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O'CONNOR | SUTTON | CRONIN
Multidisciplinary
Consulting Engineers

C1019-OCSC-XX-XX-RP-S-0001

Condition Survey Report for
Glanmire to Dunkettle roundabout
R639 Road Boundary Wall

Cork City Council

Project No. C1019

18 February 2022

Condition Survey Report for Glanmire to Dunkettle Roundabout Road Boundary Wall

For

CORK CITY COUNCIL

NOTICE

DOCUMENT CONTROL & HISTORY

OCSC Job No.: C1019	Project Code	Originator	Zone Volume	Level	File Type	Role Type	Number	Status / Suitability Code	Revision
	C1019	OCSC	XX	XX	RP	S	0001	S3	P01

Rev.	Status	Authors	Checked	Authorised	Issue Date
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Rev	**Suitability Code**	**Author**	**Checker**	**Authorised**	**Issue Date**

Condition Survey Report for Glanmire to Dunkettle Roundabout Road Boundary Wall

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APPENDICES

1 INTRODUCTION

1.1 Appointment

O'Connor Sutton Cronin (OCSC) were appointed by Cork City Council to carry out an assessment of the condition of the boundary wall along the R639 road from Glanmire to the Dunkettle roundabout in Cork.

1.2 Administrative Jurisdiction

The structure is located within the Administrative Jurisdiction of Cork City Council.

1.3 Scope of Services of Report

This report has been compiled to based on the visual inspection of the boundary wall along the R639 from Glanmire to the Dunkettle roundabout junction. The purpose of the report is to record the condition of the structure and propose an appropriate remedial action for the defects recorded.

1.4 Site Location

The boundary wall is located along both sides of the R639 road from Glanmire to the Dunkettle junction on the outskirts of Cork City. Refer to Figure 1 for Site Location Map.

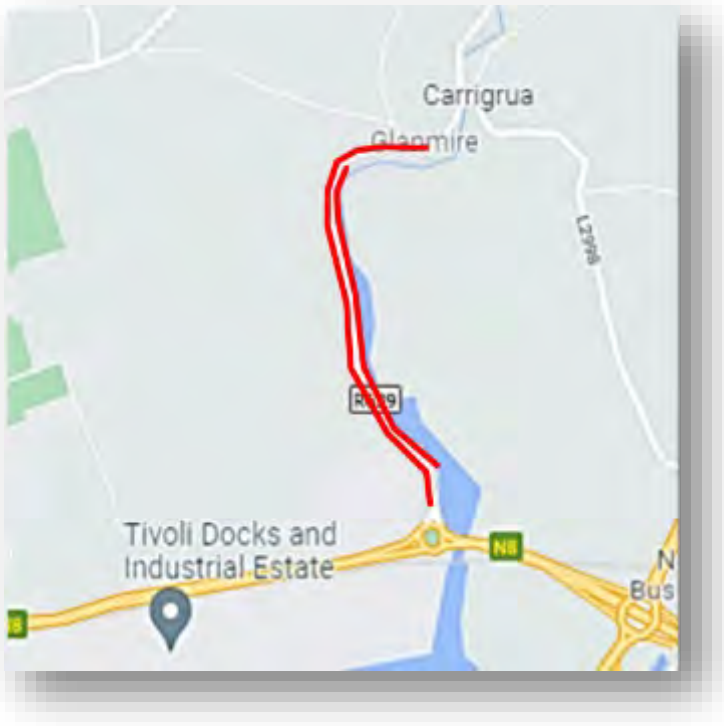

Figure 1: Site Location

1.5 Site Overview

A Topographical Survey has been provided by Cork City Council to form the basis for the assessment of the structure and for the preparation of this report.

1.6 Structure Description

The boundary wall to the west side of the road is approximately 1400metres long continuous retaining wall containing 1.8metre high and 270milimetre thick alternating concrete block wall and stone wall sections. The block wall sections have an approx. 470x470milimetre block piers at approximately 14metres centres.

The east side boundary wall is an approximately 1000metres long structure. It consist of 0.5metre high 270milimetre thick block walls and approximately 1metre high 500milimetre thick stone rubble wall alternating throughout the length of the structure.

2 STRUCTURE INSPECTION

An inspection of the walls was undertaken on the 1st of February 2022 by Paul Cunnane and Anett Nemeth of O'Connor Sutton Cronin. The full extent of the boundary wall structures were inspected with exception to the foundations and the back of the wall that are overgrown with vegetation. The nature of the inspection was visual only, with defects noted and photographic evidence of same recorded. A report was prepared following the inspection summarising the findings. Refer to Appendix A for the results of the site inspection and to Appendix B for the photographic evidences.

2.1 Structure Condition

The majority of the structure was generally found to be in a fair condition, however a number of defects were identified and it is recommended that these be rectified in order to refurbish the wall structure.

2.2 Defects Identified

The following is a list of defects identified at the time of inspection. Please refer also to the photographic evidence of the inspection included in Appendix A for further detail.

1. Vegetation Growth:

Minor vegetation growth (moss) was identified throughout the coping at the top of the wall at both sides. There were a number of locations where the pier and the adjacent wall sections were heavily overgrown and it was not possible to inspect the wall at those locations.


Figure 2 & 3: Wall overgrown by vegetation (Refer to Appendix A&B for locations)

2. Damage of Piers:

Horizontal cracking was observed on a number of piers through the mortar under the top courses of block. In some cases that separated top part of the pier was found displaced or moved from the rest of the structure below.


Figure 4 & 5: Damage to piers (Refer to Appendix A&B for locations)

3. Vertical / diagonal crack:

Vertical and stepped diagonal cracks through the wall were identified locally throughout the wall on both sides of the road. As external walls these are affected by temperature and moisture change therefore the structure can suffer from initial shrinkage and/or subsequent expansion and contraction leading to expansion cracks in masonry walls. Diagonal cracks were not noted at the bottom of the wall structure, although there are major cracks evident throughout the east side road wall which may be a sign of structural failure or stability issues due to ground slip beneath.

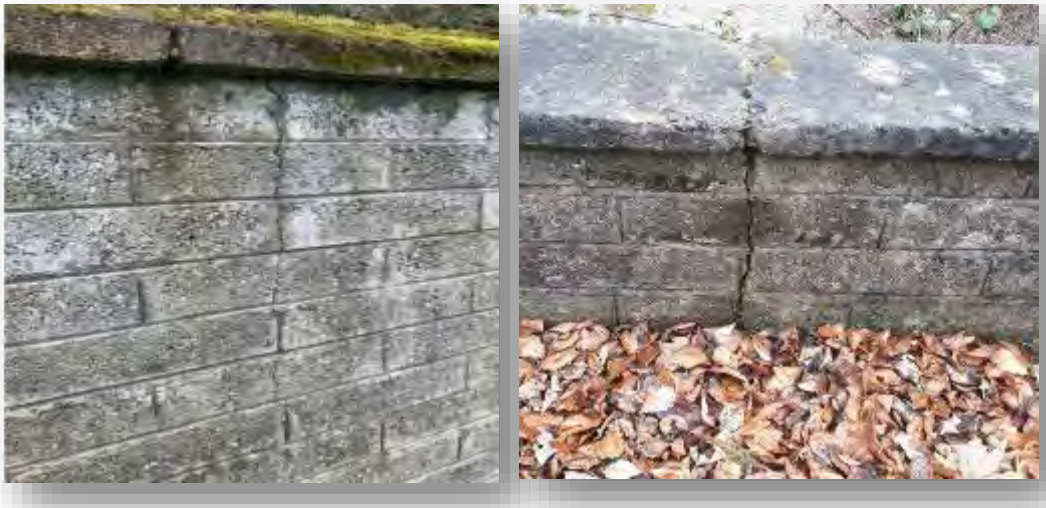

Figure 6 & 7: Vertical cracks (Refer to Appendix A&B for locations)

4. Horizontal Cracks:

A major horizontal crack was observed at the end of the stone wall at the entrance junction road to the Cork's Vienna Woods Hotel. It is possibly caused by increased loading from the traffic on the retaining wall. Further investigation and assessment is required to determine the cause of the cracking observed.

A number of locations were identified throughout the east side wall where horizontal cracking occurs below the top course of blockwork. In some instances this separated top course found to be displaced from the below structure.

Figure 8 & 9: Horizontal cracks (Refer to Appendix A&B for locations)

5. Separated Joints:

A number of locations were identified where the joint between wall and pier was separated horizontally with no mortar or sealant was present. All expansion joints should be sealed to prevent moisture ingress between the masonry. No sign of other horizontal movement joints were observed on the wall sections between piers. It was also noted that in some cases the coping was found separated and displaced from the wall below.

Figure 10 & 11: Separated joints (Refer to Appendix A&B for locations)

6. Loss of Mortar:

A significant portion of open joints in stonework exist with mortar having been washed out or removed over time throughout the west side wall. The block wall sections are not affected by this. Approximately 50% of the stone wall sections needs repointing.

Figure 12 & 13: Loss of mortar (Refer to Appendix A&B for locations)

7. Loss of Masonry:

A number of areas of missing masonry stones have been identified locally along the stone wall sections on both side of the road. There are some serious structural integrity issues where a number of stone fallen out caused by water running through the structure.

Figure 14 & 15: Loss of masonry (Refer to Appendix A&B for locations)

8. Water Damage:

There are multiple locations observed with white or black staining on the road face of the wall throughout, indicating water seepage through the wall. During the inspection, the wall was observed as being visible wet. In some locations water could be seen running through the wall. The sections of localised missing masonry and collapse identified earlier in this report have likely been caused by a build-up of water pressure at the back of the wall leading to deterioration over time. Refer to the attached sketches in Appendix A for the locations.

Figure 16 & 17: Loss of masonry & Collapsed wall (Refer to Appendix A&B for locations)

9. Structural Deterioration:

Signs of structural failure of the wall was observed where the wall is tilting outwards adjacent to a pier.

Figure 18 & 19: Wall leaning (Refer to Appendix A&B for locations)

10. Collapsed Structure:

There are a number of locations on the east side of the road along the estuary where a section of wall collapsed locally. Refer to Appendix A for locations.

Figure 20 & 21: Collapsed structure (Refer to Appendix A&B for locations)

11. Loss of Coping:

Loss of coping were observed throughout the wall on both sides of the road.

Figure 21 & 22: Collapsed structure (Refer to Appendix A&B for locations)

3 RECOMMENDATIONS

Following the inspection of the wall, appropriate remedial actions for each of the defects have been considered and are presented below. A detailed structural assessment of the structure has not been carried out. All recommendations made as part of this report are based on visual inspection only. Further assessment is required to confirm the full extent of the remediation works required. The following is a list of remedial actions deemed appropriate to address the defects raised in Section 2.2 above.

1. Vegetation Removal:

All vegetation protruding from the structural elements to be removed and the associated joints repointed with a lime mortar.

2. Masonry Pier Repair:

Structurally damaged piers to be repaired or rebuilt as required in accordance with the relevant TII standard documents.

3. Crack Repair:

Cracking to the wall to be repaired by remove the cracked mortar and cleaning out the joint. This to be followed by inserting stainless steel tying bars by grouted into pre-drilled holes transversely across the crack. The crack and hole for the tie will be grouted and re pointed in accordance with the principles of the relevant TII standard details.

4. Separated Joints:

Separated expansion joints between piers and wall to be cleaned out and filled with the appropriate sealant material.

5. Reinstallation of Coping:

Coping to be reinstalled throughout both walls where it is missing or damaged.

6. Repointing of Mortar Joints:

Joints in masonry to be repointed with an appropriate lime mortar. The provision of an appropriate drainage system and waterproofing system behind the wall is also recommended to prevent water seepage causing damage to the masonry.

7. Masonry Repairs:

Missing masonry stones are to be replaced in accordance with the principles of the relevant TII standard details. The provision of an appropriate drainage system and waterproofing system behind the wall is also recommended to prevent water seepage causing damage to the masonry.

8. Reconstruction of Wall:

Where tilting, collapse or other structural failure were observed it is recommended to rebuild the section of wall locally in the extent of the damage. Rebuild to be carried out in accordance with the relevant TII standard details.

9. Waterproofing:

A number of locations of the wall were seriously damaged by the water and water seepage or running were present. It is recommended that weepholes to be installed throughout the entire length of the wall to allow water flow out from the back of the wall and to prevent further structural damages.

Summary

The following summary of the recommended remediation works is based on the visual inspection only.

Defect No.	Description of Defect	Extent / Area of Defect
1.	Vegetation removal - minor vegetation on coping - vegetation trimming locally at overgrown sections	 ~1800m ~100m
2.	Blockwork & Stonework (including local masonry repointing & reconstruction of pier-and collapsed sections)	~500m^2
3.	Construction of weepholes (throughout the boundary retaining wall to the west side)	~1200m
4.	Crack repair	~50m
5.	Joint resealing	~150m
6.	Repointing of mortar	~500m^2
7.	Coping reinstallation	~200m

4 HERITAGE AND ARCHAEOLOGY

As part of the assessment, the heritage and archaeological significance of the structure was researched to assess the potential impact of the refurbishment works.

It was determined that the boundary wall is not a recorded protected structure, there is no heritage value noted on the Archaeology Survey Database and the structure is not included in the National Inventory of Architectural Heritage. It is therefore concluded that the recommended refurbishment works would not adversely impact on the heritage or archaeology of the area.

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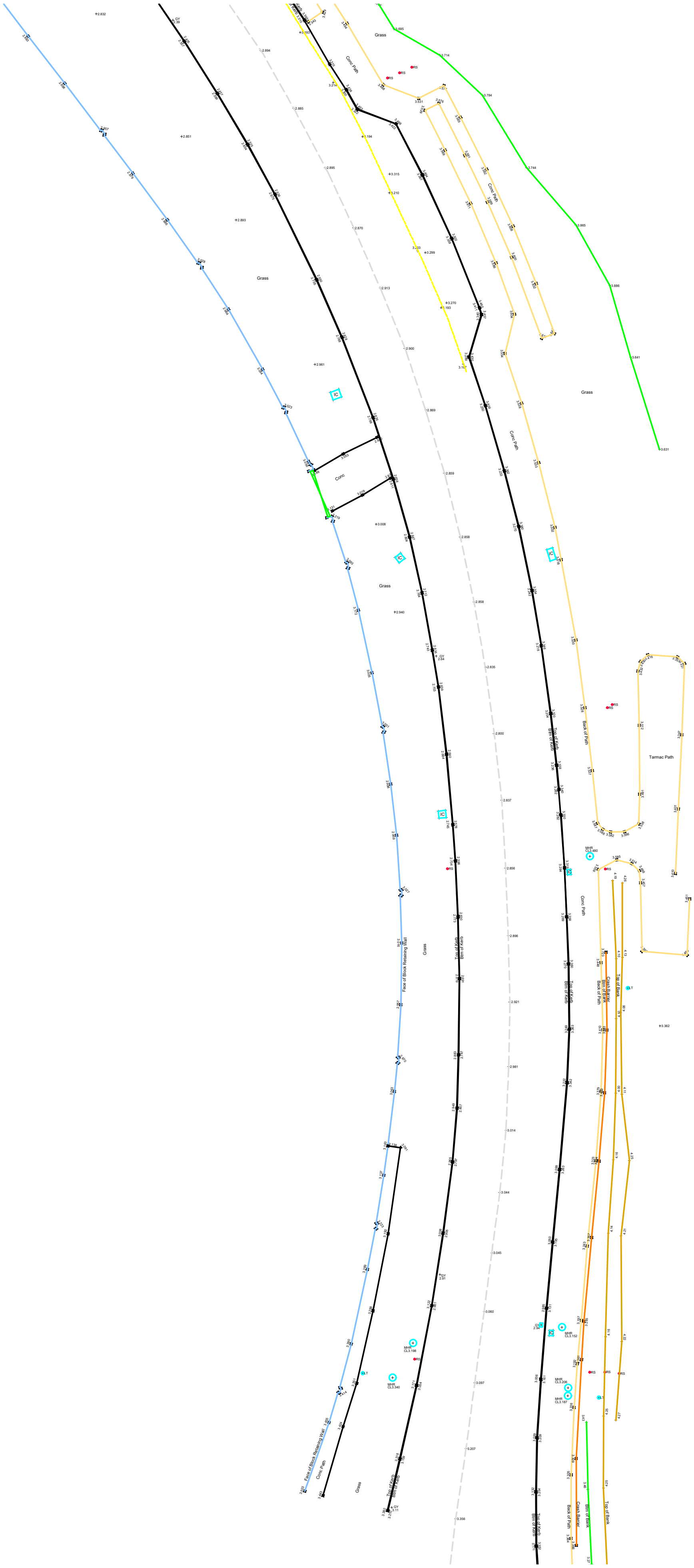
APPENDIX A. SITE INSPECTION RECORD OF DEFECTS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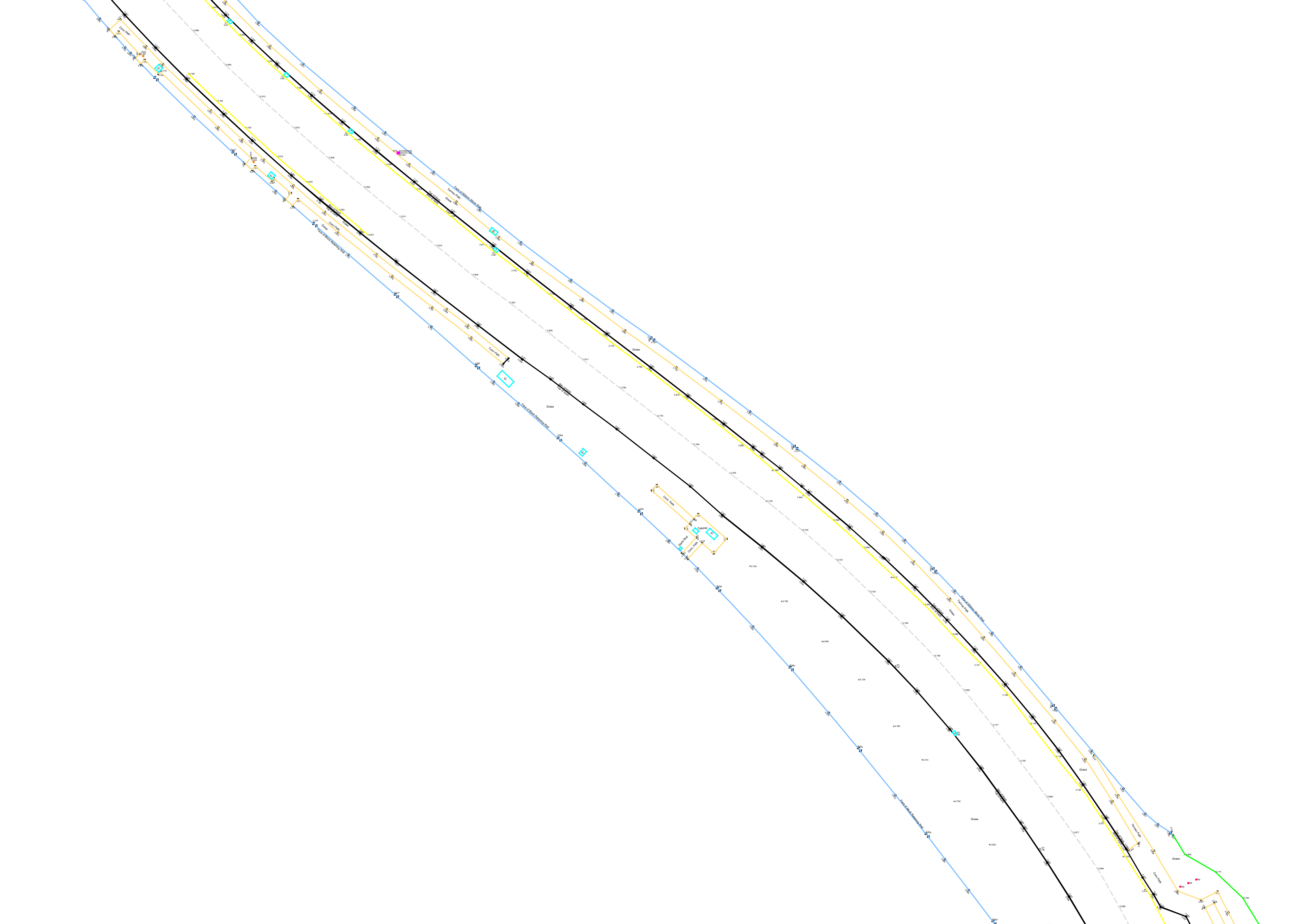
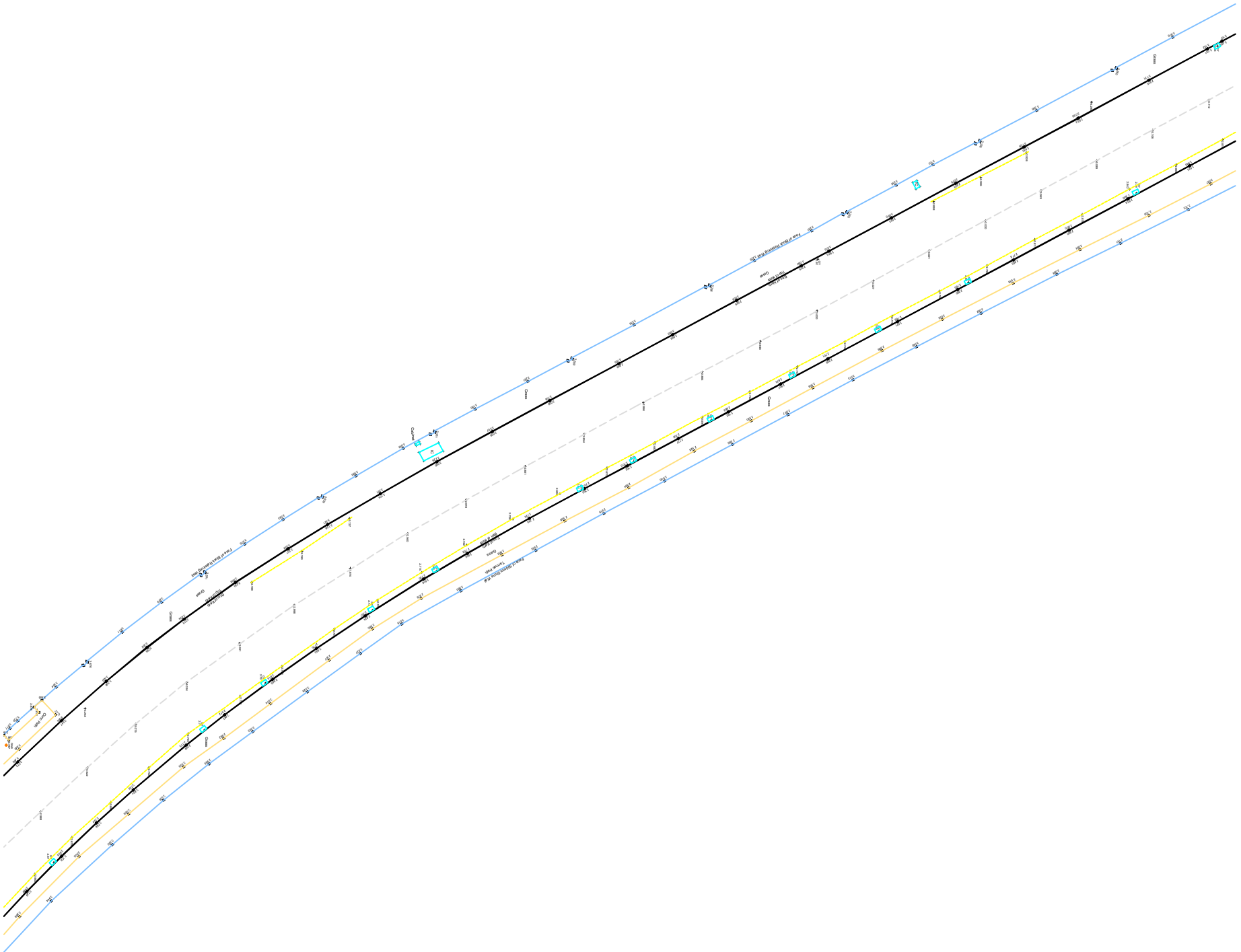
Conc Path
Conc
Tarmac Path
Back of Path
Top of Kerb
Btm of Kerb
Face of Block Retaining Wall
Top of Bank



Grass
Conc. Path
Tarmac Path
Cabinet
Face of Block Retaining Wall



Grass
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Face of Block Retaining Wall
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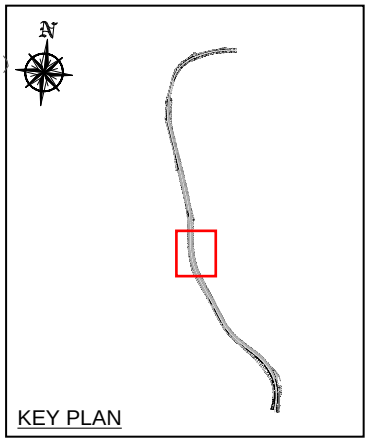

GENERAL NOTES:

1. This drawing shall be read in conjunction with the assessment report
2. The condition of this wall was assessed visually only, no intrusive tests were carried out to investigate further structural properties.
3. This wall was assessed visually above ground level only, its foundation was not checked.
4. Spalling of concrete on coping noted throughout the extent of the entire wall along the road.
5. Minor vegetation growth to coping noted throughout the extent of the entire wall along the road

SCHEDULE OF DEFECTS:

DEFECT NO.1: VERTICAL CRACK THROUGH THE WALL

DEFECT NO.2: SEPARATATION OF VERTICAL JOINT BETWEEN WALL AND PIER

DEFECT NO.3: HORIZONTAL CRACK THROUGH MORTAR AT TOP FEW COURSES OF BLOCKWORK OF PIER

DEFECT NO.4: MISSING COPING ON TOP OF WALL

DEFECT NO.5: BLOCKED WEEPHOLES AT BOTTOM OF WALL

DEFECT NO.6: CRACK THROUGH PIER/ STRUCTURE DETERIORATION

DEFECT NO. 7: SEPARATION AND GAP BETWEEN COPING AND TOP OF WALL

DEFECT NO.8: WALL HEAVILY OVERGROWN BY VEGETATION

DEFECT NO.9: MOISTURE CAUSED STAIN ON THE FACE OF WALL

DEFECT NO.10:STRUCTURAL DIVISION: TOP PART OF PIER MOVED AWAY/ ROTATED

DEFECT NO.11: WET WALL, WATER SEEPING THROUGH

DEFECT NO.12: STRUCTURAL DETERIORATION - WALL TILTING OUTWARDS

DEFECT NO.13: COLLAPSED STRUCTURE

DEFECT NO.14: MISSING STONE

LEGEND:

CONCRETE BLOCK RETAINING WALL

STONE RETAINING WALL

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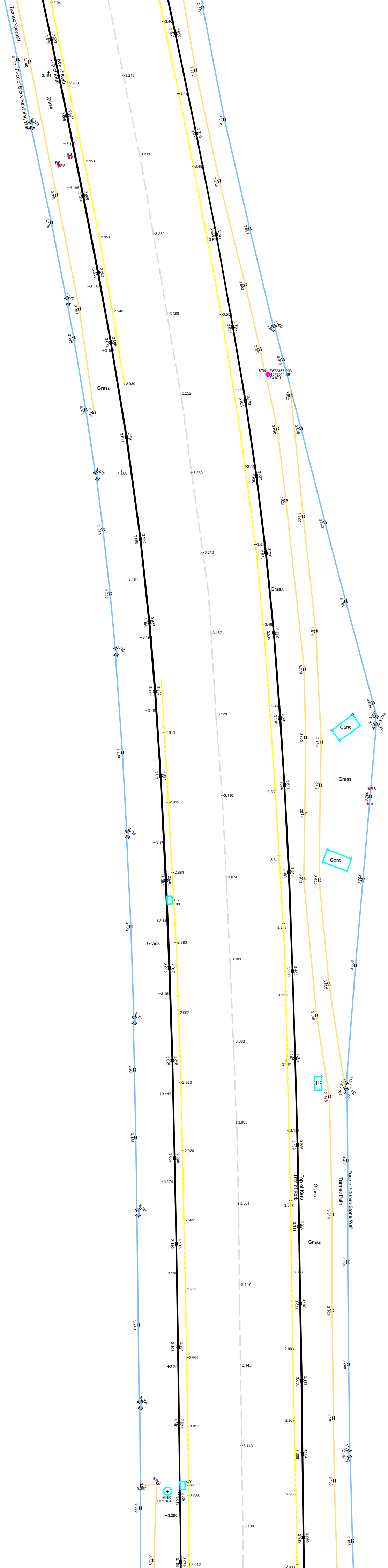
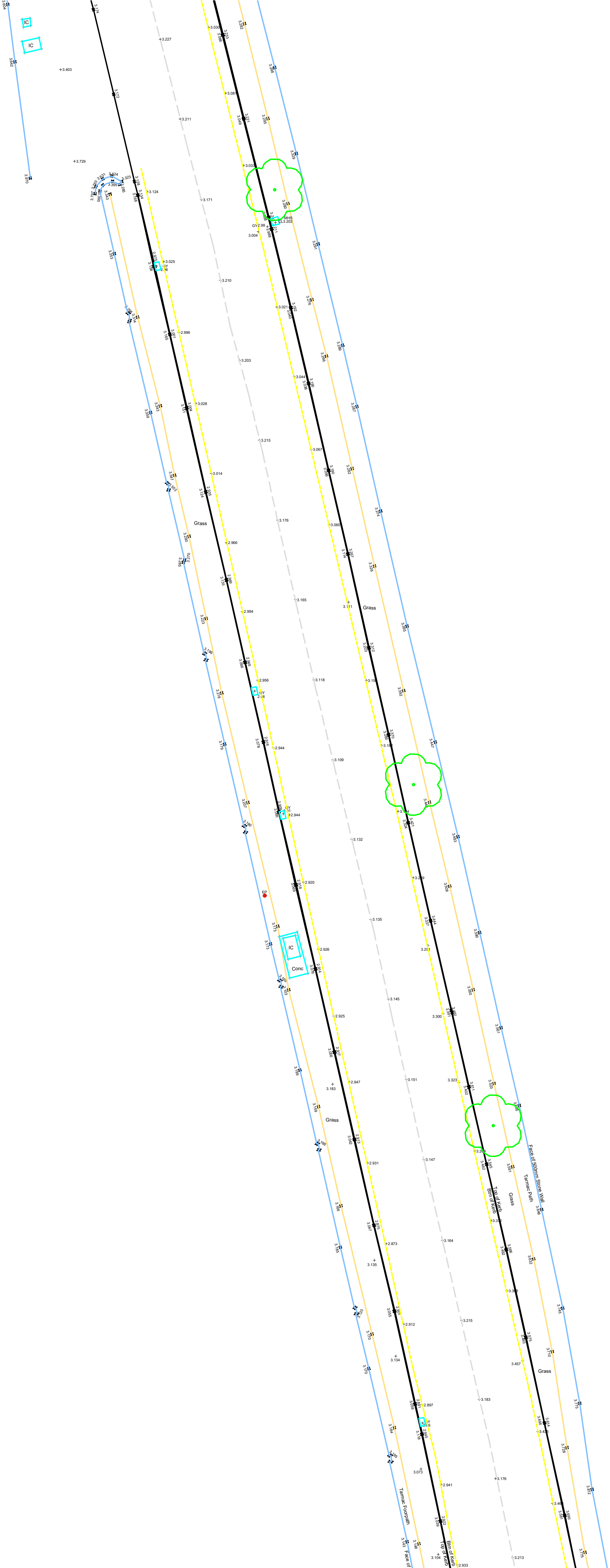
C1019-OCSC-XX-XX-SK-S-0004-P01-S3
R639 GLANMIRE TO DUNKETTLE ROUNDABOUT WALL CONDITION ASSESSMENT

REV: P01	BY: AN	DATE: 11.02.2022



Tarmac Footpath
Face of Block Retaining Wall
Btm of Kerb
Top of Kerb
Grass
STN E572367.293 N573514.491 Z3.871
Conc.
Conc.
GY
IC
MHR CL3.184
Btm of Kerb
Top of Kerb
Grass
Tarmac Path
Face of 500mm Stone Wall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Face of 500mm Stone Wall
Tarmac Path
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Tarmac Footpath
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Top of Kerb
Btm of Kerb


Face of Brick Wall
Tarmac Path
Top of Kerb
Edge of Path
Face of 300mm Brick Wall
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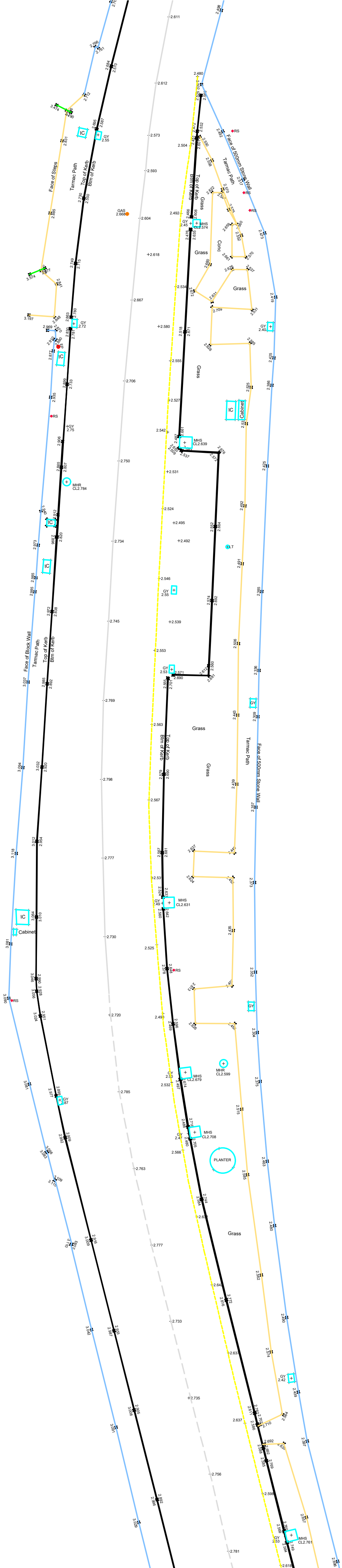
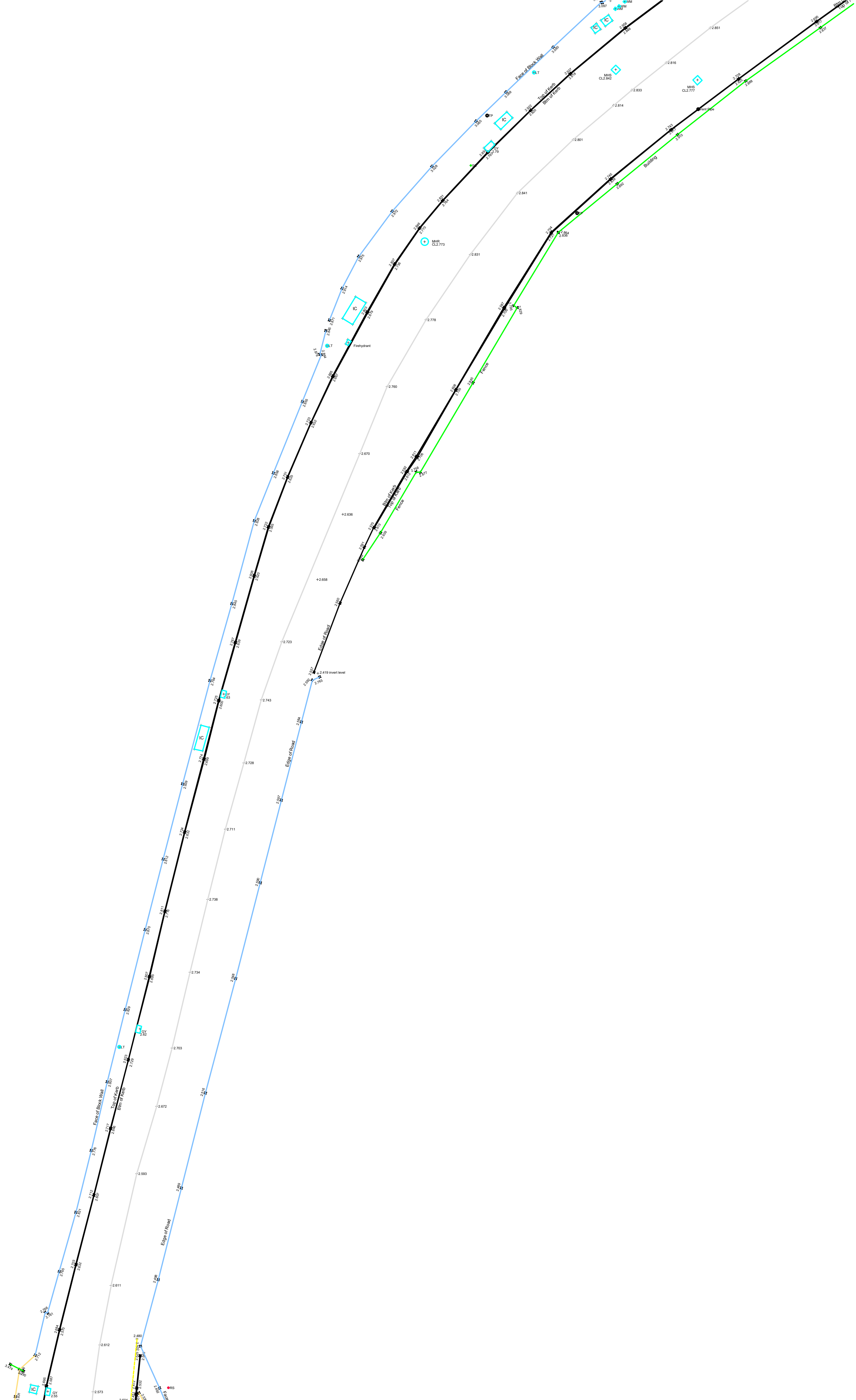


Face of Steps
Tarmac Path
Top of Kerb
Btm of Kerb
GAS
Face of 500mm Stone Wall
Grass
Conc
Cabinet
MHS CL2.639
MHR CL2.784
Face of Block Wall
Grass
Tarmac Path
Face of 500mm Stone Wall
MHS CL2.631
MHS CL2.679
MHR CL2.599
MHS CL2.708
PLANTER
Grass
MHS CL2.761


Face of Block Wall
Top of Kerb
Btm of Kerb
IC
FP
LT
MHR
CL2.773
MHS
CL2.842
MHS
CL2.777
Vent Pipe
Building
Fence
Firehydrant
Edge of Road
2.419 invert level
GY
RS
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2.816
2.833
2.814
2.801
2.841
2.831
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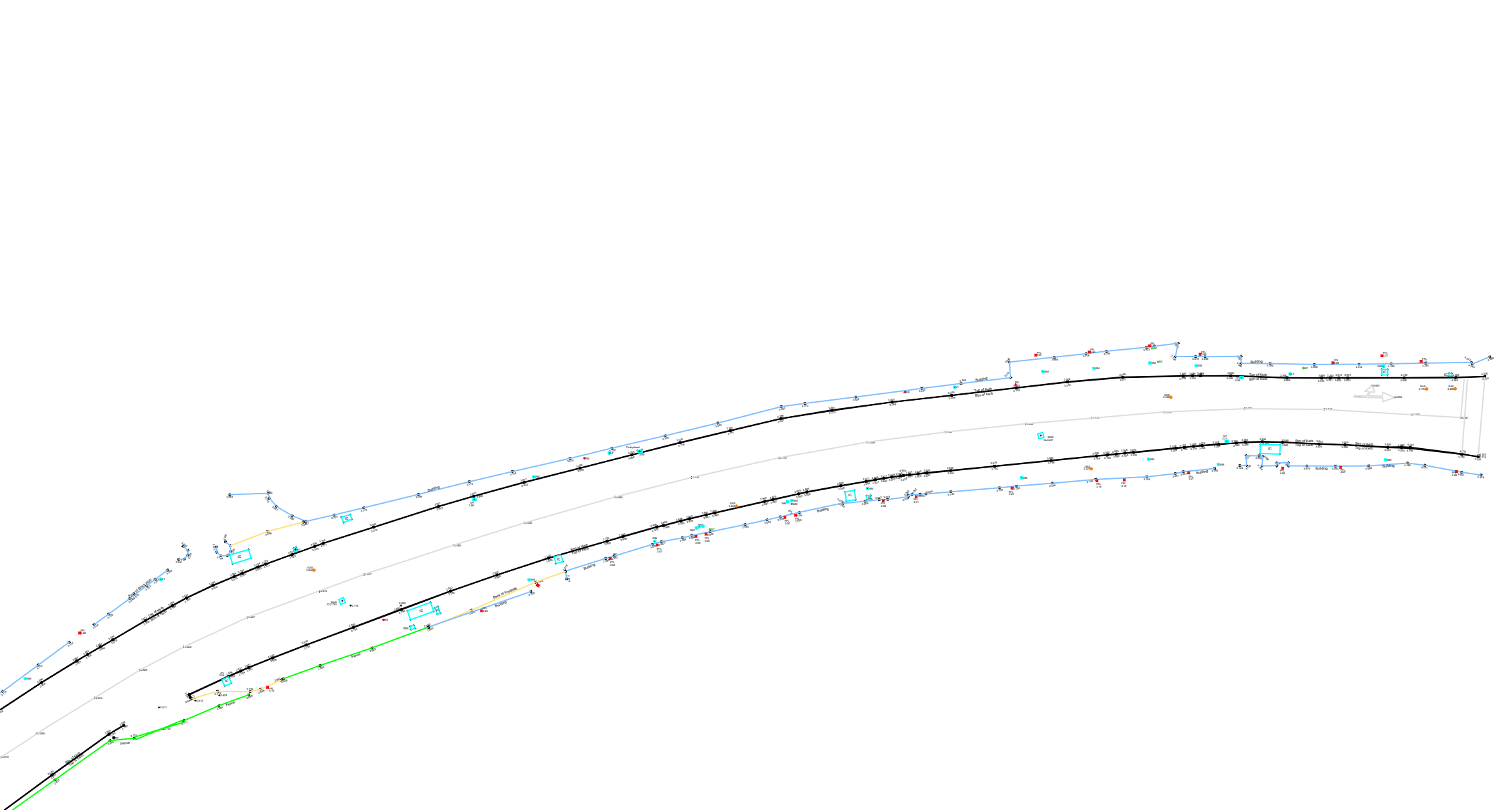

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APPENDIX B. PHOTOGRAPHIC EVIDENCE

	1. Vertical crack through wall
	2. Horizontal crack through mortar under the top course of blockwork at top of pier
	3. Separated joint between between wall and pier Minor vegetation growth to coping
	4. Vertical crack through wall & missing coping

	5. Missing coping
	6. Wall heavily overgrown by vegetation
	7. Separated joint between wall and pier
	8. Vertical crack

	9. Gap between coping and top of wall
	10. Blocked weephole
	11. Wall section overgrown by vegetation
	12. General view of the gate

	13. Pier overgrown by vegetation
	14. Vertical crack through wall
	15. Top of pier collapsed

		16. Serious deterioration of pier
		17. Cracked top part of pier tilting out & missing coping
		18. Wall overgrown by vegetation
		19. Top of pier overgrown by vegetation & seperated joint between wall and pier

		20. General view of the wall
		21. Top of pier overgrown by vegetation
		22. Horizontal crack thorugh mortr at top of pier & vegetation growth
		23. Gap between coping and top of wall & vegetation growth to wall

		24. Blocked weepholes at bottom of wall & vegetation growth to wall
		25. General view to the wall & vegetation growth to the coping &sign of stain on wall
		26. Structural division of top course of block of the pier separated and moved
		27. Water seeping through the wall

	28. Water dripping through the bottom of the wall. The ground in front of the wall is soaked
	29. Water dripping through the bottom of the wall
	30. Top of pier is overgrown by vegetation & stain present on the face of the wall
	31. Top of pier separated under the top course of block and moved

	32. Top of pier separated under the top course of block and moved

	33. Top 2 course of blockwork of pier separated and moved & rotated
	34. Wall beside pier tilting outwards
	35. General view to the wall
	36. Vertical crack through wall

		37. Division of top part of pier under first course of blockwork & top of pier covered with vegetation
		38. Top part of pier separated under the first blockwork and moved & pier covered by vegetation
		39. Stain present on the face of the wall
		40. General view to the wall

		41. Horizontal crack through mortar at top of pier
		42. Vegetation growth to the wall
		43. Missing coping on pier & stain present on the face of wall throughout
		44. Top of pier collapsed & vegetation growth onto it & stain present on the face of the wall throughout

		45. Top block course of pier separated and moved & vegetation growth onto it
		46. Electrical cable fixed to wall & evidence of stain present throughout
		47. Water seeping through wall
		48. Top block course of pier separated and moved

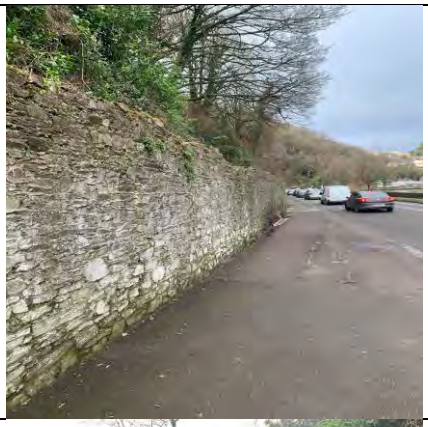
		49. Top 2 courses of blockwork of pier collapsed
		50. Top 2 courses of blockwork of pier collapsed
		51. Vertical crack through wall
		52. Gap between coping and wall

		53. Gap between coping and wall & vertical crack through wall
		54. Weephole
		55. Water seeping through wall
		56. Stepped crack through wall

		57. Evidence of weephole & Water seeping through wall
		58. Horizontal crack through pier & evidence of stain on face of wall
		59. Separated vertical joint between the pier and the wall

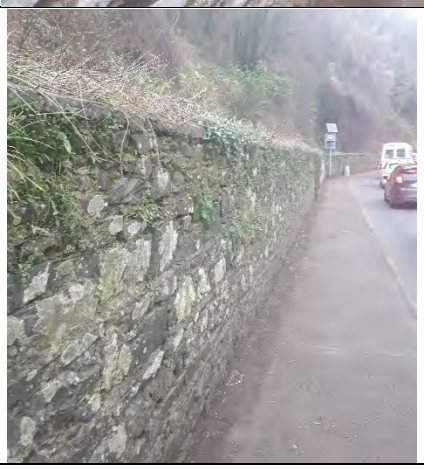
	60. Horizontal crack at top of pier
	61. Evidence of stain on bottom face of the wall
	62. Vertical crack through wall
	63. Water seeping through the bottom of the wall throughout

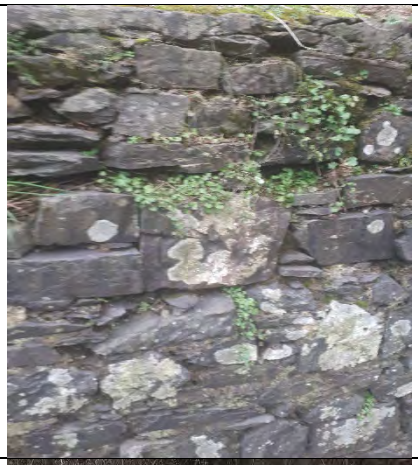
	64. Horizontal crack through wall at entrance junction to the Cork's Vienna Hotel
	65. Horizontal crack through wall at entrance junction to the Cork's Vienna Hotel
	66. Horizontal crack through wall at entrance junction to the Cork's Vienna Hotel
	67. Horizontal crack through wall at entrance junction to the Cork's Vienna Hotel

	68. Entrance road to Cork's Vienna Hotel
	69. Entrance road to Cork's Vienna hotel & loss of mortar and loose stones evident
	70. Water broke through wall & bottom of wall soaked
	71. Evidence of loss of stones & mortar

	72. Loss of mortar, loose stones & water running through the bottom of the wall
	73. Loss of mortar and loss of stones & water running through the bottom of the wall
	74. Vertical crack through wall
	75. General view to the wall & minor vegetation growth present

		76. Minor vegetation growth & loss of mortar present

	95. Crack through & deterioration of pier and adjacent wall
	96. Crack through wall & coping Spalling of concrete on coping
	97. Vertical crack through wall & coping
	98. Crack & minor vegetation on coping

	99. Minor vegetation on coping of pier
	100. Crack on coping
	101. Crack on coping
	102. Crack on coping

	103. Loss of masonry at pier
	104. Vertical crack through wall
	105. Loss of masonry at pier
	106. Collapsed section of wall

	107. Vegetation growth to coping
	108. Collapsed section of wall
	109. General view to stone wall
	110. General view to stone wall

	111. Loss of mortar & loose masonry at the edge of stone wall
	112. General view to the stone wall
	113. Crack on render
	114. General view to the stone wall

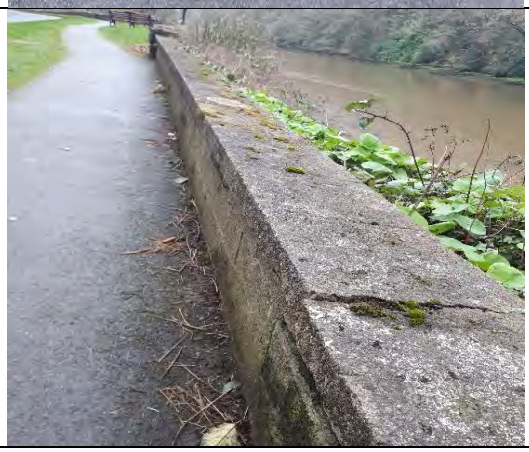
	115. Vegetation growth to the bottom of wall
	116. Loss of masonry
	117. Loss of masonry
	118. Crack through wall & tilting wall

	119. Collapsed wall section
	120. Crack through wall

	121. Crack through wall
	122. Top of pier collapsed
	123. Loss of mortar&masonry to pier
	124. Vertical crack through wall

	125. Vertical crack through wall
	126. Loss of masonry & coping to pier
	127. Horizontal crack on pier

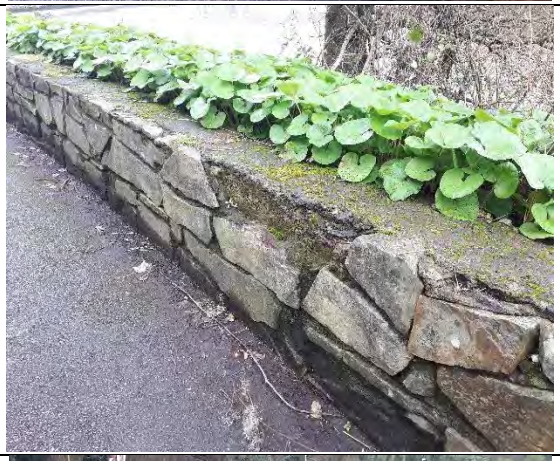
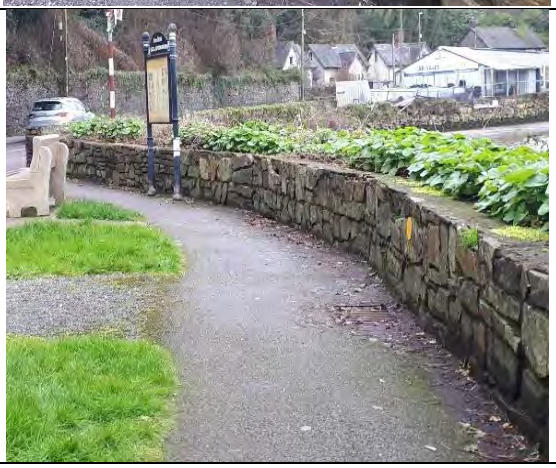
	128. Vertical crack through wall
	129. Top of pier collapsed & cracked
	130. Vertical crack through wall
	131. Vertical crack through wall

	132. Crack&Deterioration of wall
	133. Crack&Deterioration of wall
	134. Crack&Deterioration of wall

	135. Crack&Deterioration of pier & missing coping
	136. General view to wall
	137. Vertical crack through wall
	138. Vertical crack through wall & spalling of concrete on coping

	139. Vertical crack through wall
	140. Vertical crack through wall
	141. Vertical crack through wall
	142. General view to wall

	143. General view to wall
	144. Loss of mortar&masonry
	145. Loss of mortar&masonry

	146. General view to the wall
	147. Loss of masonry&mortar
	148. Loss of masonry&mortar
	149. Loss of masonry&mortar

	150. Loss of masonry&mortar
	151. Evidence of tree growth to rear of wall
	152. General view to the wall
	153. Loss of masonry&mortar