

**TUNNEL EXAMINATION REPORT  
PHOTOGRAPHS OF STRUCTURE**

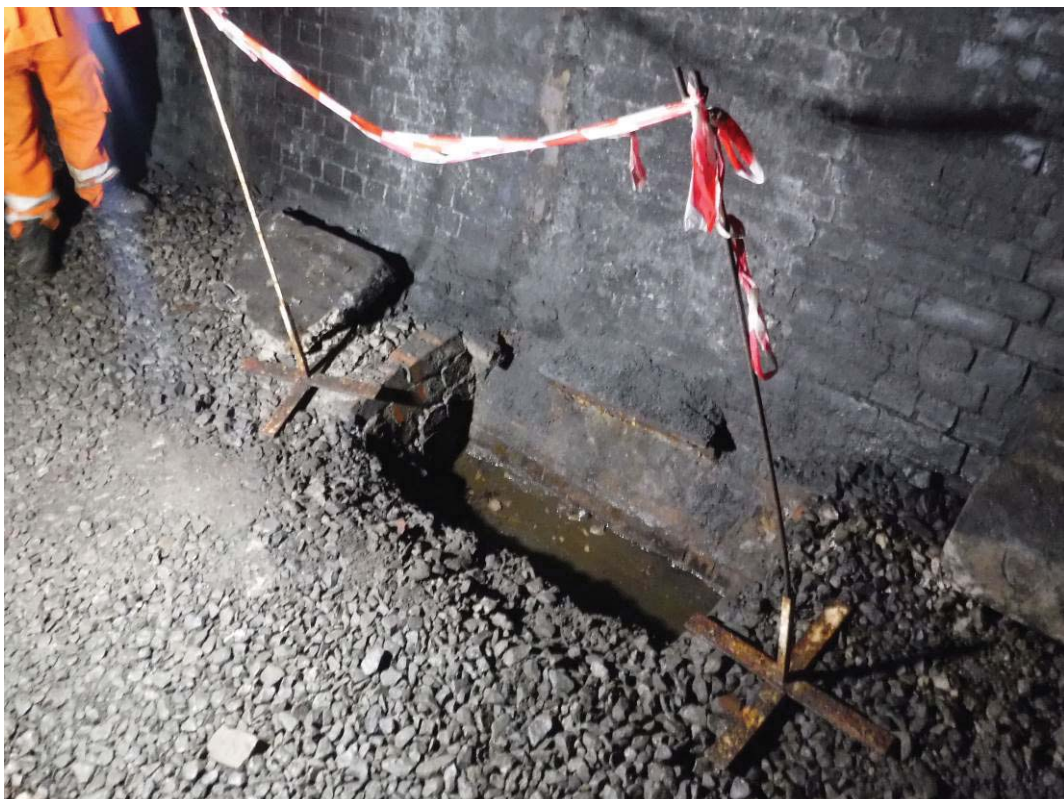
**Balfour Beatty**  
Rail

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**Photo No.79:** 027+02 Full Profile Up & Down, Arch steps out 100mm, bore increases towards NE, open construction joint.



**Photo No.80:** 027+16 Cess Up, Open catch-pit.



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**Photo No.81:** 028+21 Cess Up, Open catch-pit.



**Photo No.82:** 029+09 Crown & Haunch Up & Down, Arch steps up 2m, bore increases towards NE.

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**Photo No.83:** 030+15 Crown & Haunch Up & Down, Arch steps down 2m, bore decreases towards NE.



**Photo No.84:** 029+15 Cess Up, Open catch-pit.



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**Photo No.85:** 030+17 Sidewall Up, Old cabin built behind Refuge, old bullhead rail used as lintels for entrance are heavily corroded.



**Photo No.86:** 031+12 Refuge Up, Brickwork, rail sleeper lintel supports brick arch, timber section to rear rotten and hanging.



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**Photo No.87:** 032+15 Cess Up, Open catch-pit.



**Photo No.88:** 032+15 Cess Up, Open catch-pit.



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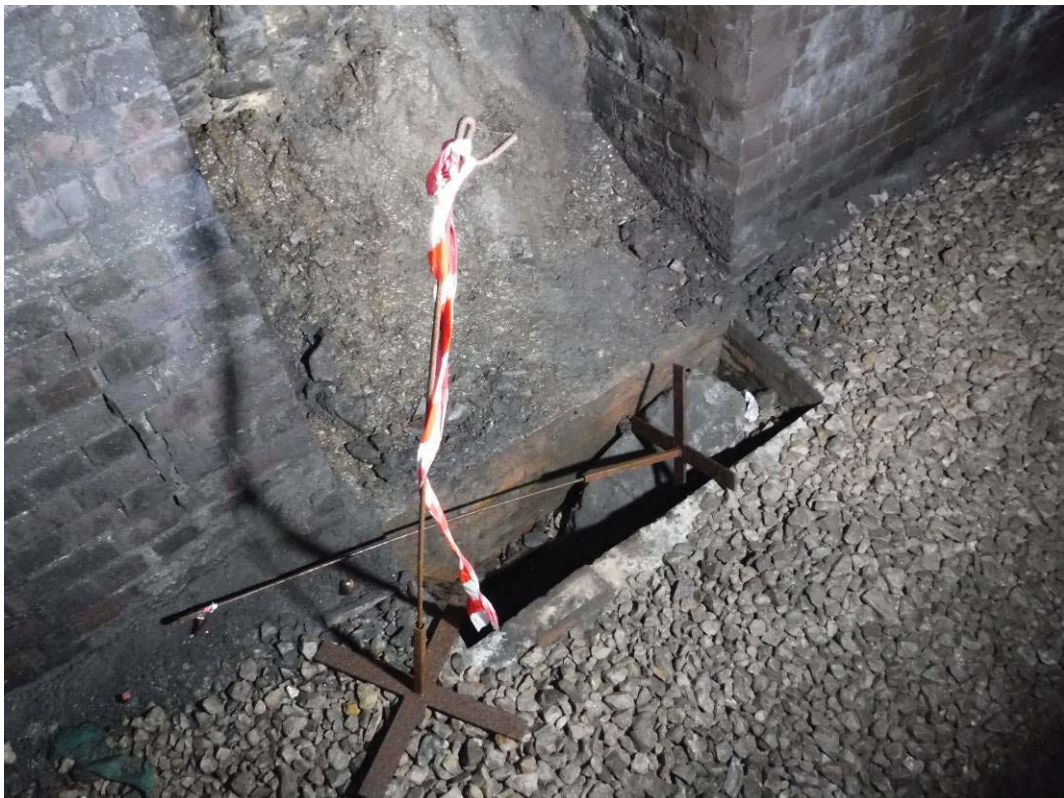
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**Photo No.89:** 033+09 Crown & Haunch Up & Down, Brickwork, arch steps up 600mm, bore increases towards NE.



**Photo No.90:** 033+15 Cess Up, Open catch-pit.



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**Photo No.91:** 034+16 Cess Up, Open catch-pit.



**Photo No.92:** 035+17 Cess Up, Open catch-pit.



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**Photo No.93:** 037+18 Cess Up, Open catch-pit.



**Photo No.94:** 038+15 Cess Up, Open catch-pit.



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**Photo No.95:** 042+21 Cess Up, Open catch-pit.



**Photo No.96:** 043+17 Cess Up, Open catch-pit.



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**Photo No.97:** 045+15 Cess Up, Open catch-pit.



**Photo No.98:** 046+15 Cess Up, Open catch-pit.



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**Photo No.99:** 047+15 Cess Up, Open catch-pit.



**Photo No.100:** 048+17 Cess Up, Open catch-pit.



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**Photo No.101:** 049+02 Cess Down, Open catch-pit.



**Photo No.102:** 052+17 Cess Up, Open catch-pit.



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**Photo No.103:** 050+16 Cess Up, Open catch-pit.



**Photo No.104:** 054+17 Cess Up, Open catch-pit.



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**Photo No.105:** 055+16 Cess Up, Open catch-pit.



**Photo No.106:** 056+18 Cess Up, Open catch-pit and substantially blocked.



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**Photo No.107:** 058+07 Solum Up, Rubbish and litter thrown/accumulated on solum.



**Photo No.108:** 058+18 Cess Up, Open catch-pit and partially blocked, water flowing towards NE.



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**Photo No.109:** 059+17 Cess Up, Open catch-pit.



**Photo No.110:** 060+16 Cess Up, Open catch-pit.



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**Photo No.111:** 061+15 Cess Up, Open catch-pit.



**Photo No.112:** 062+16 Cess Up, Open catch-pit.



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**Photo No.113:** 064+17 Cess Up, Open catch-pit.



**Photo No.114:** 065+13 Cess Up, Open catch-pit.



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**Photo No.115:** 066+13 Cess Up, Open catch-pit.



**Photo No.116:** 067+00 Sidewall Down, Tablet marker ripped off wall, remains of plate not evident on nearby solum.



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**Photo No.117:** 067+12 Cess Up, Open catch-pit.



**Photo No.118:** 068+17 Cess Up, Open catch-pit.



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**Photo No.119:** 069+18 Cess Up, Open catch-pit. New cover fitted.



**Photo No.120:** 072+15 Cess Up, Open catch-pit. New cover fitted.

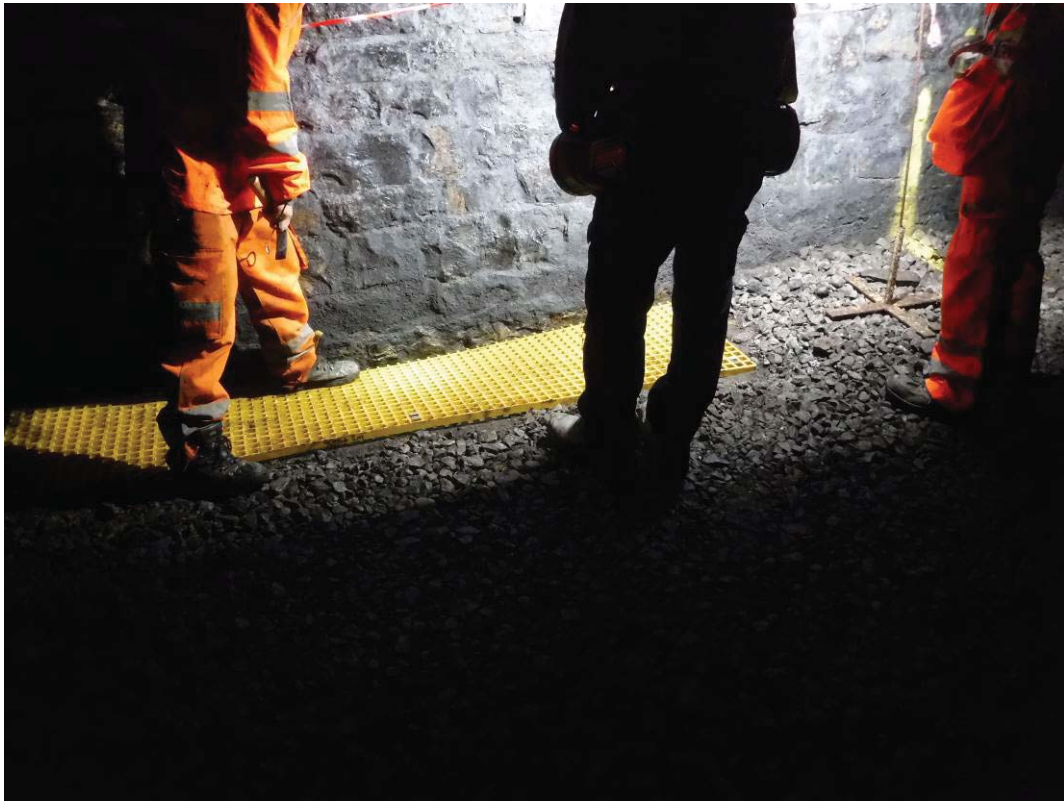


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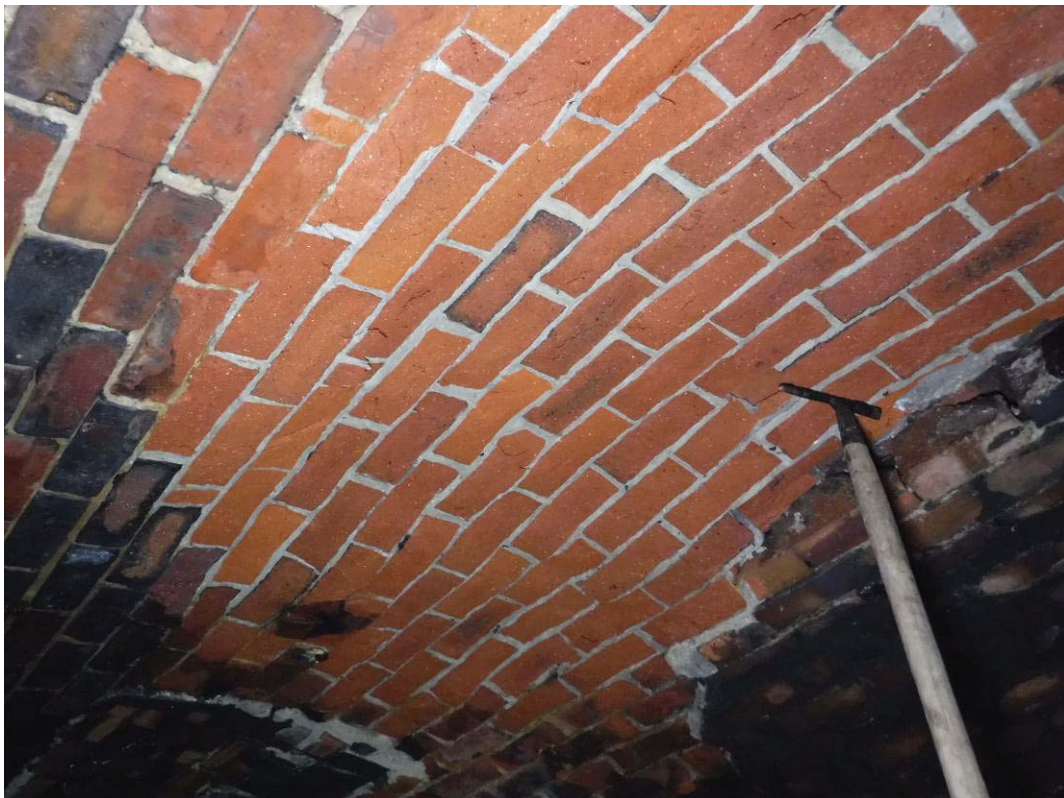
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**Photo No.121:** 072+15 Cess Up, Open catch-pit. New cover fitted.



**Photo No.122:** 080+07 to 080+19 Crown Up & Down, Brickwork, spalling, depth 75mm, area 60sq.m., light.



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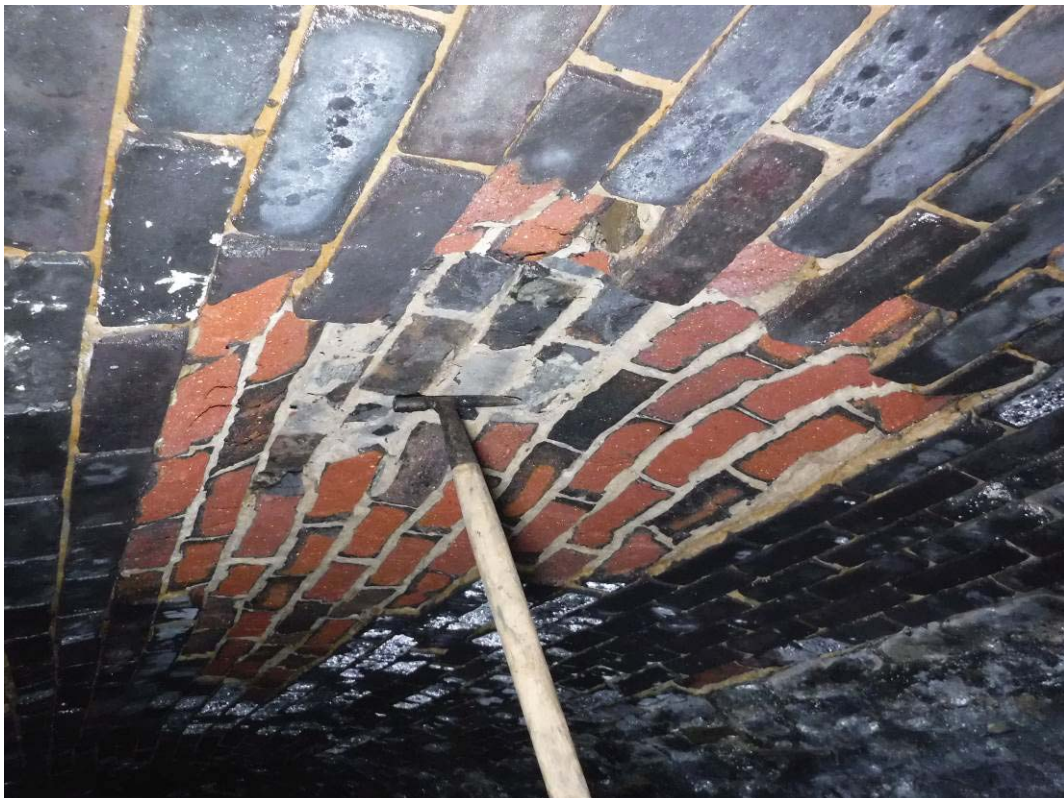
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**Photo No.123:** 082+20 Cess Down, Open catch-pit.



**Photo No.124:** 084+17 to 085+11 Crown Up & Down, Brickwork, spalling and hollow, depth 100mm, area 34sq.m., sparse.



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**Photo No.125:** 084+19 Refuge Up, Brickwork, arch, hollow with 5No. half bricks missing and some loose bricks, perished mortar, depth 75mm, area 1sq.m.



**Photo No.126:** 089+06 Refuge Down, Natural rock to rear has collapsed and run through to cess.



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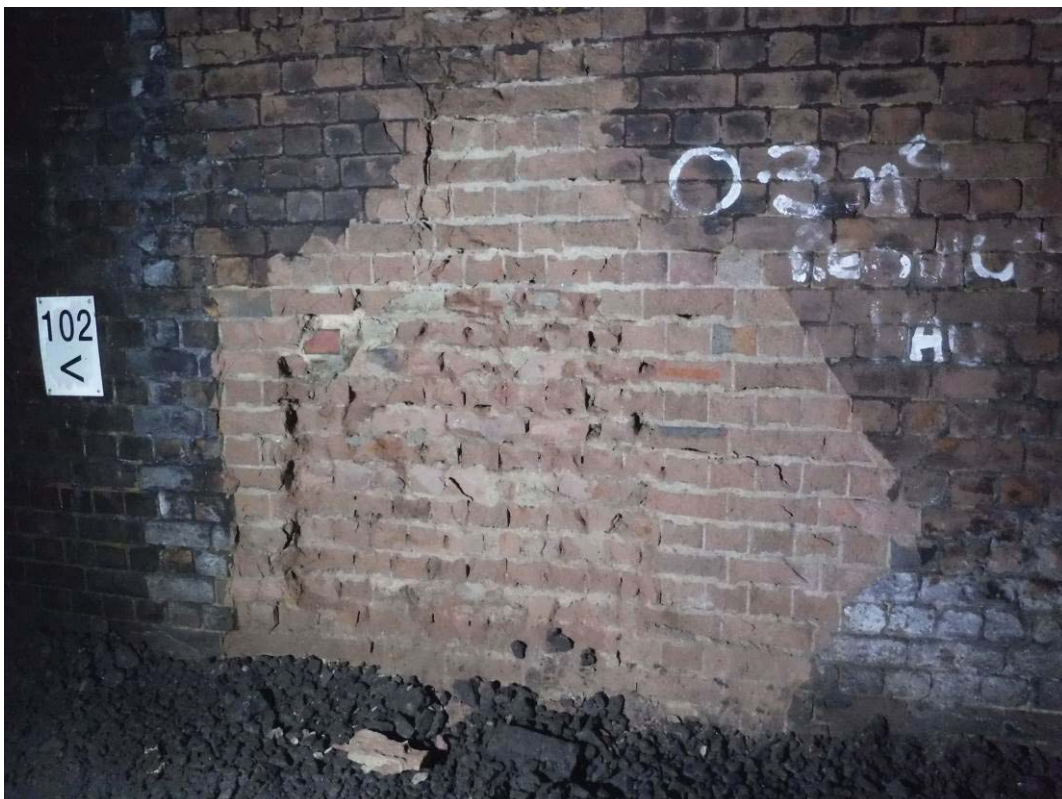
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**Photo No.127:** 096+00 Sidewalls Up & Down, Brickwork, buttresses collapsing with rotten timber bearers on top and numerous loose bricks, area 10sq.m.



**Photo No.128:** 101+21 Sidewall Down, Brickwork, spalling, depth 100mm, area 4sq.m.



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**Photo No.129:** 102+01 Sidewall Down, Brickwork, spalling to corner of support brickwork, depth 200mm, area 1sq.m. with a 5m long diagonal fracture, width 3mm.



**Photo No.130:** 102+01 Sidewall Down, Brickwork, spalling to corner of support brickwork, depth 200mm, area 1sq.m. with a 5m long diagonal fracture, width 3mm.



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**Photo No.131:** Northeast Portal, oiling hinges.



**Photo No.132:** Northeast Portal, oiling padlock.



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**Photo No.133:** Northeast Portal, Stonework, parapet stringcourse, tree stump growing, girth 500mm.



**Photo No.134:** Northeast Portal, Stonework, end of parapet, tree stump growing, girth 1.5m.

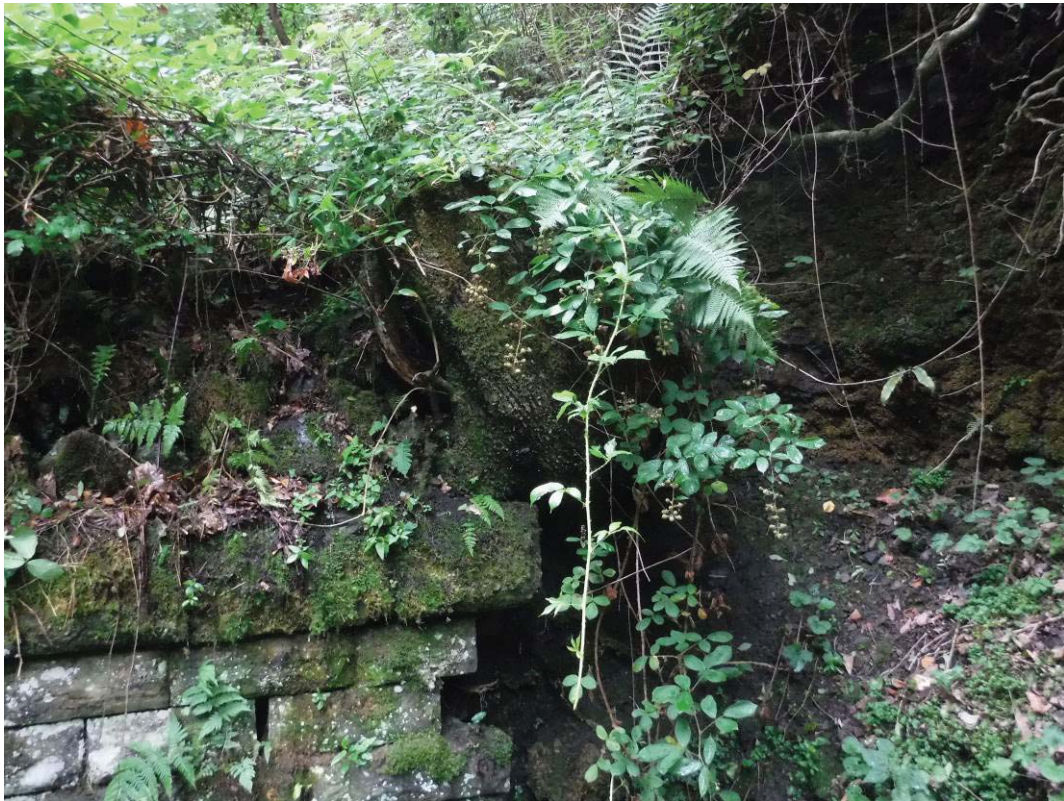


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**Photo No.135:** Northeast Portal, Stonework, end of parapet, tree stump growing, girth 1.5m.



**Photo No.136:** Northeast Portal, Stonework, end of parapet, c.3No. blocks missing.



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**Photo No.137:** Northeast Portal, Stonework, end of parapet, c.5No. blocks missing.



**Photo No.138:** Northeast Portal, Stonework, parapet, tree stump behind coping.

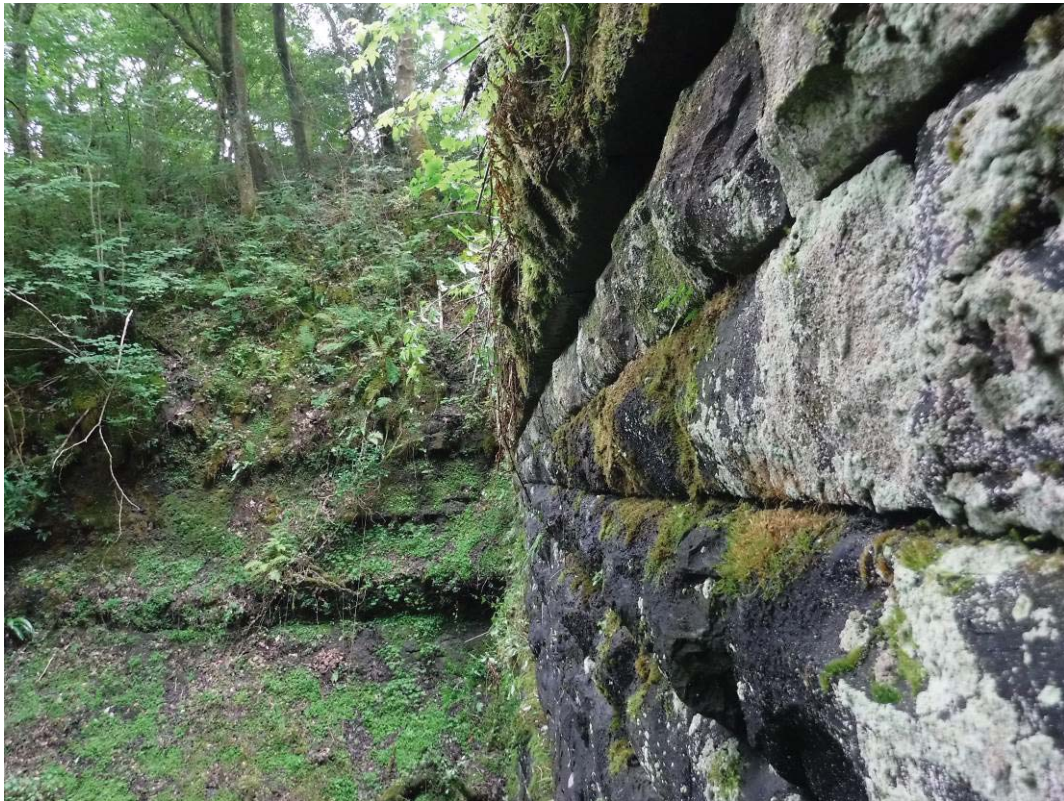


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**Photo No.139:** Northeast Portal, Stonework, parapet coping pushing forward c.6". Tree stumps behind coping.



**Photo No.140:** Northeast Portal, Stonework, parapet coping pushing forward c.6". Tree stumps behind coping.



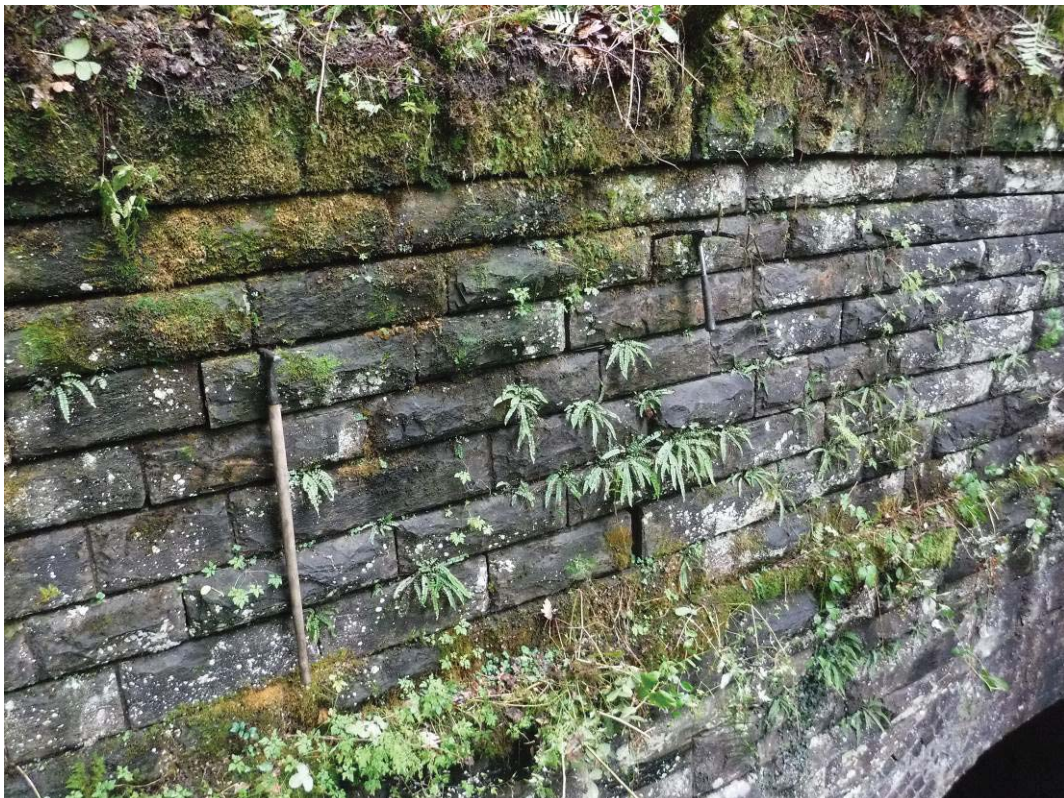
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**Photo No.141:** Northeast Portal, Stonework, parapet coping pushing forward c.6". Tree stumps behind coping.



**Photo No.142:** Northeast Portal, Stonework, loose blocks and open joints, depth 3" to 12" where blocks not tight or pointed, area 40sq.m., light.



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**Photo No.143:** Northeast Portal, Stonework, loose blocks and open joints, depth 3" to 12" where blocks not tight or pointed, area 40sq.m., light.



**Photo No.144:** Northeast Portal, Stonework, Vegetation. BEFORE WORKS.



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**Photo No.145:** Northeast Portal, Stonework, Vegetation. BEFORE WORKS.



**Photo No.146:** Northeast Portal, Stonework, Vegetation. BEFORE WORKS.



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**Photo No.147:** Northeast Portal, Stonework, Vegetation. BEFORE WORKS - Ecological examination.



**Photo No.148:** Northeast Portal, Stonework, Vegetation. DURING WORKS - Removing vegetation.



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**Photo No.149:** Northeast Portal, Stonework, Vegetation. DURING WORKS - Removing vegetation.



**Photo No.150:** Northeast Portal, Stonework, Vegetation. DURING WORKS - Removing vegetation.



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**Photo No.151:** Northeast Portal, Stonework, Vegetation. AFTER WORKS - only moss & lichens remain on stonework.



**Photo No.152:** Northeast Portal, Stonework, Vegetation. AFTER WORKS - only moss & lichens remain on stonework.



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**Photo No.153:** Northeast Portal, Stonework, Vegetation. AFTER WORKS - only moss & lichens remain on stonework.



**Photo No.154:** 114+05 Cess Down, Catch-pit blocked and water surcharging onto solum. Stream flows to NE along upside cess.



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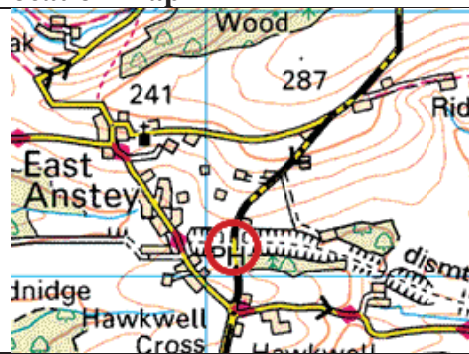


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**Photo No.155:** 114+05 Cess Down, Catch-pit blocked and water surcharging onto solum. Stream flows to NE along upside cess.



<b>ELR:</b>	BLE	<b>Structure No:</b>		<b>Mileage:</b>	187m 64ch	<b>Examination date:</b>	14/11/17
<b>Route:</b>	Barnstaple Branch Line					<b>OS ref:</b>	SS 871 261
<b>Name:</b>	East Anstey Tunnel					<b>Type:</b>	Tunnel

<b>General view of structure: CE portal</b>		<b>Location map</b>	
			
		<b>Aerial View</b>	
			
A <b>Detailed Examination</b> of this structure has been carried out to establish the condition, identify the nature, severity and extent of defects, ascertain the rate of deterioration by reference to the previous examination reports and identify the scope, extent and urgency of any remedial actions required to ensure the continued safety and long-term integrity of the structure.		<b>Examiner:</b>	R.G. Storey
		<b>Date:</b>	14/11/17
		<b>Signed:</b>	

### Access Hazards:

Access via steep embankment at DC presents slippery conditions underfoot and tripping hazards. A safety line is essential. The London end is defined as the east (Taunton) end. The formation is waterlogged throughout (**P23**).

### Recommendations:

Replace dislodged fence rail at UC (check if HE (HRE) liability) - PS £200.

Cut out and replace spalling to CE crown at 1.25ch and annually monitor adjacent local fractures - P1 £2.5k.

Remove moss and rebuild upper section of UC wingwall adjacent to mitre - P2 £6k.

**Signed by Examining Engineer:**



<b>ELR:</b> BLE	<b>Structure No:</b>	<b>Mileage:</b> 187m 64ch	<b>Examination date:</b> 14/11/17
<b>Route:</b> Barnstaple Branch Line	<b>OS ref:</b> SS 871 261		
<b>Name:</b> East Anstey Tunnel	<b>Type:</b> Tunnel		

<b>Type of construction</b>	East Anstey is a semi-circular masonry arch profile supported on masonry sidewalls. The tunnel portals comprise masonry voussoirs, spandrels, headwall and associated wing walls.
<b>No. of sections</b>	Two of 10 metres One of 3.6 metres
<b>Details of shafts</b>	None present
<b>Details of manholes and drains</b>	None

*General Comments:*

Access is via steep embankment from the roadside and the use of safety lines is essential. The best access is achieved via the DC wingwall.

*Walkover Survey (P25-28)*

The structure carries the single unclassified carriageway 'Oldway Road' (P25&28) and associated support embankments. No evidence of subsidence was observed in the carriageway. The road is found in good condition. A single fence element is displaced beyond UC embankment (may not be HE (HRE) liability).

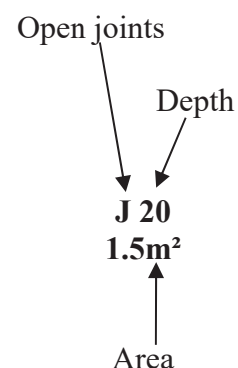
Pressure readings	Gases	
LE portal 1000.4mb	O <sub>2</sub>	20.7 – 20.9%
Mid tunnel 1000.2mb	H <sub>2</sub> S	zero
CE portal 1000.1mb	CH <sub>4</sub>	zero
	CO	1ppm

<b>Examined By:</b>	Appointees Engineer	R.G. Storey	<b>Date of exam</b>
	Appointees Examiner	M. Berry	14/11/17

Symbols Used in Tunnel Diagram:

<b>BWK</b>	Brickwork	<b>W</b>	Wetness
<b>CJ</b>	Construction Joint	<b>WD</b>	Water dripping
<b>R</b>	Refuge	<b>WR</b>	Water running
<b>S</b>	Spalling	<b>FL</b>	Flattening of Arch
<b>F</b>	Fracture	<b>B</b>	Bulging
<b>J</b>	Open Joints	<b>STLG</b>	Stalactites
<b>H</b>	Hollow/Drummy	<b>CLCT</b>	Calcite Growth
<b>ST</b>	Soot Deposits	<b>L</b>	Leaching

**Example**





<b>ELR:</b>	BLE	<b>Structure No:</b>		<b>Mileage:</b>	187m 64ch	<b>Examination date:</b>	14/11/17
<b>Route:</b>	Barnstaple Branch Line					<b>OS ref:</b>	SS 871 261
<b>Name:</b>	East Anstey Tunnel					<b>Type:</b>	Tunnel

Name of Part :	G-good F-fair P-poor	Remarks (Refer to parts by name)
Main Girders	N/A	Area of spalling to UC barrel (two units loss) Bulge to UL sidewall shows no change
Cross Girders	N/A	
Crown	F	
Haunches	F	
Sidewalls	F	
Face Rings to portal	F	
Spandrels	F	
Abutments	N/A	
Headwalls	F	
Wing & Retaining Walls	F	
Pointing	F	
Parapets & Pilasters	F	
Columns & Cylinders	N/A	
Trestles & Crossheads	N/A	
Bedstones & Cills	N/A	
Bearings	N/A	
Ballast plates/Boards	N/A	
Waterproofing	N/A	
Drainage	N/A	
Gutters & Downpipes	N/A	
Handrails	G	
Painting	N/A	
Track/Road Condition	F	
Cross Girders	N/A	
Crown	F	
Haunches	F	
Foundation	N/E	
Vegetation	P	
Bridge Number/ Mileage	G	
TICK AS APPROPRIATE		Notes/Comments: Foundations not examined: no evidence to suggest settlement was noted.
Change of Construction		
Weight Restriction Plates		
Inaccessible Parts	✓	
Tell Tales		
Plumbing Points		



<b>ELR:</b>	BLE	<b>Structure No:</b>		<b>Mileage:</b>	187m 64ch	<b>Examination date:</b>	14/11/17
<b>Route:</b>	Barnstaple Branch Line					<b>OS ref:</b>	SS 871 261
<b>Name:</b>	East Anstey Tunnel					<b>Type:</b>	Tunnel

Notes	
<p><b>East Anstey Tunnel</b> <b>BLE 187m 64ch</b></p> <p><b>Country end East Anstey portal</b></p> <p><b>Downside wingwall (P1)</b> Moss coverage to <b>60%</b> of the wingwall with some light vegetation cover. Patches removed for examination Hollow sounding area 600mm<sup>2</sup> at centre of lower third, 2m above GL. Widespread long-standing spalling up to 30mm deep over 5m<sup>2</sup> in the upper half of the wingwall (mainly moss covered) (<b>P2</b>).</p>	
<p><b>Headwall</b> Moss coverage to 65% of the headwall. Vertical fracture to headwall above crown open 2mm displaced <b>20mm (P6)</b>. Previously noted F3 in bed joint 450mm below coping visible at Downside end, now largely obscured by vegetation (<b>P7</b>) 5mm vertical fracture through masonry units in quoin of sidewall remains below U/S spandrel (<b>P9</b>). <b>F3mm</b> in first voussoir above US springing level extends into soffit of arch barrel (<b>P10</b>). Previously noted F1mm x 750mm separation fracture between U/S spandrel and voussoir extending into the mitre below springing level - overgrown with moss. Horizontal fracture one course below DS stringer, 1.2m long, open 5mm and pushing 10mm (<b>P24</b>) Lower three courses of D/S spandrel repaired in 2012. Third voussoir above D/S springing level is found spalled 50mm. Open joints to DS spandrel to 20mm (<b>P8</b>)</p>	
<p><b>Upside Wingwall (P3)</b> Widespread spalling up to 30mm throughout affecting <b>70%</b> of the wingwall. Minor increases noted to patches Localised areas of spalling up to 100mm adjacent to mitre; total area affected approximately 0.5m<sup>2</sup> (<b>P4</b>). Single unit removed (<b>P5</b>); remainder firm to hammer.</p>	

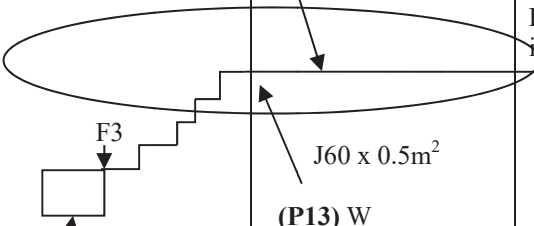


<b>ELR:</b>	BLE	<b>Structure No:</b>		<b>Mileage:</b>	187m 64ch	<b>Examination date:</b>	14/11/17
<b>Route:</b>	Barnstaple Branch Line					<b>OS ref:</b>	SS 871 261
<b>Name:</b>	East Anstey Tunnel					<b>Type:</b>	Tunnel

<b>Notes</b> Formation is found very muddy with standing water to LE of barrel (P23)	
<b>East Anstey Tunnel</b> <b>BLE 187m 64ch</b>	
<b>London end Dulverton portal (P16)</b>	
<b>Downside wingwall (P18)</b> Moss growth covers approximately 60% of the wingwall. Wall generally found to be in good condition where clear of moss and where pockets removed.	
<b>Headwall</b> Moss growth and overhanging vegetation cover approximately 90% of the headwall (P20). Previously noted areas of slight spalling and open joints to area above the crown now obscured by vegetation. Previously repaired top two courses of the headwall, displaced by approximately 50mm, could not be examined. DS spandrel, repaired in 2012, remains in good condition where seen (P21) Long-standing spalling to 100mm at DL sidewall quoin 900mm above GL (P22)	
<b>Upside Wingwall (P17)</b> Moss growth covers approximately 80% of the wingwall. Widespread and long-standing spalling throughout up to 50mm deep max. Total area affected approximately 10m <sup>2</sup> (P19) Soil erosion is taking place and has washed out from behind the wingwall.	



<b>ELR:</b>	BLE	<b>Structure No:</b>		<b>Mileage:</b>	187m 64ch	<b>Examination date:</b>	14/11/17
<b>Route:</b>	Barnstaple Branch Line					<b>OS ref:</b>	SS 871 261
<b>Name:</b>	East Anstey Tunnel					<b>Type:</b>	Tunnel

	<i>Sidewall</i>	<i>Haunch</i>	<i>Crown</i>	<i>Haunch</i>	<i>Sidewall</i>	
<b>London end</b>						
<i>0</i>	B75x1.5 high 1.0m above G.L (P15) H 2.0m x 1.5m 1.0m above g.l to s.l W Leaching S50 odd stones	W STLG	W STLG	W STLG Isolated S Isolated J	W Leaching H 0.75m <sup>2</sup>	<i>0</i>
	W	W Leaching J100 x 0.5m <sup>2</sup>	Good (P14) F2	W Leaching J60 x 0.5m <sup>2</sup>	W	
<i>1</i>	Spalling to lower sidewall repaired in 2012 (P10)			Fracture disappears into CJ H in masonry above repair patch 1m <sup>2</sup> F6mm 2.5m long 150mm from portal (P11)	W	<i>1</i>



<b>ELR:</b>	BLE	<b>Structure No:</b>		<b>Mileage:</b>	187m 64ch	<b>Examination date:</b>	14/11/17
<b>Route:</b>	Barnstaple Branch Line					<b>OS ref:</b>	SS 871 261
<b>Name:</b>	East Anstey Tunnel					<b>Type:</b>	Tunnel

*Photographs of structure*



Photograph no 1: DC wingwall



Photograph no 2: UC Wingwall: widespread long-standing spalling up to 30mm deep over 5m<sup>2</sup> in the upper half of the wingwall (mainly moss covered)

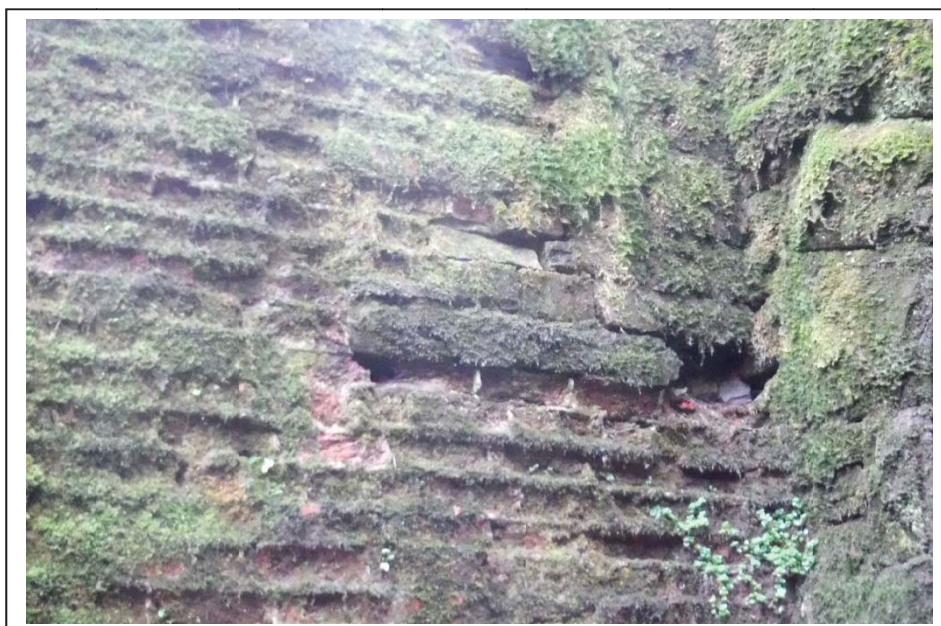


<b>ELR:</b>	BLE	<b>Structure No:</b>		<b>Mileage:</b>	187m 64ch	<b>Examination date:</b>	14/11/17
<b>Route:</b>	Barnstaple Branch Line					<b>OS ref:</b>	SS 871 261
<b>Name:</b>	East Anstey Tunnel					<b>Type:</b>	Tunnel

*Photographs of structure*



Photograph no 3: UC wingwall

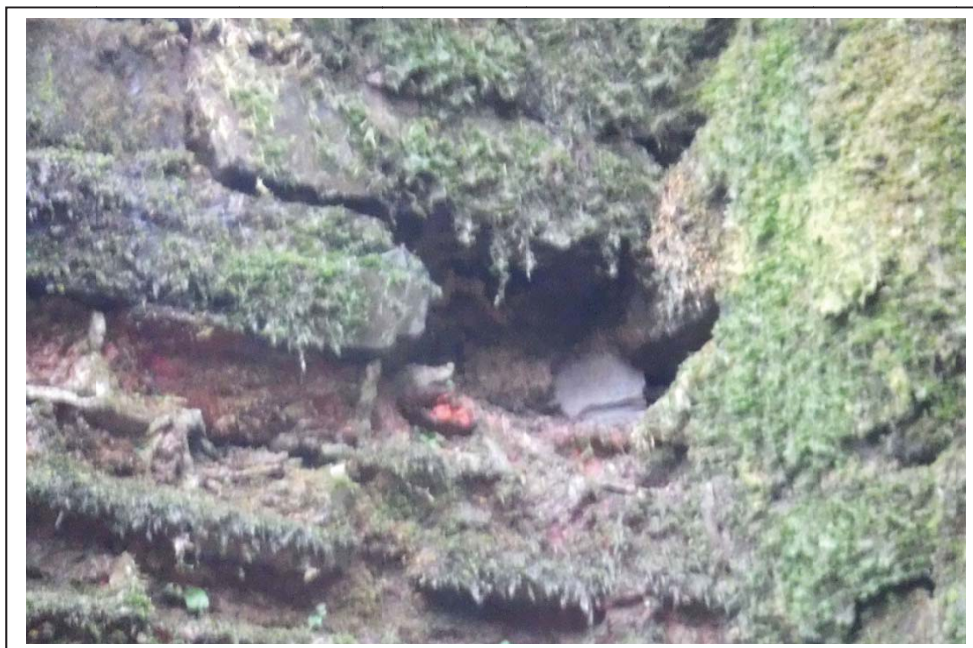


Photograph no 4: UC wingwall  
Localised areas of spalling up to 100mm adjacent to mitre  
Total area affected approximately 0.5m<sup>2</sup>



<b>ELR:</b>	BLE	<b>Structure No:</b>		<b>Mileage:</b>	187m 64ch	<b>Examination date:</b>	14/11/17
<b>Route:</b>	Barnstaple Branch Line					<b>OS ref:</b>	SS 871 261
<b>Name:</b>	East Anstey Tunnel					<b>Type:</b>	Tunnel

*Photographs of structure*



Photograph no 5: UC wingwall  
Single unit removed



Photograph no 6: CE headwall  
Vertical fracture to headwall above crown open 2mm displaced 20mm



<b>ELR:</b>	BLE	<b>Structure No:</b>		<b>Mileage:</b>	187m 64ch	<b>Examination date:</b>	14/11/17
<b>Route:</b>	Barnstaple Branch Line					<b>OS ref:</b>	SS 871 261
<b>Name:</b>	East Anstey Tunnel					<b>Type:</b>	Tunnel

*Photographs of structure*



Photograph no 7: Previously noted F3 in bed joint 450mm below coping visible at DC headwall, now largely obscured by vegetation



Photograph no 8: CE headwall  
Open joints to DS spandrel to 20mm

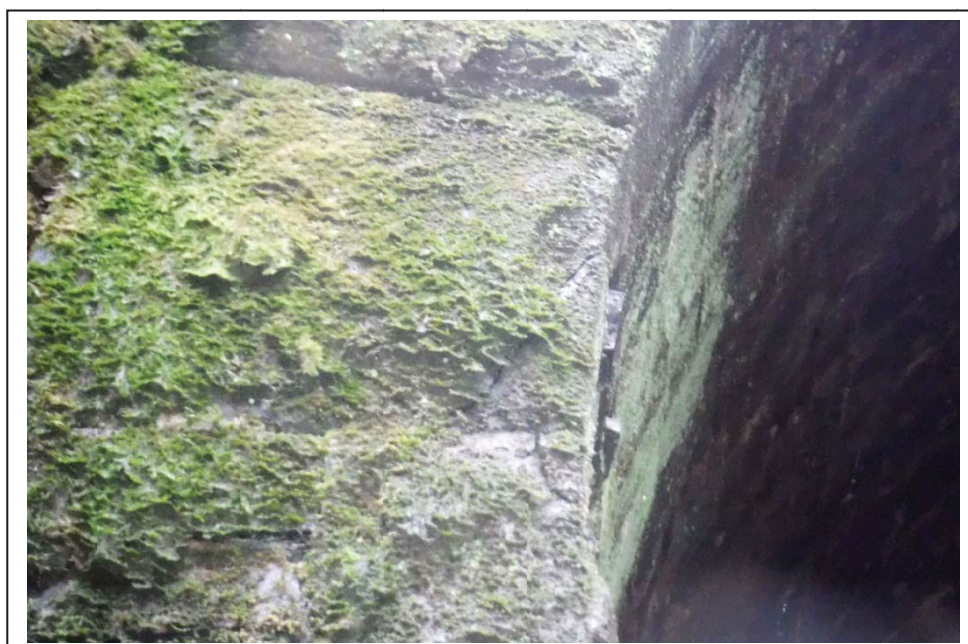


<b>ELR:</b>	BLE	<b>Structure No:</b>	<b>Mileage:</b> 187m 64ch	<b>Examination date:</b> 14/11/17
<b>Route:</b>	Barnstaple Branch Line			<b>OS ref:</b> SS 871 261
<b>Name:</b>	East Anstey Tunnel			<b>Type:</b> Tunnel

### *Photographs of structure*



Photograph no 9: CE headwall  
5mm vertical fracture through masonry units in quoin of sidewall remains below U/S spandrel



Photograph no 10: **F3mm** in first voussoir above US springing level extends into soffit of arch barrel