

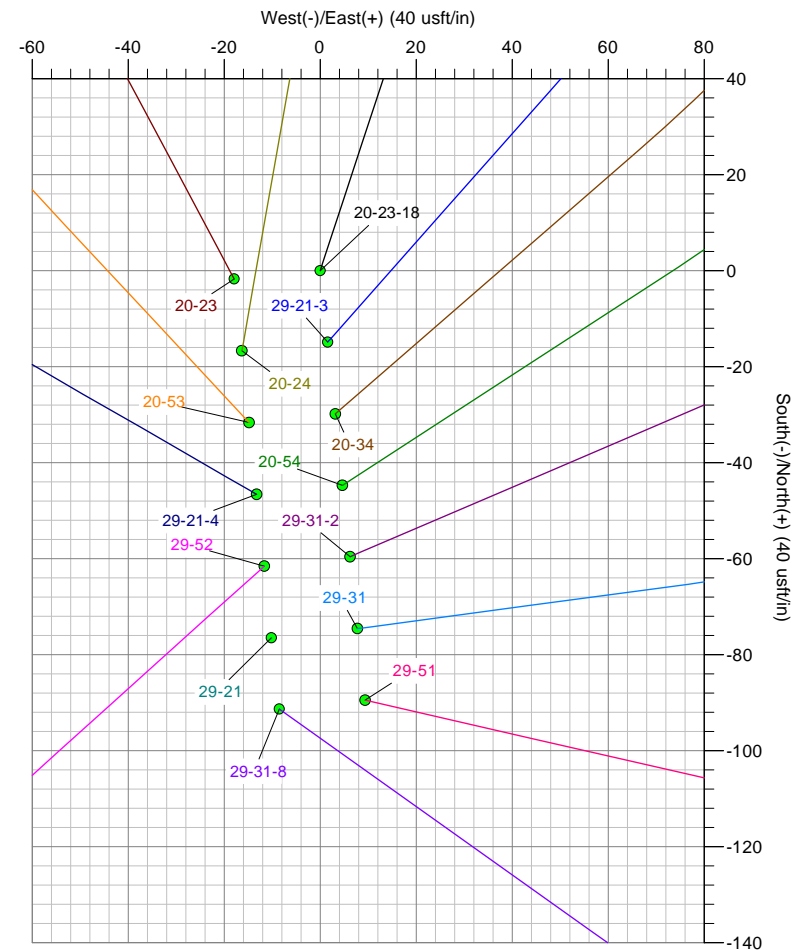
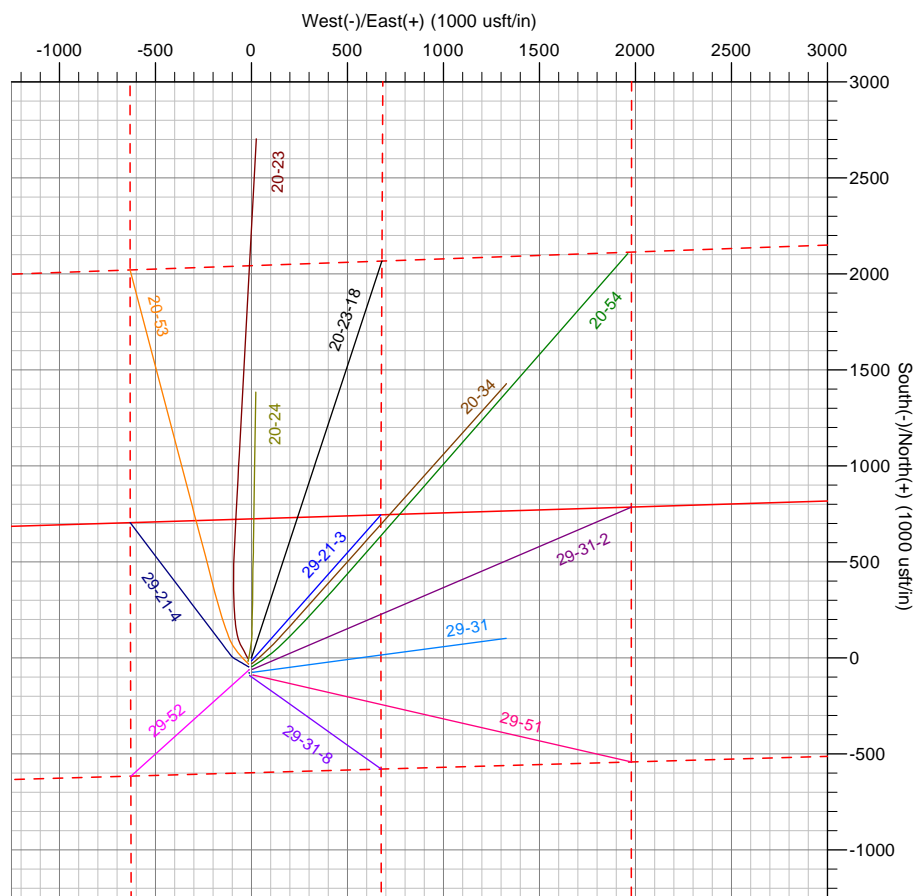




Company: Great Western  
Site: H-Y  
Project: Weld County, Colorado (NAD 83)  
Rig Name: Cade 22



Planning: 936.442.2510 Fax: 936.442.2515  
Operations: 936.442.2500 Fax: 936.442.2599



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# **Great Western**

**Weld County, Colorado (NAD 83)**

**H-Y**

**20-23-18**

**Wellbore #1**

**Plan: Design #1**

## **Standard Planning Report**

**07 March, 2012**

<b>Database:</b>	Southern Region	<b>Local Co-ordinate Reference:</b>	Well 20-23-18
<b>Company:</b>	Great Western	<b>TVD Reference:</b>	WELL @ 4798.00usft (Cade 22)
<b>Project:</b>	Weld County, Colorado (NAD 83)	<b>MD Reference:</b>	WELL @ 4798.00usft (Cade 22)
<b>Site:</b>	H-Y	<b>North Reference:</b>	Grid
<b>Well:</b>	20-23-18	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #1		
<b>Design:</b>	Design #1		

<b>Project</b>	Weld County, Colorado (NAD 83)		
<b>Map System:</b>	US State Plane 1983	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	North American Datum 1983		
<b>Map Zone:</b>	Colorado Northern Zone		

<b>Well</b>	20-23-18			
<b>Well Position</b>	<b>+N/-S</b>	1,412,090.90 usft	<b>Northing:</b>	1,412,090.90 usft
	<b>+E/-W</b>	3,161,520.93 usft	<b>Easting:</b>	3,161,520.93 usft
<b>Position Uncertainty</b>		0.00 usft	<b>Wellhead Elevation:</b>	
			<b>Latitude:</b>	40° 27' 47.3035 N
			<b>Longitude:</b>	104° 55' 10.234 W
			<b>Ground Level:</b>	4,784.00 usft

<b>Wellbore</b>	Wellbore #1				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	WMM_2010	3/2/2012	8.85	67.05	53,082

<b>Design</b>	Design #1			
<b>Audit Notes:</b>				
<b>Version:</b>	<b>Phase:</b>	PROTOTYPE	<b>Tie On Depth:</b>	0.00
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Direction (°)</b>
	0.00	0.00	0.00	18.21

<b>Plan Sections</b>										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00	
600.00	8.00	18.21	598.70	26.48	8.71	2.00	2.00	0.00	18.21	PBHL v1 - H-Y 20-2
1,000.00	8.00	18.21	994.81	79.36	26.12	0.00	0.00	0.00	0.00	
1,974.99	27.50	18.21	1,918.91	360.35	118.58	2.00	2.00	0.00	0.00	
4,932.50	27.50	18.21	4,542.26	1,657.54	545.43	0.00	0.00	0.00	0.00	
6,765.82	0.00	0.01	6,306.00	2,067.50	680.33	1.50	-1.50	0.00	180.00	
7,809.82	0.00	0.01	7,350.00	2,067.50	680.33	0.00	0.00	0.00	0.00	PBHL v1 - H-Y 20-2

<b>Database:</b>	Southern Region	<b>Local Co-ordinate Reference:</b>	Well 20-23-18
<b>Company:</b>	Great Western	<b>TVD Reference:</b>	WELL @ 4798.00usft (Cade 22)
<b>Project:</b>	Weld County, Colorado (NAD 83)	<b>MD Reference:</b>	WELL @ 4798.00usft (Cade 22)
<b>Site:</b>	H-Y	<b>North Reference:</b>	Grid
<b>Well:</b>	20-23-18	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #1		
<b>Design:</b>	Design #1		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>KOP, 2.00°/100' Build</b>									
300.00	2.00	18.21	299.98	1.66	0.55	1.75	2.00	2.00	0.00
400.00	4.00	18.21	399.84	6.63	2.18	6.98	2.00	2.00	0.00
500.00	6.00	18.21	499.45	14.91	4.91	15.69	2.00	2.00	0.00
600.00	8.00	18.21	598.70	26.48	8.71	27.88	2.00	2.00	0.00
<b>Hold 8.00° Inc, 18.21° Azm</b>									
700.00	8.00	18.21	697.73	39.70	13.06	41.80	0.00	0.00	0.00
800.00	8.00	18.21	796.76	52.92	17.41	55.71	0.00	0.00	0.00
853.77	8.00	18.21	850.00	60.03	19.75	63.20	0.00	0.00	0.00
<b>8-5/8"</b>									
900.00	8.00	18.21	895.78	66.14	21.76	69.63	0.00	0.00	0.00
1,000.00	8.00	18.21	994.81	79.36	26.12	83.55	0.00	0.00	0.00
<b>Begin 2.00°/100' Build</b>									
1,100.00	10.00	18.21	1,093.57	94.22	31.00	99.19	2.00	2.00	0.00
1,200.00	12.00	18.21	1,191.73	112.35	36.97	118.27	2.00	2.00	0.00
1,300.00	14.00	18.21	1,289.16	133.71	44.00	140.77	2.00	2.00	0.00
1,400.00	16.00	18.21	1,385.75	158.30	52.09	166.65	2.00	2.00	0.00
1,500.00	18.00	18.21	1,481.38	186.07	61.23	195.88	2.00	2.00	0.00
1,600.00	20.00	18.21	1,575.92	216.99	71.40	228.44	2.00	2.00	0.00
1,700.00	22.00	18.21	1,669.28	251.03	82.60	264.27	2.00	2.00	0.00
1,800.00	24.00	18.21	1,761.32	288.14	94.82	303.34	2.00	2.00	0.00
1,900.00	26.00	18.21	1,851.95	328.29	108.03	345.60	2.00	2.00	0.00
1,974.99	27.50	18.21	1,918.91	360.35	118.58	379.35	2.00	2.00	0.00
<b>Begin 27.50° Tangent</b>									
2,000.00	27.50	18.21	1,941.09	371.32	122.19	390.90	0.00	0.00	0.00
2,100.00	27.50	18.21	2,029.80	415.18	136.62	437.08	0.00	0.00	0.00
2,200.00	27.50	18.21	2,118.50	459.04	151.05	483.25	0.00	0.00	0.00
2,300.00	27.50	18.21	2,207.20	502.90	165.48	529.43	0.00	0.00	0.00
2,400.00	27.50	18.21	2,295.90	546.76	179.92	575.60	0.00	0.00	0.00
2,500.00	27.50	18.21	2,384.60	590.62	194.35	621.78	0.00	0.00	0.00
2,600.00	27.50	18.21	2,473.30	634.48	208.78	667.95	0.00	0.00	0.00
2,700.00	27.50	18.21	2,562.00	678.34	223.22	714.12	0.00	0.00	0.00
2,800.00	27.50	18.21	2,650.70	722.20	237.65	760.30	0.00	0.00	0.00
2,900.00	27.50	18.21	2,739.41	766.06	252.08	806.47	0.00	0.00	0.00
3,000.00	27.50	18.21	2,828.11	809.93	266.51	852.65	0.00	0.00	0.00
3,100.00	27.50	18.21	2,916.81	853.79	280.95	898.82	0.00	0.00	0.00
3,200.00	27.50	18.21	3,005.51	897.65	295.38	945.00	0.00	0.00	0.00
3,300.00	27.50	18.21	3,094.21	941.51	309.81	991.17	0.00	0.00	0.00
3,400.00	27.50	18.21	3,182.91	985.37	324.25	1,037.35	0.00	0.00	0.00
3,500.00	27.50	18.21	3,271.61	1,029.23	338.68	1,083.52	0.00	0.00	0.00
3,600.00	27.50	18.21	3,360.31	1,073.09	353.11	1,129.70	0.00	0.00	0.00
3,642.49	27.50	18.21	3,398.00	1,091.73	359.24	1,149.31	0.00	0.00	0.00
<b>Parkman</b>									
3,700.00	27.50	18.21	3,449.02	1,116.95	367.54	1,175.87	0.00	0.00	0.00
3,800.00	27.50	18.21	3,537.72	1,160.81	381.98	1,222.05	0.00	0.00	0.00
3,900.00	27.50	18.21	3,626.42	1,204.67	396.41	1,268.22	0.00	0.00	0.00
4,000.00	27.50	18.21	3,715.12	1,248.54	410.84	1,314.39	0.00	0.00	0.00
4,100.00	27.50	18.21	3,803.82	1,292.40	425.28	1,360.57	0.00	0.00	0.00
4,200.00	27.50	18.21	3,892.52	1,336.26	439.71	1,406.74	0.00	0.00	0.00
4,300.00	27.50	18.21	3,981.22	1,380.12	454.14	1,452.92	0.00	0.00	0.00

<b>Database:</b>	Southern Region	<b>Local Co-ordinate Reference:</b>	Well 20-23-18
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<b>Project:</b>	Weld County, Colorado (NAD 83)	<b>MD Reference:</b>	WELL @ 4798.00usft (Cade 22)
<b>Site:</b>	H-Y	<b>North Reference:</b>	Grid
<b>Well:</b>	20-23-18	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #1		
<b>Design:</b>	Design #1		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
4,400.00	27.50	18.21	4,069.92	1,423.98	468.57	1,499.09	0.00	0.00	0.00
4,442.93	27.50	18.21	4,108.00	1,442.81	474.77	1,518.91	0.00	0.00	0.00
<b>Sussex</b>									
4,500.00	27.50	18.21	4,158.63	1,467.84	483.01	1,545.27	0.00	0.00	0.00
4,600.00	27.50	18.21	4,247.33	1,511.70	497.44	1,591.44	0.00	0.00	0.00
4,700.00	27.50	18.21	4,336.03	1,555.56	511.87	1,637.62	0.00	0.00	0.00
4,800.00	27.50	18.21	4,424.73	1,599.42	526.31	1,683.79	0.00	0.00	0.00
4,882.60	27.50	18.21	4,498.00	1,635.65	538.23	1,721.93	0.00	0.00	0.00
<b>Shannon</b>									
4,900.00	27.50	18.21	4,513.43	1,643.28	540.74	1,729.97	0.00	0.00	0.00
4,932.50	27.50	18.21	4,542.26	1,657.54	545.43	1,744.97	0.00	0.00	0.00
<b>Begin 1.50°/100' Drop</b>									
5,000.00	26.49	18.21	4,602.40	1,686.64	555.01	1,775.61	1.50	-1.50	0.00
5,100.00	24.99	18.21	4,692.48	1,727.89	568.58	1,819.03	1.50	-1.50	0.00
5,200.00	23.49	18.21	4,783.66	1,766.88	581.41	1,860.08	1.50	-1.50	0.00
5,300.00	21.99	18.21	4,875.89	1,803.60	593.49	1,898.73	1.50	-1.50	0.00
5,400.00	20.49	18.21	4,969.10	1,838.00	604.81	1,934.96	1.50	-1.50	0.00
5,500.00	18.99	18.21	5,063.22	1,870.08	615.37	1,968.72	1.50	-1.50	0.00
5,600.00	17.49	18.21	5,158.19	1,899.81	625.15	2,000.02	1.50	-1.50	0.00
5,700.00	15.99	18.21	5,253.95	1,927.16	634.15	2,028.82	1.50	-1.50	0.00
5,800.00	14.49	18.21	5,350.44	1,952.13	642.37	2,055.10	1.50	-1.50	0.00
5,900.00	12.99	18.21	5,447.57	1,974.68	649.79	2,078.84	1.50	-1.50	0.00
6,000.00	11.49	18.21	5,545.30	1,994.82	656.41	2,100.04	1.50	-1.50	0.00
6,100.00	9.99	18.21	5,643.54	2,012.51	662.24	2,118.67	1.50	-1.50	0.00
6,200.00	8.49	18.21	5,742.24	2,027.76	667.25	2,134.72	1.50	-1.50	0.00
6,300.00	6.99	18.21	5,841.33	2,040.55	671.46	2,148.19	1.50	-1.50	0.00
6,400.00	5.49	18.21	5,940.74	2,050.87	674.86	2,159.05	1.50	-1.50	0.00
6,500.00	3.99	18.21	6,040.39	2,058.71	677.44	2,167.31	1.50	-1.50	0.00
6,600.00	2.49	18.21	6,140.23	2,064.08	679.21	2,172.96	1.50	-1.50	0.00
6,700.00	0.99	18.21	6,240.18	2,066.96	680.15	2,175.99	1.50	-1.50	0.00
6,765.82	0.00	0.01	6,306.00	2,067.50	680.33	2,176.55	1.50	-1.50	0.00
<b>Begin Vertical Hold</b>									
6,800.00	0.00	0.01	6,340.18	2,067.50	680.33	2,176.55	0.00	0.00	0.00
6,900.00	0.00	0.01	6,440.18	2,067.50	680.33	2,176.55	0.00	0.00	0.00
7,000.00	0.00	0.01	6,540.18	2,067.50	680.33	2,176.55	0.00	0.00	0.00
7,100.00	0.00	0.01	6,640.18	2,067.50	680.33	2,176.55	0.00	0.00	0.00
7,200.00	0.00	0.01	6,740.18	2,067.50	680.33	2,176.55	0.00	0.00	0.00
7,300.00	0.00	0.01	6,840.18	2,067.50	680.33	2,176.55	0.00	0.00	0.00
7,315.82	0.00	0.01	6,856.00	2,067.50	680.33	2,176.55	0.00	0.00	0.00
<b>Niobrara</b>									
7,400.00	0.00	0.01	6,940.18	2,067.50	680.33	2,176.55	0.00	0.00	0.00
7,429.82	0.00	0.01	6,970.00	2,067.50	680.33	2,176.55	0.00	0.00	0.00
<b>Nio A</b>									
7,495.82	0.00	0.01	7,036.00	2,067.50	680.33	2,176.55	0.00	0.00	0.00
<b>Nio B</b>									
7,500.00	0.00	0.01	7,040.18	2,067.50	680.33	2,176.55	0.00	0.00	0.00
7,582.82	0.00	0.01	7,123.00	2,067.50	680.33	2,176.55	0.00	0.00	0.00
<b>Nio C</b>									
7,600.00	0.00	0.01	7,140.18	2,067.50	680.33	2,176.55	0.00	0.00	0.00
7,622.82	0.00	0.01	7,163.00	2,067.50	680.33	2,176.55	0.00	0.00	0.00
<b>Nio D</b>									
7,629.82	0.00	0.01	7,170.00	2,067.50	680.33	2,176.55	0.00	0.00	0.00
<b>Fort Hayes</b>									

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<b>Project:</b>	Weld County, Colorado (NAD 83)	<b>MD Reference:</b>	WELL @ 4798.00usft (Cade 22)
<b>Site:</b>	H-Y	<b>North Reference:</b>	Grid
<b>Well:</b>	20-23-18	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #1		
<b>Design:</b>	Design #1		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
7,649.82	0.00	0.01	7,190.00	2,067.50	680.33	2,176.55	0.00	0.00	0.00
<b>Codell</b>									
7,700.00	0.00	0.01	7,240.18	2,067.50	680.33	2,176.55	0.00	0.00	0.00
7,800.00	0.00	0.01	7,340.18	2,067.50	680.33	2,176.55	0.00	0.00	0.00
7,809.82	0.00	0.01	7,350.00	2,067.50	680.33	2,176.55	0.00	0.00	0.00
<b>PBHL</b>									

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target									
- Shape									
PBHL v1 - H-Y 20-23-	0.00	0.01	7,350.00	2,067.50	680.33	1,414,158.39	3,162,201.26	40° 28' 7.6897 N	104° 55' 1.256 W
- plan hits target center									
- Circle (radius 200.00)									

Casing Points				
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
853.77	850.00	8-5/8"	8-5/8	12-1/4

Formations						
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
3,642.49	3,398.00	Parkman		0.00		
4,442.93	4,108.00	Sussex		0.00		
4,882.60	4,498.00	Shannon		0.00		
7,315.82	6,856.00	Niobrara		0.00		
7,429.82	6,970.00	Nio A		0.00		
7,495.82	7,036.00	Nio B		0.00		
7,582.82	7,123.00	Nio C		0.00		
7,622.82	7,163.00	Nio D		0.00		
7,629.82	7,170.00	Fort Hayes		0.00		
7,649.82	7,190.00	Codell		0.00		

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<b>Project:</b>	Weld County, Colorado (NAD 83)	<b>MD Reference:</b>	WELL @ 4798.00usft (Cade 22)
<b>Site:</b>	H-Y	<b>North Reference:</b>	Grid
<b>Well:</b>	20-23-18	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #1		
<b>Design:</b>	Design #1		

**Plan Annotations**

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
200.00	200.00	0.00	0.00	KOP, 2.00°/100' Build
600.00	598.70	26.48	8.71	Hold 8.00° Inc, 18.21° Azm
1,000.00	994.81	79.36	26.12	Begin 2.00°/100' Build
1,974.99	1,918.91	360.35	118.58	Begin 27.50° Tangent
4,932.50	4,542.26	1,657.54	545.43	Begin 1.50°/100' Drop
6,765.82	6,306.00	2,067.50	680.33	Begin Vertical Hold
7,809.82	7,350.00	2,067.50	680.33	PBHL