

CONVENTIONAL SIGNS & ABBREVIATIONS

STATE LINE	-----	EXCAVATION	----	E
COUNTY LINE	-----	EMBANKMENT	-----	F
TOWNSHIP LINE	-----	OVERHAUL	-----	H
SECTION LINE	-----	SURFACING	-----	S
CITY, VILLAGE, OR BOROUGH	-----	GUARD RAIL	-----	GR
FENCE LINE	-----	INTERSECTION ANGLE	-----	A
RIGHT-OF-WAY LINE	-----	RADIUS	-----	R
TRAVELLED WAY	-----	ELEVATION	-----	E
RAILROADS	-----	VERTICAL CURVE	-----	VC
RETAINING WALL	-----	BENCH MARK	-----	B.M.
BASE OR SURVEY LINE	-----	SECTIONAL CONCRETE CULVERT	-----	P.C.
LEVEE	-----	CORRUGATED METAL CULVERT	-----	C.M.
GRAVEL PIT	-----	CULVERT HAUL	-----	C.H.
SAND PIT	-----	TOW MILES	-----	T.M.
CLAY PIT	-----	PLACE	-----	P
ROCK QUARRY	-----	IN PLACE	-----	INP
CULVERTS	-----	REPLACE	-----	REP.
PLAIN	-----	RIGHT	-----	R
With FACEWALLS	-----	LEFT	-----	L
With WINGWALLS	-----	HAND DITCHING	-----	H.D.
DROP INLET	-----	POINT OF CURVE	-----	P.C.
POWER POLE LINE	-----	POINT OF TANGENT	-----	P.T.
TELEPHONE OR TELEGRAPH LINE	-----	POINT OF INTERSECTION	-----	P.I.
MARSH	-----	SPECIAL EXCAVATION	-----	S.E.
HEDGE, BRUSH, OR THIBBER	-----	SPECIAL FLOWING	-----	S.F.
GROUND ELEVATION	-----	TELEPHONE POLE	-----	TEL.P.
GRADE ELEVATION	-----			

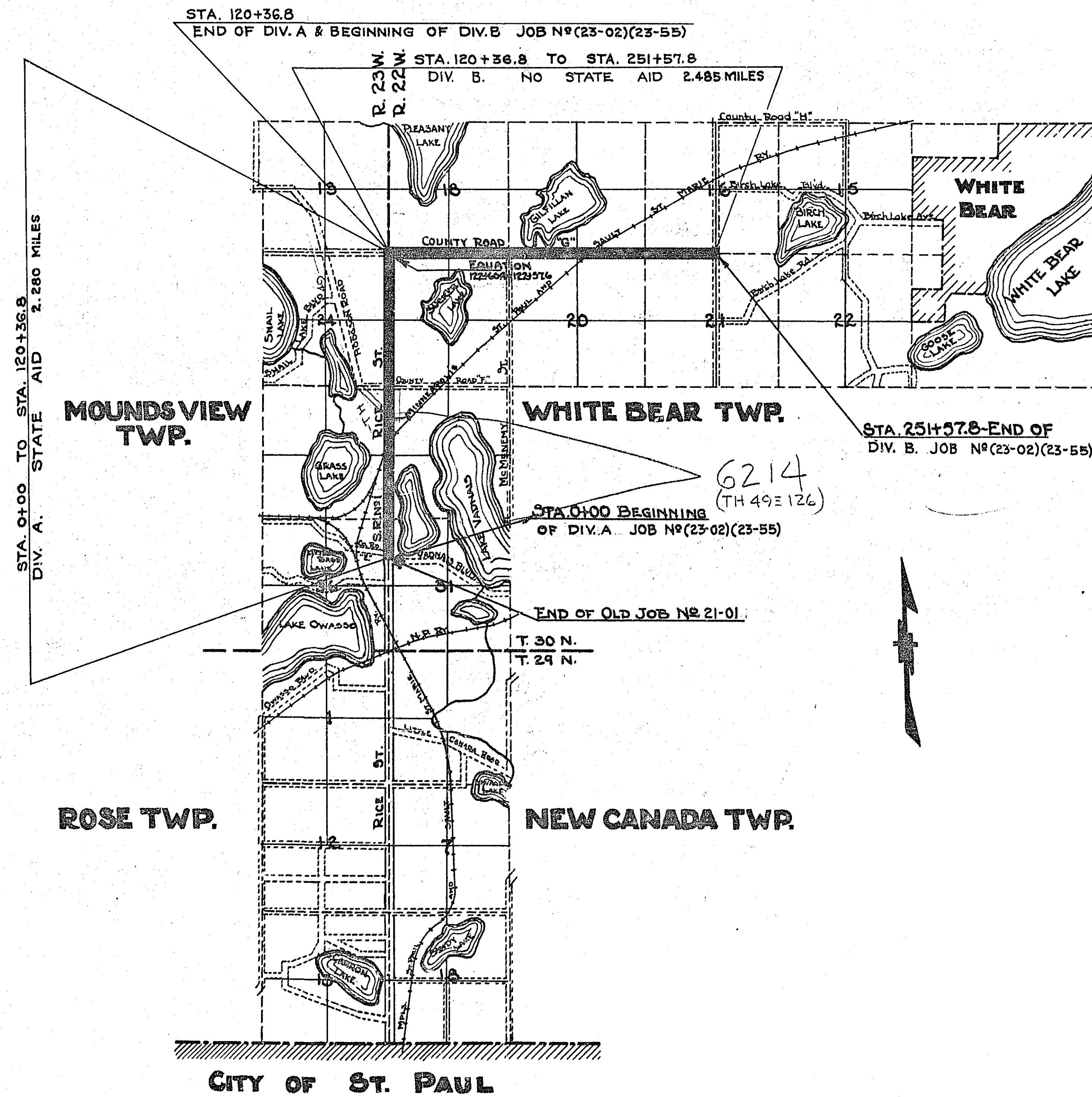
STATE HIGHWAY DEPARTMENT  
OF MINNESOTA  
Plan and Profile of State Road No. 1 & Co. Road "G"  
COUNTY OF **RAMSEY**

From 15991 So. of SW Cor. of Sec. 30 ~ T. 30 N. ~ R. 22 W. To 2896 No. of SW Cor. of SE 1/4 of Sec. 16 ~ T. 30 N. ~ R. 22 W.  
Give proper reference to Sections, Township and Range

GROSS LENGTH - 2,514.11 FEET 4.765 MILES  
LENGTH OF EXCEPTIONS - 0 FEET 0 MILES  
NET LENGTH - 2,514.11 FEET 4.765 MILES  
PLAN, 1 Inch = 200 Feet  
PROFILE, Horiz. 1 Inch = 200 Feet. Vert. 1 Inch = 20 Feet  
WORKING PLANS { Horiz. 1 Inch = 100 Feet  
Vert. 1 Inch = 10 Feet  
Cross-Sections, 1 Inch = 10 Feet  
LAYOUT  
SCALE, 1 Inch = 3520 Feet

INDEX OF SHEETS

Sheet No. 1.	Title Sheet and Layout Map
" No. 2.	Typical Cross-Sections and Statement
" No. 3.	Plan and Profile, Sta. 0+00 to Sta. 106+00
" No. 4.	" " " " 106+00 " " 212+00
" " 5	" " " " 212+00 " " 251+57.8
" " 6-9	CROSS-SECTIONS.
" " 10.	DETAIL OF CURVE WIDENING NEAR STA 120+00
" " 11	CURVE WIDENING & SUPERELEVATION

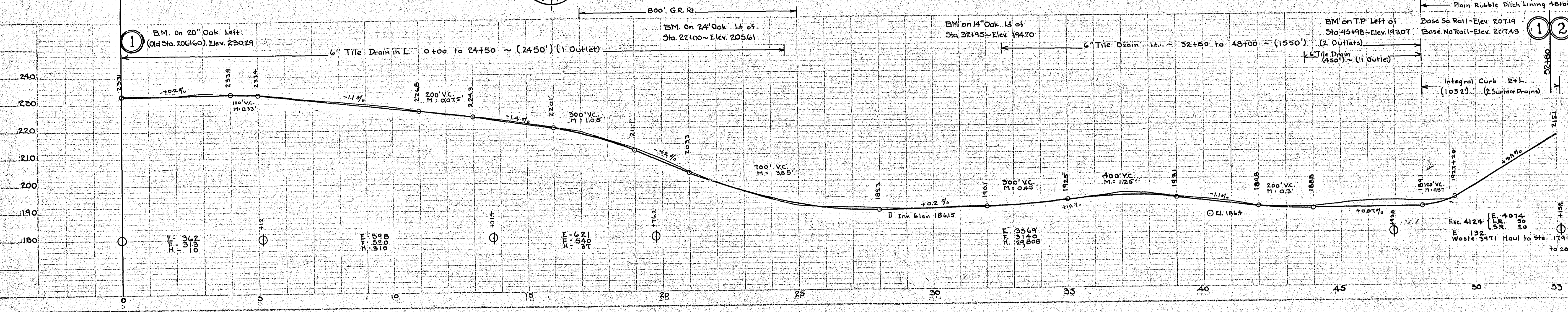
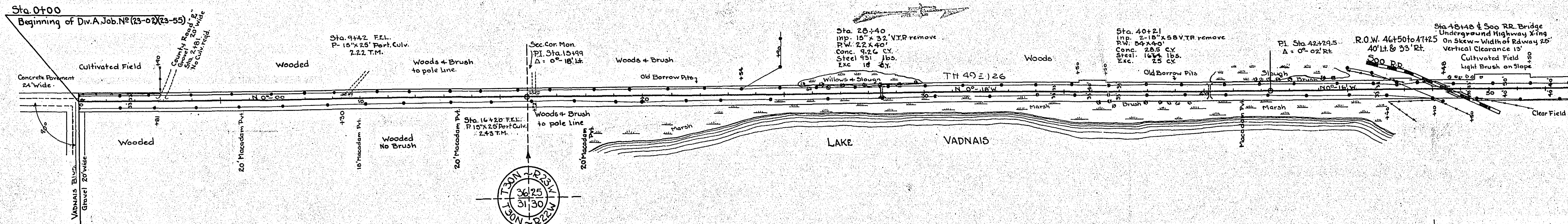


Planned by Paul J. Coates  
HIGHWAY ENGINEER FOR RAMSEY COUNTY.  
Recommended for Approval A. Chapman  
DIVISION ENGINEER  
Recommended for Approval O. L. Kipp  
CONSTRUCTION ENGINEER  
Approved 4-7-1923 John H. Muller  
CHIEF ENGINEER & DEPUTY COMMISSIONER

S. P. 6214 (T. H. 493 126)

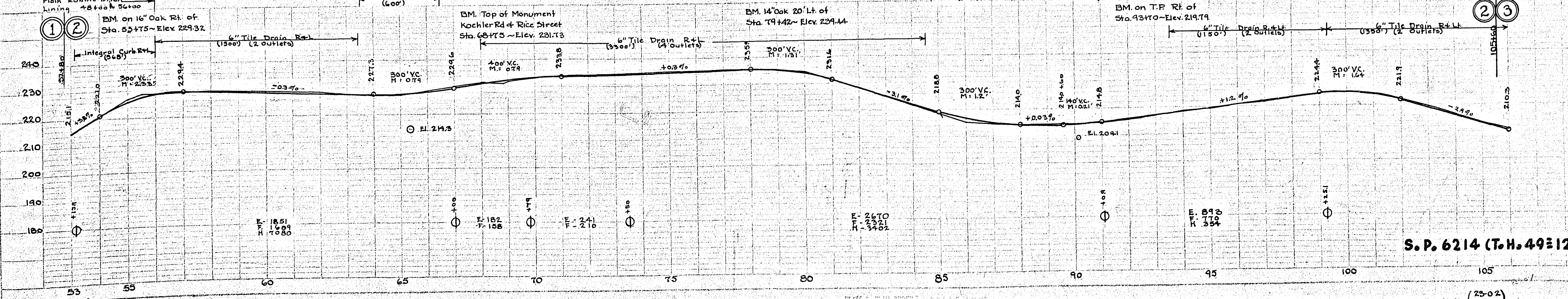
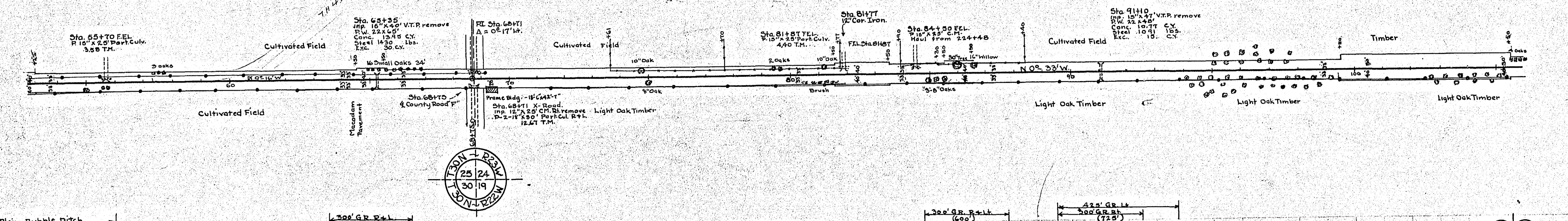
SP 6214 (TH 493 126)





**MILE 1 ESTIMATE QUANTITIES**  
Sta. 0+00 to Sta. 53+16

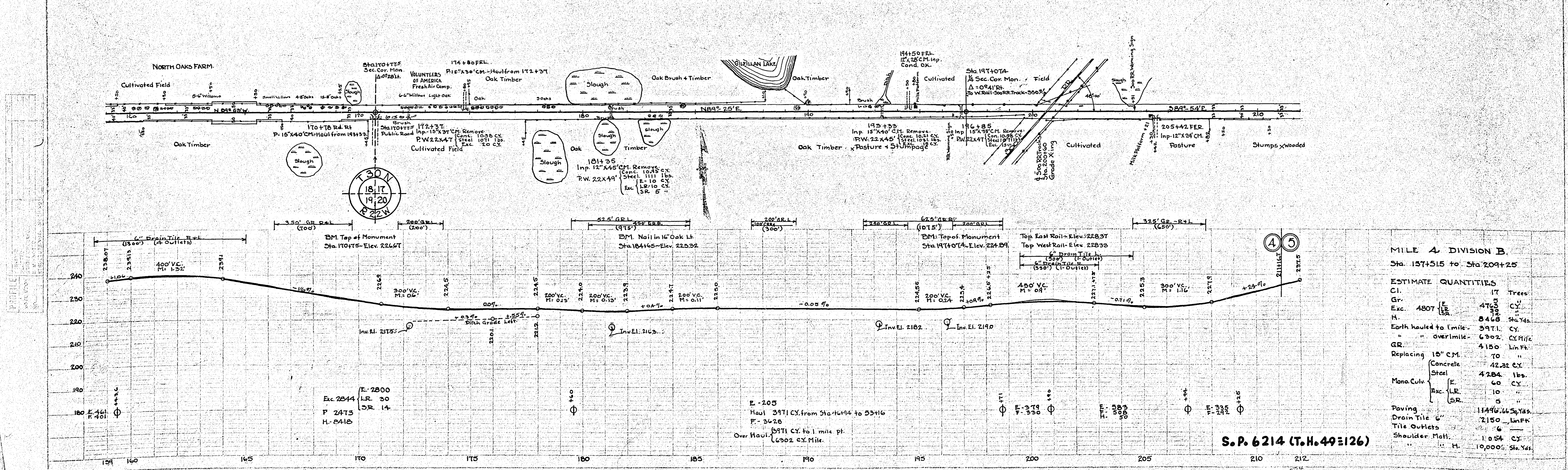
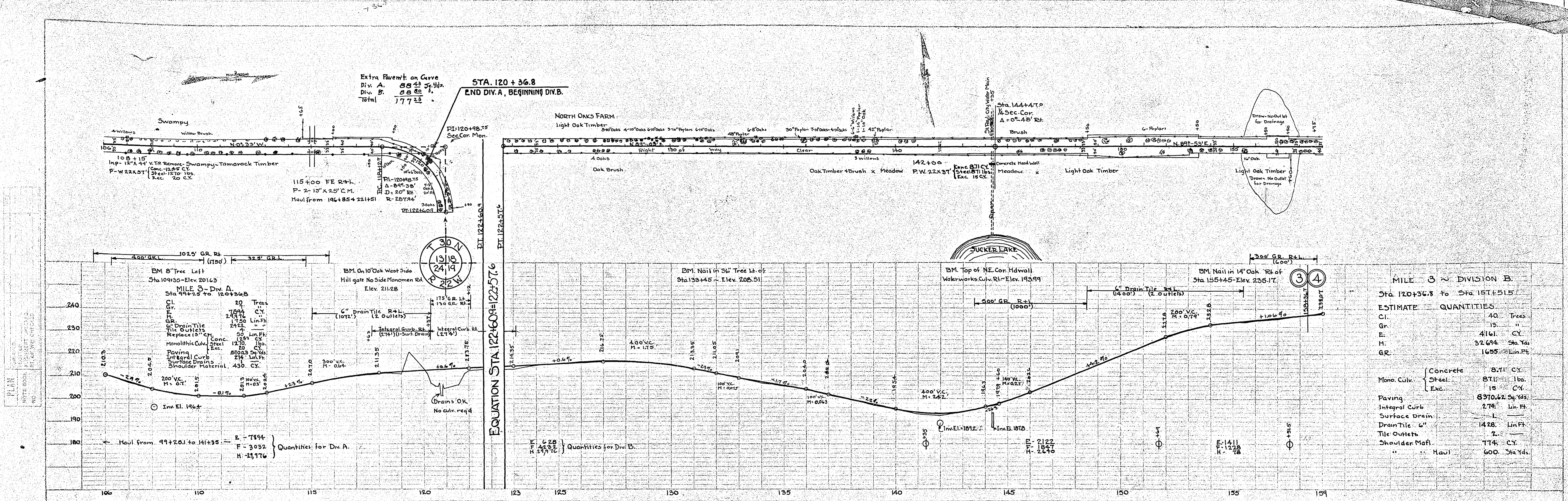
CI.	51	Trees
Gr.	15	"
Exc.	9294	{ E - 9224 C.Y. LR 50 " SR 20 "
H	30,165	Sq. Yds.
GR.	800	Lin. Ft.
Instal. Port. Culv.	15"	50 "
P. Haul.	468	TM.
Monoculv.	{ Concrete 37.76 C.Y. Steel 25.05 lbs.	
Exc.	40	C.Y.
Surfacing	14,176	Sq. Yds.
Shoulder Matl.	1088	Sq. Yds.
Scarifying	53,14	Sq. Yds.
Tile Drain 6"	4450	Lin. Ft.
Rubble Ditch Lining	24845	Sq. Yds.
Integral Curb	1032	Lin. Ft.
Surface Drains	2	"



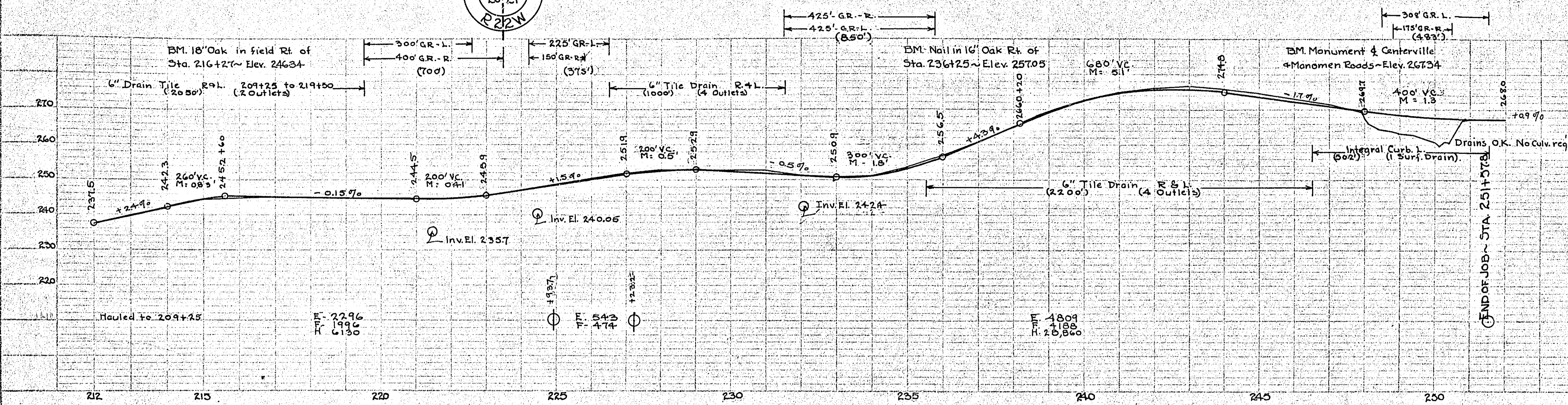
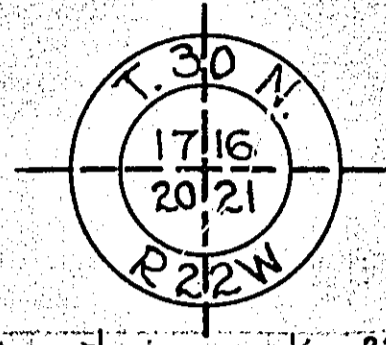
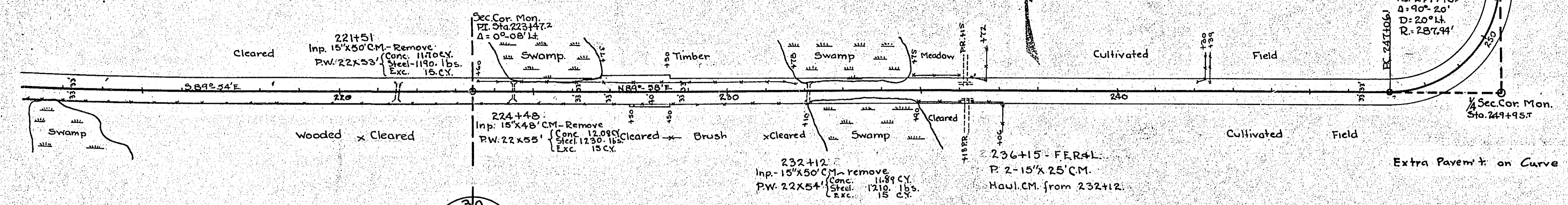
**MILE 2 ESTIMATE QUANTITIES**  
Sta. 53+16 to Sta. 99+25

CI.	38	Trees
Gr.	10	"
E	5837	C.Y.
H	10,836	"
GR.	1925	Lin. Ft.
Port. Culv.	{ Instal. 15" 50 " " 18" 60 " Replacing 18" 25 "	
P. H.	20.67	TM.
Monoculv.	{ Concrete 24.72 C.Y. Steel 2521 lbs.	
Exc.	45	C.Y.
Surfacing	17,240.66	Sq. Yds.
Shoulder Matl.	899	C.Y.
" " H	200	Sq. Yds.
Scarifying	15,55	Sq. Yds.
Tile Drain 6"	5950	Lin. Ft.
Tile Outlets	0	"
Rubble Ditch Lining	13678	Sq. Yds.
Integral Curb	368	Lin. Ft.

S.P. 6214 (To H. 49=126)



End of Co. Proj. No. 23-02  
Sta. 251+51.8



MILE 5  
ESTIMATE QUANTITIES  
Sta. 209+25 to Sta. 251+51.8

Cl.	12	Trees
Gr.	3	"
E.	7,648	CY
H.	24,990	"
GR.	2408	Lin. Ft.
Replacing 15' CM.	50	"
Concrete	3547	CY
Mono. Culv. Steel	3630	lbs.
Exc.	45	CY
Paving	9,585.75	Sq. Yds.
Integral Curb.	502	Lin. Ft.
Surface Drains	1	"
Drain Tile 6"	5250	Lin. Ft.
Tile Offsets	10	"
Shoulder Material	862	CY
"	Haul 400	Sta. Yds.

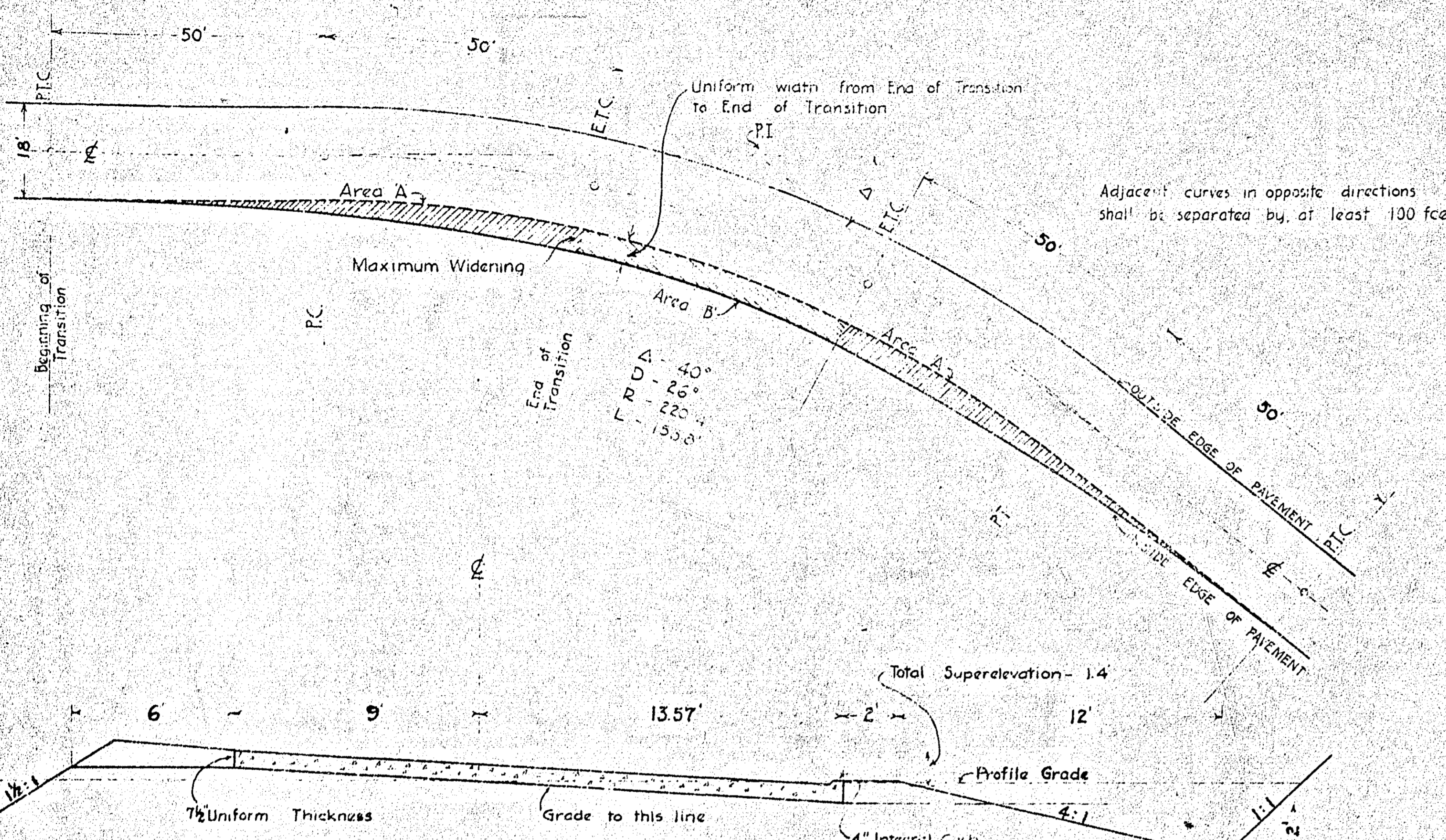
PLAN  
 SCALE: 1" = 40'  
 NOTE: BORING LOGS AND TESTS TO BE MADE AT 50' INTERVALS FROM STA. 210 TO 250.

PROFILE  
 SCALE: 1" = 10'  
 NOTE: BORING LOGS AND TESTS TO BE MADE AT 50' INTERVALS FROM STA. 210 TO 250.

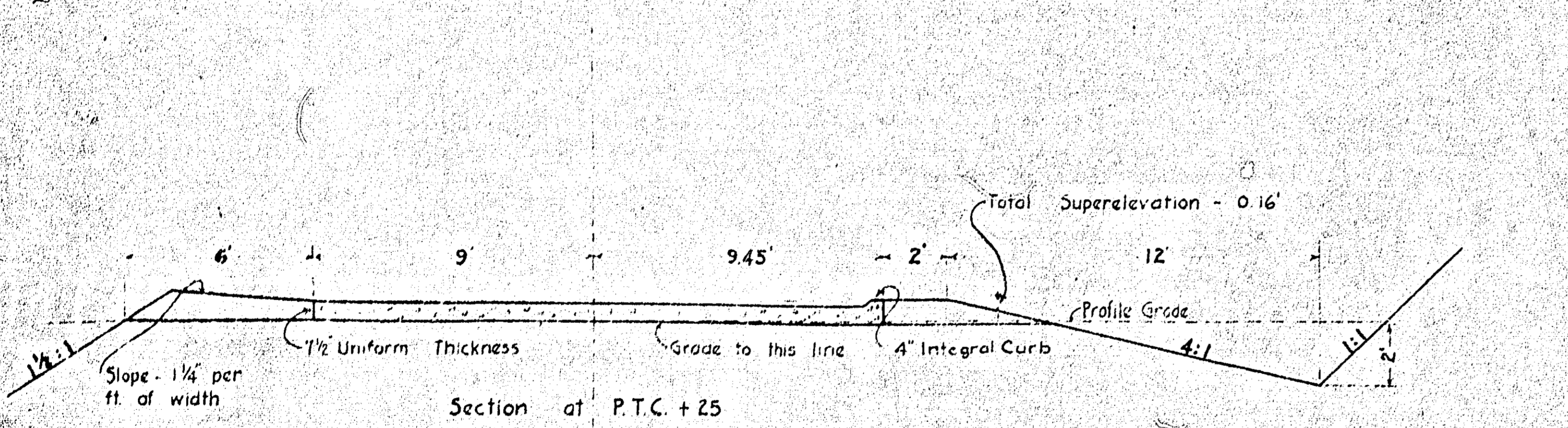
S. P. 6214 (T. H. 49 E 126)

# PLAN & SECTIONS OF PAVEMENT AT CURVES SHOWING METHOD OF WIDENING (8° TO 29°)

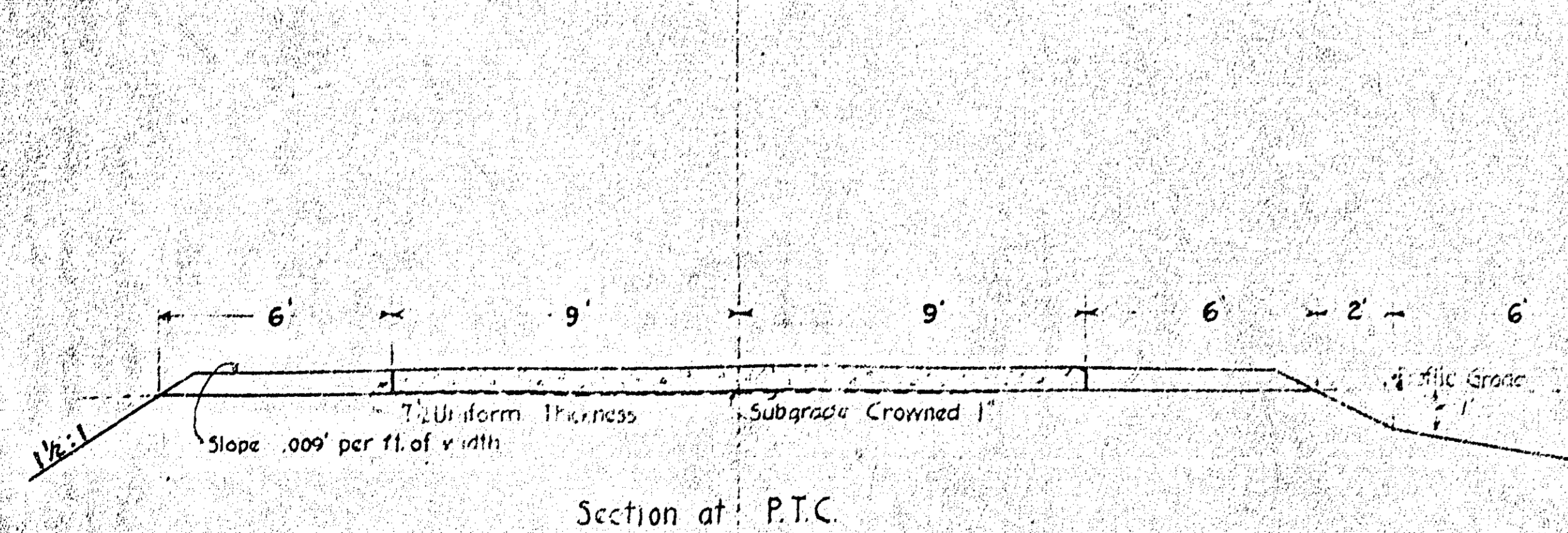
Example: 18' One Course Concrete Pavement



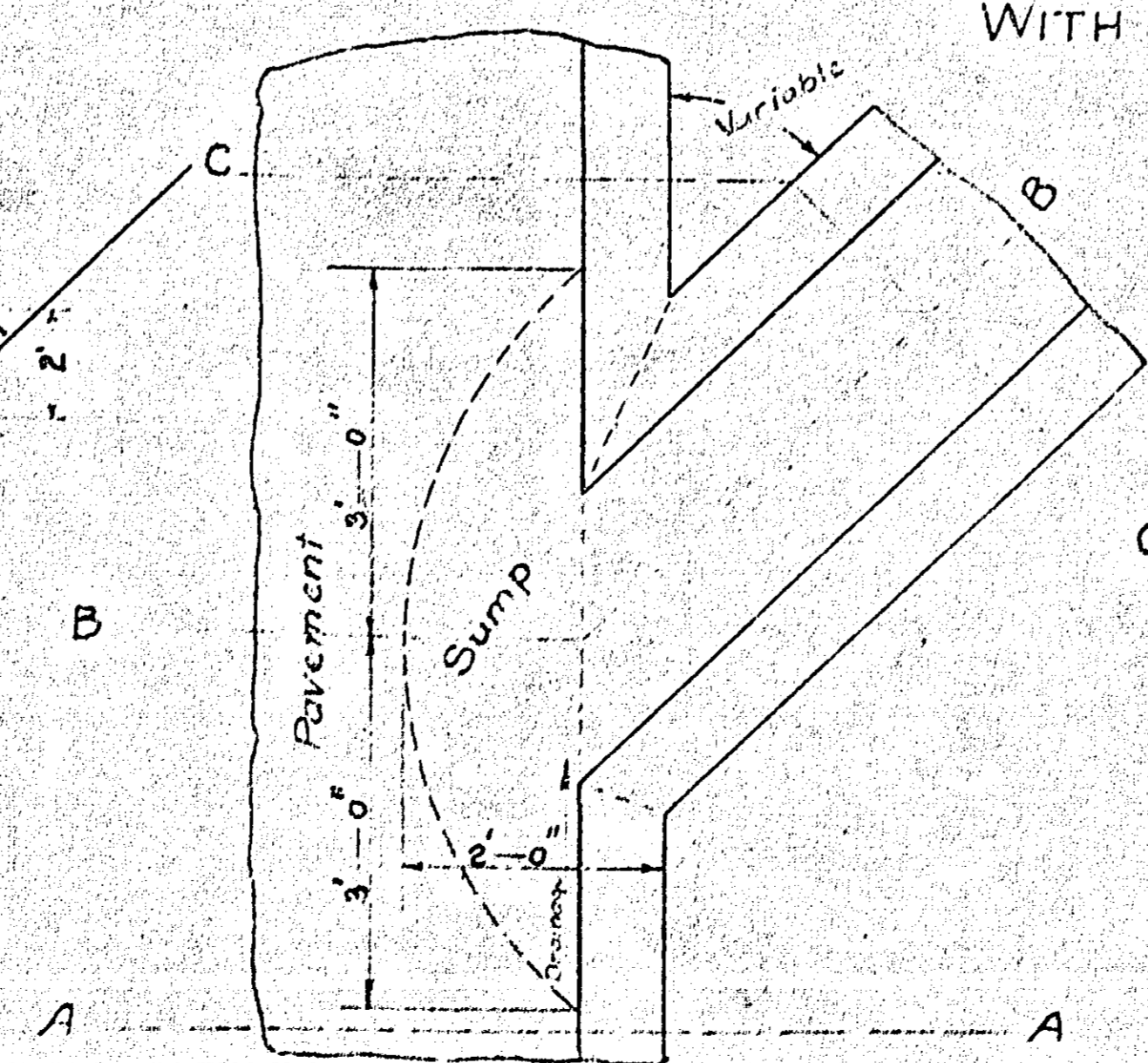
Section at E.T.C.



Section at P.T.C. + 25



Section at P.T.C.



Section A-A

Section B-B

Section C-C

Material Required 0.4 CY Concrete per lin. ft. of Surface Drain

From Chart No. 20-8, under heading 'Area in Sq. Yds. for the Two Transition Curves' 181' width, opposite 26°, the sum of the areas A is obtained, area is equal to 48,819 sq. yds.  
 From the same chart, under heading, 'Area Yds. per 100 Lin. ft. of Curve for Extra Pavement' 18 ft. width, opposite the figure 48,178 is obtained. The product of this figure multiplied by  $\frac{100}{L}$  the area 'B', or  
 $48,178 \times \frac{1833 \times 100}{100} = 25,919$  sq. yds.  
 The area of the extra pavement required is therefore,  
 $48,819 + 25,919 = 74,738$  sq. yds.  
 From the same chart the offsets to the non curve, from the inner edge of the pavement, are given for every ft.

NOTE: Super-elevation transition is not identical with widening transition.  
 (1) Super-elevation transition begins  $3\frac{1}{2}$  ft. back of P.C. and extends  $L$  past P.C. (Value of  $L$  as given in Chart No. 20-9)  
 (2) Widening transition begins  $L$  back of P.C. and extends  $L$  past the P.C. Let the P.C. bisect the transition distance. (Value of  $L$  as given in Chart No. 20-8)  
 The super-elevation transition begins  $3\frac{1}{2}$  ft. back of P.C. extending a distance of  $L$  past the P.C. super-elevation increasing uniformly from the first mentioned point and attaining maximum super-elevation in the distance  $2L$ . From there on the super-elevation is uniform to a point past the P.T.  
 Length of super-elevation transition necessary and the super-elevation in feet per foot of width is given for concrete or asphaltic concrete on One Course Concrete from 2°-29° (or greater), or Asphaltic Concrete on pavements from 3°-29° (or greater).  
 For One Course Concrete the slab is warped from 0 to 50 and for Asphaltic Concrete or Brick from 0 to 110. The profile grade is carried along the  $\frac{1}{4}$  slope.  
 EXAMPLE - (See example used in Chart No. 20-7)  
 D = 26° 2L = 100 ft. Width of pavement = 18'  
 Additional widening 'W' is obtained from Chart No. 20-6 at a 26° curve. The additional width for 25 feet can be obtained by interpolation between 20 feet and 30 feet. The following is an example of the computation in this case:  
 At 0' - Slab is normal  
 At 20' (Outer slab -  $9 \times .0016 = .0144$   
 Inner slab -  $9.06 \times .0009 = .0081$ )  
 At 40' (Outer slab -  $9 \times .0053 = .0477$   
 Inner slab -  $9.25 \times .0009 = .0083$ )  
 At 50' (Outer slab -  $9 \times .0089 = .0801$   
 Inner slab -  $9.45 \times .0009 = .0085$ )  
 At 200' (E.T.C.) (Outer slab -  $9 \times .0622 = .5598$   
 Inner slab -  $13.57 \times .0622 = .844$ )  
 Minus (-) results indicate the amount in feet to be deducted, and plus (+) results indicate the amount to be added to the elevation.

## CONCRETE INTEGRAL CURB

Material - 0.53 Cu Yds. Concrete per 100 lin. ft. of curb  
 1.24 Concrete  
 REFERENCE TO MINNESOTA STANDARD SPECIFICATIONS FOR INTEGRAL CONCRETE CURB Section 5 - Part 24

## CONCRETE SURFACE DRAIN FOR PAVEMENT WITH INTEGRAL CURB

## CHART OF OFFSETS & AREAS FOR EXTRA WIDENING OF CURVES ON PAVEMENT

Deg. of Curve	Perpendicular Offset from inner Edge of Pavement on Tangent					Radial Offset from Inner Edge of Pavement on Curve					Area in Sq. Yds. for the Two Transition Curves		Area in Sq. Yds. per 100 Lin. ft. of Curve for Extra Pavement
	10'	20'	30'	40'	50'	60'	70'	80'	90'	100'	18'	20'	
5°	0.03	0.16	0.37	0.64	0.99	1.33	1.74	2.11	2.44	2.73	21.858	21.858	21.811
9°	0.03	0.17	0.40	0.85	1.33	1.84	2.31	2.73	3.11	3.44	23.993	23.993	23.964
13°	0.04	0.18	0.44	0.96	1.54	2.07	2.55	2.97	3.34	3.66	26.462	26.462	26.449
17°	0.04	0.19	0.46	0.98	1.64	2.19	2.66	3.07	3.44	3.76	29.246	29.246	29.238
21°	0.04	0.20	0.49	0.99	1.74	2.31	2.73	3.11	3.44	3.76	32.330	32.330	32.322
25°	0.04	0.21	0.51	0.99	1.84	2.44	2.86	3.23	3.55	3.86	35.722	35.722	35.715
29°	0.04	0.22	0.52	1.00	1.94	2.55	2.97	3.34	3.66	3.97	39.422	39.422	39.415

## CHART OF SUPERELEVATION PITCHES PER FOOT OF WIDTH

Degree of Curve	Type of Pavement	Width of Pavement	0	20	40	50	60	80	100	110	120	140	160	180	200	Max. Pitch in Feet	Length of Transition in Feet		
2°	One Course Concrete	18'	-0.005	-0.018	+0.053	+0.089	+0.124									+0.16	50	375	
		20'	-0.005	-0.016	+0.048	+0.080	+0.116										+0.16		
3°	Asphaltic Concrete	18'	-0.005	-0.016	+0.048	+0.080	+0.116	+0.152									+0.27	100	500
		20'	-0.005	-0.016	+0.048	+0.080	+0.116	+0.152									+0.27		
4°	One Course Concrete	18'	-0.005	-0.016	+0.048	+0.080	+0.116	+0.152	+0.188								+0.36	125	625
		20'	-0.005	-0.016	+0.048	+0.080	+0.116	+0.152	+0.188								+0.36		
5°	Asphaltic Concrete	18'	-0.005	-0.016	+0.048	+0.080	+0.116	+0.152	+0.188	+0.224							+0.44	150	750
		20'	-0.005	-0.016	+0.048	+0.080	+0.116	+0.152	+0.188	+0.224							+0.44		
6°	One Course Concrete	18'	-0.005	-0.016	+0.048	+0.080	+0.116	+0.152	+0.188	+0.224	+0.260						+0.53	175	875
		20'	-0.005	-0.016	+0.048	+0.080	+0.116	+0.152	+0.188	+0.224	+0.260						+0.53		
7°-29°	Asphaltic Concrete	18'	-0.005	-0.016	+0.048	+0.080	+0.116	+0.152	+0.188	+0.224	+0.260	+0.296					+0.62	200	1000
		20'	-0.005	-0.016	+0.048	+0.080	+0.116	+0.152	+0.188	+0.224	+0.260	+0.296					+0.62		

Note: (+) indicates above and (-) below  $\frac{1}{4}$  elevation; also (O) indicates outer slab and (I) indicates inner slab.

# STATE HIGHWAY DEPARTMENT OF MINNESOTA CURVE WIDENING AND SUPERELEVATION DATA

APPROVED Nov. 19, 1920.  
 C. L. Kelly  
 CONST. ENGINEER  
 John H. Doolittle  
 CHIEF ENGINEER