

# Appendix F Existing Structures Impact Assessment Report

#### **BUSCONNECTS INFRASTRUCTURE DELIVERY – PROJECT D**

#### BALLYMUN/FINGLAS TO CITY CENTRE CORE BUS CORRIDOR STRUCTURAL SURVEY REPORT

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#### 1 INTRODUCTION

#### 1.1 Objective

The aim of this report is to identify, classify and know the bridges and other structures involved in the works associated to the BusConnects project, a National Transport Authority's (NTA) programme. The purpose of this programme, which is part of the Project Ireland 2040, is to solve existing mobility issues in Dublin providing additional bus lanes and reinforcing the cycle route network.

At this time, the report and analysis of the existing structures is mainly based on the information collected during a field visit, in which the layout of the corridors has been traversed and that has allowed an inventory of the bridges affected in greater or smaller way for the project.

In this report, the corridors Ballymun/Finglas to City Centre Core Bus Corridor will be studied.

#### **1.2 Project location**

Ballymun/Finglas to City Centre Core Bus Corridors of the CBC Infrastructure Works (herein after called the 'Proposed Scheme') measures approximately 6.7 km from end to end. The Proposed Scheme runs from the Ballymun Church Street southwards.

The Ballymun to City Centre Bus Corridor Study Area runs from the M50 at the northern end southward to the River Liffey at the western edge of the city centre. It is centred on the axis of Ballymun Road and Phibsborough Road and extends for a width of about 3 km in the east-west direction while the Finglas to Phibsborough Bus Corridor Study Area consisted of two sections extending from Tyrrelstown at the north-western end southwards over a distance of 6.7km to the edge of the M50 motorway, and from there to Phibsborough over a distance of approximately 5km.

Finglas to City Centre Core Bus Corridors of the CBC Infrastructure Works (herein after called the 'Proposed Scheme') measures approximately 4.2km from end to end. The Proposed Scheme runs from St Margarets Road Junction to Prospect Way southwards.



Figure 1: View of the Ballymun & Finglas corridors

#### 2 METHODOLOGY

The methodology followed in this report is mainly based on data collection and information in the field visit. The information collected is check against and then complemented with the information available to be able to classify the structures as accurately as possible.

The expected or intended works to be carried out in the existing structures is not the scope of this report. Nevertheless, it is discussed briefly in Section 3 with the current information available at the time this report is written.

#### 2.1 Available information

The existing information used to prepare this Structural Survey is as follows:

#### 2.1.1 Topography information

A topographic survey has been carried out of the Ballymun & Finglas Corridors as part of the project scope. The survey was used to obtain information and overall dimensions of the bridges and structures.



Figure 2: Details of topography information in the area of CBC03-03 (OBD 222) bridge

#### 2.1.2 Web of the National Inventory of Architectural Heritage

There is a national organization that collects information of buildings and unique and old structures that deserve to be protected. According to the description of his work that is collected on the web (<u>http://webgis.buildingsofireland.ie/HistoricEnvironment/</u>):

"The National Inventory of Architectural Heritage (NIAH) is a state initiative under the administration of the Department of Culture, Heritage and the Gaeltacht and established on a statutory basis under the provisions of the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999.

The purpose of the NIAH is to identify, record, and evaluate the post-1700 architectural heritage of Ireland, uniformly and consistently as an aid in the protection and conservation of the built heritage. NIAH surveys provide the basis for the recommendations of the Minister for Culture, Heritage and the Gaeltacht to the planning authorities for the inclusion of particular structures in their Record of Protected Structures (RPS).

The published surveys are a source of information on the selected structures for relevant planning authorities. They are also a research and educational resource. It is hoped that the work of the NIAH will increase public awareness and appreciation of Ireland's architectural heritage."

#### Cross Guns Bridge, Cabragh (ba. W By.), Dublin City



Survey Data	L
Reg No	50060185
Date	1860 - 1865
Townland	CABRAGH (BA. W BY.)
County	Dublin City
Coordinates	315097, 236272
Previous Name	Westmoreland Bridge

a

#### Description

Single-span canal bridge, likely rebuild of c.1864 at same time as construction of railway bridge to north, carrying Phibsborough Road over Royal Canal. Older canal bridge apparently removed. Ashlar limestone abutments and terminating piers, latter with dressed limestone caps supporting cast-iron lamp standards with acanthus-leaf ornament to bases. Drainage spouts to outer faces of piers. Rubble limestone wing walls. Cast-iron parapets with rounded tops, round-ended vertical perforations and curving buttress-like elements to outer sides. West side of bridge has pipe attached. Canal lock to same side.

#### Figure 3: Example of the register of the structures in the web



Figure 4: Database with buildings, bridges and other architectural elements in Dublin

#### 2.1.3 Field visit

A field visit to the bridges was carried out by the structures specialist to know better the condition and typologies of the bridges within these corridors. The information collected during the visit can be seen in more detail in the Bridge Data Sheets, included in Appendix A.

During the visit, a visual inspection of the structures was carried out, analysing the typology of the superstructure and of the substructure, the surrounding infrastructure, specific site details, etc. It was also observed if there was any type of pathology or any functional problem in the bridges, and condition of supports and expansion joints, if applicable depending on the structural type. The presence of barriers was identified and recorded its type.

Representative measurements of the bridges were taken in order to study potential widening or the need of new structures instead in the area.

The existing structures surrounding and its environs were also inspected to record its condition and to determine the physical space available just in case there was needed to build new bridges to replace existing ones or to increase the road platform by new structures adjacent to the existing.

Broadly speaking, the modern bridges have sufficient space and clearances to incorporate the proposed road layout with extra lanes in the scheme. Some of the older bridges cannot accommodate the proposed road layout, therefore it is proposed widening them or building new structures adjacent to them. In those bridges where there is no work expected, the site visit and data collection has been done in a more cursory way, because in the absence of any structural work it would not be necessary to take more detailed information.



Figure 5: Measuring the depth of the slab



Figure 6: CBC03-02 (OBO11) Existing Parapet to be removed for bridge widening



Figure 7: Cross Guns Bridge over Royal Canal - Bridge support

#### 2.2 Required information

This document details the current information available to aid the design in the subsequent stages of the project and to find the best possible solution at constrained points such as existing bridges and structures.

The relevant information required in subsequent design stages are, not exhaustive list, as follows:

- As-built of existing bridges (Drawings and reports)
- Year of construction and maintenance or refurbishment works carried out in the bridges (widenings, reinforcements, replacements)
- Rehabilitation projects (if any) of the bridges
- Bridge structural inspection reports (Principal & General Inspections)

Irish Rail shared as-builts of CBC03-02 (OBO11) and CBC03-03 (OBD222). For more details, refer to Appendix B.

Geotechnical information is also critical to undertake the design of new structures and bridge widenings, to design the foundations adequately.

#### 3 STRUCTURAL SURVEY

In the Ballymun & Finglas corridors, the bridges have been classified into two different types: bridges and footbridges which are relatively new and for which no action is expected; and older bridges, which need to be widened or required the construction of a new bridge adjacent to them.

Some of the older bridges may be considered 'listed' or protected bridge due to their special and historic character. Thus, in those that have this kind of protection, the structural works expected might be limited.

Based on the field visits, the overall condition of all bridges inspected are good, with good conservation condition and without obvious structural pathologies that may represent a H&S risk, from the visual inspection. No intrusive tests were undertaken.

A relevant consideration of older bridges is that they are founded on masonry abutments when the newest bridges are founded on reinforced concrete substructures. This must be considered when developing the design of widening and new structures adjacent to them.

#### 3.1 List of structures

The list of existing structures to be studied is shown below. For more details, refer to Annex A for the complete site information of the bridges.

	ID	Name	Inventory Code *	Typology	Obstacle	Station	Expected structural Works?
un	CBC03-01	Dean Swift Bridge	-	Concrete solid slab	Tolka river	3+760	NO
Ballyn	CBC03-02	-	OBO 11	Concrete solid slab	Railway	4+700	YES
C03 -	CBC03-03	-	OBD 222	Arch + concrete solid slab	Railway	4+750	YES
CBC	CBC03-04	Cross Guns Bridge	PB- XX- 008.00	Steel girder / Solid slab bridge	Royal Canal	4+770	YES
S	CBC04-01	Pedestrian bridge	-	Concrete slab	Finglas Road	0+060	NO
Fingla	CBC04-02	-	-	Concrete solid slab	Finglas Road	0+780	NO
CBC04 -	CBC04-03	Pedestrian bridge	-	Steel truss	el truss Finglas Road		NO
	CBC04-04	-	-	Retaining wall and concrete solid slab	Tolka River	2+660	NO

\* Inventory Code taken from the plates disposed in the bridges (where available)

 Table 1: List of structures Ballymun and Finglas



Figure 8: Location of the structures in Ballymun & Finglas corridors

#### 3.2 Expected Structural Works

At the moment this report is written, it is envisaged structural works in the following structures:

- CBC03-02 widening of the bridge.
- CBC03-03 Adjacent bridge completely independent from existing one.
- CBC03-04 Adjacent bridge completely independent from existing one

At Finglas corridor, the existing bridges are adequate to accommodate the proposed road layout with extra lanes and also comply with horizontal and vertical clearance requirements.

In the Figure 8, it is shown two proposed structures (CBC03-04\* and CBC03-05) that are not related to any existing structure. Therefore, they are outside the scope of this report.

#### **APPENDIX A – BRIDGE DATA SHEETS**





View from south abutment



Railing



Inside the arch



View from the west



North access. Zone to be widened



View from the east



STRUCTURAL SURVEY - BUSCONNECTS CORE BUS CORRIDOR - DUBLIN						
Scheme	= CBC03-Ballymun to City Centre					
Structure ID	= CBC03-01					
Name	= Dean Swift Bridge					
	TYPSA					
Station	= 3+760					
Coordinates (DD)	= 53.3724586181851,-6.26620474525664					
Typology	<ul> <li>Concrete solid slab</li> </ul>					
Total Length [m]	= 13,75					
Clear length [m]	= 12,00					
Depth [m]	= 145					
Doptii [iii]						
Structure Description	alka rivar 12 matera langth. There are not structural works planned for this bridge					
Single span concrete bridge over the T	orka niver. 12 meters length. There are not structural works planned for this bridge.					
Superstructure: - The deck contains 2	+2 lanes and 2 mixes sidewalks/bike lines in 17.70 meters width.					
Substructure: - The two abutments or	a concrete wall with concrete windwalls containing the earth					
The concrete seems to be in good co	ndition. The deck is supported directly in the abutments, without bearings pads. There are no					
expansion joints.						
Sketch						
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Suth	North.					
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	Fielde pivel					
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	17.20*					
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Railing. T sideuch	4 lanes Schumpler Pailing.					
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* - 1	P & the railing					
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Sidewalk, bike lane. West side



Deck/Railing. West side



Deck and south abutment, view from the east



Deck/Railing. East side



STRUCTURAL SURVEY - E	USCONNECTS CORE BUS CORRIDOR - DUBLIN
Scheme	= CBC03-Ballymun to City Centre
Structure ID	= CBC03-02
Name	= -
	TYPSA
Station	= 4+700
Coordinates (DD)	= 53.3648391300763,-6.27190756534662
Typology	<ul> <li>Concrete solid slab</li> </ul>
Total Length [m]	= 12,70
Clear length [m]	= 9,40
Depth [m]	= 1,10 = 1,00 interior airder / 1,43 exterior airder
Dobui [iii]	
Structure Description	
Single-span bridge over the railway. St side where there is an existing building	eel girders forming the deck and ashlars abutments. It is planned to widen the bridge by the east so close to the north abutment and deck.
Superstructure: - The deck contains 2 There is a metal railing with concrete p	⊦2 lanes and 2 sidewalks in 17.10 meters width. Iars on each side.
Substructure: The abutments are of n	asonry and the lateral walls are a little displaced towards the exterior, what would allow to build
the future abutment without modify the Estimated vertical clearance 4.60m	vingwalls.
Estimated vertical clearance 4.60m	
Sketch	
	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$

#### Photos Location

# CBC03-02

Deck. East view



Zone of the noth abutment to be widened

**Inventory Code** 



North abutment and wall. Existing building



Railing



Noth abutment. West side





Deck/Railing. West side



<image/> <text><text><text><text></text></text></text></text>	STRUCTURAL SURVEY -	BUSCONNECTS CORE BUS CORRIDOR - DUBLIN
<text><text><text><text><text><text><text><text></text></text></text></text></text></text></text></text>	Scheme	= CBC03-Ballymun to City Centre
<text><text><text><text><text><text><text><text></text></text></text></text></text></text></text></text>	Structure ID	= CBC03-03
<text><text><text><text><text><text><text><text><text></text></text></text></text></text></text></text></text></text>	Name	= -
<code-block><text><text><text><text><text><text></text></text></text></text></text></text></code-block>		TYPSA
<code-block><text><text><text><text><text><text></text></text></text></text></text></text></code-block>	Station	= 4+750
<code-block><section-header><text><text><text><text></text></text></text></text></section-header></code-block>	Coordinates (DD)	= 53.36455039776576.27186153786907
<text><text><text><text><text><text></text></text></text></text></text></text>	Typology	= Arch + concrete solid slab
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<text><section-header><text><text><section-header><image/></section-header></text></text></section-header></text>	Width [m]	= 18,30
<section-header><section-header><text><text><section-header></section-header></text></text></section-header></section-header>	Depth [m]	= 0,95
<section-header><text><text><section-header><image/></section-header></text></text></section-header>		
<text><text><section-header><image/></section-header></text></text>	Structure Description	
<text><section-header><section-header><image/></section-header></section-header></text>	Deilwey tuppel energed 1964 on branch	ling from former Dragdetone Station to Connelly Station, via North Wall. Typnal is 202 yards
abutment.	(263 metres) east-west, with elliptical ar extension to east, to front of tunnel, of c with concrete copings. West end of tunn It is planned to built a pedestrian bridge	ine from former Broadstone Station to Connolly Station, via North Wall. Funnel is 292 yards ch to east end, having rusticated limestone voussoirs and walling. Late twentieth-century oncrete, with trapezoidal-profile metal parapets flanked by short pieces of recent brick walling el not accessible to view.
Location	abutment.	
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	Location	
	Rissosia Ra	

Deck



Deck and railing



Inventory Code



Support detail



Scheme = CEC03-Ballymun to City Centre Structure ID = C8C03-04 Nom = Cross Guns Bridge over Royal Canal Station = 4+770 Coordinates (DD) = 53,3643517641307,6.27150303713494 Tyology = Skeel girdet / Solid slab bridge Total Length [m] = 14,601-64.0 Citer length [m] = 0.60-0.50 Structure Description Brigespan canal bridge, likely volubil of c.1864 at same time ac construction of railway bridge to north, carrying Philostorough Road cover Royal Canal. Older conel bridge apparently removed. Ashina Imeasure adcrements and terminating piece, latter with dressed Robert Length [m] = 0.60-0.50 Structure Description Brigespan canal bridge, likely volubil of c.1864 at same time ac construction of railway bridge to north, carrying Philostorough Road cover Royal Canal. Older conel bridge apparently removed. Ashina Imeasure adcrements and terminating piece, latter with dressed elements to outer sides. West side of bridge has pipe attoched. Canal lock to same side. Steperstructure: The clear length varies from west ade to east side (480-11.75). The deck is of concrete with casal from railings and embedded basins at the edges. The deck has at trapezoidal from due to that variable length of the span. Subtructure: The clear length varies from west ade to east side (480-11.75). The deck is of concrete with casal from railings and three adments devices. The deck has directly supported on the adment. Subtructure: The adments are of charge in the edges. The deck is directly supported on the adment.	STRUCTURAL SURVEY - BUSCONNECTS CORE BUS CORRIDOR - DUBLIN							
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<image/> Structure Description         Single-span canal bridge, likely rebuild of c.1864 at same time as construction of railway bridge to north, carrying Philoborough Road Over Royal Canal. Order canal bridge apparently removed. Ashalf Intensione abuttments and terminating piers, latter with dressed litrestore caps supporting cash-tion lamp standards with acanhus-leaf onament to bases. Drainage spouls to outer faces of piers. Rubble linestone wing walls. Casat: ion parabet with ionded tops; round-ended vertical perforations and curving buttress-like elements to outer sides. West side of bridge has pipe attached. Canal tock to same side.           Superstructure: The clear length varies from west side to east side (480-11.75). The deck is of concrete with cast iron railings and embedded beams at the edges. The deck has a trapezoidal form due to that vanable length of the span.           Substructure: The clear length varies from west side to east side (480-11.75). The deck is of concrete with cast iron railings and embedded beams at the edges. The deck has a trapezoidal form due to that vanable length of the span.           Substructure: The clear length varies from west side to east side (480-11.75). The deck is of concrete with cast iron railings and embedded beams at the edges. The deck has a trapezoidal form due to that vanable length of the span.           The abutemist are of eashalr impection. They are skewed and they neither are parallel. They have little wing walls and from them lave easing devices. The deck is directly supported on the abutment.           Sketch           Plan view         If a pink form           Use of a clarab         If a pink form           Use of a clarab         If a pink	Depth [m]	= 0.60-0.90						
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Interestore caps supporting cat-iron large standards with acanthus-leaf onmament to bases. Drainage spouls to outer faces of piers. Rubble linestone wing walk. Cast-iron parapeter with rounded tops, rounde-nded writcal parlorations and curving buttress-like alternation of the spont of the spont of the spont of the spont of the spont. Substructure: The clear length varies from west side to east side (4.80-11.75). The deck is of concrete with cast iron railings and embedded beams at the edges. The deck has a trapezoidal form due to that variable length of the spon. Substructure: The abuttments are of ashlar linnestone. They are skewed and they neither are parallel. They have little wing walls and from them leave some walls that delimit the channel. The abuttment seems to be in a good condition. The joints between ashlars seem to have been slightly dissolved in some places There are not bearing devices. The deck is directly supported on the abutment. Sketch Plan view	over Royal Canal. Older canal bridge a	pparently removed. Ashlar limestone abutments and terminating piers, latter with dressed						
Rubble limestone wing wells. Cast-iron parapets with rounded tops, round-ended vertical perforations and curving buttress-like elements to outer sides. West side of bridge has pipe attached. Canal lock to same side.  Superstructure: The clear length varies from west side to east side (4.80-11.75). The deck is of concrete with cast iron railings and embedded beams at the edges. The deck has a trapezoidal form due to that variable length of the span.  Substructure: The abutments are of ashlar limestone. They are skewed and they neither are parallel. They have little wing walls and from them leave some walls that delimit the channel  The abutment seems to be in a good condition. The joints between ashlars seem to have been slightly dissolved in some places There are not bearing devices. The deck is directly supported on the abutment.  Sketch Plan view  Regal Canal Regal Ca	limestone caps supporting cast-iron lan	ip standards with acanthus-leaf ornament to bases. Drainage spouts to outer faces of piers.						
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	old girder	ewally Pavement T F0.65 F0.65 Old. Sirder						

# 

#### Deck and railing



#### Deck



Deck. East view

Deck support on south abutment



Deck support on north abutment



South abutment. Inventory code



North entrance to the bridge







Location



West access



Main span



East access



West access and main span



Ν

Entrance to main span



Expanxion joint detail





Elevation view from the south

#### Railing



View from Finglas Rd



Deck/Railing. North side





#### Sidewalk



Sidewalk and railing



STRUCTURAL SURVEY - BUSCONNECTS CORE BUS CORRIDOR - DUBLIN					
=	CBC04-Finglas to Phibsborough				
) =	CBC04-03				
=	Footbridge over Finglass Rd				
	TYPSA				
=	1+025				
) =	53.3880330587652,-6.29935244840067 Stool truss				
′ _ =	133.00				
=	Main span 32.00				
=	2,50				
=	1.55 - 2.30				
Pood	The deck is a steel trues of square profiles with a depth of 1.55m in the access ramps and				
3.000. 2.00m	length.				
r the p	edestrian bridge, so no action in the structure is expected.				
	Saveta Tekenary         Beauty Stude         Carmines Carvery         Base         Base				
	BUS = = = = y = = ] = = Road. 32.00m er the p				

#### Deck



Western entrance



Pier



Access to main span



Eastern entrance



East access



STRUCTURAL SURVEY - BUSCONNECTS CORE BUS CORRIDOR - DUBLIN							
Scheme	=	CBC04-Finglas to Phibsborough					
Structure ID	=	CBC04-04					
Name	=	Bridge over Tolka River	TYPSA				
Station Coordinates (DD) Typology Total Length [m] Span lengths [m] Width [m] Depth [m]		2+660 53.3766127965296,-6.28626237883509 Retaining wall and concrete solid slab 25,20 7.30+10.60+7.30 26,44 1,50	TTPSA				

#### **Structure Description**

Solid slab concrete bridge over the Tolka River. The bridge has 3 spans with length of 7.30+10.60+7.30. The total length is 25.20m.

Superstructure: - The deck slab has around 1.50m depth. It has a metal railing on the west side and a stone wall/railing on the east side.

Substructure: The substructure is so skewed to be adapted to the river flow. The abutments are of concrete with a long wall in the west side of the north abutment. The two piers are very similar to a "hammerhead pier" and they are founded in the river bed.

There are not structural works planned for this bridge.

#### Location



#### Deck. Elevation view



South abutment



Expansion joint and railing



Deck, railing and wall



Support detail



Pier and stone railing



#### APPENDIX B – AS-BUILTS CBC03-02 & CBC03-03





the second of the second se

" Rail Level

Platform

Level

HALF ELEVATION A. A.

-----

Tramway, to Glasnevin.

SHEET NºI

- 5.6 ---

Weep Hole

- DRUMCONDRA LINK LINE GLASNEVIN ROAD -----OVERBRIDGE 





![](_page_32_Figure_0.jpeg)

![](_page_33_Figure_0.jpeg)

#### NOTES:

- 1. All concrete to be Grade 50/20
- 2. All chamfers 25x25 unless otherwise stated
- Edge Beam to be prefabricated and delivered to site. Bridge Deck to be poured insitu.
   All concrete surfaces to be Class F4 finish.

#### FINISHES

- Bush hammered finish:recess on outside faces F3: All other formed surfaces

- F3: All other formed surfaces
  U3: Top of walls
  U4: Surfaces to receive waterproffing membrane
  U1: All other unformed surfaces
  F4: Are as for Class F3 except that internal ties and embedded metal formwork supports will be permitted.

# THIS DRAWING IS BASED ON SURVEY DRAWING NO.: THIS DRAWING TO BE IN READ IN CONJUNCTION WITH DRAWING(S) NO.:

REV	DESCRIPTION				ΒY	снк'о	APPR'D	DATE
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C/								
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DRA	WNAWB	CHECKED	APPR'D	DATE Sept				
	<b>Elarnród Éireann</b> Structural Design Section, New Works, Iarnrød Eireann, Track & Signal HQ, Inchicore Works, Dublin 8.							
	OB 222 CROSS GUNS BRIDGE MGWR NORTH WALL (LIFFEY BRANCH) REPLACEMENT BRIDGE EXTENSION GENERAL ARRANGEMENT 1 OF 3							
SLA	1:100			awing no. 151-	3814			

![](_page_34_Figure_0.jpeg)

![](_page_34_Figure_1.jpeg)

# **PROPOSED ELEVATION**

24 ហ្

#### NOTES:

- 1. All concrete to be Grade 50/20
- 2. All chamfers 25x25 unless otherwise stated
- Edge Beam to be prefabricated and delivered to site. Bridge Deck to be poured insitu.
   All concrete surfaces to be Class F4 finish.

#### FINISHES

- Bush hammered finish:recess on outside faces F3: All other formed surfaces
- U3: Top of walls
- U4: Surfaces to receive waterproffing membrane U1: All other unformed surfaces F4: Are as for Class F3 except that internal ties
- and embedded metal formwork supports will be permitted.

# THIS DRAWING IS BASED ON SURVEY DRAWING NO.: THIS DRAWING TO BE IN READ IN CONJUNCTION WITH DRAWING(S) NO.

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564	OB 222 CROSS GUNS BRIDGE MGWR NORTH WALL (LIFFEY BRANCH) REPLACEMENT BRIDGE EXTENSION GENERAL ARRANGEMENT 2 OF 3									
SLA	1:50			чы мо. 151–	3815					

![](_page_35_Figure_0.jpeg)

# **TYPICAL CROSS SECTION A-A**

#### NOTES:

- 1. All concrete to be Grade 50/20 2. All chamfers 25x25 unless otherwise stated
- 3. Edge Beam to be prefabricated and delivered to site. Bridge Deck to be poured insitu.
- 4. All concrete surfaces to be Class F4 finish.

### FINISHES

- Bush hammered finish:recess on outside faces F3: All other formed surfaces
- U3: Top of walls
- U4: Surfaces to receive waterproffing membrane U1: All other unformed surfaces F4: Are as for Class F3 except that internal ties and embedded metal formwork supports will be permitted.

# THIS DRAWING IS BASED ON SURVEY DRAWING NO.: THIS DRAWING TO BE IN READ IN CONJUNCTION WITH DRAWING(S) NO.:

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SLV	OB 222 CROSS GUNS BRIDGE MGWR NORTH WALL (LIFFEY BRANCH) DECK EXTENSION REPLACEMENT GENERAL ARRANGEMENT 3 OF 3							
JLA	1:20			151-	3816			