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BRITANNIA BASIN - PHASES 4 & 5

GLENN HOWELLS [PHASE 4] AND SHEDKM [PHASE 5] BUILDINGS

September 2002

FABER MAUNSELL

BRITANNIA BASIN – PHASES 4 & 5

GLENN HOWELLS [PHASE 4] AND SHEDKM [PHASE 5] BUILDINGS

Prepared by: .....

John Hopkinson
Associate Director

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T +44 (0)20 8784 5784
F +44 (0)20 8784 5700
www.fabermaunsell.com

Marlborough House
Upper Marlborough Road
St Albans, Herts AL1 3UT

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1 INTRODUCTION

1 INTRODUCTION

This draft Report outlines the fire safety strategy for both buildings and the shared car park beneath. It is designed to be a discussion document for continuing meetings with the approving authorities. The initial comments and responses of the approving authorities are included.

The base document for the design of the fire precautions is Approved Document B, fire safety [AD] and its recommendations are assumed to be included in the design unless highlighted in this or later reports. All five aspects of the Building Regulations will be addressed. Reference is also made to BS5588: Pt 1 for interpreting access to apartments and for managing waste.

The AD refers to other documents, and the recommendations they contain are assumed to be included in the design unless highlighted in this or subsequent Reports. They include BS5588: Pts 5, and 8 addressing firefighting and for managing the disabled, and BS5839 and BS5266 which are assumed to be adopted for detection and escape lighting.

The fire strategy addresses life safety under the Building Regulations, Fire Precaution Act and Workplace Regulations, these latter two being applicable only to the commercial units on the ground floors. The strategy does not specifically address either property protection, or business disruption. However, in that much damage is attributable to the effects of smoke, by addressing the needs of life safety, these other aspects are to some extent also addressed. But the interests of the building insurers should be sought since their preferred standards are often higher. Clearly the individual apartment insurers arranged by occupants, is not being referred to here.

The fire strategy does not address fire precautions during the building works for which the risks and hazards can often be higher. The HSE issues guidance on identifying and managing fire precautions during the works and they should be consulted accordingly.

There are a number of aspects of the design that are not code-compliant. But the main documentation on which the fire precautions are based, Approved Document B, fire safety [the AD], provides for non-code-compliant options, but then puts the responsibility for meeting the *requirements* of Building Regulations, on the Applicant. It is therefore recommended that the non-compliant aspects of these proposals be seen in the context of the overall provisions, an approach outlined as acceptable in the AD, para 0.3, page 7. Here lower-than-recommended standards in one area can be compensated for by increased standards on others. An equivalent level of safety [sometimes appropriate] is sought by this approach.

2 BRIEF DESCRIPTION OF THE BUILDINGS

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2.1 GENERAL ARRANGEMENTS

The buildings form part of the Britannia Basin development in Manchester. The Glenn Howells building [Phase 4], also known as 1-5 Burton Place, fronts onto a new street which comes off Ellesmere Street. One side of this building is along Ellesmere Street, with the other end adjacent to Timber Wharf. The ShedKM building [Phase 5] fronts onto Ellsemere Street with one side along Arundel Street, the other along the 'New Street'. A site plan is included in Appendix B with general arrangement drawings for both buildings.

The buildings will be classed as Purpose Group 'Residential 1(a)' in Appendix D of the AD. Commercial units on the ground floor will not be ancillary to the main use [residential] but separately designated Group 4, Shop and Commercial etc. The basement car park will be designated Group 7(b), 'Storage and other non-residential'.

2.2 GLENN HOWELLS BUILDING

Preliminary arrangements on the ground floor accommodate up to seven retail/office or health club facilities. They will be separately addressed in any fire safety strategy and do not form part of this assessment – except in respect of their proximity to the apartments.

Above the ground floor, the building has six levels [known as levels 1 – 6] of apartments, grouped around three escape stairs. On levels 1 to 5, the central section accommodates four apartments per level from its stair, with the outer sections accommodating ~~eight~~ six apartments per level.

On the 6th level, the central stair accommodates four bed-sits, and the outer two accommodates two bed-sits and one 3-bed apartment.

The groups of apartments are thus served in a single-stair condition. The environment of these stairs is that they be well-lit and well-ventilated open spaces, but not 'external stairs' in the technical sense. In support of this intent, two voids run through all levels.

Each stair includes a lift, which extends to both levels of basement car park. The lifts are lobbied at both car park levels. Each stair continues uninterrupted to the basements.

The building height to the floor of the 6th level is 18.6m. The floor plan is 70x18m. The basement is 6m deep from access level.

Firefighting access is being proposed using the escape stairs through which each apartment access door can be reached within the recommended 45m from a vehicle stand. The 'New Street' is suitable for such vehicle access.

2.3 SHEDKM BUILDING

This building consists of modular units based on 9m x 4m floor plan, with access off common walkways and with size variations to accommodate larger options and terraces. They are arranged around a 'U-shaped' plan 54x36m. The building height to the floor of the 6th level is 20m. The basement providing a two-level car park beneath is 6m deep from access level.

Preliminary arrangements on the ground floor accommodate retail/office areas. They will be separately addressed in any fire safety strategy and do not form part of this assessment – apart form their proximity to the modules above.

The three sides of the 'U' enclose a landscaped garden area and residents' secure storage.

Above the ground floor, the building has six levels of apartments [known as levels 1 – 6], grouped around a centrally located circular stair with additional escape stairs, one at either end of the 'U'. Each level typically accommodates seventeen apartments.

The central stair is set back over 2m from the access walkway serving the front accommodation. It encircles the lift with both facilities descending to the car park levels. The stair/lift is enclosed, not lobbied, at car park levels, but is open-sided above ground, though not technically an 'external stair'. The two end stairs are separated at the ground floor, and continue in separate shafts to both car park levels, where they are enclosed as firefighting shafts, complete with dry falling mains.

Firefighting access to upper levels is off Ellesmere Street using the centrally located circular escape stair through which each apartment access door can be reached within the recommended 45m from a vehicle stand.

2.4 CAR PARK

The two-level car park extends beneath both buildings, and is accessed off Arundel Street beneath the ShedKM building. Its depth is 6m. It is served by three escape stairs beneath the ShedKM building, and one beneath the Glenn Howells building, four in all. It is vented by mechanical means using jet fans. Two fire firefighting shafts beneath the ShedKM building cover the whole area, and both levels.

2.5 UNITING OF BUILDINGS

Note that since the car park is located beneath both buildings, some authorities will consider those above as a single building. But since a fire detected in the car park is not going to lead automatically to the evacuation of areas above, this consideration need not apply. Any legal implications of whatever arrangement is adopted by the authorities, should be explored.

3 GLENN HOWELLS BUILDING

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3 GLENN HOWELLS BUILDING

3.1 MEANS OF ESCAPE [B1]

3.1.1 Detection/alarm, retail units

For the ground floor retail units, a single-stage evacuation regime will be adopted for each. In support of this regime, an alarm system to the standard of BS5839: Pt 1 will be provided. Detection may not be required in view of the small size but would be a matter for the Workplace Regulations. An alarm raised in these units will not be linked to the apartments above in view of their totally separated escape systems.

3.1.2 Detection/alarm, apartments

A code-compliant detection system will be provided within each apartment. An alarm in any unit will neither raise a general alarm, nor an auto-dial to the fire brigade.

One of the options to vent the stairwells, would need smoke detection at the top of the stair to open the stair louvers etc provided for the venting, compensating for the lack of protected lobbies in some apartments. In view of the criticality of this provision, and to reduce failure, two such detectors alongside each other may be appropriate. If auto-venting is not provided, permanent venting would be included, for which there would be no need for detection in the stairwells.

With respect to the linking between apartments and the car park beneath and the perceived risk associated with the link, an alarm in the car park will not raise a general alarm in apartments, but the fire brigade will be called.

3.1.3 Escape from retail units

Code-compliant final exits of suitable width will be provided for the expected occupancy and population for these units.

3.1.4 Escape regime from apartments

The usual regime is being adopted whereby persons in apartments beyond the fire unit are not expected to evacuate, unless instructed to do so by the fire brigade. However, if they choose to do so, a route is provided in the form of the single stair. In being well vented upon smoke detection in the stairwell [or permanently vented], the stair should be suitable.

3.1.5 Apartment layouts

The majority of apartment layouts are code-compliant [to the AD, diags 7 and 8] or will be suitably amended to agreed arrangements.

3.1.6 Apartment escape stairs

With the building height just over 18m [the excess being small enough to consider dropping it by reducing the ground floor to maximise B5 options], the code-compliant options for escape stair layouts are limited to those in AD, diagram 12. These call for two fire doors between apartment and escape stair, a protected lobby between apartments and escape stair, and an auto-vent to the protected lobby.

The proposals do not comply with the prescriptive guidance but do achieve the objectives of the AD including the provision of a suitably ventilated escape route [in this case the stair] when required. This and the other objectives will be achieved in the manner outlined below.

The critical issue is with smoke on the escape stair. It will be addressed either by having suitable permanent venting, or by providing it when required. Historically, well ventilated escape routes were accepted with only one fire door between apartment and the common areas. The arrangements were compromised by occupants due to unacceptable exposure to weather. The objective of the proposed design is to provide sufficient ventilation of the escape stair [common area] but only when required.

Prescriptive guidance	Objective	Proposal	Comment
Maximum 7.5m travel distance from access door to protected lobby	Suitable risk associated with travel through smoke leaked from fire flat and escape stair	Code-compliant travel distance	Risk from smoke and heat to others on the fire floor addressed by suitable stair venting
Two FD30S fire doors between apartment and escape stair	To limit smoke transfer into the escape stair, and keep the stair free of smoke for escape from upper levels, passed the fire floor	Single FD30S door in some cases, otherwise code-compliant.	When smoke detected within the escape stair, smoke to be vented in the early stages of encroachment. Should lead to conditions assumed in BS5588: Pt 1 for balcony approach for which protected lobbies are not required [see Note 1].
Protected stair to minimum 1 hour FR	Provide suitable separation between fire and stair users	Enclosing structure will be code-compliant but small openable windows, not greater than $1m^2$ from each unit will be included.	The area and relationship of these windows will be to the recommenda-tions in diag 44 of the AD [see Note 2] and above 1.1m from floor level.
Auto-venting of protected lobby	Maintain suitably clear escape route on fire floor between other units and the escape stair	Protected lobbies to AD, diag 12 will not be provided	Upon smoke detection in the escape stair, auto-venting will be provided by opening louvers or windows to simulate the degree of venting anticipated from balcony access outlined in BS5588: Pt 1 [see Note 1].

Note 1: With respect to venting of the escape route, this strategy proposes the principles of BS5588: Pt 1 and particularly figure 15(b) where balcony approach is outlined. The objectives of that approach include the provision of fire protection [up to 1.1m from access level] for persons passing a unit on fire, and a well-ventilated escape route past adjacent units.

The venting objective of this arrangement is provided in the Glenn Howells building by providing an open stair when and if smoke is detected within the stairwell. This level of venting is achieved by opening up side vents at each level of sufficient area to provide an equivalent level of venting. The stairs are not 'external', nor need be

well vented under normal use; the high degree of venting need only occur when and if smoke is detected at the top of the stairwell.

Modelling [expanded in Appendix A] indicates that:

1. with ~20-30m^2 of venting at the top and lower levels [40-60m^2 in total], smoke will not accumulate in the stairwell.
2. a fire in the stair [or presumably leaking into it] of size 1.7MW is sufficient to cause smoke to rise through 18m, above the stair height. With the stairwell suitably ventilated, smoke will be exhausted effectively.

Note 2: With respect to suitably enclosing the escape stair, this strategy proposes the principles of diagram 44 and para 14.13 of the AD, and figure 15(b) of BS5588: Pt 1. The objective of the principles in BS5588: Pt 1 is to allow a degree of openable windows within fire rated walls, and also provide a suitable degree of protection of persons have to pass the unit on fire. In the Glenn Howells building, fire rated walls are provided throughout the stair enclosure except for small openable non-rated bedroom windows. The relationship between them and the actual escape path provides at least 1.2m separation across a void and can be favourably compared with the conditions in figure 15(b) of BS5588: Pt 1.

With respect to the inclusion of non-rated windows in fire rated walls, diagram 44 and para 14.13 of the AD does provide for them even on walls coincident with a boundary. For external escape routes, the conventional separating distance from an adjacent fire is 1.8m but this standard is not sought for apartments where a suitable degree of venting is provided, as assumed with balcony access, the difference being that the apartment building is not expected to decant upon fire alarm anywhere in it, but under fire brigade supervision.

In keeping with good practice, there should be no storage areas within single stair conditions, even if enclosed in FR construction.

3.1.7 Connection to the basements

All three stairs continue uninterrupted to the two car park levels [basements]. This provision does not accord with recommendations in the AD:

1. para 3.41 discourages single stairs continuing to basements, a separate stair is recommended. Para 3.40 explains that basement stairways are more likely to become filled with smoke and heat.
2. para 6.44 discourages a lift in a single stair continuing to basements due to the possibility of smoke from a basement fire prejudicing escape routes in upper storeys.

Both concerns are being addressed by:

1. providing protected lobbies between the car park levels and the stairs with access limited to authorised car park users,
2. having increased mechanical ventilation in the car park with extract points located to draw smoke away from exits, and by having an increased extract rate [in fire] at 15 ac/hour compared with the AD recommendation of 10 ac/hour,
3. by having considerable venting of the stairs above ground upon detection within them, and
4. including auto-dial to the fire brigade for fire confirmation in the car park levels.

This package should ensure minimal smoke entry into the escape stairs.

[Note that the provision and management of fire precautions in the car park is dealt with in Section 5 of this report.]

3.1.8 Travel distances

Within apartments and from access doors to the escape stair, travel distances will be code-compliant.

3.1.9 Disabled access and egress

The recommendations to accommodate the disabled on the stair for access/egress, and within the apartments will be included in the design.

If the lift in each stair is provided for the disabled, it should remain controllable during a fire. Since common areas will have smoke detection to operate the stair venting, some control of the lift is however, possible. If its use is required for the disabled, it should be operable for the fire brigade, from which it may be implied that its use could also be available for them.

3.2 INTERNAL FIRE SPREAD LININGS – B2

The proposals will be code-compliant. Class 0 will be provided on escape and circulation routes and Class 1 elsewhere. The AD provides for small rooms in the apartments, <4m^2, to be Class 3 – see its Table 10.

3.3 INTERNAL FIRE SPREAD STRUCTURE – B3

3.3.1 Fire resistance

Fire resistance to the elements of structure will be code compliant. With a building height >18m, Table A2 of the AD recommends 90 minutes FR for the elements of structure.

The degree of excess over the 18m criteria is small enough to justify a 60 minute standard. In support of this proposal, it can be recognised that in BS5588: Pt 1, para 18.3.2, the standard for compartmentation is 60 minutes.

3.3.2 Compartmentation

The degree of compartmentation between units and the retail sections will be code-compliant, i.e all units, apartments and ground floor retail, will be in separate compartments. For the apartments, it can be recognised that in BS5588: Pt 1, para 18.3.2, the recommended standard is 60 minutes.

The car park levels will be in a single compartment beneath the two buildings.

3.3.3 Management of refuse

In apartment blocks above 4 storeys, AD H calls for attention to be made for recyclable and non- waste to be separately dealt with. Whilst recognising that AD B refers to BS5906 which recommends chutes in buildings with more than 4 storeys, a managed system of refuse disposal is being proposed. Selection of waste type will take place within apartments, and carried to the ground floor, via the lift, for collection from suitable bins.

3.3.4 Vertical connections

With compartment floors, all vertical connections, stairs, lifts, chutes, and services risers are 'protected shafts', and should have the same FR as that agreed for the structure. Services risers may instead be fire-stopped to that standard at each level, and thereby converted to cupboards. If this approach is adopted, the rear of the cupboards should be fire-rated to complete the enclosure to the units and the

content of the cupboards limited to avoid making them a fire risk in the escape system.

3.4 ACCESS AND ASSISTANCE TO THE FIRE SERVICES – B5

3.4.1 Firefighting shafts

With the building height at just over 18m [at 18.6m] there is a recommendation in the AD to provide firefighting shafts – para 18.2. However, the proposal is to offer instead suitable access for a building deign height less than 18m.

3.4.2 Non-firefighting shaft approach

All access doors to apartments can easily be reached within the 45m criteria of the AD, para 17.3, from where the vehicle can stand. All three escape stairs are easily accessed off 'New Street' from local vehicle stands.

Although not included in such a package in the AD, suitable vehicle access is provided along the front and both ends of the building. Since 'New Street' is a private road, suitable management will be required to ensure its availability for firefighting vehicles, when required.

A proposal to include a dry rising main within each stair to compensate for the additional height [0.6m excess], and reduce the need for carrying firefighting equipment the full height, was not thought to be appropriate. Code-compliancy might be assumed, with the added degree of fire protection.

4 SHEDKM BUILDING

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4 SHEDKM BUILDING

4.1 MEANS OF ESCAPE [B1]

4.1.1 Detection/alarm, retail units

For the ground floor commercial units, a single-stage evacuation regime will be adopted for each. In support of this regime, an alarm system to the standard of BS5839: Pt 1 will be provided. Detection may not be required in view of the small size, but would be a matter for the Workplace Regulations. An alarm raised in these units will not be linked to the apartments above in view of their totally separated escape systems.

4.1.2 Detection/alarm, apartments

A code-compliant detection system will be provided within each apartment. An alarm in any unit will neither raise a general alarm, nor an auto-dial to the fire brigade.

With respect to the linking between apartment floors and the car park beneath and the perceived risk associated with the link, an alarm confirmed in the car park will neither raise a general alarm in apartments nor to the ground floor commercial units, but the fire brigade will be called.

4.1.3 Escape from retail units

Code-compliant final exits of suitable width will be provided for the expected occupancy and population for these units.

4.1.4 Escape regime from apartments

The usual regime is being adopted whereby persons in apartments beyond the fire unit are not expected to evacuate, unless instructed to do so by the fire brigade. However, if they choose to do so, a choice of routes is provided in the form of the three stairs, located such that all access doors are within code limits. In being well vented by natural means, the stairs should be suitable.

4.1.5 Apartment layouts

The apartment layouts are standard from the supplier and have been accepted elsewhere in the UK. In the larger units with an additional bedroom, an inner room condition is avoided by provision of an escape door to the common walkways. Even with the terraces, direct distances to the access door are less than the 9m requiring a protected lobby.

4.1.6 Apartment escape stairs

With the building height at ~20m, the code-compliant arrangement for escape stair layouts are those in AD, diagram 13. The proposals comply with the prescriptive guidance and achieve the objectives of the AD including travel distance and the provision of suitable ventilation.

4.1.7 Access walkways

Walkways are timber-clad, suitably treated to increase grip. They are under-drawn with metallic support to avoid exposure from fire beneath. Balustrade specification will include suitable weather protection of the walkways.

The walkways are linked on the two 'arms' by a pair of feature circles. In terms of disruption to persons on higher levels, the degree of smoke travel through them to upper levels would be no greater than from the open-sided section along the front of the building. They can be included with no cause for concern. Any smoke

spread through the escape system need cause no more stress than any occurring along the glazed elevations. Smoke will be efficiently dispersed by the considerable vent area at either end of these sections, and in any event, limited by the FR enclosure to the units.

4.2 INTERNAL FIRE SPREAD LININGS – B2

The proposals should be code-compliant. Class 0 wall and ceiling linings should be provided on escape and circulation routes and Class 1 elsewhere. Timber linings on walkways will be hardwood, and treated if required. Walkways will be supported on metal decking such that there is no path for fire spread through the timber sections.

The AD provides for small rooms, <4m^2, to be Class 3 – see its Table 10.

4.3 INTERNAL FIRE SPREAD STRUCTURE – B3

4.3.1 Fire resistance

Fire resistance to the elements of structure will be code compliant. With a building height >18m, Table A2 of the AD recommends 90 minutes FR for the elements of structure.

The building consists of a steel frame into which the apartment modules are located. The modules themselves include steel frames supporting their enclosure which are to some extent protected from fire by the walls and floors etc. With respect to meeting the recommended 90 minutes FR, the combination of protection provided from the modules, and any additional protection to the supporting framework, should be clarified. It can be recognised that in BS5588: Pt 1, para 18.3.2, the standard for compartmentation [for life safety purposes] is 60 minutes. One approach would be to provide that standard in the modules, and an additional protection to the structural frame to make up the 90 minute recommendation.

4.3.2 Compartmentation

Each apartment unit will be within a separate fire compartment. By taking into account the recommendation in BS5588: Pt 1, para 18.3.2, a 60 minute standard for compartmentation [for life safety purposes] could be adopted. It would include the access doors to service cupboards, unless these are fire stopped at the floor, and the rear of the cupboards fire-rated to complete the enclosure to the units.

Each commercial unit on the ground floor will be in a separate compartment, as will the two levels of car park – one two-level compartment.

4.3.3 Vertical connections

With compartment floors, all vertical connections, stairs, lifts, chutes, and services risers are 'protected shafts', and should have the same FR as that agreed for the structure. Services risers may instead be fire-stopped to that standard at each level, and thereby converted to cupboards. If this approach is adopted, the rear of the cupboards should be fire-rated to complete the enclosure to the units and the content of the cupboards limited to avoid making them a fire risk in the escape system.

4.3.4 Waste storage and handling

In apartment blocks above 4 storeys, AD H calls for attention to be made for recyclable and non- waste to be separately dealt with. AD B refers to BS5906 which recommends chutes in buildings with more than 4 storeys. Chutes are being provided in each end stair. BS5588: Pt 1, paras 19.1.2(b) and 21.2(c) recommends

their location within protected shafts and accessed via vented lobbies [0.2m^2]. The objective of these proposals is no minimise risk to apartments by containing fire, and providing sufficient venting to avoid smoke accumulation.

An alternative approach is proposed to meet these objectives; the chutes and their access flaps are fire- rated, and a suitable level of ventilation is provided by the open nature of the two stairs.

With respect to risk to occupants of nearby apartments where their access is off the walkway pointing away from the stairwell, an alternative stair in the opposite direction is available, away from the nearby stair and chute.

4.4 ACCESS AND ASSISTANCE TO THE FIRE SERVICES – B5

With the building height over 18m the recommendation in the AD is for firefighting shafts. The most suitable provision is with the central circular stair from which all apartment access doors can be reached within a 60m laid-out hose length. The arrangement includes a firefighting lift and dry rising main. Ventilation is provided by the shaft being located 2m away from the nearest walkway, and by that link being open-sided, thus well ventilated.

Whilst the arrangement does not provide a code-complaint provision, the proposed package is considered acceptable. The departures from BS558: Pt 5, to which the AD refers, and the case for their acceptability are as follows:

Item	BS recommendation	Proposal	Comment
Access from suitable roadway			Code-compliant off Ellesmere Street
Access from dry rising main to every apartment door			Code-compliant with all apartments reached within 60m laid-out hose.
Stair serving above and below ground	BS5588: Pt 5 recommends separation at access level, particularly to avoid possible confusion over whether or not firefighting facilities continue down.	Stair continues down to basements, neither separated at access level, nor containing firefighting facilities.	Stair is highly ventilated at access level, being open-sided. Dry riser inlet at access level. Two separate stairs provide firefighting access to the car parking levels.
Stair not lobbied at basements	AD recommends basement stair should be lobbied.	Enclosure with fire doors, but no lobbies. Suitable smoke extract by these doors to limit smoke ingress.	Stair is highly ventilated at access level, being open-sided.
Stair/lift/lobby arrangement	2 hour FR enclosure, separate stair, lift, and lobby enclosures. Lobby can be replaced by protected corridor in apartment blocks.	Stair encircles lift, and no lobby. The stair/lift arrangement is included in BS5588: Pt 5, but not for residential use.	Concerns over the introduction of fire load into the facility highlighted in the BS, are less likely to be a problem in view of the particular arrange-ment. The main benefit is the high level of ventilation.
Dry rising main	Rising main in ff lobby	Code-compliant inlet at access level, outlets on each walkway, opposite	Inlet code-compliant, outlet suitably visible and protected from fire by unit enclosure,

		the stair/lift exit.	and from smoke by well-ventilated walkways.
Stair and lobby venting	15% of stair and 25% of lobby at each level	Neither specifically provided	Well ventilated stair and access walkways provide at least an equivalent level of ventilation.

This package of provisions has been discussed with the local fire authority which has not expressed a cause for concern.

5 CAR PARK

5 CAR PARK

5.1.1 General provisions

The standards of the recommendations in Section 12 of the AD, will be adopted in the car park. Matters of particular interest are associated with venting; it is otherwise code-compliant.

5.1.2 Uniting of buildings

Whilst not a technical problem, it should be noted that in being located beneath both buildings, some authorities may consider the two buildings as a single unit. But since a fire detected in the car park is not going to lead automatically to the evacuation of areas above [it will lead to alerting the fire brigade], this consideration need not apply. Any legal implications of whatever arrangement is adopted by the authorities, should be explored.

5.1.3 Means of escape – B1

By providing access into the two 'dog-leg' stairs, the circular stair under the ShedKM building, and into one stair beneath the Glenn Howells building, there are no dead-end conditions that give rise to concern. Travel distances are code-compliant without recourse to the vehicle ramp. Security issues will be addressed with respect to access into the Glenn Howells stair; there are none associated with the others since they lead to open air.

5.1.4 Fire resistance and compartmentation – B3

Supporting structure to the car park will reflect the same standard as being applied to the apartments above. The two levels will be within a single fire compartment.

5.1.5 Access and assistance to the fire brigade – B5

5.1.6 Basement venting

Of the two options available in the AD for venting basement car parks [AD, Section 12], a mechanical system will be adopted. It may include the use of 'jet fans', a relatively new approach, but well-tried nonetheless.

The recommended extract rate of 10ac/hour for a fire condition will be increased to 15ac/hour at both levels. It will be operated by any of the normal activating means for basement car parks and may include auto-dial to the fire brigade to address the perceived weakness of continuing escape stairs into the basements.

5.1.7 Firefighting

With each the floor area of the two basement car parks being >900m^2, the recommendation in the AD provision of firefighting shafts is adopted – see its para 18.4.

All areas of both levels can be reached from two firefighting shafts located at either end of the ShedKM building above. The circular stair is therefore not required for firefighting in the car park levels. The level of protection applied to it, and the fact that is serves as a firefighting shaft for levels above ground, is addressed above.

By reference to BS5588: Pt 5, the AD recommends a lobby vent to the lower level [para 8.4(e)]. An equivalent level of protection from smoke is being provided by:

1. a higher level of mechanical extract from the car park, designed to more effectively remove smoke from the basement [15ac/hour compared with 10ac/hour], and
2. local smoke extract from the car park/lobby entrance to reduce smoke gathering nearby.

5.1.8 First aid firefighting

Subject to the agreement of the fire brigade, no first aid firefighting equipment will be provided in the car park or apartment areas. However, each retail unit will have such provision as a means of meeting recommendations under the Workplace Regulations.

APPENDICES

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APPENDIX A

Glenn Howells Building:

Smoke modelling in support of arrangements in the escape stairs

The issue
The issue with the proposals is that the escape stairs [3] are not code-compliant. Had the stairs been enclosed as outlined in the AD, diagram 12, there would be no concerns over the single stair condition, only the non-interrupted descent to the basements. This latter point is addressed by better extract in the basements and is not discussed further here. The deviations from code-compliancy above ground are addressed by better and suitable venting.

Diagram 12 in the AD calls for auto-venting upon smoke detection in the stair; venting at the top of the stair, and a maximum 7.5m travel distance from access doors to stair. These provisions can be included in the building.

Diagram 12 also calls for two fire doors between an apartment and the escape stair, and a minimum FR enclosure equal to the FR to structure. These items are not being proposed in this building, with the departures being compensated for by additional and sufficient venting in fire.

In making a judgement on suitability, it should be considered that a balcony approach to apartments is acceptable because smoke and heat do not accumulate on the escape route. A single direction of escape is permitted, subject to a 1.1m high FR wall being included in the package – see BS5588: Pt 1, figure 15b.

This strategy also proposes that had the stairs been completely open-sided, the escape provisions would be acceptable, there being no accumulation of smoke. Then the challenge would be the likely unsuitability due to effects of weather, particularly wind. Ironically, the more wind, the better would be smoke dispersal.

The question is to what degree venting is required to work for smoke removal, and to avoid accumulation in the stairwell. Totally open sides would be acceptable, to what extent need they be enclosed.

The proposals
The stairwells will be suitably vented upon smoke detection in them, seeking to equate to a balcony access system in the sense that there is no accumulation of smoke. Persons can escape if required in a relatively smoke-free environment and also pass the fire apartment, below a 1.1m high FR wall.

Two options are available:

1. Upon smoke detection in the stairwell, sufficient venting is provided by opening glazing, or

2. Permanent venting is provided of sufficient area to allow smoke to disperse.

Smoke modelling
There are two aspects to be considered:

1. fire size required for smoke to reach the top of the stairwell, and
2. vent area required to avoid accumulation of smoke in the stairwell.

A number of assumptions are included in the modelling:

1. a bedroom window into the stairs is not fire rated, and may be open. It will break and provide a maximum area of 0.5m x 4m high, $2m^2$.
2. fire through an access door is less likely since it is self-closing and fire-rated. This assumption will be contentious, but all apartment escape systems assume suitable fire rating to access doors, including self-closure. Area of an open door, is ~$2m^2$.

3. the fire will grow and be controlled very conservatively to 6MW; CIBSE TM19 suggests a lower heat release rate based on 250kW/m^2, but fire size in an apartment would depend on how much it was ultimately burning.
4. smoke and heat will enter the stairwell via a line plume configuration, 0.5m wide. They will rise under the sufficient buoyancy to the top levels, from where they disperse.
5. the stairwell is taken as an atrium equivalent, with low level inlet, and higher level outlet.
6. the 'worst case scenario' is taken to be a fire on the lowest level [1] rising through 18m to the highest [6].

Smoke buoyancy
With a fire coming through an open or broken window, not fire rated, a line plume of width 0.5m is assumed, rising through the 18m height between lowest apartment, and the top of the stairwell.

CIBSE TM19 gives a relationship [6.24] for the fire size required for smoke to rise a distance:

$$z_m = 4.81\ (Q_p/l_s)^{1/3}\ (dT/dz)^{-1/2} \qquad [m]$$

Where z_m is the height [[m] through which a fire size Q_p [kW] rises from a line plume of width l_s [m]. dT/dz is the temperature gradient over the 'atrium' height [K/m].

By putting z_m to the atrium height, 18m, l_s at 0.5m, and dT/dz to (273+20)/18, the fire size Q_p required for heat to rise is the full height 1.7MW.

Fires bigger than this will easily rise the full height, smaller fires will need the assistance of venting.

The time to reach this fire size [1.7MW] for a 'slow' fire growth rate is 8.5 minutes, and 4.25 minutes for 'fast' growth rate.

Smoke removal
The degree of venting required is determined by assuming the stairwell is an atrium with high level 'extract' and low level inlet, and modelling the smoke being produced via the line plume inlet, from a growing fire.

From architects drawing, the stairwell is 18m high, and 33m^2.

Smoke modelling first determines the mass of smoke production from an opening, using relationship 5.12 in CIBSE Guide TM19, and then extracts it depending on vent area, as outlined in relationship 6.14 of the CIBSE Guide.

The following vent area results in a clear layer as shown:

Inlet area	Outlet area	Stable clear layer
10	10	15
20	20	16
30	30	17
10	20	15

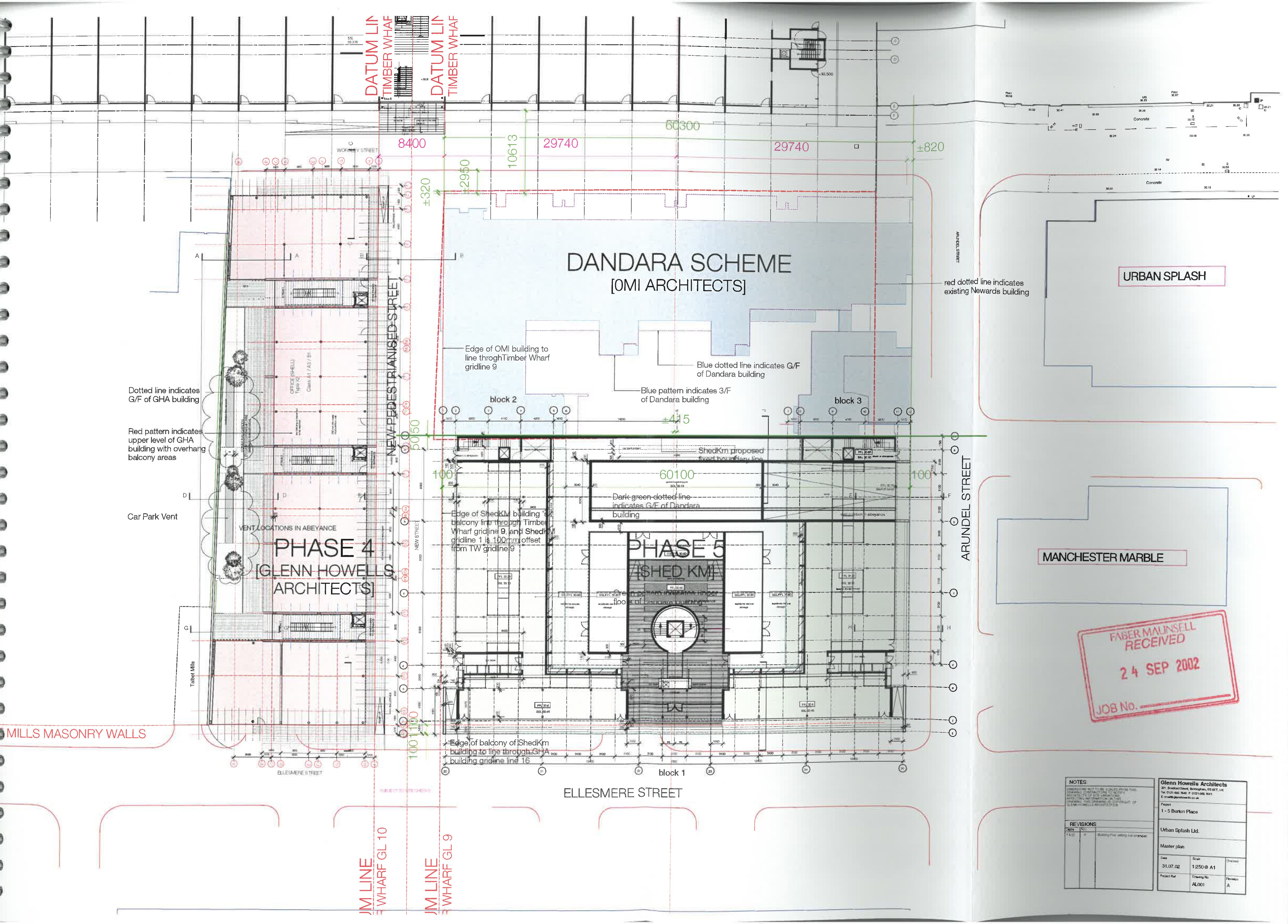
Application of these results implies that with an equivalent vent area of 20-30m^2 at both low and high level, a suitably clear layer is achieved. The 16-17m clear layer from the lowest level for the 20 and 30m^2 vent areas implies about 2m clear on the top floor, which should be acceptable.

The total vent area required [high and low] is in the region of 40-60m^2. The available vent area on one side of the stairwell is 18m x 3.2m = 56m^2, and on the other [lift side] is 18m^2, and totals 74m^2. Not surprisingly, the modelling implies that the stairwell has to be vented between 60 and 80% of the two walls, i.e more or less open-sided in fire – as predicted.

Suitable conditions can be achieved then, either by introducing auto-opening vents or having permanent venting. Even distribution up the height of the stairwell would be suitable, being an interpretation of the results in view of the available areas of glazing for venting in the particular design. Options could include overlapping glazing strips as permanent venting, or openable louvers operated upon smoke detection.

APPENDIX B

Architects drawings – Glenn Howells building, including site plan and car park



DATUM LINE TIMBER WHARF
8400
29740
60300
29740
±820
10613
2950
±320
WORSLEY STREET
NEW PEDESTRIANISED STREET
DANDARA SCHEME
[OMI ARCHITECTS]
red dotted line indicates existing Newards building
URBAN SPLASH
ARUNDEL STREET
Edge of OMI building to line throgh Timber Wharf gridline 9
Blue dotted line indicates G/F of Dandara building
Blue pattern indicates 3/F of Dandara building
block 2
block 3
±415
5050
Dotted line indicates G/F of GHA building
Red pattern indicates upper level of GHA building with overhang balcony areas
Car Park Vent
VENT LOCATIONS IN ABEYANCE
PHASE 4
[GLENN HOWELLS ARCHITECTS]
ShedKm proposed fixed boundary line
60100
100
Dark green dotted line indicates G/F of Dandara building
Edge of ShedKM building & balcony line through Timber Wharf gridline 9, and ShedKM gridline 1 is 100mm offset from TW gridline 9
PHASE 5
[SHED KM]
MANCHESTER MARBLE
FABER MAUNSELL RECEIVED
24 SEP 2002
JOB No.
Talbot Mills
MILLS MASONRY WALLS
1001100
Edge of balcony of ShedKm building to line through GHA building gridline line 16
block 1
ELLESMERE STREET
DATUM LINE TIMBER WHARF GL 10
DATUM LINE TIMBER WHARF GL 9
NOTES:
REVISIONS
Glenn Howells Architects
1 - 5 Burton Place
Urban Splash Ltd.
Master plan
31.07.02
1:250 @ A1
AL001

Talbot Mills

New wall to Talbot Mills boundary

Ventilation from car park

ELLESMERE STREET

WORSLEY STREET

NEW STREET

OFFICE (SHELL)
Unit X1
Class A1 / A3 / B1

RETAIL (SHELL)
Unit Y
Class A1 / A3 / B1

OFFICE (SHELL)
Type X2
Class A1 / A3 / B1

OFFICE (SHELL)
Type X2
Class A1 / A3 / B1

HEALTH CLUB/
OFFICE (SHELL)
Unit Z
Class D2 Health Club / Class B1

COMMUNAL GARDEN
[To Level 0 Commerical Units]
GARDEN TO FURTHER DETAIL

wall

balustrade

1100 height dividing wall

Level 1 -5 Riser

250 mm thk metal stud partition wall

ATRIUM 3

ATRIUM 2

ATRIUM 1

fire lobbying to basement to be resolved

SVP

SSL +30.100

Column location to be advised /confirmed by structural engineer

STONE PAVING TO ENTRANCE

STONE PAVING TO WALKWAY

RAMP UP

BALUSTRADE

RAISED PLINTH

Shed KM Building
Phase 5

Dandara Building

NOTES:

REVISIONS

Date	No.

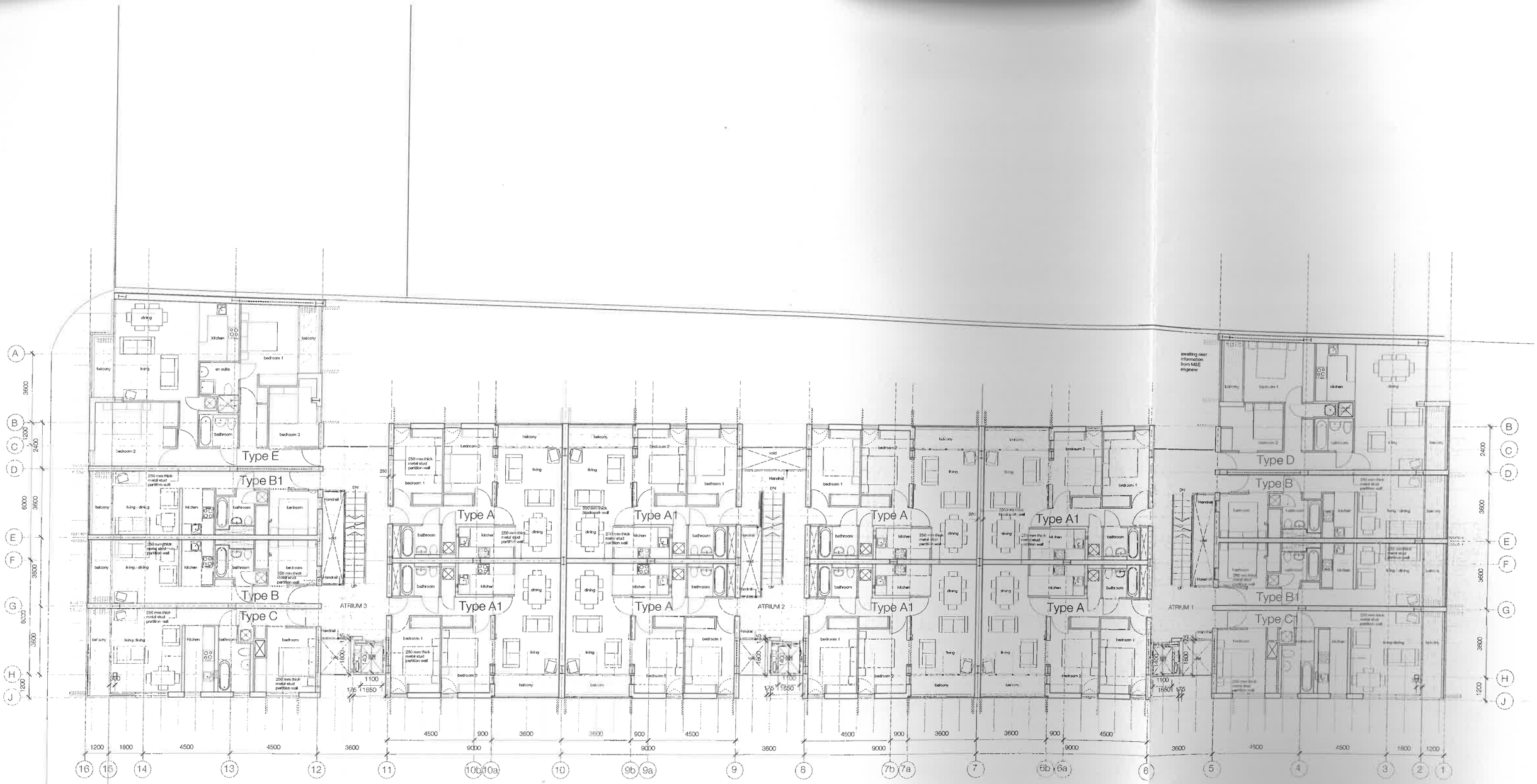
Glenn Howells Architects
63, Bradford Street, Birmingham, B5 6ET, UK
Tel: 0121 666 7640. F: 0121 666 7641
E: mail@glennhowells.co.uk

Project: St. George's Walk, Castlefield, Manchester

Client: Urban Splash Ltd.

Drawing title: General Arrangement Plan Level 0

Date	Scale	Checked
14.06.02	1:100@ A1	
Project Ref.	Drawing No.	Revision
1109	AL 100	-



Shed KM Building
Phase 5

Dandara Building

NOTES:
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REVISIONS

Date	No.

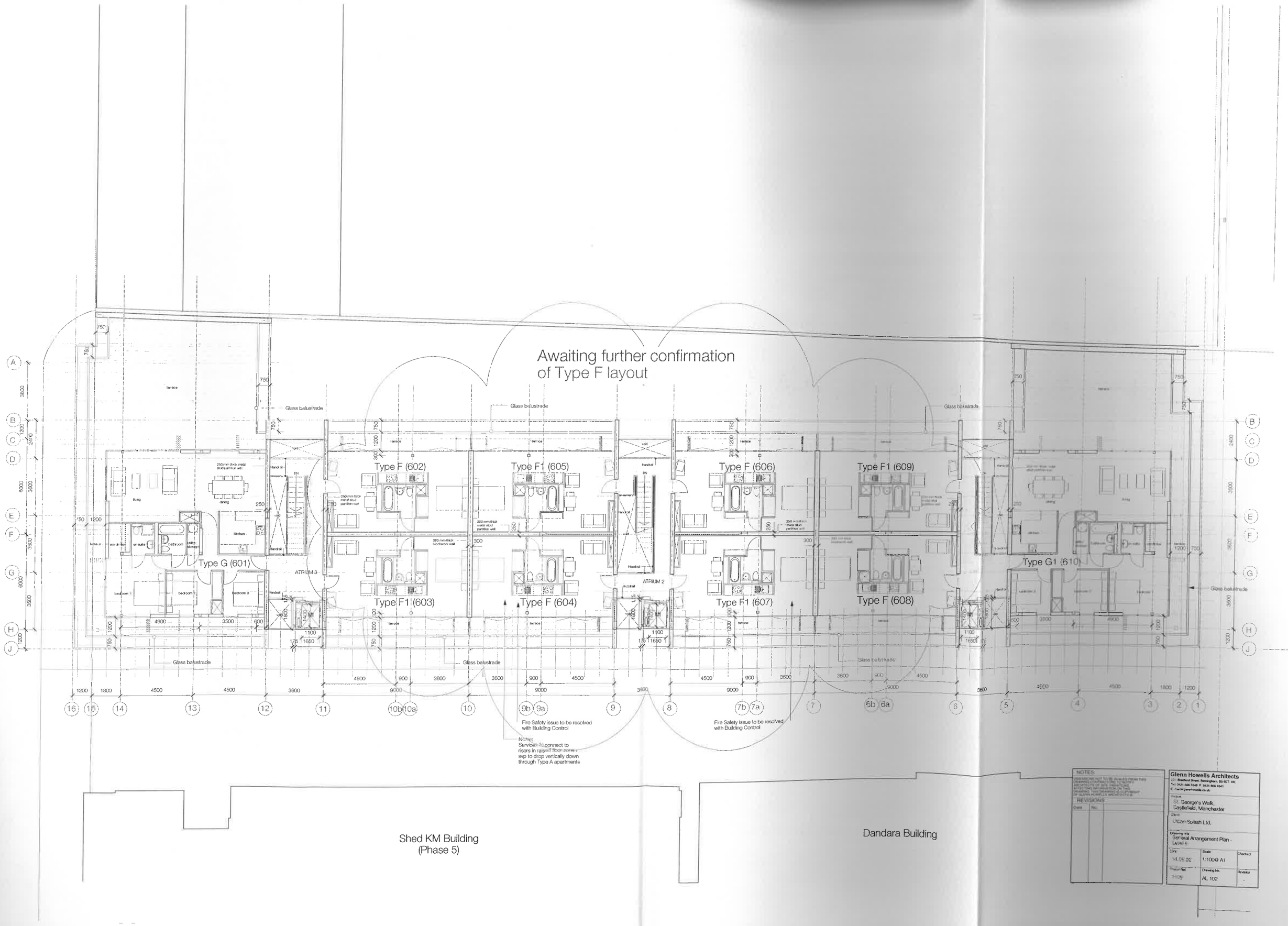
Glenn Howells Architects
321, Bradford Street, Birmingham. B5 6ET, UK
Tel. 0121 666 7646 Fax. 0121 666 7641
E. mail@glennhowells.co.uk

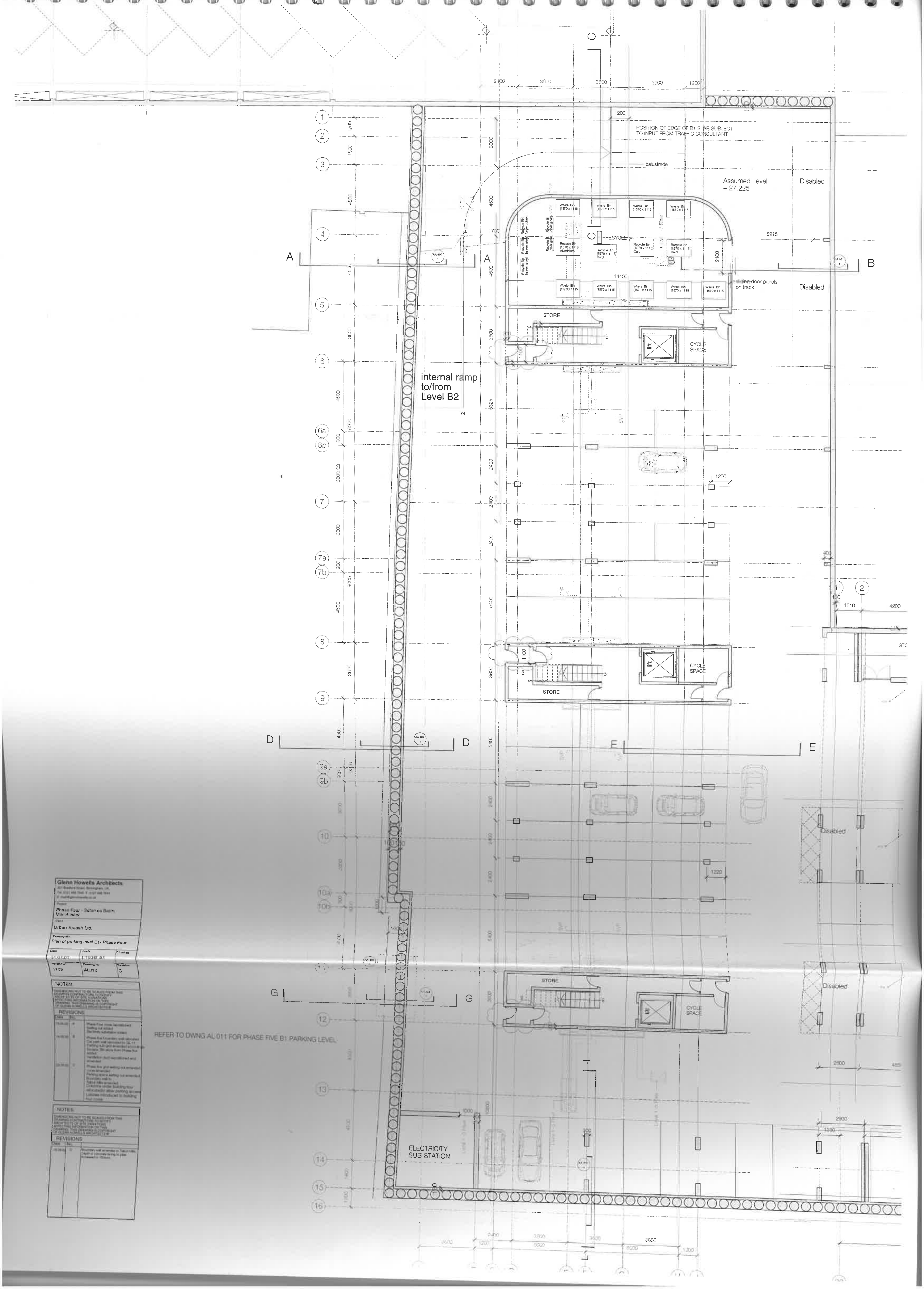
Project
St. George's walk,
Castlefield, Manchester

Client
Urban Splash Ltd.

Drawing title
General Arrangement Plan
Level 1 - 5

Date	Scale	Checked
14.08.02	1:100 @ A1	
Project Ref.	Drawing No.	Revision
1109	AL 101	-


Awaiting further confirmation
of Type F layout
Type G (601)
Type F (602)
Type F1 (603)
Type F (604)
Type F1 (605)
Type F (606)
Type F1 (607)
Type F (608)
Type F1 (609)
Type G1 (610)
ATRIUM 3
ATRIUM 2
Glass balustrade
Fire Safety issue to be resolved with Building Control
Fire Safety issue to be resolved with Building Control
Notes:
Services to connect to risers in raised floor zones - svp to drop vertically down through Type A apartments
Shed KM Building
(Phase 5)
Dandara Building
NOTES:
REVISIONS:
Glenn Howells Architects
Project
St. George's Walk, Castlefield, Manchester
Client
Urban Splash Ltd.
Drawing title
General Arrangement Plan - Level 6
Date
14.06.05
Scale
1:100@ A1
Checked
Project Ref.
1105
Drawing No.
AL 102
Revision
-



POSITION OF EDGE OF B1 SLAB SUBJECT TO INPUT FROM TRAFFIC CONSULTANT
balustrade
Assumed Level + 27.225
Disabled
Disabled
RECYCLE
sliding door panels on track
STORE
CYCLE SPACE
lift
internal ramp to/from Level B2
DN
STORE
CYCLE SPACE
STORE
CYCLE SPACE
Disabled
Disabled
ELECTRICITY SUB-STATION
REFER TO DWNG AL 011 FOR PHASE FIVE B1 PARKING LEVEL
Glenn Howells Architects
Phase Four - Britannia Basin, Manchester
Urban Splash Ltd.
Drawing title
Plan of parking level B1- Phase Four
Date
Scale
Checked
1:100 @ A1
Project Ref.
1109
Drawing No
AL010
Revision
C
NOTES:
REVISIONS
NOTES:
REVISIONS

Dandara Site

B1: 74 INDEPENDENT SPACES (INC.6 DISABLED SPACES)
62 DEPENDENT SPACES

B2: 92 INDEPENDENT SPACES (INC.6 DISABLED SPACES)
24 DEPENDENT SPACES

NOTES:
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REVISIONS

Date	No.	
19.09.01	D	Depth of concrete facing to pilae increased to 150mm.

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REVISIONS

Date	No.	
13.06.01	A	Setting out added Ramp amended Vent introduced at B1 slab
14.06.01	B	Phase five boundary wall relocated Car park wall relocated to GL 11. Parking sub-grid amended accordingly Escape, Bin store from Phase five added Ventilation duct repositioned and amended
29.06.01	C	Phase five grid setting out amended, car parking subgrid amended accordingly Phase five cores amended Ramp amended Bin/Recycle store relocated

Glenn Howells Architects
201 Bradford Street, Birmingham, UK
Tel. 0121 666 7640 F. 0121 666 7641
E. mail@glenhowells.co.uk

Project
Phase Four - Britannia Basin, Manchester

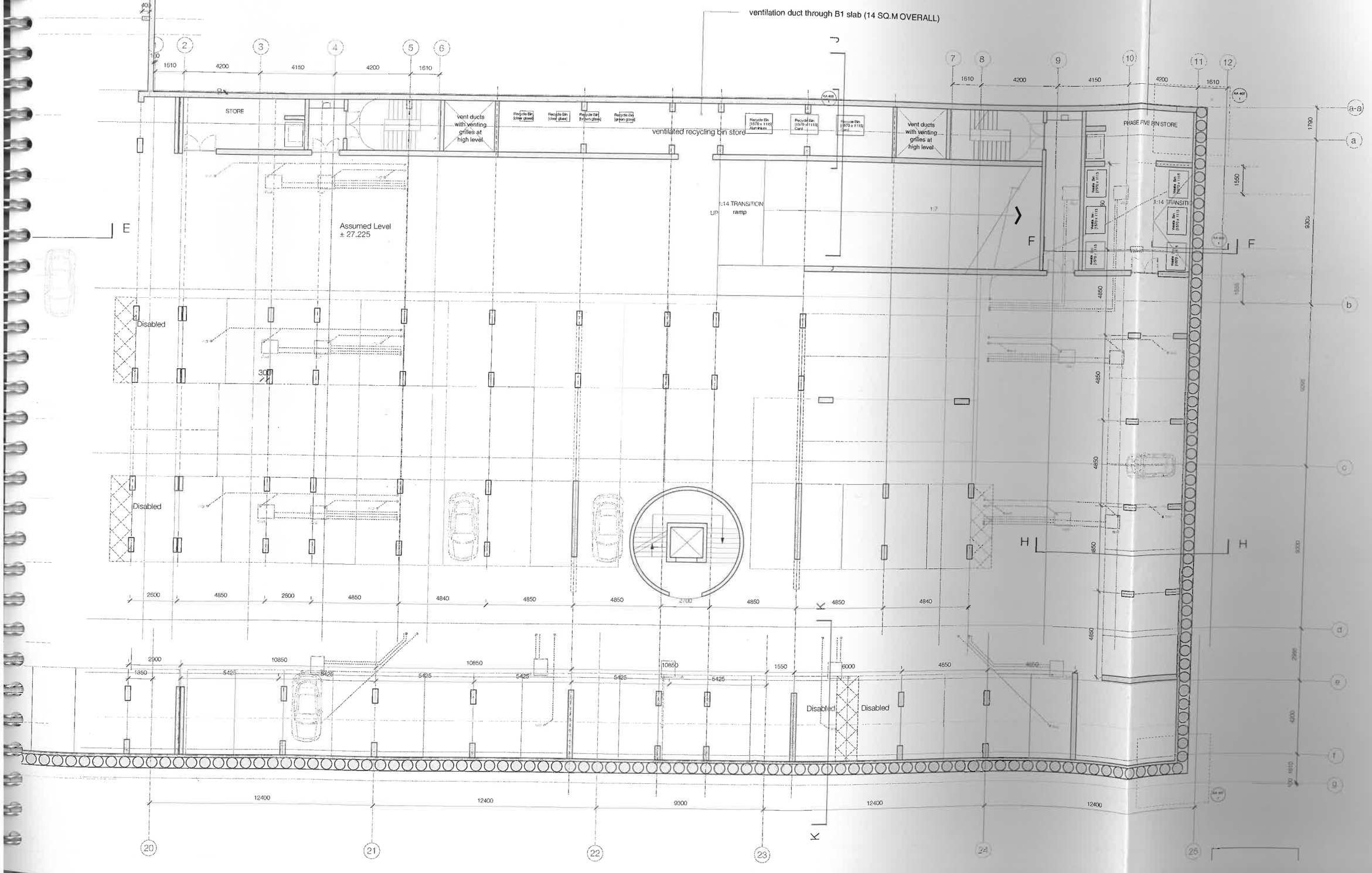
Client
Urban Splash Ltd.

Drawing title
Plan of parking level B1 - Phase Five

Date	Scale	Checked
31.07.01	1:100@ A1	

Project Ref.	Drawing No.	Revision
1109	AL011	D

REFER TO DWNG AL 010 FOR PHASE FOUR B1 PARKING LEVEL



REFER TO DWNG AL 013 FOR PHASE FIVE B2 PARKING LEVEL

ELECTRICITY CABLE ROUTE AT B2 SOFFIT

ELECTRICITY METER ROOM

ELECTRICITY METER ROOM

ELECTRICITY METER ROOM

ELECTRICITY CABLE ROUTE AT B2 SOFFIT

Disabled

Disabled

Disabled

STORAGE / PLANT

internal ramp to/from Level B2

Assumed Level + 24.575

overspill access to Timber Wharf at B2

opening through existing retaining wall

LINK TO TIMBER WHARF

sliding door panels on track

NOTES:

REVISIONS

Glenn Howells Architects	
Project	Phase four - Britannia Basin Manchester
Client	Urban Silsden Ltd
Drawing title	Plan of parking level B2- Phase Four
Date	31.07.01
Scale	1:100@ A1
Checked	
Project No.	1109
Drawing No.	AL012
Revision	C

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REVISIONS

Date	No.	
1109.01	D	Depth of concrete facing to piles increased to 150mm.

NOTES:
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REVISIONS

Dwng	Rev.	
13.06.02	A	Setting out added Motor room added Vent introduced at S1 slab Electricity cable route shown
14.06.02	B	Phase five boundary wall relocated Car park wall relocated to GL 11 Parking sub-grid amended accordingly Escape. Bin store from Phase five added Ventilation duct repositioned and amended
29.06.02	C	Phase five grid setting out amended, car parking subgrid amended accordingly Phase five cores amended Bin store relocated Car park vent duct amended

Glenn Howells Architects
021 Bradford Street, Birmingham, UK.
Tel. 0121 666 7640 F. 0121 666 7641
E -mail@glennhowells.co.uk

Project
Phase Four - Britannia Basin, Manchester

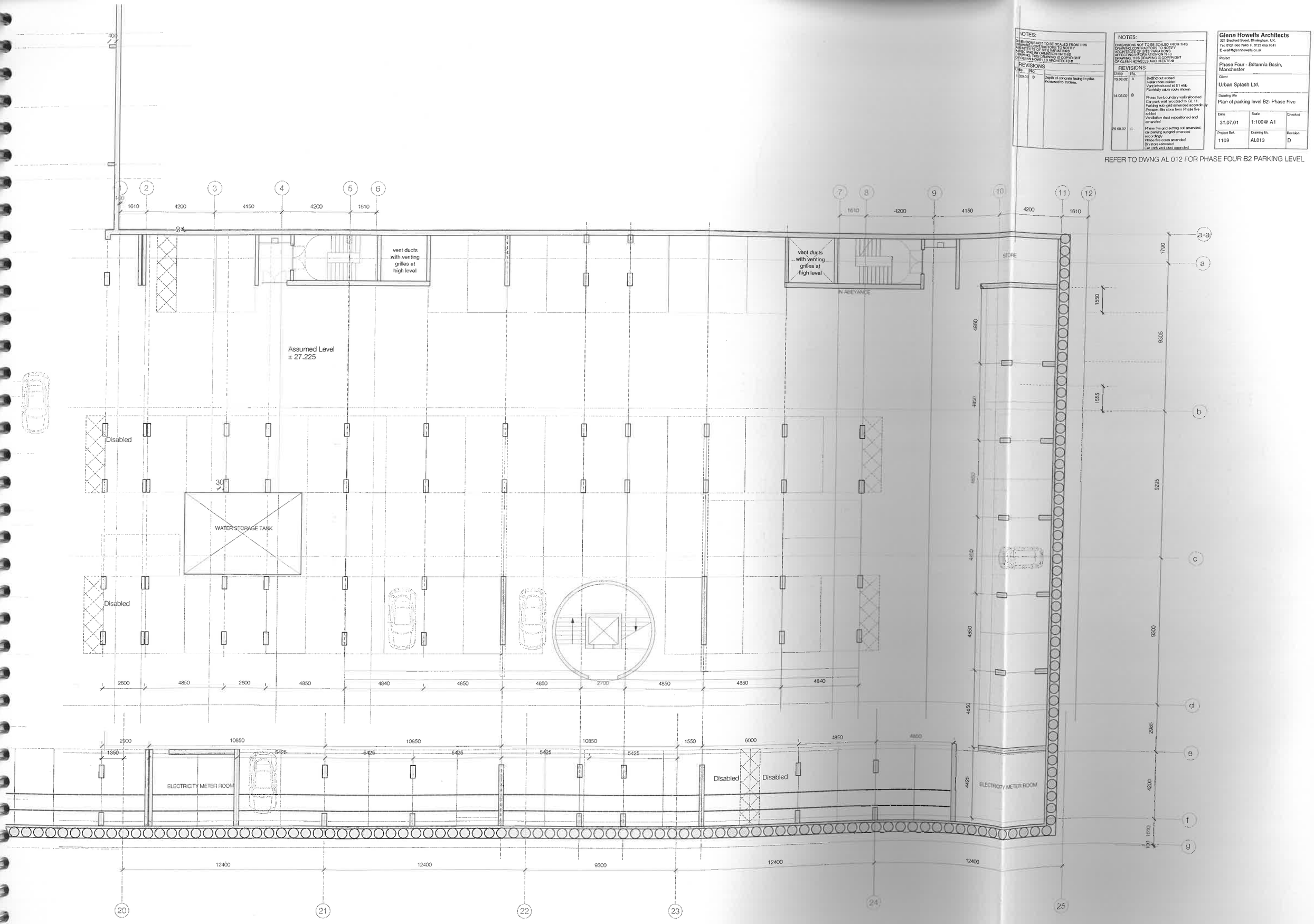
Client
Urban Splash Ltd.

Drawing title
Plan of parking level B2- Phase Five

Date	Scale	Checked
31.07.01	1:100@ A1	

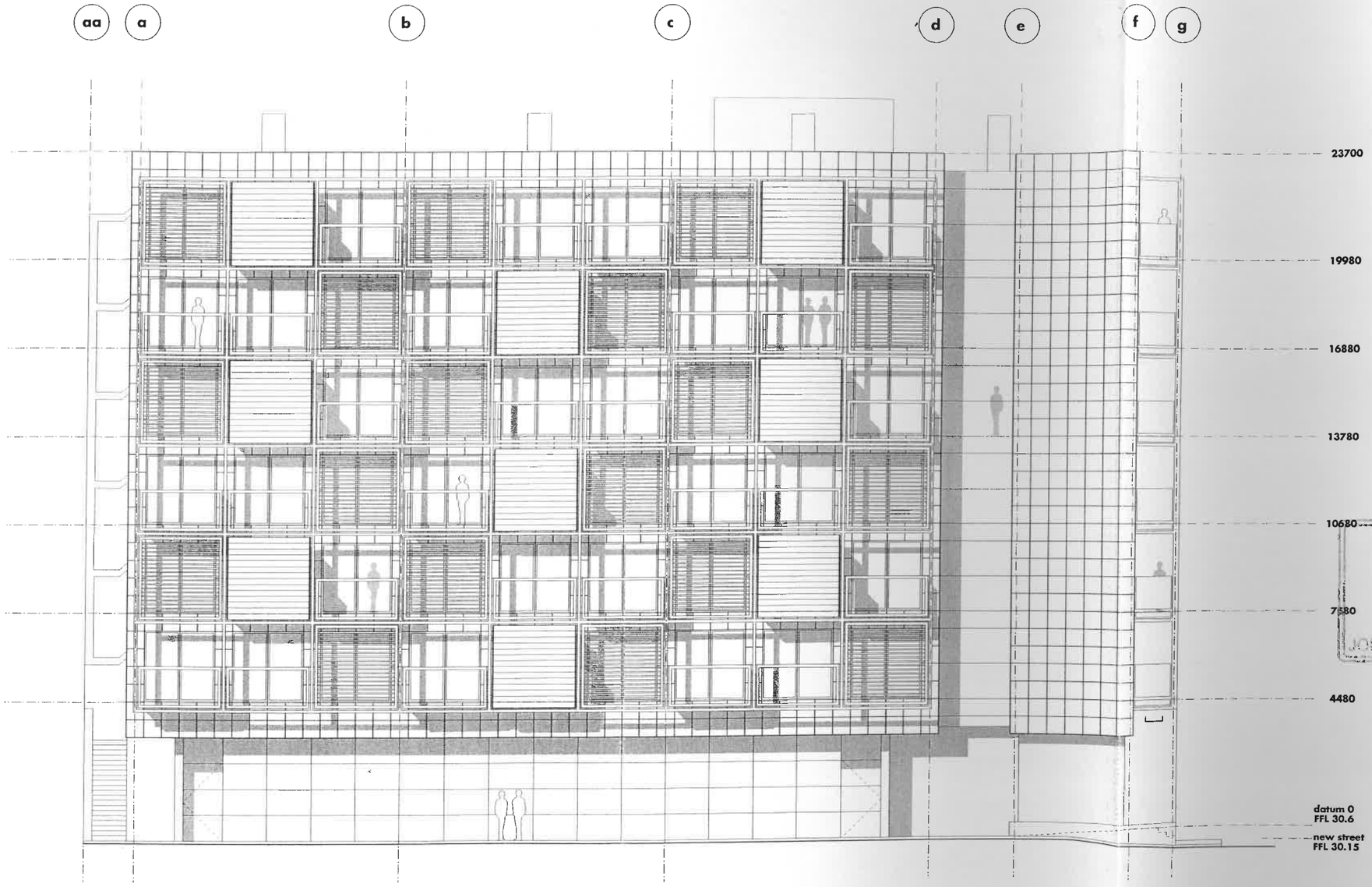
Project Ref.	Drawing No.	Revision
1109	AL013	D

REFER TO DWNG AL 012 FOR PHASE FOUR B2 PARKING LEVEL



APPENDIX C

Architects drawings – ShedKM building

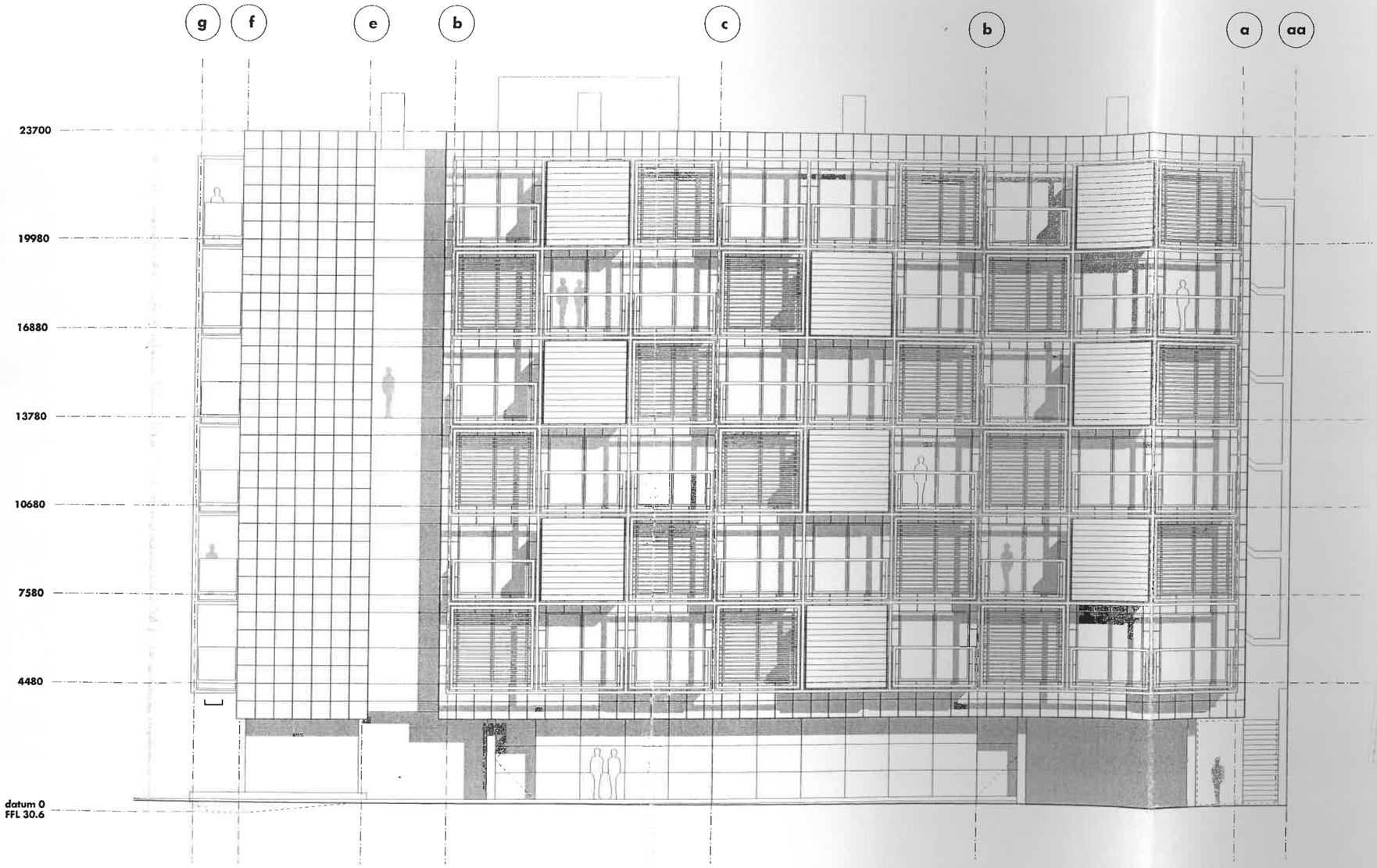


C: 10.09.02 elevation updated
B: 14.08.02 elevation updated
A: 17.06.02 elevation updated

S H E D K M

brit 4	urban splash
drawing number	601•C
scale	1:100 @ a2

proposed new street elevtion

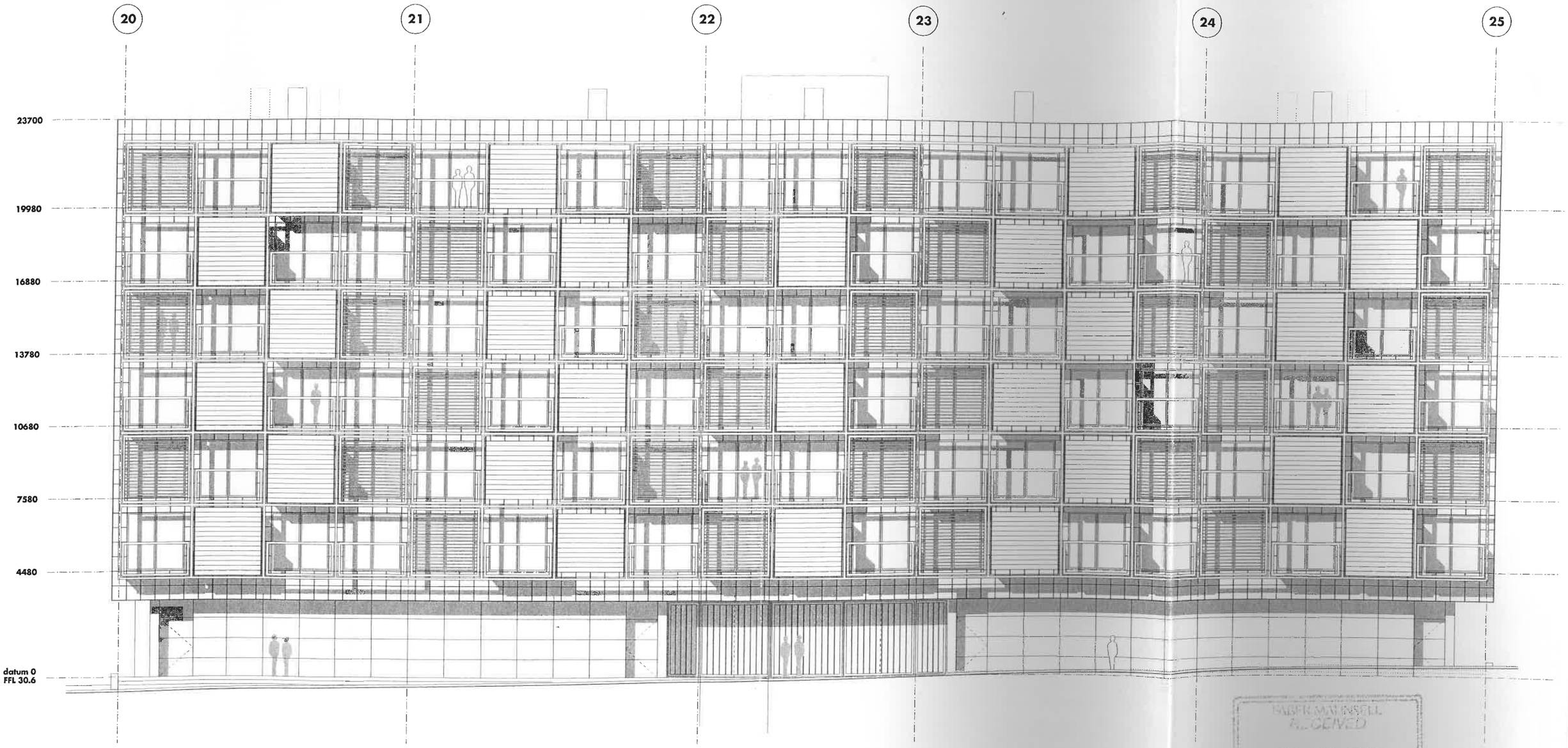


C: 10.09.02 elevation updated
B: 14.08.02 elevation updated
A: 17.06.02 elevation updated

S H E D K M

brit 4	urban splash
drawing number	602•C
scale	1:100 @ a2

proposed arundel street elevtion



C 10.09.02 elevation updated
B 14.08.02 elevation updated
A 17.06.02 elevation updated

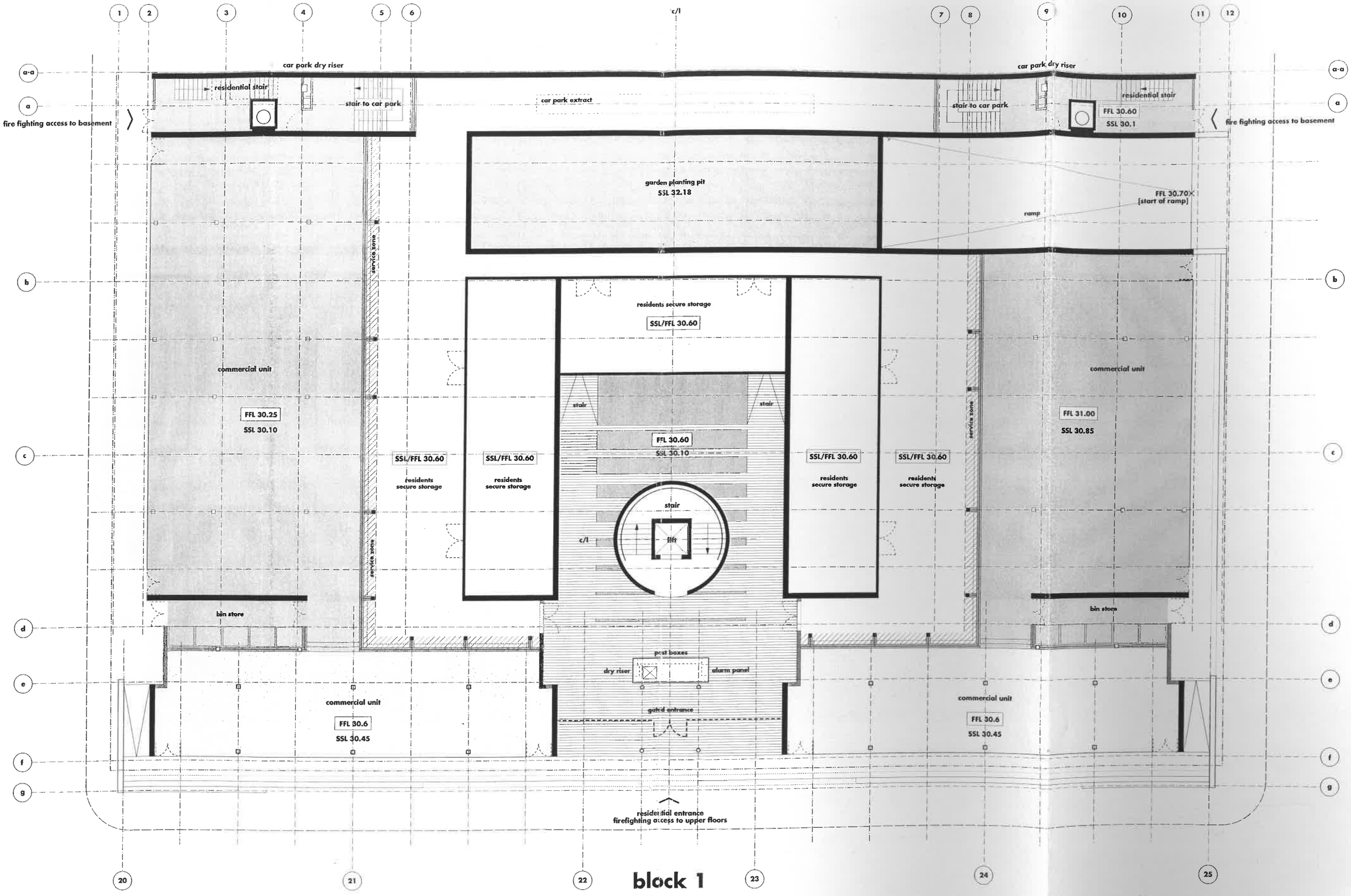
S H E D K M

brit 4 urban splash

drawing number 600•C

scale 1:100 @ a1

proposed elesmere street elevation



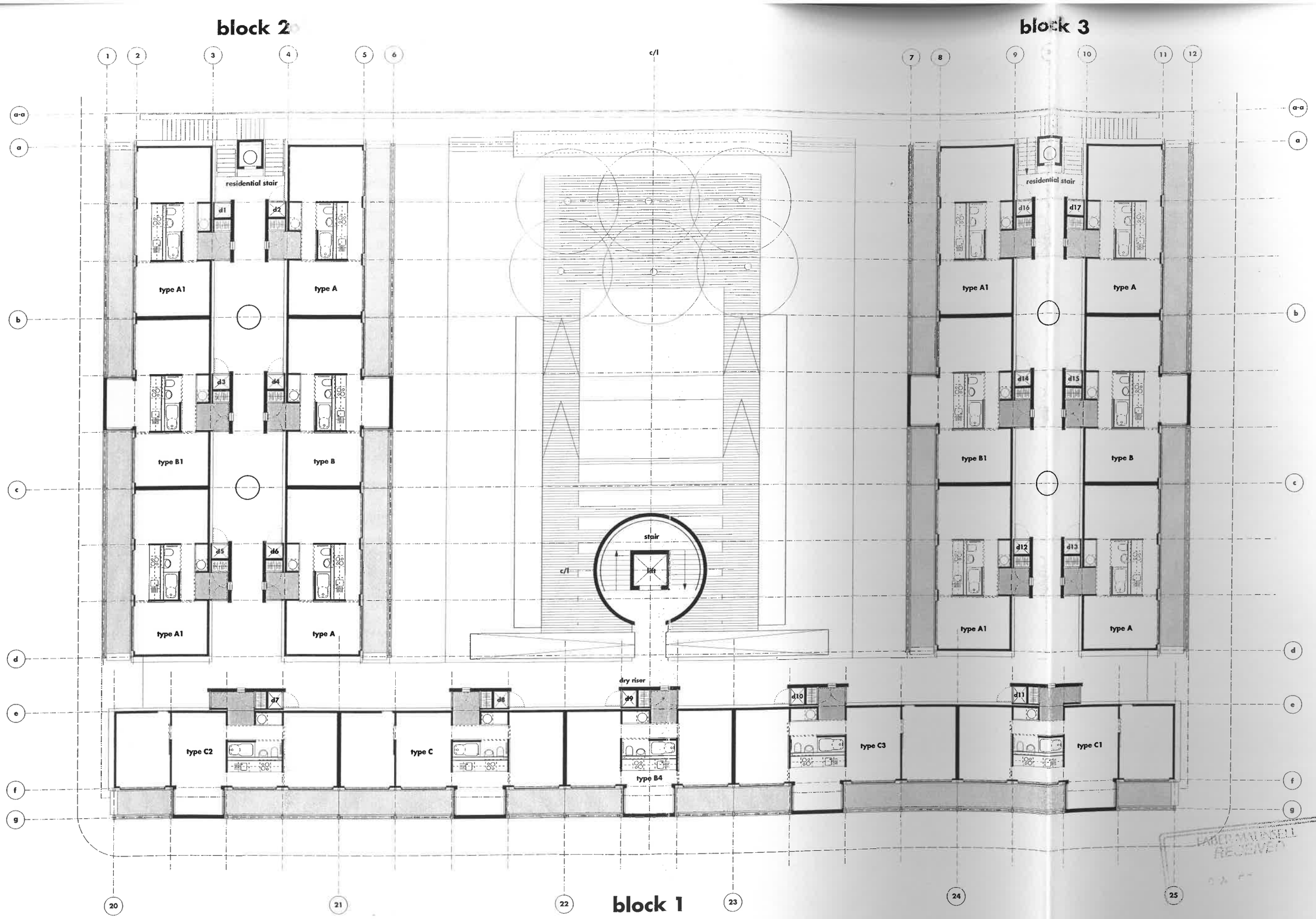
S H E D K M

brit 4 urban splash

drawing number 321a

scale 1:100@A1

ground floor plan



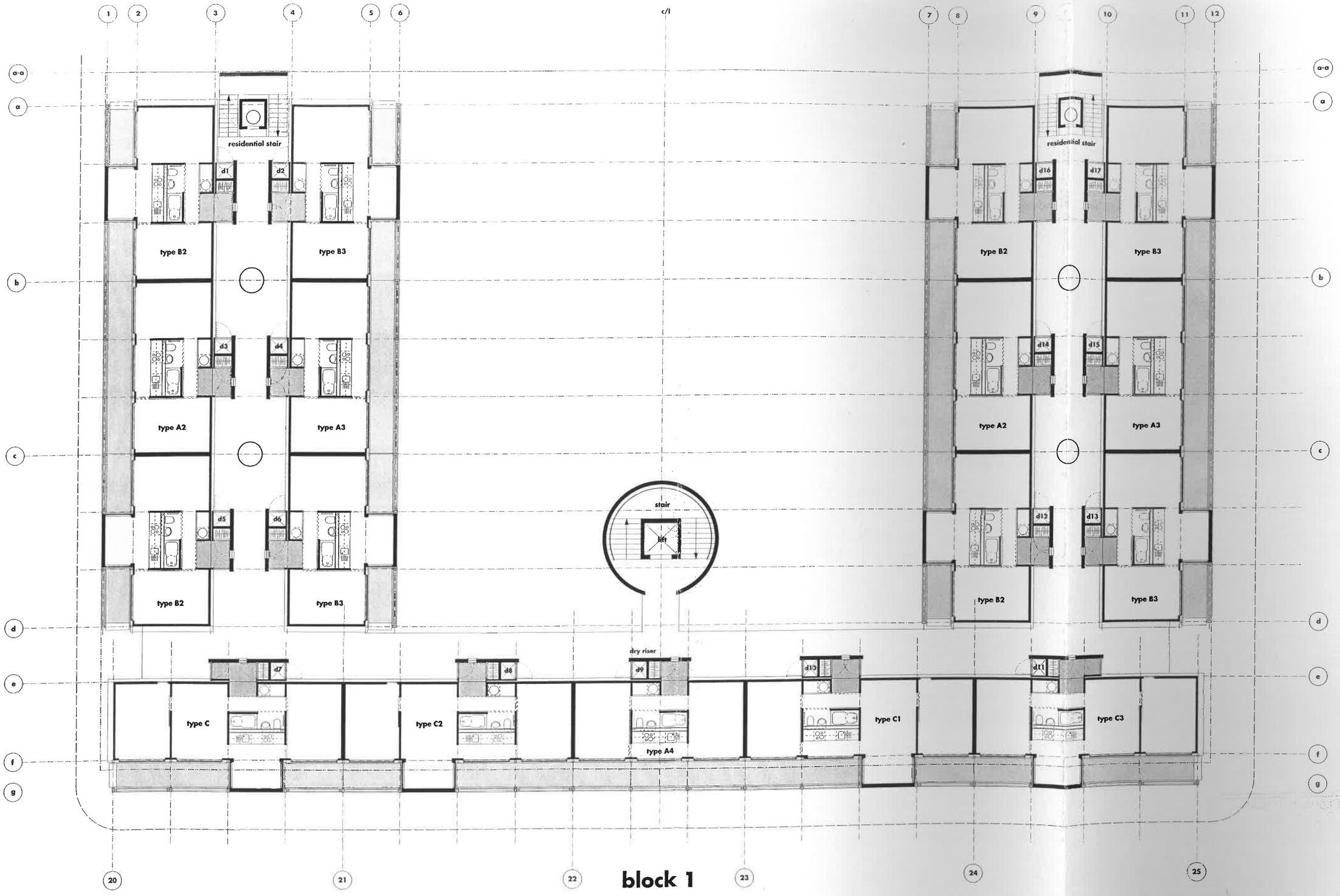
S H E D K M

brief 4 urban splash

drawing number 323a

scale 1:100@A1

1st floor plan



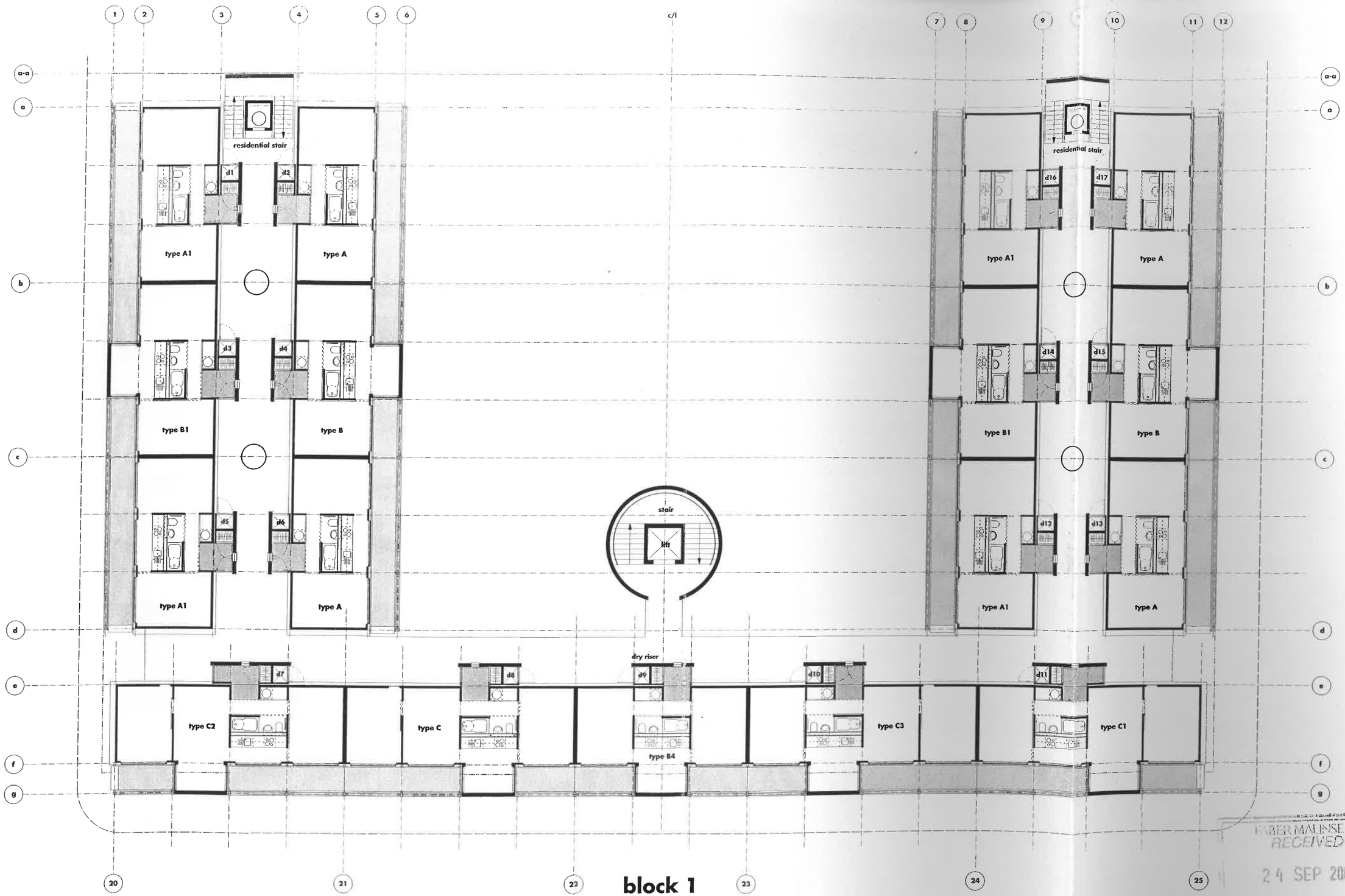
S H E D K M

brit 4 urban splash

drawing number 324a

scale 1:100@A1

2nd/4th/6th floor plan



block 1

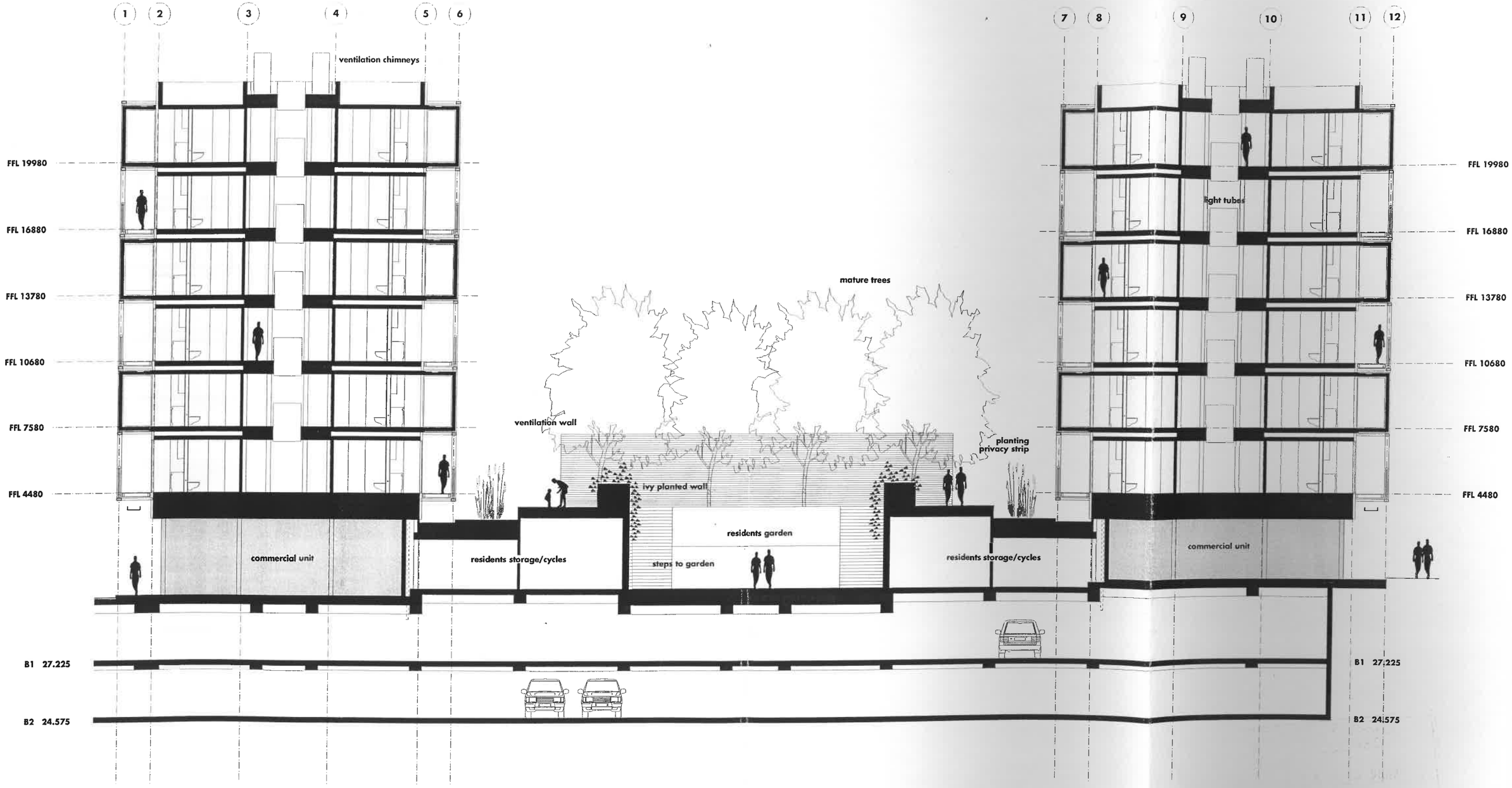
S H E D K M

brit 4 urban splash

drawing number 325a

scale 1:100@A1

3rd/5th floor plan



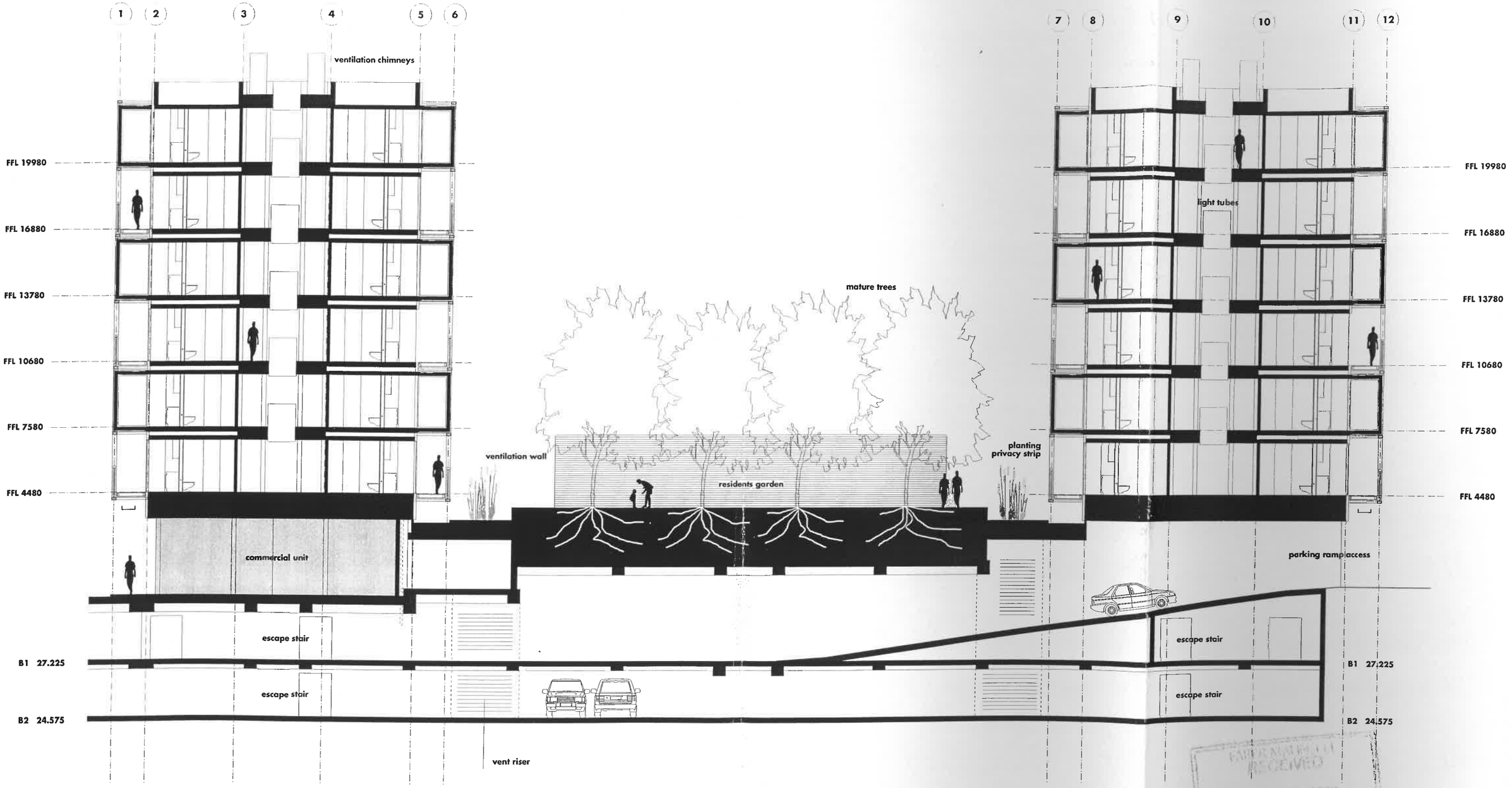
S H E D K M

brit 4 urban splash

drawing number 510a

scale 1:100 @ a1

proposed section a



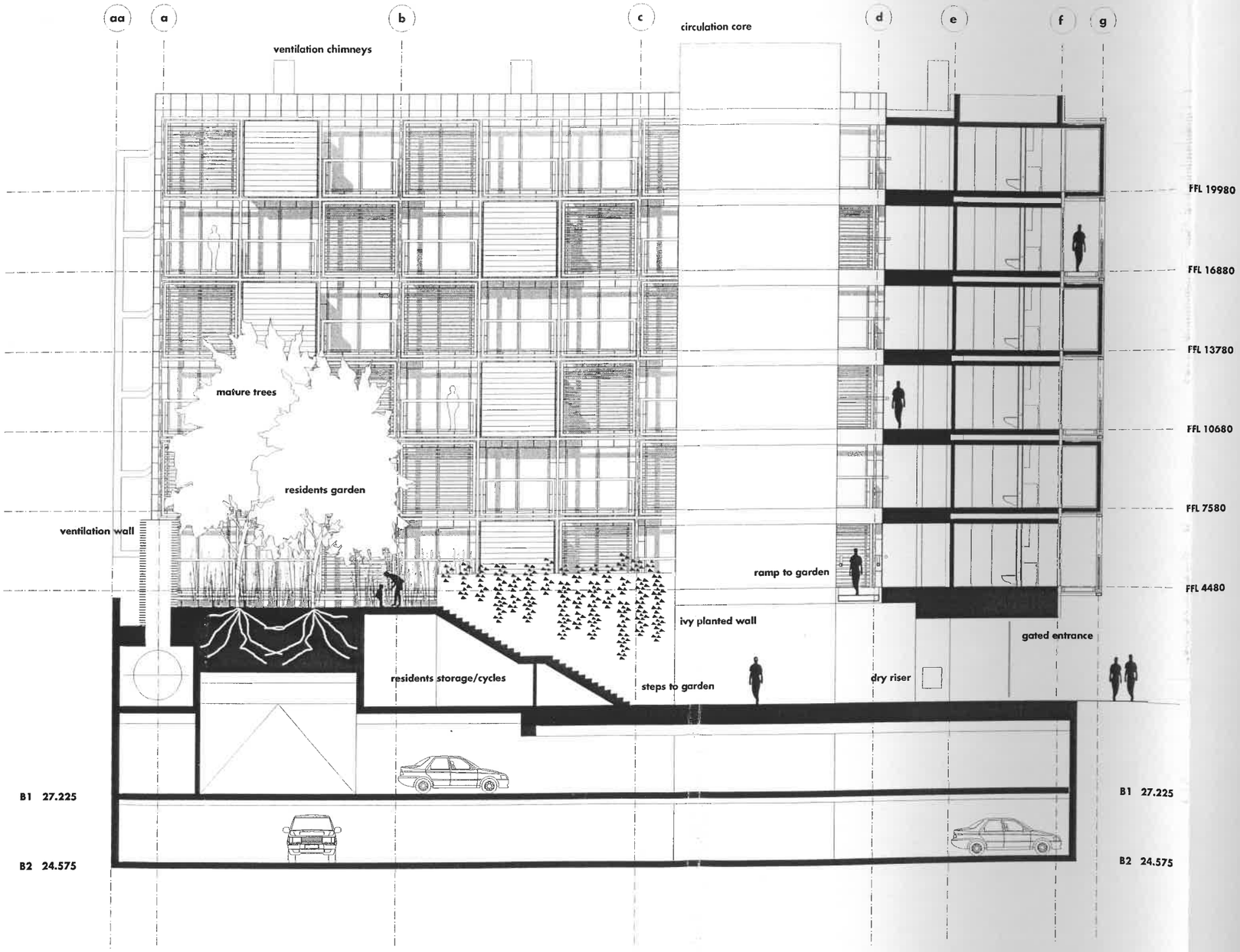
S H E D K M

brit 4 urban splash

drawing number 511a

scale 1:100 @ a1

proposed section b

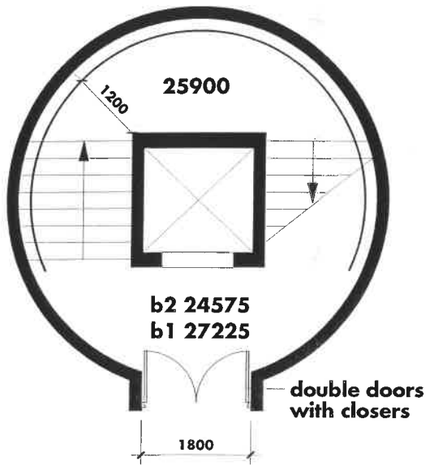


S H E D K M

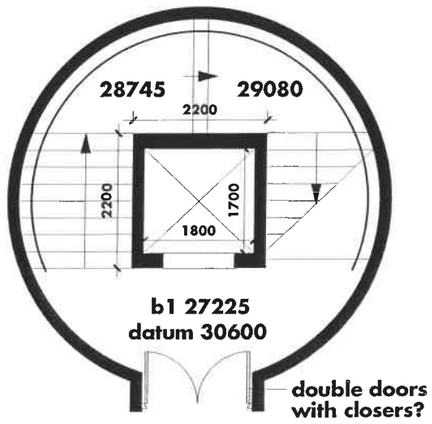
bnit 4	urban splash
drawing number	514a
scale	1:100 @ a2

proposed section e

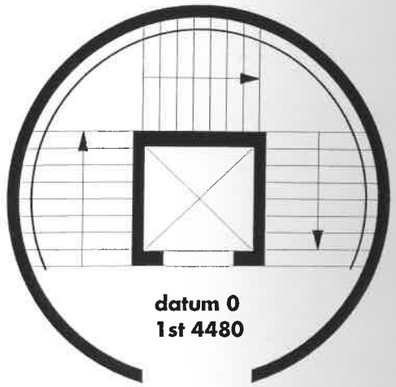
B2
16 risers @ 166



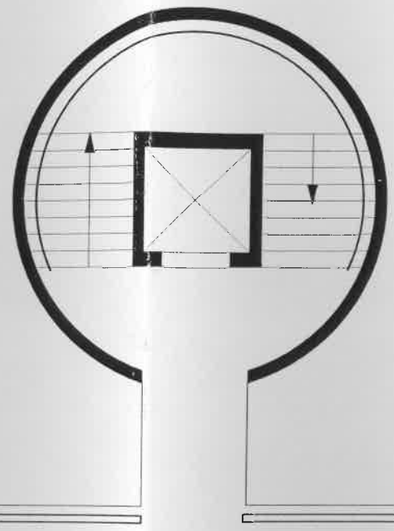
B1
18 risers @ 160

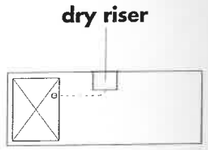


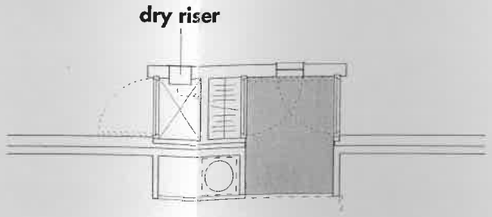
GROUND FLOOR
26 risers @ 172



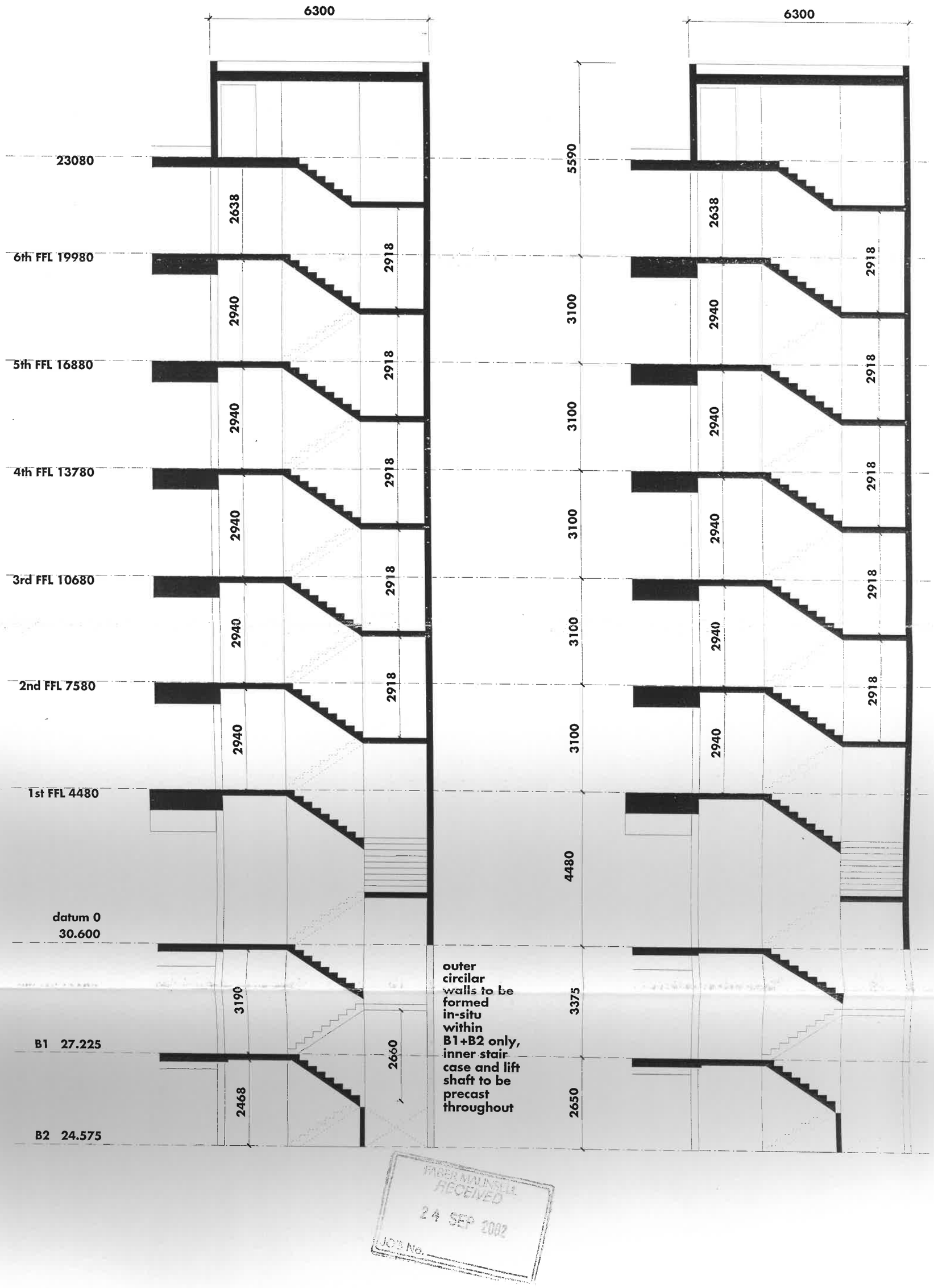
1st - 6th FLOOR - TYPICAL
18 risers @ 172







central circular core setting out [plans] scale 1:100



central circular core setting out [sections] scale 1:100