BUILDING HOMES:

Apartment construction costs in Europe with a focus on Dublin

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GLOSSARY OF TERMS

Term	Description
ICMS3	International Cost Management System (edition 3)
IPMS – All Buildings	International Property Measurement Standard – All Buildings
Hard costs*	Cost of labour and building materials associated with the actual construction of the building. **Includes:** earthworks, concrete structure, windows, masonry works, finishes, mechanical installations, electrical installations, telecommunication and security facilities, drainage systems and landscaping. **Excludes:** Loose furnishing/fittings, works off site
Soft costs*	Indirect costs associated with the delivery of a construction project. **Includes:** Preliminaries (site management, site facilities, management and control, contractors' fees), risk allowance (estimated as a fixed percentage of hard costs), and taxes. **Excludes:** Site acquisition and associated costs, development and connection fees, finance costs, professional fees, developer's margin, marketing costs and legal costs.
Gross internal area	The area of the building measured to the internal extent of the internal dominant face, as per IPMS2.
Travelling box	The same dwelling built to a typical specification costed in selected locations as if it were built in the comparator locations with costs compared under ICMS3 Groups.

***There are country-specific exclusions for both hard and soft costs where data was not obtained. VAT in the UK was costed at 0% in accordance with the national policy.**

1. EXECUTIVE SUMMARY

Many cities in high-income countries face housing shortages and affordability challenges. Understanding the drivers of construction costs is crucial for addressing these issues, as viability determines whether new supply is feasible. However, comparing costs across different countries is difficult due to variations in construction methods and regulations. The International Construction Management Standards third version (ICMS3) provides a standardised framework for classifying construction costs.

This study uses the ICMS3 framework to compare construction costs for a fixed project across multiple markets. Quantity surveyors (also known as construction cost consultants in some European countries) in ten cities across seven countries were surveyed, utilising the ICMS3 framework to estimate costs for an apartment block initially built in Switzerland. Designed in 2011, this building was proposed for use by Eurostat as the 'standard apartment' for capturing residential building costs; its specifications were revised to meet standards prevailing in 2020. The aim was to calculate the cost of building the apartment block as of the first quarter of 2020, before the onset of Covid-19 and global price instability. This report employs a 'travelling box' exercise, where quantities involved in building the home are standardised, and held constant across survey responses, to allow for systematic cost comparisons across locations.

This report includes both 'hard costs' and 'soft costs', along with some exclusions. For the purposes of this report, 'hard costs' include ICMS3 elements such as earthworks, equipment, and services (ICMS3 Groups 01-07). Similarly, 'soft costs' refer to ICMS3 elements indirectly related to construction and often calculated on a percentage basis of hard costs, in particular ICMS3 Groups 08-10, which cover preliminaries, risk, and taxes. Costs not covered in this report include site acquisition, professional, development and connection fees, finance costs, developers' margins, and marketing costs. The report does not include the financial viability of projects, nor does the research scope include affordability of housing.

Based on the survey responses, it is possible to compare construction costs across all ten cities, as well as the relative importance of the ten different ICMS3 Groups. Across the markets included, ICMS3 Group 03 (Structure), ICMS3 Group 04 (Architectural Works/Non-Structural Works), and ICMS3 Group 05 (Services and Equipment) were the

This study uses the ICMS3 framework to compare construction costs for a fixed project across multiple markets.

largest contributors to overall cost for this type of building. In Dublin, the construction cost for delivering an apartment block was calculated as €2,363/m^2 (including tax). This means that the cost in Dublin is approximately €300/m^2 higher than the ten-city average of €2,057/m^2, second only to Zurich.

As outlined in more detail in the report, compared to other EU member states, Ireland has a relatively low VAT rate on new construction. If VAT rates were zero, Dublin would rank as the fifth most expensive city, with a cost similar to the British cities included in the survey. Policymakers must, therefore, look at hard costs to better understand differences in residential construction costs across cities. The analysis here suggests that the price of resources varies far less than more labour-intensive inputs. With more labour-intensive cost headings contributing to higher costs across countries, it is therefore labour costs and productivity that play a significant role in differences. Supply chain considerations appear to be less important with, for example, Belfast (located on the same island as Dublin) one of the cheapest locations among the ten surveyed.

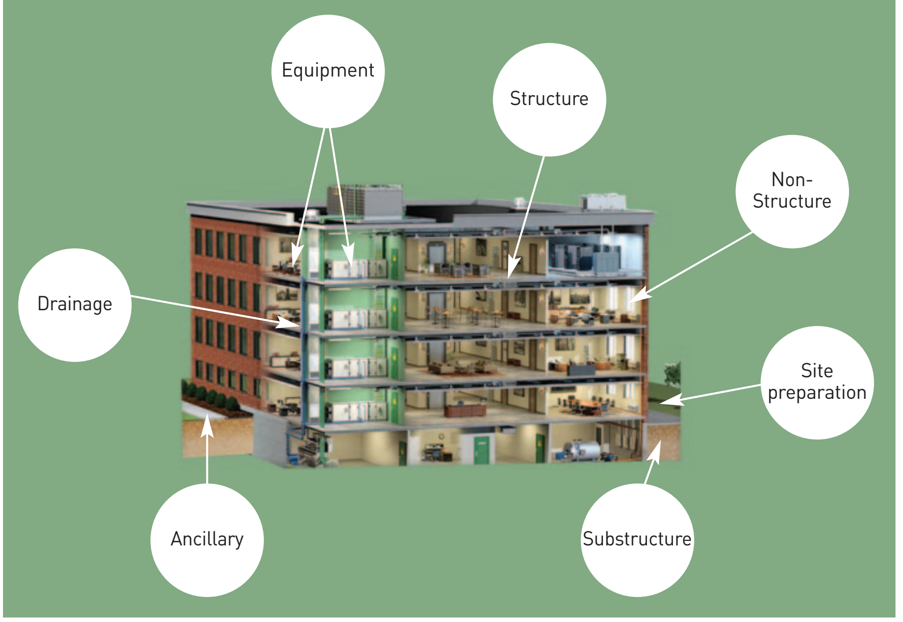
The report also compares the estimates presented here, based on the same specifications, with previous findings on differences in construction costs, including reports from the Society of Chartered Surveyors Ireland (SCSI) and the Irish Department of Housing, Local Government, and Heritage (DoHLGH) on apartment construction costs in Dublin. Sources of difference in costs include timing, survey scope (which costs are included and which are not), and building specifications. This report focuses on building specifications, so when comparing with other reports, adjustments to account for inflation and survey scope are made.

When adjusting the costs of constructing an apartment block in Dublin based on the design presented in this report to Q3 2022 (the latest published date from the DoHLGH), the total cost before tax was €2,558/m^2. The adjusted range of costs from the SCSI report for an urban medium-rise apartment, which was decided to be the most comparable to the design used in this report, was between €2,951/m^2 and €3,535/m^2. For the DoHLGH report, which is based off a Dublin apartment design, the cost of construction was €2,803/m^2. Scope differences, such as the DoHLGH report using more expensive facades, highlight the importance of design and specification when conducting such comparison studies. In particular, the lower costs in this study may relate to elements such as the façade treatment: the project in this study has a rendered façade, compared to the brickwork in the DoHLGH project, which is standard for a Dublin project in the 2020s.

Overall, the findings of this report highlight the challenge of high construction costs in Dublin as a barrier to new housing supply, as well as identifying the headings that contribute most to that differential, including Services and Equipment (ICMS 3 Group 05) and Non-Structural works (ICMS 3 Group 04). It is recommended that future analysis explore the determinants of labour productivity, as well as the role of regulatory specifications and standards – rather than market preferences – in driving scope differences. A contribution of this report is to provide a baseline for similar exercises in future years, which could be expanded to include other cities and indeed other property types.

Overall, the findings of this report highlight the challenge of high construction costs in Dublin as a barrier to new housing supply.

Hard costs associated with apartment construction



2. BACKGROUND AND CONTEXT

The availability and affordability of housing has become a central issue for policymakers and voters across a range of high-income countries since the 2000s. Many cities have experienced strong increases in housing prices, both sale and rental, making it an increasingly salient issue for prospective purchasers or renters. In addressing the challenges facing housing systems, a range of potential causes and policy levers are mentioned frequently, from the cost of raw materials sourced on international markets to the role of so-called 'soft costs', such as finance and taxation.

This report focuses on the cost of building new housing, specifically apartments. These costs are integral to relevant policy and in ensuring healthy housing systems, given their role in determining supply for a given demand. The demand, or requirement, for housing in a society reflects a variety of factors, most of which relate to other societal goals. This includes, for example, the size of the population, the arrangement of that population into households, and the average income enjoyed by households. Policymakers typically do not manipulate population size, household demographics, or income levels to achieve housing policy goals. Instead, they focus on broader objectives that housing policy should fulfil, for example, overarching delivery targets. The responsiveness of housing supply to demand plays a pivotal role in shaping the overall health of a housing system. Unlike many other goods and services, housing has a durable nature and requires significant time for construction. As a result, the relationship between housing supply and demand can be asymmetric. Where demand for housing contracts, the existing quantity of housing remains unchanged, meaning adjustment happens entirely through price falls. However, in a healthy housing system, an increase in demand would be met by an increase in the quantity of housing. But if costs are too high and new supply is not viable, an increase in demand brings about an increase in prices.

From an Irish perspective, the Society of Chartered Surveyors Ireland (SCSI) and the Department of Housing, Local Government and Heritage (DoHLGH) released construction cost reports for apartments in 2021[1] and again in 2023.[2] Both reports outlined recommendations to lower apartment construction costs. These recommendations include broader concepts such as the implementation of modern methods of construction (MMC), reductions in soft costs, and a review of the technical specifications related to building elements.

Housing construction is a complex process involving various inputs, which can be simplified into five categories: land; regulations; capital; labour; and, materials. This report primarily focuses on labour and material costs, with some discussion of regulatory costs, particularly taxes. To understand how supply responds to increased demand, a detailed analysis of each factor is necessary. However, it is important to note that land markets, regulatory frameworks, and financing models can vary significantly across different international markets. Moreover, the financing structures can differ not only between markets but also among firms and accommodation types and tenures.

While modes of construction vary across markets, even for dwellings with similar specifications, comparisons across countries in relation to the cost of building homes is now simpler by reference to the International Cost Management Standards (ICMS) third edition. ICMS3 is a principles-based international standard that sets out how to classify, define, measure, record, analyse, present and compare construction costs, project life cycle costs, and carbon emissions in a structured and logical format. It is designed to accommodate users who have an interest only in construction costs, as well as those who deal with life cycle costs and carbon emissions.[3]

1. SCSI Real Cost of New Apartment Delivery report 2021.

2. Department of Housing, Local Government and Heritage Residential Construction Cost Study 2023.

3. For further information, see www.icms-coalition.org and www.scsi.ie/icms-explained.

3. DATA AND METHODOLOGY

The core concept driving this cost comparison methodology is the recognition of two primary factors influencing the cost of constructing apartments: variations in the composition of goods and services (i.e., different quantities/specifications); and, discrepancies in prices for specific goods or services. To establish a foundation for comparing cost disparities, this project has maintained consistent quantities/specifications and directed attention towards variations in prices across different ICMS3 headings. To understand elements that drive differences in construction costs across international markets, the following methodology was adopted.

Firstly, a residential building type that is relatively common across Europe, the apartment block, was chosen rather than individual housing units, which can vary considerably in combination and type. Secondly, a common construction model was chosen, which was developed 12 years ago based on an actual Swiss project developed as a pricing cost model by *Conseil Européen des Economistes de la Construction* (CEEC, or European Council of Construction Economists) and subsequently adopted by Eurostat as one of their models for obtaining construction cost data.

The original CEEC model featured a comprehensive bill of quantities, which has since been revised to adhere to current European specifications. This updated version provided detailed descriptions and quantities for 317 distinct construction items. Each item includes a description and/or picture, where appropriate, and all items were grouped under the ICMS3 Groups (01 to 10) and into a further 79 Level 4 sub-groups. ICMS3 groups 11 to 13 were excluded; these include loose furnishings/fittings, design services engaged by the client, and works off site. This is consistent with Eurostat methods, which typically exclude these groupings.

In brief, the 317 construction items were grouped into 80 distinct sub-groups of the building, which in turn were categorised according to the ten ICMS3 groupings. The survey was completed by professionals in the following cities, with further details given in the Appendix B:

- Amsterdam (the Netherlands);
- Belfast (Northern Ireland);
- Brussels (Belgium);
- Dublin (Ireland);
- Stockholm (Sweden);
- Tallinn (Estonia);
- Birmingham, Glasgow, and Manchester (Britain); and,
- Zurich (Switzerland).

Given the use of multiple currencies in this research, an average market exchange rate for Q1 of 2020 was applied. Exchange rates for UK cities were set at €1=£0.86225, for Stockholm the rate was set at €1=10.67 SEK), and for Zurich at €1=CHF1.0668). As previously noted, this period of analysis was selected as it provided a clear baseline across all countries prior to global events that drove changes in inflation, such as Covid-19 and the war in Ukraine. This provided a consistent building and quantity/specification to be compared across all countries.

The project relates to a residential apartment building of seven storeys, over a basement, containing 39 apartments in total, six on each of the first six storeys, with three larger apartments on the top floor. Measurements for the buildings followed the International Property Measurement Standards (IPMS) All Buildings, with the gross internal area, defined by this standard, measured as 4,015m^2. The ground floor apartments have an IPMS2 internal floor area of ca.88m^2, while the penthouse apartments have an internal floor area (IPMS2) of ca.141m^2. The 30 other apartments all have a floor area of ca.84m^2. The total internal floor area for the apartments is 3,483m^2, to which is added 532m^2 of basement space, which comprises storage and laundry facilities; hence, per-square-metre costs are based on a total of 4,015m^2 (for a detailed IPMS allocation of areas, see Appendix A). The typical apartment contains a principal living/kitchen room, two bedrooms (one with shower ensuite), one bathroom and a separate toilet. The key specifications of the building are as follows:

- concrete basement/raft foundation with reinforced concrete walls/columns/floors/roof/stairs;
- storage walls/doors only in basement;
- external façade insulated, rendered external finish with triple glazed windows average 2m high;
- insulated bituminous flat roof finish on screed and gravel covering;
- brick partitions between apartments with insulated metal stud partitions;
- timber doors;
- underfloor heating/screed – source of heat gas unless otherwise advised;
- floor finishes throughout: parquet to living area, tile to wet areas;
- ceiling finishes gypsum to concrete slab;
- decoration;
- basic kitchen built in (excluding white goods) and sanitary ware including all services thereto;
- fire alarms, smoke and heat detectors;
- lifts (two);
- power and lighting, data and intruder alarms;
- main drainage and external services to complex; and,
- external works – walls/external car parking, roads, bin stores, landscaping.

The bill of quantities for the project primarily focuses on the 'hard costs' associated with construction. Out of the total items listed, 288 pertain to these hard costs, which are classified under ICMS3 Groupings 01 to 07, encompassing activities ranging from Demolition and Site Preparation to External and Ancillary Works. Of the remaining 29 items, 25 relate to Preliminaries (ICMS3 Group 08), including constructors' site overheads, and general requirements. Risk allowances and taxes/levies each contribute two items.

Although the construction project originated in 2011, with the specification revised to meet modern building standards current in 2020, the focus of this research pertains to construction costs for Q1 of 2020. The exact timing of survey responses varied, but in each case the respondent was asked to price to the same period, to maintain consistency. Thus, with quantities/specifications and timing constant across the cities in the study, this maximises the extent to which the study reflects pure cost differences, rather than quality/compositional differences across markets or inflation. Both issues, which do affect cost comparisons, are discussed in Section 5 of this report.

When requesting responses at the city level, the Steering Committee instructed all respondents to provide answers, whenever feasible, at the line item level. In cases where respondents could not price individual elements, they were permitted to report costs at the level of elemental groupings. In a few instances, survey participants faced difficulty pricing specific elements. Upon guidance from both respondents and the Steering Committee, prices for these elements were determined based on local contractors, including estimates of price differentials between markets.

To maximise the extent to which aggregate figures across cities are comparable, a number of parameters – in particular relating to preliminaries and risk – were used in certain cases. In particular, a provision for Risk (ICMS3 Group 09) of 5% was applied on the advice of the Report Committee in consultation with the survey respondents. Information on value-added tax (VAT) was either provided by survey respondents or included based on official European Union information and checked with survey respondents.

Lastly, for simplicity and readability of the figures, the following shortened headings are used for the ten ICMS3 headings:

- "Site Prep" for ICMS3 Group 01, 'Demolition, Site Preparation and Formation';
- "Substructure" for ICMS3 Group 02, of the same name;
- "Structure" for ICMS3 Group 03, of the same name;
- "Non-Structural" for ICMS3 Group 04, 'Architectural Works and Non-Structural Works';
- "Equipment" for ICMS3 Group 05, 'Services and Equipment';
- "Drainage" for ICMS3 Group 06, 'Surface and Underground Drainage';
- "External Works" for ICMS3 Group 07, 'External and Ancillary Works';
- "Preliminaries" for ICMS3 Group 08, 'Preliminaries, Constructors' Site Overheads and General Requirements';
- "Risk" for ICMS3 Group 09, 'Risk Allowances'; and,
- "Taxes" for ICMS3 Group 10, 'Taxes and Levies'.

4. RESULTS AND ANALYSIS

This section presents an analysis of the results of the survey outlined in the preceding section. On average, apartment construction cost, including taxes across the ten cities, was estimated at €2,057/m², including Taxes, Risk, and Preliminaries. The highest average contributions to overall costs were observed in ICMS3 Groups 03 (Structure), 04 (Non-Structural), and 05 (Equipment), while ICMS3 Groups 01 (Site Prep), 02 (Substructure), 06 (Drainage), and 09 (Risk) made the smallest contributions. These will be elaborated upon in subsequent sections.

4.1 Contribution by Group

Of the ten ICMS3 Groups covered, and considering the cities and apartment blocks surveyed, the largest contribution came from ICMS3 Group 04 (Non-Structural), at 31.9% of the total costs. ICMS3 Group 05 (Equipment) was the second highest (just under 20% of overall costs), with ICMS3 Group 03 (Structure) contributing 13.6% to the overall average cost. ICMS3 Groups 08-10 (Preliminaries, Risk and Taxes), or 'soft costs', contributed approximately 24.5% to the overall costs. ICMS3 Groups 01-02 and 06-07 made smaller contributions to overall costs. Group 07 (External Works) contributed 5.7% to the overall average costs, with ICMS3 Group 02 (Substructure – 3.5%), Group 06 (Drainage – 0.9%) and ICMS3 Group 01 (Site Prep – 0.2%) contributing the remainder of costs (**Figure 1**).

Given that 'soft costs' are typically based as a percentage of the preceding costs, the proportional nature of ICMS3 Groups 08-10 effectively increases the importance of the costs associated with ICMS3 Groups 03-05.[4] As a proportion of the aggregate 'hard costs', costs

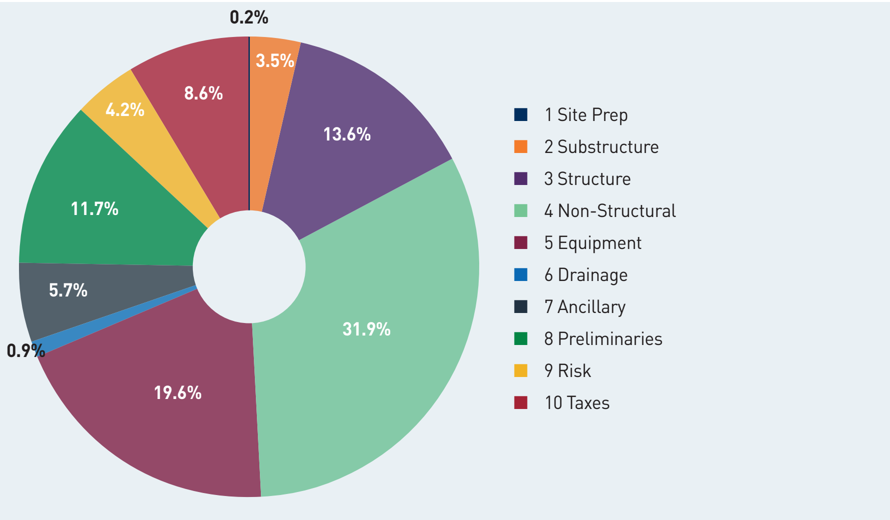


Figure 1: Overall contribution of ICMS3 Groups to average cost of apartment construction across 10 cities.
Source: Analysis of survey results. Totals may not add to 100% due to rounding.

4. As noted in the opening section, some costs that may be classified as 'soft costs' in certain contexts, such as land acquisition and marketing costs, are not included in the scope of this report. These may not always be calculated on a percentage basis.

associated with ICMS3 Groups 01-07, ICMS3 Group 03 (Structure – 18.0%), Group 04 (Non-Structural – 42.3%) and Group 05 (Equipment – 26.0%) contribute 86.3% of all hard costs associated with the apartment construction. The advantage of the methodology developed in this report is the ability to drill into specific ICMS3 groupings on a like-for-like basis across markets. Sections 4.3-4.5 explore the three largest contributors to overall costs, while Section 4.6 examines other cost groupings.

4.2 Costs by city

Figure 2 presents the cost per square metre, by ICMS3 Groups, for each of the ten cities surveyed. The cities are ordered, from left to right, based on overall aggregate cost. Across the cities, the average total cost was €8.26 million; with a total internal floor area of 4,015/m², this means that the average cost per square metre was €2,057. The most expensive city, Zurich, was more than twice as expensive as the cheapest of the cities surveyed, Tallinn: in Zurich, the aggregate cost of the building was estimated at €11.51m (or €2,866/m²), compared to €5.49m in Tallinn (€1,367/m²).

Within the ten cities, three distinct groupings emerge. Zurich (at €2,866/m²) is the most expensive, at a level of cost notably above the other cities. The second group, which had costs close to but slightly above the average, comprised the three British cities (Birmingham, Manchester, and Glasgow) plus Dublin and Stockholm, where the per-square-metre cost varied from €2,079/m² to €2,363/m². The final grouping had costs below the average and included Amsterdam, Belfast, Brussels and Tallinn, where the per-square-metre cost varied from €1,367/m² to €1,823/m². There was a significant gap between Tallinn and the next cheapest city, Belfast, with the cost per square metre in the Estonian capital more than 20% cheaper.

4.3 Non-structural costs

ICMS3 Group 04 (Non-structural Works) represents the largest contributor to the overall cost of the building specified. Across the ten cities, Tallinn had the cheapest aggregate costs at ca.€1.39m, or €346/m², while Zurich had the highest aggregate costs for ICMS3 Group 04, at ca.€3.3m, or €821/m². Dublin was the second highest total aggregate cost (€3.04m or €756/m²), followed by Manchester (€3.0m or €748/m²). The cost of non-structural works in the other UK cities ranged between €687/m² in Belfast and €710/m² in Glasgow. The remaining cities (Stockholm, Brussels, and Amsterdam)

Figure 2: Cost per m², by ICMS3 Group and city. *Source: Analysis of survey results.*

recorded costs in this heading of between €577/m² and €615/m².

Figure 3 presents a breakdown of non-structural costs per square metre, across the ten cities, within ICMS3 Group 04. Cities are presented from left to right in this figure, and in following figures, based on the overall cost ranking, rather than on the ranking for this Group alone. Nonetheless, it is clear from **Figure 3** that the ranking for cities in this heading corresponds, on average, with the overall ranking of cities, with the notable exception of Stockholm. The cost advantage enjoyed by Tallinn overall is reflected in this heading: the city is 40% cheaper on this heading than the second cheapest city.

The original specification included 28 items under this Group. These are grouped in **Figure 3** into ten sub-groups, for ease of presentation, including floors, windows, masonry and carpentry. Indeed, these four subgroups comprised on average two-thirds of costs under ICMS3 Group 04. Of these, floors made on average the largest contribution to costs in ICMS3 Group 04, with an average of €150/m² and ranging from €104/m² (Tallinn) to €183/m² (Amsterdam). Masonry made a similar contribution to cost: an average of €76/m² ranging from €59/m² (Tallinn) to €124/m² (Zurich). In six of the ten subgroups, Zurich (the overall most expensive city) was most expensive, although it was relatively cheap for floors (fourth cheapest). Similarly, Tallinn (the overall cheapest city) was cheapest in four of the ten subgroups: only for ceilings, a relatively inexpensive subgroup overall, was it outside the cheapest three markets. Amsterdam, Stockholm and Manchester all ranked as most expensive for one subgroup within Non-Structural Works. Dublin, which ranked second of the ten cities for this Group, and overall, did not rank as most expensive for any subgroups but ranked second most expensive for five of the ten subgroups. Belfast ranked as the most expensive for two subgroups: windows and carpentry.

4.4 Services and equipment costs

ICMS3 Group 05 (Services and Equipment) made the second largest contribution to overall costs across the ten cities surveyed. Zurich had the highest cost for this heading, at ca.€2.14m or €533/m², just ahead of Dublin (€487/m²) and Manchester (€485/m²). Tallinn had the lowest overall aggregate costs, at €980,000 or €244/m², with two other cities also noticeably cheaper than the average of €404/m²: Amsterdam (at €279/m²) and Stockholm (at €314/m²).

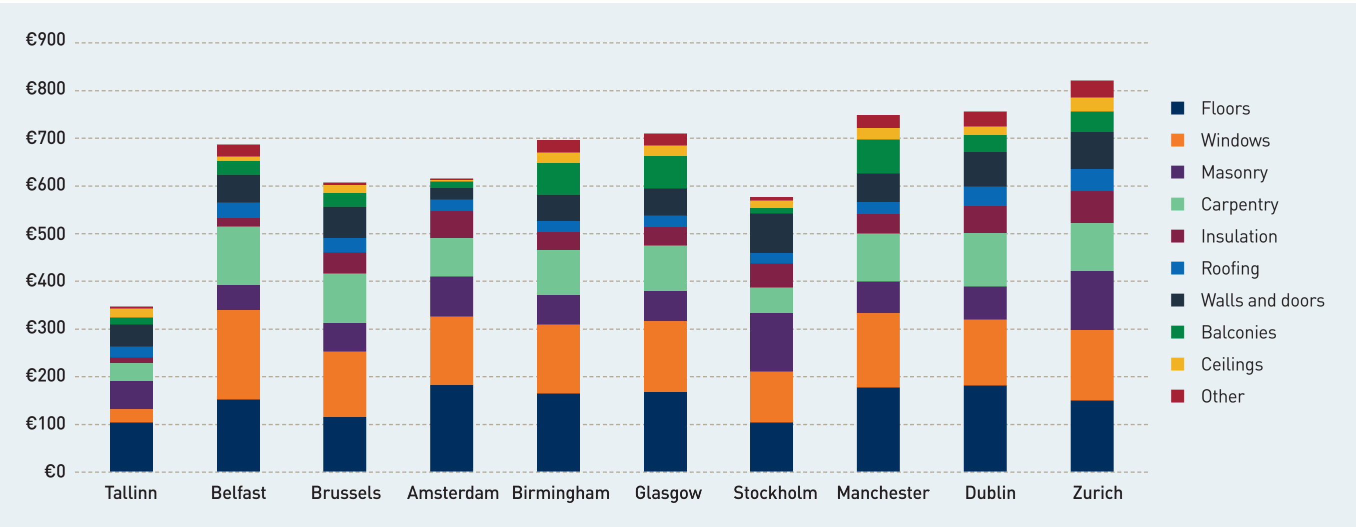


Figure 3: Non-structural costs per m², by cost type and city. *Source: Analysis of survey results.*

ICMS3 Group 05 includes 15 sub-groups, all relating to the services and equipment provided such as heating, sanitary, elevators, power, telecoms and ventilation. **Figure 4** presents a breakdown of these services and equipment costs per square metre, across the ten cities. Again, cities are presented from left to right based on the overall cost ranking (not the ranking for this heading alone). As with **Figure 3**, the overall correlation between cost for ICMS3 Group 05 and total costs is high. However, on this occasion there are two clear exceptions: Amsterdam and Stockholm. Stockholm is 23% more expensive than Tallinn for this heading – for total costs, it is 44% more expensive.

The 15 sub-groups within this ICMS3 Group are grouped, in **Figure 4**, into seven subheadings, for ease of presentation. These include heating and sanitary equipment, which each contributed over €100/m² on average and together make up over half of costs under this group. Power and lighting averaged €86/m², which contributes 21% of the overall costs under this group. The subheadings also included ventilation, elevators, telecommunications and other services/equipment costs. Of the seven subheadings, Zurich, Dublin and Manchester each ranked as most expensive

city twice, although all three cities ranked in the cheapest half for at least one element also. Tallinn and Stockholm were the only cities to rank as cheapest for more than one of the seven subheadings; Amsterdam and Birmingham ranked as cheapest for one subheading.

4.5 Structural costs

ICMS3 Group 03 (Structural Works) made the third largest contribution to overall costs across the ten cities surveyed. Zurich had the highest cost for this heading, at ca.€1.58m or €394/m², with Manchester (€352/m²) and Glasgow (€334/m²) ranking second and third most expensive. Tallinn again ranked the cheapest of the ten cities, with an overall cost of €846,000, or €211/m², with Belfast (€220/m²) and Amsterdam (€232/m²) ranking second and third cheapest. Compared to the two Groups treated in Sections 4.3 and 4.4 of this report, there was a smaller gap between most and least expensive city: the most expensive city

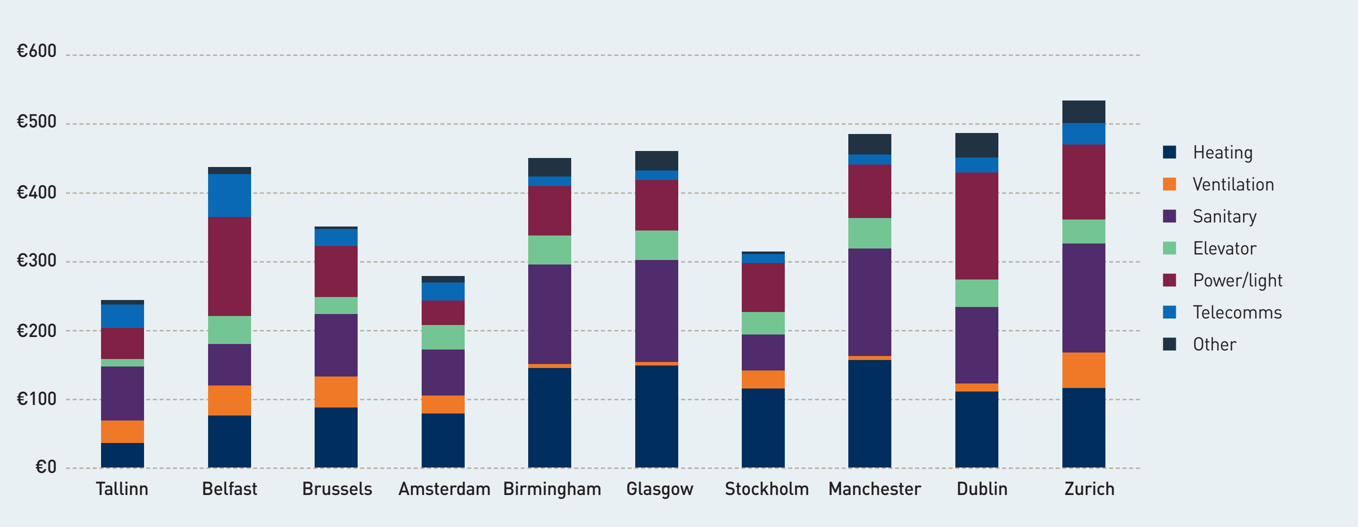


Figure 4: Services and equipment costs per m², by cost type and city. *Source: Analysis of survey results.*

> *The advantage of the methodology developed in this report is the ability to drill into specific ICMS3 Groupings on a like-for-like basis across markets.*

was 86.7% dearer than the cheapest, compared to 137% for ICMS3 Group 04 and 118% for Group 05.

ICMS3 Group 03 includes 11 items, grouped into seven subgroups for **Figure 5**, which presents a breakdown of structural costs per square metre across the ten cities. Again, cities are presented from left to right based on the overall cost ranking (not the ranking for this Group alone). Compared to **Figures 3** and **4,** the correlation between the cost for this ICMS3 heading and total costs is weaker. Dublin, for example, ranks fifth most expensive (compared to second most expensive overall), while Birmingham and Brussels rank higher here than overall.

All seven subgroups in Structural Works relate to concrete. Of the seven subgroups, floor slabs (€106/m², 38% of the ICMS3 heading total) and exterior walls (€73/m², 26%) are the most important on average, followed by balconies (€30/m², 11%). Zurich ranked as the most expensive of the ten cities for six of the seven subheadings; Manchester was the only other city to rank as most expensive city for any subheading – doing so for exterior walls, the second most important. Tallinn (for three subheadings), Belfast (twice) and Amsterdam (twice) all ranked as cheapest on more than one subheading, with Stockholm also ranking cheapest for one subheading (staircases and landings walls).

4.6 Other costs

ICMS3 Groups 03-05 comprised roughly two-thirds of all costs, on average, across the ten cities. The remaining third was made up of other 'hard costs' (ICMS3 Groups 01, 02, 06, and 07) and 'soft costs' (ICMS3 Groups 08-10). For the remaining hard costs, the total aggregate cost on average was €852,000, or €212/m². Of these, the largest contribution came from ICMS3 Group 07 (External Works), at €117/m², followed by ICMS3 Group 02 (Substructure) at €72/m². The total for these other hard costs was very similar in five of the ten cities surveyed: the cost per square metre was between €264/m² and €284/m² in the three British cities, Stockholm and Zurich. Of these, Manchester was the most expensive. Dublin was the next most expensive (€235/m²), while the remaining four cities were significantly cheaper, ranging from €104/m² in Brussels to €164/m² in Belfast.

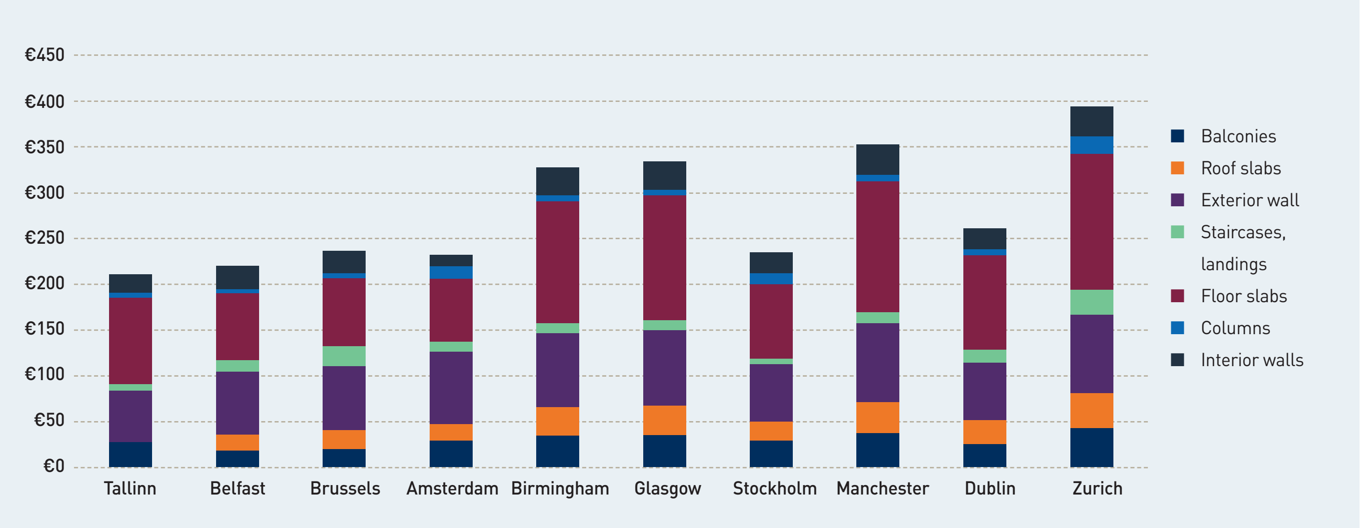


Figure 5: Structural costs per m², by cost type and city. *Source: Analysis of survey results.*

Figure 6 gives a breakdown of these other hard costs, per square metre, across the ten cities for four subheadings. The organisation largely follows the ICMS3 groupings, although all earthworks components (all ICMS3 Group 01 and two subgroups of ICMS3 Group 02) are grouped for consistency. As before, cities are presented from left to right based on the overall cost ranking, rather than the ranking for these Groups. Compared with equivalent figures for other ICMS3 Groups, the correlation between overall rank and these costs is notably weaker: nonetheless, the difference between the cheaper cities and the more expensive cities is still there.

Of the four sub-groupings, external works make up over half on average: €117/m^2 of the €212/m^2 (55% of other hard costs). The next most important sub-group relates to concrete substructure work, at €51/m^2 (24% of other hard costs). Stockholm ranked as the most expensive city for two of the four subgroups, including external works; Manchester ranked as most expensive for substructure and drainage works. Brussels ranked as cheapest for three subgroups, including Ancillary; Belfast ranked as cheapest for substructure works. Dublin, the second most expensive city for overall costs, ranked sixth most expensive for these other hard costs (and between fifth and seventh most expensive across each subgrouping).

Under the ICMS3 classification, three of the Groups included relate to soft costs: Group 08 (Preliminaries), Group 09 (Risk), and Group 10 (Taxes). **Figure 7** presents these costs, per square metre, for each of the ten cities surveyed. On average, these soft costs add €2.02m to costs, an average of €504/m^2. Preliminaries make up the largest share of soft costs, €240/m^2 (or 48% of all soft costs)

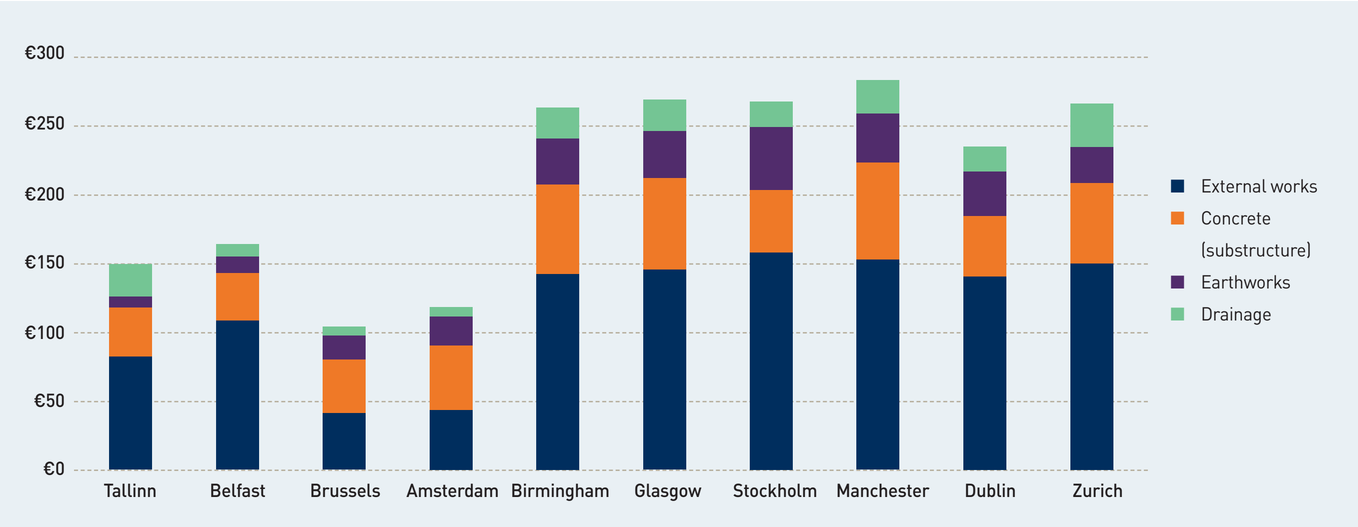


Figure 6: Other hard costs per m^2, by group/subgroup and city. *Source: Analysis of survey results.*

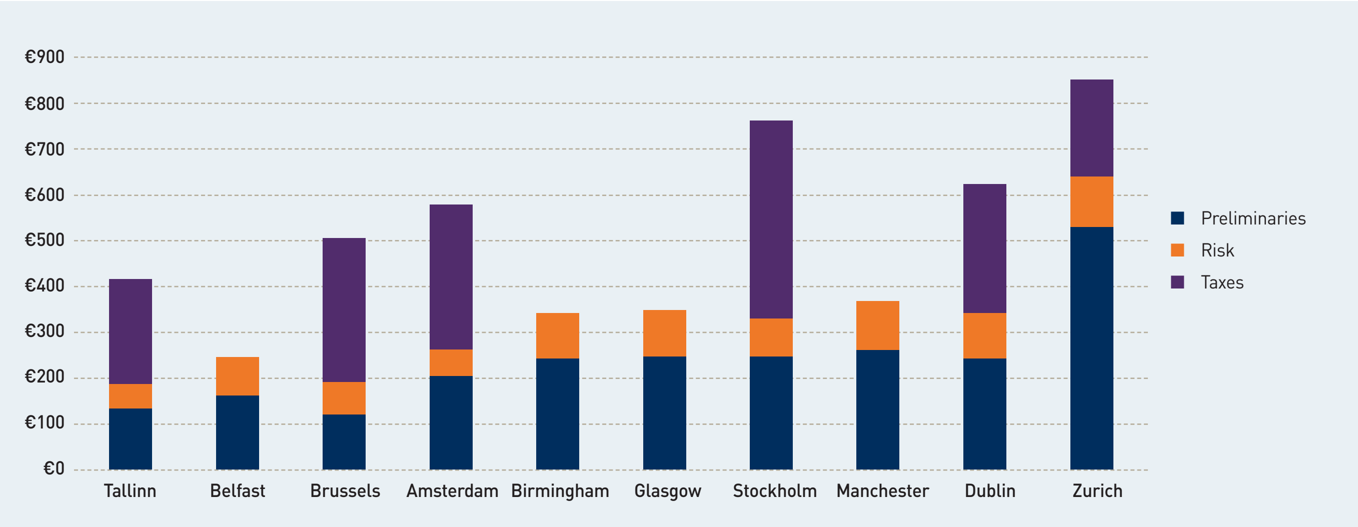


Figure 7: Soft costs per m^2, by city and ICMS3 Group. *Source: Analysis of survey results.*

on average, followed by taxes (€178/m², 35%).

A key distinction across markets, when considering soft costs, relates to taxes. For the four cities of the ten included that are in the UK, the relevant rate of taxation is zero. Excluding this heading, there is a strong correlation between ranking for costs relating to Preliminaries and Risk, and overall costs, as reflected in going from left to right in **Figure 7**. This is unsurprising, given how these costs are typically calculated (as a percentage of hard costs). Nonetheless, even excluding taxes, Zurich is substantially more expensive than the second-ranked city: its cost for Preliminaries and Risk, at €640/m², is 73.9% more expensive than the second most expensive city for the same two costs (Manchester, €368/m²).

The inclusion of taxes has a substantial bearing on the overall ranking. In the case of Stockholm, this adds almost €430/m², compared to an average of €270/m² for the five other non-UK cities. Indeed, without taxes, Stockholm ranks seventh of the ten cities; with taxes, it ranks fourth most expensive. This is a point that will be explored in more detail in Section 5.

4.7 Drivers of cost differences

The previous sections have outlined the differences in cost, by city, across the different ICMS3 cost Groups. The aggregate differences are substantial. The average cost across the ten cities was just over €2,057/m², but with a range of almost €1,499/m²: the most expensive city (Zurich) was approximately €1,370/m² more expensive than this, while the cheapest (Tallinn) was €360/m² less than this. **Figure 8** provides a summary of the differences by city, illustrating for each ICMS3 heading its contribution to the difference from the ten-city average. Presented in Euro per m² terms, it demonstrates the overall magnitude of cost disparities.

For Tallinn and Zurich, the city-level differences by ICMS3 Group are largely consistent with the overall ranking. In nine of the ten Groups, Zurich is above average, the only exception being ICMS3 Group 01,

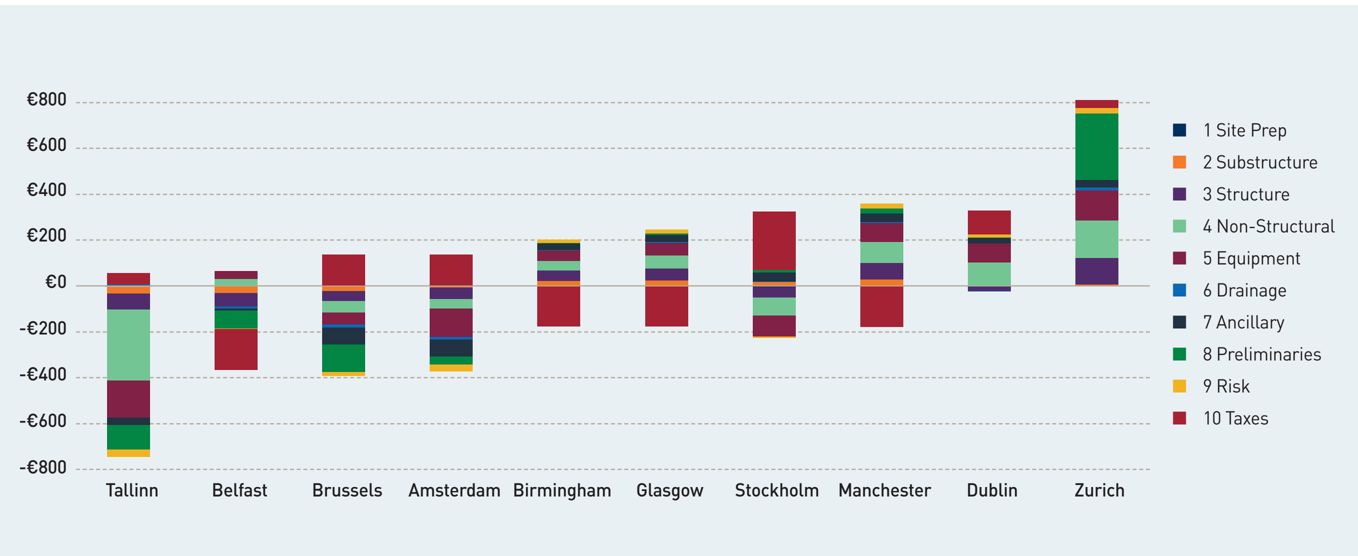


Figure 8: Contribution to per-m² cost differential, by city and ICMS3 Group.

the Group with least weight, where it is in line with the average. Similarly, in eight of the ten Groups, Tallinn is cheaper: the exceptions are drainage (again, a Group with a smaller weight) and taxation. Nonetheless, despite this consistency, **Figure 8** also indicates that certain Groups play a more significant role in determining the overall ranking of these two cities than others. Preliminaries contribute more to Zurich's high costs than its average share might suggest, while in the case of Tallinn, Non-Structural Works make the largest contribution to its cost advantage.

In Dublin, the second most expensive city, almost all Groups contribute to its high level of costs. ICMS3 Groups 02 (Substructure) and 03 (Structure) are cheaper than the average, by €4/m^2 and €19/m^2 respectively, while 06 (Drainage) is in line with the ten-city average. But all other headings contribute to a higher-than-average cost. Dublin is more than €300/m^2 more expensive than the ten-city average, and almost €300 of that comes from three ICMS3 Groups: 04 (Architectural and Non-Structural Works; €100/m^2), 05 (Services and Equipment, €83/m^2), and 10 (Taxes and Levies; €103/m^2). In the four other ICMS3 Groups, Dublin is also above average but at a much smaller magnitude (between €2/m^2 and €24/m^2).

The example of Stockholm shows how different cost headings can work in opposing directions and, in particular in the case of the Swedish capital, how 'hard' and 'soft' costs can differ. In the case of hard costs, Stockholm is €160/m^2 cheaper than the ten-city average. However, the substantially larger soft cost, where Stockholm is almost €260/m^2 more expensive than the average, means that its final ranking is above average, rather than below.

The British cities have the opposite pattern. While their hard costs make them, over those headings, more expensive than the average, the low level of soft costs – in particular the lack of taxation – offsets this. Taking the case of Glasgow, the middle ranked of the three British cities, the overall cost per square metre, including soft costs, is €2,124, slightly above the ten-city average of €2,057/m^2. However, for ICMS3 Groups 01-07, reflecting hard costs, the estimated total cost for Glasgow is €1,775/m^2, nearly €220/m^2 above the ten-city average for hard costs of €1,553/m^2. Across all cities, soft costs add on average €504/m^2, but in Glasgow they add just €350/m^2. This includes a VAT rate of 0%, compared to 13.5% in Dublin and 21% in Brussels.

Across most Groups, the correlation between ranking on that Group and overall rank was evidenced. Nonetheless, there were important exceptions, such as those relating to Stockholm and the British cities. The following section discusses the potential factors driving these differences and the potential implications arising from this discussion.

Across most Groups, the correlation between ranking on that Group and overall rank was evidenced.

5. DISCUSSION AND CONCLUSIONS

Section 4 highlighted significant differences in the cost of constructing an apartment complex building with a fixed set of quantities/specifications across various ICMS3 groupings. This section discusses several elements contributing to these differences and issues arising from those.

5.1 Soft costs, including taxation

As noted in Section 4.7, the overall cost base (and survey rank) of British cities improves considerably due to the small size of soft costs. This includes a zero rate of VAT that applies to construction of new dwellings. **Figure 9** presents the rate of VAT for new dwellings (excluding the rate applying to social housing, or similar, where different), for each of the 27 EU member states as of 2021, as well as the mean rate in the EU and the rate applicable in the UK.[5] As it shows, the UK is an outlier in Europe in not charging any VAT on new construction. While some countries,

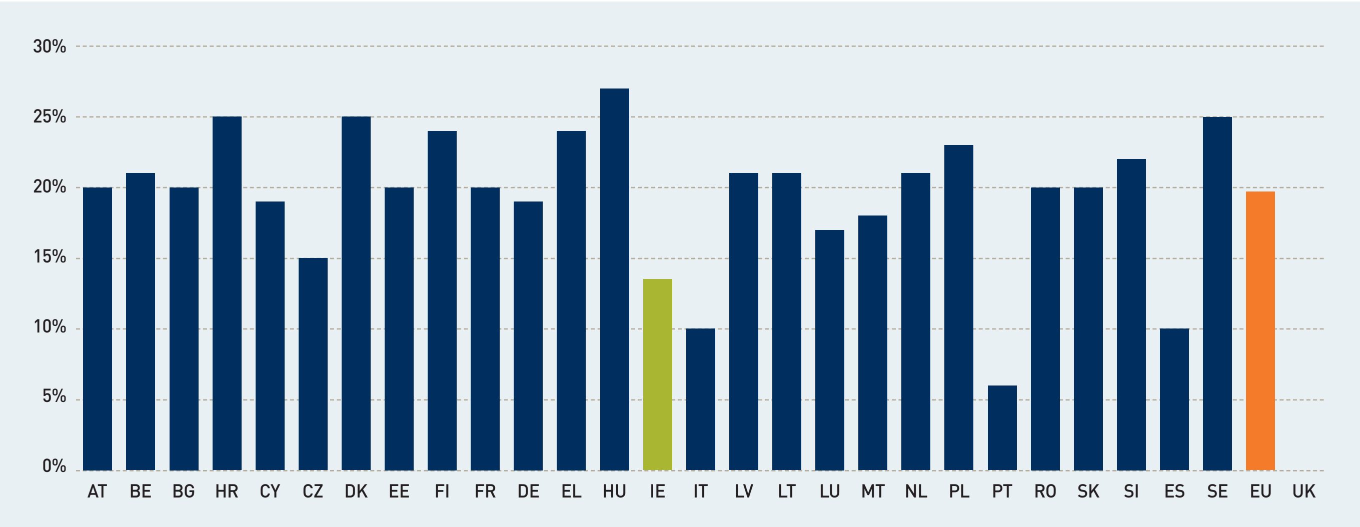


Figure 9: VAT rate on construction of new homes by EU member state (as of end 2020).

5. Source: 'VAT rates applied in the Member States of the European Union – Situation as at 1st January 2021'. Taxud.c.1(2021) – EN.

such as Luxembourg, do levy lower rates for one-off housing (in some instances below certain size thresholds), across the European Union the mean (and median) rate of VAT for new construction is 20%.

The rate of VAT applied in Ireland is the fourth lowest of 27 EU member states: only Portugal (6%), Italy and Spain (both 10%) have lower rates. If Ireland matched the UK's zero rate, the per-square-metre cost in Dublin would fall from €2,363/m^2, €306/m^2 above the ten-city average, to €2,082/m^2. In terms of ranking, if this changed and nothing else, Dublin would fall from second highest cost of the ten cities surveyed, to fifth, falling below Manchester, Glasgow and Stockholm (all of which have costs between €2,100/m^2 and €2,250/m^2) but remaining just above Birmingham. This suggests that, as of 2020, differences in the cost base between Dublin and the three British cities sampled were minimal, when VAT was excluded. However, it also suggests that even if VAT were set to zero, Dublin would remain more expensive than the average city in the survey, and over €200 more expensive, per square metre, than cities such as Belfast, Brussels and Amsterdam.

In addition, the provision for other soft costs, including ICMS3 Group 08 (Preliminaries) and Group 09 (Risk), varies by city. In the case of Risk, the cost across the ten cities ranges from €54/m^2 to €110/m^2, although the relatively small range here is driven by the requirements of the survey in relation to risk provision. In the case of Preliminaries, however, the range was larger. The cost of Preliminaries ranges from €122/m^2 in Brussels (and a level close to that in Tallinn and Belfast) to €530/m^2 for Zurich, although in this instance Zurich is a substantial outlier, with the second most expensive city for Preliminaries, Manchester, at €262/m^2.

Beyond the scope of this study, but nonetheless important in understanding differences in the cost of providing housing across Europe, is the prevailing cost of capital. The cost of capital relates to the structure of capital markets, which varies considerably across economies. This includes the relative importance of equity financing, short-term debt and long-term debt, as well as overall market size and liquidity.

5.2 The role of labour costs

The bill of quantities used in the survey (see Appendix B for more information), by its nature, does not directly include the quantity and rate of labour, as distinct from materials, when the cost of elements is reported. Nonetheless, the nature of particular groups suggests differing labour intensities: all elements in structural works contain concrete, implying a relatively materials-intensive ICMS3 Group, while the elements in Services and Equipment, by their nature, have more labour inputs. And as noted in Section 4, there is greater variation across cities in the cost of Services and Equipment (ICMS3 Group 05) than in Structural Works (ICMS3 Group 03).

Eurostat, the EU's statistical body, provides data on labour costs in the construction sector (NACE section 5) on a national basis, annually. The most recent figures from 2022 underscore the significant geographic variation in the cost of construction labour. The average hourly cost of construction labour ranged from €6.50 in Bulgaria to €46.50 in Norway. The EU27 average for 2022 was €27.30.[6] Among countries with cities included in the survey, the range was substantial. In Estonia, the average hourly cost of construction labour was €16.50, while it was close to €40 per hour in the Netherlands (€40.60) and Sweden (€39.70).

There are three limitations to these figures, for the purposes of this discussion. The first is that, as these are EU statistics, the UK and Switzerland are not reported. Given these findings, and the relative rankings of British and Swiss cities across headings, their inclusion is important. Secondly, labour costs vary within as well as across countries and

6. Eurostat. 2024. Hourly labour costs. Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Hourly_labour_costs#Labour_costs_per_hour_lowest_in_the_construction_sector. Accessed February 9, 2024.

this is particularly true in larger countries, with labour costs typically highest in the largest cities. Thirdly, the Eurostat figures are an overall average. This hides important variation across roles within the construction sector. The mix of occupations (and skill levels) may differ across occupations. For that reason, occupational wage data by city would be ideal.

Figure 10 presents hourly labour costs for 12 cities in 2020, including many of those covered in the survey, as well as other major European cities. The information comes from Turner & Townsend survey data, and includes costs faced by employers in hiring workers, such as social insurance, or the equivalent, where applicable. The cities are sorted, from left to right, by average hourly cost across the six occupations. The data reveal that labour markets for construction occupations seem regional, rather than local, with three to four broad groupings.

The most expensive grouping is central European (in particular Germanic) cities, which have the highest hourly labour costs of the cities covered. This group includes Zurich, Vienna and Berlin, but also Geneva and other German cities not shown in the graph, for ease of exposition. A second group, broadly including northwest Europe (but excluding Britain) comes next. It includes Paris, Brussels and Amsterdam as well as Dublin and Stockholm. Whereas labour costs were above €70 per hour (on average across the six occupations) in the central European cities, and above €100 in Swiss cities, they were between €50 and €60 per hour in northwest European cities. British cities (excluding Belfast) are cheaper again, with an average rate of approximately €45 per hour (at prevailing exchange rates) in Birmingham.

The final and cheapest grouping is Southern European cities, of which Milan and Madrid are shown. In both those cities, the average hourly cost of construction labour (based on the six occupations shown) is below €40/hour. Based on prevailing costs, Belfast in Northern Ireland can be included in this group. Its average hourly cost of labour, at €35/hour, was the second cheapest of the 17 cities for which data were available, above only Madrid (at €34/hour). Construction labour costs in Belfast were estimated by Turner & Townsend to be almost one-quarter cheaper than in Birmingham, which is in the same jurisdiction, and (based on prevailing exchange rates) over 30% cheaper than Dublin, which is on the same island and which would share many of the same features in relation to supply chains.

While these figures are useful in highlighting labour cost differences across cities, they do not include any measure of productivity. For this, a 'unit labour cost' would be needed that standardises labour costs based on the output. As an example, the listed hourly cost for a 'Group 1' tradesman (such as a plumber or electrician) in Amsterdam is €60, while in Dublin it is €48. This means that Amsterdam is 25% more expensive than Dublin. But if Amsterdam electricians were able to produce 25% more, per hour, in value added, then the

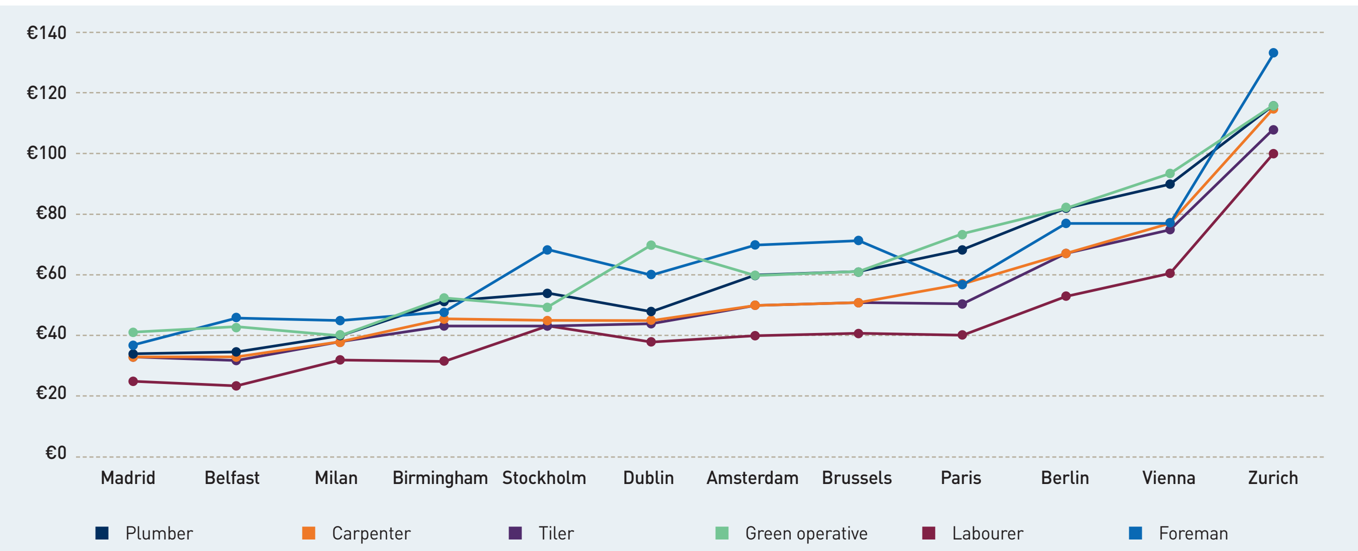


Figure 10: Prevailing hourly labour costs, by city and occupation. *Source: Analysis of Turner & Townsend data.*

Table 1: Cost comparisons for apartment construction in Dublin, adjusting for construction-related inflation.

Description	SCSI (lower and higher range provided) – Q3 2020	DoHLGH – Q3 2022	This report – Q1 2020
Total construction costs (excluding VAT)	€2,408 to €2,884	€2,803	€2,082
Wholesale Price Index (capital goods – Building and Construction Index)	109.5	134.2	109.3
Inflation % adjustment – Q3 2020 to Q3 2022	22.6%	NA	22.8%
Costing accounting for inflation to Q3 2022	**€2,951 to €3,535**	**€2,803**	**€2,556**

effective cost differential would be zero. Understanding the scale and source of productivity differences in the construction sector is a major research agenda.

Lastly, both Eurostat and Turner & Townsend figures reflect prevailing hourly costs. There may be a gap between official rates and market rates or, similarly, an unrecorded premium for labour costs in some markets. The mobility of labour is key here: Belfast is significantly cheaper than Dublin for construction labour but both cities are on the same island. Where developers can tap into that cheaper labour market, they might be able to bring down construction costs, but this depends on legal and regulatory frameworks, many of which may limit this. While this is a local example, the same principle holds true at continental level: labour is most costly in central Europe and north-western Europe (broadly speaking) and cheapest in southern and eastern Europe.

5.3 Comparison with Irish reports

Two reports by the SCSI[7] in 2021 and the DoHLGH[8] in 2023 compared the cost of building apartments in Dublin using different methodologies, with the DoHLGH report comparing the cost of building across different countries. Neither report used the ICMS3 framework for costing.

The SCSI report employed average market rates, as of Q3 2020, to determine the cost of delivering various apartment types, with the 'urban medium-rise' category being most similar to the design in this research. In contrast, the DoHLGH report provided an international cost comparison for Q3 2022, using a 'travelling box' methodology, where an apartment built to Dublin specifications was assessed across different countries, similar to the fixed 'bill of quantities' (here from a Swiss apartment block) used in this research.

The SCSI report outlined a total construction cost range of €2,408/m^2 to €2,884/m^2, whereas the DoHLGH report indicated costs in Dublin to be just over €2,800/m^2.

Table 1 compares estimates of the cost per square metre of building apartments in Dublin, across the three reports. Post-construction cost considerations such as risk and site acquisition, which were accounted for in the final delivery in the SCSI report, were excluded from this comparison. Similarly, these 'soft costs' were not included in the DoHLGH report. In addition, to facilitate an accurate comparison, the total construction costs reported in both the SCSI report and this current study required an adjustment for inflation up to Q3 2022, to align with those presented in the DoHLGH report.[9]

As per **Table 1**, applying these adjustments to the total construction costs reported here gives a value for Q3 2022 for Dublin of €2,556/m^2. This is consistent with differences in scope affecting construction costs in Dublin compared to peer cities elsewhere in Europe.

The findings of the DoHLGH study are worth reviewing here. In relation to the cost of suburban and urban apartments, the study found that costs for the 'travelling box' were similar across all locations, with only a 4% differential for suburban apartments (similar to the project here) and a 9% differential for urban apartments. However, the cost for actual apartment buildings was lower in Copenhagen, Berlin and Utrecht than in Dublin or Birmingham. While the Dublin specifications would cost €2,863/m^2 to build in Berlin, the range of actual costs in that city varied from €1,687/m^2 to €2,025/m^2. The study attempted to categorise the nature of cost differences across cities and grouped cost differences under three main headings: scope; unit sizing; and, specification.

It is common in the three cheaper cities, for

7. SCSI. The Real Cost of New Apartment Delivery, 2021.

8. DoHLGH, Residential Construction Cost Study report, 2023.

9. Using the Wholesale Price Index for Capital Price (Building and Construction Index, which incorporates materials and wages), the inflation rate between the SCSI report and the DoHLGH report was determined to be 22.6% (from Q3 2020 to Q3 2022), while the inflation rate for this study to reach Q3 2022 levels was 22.8%.

example, to sell/rent apartments with no ceiling or floor finish and no wardrobe, kitchen or light fittings. Similarly, unlike in Dublin schemes, apartments often have one shared bathroom and no ensuites. The study also highlighted an important difference between market norms and regulations, while also noting that not all standards and regulations are prescriptive. In the three cheaper cities, for example, requirements for apartment sizes are more performance-based than prescriptive, leading to a significant range of apartment sizes in those locations.

The study identified potential cost reduction opportunities in Dublin for apartments, noting that they "are primarily linked to scope and standardisation". For example, increased use of standardisation in construction systems and specification of components, such as windows, is evident in the cheaper locations, where manufactured panel systems are more common than labour-intensive site-based activities (such as block or brick laying). Workshop participants in the study noted that diversity in the design and appearance of housing can increase construction costs, while making it more challenging to increase standardisation.

The report concludes that if continental European approaches to apartment construction were adopted, the construction cost in Dublin of a two-bed apartment could be reduced by up to 14%: 3% by reductions in specification, 6% by reducing scope (such as ensuites and finishes); and, 5% from deferral of standard scope, such as kitchen, joinery and flooring. However, it also notes that such deferrals of scope are just that, deferrals, and those elements would still incur a cost that would be borne by the end user, albeit in line with their preferences, timing and budget.

5.4 Comparison with international reports

Other international data on construction costs may shed further light on the importance of scope differences in driving further variations in the cost of building homes across markets. Since 2012, Turner & Townsend has compiled an International Construction Market Survey in most years. The 2019 edition (closest in timing to the study here) includes prevailing costs for 18 cities/regions in Europe across a range of headings, including the cost per square metre for low-density apartments of medium specification, similar to the project in this survey. Including regions within the UK, there are seven markets covered in both the survey here and the 2019 edition of the Turner & Townsend report: Amsterdam, Dublin, Stockholm, Belfast/Northern Ireland, Glasgow/Scotland, Manchester/Northern England, and Birmingham/Central England.[10]

As noted in the report, building costs quoted are direct costs for construction and include preliminaries, substructure, structure, internal walls/doors and finishes, and plumbing and other services (such as communication). They exclude external works (including landscaping), as well as professional fees, demolition, and any fittings. They also exclude costs internal to the developer, such as finance and sales taxes. To compare like with like, ICMS3 Groups 01 (Demolition, Site Preparation and Formation), 07 (External and Ancillary Works) and 09-10 (Risk, and Taxes and Levies) are excluded.

With these exclusions, using the survey data from this report, the British cities and Dublin are the most expensive of the seven locations, with costs of roughly €1,830/m^2 to €1,970/m^2. Belfast, Stockholm and Amsterdam have per-square-metre costs of between €1,402/m^2 and €1,560/m^2. Of the three cities not included, Zurich remains the most expensive overall at roughly €2,390/m^2, Tallinn the

10. While the 2019 Turner & Townsend report has its own exchange rate to convert from local currency to dollars (its reporting currency), for consistency here we apply the same exchange rate as used in the survey to convert from pounds to Euro, so that exchange rate differences do not affect our conclusions.

cheapest at €1,001/m^2, and Brussels the second cheapest at €1,370/m^2.

A comparison of the Turner & Townsend prevailing costs per square metre and the relevant ICMS3 groupings indicates, through a gap between the two cost measures, that there may indeed be significant scope differences across cities. For example, in the three British cities, listed costs in the Turner & Townsend report are between 7% and 9% below those in the survey. Costs in Amsterdam are slightly higher in the Turner & Townsend report than in the survey (by 2.5%), while Dublin shows the largest premium, at over 5%: €2,300/m^2 in the Turner & Townsend report compared to €2,182 in the survey for the ICMS3 headings covered by Turner & Townsend. In Stockholm, however, a significant gap exists the other way: the Turner & Townsend figure is almost 20% cheaper than the survey.

This is consistent with significant differences of scope between markets. Taking the estimates at face value, it suggests that while, on the exact same project, Dublin would be almost 30% more expensive than Stockholm, for the six ICMS3 Groups covered (representing on average 81% of costs), once local differences in apartments actually built are factored in, Dublin would be almost 70% more expensive (as of early 2020). This implies a 31% scope differential between Dublin and Stockholm for an apartment. It is not intended for this figure to be a precise estimate of scope differences; rather, the combination of figures and their underlying methods gives this indicative figure. Such scope differences are an important topic for future research and analysis.

5.5 Report scope

It is important in any study to acknowledge what it aims to measure and what it does not. The extent to which the conclusions of this report can be more broadly applied to a general conclusion about prevailing costs

relates to specific choices in the study design. In other words, there is a trade-off between internal validity, and ensuring that the results are robust internally, and external validity, and the extent to which the conclusions here can be extrapolated to other settings. This section discusses in brief some of these limitations and how they may be addressed in future work.

Firstly, the timing of the study data is the first quarter of 2020, i.e., before the onset of Covid-19. In the subsequent three years, there were major upheavals in the construction sector, including lockdowns and supply chain problems. Post Q1 2020, developments may temper or alter some of the findings presented. Fortunately, with the study design it is straightforward to repeat the survey with other cost periods and, indeed, extend to other cities not included in the first wave.

The same principle applies to other property types. The housing here is specific in nature: a seven-storey apartment building with 39 apartments. Housing developments with smaller numbers of homes (including detached or semi-detached houses) or housing in denser developments, with over 100 homes in larger blocks, may have different cost patterns in a way that changes the ranking of cities.

Related, the year in which the original Swiss building was planned was 2011, nine years before the timing of the survey information (2020). In the intervening period, costs will have changed of course – but so too will the relevant mix of quantities/specifications. While some adjustments were made to reflect changes in standards, over time different (local) regulations and market norms may apply, such as sizes, finishings or the provision of ensuite bathrooms. Another important factor to consider is energy efficiency: minimum standards in Irish regulations mean that all newly built apartments will be to an A-rated energy efficiency standard. Any future report could address this by updating the bill of quantities to reflect such changes.

The strength of this report is also its limitation: the 'travelling box' is the same for all cities, but does not match what is actually built in each city. As discussed in the

It is important in any study to acknowledge what it aims to measure and what it does not. The extent to which the conclusions of this report can be more broadly applied to a general conclusion about prevailing costs relates to specific choices in the study design.

preceding section, there are potentially very significant differences in prevailing scope and specification across cities. An obvious next step for a subsequent report would be, in addition to any updating of the baseline bill of quantities (as mentioned in the previous paragraph), to add a column to allow amendments to the bill of quantities in each market. This would enable a direct calculation of the extent to which local differences, whether driven by regulations, norms or other factors, affect actual cost differences.

As part of the underlying research for this project, costs were shared by Hines, a developer operating in multiple markets, relating to four projects that were live in 2020/2021: two related projects in Dublin; one in Berlin; and, one in Madrid. The Dublin projects comprised 384 apartments in two blocks in the first portion, with 520 apartments in three blocks in the second. With a residential gross floor area (GFA) of 86,549m^2, this is substantially larger than the Swiss project considered here, with housing in six-storey blocks over a podium slab and raft basement carpark; the wider project includes a 200-room hotel and a substantial retail centre. The Berlin project comprised 664 residential units, built for the middle to upper end of the rental market, with a further 116 social housing units and 213 student apartments, as well as associated common areas and a kindergarten. It had a GFA of 54,675m^2. Lastly, the Madrid project included 29,900m^2 of residential space arranged into 395 units, as well as retail space, parking, private gardens and terraces, and communal areas (including a swimming pool).

These real-world projects highlight the importance of local context, both at the site level and more broadly at the market level (including regulatory requirements, market norms and other elements).

The level of detail varies across the three projects, but both the Berlin and Madrid projects required expenditure on demolition and site clearance. The cost per square metre of residential space across the four projects varied from €1,794/m^2 in Madrid, to €3,281/m^2 for one phase of the Dublin project. The other phase of the Dublin project had a cost of €2,791/m^2, giving an overall average for the Dublin projects of just over €3,000/m^2. The Berlin project had an average cost of €2,823/m^2.

The level of costs in the live Dublin projects is high relative to the costs measured in the survey project (Section 4). This underscores the point made that project-specific attributes – whether due to regulations, norms that vary by city, or other factors – are important in understanding the cost differentials.

Further, Berlin is also included in the Irish Government's 'Residential Construction Cost Study' report (Section 5.5). The significant difference in costs for the live project (€2,823/m^2 for the Hines project compared to €2,000/m^2 or less in the Irish Government report) highlights a further important factor: the positioning of the project within the city's market.

Ultimately, cost studies such as these can be used to provide a strong evidence base for policymakers to use, when ensuring that housing policy is grounded in an understanding of viability and affordability.

It is suggested, to close, that future iterations of residential construction cost surveys across markets can enrich the detail, edition by edition, so that the quantification of such local market differences can be layered in on top of what is captured here: the like-for-like differences across housing markets.

6. POLICY RECOMMENDATIONS

This study provides a benchmark of construction costs for apartments across a number of European cities. For the first time, the costs, which are reported in a consistent and now in a harmonised standard, provide the sector and policymakers with independent data to better understand costs and ways to improve viability and affordability.

Design and specifications

- Consider the findings of this report especially in the context of adopting additional standardisation of housing design and construction in an effort to quell the rising cost of construction.
- Planning policy to adopt alternative approaches in the exterior aesthetics of apartment buildings to provide designers, specifiers and cost experts with more flexibility in the use of less costly facades systems.

Further research

- Government should commission independent research with a specific examination of the 'soft costs' across similar jurisdictions and building designs covered in this report to identify additional areas to reduce costs.
- The commissioned report could also examine additional macro-economic factors that influence the level of affordability and financial viability of such projects.
- Commission a study to examine the delivery of zoned and serviced development land to the market in other European countries in an effort to identify new models for the more cost-effective delivery of key road and utility connections.

> *Consider the findings of this report especially in the context of adopting additional standardisation of housing design and construction in an effort to quell the rising cost of construction.*

APPENDIX A: COST DATA

Cost data for Figure 2

	Tallinn	Belfast	Brussels	Amsterdam	Birmingham	Glasgow	Stockholm	Manchester	Dublin	Zurich
1 Site Prep	€2	€2	€7	€5	€7	€7	€0	€8	€7	€5
2 Substructure	€42	€44	€50	€63	€92	€94	€91	€99	€69	€80
3 Structure	€211	€220	€236	€232	€327	€334	€235	€352	€261	€394
4 Non-Structural	€346	€687	€607	€615	€695	€710	€577	€748	€756	€821
5 Equipment	€244	€437	€350	€279	€451	€460	€314	€485	€487	€533
6 Drainage	€24	€9	€6	€7	€22	€23	€19	€24	€18	€31
7 Ancillary	€83	€109	€42	€44	€143	€146	€158	€153	€141	€150
8 Preliminaries	€135	€162	€122	€206	€243	€248	€248	€262	€244	€530
9 Risk	€54	€84	€71	€58	€99	€101	€82	€107	€99	€110
10 Taxes	€228	€0	€313	€315	€0	€0	€431	€0	€281	€211

Figure 2: Cost per m², by ICMS3 Group and city. *Source: Analysis of survey results.*

APPENDIX A: COST DATA

Cost data for Figure 3

	Tallinn	Belfast	Brussels	Amsterdam	Birmingham	Glasgow	Stockholm	Manchester	Dublin	Zurich
Floors	€104	€152	€116	€183	€165	€168	€103	€177	€181	€150
Windows	€29	€188	€139	€144	€146	€149	€108	€157	€139	€148
Masonry	€59	€53	€57	€84	€61	€62	€123	€65	€69	€124
Carpentry	€37	€122	€104	€82	€95	€97	€54	€102	€112	€100
Insulation	€12	€18	€43	€56	€37	€38	€49	€40	€57	€67
Roofing	€22	€32	€31	€24	€24	€24	€22	€26	€40	€46
Walls and doors	€47	€58	€64	€24	€55	€56	€83	€59	€72	€78
Balconies	€14	€29	€30	€13	€67	€68	€12	€72	€35	€43
Ceilings	€18	€11	€16	€4	€22	€22	€16	€23	€19	€29
Other	€3	€24	€5	€2	€25	€25	€6	€27	€31	€35

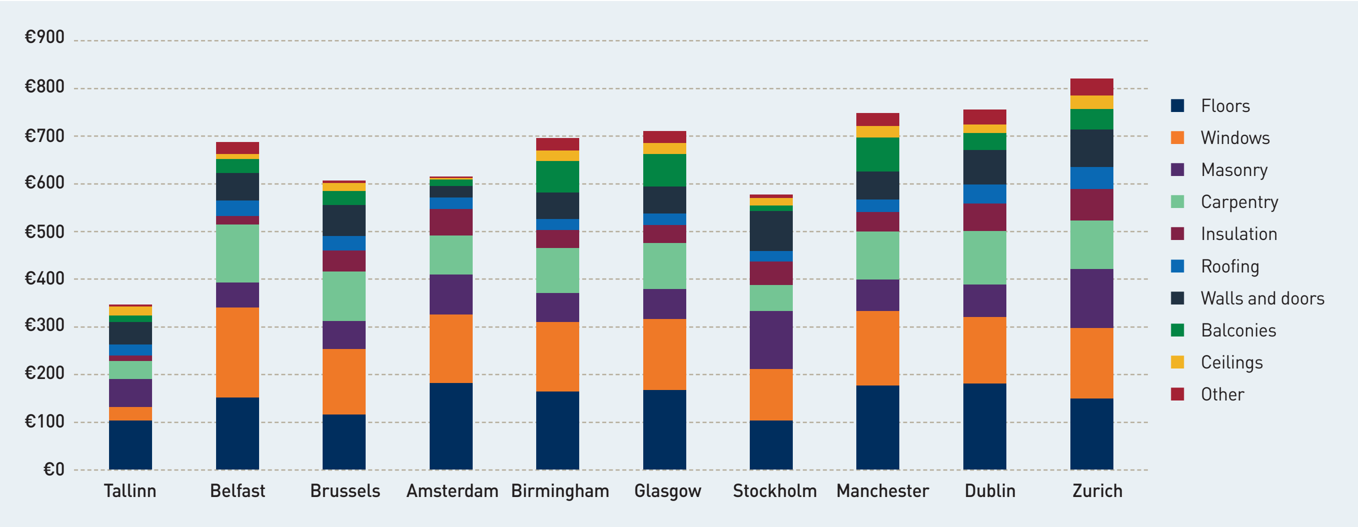


Figure 3: Non-structural costs per m^2, by cost type and city. *Source: Analysis of survey results.*

APPENDIX A: COST DATA

Cost data for Figure 4

	Tallinn	Belfast	Brussels	Amsterdam	Birmingham	Glasgow	Stockholm	Manchester	Dublin	Zurich
Heating	€37	€76	€88	€79	€146	€149	€116	€157	€112	€117
Ventilation	€33	€44	€45	€26	€5	€5	€26	€6	€11	€52
Sanitary	€78	€60	€91	€67	€145	€148	€52	€156	€112	€158
Elevator	€11	€41	€25	€36	€42	€43	€33	€45	€40	€35
Power/light	€45	€144	€74	€35	€72	€74	€71	€78	€155	€108
Telecomms	€34	€62	€25	€26	€13	€14	€13	€14	€22	€32
Other	€7	€10	€3	€9	€27	€27	€2	€29	€36	€32

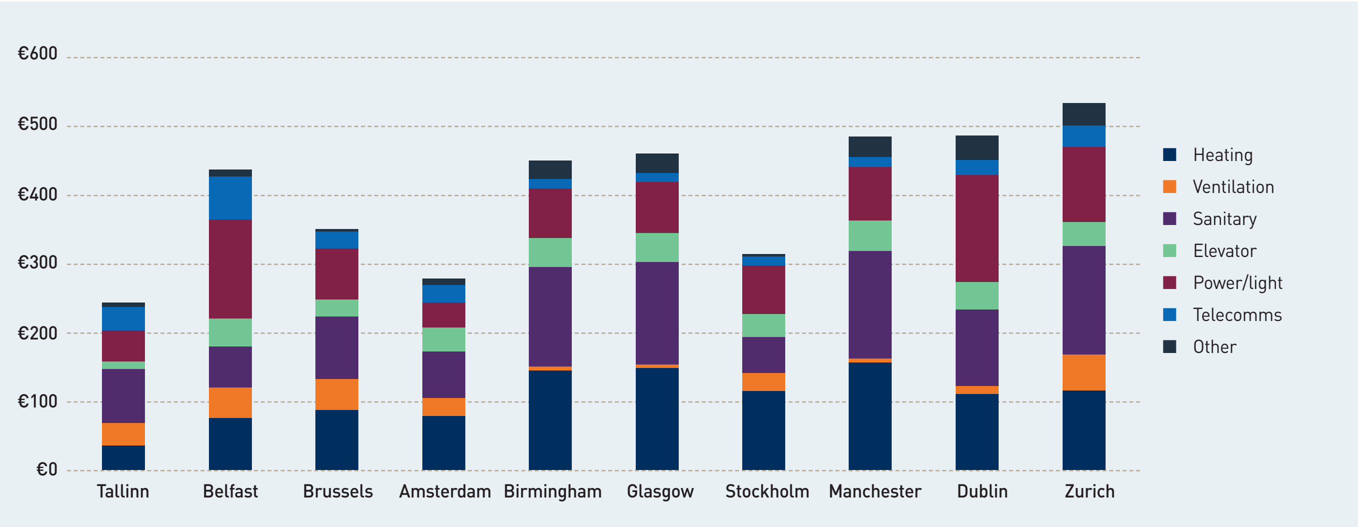


Figure 4: Services and equipment costs per m², by cost type and city. *Source: Analysis of survey results.*

APPENDIX A: COST DATA

Cost data for Figure 5

	Tallinn	Belfast	Brussels	Amsterdam	Birmingham	Glasgow	Stockholm	Manchester	Dublin	Zurich
Balconies	€28	€19	€20	€30	€35	€36	€30	€38	€26	€44
Roof slabs	€0	€18	€20	€18	€32	€32	€21	€34	€26	€38
Exterior wall	€56	€69	€70	€79	€80	€82	€62	€86	€62	€85
Staircases, landings	€7	€13	€22	€11	€11	€11	€6	€12	€14	€28
Floor slabs	€95	€73	€74	€69	€133	€136	€81	€143	€103	€149
Columns	€5	€4	€5	€13	€6	€7	€12	€7	€6	€19
Interior walls	€20	€25	€24	€12	€30	€31	€22	€33	€23	€33

Figure 5: Structural costs per m², by cost type and city. *Source: Analysis of survey results.*

APPENDIX A: COST DATA

Cost data for Figure 6

	Tallinn	Belfast	Brussels	Amsterdam	Birmingham	Glasgow	Stockholm	Manchester	Dublin	Zurich
External works	€83	€109	€42	€44	€143	€146	€158	€153	€141	€150
Concrete (substructure)	€36	€35	€39	€47	€65	€67	€45	€70	€44	€59
Earthworks	€8	€12	€17	€21	€33	€34	€45	€36	€33	€26
Drainage	€24	€9	€6	€7	€22	€23	€19	€24	€18	€31

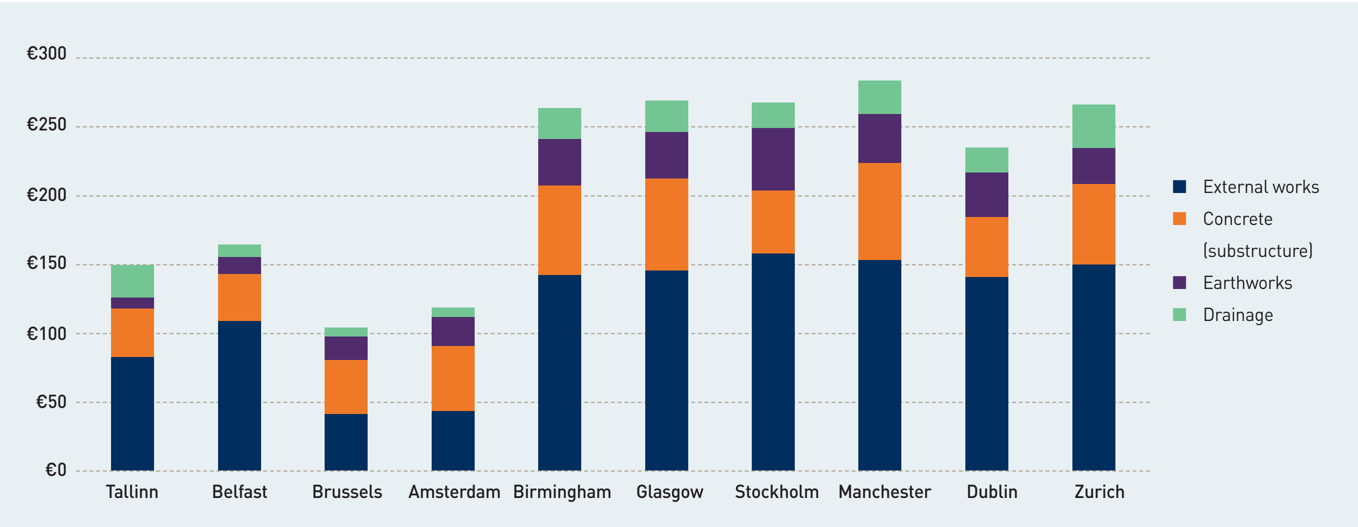


Figure 6: Other hard costs per m², by group/subgroup and city. *Source: Analysis of survey results.*

APPENDIX A: COST DATA

Cost data for Figure 7

	Tallinn	Belfast	Brussels	Amsterdam	Birmingham	Glasgow	Stockholm	Manchester	Dublin	Zurich
Preliminaries	€135	€162	€122	€206	€243	€248	€248	€262	€244	€530
Risk	€54	€84	€71	€58	€99	€101	€82	€107	€99	€110
Taxes	€228	€0	€313	€315	€0	€0	€431	€0	€281	€211

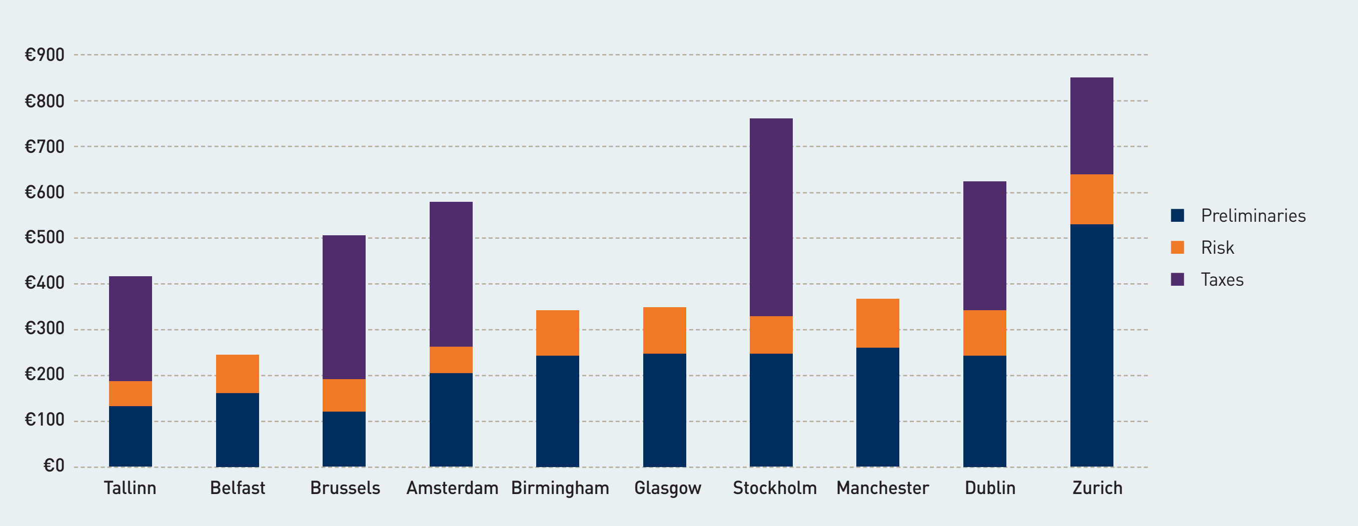
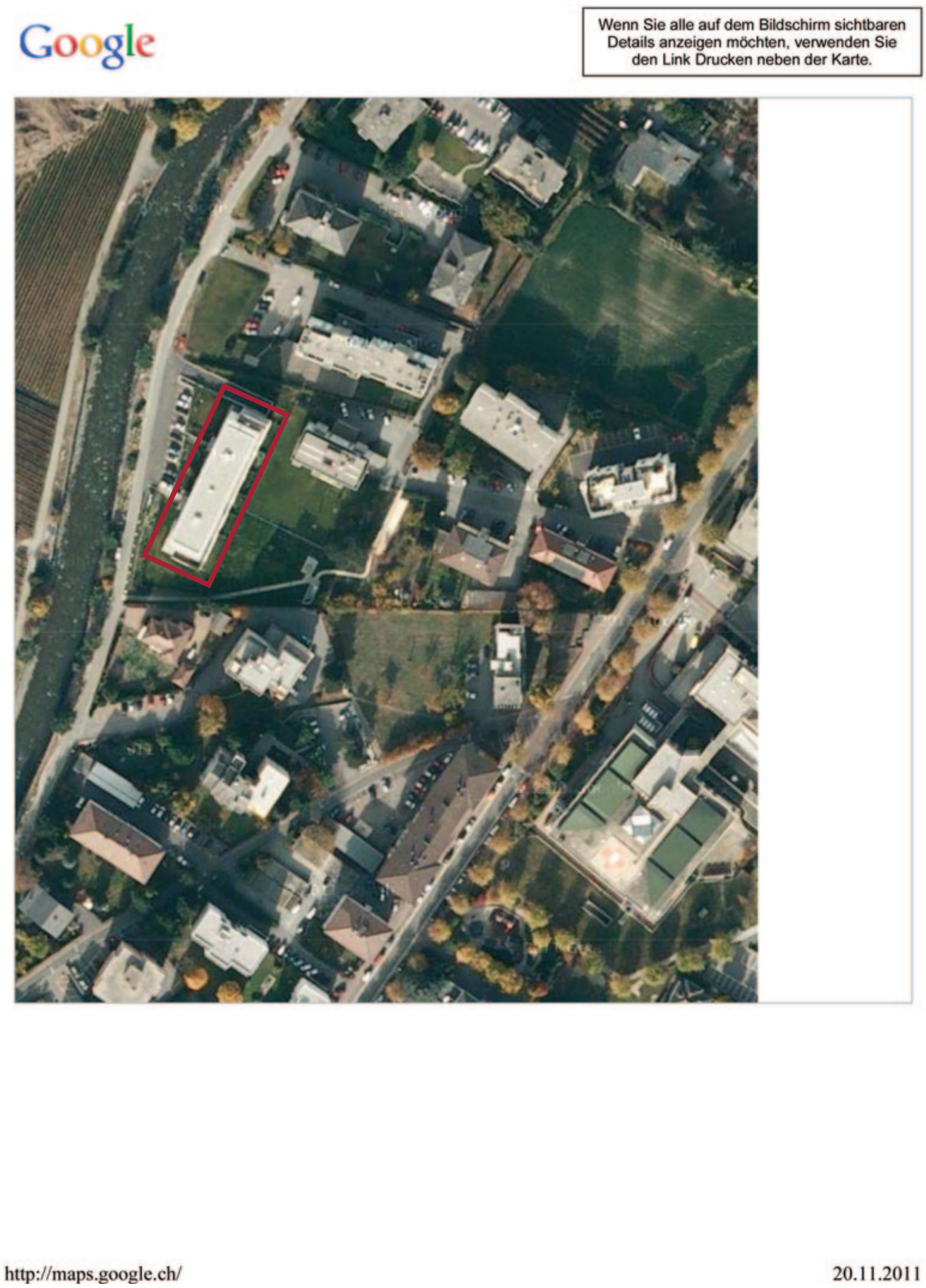


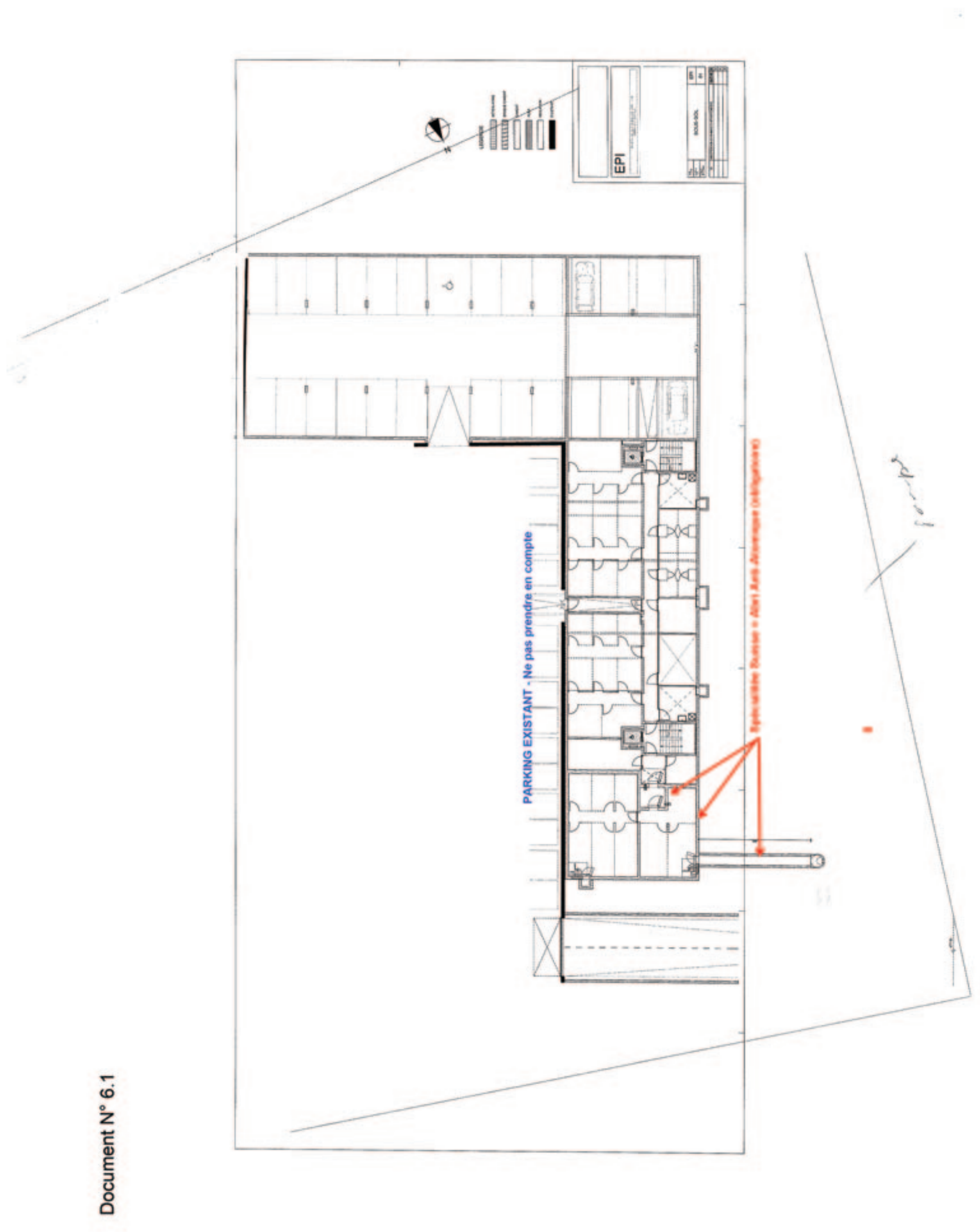
Figure 7: Soft costs per m², by city and ICMS3 Group. *Source: Analysis of survey results.*

APPENDIX B: DRAWINGS AND IMAGES OF THE SWISS APARTMENT BLOCK

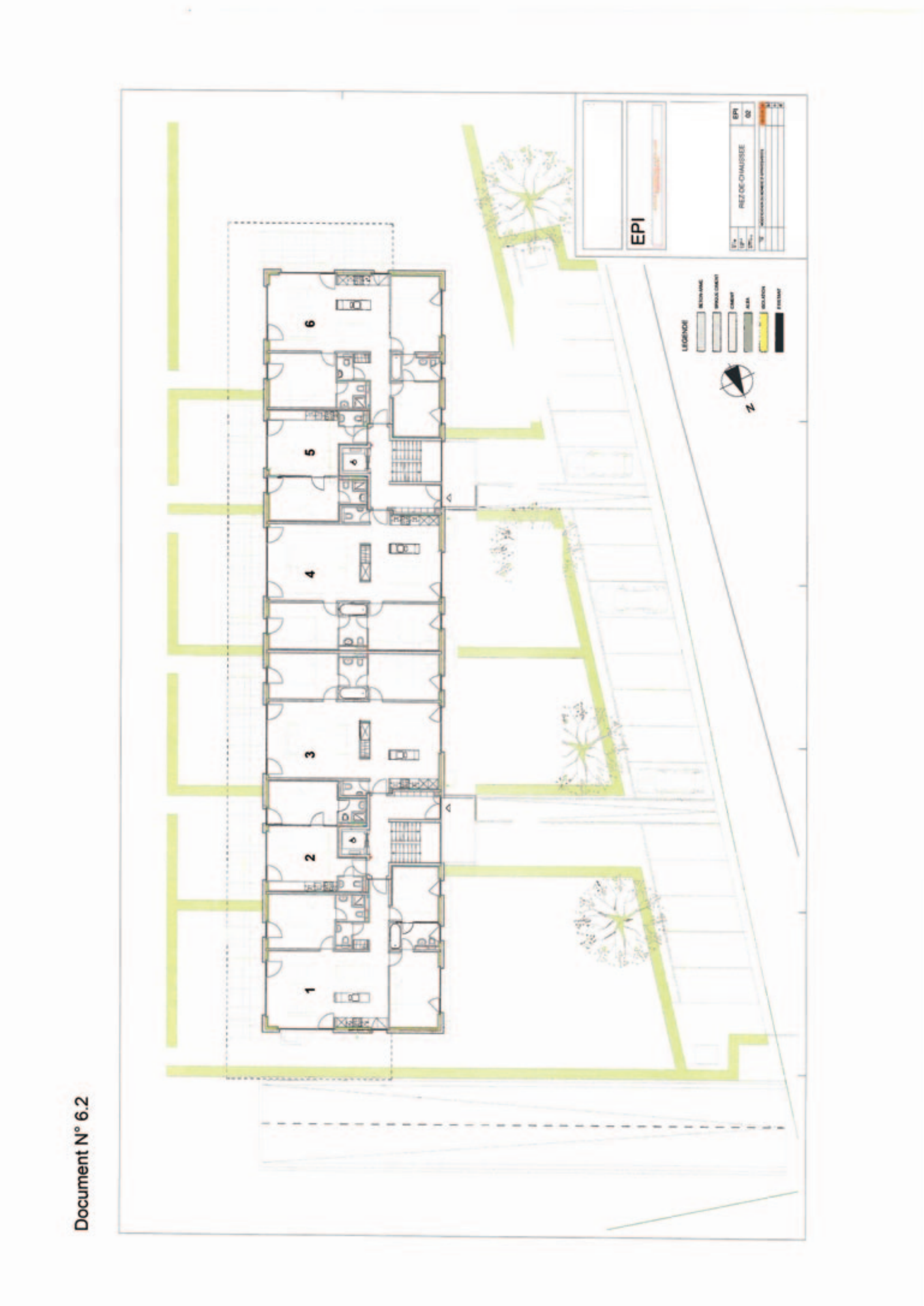
APPENDIX B: DRAWINGS AND IMAGES OF THE SWISS APARTMENT BLOCK



APPENDIX B: DRAWINGS AND IMAGES OF THE SWISS APARTMENT BLOCK



APPENDIX B: DRAWINGS AND IMAGES OF THE SWISS APARTMENT BLOCK



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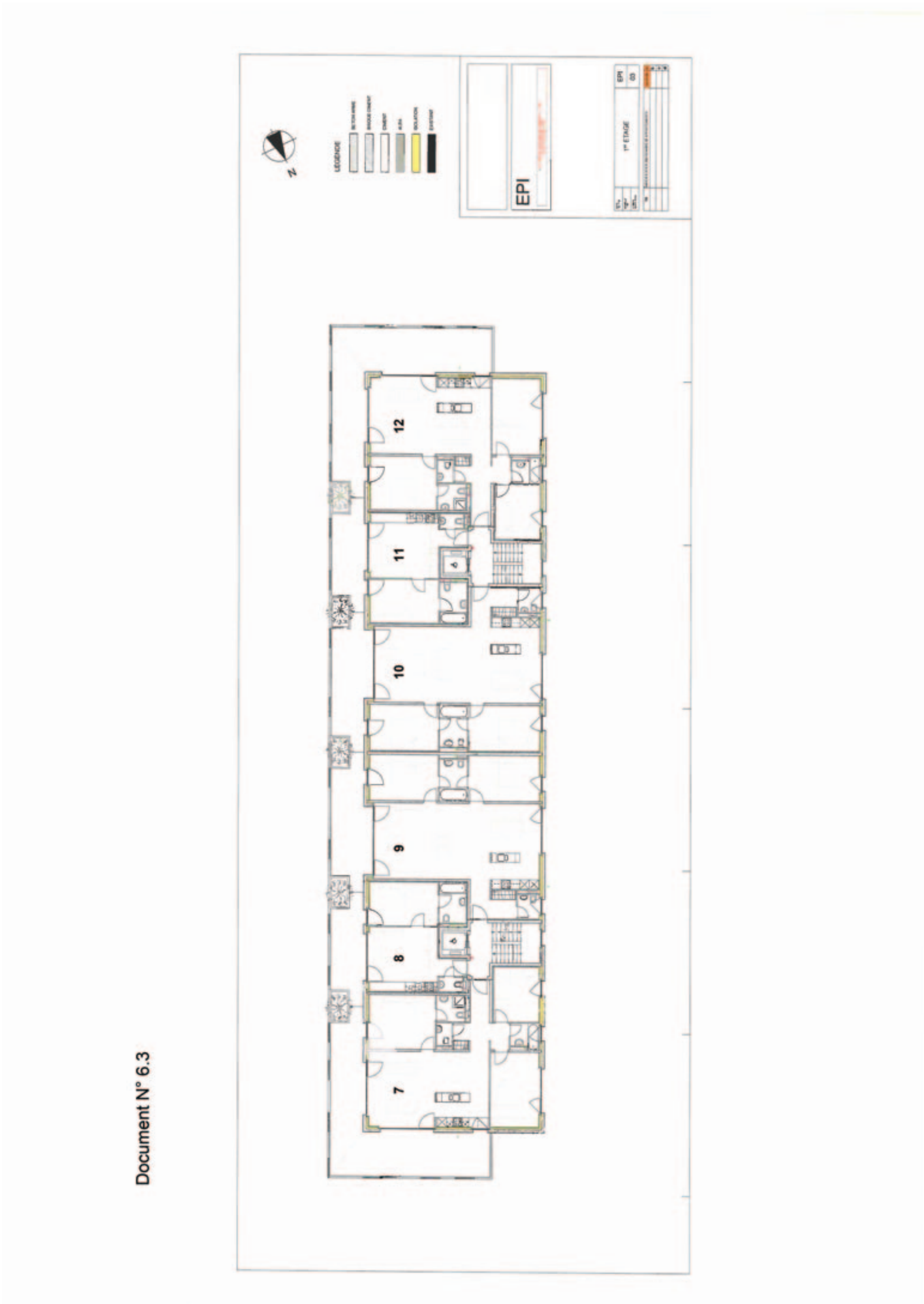
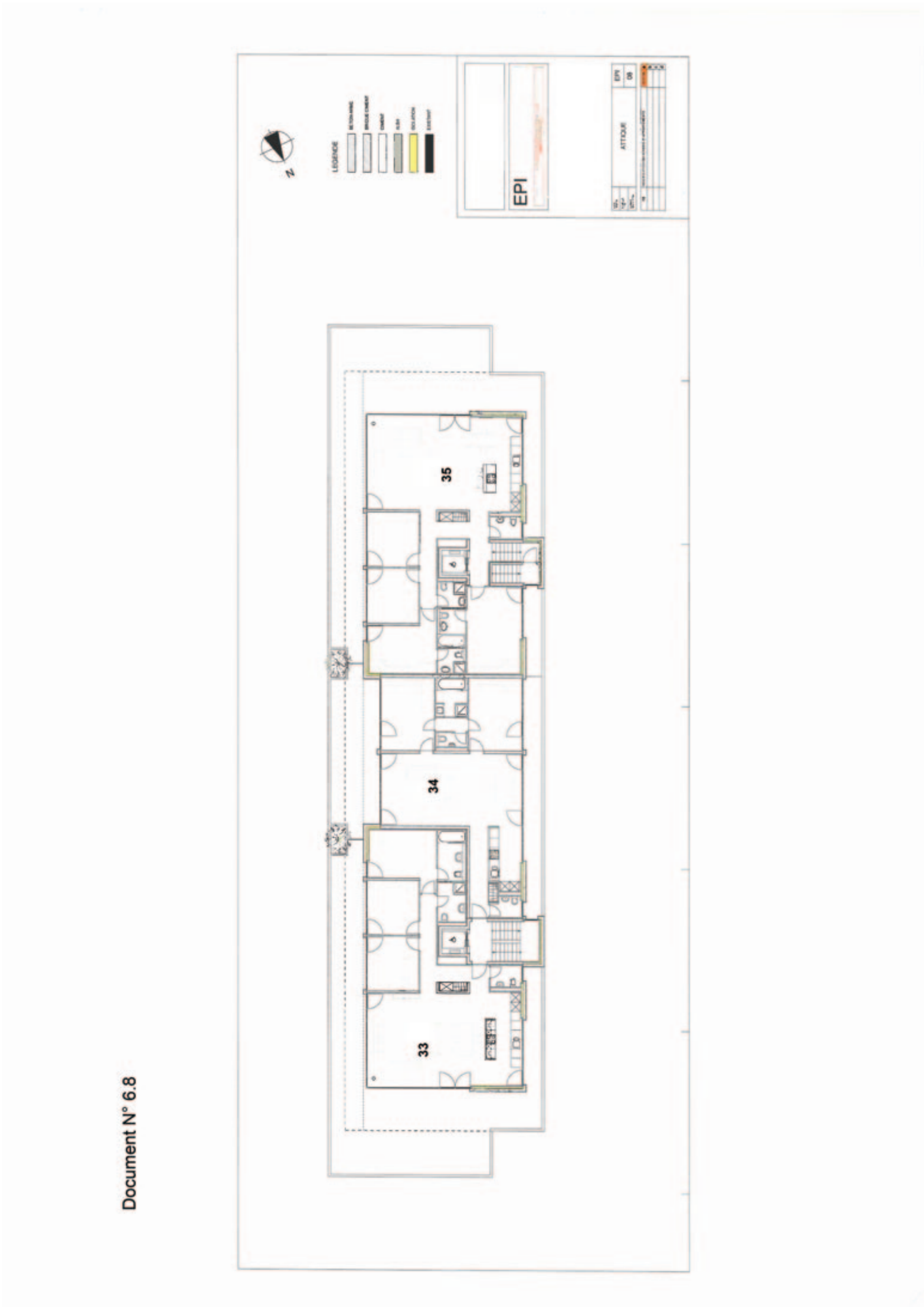


APPENDIX B: DRAWINGS AND IMAGES OF THE SWISS APARTMENT BLOCK



APPENDIX B: DRAWINGS AND IMAGES OF THE SWISS APARTMENT BLOCK

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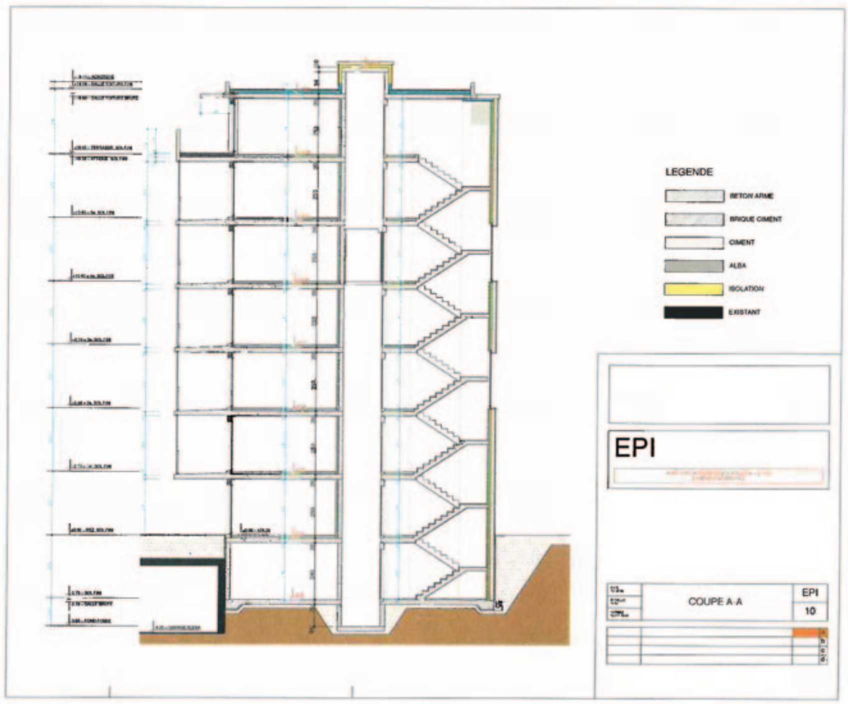

APPENDIX C: DETAILED BILL OF QUANTITIES AND MEASUREMENTS

European construction costs for apartment cost model
Européen Coût de construction pour projets d'appartements
Europäischer Baukonstruktion für Appartmentprojekte

Buildings; Bâtiment; Gebäude		**Costs**		
Item/artic	**Description/ le description/ Beschreibung**	**Total costs**	**Cost per square meter**	
ICSM	Project Quantity/ Quantité du projet/ Projektmenge		€/m2 IPMS 1 M2	€/m2 IPMS 2 M2
	Total Capital Cost/Coût Capital/ Gesamtkapitalkosta	**N/A**	**5,530**	**4,015**
1	**Acquisition Costs AC**	**N/A**	**0**	**0**
1.02	**Administrative, finance, legal and marketing expenses**	**N/A**	**0**	**0**
1,02,010	Client's General Office overheads	0	0	0
1,02,020	Client's specific project adminstative expenses ; Project management and design consutants, support project staff, project office (if not in Constructor's preliminaries), store, workshops, insurance., safety,staff training, personnel accommodation /travel and other expenses	0	0	0
1,02,030	Interest and finance costs	0	0	0
1,02,040	Legal expenses	0	0	0
1,02,050	Accounting expenses	0	0	0
1,02,060	Sales,leasing,marketing, advertising and promotional expenses	0	0	0
1,02,070	Taxes and statutory charges related to sales and lease	0	0	0
1,02,080	License and permit charges for operation and use	0	0	0
2	**Capital Construction Cost/ Coût de construction du capital / Kapital Baukosten**	**N/A**	**N/A**	**N/A**
2.01	Demolitions and site preparation / démolitions et preparation du site/ Abriss und Standortvorbereitung	N/A	N/A	N/A
2.02	Substructure/ Fondations, infrastructure de base/ Struktur bis Oberkante Bodenplatte	N/A	N/A	N/A
2.03	Structure/ structure/ Struktur	N/A	N/A	N/A
2.04	Architectural Works /Non Structural works/ \travaux d'architecture/ Travaux non structuraux/ Architektonische Werke/ Nicht-strukturelle Arbeiten	N/A	N/A	N/A
2.05	Services and Equipment/ Installations techniques et equipement/ Installationen und Transportanlagen und Ausrüstungen	N/A	N/A	N/A
2.06	Underground drainage/ drainage souterrain/ Unterirdische Entwässerung	N/A	N/A	N/A
2.07	External and ancillary works/ aménagements extérieurs et travaux auxiliaires / Außenanlagen und nebenarbeiten	N/A	N/A	N/A
2.08	Preliminaries/ Constructor's site overheads/ Installation de chantier, échafaudages/ Coût généraux du site du Constructeurs/ Baustelleneinrichtungen / allg.Kosten / Allgemeine Nebenkosten für Konstrukteur	N/A	N/A	N/A
2.09	Risk Allowances/ allocation de coût -risque / Kostenrisikozulage	N/A	N/A	N/A
2,10	Taxes and Levies / Taxes sur les coût de construction et prélèvement / Steuern auf Baukonstruktionen und Abgaben	N/A	N/A	N/A

APPENDIX C: DETAILED BILL OF QUANTITIES AND MEASUREMENTS

IPMS ALL BUILDINGS 15/1/2023

Floors	No. of apartments	Components Total IPMS 1 external include	 Total IPMS 2 excludes ext wall and excludes balconies	B Vertical penetrations	A2 External wall	A4 Internal structural walls	A5 Internal non structural elements	C Technical areas	D Sanitary areas	E Circulation areas	G1/G2 Amenity /Ancillary Areas	F Primary Areas	H 1 Other eg Balconies
Basement	0	562	532	18	30	7	28	6	0	80	393	0	0
Ground Floor	6	578	530	18	48	7	40	6	42	8	2	407	0
1st	6	732	506	18	48	7	40	6	42	5	2	386	178
2nd	6	732	506	18	48	7	40	6	42	5	2	386	178
3rd	6	732	506	18	48	7	40	6	42	5	2	386	178
4th	6	732	506	18	48	7	40	6	42	5	2	386	178
5th	6	732	506	18	48	7	40	6	42	5	2	386	178
6th	3	730	423	18	40	7	20	3	21	5	2	347	267
totals	39	5530	4015	144	358	56	288	45	273	118	407	2684	1157

IPMS 2 The floor area measured to the internal extent of the IDF (Internal dominant face) and to any notional boundaries and external floor areas

IPMS 1 The floor area measured to the external extent of the external walls and to any notional boundaries , external floor areas or sheltered areas

APPENDIX C: DETAILED BILL OF QUANTITIES AND MEASUREMENTS

ᵓroject Attributes and Project Values for Each Project

Notes:
1All values should be given so long as the attributes are relevant.
2.Alternative values are separated with a vertical slash (|).
* indicates only one of the values to be selected
3Bullet points indicate additional values.
4All quantities should be rounded to the nearest whole number unless considered inappropriate in special circumstances.

5These **Project Attributes** and **Project Values** capture the minimum principal cost-significant characteristics of a **Project**. Users may add more **Project Attributes** and **Project Values** to suit their needs.

	Project Attributes	Project Values	Project Values this project
	Common (for all **Project Categories**)		
01	**Report**		
011	Project title	Title of the Project.	CEEC APARTMENT MODEL
012	Status of cost report	Pre-construction forecast | mixture of actual and forecast during construction | actual costs after construction. *	Pre-construction forecast
013	Date of cost report	Month and year	
		revision number	
014	Brief description of the Project	Client's name Function capturing the most cost-significant Project Category Scope of project	SCSI/TCD/CEEC 39 Apartments
015	Location and country	International Organisation for Standardisation (ISO) country code (e.g. CN) | address of building site(s)	As applicable to survey return
016	Project categories included	E.g.; Buildings	BUILDING
02	**Price Level**		
021	Currency	ISO currency code (e.g.€).	EURO
022	Exchange rates	Rate used to convert from actual cost or payment currencies to be reported for rate of currency at the cost base date.	Relevant rates of exchange Q1 2020 Sweden,UK, Switzerland
023	Cost base date	Month and year.	Mar-20
03	**Price basis**	Fixed | fluctuating *	FIXED
04	**Programme**		
041	Project status	Concept and initiation phase | design phase | construction and commissioning phase | complete.*	DESIGN PHASE
042	Construction period	· Number of months · from start of demolition and site preparation | others stated * · to: completion of commissioning | others stated.*	assumed 12 months · from start of demolition and site preparation · to: completion of commissioning
05	**Site**		
0511	Existing site status	· Greenfield | brownfield *	· Greenfield*
0512		· urban | rural | agricultural*.	· urban *.
052	Legal status of site	· Freehold | leasehold | joint venture | not owned | other stated*	· Freehold
053	Site topography	Principally flat | principally hilly | mixed | mountainous | offshore.*	Principally flat
054	Ground conditions	Soft | rocky | reclaimed.| other *	Soft
0551	Site conditions and constraints	· Access problems: difficult | average | easy *	· Access problems: Average *
0552		· extreme climatic conditions: difficult | average | easy *	· extreme climatic conditions: average *
0553		· environmental constraints: difficult | average | easy.*	· environmental constraints: average
06	Procurement		
61	Funding	Private | public | public and private in partnership.*	Private development assumed
0621	Project delivery	· Lump sum stipulated price | re-measurement | cost reimbursement | others stated *	· Lump sum stipulated price
0622		· design bid build | design and build (turnkey) | build operate and transfer | public private partnership | management contracting | construction management | engineer procure construct | others stated.*	
0623		· Joint venture Constructor from another market: yes/no*	no

APPENDIX C: DETAILED BILL OF QUANTITIES AND MEASUREMENTS

	Project Attributes	Project Values	Project Values this project
	Buildings (A construction with a cover and enclosure to house people, equipment or goods for persistent daily use)		
07	**Code**		
071	UN ISIC code	F4100	F4100
0721	Local functional code (if relevant)	· Name of local classification standard	contributor to advise
0722		· code number.	contributor to advise
08	**Works**		
081	Functional type	Residential | mixed | others stated*.	Residential
082	Nature	New build (requirement for CEEC project)	New Build
0831	Grade	Ordinary quality | medium quality | high quality.* NOTE (The qualitative description must be read in conjunction with the location.)	Medium Quality
084	Environmental grade	Grade of environmental certification.	contributor to advise typical for City
0851	Principal design features	· Structural (predominant): timber | concrete | steel | load-bearing masonry | others stated*	concrete /load bearing masonry
0852		· external walls (predominant): stone | brick/block | render/block | curtain walling | others stated *	insulated render on concrete/ triple glazed screens /windows
0853		· environmental control: non-air conditioned | air conditioning.*	local ventilation to bathrooms/kitchen
0861	Project Complexity	· Shape (on plan): circular, elliptical or similar | square, rectangular, or similar | complex *	· Shape (on plan): rectangular, or similar
0862		· design: simple | bespoke | innovative *	· design: simple *
0863		· method of working: sectional completion | out-of-hours working | confined working | others stated.*	· method of working: - no restrictions
087	Design life	Years	60
088	Altitude	Average height of site above or below sea level (metres).	contributor to advise typical level for their City
089	Dimensions	Overall length and width and height of each building to highest point of main roof level (m)	48.5 m x 11.5 m x 20.5m high over ground level
08101	Storey heights (floor level to floor level)	· Typical storey height (m)	2.75 m
08102		· other storey heights (m), applicable floors stated.	basement 2.65
0811	Storey above ground (qualitative)	House | low rise | medium rise | high rise*. NOTE (The qualitative description must be read in conjunction with the location.)	high rise*.
0812	Storey above ground (quantitative)	Specific number | 0–3 | 4–7 | 8–20 | 20–30 | 30–50 | over 50 *	Specific number 4–7
0813	Storey below ground	Specific number.	1
09	**Project Quantities**		
091	Site area	Site area within lot boundary of building site, excluding temporary working areas outside the site (m^2).	2900 sq m
092	Projected footprint area	m^2	578sqm
093	Gross external floor area as **IPMS** 1	m^2	5530 sq m
094	Gross internal floor area as **IPMS** 2	m^2	4015 sqm
10	**Additional Project Information**		
101	For existing site status see 0512 above	If answer is urban state if City/Town Centre or suburban	Suburban
1021	Provide VAT rates applicable at time of project (see 023 above)	New residential construction	contributor to advise typical for country
1022		Professional consultant fees	excluded
1023		Other rates applicable	contributor to advise typical for country
103	Local Hourly Labour rates at time of project (see 023 above) and at 2017 Q 1 if different; Rate to be all inclusive of all Employer labour costs including employee insurance, government social levies, pension contributions , travel expense, tool expenses etc ; Rate to exclude constructor's profit	Craftsman | General Operatives | other	contributor to advise typical for Country
	Project Attributes	**Project Values**	**Project Values this project**
12	**Additional Project Information for Apartments**		
121	Number of residential units	Apartments	39
1221	Category Type of Apartment Development	· Category 1 surface car parking on site and/or off site	Category 1
1222		· Category 2 A Under- croft car parking at ground level	
1123		· Category 2 B Basement car parking	
1124		· Category 3 City/Town Centre | Basement car parking	
1125		· Category 4 Part Commercial Development within same building / basement car parking	

APPENDIX C: DETAILED BILL OF QUANTITIES AND MEASUREMENTS

Site Measures - Swiss Apartment building

Project Quantity		Value	Unit
External works	Assumed site area	2900	sqm
	Building footprint	562	sqm
	sum	2338	sqm
	Ramp and road to car park	340	sqm
	Car parking off road	300	sqm
	Entrance paving brick paviors		
	surround to apartment	50	sqm
		180	sqm
	Concrete yard paving	85	sqm
	sum	1383	
	planted area	583	sqm
	grassed area	800	sqm
Walls	walls front 900 high	150	m
	wall boundary walls	80	m
	retaining walls to ramp av 3 m	90	m
Other features	watermain -fire main	100	m
	Tv	40	m
	data	40	m
	electical mains	50	m
	external lighting	100	m
	lamp standards	4	
	storm drains	150	
	surface drains	100	
	foul drain	150	

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