

Our ref: DCW/RB/SL/NL00910/J69
Your ref:

Date: 23 November 2012

[REDACTED]
Interserve
17 Nant Alyn Road
Rhydymwyn
Nr Mold
Flintshire
CH7 5HQ

Dear [REDACTED]

MAFF Buffer Depot, Rhydymwyn, Mold

Further to our recent discussions, please find below our fee proposal for the following:

- 2013 inspection of the underground caverns;
- additional remedial works in accordance with the recommendations made in our report entitled "Report on Stability Inspection and Remedial Works" dated November 2012.

UNDERGROUND INSPECTION 2013

Scope of Work

It is proposed to undertake the following work:

- visual inspection of the caverns, ventilation shafts and ventilation shaft cross cut tunnels;
- sounding inspection of discrete areas identified during the visual inspection and during previous work from a mobile access platform;
- inspection of the concrete lined ingress/egress tunnels;
- clear the floor of fallen debris.

The inspection will be carried out in accordance with the method specified in our 'Report on Cavern Inspection and Repair Works' dated May 1997. Appropriate health and safety measures will be implemented, including provision of gas monitoring equipment and personal self rescuers in accordance with our Code of Practice issued with our letter of 9 April 1999; preparation of a Designers Risk Assessment and reviewing the Contractor's Method Statement and Risk Assessments.

As such the proposed inspection will be undertaken by two engineers on a single day who will be assisted by TL Excavations Ltd. TL Excavations Ltd will be on site for 2 days to complete the roof and tunnel sounding inspection works.

Costs

The estimated costs to undertake the work are as follows (all costs include disbursements and expenses but exclude VAT):





Wardell Armstrong

Provide a two person team for inspection including arranging, supervising of contractors, managing, and reporting.

£2,950.00

T L Excavations Ltd

Supervisor, underground technician and surface safety co-ordinator to undertake sounding inspection, clear debris and assist with inspection. An inspection of the concrete roof at the main entrance portal will be carried out. The cost includes for the hire of a mobile access platform, gas monitor and self rescuers, subsistence, travel and provision of basic equipment.

£3,875.00

REMEDIAL WORKS

Investigation and Remedial Works to Cavern B Drainage System

The drainage system is overflowing in Cavern B, and it is suspected that the outlet pipes may have become blocked. It is proposed to carry out a visual investigation of the outlet pipes including the pond outfall to ascertain the reason behind the overflowing waters. These works could be carried out by Wardell Armstrong following the annual inspection and is anticipated to take half a day to complete.

The costs to undertake this work is as follows:

Wardell Armstrong

To inspect the drainage system.

£250.00

Installation of Metal Mesh to Prevent Spalling of Concrete into Cavern Entrance Portal

It has become apparent that the concrete above the Caverns entrance is eroding and that small pieces of concrete are spalling onto the Cavern floor. This has health and safety implications to both site workers and visitors. It is therefore recommended that the portal roof is cleared of debris, and then a suitable mesh installed to prevent spalled material falling onto the floor. These works could be carried out by TL Excavations Ltd following the annual inspection and is anticipated to take a day to complete. WA will also supervise and inspect the works.

The costs to undertake this work are as follows:

Wardell Armstrong

To arrange, supervise and inspect the work.

£550.00

T L Excavations Ltd

To install metal mesh.

£6,969.00

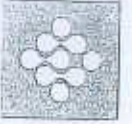
Limescale Build-up on Metal Floor Grilles

Several of the metal grilles in the floor have been covered with limescale which has made distinguishing them from the concrete floors difficult. As these grilles are extremely dangerous to walk on it is imperative they are easily identified. Therefore it is proposed that these grilles are completely cleared of limescale. These works could be carried out by Wardell Armstrong following the annual inspection and would take half a day to complete.

Wardell Armstrong

To clean off limescale from floor grilles.

£250.00



Radon Monitoring

The caverns are located in an area which is reported (Health Protection Agency report HPA-RPD-033) to be at high risk of radon gas, which can accumulate in enclosed spaces, especially in underground environments. It is understood that Interserve require this matter to be investigated further to understand any prevailing risk of radon build up in the caverns. Due to the potential health and safety implications of exposure to this radioactive gas it is recommended that Radon is monitored in the Caverns.

We therefore suggest passive monitors are installed throughout the Cavern system to assess background Radon levels, and then to actively monitor Radon levels when the inspection and remedial works are being carried out. This work can be carried out by trained Wardell Armstrong personnel. The findings of the radon monitoring will be included in the subsequent report.

Wardell Armstrong

Hire of Radon Alpha Guard Detector and 5 personal and passive radon monitors, **£800**
interpretation of results and reporting.

Summary of Proposed Works Costs

Item	Wardell Armstrong	TL Excavations
1. Annual Underground Inspection 2013	£2,950.00	£3,875.00
2. Investigate drainage system	£250.00	-
3. Install metal mesh at entrance	£550	£6,969.00
4. Descale metal grilles	£250.00	-
5. Radon monitoring	£800.00	-

The contractor has indicated that the works have been priced on the basis that all the works would form one contract. This assumes that the additional works would be undertaken immediately after the annual inspection. If there was an intention for some items to be undertaken at a later date, the above costs would need to be re-measured to account for additional mobilisation costs.

It is assumed that Interserve will be responsible for the payment of T L Excavations Ltd's invoices directly, subject to our verification.

We trust the above proposal meets with your approval, however, if you have any queries please do not hesitate to contact us. If you wish us to proceed as indicated please confirm by returning one signed copy of the attached Terms of Engagement for our files.

Yours sincerely
for Wardell Armstrong LLP

Associate Director

Enc

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[REDACTED]

From: [REDACTED]
Sent: 09 September 2013 14:23
To: [REDACTED]
Subject: FW: Underground Caverns, Rhydymwyn - Inspection Report 1012
Attachments: LWLNEW-SharpScan@wardell-armstrong.com_20121123_142018.pdf.pdf; LWLNEW-SharpScan@wardell-armstrong.com_20121123_145218.pdf.pdf

Categories: [REDACTED]

From: [REDACTED]
Sent: 09 September 2013 12:53
To: [REDACTED]
Subject: FW: Underground Caverns, Rhydymwyn - Inspection Report 1012

[REDACTED]
Interserve Facilities Manager
17 Nant Alyn Road
Rhydymwyn
Nr Mold
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From: [REDACTED] [mailto:[REDACTED].com]
Sent: 23 November 2012 13:07
To: [REDACTED]
Cc: [REDACTED]
Subject: Underground Caverns, Rhydymwyn - Inspection Report 1012

[REDACTED]

Please find attached the Report on Stability Inspection and Remedial Works. Apologies for the delay in issuing this report.

Also attached is our costed proposal to carry out next year's inspection and remedial works.

Two hard copies of the report will follow in the post.

Kind regards

[REDACTED]
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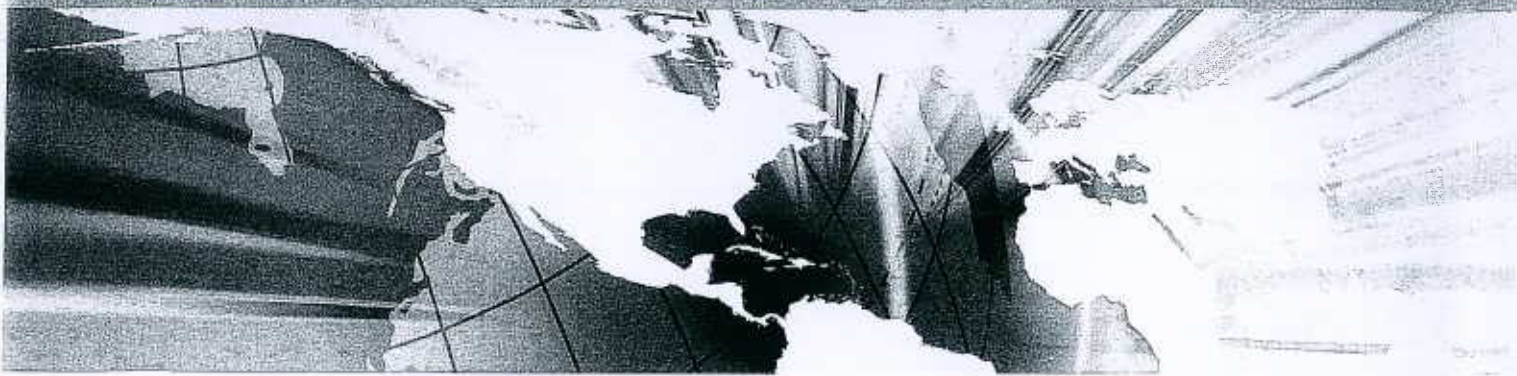
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ENERGY AND CLIMATE CHANGE
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INFRASTRUCTURE AND UTILITIES
LAND AND PROPERTY
MINING, QUARRYING AND MINERAL ESTATES
WASTE RESOURCE MANAGEMENT



Underground Caverns at Rhydymwyn, Mold

Stability Inspection and Remedial Works

November 2012

your earth our world



DATE ISSUED: November 2012
JOB NUMBER: NL00910
REPORT NUMBER: J07

INTERSERVE

Underground Caverns at Rhydymwyn, Mold

Report on Stability Inspection and Remedial Works

November 2012

PREPARED BY:

 Geologist

 Associate Director

APPROVED BY:

 Technical Director

This report has been prepared by Wardell Armstrong LLP with all reasonable skill, care and diligence, within the terms of the Contract with the Client. The report is confidential to the Client and Wardell Armstrong LLP accept no responsibility of whatever nature to third parties to whom this report may be made known.

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1 INTRODUCTION

- 1.1 This report has been prepared in accordance with order number DF36359 provided by Mr D Williams of Interserve on 29 May 2012.
- 1.2 This report comprises the results of the inspection and remedial works carried out during June 2012.
- 1.3 Wardell Armstrong (WA) carried out the inspection between 25 and 28 June 2012, assisted by T L Excavations Ltd in accordance with WA's proposal letter dated 23 January 2012. Appropriate health and safety measures were implemented and the work consisted of the following:
- Examination of the tell tale monitoring stations;
 - Visual inspection of the Caverns, ventilation shafts and ventilation cross cut tunnels;
 - Detailed sounding inspection of a previously identified hollow part of the Cavern roof;
 - Visual and sounding inspection of the concrete roof and walls at the portal of the main entrance tunnel.
- 1.4 The purpose of the inspection was to determine whether the Caverns are in a suitably stable condition to allow for the safe entry of the Caverns by members of the Inspectorate for Chemical Weapons. The north-south orientated Caverns are defined as A-D on the attached Drawing No. NL00910/01. The east-west orientated tunnels are referred to as cross-cut tunnels.
- 1.5 The inspection coincided with a phase of remediation which comprised the following:
- White washing of Cavern D wall at location D1 to identify areas of spalling;
 - Repair works to the drainage system in Cavern B;
 - Installation of metal grilles within the south western cross cut tunnel to provide access to the ventilation shafts.
- 1.6 In order to allow the inspection of the roof and walls of the portal to the main entrance tunnel to proceed a visual inspection for evidence of bats was carried out.

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APPENDICES

Appendix 1 Tell Tale Monitor Results (2001 to 2012)

DRAWINGS

Drawing No.	Title	Scale
NL00910/01	Plan of Caverns for Reference	NTS

- 2.4 Monitoring references TT2, TT4, TT7, TT8, TT9, TT10, TT11 and TT12 show minimal to zero movement in the interim period. TT3 had the greatest movement of 1mm horizontally and 2mm vertically, however, this is most likely due to the removal of the buttress wall in 2011.

Concrete and Brick Buttressing

- 2.5 Inspection of the remaining concrete and brick buttressing of the pillar at D1 did not identify any evidence of instability during the interim period since the main buttress was demolished in 2011.
- 2.6 The concrete buttressing in Cavern D adjacent to the entrance of the cross cut tunnel to the northern shaft continues to crumble and fresh spalled material was evident. This has been identified over many years and is not considered to require any remedial works.

Cavern Inspection

Caverns

- 2.7 The inspection showed that there had been no fall of rock in the Caverns and access roadways since the last inspection in 2011 with the exception of the pillar at D1. At this location there was approximately 0.3m³ of spalled rock on the floor of Cavern D, showing that the weaker shale had continued to erode and deteriorate. The wall has now been painted and continued monitoring of this area will give a greater understanding of the strength and stability of the weaker shale. Should the weaker shale beds in this area continue to spall material, there will be a requirement to remediate this area. This may be in the form of shotcrete and/or rock bolting.
- 2.8 A sounding inspection was undertaken from a mobile access platform using a pinch bar. During the roof inspection of Cavern B, an approximate area of 12m x 4m, was identified to be "hollow". The location of this was approximately 15m to the north of the main entrance tunnel adjacent to convergence point B3 shown on Drawing No. NL00910/01. TL Excavations have marked up the floor beneath this area warning of loose rock above. There was also occasional "hollow" spots identified in Caverns C and A. The "hollow" nature of the rock is identified by the sound emitted when struck with a steel bar. This indicates that this section of the roof is loose from the overlying rock and increases the potential for sudden roof collapse. This poses a future safety risk and the area has been marked for reference. The areas of "hollow"

2 STABILITY INSPECTION

Tell Tale Monitoring Stations

- 2.1 In April 2001 eight tell tale monitoring stations were installed on the concrete buttressing at D1 (TT1 to TT3 and TT5 to TT9), one was installed above the entrance to the southern shaft tunnel in Cavern D opposite the concrete buttress (TT4) and one installed at position D2 (TT10). TT6 was found to have been damaged in 2007 and refitted. It was set to the reading taken in 2006. Additional tell tales have been installed in 2007 across a crack on the Cavern wall above the entrance to the southern shaft (TT11) and across a fine crack identified on the concrete floor parallel to the south western trench of Cavern C (TT12). The locations of D1 and D2 are shown on Drawing No NL00910/01.
- 2.2 The monitoring stations were installed with the crosshairs in their central position. The results of the recent inspection of the stations are provided in Table 1 below and graphically at Appendix 1.
- 2.3 Tell tales TT1, TT5 and TT6 were destroyed during remedial works carried out in 2011.

Monitoring Station	Results	
	2011-2012	Total (Since 2001)
TT1	Destroyed as part of 2011 works	-
TT2	0mm	1.5mm horizontal and 1mm vertical
TT3	1mm horizontal and 2mm vertical	2mm horizontal and 2mm vertical
TT4	0mm	1.5mm vertical
TT5	Destroyed as part of 2011 works	-
TT6 (Refix)	Destroyed as part of 2011 works	-
TT7	1mm horizontal and 1mm vertical	4mm horizontal and 1.5mm vertical
TT8	1mm horizontal	3.5mm horizontal, 1mm vertical
TT9	1mm horizontal	2mm horizontal, 2mm vertical
TT10	0mm	2mm horizontal, 0.5mm vertical
		Total (Since 2007)
TT11	0mm	0.5mm vertical
TT12	0.5mm horizontal and 0.5mm vertical	1.5mm horizontal & 1.5mm vertical

rock identified in previous reports were no different to previous years; however, continued monitoring of the area should take place.

- 2.9 The shale bed in the central-northern area of Cavern B in the western Cavern wall showed limited signs of spalling during this visit. This area is not considered to constitute a stability issue, however, should the shale degrade significantly it could create a hazard. This area should continue to be monitored.

Gas Monitoring

- 2.10 Gas monitoring equipment was continually used to check for gas levels during the inspection. No evidence of any noxious gases was found and the ventilation system was fully operational.
- 2.11 The Health Protection Agency report HPA-RPD-033 "Indicative Atlas of Radon in England and Wales" (2007) reports the caverns to be in an area at high risk of Radon gas. In addition, works carried out at a separate nearby underground site have detected elevated levels of Radon.

Cavern Floor

- 2.12 The floor of the Caverns is suspended over the true floor at a height of between 1 metre and 1.5 metres. The intervening space is flooded and filled with debris including steel. Caverns C and D contain concrete trenches running parallel to the Cavern walls. In both of these Caverns, cracking of the suspended floor (in that part of the floor between the two trenches) running parallel to and adjacent to the trenches was noted. This suggests that at some time, the suspended floor had been settling into the trenches. However, a mortar mix had been spread across these cracks on 9 March 1997 and since this date, no further movement has been observed on the cracks.
- 2.13 The Cavern floor was visually inspected as in previous years and was assessed as being in good condition. The cracks in the floor of Cavern D are considered to be stable. The crack adjacent to TT12 in Cavern C does show limited movement (0.5mm horizontal and 0.5mm vertical). This does not constitute a stability issue at present; however, inspection of this area should continue.

- 2.14 The metal grilles in the most northern sections of Caverns A and B are being slowly covered by limescale deposits and are no longer visibility apparent. Due to the poor condition and suspected weakness of these grilles it is recommended that the limescale is removed so that they are more visible to prevent people falling through them.

Shafts and Cross-Cut Tunnels

- 2.15 An assessment of the shafts was undertaken which included an inspection of the shaft caps, shaft bases and the cross-cut tunnels linking the shafts to Cavern D. The shaft caps comprise approximately 4 metre square concrete slabs containing grilles to allow ventilation.
- 2.16 The caps are in good condition with only minimal signs of weathering. When inspected from below, the shafts can be seen to be in good condition, showing no signs of instability or collapse since the previous inspection. Access to the base of the northern shaft is via a steep rock slope which was not climbed during the inspection. The base of this shaft was inspected remotely from the base of the rock slope. No defects were identified in the shaft column.
- 2.17 The cross cut tunnels to the shafts are driven through a poorer quality rock to that found in the main Caverns. These tunnels are in a thinly bedded shaley limestone which is, in part, flaking from the roof. The roof bolts and plastic mesh installed in the roof of these areas in 2011 has assisted in stabilising the rock. No evidence of spalled rock was seen within the mesh.

Water

- 2.18 The Caverns were identified to be considerably wetter than usual; probably due to recent heavy rainfall.
- 2.19 The drainage holes drilled to the culverted River Alyn flowing beneath the access tunnel were inspected. The holes were free of debris and in good condition allowing continued drainage to the river.
- 2.20 The drainage system installed in the roof of Cavern B (north) has previously been reported to be ineffective as the point of water ingress has moved over the years.

Remedial works were carried out during the inspection period; details of which are provided later in this report.

- 2.21 The outlet pipe from the drainage system was overflowing at a section in Cavern A. Further investigation along the length of the pipe showed that the pipe's diameter reduced from c.150mm metal pipe to a c.50mm plastic pipe near to the secondary exit of the Caverns.
- 2.22 A two way valve is present at this location which, when opened allows water to flow down into the culverted River Alyn below, and this subsequently stops the overflow within Cavern A. However, this valve being open prevents the recharging of the ecological pond outside the Caverns.
- 2.23 It is possible that this smaller pipe may be damaged further along the discharge route, or has become blocked, possibly by a build up of calcium from the discharging water. It is therefore recommended that this pipe is investigated on future visits to ascertain the reason behind the blockage or possible damage.

Cavern Access and Egress

- 2.24 Access to the Caverns is via a main central concrete lined access tunnel. Secondary access and egress is provided via a northern concrete lined tunnel.
- 2.25 These tunnels were visually inspected and the concrete was identified to be in good condition, showing little signs of deterioration with the exception of limited water ingress at distinct locations.
- 2.26 In places the concrete southern tunnel was cracked and water was running onto the floor. It is recommended that this tunnel and the areas of cracking are given more detailed examination in the future for evidence that the concrete is deteriorating.
- 2.27 Directly within the main central access portal the concrete has deteriorated in part where the concrete roof is bisected by the former Cavern ventilation system. In this location there is a risk of small pieces of concrete falling and therefore it was visually inspected from the mobile access platform. On inspection the domed concrete was found to be in good condition. However, the walls either side and the roof above the concrete entrance is deteriorating and pieces of concrete were spalling off

exposing the corroding metal reinforcement beneath. There is a risk that fragments of concrete could fall to the floor at the entrance of the Cavern. Should larger fragments spall off the walls the risk would increase significantly. Some concrete was barred down from the walls above and any loose concrete was cleared from the overlying roof area.

- 2.28 Remedial measures need to be put into place to reduce the hazard of material falling onto the floor below. This will consist of a metal wire screen being put into place to catch spalled material.
- 2.29 The floor outside at the main central access/egress portal is clear of debris and provided a good safe means of access. The secondary egress has previously been cleared of vegetation/leaf litter by a third party and now provides a safe means of egress.

Bats

- 2.30 As part of the main central access portal inspection, a visual check was made with regards to roosting bats. An Ecologist from WA inspected the area and no evidence of bats was found.
- 2.31 The inspection identified a small hole which bats could use to access the caverns, it is recommended this is backfilled during the 2013 inspection works.

4 CONCLUSIONS AND RECOMMENDATIONS

- 4.1 The remedial works recommended in WA report NL00910/J06 have all been carried out.
- 4.2 The weaker shale beds exposed after the wall was demolished at D1 has now been whitewashed to make areas of spalling easily identifiable during future inspections.
- 4.3 The concrete floor of the Caverns are in good condition however a crack in Cavern C adjacent to TT12 should be carefully monitored.
- 4.4 The drainage system at the northern end of Cavern B has been addressed and the water collection vessel is now working more effectively.
- 4.5 Access to the southern shaft cross cut tunnel has been improved by the placement of additional steel grilles.
- 4.6 The path leading to the secondary egress has been cleared of vegetation and extraneous plant material by a third party prior to the inspection and now provides a safe egress.
- 4.7 It is recommended that the drainage system leading out of the northern egress tunnel is investigated to allow recharge of the ecology pond outside the Caverns.
- 4.8 It is recommended that the limescale is cleared away from the floor grilles in Cavern A (north) to make them more obvious to visitors within the Caverns.
- 4.9 It is recommended that a metal mesh is installed above the entrance to the Caverns to prevent spalled concrete falling onto the floor below. During these works the small hole identified during the visual bat inspection should also be sealed to prevent the potential for access into the Caverns for bats.
- 4.10 During April 2001, barriers were erected around the trenches in Caverns C and D and exit signs installed within the Caverns. The barriers remain in good condition.

3 REMEDIAL WORKS

- 3.1 As per recommendations made in our report NL00910/J06, dated November 2011, remedial works have been carried out during June 2012. A summary of this is provided below.

White Washing of Shale at Location D1

- 3.2 The concrete wall in Cavern D has been previously demolished to approximately 2m in height. On inspection this year, there was evidence of spalled shale on the Cavern floor. This shale has now been white washed, and during the 2013 inspection it will be evident to the location, nature and amount of material that has spalled off the wall.

Repair to Drainage System in Cavern B North

- 3.3 In order to remediate the drainage system in the roof of Cavern B (north) a c.1.5m by 1m curved section of metal plate was installed in the roof above the water collection vessel so that the falling water now enters the drainage system effectively.

Access to Shaft Cross Cut Tunnels

- 3.4 Additional steel grilles were installed above the water in the southern cross cut tunnel in order to allow access.

- 4.11 Underground works carried out elsewhere in the local area have identified elevated levels of Radon gas, and it is recommended that the Caverns are monitored during the 2013 works. This will identify whether the caverns have high levels of Radon, and remedial measures may be put into place as necessary.
- 4.12 It is recommended that the visual and sounding Cavern inspection continues to be undertaken annually and a convergence survey undertaken every 5 years.





APPENDICES

Appendix 1

Tell Tale Monitor Results (2001 to 2012)

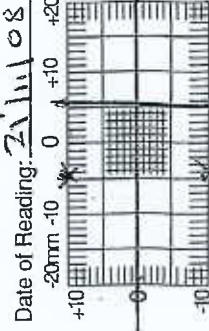
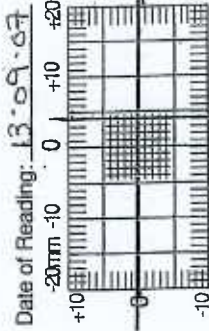
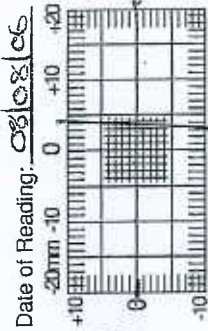
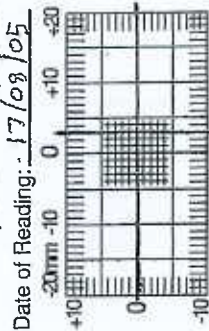
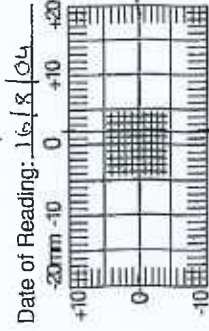
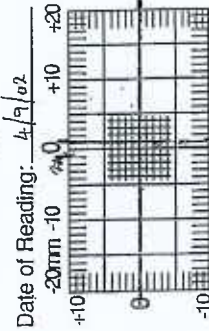
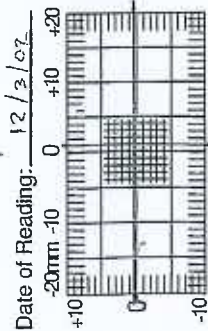
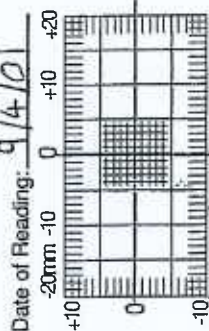


Crack Monitoring Record for the Standard and Corner Tell-Tale

Project / Monitor Reference: TT1
 Tell-Tale Location: _____

Floor & Displacement Tell-Tales also available. Please call. Need more precision? Ask about Crack-Meas!

+ Represents crack opening

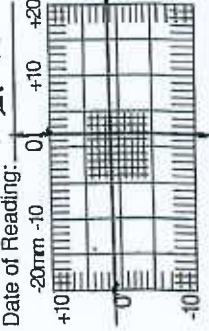
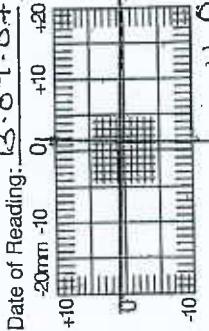
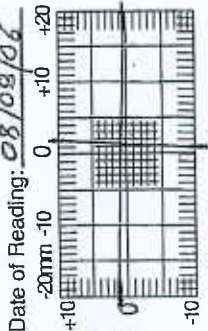
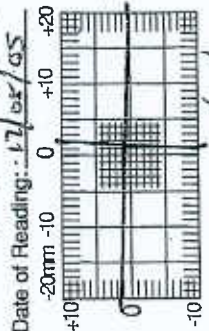
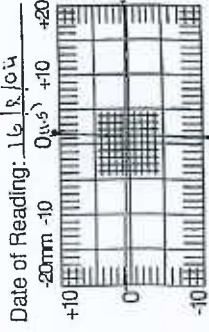
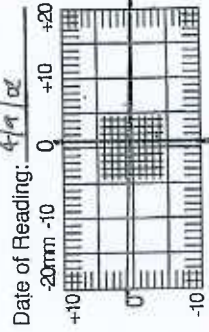
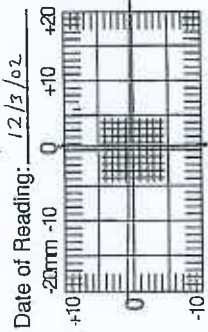
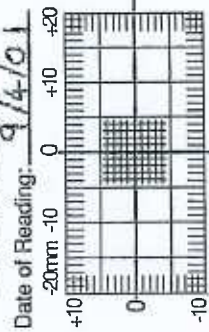


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 Tell-Tale Location: _____

Floor & Displacement Tell-Tales also available. Please call. Need more precision? Ask about Crack-Meas!

+ Represents crack opening

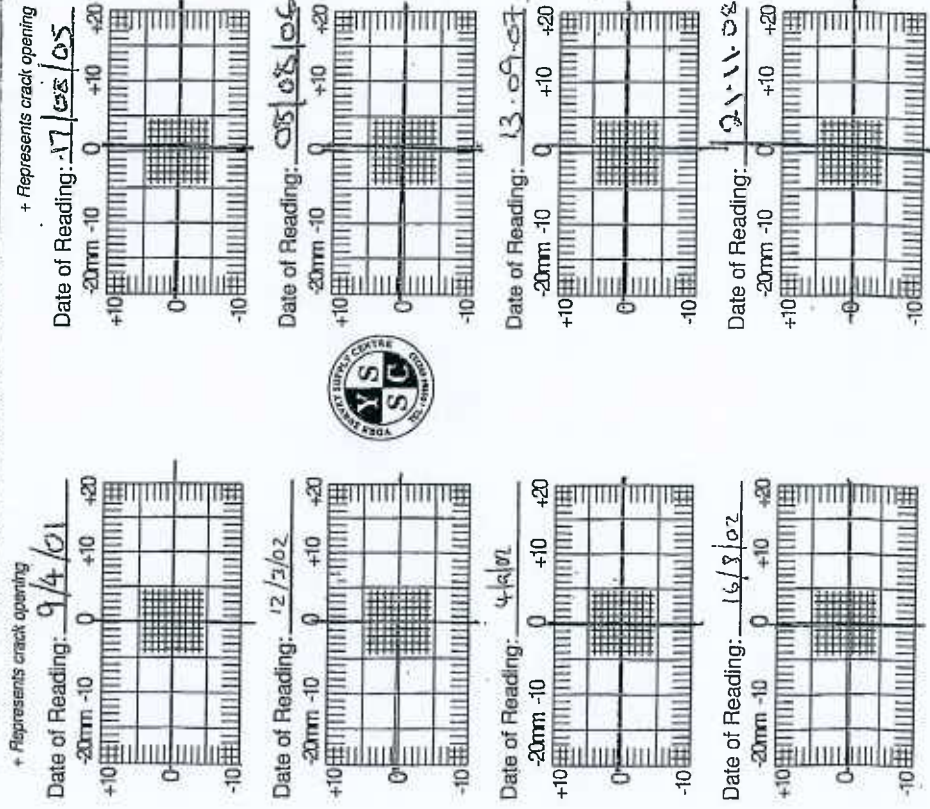




Crack Monitoring Record for the Standard and Corner Tell-Tale

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 Tell-Tale Location: _____

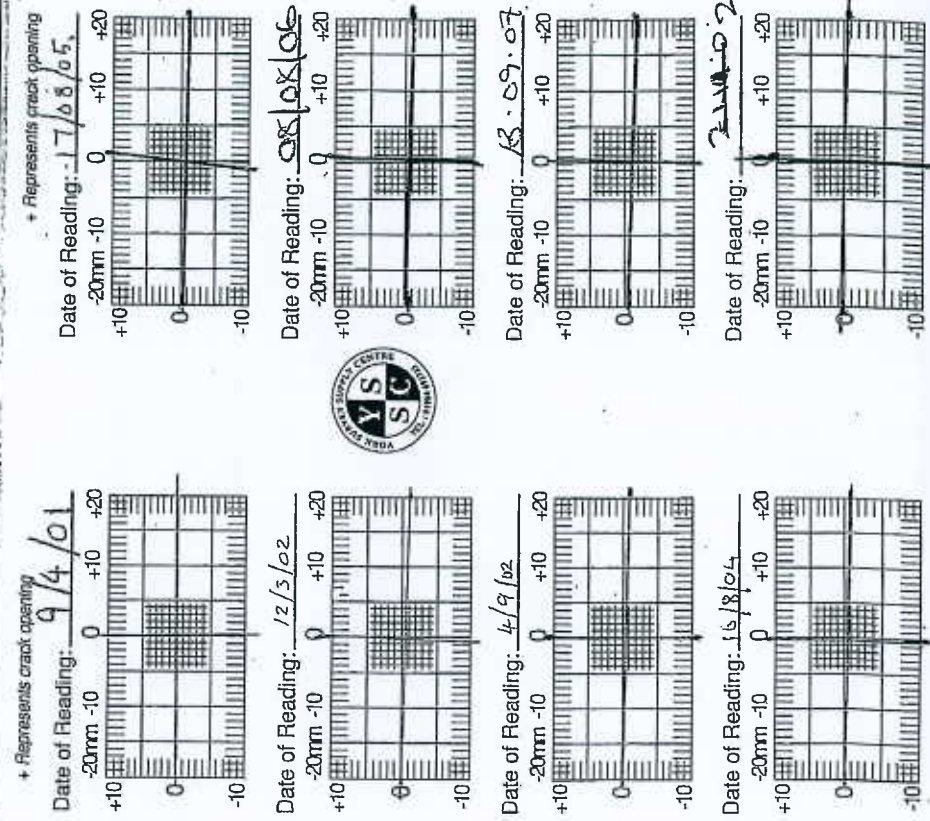
Floor & Displacement Tell-Tales also available. Please call. Need more precision? Ask about Crack-Offset



Crack Monitoring Record for the Standard and Corner Tell-Tale

Project / Monitor Reference: TT4
 Tell-Tale Location: _____

Floor & Displacement Tell-Tales also available. Please call. Need more precision? Ask about Crack-Offset

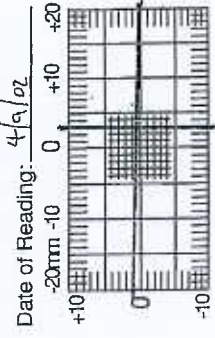
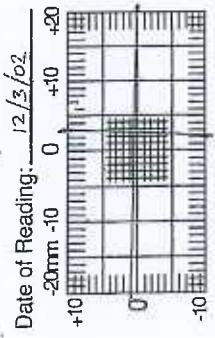
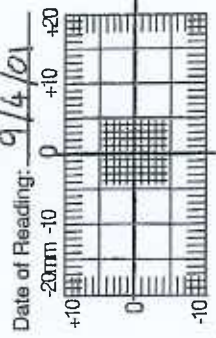


Crack Monitoring Record for the Standard and Corner Tell-Tale

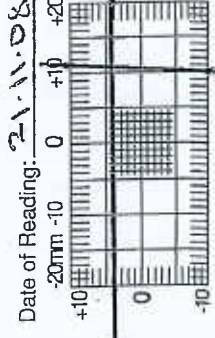
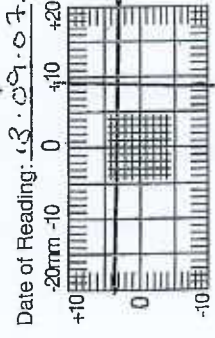
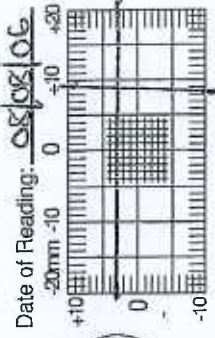
Project / Monitor Reference: TT 5
 Tell-Tale Location: _____

Floor & Displacement Tell-Tales also available. Please call. Need more precision? Ask about *Crack-Measure*

+ Represents crack opening



+ Represents crack opening

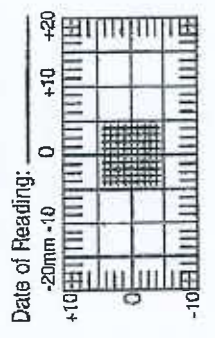
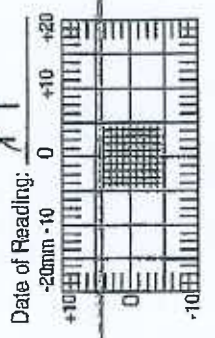
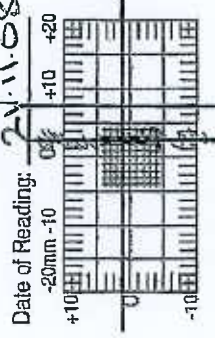
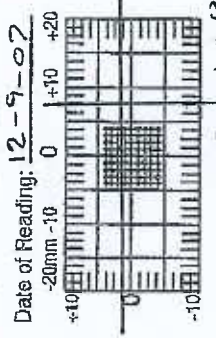


Crack Monitoring Record for the Standard and Corner Tell-Tale

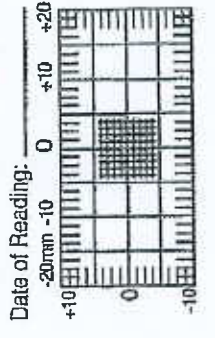
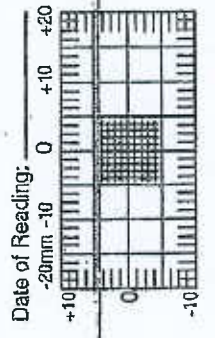
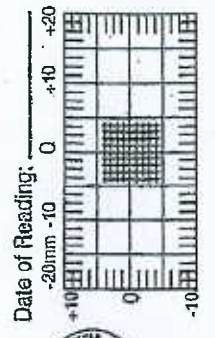
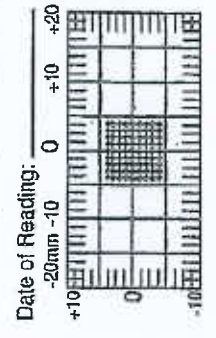
Project / Monitor Reference: _____
 Tell-Tale Location: TT 6 se-612

Floor & Displacement Tell-Tales also available. Please call. Need more precision? Ask about *Crack-Measure*

+ Represents crack opening



+ Represents crack opening





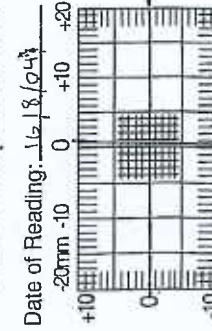
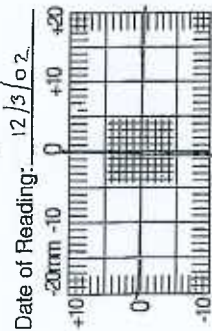
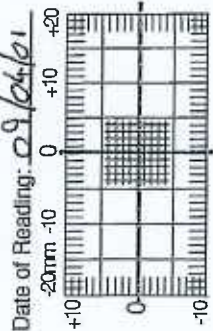
Crack Monitoring Record for the Standard and Corner Tell-Tale

Project / Monitor Reference: TT7

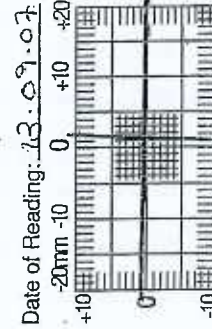
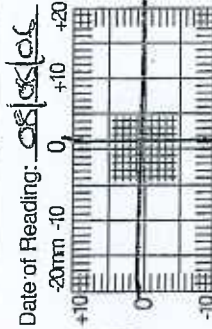
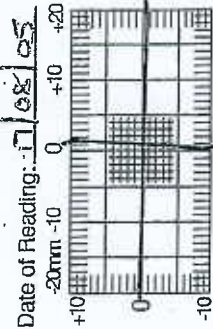
Tell-Tale Location: _____

Floor & Displacement Tell-Tales also available. Please call. Need more precision? Ask about Crack-O-Meas

+ Represents crack opening



+ Represents crack opening



Crack Monitoring Record for the Standard and Corner Tell-Tale

Project / Monitor Reference: TT8

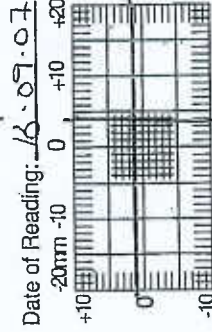
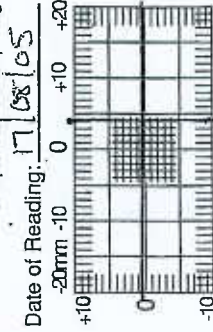
Tell-Tale Location: _____

Floor & Displacement Tell-Tales also available. Please call. Need more precision? Ask about Crack-O-Meas

+ Represents crack opening



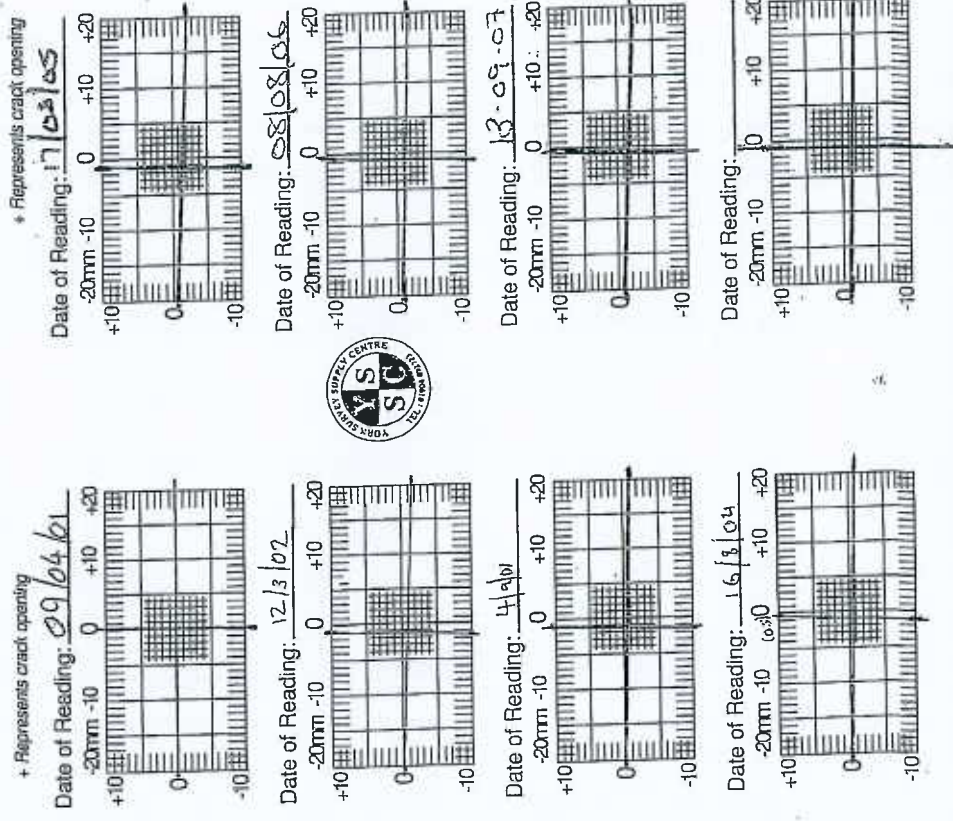
+ Represents crack opening



Crack Monitoring Record for the Standard and Corner Tell-Tale

Floor & Displacement Tell-Tales also available. Please call. Need more precision? Ask about Crack-Mat

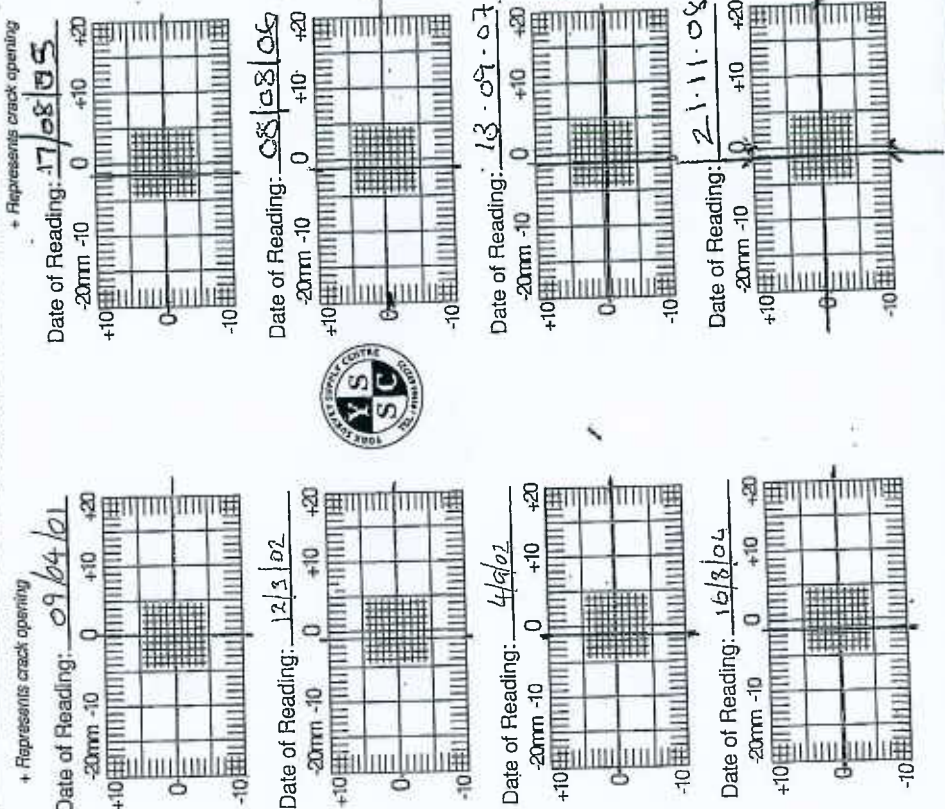
Project / Monitor Reference: TT19
 Tell-Tale Location: _____



Crack Monitoring Record for the Standard and Corner Tell-Tale

Floor & Displacement Tell-Tales also available. Please call. Need more precision? Ask about Crack-Mat

Project / Monitor Reference: TT10
 Tell-Tale Location: _____



Crack Monitoring Record for the Standard and Corner Tell-Tale

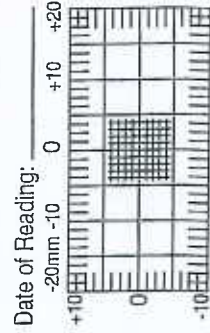
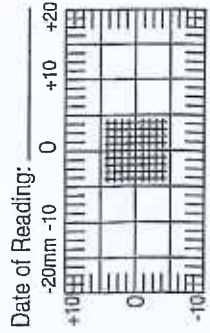
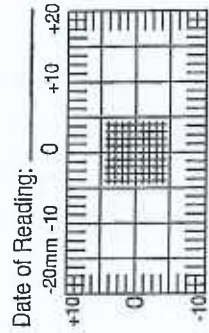
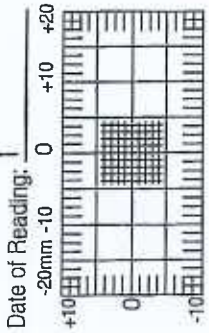
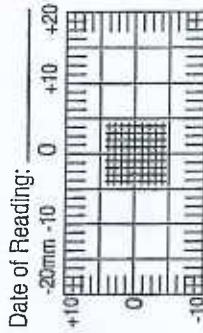
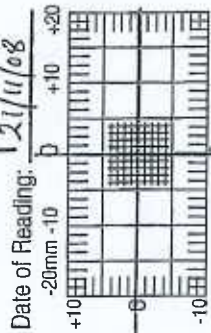
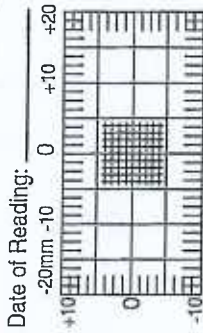
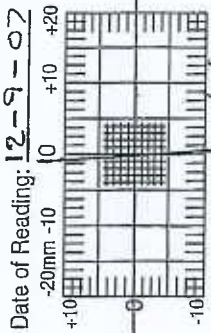
Project / Monitor Reference: _____

Tell-Tale Location: T T 11 Above Sump Door

Floor & Displacement Tell-Tales also available. Please Call. Need more precision? Ask about Crack-Mask

+ Represents crack opening

+ Represents crack opening



Crack Monitoring Record for the Standard and Corner Tell-Tale

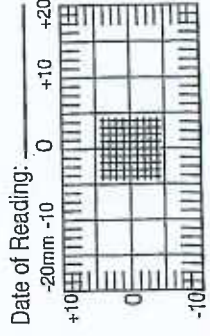
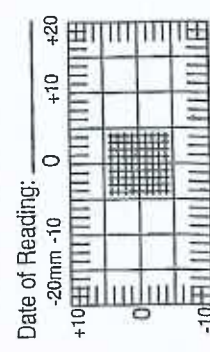
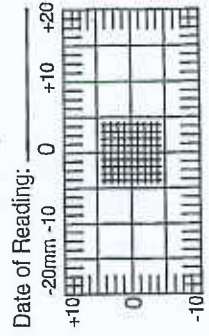
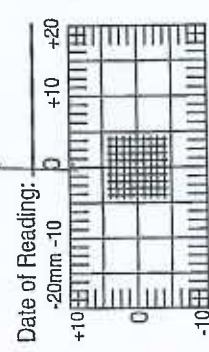
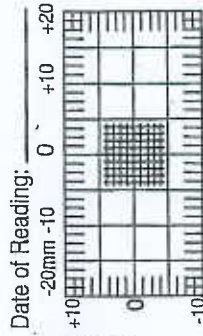
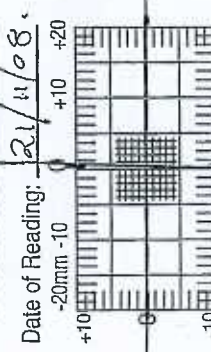
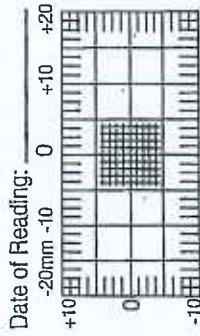
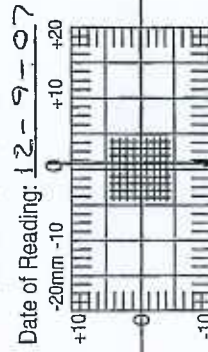
Project / Monitor Reference: _____

Tell-Tale Location: T T 12 Cavern C south Floor West side

Floor & Displacement Tell-Tales also available. Please Call. Need more precision? Ask about Crack-Mask

+ Represents crack opening

+ Represents crack opening

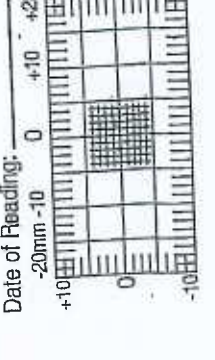
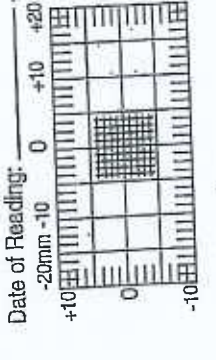
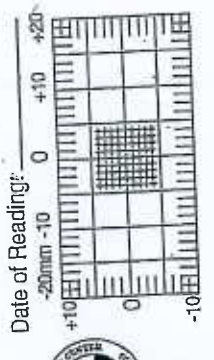
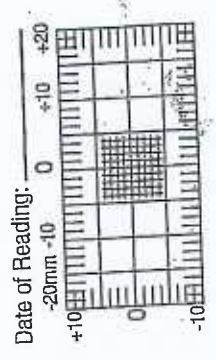


Crack Monitoring Record for the Standard and Corner Tell-Tale

Project / Monitor Reference: 174
 Tell-Tale Location: 174

Floor & Displacement Tell-Tales also available. Please Call. Need more precision? Ask about *Crack-Offset*

+ Represents crack opening

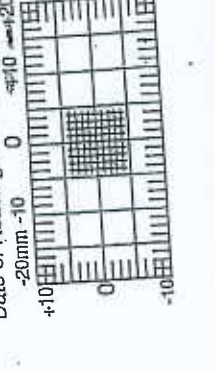
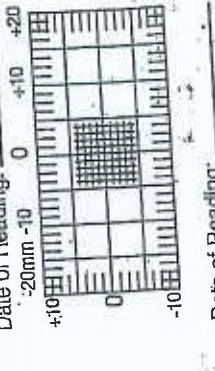
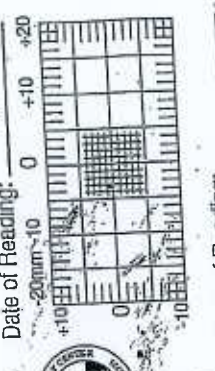
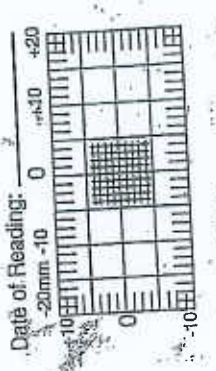


Crack Monitoring Record for the Standard and Corner Tell-Tale

Project / Monitor Reference: 174
 Tell-Tale Location: 174

Floor & Displacement Tell-Tales also available. Please Call. Need more precision? Ask about *Crack-Offset*

+ Represents crack opening





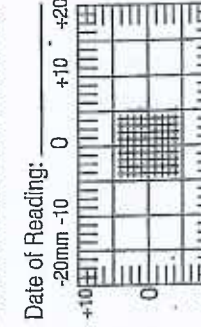
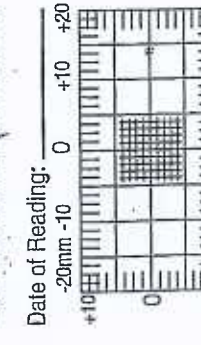
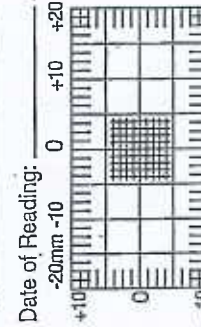
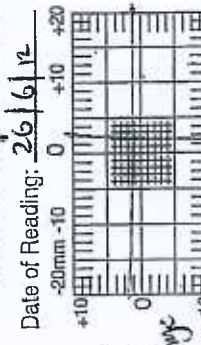
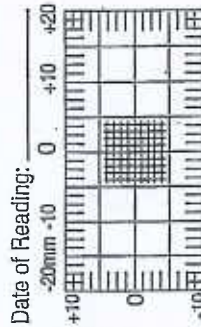
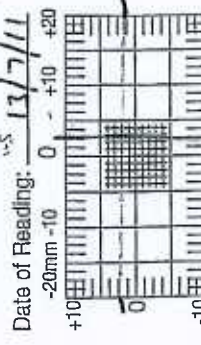
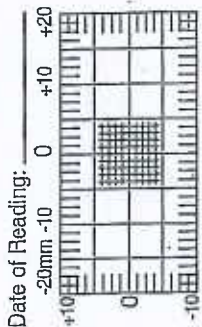
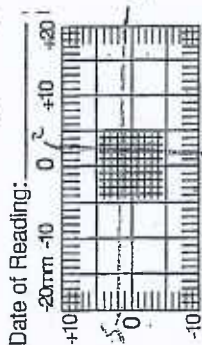
Crack Monitoring Record for the Standard and Corner Tell-Tale

Project / Monitor Reference: 112
 Tell-Tale Location: _____

Floor & Displacement Tell-Tales also available. Please Call. Need more precision? Ask about Crack-Mark

+ Represents crack opening

+ Represents crack opening



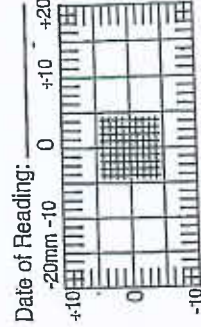
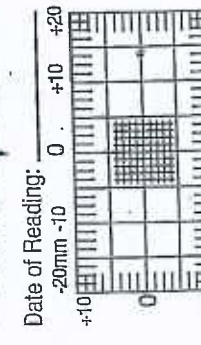
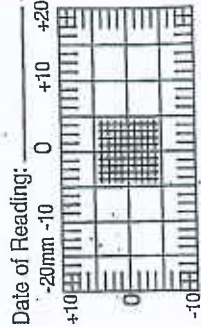
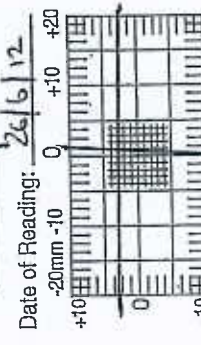
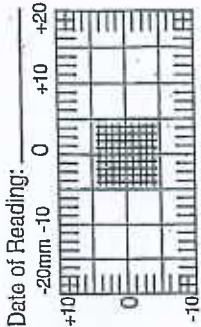
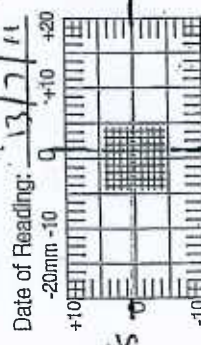
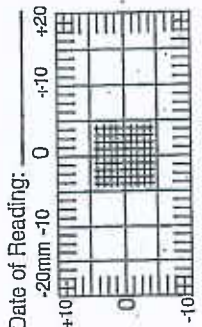
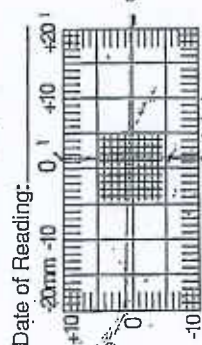
Crack Monitoring Record for the Standard and Corner Tell-Tale

Project / Monitor Reference: _____
 Tell-Tale Location: 113

Floor & Displacement Tell-Tales also available. Please Call. Need more precision? Ask about Crack-Mark

+ Represents crack opening

+ Represents crack opening





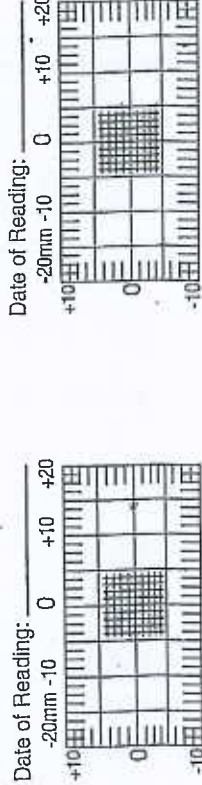
Crack Monitoring Record for the Standard and Corner Tell-Tale

Project / Monitor Reference: FIS

Tell-Tale Location: 12.5

Floor & Displacement Tell-Tales also available. Please Call. Need more precision? Ask about *Crack-Cells*

+ Represents crack opening



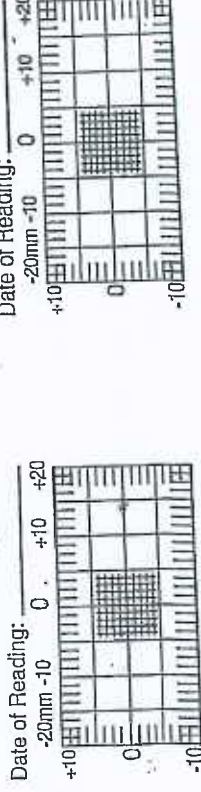
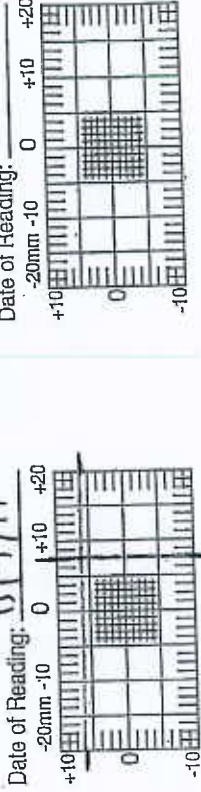
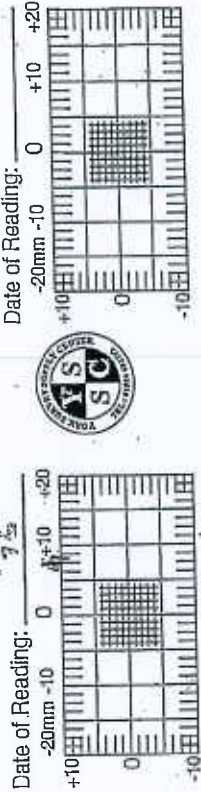
Crack Monitoring Record for the Standard and Corner Tell-Tale

Project / Monitor Reference: T 16

Tell-Tale Location: 50

Floor & Displacement Tell-Tales also available. Please Call. Need more precision? Ask about *Crack-Cells*

+ Represents crack opening



Crack Monitoring Record for the Standard and Corner Tell-Tale

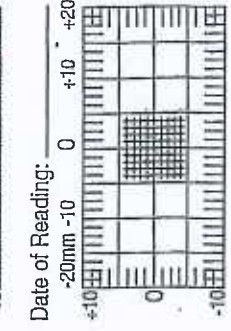
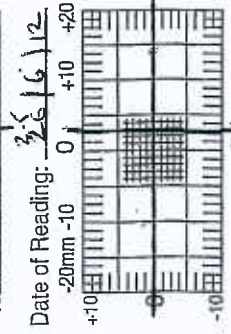
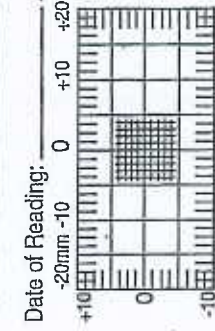
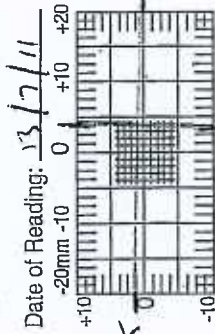
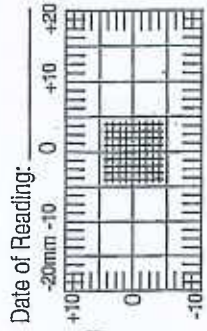
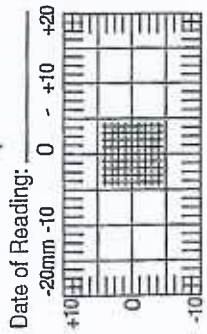
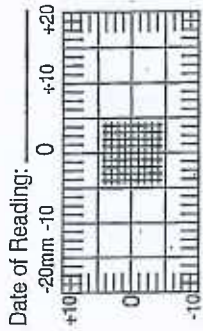
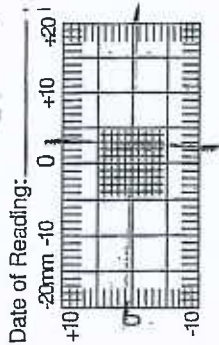
Project / Monitor Reference: _____

Tell-Tale Location: TT7

Floor & Displacement Tell-Tales also available. Please Call. Need more precision? Ask about Crack-Classe

+ Represents crack opening

+ Represents crack opening



Crack Monitoring Record for the Standard and Corner Tell-Tale

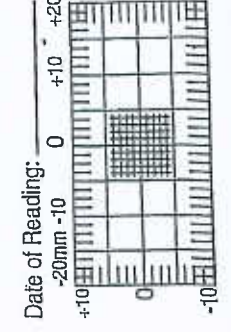
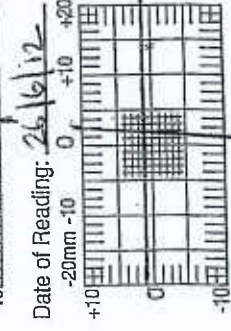
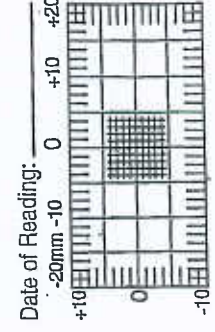
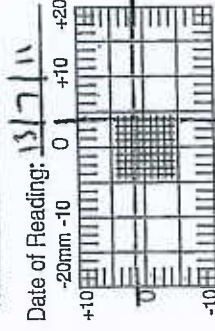
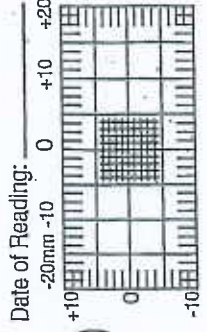
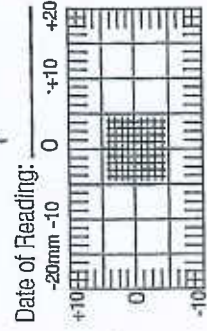
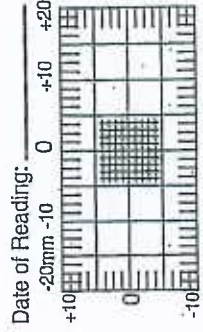
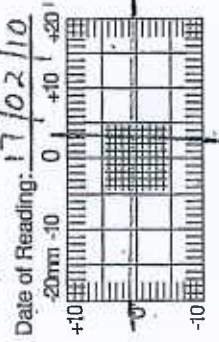
Project / Monitor Reference: _____

Tell-Tale Location: TT8

Floor & Displacement Tell-Tales also available. Please Call. Need more precision? Ask about Crack-Classe

+ Represents crack opening

+ Represents crack opening

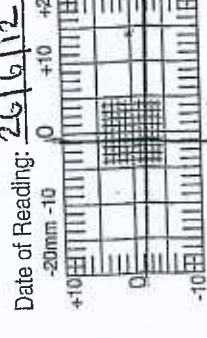
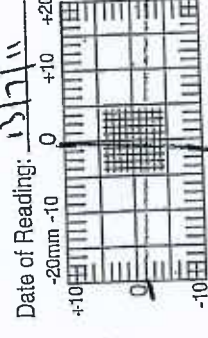
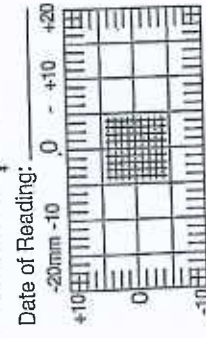
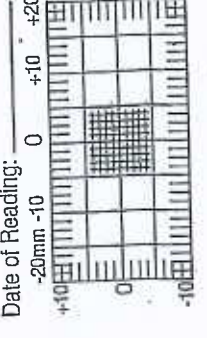
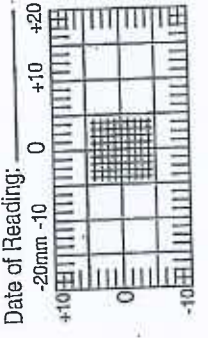
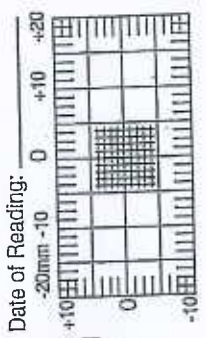
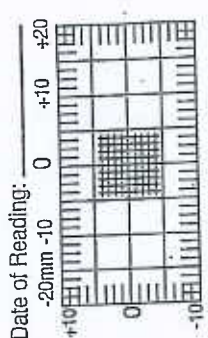


Crack Monitoring Record for the Standard and Corner Tell-Tale

Project / Monitor Reference: _____
 Tell-Tale Location: TT10

Floor & Displacement Tell-Tales also available. Please Call. Need more precision? Ask about Crack-Measr

+ Represents crack opening

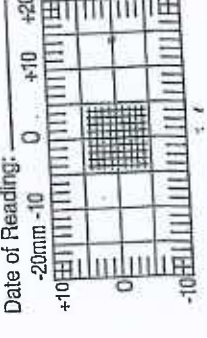
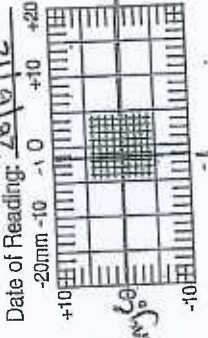
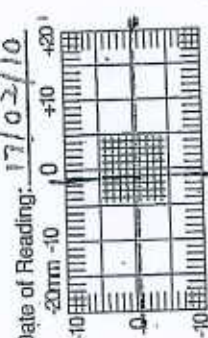
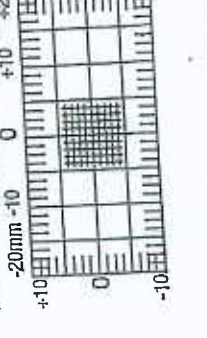
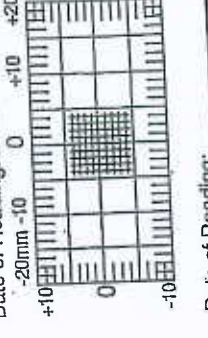
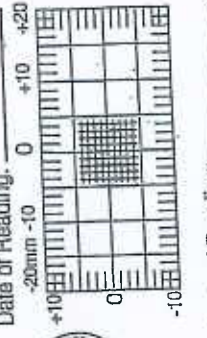
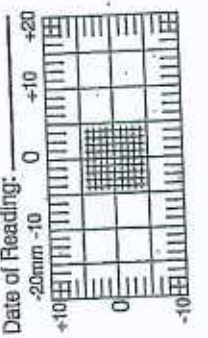


Crack Monitoring Record for the Standard and Corner Tell-Tale

Project / Monitor Reference: _____
 Tell-Tale Location: TT10

Floor & Displacement Tell-Tales also available. Please Call. Need more precision? Ask about Crack-Measr

+ Represents crack opening





Crack Monitoring Record for the Standard and Corner Tell-Tale

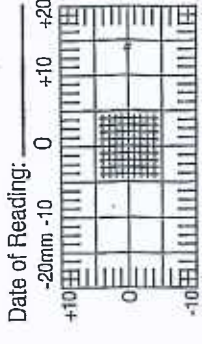
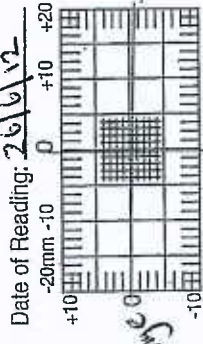
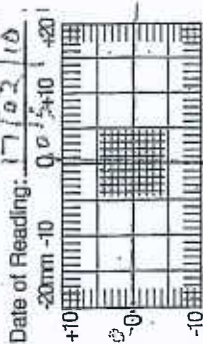
Project / Monitor Reference: _____

Tell-Tale Location: TT 11

Floor & Displacement Tell-Tales also available. Please Call. Need more precision? Ask about Crack-O-Mat

+ Represents crack opening

+ Represents crack opening



Crack Monitoring Record for the Standard and Corner Tell-Tale

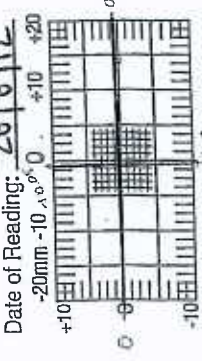
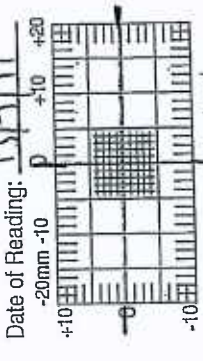
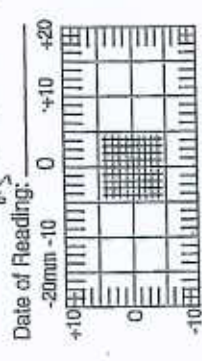
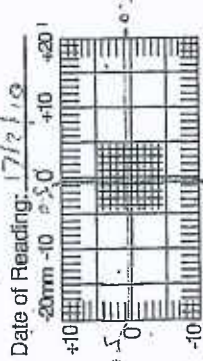
Project / Monitor Reference: _____

Tell-Tale Location: TT 12

Floor & Displacement Tell-Tales also available. Please Call. Need more precision? Ask about Crack-O-Mat

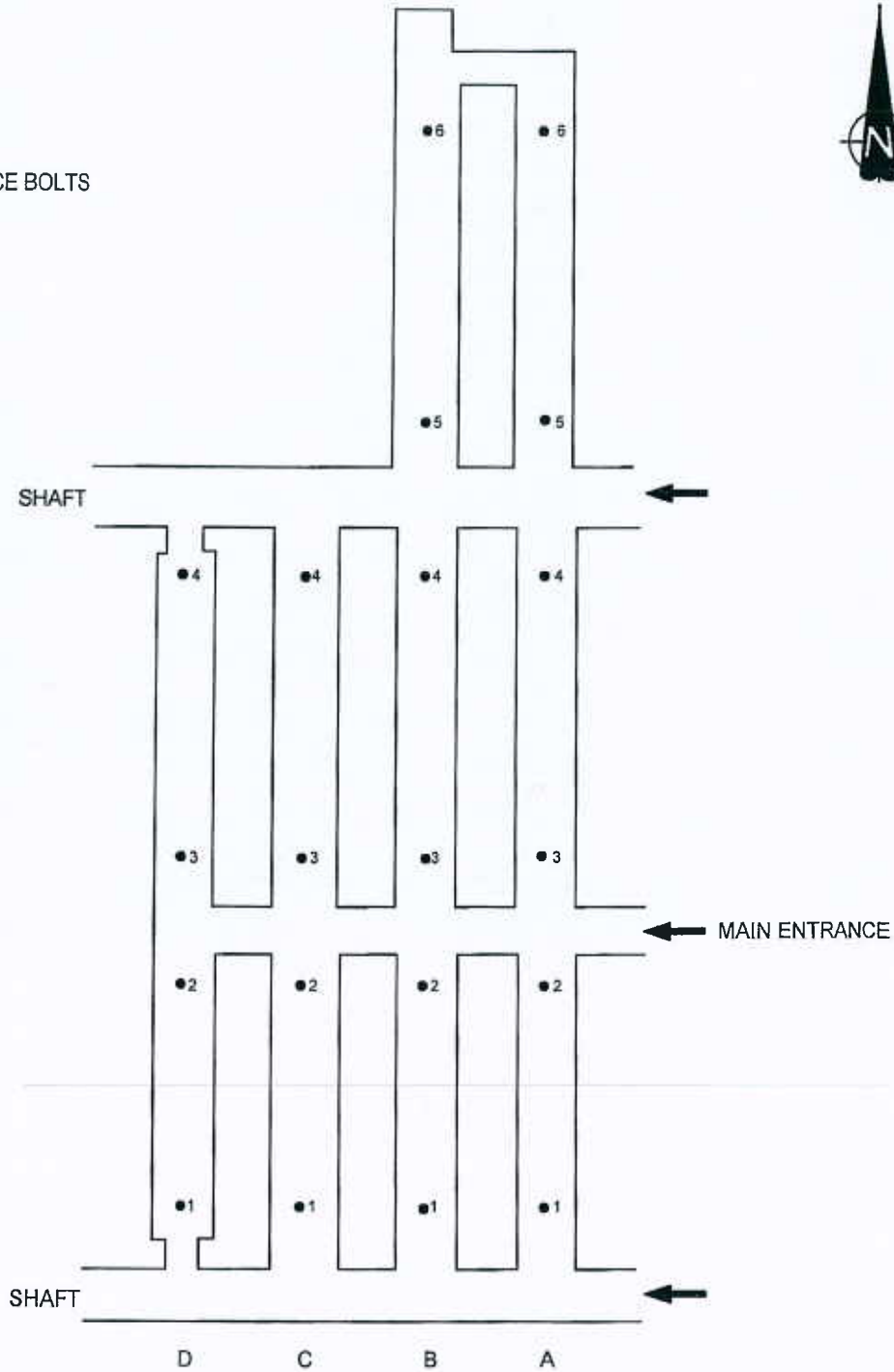
+ Represents crack opening

+ Represents crack opening




DRAWINGS

● CONVERGENCE BOLTS



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CLIENT CITEX	DRG No NL00910/01	SCALE Not to scale	DATE April 2002
PROJECT UNDERGROUND CAVERNS AT RHYDYMWYN, MOLD	DRAWN BY JD	CHECKED BY RNB	APPROVED BY PG
DRAWING TITLE PLAN OF CAVERNS FOR REFERENCE	 Wardell Armstrong Engineering & Environmental Solutions		

wardell-armstrong.com

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your earth our world



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armstrong**

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Interservefm Ltd.
Registered in England, Number : 2820560.
Registered Office :Capital Tower, 91 Waterloo Road, London SE1 8RT.

[REDACTED]

From: [REDACTED]
Sent: 09 September 2013 14:22
To: [REDACTED]
Subject: FW: MAFF Caverns: Additional Work Items
Attachments: LWL-Sharpscan@wardell-armstrong.com_20130124_173143.pdf
Categories: [REDACTED]

From: [REDACTED]
Sent: 09 September 2013 12:46
To: [REDACTED]
Subject: FW: MAFF Caverns: Additional Work Items

[REDACTED]
Interserve Facilities Manager
17 Nant Alyn Road
Rhydymwyn
Nr Mold
Flintshire
CH7 5HQ
Tel 01352 741591
Mobile 07891568385

From: [REDACTED]
Sent: 24 January 2013 15:36
To: [REDACTED]
Subject: MAFF Caverns: Additional Work Items

Dave

Further to our earlier telephone conversation, please find attached our costed proposal to carry out the additional work items.

Trust this is satisfactory.

In order to get the works complete within the end of March deadline we would be grateful for instruction as soon as possible.

Kind regards

[REDACTED]
Associate Director
Wardell Armstrong LLP
Sir Henry Doulton House
Forge Lane
Etruria
Stoke on Trent
Staffordshire
ST1 5BD

Our ref: DCW/RB/SL/NL00910/J71
Your ref:

Date: 24 January 2013

[REDACTED]
17 Nant Alyn Road
Rhydymwyn
Nr Mold
Flintshire
CH7 5HQ
[REDACTED]

MAFF Buffer Depot, Rhydymwyn, Mold: Additional Work Items

Further to our meeting on 20 December 2012, we provide the costs associated with the additional work items discussed at the meeting. The costs below are in addition to those presented in our previous costed proposal dated 23 November 2012 and assume that the works will be carried out during a single phase of operations.

Preliminary Radon Monitoring and Preliminary Radon Risk Assessment

The Ionising Radiation Regulations (IRR) 1999 apply to any work being undertaken in an atmosphere containing radon 222 gas at a concentration in air, averaged over any 24 hour period, exceeding 400 Bq/m³. It is understood that previous passive monitoring indicates that this concentration is very likely to be exceeded in the caverns. Wardell Armstrong have also recently been undertaking inspections of the Milwr Tunnel that passes beneath the caverns and elevated radon levels have been encountered here resulting in the requirement to comply with the IRR.

The IRR establish a framework for ensuring that exposure to ionising radiation arising from work activities, is kept as low as is reasonably practicable (ALARP). It specifies dose limits that must not be exceeded by individuals. The IRR have various requirements on the Employers of personnel working in radon affected environments, the most relevant of these are:

- Preparation of radon risk assessment for the works;
- Appointment of a Radiation Protection Advisor (RPA) to provide expert advice;
- Appointment of Radiation Protection Supervisor (RPS);
- Designation of Supervised /Controlled Areas dependent on potential radon dose;
- Undertake radon monitoring;
- Preparation of Local Rules to minimise exposure to radon;
- Designation of Classified Persons (if appropriate).

Due to the lack of current data relating to radon concentrations, the object of the study will be to ascertain measurements of radon concentrations in the cavern at various locations and under varying conditions (airflow direction, doors open/closed) using an Alpha Guard active (real time) monitor. The monitor can be left unattended to record concentrations and the data subsequently downloaded. This information may be supplemented by long term passive monitors and personal monitoring. This information will then be used to prepare a comprehensive Radon Risk Assessment and Local Rules that are used to determine the requirements for future access to the caverns.





Wardell Armstrong, in association with the Health Protection Agency, is able to provide the specialist expertise to undertake the study. The Health Protection Agency would be appointed as the project RPA, subcontracted through Wardell Armstrong. We would propose the following methodology:

- Prepare preliminary Radon Risk Assessment based upon the results of the previous radon monitoring, including Local Rules;
- Appoint RPA and get approval of our proposed risk assessment;
- Hire Alpha Guard active radon monitor from Germany for duration of underground works, say 3 weeks;
- 1 day underground inspection by WA/HPA team to assess airflow movements , undertake initial monitoring, train underground team in monitor operation and prepare monitoring schedule;
- Update Local Rules based on initial monitoring, if necessary;
- Commence active monitoring in accordance with agreed schedule and download data;
- Issue personal exposure badges to underground team;
- Install long term passive monitors in the caverns (for three months);
- Prepare updated Radon Risk Assessment and Local Rules based on new monitoring information.

The costs are estimated as follows (ex VAT):

Wardell Armstrong

WA fees:	£7,500
WA expenses:	£250
Disbursements:	Appointment of Health Protection Agency as RPA (1 year contract) £1,750;
	Hire of Alpha Guard active monitor (assume 3 weeks) £2,000;
	Personal badges (assume 8) £300;
	Passive monitors (assume 4) £100.

Total Wardell Armstrong costs: £11,900 (exc. VAT)

TL Excavations

Assisting Wardell Armstrong with initial monitoring of radon using Alphaguard active monitoring equipment. This will be carried out one week prior to contractual work in the caverns.

1 day to accompany Wardell Armstrong to undertake preliminary monitoring at various locations in the caverns.

TL Excavations Cost: £400 (exc. VAT)

The Alphaguard will then be left in-situ at a representative location to record radon levels under differing ventilation conditions over a longer period.

Contingency Costs for Ventilation

If, based on preliminary monitoring, it is evident that the radon levels are outside safe working parameters, it is likely that it will be necessary to ventilate the caverns during the contractual work and a fan and generator will be mobilised to site.

Once the longer term monitoring is analysed a final decision will be made on the requirement and extent of ventilation measures.



The potential ventilation requirements could require the provision and installation of a 20hp fan and ducting, 60kva diesel generator & fuel, cable and switch gear, sheeting material for bratticing.

TL Excavations Contingency Costs:
Establishment: £2,600 (exc. VAT)
Per week: £1,180 (exc. VAT), say £3,540 for 3 weeks

Replacement of Cavern Roof Water Catchment and Drainage

Removal and disposal of existing water catchment system and replacement with a 1.5m x 1.5m hot dipped galvanised hopper, utilising existing pipework and re-support from the roof.

TL Excavation costs: £5,000 exc. VAT
Wardell Armstrong costs to supervise and validate: £1,100 exc. VAT.

Installation of Second Water Catchment Hopper

Installation of 1.5m x 1.5m hot dipped galvanised hopper with associated pipework;

TL Excavations costs: £3,150 exc. VAT
Wardell Armstrong costs to supervise and validate: £550 exc. VAT.

Provide and Install Replacement Door on Northern Access Tunnel

Remove and dispose of existing door and replace with steel hot dipped galvanised door.

TL Excavations costs: £1,960 exc. VAT.
Wardell Armstrong costs to supervise and validate: £550 exc. VAT.

Paint Main Entrance Doors

Prepare steelwork and paint green on both sides:

TL Excavation costs: £70 exc. VAT
Wardell Armstrong costs: Included

Paint Internal Barrier

Prepare steelwork and paint black with yellow stripe:

TL Excavation costs: £70 exc. VAT
Wardell Armstrong costs: Included.

Steel Access Decking

Provide and install 27m x 1m steel decking to provide pedestrian access to the main entrance including ground preparation (excluding any drainage amendments).

TL Excavations costs: £8,780 exc. VAT
Wardell Armstrong costs to supervise and validate (including Senior Structural Engineer to inspect and validate on completion): £2,500 exc. VAT.

A summary of the costs are presented in Table 1 below:



Item	Wardell Armstrong Costs (exc. VAT)	TL Excavations Ltd Costs (exc. VAT)
Radon Monitoring and Risk Assessment	£11,900	£400*
Replacement of Cavern Roof Drainage	£1,100	£5,000
Installation of Second Water Hopper	£550	£3,150
Replacement Door	£550	£1,960
Paint Main Door	£0.00	£70
Paint Internal Barrier	£0.00	£70
Steel Access Decking	£2,500	£8,780

* excludes contingency for ventilation.

The above assumes that Interserve will be responsible for the payment of TL Excavation Ltd's invoices directly, subject to our verification.

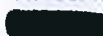
It is understood that this work must be complete by the end of March and therefore we would be grateful for instruction to proceed at your earliest opportunity.

We trust the above meets with your approval, however, if you have any queries please do not hesitate to contact us.

Yours sincerely
for Wardell Armstrong LLP



Associate Director

@wardell-armstrong.com

[REDACTED]

From: [REDACTED]
Sent: 09 September 2013 14:19
To: [REDACTED]
Subject: FW: FoI request - Rhydymwyn Tunnels, Urgent
Attachments: Cavern Inspection Report.htm; MAFF Caverns Additional Work Items.htm; RE Cavern Inspection Report.htm; Rhydymwyn Caverns Access Walkway.htm; Underground Caverns Rhydymwyn - Inspection Report 1012.htm

Categories: [REDACTED]

From: [REDACTED]
Sent: 09 September 2013 12:45
To: [REDACTED]
Cc: [REDACTED]
Subject: RE: FoI request - Rhydymwyn Tunnels, Urgent

[REDACTED]

I think this is all I have? You have the final report and I will forward you both sets of costings separately.

[REDACTED]

[REDACTED]

Interserve Facilities Manager
17 Nant Alyn Road
Rhydymwyn
Nr Mold
Flintshire
CH7 5HQ
Tel 01352 741591
Mobile 07891568385

From: [REDACTED]
Sent: 09 September 2013 11:34
To: [REDACTED]
Cc: [REDACTED]
Subject: FoI request - Rhydymwyn Tunnels, Urgent

[REDACTED]

Many thanks for this.

The FoI request asks for all correspondence around the March 2013 Wardell Armstrong report, which I assume will include commissioning, receipt, comments & distribution, although should include anything else.

Can you urgently supply & I will redact all personal information.

Regards

[REDACTED]

[REDACTED]
[REDACTED]
Deira Estates
Foss House, Kings Pool
1-2 Peasholme Green
YORK. YO1 7PX.

tel. [REDACTED]

From: [REDACTED]
Sent: 09 September 2013 09:16
To: [REDACTED]
Cc: [REDACTED]
Subject: RE: FoI request - Rhydymwyn Tunnels, Urgent

[REDACTED]

I have just got back from leave.
Please see my responses in red below.
Hope they help?
Please give me a call to discuss further.

Regards,

[REDACTED]
[REDACTED]
Interserve Facilities Manager
17 Nant Alyn Road
Rhydymwyn
Nr Mold
Flintshire
CH7 5HQ
Tel 01352 741591
Mobile 07891568385

From: [REDACTED]
Sent: 06 September 2013 10:41
To: [REDACTED]
Cc: [REDACTED]
Subject: FoI request - Rhydymwyn Tunnels, Urgent
Importance: High

[REDACTED]

We have received the attached FoI request, which would include the 2013 Caverns Inspection Report, already provided below.

The FoI request specifically asks for any further correspondence / e mails / memo's.

Can you urgently supply any further correspondence flowing from the issue of the report, perhaps remedial works? Non. I will contact my contractor probably in Jan to discuss any remedial works and inspection, for completion in March.

I see from the report there is mention of the results of Radon monitoring being passed to HP, who will report separately, Para 2.35. If there is any correspondence relating to this or reports can you supply & I assume there is no issue with releasing this into the public domain. Non as yet, monitoring is ongoing (12 month) but I am hoping for some feed back before we issue next year's inspection W.O, but I suspect we won't get it until March/April which will throw the inspection out of sinc (again), if there are any remedial actions to be taken from it.

The Fol requests information on proposed future inspection / engineering works to the tunnels. I assume we are continuing with the annual inspection, implementation and commenced remedial works. Can you confirm this & provide any further correspondence / information on future actions. As above. But all recommendations from last report 4.11 will be considered prior to issue of W.O next year.

Finally, DECC has also received a Fol request for the "Report on the Testing of Radiological Contamination in Building 45, Rhydymwyn ENV/E97017/Report Final". Can you supply a copy & confirm it can be released into the Public Doman under a Fol request. I don't believe I have ever seen this report, who was the author? All the reports etc I held were sent to Alnwick years ago. All I can tell you on this is that Radiological testing was carried out in 45 about 10 years ago by Serco Assurance, and I was told verbally that non was detected above normal background levels.

Can you deal with this urgently please as there are strict timescales for responses to Fol requests.

Regards

[REDACTED]
[REDACTED]
Defra Estates
Foss House, Kings Pool
1-2 Peasholme Green
YORK. YO1 7PX.

[REDACTED]
tel. [REDACTED]

From: [REDACTED]
Sent: 22 May 2013 09:04
To: [REDACTED]
Subject: FW: Cavern Inspection Report

[REDACTED]
Sorry I missed your call I was on leave.
After checking my records it seems I forgot to forward this on, apologies again. Dates etc covered in report, can you forward to all that need it from there?
Any problems please give me a call.

Regards,

[REDACTED]
[REDACTED]
Interserve Facilities Manager

17 Nant Alyn Road
Rhydymwyn
Nr Mold
Flintshire
CH7 5HQ
Tel 01352 741591
Mobile 07891568385

From: [redacted] [mailto:[redacted]@wardell-armstrong.com]
Sent: 21 March 2013 14:50
To: [redacted]
Subject: Cavern Inspection Report

[redacted]

Hope you are well.

Please find attached the 2013 Inspection Report. As discussed we shall carry out 12 months Radon monitoring and provide a separate report once all of the results are available.

Kind regards

[redacted]
Associate Director
Wardell Armstrong LLP
Sir Henry Doulton House
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Staffordshire
ST1 5BD

Tel: 0845 111 7777
Fax: 0845 111 8888
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From: [REDACTED]
Sent: 21 March 2013 14:50
To: [REDACTED]
Subject: Cavern Inspection Report
Attachments: J08 Stability Inspection and Remedial Works.pdf

[REDACTED]
Hope you are well.

Please find attached the 2013 Inspection Report. As discussed we shall carry out 12 months Radon monitoring and provide a separate report once all of the results are available.

Kind regards

[REDACTED]
Associate Director

Wardell Armstrong LLP

Sir Henry Doulton House
Forge Lane
Etruria
Stoke on Trent
Staffordshire
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[REDACTED]

[REDACTED]

[REDACTED]

From: [REDACTED]
Sent: 24 January 2013 15:36
To: [REDACTED]
Subject: MAFF Caverns: Additional Work Items
Attachments: LWL-SharpScan@wardell-armstrong.com_20130124_173143.pdf

[REDACTED]

Further to our earlier telephone conversation, please find attached our costed proposal to carry out the additional work items.

Trust this is satisfactory.

In order to get the works complete within the end of March deadline we would be grateful for instruction as soon as possible.

Kind regards

[REDACTED]
Associate Director
Wardell Armstrong LLP
Sir Henry Doulton House
Forge Lane
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Stoke on Trent
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ST1 5BD

Tel: 0845 111 7777

Fax: 0845 111 8888

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[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

From: [REDACTED]
Sent: 21 March 2013 15:24
To: [REDACTED]
Subject: RE: Cavern Inspection Report

[REDACTED]

Thanks for the note, I will pass your thanks on to Terry as well. Two hard copies of the report have been issued in tonight's post. Hopefully you'll get them in the morning – snow permitting!

Kind regards

[REDACTED]
Associate Director

Wardell Armstrong LLP

Sir Henry Doulton House
Forge Lane
Etruria
Stoke on Trent
Staffordshire
ST1 5BD

Tel: 0845 111 7777

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www.wardell-armstrong.com

From: [REDACTED]
Sent: 21 March 2013 15:21
To: [REDACTED]
Subject: RE: Cavern Inspection Report

[REDACTED]

Thanks for this, your assistance in getting this work completed within the short time frame is very much appreciated. Could you also pass on my sincere thanks to Terry the next time you speak. I suspect you will send me a hard copy shortly, and I will distribute this report internally.

Thanks again we'll speak soon.

[REDACTED]
Interserve Facilities Manager
17 Nant Alyn Road
Rhydymwyn
Nr Mold
Flintshire
CH7 5HQ
Tel 01352 741591
Mobile 07891568385

From: [REDACTED]
Sent: 21 March 2013 14:50
To: [REDACTED]
Subject: Cavern Inspection Report

Hope you are well.

Please find attached the 2013 Inspection Report. As discussed we shall carry out 12 months Radon monitoring and provide a separate report once all of the results are available.

Kind regards

Associate Director

Wardell Armstrong LLP

Sir Henry Doulton House
Forge Lane
Etruria
Stoke on Trent
Staffordshire
ST1 5BD

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From: [REDACTED]
Sent: 02 January 2013 16:15
To: [REDACTED]
Subject: Rhydymwyn Caverns: Access Walkway

[REDACTED]

Hope you had a good break.

I have been speaking with our structural engineers in regard to the walkway solutions employed in other similar scenarios. We use a company called Redman Fisher to provide the walkways (you may want to look at their website). An alternative could be Easi-access (their website is also easily available). These have been provided to Terry who is looking into it further.

I see our role being one of general supervision and final sign off; which could keep the costs down. An alternative would be for us to do a full specification and construction drawing for Terry to build from - but this is likely to be quite expensive.

The off the shelf products should come with suitable guarantees (in terms of life expectancy etc.) and be designed to the right British / European Standards and disabled access requirements. The risk with Terry fabricating it would be that of liability because he undoubtedly wouldn't be aware of the right standards.

Terry has provided the option of using roll out matting, which would sit directly on the ground. For this to be effective the drainage would need to be sorted.

I'll keep you informed.

Kind regards

[REDACTED]

Associate Director
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From: [REDACTED]
Sent: 23 November 2012 13:07
To: [REDACTED]
Cc: [REDACTED]
Subject: Underground Caverns, Rhydymwyn - Inspection Report 1012
Attachments: LWLNEW-Sharpscan@wardell-armstrong.com_20121123_142018.pdf.pdf; LWLNEW-Sharpscan@wardell-armstrong.com_20121123_145218.pdf.pdf

[REDACTED]

Please find attached the Report on Stability Inspection and Remedial Works. Apologies for the delay in issuing this report.

Also attached is our costed proposal to carry out next year's inspection and remedial works.

Two hard copies of the report will follow in the post.

Kind regards

[REDACTED]
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Wardell Armstrong LLP
Sir Henry Doulton House
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