

T 205
BOOK 2363

2963

F I E L D N O T E S
OF THE SURVEY OF THE
SOUTH BOUNDARY OF THE SAN CARLOS
AND
WHITE MOUNTAIN INDIAN
RESERVATIONS.

ARIZONA.

By Deputy Paul Riecker.

Calculations of triangulations to
Monuments along the crest of
Gila Range of Mountains.

Date of Contract May 19, 1883.
Survey commenced June 13, 1883.
Survey completed July 24, 1883.

TRIANGULATION COMPUTATIONS.

Bet. Mons.	Ranges.
1 - 2	1
2 - 3	2
3 - 4 and 4 - 5	3
5 - 8(run)and 8-9	4
9 - 10 and 10 - 11	5
11 - 12	6
12 - 13 and 13 - 14	7
14 - 15 and 15 - 16	8
16 - 17	9
5 - 8	10
16 - 17	12

Calculations of the Triangulations to Monuments along the Crest of the Gila Mountains.

From Mount W.M.I.R. N. 14+16.20 to W.M.I.R. N. 1

A.R. Com of Leg	Sine	73° 39'	0.0179279
"	"	34° 34'	9.7851049
"	"	<u>435.</u>	<u>2.6384893</u>
		276.39	2.4415221

From Mount W.M.I.R. N. 14+60.20 to Mount N. 1

S 35° 45' E 276.39

The bearing of the base line S 39° 21' E was obtained by solar observation and checked by turning the angle from O point to Mount W.M.I.R. N. 14+60.20 114° 49' from O point on this line

Angle from W.M.I.R. N. 14+60.20 to Mount W.M.I.R. N. 1 is 37° 34'

A.R. Com leg sine	73° 39'	0.0179279	Angle from O point to Mount W.M.I.R. N. 1	37° 34'
"	68° 41'	9.9695174	"	720 ch. " N. 1
From O point } leg 435	2.6384893			
to W.M.I.R. N. 1 }	<u>422.61</u>	<u>2.6259349</u>		

A.R. Com leg sine	75° 54'	0.0132856
"	69° 25'	9.9713504
from O point } leg 720.	2.8573325	
Monument N. 2 }	<u>694.97</u>	<u>2.8419690</u>

37° 34'	68° 41'
104° 26'	100° 21'
73° 39'	73° 39'
34° 34'	34° 34'
69° 25'	68° 41'
37° 41'	180° 00'
180° 00'	180° 00'

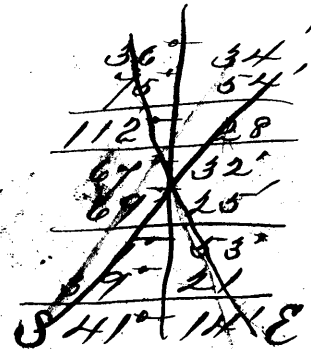
A.R. Com leg sine	75° 54'	0.0132856
"	69° 25'	9.9713504
from O point } leg 720.	2.8573325	
Monument N. 2 }	<u>694.97</u>	<u>2.8419690</u>

Angle at O point from Mount N. 1 to N. 2 = 42° 34'

A.R. Com leg sine	75° 54'	0.0132856
"	69° 25'	9.9713504
from O point } leg 720.	2.8573325	
Monument N. 2 }	<u>694.97</u>	<u>2.8419690</u>

A.R. Com leg sine	75° 54'	0.0132856
"	69° 25'	9.9713504
from Mount N. 1 }	<u>422.61</u>	<u>2.6259349</u>
to Mount N. 2 }	<u>694.97</u>	<u>2.8419690</u>
	<u>1117.58</u>	<u>2.9527204</u>
	<u>422.36</u>	<u>2.4357833</u>
	<u>694.97</u>	<u>2.8419690</u>
	<u>1234.90</u>	<u>2.9896723</u>

36° 31'
34° 41'
2° 00'
39° 21'
41° 21'



From Mount N. 1 to Mount N. 2 S 41° 21' E 448.68

Calculation of the Triangulation to Monuments along the Crest of Yala Mountain

From Monument N^o 2 to Monument N^o 3
angle at 530.49 to monument no 3 = $64^{\circ} 51'$

angle at 260. to monument N^o 3

$$\begin{array}{r} 115^{\circ} 09' \\ 39^{\circ} 11' \\ \hline 154^{\circ} 20' \\ 25^{\circ} 40' \\ 39^{\circ} 11' \\ \hline 115^{\circ} 09' \\ 180^{\circ} 00' \\ \hline 115^{\circ} 09' \\ 64^{\circ} 51' \\ \hline 25^{\circ} 32' 25.30'' \end{array}$$

A.C. Log Sin $25^{\circ} 40'$ 0.3633769
 " " $39^{\circ} 11'$ 9.8005823
 from 530.49 to } = $\frac{270.49}{394.56} = \frac{2.4321512}{2.5961104}$
 monument N^o 3 } = $\frac{530.49}{530.49}$

A.C. Log Sine 925.05 7.0338348
 " Dif. 135.93 2.1333153
 Tan $\frac{1}{2}$ Sum ang $32^{\circ} 25' 30''$ 9.8029320
 $5^{\circ} 19' 50'' = 8.9700821$

ang at point to } $37^{\circ} 45' 20''$
 monument N^o 3 } = $27^{\circ} 05' 40''$
 $115^{\circ} 09'$

A.C. Log Sine $37^{\circ} 45' 20''$ 0.2130400
 " " $115^{\circ} 09'$ 9.9567437
 530.49 2.7246772
 784.26 2.8944609
 694.97

ang at point to monument 2 = $34^{\circ} 41'$
 Cal. angle to no 3 $27^{\circ} 5' 40''$
 $7^{\circ} 35' 20''$
 $172^{\circ} 24' 40''$
 $\frac{1}{2}$ Sum $86^{\circ} 12' 20''$

A.C. Log Sine 1479.23 6.8299643
 " Dif 89.29 1.9528028
 $\frac{1}{2}$ Sum Tan $86^{\circ} 12' 20''$ 1.1783389
 Log. Tan $\frac{1}{2}$ S. Rem. Ang $42^{\circ} 18' 20''$ 9.9591060
 $128^{\circ} 30' 40''$
 $43^{\circ} 54' 00''$
 $7^{\circ} 35' 20''$
 $180^{\circ} 00' 00''$

A.C. Log Sine $128^{\circ} 30' 40''$ 0.1065226
 " " $7^{\circ} 35' 20''$ 9.1207850
 784.26 2.8944609
 132.36 2.1217685

$43^{\circ} 54'$
 $37^{\circ} 45' 20''$
 $81^{\circ} 39' 20''$ 115^o 09'
 $98^{\circ} 22' 40''$ 98 20 40
 $16 48 20$
 $39 21$

From Mont no 2 to N^o 3 $S 56^{\circ} 09' E$ 132.36

~~Says 56^o 09' 20''~~
~~Says 56^o 09' E~~

Calculation of the Triangulation to Monuments along the Crest of the Gila Mountains

From Monument No 3 to Monument No 4

angle at 720 point to Mount N: 4 = $\frac{66^{\circ} 11'}{113^{\circ} 49'}$
 " " 530.49 " " " " = $\frac{42^{\circ} 31'}{156^{\circ} 20'}$
 $\frac{23^{\circ} 40'}{42^{\circ} 31'}$
 $\frac{113^{\circ} 49'}{180^{\circ} 00'}$

Q.C. Leg Sin $23^{\circ} 40'$ 0.3964064
 " " $113^{\circ} 49'$ 9.9613462
 Dist 530.49 feet } $\frac{189.51}{431.90}$ $\frac{2.2776321}{2.6353847}$
 to Mount N: 4 }
 Dist 530.49 feet } $\frac{394.56}{826.46}$ $\frac{7.0827782}{1.5721743}$
 to Mount N: 3 }
 Leg Sin $78^{\circ} 50'$ 0.7046511
 " " $12^{\circ} 53' 30''$ 9.3596036
 $\frac{91^{\circ} 43' 30''}{65^{\circ} 56' 30''}$
 $\frac{22^{\circ} 20'}{180^{\circ} 00' 00''}$

Do do 0.3964064
 Leg Sin $24^{\circ} 31'$ 9.8298212
 Dist from 720 point } $\frac{189.51}{309.05}$ $\frac{2.2776321}{2.5038597}$
 to Mount N: 4 }
 angle at 530.49 to Mount N: 4 $42^{\circ} 31'$
 Cup of ang at 530.49 to Mount N: 3 $115^{\circ} 09'$
 $\frac{157^{\circ} 40'}{22^{\circ} 20'}$
 angle at 530.49 ft N: 3 to N: 4 = $22^{\circ} 20'$
 Sum Recum $157^{\circ} 40'$
 1/2 S Recum angle $78^{\circ} 50'$

A.C. Leg Sin $91^{\circ} 43' 30''$ 0.0001969
 " " $22^{\circ} 20'$ 9.5797772
 $\frac{431.90}{164.19}$ $\frac{2.6353847}{2.2153588}$

Do do 0.0001969
 Leg Sin $65^{\circ} 56' 30''$ 9.9605330
 $\frac{394.56}{164.19}$ $\frac{2.6353847}{2.5981146}$
 $\frac{66^{\circ} 56' 30''}{42^{\circ} 31'}$
 $\frac{23^{\circ} 40' 30''}{39^{\circ} 21'}$
 $\frac{62^{\circ} 46' 30''}{S 45^{\circ} 26' E}$

From Mount N: 3 to Mount N: 4 S $62^{\circ} 46' E$ 164.19

From Mount N: 4 to Mount N: 5

Do to 5 { angle at 800 point $\frac{74^{\circ} 06'}{105^{\circ} 54'}$
 angle at 530.49 point $\frac{39^{\circ} 21'}{145^{\circ} 15'}$

A.C. Leg Sin $34^{\circ} 45'$ 0.2441276
 " " $105^{\circ} 54'$ 9.9830583
 Leg $\frac{269.01}{464.74}$ $\frac{2.4305749}{2.6577608}$

Do do 0.2441276
 Leg Sin $39^{\circ} 21'$ 9.8021276
 Leg $\frac{2430.57}{299.80}$ $\frac{2.4768301}{2.4768301}$
 angle at 530.49 point to N: 4 $42^{\circ} 31'$
 " " " " " " N: 5 $39^{\circ} 21'$
 $\frac{3^{\circ} 10'}{176^{\circ} 50'}$
 1/2 Sum $88^{\circ} 25'$

A.C. Leg Sin $88^{\circ} 25'$ 7.0822527
 " " $22^{\circ} 84'$ 1.3586961
 Leg Sin $88^{\circ} 25'$ 1.5584397
 $\frac{42^{\circ} 57'}{9.9693885}$

A.C. Leg Sin $131^{\circ} 24'$ 0.1248744
 " " $45^{\circ} 26'$ 9.8527449
 Leg $\frac{454.74}{431.90}$ $\frac{2.6577608}{2.6353801}$

Do do 0.1248744
 Leg Sin $3^{\circ} 10'$ 8.7422586
 Leg $\frac{33.49}{33.49}$ $\frac{1.5248938}{1.5248938}$
 $\frac{45^{\circ} 26'}{39^{\circ} 21'}$
 $\frac{6^{\circ} 00'}{39^{\circ} 21'}$
 S $45^{\circ} 26' E$

From Mount N: 4 to Mount N: 5 S $45^{\circ} 26' E$ 33.49

Calculation of The Triangulation to Monuments along Crest of the Gila Mountains

From Mount N^o. 11 to Mount N^o. 12

The bearing of the S 83° 29' E base line was taken by Solar observation

	473.	
	<u>80.31</u>	
	392.69	
Sum	30° 33'	0.2938884
"	118° 34'	9.9436238
	<u>392.69</u>	<u>2.5940498</u>
From 473 point to Mount N ^o . 11	678.52	2.8315620

angle at 80.31 point to Mount N ^o . 11	118° 34'
" " " " " "	<u>30° 53'</u>
	149° 27'
Sum do	30° 53'
	<u>30° 53'</u>
	118° 34'
	<u>180° 00'</u>
Sum do	0.2938884
	30° 53'
	9.7103642
	<u>392.69</u>
	<u>2.5940498</u>
From 80.31 point to Mount N ^o . 11	396.56
	2.5983024

Sum	46° 43'	0.1378852
"	48° 30'	9.8744561
	<u>392.69</u>	<u>2.5940498</u>
80.31 point to Mt N ^o . 12	404.01	2.6063911

angle from 473 point to Mt N ^o . 12	118° 30'
" " " " " "	<u>84° 47'</u>
	133° 17'
Sum do	46° 43'
	<u>48° 30'</u>
	84° 47'
	<u>180° 00'</u>
Sum 84° 47'	0.1378852
	84° 47'
	9.9981974
	<u>392.69</u>
	<u>2.5940498</u>
473. point to Mount N ^o . 12	537.19
	2.4301824

	678.52	
	<u>537.19</u>	
Sum	1215.71	6.9151701
Diff	141.83	2.1502344
Sum 1/2	81° 11' 30"	0.8097885
	<u>36° 52' 40"</u>	<u>9.8751930</u>
	118° 04' 10"	
	44° 18' 50"	
	<u>17° 37'</u>	
	<u>180° 00' 00"</u>	

angle from 473 pt to Mt N ^o . 12	118° 30'
" " " " " " N ^o . 11	<u>30° 53'</u>
" " " " " " N ^o . 11 to N ^o . 12	17° 37'
	<u>162° 23'</u>
1/2 Sum 81° 11' 30"	

Sum	118° 04' 10"	0.0543454
	17° 37'	9.4809366
	<u>678.52</u>	<u>2.8315620</u>
Point N ^o . 11 to N ^o . 12	232.72	2.3668440

Sum	44° 18' 50"	0.0543454
	44° 18' 50"	9.8442216
	<u>678.52</u>	<u>2.8315620</u>
473 point to Mount N ^o . 12	537.19	2.7301290

	404.01	
	<u>396.56</u>	
Sum	800.57	4.0966332
Diff	7.45	0.8721563
Sum 1/2	73° 06' 30"	0.5176062
	<u>1° 45' 20"</u>	<u>8.4863957</u>
	74° 51' 50"	
	71° 21' 10"	
	<u>33° 47'</u>	
	<u>180° 00 00</u>	

angle at 80.31 point to Mount N ^o . 11	118° 34'
" " " " " " " " 12	<u>84° 47'</u>
" " " " " " N ^o . 11 to 12	33° 47'
	<u>146° 18'</u>
1/2 Sum 73° 06' 30"	

Sum	74° 51' 50"	0.0153340
	33° 47'	9.7451169
	<u>404.01</u>	<u>2.6063911</u>
Mount N ^o . 11 to N ^o . 12	232.72	2.3668440

Sum	71° 21' 10"	0.0153340
	71° 21' 10"	9.9765816
	<u>404.01</u>	<u>2.6063911</u>
80.31 pt to Mt N ^o . 11	396.57	2.5983067
	<u>396.56</u>	

	83° 29'	91° 21' 10"
	<u>13° 25' 50"</u>	<u>13° 25' 50"</u>
	S 70° 03' 10" E	

From Mount N^o. 11 to N^o. 12 S 70° 3' 10" E 232.72

Calculations of the Triangulation to Monuments along Crest of the Gila Mountains

From Monument No 12 to Mount No 13

angle at 80.31 point to Mount No 13 $70^{\circ}49'$
 " " 473. " " " " 13 $66^{\circ}16'$

<p>Sum $42^{\circ}55'$ 0.1668950 " $66^{\circ}16'$ 9.9615689 <u>392.69</u> 2.5940498 80.31 pt to N^o 13 = <u>527.85</u> 2.7225137</p> <p>473 pt to N^o 13 = 544.67 473 pt to N^o 12 = 537.19 Sum 1081.86 6.9658289 Diff 7.48 0.8739016 True Sum $81^{\circ}7'30''$ 0.8084613 Diff $2^{\circ}32'10''$ 8.6461918</p> <p>Sum $83^{\circ}39'40''$ 0.0026633 " $78^{\circ}35'20''$ 9.9913292 <u>544.67</u> 2.7361339 537.19 = <u>537.19</u> 2.7301264 80.31 pt to N^o 13 = <u>527.85</u> " " " " N^o 12 = <u>1104.07</u></p> <p>Sum 931.86 7.0306493 Diff 123.84 2.0928609 True Sum $85^{\circ}01'$ 0.9119019 <u>47^{\circ}20'</u> 0.0354121</p> <p>Sum $130^{\circ}21'$ 0.1179860 " $35^{\circ}41'$ 9.7658957 <u>527.85</u> 2.7225137 { <u>1104.07</u> 2.6063954 { <u>1104.07</u></p>	<p>Sum $42^{\circ}55'$ 0.1668950 " $66^{\circ}16'$ 9.9615689 473 pt to N^o 13 = 544.67 473 pt to N^o 12 = 537.19 Sum 1081.86 6.9658289 Diff 7.48 0.8739016 True Sum $81^{\circ}7'30''$ 0.8084613 Diff $2^{\circ}32'10''$ 8.6461918</p> <p>Sum $83^{\circ}39'40''$ 0.0026633 " $78^{\circ}35'20''$ 9.9913292 <u>544.67</u> 2.7361339 537.19 = <u>537.19</u> 2.7301264 80.31 pt to N^o 13 = <u>527.85</u> " " " " N^o 12 = <u>1104.07</u></p> <p>Sum 931.86 7.0306493 Diff 123.84 2.0928609 True Sum $85^{\circ}01'$ 0.9119019 <u>47^{\circ}20'</u> 0.0354121</p> <p>Sum $130^{\circ}21'$ 0.1179860 " $35^{\circ}41'$ 9.7658957 <u>527.85</u> 2.7225137 { <u>1104.07</u> 2.6063954 { <u>1104.07</u></p>
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From Mount No 12 to N^o 13 S $48^{\circ}19'20''$ E 167.12

From Mount No 13 to Mount No 14

angle at 473 point to N^o 14 $48^{\circ}51'$
 " " 80.31 " " " " 14 $49^{\circ}11'$

<p>Sum $51^{\circ}58'$ 0.1036654 " $49^{\circ}11'$ 9.8789840 <u>392.69</u> 2.5940498 473 to N^o 14 = <u>377.31</u> 2.5766992 " " " 13 = <u>544.67</u></p> <p>Sum 921.98 7.0352725 Diff 167.36 2.2236517 True Sum $85^{\circ}42'$ 0.9570269 Diff $65^{\circ}41'30''$ 0.2159571</p> <p>Sum $142^{\circ}23'30''$ 0.2144848 " $25^{\circ}00'30''$ 9.6260837 <u>544.67</u> 2.7361339 377.31 = <u>377.31</u> 2.5767024</p> <p>80.31 pt to N^o 13 = 527.85 " " " " 14 = 489.14 1016.99 6.9926833 Diff 38.71 1.5878232 True Sum $79^{\circ}11'$ 0.7188267 Diff $11^{\circ}16'$ 9.2998329</p> <p>Sum $90^{\circ}27'$ 0.000734 " $16^{\circ}55'$ 9.9669101 <u>527.85</u> 2.7225137 489.14 2.6894372 489.14</p>	<p>Sum $51^{\circ}58'$ 0.1036654 " $49^{\circ}11'$ 9.8789840 473 to N^o 14 = 377.31 2.5766992 " " " 13 = 544.67</p> <p>Sum 921.98 7.0352725 Diff 167.36 2.2236517 True Sum $85^{\circ}42'$ 0.9570269 Diff $65^{\circ}41'30''$ 0.2159571</p> <p>Sum $142^{\circ}23'30''$ 0.2144848 " $25^{\circ}00'30''$ 9.6260837 <u>544.67</u> 2.7361339 377.31 = <u>377.31</u> 2.5767024</p> <p>80.31 pt to N^o 13 = 527.85 " " " " 14 = 489.14 1016.99 6.9926833 Diff 38.71 1.5878232 True Sum $79^{\circ}11'$ 0.7188267 Diff $11^{\circ}16'$ 9.2998329</p> <p>Sum $90^{\circ}27'$ 0.000734 " $16^{\circ}55'$ 9.9669101 <u>527.85</u> 2.7225137 489.14 2.6894372 489.14</p>
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From Mount No 13 to Mount No 14 N $55^{\circ}15'$ E 194.65 N $55^{\circ}15'$ E

Calculations of The Traangulations to Monuments along Crest of the Gila Mountains

From Monument N^o 14 to Mount N^o 15

Line 45° 34' 0.146 2619	do 0.146 2619	105° 58'
105° 58' 9.982 9140	28° 28' 9.678 1972	28° 28'
392.69 2.594 0498	392.69 2.594 0498	134° 26'
80.31 feet to N ^o 15 = 528.72 2.723 2267	473 feet to N ^o 15 = 262.13 2.418 5089	45° 34'
" " " " 14 489.14		105° 58'
S 1017.86 6.9923 120		28° 28'
D 39.38 1.597 4758		134° 26'
Pan to Sun 79° 38' 30" 0.738 0648		45° 34'
12 60 30" 9.327 8526		105° 58'
do 0.000 1801		28° 28'
do 91° 39' 0.000 1801		134° 26'
67° 38' 9.966 0826		45° 34'
528.72 2.723 2267		105° 58'
489.14 2.689 4384		28° 28'
489.14		180° 00'
473 feet to N ^o 14 377.31		
" " " " 15 262.13		
do 0.000 1801		
do 20° 43' 9.548 6924		
do 528.72 2.723 2267		
do 489.14 2.689 4384		
from N ^o 15 = 187.11 2.272 0485		
do 0.036 6205		
do 2707 9.658 7780		
do 2.576 6983		
from 14 to 15 = 187.11 2.272 0485		
do 0.036 6205		
do 2707 9.658 7780		
do 2.576 6983		
from 14 to 15 = 187.11 2.272 0485		

From Mount N^o 14 to Mount N^o 15 N 57° 21' E 187.11

From Monument 15 to N^o 16

Line 37° 40' 0.213 9114	do 0.213 9114	108° 04'
108° 04' 9.978 1663	34° 19' 9.451 0991	34° 19'
392.69 2.594 0498	2.594 0498	142° 20'
from 80.31 to N ^o 15 = 611.12 2.786 1265	476 feet to N ^o 16 = 362.30 2.559 0603	37° 40'
" " " " 15 = 528.72		108° 04'
S 1139.84 6.943 1561		34° 19'
D 82.40 1.915 9272		108° 04'
Pan to Sun 87° 44' 30" 1.291 6192		34° 19'
54° 44' 30" 0.150 7025		180° 00'
do 0.208 9655		
do 32° 19' 40 9.728 1606		
do 611.12 2.786 1265		
do 528.72 2.723 2526		
do 628.72 2.723 2526		
from 473 to N ^o 16 = 362.30		
" " " " 15 = 262.13		
do 624.43 7.204 5162		
do 100.77 2.000 7377		
Pan to Sun 88° 58' 30" 1.747 3524		
83° 38' 10" 10.952 6068		
172° 36' 40" 0.590 7479		
5° 20' 20" 8.968 6946		
362.30 2.559 0603		
262.13 2.418 5078		
262.13		
01 dif		
do 0.890 7479		
do 2° 03' 8.533 5386		
do 2.559 0603		
from 15 to 16 = 100.77 2.000 7377		
100.77		
01 dif		
172° 36' 40"		
105° 58'		
66° 38' 40"		
83° 29'		
66° 38' 40"		
S 16° 50' 20" E		

From Mount N^o 15 to Mount N^o 16 S 16° 50' 20" E 100.77

Calculations of the Mangulation
to monuments along the Crest of the Gila Mountains

The Short Meander lines up Bonito Creek
not being used in the previous calculations as stated on
page 5. I discard their use altogether as being
more liable to be in error than the longer lines over
more even country, and calculate the course and
distance from 641 point in the S 77° 29' E line to

the 80.31 point in the S 83 29 E line

angle as obtained from

previous Cal. at Mount N^o 11 } $\frac{35^{\circ} 05'}{144^{\circ} 55'}$
from 641 point to 80.31 point } $\frac{1}{2}$ Sum $7^{\circ} 27' 30''$

From 641 pt to N ^o 11	509.38		
80.31 " " "	396.55		
	<u>905.93</u>	7.5429054	
	112.88	2.0524246	
Sum $72^{\circ} 27' 30''$		0.5001776	
	<u>2130.20</u>	<u>9.5955076</u>	
	$98^{\circ} 57' 58''$	0.0010402	
	50 57 10	9.8902125	
	509.38	2.7070419	
	<u>396.55</u>	<u>2.5982946</u>	
	$\frac{396.55}{01 \text{ dif}}$		

do	0.0010402
$35^{\circ} 05'$	9.7594920
	<u>2.7070419</u>
	293.48 2.4675741

From 641 point to 80.31 point S 50° 57' 10" E 293.48

This course and dist. will be used in the subsequent
Calculations for checking and also for obtaining
the Latitude and Longitude of Mount N^o 17

Calculation of the Triangulation
to Monuments along Crest of Yila Mountains

In order to check the Calculations I now
calculate the Course and Distance from
Monument No. 5 to No. 8 as located
from the S 39° 21' E Base line.

Line 105° 54' 0.0769417
45° 30' 9.8378122
132.80 2.1231981
95.05 1.9779520
330
445.05
229.51

do 0.0769417
3036' 9.7067531
2.1231981
7029 1.8468929
299.80
70.29
229.51

180° 36'
30 36'
149° 24'
105° 54'
48° 30'
30 36'
105° 54'
180° 00'

Sum 674.56 7.1709794
103° 54' Dif 215.54 2.8335279
52° 57' Jan 1/2 52° 57' 0.1220973
22° 56' 20" 9.6266046

Sum 75° 53' 20" 0.0133067
30° 00' 40" 9.6991158
445.05 2.6484088
229.52 } Dif. 07
229.51 } Dif. 07

do 0.0133067
74° 06' 9.7830383
2.6484048
441.34 2.6447738

30° 00' 40"
39° 21'
S 69° 21' 40" E

from Mount No. 5 to No. 8 S 69° 21' 40" E 441.34

This Course and Distance will be
used in the Subsequent tabling for checking
and also for determining the Lat and Long
of Mount No. 17. It differs by abt.
2 chain from the measurement taken
from 5 to 6, 7 & 8.

Calculations of the Triangulation to Monuments along the Crest of Gila Mts.

Check by Lat. and Long.

Monuments	Course	Dist	North	South	East	West
From N ^o 14 + 60.20 to N ^o 1	S 35° 45' E	276.39		224.31	161.48	
" N ^o 1 to N ^o 2	S 41° 21' E	478.51		359.21	316.13	
" 2 " " 3	S 56° 09' 20" E	132.36		73.72	109.93	
" 3 " " 4	S 62° 46' 30" E	164.19		75.11	146.00	
" 4 " " 5	S 45° 26' E	33.49		23.50	23.86	
" 5 " " 8	S 69° 21' 40" E	441.34		155.56	413.01	
" 8 " " 9	S 63° 13' 40" E	167.00		75.22	149.10	
" 9 " " 10	S 28° 55' E	366.26		320.60	177.10	
" 10 " " 11	S 66° 32' 25" E	304.53		121.24	279.35	
" 11 " " 12	S 70° 03' 10" E	232.72		79.39	218.76	
" 12 " " 13	S 48° 19' 20" E	167.12		111.12	124.83	
" 13 " " 14	N 55° 15' E	194.65	110.95		159.93	
" 14 " " 15	N 57° 21' E	187.11	100.95		157.54	
" 15 " " 16	S 16° 50' 28" E	100.77		96.45	29.19	
			211.90	1715.43	2466.21	
				211.90		
				1503.53		

By Base Lines

N 75° 28' E	435.00	109.16		421.08	
S 39° 21' E	1150.00			889.28	729.16
S 77° 29' E	641.00			138.92	625.76
S 50° 57' 10" E	293.48			184.88	227.92
S 83° 27' E	392.62			44.56	390.08
S 11° 30' E	362.30			355.03	72.23
				1612.67	2466.23
				109.16	2466.21
				1503.51	24.02
				1503.53	
				24.02	

Monument N^o 16 is South 1503.52 East of N^o 14 + 60.20

S 60° 00' E	115.44	57.72	57.72	99.97
S 28° 30' E	98.15		86.26	46.83
N 86° 30' E	84.83	5.18		84.67
N 11° 30' W	362.30	355.03		72.23
		360.21	1647.50	2697.69
			360.21	72.23

Monument N^o 17 is South 1287.29 East of N^o 14 + 60.20

	360.21		231.47
	143.98		72.23
	216.23		159.24

Calculation of Triangulation To Monuments along Crest of Gila Mountains

From Mount No 16 to Mount No 17

From the foregoing table I find that Mount No 17 is 216.23 North and 159.24 East of No 16 therefore

$$\begin{array}{r}
 159.24 \quad 7.7979478 \\
 216.23 \quad 2.3349159 \\
 \hline
 N \ 36^\circ \ 22' \ 10'' \ E \ 0.1328637 \\
 53 \ 37 \ 30
 \end{array}$$

$$\begin{array}{r}
 \text{Sin } 53^\circ 37' 30'' \ 0.0940908 \quad \text{Cos } 0.0940908 \\
 \text{Sin } 90^\circ \quad 10. \quad \hline
 216.23 \quad 2.3349159 \quad 9.7730570 \\
 268.54 \quad 2.4290067 \quad 159.24 \quad 2.2020537 \\
 \hline
 \end{array}$$

From No 16 to No 17 N 36° 22' 10" E 268.54

Calculation of Triangulation to Monuments Along Crest of Niles Mountains

From Monument No. 16 to Monument No. 17

From the foregoing table I find that Monument No. 17 is 216.23 North

and 159.24 East of No. 16. therefore

159.24	7.7979478
216.23	2.3349159
<u>N. 36° 22' 10" E</u>	<u>0.1328637</u>
53° 37' 50"	

Log Sin	53° 37' 50"	0.0940908	do.	0.0940908
" "	90°	10.	36° 22' 10"	9.7730470
	216.23	<u>2.3349159</u>		<u>2.3349159</u>
	268.54	2.4290067	159.24	2.2020537

From Monument 16 to 17 North 36° 22' 10" East 268.54

From Sec. Cor. of Sec 27x28 & 33x34 to Mexican Boundary ^{Chp.} 79.60
From Range 31x32 to Rec. 27x28

Less Convergence for 17 miles 88

From Stand. Cor. Range 31x32 E. to N.M. Body. = ^{Convergence all by Dep. White} 72.85

From 1/4 Sec. Cor. on N. Body. Sec. 7, 14 S. 23 E. to Long. through }
Camp Goodwin } ^{Convergence for 10 1/2 miles for same} 11.14

Dist. on 1st Standard to Long. of Camp Goodwin - 1.02.69

54.00.00
3.05.84

From Meridian of Camp Goodwin to N.M. Body, 58.07.56

From Meridian of Camp Goodwin to Mont. No. 17 = 32.65.46

Convergence to 1st Standard Parth 11.14.54

32.70.00

From Meridian of Camp Goodwin to N.M. Body, on 1st St. South

58.07.56
32.70.00

Dist. from Long. of N.M. Body. to Long. of Mt. No. 17 on 1st St. South 25.17.00

Equal to	0° 26' 02.04"
Long. of N.M. Body. =	109° 02' 59.25"
Long. of N.M. Mt. No. 17	<u>109° 29' 01.29"</u>

109° 30' 00"
<u>109° 29' 1.29"</u>

Monument No 17 E. of its proper position - 58.71"

219 ^{11A}
 In establishing Mont. No. 17 at the intersection of the $109^{\circ}30'$ long. with the Gila Range, I found that the longitude as established at Camp Thomas was so erroneous that I could not use it, and the country being so mountainous between Mont. No. 17 and the U. S. boundary as to render it almost impossible to carry the measurements directly East to the U. S. boundary. I therefore adopted what I considered the next best plan, (keeping in view as much as possible the telegraphic instructions received in the field) to calculate the longitude from the U. S. boundary by measurements as given by the Public Survey, being careful to get the monument too far East rather than take the chances of its being too far West, and now by a careful calculation I find the probable error of monument No. 17 is less than $0^{\circ}01'$ too far East, it is partly due to the difference of convergence applied by Deputy White at Closing Corner to Twp. 6 S. R. 31 + 32 E. and the convergence applied by me in the field and partly to the difference between tabling in the field and the logarithmic calculation as shown above.

Paul Piccker
 U. S. G. S.

The foregoing calculations of the
 Triangulation to monuments along the
 Crest of the Gila Mountains, executed
 by Paul Reicker, U.S. Deft. Surveyor
 under his Contract dated May 19, 1883
 have been critically examined and the
 necessary corrections and explanations
 made, the same are hereby approved.

Royall Johnson
 Chief of
 In charge U.S. Surveyor General

I certify that the foregoing transcript
 of the calculations of Triangulation to
 monuments along Crest of Gila Mountains
 has been correctly copied from the
 original calculations on file in this
 Office.

Royall Johnson
 Chief of
 In charge U.S. Surveyor General

U.S. Surveyor General's Office
 Tucson July 25, 1884.