ADDENDUM TO BRE DOCUMENT 215-693

TITLED

HMS VICTORY NEW MOVEMENT MONITORING SURVEY METHODOLOGY

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Compiled By: Barry Warburton

Signature: BL Warburton

Position: Principal Design Engineer

Date: 26th January 2017

Checked By: Bill Perry

Signature: BTR

Position: Design Services Manager

Date: 03/02/17

Introduction:

This Addendum reflects the current methodology undertaken by BAE staff whilst performing the Movement Monitoring of HMS Victory. Over the years the method has changed to ensure that the task is more streamlined to enable little disruption to the Victory's tourism trade. Additionally at the request of the stakeholder more measurement positions have been introduced in vulnerable areas. Although not stated in the original report the following statements are recommended:

- Prior to undertaking the task; a walk around of the job is performed. Frequently items are moved that obscure Datum Points; this will require either additional set ups or the NMRN need to be informed such that the items can be moved
- All arena work must be performed before 10am for safety reasons. Datum's D1 and D2 are sited under drain covers that are trip hazards. If these are opened whilst tourists are within the vicinity; it increases the chance of an accident
- BAE have been requested by Ships Staff to ensure that all equipment is minded; this includes instrumentation and support equipment. Due to the site security any equipment left unattended is liable to be blown up and can cause disruption
- All arena work must be completed before 10am.
- A Harness is required for all Dock side work
- Ships safety procedure must be adhered to
- On completion of the prop installation; the original document is up-issued to reflect monitoring changes

Glossary of Terms:

- Anything appertaining to Leica TPS 700 series 2 "total station" is to be changed to suitable device.
- Anything appertaining to Leica Disto Pro4 is to be changed to Hilti PD-1. The original Disto was damaged and had to be replaced.

1. Relating onboard fixed point to stable land datum

The opening introduction a 'Perspex' dust cap is replaced by stainless steel.

1. As per methodology

2. Paragraph 2 should now read: Set up suitable device on its tripod in an arbitrary position on the Stbd side of the arena such that the following Datum's are viewed; D1, D2 and onboard fixed point (OBP).

3. Paragraph 3 should now read: Screw the prism adaptor hand tight into the target socket at Datum D1 and set the circular prism on the prism adaptor to face directly towards the total station.

4. Paragraph 4 should now read: Enter the height of the reflector into the total station. This will be a height of 0.052m (52mm).

5. Paragraph 5 should now read: Activate the total station and take a measurement of the circular prism sited on Datum D1.

6. Paragraph 6 should now read: Repeat procedures 1.3 – 1.5 for Datum D2.

7. Paragraph 7: Is per Paragraph 6 on the methodology.

8. Paragraph 8 should now read: Enter the height of the reflector indicated on the pole into the total station. This is has been set at 1.400m by BAE staff but can be adjusted. Activate the total station and take a measurement of the circular prism sited on OBP.

9. Paragraph 9 (new): Set up suitable device on its tripod in an arbitrary position on the Port side of the arena such that the following Datum's are viewed; D1, D2 and onboard fixed point (OBP).

10. Paragraph 10 (new): Screw the prism adaptor hand tight into the target socket at Datum D2 and set the circular prism on the prism adaptor to face directly towards the total station.

11. Paragraph 11 (new): Enter the height of the reflector into the total station. This will be a height of 0.052m (52mm).

12. Paragraph 12 (new): Activate the total station and take a measurement of the circular prism sited on Datum D2.

13. Paragraph 13 (new): Repeat procedures 1.10 – 1.12 for Datum D1.

14. Paragraph 14 (new): Repeat procedures 1.7 & 1.8 for onboard fixed point (OBP).

2. Settlement of deck measuring points on the Middle gun deck

Introduction as per Methodology

1. As per Methodology

2. Paragraph 2 should now read: Position the base pin of the special bar code level staff on the onboard fixed point (copper nail). Use a torch if required to down light the bar coding at the sighting elevation. Note: The halogen staff illuminator was too bright and the Leica DNA03 digital level struggled to take readings. Notes below Paragraph 2 are to be ignored.

3. Paragraph 3 should now read: Enter the 'back sight' identification information. The elevation of the onboard fixed point should be set at 0 into the digital level, sight and focus on the staff and record reading. Final height to be determined from Total Station reading and all other readings adjusted to suit.

4. As per Methodology

5. As per Methodology

6. As per Methodology

7. As per Methodology

3. Measurement of deck to beam distance

The following information is to be added to the introduction: There are minor changes to the positions of the measurements due to accessibility. Additional points are measured in accordance with the Methodology on the Orlop Deck Carpenter Walk at beams 22 and 24 on both the Stbd and Port sides.

1. As per Methodology

2. As per Methodology

4. Measurement of beam spread

Introduction as per methodology

1. Paragraph 1 should now read: Screw the Hilti PD-1 into the threaded datum plate sited on the Stbd side. Activate and centre laser beam and centre on the Target plate sited on the Port side. Activate the measurement routine and record the distance. No line of sight can be obtained on the Orlop Deck at beams 5, 9 and 24

5. Measurement of movement at the top of Dry Dock No.2

Introduction as per methodology

1. Paragraph 1 should now read: Set up suitable device on its tripod in an arbitrary position on the Stbd side of the arena such that the following Datum's are viewed; D1, D2, S1, S2, S3 and S4. Note: These measurements can be undertaken to coincide with Section 1 Paragraph 2 of this addendum.

2. Paragraph 2 should now read: Screw the prism adaptor hand tight into the target socket at Datum D1 and set the circular prism on the prism adaptor to face directly towards the total station.

3. Paragraph 3 should now read: Enter the height of the reflector into the total station. This will be a height of 0.052m (52mm).

4. Paragraph 4 should now read: Activate the total station and take a measurement of the circular prism sited on Datum D1.

5. Paragraph 5 should now read: Repeat procedures 5.2 – 5.4 for Datum's D2, DH1, S1, S2, S3 & S4.

6. Paragraph 6 (new): Set up suitable device on its tripod in an arbitrary position on the Port side of the arena such that the following Datum's are viewed; D1, D2 and P1. Note: These measurements can be undertaken to coincide with Section 1 Paragraph 9 of this addendum.

7. Paragraph 7 (new): Screw the prism adaptor hand tight into the target socket at Datum D1 and set the circular prism on the prism adaptor to face directly towards the total station.
8. Paragraph 8 (new): Enter the height of the reflector into the total station. This will be a height of 0.052m (52mm).

9. Paragraph 9 (new): Activate the total station and take a measurement of the circular prism sited on Datum D1.

10. Paragraph 10 (new): Repeat procedures 5.7 – 5.9 for Datum's D2 & P1.

11. Paragraph 11 (new): Set up suitable device on its tripod in an arbitrary position on the Port side of the arena such that the following Datum's are viewed; D1, D2, P1, P2 and P3.

12. Paragraph 12 (new): Screw the prism adaptor hand tight into the target socket at Datum D1 and set the circular prism on the prism adaptor to face directly towards the total station.

13. Paragraph 13 (new): Enter the height of the reflector into the total station. This will be a height of 0.052m (52mm).

14. Paragraph 14 (new): Activate the total station and take a measurement of the circular prism sited on Datum D1.

15. Paragraph 15 (new): Repeat procedures 5.12 – 5.14 for Datum's D2, P1, P2 and P3.

16. Paragraph 16 (new): Set up suitable device on its tripod in an arbitrary position on the Port side of the arena such that the following Datum's are viewed; D2, P2, P3 and P4.

17. Paragraph 17 (new): Screw the prism adaptor hand tight into the target socket at Datum D2 and set the circular prism on the prism adaptor to face directly towards the total station.

18. Paragraph 18 (new): Enter the height of the reflector into the total station. This will be a height of 0.052m (52mm).

19. Paragraph 19 (new): Activate the total station and take a measurement of the circular prism sited on Datum D2.

20. Paragraph 20 (new): Repeat procedures 5.17 – 5.19 for Datum's D2, P2, P3 and P4.

Note: During each Total Station set up; a minimum of three in number targets must be measured that have been measured in the previous set up. Temporary targets may be required to enable this depending on lines of sight. This enables the data to be merged successfully. Additionally it states that all the Port side Datum's are to be measured from Datum D2. This has never been a possibility due to obstruction.

6. Measurement of vertical movement of the keel support

Introduction as per methodology

1. As per methodology
2. As per methodology
3. As per methodology however the staff steady is not used.
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9. As per methodology
10. As per methodology
11. As per methodology
12. As per methodology

7. Measurement of external hull positions within No.2 Dry Dock

Introduction as per methodology

1. Due to a lack of accuracy; Paragraph 1 on the methodology is no longer relevant. Paragraph should read: Set up suitable device on its tripod in a position such that both the Dock floor Datum and the Hull Datum can be viewed. Activate the machine and measure both points. Record the slope distance between the two Datum's. This is repeated for all eight positions.

8. Additional Measurements not included in the methodology

Measurement of Bow Sprit and Building

This procedure covers the measurement of movement of the Bow Sprit where there has been excessive movement in the past and on the building opposite HMS Victory. There are two prism's sited on the Bow Sprit BS1 and BS2. There is one prism sited on the building BD1. This building was used as a stable Datum on the previous movement monitoring regime (1974 – 2003). Note: these measurements can be undertaken to coincide with Section 1, Paragraphs 1.2 – 1.6 and Section 5, Paragraphs 5.1 – 5.5 of this document.

1. Set up Leica suitable device on its tripod in an arbitrary position on the Stbd side of the arena such that the following Datum's are viewed; D1, D2, DH1, BS1, BS2 and BD1.

2. Screw the prism adaptor hand tight into the target socket at Datum D1 and set the circular prism on the prism adaptor to face directly towards the total station.

3. Enter the height of the reflector into the total station. This will be a height of 0.052m (52mm).

4. Activate the total station and take a measurement of the circular prism sited on Datum D1.

5. Repeat procedures 8.2 – 8.4 for Datum's D2 and DH1.

6. Sight the total station on to the prism BS1 sited on the Bow Sprit.

7. Enter the height of the reflector into the total station. This will be a height of 0.000m (0mm).

8. Activate the total station and take a measurement of the prism sited on Datum BS1.

9. Repeat procedures 8.6 – 8.8 for Datum's BS2 and BD1.

Measurement of Gallery

This procedure covers the movement of the Gallery on the Transom at the Aft end of the vessel. There are two in number Datum's represented by Prism's

for this procedure; ST1 and ST2. Note: The measurement of ST1 can coincide with Section 5, Paragraph 5.16 of this document.

10. Set up suitable device on its tripod in an arbitrary position on the Port side of the arena such that the following Datum's are viewed; D2, P2, P3, P4 and ST1.

11. Screw the prism adaptor hand tight into the target socket at Datum D2 and set the circular prism on the prism adaptor to face directly towards the total station.

12. Enter the height of the reflector into the total station. This will be a height of 0.052m (52mm).

13. Activate the total station and take a measurement of the circular prism sited on Datum D2.

14. Repeat procedures 8.12 – 8.14 for Datum's D2, P2, P3 and P4.

15. Sight the total station on to the prism ST1 sited on the Port side of the Gallery.

16. Enter the height of the reflector into the total station. This will be a height of 0.000m (0mm).

17. Activate the total station and take a measurement of the prism sited on Datum ST1.

18. Set up suitable device on its tripod in an arbitrary position on the Stbd side of the arena such that the following Datum's are viewed; S1, S2, S3, S4 and ST2.

19. Screw the prism adaptor hand tight into the target socket at Datum S1 and set the circular prism on the prism adaptor to face directly towards the total station.

20. Enter the height of the reflector into the total station. This will be a height of 0.052m (52mm).

21. Activate the total station and take a measurement of the circular prism sited on Datum S1.

22. Repeat procedures 5.20 – 5.22 for Datum's S2, S3 and S4.

23. Sight the total station on to the prism ST2 sited on the Stbd side of the Gallery.

24. Enter the height of the reflector into the total station. This will be a height of 0.000m (0mm).

25. Activate the total station and take a measurement of the prism sited on Datum ST2.

Measurement of Mast verticality's

This procedure covers the measurement of the verticality of the mast. A Datum has been marked on the Deck in pencil (Note: this cannot be a permanent Datum due to the position on the Ship) for all three masts; Mizen, Main and Foremast. A corresponding azimuth Datum has been positioned at the base of all three masts. This is represented by an adhesive reflector target. Additionally there is a single adhesive reflector target positioned on all three masts on their mast caps. Note: The reflector targets are not positioned on the exact centre of the Mast Cap.

26. Set up suitable device on its tripod over the pencil Datum sited on the Deck for the Mizen Mast.

27. Sight the reflector target at the base of the mast.

28. Activate the machine and set the device azimuth angle to 0° and record.

29. Measure and record the reflector target at the base of the mast.

30. Sight the reflector target positioned on the Mast Cap.

31. Measure and record the reflector target on the Mast Cap. Record the value from the instrument.

32. Repeat procedures 8.28 – 8.33 for the Main and Fore Masts.

Figure 1

As per methodology

Figure 2

See Sheet below for updated Figure 2. Methodology is not be adhered to.

Figure 2. Outline of HMS Victory within No.2 Dry Dock with the approximate positions of the installed Deep datum's, Target sockets around the edge of the dock, additional prisms, and the on-board fixed point.