



I. Modelación de la maniobrabilidad del canal de acceso a Guayaquil

La maniobrabilidad de un buque es importante ya que nos permite conocer si el Canal de Acceso diseñado es el adecuado para que los buques que arriban al puerto sean controlables en el plano horizontal. Es decir, que el buque de diseño pueda seguir trayectorias rectas, curvas, evadir obstáculos, etc. ya sea en mar o en agua dulce; bajo condiciones de oleaje o vientos, fuertes o débiles.

Además, la modelación de la maniobrabilidad permite ver si el buque seguirá su curso dentro del canal de acceso diseñado sin problemas, de no ser así, las condiciones físicas del canal tendrían que ser modificadas.

Por ello, una vez calculado el ancho del canal de acceso a Guayaquil, se modeló la maniobrabilidad del buque de diseño para determinar si las dimensiones propuestas son las adecuadas para que éste ingrese al Puerto de Guayaquil sin problemas. Dicha modelación se realizó por medio del modelo Shipma 6.2.

El buque de diseño que se consideró es un buque portacontenedor el cual ya se encuentra pre-cargado en el modelo.

II. Zonas de interés

Para la modelación se eligieron tres zonas de interés, en las cuales se han reportado dificultades para la navegación por parte de los Prácticos, las cuales se describen a continuación. Los parámetros que se utilizaron para la modelación de la maniobrabilidad son los parámetros de corriente y batimetría de cada zona. Los valores de corriente para las tres zonas se presentan al final de este anexo.

Zona de Los Goles

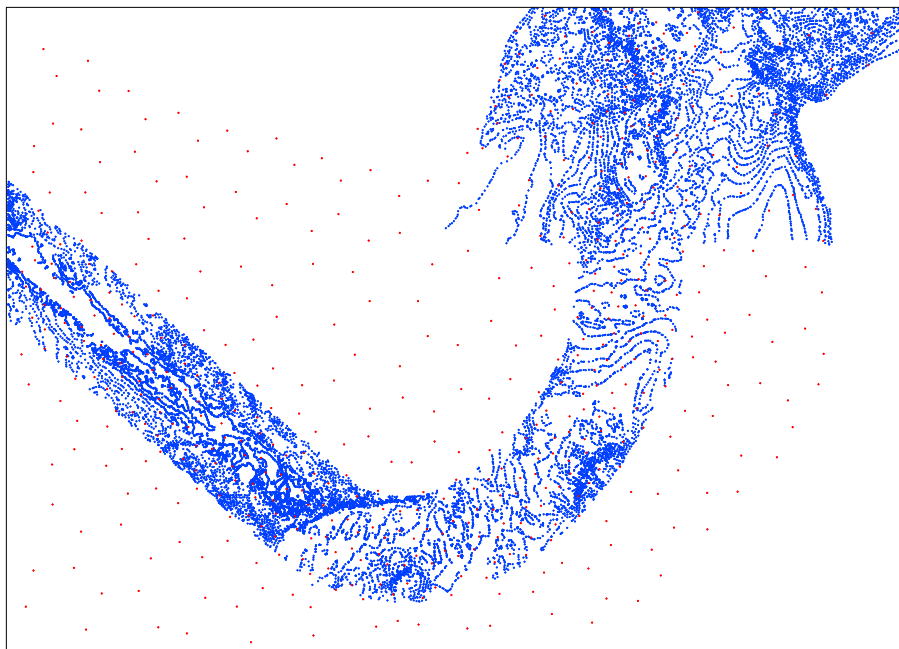
La primera zona es la zona de Los Goles, comprendida entre la Boya 7 (10+850 km) y la Boya 13 (19+150 km). En esta zona se tienen dos tipos de materiales diferentes en el fondo, roca y material suave. Además de contar con la presencia de correas, lo que hace más difícil el manejo de las embarcaciones.

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Figura 1 Zona de los Goles, comprendida entre la Boya 7 (10+850 km) y la Boya 13 (19+150 Km)



Figura 2 Campo de corriente (rojo) y batimetría (azul) de la zona de los Goles



Zona de Roca Seiba

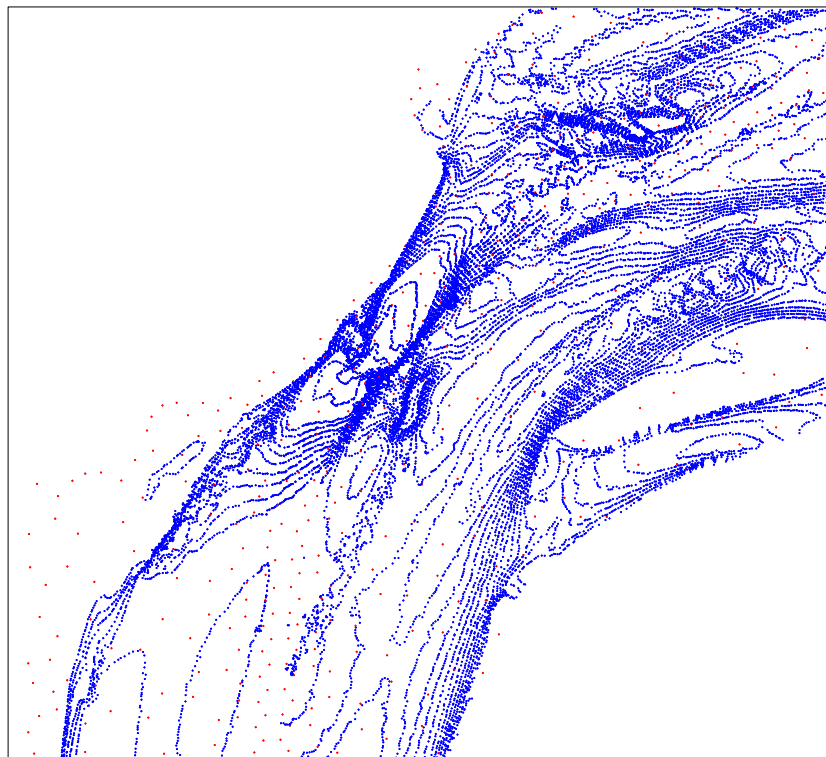
La zona de Roca Seiba es la comprendida entre la Boya 17 (31+600 km) a la Boya 33 (46+900), el material de fondo en esta zona es suave. En esta, se presentan restricciones de profundidad así como problemas con el cambio brusco de rumbo (caída) de la embarcación, de acuerdo a los comentarios realizados por los Prácticos del puerto.

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Figura 3 Zona de los Farallones, comprendida entre la Boya 17 (31+600 km) y la Boya 33 (46+900)



Figura 4 Campo de corriente (rojo) y batimetría (azul) de la zona de los Farallones



Zona de cuarentena

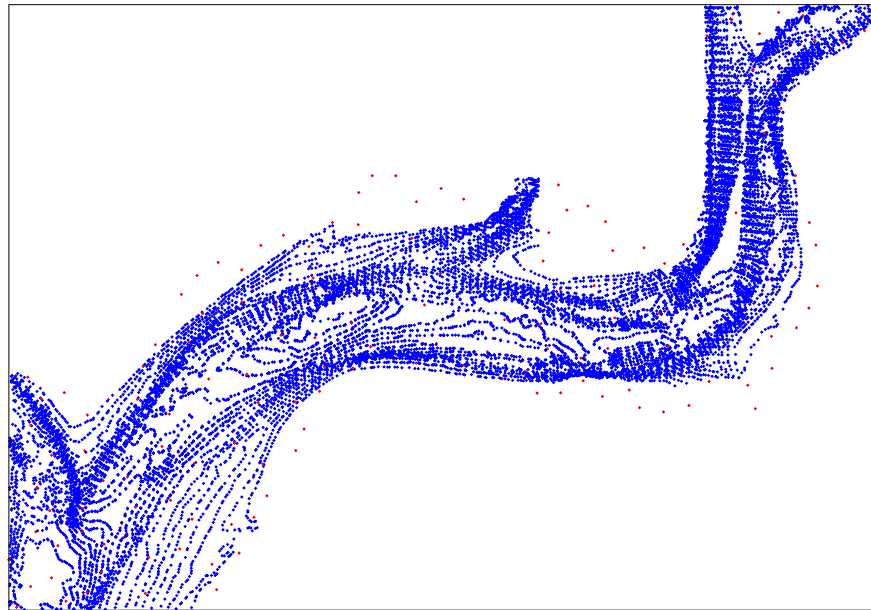
Esta zona es la comprendida entre la Boya 75 (88+100 km) y la Boya (92+800), el material que se tiene aquí es suave. Aquí se presentan problemas de viraje o caída de la embarcación.

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Figura 5 Zona de cuarentena, comprendida entre la Boya 75 (88+100 km) y la Boya (92+800)



Figura 6 Campo de corriente (rojo) y batimetría (azul) de la zona de cuarentena

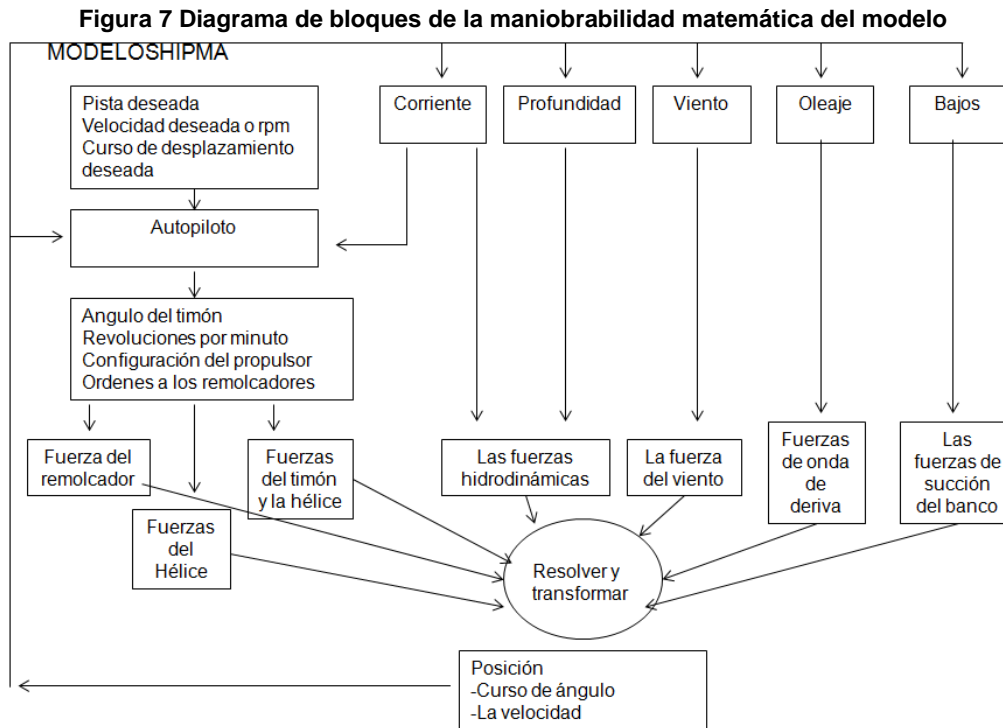


III. Descripción del modelo Shipma 6.2

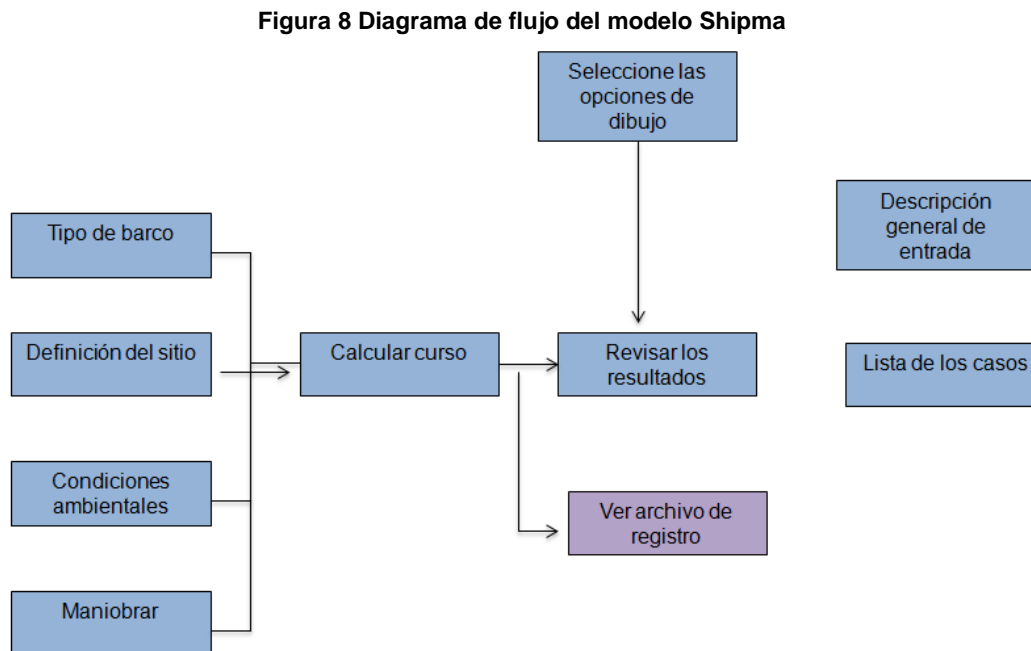
SHIPMA6 es un programa de simulación del comportamiento de maniobrabilidad de embarcaciones desarrollado en conjunto por el Maritime Research Institute Netherlands (MSCN) y WL/DELFT Hydraulics, el cual permite simular matemáticamente el comportamiento en maniobras de naves en puertos así como en canales de navegación.

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La maniobrabilidad matemática del programa se describe de manera esquemática y sencilla en el siguiente diagrama de bloques.



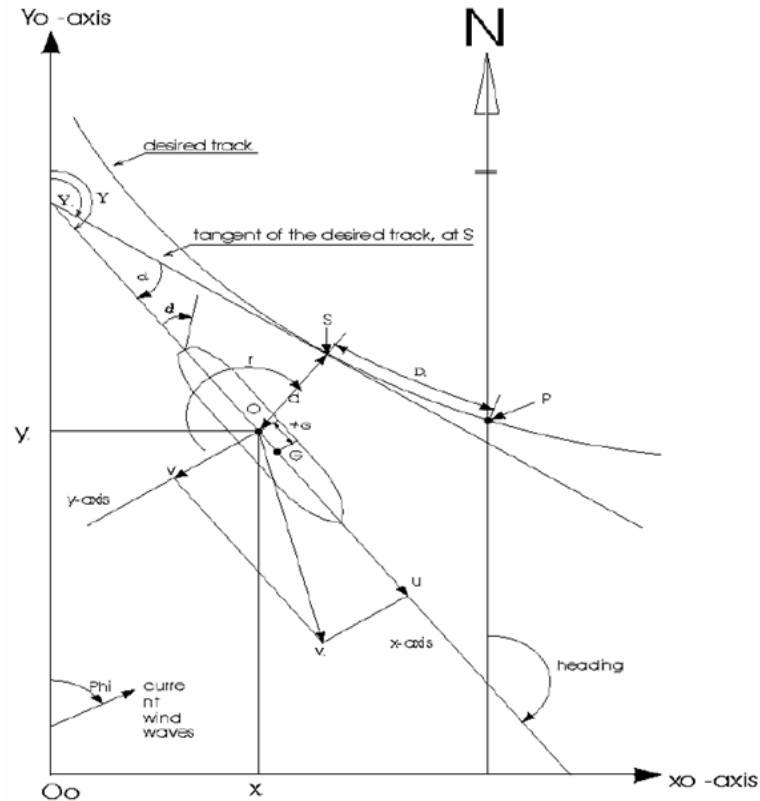
El proceso de cálculo del programa se muestra de manera esquemática en el siguiente diagrama de flujo que sigue el programa para el cálculo es el siguiente:



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Además, Shipma usa dos sistemas de coordenadas. Uno es el sistema propio del programa (x_0, O_0, y_0) y otro es el sistema cartesiano. Ambos sistemas se muestran en la Figura 9.

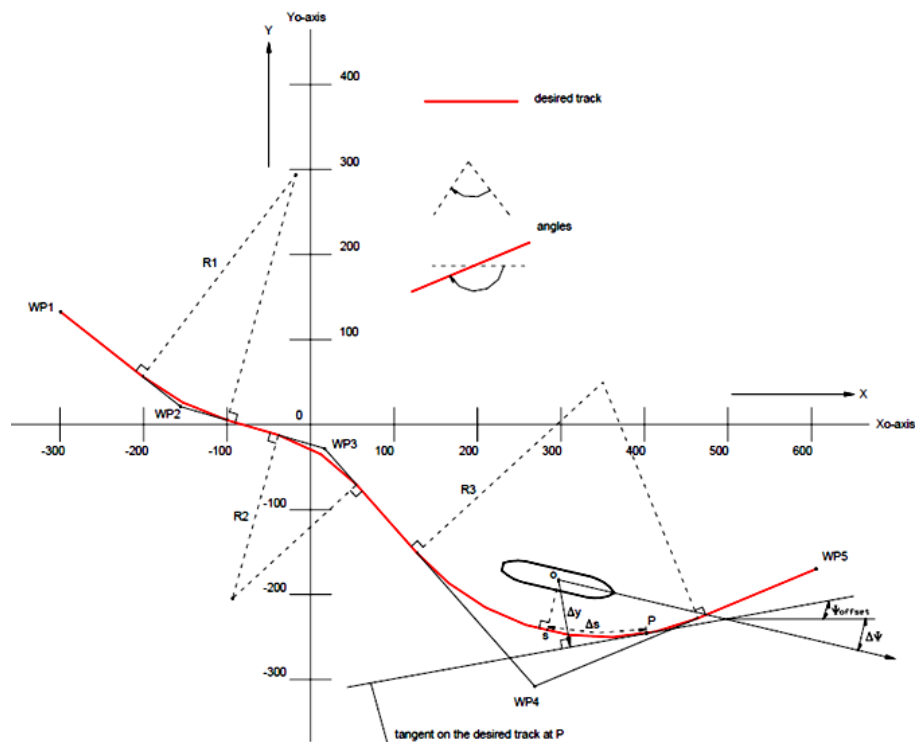
Figura 9 Sistemas de referencia utilizados por el modelo Shipma



Otro factor importante que considera el programa es la maniobrabilidad, esta se calcula por medio de un autopiloto de acuerdo al eje del canal. Después de darle al modelo los parámetros para el cálculo de la maniobrabilidad, este muestra el eje que debe de seguir la embarcación para que cruce el canal sin ningún problema. En la Figura 10 se muestra un ejemplo del eje.

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Figura 10 Definición de un eje deseado y convenios para la descripción del autopiloto.



IV. Buque de diseño

El buque utilizado para la modelación es un buque portacontenedor con las siguientes características:

- Eslora: 273 m
- Manga: 32.20 m
- Calado: 11.60 m

A continuación, se presentan los datos y dimensiones de la embarcación. Así como la hoja de datos de la misma.

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Ship's type		Container
	-	
Length over all	[m]	289.00
Length between perpendiculars	[m]	273.00
Beam	[m]	32.20
Depth	[m]	21.50
Draught amid ship's	[m]	11.60
Draught forward	[m]	11.60
Draught after	[m]	11.60
Displacement	[tons]	64400
Dead weight tonnage (fully loaded)	[tons]	59500
Maximum draught (fully loaded)	[m]	13.20
Engine type	[-]	Diesel-Electric
Power	[kW]	28700
Number of revolutions	[rpm]	93
Service speed	[kn]	21.8
Number of propellers	[-]	1
Diameter of propellers	[m]	7.80
Pitch ratio	[-]	1.14
Number of rudders	[-]	1
Frontal wind area	[m ²]	1263
Lateral wind area	[m ²]	6212
Bow Thruster	[kW]	2000
Stern Thruster	[kW]	-

Principal dimensions	RoRo-Ferry	Engine	
Length over all	289.00 m	Type:	Diesel-Electric
Beam	32.20 m	Power:	28700 kW
Draft fully laden	13.20 m	Max. revs:	93 rpm
Displacement fully laden	73283 tons	Bow Thruster:	2000 kW
Dead weight tonnage	59500 tons	Stern Thruster:	- kW

Telegraph Setting	RPM	Speed [kn]	Crash Stop Half Ahead/ Half Astern		
			Stopping Time		
			Distance [mile]	[min]	[sec]
SEA FULL	93.0	20.7	1.10	4	50
HARBOUR FULL	73.0	16.3			
HALF	60.0	13.4			
SLOW	44.0	9.8			
DEAD SLOW	30.0	6.7			

Telegraph	Rudder	Advance	Transfer	T90		Tac. Diam.
		[mile]	[mile]	[min]	[sec]	[mile]
SEA FULL	P	0.50	0.27	2	23	0.54
	SB	0.51	0.28	2	27	0.56
HALF	P	0.49	0.27	3	41	0.54
	SB	0.50	0.28	3	47	0.55

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V. Resultados de la modelación

- IV.1 Zona 1: Zona de los Goles
- IV.2 Zona 2: Zona de los Farallones
- IV.3 Zona 3: Zona del antepuerto

Valores de corriente para la zona 1, Zona de los Goles

** CANAL GUAYAQUIL ZONA 1 CONDICION DE FLUJO DE MAREA

** Note:

** Datos de velocidad de corriente obtenidos de la simulación hidrodinámica con el modulo HD del MIKE21

579649.2917	9697742.3330	0.37	121.57
579758.2917	9697451.3330	0.37	121.56
580044.3958	9697449.0000	0.39	121.59
580105.5000	9696858.3330	0.41	119.45
580208.9375	9697174.3330	0.41	119.07
580316.6042	9696570.0000	0.41	116.91
580136.0625	9696268.6670	0.38	117.58
580529.4375	9697236.3330	0.41	111.20
580609.7708	9696615.0000	0.40	113.44
580238.0417	9696010.0000	0.38	121.44
580719.1667	9696965.3330	0.41	110.80
580778.0833	9696317.3330	0.40	116.08
580611.3542	9695432.0000	0.43	117.38
580586.8958	9696013.6670	0.41	118.13
583560.8333	9692247.0000	0.52	32.03
581003.5833	9697063.3330	0.40	103.11
581087.0625	9696466.6670	0.39	110.39
580778.3958	9695121.3330	0.42	109.84
580742.8333	9695693.6670	0.43	117.77
583651.4375	9692557.3330	0.53	32.65
583751.8958	9692944.0000	0.53	33.27
581203.1667	9696862.3330	0.38	107.29
581290.6250	9696210.3330	0.41	113.96
582376.8333	9694089.0000	0.40	81.83
581731.6667	9694587.0000	0.44	94.02
581448.7083	9694750.0000	0.42	99.99
580987.4583	9694979.3330	0.40	106.46
581137.5833	9695741.0000	0.44	114.33
583858.3542	9693245.3330	0.56	34.19
583978.1458	9692577.3330	0.54	31.25
583910.1458	9692936.6670	0.53	31.74
584160.5833	9692361.0000	0.55	28.88

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584000.3750	9693723.3330	0.59	30.33
581482.2500	9696987.0000	0.40	109.10
581581.5833	9696349.3330	0.41	113.97
582391.7708	9694359.0000	0.39	84.94
582042.0208	9694632.6670	0.43	94.72
581258.5417	9695030.3330	0.43	105.02
581440.9792	9695559.6670	0.43	113.22
583958.2917	9693105.3330	0.55	31.76
583911.6250	9693400.3330	0.55	33.49
584084.2917	9692764.6670	0.52	28.93
584551.6042	9692278.0000	0.53	27.85
584028.7083	9693873.3330	0.61	33.04
584101.6667	9693587.6670	0.52	28.41
581657.1042	9696730.3330	0.40	111.86
583908.7500	9694072.0000	0.49	34.05
583020.2917	9694039.6670	0.37	63.21
581824.8333	9696087.3330	0.43	112.36
582710.7292	9694467.0000	0.31	81.79
582244.4375	9694883.3330	0.37	96.52
581484.3542	9695252.6670	0.47	106.47
581837.2708	9695767.0000	0.40	112.75
584152.8750	9693079.3330	0.57	28.33
584054.9167	9693414.0000	0.53	29.92
584259.3542	9692859.0000	0.57	25.40
584691.9167	9692512.0000	0.51	26.77
584012.3333	9694202.6670	0.48	32.02
584171.0000	9693923.6670	0.57	35.61
584233.1250	9693600.0000	0.53	28.90
581923.9583	9696794.6670	0.41	108.29
583679.0208	9694128.6670	0.46	42.77
584106.6458	9694340.0000	0.48	30.90
583015.2500	9694331.6670	0.33	63.86
582085.2292	9696251.3330	0.42	109.88
582682.9167	9694771.3330	0.28	85.40
582044.4375	9695177.0000	0.37	102.81
582224.8333	9695688.0000	0.41	110.20
584998.3542	9692489.0000	0.37	41.25
584196.2292	9693233.0000	0.51	26.28
584516.1875	9692804.3330	0.51	26.43
584187.6667	9694073.6670	0.56	32.31
584325.8333	9693851.3330	0.61	34.37
584417.4583	9693508.3330	0.57	26.63
584340.7708	9693727.0000	0.63	30.21
584332.8333	9694283.6670	0.56	29.85
582108.8333	9696577.6670	0.43	109.85
583550.5208	9694456.6670	0.32	41.37
584033.7708	9694519.0000	0.48	27.48

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583279.5208	9694549.3330	0.28	48.12
582379.4792	9695993.6670	0.40	111.38
582953.1458	9695064.6670	0.22	65.56
582388.6250	9695405.0000	0.35	98.42
585219.8542	9692736.3330	0.43	41.54
584427.3125	9693315.0000	0.60	24.94
584734.7917	9693032.3330	0.54	25.52
584326.7083	9694133.0000	0.54	30.73
584495.7708	9693930.3330	0.61	29.08
584525.1042	9693635.3330	0.68	26.53
584470.8750	9694351.6670	0.57	27.96
584464.8333	9694503.6670	0.58	25.78
582397.1042	9696679.0000	0.45	109.02
584253.9167	9694614.6670	0.49	24.63
583756.8542	9694646.0000	0.33	32.22
583245.2292	9694978.0000	0.23	49.92
582682.0625	9696069.0000	0.37	101.77
582858.8542	9695404.6670	0.26	72.44
585132.0208	9692987.3330	0.42	32.74
584691.2708	9693265.3330	0.57	22.96
584479.9792	9694062.0000	0.55	30.19
584624.7292	9693769.0000	0.62	26.97
584622.8125	9694281.3330	0.57	28.02
584596.1250	9694582.6670	0.58	27.36
582676.0833	9696428.0000	0.41	104.16
584222.0208	9694837.0000	0.55	24.06
583811.5417	9694973.3330	0.39	33.04
583570.9167	9695212.6670	0.28	39.98
582997.6458	9695763.0000	0.28	67.23
585348.2708	9693202.0000	0.49	31.91
584931.9167	9693549.0000	0.59	27.37
584638.0417	9694142.3330	0.55	28.47
584823.5208	9693794.0000	0.58	29.79
584411.8542	9694878.6670	0.58	23.28
584575.0417	9694735.3330	0.59	24.13
584768.1667	9694363.3330	0.57	29.91
584747.5208	9694512.6670	0.57	28.58
582954.3542	9696576.0000	0.37	80.45
584056.5625	9695068.6670	0.59	26.16
583648.3333	9695628.0000	0.42	41.67
583344.8958	9695894.3330	0.31	56.77
585672.9583	9693184.6670	0.42	47.52
585191.6875	9693530.6670	0.48	28.69
584852.6250	9694035.6670	0.43	26.89
584467.3333	9695035.3330	0.68	21.38
584696.4583	9694830.6670	0.61	24.38
584981.9792	9694363.0000	0.49	30.86

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584878.3333	9694595.0000	0.58	26.57
584410.3750	9695248.6670	0.71	23.92
583255.6458	9696552.0000	0.39	67.23
584189.4375	9695323.6670	0.60	27.80
583963.1250	9695729.3330	0.49	31.97
583451.7917	9696292.3330	0.45	55.54
585671.1250	9693539.6670	0.35	29.31
585388.9167	9693758.6670	0.49	23.00
585051.2083	9694174.3330	0.51	27.64
584659.3333	9694982.3330	0.67	20.25
584848.3542	9694760.3330	0.60	24.78
585054.0625	9694513.3330	0.47	28.56
584548.6458	9695339.6670	0.74	21.27
583338.5833	9696847.3330	0.32	40.96
584177.7917	9695550.6670	0.60	27.60
584048.8333	9696039.3330	0.45	38.66
583840.9375	9696336.0000	0.38	38.48
585966.8125	9693551.3330	0.26	57.44
585313.3333	9694086.3330	0.46	27.67
584765.5000	9695091.6670	0.73	17.56
584711.7708	9695235.6670	0.79	18.82
584966.6250	9694840.6670	0.58	25.25
585265.5208	9694576.0000	0.53	29.75
584568.3750	9695505.3330	0.68	22.24
583485.7500	9696892.0000	0.26	43.95
584331.0417	9695772.6670	0.60	29.36
584274.8125	9696024.6670	0.50	34.40
583938.2083	9696580.6670	0.36	40.54
586002.2708	9693902.6670	0.23	39.03
585455.5625	9694337.6670	0.42	25.80
586349.0417	9693886.0000	0.22	29.33
584742.0833	9695489.3330	0.76	19.36
584920.8958	9695020.3330	0.65	17.30
584806.4792	9695352.6670	0.78	17.49
585208.0625	9694738.0000	0.46	29.32
584581.8125	9695671.6670	0.63	22.37
583438.8125	9697080.6670	0.22	35.89
583730.7917	9696811.6670	0.41	32.75
584494.3958	9695803.0000	0.70	23.41
584351.8750	9696269.6670	0.52	32.34
584223.1667	9696529.0000	0.35	34.16
585725.5208	9694288.0000	0.31	33.85
586502.4375	9694179.0000	0.23	25.36
584836.5625	9695607.3330	0.77	17.19
585026.0833	9695092.3330	0.64	18.72
584975.1667	9695363.3330	0.78	15.82
585327.5417	9694841.6670	0.51	24.36

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585191.2917	9695016.3330	0.52	21.47
584767.5000	9695739.3330	0.72	19.18
583632.6458	9697136.6670	0.24	15.35
583828.7917	9696989.0000	0.35	26.67
584604.5208	9696002.3330	0.63	24.49
584523.6667	9696300.0000	0.60	26.70
584779.7708	9695990.6670	0.68	20.31
584277.4375	9696776.3330	0.39	33.23
586753.6042	9694596.0000	0.25	17.81
585874.4375	9694588.0000	0.31	25.10
586455.9167	9694439.3330	0.24	23.79
585004.5000	9695618.0000	0.76	15.56
585051.5833	9695257.0000	0.73	15.99
585078.7083	9695510.6670	0.75	14.68
585533.8125	9694858.6670	0.53	27.09
585332.8125	9695125.3330	0.53	20.69
584855.3333	9695859.0000	0.74	17.92
583612.1667	9697301.3330	0.30	20.41
584090.4792	9697005.3330	0.38	28.28
584615.4375	9696168.6670	0.61	25.54
584633.4375	9696501.6670	0.51	28.22
584873.3125	9696110.0000	0.71	19.12
584521.5000	9696802.0000	0.44	24.49
584644.5417	9696668.3330	0.54	25.58
586803.6250	9694892.3330	0.25	2.85
585753.2917	9694816.6670	0.37	27.43
586187.2083	9694606.6670	0.28	24.05
585103.2083	9695760.6670	0.75	14.76
585264.3750	9695265.6670	0.55	17.02
585266.0625	9695605.3330	0.64	13.03
585523.3542	9695060.3330	0.51	23.69
585023.1042	9695869.6670	0.79	15.68
583740.8333	9697388.3330	0.22	70.21
583651.9792	9697555.0000	0.02	42.31
584148.0000	9697252.6670	0.36	42.35
584558.3333	9697134.0000	0.44	32.61
584802.3125	9696240.0000	0.68	22.55
584812.5625	9696489.6670	0.58	22.15
585041.0000	9696120.3330	0.80	17.07
584635.4167	9697003.3330	0.36	35.99
584835.3750	9696739.3330	0.66	22.08
586623.8125	9695137.6670	0.30	3.50
585843.8125	9695098.0000	0.37	18.12
586305.0833	9695008.6670	0.33	9.13
585278.5833	9695771.6670	0.66	13.80
585375.3125	9695466.6670	0.60	11.78
585671.9167	9695224.6670	0.57	15.05

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585115.2292	9696011.6670	0.78	14.34
583965.0833	9697411.3330	0.25	39.17
583700.7500	9697712.3330	0.02	354.52
584366.1875	9697272.6670	0.50	36.78
584698.1875	9697250.0000	0.39	26.45
584889.6667	9696359.3330	0.65	22.80
584906.1875	9696609.0000	0.62	19.65
585137.7083	9696261.0000	0.79	16.44
584845.9792	9696989.3330	0.55	24.74
584922.8958	9696859.0000	0.65	23.98
586787.1667	9695489.6670	0.34	358.29
586082.8333	9695271.3330	0.46	12.06
585434.3750	9695887.0000	0.74	10.49
585592.3125	9695490.6670	0.58	11.94
585351.1250	9696018.0000	0.69	12.96
584019.8333	9697673.3330	0.16	52.27
583844.3542	9697807.6670	0.06	146.28
584401.2708	9697521.3330	0.43	57.12
584868.9792	9697238.3330	0.48	18.39
584709.4583	9697416.6670	0.61	30.59
585057.3750	9696370.0000	0.77	20.13
585073.8958	9696619.3330	0.71	17.54
585311.2500	9696271.0000	0.73	15.32
584939.6875	9697108.3330	0.56	24.81
585090.6042	9696869.3330	0.76	20.53
586627.1458	9695736.3330	0.32	346.57
586241.5417	9695647.0000	0.44	357.52
585638.8542	9695744.6670	0.64	7.17
585450.4375	9696136.6670	0.71	12.05
584237.8333	9697763.3330	0.22	87.94
583810.9167	9698035.6670	0.19	192.68
584604.6875	9697549.3330	0.49	38.26
584956.5833	9697358.0000	0.61	13.14
584879.7500	9697488.6670	0.73	18.70
585170.7917	9696760.0000	0.75	18.33
585147.9792	9696510.6670	0.76	18.09
585466.7500	9696386.0000	0.73	15.10
585107.3958	9697118.6670	0.70	20.71
585181.3958	9697010.0000	0.71	19.84
586800.0625	9695990.6670	0.32	353.21
586118.3333	9695894.3330	0.50	1.67
585834.2708	9695899.3330	0.61	8.34
585605.9375	9696251.6670	0.73	13.18
584287.7917	9697979.6670	0.16	88.97
584556.5000	9698023.0000	0.14	31.52
584704.2917	9697751.3330	0.34	28.98
584715.6042	9697917.6670	0.27	25.56

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585124.2917	9697368.0000	0.72	10.55
584973.5417	9697607.6670	0.73	12.73
585364.1042	9696852.0000	0.73	18.83
585383.8125	9696516.6670	0.69	19.03
585204.3958	9697258.6670	0.69	15.96
585375.2917	9697018.3330	0.67	20.68
586728.7083	9696302.3330	0.46	338.75
586272.6875	9696285.0000	0.56	356.23
585790.6875	9696239.6670	0.73	11.69
584090.5208	9698180.3330	0.17	184.81
584683.8958	9698223.3330	0.13	347.58
584902.8542	9697737.6670	0.64	11.11
584913.6667	9697987.6670	0.54	9.59
584936.8542	9698237.0000	0.57	359.29
585215.1667	9697508.6670	0.76	11.30
585141.2500	9697617.6670	0.80	10.35
585503.0417	9696717.3330	0.72	15.38
585386.5208	9697184.3330	0.65	18.69
586507.3542	9696437.0000	0.46	354.80
585999.4792	9696456.0000	0.80	6.10
585007.5208	9698106.6670	0.63	359.30
584990.5000	9697857.0000	0.63	5.90
585441.2708	9697514.6670	0.65	13.40
585238.2708	9697757.6670	0.75	6.05
585729.9792	9696827.3330	0.80	12.68
585532.5208	9697299.6670	0.74	20.95
586534.4375	9696816.6670	0.66	343.24
585958.7292	9696708.6670	0.60	3.16
585175.2292	9698116.6670	0.75	359.72
585158.2083	9697867.0000	0.73	3.44
585537.3542	9697633.6670	0.71	13.17
585408.2708	9697767.6670	0.68	6.75
585742.6458	9697160.3330	0.80	22.26
586259.0208	9696917.3330	0.65	8.33
585249.0833	9698007.6670	0.74	359.68
586829.9375	9697412.6670	0.80	60.33
585794.9583	9697658.0000	0.65	25.53
585554.3125	9697883.0000	0.65	12.21
585909.0000	9697399.6670	0.74	30.74
586336.6667	9697223.0000	0.62	34.59
585475.1875	9698013.6670	0.58	0.80
586876.1875	9697662.6670	0.48	52.87
587617.9792	9698015.6670	0.81	50.06
587237.2292	9697700.0000	0.98	59.42
585806.2708	9697824.3330	0.63	18.78
586171.9167	9697422.6670	0.63	34.53
585581.5000	9698215.3330	0.68	5.21

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Asociación Geoestudios – Consulsua	Contrato No. 41 – 2011	Fecha: Julio 2012	15



586657.1458	9697990.3330	0.70	44.42
587273.2292	9698010.6670	0.50	54.14
585928.8958	9698066.3330	0.74	18.80
586378.1667	9697909.6670	0.73	35.77
586193.5833	9698215.3330	0.78	29.28
579216.1875	9697856.6670	0.35	123.65
579344.0417	9697595.0000	0.36	123.22
579310.0833	9697132.0000	0.37	123.07
579584.0208	9697075.0000	0.38	121.75
579766.6875	9696756.6670	0.39	120.60
579277.6875	9696461.6670	0.38	123.04
579623.7083	9696462.0000	0.38	120.22
579168.0625	9696283.3330	0.37	122.97
579781.9792	9696262.3330	0.37	121.64
579257.5208	9696072.3330	0.35	123.74
579379.6667	9695957.6670	0.37	125.37
579586.4583	9695993.6670	0.37	122.70
579108.3333	9695935.3330	0.35	124.20
579296.1667	9695768.3330	0.36	126.89
579659.9792	9695765.6670	0.37	124.41
579134.4375	9695801.6670	0.33	125.27
579474.6458	9695591.0000	0.37	126.07
579317.6250	9695629.6670	0.35	127.10
579882.1042	9695695.6670	0.38	125.89
580118.6250	9695763.3330	0.38	122.24
579009.5625	9695690.6670	0.33	123.01
579511.3750	9695446.6670	0.34	126.32
579192.8125	9695518.6670	0.34	125.27
579858.3333	9695487.3330	0.40	125.80
580336.0000	9695505.3330	0.41	118.22
579046.4792	9695546.3330	0.39	121.87
579672.9375	9695413.0000	0.37	126.10
579386.6667	9695336.0000	0.34	125.64
579225.1250	9695369.3330	0.37	123.68
579980.3125	9695372.3330	0.41	123.45
580282.4792	9695265.3330	0.40	118.15
579712.7917	9695265.3330	0.35	124.46
579423.6042	9695192.0000	0.35	123.88
579107.3750	9695243.6670	0.34	117.11
579859.0208	9695237.0000	0.37	123.87
580102.3125	9695257.3330	0.39	121.63
580365.3958	9695047.6670	0.38	117.01
580585.9583	9694977.0000	0.37	109.14
579588.1667	9695155.0000	0.33	124.00
579229.5417	9695129.3330	0.31	118.44
579901.1875	9695087.0000	0.35	122.57
580044.3333	9695062.3330	0.36	122.21

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Asociación Geoestudios – Consulsua	Contrato No. 41 – 2011	Fecha: Julio 2012	16



580229.2292	9694888.0000	0.34	119.51
580589.0208	9694797.0000	0.34	107.68
580413.8958	9694715.0000	0.34	111.59
579609.8750	9695016.6670	0.34	123.34
579226.3333	9694942.3330	0.31	117.57
579776.6667	9694977.0000	0.33	121.94
580088.3333	9694910.6670	0.32	120.92
580274.6667	9694735.3330	0.32	117.36
580711.4583	9694682.6670	0.32	108.09
580460.6042	9694561.6670	0.30	113.55
579002.4167	9694886.6670	0.33	113.85
579442.1042	9694866.6670	0.29	118.51
579795.3750	9694842.3330	0.34	120.64
579963.8958	9694800.6670	0.31	120.07
580150.3125	9694626.0000	0.30	115.96
580598.6667	9694542.3330	0.31	110.07
580929.2292	9694611.0000	0.38	101.84
580953.6667	9694453.0000	0.39	100.61
580336.3125	9694452.3330	0.32	114.09
579073.1667	9694594.6670	0.31	113.39
579526.5208	9694650.3330	0.30	115.75
579713.0000	9694665.6670	0.29	114.97
579980.4375	9694668.6670	0.32	119.30
580165.2500	9694496.3330	0.35	113.70
580721.4583	9694428.3330	0.33	104.54
581073.9375	9694706.3330	0.41	102.21
581077.0417	9694340.0000	0.38	99.08
580350.1042	9694324.0000	0.36	111.37
579381.5000	9694434.0000	0.30	113.04
579835.2500	9694551.3330	0.30	114.96
580081.8333	9694324.6670	0.31	107.15
580748.8750	9694290.0000	0.33	103.05
580947.9792	9694216.0000	0.35	101.97
581297.0417	9694583.3330	0.42	97.49
581294.5833	9694273.3330	0.41	91.07
581323.8958	9694119.3330	0.38	90.23
581449.5833	9694009.6670	0.39	88.10
580472.8750	9694210.3330	0.33	104.66
580204.3542	9694210.6670	0.31	105.31
579544.5417	9694240.3330	0.31	107.46
579921.7083	9694337.0000	0.30	107.93
580624.5625	9694181.0000	0.31	102.22
580980.8125	9694076.6670	0.36	99.32
581431.3750	9694364.6670	0.44	92.31
581577.5000	9693903.3330	0.40	86.15
581139.1875	9694046.6670	0.37	94.61
581332.2083	9693880.0000	0.38	90.00

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581528.4792	9693718.0000	0.39	86.69
579300.7500	9693815.6670	0.30	102.99
579516.7708	9693964.0000	0.32	104.60
580327.1250	9694097.0000	0.30	99.93
579837.1250	9694185.0000	0.28	105.76
580699.1875	9693998.0000	0.31	99.74
580856.3333	9693967.6670	0.34	97.53
579044.6875	9692432.6670	0.34	90.61
581702.5625	9694311.3330	0.43	89.99
581749.4583	9693927.0000	0.43	85.76
581177.4792	9693906.6670	0.38	92.02
581376.4375	9693739.6670	0.37	89.47
581579.6042	9693578.0000	0.40	86.58
579305.1667	9693426.6670	0.32	96.77
579826.7708	9693803.6670	0.30	99.66
580353.4167	9693939.6670	0.30	98.45
579978.7708	9693967.3330	0.32	102.02
580573.7917	9693870.0000	0.30	97.10
580889.9167	9693828.3330	0.33	93.79
579119.3542	9692784.3330	0.35	91.80
581863.4167	9694134.0000	0.47	86.99
581850.9167	9693726.3330	0.46	82.38
581052.6875	9693797.3330	0.35	91.41
581251.0833	9693629.6670	0.38	89.30
581730.0833	9693562.6670	0.42	83.46
581453.2917	9693466.3330	0.42	88.40
579582.3542	9693163.3330	0.35	89.97
580037.1250	9693532.6670	0.34	92.45
580212.1667	9693848.0000	0.30	96.53
580697.6042	9693758.0000	0.33	93.12
579512.7708	9692810.3330	0.35	88.68
579630.5625	9692210.0000	0.34	84.34
583853.4792	9693684.3330	0.58	37.50
582139.9583	9694011.3330	0.46	78.65
581987.8542	9693633.0000	0.42	79.15
581082.0625	9693660.6670	0.35	90.17
581276.8125	9693496.3330	0.42	88.21
581789.5417	9693424.0000	0.41	81.37
581475.8542	9693337.3330	0.42	87.24
579970.9792	9693231.3330	0.34	91.14
580312.6250	9693582.3330	0.35	95.01
580708.5000	9693580.3330	0.34	92.41
579783.3958	9692561.3330	0.37	85.33
583670.9792	9693776.6670	0.50	41.30
583811.4792	9693535.0000	0.58	35.16
583555.3333	9693955.3330	0.50	42.64
582601.2500	9693842.3330	0.42	68.95

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582162.9375	9693711.0000	0.42	73.36
581940.0000	9693418.6670	0.41	81.28
580930.1875	9693514.0000	0.35	90.46
581209.0625	9693319.6670	0.41	88.05
581337.9375	9693214.6670	0.40	86.10
581661.6250	9693310.3330	0.40	83.65
580260.2708	9692902.6670	0.38	85.10
580526.4792	9693440.0000	0.33	92.23
580142.2708	9692585.6670	0.38	83.15
583543.1250	9693670.0000	0.49	43.21
583657.8542	9693514.6670	0.56	40.60
583256.3333	9693935.3330	0.49	52.71
582797.3333	9693836.6670	0.40	60.42
582469.2500	9693559.3330	0.40	67.10
582267.8125	9693505.6670	0.43	66.10
582022.3125	9693272.0000	0.41	76.00
581031.4583	9693306.3330	0.37	87.45
581470.6875	9693115.6670	0.40	81.84
581681.5833	9693187.6670	0.40	81.39
580540.2708	9693061.6670	0.37	87.24
580333.0417	9692232.3330	0.38	79.22
583402.1875	9693581.3330	0.45	43.93
583591.7292	9693377.0000	0.54	40.34
583231.0417	9693668.0000	0.41	49.77
582912.0625	9693547.3330	0.42	53.63
582520.6875	9693382.3330	0.42	63.39
582175.0417	9693281.0000	0.40	70.43
581963.1250	9693112.0000	0.37	76.77
581006.8750	9693073.6670	0.38	87.17
581509.0833	9692938.0000	0.42	80.39
581820.4583	9693097.3330	0.39	76.91
580760.4167	9692914.3330	0.38	85.93
580611.5625	9692172.6670	0.38	77.07
583432.8125	9693379.3330	0.48	42.03
583692.0833	9693242.3330	0.55	38.96
583109.7292	9693483.0000	0.38	46.33
582850.9375	9693373.6670	0.42	56.21
582685.3333	9693361.3330	0.46	59.09
582418.8958	9693203.6670	0.41	64.55
582274.6875	9693156.0000	0.40	66.63
582057.6667	9692963.3330	0.38	72.29
581288.0625	9692858.0000	0.43	78.65
581738.2708	9692895.3330	0.39	75.91
580790.1250	9692519.3330	0.40	80.90
583351.7917	9693249.6670	0.47	41.52
583633.7708	9693109.6670	0.55	35.82
583199.8542	9693266.6670	0.42	44.44

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582945.1250	9693188.0000	0.43	55.40
582679.6250	9693172.0000	0.44	58.21
582539.3750	9693104.3330	0.42	60.31
582216.5000	9692998.3330	0.39	67.81
581986.5833	9692804.3330	0.39	72.53
581348.5625	9692613.3330	0.42	74.84
581809.8542	9692751.0000	0.41	71.42
581097.0833	9692434.0000	0.42	76.98
583452.3958	9693114.6670	0.51	40.32
583096.3750	9693145.3330	0.45	48.01
582818.8750	9693095.0000	0.45	56.17
582480.5208	9692944.0000	0.40	59.63
582301.8542	9692885.6670	0.37	67.33
582059.4167	9692596.0000	0.43	68.46
581641.1667	9692549.0000	0.42	69.06
581234.6667	9692087.0000	0.43	71.06
583403.8750	9692991.0000	0.49	37.31
583604.7708	9692865.6670	0.52	35.66
583120.6458	9692977.6670	0.47	46.30
582842.9583	9692928.3330	0.47	54.92
582561.4167	9692844.3330	0.40	56.49
582215.8542	9692642.3330	0.41	68.41
581814.4792	9692428.0000	0.46	65.63
583250.4167	9692926.3330	0.46	42.67
583525.0208	9692714.3330	0.51	34.15
582993.4792	9692853.6670	0.51	47.55
582727.8750	9692835.6670	0.42	57.44
582492.5417	9692649.0000	0.43	55.48
582325.6458	9692505.3330	0.55	59.50
581842.0833	9692152.6670	0.43	62.61
583279.2292	9692729.3330	0.44	40.62
583027.7292	9692619.3330	0.46	44.55
582755.0208	9692658.6670	0.45	55.26
582617.8958	9692551.6670	0.44	55.64
582452.1667	9692238.6670	0.46	56.44
583183.7083	9692546.3330	0.44	39.25
582904.3542	9692517.0000	0.50	49.22
582661.3958	9692294.3330	0.44	52.65
583338.8958	9692221.0000	0.47	37.71
582864.4167	9692259.0000	0.43	44.35
579117.9792	9696659.3330	0.39	124.45
579124.9792	9696913.0000	0.38	124.33

Valores de corriente para la zona 2, Zona de los Farallones

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** CANAL GUAYAQUIL ZONA 1 CONDICION DE FLUJO DE MAREA

** Note:

** Datos de velocidad de corriente obtenidos de la simulación hidrodinámica con el modulo HD del MIKE21

588895.688	9711928	0.3	70.62
589073.188	9711972.33	0.28	72.95
589215.417	9711735.33	0.32	67.87
589450.292	9711822.67	0.32	67.33
589562.625	9711329	0.51	67.15
590058.188	9711206	0.55	68.46
589729.396	9711253.67	0.46	66.26
589587.667	9711595.67	0.49	58.96
590240.25	9711185.33	0.61	70.75
589883.542	9711317.33	0.48	66.94
590573.333	9711138	0.6	72.01
589820.542	9711687.67	0.42	63.98
590291.333	9711296.67	0.56	69.69
589949.646	9711484.67	0.48	64.83
590476.917	9711278.67	0.62	71.74
590718.813	9711113.67	0.59	71.07
590986.875	9711235	0.61	70.27
589953.625	9711973.67	0.46	69.47
590175.375	9711484.67	0.44	68.8
591092.354	9711072.33	0.58	68.56
590526.063	9711395	0.58	71.37
590845	9711261.67	0.61	71.55
590199.063	9712035	0.4	78.77
590329.521	9711548.67	0.47	70.38
590680.208	9711458.67	0.6	70.87
590825.75	9711434	0.62	71.44
590368.771	9711781	0.54	71.4
591098.563	9711555.67	0.63	71.76
590721.208	9711692.67	0.49	72.57
590948.458	9711579.67	0.6	71.42
590606.313	9711861.33	0.53	75.67
590875.354	9711756.33	0.49	72.38
591029.5	9711820.33	0.5	71.53
591062.979	9712032.67	0.53	72.42
583249.375	9707377	0.16	296.59
583456.083	9707256.33	0.15	325.11
583598.167	9707407.67	0.09	39.11
584266.104	9705740.33	0.35	9.39
583724.479	9707478	0.13	72.55

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584376.833	9708040	0.09	30.93
584484.563	9708151.33	0.07	51.89
584481.271	9705307.67	0.4	9.6
584998.75	9704799	0.46	10.08
584485.875	9706041.33	0.34	16.23
583880.146	9707489	0.18	94.8
584215.125	9707612	0.11	48.64
584332.771	9707903.33	0.09	16.15
584624.396	9708177.67	0.05	81.95
584785.104	9705274.67	0.45	11.64
585038.938	9705046.33	0.47	10.98
584758.083	9705853.33	0.41	15.07
584205	9706713	0.23	24.32
584626.542	9706446.67	0.33	28.14
584097.604	9706999.67	0.21	27.52
584079.354	9707410	0.13	69.41
584391.271	9707704.33	0.14	30.87
584735.104	9708054.33	0.26	48.44
584842.146	9705519.33	0.44	13.66
585388.333	9704725.67	0.54	12.75
585224.542	9705073	0.47	11.88
584942.667	9706087	0.42	17.97
584951.313	9706419.67	0.4	26.63
584591.083	9706733.67	0.4	30.52
584289.771	9707241	0.26	49.49
584678.917	9707662	0.24	34.5
584882.833	9708175	0.2	82.62
584838.854	9707849	0.3	53.07
585115.708	9705540.33	0.45	13.93
585237.917	9705239	0.46	13.11
585250.896	9705405.33	0.47	14.25
585477.729	9704843.67	0.54	12.86
585402.313	9704975	0.52	12
585147.438	9705952.33	0.44	16.83
585166.542	9706536	0.44	24.43
584955.021	9707068.67	0.37	30.27
584713.188	9707400.67	0.27	33.47
585031.875	9708100.67	0.24	67.81
585055.083	9707900	0.31	60.98
585236.417	9705739.67	0.44	15.79
585428.75	9705223.67	0.5	13.08
585442.104	9705474	0.49	15.12

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585645.854	9704851.33	0.58	13.74
585498	9705092.67	0.52	13.09
585724.5	9704741.33	0.6	14.5
585210.438	9706981.33	0.4	27.58
585299.833	9706067	0.44	17.99
585308.583	9706234	0.44	19.93
585314.021	9706401.67	0.45	22.18
585276.542	9706740.67	0.43	24.72
584990.188	9707370.33	0.4	34.42
585154.5	9708223	0.24	68.07
585267.083	9707929.67	0.25	66.77
585466.688	9705723.67	0.49	15.45
585518.063	9705342.33	0.5	14.2
585537.188	9705593	0.48	15.3
585738.646	9704990.33	0.59	14.74
585666.208	9705100.33	0.56	14.33
585889.25	9704666	0.61	15.43
585386.813	9707094.33	0.4	29.03
585477.167	9705974.33	0.48	16.56
585496.333	9706226	0.47	18.26
585499.479	9706479.33	0.47	20.55
585518.146	9706750.33	0.47	22.95
585326.021	9707519.67	0.34	42
585437.208	9707253	0.38	34.73
585420.958	9707766.67	0.42	50.12
585320.563	9708158	0.15	76.55
585555.042	9705843.67	0.47	16.21
585686.292	9705350	0.53	15.14
585705.354	9705600.33	0.5	16.21
585939.146	9704995.33	0.61	16.06
585765.188	9705239	0.58	15.55
586011.104	9704781	0.59	16.68
585545.333	9706913.67	0.45	26.46
585570.104	9706096	0.46	17.73
585581.958	9706350	0.45	19.12
585593.604	9706623.33	0.45	20.65
585618.542	9707164.33	0.45	31.24
585495.167	9707409.67	0.39	41.41
585654.396	9707810.67	0.4	43.28
585464.021	9708246	0.17	85.05
585438.458	9708392	0.12	216.69
585802.875	9705738.67	0.53	17.4

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585723.063	9705851.33	0.49	17.2
585778.5	9705489	0.54	16.6
585952.625	9705161.33	0.62	15.5
586204.583	9704723.33	0.58	17.75
585655.833	9706982.33	0.46	25.32
585737.792	9706103.67	0.46	18.45
585749.042	9706357.67	0.44	19.19
585760.042	9706631	0.43	20.88
585736.667	9707236.67	0.48	28.39
585706.583	9707404.67	0.49	39.07
585725.771	9707961.33	0.35	46.99
585802.625	9707647.33	0.49	36.75
585681.083	9708136.33	0.43	43.9
585577.833	9708477.67	0.13	275.71
585983.313	9705745.33	0.58	18.02
585812.875	9705989.67	0.51	18.56
585971.333	9705579	0.57	17.97
586126.021	9705273.67	0.59	16.88
586445.833	9704954.33	0.57	18.16
585806.875	9706908.67	0.45	24.36
585833	9706494.67	0.46	20.83
585831.104	9706241.33	0.48	19.23
585858.083	9706764.33	0.45	22.64
585887.396	9707163	0.46	26.01
585828.521	9707487	0.52	33.2
585874	9707798	0.44	40.33
585848.313	9708192.67	0.3	45.06
585770.625	9708388	0.38	3.78
585993.688	9705912	0.58	17.99
586131.792	9705525.33	0.59	18.84
586432.583	9705207.33	0.59	17.72
587205.729	9704721.67	0.49	29.5
586689.938	9704860.67	0.56	19.38
585920.313	9707017	0.48	24.43
586007.813	9706502.67	0.51	21.44
586049.083	9706247.33	0.52	20.54
586020.667	9706668.67	0.51	20.93
586007.292	9707257.33	0.5	26.41
585978.5	9707413.33	0.5	31.22
586002.979	9707870.67	0.51	32.79
586021.979	9708090.33	0.48	39.36
585933.792	9708433.33	0.2	28.26

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585877.917	9708613.67	0.26	46.29
586136.583	9706032	0.54	20.84
586395.771	9705719.33	0.56	21.67
586737.729	9705424.67	0.55	21.97
587037.438	9704986.33	0.55	30.43
586125.063	9707035	0.52	24.37
586141.833	9706371.67	0.53	22.49
586186.479	9706686.67	0.49	22.77
586181.958	9707191.67	0.53	24.6
586102.25	9707500	0.54	29.98
586115.521	9707722.33	0.47	30.98
586162.708	9708167	0.46	38.11
586152.208	9708314.67	0.38	34.09
586082.875	9708633.67	0.23	45.6
586383.896	9705976.33	0.55	21.94
586695.146	9705685	0.56	21.99
587098.479	9705297.33	0.5	23.78
586251.458	9706892.33	0.5	24.27
586308.708	9706473.67	0.53	23
586245.167	9707345.67	0.55	27.7
586244.604	9707795	0.54	31.37
586312.479	9708093.33	0.45	38.16
586239.938	9708456.67	0.4	38.09
586039.042	9708806.67	0.3	39.96
586205.917	9708995	0.5	48.35
586366.813	9709188.67	0.42	33.84
586630	9706289.33	0.54	22.95
586945.646	9705927.33	0.54	23.04
587352.75	9705540.67	0.51	25.15
586501.604	9707008.33	0.51	24.57
586552.688	9706530.67	0.54	23.15
586438.417	9707305	0.53	24.64
586434.646	9707699	0.59	29.89
586321.375	9707943	0.58	35.15
586452.208	9708167	0.55	32.83
586477.958	9708369	0.4	36.19
586373.625	9708512.67	0.37	36.75
586232.521	9708835	0.32	43.09
586394.625	9709026	0.41	34.39
586544.146	9709228.33	0.3	37.02
586540.417	9709361.67	0.49	61.4
586892.375	9706274.67	0.54	23.08

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587242.5	9705910.33	0.49	25.23
587637.25	9705511	0.4	37.99
586680.604	9706859.67	0.55	24.77
586556.875	9707507.67	0.51	27.79
586511.417	9707847	0.65	32.22
586670.271	9708124.67	0.42	29.94
586616.104	9708432.33	0.58	35.86
586410.042	9708718	0.45	37.48
586583.938	9708938	0.55	33.23
586740.917	9709141	0.5	34.87
586726.479	9709392.33	0.34	40.06
587190.396	9706470.33	0.52	24.57
587397.833	9706216.33	0.49	23.33
587794.563	9705891.67	0.4	33.41
586719.917	9709527.67	0.57	35.86
586963.104	9707005.33	0.53	25.02
586860.146	9707570.67	0.58	25.54
586720.583	9707955	0.43	31.42
586759.833	9708265	0.49	34.11
586713.188	9708567.67	0.58	33.12
586572.75	9708790	0.43	34.67
586752.896	9709013.33	0.47	32.19
586850.063	9709266.67	0.47	39.59
587242.313	9706779.67	0.52	25.58
587665.396	9706227.33	0.45	28.23
586892.833	9709578.33	0.35	29.58
587036.458	9707369.33	0.55	25.05
586947.083	9707870	0.47	30.92
586856.917	9708400.33	0.49	29.03
586724.292	9708715	0.4	33.74
586904.792	9708937.67	0.46	31.86
586977.021	9709274	0.49	38.57
587026.354	9709450.33	0.52	37.64
587555.229	9706862.33	0.56	26.97
587770.875	9706564	0.46	25.09
586873.521	9709723.67	0.67	31.99
587388.917	9707426.33	0.52	26.39
587241.896	9707917.67	0.44	32.02
587058.5	9708407.33	0.39	30.34
586887.375	9708787.33	0.54	30.37
587047.708	9708987	0.54	36.99
587074.521	9709135.33	0.47	38.27

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587159.896	9709457	0.54	38.77
587212.313	9709624	0.56	39.34
587628.479	9707145	0.52	26.66
588036.542	9706675.33	0.45	29.15
587059.458	9709762.67	0.4	30.44
587507.417	9707675.33	0.52	30.35
587306.542	9708150	0.43	32.43
587077.854	9708647	0.49	26.32
587236.833	9708922.33	0.47	37.82
587220.625	9709173.33	0.58	39.05
587256.667	9709318.67	0.51	38.38
587357.563	9709643.67	0.58	43.36
587957.479	9707225.67	0.54	33.72
588149.896	9707054.33	0.46	35.54
588599.063	9707051.33	0.36	37.35
587410.583	9709803.67	0.59	41.15
587020.292	9709921.33	0.7	28.84
587898.771	9707737.67	0.51	33.39
587585.354	9708218.33	0.53	38.79
587284.396	9708732.67	0.5	38.35
587350.896	9709043.67	0.5	37.75
587405.146	9709348.33	0.62	43.96
587453.625	9709506.33	0.56	43.8
588109.271	9707569.33	0.55	32.74
588440.771	9707239.33	0.39	38.75
588856.792	9707050.33	0.31	56.36
587003.479	9711467.67	0.12	352.45
587620.458	9709861.67	0.61	46.69
587226.167	9709942.67	0.42	31.86
587912.063	9708048.33	0.59	37.99
587543.854	9708561.33	0.62	37.9
587471.438	9709159	0.57	44.16
587602.271	9709529.67	0.72	44.14
587781.688	9709776.33	0.6	46.34
588431.208	9707595.67	0.47	39.42
589084.063	9707208	0.26	39.29
586932.125	9711174.33	0.05	357.11
587667.479	9710002	0.59	43.88
587175.313	9710114	0.72	35.39
586965.583	9711015.33	0.06	337.22
588146.021	9708286.67	0.58	40.95
587710	9708704	0.6	42.16

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Asociación Geoestudios – Consulsua	Contrato No. 41 – 2011	Fecha: Julio 2012	27



587625.833	9709053.33	0.63	40.47
587791.104	9709406.33	0.66	42.22
587732.021	9709634.33	0.69	44.74
587990.833	9709829.67	0.65	47.71
588626.396	9707804.67	0.56	37.3
589167.271	9707565.67	0.36	67.71
590522.813	9707934.67	0.08	88.63
587020.146	9711282	0.08	331.85
588038	9709977.33	0.6	47.21
587566.542	9710146.33	0.4	39.99
587800.021	9710103.33	0.6	44.38
587385.354	9710213.33	0.5	41.33
587041.792	9710869.33	0.06	328.37
588490.833	9708174.33	0.69	47.95
587985.458	9708599.33	0.52	41.47
587820.125	9709190.67	0.6	44.11
587920.854	9709511	0.61	42.26
588177.146	9709706.67	0.63	45.58
588190.271	9709982.33	0.63	48.12
588247.479	9710117	0.61	48.83
588976.896	9707805	0.31	66.47
589546.854	9707572.33	0.42	64.65
590163.021	9707767	0.1	72.26
590653.354	9708186	0.14	92.25
590970.938	9708256.33	0.14	87.2
587189.125	9711321.67	0.03	269.16
587942.667	9710114	0.62	46.98
587699.083	9710247.67	0.44	40.38
587315.875	9710402	0.64	34.1
587214.646	9710905.33	0.07	340.23
588152.083	9710254	0.63	50.74
588687	9708397	0.55	42.35
588206.688	9708888.67	0.54	49.07
588125.521	9709130.67	0.53	45.17
588156.833	9709530	0.66	41.62
588313.479	9709802.33	0.6	45.67
588408.542	9710107.33	0.62	47.92
588474.375	9710241	0.61	51.23
589029.167	9708347.67	0.73	44.34
589183.5	9708125.33	0.61	16.98
589688.375	9707962.67	0.34	34.59
589991.729	9708033	0.15	62.11

Autoridad Portuaria de Guayaquil	Contrato: Estudios de Prefactibilidad, Factibilidad y de Diseño para Determinar el Dragado a la Profundidad de 11m. respecto al MLWS.	ANEXO A	Página
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590504.083	9708456	0.26	101.4
591069.521	9708572.67	0.19	99.7
587305.854	9711173.67	0.06	353.93
587471.917	9711538	0.09	19.1
587999.542	9710256	0.61	48.42
587725.708	9710434	0.49	41.74
587523.688	9710521.33	0.51	37.8
587248.583	9710712	0.07	312.42
588218.188	9710380.67	0.6	49.92
588379.417	9710377.33	0.61	52.22
588563.417	9708798.67	0.52	50.09
588332.479	9709365.33	0.59	41.6
588455.063	9709890.33	0.59	44.68
588630.208	9710237	0.59	53.31
589200.396	9708704.67	0.49	54.05
589515.396	9708276.33	0.36	15.2
590202.25	9708470.67	0.25	68.7
590827.271	9708717.33	0.36	115
587481.146	9711298.33	0.1	3.89
587564.917	9711665	0.08	50.18
587791.729	9711820	0.16	45.15
587883.521	9710431.67	0.46	44.02
587474.417	9710713.67	0.39	26.67
588181	9710590.33	0.47	48.86
588439.396	9710511.67	0.59	54.39
588706.083	9710366.67	0.57	52.38
588906.375	9708958	0.51	50.65
588643.854	9709460.67	0.54	45.3
588676.958	9709884	0.61	46.64
588786.271	9710097	0.54	51.88
589511.375	9708646.33	0.53	73.72
590137.938	9708759	0.46	58.8
590806.167	9708999.67	0.33	93.46
587705.479	9711206.67	0.28	25.79
587753.396	9711640.33	0.16	18.75
588214.208	9712029	0.24	55.54
587928.188	9711907.33	0.17	63.36
587998.875	9710639.33	0.5	47.42
587725.979	9710938	0.39	35.04
588323.896	9710676.67	0.47	52.98
588610.229	9710505	0.63	53.84
588862.042	9710347	0.55	54.25

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588943.938	9709283.67	0.56	48.86
588826.438	9709714.67	0.6	45.62
588936.167	9710168.67	0.53	51.92
589755.229	9708843.67	0.38	52.92
590418.667	9709026.67	0.41	74.24
587884.729	9711421.67	0.27	30.4
588131.542	9711821.67	0.22	49.79
587978.792	9710905	0.37	41.3
588396.313	9710824	0.5	62.55
588668.688	9710627	0.59	58.87
588947.75	9710465	0.55	56.21
589367.896	9709405.67	0.52	55.32
589191.375	9709857.33	0.54	49.64
589091.167	9710230.33	0.52	55.25
590936.875	9709480.67	0.42	77.55
589723.708	9709216.33	0.42	59.95
590346.833	9709301.67	0.42	68.27
588530.125	9711989.33	0.22	76.31
588126.417	9711515.67	0.26	41.8
588233.333	9711003.33	0.32	56.24
588570.271	9710781	0.48	59.73
588850.25	9710606.67	0.6	59.14
589098.333	9710439.67	0.51	59.54
589432.75	9709725.33	0.59	49.82
589268.354	9710131	0.57	56.08
590602.75	9709520	0.4	67.86
590034.583	9709406.67	0.43	61.97
588711.042	9711790.67	0.31	70.47
588344.729	9711403.33	0.32	46
588378.083	9711139	0.36	52.55
588724.063	9710845.33	0.44	62.52
588903.771	9710722.33	0.55	63.91
589181.104	9710565.33	0.51	64.83
590866.771	9709943.33	0.51	58.69
589772.938	9709907.67	0.56	53.25
589496.813	9710243.33	0.48	57.32
590577.771	9709798.33	0.38	61.52
590018.958	9709778.33	0.41	57.4
588682.938	9711563.33	0.36	65.38
588694.188	9711135.33	0.46	57.9
588800.396	9710988.67	0.52	61.3
589084.042	9710706.33	0.57	65.85

Autoridad Portuaria de Guayaquil	Contrato: Estudios de Prefactibilidad, Factibilidad y de Diseño para Determinar el Dragado a la Profundidad de 11m. respecto al MLWS.	ANEXO A	Página
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589327.208	9710541.33	0.51	64.41
591041.063	9710869.33	0.53	67.73
590896.542	9710240.67	0.58	66.88
589473	9710407.67	0.47	62.27
589760.021	9710152	0.57	54.59
590306.229	9709951.67	0.49	56.26
588867.563	9711372	0.53	63.4
589029.5	9710982	0.45	64.02
589133.438	9710822.67	0.52	65.36
589412.667	9710662	0.51	65.42
590804.146	9710788	0.53	71
590658.979	9710376	0.51	67.49
590701.479	9710927	0.57	70.98
589626.854	9710471.67	0.48	65.82
589961.979	9710315.67	0.54	61.23
590357.667	9710232	0.58	61.39
589115.354	9711428.33	0.41	70.21
589183.708	9711045.67	0.47	62.92
589315.958	9710802.33	0.57	66.42
589560.313	9710633	0.55	66.97
590663.396	9710583.33	0.47	68.82
590547.5	9710863	0.57	70.58
589852.625	9710471	0.47	62.79
590208.063	9710375.33	0.53	62.23
589248.125	9711217	0.59	64.61
589366.896	9710914	0.57	64.49
589643.917	9710758	0.54	66.06
590483.729	9710690.33	0.53	68.27
590484.25	9711015.33	0.58	71.26
589931.5	9710607.67	0.51	64.75
590252.729	9710594.67	0.52	64.28
589480.063	9711201.33	0.48	63.73
589547.208	9710898.67	0.63	65.8
589789.333	9710733.33	0.54	65.91
590335	9710722.67	0.56	68.22
590336.75	9711044.67	0.59	70.82
590085.521	9710671.67	0.53	67.91
589595.958	9711014.67	0.55	64.31
589874.875	9710853.67	0.55	67.21
590251.271	9710924.67	0.58	69.69
590022.333	9710824.33	0.55	69.22
589778.208	9710994.33	0.59	67.27

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590105.813	9710949.33	0.57	70.54
589829.083	9711105.67	0.53	66.09
590009.229	9711090	0.6	69.48
583171.625	9706882	0.15	325.95
583428.979	9707033.33	0.14	328.55
583182.354	9706553.33	0.16	333.95
583652.563	9706885.67	0.2	347.98
583335.729	9706380	0.17	333.31
583276.208	9706063	0.22	346.66
583548.583	9706561	0.2	337.87
583164.188	9704924.67	0.27	347.65
583163.75	9705605.33	0.23	39.29
583210.479	9705411.67	0.21	37.97
583451.063	9705873.33	0.19	349.92
583814.271	9706410	0.23	358.67
583221.813	9704714.33	0.31	326.33
583270.958	9705085.67	0.25	10.81
583377.708	9705641	0.25	3.31
583411.542	9705325.33	0.34	3.81
583776.271	9706039.33	0.2	353.81
583444.313	9705150.33	0.27	5.78
583546.792	9705438.33	0.21	24.14
583982.688	9705754.33	0.29	7.71
583723.646	9704730	0.29	355.25
583726.938	9705011	0.29	9.41
583826.563	9705385.67	0.24	17.98
583973.938	9705133.33	0.24	13.79
584345.229	9705069.33	0.37	8.5
584500.25	9704713.33	0.43	10.37

Autoridad Portuaria de Guayaquil	Contrato: Estudios de Prefactibilidad, Factibilidad y de Diseño para Determinar el Dragado a la Profundidad de 11m. respecto al MLWS.	ANEXO A	Página
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Valores de corriente para la zona 3, Zona del antepuerto

** CANAL GUAYAQUIL ZONA 1 CONDICION DE FLUJO DE MAREA

** Note:

** Datos de velocidad de corriente obtenidos de la simulación hidrodinámica con el modulo HD del MIKE21

616211.4600	9742715.0000	0.23	27.18
616115.8300	9742870.0000	0.22	26.23
616349.5800	9742772.6700	0.22	33.61
616564.2500	9742737.0000	0.2	39.94
617209.1300	9742791.6700	0.15	21.58
616157.8800	9743083.0000	0.23	33.97
616011.9400	9743175.3300	0.3	32.94
616443.4000	9742910.3300	0.23	36.78
616737.1700	9742767.6700	0.19	52.24
615958.2900	9744199.3300	0.21	296.84
616018.9600	9743469.0000	0.26	5.21
615978.1300	9743881.0000	0.2	316.11
617357.9600	9743034.0000	0.19	41.1
617178.5400	9742959.6700	0.13	33.69
616320.9200	9743179.3300	0.23	38.77
616103.8100	9743314.6700	0.34	25.82
616463.5800	9743093.0000	0.23	41.69
616759.6900	9743005.0000	0.18	43.08
616045.8500	9744058.0000	0.18	313
616115.5400	9743682.0000	0.31	1.28
617307.2100	9743224.0000	0.19	51.52
616965.2100	9743061.3300	0.22	39.06
616321.9400	9743329.6700	0.22	24.48
616606.9600	9743157.0000	0.3	36.99
616200.4800	9744096.6700	0.27	304.6
616335.8800	9743711.0000	0.28	30.63
617456.2300	9743271.3300	0.22	36.49
617046.2500	9743258.3300	0.23	41.83
616457.4200	9743513.0000	0.24	34.2
616670.5200	9743338.6700	0.28	38.98
616353.0800	9743948.6700	0.29	26.31
617541.7300	9743413.6700	0.23	27
616904.2900	9743383.6700	0.27	43.93
616618.5400	9743538.0000	0.23	36.95
616492.5800	9744051.0000	0.34	70.53
616722.6700	9744269.6700	0.21	30.95
617514.7300	9743624.3300	0.15	23.07
617062.3500	9743629.0000	0.23	39.03
616847.7900	9743740.0000	0.24	40.23
616684.7100	9744052.6700	0.2	58.6
617733.1000	9743712.6700	0.25	27.07
617079.7700	9744872.6700	0.13	232.63

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616803.2300	9744414.0000	0.19	26.4
617326.3300	9743761.6700	0.33	37.74
616896.0000	9743954.3300	0.31	48.47
617788.2100	9743855.6700	0.23	24.1
617219.5000	9744959.3300	0.14	263.52
616975.7500	9744748.0000	0.08	207.14
617026.0400	9744429.6700	0.1	62.37
617483.6500	9744030.3300	0.3	43.21
617156.7700	9744187.0000	0.28	51.11
617727.1500	9744036.0000	0.23	51.49
617502.0800	9745071.6700	0.08	66.85
617375.5200	9744910.6700	0.09	18.8
617116.7500	9744621.0000	0.17	82.69
617409.6900	9744218.3300	0.33	46.51
617890.9600	9744105.6700	0.29	36.93
617651.3500	9745139.0000	0.09	63.16
617376.7900	9744697.0000	0.15	45.76
617636.0400	9744477.3300	0.3	52.28
621499.5600	9746494.0000	0.33	59.66
617922.0600	9744269.3300	0.18	43.45
617859.9200	9744460.0000	0.29	55.58
617820.1300	9745064.3300	0.04	83.65
617603.5200	9744684.3300	0.21	47.7
621354.0800	9746414.6700	0.31	64.63
621091.6900	9746594.3300	0.16	62.67
620930.7300	9746615.6700	0.19	83.2
620621.5600	9746567.3300	0.14	6.99
618111.4000	9744259.6700	0.23	61.24
617976.2300	9745224.0000	0.05	88.58
618150.2900	9745422.0000	0.12	242.11
618239.3300	9745533.6700	0.12	264.43
618103.8800	9744557.6700	0.27	76.12
617847.7500	9744855.6700	0.3	71.82
621171.7300	9746429.3300	0.17	61.28
620803.6700	9746474.3300	0.17	25.52
620455.4400	9746460.6700	0.14	5.89
618228.6900	9744400.6700	0.18	84.47
618146.5600	9745209.3300	0.11	31.03
618395.5000	9745533.3300	0.23	321.04
618124.2300	9744746.3300	0.29	71.76
621086.5000	9746230.0000	0.26	45.46
620760.3100	9746238.0000	0.13	26.81
620450.0400	9746296.0000	0.15	359.92
618377.5400	9744321.3300	0.25	97.9
618695.5400	9745449.0000	0.25	103.47
618286.3100	9745059.0000	0.35	50.73
618532.1700	9745361.3300	0.3	48.03

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618323.0400	9744815.3300	0.33	75.77
620909.7100	9746159.3300	0.14	26.98
620572.8100	9746166.3300	0.15	31.33
618530.7700	9744292.0000	0.26	104.61
618845.2300	9745378.6700	0.3	116.26
618502.4800	9745119.0000	0.32	77.86
618585.5200	9744677.3300	0.22	99.48
620946.2700	9745979.6700	0.18	10.29
620487.0800	9746041.0000	0.25	358.23
618664.7500	9744422.0000	0.19	111.33
619188.0200	9745446.6700	0.16	37.89
618997.1900	9745218.3300	0.3	103.33
618690.8500	9744886.0000	0.19	86.34
619472.1700	9745472.6700	0.06	303.03
620835.6900	9745814.0000	0.13	354.95
620614.4600	9745841.0000	0.16	356.17
618846.3300	9744279.0000	0.35	93.5
619226.4400	9745267.0000	0.29	85.7
618950.0800	9744938.3300	0.27	98.31
619528.6900	9745306.0000	0.16	62.49
620976.2500	9745684.0000	0.21	334.99
620484.6700	9745731.3300	0.25	8.64
619001.6000	9744366.6700	0.22	53.39
619408.7500	9745156.3300	0.33	88.04
619141.4400	9744799.3300	0.27	89.06
619667.4600	9745332.6700	0.11	115.76
621040.8800	9745533.6700	0.2	339.96
620481.5800	9745573.0000	0.27	353.35
619116.7100	9744579.3300	0.28	82.17
619099.6500	9744188.6700	0.05	48.36
619370.8500	9744968.6700	0.4	88.21
619783.8100	9745229.3300	0.13	136.97
620940.0000	9745351.6700	0.13	7.77
620489.3500	9745410.0000	0.27	0.8
621134.2100	9745223.0000	0.15	338.55
619356.6000	9744553.3300	0.24	95.86
619258.2900	9744235.6700	0.08	52.9
619483.7900	9744782.3300	0.26	90.86
619832.1700	9745037.6700	0.24	112.58
620648.1700	9745287.3300	0.21	3.55
621177.4000	9745074.0000	0.15	357.21
620300.6300	9745078.6700	0.22	70.42
620039.5200	9745056.0000	0.22	96.68
619400.1500	9744387.6700	0.19	100.57
619331.4400	9744093.6700	0.15	291.17
621187.3100	9744803.3300	0.1	183.2
619708.8100	9744805.0000	0.31	112.66

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620521.0600	9745059.6700	0.22	33.69
621041.9600	9744926.0000	0.23	63.63
620175.1900	9744952.3300	0.18	63.53
619621.7100	9744325.6700	0.19	117.19
619487.5200	9744095.0000	0.14	245.41
621130.9600	9744657.0000	0.09	201.28
619845.3800	9744592.0000	0.21	106.39
620710.3500	9744905.6700	0.2	31.23
620271.6700	9744768.6700	0.19	66.28
619799.1000	9744388.6700	0.14	110.07
619635.9400	9744175.0000	0.14	147.57
621048.9600	9744526.0000	0.09	220.79
620138.7300	9744622.0000	0.21	76.29
620586.4000	9744741.0000	0.18	50.94
619991.5800	9744280.6700	0.23	80.03
619763.3300	9744071.6700	0.18	122.12
620883.2500	9744469.6700	0.03	258.2
620201.0400	9744406.3300	0.2	75.76
620695.9400	9744558.6700	0.13	42.56
619941.5800	9744114.3300	0.24	60.82
620886.9000	9744257.3300	0.1	201.38
620443.5200	9744370.6700	0.18	89.77
620009.4600	9743997.0000	0.07	316.87
620726.4600	9744146.0000	0.11	153.18
620470.4000	9744170.3300	0.13	139.69
620168.2500	9743969.0000	0.11	252.71
620776.1300	9743990.3300	0.16	200.95
620336.7100	9744011.6700	0.09	178.08
615832.0800	9742990.0000	0.29	20.71
615977.7500	9742812.3300	0.25	20.97
615884.0400	9742674.3300	0.3	20.67

Autoridad Portuaria de Guayaquil	Contrato: Estudios de Prefactibilidad, Factibilidad y de Diseño para Determinar el Dragado a la Profundidad de 11m. respecto al MLWS.	ANEXO A	Página
Asociación Geoestudios – Consulsua	Contrato No. 41 – 2011	Fecha: Julio 2012	36