TWELFTH BIENNIAL REPORT

PART I

CHIEF ENGINEER

AND

SECRETARY

OF THE

STATE HIGHWAY COMMISSION

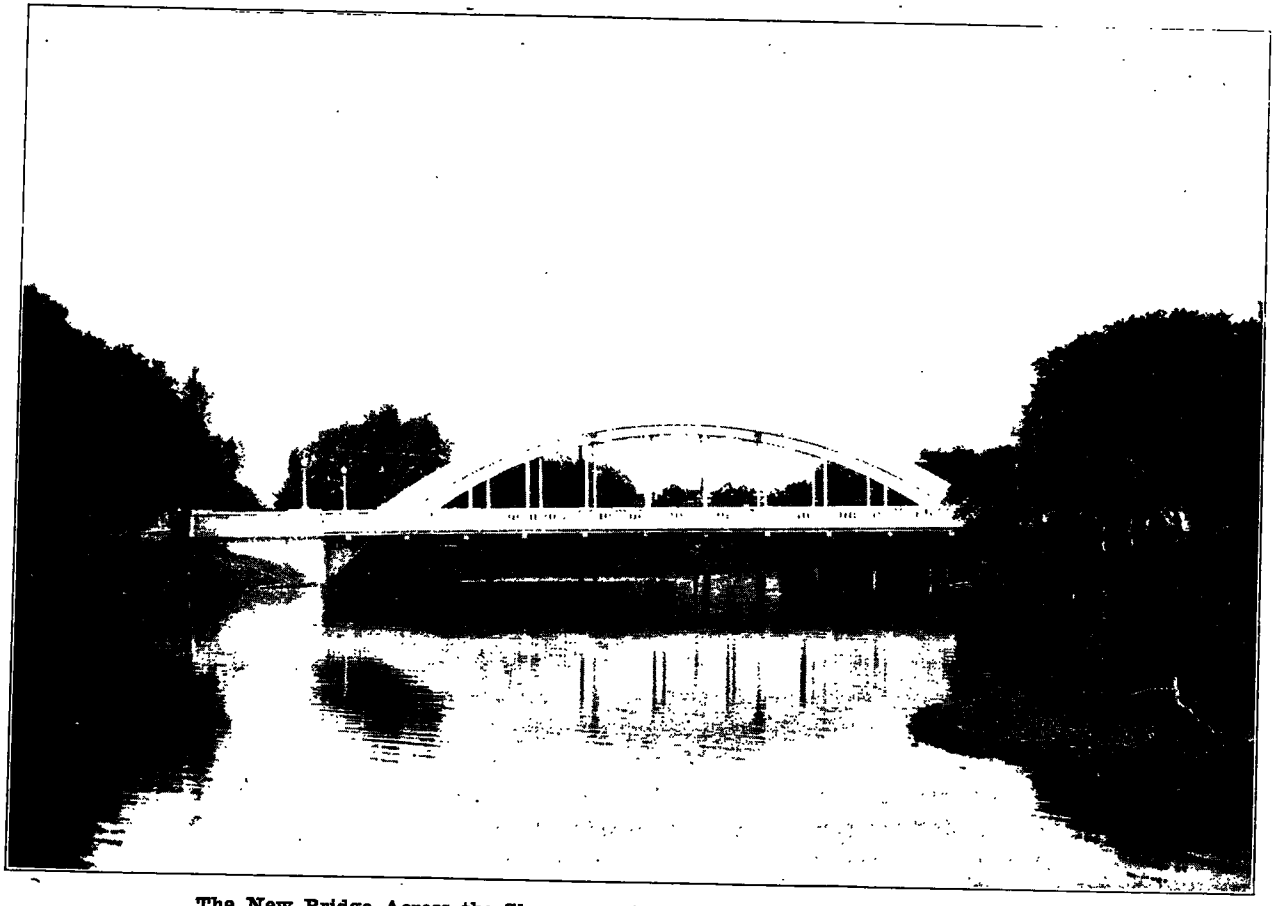
PART 2

STATE ENGINEER

MADE TO THE

NOR AND LEGISLATURE
NORTH DAKOTA

OR PERIOD JULY 1, 1924
TO JUNE 30, 1926



The New Bridge Across the Sheyenne River Recently Completed in Valley City

MEMBERS OF THE NORTH DAKOTA STATE HIGHWAY COMMISSION

A. G. Sorlie, Governor,.....Chairman

J. A. Kitchen, Commissioner of Agriculture & Labor.....Member

W. G. Black, State Engineer, (June 30, 1924—Sept. 15, 1925),.....

.....Chief Engineer & Secretary

H. C. Frahm, State Engineer, (Sept. 15, 1925 to ———).....

.....Chief Engineer & Secretary

I. J. Moe, (April 15, 1925 to ———), Valley City, N. D.....Member

Herman Hardt, (April 15, 1925 to ———), Napoleon, N. D.....Member

HEADQUARTERS STAFF

Capitol Building, Bismarck

C. A. Myhre.....Assistant Chief Engineer

J. E. O'Neil.....Construction Engineer

A. D. McKinnon.....Project Engineer

T. G. Plomasen.....Maintenance Engineer

Clifford Johnson.....Bridge Engineer

J. N. Roherty.....Chief Draftsman

James E. Kiley.....Chief Clerk

DIVISION ENGINEERS

George E. Hanson.....Bismarck

R. A. Pease.....Minot

R. C. Bertie.....Devils Lake

M. P. Wynkoop.....Valley City

H. C. Knudsen.....Dickinson

TWELFTH BIENNIAL REPORT
NORTH DAKOTA STATE ENGINEER
—and—
CHIEF ENGINEER & SECRETARY, STATE HIGHWAY COMMISSION
A SUMMARY OF ACTIVITIES

The Twelfth Biennial Report by the State Engineer and Chief Engineer and Secretary for the State Highway Commission covers the two year period beginning July 1st, 1924 and ending June 30th, 1926. During this period the personnel of the Commission underwent a number of changes owing to the expiration of the term of office of its members. Governor A. G. Sorlie became ex-officio the chairman thereof and appointed as members of the State Highway Commission Mr. I. J. Moe of Valley City, North Dakota, and Mr. Herman Hardt of Napoleon while Mr. J. A. Kitchen as Commissioner of Agriculture and Labor continued ex-officio as a member. State Engineer W. G. Black continued as Chief Engineer and Secretary until September 15th, 1925 when he resigned both positions and was succeeded by the present incumbent, Mr. H. C. Frahm as State Engineer and as Chief Engineer and Secretary of the State Highway Commission.

With the advent of the present Chief Engineer and Secretary a number of changes were made in the plan of organization of the State Highway Department. This revision was not only dictated by efficiency and economy but also due to the fact that the law at that time imposed on the State Highway Department the duty of maintaining and reconstructing all improved state roads from the funds and resources of the Commission. The Marking Department which theretofore had been a separate and distinct division was made a unit of the Maintenance Department as the one best adapted to handle this work. Division Engineers of the five districts of the state were also vested with the responsibility of supervision of that function in their respective divisions and supplied with the necessary assistants to care for this feature economically and efficiently. The Maintenance Department was thoroughly overhauled and placed in a position to perform its added duties effectively. Monthly and periodic reports were required from all department heads to enable the Chief Engineer and the State Highway Commission to gauge accurately the progress of the work and the results achieved. A number of improvements were effected in the office at Bismarck, and better quarters furnished to several division offices. The Equipment Department, handling war surplus material and maintaining repair shops, has been closed.

Other activities of the Department will be more fully treated in the following paragraphs.

INCREASED HIGHWAY CONSTRUCTION: During the past biennium more highway construction was undertaken than at any other previous period in the history of the State Highway Department. In

fact, during the past two years over half the gravel surfacing and about one-third of the earth grading undertaken by this Department was put under contract. The following table amply bears out these statements:—

CONTRACT AWARDS AND FORCE ACCOUNT CONSTRUCTION

		Earth	Gravel	Paving	Total
1917:	Mar. 3-Dec. 31	7.00	.....	.....	7.00
1918:	Jan. ..-Dec. 31	244.00	25.6	.....	269.60
1919:	Jan. ..-Dec. 31	229.90	15.4	.....	245.30
1920:	Jan. ..-Dec. 31	311.30	41.8	.....	353.10
1921:	Jan. ..-June 30	373.20	53.8	1.9	428.90
	July ..-Dec. 31	35.35	33.62	.....	68.97
1922:	Jan. ..-June 30	289.60	132.81	.....	422.41
5 Yr. Sub-Total		1,490.35	303.03	1.9	1,795.28
1922:	July ..-Dec. 31	73.16	7.20	1.05	81.41
1923:	Jan. ..-June 30	348.59	116.10	.....	464.69
	July ..-Dec. 31	61.22	83.20	0.74	145.16
1924:	Jan. ..-June 30	351.90	105.29	.....	457.19
Biennium Total		834.87	311.79	1.79	1,148.45
1924:	July ..-Dec. 31	128.64	91.08	2.89	222.61
1925:	Jan. ..-June 30	191.95	148.35	.....	340.30
	July ..-Dec. 31	201.13	293.74	0.39	495.26
1926:	Jan. ..-June 30	621.00	245.54	2.22	868.76
Biennium Total		1,142.72	778.71	5.50	1,926.93
GRAND TOTAL		3,467.94	1,393.53	9.19	
Per cent of Total State Highway System of 7,434 miles		46.65%	18.75%	0.12%	

(Note:—The earlier statistics were kept by calendar years. The Total column on the extreme right is for the purpose of affording a comparison of the work program and has no relation to the actual construction work.)

It will be noted that when all the projects under contract at the close of June 1926 are completed, then about half the State Highway System will be earth graded and provided with drainage structures. In this class of improvement, North Dakota ranks within the first five states of the entire Union. But, as only about one-fifth of its Highway System is gravel surfaced, our State takes a much lower level in that class. Only one other state possibly has as small a mileage of pavement in its highways as North Dakota. Owing to the large mileage in our State Highway System, which is among the largest federal aid systems of the

country, being exceeded in length only by Texas and South Dakota, and equaled by Minnesota, and taken together with our great area and our comparatively sparse population, no doubt the policy of grading most of our state roads first is not only a wise but also an highly commendable policy from the economic, and service to the public viewpoint. Besides, our dirt roads except under severe wet weather conditions are serviceable the year round.

For the same periods as shown in the foregoing statement, the table below gives the expenditures by the State Highway Department for general administrative purposes, or in other words, the cost of operating the headquarters at Bismarck and the division offices. This is below the general average for the country, and probably the lowest in the country. It is gratifying to point out that notwithstanding the tremendous growth in construction work during the past biennium, these expenditures show no increase.

EXPENDITURES

5 Yr. period, Mar. 1917 to June 30, 1921	$312,116.44
July 1921—June 30, 1922	96,325.41
July 1922—June 30, 1923	127,375.32
July 1923—June 30, 1924	105,557.77
July 1924—June 30, 1925	113,610.04
July 1925—June 30, 1926	102,844.02

In all recent biennial reports attention has been directed to the meagre compensation allocated to the more responsible executives of the Department. It is our belief that the best results can be gained by paying them a remuneration somewhat in keeping with the administrative and financial responsibilities placed on them and somewhere near a parity with the average granted by all the states. This is an administrative policy well worth a thorough examination because occasionally a cheap or underpaid officer is more costly and expensive than one adequately compensated. In view of the probable considerable expansion of our road program our ability to employ and to retain competent men grows more important each year.

THE TWO-CENT GAS TAX: Prior to the enactment of Chap. 167, Laws 1925, all proceeds from the one-cent tax on gasoline went into the general fund of the State government for general administrative purposes. With the enactment of that statute, all the proceeds from this source were credited to the State Highway Commission for the construction, reconstruction, and maintenance of the State Highway System except the first $200,000,000 which still was paid into the general fund. In 1925 the total proceeds from the one-cent tax was $657,122.10. The same legislature by Chap. 167 Laws 1925 imposed upon the State Highway Commission the duty of maintaining all improved state roads from its funds and this naturally resulted in such a shrinkage of the revenues of the Department available for highway construction that the State

Highway Commission found itself unable to meet its share of 25 per cent of the cost of all construction work, due of course to the unprecedented demand for highway improvement. By petitions circulated by persons interested in highway development, an initiated measure was submitted to the voters of the State on June 30th, 1926 and approved by them, which increased the gasoline tax to 2 cents per gallon and gave all the revenue to the State Highway Commission for its purposes. The new law provides for a refund of all taxes paid where the gasoline is used for other purposes than the propulsion of vehicles on the public highway. Collections and refunds are made through the State Auditor. It is estimated that the income from this source for the next year will produce over a million dollars net for road purposes. This will enable us to continue our present large construction program for a year or two provided no considerable amount of Federal Aid is diverted to expensive bridges. Within two years, on ordinary road and bridge work only, accumulated Federal Funds will be exhausted and our operations confined to the annual federal appropriation. At the present time there is over a million dollars of Federal Aid from appropriations previous to 1926 which is rapidly being released as projects are completed and applied on new work. As the mileage of completed work grows so also grows the maintenance costs and should the receipts, both Federal and State remain stationary, construction work must decrease eventually. For the present therefor no roads of minor importance should be added to the state system nor should they be placed too close together as has happened in some instances. If the allowable Federal Aid mileage were distributed at regular intervals the state roads would average approximately twenty miles apart, north and south as well as east and west.

EMPLOYMENT OF HIGHWAY ENGINEERS EXCLUSIVELY:

It was the practice in former years to employ engineers engaged in private practice to design some of the major construction work of the Department, notably in the planning of the larger bridges. Likewise, other engineers were engaged to make surveys and plats for road construction. During the present administration this practice was discontinued and now all plans for all classes of highway work are drafted wholly and solely by the engineers on the Department payroll. It is felt that this departure has not only resulted in greater economy as will be noted in the report of the Project Engineer found on a later page, but also that it will prove conducive to building up a personnel capable of coping with all or nearly all the engineering problems which may confront the Department. The plans for the Williston and the Sanish bridges were designed by our Bridge Department. These are among the three largest bridges in the State. Other excellent bridge structures were planned by the same forces. Some conception of the relative importance of bridge structures as compared to road building will be gained by a perusal of that section of this report dealing with bridges and found on a later page.

PATENTED PAVEMENT: The following resolution was adopted by the State Highway Commission at a recent meeting:—

"BE IT RESOLVED by the North Dakota State Highway Commission that for all future paving projects bids be received only on unpatented types of paving so as to permit of free competitive bidding on all types and avoid the payment of royalties due to such existing patents.

"FURTHER, that in the pursuance of the above outlined policy, plans, specifications and proposals be prepared under the direction of the State Highway Commission, and bids received on the following types only:—

1—Reinforced concrete
2—Asphaltic concrete (Lake and Oil)
3—Concrete base with asphaltic concrete (Oil or Lake)
4—Sheet asphalt or brick wearing surfaces."

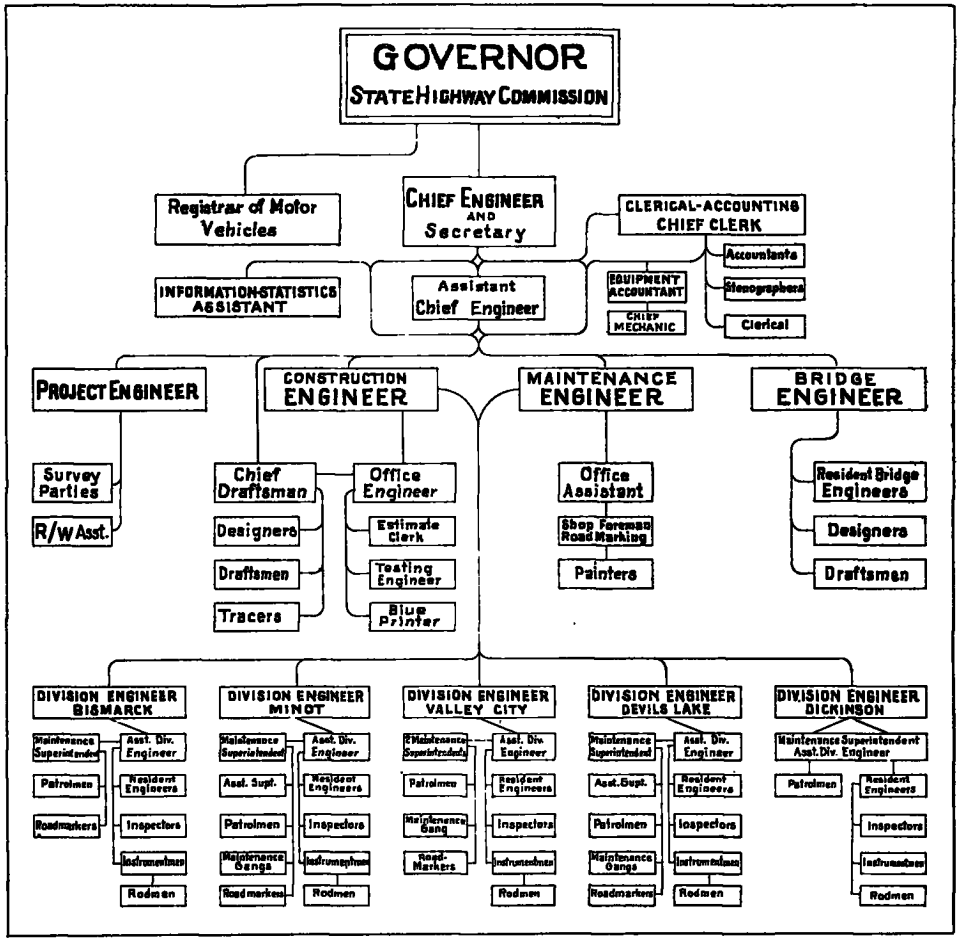
HIGHWAY MARKING AND SIGNING: The State Highway Department has every reason to feel proud of its excellent system of highway marking and signing, as North Dakota is one of the best marked states in the country. This is not only the judgment of own citizens but also that of many non-residents who have had occasion to use our highways. Up to the commencement of the current year, this duty was performed by a separate and distinct division of the Department and not related to any other function. When this Department was vested by law with sole duty of maintaining all of the improved portions of the State Highway System, it was felt wise to abolish the Marking Division as an independent division and make its functions a part of the duties of the Maintenance Division. This step was taken to secure better efficiency and greater economy and its wisdom has since been justified. Road marking has been thoroughly overhauled, a complete system of records installed and the work otherwise improved. It is now contemplated not only to continue the work on the present basis, but also to install special signs at or near points calling attention to the historical spots of the State both for the purpose of calling attention to these places and also to enable those who choose to visit them.

THE HIGHWAY BULLETIN: So that the public and especially that portion interested in the road problem may learn from time to time what the State Highway Department is doing and plans to do, the State Highway Commission in August 1925 began the publication of the North Dakota Highway Bulletin. This is a magazine issued monthly as the official organ of the Department and without the use of any public funds whatsoever, as advertising and subscriptions defray the cost of printing. Similar magazines are published by nearly all of the other highway departments of the country. It is sent gratis to all county and state officials who have to cope with the road problem in any of its aspects, and its reception by them and its general readers has more than amply justified the judgment of the Commission in providing this means of imparting general road information and statistics and more particularly the activities of the State Highway Department.

STATE ROAD MAPS AND INFORMATION: Beginning with 1925, the Department has issued annually a comprehensive map in two colors showing not only the entire State Highway System but the various stages of improvement thereof. These maps which give the route numbers are in great demand by the traveling public and those handling automobiles. They are an excellent supplement to the marking system and serve a very useful purpose. This service to the public will be continued in 1927 as the contract for the supply of maps runs for three years. It should be continued thereafter so that the people of the State may get a full use of their highways.

Whenever highway news justified it, a weekly news service was given the daily and the weekly press of the State in the shape of mimeographed copies of Highway Department activities, or any outstanding news feature. The press of the State has cooperated very generously in supplying the public with road news by the publication of these news articles.

The State Highway Department has from time to time answered quite a volume of inquiries from persons within and without the State concerning road and highway matters dealing with all angles of the road problem. The Highway Bulletin has relieved the department from considerable work of this nature.



ORGANIZATION DIAGRAM
North Dakota State Highway Department

RECOMMENDATIONS

1—LEGISLATION:

There are so many minor inconsistencies, discrepancies and ambiguities in our present highway laws that a complete redrafting of the same for the purposes of clarity and elimination of defects would prove beneficial.

According to a recent supreme court decision, authority over the State Highway System, more particularly the improved portion, is vested exclusively in the State Highway Commission, but without authority to grant right of way to power, light or 'phone companies. In case of county or township roads such authority is vested in the proper boards and should be so arranged in this case.

Our present law provides that all bids for highway improvement be sent to and opened within the county wherein the special improvement is to be made. The State Engineer awards the contract subject to the approval of the County Commissioners. This procedure entails considerable useless expense for travel and no little time by representatives of the Bureau of the Public Roads, and the State Highway Commission who must be present at such lettings. Contractors bidding and others interested in the work also flock to these occasions which means expense to them that must be passed on to the public in some form. It would seem a better procedure to have these bids opened at the State Capitol and referred to the county boards for recommendation, if the latter is desirable at all. Having lettings at the county seats of the counties in which the work is to be done prevents the award of large contracts on the seasons' requirements for materials such as culverts and the reduced prices resulting therefrom.

The most important legislation which is recommended deals with the procedure in the improvement of our highway system. Under the present practice, federal aid contributes 50 per cent to the cost of any improvement, state aid 25 per cent and the county in which the improvement is projected the balance. But, under existing statutes and practice, no improvement is or can be made unless the same is initiated by the County Board by petitioning the State Highway Commission for federal and state aid. In other words, the State Highway Commission has not the authority and certainly not the funds to make an improvement without county consent no matter how important, nor pressing it may be to close up some unimproved gap in a great arterial road. Without any desire to criticise county boards who are imposed upon by local influences and pressure to secure the location of such improvement along a certain line for the benefit of certain individuals or communities, this plan results in much hectoring and badgering and needless conferences in an endeavor to satisfy local claims. The location and improvement of a State Highway should be founded on state-wide considerations instead of local preferences. In other words, state views should prevail instead of county vision. This is the procedure of the majority of the states and especially those that have been eminently successful in highway betterment. If such a policy be adopted in this state, it will be necessary to relieve the counties of the necessity of contributing 25 per cent of the cost and to make up this loss in highway financial resources by some other and additional revenue. In brief, this procedure would permit the State Highway Commission to build highways where they are most needed from a state standpoint and be independent of county influences in this work. It would provide a better and more rounded-out system by the early improvement of the more arterial routes in keeping with the traffic burden on these routes. It would also permit counties to give their undivided attention to county and township road building, and to devote local funds entirely to purely local purposes.

2—ADMINISTRATIVE:

a—CONSTRUCTION PROGRAM:

If the foregoing suggestion should be adopted then it will be desirable for the State Highway Department to promulgate a rather comprehensive construction program for a period of years, a part of which shall be built each year. Such a program of necessity must be founded on the earlier construction of the more important state roads still unimproved and so on, until the entire system shall have been completed in accordance with the road burden it shall carry.

b—DEPARTMENTAL BUDGET:

Since the law now makes it obligatory for the State Highway Department to maintain all improved state roads as well as to construct and mark them, it is our belief that the State Highway Commission might well adopt a budgetary system to provide a fair and proportionate distribution of its estimated income to each function performed so that those officers in charge shall be advised in advance just what funds will be at their disposal to enable them to map out their own activities in accordance with the resources allowed them.

The expenses of the office of Registrar of Motor Vehicles should be entirely divorced and separated from those of the State Highway Department proper.

c—ACCOUNTING AND STATISTICAL:

Monthly reports are now required showing financial and other data and thus a considerable advance has been made over past practices. It is our impression that an expansion of these fields will prove profitable and may result in greater economy.

TABLE No. 1

STATE HIGHWAY WORK PLACED UNDER CONTRACT OR FORCE ACCOUNT CONSTRUCTION YEARS OF 1917, 1918, 1919, 1920, 1921, 1922, 1923, 1924, 1925 AND 1926 TO JUNE 30.

GRADING AND DRAINAGE STRUCTURES

Period Ending	Miles	Grading, etc. Amount	Furnishing & Delivering Pipe Culv.	Reinforced Conc. Struct.	Total Grading & Drainage Structure
Dec. 31, 1917	7.0	7,000.00			7,000.00
Dec. 31, 1918	224.0	274,753.86	17,896.89	34,342.08	326,992.83
Dec. 31, 1919	249.8	517,327.21	74,119.20	99,141.62	690,588.03
Dec. 31, 1920	311.3	1,117,316.39	67,159.04	395,695.18	1,580,170.61
				*1,074,263.00	*1,074,263.00
Dec. 31, 1921	408.55	1,259,552.79	69,347.19	316,846.65	1,645,746.63
Dec. 31, 1922	362.758	745,049.06	71,190.73	190,275.60	1,006,515.39
Dec. 31, 1923	409.811	**1,287,933.24		152,413.04	1,699,137.60
				*—175,484.32	
				*+83,307.00	
Dec. 31, 1924	380.547	**1,058,303.07		230,447.81	1,288,750.88
Dec. 31, 1925	393.078	**1,004,461.77		132,947.12	1,238,477.71
				A25,623.51	
				B39,756.35	
				C35,688.96	
June 30, 1926	621.008	1,919,612.02		296,669.97	3,225,611.89
				D422,440.43	
				E586,889.47	
TOTALS	3,387.852	9,191,309.41	299,713.05	4,292,232.11	13,783,254.57

*Missouri River Bridge, F. A. P. No. 100A
**Furnishing and Delivering Pipe Culverts & Reinforced Concrete Headwalls included in Grading Items
***Clay—Sand Surfacing
*—Pembina River Bridge F. A. P. No. 300
*+Mandan Underpass
A Tower City Underpass F. A. P. No. 213C
B Minot Underpass F. A. P. No. 83C
C Valley City Bridge F. A. P. No. 247D
D Sanish Bridge F. A. P. No. 301A
E Williston Bridge F. A. P. No. 302 A

NORTH DAKOTA

MAP OF
TRUNK HIGHWAY SYSTEM
STATE OF
NORTH DAKOTA

Prepared by North Dakota Highway Commission
H.C.FRAHM Chief Engineer and Secretary
Showing Condition as of Jan.1,1925

LEGEND

Paved
Gravelled
Graded
Under Construction or Proposed
Unimproved
Present Traveled Road
Points of Entry to Canada

Scale of Statute Miles
One Inch = 9 Miles

ROUTE NUMBER

OFFICIAL STATE HIGHWAY MARKER

OFFICIAL WARNING SIGNS

"SLOW" DIAMOND SHAPED WARNS OF AN ACTUAL DANGER

"STOP" OCTAGONAL ALWAYS REQUIRES FULL STOP!

"RAILROAD CROSSING" ROUND PLACED AT GRADE CROSSING ONLY

"CAUTION" SQUARE CALLS FOR ALERTNESS BE CAREFUL!

SASKATCHEWAN

MANITOBA

DIVIDE BURKE WILLIAMS MOUNTRAIL PIERCE MCHENRY RAMSEY BENSON NELSON GRAND FORKS MARSHALL KITTSON

SHERIDAN ROOSEVELT MCKENZIE FORT BERTHOLD INDIAN RESERVATION MCLEAN SHERIDAN WELLS EDDY FOSTER GRIGGS TRAILL NORMAN MAHNOMEN MINN.

DUNN MERCER OLIVER BURLEIGH KIDDER STUTSMAN HARNESS CASS CLAY

BILLINGS GOLDEN VALLEY SLOPE HETTINGER MORTON LOGAN MCINTOSH DICKEY LAMOURE RANSOM WILKIN RICHLAND

GRANT EMMONS

BOWMAN ADAMS

HARDING PERKINS CORSON CAMPBELL MCPHERSON EDMUNDS FAULK SPINK MARSHALL ROBERTS GRANT TRAVERSE DOUGLAS STEVENS POPE

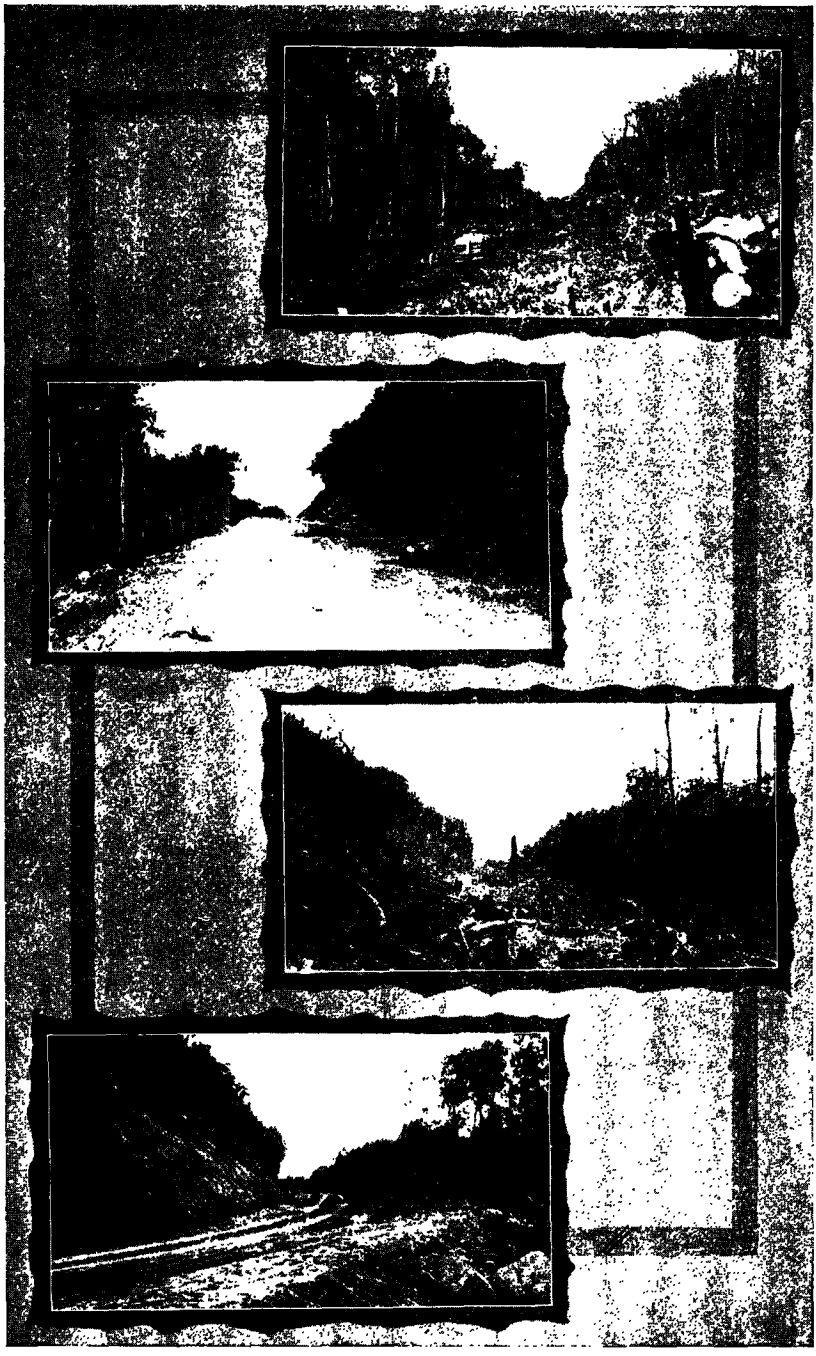
CARTER FALLON

Longitude West from Greenwich

	GRAVEL		CONCRETE			
	Miles	Amount	Miles	Amount	Missouri River Revetment	Total Contract & Force Account
Dec. 31, 1917						7,000.00
Dec. 31, 1918	25.6	56,452.30				383,445.13
Dec. 31, 1919	15.4	41,333.90				731,921.93
Dec. 31, 1920	41.8	163,785.70				
						2,818,219.31
Dec. 31, 1921	87.422	250,390.07	1.9	121,827.90		2,017,964.60
Dec. 31, 1922	140.012	278,897.19	1.052	42,055.00		1,327,467.58
Dec. 31, 1923	199.310	467,894.36	0.736	57,438.27	75,114.51	2,299,584.74
Dec. 31, 1924	196.374	356,602.55	3.467	155,667.74		1,801,111.17
Dec. 31, 1925	421.492	810,744.82	0.397	47,632.13		
	***20.798	64,313.99				
						2,161,168.65
June 30, 1926	245.542	459,687.86	2.216	138,120.06		
						3,823,419.81
TOTALS	1,393.750	2,950,192.74	9.768	562,741.10	75,114.51	17,371,302.92

TABLE NO. 2
AVERAGE CONTRACT AND FORCE ACCT. PRICES PER MILE

Period Ending	Grading	Furnishing Pipe Culverts	Reinforced Conc. Struct.	Total Grading & Structures	Gravel Surf'g.	Clay Surf'g.	Concrete Surf'g.
Dec. 31, 1917	1,000.00			1,000.00			
Dec. 31, 1918	1,126.04	73.34	140.74	1,340.13	2,205.16		
Dec. 31, 1919	2,070.96	296.71	396.88	2,764.56	2,684.01		
Dec. 31, 1920	3,589.19	215.73	1,271.10	5,076.03	3,918.31		
Dec. 31, 1921	3,082.98	169.73	775.54	4,028.25	2,864.15		64,119.94
Dec. 31, 1922	2,053.84	196.25	524.52	2,774.61	1,991.95		39,976.37
Dec. 31, 1923	3,142.75		371.91	3,514.66	2,347.57		78,041.13
Dec. 31, 1924	2,781.00		605.57	3,386.57	1,816.39		44,897.24
Dec. 31, 1925	2,555.37		403.41	2,958.78	1,923.51	3,092.32	119,949.96
June 30, 1926	3,091.12		477.72	3,568.84	1,872.14		80,078.88
General Av, to Dec. 31, 1922	2,476.30*	189.28	654.47	3,998.51	2,549.23		55,515.85
General Av. Jan. 1-23 to 6-30-26:	2,920.74**		450.26	4,129.79	1,971.38	3,092.32	58,516.75



"A Part of the State Highway System in Process of Construction. Two Views of the Same Spots."

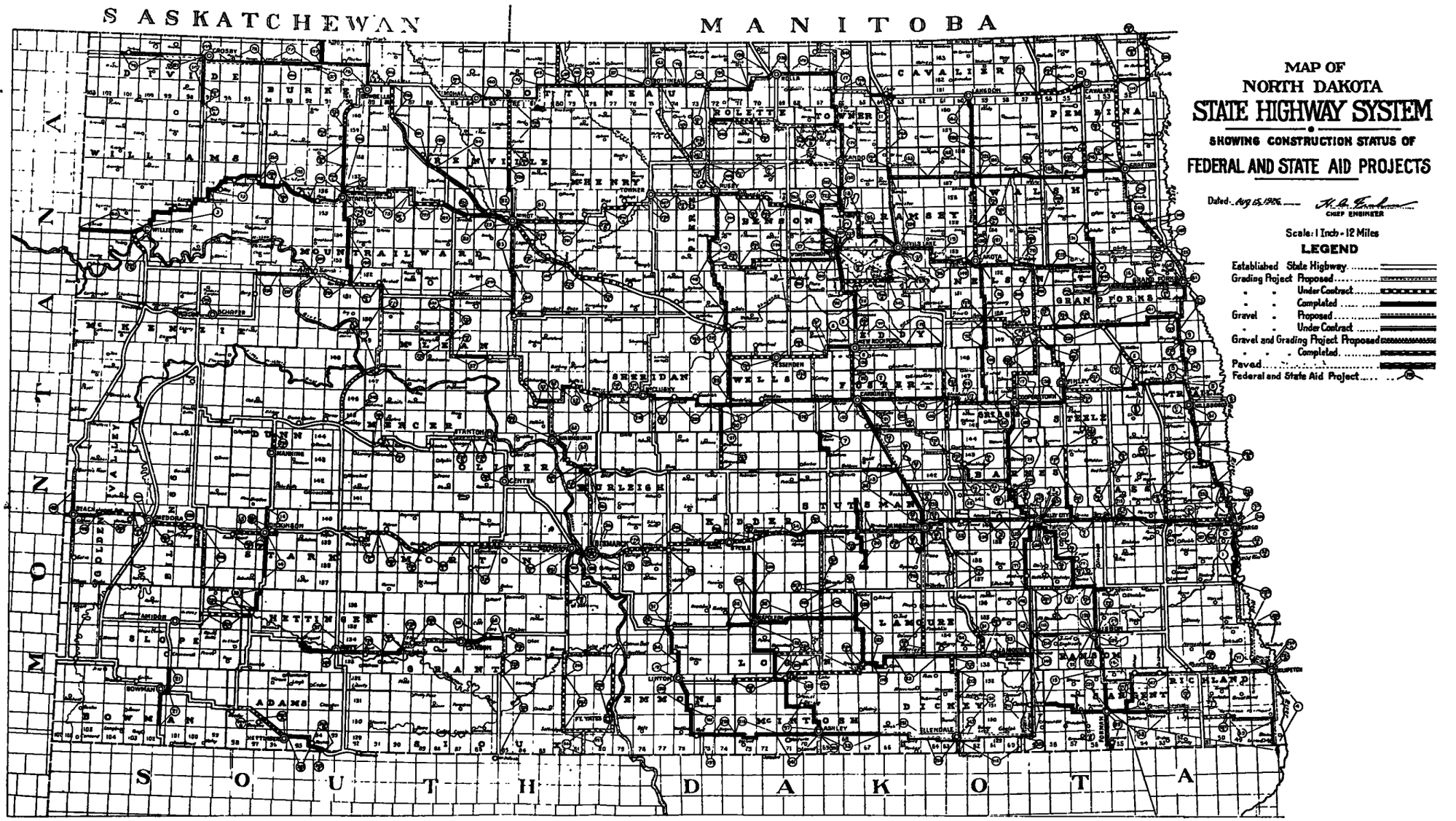

SASKATCHEWAN
MANITOBA
MONTANA
SOUTH DAKOTA
MAP OF
NORTH DAKOTA
STATE HIGHWAY SYSTEM
SHOWING CONSTRUCTION STATUS OF
FEDERAL AND STATE AID PROJECTS
Dated Aug 15 1926
CHIEF ENGINEER
Scale: 1 Inch = 12 Miles
LEGEND
Established State Highway
Grading Project Proposed
Under Contract
Completed
Gravel Proposed
Under Contract
Gravel and Grading Project Proposed
Completed
Paved
Federal and State Aid Project

TABLE NO. .....

STATUS OF PROJECTS AND PROGRAM OF CONSTRUCTION IN NORTH DAKOTA BY COUNTIES AS OF JUNE 30, 1926

COUNTY Proj. No.	LOCATION	Length	STATUS
ADAMS			
115	Lemmon, S. D.	3.5	Surveyed—Proj. indef. post.
243 A	Hettinger, E	8.979	Construction complete
243 A-Scoria	Haynes, W	2.980	Construction complete
243 B	Haynes, E	4.924	Construction complete
243 C	Haynes, E, O. H. Cros.	0.139	Under construction
320 A	Hettinger, W	10.186	Under construction
BARNES			
12 A, B, C, D, E	Valley City, etc.	25.016	Construction complete
12 A Grav.	Valley City, etc.	2.953	Construction complete
12 B Grav.	Valley City, etc.	1.136	Construction complete
12 C Grav.	Valley City, E	5.948	Construction complete
12 D Grav.	Valley City, S	12.409	Construction complete
12 E Grav.	Valley City, E	0.568	Construction complete
12 F	Valley City	Bridge	Construction complete
12 G Pav.	Valley City	0.084	Under construction
36 A, B, C, D, E, F, G	Wimbledon—Fingal	52.021	Construction complete
36 A Grav.	Rogers, S	12.218	Construction complete
36 B Grav.	Wimbledon, S E	4.880	Surveyed—1926 Letting
36 C Grav.	Wimbledon, S E	5.000	Surveyed—1926 Letting
36 D Grav.	Wimbledon, S E	1.990	Construction complete
36 D Grav.	Wimbledon, S E	6.950	Surveyed—1926 Letting
36 E Grav.	Valley City, S	6.664	Construction complete
36 F Grav.	Valley City, S	6.025	Construction complete
36 G Grav.	Valley City, S	5.995	Construction complete
47 Grav.	Valley City, S E	6.881	Construction complete
124 A Grav.	Sanborn, W	5.022	Construction complete
124 B Grav.	Sanborn, W	5.035	Construction complete
124 C	Sanborn, W	U. P.	Construction complete
126 Grav.	Rogers, N	10.360	Construction complete
135 Grav.	Sanborn, E	7.330	Construction complete
156 Grav.	Valley City	0.471	Construction complete
171 A Grav.	Hastings, N & S	9.233	Under construction
221 A Grav.	Fingal, S	6.028	Under construction
221 B Grav.	Nome, S & E	5.978	Under construction
232 Grav.	Rogers, S	4.090	Under construction
233 B	Oriska, N	9.223	Under construction
233 C	Pillsbury, N & S	13.047	Under construction
247 A Grav.	Valley City	0.795	Construction complete
247 B Pav.	Valley City	0.492	Construction complete
247 C Pav.	Valley City	0.115	Under construction
247 D	Valley City	Bridge	Under construction
BENSON			
26 Grav.	Obern	5.021	Construction complete
27 A Grav.	Minnewaukan, N	6.620	Construction complete
27 B Grav.	Minnewaukan, N	6.680	Construction complete
27 C Grav.	Minnewaukan, N	5.152	Construction complete
27 D Grav.	Minnewaukan, N	5.612	Construction complete
98 Grav.	Minnewaukan, S	14.715	Construction complete
157 Grav.	Niles, W	4.995	Construction complete
189 A Grav.	Minnewaukan, W	7.070	Construction complete
203 Grav.	York, E	7.554	Construction complete
205 Grav.	Minnewaukan, W	6.016	Under construction
223 Grav.	Churchs Ferry, N	3.018	Under construction
249 A	Fort Totten, N E	7.997	Under construction
249 A-1 Grav.	Fort Totten, N E	1.794	Under construction
249 B	Fort Totten, W	9.227	Under construction
255 A Grav.	Minnewaukan	0.282	Construction complete
290 A	York, W	7.514	Under construction
290 B	Knox, W	7.635	Under construction
291 A	Esmond, E & W	17.243	Under construction
1003 Grav.	Minnewaukan	0.470	Construction complete
BILLINGS			
283 C	Medora, E	16.240	Under construction
307 B	Medora, W	4.406	Under construction
0402	Medora	Bridge	Construction complete
1001	Medora, S	0.340	Construction complete

STATUS OF PROJECTS AND PROGRAM OF CONSTRUCTION IN NORTH DAKOTA BY COUNTIES AS OF JUNE 30, 1926

COUNTY Proj. No.	LOCATION	Length	STATUS
BOTTINEAU			
40 Grav.	East of Mohall	8.011	Plans complete. 1926 Letting
43 Grav.	Bottineau, E	10.130	Construction complete
44 Grav.	West of Bottineau	4.501	Construction complete
87 Grav.	Bottineau, W	14.753	Construction complete
111	Willow City, W, Br.	0.234	Plans complete. Indef. postponed
145	West of Bottineau	11.723	Construction complete
145 Grav.	West of Bottineau	8.000	Construction complete
145 Grav.	West of Bottineau	3.723	Plans complete. 1926 Letting
170 Grav.	Bottineau—Dunseith	2.888	Construction complete
172 Grav.	Bottineau—Mohall	11.019	Plans complete. 1926 Letting
198 Grav.	Bottineau—Mohall	0.950	Under construction
288 A	Forfar, N	15.059	Under construction
289	Westhope, N & S	12.908	Under construction
BOWMAN			
21	Bowman, N & S	19.400	Construction complete
BURKE			
76 A, B, C, D	Bowbells, N & W	23.190	Construction complete
76 B Grav.	Bowbells, N & W	1.205	Under construction
76 C Grav.	Bowbells, N & W	5.980	Under construction
76 D Grav.	Bowbells, N & W	5.990	Under construction
77 Grav.	Columbus, E & W	14.940	Construction complete
127	Portal, S	6.773	Construction complete
258 A	South of Bowbells	6.179	Construction complete
258 E	South of Bowbells	8.021	Under construction
1005 Grav.	Columbus	0.503	Under construction
BURLEIGH			
100 A	Bismarck	Bridge	Construction complete
136 A Pav.	Bismarck	1.052	Construction complete
136 B		U. P.	Construction complete
174 A Grav.	Bismarck, E	5.580	Under construction
174 B	McKenzie, W	7.937	Under construction
174 C	McKenzie, W	1.994	Under construction
244	Bismarck	2.490	Plans made. Indef. Postponed
281	Bismarck, N	12.848	Survey made
282	Sterling, S	12.223	Under construction
306 D	McKenzie, E	17.936	Under construction
CASS			
1	Fargo, S	16.9	Construction complete
1 Grav.	Fargo, S	11.301	Plans made. 1926 Letting
32	South of Fargo	Bridge	Construction complete
137 A Grav.	Mapleton, E	7.846	Construction complete
137 B	Haggart	Bridge	Construction complete
144 Grav.	Mapleton, W	18.580	Construction complete
154	Mapleton, W	Bridge	Construction complete
202	West of Fargo	Bridge	Construction complete
213 A, B-Grav.	Tower City, E	12.900	Construction complete
213 C	East of Tower City	U. Pass	Under construction
253	Fargo, W	12.809	Under construction
267 A	Casselton, N	11.489	Under construction
267 B	Hunter, N & S	12.052	Plans made
268 A Grav.	Fargo, N	18.354	Under construction
268 B	Grandin, S	14.917	Under construction
268 C Pav..	Fargo	0.737	Under construction
0982	Hickson	0.400	Construction complete
0984	S. County Line	0.400	Construction complete
0916	Mapleton, E	7.900	Construction complete
CAVALIER			
11	Clyde, E & W	7.620	Construction complete
162	Langdon, S	12.149	Construction complete
280	Nekoma, S	4.000	Construction complete
292 A	Langdon, E	6.213	Under construction

STATUS OF PROJECTS AND PROGRAM OF CONSTRUCTION IN NORTH DAKOTA BY COUNTIES AS OF JUNE 30, 1926

COUNTY Proj. No.	LOCATION	Length	STATUS
DICKEY			
112 A, B	Ellendale, E	9.949	Construction complete
112 C	Ludden, E & W	10.757	Construction complete
112 C Grav.	Ludden, E & W	2.968	Construction complete
143 Grav.	Ellendale, S	6.335	Construction complete
150 A, B	Ellendale, N	10.005	Construction complete
206	Ellendale, W	9.553	Construction complete
206 Grav.	Ellendale, W	0.707	Construction complete
211 A	Oakes, N	7.527	Construction complete
211 B	Oakes, S	11.962	Construction complete
211 B Grav.	Oakes, S	11.469	Plans made. 1926 Letting
212	North of Ellendale	7.889	Construction complete
261	West of Ellendale	15.927	Under construction
332	Ludden, S	5.082	Plans made. Indef. postponed
332 Clay	Ludden, S	0.575	Plans made. Indef. postponed
DIVIDE			
30 A, B	Crosby, S	10.460	Construction complete
30 A Grav.	Crosby, S	4.983	Construction complete
30 B Grav.	Crosby, S	5.477	Plans complete
78 A, B	Noonan, E & W	10.050	Construction complete
78 A Grav.	Noonan, W	4.050	Plans complete
78 B Grav.	Noonan, E & W	6.000	Construction complete
79 Grav.	Fortuna, E & W	11.155	Construction complete
159	Crosby, E & W	8.456	Construction complete
159 Grav.	Crosby, E & W	8.456	Plans complete
187	West of Crosby	12.110	Construction complete
257 A	South of Crosby	5.369	Construction complete
257 B	South of Crosby	5.041	Plans complete
DUNN			
266 A	Manning, N	4.290	Under construction
EDDY			
6 Grav.	Sheyenne, N & S	5.500	Construction complete
8 Grav.	New Rockford, W & S	9.300	Construction complete
103 Grav.	S of New Rockford	4.010	Construction complete
177	New Rockford, E	5.500	Survey made
178 A, B,	E of New Rockford	10.440	Construction complete
178 A, B, Grav.	E of New Rockford	10.440	Under construction
296 A	New Rockford, N	7.558	Plans complete. 1926 Letting
264 C	W of New Rockford	0.965	Plans complete
EMMONS			
34	Hazelton, N & S	14.390	Construction complete
91	North of Hazelton	8.195	Construction complete
119	Linton, N	4.673	Construction complete
139	Linton, S	10.800	Construction complete
161	Strasburg—Hull	9.741	Construction complete
197	Hull, E	5.260	Construction complete
269	Hague, E	6.009	Construction complete
FOSTER			
2 Grav.	Carrington, N & E	15.040	Construction complete
45 Grav.	E of Carrington	11.100	Construction complete
92 Grav.	N of Carrington	4.002	Construction complete
101 Grav.	Carrington, W	6.006	Construction complete
102 Grav.	Glenfield, E	3.480	Construction complete
151 A, B	Carrington, S E	11.672	Construction complete
151 A Grav.	Carrington, S E	2.023	Construction complete
151 A Grav.	Carrington, S E	3.534	Under construction
151 B Grav.	Carrington, S E	5.648	Under construction
252 Grav.	East of Carrington	4.875	Construction complete
275 A	Melville, E	10.718	Under construction
295 A	Glenfield, N & S	19.009	Under construction
1672 Grav.	West of Glenfield	4.900	Construction complete
GOLDEN VALLEY			
49	Beach	22.126	Construction complete
307 A	Sentinel Butte, E	12.338	Under construction

Earth grading in Ward county, F. A. P. No. 226 on State Highway No. 6 and which may become part of U. S. Road No. 83.

Gravel surfacing in Ransom county, F. A. P. No. 28-C. This section is just outside of Lisbon and part of State Highway No. 9.

STATUS OF PROJECTS AND PROGRAM OF CONSTRUCTION IN NORTH DAKOTA BY COUNTIES AS OF JUNE 30, 1926

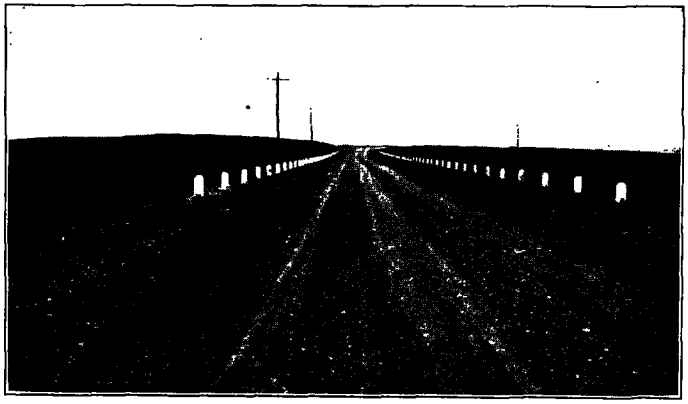
COUNTY Proj. No.	LOCATION	Length	STATUS
GRAND FORKS			
9 Grav.	Reynolds	3.579	Construction complete
16 Grav.	Emerado, E & W	6.690	Construction complete
41 A, B, C, Grav.	Thompson, Northwood	20.890	Under construction
51 Pav.	Grand Forks	1.005	Construction complete
52 Pav.	Grand Forks	0.945	Construction complete
107	Manvel, N W	6.047	Under construction
110	Levant, N W	4.646	Under construction
117 Grav.	Larimore, N	9.439	Under construction
125	Grand Forks, N	10.886	Plans complete. 1926 Letting
131 Grav.	Inkster, N & S	11.024	Under construction
199 A	W of Grand Forks	Bridge	Construction complete
215 Grav.	G. Forks, Thompson	16.142	Under construction
217 Grav.	Niagara, E	12.897	Construction complete
230 A, B	Northwood, W	16.009	Construction complete
230 B Grav.	Northwood, W	8.960	Construction complete
241 A	West of Grand Forks	9.151	Plans complete
246 A Grav.	Larimore	0.417	Under construction
246 B	Larimore, E	9.600	Plans complete
278 A	Reynolds	1.725	Under construction
309 A Grav.	Thompson, W	2.025	Under construction
310	Manvel, W	20.000	Surveyed
1872	Thompson, S	3.000	Construction complete
1874	Manvel, N W	10.700	Construction complete
18119	Grand Forks	0.800	Surveyed. Indef. postponed
GRANT			
39 A	Carson, W	6.000	Plans made. Indef. postponed
39 B, C	Carson, E	10.980	Construction complete
68	Lark, E	5.148	Construction complete
256 A	New Leipzig, N & W	6.182	Construction complete
256 B	Elgin, E	13.000	Surveyed. Not designed
276 A	Raleigh, N	5.701	Plans made. Indef. postponed
276 B	Raleigh, S	6.449	Under construction
GRIGGS			
17 Grav.	Cooperstown, E & W	17.640	Construction complete
50 Grav.	W of Cooperstown	3.990	Construction complete
99 Grav.	W of Cooperstown	2.490	Construction complete
108 A Grav.	Binford, N	5.843	Under construction
108 B, C Grav.	Binford, S	11.308	Construction complete
109 A, B, C Grav.	Cooperstown, S	15.210	Construction complete
323 A, B	Cooperstown, N	22.225	Under construction
HETTINGER			
37	Mott, E & W	18.946	Construction complete
38	New England, N	9.160	Construction complete
105	Mott	Bridge	Construction complete
220 A	New England, W	4.009	Construction complete
KIDDER			
54	Crystal Springs, E & W	3.846	Construction complete
167	Bostonia, N & S	5.936	Construction complete
306 A	Steele, E & W	13.455	Under construction
306 B	Dawson, E & W	13.985	Under construction
327 A	North of Tuttle	7.140	Under construction
2282	Dawson, S	11.000	Construction complete
LA MOURE			
23	Edgeley, E & W	10.000	Construction complete
31 A Grav.	LaMoure, E & W	4.800	Construction complete
31 B Grav.	LaMoure	1.179	Plans complete
93 Grav.	Verona, W	7.989	Construction complete
94 Grav.	West of LaMoure	14.970	Construction complete
113 Grav.	Verona, N	8.098	Under construction
140 Grav.	Verona, S	5.023	Under construction
148 Grav.	North of Verona	12.029	Under construction
176 A, B	Kulm, E & W	11.883	Construction complete
212 B	South of Medberry	5.565	Under construction
297 B	Grand Rapids, N & S	7.751	Under construction
298 A	Edgeley, N	10.035	Under construction

STATUS OF PROJECTS AND PROGRAM OF CONSTRUCTION IN NORTH DAKOTA BY COUNTIES AS OF JUNE 30, 1926

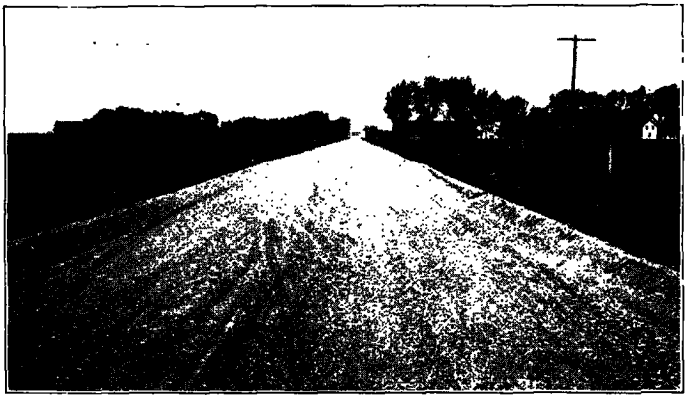
COUNTY Proj. No.	LOCATION	Length	STATUS
LOGAN			
35	Napoleon, E & W	21.660	Construction complete
64	Burnstad	Bridge	Construction complete
123	Napoleon, S	22.205	Construction complete
142	East of Napoleon	16.178	Construction complete
185	Fredonia, N & E	18.622	Construction complete
188	Gackle, S	6.669	Construction complete
207	Napoleon, N	8.193	Construction complete
254 B	E of Wishek—Logan & McIntosh Co. Line	19.341	Under construction
254 C	Fredonia, S	4.904	Under construction
313 B	Gackle, W., Logan & Stutsman Co. Line	9.902	Under construction
329	Burnstad, E	14.945	Plans made. 1926 Letting
MCHENRY			
164 A Grav.	Velva, W	4.397	Construction complete
201 Grav.	Granville, W	7.937	Construction complete
270 A	Voltaire, N W	6.341	Under construction
270 A Grav.	Voltaire, N W	6.341	Plans complete
270 D	Voltaire, E	7.090	Under construction
274 A	Riga, E	11.098	Under construction
274 B	Riga, S & W	9.430	Plans complete. 1926 Letting
McINTOSH			
33	Ashley, E	18.069	Construction complete
97	Ashley, N	11.958	Construction complete
141	Ashley, W	12.480	Construction complete
183 A	Wishek—Danzig	8.427	Construction complete
183 A Grav	Wishek—Danzig	1.096	Construction complete
183 B	Wishek—Danzig	8.984	Construction complete
254 A	Wishek, N	2.902	Under construction
315 A	West of Wishek	11.433	Under construction
330	Ashley, S	7.702	Plans complete
McKENZIE			
236	West of Sanish	6.340	Construction complete
237	Sanish, W	10.761	Construction complete
237 Grav.	Sanish, W	10.761	Under construction
302 C	South of Williston	4.994	Under construction
312	Schafer, W	14.506	Survey made
McLEAN			
57 Grav.	Garrison, W	10.463	Construction complete
62 Grav.	Turtle Lake, W	9.970	Construction complete
63 A Grav.	Washburn, S	5.000	Construction complete
63 B Grav.	Wilton, N W	4.980	Under construction
272 A	Roseglen, E & W	8.037	Under construction
272 B	South of Ryder	6.000	Survey made
273 B	South of Ryder	7.163	Under construction
316	South of Washburn	7.096	Under construction
316 Gr.	South of Washburn	1.028	Under construction
317	Turtle Lake, E	11.850	Under construction
MERCER			
235 A	Stanton, S & W	7.255	Plans complete. 1926 Letting
235 B	Hazen, E & W	8.500	Plans complete
235 B	East of Stanton	1.006	Plans complete. 1926 Letting
235 C	Golden Valley, N	3.085	Plans complete. 1926 Letting
308 A	Golden Valley, W	4.360	Plans complete. 1926 Letting

STATUS OF PROJECTS AND PROGRAM OF CONSTRUCTION IN NORTH DAKOTA BY COUNTIES AS OF JUNE 30, 1926

COUNTY Proj. No.	LOCATION	Length	STATUS
MORTON			
100 A	Mandan—Bismarck	Bridge	Construction complete
100 B, C, Pav.	Mandan—Bismarck	2.975	Construction complete
100 D	Mandan—Bismarck	U. P.	Construction complete
251 A	Mandan, S	9.029	Construction complete
251 A Grav.	Mandan	0.537	Construction complete
251 B	St. Anthony, N	5.299	Under construction
260 A	Glen Ullin, W	7.999	Under construction
260 A Grav.	Glen Ullin	0.995	Under construction
260 A Scor.	Glen Ullin	2.159	Under construction
260 B	Hebron, W & S E	7.497	Under construction
260 B Grav.	Hebron	0.708	Under construction
305 A	New Salem, E & W	14.022	Under construction
MOUNTRAIL			
74	Stanley, E	8.082	Construction complete
75	Tagus, W	15.455	Construction complete
118	Stanley, W	10.468	Construction complete
133	White Earth, E	11.769	Construction complete
190	Beldon, S	14.672	Construction complete
248	Stanley, S	12.639	Construction complete
250 B	White Earth, W	8.319	Construction complete
258 B, C, D	Stanley, N	16.042	Under construction
271 A	Van Hook, E	11.014	Under construction
277 A	Parshall, S	7.002	Construction complete
301 A	Sanish	Bridge.	Under construction
NELSON			
70 Grav.	Michigan, E	5.064	Construction complete
121 Grav.	Lakota, E	11.031	Construction complete
138 Grav.	Lakota, W	4.020	Construction complete
146 Grav.	Petersburg, E	6.143	Construction complete
152	Pekin, S	9.121	Construction complete
152 Grav.	Pekin, S	9.121	Under construction
169 Grav.	Mapes—Pekin	17.527	Construction complete
294 B	Lakota, N	11.121	Under construction
309 B, C	Pekin, E	12.948	Under construction
OLIVER			
314 A	Center, N	5.120	Plans complete. Indef. postponed
PEMBINA			
42	Cavalier, W	5.170	Construction complete
114	Hamilton, E	12.195	Construction complete
292 B	West of Cavalier	10.491	Under construction
293 A	Cavalier, S	18.086	Under construction
300	St. Vincent	Bridge	Construction complete
324	St. Vincent, S	11.319	Under construction
3402	Drayton	Bridge	Construction complete
PIERCE			
10 Grav.	Balta, S	5.000	Construction complete
48 Grav.	South of Balta	21.160	Construction complete
106 Grav.	Rugby, E	7.430	Construction complete
204	Rugby, S	16.034	Construction complete
204 Grav.	Rugby, S	16.034	Under construction
219 A	Barton, E	6.011	Plans complete. 1926 Letting
219 B	Rugby, N	9.500	Survey made
291 B	West of Esmond	8.478	Survey made
311 A	Wolford, W	16.224	Plans complete. 1926 Letting
318 B	Barton, N W	4.011	Surveyed. Indef. postponed
331 A	North of Rugby	3.025	Surveyed. Indef. postponed



Earth grading in Mountrail county on State Highway No. 24. This is F. A. P. No. 258-D.



A section of gravel surfacing in Grand Forks county along State Highway No. 15. F. A. P. 309-A.

STATUS OF PROJECTS AND PROGRAM OF CONSTRUCTION IN NORTH DAKOTA BY COUNTIES AS OF JUNE 30, 1926

COUNTY Proj. No.	LOCATION	Length	STATUS
RAMSEY			
18 Grav.	Churchs Ferry, E	4.500	Construction complete
18 B	E of Churchs Ferry	Bridge	Construction complete
19 Grav.	Devils Lake, E & W	19.900	Construction complete
95 Grav.	Sweetwater	12.425	Construction complete
96 Grav.	Crary, E	6.531	Construction complete
149 Grav.	Bartlett, W	3.390	Construction complete
153 Grav.	Starkweather, N & E	12.997	Construction complete
155 A Grav.	Devils Lake, S	5.800	Construction complete
155 B	Devils Lake	0.650	Under construction
155 B Grav.	Devils Lake	0.650	Under construction
168	Edmore, E & W	16.001	Construction complete
222	N of Churchs Ferry	3.176	Construction complete
222 Grav.	N of Churchs Ferry	3.176	Under construction
224 A	Devils Lake, N	9.480	Construction complete
224 A Grav.	Devils Lake, N	9.480	Under construction
224 B	Webster, N	10.359	Construction complete
224 B Grav.	Webster, N	10.359	Plans complete
225	South of Nekoma	12.082	Construction complete
225 Grav.	South of Nekoma	12.082	Under construction
294 A	Lawton, N & S	13.709	Under construction
RANSOM			
28 Grav.	Lisbon, N & S	28.509	Construction complete
122	Lisbon, W	10.006	Construction complete
122 Grav.	Lisbon, W	10.006	Plans complete. 1926 Letting
129 A	Lisbon, E	11.018	Construction complete
129 A Grav.	Lisbon	0.568	Construction complete
129 A Grav.	Lisbon, E	10.355	Plans complete. 1926 Letting
192 A Grav.	Lisbon	0.662	Construction complete
214	West of Lisbon	5.918	Construction complete
214 Grav.	West of Lisbon	2.005	Construction complete
214 Grav.	West of Lisbon	3.976	Plans complete. 1926 Letting
221 C	West of Enderlin	3.175	Construction complete
221 C Grav.	West of Enderlin	3.175	Under construction
RENVILLE			
180 Grav.	S E of Donnybrook	5.234	Construction complete
288 B	South of Forfar	6.012	Under construction
RICHLAND			
4	Wahpeton, S	20.000	Construction complete
59 A	Hankinson, E	7.440	Construction complete
59 A Grav.	Hankinson, E	7.440	Under construction
59 B	Fairmount, W	6.990	Construction complete
71 A	Mooreton, W	4.960	Construction complete
71 A Grav.	Mooreton, W	4.960	Under construction
71 B	Mooreton, E	4.970	Construction complete
71 B Grav.	Mooreton, E	1.959	Construction complete
71 B Grav.	Mooreton, E	3.007	Under construction
71 C Grav.	Wahpeton, W	6.001	Construction complete
285 A	Wahpeton	0.389	Under construction
285 A Grav.	Wahpeton	0.389	Under construction
285 B	Dwight, N	13.257	Under construction
285 C	Abercrombie, N	11.502	Survey complete
286 B	Wyndmere, E & W	15.340	Survey complete
287 A Pav.	Lidgerwood	0.401	Construction complete
287 B Grav.	Hankinson	0.869	Under construction
3972	S of Wahpeton	3.000	Construction complete
ROLETTE			
160 Grav.	Dunseith, W	6.960	Construction complete
194 A Grav.	Dunseith, E	6.139	Construction complete
194 B	East of Dunseith	4.874	Construction complete
194 B Grav.	East of Dunseith	4.874	Under construction
196 Grav.	West of Rolla	8.488	Plans complete. 1926 Letting
238	Rolla, E & W	6.917	Under construction
242	Fonda, E	7.200	Construction complete
263 C	East of Rolette	7.775	Plans complete. Indef. postponed
263 E	Rolette, E	8.057	Under construction

STATUS OF PROJECTS AND PROGRAM OF CONSTRUCTION IN NORTH DAKOTA BY COUNTIES AS OF JUNE 30, 1926

COUNTY Proj. No.	LOCATION	Length	STATUS
SARGENT			
15	Forman, W & N	31.400	Construction complete
15 A Grav.	Forman, W	2.000	Construction complete
15 D Grav.	Forman	0.704	Under construction
58	Forman, E	19.130	Construction complete
66	Perry, N	6.339	Construction complete
89 Grav.	Forman, S	11.999	Construction complete
147 A	Milnor, S	6.004	Construction complete
147 B, C	Milnor, E	9.912	Construction complete
147 B, C Grav.	Milnor, E	9.912	Under construction
191	Gwinner, E	7.981	Under construction
220 Grav.	Cogswell	2.137	Under construction
SHERIDAN			
209 A	Denhoff, E	7.013	Construction complete
209 A Grav.	Denhoff, E	5.938	Construction complete
209 B Grav.	East of Denhoff	5.996	Construction complete
218 A	West of McCluskey	6.171	Construction complete
218 A Grav.	West of McCluskey	6.171	Plans complete. Indef. postponed
218 B	McCluskey, E	7.459	Construction complete
218 C	McClusky, W	7.000	Under construction
SIOUX			
259	Fort Yates, N	20.202	Under construction
262	Selfridge, N	17.578	Under construction
SLOPE			
220 B	W of New England	9.802	Under construction
STARK			
14	Dickinson, N & S	18.900	Construction complete
14 Grav.	Dickinson, N	5.141	Construction complete
14 Grav.	Dickinson, S	6.611	Under construction
65	West of Dickinson	Bridge	Construction complete
260 C, D	Dickinson, E	8.082	Under construction
260 E Scor.	Dickinson	0.514	Under construction
260 E Pav.	Dickinson	0.243	Under construction
260 F	East of Antelope	U. P.	Plans complete. 1926 Letting
283 A Pav.	Dickinson	0.225	Under construction
283 A Scoria	Dickinson	0.280	Under construction
283 B	Dickinson, W	8.837	Under construction
STEELE			
29	Sherbrook, E	8.528	Plans complete. Indef. postponed
158	Pickert, W	7.000	Construction complete
233 A	Finley, S	5.049	Construction complete
325 A, B	Finley, N	16.808	Under construction
STUTSMAN			
7	Newhome, S	0.160	Construction complete
13	Pingree, W	7.000	Construction complete
24	Cleveland, N & S	25.000	Construction complete
55 Grav.	Spiritwood, E & W	5.980	Construction complete
56 A, B, Grav.	Jamestown, N	11.210	Construction complete
56 C	Jamestown	Bridge	Construction complete
56 D, E, F	Buchanan, N W	20.400	Construction complete
56 D E F Grav.	Buchanan, N W	20.400	Plans complete. 1926 Letting
56 G, H,	Jamestown, S	8.009	Construction complete
56 G, H, Grav.	Jamestown, S	5.024	Construction complete
239 Grav.	Jamestown, E	7.075	Construction complete
239 A, B, Pav.	Jamestown	0.201	Under construction
275 A	Millville, E: Foster Stutsman Co. Line	10.718	Construction complete
279 A	Jamestown, W	8.507	Under construction
279 A Grav.	Jamestown, W	8.507	Under construction
279 B	Windsor, E & W	11.848	Under construction
279 C	Medina, E	8.246	Under construction
279 D Pav.	Jamestown	0.404	Under construction
297 A	Ypsilanti, S	13.720	Surveyed
306 C	Medina, W	7.019	Under construction
313 A	Streeter, S	2.716	Under construction

STATUS OF PROJECTS AND PROGRAM OF CONSTRUCTION IN NORTH DAKOTA BY COUNTIES AS OF JUNE 30, 1926

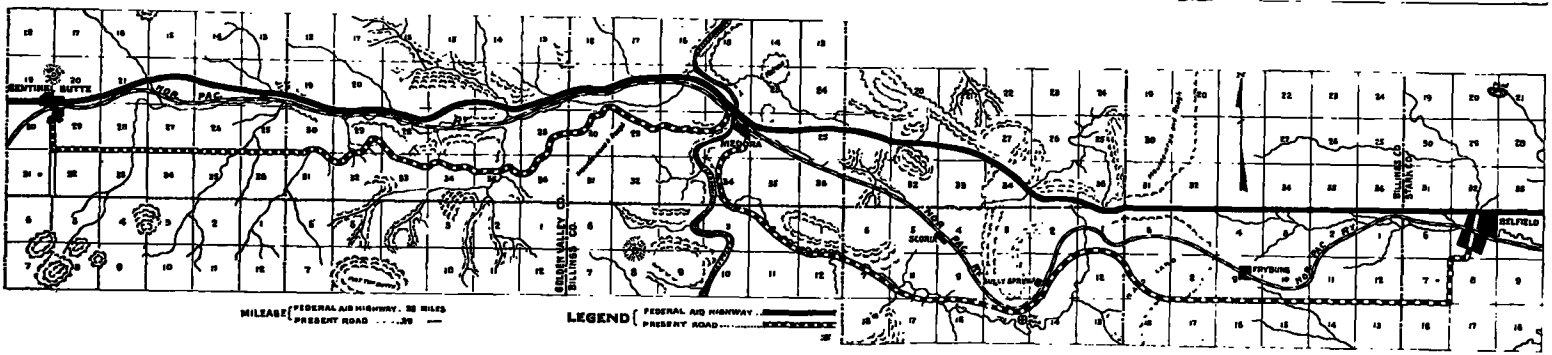
COUNTY Proj. No.	LOCATION	Length	STATUS
TOWNER			
22 Grav.	Rock Lake, N & S	18.236	Construction complete
120 Grav.	Cando, N	11.599	Construction complete
130 Grav.	Cando, S	9.979	Construction complete
179	Ellsberry, E & W	13.354	Construction complete
179 Grav.	Ellsberry, E & W	13.354	Under construction
263 A	West of Bisbee	Bridge	Construction complete
263 B	Bisbee, E	6.094	Construction complete
263 D	Bisbee, W	4.881	Plans complete
311 B	Cando, W	8.484	Under construction
TRAILL			
5	Hillsboro	22.870	Construction complete
5 B	Hillsboro	2.063	Under construction
5 G Grav.	Mayville—Portland	3.176	Construction complete
46 Grav.	Buxton, S	4.020	Construction complete
61 A, B, Grav.	Hillsboro, S	12.049	Construction complete
61 C	Hillsboro—Kelso	Bridge	Construction complete
61 D Pav.	Hillsboro	0.736	Construction complete
61 E	Kelso	Bridge	Construction complete
278 B	Buxton, N	4.949	Under construction
WALSH			
116	Park River, E	16.337	Construction complete
165	Park River, W	15.385	Construction complete
166	Minto,S	8.801	Construction complete
184	Adams, W	12.020	Construction complete
245	Grafton, S	9.174	Construction complete
293 B	Grafton, N	9.624	Under construction
322 A	Hoople, N & S	9.035	Under construction
326 B	Adams, S	15.119	Surveyed
WARD			Construction complete
25 Grav.	Minot, W	5.863	Construction complete
81 A, B, Grav.	Minot, E	13.009	Plans complete. 1926 Letting
81 A, C, Pav.	Minot	0.596	Construction complete
82	Minot, N	9.111	Construction complete
82 Grav.	Minot, N	9.111	Plans complete. 1926 Letting
82 B Pav.	Minot	0.474	Construction complete
83 A, B, Grav.	Des Lacs, N & E	7.772	
83 C Grav. & Underpass	East of Des Lacs	0.543	Construction complete
84 Grav.	Burlington, N W	22.660	Construction complete
85 Grav.	Minot, S	14.736	Construction complete
86	South of Minot	12.126	Construction complete
86 Grav.	South of Minot	12.126	Under construction
181	Kenmare, S E	18.441	Construction complete
181 Grav.	Kenmare, S E	18.441	Under construction
182	Berthold, S E	8.196	Construction complete
182 Grav.	Berthold, S E	8.196	Under construction
226	North of Minot	5.888	Under construction
227	West of Berthold	8.615	Under construction
228	Kenmare, N	9.575	Under construction
270 B, C	Minot, S E	16.845	Under construction
271	Ryder, E	14.000	Surveyed
273 A	Ryder, S	4.769	Under construction
303 A	Des Lacs	Bridge	Plans complete
WELLS			
20 Grav.	Harvey, N & S	16.800	Construction complete
88 Grav.	Hurdsfield, N	11.246	Construction complete
90 Grav.	Hurdsfield, W & S	10.220	Construction complete
175	Bowden, E	19.662	Construction complete
175 Grav.	Bowden, E	19.662	Under construction
210	Bowden, E & W	18.415	Construction complete
210 Grav.	Bowden, E & W	18.415	Under construction
264 A, B	Fessenden, E & W	28.873	Under construction
264 B, C	East of Fessenden	8.370	Plans complete. Indef. postponed

STATUS OF PROJECTS AND PROGRAM OF CONSTRUCTION IN NORTH DAKOTA BY COUNTIES AS OF JUNE 30, 1926

COUNTY Proj. No.	LOCATION	Length	STATUS
WILLIAMS			
3	Williston, N E	30.362	Construction complete
73	Ray—Tioga	16.950	Construction complete
80 A, B, C, D	Williston, W	19.028	Construction complete
80 Grav.	Williston, W	2.200	Construction complete
250 A	Tioga, S & E	6.701	Construction complete
250 C	Tioga	O.Cross	Plans complete
302 A	Williston	Bridge	Under construction
302 B	Williston, S	2.111	Under construction

A View of Some of the Rough Country Encountered by New State Highway

Scenic Territory Through Which New State Highway Passes



LINE OF OLD AND NEW ROADS THROUGH THE BAD LANDS.

New State Highway—Upper Black Line. Old County Road—Bottom Black and White Dash Line. Northern Pacific Railway—Middle Dash Line. Mileage—State Highway, 33 Miles; County Road, 39.5 miles, and Railroad 38 miles.

PROJECT DEPARTMENT

The duties of the Project Engineer are: to meet with the various County, Township and Village Boards and City Commissions to consider and initiate proposed Federal Aid Projects; to make preliminary investigations or route inspections, in company with the Federal Engineer, for the purpose of laying out or routing Federal and State Highways; to prepare project statements for submittal to the Federal Bureau of Public Roads; to take charge of location surveys of all projects and to handle right of way matters.

During the biennial period covered by this report a total of 107 Federal Aid Projects covering earth grading were initiated in 51 counties and project statements submitted and approved by the Bureau of Public Roads. The 107 projects comprised 1,469 miles of earth roads for which surveys have been made and included the construction of highways in every county in the state with the exception of Bowman and Divide Counties.

Right of way plats involving the purchase of 1,418 separate parcels of land were prepared for 220 Federal Aid Projects and furnished the various Boards of County Commissioners.

GRADE CROSSING ELIMINATION

In the location and survey of all proposed projects special attention has been given to the elimination of railroad grade crossings. Wherever possible, grade crossings have been eliminated by relocation of the proposed highway as this method is the most economical to the Counties, State, railway companies, and the Federal Government. However, in several projects it was impossible to eliminate grade crossings by relocating the highway, therefore, a separation of the grades of the highway and railroad was secured by the construction of underpasses or overhead trestles.

The accompanying tabulation shows that a total of 73 railroad grade crossings were eliminated by relocation, 5 by the construction of underpasses and 3 by the construction of overhead trestles during the period covered by this report. The accompanying tabulation also shows that from June 30th, 1917 to June 30th, 1924, 74 grade crossings were eliminated by relocation, 8 by the construction of underpasses and 2 by overheads. This makes a grand total of 165 railroad grade crossings eliminated from our State Highway System since the organization of the State Highway Department.

In addition to the grade crossings actually eliminated, plans are being prepared for the elimination of 54 other grade crossings as shown by accompanying tabulation.

PROPOSED R. R. GRADE CROSSING ELIMINATION

June 30, 1926

F.A.P. No.	County	Over-Head	R.R.	Under-Pass.	R.R.	By Re-Location	R.R.
219	Pierce					2	G. N.
227	Ward			1	G.N.		
256	Grant					1	N. P.
256	Hettinger					1	N. P.
270	McHenry					2	Soo
271	Mountrail					2	Soo
275	Foster					1	Soo
275	Stutsman					2	Soo
281	Burleigh					2	N. P.
281	Burleigh					5	Soo
282	Burleigh	1	N.P.				
283	Stark					1	N. P.
284	Mountrail					2	Soo
287	Richland			1	G.N.	2	Soo
297	Stutsman					2	N. P.
297	LaMoure					2	N. P.
298	Stutsman					2	Midland
298	LaMoure					3	Midland
305	Morton	1	N.P.				
308	Dunn					5	N. P.
312	McKenzie			1	G.N.	1	G. N.
313	Logan					2	N. P.
318	Bottineau					2	G. N.
318	Pierce					1	G. N.
322	Cavalier					2	G. N.
325	Steele					4	G. N.
Total Proposed		2		3		49	54

Total Proposed Elimination

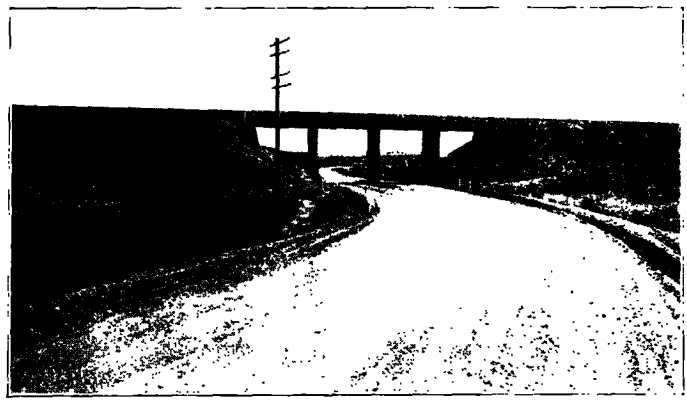
Railroad	Overhead	Underpass	Relocation
Northern Pacific	2		16
Great Northern		3	12
Midland			5
Soo Line			16
	2	3	49-54

June 30, 1924—
June 30, 1926.

ACTUAL GRADE CROSSING ELIMINATION

F.A.P. No.	County	Over-Head	R.R.	Under-Pass.	R.R.	By Re-Location	R.R
3	Williams					1	G. N.
5	Traill					2	G. N.
36	Barnes			1	Soo	2	Soo
36	Barnes					4	N. P.
83	Ward			1	G.N.		
224	Ramsey					4	G. N.
232	Barnes					2	N. P.
243	Adams	1	Mil.				
250	Williams	1	G.N.				
251	Morton	1	N.P.				
254	Logan					2	Soo
260	Morton					7	N. P.
260	Stark			1	N.P.		
263	Rolette					2	Soo
264	Wells					1	Soo
267	Cass					4	G. N.
268	Cass					4	G. N.
270	McHenry					2	Soo
274	McHenry					2	G. N.
278	Traill					2	G. N.
279	Stutsman					2	N. P.
283	Billings					1	N. P.
285	Richland					2	G. N.
285	Richland					3	Mil.
293	Pembina					1	G. N.
293	Walsh					2	G. N.
294	Ramsey					2	G. N.
294	Nelson					1	G. N.
302	Williams	1	G.N.				
306	Burleigh					2	N. P.
306	Kidder					4	N. P.
306	Stutsman	1	N.P.				
307	Golden Valley					1	N. P.
307	Billings					1	N. P.
313	Logan					3	N. P.
320	Adams					3	Mil.
325	Steele					4	G. N.
Total June 30, 1924 to June 30, 1926		5		3		73	81
Total June 30, 1917 to June 30, 1924		2		8		74	84
Grand Total to 1926		7		11		147	165

Railroad	Total Elimination Overhead	Underpass	Relocation
Northern Pacific	3	8	61
Great Northern	2	1	51
Milwaukee	1	0	8
Soo Line	1	2	27
	7	11	147-165



Underpass on State Highway No. 3, U. S. Road No. 10, about one and a half miles west of Buffalo in Cass county. By the close of 1927 every main line railway grade crossing on State Highway No. 3 will be eliminated except those within the limits of a city.

The Pembina Bridge—Roadway View

THE BRIDGE DEPARTMENT

In the months just preceding and just following the beginning of the period covered by this report, the Bridge Department "changed hands" several times. Mr. W. F. McGraw, who had been in charge of the department since March, 1922, resigned in January, 1924. No one was officially appointed to fill the place until the following May, but in the meantime Mr. E. J. Budge was depended upon to take care of the structural work on the various projects. In May, Mr. F. T. Hillman was appointed Bridge Engineer, but he held the position only until August 1st when he became Construction Engineer, although he continued to give some attention to the bridge work until he left the Highway Department in September, when Mr. Clifford Johnson, who still holds the position, was appointed Bridge Engineer.

About that time, a large number of our standard plans for reinforced concrete bridges were becoming obsolete. There were two reasons for this: first, the regular changes for advancement in general or standard engineering practice; and second, the elimination of a large number of sizes of reinforcing bars as a result of the standardization brought about by the Division of Simplified practice of the U. S. Department of Commerce.

In the winter of 1924-25, therefore, the Bridge Department commenced work on a complete new set of standard plans for reinforced concrete bridges. The different sizes of structures in the set have been designed and drawn up, for the most part, in the order in which they were required for the various highway projects. During the last two years, however, there has been such a great number and variety of bridges required that nearly every size within the range of "Standards" has been called for, and hence this set of standard plans is now practically complete.

On the projects placed under contract during 1926, and on some of the 1925 work, an unusually large number of special bridge designs were required to meet conditions of footings or topography or both which were unsuitable for structures of the standard types. A large percentage of these are on projects in the territory west of the Missouri River where, although the total annual runoff is small, the streams sometimes become suddenly filled by heavy rains and run very swiftly, thus making it necessary for drainage structures to be so designed that they will carry large volumes of water in short periods of time without being endangered by the various activities of swift currents.

Mention has been made early in this report of the fact that the Sanish and Williston Missouri River Bridges, now under contract, were designed by our Bridge Department. Investigations and preliminary surveys of the sites for these were commenced the latter part of April, 1925 and completed in August. Several different layouts for each bridge were made and studied, and after conferences with the Engineers of the U. S. Bureau of Public Roads and the War Department the type to be

used was selected and the drawing up of the plans in detail was commenced about the middle of September, 1925, and completed early in March, 1926. Before this report is read the construction of these bridges will be well under way, and will be supervised by this Department.

These two bridges are the largest individual projects ever engineered entirely by the department forces, and with one exception (the Bismarck-Mandan Bridge) are the largest ever undertaken by the department.

The Interstate Bridge over the Red River of the North between Pembina, N. D. and St. Vincent, Minn., also engineered entirely by this department, was completed and accepted in the fall of 1925, but on account of litigation between the contractor, the sub-contractor, and the surety, the final payment has not yet been made. That is why this project still remains in the "under contract" list instead of the completed project list.

The plans for the crossing of the Upper Des Lacs Lake have been completed and submitted to the U. S. Bureau of Public Roads. The plan proposed consists in leaving the old draw span in place after repairing its abutments, and replacing the old timber trestle with a heavy earth fill protected on each side by a brush mattress covered with rock, this protection work being similar to standard Missouri River revetment.

On account of disagreements and difficulties concerning the location of the proposed Fargo-Moorhead Red River Bridge, very little has yet been accomplished on this project.

The "ordinary" bridges and concrete box culverts now under contract and those completed during the two year period covered by this report are all listed in the accompanying tables. The following facts, brought out by the tables, show how rapidly the volume of structural work, exclusive of the large bridge projects, done by the department has been and is increasing.

The structures finaled in the year from July 1st, 1925 to June 30th, 1926, ($218,721.96) amount to nearly double those finaled during the previous year, July 1st, 1924 to June 30th, 1925, ($122,148.68).

The amount of structural work under contract on June 30th, 1926 ($431,129.35) exceeds by 26 per cent the total amount finaled in the two year period from July 1st, 1924 to June 30th, 1926, ($340,870.64).

The contracts awarded during the first six months of 1926 ($282,911.94) amount to 83 per cent of the total amount finaled ($340,870.64) during the two year period from July 1st, 1924 to June 30th, 1926.

RECAPITULATION
BRIDGES AND BOX CULVERTS

	BRIDGES			BOX CULVERTS			
	No.	Total Length	Cost	No.	Total Length	Cost	Total Cost
Final Estimates Issued July 1, 1924—June 30, 1926	73	2,128′—6″	$ 231,241.04	111	3,732′—0″	$ 109,629.60	$ 340,870.64
PROJECTS UNDER CONTRACT (Final Estimates Not Issued)							
CONTRACTS AWARDED PRIOR TO JANUARY 1, 1926							
Box Culverts and Ordinary Bridges	32	1,020′—4″	$ 121,847.43	28	920′—0″	$ 26,369.98	$ 148,217.41
Pembina Bridge	1	768′—0″	182,312.85	....	.....	.....	182,312.85
Total	33	1,788′—4″	$ 304,160.28	28	920′—0″	$ 26,369.98	$ 330,530.26
CONTRACTS AWARDED JAN.1,—JUNE 30, 1926							
Box Culverts and Ordinary Bridges	43	1,526′—4″	$ 171,503.42	82	3,225′—3″	$ 111,408.52	$ 282,911.94
Sanish Bridge	1	1,159′—3″	422,290.61	....	.....	.....	422,290.61
Williston Bridge	1	1,438′—1″	586,889.47	....	.....	.....	586,889.47
Total 1926 Contracts	45	4,123′—8″	$ 1,180,683.50	82	3,225′—3″	$ 111,408.52	$ 1,292,092.02
Total Box Culverts and Ordinary Bridges Under Contract	75	2,546′—8″	$ 293,350.85	110	4,145′—3″	$ 137,778.50	$ 431,129.35
Totals for Three Larger Bridges Under Contract	3	3,365′—4″	1,191,492.93	....	.....	.....	1,191,492.93
Total All Structures Under Contract....	78	5,912′—0″	$ 1,484,843.78	110	4,145′—3″	$ 137,778.50	$ 1,622,622.28

SUMMARY OF BRIDGES AND BOX CULVERTS
FOR WHICH FINAL ESTIMATES WERE ISSUED FROM JULY 1ST, 1924 TO JUNE 30TH, 1926.

PERIOD	STEEL TRUSS BRIDGES			REINFORCED CONCRETE BRIDGES Clear Span Over 20 Feet			REINFORCED CONCRETE BRIDGES Clear Span 20 Feet or Less			REINFORCED CONCRETE BOX CULVERTS		
	No.	Total Length	Cost	No.	Total Length	Cost	No.	Total Length	Cost	No.	Total Length	Cost
July 1—Dec. 31, 1924	3	315′ 0″	30,729.97	3	102′ 0″	$ 8,029.77	14	214′ 0″	$ 17,868.38	57	1,878′ 0″	$ 53,731.68
Jan. 1—June 30, 1925	1	63′ 0″	6,133.39	....	.....	.....	2	28′ 0″	2,802.13	2	74′ 0″	2,853.36
July 1—Dec. 31, 1925	2	166′ 6″	22,385.16	15	510′ 0″	57,569.76	27	434′ 0″	44,110.61	45	1,554′ 0″	47,815.66
Jan. 1—June 30, 1926	....	.....	.....	3	248′ 0″	36,721.07	3	48′ 0″	4,940.80	7	226′ 0″	5,228.90
Totals	6	544′ 6″	$ 59,198.52	21	860′ 0″	$102,320.60	46	724′ 0″	$ 69,721.92	111	3,732′ 0″	$109,629.60
Average Cost Per Structure			$ 9,866.42			$ 4,872.41			$ 1,515.69			$ 987.65
Average Cost Per Lin. Ft.			$ 108.72			$ 119.02			$ 96.30			$ 29.38

	No.	Total Length	Total Cost
Totals for Bridges	73	2,128′ 6″	$231,241.04
Totals for Culverts	111	3,732′ 0″	109,629.60
Grand Totals			$340,870.64

SUMMARY OF FINAL ESTIMATES ISSUED JULY 1—DEC. 31, 1924
BRIDGES AND BOX CULVERTS

County	F.A.P. No.	STEEL TRUSS BRIDGES No.	Total Length	Cost	REINFORCED CONCRETE BRIDGES Clear Span Over 20 Feet No.	Total Length	Cost	Clear Span 20 Feet or Less No.	Total Length	Cost	REINFORCED CONCRETE BOX CULVERTS No.	Total Length	Cost
Grand Forks	41-C	----	----------	----------	----	----------	----------	----	----------	----------	2	56' 0"	$ 1,829.85
Dickey	112-C	----	----------	----------	----	----------	----------	----	----------	----------	2	66' 0"	1,805.26
Logan	123-B	----	----------	----------	----	----------	----------	1	16' 0"	$ 1,945.41	4	131' 0"	3,260.82
Nelson	152	1	131' 6"	$ 12,547.61		----------	----------	----	----------	----------	5	150' 0"	5,597.78
Emmons	161	----	----------	----------	----	----------	----------	----	----------	----------	3	91' 0"	3,343.42
Cavalier	162	----	----------	----------	----	----------	----------	----	----------	----------	5	177' 0"	4,077.68
Ramsey	168	1	36' 0"	*3,045.14	----	----------	----------	----	----------	----------	6	202' 0"	6,951.76
Nelson	169	----	----------	----------	----	----------	----------	----	----------	----------	4	142' 0"	4,798.99
Wells	175-B	----	----------	----------	1	36' 0"	$ 3,365.04	1	12' 0"	1,363.66	2	65' 0"	2,291.49
McIntosh	183	----	----------	----------	1	24' 0"	1,257.48	2	24' 0"	1,450.70	11	361' 0"	7,985.41
Mountrail	190	----	----------	----------	----	----------	----------	----	----------	----------	5	187' 0"	4,865.66
Rolette	194-A	----	----------	----------	----	----------	----------	----	----------	----------	2	59' 0"	998.75
Emmons	197	----	----------	----------	----	----------	----------	----	----------	----------	2	58' 0"	2,142.46
Grand Forks	217-A	----	----------	----------	----	----------	----------	2	36' 0"	2,414.91	----	----------	----------
Sheridan	218-A	----	----------	----------	----	----------	----------	----	----------	----------	1	30' 0"	878.40
Hettinger	220-A	1	147' 6"	15,137.22	----	----------	----------	----	----------	----------	2	70' 0"	2,238.03
Ramsey	225	----	----------	----------	1	42' 0"	3,407.25	3	56' 0"	3,999.42	1	33' 0"	665.92
Adams	243	----	----------	----------	----	----------	----------	4	54' 0"	5,118.42	----	----------	----------
Barnes	247-A	----	----------	----------	----	----------	----------	1	16' 0"	1,575.86	----	----------	----------
Totals		3	315' 0"	$ 30,729.97	3	102' 0"	$ 8,029.77	14	214' 0"	$ 17,868.38	57	1,878' 0"	$ 53,731.68
Average Cost Per Structure				$ 10,243.30			$ 2,676.59			$ 1,276.31			$ 942.66
Average Cost Per Lin. Ft.				$ 97.56			$ 78.72			$ 83.49			$ 28.61

*Old Steel Truss Used.

	No.	Total Length	Total Cost
Totals for Bridges	20	631' 0"	$ 56,628.12
Total for Culverts	57	1,878' 0"	53,731.68
Total			$110,359.80

FINAL ESTIMATES ISSUED JULY 1—DEC. 31, 1924
REINFORCED CONCRETE BOX CULVERTS

COUNTY	F.A.P. No.	Size	Length	Cost
Grand Forks	41-C	8′ x6′	28′ —0″	$ 1,335.48
		5′ x1½′	28′ —0″	494.37
Dickey	112-C	5′ x2½′	32′ —0″	615.70
		5′ x3′	34′ —0″	1,189.56
Logan	123-B	8′ x4′	32′ —0″	822.70
		5′ x4′	33′ —0″	607.52
		5′ x3′ Double	35′ —0″	981.40
		5′ x3′ Double	31′ —0″	849.20
Nelson	152	5′ x2′	28′ —0″	489.60
		5′ x7′	30′ —0″	1,304.42
		5′ x7′	28′ —0″	1,200.85
		5′ x7′	35′ —0″	1,349.72
		5′ x7′	29′ —0″	1,253.19
Emmons	161	8′ x3′ Double	33′ —0″	1,852.60
		5′ x3′ Double	30′ —0″	1,041.45
		5′ x2′	28′ —0″	449.37
Cavalier	162	3′ x2′	29′ —0″	387.76
		2′ x2′	54′ —0″	555.02
		5′ x2′	34′ —0″	777.14
		5′ x4′	30′ —0″	822.36
		8′ x3′	30′ —0″	1,535.40
Ramsey	168	8′ x3′ Double	32′ —0″	1,680.21
		5′ x3′	32′ —0″	628.15
		8′ x3′ Double	32′ —0″	1,671.27
		6′ x2½′	32′ —0″	680.70
		5′ x3′ Double	44′ —0″	1,396.77
		8′ x3′	30′ —0″	894.66
Nelson	169	5′ x7′	28′ —0″	1,158.30
		8′ x4′	41′ —0″	1,855.71
		4′ x3′	42′ —0″	640.26
		5′ x7′	31′ —0″	1,144.72
Wells	175B	8′ x3′ Double	35′ —0″	1,697.19
		6′ x2½′	30′ —0″	594.30
McIntosh	183	5′ x3′ Double	30′ —0″	960.71
		5′ x4′	30′ —0″	682.46
		5′ x4′	33′ —0″	686.75
		5′ x2½′	35′ —0″	546.08
		5′ x5′	39′ —0″	920.64
		6′ x1½′	39′ —0″	589.70
		6′ x1½′	27′ —0″	434.63
		5′ x2½′	27′ —0″	445.34
		8′ x3′ Double	31′ —0″	1,585.89
		4′ x3′	40′ —0″	593.21
		5′ x3′	30′ —0″	540.00
Mountrail	190	4′ x3′	34′ —0″	593.33
		5′ x4′	33′ —0″	777.74
		5′ x3′ Double	30′ —0″	1,059.80
		5′ x7′	56′ —0″	1,872.46
		4′ x3′	34′ —0″	562.33
Rolette	194-A	5′ x2½′	29′ —0″	512.22
		5′ x2′	30′ —0″	486.53
Emmons	197	6′ x6′	28′ —0″	1,056.02
		6′ x6′	30′ —0″	1,086.44
Sheridan	218-A	8′ x3′	30′ —0″	878.40
Hettinger	220-A	8′ x4′	34′ —0″	1,083.89
		8′ x4′	36′ —0″	1,154.14
Ramsey	225	4′ x6′	33′ —0″	665.92
Totals			1,878′ —0″	$53,731.68

FINAL ESTIMATES ISSUED JULY 1—DEC. 31, 1924.
REINFORCED CONCRETE BRIDGES—CLEAR SPAN 20 FEET OR LESS

COUNTY	F. A. P. No.	Abutment Height	Abutment Type	Width Curb-Curb	Overall Length	Cost
Logan	123-B	12′ 0″	Std. Wing Sk. 20°	22′ 6″	16′ 0″	$ 1,945.41
Wells	175-B	10′ 0″	Std. Wing	22′ 6″	12′ 0″	1,363.66
McIntosh	183	7′ 0″	Std. Wing	22′ 6″	12′ 6″	811.64
		5′ 0″	Std. Wing	22′ 6″	12′ 0″	639.06
Grand Forks	217-A	9′ 0″	Std. Wing	22′ 6″	22′ 0″	1,462.93
		7′ 0″	Std. Wing	22′ 6″	14′ 0″	951.98
Ramsey	225	8′ 0″	Std. Wing	19′ 0″	16′ 0″	1,017.80
		12′ 0″	Std. Wing	19′ 0″	20′ 0″	1,740.49
		8′ 0″	Std. Wing	19′ 0″	20′ 0″	1,241.13
Adams	243-A	8′ 0″	Std. Wing	22′ 6″	12′ 0″	1,054.66
		10′ 0″	Std. Wing	22′ 6″	14′ 0″	1,447.12
		10′ 0″	Std. Wing	22′ 6″	14′ 0″	1,460.12
		8′ 0″	Std. Wing	22′ 6″	14′ 0″	1,156.52
Barnes	247-A	10′ 0″	Spl. Wing	26′ 6″	16′ 0″	1,575.86
Totals					214′ 0″	$17,868.38

FINAL ESTIMATES ISSUED JULY 1—DEC. 31, 1924.
REINFORCED CONCRETE BRIDGES—CLEAR SPAN OVER 20 FEET.

COUNTY	F. A. P. No.	Abutment Height	Abutment Type	Width Curb-Curb	Overall Length	Cost
Wells	175-B	13	Std. Wing	19′ 4″	36′ 0″	$ 3,365.04
McIntosh	183	2—5′—0″ 1—5′—0″	Std. Wing Center Pier	22′ 6″	24′ 0″	1,257.48
Ramsey	225	14	Std. Wing	19′ 4″	42′ 0″	3,407.25
Totals					102′ 0″	$ 8,029.77

FINAL ESTIMATES ISSUED JULY 1—DEC. 31, 1924
STEEL TRUSS BRIDGES

COUNTY	F. A. P. No.	Abutment Height	Abutment Type	Width Curb-Curb	Overall Length	Cost
Nelson	152	2—12′ 1—16′ 1—18′	Std. Ped. Pier Pier	19′ 0″	131′ 6″ 1–90′ Steel Truss 2–20′ I–Beam Approach Spans.	$ 12,547.61
Ramsey	168	16′	Spl. Wing	18′ 0″	36′ 0″ Old Steel Truss with new Concrete floor and new abutments	3,045.14
Hettinger	220-A	2—16′ 0″ 2—26′ 0″	Std. Wing Std. Piers	19′ 0″	147′ 5″ 70′ Steel Truss with 2–38′ 0″ Reinforc'd Concrete Approach spans.	15,137.22
Totals					314′11″	$ 30,729.97

SUMMARY OF FINAL ESTIMATES ISSUED JAN. 1—JUNE 30, 1925
BRIDGES AND BOX CULVERTS

County	F.A.P. No.	STEEL TRUSS BRIDGES No.	STEEL TRUSS BRIDGES Total Length	STEEL TRUSS BRIDGES Cost	REINFORCED CONCRETE BRIDGES Clear Span Over 20 Feet No.	Total Length	Cost	REINFORCED CONCRETE BRIDGES Clear Span 20 Feet or Less No.	Total Length	Cost	REINFORCED CONCRETE BOX CULVERTS No.	Total Length	Cost
Ward	82	----	----------	----------	----	----------	----------	1	14′ 0″	$ 1,742.93	----	----------	----------
	182	----	----------	----------	----	----------	----------	----	----------	----------	2	74′ 0″	$ 2,853.36
Grand Forks	217-B	----	----------	----------	----	----------	----------	1	14′ 0″	1,059.20	----	----------	----------
	230-B	1	63′ 0″	$ 6,133.39	----	----------	----------	----	----------	----------	----	----------	----------
Totals		1	63′ 0″	$ 6,133.39	----	----------	----------	2	28′ 0″	$ 2,802.13	2	74′ 0″	$ 2,853.36
Average Cost Per Structure				$ 6,133.39						$ 1,401.07			$ 1,426.68
Average Cost Per Lin. Ft.				$ 97.36						$ 100.08			$ 40.76

	No.	Total Length	Total Cost
Totals for Bridges	3	91′ 0″	$ 8,935.52
Totals for Culverts	2	74′ 0″	$ 2,853.36
Total			$ 11,788.88

FINAL ESTIMATES ISSUED JAN. 1—JUNE 30, 1925
REINFORCED CONCRETE BOX CULVERTS

COUNTY	F.A.P. No.	Size	Length	Cost
Ward	182	6′ x6′ 6′ x6′	37′ 0″ 37′ 0″	$ 1,426.68 1,426.68
Totals			74′ 0″	$ 2,853.36

FINAL ESTIMATES ISSUED JAN. 1—JUNE 30, 1925
REINFORCED CONCRETE BRIDGES—Clear Span 20 Feet or Less

COUNTY	F. A. P. No.	Abutment Height	Abutment Type	Width Curb-Curb	Overall Length	Cost
Ward	82	12′ 0″	Std. Wing	19′ 0″	14′ 0″	$ 1,742.93
Grand Forks	217-B	9′ 0″	Std. Wing	22′ 6″	14′ 0″	1,059.20
Totals					28′ 0″	$ 2,802.13

FINAL ESTIMATES ISSUED JAN. 1—JUNE 30, 1925
STEEL TRUSS BRIDGES

COUNTY	F. A. P. No.	Abutment Height	Abutment Type	Width Curb-Curb	Overall Length	Cost
Grand Forks	230-B	16′ 0″	Std. Wing	19′ 0″	63′ 0″	$ 6,133.39

SUMMARY OF FINAL ESTIMATES ISSUED JULY 1—DEC. 31, 1925
BRIDGES AND BOX CULVERTS

County	F.A.P. No.	STEEL TRUSS BRIDGES No.	Total Length	Cost	REINFORCED CONCRETE BRIDGES Clear Span Over 20 Feet No.	Total Length	Cost	Clear Span 20 Feet or Less No.	Total Length	Cost	REINFORCED CONCRETE BOX CULVERTS No.	Total Length	Cost
Traill	61-E	1	83′ 0″	$ 12,552.72	----	----------	----------	----	----------	----------	----	----------	----------
Grant	68	----	----------	----------	1	24′ 0″	$ 2,889.15	1	20′ 0″	$ 2,095.80	3	115′ 0″	$ 3,020.10
Logan	123-A	----	----------	----------	1	26′ 0″	4,467.67	3	40′ 0″	4,576.31	7	246′ 0″	7,079.47
Walsh	166	1	83′ 6″	9,782.44	2	100′ 0″	13,029.09	1	16′ 0″	1,729.62	4	134′ 0″	2,974.42
Wells	175-A	----	----------	----------	----	----------	----------	1	14′ 0″	1,448.75	3	100′ 0″	3,498.14
Towner	179-B	----	----------	----------	1	32′ 0″	2,028.88	2	24′ 0″	3,085.42	----	----------	----------
Grand Forks	199	----	----------	----------	1	42′ 0″	5,065.15	----	----------	----------	----	----------	----------
Benson	203	----	----------	----------	1	30′ 0″	2,367.53	----	----------	----------	----	----------	----------
Pierce	204-A	----	----------	----------	----	----------	----------	----	----------	----------	2	69′ 0″	1,581.01
Pierce	204-B	----	----------	----------	----	----------	----------	----	----------	----------	2	63′ 0″	2,214.63
Wells	210-B	----	----------	----------	----	----------	----------	----	----------	----------	2	61′ 0″	1,334.40
Dickey	211-A	----	----------	----------	----	----------	----------	----	----------	----------	1	34′ 0″	1,037.54
Dickey	212	----	----------	----------	1	30′ 0″	5,272.42	----	----------	----------	----	----------	----------
Cass	213	----	----------	----------	----	----------	----------	1	12′ 0″	1,144.40	----	----------	----------
Grand Forks	215-A	----	----------	----------	----	----------	----------	1	22′ 0″	3,524.78	----	----------	----------
Grand Forks	215-B	----	----------	----------	----	----------	----------	1	22′ 0″	2,108.39	----	----------	----------
Grand Forks	215-C	----	----------	----------	1	34′ 0″	2,429.78	----	----------	----------	----	----------	----------
McIntosh	216	----	----------	----------	1	24′ 0″	1,710.69	----	----------	----------	4	119′ 0″	2,889.02
McKenzie	236	----	----------	----------	----	----------	----------	1	16′ 0″	2,129.48	1	32′ 0″	2,076.71
McKenzie	237	----	----------	----------	1	42′ 0″	4,959.88	1	22′ 0″	2,898.58	4	132′ 0″	3,246.40
Rolette	242	----	----------	----------	2	52′ 0″	4,853.80	----	----------	----------	3	129′ 0″	6,301.57
Walsh	245	----	----------	----------	----	----------	----------	8	106′ 0″	7,081.36	1	30′ 0″	461.23
Mountrail	248-B	----	----------	----------	1	24′ 0″	1,954.24	----	----------	----------	1	29′ 0″	692.74
Williams	250-A	----	----------	----------	----	----------	----------	1	20′ 0″	1,602.98	4	163′ 0″	6,089.74
Grant	256-A	----	----------	----------	----	----------	----------	3	60′ 0″	6,487.84	1	35′ 0″	932.30
Burke	258-A	----	----------	----------	----	----------	----------	----	----------	----------	2	63′ 0″	2,368.24
Towner	263-A	----	----------	----------	1	50′ 6″	5,911.48	----	----------	----------	----	----------	----------
Mountrail	277-A	----	----------	----------	----	----------	----------	2	40′ 0″	4,196.90	----	----------	----------
Totals		2	166′ 6″	$ 22,335.16	15	510′ 6″	$ 57,569.76	27	434′ 0″	$ 44,110.61	45	1,554′ 0″	$ 47,815.66
Average Cost Per Structure				$ 11,167.58			$ 3,837.98			$ 1,633.73			$ 1,062.57
Average Cost Per Lin. Ft.				$ 134.15			$ 112.77			$ 101.64			$ 30.77

	No.	Total Length	Cost
Totals for Bridges	44	1,111′ 0″	$124,015.53
Totals for Culverts	45	1,554′ 0″	$ 47,815.66
Total			$171,831.19

FINAL ESTIMATES ISSUED JULY 1—DEC. 31, 1925.
REINFORCED CONCRETE BOX CULVERTS.

COUNTY	F.A.P. No.	Size	Length	Cost
Grant	68	8′ x6′	34′ —0″	$ 1,180.22
		6′ x6′	48′ —0″	1,229.58
		5′ x4′	33′ —0″	610.30
Logan	123-A	5′ x4′	32′ —0″	583.46
		10′ x3′	33′ —0″	1,036.00
		8′ x3′ Double	33′ —0″	1,435.00
		5′ x4′	33′ —0″	611.27
		5′ x4′	35′ —0″	641.99
		5′ x3′ Double (Skewed 45°)	45′ —0″	1,275.25
		8′ x3′ Double	35′ —0″	1,496.50
Walsh	166	6′ x1½′	31′ —0″	417.06
		6′ x1½′	31′ —0″	415.56
		8′ x6′	38′ —0″	1,320.98
		8′ x4′	34′ —0″	820.82
Wells	175-A	8′ x3′ Double	32′ —0″	1,573.58
		8′ x4′	36′ —0″	1,056.35
		8′ x3′	32′ —0″	868.21
Pierce	204-A	5′ x3′	38′ —0″	699.94
		8′ x3′	31′ —0″	881.07
Pierce	204-B	5′ x3′ Double	30′ —0″	1,074.96
		5′ x3′ Double	33′ —0″	1,139.67
Wells	210-B	8′ x3′	30′ —0″	742.68
		4′ x4′	31′ —0″	591.72
Dickey	211-A	8′ x3′	34′ —0″	1,037.54
McIntosh	216	8′ x3′	32′ —0″	832.33
		8′ x3′	28′ —0″	759.94
		8′ x3′	29′ —0″	750.59
		6′ x2½′	30′ —0″	546.16
McKenzie	236	9′ x9′	32′ —0″	2,076.71
McKenzie	237	8′ x3′	34′ —0″	787.70
		8′ x3′	29′ —0″	722.00
		8′ x3′	28′ —0″	693.00
		8′ x4′	41′ —0″	1,043.70
Rolette	242	5′ x7′	33′ —0″	1,302.27
		5′ x3′	32′ —0″	616.09
		10′ x5′ Double	64′ —0″	4,383.21
Walsh	245	4′ x3′	30′ —0″	461.23
Mountrail	248-B	8′ x3′	29′ —0″	692.74
Williams	250-A	5′ x5′	41′ —0″	1,034.03
		5′ x5′	38′ —0″	1,035.53
		8′ x8′ Skewed 30°	48′ —0″	2,753.38
		6′ x6′	36′ —0″	1,266.80
Grant	256-A	6′ x6′ Skewed 30°	35′ —0″	932.30
Burke	258-A	5′ x7′	33′ —0″	1,200.68
		5′ x7′	30′ —0″	1,167.56
Totals			1,554′ —0″	$47,815.66

FINAL ESTIMATES ISSUED JULY 1—DEC. 31, 1925.
REINFORCED CONCRETE BRIDGES, CLEAR SPAN 20 FEET OR LESS

COUNTY	F. A. P. No.	Abut. Height	Abutment Type	Width Curb-Curb	Overall Length	Cost
Grant	68	14′—0″	Std. Wing	19′—0″	20′—0″	$ 2,095.80
Logan	123-A	11′—0″	Std. Wing 15° Skew	22′—6″	12′—0″	1,431.19
		9′—0″	15° Skew	22′—6″	14′—0″	1,130.50
		14′—0″	Std. Wing	22′—6″	14′—0″	2,014.62
Walsh	166	13′—0″	Std. Wing	19′—4″	16′—0″	1,729.62
Wells	175-A	8′—0″	Std. Wing 30° Skew	23′—0″	14′—0″	1,448.75
Towner	179-B	10′—0″	Std. Wing	22′—6″	12′—0″	1,897.36
		8′—0″	Std. Wing	22′—6″	12′—0″	1,188.06
Cass	213	10′—0″	Std. Wing	22′—6″	12′—0″	1,144.40
Grand Forks	215-A	17′—0″	Std. Wing	22′—0″	22′—0″	3,524.78
Grand Forks	215-B	10′—0″	Std. Wing	22′—0″	22′—0″	2,108.39
McKenzie	237	14′—0″	Std. Wing	22′—6″	16′—0″	2,129.48
McKenzie	237	17′—0″	Std. Wing	22′—0″	22′—0″	2,898.58
Walsh	245	7′—0″	Std. Wing	22′—6″	16′—0″	995.44
		7′—0″	Std. Wing	22′—6″	12′—0″	838.66
		7′—0″	Std. Wing	22′—6″	12′—0″	838.66
		7′—0″	Std. Wing	22′—6″	12′—0″	838.66
		7′—0″	Std. Wing	22′—6″	14′—0″	918.18
		7′—0″	Std. Wing	22′—6″	12′—0″	808.66
		7′—0″	Std. Wing	22′—6″	12′—0″	853.66
		7′—0″	Std. Wing	22′—6″	16′—0″	989.44
Williams	250 A	8′—0″	Std. Wing	19′—0″	20′—0″	1,602.98
Grant	256-A	16′—0″	Std. Wing	19′—0″	20′—0″	2,694.56
		14′—0″	Std. Wing	19′—0″	20′—0″	2,081.40
		12′—0″	Std. Wing	19′—0″	20′—0″	1,711.88
Mountrail	277-A	9′	Std. Wing	23′—0″	18′—0″	1,481.80
		15	Std. Wing	23′—0″	22′—0″	2,715.10
Totals					434′—0″	$44,110.61

FINAL ESTIMATES ISSUED JULY 1—DEC. 31, 1925.
REINFORCED CONCRETE BRIDGES—CLEAR SPAN OVER 20 FEET

COUNTY	F. A. P. No.	Abutment Height	Abutment Type	Width Curb-Curb	Overall Length	Cost
Grant	68	12′ 0″	Std. Wing	19′ 0″	24′ 0″	$ 2,889.15
Logan	123-A	13′ 0″	Std. Wing	22′ 6″	26′ 0″	4,467.67
Walsh	166	13′ 0″	Std. Wing	19′ 4″	36′ 0″	4,687.97
	....	2—13′ 0″	Std. Wing	19′ 4″	64′ 0″	9,241.10
	....	1—14′ 0″	Ctr. Pier	.....	.....	.....
Towner	179-B	9′ 0″	Std. Ped.	19′ 4″	32′ 0″	2,028.88
Grand Forks	199	16′ 0″	Std. Wing	23′ 0″	42′ 0″	5,065.15
Benson	203	12′ 0″	Std. Wing	23′ 0″	30′ 0″	2,367.53
Dickey	212	16′ 0″	Std. Wing	23′ 0″	30′ 0″	5,272.42
Grand Forks	215-C	12′ 0″	Std. Wing	19′ 4″	34′ 0″	2,429.78
McIntosh	216	2—9′ 0″	Std. Wing	22′ 6″	24′ 0″	1,710.69
	....	1—9′ 0″	Ctr. Pier	.....	.....	.....
McKenzie	237	18′ 0″	Std. Wing	23′ 0″	42′ 0″	4,959.88
Rolette	242	11′ 0″	Std. Wing	20′ 0″	26′ 0″	2,508.40
	....	11′ 0″	Std. Wing	20′ 0″	26′ 0″	2,345.40
Mountrail	248-B	10′ 0″	Std. Wing	23′ 0″	24′ 0″	1,954.24
Towner	263-A	16′ 0″	Std. Wing	20′ 0″	50′ 6″	5,911.48
Totals	....	.....	.....	.....	510′ 6″	$ 57,569.76

FINAL ESTIMATES ISSUED JULY 1—DEC. 31, 1925
STEEL TRUSS BRIDGES

COUNTY	F. A. P. No.	Abutment Height	Abutment Type	Width Curb-Curb	Overall Length	Cost
Traill	61-E	20′ 0″	Std. Wing	20′ 0″	83′ 0″	$ 12,552.72
Walsh	166	18′ 0″	Spl. Box	19′ 0″	83′ 6″	9,782.44
Totals	....	.....	.....	.....	166′ 6″	22,335.16

SUMMARY OF FINAL ESTIMATES ISSUED JAN. 1—JUNE 30, 1926
BRIDGES AND BOX CULVERTS

County	F.A.P. No.	STEEL TRUSS BRIDGES No.	STEEL TRUSS BRIDGES Total Length	STEEL TRUSS BRIDGES Cost	REINFORCED CONCRETE BRIDGES Clear Span Over 20 Feet No.	Total Length	Cost	REINFORCED CONCRETE BRIDGES Clear Span 20 Feet or Less No.	Total Length	Cost	REINFORCED CONCRETE BOX CULVERTS No.	Total Length	Cost
Barnes	12-F	....	.....	.....	1	132′ 0″	$ 27,122.15	....	.....	.....	....	.....	.....
Grand Forks	110	....	.....	.....	1	52′ 0″	3,996.78	....	.....	.....	....	.....	.....
Grand Forks	230-A	....	.....	.....	....	.....	.....	2	36′ 0″	$ 4,090.10	1	33′ 0″	$ 858.30
Morton	251-A	....	.....	.....	....	.....	.....	....	.....	.....	5	160′ 0″	3,327.17
Towner	263-B	....	.....	.....	1	64′ 0″	5,602.14	1	12′ 0″	850.70	....	.....	.....
Foster-Stutsman	275-A	....	.....	.....	....	.....	.....	....	.....	.....	1	33′ 0″	1,043.43
Totals	....	....	.....	.....	3	248′ 0″	$ 36,721.07	3	48′ 0″	$ 4,940.80	7	226′ 0″	$ 5,228.90
Average Cost Per Structure							$ 12,240.35			$ 1,646.93			$ 746.99
Average Cost Per Lin. Ft.							$ 148.07			$ 102.93			$ 23.14

	No.	Total Length	Cost
Totals for Bridges	6	296′ 0″	$ 41,661.87
Totals for Culverts	7	226′ 0″	$ 5,228.90
Total			$ 46,890.77

FINAL ESTIMATES ISSUED JANUARY 1—JUNE 30, 1926
REINFORCED CONCRETE BOX CULVERTS

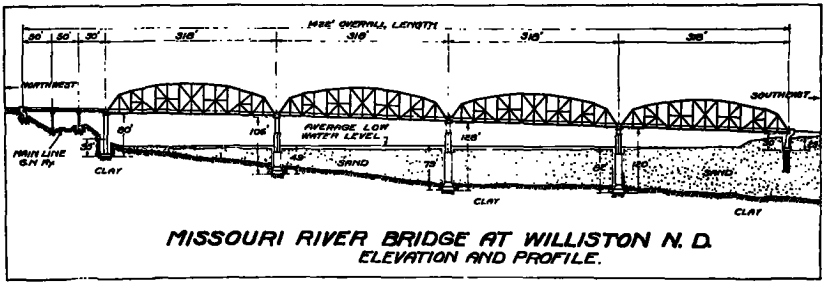
COUNTY	F.A.P. No.	Size	Length	Cost
Grand Forks	230—A	5x3 Double	33′—0″	$ 858.30
Morton	251—A	4x3	28′—0″	579.69
		5x5	30′—0″	632.16
		8x3	39′—0″	836.83
		4x6 30°	28′—0″	554.14
		8x3 Skewed	35′—0″	724.35
Foster Stutsman	275—A	8x3	33′—0″	1,043.43
Totals			226′—0″	$5,228.90

FINAL ESTIMATES ISSUED JANUARY 1—JUNE 30, 1926
REINFORCED CONCRETE BRIDGES—CLEAR SPAN 20 FEET OR LESS

COUNTY	F. A. P. No.	Abutment Height	Abutment Type	Overall Length	Width Curb-Curb	Cost
Grand Forks	230-A	11′ 0″	Std. Wing	18′ 0″	23′ 0″	$ 1,480.80
	....	14′ 0″	Std. Wing (on Piles)	18′ 0″	23′ 0″	2,609.30
Towner	263-B	7′ 0″	Std. Wing	12′ 0″	23′ 0″	850.70
Totals	....	.....		48′ 0″	.....	$ 4,940.80

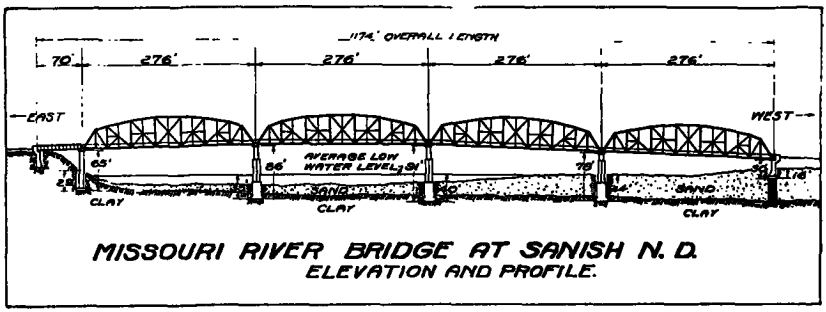
FINAL ESTIMATES ISSUED JANUARY 1—JUNE 30, 1926
REINFORCED CONCRETE BRIDGES—CLEAR SPAN OVER 20 FEET

COUNTY	F. A. P. No.	Abutment Height	Abutment Type	Overall Length	Width Curb-Curb	Cost
Barnes	12-F	2—7′ 0″	Spec. Wing	132′ 0″	24′ 0″	.....
	....	.....	.....	.....	.....	$ 27,122.15
	....	2—15′ 6″	Spec. Piers on Piles	Canti-lever	.....	.....
Grand Forks	110	13′ 0″	Std. Wing	52′ 0″	20′ 0″	3,996.78
Towner	263-B	2—16′ 0″	Std. Wing	64′ 0″	20′ 0″	5,602.14
	....	1—15′ 0″	Std. Pier	.....	.....	.....
Totals	....	.....		248′ 0″	.....	$ 36,721.07



MISSOURI RIVER BRIDGE AT WILLISTON N. D.
ELEVATION AND PROFILE.

The bridge to be erected across the Missouri River at Williston will be the second largest structure in the State. It will be 1,422 feet in length and will cost about $700,000.00. Plans therefor have been prepared by the engineers of the State Highway Commission, and the contract will be let during the Spring months. When completed, the bridge will be the second across the Missouri River in North Dakota and will serve a large territory whose only means of crossing the "Old Muddy" is by ferry.



MISSOURI RIVER BRIDGE AT SANISH N. D.
ELEVATION AND PROFILE.

Plans for the new Sanish bridge across the Missouri River will shortly be ready and bids for the construction will be asked within a few months. This bridge will be the third across this mighty stream, and will be the third in size in the State, being exceeded only by the Bismarck-Mandan bridge and the new one at Williston. Its estimated cost is $450,000.00 and its length 1,174 feet. As only one span in each the Williston and Sanish bridges is open to navigation, a considerable saving was effected in construction costs.

SUMMARY OF BRIDGES AND BOX CULVERTS
UNDER CONTRACT (Final Estimates Not Issued) JUNE 30, 1926
CONTRACTS AWARDED BEFORE JAN. 1, 1926

		STEEL TRUSS BRIDGES			REINFORCED CONCRETE BRIDGES Clear Span Over 20 Feet			REINFORCED CONCRETE BRIDGES Clear Span 20 Feet or Less			REINFORCED CONCRETE BOX CULVERTS		
County	F.A.P. No.	No.	Total Length	Cost	No.	Total Length	Cost	No.	Total Length	Cost	No.	Total Length	Cost
Grand Forks	107	1	73′ 6″	$ 8,677.25	----	----------	----------	----	----------	----------	----	----------	----------
Burleigh	174-A	----	----------	----------	----	----------	----------	1	14′ 0″	$ 910.57	2	66′ 0″	$ 1,808.55
Rolette	196	----	----------	----------	----	----------	----------	----	----------	----------	1	32′ 0″	986.73
Dickey	211-B	----	----------	----------	----	----------	----------	----	----------	----------	1	31′ 0″	897.28
Sheridan	218-B	----	----------	----------	----	----------	----------	----	----------	----------	1	36′ 0″	1,327.74
Ramsey	224-B	----	----------	----------	----	----------	----------	1	16′ 0″	991.93	----	----------	----------
Ward	226	----	----------	----------	----	----------	----------	1	18′ 0″	2,214.34	----	----------	----------
Ward	228	----	----------	----------	----	----------	----------	----	----------	----------	1	41′ 0″	1,031.36
Steele	233-A	----	----------	----------	1	32′ 0″	$ 2,724.12	----	----------	----------	----	----------	----------
Barnes	233-B	----	----------	----------	----	----------	----------	1	14′ 0″	1,559.17	----	----------	----------
Rolette	238	----	----------	----------	----	----------	----------	1	12′ 0″	1,835.83	2	65′ 0″	1,551.39
Adams	243-B	----	----------	----------	----	----------	----------	----	----------	----------	2	62′ 0″	1,942.44
Barnes	247-D	----	----------	----------	1	128′ 0″	34,282.81	----	----------	----------	----	----------	----------
Cass	253	----	----------	----------	3	102′ 0″	7,209.00	----	----------	----------	1	29′ 0″	711.54
Logan-McIntosh	254-C	----	----------	----------	----	----------	----------	1	16′ 0″	1,585.06	1	34′ 0″	699.36
Mountrail	258-C	----	----------	----------	----	----------	----------	----	----------	----------	1	31′ 0″	1,365.83
Morton	260-A	----	----------	----------	2	68′ 0″	6,584.97	3	66′ 0″	5,549.72	----	----------	----------
Morton	260-B	----	----------	----------	1	38′ 10″	4,370.90	----	----------	----------	----	----------	----------
Dickey	261	----	----------	----------	----	----------	----------	----	----------	----------	3	93′ 0″	3,229.77
Wells	264-A	----	----------	----------	----	----------	----------	3	54′ 0″	5,664.29	3	97′ 0″	2,933.10
Dunn	266-A	----	----------	----------	----	----------	----------	4	72′ 8″	9,342.83	2	76′ 0″	2,125.86
Cass	268-A	1	145′ 0″	12,983.16	2	70′ 0″	6,091.36	----	----------	----------	1	33′ 0″	618.46
McHenry	270-A	----	----------	----------	----	----------	----------	2	30′ 0″	3,112.43	1	30′ 0″	880.50
Ward	270-B	----	----------	----------	1	24′ 4″	2,783.92	----	----------	----------	3	104′ 0″	2,663.54
McLean	273-B	----	----------	----------	----	----------	----------	----	----------	----------	1	28′ 0″	882.16
Cavalier	280	----	----------	----------	----	----------	----------	----	----------	----------	1	32′ 0″	714.33
Burleigh	282	----	----------	----------	1	26′ 0″	3,378.77	----	----------	----------	1	32′ 0″	714.33
Totals	----	2	218′ 6″	$ 21,660.41	12	489′ 2″	$ 67,420.85	18	312′ 8″	$ 32,766.17	28	920′ 0″	$ 26,369.98
Average Cost Per Structure				$ 10,830.21			$ 5,618.40			$ 1,820.30			$ 941.78
Average Cost Per Lin. Ft.				$ 99.13			$ 137.83			$ 104.80			$ 28.66
Pembina	300	1	768′ 0″	$173,871.65									
Average Cost Per Lin. Ft. Bridge				$ 226.39									
Cost of Earth Approaches				8,441.20									
Total Cost Pembina Bridge Project				$182,312.85									

	No.	Total Length	Cost
Totals for Bridges (Excluding Pembina Bridge)	32	1,020′ 4″	$121,847.43
Totals for Culverts	28	920′ 0″	$ 26,369.98
Total			$148,217.41

REINFORCED CONCRETE BOX CULVERTS
UNDER CONTRACT (Final Estimates Not Issued) JUNE 30, 1926.
CONTRACTS AWARDED BEFORE JAN. 1, 1926.

COUNTY	F.A.P. No.	Size	Length	Cost
Burleigh	174—A	5′ x3′ Double	32′ —0″	$ 872.87
		5′ x3′ Double	34′ —0″	935.68
Rolette	196	8′ x3′	32′ —0″	986.73
Dickey	211—B	8′ x3′	31′ —0″	897.28
Sheridan	218—B	5′ x7′	36′ —0″	1,327.74
Ward	228	5′ x5′	41′ —0″	1,031.36
Rolette	238	5′ x3′	29′ —0″	581.70
		8′ x4′	36′ —0″	969.69
Adams	243—B	6′ x4′ Skewed 30°	30′ —0″	863.32
		6′ x6′	32′ —0″	1,079.12
Cass	253	8′ x4′	29′ —0″	711.54
Logan-McIntosh	254—A-B	5′ x3′	34′ —0″	699.36
Mountrail	258—C	5′ x7′	31′ —0″	1,365.83
Dickey	261	4′ x6′	28′ —0″	708.55
		5′ x7′	32′ —0″	1,226.13
		5′ x7′	33′ —0″	1,295.09
;Wells	264—A	10′ x3′	34′ —0″	1,223.69
		6′ x3½′ Double	35′ —0″	1,238.58
		5′ x2½′	28′ —0″	470.83
Dunn	266—A	6′ x6′ Skewed 45°	45′ —0″	1,262.66
		6′ x6′	31′ —0″	863.20
Cass	268—A	4′ x6′	33′ —0″	618.46
McHenry	270—A	8′ x4′	30′ —0″	880.50
Ward	270—B	4′ x6′	32′ —0″	703.29
		5′ x7′	39′ —0″	1,347.71
		5′ x3′	33′ —0″	612.54
McLean	273—B	4′ x6′	28′ —0″	882.16
Cavalier	280	5′ x4′	32′ —0″	714.37
Totals			920′ —0″	$26,369.98

REINFORCED CONCRETE BRIDGES—CLEAR SPAN 20 FEET OR LESS
UNDER CONTRACT (Final Estimates Not Issued) JUNE 30TH, 1926
CONTRACTS AWARDED BEFORE JAN. 1, 1926

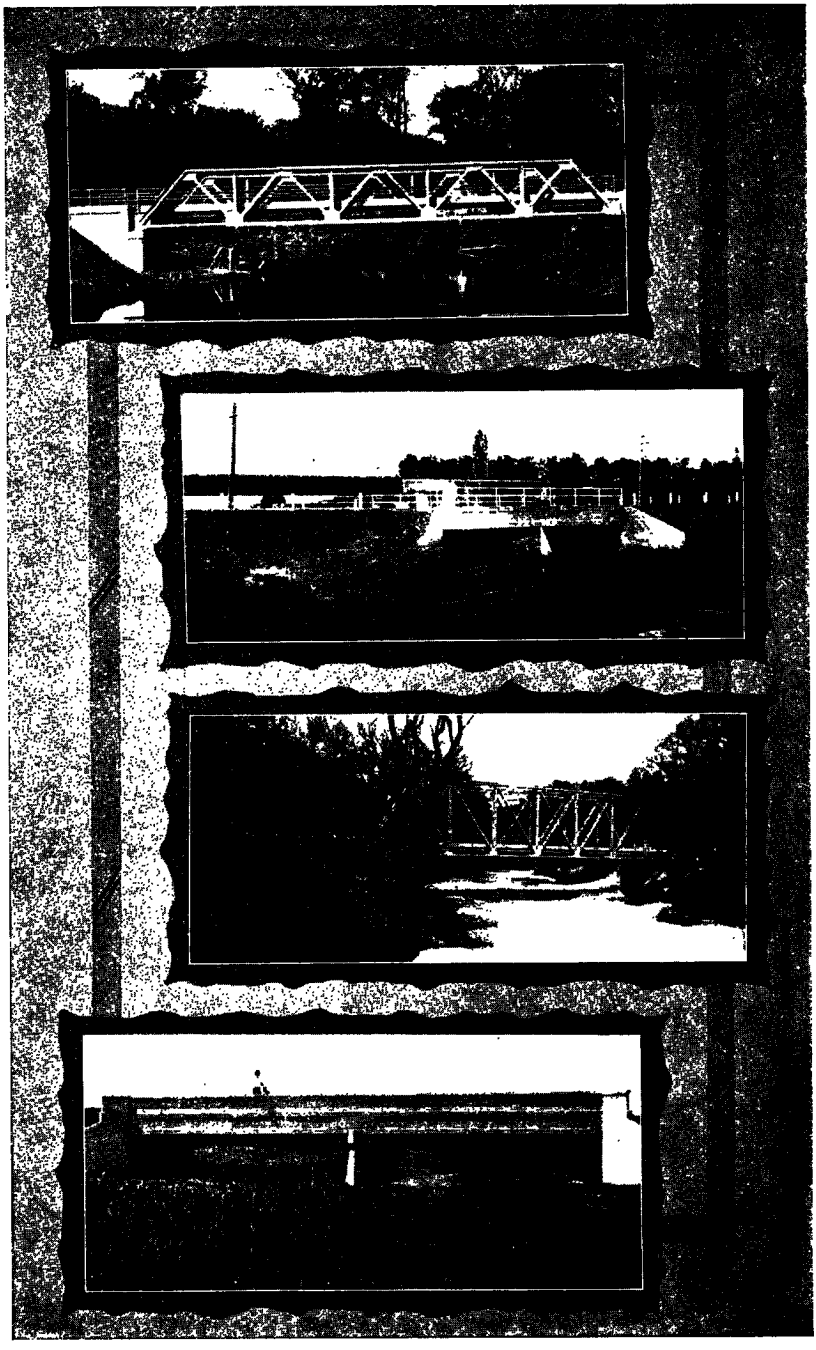
COUNTY	F.A.P. No.	Abutment Height	Abutment Type	Width Curb-Curb	Overall Length	Cost
Burleigh	174-A	7′ 0″	Std. Wing	23′ 0″	14′ 0″	$ 910.57
Ramsey	224-B	7′ 0″	Std. Wing	22′ 0″	16′ 0″	991.93
Ward	226	12′ 0″	Std. Wing	23′ 0″	18′ 0″	2,214.34
Barnes	233-B	9′ 0″	Std. Wing	23′ 0″	14′ 0″	1,559.17
Rolette	238	13′ 0″	Std. Wing	19′ 0″	12′ 0″	1,835.83
Logan-McIntosh	254-AB	10′ 0″	Std. Wing	23′ 0″	16′ 0″	1,585.06
Morton	260-A	13′ 0″	Std. Wing	23′ 0″	22′ 0″	1,969.40
	------	13′ 0″	Std. Wing	23′ 0″	22′ 0″	2,016.15
	------	10′ 0″	Std. Wing	23′ 0″	22′ 0″	1,564.17
Wells	264-A	11′ 0″	Std. Wing	23′ 0″	18′ 0″	1,809.49
	------	11′ 0″	Std. Wing	23′ 0″	18′ 0″	1,757.49
	------	13′ 0″	Std. Wing	23′ 0″	18′ 0″	2,097.31
Dunn	266-A	13′ 0″	Std. Wing Skewed 30°	23′ 0″	16′ 4″	1,968.59
	------	15′ 0″	Std. Wing	23′ 0″	20′ 0″	2,306.04
	------	15′ 0″	Std. Wing Skewed 30°	23′ 0″	16′ 4″	2,535.65
	------	15′ 0″	Std. Wing	23′ 0″	22′ 0″	2,532.55
McHenry	270-A	12′ 0″	Std. Wing	23′ 0″	16′ 0″	1,820.84
	------	9′ 0″	Std. Wing	23′ 0″	14′ 0″	1,282.59
Totals	------	----------	----------	----------	312′ 8″	$ 32,766.17

REINFORCED CONCRETE BRIDGES—CLEAR SPAN OVER 20 FEET
UNDER CONTRACT (Final Estimates Not Issued) JUNE 30TH, 1926
CONTRACT AWARDED BEFORE JAN. 1, 1926.

COUNTY	F.A.P. No.	Abutment Height	Abutment Type	Width Curb-Curb	Overall Length	Cost
Steele	233-A	14′ 0″	Std. Wing	20′ 0″	32′ 0″	$ 2,724.12
Barnes	247-D	24′ 1½″	Spl. Box on Piling	24′ 0″ with S. walk	128′ 0″	34,282.81
Cass	253	14′ 0″	Std. Wing on Piling	20′ 0″	44′ 0″	4,197.61
	------	14′ 0″	Std. Ped.	20′ 0″	32′ 0″	1,734.86
	------	8′ 0″	Std. Ped.	20′ 0″	26′ 0″	1,276.53
Morton	260-A	20′ 0″	Spl. Wing	23′ 0″	24′ 0″	2,521.47
	------	14′ 0″	Std. Wing On Piling	20′ 0″	44′ 0″	4,063.50
Morton	260-B	14′ 0″	Spl. Wing on Piling Skewed 45°	20′ 0″	38′10″	4,370.90
Cass	268-A	15′ 0″	Std. Wing	20′ 0″	32′ 0″	2,844.65
	------	15′ 0″	Std. Wing	20′ 0″	38′ 0″	3,246.71
Ward	270-B	13′ 0″	Std. Wing Skewed 30°	23′ 0″	24′ 4″	2,783.92
Burleigh	282	12′ 0″	Std. Wing on Piles	20′ 0″	26′ 0″	3,373.77
Totals	------	----------	----------	----------	489′ 2″	$ 67,420.85

STEEL TRUSS BRIDGES
UNDER CONTRACT (Final Estimates Not Issued) JUNE 30, 1926
CONTRACTS AWARDED BEFORE JAN. 1, 1926

COUNTY	F.A.P. No.	Abutment Height	Abutment Type	Width Curb-Curb	Overall Length	Cost
Grand Forks	107	24′ 0″	Spl. Box	20′ 0″	73′ 6″	$ 8,677.25
Cass	268-A	2—15′ 0″	Spl. Wing	20′ 0″	145′ 0″	12,983.16
	------	2—27′ 0″	Spl. Piers on Piles	1—80′ St'l Truss 2—32′ I-Beam Approach Spans	----------	----------
Totals	------	----------	----------	----------	218′ 6″	$ 21,660.41



"A Few of the Many Smaller Bridges Built by the State Highway Commission."

CONTRACTS LET JAN. 1 TO JUNE 30, 1926
SUMMARY BRIDGES AND BOX CULVERTS

County	F.A.P. No.	STEEL TRUSS BRIDGES No.	Total Length	Cost	REINFORCED CONCRETE BRIDGES Clear Span Over 20 Feet No.	Total Length	Cost	Clear Span 20 Feet or Less No.	Total Length	Cost	REINFORCED CONCRETE BOX CULVERTS No.	Total Length	Cost
Slope	220-B	----	----------	----------	1	26′ 0″	$ 2,980.98	----	----------	----------	6	192′ 0″	$ 7,071.23
Barnes	233-C	----	----------	----------	----	----------	----------	----	----------	----------	2	72′ 0″	2,281.64
Benson	249-B	----	----------	----------	----	----------	----------	----	----------	----------	2	66′ 0″	1,216.20
Morton	251-B	----	----------	----------	----	----------	----------	----	----------	----------	2	68′ 0″	1,504.60
Burke	258-E	----	----------	----------	----	----------	----------	----	----------	----------	1	31′ 0″	1,364.42
Sioux	259-A	1	84′ 0″	$ 12,253.78	1	24′ 4″	4,053.49	----	----------	----------	6	241′ 0″	11,242.07
Stark	260-C	----	----------	----------	3	96′ 0″	12,239.60	2	28′ 0″	$ 4,617.27	2	59′ 0″	1,388.05
Stark	260-D	----	----------	----------	----	----------	----------	----	----------	----------	1	55′ 0″	2,040.40
Sioux	262-A	----	----------	----------	2	134′ 0″	13,449.66	2	44′ 0″	10,025.14	12	501′ 3″	23,376.39
Rolette	263-E	----	----------	----------	1	44′ 0″	6,206.96	----	----------	----------	1	84′ 0″	3,700.56
Cass	268-B	----	----------	----------	1	38′ 0″	2,287.48	----	----------	----------	----	----------	----------
McHenry	270-D	----	----------	----------	----	----------	----------	----	----------	----------	2	56′ 0″	2,146.90
Grant	276-B	----	----------	----------	----	----------	----------	1	22′ 0″	2,296.42	1	31′ 0″	1,013.17
Traill	278-A	----	----------	----------	----	----------	----------	1	14′ 0″	1,591.59	----	----------	----------
Traill	278-B	----	----------	----------	----	----------	----------	1	20′ 0″	1,897.37	----	----------	----------
Stutsman	279-B	----	----------	----------	----	----------	----------	----	----------	----------	1	28′ 0″	1,004.60
Stutsman	279-C	----	----------	----------	----	----------	----------	----	----------	----------	2	67′ 0″	1,363.93
Stark	283-B	----	----------	----------	1	26′ 0″	2,704.86	2	40′ 0″	6,824.28	----	----------	----------
Billings	283-C	----	----------	----------	----	----------	----------	----	----------	----------	11	570′ 0″	14,535.61
Richland	285-B	----	----------	----------	----	----------	----------	----	----------	----------	1	33′ 0″	922.82
Bottineau	288-A	----	----------	----------	2	84′ 0″	9,063.63	1	12′ 0″	1,070.07	1	31′ 0″	633.15
Renville	288-B	----	----------	----------	1	26′ 0″	2,689.75	----	----------	----------	----	----------	----------
Bottineau	289	----	----------	----------	----	----------	----------	----	----------	----------	1	34′ 0″	3,017.54
Cavalier	292-A	----	----------	----------	1	65′ 8″	7,142.87	----	----------	----------	3	206′ 0″	5,506.42
Pembina	292-B	----	----------	----------	3	152′ 0″	16,431.80	1	22′ 0″	2,303.80	1	28′ 0″	813.95
Pembina	293-A	----	----------	----------	1	44′ 0″	3,438.84	1	22′ 0″	2,311.72	1	26′ 0″	891.30
Foster	295-A	----	----------	----------	----	----------	----------	1	14′ 0″	2,150.00	----	----------	----------
LaMoure	297-B	----	----------	----------	----	----------	----------	----	----------	----------	1	29′ 0″	975.30
Williams	302-B	----	----------	----------	----	----------	----------	----	----------	----------	1	28′ 0″	700.53
McKenzie	302-C	----	----------	----------	----	----------	----------	----	----------	----------	2	66′ 0″	4,231.68
Stutsman	306-C	----	----------	----------	----	----------	----------	----	----------	----------	2	60′ 0″	1,451.23
Golden Valley	307-A	----	----------	----------	1	64′ 0″	4,115.51	2	32′ 0″	5,924.66	6	250′ 0″	5,505.53
Billings	307-B	----	----------	----------	1	176′ 0″	12,322.87	----	----------	----------	5	157′ 0″	6,058.34
Nelson	309-B	----	----------	----------	----	----------	----------	----	----------	----------	1	33′ 0″	1,109.22
Towner	311-B	----	----------	----------	1	38′ 0″	3,920.36	----	----------	----------	----	----------	----------
McLean	316-C	----	----------	----------	1	38′ 0″	3,267.82	1	14′ 4″	2,448.29	1	34′ 0″	830.77
Adams	320-A	----	----------	----------	----	----------	----------	2	28′ 0″	3,478.07	2	59′ 0″	2,346.94
Walsh	322-A	----	----------	----------	1	32′ 0″	4,253.44	1	22′ 0″	2,241.04	----	----------	----------
Griggs	323-A	----	----------	----------	----	----------	----------	----	----------	----------	1	30′ 0″	1,164.03
Totals	.....	1	84′ 0″	$ 12,253.78	28	1,108′ 0″	$110,569.92	19	334′ 4″	$ 48,679.72	82	3,225′ 8″	$111,408.52

Average Cost Per Structure	$ 12,253.78	$ 4,807.39	$ 2,562.09	$ 1,358.64
Average Cost Per Lin. Ft.	$ 145.88	$ 99.79	$ 145.60	$ 84.54

SUMMARY

	No.	Total Length	Cost
Bridges	43	1,526′ 4″	$171,503.42
Culverts	82	3,225′ 8″	111,408.52
Total			$282,911.94

REINFORCED CONCRETE BOX CULVERTS
UNDER CONTRACT (Final Estimates Not Issued) JUNE 30, 1926
CONTRACTS AWARDED JAN. 1—JUNE 30, 1926.

COUNTY	F.A.P. No.	Size	Length	Cost
Slope	220—B	6′ x6′ Skewed 45°	45′ —0″	$ 1,617.18
		5′ x3′	31′ —0″	627.30
		6′ x6′	30′ —0″	1,068.39
		10′ x8′	28′ —0″	1,120.00
		5′ x5′ Double	29′ —0″	1,320.18
		5′ x5′ Double	29′ —0″	1,318.18
Barnes	233—C	5′ x5′	36′ —0″	1,140.82
		5′ x5′	36′ —0″	1,140.82
Benson	249—B	4′ x6′	33′ —0″	615.10
		4′ x6′	33′ —0″	601.10
Morton	251—B	5′ x5′	38′ —0″	909.46
		6′ x2½′	30′ —0″	595.14
Burke	258—E	5′ x7′	31′ —0″	1,364.42
Sioux	259—A	10′ x6′	36′ —0″	3,246.89
		6′ x6′	56′ —0″	1,982.38
		5′ x4′	32′ —0″	936.90
		6′ x6′	50′ —0″	1,792.52
		8′ x4′	35′ —0″	1,385.21
		8′ x6′ Skewed 30°	32′ —0″	1,898.17
Stark	260—C	8′ x4′	31′ —0″	817.72
		4′ x6′	28′ —0″	570.33
Stark	260—D	8′ x6′	55′ —0″	2,040.40
Sioux	262—A	5′ x5′ Double Skewed 45°	64′ —0″	3,599.60
		5′ x3′ Double Skewed 45°	45′ —3″	2,098.00
		8′ x3′	31′ —0″	1,272.25
		5′ x4′	36′ —0″	1,097.82
		8′ x6′	44′ —0″	2,566.52
		8′ x4′	45′ —0″	1,890.78
		8′ x4′	39′ —0″	1,701.18
		8′ x4′	53′ —0″	2,181.72
		5′ x5′ Double	45′ —0″	2,500.09
		5′ x5′	33′ —0″	1,273.79
		5′ x3′ Double	34′ —0″	1,633.39
		5′ x3′ Double	32′ —0″	1,561.25
Rolette	263—E	5′ x5′ Double Skewed 45°	84′ —0″	3,700.56
McHenry	270—D	5′ x3′ Double	28′ —0″	1,146.60
		8′ x3′	28′ —0″	1,000.30
Grant	276—B	6′ x6′	31′ —0″	1,013.17
Stutsman	279—B	5′ x3′ Double	28′ —0″	1,004.60
Stutsman	279—C	4′ x4′	33′ —0″	721.24
		5′ x3′	34′ —0″	642.69
Billings	283—C	4′ x4′ Skewed 30°	78′ —0″	1,482.23
		5′ x7′	52′ —0″	1,874.08
		5′ x4′	66′ —0″	1,421.36
		5′ x7′ Skewed 20°	82′ —0″	2,723.16
		4′ x4′	34′ —0″	812.30
		3′ x3′	39′ —0″	536.50
		5′ x4′	45′ —0″	1,021.53
		6′ x6′	45′ —0″	1,575.58
		5′ x5′	46′ —0″	1,168.38
		4′ x4′	46′ —0″	1,007.85
		4′ x6′	37′ —0″	912.64
Richland		4′ x6′	33′ —0″	922.82
Bottineau	288—A	5′ x3′	31′ —0″	633.15

Bottineau	289	9′ x9′	34′ —0″	3,017.54
Cavalier	292—A	6′ x6′	44′ —0″	1,376.66
		6′ x6′ Skewed 45°	72′ —0″	2,183.63
		5′ x5′	90′ —0″	1,946.13
Pembina	292—B	8′ x3′	28′ —0″	813.95
Pembina	293—A	5′ x3 Double	26′ —0″	891.30
LaMoure	297—B	8′ x3′	29′ —0″	975.30
Williams	302—B	4′ x6′	28′ —0″	700.53
McKenzie	302—C	8′ x8′	33′ —0″	2,115.84
		8′ x8′	33′ —0″	2,115.84
Stutsman	306—C	4′ x4′	30′ —0″	696.88
		4′ x6′	30′ —0″	754.35
Golden Valley	307—A	4′ x4′	64′ —0″	1,111.57
		4′ x6′	31′ —0″	705.05
		6′ x6′	39′ —0″	1,188.47
		5′ x4′	30′ —0″	677.76
		5′ x4′	36′ —0″	760.06
		4′ x6′	50′ —0″	1,062.62
Billings	307—B	5′ x7′	45′ —0″	1,704.07
		8′ x3′ Double	28′ —0″	1,611.70
		10′ x3′	28′ —0″	1,180.45
		5′ x3′ Double	28′ —0″	1,044.10
		6′ x1½′	28′ —0″	518.02
Nelson	309—B	6′ x6′	33′ —0″	1,109.22
McLean	316—A-B	5′ x5′	34′ —0″	830.77
Adams	320—A	5′ x3′	29′ —0″	630 77
		8′ x3′ Double	30′ —0″	1,716.17
Griggs	323—A	6′ x6′	30′ —0″	1,164.03
Totals			3,225′ —3″	$111,408.52

REINFORCED CONCRETE BRIDGES—CLEAR SPAN 20 FEET OR LESS
UNDER CONTRACT (Final Estimates Not Issued) JUNE 30, 1926
CONTRACTS AWARDED JAN. 1—JUNE 30, 1926.

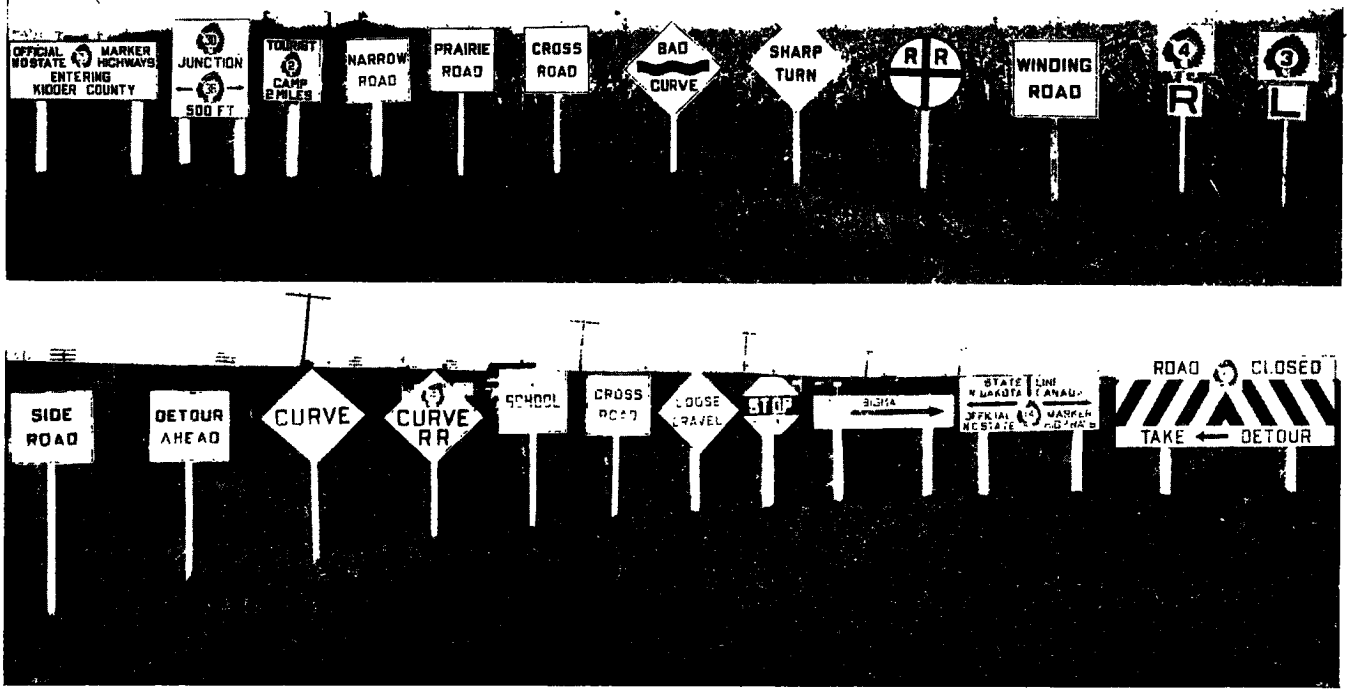
COUNTY	F. A. P. No.	Abut. Height	Abut. Type	Width Curb-Curb	Overall Length	Cost
Stark	260—C	14′—0″	Std. Wing	23′—0″	14′—0″	$ 1,830.35
		18′—0″	Spl. Wing	23′—0″	14′—0″	2,786.92
Sioux	262—A	14′—0″	Std. Wing on Piles	23′—0″	22′—0″	4,982.20
		17′—0″	Std. Wing	23′—0″	22′—0″	5,042.94
Grant	276—B	12′—0″	Std. Wing	23′—0″	22′—0″	2,296.42
Traill	278—A	11′—0″	Std. Wing	23′—0″	14′—0″	1,591.59
	278—B	11′—0″	Std. Wing	23′—0″	20′—0″	1,897.37
Stark	283—B	13′—0″	Std. Wing	23′—0″	18′—0″	1,967.88
		20′—0″	Std. Wing	23′—0″	22′—0″	4,356.40
Bottineau	288—A	7′—0″	Std. Wing	23′—0″	12′—0″	1,070.07
Pembina	292—B	12′—0″	Std. Wing	23′—0″	22′—0″	2,303.80
Pembina	293—A	12′—0″	Std. Wing	23′—0″	22′—0″	2,311.72
Foster	295—A	11′—0″	Std. Wing	23′—0″	14′—0″	2,150.00
Golden Valley	307—A	17′—0″	Std. Wing	23′—0″	20′—0″	3,312.24
		16′—0″	Std. Wing	23′—0″	12′—0″	2,612.42
McLean	316—AB	14′—0″	Std. Wing Skew'd 30°	23′—0″	14′—4″	2,448.29
Adams	320—A	13′—0″	Std. Wing	23′—0″	14′—0″	2,259.80
		7′—0″	Std. Wing	23′—0″	14′—0″	1,218.27
Walsh	322—A	11′—0″	Std. Wing	23′—0″	22′—0″	2,241.04
Totals					334′—4″	$48,679.72

REINFORCED CONCRETE BRIDGES—CLEAR SPAN OVER 20 FEET
UNDER CONTRACT (Final Estimates Not Issued) JUNE 30, 1926
CONTRACTS AWARDED JAN. 1,—JUNE 30, 1926

COUNTY	F.A.P. No.	Abutment Height	Abutment Type	Width Curb-Curb	Overall Length	Cost
Slope	220-B	13' 0"	Std. Wing	20' 0"	26' 0"	$ 2,980.98
Sioux	259-A	13' 0"	Std. Wing Skewed 30°	23' 0"	24' 4"	4,053.49
Stark	260-C	21' 0"	Spl. Wing	20' 0"	32' 0"	5,119.71
	.....	21' 0"	Spl. Wing	20' 0"	32' 0"	5,112.78
	.....	10' 0"	Std. Wing	20' 0"	32' 0"	2,007.11
Sioux	262-A	2—8' 0"	Std. Ped.	20' 0"	96' 0"	8,245.80
	.....	2—20' 0"	Piers			
	.....	14' 0"	Std. Wing	20' 0"	38' 0"	5,203.86
Rolette	263-E	12' 0"	Std. Wing	20' 0"	44' 0"	6,206.96
	.....	.....	on Piles			
Cass	268-B	10' 0"	Std. Ped.	20' 0"	38' 0"	2,287.48
Stark	283-B	14' 0"	Std. Wing	20' 0"	26' 0"	2,704.86
Bottineau	288-A	2—15' 0"	Std. Wing	20' 0"	52' 0"	5,930.46
	.....	1—15' 0"	Ctr. Pier			
	.....	2—11' 0"	Std. Wing	23' 0"	32' 0"	3,133.17
	.....	1—10' 0"	Ctr. Pier			
Renville	288-B	11' 0"	Std. Wing	20' 0"	26' 0"	2,689.75
Cavalier	292-A	2—16' 0"	Spl. Wing	20' 0"	65' 8"	7,142.87
	.....	1—17' 0"	Spl. Pier Skewed 45°			
Pembina	292-B	16' 0"	Std. Wing on Piles	20' 0"	44' 0"	6,054.74
	.....	14' 0"	Std. Wing	20' 0"	44' 0"	4,207.14
	.....	2—12' 0"	Std. Wing on Piles			
	.....	1—12' 0"	Pier on Piles	20' 0"	64' 0"	6,169.92
Pembina	293-A	12' 0"	Std. Wing	20' 0"	44' 0"	3,438.84
Golden Valley	307-A	1—14' 0"	Std. Ped.	20' 0"	64' 0"	4,115.51
	.....	1—8' 0"	Std. Ped.			
	.....	1—20' 0"	Std. Pier			
Billings	307-B	2—15' 0"	Std. Ped.	20' 0"	176' 0"	12,322.87
	.....	3—18' 0"	Piers			
Towner	311-B	13' 0"	Std. Wing	20' 0"	38' 0"	3,920.36
McLean	316-C	12' 0"	Std. Wing	20' 0"	38' 0"	3,267.82
Walsh	322-A	16' 0"	Std. Wing	20' 0"	32' 0"	4,253.44
Totals	.....	.....	.....	.....	1,108' 0"	$110,569.92

STEEL TRUSS BRIDGES
UNDER CONTRACT (Final Estimates Not Issued) JUNE 30, 1926
CONTRACTS AWARDED JAN. 1—JUNE 30, 1926

COUNTY	F.A.P. No.	Abutment Height	Abutment Type	Width Curb-Curb	Overall Length	Cost
Sioux	259-A	28' 0"	Sp. Ped.	20' 0"	84' 0"	$ 12,253.78



NORTH DAKOTA HIGHWAYS ARE WELL MARKED. 16,000 OF THESE MARKERS ALREADY ERECTED

MAINTENANCE DEPARTMENT

Prior to January 1st, 1926, the maintenance work on all improved portions of the State Highway System was done by the various counties under the supervision of the State Highway Department. The funds for this purpose were derived from the counties' share of automobile license fees, apportioned to them upon the basis of the license fees paid by the vehicles of each county. This fund was known as the "Special Road Maintenance Fund," and all moneys not expended on such improved roads were used for county road purposes.

By Chap. 167, Laws of 1925, the State Legislative Assembly imposed upon the State Highway Commission the full duty of maintaining all improved state roads and relieved the counties of this burden. While the law became effective on July 1st, 1925, nevertheless because the change occurred in the middle of maintenance season and other operative reasons, no attempt was made by the State Highway Department to exercise its powers fully under the new law until January 1926.

Under the present system of operation, each division engineer is made responsible for the maintenance of the improved state roads in his division subject to the supervision and control of the Maintenance Engineer at Bismarck. Under each division engineer, directly in control of maintenance, are one or more maintenance superintendents and supervising patrolmen who direct the daily patrol work of several hundred patrolmen, each in charge of a definite section of the road. In addition there are several "Maintenance Gangs" equipped with heavy road machinery to do such work which is before the powers of the individual patrolmen to perform. One of the sweeping improvements made during the current year was the installation of a complete and comprehensive accounting and cost system which will enable those in charge not only to gauge the economy and efficiency of the management of the entire Maintenance Department, but also each and every factor and section thereof. A full description thereof will be found in the following paragraphs.

Another activity imposed on the Maintenance Department is the duty of marking all the State Highways whether improved or not with route markers, warning signs and distance signs. This was formerly an independent division of the Department. The enviable reputation established by the State for the excellent road marking of its State Highway System was continued during the past biennium. Considerable more work along this line will be done during the coming year, and it is expected that all so-called U. S. Roads will shortly be marked with the U. S. emblem.

MAINTENANCE ACCOUNTING

Maintenance expenditures are divided into five principal classifications for convenience in accounting, supervision and examination. Under these five classes, the expenditures are further subdivided into various work items so that the supervisors in charge of the work may ascertain

at any time the amount of time spent on the different details of the work, and the Maintenance Engineer can tell whether any particular item of work is being taken care of; if too much is spent on any item, or any item is being neglected. Also, it makes the expenditures for the different functions of the Maintenance Department, as Road Marking. Equipment, Purchase and operation, and the overhead, readily available. In this way, no branch of the work can get out of bounds without being detected.

All expenditures that are of such a nature as to make it practicable, are charged directly against the county and patrol section on which the labor was performed or for which the purchase was made. Other expenditures, which cannot be directly disposed of, are allowed to accumulate until the end of the year and prorated to the various counties and patrol sections in an equitable manner.

Each claim for which a voucher is submitted is accompanied by a distribution showing the classification of the work and the county and patrol section, or account which is to be charged. At the Central Office a ledger account is kept with each patrol section, and at the Division Office an account is kept with each unit of equipment.

At the end of the year the Division Office submits a complete report of the work done by each piece of equipment and the expense incurred. The accumulated repair and operation costs are then charged out to the different patrol sections according to the time spent on them by each unit of equipment. The accumulated repair and operation costs include depreciation on the equipment.

Detailed and complete monthly records of the work done and the expense incurred by each unit allow an accurate distribution of such expense at the end of the year, as well as giving a basis of determining the comparative efficiency of the unit. A card index is kept of the year to year costs and depreciation of each unit.

* * * * *

MAINTENANCE EMPLOYEES

Class	Number	Average Wage
Patrolmen	274	60c per hour
Equipment Operators	19	60c per hour
Superintendents and Supervising Patrolmen	8	$150.00 per mo.
Casual Help	(As Required	)
	(Man and Team	60c per hour)
	(Man	35c per hour)

MAINTENANCE EQUIPMENT OWNED BY THE DEPARTMENT

No.	Class	Size	Make
1	Tractor	10 Ton	Holt
1	Tractor	5 Ton	Holt
1	Tractor	"60"	Best
1	Tractor	10-20	Twin City
1	Grader	12 ft.	Russell
1	Grader	12 ft.	Adams
2	Grader	10 ft.	Edwards
1	Maintainer	12 ft.	Russell
1	Grader	12 ft.	Austin-Western
1	Power Patrol	10 ft.	Fordson-Edwards
1	Power Patrol	8 ft.	Fordson-Austin-Western
1	Power Patrol	10 ft.	Wehr
2	Power Patrol	10 ft.	International-Austin-Western
1	Power Patrol	12 ft.	International-Austin-Western
153	Patrol Graders		
4	Trucks. Used for Highway Marking.		

MAINTENANCE METHODS

Two hundred sixty-five patrol sections are maintained with horse-drawn equipment. On a very few sections carrying exceptionally heavy traffic this horse-drawn equipment is supplemented with heavier motor patrols. However, we have very few of these motor patrol units available for this work.

As the limited amount of heavy equipment permits, the older portions of the roads are reshaped to the standard cross section. At present, there are four outfits employed at reshaping.

Nine patrol sections are equiped with light motor patrols for smoothing surface, the other work being done by casual help employed when needed.

In a few instances motor equipment is hired from individuals or contractors, and the cost of the work done by State-owned equipment and hired equipment will be carefully watched and compared. This comparison will influence the policy of the Department as to equipment purchase.

CERTIFIED EXPENDITURES FROM SPECIAL ROAD MAINTENANCE FUND, FROM JULY 1, 1924, TO DECEMBER 31, 1924.

COUNTIES	Classification Mileage Federal Aid: Earth	Classification Mileage Federal Aid: Gravel	Total Mileage Under Maintenance	Smoothing Surface	Surface Repair	Drainage Culverts Bridges	Weeds and Brush	Guard Rail and Snow Fence	Gasoline, Oil and Repairs	Maintenance Equipment Purchased	Additions and Betterments	Total Cost of Maintenance	Average Cost Per Mile (6 Months)	Special Road Maintenance Fund, 1924
Adams														$2,224.94
Barnes	73.5	46.3	119.8	$3,352.38	$775.88	$308.42	$1,366.29	415.77	99.67			6,318.36	31.62	8,879.59
Benson	12.1	43.5	55.6	984.59	210.71	74.83	668.07	60.95	6.90			2,006.05	36.08	4,268.15
Billings														572.50
Bottineau	39.9	24.1	64.0	933.10	99.75	84.11	557.80	84.89	371.80			2,131.45	33.30	5,457.07
Bowman	17.7		17.7	78.75	141.72	7.80	7.80	3.40	88.82			328.29	18.55	1,950.36
Burke	30.0	14.9	44.9	1,018.85	30.45	41.45	208.21	15.40	15.04			1,329.40	29.61	4,065.02
Burleigh				290.00	185.86	68.75	38.00					582.61	529.64	8,701.66
Cass	16.3	26.4	47.0	2,160.50								2,160.50	45.97	24,793.90
								(Report incomplete—4.3 miles unimproved State Highway)						
Cavalier	19.7		19.7	340.16	12.75		17.62					370.53	18.81	5,120.96
Dickey	31.0		31.0	850.75	130.57	84.04	542.04	35.04	26.30			1,668.74	53.83	4,720.61
Divide	41.3	11.0	52.3	929.05	225.34	114.20	320.45	49.50	526.78	274.80	145.44	2,585.56	49.44	3,939.57
Dunn														2,149.08
Eddy	10.3	18.8	35.2	1,268.68								1,268.68	36.04	2,434.66
								(6.1 miles unimproved State Highway)						
Emmons	53.1		53.1	893.21	809.95	228.80	626.98	264.95	225.26			3,049.15	57.42	3,681.71
Foster	15.0	41.2	56.2	758.50	86.39	25.50	411.25	70.30	350.41			1,702.35	30.29	2,569.25
Golden Valley	22.2		22.2	203.15	31.80	39.28	10.20	.10	8.75			293.28	13.21	1,664.53
Grand Forks	29.2	10.2	39.4	1,176.20	143.80	62.55	354.66	1.50	26.10			1,764.81	50.57	15,013.68
Grant	10.2		10.2	305.21	169.76	46.00	222.52	15.81	8.00			767.30	75.22	2,495.17
Griggs	10.9	46.2	57.1	1,801.21	310.41	67.35	402.91	125.85	77.37			3,285.10	57.53	2,964.76
Hettinger	27.8		27.8	412.50		38.50	31.00					482.00	17.34	3,185.37
								(Report incomplete)						
Kidder	9.8		9.8	228.40	34.00	4.00	9.75					276.15	28.18	2,378.05
LaMoure	70.0	4.8	74.8	1,902.43	361.37	206.40	559.26	87.55	46.17			3,163.18	42.29	5,056.16
Logan	71.4		71.4	1,464.15	486.40	18.50	835.33	57.20	4.53			2,866.11	40.14	2,064.58
McHenry		4.7	4.7	32.00			6.00					38.00	8.08	5,991.19
McIntosh	59.9		59.9	1,265.06	386.42	29.20	490.89	10.43				2,182.00	36.43	3,012.17
McKenzie														2,388.29
McLean	25.5	5.0	30.5	360.10	124.10	11.30	152.95	18.10	18.00			684.55	22.44	6,300.32
Mercer														2,701.89
Morton			3.0											8,106.07
Mountrail	60.4		60.4	339.10	243.40	244.70	481.45	77.50	486.03		314.40	2,136.58	35.37	4,763.89
Nelson	47.8	5.3	53.1	398.38	374.45	114.77	407.55	30.40	5.30			1,330.85	25.06	4,133.88
Oliver														936.48

Pembina	17.4		21.4	627.65	98.14	7.13	173.01		3.20			909.13	42.48	5,307.04
								(4.0 miles unimproved State Highway)						
Pierce		26.3	26.3	929.50			33.00					962.50	86.60	2,717.28
								(Report incomplete)						
Ramsey	28.7	52.5	81.2	1,128.37	856.17	108.56	715.90	8.56	7.00			2,824.56	34.79	7,766.27
Ransom	47.5	1.3	48.8	1,427.12	389.60	161.44	733.78	149.87	28.07			2,889.88	59.22	4,764.99
Renville	5.2		5.2	151.95	14.28		24.02	11.25	8.40			209.90	40.36	2,905.55
Richland	45.4	8.0	53.4	2,104.13	114.49	69.20	262.08	1.55	11.00			2,562.45	47.98	9,641.24
Rolette	6.1	7.0	13.1	133.55	171.00	93.95		15.75	2.40			416.65	31.80	2,667.94
Sargent	84.9	2.0	86.9	2,770.61	286.20	153.36	1,261.99	122.17	106.58			4,700.91	54.09	4,367.15
Sheridan														1,796.48
Sioux														868.82
Slope														1,485.02
Stark	13.8	5.1	25.0	44.80	129.35	8.20	21.00	287.38	112.25			602.98	24.12	6,233.53
								(6.1 miles unimproved State Highway)						
Steele	8.0		13.0	360.27	34.23	7.05	109.12	27.28	2.53			540.48	41.58	3,399.68
								(5.0 miles unimproved State Highway)						
Stutsman	84.4	6.0	90.4	2,342.82	175.06	93.85	521.85	18.37	21.55			3,173.50	35.10	10,489.77
Towner	9.0	29.8	38.8	370.38	247.47	12.75	644.00	22.00	400.22	159.00		1,855.82	62.28	2,858.00
Traill	35.8	7.2	64.0	2,899.90	207.90	37.50	255.55	17.70				3,418.55	53.41	6,224.47
								(21.0 miles unimproved State Highway						
Walsh	16.3		16.3	561.80	355.09	9.00	240.66	2.75				1,169.30	71.74	7,980.78
Ward	18.4	64.4	82.8	2,443.66	470.79	459.82	716.10	240.06	110.27			4,440.70	53.63	15,679.01
Wells	21.5	17.0	38.5	504.83	146.35	89.80	171.60	41.20	599.43			1,553.21	40.34	5,081.53
Williams	65.0	2.0	67.0	1,021.05	1,013.20	166.90	410.47	71.47	2,050.69	143.27		4,877.05	72.79	7,515.52
Totals	1,312.4	531.0	1,894.0	$43,568.75	$10,584.60	$3,398.96	$14,973.11	$2,462.00	$5,854.82	$577.07	$459.84	$81,879.15	$43.23	$268,435.58

CERTIFIED EXPENDITURES FROM THE SPECIAL ROAD MAINTENANCE FUND FOR THE SEASON OF 1925.

COUNTIES	Federal Aid Mileage			State Highways	Total Miles Maintained	DISTRIBUTION					Total Cost	Average Cost Per Mile	Special Road Maintenance Fund
	Earth	Gravel	Paved			Smoothing Surface	Surface Repair	Structures	Weeds, Brush	Miscellaneous			
Adams	6.0	3.0	.....	.....	9.0	$178.00	$282.00	$66.00	$286.00	$.....	$762.00	$84.67	$2,565.46
Barnes	39.7	91.7	0.5	.....	131.9	6,752.20	3,447.02	367.70	1,791.05	964.40	13,322.37	101.03	10,253.95
Benson	15.0	57.5	.....	.....	72.5	3,818.95	897.40	99.00	1,072.20	155.40	6,042.95	83.35	5,196.15
Billings	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	667.64
Bottineau	22.8	40.3	.....	0.9	64.0	2,135.12	1,114.57	228.90	1,413.71	241.35	5,133.65	80.21	6,712.37
Bowman	18.0	.....	.....	10.0	28.0	654.55	651.87	74.00	147.65	.....	1,527.57	54.55	2,369.07
Burke	29.8	15.0	.....	.....	44.8	2,650.44	226.50	85.03	415.75	102.85	3,480.57	77.69	4,596.29
Burleigh	.....	.....	1.0	.....	1.0	25.40	521.00	10.50	68.00	108.50	733.40	733.40	10,985.99
Cass	16.5	39.2	.....	.....	55.7	13,188.00	5,145.00	.....	99.50	.....	18,427.50	330.83	28,183.89
Cavalier	19.9	.....	.....	.....	19.9	845.14	40.65	7.00	149.15	2.75	1,044.69	52.49	6,109.15
Dickey	52.4	9.9	.....	.....	62.3	3,833.74	1,223.30	625.90	788.05	98.75	6,569.74	105.45	5,292.91
Divide	36.8	11.0	.....	.....	47.8	3,326.55	1,537.84	578.70	939.50	111.10	6,493.69	135.85	4,505.72
Dunn	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,634.45
Eddy	10.8	18.8	.....	6.0	35.6	1,657.70	518.40	3.20	414.40	.....	2,593.70	72.85	2,048.09
Emmons	60.7	.....	.....	.....	60.7	2,543.97	1,498.40	234.00	1,239.95	247.50	5,764.72	94.97	4,859.61
Foster	15.0	41.0	.....	.....	56.0	4,409.65	1,410.42	54.50	797.37	264.20	6,936.14	123.86	3,409.29
Golden Valley	22.2	.....	.....	.....	22.2	921.75	524.90	109.20	411.10	3.50	1,970.45	88.76	2,059.78
Grand Forks	83.3	10.2	2.0	.....	95.5	4,767.85	420.70	204.00	670.00	150.20	6,212.25	65.05	17,287.77
Grant	10.3	.....	.....	.....	10.3	521.65	556.80	40.10	290.00	6.00	1,414.55	137.33	3,381.97
Griggs	.....	59.5	.....	.....	59.5	3,508.55	4,976.96	159.97	681.40	326.20	9,653.08	162.23	3,447.19
Hettinger	31.7	.....	.....	.....	31.7	875.10	421.55	21.80	273.35	3.50	1,595.30	50.32	3,959.81
Kidder	9.8	.....	.....	.....	9.8	654.08	20.60	18.00	55.80	11.43	759.91	77.54	2,913.04
LaMoure	48.2	27.8	.....	.....	76.0	4,308.71	1,578.61	408.20	825.70	192.32	7,308.54	96.17	5,643.73
Logan	94.3	.....	.....	.....	94.3	3,680.35	1,244.86	351.20	1,426.97	242.09	6,945.47	74.36	2,751.21
McHenry	12.4	.....	.....	.....	12.4	357.73	148.47	3.00	174.85	1.05	680.10	54.84	7,596.88
McIntosh	73.5	1.0	.....	.....	74.5	2,603.57	1,545.18	268.34	832.75	75.76	5,325.60	71.48	3,963.10
McKenzie	17.1	.....	.....	.....	17.1	20.40	.....	.....	.....	.....	20.40	.....	3,366.81
McLean	25.5	5.0	.....	.....	30.5	638.70	408.76	44.20	110.20	29.95	1,226.81	40.22	7,756.17
Mercer	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8,484.09
Morton	.....	.....	3.0	.....	3.0	.....	.....	.....	.....	.....	.....	.....	9,329.03
Mountrail	82.2	.....	.....	.....	82.2	2,367.44	1,519.45	316.90	893.50	104.55	5,201.84	63.28	5,620.21
Nelson	11.9	26.4	.....	.....	38.3	1,508.36	285.20	26.70	454.80	110.10	2,385.16	62.28	5,335.21
Oliver	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,248.55
Pembina	17.4	.....	.....	.....	17.4	1,217.40	346.80	12.00	203.70	9.20	1,789.10	102.82	6,170.90
Pierce	33.7	.....	.....	.....	33.7	598.12	66.65	9.70	404.45	8.75	1,087.67	32.28	3,274.08
Ramsey	15.4	81.5	.....	.....	96.9	4,764.70	3,819.00	66.20	1,013.20	161.60	9,824.70	96.23	9,666.11

Ransom	55.1	3.2	.....	.....	58.3	3,216.45	922.20	189.25	924.95	595.95	5,818.80	99.81	5,577.63
Renville	5.2	.....	.....	.....	5.2	323.28	.....	5.50	78.86	.....	407.64	78.39	3,715.16
Richland	45.4	8.0	.....	.....	53.4	4,148.39	327.87	131.33	471.93	2.75	5,082.27	95.17	11,169.14
Rolette	13.4	13.1	.....	.....	26.5	693.98	423.80	124.65	300.00	180.40	1,722.83	65.01	3,003.71
Sargent	85.5	2.0	.....	.....	87.5	5,832.87	1,072.43	405.63	1,088.71	329.15	8,728.79	99.76	4,879.34
Sheridan	22.0	1.1	.....	.....	23.1	423.65	99.60	19.20	116.10	8.00	666.55	28.85	2,394.73
Sioux	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,117.70
Slope	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,441.66
Stark	13.8	5.1	.....	.....	18.9	1,194.92	819.75	23.13	263.20	258.65	2,559.65	135.43	6,942.13
Steele	13.0	.....	.....	.....	13.0	608.90	160.20	65.55	137.25	20.20	992.10	76.31	3,880.85
Stutsman	67.5	30.5	.....	.....	98.0	5,180.30	219.95	67.50	697.20	93.07	6,258.02	63.86	12,296.81
Towner	3.4	39.8	.....	.....	43.2	1,951.61	828.10	56.00	868.90	4.90	3,709.51	85.87	3,380.25
Traill	56.1	7.2	0.7	.....	64.0	6,072.00	875.57	40.70	598.35	30.80	7,617.42	119.02	6,722.07
Walsh	52.5	.....	.....	.....	52.5	3,022.30	895.50	49.20	815.80	15.40	4,798.20	91.39	9,782.44
Ward	48.7	64.3	.....	.....	113.0	9,308.76	4,455.19	397.23	2,047.33	299.70	16,508.21	146.09	17,822.83
Wells	49.2	28.3	.....	.....	77.5	3,178.11	756.50	110.20	776.60	740.81	5,562.22	71.77	6,735.76
Williams	71.7	2.0	.....	.....	73.7	4,876.39	1,513.75	395.10	674.60	22.74	7,482.58	101.53	9,139.17
Totals	1,534.8	743.4	7.2	16.9	2,302.3	$129,360.28	$49,258 77	$6,570.01	$28,153.83	$6,805.52	$219,648.41		$319,479.05
Percentage of total expenditure						59%	22%	8%	13%	3%			
Average mileage maintained during season					2,150.0	Average cost per mile						$102.16	

GENERAL MAINTENANCE EXPENDITURES, JANUARY 1, 1926, TO JUNE 30, 1926.

Class 1—Routine Maintenance

COUNTY	Miles Earth	Miles Gravel	Miles Paved	Total Miles Under Maintenance	Smoothing Surface	Surface Repair	Cleaning Culverts and Drains	Weeds, Brush, Roadside	Snow Prevention	Snow Removal	Class 2. Repairs and Replacements Reshaping
Adams	12.5	3.0	.....	15.5	$501.05	303.00	38.00	78.00	.....	.....	.....
Barnes	30.2	111.4	.5	142.1	4,086.53	820.20	359.35	1,019.70	345.70	3.00	.....
Benson	13.8	59.9	.....	73.5	1,647.24	584.10	431.70	694.70	.....	.....	.....
Billings	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bottineau	22.9	41.0	.....	63.9	1,411.61	426.20	210.90	465.10	117.90	.....	.....
Bowman	18.0	.....	.....	18.0	259.91	408.00	6.60	15.00	26.25	58.80	1,072.40
Burke	39.4	15.0	.....	54.4	1,326.36	346.50	252.22	441.00	12.00	4.20	.....
Burleigh	.....	.....	1.0	1.0	.....	.....	.....	.....	.....	.....	.....
Cass	19.1	39.2	.....	58.3	3,861.25	429.00	242.20	133.80	.....	5.30	743.16
Cavalier	23.6	.....	.....	23.6	558.80	130.80	1.20	60.40	.....	.....	.....
Dickey	58.8	9.2	.....	68.0	1,791.09	1,443.60	146.40	253.30	3.00	13.80	.....
Divide	36.0	22.2	.....	58.2	1,535.52	391.85	118.30	147.65	.....	.....	.....
Dunn	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Eddy	12.7	18.8	.....	31.5	717.59	111.00	20.40	136.00	.....	.....	.....
Emmons	61.0	.....	.....	61.0	1,164.70	1,371.00	34.80	629.60	16.80	18.00	660.60
Foster	.....	57.1	.....	57.1	1,737.04	433.80	39.20	263.80	16.00	.....	.....
Golden Valley	22.2	.....	.....	22.2	346.78	586.80	67.30	55.40	16.00	26.65	.....
Grand Forks	75.5	19.5	2.0	97.0	2,203.07	324.10	262.20	488.70	68.14	32.60	.....
Grant	21.4	.....	.....	21.4	700.79	573.66	68.10	50.00	25.50	.....	.....
Griggs	9.0	52.4	.....	61.4	1,569.32	362.00	115.90	338.80	150.70	.....	.....
Hettinger	32.5	.....	.....	32.5	688.11	744.00	65.00	86.20	.....	.....	.....
Kidder	22.0	.....	.....	22.0	447.20	346.80	55.80	112.60	17.20	.....	.....
LaMoure	48.3	27.8	.....	76.1	2,016.07	847.87	202.80	333.86	77.86	.....	113.91
Logan	93.0	.....	.....	93.0	2,308.80	1,903.70	209.70	303.00	41.05	5.40	.....
McHenry	.....	12.4	.....	12.4	657.38	25.92	3.00	60.00	.....	.....	.....
McIntosh	73.4	1.1	.....	74.5	1,302.38	1,860.00	46.20	460.75	.....	.....	.....
McKenzie	17.1	.....	.....	17.1	457.38	139.20	78.80	42.00	7.60	.....	.....
McLean	9.0	21.5	.....	30.5	343.48	361.26	66.40	236.10	.....	.....	.....
Mercer	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Morton	8.6	0.5	3.0	12.1	199.85	249.60	77.40	330.00	6.00	4.20	.....
Mountrail	83.3	.....	.....	83.3	1,375.15	1,178.55	381.90	318.80	1.60	.....	553.92
Nelson	8.8	43.7	.....	52.5	1,720.80	408.55	365.90	606.25	25.70	.....	.....
Oliver	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pembina	17.4	.....	.....	17.4	672.42	157.20	14.40	18.40	.....	.....	.....

Pierce	16.0	33.8	----------	49.8	686.16	395.05	114.80	677.30	19.10	----------	----------
Ramsey	81.5	81.5	----------	113.0	2,491.43	1,705.90	604.80	764.40	----------	25.80	----------
Ransom	49.2	10.4	----------	59.6	938.76	447.60	162.60	259.80	115.80	19.80	----------
Renville	----------	5.2	----------	5.2	----------	----------	----------	----------	----------	----------	----------
Richland	45.4	8.0	----------	53.4	1,971.76	162.60	54.80	81.00	----------	18.60	----------
Rolette	13.4	13.1	----------	26.5	254.35	181.30	85.80	171.90	21.20	4.80	----------
Sargent	64.8	24.0	----------	88.8	1,878.77	1,026.60	281.00	774.80	----------	----------	----------
Sheridan	23.1	----------	----------	23.1	365.83	90.00	15.00	170.60	----------	----------	----------
Sioux	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------
Slope	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------
Stark	18.8	5.1	----------	18.9	424.22	423.00	42.00	74.00	18.00	6.00	----------
Steele	13.0	----------	----------	13.0	230.76	121.80	6.00	38.40	----------	----------	----------
Stutsman	78.8	30.2	----------	109.0	3,889.04	878.10	340.60	523.98	10.80	2.40	----------
Towner	21.3	39.8	----------	61.1	693.81	347.40	201.00	479.85	1.60	----------	----------
Traill	44.1	19.2	.7	64.0	1,885.27	145.40	156.70	74.20	4.80	----------	----------
Walsh	64.0	----------	----------	64.0	1,978.64	286.30	193.40	267.20	10.00	27.30	----------
Ward	48.6	64.4	----------	113.0	3,688.94	1,331.40	241.30	308.10	----------	----------	----------
Wells	38.6	38.2	----------	76.8	1,735.68	687.20	30.00	593.55	36.50	17.95	----------
Williams	71.1	2.2	----------	73.3	1,521.43	1,860.70	188.90	288.80	----------	16.80	----------
Totals	1,525.5	930.8	7.2	2,463.5	$62,242.52	$27,358.61	$6,700.77	$13,676.79	$1,212.30	$311.40	$8,143.99

GENERAL MAINTENANCE EXPENDITURES, JANUARY 1ST, 1926 TO JUNE 30TH, 1926

Class 2—Repairs and Replacements Class 3—Betterments Class 4—Special Work

COUNTY	Surface Additions	Drainage and Drainage Structures	Repair Guard Rail	Road Bed	Structures	Shoulder Repairs	Filling Cracks Paved Roads	Special Work	Summary: Total Cost	Summary: Miles	Ave. Per Mile for 6 Months
Adams									920.05	15.5	59.86
Barnes	$348.29		$22.48						7,005.25	142.1	49.30
Benson			20.70						3,378.44	73.5	45.96
Billings											
Bottineau			83.35		$19.00				2,734.06	63.9	42.78
Bowman									1,846.96	18.0	102.60
Burke									2,382.28	54.4	43.79
Burleigh				Reported as of Morton County							
Cass	56.41								5,471.12	58.3	93.84
Cavalier									751.20	23.6	31.83
Dickey		$64.65							3,715.84	68.0	54.64
Divide			2.80						2,196.12	58.2	37.73
Dunn											
Eddy									984.99	31.5	31.27
Emmons									3,895.50	61.0	63.86
Foster	776.04	31.50							3,297.38	56.5	58.36
G. Valley									1,098.93	22.2	49.50
Gr. Forks									3,378.81	97.0	34.83
Grant					28.00				1,446.05	21.4	67.57
Griggs	2,922.20								5,458.92	61.4	88.91
Hettinger			.50		96.48				1,680.29	32.5	51.70
Kidder	102.67		8.28						1,090.55	22.0	49.57
LaMoure		67.86	2.00		12.00				3,673.73	76.1	48.28
Logan			45.06						4,816.71	93.0	51.79
McHenry									746.80	12.4	60.18
McIntosh			10.80		107.88				3,788.01	74.5	50.84
McKenzie									724.98	17.1	42.39
McLean	188.90		18.70						1,209.84	30.5	39.67
Mercer											
Morton		251.30				$122.40	$279.86	$16.50	1,537.11	13.1	117.33
Mountrail			.82						3,810.74	83.3	45.75
Nelson	448.27		8.53						3,584.00	52.5	68.26
Oliver											
Pembina		125.55	1.60						989.57	17.4	56.87

Pierce				2.65						1,895.06	49.8	38.05
Ramsey	68.00	89.80	2.40		118.75					5,811.28	118.0	51.43
Ransom		145.56								2,089.92	59.6	35.07
Renville					Reported as of		Ward County					
Richland		299.16			5.40						59.4	48.56
Rolette	83.20		1.80							2,593.32	26.5	30.33
Sargent	2,161.65	43.20	2.62							803.85	88.3	60.86
Sheridan										6,168.64	28.1	27.77
Sioux										641.48		
Slope												
Stark												
Steele				39.06						1,026.28	18.9	54.80
Stutsman										396.96	13.0	30.54
Towner	330.60	129.00	3.53							5,777.45	109.0	53.00
Traill			.75							2,055.01	61.1	33.63
Walsh		94.60		4.14						2,360.97	64.0	36.89
Ward				61.50						2,766.98	64.0	43.23
Wells	102.67	8.20		6.00						5,639.44	118.2	47.71
Williams		24.00		12.00	9.00					3,242.55	76.8	42.22
Totals	$7,588.90	$1,324.38	$317.51	$89.06	$391.51	$122.40	$279.86	$16.50	$124,721.50	3,838.63	78.3	52.37
										2,467.9		$50.64

NORTH DAKOTA STATE HIGHWAY COMMISSION

SUMMARY OF MAINTENANCE ACCOUNTS, JANUARY 1ST TO JUNE 30TH, 1926

MAINTENANCE EQUIPMENT SUSPENSE ACCOUNT

DIVISION	Purchase of Equipment	Oil and Grease	Shop Maintenance	Operator's Salaries	Truck Expense	Tractor Expense	Power Patrol Expense	Grader Expense	Misc. Equipment Expense	Mechanics Labor	Totals
Central Office	$35,978.61	$	$	$	$	$	$	$	$	$	$
Bismarck			10.35	491.32	114.52	3,134.99		378.58	151.00		
Valley City		348.45		196.00	8.53	14.51	103.35	602.97		36.05	
Devils Lake		659.76	26.00	791.68	15.25	1,012.44	173.50	173.70		280.60	
Minot		505.38	28.00	380.00	13.00		41.19	193.62	213.80	75.00	
Dickinson											
Total	$35,978.61	$1,508.59	$64.35	$1,859.00	$151.30	$4,161.94	$318.04	$1,348.87	$364.80	$391.65	$46,147.15

HIGHWAY MARKING ACCOUNT

	Posts	Lumber	Paint	Misc. Supplies	Shop Expense	Salaries	Traveling Expense	Gasoline Oil and Supplies	Truck Repairs	New Signs Purchased	
All Divisions and Central Office	$172.46	$1,468.05	$495.66	$1,201.54	429.06	$4,867.32	$848.09	$359.31	$299.27		$10,141.36

PRORATION ACCOUNT

	Salaries	Postage and Printing	Office Supplies	Misc.	Pers. Exp. Car Mileage Etc.	Workman's Compensation	Traffic Census				
All Divisions and Central Office	$9,144.88	$1,028.98	$163.64	$525.80	$6,411.12	$3,949.00					$21,223.42

Total General Maintenance Account	$124,721.50
Total Maintenance Accounts	202,233.43
Control Account	155,790.80
Amount of June Expenditures Paid-July	46,442.63

Earth grading in Rolette county on State Highway No. 5, the most northerly of the east and west roads. F. A. P. No. 196. Observe the guard railing on both sides near the turn for protection of the traffic.

Paving in Barnes county, F. A. P. No. 247-C and part of U. S. Road No. 10 or State Highway No. 3.

EQUIPMENT DEPARTMENT
WAR SURPLUS MATERIAL

The Equipment Department Organization as described in the previous Biennial Report ending June 30th, 1924, consisted of a Superintendent of Equipment, Bookkeeper, Storekeeper, force of mechanics and two watchmen. All cars belonging to the Department were brought into Bismarck late in the fall and overhauled in the shops during the winter months by the Department mechanics. During the summer months cars operating out of Bismarck were serviced and kept in repair at the Department Shops, however other field cars located at different Residences scattered over the State obviously could not be brought into Bismarck for service and repairs during the construction season and therefore had to be taken care of locally at the points where the Division and Resident Engineers operating the cars were stationed. Consequently during the summer months or construction season the mechanical forces, besides servicing and repairing Departmental cars at Bismarck, were employed in repairing, overhauling and placing inserviceable condition trucks, tractors, etc. belonging to the Department which were received from the Government as War Surplus Material. As this War Surplus Material, especially trucks, tractors, etc., was gradually being disposed of to State Institutions, Counties and other organizations, it was felt that the Equipment Department, organized as previously outlined, could not function economically to the best advantage of the Department and therefore the State Highway Commission at a meeting on June 19, 1925, decided to close the State Highway Shops, disband the entire force under the existing organization, retaining only one mechanic to act as Chief Mechanic in charge of all Department Cars.

Carrying the above adopted policy into effect required that other plans be adopted for repairing, servicing and overhauling the Department cars as needed and it was finally decided to have this work performed at the various Division headquarters by private garages under annual contracts for such work. Some time was naturally required to discontinue the old organization and reconstruct an entirely different one on a practicable working basis. As the old Ten per cent Fund which was used to finance the previous Equipment Department organization was repealed, taking effect July 1st, 1925, it also became necessary to arrange a means for financing Departmental car operation, maintenance and new purchases.

Past methods of recording operations and finances in the Equipment Department made no distinction between the War Surplus Material and Departmental Car Operation transactions in both being recorded under one account and as a first step toward a new operating and financing plan, it was decided to separate the War Surplus Material entirely from the Department Car Operation as with the former's assets of War Surplus Material on hand and accounts receivable, it would be more than self sustaining through sale of material and collection of outstanding ac-

counts and when all material was sold this account could be closed up and any surplus on hand disposed of as the State Highway Commission might see fit. Further reference to the War Surplus Material will be made in the latter part of this statement.

In the matter of car operation a number of plans for financing were considered before the present plan was finally adopted. One, which had considerable merit and is used in several States at the present time, is to allow each man employed to use his own car, he paying all expense of operation and the Department allowing him ten cents per mile of travel on official business for the use of the same. Certain objections, however, developed to this plan, first the Commission had on hand approximately sixty (60) cars which would have to be disposed of, probably at a considerable depreciated value. Second, the tendency would be in certain cases for employees to run up as large a mileage as possible without much chance for a check up by the Department. Third, it appeared logical to assume that if each individual employe could furnish a car, pay all expenses and operate his car for ten (10) cents per mile without loss that there was apparently no reason why the Commission could not do the same thing and profit at least to the extent of owning the cars in the end, besides any other savings that could be effected in the operation of a large fleet of cars and through the wholesale purchases of supplies made possible by reason of such fleet ownership.

The plan of financing finally adopted and now in operation since October 1st, 1925, is based on the principle of creating a separate and distinct fund having assets consisting of a working capital and the cars belonging to the Department and a certain prescribed rate of earnings per car per mile travelled on official business, which would make the Fund self sustaining, also permitting sufficient surplus to accrue so as to be able to purchase additional new cars required and replace old cars as they become worn out, as well as pay for all expenses of operating the cars while engaged in carrying on the work of the Department.

A cut off on the records was made on October 1st, 1925, and the War Surplus Material assets and liabilities were placed in a separate fund, all future transactions under this heading being separated from Department Car Operation.

The Car Operation Fund was created with a working capital of $9,756.33 set aside, same being the balance remaining of the old Ten Percent Fund, this of course being merely a book transaction. A charge of ten cents per mile is made against every car operated by Department field employees working on Preliminary, Construction and Maintenance, an exception being necessary in the case of cars being operated by Department Heads out of Bismarck due to the fact that payments for their car expenses come out of a separate and distinct fund carried on the State Treasurer's and State Auditor's records as Highway Operating Fund and for that reason would not permit of a transfer from such fund into the Department's Car Operating Fund. Therefore, such cars are

charged directly with the expenses of operation of the cars out of their respective fund and new car purchases for these employees made out of the same fund. The charge of ten (10) cents per mile against Preliminary, Construction and Maintenance cars is made against the proper fund from which payment is ordinarily made for the class of work on which the employee driving the car happens to be engaged at the time reported, such as Preliminary, Construction or Maintenance. Each employee driving a car submits a monthly report of all expenses incurred in the operation of the car assigned to him and the number of miles travelled. In addition, in the case of men assigned to Preliminary and Construction, the expense and mileage is prorated as a charge among the Projects (designated by numbers) under his supervision. When these reports are received in Bismarck at the end of each month, the Bookkeeping Department debits the Preliminary, Construction or Maintenance Fund as the case may be with the mileage at the rate of ten (10) cents per mile and credits the Car Operation Fund with these earnings. In payment for these earnings the Car Operation Fund pays for all expense of operation of the Department cars, including repairs, storage and purchase of needed new cars out of the Capital set aside and mileage earnings accruing as previously explained.

Financial operating statement of the Car Operation Fund from October 1st, 1925, to June 30th, 1926, is set forth below and a glance will indicate how the plan is working out in actual practice:

EQUIPMENT DEPARTMENT

Car Operation
June 30, 1926

Capital Set Aside 10/1/25 as Car Operating Fund		$9,756.33
Earnings		
Total Earnings Last Report	18,652.99	
Mileage Earned for May	7,592.80	
Mileage Earned for June	7,849.80	
Car Sales Since last Report	384.60	
Total Earnings		34,480.19
Capital & Earnings		44,236.52

Expense			
Car Purchases 10/1/25—6/30/26		12,333.07	
Operating Expense last Report	19,856.21		
Since Last Report:			
Labor—Garages	585.46		
Gas	2,405.50		
Oil	390.73		
Misc.	103.88		
Accessories	169.90		
Batteries	9.95		
Tires & Tubes	890.25		
Car Parts	297.97		
Storage	217.30		
Overhead Expense:			
Salaries, May & June	670.00		
Light	1.00		
Traveling Expense	89.65		
Total Operating Expense	25,687.80		
Less Refund from Highway Operating on Administration Car Expenses	1,781.03		
Net Operating Expense Equip. Fund Cars		23,906.77	
Total Operating Expense & Car Purchases			36,239.84
Car Operating Fund Balance			7,996.68

FINANCIAL STATEMENT

Assets			
Estimated Value Cars on hand 10/1/25		27,733.55	
Car Purchases Since 10/1/25		12,233.07	
Total		40,066.62	
Less Car Sales 10/1/25—6/30/26		1,352.10	
Estimated Value Cars on hand 6/30/26		38,714.52	
Car Operating Fund " " "		7,996.68	
Shop Equipment		673.88	
Total Assets			47,385.08
Liabilities			
Accounts Payable			2,213.82
Surplus			45,171.26

WAR SURPLUS MATERIAL

At a meeting of the State Highway Commission on August 24, 1925, action was taken toward disposing of all War Surplus Material remaining in the hands of the Department as of that date and instructions issued to close up the Department until an inventory could be taken and clearance received from the U. S. Government to dispose of all such material on hand.

On October 1st, 1925, as previously explained, the War Surplus Material was separated from the Car Operation and set up as a separate and distinct fund having assets consisting of cash on hand, all War Surplus Material on hand and Accounts receivable on previous sales remaining uncollected as of that date.

Having duly received a clearance from the U. S. Government permitting sale of all War Surplus Material on hand, the State Highway Commission on January 22, 1926, took action instructing the Chief Engineer and Secretary of the Commission to advertise for bids for the sale of all War Surplus materials on hand in one lot. Such bids to be submitted for consideration by the Commission at their regular meeting on February 25th, 1926. At the meeting for consideration of bids as of the above date, four bids were received as follows:

1. Goldberg Bros., Indianapolis, Ind. $2,500.00
2. Robinson & Foote, Minot, N. Dak. 1,150.00
3. Fargo Iron & Metal Co., Fargo, N. Dak. 1,135.00
4. Abe Tolchinsky, Bismarck, N. Dak. 750.00

As the bids were considered too low, they were all rejected and it was decided to sell same in lots to the highest bidder in the open market.

An Operating and Financial Statement of the War Surplus Material Fund from October 1st, 1925 to June 30, 1926, is herewith given below and it will be noted from this report that all material is practically disposed of with the exception of an estimated value of $1,000.00 worth, most of which it is planned to keep for Department use. It will also be noted that total sales as of June 30th, 1926, aggregated $10,145.65 which is considerable in excess of the most favorable bid received on February 25th, 1926, of $2,500.00 for all material on hand.

EQUIPMENT DEPARTMENT

War Surplus Material
June 30, 1926

Income—10/1/25—6/30/26			
Int. Registered Warrant Oliver Co.		7.33	
Rental Gravel Loader		108.00	
Sales:			
Trucks, Tractors & Gov't Cars	3,532.00		
Steam Shovel	600.00		
Gravel Loader	600.00		
Truck Parts	645.25		
Solid Tires	917.50		
Scrap Iron	1,186.10		
Tents, Junk Tires, Misc.	2,664.80		
Total Sales		10,145.65	
Total Income			10,260.98
Expense—10/1/25—6/30/26			
Salaries & Inventory	1,421.25		
Rental Bank Basement	38.00		
Misc., Drayage, Etc.	146.96		
Travel Exp.—Collecting Accts.	93.45		
Total Operating Expense		1,699.66	
Adj. Error in old 10% Fund		203.52	
Old Frt. Bill Corrections		410.40	
Gov't. Handling Chgs., Refunds, etc.		1,033.02	
Furniture—Office Supplies		25.15	
Total all Expense			3,371.75
Net Earnings for period			6,889.23

FINANCIAL STATEMENT

Assets		
Cash on Hand	293.55	
Est. Value War Surplus Material on hand	1,000.00	
Accounts Receivable	16,617.56	
Total Assets		17,911.11
Liabilities		
Accounts Payable		13,373.35
Surplus		$4,537.76

Summing up the affairs of the Equipment Department at the present time we find that the War Surplus Materials are practically disposed of in full, that the Department Car Operation is believed to be on a sound financial plan of operation and is functioning in an economical and satisfactory manner. The only employees in the Equipment Department at the present time is a Chief Mechanic who has charge of the operation of all cars and keeping them in condition and a bookkeeper who devotes such time as required to War Surplus Material and Car Operation accounts and the rest of the time to other Department work, which it is believed makes for the minimum overhead expense that could be employed in the supervision of these activities.

State of North Dakota

MOTOR VEHICLE REGISTRATION DEPARTMENT

Bismarck, North Dakota

Fred B. Ingstad, Registrar

August 20, 1926

N. D. State Highway Commission,

Bismarck, North Dakota.

Gentlemen:

In compliance with your request we beg to transmit for your Fifth Biennial Report, financial statements, schedules of receipts and distribution of motor vehicle license fees, for the period from July 1, 1924 to June 30, 1926, and expenditures of this office for the period from July 1, 1925, to June 30, 1926.

Respectfully submitted,

MOTOR VEHICLE REGISTRATION DEPARTMENT

By Fred B. Ingstad,

Registrar.

FINANCIAL REPORT
of the
MOTOR VEHICLE REGISTRATION DEPARTMENT
FOR THE PERIOD
JULY 1, 1924—DECEMBER 31, 1924

* * * * *

RECEIPTS

Motor Vehicle License Fees		
Passenger cars and trucks	$ 99,116.30	
Motorcycles	326.00	
Transfer of Ownership	10,508.00	
Duplicates	292.00	
TOTAL		$110,242.30

DISBURSEMENTS

Apportionment to Counties	$ 55,121.16	
Apportionment to State Highway Commission	55,121.14	
TOTAL		$110,242.30

MOTOR VEHICLE LICENSE RECEIPTS AND DISTRIBUTION THEREOF IN ACCORDANCE WITH INSTRUCTIONS CONTAINED IN SEC. 11, CHAP. 44, SPECIAL SESSION LAWS, 1919, AND CHAP. 73, SESSION LAWS, 1919.

* * * * *

JULY 1, 1924—DECEMBER 31, 1924

County	Total Receipts	County Share	Highway Share
Adams	1,056.05	528.03	528.02
Barnes	3,326.60	1,663.30	1,663.30
Benson	1,583.10	791.55	791.55
Billings	198.90	99.45	99.45
Bottineau	2,269.75	1,134.88	1,134.87
Bowman	975.45	487.72	487.73
Burke	1,243.20	621.60	621.60
Burleigh	5,354.60	2,677.30	2,677.30
Cass	8,358.90	4,179.45	4,179.45
Cavalier	1,963.35	981.68	981.67
Dickey	1,497.80	748.90	748.90
Divide	1,508.80	754.40	754.40
Dunn	909.65	454.82	454.83
Eddy	892.00	446.00	446.00
Emmons	1,089.60	544.80	544.80
Foster	1,018.75	509.38	509.37
Golden Valley	911.15	455.57	455.58

Grand Forks	6,162.40	3,081.20	3,081.20
Grant	1,401.75	700.87	700.88
Griggs	860.70	430.35	430.35
Hettinger	1,789.45	894.73	894.72
Kidder	996.80	498.40	498.40
LaMoure	1,596.00	798.00	798.00
Logan	593.00	296.50	296.50
McHenry	2,950.20	1,475.10	1,475.10
McIntosh	769.65	384.82	384.83
McKenzie	1,473.15	736.58	736.57
McLean	3,742.80	1,871.40	1,871.40
Mercer	1,250.10	625.05	625.05
Morton	3,197.55	1,598.78	1,598.77
Mountrail	2,776.85	1,388.42	1,388.43
Nelson	1,389.30	694.65	694.65
Oliver	316.40	158.20	158.20
Pembina	1,861.65	930.83	930.82
Pierce	784.50	392.24	392.26
Ramsey	2,917.75	1,458.88	1,458.87
Ransom	1,181.35	590.68	590.67
Renville	1,177.15	588.57	588.58
Richland	2,831.60	1,415.80	1,415.80
Rolette	1,060.05	530.03	530.02
Sargent	1,481.95	740.97	740.98
Sheridan	664.35	332.17	332.18
Sioux	470.05	235.03	235.02
Slope	657.70	328.85	328.85
Stark	3,542.15	1,771.08	1,771.07
Steele	1,224.65	612.32	612.33
Stutsman	4,402.40	2,201.20	2,201.20
Towner	1,007.70	503.85	503.85
Traill	2,159.95	1,079.98	1,079.97
Walsh	2,705.15	1,352.57	1,352.58
Ward	8,886.60	4,443.30	4,443.30
Wells	2,033.60	1,016.80	1,016.80
Williams	3,768.25	1,884.13	1,884.12
Total	110,242.30	55,121.16	55,121.14

FINANCIAL REPORT

of the

MOTOR VEHICLE REGISTRATION DEPARTMENT

FOR THE PERIOD

JANUARY 1, 1925—DECEMBER 31, 1925

* * * * *

RECEIPTS

Motor Vehicle License Fees		
Ford Passenger	$491,813.90	
Non-Ford Passenger	443,217.45	
Ford trucks	75,060.25	
Non-Ford trucks	39,232.85	
Motorcycles	1,397.00	
Transfer of Ownership	31,658.00	
Duplicates	1,194.00	
TOTAL		$1,083,573.45

DISBURSEMENTS

Maintenance State Highway Commission and Motor Vehicle Registration Department	$150,000.00	
State Bridge Fund	130,000.00	
Apportionment to Counties	401,786.72	
Apportionment to State Highway Comm.	401,786.73	
TOTAL		$1,083,573.45

MOTOR VEHICLE LICENSE RECEIPTS AND DISTRIBUTION THEREOF IN ACCORDANCE WITH INSTRUCTIONS CONTAINED IN SEC. 11, CHAP. 44, SPECIAL SESSION LAWS, 1919, AND CHAP. 73, SESSION LAWS, 1919 AS AMENDED BY CHAP. 167, SESSION LAWS, 1925.

* * * * *

JANUARY 1, 1925—DECEMBER 31, 1925

County	Total Receipts	Annual Deduction	County Share	Highway Share
Adams	9,290.33	2,239.72	3,525.31	3,525.30
Barnes	34,063.45	9,068.64	12,497.40	12,497.41
Benson	17,188.35	4,546.36	6,321.00	6,320.99
Billings	2,181.90	580.16	800.87	800.87
Bottineau	22,749.80	5,875.80	8,437.00	8,437.00
Bowman	8,119.40	2,062.48	3,028.47	3,028.45
Burke	15,517.05	3,988.46	5,764.29	5,764.30
Burleigh	39,783.40	9,570.96	15,106.21	15,106.23
Cass	93,466.70	25,031.58	34,217.56	34,217.56
Cavalier	20,265.77	5,275.76	7,495.00	7,495.01
Dickey	17,713.25	4,700.64	6,506.31	6,506.30
Divide	14,684.55	3,911.60	5,386.48	5,386.47
Dunn	8,926.25	2,282.00	3,322.12	3,322.13
Eddy	9,850.40	2,561.72	3,644.33	3,644.35
Emmons	16,551.25	4,265.94	6,142.66	6,142.65
Foster	11,496.20	2,995.86	4,250.17	4,250.17
Golden Valley	6,958.80	1,787.66	2,585.58	2,585.56
Grand Forks	57,516.85	15,005.20	21,255.82	21,255.83
Grant	11,771.75	2,920.12	4,425.82	4,425.81
Griggs	10,887.30	3,041.78	3,922.77	3,922.75
Hettinger	13,943.25	3,448.76	5,247.23	5,247.26
Kidder	9,869.60	2,546.18	3,661.71	3,661.71
LaMoure	19,712.10	4,960.48	7,375.81	7,375.81
Logan	9,163.80	2,431.94	3,365.93	3,365.93
McHenry	25,170.60	6,692.98	9,238.81	9,238.81
McIntosh	13,599.90	3,515.40	5,042.25	5,042.25
McKenzie	11,774.90	2,912.84	4,431.04	4,431.02
McLean	26,671.90	6,785.80	9,943.04	9,943.06
Mercer	11,546.10	3,025.82	4,260.14	4,260.14
Morton	32,159.60	8,162.98	11,998.30	11,998.32
Mountrail	20,657.20	4,876.20	7,890.52	7,890.48
Nelson	17,373.20	4,640.16	6,366.50	6,366.54
Oliver	4,167.90	1,092.56	1,537.68	1,537.66
Pembina	20,377.55	5,335.40	7,521.08	7,521.07
Pierce	11,242.00	2,858.94	4,191.52	4,191.54
Ramsey	32,623.35	8,531.18	12,046.09	12,046.08
Ransom	18,145.55	4,958.24	6,593.65	6,593.66
Renville	12,944.25	3,249.54	4,847.36	4,847.35

Richland	36,429.25	9,933.42	13,247.92	13,247.91
Rolette	9,987.25	2,597.42	3,694.91	3,694.92
Sargent	16,165.65	4,291.42	5,937.11	5,937.12
Sheridan	7,601.50	2,116.10	2,742.71	2,742.69
Sioux	4,180.70	967.40	1,606.65	1,606.65
Slope	4,988.25	1,246.42	1,870.91	1,870.92
Stark	24,730.85	6,055.00	9,337.93	9,337.92
Steele	12,618.30	3,339.28	4,639.50	4,639.52
Stutsman	42,345.40	10,874.78	15,735.30	15,735.32
Towner	11,402.30	2,930.06	4,236.13	4,236.11
Traill	22,074.05	5,901.56	8,086.24	8,086.25
Walsh	32,509.20	8,511.72	11,998.75	11,998.73
Ward	64,068.60	15,626.94	24,220.82	24,220.84
Wells	22,786.30	5,944.68	8,420.81	8,420.81
Williams	31,560.35	7,925.96	11,817.20	11,817.19
Total	1,083,573.45	280,000.00	401,786.72	401,786.73

FINANCIAL REPORT
of the
MOTOR VEHICLE REGISTRATION DEPARTMENT
FOR THE PERIOD
JANUARY 1, 1926—JUNE 30, 1926.

* * * * *

RECEIPTS

Motor Vehicle License Fees		
Ford passenger	$578,364.95	
Non-Ford passenger	668,746.80	
Ford trucks	94,723.25	
Non-Ford trucks	58,759.05	
Motorcycles	1,201.00	
Transfer of Ownership	19,298.00	
Duplicates	245.00	
TOTAL		$1,421,338.05

DISBURSEMENTS

Maintenance State Highway Commission and Motor Vehicle Registration Department	$150,000.00	
State Bridge Fund	130,000.00	
Apportionment to Counties	570,669.02	
Apportionment to State Highway Comm.	570,669.03	
TOTAL		$1,421,338.05

MOTOR VEHICLE LICENSE RECEIPTS AND DISTRIBUTION THEREOF IN ACCORDANCE WITH INSTRUCTIONS CONTAINED IN SEC. 11, CHAP. 44, SPECIAL SESSION LAWS, 1919, AND CHAP. 73, SESSION LAWS, 1919, AS AMENDED BY CHAP. 167, SESSION LAWS, 1925.

* * * * *

JANUARY 1, 1926—JUNE 30, 1926

County	Total Receipts	Annual Deduction	County Share	Highway Share
Adams	10,840.75	1,552.32	4,644.21	4,644.22
Barnes	44,234.40	10,420.76	16,906.82	16,906.82
Benson	22,443.40	4,119.92	9,161.75	9,161.73
Billings	2,683.90	309.12	1,187.39	1,187.39
Bottineau	30,815.90	5,822.32	12,496.78	12,496.80
Bowman	10,855.70	1,153.04	4,851.33	4,851.33
Burke	19,505.55	3,592.12	7,956.72	7,956.71
Burleigh	54,099.10	12,823.72	20,637.69	20,637.69
Cass	128,138.60	28,064.96	50,036.82	50,036.82
Cavalier	25,874.20	3,684.52	11,094.84	11,094.84
Dickey	23,844.60	5,270.72	9,286.94	9,286.94
Divide	15,624.35	2,492.56	6,565.89	6,565.90
Dunn	12,068.25	1,976.80	5,045.73	5,045.72
Eddy	12,578.85	2,042.60	5,268.13	5,268.12
Emmons	22,814.25	5,158.72	8,827.76	8,827.77
Foster	17,105.75	3,164.28	6,970.74	6,970.73
Golden Valley	7,765.35	1,089.20	3,338.07	3,338.08
Grand Forks	73,903.50	14,537.04	29,683.23	29,683.23
Grant	14,799.50	2,728.88	6,035.31	6,035.31
Griggs	13,552.45	2,439.92	5,556.26	5,556.27
Hettinger	16,563.60	2,596.16	6,983.73	6,983.71
Kidder	13,595.60	2,568.16	5,513.72	5,513.72
LaMoure	28,382.75	5,613.44	11,384.65	11,384.66
Logan	13,649.90	3,364.76	5,142.57	5,142.57
McHenry	31,557.50	6,584.20	12,486.65	12,486.65
McIntosh	19,739.35	4,714.08	7,512.64	7,512.63
McKenzie	15,181.40	2,382.24	6,399.57	6,399.59
McLean	33,503.45	6,837.60	13,332.93	13,332.92
Mercer	14,975.40	3,121.16	5,927.12	5,927.12
Morton	48,705.95	11,930.80	18,387.58	18,387.57
Mountrail	25,868.35	4,027.52	10,920.41	10,920.42
Nelson	22,109.00	4,012.96	9,048.02	9,048.02
Oliver	5,146.30	1,229.76	1,958.27	1,958.27
Pembina	26,870.75	4,810.96	11,029.90	11,029.89
Pierce	15,137.00	2,862.44	6,137.27	6,137.29
Ramsey	43,437.95	8,519.00	17,459.48	17,459.47
Ransom	23,853.70	5,188.96	9,332.37	9,332.37

Renville	16,506.40	2,964.08	6,771.16	6,771.16
Richland	46,094.00	9,405.48	18,344.26	18,344.26
Rolette	13,170.65	2,050.16	5,560.24	5,560.25
Sargent	19,820.85	3,668.84	8,076.01	8,076.00
Sheridan	10,002.85	2,101.68	3,950.58	3,950.59
Sioux	4,923.25	921.76	2,000.75	2,000.74
Slope	4,901.05	602.28	2,149.39	2,149.38
Stark	31,015.30	4,855.48	13,079.91	13,079.91
Steele	13,860.15	2,490.04	5,685.05	5,685.06
Stutsman	59,488.95	13,560.40	22,964.27	22,964.28
Towner	13,911.55	2,158.80	5,876.38	5,876.37
Traill	32,430.35	6,453.44	12,988.46	12,988.45
Walsh	41,943.15	8,547.56	16,697.79	16,697.80
Ward	81,841.65	15,074.08	33,383.78	33,383.79
Wells	30,610.25	6,118.56	12,245.85	12,245.84
Williams	38,991.35	6,219.64	16,385.85	16,385.86
Total	1,421,338.05	280,000.00	570,669.02	570,669.03

LEGISLATIVE APPROPRIATION
JULY 1, 1925—JUNE 30, 1927

* * * * *

BUDGET DISTRIBUTION:		Amt. Expended Jul. 1-25, June 30-'26	Balance June 30, 1926
Salaries	4,800.00	2,400.00	2,400.00
Clerkhire	24,000.00	13,550.50	10,449.50
Postage	21,500.00	15,841.42	5,658.58
Office Supplies	400.00	301.16	98.84
*Furniture & Fixtures	*1,652.00	1,449.22	202.78
Printing	4,000.00	2,880.28	1,119.72
Miscellaneous	850.00	778.07	71.93
Traveling Expense	1,000.00	653.74	346.26
Special Agents	2,000.00	1,876.27	123.73
**Tags	32,000.00	**12,204.27	19,795.73
Trans. Equip.	600.00	300.00	300.00
Refund Account, Advanced by Highway Commission	500.00	228.80	271.20
TOTAL	93,302.00	52,463.73	40,838.27

* $1,500.00 Appropriated by Legislature,
$ 152.00 Credited account by sale of old filing cases to Bank of North Dakota.

** One-half biennial appropriation credited by Treasurer July first annually; $12,766.44 borrowed from Bank of N. D. (authorized by Industrial Commission) to pay tag invoice due February, 1926. Repayment of loan made in July, after second half of appropriation was credited July 1, 1926, leaving balance of only $7,029.29 for 1927 tag contract of $15,782.60.

I, Fred B. Ingstad, duly appointed, qualified and acting Registrar of the Motor Vehicle Registration Department, do hereby certify that the foregoing financial statements, schedules of receipts and distribution of motor vehicle license fees, for the period from July 1, 1924 to June 30th, 1926, and expenditures for the period from July 1, 1925 to June 30, 1926, are correct as shown by the records of this office.

FRED B. INGSTAD,
Registrar.

Subscribed and sworn to before me this 20th day of August, 1926.

(SEAL)

J. E. RAND,
Notary Public.

My Commission expires March 2nd, 1932.

TWELFTH

BIENNIAL REPORT

OF THE

STATE ENGINEER

From July 1st, 1924 to June 30th, 1926

Officers and Regular Employees for the Biennial Period:

W. G. BLACK.....State Engineer
July 1st, 1924 to Sept. 15th, 1925

H. C. FRAHM.....State Engineer
Sept. 15th, 1925 to June 30th, 1926

GEO. H. McMahon.....Assistant State Engineer
July 1st, 1924 to Jan. 7th, 1926

ROBT. E. Kennedy.....Assistant State Engineer
Mar. 20th, 1926 to June 30th, 1926

J. N. ROHERTY.....Assistant State Engineer
April 1st, 1926 to June 30th, 1926 (part time)

CLARA CHRISTENSON.....Stenographer
July 1st, 1924 to July 1st, 1925

GWENDOLYN JONES .....Stenographer
July 1st, 1925 to Jan. 31st, 1926

SYLVIA SELL .....Stenographer
Feb. 1st, 1926 to June 30th, 1926

Temporary Employees

The following were employed for intermittant periods, mostly during the summer months.

W. C. BROUGHTON.....Assistant Engineer

ARTHUR JOHNSON.....Typographer

A. O. SORLIE.....Instrumentman

M. DIEHL.....Instrumentman

Byron Personius, Harold Bowes, Robt. Jacobson, John H. Rider, John Rutherford, John Peterson, Frank L. Whaley, Earl Hamnock, E. W. Shields, Harold E. Tooley, Erling Thorson, E. Russel Watkins, Darrel Gooler, were employed as laborers and rodmen.

FINANCIAL STATEMENT

July 1st, 1924 to June 30, 1925

Balance in Fund June 30, 1924	$10,449.17	
Transfer to Clerkhire Fund	300.00	
Transfer to Travel Fund	200.00	
Transfer to Hydrographic Fund	100.00	$11,049.17
Less Expenditures	9,730.87	
Less 1923 Prior Balance Reverted to General Fund	928.21	10,660.08
Balance in State Engineer's Fund June 30, 1925		389.09

July 1st, 1925 to June 30th, 1926

Balance in Fund June 30, 1925	389.09	
Credit by Appropriation	21,140.00	21,529.09
Less Expenditures		11,484.39
Balance in State Engineer's Fund June 30, 1926		$10,044.70

Fees of State Engineer's Office July 1, 1924 to June 30th, 1926

For Field Notes	$22.52
For Water Rights	25.00
For Township Plats	12.00
For Water License	3.00
For Proof of Publication	7.25
Credited to General Fund	69.77

FINANCIAL STATEMENT IN ACCORDANCE WITH THE SUBDIVISIONS OF THE APPROPRIATION FOR THE STATE ENGINEER'S OFFICE

	Budget Bill	S. B. No. 25		Budget Bill	S. B. No. 52	
	Balance July 1, 1924 and Transfer	Expenditures	Balance June 30, 1925	Balance July 1, 1925	Expenditures	Balance June 30, 1926
State Engineer Salary	2,500.04	2,500.04	0.00	5,000.00	2,499.97	2,500.03
Clerkhire	4,300.04	4,239.65	60.39	8,240.00	3,577.97	4,662.03
Postage	184.90	161.15	23.76	300.00	0.00	300.00
Supplies	151.24	148.33	2.91	300.00	1.68	298.32
Furniture & Fixtures	589.32	585.39	3.93	300.00	96.39	203.61
Printing	694.51	594.92	99.59	300.00	2.47	297.53
Miscellaneous	175.92	164.15	11.77	200.00	0.00	200.00
Travel	1,025.32	838.58	186.74	2,000.00	1,458.59	541.41
Hydrographic	499.67	499.67	0.00	1,000.00	715.14	284.86
Field Assistants				2,000.00	1,959.73	40.27
Transportation & Equipment				1,500.00	1,000.00	500.00
Prior	928.21	928.21		389.09	172.45	216.64
TOTALS	11,049.17	10,660.18	389.09	21,529.09	11,484.39	10,044.70

GEOLOGICAL SURVEY

Appropriation S. B. No. 189 Session Laws 1925

Appropriation	$25,000.00
Expenditures July 1, 1925 to June 30, 1926	10,794.45
Balance June 30, 1926	$14,205.55

HISTORICAL STATEMENT

The Department of the State Engineer originally concerned itself mainly with irrigation and coal mining. The 1919 Legislature relieved the Department of the coal mine inspection. Since 1917 the highway work has taken an increasingly greater part of the time and attention of the State Engineer. The other features of the Department—such as irrigation, flood control, and the water resources of the state have been under the supervision of the Assistant State Engineer.

THE MISSOURI RIVER DIVERSION

Persistant prominence is attaching itself to the Missouri River Diversion scheme as the only solution of several of the serious problems which have arisen in the eastern part of the state. The most urgent need just now is an additional water supply for municipal and sewage dilution purposes for some sixteen cities on the Sheyenne River in this state and the James River in this state and South Dakota. A serious water shortage with its attendant fire hazard is threatening several of these cities and some have no way in sight at the present time to get additional water. As the problem is studied, we find that it concerns the Cities of the James River Valley in South Dakota as closely and perhaps more imminently than most of our North Dakota cities. Legislation, looking to interstate cooperation in the project, will be necessary before the problem can be worked out.

Another situation while not so vital is nevertheless serious. The people of this area are losing their playgrounds. The lakes of eastern North Dakota are fast passing away. Devils Lake is typical. Once it was Dakota's majectic "inland sea," abounding in fish and wild fowl. Now, more than half of it has disappeared. Where once floated the leisurely canoe, now rushes to and fro the racous tractor and the swift automobile. From these parts the lake has departed forever.

There are wide bottom areas, however, which are now brackish, ill-smelling alkali flats. A few feet of water would afford enormous storage and restore the lake to much of its former glory and usefulness.

The only source of water for these needs, apparently,is a part of the flood waters of the Missouri River, the general water level of which is some 260 feet above Devils Lake. The most feasible way to obtaining it is thought to be by means of a tunnel from a point near the Big Bend in the Missouri River near Garrison to the vicinity of Dodgen Butte. The engineering details cannot be worked out and definite statements are not possible until the topographical survey is completed which is now being made by the U. S. Geological Survey in cooperation with the State. The survey is expected to reveal not only the most desirable tunnel site but also the general route of the necessary ditches, as well as large areas of cultivated farm lands which it has been suggested could obtain a supplemental supply of water for crop insurance during years of deficient rainfall.

The plan at present is to divert the water from the mouth of the tunnel into drainage courses leading to Devils Lake, and the James and Sheyenne Rivers, all of which have headwaters close together. From Devils Lake an old channel into the Sheyenne River can be utilized to supply cities on that stream with water stored in the lake. Numerous lakes on the James River such as the Arrowwood and Jim Lakes would afford storage for cities on that river. In fact, the headwaters of these streams could be made into the land of a thousand lakes, if need arose for such storage.

MOUSE RIVER FLOODS

The City of Minot has suffered four disastrous floods in the last twenty-three years, during which gaging records have been kept in the following order of magnitude:

Year	Cu. Ft. Per Sec.
1904	12,000
1916	4,340
1925	3,500
1923	3,460

This is an average of one about every six years. The last two were only two years apart. A longer period of record will change the probable frequency to some extent but they have been coming and will continue to come with more or less certainty. The flood hazard area comprises a beautiful residence section and the main wholesale and railroad district. The flood problem is a live problem in that city and one to which this Department hopes to be able to contribute something of interest and value.

FEDERAL ENGINEER VISITS STATE

Mr. Geo. E. Stratton, Engineer for the Bureau of Reclamation ,spent the month of July and most of August, 1926, within the state checking up some of the earlier reports made by the Reclamation Service and looking over some of our larger engineering problems. He spent several days on the Heart River looking over its irrigation and flood prevention possibilities. He checked up favorably on the Bowman project in the southwestern corner of the state. He spent several days in company with the Assistant State Engineer going over the Mouse River flood problem and the Buffalo Lodge area in the Mouse River Loup. He, also, spent a couple of days at Devils Lake. We await his report with interest.

TOPOGRAPHICAL MAPPING

Under an appropriation of $25,000.00 by the 1925 session of the Legislature, which was matched by an equal amount from the Federal Government, the U. S. Geological Survey is making a topographical map of the general area between Minot, the Missouri River and Devils Lake.

The Mouse River Valley from the Canadian line to Verendrye, where the Great Northern R. R. crosses it, has been mapped by what is known as a strip survey showing the valley and adjacent hills only. This is essential to any intelligent study of the Mouse River floods.

Regular sheets have been completed of the area in the vicinity of Coleharbor, Benedict, Sawyer, Minot, Kongsberg, and Dogden. This covers the area in which will probably be located the proposed Missouri River Diversion tunnel. Besides this mapping, levels and preliminary work have been done for some five or six additional sheets. The work will not be complete until the area from the present work to Devils Lake and Devils Lake itself has been mapped.

THE MOUSE RIVER LOOP PROJECT

By Geo. H. McMahon, Asst. State Engineer, Bismarck, N. Dak.
October 1, 1925.

This project is located within the Mouse River Loop in North Dakota and contemplates the irrigation of a minimum area of 30,000 acres. The ultimate extension of this project is limited only by the storage capacity of various reservoir sites in the Mouse River Valley and the economic limit of storage in Buffalo Lodge Lake, Goose Lake, and a reservoir site in the Valley of Cut Bank Creek south and west of Upham that would be suitable for the storage of return waters for the irrigation of the Mouse River flats between Upham and the Canadian border.

Storage could be obtained by sharing the cost of the proposed retention reservoir on the Mouse River above Minot. It is quite probable, however, that in the earlier stages of the project sufficient storage could be obtained at a lower cost at the reservoir sites already mentioned.

This project was first studied by the U. S. Reclamation Service in 1904, but was abandoned due to the high cost of the diversion plan then proposed. During the present season this office has worked out a diversion scheme that can be developed at a comparatively low cost.

Water Supply

The accompanying chart shows the annual discharge of the Mouse River for the past 23 years. The flow of the stream is somewhat irregular. Storage, however, may be provided at a comparatively reasonable cost. The highwater period of the stream invariably occurs late in April after the danger of ice gorges is past. The stream is of a sluggish nature and the silt content is extremely low. These facts, together with the long duration of the spring floods, tend to simplify the problems of diversion and storage.

As the rainfall averages in excess of fourteen inches, a gross duty of water equal to a depth of 18 inches per annum may be assumed. This will require a diversion of 45,000 acre feet per annum. The discharge of the Mouse River, measured over a twenty-three-year priod,

has fallen below 45,000 acre feet in three years out of twenty-three. On only one year out of twenty-three was the flow less than 30,000 acre feet, or the equivalent of one acre foot per acre.

It, therefore, seems safe to assume that 30,000 acres may be irrigated without providing year to year storage.

As the average flow of the stream over a twenty-three-year period exceeds 100,000 acre feet, it seems safe to assume that an additional 10,000 acres could be developed with a secondary water right. It is thought that if this area were in hay lands, the losses through a failure of the water supply would not be excessive.

Soils

The soils on this project are for the most part a fine sandy loam and are highly productive under favorable rainfall conditions.

This subject is treated in detail in a report of a soil survey made in 1921 by the Bureau of Soils of the U. S. Department of Agriculture, in cooperation with the North Dakota Agricultural Experimental Station.

Topography

The topography of the irrigable areas is marked by a long low ridge extending to the northeast from Buffalo Lodge Lake. This ridge offers an excellent canal location. The gentle slopes on each side of the ridge will make for low cost distribution.

The project will require a low ditch grade throughout. The almost entire absence of silt in the Mouse River will make this low ditch grade practicable.

The nature of the soil, it is believed, will somewhat lessen the difficulties of providing drainage for this project. Natural drainage channels may ultimately have to be deepened or straightened to some extent.

Verendrye Diversion Dam

The type of dam to be constructed at Verendrye is a low earthen dike with a top width of 24 feet and a slope of 3:1 on the upper slope and 2:1 on the lower slope. The intention being to use the top of the dam as a highway location. An earth fill of 80,000 cubic yards will be required. This dam will require a spillway with a minimum length of 150 feet.

If the proposed flood control dam above Minot were built prior to the construction of this dam, a spillway of not to exceed 70 feet in length would no doubt be sufficient.

The greatest measured flow, that of April 20, 1904, was 8,000 second feet. This flow continued for a ten-day period. During this period the flood peak was estimated to be 12,000 second feet.

There are three possible locations for the proposed dam. The most favorable location is just north of the highway leading west from Verendrye. A possible objection to this site is the effect of the action of ice on the piers and columns of the railway trestle just above the dam site, as well as the cost of riprap on both banks of the railway fill.

An alternative location would be just above the railway trestle. This location, however, will necessitate the construction of an outlet tunnel through the railway fill.

A plan to build the dam as an integral part of the railway fill has also been considered. By this plan the railway fill would form the lower toe of the dam, utilizing the top of the dam as a roadway.

As the fall of the river above Verendrye does not exceed one foot per mile, a considerable volume of storage may be made by raising the spillway level another five feet in El. 1500. This would be the highest possible elevation without flooding the low lying sections of the town of Velva. The only objection to this plan would be the probable high cost of the additional land required.

Distribution System

The irrigable lands are of uniform slope with a general fall of five to ten feet per mile. There is practically no cross drainage either on the main diversion canal or on the proposed distribution system.

Plan of Development

The project proposes the diversion of the waters of the Mouse River through a chain of sloughs lying between a point four miles north of Verendrye and Buffalo Lodge Lake. The first unit of the project comprises 5,000 acres of excellent soil and lies in the Mouse River Valley immediately below the site of the diversion dam. It is thought that a maximum expenditure of $250,000 will provide irrigation for this unit, and also provide the diversion dam and the diversion canal leading to the divide between the Mouse River and Buffalo Lodge Lake.

The material to be excavated for a diversion ditch through this divide will amount to 507,000 cubic yards. The proposed ditch will have a 10 ft. bottom width, will be eight feet deep, and will carry 234 cu. ft. per second. The grade of the proposed ditch will be six inches per mile.

Buffalo Lodge Lake Storage

It is proposed to build a long low dike on the North line of Sec. 32, T. 157 N., R. 78 W., and raise the lake to El. 1488—twelve feet above its present level, providing a storage capacity of 29,000 acre feet to El. 1485—and 50,000 acre feet to El. 1488.

From this point the main canal will follow a long low ridge in the general direction of Bantry.

Upham Reservoir Site

For better utilization of return waters additional storage may be provided by constructing a low carthen dam across a narrow point on Cut Bank Creek immediately west of Upham, providing storage for the irrigation of the lands of the Mouse River bottoms north and east of

Upham. Possibly, in excess of ten thousand acres could be irrigated below this dam site. As this reservoir site would not be needed until the later stages of the project, no further study was made during the present season.

Settlement Plan

The land is practically all in private ownership and many of the farms have good buildings, are well fenced, and windbreaks of cottonwood timber are very general.

A very large proportion of the farms have been abandoned through foreclosure, the land being in the hands of loan companies, banks and insurance companies. This is due to a long series of dry seasons coupled with a gradual decline in the ground water level, which is general throughout the Mouse River Loop District.

In some areas over 75% of the settlers have left, abandoning good houses and farm buildings. The investment in home and farm improvements would no doubt be equal to the cost of developing this project. The project is surrounded by a very extensive dry land area largely in small grains. Settlers for the greater part of this project could be secured in this adjacent dry land territory.

Conclusion

Everything considered, this project appears to merit all possible help from state or federal agencies.

LOWER YELLOWSTONE PROJECT

By H. A. Parker, Superintendent.

The Lower Yellowstone Federal Reclamation project contains a total irrigable area of about 59,000 acres. Of this, about 20,000 acres are in the State of North Dakota. During the past two years the project has been strickly on an operation basis, no new constructon being undertaken. The distribution system is practically completed but drainage construction estimated to cost $500,000, will be required to reclaim lands already water-logged or threatened with a high-water table.

During 1924 about 14,000 acres were irrigated. In 1925 this was increased to over 18,000 acres of which about one-third was in North Dakota. The failure of the settlers to use the water is one of the reasons for delay in development of this project. If irrigation were unprofitable, there might be some excuse for this but a comparison of returns from the irrigated and non-irrigated lands dispels all doubt of the value of the water. The following figures give this comparison:

Year	Value of Irrigated Crop per Acre	Value of Non-irrigated Crop per Acre
1924	$39.10	$15.11
1925	35.14	14.41

The per acre cost of water has been as follows:

Year	Construction Repayment	Operation and Maintenance	Total
1924	$0.90	$1.15	$2.05
1925	0.90	1.60	2.50

A beet sugar factory was erected at Sidney in time to handle the 1925 crop. This makes a saving of freight charges to the beet growers of approximately $1.00 per ton of beets. It, also, furnishes a large amount of excellent forage in the form of pulp, and feeding operations have already shown a substantial increase. Feeding of all forage crops on the farms is of inestimable value on account of the increase in the available supply of fertilizer.

On May 25, 1926, Congress passed an Act intended to put the Reclamation projects on a sound financial and economic footing. New contracts are now being negotiated on the lower Yellowstone putting this legislation into effect. Some of the principal items are:

(a) A reduction in the cost of the project of $382,254.

(b) The repayment of construction charges on the basis of 5% annually of the average gross acre income during the preceding ten years.

(c) The suspension of all charges against 10,801 acres of temporarily unproductive lands because of forest covering, waterlogging, etc.

(d) The management of the project to be taken over by the water users on December 31, 1931.

Realizing the necessity of more settlers, the Government is obtaining options on at least 8,000 acres of non-cultivated or poorly cultivated land. These options carry long time payment terms and care will be exercised in the selection of settlers as to their capital and experience. When the options are all obtained, a settlement campaign participated in by the Government and the interested railroad companies will be vigorously pushed.

* * * * *

FILINGS MADE UNDER THE IRRIGATION CODE, JULY 1, 1922, TO JUNE 30, 1926.

No.	Name of Applicant	Land to be Irrigated	Source of Supply	Amt. of Water Claimed Sec.-Ft.	Acres	Date of Claim
156	F. W. Haas	Parts of Sec. 19, T. 144 N. R. 86 W.	Brady Creek	2.70	216	July 2, 1923
157	August Johnson	Parts of Sec. 17 and 20, T. 144 N. R. 82 W.	Missouri R.	5.28	420	July 23, 1923
158	W. S. Williams	Parts of Sec. 31, 32, 33, T. 134 N. R. 71 W. and 4, 5, 6, T. 135 N. R. 71 W.	Beaver Lake	32.00	2,560	Aug. 20, 1923
159	Andrew Ostlund	Parts of Sec. 11, T. 129 N. R. 98 W.	Coulee	1.00	80	Nov. 16, 1923
160	N. P. Railway		Spring Creek	2.00	.....	Nov. 8, 1923
161	N. P. Railway		Spring Creek	2.00	.....	Nov. 8, 1923
162	Knife R. Coal Mining Co.		Knife River	2.00	.....	Aug. 11, 1924
163	Fred Moench	Parts of Sec. 23, T. 144 N. R. 89 W.	Spring Creek	0.44	30	Dec. 4, 1924
164	Wm. H. Brown Co.	Parts of Sec. 2, T. 133 N R. 93 W.	Cannon Ball R.	1.00	80	Feb. 2, 1925
165	Koesel & Schafer	Parts of Sec. 10, 8, 15, T. 142 N. R. 91 W.	Knife River	2.90	232	Aug. 1, 1925
166	Wm. Gibb	Parts of SE¼, Sec. 31, T. 154 N. R. 92 W. and of Sec. 5, T. 153 N. R. 92 W.	A Spring	2.00	160	Dec. 1, 1925

SURFACE WATER SUPPLY OF NORTH DAKOTA

1882 - 1925

SURFACE WATER SUPPLY OF NORTH DAKOTA
1882—1925

Introduction

This compilation of all the measurements of the streams and lakes of North Dakota, wherever authentic records have been kept, is here published to fill a long felt want for such a book of reference on the part of engineers and others interested in the water resources of the State. Besides those within the state there are included the Minnesota streams which directly affect the welfare of the North Dakota cities on the Red River, the Canadian records on the Mouse River which causes extensive flood damage within the state, and the Yellowstone River records which directly affect the welfare of irrigation interests on that stream within this state.

It would be difficult, even impossible at times, to obtain access to the sixty-five or more publications which have been consulted in this work. Some are no longer available for general distribution. Some of the information is here published for the first time.

Acknowledgments

This is the work of Dean E. F. Chandler, (P. O., University, North Dakota), Hydraulic Engineer for the U. S. Geological Survey, who has had charge of this region for twenty-three years. He gave a large amount of time, and personally made careful comparison of the various published tables with original records, wherever possible, to eliminate all possible errors and misprints. Furthermore, he has filled out by estimate, so far as possible, the lacking months or portions of months in many of the records wherever a comprehensive survey of the adjacent records seem to warrant. The results as here printed are deemed by Professor Chandler as good as the data will justify. In general, the tables may be considered well founded and correct except where otherwise indicated and as having no errors exceeding 10% or at worst 15%.

References

At the close of each table is printed by volume and page the reference from which the data was obtained, if it is in published form. The records of the last two years were taken from Dean Chandler's unpublished computations. The following initials are used:

W. S. ="Water Supply Paper" of U. S. Geol. Survey.
St. E. = Biennial Report of North Dakota State Engineer.
W. R. P. ="Water Resources Paper" of Dominion Water Power Branch, Dept. of Interior, Canada.
W. S. B. ="Water Supply Bulletins", Reclamation Service, Dept. of Interior, Canada.

Note should be made of the fact that from 1913 the government records are divided according to the climatic year which begins with October of the year previous to the one indicated in the reference.

Units Used

The discharge for the month or period indicated is the total flow in acre feet. Acre foot is enough water to cover an acre one foot deep. The figures for maximum and minimum flows are in second feet, being the flow of one cubic foot of water in one second of time. A flow of one second-foot amounts to 1.983 acre-feet in one day or to 59.5 and 61.5 acre-feet in a thirty and thirty-one day month respectively. One second-foot also equals 448.8 gallons per minute.

The notations used are as follows:

† indicates that the quantity was "partly estimated" or extended from only partial measurements and incomplete records. The figures may be expected to be perhaps as much as 20 or even 30% in error.

* indicates that the figure was entirely "estimated" either by local observers or by comparison by Dean Chandler with adjacent and better river records, or other data. He states they are unquestionably uncertain but they are inserted where possible, because they give a better idea of the approximate behavior and seasonal flow of the stream than a blank space. They are presumably within 50% of correct unless the flow is so small that even if it were doubled or cancelled, the effect on hte total for the year would be negligable.

‡ indicates the "maximum crest discharge" when it was different than the average for the day and the observer happened to catch it. Otherwise, the maximum discharge is the average for the day.

Attention should be called to the fact that the minimum as given is not the absolute minimum, necessarily, unless the guage readings were maintained during the winter months.

MISSOURI RIVER NEAR WILLISTON, NORTH DAKOTA

Location: At Baker's Ferry, in or near Section 32, T. 153 N., R. 100 W. about ten miles downstream from Williston.

Drainage Area: 167,530 sq. miles.

	1905	1906	1907
	Ac.-ft.	Ac.-ft.	Ac.-ft.
Jan.		310,000†	
Feb.		329,000†	
March	2,150,000†	599,000†	4,790,000
April	583,000†		4,020,000
		(26—31)	(1—22)
May	1,080,000†	985,000	2,190,000
June	4,050,000	5,570,000	
July	3,380,000	3,240,000	
August	1,190,000	1,550,000	
Sept.	422,000	916,000	

Oct.	473,000	544,000	
Nov.	480,000	545,000†	
Dec.	401,000†		
Total	14,209,000	14,588,000	
Max.	June 8	June 10	
C.f.s.	83,800	155,000	
Min.	Sept.	Oct.	
C.f.s.	6,000	8,340	
W. S.	246	246	246
Page	42	42	42
St. E.	2	2	
Page	66	66	

MISSOURI RIVER NEAR BISMARCK, NORTH DAKOTA

Location: Gage at Northern Pacific Railway bridge near the southwest corner of T. 139 N., R. 80 W.

Discharge Measurements made at Fort Lincoln Ferry about four miles downstream from bridge, and include discharge of Heart River

Drainage Area. 190,650 sq. miles.

	1904	1905	1906
	Ac.-ft.	Ac.-ft.	Ac.-ft.
Jan.		727,000†	423,000†
Feb.		535,000†	388,000†
March		919,000†	645,000†
April		607,000	862,000†
May		839,000	
June		2,739,000	
July		2,522,000	
August		1,321,000	
Sept.		577,000	
Oct.	625,000	519,000	
Nov.	619,000	512,000	
Dec.	1,029,000	481,000†	
Total	2,273,000	12,298,000	2,318,000
Max.		June 10	
C.f.s.		59,440	
Min.		Oct.	
C.f.s.		7,680	
W. S.	172	172	
Page	32	32	
Water Supply Paper	P. 32	P. 32	
St. Engr.		2	
Page		66	

MISSOURI RIVER GAGE HEIGHTS NEAR BISMARCK, N. DAK.

Average gage heights for the month

Zero of gage is 1617.2 feet above mean sea level.

Mo. Yr.	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903
Jan.							3.4	3.0	1.9	3.2	3.9
Feb.							4.2	2.8	3.0	1.6	3.8
March						5.8	7.9	6.6	5.2	7.3	3.9
April					10.7	5.7	10.4	4.4	2.6	4.3	3.8
May	4.4	6.8	5.7	4.4	6.6	5.8	6.2	6.0	5.6	4.5	3.5
June	8.5	11.8	6.6	9.8	7.8	10.5	9.5	7.5	8.0	7.9	7.2
July	6.9	8.7	6.7	8.0	6.1	7.8	9.8	4.2	5.7	6.3	6.7
Aug.	3.8	4.7	4.3	4.2	3.6	4.1	5.1	2.3	2.3	3.4	4.2
Sept.	2.3	3.4	2.6	2.9	2.2	2.9	2.8	1.5	1.7	1.1	2.6
Oct.	2.4	3.0	2.3	2.5	1.9	2.3	1.8	1.2	1.4	0.6	1.5
Nov.					2.6	2.5	2.1	1.8	0.6	1.5	0.9
Dec.					3.5	3.4	2.1	3.1	2.3	2.3	1.4
Av. Stage May to Sept	5.2	7.1	5.2	5.9	5.3	6.2	6.7	4.3	4.7	4.6	4.8
Max. Gage	13.6	16.6	9.6	13.7	22.1	9.1	21.2	22.8	11.0	9.6	12.4
Date					4/8	4/15	4/14	4/3	4/5	3/19	4/6

MISSOURI RIVER GAGE HEIGHTS NEAR BISMARCK, N. DAK.

Average gage heights for the month

Zero of gage is 1617.2 feet above mean sea level.

Mo. Yr.	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914
Jan.	1.4	2.4	0.7	2.3	3.6	3.3	3.7	2.1	2.3	2.1	—0.4
Feb.	0.5	2.1	1.0	3.1	3.3	4.0	4.7	2.6	3.1	1.0	—1.4
March	3.2	3.6	2.5	7.8	4.4	7.8	7.2	4.5	4.3	3.2	3.1
April	7.1	0.3	2.0	5.7	5.1	5.0	3.2	1.8	7.2	5.7	2.8
May	5.1	1.3	3.3	4.6	4.5	3.6	5.7	2.3	3.2	2.4	4.0
June	7.9	6.3	8.0	8.4	11.2	11.7	6.3	6.5	6.2	6.7	7.2
July	6.1	5.7	4.5	9.6	8.1	8.8	3.9	4.7	5.5	4.0	4.1
Aug.	2.7	2.9	2.1	5.6	4.2	4.1	2.7	2.3	3.0	2.5	0.5
Sept.	0.7	0.1	1.3	3.1	2.6	2.4	2.4	2.1	1.3	0.3	—0.9
Oct.	—0.3	—0.5	0.4	2.2	2.2	1.6	2.9	2.1	1.5	0.8	0.5
Nov.	0.4	—0.3	1.0	1.9	2.8	2.7	1.5	1.9	1.3	0.8	1.3
Dec.	1.8	—0.1	1.9	3.4	3.2	3.5	1.6	2.2	2.3	—0.3	0.9
Av. Stage May to Sept.	4.5	3.3	3.8	6.3	6.1	6.1	4.2	3.6	3.8	3.2	3.0
Max. Gage	14.2	9.1	12.9	12.2	15.1	13.9	26.4	11.2	17.2	18.6	11.6
Date	Apr. 7	3/23	4/2	6/29	6/19	6/26	3/14	3/25	4/6	4/7	4/7
Min. Gage								0.9	0.7	—3.1	—1.7
Date								Dec. 2	9/9	12/12*	2/22*

*Other Dates Also.

MISSOURI RIVER GAGE HEIGHTS NEAR BISMARCK, N. DAK.

Average gage heights for the month

Zero of gage is 1617.2 feet above mean sea level.

Mo. Yr.	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926
Jan.	—0.5	0.9	2.0	1.2	4.5							
Feb.	—1.1	1.4	3.5	2.7	3.8							
March	0.0	11.4	4.8	7.8	3.1							
April	3.1	6.5	8.5	4.2	5.2	3.8	1.5	4.9	3.7	5.7	4.9	1.9
May	2.9	3.5	4.7	3.9	2.5	4.2	2.7	3.0	3.1	4.9	3.9	4.6
June	5.9	6.6	8.9	7.9	4.0	7.3	7.7	5.8	7.2	6.4	7.0	4.6
July	5.5	8.9	7.9	6.6	0.9	6.9	3.6	3.0	6.2	5.2	5.7	3.4
Aug.	3.6	3.3	2.9	4.0	—0.1	2.9	0.1	1.4	2.3	0.0	2.7	
Sept.	2.5	1.1	1.2	1.8	—0.4	1.6	—0.4	—0.1	0.9	—1.2	1.5	
Oct.	2.5	1.2	1.3	2.2	0.4	1.5	—0.4	—0.6	2.9	1.1		
Nov.	1.4	2.4	0.9	1.5	0.8	2.4	—0.6	—0.7	1.2	1.8		
Dec.	2.2	2.3	0.8	3.3		1.6						
Av. Stage May to Sept.	4.1	4.7	5.1	4.8	1.4	4.6	2.7	2.6	3.9	3.1	4.2	
Max. Gage	9.6	15.3	23.6	13.6	15.6	18.5	12.7	9.8	11.0	9.5	13.0	14.6
Date	Apr. 7	3/20	4/8	3/23	4/5	3/29	6/24	4/3	4/9	4/8	3/29	3/22
Min. Gage	—1.3	—0.1	0.1	0.2	—0.1	1.1	—0.8	—0.9	0.3	—1.5	1.2	
Date	Mar. 15*	1/31	11/30	1/1	9/2	12/11	10/9*	10/26*	9/24*	9/14*	9/11—14	

*Other Dates Also.

YELLOWSTONE RIVER, INTAKE, MONTANA

Location: Glendive, Mont., until 1911. Intake, Mont., 1912 to date. Drainage area: 66,090 square miles.

Year—	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912
Month	Ac. Ft.	Ac. Ft.	Ac. Ft.	Ac. Ft.	Ac. Ft.	Ac. Ft.	Ac. Ft.	Ac. Ft.	Ac. Ft.	Ac. Ft.
January	----------	350,500	----------	----------	----------	----------	----------	338,000	215,000	----------
February	----------	327,900	----------	----------	----------	----------	----------	278,000	222,000	----------
	(16-31)		(20-31)		(24-31)					(27-31)
March	557,000	350,500	111,200		154,000			1,160,000	570,000	675,000
						(8-30)				
April	369,300	329,200	260,300	637,000	413,000	385,000	335,000	593,000	351,000	1,340,000
May	664,100	1,660,300	594,200	1,540,000	1,270,000	1,310,000	861,000	1,760,000	787,000	1,300,000
June	2,415,600	3,265,700	2,854,000	2,470,000	3,170,000	3,620,000	4,420,000	1,920,000	3,320,000	3,250,000
July	1,726,800	2,059,800	1,798,000	1,620,000	3,940,000	2,750,000	3,090,000	953,000	1,690,000	2,790,000
August	861,600	797,400	683,100	947,000	1,480,000	1,010,000	1,030,000	497,000	953,000	1,260,000
September	460,400	492,300	330,800	525,000	690,000	513,000	720,000	432,000	589,000	797,000
October	421,800	----------	363,800	345,000	505,000	584,000	470,000	358,000	411,000	836,000
	(1-15)					(1-10)				
November	339,500	----------	294,000	331,000	363,000	153,000	185,000	328,000	283,000	562,000
		(1-5)			(1-12)					
December	350,500	76,500	----------	----------	128,000	----------	----------	277,000	246,000	304,000
Total	8,166,600	10,210,100	7,289,400	8,415,000	12,113,000	10,325,000	11,111,000	8,894,000	9,687,000	13,114,000
Max.	June	June 23	June 8	June 8	June 24	June 18	June 9	June 2	June 22	March 29
C.f.s.	62,300	77,900	67,800	79,400	90,600	86,400	107,000	31,600	78,400	114,000
Min.	April	Jaunary	April	October	December	April	November	November	October	December
C.f.s.	4,600	5,700	3,750	5,420	4,860	4,640	5,880	5,330	6,000	2,950
W. S.	180	180	172	208	246	246	266	286	306	326
Page	126	126	100	92	150	152	152	147	156	154

YELLOWSTONE RIVER, INTAKE, MONTANA

Location: Glendive, Mont., until 1911. Intake, Mont., 1912 to date. Drainage area: 66,090 square miles.

Year—	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922
Month	Ac. Ft.	Ac. Ft.	Ac. Ft.	Ac. Ft.	Ac. Ft.	Ac. Ft.	Ac. Ft.	Ac. Ft.	Ac. Ft.	Ac. Ft.
January	312,000	.....	192,000	.....	.....	.....	306,000	368,000	.....	.....
February	258,000	.....	178,000	.....	.....	.....	267,000	.....	.....	.....
				(11-31)		(20-31)				(21-31)
March	601,000	491,000	341,000	1,010,000	.....	785,000	646,000	.....	542,000	395,000
					(8-30)					
April	1,040,000	555,000	511,000	553,000	1,151,000	690,000	631,000	564,000	342,000	541,000
May	1,870,000	1,810,000	1,020,000	1,070,000	1,620,000	1,180,000	818,000	1,470,000	990,000	190,000
June	3,520,000	3,170,000	2,710,000	2,760,000	3,680,000	4,600,000	690,000	3,180,000	3,840,000	2,930,000
July	1,760,000	1,320,000	2,120,000	2,910,000	3,390,000	2,070,000	204,000	2,310,000	1,100,000	1,120,000
August	1,150,000	554,000	1,090,000	928,000	824,000	781,000	217,000	670,000	358,000	599,000
September	489,000	379,000	768,000	404,000	595,000	523,000	224,000	405,000	249,000	342,000
October	461,000	479,000	701,000	460,000	467,000	614,000	303,000	386,000	229,000	.....
									(1-13)	.....
November	377,000	387,000	339,000	409,000	396,000	460,000	440,000	390,000	100,000	.....
December	330,000	234,000	398,000	354,000	405,000	453,000	389,000	.....	257,000	.....
Total	11,663,000	9,379,000	10,363,000	10,858,000	12,528,000	12,156,000	5,185,000	9,788,000	8,007,000	6,117,000
Max.	June 4	June 7	June 13	June 28	June 28	June 20	May 29	June 20	June 21	June 17
C.f.s.	73,800	78,400	94,200	101,000	94,600	126,000	25,900	89,700	142,000	83,200
Min.	January	December	December	November	December	December	July*	January*	December	
C.f.s.	3,660	3,120	5,750	4,040	6,240	5,760	2,270	5,760	1,600	.....
W. S.	356	386	406	436	456	476	506	506	526	546
Page	156	112	123	110	105	120	165	165	136	133

* Other months also.

LITTLE MUDDY RIVER NEAR WILLISTON, NORTH DAKOTA

Location: At Center of Section 19, T. 155 N., R. 100 W., above the Mouth of Cow Creek.

Drainage Area: 1,100 Sq. Miles.

	1904	1905	1906	1907	1908	1909
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.	400*	600*	550*	370*	310*	
Feb.	400*	500*	440*	330*	220*	
March	600*	3,440†	740†	1,300*	630†	17,500‡
April	73,100†	540	5,010	43,150	12,480	3,480
May	10,100	620	1,620	3,960	2,960	
June	1,450	1,610	11,900	1,690	4,440	
July	730	920	1,240	740	490	
August	500	430	580	290	310	
Sept.	510	360	490	490	320	
Oct.	640	680	550	550	440	
Nov.	950	660	580	490†	360†	
Dec.	900*	620*	430*	430*	310*	
Total	90,280	10,980	24,130	53,790	23,270	
Max.	April 11	Mar. 1	June 7	April 18	April 15	April
C.f.s.	2,990†	200†	1,570‡	1,150‡	1,580	1,670
Min.	Sept.	Sept.	Sept.	Aug.	Sept.	
C.f.s.	6	6	6	4	5	
W. S.	130	172	208	246	246	
Page	117	91	87	204	205	
St. E.		†2	2	3	3	
Page		60	60	45	45	

LITTLE MISSOURI RIVER AT MEDORA, NORTH DAKOTA

Location: In T. 140 N., R. 102 W. one-fourth mile west of Northern Pacific Railway Station, Medora.

Drainage Area: 6,190 sq. miles.

	1903	1904	1905	1906	1907	1908	1921	1922
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.		2,500†		4,000*	2,500*	200*		
Feb.		2,300†		3,300†	70,000†	3,000*		
								(12—31)
March		46,500†	31,600	76,200†	41,200	32,000†		42,400
April		47,400	750	52,800	8,300	22,500		70,200
	(12—31)							
May	37,800	11,000	3,930	61,900	153,500	78,500		91,600†
								(1—17)
June	14,100	71,200	149,000	119,000	246,000	197,000		89,700
July	66,600	6,300	211,000	10,700	109,000	29,100		
Aug.	141,000	570	57,600	52,900	17,300	6,400		

Sept.	73,900	4,750	14,100	26,400	6,400	3,400		
Oct.	4,200	2,030	16,000	2,200	1,540	18,000	690†	
								(6—30)
Nov.	4,500†	840	13,000	3,400	360		670	16,900
Dec.	3,100†	100†		3,100*	140†			5,300†
Total	345,200	195,490	496,980	415,900	656,240	390,100		
Max.	Aug. 31	June 8	July 2	June 8	June 24	June 6		
C.f.s.	6,100	6,280‡	558	10,600	22,200‡	10,200		
Min.	May	Oct.	Sept.	Oct.	Dec.	Sept.		
C.f.s.	43	2	2	24	2	15		
W. S.	99	130	172	208	246	246	546	546
Page	73	149	128	112	209	209	213	213
St. Engr.			2	2	3	3	11	11
Page			65	66	50	50	151	151

LITTLE MISSOURI RIVER AT MEDORA, NORTH DAKOTA

	1923	1924	1925
	Ac-ft.	Ac-ft.	Ac-ft.
Jan.		2,400*	800†
Feb.		25,200†	36,800†
March		97,400†	293,000†
April		335,000	26,500
May	4,700	17,800	5,200
June	22,700	37,800	126,000
July	21,900	33,600	24,600
August	87,700	14,300	4,300
Sept.	39,400	2,800	7,100
Oct.	126,000	32,500	1,700
Nov.	9,700	4,100	900
Dec.	7,100	1,100†	1,500†
Total	319,200	604,000	528,400
Max.	Oct. 2	April 4	March
C.f.s.	10,700	18,520	12,400†
Min.	June	Oct.	Jan.
W. S. Page	41	15	10†
St. E.	11	11	
Page	151	151	

KNIFE RIVER NEAR BRONCHO, NORTH DAKOTA

Location: In southeast quarter of Section 4, T. 142 N., R. 90 W., a half mile below mouth of Elm Creek, and 15 miles above mouth of Spring Creek.

Drainage Area: 1,200 sq. miles.

	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.		450*	500*	230*	440*	310*	230*	310*	310*	240*	370*
Feb.		400*	400*	200*	360*	230*	200*	330*	220*	290*	220*
March		2,000*	2,200†	9,800*	1,000*	11,200	40,100†	48,400	5,110	24,500†	8,160*
April		62,500	430	6,960	6,570	6,380	5,750	1,880	2,500	68,700	38,200
May		5,990	620	22,700	1,470	7,140	6,360	910	910	35,100	1,680
June	1,810	4,420	5,050	41,800	2,380	9,410	22,300	3,350	5,520	4,170	1,110
July	3,590	760	3,760	6,330	760	580	9,470	520	630	4,260	710
Aug.	2,800	250	1,020	1,480	510	280	9,650	530	2,800	1,840	880
Sept.	3,690	180	90	850	230	140	670	690	3,640	1,130	530
Oct.	740	430	150	600	270	340	800	620	710	1,760	710
Nov.	570†	830	210	540†	410	300†	740†	740	480†	3,110	840
Dec.	500*	600*	240†	470*	360†	250*	600*	370	310*	610	570*
Total	13,700	78,810	14,670	91,960	14,760	36,560	96,870	58,650	23,140	145,710	53,980
Max	July 27	April	July	May	April 4	June 6	June 2	March 7	June 3	March 30	April 1
C.f.s.	840†	3,500	634‡	2,430‡	373	895‡	2,400‡	3,570‡	740†	5.000	6,350‡
Min.	Nov.	Sept.	Sept.	April	Sept.	Sept.	Aug.	July	July	July	Sept.
C.f.s.	9	3	0	8	2	0	7	4	2	4	6
W. S.	99	246	246	246	246	246	266	286	306	326	356
Page	70	213	213	213	213	213	197	193	226	227	194
St. Engr.			2	2	3	3	4	4	5	5	6
Page			64	64	49	49	45	45	58	58	48

KNIFE RIVER NEAR BRONCHO, NORTH DAKOTA

	1914	1915	1916	1917	1918	1919	1921	1922	1923	1924	1925
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.		Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.	320*	620*	490*	330*	310*	500*		400*	430*	370*	480*
Feb.	220*	440*	14,400†	220*	560*	400*		870*	330*	400*	2,320†
March	1,010†	990†	26,300†	8,480†	36,100†	5,900†		14,000†	47,100†	6,390†	8,420†
April	6,520	3,290	62,600	32,100	6,140	30,700		15,100	45,800	12,500	2,890
May	4,670	2,190	2,290	2,790	1,190	2,720		1,330	90	3,120	1,220
June	70,900	20,800	8,810	1,760	930	1,300		18,900	60	15,000	8,470
July	4,950	4,740	3,760	680	1,750	140		1,400	5,240	5,530	400
Aug.	1,800	2,460	860	390	44,600	990		18,500	1,600	1,570	120
Sept.	780	840	500	240	1,910	120		970	3,070	1,660	200
Oct.	680	3,800	1,060	560	1,420	360	280	580	2,370	5,210	780
Nov.	710†	710	740†	650	1,200*	350*	440†	1,430	1,500	1,240	840†
Dec.	680*	620*	540*	310*	600*	300*	430*	540*	730†	710†	340*
Total	93,240	41,500	122,350	48,510	96,710	43,780	1,150	74,020	108,320	53,700	26,480
Max.	June 26	June 14	April 3	March 31	Aug. 22	April 2		Aug. 3	April 14	June 21	June
C.f.s.	7,700	2,320	4,600	1,480	4,420‡	3,160		3,780	4,730	1,850‡	1,850
Min.	Feb.	Sept.	Aug.	Sept.	July	Sept.		Sept.	June	Feb.	Aug.
C.f.s.	4*	9	7	4	5	2		4	1	5*	2
W. S.	386	406	436	456	476	506	546	546			
Page	140	170	162	150	166	241	215	215			
St. E.	6	7	7	8	8	9	10	10	11	11	
Page	48	60	60	44	44	56	43	43	149	149	

SPRING CREEK AT ZAP, NORTH DAKOTA

Location: At railway bridge in southwest quarter of Section 14, T. 144 N., R. 89 W., a few hundred feet west of Northern Pacific Railway Station, Zap.
Drainage Area: 547 Sq. Miles.

	1924	1925
	Ac-ft.	Ac-ft.
Jan.	250*	
Feb.	200*	
Mar.	6,880†	
Apr.	7,940	
May	2,080	
June	4,400	
July	1,510	
Aug.	480	230
Sept.	180	250
Oct.	1,050	450
Nov.	150	530†
Dec.	120*	350†
Total	25,240	1,810
Max.	June 27	
C.f.s.	878	
Min.	Sept.	
C.f.s.	3	
St. E.	11	
Page	150	

MANDAN LAKE CREEK NEAR HENSLER, NORTH DAKOTA

Location: In Section 34, T. 144 N., R. 83 W.
Drainage Area: 30 Sq. Miles.

	1909
	Ac-ft.
Jan.	
Feb.	
Mar.	
Apr.	
May	
	(20—30)
June	9
July	18
Aug.	6
Sept.	6
Oct.	

Nov.	
Dec.	
Total	
Max.	
Min.	
St. E.	4
Page	48

TURTLE CREEK NEAR WASHBURN, NORTH DAKOTA

Location: Near northwest corner of Section 15, T. 144 N., R. 81 W., about three miles above outlet of Creek.

Drainage Area: 320 Sq. Miles.

	1909	1910
	Ac-ft.	Ac-ft.
Jan.		
Feb.		
Mar.	2,000†	1,260†
Apr.	680†	110
May	110	70
June	180	110
July	30	70
Aug.	0	10
Sept.	2	5
Oct.	20	10
Nov.	10	5*
Dec.	5*	
Total	3,037	1,650
Max.	Mar. 26	Mar. 13
C.f.s.	100†	156†
Min.	Aug.	July
C.f.s.	0	0
W. S.	286	286
Page	196	196
St. E.	4	4
Page	47	47

PAINTED WOODS CREEK NEAR WASHBURN, NORTH DAKOTA

Location: At north side of Section 34, T. 144 N., R. 81 W. about five miles above outlet of creek.

Drainage Area: 580 Sq. Miles.

	1909	1910
	Ac-ft.	Ac-ft.
Jan.		
Feb.		

March	3,270†	690†
April	1,280	180
May	230	70
June	320	170
July	110	90
August	70	30
Sept.	40	30
Oct.	60	30
Nov.	60†	
Dec.	60†	
Total	5,500	1,290
Max.	March 20	March 13
C.f.s.	215†	50†
Min.	Sept.	June
C.f.s.	0	0
W. S.	286	286
Page	194	194
St. E.	4	4
Page	46	46

MISSOURI COULEE NEAR SANGER, NORTH DAKOTA

Location: About one-half mile north of Sanger, near the middle of the east side of T. 143 N., R. 82 W.
Drainage Area: 30 Sq. Miles.

	1909
	Ac-ft.
Jan.	
Feb.	
Mar.	
Apr.	670*
May	60
June	20
July	30
Aug.	20
Sept.	0
Oct.	0
Nov.	0
Dec.	
Total	800
Max.	
Min.	
St. E.	4
Page	48

*Estimated

HEART RIVER NEAR RICHARDTON, NORTH DAKOTA

Location: In Section 21, T. 138 N., R. 92 W., at highway bridge ten miles south of Richardton.
Drainage Area: 1,250 Sq. Miles.

	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.		300*	110*	300*	200*	170*	260*	180*	100*	6*	120†
Feb.		230*	300*	250*	3,600†	130*	200*	160*	100*	240*	30†
Mar.		1,500*	5,680	4,500*	30,200†	7,700	32,200†	71,700	3,720†	27,000†	5,580†
Apr.		62,900	400	6,300	5,430	6,310	5,790	1,780	1,940	62,780	43,100
	(18—31)										
May	16,200	3,440	390	17,300	1,010	9,810	10,300	410	1,240	21,100	2,650
June	1,330	5,660	2,600	65,500	1,320	7,310	34,800	1,620	2,150	7,610	1,420
July	220	350	7,860	1,580	9,880	920	16,300	480	180	14,860	820
Aug.	1,120	30	200	1,220	580	240	24,800	60	370	2,140	770
Sept.	3,960	40	160	480	150	70	1,050	38	600	1,140	170
Oct.	500	130	130	260	260	1,760	460	50	430	1,130	740
Nov.	460†	180	400	440†	240†	450†	720†	150	240†	2,480	890
Dec.	400*	130*	350*	300*	200*	300*	400*	120*	190†	270†	630†
Total	24,190	74,890	18,580	98,430	53,070	35,170	127,280	76,740	11,260	140,756	56,920
Max.	May 24	Apr. 4	July 5	June	Mar. 22	May 24	June 2	Mar. 14	Mar. 19	Mar. 31	April 2
C.f.s.	2,504	4,115	760	8,000	2,350	1,130	3,920	4,570	210	3,950	4,700
Min.	July	Aug.	Sept.	Oct.	Sept.	Sept.	Oct.	Sept.	July	Jan.	Feb.
C.f.s.	0	0	0	4	1	0	4	0	0	0	0
W. S.	99	130	172	246	246	246	266	286	306	326	356
Page	68	153	132	216	216	216	199	199	228	229	196
St. E.			2	2	3	3	4	4	5	5	6
Page			63	63	47	47	44	44	57	57	47

HEART RIVER NEAR RICHARDTON, NORTH DAKOTA

	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.	160†	350†	370†	300†	100†	600†	60†	40†	120†	310†	170†
Feb.	30†	310†	13,000†	160†	500†	990†	210†	30†	110*	440†	180†
March	100†	500†	19,000†	13,700†	27,700	2,880†	24,600†	2,450†	3,780†	16,000†	4,200†
April	7,700	3,090	56,600	48,400	4,450	9,450	15,200	1,090	16,900	29,800	
May	4,640	2,140	5,960	5,280	1,180	2,560	1,390	630	2,660	4,940	
June	23,300	14,600	7,570	2,090	1,010	390	5,740	3,910	24,000	9,380	
July	11,300	3,700	3,120	660	380	30	8,540	1,220	4,950	12,000	
Aug.	4,180	2,560	450	60	13,600	80	100	350	4,520	6,980	
Sept.	480	520	840	90	400	4	120	460	90	11,500	
Oct.	810	2,240	1,380	170	640	50	180	160	190	10,700	
Nov.	880†	1,110†	730†	310	890	100†	220†	210†	1,250	910	
Dec.	580†	740†	460†	160†	590†	40†	130†	120†	180†	430†	
Total	54,160	31,860	109,480	71,380	51,440	17,174	56,490	10,670	58,750	103,390	4,550
Max.	June 29	June 15	Apr. 4	Apr. 1	Aug. 23	Apr. 1	Mtar. 29	June 19	Apr. 4	April	
C.f.s.	1,550	1,820	2,470	1,850	1,620	966	1,500	714	1,470	1,380	
Min.	Feb.	Sept.	Aug.	Aug.	Sept.	Sept.	Aug.	Aug.	Sept.	Feb.	
C.f.s.	0	5	1	0	1	0	1	0	1	3	
W. S.	386	406	436	456	476	506	506	526	546		
Page	142	172	164	151	167	243	243	213	216		
St. E.	6	7	7	8	8	9	9	10	10	11	11
Page	47	59	59	43	43	55	55	42	42	147	147

HEART RIVER AT SUNNY, NORTH DAKOTA

Location: At highway bridge near Northern Pacific Railway Bridge in the northeast quarter of Section 25, T. 139 N., R. 82 W. about five miles west of Mandan.

Drainage Area: 3,320 sq. miles.

	1924	1925
	Ac-ft.	Ac-ft.
Jan.		920*
Feb.		1,110*
March		16,600†
April	28,200	10,400
May	8,030	2,460
June	34,900	18,500
July	16,900	2,360
August	2,140	180
Sept.	300	180
Oct.	3,610	340
Nov.	1,890	760
Dec.	1,230*	590†
Total	97,200	54,400
Max.	June 19	March
C.f.s.	2,530	962
Min.	Sept.	Aug.
C.f.s.	2	2
St. E.	11	
Page	148	

APPLE CREEK NEAR BISMARCK, NORTH DAKOTA

Location: On the township line at north side of Section 3, T. 138 N., R. 79 W., about six miles east of Bismarck.

Drainage Area: 2,950 Sq. Miles.

	1905
	Ac-ft.
Jan.	
Feb.	
Mar.	3,360
Apr.	520
May	550
June	2,500†
July	
Aug.	
Sept.	
Oct.	
Nov.	

	Dec.
Total	6,930
Max.	March 7
C.f.s.	307
Min.	
C.f.s.	
W. S.	172
Page	133

CANNON BALL RIVER AT STEVENSON, NORTH DAKOTA

Location: In northwest quarter of Section 21, T. 133 N., R. 82 W., four miles above mouth of Dogtooth Creek, and four miles south of Timmer, Morton County.

Drainage Area: 3,650 Sq. Miles.

	1903	1904	1905	1906	1907	1908	1911
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.		900*	500*	1,000*	310*	180*	
Feb.		700*	17,000†	900*	5,950†	290*	
Mar.		2,900*	35,900	5,000*	29,900*	49,900†	3,600*
Apr.		64,000†	2,790	22,000†	15,800	21,800†	1,700*
May		5,200	14,200	39,900	7,600	35,000†	
	(10—30)						
June	1,380	32,800	19,300	130,000	36,400	72,100†	
July	1,540	2,240	18,700	3,330	16,200	8,710†	
Aug.	20,400	290	4,610	2,940	850	340	1,280†
Sept.	11,200	200	360	2,300	30	100	590
Oct.	1,320	940	420	770	30	1,990	330
Nov.	1,300†	650	1,500†	250†	80†	240†	110†
Dec.	1,100*	500*	1,100*	300*	180†	180†	120†
Total	38,240	111,320	116,380	208,690	113,330	190,830	
Max.	Aug. 28	Apr. 2	June 8	June 7	June 22	Mar. 20	
C.f.s.	1,930	3,000	2,300	5,350	3,340	3,800	
Min.	Sept.	Sept.	Oct.	Nov.	Oct.	Oct.	Oct.
C.f.s.	4	0	0	0	0	0	2
W. S.	208	208	208	208	246	246	306
Page	117	117	117	117	220	220	229
St. E.			2	2	3	3	5
Page			61	62	46	46	56

CANNON BALL RIVER AT STEVENSON, NORTH DAKOTA

	1912	1913	1914	1915	1916	1917
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.	120†	160†	60*	310†	360*	600*
Feb.	600†	410†	50*	390†	23,200†	550*
Mar.	32,500†	8,150†	5,100†	1,480†	24,700†	4,010†
Apr.	72,900	52,800	4,980	5,730	109,000	58,000
May	9,650	6,220	5,360	15,400	18,200	8,270
June	6,440	2,420	58,700	98,600	6,800	4,340
July	29,700	1,430	13,300	36,800	4,140	1,110
Aug.	2,610	190	2,470	27,600	2,220	170
Sept.	1,700	60	1,520	4,250	1,600	210
Oct.	1,200	250	800	9,850	620	150
Nov.	1,060	90	480	1,710†	1,240†	500
Dec.	380†	70†	340†	740†	800*	370†
Total	158,860	72,250	93,160	202,860	192,880	78,280
Max.	Apr. 2	Apr. 4	June 27	June 13	Apr. 13	Apr. 13
C.f.s.	6,360	3,820	5,360‡	5,040	3,900	1,880
Min.	Feb.	Sept.	Sept.	Jan.	Feb.	Aug.
C.f.s.	2*	0	2	5	4	2
W. S.	326	356	386	406	436	456
Page	231	198	143	175	165	153
St. E.	5	6	6	7	7	8
Page	56	46	46	58	58	42

CANNON BALL RIVER AT STEVENSON, NORTH DAKOTA

	1918	1921	1922	1923	1924	1925
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.	310*		310*	1,650*	1,430*	310*
Feb.	1,120*		280*	1,460*	660*	2,880†
Mar.	57,400†		31,700†	74,300†	820*	56,200†
Apr.	13,100		67,800	50,000*	32,200	8,170
May	4,270		9,410	7,800†	5,390	1,680
June	2,520†		57,000	12,700†	7,500	21,500
July	680		10,300	31,500†	2,470	2,080
Aug.	770		3,920	17,700†	10,000	100
Sept.	140		1,080	10,700†	790	320
Oct.		770†	410	25,800	2,110	390
Nov.		340†	3,150	7,100	1,060	480†
Dec.		310†	1,580*	2,170†	510†	370*
Total	80,310	1,420	186,940	242,880	64,940	94,480
Max	Mar. 18		Apr. 7	Mar. 2	August	March
C.f.s	3,500		4,400	6,900†	2,440‡	4,400

Min. C.f.s.	Sept. 2		Sept. 6	Sept. 9†	Sept. 3	Sept. 1
W. S.	476	546	546			
Page	169	218	218			
St. E.	8	10	10	11	11	
Page	42	41	41	145	146	

GRAND RIVER, NORTH BRANCH, AT HALEY, NORTH DAKOTA

Location: At highway bridge near northeast corner of Sec. 36, T. 129 N., R. 100 W., about 20 rods south of Postoffice at Haley in Bowman Co.

Drainage Area: 500 Sq. Miles.

	1908	1909	1910	1911	1912	1913	1914
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.		0†	80*	15*	8*	4	10*
Feb.		2,160†	100*	15*	10*	5	22*
Mar.		6,210	10,600†	160†	4,940†	9,730	700†
Apr.		430	2,050	200	6,630	7,330	2,590
May	3,530†	1,250	720	190	5,530	100	81
June	2,860	5,880	1,160	180	3,600	60	8,450
July	590	740	84	37	3,920	370	1,470
Aug.	74	690	31	12	12	62	3,020
Sept.	30	120	41	13	6	33	184
Oct.	51	130	31	12	25	18	135
Nov.	30	120	30	12†	120	18†	65†
Dec.	30†	120	20*	10*	6†	12*	50*
Total	7,195	17,850	14,947	856	24,807	17,742	16,777
Max.	May 23	May 31	May	Mar.	Mar. 29	Mar. 31	June 22
C.f.s.	1,470‡	1,800‡	410‡	5	1,350‡	4,800	5,650‡
Min.	Aug.	Feb.	Dec.	Sept.	Sept.	Oct.	June
C.f.s.	0	0	0	0	0	0	0
S. W.	286	286	286	306	326	356	386
Page	202	202	202	230	233	200	145
St. E.	4	4	4	5	5	6	6
Page	43	43	43	55	55	45	45

GRAND RIVER, NORTH BRANCH, AT HALEY, NORTH DAKOTA

	1915	1916	1917	1918	1919	1920
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.	24*	37*	25*	18*	63*	12†
Feb.	16*	3,110†	17*	145*	33*	12*
Mar.	420†	1,100†	86*	13,500†	165†	10,100†
Apr.	230	3,570	9,770	2,160	710	2,370
May	3,510	860	620	74	60	15,000
June	11,900	1,060†	260	49	42	383
July	12,900	2,060	21	98	16	6,570
Aug.	2,880	200	16	6,030	1	43
Sept.	200	77	12	38	9	13
Oct.	190†	80	12	37	15	115
Nov.	79*	54*	24	35	41	
Dec.	53*	37*	24†	35†	18†	
Total	32,402	12,245	10,887	22,219	1,173	34,618
Max.	June 13	Feb. 21	April 9	August	April	May 11
C.f.s.	3,500‡	524†	602	2,260	19†	3,860
Min.	Feb.	Feb.	June	June	Aug.	Sept.
C.f.s.	0	0	0	0	0	0
W. S.	406	436	456			
Page	176	167	154			
St. E.	7	7	8	8	9	9
Page	57	57	41	41	54	54

RED RIVER OF THE NORTH AT FARGO, NORTH DAKOTA

Location: At the Front Street Bridge near northeast corner of Section 7, T. 139 N., R. 48 W.
Drainage Area: 6,420 sq. miles.

	1901	1902	1903	1904	1905	1906	1907	1908	1909
	Ac-ft..	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.		14,000*	13,000*	16,000*	9,200*	24,200*	31,000*	17,800*	11,700*
Feb.		11,000*	11,000*	14,000*	5,600*	16,700*	20,400*	14,400*	7,800*
March		45,300	16,000*	23,000*	24,600†	36,900†	94,400†	30,700*	23,200†
April		27,900	75,000	191,600	35,600	118,000	173,700†	65,400	56,300
May		45,100	34,800	63,900	100,800	99,400	84,200	42,500	57,600
June	28,200	53,800	27,400	75,600	60,900	99,400	131,000	102,300	66,000
July	32,100	41,600	22,300	68,900	68,000	94,500	62,100	75,600	37,400
Aug.	29,200	28,500	16,500	30,900	73,000	78,600	34,900	42,800	42,200
Sept.	22,000	19,500	18,900	26,900	59,200	63,200	25,500	27,500	47,100
Oct.	24,300	16,900	29,000	30,000	52,600	57,000	28,000	25,500	46,900
Nov.	21,200	17,700	22,000*	25,500	44,900	56,000	23,800*	21,400*	34,200†
Dec.	15,800*	15,000*	18,000*	15,000*	35,900*	36,900*	19,400	18,400*	30,000*
Total	172,800	336,300	303,900	581,300	570,300	780,800	728,400	484,300	460,400
Max.		May 23	Apr. 27	Apr. 20	May 17	Apr. 9	June 17	June 13	May 30
C.f.s.		1,180	2,450	6,090	4,270	3,040	4,420	2,600	1,780
Min.		Nov.	Aug.	Nov.	Mar.	Nov.	Nov.	Oct.	Mar.
C.f.s.		172	225	231	150†	640	220	381	232
W. S.	85	100	100	130	171	207	245	245	265
Page	238	503	503	40	29	24	46	46	53
St. E.					2	2	3	3	4
Page					51	52	37	38	36

RED RIVER OF THE NORTH AT FARGO, NORTH DAKOTA

	1910	1911	1912	1913	1914	1915	1916	1917	1918
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.	25,000*	2,000*	5,500*	4,600*	12,300*	20,900*	16,300*	25,700	2,600†
Feb.	18,000*	1,800*	4,600*	3,000*	7,800*	17,200*	14,600*	20,200*	1,800†
Mar.	131,000*	15,100	5,500*	4,800*	20,100†	24,000*	39,700*	56,800†	21,000
April	85,100	22,000	33,300	27,400	39,600	59,500	361,000	189,000	22,400
May	59,400	17,400	45,500	22,200	53,900	48,500	156,000	111,000	27,400
June	29,200	14,200	31,100	20,200	92,200	91,000	126,000	42,900	26,200
July	13,500	6,270	29,000	39,200	62,200	117,000	335,000	20,300	15,500
Aug.	5,240	10,200	19,300	16,500	31,400	64,900	114,000	8,800	11,400
Sept.	2,850	9,520	14,100	25,100	32,200	46,900	74,300	5,400	6,900
Oct.	3,580	15,100	16,800	30,300	35,800	48,800	63,200	6,600	5,900
Nov.	2,680†	8,030*	12,700	26,000	31,700	39,400†	37,500†	7,900	7,400
Dec.	2,300†	7,380*	6,500†	21,700	25,200†	30,400*	30,000†	5,300	6,300†
Total	377,850	129,000	233,900	241,000	444,400	608,500	1,367,600	499,900	154,800
Max.	Mar. 20	Apr. 11	May 14	July 8	June 12	July 2	July 11	Apr. 3	May 25
C.f.s.	4,700	608	1,100	1,460	3,060	3,110	7,720	5,200	750
Min.	Oct.	March	Dec.	Aug.	Feb.	Feb.	Feb.	Sept.	Feb.
C.f.s.	30	60	80*	142	130*	300*	225*	42	16†
W. S.	285	305	325	355	385	405	435	455	475
Page	41	27	33	35	34	29	27	25	25
St. E.	4	5	5	6	6	7	7	8	8
Page	36	49	49	39	39	52	52	37	37

RED RIVER OF THE NORTH AT FARGO, NORTH DAKOTA

	1919	1920	1921	1922	1923	1924	1925
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.	4,800	9,700†	13,300†	1,500†	2,900†	3,200†	3,400
Feb.	4,300	8,600*	13,600†	1,300†	1,700†	2,900†	4,200
Mar.	17,000	103,000	29,500	114,000	3,500†	4,400†	10,600
Apr.	27,600	52,800	43,900	157,000	65,700	15,900	17,600
May	28,800	57,100	31,500	65,900	33,400	18,600	14,500
June	23,700	72,500	36,500	41,300	51,200	12,200	33,500
July	18,100	59,000	15,600	19,000	32,400	10,200	17,500
Aug.	17,400	30,600	11,300	5,400	5,600	5,200	8,500
Sept.	12,400	27,300	8,310	2,200	4,100	5,400	7,700
Oct.	11,600	28,700	8,900	2,500	5,400	10,000	10,400
Nov.	15,000	24,600	5,700	5,700	5,600	7,400	8,500
Dec.	9,400†	18,800†	4,300†	3,600	4,500	3,700	4,900
Total	190,100	492,700	222,410	419,400	216,000	99,100	141,300
Max.	May 12	Mar. 27	Apr. 6	Apr. 11	June 29	Apr. 30	June
C.f.s.	630	6,120	1,970	5,200	3,960	530	885
Min	Feb.	Jan.	Dec.	Sept.	Feb.	Sept.	Jan.
C.f.s	29	142	18	9	24	24	42
W. S.	505	505	525	545			
Page	37	37	25	26			
St. E.	9	9	10	10	11	11	
Page	47	47	31	31	135	135	

RED RIVER OF THE NORTH AT GRAND FORKS, NORTH DAKOTA

Location: At Northern Pacific Railway bridge below outlet of Red Lake River in northeast quarter of Section 3, T. 151 N., R. 50 W.
Drainage Area: 25,480 Sq. Miles
Records Available: (see below).

	1882	1883	1884	1885	1886	1887	1888	1889	1890	1891	1892
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.		92,200†	50,100†	97,200†	50,100†	25,200†	18,200†	33,100†	20,900†	30,300†	50,100†
Feb.		90,500†	40,100†	70,500†	38,700†	18,100†	13,900†	28,600†	15,700†	23,800†	43,600†
Mar.		93,500†	44,000†	70,700†	61,500†	21,000†	14,500†	59,900†	17,800†	27,700†	125,000†
Apr.	1,569,600	1,000,800	653,300	400,400	377,200	179,100	555,100	120,200	108,900	202,900	1,035,300
May	852,900	886,700	292,700	265,600	372,600	108,800	266,900	72,600	60,500	88,500	538,700
June	421,300	298,600	212,400	285,000	155,300	73,800	507,500	42,200	77,400	76,200	433,200
July	348,000	163,600	139,500	348,600	95,300	73,800	285,900	36,900	63,900	81,800	209,700
Aug.	196,400	106,400	93,500	304,400	45,500	76,200	122,400	30,100	37,500	71,300	84,900
Sept.	128,500	77,900	138,600	152,300	32,100	52,400	58,300	29,200	33,300	47,600	70,200
Oct.	134,000	77,500	183,900	113,800	37,500	40,600	55,300	31,400	43,000	90,400	62,700
Nov.	136,000†	75,600	155,000	100,000	43,300	35,100	57,100	38,100†	47,600	70,800	50,900†
Dec.	131,000†	65,800†	128,000†	78,100†	36,100	25,200†	42,900†	28,900†	39,400†	61,200†	40,900†
Total	3,917,700	3,029,100	2,131,100	2,286,600	1,345,200	729,300	1,998,000	551,200	565,900	872,500	2,745,200
Max.	April	April	April	April	April	April	April	April	April	April	April
C.f.s.	40,800	33,400	20,600	13,040	10,300	7,100	19,000	4,290	3,470	8,360	23,000
Min.	Oct.	Oct.	Aug.	Nov.	Oct.	Nov.	Nov.	Sept.	Sept.	Sept.	Oct.
C.f.s.	1,830	1,190	1,190	1,630	520	560	730	390	490	760	960

Records have been kept at this station by the U. S. Corps of Engineers since 1882. They have been published in the "Report of Water Resources Investigations of Minnesota" by the State Drainage Commission,—pages 369-380, in a somewhat different form than here given.

RED RIVER OF THE NORTH AT GRAND FORKS, NORTH DAKOTA

	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.	30,300†	26,400†	26,400†	18,200†	46,600†	56,000†	42,800†	45,500†	112,500†	58,400†	98,400†
Feb.	23,800†	21,700†	21,700†	23,600†	38,700†	55,000†	30,500†	31,100†	83,300†	60,000†	78,900†
Mar.	27,100†	27,100†	27,900†	73,500†	50,800†	81,800†	40,000†	48,100†	99,600†	240,000†	129,100†
Apr.	952,000	595,000	66,000	401,000	1,814,800	152,900	254,100	120,200†	636,600	354,000†	630,700
May	937,100	362,800	56,600	762,500	531,300	118,100	217,700	65,200	282,200	503,000	331,400
June	193,400	177,300	86,900	714,000	191,600	169,000	292,100	37,500	206,400	384,000	198,700
July	129,700	93,500	88,500	162,900	558,300	211,500	236,700	41,200	418,700	194,000	88,500
Aug.	68,900	46,700	46,700	86,700	408,300	92,800	123,600	54,700	154,300	114,000	64,600
Sept.	48,800	31,500	32,700	66,000	148,800	71,400	89,200	147,000	90,400	100,000	112,500
Oct.	51,700	44,900	33,800	65,200	111,900	81,800	84,200	349,900	124,200	100,000	183,200
Nov.	34,500	47,000†	53,900	73,200†	94,000	66,600	75,000	273,100	97,600	141,000†	130,900
Dec.	36,100†	36,100†	28,900†	59,000†	70,700	52,300†	63,900†	141,100†	73,800†	117,000†	120,500†
Total	2,533,400	1,510,000	569,100	2,505,800	4,065,800	1,209,200	1,549,800	1,354,600	2,379,600	2,365,400	2,167,400
Max.	April	April	June	May	April	April	April	Oct.	April		April 11
C.f.s.	37,500	16,450	2,230	21,600	42,400	6,300	11,100	7,400	15,000		18,800
Min.	Oct.	Sept.	Sept.	Oct.				July			Aug.
C.f.s.	760	430	470	990				410			870
W. S.									66	100	100
Page									12	498	498

RED RIVER OF THE NORTH AT GRAND FORKS, NORTH DAKOTA

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.	70,100†	73,800†	107,600	86,100	54,700	43,200	93,500	12,900	8,600	19,600	31,300
Feb.	52,000†	67,800†	88,300	60,500	46,000	31,300	72,200	10,300	6,400	13,000	23,800
Mar.	62,600†	157,000†	116,200	188,800	120,600	56,900	517,700	46,700	11,500	17,400	56,000
Apr.	1,334,000†	230,000	1,178,100	993,600	586,100	258,000	466,500	120,900	108,500	420,000	178,000
May	841,400	500,500	505,400	279,800	356,000	190,000	265,900	92,200	108,800	112,000	157,000
June	357,500	287,400	360,600	357,000	424,800	185,000	116,000	104,700	74,200	70,800	287,000
July	240,900	359,700	280,400	202,300	202,300	232,400	52,900	35,500	53,300	63,600	174,000
Aug.	108,000	403,400	195,500	123,000	121,100	343,700	30,100	24,100	44,900	46,600	67,100
Sept.	95,800	268,300	147,000	116,000	104,700	191,000	25,300	23,300	54,100	60,900	70,400
Oct.	113,600	205,400	135,300	121,100	88,500	137,100	25,400	28,500	86,000	64,300	77,800
Nov.	100,400	161,200	127,900	85,700	74,400	113,000	23,500	22,000	50,900	68,200	80,000
Dec.	76,600†	156,000	100,100	73,800	51,000	149,400	19,100	20,900	26,000	48,700	71,700
Total	3,452,900	2,870,500	3,342,400	2,687,700	2,230,200	1,931,000	1,708,100	542,000	633,200	1,005,100	1,274,100
Max.	April 27	May 16	April 18	April 7	April 11	July 30	Mar. 22	June 12	Apr. 9	April 8	June 17
C.f.s.	32,900	16,700	27,600	29,400	20,500	9,260	18,500	3,500	4,710	13,130	9,200
Min.	Aug.	Feb.	Feb.	Feb.	Feb.	Feb.	Nov.	Feb.	Feb.	March	Feb.
cfs.	1,320	850†	1,430†	1,000†	680	480	280	160	100	195	370
W. S.	130	171	207	245	245	265	285	305	325	355	385
Page	43	33	26	49	49	56	44	29	35	37	37
St. E.		2	2	3	3	4	4	5	5	6	6
Page		50	50	36	36	35	35	48	48	38	38

RED RIVER OF THE NORTH AT GRAND FORKS, NORTH DAKOTA

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.	48,000	51,900	74,800	16,300	24,500	42,500	49,000	23,700	24,900	14,500	9,200
Feb.	41,100	38,600	51,600	11,100	19,100	38,500	40,400	23,200	16,900	12,300	8,300
Mar.	71,800	65,700	108,000	91,600	67,700	434,000	95,400	198,000	25,000	33,600	63,300
Apr.	247,000	1,320,000	697,000	108,000	314,000	676,000	289,000	689,000	324,000	106,000	130,700
May	198,000	676,000	294,000	114,000	198,000	228,000	115,000	404,000	196,000	123,000	86,400
June	342,000	406,000	130,000	117,000	104,000	276,000	162,000	168,000	93,300	62,700	343,000
July	679,000	698,000	72,300	51,800	410,000	204,000	84,500	70,600	116,000	46,100	133,000
Aug.	148,000	303,000	36,700	44,400	194,000	87,700	37,100	31,300	36,200	26,000	26,600
Sept.	92,300	236,000	33,400	33,800	84,700	61,600	87,500	30,200	28,100	20,000	29,000
Oct.	99,200	188,000	36,200	25,000	72,000	72,400	48,300	31,300	29,400	34,000	41,100
Nov.	88,000	165,000	47,400	38,800	66,000	63,800	36,600	42,800	29,800	22,600	36,000†
Dec.	76,200	109,000	27,500	41,400	47,900	63,500	42,400	31,200	26,700	16,000	28,000†
Total	2,130,600	4,527,200	1,608,900	693,200	1,601,900	2,248,000	1,087,200	1,743,300	946,300	516,800	934,600
Max.	July 3	Apr. 23	Apr. 8	Mar. 28	July 8	March 31	April 10	April 11	April 21	May 2	June
C.f.s	21,500	29,000	20,200	4,480	13,400	30,300	11,500	16,600	15,900	2,530	9,690
Min.	Feb.	Feb.	Dec.	Feb.	Feb.	Feb.	Aug.	Jan.	Feb.	Jan.	Feb.
C.f.s.	680	620	305	186	263	590	230	263	267	174	120*
W. S.	405	435	455	475	505	505	525	545			
Page	31	29	27	27	40	40	27	28			
St. E.	7	7	8	8	9	9	10	10	11	11	
Page	51	51	36	36	46	46	30	30	134	134	

BOIS DES SIOUX RIVER NEAR FAIRMOUNT, N. DAK.

Location: At the Soo Railway bridge near the center of Section 22, T. 130 N., R. 47 W., about two miles east of Fairmount.

Drainage Area: 1,460 sq. miles.

	1919	1920	1921	1922	1923	1924	1925
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.			370*	0	0	0	0
Feb.			170*	0	0	0	0
Mar.			680*	840†	40†	0	0
April	411	10,100	2,320	15,700	2,320	0	0
May	769	9,780	2,000	12,900	1,350	0	0
June	744	8,090	1,210	3,830	520	0	0
July	2,440	4,120	430	1,700	140	0	0
Aug.	3,240	3,010	40	270	0	0	0
Sept.	1,600†	2,980	250	10†	0	0	0
Oct.		2,340	100	0	0	0	0
Nov.		1,400†	40†	0	0	0	0
Dec.		920†	0	0	0	0	0
Total	9,204	42,740	7,610	35,250	4,370	0	0
Max.	Aug. 4	Apr. 2	Apr. 2	Apr. 20	Apr. 2	Apr.	Apr.
C.f.s.	77	214	64	390	76	0	0
Min.	Apr.	Nov.	Aug.	Sept.	Aug.	June	June
C.f.s.	6	18	0	0	0	0	0
W. S.	505	505	525	545			
Page	42	42	29	30			
St. E.	9	9	10	10	11	11	
Page	50	50	36	36	140	140	

MUSTINKA RIVER NEAR WHEATON, MINNESOTA

Location: On east line of Section 7, T. 127 N., R. 46 W., about one mile northeast of Wheaton, and eight miles above the outlet of the river.

Drainage Area: 770 Sq. Miles.

	1917	1919	1920	1921	1922	1923	1924
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.				60*	40*	3*	6*
Feb.				60*	30*	2*	6*
	(23—31)		(20—31)				
March	13,400		6,220	280*	23,400	3*	60*
April	37,200		1,760	3,540	16,180	11,800	770
May	9,780		4,990	990	1,600	360	170
		(25—30)					
June	1,050	3,170	6,160	240	230	240	120
July	190	1,670	5,370	190	40	180	80
Aug.	110	330	390	40	4	5	14
Sept.	120	60	130	250	6	1	90

Oct.		120	100	120	5	8	210†
Nov.			170†	80†	4*	23	
Dec.			100*	60*	3*	12*	
Total	61,850	5,350	25,390	5,910	41,542	12,637	1,526
Max	April 1		May 11	Apr. 2	Mar. 23	Apr. 14	Apr. 5
C.f.s.	2,240		970	287	1,290	746	45
Min.	Aug.	Oct.	Sept.	Aug.	Sept.	Aug.	Aug.
C.f.s.	1	0	1	0	0	0	0
W. S.	455	505	505	525	545		
Page	29	45	45	31	32		
St. E.		9	9	10	10	11	11
Page		51	51	37	37	141	141

OTTERTAIL RIVER AT OUTLET OF OTTERTAIL LAKE

Location: At outlet of Ottertail Lake in Section 4, T. 133 N., R. 40 W.
Drainage Area: 1,160 Sq. Miles.

	1899	1900	1901	1902	1903	1904
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.		14,500	10,600	9,900	6,900	14,300
Feb.		13,100	7,900	8,000	5,600	11,300
March		13,400	9,000	10,200	10,300	12,200
April		12,100	11,900	8,600	17,000	19,200 (1—14)
May	14,600	11,700	12,400	21,600	22,800	14,000
June	33,000	8,000	13,600	37,400	20,800	
July	39,900	6,000	21,600	31,900	14,600	
August	29,600	8,100	24,300	21,800	11,100	
Sept.	23,400	9,200	16,800	14,900	12,900	
Oct.	17,900	11,900	11,600	13,000	20,700	
Nov.	19,500	12,200	12,500	12,800	19,200	
Dec.	18,600	12,200	10,000	11,200	18,600	
Total	196,500	132,400	162,200	201,300	180,500	71,000
Max.	July	March	Aug.	June	May	May
C.f.s.	831	235	468	729	420	567
Min.	May	July	March	April	Feb.	March
C.f.s.	201	71	123	16	44	110

OTTERTAIL RIVER NEAR FERGUS FALLS, MINNESOTA

Location: At the south line of Section 18, T. 133 N., R. 42 W., until October 25, 1913; thereafter on the south line of Section 31, T. 134 N., R. 42 W.

Drainage Area: 1,310 and then 1,300 Sq. Miles.

	1904	1905	1906	1907	1908	1909	1910	1911	1912
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.					16,000*		20,000	4,900	4,900†
Feb.					13,200*		13,300	4,700	4,000
March		18,300			12,300*		17,500	7,700	4,300
April		17,400	29,700	39,000	18,600	23,700	25,800	13,600	10,800
	(9—31)								
May	25,800	31,800	47,500	43,600	25,900	28,300	25,600	13,600	17,500
June	41,400	36,500	57,400	41,200	48,400	29,300	17,500	10,100	19,300
July	31,500	44,300	57,300	34,700	42,200	21,100	10,000	6,640	17,100
Aug.	22,500	47,900	45,600	22,100	27,900	23,100	3,980	7,750	13,300
Sept.	19,600	44,700	43,300	18,000	21,500	32,700	1,940	7,620	12,100
Oct.	20,000	37,800	41,400	20,700	18,500	31,400	2,970	10,100	11,900
Nov.	19,500	32,600	39,800	20,000	15,500	25,300	4,700	7,620	12,000
Dec.		30,000†	36,000*	18,500*	13,500*	24,000*	4,920	6,760	10,100
Total	180,300	341,300	398,000	257,800	273,500	238,900	148,210	101,090	137,300
Max.	June 23	Aug. 5	July 1	Apr. 1	June 12	Sept. 15	Apr. 15	Apr. 19	July 8
C.f.s.	1,075	855	1,020	790	920	580	449	274	402
Min.	Sept.	April	April	Sept.	Nov.	Aug.	Sept.		
C.f.s.	320	236	402	274	236	294	16		
W. S.	130	171	207	245	245	265	285	305	325
Page	45	35	28	43	43	49	38	25	30
St. E.		2	2	3	3	4	4	5	5
Page		52	53	39	39	37	37	50	50

OTTERTAIL RIVER NEAR FERGUS FALLS, MINNESOTA

	1913	1914	1915	1916	1917
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.	6,330	17,200†	14,900†	13,000	18,400
Feb.	4,270	10,500†	18,600†	14,200	14,700
March	7,990†	11,400†	16,200†	18,300	16,900
April	10,700†	14,800	16,800	23,300	26,200
May	16,400	18,800	22,800	41,300	32,700
June	14,500	24,300	33,100	46,100	23,900
July	19,800	32,100	47,000	44,800	16,000
August	16,000	27,200	39,100	33,800	10,100
Sept.	21,400	22,600	29,200	34,800	8,500
Oct.	19,300	25,100	26,600	36,200	
Nov.	21,600	24,900	22,000	31,300	
Dec.	21,500	20,100†	19,700	23,300	
Total	179,790	249,000	306,000	360,400	167,400
Max	July 5	June 27	July 19	June 29	May 19
C.f.s.	726	584	837	982	557
Min.	Feb.			Jan.	Sept.
C.f.s.	77			181	121
W. S.	355	405	405	435	455
Page	32	27	27	25	24

PELICAN RIVER NEAR FERGUS FALLS, MINNESOTA

Location: In Section 18, T. 133 N., R. 43 W., five miles above mouth of river.

Drainage Area: 450 Sq. Miles.

	1909	1910	1911	1912
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.		7,700†	120*	120*
Feb.		4,440†	110*	110*
March		11,100†	610*	250*
April		11,200	2,280	4,240
May		9,160	2,050	11,200
	(19—30)			
June	3,200	4,220	2,050	5,900
July	6,000	1,140	700	2,000
Aug.	9,300	560	940	2,580
Sept.	11,200	330	1,120	2,150
Oct.	10,600	500	2,190	2,860
Nov.	8,200	760	1,330	2,540
Dec.	8,000†	180†	610†	1,230†
Total	56,500	51,290	14,110	35,180
Max.	Oct. 10	Apr. 21	June 9	May 28
C.f.s.	226	231	84	230

Min.	July	November	July	
C.f.s.	46	1	1	
W. S.	285	285	305	325
Page	47	47	31	37

WILD RICE RIVER NEAR WILD RICE, NORTH DAKOTA

Location: At the southeast corner of Section 35, T. 138 N., R. 49 W., about five miles above outlet of the river.

Drainage Area: 2,200 Sq. Miles.

	1919
	Ac-ft.
Jan.	
Feb.	
March	
	(8—30)
April	2,220
May	2,160
June	1,050
July	
August	180
Sept.	
Oct.	
Nov.	
Dec.	
Total	5,610
Max.	April 10
C.f.s	98
Min.	August
C.f.s.	0
W. S.	505
Page	46

SHEYENNE RIVER AT VALLEY CITY, NORTH DAKOTA

Location: In T. 140 N., R. 58 W., at bridge a few hundred feet southwest from the Northern Pacific Railway station, Valley City.

Drainage Area: 4,210 Sq. Miles.

	1919
	Ac-ft.
Jan.	
Feb.	
	(24—31)
March	3,500†
April	94,000
May	24,900
June	11,800†

July	5,770†
August	1,900†
Sept.	
Oct.	
Nov.	
Dec.	
Total	141,870
Max.	April 18
C.f.s.	2,750
Min.	
W. S.	505
Page	47

SHEYENNE RIVER AT HAGGART, NORTH DAKOTA

Location: At private wagon bridge one-fourth mile north of main line of Northern Pacific Railway, in Section 6, T. 139 N., R. 49 W.

Drainage Area: 5,420 Sq. Miles.

	1902	1903	1904	1905	1906	1907	1919
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.			5,000*	2,400*	2,100*	1,600*	
Feb.			5,000*	2,500*	2,100*	1,400*	
	(29—31)						(21—31)
March	5,900		9,000*	12,100*	7,100†	23,500*	6,500
April	88,800	55,300	85,000	11,900	40,400	35,200	93,400
May	32,900	22,700	64,200	18,700	19,100	27,200	48,200
June	15,600	9,840	25,000	11,900	17,500	15,200	18,100†
July	6,500	4,950	13,300	10,500	9,950		10,800
Aug.	5,040	2,860	5,420	17,300	6,370		4,200
Sept.	5,000	4,890	5,080	6,890	2,830		
Oct.	5,660	6,080	5,690	4,560	2,760		
Nov.	5,000†	5,440†	5,430	4,190†	2,730		
Dec.		4,480*	5,000*	3,000*	1,840†		
Sum.	170,400	116,540	233,120	105,940	114,780	104,100	181,200
Max.	April	April 11	April 22	May 13	April 16	March	April 28
C.f.s.	2,030	1,570	1,950	758	1,060	2,000†	2,220
Min.	August	August	Sept.	Oct.	Sept.		
C.f.s.	53	20	32	59	32		
W. S.	100	100	130	207	207	245	505
Page	500	500	47	30	30	51	49
St. E.				2	2	3	
Page				56	57	43	

WILD RICE RIVER AT TWIN VALLEY, MINN.

Location: In Section 22, T. 144 N., R. 44 W., at bridge northeast of Northern Pacific Railway station, Twin Valley.
Drainage Area: 805 sq. miles.

	1909	1910	1911	1912	1913	1914	1915	1916	1917
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.		2,500†	1,350*	1,800†	800†	1,300†	1,750†	2,270†	3,690
Feb.		1,500†	1,000*	700†	510†	790†	1,730†	1,600†	2,220†
March		7,600†	4,300*	1,500†	2,250†	2,280†	3,830†	4,730†	6,790†
April		33,200	12,900	10,700	29,500	15,900†	14,800	58,900†	24,800
May		36,500	10,500	27,700	8,320	13,800	25,200	40,200	13,200
June		15,400	5,100	6,820	21,700	34,800	44,600	50,100	4,910
July	118,000	3,300	7,700	3,370	6,860	22,500	47,700	44,100	2,880
Aug.	60,600	2,100	2,700	2,720	8,510	7,590	15,200	15,800	1,660
Sept.	15,600	2,100	2,400	6,230	3,370	8,590	8,260	12,200	3,020
Oct.	5,100	2,400	6,900	9,680	3,640	7,370	6,760	9,120	
Nov.	5,100	1,900*	2,700	4,230	4,840	5,730	4,860	6,580	
Dec.	3,800†	1,500*	2,100†	1,200†	3,430†	4,320†	3,300†	4,890	
Total	208,200	110,000	59,650	76,650	93,730	124,970	177,990	250,490	63,170
Max.	July 22	April 26	April 23	May 11	April 2	June 10	June 29	July 1	April 3
C.f.s.	9,120	1,560	459	688	1,560	1,080	2,200	1,670	622
Min.	Oct.	Aug.	Dec.	Feb.	Jan.	Feb.	Feb.	Mar.	Aug.
C.f.s.	44	33	25†	10†	6*	12†	15†	25†	14
W. S	265	285	305	325	355	385	405	435	455
Page	59	52	33	40	39	39	32	32	30

RED LAKE RIVER AT THIEF RIVER FALLS, MINN.

Location: In Section 33, T. 154 N., R. 43 W., one mile below confluence with Thief River.
Drainage Area: 3,430 Sq. Miles.

	1909	1910	1911	1912	1913	1914	1915	1916
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.		32,500†	7,700*	250†	5,300	7,660	13,300*	22,600†
Feb.		29,400†	5,300*	230†	4,600	5,680	20,400*	21,400†
Mar.		135,000	9,200*	420†	5,000	13,300	32,000*	25,700†
Apr.		134,000	22,300†	5,700	81,400	28,300	42,100	213,000†
May		81,800	17,800	6,290	22,000	28,700	46,900	202,000
June		46,800	37,100	6,500	15,500	34,200	67,500	138,000
July	85,900	24,900	4,000	12,400	12,500	20,200	78,900	116,000
Aug.	58,300		1,900	12,700	9,600	13,900	30,100	67,900
Sept.	57,500		1,550	18,300	9,200	17,500	27,300	77,900
Oct.	56,900		2,010	17,300	12,800	25,500	31,300	63,900
Nov.	49,300		820	15,300	12,300	16,000	24,200	47,500
Dec.	43,000†		2,000†	7,700	6,800	16,900†	29,200†	32,200
Total	350,900	484,400	111,680	103,090	197,000	227,840	443,200	1,028,100
Max.	July	Apr. 20	June 9	Sept. 24	Apr. 8	June 10	June 27	Apr. 19
C.f.s.	3,500	2,870	3,820	740	3,550	1,170	7,860	7,040
Min.	Oct.	July	Sept.	Feb.	Dec.	Nov.	Sept.	Dec.
C.f.s.	640	309	2	4†	27	45	306	97
W. S.	285	285	305	325	355	385	405	435
Page	59	59	36	42	42	41	34	34

RED LAKE RIVER AT THIEF RIVER FALLS, MINN.

	1917	1918	1920	1921	1922	1923	1924	1925
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.	18,500	4,920		20,900	21,800†	8,100†	8,900*	4,160†
Feb.	21,600	2,220*		18,400	15,900†	7,200†	12,200*	2,260†
			(25—31)					
Mar.	39,800	22,000†	14,100	17,400	18,500†	7,100†	3,800*	21,500†
Apr.	145,000	21,200	140,000	60,700	87,000	79,300†	18,700	17,200
May	63,900	29,100	62,900	40,500	93,400	50,600	27,200	23,500
June	38,800	29,100	80,700	41,100	41,800	26,700	20,300	77,500
July	26,800	14,600	46,800	23,800	18,900	17,900	14,300	26,600
Aug.	13,700	11,900	32,700	14,500	13,300	13,100	10,500	10,100
Sept.	13,000	6,180	29,700	18,300	14,500	11,900	6,800	16,800
Oct.	13,200*		27,400	20,200	13,500	13,200	9,690	31,700
Nov.	14,300*		20,800	11,800	16,400	14,000	5,880	23,200
Dec.	7,400*		22,100	21,100	13,400†	12,300	3,480†	22,500†
Total	416,000	141,220	477,200	308,700	368,400	261,400	141,750	277,020
Max.	Apr. 10	Mar. 26	Apr. 16	Apr. 8	Apr. 13	Apr.	Apr.	June
C.f.s.	5,060	995	3,700	3,200	4,200	4,100	845	3,400
Min.	Aug.	Sept.	Nov.	Aug.	Aug.	Sept.	Oct.	Aug.
C.f.s.	99	19	78†	88	31†	30	10†	64
W. S.	455	475	505	525	545			
Page	33	30	51	33	34			

RED LAKE RIVER AT CROOKSTON, MINN.

Location: In Section 30, T. 150 N., R. 46 W., below dam of Crookston L. W. & P. Co.
Drainage Area: 5,320 Sq. Miles.

	1901	1902	1903	1904	1905	1906	1907	1908
Jan.					35,000*	92,500†	40,000†	28,700
Feb.					25,000*	56,600	25,500*	29,200
		(13—31)						
Mar.		132,000			42,000†	95,700	78,700†	38,100
Apr.		130,000		434,000	119,000	477,000	260,000	277,000
	(19—31)		(25—31)					
May	65,600	253,000	47,000	334,000	196,000	228,000	128,000	231,000
June	171,000	232,000	108,000	199,000	123,000	151,000	130,000	181,000
July	227,000	118,000	61,200	112,000	181,000	111,000	75,000	82,400
Aug.	113,000	72,000	41,200	57,600	186,000	94,000	52,500	73,200
Sept.	80,700	61,000	82,600	60,700	179,000	75,000	59,100	70,200
Oct.	95,900	73,000	119,000	62,700	139,000	60,600	64,000	52,900
Nov.	72,700	80,000	75,800	53,200	100,000	46,000	39,700	47,800
Dec.			91,500	45,000	93,000	58,000†	38,500	26,900
Total	825,900	1,151,000	626,300	1,358,200	1,418,000	1,545,400	991,000	1,138,400
Max.		March		April 24	May 13	April 15	April 4	April 7
C.f.s.		5,020		13,600	8,390	14,200	6,260	10,340
Min.		Aug.	Aug.	Nov.	Mar.	Nov.	Nov.	Feb.
C.f.s.		735	400	430	400*	600	410	300
W. S.		100	100	130	171	207	245	245
Page		494	494	50	39	32	56	57
St. E.					2	2	3	3
Page					55	55	41	42

RED LAKE RIVER AT CROOKSTON, MINN.

	1909	1910	1911	1912	1913	1914	1915	1916
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.	29,500	46,300	7,700	1,810	7,590	12,400	23,700	27,700
Feb.	21,400	41,000	5,500	2,120	6,540†	11,300†	25,000	26,500
Mar.	40,400	188,000	19,000	2,640	7,130†	28,000	33,400	42,400
Apr.	129,000	245,000	39,000	23,500	200,000	81,200	79,500	412,000†
May	93,500	120,000	27,600	19,700	44,900	66,500	82,500	276,000
June	58,300	60,700	58,000	14,400	22,900	92,900	141,700	189,000*
July	104,000	32,800	8,800	18,800	18,400	62,200	183,100	171,000*
Aug.	140,000	20,500	6,800	18,800	16,300	23,200	43,800	90,200
Sept.	80,000	19,000	4,800	38,300	16,400	30,700	35,700	96,200
Oct.	91,400	17,300	6,000	43,300	20,000	33,500	36,900	66,800
Nov.	64,400	12,100	4,700	22,600	16,900	35,900	28,800	51,800
Dec.	85,600	11,800	7,500†	10,100	11,700	28,700†	34,300	38,200†
Total	937,500	814,500	195,400	216,070	388,760	506,500	748,400	1,487,800
Max.	July 21	Mar. 20	June 10	Sept. 29	Apr. 8	June 12	June 29	Apr. 17
C.f.s.	3,630	7,830	3,380	2,120	6,920	2,550	7,860	14,400
Min.	Feb.	Nov.	Sept.	Feb.	Dec.	Jan.	Nov.	Jan.
C.f.s.	370	70	44	15	68	140	289	344
W. S.	265	285	305	325	355	385	405	435
Page	64	62	38	45	44	43	35	36
St. E.	4	4	5	5	6	6	7	7
Page	39	39	52	52	42	42	54	54

RED LAKE RIVER AT CROOKSTON, MINN.

	1917	1918	1919	1920	1921	1922	1923	1924	1925
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.	23,800†	7,850*			26,400*	18,400*	11,700*	10,300*	5,490†
Feb.	23,900†	5,080*			22,800*	19,400*	9,400*	9,900*	3,170†
			(25—31)	(25—31)					
March	45,300	41,200†	26,300	106,000†	24,600*	23,400*	9,800*	15,900*	27,800†
April	202,000	38,300	87,200	237,000	94,700†	153,000	127,000	41,100	34,500
May	88,400	44,600	56,200		59,000	161,000	79,600	41,600	44,600
June	52,300	42,400	54,300		71,000	57,300	41,200	28,400	160,000
July	39,600	20,400	357,000		33,900	31,800	32,900	14,600	25,600
				(24—31)					
Aug.	16,800	21,700	126,000	10,000	31,800	17,300	14,500	9,900*	
Sept.	9,500	11,700	30,100	32,300	32,600	28,400	16,300	4,100*	
Oct.	16,600	11,800		33,800	32,000	20,100	21,000	10,000*	
Nov.	17,100			28,500*	25,000	27,900	18,600*	6,950	
Dec.	12,100*			28,900*	27,100*	14,700†	16,700*	5,990†	
Total	547,400	245,030	737,100	476,500	480,900	572,700	398,700	198,740	301,160
Max.	Apr. 11	Apr. 1	July 5	May 25	Apr. 8	May 13	Apr. 19	Apr. 23	June
C.f.s.	5,320	1,760	14,400	10,100	3,500*	7,100	5,820	1,090	7,550
Min.	Aug.	Sept.			Nov.	Aug.	July	Sept.	Aug.
C.f.s.	78	50			218	125	30	30	5
W. S.	455	475	505	505	525	545			
Page	34	32	54	54	34	36			
S. E.	8	8	9	9	10	10	11	11	
Page	38	38	48	48	33	33	137	137	

THIEF RIVER NEAR THIEF RIVER FALLS, MINNESOTA

Location: In Section 3, T. 154 N., R. 43 W., five miles above Mouth of River.
Drainage Area: 1,010 Sq. Miles.

	1909	1910	1911	1912	1913	1914	1915	1916
	Ac—ft.	Ac—ft.	Ac—ft.	Ac—ft.	Ac—ft.	Ac—ft.	Ac—ft.	Ac—ft.
Jan.		6,200†	0	0†	630*	320*	2,600*	100*
Feb.		2,500†	0	0†	500*	60*	1,850*	30*
Mar.		20,300†	800†	30*	440*	200*	3,630	110*
Apr.		68,400	2,680	870	37,100†	8,750	17,400	122,600
May		26,900	440	320	4,810	8,090	15,200	62,600
June		9,500	650	110	1,680	10,400	32,700	14,600
July	27,300	6,600	60	70	890	4,260	33,500	6,370
Aug.	24,300	2,700	10	10	590	1,800	5,410	15,100
Sept.	17,800	480	20	1,400	620	3,010	1,930	22,200
Oct.	22,300	0	40	2,400	1,310	5,630	2,850	9,860
Nov.	16,400	0	10	1,980	1,480	5,030	2,600	6,480
Dec.	10,700†	0	0	830†	950†	3,850†	530*	790†
Total	118,800	143,580	4,710	8,020	51,000	51,400	120,200	260,840
Max.	July 19	April 3	Apr. 26	Sept. 27	Apr. 11	June 10	June 30	Apr. 23
C.f.s.	1,970	1,440	114	119	1,530†	725	1,900	4,080
Min.	July	Oct.	Sept.	Aug.	July	Feb.	Dec.	Feb.
C.f.s.	93	0	0	0	2	1*	1*	0
W. S.	285	285	305	325	355	385	405	435
Page	65	65	41	47	49	46	37	38
St. E.	4	4	5	5	6	6	7	7
Page	41	41	53	53	43	43	55	55

THIEF RIVER NEAR THIEF RIVER FALLS, MINNESOTA

	1917	1920	1921	1922	1923	1924	1925
	Ac—ft.	Ac—ft.	Ac—ft.	Ac—ft.	Ac—ft.	Ac—ft.	Ac—ft.
Jan.	300*		10*	370*	50*	60*	20*
Feb.	160†		10*	280*	40*	40*	20*
Mar.	260†		20*	490*	40*	120*	610†
April	49,400†	56,200†	26,200†	27,500	20,600	2,930	1,440
May	7,520	9,060	2,990†	56,400	13,600	1,540	5,640
June	1,950	21,800	7,210†	19,800	920	1,130	53,900
July	1,160	2,240	1,350	7,580	600	930	35,300
Aug.	130	320	510	380	100	160	1,720
Sept.	200	50	890	1,010	60	10	1,500
Oct.		410	1,620	520	100	190	4,790
Nov.		70	1,050†	350	170†	50†	150*
Dec.		10*	610*	60*	90*	40*	60*
Total	61,080	90,160	42,470	114,740	36,370	7,200	105,150
Max.	Apr. 11	Apr 8	Apr. 6	May 12	Apr. 21	Apr. 21	June
C.f.s.	2,550†	1,780†	1,700	2,680	1,160	132	1,380
Min.	Aug.	Sept.	Sept.	Aug.	Sept.	Sept.	Sept.
C.f.s.	1	0	1	1	0	0	0
W. S.	455	505	525				
Page	36	57	36				
St. E.	8	9	10	10	11	11	
Page	39	49	34	34	138	138	

CLEARWATER RIVER AT RED LAKE FALLS, MINN.

Location: In Section 22, T. 151 N., R. 44 W., at Great Northern railway bridge, one mile above mouth of river.
Drainage Area: 1,310 sq. miles.

	1909	1910	1911	1912	1913	1914	1915	1916	1917
	Ac—ft.	Ac—ft.	Ac—ft.	Ac—ft.	Ac—ft.	Ac—ft.	Ac—ft.	Ac—ft.	Ac—ft.
Jan.		9,400†	2,200†	1,840*	2,140*	3,410*	3,070*	4,200*	4,300*
Feb.		4,800†	1,200†	2,010*	1,610*	3,980*	2,780*	4,380*	3,960*
March		38,800	4,400*	2,340*	1,920*	4,590*	3,690*	3,930†	6,460*
April		77,300	17,700†	19,500†	79,800†	18,300†	40,200	125,000†	37,200
May		19,900	5,800	14,900	18,500	33,200	30,300	85,800	13,100
	(18—30)								
June	4,500	7,020	10,700	6,480	7,090	51,300	59,400	46,700	5,100
July	31,400	2,200	1,800	8,250	6,150	37,700	84,000	37,300	4,090
Aug.	73,200	2,200	4,300	4,270	5,210	10,900	9,550	8,200	3,570
Sept.	23,000	2,440	3,600	20,300	5,190	11,800	5,940	8,160	4,160
Oct.	23,500	2,700	4,800	25,200	7,710	10,900	7,380	6,540	
Nov.	17,300	2,200†	4,200†	5,960	5,730	8,430	5,450	3,800†	
Dec.	13,000†	3,700†	4,000*	3,760†	3,970†	3,350†	4,820†	3,490†	
Total	185,900	172,660	64,700	114,810	145,020	197,860	256,580	337,500	81,940
Max.	July	Mar. 22	Apr. 8	Oct. 2	Apr. 8	June 13	June 29	Apr. 15	Apr. 11
C.f.s.	1,790	1,960	767	1,270	3,410*	1,340	3,230	3,990	1,080
Min.	July	June	July	Sept.	Feb.	Nov.	Nov.	Oct.	Aug.
C.f.s.	74	21	11	46	25*	85	53	72	42
W. S.	265	285	305	355	355	385	405	435	455
Page	68	67	43	51	51	48	38	40	38

SOUTH BRANCH OF TWO RIVERS AT HALLOCK, MINN.

Location: In Section 12, T. 161 N., R. 49 W., a half mile above the Great Northern Railway bridge.

Drainage Area: 776 Sq. Miles.

	1911	1912	1913	1914
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.		180*	190*	10*
Feb.		30*	110*	10*
Mar.		30*	170*	100†
Apr.		2,800	38,100	10,400
May	3,140	1,480	5,050	5,120
June	19,400	1,100	800	3,110
July	1,780	540	250	1,420
Aug.	400	1,110	620	240
Sept.	500	1,980	810	610
Oct.	2,800	6,860	900	
Nov.	700†	3,280	610	
Dec.	490*	770*	150†	
Total	29,210	20,160	47,760	21,020
Max.	June 11	Oct. 7	Apr. 13	Apr. 6
C.f.s.	634	215	1,320	382
Min.	Aug.	July	Aug.	Feb.
C.f.s.	3	1	0	0
W. S.	305	325	355	385
Page	45	50	53	50

PEMBINA RIVER AT NECHE, N. DAK.

Location: At Great Northern Railway Bridge in northeast quarter of Section 36, T. 164 N., R. 54 W.
Drainage Area: 2,960 Sq. Miles.

	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.		2,000*	3,600*	3,700*	3,100*	370†		2,500*	490*	700*
Feb.		1,800*	2,800*	2,800*	2,500*	170*		2,000*	390*	500*
Mar.		2,200*	18,000†	3,700*	2,500*	190*		13,000†	12,200†	1,200*
Apr.		88,500†	33,700	28,500	19,100†	22,500		9,850	17,000	10,900†
May	12,400†	162,400	27,800	11,800	98,200	29,100		7,370	14,000	10,700
June	8,870	100,800	29,700	16,100	30,100	13,300	19,600†	3,620	9,150	8,820
July	3,700	51,500	12,200	10,800	9,580	5,400	7,960	2,180	3,030	7,940
Aug.	2,040†	23,600	6,010	8,040	3,070	3,190	2,960	400	1,490	5,260
Sept.	1,950*	17,600	5,660	8,760	2,090	3,580	1,650	230†	340	10,800
Oct.	2,450†	13,100	6,970	8,860	3,400	3,370	2,820	390†	1,210	11,700
Nov.	2,400†	10,100	5,920	5,790†	2,250†	2,680*	2,700†	600*	1,100*	14,200
Dec.	2,200*	8,000*	3,600*	3,700*	1,170*	2,270*	2,600*	550*	900*	8,500*
Total	36,010	481,600	155,960	112,550	177,060	86,120	40,290	42,690	61,300	91,220
Max.		May 26	Apr. 5	Apr. 4	May 14	Apr. 10	June 6	Mar. 15	Mar. 24	July 29
C.f.s.		3,870	1,372	1,220	2,190	927	654	685	900	870
Min.	Sept.	Nov.	Aug.	Nov.	Dec.	Jan.	Sept.	Sept.	Sept.	Aug.
C.f.s.	30†	133	74	82	15†	4	22	3	1	10
W. S.	100	207	171	207	245	245	265	285	305	325
Page	491	34	42	34	60	60	70	70	47	53
St. E.			2	2	3	3	4	4	5	5
Page			54	54	40	40	38	38	51	51

PEMBINA RIVER AT NECHE, N. DAK.

	1913	1914	1915	1919	1920	1921	1922	1923	1924	1925
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.	4,300*	1,800*	390*		1,230*	3,380*	530*	1,200*	230*	90*
Feb.	2,200*	1,100*	290*		860*	2,780*	280*	560*	170*	100†
Mar.	1,800*	2,200*	520*		1,730†	2,840†	2,640†	680*	420*	23,700†
April	101,000	15,100	2,720†	52,300	11,600	24,100	30,000	68,100	13,100	25,000
May	32,600	12,000	1,550	24,700	15,400	10,800	17,400	69,500	9,630	12,100
June	11,400	7,500	1,470	8,640	8,910	6,210	9,490	18,700	5,860	15,100
July	6,550	2,980	1,250	4,110	4,220	7,710	1,570	5,310	3,320	6,980
Aug.	4,270	820	540	1,690	1,080	1,150	580	5,480	880	1,170
Sept.	3,670	770	710	1,810	1,030	990	2,300	6,200	1,220	3,790
Oct.	3,910	1,950		4,140	7,540	7,190	4,180	7,000	10,400	9,200
Nov.	4,200*	1,250†		2,860†	5,300†	3,200†	4,360†	5,380	6,280†	3,830
Dec.	3,100*	570*		1,840*	3,170*	1,860*	2,040*	1,430*	1,230*	1,250†
Total	179,000	48,040	9,440	102,090	62,070	72,210	75,370	189,540	52,740	102,310
Max.	Apr. 8	Apr. 4	Apr. 7	Apr. 15	Apr. 19	Apr. 13	Apr. 7	Apr. 20	Apr. 20	March
C.f.s	3,850	365	154†	2,430	361	733	1,300	3,120	674	2,350†
Min.	Oct.	Sept.	Aug.	Apr.	Sept.	Sept.	Aug.	Feb.	Sept.	Feb.
C.f.s.	49	6	5	4	10	5	6	9	3	1
W. S.	355	385	405	505	505	525	545			
Page	56	53	40	60	60	38	38			
St. E.	6	6	7	9	9	10	10	11	11	
Page	40	40	53	52	52	39	39	142	142	

ROSEAU RIVER—WEST BRANCH—NEAR MALUNG, MINN.

Location: In the center of Section 7, T. 161 N., R. 39 W., a half mile above the confluence with the East Branch.

Drainage Area: 265 Sq. Miles.

	1911	1912	1913	1914
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.		25*	160*	40*
Feb.		10*	60*	3*
Mar.		30*	70*	180*
Apr.		1,220†	18,100	9,400
	(6—31)			
May	320	1,050	2,470	7,200
June	5,200	340	460	9,540
July	330	130	1,390	2,860
Aug.	240	210	210	620
Sept.	100	7,160	140	520
Oct.	210	19,600	360	
Nov.	120†	3,400	280	
Dec.	90*	600*	140*	
Total	6,610	33,775	23,840	30,363
Max.	June 12	Oct. 1	Apr. 8	Apr. 22
C.f.s.	507	1,040	854	475
Min.	Sept.	July	Sept.	Aug.
C.f.s.	1	1	2	5
W. S.	305	325	355	385
Page	49	56	58	55

ROSEAU RIVER AT CARIBOU, MINNESOTA

Location: In Section 34, T. 164 N., R. 45 W., three miles upstream from crossing of international boundary by river.

Drainage Area: 1,650 Sq. Miles.

	1917	1920	1921	1922	1923	1924	1925
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.			740*	1,110*	3,070*	1,840†	2,580*
Feb.			610*	830*	1,670*	3,380†	2,540*
Mar.			620*	1,230*	2,210*	6,380†	14,000
		(12—30)					
Apr.	42,800	30,000	57,600	29,700†	42,300	31,400†	57,300
May	28,300	23,700	17,800	55,700	115,000	42,400	28,900
June	3,600	24,700	7,130	24,000	6,490	11,100	89,700
July	3,490	2,160	1,770	5,780	6,330	4,660	93,600
Aug.	1,040	860	1,730	2,880	2,200	12,000	4,610
Sept.	1,040	1,060	3,910	10,080	1,810	3,670	7,740
Oct.		1,990	3,220	4,040	2,770	13,400	12,560
Nov.		1,900†	2,090	10,500	2,380	8,360†	16,100*
Dec.		1,100*	1,230*	4,090†	2,020†	2,670†	8,200*
Total	80,270	87,470	98,450	149,940	188,250	141,260	337,830
Max.	Apr. 17	Apr. 15	Apr. 11	May 25	May	April	July
C.f.s.	1,370	1,600†	1,980	1,360	2,980	1,230	2,140
Min.	Sept.	Aug.	July	Aug.	Sept.	Sept.	Sept.
C.f.s.	4	12	17	31	22	34	31
W. S.	455	505	525	545			
Page	39	61	40	40			

SOURIS (OR MOUSE) RIVER NEAR ESTEVAN, CANADA

Location: NE¼ Sec. 11, Twp. 2, Rge. 8, 2nd Mer., 1 mile below confluence of Long Creek and Souris River. Drainage area:, 2,660 square miles.

Year—	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923
	Ac. Ft.	Ac. Ft.	Ac. Ft.	Ac. Ft.	Ac. Ft.	Ac. Ft.	Ac. Ft.	Ac. Ft.	Ac. Ft.	Ac. Ft.	Ac. Ft.	Ac. Ft.	Ac. Ft.
January	----------	----------	18	18	62	86	31	7	46	0	18	23	37
February	----------	----------	134	28	103	89	28	32	40	0	12	43	17
March	----------	----------	2,705	5,288	114	172	2,091	5,780	51	1	953	2,707	910
April			24,379	13,626	179	45,878	24,278	5,296	19,686	55,815	1,083	29,693	40,344
May			1,064	3,997	120	15,003	13,843	2,644	1,722	11,990	590	12,175	1,735
June			738	9,223	59	2,678	2,083	309	119	678	8,866	2,142	
July	270	812	1,316	885	74	1,060	923	54	225	79	10,207	953	
August	92	817	260	135	17	664	98	175	8	6	818	46	
September	114	180	39	4	2	202	30	30	1	2	226	25	
October	2,078	410	65	83	3	178	39	23	1	9	129	56	
November		262	138	45	26	181	68	58	27	44	73	107	
December		139	59	61	44	98	20	31	0	39	46	80	
Total			30,010	33,488	803	66,784	43,031	14,439	21,876	68,663	23,016	48,109	
Max. in	October	June	April	June	July	April	May	March	April	April	June	April	April
C.f.s.	73.0	22.0	1,705	613.00	8.00	1,886	703	576	718	1,760	819	1,079	1,680
Min. in	Sept.	Dec.	Jan.	Jan.	Aug.	Jan.	Sept.	Dec.	Sept.	Jan.	Feb.	Jan.	Feb.
C.f.s.	0.48	8.3	Feb. & Oct. 0.00	0.07	Sept. & Oct. 0.01	0.74	0.03	0	0	0	0.05	.03	0.20
Ref. Page	Report of Hydrometric Surveys for 1912, P. 439		Report of Hydrometric Surveys for 1913 P. 394	Report of Hydrometric Surveys for 1914 P. 487	Report of Hydrometric Surveys for 1915 P. 523	Report of Hydrometric Surveys for 1916 P. 590	W.S.B. 9 P. 357	W.S.B. 10 P. 330	W.S.B. 11 P. 365	W.R.P. 31 P. 100	W.R.P. 36 P. 68	W.R.P. 40 P. 78	W.R.P. 44 P. 72

MOUSE RIVER AT MINOT, NORTH DAKOTA.

Location: Until March, 1924, at Anne St. footbridge near G. N. Ry. roundhouse, in the northwest quarter of Section 24, T. 155 N., R. 83 W. Thereafter immediately above Minot Park Board concrete dam, in the southwest quarter of Section 19, T. 155 N., R. 82 W.

Drainage Area: 10,270 Sq. Miles.

	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913
	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.	Ac-ft.
Jan.		1,200*	2,150*	1,660*	960*	490*	610*	80†	60*	60*	180†
Feb.		1,100*	1,660*	1,390*	660*	350*	440*	40†	80*	20*	10†
March		1,500*	5,610	1,840*	1,020*	740*	9,600†	7,800	240†	2,780	3,620
April		290,000	3,640	27,000	10,900	18,500	43,200	10,200	20,100	41,400	47,200
May	15,400	298,000	3,940	9,780	92,200	8,350	17,800	6,760	27,600	31,400	8,880
June	19,300	47,800	5,870	23,900	48,800	14,200	19,100	2,770	8,220	14,200	3,000
July	16,700	16,500	5,000	13,200	28,900	7,690	5,020	1,230	2,100	4,100	4,610
Aug.	11,400	7,900	4,210	3,810	6,400	5,770	2,280	130	940	2,630	5,370
Sept.	41,400	4,700	1,800	1,560	2,150	3,730	790	20	130	1,990	1,220
Oct.	18,000	4,000	950	1,000	1,230*	1,430	60	30	150	2,900	200
Nov.	9,800†	3,000†	1,510	950†	950*	1,810	100†	30	660†	2,520	1,460
Dec.	5,000*	2,400*	1,500*	920*	680*	920*	120†	30†	140†	790†	1,310
Total	137,000	678,100	37,840	87,010	194,850	63,980	99,120	29,120	60,400	104,790	77,060
Max.	Sept.	Apr. 20	May 31	Apr. 10	May 28	Apr. 13	Apr. 13	Apr. 1	Apr. 29	Apr. 20	Apr. 9
C.f.s.	1,136	12,000†	130	1,320	2,190	644	1,090	207	745	1,200	1,080
Min.	Aug.	Nov.	Oct.	Oct.	Oct.	Oct.	Oct.	Sept.	Sept.	Mar.	Feb.
C.f.s.	165	34	4	8	10	14	1	0	1	0*	0
W. S.	100	207	207	207	245	245	265	285	305	325	355
Page	488	37	37	37	64	64	73	73	52	59	61
St. E.			2	2	3	3	4	4	5	5	6
Page			58	58	44	44	42	42	54	54	44

MOUSE RIVER AT MINOT, NORTH DAKOTA.

	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925
Jan.	210	60	40	770	270	670	30	100	680	60	360	1,050†
Feb.	20	70	80	300	550	360	30	60	610	40	80	830†
Mar.	11,400	170	360	4,560	16,000	1,200	860	1,720	9,940	5,260	6,370	7,500†
Apr.	38,500	1,240	85,700	54,300	14,900	71,200	51,800	10,500	84,700	84,100	15,300	143,000
May	13,900	1,220	123,000	49,200	6,420	12,200	75,000	3,670	19,400	82,500	9,320	19,000
June	15,800	1,230	20,000	11,600	1,410	1,850	7,670	3,190	7,950	13,700	8,420	7,950
July	2,940	940	12,600	3,920	230	680	2,130	23,400	2,820	30,200	4,400	3,510†
Aug.	310	750	3,560	790	340	130	440	3,040	910	15,700	1,800	2,460†
Sept.	240	420	1,560	30	750	50	370	1,240	360	4,410	620	2,380†
Oct.	100	110	1,560	330	1,090	40	520	770	100	1,350	2,700	1,570†
Nov.	170	60	1,880	1,930	1,090	50	450	850	110	660	1,900	1,740†
Dec.	80	40	1,360	960	1,140	40	310	650	60	640	1,410	1,600†
Total	83,670	6,310	251,700	128,690	44,190	88,470	139,610	49,190	127,640	238,620	52,680	192,590
Max.	Apr. 20	June 26	May 4	Apr. 29	Mar. 30	Apr. 18	May 5	July 10	Apr. 21	May 1	Apr.	Apr. 19
C.f.s.	1,080	41	4,340‡	1,280	790	1,860	2,560	790	2,570	3,460	472	3,500‡
Min.	Feb.	Feb.	Feb.	Sept.	July	Sept.	Feb.	Feb.	Dec.	Feb.	Feb.	Feb.
C.f.s.	0	1	1	0	2	1	1	1	1	1	1	13
W. S.	385	405	435	455	475	505	505	525	545			
Page	57	41	42	41	33	64	64	41	42			
St. E.	6	7	7	8	8	9	9	10	10	11	11	
Page	44	56	56	40	40	53	53	40	40	144	144	

DES LACS RIVER AT FOXHOLM, NORTH DAKOTA

Location: In Section 36, T. 157 N., R. 85 W., at highway bridge near the Soo railway station, Foxholm.

Drainage Area: 1,340 Sq. Miles.

	1904	1905	1906
	Ac-ft.	Ac-ft.	Ac-ft.
Jan.		100*	70*
Feb.		70*	60*
March		1,040	1,730†
April		230	3,540†
May		190	840
	(23—30)		
June	610	180	1,180
July	1,430	290	70
Aug.	540	1,010†	
Sept.	290	60	
Oct.	480	60	
Nov.	200	120	
Dec.	130*	80†	
Total	3,680	3,430	7,490
Max.		Aug. 2	Apr.1
C.f.s.		425†	355†
Min.	Nov.	Sept.	July
C.f.s.	2	1	1
W. S.	130	171	207
Page	37	49	39
St. E.	2	2	2
Page	59	59	59

EVAPORATION RECORD AT UNIVERSITY OF NORTH DAKOTA

In order to determine the evaporation from the water surface or reservoirs, lakes, or streams in this region, an evaporation gage was established at the University of North Dakota, April 17, 1905 and maintained until June, 1920. This gage consisted of a metal tank 3 feet square and 18 inches deep, placed in the center of an anchored raft and filled with water to about the same level as the water surface outside. The temperature of the water and the exposure of its surface to the wind is the same as that of the reservoir in which it is floated and the evaporation presumably is the same.

Once each day after the change produced by evaporation or rainfall, the water level is restored to the original height and the precise depth of water thus transferred is measured to the 0.01 inch depth. The standard rain gage of the Weather Bureau is located near at hand. On days of rainfall the difference (which is usually small) between the quantity measured by the rain gage and the surplus in the tank is considered the total evaporation for the day. Rainfall is thus eliminated. The figures below give the total evaporation for the period indicated.

The evaporation on any day depends essentially upon temperature of the water; temperature of the air; humidity of the air, and wind movement, and varies from a minimum of zero in cool, very damp weather, to an ordinary maximum of 0.20 to 0.30 inches per day in hot, dry, windy weather. These daily variations can be studied by comparing the daily records of evaporation and the corresponding Weather Bureau records of temperature, wind velocity, humidity, etc.

It was not convenient to keep records here during the frozen season, but similar observations in other northern regions give a basis for fair estimates.

This gage was located in a pool of several acres, depth 6 to 8 feet, on the University campus and it may be assumed that the evaporation from any large outdoor reservoir or lake in North Dakota would have nearly the same total.

EVAPORATION GAGE AT UNIVERSITY, N. DAK.

Location: In pool of English Coulee, in southeast quarter of Section 5, T. 151 N., R. 50 W. Elevation above sea-level, 820 feet.

	1905	1906	1907	1908	1909	1910	1911	1912
Jan.								
Feb.								
March								
	(17—30)							
April	1.78	3.52	(22-30)	(15-30)	(20-30)	(3-30)	(22-30)	(19-30)
May	3.48	3.68	0.46	2.26	0.89	2.81	1.80	0.94
June	3.89	4.13	3.48	3.83	3.84	5.08	3.71	4.98
July	5.46	4.83	4.55	3.22	.....	6.95	4.33	5.79
Aug.	4.02	4.92	5.99	6.32	5.02	7.01	6.13	5.76
Sept.	3.75	4.04	4.53	5.77	4.19	4.76	3.99	3.94
	(1—13)		3.17	4.24	3.68	3.03	2.32	4.23
Oct.	1.37	1.92	1.98	1.58	1.51	3.32	1.29	1.66
Nov.			(1-10)	(1-10)				(1-9)
Dec.			0.17	0.19				0.15
Total	23.75	27.04	24.33	27.41		32.96	23.57	27.45
W. S.	245	245	245	245	265	285	305	325
Page	66	66	66	66	74	74	53	60

EVAPORATION GAGE AT UNIVERSITY, N. DAK.

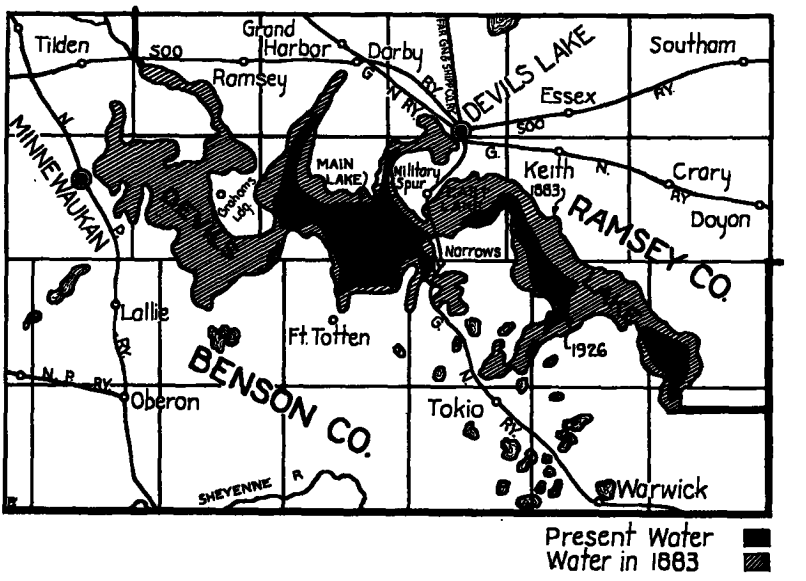
	1913	1914	1915	1916	1917	1918	1919	1920	Mean.
Jan.									0.40*
Feb.									0.50*
March									1.40*
	(5-30)	(16-30)	(10-30)		(25-30)	(9-30)	(27-30)	(26-30)	
					0.34	3.97	0.51	0.48	2.69†
April	3.87	0.95	2.96	(17-31)					
May	4.23	4.86	3.94	1.92	5.03	3.57	5.77	5.74	4.35
June	7.09	4.53	3.68	4.37	5.27	4.93	6.47	2.74	4.94
July	5.74	5.55	5.02	5.42	4.94	.....	6.43	.....	5.69
Aug.	5.29	4.60	4.80	5.95	5.32	.....	7.03	.....	4.94
Sept.	3.69	4.14	3.88	3.76	3.30	3.13	4.14	.....	3.63
Oct.	1.68	2.89	2.94				(1-23)		
	(1-25)	(1 -11)	(1-10)	1.63	1.92	1.39	1.76	.....	1.98
				(1-9)	(1-9)	(1-20)			
Nov.	0.42	0.39	0.77	0.50	0.32	0.38			0.68†
Dec.									0.40*
Total	32.01	27.91	27.99	23.55	26.44		32.11		31.60
W. S.	355	385	405	4.55	455	475	505	505	
Page	62	58	42	42	42	34	64	64	

DEVILS LAKE AT DEVILS LAKE, NORTH DAKOTA

Devils Lake, in the north-central portion of North Dakota, offers an interesting example of the rainfall-evaporation-run-off ratio. This lake has no outlet and its surface elevation depends entirely upon the relation between evaporation from its surface, the rainfall upon it, and inflow from the surrounding country.

On the south the lake is bordered by hills 100 to 200 feet in height, and it is not far to the divide between Devils Lake drainage area and the valley of Sheyenne River, which flows nearly parallel to the lake on the south at a distance of 6 to 12 miles. On the north a gently rolling prairie rises gradually, almost or quite to the Canadian boundary, and on the northwest no other drainage area is reached for a distance of more than 50 miles. The total area draining to Devils Lake is theoretically 3,500 square miles.

This area is all included within the region covered by glacial drift; and small lakes, hollows, and pools are thickly scattered over it. The fall is slight, nearly the whole area being included between the elevations of 1,440 and 1,600 feet above sea level. The rainfall is but little in excess of the evaporation, the total run-off for the entire year as found at river stations in this State being rarely more than 2 inches, and often only a small fraction of 1 inch, as computed from the theoretical drainage areas. With so small run-off and so small fall, the drainage channels and river systems are therefore as yet very imperfectly developed. Much of the water that runs into the small lakes or



coulees is held there until it evaporates, and from large portions of the total drainage area no water ever reaches Devils Lake except in years of exceptionally great or sudden rainfall. The area which actually drains into Devils Lake in ordinary years is only a very small fraction of the theoretical 3,500 square miles.

When the region was first settled, the meander surveys in 1883 showed Devils Lake to have a total length of 35 miles, a width ranging from 1 mile to 15 miles, and an area of approximately 115 square miles; on account of its many bays and slender arms, the total shore line measured about 180 miles. With settlement and the conversion into farms of the prairies formerly tenanted by vast herds of buffalo, the sod was broken, the soil cultivated, and the flow of rainfall from its surface retarded. The lake thus lost a large portion of its annual supply, and its level is continuously lowered by evaporation, until the reduction in surface area brings the evaporation to equality with the inflow. The present area of the lake is not precisely known, but the total acreage of the large and small lakes and lakelets, about a dozen in number, occupying the location of the original lake, is slightly less than 50 square miles.

It is a shallow lake, the greatest depth found at present stage being only about 20 feet. Many old beaches are seen surrounding it at elevations of 15 to 40 feet above the present surface; at a still farther elevation of a few feet, it is said that the lake would overflow the rim of its basin at the eastern end and find outlet into Stump Lake or Sheyenne River. It is certain that the lake had an outlet in some direction in quite recent geologic times, perhaps within one hundred years, for the water, though rather brackish or saline forty years ago, had comparatively small solid content. Since that time, by evaporation, the solution has been so much condensed that the main lake contains more than half as great a weight of the salts of sodium, calcium and magnesium as ordinary sea water and the section of the lake immediately east of the Pelican point railway crossing has perhaps a greater density than sea water.

There are a few records of the height of the lake surface since 1867. Since June, 1901, a gage has been maintained and records taken several times each year or more often. The zero of the gage is 1416.2 feet above sea level. Itemized tables of gage-height have been published in U. S. Geological Survey Water Supply Papers, as follows:

Vol.	66	85	245	265	285	305	325	435	455	475	505
Page	14	239	53	60	53	34	40	33	31	28	49

In the following table the record is summarized.

GAGE-HEIGHT OF DEVILS LAKE

Date		Gage-height.
1867		26.7 ft.
1879	June	22.9
1887	August 8	15.4
1896	August	13.0
1901	June 8	12.4
	Sept. 14	11.9
1902	June 5	14.0
	November 15	13.0
1903	May 29	13.1
	November 15	11.7
1904	April 30	12.8
	June 26	13.4
	November 29	12.6
1905	July 15	13.3
	November 29	12.6
1906	June 7	13.0
	November 16	11.6
1907	July 9	12.5
	November 15	11.3
1908	April 21	11.7
	November	10.2
1909	June 6	11.0
	October 25	10.0
1910	June 25	9.7
	Sept. 1	8.6
1911	August 10	8.7
	Sept. 30	8.5
1912	May 20	9.1
	August 24	9.7
1913	May 5	10.1
	November	8.7
1914	July 7	8.9
	November 2	7.8
1915	April 19	7.7
	October 2	6.8
1916	May 1	7.7
	November 5	6.9
1917	April 15	7.1
	November 10	5.6
1918	May 7	5.7
	November 22	4.7
1919	June 24	6.3
	November 23	5.5

1920	June 22	5.9
	October	4.6
1921	July	5.1
	November	5.0
1922	June 25	5.6
1923	August 27	4.7
1924	June 27	4.6
1925	September 3	3.2

Since the portion of the lake immediately east of the railroad at Pelican Point, known as East Lake, has been separated from the main lake by the highway fill, its gage-height has been lower than that of the main lake. In August, 1926, the water in East Lake had practically disappeared.

The differences in gage-heights are as follows:

1916—August—1.8 feet	1922—June 25—3.3 feet
1917—August—1.5 feet	1924—June 24—2.8 feet
1918—July —1.0 feet	1925—Sept. 3—1.9 feet
1920—June —3.2 feet	1926—Aug. —Water gone.

CURRENT METER MEASUREMENTS

Discharge measurements with current meter at the various river stations as shown in the following list have been made since those published in the last biennial report of the State Engineer—1924. The gage-heights are in feet; the * indicates that the river was frozen at the time of the measurement and the surface of flowing water under the ice a few inches or a foot or two below the gage reading; and the figures of discharge in second-feet.

RED RIVER AT GRAND FORKS, N. D.

Date	Hydrographer	Gage-height	Discharge
9- 6-24	E. F. Chandler	2.34	210
10- 4-24	M. Diehl	3.19	436
11- 3-24	M. Diehl	3.85	553
1- 5-25	Black and Kemper	2.84*	123
1-30-25	Levi & Daily	2.93*	140
3- 4-25	Daily & Dixon	3.48*	138
3-13-25	Meyers & Dixon	4.20*	234
3-27-25	Diehl & Wright	14.29	4,175
4- 4-25	Diehl & Meyers	10.95	3,754
6-12-25	Gray & Chandler	18.98	9,996
9-14-25	E. F. Chandler	4.39	823

RED LAKE RIVER, CROOKSTON, MINN.

Date	Hydrographer	Gage-height	Discharge
9- 3-24	E. F. Chandler	2.81	88
9- 5-24	E. F. Chandler	2.81	90
10-26-24	M. Diehl	2.82	115
4-15-25	R. B. Black	3.60	538
6-11-25	Gray & Chandler	11.41	5,837
6-11-25	Gray & Chandler	11.40	5,930
6-18-25	Gray & Chandler	7.55	2,597
8-17-25	E. F. Chandler	2.83	148
8-21-25	E. F. Chandler	2.84	159

THIEF RIVER NEAR THIEF RIVER FALLS, MINN.

Date	Hydrographer	Gage-height	Discharge
9- 3-24	E. F. Chandler	3.58	0.1
4-14-25	R. B. Black	4.32	19
6-16-25	Gray & Chandler	8.25	1,053
8-21-25	E. F. Chandler	4.10	5.8

BOIS DES SIOUX RIVER NEAR FAIRMOUNT, N. D.

4-11-25	R. B. Black	1.29	0

MOUSE RIVER AT MINOT, N. DAK.

4-15-25	G. H. McMahon	(Anne St. 19.35)	3,530

CANNON BALL RIVER NEAR STEVENSON, N. D.

4- 3-25	G. H. McMahon	4.02	269
5- 4-25	G. H. McMahon	3.00	33
6-18-25	G. H. McMahon	4.11	316

HEART RIVER AT SUNNY, N. DAK.

Date	Hydrographer	Gage-height	Discharge
10-22-24	G. H. McMahon	8.18	147
3-30-25	G. H. McMahon	9.96	803
4- 6-25	G. H. McMahon	8.51	271
5-15-25	G. H. McMahon	7.61	41
6- 4-25	G. H. McMahon	9.48	741
6-15-25	G. H. McMahon	8.35	195

KNIFE RIVER NEAR BRONCHO, N. D.

10-24-24	G. H. McMahon	3.89	20
3-29-25	G. H. McMahon	8.31	428
4- 1-25	G. H. McMahon	4.91	111
5-18-25	G. H. McMahon	3.30	7.6
6- 9-25	Diehl & Sorlie	4.35	87

SPRING CREEK AT ZAP, N. D.

Date	Hydrographer	Gage-height	Discharge
10-24-24	G. H. McMahon	9.08	9.6
3-31-25	G. H. McMahon	13.02	93.1
4-24-25	G. H. McMahon	9.28	21.1
5-18-25	G. H. McMahon	9.01	6.4
6- 9-25	Diehl & Sorlie	9.68	42.1
7-22-25	Sorlie & Broughton	8.62	3.1

LITTLE MISSOURI RIVER AT MEDORA, N. D.

Date	Hydrographer	Gage-height	Discharge
10- 3-24	G. H. McMahon	2.81	23
10-14-24	G. H. McMahon	5.98	2,503
10-18-24	G. H. McMahon	4.69	914
3-26-25	G. H. McMahon	8.00	5,470
4- 1-25	G. H. McMahon	5.20	1,222
4-23-25	G. H. McMahon	3.58	208
5-19-25	G. H. McMahon	3.07	78
6-11-25	McMahon & Sorlie	4.77	986
7-20-25	A. Sorlie	3.28	74
8-24-25	Sorlie & Diehl	2.82	16