and, thereby, some of the federal financial aids the city might expect, McCleery indicated.

Most of the north area levee would be of earth construction but some parts—especially in the downtown area—would be concrete.

McCleery said the latest proposal offers some help for both the Point area and the City of Grand Forks, because it provides a wider Red River channel to carry flood waters past the two cities. This widening would help drop the river level a half a foot.

Without improved levee protection, McCleery maintains, East Grand Forks property damage could reach $50 million in a 100-year flood and $30 million in a 50-year flood. With the protection proposed in the latest plan, the corps estimates the city would not sustain significant property damage in the worst flood that can be expected to occur here once each 50 years and that property damage that would result from the worst flood that can be expected to occur here once each 100 years would be only $10 million.

City Clerk-Treasurer Dave Mack offered this resume of the new timetable McCleery has spelled out:

•By April 1984—The city council and the city flood control committee are to have submitted to the corps final decisions about the variables in which they can ask for changes.

•By June 1984—Corps office will have incorporated changes into planning and will return to East Grand Forks to hold public hearing on the plan. Just what kind of public forums and the number that would be scheduled have not been determined, Mack says.

•By August, 1984—The city council shall let the corps know if it essentially agrees with this latest corps plan.

•Early in 1986—The city council must make a final decision on whether the corps should halt its study and the city will develop its own flood protection plan, or whether the city will keep working with the corps to complete the corps-designed project.

Corps' plan—

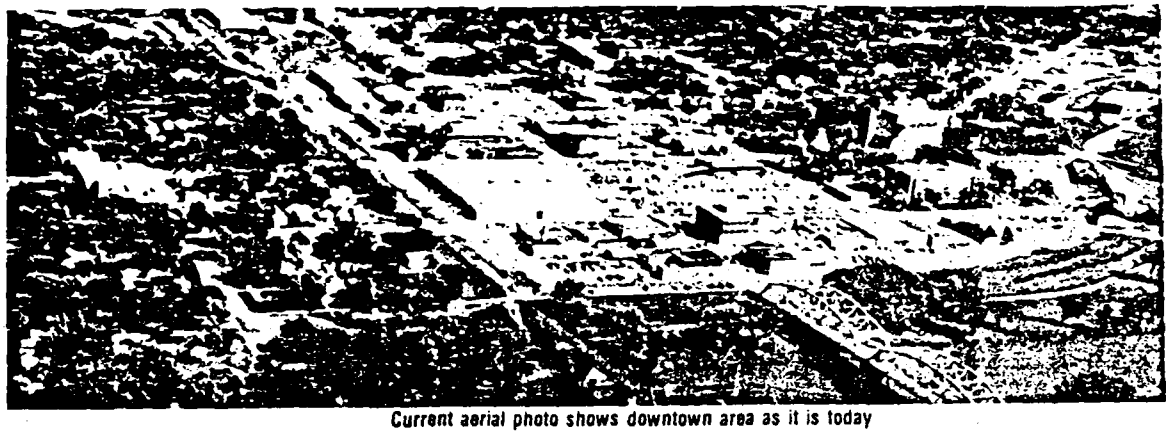
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'The Expo'
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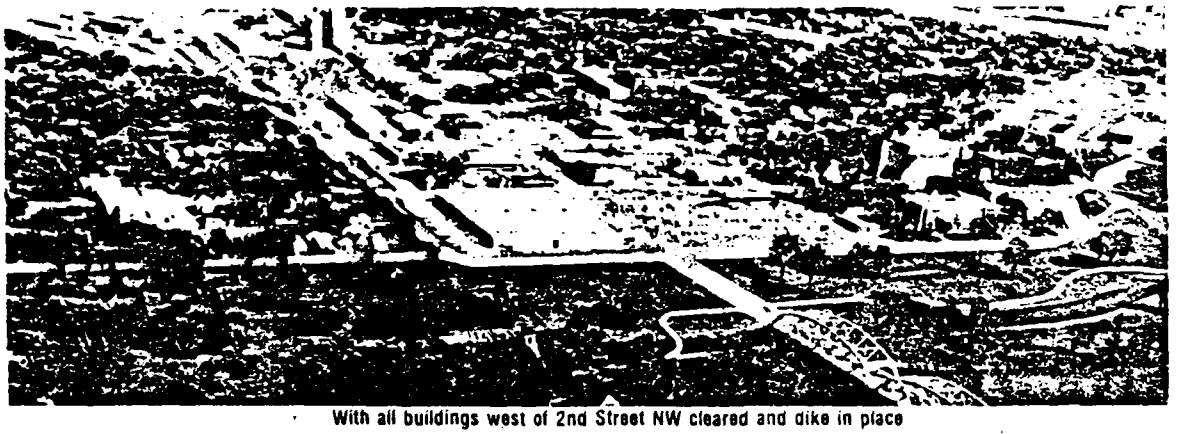
THE EXPO

Serving East Grand Forks and surrounding Minnesota communities

Corps flood project would change city . . .



Current aerial photo shows downtown area as it is today



With all buildings west of 2nd Street NW cleared and dike in place



With buildings cleared to 2nd Street NW and a new shopping area in place east of Valley Dairy offices

EGF to hire staff member for economic development

By Liz Fedor
Herald Staff Writer

ST. PAUL — East Grand Forks officials want the city to get a bigger share of the state and federal grant money available for economic development, so they plan to hire a full-time person to go after that money.

The person would work on other business projects, as well.

Henry Tweten, Water and Light Commission president, said East Grand Forks "is very serious about its effort to promote commercial and industrial development, but "We don't have time to cover our bases with the state and federal money."

Tweten was in the Capitol Wednesday to explain the planned effort to Sen. Roger Moe, DFL-Ada.

The new economic development staff person would work on existing projects with Steve Gorman, executive vice president of the Chamber of Commerce, and Don Schneider, community development director. The person also would promote business use of city-owned utilities by working for the Water and Light Commission.

Jim Gander, president of the City Council, said in a telephone interview that the council and the Water and Light Commission would share the cost of adding this person to the city payroll.

The new employee's salary probably would be offset by the extra grant money brought into the city, Gander said. Most grants allow for administrative costs.

The city officials plan to ask the Polk County Board of Commissioners to contribute $15,000 to pay for East Grand Forks development efforts. Jack Schmalenberg, the board's executive secretary, said the commissioners have established a new program that allows them to provide matching funds for economic development efforts in cities. The board already has planned such an arrangement with Crookston.

The person who fills the new position would be asked to establish a tax increment financing district, administer development of the industrial park and assist with the border cities tax credit program.

The council probably will authorize the position at its March 6 meeting, Gander said.

East Grand Forks City Council Proceedings

Alderman Wogaman, supported by Alderman LaFave, introduced the following resolution and moved its adoption

WHEREAS, A Flood control project involving the United States of America and the City of East Grand Forks, Minnesota, is in the draft stages, and

WHEREAS, The City of East Grand Forks proposes to perform certain work which falls within the work required under the proposed flood control project, and

WHEREAS, The Secretary of the Army, acting through the Chief of Engineers, may enter into an agreement to reimburse the costs of certain work accomplished by the city which later is incorporated into the flood control project, when it is determined that such reimbursement is in the public interest, or in lieu thereof may provide for a reduction in the amount of contribution required from the city in lieu of reimbursement for costs incurred; and

WHEREAS, The Secretary of the Army, acting through the Chief of Engineers, has determined that crediting the city for the cost of the work the city proposes to do is in the public interest, and has submitted an Agreement for the United States Government by the Chief of Engineers, U.S. Army, and the City of East Grand Forks to execute, wherein the United States of America agrees to so reimburse the said city for the cost of any such work the city perform.

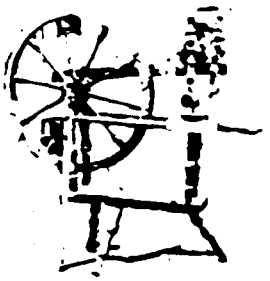
NOW, THEREFORE, BE IT RESOLVED, By the City Council of the City of East Grand Forks, Minnesota, that the Mayor and Clerk-Treasurer are authorized and directed to execute said Agreement for and on behalf of the said city.

Voting Aye: Mongoven, Wogaman, Gorman, Gander, Stauss, LaFave
Voting Nay: None

Absent: Hanson
The President declared the Resolution passed

Homespun

WARREN
STANDEL



Keeping an eye on the river will not only be a point of interest, but one of concern in the next few days and weeks.

We're conditioned, of course, to the threat that is there each spring. We know that years like 1950, 1966, 1969 and 1979 can return with little warning. But, we also know that within a week, the danger, at least to life, will be over for another year.

There appears now to be no major concern about high water this spring, but the time is still right to think about the future, specifically, the Army Corps of Engineers' plan for "permanent" levees.

The proposal is one that all of us should become informed about. And, during the weeks and months ahead, we'll have that chance as public hearings are held and more information is made available.

There are, of course, two sides to the issue.

One is the effect of moving 172 properties, with some of those sure to disappear from the community (we should have learned something from urban renewal), and of having $7.1 million added to our tax rolls.

On the other side is the consideration that with a permanent levee, we should seldom have to worry again.

Saying yes or no (by August) will be a very big decision, probably our the biggest of this century.

The information that we've gotten to this point leaves a lot of unanswered questions and while sentiment — including mine — is opposed to the project, it will be wise to continue listening.

The latest cost figures are that the federal government will provide $11.3 million and that the city will be taxed for $7.1 million. Not included in that $18 million amount is the cost of relocation of the affected businesses and homes... a price tag on that has to be astronomical.

In return for our investment, which in effect would leave us "owing our souls to the company store," we would be in a position, the corps says, to reduce the damage from a 100-year flood from $50 million down to $10 million.

Those numbers need some further explanation, though. The total "market value" in the city is about $120 million and not even a 100-year flood is going to wash half the town away.

If Uncle Sam is so intent on solving our problems, I have an alternative: Let him write us a check for the federal share of the project plus the federal share of relocation costs. With that $15 to $20 million, we could invest the money, operate our own flood insurance program, fight any floods that come along, and still probably live off the interest.

That's the kind of cost-benefit ratio I could live with.

But, back to the corp's plan. I'm going to try to listen with an open mind, but from what I know now, forget it. Let the corps go study somewhere else.

EGF probing flood protection plan

By Marcia Harris
Herald Staff Writer

East Grand Forks officials are about to begin a series of meetings aimed at deciding about the U.S. Army Corps of Engineers' proposal for a $20 million flood protection project for the city.

The plan calls for levee construction around the city's north side. It would require removal of 172 buildings, including about 30 businesses that make up the heart of the downtown business district.

The Corps has estimated the city's total project cost to be about $7 million.

The city would be totally responsible for the cost of relocating city services and for the legal costs associated with acquiring property for the project.

The federal government would pay 80 percent of relocation costs for businesses and homeowners. The city would pay the remaining 20 percent.

Steve Gorman, alderman at large and director of the chamber of commerce, described city officials' current feeling about the project as "bewilderment."

"I think they're just kind of bewildered ... and frustrated. It's such a big problem, with such dramatic impact potential. You'd kind of almost like to not think about it," Gorman said.

Some of that frustration and concern was expressed during discussion at this week's council meeting.

Jim Gander, president of the council, said he feared the town would become literally boxed in by the proposed levee and would be unable to expand.

"They've got you tied up. You're hemmed in ... you're done," he said.

Some council members wondered if the flood plan isn't too cautious, because the 12 to 14 foot walls would be protection against a worst-case scenario.

Gary Sanders, the city's consulting engineer, said, "It'd be the only dry place for miles."

"Actually, it ends up that they would have flood protection to the 362-year flood, substantially above the 1 percent chance," Sanders said.

Gorman said he has not made up his mind about the project, but, "I want to have some real good reason for not endorsing this project 10 years from now when the big one comes."

Gorman, Sanders and three other officials have formed a subcommittee to study the engineering, legal, financial and community impact aspects of the proposed project. They are gathering information and will hold meetings with the council as a whole.

Other subcommittee members are Dave Mack, city clerk-treasurer, and Karl Lindquist, assistant city attorney.

When the subcommittee considers community impact, it will conduct a survey of the businesses and homeowners who might be displaced.

Gorman said he has talked with some business people informally.

"The feeling a year ago was, it's a pie-in-the-sky project. Now, they're starting to realize that the city is looking at this thing very closely," Gorman said.

Council members are concerned that they might be perceived as "driving people out of town" if they approve the project, Gorman said.

However, the notion that all East Grand Forks businesses would automatically move to Grand Forks is not necessarily accurate.

"That was the initial fear. But that comes from reading too much North Dakota press," Gorman said.

Gorman said the Corps will return in June to present its "final preliminary report" and to hold hearings with local citizens.

The Corps wants a decision from the city by August on whether to go ahead with the design and construction stage of the proposal. That could take two years. Then, the city would make its final decision. Pending Congressional approval, construction could begin in 1987.

However, the city could decide now to halt any further study. That is why the subcommittee is gathering information.

"We're not saying they don't have the right information" from the Corps, Gorman said.

"It's like going to a doctor," he said. "You want to have a second opinion."

The subcommittee's first report to the council as a whole will be sometime next week and will deal with engineering problems associated with relocating city services along the Red River.

Sanders said water mains and sewer lines in "almost every street intersection from the north end by the golf course to the water plant" would be affected.

Sanders said he is not disputing the Corps figures, but he said the costs so far for relocating services have not been broken out very clearly.

"They do projects all over and they tend to use figures developed over time. Differences vary from city to city," he said.

N-B-63

GRAND FORKS HERALD - April 5, 1984
LOCAL/AREA

GRAND FORKS HERALD - April 20, 1984

EGF council buys $800,000 parking lot improvement

By Marcia Harris
Herald Staff Writer

East Grand Forks City Council members Thursday night accepted a bid from Valley Contracting of Grand Forks for a seal coat improvement on the Civic Center parking lot for about $800,000.

Council members also agreed to draw up special assessment tax estimates for residents for a proposed street-sealing project after a public hearing on the matter Thursday night.

Low bid on the street-sealing project is $189,833, also from Valley Contracting of Grand Forks.

The council will send out special assessment estimates to homeowners and hold another hearing in late June or May. After that hearing, they hope to approve the project.

It includes streets in the north end and most of the point section of town.

A homeowner with 75 feet of frontage would pay about $148.50 per year for five years in special assessments for the project, according to Gary Sanders, city engineer. The cost has more than doubled since the 1977 street-sealing project, Sanders said.

About 20 people, who attended for the public hearing on the project, were interested in cost and the type of seal that would be put down.

In other action, the council agreed to contract with Lu Hoover, a University of North Dakota graduate student, to conduct surveys of residents effected by the U.S. Army Corps of Engineers proposed dike for the city.

Although the Corps has already studied the proposed project's impact on the community, the council wants to conduct its own study, according to Steve Gorman, alderman-at-large.

Hoover will be paid $800 for the survey.

Kenny Knoff, director of special projects for the city, and Don Schneider, community development director, will direct Hoover.

Hoover's work mainly will be with residents, while Knoff and Schneider will talk to businesses that might have to relocate.

Gorman estimated it will take about a month to conduct and few more weeks to compile results.

Jim Gander, alderman-at-large, said he wants to make certain people understand the council has not made up its mind about the merits of the project, but is just gathering more information so it can make a better decision.

The council also:

- Appointed a sub-committee to have the city participate in the construction of a super-insulated house project with the Area Vocational Technical Institute. The project would be a "model home," possibly built on a vacant city-owned lot.
- Discussed participating with the Crimestoppers program in Grand Forks, at no cost to the city. The program is a referral service that accepts anonymous tips about unsolved crimes. The council will take up the matter at their next meeting, May 8.
- Discussed advertising bids for a new fire truck, which could cost up to $120,000. That topic also will appear



When the flood water began to recede, "we thanked God and then everyone else

Louis Murray
East Grand Forks mayor



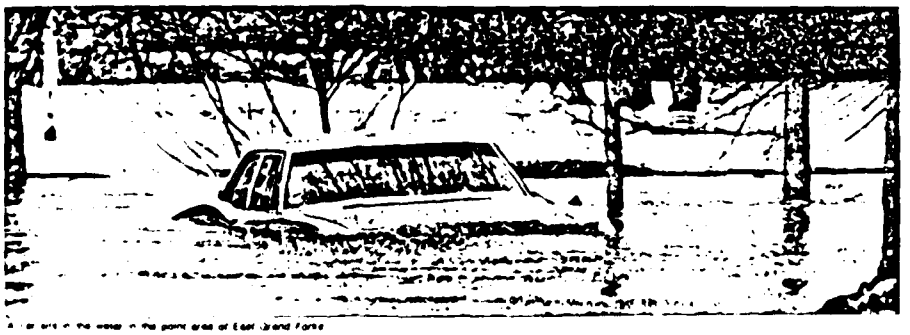
Workers above and below sandbag in the riverside area to stop flooding



Frank Onthmayer, Grand Forks city engineer, checks sandbags in the riverside section of the city

Herald file photos

Local residents recall the flood of 1979



A car sits in the water in the point area of East Grand Forks

Grand Forks Herald

Section B — Saturday, May 26, 1984

local/area

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EGF survey will gauge response to flood plan

By Liz Fedor
Herald Staff Writer

Lu Hoover, a University of North Dakota graduate student, is spending many 12-hour work days in East Grand Forks this spring to learn whether city residents are willing to move out of their homes to make way for a permanent levee.

Later this year, the City Council will decide whether to support a $29 million flood-fighting plan designed by the U.S. Army Corps of Engineers.

The levee construction would force about 230 homeowners and tenants to find other places to live in East Grand Forks or outside the community.

The corps plan, revealed in February, lists the acquisition of 172 homes and commercial buildings north of the Red Lake River.

Council President Jim Gander said the city hired Hoover to undertake the survey because council members want to know how residents feel about the corps plan.

Some citizens believe the council's final decision to accept or reject the levee plan will have a significant impact on the future of the city's business and residential communities.

The cost and the breadth of the relocations called for in the corps proposal have prompted skepticism among city officials.

"I think it's too big of a burden for the city to tie itself down to," Gander said. "The levee might be needed next year, and it might never be needed. It's like buying an insurance policy you can't afford."

Steve Gorman, a council member, said he opposes the plan because there are too many unknowns associated with it, which he described as "a potentially disruptive kind of a project."

"How much will it *really* cost, and who will pay for it?" Gorman asked.

Suzanne Gaines, a corps sociologist, said the latest estimates show it will cost almost $19 million in federal money and more than $10 million in non-federal money to pay for the construction of the levees, relocation of homes and businesses, and other related costs.

Don Schneider, East Grand Forks community development director, said the $10 million would come from local taxpayers and from state and federal loans and grants that the city would seek.

Hoover has surveyed about 120 of the 230 residents directly affected, and she said many want the city to make a decision on the project soon.

> 'How much will it really cost, and who will pay for it?'
>
> **Steve Gorman**
> East Grand Forks City Council member said of proposed flood plans

Until recently, it appeared the council would accept or reject the project in June. A final project commitment would be required in 1986.

The corps was expected to hold public hearings in June to explain the final proposal, but those hearings have been postponed. The corps budget that covers the East Grand Forks project is depleted until the new fiscal year begins Oct. 1, Gaines said.

Gander said he probably will advise the council to hold off on a decision until the corps holds fall or winter hearings. But the council expects results of its survey this summer.

In her one-on-one interviews, Hoover is trying to determine how residents who will be affected directly by levee construction feel about it. In addition, she wants to know whether residents would leave the city or find suitable neighborhoods in other parts of East Grand Forks.

Hoover has talked to residents who live along Dike Street, First Avenue N.E., and First, Second and Third streets northwest. She said response has been divided: half support the plan, half oppose it.

Whichever side they come down on, most residents hold strong opinions.

"Nearly everyone wants a decision soon. They're mainly concerned about whether or not to make improvements on their homes or how to plan," she said.

Eight of the 120 surveyed so far said they intend to leave East Grand Forks if the levee project is approved, she said.

The personal interviews are concentrated in the neighborhoods where the levee would cut through. Residents along Forrest Court and River Road still must be surveyed, Hoover said.

A mail survey was sent to 400 households selected at random from the 2,658 households in East Grand Forks to gauge how the entire city views the corps plan. Hoover said she expects about 200 of the surveys to be completed.

Kerry Knoff, the city's special projects director, is talking to the business owners who would be affected by the levee. About 15 structures, housing 25 businesses, would be left outside the ring dike that would run parallel to Second Street Northwest.

"The business sector is not for it," Knoff said, partly because the businesses want to hang on to their prime locations near the DeMers Avenue bridge.

Some of the businesses that would need to relocate are Whitey's Cafe, Mike's Pizza, the Antique Lounge, American Federal Savings and Loan Association, the Golden Cue and the American Legion.

Knoff said it is difficult to predict how many of these businesses would stay in East Grand Forks because business traffic along Highway 2 East or Highway 220 North may not be as advantageous.

Dave Mack, clerk-treasurer, said many of these business owners and residents are in a "limbo stage." The officials have not made a decision on the plan, and they, too, are unclear on precisely how a corps plan would work, Mack said.

The City Council, meanwhile, has suffered two flood-fighting setbacks with state agencies recently.

The Energy and Economic Development Department rejected the city's request for a $515,000 grant that would have provided money to acquire eight homes and relocate those families. The grant also would have been used to develop an alternative permanent flood protection plan.

Before the department will issue a grant, Schneider said, "The city is going to have to decide what they're going to do." Then, he said, a three-year comprehensive grant application will be submitted that will need corps and Department of Natural Resources support to get approved.

City officials verbally attacked an area DNR staff member during a May council meeting because they are frustrated that the state agency will not allow the city to adopt an ordinance that varies from state rules.

Homeowners in the flood plain should be allowed to make minor improvements to their homes, Gorman said, and the council wants to permit this practice. But DNR regulations state that property susceptible to flooding should not be improved to increase the value.

Gorman and Gander said East Grand Forks should cooperate with other communities in the watershed to develop a regional flood fighting strategy. Both favor impounding water upstream versus constructing expensive, permanent dikes in their town.

N-B-66

Flood project surveys:

1 of 3 affected businesses would leave

How do you like your statistics?

The answers that 27 East Grand Forks businessmen - those who would be forced to move if a permanent diking project is constructed in the city – gave in a recent city council-sponsored survey have both a positive and a negative side.

For instance, if forced to move because of a permanent diking project, almost one of three (8 of the 27 firms) would relocate to Grand Forks or elsewhere.

The good news is that 41 percent (11 of the 18 businesses indicating that they would stay in the city), would "build a new building."

Another two business operations answered that a forced move would mean that they would simply cease operations completely.

Another question in the survey asked "5-10 years from now I (we) anticipate our business location to be in:"

To that question, 24 (89 percent) answered "East Grand Forks;" one (4 percent) answered "Grand Forks;" and two (7 percent) said "other (retired)."

Other questions in the survey included:

How long have you been in business?

0-2 years – 4; 3-7 years – 3; 8-11 years - 5; 12-15 years – 2; 16-20 years – 3; 21-25 years – 2; 26-30 years – 0; and 31 and over – 8.

Average No. of years: 24.3.

How long at present location?

0-2 years – 5; 3-7 years – 4; 8-11 years – 8; 12-15 years - 2; 16-20 years – 3; 21-25 years – 3; 26-30 years – 0; and 31 and over – 2.

Average length: 11.5.

No. of employees?

0-5 - 14; 6-10 – 6; 11-15 – 2; 16-20 – 0; 21-15 – 2; 26-30 – 1; 31-40 – 0; 41-50 – 1; and 51 or more – 1.

Total No. of employees – 308; average per business – 11.

Do You:

Own the business – 22; manage the business – 25; own the building – 9; and rent or lease – 21.

Do you feel that the need for flood protection and permanent diking to the City of East Grand Forks is:

Of major importance – 8; somewhat important – 17; and not important at all – 2.

The one businessman indicating that within five to 10 years his firm would be in Grand Forks cited as reasons: "Destroying of downtown are, lack of downtown traffic, sales taxes, and income taxes."

Additional comments by the 27 firms answering the survey included "that the dike would destroy the downtown business district," and that the "total cost is outrageous."

Another said a dike would not only destroy the downtown, but also the entire city.

There was sentiment for revamping present dikes. One businessman said, "The city has done a good flood protection job in the past and will continue (to do that), therefore (there is) no need for such an extravagant system – modify the present system (instead)."

The report indicated that some businesses

Please see BUSINESSES, Page 2

Businesses

Continued from Page 1

would not again make the same commitment to the community that they presently have.

Businessmen generally agreed that there are alternatives to the Army Corps of Engineers' plan.

The 27 businesses interviewed were: American Legion Post 157; Fall Apartments and Commercial Rentals; Dr. R. J. Osmundson, DDS; Dr. Irvin Galstad, DDS; Dr. James McDonald, DDS; Dr. Dan Rose, DDS; Center Cinema; Massee, Leonard & Lindquist law firm; Duling Optical.

Stylistics Beauty Salon; Dietrich Sewing Center; Larry Aubol Ins.; C & L Laundry & Dry Cleaners; Brady, Martz & Associates PC; Midwest Vision Center; Bob Harvey Ins.; American Federal Savings & Loan Association; Robert Matt, Attorney.

Legends; Whitey's Cafe; Mike's Pizza; Golden Cue Billiards; Ivan Ferguson, LPA; Luv-n-Pet; Harry P. Larson Ins.; Advance Office Supply; Antique Lounge.

Homeowners are divided over Corps' plan

A survey of the 186 East Grand Forks families whose homes would be directly affected if the Army Corps of Engineers' proposed permanent diking program is instituted reveals that 4 of 10 believe there is a need for permanent diking in the city.

Yet, the survey shows that there is a difference of opinion over the corps plan: 27 percent neither strongly oppose or favor, 37 percent oppose, and about 36 percent favor it.

The survey was conducted between May 14 and June 13 by Lu Hoover, a UND graduate student. She was hired by the city council to conduct the survey as part of a series of data-gathering projects to provide aldermen with more information about city residents' opinions and concerns regarding the corps proposal.

The corps' plan, outlined last February at a meeting with aldermen, is designed to protect the city against the worst floods that are expected here every 50 years and would limit the damage in the worst flood expected each 100 years to about $10 million.

She notes, "Two general concerns were expressed so frequently that they should be stressed at the outset:

"Nearly all respondents expressed a desire for a decision on the proposed dike project to be made soon. This was true whether the respondents (favored or opposed) the current proposal. They are unable to make major changes on their real estate because building permits are not being issued (and) they hesitate to make even minor improvements, such as interior painting or carpeting since they may have to leave their homes in the near future.

"The second most frequent comment was that the respondents have not received adequate information about the proposed project. The general feeling is that they should receive specific information on the project by direct mail rather than through (the media). Affected residents requested to be informed individually by direct mail of the time and place of any public meetings about the project."

Most of the respondents are homeowners. Only 18.2 percent are renters and a strong majority (84.4 percent) plan to be living in East Grand Forks five to 10 years from now.

Asked what they would do if their housing unit was purchased by the city as a flood protection alternative and was moved to a new East Grand Forks location at no cost to them, most said they would buy a house elsewhere in East Grand Forks (29.6 percent), or move to a rental unit in East Grand Forks (28.5 percent).

Current homeowners queried, however, were more inclined than current renters to say they would move from East Grand Forks if their housing units were bought by the city – 24.5 percent of the homeowners and only 14.3 percent of the renters.

"Those residents who indicated they would leave East Grand Forks if the corps project is undertaken expressed the concern that there are not enough homes, apartments, or condominiums at acceptable locations in East

Please see HOMEOWNERS, Page 2

Homeowners

Continued from Page 1

Grand Forks to offer them acceptable living situations," Hoover writes in her conclusion.

"Residents who would move to apartments or buy homes in East Grand Forks expressed the same concerns. While they do not wish to leave the East Side, they are afraid they will be unable to find suitable housing here."

Her conclusion also notes, "The general feeling of those who favor a permanent dike is that the current earth dikes are not safe. They feel that a permanent diking system is long overdue...Their comments include:

'Get rid of the old part of town and update the city.'

'I'll stay in East Grand Forks if something is done about the flooding.'

'Do a complete project now so that our children won't have to worry about flooding as we have.'

'I don't care if my taxes increase. This is a good project for the city. It will have to be done sometime unless the city is just going to stand still.'

Respondents who indicated they are in the "middle range" of strong opinions about the corps proposal often expressed a conflict of concerns, according to Hoover. "While they may not feel safe with the present dike, they hesitate to favor the proposed plan because of (its) size and its impact on the community," she states.

"The impact of the project on the community is a significant concern of many respondents," she writes. "Some feel that, there will be no East Grand Forks if they take all those houses and so many businesses. Other respondents feel that the threat of flooding is a deterrent to new businesses and that a permanent dike will make the city more attractive to new businesses.

"The cost of the corps project is also a major factor. Many respondents feel that taxes will go 'sky high' if the project is undertaken. Other comments on the economic impact include:

"This is a small city. Who will pay for this project?'

'Minnesota is already known as a high-tax state. No one will want to locate in East Grand Forks if our taxes go even higher.'"

EAST GRAND FORKS EXPONENT - June 21, 1984

N-3-68

EGF residents divided over plans for flood levee

By Liz Fedor
Herald Staff Writer

East Grand Forks residents who would be directly affected by construction of permanent levees are divided over whether the city should undertake the $29 million flood-fighting project.

Lu Hoover, a University of North Dakota graduate student, spent a month interviewing 85 percent of the families that live in the path of the levees proposed by the U.S. Army Corps of Engineers.

She found that 36 percent of the residents favor the corps plan, 37 percent oppose it, and 27 percent are neither strongly for nor against the proposed plan.

Hoover explained her results Thursday night to the City Council, which must decide whether to accept or reject the corps plan.

In her report, Hoover said, "The general feeling of those who favor a permanent dike is that the current earthen dike is not safe. They feel that a permanent diking system is long overdue."

In contrast, she said, "Those who oppose a permanent dike feel that the present dike is adequate and safe. They feel that, 'It may not flood again for another 100 years, so why spend millions on a permanent dike?' They recall the 1979 flood when the community pooled together to sandbag and held the floodwater until it subsided."

The corps plan, revealed in February, lists the acquisition of 172 homes and commercial buildings north of the Red Lake River.

Hired by the city to measure residents' views, Hoover talked to members of 186 of the 220 households who would be affected. Her research was conducted between May 14 and June 13.

Most of the people said they want some decision from the council soon. "This was true whether the respondents were in favor of or opposed to the current proposal," Hoover said. "They are unable to make major changes on their property because building permits are not being issued. Also, they hesitate to make even minor improvements, such as interior painting or carpeting, since they may have to leave their homes in the near future."

If the corps plan is adopted, a few hundred homeowners would need to decide whether to relocate in East Grand Forks or move out of the city. The survey showed that 31.8 percent would buy other homes in East Grand Forks, 24.5 percent would leave East Grand Forks, 19.9 percent would move to rental housing in East Grand Forks and 18.5 percent would buy their houses back from the city after relocation. Only 3.3 percent said they would build other homes in the city, and 2.7 percent were undecided.

Mayor Louis Murray said he was surprised that there is no consensus among residents who live in the proposed levee area. "I thought there'd be an overwhelming majority opposed to it," Murray said in an interview. "Right now I am opposed to it," he said, because it would require widespread removal of homes and the relocation of about 25 businesses.

Murray is particularly troubled by the cost involved. The latest corps estimate is that the project would cost about $29 million. The federal government would pay for $19 million, while it would be the city's responsibility to find the other $10 million from sources such as local property taxes and state and federal grants and loans.

The mayor termed the corps plan "extravagant" and said he would like to review a scaled-down version.

Council President Jim Gander said the survey showed city residents want more information about the impact of the corps project, but council members do not even have specific answers. Community Development Director Don Schneider and Kerry Knoff, special projects director, are researching the cost of relocating businesses and purchasing homes and the levee's cost to city taxpayers.

The corps will hold a public hearing in October, and Gander said he hopes the council will take action on the corps proposal shortly thereafter. Gander opposes the plan. "I think it's dead wrong. The oldtimers in the community said the only way to do it is to hold the water back where it falls," he said. A regional flood-fighting strategy must be developed that involves the entire watershed, he said.

If the corps plan is accepted, Gander told his colleagues, "It's going to be a big burden on the taxpayers just for the annual maintenance."

In a second survey, Hoover mailed random questionnaires to 400 East Grand Forks residents. There was a return of 40 percent or 159 residents. "Generally, the respondents felt that flooding is a serious problem in East Grand Forks, but it is seen as more of an economic threat than as a safety threat. Most of the respondents (49 percent) felt that present city levees, combined with emergency flood fighting and flood forecasting was the most acceptable flood control alternative. The alternative of permanent new levees and floodwall was the second most common choice of the respondents (32 percent)," she said in a 14-page report.

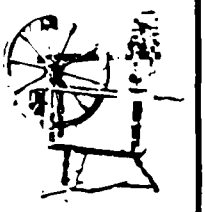
Residents showed great concern over whether permanent cement levees would reduce their property values, and they questioned the distance of the levees from their homes and the levees' appearance.

Between 40 percent and 45 percent of those responding to the random survey said East Grand Forks property taxpayers and Minnesota and U.S. income taxpayers should offset the cost of levee construction.

Businesses that would be relocated by the levees are just off the DeMers Avenue bridge. In a survey conducted by Knoff, business owners were united in opposing the corps plan. They contend the permanent dikes would destroy the downtown area and their businesses would suffer at new locations.

If the corps plan is implemented, business owners said they would likely make the following decisions: 18 would relocate their companies in rental space in East Grand Forks, 11 would construct new buildings in East Grand Forks, 8 would move their operations to Grand Forks or other cities, 2 people would go out of business

Homespun



The East Grand Forks School System would, of course, be affected by the Army Corps of Engineers' proposal to construct permanent levees in the city.

At a recent school board meeting, Supt. of Schools Jim Noonan announced that a preliminary survey shows that 176 persons between the ages of infant and 18 years old live in the 172 properties that would have to be cleared for the project. He said, too, that another 30 Sacred Heart School students would be affected.

The potential loss of students and future students, in terms of percentages, would be near 10 percent. But, the effect doesn't end with just reduced numbers. There would also be a near 10 percent loss in aids that would probably mean a 10 percent decrease in teachers and staff, etc.

The recent person-to-person opinion surveys made with those directly affected (those whose businesses and homes would end up on the wrong side of the dike), it seems, are hardly a measuring stick of public sentiment.

What is missing, of course, is a lack of specific information about relocations, benefits, buy-outs, and costs to city taxpayers. The sketchy facts currently available are hardly the basis on which residents can provide answers.

We believe that more weight must be given to those whose properties would not be taken by the project. Afterall, it is those people who must bear the local costs in the years ahead.

Few will argue that there isn't a need for a better flood protection, but few, we believe, are elated about the massive loss of property involved with what has to be considered an extravagant corps plan.

Maybe it is the timing of the program, with its forced deadlines for decisions, that is the stumbling block to the permanent levee plan.

We'd like to see consideration given to a longterm program — one that might not result in any construction for from 20 to 30 years.

In that arrangement, we would envision that many of the properties that would be needed would have reached a point of diminished value by the time work were to start. And, enroute to that date, there could be an acquisition program for both businesses and homes as they would naturally come up for sale.

The acquisition plan wouldn't have to limit property owners from making improvements. It would just tell them that in the year 2004, 2014, or whatever, that their properties would be acquired for construction of a levee project.

The only restriction to the affected property owners during the period leading up to construction would be that if they were to sell, it would be to the government. With that arrangement, we think much of the turmoil of a massive clearing project could be staged out over the years and that when the date finally arrived the required area would already be nearly cleared.

We, of course, would be leaving ourselves open to flooding during the 20 to 30-year period. But, we've been that way — at least, according to the corps — for many years already.

The corps' plan for permanent levees would give us protection for only a "once in 50 years" level of flooding. As an alternative to wholesale destruction of the community now, I'd take the odds of a 20 to 30-year acquisition and clearing program. Afterall, our "temporary" dikes haven't done that badly.

Looking back:

July 9, 1960 — The EGF City Council gave its final approval for moving the city library to the Gorman Building. Dr. Orley Gunderson resigned as assistant director of the EGF AVTI to become director of the AVTI at Thief River Falls.

Jenson licensed representa

Steve L. Jenson, 1711 20th St. NW, East Grand Forks, a representative for Mutual of Omaha and United of Omaha, has been licensed as a representative of Mutual of Omaha's Fund Management Company.

He earned the mutual funds license by completing a comprehensive securities training course and passing an examination admini the National Ass Securities Dealers.

The fund manage pany manages eigh cluding a money m count and closed-enc listed on the New Y Exchange.

Jenson is associ the Paul V. Dahlke Duluth.

EAST GRAND FORKS EXPONENT - August 16, 1984

More information slated on dike plan

Meeting with several East Grand Forks aldermen last week, Martin McCleery, study manager for the St. Paul District of the U.S. Army Corps of Engineers, reported that funding has been restored and planning has resumed for development of a permanent diking project in the city.

A shortage of fund last spring, he said, has forced postponement of a series of public meeting that the corps had planned to conduct in the city during June.

McCleery expressed concern over the fact the a number of residents, when contacted in both corps and city government surveys, had said they needed more information on the effect of the proposal on both themselves and the city.

The new timetable for the city council's decision on whether or not continue study, he said, calls for that answer to be determined in late October.

In advance of the decision, McCleery said the corps will use the news media, direct mail, telephone polling, a telephone call-in service, and the rescheduled series of public information meetings to get as much information as possible to the public.

Grand Forks Herald

Section B — Thursday, August 30, 1984

local/area

• REGIONAL ROUND-UP Page 2B
• BOYS RANCH PROBE Page 4B
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Discussions of EGF flood plan continue

By Kevin Fee
Herald Staff Writer

Federal, state and city officials met in East Grand Forks Wednesday to discuss the $40 million U.S. Army Corps of Engineers plan to protect the city from flooding.

Col. Ed Rapp of the corps said the problem with the dike in East Grand Forks is that it is moving down toward the river.

Existing levees are almost of zero value in terms of permanent protection, Rapp told the officials. The corps proposes new permanent levees and a floodwall to protect about two-thirds of East Grand Forks. The Point area is not included.

If you had a permanent structure on the rest of the area, you could concentrate to protect the Point, Rapp said.

The corps plan, revealed in February, anticipates the acquisition of about 200 homes and buildings, including about 30 businesses that make up the heart of the downtown business district.

The plan would cost the federal government $22.5 million, while the city would pay about $8.1 million. Federal and state grants and loans may be available for the city to cover some of its cost.

The city cost would include relocating city services and legal costs of acquiring property, plus 20 percent of relocation costs for businesses and homes.

Rapp said the corps would like to start construction by March 1987.

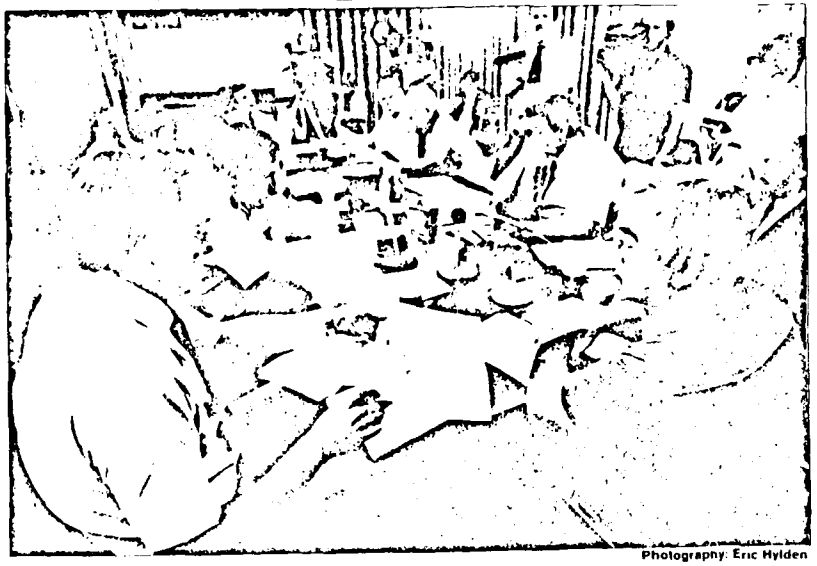
He said relocating families isn't easy, but it can be done. He pointed out that a corps plan for the city of Prairie Du Chien, Wis., meant relocating about 135 families from a flood prone area.

Gary Sanders, the city's consulting engineer, said he believes "negatives have to turn into positives" before the city will go ahead with the project. He said that the city must be assured that businesses and families won't leave the city.

Rapp said there are a number of pony excesses the city has to overcome before it decides to go ahead with the project. "In the middle of the excesses," Rapp said, "is We did it before, so we can do it again." He was referring to the successful community effort to hold back the 1979 flood.

Larry Seymour, who works for the state Department of Natural Resources, said, "The decision the community has to make is whether it is better off protecting what can be protected or not protecting anything at all."

Mayor Louis Murray and many City Council members who must decide whether to accept or reject the corps' plan were at the meeting.



Photography: Eric Hylden

Martin McCleery, left front, from the Army Corp of Engineers and Rep. Arlan Stangeland, R-Minn., right front, look over a flood control proposal during a meeting in East Grand Forks Wednesday.

"I thought they gave a very fine explanation of what they thought they should do," Murray said. "I think there's a lot of questions that still have to be asked, and undoubtedly some public meetings.

"We have not made up any minds yet. We're not going to run into it until we figure it out clearly."

N-B-72

East Grand Forks Flood Control Project



1979 — Dike walker patrols area behind First Street NW

About This Supplement

[illegible] share of the total cost of the project. The city's share is $8.7 million of the $30.7 million total cost. The remainder of the project cost will be funded by the federal government.

This special supplement to the Exponent was developed to assist the people of East Grand Forks in understanding the flood problem, the flood control plan developed by the Corps and city, and the benefits and costs of the proposal. This information will help East Grand Forks decide whether to accept the Corps' flood control plan. In addition the Corps and city will hold a public meeting to discuss the proposed project. The meeting is scheduled for 7:30 P.M. on October 11, 1984, in the Area Vocational Technical Institute, East Grand Forks, Minnesota.

Why should you be involved?

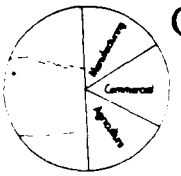
- All citizens will benefit from the recommended plan
- Some residents will be relocated; they will need help in the relocation as well as fair compensation
- The city council needs an informed citizenry and your help in the decision
- You may be asked to help pay
- You may be asked to help participate, plan, decide
- You will be responsible for the consequences of the decision

What needs to be decided now?

- Does the city want to continue studies of the recommended plan (design studies)?

What needs to be decided later?

- What is the final design of the levees?
- What is the final design of relocation and other nonstructural measures?
- What is the final design of the overall plan?
- Who will pay?



City of East Grand Forks

"Center of the Rich Red River Valley"
EAST GRAND FORKS, MINNESOTA 56721

[illegible]

September 20 1984

Dear Citizens

At the request of the City, the U.S. Army Corps of Engineers has been studying the flood problems in East Grand Forks, Minnesota, for the past four years. During this period, they have worked closely with Representatives of the City and have had contact with many local residents.

The Corps has now completed its initial report which outlines a number of ways to eliminate or reduce the impacts of floodwaters on East Grand Forks. It is our turn now to study their proposal and to make the decision whether to support their plan.

To assist East Grand Forks residents in understanding the flood problem and the Corps' proposal, the Exponent and the Representatives of the Corps have put together the special supplement on the proposed flood control project for East Grand Forks. I urge every resident of the City to become involved in the decision process.

Sincerely yours

Louis A. Murray
Mayor

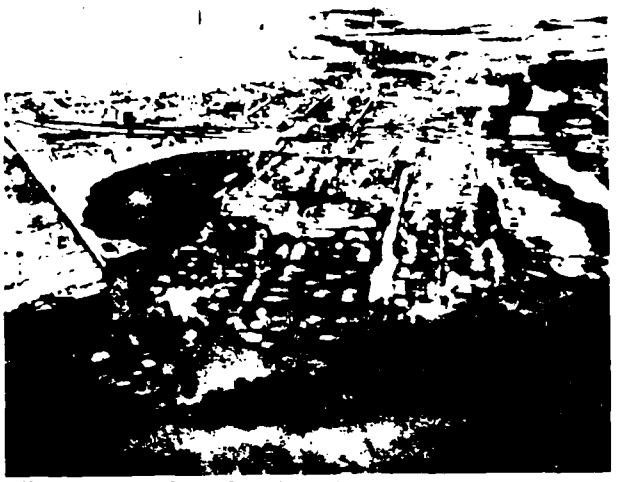
Inside this Supplement

- ☐ The Flooding Problem ..... Page 2
- ☐ Cost of Emergency Protection ... Page 2
- ☐ Old Levees Failing ..... Page 2
- ☐ Flood Plain Map ..... Page 3
- ☐ Flood Insurance ..... Page 3
- ☐ Flood Plain Zoning ..... Page 4
- ☐ Economic Risks ..... Page 4
- ☐ Recommended Plan ..... Page 4
- ☐ Some Questions ..... Page 5
  - What Will Happen to Me?
  - What Will Happen to Our Community?
  - Can We Afford it?
  - What About the Point?
- ☐ Public Meetings ..... Page 5
- ☐ Do You Remember? ..... Page 6

BRING THIS SUPPLEMENT TO THE PUBLIC MEETING ON THURSDAY, OCT. 11, 1984, AT THE EAST GRAND FORKS AVTI



1897 — East Grand Forks DeMers Avenue Photo courtesy of Jerry Kane



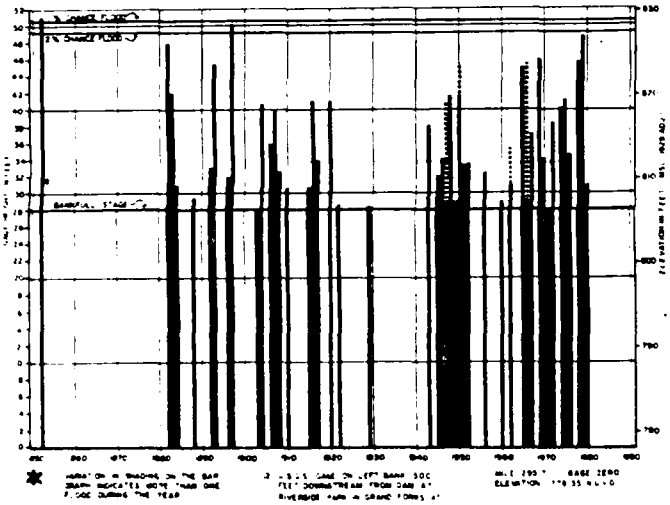
1950 — East Grand Forks "Old North End" in foreground

WHAT IS THE FLOOD PROBLEM?

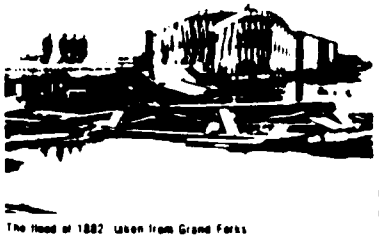
History of flooding:

East Grand Forks has been flooded many times. The following is a partial summary of the height (stage) of significant floods since 1881. Note that many floods in 1898 through 1920 and [illegible] were above bankfull stage. The horizontal lines represent percent chance and identify the percent chance of these floods occurring in any given year.

Floods Above Bankfull Stage — East Grand Forks *



* Number in shading on the bar indicates more than one flood during the year



The flood of 1882 taken from Grand Forks



Taken from East Grand Forks

10 worst floods:

Seven of the 10 highest floods of record in East Grand Forks have occurred since 1950. The 1897 flood is the highest flood documented from historic records, although the 1979 flood of record came within one foot of the 1897 flood. The 1979 flood was approximately three feet below the one percent chance flood.

Highest Floods in Order of Magnitude

Red River of the North at East Grand Forks

Date of Crest	Stage (Feet)	Elevation (Feet)	Estimated Peak Discharge (cfs)
10 Apr 1897	44.3	827.05	85,300
26 Apr 1979	43.6	827.00	82,000
18 Apr 1950	45.4	823.7	75,000
4 Apr 1966	45.35	823.99	55,000
11 Apr 1978	45.73	824.38	54,200
12 May 1950	45.5	823.8	54,300
16 Apr 1969	45.09	824.74	53,500
24 Apr 1965	43.8	820.2	53,300
17 Apr 1975	44.35	822.07	52,000
14 [illegible] 1979	43.27	819.80	42,800

* At Fargo, flood stage = 45.0 ft.

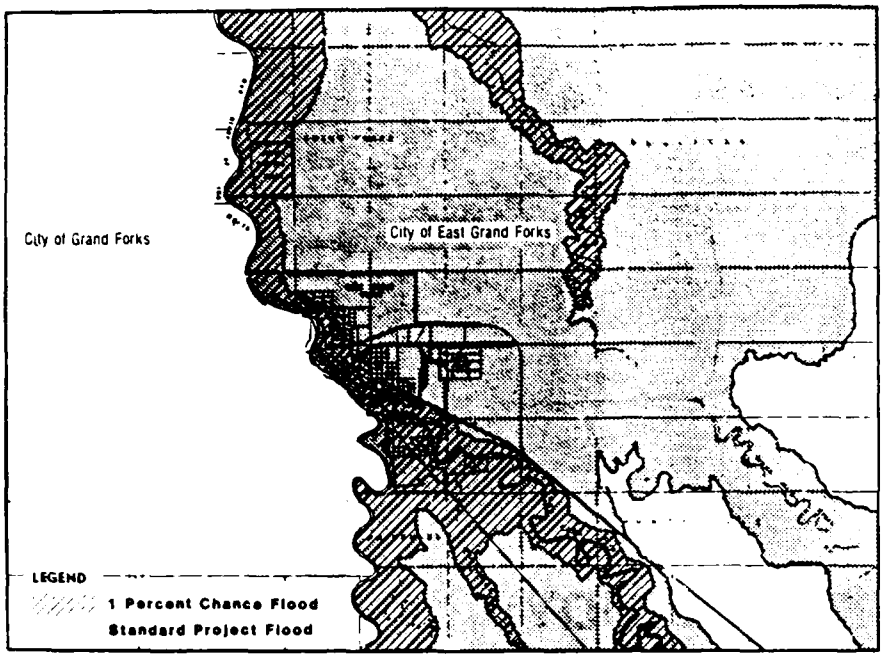
Other major floods occurred in descending order of severity in 1979, 1969, 1965, 1975 and [illegible] in 1975.



Failure of unstable river bank near Crookston in 1980

Emergency levees currently failing along existing alignments:

The stability of the banks along the Red and Red Lake Rivers in East Grand Forks, Minn. and Pembina, N.D. have been [illegible] during the 1979 flood and are [illegible] Emergency levees [illegible] were [illegible] and [illegible] [illegible] [illegible]



FLOOD INSURANCE: Who needs it?

Flood insurance brings to mind many questions. Do you fit one or these categories?

- Who is in the floodplain and who is not? How many people in East Grand Forks really know if they are and if insurance is required?
- I know I am in the floodplain but why buy the insurance every year? The rates keep going up and cover less and it is expensive. It just pays the insurance game and wait until there are floods in Fargo then buy the insurance ahead of the application deadline. No use spending any more than have to!
- I know I am not in the base (1 percent chance) floodplain therefore I don't need insurance. If a higher flood occurs the city state federal or someone will bail me out.

Flood insurance does not prevent or protect against floods it does provide a pool of money to cover losses when a flood occurs. The following tables shows the history of flood insurance use in East Grand Forks. The data is sketchy but it does show that 1/3 of the 1,277 floodable structures in the City a maximum of 388 or 20 percent were insured in 1979 and 1/2 of the approximately $200 million potential flood damages in the city $7 million or 4 percent were covered by insurance in 1979. This means that 80 percent of the floodplain structures or 96 percent of the flood damages in East Grand Forks are not covered by flood insurance. Many homes and businesses are taking a risk.

History of Flood Insurance Policy Use in East Grand Forks

Date	Number Policies	Total Coverage	Residential	Other	Total Premium
Dec. 83	219				
Dec. 82	247				
30 Nov. 81	172	$5,101,800	$4,334,000	$768,000	$16,775
30 Jun. 80	277	7,013,900	6,221,400	768,000	18,774
Dec. 79	368				
Dec. 78	287				

Flooding: How much do you know about it...?

Let's be honest. Your perspective and understanding of the real threat of flooding may not be what it should be that is unless you live next to the river and are forced to watch it flow by your window with only the security of an emergency levee. Or you help a neighbor or the city fight a flood. Or the bank requires that you pay to take out flood insurance before they will give you a loan on the house you live in.

Do you know if your house is in the floodplain? Do you know if you need flood insurance? Do you know the risk of your home or business being flooded that is the chance it has of being flooded what it would cost you who would pay what what assistance could be provided and what you would be expected to pay out of your pocket?

The map shows the 1 percent chance floodplain and the standard project floodplain. About 44 percent of the land surface in East Grand Forks is in the 1 percent chance floodplain. Those who live in either floodplain need flood insurance. Those in the 1 percent chance floodplain will pay more for flood insurance than those in the standard project floodplain because their frequency of flooding is greater.

Keep in mind that the map shows only surface flooding and your sewer and water lines are buried 7 feet deeper. As water enters the sewer system it will back up into your homes and businesses unless the city or individual property owner have protection systems. Note also the flood problem does not end at the border. The city of Grand Forks has a similar flood problem.

Emergency flood fighting activities depend on help from the outside

Through experience with past floods the city of East Grand Forks has developed a very efficient and well trained flood fighting group. It has done the job and prevented major flood damages to the city.

However without outside help from neighboring communities friends county state and federal emergency programs there would have been fewer success stories. Talk to anyone who fought the flood of 1978. They considered it the worst in many years but it was followed by the flood of 1979 which was much higher.

The 1979 flood literally required all the city's resources plus help from outside sources to keep ahead of rising flood waters. State and federal resources were spread thin over a much larger area because everyone was being flooded. Everyone was pushed to the limit. Residents in Warren Reiser Argusville Stephen and Grafton were flooded.

Approximately $1.8 million in federal funds was required to assist East Grand Forks alone in 1979. The Red Cross and Salvation Army spent over $400,000 in this four-county area provided emergency services. The help of community groups and citizens was tremendous. Businesses closed their doors and contributed labor and food to battle the floodwater.

Who they provide the help again? Can the city continue to count on this type of help especially if it takes no positive steps to reduce its requirement for scarce emergency resources?

Protected area needs interior flood control facilities

Interior flood control facilities are storm water drains modified so they can collect runoff water from the interior of the city and pump it over the dikes. This prevents interior structures from being flooded with storm water. The interior water can come from basement flooding and groundwater seepage occurring when sewers are in place for a flood event. The city does not have a system to handle interior drainage during a flood. East Grand Forks depends on emergency pumps strategically placed along dike points in the city to pump water over the emergency levee. This effort requires a substantial commitment of time money and manpower to be sure adequate property is not properly insured. Can result in flood damage to properties and structures in collection points or low lying areas.

Flood plain zoning, regulations hard to enforce

Approximately 44 percent of the land area in East Grand Forks is base floodplain (100 year flood). Virtually all of East Grand Forks is in the standard project floodplain. Strict enforcement of floodplain zoning regulations has been difficult for many reasons. Some of them are as follows:

- Many structures were built before floodplain zoning regulations were put into effect. If the regulations are strictly enforced property owners would not maintain or improve their property.
- Property owners are wanting to improve their property but see the zoning regulations as an unnecessary requirement and expense. "The emergency levees have done this job why do more?"
- City growth and development are being restricted to less expensive non floodplain areas where regulations are less restrictive. Old areas are deteriorating as enforcement continues. Floodplain owners fear they are being abandoned and are frustrated.
- Strict enforcement of floodplain regulations is viewed as forcing business and residential growth to neighboring communities in neighboring states where regulations are less restrictive. The loss of residential and commercial growth due to competing economies in the area has compounded the situation and is sometimes confused with losses due to floodplain zoning regulations.
- The Minnesota Department of Natural Resources (MDNR) wants the city to strictly enforce the floodplain regulations or lose the federally subsidized flood insurance (rates approximately 70 percent). Flood insurance buyers would most probably refuse to buy insurance and either risk a major flood loss or move out of the city. The result is a negotiated enforcement of floodplain regulations.

With permanent flood protection there is no need for flood insurance and no need for enforcement of floodplain regulations.

The city needs a growth plan

One of the more difficult problems for the Corps and city has been pinpointing the city's future. City growth and development plans are usually spelled out in a community development plan which lays out a development strategy and the various components of growth and development. The city's plan until recently was never adopted or used.

Lack of a definite plan has made difficult for city officials and the Corps to evaluate the advantages of a flood plain. A comprehensive community development plan would help determine how the flood control project would benefit community growth and development. Sometimes community direction appears to work at cross purposes.

For example community funds have been targeted to improve business growth in the floodplain along 2nd Avenue. However the Corps proposal calls for that area to be evacuated with businesses relocated to protected areas.

The question is: Why spend money to improve properties in the floodplain if they are going to be removed as part of a flood control project? The city recently took to eliminate this kind of development and planning problem by trying to identify its future direction. City citizens participated in a series of three meetings to define that future.

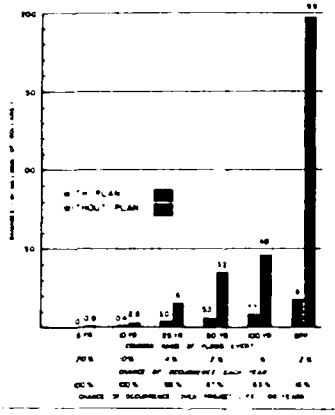
Natural areas along river important to East Grand Forks

The wooded areas along the Red River of the East (Grand Forks are valuable natural resources. Although these areas have been reduced in size because of urban and agricultural development they still provide important wildlife habitat and recreation opportunities.

In addition the vegetation present in these areas tends to stabilize the soil and reduce erosion problems during flooding. A well planned mix of wildlife and recreation components in this riverine environment can benefit the city by providing additional wildlife habitat and recreation facilities plus a reduced maintenance cost for the city.

Economic risk of major flood damages

Risk of Damages in Percent Change for Selected Flood Events Occurring During the Study Period — 1990-2090



Without a flood control project, the City of East Grand Forks faces considerable economic risk in terms of future flood damages. This graph compares the millions of dollars of risk to the probability of flood occurrence with and without a flood control project.

For example, the 1979 flood was about a 50 year flood. That means it has a 2 percent chance of occurring in any given year and an 87 percent chance of occurring in the next 100 years. Project data with an 87 percent chance of occurrence. It's a good bet that it will occur again at least once in the next 100 years.

With a flood of the magnitude that [illegible] residents risk approximately $[illegible] million in potential flood damage without a flood control project. With a project, approximately $5 million of potential flood damage would occur during a 100 year or 2 percent chance flood.

Therefore, during a flood similar to the 1979 flood, the city's investment of $8 million would result in a reduction in flood damages of approximately $[illegible] million.



1979 — Point area of East Grand Forks became known as Isle De-Sandbag

FLOOD CONTROL STUDY: Corps and the City working together

The study

[illegible]

Measures studied

[illegible]

Structural Measures
- [illegible]

Nonstructural Measures
- Evacuation
- Flood forecasting and warning
- Flood proofing
- Flood insurance
- Floodplain zoning
- Emergency preparedness

[illegible]

Plans evaluated

[illegible]



East Grand Forks — Artist's conception of downtown area after plan is completed

Description of the recommended plan

North of the Red Lake River

[illegible]

South of the Red Lake River

[illegible]

Plan accomplishments

[illegible]

THE STUDY TEAM

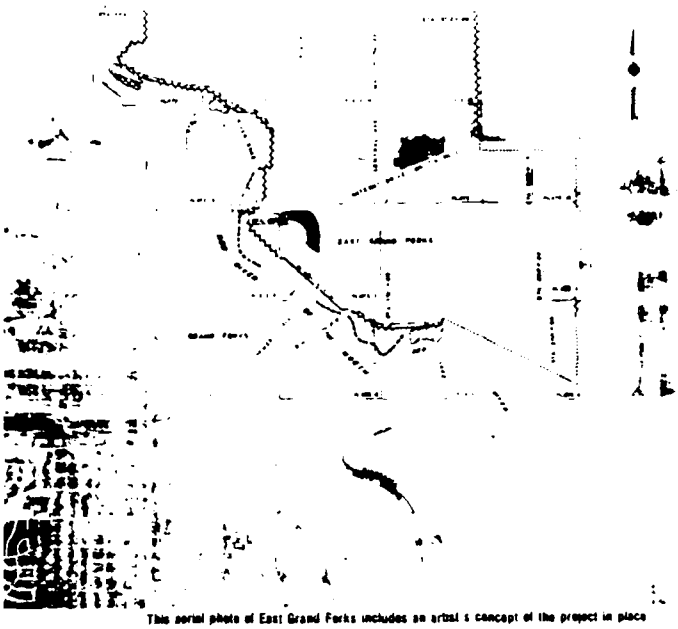
City and Corps personnel have been working together to iden
ify solutions to the flood problem. If you need information or
have any questions or concerns, please contact one of them.

City of East Grand Forks Study Team

Dave Mack	-Study Coordinator
Lewis A. Murray	-Mayor
Jim Gander	-President, City Council
Karl Lindquist	-City Attorney
Robert A. Mart	-Former City Attorney
Robert Peabody	-Former President, Chamber of Commerce
Mellord Johnson	-Coast-to-Coast
Steve Gorman	-Alderman
Jim Mangoven	-Alderman
George Wegaman	-Alderman
Duane Fettig	-Alderman
Paul Hanson	-Alderman
Lynn Stauss	-Alderman
Allen LaFave	-Alderman
Gary Sanders	-City Engineer
Don Schneider	-City Housing and Redevelopment Authority
Daniel J. Formato	-Civil Defense Director
Ellis Larson	-City Assessor
Edwin Osowski	-Superintendent, Streets and Sanitation

Corps of Engineers Study Team

Martin McCleery	-Study Manager
Jim Diedrick	-Economist
Rich Pomerleau	-Engineer
Mark Zismer	-Engineer
Mike Lesher	-Engineer
Ralph Berger	-Engineer
Suzanne Gaines	-Sociologist
Terry Pfutzenreuter	-Archeologist
Frank Star	-Outdoor Recreation Planner
Randy Devendorf	-Wildlife Biologist



This aerial photo of East Grand Forks includes an artist's concept of the project in place

SOME GENERAL QUESTIONS:

"What will happen to me?"

If you are in a relocation area — where your home or property must be acquired for the project, your rights are protected by Public Law 91-646. Fair treatment for homeowners, renters, and business people is discussed in several government pamphlets. Purchase of property will be handled by the City's Housing Redevelopment Authority (HRA). Don Schneider, HRA Executive Director, is experienced in helping East Grand Forks residents get resettled after other such projects.

If you are in a protected area, your property value and your safety will be greatly increased. In addition to reduced concerns about possible floods, the legal restrictions on development in the floodplain will be removed. This will mean you can improve your property without expensive zoning requirements and property value will probably increase.

If you are on the Point (south of the Red Lake River), you will not see any changes in your neighborhood — until the next flood. At that time, an improved emergency flood fighting plan, lower flood stages due to the levee setback across the river, and greater availability of city emergency resources — formerly committed to the entire city — will help make flood fighting more successful on the Point.

"What will happen to our community?"

The Corps believes there will be four general effects on the community relating to relocations, taxation, flood fights, and property values.

- Relocations necessary for the construction of a safe, permanent levee would mean that many homes (closest to the river, north of the Red Lake River) would be moved, and that the first blocks of downtown businesses would also be moved. Most residents (about two-thirds, according to surveys) would choose to relocate within the city. But some would choose to move to North Dakota or elsewhere. Most businesses would also choose to stay in the city, either further out along Gateway or north on 220. Since some of the blocks to be vacated are difficult to redevelop with businesses and costly to maintain, or improve due to floodplain restrictions, this may be an ideal chance for the City to redevelop, create a new downtown in the flood protected area.
- [illegible] would be necessary to pay for the City's share of the flood protection. The City has not yet developed a plan showing the average cost per property owner. The City hopes to receive grants from the State and other State agencies to pay a large portion of its cost. However, this type of assistance is becoming less and less available.
- Flood fighting should cut costs and energies in the future. Can be studied on the Point, and even there the flood [illegible] be slightly lower. This means less dirt, [illegible] and fewer [illegible] residents and businesses will be involved in flood fights. Greater development [illegible] and flood insurance will no longer be necessary on much of the City, which means [illegible] flood problem.

"How can I influence the project?"

In the next few weeks, the City will be making the important decision whether to concur in the Corps' plan. If the city concurs, the Corps will develop detailed plans for the levees, design and work with the City on the relocation part of the plan.

Before the City makes that decision, there will be a public meeting held on October 11, 1984, in the Area Vocational-Technical Institute. This will be your chance to learn more about the proposed project and to express your opinions to your elected city representatives and to the Corps planners. You may also want to contact your State representatives. In addition, you may want to write or call:

The City of East Grand Forks
Dave Mack
City Clerk/Treasurer
East Grand Forks, MN
56721
218-773-2483

(or) The U.S. Army Corps of Engineers
Marty McCleery, Project Manager
1135 U.S. Post Office and Custom House
St. Paul, Minnesota 55101
612-725-5882

"Can the city afford the plan?"

The city and the Corps are concerned about the costs of the project. An earlier grant application by the city to the State for flood-related assistance was unsuccessful, but the city and hopes to get help from the State or from other federal sources.

If the city has to pay $8,100,000 for its local share, without other help, it will be a significant fiscal burden for the community for a number of years. And the city has not yet addressed the issue of who should pay for those costs. The other way of asking the question is: Can the city afford not to have confined flood protection?

"Why must the levees be set back so far?"

No one wants to pay for flood protection only to find out that a few years down the road expensive repairs are required to maintain the project as a result of foundation failure. To make the flood control plan work, the levees need to be moved away from the unstable city riverbanks of the Red and Red Lake Rivers, basically to remove the risk of any failure. You may already be aware of the stability problem from conversations with neighbors whose homes have experienced cracked basements or foundation failure because they were too close to the riverbank or existing emergency levees.

Or you may remember neighboring communities which have experienced serious and expensive failures of levees and riverbanks. Some of these include St. Vincent, Oslo and Cropston, Minnesota and Drayton, North Dakota.

The Corps' technical staff has gathered much information on East Grand Forks' problem and has determined that the permanent levee location provides the necessary factors of safety to guarantee permanent flood protection for the city. Levees closer to the river would not provide this protection.

"What can be done for the Point Area"

Many residents of the Point area are concerned that no permanent solution can be found to their flood problem. Permanent protection is not feasible because the cost of protection exceeds the benefits. However, there are many things the city and Point residents can do to reduce their risk of flood damages. The plan as recommended contains several nonstructural measures for dealing with the problem. These include preparing an emergency plan of action, flood insurance, flood forecasting and warning, and floodplain zoning. The advantages of these measures to the city and Point residents include:

- The permanent flood protection plan north of the Red Lake River.
  (1) Frees up the emergency flood fighting resources of the city residents and other agencies and groups, focusing them on the needs of the Point.
  (2) Reduces flood levels on the Point by removing obstructions in the floodplain.
- The emergency plan of action provides:
  (1) An organized step-by-step emergency plan for the locals to minimizing flood losses and preparing residents and emergency agencies and activities for the fight against flood losses.
  (2) A plan for laying down [illegible] emergency protection such as emergency clay levees, [illegible] sidewalk levees, and other emergency facilities to reduce future emergency costs.
- Flood insurance, though it does not prevent flood damages, would be utilized to hedge against flood losses where emergency efforts fail. This would protect the City and Point residents against a possible $10 million in flood damages.
- Flood warnings and forecasting would provide sufficient time for the city and others to implement the emergency plan of action as well as to obtain the necessary insurance protection.
- Floodplain zoning regulations would be enforced to assure owners and buyers that structures meet acceptable city and state requirements for floodplain property.

REMEMBER —

- Review the supplement
- Discuss the project with friends and neighbors
- Attend the Public Meeting:
  Thursday, Oct. 11, 1984
  EGF AVTI
  7:30 P.M.

Do you remem'er?



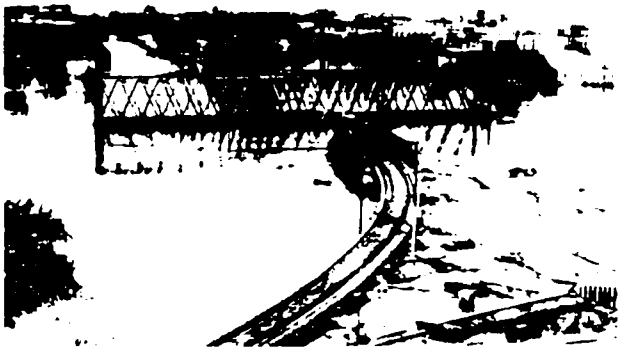
Where the Red and Red Lake rivers meet — Before East Grand Forks (lower part of picture) had emergency dikes



May 11 1965



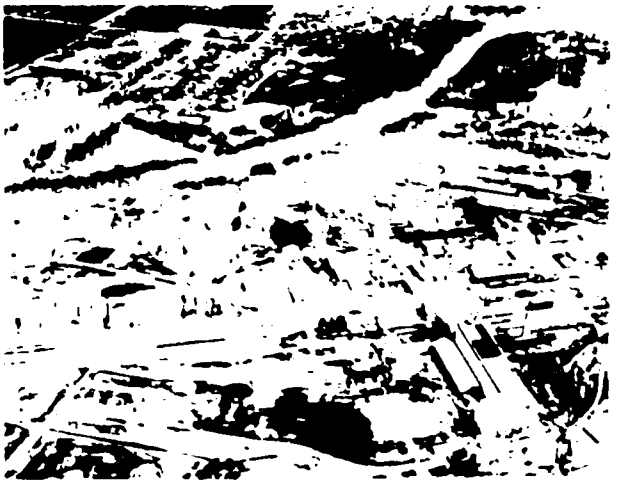
Sand bagging operation in 1979



April 1897



1979 — Kennedy Bridge at left East Grand Forks in top of picture



1979 — East Grand Forks in top of picture

City to host expert on flood project aids

East Grand Forks City Council President Jim Gander returned Tuesday from a 1,020-mile trip to Wisconsin where he spent a day and a half with the project coordinator of a flood protection program at Prairie du Chien, Wis.

That project was one that involved the relocation of many homes and businesses. Steep banks along the Mississippi River there made dike building unnecessary, Gander told the council in his report at Tuesday night's council meeting.

The point of Gander's message was that with state and federal grants and other sources of financing, the "city there didn't have to levy a dime."

The person finding the sources of funding was Dale Klemme, the project engineer for the City of Prairie du Chien. And, that's who Gander went to see.

Besides a four-hour personal visit with Klemme, Gander compiled notes from phone conversations with many other government officials there, took tours of the project, and, of course, took a number of photographs.

"If we get any ideas about going through with the Army Corps of Engineers' proposed flood protection plan here," Gander said, "we're going to have to have the help of a guy like this."

Klemme, Gander said, had indicated that he would be interested in visiting East Grand Forks to meet with community leaders and perhaps the council as a whole. He might also attend the Corps of Engineers' public hearing scheduled for 7:30 p.m. Thursday, Oct. 11, at the AVTI.

To Gander's proposal that the city finance Klemme's visit, Alderman Lynn Stauss replied, "The expenses of a three-day visit are nothing when you are dealing with the consequences of a multi-million dollar project."

Klemme is expected to be in the city next week.

In other business Tuesday, the council:

- Supported the application of Ideal Aerosmith, Inc. for a $250,000, one percent, 15-year loan/grant from the Minnesota Department of Economic Development (DEED).
- Approved using $114,000 in 1985 federal revenue sharing funds to help pay police salaries.
- Approved a special use permit and a variance from flood proofing ordinances to allow the park department to construct a restroom facility this fall in the new River's Edge Park. The park is being developed as a

See FLOOD EXPERT, Page 2

Flood expert

Continued from Page 1

campsite below the city maintenance building.

- Approved a variance to allow Consolidated Resources, Inc., Grand Forks, to have a 74-foot driveway to the convenience store-gas station it is building on 2nd Street NE at the north end of the Red Lake Bridge. The variance is for 12 months and subject to review.
- Authorized the Civil Service Commission to fill a vacancy in the street maintenance department, a new fulltime position in the park department, and a secretary for the building inspector-tax assessor's office.
- Learned from Kerry Knoff, director of special city projects, that free rides will be offered the first Saturday of each month on the Grand Forks City Bus that is serving East Grand Forks on a trial basis.
- Approved $2,000 payment to help finance the publication of brochure that will be used to promote Greater Grand Forks.
- Approved a resolution to allow the city to apply for $350,000 in industrial revenue bonding authority to provide financing for JST, Inc., which is planning a new potato processing plant in the industrial park.

FARGO FORUM - October 7, 1984

Dike plan places EGF on hold

By Ed Maixner
STAFF WRITER

EAST GRAND FORKS, Minn. — About 200 homes and businesses remain on hold while this community of 8,400 people looks at a plan to surround about two-thirds of the city with a new dike.

Plans for a new dike have suspended the real estate market in the neighborhood near the confluence of the Red River and Red Lake River. Colleen Bushy, 12 1st St. N.E., asks: "Where we are now? No one will buy (a house)."

The East Grand Forks City Council created a flood control committee five years ago, and asked the U.S. Army Corps of Engineers to provide technical assistance.

The fruits of the community planning and engineering work is a plan by the Corps to build more than six miles of levee and floodwall, and raise the elevation of streets and roads on the north and east sides of the city. The top of the new dike would be six feet higher than the rim of the present dikes, said City Engineer Gary Sanders.

Construction of the levees, road raising and relocation of 180 homes and 33 downtown businesses are to cost about $30 million. City officials are guessing the local share of costs would probably be $8 million. That is nearly $1,000 per capita.

Residents will get a detailed look at the plan Thursday. The Corps and city officials have scheduled a public hearing for 7:30 p.m. at the main cafeteria of the Area Vocational Technical Institute.

Residents first learned of the $30 million dike last winter.

A striking factor in the plan is its distance from the rivers. While the present dikes follow the floodway, the proposed levees are drawn across the downtown commercial district and residential neighborhoods developed through the first half of the century.

Sanders said Corps engineers have not trusted the old dike because the ground beneath it is not stable. To build a dike high enough to protect the community from nearly any imaginable flood, the earth must be stable. For the Corps,, that means building it about 700 feet from the river. All buildings that end up on the rivers' side would have to be removed, Sanders said.

"When the plan first came out people thought it was preposterous," said Greg Stennes, owner of Whitey's restaurant-lounge near the Red River. But, the plan does offer greater flood protection, and people are, more recently, seriously weighing the costs and benefits, he said. If enough federal and state money can be found, the community might go for the big dike, he said.

That's all contrary to Stennes' own sentiments. Whitey's is a downtown landmark. "College kids come here because their parents came here," he said. The location and the building's 1930 origin as a saloon carry an identity that cannot be duplicated at another location, he said.

If built, the new dikes would mean removing about 180 residences. Some of the homeowners think the Corps' solution to be excessive, economically foolish and unnecessarily disruptive.

Al LaFave, 60, lives a block from the dike that has protected his neighborhood from floods since the mid-1960s. The greatest recent flood, in 1979, required a temporary earthen top for the old dike.

But, LaFave, a city councilman, built his own house in 1953 and thinks it would be capricious for a great new dike to be built over his lot.

"It would be better to just fight the floods when they come," he said. 1979 was the only year the current dike has had to be extended, he said. "We're told the (old) dike will slide into the river. But each day I look and she's still there."

Financially, the burden of the new dikes would be borne by all residents, LaFave said. The affected homeowners "will come out smelling like a rose," he said. "They (the city) will give us $15,000 to relocate, plus the value of our houses. Then, after the houses are moved, we can turn around and buy the houses back if we want — and probably for less than we sold them."

Minnesota law also coerces homeowners to go for the dikes.

Sanders said Minnesota restrictions on building in river flood plains are more stringent than federal regulations. Homeowners cannot build additions to their houses, for example, or rebuild if fire destroys more than half the value of a house.

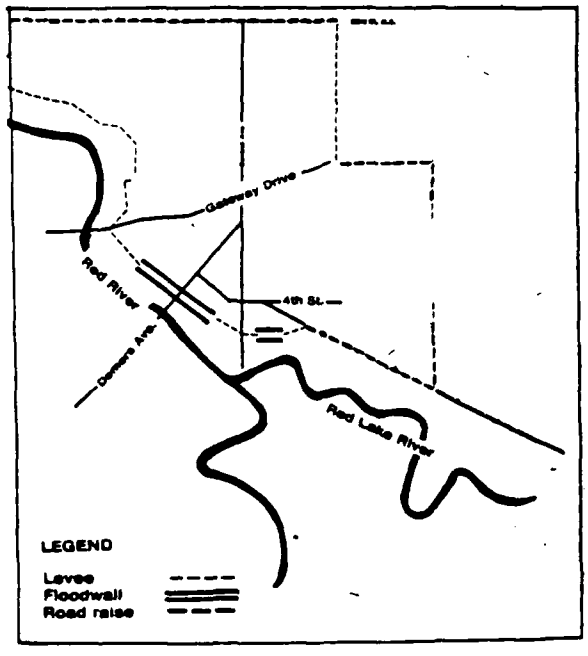
Sanders said he is not an advocate for the Corps proposal. The city will face costs beyond its $8 million, he said. The dikes will be expensive to maintain. Also, relocation means the costs of new streets and utilities to areas were houses and businesses will be moved.

"In the meantime, East Grand Forks has a problem, and the Corps has a solution," Sanders said.

Stennes hopes city officials look closely at relocation before they adopt the Corps plan. North Dakota taxes are less than Minnesota taxes, he said. If uprooted, businesses and homeowners will likely move to Grand Forks, he said. And, the 30-plus businesses which would be uprooted represent about half of the city's downtown business district, he said.

Steve Gorman, a city councilman and executive vice president of the city's Chamber of Commerce, said Stennes' scenario is not taken lightly.

"We realize we can't fight floods forever with shovels and sandbags." Still, Gorman said, "the Chamber members are in the middle at this point — we have mixed feelings. The Corps proposal is potentially very expensive and very disruptive." The local costs would worsen the tax differential between East Grand Forks and Grand Forks, a factor that has already dulled his city's ability to attract new businesses, he said.





GREG STENNES

GRAND FORKS HERALD - October 10, 1984

Hearing on EGF flood plan could draw big crowd

By Liz Fedor
Herald Staff Writer

Jim Gander, president of the East Grand Forks City Council, hopes as many as 500 people come to the Area Vocational Technical Institute Thursday night to hear how a $29 million flood-fighting project would affect them.

The alignment of the proposed levees has not changed, but Clerk-Treasurer Dave Mack said the 7:30 p.m. hearing was scheduled to clarify the details of the project and answer the public's questions.

Next month, council members will decide whether the corps should continue work on the project. "If the decision is yes, we continue to do design studies," Martin McCleery, corps project engineer, said. "If no, then we drop the study, and that's the end of it."

Council members are becoming more receptive to the project, Mack said, because they're beginning to see how it would work. Some weeks ago, he said, the council probably would have torpedoed it.

"If there's some way we can swing it and satisfy the people involved, I'd like to see the thing go through," Gander said. He would not commit to a vote for continuing project planning, however, because he wants to hear Thursday night's testimony.

Gander said he was reassured about the project's feasibility when he visited a corps project in Prairie du Chien, Wis. That city relocated a number of residents, and local taxpayers didn't have to bear any of the cost.

Dale Klemme, project coordinator in Wisconsin, will attend Thursday's session at the invitation of the council.

Please see EGF, 9A

EGF

Continued from Page 1A

According to the corps draft report for East Grand Forks, structural levees would be constructed north of the Red Lake River. However, there would be no construction along the Red Lake River on the Point — the city's south end. All portions of the city would get new flood-plain zoning and enforcement and plans for flood warning and forecasting.

The plan calls for the evacuation of 204 residential and commercial structures, which are either in the way of the proposed levee or between the levee and river. McCleery said the corps is still unable to tell people how much they will be paid for their homes.

Neither city nor corps officials predict how much the project would cost East Grand Forks property taxpayers.

A final decision on the project won't be made until early 1986. At that time, McCleery said, city officials will know more about grant money available to offset local project costs. As the project is designed, the federal government would pick up $18.9 million, but the city would be responsible for raising $10.2 million through local levies or grants.

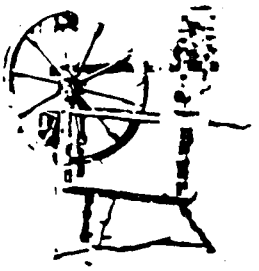
Council member Steve Gorman said he won't take a firm position on the project until he learns what kind of assistance East Grand Forks will get.

"I support continued study, however," Gorman said. After all the facts are known, he said, "The council has to assess whether the threat of flood protection is greater or less than the threat of flooding."

Copies of the corps report are available in the East Grand Forks City Hall and Public Library. People who do not want to speak during Thursday's hearing have the option of sending written comments to the corps by Oct. 31.

Homespun

Tonight's meeting important to all...



Thanks for for turning to this piece but, *if tonight is* Thursday and you live in EGF, why aren't you at the public meeting on the Corps of Engineers' flood protection proposal?

It starts at 7:30... at the AVTI. It will go on for a couple of hours, so, if its after 7:30, there's still time to hear about it.

Ah, but my home or business isn't one of those that would be taken if the project goes through, you say. That may be true, but your property, regardless of where it is located, could be taxed for your part of the $8 to $10 million in local costs. You ought to go hear what will be said; ask the questions that you feel need to be answered.

This column and the television set will still be here when you get back.

Hope you had a chance to read the supplement explaining the project that was a part of last week's paper. The information in those pages was provided by the Corps of Engineers. Sponsorship was by the City of East Grand Forks.

Its publication in the Expo should not be taken to be an endorsement either by the newspaper, or by the city council. Instead, the supplement was designed only to help the community decide if it wants to proceed with the planning.

Personally, we have two major reservations about the plan.

First, and most important, is the effect that removal/relocation of up to 200 homes and businesses would have on the community. Simply, it's the question of who and how many would leave, and who and how many would stay?

Our second concern is that of the local cost... the actual dollars expended beyond the economic impact of the inevitable loss of businesses, homes and people.

Some are calling the urban renewal project that was done in the early 1970s a big mistake. Based on that experience, the clearing that would have to be done for this project has the potential to be even more damaging.

On the financial side is the $8.1 million local cost. True, some and maybe almost all of that could be funded by outside sources, but there needs to be an overall assessment of the final "cost-benefit" ratio to the city. In short, is the loss of tax base and people worth the protection?

Review — These seem to be the major points to be considered:

The project would offer a 50-year level of flood protection (to the levels of 1979) for a total cost of $30.5 million, with the city's share of cost to be $8.1 million. That $30.5 million expenditure would save about $27 million in damages for a flood of the 1979 level. Federal aids provided East Grand Forks in 1979 totaled $1.8 million. A 50-year flood is one that has a two percent chance of occurring in any one year; or, by corps calculations, one that has an 87 percent chance of occurring in the 100-year life of the project.

I have difficulty in making those numbers add up to the benefit of either the city or federal government.

The indirect costs to the city — those involved with the loss of businesses and residents that would certainly occur to some degree — are the real hang-up.

The city, of course, needs flood protection. Thus, there is risk either way.

The part of the plan that seems most damaging to the community is the distance involved with the set-back of the dikes. I have a hard time believing that not to be an over-kill.

But, if the set-back distance really has to be that great, I believe (as has been noted in this space before) that the community needs more time — 20 years or more — to prepare for the project. With that extended preparation and planning period, there could be an ongoing acquisition program and we could avoid the total chaos that a mass exodus would create.

A point in favor of that thinking, too, is that if we are to say "No" to this plan now, nothing will apparently be done and 20 years down the road the situation won't have changed much at all. And, if we say "Yes," the effect of our "total costs" may be more than we can afford.

Questions concerning relocation that need to be addressed include what the effect of a mass move from some 200 properties would have on the value of real estate. Simply, if about 170 homeowners are suddenly looking for some place else to live, what will happen to the prices of homes that are now on the market?

Some homes in the project area would, of course, be moved, but not all are suitable for relocation. Of those that are, where will they go?

We can't help but believe that exaggerated prices will develop and, thus, force many out the community even if they would prefer to stay.

The same is true of commercial property.

The cost of new construction for both homes and businesses has, of course, gone up over the years — probably to the point where it isn't economically feasible for most.

There are other concerns, too. Like, the effect that a wider channel — the result of a set-back of dikes — will have on downstream communities and farmlands. Water will certainly reach them faster and have a greater impact.

And, there is the question of who pays for the project. Do Point area residents, *who get no direct protection, have to* pay? If so, what is fair? What about north end properties that are on seemingly safe sites? And, those properties that might benefit the most are the ones that will be taken in the project, so who is left to pay?

There are many other questions that need to be both asked and answered. And, that's why you ought to be at that meeting. If you haven't left yet, get going. See you there.

Dike alternate needed

EAST GRAND FORKS — I can't understand the East Grand Forks City Council even considering the Corps of Engineers grand plan for a dike. They certainly must have an alternate plan that isn't so expensive, but, of course, the corps wants the most expensive plan

I'm a senior citizen. A lot of people in the area are older people, and I don't think any of us can afford to relocate. Taxes and everything will be higher.

My house is paid for and now they say we may have to move. They say they will pay you a fair market price for your home. Even if they paid $10,000 above the appraised value of my home, you couldn't buy a house that was in good shape for that price; so you would end up spending thousands of dollars to fix it up. They don't consider all the work you put on the yard, the shrubs or trees you planted.

I know some changes have to be made in part of the area, but I'm sure the corps can come up with an alternate plan that isn't so drastic.

I hope the City Council considers these people who elected them and considers their feelings and needs, too.

Ruth Dunton

The East Grand Forks City Council will hold a public hearing on a flood protection plan tonight at 7:30 in the Area Vocational Technical Institute. — The editor.

Downstream burdens

GRAND FORKS — Landowners north of the Grand Forks-East Grand Forks metropolitan area should know that at tonight's public meeting at the East Grand Forks AVTI, the U.S. Army Corps of Engineers will review its proposal that new levees, or dikes, be constructed to protect the property of East Grand Forks residents during flooding along the main stem of the Red River of the North. The flood-control project will require East Grand Forks to bear $8.1 million of the $30.5-million total cost. The remainder of the project cost will be funded by the federal government.

In a special announcement to East Grand Forks citizens, the corps states, "According to the study, levees are the only economically feasible structural measure which will significantly reduce flood damages at East Grand Forks." What happened to all the action-packed ideas aired during the meetings after the 1979 flood? Where is the promised "mainstem study" then proposed by the corps? Where is the super board of counties organized to alleviate upstream flooding? Where is drainage control under the enforcement of the states of Minnesota and North Dakota?

The plan suggests a one-block setback of such dikes, thus creating a wider channel for Red floodwaters to pass through the Grand Forks-East Grand Forks area. Although the plan will ease flooding in both these sister cities, the new wall of water would create even greater damage to farmlands and communities north of the metropolitan area. Remember, Walsh County and Grand Forks County citizens paid into a fund to bring suit to remove or lower dikes already existing north of Grand Forks-East Grand Forks. The proposed levees would create new burdens for landowners north of these sister cities.

Perhaps it would be better if the corps proposed flood control measures centered upstream. Then, all area landowners along the Red can be assured of some meaningful action to control an old problem.

John Rolczynski

GRAND FORKS HERALD - October 12, 1984

500 turn out to get 'facts' on dike plan

By Liz Fedor
Herald Staff Writer

Linda Novacek strode to the front of the crowd of 500 people and asked engineer Martin McCleery what an eight-foot flood dike in East Grand Forks would do to her.

"How much of our backyard will be left? Will I be able to see out of my kitchen window? I'm awfully short," the East Grand Forks woman said.

"You'll be able to see out your kitchen window. I'm not sure you'll be able to see over the dike," McCleery said.

Novacek was among a large crowd that gathered at the Area Vocational Technical Institute Thursday to hear the U.S. Army Corps of Engineers explain how a $30 million flood-fighting project for East Grand Forks would be implemented. That proposal includes the construction of a levee system parallel to the Red River and the evacuation of 204 residential and commercial structures.

Within a month, the seven-member City Council will vote on whether the corps should draw up specific design plans for implementation of the project.

Opponents of the project dominated public testimony, but only a few dozen people stood to state their views.

Several council members said they have not made up their minds on the issue.

They said they view it as a controversial and important matter.

All, except council President Jim Gander, passed the opportunity to address the crowd. Gander said he saw strengths and weaknesses in the project, and he did not take a firm position.

"The City Council is absolutely neutral on the whole thing until they get all the facts. . . We could make it work if you people want it to work," Gander said.

Two council members who remain undecided on the project's fate are running for higher office.

"I haven't made up my mind yet," said Jim Mongoven, a Polk County commission candidate. During his campaign for the county board, Mongoven said he has been talking about the dike proposal as he travels door-to-door. "They haven't got the whole story yet," Mongoven said, so citizens do not know what they want.

Steve Gorman, a Republican legislative candidate, said earlier this week that he favors going ahead with a study of the corps proposal. But, he said, he will not commit to the project until he gets specifics about how it would affect the East Grand Forks community. Gorman did not interpret the strong turnout Thursday

Please see DIKE, 7A

Dike

Continued from Page 1A

night as support or opposition to the plan. "The concern is great, and the confusion is massive," he said.

An endless series of project questions followed public testimony during the 2½-hour hearing.

Civil Defense Director Dan Formato said, "The people here want facts."

If homeowners and business people are forced to leave their locations, Formato said, "deep down I believe some people will stay." However, he added, "What will it do to our business area?"

"I don't think we, the city, have anything to lose by continuing study" on the project, Formato said.

Col. Edward Rapp of the Army Corps said the federal government will pay for the cost of drawing up design specifications for the project.

The city would not need to decide to accept or reject the project until February 1986.

Some people vented their frustration with the plan at Rapp. They said they believe the corps is pushing this project on East Grand Forks.

But Mayor Louis Murray said that the city asked the corps to draft this proposal in an effort to find a long-term solution to the continuing flood problems.

"I thought they're being fair about it. I don't think they're giving a biased report," the mayor said.

In response to a question, Rapp said he is not trying to peddle this project in his personal interest. "You're participating with the federal government, and I'm not selling. I don't care if you buy it or not. I don't have to live here. We put in our very best effort so you can have a choice. Now it's the city's future that you must decide on."

Those who spoke generally favored maintaining the city's emergency dike system and using nonstructural measures to minimize flood damage.

Gary Brown, Whitey's Cafe head cook, said, "I feel this idea is crazy." He asked corps officials what would happen to the employees who may be laid off because of the evacuation plan. Whitey's and other businesses adjacent to the DeMers Avenue bridge would be forced to move under the plan, since the dike would run along Second Street Northwest.



Photography: John Stennes

Col. Edward Rapp of the Army Corps addresses a crowd of 500 Thursday in the East Grand Forks AVTI.

Marv Devig, president of American Federal Savings & Loan, opposed the plan. He said his company would relocate in East Grand Forks, but he is not so sure other businesses in his building would follow suit.

Former council member Bob Peabody said, "We need protection. But do we need the total protection as presented in this plan?"

Others outside the East Grand Forks area came to criticize the plan.

John Rolczynski, Grand Forks, said East Grand Forks should not be contemplating levee construction without looking at the affect on other people along the river. "If we continue to solve the problem by levees and dikes, it is only stop gap," Rolczynski said. He favors drainage control throughout the valley.

Iner Quern, Oslo, Minn., spoke in favor of retention ponds and water control satisfactory to the concerns of Minnesotans, North Dakotans and Canadians.

Rapp told the crowd, "There is no ubiquitous panacea for the Red River of the North. There are pieces that are justified." The proposed East Grand Forks project is one that he suggested is worthwhile.

"This project will not hurt flooding in the rest of the valley," Rapp said. "It will help stabilize your economic community."

East Grand Forks resident Roland Stabley said that the flooding problem will not disappear, and that it is unrealistic to assume that the federal government will continue to provide aid during major floods.

"We need to take a little bit more responsibility," Stabley said.

Ivan Ferguson, a certified public accountant, did not speak during the meeting but said during an interview that he favors the flood-fighting project. He would be affected by the project because his business is located at [illegible] St. N.W.

"It's the only [illegible] that's available," Ferguson said.

FARGO FORUM - October 13, 1984

E. Grand Forks board seeks views on dike proposal

East Grand Forks, Minn.

The East Grand Forks Council is seeking more local opinion on a $30 million dike proposal after holding a public hearing Thursday night.

Council president Jim Gander said the plan developed by the Army Corps of Engineers brought "lots of cards with comments" at the hearing, so additional ideas are to be solicited over the next month.

Gander said the council then will have two choices: "scrap the whole idea, or continue working with them (the Corps)." Improved flood protection has been a council committee concern for five years, and longer for low-lying property interests.

East Grand Forks property owners would have to pay about $8 millon of the cost of Corps' proposal to give protection above the 100-year flood level.

The plan proposes more than six miles of new levee and floodwall about six feet higher than the present earthen dike capable of protecting against a 48-foot flood.

In addition, several streets and roads would be raised and about 180 residential and 30 commercial properties would have to be relocated.

Gander said he believed reaction to the dike proposal was split about evenly among the estimated 500 people at the three-hour hearing.

However, councilman Al LaFave said a show of hands at Thursday's hearing indicated that the majority of people present were against the proposal. LaFave admits to being prejudiced. His home is a block from the existing dike that has protected the neighborhood for about 20 years and the new dike location would run across his lot.

Gander said he believes not much progress could be expected before 1986, even if everything proceeded smoothly.

EXPONENT

ıding Minnesota communities (USPS 490-890) Price 25¢ OCT. 18, 1984

Little new information given at dike meeting

The over 400 people who attended last Thursday's public meeting on the Army Corps of Engineers' plan for a flood control project for the City of East Grand Forks got little in the way of new information.

The meeting, which was designed to be a hearing, was just that — mostly a repeat of information made available in the past.

And, it was a chance for residents — along with some non-residents, too — to express their feelings about the overall flood problem of the Red River Valley and to voice their concerns that generally followed the contention that, while the project would be of benefit to the community, it would also be very damaging in terms of the property that would have to be acquired.

In explaining the project's need, the main point of Martin McCleery, study manager for the St. Paul District of the Army Corps of Engineers, was that the emergency dikes built following the 1950 flood are located on an unstable foundation and are not safe.

The corps' protection plan, which would involve the construction of new dikes set well-back from the river, would provide protection from a 1979 and greater flood, he said. Its cost would be $30.5 million, of which $8.1 million would be a local cost.

With the repeat of 1979, McCleery asked, "Are the people (the thousands of sandbaggers) going to be there again?"

And, he warned, "the levels of the existing dike can't be raised without serious risk." Upstream controls, such as dams on tributarties to the Red River, and diversions, he said, "won't sufficiently reduce the flood level."

And, East Grand Forks, he said, needs outside resources to battle major floods, with its most vulnerable point being the downtown area — the area west of 2nd Street NW, including the 100 block of DeMers Avenue.

The Point area of the city, the area south of the Red Lake River, McCleery said, was removed from the plan because "most structures are on high land and the construction of levees was not justified as economically feasible."

Should the plan be endorsed by the city council, first for the continuation of the study (a decision that must be made yet this year) and later (in February 1986) by signing a formal agreement to proceed with the project, McCleery said, acquisition, evacuation and construction would be conducted beginning in March 1987. Completion of the project would occur in 1990.

Col. Edward G. Rapp of the St. Paul District office, said that the 35 percent local cost of $8.1 million would generate a "four to one" payback in reduced flood damages over the 100-year life of the project.

The concern about the overall problem, during the hearing portion of the 2½-hour meeting, was led by Maurice Bushaw, Grand Forks, representing the Grand-Walsh Water Control Cooperative; Iner Quern, Oslo

Please see DIKE MEETING, Page 2

N-B-78(9)

Dike meeting

Continued from Page 1

farmer, representing the Lower Red River Water Management Board; and John Rolczynski, Grand Forks, a veteran follower of flood control issues, mostly in North Dakota.

All three pointed up the need for basin-wide controls, with Bushaw charging that, "every Corps project so far has not concerned the basin-area whole." He said, "If we keep draining like we are, this (proposed) dike system will be topped, too."

Quern pointed out that "what is good for the farmers, is good for the entire area," asked how there "could be $80 million in benefits from this system of dikes, when you couldn't justify a series of three dams on the Red Lake River for the same amount of money?"

He added that impounding of water in that three-dam series on Red Lake River, along with construction of a large control on the Sheyenne River in North Dakota could provide "two-thirds of the 1.3 million acre feet of impoundment that is needed to control flooding along the Red River." And, he said, that the impoundments would provide for a constant water supply in the river.

Rolczynski called the diking proposal a "stop-gap" plan and said that he would "rather eat steak at Whitey's than sit at some suggested picnic table (in the park area created by the clearing of the area)."

He said flood control should begin upstream.

The "residents" portion of the hearing made many points, most opposing the large acquisition of property that would force about 170 families and another 30 businesses to relocate.

Jerry Brown, a cook at Whitey's, said, "I feel this plan is crazy. By putting the money (to be provided as the federal government's share of the project) in a fund, the interest alone would be enough to protect us from any flood that comes along.

"And, may I ask, what is the city council going to do with the employees at Whitey's, plus those at Mike's (Pizza) and the other businesses?"

Marvin Devig, president and a member of the board of directors of American Federal Savings & Loan Association, said the the board of directors, meeting this summer, had gone on record as opposing the project. He said the board recognized the need for flood protection, but had determined that "this plan is not feasible" for the community.

The American Federal Building, he said, houses five different firms. If forced to relocate, he said, the savings and loan firm would not make that large a commitment to the community again, building only for its own needs.

Robert Peabody, a former alderman and former city council president, acknowledged that the corps had spent a lot of time and effort on the proposal, "but I don't agree with everything in it."

"When I was first on the council," he said of the period in which the city was considering participating in an urban renewal project for the downtown area, "I was young and eager to get involved. Urban renewal was something that I was told was supposed to be good for the city. As it turned out, I was involved in a drastic mistake and I go to bed with that thought every night," he said.

At the time, he said, the city had firm commitments from the stores (in buildings to be removed) that they would all relocate in the city. But, that didn't materialize, he said.

"How to handle the businesses and the people to be relocated is the No. 1 question. And, how much can we afford (the local cost)? Not to the extent of this plan."

Peabody was given an ovation when it was pointed out by Madelene Knutson that "Bob is the first to say, 'I'm sorry, I made a mistake (about urban renewal)'."

Frenchie Mireault, owner of Frenchie's Jewelers, located in the 300 block on DeMers, asked, "What will happen (to downtown), if you take all of the first block of DeMers? All we will have is that white elephant (Holiday Mall) staring at us. We need all of those businesses."

Later, during the "questions" portion of the hearing, he asked, why firms out of the acquisition area weren't a part of the opinion surveys that were conducted.

The answer from Suzzand Gaines, the corps' sociologist involved with the survey, said was that there was no money to expand the effort. Rapp added that the corps assumed that the businesses not affected by the acquisitions "would like the proposal because it would increase the value of their properties."

Bill Martin charged that the surveys, which indicated that most businesses would stay in the community, was "a stacked deck." And, he charged, "There was no cross-section (of the community) involved with the planning," in which, "the old homes are protected and the nice ones (in the Forest Court area) are torn down."

Mrs. Irvin (Jane) Gaistad said the big concern of the project was the question of "who goes and who stays."

Dan Sheridan, who noted that he "lives in one of those shacks" to which another resident had called homes in the "old north end" area, encouraged the council to "decide" one way or the other, because "the farmers are wild and the sooner you do something the better off we will be."

Pat Vettel asked the crowd two questions: How many of you are in favor of the project, and how many are opposed? The "opposed" won quite easily, but most people didn't raise a hand either way.

Council President Jim Gander, the only member of the council to request time at the podium, said the corps proposal was the result of a request by the city for a flood protection plan. He pointed out that "the council is neutral" and was "just gathering the facts."

"If we would go on this project," he said, "we could make it work... if you want it to work. But, you've got to want it. In the 20 years that I've been involved with city government, this is the first time that we've had anything to consider."

He pointed, also that the effect of the setback dikes would reduce by six inches the level of water for the Point area. Gander lives on the Point.

Gander then called to the stand Dale Klemme, Prairie du Chien, Wis., who had been brought to East Grand Forks at city expense to relate how that city had dealt with a somewhat similar project and how it had found outside grants to pay for the local share of a flood plain-clearing effort.

Klemme said 150 home and three businesses were forced to relocate in Prairie du Chien. "Nine years ago, we were at the same stage... going through hearings. We were much the same, anxious and uncertain."

Regardless of the final decision, Klemme said it was "important to get the facts... go to the horses mouth and get the facts."

At Prairie du Chien, he said about 70 percent of the community was opposed to the project at the start, but that most people cooperated with it.

"We were able to come up with the money (local share) from other sources," he said, adding, "You have a tough decision and I can't tell you what to do."

Mayor Louis Murray asked residents to contact their councilman. "We need input," he said, calling the decision "one of the most important decisions to be made in 50 to 60 years."

He promised that the council would make a quick decision, but explained that the decision facing aldermen now is not whether to go ahead with the project, but rather only whether or not to continue study.

The specific questions that are unanswered now, he and corps representatives said, would be addressed in the "design" portion of the study that would be conducted over the next year and a half.

At that time, the final "yes" or "no" decision would have to be made.

N-3-78(10)

Page 2 of 2

The Exponent/Thursday, November 15, 1984

Chamber to discuss dike plan of Corps

The East Grand Forks Chamber of Commerce will host a meeting for members at 7:30 p.m. Monday, Nov. 19, at the AVTI to further discuss the Army Corps of Engineers' proposed flood protection plan for East Grand Forks.

Focus of the meeting will be to examine the impact the plan could have on the East Grand Forks business community. Questions and comments from members of the business community will be encouraged. Representatives of the corps and city council will be available to answer questions.

The meeting is a part of the public hearing portion of the plan and will become a part of the public record.

The chamber has not taken a position on the proposed plan. However, the chamber board believes it important that members be given the opportunity to ask questions and express their opinions, according to R. F. Wiley, president.

Grand Forks Herald

Section B — Wednesday, November 21, 1984

EGF council tells corps to continue flood plans

By Liz Fedor
Herald Staff Writer

The East Grand Forks City Council voted unanimously Tuesday to direct the U.S. Army Corps of Engineers to design specific plans for a $30 million flood-fighting program, including the construction of levees parallel to the Red River.

The council took its action one night after meeting with downtown business owners who would be forced to evacuate their present business locations.

The council motion does not financially commit the city to the project. It orders Clerk-treasurer Dave Mack to inform the corps that the city wants to see the final design specifications, before making a final project decision in early 1986.

"The council doesn't have any choice but to go ahead with the next step," said council member Lynn Stauss. "We just do not have the information — to say yes or no."

If the project is approved, the federal government probably would pay for $22 million, and the city would be responsible for $8 million, according to corps officials. The study authorized Tuesday will be financed through federal taxes.

Although they did not adopt a resolution, council members agreed that a committee should be formed to study areas of the city that would provide suitable sites for the businesses and homes to be relocated by the project.

During discussion of the flood project, council members said the only way to get answers to the questions raised by citizens is to ask the corps to provide a detailed breakdown of the levee system and other flood fighting measures it is recommending.

The controversial hiring of a new library director surfaced briefly Tuesday night, although it was not on the agenda.

Also Tuesday, City Attorney Karl Lindquist informed the council that he has asked Attorney General Hubert Humphrey III to issue an opinion on the legalities surrounding the Library Board's hiring of Robert Campbell.

In other action, the council approved $281,000 in property and income tax credits to 126 East Grand Forks businesses. These credits were awarded through the Minnesota border cities program and will reduce business property taxes by 30 percent and cut income taxes by 50 percent.

Lindquist reported that he mailed a letter to the state attorney general Tuesday because there are conflicting local legal opinions. Lindquist has stated that the Library Board did not follow the law because the Civil Service Commission was not used to screen applicants. In addition, Campbell was hired over a dozen applicants with college degrees, including many with training or experience in library science. Campbell, 55, is a high school graduate. The position advertisement listed library experience and a college degree as minimum qualifications.

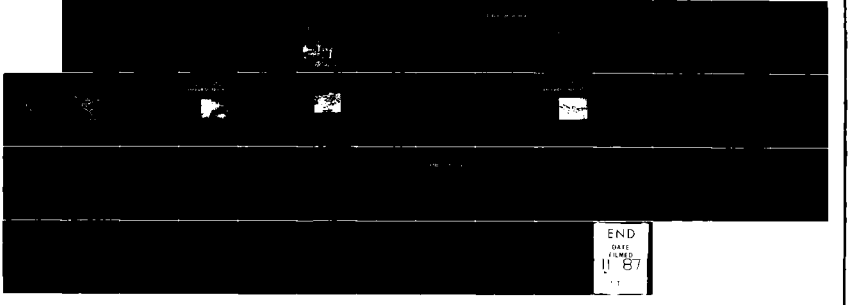
But Gerard Neil, an East Grand Forks attorney hired by the board, stated the Library Board acted according to its authority spelled out in state law. In addition, he said, there was no legal requirement to use the Civil Service process, since there was no precedent for using Civil Service for earlier library hirings.

Considering the conflicting opinions and numerous lawsuit threats, Lindquist decided to bring Humphrey into the matter, because "it is a practical thing to do."

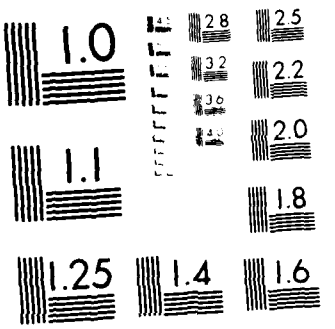
Lindquist said the Library Board members "could" be held personally liable for their actions in court. "It's possible these people could be looking at personal liability for punitive and compensatory damages," he said.

AD-A184 845 GENERAL REEVALUATION SUPPORTING DOCUMENTATION FOR FLOOD CONTROL AND RELATED PURPOSES(U) CORPS OF ENGINEERS ST PAUL MN ST PAUL DISTRICT NOV 84 8/8

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MICROCOPY RESOLUTION TEST CHART

Council expecting to authorize next phase of dike study

"Unless some residents come forth soon and say 'No,' I feel we (city council) will vote to go ahead with the corps studies."

Those words were by Council President Jim Gander at a Monday meeting arranged by the East Grand Forks Chamber of Commerce to discuss the impact of the Corps of Engineers' diking proposal on the downtown area of the city.

And, they represent the strongest public indication to date of how aldermen are likely to vote when they face the question of whether to authorize the corps to proceed with the design stage of studies, or to drop the project.

At the conclusion of the Oct. 11 public information meeting on the $30 million diking proposal that would force the relocation of about 30 businesses and over 170 families, a poll of aldermen showed that only Lynn Stauss and Steve Gorman had made up their minds then that the studies should be continued.

Both said that the city needed the benefit of more detailed information — that would be developed in the design stage of study — on the probable impact on the city before a decision could be made.

The other five alderman, in answering the poll, said they would wait to measure citizen reaction before deciding how to vote.

The council is expected to face the question soon. Although it was not a part of the formal agenda for last night's (Tuesday) meeting, the subject was likely to have at least received another round of discussion and, with the corps asking a decision by the "end of the month," a decision was possible, too.

Martin McCleery, director of the corps studies that have been going on since 1980 and would provide protection up to the worst possible flood that could be expected in 500 years, appeared at the chamber meeting Monday night.

He reminded the nearly 55 business people and residents attending that a council vote

Please see DIKE PLAN, Page 2

Dike

Continued from Page 1

in favor of continued studies would not obligate the city, financially or otherwise.

If the council does vote to continue with the design stage study, it would not have to make the decision on whether or not to actually build the dikes until February 1986.

An affirmative vote by a majority of aldermen now would impose on the city obligations to plan financing for the $3 million local share of the project.

Most of the information at Monday's meeting was a repeat of that discussed at earlier meetings.

Statements and questions by Marvin Devig, president of American Federal Savings & Loan; Jane Galstad, wife of dentist, Dr. Irvin Galstad; JoAnn Sayler, who with her husband, Jerry, are owner-operators of Olson Drug; Matt Linzbach, a real estate agent and chairman of the city's planning commission; and Francis "Frenchie" Mireault, owner of Frenchie's Jewelers, all underscored the need for more information and planning concerning possible relocation sites for businesses that would have to move, along with effect that those relocations would have on businesses that would not move.

SUPPORTING DOCUMENTATION
PUBLIC INVOLVEMENT
APPENDIX B
SIGNIFICANT NEWS CLIPPINGS, PUBLIC NOTICES, AND PROGRESS REPORTS

PUBLIC NOTICES

St. Paul District, Corps of Engineers
1135 U.S. Post Office and Custom House
St. Paul, Minnesota 55101

NCSED-PB

9 October 1980

ANNOUNCEMENT OF PUBLIC MEETING
FOR FLOOD CONTROL AT
EAST GRAND FORKS, MINNESOTA

MEETING TO BE HELD AT 7:30 P.M.
ON WEDNESDAY, 5 NOVEMBER 1980
AT THE REGENCY INN
HIGHWAY 2
EAST GRAND FORKS, MINNESOTA

Have you and your neighbors wondered what is being done about the flooding problem in East Grand Forks? The East Grand Forks Flood Control Committee and the Corps of Engineers will be presenting a summary of the flood problems and some possible solutions at this public meeting.

The meeting will begin at 7:30 p.m. sharp. It will include a slide presentation summarizing the Flood Control Committee's and the Corps' planning efforts to date followed by a general discussion giving you a chance to express your views, concerns, and suggestions.

The time for analyzing East Grand Forks' flood problems is now. Congress has appropriated funds for this study, and we need to hear your views at this meeting so that we can consider them in this early stage of planning.

S. B. DRAPER
Lieutenant Colonel, CE
Acting District Engineer



DEPARTMENT OF THE ARMY
ST PAUL DISTRICT, CORPS OF ENGINEERS
1135 U S. POST OFFICE & CUSTOM HOUSE
ST. PAUL, MINNESOTA 55101

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DEPARTMENT OF THE ARMY
ST PAUL DISTRICT CORPS OF ENGINEERS
1135 U S POST OFFICE & CUSTOM HOUSE
ST PAUL MINNESOTA 55101

REPLY TO
ATTENTION OF:

NCSED-PB

4 September 1981

The city of East Grand Forks, Minnesota, and the St. Paul District, Corps of Engineers are conducting a flood control study to determine cost effective measures for reducing flood damages in the city. As part of this study, representatives of the Corps of Engineers and the Minnesota Department of Natural Resources in cooperation with the East Grand Forks Flood Control Committee will be conducting an industrial/commercial economic damage survey during the week of 14-18 September 1981. They will be contacting you by phone and/or visiting your establishment during that week.

We would appreciate your assistance in arriving at a reasonable estimate of flood damages that you would expect to occur to your business for one to three levels of flooding. These estimates and levels of flooding will be used to determine a total commercial/industrial damage estimate for the city and will identify which flood reduction measures/plans are most cost effective.

Representatives conducting the survey include Mr. Martin McCleery and Miss Kim Wick with the Corps of Engineers and Mr. Al Decker with the Minnesota Department of Natural Resources. A sample of the interview form and damage categories along with the Privacy Act Statement is provided for your information. One of the representatives will discuss these materials with you.

If you have any questions, please contact Mr. McCleery, Project Manager, at 612-725-7295 or Mr. Dave Mack, City Clerk/Treasurer, who is coordinating the study for the city.

Sincerely,

WILLIAM W. BADGER
Colonel, Corps of Engineers
District Engineer

2 Incl
1. Sample interview form
2. Privacy Act Statement

Copy furnished: Mr. Dave Mack
Clerk/Treasurer
East Grand Forks, Minnesota 56721

N-B-81

DEPARTMENT OF THE ARMY
ST PAUL DISTRICT CORPS OF ENGINEERS
1135 U S POST OFFICE & CUSTOM HOUSE
ST PAUL MINNESOTA 55101

REPLY TO
ATTENTION OF:

September 1983

Planning
Plan Formulation

ANNOUNCEMENT OF PUBLIC WORKSHOP
EAST GRAND FORKS GENERAL REEVALUATION STUDY

The city of East Grand Forks, Minnesota, and the St. Paul District, Corps of Engineers are studying flood and related water resource problems on the Red River and the Red Lake River in East Grand Forks, Minnesota. In 1953, a federally authorized project was planned and designed for the city. Until recently, the authorized plan was not studied further because the city would not indicate that it would meet local cooperation requirements. Following several serious floods in the 1960's and 1970's, the city signed an official agreement indicating willingness to participate in the project. Since the 1953 project design, many changes have occurred which require a reevaluation of the authorized project and other measures and plans so that a "best plan" can be identified. The purpose of this planning study is to focus in on and identify the best plan.

This study was authorized by Congress in the Flood Control Acts of 1948, 1950, and 1975. Generally, the major problem is flooding and the continued threat of flood damages. The basic need is a plan which will significantly reduce flood damages and afford the city of East Grand Forks, the opportunities for continued growth and development into the future. Planning studies have analyzed a wide range of structural and nonstructural measures for their merit in reducing flood damages at East Grand Forks. Structural measures analyzed and dropped from further study include upstream dams and tributary reservoirs, diversions, and channel modification. Ongoing engineering, economic, and environmental planning studies indicate that levees are the only structural measure capable of significantly reducing flood damages. The focus of future planning studies will be on plans composed of levees in combination with nonstructural measures to include floodproofing, acquisition/relocation, floodplain zoning, flood warning and forecasting, flood insurance, and an emergency plan of action. It is too early to tell the extent to which each measure will be used. Your help is needed to focus in on a "best plan."

To bring interested citizens up to date on the study status and current problem and to identify significant issues, desires, and needs of everyone affected, a workshop will be held on October 11, 1983, at 7:30 p.m. in the East Grand Forks, Minnesota, AVTI. This workshop will serve as an informational and working meeting with concerned citizens and interested publics and as a scoping meeting as required by the Council on Environmental Quality. Scoping is defined as the process of identifying and focusing in on likely significant issues and the range of these issues.

We invite you to attend the workshop and participate in the exchange of information and ideas. Your input will be instrumental in the identification of a "best" flood damage reduction plan for the city.

Edward G. Rapp
Colonel, Corps of Engineers
District Engineer

US Army Corps of Engineers
St. Paul District

East Grand Forks Study of Flood Problems

PUBLIC WORKSHOP

THE CITY OF EAST GRAND FORKS AND THE ST. PAUL DISTRICT, CORPS OF ENGINEERS WILL SPONSOR A WORKSHOP FOR THE EAST GRAND FORKS, MINNESOTA, FLOOD DAMAGE REDUCTION STUDY.

PURPOSE:

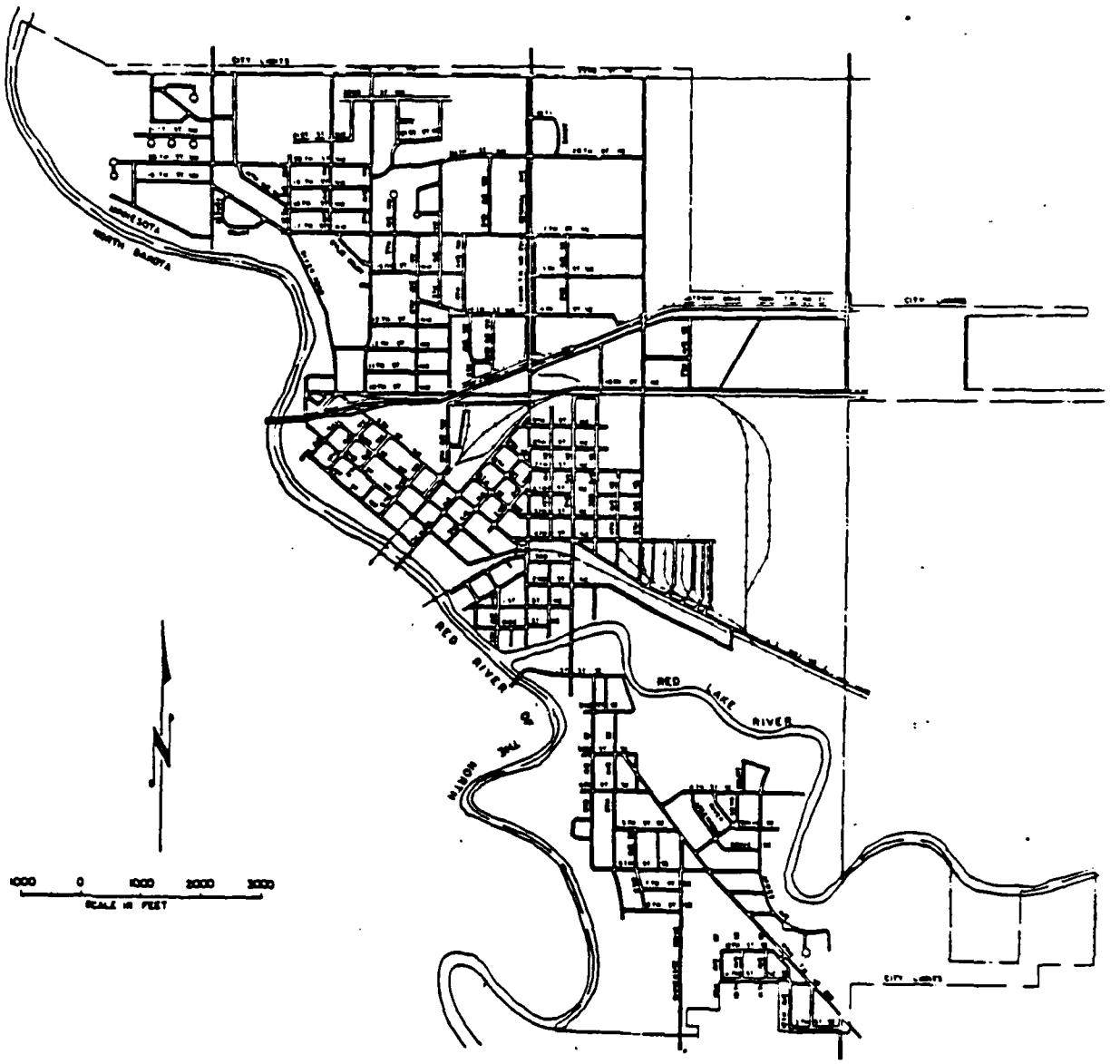
- o TO INFORM YOU OF THE STUDY STATUS;
- o TO SCOPE/IDENTIFY SIGNIFICANT ISSUES, DESIRES, AND NEEDS OF EVERYONE AFFECTED;
- o TO OBTAIN YOUR COMMENTS, VIEWS, AND SUGGESTIONS;
- o TO PROVIDE FOCUS TOWARD SELECTION OF A BEST PLAN.

WHEN: 7:30 PM ON TUESDAY, OCTOBER 11, 1983

WHERE: EAST GRAND FORKS AREA VOCATIONAL TECHNICAL INSTITUTE
2022 CENTRAL AVENUE NORTHEAST
EAST GRAND FORKS, MINNESOTA

ALL INTERESTED CITIZENS AND AGENCIES ARE INVITED TO PARTICIPATE IN THE WORKSHOP

EAST GRAND FORKS , MINNESOTA



STUDY OF FLOOD PROBLEMS AT

EAST GRAND FORKS, MINNESOTA

PUBLIC WORKSHOP

OCTOBER 11, 1983

Sponsored by the city of
East Grand Forks, Minnesota, and
The St. Paul District Corps of Engineers

AGENDA
PUBLIC WORKSHOP
EAST GRAND FORKS, MINNESOTA

OCTOBER 11, 1983

7:30 p.m.	INTRODUCTION	City Official
7:35 p.m.	STATUS REPORT	Martin McCleery
8:00 p.m.	WHAT THE WORK GROUPS WILL DO	Martin McCleery
8:05 p.m.	REVIEW OF PLANS AND IMPACTS	Aldermen
8:30 p.m.	IDENTIFICATION AND DISCUSSION OF OTHER ISSUES AND CONCERNS	Aldermen
9:00 p.m.	SUMMARY OF WORKSHOP ACTIVITIES	Aldermen/McCleery
9:30 p.m.	MEETING ADJOURNED	

A

Current

DESCRIPTION OF PLANS

Plan #

1 Plan number 1 consists of levees located within the alignment corridor between alignment number 2 and alignment number 3. Emergency levees outside the permanent levee would be removed and earthen material from the emergency levees would be used where possible to construct the permanent levee. Buildings outside the permanent levee would be provided transportation and utilities access during non-flood periods. Levees would be constructed to a height somewhere between 1-percent chance and standard project flood. Other nonstructural means including: floodplain zoning, flood forecasting and flood warning, flood insurance, and a flood emergency plan of action, would be a part of this plan.

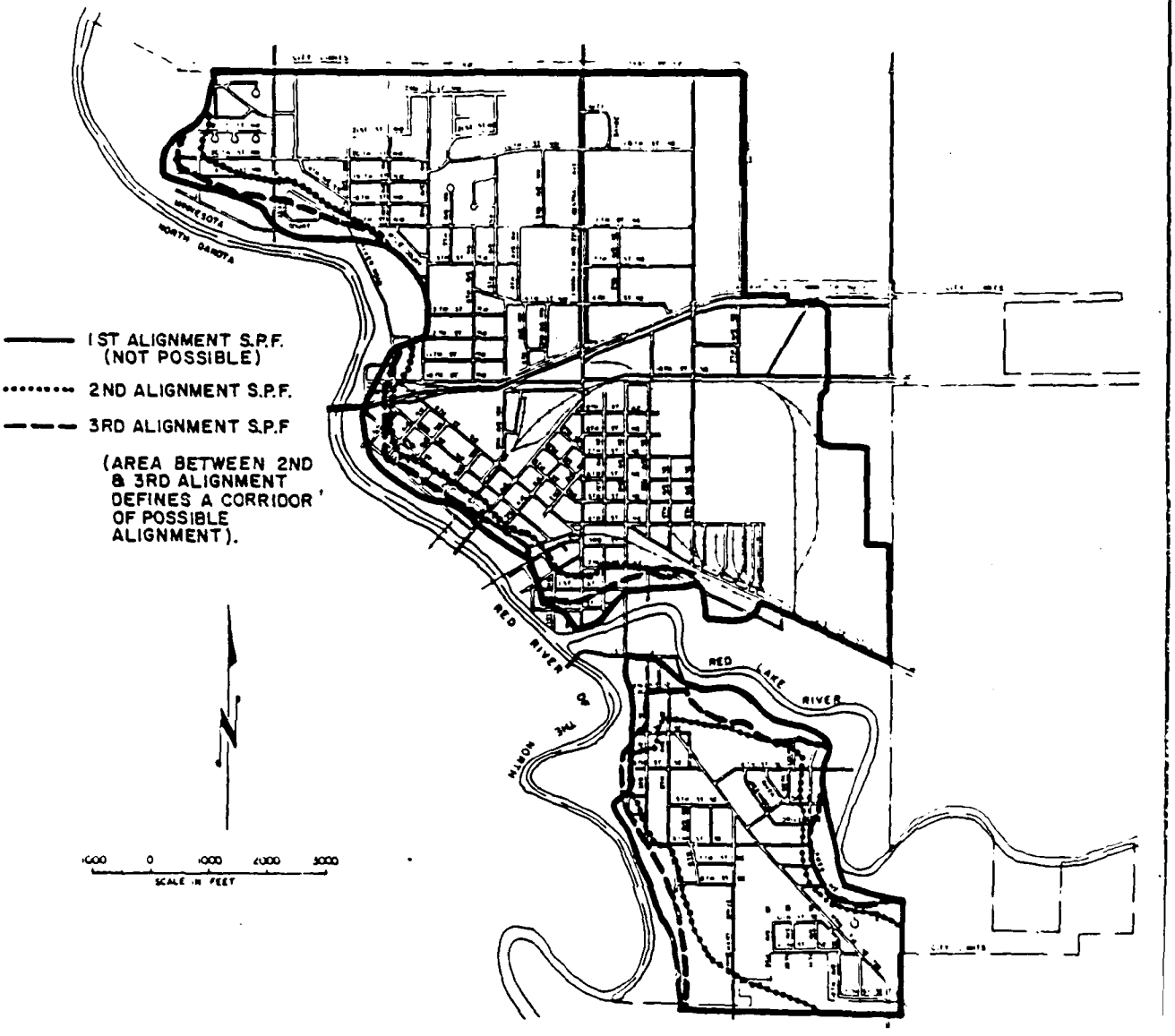
2 Plan number 2 is the same as plan number 1. In addition, buildings outside the levee protection would be flood proofed when the cost of flood proofing did not exceed the cost of flood damages.

3 Plan number 3 is the same as plan number 1. In addition, buildings outside the levee protection would be acquired and relocated where acquisition costs did not exceed the cost of flood damages.

4 Plan number 4 is the same as plan number 1. In addition, buildings outside the levee protection would be flood proofed or acquired and relocated where costs did not exceed the cost of flood damages.

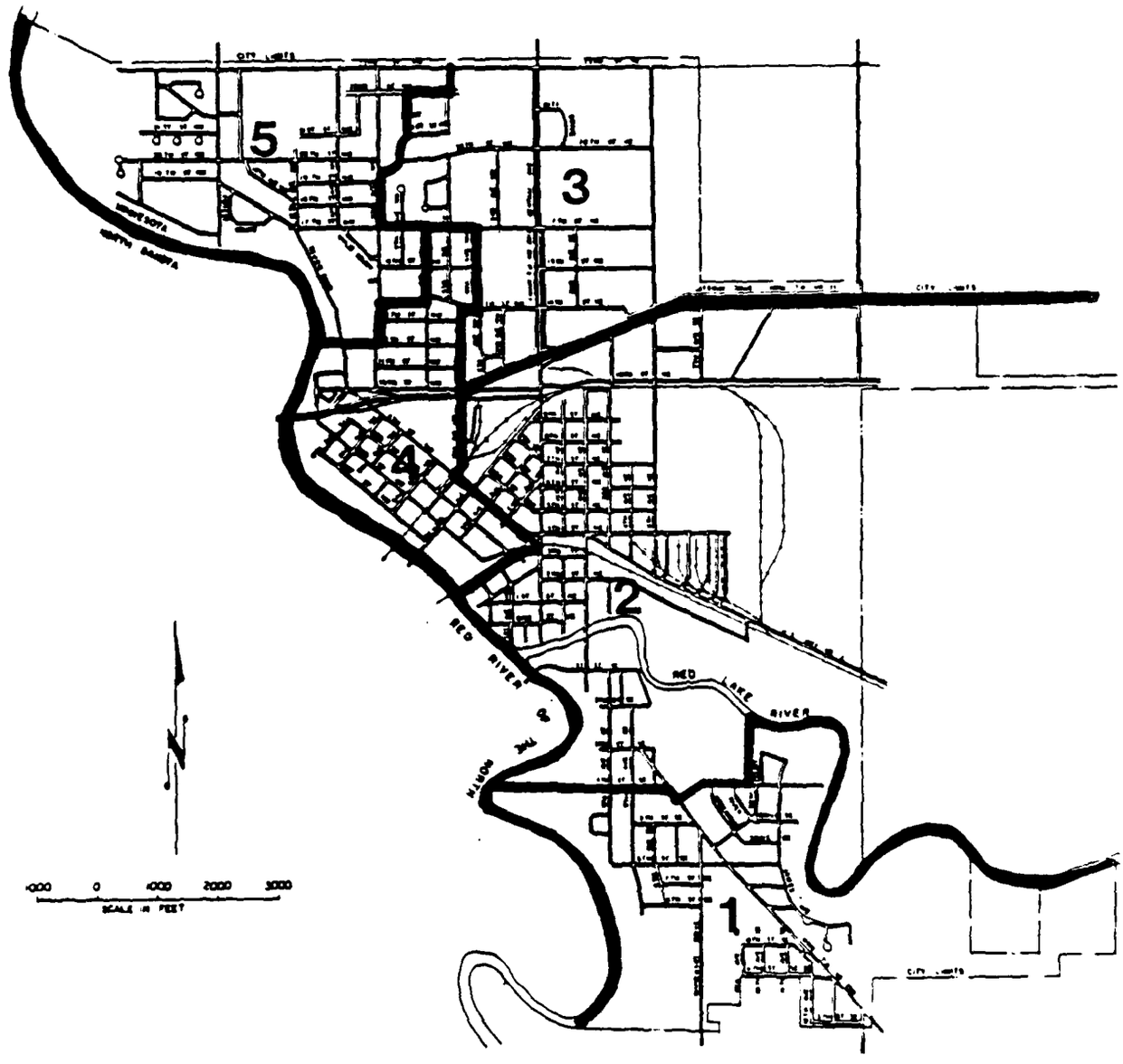
5 Plan number 5 is the no new action plan. It consists of the continuation of existing emergency management measures without permanent flood control works. This includes continuation of emergency levee, dependence on Federal, State, and local time, money, manpower, and material resources to meet future flood threats, and dependence on other nonstructural measures, such as floodplain zoning, flood forecasting and flood warning, flood insurance, and a flood emergency plan of action.

EAST GRAND FORKS , MINNESOTA



D

EAST GRAND FORKS , MINNESOTA
WARD BOUNDARIES



SUPPORTING DOCUMENTATION

PUBLIC INVOLVEMENT

APPENDIX B

SIGNIFICANT NEWS CLIPPINGS,

PUBLIC NOTICES, AND PROGRESS REPORTS

PROGRESS REPORTS

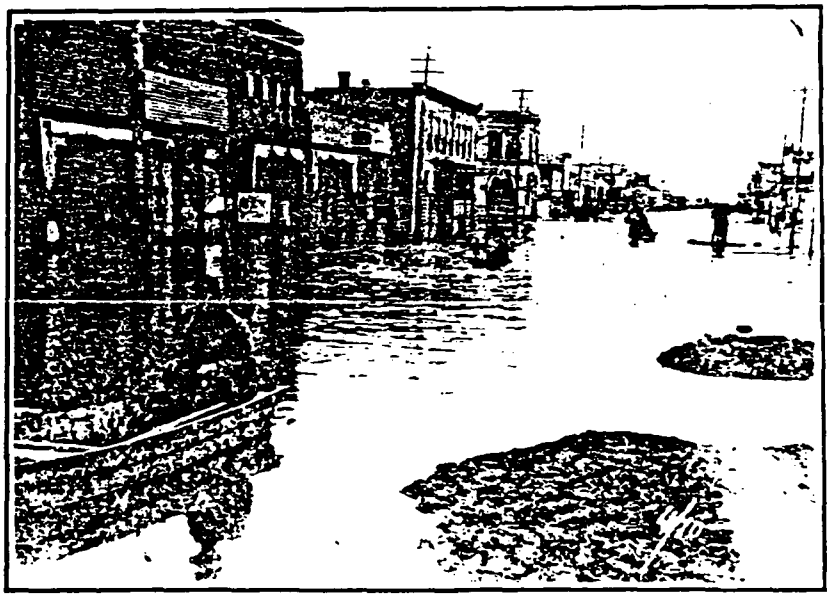
US Army Corps of Engineers
St. Paul District

East Grand Forks, Minnesota Study of Flood Problems

PROGRESS REPORT

DETAILED PLANNING		DESIGN OF PLAN FEATURES	PLANS/SPECIFICATIONS	CONSTRUCTION OF PLAN FEATURES
SEPT 1980	▲OCT 1983 Working Papers	OCT 1984	FEB 1986	MAR 1987 — MAR 199(

OCT 1983 Vol 1



1897 Flood - DeMers Avenue, East Grand Forks

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THE PROGRESS REPORT

This is the first in a series of progress reports designed to keep you informed on the study status and issues. From time to time, we will be reporting to you the findings and facts which bear on decisions and progress made in each stage of the study. We invite you to participate in the study. If you or someone you know would like to be on our mailing list for future progress reports, please fill out and forward to us the tear-off mailer enclosed in this report.

ABOUT THE STUDY AND WHO IS INVOLVED

In September 1980, the city of East Grand Forks, Minnesota, and the St. Paul District, Corps of Engineers began a study of the city's flood and related water resource problems. The purpose of the study is to identify feasible flood damage reduction measures and plans so that a best plan can be implemented for the city. The study was authorized by Congress by the Flood Control Acts of 30 June 1948, 17 May 1950, and 31 December 1970. A local cooperation agreement was furnished by the city in 1975.

WHO IS INVOLVED IN THE STUDY

City and Corps personnel have been working together to identify solutions to the flood problem. If you need information or have any questions or concerns, please contact one of them.

City of East Grand Forks Study Team:

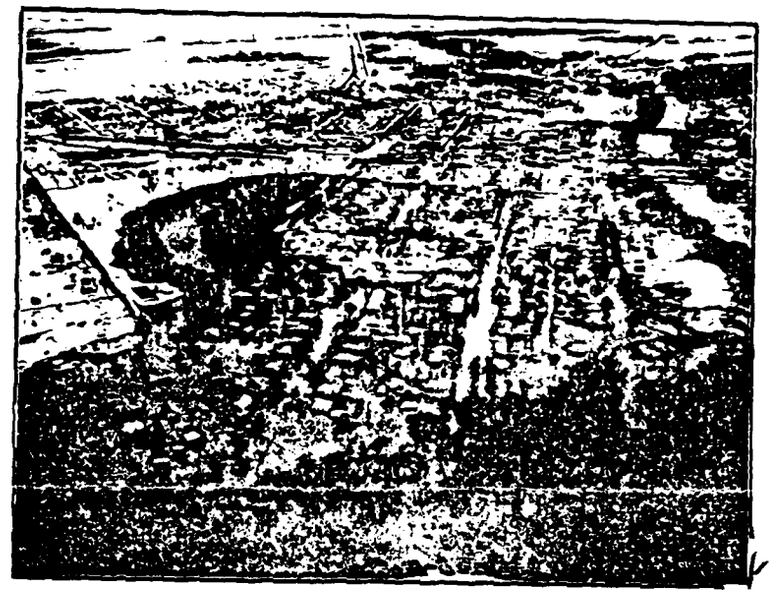
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Rich Pomerleau - Engineer
Mark Ziemer - Engineer
Mick Lesher - Engineer
Ralph Berger - Engineer
Suzanne Gaines - Sociologist
Terry Pfutzenreuter - Archeologist
Frank Star - Outdoor Recreation Planner

FLOOD PROBLEM

Historically, flooding or the threat of floods has always been a problem at East Grand Forks. Residents of the city may still remember the 1950 flood and the damage it caused.



1950 Flood - East Grand Forks looking southeast

Others will remember the 1979 flood which involved the entire community. During that flood event, most residents became generally aware of the problem and its potential impacts on the community and individual life styles. In one way or another, everyone was affected. In 1979 the city's emergency management approach to fighting floods worked but required extensive outside Federal and State assistance as well as the help of thousands of volunteers. Many citizens recognized that higher flood levels would have been difficult to manage. Some questioned: What would have happened if emergency levees had been overtopped? Is the emergency management approach the best way to handle the flood problem or is there a better way which would allow the city the opportunity to grow and develop into the future? Finding a better way is the objective of this study.

POSSIBLE SOLUTIONS

The study team recently compiled ongoing study results in the form of working papers. These papers bring together the detailed engineering, economic, environmental and social information for decision-makers to provide direction to future study efforts and focus in on a solution to the city's flood problem. Structural measures analyzed and dropped from further study include upstream dams and tributary reservoirs, diversions, and channel modifications. Only one structural measure, levees, was found to have the capability to significantly reduce flood damages at East Grand Forks and maintain engineering, economic, and environmental feasibility. Further study of levees in combination with nonstructural measures including floodproofing, acquisition/relocation, floodplain zoning, flood warning and forecasting, flood insurance, and an emergency plan of action is continuing.

ISSUES AND CONCERNS

There are many important issues and concerns that must be looked at as planning continues. Some of these issues and concerns are:

- What is East Grand Forks' future with and without permanent flood protection?
- Do residents want permanent levee flood protection?
- What is the "Best" plan and how do measures to include levees, flood proofing, acquisition/relocation, flood insurance, floodplain zoning, flood forecasting and warning, and an emergency plan of action relate as part of that plan?
- How will such a plan be financed and implemented?
- Can levees be safely constructed to protect all structures in East Grand Forks or will historically unstable riverbanks require alignment setbacks, leaving many structures unprotected? Currently an alignment corridor has been identified which could, depending on final alignment selection, leave many structures outside levee protection.
- What choices are there for protecting structures outside the levee's protection? Will floodproofing, acquisition/relocation, flood insurance, and providing utility services to these areas be feasible in terms of costs and local acceptance?

WHAT CITIZENS HAVE SAID

A city-wide residential survey in the fall of 1982 showed that citizens are interested in flooding and the flood study. They expressed opinions about:

FLOODING

- Flooding is seen as a serious threat to the city, especially in terms of economics and safety.
- During floods, residents experience many costly and disruptive effects.
- After floods, there are economic costs of flooding as residents pay for flood insurance, move, and modify their property.

FLOOD AWARENESS

- Twenty percent of the floodplain residents are unaware of the fact that they live in a floodplain.
- Some parts of town are not widely recognized as being in the floodplain.
- The majority of people who moved here as adults were aware of the flood threat.

PROJECT INTEREST AND CONCERNS

- If residents had to move as a result of the project, about two-thirds would stay within the city.
- Most people prefer new levees/floodwalls.
- Strongest support is from residents who are aware that they live in the floodplain.
- Concerns about flood protection measures center on property values, safety, and aesthetics.
- Homes outside the levee should be treated as part of the plan.
- Residents want more information about the project.

In the spring of 1983, businesses which may be outside of the protected area were interviewed. Because many businesses may be affected, the study team was concerned about disruption to the city's economy. About two-thirds of the businesses reported that they would prefer to remain somewhere in East Grand Forks if they had to move because of a flood project. The other one-third would either move elsewhere, or go out of business. Some may do this anyway, with or without a project.

UPCOMING EVENTS/NOTES

October 11, 1983	A public workshop is planned at 7:30 p.m. in the East Grand Forks Area Vocational-Technical Institute. The workshop is an informational and working meeting with interested citizens and agencies to scope and focus in on significant issues and concerns.
October 17, 1983 November 14, 1983 November 21, 1983	A series of meetings is planned to help identify the city's most probable future. Problems will be prioritized and solutions and goals will be developed to identify what East Grand Forks' future will be. Watch your local newspaper for the exact time and place for each meeting.

You may have noticed a display located at City Hall that includes pictures, tables, and graphs about past floods and the flood future. We invite you to visit City Hall, view the display, and pick up a brochure on the city's current flood emergency plan of action. A copy of the working papers will also be maintained at City Hall for your review. Remember, if you have any questions, please contact one of the study team representatives.

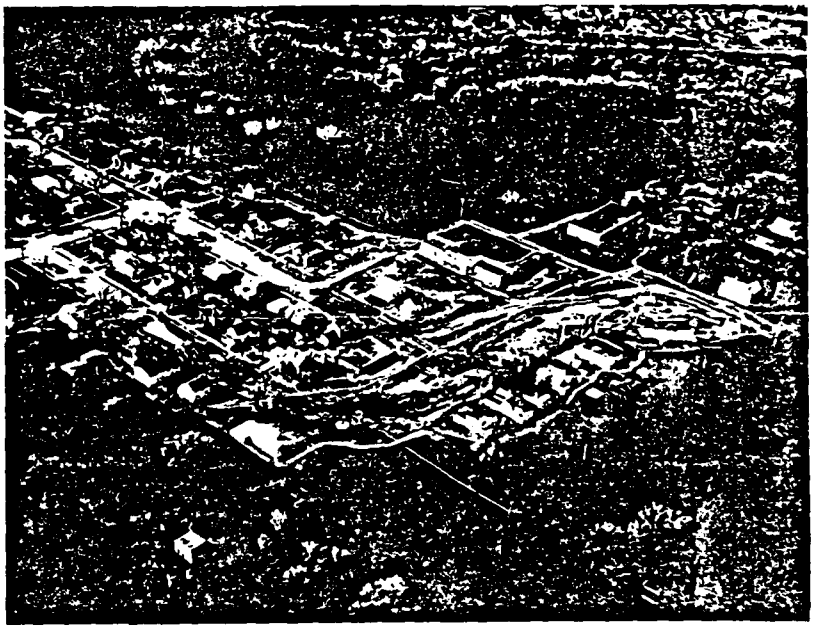
US Army Corps of Engineers
St Paul District

East Grand Forks, Minnesota Study of Flood Problems

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DEC 1983 Vol 2



1979 Flood - The Point, East Grand Forks

IN THIS ISSUE

- The Progress Report
- About the Study and Who's Involved
- Workshop Summary
- Workshop Question/ Concerns
- East Grand Forks Future
- The Next Step

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Terry Pfutzenreuter - Archeologist
Frank Star - Outdoor Recreation Planner
Randy Devendorf - Wildlife Biologist

WORKSHOP SUMMARY

On October 11, 1983, a public workshop was held in the Area Vocational Technical Institute in East Grand Forks. The purpose of the workshop was to inform interested publics about the study status and current plans; identify significant issues, desires, and needs of everyone affected; obtain comments, views, and suggestions; and provide focus toward selection of a best plan. Five plans and their impacts were reviewed by workshop participants. People attending the meeting broke up into groups by ward, and the workshop was conducted by ward aldermen.

THE PLANS: The first progress report informed you that the only feasible plan that would significantly reduce damages at East Grand Forks was a levee plan in combination with nonstructural measures. Nonstructural measures included floodproofing and acquisition/relocation of homes. Figure 1 shows three levee alignments. Note that levee alignment 1 is not possible due to an unstable riverbank foundation. This is the alignment of the existing emergency levee. The area between alignments 2 and 3 defines a corridor in which a possible levee may safely be located. Five conceptual plans were reviewed.

Plan	Description
1	Plan 1 consists of levees located within the corridor between alignments 2 and 3. Emergency levees outside the permanent levee would be removed, and earthen material from the emergency levees would be used, where possible, to construct the permanent levee. Buildings outside the permanent levee would be provided transportation and utilities access during nonflood periods. Levees would be constructed to a height somewhere between the 100-year and standard project flood levels. Other nonstructural measures including floodplain zoning, flood forecasting and warning, flood insurance, and a flood emergency plan of action would be part of this plan.
2	Plan 2 is the same as plan 1. In addition, buildings outside the levee protection would be floodproofed when the cost of floodproofing did not exceed the cost of flood damages.
3	Plan 3 is the same as plan 1. In addition, buildings outside the levee protection would be acquired and relocated where acquisition costs did not exceed the cost of flood damages.
4	Plan 4 is the same as plan 1. In addition, buildings outside the levee protection would be floodproofed or acquired and relocated where the cost did not exceed the cost of flood damages.
5	Plan 5 is the no action plan. It consists of the continuation of existing emergency management measures without permanent levees. This includes continuation of emergency levees; dependence on Federal, State, and local time, money, manpower, and material resources to meet future flood threats; and dependence on other nonstructural measures.

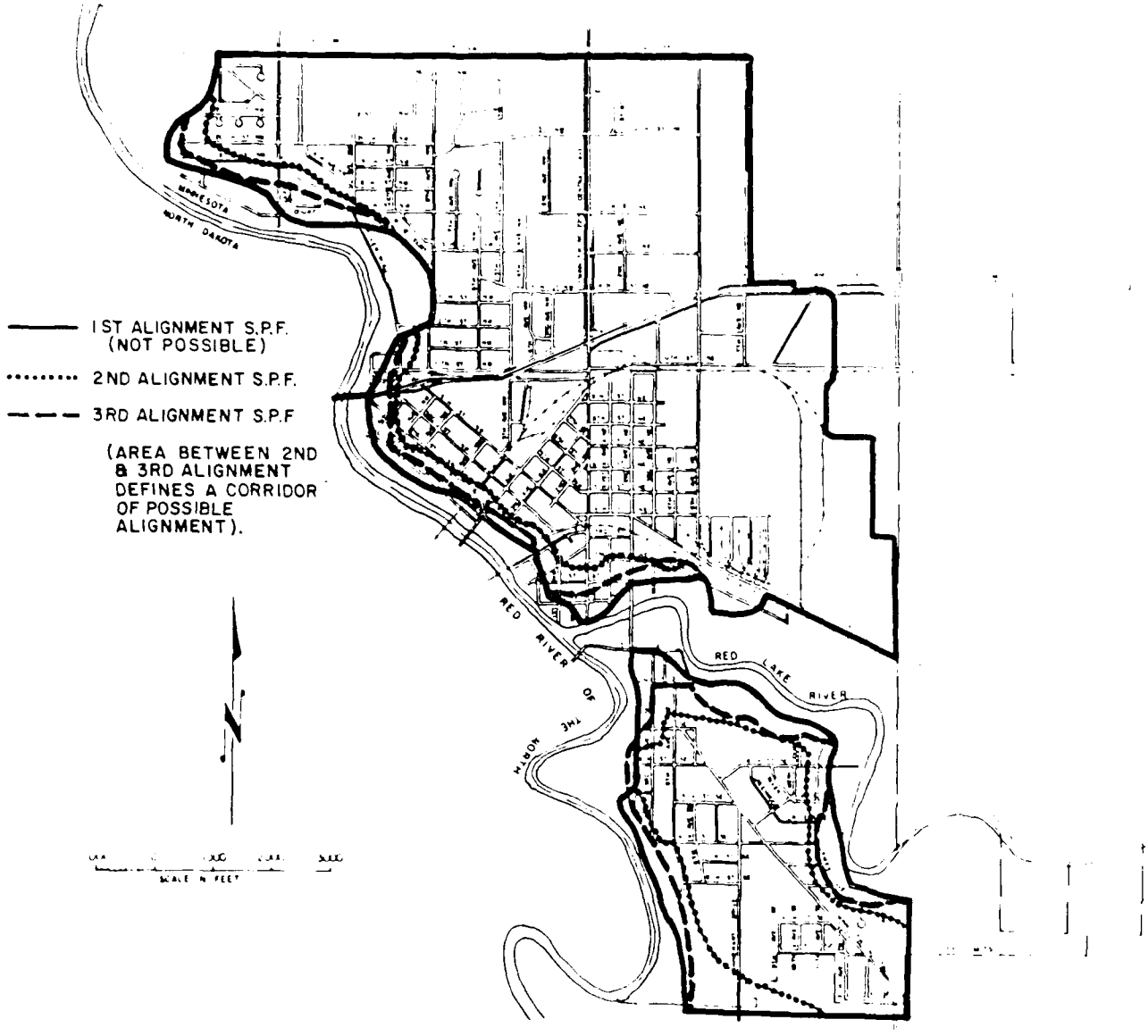
IMPACTS OF EACH PLAN

Table 1 is a summary comparison of impacts by plan.

Summary Comparison of Impacts by Plans

Item (Applied Levee Alignment)	Plan 1		Plan 2		Plan 3		Plan 4		[illegible]
	Alignment 1	Alignment 2	Alignment 1	Alignment 2	Alignment 1	Alignment 2	Alignment 1	Alignment 2	[illegible]
Plan Description	Permanent levee and other nonstructural measures.		Permanent levee, flood proofing, and other nonstructural measures.		Permanent levee, evacuation, and other nonstructural measures.		Permanent levee, flood proofing, evacuation, and other nonstructural measures.		[illegible]
Engineering considerations	Alignments 1 and 2 define a portion of possible levee alignments.		Same as plan 1. Flood proofing of residential structures not possible due to long inundation period.		Acquired area can be excavated and serve as a source of borrow materials.		Same as plans 1 and 3.		Failure of interior levee could result in flooding of interior.
	Levee Alignment rejected further study.	Levee alignment not ready to move further standward.							
Interior flood control	Interior flood control works provided for area protected by levee.		Same as plan 1.		Same as plan 1.		Same as plan 1.		No interior flood control facilities for emergency levees. Areas subject to interior flooding.
Design	Levee designed to meet engineering, economic, environmental, and social constraints. Guaranteed to work for levee designed.		Same as plan 1 plus flood proofed structures.		Same as plan 1 plus structures relocated out of floodplain.		Same as plans 1, 2, and 3.		Design is on an as-needed emergency basis. No guarantee emergency levees will work for next flood event.
Economic	Plan benefits exceed costs. Benefit-cost ratio of 2.8 at 3 1/4 percent and 1.7 at 7 7/8 percent.		Same as plan 1.		Same as plan 1.		Same as plan 1.		o Expensive emergency costs. Approximate $5 million Federal, State, and local funds expended since 1965. o Loss of revenues during pre- and post-flood activities. o Estimated average annual damages of $3.1 million at 3 1/4 percent interest and $2.4 million at 7 7/8 percent interest
	Levees will provide 89-93 percent reduction of flood damages.	Levee will provide 92-93 percent reduction of flood damages.							
	Range of first cost		Range of first cost		Range of first cost		Range of first cost		
	Federal		Federal		Federal		Federal		
	$10.7 to $15.6 million.		$12.2 to $15.6 million.		$16.5 to $21.4 million.		$20.0 to $24.9 million.		
	Non-Federal		Non-Federal		Non-Federal		Non-Federal		
	$ 4.8 to $10.0 million.		$10.0 to $10.2 million.		$11.2 to $11.5 million.		$11.6 to $11.8 million.		
Social	Structures protected		Same as plan 1 and:		Same as plan 1 and:		Same as plan 2 and:		o 2475 structures without permanent protection: 162 commercial, industrial, and public structures 2,313 residential structures.
	2,193	1,993	Commercial structures flood proofed		Homes outside levee acquired		Homes outside levee acquired		
	Under Levee		2	13	135	135	135	135	
	78	82			Unprotected		Flood proofed		
	Outside protection				66	275	2	13	
	251	410					Unprotected		
							84	252	
	o Same as no action plan for area/structures without flood protection. o Opportunity to maintain or improve economic and population bases. o Noise level high during construction. o Aesthetics will change significantly along downtown/residential floodwall areas. o Opportunity to maintain and improve community cohesion. o All above impacts depend on timing of acquisition of unprotected structures.		o Same as plan 1.		o Same as plan 1.		o Same as plan 1.		o Regional factors remain constant o National relations change o Flood regime remains constant or worsens o Continual decay of commercial and residential floodplain areas o Reduced property values and tax base of floodplain areas
Environmental: Terrestrial habitat	57 acres of woods lost over 100 years, 6 acres of agricultural land lost. Short-term adverse impacts on grassed/open areas. Approximately 24 acres affected.	Same as base condition - 48 acres of woods lost.	Same as plan 1.		Same effects as plan 1 with some increase in acres of grass and/open due to relocation/evacuation.		Same as plan 1		Future condition - 48 acres of woodland lost over 100 years.
Wetlands	No effect.		No effect.		No effect.		No effect		Present condition.
Water quality	Short-term decrease in surface water quality due to runoff from construction site.		Same as plan 1		Same as plan 1.		Same as plan 1.		Present condition.
Air quality	Temporary increase in air pollution during construction.		Same as plan 1.		Same as plan 1.		Same as plan 1.		Present condition.
Threatened and endangered species	No effect.		No effect.		No effect.		No effect		Present condition.
Cultural	Currently no known sites listed on or eligible for inclusion on National Register. Future surveys may identify previously unknown significant sites that may be impacted.		Same as plan 1.		Same as plan 1.		Same as plan 1.		Present condition.
Recreation	There is an opportunity to upgrade and/or add areas and facilities to the city's park system.		Same as plan 1.		Same as plan 1.		Same as plan 1.		No change from present condition.

EAST GRAND FORKS , MINNESOTA



Following the review of general impacts shown in table 1, workshop participants were requested to discuss and provide comments, questions, and concerns about each plan. The following is a summary of what they said.

Summary of
Workshop Questions and Concerns

Ward 1 (Conducted by Lynn Stause and Dave Mack)

1. Prevention: Why couldn't the Corps work on a better plan for preventing water from getting to East Grand Forks, Minnesota?

2. Drainage and Ponding: Away from cities, we have conflicting drainage and ponding programs. We have no control and it is costing us plenty.

3. Who Received the Survey - Not Reliable: People feel the survey of residents and businesses in East Grand Forks was not reliable.

4. Valuation: People close to the river feel that their property value has gone down and that continued talk of flooding is stopping future building and improvements.

5. Limbo status - too much time which affects values and sales: It takes too long to solve the problem. By bringing flooding up too often, people get down in the community and become concerned for its future.

6. Remove all existing dikes: One suggested plan was to remove the dike and let it flood. Then let Federal and State officials come in after the flood, pay for it, and relocate the town close to Key West.

7. Plans prevent improvements: Continued talk of plans is preventing improvements and stopping future building.

8. Grand design: The plan is too elaborate and probably should be done in stages and smaller portions.

9. Will the city survive with the plan?

10. Subsidy: Because we have been talking about flooding for so long, people feel they deserve a subsidy for their devalued property.

Ward 2 (Conducted by Jim Gander and Jerry Skyberg)

1. Where will the non-Federal money come from?
2. What is the breakdown of Federal and non-Federal costs?
3. If this happens, what will be the impact on the community?
4. Can we get State funds?
5. Will Mark Dayton pay for our levees?
6. Who will determine the value of acquired property?
7. How would the levees affect the look of the downtown area?
8. What are the consequences if we accept plan 5 (No Action)?

Ward 3 (Conducted by Duane Fettig and Ellis Larson)

1. Although no people from Ward 3 attended the meeting, how much of the Third Ward's money goes into this project?

Ward 4 (Conducted by Robert Matt and Dan Formato)

1. Will there be a city-wide assessment for local costs?
2. How are homes affected and how would they be acquired?
3. What are the city's sources of funds?

Ward 5 (Conducted by Steve Gorman and George Wogamen)

1. How come Grand Forks dikes work and ours don't?
2. How likely will alignment 3 be?
3. What happens to streets?
4. Have they ever conducted a survey of the economic impacts on properties along the dike?
5. Who is going to compensate for homes on the wrong side of the dike?
6. Why doesn't channel modification or holding water back work?
7. We should incorporate other water control projects to lower flood levels.
8. How much wider would the new levees be?
9. The city should feel obligated to reimburse people on the other side of the dike.
10. Who has the authority to approve the plan? Would there be a vote?
11. Where will non-Federal funds come from?

QUESTIONS AND ANSWERS

The many questions and concerns expressed at the meeting ranged from facts about a particular plan to personal values. Many of them were answered at the workshop or in the working papers which are available for your review at City Hall. Some are presently answerable. Some can be answered in more detail when we conclude the planning study in August 1984. Others are answered only on the basis of individual preferences and judgments. Here is our initial response to your concerns. They have been grouped and addressed by ward and question numbers (e.g., 1.1 means Ward 1 - concern 1).

Ward and Concern	Response
1.1, 1.2, 5.6, 5.7	The central theme of these concerns is: "Isn't there a better plan for reducing flood damages?" City officials and the Corps study team have evaluated all possible measures. These include structural measures such as reservoirs, diversions, and channel modifications. Although all of these measures are possible, they are too expensive and, most important, would not significantly reduce flood damages at East Grand Forks without levees as part of the plan. For the foreseeable future, levees combined with nonstructural measures such as floodproofing, evacuation/relocation, flood warning and forecasting, and flood insurance are the only measures that would significantly reduce flood damages at East Grand Forks.
1.3, 5.4	People don't believe the Corps survey of residential and business areas. The fall 1982 questionnaire was intentionally sent to residents in all geographic areas of the city because the flood control study would be important throughout the city. Responses came from all areas; 60 percent of the respondents live in the legal floodplain, and 78 percent have personally experienced flood problems while living in the city. Although the total number of responses is small (97) compared to the city size, the scientific process of sampling and analysis assures that the opinions expressed by the sample will be the same -- plus or minus a few percentage points -- as the opinions of the rest of the residents. The summer 1983 interviews of businesses involved personal discussions with all 36 affected establishments. Results from both the business and residential surveys are discussed in the working papers, available at City Hall. The attitudes expressed in these surveys are very important, such as concerns about the project and about where people or businesses would move, if forced to relocate; thus, you are encouraged to read the working papers, which describe the surveys and their results.
1.4, 1.5, 1.7, 1.10, 2.3, 2.7	People in the floodplain feel that their property values have gone down and that continued talk of flooding is stopping further building and improvements. Until recently, people's perceptions of property values in relationship to flood damages in East Grand Forks were not openly discussed and were unclear. The 1978 and 1979 floods and results of this study have more clearly identified those properties at risk to flood damages, the seriousness of the problem, and the potential for significant property loss. With only emergency protection available, potential investors would most likely consider property in the floodplain less valuable than property outside the floodplain. However, backed by permanent protection guarantees, these properties would maintain or improve in value and further

building and improvements would be encouraged. The city and the Corps feel the time is right to consider solutions to this flood-related problem; that is, a better flood damage reduction plan.

1.6 Why not remove the dikes and let it flood?

This plan does not prevent flood damages but invites them to occur. It is not cost-effective where plans are available that cost less in the long run than the damages that would occur under direct flooding. The plan would not be socially acceptable to local residents. In addition, a State and Federal bailout is not guaranteed with every flood. Floods in the foreseeable future may not involve a State or Federal disaster declaration, without which State and Federal assistance would not be available. Then the city and its residents may have to pay the full price for flooding.

1.8 The plans are too elaborate and probably should be done in stages and smaller portions.

We agree that the period of time between initiation of this planning study and implementation of a plan is lengthy and that current plans are comprehensive and complex. As Federal water resource planners, we are as eager as you are to arrive at a best plan. However, we are limited in how we plan for you by Federal water planning policies and regulations, congressional funding priorities, and the complexities of the engineering, economic, social, and environmental constraints of this study. It takes a lot of time to work through the details.

It is the Corps goal to provide certified flood protection so that the remaining flood damages are minor and do not create significant social or environmental impacts. This level of flood protection typically lies somewhere between the 100-year to standard project flood (SPF) level. We prefer the SPF level of protection in situations where the consequences of failure would be catastrophic, such as plans in urban areas involving high levees, high floodwalls, and rapid velocities. Other goals include a plan that has: (1) economic feasibility - having more dollars of benefit than cost and being affordable by the city and other State and local units of government; and (2) social and environmental acceptability - fitting in with existing conditions and future plans of the city.

There are certainly less time consuming and less complex methods of planning and implementing solutions. For example, studies can be conducted by non-Federal entities which might provide an acceptable solution at a lower level of protection with less time and cost. However, current study efforts indicate that the most cost effective level of protection lies somewhere between the 100-year and SPF level. Further studies will focus in on the most cost effective level of protection and the environmental and social implications of such a plan.

2.8, 1.9, 4.4, 4.5, 4.6 Will the city survive with or without a plan?

Without permanent flood protection, the city will continue to be restricted in development and maintenance in its legal floodplain area. This will make it more difficult for the present downtown area to support businesses, in competition with the 220 North area and with Grand Forks. If a flood occurs which cannot be handled with emergency floodfighting, considerable damage could result, which would accelerate blight in both commercial and residential areas. Property values will continue to be restrained by both the threat of floods and the limitations imposed by the legal floodplain status, as well as by floods themselves.

With permanent flood protection, property values within the protected area will be significantly improved by the removal of the flood threat, flood damages, and legal floodplain status. Options for commercial redevelopment will be improved. Negative consequences are that commercial blocks closest to the river will have to be relocated. Residences near the rivers will also be relocated, or possibly allowed to remain on the unprotected side of the new levee, with the emergency levee removed. As local costs will be high, protected properties will have a high tax burden.

"Survival" is perhaps not the issue so much as "change", for East Grand Forks will continue to change, in either case. But the community must decide which types of change it prefers.

5.3, 5.2 What happens to streets? How much wider will levees be?

The city and Corps objective is to make only necessary changes with a minimum of impact on other areas. The limited space in this progress report does not permit us to provide specific details of each plan. We suggest you review the working papers, available at City Hall, which contain detailed information on levee locations, street modifications, utility relocations, and levee widths and heights. Please keep in mind that these details will change during our next level of analysis. The study team is currently focusing in on the engineering, economic, social, and environmental variables to provide information which will help us identify a best plan.

5.9 The city should feel obligated to reimburse people on the unprotected side of the dike.

Currently, it has not been determined if there is any legal obligation for either the city or the Corps to acquire homes outside the protected area. Both the city and the Corps are definitely concerned about those properties which cannot be protected, especially if they are presently given a sense of security by the existing emergency levee. According to our public opinion survey of city residents conducted in the fall of 1982, we know that only 11 percent of the citizens think that it is simply the property owners' problem; most believe that either the city or Federal Government has a responsibility to compensate or move those homes. However, it is not yet known just what legally must be done, or who can afford to do it.

2.6, 4.2, 4.3 Who would determine the value of acquired property?

The sponsor, the city of East Grand Forks, would be responsible for acquiring all lands, easements, and rights-of-way for the project. An appraiser would determine the value of the property with interaction from the city and the Corps. A fair market value offer would be made and agreed to by all parties before the property would be acquired.

2.1, 2.2, 2.4, 2.5, 3.1, 5.5, 5.11, 4.1, 4.7 Where will the money come from?

If the city and its residents conclude from this planning study that a plan is acceptable, they need to begin dealing with this question soon. The city and its residents need to weigh out a strategy and set a course for finding the money for the local share of the project. The Corps of Engineers will provide the Federal funds for the plan. The local sponsor, the city of East Grand Forks, is responsible for providing the non-Federal share of funds. Non-Federal fund sources are typically obtained through (1) revenue sharing funds made available under the State and Local Fiscal Assistance Act, (2) Housing and Urban Development community block grants, (3) special local assessments, (4) watershed districts, and (5) special State legislation.

5.10 Who has the authority to approve the plan?

The city of East Grand Forks has the legal authority to construct levees and floodwalls by virtue of its Home-Rule Charter. Chapter 458.32 of the Minnesota Statutes grants the power to construct levees to East Grand Forks. The city also has the authority to be involved in levee systems extending beyond its corporate limits through the joint power authority granted cities.

5.1 Why do levees and floodwalls work in Grand Forks and not in East Grand Forks?

The focus of this study is strictly on the East Grand Forks flood problem. The city of Grand Forks, however, faces similar flood problems. In the early 1950's, the Corps of Engineers and the city of Grand Forks constructed a levee-floodwall system which has paid for itself in reduced flood damages for Grand Forks. A more recent study completed in 1981 did not identify a comprehensive solution to Grand Forks' current problem that involved Corps participation. However, we feel that a comprehensive plan exists for the city of East Grand Forks which would involve Corps participation.

EAST GRAND FORKS FUTURE
WITH AND WITHOUT A BETTER PLAN

Citizens of East Grand Forks participated in meetings held during October and November 1983, to help give direction to the future of the city. The first meeting focused on goals; the second, on obstacles to those goals which the group gave highest priority; and the final meeting developed strategies for achieving goals and circumventing the obstacles.

The Corps helped sponsor the meetings, as a part of its determination of the most likely future of the city, with or without a Corps project. We want to thank all of the citizens who gave their time to address these important civic issues.

THE NEXT STEP

The study team is involved in the following activities. If you have any questions concerning their status, please contact a team representative and we will try to answer them as soon as we can.

Present - Dec 1983 — City identifies most probable future. Corps considers comments from city and workshop activities and readies data for the final planning evaluation.

Present - Jun 1984 — Screening and selection of a best plan and preparation of a draft report for public comment.

- o Identification and selection of a levee alignment.
- o Development of recommended levee components (earthen levee or floodwall).
- o Development of recommended nonstructural components (flood proofing, evacuation/relocation, flood insurance, floodplain zoning, flood warning and forecasting components).
- o Evaluation of engineering, economic, social, and environmental impacts (with and without the plan).
- o Recommendation of a best plan for design studies.

Jun 1984 — Public meeting to solicit comments.

Aug 1984 — City agrees in principle with the recommended plan.

Sep 1984 — Initiation of design studies.

- o You may have noticed a display located at City Hall that includes pictures, tables, and graphs about past floods and the flood future. We invite you to visit City Hall, view the display, and pick up a brochure on the city's current flood emergency plan.

- o A copy of the working papers is being maintained at City Hall for your review. If you have any questions, please contact one of the study team representatives.

US Army Corps
of Engineers
St Paul District

East Grand Forks
Study of Flood Problems

PUBLIC MEETING

THE CITY OF EAST GRAND FORKS AND THE ST. PAUL DISTRICT CORPS OF ENGINEERS WILL CONDUCT A MEETING FOR THE EAST GRAND FORKS MINNESOTA FLOOD CONTROL STUDY

PURPOSE : TO INFORM YOU OF THE STUDY FINDINGS AND RECOMMENDED PLAN

TO ANSWER YOUR QUESTIONS ON THE RECOMMENDED PLAN

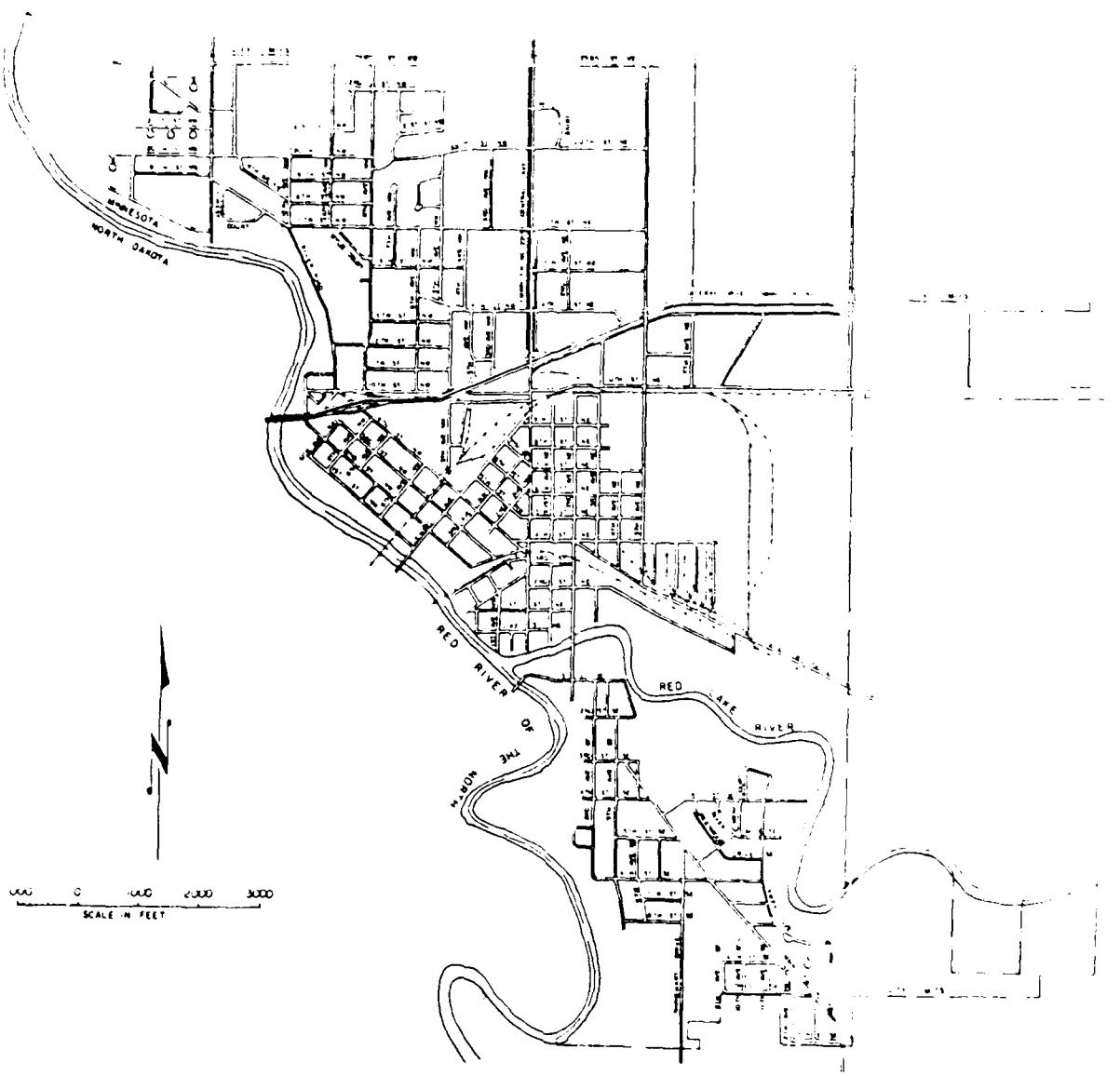
WHEN : 7:30 PM ON THURSDAY OCTOBER [illegible]

WHERE : EAST GRAND FORKS AREA VOCATIONAL TECHNICAL INSTITUTE
2022 CENTRAL AVENUE NORTHEAST
EAST GRAND FORKS MINNESOTA

ALL INTERESTED CITIZENS AND AGENCIES ARE INVITED

N-B-109

EAST GRAND FORKS , MINNESOTA



DEPARTMENT OF THE ARMY
ST PAUL DISTRICT CORPS OF ENGINEERS
1135 U S POST OFFICE & CUSTOM HOUSE
ST PAUL MINNESOTA 55101

REPLY TO
ATTENTION OF:

September 1984

Planning
Plan Formulation

ANNOUNCEMENT OF PUBLIC MEETING
EAST GRAND FORKS GENERAL REEVALUATION STUDY

The City of East Grand Forks, Minnesota, and the St. Paul District, Corps of Engineers, have completed the study of flood and related water resource problems on the Red River and the Red Lake River in East Grand Forks, Minnesota. In 1953, a federally authorized project was planned and designed for the city. Until recently, the authorized plan was not studied further because the city would not indicate that it would meet Federal local cooperation requirements. Following several serious floods in the 1960's and 1970's, the city signed an official agreement indicating willingness to participate in the project. Since the 1953 project design, many changes have occurred which required a reevaluation of the authorized project and other measures and plans during the period of October 1980 through October 1984 so that a recommended plan could be identified. The completed planning study has identified a recommended flood damage reduction plan for East Grand Forks.

This study was authorized by Congress in the Flood Control Acts of 1948, 1950, and 1975. Generally, the major problem is flooding and the continued threat of flood damages. The basic need is a plan which will significantly reduce flood damages and afford the City of East Grand Forks the opportunities for continued growth and development into the future. Planning studies have analyzed a wide range of structural and nonstructural measures for their merit in reducing flood damages at East Grand Forks. Structural measures analyzed and dropped from further study include upstream dams and tributary reservoirs, diversions, and channel modification. Levees were identified as the only structural measure capable of significantly reducing flood damages at East Grand Forks, Minnesota. The draft report recommends further study and engineering design of a plan which includes levees in combination with nonstructural measures to include floodproofing, acquisition/relocation, floodplain zoning, flood warning and forecasting, flood insurance, and an emergency plan of action.

To inform interested citizens on the study findings and to answer questions, a meeting will be held on October 11, 1984, at 7:30 p.m. in the East Grand Forks, Minnesota, AVTI. This meeting will serve as an informational meeting with concerned citizens and interested publics. We invite you to attend the meeting and participate in the exchange of information and ideas. Your input will be helpful to the city in deciding whether to continue detailed engineering studies of the recommended plan.

Edward G. Rapp
Colonel, Corps of Engineers
District Engineer

N-B-111

DEPARTMENT OF THE ARMY
ST PAUL DISTRICT, CORPS OF ENGINEERS
1135 U S. POST OFFICE & CUSTOM HOUSE
ST. PAUL, MINNESOTA 55101

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ST. PAUL, MN
PERMIT NO. G-5

SUPPORTING DOCUMENTATION
PUBLIC INVOLVEMENT

APPENDIX C
LIST OF INDIVIDUALS AND GROUPS RECEIVING THE DRAFT GENERAL REEVALUATION AND SUPPLEMENT TO ENVIRONMENTAL IMPACT STATEMENT FOR FLOOD CONTROL AND RELATED PURPOSES

RED AND RED LAKE RIVERS
AT EAST GRAND FORKS, MINNESOTA

EAST GRAND FORKS MAIL LIST

Those checked received the draft report and draft supplement to the final EIS

***

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Mr E W Johnson, Assistant District Engineer, Minn. Dept of Transportation, Bemidji, Minnesota 56601
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33)**********

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Mr. William Nelson, Jr., Township Chairman/Polk County, Sullivan Township, Route 2, East Grand Forks, MN 56721
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Mr. Earl Strande, Township Chairman/Polk County, Fisher Township, Fisher, MN 56723
Mr. Ordean Sundrud, Township Chairman/Polk County, Hill River Township, Fosston, MN 56542
Mr. Earl Sykes, Township Chairman/Polk County, Grove Park Township, Mentor, MN 56736

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✓Mr. Joel Vennes, Township Chairman/Polk County, Brandsvold Township, Fosston MN 56542
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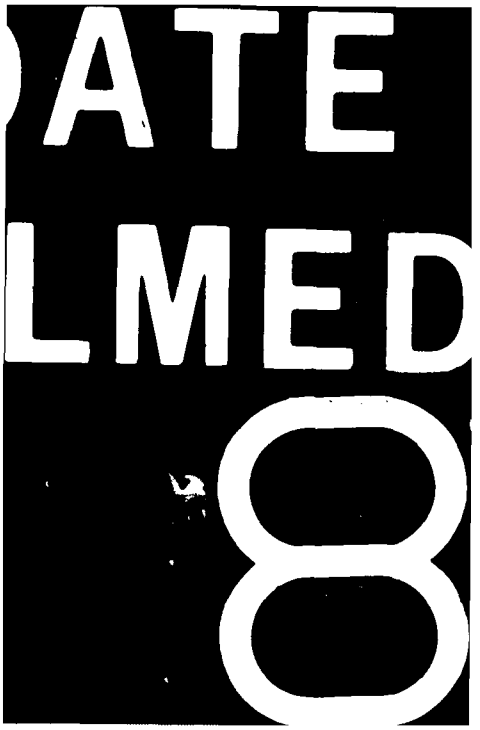
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Mrs. Maldor Sorenson, 812 12th Street NW, East Grand Forks, MN 56721
Gunder Sorenson, 727 12th Street NW, East Grand Forks, MN 56721
Shirley Sorenson, 820 12 Street NW, East Grand Forks, MN 56721
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Mr. Gregory Stennes, 804 1st NW, East Grand Forks, MN 56721
Mr. Thomas J. Stennes, 902 18th NW, East Grand Forks, MN 56721
Mr. Tom Stennes, 902 - 18 Street N.W., East Grand Forks, MN 56721
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Ms. Maureen J. Sweet, 711 1st St. NW, East Grand Forks, MN 56721
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Mr. Larry Tack, 802 NW 17th Street, East Grand Forks, MN 56721
June Tangen, 1022 17th Street NW, East Grand Forks, MN 56721
Mr. Dale B. Taylor, 1615 NW 21st Street, East Grand Forks, MN 56721
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Mr. Dennis O. Thompson, 820 1st St. NW, East Grand Forks, MN 56721
Lois and Ron Thompson, 1615-7th Avenue NW, East Grand Forks, MN 56721
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Mr. James Troyer, 19 Forrest Ct. NW, East Grand Forks, MN 56721
Mr. Henry G. Tweten, 110 South Second Street, East Grand Forks, MN 56721
Roland Twite, 521 3rd Street NW, East Grand Forks, MN 56721
George Vanya, 722 Central Avenue, East Grand Forks, MN 56721
Mr. George Vanya, 722 Central Avenue, East Grand Forks, MN 56721
Elaine Vigen, 1004-2nd Street NW, East Grand Forks, MN 56721
Pamela Vigen, 211-10th Avenue NW, East Grand Forks, MN 56721
John Voiss, 10-1st Street NW, East Grand Forks, MN 56721
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Mrs. Edward Von Reuden, 308-3rd Avenue SE, East Grand Forks, MN 56721
Mr. Mike Von Rueden, 2216-11th Ave NW, East Grand Forks, MN 56721
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, Postmaster, Grand Forks, ND 58201
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Mr Keith Bisson, Lions Club, 521 DeMers Avenue, East Grand Forks, MN 58201
Mr Ardell Buchholtz, Old Dutch Foods, Business 2, East Grand Forks MN 56721
Mr Joe Bushaw, American Legion Club, 2220 Shadow Road, East Grand Forks,
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Mr John P Bushee, John P Bushee Potato Co., 408 4th St NW, East Grand Forks,
MN 56721
Mr James Carlson, A & H Vending, 212 2nd St NE, East Grand Forks, MN 56721
Mr Dick Carlson, Haynes Chemical Company, 421 Demers Ave, East Grand Forks,
MN 56721
Ms Kathy Cumming, Valdak Corporation, 401 Demers Ave ,
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Mr DeWayne Delisle, Mayo Manufacturing Company, Business 2, East Grand Forks,
MN 56721
Mr John Doherty, Center Cinema, 301 2nd St NW, East Grand Forks, MN 56721
Mr Robert Driscoll, Olson Drug, Inc , 302 Demers Ave, East Grand Forks,
MN 56721
Ms Marlys Dudgeon, Point Ceramics, 320 Demers Ave , East Grand Forks MN 56721
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Mr Ron England, American Crystal, 1515 7th Avenue NW, East Grand Forks,
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Mr Robert Gaddie, Gaddie Water Hauling, 203 2nd Ave NE, East Grand Forks,
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Mr. Melvin Johnson, Johnson Iron and Machine, 1201 Central Ave., East Grand Forks, MN 56721
Mr. Hilton Johnson, King of Potatoes, Inc., Business 2, East Grand Forks, MN 56721
Ms. Pat Kane, Midwest Vision Center, 309 2nd St. NW, East Grand Forks MN 56721
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Mr. Bixby Knight, Golden Cue Billiard Hall, 303 2nd St. NW, East Grand Forks, MN 56721
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Mr. John Rasmussen, Simplot Soilbuilders, Highway 2, East Grand Forks MN 56721
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Mr. William Rosenberg, Mikes Pizza Palace, 105 Demers Ave., East Grand Forks, MN 56721
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Mr. Tony Senger, Senger's Piggly Wiggly, 419 2nd St. NW, East Grand Forks, MN 56721
Mr. Wy Sheppard, Wy's Garden Center, Business 2, East Grand Forks MN 56721
Ms. Kay Spear, Kay's Kut and Kurl, 535 7th Ave SE, East Grand Forks MN 56721
Mr. Greg Stennes, Whitey's Cafe, 109 Demers Ave., East Grand Forks MN 56721
Mr. J C. Tanner, American Crystal Sugar Co., East Grand Forks, MN 56721
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Mr. Dick Wiley, Citizens State Bank, East Grand Forks, MN 56721
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Mr. Ron Adrian, Engineer, Middle-Snake River Wtrshd Dist, 122 West Johnson Avenue, Warren MN 56762
Mr. Charles L. Anderson, Engineer, Red Lake Watershed District, 210 Fourth Avenue South, Crookston, Minnesota 56716
Mr. Eugene Battles, President, Warroad River Watershed Dist, Rural Route 1, Warroad, MN 56736
Mr. Roland Gullekson, President, Sand Hill River Drainage & Con, Fertile MN 56540
Mr. John Lofton, President, Roseau River Watershed Dist, Star Route A, Roseau, MN 56751
Mr. Donald Ogaard, President, Wild Rice Watershed District, Ada, MN 56610
Mr. Arnold Person, President, Red Lake Watershed District, Oklee MN 56742
Mr. Don Rivard, President, Middle-Snake Watershed Dist, Argyle, MN 56713

Mr. Roger Ward, President, Joe River Watershed District, St. Vincent, MN 56755
Mr. C. Harley Youngren, President, Two Rivers Watershed District, Hallock, MN 56728
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, FIRST LUTHERAN CHURCH, 203 5TH ST N W, EAST GRAND FORKS,MN 567 21
, RIVER HEIGHTS LUTHERAN CHURCH, 2214 10TH AVE N W, EAST GRAND FORKS,MN 56721
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, Grand Forks Herald, 120 North Fourth, ATTN: LIZ FEDERS, Grand Forks, ND 58201
Ms. Liz Feders, Grand Forks Herald, East Grand Forks, MN 56721
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, KKXL, 505 University Avenue, Grand Forks, ND 58201
, KTHI, c/o Community Calendar, P.O. Box 1078, Fargo, N.D. 58107
, KFJM, Box 8116, Grand Forks, N.D. 58201
, KNOX, South of Grand Forks, Grand Forks, ND 58201
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, KTHI - TV, 314 9th Avenue North, Grand Forks, ND 58201
, Grand Forks Cable TV, 1302 4th Avenue N, Grand Forks, ND 58201
, WDAZ - TV, 300 De Mers Avenue, Grand Forks, ND 58201
, KXJB - TV, 2123 Dyke Avenue, Grand Forks, ND 58201
, KDQ, 505 University Avenue, Grand Forks, ND 58201
Mr. Tim Burke, KTHI-TV, East Grand Forks, MN 56721
Mr. John Gillespie, WDAZ-TV, Box 638, Grand Forks, ND 58201
Mr. Dan Stratmann, KFJM, Box 8116, Grand Forks, ND 58202
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, East Grand Forks Public, Library, 223 2nd Street NW, East Grand Forks, MN 56721
, Ada Public Library, Creamery Mall, Ada, MN 56510
Barb Jauquet, Northwest Regional Library, 101 East First, Thief River Falls, MN 56701
, Climax Public Library, Climax, MN 56523
, Fosston Library, 216 East First, Fosston, MN 565542
, McIntosh Public Library, 209 Cleveland Ave. SE, McIntosh, MN 56556
, Fertile Public Library, 212 Mill Street North, Fertile, MN 56540
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, Pribula Engineering & Survey, Box 482, 712 Demers Avenue, East Grand Forks, MN 56721
Mr. Jerry Pribula, 15 Wyle Ct. Box 482, East Grand Forks, N.D. 56721
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Mr. Dan J. Formato, Fire Chief, East Grand Forks, 802 NW 2nd Street, East Grand Forks, MN 56721
Mr. James Gander, President, East Grand Forks City Council, 724 5th Avenue SE, East Grand Forks, MN 56721
Mr. Melford Johnson, 1003 James Ave. SE, East Grand Forks, MN 56721
Mr. Karl Lindquist, Alderman, East Grand Forks, 304 Central Avenue NE, East Grand Forks, MN 56721
Mr. Dave Mack, Clerk/Treasurer, City of East Grand Forks, East Grand Forks, MN 56721
Mr. Robert A. Matt, City Attorney, 312 2nd Street NW, East Grand Forks, MN 56721
Hon. Louis A. Murray, Mayor, City of East Grand Forks, East Grand Forks, MN 56721
Mr. E.J. Osowski, 200 1st Avenue NW, East Grand Forks, MN 56721
Mr. Robert Peabody, 534 3rd Avenue SE, East Grand Forks, MN 56721
Mr. Gary Sanders, City Engineer, East Grand Forks, 123 NE 17th Street, East Grand Forks, MN 56721
Mr. Lynn Stauss, Alderman, East Grand Forks, 831 James Ave. SE, East Grand Forks, MN 56721


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