

RECONNAISSANCE
REPORT ON
E N G L I S H C O U L E E
THROUGH
GRAND FORKS, NORTH DAKOTA

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SWC Project #1351

North Dakota State Water Commission
Bismarck, North Dakota 58505
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A. INTRODUCTION

1. Purpose and Scope

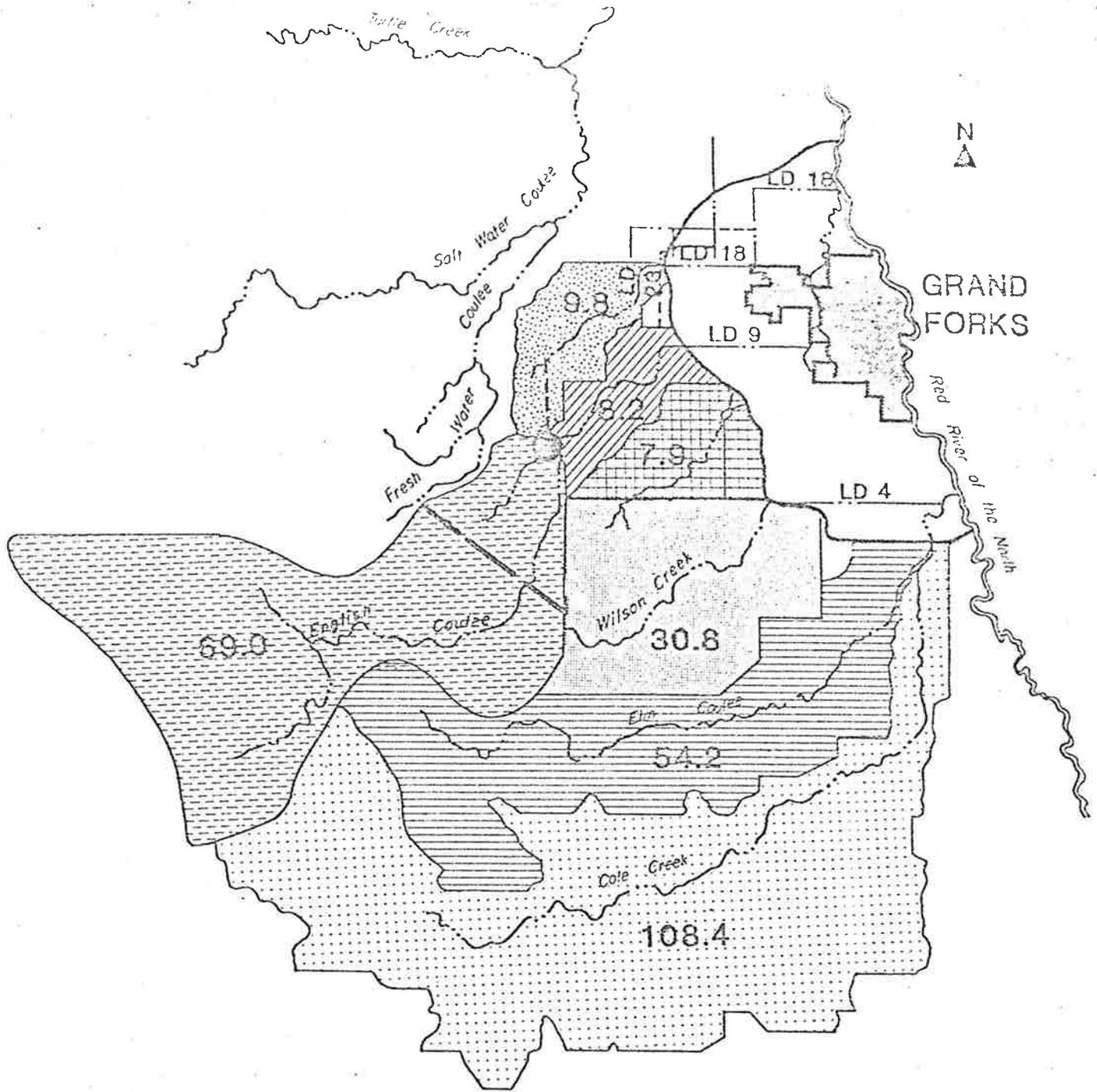
The purpose of this report is to review the past and current activities of the State Water Commission and other agencies involved with English Coulee through Grand Forks, North Dakota. This report was prepared as background information in anticipation of State Water Commission cost participation in the English Coulee Project.

B. ENGLISH COULEE

1. General

The English Coulee channel drains a watershed of approximately 114 square miles (figure 1) and joins the Red River north of Grand Forks. The slope of the watershed is from the southwest to the northeast. Since the Coulee is located on the flat bed of former glacial Lake Agassiz, the channel is virtually nonexistent in places in the upper part of the watershed. The channel becomes more defined and deeply entrenched as it passes through Grand Forks.

The flooding problem along English Coulee is mainly from two sources. The principal flood problem is caused by backwater from the Red River of the North. The 100 year flood level flow on the Red River is 829.0. Flood flows back-up English Coulee approximately 5.5 miles to the vicinity of Demers Avenue (figure 2). Spring flood problems associated with this backwater may be aggravated by snowmelt and/or rainfall runoff from English Coulee watershed. Flood problems along the coulee may also be caused by heavy summer thunderstorms and related rapid runoff through the coulee. This source of flooding has not been as severe as the backwater flooding problem.



108.4 Watershed Area, Square Miles

- Study Boundaries
- Watershed Divide
- Diversion Structure
- Proposed SCS Dam
- - - - New Ditch Required Under Proposed SCS Plan

FIGURE 1

TRIBUTARY WATERSHED MAP

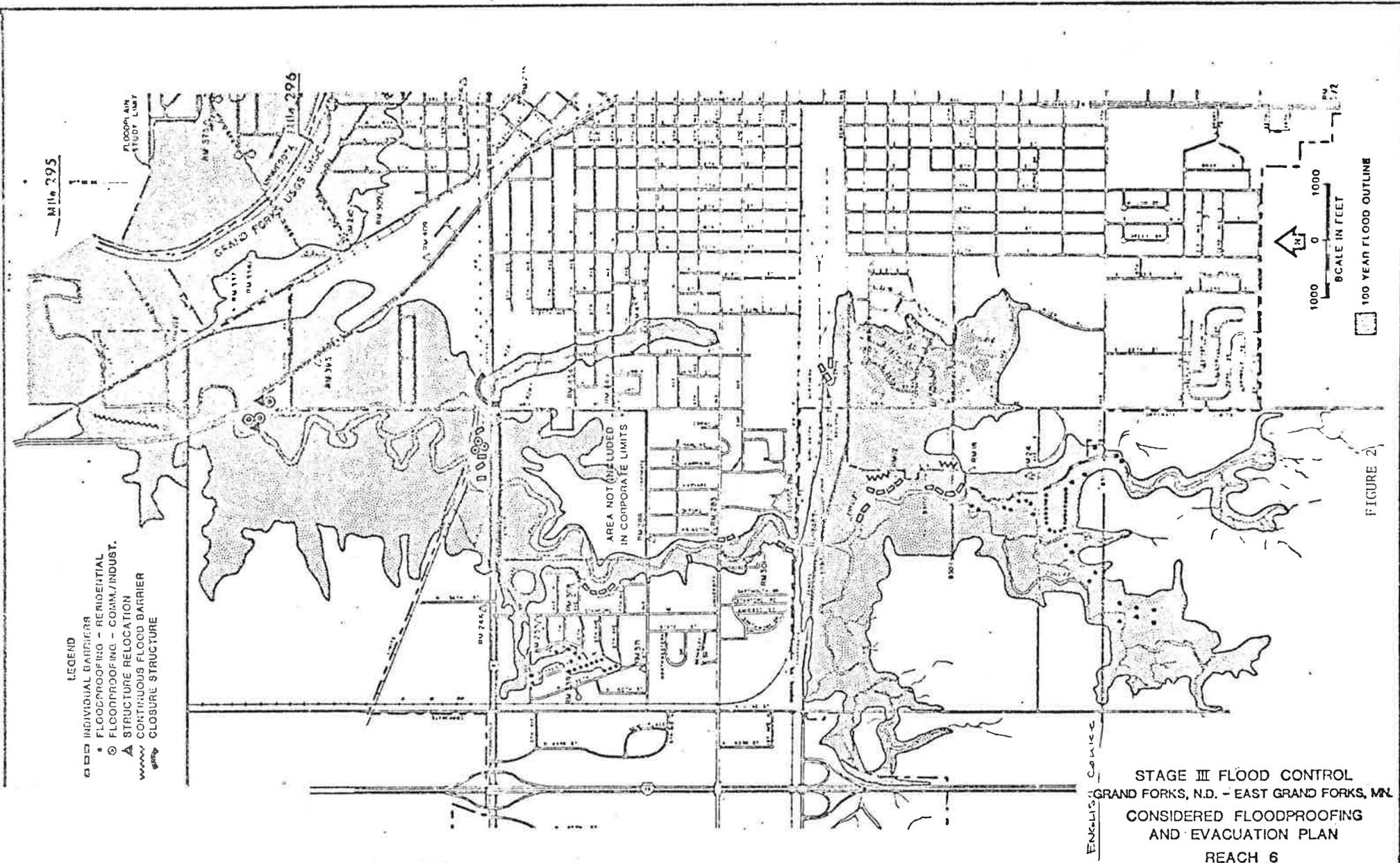
2. History of Development

Development along the coulee in the vicinity of Grand Forks has taken place in stages relating to the growth of the city. The oldest development includes commercial and residential structures built north of Highway 2 along the coulee near the Red River. These structures were constructed long before any data was available on English Coulee. As the city grew, development started to take place south of Highway 2 to University Avenue. This development was primarily residential with the exception of the University of North Dakota. Most of the residential structures were located outside of the known 100 year floodplain at that time. The University had placed some structures in the 100 year floodplain.

South of University Avenue to 17th Avenue South is all recent development along the coulee. This development followed the floodplain information supplied by the Federal Insurance Administration under the Department of Housing and Urban Development. Outside of the identified flood hazard area, development proceeded without regard to flooding of English Coulee (which they could do at that time).

3. The 1979 Spring Flood

The 1979 spring flood on English Coulee is considered to approximate the 100 year flood. This flood was unique because the 100 year flood on the coulee nearly coincided with the peak of the Red River flows (figure 2). The 100 year peak discharge was estimated at 2,508 cfs prior to the 1979 spring flood. After flood routing and considering channel storage along the coulee, this peak discharge was revised to 2,300 cfs (1% chance). This discharge was based on a drainage area of 60 square miles which starts at the junction of the Soil Conservation Service floodway



LEGEND

- ▣ INDIVIDUAL BARRIERS
- FLOODPROOFING - RESIDENTIAL
- ⊙ FLOODPROOFING - COMM./INDUST.
- ▲ STRUCTURE RELOCATION
- ▩ CONTINUOUS FLOOD BARRIER
- ▬ CLOSURE STRUCTURE

AREA NOT INCLUDED
IN CORPORATE LIMITS

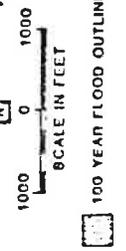


FIGURE 2
100 YEAR FLOOD OUTLINE

ENKELT'S CAUSEWAY

STAGE III FLOOD CONTROL
GRAND FORKS, N.D. - EAST GRAND FORKS, MN.
CONSIDERED FLOODPROOFING
AND EVACUATION PLAN
REACH 6

diversion and English Coulee. This junction is located in Section 30, Township 151 North, Range 51 West.

The floodway was passing approximately 500 cfs. This was 100 cfs less than design estimate. The reason this was less than design was because various elements in the original design were not constructed.

At Grand Forks County Highway 5 and English Coulee just downstream from the junction of the coulee and floodway, there was a total estimated peak discharge of 2,438 cfs crossing County Highway 5. This water went down the channel into Legal Drain #9, which is also a part of English Coulee.

At I-29 just south of the city, water from Legal Drain #4's watershed crossed into the English Coulee Watershed between the lanes of I-29. While the amount of water that came down appeared to be relatively small, it did overtop one of the interstate lanes for a short period of time.

Once this water reached the railroad tracks just south of the University it started to form a reservoir. The culverts through the railroad were only capable of passing approximately 750 cfs. Flow coming into the area above the railroad culverts was greater than 2900 cfs. This difference in inflow and outflow resulted in the backup of water behind the culverts. As this reservoir was being formed, water overtopped a portion of Columbia Road and flowed back into a residential area south of Demers Avenue and east of Columbia Road. Prior to development, this residential area was a large slough and consequently this low-lying area quickly filled and inundated approximately 200 homes.

Many other buildings that were built too close to the coulee also suffered from water damage, including the new hospital, apartment complexes, and some university buildings.

The flooding of the coulee caught the local people and government officials by surprise. Little warning time was available to prepare for and prevent flood damages because the majority of the flood fight was directed at protecting the city from high flows on the Red River.

4. State Water Commission's Involvement

Records indicate that the Water Commission's involvement with English Coulee began in early 1960 when the State Highway Department was planning the U.S. Highway 2 and I-29 bypass. Phil Nelson, former Drainage Engineer for the State Water Commission, went to Grand Forks to meet with the Grand Forks Drain Board and discuss the route of Legal Drain #18. As a result of reviewing the highway plans and problems associated with Legal Drain #18, he wrote to the Drain Board in May, 1960 making some suggestions for this problem. One of the suggestions worth noting is: "It would be a benefit to Grand Forks to get most of the discharge from Drain #18 further away from the settled area so it doesn't flow through or near town." Nelson also suggested, "that the outlet for Legal Drain #18 be into Salt Water Coulee or to the Turtle River if evidence indicates it to be needed."

Milo Hoisveen, former State Engineer, wrote (March 8, 1961) to Alan Webster, Grand Forks City Manager (Appendix A) warning about the encroachment of buildings near the English Coulee. A strong approach was used in his letter aimed at stopping future encroachments. His letter stated that, "...a building is an obstruction of the channel, substantially

lowering its capacity and is in violation of Section 61-01-07 (Obstruction of a Watercourse) of the North Dakota Century Code."

In May, 1962, the Highway Department, in coordination with the State Water Commission, developed a drainage plan for the west side of Grand Forks for drainage of Highway 2 and I-29. Because of the short time frame in which this plan was to be implemented, it did not allow for the time needed for design and land purchases and to do other things necessary before the highways were constructed. The Water Commission then met with the Grand Forks County Drain Board and the Soil Conservation Service and worked out alternate plans which could be implemented within the time frame of the scheduled highway construction. These alternative plans were then to be used for the control and diversion of all the surface drainage away from the City of Grand Forks (Appendix B).

In August, 1963 the State Water Commission presented the Grand Forks City Council a report on the interception of surface flood waters (Appendix C). This report presented a plan to divert excess flows from storm sewers and/or spring runoff from English Coulee. Before this time there were no plans or studies concerning flood protective improvements for surface waters entering the Red River through Grand Forks. The report also recommended that a plan be implemented to encourage orderly development along the coulee as the city expands.

In September, 1963 an interagency meeting was held by the Highway Department on English Coulee. The result of this meeting was that the Highway Department could not use English Coulee as an outlet for the drainage of Highway 2 and I-29 due to the encroachments that had taken place in the coulee and its tributaries. The Highway Department then proposed that the water be diverted around Grand Forks through a diversion

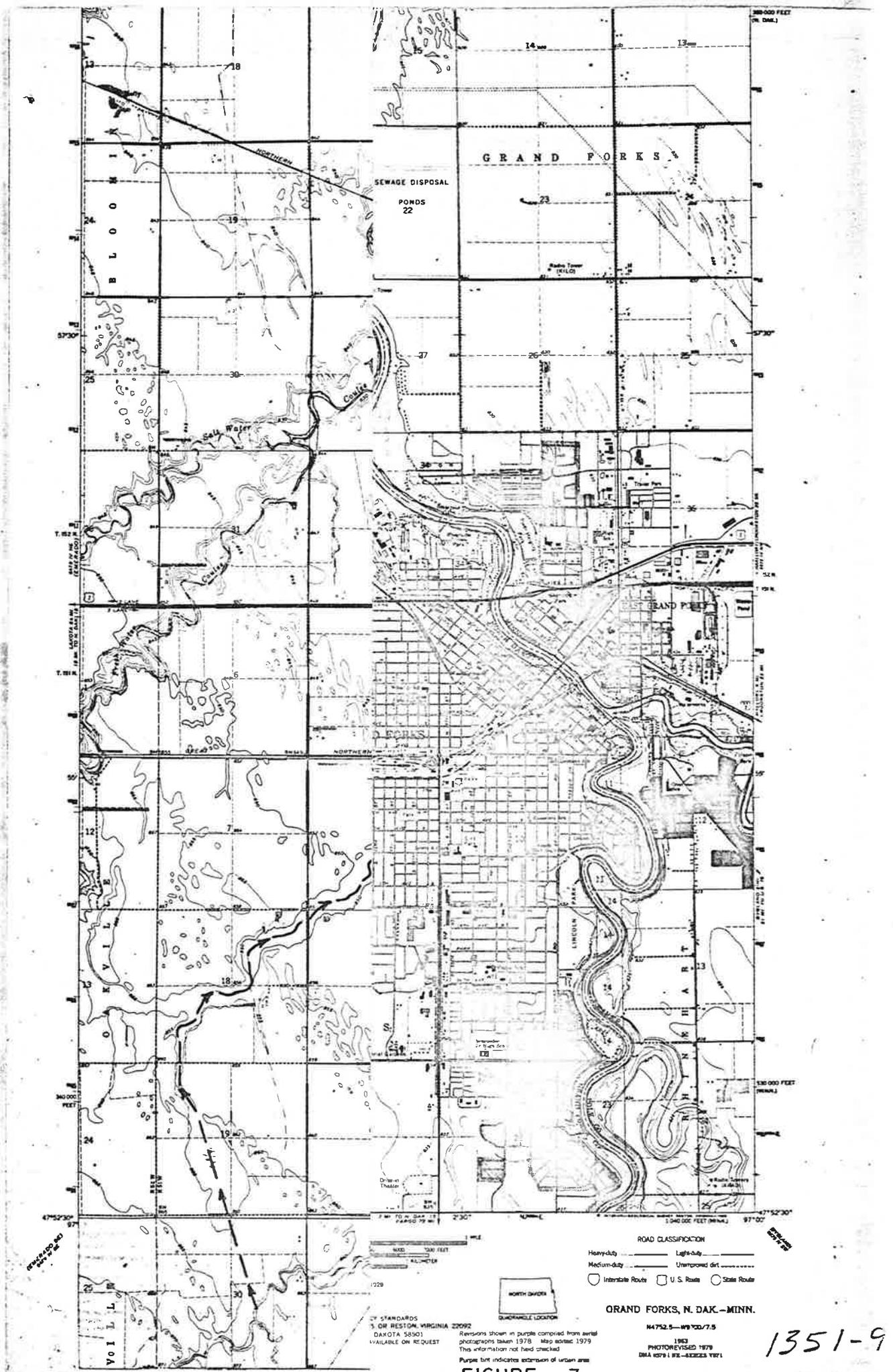
channel starting at the northeast corner of Section 1, Township 151 North, Range 51 West, then running two miles north and then east for approximately 2½ miles into the Red River (figure 3).

The Water Commission also made a proposal to divert flood flows from English Coulee into the diversion proposed by the Highway Department. This proposal would allow normal flows to pass through Grand Forks.

George Seaworth of the Federal Highway Administration, said that as far as they were concerned, the water should be allowed to flow in the same channel as it is now and the encroachments removed. He then also stated that "the Bureau would only participate in the cost that would be necessary to maintain the existing drainage".

A meeting held with the Grand Forks city officials pointed out that encroachments along English Coulee would continue as the city expanded. Therefore, the coulee could not be used for highway drainage. The State Highway Department and State Water Commission presented a plan to the local officials which would divert Legal Drain #18 north, then east into the Red River (figure 3). This would reduce the costs and the size of structures required over English Coulee. The City, Grand Forks County Drain Board, Highway Department, and State Water Commission all participated in the diversion route presently referred to as the North Diversion.

The Water Commission provided technical and financial assistance to the Grand Forks Drain Board and the City of Grand Forks. The North Diversion required three drop structures for the outfall into the Red River. The State Water Commission did the surveys, soil testing, design, and construction management for these structures. The construction of



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the North Diversion took place over a long period of time because of the city's problem in providing the local share of the financing, and other difficulties which arose on the project.

According to Water Commission files, the sequence of events was as follows:

- Sept. 1963 - Highway Department and State Water Commission laid out plans for North Diversion to city officials.
- Dec. 1963 - Highway Department requested the State Water Commission to handle local negotiations and contracts.
- Jan. 1964 - Corps was asked to participate but due to the time factor involved the State Water Commission declined their participation.
- Feb. 1964 - Grand Forks County Water Management District held a meeting and discussed the diversion of Drains #9 and #18 and learned that English Coulee was good enough for at least fifteen years. Therefore, the City of Grand Forks dropped the project because they could not finance it themselves (Appendix D).
- Feb. 1964 - State Highway Department resumed design on I-29 using the design information supplied by the State Water Commission and others even though the local sponsors did not believe the diversion of English Coulee was necessary at this time.
- April 1965 - The Water Management District wanted a structure installed through Highway 2 along the proposed route units. This structure is a structural steel arch pipe. Rise of 8'1" and width of 14'1" to handle approximately 750 cfs.
- March 1965 - State Water Commission Engineer attended a meeting by Grand Forks County Water Management District where Mr. Thoraldson, Grand Forks County Chairman reviewed the history of the diversion plan for English Coulee, citing particularly the failure of the diversion plan as planned by the Water Commission and estimated by the Highway Department because of the short time available then to raise the needed \$229,000

local funds required to accomplish the diversion as part of the Highway 2 and I-29 construction project. According to Phil Nelson's memo to Milo Hoisveen (Appendix E), Ray Zink, Highway Department, then told the water management board that since the diversion plans had been discarded, the plans were altered to fit the Highway Department needs and said the rest is now a local problem.

- April 3, '65 - The Grand Forks County Drain Board proposed a design to divert water from Drain #9 into Drain #18, then Highway 2 was brought to the Highway Department's attention. The Highway Department's response was that the structures through I-29 and Highway 2 were not designed for this increase in flow (Appendix F).
- April 5 '65 - The State Water Commission approached the Grand Forks County Water Management District to review the original need of a plan and the reasons for them to divert floodwater from English Coulee around the City of Grand Forks. After a discussion by representatives of the city, county, and state, the concensus was that it is worthwhile to invest local funds as necessary to install a drainage structure under Highway #2.
- April 11, '65 - State Water Commission made an agreement with the Grand Forks County Water Management District to install an SSP through Highway 2 for an estimated amount of \$24,300.
- June 1965 - The Highway Department excavated the North Diversion for fill material needed to complete highway interchanges.
- Feb. 15, '66 - As per agreement with Grand Forks County Water Management Board and State Water Commission dated May 18, 1964, the State Water Commission made a study of the coulee area through the city and reaches above and below the city. The results of this study were:
1. Restore, stabilize and improve as necessary for a 50 year flood through the reach of East Coulee from U.S. 2 to the Red River outlet. No estimated costs were given on this item.

2. Construct a diversion extending from U.S. 2 around the City of Grand Forks to Red River. Estimated cost, exclusive of right-of-way and easement, of \$208,550.
3. Construct a diversion from Drain #9 north to the south ditch of U.S. 2 (figure 3) to reduce and control the excess runoff through the main channel. Estimated cost of \$27,100.

Phil Nelson also stated in this memo to Hoisveen these plans could exceed a half-million dollars (Appendix G).

- Feb. 15, '66 - The commission members were made aware of the proposed plans and costs at their regular meeting. The Grand Forks Water Management Board wanted to know what help they can get from the Water Commission. The Commission recommended the Grand Forks Water Management District explore other financial sources, and the University of North Dakota (Appendix H).
- Feb. 23, '66 - Letter to Art Thoraldson, Chairman, Grand Forks County Water Management District from Hoisveen stating "the Commission members at their most recent meeting stated they would provide every aid possible in the way of engineering which would be a continuation of our present activities. The Commission would also provide legal advice commensurate with our abilities to do so" (Appendix I).
- Feb. 24, '66 - Letter from State Water Commission to Grand Forks County Water Management District telling them that the Soil Conservation Service, State Water Commission, and others agreed to give the North Diversion top priority for construction.
- June 1966 - Phil Nelson explained the Highway Department's position on North Diversion to Northern Pacific Railroad Company. He stated that the Highway Department was only going to dig the channel for needed fill. The Highway Department had revised the amount of fill needed so they changed the channel geometry by increasing the channel bottom width to 40' with 4:1 side slopes. The Highway Department was to dig the channel for fill only, and no bridges or crossings were to be installed by the Highway Department except for localized drainage. The State

Water Commission had designed this channel with a bottom width of 24' and a gradient of 0.0005 feet per foot which remained the same. With this large of a channel, the State Water Commission changed the design of the outlet structure to handle a flow of 1,000 cfs instead of 750 cfs as previously planned. The State Water Commission recommended that the railroad structures be designed for the estimated maximum peak of 1,000 cfs.

The Commission later asked the Great Northern Railway to consider the proposed estimated peak discharge in the design of their structures.

- June 24, '66 - In a letter from the State Water Commission to the Grand Forks County Water Management District, the original plans had called for two drop structures with spoil banks on both sides of the structures to contain the full flow of the channel without spillage over land. The drop structures had to be redesigned by the State Water Commission because of the danger to existing structures.
- June 24, '67 - State Water Commission was trying to work out the legal requirements involving railroad crossings and other incidental work.
- Jan. 22, '68 - Grand Forks County Water Management District petitioned the State Water Commission for any financial help in completing the outlet structures of the North Diversion as per the plans of the State Water Commission. Grand Forks County Water Management District stated that after the North Diversion is finished they can start on the South Diversion of the coulee.
- Jan. 23, '68 - The State Water Commission at its regular meeting agreed to cost participation for 40% of \$98,000, which amounted to \$39,200 (Appendix J).
- Jan. 23, '68 - The agreement was signed by the Grand Forks County Water Management District and the State Water Commission (Appendix K).
- April 12, '68 - The bids were let on the drop structures.
- May 3, 1968 - A letter from Hoisveen to Grand Forks County Water Management District stated that construction was to start May 15, 1968.

May 16, 1968 - Grand Forks Herald Newspaper cited the activities of the various agencies involved with reducing flows on English Coulee through Grand Forks (Appendix L).

Nov. 1968 - The drop structures were completed on the North Diversion. The cost to the State Water Commission as noted in the Cost Report for the North Diversion was a total of \$32,947.15 (Appendix M).

In summary, the North Diversion, was part of the plan done by the State Water Commission and others from the early 1960's to 1968. It's dimensions were changed by the North Dakota Highway Department and the material was used for fill on I-29. This change was accepted by the county, city, and water management district after a series of negotiations. Even though this project did not fit the typical project classification for the Water Commission we continued to pursue the project because of its benefit in the future.

5. Encroachments on English Coulee

During the Highway Department's planning phases for highway drainage, the State Water Commission was asked to assist. Because there were too many buildings encroaching on English Coulee, the Highway Department felt that they could not use the Coulee for their drainage outlet (Appendix N). This was stated in a letter (dated March 13, 1964) from Highway Department Chief Engineer R. E. Bradley, to Milo Hoisveen. Bradley also requested that proper action be taken concerning the remaining encroachments. He wrote that he believed that these property owners should be notified that they are in violation of Section 61-01-07 and they should be made aware of the possible penalties provided by the section.

This brought on a strong campaign by the State Water Commission to remove the present encroachments and to stop any future ones. One

method mentioned earlier in this report was the letter to the City of Grand Forks from Milo Hoisveen (Appendix A).

At a regular meeting of the Commission on April 24, 1964, Secretary Milo Hoisveen stated that there has been considerable encroachment on the English Coulee (Appendix O). Hoisveen also stated that the Highway Department had come across encroachments that could impair Highway 2. It was the consensus of the City Engineer, Water Management District, and officials in Grand Forks to send out letters notifying people that the channel had to be maintained at a specific opening size. General letters (Appendix P) were sent to the following property owners:

Northern Builders Supply, Inc.
Grand Forks, ND

Ann H. Bacon
Watertown, SD

N.D. Mill and Elevator Association
Grand Forks, ND

City of Grand Forks

Local Dairy Production Company Inc.
Grand Forks, ND

Harold Jensen
Grand Forks, ND

Dakota Paint Manufacturing Company
Grand Forks, ND

One paragraph on the second page of the letter (Appendix P) is worth noting: "You are notified that the channel through and adjacent to your property, being in fact, the outfall of a legally established county drain, is regarded as a watercourse and any obstruction or encroachment which impairs its function as escape route for flood waters is a violation of Section 61-01-07 of the North Dakota Century Code, and will be prosecuted as such. The penalty, in any case involv-

ing English Coulee, would be very minor in comparison to the total potential liability which can be caused by back-up floodwater. Other letters, similar to the general letter, were sent to property owners where their encroachments could prove to restrict the flows if allowed to remain. The main emphasis used again was the violation of Section 61-01-07 of the North Dakota Century Code. Some of these letters addressed a specific encroachment which had taken place and made recommendations as to how to restore the channel capacity. These specific letters (Appendix Q) and a general letter were sent to the following property owners:

Westward Ho Motel
Grand Forks, ND

Pitzenberger Land Co.
Moorhead, MN

Swingen Construction Company
Grand Forks, ND

Meat Service Corporation
Grand Forks, ND

Northland Packing Company
Grand Forks, ND

Thomas S. Walsh
Grand Forks, ND

Matt Kramer & R.C. Patterson
Enderlin, ND

Lockwood Graders
c/o C. T. Corporation System
Bismarck, ND

The next step taken by the State Water Commission and Water Management District in the course of stopping further encroachments was to do a Flood Control Survey of English Coulee. The survey involved a study of the encroachments that were taking place in the channel. This study

would provide recommendations for uniform slopes, grades, and right-of-way which would alleviate future encroachments.

At the regular meeting of the Commission, on May 28, 1964, the State Engineer granted authority to make this study of English Coulee. Plan and profiles were completed and a channel was designed to handle a 50 year frequency flood. The new channel was designed to follow the alignment of the existing one. This enabled the needed right-of-way to be shown on the plan-profile sheets. The right-of-way shown was estimated to be sufficient to prevent encroachments, allow for channel improvements, and allow room for access along one side for possible park use.

A member of the State Water Commission attended the June 31, 1966, meeting of the Grand Forks County Water Management Board. A 280 foot right-of-way was discussed and the minutes of the meeting concerning this are as follows: "The third priority would be the development of the present English Coulee (SIC) by the County and State Zoning Committee by establishing a two hundred foot right-of-way".

"Mr. Havig of the City Planning Commission, and Mr. Schoenborn, City Engineer, volunteered to proceed with this work with the proper committees."

In November 1966, Phil Nelson met with the Planning and Zoning Commission and the Grand Forks Public Works Committee to establish a right-of-way on English Coulee. Nelson had proposed to the Commission that the Water Management District purchase channel easements along the Coulee. The Planning and Zoning Commission requested that a flood zoning ordinance be drawn up based on the plan and profile presented by the Water Commission. An ordinance was set up and presented (Appendix R) to the Planning and Zoning Commission which sets forth a floodway and flood fringe.

In October 1970, the State Water Commission contacted the University of North Dakota and the City of Grand Forks to set up a meeting to stop further encroachments in English Coulee (Appendix T). Although there is no record of what happened or what was discussed at the meeting, we did receive an updated flood hazard ordinance from the city (Appendix U).

6. Jensen Dam

In other action to preserve the original channel and provide for flood protection, the Grand Forks County Water Management Board also looked at recreational needs for the area. A dam placed in the channel north of Grand Forks on the coulee would create a channel reservoir. The reservoir would have had approximately 31 surface acres and a capacity of 200 acre-feet. This proposed recreation dam was referred to as Jensen Dam, SWC Project #1502. This dam was to be located in Section 28, Township 152 North, Range 50 West. Its drainage area is 108.5 square miles and would have a control elevation of 805 msl.

The State Water Commission did the design, topography and conducted the soil testing for the proposed dam in November 1968. The cost of the dam was estimated to be \$155,100. This did not include the cost of land acquisition and recreation items. When this estimate was presented to the Water Commission, they agreed to participate in the construction of Jensen Dam. Financial arrangements would have to be worked out with other agencies before the project could begin.

The North Dakota Game and Fish Department declined to participate because the maximum depth was marginal, the average depth was sub-marginal, and the cost was prohibitive for a fisheries reservoir.

The Bureau of Outdoor Recreation was contacted to see if this project would qualify for BOR funds. If it would qualify for BOR funds the breakdown of costs would be:

	Land	Dam	Facilities	Total
BOR	\$30,511.25	\$77,550.00	\$ 70,900.00	\$178,961.25
GFWMD	30,511.25	38,775.00	70,900.00	140,186.25
SWC	---	38,775.00	---	38,775.00
	<u>\$61,022.50</u>	<u>\$155,100.00</u>	<u>\$141,800.00</u>	<u>\$357,922.50</u>

At a meeting of the State Water Commission in Minot on April 10, 1969, Milo Hoisveen stated to the Commission that BOR would participate to the extent of \$178,961. The Grand Forks Water Management District would purchase the land totaling \$30,511 and contribute \$38,775 to the construction of the dam. The Commission approved participation in the construction of Jensen Dam in an amount not to exceed \$38,775 (Appendix S).

On November 19, 1969, the BOR withdrew from the project due to environmental hazards noted by the State Health Department. Therefore, the Jensen Dam Project was dropped.

7. South Diversion Channel

The route of the South Diversion channel proposed by the State Water Commission (figure 3) was dropped due to proposed expansion of the City of Grand Forks and because the Soil Conservation Service found that the channel would not be economically feasible.

The Soil Conservation Service designed a floodway for English Coulee further east of the one proposed by the State Water Commission. This diversion was to be capable of diverting all the floodwater away from Grand Forks. The State Water Commission's participation was to be only monetary.

The State Water Commission approved the South Diversion project in August 1972, it was completed in the fall of 1977. In January 1978 the State Water Commission paid the Grand Forks County Water Management District \$53,861.39

C. STATE WATER COMMISSION RECENT INVOLVEMENT AND STUDIES

As the result of the spring flood in 1979, many problems were evident concerning the development along English Coulee. One of the problems that surfaced was a residential area that suffered considerable flood damages along with new development along the Coulee.

In reviewing the records of the State Water Commission, it seems that the Water Commission, along with other agencies, tried to inform, direct, and construct flood protection works for the City of Grand Forks for many years.

The Corps of Engineers have completed an urban study for the city and have made these recommendations regarding English Coulee (Appendix V).

1. A closure structure on English Coulee (figure 4) to prevent backwater from the Red River and pumping facilities at the closure structure. This would be based upon the assumption that:
 - a. the considered dam or upstream diversion measures would be in place prior to any closure measure.

The City of Grand Forks has taken some steps to reduce future flood damages. These are as follows:

1. They have raised South 30th Street from Demers Avenue southward to 11th Avenue South and installed floodgates on two sewer lines.
2. They have asked for and received a flood emergency plan from the Corps of Engineers to accomplish pre-flood preparations, emergency flood fight and evacuation activities and post flood activities.

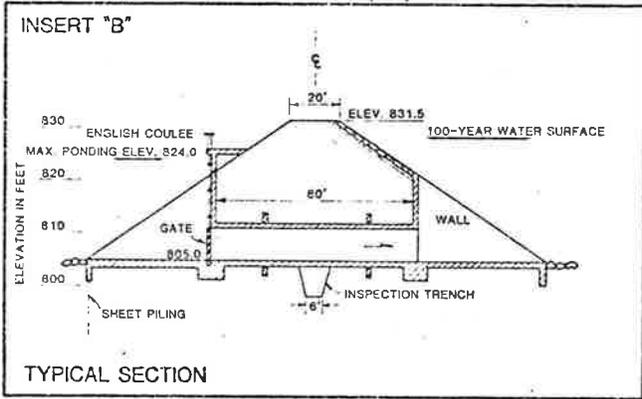
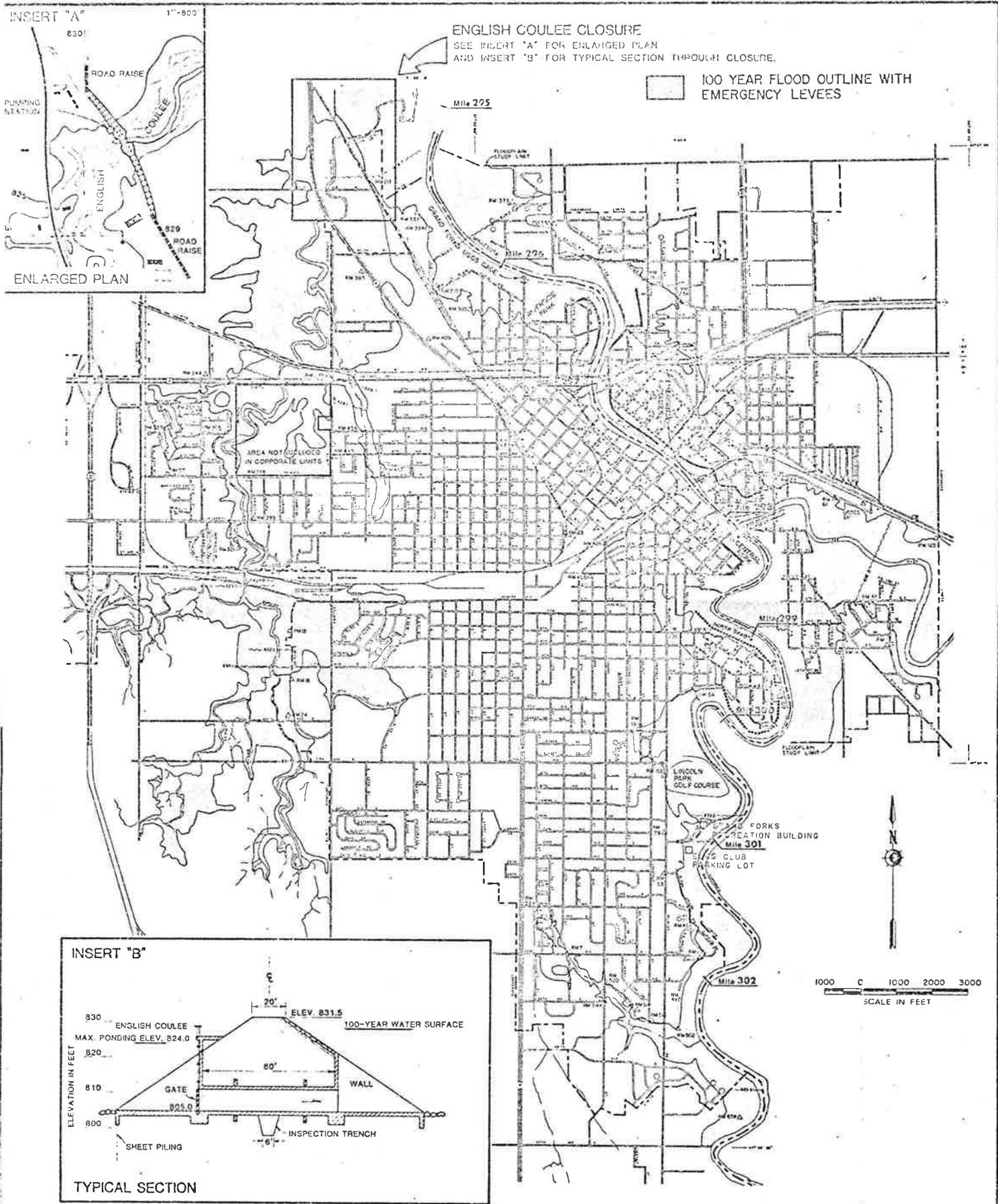


FIGURE 4

STAGE III FLOOD CONTROL
 GRAND FORKS, N.D. - EAST GRAND FORKS, MN
 CONSIDERED ENGLISH COULEE CLOSURE

The Soil Conservation Service has been requested to design flood control works for the city by the water management board. The Soil Conservation Service has presented to the Grand Forks Water Management District four alternatives and are as follows: the present condition; with dam; with dam and diversion channel; and a diversion channel. A cost break-down for the alternatives is on table 1. Three of these alternatives would reduce flood damages from the one percent chance or a 100 year frequency storm.

The State Water Commission has been asked to financially participate in the proposed construction of the flood detention structure. So far, the State Water Commission has put \$7,174 into sub-surface exploration for the structure. The city, water management board, and county commission requested the State Water Commission to include one million dollars in our budget for the construction of the structure and other works. This was granted by the 1981 Legislature.

D. SUMMARY

The State Water Commission initially became involved in the English Coulee when the State Highway Department was planning the Highway 2 and I-29 bypass around the City of Grand Forks. The State Water Commission's involvement centered around the drainage pattern for Drain #18. The Commission recommended that the city take this opportunity to approach the city's entire surface water flood potential rather than limiting themselves to rerouting Drain #18 alone.

In 1963, along with the State Highway Department, the State Water Commission prepared plans for a drainage project that considered both Drains #9 and #18 and would be constructed as part of the Highway bypass project. Due to the limited timeframe, the city was unable to provide

TABLE 1. - SOIL CONSERVATION SERVICE'S
PRELIMINARY COST ESTIMATE

Alternatives Studied	Estimated Construction Costs	Estimated Land Rights Costs	Estimated Road & Bridge Costs	Estimated Total Costs	Discharge (100 Yr.) Point 1 Highway 2	Discharge (100 Yr.) Point 2 Interstate 29
No Action	---	---	---	---	---	2,690 cfs
Upstream Flood Water Retarding Structure, expanding existing diversion & new diversion north of highway 2	<u>Dam</u> Earth fill 750,000 C.Y. Excavation 120,000 C.Y. Concrete 238 C.Y. Rock Riprap 16,200 C.Y. Topsoil 1,111,111 S.F. Drain, trash rack & etc. \$1,698,866 <u>Channel</u> Excavation 395,202 C.Y. Riprap, Seeding, Misc. \$360,061	<u>Dam</u> 474 Ac's Perm. 2,781 Ac's Flood Pool \$584,625 <u>Channel</u> 75 Ac. Channel & Dike 74 Ac. Spoil \$139,875	\$297,600	\$3,081,027	1,276 cfs	936 cfs
Upstream Flood Water Retarding Structure & new diversion	<u>Dam</u> Earth fill 750,000 C.Y. Excavation 120,000 C.Y. Concrete 238 C.Y. Rock Riprap 16,200 C.Y. Topsoil 1,111,111 S.F. Drain, trash rack & etc. \$1,698,866 <u>Channel</u> Excavation 735,039 C.Y. 4 Pipe drops Riprap, Seeding, Misc. \$671,827	<u>Dam</u> 474 Ac's Perm. 2,781 Ac's Flood Pool \$584,625 <u>Channel</u> 96 Ac. Channel & Dike 154 Ac. Spoil \$201,750	\$312,700	\$3,469,768	1,587 cfs	702 cfs
New Diversion	Excavation 2,275,866 C.Y. 3 Pipe drops 2 Concrete drops Riprap, Seeding, Misc. \$1,795,806	155 Ac. Channel & Dike 190 Ac. Spoil \$303,750	\$695,900	\$2,795,456	2,415 cfs	686 cfs

NOTE: Preliminary Data Only.

the necessary local share of financing and the drainage project, as planned, was dropped (February, 1964). The Highway Department then proceeded with the bypass project and decided to use English Coulee as the outfall for highway drainage.

From 1964 until 1968 negotiations between the Grand Forks County Drain Board, the State Highway Department, the State Water Commission, and the Grand Forks County Water Management District continued. Finally, the North Diversion part of the original plans was constructed by the Highway Department, with technical and financial assistance from the State Water Commission.

The South Diversion portion of the original plans prepared by the State Water Commission was dropped and replaced by a floodway prepared by the Soil Conservation Service in 1972. The Soil Conservation Service floodway was constructed by the Soil Conservation Service with some financial assistance from the State Water Commission, and was completed in 1977.

Throughout this same period, encroachment of English Coulee continued causing the State Highway Department and State Water Commission to encourage Grand Forks officials to limit development in the area and to warn landowners that they were in possible violation of Section 61-01-07 of the North Dakota Century Code (Obstruction of a Watercourse).

In 1964, the State Water Commission completed a flood control survey for English Coulee that outlined recommendations for uniform slopes, grades, and sufficient right-of-way. This would alleviate future encroachments and allow for channel improvements and room for

possible future park use. The City of Grand Forks eventually adopted a flood zoning ordinance based on the survey done by the State Water Commission.

The proposed Jensen Dam that would have provided a channel reservoir and recreation area was dropped due to BOR's refusal to participate financially in the project. Their refusal was based on environmental hazards noted by the State Health Department.

In reviewing the records of the State Water Commission, it appears that the State Water Commission, along with other agencies, have worked to inform, direct, and construct flood protection works for the City of Grand Forks for nearly 20 years.

The considerable damage suffered by Grand Forks residents as a result of the spring flood in 1979 indicates flood protection for that city is far from complete.

BIBLIOGRAPHY

1. Grand Forks-East Grand Forks Urban Water Resources Study, U.S. Army Corps of Engineers, St. Paul District, December 1979.
2. Flooding in the Grand Forks-East Grand Forks Area, North Dakota Geological Survey, Educational Series #12, 1980.

APPENDIX

- A. Letter from Grand Forks Mayor to State Water Commission dated March 8, 1961.
- B. State Water Commission memo dated March 21, 1963.
- C. Highway Department memo and State Water Commission report to Grand Forks Water Management District dated June 22, 1966.
- D. Letter from City of Grand Forks to State Water Commission dated February 3, 1964.
- E. State Water Commission memo dated March 4, 1965, to Chief Engineer - Grand Forks meeting, March 2, 1965.
- F. Letter from Highway Department to State Water Commission dated April 6, 1965.
- G. Plans for right-of-way on English Coulee - on file at State Water Commission office.
- H. Letter from Grand Forks County Water Management Board to State Water Commission dated February 2, 1966; SWC minutes, February 14, 1966; and Status Report Memo.
- I. Letter from State Water Commission to Grand Forks Water Management District dated February 23, 1966.
- J. State Water Commission minutes dated January 23, 1968.
- K. Agreement between State Water Commission and Grand Forks County Water Management District dated January 31, 1968
- L. Newspaper clipping - Grand Forks Herald, May 16, 1968.
- M. Cost Report on English Coulee dated January 10, 1969.
- N. Highway Department memo dated September 6, 1963.
- O. State Water Commission Minutes dated April 20, 1964.
- P. State Water Commission letter to landowners along English Coulee dated April 15, 1964.
- Q. State Water Commission letter to R. C. Peterson, April 15, 1964.
- R. Grand Forks Floodplain Management Ordinance dated November 25, 1966.
- S. State Water Commission minutes on Jensen Dam dated April 10, 1969.
- T. Letter from State Water Commission to Grand Forks Mayor dated October 8, 1970.
- U. Grand Forks Floodplain Management Ordinance dated October, 1970.

APPENDIX A

#135

March 8, 1951

N. D. State Water Conservation Commission		
ROUTE TO		
Asst. Secretary	✓	
Asst. Chief Engineer	✓	RO
Office Engineer	✓	
Construction Engineer		
Investigation Engineer		CM
Chief Stenographer		
Bookkeeper		
	AG	✓
File		

Mr. Alan Webster
City Manager
Grand Forks, North Dakota

Dear Mr. Webster:

Mr. C. P. Nelson recently conducted a short inspection of English coulees just north of highway #2. He has informed us that an auto wrecking firm has a building that extends into the coulee. This building is an obstruction of the channel, substantially lowering its capacity and is in violation of section 61-01-07 of the North Dakota Century Code.

You likely have received complaints concerning this condition and will certainly receive more in the future. Since the Water Commission has participated in the construction of two legal drains which discharge into English coulees above this point, we are concerned that the effectiveness of these drains may be impaired. The location and nature of the obstruction may also cause flooding of highway #2 and endanger the structures in the highway. Extensive flooding in the city in this area would also result if the coulee should overflow its banks.

It is our opinion that the city of Grand Forks should take immediate steps to correct this situation and be on guard against the occurrence of any similar problems in this area.

Sincerely yours,

Milo W. Hoigveen
Chief Engineer, State Water
Conservation Commission

R. E. Bradley, Chief Engineer
State Highway Department

MWH:lh
cc: Mr. Bradley

Dictated by Grindberg



APPENDIX B

SWC #1103

MEMO TO: Milo W. Hoisveen, State Engineer
FROM: C. P. Nelson, Drainage Engineer
SUBJECT: City of Grand Forks Surface Drainage Correlation With
Highway Design
DATE: March 21, 1963

1351

In May, 1960, we were requested to assist in the disposition of Grand Forks County Drain #18 by the Soil Conservation Service advisors to the Drain Board. We acted on this matter then. As a result, the North Dakota Highway Department has come up with a tentative design on #2 Highway to locate this drain along the south ditch, enlarging the ditch considerably to meet their design requirements. The outlet of this drain is eventually to extend north at the east edge of Sec. 36-152-51, for 2 miles, as tentatively planned, thence east 2 1/3 miles to the Red River. This, or any final plan for this diversion will be completed as a part of the Interstate #29 project through Grand Forks. Until construction of Interstate #29 at Grand Forks is underway the present ditch will be faired into its original outlet in English coulee at about the center of Section 32.

The City of Grand Forks will be asked to contribute right-of-way for the planned north and east diversion, and the cost of the drainage structures north within the work projects along #2 and #29. There will probably be additional participation requested beyond these costs at the outfall.

It is therefore necessary that the City of Grand Forks be given a clear and understandable presentation of the costs and benefits to them chargeable to this project, and a definite reply requested for the design of Highway #2 and #29 drainage.

This presentation depends on a series of estimates of alternate plans which can be used for road drainage by the Highway Department and from which the local participation required will be calculated.

These estimates are now being worked up by Ray Zink and others, in the Highway Department.

In previous discussion, comparing the potential flood problems of Grand Forks to the problems encountered from surface drainage in Southwest Fargo, we concluded that it would be worth while to approach the Grand Forks city problem with aims to cover the entire surface water flood potential rather than limit the presentation to Drain #18 rerouting alone.

I have therefore made a preliminary investigation of the surface drainage potential through the city of Grand Forks, and have the following to report:

The proposed drainage diversion involving Grand Forks County Drain #18 will divert runoff from approximately 8 square miles of area. English Coulee itself, which extends through potentially valuable ground south of the University and the University itself, has a total watershed area of approximately 85 square miles. This is slow, being flat and in some areas marshy, but it is all channelled into Grand Forks Drain #9, entering the eroded channel of English Coulee in the northwest corner of Sec. 8, Twp. 151N. Rge. 50W. This coulee can be diverted around Grand Forks by several means. Inspection by myself, Martin Lund of the SCS in Grand Forks, and Edd Brenna of the Drain Board resulted in a preliminary study of several solutions to the reroute of English Coulee, which are presented herewith:

(1) Intercept English Coulee in the NE $\frac{1}{4}$ of Sec. 21-151-51 and extend it east to a coulee in Sec. 22-151-50.

a.) Advantages - Intercepts all of drainage from south. Stays away from highway construction, except for large

structure through Interstate #29 in which matter North Dakota Highway Department would no doubt cooperate, provided Grand Forks were definitely committed to this plan.

b.) Disadvantages - Six miles of ditch would be needed. The city has grown south to the section line along which this drain is proposed. A large grade school is in the SW $\frac{1}{4}$ of Sec. 15, and quite a few residences are built along the proposed outfall coulee in Sec. 22. At least one road crossing for residence access would be necessary, and the channel proper would have to be reworked, and probably several drops, installed. The coulee, in brief, is not as advantageous as it appears on the quad map.

(2) Intercept English Coulee at the North $\frac{1}{4}$ corner of Sec. 15-151-51, extend it North to the South ditch of #2 highway, and integrate it into the design of #18 with its rerouted outlet.

a) Advantages - Low cost. The Great Northern railroad already has a trestle coinciding with this route. Land in the area is marginal, and the drain would benefit the area along the north tangent to #2 highway. Right-of-way should be inexpensive. Two miles of ditch would be sufficient.

b) Disadvantages - The change of capacity to include Drain #9 will necessitate increasing the size of the ditch along #2 highway. The design of this, including Drain #18 is ready for letting, which is expected within ^{two}~~two~~ weeks. Besides, the ditch width, to meet highway specifications, would no doubt become so wide as to make the design impractical, according to the preliminary estimate of Ray Zink. Interception of drainage would not be complete, since about 20% of the English Coulee drainage area would be east of this intercept.

(3) Intercept English Coulee by diverting Grand Forks Drain #9 at the northeast corner of Sec. 13-151-51, and extend it straight north through #2 highway,,along the diverted outlet route of Drain #18.

a) Advantages - Does not follow any highway, intercepts all drainage west of the N-S tangent of the Great Northern Railroad, and can be placed under #2 highway, as I understand.

b) Disadvantages - New railroad bridge necessary, and right-of-way may be costly, being close to potential industrial and commercial sites.

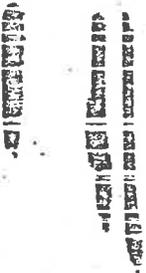
It is my belief that we should present the most practical scheme of diverting English Coulee possible. Route #3 is one considered by the Highway Department at least as a remote possibility for benefit to general structure design along #2 and #29. I am inclined to favor it, and would like to make a definite recommendation to correlate with road design. ~~It~~ would appreciate your comments.

Respectfully submitted,



C. P. Nelson
Drainage Engineer

kl



APPENDIX C

June 22, 1966

THE GRAND FORKS CITY COUNCIL

GRAND FORKS COUNTY WATER MANAGEMENT BOARD

RE: INTERCEPTION OF SURFACE FLOOD WATERS

This report, with the recommendations which are a part of it, evaluates the existing flood potential of surface waters which drain into English Coulee from outside the City of Grand Forks, and recommends measures which are aimed at managing the excess runoff, which now flows through a considerable portion of the city, by diverting that excess runoff into the Red River outside the developed area. The report has been prepared as the result of studies and investigation by the State Water Conservation Commission, the State Highway Department, the Board of Drain Commissioners of Grand Forks County, and the Soil Conservation Service, as technical advisors.

It is presented for your information and careful consideration as an expression of confidence in the continued expansion of Grand Forks, and interest in the orderly manner of that expansion in the years ahead.

Interest in the problems of water management shown by the City of Grand Forks has resulted in major channel improvements by the Corps of Engineers, and the provision of flood protective measures to tame the Red River. There is no indication in our files that flood protective improvements aimed at surface waters entering the Red River through Grand Forks were studied or planned as a part of that project.

The pattern of surface drainage which uses English Coulee as escape route to the Red River is as important to the orderly planning of the City storm sewers, parks and in fact all phases of city development as the taming of the Red. To emphasize the importance of this, a few basic requirements of surface drainage should be reviewed:

In the flat areas of the Red River Valley, a rural drain is needed at quite frequent intervals to make it feasible to plant and harvest crops without floodwater damage. These rural drains are designed, as in all such improvements, on the reasonable basis that the benefits must exceed the cost, or the project is not worth the money spent on it. Through many years of experience, the best return for the money spent for rural drains has been determined to be for a design which is considerably less effective in its total capabilities in preventing floods than a city storm sewer. The ditch, culverts, bridges, inlets, outfall, are all designed to a capacity that will allow flood damage to adjacent land one year out of ten, and brief flooding each year. It is simply not worth the money spent on the increased size of all components of the drain to build it big enough to prevent all flooding. The cost of this engineering approach would invariably exceed the benefits.

In contrast to this design basis, drainage within a densely settled area, with a large proportion of the surface taken up by surfaced streets, sidewalks, parking areas and buildings requires use of a considerably stiffer formula in the design of facilities needed to dispose of storm water. The amount and

From a point in the south ditch of #2 Highway $2\frac{1}{2}$ miles west, thence south two miles, a ditch designed to accommodate the full design capacity of drain #9 would connect this drain to the highway ditch. The upstream end of this extension would be so graded as to start two feet above the present ditch bottom of drain #9. A ditch block across drain #9, downstream from this diversion, with a 48 inch culvert through it, would allow all flow in English Coulee to pass on into its regular channel, up to two feet depth in the ditch. With increased flows, both the original channel and the diversion ditch would receive water from drain #9; at a depth of 4.3 feet in drain #9, which is its design depth for about a 10-year flood, the water would be roughly equally divided between the two outlets-approximately 86 CFS into the channel through town, and 86 CFS into the diversion.

At 6 feet depth in the drain channel-enough water to flood some of the surrounding land-there would be 100 CFS going into the channel through town, and 175 CFS going into the diversion ditch.

It is envisioned by the planners of the proposed diversion that the opening through the ditch block, allowing not more than 100 CFS during even a 25-year flood into the English Coulee channel, but allowing all of the minimum flow, would give the city, as it develops, a reliable and controllable stream, and eliminate the guesswork, gambling, and almost certain damages which flash rains and fast spring runoffs could cause within the banks and adjacent to the English Coulee channel.

The channel of English Coulee will still be needed-and wanted for its esthetic value. Riparian owners will demand that water shall be allowed to flow as always in the channel. It is submitted that the plan presented herewith provides for these needs, but eliminates the higher flood hazard which is the natural consequence of letting nature take her course in providing the water.

9-16-63

1351

MEMORANDUM

TO: R. P. Thomas
Design Engineer

FROM: Raymond Zink
Road Designer I

SUBJECT: Grand Forks Meeting on the Proposed
Diversion of English Coulee.

On September 12, 1963, a meeting was held in the City Hall at Grand Forks to discuss the proposed diversion of English Coulee around that City. Attending this meeting were Jerome Endres, City Alderman and a member of the City's Utilities Committee; Thoburn Peterson, City Engineer; H.E. Martin, City Auditor; M.C. Lund, S.C.S. Work Unit Conservationist; C.P. Nelson, State Water Commission; and this writer. The purpose of the meeting was to familiarize the various local agencies with the plan proposed for the area. This report will discuss the proceedings of the meeting.

Mr. Nelson opened the meeting with a general discussion of the proposal. He pointed out the encroachment on English Coulee through town. He pointed out that these encroachments would continue with the development of the City and because of this, the problem of the lessening of the Coulee capacity would ultimately have to be considered. He made the point that it would be almost impossible to treat the runoff through English Coulee as urban runoff is treated, with storm sewers etc. He maintained that if it were left outside the City the runoff could be handled as rural, country drainage. Mr. Nelson noted that now is the proper time to act. Later on I-29 and U.S. 2 would be completed and any work done to cross the roadways would be exceedingly expensive. Also at this time, the Highway Department would realize a benefit and would be in a position to participate in the construction.

Page Two
MEMORANDUM
R. P. Thomas

This writer was then asked to explain the Highway Department's position in the matter. It was pointed out that as far as this Department is concerned, the main interest is to properly drain and to prevent any flooding on the Interstate and Highway 2 ditches, primarily in the I-29 U.S. 2 interchange area. It is believed that the encroachments on English Coulee and the tributary to the Coulee are serious enough to warrant the diversion of County Drain 18 along U.S. 2. It was stated that any diversion other than Drain 18 is the proposal of the State Water Commission. This writer went on to say that any benefit to this Department would be realized in the elimination of large drainage structures through the interchange and the possible use of the drain excavation material as roadway embankment. It was pointed out to the group that the Bureau of Public Roads is on record as favoring the existing drainage route, with the encroachments removed, as the best route for the required drainage.

The others in the group were asked for their comments. Mr. Peterson said that he was in favor of the entire proposal, but would like to see an estimate before he made any recommendation to the City. Mr. Endres stated that the Bureau should reconsider its view after the reconstruction of Drain 18 along Highway 2. He believed that they should be obliged to help more than the indicated benefit, because of the higher capacity of the drain. Mr. Lund stated that the City of Grand Forks could request that a drain be constructed along the proposed alignment and this would give the drain board the right to establish a special assessment over the City for its share of the benefit.

Page Three
MEMORANDUM
R. P. Thomas

As a result of the meeting, it was decided that a cost estimate should be made. From this estimate a determination should be made concerning the individual costs for each of the parties involved. With the next steps in this matter established, the meeting was adjourned.

9-16-63

td:

APPENDIX D



CITY OF GRAND FORKS

GRAND FORKS, NORTH DAKOTA

CITY ENGINEER

February 3, 1964

#1351
H-O-G
DRAIN #900 ENGLISH COULEE
ORIGINAL IN #1114-G.F. DRAIN #15
COPY IN #1319 U.M.D.

Mr. P. Nelson, Eng.
State Water Conservation Commission
Bismarck, North Dakota

Dear Phil:

The Grand Forks County Water Management board had a meeting the morning of Saturday, January 25, 1964, to consider further the possibility of the proposed rerouting of legal drains 9 and 18.

The meeting got off to a bad start when Carl Young, Division Engineer for the Great Northern Railway, stated that the proposed pipe arch culvert was considered to be inadequate for the railway crossing. This, of course, was a "death blow" to the project.

Further discussion revealed that the Water Management Board was not sympathetic to the project as they had visited with others and learned that the English Coulee was good enough "for at least fifteen years."

With this attitude that no solution was needed until the problem actually exists, there was little point in trying further.

As previously indicated to you, there is no possible way for the City to finance this project itself, so it appears that the present situation must continue to exist.

Yours very truly,

Thoburn F. Peterson, P.E.
City Engineer and
Director of Public Service

cc: Ray Zink, Drainage Engineer
State Highway Department
Bismarck, North Dakota

APPENDIX E

NORTH DAKOTA STATE WATER COMMISSION

OFFICE MEMO

TO: Milo W. Hoisveen, Chief Engineer
FROM: C. P. Nelson, Drainage Engineer
SUBJECT: English Coulee Outfall, SWC #1351 - Meeting March 2, 1965
7:30 p.m., Grand Forks ~~County Court House~~
DATE: March 4, 1965 CITY AUDITORIUM

Attendance list attached.

At the request of the board of Grand Forks County Water Management District, I attended a meeting of city, county and township officials and interested landowners for the purpose of placing before them the existing English Coulee problem and outlining means of correcting coulee outfall capacity. Also at the request of the board, Ray Zink of the North Dakota Highway Department, accompanied me to outline the present position of the Highway Department and to answer questions concerning highway construction related to the coulee.

The meeting was convened at the meeting room of the Grand Forks County Court House by Mayor Magnuson, who turned the meeting over to Mr. Art Thoraldson after stating its purpose. Mr. Thoraldson reviewed the history of the diversion plan for English Coulee, citing particularly the failure of the diversion plan as planned by the Water Commission and estimated by the Highway Department, because of the short time available then to raise the needed \$229,000 local funds required to accomplish the diversion as a part of the Highway #2 and Interstate #29 construction project.

Thoraldson then called on the writer to explain the English Coulee improvement, which as matters now stand,¹⁵ the only feasible way in which the rural and city drainage can be handled.

Since most of the city officials were not well informed of the plan or the need for it, I reviewed the size and scope of the problem, using maps and plans to illustrate total runoff areas. I explained the difference between city and rural drainage requirements to justify the use of the

50-year flood frequency standards of design on lower English Coulee, and then outlined the plan for establishment of channel adequate for a 50-year flood in both the west branch and the main channel, including dam and spillway in the lower reach aimed at stabilizing the main channel. I quoted a preliminary estimate figure for accomplishing the work, including the dam, from #2 Highway downstream at approximately \$160,000.

Thoraldson then called on Ray Zink who outlined the present status of plans in the Highway Department. Zink stressed the fact that since the diversion plans had been discarded, plans had been altered to fit use of the natural coulee as outfall route, and that both time and money were factors in making the original plans and estimates inapplicable now.

Both Mr. M. O. Weekley and Mr. Art Greenberg stated to Ray Zink that they felt it was more sensible to extend the south ditch of #2 Highway straight east along the highway clear to the main channel of English Coulee, and dispense with the original west branch in this area. Zink pointed out that this proposal did not fall within Highway Department responsibility, since the west branch as it now exists is the natural channel, which the Highway Department had the right, as well as the obligation to use as the most economic way to drain the roadway. This, Zink stated, was a local problem.

Several of those present raised the question of condition of main coulee channel through the UND campus and through the Boyd addition to the south, which has been recently platted. Thoraldson announced that the areas questioned were within the survey requested of the State Water Commission, and that the study of needed channel width and needed channel improvements would be made.

Mayor Magnuson called for further questions, and there being none, he adjourned the meeting.

APPENDIX F

Walter R. Hjelle
Commissioner

William L. Guy
Governor of North Dakota

ENGLISH COULEE DIVERSION

R. E. Bradley
Chief Engineer

1351

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT
BISMARCK

Highway Building

April 6, 1965

Please Refer To
File No. -----

Mr. Milo Hoisveen
Chief Engineer and Secretary
State Water Commission
Bismarck, North Dakota

[Handwritten signature]

Dear Mr. Hoisveen:

It has been brought to the attention of this Department that the Grand Forks County Drain Board is considering the possibility of diverting water from Drain No. 9 (English Coulee) into Drain No. 18. Since this diverted water would flow along Highway No. 2, through the existing structures, through the area of the proposed I-29, and ultimately through Highway No. 2, the Highway Department has a significant interest in any diversion of flow.

The purpose of this letter is to set forth this Department's views on this matter. This Department would strongly urge that the above mentioned diversion not be done until the diversion of the main channel of English Coulee, which is now being seriously considered, is accomplished. This view is based upon the facts that: (1) The structures along Highway No. 2 were not designed for an increase in flow; (2) The proposed structures through I-29, in the I-29, Highway No. 2 interchange area, are not designed for this increase in flow and should not be due to the probability that this diverted water will ultimately be taken around Grand Forks proper. (3) The final portion of this channel, between Highway No. 2 and English Coulee, has been encroached upon and an increase in flow would add to the existing problems in this area. It should be pointed out also, that the responsibility on any diversion of flow will rest with those agencies involved in the project. Specifically, the Highway Department will not assume any responsibility in this recent proposal.

It is recognized that this Department does not have an authoritative position in this matter; however, since the Highway Department is intrinsically involved in the drainage in this area it is believed that the views of this Department, concerning this matter, should be made known to others also involved.

Very truly yours,

[Handwritten signature]

R. E. Bradley
Chief Engineer

cc: Vaaler
cc: Schoenbom
cc: Ault

APPENDIX G

Plans for Right of Way
From Drain #9 to the Red River
In SWC Files

APPENDIX H

WATER MANAGEMENT AND CONTROL BOARD

2-17-66



NORTH DAKOTA

GRAND FORKS, N.D.

February 2 1966

CHAIRMAN
ART THORALDSON
P. O. BOX 1411
GRAND FORKS, N. DAK.

VICE CHAIRMAN
SIMON FAGSTAD
LARIMORE, N. DAK.

SECRETARY
ROY ROMAN
MANVEL, N. DAK.

TREASURER
VINCENT F. REED
211 FENTON AVENUE
GRAND FORKS, N. DAK.

Mr. Milo W. Hoisveen
No. Dak. State Water Commission
Bismarck, North Dakota

Dear Mr. Hoisveen:

The Grand Forks County Water Management & Control Board would like a complete report on the English Coulee survey.

We are planning and working on its diversion around the City of Grand Forks, and at this date in conjunction with your board and the Highway Department have invested over \$25,000.00 to start this program. This includes Legal Drains 9 and 18.

Budget time is also coming up. We need facts and figures to plan a program and budget for 1967.

Along with this is the University of North Dakota with the English Coulee going through its property. What help can we get from the State Water Commission on this project?

Your help and advice on this matter would be greatly appreciated by the Board. The City planning board has been approached to zone the Coulee through the City of Grand Forks, then next the County. This must be done to make the project work.

Sincerely yours,

Art Thoraldson
Art Thoraldson
Chairman

AT st



They also agreed to fly the area daily and check on impending flood conditions during the freeze up period. They could better evaluate the condition and advise the landowners relative to the danger of flooding through the Weather Bureau and news media. They also agreed to explore the possibility of purchasing flowage easements on lands in this reach of the river. The compensation would be based on 90% to 95% of the value of the land. The land would still belong to the present owner. They did not believe there was any danger of ice damage in the spring unless there were heavy flows coming from the Heart, Knife and Burnt Creek, which would be compensated for by closing the date of the dam.

Mr. Fredrickson stated that the farmers could get relief from the inundation statute. This statute states that inundated lands could be taken off the tax roll; however, the statute does not state how long the lands can be inundated or how often. The statute should be amended. The Commission suggested that this be placed on the agenda for the next meeting and that this matter be taken up with the Tax Department.

ENGLISH COULEE DIVERSION

Grand Forks County Water Management District # 1351

A letter was received from the Grand Forks County Water Management District requesting a complete report on the English Coulee survey. The Board would like to know what help they can get from the Water

Commission on this project. They need these figures to plan a program and budget for 1967. Mr. Nelson, State Water Commission Engineer, has been working with these people from time to time. (The Commissioners were furnished maps of the area.) Secretary Hoisveen describes what is proposed to be done to divert the water in English Coulee. Mr. Nelson has estimated a cost of \$500,000 for this project. It would not be possible for the Commission to participate in this project on a 40 per cent basis, as it would be too costly. University of North Dakota might possibly be interested in this project. Commissioner Gallagher believed that their request is premature and the Secretary averred that the Board should explore its own avenues of participation on this project. The Board of Administration and Highway Department should be interested in this project also.

It was moved by Commissioner Dushinske, seconded by Commissioner Gray and carried that the State Engineer confer with the Grand Forks County Water Management District on the finances of their project and ask them to explore other financial sources, and the University of North Dakota.

STATE DEVELOPMENT PLAN 701

The scope of the State Development Plan will indicate the population, present and projected, economic activity and

land use. The basic data would then be utilized by all government agencies in developing plans in specialized areas. The State Water Plan would be an element of the State Development Plan and prepared with 701 funds which provides 2/3 of the cost. It is estimated that if a planning division was formed within the Commission the cost would approximate \$90,000 annually for personnel and related costs in the development of a comprehensive state water plan. The Commission discussed the "701" plan which is under the jurisdiction of the RHF Administration, a federal agency. Funds under the Land, Water and Conservation Fund Act were on a 50-50 matching grant basis.

NORTH DAKOTA STATE WATER COMMISSION

OFFICE MEMO

TO: Milo W. Hoisveen, State Engineer
FROM: C. P. Nelson, Drainage Engineer
SUBJECT: English Coulee, #1351, Status Report
DATE: February 15, 1966

In accordance with the project agreement dated 5/18/64 between Grand Forks County Water Management Board and the State Water Commission, and the action approving a flood control survey of the English Coulee area through the city of Grand Forks, and the reaches above and below the city, the following has been done:

1. Topographic surveying of English Coulee main channel has been completed by the S.W.C. crew from the designed outfall of Grand Forks drain #9 to the Red River.

From the above topographic map, hydrologic data obtained from the Highway Department, and engineering study by S.W.C. staff, the following plans have been developed:

- a. A recommended right-of-way width for the coulee, from the NW corner of Sec. 17-151-50 (overlapping drain #9 r/w by about 1000') to the Red River, with room for a properly designed channel, capable of handling a 50-year flood, with room for further improvement.
- b. A channel design from the US #2 highway downstream to the Red River, showing all improvements needed to provide a minimum channel, designed with 4:1 side slopes, capable of handling a 50-year flood of 1800 c.f.s. No cost estimate of this work has yet been finalized or presented.

Additional topographic survey by the W.S.C. crew, along the NE side of US #81 and the Mill road has been completed.

- a. From this survey, plus profile and cross-sections provided by the North Dakota Highway Department, a diversion ditch has

been designed by S.W.C. staff, with assistance from the SCS state office, for 750 c.f.s. from the south ditch of US #2 highway north 2 miles, east $1 \frac{2}{3}$ miles, thence SE $\frac{3}{4}$ mile into English Coulee. Preliminary design and estimate of the needed drop structure has been done, and an estimated cost of the project, including all bridges, culverts and the drop structure prepared. Right of way and spoil easements have not been included.

A copy of this estimate, totalling \$208,428 is attached.

Further topographic survey by the S.W.C. crew covering three sites and a series of hand-level check points between has been completed from US #2 highway south to drain #9 through sections 3 and 10-151-51.

1. From this survey, a design for a diversion ditch extending from the south ditch of US #2 highway to drain #9 through sections 3 and 10 has been completed, and an estimate prepared, on the same basis as the one for the north diversion. The total of this estimate is \$27,087. A copy of this estimate is attached.

The downstream portion of the English Coulee channel improvement includes the tentative design of a recreation-oriented dam and spillway which has the dual purpose of providing a park site with adjacent water and stabilization of the lower channel, which is quite steep. Site topography of the proposed dam and spillway has been done. Test drilling at the damsite indicates that the dam may have to be moved upstream a short distance to avoid permeable material in the coulee bottom. The spillway design appears feasible at its design location. No plan or estimate for this part of the channel improvement has yet been sufficiently firmed up to provide a realistic estimate, and none has been presented.

In summary, the response of this office to date on the request for the English Coulee study has resulted in plans to:

1. Restore, stabilize and improve as necessary for a 50-year flood the reach of English Coulee from US #2 highway to the Red River outlet. No estimate of cost for this has been finalized.

2. Construct a diversion extending from #2 highway around the city of Grand Forks, and back to English Coulee for flood outfall. Estimated cost, exclusive of right of way and spoil easements and leveling \$208,500.
3. Construct a diversion from Grand Forks drain #9 north to the south ditch of US #2 highway, to reduce and control the excess runoff through the main channel through the developing southwest area, the University Campus, and the industrial area north of US #2. Estimated cost, exclusive of right of way and spoil easements and leveling \$27,100.

The various projects as outlined above, including the lower dam and spillway as a needed part of item 1, are designed to provide the city of Grand Forks adequate flood protection from English Coulee runoff for present and future development, to provide an excellent park as a part of it, and to make the lower reach of drain #9 available to needed drainage from the south.

It is my belief that the projects proposed are worthy of participation in some degree, although with a grand total which will no doubt exceed a half million dollars. I could not suggest that this be treated simply as a major drainage project.

Since the key to the entire program - the starting project which makes the rest feasible - consists of the north diversion, I suggest that this part of the series of improvements be given favorable consideration. The reason I suggest this project is because the need is great for immediate commitment on the part of the sponsors, the Grand Forks County Water Management board. The Highway Department may yet be able to help in their plans for I 29, because of their need for over a half-million yards of fill material. Provided a firm commitment can be made by the Water Management District by next June, a combination of effort to save cost and land between diversion ditch excavation and fill required for interchanges a certainty, I am convinced.

It is therefore my recommendation that S.W.C. participation in the north diversion be given favorable consideration, to get it off the ground. The ditch

right of way only, which will no doubt have to be purchased, amounts to 4 4 acres. Based on estimates covering land purchases in the area by the Highway Department, I estimate the average right of way cost to be \$300 per acre. The right of way alone on the north diversion would therefore cost roughly \$13,200. Purchase of this is the first order of business, to which Bob Shoenborn, Grand Forks city engineer has actually been assigned. Since procurement of right of way would establish quite firmly the intent of completion, I suggest that no less than sufficient participation to do this be favorably considered.



C. P. Nelson
Drainage Engineer

CPN:kl

Dist.
(MWH (#1351)
HAS
VEZ

APPENDIX I

North Dakota State Water Commission

1331 State Capitol

222-8000 Ext. 251

Bismarck, North Dakota 58501

February 23, 1965

Asst. Sec'y	
Asst. Chief Eng.	
Chief Eng.	
Insp. Eng.	
Const. Eng.	
Invest. En.	
Drain. Eng.	
Field Eng.	
Chief Asst.	
Chief Steno.	
Sec'y	

Mr. Art Thoraldson, Chairman
 Grand Forks County Water Management District
 P. O. Box 1411
 Grand Forks, North Dakota

1351

Dear Mr. Thoraldson:

This will acknowledge receipt of your letter of February 2nd in which you request information from the State Water Commission pertaining to participation in the English Coulee activities.

The Commission members at their most recent meeting stated they would provide every aid possible in the way of engineering which would be a continuation of our present activities. The Commission would also provide legal advice commensurate with our abilities to do so.

In regard to the cost participation, commitments are difficult to make without a final cost estimate. The maximum participation made by the State Water Commission in a flood control district project to date was \$50,000. The Commission did participate to the extent of \$100,000 in the Drayton Dam. This, however, was covered in a special appropriation earmarked for that project. It is quite possible that your legislators might be in a position to obtain a special appropriation for the English Coulee project should it appear necessary. As you are aware, the Commission normally participates to the extent of 40 per cent of the cost in drainage projects. The 40 per cent figure is not a figure set by law or included in our rules and regulations but may become flexible if necessary. It is also my understanding that the State Highway Department, the University of North Dakota, your Water Management District and the State Water Commission will be participants in the project. It is quite possible that a satisfactory cost participation ratio could be resolved through these four agencies.

In reviewing the project proposal, there appears to be some features of the project that can be delayed and constructed as funds become available if funding becomes a problem. This might be applicable to the proposed recreation dam near the confluence of English Coulee and the Red River. The recreation project appears to be an excellent one and should be included in the comprehensive plan. It is quite possible that funds through the Bureau of Outdoor Recreation, which is handled by the State Outdoor Recreation Agency, may be available for use in connection with this segment of the project. Such recreation projects are eligible to receive approximately 50 per cent of the construction costs and some other costs such as recreation facilities. Possibly the County Park Board or the Water Management District could cooperate with the State Water Commission in sponsoring such a project independent of the overall project. Generally the Commission and the local proponents of such projects share the remaining 50 per cent on an equal basis.

Governor William L. Guy
 Chairman
 Richard P. Gallagher
 Vice Chairman - Mandan

Harold Hanson
 New England
 Russell Dushinske
 Devils Lake

Henry J. Stemberger
 Donnybrook
 Gordon K. Gray
 Valley City

Arne Dahl, Ex-Officio Member
 Comm. of Agriculture & Labor
 Milo W. Holvers, Secretary
 Chief Engineer of State Engineers

Art Thoraldson
February 23, 1966
Page 2

As a suggestion, it might be logical to assume that your Board should make a levy which would provide a fund approximating \$200,000 to \$250,000 over the next four years. It is my understanding that a mill levy will approximate \$42,650 in Grand Forks County.

I am sorry that I cannot give you any exact figure as to our participation; however, I am certain you can understand the position of the Commission in regard to the need for a fairly accurate cost estimate.

It is a pleasure to witness the manner in which your Board is handling water problems in Grand Forks County. I am certain your county and the State will benefit from your efforts.

Sincerely yours,

Nilo W. Hoisveen
Engineer-Secretary

NWN:lh

cc: Russell Dushinske, Devils Lake

APPENDIX J

It was moved by Commissioner Jungroth, seconded by Secretary Hoisveen and carried that an appropriate resolution be forwarded to Mr. Hagen's son and daughter who are the immediate survivors.

(See Appendix C.)

ENGLISH COULEE - REQUEST FOR STATE
WATER COMMISSION PARTICIPATION
(#1351) ✓

The State Water Commission received a request from the Grand Forks County Water Management District for financial assistance in diverting flood waters of

the English Coulee north of Grand Forks rather than permitting the waters to flow through the city where flood damages were caused to the University of North Dakota and property in that city. Hoisveen explained that the State Water Commission had made the plans and the total cost approximated \$250,000 of which \$98,000 was eligible for Commission participation. Cost to the Commission would be about \$39,200 based on 40 per cent of \$98,000.

It was moved by Commissioner Jungroth, seconded by Secretary Hoisveen and carried that the Commission accept the request for State financial assistance to Grand Forks County to alleviate flooding from English Coulee approximating \$39,200.

RESERVOIR AND DAM SITES SURVEY
NEW ENGLAND AREA

At the request of Commissioner Hanson visits were made by staff members to several dam sites in the New England area.

A very fine site appears as a possibility. The State Water Commission will make a study of the site upon receipt of \$200 from local legal entities. Secretary Hoisveen recommended that authorization for the survey be granted.

It was moved by Secretary Hoisveen, seconded by Commissioner Jungroth and carried that the survey be made of the New England area upon receipt of a deposit of \$200.

WATER RIGHTS

#1508

The application of Northland Research Co. Minneapolis, Minnesota to divert 1000 acre-feet of water from the Maple River for industrial use was presented to the Commission by the Secretary for consideration.

The State Engineer, Milo W. Hoisveen, having considered the application and made his recommendation thereon for 1000 acre-feet annually for industrial use, it was moved by Secretary Hoisveen, seconded by Commissioner Jungroth and carried that the application be approved and the conditional permit granted for the diversion of 1000 acre-feet for industrial use, subject to such conditions as indicated on the permit.

#1509

One permit, Northland Research Company for groundwater was deferred by previous action taken by the State Engineer. This permit request will require further examination before being submitted to the State Water Commission.

APPENDIX K

NORTH DAKOTA STATE WATER COMMISSION
AGRICULTURAL LANDS FLOOD PROTECTIVE PROJECT
AGREEMENT

THIS AGREEMENT entered into by and between:

- (1) The North Dakota State Water Commission, hereinafter referred to as the Commission, acting by and through Milo W. Hoisveen, Secretary and Chief Engineer;
(2) The Grand Forks County Water Management District, hereinafter referred to as the District, acting by and through Chairman;
(3) The [blank], hereinafter referred to as the [blank], acting by and through [blank]

I. PROJECT, LOCATION AND PURPOSE

WHEREAS, the parties to this Agreement propose to construct the following:

English Coulee Improvement

hereinafter referred to as the Project, located in Grand Forks County, North Dakota, the purpose of which is to provide flood protection for agricultural lands and assist in the overall water management of the watershed in which the Project is located.

NOW, THEREFORE, IT IS AGREED:

II. DRAWINGS AND SPECIFICATIONS

That the project shall be constructed in accordance with drawings and specifications provided to and approved by the North Dakota State Water Commission, which drawings and specifications are made a part of this Agreement to the same force and effect as if they were incorporated into the body of this Agreement.

III. RULES AND REGULATIONS

That the project shall conform to the "Agricultural Lands Flood Protection Rules and Regulations of the North Dakota State Water Commission" as adopted June 10, 1963, with amendments thereto.

IV. COSTS AND ALLOCATIONS

That the estimated cost of the project and the cost allocations to the project participants shall be as follows:

Table with 3 columns: Item, Amount, Percentage. Row 1: Total Estimated Costs Structures \$ 98,000. Row 2: 1. North Dakota State Water Commission \$ 39,200 or %.

That all parties shall provide the others with cost statements within thirty (30) days after the project's completion and settlements shall be made within thirty (30) days of receipt of said statements unless other provisions for repayment have been made in writing.

V. TITLE TO LANDS AND/OR EASEMENTS

That title to all lands and/or easements for the project shall be provided by the District and recorded in the County Register of Deeds office wherein the Project is situated.

VI. OPERATION AND MAINTENANCE

That the District shall operate and maintain the Project in accordance with rules and regulations prescribed by the Commission.

VII. INDEMNIFICATION

That the District does hereby accept responsibility for, and holds the Commission harmless from, all claims and damages to public or private properties, rights, or persons arising out of the construction, operation, and maintenance of the Project. In the event a suit is initiated or judgment entered against the Commission the District shall indemnify the Commission for any settlement arrived at or judgment satisfied.

VIII. CHANGES IN RESPONSIBILITIES

That changes in any responsibilities of the parties hereto or conditions herein stated will not be effective or binding unless such changes or conditions are made in writing, signed by the parties concerned and attached hereto.

IX. OTHER STIPULATIONS

IN WITNESS WHEREOF, the parties hereto have signed this Agreement the day and year indicated below.

WITNESS:

Handwritten signature: Kay Kohl

DATE: Jan. 31, 1968

NORTH DAKOTA STATE WATER COMMISSION

By: Alan Crumley, Secretary and Chief Engineer

Handwritten date: 7/21/68

By: [Handwritten Signature], Chairman Co. Water Board

By:

APPENDIX L

Big Savings Realized On Coulee Diversion

SWC 1351

By BOB GILMOUR
It certainly wasn't a "dirty deal" but a deal involving dirt saved the Grand Forks County Water Management Board and the State Water Commission more than a half million dollars. The savings came to light as Moorhead Construction Co., moved in equipment Wednesday to install three drop structures on the English Coulee north diversion project. The project is a step toward diverting water moving normally toward the English Coulee instead to the Red River in order to prevent flooding of

property in the University of North Dakota and Boyd Addition areas of Grand Forks. In short, members of Gamma Phi Beta sorority and others living along the coulee won't have to sandbag anymore when flood time comes. Moorhead Construction Co. received the contract for the installation of three drop structures, the shaping of one-quarter mile of channel, site preparation and backfill and channel excavation, on a bid of \$63,331.80. With engineering costs added, this portion of the project will cost about \$98,000, according to

Art Thoraldson of Grand Forks, chairman of the water management board for the county. The three drop structures, designed to prevent erosion, will involve steel, concrete, gravel and dirt and will be located in a one-quarter mile stretch from the old Falconer school to the Red River. This quarter-mile will be the final leg of a 4/4-mile north English Coulee diversion project which will start at Highway 2 near Weekly's Auto Wrecking and proceed two miles north and then east for 2 1/4 miles to the Red River.

The big savings come on the four regular channel miles of the project. Conveniently, contractors for Interstate 20 nearby needed dirt. The water board bought the land needed for the channel for \$22,500 and then made a deal with the highway contractors who were given use of the dirt while also shaping a channel 40 feet wide at the bottom and 160 feet wide at the top. Contractors used the dirt to build the interchanges on the highway. Adding bridge and culvert cost to the \$52,000 for the drop structures, water board treasurer Vincent F. Reed figures the total cost of the north diversion English Coulee project will be under \$200,000. Originally the cost was figured at \$829,000, but the dirt deal cut it an amazing 75 per cent. Costs will be borne 60 per cent by the county water board and 40 per cent by the State Water Commission.

The next phase of the overall plan will be the English Coulee south diversion project in Brenna and Grand Forks Townships. The complete project will not be in operation for about two years, the water board said.

A host of problems were overcome in bringing the project along this far. Contributing organizations included the Grand Forks County Commissioners, City of Grand Forks, State Water Commission, State Highway Department, United States Soil Conservation Service and local farmers and friends interested in the work, the board pointed out.

Some of the problems overcome included lowering forced sewer pipe to the city lagoon, lowering of telephone cables, lowering of the water line to the Grand Forks Air Force Base and installation of bridges two miles north of Highway 2 on the Falconer-Rye township line and near the Falconer school drop structure. Culverts must be installed under Great Northern and Northern Pacific Railway bridges. One big problem remains. The fuel line from the pipeline to the air base also must be lowered.

The English Coulee will maintain its present level. Flooding in the University of North Dakota area and Boyd Addition will be controlled. UND still will have the esthetic value of the English Coulee. In other words, the coulee will still be there to soothe the nerves of exam-riddled students. Only the excess water will be diverted to the Red River.

GRAND FORKS HERALD THURS MAY 16, 68

The south diversion for the coulee will be planned as soon as the north unit is done. The outlets are planned to handle all the flood waters coming from the county through the city for the next 100 years. The water board has told the City Council that the pattern of surface drainage which uses English Coulee as an escape route to the Red River is very important to the orderly planning of city storm sewers, parks and all other phases of city development. Also planned for the future are two parks, one in Boyd Addition and the other along the river at the end of the project. Thoraldson said much credit for the project should go to Ray Zink of the State Highway Department and C. P. "Phil" Nelson of the State Water Commission, planners and designers. Other members of the water board, in addition to Thoraldson, are Tom Ronan of Manvel and Simon Fagstad of Larimore.

APPENDIX M

NORTH DAKOTA STATE WATER COMMISSION

1-10-69

COST REPORT

English Coulee Outfall
 SWC Project #1351
 Grand Forks County

Construction of this project was initiated in May, 1968, and was completed in November, 1968. Cost report date - January 10, 1969.

Preliminary Investigation and Design Costs

Personnel Services:

Engineers - 9½ days Salaries & Expenses	\$ 454.09
Draftsmen - 21 days Salaries	<u>585.15</u>
Total Preliminary Investigation and Design Costs	\$ 1,039.24

Construction Costs

Personnel Services:

Engineers - 45 days Salaries & Expenses	\$2,474.01
Construction Inspectors - 144 days Salaries & Expenses	5,863.70
Construction Surveyors - 20 days Salaries & Expenses	743.30
Soil Technician - 3 days Salaries	<u>120.00</u>
Total Personnel Services	\$ 9,201.01

Vehicles and Major Equipment:

#348 - '66 Panel - 970 mi. @ 7 cents	\$ 67.90
#400 - '66 Sedan - 874 mi. @ 6 cents	52.44
#3928 - '67 Sedan - 10,200 mi. @ 6 cents	612.00
#4125 - '68 ½ Ton - 1234 mi.	72.52
#5763 - '66 ½ Ton - 12,534 mi. @ 7 cents	877.38
#5764 - '66 ½ Ton - 375 mi. @ 7 cents	26.25
#5827 - '66 Panel - 298 mi. @ 7 cents	20.86
#5808 - '66 Sedan - 692 mi. @ 6 cents	41.52
Air plane fare to Grand Forks & Return	<u>71.35</u>

Total Vehicle & Major Equipment Costs \$ 1,842.22

Supplies and Materials:

Laths, stakes, flagging and reinforcing bar \$ 32.88

Total Supplies & Materials Cost \$ 32.88

Contract Work:

Moorhead Construction

Concrete - 393 CY @\$90	\$35,370.00
Reinforcing Steel - 45,196# @ 15 cents	6,779.40
Gravel - 350 CY @\$4.50	1,575.00
Rock Riprap - 160 CY @\$12.50	2,000.00
Corrugated Steel Sheet Piling (10 gage) 1,200 sq.ft. @\$2.75	3,300.00
Site Preparation and Backfilling for all 3 structures - LUMP SUM	4,400.00
Channel Excavation - 21,114 CY @ 44 cents	9,290.16
Extra Clearing & Grubbing for #3 Structure - LUMP SUM	50.00

Total Contract Work Costs \$62,764.55

Total Direct Costs \$74,879.91

Total Indirect Costs
(10% of Direct Costs) 7,487.99

TOTAL COSTS \$82,367.90

Allocation of Costs:

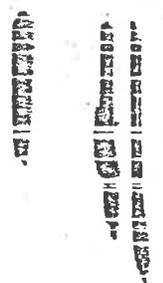
North Dakota State Water Commission - 40% \$32,947.16

Grand Forks County Water Management District = 60%
(as per 1-31-68 agreement) 49,420.74*

\$82,367.90

*Balance due from Grand Forks County Water Management District is \$18,920.74 as \$30,000 was paid May, 1968, and \$500 was paid in May, 1964.

ka
Dist.
SWC File C5-4 ✓
SWC File #1351
SWC Acct.
SWC Const. Engineer
Grand Forks Co. WMD



APPENDIX N

9-6-63

1351



M E M O R A N D U M

TO: R. P. Thomas
Design Engineer

FROM: Raymond Zink
Road Designer

SUBJECT: Interagency Meeting On Grand Forks Drainage

N. D. State Water Conservation Board

ROUTE TO

	✓	
Asst. Sec'y		
Asst. Chief Engr.		
Office Engr.		
Insig. Engr.		
Comm. Engr.		
Invest. Engr.		
Drain. Engr.	✓	OM
Field Engr.		
Chief Acct.		
Chief Steno.		
File		

On September 3rd, George Seaworth, Milo Hoisveen, Phil Nelson, Cliff Jochim, R. E. Bradley, R. P. Thomas and this writer, met to discuss the drainage in and around Grand Forks.

Mr. Bradley opened the meeting by outlining the problem. He pointed out the encroachments that had taken place in English Coulee and its tributaries. Due to these encroachments, the Highway Department would not want to rely on English Coulee to drain the Interstate and primarily the Interchange at Highway #2. The Highway Department has proposed that the water be diverted around Grand Forks by starting a diversion ditch at the northeast corner of Section 1, Twp. 151, Rge. 51 and then running two miles north and then east for approximately 2 1/2 miles in to the Red River.

Mr. Nelson then stated that if this was done, the Water Commission would like to propose a plan to divert English Coulee by constructing a ditch from the northeast corner of Section 13, Twp. 151, Rge. 51 north to connect with the ditch proposed by the Highway Department. This proposal would allow the normal flows to continue through Grand Forks and the flood flows would be diverted. The proposed Highway Department diversion ditch would have to be enlarged to accommodate these flood flows.

APPENDIX O

Commission. Secretary Hoisveen recommended that the Water Commission's participation be no more than \$5,000, which sum would be used for drilling. Secretary Hoisveen stated that there were advantages in participating in this type of demonstration, but there were also disadvantages.

It was moved by Commissioner Steinberger, seconded by Commissioner Gallagher and carried that the Commission participate with the Geotechnics Company to the extent of \$5,000, which sum is to be used for drilling.

ENGLISH COULEE OUTFALL -
PROJECT #1351

Secretary Hoisveen stated that there has been considerable encroachment going on in English Coulee which is a tributary of the Red River and flows thru a portion of Grand Forks. The Drainage Engineer of the State Water Commission and Highway Department engineers have come across encroachment that could impair Highway #2. As a result of a review of this situation with the city engineer, the water management district and officials in Grand Forks it was thought advisable to send out a letter warning people that the channel had to be maintained at a specific opening. A letter was sent out informing property owners of this situation and certain corrections would be required of some owners in order to meet the specified opening.

Commissioner Gallagher was of the opinion that the law should be changed to permit the water management district to have the same power to control stream obstruction as they do drain obstruction. The Commission reaffirmed the opinion and the action of the staff in caring for this problem. (61-16-28.1)

SOURIS RIVER BASIN
FLOOD CONTROL -
PROJECT #984

Secretary Hoisveen stated that in the not too distant future, hearings are to be held in Minot on the Souris River basin flood control project. The present plan calls for storing water on land in the area above Minot and he felt that there will certainly be opposition to this plan. The storage as contemplated would be in the vicinity of Burlington. Several years ago the mayor of Minot had suggested that a study be made of Lake Darling dam as it was rumored to be unsafe. It was also thought inadvisable to attend a meeting concerning the Souris River Basin Flood Control as a commission.

NORTH DAKOTA ASSOCIATION
OF SOIL CONSERVATION
DISTRICTS

Secretary Hoisveen stated that he had met with the Water Resources Committee of the North Dakota Association of Soil Conservation Districts concerning Public Law 566 which provided for 50% cost sharing for features that serve irrigation, recreation and fish and wildlife purposes. The Association adopted a resolution which Secretary Hoisveen presented urging that the Federal Congress modify Public Law 566 to permit political subdivisions of the states to cooperate with the U. S. Department of Agriculture on the 50% cost sharing basis for conservation purposes similar to that now governing fish and wildlife participation.

APPENDIX P

North Dakota State Water Commission

1301 State Capitol

223-8000 Ext 41

Bismarck, North Dakota 58501

April 15, 1964

7251

Dear Landowner:

The State Water Commission has long been aware of the significance of English Coulee and its principal west tributary to the City of Grand Forks. During the period of planning for the improvement of Highway #2 and the construction of Interstate #29, the engineers of the Water Commission and the Highway Department mutually recognized the hazards of serious flooding which are due to the topography of the English Coulee watershed, and the location of its outfall route through and adjacent to areas of increasing land value and use. In recognition of this hazard, an attempt was made to work out a plan of diversion for both the main channel of the coulee and its principal tributary from the west. This plan proved unsuccessful for economic reasons.

Since no other escape route is available, both the improvements on U.S. #2 and Interstate #29 require use of the present main and tributary channels of English Coulee to drain the roadways and interchanges.

With the designs of the federal highway and Interstate improvements now committed to use the original channels of the coulee for drainage, it is essential that recognition be given to the need for adequate channel capacity, in order to avoid hazard to the roadways being planned and constructed, and to avoid damage to structures and facilities within the potential flood area.

Two channels are actually involved in the drainage of that portion of the land lying north of #2 highway. One is the west tributary of English Coulee which drains over 10 square miles of rural land, through Grand Forks County Legal Drain #18 established in 1926 as such. The other is the main channel of English Coulee, which drains over 75 square miles of rural land through natural intermittent stream beds and an extension of the principal stream bed established in 1916 as Grand Forks County Legal Drain #9.

It is essential to the future development of the entire lower portion of the English Coulee watershed, as well as the adequate safety, use, and maintenance of the federal highways involved, that the natural channels described above be reserved for and dedicated to the passage of flood water with sufficient water carrying capacity to avoid flood damage to public or private property.

Governor William L. Guy
Chairman

Oscar Lunseth, Vice Chairman
Grand Forks

Einar H. Dahl
Watford City

Richard P. Gallagher
Mandan

Henry J. Steinberger
Donnybrook

Gordon K. Gray
Valley City

Math Dahl, Ex-Officio Member
Comm. of Agriculture & Labor

Milo W. Hoisveen, Secretary
Chief Engineer & State Engineer

It is therefore necessary that the Commission take note of existing conditions along the outfall route of English Coulee and the principal west tributary, and to take such action as is necessary to protect the natural function of each.

You are notified that the channel through and adjacent to your property, being in fact, the outfall of a legally established county drain, is regarded as a watercourse and any obstruction or encroachment which impairs its function as escape route for flood waters is a violation of section 61-01-07 of the North Dakota Century Code, and will be prosecuted as such. The penalty, in any case involving English Coulee, would be very minor in comparison to the total potential liability which can be caused by backed-up flood water.

As a measure of the channel requirements in each case, the specifications of the Highway Department design engineers are herein cited:

For the tributary channel extending from the west into English Coulee between #2 Highway and the Northern Pacific Railroad: 12' bottom, 3:1 side slopes or equivalent in capacity and permanence.

For the main channel of English Coulee, from #2 Highway to its outfall into the Red River: 30' bottom, 3:1 side slopes, or equivalent in capacity and permanence.

The channel requirements have been arrived at by joint studies of watershed area and hydrology, by both highway and water commission engineers. The requirements are based on a channel capable of delivering a 50-year flood. In the tributary channel, this amounts to 450 CFS, and in the main channel 1795 CFS. The requirements are much higher than they would have to be for purely rural drainage. The reason for this is that the English Coulee channels involved comprise the only available escape route for excess water through an area in which water can do much more damage if it is a few feet higher than the same condition in an area devoted exclusively to farming. In addition, the further development of Grand Forks will no doubt increase the demands made on this channel as more and more of the drainage area is paved, surfaced, or otherwise converted to "immediate runoff" conditions.

It is therefore deemed essential to the interests of all landowners along the channel of English Coulee and the west tributary that corrective measures be taken to insure that the channel is uniformly broadened, cleaned and graded, and existing structures enlarged, improved or changed so that the channel will be capable of handling a 50-year flood.

The Grand Forks County Water Management District Board and Grand Forks City officials have been made aware of the circumstances surrounding this request for action to insure adequate channel capacity in English Coulee, and concur that action is needed.

Sincerely yours,

Milo W. Hoisveen
Milo W. Hoisveen
Engineer-Secretary

APPENDIX Q

APPENDIX R

AN ORDINANCE FOR CREATION OF FLOOD PLAIN DISTRICTS.

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF GRAND FORKS, NORTH DAKOTA, THAT:

Section 1. Creation of Flood Plain Districts.

- (a) For the purpose of promoting the public health, safety, and general welfare through the confinement of periodic floods to reasonable limits, by reguldting and restricting areas of development along or in natural watercourses, channels, drainage ditches and streams, ~~there are hereby created two districts as follows:~~

FP-1-Flood Plain District

FP-2-Channel District

- (b) These districts and the regulations thereof shall apply in addition to regulations of any other zoning district, which now or in the future may lie within the boundaries of these districts.

Section 2. Definitions.

Flood plain: That continuous area, adjacent to a watercourse, whose elevation is equal to or below the elevation of the highest flood level of record; and any land of higher elevation, having an area of less than two acres, which is completely surrounded by land having elevation equal to or lower than the elevation of the highest flood level of record.

Channel: That area, adjacent to a watercourse, which is at an elevation of two feet lower than the elevation of the surrounding flood plain area.

Section 3. Boundaries of Districts.

The boundaries of such districts shall be such limits as shall be shown on a map of the flood plain districts of this city and adopted as a part of this ordinance. The location of such boundary lines may be determined from time to time and this section amended by addition thereto of the then proper description of such channel lines.

Section 4. FP-1-Flood Plain District.

- (a) No building or structure other than a fence shall be erected in or moved to an FP-1 flood plain district unless the ground upon which said building or structure is to be erected and the ground ten feet beyond the limits of said building or structure and any entrance drives are raised to such level that the main floor of said building or structure and said grounds and drives shall be not less than two feet above the high water level, as shown on the map above referred to. No basement floor or other floor shall be constructed below or at a lower elevation than the main floor or two feet above the high water level.
- (b) Any use shall be permitted as provided for in that district as established by the City zoning ordinance, which does not by its activity require a structure, cause a change in the natural drainage grade, or constitute obstructions to flood flow or constitute hazards to life and property.

Section 5. FP-2 Channel District.

- (a) It shall be unlawful to erect any building or structure, retaining or revetment wall, except bridges or dams, in the FP-2 channel district or to establish any kind of dump, deposit any fill material consisting of but not limited to: earth, ashes, rubbish, rubble, concrete, or masonry.
- (b) Any use shall be permitted as provided by the zoning ordinance, which does not by its activity require a structure, cause a change in the natural drainage grade, or constitute obstructions to flood flow or constitute hazards to life and property.
- (c) Provided, that construction in the FP-2 district may be permitted as in the FP-1 district, under the following conditions:
- (1) That the elevation requirements provided for in 4(a) above are complied with.
 - (2) That an equivalent ponding area, equal in volume extent to the building site earth fill, necessary to meet the provisions of the FP-1 district, be created within one hundred feet of the desired building site. Such ponding area shall be documented by a registered professional engineer and shall be properly identified upon a plot plan of the drawings for the proposed construction, and such ponding area shall be constructed before any certificate of occupancy is issued for the said structure.
 - (3) In the event of construction under this section, fill provided for an intended structure at an elevation as provided for in 4(a) shall extend at least twenty-five feet in every direction beyond the limits of the structure, and include any entrance drives to the structure.
 - (4) Engineering data must be furnished to substantiate the fact that foundations of structures in this district are designated to withstand flood conditions.

H. R. Magnuson, Mayor

ATTEST:

Arne E. Loven, Deputy City Auditor

Introduction and First Reading:

Second Reading and Final Passage:

Approved.

Published:

APPENDIX S

MINUTES
NORTH DAKOTA STATE WATER COMMISSION
Held in the Bison Room, Clarence Parker Hotel
Minot, North Dakota
April 10, 1969

MEMBERS PRESENT:

Russell Dushinske, Member from Devils Lake
Arne Dahl, Commissioner, Department of Agriculture, Bismarck
James R. Jungroth, Member from Jamestown
Harold Hanson, Member from New England
Richard P. Gallagher, Member from Mandan
Milo W. Hoisveen, State Engineer, Chief Engineer, and Secretary
State Water Commission, Bismarck

Others Present:

Alan Grindberg, Assistant Chief Engineer, State Water
Commission, Bismarck
Cliff Jochim, Special Assistant Attorney General, State
Water Commission, Bismarck
Vincent Reed, Secretary-Treasurer, Grand Forks County
Water Management District, Grand Forks
Gordon Gray, Chairman, Souris-Red-Rainy River Basins Commission,
Moorhead, Minnesota
Earl C. Palmer, Mayor, City of Glenburn
Harry Nelson, Renville County Water Management District, Lansford

Commissioner Dushinske presiding.

The meeting opened at 1:30 p.m. with

JENSEN DAM (#1502)

Secretary Hoisveen stated that Vincent Reed from the Grand Forks County Water Management District wished to make a presentation in regard to proposed Jensen Dam located on the English Coulee north of Grand Forks. Mr. Hoisveen stated that the total cost of the project was over \$350,000. The Bureau of Outdoor Recreation would participate to the extent of \$178,961. The Grand Forks County Water Management District would buy the land totalling \$30,511 and contribute \$38,775 to the construction of the dam. It is proposed that the State Water Commission match the contribution of the water management district on construction of the dam in the amount of \$38,775. Vincent Reed stated that the water management district proposed to create a 110 acre park three miles north of Grand Forks. This park would have a recreation lake of 31 acres. The water management district further proposed to clean up the channel in English Coulee back to highway 81. The water management district is prepared to go ahead immediately; however, they would like to spread the repayment over a two year period.

Commissioner Hanson moved that the State Water Commission approve participation in the construction of Jensen Dam in an amount not to exceed \$38,775. Seconded by Commissioner Dahl and all voted aye.

Commissioner Dushinske recommended that a suitable dedication ceremony be held at the completion of the project and Mr. Reed promised he would keep it in mind.

APPENDIX T

North Dakota State Water Commission

State Office Building

(701) 324-2750

Bismarck, North Dakota 58501

October 3, 1970

Mr. H. R. Magnuson, Mayor
City Hall
Grand Forks, ND 58201

Re: SAC Project # 1351

Dear Mr. Magnuson:

The constant and continuing encroachments on the English Coulee right-of-way within and near Grand Forks are a matter of ever-increasing concern to the State Water Commission. Such collective acts are definitely obstructing the coulee's channel and decreasing its load carrying capacity. The size of the coulee's drainage area (approximately 75 square miles), however, remains the same. This is comparable to plugging or obstructing the barrel of a shot gun. If the force generated is denied its ordinary and natural outlet the results could very well be disastrous. Section 31-01-07, North Dakota Century Code, prohibits the obstruction of a watercourse.

It is strongly recommended that representatives of the University, the Water Management District and the City of Grand Forks arrange a meeting in the very near future in order to discuss this problem in depth and seek a solution. Please notify us of such meeting when scheduled and we will have representatives present. If nothing is done on the local level to adequately handle this situation the State Water Commission will have no alternative but to exercise its authority in order to protect the lives and property of landowners adjacent to the coulee.

Sincerely yours,

Cliff Jochim
Special Assistant Attorney General

CJ:c

Governor William L. Guy
Chairman
Richard P. Gallagher
Vice Chairman-Mandan

Harold Hanson
New England
Russell Dushinske
Devils Lake

Henry J. Steinberger
Donnybrook
James Jungroth
Jamestown

Arne Dahl, Ex-Officio Member
Comm. of Agriculture & Labor
Milo W. Hoisveen, Secretary
Chief Engineer & State Engineer

APPENDIX U

Grand Forks N D C.

CDJ

English
Coulter outfall

1351
Oct. 1970

Definitions:

1. Flood Plain: That continuous area, adjacent to a watercourse, whose elevation is such that it has been or may be subject to flood water inundation. Generally the flood plain shall be considered to have an elevation at or below 829 feet above sea level.
2. Channel: That area adjacent to a watercourse, which is subject to periodic flooding. Generally the channel shall be considered to have an elevation at or below 820 feet above sea level.

Floodproofing: A combination of structural provisions, changes, or adjustments to properties and structure subject to flooding primarily for the reduction or elimination of flood damages to properties, water and sanitary facilities, structures, and contents of buildings in a flood hazard area.

Regulatory Flood: A flood which is representative of large floods known to have occurred generally in the area and reasonably characteristic of what can be expected to occur on a particular stream. The regulatory flood generally has an average frequency in the order of the 100 year recurrence interval flood determined from an analysis of floods on a particular stream and other streams in the same general region.

Regulatory Flood Protection Elevation: The elevation to which uses regulated by this ordinance are required to be elevated or flood proofed. Generally this elevation shall be to a height of 829 feet above sea level.

19-0312 FLOOD PLAIN ZONING DISTRICT

A. Purpose:

Uncontrolled use of flood plains in the City of Grand Forks adversely affects the public health, safety, convenience and general welfare of the City and its residents. Public expenditures are required to protect private property and persons in areas subject to flooding. Development of and construction of structures, land fills, etc., in flood plain areas tend to affect current, velocity and heights of floods, thereby contributing further to the need for additional public expenditures for private property as well as public facilities serving these private properties. It is the purpose of this ordinance to establish certain minimum controls on the flood plains that affect the City of Grand Forks to insure the minimum of public expenditure and provide a minimum level of protection for life and property. For these reasons there are hereby created two districts as follows:

- F-1 Channel District
- F-2 Flood Plain District

B. Boundaries of the District.

- a. The boundaries of these districts shall be such limits as shall be shown on the official flood plain zoning map with all explanatory matter thereon, and attached thereto is hereby adopted by reference and declared to be a part of this ordinance. The location of such boundary lines may be determined from time to time and this section amended by additions thereto of the then proper description of such boundary lines.
- b. The Flood Plain Zoning District Map shall become a part of and be supplemental to the zoning ordinance of the City and shall overlay other zoning districts as shown of the City of Grand Forks Zoning Ordinance. When the Flood Plain Zoning Ordinance conflicts with the uses and other regulations of the underlying district the more restrictive of the two districts and that portion of the districts in conflict shall take precedence.

C. Disclaimer of Liability.

The districts herein established are intended to provide a reasonable approach to flood control based on present information. As additional information becomes available, the extent of the various boundaries shall be so altered to maintain this reasonableness. This ordinance does not imply that areas beyond the district limits will be free from flooding or that uses within the districts will be free from flooding; nor shall this ordinance, or districts established therein, create a liability on the part of, or cause action against the City of Grand Forks or any office or employee thereof, for any flood damage that may result from reliance upon this ordinance or flood districts so established.

D. F-1 Channel District.

Permitted Uses. The following uses are permitted in the F-1 Floodway District insomuch as they are not prohibited by the particular underlying zone.

1. Farming, Pasture, grazing, horticulture, truck farming, crop harvesting.
2. Vehicular loading and parking areas, heliport strips.
3. Parks, swimming areas, golf courses, driving ranges and picnic grounds.
4. Utility facilities such as dams, power plants, flowage areas, transmission lines, pipe lines, navigational and drainage aids or marshes and other related uses.
5. Other uses which the Planning Commission finds to be similar in character to the above and which do not require a structure, cause a substantial change in the natural drainage grade, unduly obstruct the natural flood flow, or constitute a hazard to life and property.

E. F-2 Flood Plain District

Permitted Uses.

- a. Uses permitted in the F-1 Channel district
- b. Any non-structural use if it is elevated above the regulatory flood protection elevation and determination is made by the City Engineer that the use will not unduly restrict the capacity of the channels or floodway of tributaries to the main stream, drainage ditches, or any other drainage facilities or systems.
- c. Structures constructed on fill if the basement floor is above the regulatory flood protection elevation. The fill shall be at a point no lower than one (1) foot below the regulatory flood protection elevation for the particular area and shall extend at such elevation at least fifteen (15) feet beyond the limits of any structure or building erected thereon.
- d. Other structures if adequately flood-proofed or otherwise protected to a point above the regulatory flood protection elevation. Such flood proofing shall generally consist of but not be limited to the following:
 1. Anchorage to resist flotation and lateral movement.
 2. Installation of watertight doors, bulkheads and shutters.
 3. Reinforcement of walls to resist water pressures.
 4. Use of paints, membranes or mortars to reduce seepage of water through walls.
 5. Addition of mass or weight to structures to resist flotation.
 6. Installation of pumps to lower water levels in structures.
 7. Construction of water supply and waste treatment systems to prevent the entrance of flood waters.
 8. Pumping facilities for subsurface drainage systems for buildings to relieve external foundation wall and basement floor pressures.
 9. Construction to resist rupture or collapse caused by water pressure floating debris.
 10. Cut off valves or sewer lines or the elimination of gravity flow basement drains.

Approval of the proposed flood proofing measures must be obtained from the City Engineer prior to construction.

F. Conditional Use Permit

Structures or uses which would ordinarily be permitted by the zoning ordinance, but which are prohibited by or in violation of the provisions of the R-1 (channel) or R-2 (flood plain) ordinance, may be permitted by conditional use permit subject to the conditions and powers granted in ordinance 19-0223. A conditional use permit may only be granted if the Planning Commission finds that the erection of such structures or the establishment of such uses will not violate the intent of this ordinance.