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January 7, 2006

**Reef Ball Breakwater Project in Chesapeake Bay  
Chesapeake Ranch Estates  
Lusby, Calvert County, MD 20657**

**Field Work Performed – Beach Profile Survey Dates:**

**Pre-construction survey performed July 14-16, 2005**

**Post-construction survey performed January 6-7, 2006**

***Beach Profile Survey Locations***

Beach profile surveys were performed in July 2005 to determine the location of the Reef Ball breakwater. The breakwater was constructed in August 2005, and post-construction monitoring was performed in January 2006. The Table below summarizes the survey baseline points that are used for the beach profile surveys, with the elevations as given by the surveyor for the original points set.

**Table 1. Profile Line Information**

| <i>Profile Line</i> | <i>Locations</i>                  | <i>Remarks/Elevations</i>                |
|---------------------|-----------------------------------|--|
| PL-N                | 100 feet north of north end of BW | Control -Set FR in Jan 2006              |
| PL-0                | At the north end of BW            | Upper IR elev. 2.79; lower IR elev. 2.49 |
| PL-1                | 100 feet south of north end of BW | IR elev. 3.84 (buried 2' in 2006)        |
| PL-2                | 200 feet south of north end of BW | IR elev. 3.76; missing in 2006-reset     |
| PL-3                | 300 feet south of north end of BW | IR elev. 4.51                            |
| PL-4                | 400 feet south of north end of BW | IR missing; Reset IR 7' further landward |
| PL-5                | At the south end of BW            | Upper IR elev. 5.08; lower IR elev. 3.71 |
| PL-5.5              | 50 feet south of south end of BW  | Control - Set FR in Jan 2006             |
| PL-6                | 100 feet south of south end of BW | Control - Set FR in Jan 2006             |

Nomenclature:

IR = iron rod (rebar)

IP = iron pipe (galvanized)

FR = fiberglass rod (rebar)

The November 2005 aerial photograph shown in Figure 1 shows the location of the Reef Ball breakwater and the beach profile lines. Profile lines 0 through 5 were surveyed in July 2005 and were used to determine the location of the breakwater. These profile lines were surveyed again in January 2006, and three additional lines were added north and south of the breakwater.

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**Figure 1. Locations of Beach Profile Lines**

### **Water Level Data**

The closest tide station is Cove Point, MD, NOAA Station ID: 8577188

NOAA Chart: 12264

Latitude: 38° 23.5' N

USGS Quad: COVE POINT

Longitude: 76° 23.9' W

Elevations of tidal datums for Cove Point referred to Mean Lower Low Water (MLLW) in meters:

|                               |         |
|-------------------------------|---------|
| MEAN HIGHER HIGH WATER (MHHW) | = 0.420 |
| MEAN HIGH WATER (MHW)         | = 0.344 |
| MEAN SEA LEVEL (MSL)          | = 0.191 |
| MEAN TIDE LEVEL (MTL)         | = 0.186 |
| MEAN LOW WATER (MLW)          | = 0.028 |
| MEAN LOWER LOW WATER (MLLW)   | = 0.000 |

The next closest is Solomons Island, Patuxent river, NOAA Station ID: 8577330

NOAA Chart: 12284

Latitude: 38° 19.0' N

USGS Quad: SOLOMONS ISLAND

Longitude: 76° 27.1' W

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Tidal datums at Solomons Island, Patuxent River based on:

LENGTH OF SERIES: 19 Years  
TIME PERIOD: January 1983 - December 2001  
TIDAL EPOCH: 1983-2001

Elevations of tidal datums for Solomons Island referred to Mean Lower Low Water (MLLW), in meters:

HIGHEST OBSERVED WATER LEVEL (08/13/1955) = 1.303  
MEAN HIGHER HIGH WATER (MHHW) = 0.449  
MEAN HIGH WATER (MHW) = 0.404  
NORTH AMERICAN VERTICAL DATUM-1988 (NAVD) = 0.259  
MEAN SEA LEVEL (MSL) = 0.230  
MEAN TIDE LEVEL (MTL) = 0.226  
MEAN LOW WATER (MLW) = 0.048  
MEAN LOWER LOW WATER (MLLW) = 0.000  
LOWEST OBSERVED WATER LEVEL (12/31/1962) = -1.135

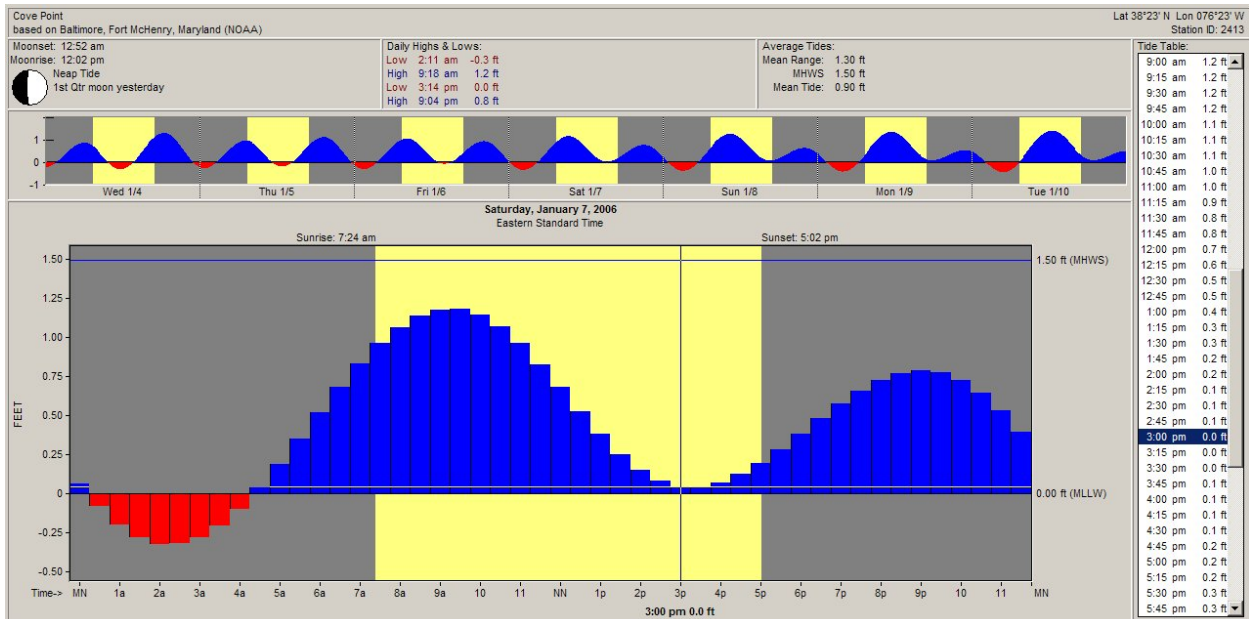
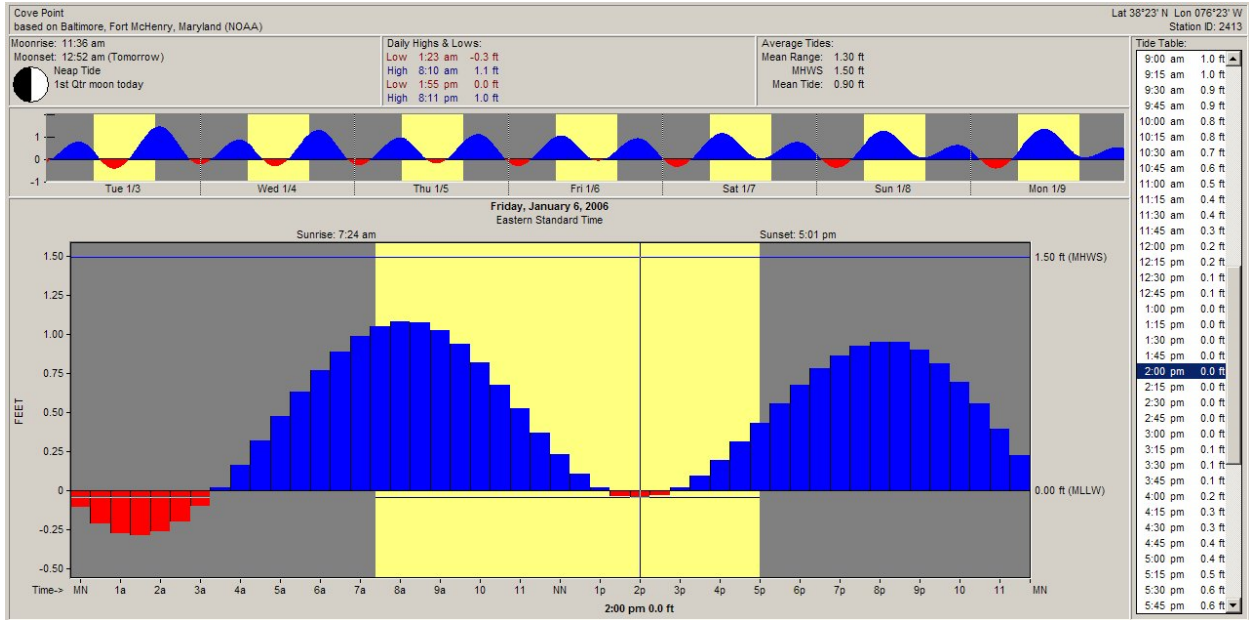
Table 2 presents the tide data for these two stations for comparison, in units of meters and in feet.

**Table 2. Tide Station Water Level Datums (from NOAA, MLLW datum)**

| <i>Water Level Datum</i> | <i>Solomons (meters)</i> | <i>Cove Point (meters)</i> | <i>Difference (meters)</i> | <i>Solomons (feet)</i> | <i>Cove Point (feet)</i> | <i>Difference (feet)</i> |
|--------------------------|--------------------------|----------------------------|----------------------------|------------------------|--------------------------|--------------------------|
| Highest Observed         | 1.303                    |                            |                            | 4.27                   |                          |                          |
| MHHW                     | 0.449                    | 0.42                       | 0.029                      | 1.47                   | 1.38                     | 0.10                     |
| MHW                      | 0.404                    | 0.344                      | 0.060                      | 1.33                   | 1.13                     | 0.20                     |
| NAVD88                   | 0.259                    |                            |                            | 0.85                   |                          |                          |
| MSL                      | 0.23                     | 0.191                      | 0.039                      | 0.75                   | 0.63                     | 0.13                     |
| MTL                      | 0.226                    | 0.186                      | 0.040                      | 0.74                   | 0.61                     | 0.13                     |
| MLW                      | 0.048                    | 0.028                      | 0.020                      | 0.16                   | 0.09                     | 0.07                     |
| MLLW                     | 0.000                    | 0.000                      | 0.000                      | 0.00                   | 0.00                     | 0.00                     |
| Lowest Observed          | -1.135                   |                            |                            | -3.72                  |                          |                          |

Note: blank table values indicate no information available from NOAA.

Predicted tides for the January 2006 survey dates are shown in Figure 2. Field work was performed from 2pm to 5pm on January 6, and the low tide that afternoon was predicted to be 0.0 MLLW at 2pm. Field work was performed from 11am to 2pm on January 7, and the low tide that afternoon was predicted to be 0.0 MLLW at 3pm. Due to stronger onshore winds on January 6, the water levels on that date were a little higher than on January 7.



**Figure 2. Predicted Tides for January 6 and 7, 2006**

**Beach Profile Data**

Beach profile survey data from July 2005 and January 2006 are shown in the graphs on the following pages. All profile lines landward of the breakwater show stabilization of the shoreline, with sand accretion of one to over two feet vertically on all of the beach areas except for PL-3. Shoreline advance varied from 0 to over 20 feet horizontally.

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