

Colt

Bullsbrook Road Substation

Fire Safety Statement for Planning Application

Reference: LONDPPSS2-ARUP-SS-SS-XX-RP-Y-00004

P03 | 11 December 2024

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1. Introduction

This fire planning statement has been produced by Arup on behalf of Colt to document the fire safety approach for the Bullsbrook Road Substation, in support of the planning application.

1.1 Fire Safety Objectives

As a minimum, the fire strategy must comply with relevant legislation. In respect of the design, construction, maintenance and operation of buildings, the following legislation is relevant to the fire strategy:

- The Building Regulations 2010, Schedule 1, Part B (The Building Regulations) [2];
- Construction Design and Management Regulation 2015 (CDM) [3]; and
- Regulatory Reform (Fire Safety) Order 2005 (RRFSO) [4].

To comply with the functional requirements of Part B – Fire Safety of the Building Regulations 2010 (as amended), the design has followed the guidance within Approved Document B Volume 2: Buildings other than dwellings, referred to as ADB V2 herein.

In addition to the legislative goals described above, property protection measures consisting of gaseous suppression have been communicated to Arup. These measures have been communicated to Arup by the principle designer- JSM- by email. No other client requirements have been communicated to Arup at the time of writing this report.

1.2 Development Description

The substation is part of the wider data centre campus development. This Fire Planning Statement is concerned with the substation buildings only.

The site plan for the substation is shown in Figure 1. The site will consist of a building used for housing high voltage switchgear and associated control rooms which is displayed on Figure 1 as ‘Control rooms’. This building will be accessed by raised walkways. This building is divided into four rooms on the upper level, including two switch rooms and two control rooms. The lower level will be used for cable distribution.

‘Transformer’ enclosures are proposed to be constructed. These will be roofless open-air structures without a wall on the side facing the road, away from the control room building. The existing car park will be retained.

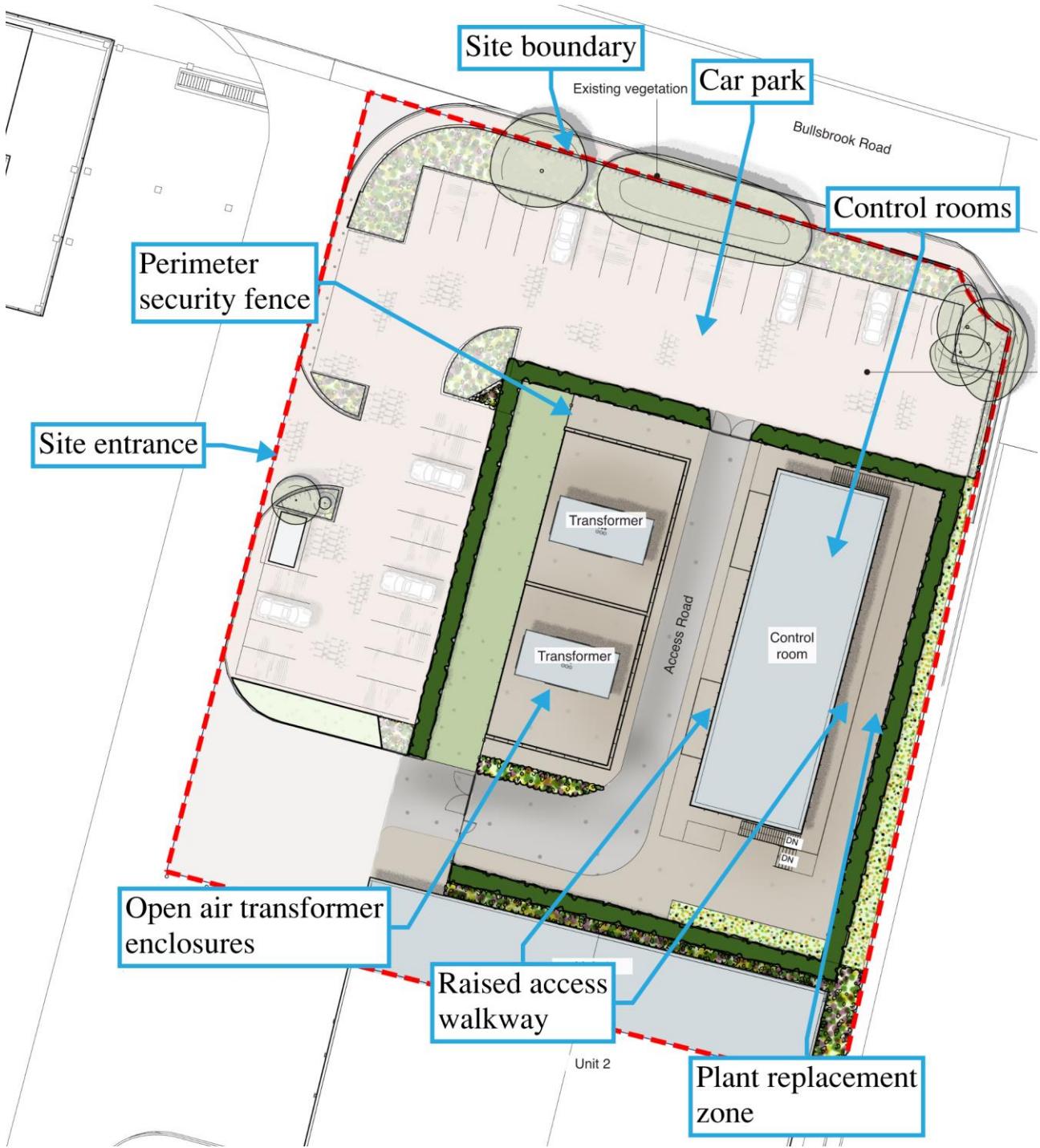


Figure 1: Site plan

1.3 Classification under Building Regulations and applicable guidance

There are no areas within the building proposed to be used for either residential purposes or as an institution. Therefore, the building is not considered 'relevant' under Regulation 7(4)a of the Building Regulations 2010 (as amended).

As per ADB V2, the purpose group for the substation is purpose group 6- Industrial. ADB sets out specific guidance for places of special fire hazard. The switch rooms and transformers fall under the definition of 'places of special fire hazard'.

2. Means of warning and escape

2.1 Fire detection and alarm

Automatic fire detection and alarm systems should be provided in non-residential occupancies where a fire could break out in an unoccupied part of the premises (e.g. parts of the building that is not visited on a regular basis).

A category L1 automatic detection and alarm system is advised within the Control rooms to allow for early warning of fire. However, risk to life is low within the substation premises, since places of safety are within short distances of all areas of the accommodation, see Section 2.2. Therefore, a category L5 system may be incorporated, such that detectors are placed in the switch rooms and control rooms only. Fire detection and alarm systems should comply with BS 5839-1.

It is anticipated that occupants of the substation may be working in relative isolation. Therefore, both audible and visual alarm is suggested. Within the areas protected by gas suppression systems, there should be a clear visual indication of operation of the fire detection and alarm system such as a flashing beacon, as per BS 7273-1. Such a system will warn occupants of the potential release of fire extinguishing gas.

2.2 Horizontal escape routes

The general principle is that any person confronted by a fire within a building can turn away from it and escape safely.

For control rooms (purpose group 6 premises), the maximum permitted travel distance is:

- 25m within the room of occupant origin where escape is available in more than one direction.
- 45m total where escape travel is available in more than one direction.

For the switch rooms and transformer enclosures (purpose group 6 premises of special fire hazard), the maximum permitted travel distance is:

- 9m within the room of occupant origin where escape travel is available in only one direction.
 - 12m total where escape travel is available in only one direction.
- 18m within the room of occupant origin where escape travel is available in more than one direction.
 - 25m total where escape travel is available in more than one direction.

These travel distance requirements can be achieved within the design.

Since the number of occupants within the entirety of the substation is not expected to exceed 60, it is acceptable to provide only one escape route for each room/enclosure, so long as the escape routes allow for satisfaction of the travel distance requirements. Escape routes should be a minimum of 750mm in width.

2.2.1 External Escape routes

Where an external escape route is beside an external wall of the building, the external wall should be of fire resisting construction in both of the following zones (excludes escape stairs).

- a. Within 1800mm of the escape route.
- b. Up to 1100mm above the surface of the escape route.

2.3 Vertical escape routes

It is understood that no disabled occupants will be attending the substation site. Therefore, refuges need not be provided.

The escape stairs should be of at least 750mm in available clear width.

Fire resisting construction (minimum RE 30) is required for the building envelope within the following zones, measured from the flights and landings of the external stair.

- a. 1800mm above and horizontally.
- b. 9m vertically below.
- c. 1100mm above the top landing of the stair.

2.4 Escape lighting and signage

As back-up in the event of electrical mains power supply failure, emergency escape lighting should be provided within the Switch rooms and Control rooms, as per ADB V2 Table 5.1.

Emergency lighting shall be provided to internal and external escape routes in accordance with ADB and BS5266-1.

Every doorway or other exit providing access to a means of escape, other than exits in ordinary use (e.g. main entrances), should be distinctively and conspicuously marked by an exit sign in accordance with BS ISO 3864-1 and BS 5499-4.

3. Internal fire spread (linings)

Requirement B2 of the Building Regulations 2010 is met by achieving a restricted spread of flame over internal linings. The building fabric should make a limited contribution to fire growth, including a low rate of heat release.

The surface linings of walls and ceilings should meet the classifications in Table 1.

Table 1: Classification of linings

Location	Classification
Small rooms of maximum internal floor area 30m ²	D-s3, d2
Other rooms	C-s3, d2

4. Internal fire spread (structure)

4.1 Loadbearing elements of structure

Elements of structure such as structural frames, beams, columns, loadbearing walls (internal and external) and floor structures should have, as a minimum, the fire resistance of 60 minutes.

A structure that supports only a roof does not fall under the definition of 'element of structure', unless the structure is essential for the stability of an external wall that needs to be fire resisting.

4.2 Compartmentation and fire resisting enclosures

The switch rooms and transformers are places of special fire hazard. Fire resisting construction that encloses places of special fire hazard should meet the minimum provision of REI 30 when tested to the relevant European standard.

As per ADB V2 Table 8.1, there is no limit on the size of a compartment.

4.3 Openings in fire resistant walls

Openings in fire resisting walls, relevant to the substation, should be limited to those for any of the following.

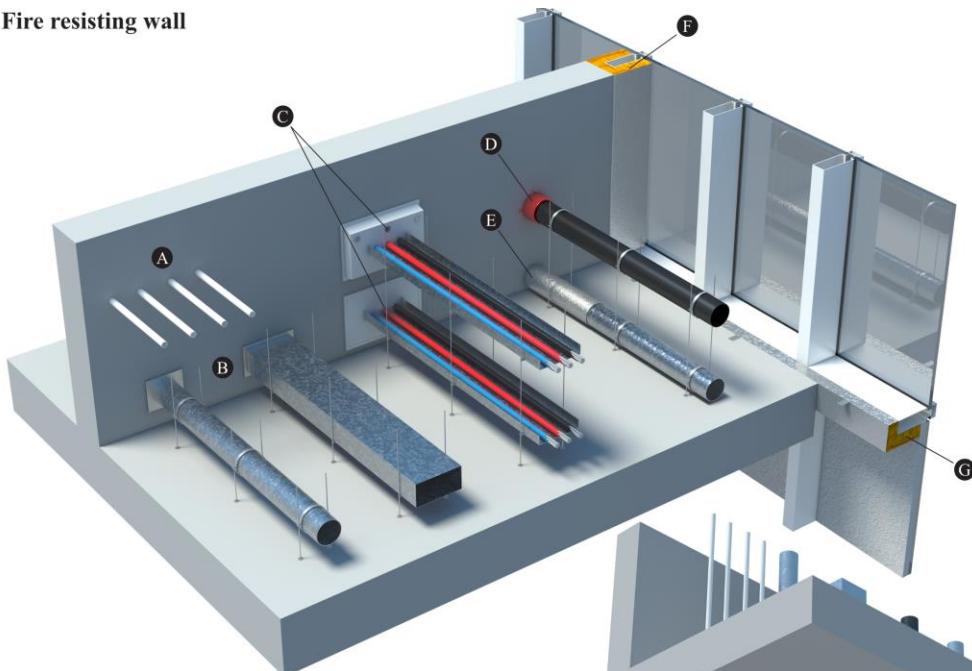
- a. Fire doorsets fitted in accordance with the provisions in Appendix C of ADB V2

- a. Pipes, ventilation ducts, service cables, chimneys, appliance ventilation ducts or ducts encasing one or more flue pipes, complying with the provisions in Section 10 of ADB V2
- b. Refuse chutes of class A1 construction.

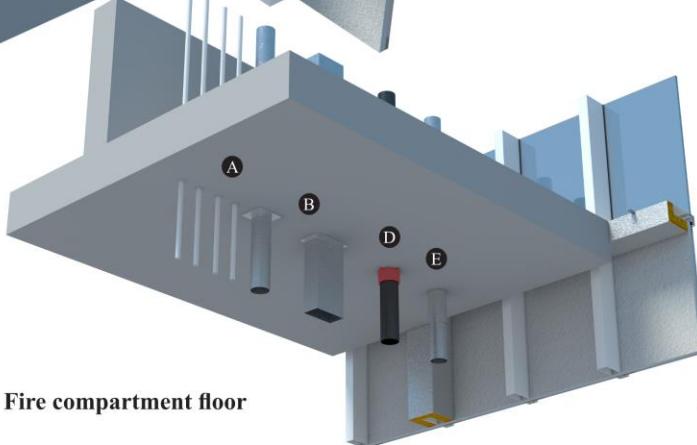
Where pipes pass through fire resisting walls, these shall meet the recommendations set out in Section 10 of ADB V2. Cables penetrating elements of compartmentation shall be provided with fire stopping tested in accordance with BS EN 1366-3.

Examples of fire stopping of penetrations are shown in Figure 2.

Fire resisting wall



A	Pipes of materials listed in Table 14 of ADB smaller than 40mm internal diameter do not require fire collars. These pipes require fire-stopping around them.
B	Protection using a fire/smoke damper.
C	Cable trays or trunking box fire stopped with proprietary box frame, mineral wool batt and mastic system, all systems should be tested and approved.
D	Proprietary seals such as; fire collar or fire wrap. Tested and approved.
E	Non-combustible sleeve satisfying Note 1 of Table 14 of ADB or protection required 1m either side of wall for pipe of lead, aluminium, aluminium alloy, fibre-cement or uPVC with a maximum nominal internal diameter of 160mm (as shown in Diagram 37 of ADB).
F	Fire Stopping around mullion
G	Fire Stopping to achieve same period of fire resistance as the floor and be fixed back to the structure.



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Note:
The above graphics are of typical fire stopping methods - the installations illustrated are indicative only. The selected fire stopping system needs to be in accordance with that stated within the fire strategy and referenced guidance, and the manufacturer's specification. The selected fire stopping installation must be tested and approved for the structure within which it is being installed.

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Figure 2: Protection to service penetrations.

5. External fire spread

The external envelope of a building should not provide a medium for undue fire spread to adjacent buildings or be readily ignited by fires in adjacent buildings. This intention can be met by constructing external walls so that all of the following are satisfied.

- a. The risk of ignition by an external source to the outside surface of the building is restricted.
- b. The amount of thermal radiation that falls on a neighbouring building from window openings and other unprotected areas in the building on fire is not enough to start a fire in the other building.
- c. Flame spread over the roof and/or fire penetration from external sources through the roof is restricted.

The extent to which this is necessary depends on the use of the building and its position in relation to adjacent buildings and therefore the site boundary.

5.1 External wall construction

Since the substation site does not comprise of any buildings over 18m in height, any external wall surfaces requiring fire resistance as per Section 5.2 should achieve a minimum of class B-s3, d0.

5.1.1 Roof coverings

As shown in Figure 3, the distance from the Control rooms building to the relevant boundary is less than 6m. Therefore, roof linings should be no worse than B_{ROOF}(t4).

5.2 Acceptable unprotected area

The fire resistance of a wall depends on its distance from the relevant boundary. For the purpose of this assessment, the closest of the site boundary or half the distance to the nearest building will be used as the relevant boundary. Figure 3 shows the maximum permitted percentage of unprotected area, as per the methods outlined in BR 187. Where a part of a wall is required to be fire resistant it shall achieve 60 minutes fire resistance in terms of stability and integrity and 15 minutes in terms of insulation.

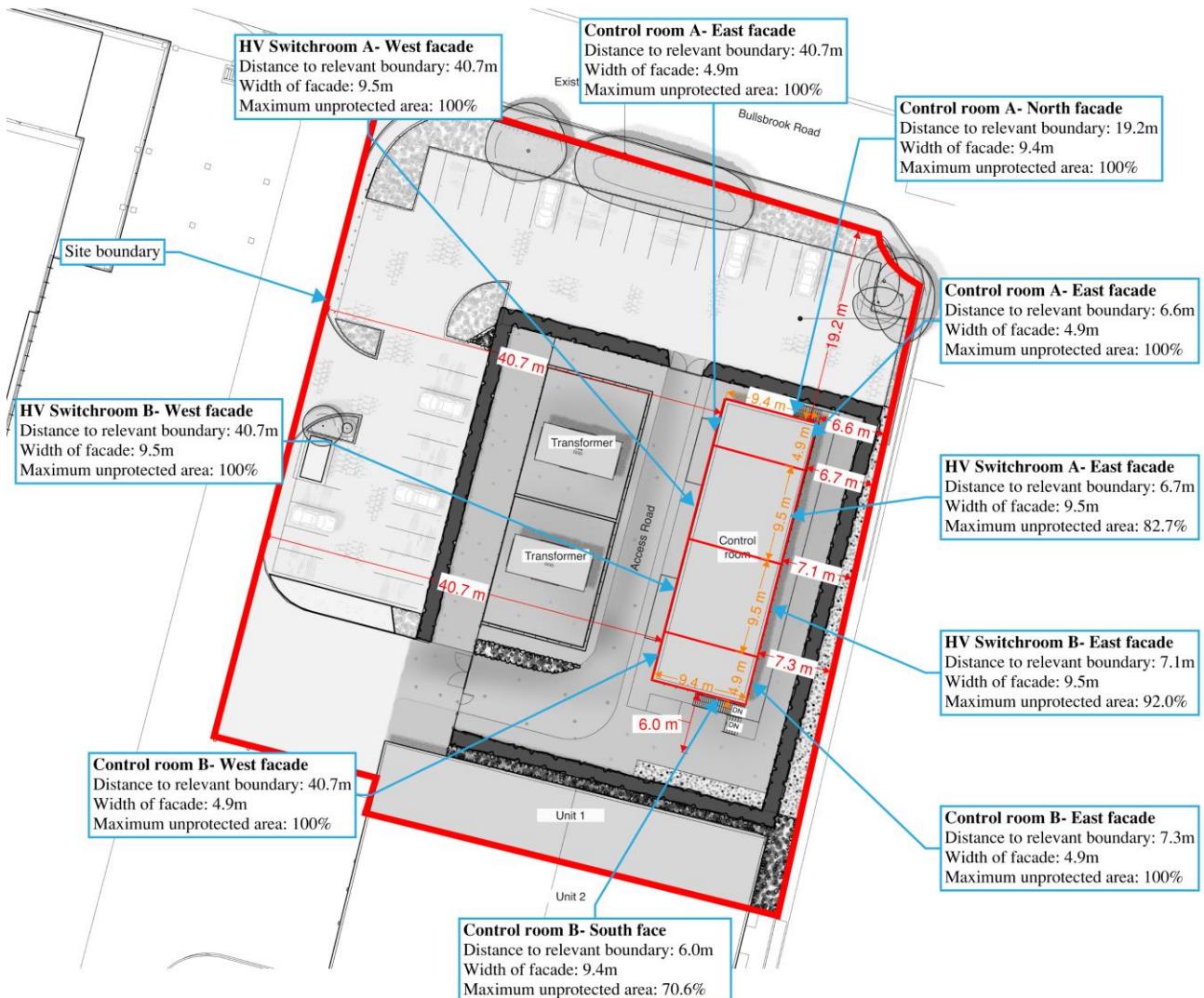


Figure 3: External fire spread assessment

6. Fire service access

6.1 Vehicle access

The substation is less than 2000m² in area or the highest storey is less than 11m above ground, therefore vehicle access for a pump appliance should be provided to whichever is the less onerous of the following.

- a. 15% of the perimeter.
- b. Within 45m of every point of the footprint of the building

Access routes and hardstandings should comply with Table 2.

Table 2: Pump appliance vehicle access route specification

Minimum width of road between kerbs (m)	Minimum width of gateways (m)	Minimum turning circle between kerbs (m)	Minimum turning circle between walls (m)	Minimum clearance height (m)	Minimum carrying capacity (tonnes)
3.7	3.1	16.8	19.2	3.7	12.5

Access routes should be such that fire and rescue service vehicles should have to reverse more than 20m from the end of an access road. These requirements can be achieved within the design.

6.2 Fire fighting provisions

The substation is not required to have fire mains.

Arup have received plans indicating hydrant locations around the substation site. These plans are not scaled or highly detailed but suggest a hydrant is within 90m of the substation site. No new hydrants need to be provided for the site, regardless of proximity to the substation, as per ADB V2 Clause 16.8.

6.3 Access to the buildings for fire service personnel

No firefighting shafts are required on the site.

The fire and rescue service should be able to manually open and close any proposed rolling shutters without the use of a ladder.

7. Conclusion

This report has summarised the fire safety requirements for the Bullsbrook Road Substation, in order support the planning application for the site. This planning statement demonstrates that it is possible for the substation to comply with the functional requirements of Part B of the Building Regulations 2010. If there is any uncertainty within the design team regarding the fire strategy specifications or how the fire strategy is to be implemented, then this must be raised with the project fire engineer and the Approval Authorities to clarify the requirements.