Appendix 8.2

VENTIALTION AND REFRIDERATION STATEMENT

BUROHAPPOLD ENGINEERING

The People's Project

Ventilation and Refrigeration Statement (EIA Appendix)

0040026

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Revision P07

BMD01-BHE-ZX-XX-RP-MX-0301

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1.1 Introduction

This statement has been prepared on behalf of Everton Stadium Development Limited (hereafter 'Everton') to inform a full planning application for the development of a new football stadium with associated facilities and infrastructure at Bramley-Moore Dock, Liverpool. The statement outlines the ventilation and refrigeration design for the proposed stadium and is intended to inform technical assessments (primarily noise & vibration and air quality) being prepared as part of the planning application.

The services detailed in this statement include:

- Ventilation strategies.
- Louvre locations on the external elevations; and
- Refrigeration strategies.

The majority of the ventilation requirements are in the west stand where the majority of hospitality facilities (including restaurant) and the changing rooms are located. There are however some hospitality areas in the east stand (including a café), a ticket office and a club shop that also requires ventilation. The general admission ('GA') areas are generally unconditioned with the supply of air via natural ventilation through openings in the façade and vomitories. To remove smells from toilets and concessions in GA areas extract ventilation will be provided.

1.2 Project Overview

The proposed new stadium for Everton will provide approximately 52,888 Seats predominantly for football use with the ability to host other events (4 no. concerts or non-football sporting events plus use of the stadium hospitality areas for conferences etc on a frequent basis).

A detailed overview of the internal stadium layout is provided in the Design & Access ('D&A') Statement prepared by the scheme architect, Pattern, which accompanies the planning application submission. However, in summary, the proposed layout of the stadium (orientated north-south) has level access on to the lower concourse from a large (fanzone) plaza area to the east facing towards Regent Road.

The west stand accommodates the main player, welfare, media and hospitality facilities with a central production catering facility provided below three levels of hospitality above. The north and south stands are predominantly for general admission (including away supporters area in the north west corner of the stadium). The east stand includes general admission but also contains a separate hospitality area with its own kitchen.

The proposed general admission concourse areas will have appropriate facilities including food and beverage concessions and toilets.

1.3 Design Changes

The below is a summary of the main changes.

- Removal of the multi-storey carpark (MSCP) and redesign of the western elevation to incorporate a new elevated stepped amenity area/public realm, with sheltered access/egress to the west stand turnstiles located below (underneath the elevated stepped plaza
- Removal of surface carpark canopy to the west of the water channel
- Relocation of chillers from south west corner above car park to north west corner on level 3 roof and relocation of boiler room to level 3 of the east stand.
- 2,050 sqm of Photovoltaic (PV) panels previously affixed to surface car park located on the stadium roof on the south stand (to be structurally integrated with roof so not visible from street level)
- Relocation of Outside Broadcasting (OB) compound and sub-station to northern extent of west quay
- Wind mitigation redesign due to removal of MSCP and optimisation of northern and southern solutions
- Redesign of the western elevation has resulted in the provision of a large glazed area above the entrance portal

1.4 Planning Policy Background

The statutory development plan for Liverpool currently comprises the Unitary Development Plan ('UDP') which was adopted in 2002. **Policy HD 18 (General Design Requirements)** states that applications should comply with a number of design-based criteria including (amongst others) that all plant machinery and equipment are provided within the building envelope or at roof level as an integral part of the design.

The emerging Local Plan, which was submitted for formal examination in May 2018 and has yet to be examined (thereby having substantial but not full weight in decision-making at present), has a similar design-based policy to the adopted UDP. **Policy UD5 (New Buildings)** details that all new buildings must be designed to the highest design standards and must, amongst others, demonstrate that adequate sound attenuation and fume extraction is achieved.

1.5 Future Baseline Receptor – Liverpool Waters

Whilst the application site and the wider dock system to the south is presently (predominantly) vacant, Peel Land & Property secured outline planning permission (LPA ref. 10O/2424 – latest variation is 19NM/1121) in 2013 for a mixed-use development, known as 'Liverpool Waters', including 9,000 dwellings and 310,000m² of office space (figures rounded). The site stretches from Princes Dock in the south to Bramley-Moore Dock to the north. The timeframe for full delivery of the scheme at the time of planning application was 2041.

The proposed application site is located within the Northern Docks (comprising Nelson Dock and Bramley-Moore Dock) and the Liverpool Waters planning application identified that development would take place between 2036 and 2041 for a predominantly residential-led scheme. Accordingly, as set out in the Environmental Statement ('ES') prepared in support of the stadium application, there are potential future residential receptors located at Nelson Dock to the south and appropriate assessments (particularly noise and air quality) have been prepared to demonstrate that the approved residential uses can be constructed alongside the proposed stadium scheme.

An overview of the ventilation and refrigeration equipment and proposed locations is therefore provided in this report with the intention of informing the relevant technical assessments.

2 Chillers and heat rejecting equipment

2.1 Central chillers

Basis of Design

It is proposed that a centralised chilled water system will be provided for all the comfort cooling and IT equipment rooms within the new stadium. To provide resiliency to the IT equipment room cooling system a life safety power supply will be provided to serve two of the chillers to provide cooling to critical rooms in a duty-standby arrangement.

Three 1100kW chillers and two 650kw Chillers have been proposed for the development to provide all comfort cooling and IT equipment room cooling in the stadium. The noisier of the selected chillers produce the following sound power and pressure levels when tested with the unit running at the specified duty under steady state operation.

Sound power level	90	dB(A)
Sound pressure level @10m	57.3	dB(A)

All sound data quoted has been measured in the third-octave band limited values, using a Real Time Analyser calibrated sound intensity meter in accordance with BS EN ISO9614 : 2009.

All Sound Power Levels quoted are calculated from measured sound intensity according to BS EN ISO9614 : 2009.

Sound Pressure Levels are calculated from sound power using the expanded parallelepiped method according to BS EN ISO11203 : 2009.

Acoustic screening will be provided as required to meet the required ambient noise levels at the receptor.

Plant locations

The central chillers will be located at Level 3 on the roof above the north west GA in the corner. Refer to Figure A—1 in the appendix for further details of chiller compound location.

Figure 2—2 Main Stadium Packaged Chillers

2.2 Catering chillers

Basis of design

The catering chillers for cold rooms, freezers and cellars and “point of pouring” python cooling will be separate from the main stadium chillers. The beverage cooling units operate at a lower temperature than the food fridges and will have separate external heat rejection units. These units only discharge warm air and do not constitute an odour or air quality issue. Acoustic screening will be provided as required to meet the required ambient noise levels at the receptor, to be determined during design development when catering chillers are selected.

Plant locations

Catering chillers are located reasonably local to the kitchens/cellar they serve in each corner of the stadium on the roofs. The catering chillers are generally obscured by the roof cladding and structure or set back from the building edge such that they are not visible from the public realm. See Figure A—2 in the appendix for further details of catering chillers location.

3 Ventilation

3.1 Food and beverage outlets on general admission concourses.

Basis of design

There are food and beverage outlets located on the General Admission (GA) concourses serving pre-match and halftime food and beverage offers for the GA fans. The beverage units will not be provided with extract ventilation, but food units with an active cooking requirement are provided with extract canopies and the extract air is ducted to ventilation fans located on the roof at level 3 and level 4. See appendix A for further details of fan locations. Ventilation requirements to food units has been provided by a catering specialist based on the cooking requirements. UV filtration will be provided as required, depending on the food offer in the unit.

Plant locations

Extract ventilation fans for general admission food outlets will be located on the nearest third floor roof. Refer to Figure A—2 and Figure A—1 in the appendix for further details of fan locations.

3.2 Main kitchen (commissary) extract air

Basis of design

The main kitchen is located at ground floor on the north end of the west stand. The discharge point for the main kitchen extract ventilation will be on the north elevation of the stadium approximately 12m above ground level and facing the waste water treatment plant (non-residential receptor). The cooking in the main kitchen will occur under kitchen extract canopies that shall be fitted with UV filters.

Plant locations

Three kitchen extract fans are required for the main kitchen, one of which will be dedicated to the bakery which may operate during different hours. The extract fans for the main kitchen are located at high-level on level 1 in the north west corner above the main kitchen. Refer to Figure A—1 for fan locations. Attenuators shall be included inline on the intake and exhaust of the fans. Acoustic treatment shall be provided to ensure that a maximum noise rating of 50NR will be achieved at 3m from the fan.

3.3 General kitchens serving hospitality areas

Basis of design

Within the hospitality floors on east stand level 01 and west stand levels 00, 01, 02 & 03 there are satellite kitchens serving the dining spaces. These include both enclosed preparation kitchens and show kitchens. Each kitchen is provided with dedicated canopies with UV filtration and ducted to dedicated extract fans.

Plant locations

The extract air from the canopies on the west stand will ducted to the west level 4 plantroom and discharged behind the perforated 'barrel' roof of the stadium approximately 35m above ground level. All exhaust discharge points will be at least 5m above supply fan and AHU intakes. Refer to Figure 3—1 for details of the exhaust duct termination and Figure A—1 for details of fan plantroom.

The extract air from the canopies on the east stand will ducted to the east level 4 plantroom and also discharged behind the perforated 'barrel' roof of the stadium, approximately 35m above ground level and at least 5m above any fresh air intake. Refer to Figure 3—1 and Figure A—1 for details of fan plantroom.

Acoustic treatment shall be provided to ensure that a maximum noise rating of 50NR will be achieved at 10m from the fan.

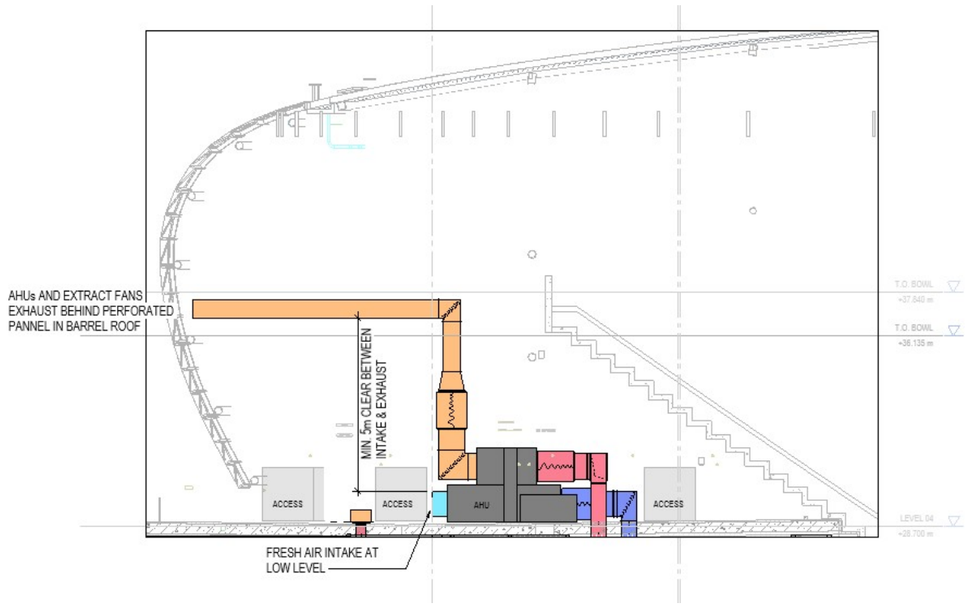

Figure 3—1 Typical Kitchen Extract Section

3.4 Boiler Flues

The Stadium is fed by a central boiler room located at level 1 in the East Stand. It is intended to provide 6 modular boilers. The boilers shall be gas fired pressure jet type with a fan dilution system to avoid extending conventional flues through the stadium roof. The diluted products of combustion will be discharged at high level on the East elevation of the wrap around roof above any occupied floors but level with the back of the upper tier. A blank section of façade will be provided around the outlet point to mitigate against the discharged air passing back through the permeable façade. See Figure B—3 for further details of the fan dilution louvre positions.

Appendix A Roof Plans

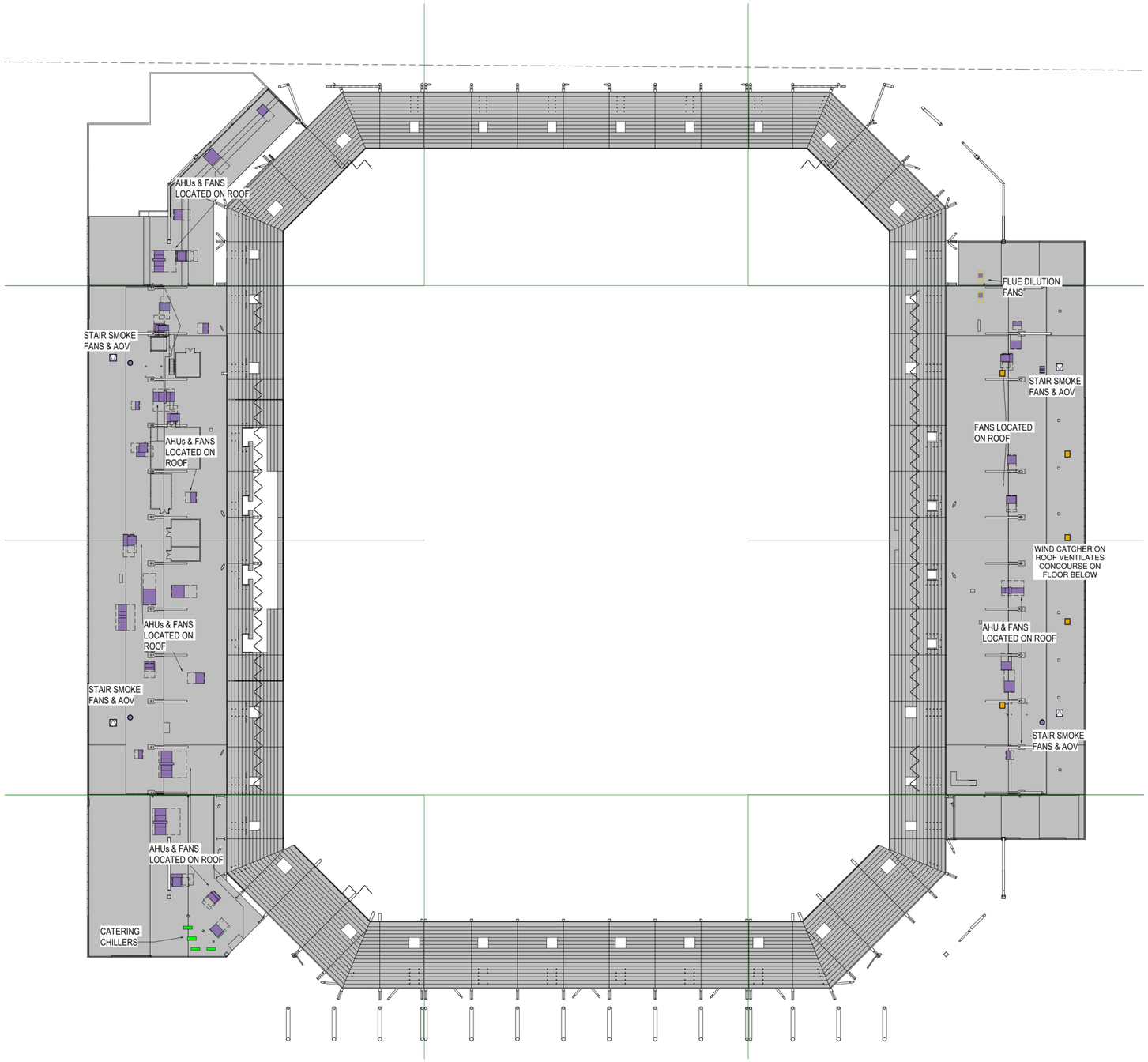

Figure A—1 Fan plantrooms, car park extract louvre and chiller compound louvre location

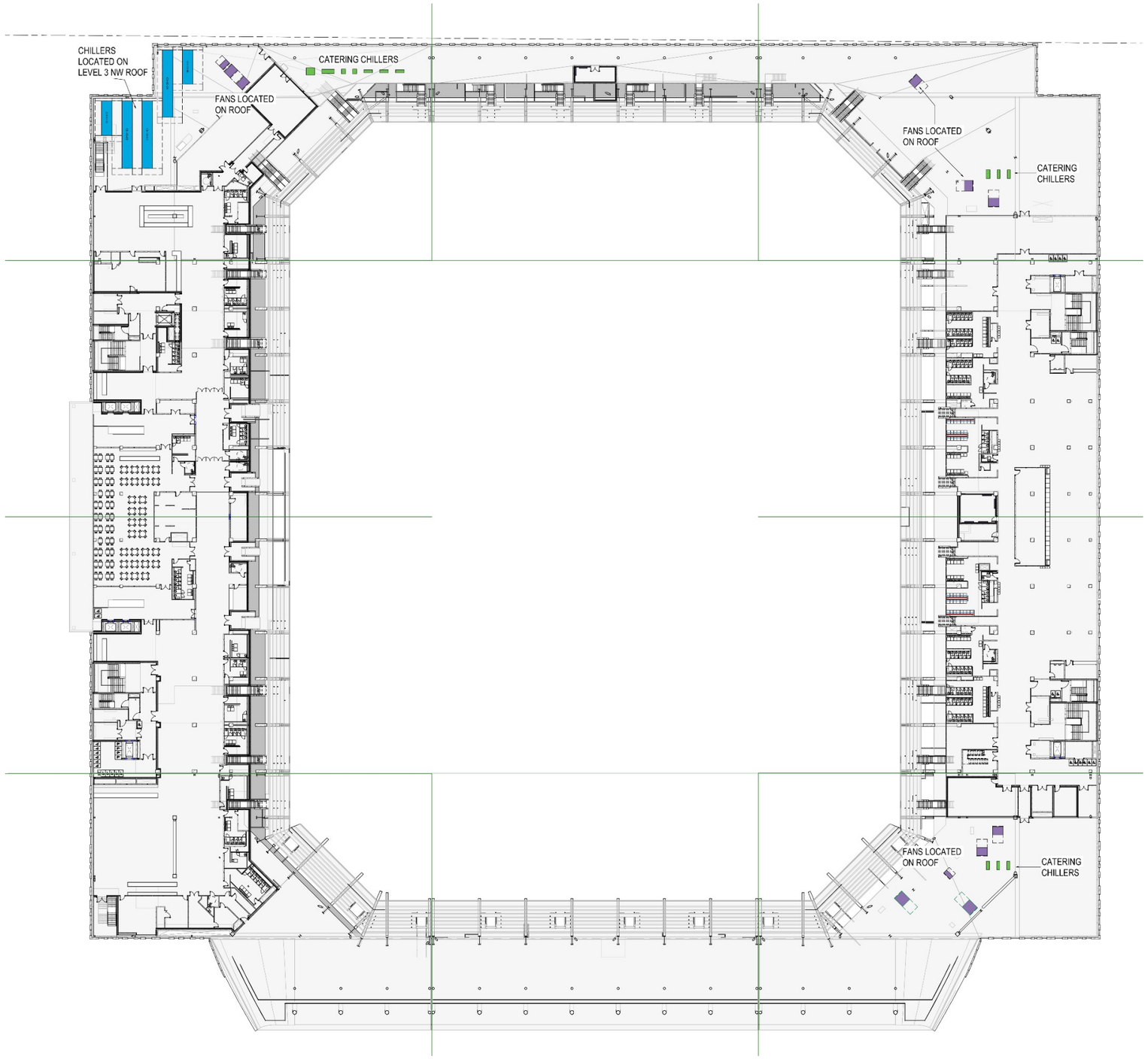

Figure A—2 Level 3 roof plant

Appendix B Elevations for Louvre Locations

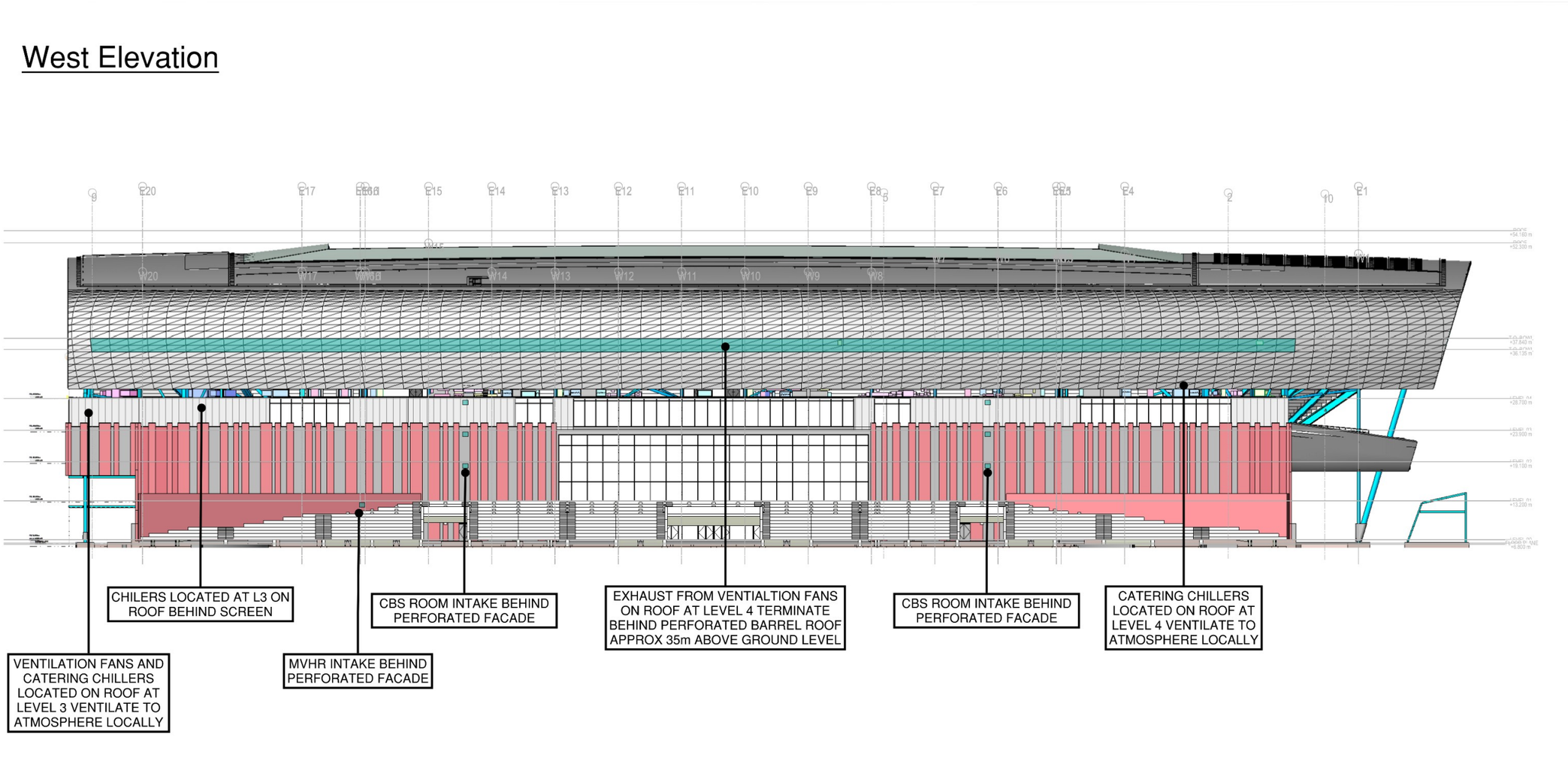

Figure B—1 West Elevation

North Elevation

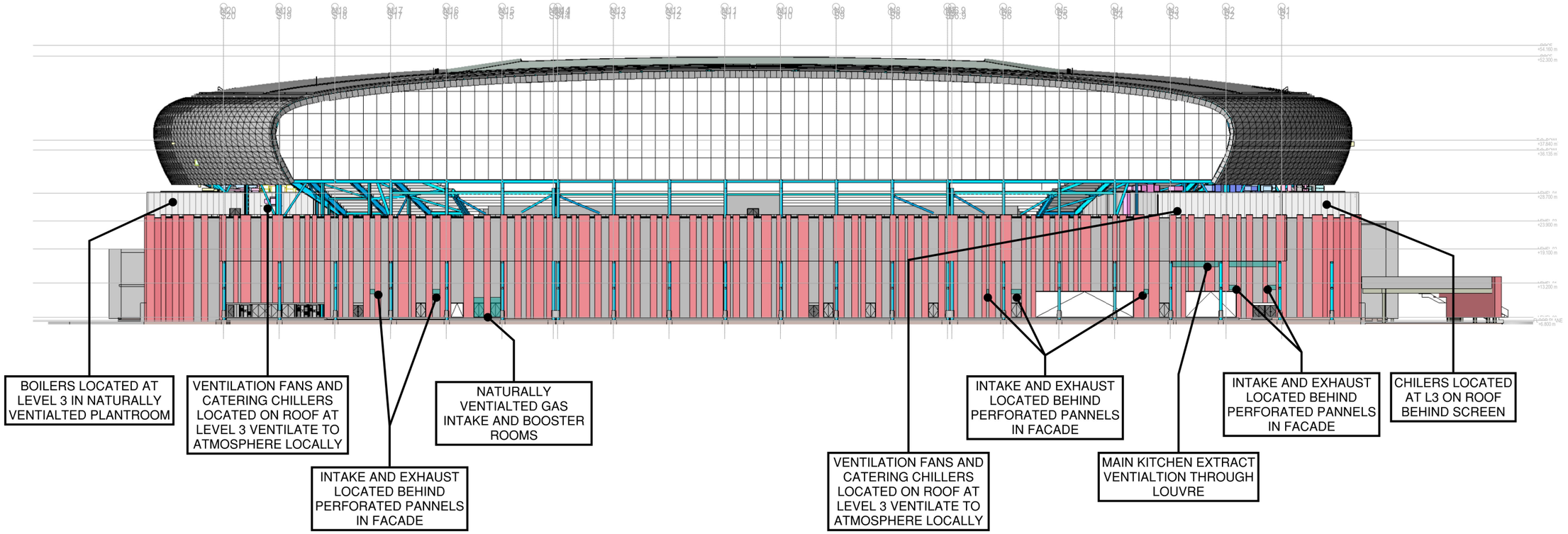

Figure B—2 North Elevation

East Elevation

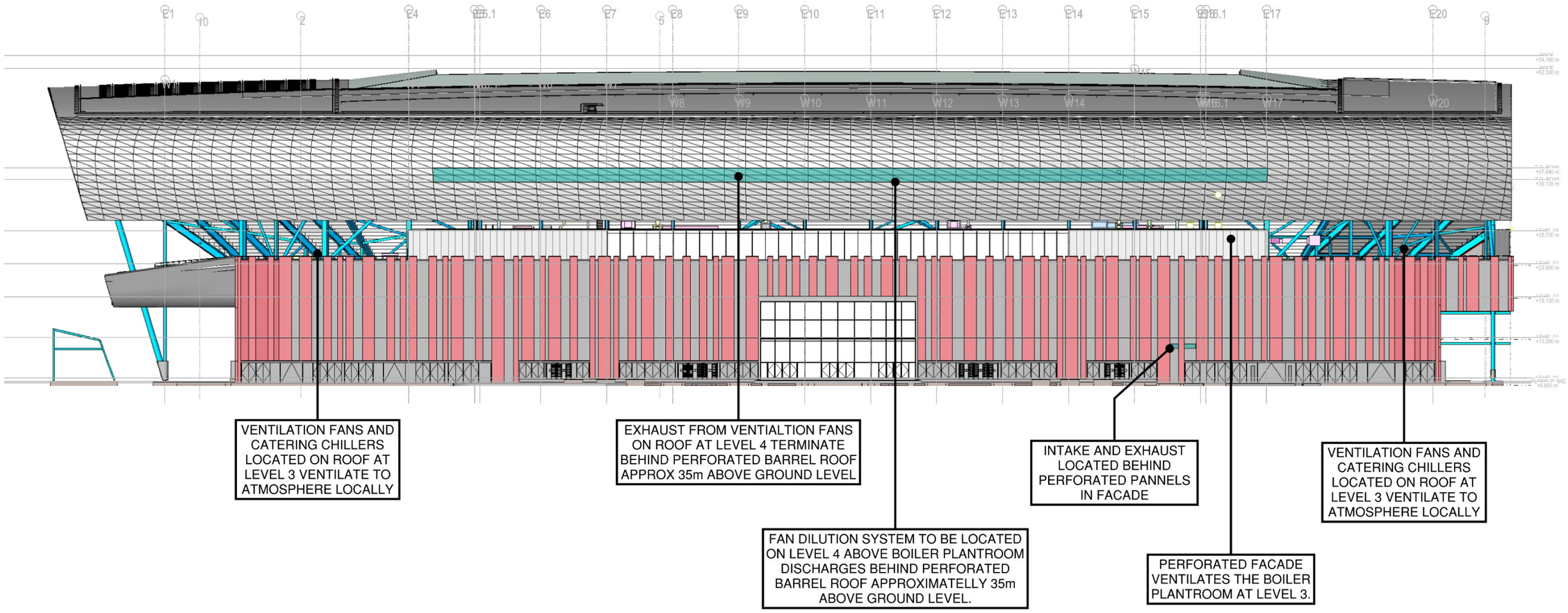

Figure B—3 East Elevation

South Elevation

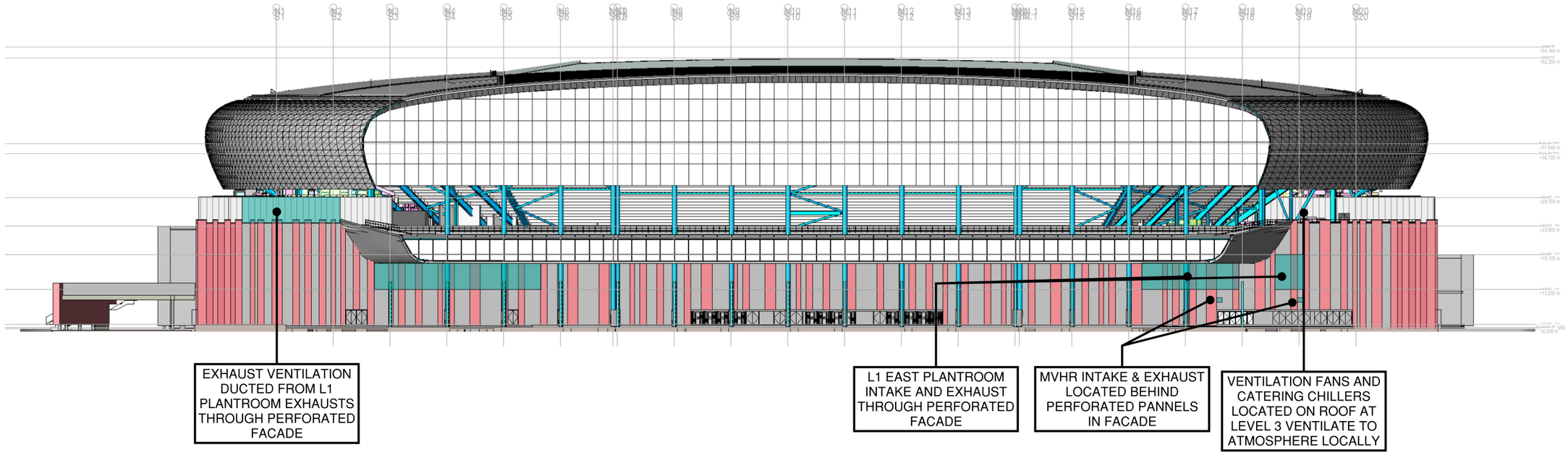

Figure B—4 South Elevation

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