



Directional Survey Certification

2948 I-70 Business Loop
Grand Junction, CO 81504
(970)-245-9447 Fax (970)-245-9454

Operator	TEP Rocky Mountain, LLC.
Well Name & No.	GM 323-4
County & State	Garfield County, CO
SDI Job No.	OP.004799
Rig	H&P 271

I, Mel Mireles Jr., having personal knowledge of all the facts, hereby certify that the attached directional survey run from a measured depth of 122 feet to a measured depth of 7,785 feet is true and correct as determined from all available records.


Signature

26-Oct-17
Date

Mel Mireles Jr.
Grand Junction Assistant Well Planner
Scientific Drilling - Colorado District

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well GM 323-4 - Slot A11 (GM 323-4)
Project:	Garfield County, CO NAD83	TVD Reference:	GL 5977' & RKB 24' @ 6001.00usft (H&P 271)
Site:	MV 34-5 Pad	MD Reference:	GL 5977' & RKB 24' @ 6001.00usft (H&P 271)
Well:	GM 323-4	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Grand Junction District

Project	Garfield County, CO NAD83		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Central Zone		

Site		MV 34-5 Pad			
Site Position:		Northing:	1,603,476.79 usft	Latitude:	39.4609066
From:	Map	Easting:	2,258,772.10 usft	Longitude:	-108.1256571
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in	Grid Convergence:	-1.66 °

Well	GM 323-4 - Slot A11 (GM 323-4)					
Well Position	+N/-S	0.00 usft	Northing:	1,603,483.03 usft	Latitude:	39.4609241
	+E/-W	0.00 usft	Easting:	2,258,776.22 usft	Longitude:	-108.1256432
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	5,977.00 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	10/4/2017	9.57	65.77	51,759

Design	OH				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	256.48	

Survey Program	Date	10/10/2017			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
122.00	580.00	Survey #1 - Gyro MWD Survey (OH)	SDI Gyro MWD 104	SDI Gyro MWD Error Model Ver 1.0.4	
657.00	1,212.00	Survey #2 - Surface MWD Survey (OH)	SDI MWD	SDI MWD - Standard ver 1.0.1	
1,357.00	7,785.00	Survey #3 - Production MWD Survey (OH)	SDI MWD	SDI MWD - Standard ver 1.0.1	

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	
122.00	0.79	254.44	122.00	-0.23	-0.81	0.84	0.65	0.65	0.00	
First SDI Gyro MWD Survey										
212.00	2.46	258.40	211.96	-0.78	-3.30	3.39	1.86	1.86	4.40	
305.00	2.90	254.53	304.85	-1.81	-7.52	7.74	0.51	0.47	-4.16	
396.00	2.11	246.88	395.77	-3.08	-11.28	11.69	0.94	-0.87	-8.41	
488.00	3.34	66.45	487.73	-2.68	-10.38	10.72	5.92	1.34	195.18	
580.00	8.89	71.54	579.17	0.65	-1.18	0.99	6.06	6.03	5.53	

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Site:	MV 34-5 Pad	MD Reference:	GL 5977' & RKB 24' @ 6001.00usft (H&P 271)
Well:	GM 323-4	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Grand Junction District

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)	
Last SDI Gyro MWD Survey										
657.00	13.10	69.36	654.74	5.61	12.64	-13.60	5.49	5.47	-2.83	
First SDI Surface MWD Survey										
750.00	18.43	69.23	744.21	14.55	36.27	-38.66	5.73	5.73	-0.14	
841.00	23.91	66.99	829.04	26.87	66.71	-71.15	6.09	6.02	-2.46	
935.00	30.45	63.07	912.62	45.12	105.53	-113.15	7.21	6.96	-4.17	
1,030.00	35.38	64.35	992.34	67.94	151.81	-163.49	5.24	5.19	1.35	
1,125.00	40.16	65.86	1,067.42	92.39	204.59	-220.52	5.12	5.03	1.59	
1,212.00	44.23	68.19	1,131.86	115.15	258.39	-278.15	5.01	4.68	2.68	
Last SDI Surface MWD Survey										
1,357.00	44.47	68.65	1,235.55	152.43	352.64	-378.51	0.28	0.17	0.32	
First SDI Production MWD Survey										
1,451.00	47.75	66.18	1,300.72	178.47	415.16	-445.38	3.97	3.49	-2.63	
1,546.00	47.05	66.75	1,365.02	206.40	479.27	-514.25	0.86	-0.74	0.60	
1,641.00	48.03	66.87	1,429.15	234.00	543.69	-583.34	1.04	1.03	0.13	
1,735.00	46.38	65.61	1,493.01	261.78	606.82	-651.21	2.01	-1.76	-1.34	
1,830.00	46.90	64.51	1,558.24	290.90	669.45	-718.91	1.00	0.55	-1.16	
1,925.00	47.90	65.56	1,622.54	320.41	732.84	-787.45	1.33	1.05	1.11	
2,020.00	47.50	66.39	1,686.48	349.02	797.02	-856.54	0.77	-0.42	0.87	
2,114.00	47.04	68.89	1,750.27	375.29	860.86	-924.75	2.01	-0.49	2.66	
2,209.00	45.90	69.51	1,815.69	399.75	925.25	-993.07	1.29	-1.20	0.65	
2,303.00	47.21	69.98	1,880.33	423.37	989.27	-1,060.85	1.44	1.39	0.50	
2,398.00	46.11	70.18	1,945.53	446.91	1,054.23	-1,129.51	1.17	-1.16	0.21	
2,492.00	45.74	68.65	2,010.92	470.65	1,117.45	-1,196.53	1.23	-0.39	-1.63	
2,587.00	44.63	68.52	2,077.88	495.26	1,180.19	-1,263.28	1.17	-1.17	-0.14	
2,681.00	45.16	68.42	2,144.47	519.61	1,241.90	-1,328.98	0.57	0.56	-0.11	
2,775.00	45.97	67.61	2,210.28	544.74	1,304.14	-1,395.37	1.06	0.86	-0.86	
2,870.00	45.08	67.51	2,276.83	570.61	1,366.79	-1,462.33	0.94	-0.94	-0.11	
2,964.00	44.32	67.14	2,343.65	596.10	1,427.80	-1,527.61	0.85	-0.81	-0.39	
3,059.00	45.33	66.05	2,411.03	622.71	1,489.26	-1,593.58	1.34	1.06	-1.15	
3,153.00	46.95	67.42	2,476.16	649.46	1,551.52	-1,660.38	2.02	1.72	1.46	
3,248.00	44.42	68.87	2,542.52	674.78	1,614.60	-1,727.62	2.88	-2.66	1.53	
3,342.00	45.55	68.63	2,609.01	698.87	1,676.53	-1,793.47	1.22	1.20	-0.26	
3,436.00	46.08	67.48	2,674.53	724.06	1,739.05	-1,860.15	1.04	0.56	-1.22	
3,531.00	48.23	66.17	2,739.12	751.48	1,803.07	-1,928.81	2.48	2.26	-1.38	
3,625.00	46.70	66.50	2,802.67	779.29	1,866.51	-1,996.99	1.65	-1.63	0.35	
3,720.00	46.33	65.61	2,868.05	807.26	1,929.50	-2,064.78	0.78	-0.39	-0.94	
3,814.00	45.02	65.38	2,933.73	835.15	1,990.69	-2,130.79	1.40	-1.39	-0.24	
3,909.00	43.59	65.16	3,001.71	862.91	2,050.96	-2,195.88	1.51	-1.51	-0.23	
4,004.00	42.96	65.68	3,070.88	890.00	2,110.18	-2,259.79	0.76	-0.66	0.55	
4,098.00	40.26	66.18	3,141.15	915.46	2,167.16	-2,321.15	2.89	-2.87	0.53	

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Site:	MV 34-5 Pad	MD Reference:	GL 5977' & RKB 24' @ 6001.00usft (H&P 271)
Well:	GM 323-4	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Grand Junction District

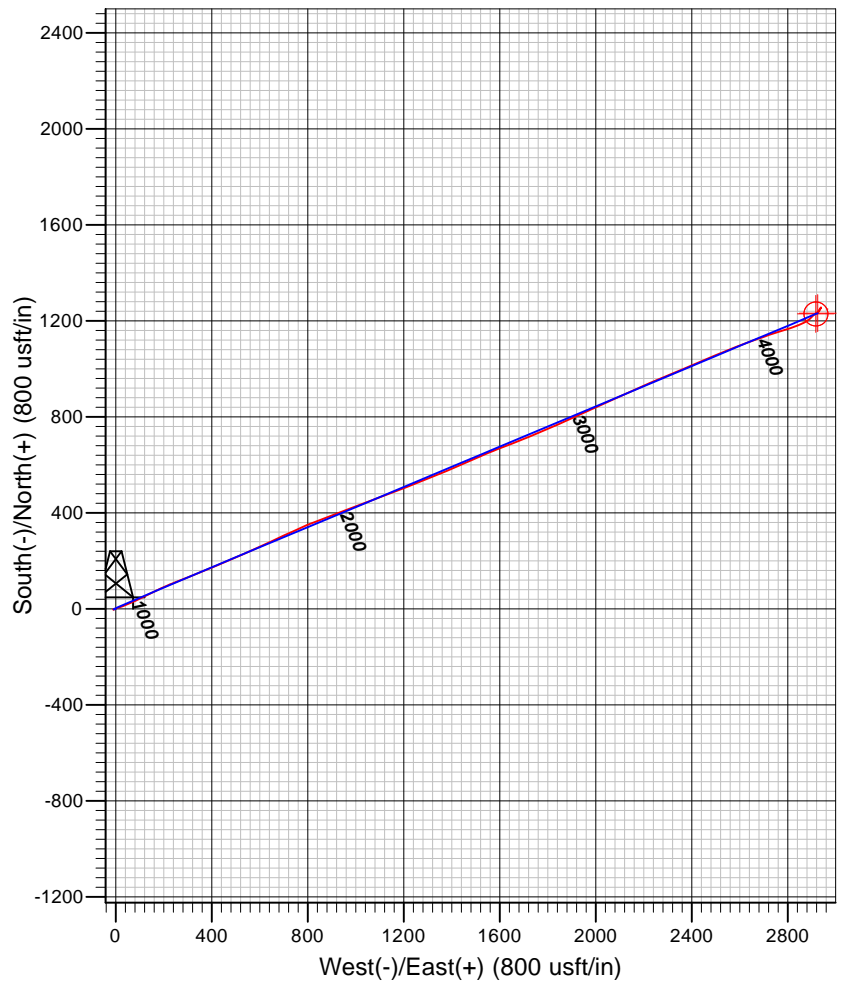
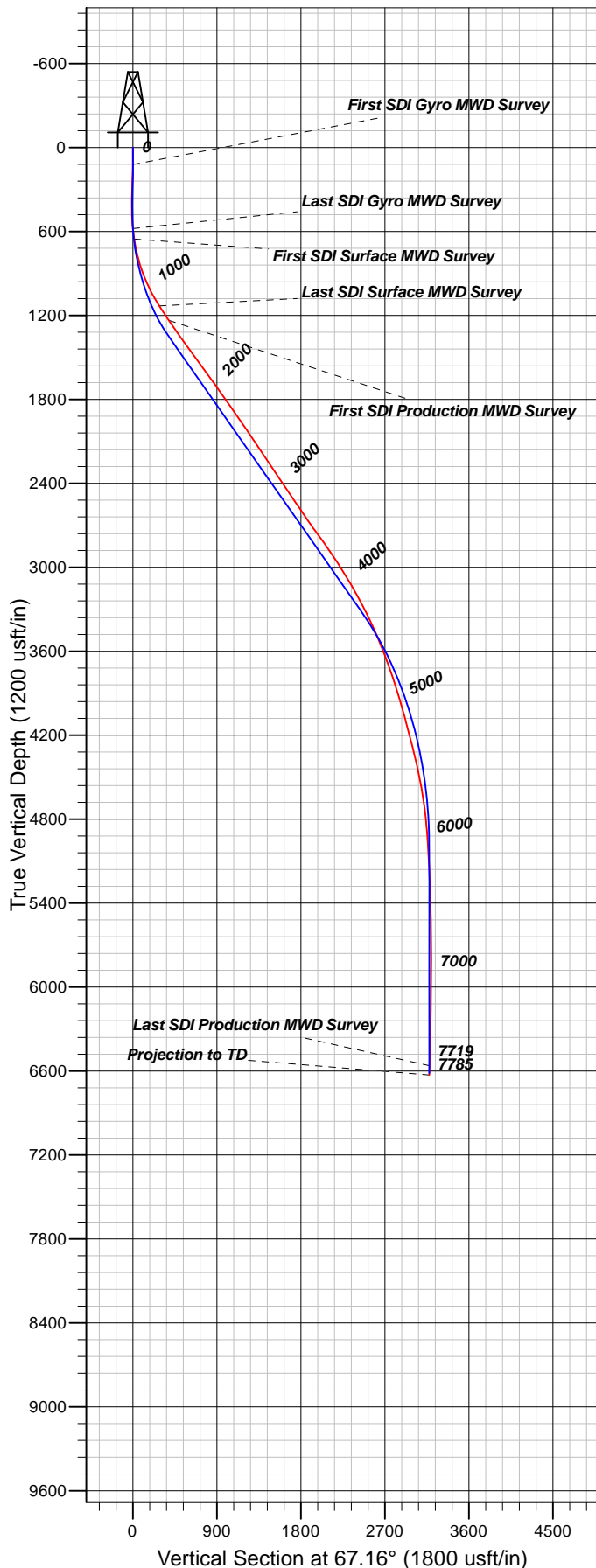
Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
4,193.00	39.03	66.31	3,214.30	939.87	2,222.64	-2,380.80	1.30	-1.29	0.14	
4,287.00	37.44	68.26	3,288.14	962.35	2,276.29	-2,438.22	2.12	-1.69	2.07	
4,382.00	36.00	66.22	3,364.29	984.31	2,328.66	-2,494.28	1.99	-1.52	-2.15	
4,476.00	34.02	66.79	3,441.27	1,005.81	2,378.12	-2,547.39	2.13	-2.11	0.61	
4,571.00	32.05	67.66	3,520.91	1,025.87	2,425.86	-2,598.50	2.13	-2.07	0.92	
4,665.00	30.06	66.62	3,601.44	1,044.69	2,470.54	-2,646.34	2.19	-2.12	-1.11	
4,760.00	28.82	67.62	3,684.17	1,062.85	2,513.56	-2,692.41	1.40	-1.31	1.05	
4,854.00	27.38	67.92	3,767.09	1,079.61	2,554.54	-2,736.18	1.54	-1.53	0.32	
4,893.27	26.68	68.38	3,802.06	1,086.25	2,571.10	-2,753.83	1.87	-1.79	1.17	
GM 323-4 MVRD										
4,949.00	25.68	69.07	3,852.08	1,095.17	2,594.01	-2,778.19	1.87	-1.79	1.24	
5,044.00	23.41	69.97	3,938.49	1,108.99	2,630.97	-2,817.36	2.42	-2.39	0.95	
5,138.00	23.21	70.64	4,024.82	1,121.53	2,665.99	-2,854.34	0.35	-0.21	0.71	
5,233.00	21.28	72.50	4,112.74	1,132.92	2,700.10	-2,890.16	2.16	-2.03	1.96	
5,327.00	21.36	69.77	4,200.31	1,143.97	2,732.43	-2,924.18	1.06	0.09	-2.90	
5,422.00	20.75	70.74	4,288.97	1,155.50	2,764.55	-2,958.11	0.74	-0.64	1.02	
5,517.00	20.12	72.29	4,377.99	1,166.02	2,796.00	-2,991.15	0.87	-0.66	1.63	
5,611.00	17.60	72.22	4,466.94	1,175.28	2,824.94	-3,021.45	2.68	-2.68	-0.07	
5,706.00	15.30	69.42	4,558.04	1,184.08	2,850.36	-3,048.22	2.56	-2.42	-2.95	
5,800.00	12.84	59.58	4,649.23	1,193.73	2,870.98	-3,070.53	3.64	-2.62	-10.47	
5,895.00	10.90	50.26	4,742.20	1,204.82	2,886.99	-3,088.69	2.86	-2.04	-9.81	
5,949.53	9.46	47.12	4,795.87	1,211.16	2,894.24	-3,097.22	2.83	-2.64	-5.75	
GM 323-4 KMV										
5,989.00	8.44	44.20	4,834.86	1,215.44	2,898.64	-3,102.50	2.83	-2.58	-7.41	
6,084.00	7.12	48.77	4,928.99	1,224.32	2,907.93	-3,113.60	1.53	-1.39	4.81	
6,178.00	5.28	53.43	5,022.43	1,230.74	2,915.78	-3,122.74	2.03	-1.96	4.96	
6,273.00	4.13	59.14	5,117.11	1,235.10	2,922.23	-3,130.03	1.31	-1.21	6.01	
6,367.00	3.83	33.59	5,210.89	1,239.45	2,926.87	-3,135.56	1.90	-0.32	-27.18	
6,462.00	3.24	34.29	5,305.71	1,244.31	2,930.14	-3,139.88	0.62	-0.62	0.74	
6,557.00	2.29	34.28	5,400.60	1,248.10	2,932.72	-3,143.27	1.00	-1.00	-0.01	
6,652.00	1.94	32.87	5,495.54	1,251.02	2,934.66	-3,145.84	0.37	-0.37	-1.48	
6,747.00	1.58	37.87	5,590.49	1,253.40	2,936.34	-3,148.03	0.41	-0.38	5.26	
6,841.00	0.70	43.32	5,684.47	1,254.84	2,937.53	-3,149.52	0.94	-0.94	5.80	
6,936.00	0.70	24.16	5,779.46	1,255.80	2,938.17	-3,150.36	0.25	0.00	-20.17	
7,031.00	0.03	14.01	5,874.46	1,256.35	2,938.41	-3,150.73	0.71	-0.71	-10.68	
7,125.00	0.62	207.89	5,968.46	1,255.92	2,938.18	-3,150.41	0.69	0.63	-176.72	
7,220.00	1.21	206.92	6,063.45	1,254.57	2,937.48	-3,149.42	0.62	0.62	-1.02	
7,314.00	2.04	205.77	6,157.41	1,252.18	2,936.31	-3,147.71	0.88	0.88	-1.22	
7,407.00	2.64	202.75	6,250.33	1,248.72	2,934.76	-3,145.40	0.66	0.65	-3.25	
7,502.00	2.37	206.71	6,345.24	1,244.94	2,933.03	-3,142.83	0.34	-0.28	4.17	

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Site:	MV 34-5 Pad	MD Reference:	GL 5977' & RKB 24' @ 6001.00usft (H&P 271)
Well:	GM 323-4	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Grand Junction District

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)	
7,596.00	2.74	215.08	6,439.15	1,241.37	2,930.87	-3,139.89	0.56	0.39	8.90	
7,691.00	2.92	217.86	6,534.03	1,237.60	2,928.08	-3,136.30	0.24	0.19	2.93	
7,719.00	3.17	220.33	6,561.99	1,236.45	2,927.14	-3,135.12	1.01	0.89	8.82	
Last SDI Production MWD Survey										
7,785.00	3.17	220.33	6,627.89	1,233.67	2,924.77	-3,132.17	0.00	0.00	0.00	
Projection to TD - GM 323-4 PBHL										

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
122.00	122.00	-0.23	-0.81	First SDI Gyro MWD Survey	
580.00	579.17	0.65	-1.18	Last SDI Gyro MWD Survey	
657.00	654.74	5.61	12.64	First SDI Surface MWD Survey	
1,212.00	1,131.86	115.15	258.39	Last SDI Surface MWD Survey	
1,357.00	1,235.55	152.43	352.64	First SDI Production MWD Survey	
7,719.00	6,561.99	1,236.45	2,927.14	Last SDI Production MWD Survey	
7,785.00	6,627.89	1,233.67	2,924.77	Projection to TD	

Checked By: _____ Approved By: _____ Date: _____



Well Details: GM 323-4

TVD Reference: GL 5977' & RKB 24' @ 6001.00usft (H&P 271) & B&B 24' @ 6001.00usft (H&P 271)
 +N/-S +E/-W Northing Easting Latitude Longitude Slot
 0.00 0.00 1603483.04 2258776.22 39.4609240 -108.1256432 A11 (GM 323-4)

REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well GM 323-4 - Slot A11 (GM 323-4), True North
 Vertical (TVD) Reference: GL 5977' & RKB 24' @ 6001.00usft (H&P 271)
 Section (VS) Reference: Slot - A11 (GM 323-4)(0.00N, 0.00E)
 Measured Depth Reference: GL 5977' & RKB 24' @ 6001.00usft (H&P 271)
 Calculation Method: Minimum Curvature

PROJECT DETAILS: Garfield County, CO NAD83

Geodetic System: US State Plane 1983
 Datum: North American Datum 1983
 Ellipsoid: GRS 1980
 Zone: Colorado Central Zone

System Datum: Mean Sea Level

Plan: Plan #5 3Oct2017 mmsdi

15:18, October 26 2017
 Created By: Mel Mireles Jr.