Appendix 6 – Technical Notes

Source: Dublin Airport

DUBLIN AIRPORT

Technical Note 001

Airbridges

CIP2020+ Airbridges Rates Review

Revision: 0.0

To: Commission for Aviation Regulation

From: Daa – amd (CIP2020 Team)

Date: 18/06/2019

Re: Response to Dublin Airport CIP2020 Efficiency Assessment (Steer - May 2019)

The purpose of this technical note is to provide further detail on the rates included within the CIP estimates for the airbridges. As noted within the Steer site visit to Dublin Airport on Thursday 13th June 2019, Steer had queries on manufacturer and specification of airbridges which have been assumed within the Dublin Airport Estimates and what is installed at Dublin Airport at present.

The variance between Dublin Airports rate of €XXXX/Item and Steers rate of €XXXX/Item equates to a direct rate variance of **€5.6m** across **3no**. projects which are noted below:

Project No.	Project	Dublin Airport Rate (each)	Steer Rate (each)
CIP.20.03.029	New Pier 5 (T2 and CBP Enabled)	XXXXXX	XXXXXX
CIP.20.03.043A	Terminal 1 Piers - New Airbridges (6NBE / 3WB)	XXXXXX	XXXXXX
CIP.20.03.051B	West Apron Vehicle Underpass - Pier 3	XXXXXX	XXXXXX

Following some queries raised during our presentation, we have further reviewed the manufacturer of the current airbridges at Dublin Airport. Dublin Airport can confirm that all the current airbridges in operation are manufactured by John Bean Technologies (JBT) as discussed during Steer's site visit. There are currently ~27 Airbridges in operation at Dublin Airport deployed in Pier 4 and Pier 3. They are all 3 section tunnel models with varying detailed specifications. Dublin Airport are in the process of reviewing this further to determine the different specifications of airbridge which are in use.

All our airbridges are JBT, when we have needed additional airbridges we used JBT to ensure consistency of spares, use by staff (i.e. training) etc. In the context of airbridge refurbishment we therefore have no option but to continue to use JBT. For new airbridges Dublin Airport will continue with the same supplier to ensure efficiency and robustness of operations, for what is a critical forward facing piece of infrastructure.

As discussed during our presentation the most recent airbridge purchased by Dublin Airport was in 2016 which is the basis of the rate in our estimate of €XXXXX per item which was supplied and installed by JBT. Dublin Airport Asset Care Department have advised that it their preference to utilise JBT airbridges for maintenance and operational purposes.

Figure 1 3 tunnel section airbridges used in Pier 4 & Pier 3

Dublin Airport are also re-engaging with the supplier to further review the costs of the airbridges required under the CIP 2020-2024. Dublin Airport will share this information in due course.

Figure 2 JBT – Airbridge Refurbishment Invoice (€XXXXX– dated 2016)

Figure 3 JBT – Airbridge Invoice (Sub-total €XXXXXX– Not Including cabling & ancillary Costs – Total €XXXXX– dated 2016)

DUBLIN AIRPORT

Technical Note 002

Fitout

CIP2020+ Fit-Out Rate Review

Revision: 0.0

To: Commission for Aviation Regulation

From: Daa – amd (CIP2020 Team)

Date: 18/06/2019

Re: Response to Dublin Airport CIP2020 Efficiency Assessment (Steer - May 2019)

The purpose of this technical note is to provide further detail on the rates and quantities included within the CIP estimates. As noted within the Steer site visit to Dublin Airport on Thursday 13th June 2019, there are some items which are unclear to Steer when making their cost efficiency assessment. This technical note should shed light on the assumptions which have been made by Dublin Airport when preparing the estimates.

Fit-Out Rates Breakdown

As part of the Dublin Airport report CIP2020+ issued during consultation, Dublin Airport have provided a breakdown of the Fit-out rates included within the various estimates. The report is included within Appendix 1 for further review.

Fit-Out Project Benchmarks

As presented during the Steer Site Visit to Dublin Airport on Thursday 13th June 2019, Dublin Airport provide the breakdowns of the project benchmarks which demonstrate the cost of completed projects within Dublin Airport. They are as follows:

Project Benchmark	Benchmark Rate
T2 Liquor Store (2018) – Full Fit-Out – Inclusive of Demolition	€XXXX/m2
51st and Green (2016) – Lounge – Full Fit-out of Lounge – Inclusive of Demolition	€XXXX/m2
East Lounge (2019 Tender) – Cosmetic Upgrade – New Wall & Floor Finishes, Negligible M&E, No Ceiling Works	€XXXX/m2
T1 Arrivals Refurbishment (2018) – Aesthetic Refurbishment	€XXXX/m2
Pier 2 Bussing Lounge – Very Low Specification Fit-Out	€XXXX/m2
Level 10 Bussing Lounge – Very Low Specification Fit-Out	€XXXX/m2

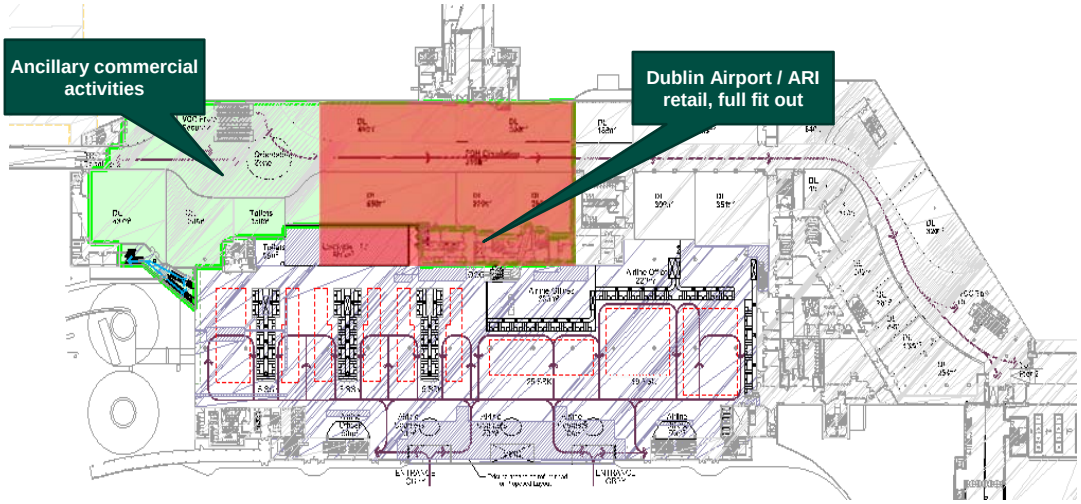
CIP.20.03.013 – Terminal 1 Departure Lounge (IDL) Reorientation and Rehabilitation

As outlined in our presentation the rate of €XXXX/m2 allowed for this space is blended rate for the entire area, as the nature of the space is likely to evolve as the level of detail of the project evolves.

A key point of clarity which emerged at the presentation is that Dublin Airport are the concessionaire in this space. ARI manage this concession.

As per our current commercial strategy, and in line with current international best practice, it is intended to develop the space into a series of zones, with the final zone being F&B. In this way drawing passengers through the retail space. Ancillary services such as bureaux de change, lounges etc. to be provided in areas which fall outside of the principle direction of travel of passengers, but which passengers seeking theses services will seek out.

In line with this it is currently intended to develop approx.1850m2 of the space to full fit out retail with the balance of the space priced at basic fit out level to accommodate external concessionaires and or other functions.



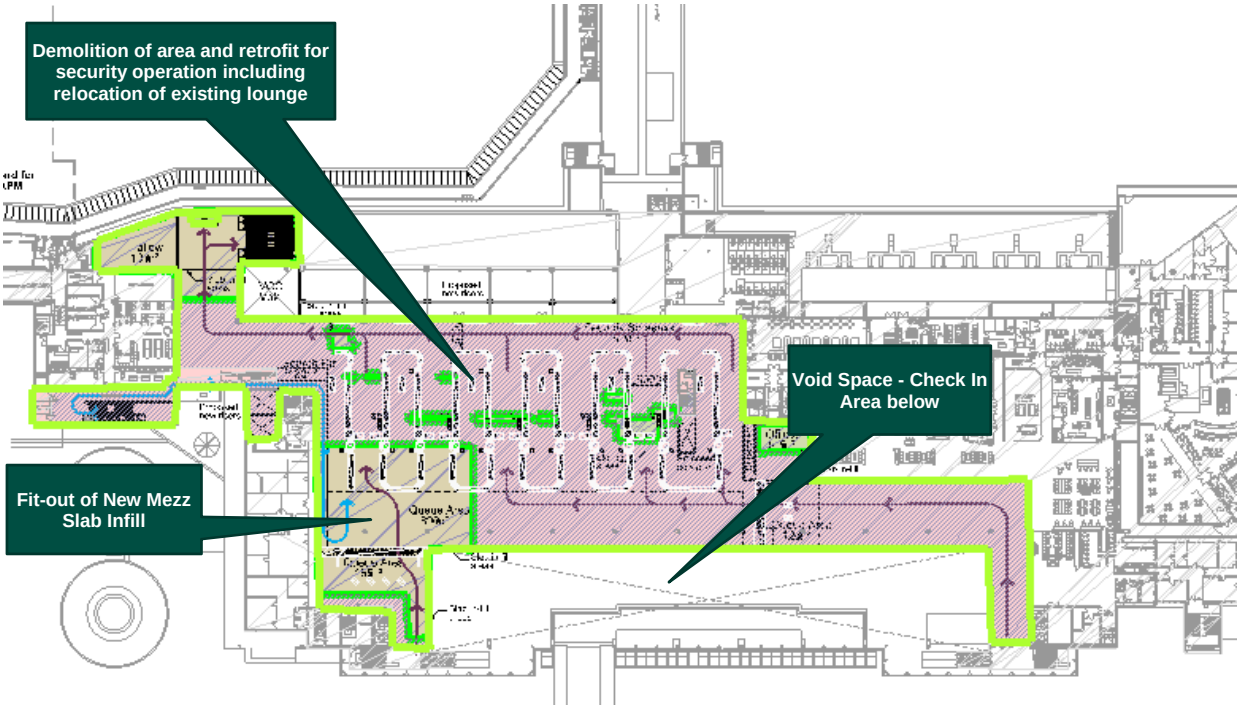
This space also shares a floor plate with the departures floor area. The recent tiling project on this floor plate in the check-in hall resulted in an outturn cost of €XXXX/m2. While we do not anticipate the same level issues being encountered in the IDL, we are conscious that there will certainly be additional costs which cannot be determined until the works are opened up.

As noted during the presentation this work requires micro-phasing to accommodate the continuous passenger flow though the space while continuously updating temporary relocations, way finding and restricted operating hours. This area of the terminal is reaching capacity and delivery of this additional IDL is critical to providing additional capacity, however it will be an exceptionally challenging working environment.

CIP.20.03.012 – Terminal 1 Central Search - Relocation to Mezz Level

As outlined in our presentation the rate of €XXXX/m2 allows for the full fit-out of the new central search area on the T1 Mezzanine level. The scope includes for the demolition of existing space which consists of offices and lounge space with subsequent refurbishment to provide a fully operational security & screening facility. This will consist of modifications to all mechanical and electrical systems to future proof the space in line with the Airports growth in passenger numbers.

It is important to reiterate again at this point the onerous phasing requirements which will be imposed on this project as a result of its location i.e. no single build and due to current occupants of the space, there will be significant temporary works to maintain operations while changing the design use of this space to accommodate the new security process.

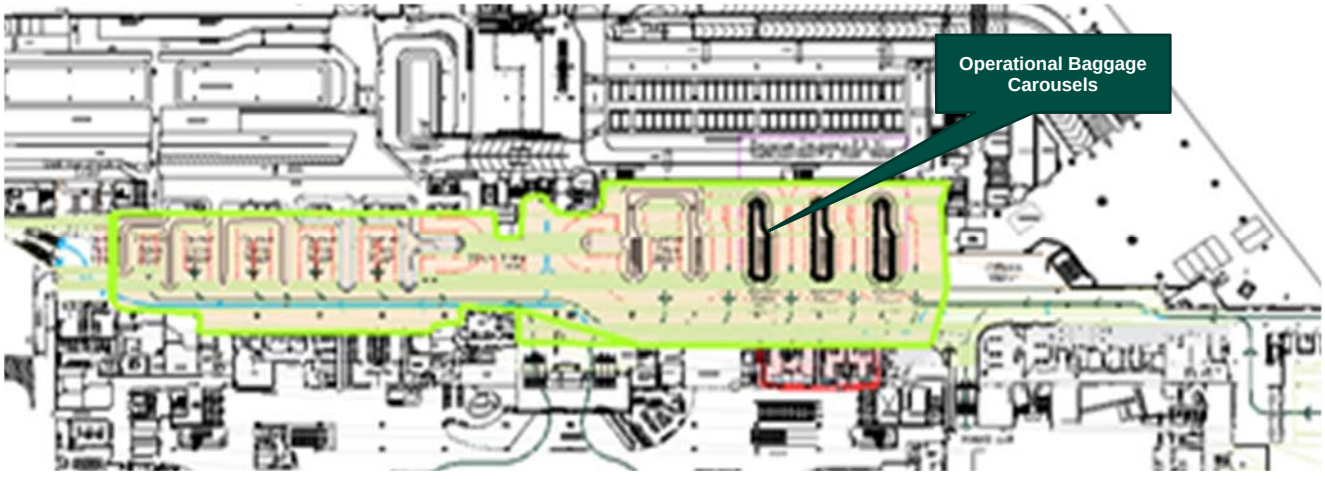


Due to the location of the works, there will be significant challenges in undertaking the works while maintaining a positive passenger experience. The space being refurbished is directly above the T1 check-in area with a void space from departures level to mezzanine leaving the area open, which will create challenges when preventing any construction pollution (noise, dust, smells etc) reaching the lower levels. As a result, works will predominantly be executed out-of hours with further restrictions on deliveries in and out during normal operating times.

It is also worth noting that there is requirement of extensive service diversion as part of this Project (outside of cores) as this mezzanine is part of the interstitial space between Level 4 and 5 and the departures/arrivals floors. Initial indication is that this will require serves to be held at their current location at ceiling and floor level and diverted laterally to provide the required open area for security operations.

CIP.20.03.015 – Terminal 1 Baggage Reclaim Upgrade & Alterations

The Terminal 1 baggage reclaim upgrade and alterations require extensive refurbishment of the floors and ceilings throughout the space noted below. We have allowed a lower refurbishment rate of €XXXX/m2 for this space as only floors and ceilings are deemed to be included;

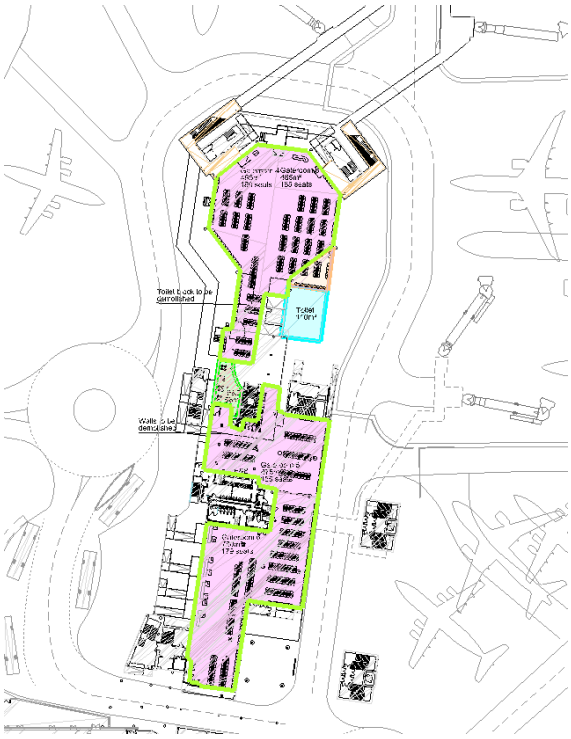


As a review against other projects completed within Dublin airport the recent tiling project on T1 departures level resulted in an outturn cost of €XXXX/m2 as well as the T1 arrivals hall refurbishment which resulted in an outturn cost of €XXXX/m2. While we do not anticipate the same issues being encountered in the baggage hall flooring, we

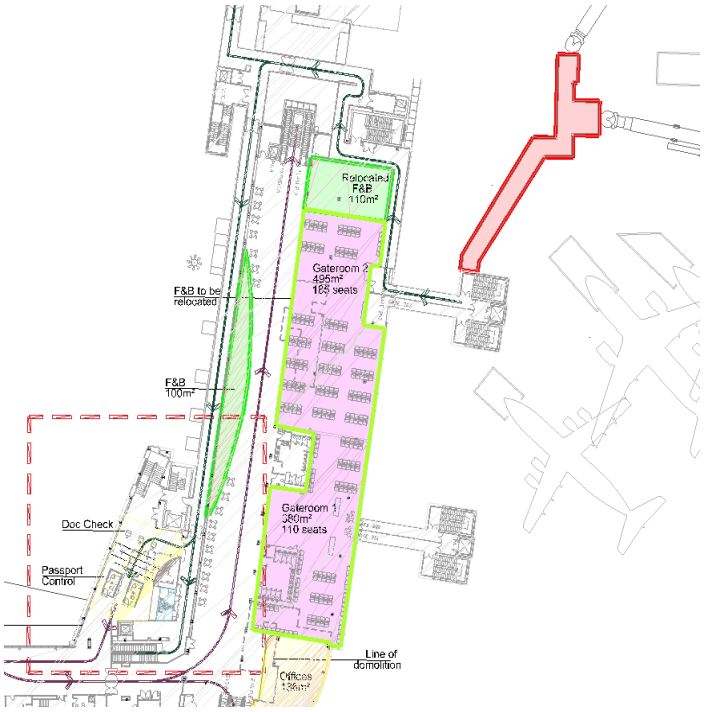
are conscious that there will be costs associated with the remediation of the floor and ceiling, albeit to a lesser extent. We therefore believe the rate of €XXXX/m2 is fair and reasonable given the level of design development at present and the likelihood that the project will evolve once further investigations are undertaken.

As the drawing above illustrates the works will be undertaken in an operational baggage hall which will be significantly constrained given the projected passenger numbers in the next four years. This will result in multiple phases and out-of-hours working during construction. As this area is customer facing space there will be strict limitations on hot works, deliveries and the requirement for a wayfinding strategy to manage passenger flows and maintain a high level of passenger experience.

CIP.20.03.043A – Terminal 1 Piers - New Airbridges (6NBE / 3WB)



Apron Level



Level 15

The existing lounges/gate rooms at Terminal 1 Pier 2 will require refurbishment throughout including floors, ceilings, walls and minor MEP alterations. As discussed in our presentation, Pier 2 is currently in a relatively poor condition and is overdue for refurbishment. We have allowed a lower refurbishment rate of €XXXX/m2 for this space as despite the poor condition of the space, the project will only provide a light refresh of the space.

Dublin Airport have recently undertaken two bus lounge projects at Pier 2 and Level 10; both of which were relatively low specification, i.e. basic wall and floor finish and mineral fibre suspended ceilings with minor MEP alterations. The outturn costs for these projects were:

Pier 2 - €XXXX/m2

Level 10 - €XXXX/m2

Although these rates are substantially higher than what Dublin Airport have included within the cost estimate for this project, it is not anticipated to undertake the same level of scope.

Core projects

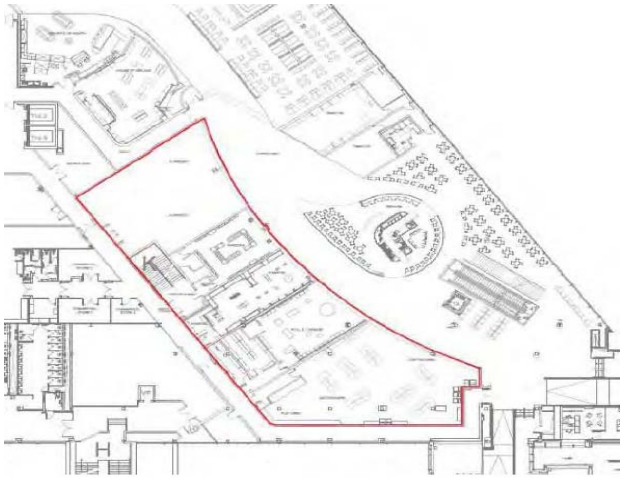
Today there are 40nr food and beverage (F&B) units of varying sizes and configuration across Terminal 1 and Terminal 2 at Dublin Airport, operated by 13 concessionaires. In line with international best practice and in order to maximise efficiencies, Dublin Airport over the course of this CIP is actively moving to reduce the number of

concessionaires to a total of just 4. To attract the desired concessionaires to Dublin Airport, the airport will facilitate them through development of basic fit outs to their specifications.

This is of relevance to Dublin as the only significant international airport. We are striving to maximise the scale for our future partnerships with concessionaires. However, while familiar with the principles of being a concessionaire, there is an unfamiliarity with the requirements of developing facilities in an airside environment and this is increasingly being transferred to the airport to deliver.

CIP.20.04.003 – New Food & Beverage (T1X)

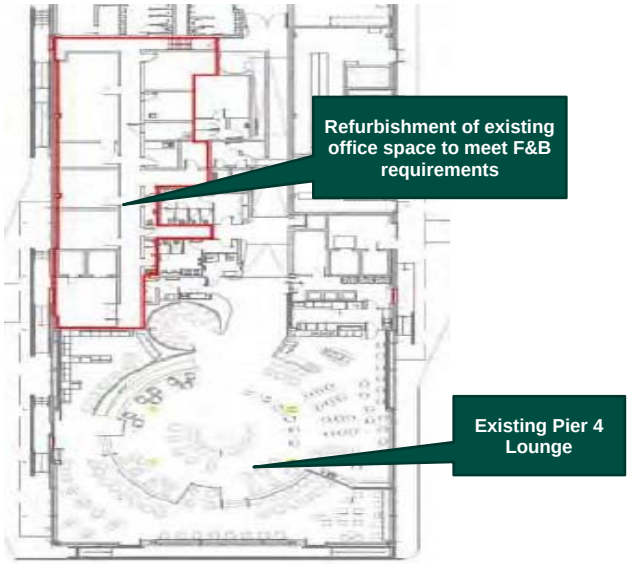
This location is relatively accessible from the landside, and as such presents less challenges than other locations. We would note however the need to bring services, including gas and mechanical intake/extract ventilation to a location which is currently utilised as offices and retail space. The space currently consists of 5 principle compartments and as such it is envisaged that there will be significant complexity resultant from the demolition or compartmentalisation. The scope of the project is to provide a basic fitout.



The benchmark rate for this type of work is the recent fit out of retails space to fit out in T2 at €XXXX/m2.

CIP.20.04.023 Food & Beverage Fit-out – Post CBP

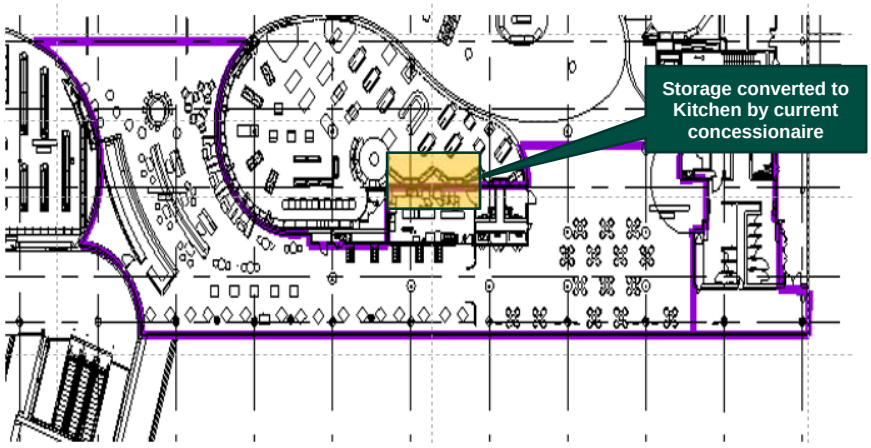
This is a very constrained location, occurring as it does at the end of Pier 4, in an airfield interface, within the US controlled post CBP environment, it, it has a significant number of existing compartments and requires repurposing of existing office space to kitchens (inclusive of all associated services). Other constraints include security upgrade works to prevent ramp access, more complex M&E systems are currently in place and permanent escorting is required due to the nature of the area. The scope of the project is to provide a basic fitout.



The benchmark rate for this type of work is the recent fit out of retails space to fit out in T2 at €XXXX/m2.

CIP.20.04.030 – New Kitchen in T2

The rate provided for this space, provides for the bringing back of the space to basic fitout. The current space has been heavily modified for the current concessionaire as a bar and restaurant. It is intended to return this space such that a concessionaire can develop it as seating, requiring the removal of all existing electrical and mechanical installations, fixture and fittings.



This is inclusive of the removal of the existing space in the centre which has been repurposed overtime into a small kitchen and returning it to its original purpose as a storage unit. Including removal of current venting thought the levels below. At a rate of €XXXX/m2 this project is not viable.

Fitout Projects Benchmark

Issue date: 20-June-2019

CONTENTS

REDACTED VERSION - CONFIDENTIAL & COMMERCIALLY SENSITIVE INFORMATION

pages 14-31

DUBLIN AIRPORT

Technical Note 003

High Mast Lighting

CIP2020+ High Mast Lighting Rates Review

Revision: 2.0

To: Commission for Aviation Regulation

From: Daa – amd (CIP2020 Team)

Date: 18/06/2019

Re: Response to Dublin Airport CIP2020 Efficiency Assessment (Steer - May 2019)

The purpose of this technical note is to provide further detail on the rates included within the CIP estimates for the high mast lighting (HML). As noted within the Steer site visit to Dublin Airport on Thursday 13th June 2019, there are some scope components which were unclear to Steer when making their cost efficiency assessment. This technical note should provide further clarity on the breakdown of the high mast lighting rates.

The variance between Dublin Airports rate of €XXXX/Item and Steers rate of €XXXX/Item equates to a direct rate variance of **€0.75m** across **3no**. projects which are noted below:

Project No.	Project	Dublin Airport Rate (each)	Steer Rate (each)
CIP.20.03.029	New Pier 5 (T2 and CBP Enabled)	XXXXX	XXXXX
CIP.20.03.031	South Apron Expansion (Remote Stands, Taxiway and Apron)	XXXXX	XXXXX
CIP.20.03.036	North Apron Development – Pier 1 Extension (Module 1) & Apron 5H PBZ	XXXXX	XXXXX

High Mast Lighting Rate

In order to clarify the scope and breakdown of the high mast lighting rate of €XXXX/Item, Dublin Airport have provided within this technical note further breakdown of the Dublin Airport rate as well comparable project costs which were reviewed when evaluating the rates within the estimate. As noted, the rate included is based on subcontractor costs at Dublin Airport for project D16006 Apron 3-4. As advised we are unable to share the full tender document presented in the Steer Site Visit Meeting on June 13th at this time, however we have provided a cost summary in Appendix 1 which details the scope items within the works package.

As advised within the Steer Site Visit Meeting, the following scope is included within the high mast lighting rate:

- Lighting Column, Heads & Base including excavation and disposal
- Crash Protection to Column
- Local Control Point to High Mast Lighting Columns
- Reinforced Apron Chamber to base of each unit – including heavy duty cover
- Duct & Cabling between installations plus connections
- Trench Excavation
- Backfilling of trench and new pavement formation
- Lightning Protection Installation
- Allowance for MCC Control Upgrade & System Integration

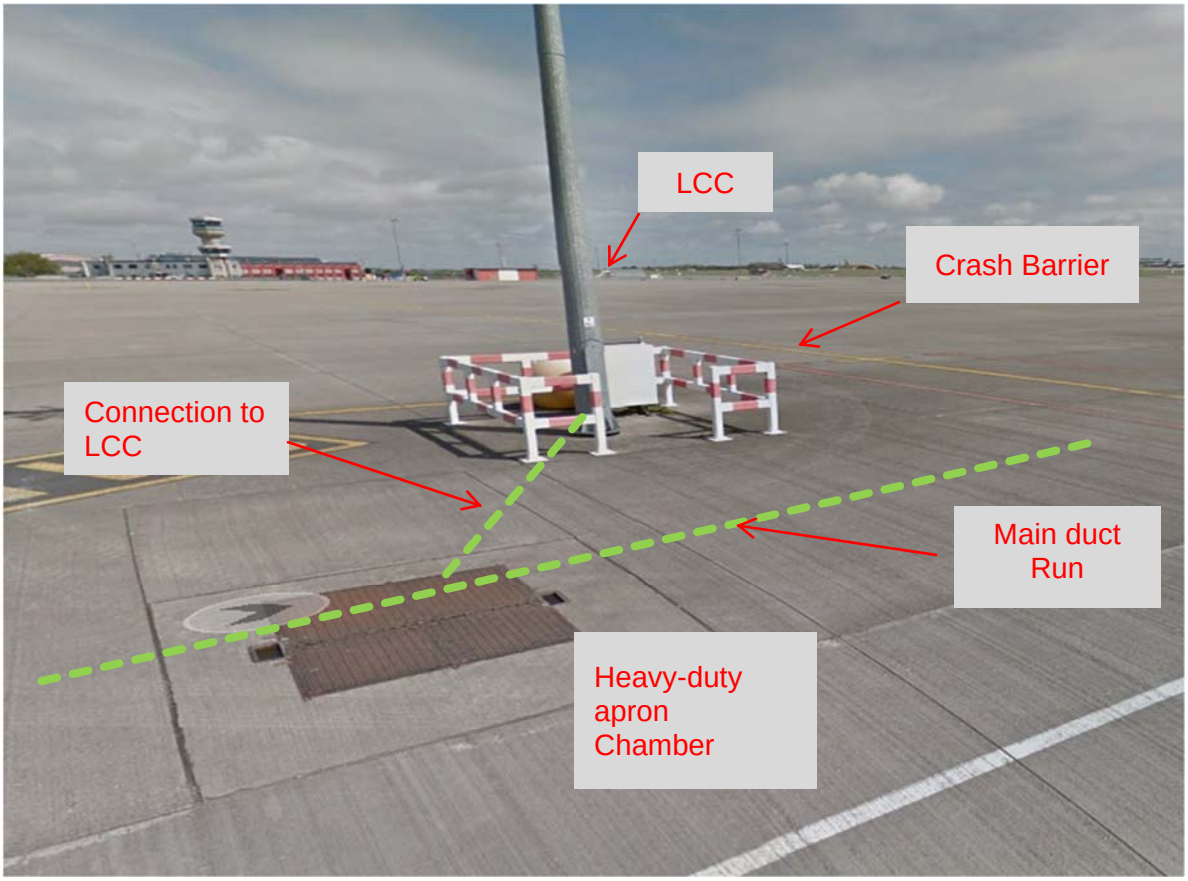


Figure 1 – High Mast Light Installation

The high mast lighting scope components noted can be referenced in the table below. This breakdown illustrates the build-up to the rate utilised within the Dublin Airport estimates. The rates consider the complexity of installing each high mast lighting column including the associated civils works with installation of new duct and cable as well as backfilling and pavement construction while in a live airfield environment.

It should be noted, the rate allows for a potential requirement to replace existing infrastructure which involves replacement of full cable and duct runs to termination point and upgrade of existing MCC control system to accept

the new installations with associated pavement works. The Dublin Airport rate of €XXXX/item is reflective of this complexity.

	Quant	UoM	Rate (€)	Total
Column, including column, lighting, base, excavation and disposal	**XXXX**	**no.**	**XXXX**	**XXXX**
Crash barrier to the base of each unit	**XXXX**	**m**	**XXXX**	**XXXX**
Local control panel to each unit	**XXXX**	**no.**	**XXXX**	**XXXX**
Chamber to the base of each unit. Reinforced chamber to handle apron level loading	**XXXX**	**no.**	**XXXX**	**XXXX**
Duct and cable, allowing for 90m between lighing installations, plus connections	**XXXX**	**m**	**XXXX**	**XXXX**
Trench	**XXXX**	**m**	**XXXX**	**XXXX**
Backfill	**XXXX**	**m3**	**XXXX**	**XXXX**
Lightning protection	**XXXX**	**no.**	**XXXX**	**XXXX**
Allowance for central MCC control upgrade, and integration into existing lighting control system			**XXXX**	**XXXX**
			XXXX	**XXXX**
Total			**XXXX**	**XXXX**
Rounding for feasibility level estimate			**XXXX**	**XXXX**

Appendix 1

D16006 – D725 DAA Apron 3-4 Project

As noted this project benchmark was tendered by Dublin Airport in February 2017. Dublin Airport note that the cost is higher per item than the Dublin Airport estimate rate included (as per previous breakdown). However upon review as this benchmark is only for one High Mast Lighting column, we believe there is are efficiencies which could be achieved through procuring a higher quantity and therefore feel the Dublin Airport rate is fair and accurate.

Item		Quant	UoM	Rate (€)	Total
1	Supply, install and connect earthing rod for mast and bonding installation in accordance with ET101	XXXX	Sum		XXXX
2	Supply and delivery of 25 metre high winched lantern carriage type floodlighting mast including headframe, wire ropes, internal cables etc.	XXXX	Sum		XXXX
3	Supply and delivery of LED floodlights fittings and associate control gear. Include with tender quantity and type of fittings for each Hi-mast A307 & A401.	XXXX	Sum		XXXX
5	Supply and delivery of LED obstruction light.	XXXX	Sum		XXXX
6	Supply and delivery of Photocell.	XXXX	Sum		XXXX
7	Assembly, installation, wiring up and commissioning of 25 metre high floodlighting mast, complete with floodlights, photocell, obstruction light, control gear in weatherproof boxes, cables etc.	XXXX	Sum		included Item 2
8	Supply, delivery, installation, wiring up and commissioning of new floodlighting mini pillar, including switchfuses, MCB's, panel heater, bypass, IP 65 Socket (for winch) etc	XXXX	Sum		XXXX
9	Supply, delivery and installation of 1 # 4x25 sqmm SWA cable in ducting between existing cable and new floodlighting mini pillar. Exact lengths to be measured during pretender visit	XXXX	Sum		XXXX
10	Supply, delivery and installation of 1 # 16sqmm Earth cable in ducting between existing cable and new floodlighting mini pillar. Exact length to be measured during pretender visit	XXXX	Sum		XXXX
11	Supply, delivery and installation of 1 # 3 x 6 sqmm SWA cable in ducting between existing cable and new floodlighting mini pillar. Exact length to be measured during pretender visit	XXXX	Sum		XXXX
12	Supply, delivery and installation of 1 submarine resin filled joint between existing and new # 4x25sqmm cables	XXXX	Sum		XXXX
13	Supply, delivery and installation of 1 submarine resin filled joint between existing and new # 3x6 sqmm cables	XXXX	Sum		XXXX
14	Supply and install all necessary cabling and connections between new mast and associated pillar.	XXXX	Sum		XXXX
15	Test and commission completed installation, including for training of maintenance staff and for Photometric survey at night.	XXXX	Sum		XXXX

16	Supply and install cable/equipment marking system for floodlighting installation, including labelling all cables, floodlighting columns and switchgear, etc.	**XXXX**	**Sum**		**XXXX**
17	Supply and install all miscellaneous items required for the satisfactory completion of the installation, including lugs, glands, cable trays, trunking, conduit, tape, misc. cables etc.	**XXXX**	**Sum**		**XXXX**
19	Miscellaneous Items – Installation Equipment Costs, Sub-Contractor set-out survey etc	**XXXX**	**Sum**		**XXXX**
		XXXX			**XXXX**
20	**Total**	**XXXX**	**Sum**		**XXXX**
	Inflation to Q1 2019 – SCSI Cost Index	**XXXX**			**XXXX**
21	**Total at Base Date**	**XXXX**			**XXXX**
		XXXX			**XXXX**

DUBLIN AIRPORT

Technical Note 004

Road Pavements

CIP2020+ Road Pavements

Revision: 0.0

To: Commission for Aviation Regulation

From: Daa – amd (CIP2020 Team)

Date: 18/06/2019

Re: Response to Dublin Airport CIP2020 Efficiency Assessment (Steer - May 2019)

The purpose of this technical note is to provide further detail on the rates included within the CIP estimates covering the different road build ups. As noted by Steer during their site visit on 13th of June 2019, some of the road rates included in the CIP submission were not clear on scope and required further detail to enable an efficiency assessment. The following projects have been impacted by the revision to airport road allowances:

CIP Number	Project Title	Daa rate (m2)	Steer rate (m2)	Total Impact* (€m)
CIP.20.01.002	Apron Rehabilitation Programme	€XXX	€XXX	€XXX
CIP.20.01.003	Airfield Taxiway Rehabilitation Programme	€XXX	€XXX	€XXX

* Cost impact on direct construction costs

Each one of these projects includes a different road configuration depending on its purpose. At feasibility stage daa made the decision to use a fixed rate of XXX€/m2 across all the projects. Whilst some of the features of the airfield roads are the same, the scope captured varies on an individual project basis. The rate can be broken down in the following way:

1. Standard access road:
    a. Pavement build-up
    b. Road markings
    c. Drainage
    d. Utilities
    e. Ancillaries
2. Additional scope

Further granularity is provided below on the additional scope that each of the projects is addressing to make the efficiency exercise easier and arrive at an accurate costing of each project, based on current Irish market rates. It should also be noted that, in some instances, the rate used is slightly over the actual cost, but in others, is too low to cover for the total of the works. **Therefore, it is daa's position that on a pro-rata application the rate averages out across the projects appropriately.**

CIP.20.03.029. New Pier 5

Description	Qty	Unit	Rate (Eur)	Total
Road to front of pier 5	XXX	m2	XXXX	XXXX

With regards to the front of pier 5, the additional scope captured is listed below:

- New pull in bus bays to the front of lounges
- Parking and storage paved areas
- Safety barriers to fixed links
- Increased width of road as will be used by GSE as Head of Stand road

Figure 1 Pier 5 front road, measured area

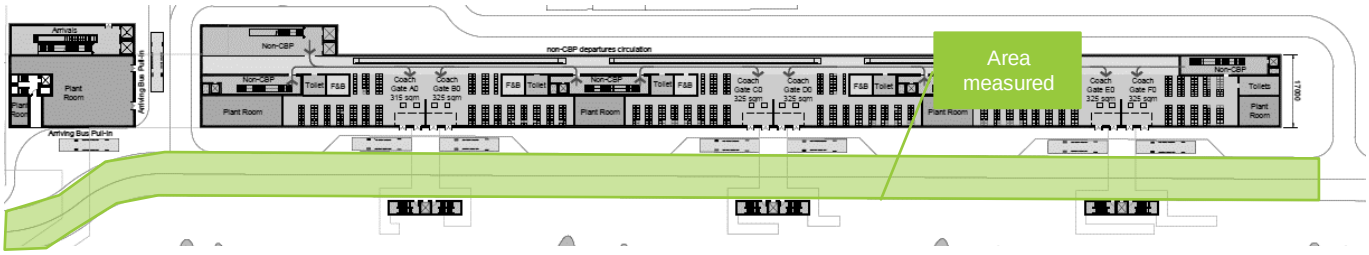
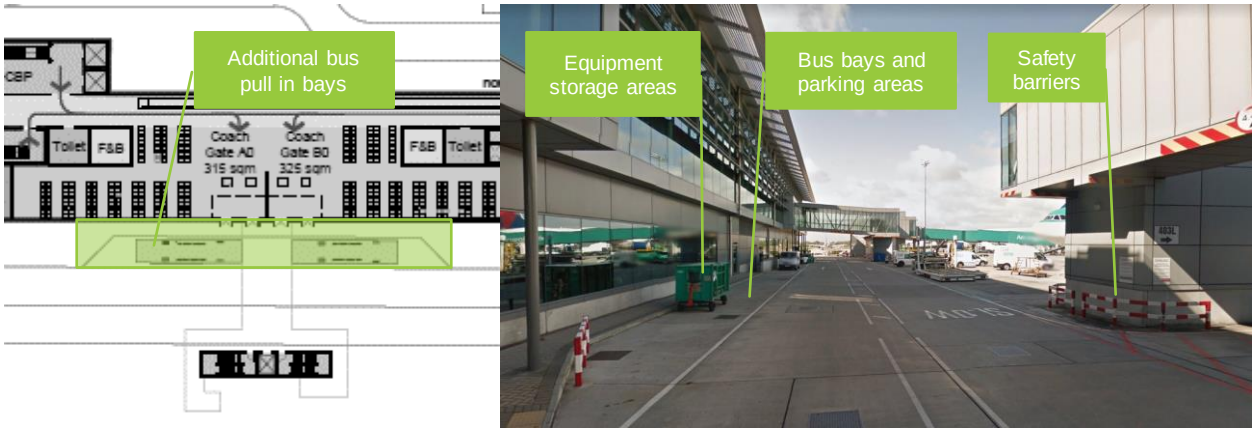


Figure 2 Pier 5 front road, additional scope & Pier 4 road



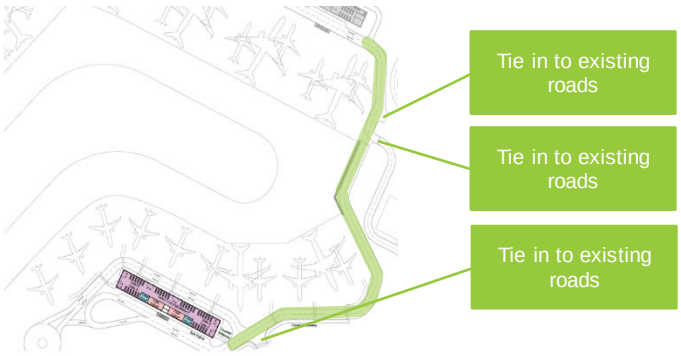
Description	Qty	Unit	Rate (Eur)	Total
Road behind PBZ, including drainage	XXXX	m2	XXXXX	XXXXX

An access road to the rear of the southern PBZ will be built all the way from the end of Pier 5.

It is anticipated that this road will require the following additional items in excess of the standard:

- dedicated lighting (as it moves away from the apron at certain sections)
- numerous tie in junctions to existing roads
- increased width at certain sections as it will be used to service aircraft as Head of Stand road

Figure 3 Access to back of PBZ, measured area & additional scope



CIP.20.03.036 South Apron Expansion

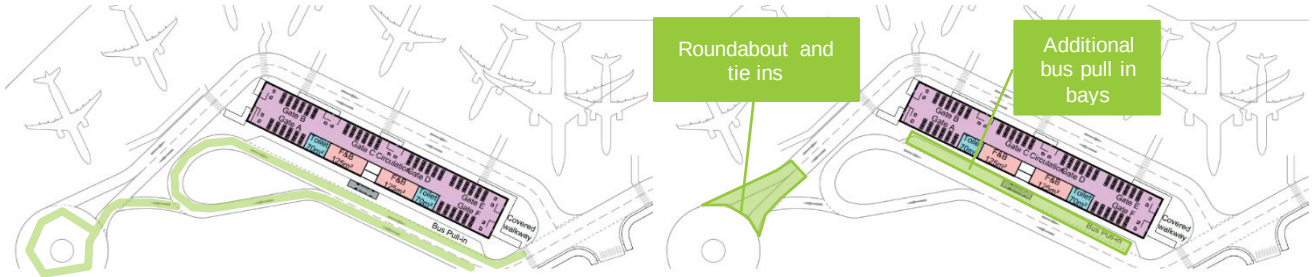
Description	Qty	Unit	Rate (Eur)	Total	Length (m)
Access road realignment to south east of Cuckoo Stands and security gate	XXXX	m2	XXXX	XXXXX	500

An access road to the rear of the southern PBZ will be built all the way from the end of Pier 5.

It is anticipated that this road will require the following additional items in excess of the standard:

- dedicated lighting (as it moves away from the apron at certain sections)
- hardstanding areas (around perimeter of the building)
- equipment storage and parking areas
- Tie in junctions to other roads

Figure 4 Access to back of PBZ, measured area & additional scope



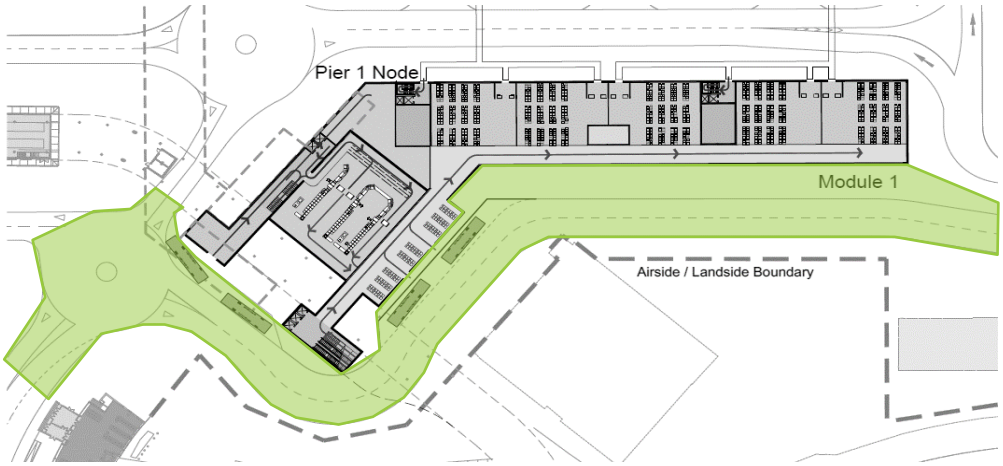
CIP.20.03.031 North Apron Development

Description	Qty	Unit	Rate (Eur)	Total
New access road to rear of Module 1, and to SW of skybridge 6m width. Including cost of drainage.	XXXX	m2	XXXXX	XXXXXX

It is anticipated that the road to the rear of the Module 1 will require the following additional scope:

- Dedicated lighting
- Rationalization of existing services and utilities
- Roundabout / turning areas
- Tie ins to existing roads

Figure 5 rear of Module 1 road, measured area

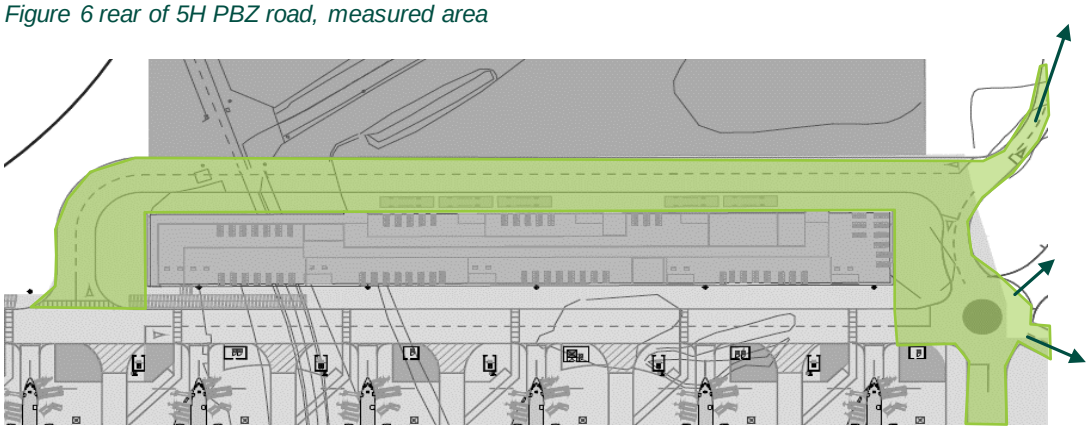


Description	Qty	Unit	Rate (Eur)	Total
New GSE access road to rear of PBZ 5H, 6m width.	XXXX	m2	XXXX	XXXXXX

It is anticipated that the road to the rear of the Module 1 will require the following additional scope:

- Dedicated lighting
- Roundabout / turning areas
- Tie ins to existing roads

Figure 6 rear of 5H PBZ road, measured area

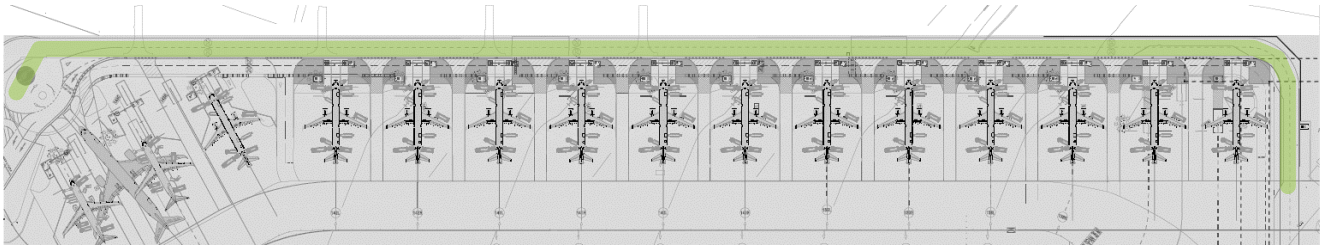


Description	Qty	Unit	Rate (Eur)	Total
Head of stand road to apron 5G, plus access road to security gate post	XXXX	m2	XXXX	XXXXX

It is anticipated that the road to the rear of the Module 1 will require the following additional scope:

- Dedicated lighting
- Roundabout / turning areas

Figure 7 head of stand road to 5G, measured area



CIP.20.03.054 Remote 5M Stands

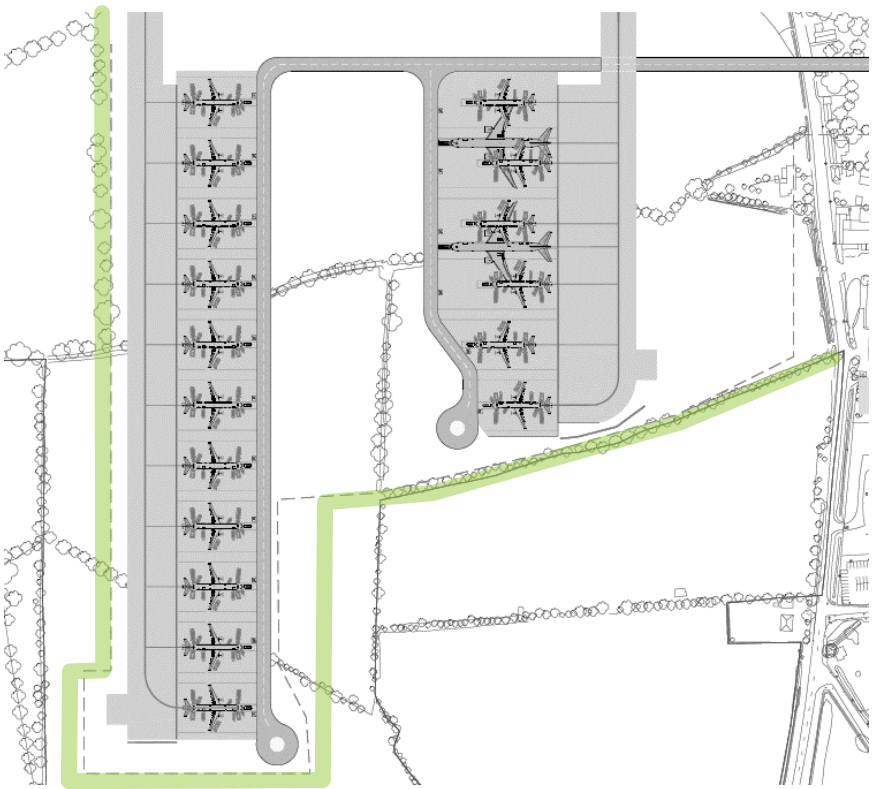
Description	Qty	Unit	Rate (Eur)	Total
Road diversion allowance assuming 6m road width, at €315/m2 which is inclusive of excavation, disposal, fill, drainage, surfacing, kerbs and road markings	XXXX.	m	XXXXX	XXXXXX

This line item corresponds to the realignment of a single carriageway public road (R108) around the new apron 5M. It is expected that the road will carry additional scope in excess of a standard airfield road to comply with public standards and the rate used of XXX€/m2 will not on its own cover all the works required:

- Additional carriageway width (3.5m per lane)
- Hard shoulders
- Lighting
- Fencing (boundary to adjoining properties)
- Utilities

- Signage according to standards
- Culverts
- Tie in junctions to existing roads and private accesses

Figure 8 5M public road diversion, measured area



CIP.20.03.004 - Gate Post 9

Description	Qty	Unit	Rate (Eur)	Total
Roads; including excavation, hardcore, bitumen macadam; exceeding 300mm wide	XXXXX	m2	XXXXX	XXXXXXX

This item covers the access to and from the Gate post, including the following additional scope in excess of a standard airfield road:

- Lighting

Benchmarking

3 projects of diverse scope have been used that can be identified similarly to the different new roads that are to be built in the CIP:

- Source 1: PACE approved project
  - Public road diversion project like 5M diversion
  - Approved rate: XXX €/m2
  - Project included airside/landside fence
- Source2: T&T Airside perimeter road project (Gatwick airport)
  - Approved rate XXX €/m2
- Source 3: AECOM Northern Parallel runway airport road
  - Estimated rate XXX €/m2
  - Airfield road to access terminal areas and remote aprons

REDACTED VERSION - CONFIDENTIAL & COMMERCIALLY SENSITIVE INFORMATION

pages 46-47

DUBLIN AIRPORT

Technical Note 005

5M Apron Pavement

CIP2020+ 5M Pavement design

Revision: 0.0

To: Commission for Aviation Regulation

From: Daa – amd (CIP2020 Team)

Date: 18/06/2019

Re: Response to Dublin Airport CIP2020 Efficiency Assessment (Steer - May 2019)

The purpose of this technical note is to address the comment made by Steer regarding the suitability of the allowance made in apron 5M project for pavement build up. It was noted that the pavement build-up included was deemed insufficient for Wide-body use.

Figure 1 Extract from CIP2020 Efficiency Assessment (Steer - May 2019)

Subject	Comments
Effectiveness of scope	The scope, while high level, demonstrates an effective delivery of the required objective to deliver further stand space.
Alternative scopes	No alternative scopes have been identified.
Quality of specifications	The Level 3 costs provide a reasonably detailed breakdown of the specification of the works. The costs include for a pavement thickness of 325mm PQC. While this could be considered sufficient for Code C NB aircraft, a thicker pavement would be expected for Code E WB aircraft – particularly if fully loaded. As the whole pavement is to be safeguarded for future WB usage, the pavement specification is considered to be too thin.
Phasing and synergies with other projects	The proposal assumes the construction of the parallel taxiways associated with future Runway 10L/28R. This is required in order for the Apron to be accessed. The initial stated purpose of the Apron is for non-passenger aircraft, as currently served by the West Apron. Project CIP.20.04.021 proposes welfare facilities for cargo and line operators specifically to encourage further business in this area. It is expected for this welfare facility to service the new apron, but similarly a dedicated purpose-built facility might also be beneficial.
Existing asset conditions	New construction on greenfield site.
Double counting	None identified.

Daa commissioned a specialised consultant to provide a feasibility design of all the airfield elements included in the CIP. The reason why the right pavement spec was not included in the initial consultation document was to time frames. Daa now has a revised preliminary design of apron 5M pavement attending to the fleet of aircraft expected to use the remote stands and the expected ground conditions on that location.

This design is endorsed by an external consultant and follows international standards of airport pavement design.

Figure 2 Extract from CIP2020 Airfield Feasibility Report (AECOM – 2019)

DMG27 Pavement Design

Table 8. 4 5M DMG27 Pavement Design

The table below provides a summary of the design criteria and pavement thickness for pavement type A.

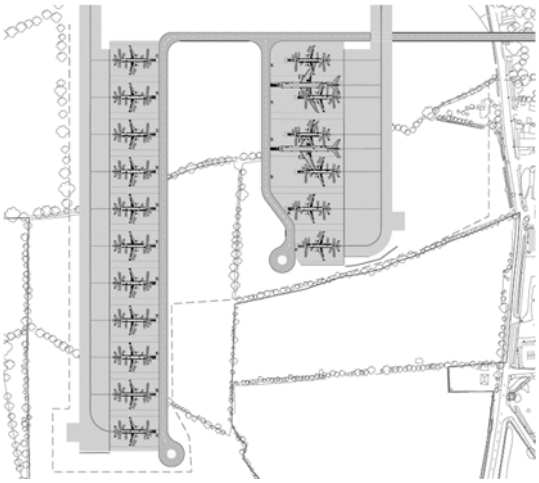
Pavement Type	Design Aircraft	Traffic Frequency	Subgrade Category	Pavement Thickness
A (Rigid)	B777-300ER	Low	D**	415mm Pavement Quality Concrete 200mm Dry Lean Concrete 150mm Granular Base*
B (Flexible)	B777-300ER	Medium	D***	100mm Asphalt 565mm High Strength Bound Base 285mm Dry Lean Concrete 150mm Granular Base*

Notes

* Whilst a granular base layer is not required as part of the DMG27 pavement design, it is recommended to allow a 150mm granular base layer to provide a stable platform for the pavement construction.

**Very weak subgrade may provide non-uniform support to rigid concrete slabs – give consideration to subgrade improvement. AGAPDE Fig 10 suggests 370mm granular layer required to improve Cat D subgrade to Cat C

***Very weak subgrade with large aircraft loading may result in differential settlement. Also construction of Type FH dry lean concrete may be problematic. Consider a sacrificial layer or subgrade improvement. AGAPDE Fig 10 suggests 370mm granular layer required to improve Cat D subgrade to Cat C



Note that the subgrade category for the location 5M is Cat D and will require an additional 370mm sub base layer to achieve the required resistance.

The table below summarises the cost of the revised build-up in comparison to the initial estimate. Excavations have been increased according to the new overall depths. Area rates for pavement layers have been increased proportionally to the new depths. Other items have been kept the same.

Figure 3 Table comparing 5M pavement CIP estimate submission and new revised spec

The total revised Cost for this project is of **€XXXXXXX**

A revised level 3 cost is attached to this note.

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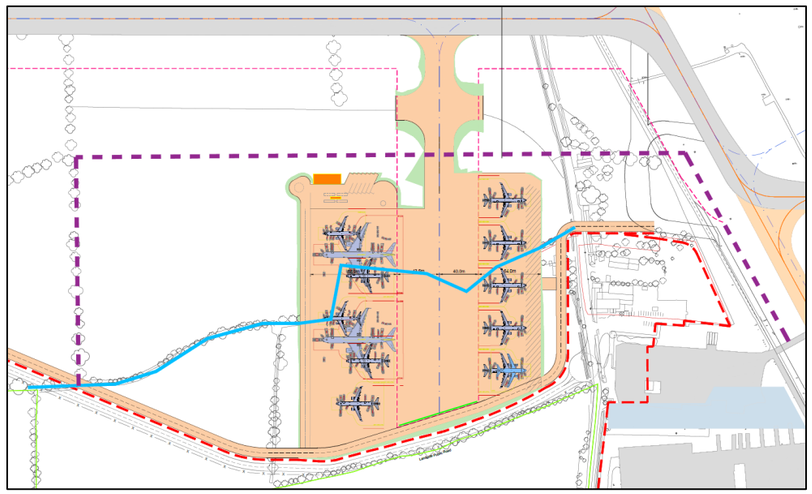
page 51

Option 1 is a straight culverted diversion of the Cuckoo stream joining the drainage masterplan developments, beginning at Taxiway Whiskey. In addition, part of the diverted stream will have to run through areas not owned by the airport, in order to reach the Masterplan optioneering of this stream.

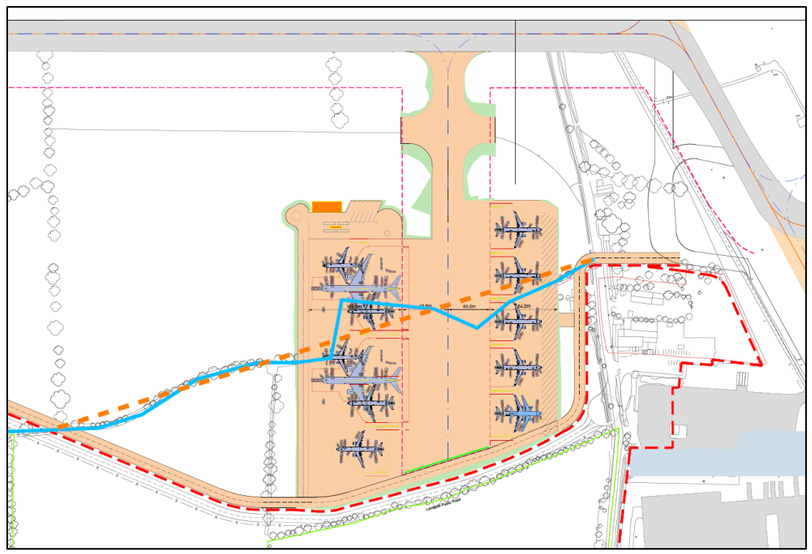
The attenuation and pollution control storage will have to be built underneath 5M Apron Phase 1 section. If the Pier between Phase 1 and 2 of 5M Apron is built, it will be necessary to avoid any clashes when constructing the pier. Therefore, in the long run, this option may not be viable, since it will create major disruptions when developing the apron to achieve a 55MPPA.

Figure 8. 7 Option 2 - Open channel Cuckoo Stream



In option 2, the stream would consist of an open channel, sections of which will be culverted under the taxiway connections (See Figure 8.7). The attenuation and pollution storage may be placed between Taxiway Mike and Papa, in the purple area shown. This solution appears more viable, since there is minimal impact on the development of this apron.

Figure 8. 8 Option 3 – Direct Culvert Cuckoo Stream within Land Boundary



Option 3 culverts the stream along its existing alignment; however, in the long term, it may create an issue, since in the 55MPPA development, at the east end of the apron, there are plans to construct a fuel farm and a substation (Refer to Figure 8.8).

8.5.4 Pavement

8.5.4.1 Existing Pavement Review

There are no existing airfield pavements in this area.

8.5.4.2 Proposed Aircraft Pavement Design

In general, for new pavements across the airfield it is proposed that taxiway pavements shall be of flexible construction (20 year design life) and apron stands shall be of rigid construction (25 year design life). Pavement designs have been carried out in accordance with the Design & Maintenance Guide 27 'A Guide to Airfield Pavement Design & Evaluation, 3rd Ed 2011'; and for comparative purposes FAA AC 150/5320-6F using FAARFIELD design software.

FAA AC 150/5320 (FAARFIELD)

The following traffic mix was derived through data provided by daa, annual departures for 2018 were taken from a typical busy schedule listing for the week 16/07/18 to 22/07/18; the compound annual growth rates (CAGR) were subsequently calculated from the schedules for the masterplan 50mppa and 55mppa scenarios. It has been assumed that the same level of traffic on the west apron will occur on the 5M apron and whilst this is a broad assumption it is considered suitable for the purposes of this study. A more detailed traffic mix based on a refined designation of movements should be undertaken beyond this study to develop a final design.

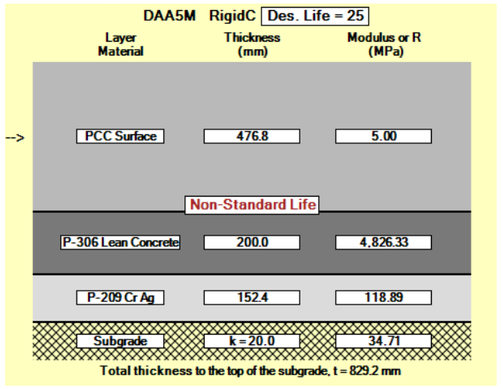
Table 8. 2 5M Traffic Mix

Type of Aircraft	Annual departures	CAGR* (20 Years)	CAGR* (25 years)
Airbus Industrie A319	52	2.25%	1.78%
Airbus Industrie A320	104	1.56%	1.55%
Airbus Industrie A330-200	728	-1.38%	-0.54%
Airbus industrie A350-900	208	9.14%	7.17%
Boeing 737-800	52	-3.19%	-2.54%
Boeing 787-800	1040	7.02%	5.80%
Boeing 787-900	104	4.58%	8.46%
Boeing 777-200 LR	156	8.46%	6.64%
Boeing 777-300ER	364	-5.60%	-4.46%
Total	2808		

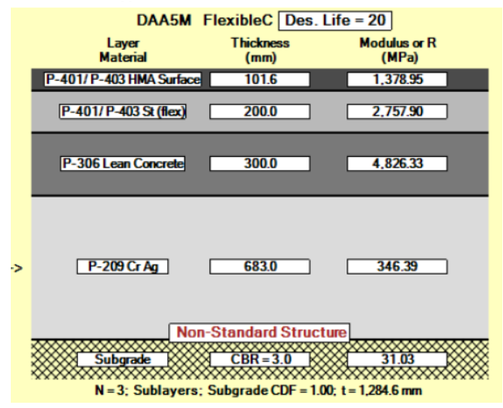
The following pavement thicknesses for Pavement Types A & B derived from FAARFIELD are shown below:

Table 8. 3 5M Pavement Types A and B

Pavement Type A



Pavement Type B



Material Abbreviations

PCC – Portland Cement Concrete

Cr Ag – Crushed Aggregate

HMA – Hot mix Asphalt

St (flex) – Flexible Stabilized Base

DMG27 Pavement Design

Table 8. 4 5M DMG27 Pavement Design

The table below provides a summary of the design criteria and pavement thickness for pavement type A.

Pavement Type	Design Aircraft	Traffic Frequency	Subgrade Category	Pavement Thickness
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B (Flexible)	B777-300ER	Medium	D***	100mm Asphalt 565mm High Strength Bound Base 285mm Dry Lean Concrete 150mm Granular Base*

Notes

* Whilst a granular base layer is not required as part of the DMG27 pavement design, it is recommended to allow a 150mm granular base layer to provide a stable platform for the pavement construction.

**Very weak subgrade may provide non-uniform support to rigid concrete slabs – give consideration to subgrade improvement. AGAPDE Fig 10 suggests 370mm granular layer required to improve Cat D subgrade to Cat C

***Very weak subgrade with large aircraft loading may result in differential settlement. Also construction of Type FH dry lean concrete may be problematic. Consider a sacrificial layer or subgrade improvement. AGAPDE Fig 10 suggests 370mm granular layer required to improve Cat D subgrade to Cat C

DMG27 27 vs FAA Designs

The rigid pavement designs are more onerous using the FAA designs method, whereas the flexible pavement designs are more onerous using the DMG27 design method. For the purposes of this feasibility study and pricing the DMG 27 designs have been adopted, they are considered to be less susceptible to changes in design criteria which are likely to happen as the design progresses.

8.5.5 Construction Phasing

5M Apron can be constructed landside of the airside/landside boundary which will reduce costs and duration of construction. A landside construction will reduce the need for additional personnel to escort the materials/vehicles and reduce security requirements.

5M Apron could be constructed with the NorthRunway project to minimize construction costs, security delays and overall construction time scale.

5M can be constructed as a single or multi-phase construction.

8.5.6 Airfield Ground Lighting

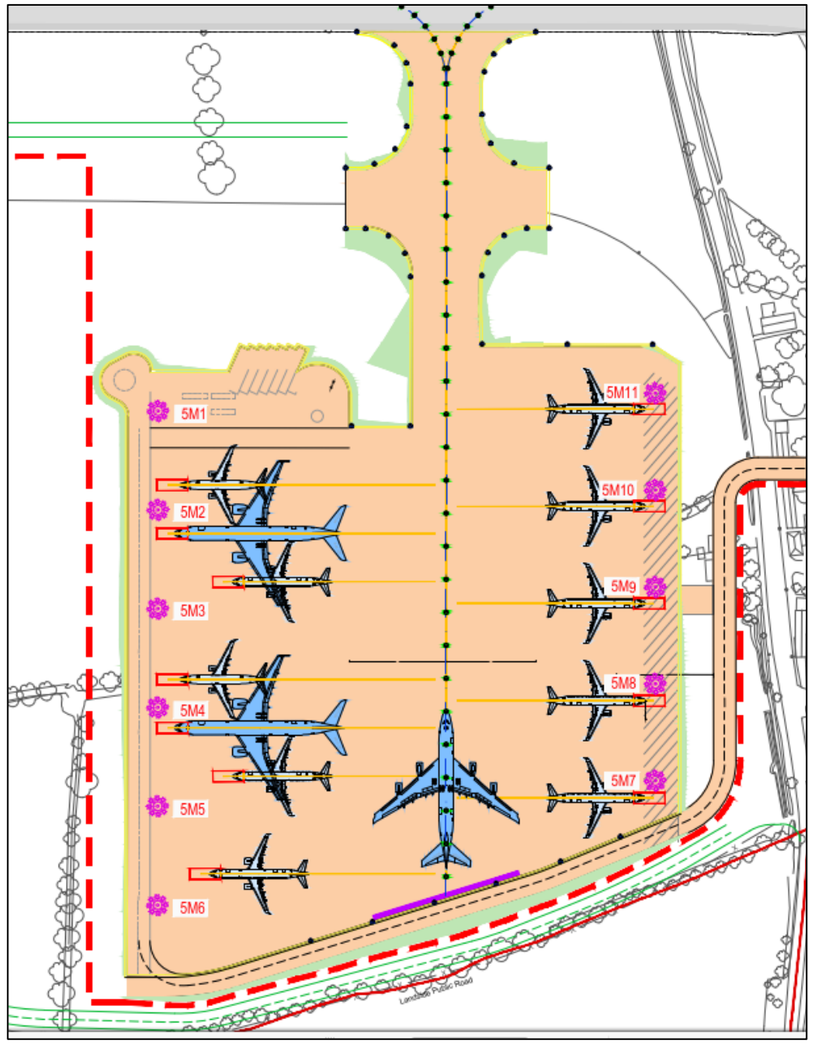
8.5.6.1 Existing Services & Proposed Diversion

It is believed that existing electrical ESB power lines are located on the proposed site. These power lines would need to be cleared as part of Northern Runway project (shown on DAA Drawing G00-1012-006 MV).

8.5.6.2 Proposed Electrical Layout

The proposed electrical layout for the 5M Apron is shown in Figure 7.11 below.

Figure 8. 9 Proposed Electrical Layout on 5M Apron



For further details on Figure 8.9 please refer to drawing: CIP20-03-AIR-A5M-STD-000-01-3030

The proposed AGL layout includes the following systems:

- TCL Green/Green straight 28
- TCL Green/Green curved 16
- New Primary Cable 3500m x 2 7000m
- TWE Blue 71
- Guidance Signs 4 (600mm x 3000mm)
- New Primary Cable 4000m

DUBLIN AIRPORT

Technical Note 006

Demolition

CIP2020+ Demolition Rates Review

Revision: 0.0

To: Commission for Aviation Regulation

From: Daa – amd (CIP2020 Team)

Date: 21/06/2019

Re: Response to Dublin Airport CIP2020 Efficiency Assessment (Steer - May 2019)

The purpose of this technical note is to provide further detail on the rates included within the CIP estimates for the demolition works. As noted during the Steer site visit to Dublin Airport on Thursday 13th June 2019, there remain some scope elements which require clarification for Steer to enable them to conclude their cost efficiency assessment. This technical note provides clarity on the breakdown of the demolition rates.

Airports' demolition rates and Steers' rates equates to a direct rate variance of **€8.58m** across **5no**. projects. As presented, the below variances represent the largest cost variances across the demolition rates.

Project No.	Project	Description	Dublin Airport Rate (m2)	Steer Rate (m2)	Variance
CIP.20.03.029	New Pier 5 (T2 and CBP Enabled)	Cargo Centre 1 -Workshop GF Cargo Centre 1 – Office 1st floor Cargo Centre 1 – Office 2nd floor Cargo Centre 2 – End block GF Cargo Centre 1 – Removal of ACMs Cargo Centre 2 – Removal of ACMs Cargo Centre 2 - Warehouse Area	XXXX	XXXX	XXXX
		Old Ryanair Building – GF Old Ryanair Building – 1st Old Ryanair Building – 2nd South Apron Accommodation – GF South Apron Accommodation – 1st	XXXX	XXXX	XXXX
CIP.20.03.036	North Apron Development	Demo of Hanger 1; incl. Office Block (currently used by Dublin Airport IT) Demo of Hanger 2; complete	XXXX	XXXX	XXXX
		Demolition of Sim Building; Annex demo includes Old Fire Station and Workshops	XXXX	XXXX	XXXX
		Demolition of North Terminal	XXXX	XXXX	XXXX

The Demolition costs are a direct function of the nature of the building to be demolished. It should be noted that the buildings earmarked for demolition in the next CIP are predominantly legacy structures, which have been extensively modified in line with their changes in use over their operational lives. The result is a series of complex, multiuse buildings, some of which are interlinked with existing structures which are to be retained and have to remain operational throughout the demolition phase. The adjacency of these structures to the live airfield and aircraft further complicates the process of demolition as regards dust and foreign object debris (FOD). This will require slow and meticulous de-construction of the buildings and subsequent careful removal of materials from site.

Demolition Rates

To clarify the scope and breakdown of the demolition rates Dublin Airport have provided further breakdown of the rates utilised, as well benchmark costs which from which the estimated rates were derived in consultation with our cost consultants AECOM.

As advised during the Site Visit, the following scope is included within the demolition rate:

- Cost of demolishing structures
- Cost of transporting waste materials to licenced tipping/treatment facilities
- Cost savings associated with any salvage value are included in the rates
- Sub-contractor preliminaries
- The rates also include an allowance for cost associated with working in a heavily constrained airport environment

Please refer to the below rate breakdown which Dublin Airport, in conjunction with AECOM, have utilised to prepare the cost estimates. The breakdown notes the type of building and the associated demolition and disposal costs. These rates are based on benchmark data from other UK airports and have been adjusted for location and inflation.

Figure 1 Average rates from AECOM Price Books

As noted during our presentation Dublin Airport have obtained quotations from a consultant commissioned for demolition works at Cork Airport, in the South of Ireland in Q1 2019. Budget quotations were sought from two demolition contractors for the old Cork Airport Terminal building which is approx.12,000m3 spread over three-storeys. Both quotations have valued the demolition of this building at approx. €XXXX/m3.

Dublin Airport note that the Cork region would experience substantially lower construction costs than the Greater Dublin Area and this strengthens our view that the rates included within the cost estimates are fair and reflective of the current market.

Figure 2 Old Cork Airport Terminal Building (~€XXX/m3 – Demolition & Disposal)

Northern Site complexity

In particular for the northern buildings you can see from the above images that the building consists of integrated offices, which are currently occupied. These are interlinked with internal workshops in the hangars and active services, including MV, gas and sewers.

The location is bounded on all sides by constraints:

- North Airside – immediate to live stands, which will remain active throughout (are currently being advanced for upgrade under PACE), requiring particular FOD control and limiting allowable operations
- West – Skybridge – the site is in immediate proximity to the skybridge which will remain active throughout.
- South – Top of the 'horse shoe' – To the south the site is bounded by airport roads at one of the most constrained points of the airport – where access has to be maintained to the OCTB (executive offices and Platinum services, the end point of the exit ramp from T1 and to live businesses in hangars 3-6)
- East – Hangar 3 to the immediate east need to be operational throughout, inclusive of the airside perimeter road which provides vehicular access for suppliers.

Figure 3 Top to bottom, left to right: Hangar 1 airside access road, with significant office space, storage of hazardous materials in the environs of the site, Hangar 3 and offices.

Southern Site Complexity

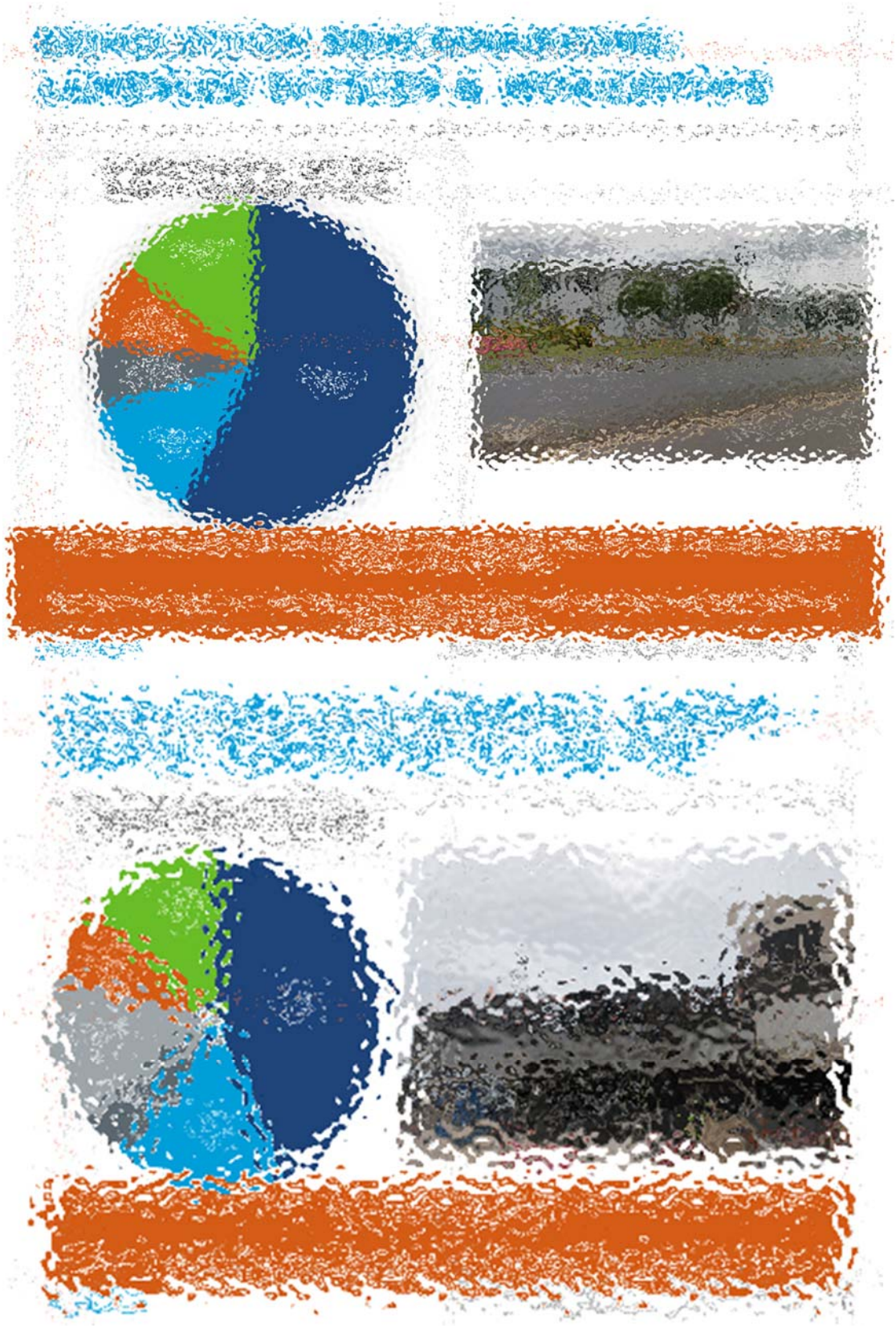
While relatively simpler than the northern site, there are a number of key constraints which contribute to this remaining a complex site with a number of constraints including:

- There are 13 separate buildings/operations in the south, requiring each to be individually deconstructed. Within the IAG facilities they have internally constructed a series of mezzanine structures for offices, storage etc. cargo consolidation facilities, cold storage, morgue etc.
- All of the cargo integrator facilities share a boundary with the bonded road facility requiring management of particular security requirements during the deconstruction.
- Gate post 4 is a primary gate post for airport activities and access for HGVs and HGV queueing will have to be maintained throughout. In particular the demolition of the Ryanair office building is in bounded on three sides by this access.

Project Benchmarking

In 2017 Dublin Airport commissioned Turner & Townsend to provide benchmarking advice which inform and provide confidence in Dublin cost estimates utilising outturn project cost data. As presented on June 13th, Turner & Townsend have advised on net construction cost of €XXXX/m3 (inflated to Q1 2019) for landside buildings such as offices/workshops/cargo buildings. The study also suggests demolition of airside buildings on average have a net cost of €XXXX/m3 based on buildings demolished at UK airports.

Figure 4 Extract from Turner & Townsend Benchmark Study (Dated 2017)



Waste Disposal in Ireland

Construction industry in Ireland and specifically in Dublin is under increasing strain due to the lack of active landfill site for the disposal of waste materials specifically inert construction materials. A recent review by the Construction Industry Federation (CIF) noted the impact which the decrease in active landfills which are now in operation in Ireland. It is noted that in 2009, there were 30 municipal and four inert landfill sites, however as off 2017 there are only 4 active municipal landfills in Ireland. The lack of landfills in the immediate greater Dublin area is causing serious issues for the construction industry which is now producing more construction and demolition (C&D) waste per annum than at peak of productivity in 2007.

Restriction in place by the Environmental Protection Agency (EPA) are enforcing a sustainable waste management strategy for Ireland which implements charges on different types of waste. This is also having an inherent effect on tendered rates being received from demolition contractors.

The following articles provide a closer insight into some of the challenges which the Irish Construction industry is currently experiencing:

http://www.engineersjournal.ie/2016/11/01/threat-to-infrastructure-projects-construction-waste/

https://www.independent.ie/business/commercial-property/construction-industry-fears-epa-waste-proposals-will-drive-up-building-costs-36807401.html

REDACTED VERSION - CONFIDENTIAL & COMMERCIALLY SENSITIVE INFORMATION

pages 61-75

DUBLIN AIRPORT

Technical Note 007

Quantity Variances

CIP2020+ Quantity Variances

Revision: 0.0

To: Commission for Aviation Regulation

From: Daa – amd (CIP2020 Team)

Date: 21/06/2019

Re: Response to Dublin Airport CIP2020 Efficiency Assessment (Steer - May 2019)

The purpose of this technical note is to provide further detail on the quantity variances between Dublin Airport Capacity Project estimates and Steers Draft Cost Efficiency Assessment. This impacts the below projects:

- CIP.20.03.029 - New Pier 5 (T2 and CBP Enabled)
- CIP.20.03.031 - South Apron Expansion (Remote Stands, Taxiway and Apron)
- CIP.20.03.036 - North Apron Development – Pier 1 Extension (Module 1) & Apron 5H PBZ

CIP.20.03.029 - New Pier 5 (T2 and CBP Enabled)

The quantity variances on CIP.20.03.029 CBP Enabled Pier 5 have created a significant variance of **€7.50m** between the Dublin Airport Estimate and Steer's Cost Efficiency Assessment.

Project No.	Project	Description	Dublin Airport (m2)	Steer (m2)	Variance (m2)
CIP.20.03.029	New Pier 5 (T2 and CBP Enabled)	Overall Floor Area	XXXX	XXXX	XXXX
		Internal Fit-Out Area	XXXX	XXXX	XXXX
		External walls.	XXXX	XXXX	XXXX
		Stair/Ramp	XXXX	XXXX	XXXX

Overall Floor Area

To provide further clarity, please refer the attached drawings which illustrate the Overall Floor Area for all levels and can be summarised as follows:

Apron Level	XXXX
Level 15	XXXX
Level 20	XXXX
Level 30	XXXX
Total Area (m2)	XXXX

Dublin Airport have reviewed the Steer overall area of XXXX and are unable to reconcile this quantity against the drawings provided.

Internal Fit-Out Area

Please refer the attached drawings which illustrate the fit-out areas for all levels. There is substantial variance between internal fit-out area assessed by Steer within the draft Cost Efficiency Report **(XXXX).** As this equates to a difference of approximately one level of Pier 5, we believe it would be prudent to undertake a review of both quantity take-offs to determine where the differences exist.

External Walls

As there is currently a variance in area for external walls of **XXXm2**; please refer below for further information supporting the quantity measured and how the quantity has been calculated as follows:

- (A) Lengths Taken-Off in metres XXXXm
- (B) Assumed Height x XXm
- **C= (AxB) Total Area External Wall areas XXXXm²**

Stairs/Ramp

As there is currently a significant variance of **XXno**. stairs/ramps throughout this project, we have provided marked-up drawings attached illustrating the quantity of stairs and ramps throughout Pier 5. We hope this provides further clarity to support the Dublin Airport cost estimate.

CIP.20.03.031 - South Apron Expansion (Remote Stands, Taxiway and Apron)

The quantity variances on CIP.20.03.031 have created a variance of **€XXXm** between the Dublin Airport Estimate and Steer Cost Efficiency Assessment. This relates to the following quantity variance:

Project No.	Project	Description	Dublin Airport (m2)	Steer (m2)	Variance (m2)
CIP.20.03.031	South Apron Expansion (Remote Stands, Taxiway and Apron)	Overall Floor Area	XXX	XXX	XXX

To provide further clarity on the above quantity variance **(XXm2),** Dublin Airport have attached the take-off drawing for the new PBZ building where this difference exists. It should be noted that this quantity variance creates a cost variance on other items which are linked to the overall floor area of module 1 i.e. structure and internal fit-out and services.

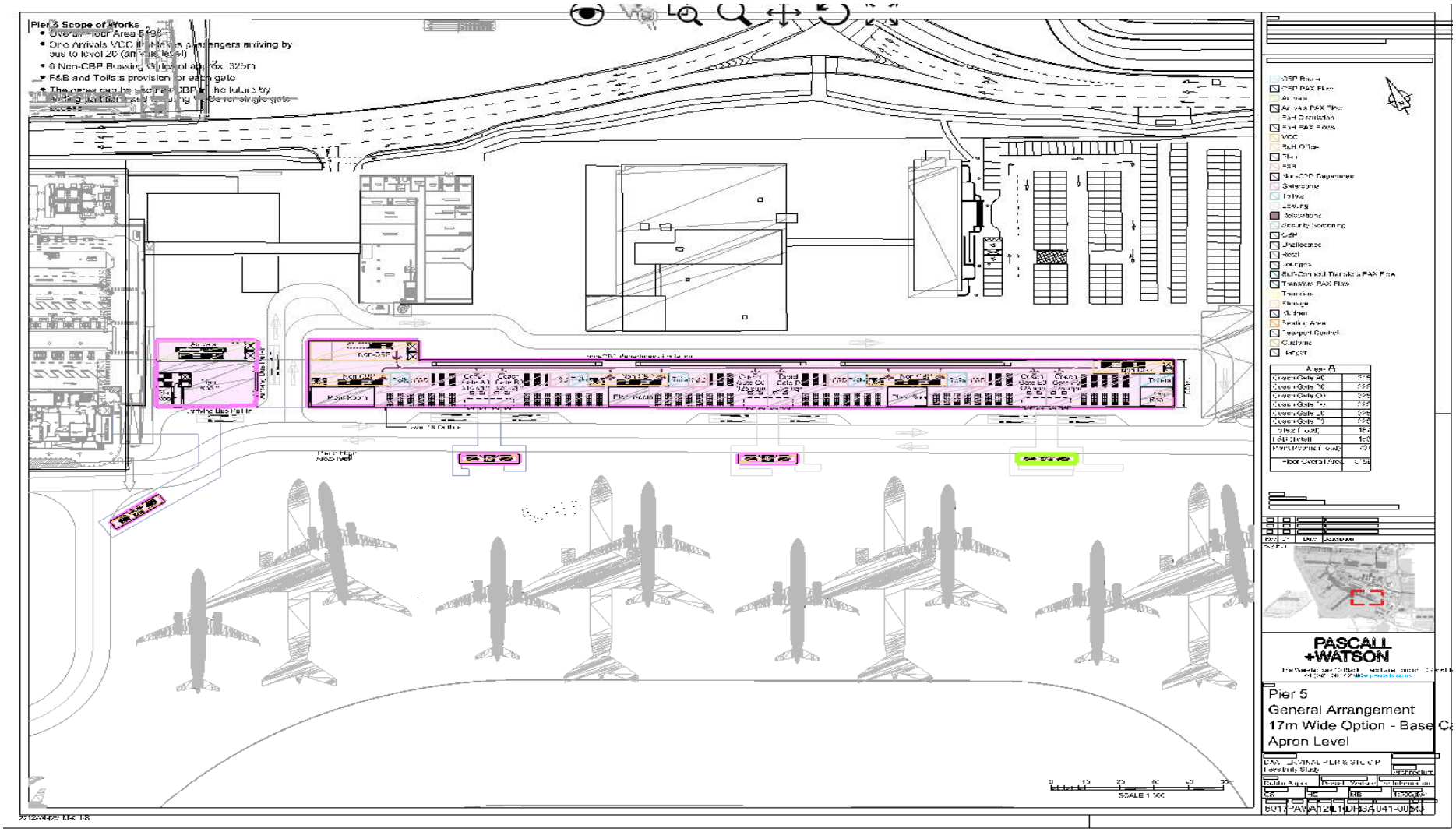
CIP.20.03.036 - North Apron Development – Pier 1 Extension (Module 1) & Apron 5H PBZ

The quantity variances on CIP.20.03.036 have created a variance of **€0.86m** between the Dublin Airport Estimate and Steer Cost Efficiency Assessment. This relates to the following quantity variance:

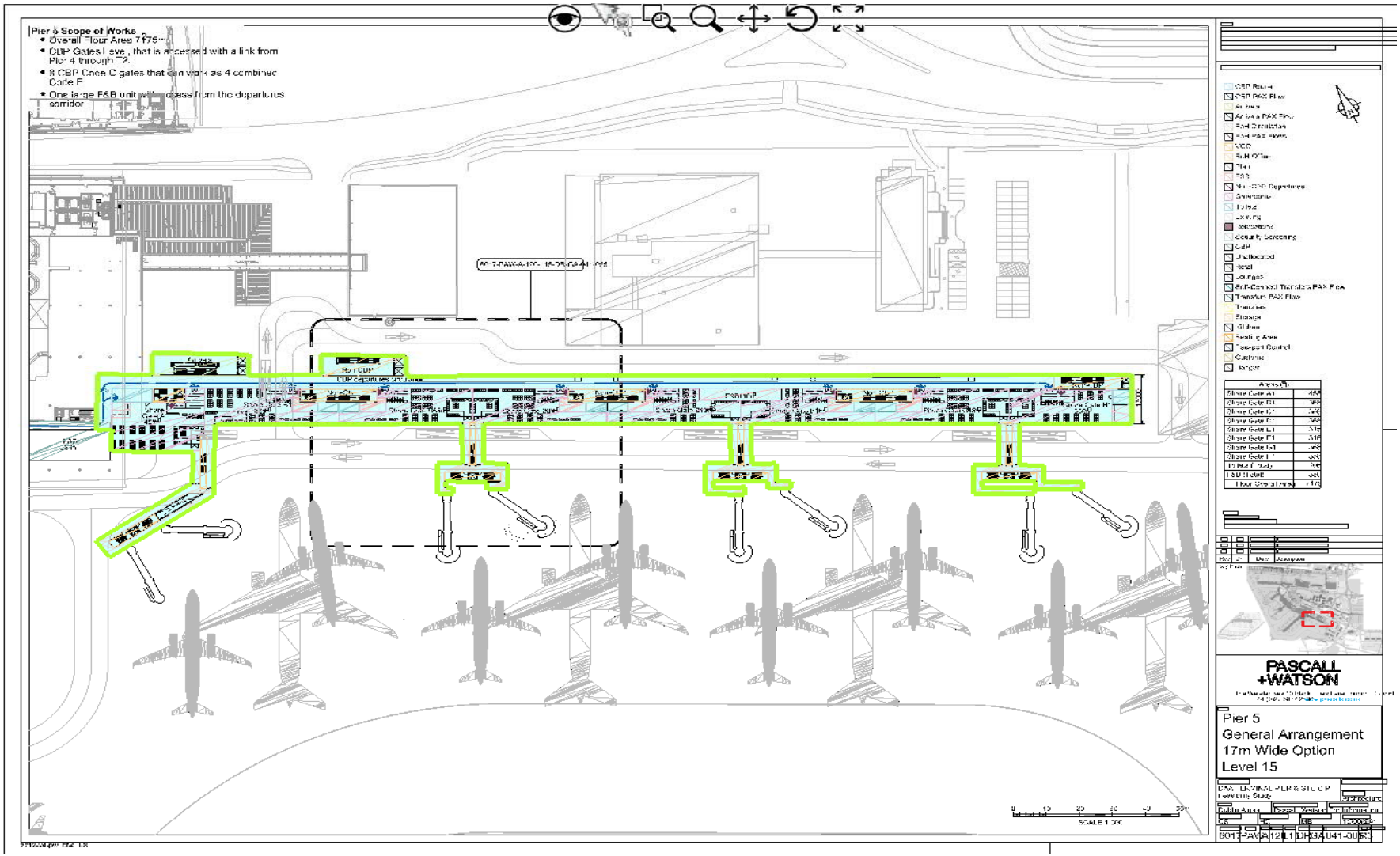
Project No.	Project	Description	Dublin Airport (m2)	Steer (m2)	Variance (m2)
CIP.20.03.036	North Apron Development – Pier 1 Extension (Module 1) & Apron 5H PBZ	Overall Floor Area	XXXX	XXXX	XXXX

To provide further clarity on the above quantity variance **(XXXm2),** Dublin Airport have attached the take-off drawing for the Module 1 building where this difference exists. It should be noted that this quantity variance creates a cost variance on other items which are linked to the overall floor area of module 1 i.e. structure and internal fit-out and services.

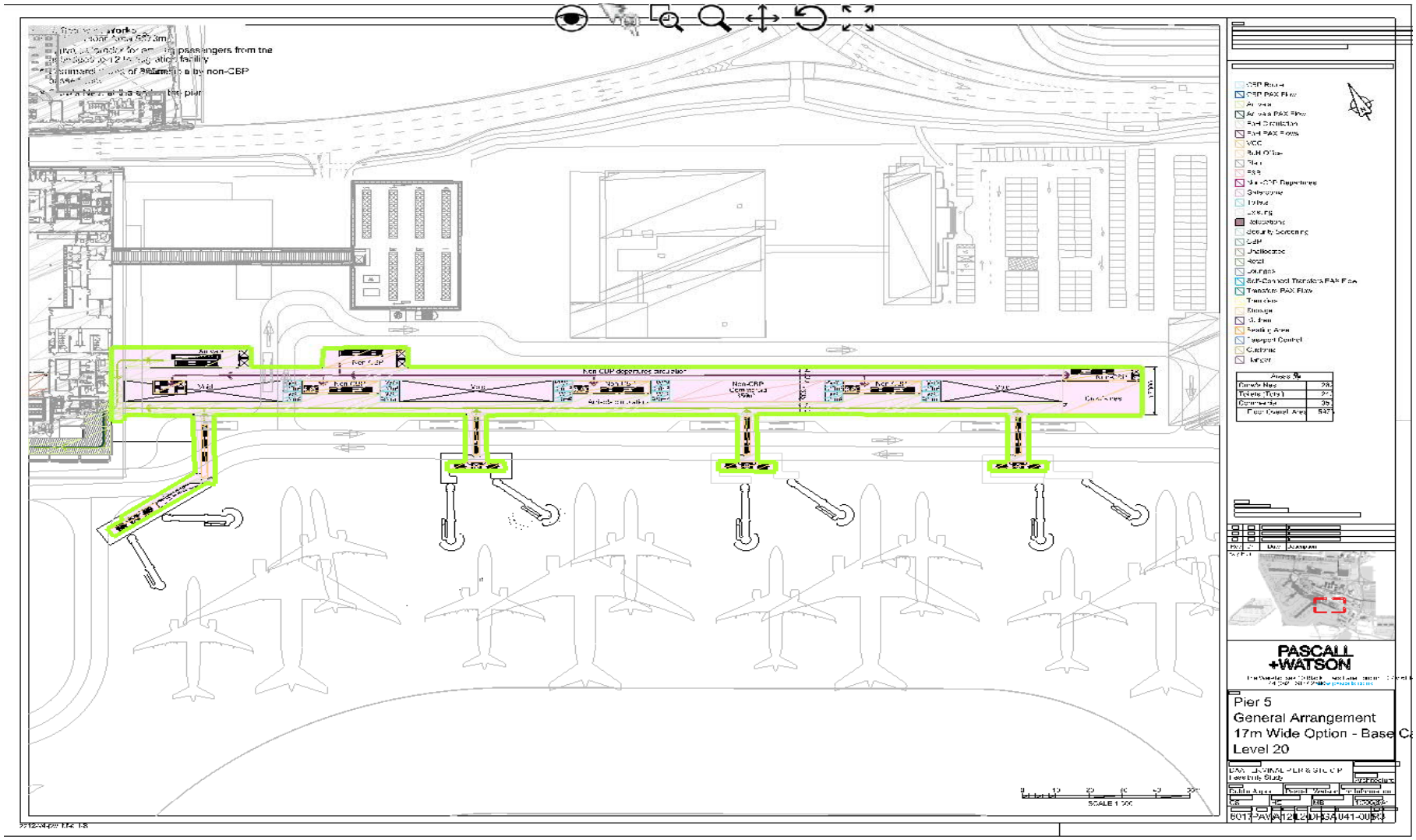
Appendix 1 – 20.03.029 – Overall Floor Areas



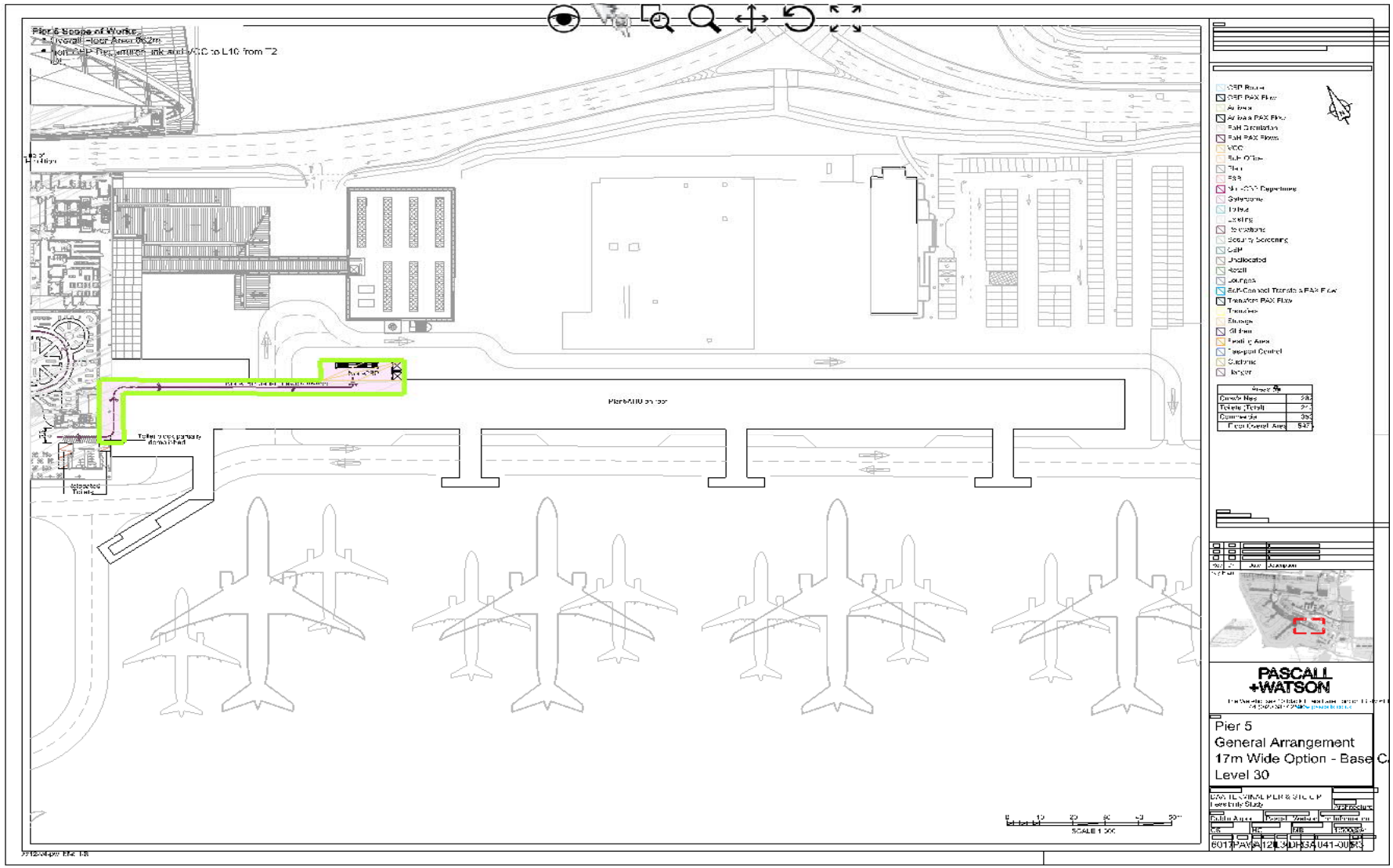
Pier 5 – Level 10 Area (XXXXm²)



Pier 5 – Level 15 Area (XXXXm²)

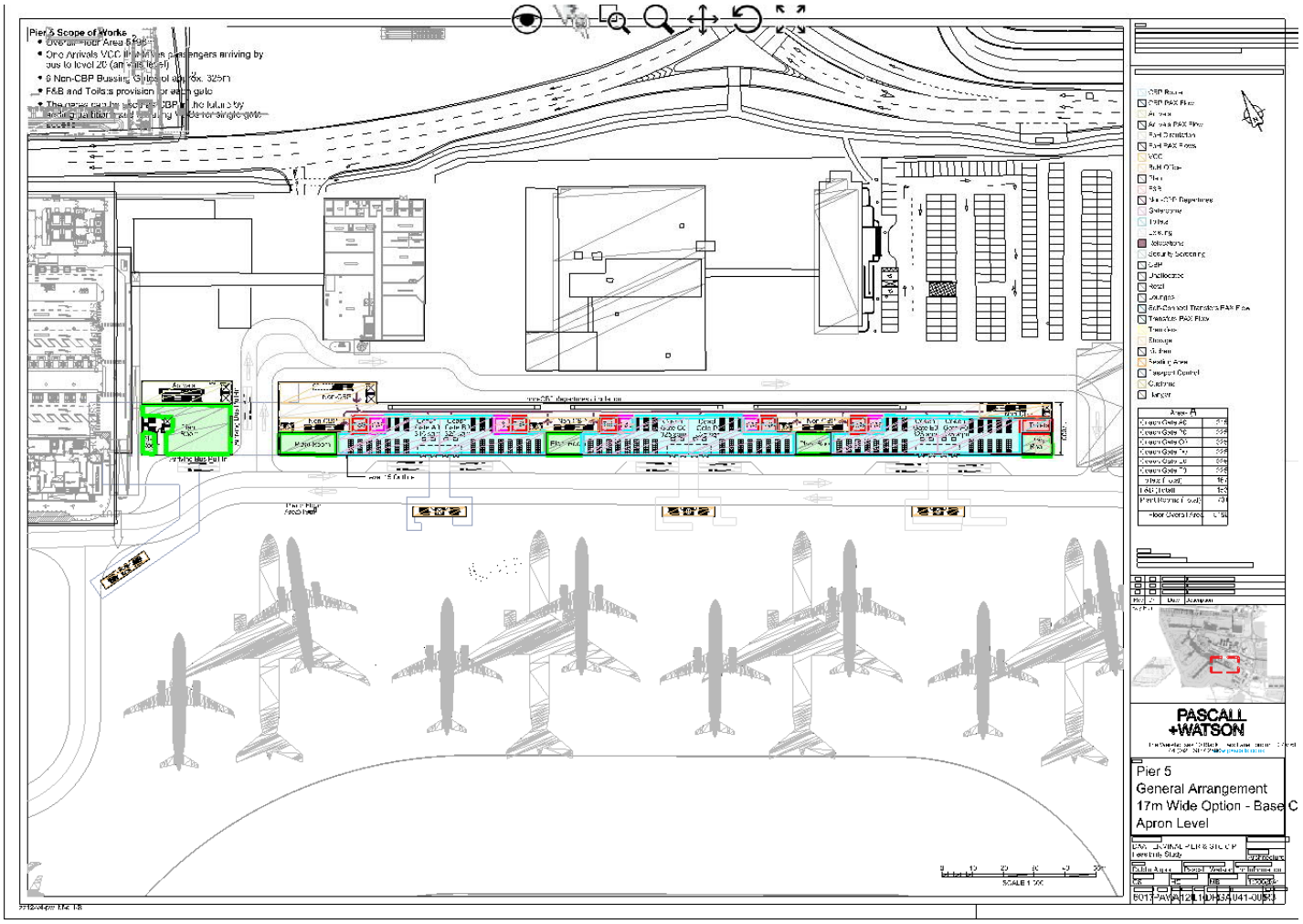


Pier 5 – Level 15 Area (XXXXm²)



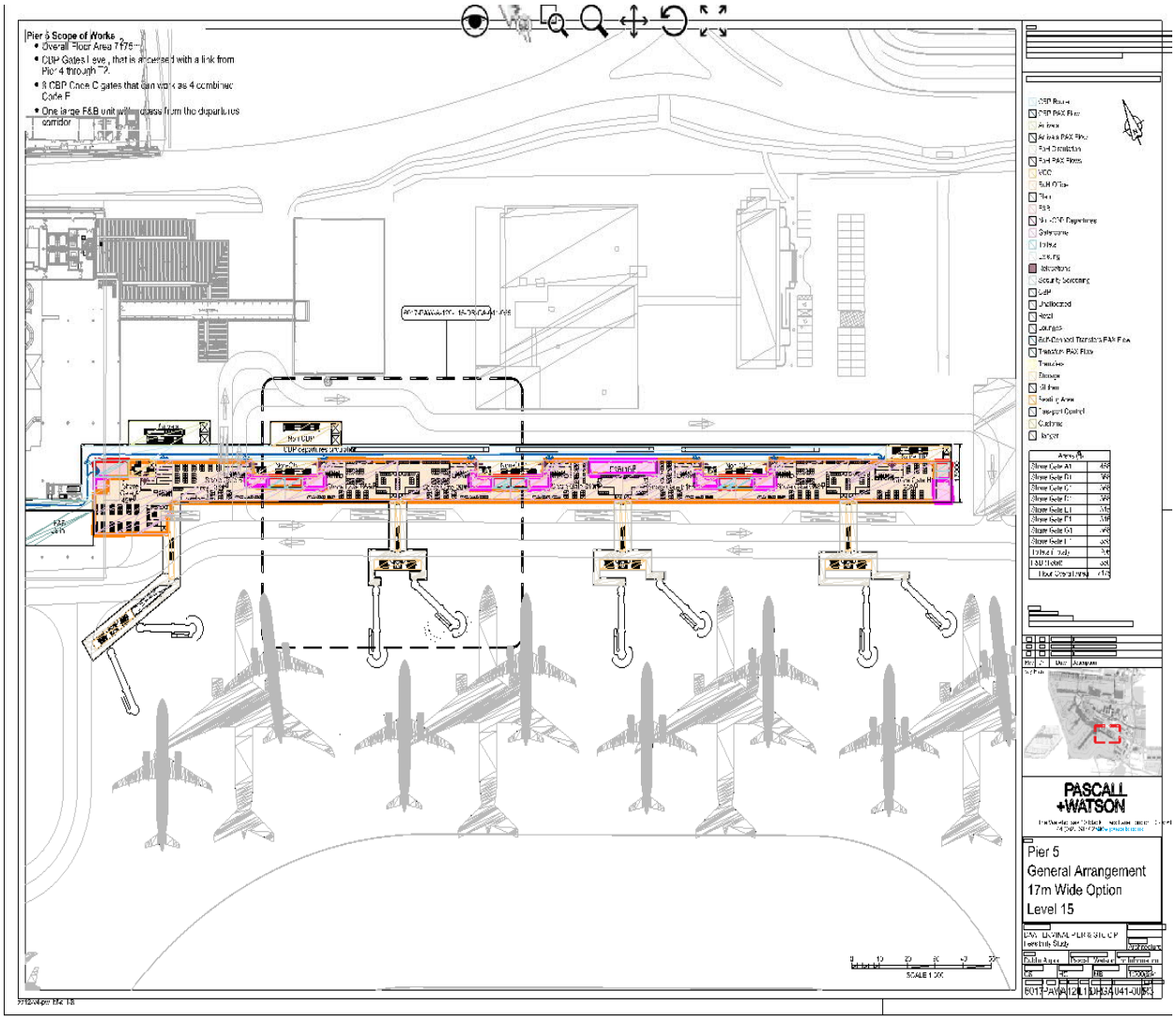
Pier 5 – Level 15 Area (XXXm²)

Appendix 2 – 20.03.029 – Internal Fit-Out Areas



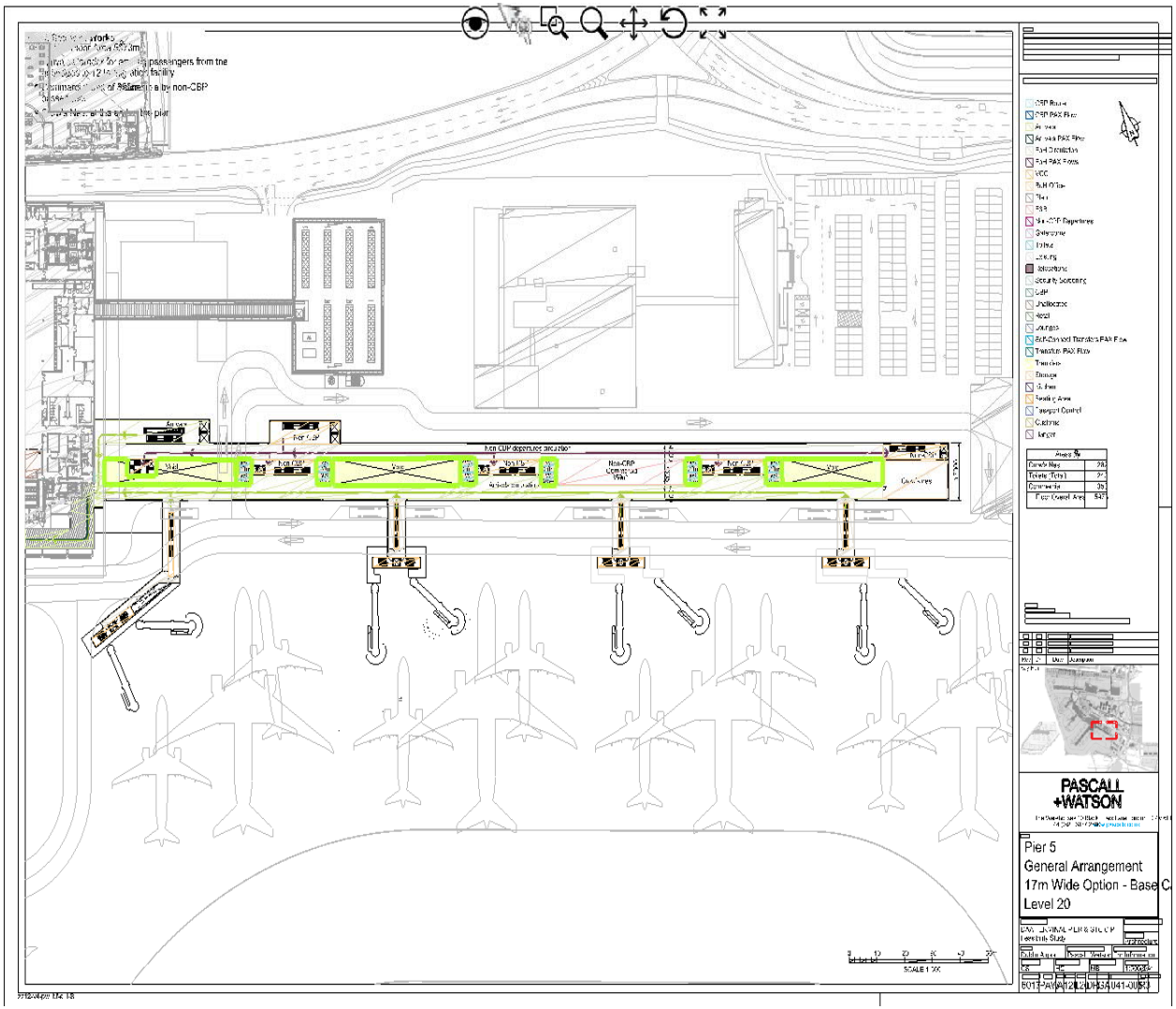
Level 10 Fit out Areas:

- Blue: Coach Gates
- Green: Plant Rooms
- Red: Toilets
- Purple: F&B
- Remaining Circulation



Level 15 Fit out Areas:

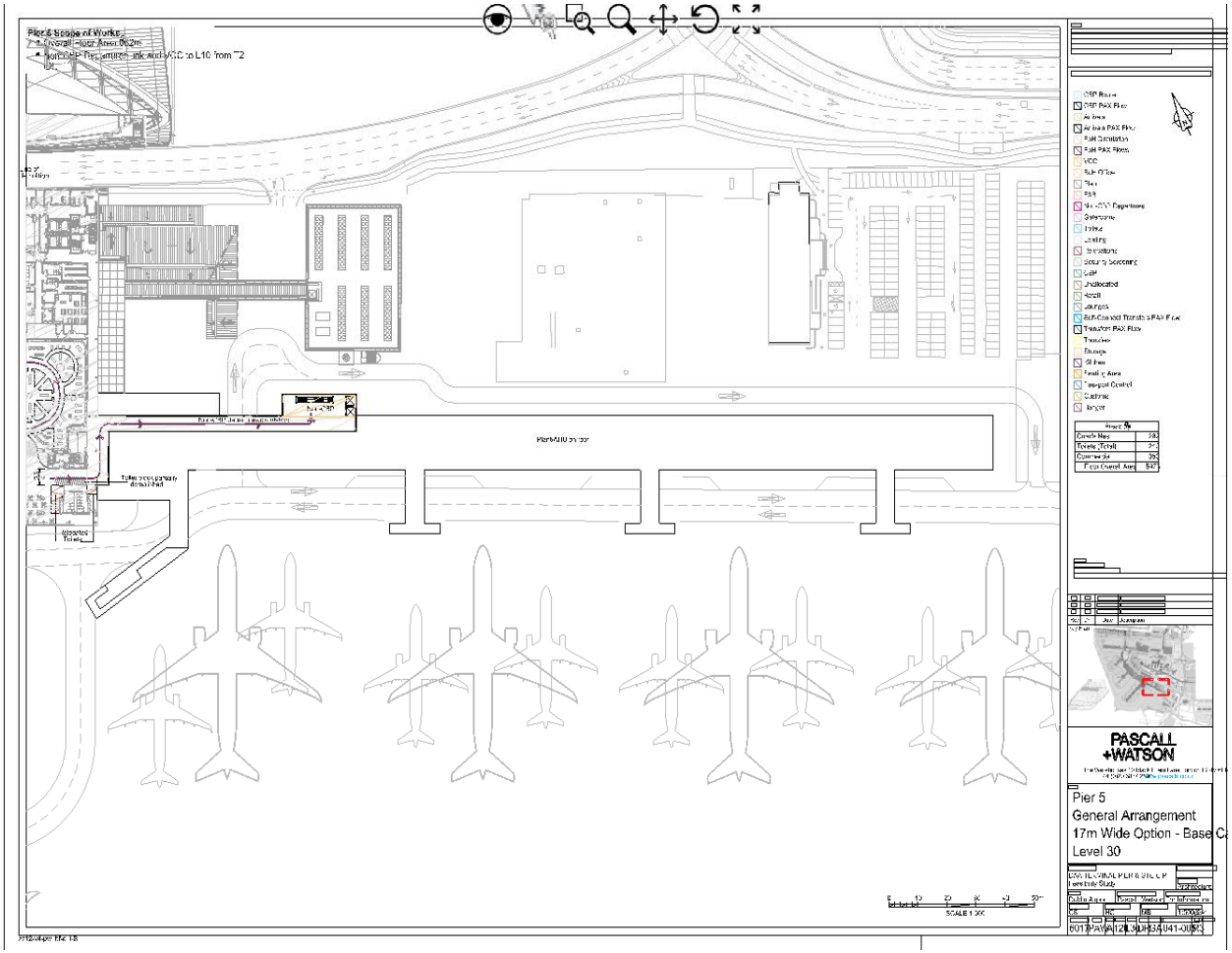
- Blue: N/A
- Green: N/A
- Red: Toilets
- Purple: F&B
- Orange: Departures Gate
- Remaining Circulation



Level 20 Fit out Areas:

- Blue: N/A
- Green: Toilets
- Green 2: Voids
- Red: N/A
- Purple: N/A
- Orange: N/A
- Remaining Circulation

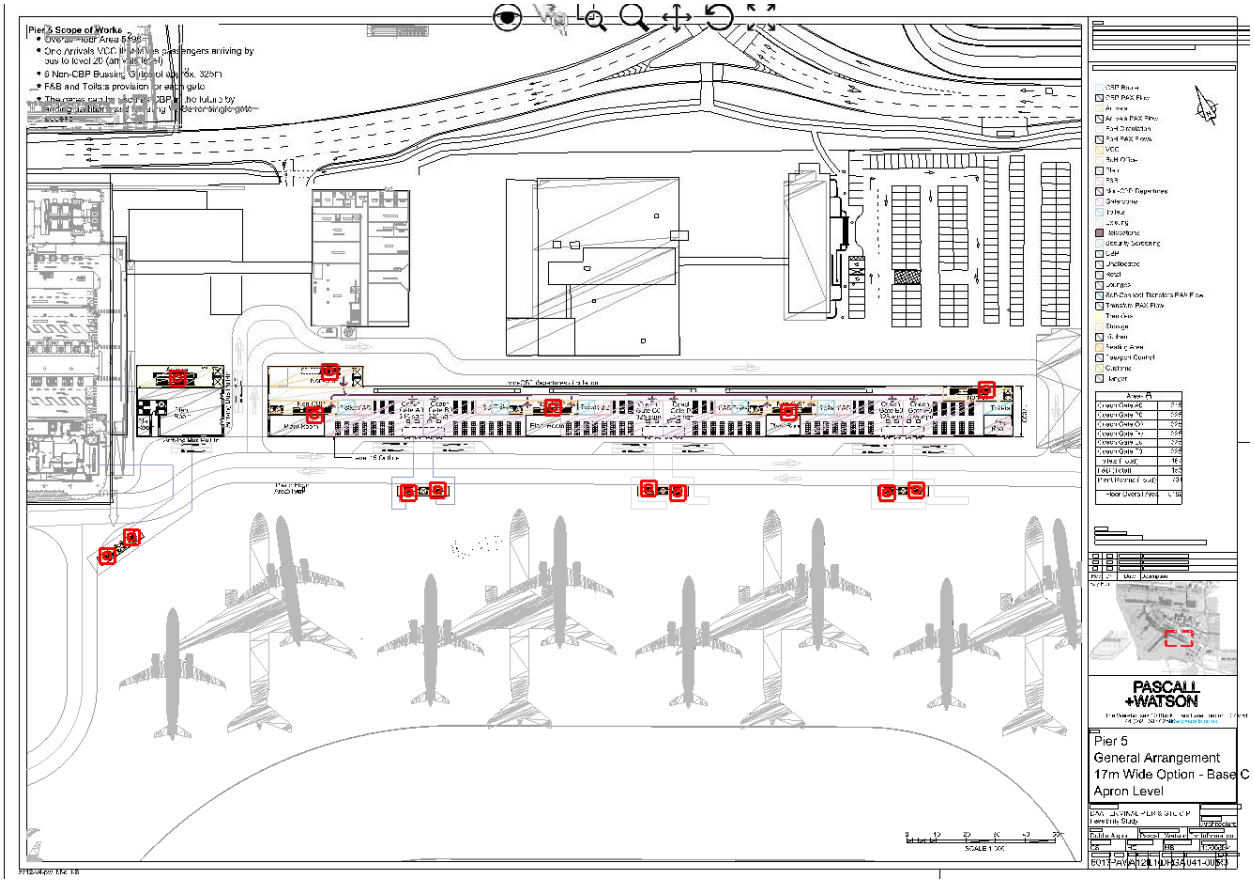
-



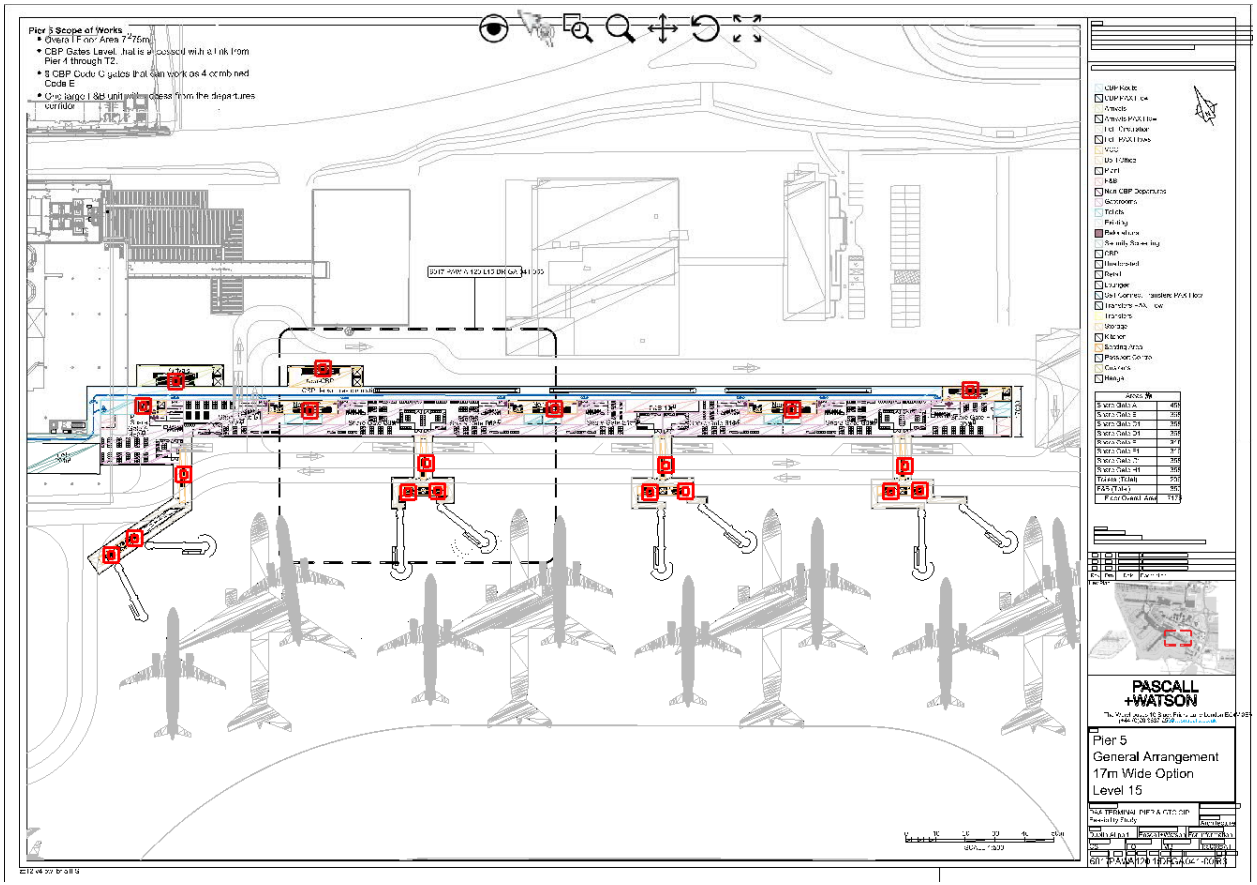
Level 30 Fit out Areas:

- Blue: N/A
- Green: N/A
- Red: N/A
- Purple: N/A
- Orange: N/A
- Remaining Circulation

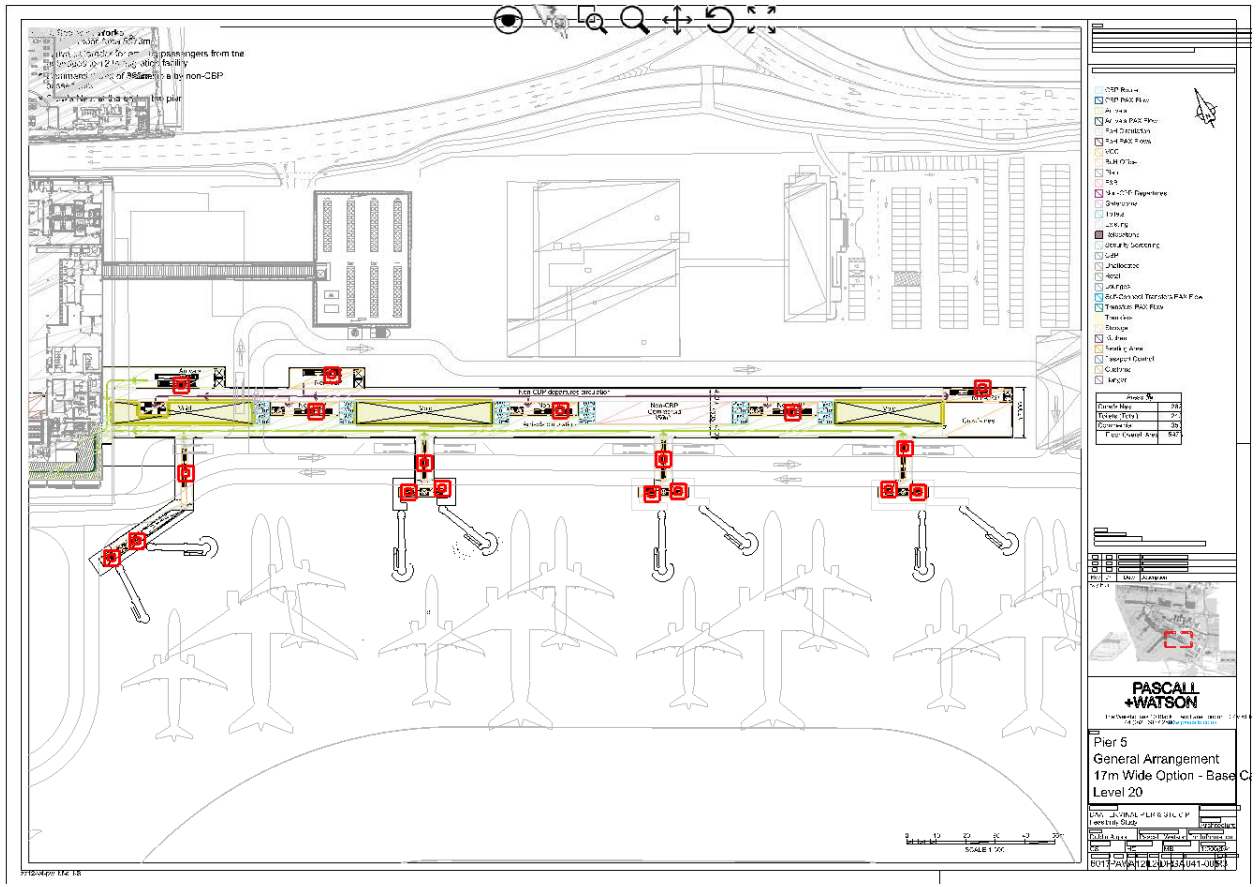
Appendix 3 – 20.03.029 – Stairs & Ramps Quantity



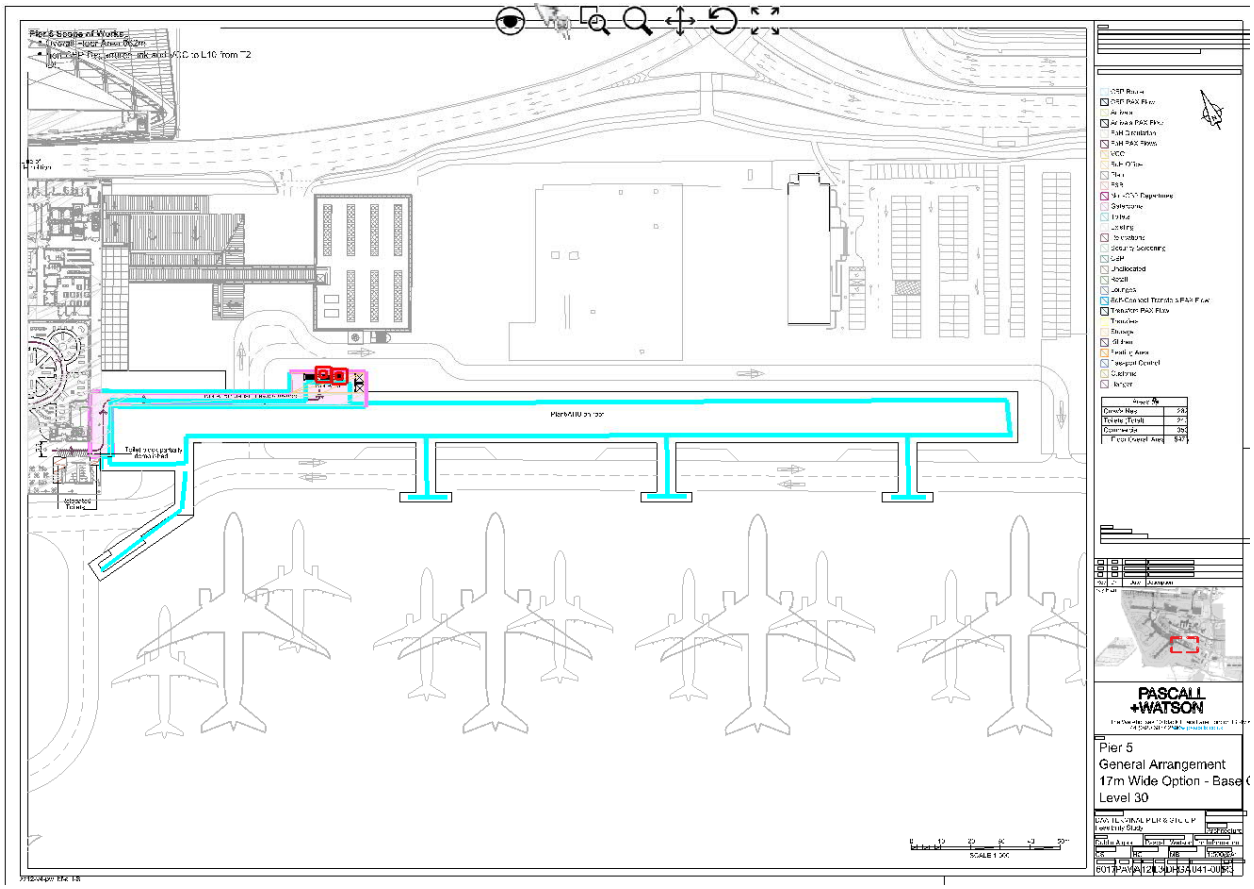
Level 10 Stairs: XXnr



Level 15 Stairs: XXnr

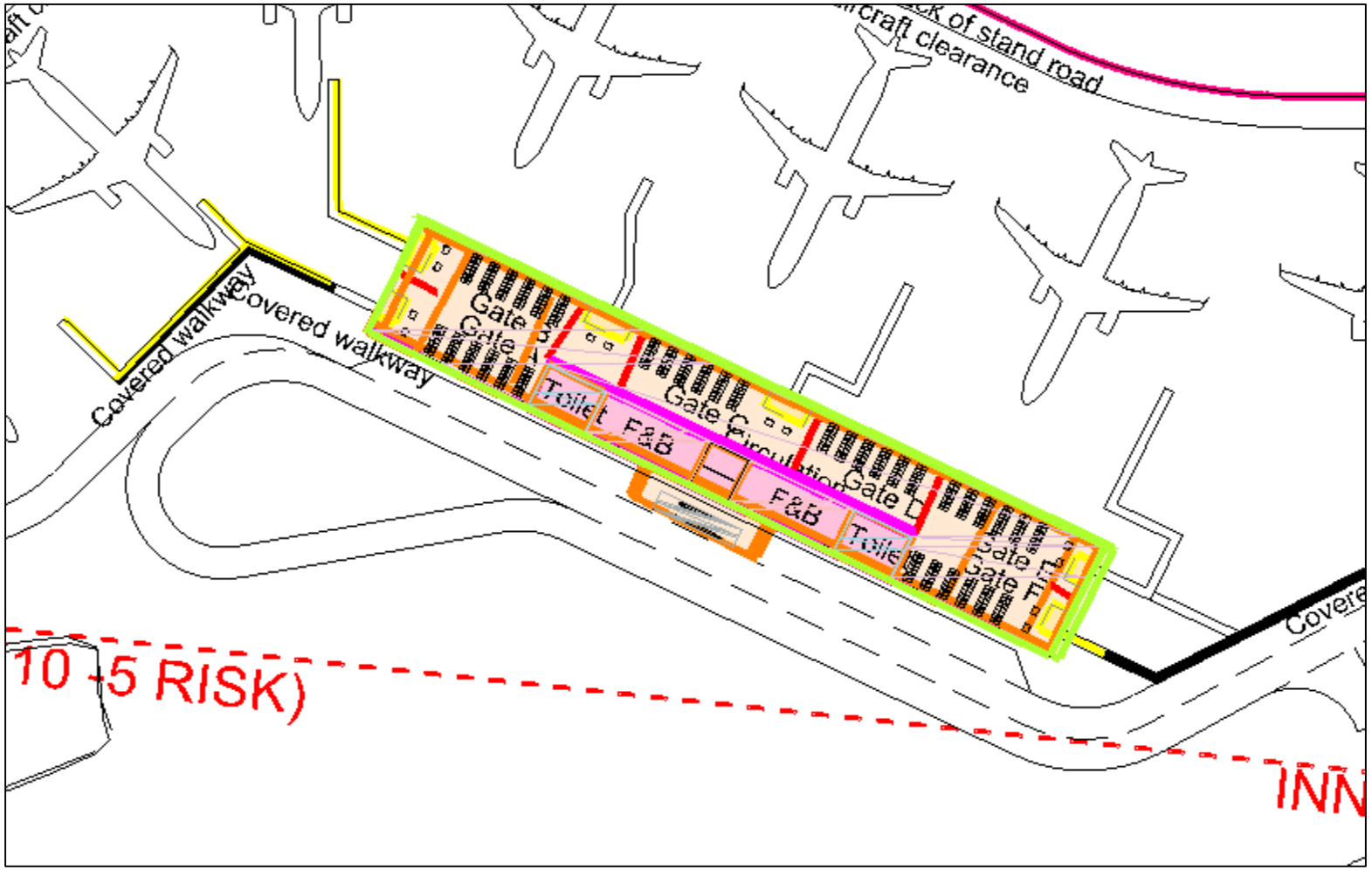


Level 20 Stairs: XXnr



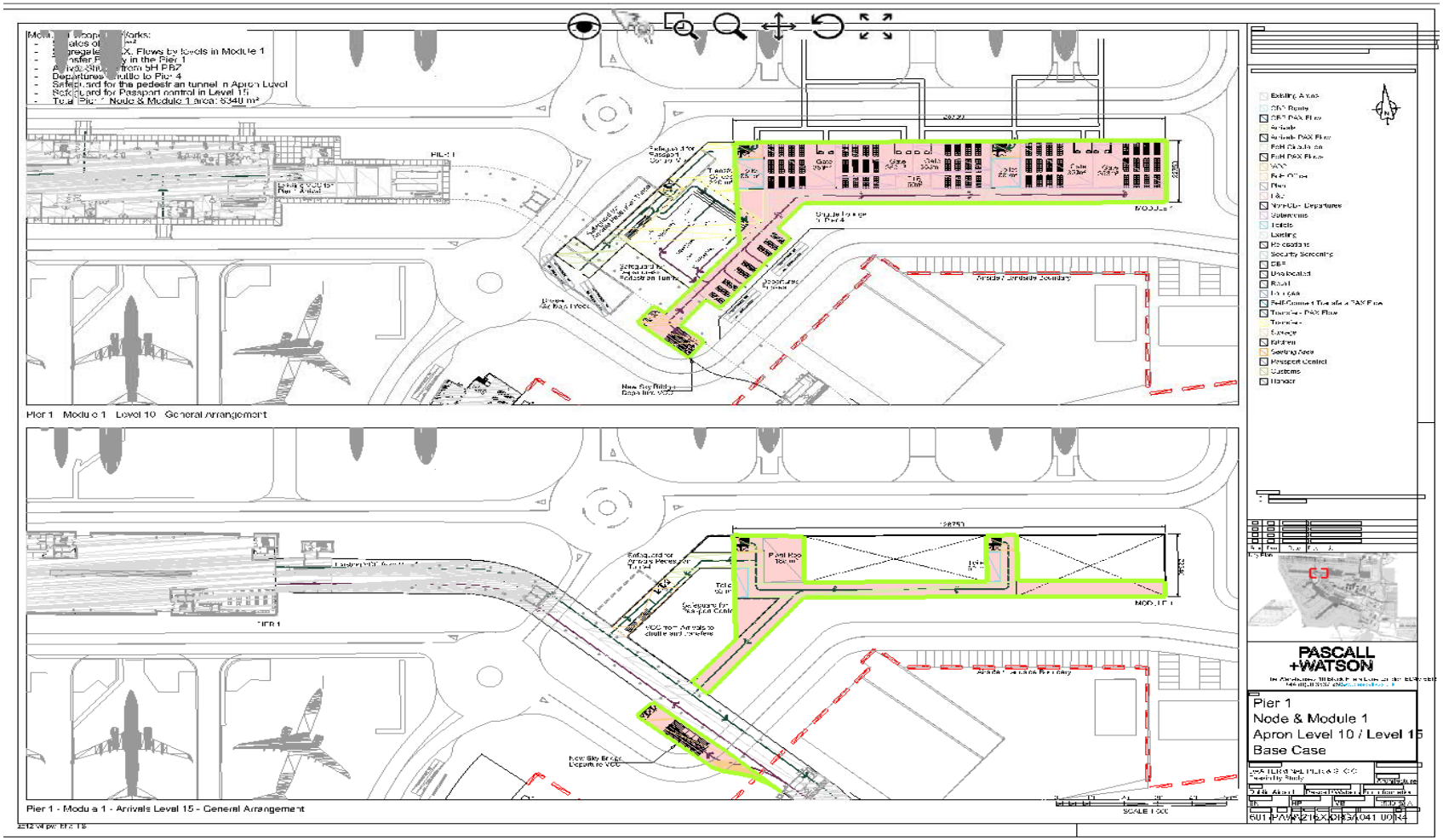
Level 30 Stairs: xnr

Appendix 4 – 20.03.031 – PBZ Building Overall Floor Area



New PBZ Building Floor Area - XXXXm2

Appendix 5 – 20.03.036 – Module 1Overall Floor Area



Module 1 GFA (XXXXm²)

Level 10: XXXXm²

Level 15: XXXXm²

DUBLIN AIRPORT

Technical Note 008

Communication Systems

CIP2020+ Communications Systems Rates

Revision: 2.0

To: Commission for Aviation Regulation

From: Daa – amd (CIP2020 Team)

Date: 18/06/2019

Re: Response to Dublin Airport CIP2020 Efficiency Assessment (Steer - May 2019)

The purpose of this technical note is to provide further detail on the rates included within the CIP estimates for the communication systems. As noted within the Steer site visit to Dublin Airport on Thursday 13th June 2019, there are some scope components which were unclear to Steer when making their cost efficiency assessment. This technical note should provide further clarity on the breakdown of the communication systems rates.

Figure 1 – Flight Information Display System (FIDS)

The variance between Dublin Airports rate of [redacted] and Steers rate of [redacted] equates to a direct rate variance of [redacted] across **4no**. projects which are noted below:

Project No.	Project	Dublin Airport Rate (m2)	Steer Rate (m2)
CIP.20.03.029	New Pier 5 (T2 and CBP Enabled)	[redacted]	
CIP.20.03.030	Expansion of US Pre-Clearance Facilities		
CIP.20.03.031	South Apron Expansion (Remote Stands, Taxiway and Apron)		
CIP.20.03.036	North Apron Development – Pier 1 Extension (Module 1) & Apron 5H PBZ		

Breakdown of Dublin Airport Rate

In order to clarify the scope and breakdown of the [redacted] rate for communications systems, Dublin Airport have provided within this technical note further information on the Dublin Airport rate and cost benchmark which was used to evaluate the rate. As noted, the rate included is based on benchmark data from UK Airports and an average cost was taken from the cost range for each of the communications systems components. As advised

within the Steer Site Visit meeting held on 13th June, these items have not been allowed for either separately or within any other rates included within the cost estimates which have specific allowance for communications systems. Items included within the rate are as follows:

- Fire, Smoke Detection & Alarms
- Voice/Public Address System (PA)
- Intruder Detection
- Security, CCTV, Access Control
- Wireways for telephones, data, structured cabling
- Structured cabling installation
- Flight Information Display System (FIDS)
- Building Management System (BMS)

Figure 2 –Public Address System

The systems noted can be referenced in the table below. This breakdown illustrates the cost range which was used to determine the rate included within the Dublin Airport estimates. The rates consider the complexity of installing these systems in a live airport environment, taking into account the interface with existing systems within the airport. It should be noted, where existing infrastructure is unable to be connected into there is a potential requirement to upgrade existing communications systems infrastructure including but not limited to, replacement of full cable runs to a termination point and upgrade of existing control systems to support an increase to system capacity. The Dublin Airport rate and the benchmark rates noted below are typical of the costs associated with undertaking this scope of works in an airport.

Communications Items Split	Cost Range - Low	Cost Range - High	Cost Range - Average
Fire, smoke detection and alarms			
Voice/public address systems			
Intruder detection			
Security, CCTV, Access Control			
Wireways for telephones, data, structured cabling			
Structured cabling installation			
Flight information display system (FIDS)			
Building Management System (BMS)			
TOTAL			

DUBLIN AIRPORT

Technical Note 009

Other

CIP2020+ Various Variance projects

Revision: 0.0

To: Commission for Aviation Regulation

From: Daa – amd (CIP2020 Team)

Date: 27/06/2019

Re: Response to Dublin Airport CIP2020 Efficiency Assessment (Steer - May 2019)

The purpose of this technical note is to provide further detail on the rates included within the CIP estimates. As noted within the Steer site visit to Dublin Airport on Thursday 13th June 2019, there are some scope components which were unclear to Steer when making their cost efficiency assessment. This technical note should provide further clarity on the breakdown of s series of smaller variances which are of lower magnitude but non-the less represent significant sums and their absence potential compromises the overall viability of projects.

This note initially presents the Capacity and then Core project variances.

Mentioned project benchmarks for most of the rates commented in this note can be found in *TN002 CIP2020+ Fit-Out rate review*.

Figure 1 Summary of cost variances on other projects. Capacity Projects

CIP Number	Project Title	Variance (€m)
CIP.20.03.017	Terminal 1 Shuttle, bus lounges and injection points	**XXX**
CIP.20.03.020	Terminal 2 Check-in Area Optimisation	**XXX**
CIP.20.03.021	Terminal 2 Central Search Area Expansion	**XXX**
CIP.20.03.029	New Pier 5 (T2 and CBP Enabled)	**XXX**
CIP.20.03.033A	Enablement of Pier 3 for Precleared US bound passengers	**XXX**
CIP.20.03.034	Pier 3 Immigration (Upgrade & Expansion)	**XXX**
CIP.20.03.036	North Apron Development – Pier 1 Extension (Module 1) & Apron 5H PBZ	**XXX**
CIP.20.03.011A	Terminal 1 Check-In (Partial shoreline)	**XXX**
CIP.20.03.036	North Apron Development – Pier 1 Extension (Module 1) & Apron 5H PBZ	**XXX**
CIP.20.03.043A	Terminal 1 Piers - New Airbridges (6NBE / 3WB)	**XXX**
CIP.20.03.051B	West Apron Vehicle Underpass - Pier 3	**XXX**

Figure 2 Summary of cost variances on other projects. Core Projects

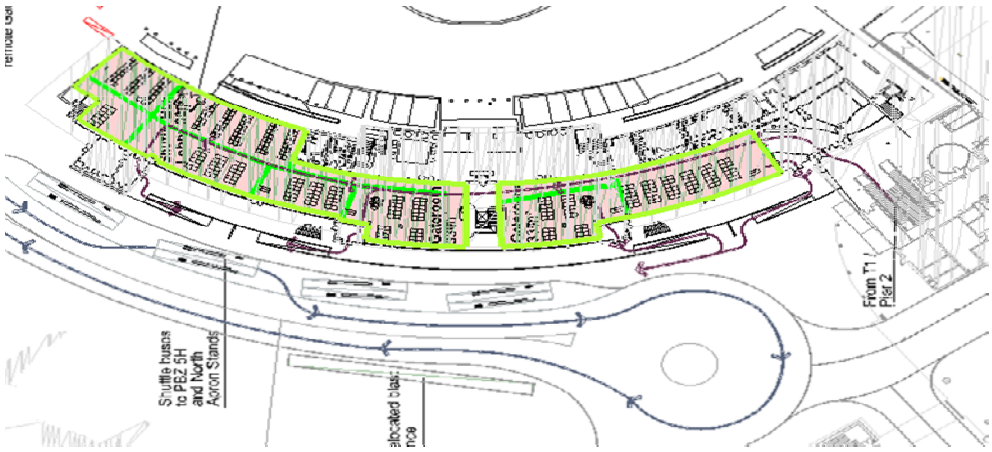
CIP Number	Project Title	Variance (€m)
CIP.20.01.006/34/39	Disposal of Contaminated Material Rates	**XXX**
CIP.20.01.020	Terminal 1 Façade, Roof & Spirals	**XXX**
CIP.20.04.021	West Apron - Accommodation & Welfare Facilities	**XXX**
CIP.20.06.042	ATRS - Central Search Areas (T1 and T2)	**XXX**

Capacity Projects

CIP.20.03.017 - Terminal 1 Shuttle, bus lounges and injection points

The Steer rates of **€XXXX/m2** and **€XXXX/m2** for refresh works within the OTCB results in a shortfall of approximately **€XXXm** compared to our efficient estimates not including associated reductions in allowances for phasing, design development, preliminaries, risk & contingency, design and management costs and escalation costs.

Figure 3 OCTB refurbishments, area measured



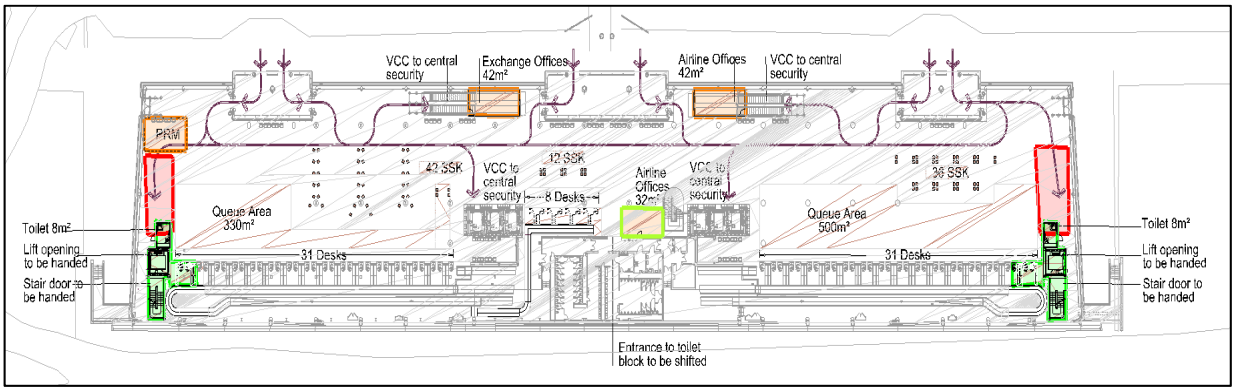
As a review against other projects completed within Dublin airport the recent tiling project on T1 departures level resulted in an outturn cost of **€XXXX.m2** as well as the T1 arrivals hall refurbishment which resulted in an outturn cost of €2,200/m2. As noted albeit have underlaying floor issues in T1 departures level floor we are conscious that there will be costs associated with the remediation of the existing sub-strata when refreshing the OTCB. We are also conscious that this is a listed structure, and all works in this area will probably done under supervision and must be done to level of detail and character which meets that of the original building. This level of finish is likely to be a condition of the planning for this facility.

We therefore believe the rate of €XXXX/m2 is fair and reasonable given the level of design development at present and the likelihood that the project will evolve once further investigations are undertaken.

CIP.20.03.020 - Terminal 2 Check-in Area Optimisation

The Steer rates of **€XXXX/m2** and **€XXXX/m2** for alterations to WC's & relocation and development of various offices results in a shortfall of approximately **€0.86m** compared to our efficient estimates not including associated reductions in allowances for phasing, design development, preliminaries, risk & contingency, design and management costs and escalation costs.

Figure 4 T2 Check in hall, office and WC relocation



In alignment with the previous Dublin Airport rate of **€XXXX/m2** allows for demolition and alterations, an element of new build shell & core and subsequent fit-out of the new WC's including all fixtures, fittings and equipment. It is also reflective of the costs of these works generally being undertaken as small standalone, piecemeal works.

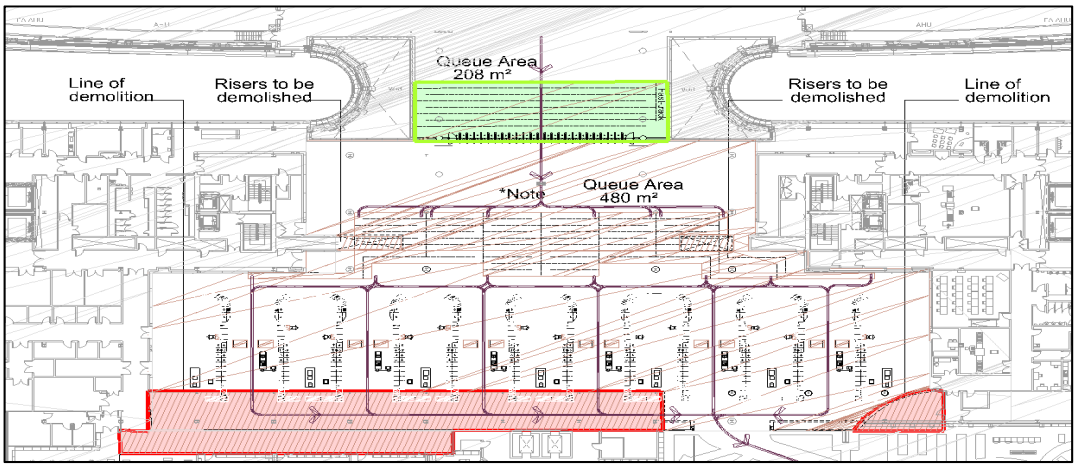
The Dublin Airport rate of **€XXXX/m2** for relocation of the offices includes for demolition and alterations of existing partitions, ceilings, floor finishes as well as associated services with subsequent fit-out allowance for internal sub-division where required, new floor, wall and ceilings finishes, fixtures and fittings, sanitaryware and WC fittings to WC's, new on floor mechanical and electrical installations.

Dublin Airport have reviewed benchmarks of other fit-out projects within the airport and, with the level of demolition and refurbishment considering phasing requirements to maintain normal operations, we believe this rate is realistic for the scope of works. Dublin Airport notes that this reduction will impact the viability of constructing these facilities. Fit-out costs on projects at Dublin Airport and other UK airports would suggest that this reduction is not a fair assessment of the current construction market.

CIP.20.03.021 - Terminal 2 Central Search Area Expansion

The Steer rate of **€XXXX/m2** for fit-out of the expanded T2 central search area results in a shortfall of approximately **€XXXm** compared to our efficient estimates not including associated reductions in allowances for phasing, design development, preliminaries, risk & contingency, design and management costs and escalation costs.

Figure 5 T2 central search proposed expansion



The Dublin Airport rate of €XXXX/m2 is for direct construction costs associated with demolition, removal, disposal of existing floors, walls, ceilings and MEP services along with installation of and making good new finishes. The rate also takes account of any phasing requirements to complete this project in an operational airport, including any temporary works which are required to maintain the existing central search facility. As can be noted from the drawing above, these works will be undertaken in a critical area where passenger flows are vital for Dublin Airport and its customers. This scope of work will take significant planning and execution to maintain Dublin Airport reputation for excellent passenger experience.

CIP.20.03.029 - New Pier 5 (T2 and CBP Enabled)

The Steer rates of **€XXX/m2** for fit-out of food & beverage (F&B) results in a shortfall of approximately **€0.26m** compared to our efficient estimates not including associated reductions in allowances for phasing, design development, preliminaries, risk & contingency, design and management costs and escalation costs.

As noted previously Steer have noted within their draft estimate report that fit-out costs for food & beverage have been omitted as these are by the concessionaire. Dublin Airports strongly reject this assumption as food & beverage and retail facilities which are developed by ARI are at a cost to the airport and not a concessionaire. The **€XXXX/m2** rate is a much lower fit-out rate and includes for basic fit-out considering that this will be undertaking in the Pier 5 new build with less working restrictions due to airport operations. We strongly urge Steer to reconsider the removal of this cost from their draft estimate.

CIP.20.03.033A - Enablement of Pier 3 for Precleared US bound passengers

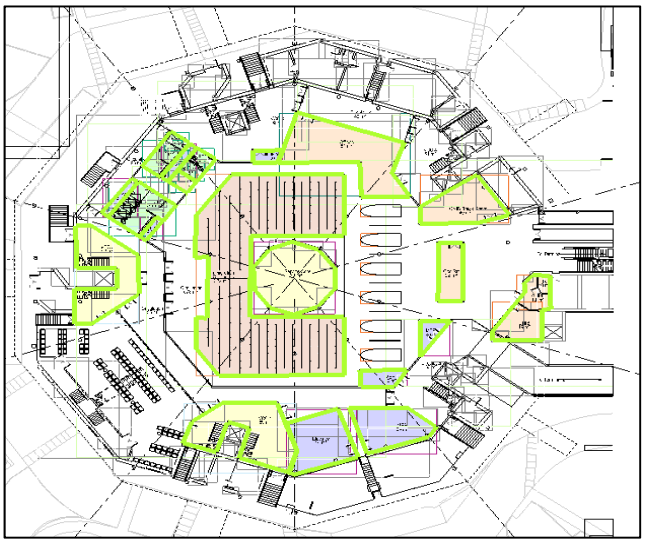
The Steer rates of **€XXXX/m2** for development of new WCs and **€XXXX/m2** for development of a new CBP bus waiting lounge in Pier 4 results in a shortfall of approximately **€0.54m** compared to our efficient estimates not including associated reductions in allowances for phasing, design development, preliminaries, risk & contingency, design and management costs and escalation costs.

Pier 3 is an incredibly congested space, as noted elsewhere over the course of the CIP the volume of passengers sung this space ensures that there are very limited periods where works can proceed uninterrupted. Its notable that this work needs to take place within this, very active environment and will need to be undertaken in micro phases to succeed.

CIP.20.03.034 - Pier 3 Immigration (Upgrade & Expansion)

The Steer rates of **€XXXX/m2** for development of new electrical room, **€XXXX/m2** for alterations to queue space and **€XXXX/m2** for development of a new WCs results in a shortfall of approximately **€0.54m** compared to our efficient estimates not including associated reductions in allowances for phasing, design development, preliminaries, risk & contingency, design and management costs and escalation costs.

Figure 6 Pier 3 immigration hall, measured retrofit areas



Pier 3 is an incredibly congested space, as noted elsewhere over the course of the CIP the volume of passengers sung this space ensures that there are very limited periods where works can proceed uninterrupted. Its notable that this work needs to take place within this, very active environment and will need to be undertaken in micro phases to succeed.

CIP.20.03.036 - North Apron Development – Pier 1 Extension (Module 1) & Apron 5H PBZ

The Steer rates of **€XX/m2** for wall finishes generally and **€XX/m2** for food & beverage results in a shortfall of approximately **€XXXXm** compared to our efficient estimates not including associated reductions in allowances for phasing, design development, preliminaries, risk & contingency, design and management costs and escalation costs. As noted in the fit out technical note (TN002) Dublin Airport is required, to attract concessionaires, to provide a higher level of finish for its concessionaires than would normally be the case in non-airport environment in Ireland or elsewhere.

CIP.20.03.011A- Terminal 1 Check-In (Partial shoreline)

Within Steer's cost efficiency estimate it is noted that one of the zones, Zone 0 Option was identified as not being required and it has therefore been omitted. This omission from Steer's cost efficiency estimate creates a variance of **€XXXm** not including associated reductions in allowances for phasing, design development, preliminaries, risk & contingency, design and management costs and escalation costs.

While this is presented as an optional component; this optionality is a function of design development and may be required to facilitate construction phasing. It is therefore a required component for inclusion.

CIP.20.03.036- North Apron Development – Pier 1 Extension (Module 1) & Apron 5H PBZ

A variance of approx. **€XXXk** exists between the Steer cost efficiency estimate and Dublin Airports estimate relating to the external enclosing walls of the Module 1 building. This variance exists partly in relation to a variance in quantity (18m2) however predominantly in relation to a significant rate reduction from €XXX/m2 to €XXX/m2 for this building component. To further support the Dublin Airport of €XXX/m2 for external enclosure, a project benchmark from Dublin Airport (D15262 Pier 1 Extension) which was tendered in Q2 2016 has been included within the appendix documents. The tendered cost for external wall completions equates to €XXX/m2 (inflated to Q1 2019 prices). Dublin Airport have taken into consideration the increase in quantities associated with the Module 1 build and therefore consider that €XXX/m2 is a reasonable allowance for this scope given the feasibility level design information. Dublin Airport believe that Steers rate of €XXX/m2 will create difficulties in delivering this project which is vital to Dublin Airport customers.

As part of the technical note TN005 issued to Steer on “Quantity Variances” Dublin Airport have provided the area quantity taken for the Module 1 Building to support the cost estimates. We have been unable to review the quantities with Steer at this point in time, however would like the opportunity to review and reach agreement.

CIP.20.03.043A- Terminal 1 Piers - New Airbridges (6NBE / 3WB)

A variance of **€XXXm** exists between the Steer cost efficiency estimate and the Dublin Airport estimate in relation to the two Vertical Circulation Cores (VCC) which will be constructed as part of the Pier 2 project. It is noted within Steers cost efficiency report that the basis is the reduction of €XXXk on each VCC is that the complexity of installing the VCCs in the Pier is less than within the terminal.

While it is accepted that the proposed locations of the VCC are in a less complex location, they are both on the airfield. They will need to be constructed while keeping all adjacent stands active. As noted elsewhere Dublin Airport is stand constrained and it will be required to gain maximum utilisation from these stands. It will also be required to keep the adjacent rotunda active at all times. For these reasons alone, the complexity associated with the development of these VCCs is significant.

CIP.20.03.051B - West Apron Vehicle Underpass - Pier 3

A direct rate variance between the **€XXXX/m2 rate** in the Dublin Airport cost estimate and **€XXXX/m2** results in a direct variance of **€XXXk** in relation to refurbishment works for the fixed link bridges at Pier 3 not including associated reductions in allowances for phasing, design development, preliminaries, risk & contingency, design and management costs and escalation costs.

Steer note within the cost efficiency report that they believe the rate of **€XXXXX** is higher than expected for this scope of work. In ongoing communication with Steer, Dublin Airport have provided a technical note on refurbishment rates and recent project benchmarks at Dublin Airport. As noted within the report the refurbishment rates included within the cost estimates are reflective of recent project costs at Dublin Airport. As referenced in the technical note on refurbishment projects, a project benchmark for refurbishment of a space of similar use such as Level 10 Bus Lounge cost approx. €XXXX/m2 at a very low specification with minimal works to Mechanical, Electrical & Plant (MEP) and basic finishes excluding seating/furnishings. The Pier 3 fixed links will require a full extensive refurbishment of the fixed links as the fixed links will be modified to coordinate with the Pier 3 underpass. It is therefore likely that there will be a requirement for significant MEP scope.

Dublin Airport strongly believe that given the feasibility level of information availability to support the development of a cost estimate that this rate is a reasonable allowance for this scope of works.

Core Projects

Disposal of Contaminated Material Rates

The Steer rates of €XXX/m3 for disposal of contaminated material results in a shortfall of approximately €XXXk across three projects. The rate submitted by Dublin Airport of €XXX/m3 was based on recently tendered projects. The rates received from tenderers on the recent 5H Enabling Project ranged from €XXX/m3 to XXX/m3. On the basis that rates for these works can fluctuate depending on the availability of capacity in the nearest disposal facility we felt it prudent to include a rate which represented the average of recent rates received. Extracts from the above referenced tender returns are available on request.

CIP.20.01.020 Terminal 1 Façade, Roof & Spirals

The Steer rates of €XXX/m2 for the strip out of existing services are insufficient to complete the works. The works will include the strip out of the redundant services, jacking up of remaining services to allow for new roof finishes to be installed, some equipment will need to be disconnected and some equipment will require a temporary substitute in place during the planned down time. The rate of €XXX/m2 included by Dublin Airport for services strip out is based on the costs of recent roof finishes projects completed in the airport under the current CIP namely Roof Upgrades Phase 2 & 3.

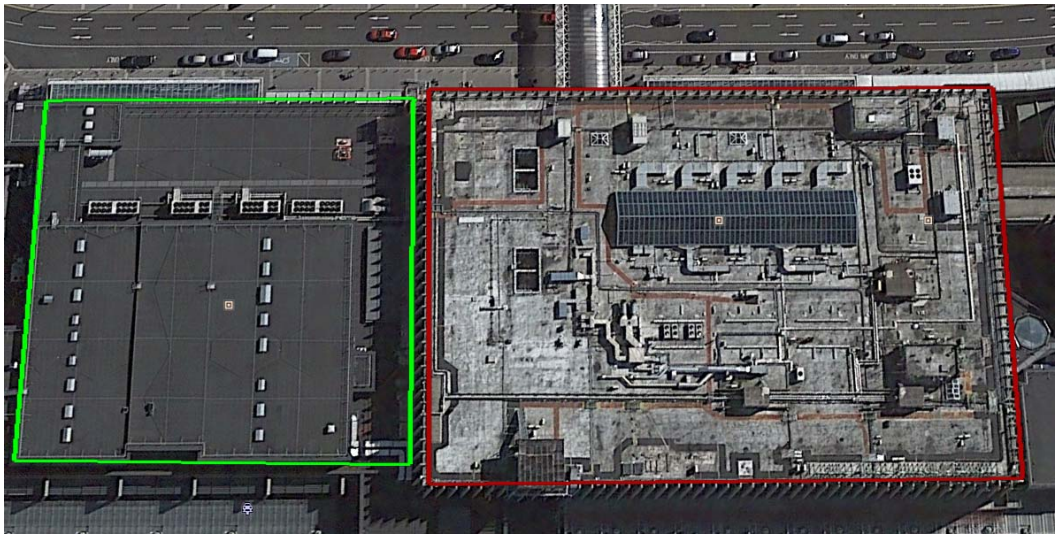
The average cost of these projects (incl. prelims) was circa €XXX/m2 this compares to the €XXX/m2 submitted by Dublin Airport which has been reduced by Steer to €XXX/m2 (see table below for rate build up). It is also noted that

the level of existing services on the T1 Roof are significantly greater than experienced on the previously completed roof projects referenced above, the image below illustrates the extent of services present.

Figure 7 Dublin Airport roof rate cost breakdown

Description	Dublin Airport Rate €	Steer Rate €
Strip out of existing Services to Roof	XXXX	XXXX
Allowance for new roof coverings to entire roof area including vapour barrier and insulation	XXXX	XXXX
Misc. allowance for Fire Proofing	XXXX	XXXX
Prelims @ 20%	XXXX	XXXX
Total Roof Rate	XXXX	XXXX

Figure 8 T1 roof plan view



Previously Completed Roof

Proposed Roof

CIP.20.04.021 West Apron - Accommodation & Welfare Facilities

The rate submitted by Dublin Airport for the construction of the West Apron Accommodation Facility has been reduced by Steer from €XXXX/m2 to €XXXX/m2. It is noted that these rates are inclusive of all preliminary costs. It is not possible to construct what is mainly office accommodation at these rates. In August 2017 a budget estimate was sought from modular building suppliers to provide office accommodation in the West Apron, the quotes received equated to €XXXX/m2. These quotes did not include for foundation works and services connections and given the airside location of the project a main contractor would have been required to coordinate the works. This project proposes to construct a more permanent traditional building.

CIP.20.06.042 ATRS - Central Search Areas (T1 and T2)

The rate submitted by Dublin Airport for 19m lanes was reduced by Steer from €XXXXX/lane to €XXXXX/lane. The cost of 15nr 17m lanes installed in Terminal 1 in 2016 was €XXXX/lane. Following discussions with the suppliers it was expected that this cost could be reduced to €XXXX/lane for project CIP.20.06.042, however it would not be possible to reduce this cost by a further €XXXX/lane or €XXXXoverall as this would not be achievable.

DUBLIN AIRPORT

Technical Note 010

Apron Rehabilitation

CIP2020+ Apron Rehabilitation

Revision: 0.0

To: Commission for Aviation Regulation

From: Daa – amd (CIP2020 Team)

Date: 27/06/2019

Re: Response to Dublin Airport CIP2020 Efficiency Assessment (Steer - May 2019)

The purpose of this technical note is to provide further detail on the rates included within the CIP estimates covering apron rehabilitation. As noted by Steer during their site visit on 13th of June 2019, some of the pavement rates included in the CIP submission were not clear on scope and required further detail to enable an efficiency assessment. The following projects have been impacted by the revision to apron rehabilitation rates and at present the variance between the Dublin Airport and Steer cost estimates equate to approx. **€5.36m**.

Figure 1 Cost Variance Summary

CIP Number	Project Title	Daa rate (/m2)	Steer rate (/m2)	Total Impact* (€m)
CIP.20.01.002	Apron Rehabilitation Programme	XXX	XXX	XXX
CIP.20.01.003	Airfield Taxiway Rehabilitation Programme	XXX	XXX	XXX

* Cost impact on direct construction costs

Dublin Airport has based its rates for apron rehabilitation on recent approved projects as part of the Programme of Airport Campus Enhancement (PACE) some of which were endorsed by the regulator in the last supplementary Capex determination. The PACE 5H project has been used as the most relevant benchmark for costing these works due to its current nature and similarities in scope.

Figure 2 PACE 5H project apron rehab rate breakdown

Apron 5H (65000m2)				
Excavation and disposal	XXX	m3	XXX	XXX
400mm Crushed Aggregate Base Course	XXX	m2	XXX	XXX
300mm Cement Treated Base Course	XXX	m2	XXX	XXX
540mm PCC paving's	XXX	m2	XXX	XXX
Drainage	XXX	m2	XXX	XXX
Transverse joints including sealant	XXX	m	XXX	XXX

Longitudinal joints including sealant	XXX	m	XXX	XXX
Isolation joints including sealant	XXX	m	XXX	XXX
Surface markings	XXX	Item	XXX	XXX
Night Works / Phasing	XXX	Item	XXX	XXX
Total			XXX	XXX
Per m2				XXX

Dublin Airport have also reviewed other project benchmarks that reinforce the use of a €XXX/m2 and €XXX/m2 are given below in Figure 3. These projects have a cost range of €XXX/m2 to €XXX/m2 with an average cost of €XXX/m2

Figure 3 PACE project benchmarks

SDG Approved Rates in PACE	Quantity (m2)	Pavement €/m2	Total €/m2 Adjusted for Inflation @ 7.5%
South Apron Stands (New Apron)	XXX	XXX	XXX
Apron 5H and Taxiway Rehabilitation (New Apron)	XXX	XXX	XXX
Apron 5H and Taxiway Rehabilitation (Full Rehab)	XXX	XXX	XXX
Hangar 1 and Hangar 2 Stands (New Apron/Rehab)	XXX	XXX	XXX
South Apron Stands Phase 2 (New Apron)	XXX	XXX	XXX
		Average	**XXX**

Dublin Airport request that Steer take into consideration the above information in relation to the two apron rehabilitation projects which have had substantial cost reductions.

Furthermore, Steer have removed the LVP and Out of Hours Works costs from CIP.20.01.004. These allowances are a vital cost component for this project given the works will be have significant constraints due to the location and the requirement to maintain usual operations on the apron.

DUBLIN AIRPORT

Technical Note 011

Pier 5 Escalators

CIP2020+ Pier 5 escalators

Revision: 0.0

To: Commission for Aviation Regulation

From: Daa – amd (CIP2020 Team)

Date: 27/06/2019

Re: Response to Dublin Airport CIP2020 Efficiency Assessment (Steer - May 2019)

The purpose of this technical note is to provide further detail on the allowances included within the CIP estimates covering escalators in Pier 5 (CIP.20.03.029). A variance of approx.-**€XXXk** exists between the Dublin Airport estimate and the Steer estimate due to a difference in count of -2no. escalators in the new Pier 5.

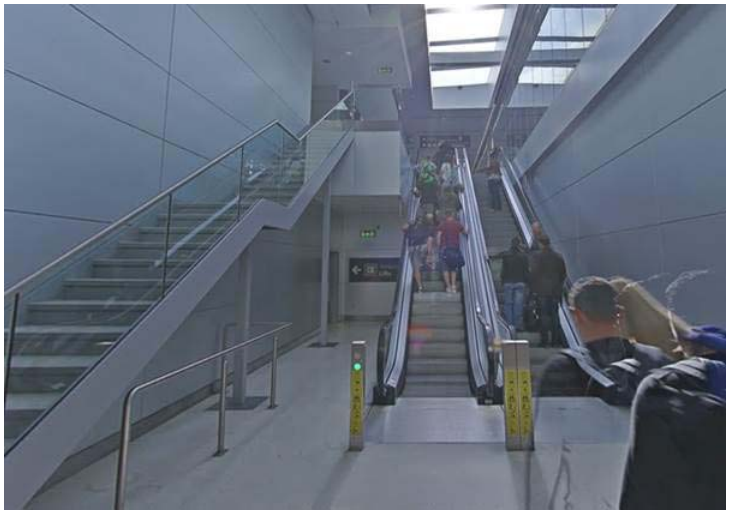
Following a further review of the design drawings used to prepare the Dublin Airport cost, we have discovered an error within our cost estimate in relation to the number of escalators allowed. The following breakdown provides the number of escalators which are included within the Pier 5 design and should be accounted for with the Dublin Airport Cost Estimate.

At the time of preparing the Dublin Airport cost estimate the design assumption made was:

- Arrivals: dual escalators
- Departures: dual escalators
- fixed links: single escalator.

This assumption was not captured within the Dublin Airport estimate and as a result only dual escalators were allowed at the arrivals core which services between apron level and level 20, and single escalators from level 30 to apron level in the departures core, as opposed to dual escalators. The escalators required within the cores in each fixed link were omitted entirely. The design assumption for dual escalators was on the basis that the same level of service would be required as per the T1 skybridge.

Figure 1 Skybridge dual escalators at arrivals journey



The below table summarises the cost variance between the Dublin Airport cost estimate submitted and the revised estimate based on corrected assumptions in line with the required levels of service in both departures and arrival journeys:

Figure 2 CIP.20.03.029 Escalator count variance summary

DUB Original Estimate				DUB Corrected Estimate				Variance
Description	**Quantity (no.)**	**Rate**	**Cost**	**Description**	**Quantity (no.)**	**Rate**	**Cost**	
Arrivals Escalators (dual) – Apron to Level 20	XXX	XXX	XXX	**Arrivals Escalators (dual) – Apron to Level 20**	XXX	XXX	XXX	XXX
Departures Escalators – Apron to Level 30	XXX	XXX	XXX	**Departures Escalators (dual) – Apron to Level 30**	XXX	XXX	XXX	XXX
Arrivals Escalators in Fixed Links	XXX	XXX	XXX	**Arrivals Escalators in Fixed Links**	XXX	XXX	XXX	XXX
Total	XXX	XXX	XXX	**Total**	XXX	XXX	XXX	XXX

As illustrated above the increase in quantity of escalators equates to a revised direct cost of **€XXXm** on the Dublin Airport Cost estimate.

Drawings have been included as an appendix which highlight the locations of these escalators for review by the Commission.

Pier 5 Scope of Works

- Overall Floor Area 5196m^2
- New Arrivals VCC for bussed PAX from Apron to level 20
- 6 Non-CBP Bussing Gates of approx. 325m^2
- New F&B provision, totalling 125m^2
- New Toilets provision, totalling 165m^2
- Gates can be used as CBP in the future by adding partitions and isolating VCCs for single gate access

1 New Escalator From Apron Level 10 to Gateroom Level 15
Total No of Escalators= 2

1 New Escalator From Apron Level 10 to Gateroom Level 15
Total No of Escalators= 2

Energy

Terminal 2 Baggage Hall

Arrivals

Plant Room

Arriving Bus Pull-In

Plant Room

Arriving Bus Pull-In

Non-CBP

non-CBP departures circulation

Non-CBP

Toilet | F&B

Coach Gate A0 315 sqm

Coach Gate B0 325 sqm

F&B | Toilet

Non-CBP

Toilet | F&B

Coach Gate C0 325 sqm

Coach Gate D0 325 sqm

F&B | Toilet

Non-CBP

Toilet | F&B

Coach Gate E0 325 sqm

Coach Gate F0 325 sqm

Non-CBP

Toilets

Plant Room

Plant Room

Plant Room

Plant Room

17000

Total No of Escalators@ L10 = 4

0 10 20 30 40 50m

SCALE 1:500

Note:
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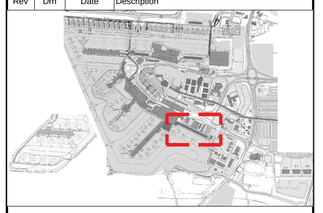
Model File References List -XRef Model Name, Version & Status:

- CBP Route
- CBP PAX Flow
- Arrivals
- Arrivals PAX Flow
- FoH Circulation
- FoH PAX Flows
- VCC
- BoH Office
- Plant
- F&B
- Non-CBP Departures
- Gaterooms
- Toilets
- Existing
- Relocations
- Security Screening
- CBP
- Unallocated
- Retail
- Lounges
- Self-Connect Transfers PAX Flow
- Transfers PAX Flow
- Transfers
- Storage
- Kitchen
- Seating Area
- Passport Control
- Customs
- Hangar

Areas (m^2)	
Coach Gate A0	315
Coach Gate B0	325
Coach Gate C0	325
Coach Gate D0	325
Coach Gate E0	325
Coach Gate F0	325
Toilets (Total)	167
F&B (Total)	153
Plant Rooms (Total)	731
Floor Overall Area	5196

Notes:
R1 - First Issue
R2 - Graphics Updated
R3 - PAX Flow arrows added, Drawing Text amended
R4 - Graphics Updated

Rev	Drn	Date	Description
R4	AV	18/01/2019	Final Project Sheet Issue
R3	CS	08/11/2018	Issued for Information
R2	CS	08/10/2018	Issued for Information
R1	CS	07/09/2018	Issued for Information



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Title

Pier 5

General Arrangement

17m Wide Option - Base Case

Apron Level

Project Name: DAA TERMINAL PIER & GTC CIP Feasibility Study										Originators Job No.	
										Discipline: Architecture	
Client: Dublin Airport		Drawing Originator: Pascall+Watson						Purpose of Issue: For Information			
Drawn By: CS		Checked By: HO			Approved By: MB			Scale @ A1: 1:500@A1			
Proj.Code	Orig.	Disc.	Zone	Level	Type	Subtype	Org. Series/Number			Rev.	Status
6017	PAW	A	120	L10	DR	GA	041-005			R4	

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Pier 5 Scope of Works

- Overall Floor Area 7175m^2
- CBP Gateroom level accessed by link from CBP in Pier 4.
- 8 CBP Code C gates, with areas of 458m², 368m², 358m² and 315m²
- One large F&B unit with access from the departures corridor of 110m².
- New Toilets provision totalling 206m²
- 4 New Fixed links with 3 staircases and 1 lift each

1 New Escalator From Gateroom Level 15 to Arrivals Level 20 Total escalators= 2

1 New Escalator From Gateroom Level 15 to Arrivals Level 20 Total escalators= 2

4 New Escalators From Airbridge Level to Arrivals to Level 20

Total No of Escalators@ L15 = 8

Energy Centre

-041-055

Terminal 2 Baggage Hall

Arrivals

Non-CBP

CBP departures circulation

Share Gate A1 458m^2

Share Gate B1 368m^2

Share Gate C1 368m^2

Share Gate D1 368m^2

Share Gate E1 315m^2

F&B 110m^2

Share Gate F1 316m^2

Share Gate G1 368m^2

Share Gate H1 358m^2

17000

F&B 294m²

0 10 20 30 40 50m

SCALE 1:500

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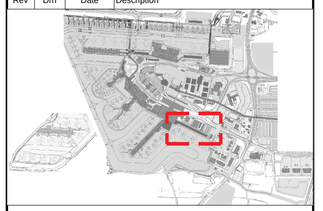
- FoH PAX Flows
- VCC
- BoH Office
- Plant
- F&B
- Non-CBP Departures
- Gaterooms
- Toilets
- Existing
- Relocations
- Security Screening
- CBP
- Unallocated
- Retail
- Lounges
- Self-Connect Transfers PAX Flow
- Transfers PAX Flow
- Transfers
- Storage
- Kitchen
- Seating Area
- Passport Control
- Customs
- Hangar

Areas (m^2)	
Share Gate A1	458
Share Gate B1	368
Share Gate C1	368
Share Gate D1	368
Share Gate E1	315
Share Gate F1	316
Share Gate G1	368
Share Gate H1	358
Toilets (Total)	206
F&B (Total)	350
Floor Overall Area	7175

Notes:
R1 - First Issue
R2 - Graphics Updated
R3 - PAX Flow arrows added, Drawing Text amended
R4 - Graphics Updated, text amended

Rev	Drn	Date	Description
R4	AV	18/01/2019	Final Project Sheet Issue
R3	CS	08/11/2018	Issued for Information
R2	CS	08/10/2018	Issued for Information
R1	CS	07/09/2018	Issued for Information



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Title

Pier 5
General Arrangement
17m Wide Option
Level 15

Project Name: DAA TERMINAL PIER & GTC CIP Feasibility Study			Originators Job No. / Discipline: Architecture
Client: Dublin Airport	Drawing Originator: Pascall+Watson		Purpose of Issue: For Information
Drawn By: CS	Checked By: HO	Approved By: MB	Scale @ A1: 1:500@A1

Proj.Code	Orig.	Doc.	Zone	Level	Type	Subtype	Drg. Series/Number	Rev.	Status
6017	PAW	A	120	L15	DR	GA	041-005	R4	

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Pier 5 Scope of Works

- Overall Floor Area 5973m^2
- Arrivals Corridor for arriving passengers from the airbridges to T2 immigration facility
- Commercial Unit of 350m^2 accesible by non-CBP passengers
- Crow's Nest at the end of the pier

1 New Escalator From Departures Level 30 to Arrivals Level 20
Total escalators= 2

T2 Reclaim Hall

Arrivals

Non-CBP

Non-CBP departures circulation

Void

WC 20m²

Non-CBP

Void

Non-CBP

Non-CBP Commercial 350m²

7005

4000

Non-CBP

Crow's nest 262m²

17000

Arrivals circulation

Total No of Escalators@ L20 = 2

0 10 20 30 40 50m

SCALE 1:500

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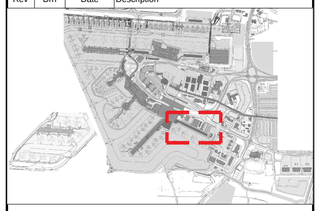
- F&B
- Non-CBP Departures
- Gaterooms
- Toilets
- Existing
- Relocations
- Security Screening
- CBP
- Unallocated
- Retail
- Lounges
- Self-Connect Transfers PAX Flow
- Transfers PAX Flow
- Transfers
- Storage
- Kitchen
- Seating Area
- Passport Control
- Customs
- Hangar

Areas (m^2)	
Crow's Nest	262
Toilets (Total)	240
Commercial	350
Floor Overall Area	5973

Notes:
R1 - First Issue
R2 - Graphics Updated
R3 - PAX Flow arrows added, Drawing Text amended
R4 - Graphics Updated

Rev	Drn	Date	Description
R4	AV	18/01/2019	Final Project Sheet Issue
R3	CS	08/11/2018	Issued for Information
R2	CS	08/10/2018	Issued for Information
R1	CS	07/09/2018	Issued for Information



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Title
Pier 5
General Arrangement
17m Wide Option - Base Case
Level 20

Project Name: DAA TERMINAL PIER & GTC CIP Feasibility Study			Originators Job No.
			Discipline: Architecture
Client: Dublin Airport	Drawing Originator: Pascall+Watson		Purpose of Issue: For Information
Drawn By: CS	Checked By: HO	Approved By: MB	Scale @ A1: 1:500@A1

Proj.Code	Orig.	Disc.	Zone	Level	Type	Subtype	Drg. Series/Number	Rev.	Status
6017	PAW	A	120	L20	DR	GA	041-005	R4	

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Pier 5 Scope of Works

- Overall Floor Area 662m^2
- Non-CBP Departures link and VCC to L10 from T2 IDL

e of
molition

T2 Departures Lounge

Non-CBP

Non-CBP departures circulation

Plant/AHU on roof

5.5

Toilet block partially demolished

Relocated Toilets

0 10 20 30 40 50m

SCALE 1:500

Note:
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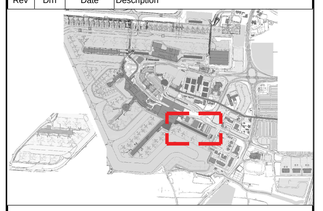
- FoH Circulation
- FoH PAX Flows
- VCC
- BoH Office
- Plant
- F&B
- Non-CBP Departures
- Gaterooms
- Toilets
- Existing
- Relocations
- Security Screening
- CBP
- Unallocated
- Retail
- Lounges
- Self-Connect Transfers PAX Flow
- Transfers PAX Flow
- Transfers
- Storage
- Kitchen
- Seating Area
- Passport Control
- Customs
- Hangar

Floor Overall Area: 681m²

Notes:
R1 - First Issue
R2 - Graphics Updated
R3 - Access into Terminal 2 amended as per MEP input received 11/10/18.

Rev	Drn	Date	Description
R4	AV	18/01/2019	Final Project Sheet Issue
R3	HP	16/10/2018	Issued for Information
R2	CS	08/10/2018	Issued for Information
R1	CS	07/09/2018	Issued for Information



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Title

Pier 5

General Arrangement

17m Wide Option - Base Case

Level 30

Project Name: DAA TERMINAL PIER & GTC CIP Feasibility Study			Originators Job No. / Discipline: Architecture
Client: Dublin Airport	Drawing Originator: Pascall+Watson		Purpose of Issue: For Information
Drawn By: CS	Checked By: HO	Approved By: MB	Scale @ A1: 1:500@A1

Proj.Code	Orig.	Disc.	Zone	Level	Type	Subtype	Drg. Series/Number	Rev.	Status
6017	PAW	A	120	L30	DR	GA	041-005	R4	

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DUBLIN AIRPORT

Technical Note 012

Quantity Takeoff

CIP2020+ Quantities take off

Revision: 1.0

To: Commission for Aviation Regulation

From: Daa – amd (CIP2020 Team)

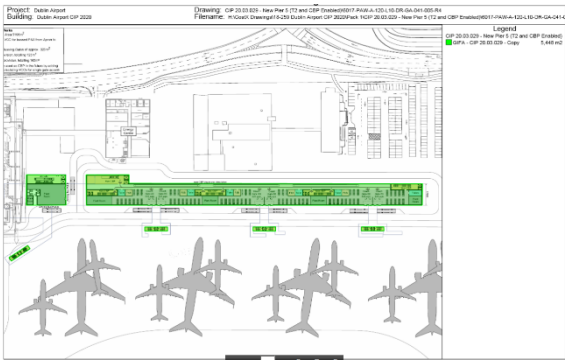
Date: 05/07/2019

Re: Response to Dublin Airport CIP2020 Efficiency Assessment (Steer - May 2019) and Steer quantity take offs on Pier 5 (3rd July)

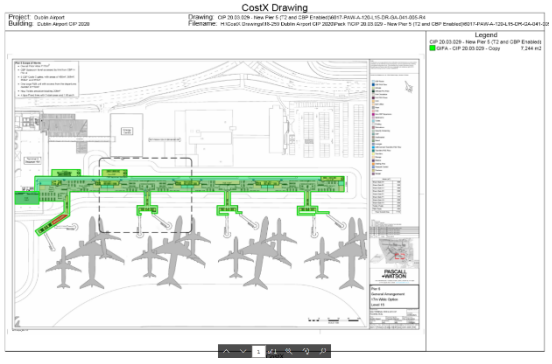
The purpose of this technical note is to reconcile the quantity take-offs between Dublin Airport and Steer estimates on Pier 5, following receipt of Steer take-off drawings on the 3rd of April. This follows the previous technical Note 5 on quantities across the airport.

Overall floor area

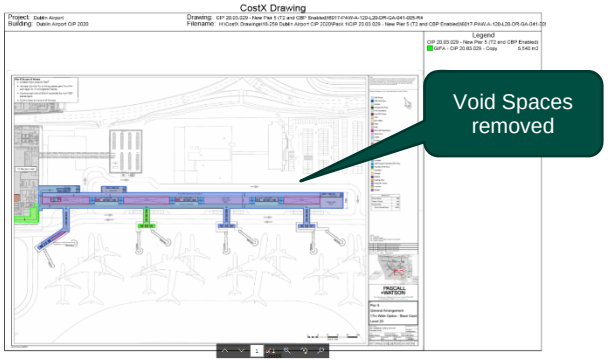
We note that Steer have revised their quantities from the draft determination, XXXXmsq, to the current measure of XXXXmsq which is closer to the Dublin Airport measure of XXXXmsq. However, we note that Steer have not accounted for the voids on L20 which appears to account for the remaining difference against the Dublin Airport measurements.



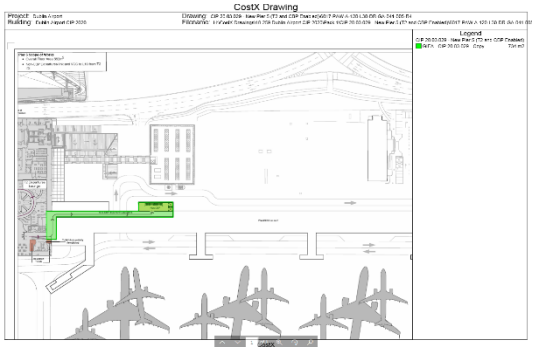
XXXXmsq



XXXXmsq



XXXXmsq



XXXmsq

The development of the void area has real costs including, all associated heating and ventilation to the void volume, requirement of additional finishing including handrails, balconies / suspended landings, lighting etc. and the creation of a void space within a contiguous slab and the additional internal framing required to facilitate this.

Given that the Pier 5 drawings are at feasibility level only, Dublin Airport consider it good practice to measure over the voids, as representative of the additional, albeit not yet fully defined, costs associated with the development of the void space within the Pier.

The costs associated with the volume of space are significant and should Steer wish to account for this cost in an alternative manner, this would also be acceptable to Dublin Airport.

Internal fit out

We note that Steer have revised their quantities from the draft determination, XXXXmsq to the current measure of XXXXXmsq which is closer to the Dublin Airport measure of XXXXmsq. There does however remain a difference between the take off areas:

- Steer have not included for fit out of the stairwells. Dublin Airports rates for the provision of stairs in the estimate is for the structural element and does not consider the cost of finishing. Stairwells in a new airport pier are required to have considerably durability to facilitate heavy passenger traffic. The fit out of these areas is a requirement and therefore costs should be included for this by Steer.
- Steer have omitted the plant rooms. While the level of finish in a plant room is significantly less than elsewhere in the pier, and our rates are reflective of this; plantroom space still requires a level of fit out to make them suitable environments for operatives.
- Steer have omitted retail and food and beverage – As documented in Technical Note 2 Dublin Airport act either as the concessionaire, or are required to fit the space out to a higher spec than is normally required on behalf of incoming concessionaires. Pier 5 is a complex operational environment for external parties as it includes both CBP and non-CBP, which is likely to exacerbate this. If allowance is not provided to fit out for F&B space, it will make these services untenable and at an absolute minimum these spaces should be measured as part of the departure lounges.

External Walls:

We have received no further detail from Steer in relation to the take-off of the external walls.

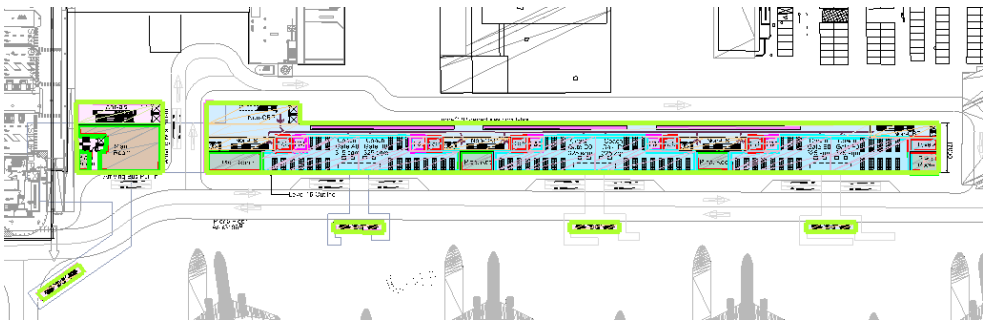
Further to provide further detail to TN005 the overall perimeter, for both glazred and clad walls is:

- Apron XXX m
- Level15 XXXX m
- Level 20 XXX m
- Level 30 XXX m

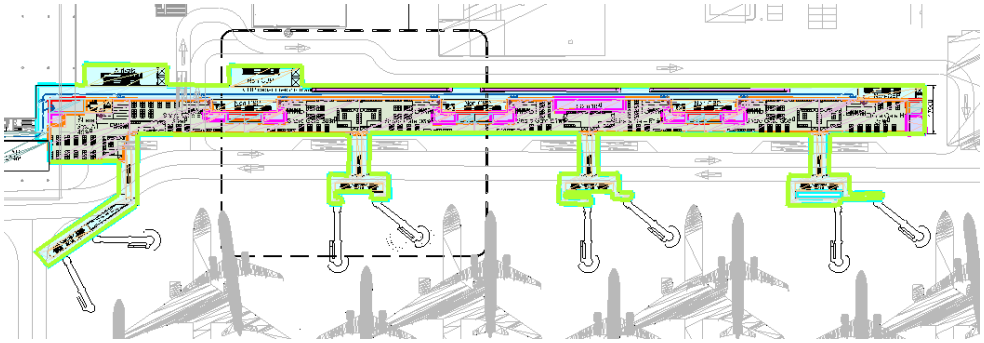
Total = XXXXm

With a floor to ceiling height of 5.5m for all. This gives and overall quantum of cladding of XXXXm. We have assumed a 50:50 split of glazed and clad areas. The images of the take-off are provided below.

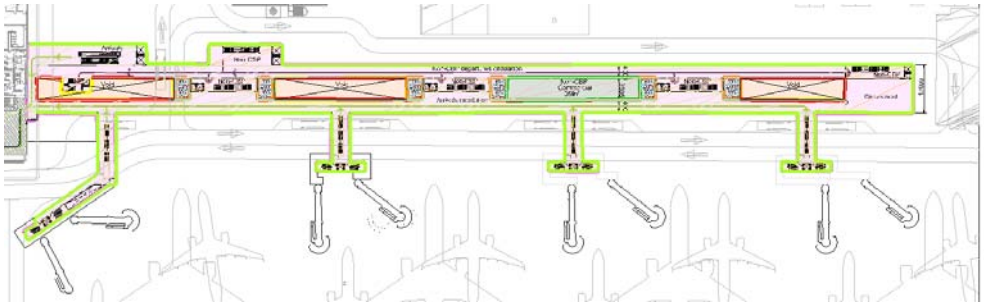
Apron level



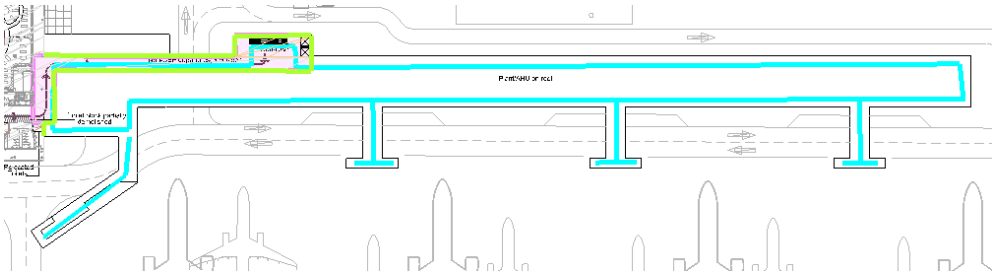
L15



L20



L30



Stairs/Ramp

We note that there continues to be a variance in the quantities associated with the stairs. With the most recent count from steer showing XXX, while Dublin Airports consultant have measured XXX.

We note that in Steers method of taking off the quantities of stairs they have accounted for XX stairs but in doing so they have only accounted for the stairs in the fixed links VCC over a single level. For example, while the arrivals stair is counted on each level (Apron level Stair 10, Level 15 Stair 16 and on Level 20 stair 25) the equivalent stair in the fixed link VCC is counted as Stair 1 on all levels. This would account for an additional 16 stairs (each link having two wells over an additional 2 floors).

The stair in the 2nd fixed link also appears to have been missed and the stairs in the first VCC on the pier appears to have counted stair 9 twice (on level 20 and the apron). This would bring the overall count of the Stairs by Steer to XX.