The Fort Shaw Unit. — Actual construction work was begun on the Fort Shaw Unit in May, 1907, and was continued through the summer of 1908, and there are now 16 000 acres under ditch, for which water is ready. Water was first turned into the canals July 21, 1908, and turned off for the winter on October 24, 1908. The size of the farms as they are laid out varies from 40 acres to 160 acres. These were first opened to settlement on May 7, 1908, and up to this time 12 per cent. of the total number of farms and of the irrigable land has been filed upon. The new settlers are building their homes and beginning the cultivation of their lands and it is expected that this unit will be practically settled in its entirety during the coming year and work will be prosecuted upon further units of the project.

WORK BY THE RAILROADS.

The railroad work in the state has consisted of the extension of the Chicago, Milwaukee and St. Paul Railway, now named the Chicago, Milwaukee & Puget Sound Railway, extensive line changes by the Northern Pacific, the construction of some new lines by the Northern Pacific, the construction of the Billings and Northern and line changes by the Great Northern and Montana and Great Northern.

The Chicago, Milwaukee & Puget Sound Railway Company.— The surveys for the road were begun on December 25, 1905, and since then the line has been completed as far west as Butte. Freight traffic to that point was started early in the year and passenger traffic has recently been inaugurated. The approximate length of the line from Chicago to Seattle is 2 175 miles, and the length of the line in Montana will be 753 miles, entering on the eastern boundary at Marmouth and leaving on the western boundary at the St. Paul Pass Tunnel. The main range of the Rocky Mountains is crossed through the Pipestone Pass, about fifteen miles east of Butte, and the Bitter Root Mountains are crossed at St. Paul Pass at an elevation of 4 169 ft. above sea level. As a large part of the work on the road during the year has been west of Butte, I will refer more particularly to that part.

The line west of Butte is located along the Deer Lodge, Hellgate, Missoula and St. Regis rivers. It has been constructed with a maximum grade of six tenths of 1 per cent., except the crossing of the Bitter Root Mountains, where a 1.7 per cent. compensated grade is used. The maximum curvature is 3 degrees,

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except on the mountain grade, where 10 degree curves are used. It is expected that early in January, 1909, the grading, tunneling, except that portion of the St. Paul Pass Tunnel which is in Idaho, and the bridging will be completed and the track will be laid for 140 miles over this territory. Thirty miles of this track have already been ballasted.

There are six tunnels besides the St. Paul Pass Tunnel, aggregating $4\,862$ linear ft. The St. Paul Pass Tunnel, through the Bitter Root Mountains from the head of Rainy Creek in Montana to Cliff Creek in Idaho, is $8\,751$ ft. long from portal to portal. The summit of the grade of the whole line is $3\,518$ ft. from the east portal of this tunnel and is at an elevation of $4\,169$ ft. above sea level and $1\,020.7$ ft. below the surface. The grade in the tunnel is 0.2 per cent. each way from this summit. An interesting feature in the construction of this tunnel is the use of an air-operated shovel of $1\frac{1}{4}$ yd. capacity. The tunnel is 18 ft. 6 in. by 25 ft. inside the timbers, with a theoretical excavation of 18.5 cu. yd. per linear foot.

Up to December 1, 1908, there had been driven 6 877.5 ft. of tunnel, all timbered complete except 1 302 ft. in the west end.

The record of progress for the six months ending on December 1, 1908, was as follows:

		EAST END.			WEST END.			BOTH ENDS.		
1908.	Heading. Feet.	Bench. Feet.	Tunnel. Feet.	Heading Feet.	. Bench Feet.	. Tunnel. Feet.	Heading Feet.	Bench. Feet.	Tunnel. Feet.	
June,	203	325	264.0	333	309	321.0	536	634	585.0	
July,	249	207	228.0	295	319	307.0	544	526	535.0	
August,	318	200	259.0	310	415	362.5	628	615	621.5	
September	, 306	218	262.0	254	333	293.5	560	551	555.5	
October,	320	272	296.0	227	342	284.5	547	614	580.5	
November	, 340	328	334.0	268	527	397.5	608	855	731.5	
Total, Average	1 736	1 550	1 643.0	1 687	2 245	1 966.0	3 4 2 3 3	8 795	3 609.0	
per month	, 289.3	258.3	273.8	2812	374.2	327.7	570.5	632.5	601.5	

ST. PAUL PASS TUNNEL.

This shows some very good progress, particularly the month of November. The daily progress during this month was as follows:

ST. PAUL PASS TUNNEL.

Daily Progress for November, 1908.

	EAS	EAST.		ST.	TOTAL.			
	Heading.	Bench.	Heading.	Bench.	Heading.	Bench.	Tunnel.	
I	8	9	7	13	15	22	18.5	
2	IO	12	0	II	10	23	16.5	
3	II	5	15	16	26	21	23.5	
4	14	12	12	13	26	25	25.5	
5	12	10	II	17	23	27	25.0	
6	II	10	6	15	17	25	21.0	
7	II	12	11	15	22	27	24.5	
8	II	10	II	15	22	25	23.5	
9	II	4	12	21	23	25	24.0	
IO	12	II	12	16	24	27	25.5	
II	9	10	7	16	16	26	21.0	
12	II	10	12	15	23	25	24.0	
13	10	15	12	16	22	31	26.5	
14	10	15	13	τ7	23	32	27.5	
15	12	10	17	19	29	20	29.0	
16	12	14	14	23	26	37	31.5	
17	10	6	11	20	21	26	23.5	
18	13	II	19	20	32	31	31.5	
19	II	14	14	18	25	32	28.5	
20	II	13	16	ıб	27	20	28.0	
21	13	12	10	21	23	33	28.0	
22	13	12	12	22	25	34	29.5	
23	10	II	6	21	16	32	24.0	
24	12	II	8	20	20	31	25.5	
25	II	II	0	22	II	33	22.0	
26	12	I 2	0	17	12	29	20.5	
27	12	13	0	17	I 2	30	21.0	
28	12	8	0	21	12	29	29.5	
29	13	12	0	16	13	28	20.5	
30	12	13	0	18	12	3 1	21.5	
	340	328	268	527	608	855	731.5	

Note. — No progress was made in West Heading from the 25th to the 30th inclusive; account talc seam very wet, running ground.

It is expected that the tunnel will be entirely completed by May 1, 1909.

Northern Pacific Railway. — The work done by this company has consisted of the double tracking of its line from Garrison to Missoula, including many heavy line changes and grade revisions and the construction of a line from St. Regis to Paradise.

Work was commenced in November, 1906, and was expected to be completed by January 1, 1909. The grading for this work was practically completed on June 1, 1908, but the floods of that month destroyed a great deal of the work and it

has required the balance of this season to repair it. All of the above work for the Chicago, Milwaukee & Puget Sound Railway Company and the Northern Pacific has been done by Winston Bros., and their contracts have included the excavation of something over 20 000 000 cu. yd. of material, exclusive of tunnel excavations and the driving of 29 tunnels varying in length from 100 ft. to 8 750 ft. and aggregating 27 125 ft. Three of the tunnels are double track and the others are single track.

The Billings & Northern and the Great Northern. — The total length of the Billings & Northern line from Armington to Laurel is 194 miles, but in order to make this available for the heavy traffic it is designed to carry, it is necessary to make changes in the Great Northern line from Armington to Great Falls and in the Montana & Great Northern from Great Falls to Shelby.

The grading on the Billings & Northern has required the moving of 10137000 cu. yd. of material and the driving of 6662 linear ft. of tunnel. One hundred and seventy-three miles of the track is laid with 85 lb. rail and 21 miles with 90 lb. rail, Wolhaupter joints and tie plates being used throughout. All track is ballasted with 10 in. of gravel ballast under the ties. The approximate cost of the line will be \$11000000.

Changes on the Montana & Great Northern mentioned above are being made to reduce grades to a maximum 0.6 per cent. equated grade and to remove the track from water courses and prevent damage by floods. The changes now under way will require the moving of about 520 000 cu. yd. of material. There will still remain some 0.7 per cent. to 1.0 per cent. grades, which will probably be reduced during the coming summer.

The Great Northern Railway suffered very severely from two very serious floods, one in April, 1908, due to the breaking of the Hauser Lake Dam, and, almost before the damage due to this had been repaired, the very heavy flood of June came. There has been a very large amount of reconstruction work done in repairing these damages, but there have been few changes made in the original line.

WATER-POWER DEVELOPMENTS.

The Madison River Power Company. — At the Madison Cañon Station of this company, the No. 1 Generating Station was remodeled and reconstructed and a new stave pipe 12 ft. in diameter and 6 500 ft. long was constructed from the dam