The background features a vibrant red field with several abstract geometric elements. In the upper right, there is a blue shape with a white circle inside, and a dark blue horizontal bar below it. In the lower right, a large green arc is partially visible, with a red arc below it. On the left side, there are blue shapes with white circles, and a dark blue shape at the bottom left. The overall design is modern and graphic.

**Appendix J3**  
Preliminary Design Report  
- Retaining Walls

National Transport Authority  
**Blanchardstown to City Centre  
Core Bus Corridor Scheme**  
Preliminary Design Report -  
Retaining Walls

Issue | 25 April 2022

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 268401

**Ove Arup & Partners Ireland Ltd**

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**ARUP**

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## Appendices

### Appendix A

Drawings

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Geotechnical Information

# 1 Introduction

---

## 1.1 Design Brief

Arup has been appointed by the National Transport Authority (NTA) to undertake a preliminary design of the proposed Blanchardstown to City Centre Core Bus Corridor (CBC) Scheme (hereinafter referred to as the 'Proposed Scheme') of the BusConnects CBC network. Arup's appointment includes the preliminary design of structures including modifications, on this Proposed Scheme.

This report includes the considerations and assumptions made during the preparation of the preliminary design of the retaining wall structures on the Blanchardstown to City Centre Core Bus Corridor.

## 1.2 Project Background

The BusConnects Dublin Programme is a plan to transform Dublin's bus system, with the Core Bus Corridor (CBC) project providing 230 km of dedicated bus lanes and 200 km of cycle tracks across sixteen of the busiest bus corridors in and out of the city centre. The project is fundamental to addressing the congestion issues in the Dublin region with the population due to grow by 25 % by 2040. In June 2018 the National Transport Authority (NTA) published the Core Bus Corridors Project Report, which sets out the vision for the provision of bus lanes and cycle tracks on sixteen key bus corridors.

The Blanchardstown to City Centre CBC is identified in this document as forming part of the radial Core Bus Network. The BusConnects Dublin Core Bus Network is shown in Figure 1.

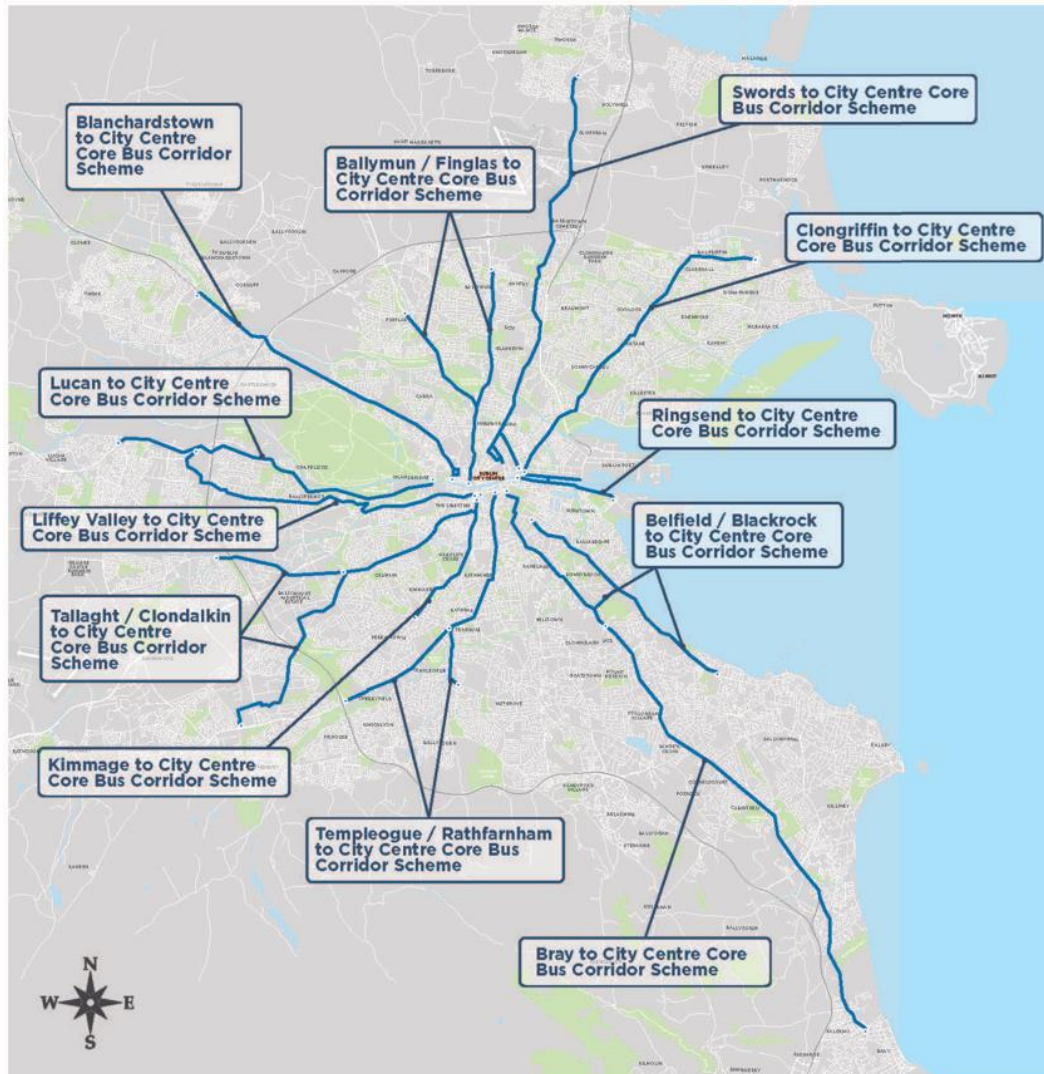


Figure 1: BusConnects Dublin Radial CBC Network

The Proposed Scheme commences at Junction 3 (Blanchardstown / Mulhuddart) southbound off-slip from the N3. The Proposed Scheme proceeds along the R121 Blanchardstown Road South into the Blanchardstown Shopping Centre.

From a new terminus to the north-west of Blanchardstown Shopping Centre the Proposed Scheme is routed onto the N3 Navan Road via the Snugborough Road junction and follows the N3 and Navan Road as far as the junction with the Old Cabra Road. From here, the Proposed Scheme is routed along Old Cabra Road, Prussia Street, Manor Street and Stoneybatter to the junction with King Street North. The core bus corridor is then routed via Blackhall Place as far as the junction with Ellis Quay, where it joins the prevailing traffic management regime on the North Quays. At the Stoneybatter / Brunswick Street North junction, cyclists proceed along Brunswick Street North, George's Lane and Queen Street as far as Ellis Quay/Arran Quay.

## 1.3 Previous Studies

The first non-statutory public consultation on the BusConnects CBCs took place on a phased basis between November 2018 to May 2019. The second round of public consultations occurred between March 2020 to April 2020. A third round of public consultations then followed between November 2020 and December 2020.

Consultation with the principal project stakeholders (i.e. Dublin City Council, Fingal County Council, Transport Infrastructure Ireland, An Garda, Utility companies and the National Transport Authority) has also taken place.

A desktop study was undertaken to identify the existing structures within the project extents, with site inspections undertaken where information was limited.

## 2 Site & Function

### 2.1 Site Location

Table 1 below provides a summary of the retaining walls, greater than 1.5 m in retained height, considered along the scheme.

Table 1: List of retaining wall structures greater than 1.5 m in retained height

Retaining wall	Type	Length	Max. retained height	Comments
RW01	Spreadfoot cantilever wall	270 m	3.0 m	Retains vegetated berm adjacent Blanchardstown Road South.
RW02	Wall removed as part of design development.			
RW03	Soil nail wall	100 m	4.0 m	Retains cut slope to accommodate bus stop.
RW04	Wall removed as part of design development.			
RW05	Wall removed as part of design development.			
RW06	Wall removed as part of design development.			
RW07-A	Spreadfoot cantilever wall	100 m	1.5 m	To service bus stop on southern side of N3. Includes ramp and stair access.
RW07-B	Spreadfoot cantilever wall	250 m	3.0 m	To service bus stop on northern side of N3. Includes ramp and stair access.
RW08	Wall removed as part of design development.			
RW09	Spreadfoot cantilever wall	90 m	4.0 m	Retains N3 embankment adjacent Castleknock health & leisure centre.

Refer to Figure 2 below for their location.





Figure 2: Retaining walls general location

## 2.2 Function of Structure and Obstacles Crossed

The purpose of these retaining walls is to maintain the required ground level in the areas that are affected by the proposed new elements of the bus corridor, where the height difference is too high to be maintained with an embankment.

## 2.3 Choice of Location

Walls are located where geometric constraints don't allow for traditional earthworks batters to be contained within the site boundaries.

## 2.4 Site Description and Topography

The surrounds comprise of a brownfield site, with walls located adjacent to existing carriageways and road embankments.

## 2.5 Vertical and Horizontal Alignments

Refer to the road design drawings for the proposed vertical and horizontal road alignments along the scheme.

## 2.6 Existing Underground and Overground Services

The services mentioned in Table 2 below are existing underground services in the vicinity of the proposed structures. Only the MV electricity at RW03 needs to be relocated.

Table 2: Existing Services

Retaining wall	Utility Provider	Service	Comment
RW01	ESB	MV electricity (UG)	Retained Runs parallel in front of wall.
	Irish Water	600 dia Stormwater	Retained Crosses perpendicular to wall.
RW03	ESB	MV electricity (UG)	<b>Relocated</b>
	Irish Water	600 dia Stormwater	Retained Runs parallel in front of wall.
RW07-A	Irish Water	Foul water	Retained Crosses perpendicular to ramp.
	Irish Water	1050 dia Stormwater	Retained Crosses at skew to ramp.
	ESB	LV & MV electricity (UG)	Retained Crosses at skew to ramp.
RW07-B	Irish water	Foul water	Retained Crosses perpendicular to ramp.
	ESB	MV electricity (UG)	Retained Beneath Mill Rd footpath.
	EIR	Telecom	Retained Beneath Mill Rd footpath.
	Irish Water	Water	Retained Beneath Mill Rd footpath.
RW09	ESB	MV electricity (UG)	Retained Runs parallel in front of wall.
	GNI	LP Gas	Retained Crosses perpendicular to wall.

These services are illustrated in the figures below.

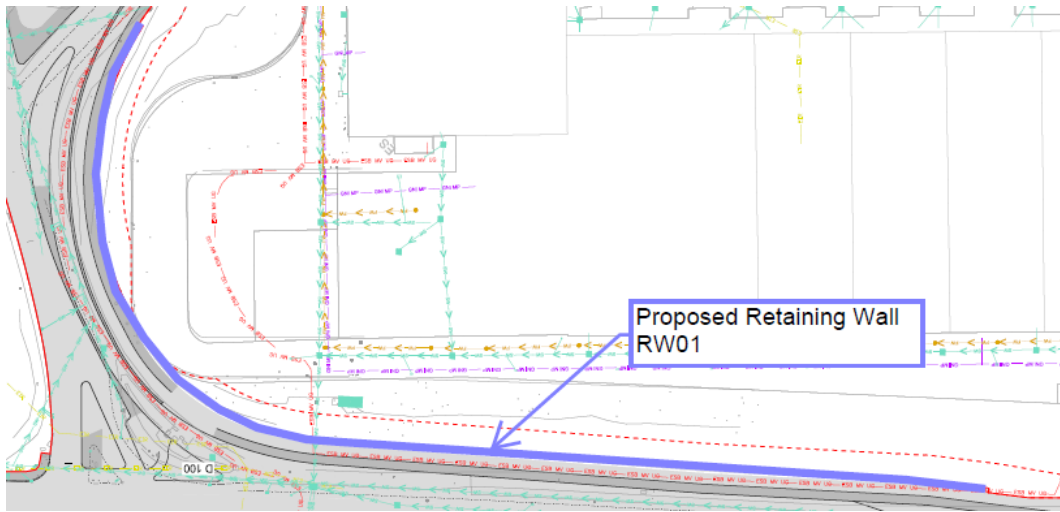


Figure 3: RW01 existing Services

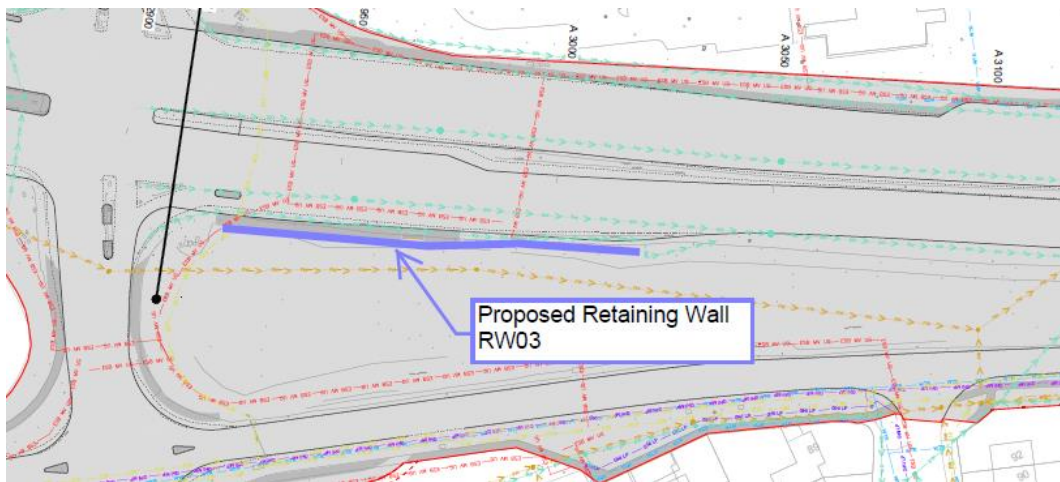


Figure 4: RW03 existing Services

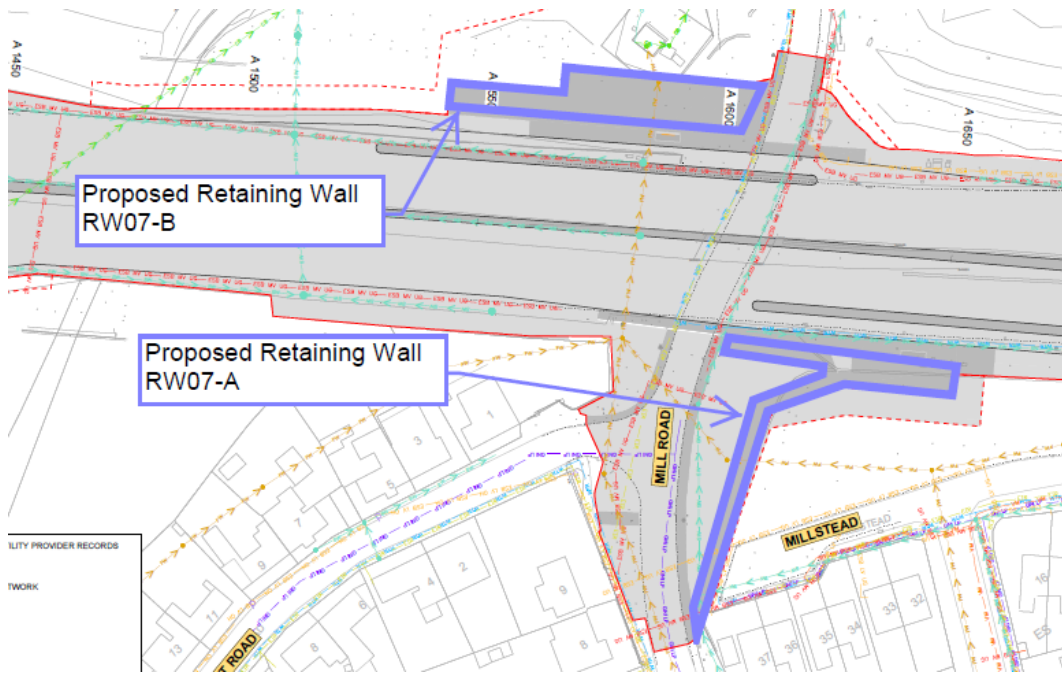


Figure 5: RW07 existing Services

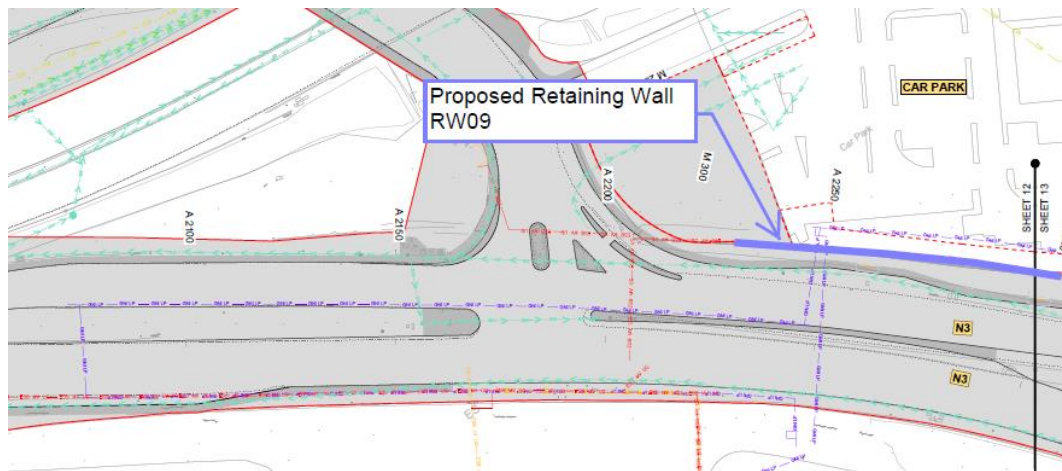


Figure 6: RW09 existing Services

No above ground services were identified at the retaining walls locations.

## 2.7 Geotechnical Summary

A geotechnical desktop study of the area has been undertaken using existing GI information. Where identified, supplementary GI information was requested to increase the understanding of the geological conditions at targeted locations across the scheme.

Refer to Section 7 for details of the ground conditions at each retaining wall location.

## **2.8 Hydrology and Hydraulic Summary**

It is not expected that the construction of the retaining walls on this scheme will have any significant impact on the local hydrogeology.

## **2.9 Archaeological Summary**

There is no impact envisaged from these structures.

## **2.10 Environmental Summary**

An Environmental Impact Assessment (EIA) is currently being prepared for this project. Outcomes from this EIA will be reviewed and incorporated once determined.



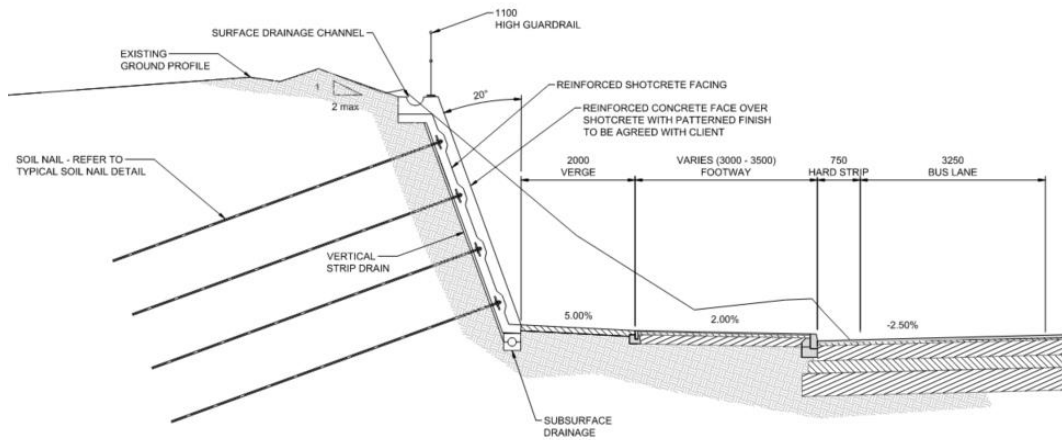


Figure 8: RW03 – Typical Cross Section

### 3.1.3 Retaining Wall 07-A and RW07-B

Retaining walls RW07-A and RW07-B are required to provide access from Mill Road to the proposed bus stops either side of the N3. They comprise a combination of ramps and stairs catering for pedestrian access.

RW07-A provides access to the bus stop on the N3 outbound carriageway and is located to the southeast of Mill Road Bridge. It comprises several small-height retaining walls, with a maximum retained height of 1.5 m. The layout of the ramps and stairs are set out to minimise the impact on the adjacent Millstead Estate, with the access ramp running parallel to the existing boundary. These ramps have a slope of 1V:25H.

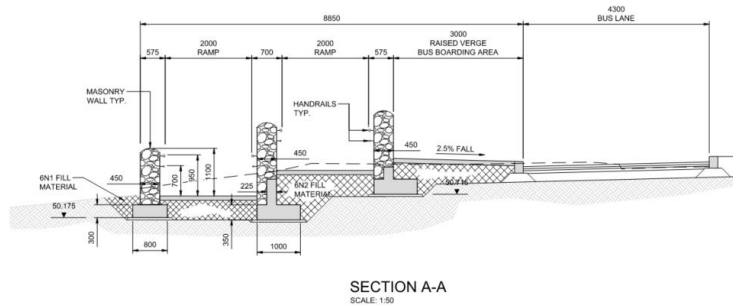


Figure 9: RW07-A – Typical Section through access ramp

RW07-B provides access to the bus stop on the N3 inbound carriageway, located to the northwest of Mill Road Bridge. It comprises several retaining walls, with a maximum retained height of 3.0 m. The access ramp was originally positioned to the northeast of Mill Road but was subsequently moved to the northwest

following an environmental review of its potential impact on the Tolka River and the associated Alluvial Woodland, which is an Annex 1 Habitat.

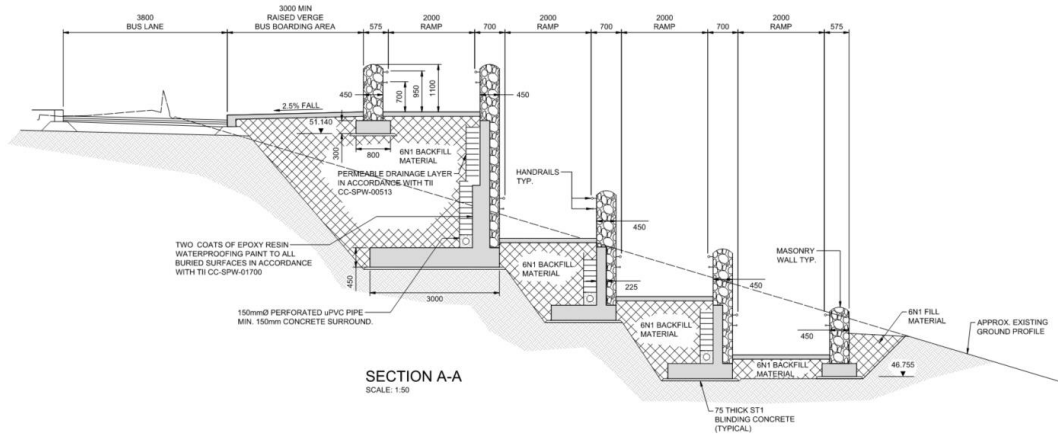


Figure 10: RW07-B – Typical Section through access ramp

These ramps and stairs will accommodate a 32.0 m path between handrails, with the ramps inclined at a maximum slope of 1V:20H. The geometry of the ramps and the stairs have been detailed to the National Disability Authority’s guideline “Building for Everyone: A Universal Design Approach”.

The walls will be clad in a masonry stonework façade that will improve its visual impact and deter graffiti vandalism.

### 3.1.4 Retaining Wall RW09

Retaining wall RW09 comprises a reinforced concrete spreadfoot cantilever retaining wall. The wall is required to retain the widened N3 embankment from spilling into the adjacent Castleknock health & leisure centre.

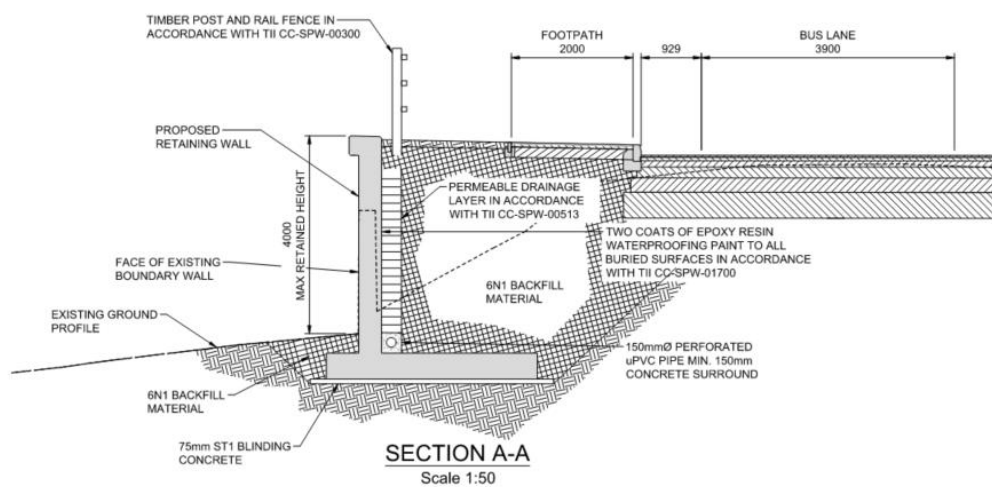


Figure 11: RW09 – Typical section



## **3.2 Aesthetic Considerations**

The walls follow conventional forms. Walls which are exposed to high levels of pedestrian activity, such as RW01, RW07-A and RW07-B, will be clad in masonry stonework. RW09, which is set back from public passage, will comprise a Reckli patterned concrete finish (or approved equivalent). The shotcrete façade to RW03 will be finished off with a profiled/patterned cast in-situ concrete face, to be agreed with the urban designer.

## **3.3 Proposals for the Recommended Structure**

### **3.3.1 Proposed Category**

The retained height of all the walls is smaller than 5 m, hence they are classified a Category 1 structures in accordance with DN-STR-03001.

### **3.3.2 Span Arrangements**

Not Applicable.

### **3.3.3 Minimum Headroom Provided**

Not Applicable.

### **3.3.4 Approaches including run-on Arrangements**

Not Applicable.

### **3.3.5 Foundation Type**

All spreadfoot cantilever walls will comprise a pad footing foundation cast on a 75 mm blinding layer, bearing on the subsurface below.

The soil nail wall will comprise galvanised bars drilled into the cut slope and fully grouted.

### **3.3.6 Substructure**

Not applicable.

### **3.3.7 Superstructure**

Not applicable.

### 3.3.8 Articulation Arrangement, Joints & Bearings

Nominal 20 mm vertical movement joints will be used between sections of wall to allow for natural expansion and contraction of the concrete. Stainless steel dowel bars will be used to control differential displacement of the wall sections.

### 3.3.9 Vehicle Restraint System

Where walls present a hazard within the clear zone, a Vehicle Restraint System (VRS) will be provided in accordance with DN-REQ-03034.

Retaining walls RW07-A & RW07-B are located adjacent a bus stop. The bus stop and adjacent bus lane is protected by a VRS system mounted on the raised island which separates the bus lane from the N3. The bridge parapets will align and tie into a bespoke concrete wall barrier integrated into the retaining wall for the stairs.

Retaining wall RW09 is located within the clear zone of the adjacent carriageway. A road VRS system is proposed at the back of the footpath in front of the wall.

### 3.3.10 Drainage

A permeable drainage layer will be provided behind the in-situ concrete retaining walls in accordance with CC-SPW-00500 and will provide positive outfall from a one end to the other of the structure and will connect to the mainline road drainage.

For the soil nail wall, vertical strip drains will be placed against cut slope prior to the application of the shotcrete. These will connect to a subsurface drainage pipe placed beneath the toe of the wall.

### 3.3.11 Durability

The structures will comprise reinforced concrete, which is a highly durable material. Concrete specification and cover to reinforcement will be in accordance with TII publication DN-STR-03012 (Design for Durability).

### 3.3.12 Sustainability

Recycled GGBS will be used in the design and construction of some of the concrete elements of the structure leading to a more sustainable structure overall.

### 3.3.13 Inspection and Maintenance

The proposed structures are of reinforced concrete construction, with the working design life for the structure being 120 years (Working Life Category 5). It is expected that the structure will have minimal maintenance and inspection requirements.

## **4 Safety**

---

### **4.1 Traffic Management During Construction including Land for Temporary Diversions**

To be developed at a further stage of the design.

### **4.2 Safety During Construction**

The Designer will take account of the General Principles of Prevention, as specified in the Schedule 3 of the Safety, Health and Welfare at Work Act 2005, liaise with the Project Supervisor appointed by the Client for the Design Process and the Project Supervisor appointed for the Construction Stage and carry out all other duties as required by Clause 15 of the Safety, Health and Welfare at Work (Construction) Regulations 2013 (S.I. No. 291 of 2013).

### **4.3 Safety In Use**

Safety barriers in accordance with TII Publication DN-REQ-03034 will be used to protect errant vehicles from the hazard posed by walls within the clear zone.

### **4.4 Lighting**

There are no lighting requirements for these structures.

## **5 Design Assessment Criteria**

---

### **5.1 Actions**

Design actions for the retaining walls are as set out in the sections below.

### **5.2 Permanent Actions**

Permanent Actions in accordance with IS EN 1991-1-1:2002 and the associated National Annex.

### **5.3 Snow, Wind and Thermal Actions**

Snow actions are not considered in the design of the retaining walls.

Wind actions shall be in accordance with IS EN 1991-1-4 and the associated National Annex.

Thermal actions will be assessed in accordance with IS EN 1991-1-5 and the associated National Annex.

### **5.4 Actions relating to Normal Traffic**

The application of traffic loads and distribution through the soil will be applied to the retaining walls in accordance with PD 6694-1:2011 (*Recommendations for the design of structures subject to traffic loading to BS EN 1997-1:2004*).

### **5.5 Actions relating to Abnormal Traffic**

Not applicable.

### **5.6 Footway or Footbridge Live Loading**

Not applicable.

### **5.7 Provision for Exceptional Abnormal Loads**

Not applicable.

### **5.8 Accidental Actions**

Not applicable.

### **5.9 Actions During Construction**

Not applicable.

## 5.10 Any Special Loading not Covered Above

A transient surcharge load will be applied to the ground behind the walls. The following non-concurrent loads have been considered in the design depending on the slope of the ground level behind the wall:

- 10 kPa Construction Surcharge (ground profile level behind the wall)
- 10 kPa Design Surcharge for slopes  $\beta \leq 1V:6H$
- 5.0 kPa Design Surcharge for slopes  $1V:6H < \beta \leq 1V:3H$
- 2.5 kPa Design Surcharge for slopes  $\beta > 1V:3H$

## 6 Ground Conditions

---

A geotechnical desktop study of the area has been undertaken using existing GI information where available. Where identified, supplementary GI information was requested to increase the understanding of the geological conditions at targeted locations across the scheme.

The local stratigraphy at each retaining wall location has been developed based on the desk top study and is described for each wall location below.

### 6.1 Retaining Wall RW01

The ground conditions comprise Made Ground over Till derived from Limestone over Limestone. The two closest exploratory locations, namely R05-TP01 and R05-CP01, verify this stratigraphy. The thickness of Made Ground varies from approximately 1.3 m to 3.4m. Based on the log descriptions the Made Ground is likely to be reworked Boulder Clay. The SPT tests show that the Made Ground is very stiff. The thickness of Dublin Boulder Clay ranges from around 0.3 m to 1.6 m. The proposed retaining wall is expected to be founded on Dublin Boulder Clay or reworked Dublin Boulder Clay.

### 6.2 Retaining Wall RW03

The local stratigraphy comprises Made Ground over Till derived from Limestone over Limestone. As part of the site-specific GI two trial pits, namely R05-TP08A and 09, were excavated close to the proposed RW03 location. The GI results verify the stratigraphy of the overburden (rockhead and rock type was not verified). The logs present Topsoil (0.2m thick ) over Made Ground (0.6m to 1.2m thick) over Till derived from Limestone (Dublin Boulder Clay, 0.0m to 1.4m thick). The nature of the Made Ground varies highly. R05-TP08A encountered granular Made Ground while R05-TP09 recorded cohesive material which is likely to be reworked Made Ground.

### 6.3 Retaining Wall RW07-A & RW07-B

The ground conditions at the proposed locations consist of Made Ground over Till derived from Limestone over Mudstone. The desk study also presents areas where bedrock outcrops. RC03, RC04 were drilled, R05-TP05B and TP06 were excavated close to the proposed structures. The ground investigation encountered Topsoil and Made Ground or Till derived from Limestone. Ground investigation verified that bedrock is shallow. The proposed retaining walls will be founded on existing road embankment material and on Mudstone.

### 6.4 Retaining Wall RW09

This wall was introduced after the supplementary GI for the scheme was undertaken. Hence there is no site-specific GI at this location.

Publicly available information was reviewed as part of the desktop study across the scheme. The available information indicates the ground profile at this location comprises made ground upon Glacial Gravel and/or Glacial Till. Rock appears to be shallow ranging from 1 to 3m below ground level (based on GSI info).

## 7 Drawings and Documents

### 7.1 List of All Documents Accompanying the Submission

Relevant documents are included as appendices to this report.

#### Appendix A - Drawings

The following drawings are included as part of this submission.

Table 3: Drawing List

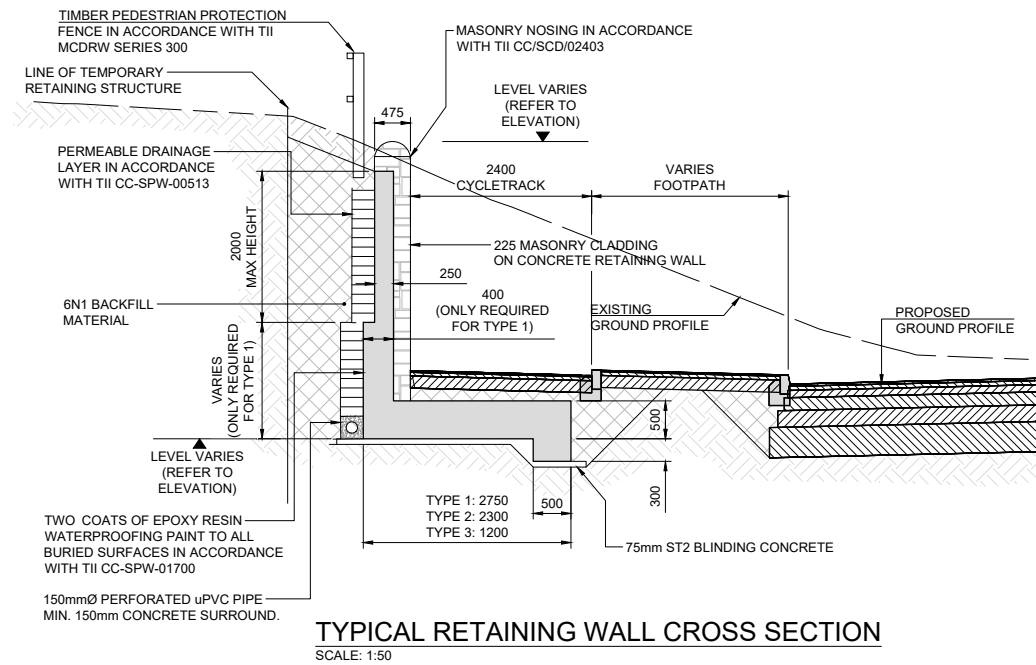
Drawing Number	Drawing Title
BCIDC-ARP-STR_GA-0005_RW_01-DR-CB-0002	General Arrangement – Sheet 1
BCIDC-ARP-STR_GA-0005_RW_01-DR-CB-0003	General Arrangement – Sheet 2
BCIDC-ARP-STR_GA-0005_RW_03-DR-CB-0002	General Arrangement – Sheet 1
BCIDC-ARP-STR_GA-0005_RW_03-DR-CB-0003	General Arrangement – Sheet 2
BCIDC-ARP-STR_GA-0005_RW_07-DR-CB-0002	General Arrangement – Sheet 1
BCIDC-ARP-STR_GA-0005_RW_07-DR-CB-0003	General Arrangement – Sheet 2
BCIDC-ARP-STR_GA-0005_RW_07-DR-CB-0004	General Arrangement – Sheet 1
BCIDC-ARP-STR_GA-0005_RW_09-DR-CB-0002	General Arrangement – Sheet 1

#### Appendix B – Geotechnical Information

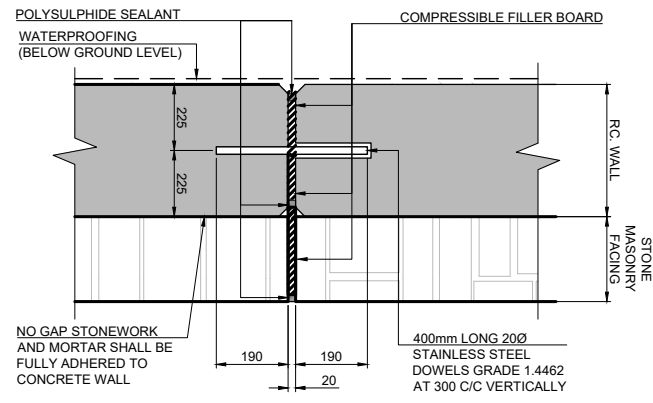


## Appendix A

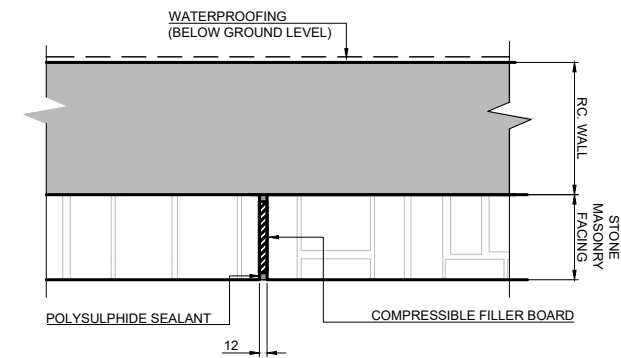
### Drawings



**TYPICAL RETAINING WALL CROSS SECTION**  
SCALE: 1:50

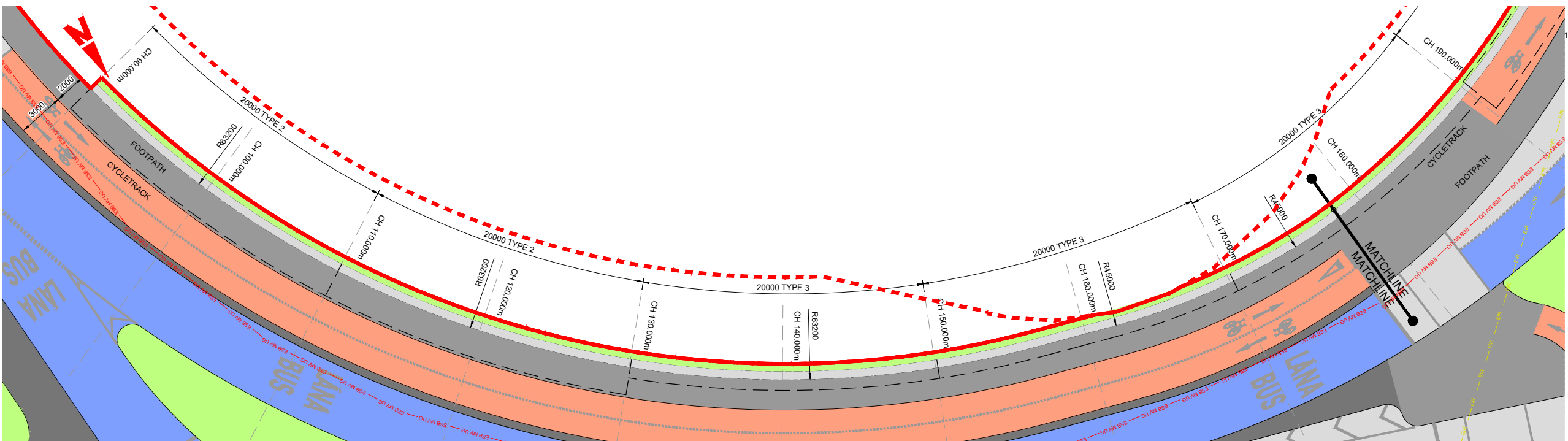


**TYPICAL RC WALL AND MASONRY EXPANSION JOINT DETAIL**  
Scale 1:10

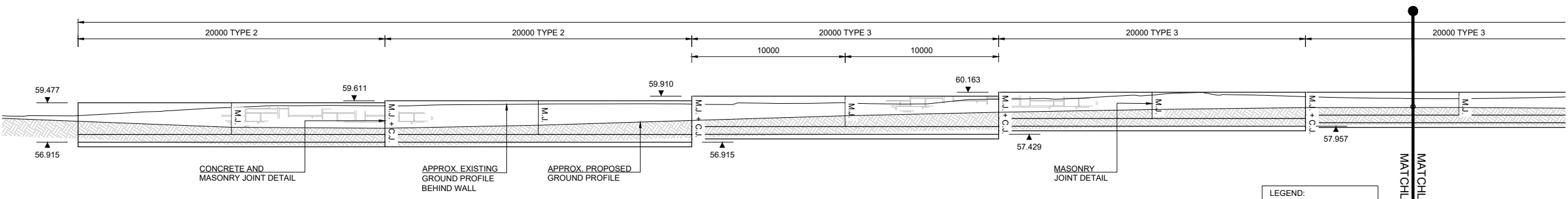
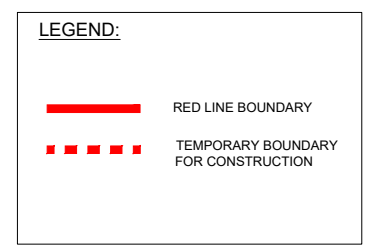


**TYPICAL MASONRY EXPANSION JOINT DETAIL**  
Scale 1:10

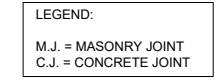
- NOTES:**
- ALL DIMENSIONS ARE SHOWN IN MILLIMETRES UNLESS NOTED OTHERWISE.
  - ALL LEVELS ARE SHOWN IN METRES ABOVE ORDANCE DATUM USING GEOID OSGM02.
  - FINISHES:
    - BURIED UNFORMED SURFACES - U1
    - BURIED FORMED SURFACES - F1
    - EXPOSED UNFORMED SURFACES (EXCLUDING AREA TO BE WATERPROOFED) - U3
    - ALL OTHER EXPOSED FORMED SURFACES - F4
  - MATERIALS:
    - LOCATION: RETAINING WALLS - CONCRETE GRADE: - C45/55 (50% GGBS)
    - NON-STRUCTURAL CONCRETE: LOCATION: CONCRETE FOR BLINDING - CONCRETE GRADE: - ST2
  - BURIED CONCRETE SURFACES SHALL BE TREATED WITH TWO COATS OF EPOXY RESIN WATERPROOFING PAINT IN ACCORDANCE WITH TII CC-SPW-01700.
  - ALL EXPOSED CONCRETE SHALL BE IMPREGNATED WITH A HYDROPHOBIC PORE LINER IN ACCORDANCE WITH THE TII CC-SPW-01700.
  - EXTERNAL CONCRETE ARISING TO BE CHAMFERED 25x25 UNO.
  - INTERFACE BETWEEN NATURAL GROUND WITH 6N AND INTERFACE BETWEEN EMBANKMENT FILL WITH 6N TO BE BENCHED. MAXIMUM BENCH HEIGHT SHALL BE 0.5M AND BENCHES SHALL HAVE A MINIMUM SLOPE GRADIENT OF 5%.
  - STONE MASONRY FACING TO BE ANCHORED TO RETAINING WALL USING ANCON POST FIXED STAIPIX UNIVERSAL WALL STARTER SYSTEM AND SD21 125MM WALL TIES OR EQUIVALENT AT 600MM STAGGERED HORIZONTAL AND VERTICAL CENTRES.
  - LOCALISED SOFT SPOTS, IF PRESENT, TO BE EXCAVATED AND REPLACED WITH 6N2



**PLAN ON RETAINING WALL - PART A**  
SCALE: 1:150



**DEVELOPED FRONT ELEVATION - PART A**  
SCALE: 1:150



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National Transport Authority

Engineering Designer: **ARUP**

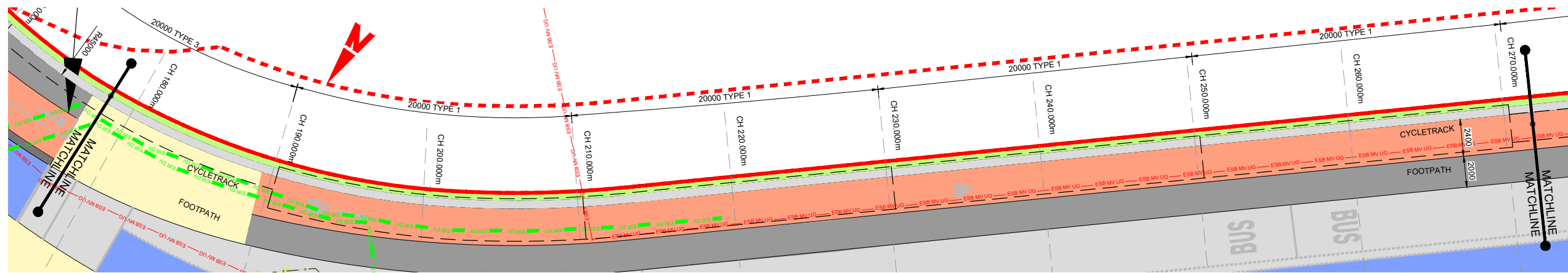
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Drawn: BM  
Checked: CG  
Approved: BD

Project Code: BCIDC  
Originator Code: ARP  
QMS Code: 268401-00

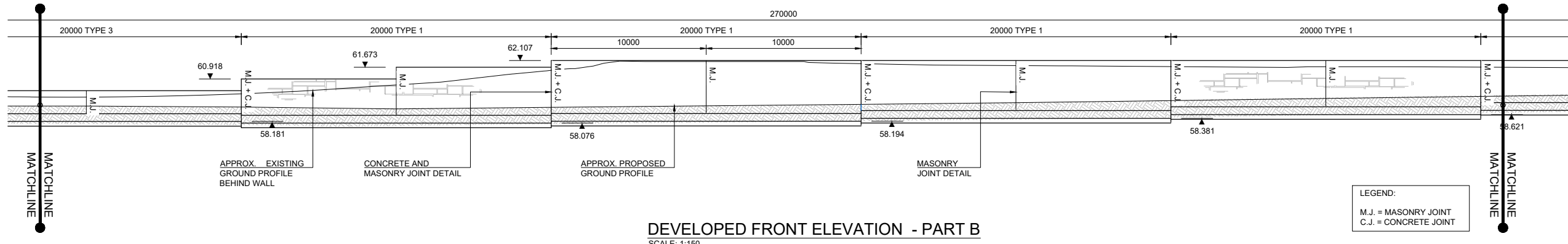
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Drawing Title: <b>BLANCHARDSTOWN TO CITY CENTRE CORE BUS CORRIDOR SCHEME RETAINING WALL 01 GENERAL ARRANGEMENT SHEET 1</b>			
Drawing File Name: BCIDC-ARP-STR_GA-005_RW_01-DR-CB-0002	Sheet Number: 01 of 01	Status: A	Rev: M01

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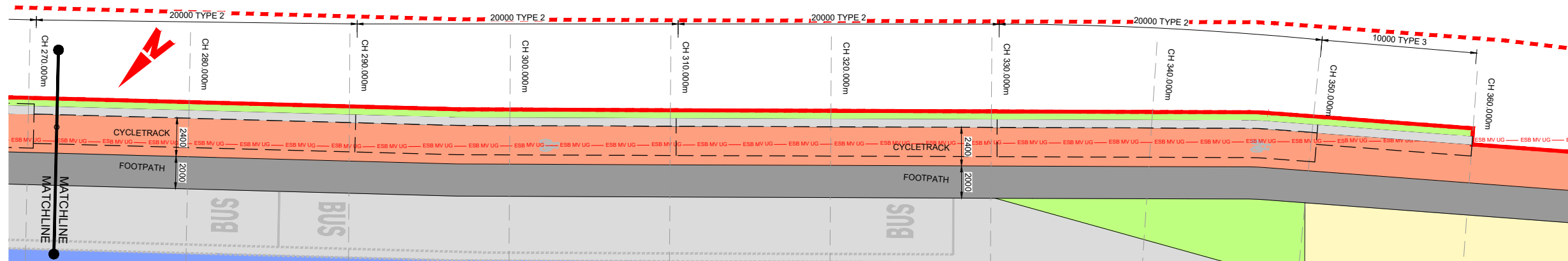


PLAN ON RETAINING WALL - PART B  
SCALE: 1:150

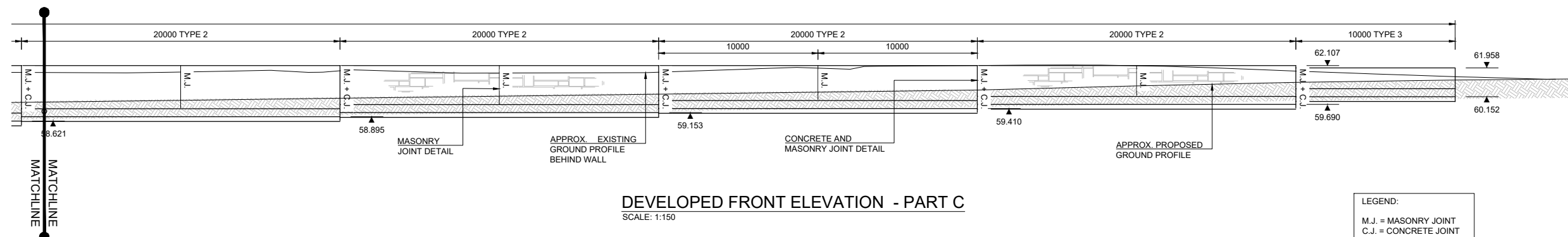
NOTES:  
1. REFER TO DWG BCIDC-ARP-STR\_GA-0005\_RW01-DR-CB-0002 FOR NOTES.



DEVELOPED FRONT ELEVATION - PART B  
SCALE: 1:150



PLAN ON RETAINING WALL - PART C  
SCALE: 1:150



DEVELOPED FRONT ELEVATION - PART C  
SCALE: 1:150

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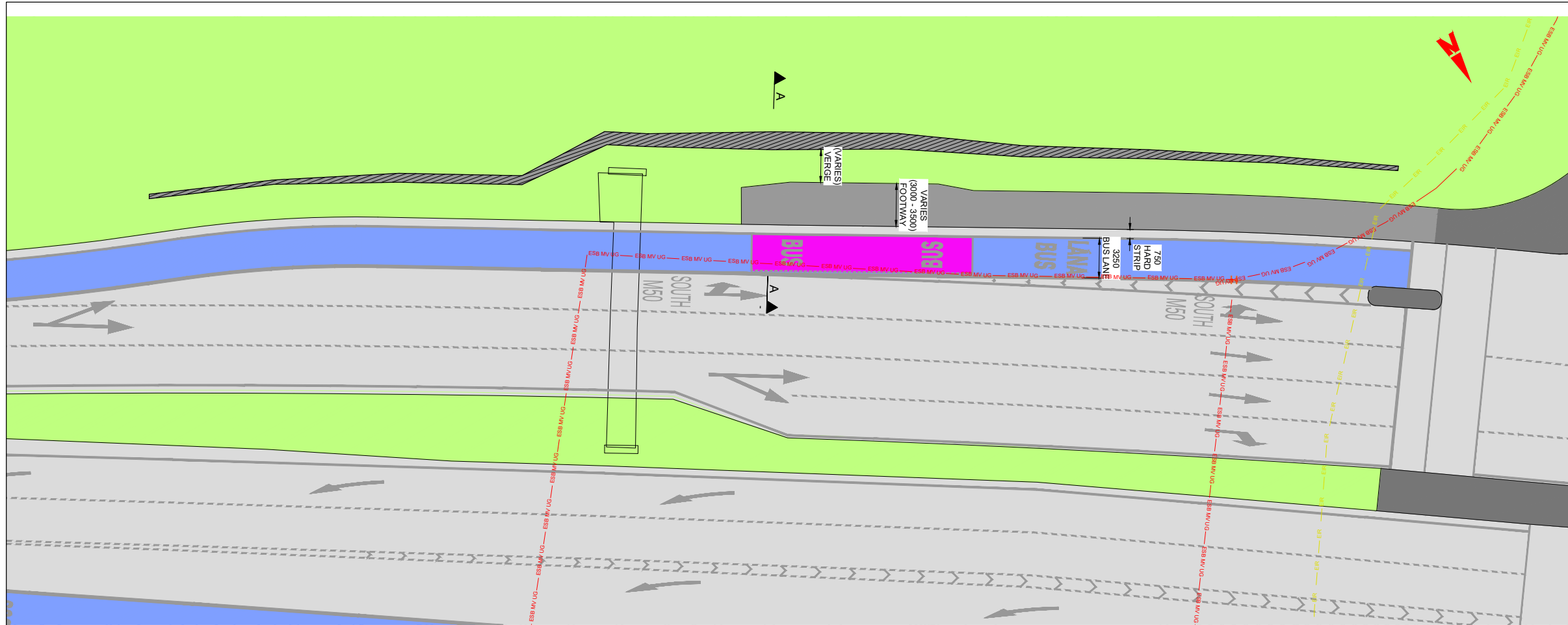


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Client <b>NTA</b> Údarás Náisiúnta Iompair National Transport Authority		Engineering Designer <b>ARUP</b>		
Date 04/04/2022	Scale As Shown @ A1 As Shown @ A3	Drawn BM	Checked CG	Approved BD
Project Code BCIDC	Originator Code ARP	QMS Code 268401-00		

Programme Title <b>BUSCONNECTS DUBLIN CORE BUS CORRIDORS INFRASTRUCTURE WORKS</b>				
Drawing Title BLANCHARDSTOWN TO CITY CENTRE CORE BUS CORRIDOR SCHEME RETAINING WALL 01 GENERAL ARRANGEMENT SHEET 2				
Drawing File Name BCIDC-ARP-STR_GA-0005_RW_01-DR-CB-0003	Sheet Number 01 of 01	Status A	Rev M01	

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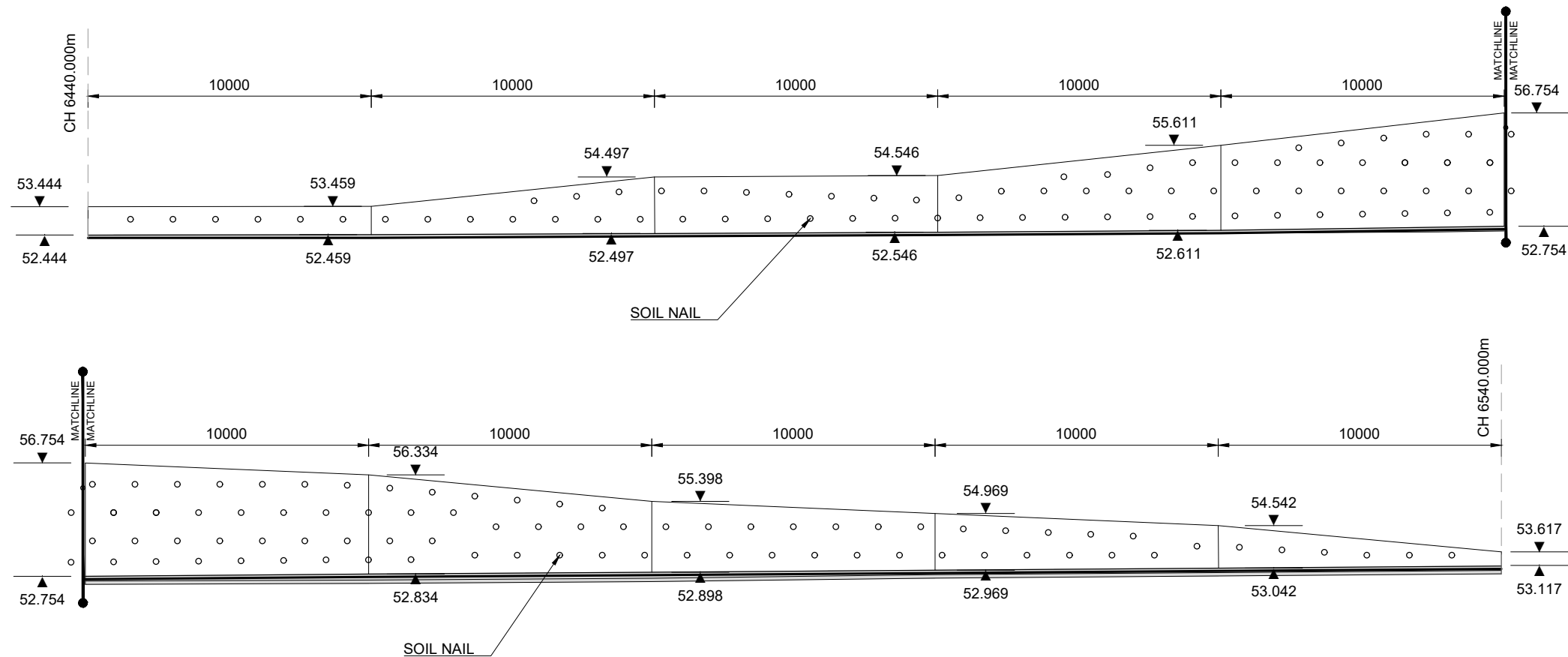


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  - ALL LEVELS ARE SHOWN IN METRES ABOVE ORDNANCE DATUM USING GEOID OSGM02.
  - FINISHES:
    - BURIED UNFORMED SURFACES - U1
    - BURIED FORMED SURFACES - F1
    - EXPOSED UNFORMED SURFACES (EXCLUDING AREA TO BE WATERPROOFED) - U3
    - ALL OTHER EXPOSED FORMED SURFACES - F4
    - CONCRETE FACING - PATTERNED FINISH
  - MATERIALS:
    - LOCATION: CONCRETE GRADE:
      - SHOTCRETE WALL - C40/50
      - CONCRETE FACING - C40/50 (50% GGBS)
  - ALL EXPOSED CONCRETE SHALL BE IMPREGNATED WITH A HYDROPHOBIC PORE LINER IN ACCORDANCE WITH THE TII CC-SPW-01700.



**PLAN ON PROPOSED RETAINING WALL**

Scale 1:200



**DEVELOPED ELEVATION**

Scale 1:100

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 National Transport Authority

Engineering Designer: **ARUP**

Date: 04/04/2022  
 Scale As Shown @ A1  
 As Shown @ A3

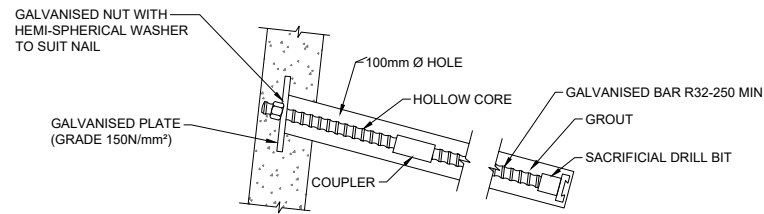
Drawn: BM  
 Checked: CG  
 Approved: BD

Project Code: BCIDC  
 Originator Code: ARP  
 QMS Code: 268401-00

Programme Title <b>BUSCONNECTS DUBLIN CORE BUS CORRIDORS INFRASTRUCTURE WORKS</b>	
Drawing Title BLANCHARDSTOWN TO CITY CENTRE CORE BUS CORRIDOR SCHEME RETAINING WALL 03 GENERAL ARRANGEMENT SHEET 1	
Drawing File Name BCIDC-ARP-STR_GA-0005_RW_03-DR-CB-0002	Sheet Number 01 of 01
Status A	Rev M01

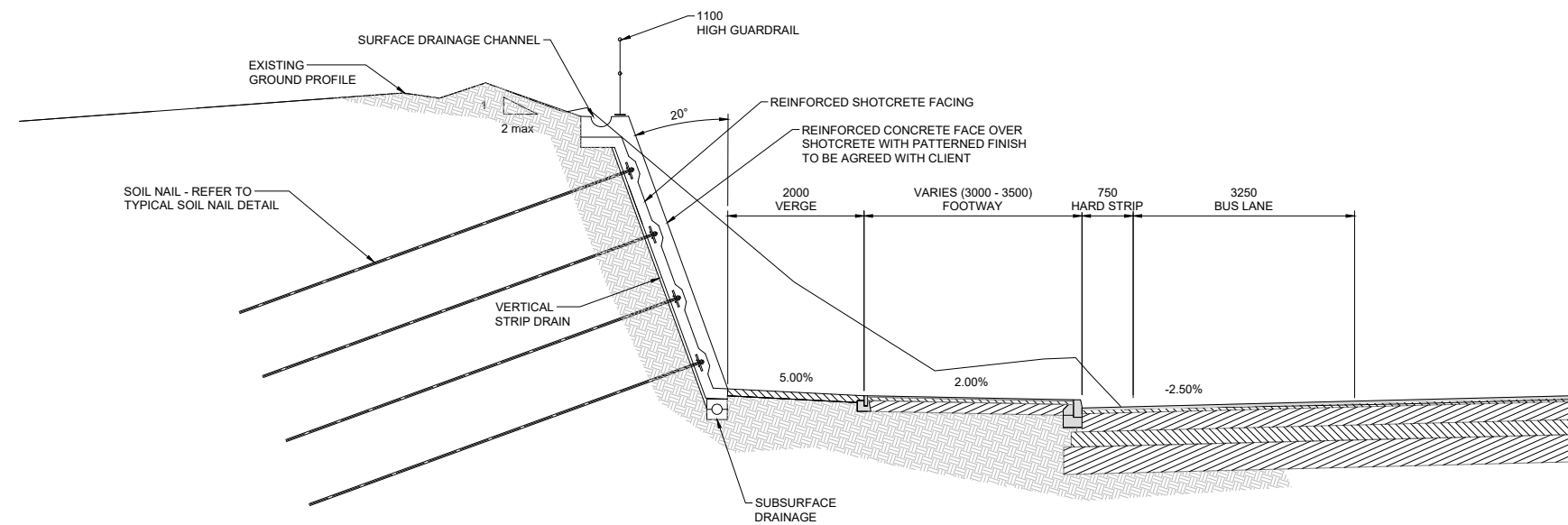
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NOTES:  
REFER TO DWG BCIDC-ARP-STR\_GA-0005\_RW\_03-DR-0002 FOR NOTES



NOTE:  
ALL COMPONENTS TO BE COMPATIBLE  
WITH PROPRIETARY NAIL SYSTEM.

TYPICAL SOIL NAIL DETAIL  
Scale 1:10



SECTION A-A  
Scale 1:50

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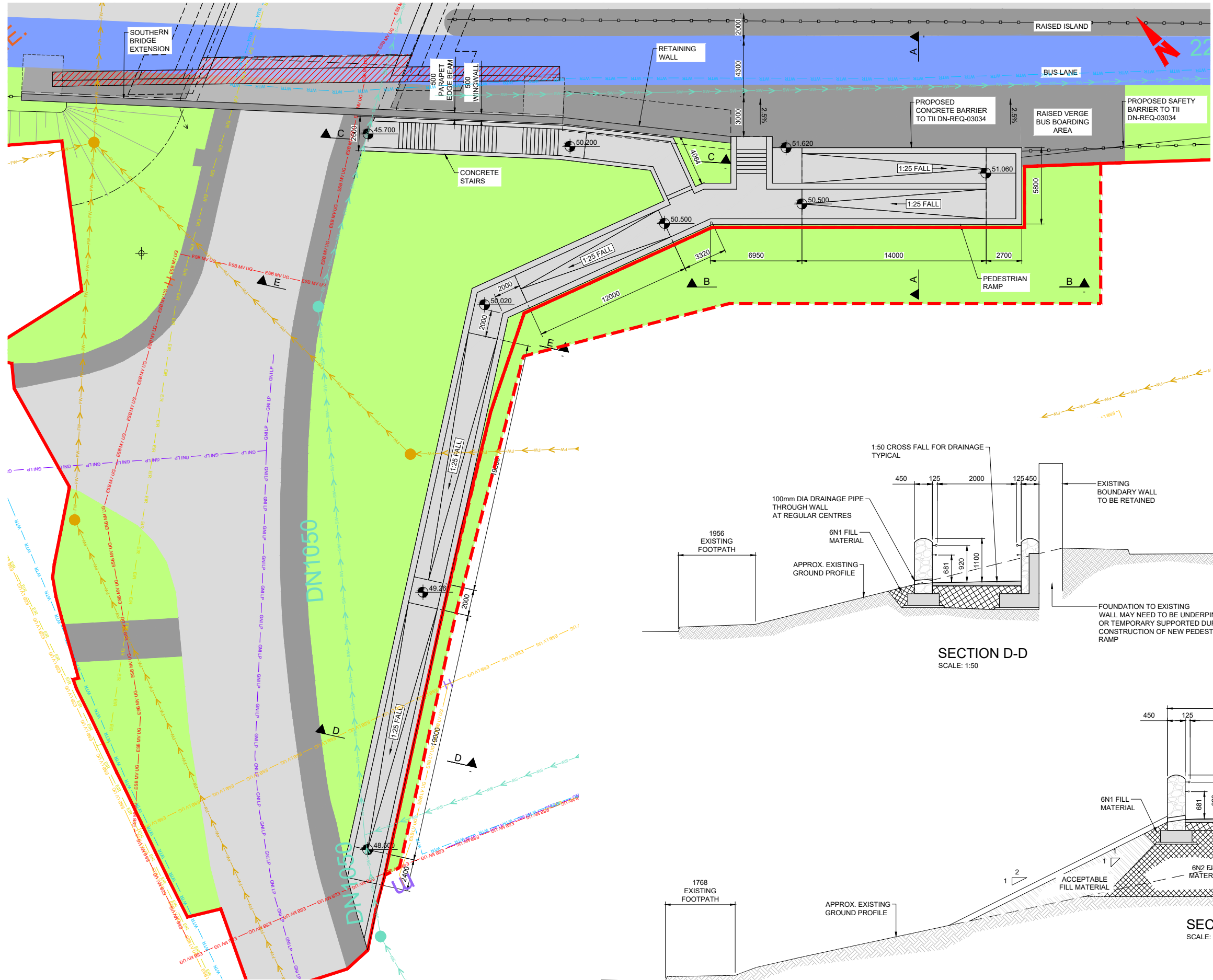
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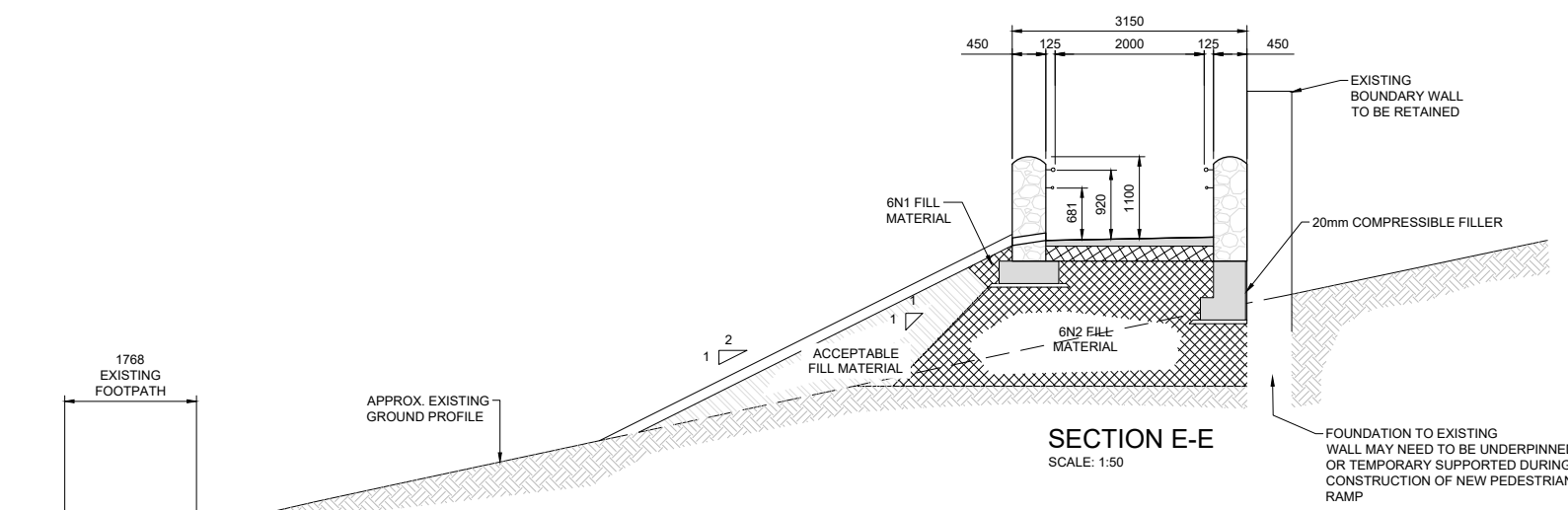
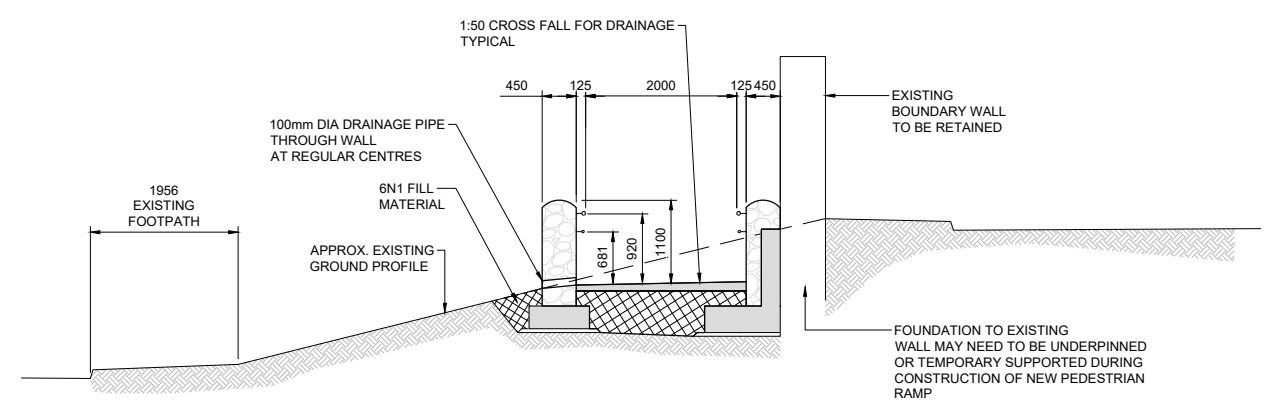
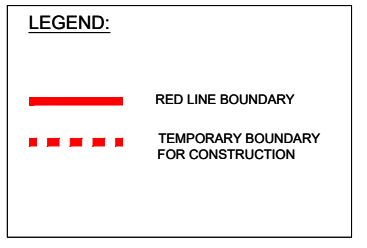
Engineering Designer  
**ARUP**

Programme Title <b>BUSCONNECTS DUBLIN CORE BUS CORRIDORS INFRASTRUCTURE WORKS</b>				
Drawing Title BLANCHARDSTOWN TO CITY CENTRE CORE BUS CORRIDOR SCHEME RETAINING WALL 03 GENERAL ARRANGEMENT SHEET 2				
Date 04/04/2022	Scale As Shown @ A1 As Shown @ A3	Drawn PK	Checked CG	Approved BD
Project Code BCIDC	Originator Code ARP	QMS Code 268401-00		Drawing File Name BCIDC-ARP-STR_GA-0005_RW_03-DR-CB-0003
Sheet Number 01 of 01		Status A	Rev M01	

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  - ALL LEVELS ARE SHOWN IN METRES ABOVE ORDNANCE DATUM USING GEOID OSGM02.
  - FINISHES:
    - BURIED UNFORMED SURFACES - U1
    - BURIED FORMED SURFACES - F1
    - EXPOSED UNFORMED SURFACES (EXCLUDING AREA TO BE WATERPROOFED) - U3
    - ALL OTHER EXPOSED FORMED SURFACES - F4
  - MATERIALS:
    - LOCATION: RETAINING WALLS - CONCRETE GRADE: - C45/55 (50% GGBS)
    - NON-STRUCTURAL CONCRETE: LOCATION: CONCRETE FOR BLINDING - CONCRETE GRADE: - ST1
  - BURIED CONCRETE SURFACES SHALL BE TREATED WITH TWO COATS OF EPOXY RESIN WATERPROOFING PAINT IN ACCORDANCE WITH TII CC-SPW-01700.
  - ALL EXPOSED CONCRETE SHALL BE IMPREGNATED WITH A HYDROPHOBIC PORE LINER IN ACCORDANCE WITH THE TII CC-SPW-01700.
  - EXTERNAL CONCRETE ARISES TO BE CHAMFERED 25x25 UNO.
  - STONE MASONRY FACING TO BE ANCHORED TO RETAINING WALL USING ANCON POST FIXED STAIFIX UNIVERSAL WALL STARTER SYSTEM AND SD21 125MM WALL TIES OR EQUIVALENT AT 600MM STAGGERED HORIZONTAL AND VERTICAL CENTRES.
  - LOCALISED SOFT SPOTS, IF PRESENT, TO BE EXCAVATED AND REPLACED WITH CLASS 6N2



**PLAN ON PROPOSED SOUTHERN RAMP AND STAIRS (RW07-A)**  
SCALE: 1:150

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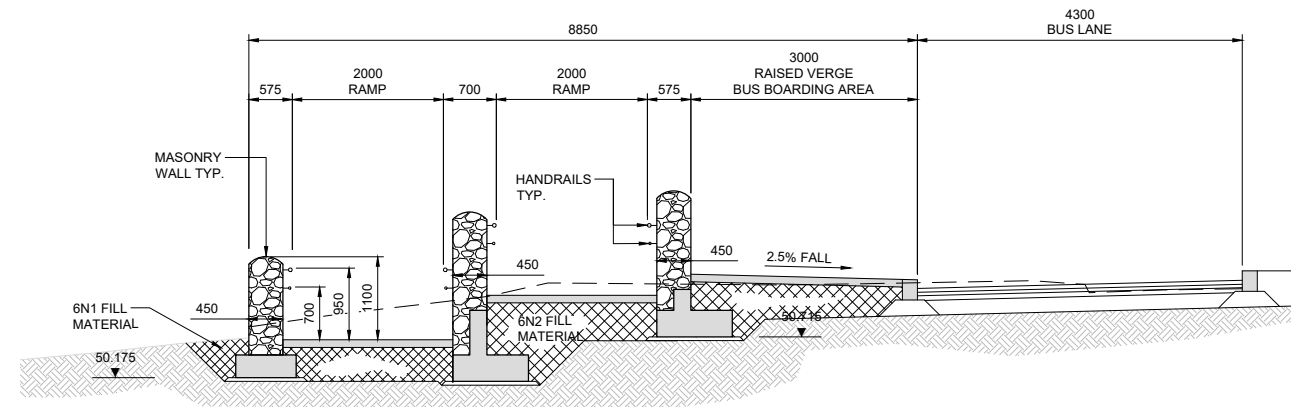


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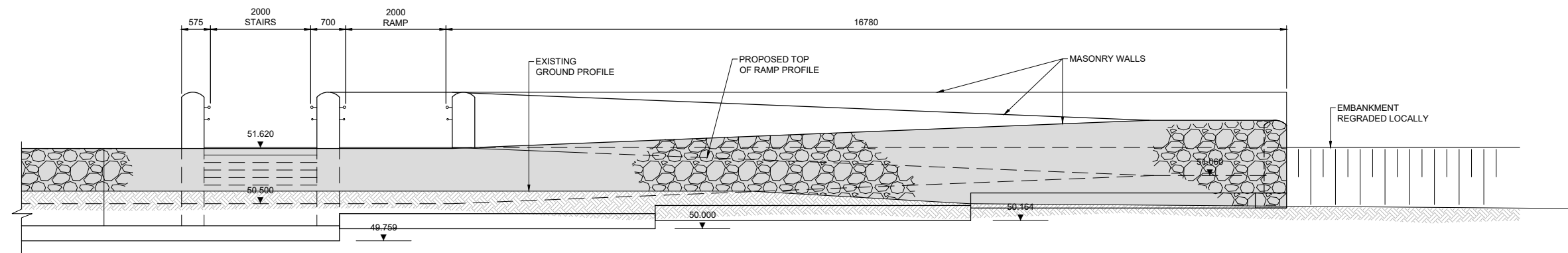
Client		Engineering Designer				
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Date	Scale	As Shown @ A1	As Shown @ A3	BM	CG	BD
04/04/2022						
Project Code	Originator Code	QMS Code		268401-00		
BCIDC	ARP					

Programme Title			
<b>BUSCONNECTS DUBLIN</b> <b>CORE BUS CORRIDORS INFRASTRUCTURE WORKS</b>			
Drawing Title			
BLANCHARDSTOWN TO CITY CENTRE CORE BUS CORRIDOR SCHEME RW07-A STAIRS AND ACCESS RAMP GENERAL ARRANGEMENT SHEET 1			
Drawing File Name	Sheet Number	Status	Rev
BCIDC-ARP-STR_GA-0005_RW_07-DR-CB-0002	01 of 01	A	M01

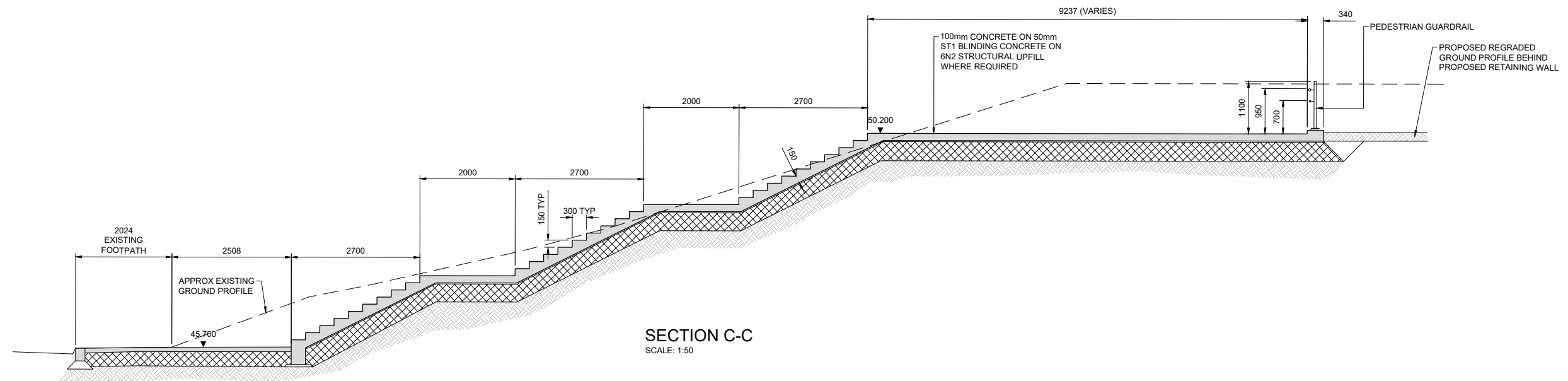
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SECTION A-A  
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SECTION B-B  
SCALE: 1:50



SECTION C-C  
SCALE: 1:50

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Project Code	Originator Code	QMS Code	Drawing File Name		Sheet Number
BCIDC	ARP	268401-00	BCIDC-ARP-STR_GA-0005_RW_07-DR-CB-0003		01 of 01
					Status
					A
					Rev
					M01

Client		Engineering Designer		Programme Title	
NTA Údarás Náisiúnta Iompair National Transport Authority		ARUP		BUSCONNECTS DUBLIN CORE BUS CORRIDORS INFRASTRUCTURE WORKS	
Date	Scale As Shown @ A1 As Shown @ A3	Drawn	Checked	Approved	Drawing Title
04/04/2022		PK	CG	BD	BLANCHARDSTOWN TO CITY CENTRE CORE BUS CORRIDOR SCHEME RW07-A STAIRS AND ACCESS RAMP GENERAL ARRANGEMENT SHEET 2
Project Code	Originator Code	QMS Code	Drawing File Name		Sheet Number
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					A
					Rev
					M01

Client		Engineering Designer		Programme Title	
NTA Údarás Náisiúnta Iompair National Transport Authority		ARUP		BUSCONNECTS DUBLIN CORE BUS CORRIDORS INFRASTRUCTURE WORKS	
Date	Scale As Shown @ A1 As Shown @ A3	Drawn	Checked	Approved	Drawing Title
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## **Appendix B**

### **Geotechnical Information**

<b>ARUP</b>	Job No.	Sheet No.	Rev.
	268401-00		
Job Title	Member/Location		
Bus Connects	Drg. Ref.		
Calculation	Made by	Date	Chd.
	OA	05/11/2020	MMCE

**Background Data**

Historic Ground Investigation Report - Blanchardstown SC-Mall Extensions (Project No 19826, 2017, IGSL )

Link: [19826 Blanchardstown SC MALL EXTENSIONS IGSL Report 06-04-17.pdf](#)  
[\\global\europa\dublin\jobs\268000\268401-00\4. Internal\4-03 Design\4-03-03 Infrastructure\0600 Geotech\Desk Study\CBC05 Blanchardstown to City Centre\Arup\Blanch Shopping Centre\Phase 1](#)

Historic Ground Investigation Report - Blanchardstown SC-Mall Extensions (Project No 19826, 2017, IGSL )

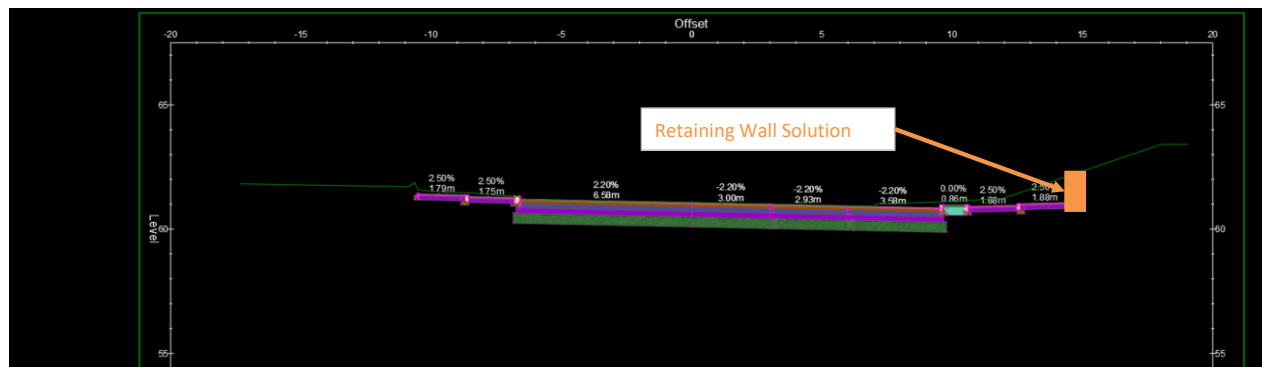
Link: [R05\\_TP01.pdf](#)  
[R05\\_CP01 with RC.pdf](#)  
[\\global\europa\dublin\jobs\268000\268401-00\7. Site Related Activities\7-02 Site Investigations\01\\_Draft logs](#)

Table 01: Proposed Ground Profile for structure no. 01 - Retaining Wall Solution between B0+410 to B0+610-RHS

Ground Profile	Descriptions	Depth to the top of the stratum (mBGL)	Elevation At the top of the stratum (mOD)	SPT N values	Thickness of the stratum (m)
	Topsoil	0.00	Not Available	Not Available	0.20
	Made Ground Brown slightly sandy gravelly Clay with some angular to subangular cobbles and occasional boulders and with frequent rootlets. Gravel is angular to subangular fine to coarse	0.20	Not Available	~50/200	Not Available
	Stiff to very stiff, grey slightly sandy gravelly CLAY.	1.30	Not Available	50/190	Not Available
	Bedrock Medium strong thin to thickly laminated grey fine grained argillaceous LIMESTONE with occasional calcite veining. Distinctly weathered	5.00	Not Available	Not Available	

\*There is no site specific GI available near the structure. The closest ground investigation data is 300m to the east.  
 \*Soil and rock descriptions were taken from closest ground investigation.  
 \*Depth of the bedrock was taken from publicly available information from the Geological Survey of Ireland's web page (www.gsi.ie) to be conservative.

Figure 1-1 - Typical cross section of the Retaining Wall (RW)





**ARUP**

Job Title: Bus Connects  
 Calculation: \_\_\_\_\_

Job No. 268401-00  
 Sheet No. \_\_\_\_\_  
 Rev. \_\_\_\_\_

Member/Location: \_\_\_\_\_  
 Drg. Ref. \_\_\_\_\_  
 Made by OA Date 05/11/2020 Chd. MMCE

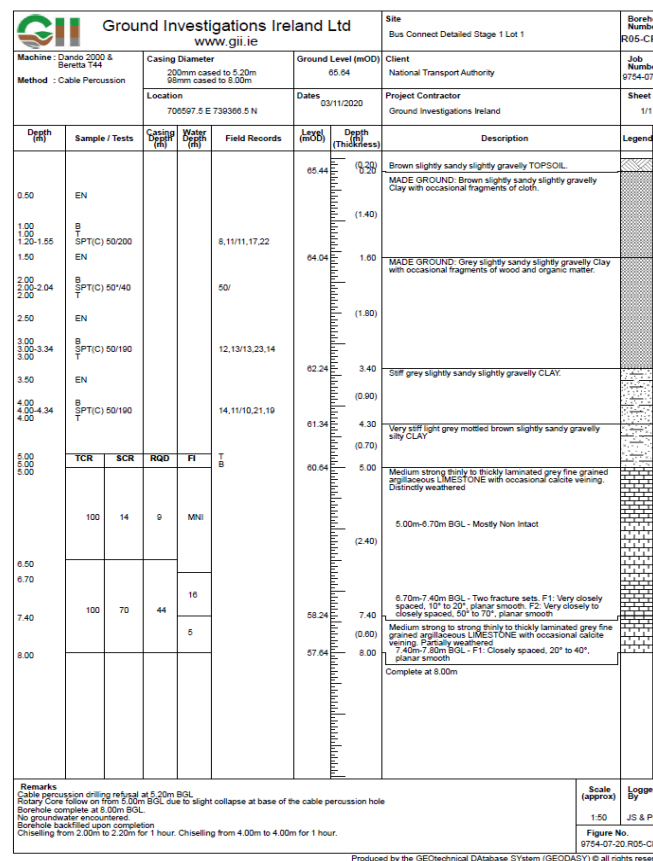
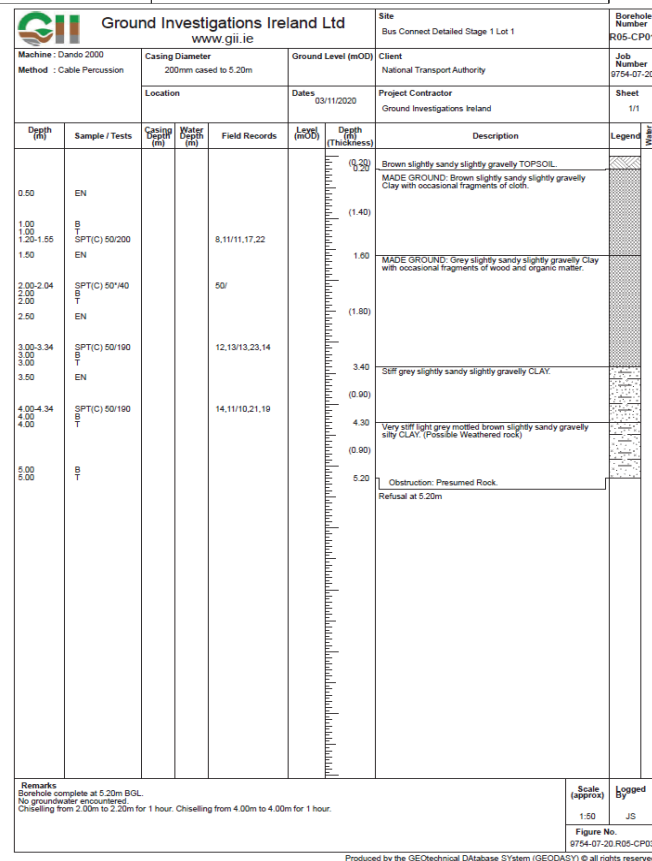
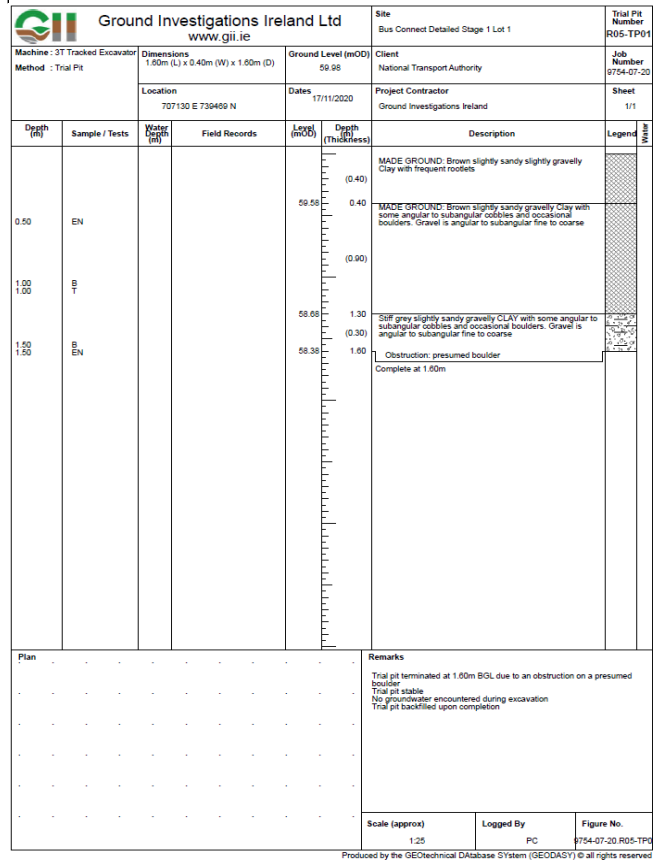


Figure 1-4 - Geological descriptions of historical GI (Blanchardstown SC-Mall Extensions (Project No 19826, 2017, IGSL ))

GEOTECHNICAL BORING RECORD										REPORT NUMBER	
Blanchardstown S.C. - Mall Extensions										19826	
CONTRACT		306,986,41 E		BOREHOLE NO.		BH A		SHEET		Sheet 1 of 1	
CO-ORDINATES		239,318,32 N		DATE COMMENCED		17/01/2017		DATE COMPLETED		17/01/2017	
CLIENT		M&I Ireland Management Suite		BORED BY		JOYICR		PROCESSED BY		A. Muresan	
ENGINEER		ARUP		SPT HAMMER REF. NO.		ENERGY RATIO (%)		REMARKS			
Depth (m)	Description	Legend	Elevation	Depth (m)	Sample No.	Sample Type	Recovery	Field Test Results	Standard Deviation		
0	Tarmacadam (MADE GROUND)		62.28	0.10							
0	Grey, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular. (MADE GROUND)		62.03	0.35							
0	Silt, brown, mottled orange and dark brown, slightly sandy slightly gravelly SILT with some cobbles and rare root-like traces. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of various shapes.		61.78	0.80	AA0282	S	100				
1	Possible Highly Weathered Rockhead recovered as Brown, clayey/sandy GRAVEL with occasional limestone cobbles. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse.		61.28	1.10	AA0283	ENV	100	N = 5000 mm (18.50)			
1	Obstruction - Possible Rockhead recovered as granularized fragments of angular shaly mudstone / muddy limestone		60.88	1.50	AA0343	S	100	N = 5000 mm (90)			
End of borehole at 1.50 m											
HARD STRATA BORING/CHISELLING				WATER STRIKE DETAILS							
From (m)	To (m)	Time (h)	Comments	Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments		
1.1	1.5	1.5							No water strike		
GROUNDWATER PROGRESS											

GEOTECHNICAL CORE LOG RECORD										REPORT NUMBER	
Blanchardstown S.C. - Mall Extensions										19826	
CONTRACT		306,986,41 E		DRIILLHOLE NO.		RCA		SHEET		Sheet 1 of 1	
CO-ORDINATES		239,318,32 N		DATE DRILLED		10/02/2017		DATE LOGGED		10/02/2017	
CLIENT		M&I Ireland Management Suite		DRILLED BY		Petersen		LOGGED BY		D.O'Shea	
ENGINEER		ARUP		CORE DIAMETER (mm)		78		REMARKS			
Downhole Depth (m)	T.C.S.%	R.C.D.%	Fracture Spacing Log (mm)	Non-recovery Zone	Description	Depth (m)	Elevation	Sample Depth	SPT (N (kN))		
0					SYMMETRIC DRILLING: No recovery, observed by driller as returns of MADE GROUND consisting of Shell & Auger Material.						
1.00					SYMMETRIC DRILLING: No recovery, observed by driller as returns of ROCK with shale layers.	1.00	60.88				
1.00					Strong, medium to thickly bedded, grey/tan grey/black, fine-grained LIMESTONE: predominantly argillaceous (muddy) limestone with subordinate calcareous limestone layers. Local shaly lenses, fresh to locally slightly weathered. Discontinuities are medium to closely spaced, smooth to rough, planar. Apertures are tight to locally moderately open, locally clay-lined, locally strongly iron-oxide stained. Dips are 15° & locally 7°.	1.00	60.48				
3.20	100	90	33								
4.00	100	87	33								
End of Borehole at 4.60 m											
REMARKS				WATER STRIKE DETAILS							
H&C cased 0.05-1.00m.				Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments		
									No water strike recorded		

Job Title: Bus Connects

Calculation

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INSTALLATION DETAILS		Date		Hole Depth		Casing Depth		Depth to Water		Comments	
Date	Tip Depth	RZ Top	RZ Base	Type							
REMARKS: CAT scan and hand dug inspection pit carried out (2 hrs)											

INSTALLATION DETAILS		Date		Hole Depth		Casing Depth		Depth to Water		Comments	
Date	Tip Depth	RZ Top	RZ Base	Type							
REMARKS: CAT scan and hand dug inspection pit carried out (2 hrs)											

GEOTECHNICAL BORING RECORD										REPORT NUMBER		
CONTRACT										19826		
CO-ORDINATES										BOREHOLE NO.		
GROUND LEVEL (m AOD)										BH B		
CLIENT										SHEET		
ENGINEER										19826		
Description		Legend	Elevation	Depth (m)	Sample No.	Sample Type	Depth (m)	Recovery	Field Test Results	Sample Details		
Tarmacadam (MADE GROUND)			62.26	0.10								
MADE GROUND comprised of grey, sandy GRAVEL. Sand is fine to coarse, Gravel is fine to coarse, angular to subangular.			62.26	0.40								
Silt, brown, moist orange and dark brown, slightly sandy silty CLAY with some cobbles and rare rootlets trace. Sand is fine to coarse, Gravel is fine to coarse, subangular to subrounded.			61.96	0.70	AA0283	B	0.40					
Possible Weathered Rockhead recovered as angular gravel-sized fragments of shaly mudstone / muddy limestone			61.66	1.00	AA0434	HW	0.40		N = 6085 mm (92.50)			
Obstruction / Possible bedrock			61.36	1.30					N = 3043 mm (90)			
End of Borehole at 1.30 m												

GEOTECHNICAL CORE LOG RECORD										REPORT NUMBER		
CONTRACT										19826		
CO-ORDINATES										DRILLHOLE NO.		
GROUND LEVEL (m AOD)										RCB		
CLIENT										SHEET		
ENGINEER										19826		
Description		Legend	Elevation	Depth (m)	Sample No.	Sample Type	Depth (m)	Recovery	Field Test Results	Sample Details		
SYMMETRIC DRILLING: No recovery, observed by driller as returns of MADE GROUND consisting of Shell & Auger Material.												
SYMMETRIC DRILLING: No recovery, observed by driller as returns of ROCK with shale and calcite layers												
Strong, medium to thick bedded, grey/dark grey/black, fine-grained LIMESTONE (predominantly argillaceous/muddy limestone with subordinate calcareous layers, local shales, abundant calcite veins), fresh to locally moderately weathered (contributing to slight cohesion at 2.05-2.75m).												
Thin shale layer at 1.72-1.75m.												
Discontinuities are medium to closely spaced, smooth to rough, planar. Apertures are tight to locally moderately open, locally clay-stained, large calcite veins at 2.05-2.55m. Dips are 15° & locally 70°.												
End of Borehole at 4.60 m												

GEOTECHNICAL BORING RECORD										REPORT NUMBER		
CONTRACT										19826		
CO-ORDINATES										BOREHOLE NO.		
GROUND LEVEL (m AOD)										BH E		
CLIENT										SHEET		
ENGINEER										19826		
Description		Legend	Elevation	Depth (m)	Sample No.	Sample Type	Depth (m)	Recovery	Field Test Results	Sample Details		
Reinforced CONCRETE (MADE GROUND)			62.24	0.20								
Grey silty very sandy GRAVEL with occasional pockets of CLAY (MADE GROUND)			62.04	0.40	AA0548	B	0.30					
Dark grey, sandy GRAVEL. Sand is fine to coarse, Gravel is fine to coarse, angular to subangular. (MADE GROUND)			61.89	0.55								
Firm brown, occasional moist light grey, yellow and orange, slightly sandy slightly gravelly CLAY/SILT with some cobbles. Sand is fine to coarse, Gravel is fine to coarse, mainly subangular to angular of limestone.					AA0543	HW	1.00		N = 13 (2.2, 3.4, 3.3)			
Firm to stiff dark grey, sandy slightly gravelly silty CLAY. Sand is fine to coarse, Gravel is fine to coarse, subangular to angular. 2.30 - 2.80m Soil noted moist			60.14	2.30	AA0544	HW	2.00		N = 12 (2.2, 3.4, 3.2)			
Obstruction / Possible bedrock			59.64	2.80								
End of Borehole at 2.82 m			59.52	2.92	AA0543	HW	2.80		N = 5070 mm (90)			

GEOTECHNICAL CORE LOG RECORD										REPORT NUMBER		
CONTRACT										19826		
CO-ORDINATES										DRILLHOLE NO.		
GROUND LEVEL (m AOD)										RCE		
CLIENT										SHEET		
ENGINEER										19826		
Description		Legend	Elevation	Depth (m)	Sample No.	Sample Type	Depth (m)	Recovery	Field Test Results	Sample Details		
SYMMETRIC DRILLING: No recovery, observed by driller as returns of MADE GROUND consisting of Shell & Auger Material.												
SYMMETRIC DRILLING: No recovery, observed by driller as returns of ROCK with shale layers												
SYMMETRIC DRILLING: No recovery, observed by driller as returns of ROCK												
Strong, thickly to thinly bedded, grey/dark grey/black, fine-grained LIMESTONE (predominantly argillaceous/muddy limestone with subordinate calcareous layers), fresh to locally slightly weathered.												
Discontinuities are widely to closely spaced, smooth to rough, planar. Apertures are tight to locally moderately open, locally clay-stained, locally strongly iron-oxide stained. Dips are 60° & locally subvertical.												
End of Borehole at 6.20 m												

Job Title: Bus Connects

Calculation: [ ]

Drg. Ref. [ ]

Made by: OA      Date: 05/11/2020      Chd.: MMCE

HARD STRATA BORING/SELLING				WATER STRIKE DETAILS			
From (m)	To (m)	Time (h)	Comments	Water Strike	Casing Depth	Sealed At	Rise To
2.8	2.92	1.5		2.80	2.00	No	2.90
							20
							Seepage

INSTALLATION DETAILS				GROUNDWATER PROGRESS			
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth
					04/04/17	2.00	2.00
						2.00	2.00

INSTALLATION DETAILS				GROUNDWATER DETAILS			
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth

**REMARKS** CAT scan and hand dug inspection pit carried out (2 hrs), Disturbed tub taken at 0.30m for pyrite analysis.

**Sample Legend**  
 T - 100mm Diameter  
 F - 50mm Diameter  
 S - 25mm Diameter  
 SP - 50mm SP  
 W - Water Sample

REMARKS				WATER STRIKE DETAILS			
Hole cased 0.00-3.40m.				Water Strike	Casing Depth	Sealed At	Rise To

INSTALLATION DETAILS				GROUNDWATER DETAILS			
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth
08-02-17	5.90	3.90	5.90	50mm SP			

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	OA	05/11/2020	MMCE

**Background Data**

No Historic Ground investigation available. The ground profile is based on publicly available information from the Geological Survey of Ireland web site. (www.GSI.ie)

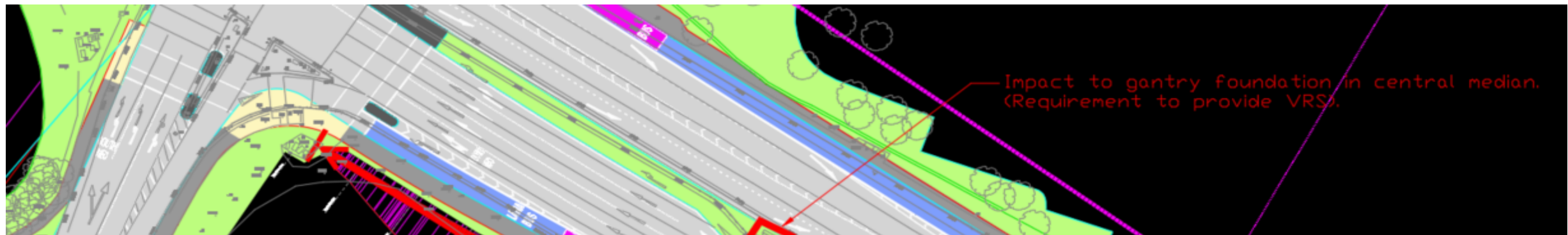
Links:	<a href="http://www.GSI.ie">www.GSI.ie</a>
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Table 27&28-1: Proposed Ground Profile for structure no. 27&28 - Retaining Wall Solution between Ch.A2+910 to A3+325-RHS and Gantry foundation at ChA2+980 to A2+990-RHS

Ground Profile	Descriptions	Depth to the top of the stratum (mBGL)	Elevation At the top of the stratum (mOD)	Thickness of the stratum (m)
	Made ground underlain by till derived from limestone.	0 to 3	Not Available	Not Available
	Limestone <b>Lucan Formatin, Drak limestone and Shale</b>	1 to 3	Not Available	Not Available

\*There is no site specific and public available ground ivestigation data available near the structure.  
\*Based on GSI, rockhead should be at 3mbgl.

Figure 27-1 -Location of the Retaining Wall Solution





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Job Title: Bus Connects

Calculation:

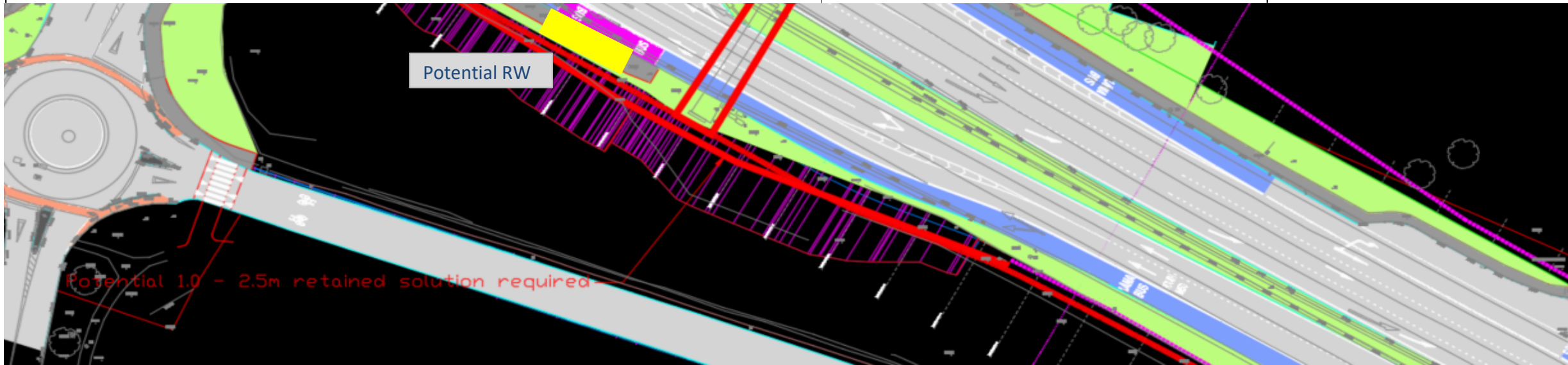
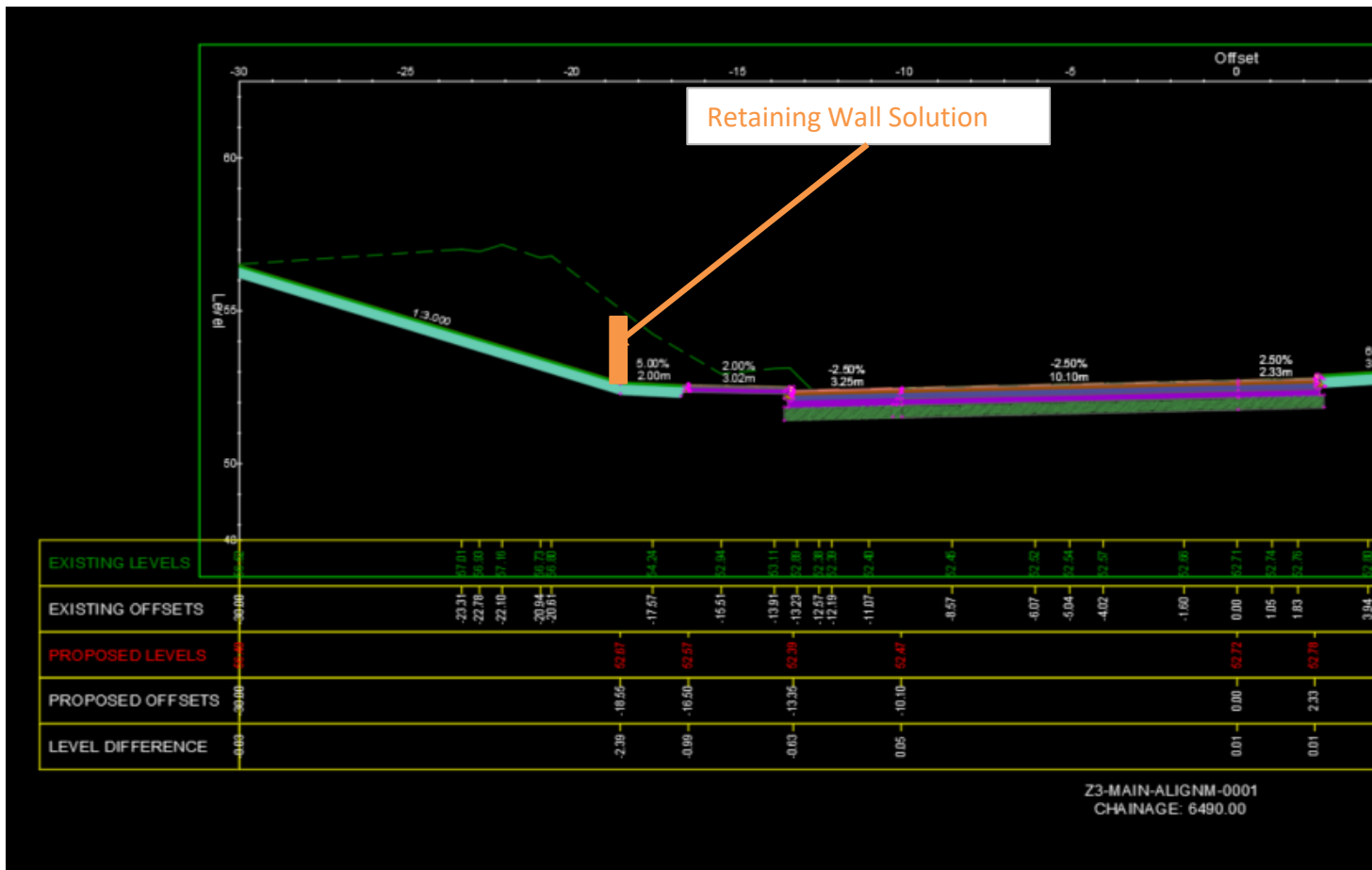


Figure 27-2 -Typical section of the retaining wall solution



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	OA	05/11/2020	MMCE

Figure 27-3 -Existing gantry

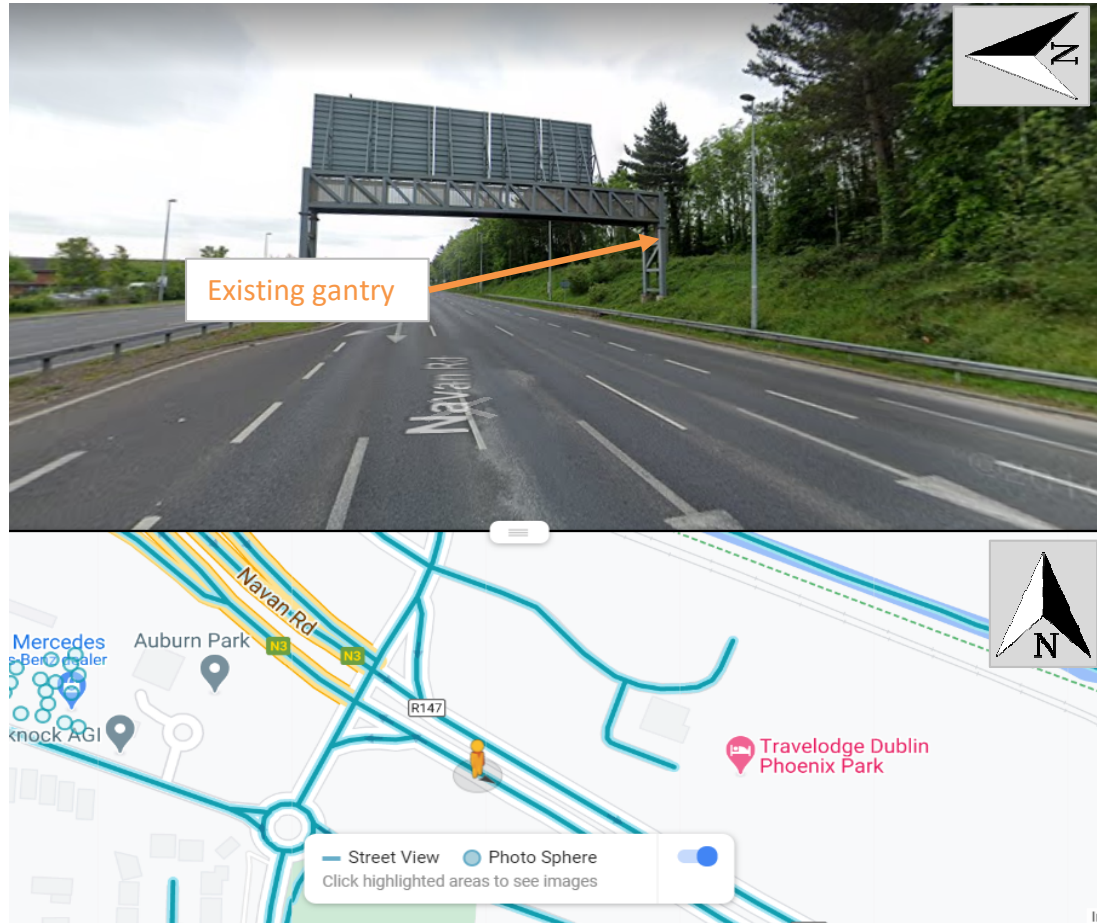


Figure 27-4 -Depth to Bedrock - Geological Survey Ireland (www.gsi.ie)



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Member/Location		
Drg. Ref.		
Made by	Date	Chd.
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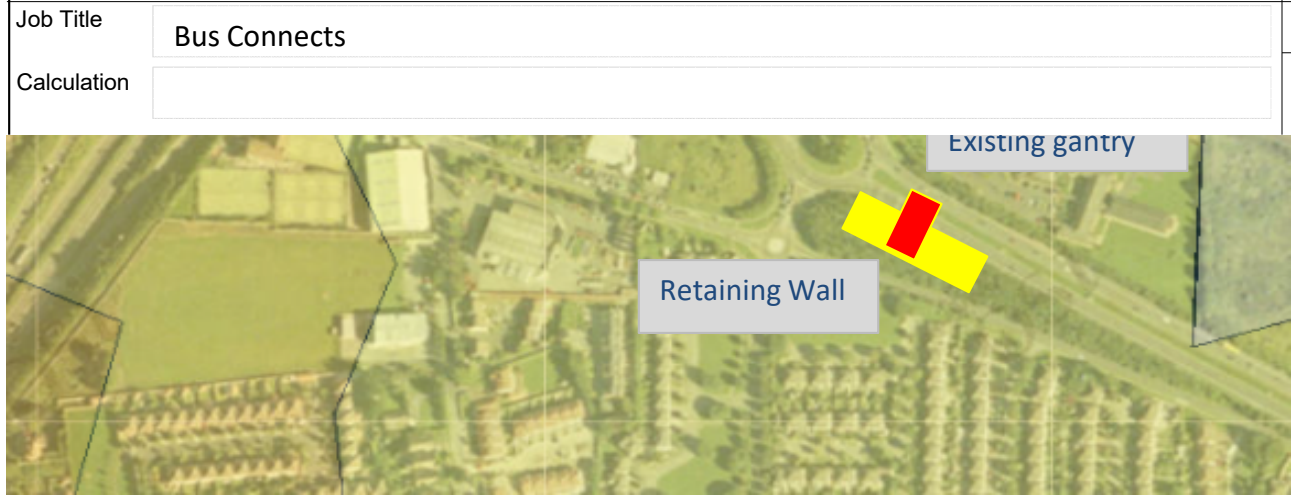
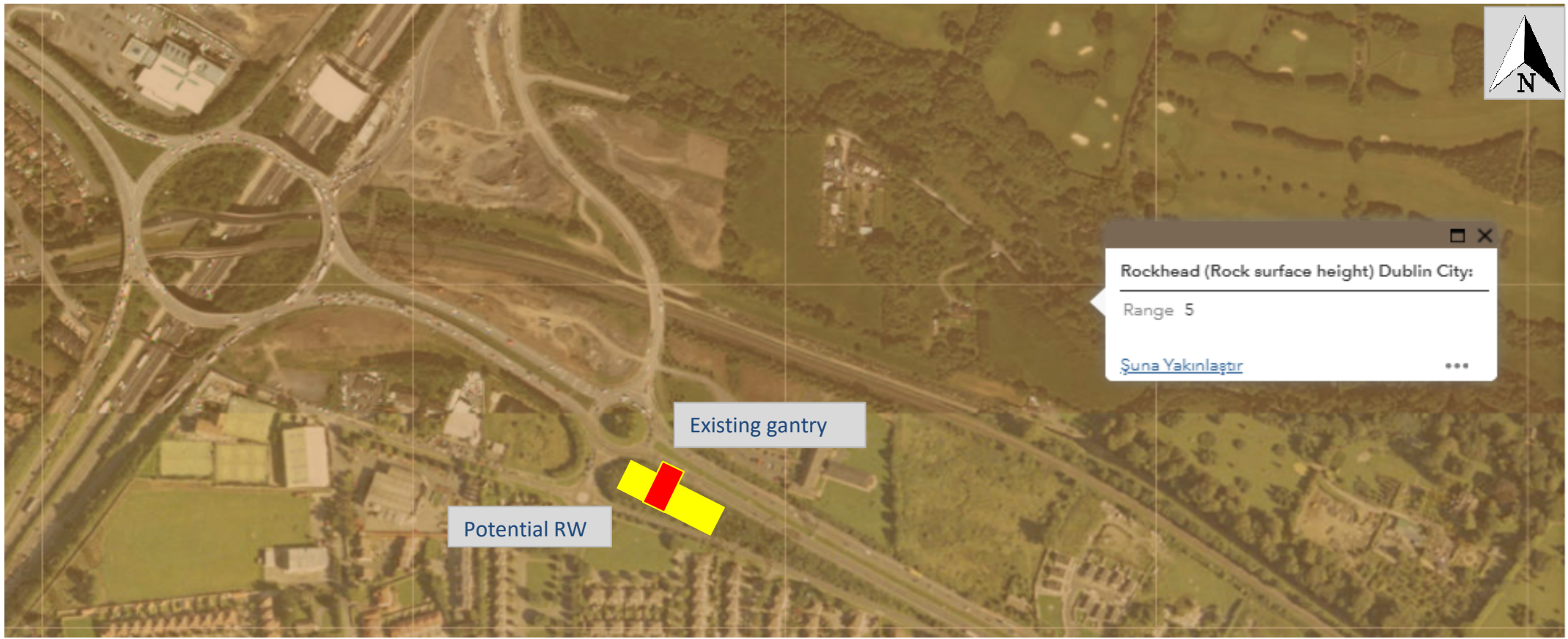


Figure 27-5 -Elevation of Top of the Bedrock - Geological Survey Ireland (www.gsi.ie)



- Groundwater Resources (Aquifers) ...
- Groundwater Catchment and WFD Management Units ...
- Groundwater Drinking Water Protection Areas ...
- Groundwater Vulnerability ...
- Groundwater Recharge ...
- Depth to Bedrock 2011 ...
- Rockhead (Rock surface height) Dublin City ...

-40 to -20m	
-20m to 0m	
0 to 20m	
20 to 40m	
40 to 60m	40 to 60 mOD
60 to 80m	
80 to 122.9m	

<h1>ARUP</h1>	Job No.	Sheet No.	Rev.
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Job Title	Member/Location		
Bus Connects	Drg. Ref.		
Calculation	Made by	Date	Chd.
	OA	05/11/2020	MMCE

**Background Data**

Historic Ground Investigation Report - Navan Road Bridge at Mill Road, Location Plan and Borehole Details (Drawing no 928/1, Oct 85, John B. Barry+Partners Consulting Eng. )	
Links:	<a href="#">FG-N03-010.00Dwgs.pdf</a> <a href="#">\\global\europa\dublin\jobs\268000\268401-00\5. External\5-03 Project Manager\2020-04-01 0005 TII Bridge Info\Mill Road Bridge\</a>

Table 16-1: Proposed Ground Profile for structure no. 16 - Footramp between Ch.A1+630 to A1+690- LHS+RHS (Profile at the South side of the existing structure)

Ground Profile	Descriptions	Depth to the top of the stratum (mBGL)	Elevation At the top of the stratum (mOD)	Thickness of the stratum (m)
	Topsoil	0.00	46.70	0.20
	Firm greyish brown slightly sandy gravelly CLAY with frequent angular to subangular cobbles. Gravel is angular to subangular fine to coarse	0.20	46.50	0.70
	Bedrock Weak to medium strong thinly laminated dark grey fine grained calcareous MUDSTONE. Distinctly weathered	0.90	45.80	0.40
	Bedrock Medium strong to strong thinly laminated dark grey fine grained calcareous MUDSTONE with occasional specs of pyrite. Partially to distinctly weathered	1.30	45.40	Not Available

Table 16-2: Proposed Ground Profile for structure no. 16 - Footramp between Ch. 0+310 to Ch. 0+370 (Profile at the North side of the existing structure)

Ground Profile	Descriptions	Depth to the top of the stratum (mBGL)	Elevation At the top of the stratum (mOD)	Thickness of the stratum (m)
	Topsoil	0.00	45.40	0.20
	Made Ground Brown gravelly clayey fine to coarse Sand with occasional angular to subangular cobbles, rootlets and occasional fragments of metal, plastic and red brick	0.20	45.20	1.50
	Brown sandy clayey angular to subangular fine to coarse GRAVEL with some angular to subangular cobbles (possible weathered rock)	1.70	43.70	0.55
	Bedrock Medium strong to strong thinly laminated dark grey fine grained calcareous MUDSTONE. Partially to distinctly weathered with occasional calcite veining	2.25	43.15	Not Available

<b>ARUP</b>		Job No.	Sheet No.	Rev.
		268401-00		
Job Title		Member/Location		
Bus Connects				
Calculation		Drg. Ref.		
		Made by	Date	Chd.
		OA	05/11/2020	MMCE

Figure 17-1 - Location of the Footramp

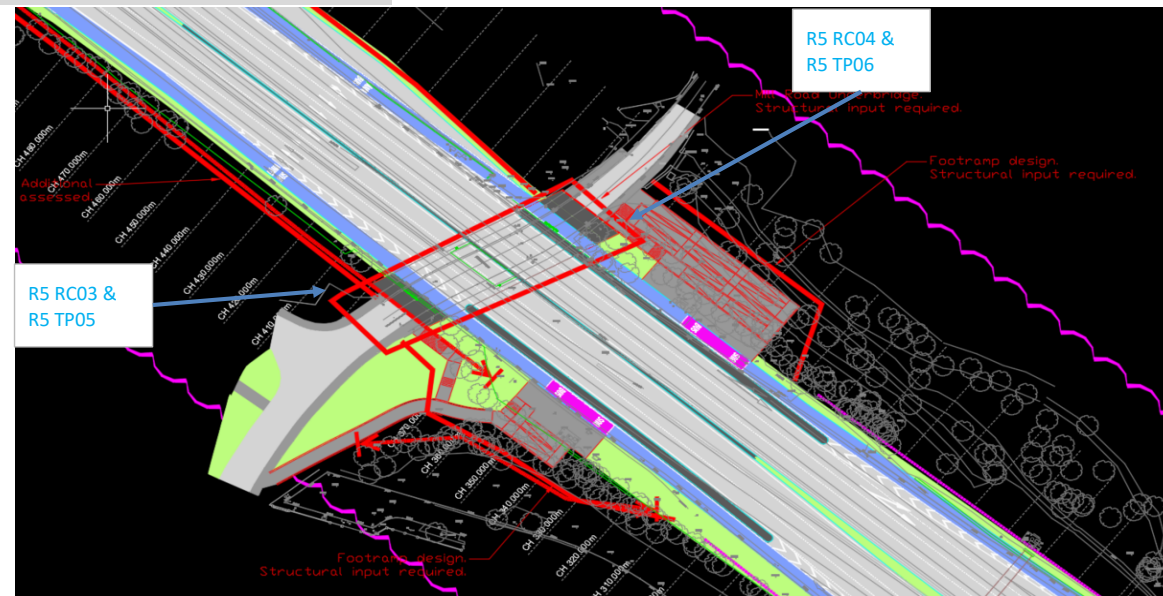


Figure 17-2 -Site Specific GI (GII 2020)

<b>GII</b> Ground Investigations Ireland Ltd www.gii.ie		Site Bus Connect Detailed Stage 1 Lot 1		Trial Pit Number R05-TP06	
Machine: 3T Tracked Excavator Method: Trial Pit	Dimensions 1.50m (L) x 0.30m (W) x 0.90m (D)	Ground Level (mOD) 46.70	Client National Transport Authority	Job Number 9754-07-20	
Location 708176.9 E 738710.5 N		Dates 10/11/2020	Project Contractor Ground Investigations Ireland		
Sheet 1/1		Method: Rotary Cored			
Depth (m)	Sample / Tests	Water (m)	Field Records	Description	Legend
0.00 0.90	B EN			Brown slightly sandy slightly gravelly TOPSOIL with occasional roots. Firm greyish brown slightly sandy gravelly CLAY with frequent angular to subangular cobbles. Gravel is angular to subangular fine to coarse. Obstruction: presumed rock Complete at 0.90m	
<b>Remarks</b> Trial pit terminated at 0.90m BGL due to an obstruction on presumed rock Trial pit stable No groundwater encountered Trial pit backfilled upon completion Scale (approx) 1:25 Logged By PC Figure No. 9754-07-20 R05-TP06 Produced by the GEOTECHNICAL DATABASE SYSTEM (GEOBASE) © all rights reserved					

<b>GII</b> Ground Investigations Ireland Ltd www.gii.ie		Site Bus Connect Detailed Stage 1 Lot 1		Borehole Number R05-RC03			
Machine: Seneca T44 Flash: Water Cork Dia: 65 mm Method: Rotary Cored	Casing Diameter 95mm cased to 10.10m	Ground Level (mOD) 48.56	Client National Transport Authority	Job Number 9754-07-20			
Location 708178.6 E 738712.1 N		Dates 17/11/2020	Project Contractor Ground Investigations Ireland				
Sheet 1/2		Method: Rotary Cored					
Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Description	Legend
0.30						Brown slightly sandy slightly gravelly TOPSOIL with occasional roots. MAGE GROUND: Brown slightly sandy gravelly Clay with frequent angular cobbles. Gravel is angular to subangular fine to coarse. Weak to medium strong thinly laminated dark grey fine grained calcareous MUDSTONE. Distinctly weathered 0.30m-0.70m BGL - Mostly Non Intact 0.70m-1.30m BGL - F1: Very closely spaced, 60° to 80°, undulating smooth Medium strong to strong thinly laminated dark grey fine grained calcareous MUDSTONE with occasional specks of pyrite. Partially to distinctly weathered 1.30m-3.00m BGL - F1: Very closely to closely spaced, 60° to 80°, undulating smooth 3.00m-4.60m BGL - F1: Closely to medium spaced, 60° to 80°, undulating smooth 4.60m-5.30m BGL - Mostly Non Intact 5.30m-10.10m BGL - F1: Closely to medium spaced, 60° to 80°, undulating smooth to rough	
<b>Remarks</b> Borehole completed at 10.10m BGL Borehole backfilled upon completion Scale (approx) 1:50 Logged By PC Figure No. 9754-07-20 R05-RC03 Produced by the GEOTECHNICAL DATABASE SYSTEM (GEOBASE) © all rights reserved							

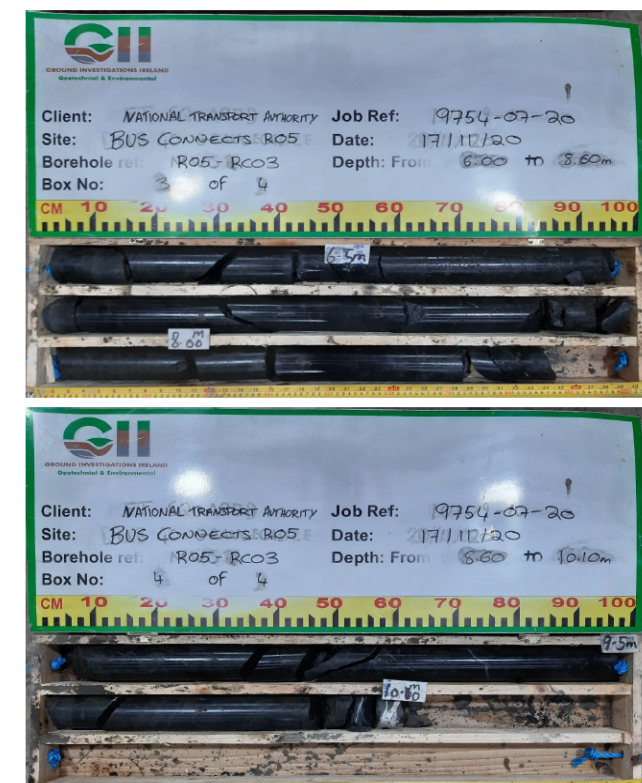
Bus Connects Route 5 – Rotary Core Photographs

R05-RC03



Bus Connects Route 5 – Rotary Core Photographs

R05-RC03



<h1>ARUP</h1>	Job No. <b>268401-00</b>	Sheet No.	Rev.
	Member/Location		
Job Title <b>Bus Connects</b>	Drg. Ref.		
Calculation	Made by <b>OA</b>	Date <b>05/11/2020</b>	Chd. <b>MMCE</b>

Ground Investigations Ireland Ltd www.gii.ie		Site: Bus Connect Detailed Stage 1 Lot 1 Client: National Transport Authority Project Contractor: Ground Investigations Ireland	Trial Pit Number: R05-TP06 Job Number: 9754-07-20 Sheet: 1/1
Machine: 3T Tracked Excavator Method: Trial Pit	Dimensions: 1.50m (L) x 0.30m (W) x 2.00m (D)	Ground Level (mOD):	Dates: 10/11/2020
Location:	Field Records:	Depth (m):	Description:
Depth (m):	Sample / Tests:	Layer (mOD):	Legend:
0.00 0.50 1.00 1.50 2.00	EN BT EN BT	0.20 0.30 1.50 1.70 2.00	Dark greyish brown slightly sandy slightly gravelly TOPSOIL with frequent nodules MADE GROUND: Brown gravelly clayey fine to coarse sand with occasional angular to subangular cobbles, pebbles and occasional fragments of metal, plastic and red brick Brown sandy clayey angular to subangular fine to coarse GRAVEL with some angular to subangular cobbles (possible weathered rock) Obstruction: boulder or possible rock Complete at 2.00m
Plan:			
Remarks: Trial pit terminated at 2.00m BGL due to obstruction on a boulder or possible rock Trial pit stable No groundwater encountered during excavation Trial pit backfilled upon completion			
Scale (Approx): 1:25		Logged By: PC	Figure No.: 9754-07-20-R5-TP06

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Ground Investigations Ireland Ltd www.gii.ie		Site: Bus Connect Detailed Stage 1 Lot 1 Client: National Transport Authority Project Contractor: Ground Investigations Ireland	Borehole Number: R05-RC04 Job Number: 9754-07-20 Sheet: 1/2
Machine: Sereita T44 Flush: Water Core Dia: 65 mm Method: Rotary Core	Casing Diameter: 90mm cased to 10.00m	Ground Level (mOD): 45.40	Dates: 17/11/2020
Location: 705240 E 738732 N	Field Records:	Depth (m):	Description:
Depth (m):	TCR (%):	Layer (mOD):	Legend:
0.70 2.00 2.25 3.50 4.50 5.00 6.50 8.00 9.00 9.50 10.00	68 100 100 100 100 100 100 100 100 100	0.70 1.55 2.25 3.50 4.50 5.00 6.50 7.75 9.00 9.50	Brownish grey angular to subangular fine to coarse GRAVEL with occasional angular to subangular cobbles Weak finely laminated dark grey fine grained calcareous MUDSTONE. Distinctly weathered 0.70m-2.25m BGL - Mostly Non Intact Medium strong to strong finely laminated dark grey fine grained calcareous MUDSTONE. Partially to distinctly weathered with occasional calcite veining 2.25m-4.50m BGL - F1: Closely to medium spaced, 40° to 60°, undulating rough with occasional clay infilling/staining 4.50m-5.00m BGL - Mostly Non Intact 5.00m-9.00m BGL - F1: Closely to medium spaced, 40° to 60°, undulating smooth to rough with occasional clay infilling/staining 9.00m-9.50m BGL - Mostly Non Intact 9.50m-10.00m BGL - F1: Closely spaced, 10°
Remarks: Borehole complete at 10.00m BGL 65mm solid standpipe installed from 1.40m to 1.00m BGL with pea gravel surrounds, plain standpipe installed from 1.00m BGL to ground level with bentonite surrounds and flush cover			
Scale (Approx): 1:50		Logged By: PC	Figure No.: 9754-07-20-R5-RC04

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Bus Connects Route 5 – Rotary Core Photographs  
R5-RC04



Bus Connects Route 5 – Rotary Core Photographs  
R5-RC04



<b>ARUP</b>	Job No.	Sheet No.	Rev.
	268401-00		
Job Title	Member/Location		
Bus Connects	Drg. Ref.		
Calculation	Made by	Date	Chd.
	OA	05/11/2020	MMCE

Figure 17-2 - Location of historical GI (Navan Road Bridge at Mill Road, Location Plan and Borehole Details (Drawing no 928/1, Oct 85, John B. Barry+Partners Consulting Eng. ) and Plan view of the sections

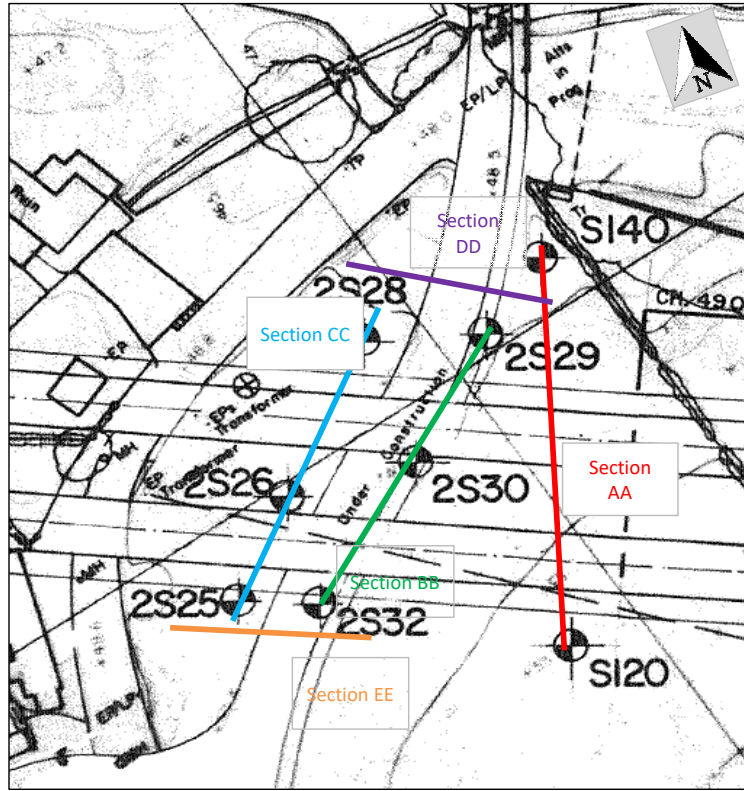
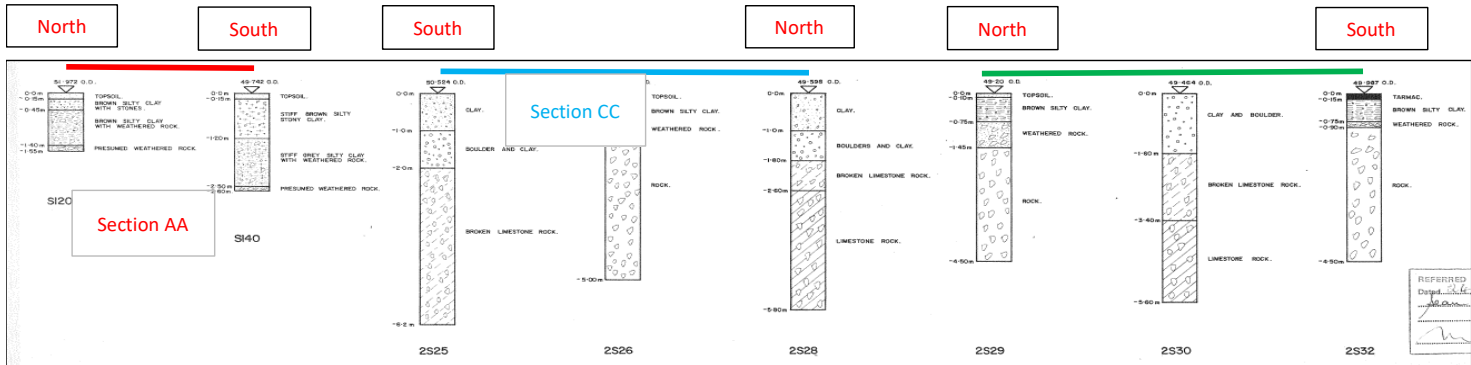


Figure 17-3 - Cross sections taken from historical GI (Navan Road Bridge at Mill Road, Location Plan and Borehole Details (Drawing no 928/1, Oct 85, John B. Barry+Partners Consulting Eng. )



Blanchardstown to City Centre CBC  
New Retaining Wall (RW09)

RW09 was added at a later stage. Therefore, no site specific GI has been carried at or close to proposed RW09 location. To assist with the preliminary stage of the design, a few snapshots taken from GSI webpage were put together.

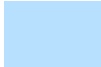



Approximate location of RW09



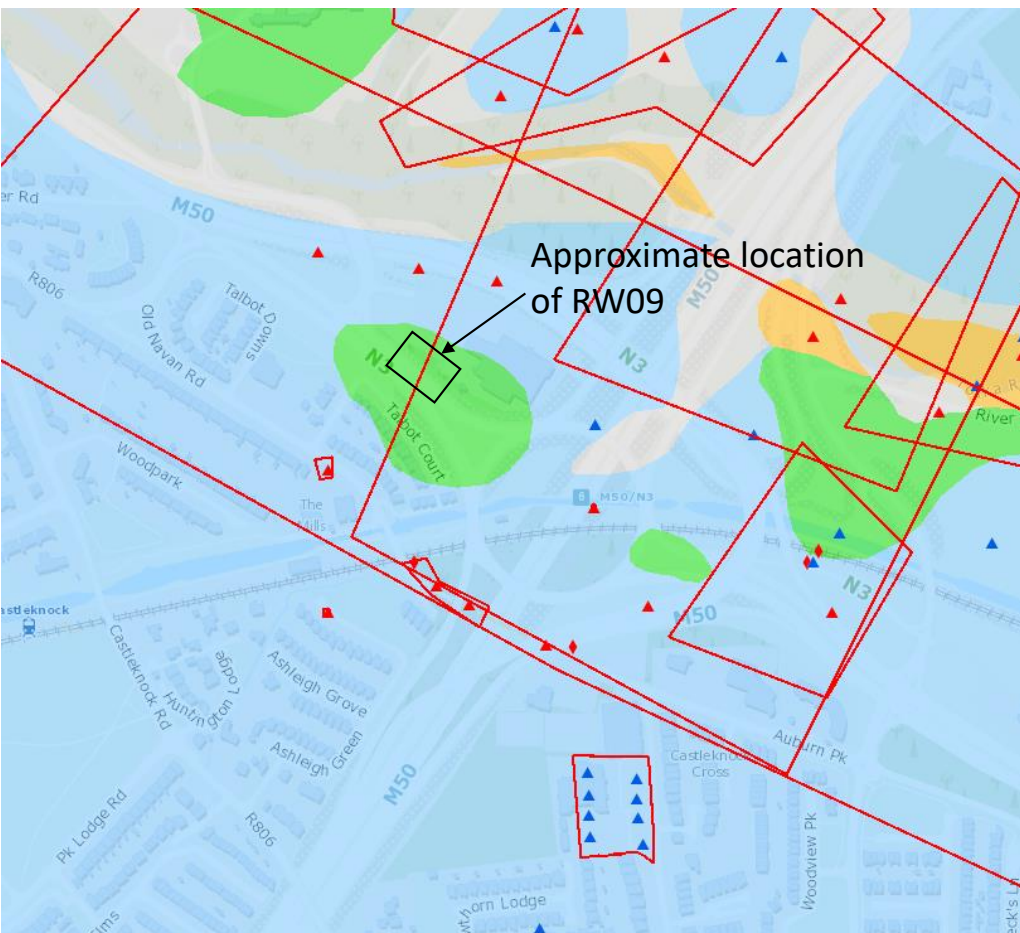
Legend (focused on proposed RW09 location):

 Gravels derived from Limestone

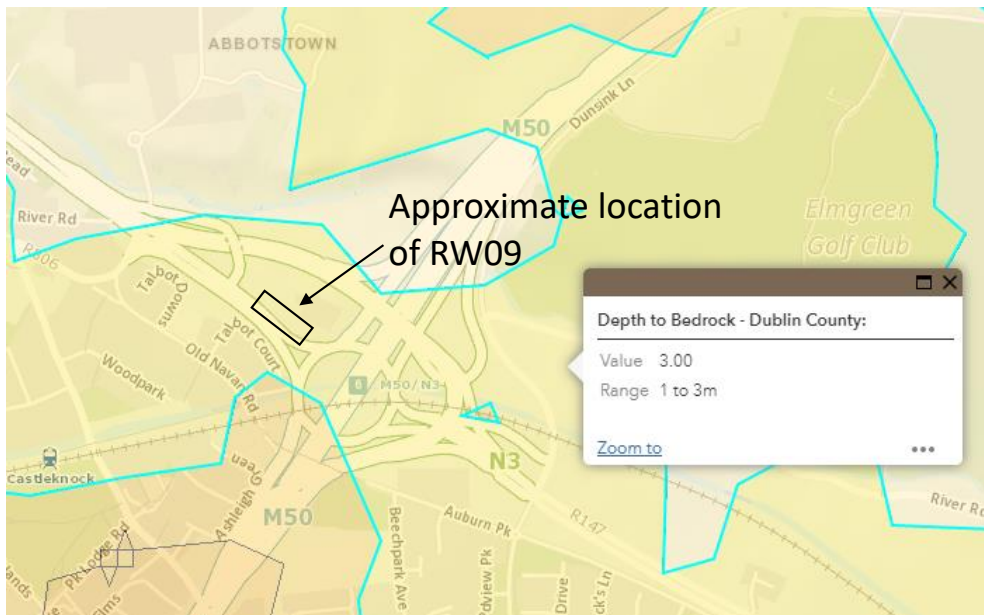
 Till derived from Limestone

 0-5m Bedrock Met

RW09 was added at a later stage. Therefore, no site specific GI has been carried at or close to proposed RW09 location. GSI webpage and site specific desk study show Gravels derived from Limestone at proposed location. Till derived from Limestone are present close to the proposed location. No sign of soft soil at the area.



Snapshot taken from GSI webpage.



Bedrock appears to be shallow ranging from 1 to 3m BGL.

Snapshot taken from GSI webpage.