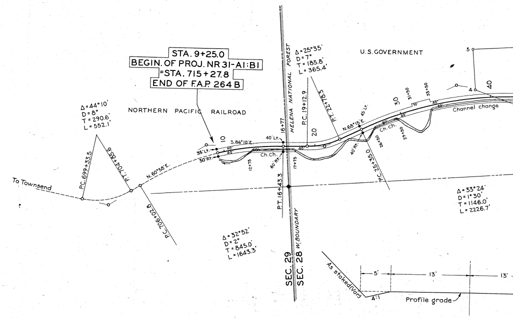
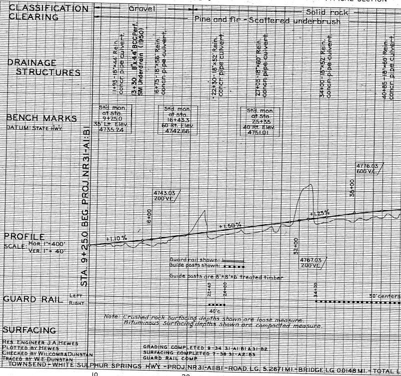
TOWNSEND-WHITE SULPHUR SPRINGS PROJ. NR 31-A1:B1 & 31-B2


HELENA
STA. 9+25.0
BEGIN. OF PROJ. NR 31-A1:B1
=STA. 715+27.8
END OF F.A.P. 264 B
NORTHERN PACIFIC RAILROAD
U.S. GOVERNMENT
HELENA NATIONAL FOREST
W. BOUNDARY
SEC. 29
SEC. 28
To Townsend
Δ=44°10'
D=8°
T=290.6'
L=552.1'
P.C. 699+33.5
P.T. 704+85.9
N. 60°58'E.
P.C. 706+02.9
Δ=32°52'
D=2°
T=845.0'
L=1643.3'
10
S.86°10'E.
35' Lt.
30' Rt.
40'
60'
Ch.ch.
12+75
40' Lt.
60' Rt.
16+77
17+75
P.T. 16+43.3
Δ=25°35'
D=7°
T=185.8'
L=365.4'
P.C. 19+12.9
P.T. 22+78.3
20
N.68°15'E.
45' Lt.
40' Rt.
P.C. 25+35.0
26+50
29+50
30
31+50
33+50
70'
Channel change
4
5
40
Δ=33°24'
D=1°30'
T=1146.0'
L=2226.7'
As staked (Var)
5'
13'
13'
4:1
Profile grade

STANDARD MONUMENTS SHOWN THUS •

TYPICAL SECTION



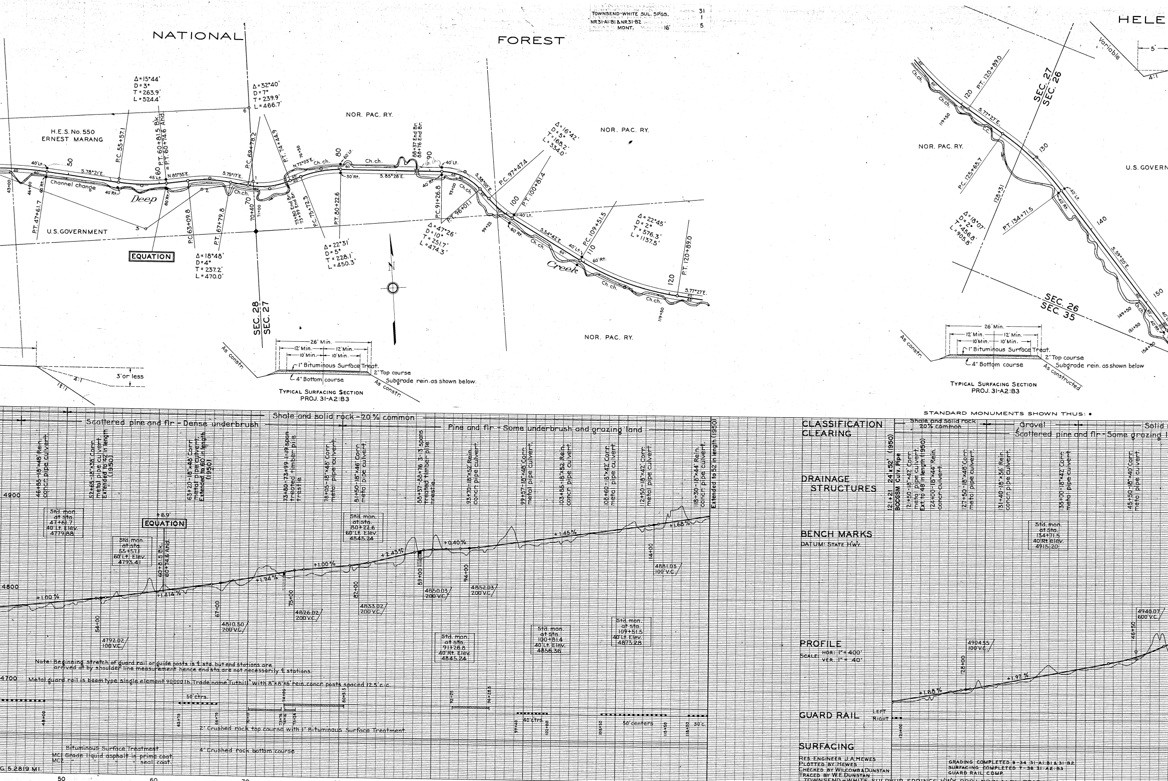
Note: Crushed rock surfacing depths shown are loose measure.
Bituminous surfacing depths shown are compacted measure.

RES. ENGINEER J.A. HEWES
PLOTTED BY HEWES
CHECKED BY WILCOMB & DUNSTAN
TRACED BY W.E. DUNSTAN

GRADING COMPLETED 9-34 31-A1:B1 & 31-B2
SURFACING COMPLETED 7-38 31-A2:B3
GUARD RAIL COMP.

TOWNSEND - WHITE SULPHUR SPRINGS HWY. - PROJ. NR 31-A1:B1 - ROAD LG. 5.2671 MI. - BRIDGE LG. 0.0148 MI. - TOTAL L

TOWNSEND-WHITE SUL. SP'GS.	31
NR31-A1:B1 & NR31-B2	1
MONT. 16'	5


NATIONAL
FOREST
HELE
H.E.S. No. 550
ERNEST MARANG
U.S. GOVERNMENT
NOR. PAC. RY.
Deep
Creek
Channel change
Ch. ch.
EQUATION
Δ=15°44' D=3° T=263.9' L=524.4'
Δ=32°40' D=7° T=239.9' L=466.7'
Δ=18°48' D=4° T=237.2' L=470.0'
Δ=22°31' D=5° T=228.1' L=450.3'
Δ=47°26' D=10° T=251.7' L=474.3'
Δ=16°42' D=5° T=168.2' L=334.0'
Δ=22°45' D=2° T=576.3' L=1137.5'
Δ=18°07' D=2° T=456.8' L=905.8'
P.T. 47+61.7
P.C. 55+57.1
P.T. 60+81.5 Bk. = P.T. 60+74.6 Ahd.
P.C. 63+09.8
P.T. 67+79.8
P.C. 69+78.2
70+40
P.T. 74+44.9
P.C. 75+12.5
73+80 End Br. 73+99 End Br.
P.T. 80+22.6
88+37 End Br. 88+76 End Br.
P.C. 91+26.8
P.T. 96+01.1
P.C. 97+47.4
P.T. 100+81.4
P.C. 109+51.5
P.T. 120+89.0
P.C. 125+65.7
P.T. 134+71.5
128+31
S.78°21'E.
N.85°55'E.
S.75°17'E.
N.72°03'E.
S.85°28'E.
S.38°00'E.
S.54°42'E.
S.77°27'E.
S.59°20'E.
SEC. 28
SEC. 27
SEC. 26
SEC. 35
N
Variable
4:1
1½:1
3' or less
As constr.
As constructed
26' Min.
12' Min.
10' Min.
1" Bituminous Surface Treat.
2" Top course
4" Bottom course
Subgrade rein. as shown below.
TYPICAL SURFACING SECTION
PROJ. 31-A2:B3
STANDARD MONUMENTS SHOWN THUS: •
Scattered pine and fir - Dense underbrush
Shale and solid rock - 20% common
Pine and fir - Some underbrush and grazing land
Gravel
Scattered pine and fir - Some grazing
46+85-18"x48" Rein. concr. pipe culvert.
52+65-18"x38" Corr. metal pipe culvert. Extended to 42' in length (1950)
63+20-18"x48" Corr. metal pipe culvert. Extended to 60' in length (1950)
73+80-73+99 1-19 span treated timber pile trestle.
78+05-18"x48" Corr. metal pipe culvert.
81+50-18"x46" Corr. metal pipe culvert.
88+57-88+76 3-13 spans treated timber pile trestle.
93+70-18"x52" Rein. concr. pipe culvert.
99+57-18"x48" Corr. metal pipe culvert.
103+85-18"x52" Rein. concr. pipe culvert.
108+60-18"x42" Corr. metal pipe culvert.
112+50-18"x42" Corr. metal pipe culvert.
118+30-18"x44" Rein. concr. pipe culvert. Extended to 52' in length (1950)
121+21 24"x52' (1950) BOCGSM Culv. Pipe
121+50-18"x42" Corr. metal pipe culvert. Ext. to 48' in length (1950)
124+00-18"x44" Rein. concr. culvert.
127+50-18"x48" Corr. metal pipe culvert.
131+40-18"x56" Rein. concr. pipe culvert.
138+00-18"x42" Corr. metal pipe culvert.
145+50-18"x40" Corr. metal pipe culvert.
Std. mon. at sta. 47+61.7 40' Lt. Elev. 4779.88
Std. mon. at sta. 55+57.1 60' Lt. Elev. 4793.41
Std. mon. at sta. 80+22.6 60' Lt. Elev. 4845.24
Std. mon. at sta. 91+26.8 40' Rt. Elev. 4845.24
Std. mon. at sta. 100+81.4 40' Lt. Elev. 4856.36
Std. mon. at sta. 109+51.5 40' Lt. Elev. 4873.28
Std. mon. at sta. 134+71.5 40' Rt. elev. 4915.20
+6.9'
60+81.5 Bk. 60+74.6 Ahd.
+1.00%
+1.414%
+1.94%
+1.00%
+2.43%
+0.40%
+1.45%
+1.68%
+1.92%
4792.02 100' V.C.
4810.50 200' V.C.
4826.02 200' V.C.
4833.02 200' V.C.
4850.03 200' V.C.
4852.03 200' V.C.
4881.03 100' V.C.
4904.55 100' V.C.
4940.07 600' V.C.
4900
4800
4700
50' ctrs.
40' ctrs.
50' centers
50' c.
48+00
62+70
66+70
70+10
73+76
74+16
74+05
75+24
80+5.5
92+25
96+28.5
99+40
102+60
108+50
115+50
118+00
121+00
CLASSIFICATION
CLEARING
DRAINAGE STRUCTURES
BENCH MARKS
DATUM: STATE HWY.
PROFILE
SCALE: HOR. 1" = 400' VER. 1" = 40'
GUARD RAIL
LEFT
RIGHT
SURFACING
50
60
70
80
90
100
110
120
130
140

Note: Beginning stretch of guard rail or guide posts is ℄ sta. but end stations are arrived at by shoulder line measurement hence end sta. are not necessarily ℄ stations.

Metal guard rail is beam type single element 90,000 lb. Trade name "Tuthill" with 8"×8"×6' rein. concr. posts spaced 12.5' c.-c.

2" Crushed rock top course with 1" Bituminous Surface Treatment

4" Crushed rock bottom course

Bituminous Surface Treatment
MC1 Grade liquid asphalt in prime coat.
MC2 " " " " seal coat.

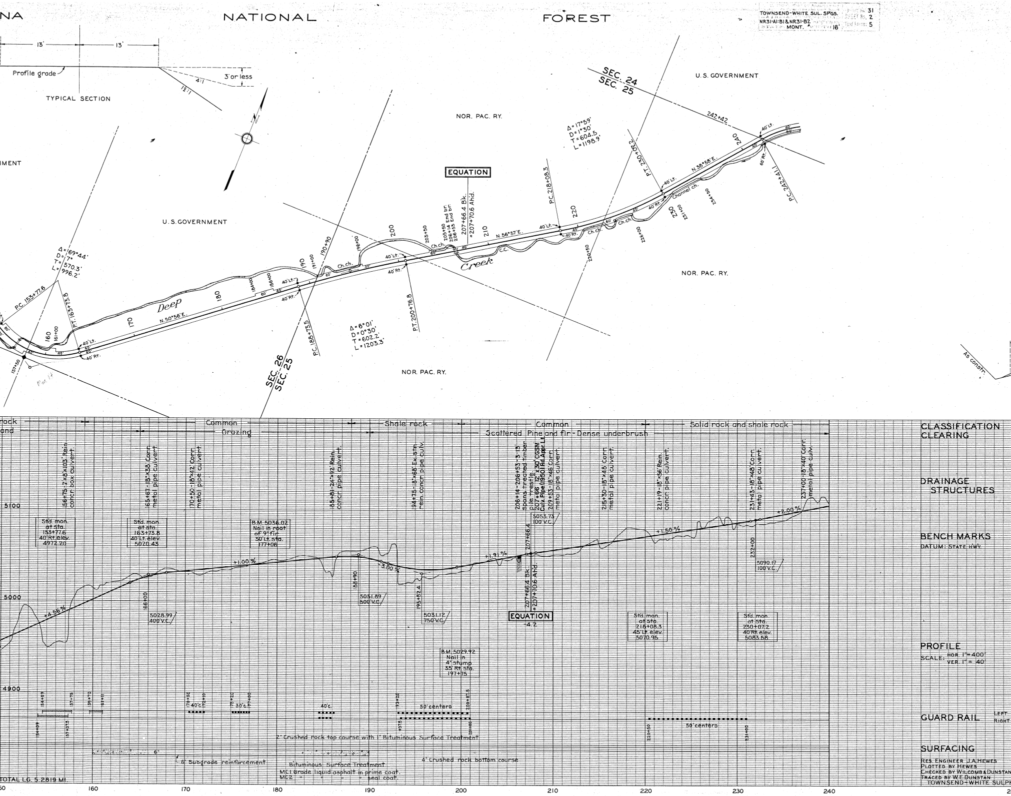
G. 5.2819 MI.

RES. ENGINEER J. A. HEWES
PLOTTED BY HEWES
CHECKED BY WILCOMB & DUNSTAN
TRACED BY W. E. DUNSTAN

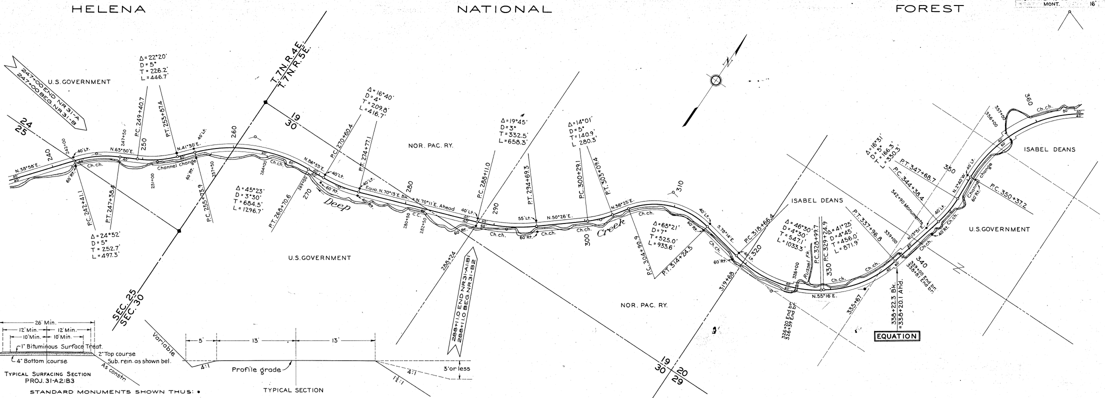
GRADING COMPLETED 9-34 31-A1:B1 & 31-B2
SURFACING COMPLETED 7-38 31-A2:B3
GUARD RAIL COMP.

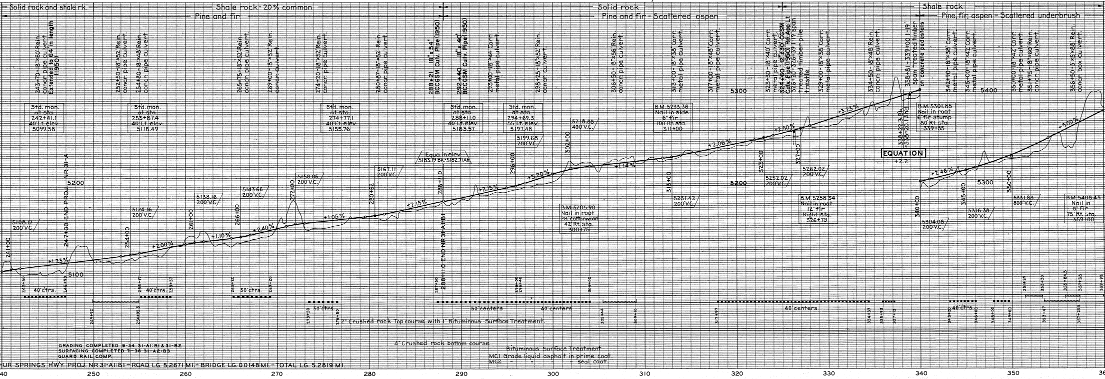
TOWNSEND-WHITE SULPHUR SPRINGS HWY. PROJ. NR 31-A1:B1 - ROAD LG. 5.2671 MI. - BRIDGE LG. 0.0148 MI.

TOWNSEND-WHITE SUL. SP'GS. 31
NR31-A1:B1&NR31-B2 2
MONT. 16' 5


NA
NATIONAL
FOREST
13'
13'
Profile grade
4:1
3' or less
1½:1
TYPICAL SECTION
IMENT
U.S. GOVERNMENT
NOR. PAC. RY.
U.S. GOVERNMENT
NOR. PAC. RY.
NOR. PAC. RY.
EQUATION
207+66.4 Bk.
=207+70.6 Ahd.
SEC. 24
SEC. 25
SEC. 26
SEC. 25
Δ=69°44'
D=7°
T=570.3'
L=996.2'
P.C. 153+77.6
P.T. 163+73.8
Δ=6°01'
D=0°30'
T=602.2'
L=1203.3'
P.C. 188+73.5
P.T. 200+76.8
Δ=17°59'
D=1°30'
T=604.5'
L=1198.9'
P.C. 218+08.3
P.T. 230+07.2
P.C. 242+41.1
242+42
N.50°56'E.
N.56°57'E.
N.38°58'E.
Deep
Creek
Ch.ch.
C.C.
Channel ch.
40' Lt.
40' Rt.
60' Rt.
205+50 End br.
206+14 End br.
206+53 End br.
As constr.
Common
Shale rock
Common
Solid rock and shale rock
Grazing
Scattered Pine and fir - Dense underbrush
156+75-7'×8'×103' Rein. conc. box culvert
165+67-18"×38' Corr. metal pipe culvert
170+50-18"×42' Corr. metal pipe culvert
185+81-24"×92' Rein. concr. pipe culvert
194+75-18"×68' Ex. Str. rein. concr. pipe culv.
206+14-206+53-3-13' Spans treated timber pile trestle
207+66 12"×30' CGSM Culv. Pipe (1950) Rd. Appr. Lt.
209+53-18"×46' Corr. metal pipe culvert
215+30-18"×48' Corr. metal pipe culvert
221+19-18"×56' Rein. concr. pipe culvert
231+43-18"×48' Corr. metal pipe culvert
237+00-18"×40' Corr. metal pipe culv.
5100
5000
4900
Std. mon. at sta. 153+77.6 40' Rt. elev. 4972.20
Std. mon. at sta. 163+73.8 40' Lt. elev. 5020.43
B.M. 5036.02 Nail in root of 9" fir 30' Lt. sta. 177+06
B.M. 5029.92 Nail in 4" stump 35' Rt. sta. 197+75
Std. mon. at sta. 218+08.3 45' Lt. elev. 5070.95
Std. mon. at sta. 230+07.2 40' Rt. elev. 5083.58
+4.56%
+1.00%
-3.00%
+1.91%
+1.50%
+2.00%
5028.99 400' V.C.
5051.89 500' V.C.
5031.12 750' V.C.
5053.73 100' V.C.
5090.17 100' V.C.
166+00
188+90
195+52.4
207+66.4
232+00
207+66.4 Bk.
=207+70.6 Ahd.
EQUATION
-4.2
40'c.
30'c.
40'c.
50' centers
50' centers
2" Crushed rock top course with 1" Bituminous Surface Treatment
6"
6" Subgrade reinforcement
Bituminous Surface Treatment
MC1 Grade liquid asphalt in prime coat
MC2 " " " seal coat
4" Crushed rock bottom course
TOTAL LG. 5.2819 MI.
50
160
170
180
190
200
210
220
230
240
CLASSIFICATION
CLEARING
DRAINAGE STRUCTURES
BENCH MARKS
DATUM: STATE HWY.
PROFILE
SCALE: HOR. 1"=400' VER. 1"=40'
GUARD RAIL
LEFT
RIGHT
SURFACING
RES. ENGINEER J.A. HEWES
PLOTTED BY HEWES
CHECKED BY WILCOMB & DUNSTAN
TRACED BY W.E. DUNSTAN
TOWNSEND-WHITE SULPH
2

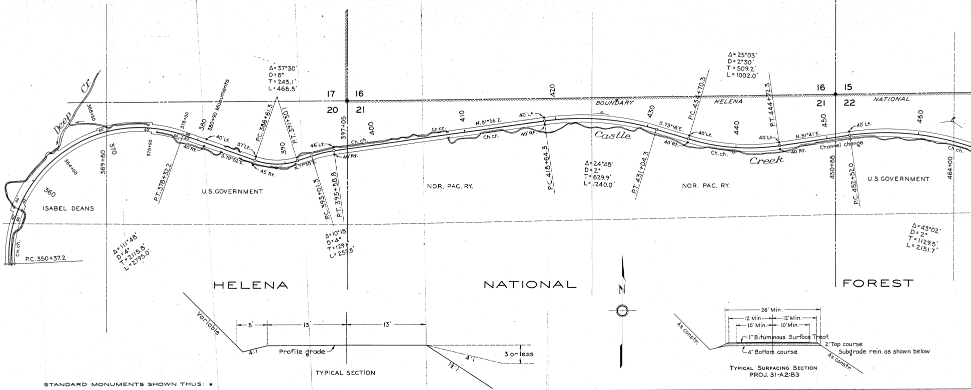
TOWNSEND-WHITE SUL. SP'GS.
NR31-A1:B1 & NR31-B2
MONT. 16'

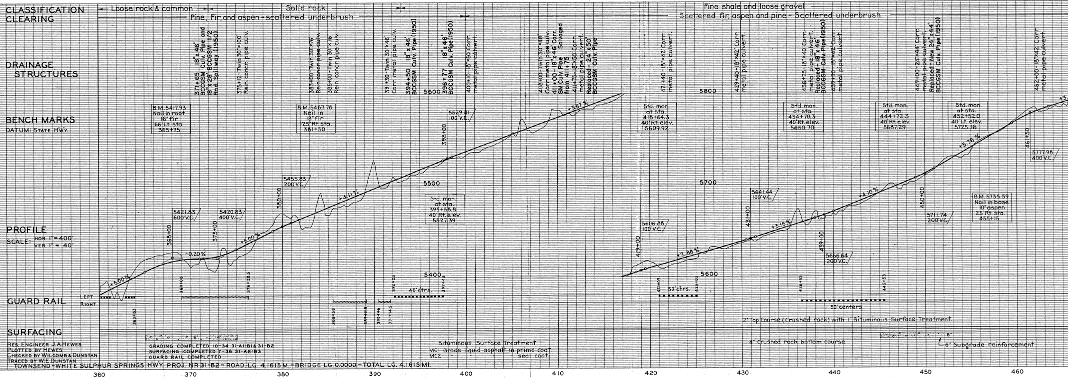

HELENA
NATIONAL
FOREST
247+00 END NR 31-A
247+00 BEG. NR 31-B
U.S. GOVERNMENT
24
25
Δ = 22°20'
D = 5°
T = 226.2'
L = 446.7'
P.C. 249+40.7
P.T. 253+87.4
Δ = 24°52'
D = 5°
T = 252.7'
L = 497.3'
P.C. 242+41.1
P.T. 247+38.4
P.C. 255+73.9
N.38°58'E.
N.65°50'E.
N.41°30'E.
Channel change
Ch.ch.
40' Lt.
60' Rt.
240
250
260
T.7N.R.4E.
T.7N.R.5E.
19
30
SEC. 25
SEC. 30
Δ = 45°23'
D = 3°30'
T = 684.5'
L = 1296.7'
P.T. 268+70.6
P.C. 270+60.4
P.T. 274+77.1
Δ = 16°40'
D = 4°
T = 209.8'
L = 416.7'
270
Deep
N.86°53'E.
Equa. N.70°13'E. Bk. – N.70°11'E. Ahead
280
NOR. PAC. RY.
U.S. GOVERNMENT
288+11.0 END NR 31-A1:B1
288+11.0 BEG. NR 31-B2
288+24
P.C. 288+11.0
290
Δ = 19°45'
D = 3°
T = 332.5'
L = 658.3'
P.T. 294+69.3
N.50°26'E.
Δ = 14°01'
D = 5°
T = 140.9'
L = 280.3'
P.C. 300+29.1
P.T. 303+09.4
300
Creek
N.36°25'E.
310
Δ = 65°21'
D = 7°
T = 525.0'
L = 933.6'
P.C. 304+90.9
P.T. 314+24.5
S.78°14'E.
319+68
P.C. 318+66.4
320
Δ = 46°30'
D = 4°30'
T = 547.1'
L = 1033.3'
Russel Fk.
326+20 End br.
326+39 End br.
P.C. 329+97
P.C. 329+24.9
Δ = 41°25'
D = 4°45'
T = 456.0'
L = 871.9'
330
N.55°16'E.
NOR. PAC. RY.
ISABEL DEANS
P.T. 337+96.8
335+67
338+22.3 Bk.
338+20.1 Ahd.
339+00 End br.
339+19 End br.
340
EQUATION
Δ = 16°31'
D = 5°
T = 166.3'
L = 330.3'
P.T. 347+68.7
P.C. 344+38.4
342+90 Monuments
N.13°51'E.
350
N.2°40'W.
Channel change
P.C. 350+37.2
U.S. GOVERNMENT
ISABEL DEANS
356+00
357+00
360
19
20
30
29
26' Min.
12' Min.
12' Min.
10' Min.
10' Min.
1" Bituminous Surface Treat.
2" Top course
Sub. rein. as shown bel.
4" Bottom course
As constr.
TYPICAL SURFACING SECTION
PROJ. 31-A2:B3
Variable
5'
13'
13'
4:1
Profile grade
4:1
1½:1
3' or less
TYPICAL SECTION
STANDARD MONUMENTS SHOWN THUS: •



UR SPRINGS HWY. PROJ. NR 31-A1:B1 – ROAD LG. 5.2671 MI. – BRIDGE LG. 0.0148 MI. – TOTAL LG. 5.2819 MI.

31
3
5


Deep Cr.
368+50
360
364+00
369+80
370
375+00
378+00
380
380+90 Monuments
390
397+05
400
410
420
430
440
450
460
464+00
450+88
ISABEL DEANS
U.S.GOVERNMENT
NOR. PAC. RY.
NOR. PAC. RY.
U.S.GOVERNMENT
Castle Creek
BOUNDARY
HELENA
NATIONAL
Ch.ch.
Channel change
17
16
20
21
16
15
21
22
P.C. 350+37.2
Δ=111°48'
D=4°
T=2115.8'
L=2795.0'
P.T. 378+32.2
S.70°52'E.
Δ=37°30'
D=8°
T=243.1'
L=468.8'
P.C. 386+61.3
P.T. 391+30.1
N.71°36'E.
P.C. 393+01.3
P.T. 395+58.8
Δ=10°18'
D=4°
T=129.1'
L=257.5'
N.81°56'E.
P.C. 418+64.3
Δ=24°48'
D=2°
T=629.9'
L=1240.0'
P.T. 431+04.3
S.73°16'E.
P.C. 434+70.3
Δ=25°03'
D=2°30'
T=509.2'
L=1002.0'
P.T. 444+72.3
N.81°41'E.
P.C. 452+52.0
Δ=43°02'
D=2°
T=1129.5'
L=2151.7'
40' Lt.
40' Rt.
37' Lt.
45' Rt.
45' Lt.
HELENA
NATIONAL
FOREST
N
Variable
5'
13'
13'
4:1
Profile grade
3' or less
4:1
1½:1
TYPICAL SECTION
STANDARD MONUMENTS SHOWN THUS: •
26' Min.
12' Min.
12' Min.
10' Min.
10' Min.
1" Bituminous Surface Treat.
2" Top course
4" Bottom course
Subgrade rein. as shown below
As constr.
As constr.
TYPICAL SURFACING SECTION
PROJ. 31-A2:B3



GRADING COMPLETED 10-34 31-A1:B1 & 31-B2
SURFACING COMPLETED 7-38 31-A2:B3
GUARD RAIL COMPLETED

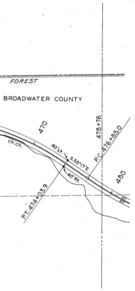
Bituminous Surface Treatment
MC1 Grade liquid asphalt in prime coat.
MC2 " " " " seal coat.

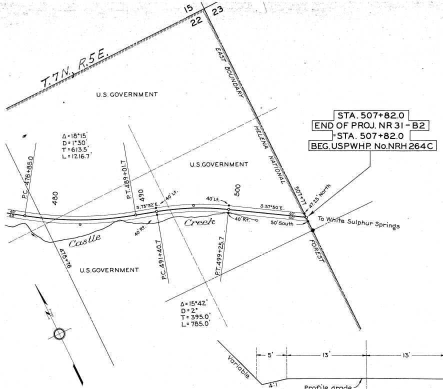
RES. ENGINEER J.A. HEWES
PLOTTED BY HEWES
CHECKED BY WILCOMB & DUNSTAN
TRACED BY W.E. DUNSTAN

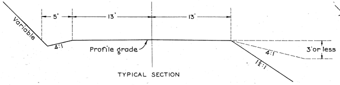
TOWNSEND - WHITE SULPHUR SPRINGS HWY. PROJ. NR 31-B2 - ROAD LG. 4.1615 M. + BRIDGE LG. 0.0000 - TOTAL LG. 4.1615 MI.

TOWNSEND-WHITE SUL. SP'GS.
NR31-A1:B1 & NR31-B2
MONT. 16'

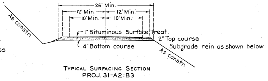
	31
	4
	5


FOREST
BROADWATER COUNTY
470
ch.ch.
40'Lt.
S.55°17'E.
40'Rt.
478+76
P.C.476+85.0
P.T.474+03.9
480
40
40


15
22
23
T.7N. R.5E.
U.S.GOVERNMENT
EAST BOUNDARY HELENA NATIONAL FOREST
Δ=18°15'
D=1°30'
T=613.5'
L=1216.7'
U.S.GOVERNMENT
STA. 507+82.0
END OF PROJ. NR 31-B2
=STA. 507+82.0
BEG. USPWHP. No. NRH 264C
P.C. 476+85.0
480
P.T. 489+01.7
490
S.73°32'E.
40'Lt.
40'Lt.
500
S.57°50'E.
507+77
47.25' North
40
40
40'Rt.
50' South
To White Sulphur Springs
Castle Creek
40'Rt.
478+76
P.C.491+40.7
P.T.499+25.7
U.S.GOVERNMENT
Δ=15°42'
D=2°
T=395.0'
L=785.0'
N

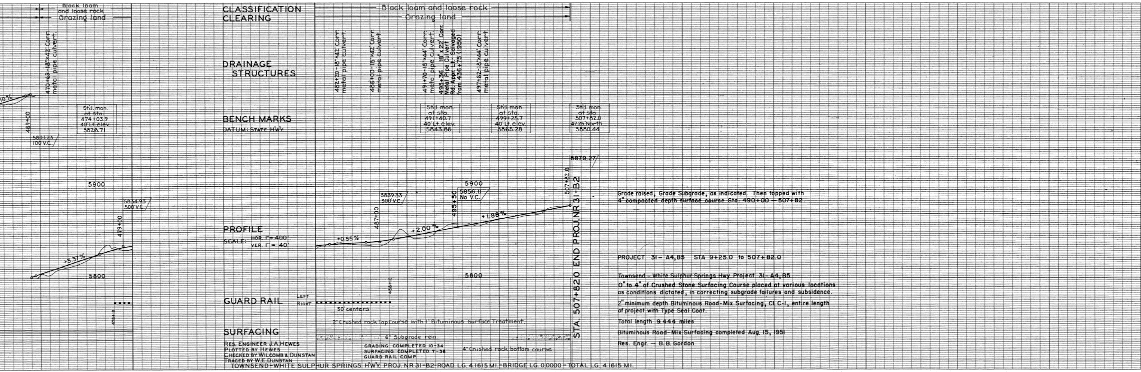

Variable
5'
13'
13'
4:1
Profile grade
4:1
1½:1
3' or less

TYPICAL SECTION


26' Min.
12' Min.
12' Min.
10' Min.
10' Min.
As constr.
1" Bituminous Surface Treat.
2" Top course
4" Bottom course
Subgrade rein. as shown below.
As constr.

TYPICAL SURFACING SECTION
PROJ. 31-A2:B3

STANDARD MONUMENTS SHOWN THUS: ●


CLASSIFICATION
CLEARING
Black loam and loose rock
Grazing land
Black loam and loose rock
Grazing land
DRAINAGE STRUCTURES
470+65-18"×42' Corr. metal pipe culvert
482+20-18"×42' Corr. metal pipe culvert
486+00-18"×42' Corr. metal pipe culvert
491+70-18"×44' Corr. metal pipe culvert
493+36 18"×22' Corr. Metal Pipe Culvert Rd. Appr. Lt. Salvaged from 436+75 (1950)
497+62-18"×44' Corr. metal pipe culvert
BENCH MARKS
DATUM: STATE HWY.
Std. mon. at sta. 474+03.9 40'Lt. elev. 5876.71
Std. mon. at sta. 491+40.7 40'Lt. elev. 5843.86
Std. mon. at sta. 499+25.7 40'Lt. elev. 5865.28
Std. mon. at sta. 507+82.0 47.25'North 5880.44
469+00
5801.23
100'V.C.
5900
5834.93
500'V.C.
479+00
+3.37%
5800
5879.27
507+82.0
5900
5839.33
300'V.C.
487+00
495+50
5856.11
No V.C.
+0.55%
+2.00%
+1.88%
5800
PROFILE
SCALE: HOR. 1" = 400'
VER. 1" = 40'
STA. 507+82.0 END PROJ. NR 31-B2
GUARD RAIL
LEFT
RIGHT
478+10
488+10
50' centers
SURFACING
2" Crushed rock Top Course with 1" Bituminous Surface Treatment.
6" Subgrade rein.
4" Crushed rock bottom course
GRADING COMPLETED 10-34
SURFACING COMPLETED 7-36
GUARD RAIL COMP.
470
480
480
490
500

Grade raised; Grade Subgrade, as indicated. Then topped with 4" compacted depth surface course Sta. 490+00 – 507+82.

PROJECT 31– A4,B5 STA 9+25.0 to 507+82.0

Townsend – White Sulphur Springs Hwy. Project 31– A4,B5

0" to 4" of Crushed Stone Surfacing Course placed at various locations as conditions dictated, in correcting subgrade failures and subsidence.

2" minimum depth Bituminous Road-Mix Surfacing, Cl. C-1, entire length of project with Type Seal Coat.

Total length 9.444 miles

Bituminous Road-Mix Surfacing completed Aug. 15, 1951

Res. Engr. — B. B. Gordon

RES. ENGINEER J.A. HEWES
PLOTTED BY HEWES
CHECKED BY WILCOMB & DUNSTAN
TRACED BY W.E. DUNSTAN

TOWNSEND-WHITE SULPHUR SPRINGS H'WY. PROJ. NR 31-B2-ROAD LG. 4.1615 MI.-BRIDGE LG. 0.0000-TOTAL LG. 4.1615 MI.

TOWNSEND-WHITE SUL. SPGS.	31
NR 31-A1:B1 & NR31-B2	5
MONT. 16'	5