

8.2 Potential Hazardous Wastes Arising

8.2.1 Contaminated Soil

In 2008 an initial joint geotechnical and environmental site investigation was undertaken (by O' Callaghan Moran & Associates) comprising the excavation of trial pits, the installation of boreholes in the subsoils and bedrock and the collection and testing of soil and groundwater samples. The intrusive investigations were confined to open areas in the middle of the site and around the site parameter. It is envisaged that further site investigations and environmental soil analysis will be undertaken post demolition and prior to any excavated material being removed from site.



Figure 46 – Site 2 areas of Potential Contaminated Material

Three (3) samples of the fill material from BH-7, 9 and 10 were analysed for Total Petroleum Hydrocarbons (TPH), BETX (benzene, toluene, ethylbenzene and xylene), PAH (polycyclic aromatic hydrocarbons) and metals (arsenic, barium, cadmium, chromium, copper, mercury, molybdenum, nickel, lead, tin, selenium and zinc).

Nineteen (19) samples, of the fill and natural ground from, BH-7, 9, 10, 12, 14, 15, RC-8 and W-2, were tested for the WAC, which included Total Organic Carbon (TOC), BETX, PCBs (polychlorinated biphenyls, 7 congeners), Mineral Oil (C10 to C40) and PAH sum of 17. They were also subjected to leach testing at a liquid to solid ratio of 10:1 and the leachate analysed for arsenic, barium, cadmium, chromium, copper, mercury, molybdenum, nickel, lead, tin, selenium, zinc, chloride, fluoride, sulphate, phenols, dissolved organic carbon and total dissolved solids.

If any potentially contaminated material is encountered, it will need to be segregated from clean/inert material, tested and classified as either non-hazardous or hazardous in accordance with the EPA publication entitled 'Waste Classification: List of Waste & Determining if Waste is Hazardous or Non-Hazardous' using the HazWasteOnline application (or similar approved classification method). The material will then need to be classified as clean, inert, non-hazardous or hazardous in accordance with the EC Council Decision 2003/33/EC, which establishes the criteria for the acceptance of waste at landfills.

In the event that Asbestos containing materials (ACMs) are found, the removal will only be carried out by a suitably permitted waste contractor, in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare

at Work (Exposure to Asbestos) Regulations 2006-2010. All asbestos will be taken to a suitably licensed or permitted facility.

In the event that hazardous soil, or historically deposited waste is encountered during the construction phase, the contractor will notify DCC and provide a Hazardous/Contaminated Soil Management Plan, to include estimated tonnages, description of location, any relevant mitigation, destination for disposal/treatment, in addition to information on the authorised waste collector(s).

8.2.2 Fuel/Oils

Fuels and oils are classed as hazardous materials; any on-site storage of fuel/oil, and all storage tanks and all draw-off points will be bunded and located in a dedicated, secure area of the site. Provided that these requirements are adhered to and the site crew are trained in the appropriate refuelling techniques, it is not expected that there will be any fuel/oil waste generated at the site.

8.2.3 Invasive Plant Species

An ecological site survey was undertaken by Scott Cawley Ecology in June 2020. This included a site walkover survey of the entire site, and around part of the outside perimeter to search for any schedule 3 invasive species. Japanese Knotweed *Fallopia japonica*, which is listed on the Third Schedule of the Birds and Habitats Regulations, was not recorded on the site.

Japanese Knotweed (*Fallopia japonica*) is an alien invasive species listed under schedule 3 of Regulations SI No. 355/2015. SCE's report concludes that it is not present on this site and there was no indication that it is growing in the immediate vicinity.

8.2.4 Asbestos

Multiple asbestos refurbishment/demolition survey were undertaken by About Safety Ltd in September and October 2020. The scope of the survey's were confined to all accessible areas of the existing buildings which are due for demolition and/or refurbishment in the future.

Asbestos Containing Materials (ACM) were detected in several locations within some of the buildings including but not limited to floor tiling, roof slates, roof felt, rope seals, bitumen and woven rope.

Removal of asbestos or ACMs will be carried out by a suitably qualified contractor and ACM's will only be removed from site by a suitably permitted/licenced waste contractor. in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010. All material will be taken to a suitably licensed or permitted facility.

8.2.5 Other known Hazardous Substances

Paints, glues, adhesives and other known hazardous substances will be stored in designated areas. They will generally be present in small volumes only and associated waste volumes generated will be kept to a minimum. Wastes will be stored in appropriate receptacles pending collection by an authorised waste contractor.

In addition, WEEE (containing hazardous components), printer toner/cartridges, batteries (Lead, Ni-Cd or Mercury) and/or fluorescent tubes and other mercury containing waste may be generated from during C&D activities or temporary site offices. These wastes, if generated, will be stored in appropriate receptacles in designated areas of the site pending collection by an authorised waste contractor.

8.3 Main Construction and Demolition Waste Categories

AWN Consulting Ltd. has prepared Site-specific Construction & Demolition Waste Management Plan submitted as part of this planning application [document reference CB/20/11784WMMR01] and is summarized below.

The main non-hazardous and hazardous waste streams that could be generated by the demolition and construction activities at a typical site are shown in. The List of Waste (LoW) code (as effected from 1 June 2015) (also referred to as the European Waste Code or EWC) for each waste stream is also shown.

Waste Material	LoW/EWC Code
Concrete, bricks, tiles, ceramics	17 01 01-03 & 07
Wood, glass and plastic	17 02 01-03
Treated wood, glass, plastic, containing hazardous substances	17-02-04*
Bituminous mixtures, coal tar and tarred products	17 03 01*, 02 & 03*
Metals (including their alloys) and cable	17 04 01-11
Soil and stones	17 05 03* & 04
Gypsum-based construction material	17 08 01* & 02
Paper and cardboard	20 01 01
Mixed C&D waste	17 09 04
Green waste	20 02 01
Electrical and electronic components	20 01 35 & 36
Batteries and accumulators	20 01 33 & 34
Liquid fuels	13 07 01-10
Chemicals (solvents, pesticides, paints, adhesives, detergents etc.)	20 01 13, 19, 27-30
Insulation materials	17 06 04
Organic (food) waste	20 01 08
Mixed Municipal Waste	20 03 01

* individual waste type may contain hazardous substances

Table 1. Typical waste types generated and LoW codes (individual waste types may contain hazardous substances)

8.4 Demolition Waste Generation

The demolition stage will involve the demolition of multiple brick buildings onsite. The demolition areas are identified in the planning drawings provided with this application. The anticipated demolition waste and rates of reuse, recycling/recovery and disposal is shown in Table 2 and 3.

Waste Type	Tonnes	Reuse		Recycle/Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Glass	1216.2	0	0.0	85	1033.7	15	182.4
Concrete, Bricks, Tiles, Ceramics	6891.5	30	2067.5	65	4479.5	5	344.6
Plasterboard	540.5	30	162.2	60	324.3	10	54.1
Asphalts	135.1	0	0.0	25	33.8	75	101.3
Metals	2026.9	5	101.3	80	1621.5	15	304.0
Slate	1081.0	0	0.0	85	918.9	15	162.2
Timber	1621.5	10	162.2	60	972.9	30	486.5
Asbestos	2.0	0	0.0	0	0.0	100	2.0
Total	13514.7		2493.1		9384.6		1637.0

Table 2. Estimated off-site reuse, recycle and disposal rates for demolition waste from Site 2

Waste Type	Tonnes	Reuse		Recycle/Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	871.1	10	87.1	80	696.9	10	87.1
Timber	739.1	40	295.6	55	406.5	5	37.0
Plasterboard	264.0	30	79.2	60	158.4	10	26.4
Metals	211.2	5	10.6	90	190.1	5	10.6
Concrete	158.4	30	47.5	65	102.9	5	7.9
Other	396.0	20	79.2	60	237.6	20	79.2
Total	2639.7		599.2		1792.3		248.1

Table 3. Estimated off-site reuse, recycle and disposal rates for construction waste from Site 2

8.5 Appointment of C&D Waste Manager

The Main Contractor/Contractors will appoint a C&D Waste Manager. The C&D Waste Manager will have overall responsibility for the implementation of the project Waste Management Plan (WMP) during the construction phase.

Copies of the Waste Management Plan will be made available to all relevant personnel on site. All site personnel and sub-contractors will be instructed regarding the objectives of the Waste Management Plan and informed of the responsibilities which fall upon them as a consequence of its provisions. Where source segregation, selective demolition and material reuse techniques apply, each member of staff will be given instructions on how to comply with the Waste Management Plan. Posters will be designed to reinforce the key messages within the Waste Management Plan and will be displayed prominently for the benefit of site staff.

9. Archaeology

Archaeological monitoring will take place where any preparatory ground reduction works are required including site investigation works and opening up works at basement or ground levels. Post-demolition archaeological investigation will be carried out in areas across the site without basements. This is required to establish the nature of below ground structures, foundation remnants and features of archaeological and historical importance and to establish the presence or otherwise of archaeological remains. Further resolution may involve the recording of historic features and full archaeological excavation (i.e., preservation of the archaeology in record form, of all archaeological soils or features encountered). The resolution will occur during this post demolition phase in the area of the find spot in advance of the main construction phase.

10. Building Control Amendment Regulations

10.1 Quality Assurance during Construction and BC(A)R Compliance

The Main Contractor/Contractors will need to demonstrate how they will be providing quality in construction. They shall comply fully with all requirements of the Amended Building Control regulations to the satisfaction of the Ancillary and Assigned certifiers.

The Main Contractor/Contractors will be responsible for the preparation of benchmark samples of each new element of the works to the satisfaction of the Assigned and Ancillary Certifiers under the Building Control regulations (BCAR). Each benchmark sample will be considered a 'hold point' under the Preliminary Inspection Plan (PIP) and will be required to be offered up to the Certifiers involved ahead of the works starting - with a minimum of two days' notice (in writing).

The Main Contractor/Contractors will be required to keep pre- and post-pour check sheets for submission to the assigned and ancillary certifiers where required.

Written acceptance will be required from the Certifiers after inspection of the benchmark samples before the rest of the works proceed.

Where 'specialist' suppliers are noted by the design team to have design responsibility, they will be required to provide Certificates of Design (Sd), Certificates of Inspection (Si) and Certificates of Completion (Sc). Ahead of appointment of the 'specialist' suppliers / designers - evidence of competency and Professional Indemnity insurance cover will be required for the approval of the Contract Administrator and Waterman Moylan.

This is to be confirmed by the Main Contractor/Contractors once appointed and will include a quality check regime.

11. Liaison with Third Parties

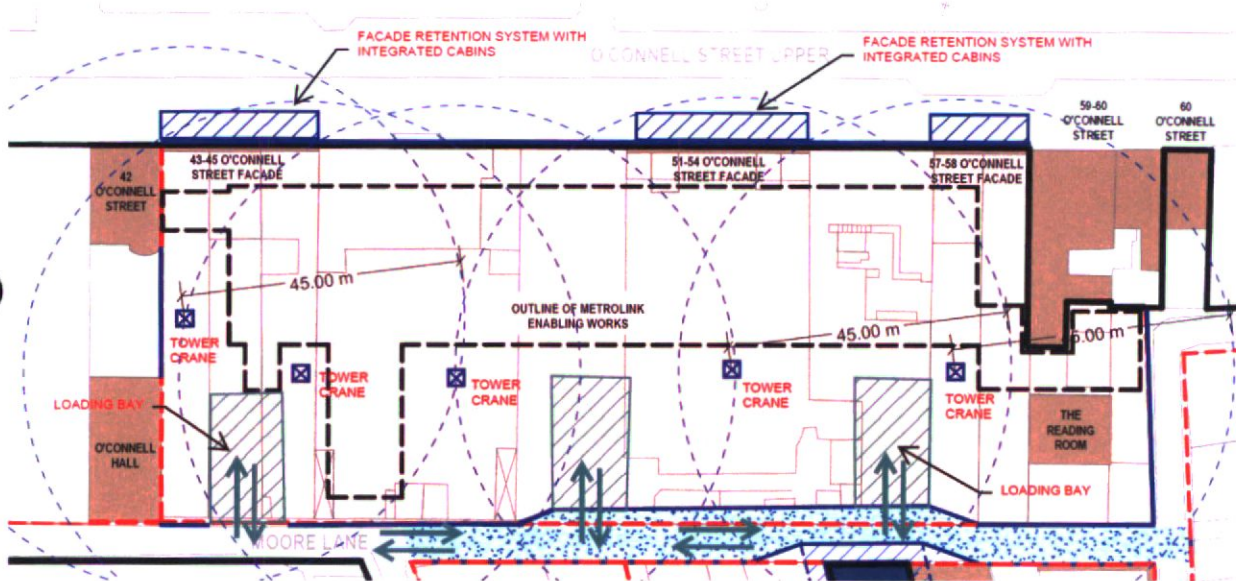
It is imperative that the Main Contractor/Contractors engages in discussions with local residents, businesses and the general public well in advance of work commencing on site. Formal communication should be provided to immediate neighbours regarding activities or possible disruptions.

The appointed contractor will be required to adopt the practices covered under the 'Considerate Constructors Scheme' for establishing a good neighbour strategy and maintaining good relationships with neighbouring communities. The ideas described within this scheme will be implemented on site where applicable to minimize negative impact on local community and the environment.

Handling of any complaints must be logged and actioned quickly by the Main Contractor/Contractors.

APPENDIX A

Site 2 – Site Setup

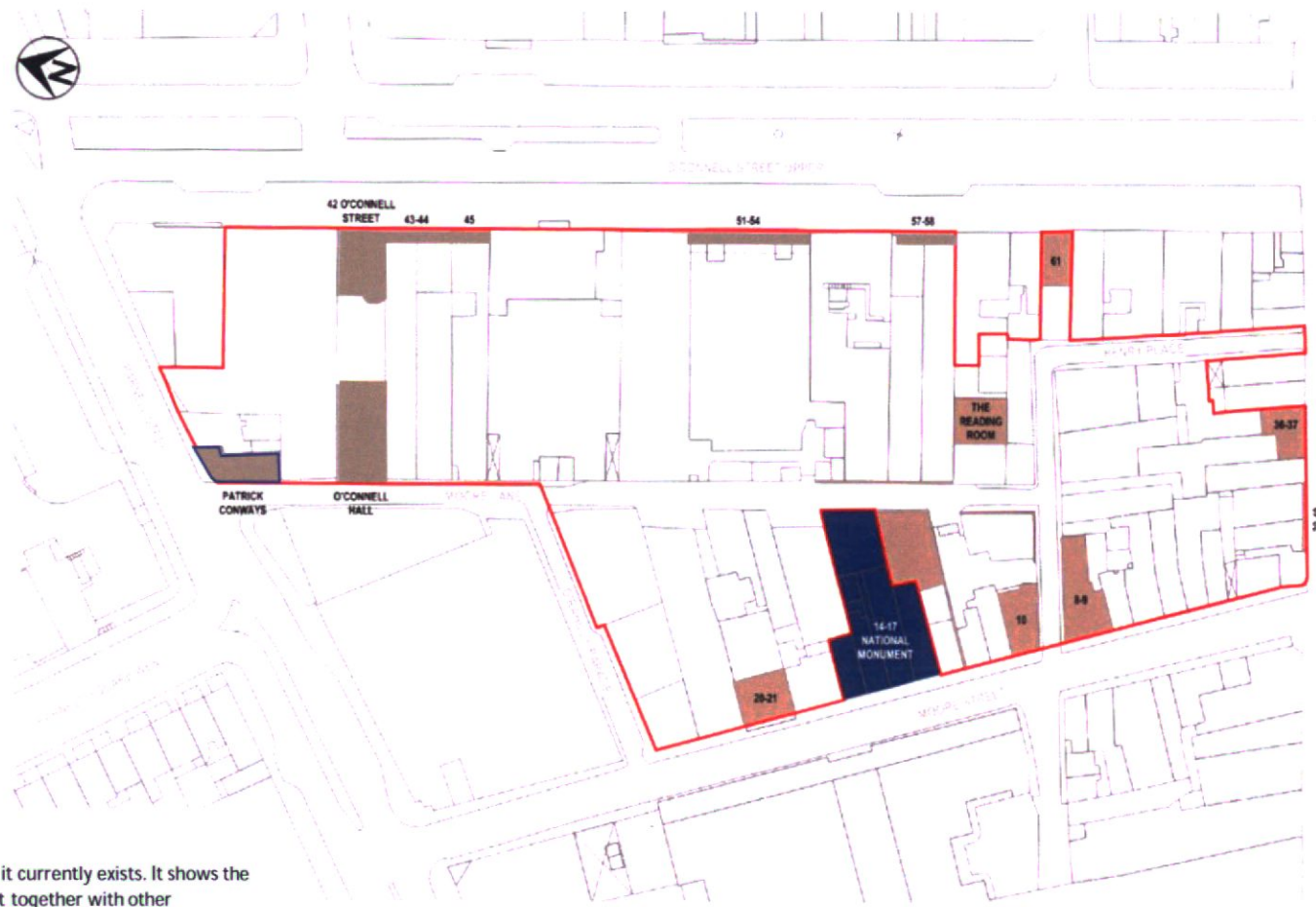


APPENDIX B

Site 2 – Construction Sequencing

TIMESLICE IMAGES FOLLOW

- Assumes Planning Approval Granted in September 2023
- A protected zone will be established around the National Monument and a temporary haul road will be installed.
- The Construction Management Plan provides further detail as to the approach to be taken and therefore reference should be made to that document when considering this.



Principal activities taking place:

This image demonstrates the site as it currently exists. It shows the proximity of the National Monument together with other Protected Structures and Non-Protected structures of historical significance to be retained.

2022				2023				2024				2025				2026				2027				2028				2029				2030				2031				2032				2033							
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4								



Principal activities taking place:

Construction work commences on Sites 1, 3 and 4 during this period, and Site 5 is hoarded off to provide the necessary vehicle unloading area to service all of the construction sites.

PRELIMINARY PROJECT PROGRAMME - INDICATIVE ONLY

2022				2023				2024				2025				2026				2027				2028				2029				2030				2031				2032				2033							
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4								



PRELIMINARY PROJECT PROGRAMME - INDICATIVE ONLY

Principal activities taking place:

At the start of this period the demolition and construction work for the MEW commences.

Construction work continues on Sites 1, 3 and 4 during this period, and Site 5 remains hoarded off to provide the necessary vehicle unloading area to service all of the construction sites.

2022				2023				2024				2025				2026				2027				2028				2029				2030				2031				2032				2033							
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4								



Principal activities taking place:

Site 1 completes, the construction of the MEW continues, Site 3 enters its fitting out phase, and Site 4 remains under construction.

Site 5 remains hoarded off to provide the necessary vehicle unloading area to service all of the construction sites.

PRELIMINARY PROJECT PROGRAMME - INDICATIVE ONLY

2022				2023				2024				2025				2026				2027				2028				2029				2030				2031				2032				2033							
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4								



Principal activities taking place:

Site 3 now completes together with the public realm around it. Henry Place is opened up to public use together with the central passageway through Site 3.

The construction of the MEW continues, and Site 4 enters its fitting out phase.

Site 5 remains hoarded off to provide the necessary vehicle unloading area to service all of the construction sites.

PRELIMINARY PROJECT PROGRAMME - INDICATIVE ONLY

2022				2023				2024				2025				2026				2027				2028				2029				2030				2031				2032				2033							
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4								



Principal activities taking place:

Site 4 South now completes and the residential units become occupied. Site 4 North is held back as it remains in the construction zone without safe public access.

The construction of the MEW continues.

Site 5 remains hoarded off to provide the necessary vehicle unloading area to service all of the construction sites.

PRELIMINARY PROJECT PROGRAMME - INDICATIVE ONLY

2022				2023				2024				2025				2026				2027				2028				2029				2030				2031				2032				2033							
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4								



Principal activities taking place:

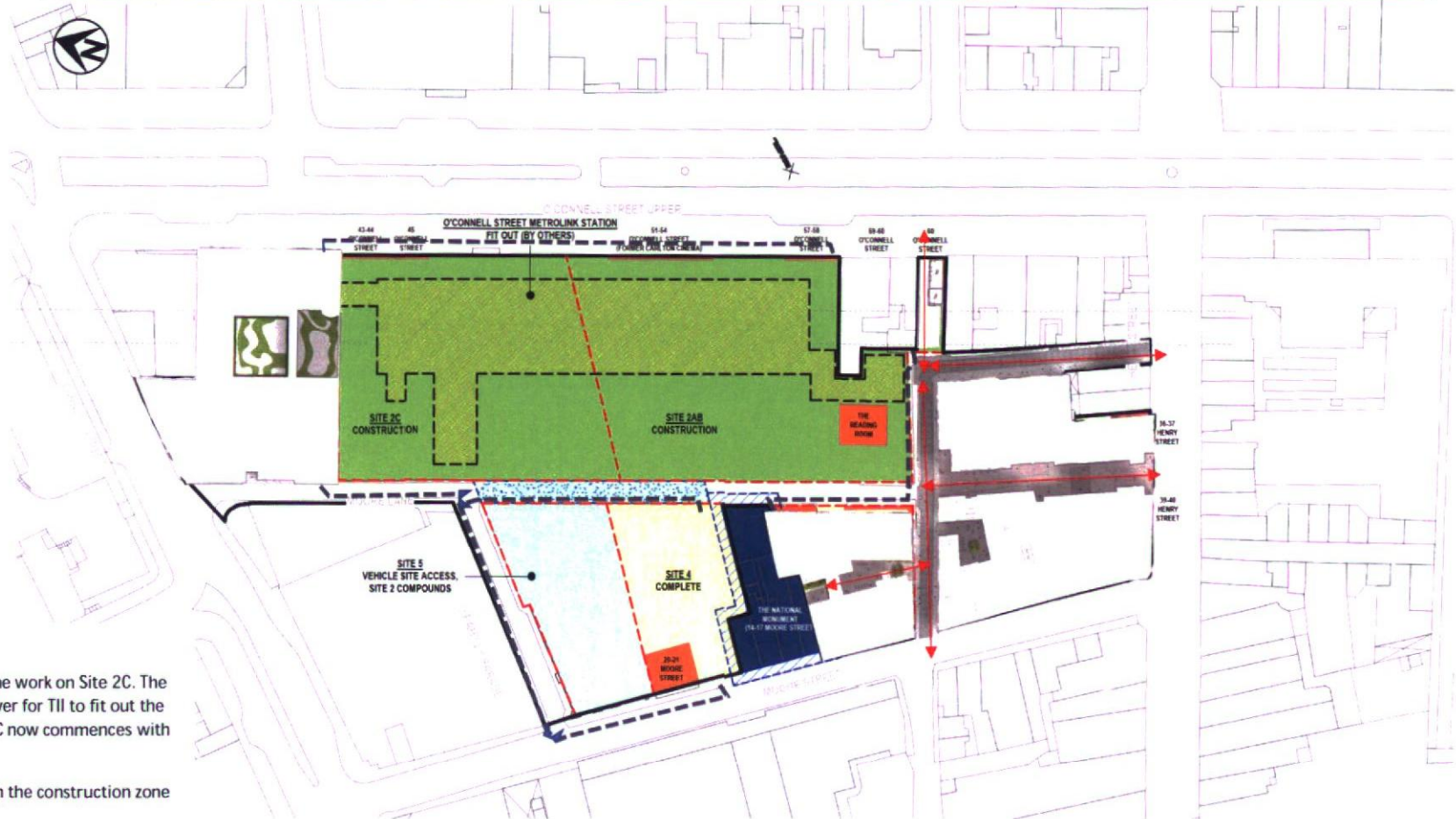
The principal change on this image is the work on Site 2AB. The MEW are now completed sufficiently at the southern end to allow Site 2AB construction activity to commence. Construction on the MEW continues to the northern part on Site 2C.

Site 4 North is held back as it remains in the construction zone without safe public access.

Site 5 remains hoarded off to provide the necessary vehicle unloading area to service all of the construction sites.

PRELIMINARY PROJECT PROGRAMME – INDICATIVE ONLY

2022				2023				2024				2025				2026				2027				2028				2029				2030				2031				2032				2033							
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4								



PRELIMINARY PROJECT PROGRAMME - INDICATIVE ONLY

Principal activities taking place:

The principal change on this image is the work on Site 2C. The MEW are now complete and handed over for TII to fit out the station, connect the tunnels etc. Site 2C now commences with its construction activity.

Site 4 North is held back as it remains in the construction zone without safe public access.

Site 5 remains hoarded off to provide the necessary vehicle unloading area to service all of the construction sites.

2022				2023				2024				2025				2026				2027				2028				2029				2030				2031				2032				2033							
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4								



Principal activities taking place:

This image shows the works continuing with the construction of Site 5

The Station is now being commissioned.

PRELIMINARY PROJECT PROGRAMME - INDICATIVE ONLY

2022				2023				2024				2025				2026				2027				2028				2029				2030				2031				2032				2033											
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4												



Principal activities taking place:

This image shows the completed development.

O'Rahilly Parade will have been resurfaced into its final surface.

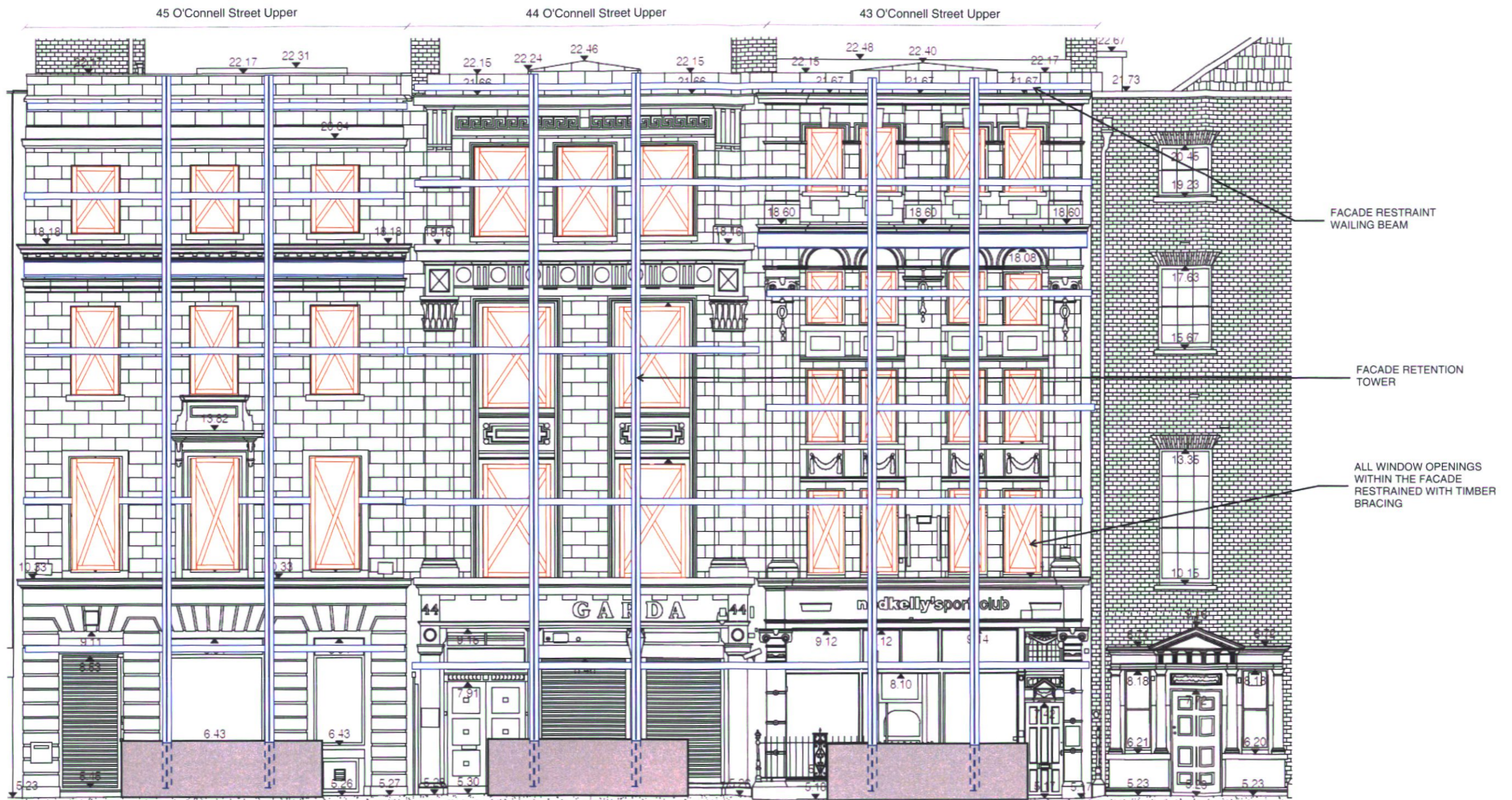
Resurfacing the northern section of Moore Lane up to Parnell Street will have been completed.

PRELIMINARY PROJECT PROGRAMME – INDICATIVE ONLY

APPENDIX C

Site 2 – Temporary Works





43-45 O'Connell Street Upper - Elevation
SCALE 1:100

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TITLE

43-45 O'Connell Street - Retained
Facade Elevation

PROJECT

Dublin Central

CLIENT

Dublin Central GP Limited

DRAWING STATUS

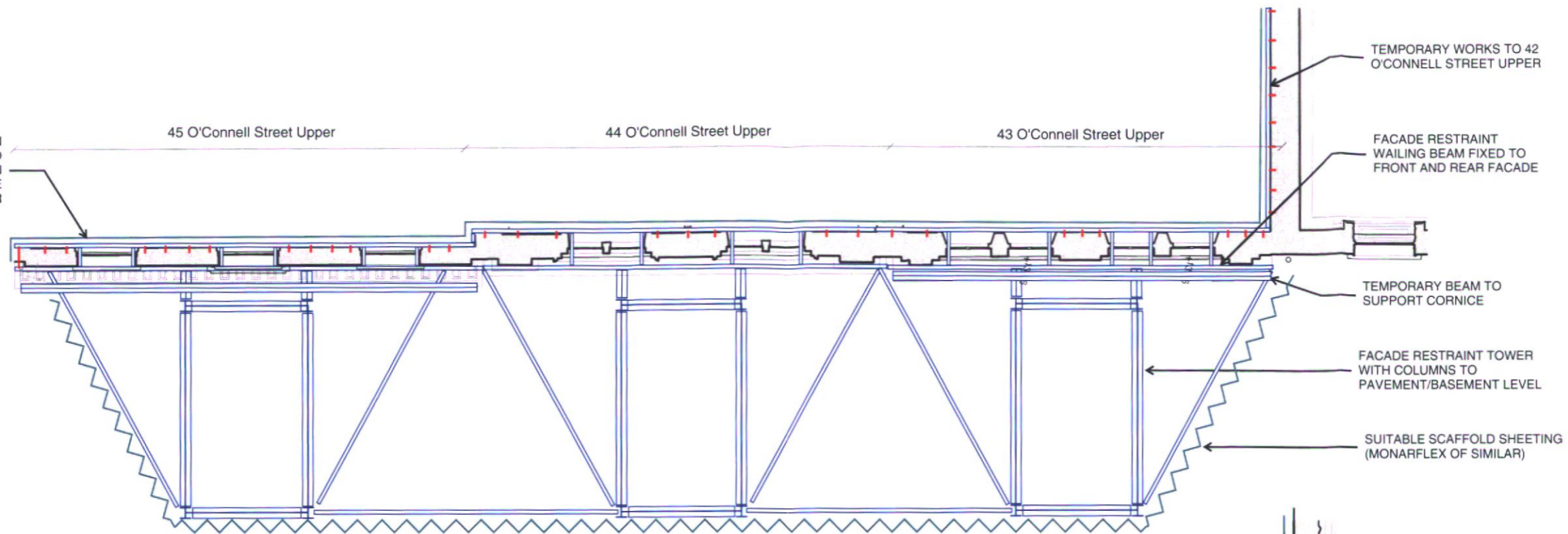
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PROJECT 19-021

INFORMATION

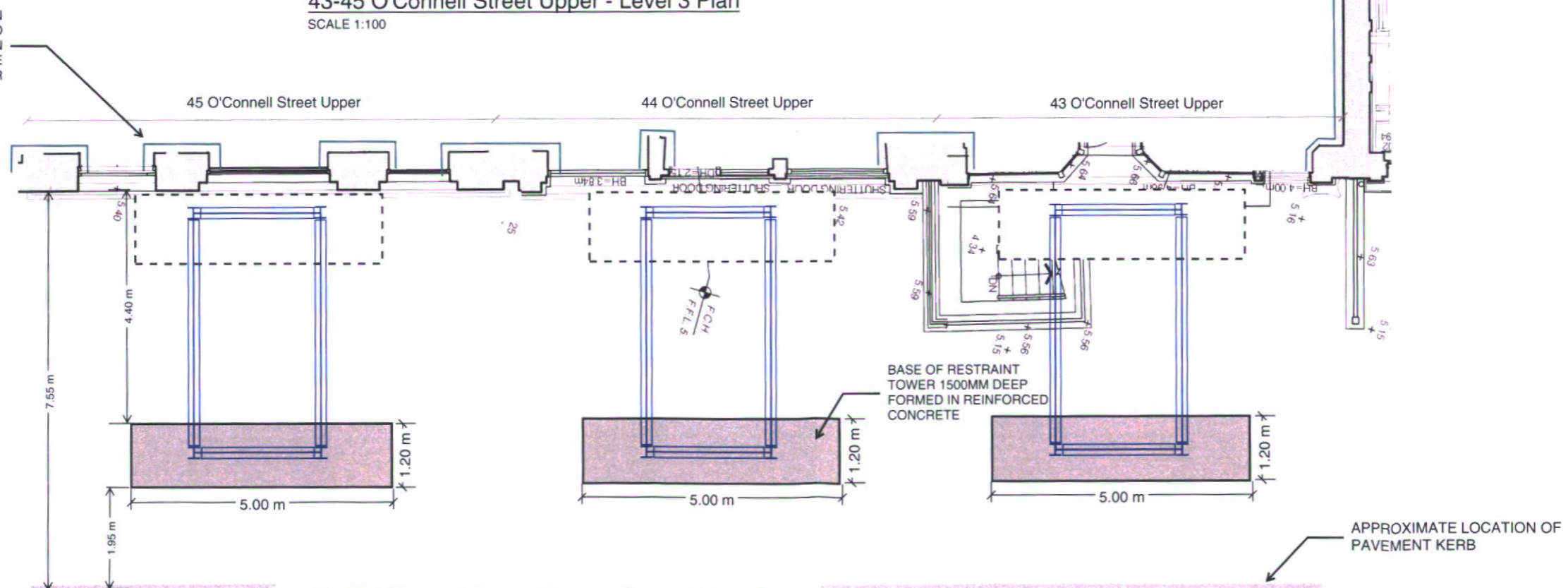
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DRAWING REFERENCE

WM-ZZ-ZZ-SK-S-008



43-45 O'Connell Street Upper - Level 3 Plan
SCALE 1:100



43-45 O'Connell Street Upper - Ground Floor Plan
SCALE 1:100

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TITLE

43-45 O'Connell Street - Retained
Facade Plans

PROJECT

Dublin Central

CLIENT

Dublin Central GP Limited

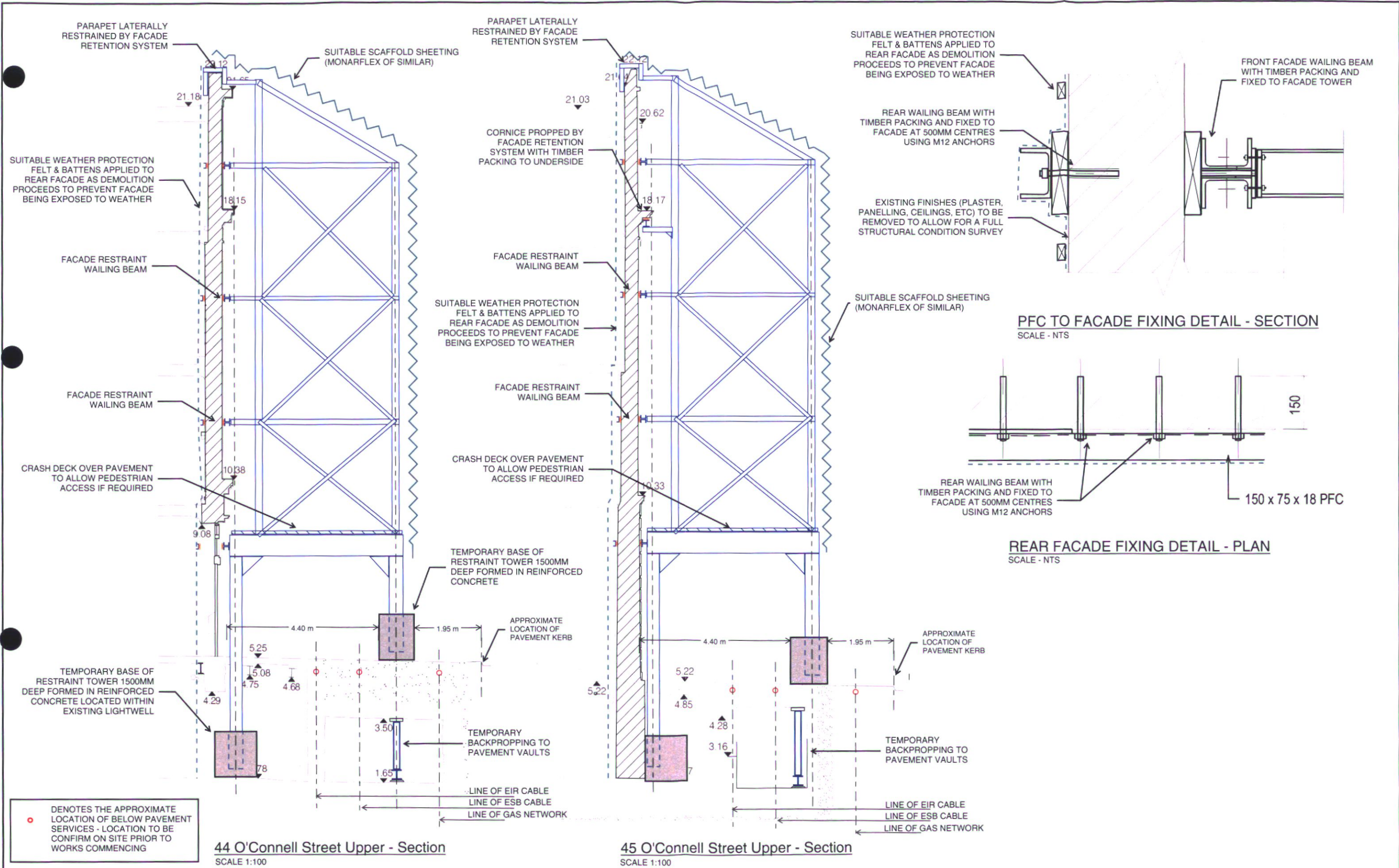
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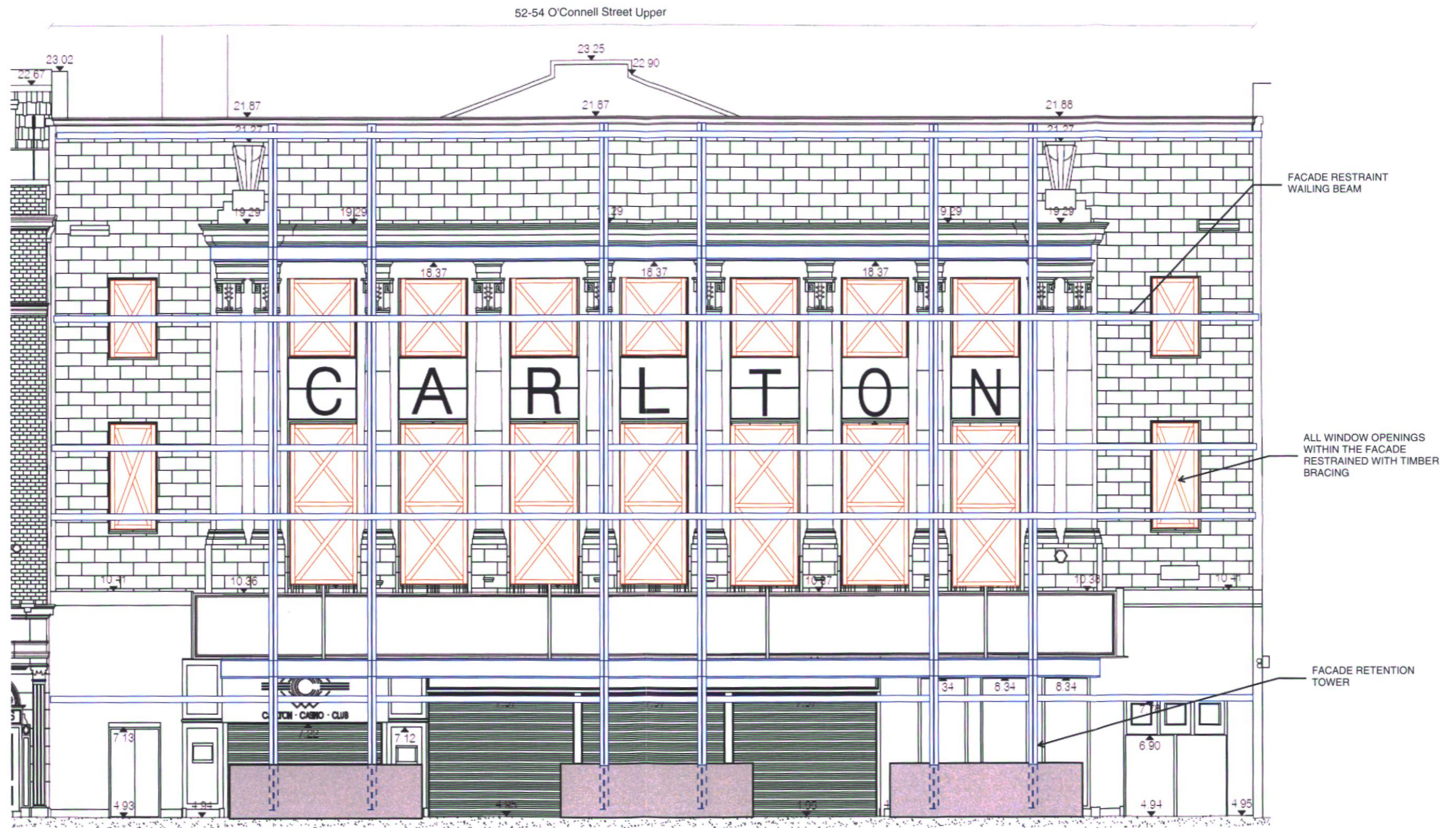
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INFORMATION

DRAWING REFERENCE

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52-54 O'Connell Street Upper - Elevation
SCALE 1:100

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TITLE

52-54 O'Connell Street - Retained
Facade Elevation

PROJECT

Dublin Central

CLIENT

Dublin Central GP Limited

DRAWING STATUS

DRAWN

RN

PROJECT

19-021

INFORMATION

DESIGNED

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DATE

05.07.2021

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SCALE

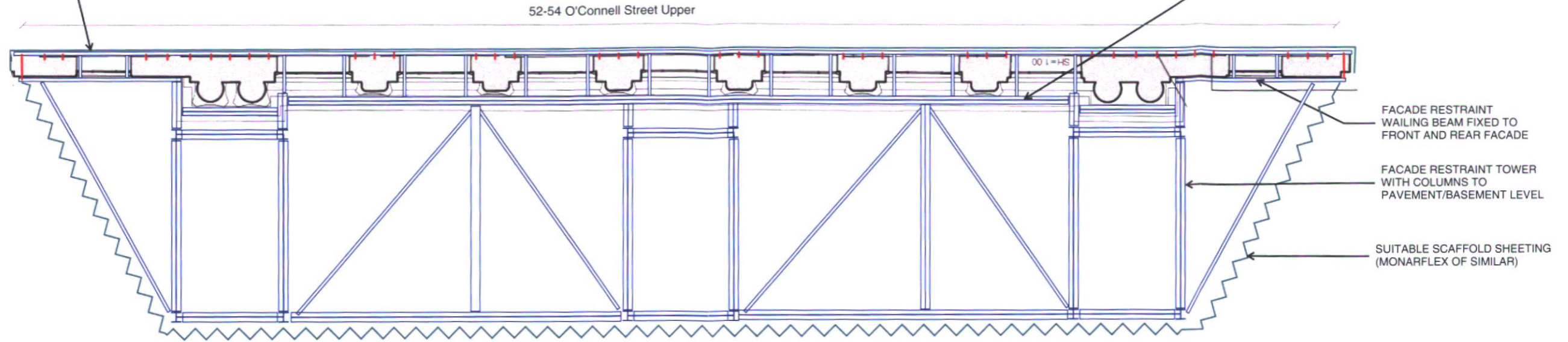
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DRAWING REFERENCE

WM-ZZ-ZZ-SK-S-011

SUITABLE WEATHER PROTECTION
FELT & BATTENS APPLIED TO
REAR FACADE AS DEMOLITION
PROCEEDS TO PREVENT FACADE
BEING EXPOSED TO WEATHER

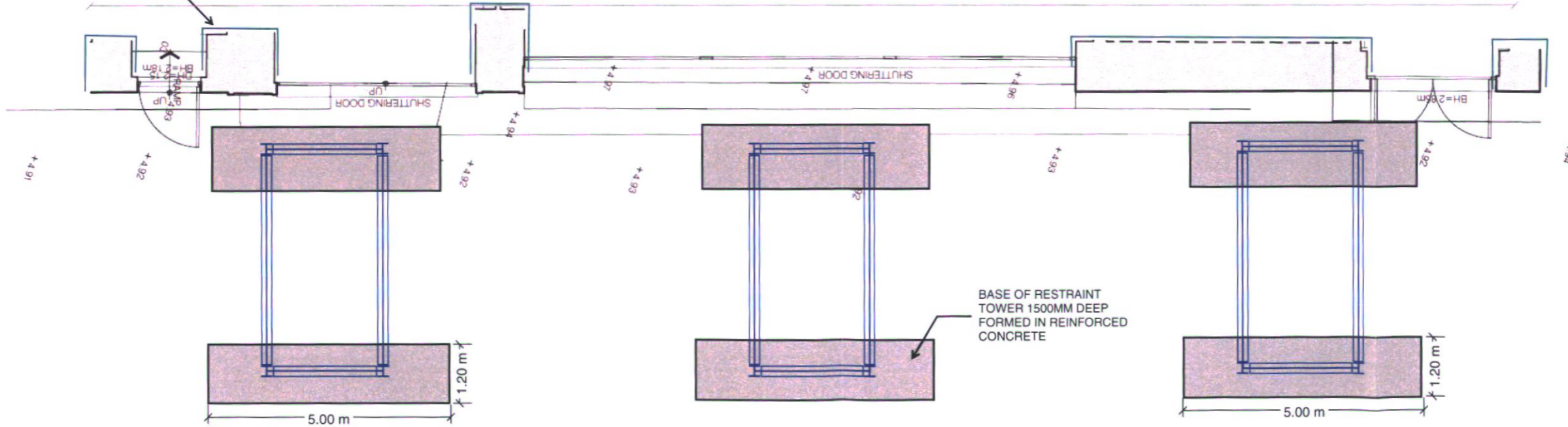
TEMPORARY BEAM TO
SUPPORT CORNICE



52-54 O'Connell Street Upper - Level 3 Plan
SCALE 1:100

SUITABLE WEATHER PROTECTION
FELT & BATTENS APPLIED TO
REAR FACADE AS DEMOLITION
PROCEEDS TO PREVENT FACADE
BEING EXPOSED TO WEATHER

52-54 O'Connell Street Upper



52-54 O'Connell Street Upper - Ground Floor Plan
SCALE 1:100

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TITLE

52-54 O'Connell Street - Retained
Facade Plans

PROJECT

Dublin Central

CLIENT

Dublin Central GP Limited

DRAWING STATUS

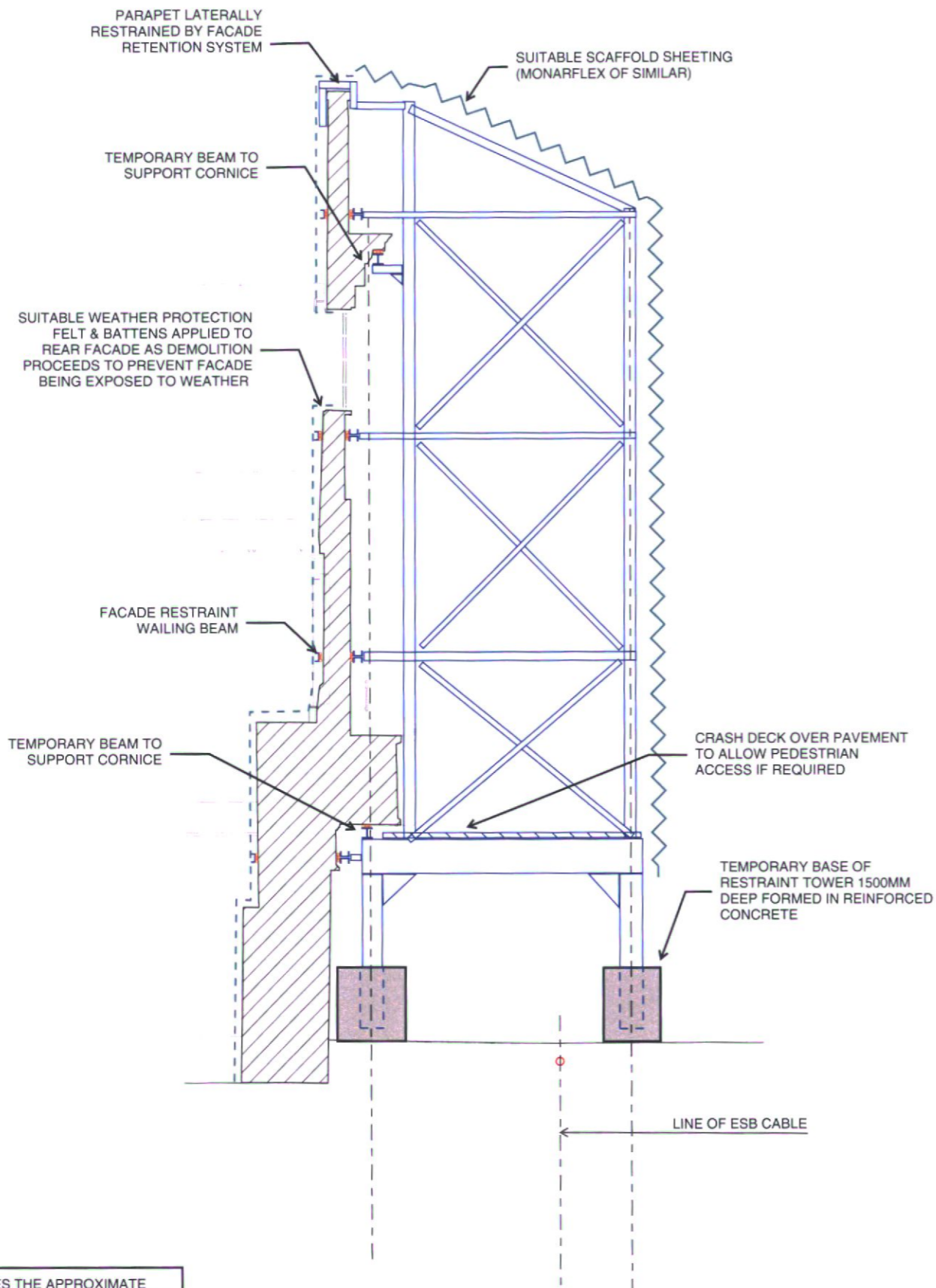
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PROJECT 19-021

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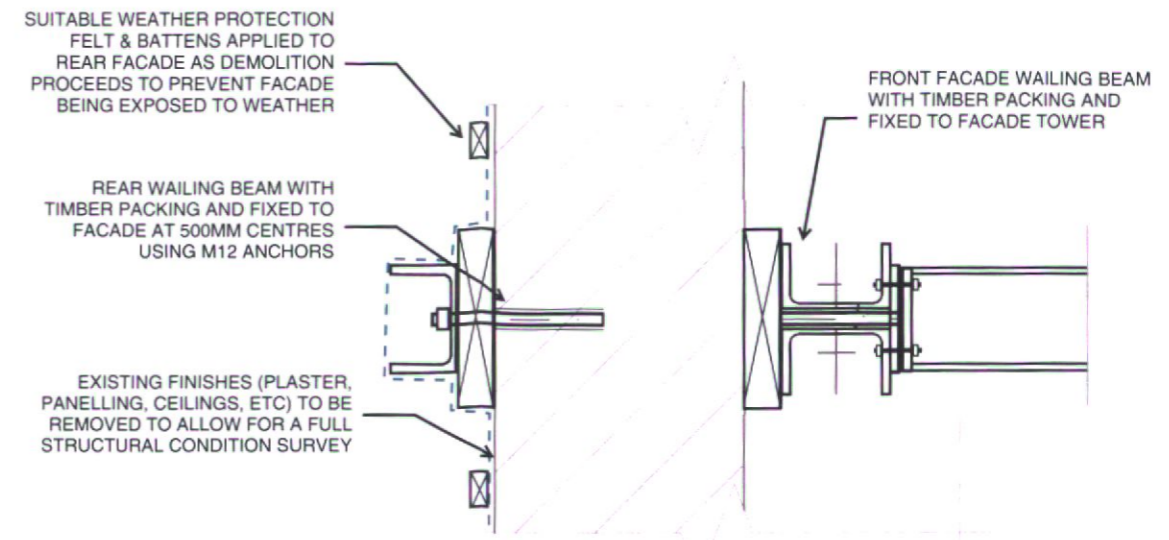
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DATE 05.07.2021	SCALE 1:100

DRAWING REFERENCE

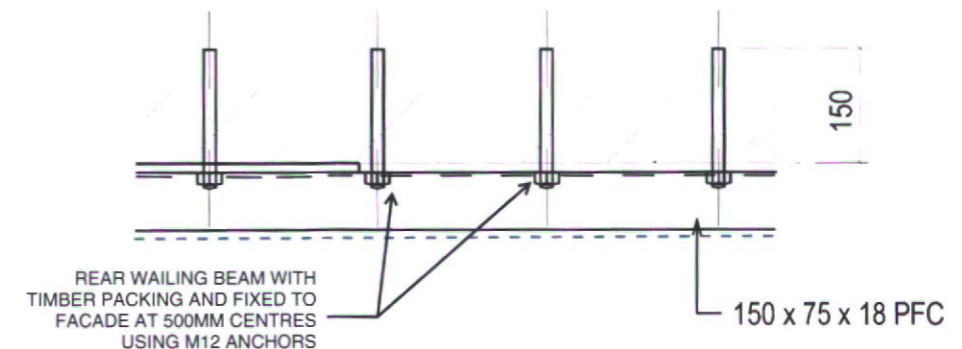
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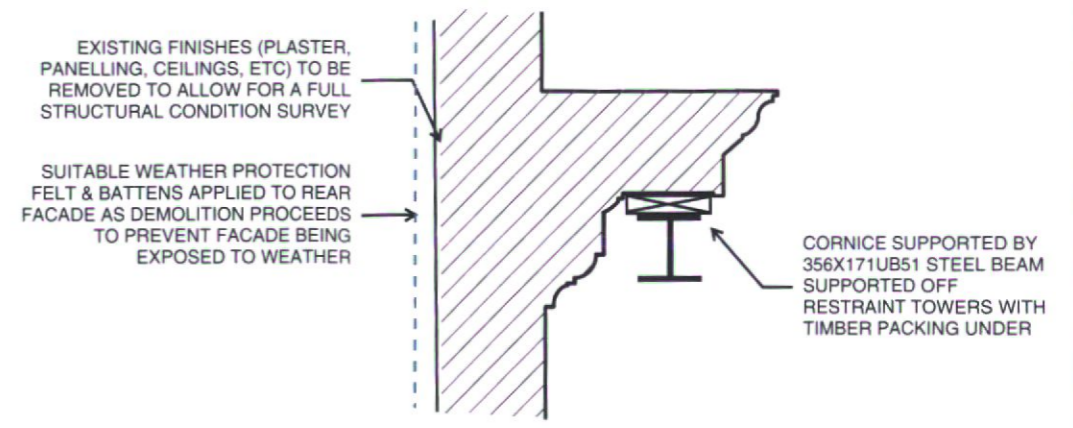
52-54 O'Connell Street Upper - Section
SCALE 1:100



PFC TO FACADE FIXING DETAIL - SECTION
SCALE - NTS



REAR FACADE FIXING DETAIL - PLAN
SCALE - NTS



CORNICE SUPPORT DETAIL - SECTION
SCALE - NTS

○ DENOTES THE APPROXIMATE LOCATION OF BELOW PAVEMENT SERVICES - LOCATION TO BE CONFIRMED ON SITE PRIOR TO WORKS COMMENCING

GENERAL NOTES

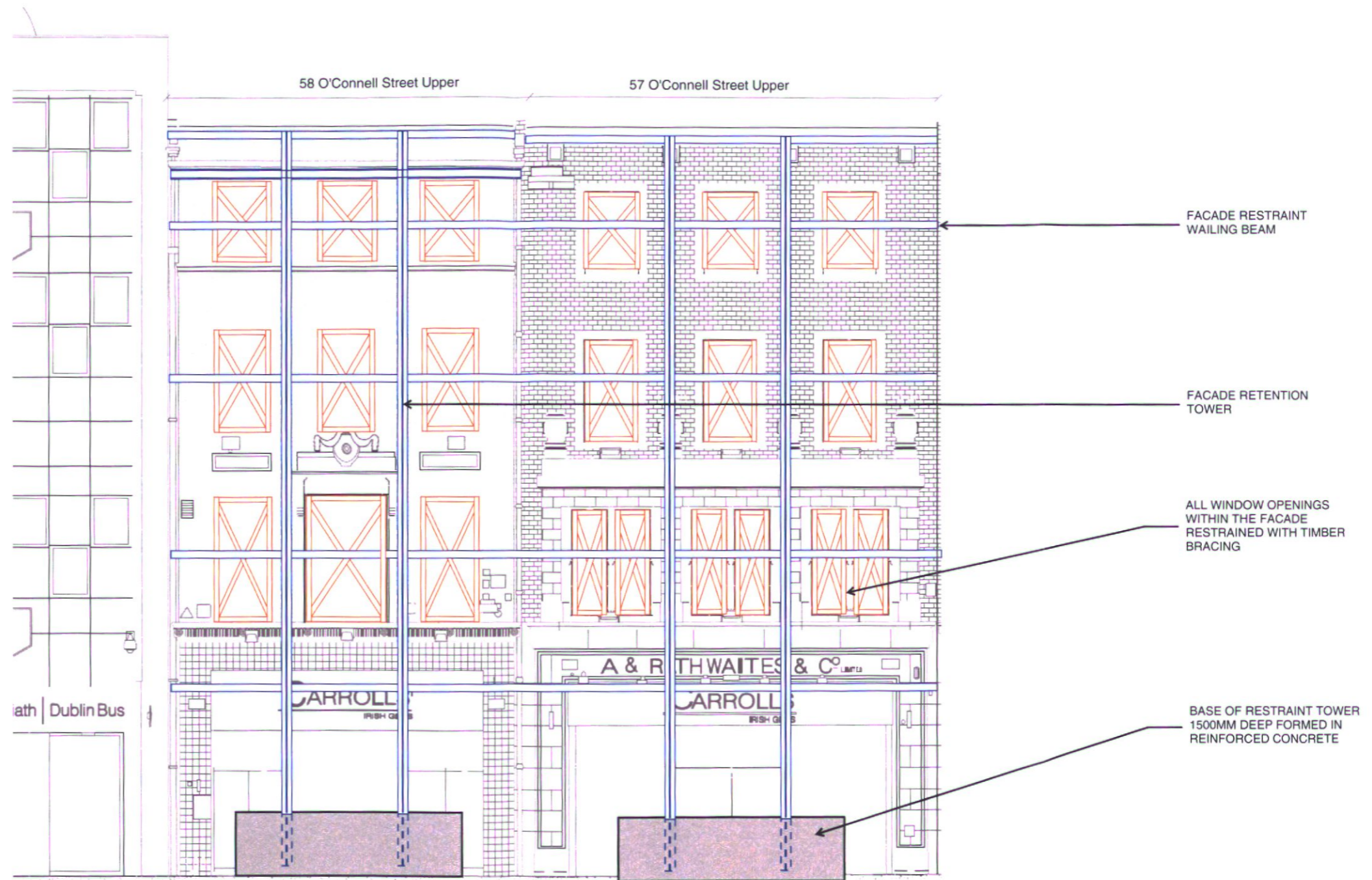
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TITLE		DRAWING STATUS	
52-54 O'Connell Street - Retained Facade Section & Details		INFORMATION	
PROJECT	Dublin Central	DRAWN	RN
CLIENT	Dublin Central GP Limited	DESIGNED	RN
		CHECKED	RO
		PROJECT	19-021
		DATE	05.07.2021
		SCALE	1:100
		DRAWING REFERENCE	WM-ZZ-ZZ-SK-S-013





57-58 O'Connell Street Upper - Elevation
SCALE 1:100

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TITLE

57-58 O'Connell Street - Retained
Facade Elevation

PROJECT

Dublin Central

CLIENT

Dublin Central GP Limited

DRAWING STATUS

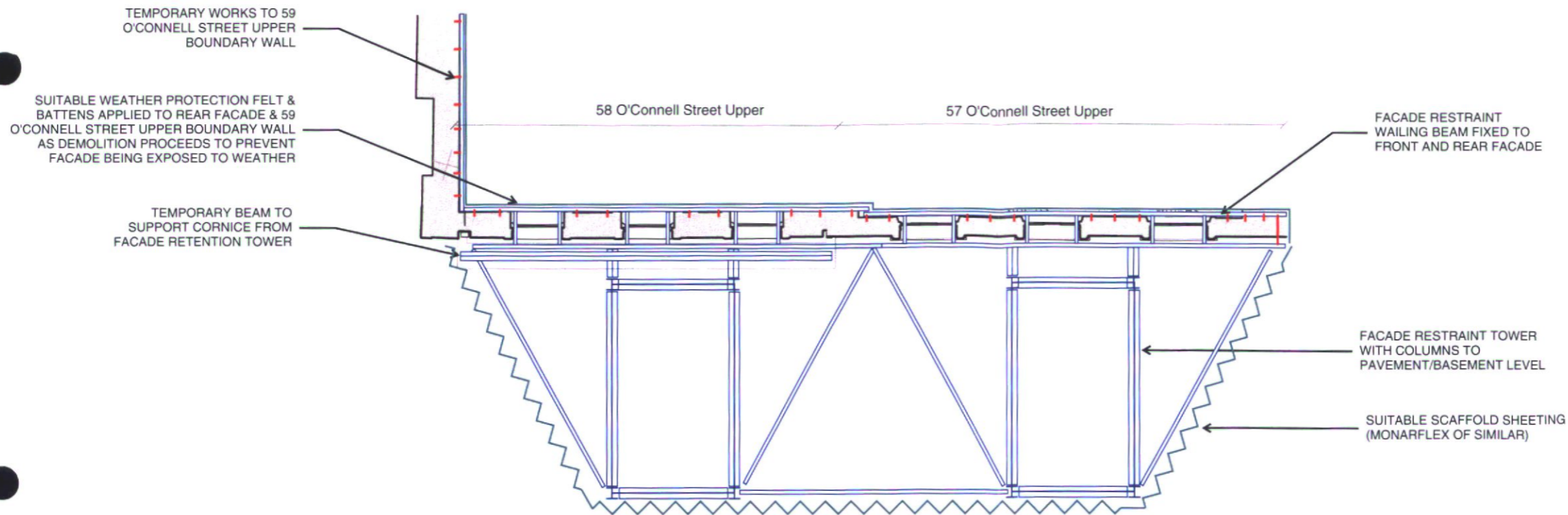
DRAWN RN
PROJECT 19-021

INFORMATION

DESIGNED RN	CHECKED RO
DATE 08.07.2021	SCALE 1:100

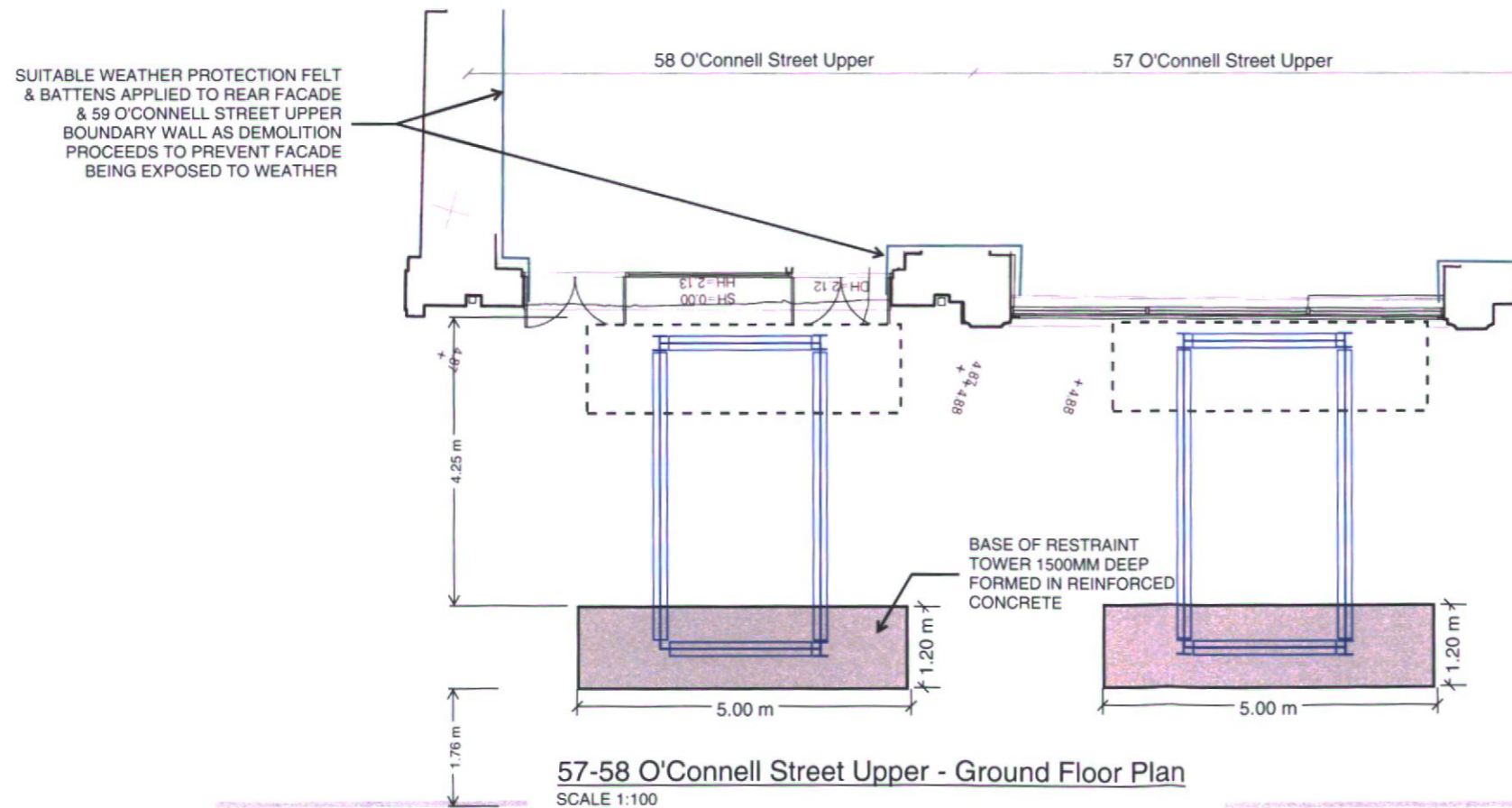
DRAWING REFERENCE

WM-ZZ-ZZ-SK-S-014



57-58 O'Connell Street Upper - Level 3 Plan

SCALE 1:100



57-58 O'Connell Street Upper - Ground Floor Plan

SCALE 1:100

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TITLE

57-58 O'Connell Street - Retained
Facade Plans

PROJECT

Dublin Central

CLIENT

Dublin Central GP Limited

DRAWING STATUS

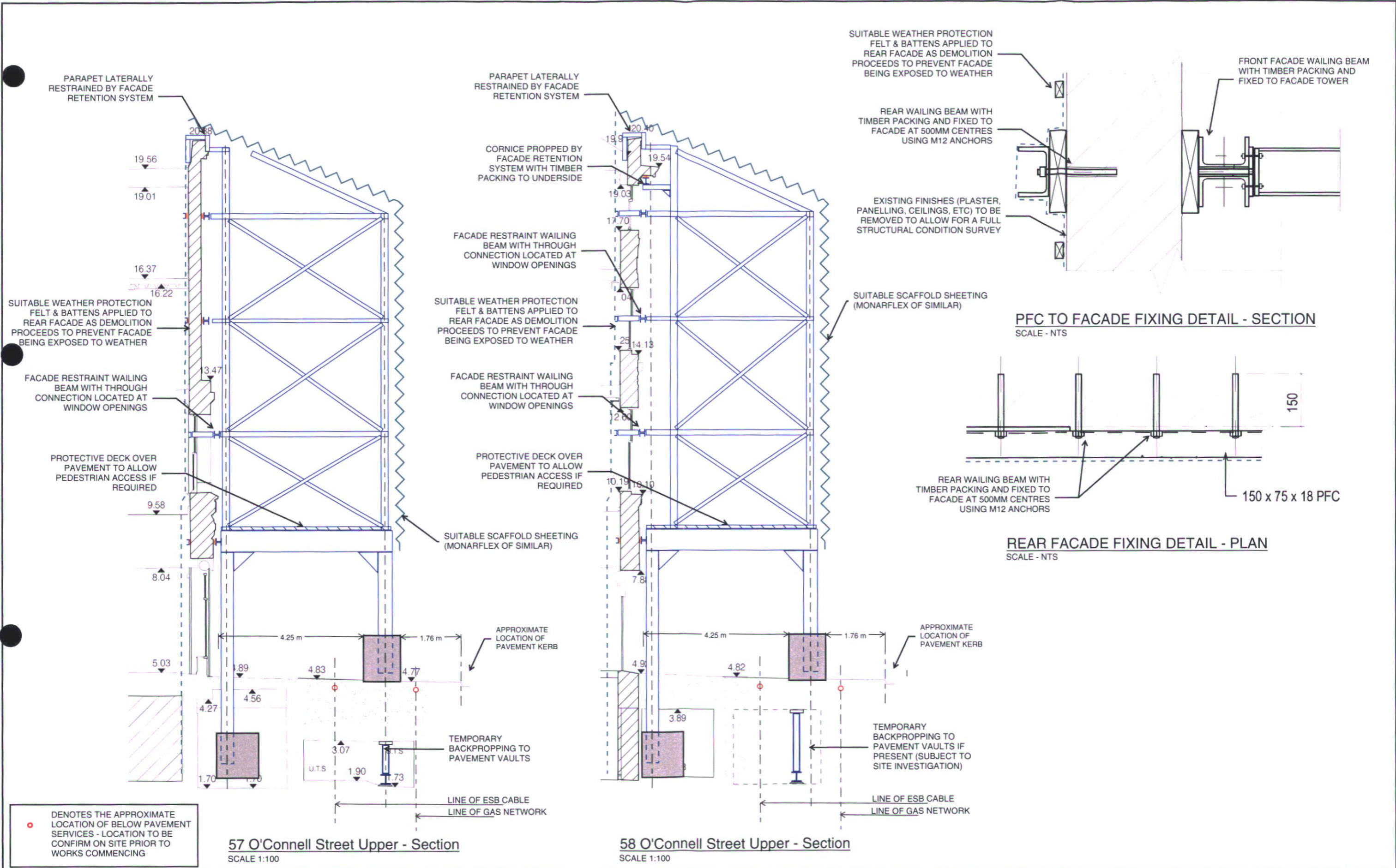
DRAWN RN
PROJECT 19-021

INFORMATION

DESIGNED RN
CHECKED RO
DATE 08.07.2021
SCALE 1:100

DRAWING REFERENCE

WM-ZZ-ZZ-SK-S-015



• DENOTES THE APPROXIMATE LOCATION OF BELOW PAVEMENT SERVICES - LOCATION TO BE CONFIRMED ON SITE PRIOR TO WORKS COMMENCING

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TITLE

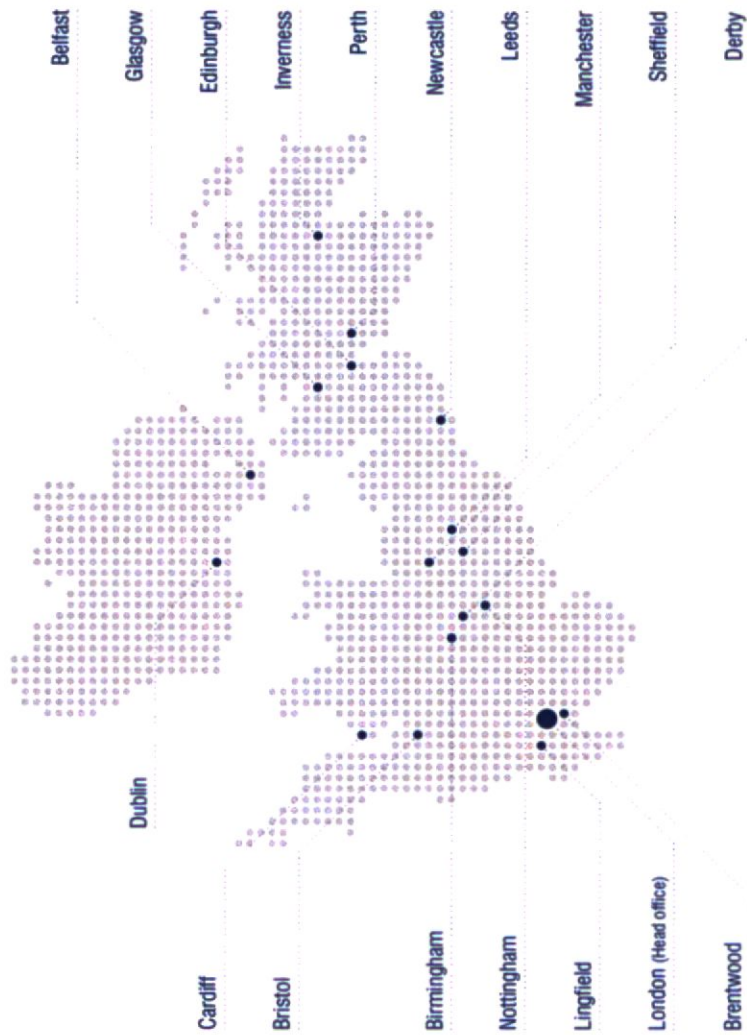
57-58 O'Connell Street - Retained Facade Section & Details

PROJECT Dublin Central

CLIENT Dublin Central GP Limited

DRAWING STATUS		INFORMATION			
DRAWN	RN	DESIGNED	RN	CHECKED	RO
PROJECT	19-021	DATE	08.07.2021	SCALE	1:100
DRAWING REFERENCE		WM-ZZ-ZZ-SK-S-016			

UK and Ireland Office Locations





APPENDIX 7.2

DUBLIN CENTRAL GROUND INVESTIGATION



CAUSEWAY
—
GEOTECH

Dublin Central Ground Investigation

Client: Dublin Central GP Ltd

Client's Representative: Waterman

Report No.: 22-0874

Date: March 2023

Status: Final for Issue

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Approved: ISO 9001 • ISO 14001 • OHSAS 18001



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Document Control Sheet




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APPENDICES

Appendix A	Site and exploratory hole location plans
Appendix B	Borehole logs
Appendix C	Core photographs
Appendix D	Pump test results
Appendix E	Geotechnical laboratory test results
Appendix F	Environmental laboratory test results
Appendix G	SPT hammer energy measurement report

Document Control Sheet

Report No.:		22-0874			
Project Title:		Dublin Central Ground Investigation			
Client:		Dublin Central GP Ltd			
Client's Representative:		Waterman			
Revision:	A00	Status:	Final for issue	Issue Date:	9 th March 2023
Prepared by:		Reviewed by:		Approved by:	
 Carin Cornwall BSc MSc PhD		 Sean Ross BSc MSc PGeo MIEI		 Darren O'Mahony BSc MSc MIEI EurGeol PGeo	

The works were conducted in accordance with:

British Standards Institute (2015) BS 5930:2015+A1:2020, Code of practice for ground investigations.

BS EN 1997-2: 2007: Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing.

Geotechnical Society of Ireland (2016), Specification & Related Documents for Ground Investigation in Ireland

Laboratory testing was conducted in accordance with:

British Standards Institute BS 1377:1990 parts 2, 4, 5, 7 and 9

METHODS OF DESCRIBING SOILS AND ROCKS

Soil and rock descriptions are based on the guidance in BS5930:2015+A1:2020, The Code of Practice for Ground Investigation.

Abbreviations used on exploratory hole logs	
U	Nominal 100mm diameter undisturbed open tube sample (thick walled sampler).
UT	Nominal 100mm diameter undisturbed open tube sample (thin walled sampler).
P	Nominal 100mm diameter undisturbed piston sample.
B	Bulk disturbed sample.
LB	Large bulk disturbed sample.
D	Small disturbed sample.
C	Core sub-sample (displayed in the Field Records column on the logs).
L	Liner sample from dynamic sampled borehole.
W	Water sample.
ES / EW	Soil sample for environmental testing / Water sample for environmental testing.
SPT (s)	Standard penetration test using a split spoon sampler (small disturbed sample obtained).
SPT (c)	Standard penetration test using 60 degree solid cone.
(x,x/x,x,x,x,x)	Blows per increment during the standard penetration test. The initial two values relate to the seating drive (150mm) and the remaining four to the 75mm increments of the test length.
(Y for Z/ Y for Z)	Incomplete standard penetration test where the full test length was not achieved. The blows 'X' represent the total blows for the given seating or test length 'Z' (mm).
N=X	SPT blow count 'N' given by the summation of the blows 'X' required to drive the full test length (300mm).
HVP / HVR	In situ hand vane test result (HVP) and vane test residual result (HVR). Results presented in kPa.
V	Shear vane test (borehole). Shear strength stated in kPa.
VR	V: undisturbed vane shear strength VR: remoulded vane shear strength
Soil consistency description	In cohesive soils, where samples are disturbed and there are no suitable laboratory tests, N values may be used to indicate consistency on borehole logs – a median relationship of $N \times 5 = C_u$ is used (as set out in Stroud & Butler 1975).
dd-mm-yyyy	Date at the end and start of shifts, shown at the relevant borehole depth. Corresponding casing and water depths shown in the adjacent columns.
▽	Water strike: initial depth of strike.
▼	Water strike: depth water rose to.
Abbreviations relating to rock core – reference Clause 36.4.4 of BS 5930: 2015+A1:2020	
TCR (%)	Total Core Recovery: Ratio of rock/soil core recovered (both solid and non-intact) to the total length of core run.
SCR (%)	Solid Core Recovery: Ratio of solid core to the total length of core run. Solid core has a full diameter, uninterrupted by natural discontinuities, but not necessarily a full circumference and is measured along the core axis between natural fractures.
RQD (%)	Rock Quality Designation: Ratio of total length of solid core pieces greater than 100mm to the total length of core run.
FI	Fracture Index: Number of natural discontinuities per metre over an indicated length of core of similar intensity of fracturing.
NI	Non Intact: Used where the rock material was recovered fragmented, for example as fine to coarse gravel size particles.
AZCL	Assessed zone of core loss: The estimated depth range where core was not recovered.
DIF	Drilling induced fracture: A fracture of non-geological origin brought about by the rock coring.
(xxx/xxx/xxx)	Spacing between discontinuities (minimum/average/maximum) measured in millimetres.

Dublin Central Ground Investigation

1 AUTHORITY

On the instructions of Waterman Consulting Engineers, (“the Client’s Representative”), acting on the behalf of Dublin Central GP Ltd (“the Client”), a ground investigation was undertaken at the above location to provide geotechnical and environmental information for input to the design and construction of a proposed mixed-use development.

This report details the work carried out both on site and in the geotechnical and chemical testing laboratories; it contains a description of the site and the works undertaken, the exploratory hole logs and the laboratory test results.

All information given in this report is based upon the ground conditions encountered during the ground investigation works and on the results of the field tests performed. However, there may be conditions at the site that have not been taken into account, such as unpredictable soil strata, contaminant concentrations, and water conditions between or below exploratory holes. It should be noted that groundwater levels usually vary due to seasonal and/or other effects and may at times differ to those recorded during the investigation. No responsibility can be taken for conditions not encountered through the scope of work commissioned, for example between exploratory hole points, or beneath the termination depths achieved.

This report was prepared by Causeway Geotech Ltd for the use of the Client and the Client’s Representative in response to a particular set of instructions. Any other parties using the information contained in this report do so at their own risk and any duty of care to those parties is excluded.

2 SCOPE

The extent of the investigation, as instructed by the Client’s Representative, included boreholes, soil sampling, in-situ and laboratory testing, and the preparation of a factual report on the findings.

3 DESCRIPTION OF SITE

As shown on the site location plan in Appendix A, the works were conducted across commercial properties located north of River Liffey in Dublin. The site is bordered by Parnell Street to the north, Henry Street to the south, Moore Street to the west, and O’Connell Street Upper to the east.

4 SITE OPERATIONS

4.1 Summary of site works

Site operations, which were conducted between 14th November 2022 and 27th January 2023, comprised:

- nine boreholes by sonic drilling techniques
- standpipe installations in nine boreholes
- one pump test.

The exploratory holes and in-situ tests were located as instructed by the Client's Representative, and as shown on the exploratory hole location plan in Appendix A.

4.2 Boreholes

Nine boreholes (DC-BH101-DC-BH108 and DC-BH110) were put to their completion by sonic drilling techniques only. The boreholes were completed using a Fraste CRS XL Duo rubber-tracked sonic drilling rig. DC-BH109 was not completed due to access restrictions.

Hand dug inspection pits were carried out between ground level and 1.20m depth to ensure boreholes were put down at locations clear of services or subsurface obstructions. Fully cased sonic drilling techniques were employed to advance the boreholes of nominal 180mm diameter to a specific depth after which Geobor-S coring was undertaken with core recovery in overburden and bedrock strata.

Standard penetration tests were carried out in accordance with BS EN 22476-3:2005+A1:2011 at standard depth intervals throughout the overburden using the split spoon sampler (SPT_(s)) or solid cone attachment (SPT_(c)). The penetrations are stated for those tests for which the full 150mm seating drive or 300mm test drive was not possible. The N-values provided on the borehole logs are uncorrected and no allowance has been made for energy ratio corrections. The SPT hammer energy measurement report is provided in Appendix G.

The disturbed sonic samples were placed a rigid core liner in single channel wooden core boxes. They were then photographed and examined by a qualified and experienced Engineering Geologist, thus enabling the production of an engineering log in accordance with BS 5930: 2015: Code of practice for ground investigations.

Environmental samples were taken at suitable depths as instructed by the Client's Representative.

Where coring was carried out within overburden and bedrock strata, Geobor S Coring was used. The core was extracted in up to 1.5m lengths using an SK6L core barrel, which produced core of nominal 102mm diameter, and was placed in single channel wooden core boxes.

Appendix B presents the borehole logs, with core photographs presented in Appendix C.

4.3 Standpipe installations

A groundwater monitoring standpipe was installed in at depths as shown below in Table 1.

Table 1 Summary of standpipe installations

GI Ref	Type	Depth Range (mbgl)
DC-BH101	50mm standpipe	4.00-13.00
DC-BH102	50mm standpipe	0.50-13.00
DC-BH103	50mm standpipe	4.50-14.60
	50mm standpipe	20.00-25.00
DC-BH104	125mm standpipe	22.00-40.00
DC-BH105	50mm standpipe	4.00-15.00
	50mm standpipe	20.00-30.00
DC-BH106	50mm standpipe	0.50-9.00
	50mm standpipe	15.00-25.00
DC-BH107	50mm standpipe	0.50-12.00
DC-BH108	50mm standpipe	1.50-13.00
DC-BH110	50mm standpipe	0.50-8.00
	50mm standpipe	20.50-23.50

Details of the installations, including the depth range of the response zone, are provided in Appendix B on the individual borehole logs.

4.4 Pump tests

Three step test and one continuous rate pump test (CRT) Pump tests were undertaken withing DC-BH104 in accordance with BS EN ISO 22282-2:201 after the installation of a 100mm groundwater well.

Monitoring of nearby standpipes was carried out using manual dip-meters and digital data loggers to measure “drawdown” of the groundwater during tests.

Results of pump tests are presented in Appendix D and issued electronically to the Client.

5 LABORATORY WORK

Upon their receipt in the laboratory, all disturbed samples were carefully examined and accurately described, and their descriptions incorporated into the borehole logs.

5.1 Geotechnical laboratory testing of soils

Laboratory testing of soils comprised:

- **soil classification:** moisture content measurement, Atterberg Limit tests and particle size distribution analysis.
- **soil chemistry:** BRE suite B and D

Laboratory testing of soils samples was carried out in accordance with British Standards Institute: *BS 1377, Methods of test for soils for civil engineering purposes; Part 1 (2016), and Parts 2-9 (1990)*.

The test results are presented in Appendix E.

5.2 Environmental laboratory testing of soils

Environmental testing, as specified by the Client's Representative was conducted on selected environmental soil samples by Chemtest at its laboratory in Newmarket, Suffolk.

Testing was carried out for a range of determinants, including:

- Metals
- Speciated total petroleum hydrocarbons (TPH)
- Speciated polycyclic aromatic hydrocarbons (PAH)
- BTEX compounds
- Polychlorinated biphenyls (PCBs)
- Phenols
- Organic matter
- Cyanides
- Asbestos screen
- Sulphate and sulphide
- pH
- Waste acceptance criteria (WAC)

Results of environmental laboratory testing are presented in Appendix F.



6 GROUND CONDITIONS

6.1 General geology of the area

Published Geological Survey of Ireland (GSI) geological mapping indicates the superficial deposits across the site consist of made ground and alluvium. The site sites within the Pre-Glacial Liffey channel which runs approximately NW-SE in the vicinity of O'Connell Street and comprises fluvioglacial sands and gravels glaciofluvial sands and gravels. These deposits are underlain by limestones and mudstones of the Lucan Formation.

6.2 Ground types encountered during investigation of the site

A summary of the ground types encountered in the exploratory holes is listed below, in approximate stratigraphic order:

- **Paved surface:** DC-BH105-108 and DC-BH110 encountered 100-250mm of concrete surfacing. In addition, DC-BH103 encountered 70mm of bitmac surfacing.
- **Made Ground (fill):** reworked sandy gravelly clay/silt or sandy clayey gravel or gravelly clayey sand fill encountered across the site to a maximum depth of 4.90m in BDC-BH102. Anthropogenic material comprising varying fragments of red brick, concrete, wood, steel, rebar and plastic was encountered across the site within the made ground.
- **Fluvioglacial deposits:** typically medium dense to dense sands and gravels with varying cobble content encountered across the site to a maximum depth of 21.10m in DC-BH104 generally overlying glacial till.
- **Glacial Till:** sandy gravelly clay, frequently with low cobble content, generally stiff underlying fluvioglacial deposits and overlying bedrock to a maximum depth of 23.25m in DC-BH104.
- **Bedrock (Limestone):** Extremely weak to medium strong grey limestone encountered at depths ranging from 14.65m in DC-BH108 to 23.25m in DC-BH104.

6.3 Groundwater

Details of the individual groundwater strikes, along with any relative changes in levels as works proceeded, are presented on the exploratory hole logs for each location.

Groundwater was encountered during drilling as water strikes at depths of 5.00 and 20.50m in DC-BH103.

Groundwater was not noted during drilling at any of the other borehole locations. However, it should be noted that the casing used in supporting the borehole walls during drilling may have sealed out any or additional groundwater strikes and the possibility of encountering groundwater at other depths during excavation works should not be ruled out.

It should be noted that any groundwater strikes within the overburden and bedrock may have been masked by the fluid used as the drilling flush medium.

Seasonal variation in groundwater levels should also be factored into design considerations and continued monitoring of the two installed standpipes will give an indication of the seasonal variation.

7 REFERENCES

Geotechnical Society of Ireland (2016), Specification & Related Documents for Ground Investigation in Ireland.

IS EN 1997-2: 2007: Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing. National Standards Authority of Ireland.

BS 5930: 2015+A1:2020: Code of practice for ground investigations. British Standards Institution.

BS EN ISO 14688-1:2018: Geotechnical investigation and testing. Identification and classification of soil. Part 1 Identification and description.

BS EN ISO 14688-2:2018: Geotechnical investigation and testing. Identification and classification of soil. Part 2 Principles for a classification.

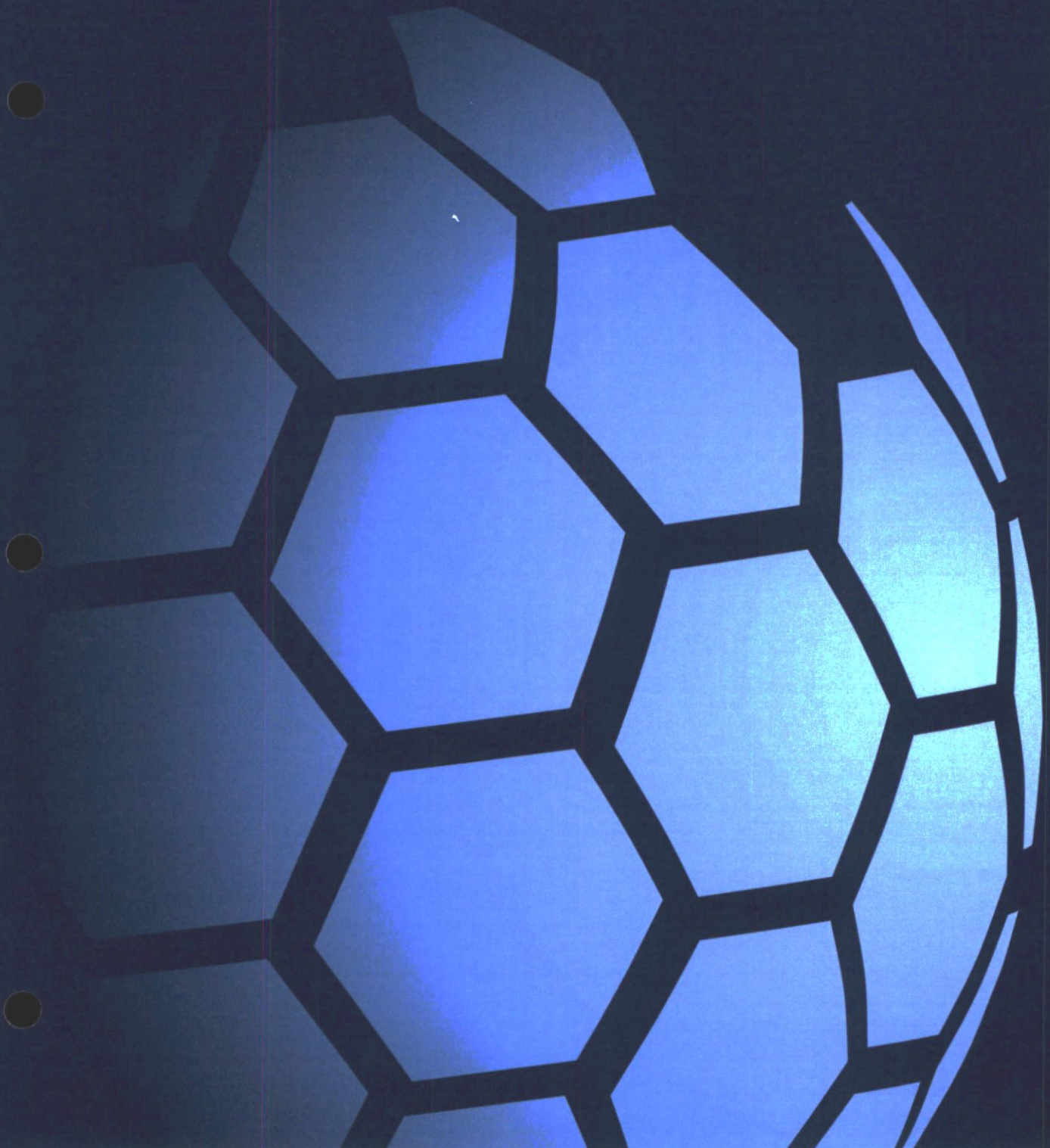
BS 1377: 1990: Methods of test for soils for civil engineering purposes. British Standards Institution.

BS EN ISO 22476-3:2005+A1:2011: Geotechnical investigation and testing. Field testing. Standard penetration test.



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APPENDIX A
SITE AND EXPLORATORY HOLE LOCATION PLANS

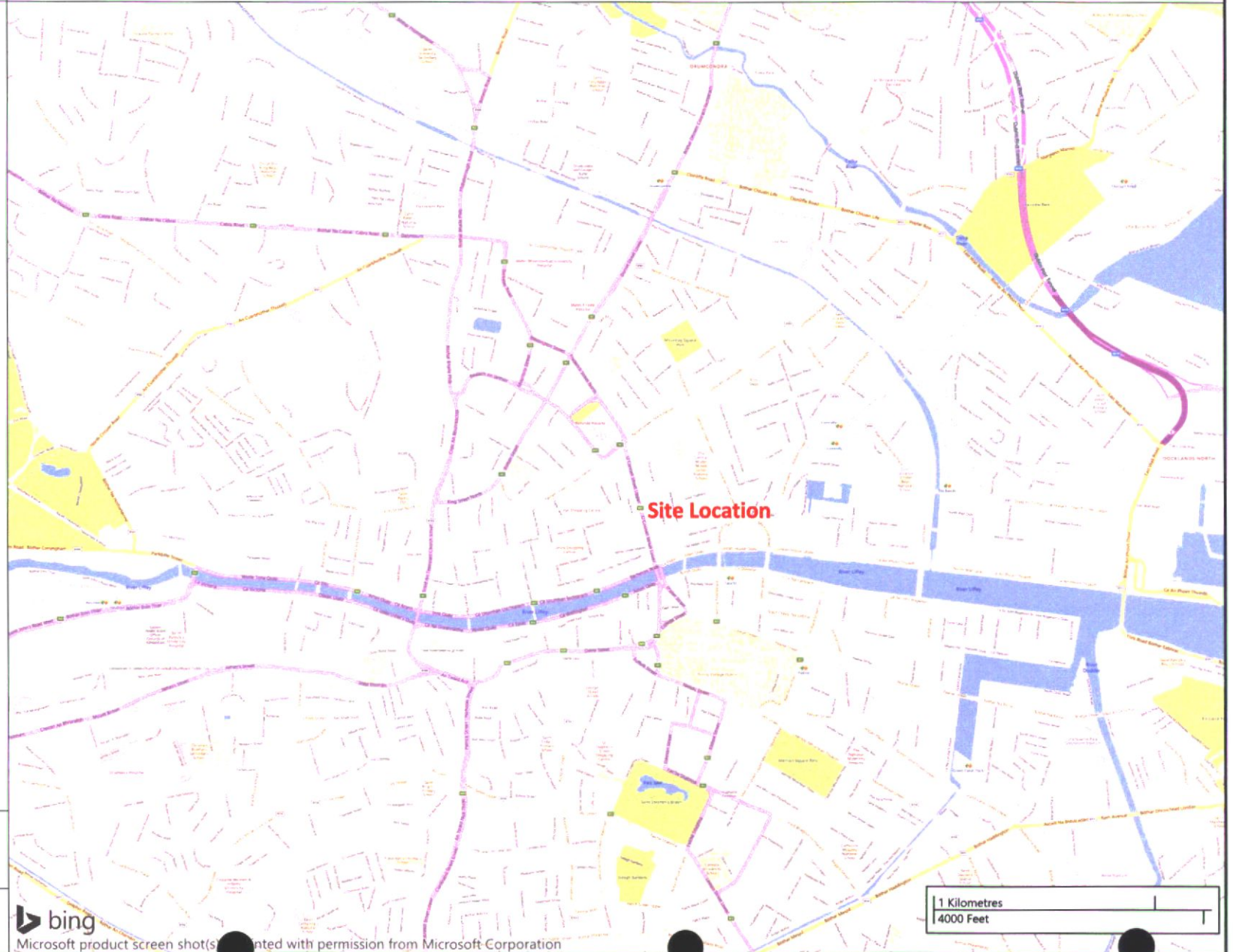




Project No.: 22-0874
Project Name: Dublin Central Ground Investigation

Client: Dublin Central GP Ltd
Client's Representative: Waterman

Legend Key



Title:
Site Location Plan

Last Revised:
24/07/2023

Scale:
1:25000



Microsoft product screen shot(s) presented with permission from Microsoft Corporation



Project No.: 22-0874
Project Name: Dublin Central Ground Investigation

Client: Dublin Central GP Ltd
Client's Representative: Waterman

Legend Key

 Locations By Type - SNC



Title:
Exploratory Hole Location Plan

Last Revised:
24/02/2023

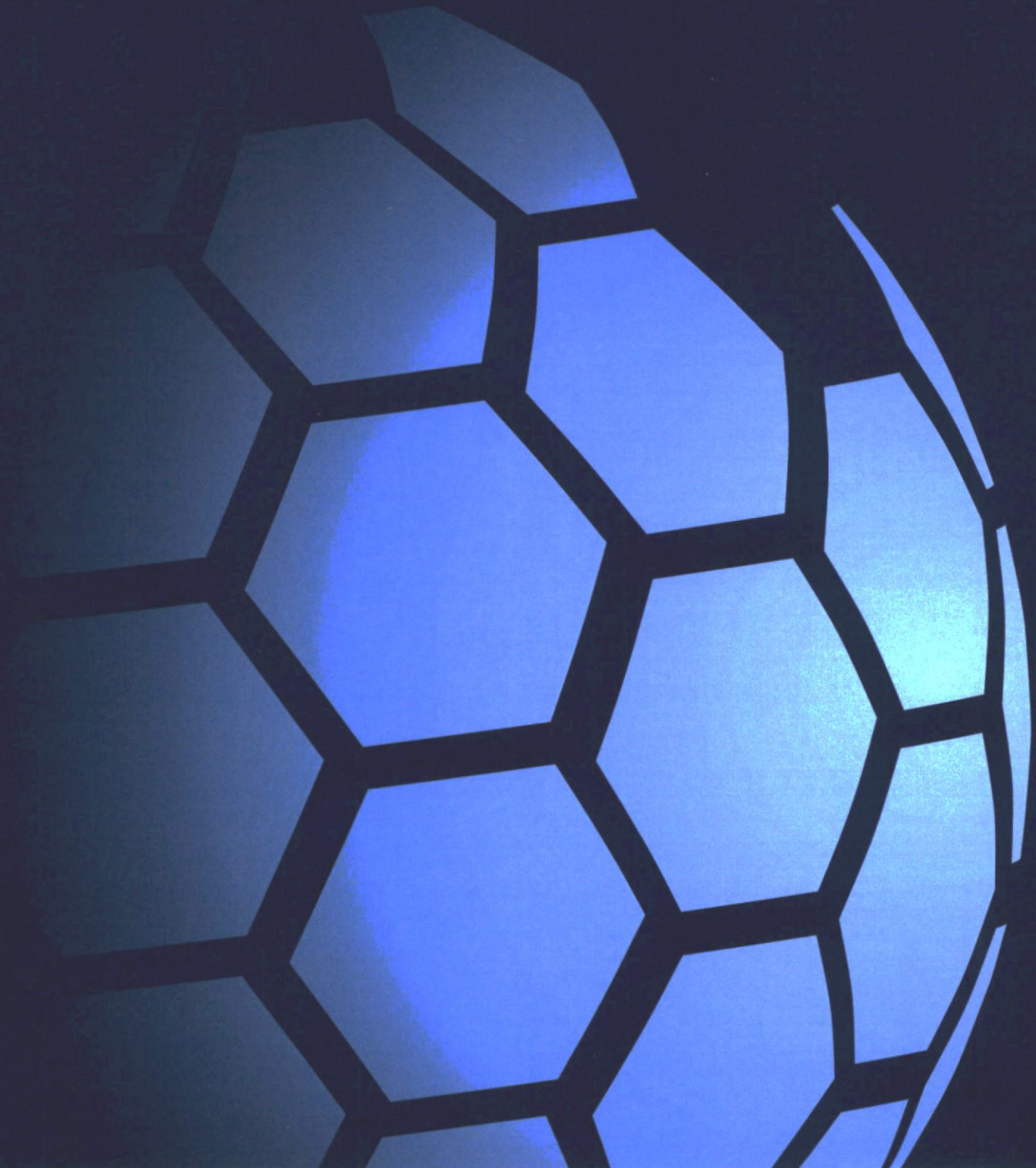
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APPENDIX B
BOREHOLE LOGS





Project No.
22-0874

Project Name: Dublin Central Ground Investigation

Borehole ID
DC-BH101

Client: Dublin Central GP Ltd

Client's Rep: Waterman

Sheet 1 of 5
Scale: 1:50

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth: 40.00 m	Start Date: 14/12/2022	Driller: KW/ AG	FINAL
Sonic Drilling Rotary Coring	Fraste XL Duo Fraste XL Duo	0.00 15.00	15.00 40.00	715700.59 E 734928.65 N	Elevation: 2.10 mOD	End Date: 21/12/2022	Logger: CMc +SMC	

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
0.50	ES1							MADE GROUND: Very loose to loose greyish brown sandy clayey subangular to subrounded fine to coarse GRAVEL of various lithologies with low cobble and boulder content and fragments of red brick and concrete. Sand is fine to coarse. Cobbles and boulders are subangular to subrounded of predominantly limestone.		
1.00	ES2									
1.20 - 1.65	SPT (C)	N=4 (1,0/0,1,1,2) Hammer SN = 1398								
2.00	ES3									
3.00	ES4				-0.70	2.80		MADE GROUND: Medium dense dark grey speckled white and blue sandy slightly silty subangular to subrounded fine to coarse GRAVEL of predominantly limestone. Sand is fine to coarse.		
3.00 - 3.45	SPT (C)	N=11 (1,3/2,2,3,4) Hammer SN = 1398	3.00	2.80						
4.00	ES5				-2.00	4.10		Medium dense grey speckled white and orange sandy silty subangular to subrounded fine to coarse GRAVEL of predominantly limestone with low cobble content. Sand is fine to coarse. Cobbles are subrounded of limestone.		
4.50 - 4.95	SPT (C)	N=19 (2,2/4,4,5,6) Hammer SN = 1398	4.50	4.00						
5.00	B10									
5.00	ES6									
6.00	B11									
6.00 - 6.45	SPT (C)	N=25 (2,2/5,6,6,8) Hammer SN = 1398	6.00	5.00						
7.00	B12									
7.50 - 7.95	SPT (C)	N=28 (3,3/5,5,8,10) Hammer SN = 1398	7.50	5.00						
8.00	B13									
8.00	ES7									
9.00	B14				-6.90	9.00		Dense greyish brown sandy slightly silty subrounded fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subrounded of limestone.		
9.00 - 9.45	SPT (C)	N=41 (3,4/9,10,10,12) Hammer SN = 1398	9.00	5.00						

Water Strikes				Remarks
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	
				Hand dug inspection pit excavated to 1.20m. No groundwater encountered.
Casing Details		Water Added		
To (m)	Diam (mm)	From (m)	To (m)	
15.00	183	0.00	40.00	
40.00	146			
Core Barrel	Flush Type	Termination Reason	Last Updated	
SK6L	Water	Terminated at scheduled depth.	08/03/2023	





Project No.
22-0874

Project Name: Dublin Central Ground Investigation

Borehole ID
DC-BH101

Client: Dublin Central GP Ltd

Client's Rep: Waterman

Sheet 2 of 5
Scale: 1:50

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth:	Start Date:	Driller:	Logger:	FINAL
Sonic Drilling Rotary Coring	Fraste XL Duo Fraste XL Duo	0.00 15.00	15.00 40.00	715700.59 E 734928.65 N	40.00 m	14/12/2022	KW/ AG		
					Elevation:	End Date:			
					2.10 mOD	21/12/2022			

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
10.00	B15							Dense greyish brown sandy slightly silty subrounded fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subrounded of limestone.		
10.50 - 10.78	SPT (C)	N=50 (8,10/50 for 131mm) Hammer SN = 1398	10.5	5.00	-8.40	10.50		Very dense grey sandy slightly silty subangular to subrounded fine to coarse GRAVEL of predominantly limestone with low cobble content. Sand is fine to coarse. Cobbles are subangular to subrounded of limestone.		
11.00	ES8									
11.50	B16									
12.00 - 12.40	SPT (C)	N=50 (11,13/50 for 253mm) Hammer SN = 1398	12.0	5.00						
13.00	B17									
13.50 - 13.86	SPT (C)	N=50 (8,12/50 for 207mm) Hammer SN = 1398	13.5	5.00	-11.40	13.50		Very stiff grey slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of predominantly limestone. Cobbles are subangular to subrounded of limestone.		
14.00	ES9									
14.50	B18									
15.00	D19		15.0	5.00	-12.90	15.00		Very stiff brown slightly gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of various lithologies.		
15.00 - 16.50	C20									
15.00 - 15.20	SPT(C) N=50 (25 for 95mm/50 for 106mm) Hammer SN = 1398	100 0 0								
16.50	C21		16.5	1.00		(3.30)		16.50-16.85m: Slightly gravelly sandy clay.		
16.50 - 18.00	SPT(C) N=50 (25 for 98mm/50 for 69mm) Hammer SN = 1398	100 0 0								
18.00	C22		18.5	1.00						
18.00 - 19.50					-16.20	18.30		Very stiff brown slightly gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is subangular fine of various lithologies.		
		TCR SCR RQD FI								

Water Strikes				Remarks			
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)				
				Hand dug inspection pit excavated to 1.20m. No groundwater encountered.			
Casing Details		Water Added		Core Barrel	Flush Type	Termination Reason	Last Updated
To (m)	Diam (mm)	From (m)	To (m)				
15.00	183	0.00	40.00				
40.00	146			SK6L	Water	Terminated at scheduled depth.	08/03/2023





Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth:	Start Date:	Driller:	Sheet 3 of 5 Scale: 1:50
Sonic Drilling Rotary Coring	Fraсте XL Duo Fraсте XL Duo	0.00 15.00	15.00 40.00	715700.59 E 734928.65 N	40.00 m	14/12/2022	KW/ AG	
					Elevation:	End Date:	Logger:	FINAL
					2.10 mOD	21/12/2022	CMc +SMC	

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
18.00 - 18.29	SPT(C) N=50 (10,12/50 for 136mm) Hammer SN = 1398	100	0	0	N/A			-16.90	(0.70) 19.00		Very stiff brown slightly gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is subangular fine of various lithologies.		
19.50 19.50 - 21.00	C23				N/A			-17.85	(0.95) 19.95		Very stiff brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular fine to coarse of limestone.		
21.00		87	51	39					19.95		Moderately weak (locally medium strong) dark grey LIMESTONE with occasional white calcite veins (up to 20mm thick) and occasional brassy yellow pyrite mineralisation. Slightly to moderately weathered: slightly reduced strength, localised significantly reduced strength, closer fracture spacing, clay infill on the occasional fracture surfaces, orangish brown staining on some fracture surfaces.		
22.50		100	100	49							Discontinuities: 1. 10-25 degree bedding fractures, closely spaced (10/145/580), planar, smooth, patchy orangish brown staining on some fracture surfaces, patchy pyrite mineralisation on some bedding fractures. 2. 45-60 degree joints, widely spaced (200/1180/3000), planar, rough, orangish brown staining on most joint surfaces. 3. 70-90 degree joints from 21.00-21.35m, 21.65-21.80m, 22.70-22.90m, 24.45-24.65m, 28.75-28.90m, 33.00-33.25m, 34.50-35.25m and 35.35-35.75m, planar, rough, orangish brown staining on joint surfaces. <i>20.80-20.85m Gravelly clay infill on fracture surface</i>		
24.00		100	100	53	10								
25.50		100	97	39							<i>24.60-24.65m Gravelly clay infill on fracture surface</i>		
27.00		100	100	93									
		100	100	97									
		TCR	SCR	RQD	FI								

Water Strikes			Chiselling Details			Remarks Hand dug inspection pit excavated to 1.20m. No groundwater encountered.	
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)		Time (hh:mm)
Casing Details		Water Added		Core Barrel	Flush Type	Termination Reason	Last Updated
To (m)	Diam (mm)	From (m)	To (m)				
15.00	183	0.00	40.00	SK6L	Water	Terminated at scheduled depth.	08/03/2023
40.00	146						





Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth:	Start Date:	Driller:	Logger:	FINAL
Sonic Drilling Rotary Coring	Fraste XL Duo Fraste XL Duo	0.00 15.00	15.00 40.00	715700.59 E 734928.65 N	40.00 m	14/12/2022	KW/ AG		
					Elevation:	End Date:			
					2.10 mOD	21/12/2022			

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill	
28.50											Moderately weak (locally medium strong) dark grey LIMESTONE with occasional white calcite veins (up to 20mm thick) and occasional brassy yellow pyrite mineralisation. Slightly to moderately weathered: slightly reduced strength, localised significantly reduced strength, closer fracture spacing, clay infill on the occasional fracture surfaces, orangish brown staining on some fracture surfaces. Discontinuities: 1. 10-25 degree bedding fractures, closely spaced (10/145/580), planar, smooth, patchy orangish brown staining on some fracture surfaces, patchy pyrite mineralisation on some bedding fractures. 2. 45-60 degree joints, widely spaced (200/1180/3000), planar, rough, orangish brown staining on most joint surfaces. 3. 70-90 degree joints from 21.00-21.35m, 21.65-21.80m, 22.70-22.90m, 24.45-24.65m, 28.75-28.90m, 33.00-33.25m, 34.50-35.25m and 35.35-35.75m, planar, rough, orangish brown staining on joint surfaces.			
		100	100	89										
30.00					6									
		100	100	81										
31.50														
		100	100	52										
33.00									(20.05)					
		100	100	85										
34.50					7									
		97	97	93										
36.00														
		100	100	78										
		TCR	SCR	RQD	FI									

Water Strikes				Chiselling Details			Remarks
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)	
Casing Details		Water Added					
To (m)	Diam (mm)	From (m)	To (m)				
15.00	183	0.00	40.00				
40.00	146						
				Core Barrel	Flush Type	Termination Reason	Last Updated
				SK6L	Water	Terminated at scheduled depth.	08/03/2023

