



**REPORT ON THE
DURBAN HARBOUR CONTROL
(Survey & Leveling)
Date of Survey: May - June 2013**

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REPORT

DURBAN HARBOUR CONTROL

SURVEY AND LEVELING

May - June 2013

REPORT ON THE DURBAN HARBOUR CONTROL MAY – JUNE 2013

Scope of Work

Lloyd and Hill Inc Land Surveyors were requested by ZAA Engineering Projects and Naval Architecture to strategically position, measure and precise level thirty control points, covering the entire Durban harbour (see annexure 1) for future construction. This was done during May and June 2013.

A thorough reconnaissance was done to ensure that, where possible, control points are inter-visible with another control point or with an external trigonometric beacon. The positions of the control points were selected in areas, as far as possible, where it would remain undisturbed. Thirty brass pins were used to permanently define the control points.

These control points were epoxied into the 70mm holes, drilled into concrete surfaces with the brass labels, clearly indicating the names of the various control points. The top of the brass pins defines the level, whereas the middle 5mm hole in the brass pins defines planimetric (x and y) datum (see annexure 2).

Leveling Methodology

A total distance of 29,30km was covered in the precise double-leveling. Two leveling teams, each equipped with a Leica precise digital level (DNA03 & NA3000) and bar-coded leveling staves, started at DHC01 and closed the leveling loop at DHC30. This spirit leveling loop was then linked to the Tide Gauge Benchmark (Getymeter) = 2.6787m Land Leveling Datum (LLD) close to DHC01. The difference between LLD and chart datum (CD) was established in 2003 by the Hydrographer to be 0.913m. This relationship is unlikely to change significantly in the next twenty years. Also note that the LLD is often referred to as Mean Sea Level (MSL) which it is close to, but LLD is the correct term.

The basic leveling approach of backsight-foresight was utilized with simultaneous double leveling. Checks in the field were done in order to ensure that the different loops / sections of leveling would be correct. Leveling bays were kept less than 50m in order to reduce deviation to less than 0.2mm loops. A maximum of ten change points, per leveling loop / section, were leveled, then the field checks were done.

Reciprocal trigonometrical leveling across the water between DHC07 and DHC08, DHC03 and P3 (near DHC23), DHC01 and DHC30 were done to check for gross errors. The maximum error in the height transfer was in the order of 0.033m between DHC07 and DHC08 with the errors at the other reciprocal leveling areas less than 0.012m. These reciprocal observations were not used in the final adjustment.

There exist a discrepancy between the heights of the control points that were already issued on the topographical plan (Rev.1) and the same heights in the precise leveling on **Pier 1**. The CD heights of the points that were issued on the topographical plan are based on the following control points (see table 1):

Name	Topo Survey	Final Height	Difference	Average
P3	3.9060	3.8566	-0.0494	-0.048
P5	3.9330	3.8836	-0.0494	
S2	3.8170	3.7635	-0.0535	
P7	3.7640	3.7230	-0.0410	

Table 1: Pier 1 Height Adjustment

The average difference between the two datasets is -0.048m. The latter dataset, which is based on the LLD, is the adopted heights of the control points for the entire Durban Harbour. The heights on the topographical plan thus have to be adjusted by -0.048m to conform to the leveled heights.

Similarly, the heights on the topographical plan issued for **Pier 2** on CD should be adjusted by an average of -0.015m to conform to the precisely leveled heights, as shown on table 2 below.

Name	Topo Survey	Final Height	Difference	Average
Base 1	4.4290	4.4065	-0.0225	-0.015
PL3	3.9350	3.9273	-0.0077	

Table 2: Pier 2: Height Adjustment

GPS Measurements

The planimetric co-ordinates of all the thirty control points (DHC01 – DHC30) were measured, for post-processing computation, using the Trimble R10 GPS system. Two receivers were used simultaneously to measure the different control points, receiving corrections from the two base stations (Base 2 & Durban – trignet station). Control points were measured in static mode, occupying the control points for ten minutes with the number available satellites ranging from 5 to 21 at any given epoch (see annexure 3).

Occupation of the control points were done carefully, setting up a tripod over the control points with the receiver mounted on a tribrach to ensure that the receiver was perfectly leveled. The height of the receiver was measured carefully with a tape measure twice from different positions at the setup.

Results and Accuracies

The leveling accuracy of the entire leveling loop, ie. from the Tide Gauge Benchmark to DHC30 is -0.0024m over 29,30km (see annexure 4 for the detail of the leveling traverse route).

The GPS measurements have a standard deviation of 0.004m and 0.007m in the horizontal and vertical respectively, with a maximum baseline of 4km. Only the horizontal WG31 value was adopted for the co-ordinate list.

The results are listed in a single page co-ordinate list at the end of this report.

Personnel

Surveyors Joe Martin, Nate Titus, Professional Land Surveyor-in-Training Kyle van Niekerk; assistants Malinga Nxumalo and Bongokhakhe Manukuza performed the survey and leveling. The overall project was directed by Professional Land Surveyor Gavin Lloyd.

A handwritten signature in black ink, appearing to read "G. Lloyd".

GCW Lloyd 04 July 2013

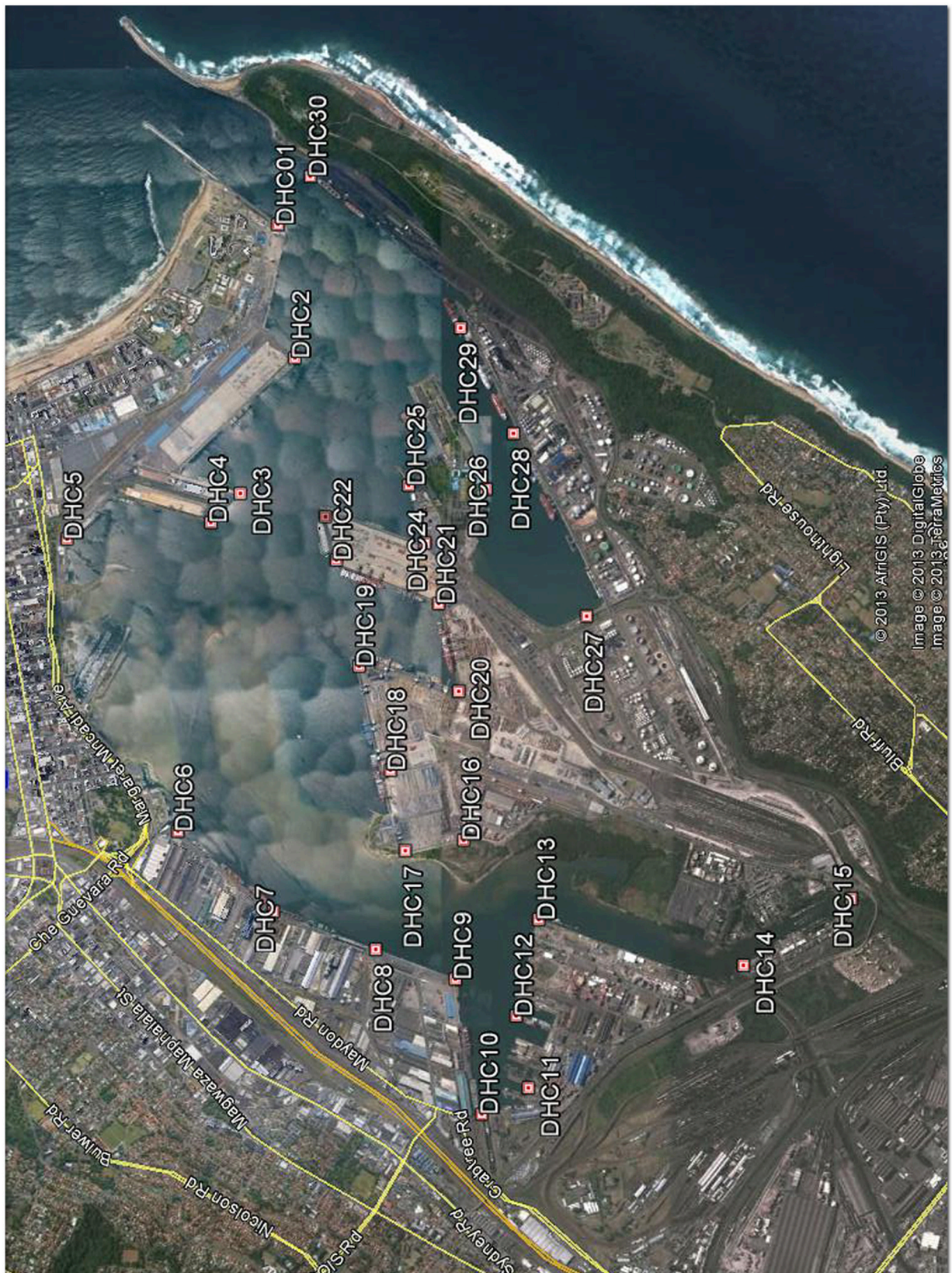
NAME	Y	X	Height (LLD)	CD 2003	DESCRIPTION (see index for individual locality images)
ASP1	-4912.734	3306131.994	2.794	3.707	Nail in Concrete approximately 7m to the North of the TGBM
BASE1	-1127.367	3306930.700	3.494	4.407	12mm Round Iron Peg in Brick Paving approximately 26m South West of DHC17
BASE2	-1755.348	3307161.188	Not Leveled	Not leveled	12mm Round Iron Peg in Grass on Traffic Circle
DHC01	-4942.015	3306128.231	3.237	4.150	0.52m West of Water on Raised Concrete Wall
DHC02	-4129.995	3306230.689	3.526	4.439	1.84m South of Navigation Pole
DHC03	-3306.238	3305900.231	2.788	3.701	2.32m North of Navigation Pole
DHC04	-3128.792	3305720.486	2.693	3.606	2.76m South West of Navigation Pole
DHC05	-3029.350	3304845.390	2.802	3.715	8.4m East of Bollard no. 205
DHC06	-1247.871	3305519.904	2.837	3.750	1.6m West of Bollard and 1.4m East of yellow line
DHC07	-762.489	3306099.498	2.844	3.757	5.75m West of Bollard no. 53
DHC08	-534.570	3306720.938	2.842	3.755	4.4m to the East of Double Rails running along Quay Edge
DHC09	-355.652	3307203.085	2.828	3.741	2.73m North West of Quay Edge Corner
DHC10	-462.794	3307362.652	2.837	3.750	1.35m West of old Bollard and 1.91m South West of Chamber
DHC11	300.899	3307644.559	3.210	4.123	2.6m North of Step up Strip and 5.7m west of bottom of slope
DHC12	-134.365	3307571.070	2.985	3.898	1.2m South and 1.12m East of Quay Edge
DHC13	-719.547	3307707.179	2.827	3.740	0.85m East of Low wall and 1.06m of Quay Wall
DHC14	-446.348	3308940.106	2.104	3.017	1.3m East of Steel Pole and 0.6m West of Wooden Post
DHC15	-853.170	3309586.341	3.257	4.170	0.17m South and 0.2m West of Concrete Chamber Corner
DHC16	-1200.008	3307253.459	3.603	4.516	3.12m East of Pallsade Fence and 2.27m West of Tar Road
DHC17	-1134.499	3306900.381	3.301	4.214	2.2m East of Tar Road and 2.38m North East of Low Conc. Wall
DHC18	-1623.461	3306810.694	3.408	4.321	70m South of Bollard no. 79 at Intersection of Concrete Joints
DHC19	-2255.266	3306620.547	3.001	3.914	1.37m North West of Concrete Block and 0.59m South of Tar Edge
DHC20	-2103.728	3307223.994	2.759	3.672	0.88m South of Quay Edge Corner and 1.17m West of Steps
DHC21	-2636.095	3307102.999	2.769	3.682	0.96m South East of Quay Edge Corner and 1.43m South of Bollard no. 95
DHC22	-2900.987	3306483.137	3.089	4.002	1.03m North and 1.18m North East of Eastern and Western Concrete Block Corners
DHC23	-3163.479	3306416.368	3.075	3.988	0.97m North and 2.18m East of Concrete Plinth
DHC24	-3003.830	3307019.930	2.826	3.739	1.44m East of Quay Edge Corner and 1.43m South East of Quay Wall
DHC25	-3354.130	3306921.289	2.840	3.753	1.5m West of the Quay Edge across the Face of Top Steps
DHC26	-3330.644	3307389.384	2.826	3.739	1.24m South of Quay Wall and 1.14m North of Bollard no. 98
DHC27	-2559.984	3307995.952	2.508	3.421	1.2m South West of Bridge Parapet in Concrete Strip
DHC28	-3667.932	3307554.876	3.061	3.974	Cut off Stud in Concrete 0.8m South East of Raised Wall
DHC29	-4309.573	3307235.616	3.232	4.145	1.8m North of Bollard and 0.69m South East Raised Kerbline
DHC30	-5232.431	3306326.617	2.385	3.298	1.47m East of Water on Breakwater Concrete

ANNEXURE 1

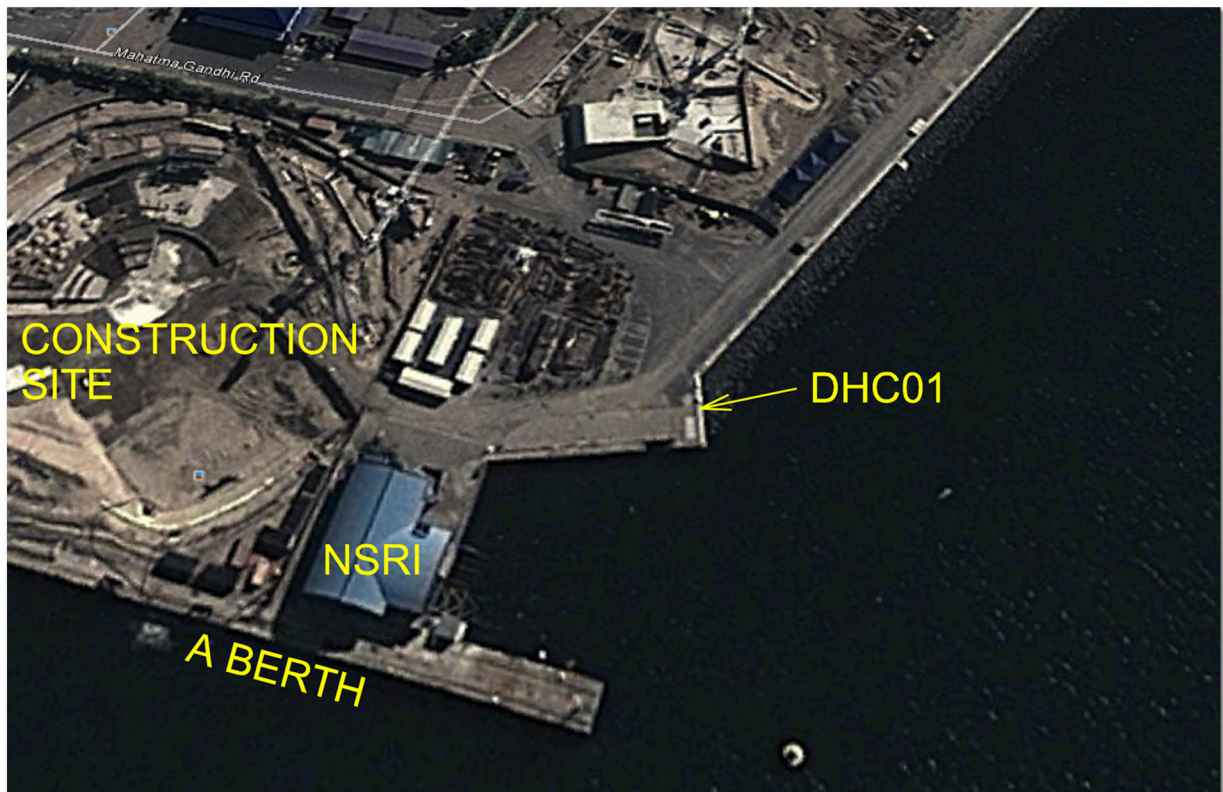
DURBAN HARBOUR CONTROL

IMAGE LOCALITY INDEX

IMAGE DHC01 - DHC30



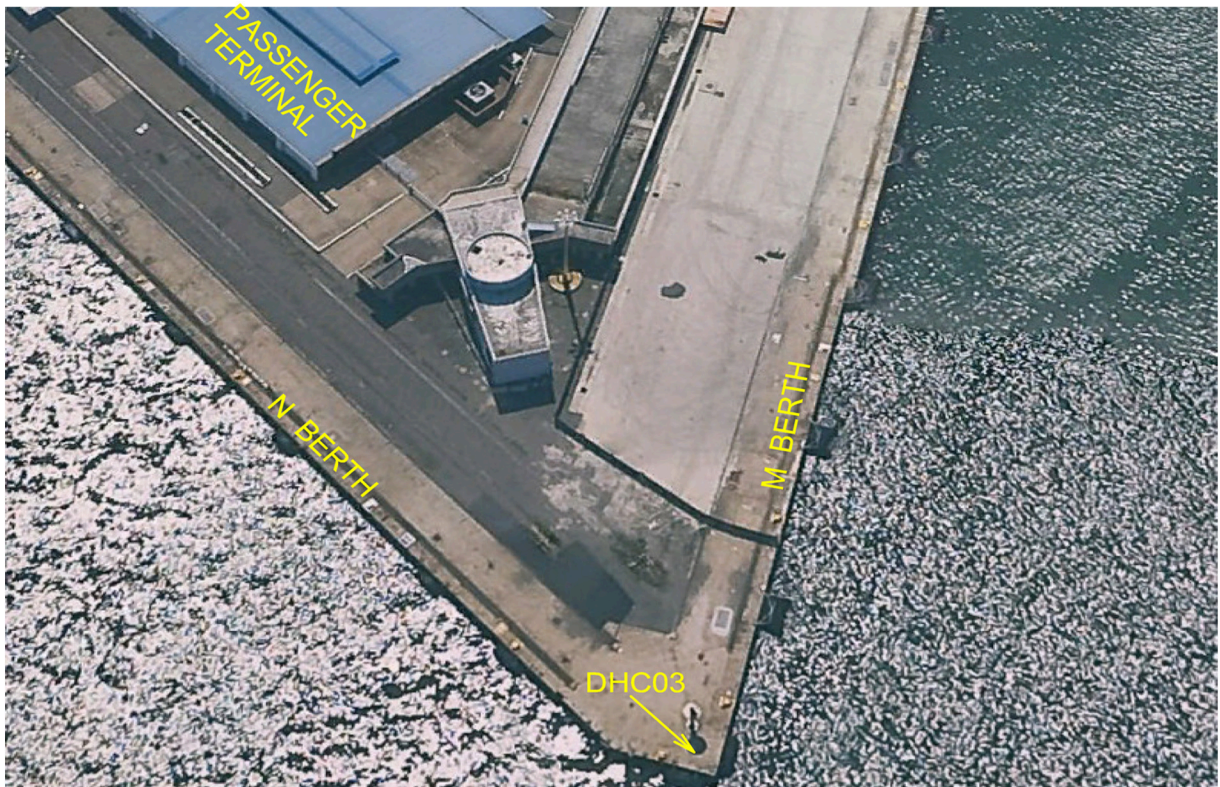
DURBAN HARBOUR CONTROL
IMAGE LOCALITY INDEX



DHC01
12mm Round Iron Peg
WG 31



DHC02
12mm Round Iron Peg
WG 31



DHC03
12mm Round Iron Peg
WG 31



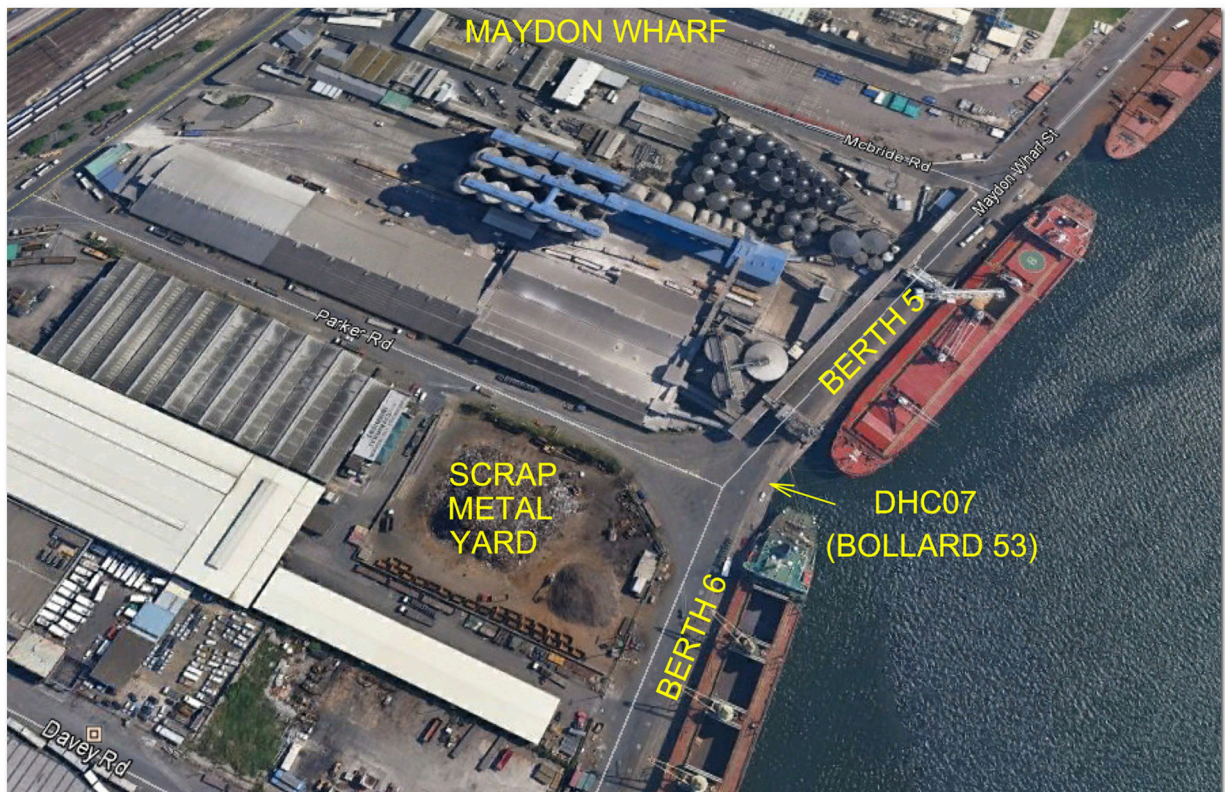
DHC04
12mm Round Iron Peg
WG 31



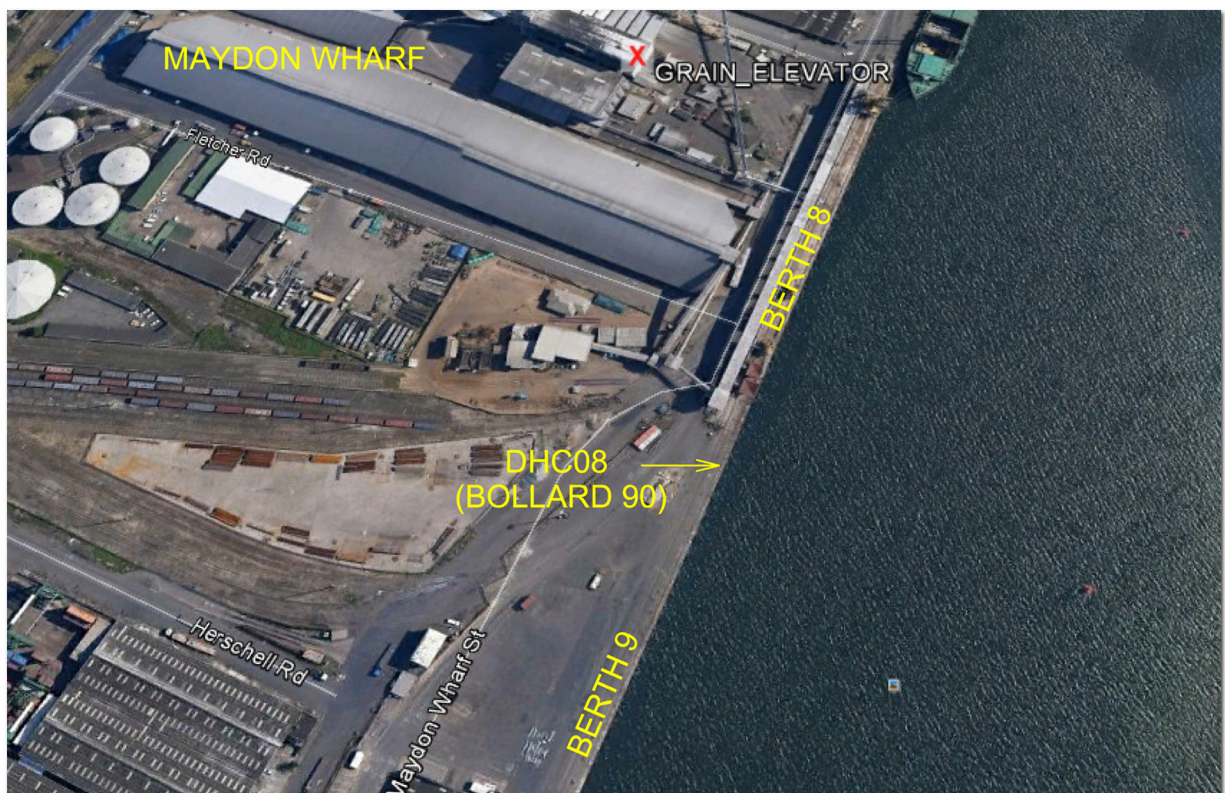
DHC05
12mm Round Iron Peg
WG 31



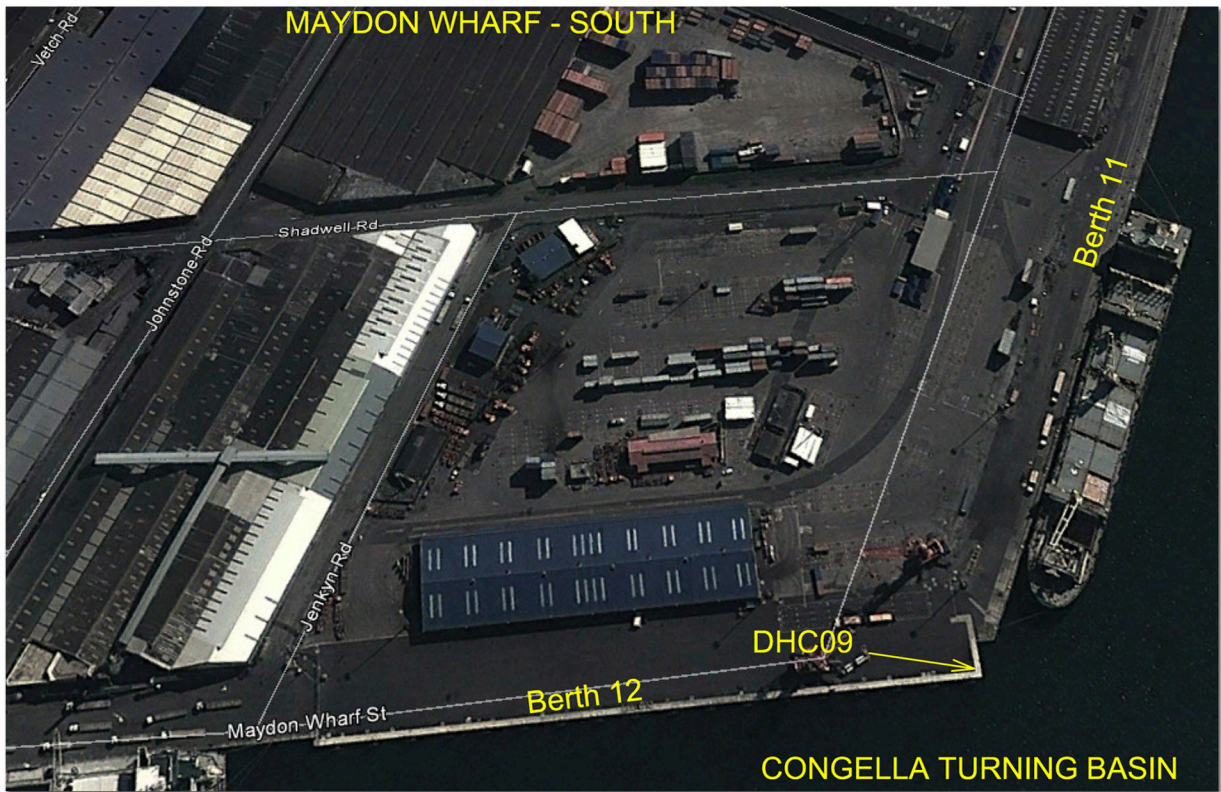
DHC06
12mm Round Iron Peg
WG 31



DHC07
12mm Round Iron Peg
WG 31



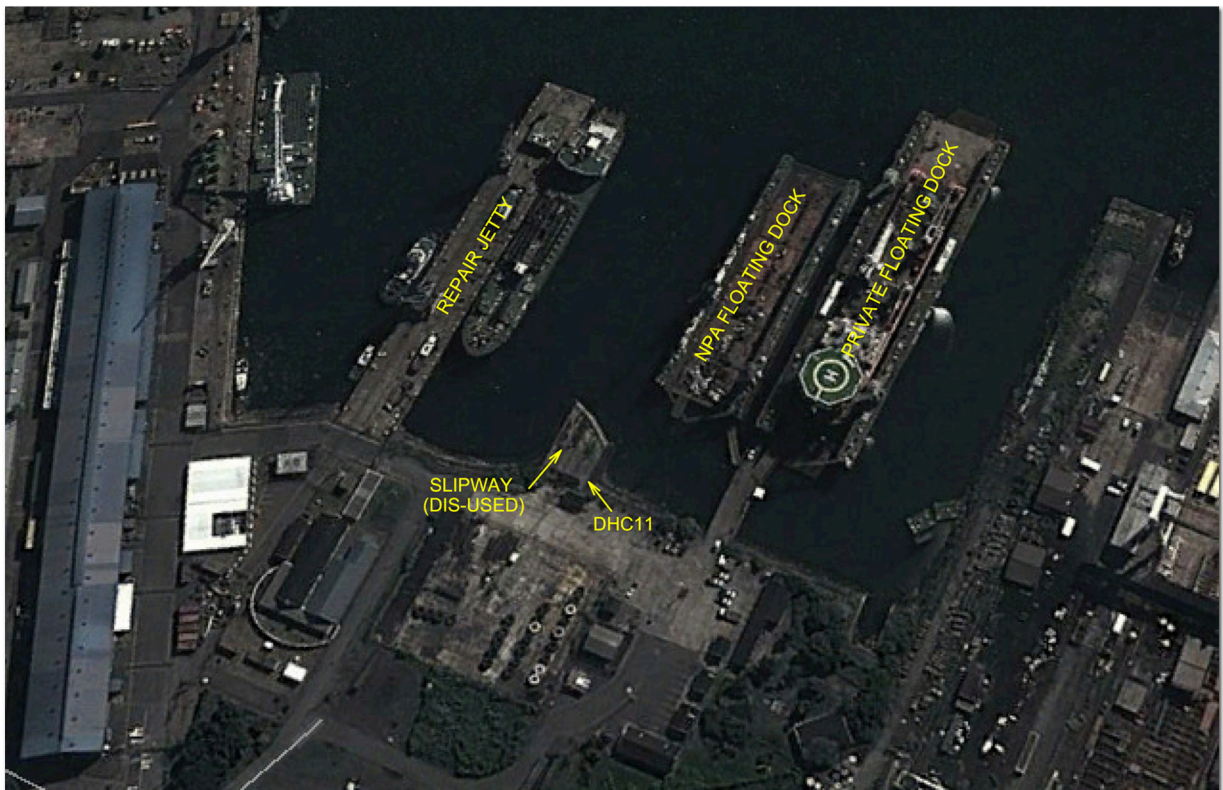
DHC08
12mm Round Iron Peg
WG 31



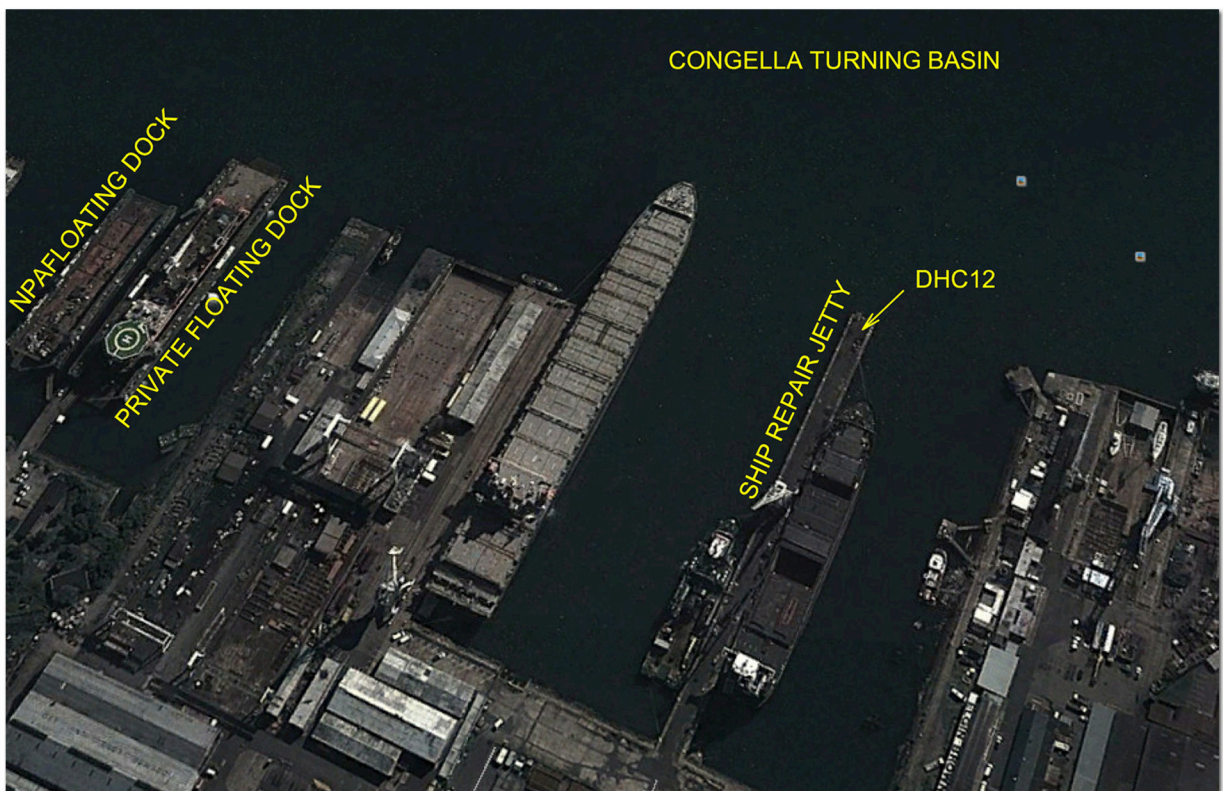
DHC09
12mm Round Iron Peg
WG 31



DHC10
12mm Round Iron Peg
WG 31



DHC11
12mm Round Iron Peg
WG 31



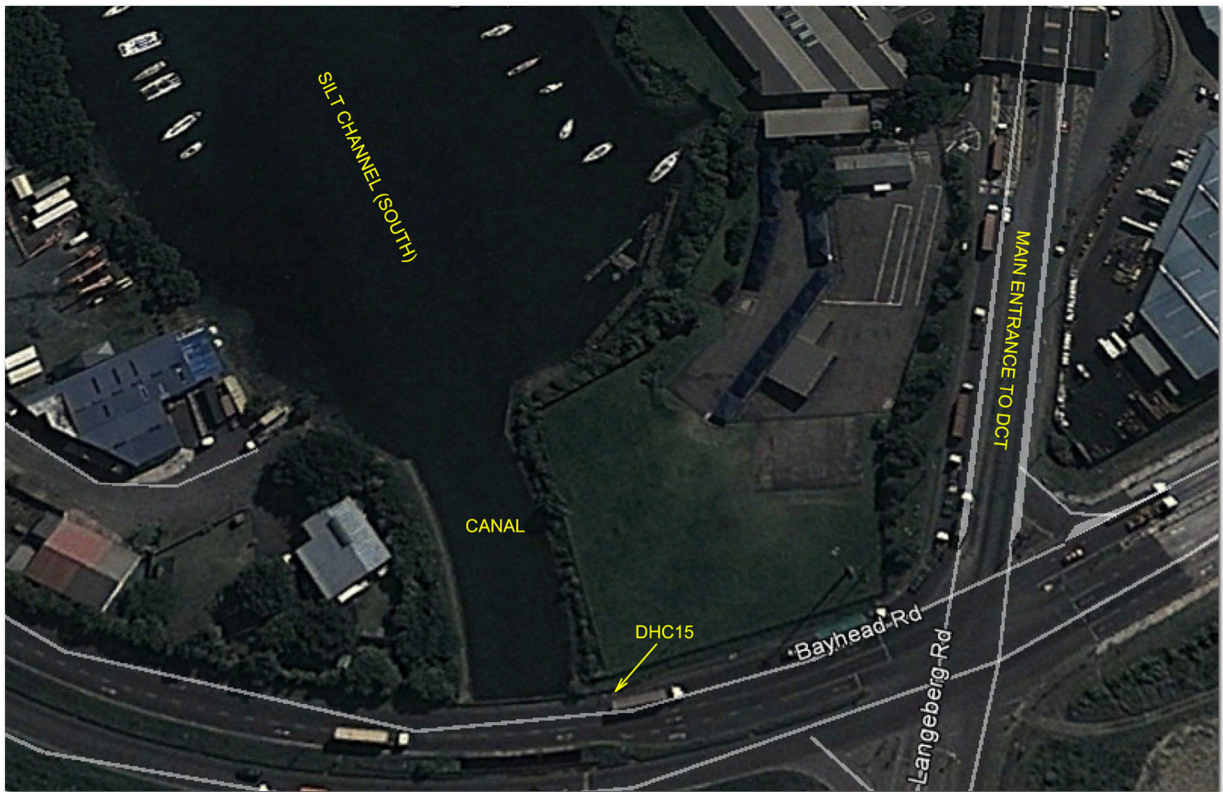
DHC12
12mm Round Iron Peg
WG 31



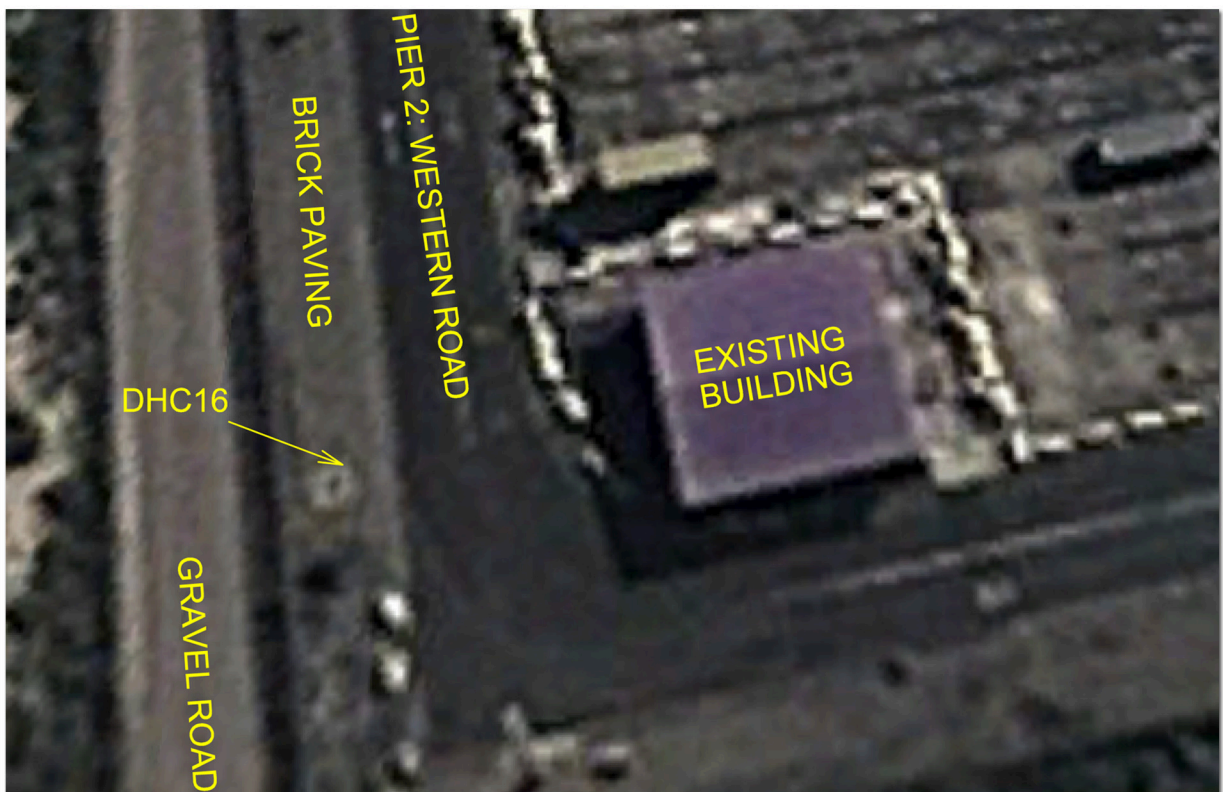
DHC13
12mm Round Iron Peg
WG 31



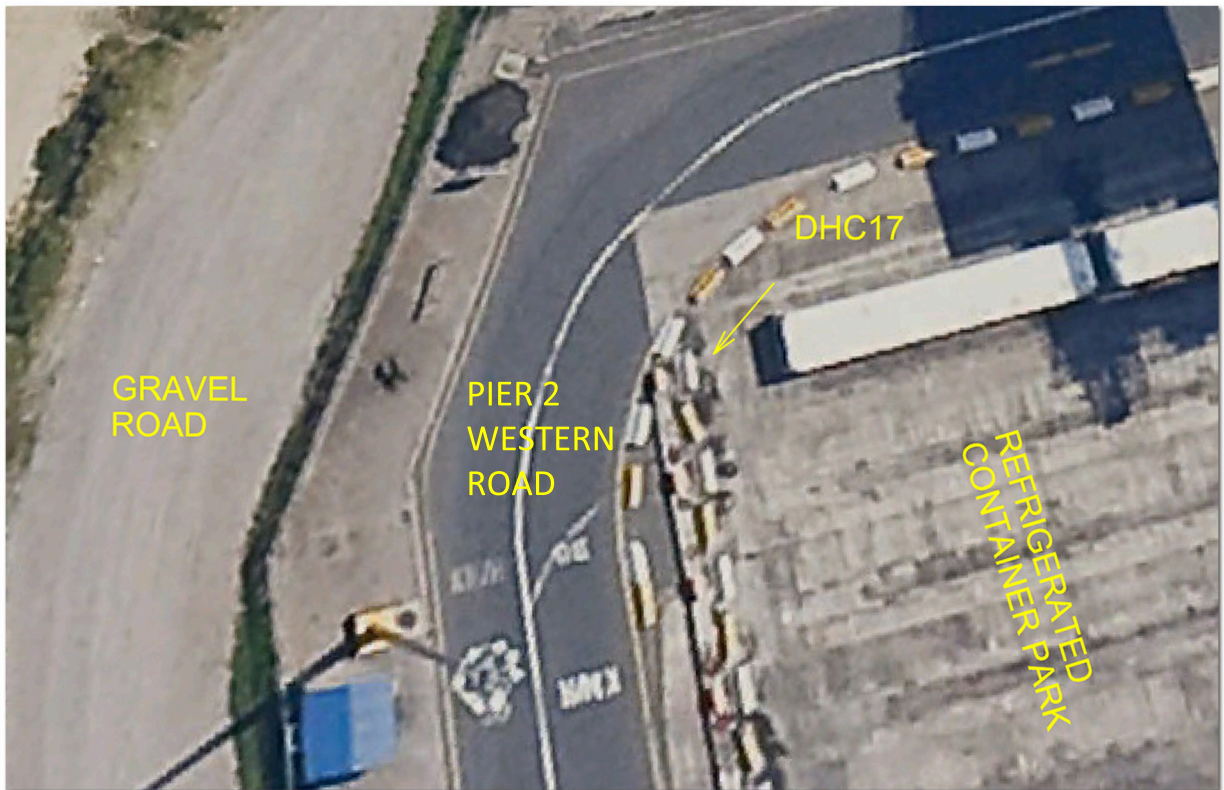
DHC14
12mm Round Iron Peg
WG 31



DHC15
12mm Round Iron Peg
WG 31



DHC16
12mm Round Iron Peg
WG 31



DHC17
12mm Round Iron Peg
WG 31



DHC18
12mm Round Iron Peg
WG 31



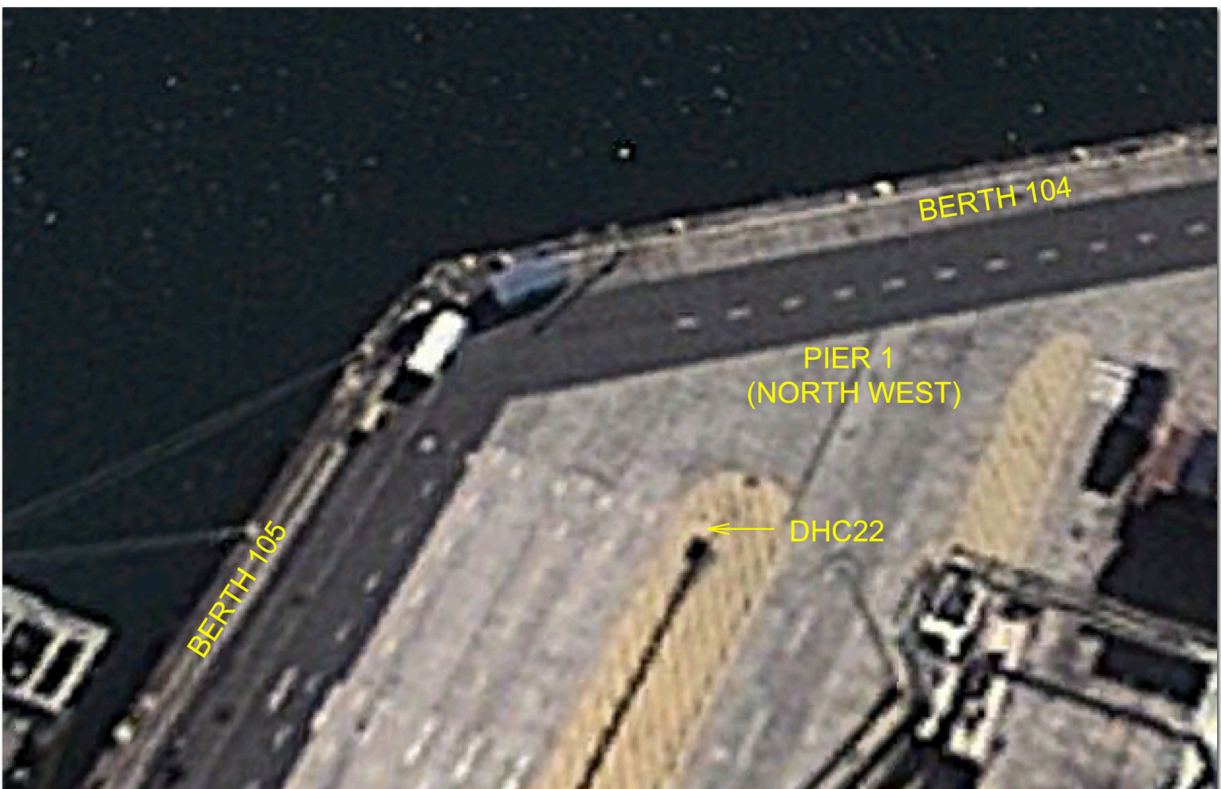
DHC19
12mm Round Iron Peg
WG 31



DHC20
12mm Round Iron Peg
WG 31



DHC21
12mm Round Iron Peg
WG 31



DHC22
12mm Round Iron Peg
WG 31



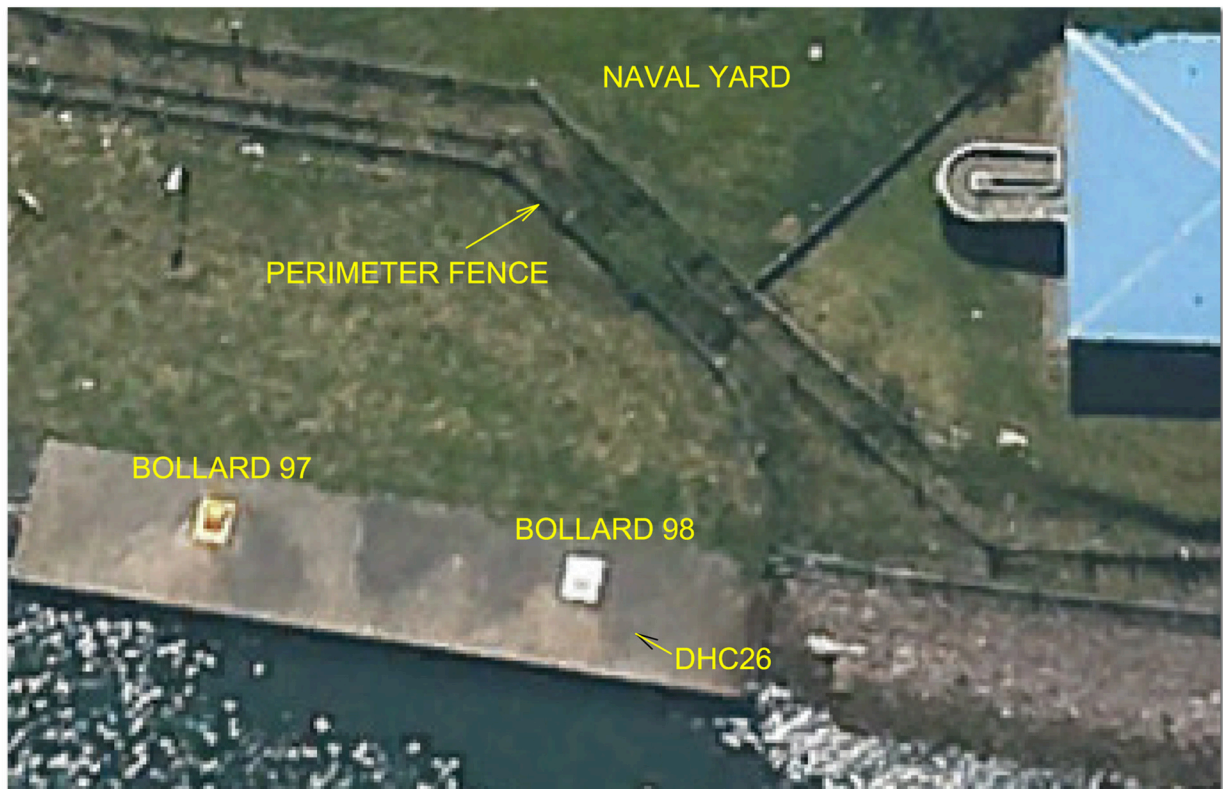
DHC23
12mm Round Iron Peg
WG 31



DHC24
12mm Round Iron Peg
WG 31



DHC25
12mm Round Iron Peg
WG 31



DHC26
12mm Round Iron Peg
WG 31



DHC27
12mm Round Iron Peg
WG 31



DHC28
12mm Round Iron Peg
WG 31



DHC29
12mm Round Iron Peg
WG 31



DHC30
12mm Round Iron Peg
WG 31

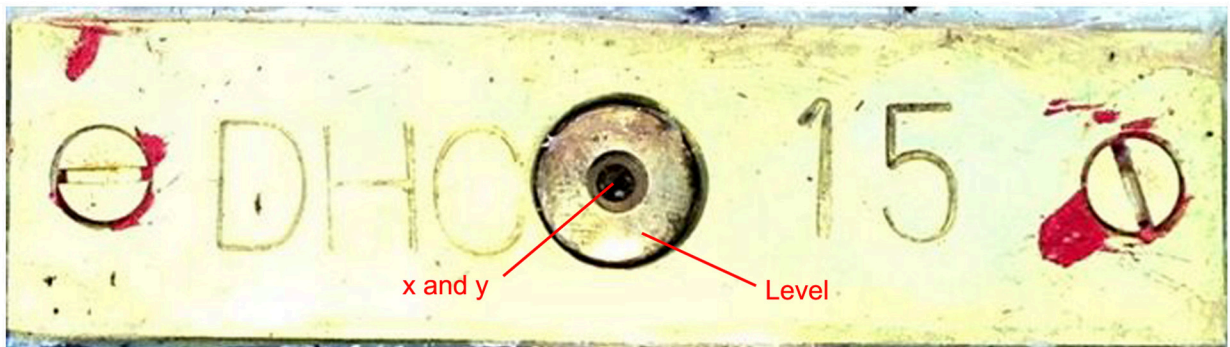
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ANNEXURE 2

DURBAN HARBOUR CONTROL



DHC15

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ANNEXURE 3

DURBAN HARBOUR CONTROL

Project Information
 Name: Durban Harbour Control
 Datum: Hartebeesthoek 94
 Zone: WG 31
 Time zone: SA Standard Time
 Geoid: South Africa Geoid 2010

Coordinate System
 Name: South Africa
 Datum: Hartebeesthoek 94
 Zone: WG 31
 Geoid: South Africa Geoid 2010

Annexure 3

Observation	From	To	Occupation Start Time	Occupation Stop Time	Solution Type	H. Prec. (Meter)	V. Prec. (Meter)	DX (Meter)	DY (Meter)	DZ (Meter)	Geodetic Az.	Ellipsoid Dist. (Meter)	DHeight (Meter)	Processing Start Time	Processing Stop Time	Satellite Available
DRBA — BASE2	DRBA	BASE2	41421.45145	41421.68354	Fixed	0.003	0.01	-1272231	-1359784	-3058851	8°10'52"	3580931	-31654	41421.4514	41421.6835	GPS: 19 GLONASS: 0
BASE2 — DHC20	BASE2	DHC20	41421.5062	41421.51322	Fixed	0.004	0.006	-206700	282236	-54157	280°12'38"	353996	-0.677	41421.5062	41421.5132	GPS: 8 GLONASS: 6
DHC16	BASE2	DHC16	41421.46253	41421.47053	Fixed	0.004	0.006	246796	-499592	-80124	80°33'26"	567953	0.178	41421.4625	41421.4705	GPS: 8 GLONASS: 6
BASE1	BASE2	BASE1	41421.47655	41421.48247	Fixed	0.004	0.006	422162	-478967	199649	110°08'44"	668943	0.072	41421.4766	41421.4825	GPS: 10 GLONASS: 6
DHC17	BASE2	DHC17	41421.47853	41421.48547	Fixed	0.004	0.005	431144	-465249	226132	112°46'38"	673404	-0.123	41421.4785	41421.4855	GPS: 10 GLONASS: 6
DHC19	BASE2	DHC19	41421.48418	41421.50115	Fixed	0.005	0.007	-26916	567051	468983	222°44'59"	736349	-0.446	41421.4942	41421.5011	GPS: 10 GLONASS: 6
DHC21	BASE2	DHC21	41421.51869	41421.52563	Fixed	0.006	0.009	-429366	769525	50851	266°12'40"	887667	-0.68	41421.5187	41421.5256	GPS: 8 GLONASS: 6
DHC22	BASE2	DHC22	41421.52301	41421.52999	Fixed	0.005	0.01	-301072	1155645	588303	239°22'18"	1331255	-0.394	41421.523	41421.53	GPS: 8 GLONASS: 6
DHC24	BASE2	DHC24	41421.53808	41421.54509	Fixed	0.006	0.01	-577347	1090348	118184	263°42'19"	1239411	-0.581	41421.5381	41421.5451	GPS: 9 GLONASS: 6
DHC25	BASE2	DHC25	41421.54257	41421.5497	Fixed	0.006	0.011	-721775	1431516	208534	261°27'26"	1616680	-0.602	41421.5426	41421.5497	GPS: 9 GLONASS: 6
DHC26	BASE2	DHC26	41421.55604	41421.563	Fixed	0.008	0.011	-909777	1291153	-197200	278°14'00"	1591738	-0.618	41421.556	41421.563	GPS: 9 GLONASS: 6
DHC28	BASE2	DHC28	41421.57728	41421.58422	Fixed	0.007	0.012	-1154168	1537801	-340691	281°37'20"	1952682	-0.384	41421.5773	41421.5842	GPS: 9 GLONASS: 6
DHC30	BASE2	DHC30	41421.58961	41421.59656	Fixed	0.008	0.016	-1436530	3193346	725028	256°29'39"	3575837	-1.065	41421.5896	41421.5966	GPS: 7 GLONASS: 5
DHC15	BASE2	DHC15	41421.61294	41421.62	Fixed	0.010	0.015	-571543	-1395934	-2102396	20°23'48"	2587526	-0.16	41421.6129	41421.62	GPS: 10 GLONASS: 6
DHC12	BASE2	DHC12	41421.63519	41421.64215	Fixed	0.007	0.011	659854	-1494684	-355347	75°48'08"	1672043	-0.425	41421.6352	41421.6422	GPS: 10 GLONASS: 8
DHC13	BASE2	DHC13	41421.64433	41421.65128	Fixed	0.005	0.007	299925	-1028193	-473148	62°11'47"	1170893	-0.59	41421.6443	41421.6513	GPS: 10 GLONASS: 8
DHC10	BASE2	DHC10	41421.6631	41421.67006	Fixed	0.006	0.011	1056096	-1953206	-174479	84°48'05"	2227273	-0.554	41421.6631	41421.6701	GPS: 9 GLONASS: 8
DHC08	BASE2	DHC08	41422.39179	41422.39895	Fixed	0.006	0.008	816665	-933507	381787	109°49'18"	1297736	-0.57	41422.3918	41422.3989	GPS: 9 GLONASS: 9
DHC06	BASE2	DHC06	41422.40825	41422.41524	Fixed	0.007	0.01	961779	-14147	1423431	162°48'35"	1717948	-0.567	41422.4083	41422.4152	GPS: 9 GLONASS: 8
DHC03	BASE2	DHC03	41422.42627	41422.43323	Fixed	0.009	0.018	-261164	1652431	1093820	230°52'49"	1998784	-0.651	41422.4263	41422.4332	GPS: 9 GLONASS: 8
DHC05	BASE2	DHC05	41422.4326	41422.43961	Fixed	0.007	0.013	331648	1685500	2008674	208°48'25"	2643028	-0.629	41422.4326	41422.4396	GPS: 9

ASP1	BASE2	ASP1	41422.45656	41422.46358	Fixed	0.007	0.013	-1188248	2969559	893435	251°56'13"	3320892	-0.653	41422.4566	41422.4636	GLONASS:	7
																GPS:	8
DHC01	BASE2	DHC01	41422.47316	41422.48015	Fixed	0.013	0.018	-1201413	2995809	896491	252°01'51"	3349902	-0.215	41422.4732	41422.4802	GLONASS:	6
																GPS:	10
BASE2 --- DHC23	BASE2	DHC23	41421.5305	41421.53744	Fixed	0.005	0.009	-407719	1397799	646172	242°06'53"	1592981	-0.355	41421.5305	41421.5374	GLONASS:	5
																GPS:	8
BASE2 --- DHC27	BASE2	DHC27	41421.55498	41421.56199	Fixed	0.006	0.01	-771724	475021	-723244	316°02'38"	1159427	-0.932	41421.555	41421.562	GLONASS:	6
																GPS:	9
DHC26	DHC27	DHC26	41421.55604	41421.56199	Fixed	0.006	0.01	-138051	816133	526043	231°46'53"	980735	0.316	41421.556	41421.562	GLONASS:	6
																GPS:	9
BASE2 --- DHC29	BASE2	DHC29	41421.59128	41421.59826	Fixed	0.007	0.015	-1348470	2169617	-63760	271°39'36"	2555309	-0.211	41421.5913	41421.5983	GLONASS:	6
																GPS:	7
DHC30	DHC29	DHC30	41421.59128	41421.59656	Fixed	0.006	0.013	-88060	1023728	788788	225°24'40"	1295355	-0.854	41421.5913	41421.5966	GLONASS:	5
																GPS:	7
BASE2 --- DHC17X	BASE2	DHC17X	41421.61659	41421.62359	Fixed	0.004	0.006	446772	-486234	230390	112°19'39"	699359	-0.2	41421.6166	41421.6236	GLONASS:	10
																GPS:	6
BASE2 --- DHC14	BASE2	DHC14	41421.62697	41421.63499	Fixed	0.006	0.01	-86619	-1579177	-1541682	36°20'17"	2208627	-1316	41421.627	41421.635	GLONASS:	10
																GPS:	6
BASE2 --- DHC11	BASE2	DHC11	41421.64991	41421.65686	Fixed	0.006	0.01	852765	-1886507	-419205	76°45'44"	2112298	-0.199	41421.6499	41421.6569	GLONASS:	9
																GPS:	8
BASE2 --- DHC09	BASE2	DHC09	41422.39382	41422.40079	Fixed	0.007	0.008	702724	-1210701	-36137	88°16'35"	1400322	-0.579	41422.3938	41422.4008	GLONASS:	10
																GPS:	9
DHC08	DHC09	DHC08	41422.39382	41422.39895	Fixed	0.005	0.006	113942	277196	417925	200°21'26"	514275	0.011	41422.3938	41422.3989	GLONASS:	9
																GPS:	9
BASE2 --- DHC07	BASE2	DHC07	41422.40419	41422.41125	Fixed	0.007	0.01	964605	-578716	920653	136°54'35"	1453601	-0.57	41422.4042	41422.4113	GLONASS:	8
																GPS:	8
BASE2 --- DHC04	BASE2	DHC04	41422.43631	41422.44331	Fixed	0.007	0.013	-93006	1546430	1249766	223°37'19"	1990470	-0.76	41422.4363	41422.4433	GLONASS:	9
																GPS:	9
DHC05	DHC04	DHC05	41422.43631	41422.43961	Fixed	0.006	0.011	424652	139065	758909	173°29'46"	880683	0.127	41422.4363	41422.4396	GLONASS:	7
																GPS:	9
BASE2 --- DHC02	BASE2	DHC02	41422.46186	41422.46888	Fixed	0.009	0.016	-826494	2273745	807318	248°35'38"	2550431	0.098	41422.4619	41422.4689	GLONASS:	8
																GPS:	8
DRBA --- DHC14	DRBA	DHC14	41421.62697	41421.63499	Fixed	0.010	0.016	-1358926	-2939016	-4600482	18°51'25"	5625608	-33076	41421.627	41421.635	GLONASS:	6
																GPS:	10
DHC16	DRBA	DHC16	41421.46253	41421.47053	Fixed	0.010	0.017	-1025516	-1859429	-3138927	16°19'13"	3789579	-31583	41421.4625	41421.4705	GLONASS:	0
																GPS:	8
BASE1	DRBA	BASE1	41421.47655	41421.48247	Fixed	0.010	0.014	-850144	-1838799	-2859159	18°56'43"	3503947	-31680	41421.4766	41421.4825	GLONASS:	0
																GPS:	10
DHC17	DRBA	DHC17	41421.47853	41421.48547	Fixed	0.010	0.013	-841160	-1825081	-2832678	18°59'47"	3472959	-31873	41421.4785	41421.4855	GLONASS:	0
																GPS:	10
DHC19	DRBA	DHC19	41421.49418	41421.50115	Fixed	0.014	0.018	-1299230	-797782	-2589824	0°11'11"	3003770	-32205	41421.4942	41421.5011	GLONASS:	0
																GPS:	10
DHC21	DRBA	DHC21	41421.51869	41421.52563	Fixed	0.015	0.02	-1701672	-590306	-3007963	353°55'22"	3505834	-32428	41421.5187	41421.5256	GLONASS:	0
																GPS:	8
DHC22	DRBA	DHC22	41421.52301	41421.52999	Fixed	0.011	0.018	-1573380	-204184	-2470500	347°29'26"	2935905	-32088	41421.523	41421.53	GLONASS:	0
																GPS:	8
DHC24	DRBA	DHC24	41421.53808	41421.54509	Fixed	0.011	0.021	-1849651	-269472	-2940607	348°02'04"	3484232	-32335	41421.5381	41421.5451	GLONASS:	0
																GPS:	9
DHC25	DRBA	DHC25	41421.54257	41421.5497	Fixed	0.011	0.02	-1994081	71696	-2850259	341°45'24"	3479133	-32356	41421.5426	41421.5497	GLONASS:	0
																GPS:	9
																GLONASS:	0

DHC26	DRBA	DHC26	41421.55604	41421.563	Fixed	0.014	0.023	-2182092	-68683	-3255997	344°13'27"	3920023	-32384	41421.556	41421.563	GPS:	9
DHC28	DRBA	DHC28	41421.57728	41421.58422	Fixed	0.012	0.021	-2426482	17967	-3399491	340°23'18"	4180291	-32147	41421.5773	41421.5842	GPS:	9
DHC30	DRBA	DHC30	41421.58961	41421.59656	Fixed	0.012	0.028	-2708845	1833511	-2333771	312°23'47"	4018071	-32831	41421.5896	41421.5966	GPS:	7
DHC15	DRBA	DHC15	41421.61294	41421.62	Fixed	0.011	0.019	-1843852	-2755769	-5161202	13°18'02"	6134376	-31918	41421.6129	41421.62	GPS:	10
DHC12	DRBA	DHC12	41421.63519	41421.64215	Fixed	0.013	0.019	-612450	-2854518	-3414143	28°18'47"	4492050	-32183	41421.6352	41421.6422	GPS:	10
DHC13	DRBA	DHC13	41421.64433	41421.65128	Fixed	0.011	0.017	-972381	-2388032	-3531946	20°41'39"	4372829	-32351	41421.6443	41421.6513	GPS:	10
DHC10	DRBA	DHC10	41421.6631	41421.67006	Fixed	0.012	0.019	-216206	-3313036	-3233290	36°03'27"	4634205	-32301	41421.6631	41421.6701	GPS:	9
DHC08	DRBA	DHC08	41422.39179	41422.39895	Fixed	0.013	0.016	-455680	-2293352	-2676987	29°08'07"	3554188	-32329	41422.3918	41422.3989	GPS:	9
DHC06	DRBA	DHC06	41422.40825	41422.41524	Fixed	0.011	0.016	-310578	-1374004	-1635346	28°07'34"	2158169	-32338	41422.4083	41422.4152	GPS:	9
DHC03	DRBA	DHC03	41422.42627	41422.43323	Fixed	0.015	0.028	-1533508	292577	-1964958	335°29'22"	2509439	-32411	41422.4263	41422.4332	GPS:	9
DHC05	DRBA	DHC05	41422.4326	41422.43961	Fixed	0.009	0.015	-940686	325657	-1050114	328°07'34"	1446618	-32372	41422.4326	41422.4396	GPS:	9
ASP1	DRBA	ASP1	41422.45656	41422.46358	Fixed	0.011	0.019	-2460598	1609700	-2165352	313°31'30"	3651479	-32416	41422.4566	41422.4636	GPS:	8
DHC01	DRBA	DHC01	41422.47316	41422.48015	Fixed	0.010	0.014	-2473755	1635956	-2162288	313°10'03"	3670177	-31973	41422.4732	41422.4802	GPS:	10
DHC18	DRBA	DHC18	41431.44275	41431.4498	Fixed	0.011	0.018	-1054562	-1382861	-2754997	11°21'25"	3257816	-31784	41431.4428	41431.4498	GPS:	8
DHC24N	DRBA	DHC24N	41431.53519	41431.54215	Fixed	0.017	0.029	-1855674	-253824	-2935875	347°44'59"	3482270	-32377	41431.5352	41431.5422	GPS:	9
DHC12N	DRBA	DHC12N	41431.55723	41431.56418	Fixed	0.015	0.029	-612493	-2854476	-3414185	28°18'44"	4492062	-32175	41431.5572	41431.5642	GPS:	10
DHC2N	DRBA	DHC2N	41431.59354	41431.60049	Fixed	0.017	0.028	-2098681	913991	-2251533	324°29'24"	3210638	-31746	41431.5935	41431.6005	GPS:	10
DRBA — DHC20	DRBA	DHC20	41421.5062	41421.51322	Fixed	0.012	0.017	-1479019	-1077600	-3112953	2°33'31"	3610826	-32448	41421.5062	41421.5132	GPS:	8
DRBA — DHC23	DRBA	DHC23	41421.5305	41421.53744	Fixed	0.010	0.017	-1680025	37971	-2412623	342°12'25"	2940006	-32112	41421.5305	41421.5374	GPS:	8
DRBA — DHC27	DRBA	DHC27	41421.55498	41421.56199	Fixed	0.013	0.022	-2044045	-884819	-3782038	356°08'35"	4389031	-32706	41421.555	41421.562	GPS:	9
DRBA — DHC29	DRBA	DHC29	41421.59128	41421.59826	Fixed	0.012	0.027	-2620785	809783	-3122558	330°31'49"	4156134	-31977	41421.5913	41421.5983	GPS:	7
DRBA — DHC17X	DRBA	DHC17X	41421.61659	41421.62359	Fixed	0.009	0.014	-825538	-1846069	-2828408	19°25'44"	3476822	-31962	41421.6166	41421.6236	GPS:	10
DRBA — DHC11	DRBA	DHC11	41421.64991	41421.65686	Fixed	0.011	0.018	-419537	-3246341	-3478010	32°29'39"	4775987	-31951	41421.6499	41421.6569	GPS:	9
DRBA — DHC09	DRBA	DHC09	41422.39382	41422.40079	Fixed	0.014	0.017	-569631	-2570553	-3094906	28°01'38"	4063185	-32352	41422.3938	41422.4008	GPS:	10
DRBA — DHC07	DRBA	DHC07	41422.40419	41422.41125	Fixed	0.014	0.02	-307750	-1538576	-2138127	31°10'53"	2902296	-32340	41422.4042	41422.4113	GPS:	8
DRBA — DHC04	DRBA	DHC04	41422.43631	41422.44331	Fixed	0.010	0.018	-1365340	186586	-1809025	337°40'48"	2273879	-32502	41422.4363	41422.4433	GPS:	10

DRBA --- DHC02	DRBA	DHC02	41422.46186	41422.46888	Fixed	0.013	0.023	-2098854	913883	-2251457	324°29'26"	3210665	-31679	41422.4619	41422.4689	GLONASS: GPS:	0
DRBA --- DHC3N	DRBA	DHC3N	41431.61841	41431.62539	Fixed	0.012	0.019	-1533476	292573	-1964880	335°29'20"	2509358	-32428	41431.6184	41431.6254	GLONASS: GPS:	0
DRBA --- DHC5N	DRBA	DHC5N	41431.65264	41431.65958	Fixed	0.010	0.015	-940465	325862	-1050223	328°07'23"	1446607	-32388	41431.6526	41431.6596	GLONASS: GPS:	0
DHC18N	BASE2	DHC18N	41431.44275	41431.4498	Fixed	0.004	0.006	217737	-23042	303816	159°22'10"	374491	-0.029	41431.4428	41431.4498	GLONASS: GPS:	0
DHC24N	BASE2	DHC24N	41431.53519	41431.54215	Fixed	0.006	0.011	-583362	1106004	122933	263°32'08"	1256444	-0.606	41431.5352	41431.5422	GLONASS: GPS:	6
DRBA --- BASE2	BASE2	DRBA	41431.39622	41431.68061	Fixed	0.003	0.009	1277296	1359820	3058816	188°11'01"	3580936	31751	41431.3962	41431.6806	GLONASS: GPS:	21
DRBA --- BASE2	BASE2	DRBA	41439.41778	41439.55541	Fixed	0.004	0.012	1277500	1359940	3058682	188°11'01"	3580938	31790	41439.4178	41439.5554	GLONASS: GPS:	0
DHC12N	BASE2	DHC12N	41431.55723	41431.56418	Fixed	0.009	0.018	659816	-1494654	-355375	75°48'03"	1672007	-0.41	41431.5572	41431.5642	GLONASS: GPS:	17
DHC2N	BASE2	DHC2N	41431.59354	41431.60049	Fixed	0.015	0.025	-826374	2273805	807278	248°35'36"	2550434	0.014	41431.5935	41431.6005	GLONASS: GPS:	10
TSM620N1C	BASE2	TSM620N1C	41439.45367	41439.46072	Fixed	0.007	0.009	972798	-11154	1442284	162°55'26"	1739716	-0.892	41439.4537	41439.4607	GLONASS: GPS:	6
TSM620N1C	DRBA	TSM620N1C	41439.45367	41439.46072	Fixed	0.010	0.014	-299677	-1371072	-1616420	28°28'29"	2140432	-32642	41439.4537	41439.4607	GLONASS: GPS:	8
TSM32N1C	BASE2	TSM32N1C	41439.48094	41439.48797	Fixed	0.017	0.049	-949091	2720246	1025806	247°15'06"	3058218	-0.593	41439.4809	41439.488	GLONASS: GPS:	0
TSM32N1C	DRBA	TSM32N1C	41439.48094	41439.48797	Fixed	0.010	0.018	-2221563	1360323	-2032898	315°37'36"	3304150	-32343	41439.4809	41439.488	GLONASS: GPS:	8
BASE2 --- DHC3N	BASE2	DHC3N	41431.61841	41431.62539	Fixed	0.007	0.012	-261171	1652398	1093931	230°52'40"	1998818	-0.665	41431.6184	41431.6254	GLONASS: GPS:	0
BASE2 --- DHC5N	BASE2	DHC5N	41431.65264	41431.65958	Fixed	0.011	0.017	331832	1685685	2008596	208°48'27"	2643110	-0.637	41431.6526	41431.6596	GLONASS: GPS:	9
BASE2 --- TIDE G	BASE2	TIDE G	41439.49943	41439.50647	Fixed	0.009	0.016	-1213079	2967356	854076	252°44'20"	3317544	-0.653	41439.4994	41439.5065	GLONASS: GPS:	7
BASE2 --- DHC14C	BASE2	DHC14C	41439.54066	41439.54763	Fixed	0.007	0.013	-86230	-1578949	-1541936	36°20'18"	2208626	-1316	41439.5407	41439.5476	GLONASS: GPS:	9
DRBA --- TIDE G	DRBA	TIDE G	41439.49943	41439.50647	Fixed	0.015	0.025	-2485565	1607423	-2204619	313°55'05"	3690671	-32423	41439.4994	41439.5065	GLONASS: GPS:	6
DRBA --- DHC14C	DRBA	DHC14C	41439.54066	41439.54763	Fixed	0.012	0.024	-1358714	-2938876	-4600633	18°51'24"	5625608	-33080	41439.5407	41439.5476	GLONASS: GPS:	0
TSM575N1C	DRBA	TSM575N1C	41439.49684	41439.44769	Fixed	0.012	0.018	-296094	-1954656	-2134916	31°33'06"	2909495	-32460	41439.4968	41439.4477	GLONASS: GPS:	9
TSM575N1C	BASE2	TSM575N1C	41439.49684	41439.44769	Fixed	0.010	0.015	976383	-594714	923772	136°26'36"	1469810	-0.688	41439.4968	41439.4477	GLONASS: GPS:	0

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Acceptance Summary			
Processed	94	Flag	0
		Fail	0

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