








STANDARD WORK METHOD



	Standard Work Instruction Sheet		SWIS ID	SOP.0738.01.SHE.Stockbay Inspection
			RA ID	Stockbays:- Inspection Procedure
	Description:	Stockbay Walls:- Visual Inspection Procedure (Various construction types)	Date	13.12.16
 FAMILIES	 CUSTOMERS	 EMPLOYEES	 COMMUNITIES	 SHAREHOLDERS



Tools & Equipment required:	Standard PPE, camera and check sheet.
Comments:	



No	Full Task Description	Visual Reference
1	<p>Ensure you have all the correct PPE before commencing.</p> <p>This inspection is intended to be carried out on a regular basis throughout the year to monitor the condition of the stockbays and report any collision damage or deterioration that could possibly affect the structural integrity of the installation and any potential safety hazard. The inspections are not intended to replace the statutory structural surveys (usually every four years) but to supplement them.</p> <p>Any collision damage should always be reported immediately and if necessary an Engineer should be contacted to assess the extent of the damage and advise on any remediation's required.</p>	



No	Full Task Description	Visual Reference
<p>2</p>	<p>Ensure the designated area is safe to carry out an inspection.</p> <p>This can be achieved by either:-</p> <ul style="list-style-type: none"> a) Carry out the inspection during non production hours or alternately b) Stop mobile plant operating around the stockbays for the duration of the inspection. 	<p>Stockbays Example</p> 
<p>3</p>	<p>An initial point worthy of note relates to the possibility of partial failure of a stock bay retaining wall, namely:-</p> <p>If a retaining wall that has been correctly installed and maintained receives a sufficiently high impact load from a moving plant vehicle it will not be able to fully absorb the energy and it will suffer a level of damage such that a section of it can potentially collapse. Part of a wall in conjunction with any localized stored material can therefore fall externally to ground. Of course, this is an exceptional case and a vehicle would have to be driven in an unacceptable manner for this to occur. The point has been raised to highlight the importance to the adherence of correct driving techniques during filling and emptying operations in conjunction with avoiding excessive overfilling of material in order to prevent this type of failure.</p>	


No	Full Task Description	Visual Reference
4	<p>Inspection Procedure (to be carried out on a monthly basis)</p> <p>In order to ensure that bulk material retaining walls cannot fail through vehicle impact damage, movement, general deterioration or ground settlement the following visual inspection procedures must be adhered too:-</p> <p>Types of retaining walls requiring regular inspection are listed below:-</p> <ul style="list-style-type: none"> • Examples of timber / concrete sleeper type walls are contained in item 5 (referenced as wall type 1). The inspection procedure is listed in item 6. • Example of precast concrete A frame unit walls are contained in item 7 (referenced as wall type 2). The inspection procedure is listed in item 8. • Example of precast concrete L frame unit walls are contained in item 9 (referenced as wall type 3). The inspection procedure is listed in item 10. • Example of precast Taperbloc frame unit walls are contained in item 11 (referenced as wall type 4). The inspection procedure is listed in item 12. • Example of precast mass concrete rectangular block walls (aka Lego blocks) are contained in item 13 (referenced as wall type 5). The inspection procedure is listed in item 14. • Example of precast modular panel walls are contained in item 15 (referenced as wall type 6). The inspection procedure is listed in item 16. • Examples of cast in-situ concrete walls are contained in item 17 (referenced as wall type 7). Please note:- There are <u>no</u> regular inspection procedures for this type of wall. 	



No	Full Task Description	Visual Reference
5	<p>Wall Type 1:-</p> <p>Open Stockbays Wooden or concrete sleepers stacked laterally to form a vertical wall that locates in a series of equi-spaced rolled steel posts. The top of the posts finish approximately level with the top sleeper leaving all stocked material fully open to the weather. Photo examples 001 – 004 inclusive.</p> <p>Covered Stockbays Very similar in design to the above open stockbays other than the rolled steel posts continue past the top sleeper in order to provide support to profiled steel clad walls and an overhead profiled steel clad roof. The stocked material is therefore partially protected from the weather. Photo examples 005 & 006.</p> <p>Overhead Conveyor Discharge Stockbays Some storage assemblies also have overhead tripper car conveying systems and associated maintenance walkways in order to feed material directly into the individual bays. Photo examples 007 & 008.</p> <p>Washing & Screening Plant Stockbays Additionally material can also be discharged and stored under washing and screening plant assemblies using similar wall constructions. Photo example 009.</p> <p>Inspection Procedure:- See item 6</p>	<p>Photo 001 Wooden Sleepers Example – Wall Type 1</p>  <p>Photo 002 Wooden Sleepers Example – Wall Type 1</p> 



No	Full Task Description	Visual Reference
5 Cont'd		<p data-bbox="1198 167 1825 199">Photo 003 Concrete Sleepers Example – Wall Type 1</p>  <p data-bbox="1198 805 1825 837">Photo 004 Concrete Sleepers Example – Wall Type 1</p> 



No	Full Task Description	Visual Reference
5 Cont'd		<p data-bbox="1198 167 1825 199">Photo 005 Covered Stockbay Example – Wall Type 1</p>  <p data-bbox="1198 813 1825 845">Photo 006 Covered Stockbay Example – Wall Type 1</p> 



No	Full Task Description	Visual Reference
5 Cont'd		<p data-bbox="1198 167 1944 199">Photo 007 Overhead Conveying System Example – Wall Type 1</p>  <p data-bbox="1198 790 1944 821">Photo 008 Overhead Conveying System Example – Wall Type 1</p> 



No	Full Task Description	Visual Reference
5 Cont'd		<p data-bbox="1198 167 2116 199">Photo 009 Washing & Screening Plant Discharge Bays Example – Wall Type 1</p> 



No	Full Task Description	Visual Reference
<p data-bbox="114 172 136 204">6</p> <p data-bbox="208 172 1155 268">Wall Type 1:- Wooden or concrete sleepers stacked laterally to form a vertical wall. Some stockbays are fully open to the weather whilst others are partially covered. The walls can also support overhead conveyors or plant equipment.</p> <p data-bbox="208 316 1149 411">Please note:- All defects uncovered during the inspection will require address by the individual sites. An Engineer should be contacted to further discuss any points.</p> <p data-bbox="208 491 739 523">The inspection requirements are as follows:-</p> <ul data-bbox="255 563 1137 778" style="list-style-type: none"> • Inspect all vertical structural members for any significant collision damage. Photos 010 & 011. • All structural steelwork that has suffered significant collision damage must be reported asap to ensure the integrity of the structure has not been compromised. 		<p data-bbox="1200 172 2022 204">Photo 010 Example of damaged and distorted member – Wall Type 1</p>  <p data-bbox="1200 802 2022 834">Photo 011 Example of damaged and distorted member – Wall Type 1</p> 



No	Full Task Description	Visual Reference
6 Cont'd	<ul style="list-style-type: none">• Check to see if any bolted sections have bolts missing and as a result have become misaligned and not secure. Photo 012.• Check to see whether baseplates have suffered significant damage and have loosened or sheared anchor bolts. Photo 013.	<p>Photo 012 Example of missing cap plate bolts – Wall Type 1</p>  <p>Photo 013 Example of lifted baseplate / loose anchor bolts – Wall type 1</p> 



No	Full Task Description	Visual Reference
<p>6 Cont'd</p>	<ul style="list-style-type: none"> Inspect the full height of all walls to see whether any collision damage to the vertical members has resulted in the sleeper ends not being fully captive. Photos 011 & 014. Inspect the vertical walls for alignment. They could have suffered collision damage or been subject to internal forces from either the loading shovels or pressure of the materials against them. Photos 015 & 016. The top of the wall should be within a lateral tolerance of 100mm from its original position. 	<p>Photo 014 Example of sleepers that are not held captive – Wall Type 1</p>  <p>Photo 015 Example of rear wall that has canted over – Wall Type 1</p> 



No	Full Task Description	Visual Reference
<p data-bbox="69 172 181 252">6 Cont'd</p> <ul data-bbox="255 204 1115 271" style="list-style-type: none"> <li data-bbox="255 204 1115 271">• Inspect the vertical members for significant corrosion deterioration. Photo 017. 		<p data-bbox="1198 167 1836 199">Photo 016 Example of canted over post – Wall Type 1</p>  <p data-bbox="1198 805 1881 837">Photo 017 Example of highly corroded post – Wall Type 1</p> 


No	Full Task Description	Visual Reference
<p>6 Cont'd</p>	<ul style="list-style-type: none"> Inspect the individual sleepers for rot in order to prevent failure. Photo 018. Where the structure is clad, all panels require inspection for damage and failed fixings. Any loose sections that could become dislodged in high winds require address. Photo 019. 	<p>Photo 018 Example of rotting & broken sleeper – Wall Type 1</p>  <p>Photo 019 Example of missing purlin / loose cladding panels – Wall Type 1</p> 


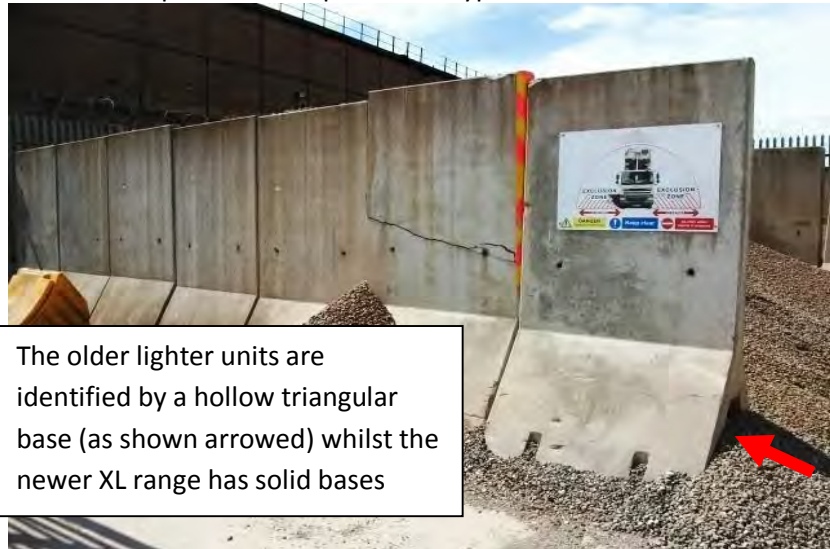
No	Full Task Description	Visual Reference
<p>6 Cont'd</p>	<ul style="list-style-type: none"> Inspect all ties and bracings for damage or distortion on all the sides and also on the underside of the roof of covered storage bays. Photos 020. 	<p>Photo 020 Example of missing canopy frame member – Wall Type 1</p> 
<p>7</p>	<p>Wall Type 2:-</p> <p>Precast and prestressed concrete A frame units (also called Alfablocs) are positioned in a straight line and are either freestanding or can be anchored to a concrete foundation (for higher loading applications) and are mechanically fixed to each other. They range in height from 1.22m – 6m. Photo example 021.</p> <p>Inspection Procedure:- See item 8</p>	<p>Photo 021 A Frame Example – Wall Type 2</p> 

No	Full Task Description	Visual Reference
8	<p>Wall Type 2:- Precast concrete A frame units are positioned in a straight line and are anchored to each other. Some walls will be freestanding whilst others will be anchor bolted to a concrete slab foundation. In instances where they are not bolted down they may sit on compacted ground and not necessarily on concrete.</p> <p>The inspection requirements are as follows:-</p> <ul style="list-style-type: none"> Assess that the retaining wall is relatively plumb. The apex of the wall should be within a lateral tolerance of 100mm from its original position. Photo 022. If ground anchor bolts are fitted, check that all base fixings remain intact and have not partially or fully pulled out. Check the mechanical fixings that run vertically between all the individual units remain intact. (i.e, check that the joints have not pulled apart in some manner). Photo example 023. 	<p>Photo 022 Example of Misaligned Unit – Wall Type 3</p>  <p>Photo 023 Example of Failed Joint Fixing – Wall Type 3</p> 


No	Full Task Description	Visual Reference
<p>8 Cont'd</p>	<ul style="list-style-type: none"> • Check that the panels have not completely fractured to the point where only the rebars hold them together. Localised damage is to be expected over time, which manifests in partial fracture, spalling and occasionally punched holes. A judgement therefore has to be made regarding the severity of the damage. Photo examples 024 & 025. • As mentioned, some A frame walls are not anchor bolted to a concrete foundation and only sit on compacted ground. There is therefore an increased possibility of movement in these instances. An excessive force from a loading shovel bucket can potentially lift up a section of wall or move it laterally. If a section of wall is accidentally raised up it tends to drop back down into position relatively quickly as each precast section is tied vertically along its joints to its neighbouring units. There is therefore considerable weight acting against any uplift. However, stored material can also swiftly flow underneath. Lateral movement can also occur where overfilling or excessive vehicle force gradually pushes a wall into a bowed position. It has been known for a wall to slide up to 1m from its original position. Each wall therefore requires checking to ensure that it is reasonably straight in line and level. If aggregate has got under any areas resulting in any noticeably raised sections, then the material requires removal and if a wall has moved laterally in excess of 0.5m then it requires realignment. It may be necessary to review the filling and emptying operations if this problem repeats itself or to investigate fitting foundation anchor bolts if the walls sit on a concrete foundation. 	<p>Photo 024 Example of an Acceptable Concrete Fracture (taperbloc wall)</p>  <p>Photo 025 Example of an Unacceptable Concrete Fracture & Localised Damage (L frame wall)</p> 

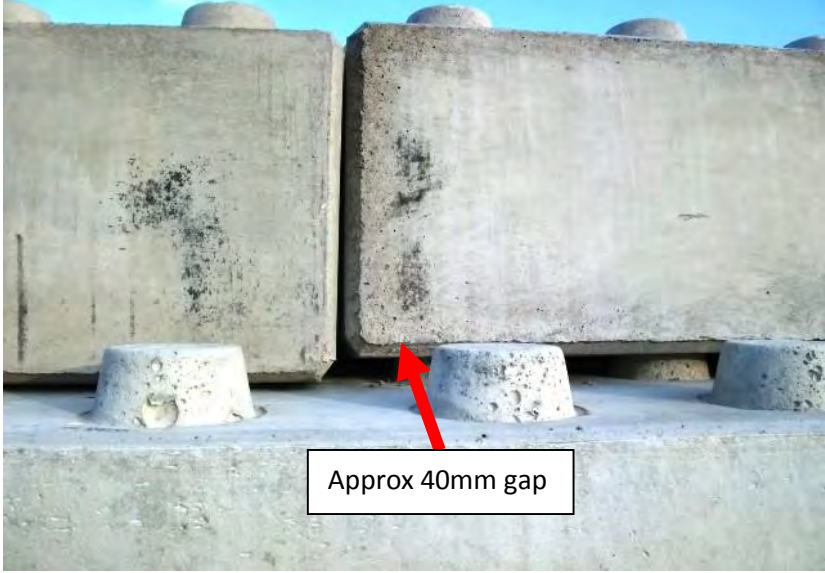
No	Full Task Description	Visual Reference
<p data-bbox="107 167 138 204">9</p> <p data-bbox="206 167 414 204">Wall Type 3:-</p> <p data-bbox="206 247 1164 459">Precast concrete L frame units (also called L blocs) are positioned in a straight line and are always anchored to a concrete foundation. Some manufacturers tie each unit together via a tongue and groove joint arrangement whilst others leave them fully independent. Some manufacturers also offer prestressed units whilst others don't. They range in height from 3.6m (standard) – 5m. Photo examples 026 & 027.</p> <p data-bbox="206 502 750 539">Inspection Procedure:- See item 10</p>		<p data-bbox="1198 167 1702 204">Photo 026 L Frame Example – Wall Type 3</p>  <p data-bbox="1198 790 1702 826">Photo 027 L Frame Example – Wall Type 3</p> 



No	Full Task Description	Visual Reference
10	<p>Wall Type 3:- Precast concrete L frame units are positioned in a straight line. Some will be anchored to each other by various tongue and groove vertical joint methods whilst some are fully independent. They are all bolted to the concrete slab foundation and are not freestanding.</p> <p>The inspection requirements are as follows:-</p> <ul style="list-style-type: none"> • Assess that the vertical retaining wall is relatively plumb. The top of the wall should be within a lateral tolerance of 100mm from the vertical position. Photo 028. • Check that base fixings remain intact and have not partially or fully pulled out. The panels can become unstable if they are not fully anchored. Photo 029. If aggregate has got under any areas resulting in any noticeable raised sections of wall, then the material should be removed to enable the panels to be realigned and fully bolted down. • Check that the joints that run vertically between all the individual units remain intact particularly the types where they incorporate a tongue and groove joint of some description. (i.e, check that the joints have not pulled apart). Photo 030. If experience has indicated that the panels tend to move over time then a continuous channel member can be bolted across the back of the units to improve their rigidity. See photo example 027. • Check that the panels have not completely fractured to the point where only the rebars hold them together. Localised damage is to be expected over time, which manifests in partial fracture, spalling and occasionally punched holes. A judgement has to be made regarding the severity of the damage. See photo examples 024 & 025. 	<p>Photo 028 Example of Misaligned Units – Wall Type 3</p>  <p>Photo 029 Example of Raised & Misaligned Units – Wall Type 3</p> 



No	Full Task Description	Visual Reference
<p>10 Cont'd</p>		<p>Photo 030 Example of Raised & Misaligned Units – Wall Type 3</p> 
<p>11</p>	<p>Wall Type 4:-</p> <p>Precast concrete taperbloc units are positioned in a straight line, the older generation are lighter and therefore require anchor bolting to a concrete foundation whilst the newer taperbloc XL range is a heavier construction and is designed to be freestanding. They range in height from 2.4m – 3.0m. Photo example 031.</p> <p>Inspection Procedure:- See item 12</p>	<p>Photo 031 Taperbloc Example – Wall Type 4</p>  <div data-bbox="1200 1173 1659 1364" style="border: 1px solid black; padding: 5px;"> <p>The older lighter units are identified by a hollow triangular base (as shown arrowed) whilst the newer XL range has solid bases</p> </div>

No	Full Task Description	Visual Reference
12	<p>Wall Type 4:- Precast concrete Taperbloc units are positioned in a straight line and are fully independent of each other. The lighter units with the hollow triangular bases are designed to be anchor bolted to a concrete foundation whilst the heavier solid triangular bases are designed to be freestanding. In instances where they are not bolted down they may sit on compacted ground and not necessarily on concrete.</p> <p>The inspection requirements are as follows:-</p> <ul style="list-style-type: none"> Assess that the retaining wall is relatively plumb. The apex of the wall should be within a lateral tolerance of 100mm from its original position. If ground anchor bolts are fitted, check that all base fixings remain intact and have not partially or fully pulled out. If aggregate has got under any areas resulting in any noticeable raised sections of wall, then the material should be removed to enable the panels to be realigned and fully bolted down. Photo 032. Check that the panels have not completely fractured to the point where only the rebars hold them together. Localised damage is to be expected over time, which manifests in partial fracture, spalling and occasionally punched holes. A judgement has to be made regarding the severity of the damage. See photo examples 024 & 025. 	<p>Photo 032 – Example of Raised Unit – Wall Type 5</p> 

No	Full Task Description	Visual Reference
<p>12 Cont'd</p>	<ul style="list-style-type: none"> As mentioned, some solid Taperbloc walls are not anchor bolted and some walls only sit on compacted ground. There is therefore an increased possibility of movement in these instances. An excessive force from a loading shovel bucket can potentially lift up a section of wall or move it laterally. Lateral movement can also occur where overfilling or excessive vehicle force gradually pushes a wall into a bowed position. It has been known for a wall to slide up to 1m from its original position. Each wall therefore requires checking to ensure that it is reasonably straight in line and level. If aggregate has got under any areas resulting in any noticeably raised sections of wall, then the material requires removal and if a wall has moved laterally in excess of 0.5m leaving significant gaps between adjacent units for material to flow through then it requires realignment. It may be necessary to review the filling and emptying operations if this problem repeats itself or to investigate fitting foundation anchor bolts if the walls sit on a concrete foundation. Consideration can also be given to bolting a continuous channel member across the units to assist with their rigidity. See photo example 027. 	
<p>13</p>	<p>Wall Type 5:-</p> <p>Precast mass concrete rectangular blocks that interlock via raised male connectors and are built in a straight line in a standard staggered joint brick formation. These are commonly called Lego blocks (also called Legato, Duo, Betablocs) and maintain their stability and rigidity without the need for any additional mechanical fixings.</p> <p>The blocks are available in various sizes, the larger blocks measure 800mm width x 800mm depth x 1600mm length whilst the smaller blocks measure in the region of 600mm width x 450mm depth x 1500mm length although the dimensions are subject to slight variation depending on the individual suppliers. The walls generally range in height up to approx 2.4m although utilising spreader footblocks can increase the height beyond this up to approx 3.2m. Photo example 033 (shows larger size blocks).</p> <p>Additional strength can also be achieved by having a double width wall (i.e, laying blocks side by side).</p> <p>Inspection Procedure:- See item 14</p>	<p>Photo 033 Lego Block Example – Wall Type 5</p> 

No	Full Task Description	Visual Reference
<p>14</p>	<p>Wall Type 5:- Precast concrete blocks that interlock and are built in a straight line in a brick formation. These are commonly called Lego blocks and maintain their stability and rigidity without the need for any additional mechanical fixings).</p> <p>The inspection requirements are as follows:-</p> <ul style="list-style-type: none"> • Assess that the vertical retaining wall is relatively plumb. The top of the wall should be within a lateral tolerance of 100mm from the vertical position. • Check that the block joints have not noticeably pulled apart. The joint gaps should be within the region of 0 – 10mm max. • Check that the perimeter blocks have not been accidentally pushed out of position. The top edge blocks in particular should be checked to ensure they remain in line with the wall. Any that have noticeably moved should be repositioned. Photo 034. • If irregularities can be seen, assess whether there has been any noticeable ground movement (compaction, unevenness etc). 	<p>Photo 034 – Example of a Lifting Upper Block – Wall Type 5</p>  <p>The photograph shows two concrete blocks stacked vertically. A red arrow points to a gap between the blocks, which is labeled 'Approx 40mm gap'. The blocks are light grey and have a textured surface. The gap is located at the bottom of the upper block, between the two blocks.</p>

No	Full Task Description	Visual Reference
<p>15</p>	<p>Wall Type 6:-</p> <p>Precast and prestressed modular interlock panels that are mechanically fixed to the inside faces of building columns to form perimeter walls. The panels are self supporting and sit on the concrete ground slab. The lateral joints are usually tied together by a tongue and groove arrangement. Photo example 035.</p> <p>Inspection Procedure:- See item 16</p>	<p>Photo 035 Precast Modular Wall Panel Example – Wall Type 6</p> 
<p>16</p>	<p>Wall Type 6:- Precast and prestressed modular interlock panels that are mechanically fixed to the inside faces of building columns to form perimeter walls.</p> <p>The inspection requirements are as follows:-</p> <ul style="list-style-type: none"> • Access the rear of the panels to check that the bolts and fishplates connecting the panels to the building columns remain fully secure and tightened up. Photo 036. • Check that the panels have not completely fractured to the point where only the rebars hold them together. Localised damage is to be expected over time, which manifests in partial fracture, spalling and occasionally punched holes. A judgement has to be made regarding the severity of the damage. 	<p>Photo 036 Example of Loose Fixing Clip – Wall Type 6</p> 

No	Full Task Description	Visual Reference
<p data-bbox="107 172 145 199">17</p> <p data-bbox="208 172 403 199">Wall Type7:-</p> <p data-bbox="208 252 1164 459">Cast in-situ concrete walls and precast concrete wall panels that are of a fixed base design and are tied into the civil foundation design of a building are not normally subject to potential instability. Photo examples 037 & 038. Walls of this type can be inspected as part of the main statutory structural survey work carried out at intervals of between 3 – 5 years. Monthly inspections are therefore considered unnecessary.</p> <p data-bbox="208 512 560 539">Inspection Procedure:-</p> <p data-bbox="208 592 1052 651">Only requires carrying out by a Structural Engineer during the statutory structural surveys.</p>		<p data-bbox="1205 172 1736 199">Photo 037 Cast in-situ Example – Wall Type 7</p>  <p data-bbox="1205 805 1915 833">Photo 038 Cast in-situ Retaining Wall Example – Wall Type 7</p> 

No	Full Task Description	Visual Reference
<p>18</p>	<p>Good practice during filling and emptying of stock bays</p> <p>Overfilling is to be avoided as this increases the lateral pressure on a retaining wall that could be in excess of its design capability.</p> <p>Wall impact from a loading shovel bucket should also be kept to a minimum. The bucket should not be rammed up against a wall. Driver training is therefore essential to ensure material is filled and removed in the correct manner.</p> <p>Consideration can be given to fitting warning signs where wall impact damage periodically occurs. Photo 039.</p>	<p>Photo 039 Driver Information Sign</p> 