WESTFIELD LIVERPOOL

ROOFTOP CASUAL DINING AND ELP PRECINCT

DA STUDY (SCHEME 07)



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1.0 INTRODUCTION

MPN Group was commissioned by Scentre Group to review the structural implications of the proposed Rooftop Casual Dining and ELP Precinct for a proposed DA submission at Westfield Liverpool.

The study was based on Architectural drawings of the proposed development L1.02.01[V], L1.02.02[V], L1.02.03[V], L1.02.04[V], L1.02.05[V] and L1.02.06[V] dated 29 & 30 May 2019 and existing structural documentation by Mateffy-Perl-Nagy Consulting Engineers. Architectural elevations and sections of the carpark on the corner of Campbell and Bathurst Street were also provided (no date).

MPN prepared reports on three previous schemes. The MPN reports are 11001-MS03 dated 18 January 2017, 11001-AM01 dated 8 November 2017 and 11001-MS04 dated 13 September 2018.

The Architectural drawings, Structural key Plan and Sketches that describe various aspects of the structural implications of the scheme are presented in the appendices at the end of this report.

2.0 PROPOSED DEVELOPMENT

The Architectural drawings of the latest proposed development were received by MPN on 30 May 2019 and are included in Appendix A at the end of this report. The proposed development consists of the following:

- One Indoor Recreation tenancy
- Twenty specialty shops/restaurant tenancies
- Common outdoor ELP areas
- Demolition of part of the existing cinemas to make way for a new Commercial Tower
- Modifications to the existing cinemas
- An additional carpark deck (level 4) above the existing multi-level carpark located on the corner of Campbell and Bathurst Streets
- New car ramps from level 2 to 2m and 2m to 3 in the existing multi-level carpark located on the corner of Campbell and George Streets

3.0 EXISTING STRUCTURE

Westfield Liverpool shopping centre is located in the Western Sydney region. Originally constructed in the early 1970's it has undergone a number of extensions and alterations since. The site is bounded by Campbell Street to the North, Elizabeth Drive to the south, George Street to the East and Bathurst Street to the West. The building within the footprint of the proposed casual dining and ELP development generally consists of two levels of retail with rooftop carparking and a cinema complex at roof level. A large part of this proposed development is within the existing cinema foyer and requires the demolition of several existing cinema auditoria to accommodate a new commercial tower.

The proposed new level 4 carpark deck is in structural Blocks 22 and 23 of the existing multi-level carpark (Zone A) constructed in the early 1990's and extended in 2005. The proposed casual dining and ELP as well as the office tower predominately overlays structural Blocks 12, 14, 15, 16, 18, 20, 28, 29 and 30 of the major extension (Zone B) constructed in the early 1990's. The proposed new car ramps are in structural Blocks 1 and 4 of the original structure (Zone C) constructed in the early 1970's.

Blocks 22 and 23 of the Zone A 1990's extension designed by Mateffy-Perl-Nagy consists of pier footings, reinforced concrete columns and prestressed concrete slab/bandbeam floors. The pier footings and columns were strengthened in 2005 to accommodate extra carpark levels.

Blocks 12 and 18 consist of pad footings, reinforced concrete columns and prestressed concrete slab/bandbeams at the first suspended and roof levels. Blocks 14, 15, 16 and 20 of the Zone B 1990's extension designed by Mateffy-Perl-Nagy consists of pad footings, reinforced concrete columns, two-way reinforced concrete flat slabs at the first suspended level and prestressed concrete slab/bandbeams at roof level. Part of these slabs are the original retained slabs designed by MacDonald, Wagner & Priddle prior to the 1970's that subsequently had their footings lowered in the 1990's extension.

Blocks 28, 29 & 30 of the Zone B 1990's extension designed by Mateffy-Perl-Nagy consists of pad footings, reinforced concrete columns and prestressed concrete slab/bandbeams at the first suspended and roof levels. There are a number of existing transfer beams at the first suspended level in Block 29. Block 28 main structural slab at level 2 is set at the original road level and has a secondary raised Bondek slab at retail level.

There have been numerous structural alterations to the original Zone B structure within the footprint of the proposed development. The more structurally complex alterations include new cinemas in the 1990's designed by Mateffy-Perl-Nagy that involved construction of concrete slabs and transfer beams over the existing Block 16 to 21 roof slabs. The beams span to existing columns and do not load the existing structural slab.

Blocks 1 and 4 of the original Zone C 1970's structure designed by Mateffy-Perl-Nagy consists of pad footings, reinforced concrete columns, reinforced concrete slab/bandbeam floors. Some of the larger span bandbeams are prestressed.

Note that there is a large change in existing floor level between Zone B and Zone C that will need careful consideration in the architectural planning of the proposed development.

4.0 STRUCTURAL REVIEW

4.1 Extent of Proposed Development

Parts of the proposed development are located in Zones A, B and C. Refer to the Architectural Plans in Appendix A and MPN Structural Key Plan in Appendix B for locations.

The proposed commercial tower is located above existing retail space primarily in structural Block 20 with the two northern-most column lines crossing into Block 18.

New cinema alteration works overlay existing Blocks 16, 18 and 20.

As stated in Section 3.0, Zone B underwent alterations during the 1990's for new cinemas. Most of the existing level 3 floor for Blocks 16 to 21 is raised above the original structural slab with a grillage of transfer beams and a Bondek slab. This level varies by approximately 950-1,000mm (to be confirmed) above the adjacent Blocks 28 and 29.

Other areas of the proposed ELP development extend into Blocks 12, 14, 15, 17, 28, 29 and 30.

The additional carpark deck (level 4) above the existing multi-level carpark on the corner of Campbell and Bathurst Streets is within structural Blocks 22 & 23.

The new car ramps in the existing multi-level carpark on the corner of Campbell and George Streets are in structural Blocks 1 and 4. The ramp from level 2 to 2m is in structural Block 4 whilst the ramp from level 2m to 3 is in structural Block 1.

4.2 Loading

Preliminary structural checks have been carried out using the following loads:

- Superimposed dead loads for floor finishes, services and lightweight walls in the Rooftop Casual Dining and ELP Precinct areas = 1.5kPa
- Self-weight of lightweight raised floor throughout Zone B level 3 = 1kPa
- Superimposed live load in the Rooftop Casual Dining, ELP Precinct areas = 5kPa
- Superimposed live load in cinema areas = 4kPa
- Superimposed live load in carparks = 2.5kPa
- Weight of new metal deck roofs = 0.5kPa

Previous schemes investigated by MPN in Zone B included the structural implications of both a lightweight raised floor and a concrete raised floor in areas that needed raising to suit the proposed architectural floor levels. Based on these previous investigations, Scentre Group have advised that the lightweight raised floor option is to be adopted. Hence, a concrete raised floor option for Zone B is not provided in this report.

A lateral analysis (for earthquake) was carried out on a previous ELP scheme mentioned above for a combined ('stitched') Zone B Blocks 12 to 17. The findings of this previous lateral analysis have been used to estimate the likely earthquake strengthening for the current ELP scheme.

No other lateral analysis has been carried out at this stage. However, commentary on likely Earthquake strengthening has been made in Section 4.8 of this report based on engineering judgement and experience.

4.3 Zone A

Refer to the Architectural Plans in Appendix A and MPN Structural Key Plan in Appendix B for locations.

4.3.1 Additional Carpark Deck in Structural Blocks 22 & 23

An additional carpark deck is proposed at level 4 in Blocks 22 and 23 of the existing multi-level carpark located on the corner of Campbell and Bathurst Streets.

The existing carpark structure was constructed in the early 1990's and subsequently extended in 2005. The 1990's pier footings and columns were strengthened in 2005 to accommodate extra carpark levels. Spot checks have been conducted on the strengthened footings and columns for the extra carpark level with the following structural implications:

- The existing columns and footings supporting the existing concrete structure are generally adequate to support the vertical loads of an extra carpark deck at level 4.

- Composite concrete slabs supported by steel beams spanning directly to existing columns is the recommended structural floor system for the new level 4 carpark decks to minimise load on the existing structure and to avoid backpropping several floors through the existing carpark required for a full concrete floor system such as PT concrete.
- Earthquake bracing (concrete shear walls or steel bracing) is required in both Blocks 22 and 23 to comply with current Australian Standards. Refer to Section 4.8 for commentary on the likely bracing requirements.

4.4 Zone B

Refer to the Architectural Plans in Appendix A and MPN Structural Key Plan in Appendix B for locations. Refer to Appendix D for sketch drawings of the proposed structural alterations and new works described in the following sub-sections.

4.4.1 Works Within Structural Blocks 12, 14 & 15

An Indoor Recreation tenancy is proposed at level 3 and a large tenancy S4.01 is proposed at level 4. These tenancies are predominantly within structural Blocks 12, 14 and 15 except for one bay that extends into Blocks 16 and 17. Specialty shops S3.01 to S3.04 and part of the ELP common outdoor area are also proposed within Blocks 12, 14 and 15.

Structural checks have been conducted on the existing footings, columns and floor slabs in Blocks 12, 14 and 15 with the following structural implications:

- Spot checks have been carried out on the existing structural floor slabs at level 3 for a lightweight raised floor to account for the changes in level between the original slab and new tenancy level. It was found that a lightweight raised floor system (e.g. Boxspan as used at the recent Hurstville ELP precinct) consisting of bearers and joists supported on piers can be adopted in most areas. However, the bandbeam end spans generally need to be strengthened. Based on preliminary slab analysis, strengthening using carbon fibre strips or steel beams is considered feasible.
- Spot checks have been carried out on the existing footings and columns to accommodate an extra retail floor at level 4. A composite concrete slab supported by steel beams spanning directly to existing columns with a metal deck roof above has been assumed for the new structure. The existing columns and footings are generally adequate to support the new vertical loads. The columns required to support the new level 4 slab and roof will need to be located directly above existing building columns under. Plant equipment on the new roof will need to be kept to a minimum to reduce loading to the existing structure.
- All new walls must be of lightweight construction (e.g. steel studs lined with plasterboard).
- The new level 4 slab and roof will need to be braced down to existing level 3 slab.
- An expansion joint at levels 3 and 4 will need to be provided through the proposed tenancies where they cross into Blocks 16 and 17 (along grid B14). This portion of the new extension will also need to be braced down to existing level 3 slab independent of the bracing required for Blocks 12, 14 and 15.

Earthquake bracing (concrete shear walls or steel bracing from footing to level 3) and Block ‘stitching’ with steel members is required for Blocks 12, 14 and 15 to comply with current Australian Standards. Refer to Section 4.8 for commentary on the likely earthquake upgrade works.

4.4.2 Works Within Structural Blocks 16 & 17

One bay of the proposed Indoor Recreation tenancy and part of tenancy S4.01 discussed in Section 4.4.1 extends into Blocks 16 and 17. Refer to Section 4.4.1 for comments related to these tenancies. Specialty shops S3.12 to S3.15, part S.16 and part of the ELP common outdoor area are also proposed in Block 16 at level 3. Part of specialty shop S4.02 is proposed in Block 16 at level 4.

It is understood that the existing mezzanine floors within Block 16 (denoted M3 on the structural sketch drawings in Appendix D) are to remain. These consists of mezzanine slabs at level 3m and level 4 with a metal roof above. The ceiling height below level 3m may be low and will need to be considered in the planning.

The following structural implications are noted in relation to the proposed works in these Blocks:

- It is understood that the new ELP areas will be raised to match the existing cinema foyer level where required. A lightweight raised floor system (e.g. Boxspan as used at the recent Hurstville ELP precinct) consisting of bearers and joists supported on piers can be adopted in most areas. However, the bandbeam end spans generally need to be strengthened. Based on preliminary slab analysis, strengthening using carbon fibre strips or steel beams is considered feasible.
- To accommodate the proposed level 4 addition, the existing raised Bondek slabs within the existing cinema foyer are to be demolished and replaced by a lightweight floor system (such as Boxspan) to minimise load on the existing columns and footings.
- Part of the existing cinema foyer roof needs to be demolished to accommodate the proposed new level 4. Temporary diagonal bracing and support down to level 3 is required for the existing roof that remains. Permanent bracing will need to be provided by the new structure proposed in place of the existing roof.
- Where new tenancies are proposed under the existing saw-tooth skylight, structural checks will need to be performed (at Design Development stage) to determine if a new ceiling and services can be hung from the existing structure without strengthening works. Removing the existing walkways, 'boats' and large ducts that currently hang from the skylight would assist in adding new ceilings and services.

The existing void between grids B17.5-B19/BN-BO (denoted V2 on the structural sketch drawings in Appendix D) is to be infilled as per the proposed floor plan. The following structural implications of the void infill are noted:

- A composite concrete and steel beam floor is recommended to fill the void.
- The steel floor beams should span directly onto existing concrete columns to avoid strengthening works to existing slab bands.
- Void edge beams will need to be strengthened for loading from the proposed infill if steel beams cannot span directly to existing columns. This could be achieved with Carbon fibre strips or composite concrete upturn beams between the original level 3 slab and the existing raised Bondek slab.
- The void infill continues into Block 18. An expansion joint along grid B19 is required through the infill slab.

It is understood that since there is no change of building class in Blocks 16 and 17, the building certifier has apparently confirmed that an earthquake upgrade is not obligated for these two structural Blocks. Refer to Section 4.8 for commentary on earthquake upgrade works.

4.4.3 Works Within Structural Blocks 18 & 20

The proposed commercial tower is located primarily over structural Block 20 with the two northern-most column lines crossing into Block 18. Specialty shops S3.16 (part), S3.17, S.20 and part of the ELP common outdoor area are proposed in Blocks 18 and 20 at level 3. Part of specialty shop S4.02 and the first commercial tower floor are proposed at level 4 in these Blocks. Part of proposed shop S3.20 requires an extension of Block 20 slab at level 3.

The following structural implications are noted in relation to the proposed ELP works in these Blocks:

- It is understood that the new ELP areas will be raised to match the existing cinema foyer level where required. A lightweight raised floor system (e.g. Boxspan as used at the recent Hurstville ELP precinct) consisting of bearers and joists supported on piers can be adopted in most areas. However, the bandbeam end spans generally need to be strengthened. Based on preliminary slab analysis, strengthening using carbon fibre strips or steel beams is considered feasible.
- To accommodate the proposed level 4 addition, the existing raised Bondek slabs within the existing cinema foyer are to be demolished and replaced by a lightweight floor system (such as Boxspan) to minimise load on the existing columns and footings.
- Part of the existing cinema foyer roof needs to be demolished to accommodate the proposed new level 4. Temporary diagonal bracing and support down to level 3 is required for the existing roof that remains. Permanent bracing will need to be provided by the new structure proposed in place of the existing roof.
- Where new tenancies are proposed under the existing saw-tooth skylight, structural checks will need to be performed (at Design Development stage) to determine if a new ceiling and services can be hung from the existing structure without strengthening works. Removing the existing walkways, 'boats' and large ducts that currently hang from the skylight would assist in adding new ceilings and services.

The existing level 3 void between grids B19-B20a/BN-BO (denoted V2 on the structural sketch drawings in Appendix D) is to be infilled as per the proposed floor plan. The following structural implications of the void infill are noted:

- A composite concrete and steel beam floor is recommended to fill the void.
- The steel floor beams should span directly onto existing concrete columns to avoid strengthening works to existing slab bands.
- Void edge beams will need to be strengthened for loading from the proposed infill if steel beams cannot span directly to existing columns. This could be achieved with Carbon fibre strips or composite concrete upturn beams between the original level 3 slab and the existing raised Bondek slab.
- The void infill continues into Block 16. An expansion joint along grid B19 is required through the infill slab.

The south-eastern extent of the proposed tenancy S3.20 falls outside the existing level 3 structure. This will require a new build consisting of a floor extension at level 3, columns and footings. The following comments are in relation to this new extension:

- A geotechnical engineer would need to be engaged to provide advice on the existing ground conditions.
- A composite concrete floor on steel beams over braced steel columns is the recommend floor structure. A waterproofing membrane is required for any new external slab areas.

- The existing perimeter concrete upstand may need to be "cut down" depending on the floor level of the new slab.
- It is recommended that the new floor (outside the existing structure) be constructed to the proposed architectural level. This will eliminate the requirement for further topping to achieve the proposed architectural levels.

The option of retaining the existing raked cinema slab at level 3 between grids BQ.4 and BUX within Void 1 and raising the floor as required architecturally with a lightweight raised floor has been investigated. The existing infill slab could be retained noting the following:

- Some of the existing slab panels need to be strengthened with steel beams under and possibly carbon fibre on top (for crack control).
- Some of the existing concrete beams need to be strengthened with steel beams under.
- Where the proposed office tower columns intersect this existing slab the tower columns may need to be made larger to enable the column load to pass safely through the column/beam joint. Note that the existing east-west spanning beams cantilever towards the existing void and some contain PT cables, adding to the difficulty of these column transitions.
- Consideration needs to be given as to how the office tower floors will be constructed above the existing Void 1 infill slab. If the office level slabs are PT concrete or conventionally reinforced slabs, the existing infill slab would need to be back propped down to level 1 during construction of the first few office levels. Alternatively, the office slabs could be composite concrete / steel designed to avoid backpropping.
- The FFL in the area of the existing raked infill slab is currently proposed at the lower level (RL 26.400) as per the architectural plan on level 3. This area would need to be replanned architecturally if the existing raked infill slab were to be retained.

The following comments are in relation to the proposed new cinema entry / foyer at level 3:

- The new cinema entry area passes under two existing mezzanines (denoted M1 and M2 on the structural sketch drawings in Appendix D). Both mezzanines may need to be demolished depending on the required ceiling height to the new cinema foyer.
- To accommodate the proposed level 4 addition, the existing raised Bondek slabs within the existing cinema foyer are to be demolished and replaced by a lightweight floor system (such as Boxspan) to minimise load on the existing columns and footings.
- All walls of the proposed development are to be of lightweight construction.

A new Commercial Tower is proposed to be constructed above the existing retail space. The tower is primarily situated in structural Block 20 with the two northernmost rows of columns crossing into Block 18. The following structural implications are noted:

- Part of the existing level 3 cinema grillage of transfer beams, level 3 raised Bondek floor, projection room, fan room and cinema roof need to be demolished to make way for the commercial tower. The extent of demolition is shown in the drawings in Appendix C. Temporary and permanent bracing in addition to new vertical roof support is required down to level 3 for the existing roof that remains.
- Due to the two northern-most rows of tower columns crossing into Block 18, Blocks 18 and 20 will need to be 'stitched' together at the expansion joints at levels 2 and 3 with steel members to act as a single structure.

Earthquake bracing and Block 'stitching' is required for Blocks 18 and 20 to comply with current Australian Standards. Refer to Section 4.8 for commentary on the likely earthquake upgrade works.

4.4.4 Works Within Structural Block 28

The proposed new level 3 tenancies S3.09, S3.10, S3.11 and part of the ELP common outdoor area fall within existing structural Block 28. The existing level 3 slab is constructed to approximately Grid B21.5. South of Grid B21.5 is currently void space for the existing skylight (denoted V3 on the structural sketch drawings in Appendix D). Further, an escalator void with skylight above exists between grids CA1 and CA2 north of Grid B21.5 (denoted V4 on the structural sketch drawings in Appendix D). Both voids (V3 & V4) need to be infilled.

MPN have devised a method of constructing the new infill floors within Voids V3 and V4 prior to demolition of the existing skylight structure above. This method of construction was requested by Scentre Group to maintain watertightness of the existing shopping centre. The method involves the installation of primary structural steel frames in the east-west direction on each side of existing concrete columns. The top of the primary steel frames is positioned just below the existing sloping skylight columns. The bottom of the frames needs to be taken through the existing raised Bondek slab at level 2 to bear on the main structural slab beneath. Secondary steel floor beams would then be installed between the primary steel frames to support a new composite Bondek slab. Once the Bondek slab has been constructed the existing skylight structure can be demolished and the new Bondek slab waterproofed. A lightweight raised floor is then to be constructed on top of the new Bondek slab and on top of the two areas of existing slab at level 3 to achieve the required architectural floor level. The two areas of existing slab require some slab and bandbeam strengthening. Structural concept drawings depicting these works are included in Appendix D at the end of this report.

The new infill slabs and lightweight raised floors described above will add extra load to the existing building. Spot checks have revealed that the existing columns and footings are generally adequate to support the new vertical loads.

Metal deck roofs can be constructed above the new raised floor to enclose the proposed level 3 tenancies. The roof support columns will need to be located directly above existing building columns under the existing roof slab or transferred on steel beams that span to the existing bandbeams or building columns. All walls must be of lightweight construction (e.g. steel studs lined with plasterboard) and plant equipment on the new roofs will need to be kept to a minimum.

Earthquake bracing is required for Block 28 to comply with current Australian Standards. Refer to Section 4.8 for commentary on the likely earthquake upgrade works.

4.4.5 Works Within Structural Blocks 29 & 30

The proposed new level 3 tenancies S3.5 to S3.8 and part of the ELP common outdoor area fall within existing structural Blocks 29 and 30. The existing skylight void (denoted V5 on the structural sketch drawings in Appendix D) in Block 29 is proposed to be infilled to form part of the common outdoor area.

MPN have devised a method of constructing the new infill floor within Void V5 prior to demolition of the existing skylight structure above. This method of construction was requested by Scentre Group to maintain watertightness of the existing shopping centre. The method involves the installation of primary and secondary structural steel beams positioned to suit the proposed architectural raised floor level above the existing level 3 slab. The primary beams transfer the infill floor loads directly to the

existing building columns. The existing concrete upstands under the eastern side of the skylight need to be locally demolished to allow the primary steel beams to pass through in locations that avoid the skylight support points. Once the steel beams have been installed the Bondek infill slabs can be constructed. Following this, the existing skylight structure can be demolished and the new Bondek slab waterproofed. Structural concept drawings depicting these works are included in Appendix D at the end of this report.

A lightweight raised floor structure is to be constructed elsewhere in Blocks 29 and 30 to achieve the required architectural floor levels. Spot checks on the existing floor structure have revealed that a lightweight raised floor system (e.g Boxspan as used at the recent Hurstville ELP precinct) consisting of bearers and joists supported on piers can be adopted.

The new infill slab (V5) and lightweight raised floors described above will add extra load to the existing building. Spot checks have revealed that the existing columns and footings are generally adequate to support the new vertical loads.

Metal deck roofs can be constructed above the new raised floor to enclose the proposed level 3 tenancies. The roof support columns will need to be located directly above existing building columns under the existing roof slab or transferred on steel beams that span to the existing bandbeams or building columns. All walls must be of lightweight construction (e.g. steel studs lined with plasterboard) and plant equipment on the new roofs will need to be kept to a minimum.

There are a number of existing transfer beams at level 2 in Block 29. These have been checked and found to be generally structurally adequate to support the loads imposed by the proposed development except that extra “hanger steel” (e.g. a series of vertical bolts drilled and grouted through the beam) is required where the east-west spanning beams frame into the north-south beam on grid BZ. These locations are shown on sketch drawing SK-S1 in Appendix D.

An existing concrete column was removed on grid CA-C20.4 from level 2 to the underside of the roof slab (level 3) as part of the alteration works carried out in 2011. This column was replaced with a steel column on grid CA-C20 between the same floors as the demolished column. This new steel column currently transfers onto an existing concrete beam at level 2. It is noted on the alteration drawings that the existing beam is only adequate to support the current loads, not future loads. This transfer beam has been checked and we can confirm that it cannot support the additional loads imposed by the proposed development. It is therefore recommended that either a new steel strengthening beam be installed under the existing concrete transfer beam or a new column be installed on grid CA-C20 from a new footing to the underside of level 2. These options are shown on sketch drawings SK-16 to S18 in Appendix D.

Two columns (grids CA-C17 & CA1-C17) were noted on the existing structural drawings to be installed from footing level to the underside of level 2 to avoid transfers at these locations. Some of the structural and architectural drawings indicated that these columns were installed prior to construction of the existing roof slab above but it is uncertain on other drawings. A site inspection has been carried out to confirm that these two columns do exist from footing to roof level (level 3).

Earthquake bracing is required for Blocks 29 and 30 to comply with current Australian Standards. Refer to Section 4.8 for commentary on the likely earthquake upgrade works.

4.5 Zone C

Refer to the Architectural Plans in Appendix A and MPN Structural Key Plan in Appendix B for locations.

Note that MPN recently carried out a structure life span assessment on the existing Zone C structure (refer to MPN report 11063-MS01 Rev 1 dated 2 Feb 2018). The recommendations of this report should be taken into consideration. It was found that the roof slab above Myer is in relatively good condition (except for a few full depth cracks that need to be treated and EJ/mechanical penetrations waterproofed). However, other exposed carpark slabs need to be treated and maintained against corrosion as recommended in the report.

4.5.1 Eastern Side of Tenancies S3.09 to S3.11

Some of the proposed development falls within Blocks 7 and 9A of Zone C. Spot checks have been carried out on the floor slabs between Grids CA-CBC/C25-C28 for a lightweight raised floor (Boxspan). It was found that slab strengthening will be required. The strengthening is likely to consist of grillages of steel beams under the slab. It is recommended that any new works in Zone C be limited to a maximum of 1,000mm east of Grid CBC.

4.5.2 New Car Ramps in Structural Blocks 1 & 4

Refer to the structural concept drawings in Appendix E for both new car ramps.

A new car ramp is proposed in Block 1 from level 2m to level 3. This ramp can be constructed by demolishing a slot in the existing slab at level 3 and the corresponding section of northern façade at the location of the proposed ramp. The existing prestressed beam on grid C2 is to remain undamaged. The new ramp is proposed to be constructed using primary and secondary steel beams and composite Bondek slab. The primary beams are to span directly to existing building column locations.

A new car ramp is also proposed in Block 4 from level 2 to level 2m. This ramp can be constructed by demolishing a slot in the existing slab at level 2m at the location of the proposed ramp. The existing level 2m slab needs to be supported / strengthened with steel beams prior to slab demolition. The southern edge of the slab demolition needs to be supported by a line of beams with columns under to level 2. The new columns require support on steel transfer beams under level 2 that span to the existing building columns. The slab / bandbeams in the bays adjacent to the new ramp will lose their continuity due to the void created for the ramp and therefore need to be strengthened with steel beams under. The new ramp is proposed to be constructed using primary and secondary steel beams and composite Bondek slab.

4.6 Loading Docks

The architectural sketch plan does not indicate a loading dock area. We understand that goods will be delivered at level 1 then transported to level 3 via extended lifts.

4.7 Landscaping

To avoid structural strengthening, the weight of any landscaping will need to be kept within the design load of the existing floor. It may be possible to strategically locate larger pot plants over existing building columns or floor beams.

Preliminary calculations have been performed to give an indication of what structure might be required to achieve a more substantial landscaped zone in some areas. Assuming one regular typical bay of structure (approx. 8.23m x 8.5m) is loaded with 500mm deep soil for planting, a new raised suspended Bondek slab (180mm thick) supported on a grillage of steel beams (400WC to 500WC) above the existing roof slab would be required to span directly to the building columns. Spot checks on existing columns and footings for this arrangement have been carried out and they appear to be adequate for strength (columns may need extra fire protection).

We understand that most of the common outdoor ELP will be used for "lighter" type activities and uses (e.g. kids playground areas, etc.) with only smaller zones of landscaping than the example described above. This would be structurally preferred as it minimises earthquake load and would also lead to a more economical raised floor planter structure.

4.8 Earthquake Comments Based on Engineering Judgement/Experience

As mentioned in Section 4.2, a lateral analysis (earthquake) was carried out on the combined ('stitched') Zone B Blocks 12 to 17 for the ELP scheme proposed prior to the current scheme presented in this report. The findings of this lateral analysis have been used to estimate the likely earthquake strengthening for the current ELP scheme.

No other lateral analysis has been carried out at this stage. However, based on engineering judgement/experience with these types of structures, lateral strengthening of existing structural blocks is expected to be required.

Two main methods of Earthquake strengthening used on previous projects are as follows:

Method 1

This method involves the "stitching" of adjacent structural blocks along their expansion joints in combination with installing shear walls/bracing. While this requires each suspended slab level to be stitched along the expansion joints between relevant Blocks, stitching leads to a lesser number of shear walls/bracing and more opportunities to locate them in architecturally acceptable locations (e.g. between tenancies or in corridors). The bracing/shear walls need to be located between all levels. The number of shear walls/bracing required in each orthogonal direction needs to be determined by detailed lateral analysis.

Method 2

If adjacent blocks cannot be stitched, another option is to introduce bracing/shear walls to individual structural Blocks that require Earthquake upgrade. While this maintains isolation of adjacent Blocks, it would require the installation of bracing /shear walls at each level of each Block. The number of shear walls/bracing required in each orthogonal direction needs to be determined by detailed lateral

analysis. Depending on the Block size, this method typically requires two bracing/shear wall bays in one direction and one (sometimes two) bracing/shear wall bay(s) in the orthogonal direction.

Detailed lateral analysis is required to confirm the suitability of each option above and to determine the stitching requirements or the number of shear walls/bracing and their locations. Further, local footing/column strengthening at the shear wall/bracing locations is typically required.

Sketch drawings of typical steel K-bracing, concrete shear wall options and Block stitching types and where they are expected to be required in the various structural Blocks are included in Appendix F at the end of this report for information.

Two alternatives of having concrete shear walls “off grid” (i.e. not lining up with existing columns) are provided in Appendix F at the end of this report. Alternative 1 has concrete shear walls off grid and in alignment at both levels R1 & R2. Alternative 2 has concrete shear walls off grid at level R1 but on grid (connecting to existing columns) at level R2. These options give flexibility in terms of shear wall placement. Ground anchors are envisaged with both these alternatives as there is little building weight assisting to tie-down the shear walls (as opposed to connecting to existing columns where the building weight helps to reduce or even eliminate ground anchors). The structural order of preference for shear walls is – 1. Connecting new concrete shear walls to existing columns at levels R1 & R2, 2. Concrete shear walls off grid and in alignment at both levels R1 & R2 (alternative 1 in Appendix F) and 3. Concrete shear wall off grid at level R1 but on grid (connecting to existing columns) at level R2 (alternative 2 in Appendix F).

Expansion joint stitching plates/members typically consist of a combination of long tension plates and short shear plates to transfer the longitudinal and transverse earthquake forces acting across the joint. The stitching plates can be located at the top or bottom of existing slabs as required to suit the building function.

The following sub-sections provide commentary on the expected earthquake upgrade of the various structural blocks.

4.8.1 Blocks 22 & 23

Due to the proposed addition of an extra carpark level, earthquake bracing (concrete shear walls or steel bracing) is required in both Blocks 22 and 23 to comply with current Australian Standards.

Method 2 (refer to Section 4.8 above) earthquake strengthening is usually adopted for carpark structures as acceptable bracing locations can usually be found in both major structural directions without impeding carpark function. This type of earthquake upgrade bracing was detailed in the current Westfield Parramatta Zone E carpark extensions.

Sketch drawings of the expected earthquake strengthening for Blocks 22 & 23 are included in Appendix F at the end of this report.

4.8.2 Blocks 12, 14 & 15

The proposed ELP additions to Blocks 12, 14 and 15 include large areas of lightweight raised floors and a new level 4 over part of these Blocks with a new metal deck roof above. In addition, there is a change in use (building class) for these areas. These blocks will therefore require earthquake upgrade.

Earthquake strengthening Method 1 is the most suitable solution for these Blocks due to the existing major retail tenant at level 1 and other specialty shops at levels 1 and 2 limiting the available locations for new bracing. Placement of bracing/shear walls needs careful consideration due to the trading retail shops.

Sketch drawings of the expected earthquake strengthening for Blocks 12, 14 & 15 are included in Appendix F at the end of this report and indicate locations of stitching lines and possible bracing locations. Note that the new lift proposed in Block 14 forms part of the earthquake strengthening system for these three Blocks.

4.8.3 Blocks 16 & 17

It is understood that since there is no change of building class in Blocks 16 and 17, the building certifier has apparently confirmed that an earthquake upgrade is not obligated for these two structural Blocks.

4.8.4 Blocks 18 & 20

The proposed commercial tower is situated over Blocks 18 and 20. As mentioned in Section 4.4.3, Blocks 18 and 20 will need to be 'stitched' together at the expansion joints at levels 2 and 3 with steel members to act as a single structure due to the two northernmost rows of tower columns crossing into Block 18. The new reinforced concrete lift shafts (and possibly stair shafts) required to service the commercial tower will extend from footing level to the tower roof level. These concrete shafts should be sufficient to brace Blocks 18 and 20 for lateral loading (wind, earthquake and robustness). Latest advise from the current tower structural design firm however is that these tower walls are at their limit for the tower alone and extra shear walls are requested within the retail.

Sketch drawings of the expected stitching concept for Blocks 18 and 20 are included in Appendix F at the end of this report.

4.8.5 Block 28

The proposed alterations in Block 28 include a large infill slab (V3 & V4) and large areas of lightweight raised flooring at level 3 forming part of the proposed ELP. In addition, there is a change in use (building class) for this area. This block will therefore require earthquake upgrade.

The new structural steel sway frames at level 3 are proposed to act as the earthquake resisting system for this level. Method 2 earthquake strengthening is proposed to upgrade the structure below level 2. Placement of bracing/shear walls below level 2 needs careful consideration due to trading retail tenancies.

Sketch drawings of the expected earthquake strengthening for Block 28 are included in Appendix F at the end of this report.

4.8.6 Blocks 29 & 30

The proposed alterations in Blocks 28 and 29 include a large infill slab (V5) and large areas of lightweight raised flooring at level 3 forming part of the proposed ELP. In addition, there is a change in use (building class) for this area. These blocks will therefore require earthquake upgrade.

Earthquake strengthening Method 1 is the most suitable solution for these Blocks due to existing retail tenancies at levels 1 and 2 limiting the available locations for new bracing. Placement of bracing/shear walls needs careful consideration due to the trading retail shops.

Sketch drawings of the expected earthquake strengthening for Blocks 29 and 30 are included in Appendix F at the end of this report and indicate locations of stitching lines and possible bracing locations. The existing lift in Block 29 may be used as part of the earthquake strengthening system for these Blocks but the lift shaft walls and footing may need strengthening.

4.8.7 Zone C

A small part of the proposed ELP falls within Blocks 7 and 9A of Zone C. This is considered minor since it involves the construction of only small areas of new lightweight structure as described in Section 4.5.1. Other proposed work in Zone C is the construction of two new car ramps as described in Section 4.5.2.

It could be argued that these works are minor and therefore the existing lateral capacity is not compromised by the alterations. This would need to be confirmed by the building certifier. If it is deemed that Zone C does need upgrading, both Earthquake strengthening methods may need to be considered to determine the most viable/least disruptive option.

4.9 Fire Design Comments

The existing slabs within the footprint of the proposed development will generally achieve a 2 hour fire rating. The original ‘flat slab’ type floor structures have been assessed using Eurocode 2 methods. Using Australian Standards their rating would be 1.5 hours. The existing concrete columns in general need to be assessed individually for fire compliance. Fire design of unbraced concrete columns, columns with less than 8 vertical bars and tall columns is nowadays more onerous than in the past. Where Blocks are braced as part of earthquake upgrades, most of the columns are expected to achieve a 2 hour fire rating but slender columns (e.g. at expansion joints) may not. Non-compliant columns affected by the proposed development may need to be wrapped with suitable/sufficient fire rated material (e.g. “Gyprock Fyrchek”).

4.10 Solar Panels on Existing Cinema Roof

Spot checks have been carried out on the existing cinema roof to determine their capacity to support solar panels (15kg/m2). It was found that the primary roof beams are inadequate to support the added weight and therefore solar panels are not feasible without structural upgrades.

5.0 SUMMARY

The major structural implications of the proposed Rooftop Casual Dining and ELP Precinct have been investigated and are described in this report. The proposed scheme is feasible with structural strengthening of existing structures.

It is generally recommended to:

- Confine the ELP to the least number of discrete structural blocks
- Provide a lightweight raised floor in preference to a heavier concrete topping
- Determine the floor level(s) to suit existing varying conditions, functionality and the need to minimise weight on the existing structure

Lateral loads have not been considered at this stage. However, commentary is provided in this report on the expected lateral strengthening for various structural blocks based on engineering judgement/experience.

APPENDIX A

ARCHITECTURAL DRAWINGS

CAMPBELL STREET

BATHURST STREET

GEORGE STREET

ELIZABETH DRIVE

LEGEND

- PROPOSED COMMERCIAL TOWER
- PROPOSED ENTERTAINMENT/ LEISURE/ MINI MAJOR
- PROPOSED FOOD SPECIALTY/KIOSK
- PROPOSED RETAIL SPECIALTY/KIOSK
- PROPOSED RESTAURANTS
- PROPOSED CINEMA
- PROPOSED STORAGE
- PROPOSED AMENITIES/ BACK OF HOUSE
- PROPOSED MALL
- PROPOSED CORRIDOR
- PROPOSED PLANT/ SERVICES
- PROPOSED VERTICAL TRANSPORT
- PROPOSED/ MODIFIED CARPARK
- PROPOSED LANDSCAPE ZONE
- PROPOSED AWNING
- PROPOSED EXTERNAL AREA
- UPGRADED COLUMNS AS PER LATEST FITPATRICK&PARTNERS AND TTW DESIGN
- NEW COLUMNS AS PER LATEST FITPATRICK&PARTNERS AND TTW DESIGN
- EXISTING COLUMNS
- EXISTING COLUMNS TO BE DEMOLISHED
- STRUCTURAL BLOCK LINE



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Title

PROPOSED LEVEL 1 PLAN (BASEMENT LEVEL)

Centre

WESTFIELD LIVERPOOL

SCHEME 07

PRELIMINARY

Project No.	Drawing No.	Revision
5222	L1.02.01	V
Drawing Scale 1:500 @A1		
Plot Date 30/05/2019		

0 5m 10m 15m 25m 50m

SCALE = 1:500

CAMPBELL STREET

BATHURST STREET

GEORGE STREET

ELIZABETH DRIVE

PEDESTRIAN CROSSING

LOW CHAINWIRE FENCE

MODIFIED CARPARK LAYOUT

EXISTING L2 CARPARK MODIFICATION

NEW RAMP DOWN RL4.2M

NEW RAMP DOWN RL2.2M

STORAGE

EXISTING MALL ENTRY

MALL ENTRY

MYER 5800.7sqm

SUNGLASS HUT 1003 71.1sqm

ABC SHOP 2035 79.2 sqm

FONE BOX 2002 27.2sqm

SOLITAIRES 2036 126.0 sqm

COTTON ON KIDS 2037 LEADER COUNCIL 2038 405.7 sqm

BIG W 7261.2 sqm

SPORTSGIRL 2004/2005/2006 881.9 sqm

TOYS 'R' US 3760

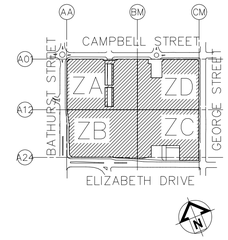
SANDY BAY SURF CO. 267/269 519.2sqm

VAKKO FASHION 270 76.2 sqm

GODFREYS 279 64.2 sqm

HARTS 2001 774 sqm

NANDOS 2056 186.1sqm



LEGEND

- PROPOSED COMMERCIAL TOWER
- PROPOSED ENTERTAINMENT/ LEISURE/ MINI MAJOR
- PROPOSED FOOD SPECIALTY/KIOSK
- PROPOSED RETAIL SPECIALTY/KIOSK
- PROPOSED RESTAURANTS
- PROPOSED CINEMA
- PROPOSED STORAGE
- PROPOSED AMENITIES/ BACK OF HOUSE
- PROPOSED MALL
- PROPOSED CORRIDOR
- PROPOSED PLANT/ SERVICES
- PROPOSED VERTICAL TRANSPORT
- PROPOSED/ MODIFIED CARPARK
- PROPOSED LANDSCAPE ZONE
- PROPOSED AWNING
- PROPOSED EXTERNAL AREA
- UPGRADED COLUMNS AS PER LATEST FITPATRICK&PARTNERS AND TTW DESIGN
- NEW COLUMNS AS PER LATEST FITPATRICK&PARTNERS AND TTW DESIGN
- EXISTING COLUMNS
- EXISTING COLUMNS TO BE DEMOLISHED
- STRUCTURAL BLOCK LINE

0 5m 10m 15m 25m 50m

SCALE = 1:500

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PROPOSED LEVEL 2

Centre

WESTFIELD LIVERPOOL

SCHEME 07

PRELIMINARY

Project No.	Drawing No.	Revision
5222	L1.02.02	V

Drawing Scale 1:500 @A1

Plot Date 29/05/2019

CAMPBELL STREET

BATHURST STREET

GEORGE STREET

ELIZABETH DRIVE

NEW EXPRESS RAMP UP TO L3

LEVEL 2 MEZZANINE MODIFIED CARPARK LINEMARKING & NEW INTERNAL RAMPS

NEW RAMP DOWN TO L2

E.RL23.670

E.RL22.80

E.RL23.47

RAMP TO LVL 3

DO NOT PARALLEL TO GRID B-9

DO NOT PARALLEL TO GRID B-9

BOUNDARY

PEDESTRIAN CROSSING

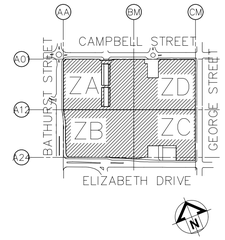
PEDESTRIAN CROSSING

LOW CHAINWIRE FENCE

LEGEND

- PROPOSED COMMERCIAL TOWER
- PROPOSED ENTERTAINMENT/ LEISURE/ MINI MAJOR
- PROPOSED FOOD/ RESTAURANTS
- PROPOSED RETAIL SPECIALTY
- PROPOSED RETAIL KIOSK
- PROPOSED CINEMA
- PROPOSED STORAGE
- PROPOSED AMENITIES/ BACK OF HOUSE
- PROPOSED MALL/ EXTERNAL AREA
- PROPOSED CORRIDOR
- PROPOSED PLANT/ SERVICES
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- PROPOSED AWNING

- UPGRADED COLUMNS AS PER LATEST FITPATRICK&PARTNERS AND TTW DESIGN
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- EXISTING COLUMNS TO BE DEMOLISHED



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Title

PROPOSED LEVEL 2 MEZZANINE PLAN

Centre

WESTFIELD LIVERPOOL

SCHEME 07

PRELIMINARY

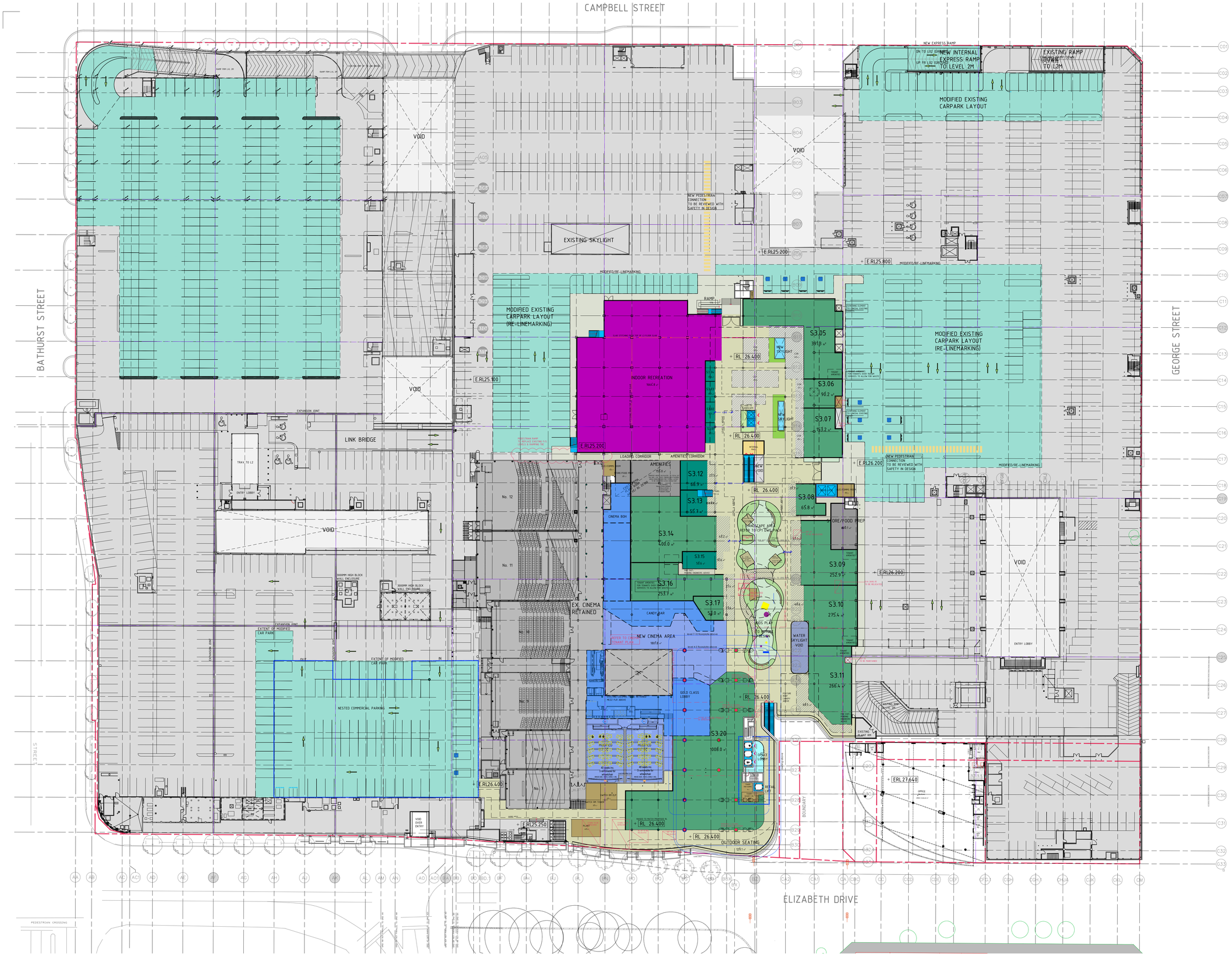
Project No.	Drawing No.	Revision
5222	L1.02.03	V

Drawing Scale 1:500 @A1

Plot Date 29/05/2019

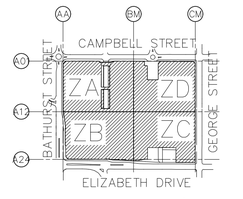
0 5m 10m 15m 25m 50m

SCALE = 1:500



LEGEND

- PROPOSED COMMERCIAL TOWER
- PROPOSED ENTERTAINMENT/ LEISURE/ MINI MAJOR
- PROPOSED FOOD SPECIALTY/KIOSK
- PROPOSED RETAIL SPECIALTY/KIOSK
- PROPOSED RESTAURANTS
- PROPOSED CINEMA
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Title

PROPOSED LEVEL 3 PLAN

Centre

WESTFIELD LIVERPOOL

SCHEME 07

PRELIMINARY

Project No.	Drawing No.	Revision
5222	L1.02.03	V

Drawing Scale 1:500 @A1

Plot Date 30/05/2019

0 5m 10m 15m 25m 50m

SCALE = 1:500

CAMPBELL STREET

BATHURST STREET

GEORGE STREET

ELIZABETH DRIVE

NEW LEVEL 4 CAR PARK

RL 29.200

NEW EXPRESS RAMP
UP TO L02 (GROUND)

EXISTING RAMP DOWN TO L2 (RL22)

CAR PARK BELOW
EXISTING ROOF
TO F/S BELOW

PLANT ROOM LAYOUT SUBJECT TO SERVICE ENG. DESIGN

AWNING TO ENTRY BELOW

ROOF PLANT

HIGH LEVEL ROOF ABOVE RL38.65 TO TOP

CRANE JUMP OFF BASE

SEATING AREA LANDSCAPE BELOW

S4.01
2000 m²

RL 32.40

OPEN TO BELOW

SEATING AREA LANDSCAPE BELOW

TOP OF SLAB
RL 31.40

ROOF BELOW
RL 30.90

AWNING TO ENTRY BELOW
RL 30.90

EXISTING PLANT ROOM BELOW, RL 29.30
EXISTING ROOF SLAB 32.090

EXISTING COOLING TOWERS ON STEEL PLATFORMS SUPPORTED OFF EXISTING PLANT ROOM SLAB BELOW @ RL29.390

EXISTING COOLING TOWER

EXISTING CINEMA

ROOF PEAK RL40.15

ROOF TROUGH RL33.52

S4.02
590.2 m²

RL 30.400

LANDSCAPING REFER TO CPT DWG PACK

TOP OF PARAPET
RL 32.90

TOP OF SLAB
RL 31.40

ROOF PLANT

EXISTING ROOF TO F/S BELOW

PLANT ROOM LAYOUT SUBJECT TO SERVICE ENG. DESIGN

EXTENT OF MODIFIED CAR PARK

NESTED COMMERCIAL PARKING

EXISTING ROOF

NEW PARAPET ROOF BELOW RL 30.49

WATER SKYLIGHT WELL BELOW

EX AWNING

NEW FEATURE ROOF ABOVE RL 36.10

COMMERCIAL TOWER LEVELS
L06A RL53.40
L06 RL49.90
L05 RL45.90
L04 RL41.90
L03 RL37.90
L02 RL33.90
L01 RL29.90
ROOFTOP RL58.90

GFA 1,509 m²
NLA 1,443 m²

BOUNDARY

OFFICE

ROOF TO PLANT BELOW

NEW AWNING TO WALKWAY BELOW

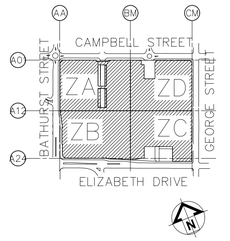
ROOF TO TENANT BELOW

PEDESTRIAN CROSSING

LOW CHAINWIRE FENCE

LEGEND

- PROPOSED COMMERCIAL TOWER
- PROPOSED ENTERTAINMENT/ LEISURE/ MINI MAJOR
- PROPOSED FOOD SPECIALTY/KIOSK
- PROPOSED RETAIL SPECIALTY/KIOSK
- PROPOSED RESTAURANTS
- PROPOSED CINEMA
- PROPOSED STORAGE
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PROPOSED LEVEL 4 PLAN

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WESTFIELD LIVERPOOL

SCHEME 07

PRELIMINARY

Project No.	Drawing No.	Revision
5222	LI.02.05	V
Drawing Scale: 1:500 @A1		
Plot Date: 29/05/2019		

CAMPBELL STREET

BATHURST STREET

GEORGE STREET

ELIZABETH DRIVE

PEDESTRIAN CROSSING

NEW EXPRESS RAMP
DN TO L02 (GROUND)
UP FR L02 (GROUND)

EXISTING RAMP DOWN
TO L2 (PL22)

CAR PARK BELOW

ROOF PLANT

ROOF TO TENANT4-01 BELOW
RL 37.40

HIGH LEVEL ROOF CANOPY
TO TOP, RL 38.00

TOP OF PARAPET
+ RL 38.800

TOP OF ROOF
+ RL 40.150

ROOF PLANT

ROOF TO TENANT4-02 BELOW
RL 37.40

TOP OF PARAPET
RL 32.06

TOP OF SLAB
RL 31.64

FEATURE STRUCTURE
RL 35.65 (TOP)
RL 34.65 (BOTTOM)

TOP OF ROOF
+ RL 40.150

NEW PARAPET
ROOF TO
LOBBY BELOW
RL 35.69

WATER
SKYLIGHT
VOID

EX AWNING

TOP OF PARAPET
+ RL 38.800

TOP OF ROOF
+ RL 40.150

+ RL 35.500

COMMERCIAL TOWER LEVELS

GFA 1,509 m²
NLA 1,443 m²

NEW
FEATURE ROOF
ABOVE RL 36.10

EXTENT OF MODIFIED
CAR PARK

EXTENT OF MODIFIED
CAR PARK

NESTED COMMERCIAL PARKING

ROOF TO
PLANT BELOW

NEW AWNING TO BALCONY BELOW

ROOF TO
TENANT BELOW

ROOF TO
PLANT BELOW

BOUNDARY

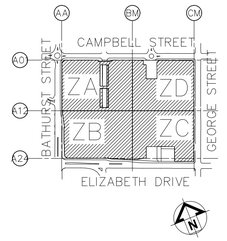
+ RL 27.640

OFFICE

LIFT OVERRUN
RL 43.10

LEGEND

- PROPOSED COMMERCIAL TOWER
- PROPOSED ENTERTAINMENT/ LEISURE/ MINI MAJOR
- PROPOSED FOOD SPECIALTY/KIOSK
- PROPOSED RETAIL SPECIALTY/KIOSK
- PROPOSED RESTAURANTS
- PROPOSED CINEMA
- PROPOSED STORAGE
- PROPOSED AMENITIES/ BACK OF HOUSE
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Title

PROPOSED ROOFTOP PLAN

Centre

WESTFIELD LIVERPOOL

SCHEME 07

PRELIMINARY

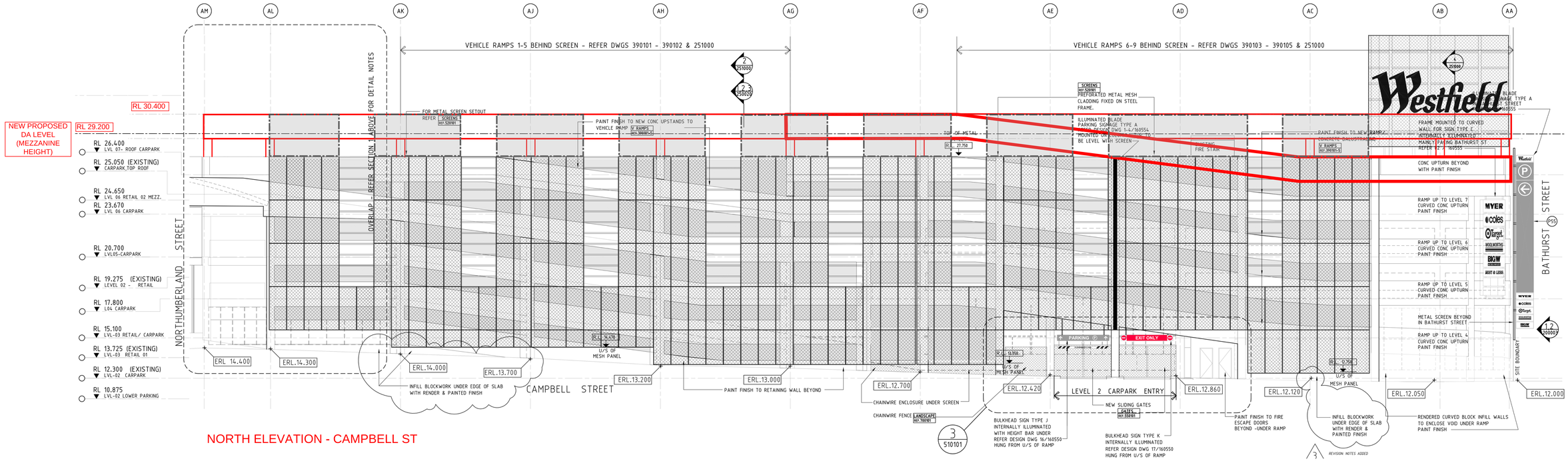
Project No.	Drawing No.	Revision
5222	LI.02.06	V

Drawing Scale
1:500 @A1

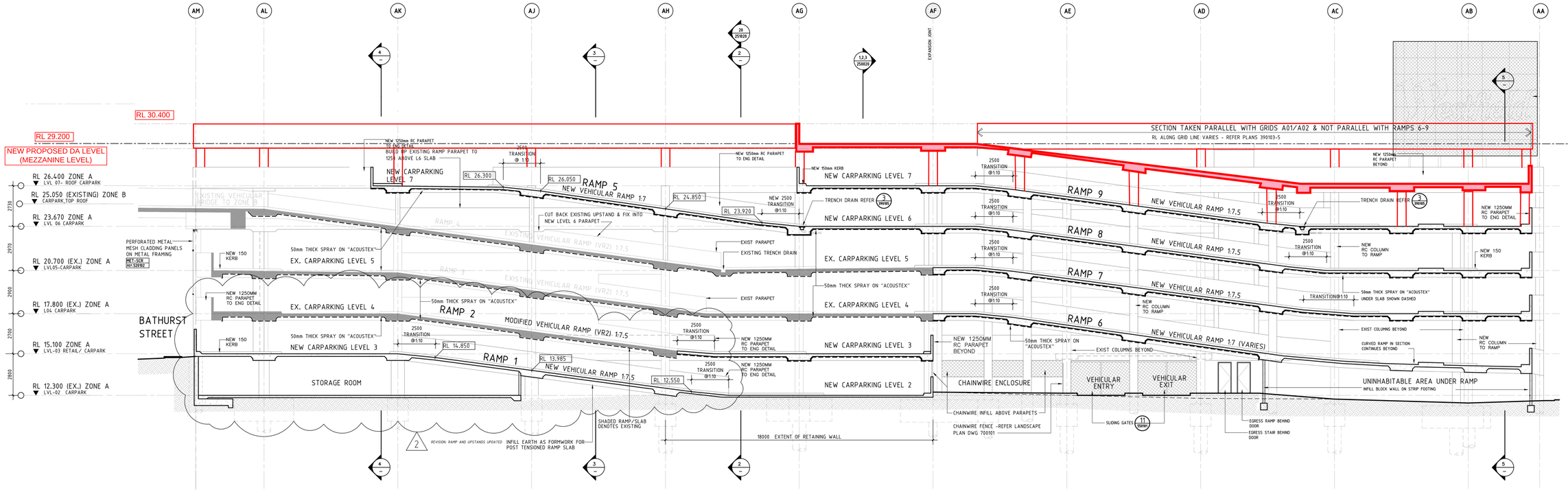
Plot Date
30/05/2019

0 5m 10m 15m 25m 50m

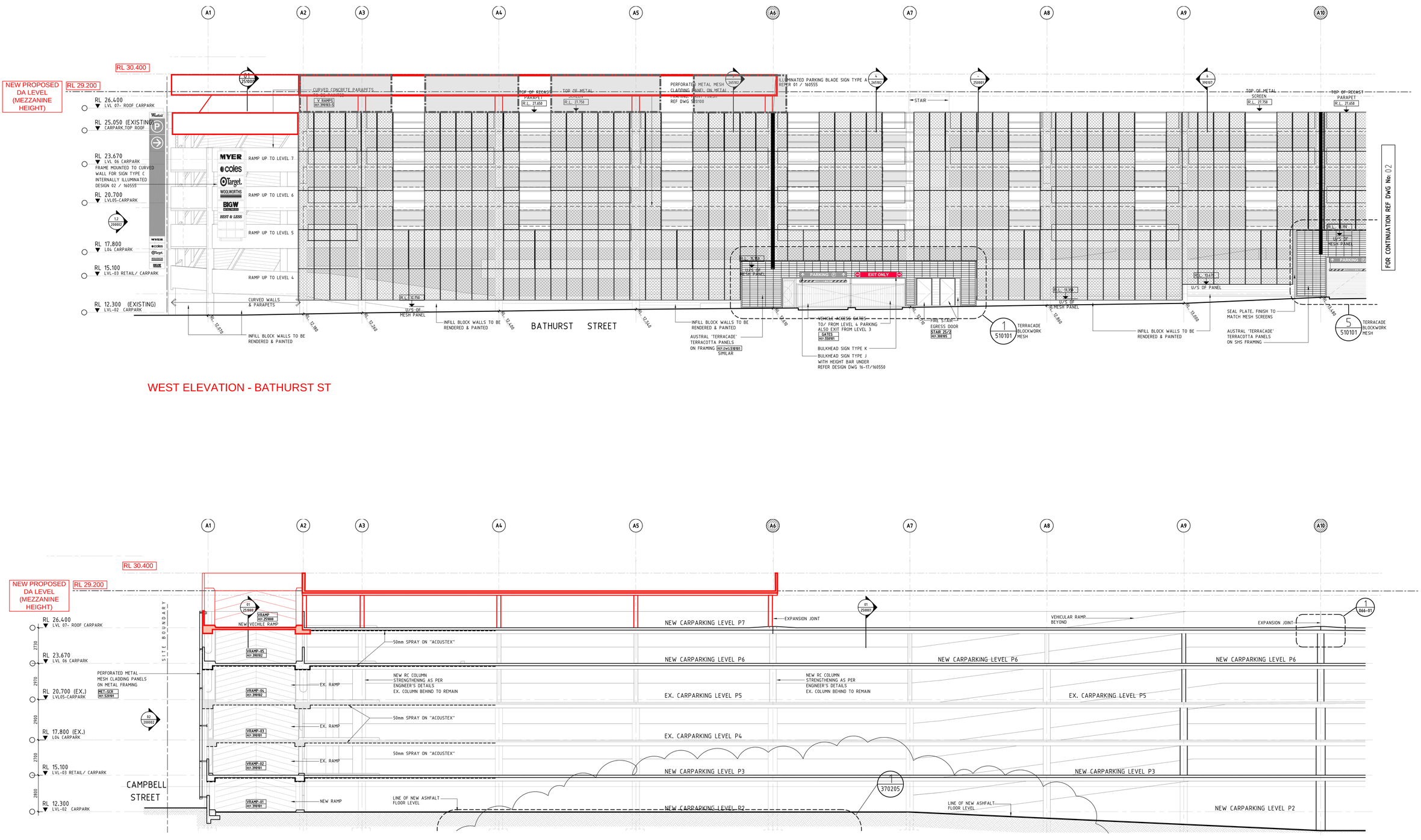
SCALE = 1:500



NORTH ELEVATION - CAMPBELL ST



CROSS SECTION - CAMPBELL ST

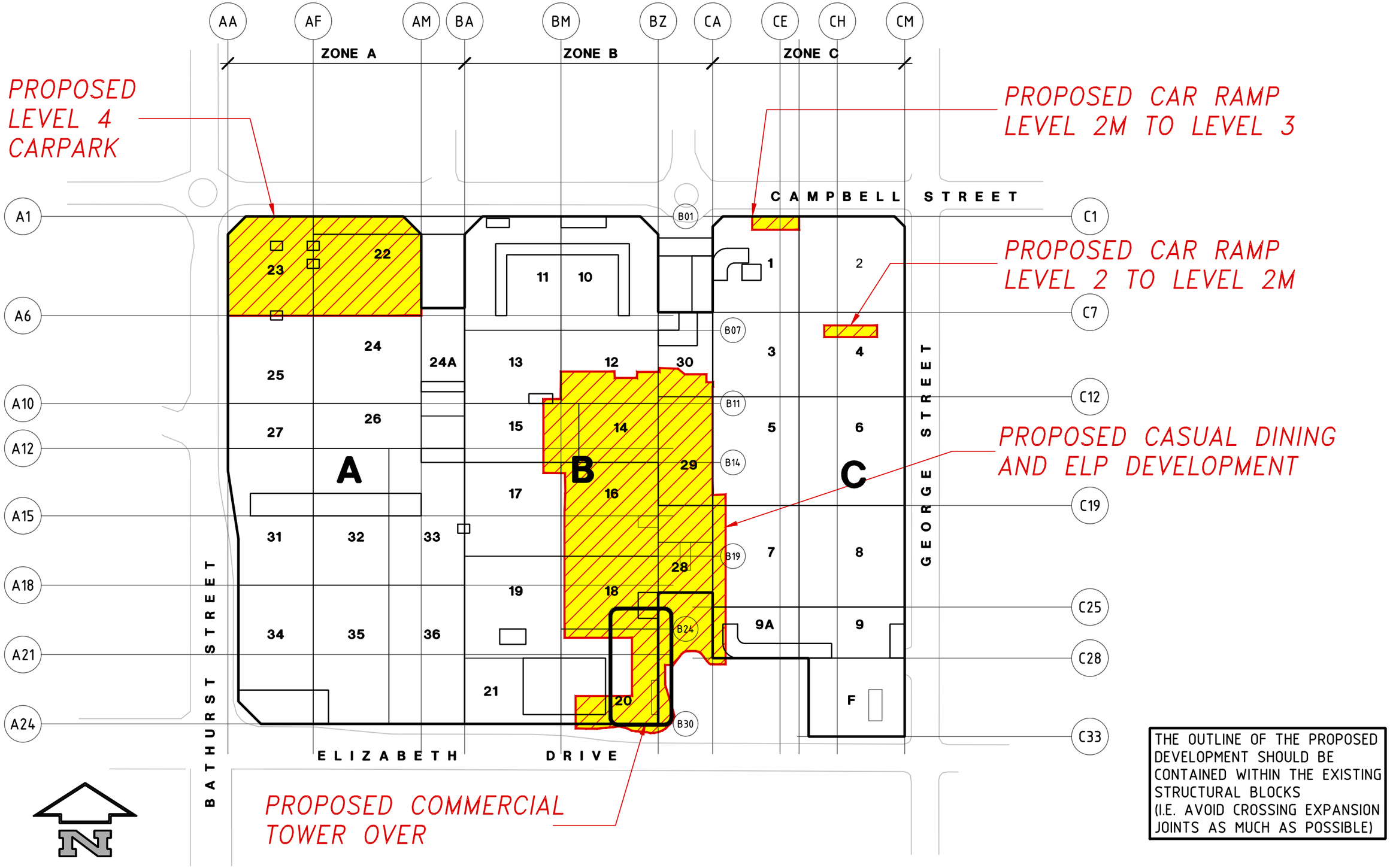


WEST ELEVATION - BATHURST ST

LONG SECTION - BATHURST ST

APPENDIX B

STRUCTURAL KEY PLAN



THE OUTLINE OF THE PROPOSED DEVELOPMENT SHOULD BE CONTAINED WITHIN THE EXISTING STRUCTURAL BLOCKS (I.E. AVOID CROSSING EXPANSION JOINTS AS MUCH AS POSSIBLE)

MPN GROUP PTY LTD
CONSULTING ENGINEERS - A.C.N. 001568878
GROUND FLOOR, 213 MILLER STREET
NORTH SYDNEY, N.S.W. 2060, AUSTRALIA
TEL. +61 2 9929 7144, EMAIL - EMAIL@MPN.COM.AU

WESTFIELD LIVERPOOL STRUCTURAL KEY PLAN

FILE LOCATION	SCALE	DATE LAST MODIFIED	DWG No.	REVISION
J:\11001\STR\GEN\KD_LIVERPOOL OVERLAY.DWG	NOT TO SCALE	07/06/2019		

APPENDIX C

CINEMA DEMOLITION WORKS

Refer to earthquake upgrade sketches for bracing and block stitching details

BLOCK 21

BLOCK 19

BLOCK 17

BLOCK 15

BLOCK 13

BLOCK 20

BLOCK 18

BLOCK 16

BLOCK 14

BLOCK 12

BLOCK 28

BLOCK 29

BLOCK 30

2 x CFT

CFT

Demolish existing raised grillage beams

Existing raised sloping cinema slab to remain. Refer to SK-S3 for strengthening details.

Resupport existing roof prior to demolition at this level

Existing Block 28 slabs to be strengthened. Refer to SK-S6 for details

WESTFIELD LIVERPOOL ELP
LEVEL 3 DEMOLTION AND STRENGTHENING PLAN
MPN-11001-SK. D01
14.06.2019

NOTES :

1) REFER TO DRAWING No 7139/1 FOR ALL RELEVANT CONSTRUCTION NOTES.
2) THIS DRAWING TO BE READ IN CONJUNCTION WITH DWG No's 10 & 11.
3) REFER TO ARCHITECT'S DRAWINGS FOR ALL CHAMFERS, REBATES AND RECESSES.
4) SUPERIMPOSED DESIGN LOADS :
   DEAD LOAD : 0.5 kPa SEATING
   LIVE LOAD : 4.0 kPa CINEMAS
5) CONCRETE GRADE = S25 INTERNAL, S32 EXTERNAL.
6) FIRE RESISTANCE RATING = HOURS U.N.O.
7) COVER TO REINFORCEMENT :

EXTERNAL EXPOSURE CLASSIFICATION : B1

ELEMENT	EXPOSURE	
	INTERNAL	EXTERNAL
SLAB & SLABBANDS : TOP	20	40
SOFFIT, SIDES	20	40
BEAMS : TOP	N/A	N/A
SOFFIT, SIDES	N/A	N/A

Resupport existing roof prior to demolition at this level

Demolish existing raised Bondek slabs. Replace with Boxspan lightweight floor system. Do not damage existing beams that remain where shown.

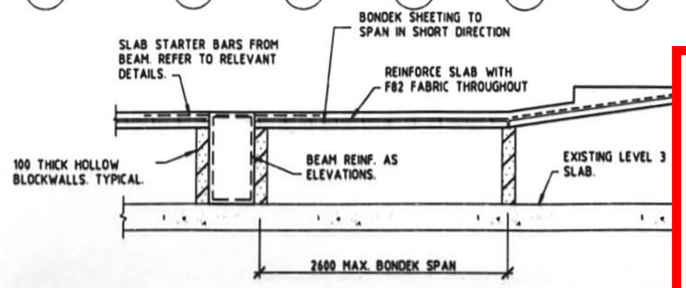
THIS AREA AMENDED. REFER DWG No's 37 & 38.

Demolish existing raised Bondek slabs. Replace with Boxspan lightweight floor system.

PLAN ON CINEMA SLAB : 100 THICK SLABS ON 1.0mm BONDEK U.N.O.

NOTE : BONDEK SLAB TO BE SUPPORTED ON 100 THICK HOLLOW BLOCKWALLS AT 2600 MAX. c/c.
: PC DENOTES CONCRETE COLUMN FOR PROJECTION & PLANTROOMS OVER.
REFER TO DWG No. 11 FOR DETAILS.
: 120 SLABS ARE 2 HOURS FIRE RATING.

NOTE:
(*) DENOTES SLAB TO BE POURED INSITU WITH CONCRETE BEAMS. REFER TO DWG No.'s 12 & 13 FOR PLANS & DETAILS.



TYPICAL BONDEK SLAB DETAILS

ISSUE	AMENDMENT	BY	DATE
D	STAIR AMENDED AT GRID BP/B21 & AREA 6 BONDEK SLAB ADDED	MJD	1/6/19
C	BLOCKWALLS ADDED UNDER BAFFLE WALLS	MS	21/12/18
B	WALLS SHIFTED AT SECTIONS 3A TO 3F AND REVISED AS SHOWN	MS	24/11/18
A	ISSUED FOR CONSTRUCTION	MS	11/10/18

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WESTFIELD LIVERPOOL ELP
LEVEL 3 DEMOLTION PLAN
MPN-11001-SK. D02
14.06.2019

New steel column under onto new infill slab at R3

Existing cinema wall

Resupport existing roof structure onto new beams and columns prior to any slab demolition

Demolish existing projection room slab

NOTE
'E' DENOTES EXTRA REINFORCEMENT
DISTRIBUTION BARS TO BE Y12-300 U.N.O.
DISPLACE ALL TOP & BOTTOM BARS EQUALLY TO EACH SIDE OF SMALL PENETRATIONS WHERE NOT SHOWN ON PLAN. DO NOT CUT REINF. TYPICAL
ALL FALLS IN SLAB TO BE TAKEN UP IN FORMWORK ONLY & NOT IN SLAB THICKNESS.

NOTES:
1 REFER TO DRAWING No. 1 FOR GENERAL CONSTRUCTION NOTES.
2 REFER TO DRAWING No. 33 FOR ALL PRESTRESSING NOTES.
3 REFER TO DRAWING No. 33 FOR PRESTRESSING DETAILS.
4 ⟦ ON PLAN DENOTES LIVE END ANCHORAGE.
5 ⟧ ON PLAN DENOTES DEAD END ANCHORAGE.
6 CONCRETE STRENGTH GRADE REFER DWG No. 33.
7 THE STRUCTURAL ELEMENTS SHOWN ON THIS DWG. HAVE BEEN DESIGNED FOR THE FOLLOWING SUPERIMPOSED LOADS:
DEAD LOAD: kPa kPa
LIVE LOAD: 5.0 kPa PROJECTION ROOM, PLANTROOM
9 CABLES ARE SHOWN DIAGRAMMATICALLY ON PLAN. USE FIGURED DIMENSIONS ONLY WHEN SETTING OUT CABLES. PROVIDE CABLE SUPPORTS AT 1000 MAX CENTRES.
9 CABLE ORDINATES ARE GIVEN FROM UNDERSIDE OF SLAB TO CENTRELINE AT ANCHORAGES AND TO UNDERSIDE OF DUCT ALONG CABLE.
10 WHERE CABLES ARE TO BE STRESSED FROM BOTH ENDS TWO FIGURES ARE TO BE SUBMITTED BY THE CONTRACTOR. THE FIRST FIGURE TO BE GIVEN IS THE FIELD EXTENSION FOR THE FIRST END STRESSED. THE SECOND FIGURE TO BE GIVEN IS THE FIELD EXTENSION FOR THE SECOND END STRESSED.
11 FIRE RESISTANCE RATING AS DETAILED: 2 HOURS
12 COVER TO REINFORCEMENT:
EXTERNAL EXPOSURE CLASSIFICATION : B1

ELEMENT	EXPOSURE INTERNAL	EXPOSURE EXTERNAL
SLAB & SLABBANDS : TOP	20	40
: SOFFIT, SIDES	20	40
BEAMS : TOP	25	40
: SOFFIT, SIDES	30	40

ELEMENT	CABLE No.	No. OF STRANDS.	APPROX. LENGTH.	JACKING FORCE kN PER STRAND.	CALCULATED EXTENSION.
BEAM	1 - 10	7	10 000	156	FIELD EXTENSIONS TO BE SUBMITTED BY THE CONTRACTOR.

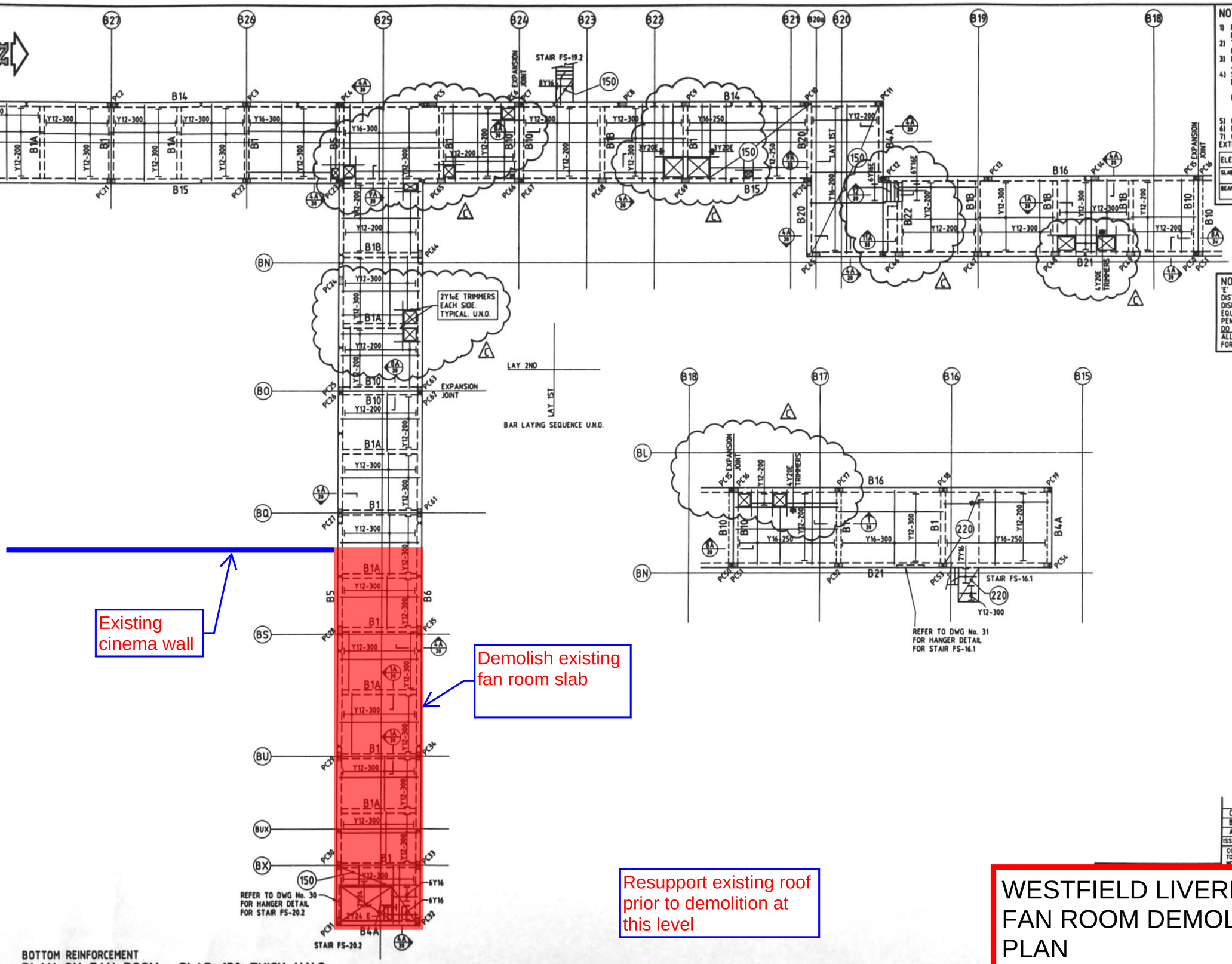
C	SLABS AMENDED & PEND ADDED	MAS	29/2/96
B	SLABS AMENDED AT STAIRS	M.S.	20/11/95
A	ISSUED FOR CONSTRUCTION	M.S.	11/10/95
ISSUE	AMENDMENT	BY	DATE

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BOTTOM REINFORCEMENT
PLAN ON PROJECTION ROOM : SLAB 130 THICK U.N.O.
: REFER DWG.No.24 FOR BEAM ELEVATIONS AND DETAILS.

REFER TO DRAWING NUMBER 7139/21 FOR TOP REINFORCEMENT DETAILS

WESTFIELD LIVERPOOL ELP
PROJECTION ROOM
DEMOLTION PLAN
MPN-11001-SK. D03
14.06.2019



NOTES :

1) REFER TO DRAWING No 1 FOR ALL RELEVANT CONSTRUCTION NOTES.
2) THIS DRAWING TO BE READ IN CONJUNCTION WITH DWG. 20,22,24
3) REFER TO ARCHITECT'S DRAWINGS FOR ALL CHAMFERS, REBATES AND RECESSES.
4) SUPERIMPOSED DESIGN LOADS :
   DEAD LOAD : - kPa
   - kPa
   LIVE LOAD : 5 kPa PLANT ROOM
   - kPa
   - kPa
5) CONCRETE STRENGTH GRADE = S32 U.N.O.
6) FIRE RESISTANCE RATING = 2 HOURS U.N.O
7) COVER TO REINFORCEMENT :

EXTERNAL EXPOSURE CLASSIFICATION : B1

ELEMENT	EXPOSURE	
	INTERNAL	EXTERNAL
SLAB & SLABBANDS : TOP	20	40
: SOFFIT, SIDES	20	40
BEAMS : TOP	25	40
: SOFFIT, SIDES	20	40

NOTE

'E' DENOTES EXTRA REINFORCEMENT
DISTRIBUTION BARS TO BE Y12-300 U.N.O.
DISPLACE ALL TOP & BOTTOM BARS EQUALLY TO EACH SIDE OF SMALL PENETRATIONS WHERE NOT SHOWN ON PLAN, DO NOT CUT REINF. TYPICAL.
ALL FALLS IN SLAB TO BE TAKEN UP IN FORMWORK ONLY & NOT IN SLAB THICKNESS.

BOTTOM REINFORCEMENT
PLAN ON FAN ROOM : SLAB 130 THICK U.N.O.
: REFER DWG.No.24 FOR BEAM ELEVATIONS AND DETAILS.

REFER TO DRAWING NUMBER 7139/23 FOR TOP REINFORCEMENT DETAILS

ISSUE	AMENDMENT	BY	DATE
C	PENETRATIONS ADDED, STAIRS MOVED	PMG	7/3/96
B	SLABS AMENDED AT STAIRS	M.S	26/11/95
A	ISSUED FOR CONSTRUCTION	M.S	15/10/95

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WESTFIELD LIVERPOOL ELP
FAN ROOM DEMOLTION PLAN
MPN-11001-SK. D04
14.06.2019

C:\PROJECTS\LIVERPOOL\DRAWINGS\ Thu Mar 7 11:47:23 1996 MPN GROUP PTY Limited

Resupport existing roof structure onto new beams and columns prior to any slab demolition

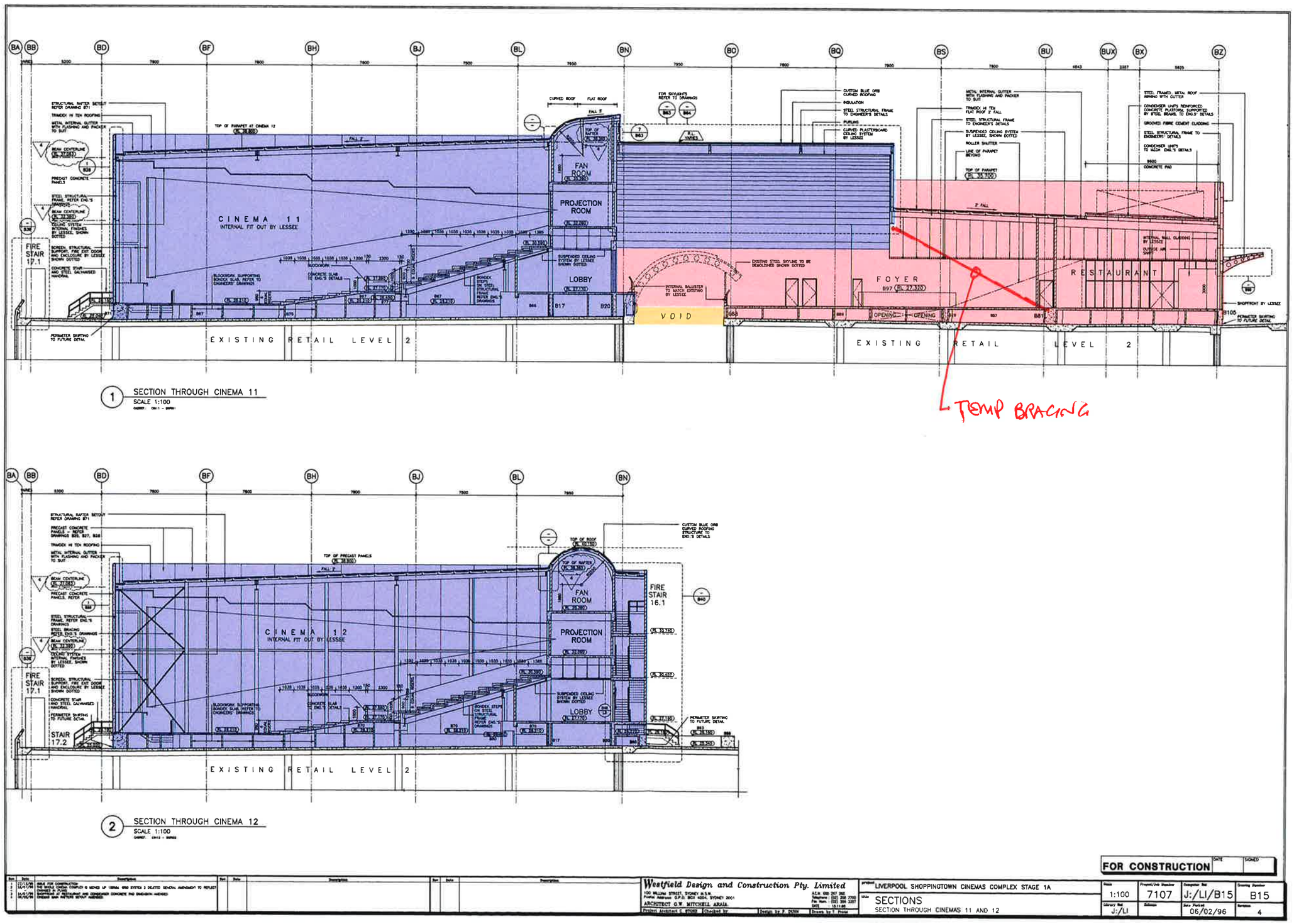
Resupport existing roof prior to demolition at this level

Temporary diagonal bracing to level 3 required for the existing roof that remains prior to demolition. Typical.

Existing roof to be demolished

WESTFIELD LIVERPOOL ELP
ROOF DEMOLTION PLAN
MPN-11001-SK. D05
14.06.2019

WESTFIELD LIVERPOOL ELP
ROOF DEMOLTION SECTIONS
MPN-11001-SK. D06
14.06.2019



1 SECTION THROUGH CINEMA 11
SCALE 1:100

2 SECTION THROUGH CINEMA 12
SCALE 1:100

FOR CONSTRUCTION

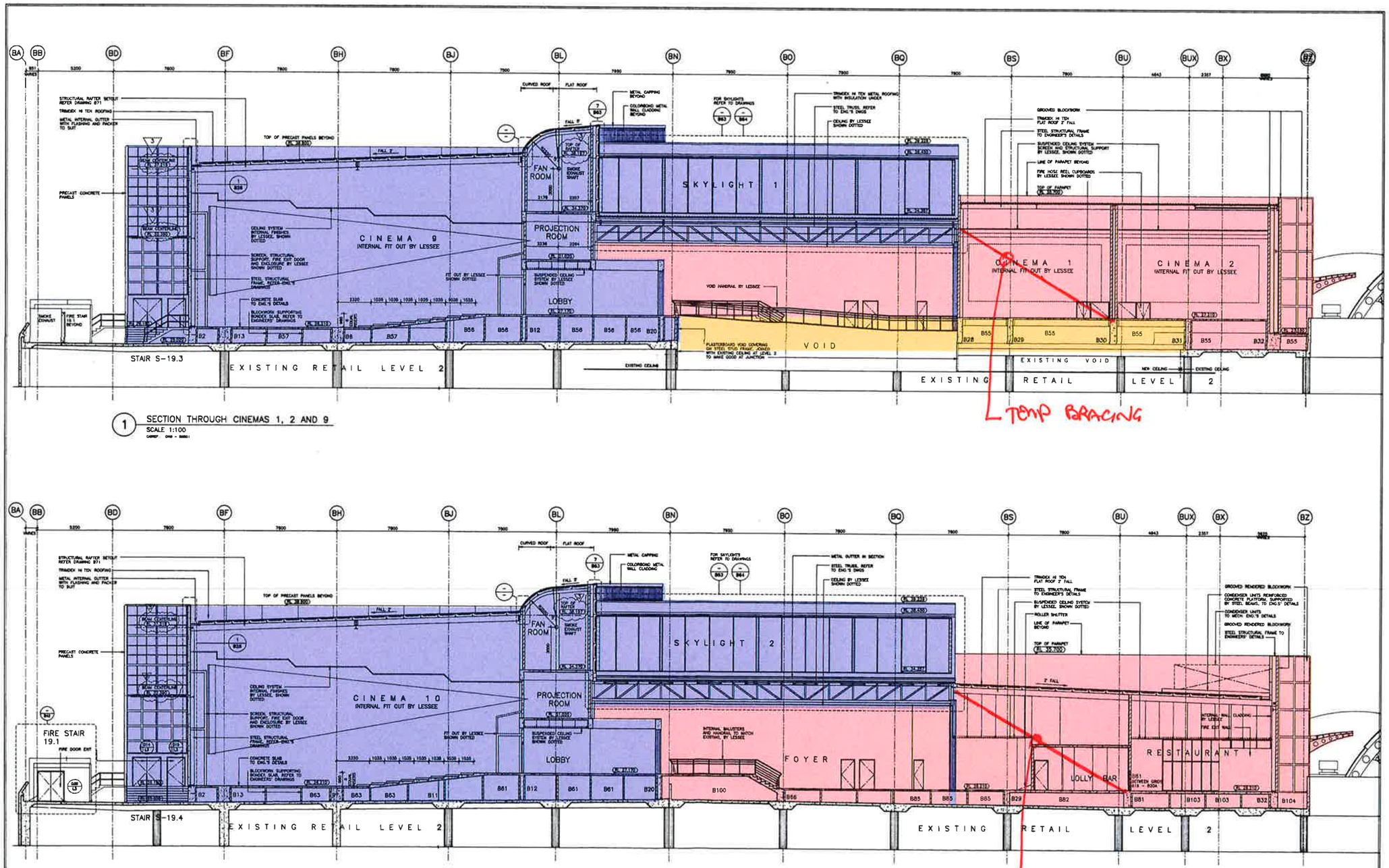
Westfield Design and Construction Pty. Limited
100 WILLIAM STREET, SYDNEY N.S.W.
ARCHITECT G.W. MITCHELL ARAIA

LIVERPOOL SHOPPINGTOWN CINEMAS COMPLEX STAGE 1A
SECTIONS
SECTION THROUGH CINEMAS 11 AND 12

1:100 | 7107 | J:/LI/B15 | B15 | 4
J:/LI | 06/02/96

WLI 915

WESTFIELD LIVERPOOL ELP
ROOF DEMOLTION SECTIONS
MPN-11001-SK. D07
14.06.2019



1 SECTION THROUGH CINEMAS 1, 2 AND 9
SCALE 1:100

2 SECTION THROUGH CINEMA 10
SCALE 1:100

FOR CONSTRUCTION

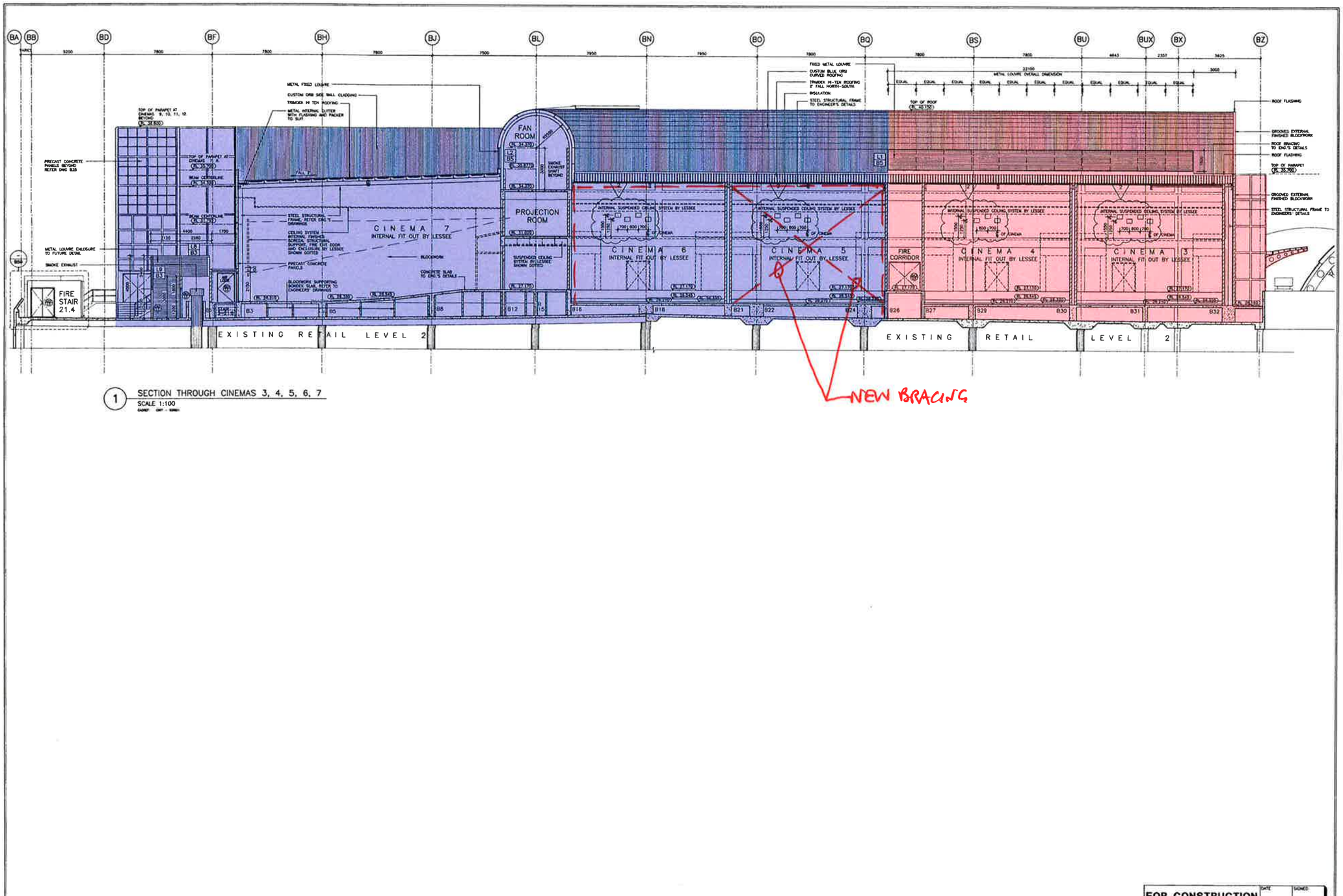
Westfield Design and Construction Pty. Limited
100 WILLIAM STREET, SYDNEY, N.S.W.
Postal Address: G.P.O. BOX 4004, SYDNEY 2001
ARCHITECT G.W. MITCHELL ARAIA

LIVERPOOL SHOPPINGTOWN CINEMAS COMPLEX STAGE 1A
SECTIONS
SECTION THROUGH CINEMAS 1, 2, 9 AND 10

Scale	Project/Job Number	Completion Ref.	Drawing Number
1:100	7107	J:/LI/B16	B16
Library Ref. J:/LI	Reference	Date Plotted 06/02/96	Revision 3

WLI916

WESTFIELD LIVERPOOL ELP
ROOF DEMOLTION SECTIONS
MPN-11001-SK. D08
14.06.2019



1 SECTION THROUGH CINEMAS 3, 4, 5, 6, 7
SCALE 1:100

Rev	Date	Description
1	06/12/95	ISSUE FOR CONSTRUCTION - SECTION 1 -
2	16/02/96	PROJECTION HOLES IN CINEMAS ADJUSTED

Westfield Design and Construction Pty. Limited
100 WILLIAM STREET, SYDNEY, N.S.W.
Postal Address: G.P.O. BOX 4004, SYDNEY 2001
ARCHITECT: G.W. MITCHELL AR.A.I.A.
Project Architect: C. STONE | Checked by: | Design by: P. DUNN | Drawn by: T. Price
A.C.N. 000 287 395
Telephone: (02) 356 7700
Fax Num: (02) 356 1287
DATE: 1:1.96

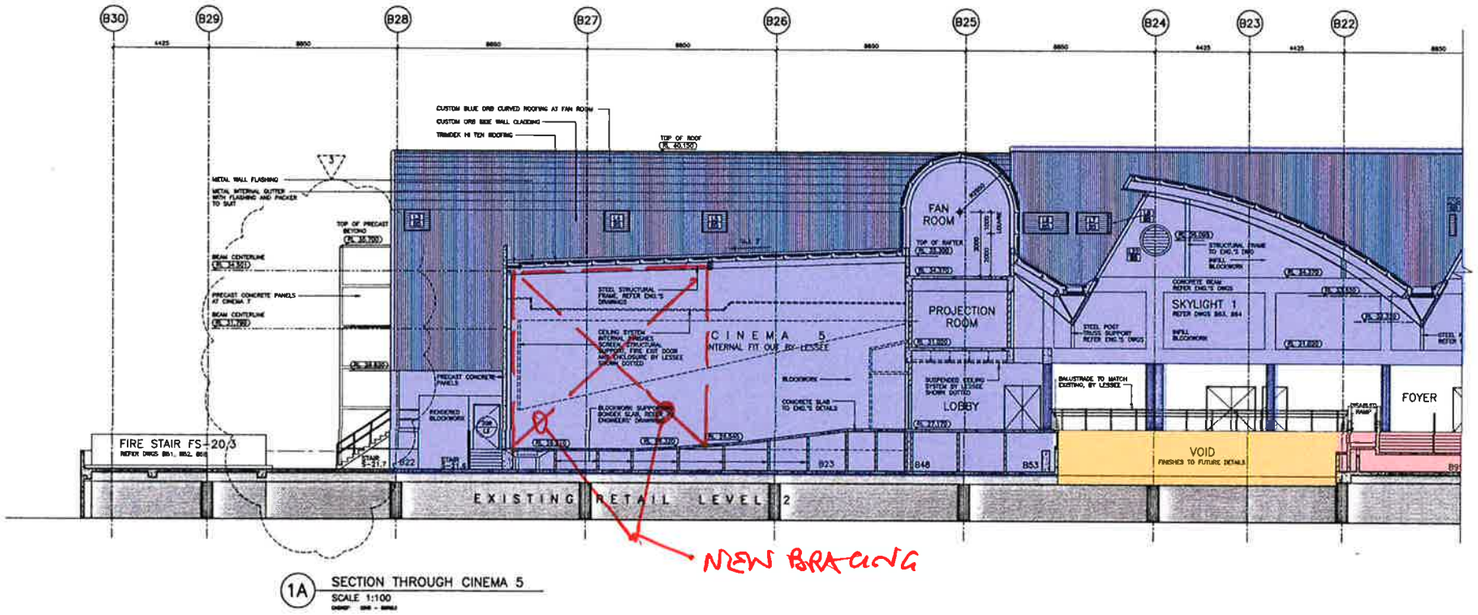
FOR CONSTRUCTION DATE: SIGNED:

Project: LIVERPOOL SHOPPINGTOWN CINEMAS COMPLEX STAGE 1A
Title: SECTIONS
SECTION THROUGH CINEMAS 3, 4, 5, 6, 7 AND 8

Scale	Project/Job Number	Computer File	Drawing Number
1:100	7107	J:/LI/B17	B17
Library Ref: J:/LI	Subject	Date Plotted: 16/02/96	Revision: 2

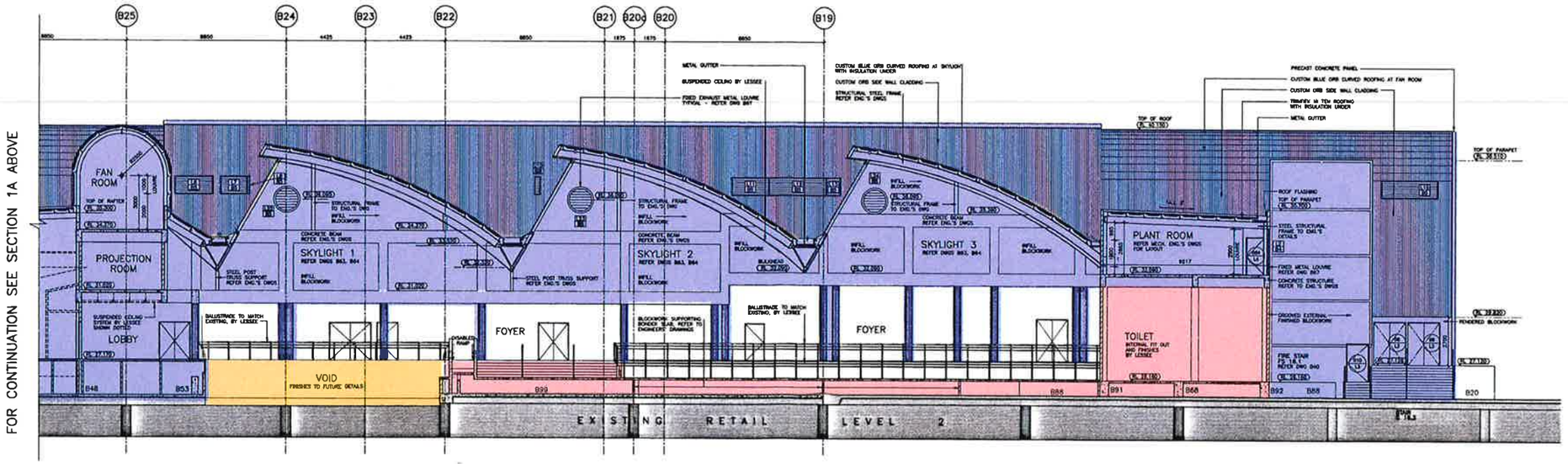
WLI 917

WESTFIELD LIVERPOOL ELP
ROOF DEMOLTION SECTIONS
MPN-11001-SK. D09
14.06.2019



1A SECTION THROUGH CINEMA 5
SCALE 1:100

FOR CONTINUATION SEE SECTION 1B BELOW



FOR CONTINUATION SEE SECTION 1A ABOVE

1B SECTION THROUGH CINEMA 5
SCALE 1:100

FOR CONSTRUCTION

Rev	Date	Description
1	15/05/96	ISSUE FOR CONSTRUCTION
2	22/05/96	NEW BAY TOP LEVEL ADDED.
3	23/05/96	FREE STANDING STRUCTURE AT SKYLIGHT END DELETED.

Westfield Design and Construction Pty. Limited
100 WILLIAM STREET, SYDNEY N.S.W.
Postal Address: G.P.O. BOX 4004, SYDNEY 2001
A.C.N. 000 267 785
Telephone : (02) 354 7200
Fax Num. : (02) 356 1357
DATE : 11-03-96
ARCHITECT G.W. MITCHELL ARAIA
Project Architect C. Wood | Checked by: | Design by | Drawn by T. Price

PROJECT: LIVERPOOL SHOPPINGTOWN CINEMAS COMPLEX STAGE 1A
TITLE: SECTION
SECTION THROUGH CINEMA 5

Scale	Project/Job Number	Computer Ref.	Drawing Number
1:100	7107	J:/LI/B18	B18
Library Ref. J:/LI	Revision	Date Produced 23/05/96	Revision 3

WLI 918

APPENDIX D

STRUCTURAL ALTERATIONS & NEW WORKS

Boxspan lightweight floor system throughout green area

BLOCK 13

BLOCK 12

BLOCK 30

Steel beams under specialty/ restaurant buildings.
Allow for 310UC97 typical.

Extra hanger bolts required at existing level 2 transfer beam intersections on grids BZ-C12.1, C13.1, C14.1 & C15.1

Void 5
Infill Slab.
Refer to SK-S10 & S11.

BLOCK 15

BLOCK 14

BLOCK 29

BLOCK 17

BLOCK 16

Void 2 Block 16
Infill Slab.
Refer to SK-S5.

Void 2 Block 18
Infill Slab.
Refer to SK-S4.

BLOCK 18

BLOCK 19

BLOCK 28

Existing raked slab to be retained.
Refer to SK-S3 for strengthening.

BLOCK 20

New column/footing to be installed at L1 under steel column built in 2011.
Refer to SK-S16 to S18.

Void 4
Infill Slab.
Refer to SK-S6 to S9.

Steel beams under specialty/restaurant buildings.
Allow for 310UC97 typical.

Void 3
Infill Slab.
Refer to SK-S6 to S9.

BLOCK 21

Outline of proposed Commercial Tower above

Stair Void Infill Slabs.
Refer to SK-S12.

Block 20 Slab Extension.
Refer to SK-S2.

WESTFIELD LIVERPOOL ELP
LEVEL 3 STRUCTURAL PLAN
MPN-11001-SK.S1
14.06.2019

WESTFIELD LIVERPOOL ELP
BLOCK 20 L3 SLAB EXTENSION
MPN-11001-SK.S2
14.06.2019

NOTE
SLAB EXTENSION MAY NOT BE REQUIRED IF EXISTING SLAB IS DEMOLISHED/REPLACED AS PER COMMERCIAL TOWER PROPOSAL.

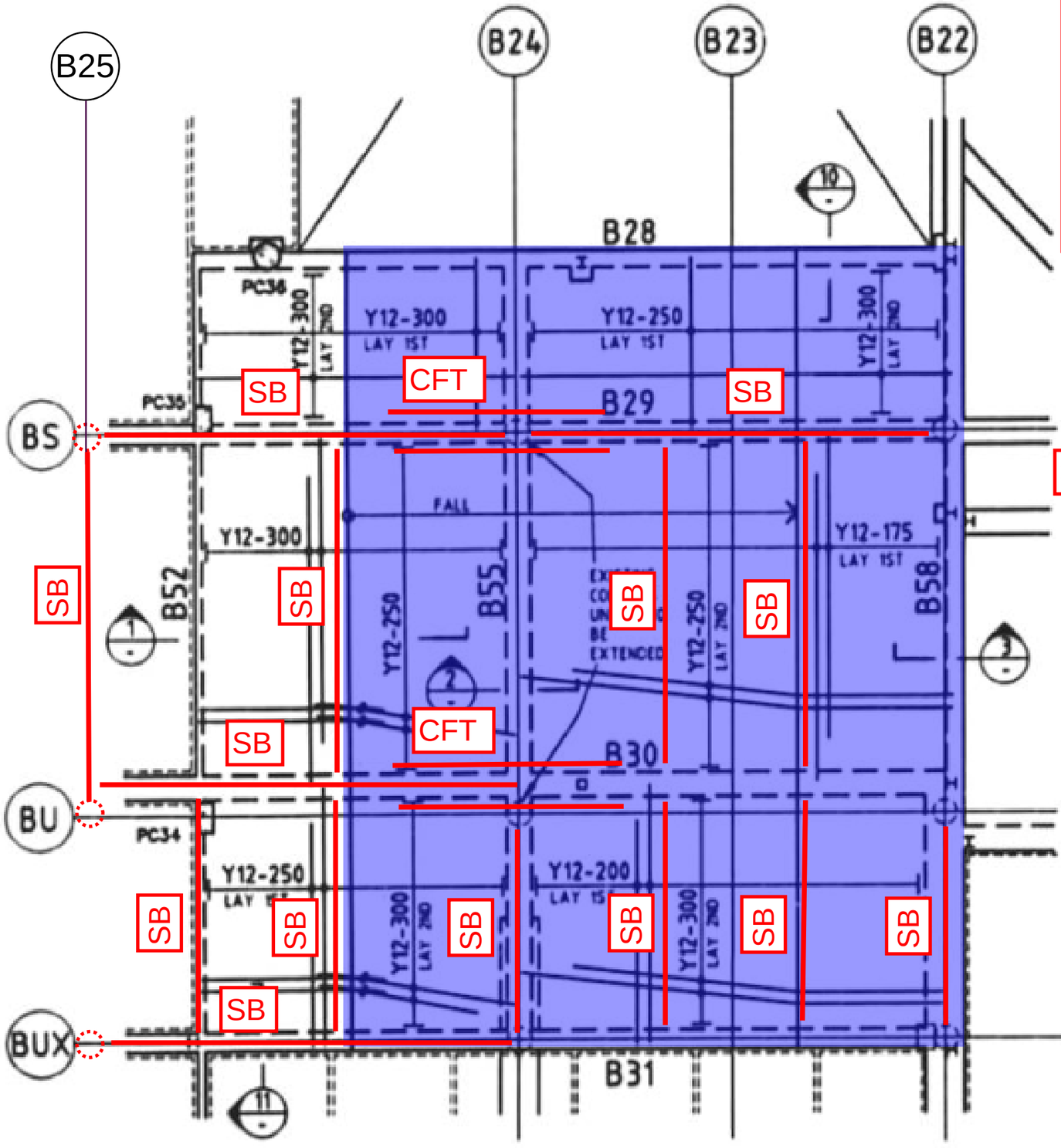
MEMBER SCHEDULE
PB1 - 460UB75
PB2 - 410UB54
PB3 - 310UB40

SB1 - 310UB40
SB2 - 360UB45
⟷ DENOTES 125 BONDEK SLAB SPAN DIRECTION
NCC - DENOTES NEW CONCRETE COLUMN

EXCC - DENOTES EXISTING CONCRETE COLUMN

TOP OF ESCALATOR TO BE RELOCATED SOUTH TO AVOID CLASH WITH PROPOSED VOID 3 INFILL PORTAL FRAME.
REFER TO SK.S6 FOR DETAILS.

WESTFIELD LIVERPOOL ELP
STRENGTHENING OF EXISTING RAKED CINEMA SLAB
MPN-11001-SK. S03
14.06.2019



Denotes extent of Boxspan lightweight floor system built on top of existing raked slab

SB Denotes steel strengthening beam under

CFT Denotes carbon fibre strengthening on top of slab

N

Notes

The following design loads have been used – 1.0kPa self-weight of the lightweight raised floor, 1.5kPa superimposed dead load for services, finishes, etc and 4.0kPa live load for cinema foyer.

Where proposed office tower columns intersect this existing slab the tower columns may need to be made larger so that the column load can pass around the existing beams. Note that the existing EW beams cantilever towards the existing void and some have PT cables in them, adding to the difficulty of these column transitions.

Consideration needs to be given as to how the office tower floors will be constructed above th is existing infill slab. If the office level slabs are PT concrete or conventionally reinforced slabs, the existing infill slab would need to be back propped down to level 1 during construction of the first few office slabs. Alternatively, the office slabs could be composite concrete / steel designed to avoid backpropping.

The FFL in the area of the existing raked infill slab is currently proposed at the lower level (RL 26.400). This area would need to be replanned architecturally if the existing raked infill slab were to be retained.

BOTTOM REINFORCEMENT
PLAN ON CINEMA INSITU SLAB : 150 THICK SLAB U.N.O

Void previously infilled as part of cinema support upgrades, detailed in MPN Job 7139.

VOID 2

Steel framing members are likely to be heavier to support greater depth of raised floor if Void 2 infill is constructed at the lower level.

Extent of raised floor as part of cinema support upgrades, detailed in MPN job 7139, to be demolished and replaced with Boxspan lightweight floor system.

Beam strengthening not required if Void 2 infill is framed to existing concrete columns as shown.

M1

M2

Existing Mezzanines
Demolish mezzanine 01 and 02 between Level 03 and Roof Level for new cinema foyer area.

MEMBER SCHEDULE
PB1 - 610UB101
PB2 - 530UB82
SB1 - 530UB82
SB2 - 460UB67
⟷ DENOTES 125 BONDEK SLAB SPAN DIRECTION

ALLOW FOR SHEAR STUDS ON ALL PRIMARY AND SECONDARY STEEL BEAMS.

PLAN ON ROOF SLAB - BLOCK 'B' AREA 18
SLAB 170 THICK U.N.O. THUS
SLAB BANDS DEEP 500 UNO THUS

NOTES:
1 REFER TO DRAWING No. G1 FOR GENERAL CONSTRUCTION NOTES.
2 REFER TO DRAWING No. G18 FOR ALL PRESTRESSING NOTES.
3 REFER TO DRAWING No. G18 FOR PRESTRESSING DETAILS.
4 ⟵ ON PLAN DENOTES LIVE END ANCHORAGE.
5 ⟵ ON PLAN DENOTES DEAD END ANCHORAGE.
6 CONCRETE STRENGTH REFER DWG No G18
7 THE STRUCTURAL ELEMENTS SHOWN ON THIS DWG. HAVE BEEN DESIGNED FOR THE FOLLOWING SUPERIMPOSED LOADS
DEAD LOAD: 2 kPa LEVELLING SLAB
kPa
LIVE LOAD: 5 kPa FUTURE RETAIL
kPa
kPa
8 CABLES ARE SHOWN DIAGRAMMATICALLY ON PLAN. USE FIGURED DIMENSIONS ONLY WHEN SETTING OUT CABLES. PROVIDE CABLE SUPPORTS 1000 MAX. CTS
9 CABLE ORDINATES ARE GIVEN FROM UNDERSIDE OF SLAB TO CENTERLINE AT ANCHORAGES AND TO UNDERSIDE OF DUCT ALONG CABLE.
10 WHERE CABLES ARE TO BE STRESSED FROM BOTH ENDS TWO FIGURES ARE TO BE SUBMITTED BY THE CONTRACTOR. THE FIRST FIGURE TO BE GIVEN IS THE FIELD EXTENSION FOR THE FIRST END STRESSED. THE SECOND FIGURE TO BE GIVEN IS THE FIELD EXTENSION FOR THE SECOND END STRESSED.
11 FIRE RESISTANCE RATING AS DETAILED: 3HRS

ELEMENT	CABLE NO.	NO. OF STRANDS	APPROX. LENGTH	JACKING FORCE kN PER STRAND	CALCULATED EXTENSION
SLAB	1	5	41700	156	
	2	5	43000		
	3,4	5	44700		
	5-12	5	37400		
	13	5	32200		
	14,15	5	34300		
	16	5	37400		
	17	5	14600		
	18	5	21600		
	19-24	5	21600		
SLABBAND	25,26	7	17000		
	27-45	5	21600		
	46,47	5	*21600		
	48	5	39800		
	49,50	5	10500		

FIELD EXTENSIONS TO BE SUBMITTED BY THE CONTRACTOR

ISSUE	AMENDMENT	BY	DATE
D	NOT TO BE USED / NOT TO BE APPROVED	M.S.	6-1-92
C	UPSTAND REVISED	MP	8-12-91
B	REINFORCING ADDED	MP	2-12-91
A	AS NOTED	MP	4-2-91

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MATEFFY-PERL-NAGY PTY. LTD.
CONSULTING ENGINEERS
3 NORTHCLIFF ST. MILSONS POINT 2061
N.S.W. AUSTRALIA — TEL. (02) 929 7144

ARCHITECT:
M KALAJZICH FRAIA

PROJECT:
LIVERPOOL SHOPPINGTOWN EXTENSIONS & UPGRADING.

FOR:
WESTFIELD DESIGN & CONST. PTY LTD

BLOCK 'B' AREA 18
ROOF STRESSING

DESIGN	DRAWN	SCALES
LNP	TS	1:100, 20

CHKD | No. IN SET | mpn JOB | DRAWING No.
APPRD | | 5937 | 18/3
DATE 5.11.91

SITE PLAN.
NOT TO SCALE

WESTFIELD LIVERPOOL ELP
BLOCK 18 VOID 2 INFILL
MPN-11001-SK.S4
14.06.2019

Steel framing members are likely to be heavier to support greater depth of raised floor if Void 2 infill is constructed at the lower level.

Beam strengthening not required if Void 2 infill is framed to existing concrete columns as shown.

Mezzanine 3
Level 3M, 4 and Roof over Level 3 to be retained.

Lightweight raised floor system consisting of steel bearers and joists supported on piers (e.g. Boxspan system). Combination with steel frame flooring may be required at end bay locations.

Extent of raised floor as part of cinema support upgrades, detailed in MPN job 7139, to be demolished and replaced with Boxspan lightweight floor system.

MEMBER SCHEDULE
PB1 - 610UB101
PB2 - 460UB67
SB1 - 530UB82
SB2 - 460UB67
SB3 - 310UB40
⟷ DENOTES 125 BONDEK SLAB SPAN DIRECTION

ALLOW FOR SHEAR STUDS ON ALL PRIMARY AND SECONDARY STEEL BEAMS.

WESTFIELD LIVERPOOL ELP
BLOCK 16 VOID 2 INFILL
MPN-11001-SK.S5
14.06.2019

NOTES:
1 REFER TO DRAWING No. G 1 FOR GENERAL CONSTRUCTION NOTES.
2 REFER TO DRAWING No. G18 FOR ALL PRESTRESSING NOTES.
3 REFER TO DRAWING No. G18 FOR
" LIVE END ANCHORAGE.
: DEAD END ANCHORAGE.
FER DWG No G18.
NTS SHOWN ON THIS DWG.
OR THE FOLLOWING
kPa
kPa
LIVE LOAD: 5 kPa FUTURE RETAIL
kPa
kPa
8 CABLES ARE SHOWN DIAGRAMMATICALLY ON PLAN.USE FIGURED DIMENSIONS ONLY WHEN SETTING OUT CABLES.PROVIDE CABLE SUPPORTS 1000 MAX. CTS
9 CABLE ORDINATES ARE GIVEN FROM UNDERSIDE OF SLAB TO CENTERLINE AT ANCHORAGES AND TO UNDERSIDE OF DUCT ALONG CABLE.
10 WHERE CABLES ARE TO BE STRESSED FROM BOTH ENDS TWO FIGURES ARE TO BE SUBMITTED BY THE CONTRACTOR. THE FIRST FIGURE TO BE GIVEN IS THE FIELD EXTENSION FOR THE FIRST END STRESSED. THE SECOND FIGURE THE FIELD EXTENSION FOR
STRESSED.
RATING AS DETAILED: 3 HRS

ELEMENT	CABLE NO.	NO. OF STRANDS	APPROX. LENGTH	JACKING FORCE kN PER STRAND	CALCULATED EXTENSION
SLAB	1,3,5-9	5	37500	156	
	2,4,	5	35200	"	
	10	5	34500	"	
	11, ,	5	37500	"	
	12-21	5	45000	"	
	22,23,25	5	34500	"	
	24,26-32	5	45000	"	
	33-36	5	41400	"	
	42-49	5	45000	"	
	50,51	5	29800	"	
SLABBAND	52	7	45000	"	
	53	5	41000	"	
	54-71	5	45000	"	
	73,74,	5	45000	"	
	75,76,	5	37500	"	
	77	5	9000	"	
	72	5	29400	"	
	37-41	NOT USED			

FIELD EXTENSIONS TO BE SUBMITTED BY THE CONTRACTOR

ISSUE	AMENDMENT	BY	DATE
F	SECT. MARK 5 ADDED SECT 53A REVISED SECT 6 REVISED	MLS	6-1-92
E	SECTION MARK ADDED	UW	12-12-91
D	CABLES 71,72 REV. DET. X ADDED	UW	10-12-91
C	REINF. ADDED.	UW	18-9-91
B	ISSUED FOR PROFILES ONLY	UW	4-7-91
A	AS NOTED	UW	4-2-91

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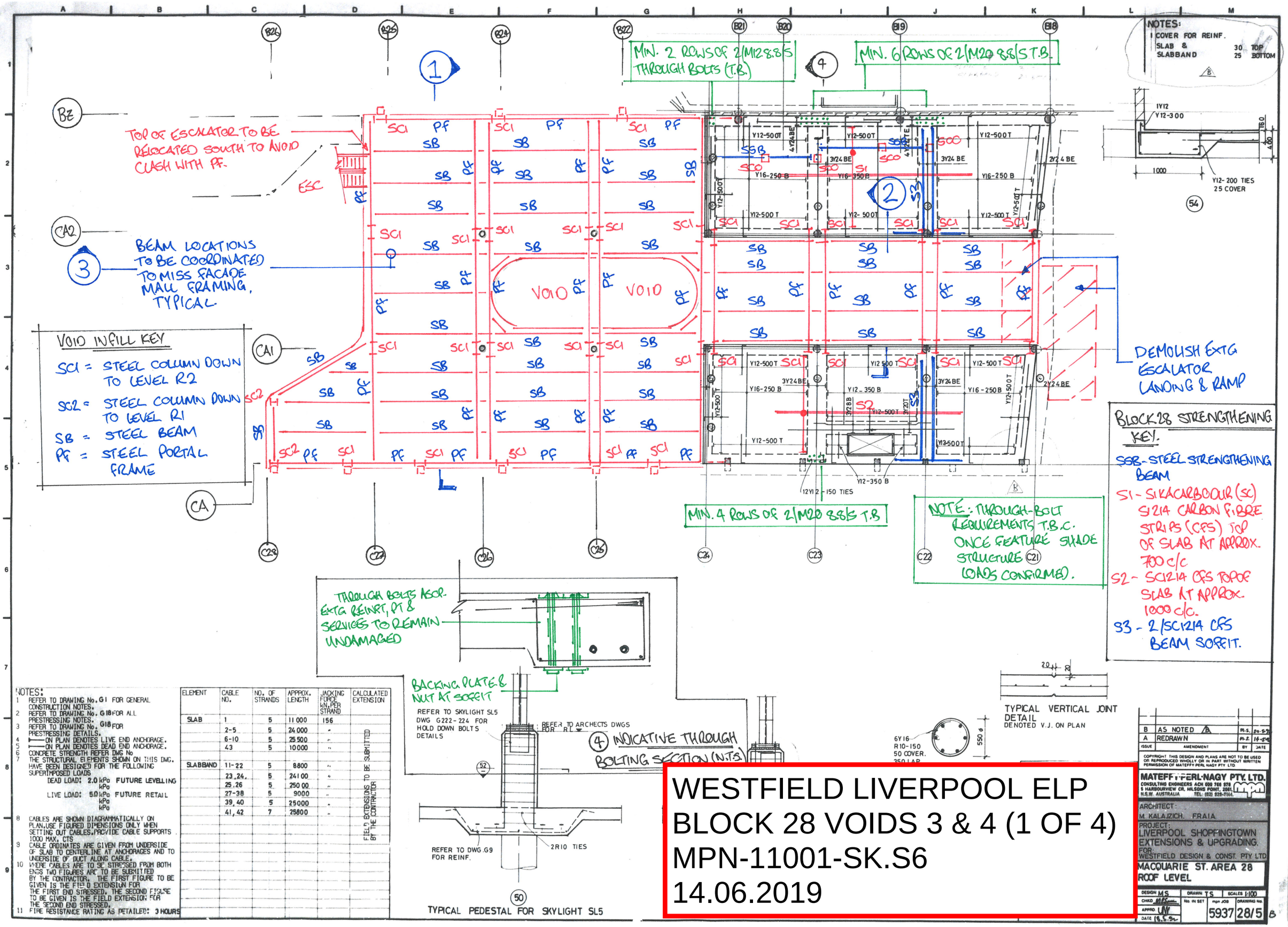
MATEFFY-PERL-NAGY PTY. LTD.
CONSULTING ENGINEERS
3 NORTHCLIFF ST MILSONS POINT 2061
N.S.W. AUSTRALIA - TEL. (02) 929 7144

ARCHITECT
M. KALAJZICH F.R.A.I.A.

PROJECT
LIVERPOOL SHOPPINGTOWN EXTENSIONS & UPGRADING.
FOR
WESTFIELD DESIGN & CONST PTY LTD

BLOCK 'B' AREA 16
ROOF STRESSING

DESIGN L.N.P | DRAWN T.S | SCALES 1:100, 1:20
CHKD UW
APPRD
DATE 18.9.91
JOB 5937
DRAWING No. 16/3 F



NOTES:
1. REFER TO DRAWING No. G1 FOR GENERAL CONSTRUCTION NOTES.
2. REFER TO DRAWING No. G18 FOR ALL PRESTRESSING NOTES.
3. REFER TO DRAWING No. G18 FOR PRESTRESSING DETAILS.
4. ⊢— ON PLAN DENOTES LIVE END ANCHORAGE.
5. —⊢ ON PLAN DENOTES DEAD END ANCHORAGE.
6. CONCRETE STRENGTH REFER DWG No
7. THE STRUCTURAL ELEMENTS SHOWN ON THIS DWG. HAVE BEEN DESIGNED FOR THE FOLLOWING SUPERIMPOSED LOADS
   DEAD LOAD: 2.0 kPa FUTURE LEVELLING
   kPa
   LIVE LOAD: 5.0 kPa FUTURE RETAIL
   kPa
   kPa
8. CABLES ARE SHOWN DIAGRAMMATICALLY ON PLAN. USE FIGURED DIMENSIONS ONLY WHEN SETTING OUT CABLES. PROVIDE CABLE SUPPORTS 1000 MAX. CTS
9. CABLE ORDINATES ARE GIVEN FROM UNDERSIDE OF SLAB TO CENTER-LINE AT ANCHORAGES AND TO UNDERSIDE OF DUCT ALONG CABLE.
10. WHERE CABLES ARE TO BE STRESSED FROM BOTH ENDS TWO FIGURES ARE TO BE SUBMITTED BY THE CONTRACTOR. THE FIRST FIGURE TO BE GIVEN IS THE FIELD EXTENSION FOR THE FIRST END STRESSED. THE SECOND FIGURE TO BE GIVEN IS THE FIELD EXTENSION FOR THE SECOND END STRESSED.
11. FIRE RESISTANCE RATING AS DETAILED: 3 HOURS

ELEMENT	CABLE NO.	NO. OF STRANDS	APPROX. LENGTH	JACKING FORCE kN. PER STRAND	CALCULATED EXTENSION
SLAB	1	5	11 000	156	FIELD EXTENSIONS TO BE SUBMITTED BY THE CONTRACTOR
	2-5	5	24 000	"	
	6-10	5	25 500	"	
	43	5	10 000	"	
SLABBAND	11-22	5	8800	"	
	23,24,	5	24100	"	
	25,26	5	25000	"	
	27-38	5	9000	"	
	39,40	5	25000	"	
	41,42	7	25800	"	

B	AS NOTED	PI-S.	20-5-19
A	REDRAWN	PI-S.	16-5-19
ISSUE	AMENDMENT	BY	DATE

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MATEFFY PERL NAGY PTY LTD.
CONSULTING ENGINEERS ACN 000 766 578
5 HARBOURVIEW CR, MILSONS POINT, 2061
N.S.W. AUSTRALIA TEL: (02) 929-7144

ARCHITECT: M. KALAJZICH. FRAIA.

PROJECT: LIVERPOOL SHOPPINGTOWN EXTENSIONS & UPGRADING.
FOR: WESTFIELD DESIGN & CONST. PTY LTD.

MACQUARIE ST. AREA 28
ROOF LEVEL

DESIGN MS	DRAWN TS	SCALES 1:100	
CHKD MPS	No. IN SET	mpn JOB 5937	DRAWING No. 28/5 B
APPRD UW			
DATE 16.5.19			

WESTFIELD LIVERPOOL ELP
BLOCK 28 VOIDS 3 & 4 (1 OF 4)
MPN-11001-SK.S6
14.06.2019

LIGHTWEIGHT RAISED FLOOR BUILT ON TOP OF BONDEK SLAB AFTER SKYLIGHT DEMOLISHED

COMPOSITE STEEL BEAM / BONDEK SLAB WITH WATERPROOF MEMBRANE INSTALLED PRIOR TO SKYLIGHT DEMOLITION.

EXISTING RAISED BONDEK SLABS ON BLOCK WALLS

CHECK HEADROOM

LOCALLY CUT OUT EXISTING BONDEK SLAB TO INSTALL NEW COLUMNS. TYP.

EXISTING MAIN SUSPENDED SLAB

K-BRACING BETWEEN R1 & R2 LEVELS

LOCALLY CUT BACK EXISTING CONC. COLUMN

PF BEAM ABOVE

SCI

1 SECTION 1:50

2 ELEVATION STRUCTURAL FRAME FOR GLAZING 1:50
CENTRED ON PARAPET ADJACENT GRID C 24

WESTFIELD LIVERPOOL ELP
BLOCK 28 VOIDS 3 & 4 (2 OF 4)
MPN-11001-SK.S7
14.06.2019

Westfield Projects (Australia) Limited
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Postal Address: G.P.O. BOX 4004 SYDNEY 2001
ARCHITECT M. KALAJZICH F.R.A.I.A.
A.C.N. 008 598 409
Telephone: (02) 358 7700
Fax: (02) 356 3357
DATE 30/4/92
project architect
design
drawn RA

project LIVERPOOL SHOPPINGTOWN
title SL5 SECTION & END WALL FRAMING
scale 1:500 1:200 1:100 1:50 1:20
project/job number 1241
drawing number C 110
amendments 4

LIGHTWEIGHT RAISED FLOOR BUILT ON TOP OF BONDEK SLAB AFTER SKYLIGHT DEMOLITION.

COMPOSITE STEEL BEAM/BONDEK SLAB WITH WATERPROOF MEMBRANE INSTALLED PRIOR TO SKYLIGHT DEMOLITION

LOCALLY CUT OUT EXISTING BONDEK SLAB TO INSTALL NEW COLUMNS. TYPICAL

EXISTING RAISED BONDEK SLAB ON BRICK WALLS

EXISTING MAIN SUSPENDED SLAB

BLOCK C

BLOCK B

R3

R2

PF

SC1

SC1

CHECK HEADROOM

11000

7900

RL 21600

LEVEL 2 RETAIL

ROOF DECK CARPARK

OFF FORM CONC PARAPET

PEDESTALS RL 28440

410 UB BOLTED DOWN ON TOP OF PARAPET TO ENG DET.

COLORBOND BARGE CAPPING AND FLASHING

REFER DWG C106 FOR ARCH SETOUT AND HOLE SETOUT

2177

5793

2177

1 SECTION / ELEVATION
1:50

2 NORTH ELEVATION
1:50

2

WESTFIELD LIVERPOOL ELP
BLOCK 28 VOIDS 3 & 4 (3 OF 4)
MPN-11001-SK.S8
14.06.2019

Westfield Projects (Australia) Limited
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A.C.N. 008 598 409
Telephone: (02) 358 7700
Fax: (02) 356 3357
DATE / 4 / 92
drawn NR

project LIVERPOOL SHOPPINGTOWN
title SL5 SECTIONS/ ELEVATIONS
scale 1:500 1:200 1:100 1:50 1:20
project/job number 1241
drawing number C111
amendment

WESTFIELD LIVERPOOL ELP
BLOCK 28 VOIDS 3 & 4 (4 OF 4)
MPN-11001-SK.S9
14.06.2019

BLOCK B

BLOCK B Boundary

BLOCK C Boundary

ELIZABETH DRIVE

CONCRETE PARAPET RL 25750

GUTTER & D.P.R. DISCHARGE TO ROOF

ROOFLIGHT GLAZING SHOWN SHADED

ALL GLAZING BARS AT NOM 1200 CTRS

LINE OF PARAPET BELOW

NOTE ALL ROOFING PURLINS ~~INCLUDING RHS PURLINS NOTED~~ DWG C106 TO BE CLEATED 50mm OFF TOP OF RAFTER BEAM

RHS GLAZING PURLINS WELDED TO TOP OF RAFTER BEAM

LINE OF GLAZED FRONT WALL UNDER

COLORBOND CORRUGATED ROOFSHEET AND BARGE CAP

NTH ELEV.

REFER TO DWG C 80 FOR REVISED MAC. ST GRID SETOUT

CONC CAPPED 150 BLOCKWORK COLUMN CLAD WITH 0.6MM DECOR FEATHER EDGE FINISH

NEW 150 CONC PARAPET REMOVE EXISTING PRE-CAST CONCRETE PARAPET

NEW GUTTER & D.P.R. DISCHARGING TO ROOF

COLORBOND CORRUGATED ROOFSHEET & CAPPINGS

PERIMETER PLANTER BOXES TO FUTURE DETAIL

ROOF DECK

PARKING

ALL GLAZING BARS AT NOM 1200 CTRS INCLUDING CLERESTORY GLAZING GENERALLY.

CLERESTOREY GLAZING

All glazing to be in accordance with Australian Standards:

AS 1288, Glass in buildings, selection & installation.
AS 2208, Safety glazing materials for use in buildings.
AS 2047 & AS 2048, Aluminium windows for buildings.

and in accordance with requirements of any relevant authority.

The Contractor is responsible for the design and installation of the glazing system including all frame fixings, water proofing, flashing, glazing beads, necessary trims and coverplates.

The Contractor is to supply shop drawings, such drawings to be clearly annotated, dimensioned and cross referenced, general plans/elevations at a scale of 1:50, details full scale or ½ scale as appropriate.

Framing generally, aluminium section 100 x 50 powder coat finish Dulux Notre Dame.

1 ROOF PLAN READ WITH C 106
1:100

2 LONG SECTION.
1:100

DEMOLISH EXTERNAL CANOPY FIRST

ROOFLIGHT GLAZING ON RHS PURLINS

TOP OF COLUMNS RL 24 780

PLASTERBRD CEILING

ROOFLIGHT GLAZING ON RHS PURLINS

CLERESTORY GLAZING

CARPARK.

COMPOSITE STEEL/BONDEK SLAB WITH WATERPROOF MEMBRANE INSTALLED PRIOR TO SKYLIGHT DEMO

LIGHTWEIGHT RAISED FLOOR BUILT ON TOP OF NEW BONDEK SLAB

EXISTING RAISED BONDEK SLAB ON BLOCK WALLS

EXISTING MAIN SUSPENDED SLAB

CASTELLATED COLUMN CC2

FFL 19050 AT ENTRY

550 ø COLUMNS

CEILING PROFILES TO FUTURE DET.

3

FOR CONSTRUCTI

19.4.92	1	PRELIM ISSUE TO CCR
29.4.92	2	FOR TENDER
8.9.92	3	ADDED GUTTER & DOWNPIPE

Westfield Projects (Australia) Limited
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ARCHITECT M. KALAJZICH F.R.A.I.A.
A.C.N. 008 598 409
Telephone: (02) 358 7700
Fax: (02) 356 3357
DATE 25/ 3 /92
project architect | design | drawn RR

project LIVERPOOL SHOPPINGTOWN
title SL 5 ROOFPLAN & LONG SECTION
scale 1:500 1:200 1:100 1:50 1:20
project job number: 1241
drawing number C 105
amendment 3

WESTFIELD LIVERPOOL ELP
BLOCK 29 VOID 5 (1 OF 2)
MPN-11001-SK.S10
14.06.2019

B16 B15 B14 B13 B12 B11 B10 B9

BLOCK 16

SSB DENOTES STEEL STRENGTHENING BEAM (AT SOFFIT)

BLOCK 14

DENOTES NEW INFILL SLAB TO BE CONSTRUCTED AT EXTG STRUCTURAL SLAB LEVEL

BS BU BY BZ CA2 CA1 CA

C22.1 C21.1 C20.1 C19.1 C18.1 C17.1 C16.1 C15.1 C14.1 C13.1 C12.1 C11.1 C10.1

DENOTES DO NOT DAMAGE

EXTG UPSTAND TO BE LOCALLY DEMOLISHED TO NEEDLE 'SB' THROUGH

DENOTES STEP IN RAISED FLOOR LEVEL - FINAL RLS TO BE ACHIEVED WITH LIGHTWEIGHT RAISED FLOOR.

VOID TO BE LOCATED BETWEEN EXISTING BAND BEAMS

BLOCK 29 INFILL SLAB TO BE CONSTRUCTED AT HIGHER RL

NOTE: EXTEND RAISED STRUCTURAL COMPOSITE SLAB TO GRID CA1 TO SUPPORT PROPOSED CANOPY ROOF OVER. (REFER TO S13)

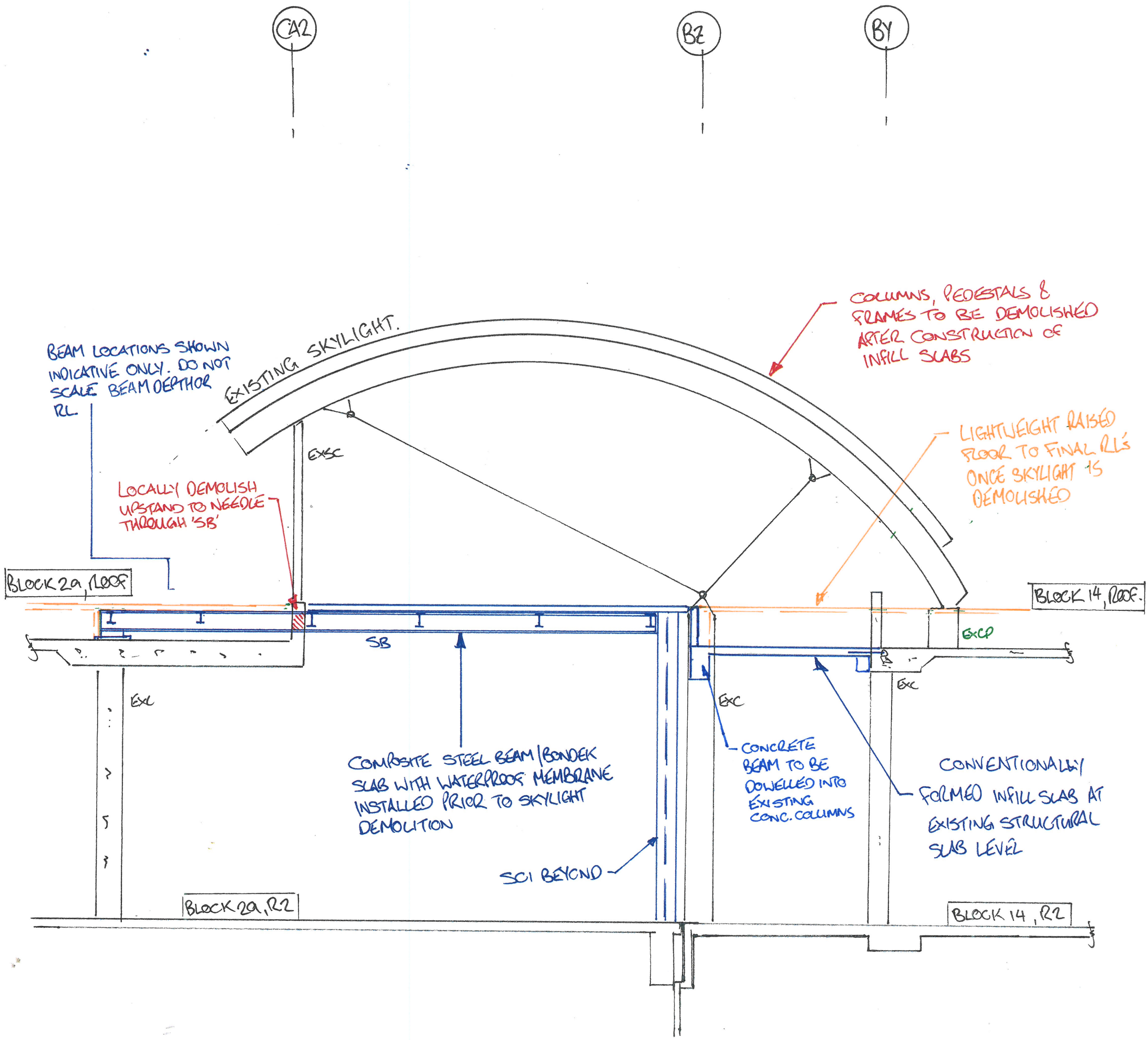
BLOCK 29

BLOCK 14/16/29 ROOF LEVEL - PART PLAN
SLAB ALTERATIONS & VOIDS

F(O) - LINE OF EXTG SKYLIGHT FRAME OVER
EXSC - EXTG STEEL COLUMN
EXCC - EXTG CONC. COLUMN
EXCP - EXTG CONC. PEDESTAL.
CSC1 - PROPOSED CANOPY STEEL COLUMN

SC1 - STEEL COLUMN TO R2
SC2 - STEEL COLUMN TO ROOF
SB - STEEL BEAM
SPAN - 125 BONDEK SLAB - ALLOW FOR SHEAR STUDS ON ALL PRIMARY & SECONDARY BEAMS.

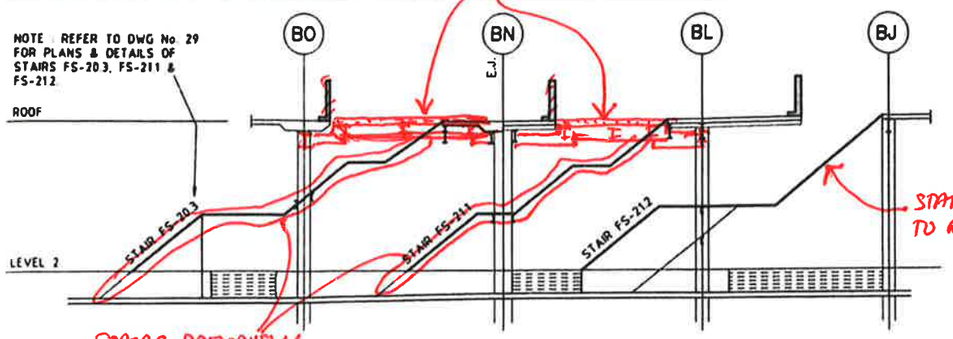
VOID 5
MPN-11001
1 OF 2



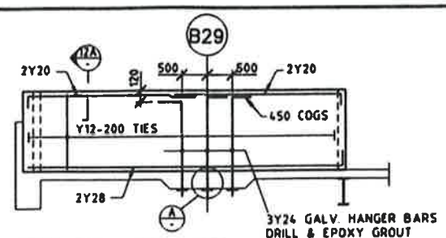
WESTFIELD LIVERPOOL ELP
BLOCK 29 VOID 5 (2 OF 2)
MPN-11001-SK.S11
14.06.2019

NEW INFILL SLABS

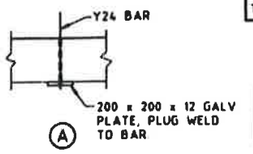
NOTE : REFER TO DWG No 29 FOR PLANS & DETAILS OF STAIRS FS-20.3, FS-21.1 & FS-21.2



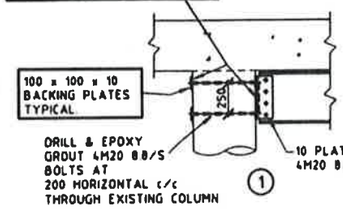
STAIRS FS-20.3, FS-21.1 & FS-21.2 KEY DIAGRAM



BEAM RB1 : 1600 x 250
RB2 SIMILAR

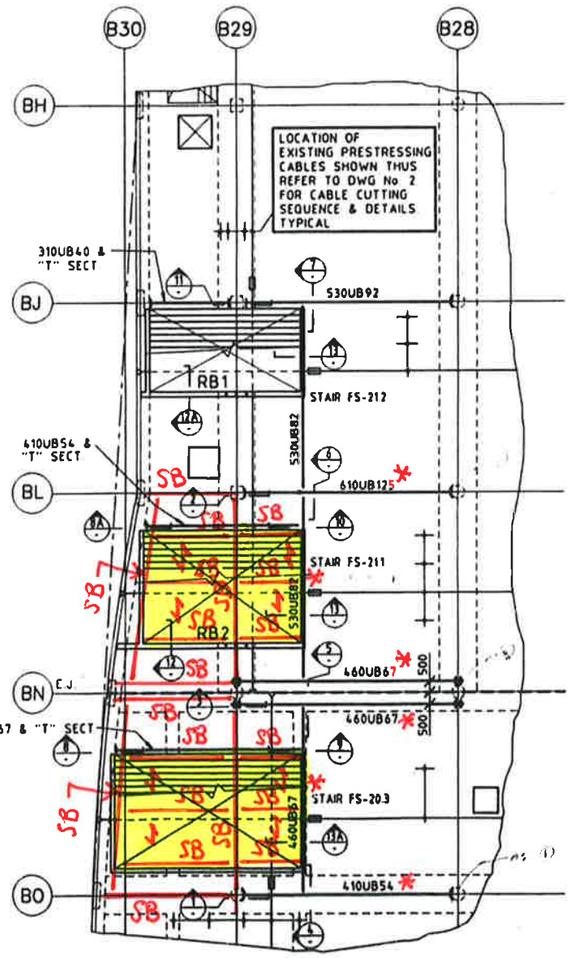


NOTE: PROVIDE CURVED PLATES AT CIRCULAR COLUMNS TYPICAL



NOTES :
1. REFER TO DWG No. 1 FOR GENERAL CONSTRUCTION NOTES
2. THIS DWG IS TO BE READ IN CONJUNCTION WITH DWG No's 2 & 29.

NOTE : REFER TO DWG.No.1 FOR STEELWORK NOTES.

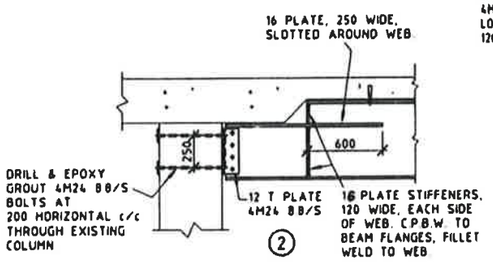


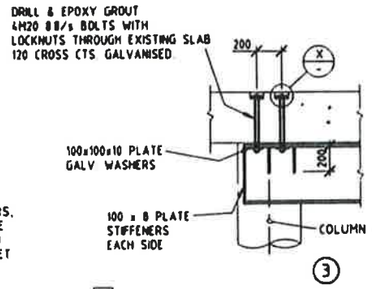
PLAN AT ROOF LEVEL (STAIR VOID SUPPORT BEAM LAYOUT)

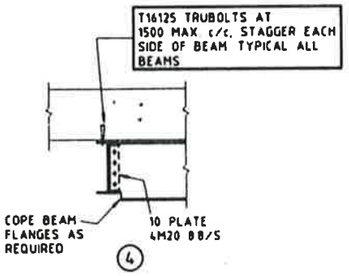
NOTE : FIRE SPRAY ALL STEEL BEAMS TO ACHIEVE A FIRE RESISTANCE LEVEL OF 3 HOURS.

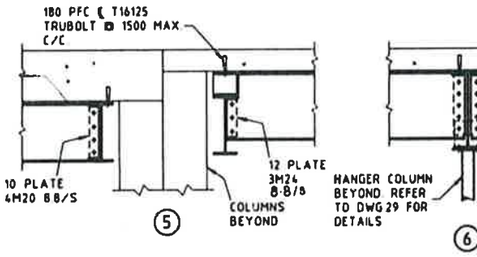
NOTE : ALL STEEL BEAMS TO BE 'BHP GRADE 300 PLUS'.

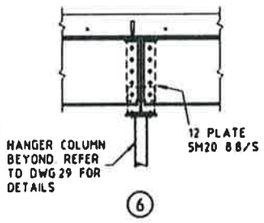
NOTE: WEDGE STEEL BEAMS TO PREDEFLECT & HARD PACK GROUT BETWEEN BEAM & SLAB BEFORE CUTTING PENETRATIONS IN EXISTING SLABS.

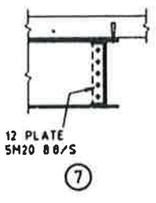


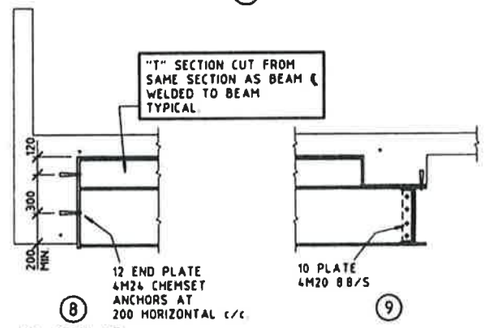


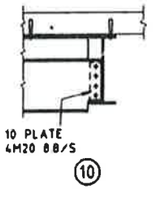


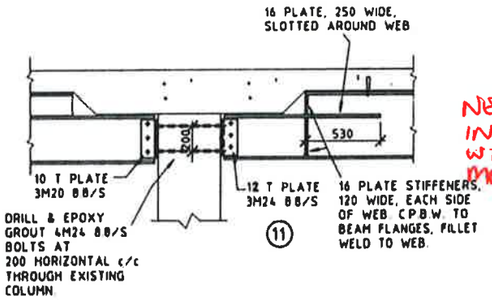


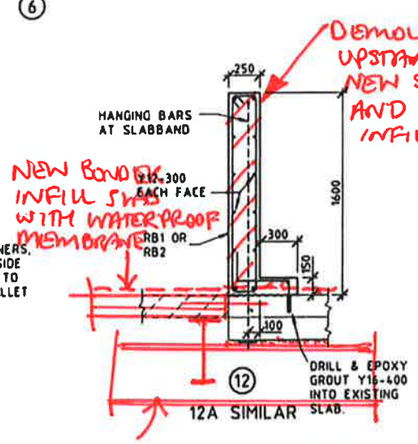


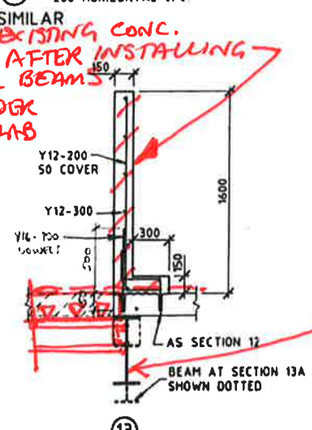












TYPICAL UPSTAND AT STAIR U.N.O.

EXISTING BEAMS DENOTED * ON PLAN TO BE CHECKED FOR EXTRA LOAD.

SB = NEW STEEL SUPPORT BEAMS

∫ = NEW BONDEK INFILL SLABS

* = EXISTING BEAMS AND CONNECTIONS TO BE CHECKED FOR EXTRA LOAD FROM INFILL SLABS.

WESTFIELD LIVERPOOL ELP
STAIR INFILL SLABS
MPN-11001-SK.S12
14.06.2019

ISSUE	AMENDMENT	BY	DATE
A	ISSUED FOR CONSTRUCTION		11.10.95

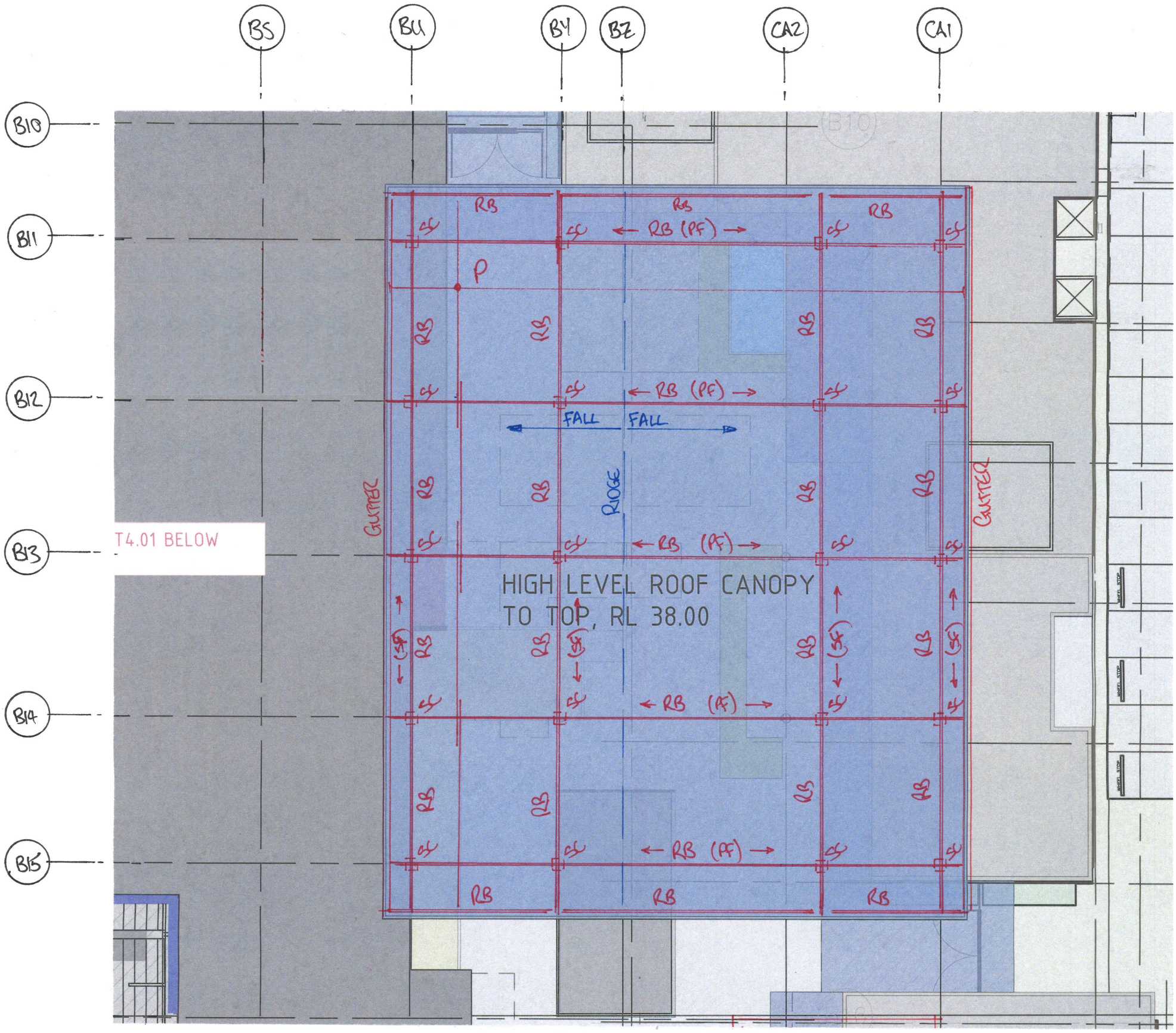
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MPN GROUP PTY LTD
CONSULTING ENGINEERS - A.C.N. 001560878
5 HARBOURVIEW CR., MOSMAN POINT 2061
N.S.W. AUSTRALIA - TEL. (02) 9929 7144
ARCHITECT: G. W. MITCHELL A.R.A.I.A.

PROJECT: LIVERPOOL SHOPPINGTOWN CINEMAS COMPLEX STAGE 1A
FOR WESTFIELD DESIGN AND CONSTRUCTION PTY LTD

STAIR DETAILS
SHEET 4
(STAIRS FS-20.3, FS-21.1 & FS-21.2)

DESIGN: M.S.	DRAWN: D.A.S.	SCALES: 1:100,20
CHKD:	MPN JOB 7139	DWG No 28 A
APPD:		
DATE: 11-10-95		



HIGH LEVEL ROOF CANOPY

RB- DENOTES RAFTER BEAM
SC- DENOTES STEEL COLUMN TO LEVEL 3
P- DENOTES CONTINUOUS PURLINS
PF- DENOTES PRIMARY PORTAL FRAME
SF- DENOTES SECONDARY PORTAL FRAME

WESTFIELD LIVERPOOL ELP
HIGH LEVEL ROOF CANOPY
MPN-11001-SK.S13
14.06.2019

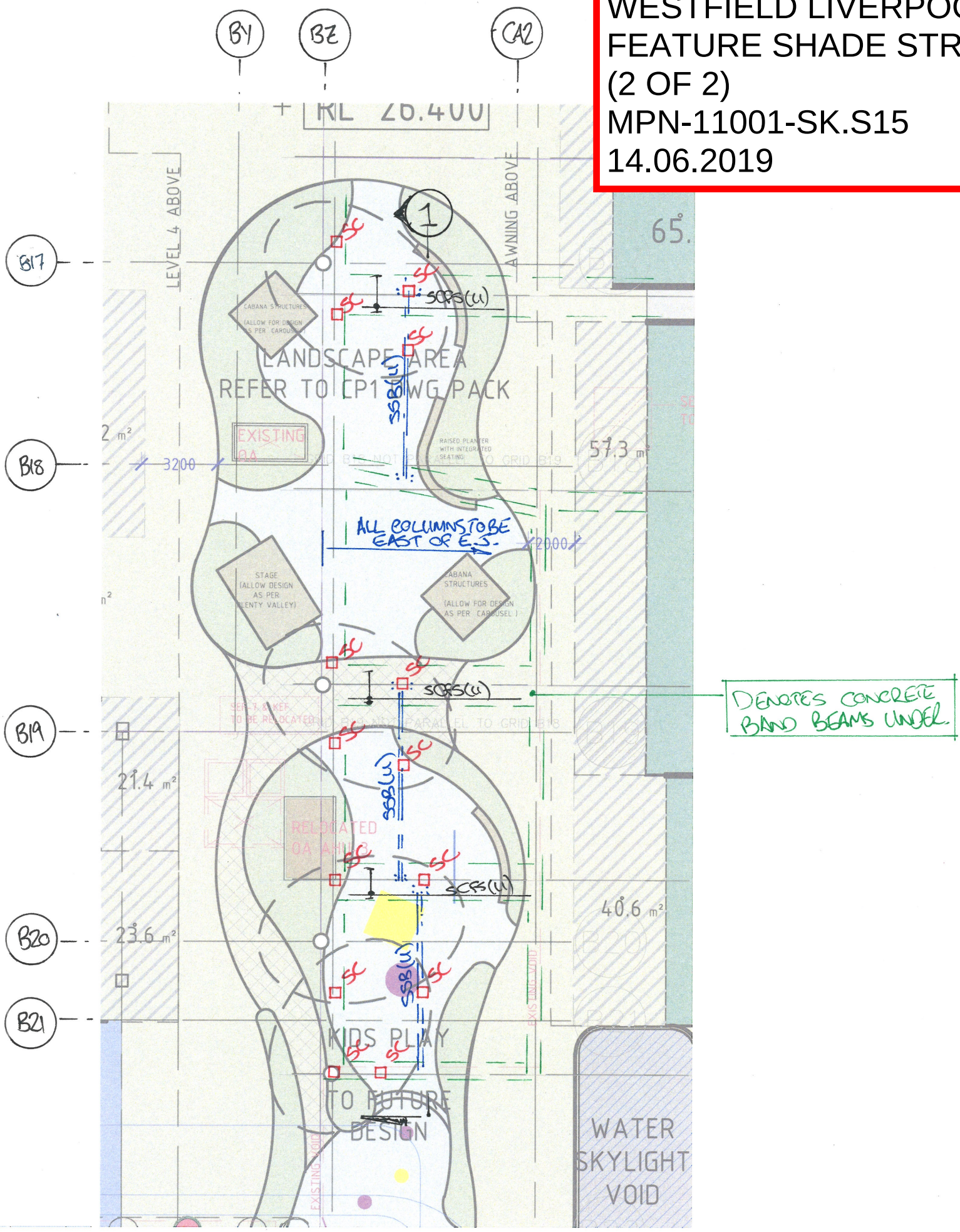


BLOCK 28/29 FEATURE SHADE STRUCTURE (L4)

SB - DENOTES STEEL BEAM SC - DENOTES STEEL COLUMN U - DENOTES ELEMENT UNDER

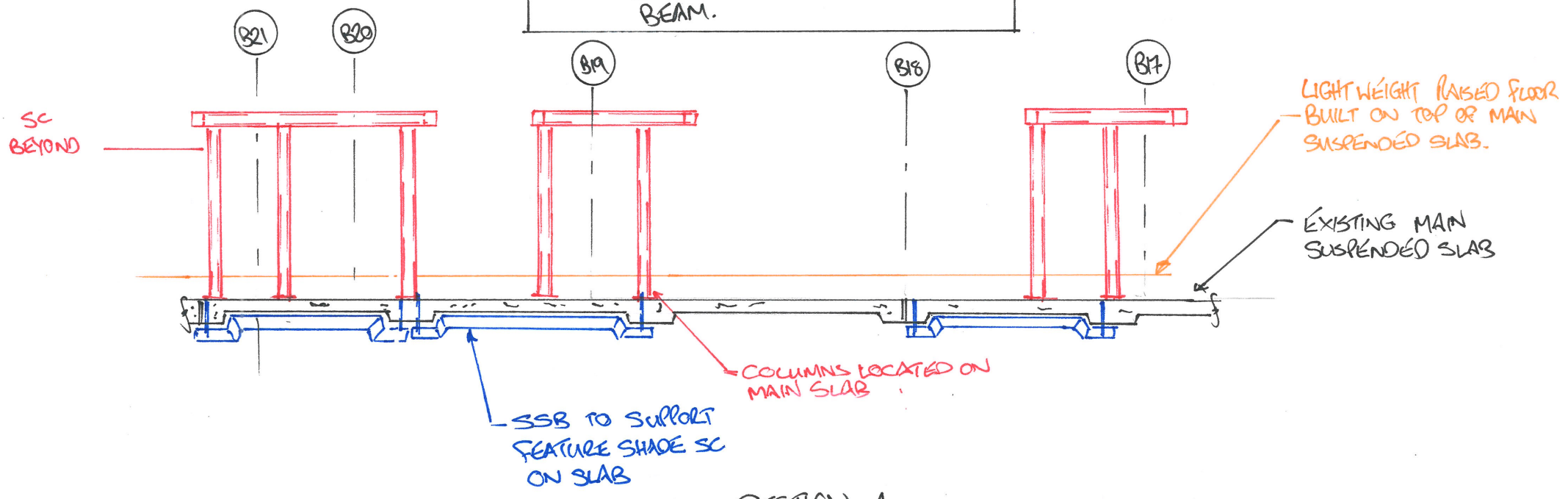
WESTFIELD LIVERPOOL ELP
FEATURE SHADE STRUCTURES
(1 OF 2)
MPN-11001-SK.S14
14.06.2019

WESTFIELD LIVERPOOL ELP
FEATURE SHADE STRUCTURES
(2 OF 2)
MPN-11001-SK.S15
14.06.2019

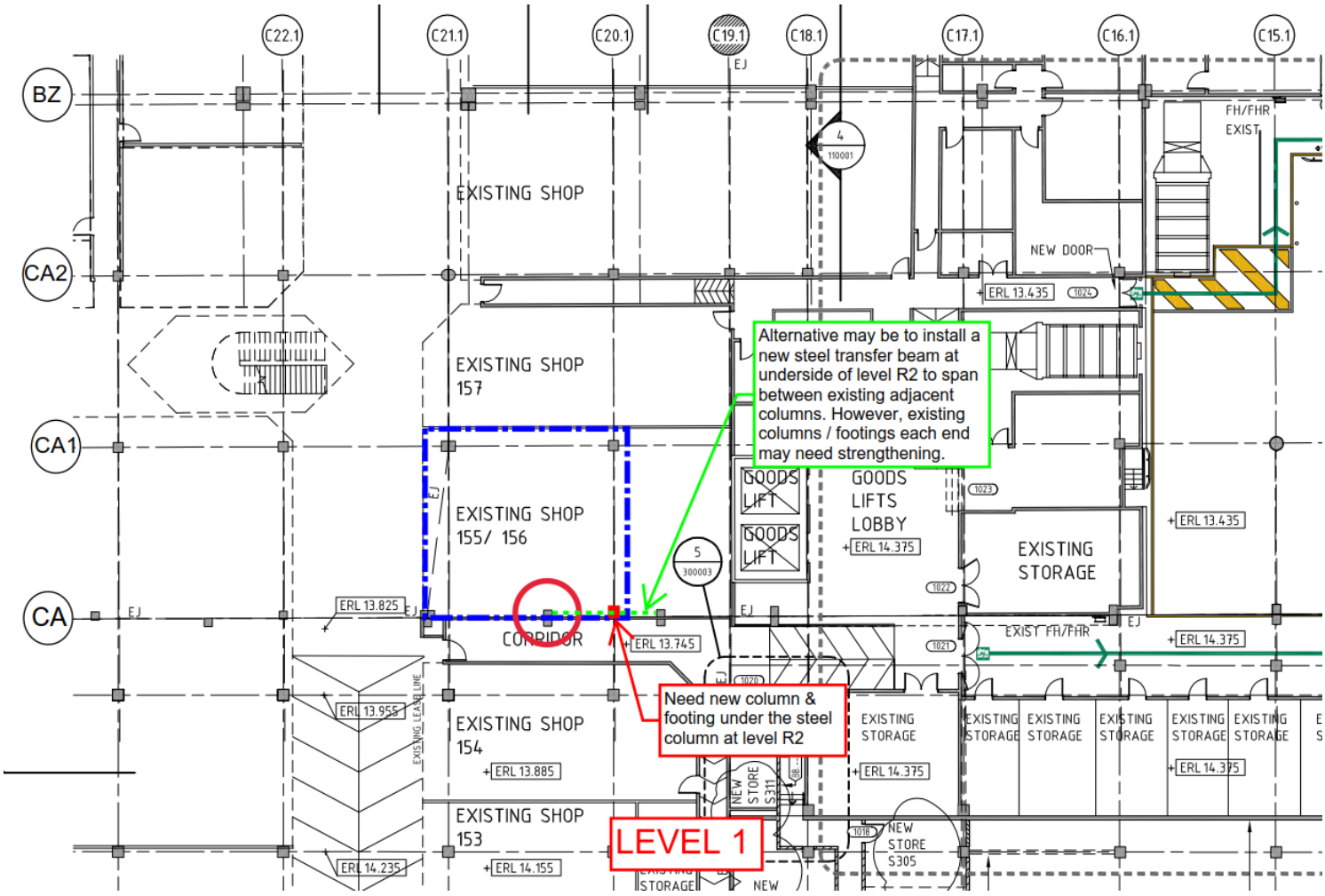


BLOCK 28/29 FEATURE SHADE STRUCTURE (L3)

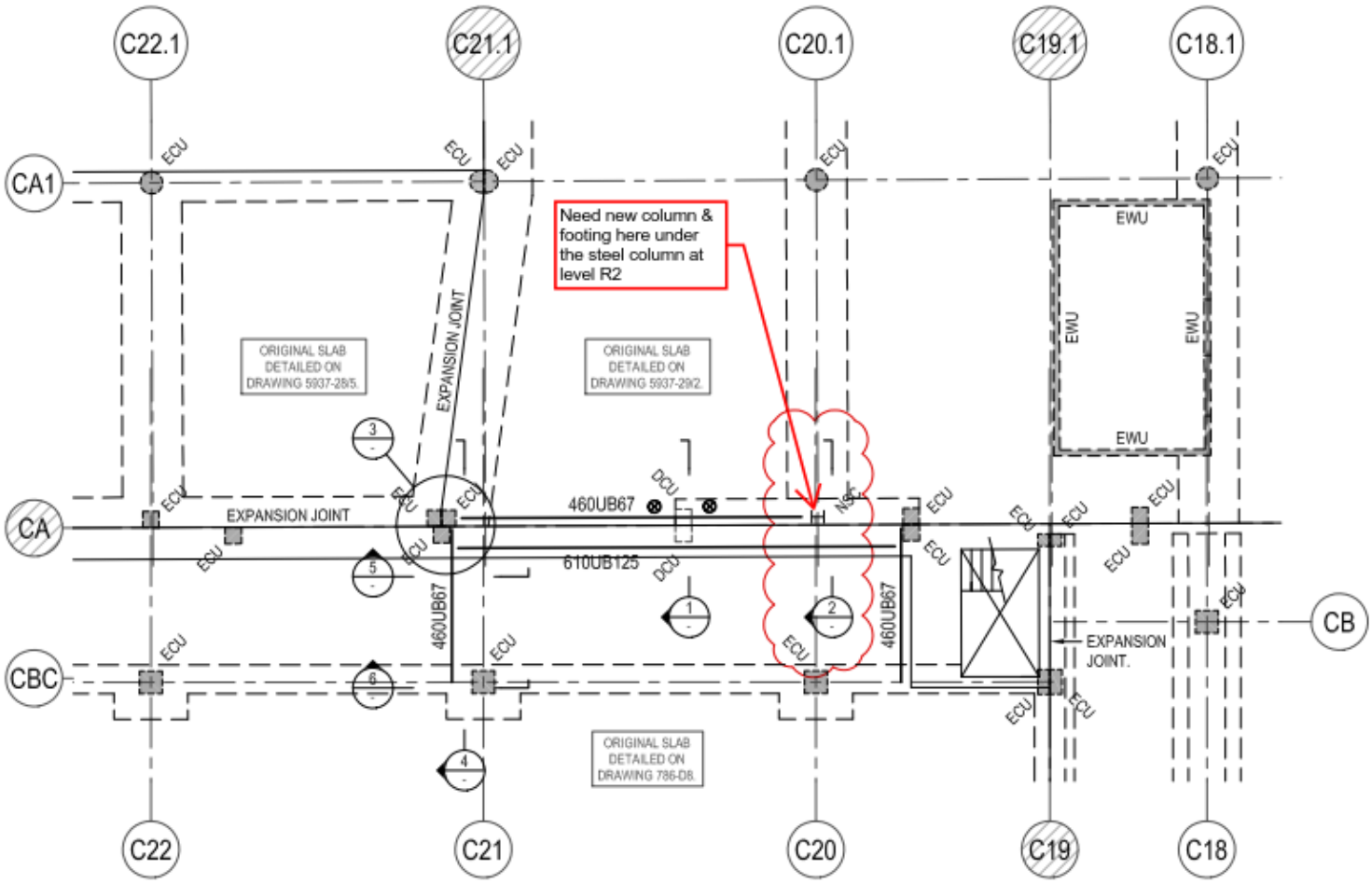
SC - DENOTES STEEL COLUMN
SSB(U) - DENOTES STEEL STRENGTHENING BEAM UNDER SLAB
SCFS (U) - DENOTES STRENGTHENING CARBON FIBRE STRIPS UNDER BEAM.



SECTION 1



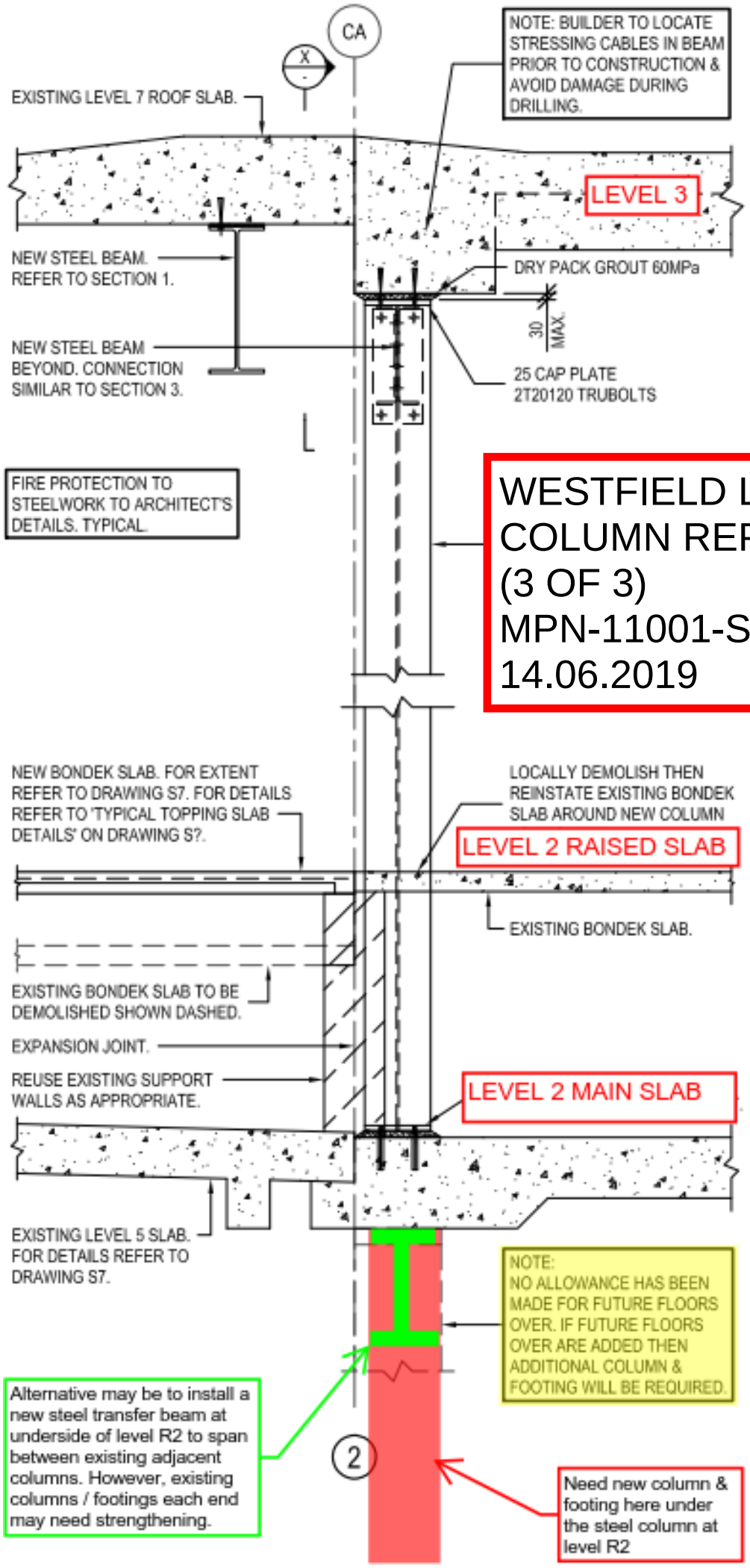
WESTFIELD LIVERPOOL ELP
COLUMN REPLACEMENT
(1 OF 3)
MPN-11001-SK.S16
14.06.2019



PART LEVEL 7 ROOF PLAN. LEVEL 3

ECU DENOTES EXISTING CONCRETE COLUMN UNDER.
DCU DENOTES EXISTING CONCRETE COLUMN UNDER TO BE DEMOLISHED.
EWU DENOTES EXISTING CONCRETE WALL UNDER.
NCC DENOTES NEW 500x400 CONCRETE COLUMN FROM LEVEL 5 TO ROOF.
NSC DENOTES NEW 310UC97 STEEL COLUMN UNDER.
⊗ DENOTES TEMPORARY PROPS (50kN CAPACITY). REFER TO CONSTRUCTION SEQUENCE FOR STAGING.

WESTFIELD LIVERPOOL ELP
COLUMN REPLACEMENT
(2 OF 3)
MPN-11001-SK.S17
14.06.2019


CA
X
NOTE: BUILDER TO LOCATE STRESSING CABLES IN BEAM PRIOR TO CONSTRUCTION & AVOID DAMAGE DURING DRILLING.
EXISTING LEVEL 7 ROOF SLAB.
LEVEL 3
NEW STEEL BEAM. REFER TO SECTION 1.
DRY PACK GROUT 60MPa
30 MAX.
NEW STEEL BEAM BEYOND. CONNECTION SIMILAR TO SECTION 3.
25 CAP PLATE 2T20120 TRUBOLTS
FIRE PROTECTION TO STEELWORK TO ARCHITECT'S DETAILS. TYPICAL.
WESTFIELD LIVERPOOL ELP COLUMN REPLACEMENT (3 OF 3) MPN-11001-SK.S18 14.06.2019
NEW BONDEK SLAB. FOR EXTENT REFER TO DRAWING S7. FOR DETAILS REFER TO 'TYPICAL TOPPING SLAB DETAILS' ON DRAWING S?.
LOCALLY DEMOLISH THEN REINSTATE EXISTING BONDEK SLAB AROUND NEW COLUMN
LEVEL 2 RAISED SLAB
EXISTING BONDEK SLAB.
EXISTING BONDEK SLAB TO BE DEMOLISHED SHOWN DASHED.
EXPANSION JOINT.
REUSE EXISTING SUPPORT WALLS AS APPROPRIATE.
LEVEL 2 MAIN SLAB
EXISTING LEVEL 5 SLAB. FOR DETAILS REFER TO DRAWING S7.
NOTE:
NO ALLOWANCE HAS BEEN MADE FOR FUTURE FLOORS OVER. IF FUTURE FLOORS OVER ARE ADDED THEN ADDITIONAL COLUMN & FOOTING WILL BE REQUIRED.
Alternative may be to install a new steel transfer beam at underside of level R2 to span between existing adjacent columns. However, existing columns / footings each end may need strengthening.
2
Need new column & footing here under the steel column at level R2

APPENDIX E

ZONE C CAR RAMPS

RETAIN EXISTING COLUMN

DEMOLISH EXISTING SLAB FOR NEW RAMP

DEMOLISH UP TO GRID F (EJ)

SB

RETAIN SLAB REINF

BLOCK 1

BLOCK 2

CONSTRUCTION NOTES

01 This drawing shall be read in conjunction with all other working drawings and specifications and with such other written instructions as may be issued during the course of the construction. All discrepancies and variations shall be referred to the Engineer before proceeding with the work.

FOR RELEVANT CONSTRUCTION NOTES REFER TO DRG. Nº 786/A10

Constant 4¹ profile

5-4x1¹⁄₈ϕ Supa 7

8-2x1¹⁄₈ϕ Supa 7

2-4x1¹⁄₈ϕ Supa 7

2-2x1¹⁄₈ϕ Supa 7

8-4x1¹⁄₈ϕ Supa 7

5-4x1¹⁄₈ϕ Supa 7

2-4x1¹⁄₈ϕ Supa 7

2-2x1¹⁄₈ϕ Supa 7

2-2x1¹⁄₈ϕ Supa 7

2-4

NEW RAMP UP FROM LEVEL 2M

CONC UPSTAND

SB

SC

BLOCK 1

BLOCK 2

CONSTRUCTION NOTES

FOR RELEVANT CONSTRUCTION NOTES REFER TO DRG. Nº 786/A10

2-2x1¼ Supa 7

B-4x1¼ Supa 7

Constant 4¹ profile

2-4x1¼ Supa 7

1-2x1¼ Supa 7

10¹ Profile for beams

REINFORCEMENT SCHEDULE

BLOCK B ADJOINS

SLAB PLAN - R.L. 85'-0" (8" THICK) TOP REINFORCEMENT

BLOCK 1 LEVEL 3

NEW BUILD

SB = NEW STEEL BEAM UNDER

SC = NEW STEEL COLUMN UNDER

↕ = BONDEK SLAB

BAR LAYING SEQUENCE

Possible future 7¼ holes

TYPICA

Note: Rei... to avoid

WESTFIELD LIVERPOOL ELP
BLOCK 1 CAR RAMP
MPN-11001-SK. R02
14.06.2019

Completed 13-12-71

MATTHEY-PERL-NAGY
CONSULTING ENGINEERS
8 GUN STREET, MILSONS POINT. Tel: 929-7166

ARCHITECT: B.V. BASOLCH B.ARCH. F.R.A.I.A.

PROJECT: LIVERPOOL SHOPPING CENTRE

FOR: WESTFIELD DEVELOPMENT CORP LTD.

BLOCK A
FLOOR PLAN - R.L. 85'-6"

SCALE 1/8"=1'-0" | DRAWN G.L.E. | APPROVED M.P.

LIVERPOOL SHOPPING CENTRE | JOB No. 786 | DRG No. A10

SB UNDER TO SUPPORT BOTTOM OF NEW RAMP

SB

SB

SB

TRANSITION TOPPING

6'x3'C B10' long

8'x3'C 15'0" long

STAIR No A1

Tree Prog No 786-A11

BLOCK 1

BLOCK 2

E.J.

BLOCK B ADJOINS

CONSTRUCTION NOTES

GENERAL

01 This drawing shall be read in conjunction with all other working drawings and specifications and with such other written instructions as may be issued during the course of the construction. All discrepancies and variations shall be referred to the Engineer before proceeding with the work.

FOR ALL RELEVANT CONSTRUCTION NOTES, OTHER THAN NOTED HEREUNDER, REFER TO DRAWING No. 786/A9 .

PLAN ON SLAB AT RL 74'-10" – 8" THICK BOTTOM REINFORCEMENT

For prestressing notes see drg. No 786/A7

BLOCK 1 LEVEL 2m

NEW BUILD

REINFORCEMENT SCHEDULE

A

TAG No	No OF BARS	SIZE & %g
A1	49	ϕ.4 (10)
A2	10	ϕ.7 (10)
A3	11	ϕ.5 (10)
A4	20	ϕ.5 (10)
A5	17	ϕ.5 (10)
A6	14	ϕ.5 (10)
A7	10	ϕ.5 (10)
A8	5	ϕ.9 –
A9	7	ϕ.5 (10)
A10	9	ϕ.5 (10)
A11	14	ϕ.5 (10)
A12	17	ϕ.5 (10)
A13	27	ϕ.5 (10)
A14	11	ϕ.5 (10)
A15	5	ϕ.5 (10)
A16	8	ϕ.5 (10)
A17	22	ϕ.5 (10)
A18	56	ϕ.4 (10)
A19	20	ϕ.4 (10)
A20	9	ϕ.5 –
A21	6	ϕ.5 (10)
A22	17	ϕ.4 (10)
A23	16	ϕ.4 (10)
A24	9	ϕ.4 (10)

TAG No	No OF BARS	SIZE & %g
A25	29	ϕ.4 (10)
A26	6	ϕ.5 (10)
A27	16	ϕ.4 (10)
A28	6	ϕ.5 (10)
A29	5	ϕ.5 –
A30	28	ϕ.4 (10)
A31	8	ϕ.5 (10)
A32	3	ϕ.4 (10)
A33	10	ϕ.4 (10)
A34	12	ϕ.4 (10)
A35	25	ϕ.5 (10)
A36	20	ϕ.4 (10)
A37	37	ϕ.4 (10)
A38	15	ϕ.5 (10)
A39	23	ϕ.4 (10)
A40	24	ϕ.4 (10)
A41	6	ϕ.5 (10)
A42	8	ϕ.5 (10)
A43	8	ϕ.4 (10)
A44	4	ϕ.5 –
A45	6	ϕ.5 –
A46	10	ϕ.4 (10)
A47	5	ϕ.5 –
A48	17	ϕ.5 (10)

TAG No	No OF BARS	SIZE & %g
A49	15	ϕ.4 (10)
A50	29	ϕ.5 (10)
A51	7	ϕ.5 (10)
A52	27	ϕ.4 (10)
A53	10	ϕ.10 –
A54	16	ϕ.4 (10)
A55	5	ϕ.5 –
A56	6	ϕ.5 (10)
A57	16	ϕ.5 (10)
A58	11	ϕ.5 (10)
A59	15	ϕ.4 (10)
A60	14	ϕ.5 (10)
A61	18	ϕ.5 (10)
A62	15	ϕ.4 (10)
A63	9	ϕ.5 (10)
A64	21	ϕ.4 (10)
A65	21	ϕ.4 (10)
A66	22	ϕ.5 (10)
A67	18	ϕ.5 (10)
A68	13	ϕ.4 (10)
A69	10	ϕ.4 (10)
A70	26	ϕ.4 (10)
A71	25	ϕ.4 (10)
A72	22	ϕ.4 (10)
A73	4	ϕ.5 –

B

TAG No	No OF BARS	SIZE & %g
B1	19	ϕ.4 (10)
B2	20	ϕ.4 (10)
B3	2	ϕ.5 –
B4	17	ϕ.5 (10)
B5	3	ϕ.5 –
B6	10	ϕ.5 –
B7	10	ϕ.5 –
B8	9	ϕ.5 –
B9	9	ϕ.5 –
B10	10	ϕ.5 (10)
B11	9	ϕ.5 –
B12	17	ϕ.5 (10)
B13	7	ϕ.5 –
B14	17	ϕ.4 (10)
B15	4	ϕ.5 –
B16	24	ϕ.5 –
B17	17	ϕ.5 (10)
B18	5	ϕ.5 –
B19	10	ϕ.5 (10)
B20	8	ϕ.5 –
B21	23	ϕ.5 (10)
B22	17	ϕ.5 (10)
B23	5	ϕ.5 –
B24	8	ϕ.5 –

TAG No	No OF BARS	SIZE & %g
B25		ϕ.4 (10)
B26		ϕ.4 (10)
B27		ϕ.5 –
B28		ϕ.5 –
B29		ϕ.5 –
B30		ϕ.5 –
B31		ϕ.5 –
B32		ϕ.5 –
B33		ϕ.5 –
B34		ϕ.5 –
B35		ϕ.5 –
B36		ϕ.5 –
B37		ϕ.5 –
B38		ϕ.5 –
B39		ϕ.5 –
B40		ϕ.5 –
B41		ϕ.5 –
B42		ϕ.5 –
B43		ϕ.5 –
B44	12	ϕ.4 (10)
B45	2	ϕ.4 (10)
B46	2	ϕ.5
B47	26	ϕ.5

Possible future 7' dia holes

C	Sections 18&19 added	16-12-71
B	Profiles as noted	19-12-71
A	As noted	8-12-71
–	Completed	1-12-71
ISSUE	AMENDMENT	DATE

MATEFFY-PERL-NAGY
CONSULTING ENGINEERS
8 GUEN STREET, MILSONS POINT. Tel: 929-7144.

ARCHITECT
B.E. SABOLCH

PROJECT
LIVERPOOL SHOPPING CENTRE

WESTFIELD DEVELOPMENT CORP LTD.

WESTFIELD LIVERPOOL ELP
BLOCK 1 CAR RAMP
MPN-11001-SK. R03
14.06.2019

BLOCK 'A' SLAB AT RL 74'-10" BOTTOM REINFORCEMENT.

SCALE 1/8" to 1'-0"
DRAWN L.W.T&G.L.E.
APPROVED

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FOR LIVERPOOL SHOPPING CENTRE

JOB No. 786

DWG No. A6 C

Note. Cable profile dimensions are from underside of slab to centre line of cable.

BLOCK 3

BLOCK 4

DEMOLISH EXISTING SLAB FOR NEW RAMP

SLAB IN THIS BAY WILL NEED TO BE CHECKED. STRENGTHENING MAY BE REQUIRED.

SB = NEW STEEL BEAM UNDER

SC = NEW STEEL COLUMN UNDER

BLOCK 4 LEVEL 2m — DEMOLITION

BLOCK C ADJOINS

SLAB PLAN - R.L. 74'10" (8" THICK) TOP REINFORCEMENT

BAR LAYING SEQUENCE.

Possible future 7"ϕ hole.

Note: Reinforcement to be placed in order to avoid possible future 7"ϕ holes as shown.

TYPICAL DETAIL AT COLUMN.

PLAN OF STRONG ROOM.

CONSTRUCTION NOTES

GENERAL

01 This drawing shall be read in conjunction with all other working drawings and specifications and with such other written instructions as may be issued during the course of the construction. All discrepancies and variations shall be referred to the Engineer before proceeding with the work.

PRESTRESSING NOTES

1. All materials and workmanship shall conform to the current edition of S.A.A. Code CA-35 except where varied by the contract documents.
2. The type serial numbers and calibration certificates of stressing jacks designated for stressing operations are to be forwarded to the consulting engineer before commencement of stressing work.
3. The cables shall be located and fixed in accordance with the drawings and profiled to a vertical tolerance of plus or minus ¼". Each cable shall be supported at maximum 3'-6" centres along its length on substantial support chairs securely fixed in position to prevent vertical and lateral displacement of the cable during concreting.
4. Slab cables are to have a parabolic profile and are to conform to the control points shown on plans. Dimensions locating the profile apply to the centre of the cable.
5. Whenever there is interference between a cable and any kind of conduit, the cable profile governs.
6. Sheathing joints shall be securely taped to prevent entry of mortar into the ducts.
7. Before stressing is commenced the test results of the specified concrete test samples are to be relayed to the consulting engineer and his approval for commencement of stressing obtained.
8. Records of strand extension shall be made available to the consulting engineer within 24 hours of completion of each stressing operation.
9. After allowance is made for 'draw-in' at anchorages the average of the extensions of all strands in a cable should vary by not more than 5% from the calculated extensions at the specified jacking load as scheduled below.
10. Re-stressing of cables, examination of wedge grips and calibration check on jack gauges may be directed by the Engineer where extension readings exceed the limit of variation.
11. Grouting of cables and cutting off strand ends shall be carried out only after written approval from the consulting engineer who will issue such approval within 24 hours of receiving records of extensions. Grouting of cables and anchorage ends shall be carried out within 48 hours of Engineers granting approval for grouting work.

NOTES TO GENERAL CONTRACTOR

12. The general contractor shall provide all necessary staging and safety hoarding for stressing operations.
13. Care is to be maintained that cable ducts, joint seals and vent pipes are not displaced or damaged during concreting.
14. Apply approved curing compound to slabs not later than 18 hours after pouring.
15. Any subsequent proposed chases, penetrations, etc. in completed prestressed slabs are subject to Engineers approval.

PRESTRESS LOSSES

The calculated losses due to elastic, creep and shrinkage strains in the concrete, strand relaxation and column resistance are noted as 'deferred strain' losses and are as scheduled in the table of stressing cycles.
The calculated losses due to cable friction and wobble are based on $\mu = 0.22$, $k = 0.001$
The average friction losses over the whole cable length for calculation of extensions are as scheduled and includes allowance of 3% for jack and anchorage friction.

MATERIAL SPECIFICATION

Strand type Supa 7
Nominal diameter ½"
Minimum breaking load 61,300 lb.
Minimum limit of proportionality (0·01% offset) 26,780 lb.
Duct type - Slabs ¾"
Beams ⅞"
Minimum 0·1% proof load or elastic limit 55,175 lb.
Minimum elong. to fracture 4%
Relaxation after 1000 hrs. at 0·8 of initial load.
Modulus of elasticity (E) 28·5 x 10⁶ lb/in².

STRESSING CYCLES & REQUIRED TEST SAMPLES

CYCLE NUMBER	AGE OF CONCRETE (DAYS)	CONCRETE STRENGTH f'c R.D.1.	NO. OF TEST SAMPLES	NO. OF STRANDS STRESSED
1	7	3,800		11.
4	7	3,500		12.

JACKING LOADS PER CABLE & CALCULATED EXTENSIONS

CYCLE NUMBER	ELEMENT	CABLE NUMBER	NUMBER OF CABLE STRANDS	CABLE LENGTH APPROX.	JACKING LOAD K	AVERAGE FRICTION LOSS K	NET TRANSFER FORCE =
1	Beam	C57	4	49	55	3	33
	Slab	C4 to 8	2	42	35	1	34
2	Beam	C5 to 18	4	45	55	3	32
	Slab	C1 to 3	2	45	35	1	34

TENDON SCHEDULE

cable	No	Tag No	No of bars	Size & c/s
C1	18	ϕcD (7")	D1	17	4c 7 (4½)
C2	16	ϕcB (15")	D2	15	4cG (7½)
C3	32	ϕc5 (7")	D3	34	4c 7 (9½)
C4	11	ϕc5 (15")	D4	18	4cG (9")
C5	20	ϕc5 (7")	D5	13	4cG (11")
C6	12	ϕc5 (18")	D6	0	4cG (12")
C7	13	ϕc5 (7")	D7	16	4c 7 (5")
C8	2	ϕc 7	D8	16	4cG (10")
C9	17	ϕc 7	D9	32	4c 7 (8")
C10	32	ϕcG (7")	D10	12	4c 7 (6½)
C11	34	ϕc 7 (6½")	D11	12	4cG (12")
C12	23	ϕcG (7")	D12	21	4c 7 (6½)
C13	28	ϕc 7 (6½)	D13	7	4c 7 (12")
C14	26	ϕcG (7")	D14	15	4c 7 (6")
C15	14	ϕc 7 (6½)	D15	16	4cG (10")
C16	2	ϕc 7	D16	26	4c 7 (6")
C17	10	ϕcB (10")	D17	18	4c 7 (4½)
C18	16	ϕcG (7")	D18	23	4c 7 (4½)
C19	35	ϕcG (7")	D19	15	4c5 (10")
C20	16	ϕcG (7")	D20	12	4c5 (10")
C21	13	ϕc 7 (7½)	D21	19	4c 7 (6½)
C22	6	ϕc 7	D22	34	4c 7 (6½)
C23	12	ϕc 7 (7½)	D23	20	4cG (7")
C24	11	ϕc 5	D24	18	4c5 (6")
C25	8	ϕc 5	D25	20	4c5 (6")
C26	4	ϕc 5	D26	12	4c5 (7½)
C27	20	ϕc5 (10")	D27	9	4c5 (8")
C28	16	ϕcG (7")	D28	9	4c5 (7½)
C29	16	ϕ4cG (7")	D29	35	4c5 (7½)
C30	24	ϕc 7 (7½)	D30	14	4c5 (7½)
C31	25	ϕcG (7")	D31	22	4c5 (7½)
C32	14	ϕc 7 (7½)	D32	20	4cG (7")
C33	24	ϕcB (7")	D33	34	4c 7 (6½)
C34	12	ϕcB (10")	D34	16	4c 7 (8")
C35	14	ϕcB (7")	D35	34	4c 7 (6½)
C36	8	ϕc5 (10")	D36	20	4cG (7")
C37	12	ϕcB (7")	D37	19	4c 7 (6½)

ISSUE	AMENDMENT	DATE
D	Strongroom walls amended	8.12.71
C	Tos added, grids W3 to W8 (section 17)	12.8.71.
B	Strongroom door attd., wall numbers added	5.8.71
A	Penetrations added	1.8.71
–	Completed	28.10.71

MATEFFY-PERL-NAGY
CONSULTING ENGINEERS
8 GLEN STREET, MILSONS POINT. Tel. 929-7144.

ARCHITECT
D.E. BABOLCH B.ARCH. F.R.A.I.A.

PROJECT
LIVERPOOL SHOPPING CENTRE

FOR
WESTFIELD DEVELOPMENT CORP. LTD.

BLOCK B
FLOOR PLAN - R.L. 74'10"

SCALE 1/8" = 1'-0"
DRAWN G.L.E. & M.D.
APPROVED

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FILE LIVERPOOL SHOPPING CENTRE
JOB No. 786
DWG No. B 6D

WESTFIELD LIVERPOOL ELP
BLOCK 4 CAR RAMP
MPN-11001-SK. R04
14.06.2019

Note: Cable profile dimensions are from undersides of slab to centre line of cable.

STEEL BEAMS UNDER SHOWN ON DEMOLITION PLAN

NEW RAMP UP FROM LEVEL 2

BLOCK 3

BLOCK 4

BLOCK C ADJOINS

BLOCK 4 LEVEL 2M – NEW BUILD
SB = STEEL BEAM
↕ = BONDEK SLAB

CONSTRUCTION NOTES

GENERAL:

01 This drawing shall be read in conjunction with all other working drawings and specifications and with such other written instructions as may be issued during the course of the construction. All discrepancies and variations shall be referred to the Engineer before proceeding with the work.

SLAB PLAN – R.L. 74'10" (8" THICK) TOP REINFORCEMENT

BAR LAYING SEQUENCE.

13. 14. 15.

16. 17.

10.

Possible future 7½ϕ hole.

Note: Reinforcement to be placed in order to avoid possible future 7½ϕ holes as shown.

TYPICAL DETAIL AT COLUMN.

PLAN OF STRONG ROOM.

C4	11	4c5 (15')	D4	18	4cG (12')
C5	20	4c5 (7')	D5	13	4cG (15')
C6	12	4c5 (15')	D6	9	4cG (12')
C7	15	4c5 (7')	D7	18	4c7 (5')
C8	2	4c7	D8	16	4cG (5')
C9	17	4c7	D9	32	4c7 (5')
C10	32	4cG (7')	D10	12	4c7 (6½')
C11	34	4c7 (6½')	D11	12	4cG (12')
C12	23	4cG (7')	D12	21	4c7 (6½')
C13	28	4c7 (6½')	D13	7	4c7 (12')
C14	26	4cG (7')	D14	15	4c7 (6')
C15	14	4c7 (6½')	D15	16	4cG (9')
C16	2	4c7	D16	26	4c7 (6')
C17	10	4c5 (10')	D17	18	4c7 (4½')
C18	16	4cG (7')	D18	23	4c7 (4½')
C19	55	4cG (7')	D19	15	4c5 (10')
C20	14	4cG (7')	D20	12	4c5 (10')
C21	18	4c7 (7½')	D21	13	4c7 (4½')
C22	6	4c7	D22	34	4c7 (6½')
C23	12	4c7 (7½')	D23	20	4cG (7')
C24	11	4c5	D24	18	4c5 (6')
C25	8	4c5	D25	20	4c5 (6')
C26	4	4c5	D26	12	4c5 (7½')
C27	20	4c5 (10')	D27	9	4c5 (15')
C28	16	4cG (7')	D28	9	4c5 (7½')
C29	16	4cG (7')	D29	35	4c5 (7½')
C30	24	4c7 (7½')	D30	14	4c5 (7½')
C31	25	4cG (7')	D31	22	4c5 (7½')
C32	14	4c7 (7½')	D32	20	4cG (7')
C33	24	4c5 (7')	D33	34	4c7 (4½')
C34	12	4c5 (18')	D34	16	4c7 (9')
C35	14	4c5 (7')	D35	34	4c7 (6½')
C36	8	4c5 (15')	D36	20	4cG (7')
C37	12	4c5 (7')	D37	19	4c7 (4½')

PRESTRESSING NOTES

1. All materials and workmanship shall conform to the current edition of SAA Code CA-35 except where varied by the contract documents.
2. The type, serial numbers and calibration certificates of stressing jacks designated for stressing operations are to be forwarded to the consulting engineer before commencement of stressing work.
3. The cables shall be located and fixed in accordance with the drawings and profiled to a vertical tolerance of plus or minus 4". Each cable shall be supported at maximum 3'-6" centres along its length on substantial support chairs securely fixed in position to prevent vertical and lateral displacement of the cable during concreting.
4. Slab cables are to have a parabolic profile and are to conform to the control points shown on plans. Dimensions locating th. profile apply to the centre of the cable.
5. Whenever there is interference between a cable and any kind of conduit, the cable profile governs.
6. Sheathing joints shall be securely taped to prevent entry of mortar into the ducts.
7. Before stressing is commenced the test results of the specified concrete test samples are to be relayed to the consulting engineer and his approval for commencement of stressing obtained.
8. Records of strand extension shall be made available to the consulting engineer within 24 hours of completion of each stressing operation.
9. After allowance is made for "draw-in" at anchorages the average of the extensions of all strands in a cable should vary by not more than 5% from the calculated extensions at the specified jacking load as scheduled below.

NOTES TO GENERAL CONTRACTOR

12. The general contractor shall provide all necessary staging and safety hoarding for stressing operations.
13. Care is to be maintained that cable ducts, joint seals and vent pipes are not displaced or damaged during concreting.
14. Apply approved curing compound to slabs not later than 18 hours after pouring.
15. Any subsequent proposed chases, penetrations, etc. in completed prestressed slabs are subject to Engineer's approval.

PRESTRESS LOSSES

The calculated losses due to elastic, creep and shrinkage strains in the concrete, strand relaxation and column resistance are noted as "deferred strain" losses and are as scheduled in the table of stressing cycles.
The calculated losses due to cable friction and wobble are based on μ = 0·22 , k = 0·001
The average friction losses over the whole cable length for calculation of extensions are as scheduled and includes allowance of 5% for jack and anchorage friction.

MATERIAL SPECIFICATION

Strand type Supa 7
Nominal diameter ½"
Minimum breaking load 41,300 lb.
Minimum limit of proportionality (0·01% offset) 34,780 lb
Duct type – Slabs: 4½"
Beams: 6½"

Minimum 0·1% proof load or elastic limit 35,175 lb.
Minimum elong. to fracture 4%
Relaxation after 1000 hrs. at 80% of initial load.
Modulus of elasticity (E) 28·5 x 10⁶ lb/in².

STRESSING CYCLES & REQUIRED TEST SAMPLES

CYCLE NUMBER	AGE OF CONCRETE (days)	CONCRETE STRENGTH f'c R.D.I.	NO. OF TEST SAMPLES	NO. OF STRANDS STRESSED
1	7	5,800		11.
4	7	5,800		12.

JACKING LOADS PER CABLE & CALCULATED EXTENSIONS

CYCLE NUMBER	ELEMENT	CABLE NUMBER	NUMBER OF CABLE STRANDS	LENGTH OF CABLE (ft)	JACKING LOAD K	WEDGE FRICTION LOSS %	NET TRANSFER FORCE %
1	Beam	11 to 17	6	45	35	5	33
	Slab	1 to 11	2	42	35	1	34
2	Beam	11 to 18	6	45	35	5	33
	Slab	1 to 11	2	42	35	1	34

WESTFIELD LIVERPOOL ELP
BLOCK 4 CAR RAMP
MPN-11001-SK. R05
14.06.2019

D	Strongroom walls amended	8-12-71
C	Toe added, grids N9 to M8 (section 17)	10-3-71
B	Strongroom door altd., wall numbers added	5-3-71
A	Penetrations added	1-3-71
–	Completed	28-10-71
ISSUE	AMENDMENT	DATE

MATEFFY-PERL-NAGY
CONSULTING ENGINEERS
8 GLEN STREET, MILSONS POINT. Tel. 929-7144.

ARCHITECT
B.E. GABOLCH B.ARCH. F.R.A.I.A.

PROJECT
LIVERPOOL SHOPPING CENTRE

FOR
WESTFIELD DEVELOPMENT CORP. LTD.

BLOCK B
FLOOR PLAN – R.L. 74'-10"

SCALE 1/8"=1'-0"	COPYRIGHT: THIS DESIGN AND PLANS ARE NOT TO BE USED OR REPRODUCED WHOLLY OR IN PART WITHOUT WRITTEN PERMISSION OF MATEFFY-PERL-NAGY.
DRAWN G.L.E. & M.D.	
APPROVED	
FILE LIVERPOOL SHOPPING CENTRE	JOB No. 786
	DWG No. B 6D

BLOCK A ADJOINS

TYPICAL DETAIL AT COLUMN

NOTE: Reinforcement to be placed in order to avoid possible future 7"ø holes.

Possible Future 7"ø holes

CONSTRUCTION NOTES

GENERAL

01 This drawing shall be read in conjunction with all other working drawings and specifications and with such other written instructions as may be issued during the course of the construction. All discrepancies and variations shall be referred to the Engineer before proceeding with the work.

FOR ALL RELEVANT CONSTRUCTION NOTES, OTHER THAN NOTED HEREUNDER, REFER TO DRAWING No. 786 :: S01

NEW RAMP UP TO RL 2m

SBU

SCO

BLOCK 3

BLOCK 4

BLOCK C ADJOINS

SLAB PLAN – R.L. 64'-0" (8" THICK) BOTTOM REINFORCEMENT

REINFORCEMENT LAYING SEQUENCE

BLOCK 4 LEVEL 2 – NEW BUILD

SBU = NEW STEEL BEAM UNDER

SCO = NEW STEEL COLUMN OVER TO SUPPORT LEVEL 2m SLAB AT DEMOLITION LINE

ISSUE	AMENDMENT	DATE
–	Completed	19-10-71

MATEFFY-PERL-NAGY
CONSULTING ENGINEERS
8 GLEN STREET, MILSONS POINT. Tel.: 929-7144.

ARCHITECT
D.E. SABOLCH B.ARCH. F.R.A.I.A.

PROJECT
LIVERPOOL SHOPPING CENTRE

FOR
WESTFIELD DEVELOPMENT CORP. LTD.

BLOCK B
FLOOR PLAN – R.L. 64'-0"

SCALE 1/8" = 1'-0"
DRAWN G.L.E.
APPROVED

CONTENTS, THE IDEAS AND PLANS ARE NOT TO BE USED OR REPRODUCED WHOLLY OR IN PART WITHOUT WRITTEN PERMISSION OF MATEFFY-PERL-NAGY

FILE
LIVERPOOL SHOPPING CENTRE

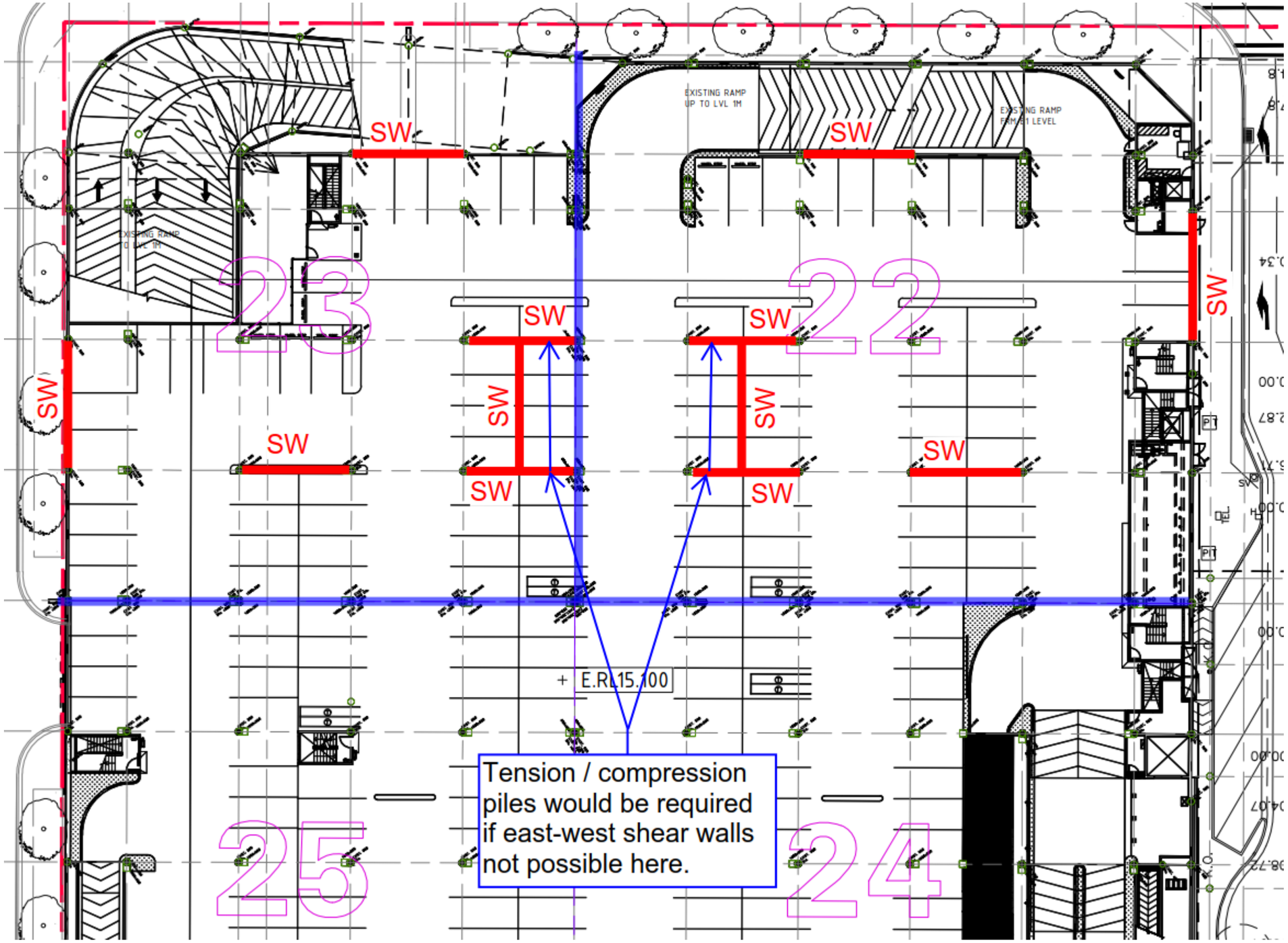
JOB No. 786

DWG No. S3

WESTFIELD LIVERPOOL ELP
BLOCK 4 CAR RAMP
MPN-11001-SK. R06
14.06.2019

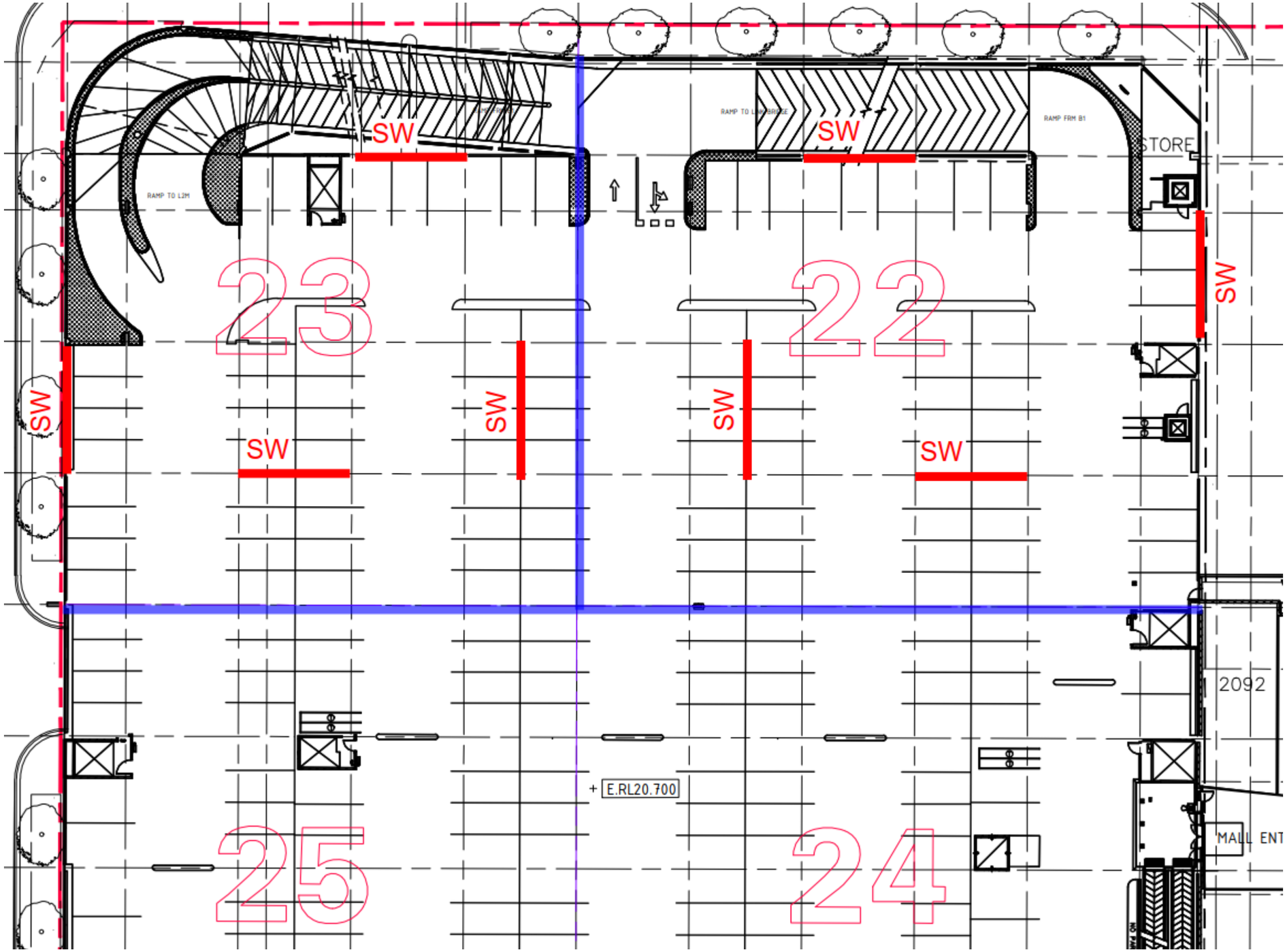
APPENDIX F

EARTHQUAKE UPGRADE CONCEPTS



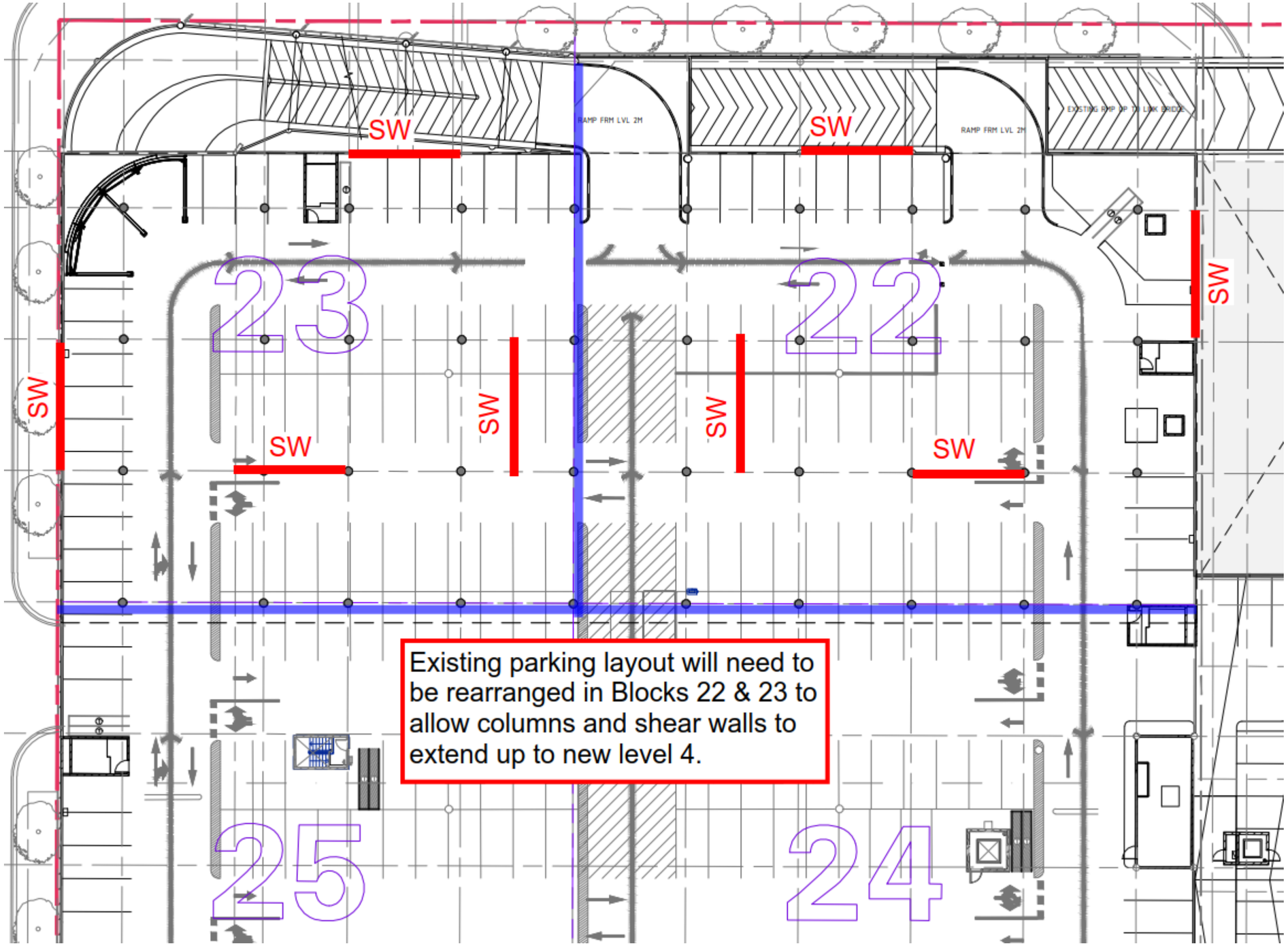
SW = NEW SHEAR WALL

WESTFIELD LIVERPOOL ELP
EARTHQUAKE UPGRADE CONCEPT
BLOCKS 22 & 23 LEVEL 1
MPN-11001-SK. E1
14.06.2019



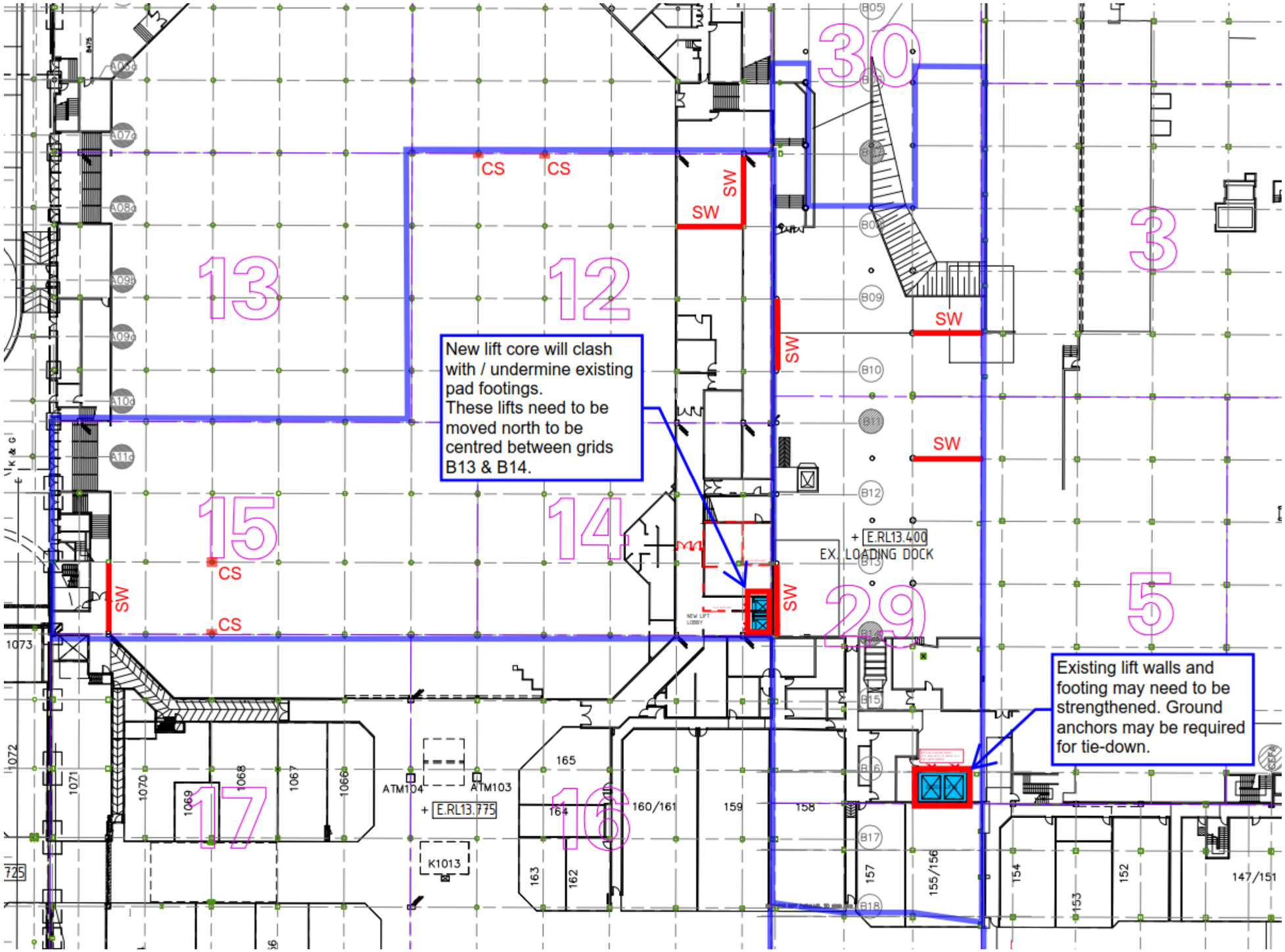
SW = NEW SHEAR WALL

WESTFIELD LIVERPOOL ELP
EARTHQUAKE UPGRADE CONCEPT
BLOCKS 22 & 23 LEVEL 2
MPN-11001-SK. E2
14.06.2019



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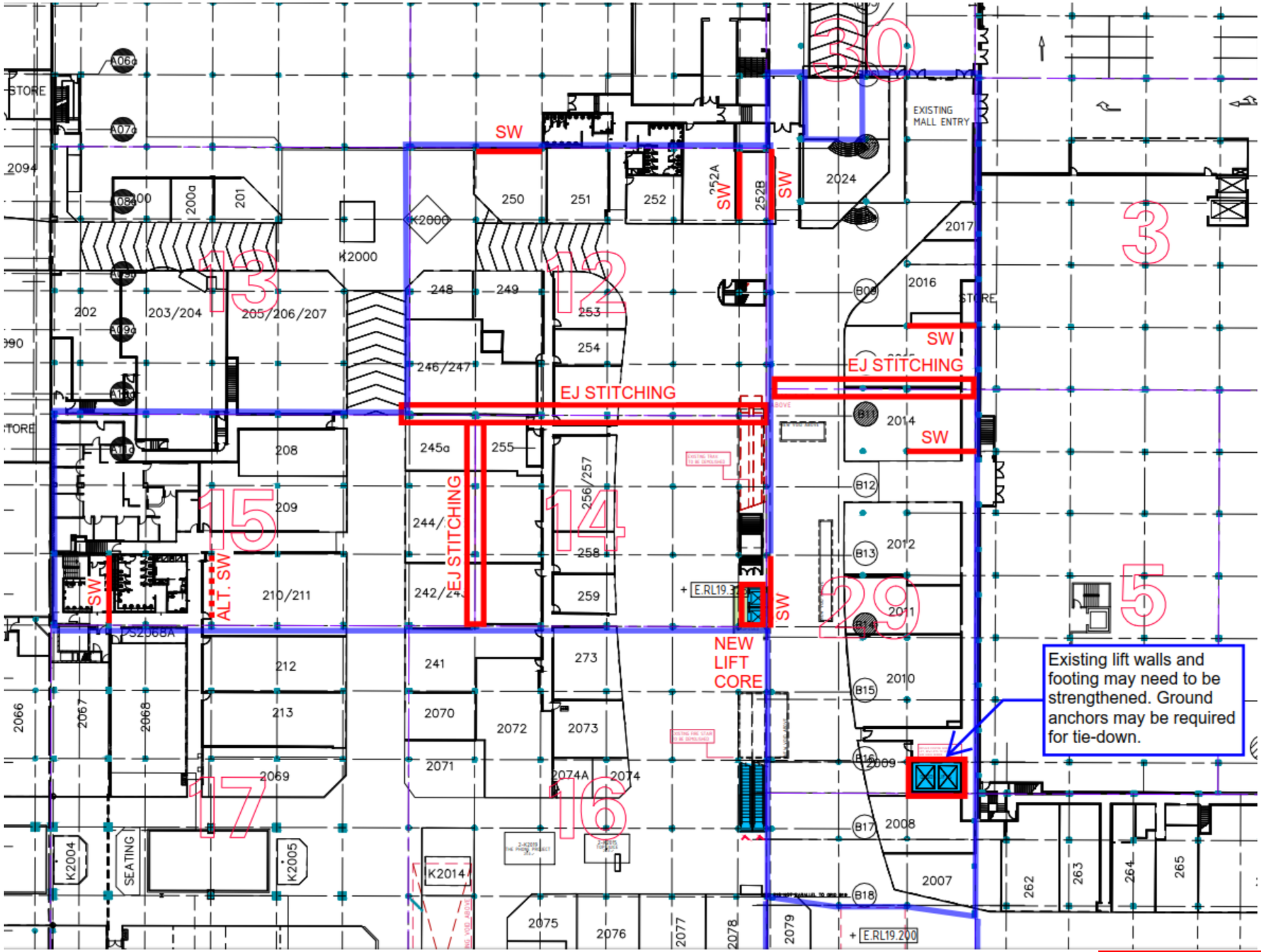
WESTFIELD LIVERPOOL ELP
EARTHQUAKE UPGRADE CONCEPT
BLOCKS 22 & 23 LEVEL 3
MPN-11001-SK. E3
14.06.2019



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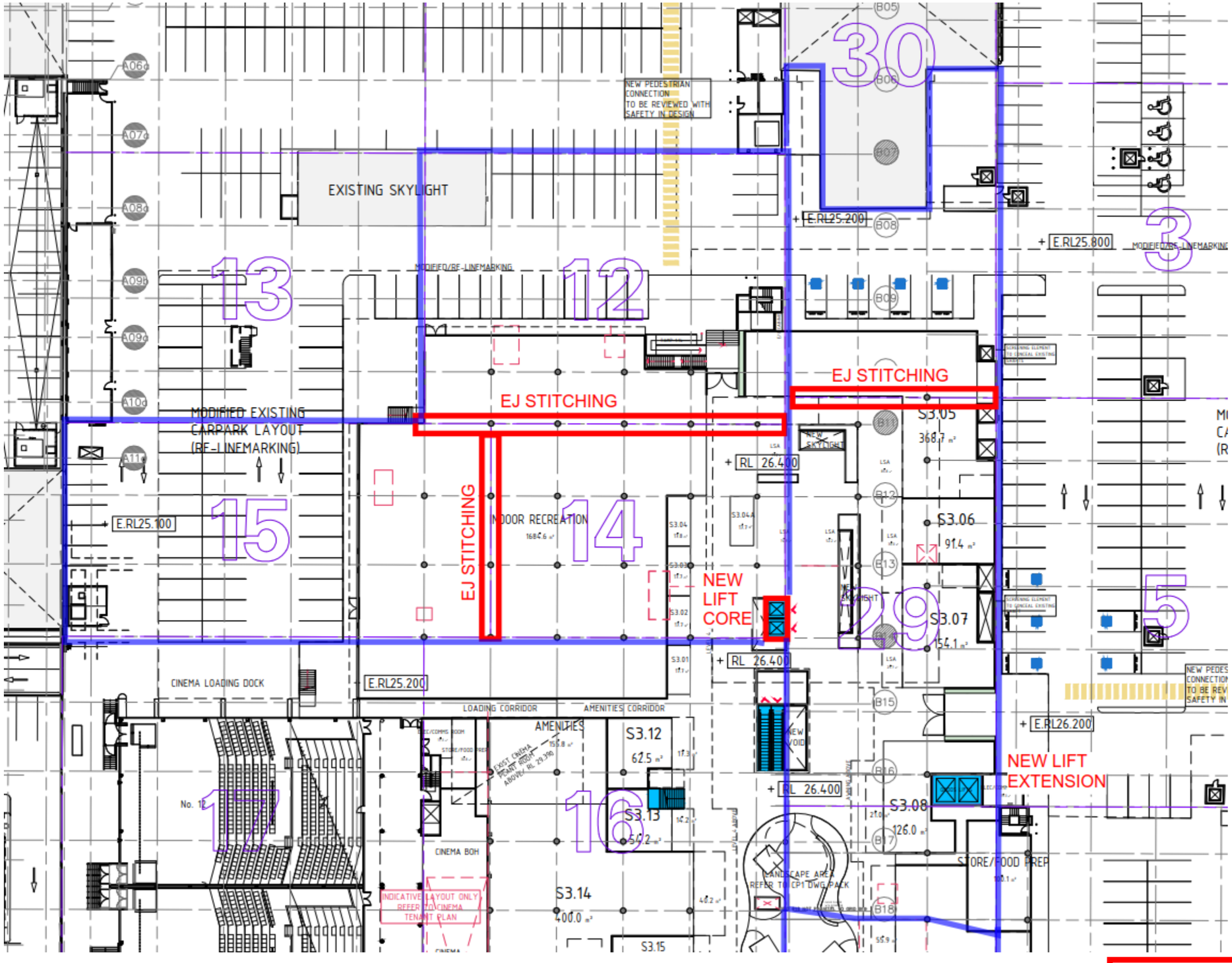
CS = NEW COLUMN / FOOTING STRENGTHENING

WESTFIELD LIVERPOOL ELP
EARTHQUAKE UPGRADE CONCEPT
BLOCKS 12, 14, 15, 29 & 30 LEVEL 1
MPN-11001-SK. E4
14.06.2019

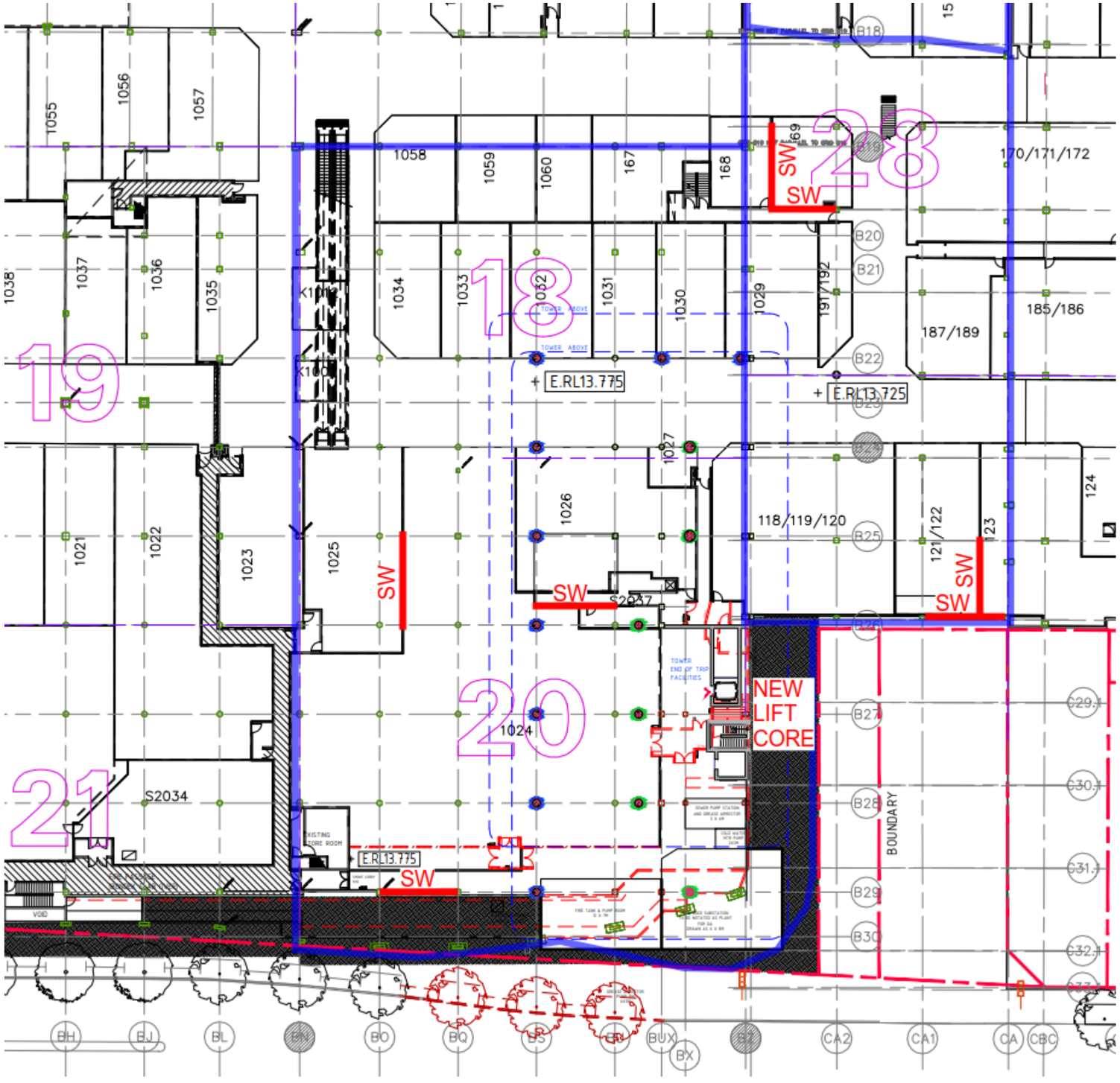


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WESTFIELD LIVERPOOL ELP
EARTHQUAKE UPGRADE CONCEPT
BLOCKS 12, 14, 15, 29 & 30 LEVEL 2
MPN-11001-SK. E5
14.06.2019

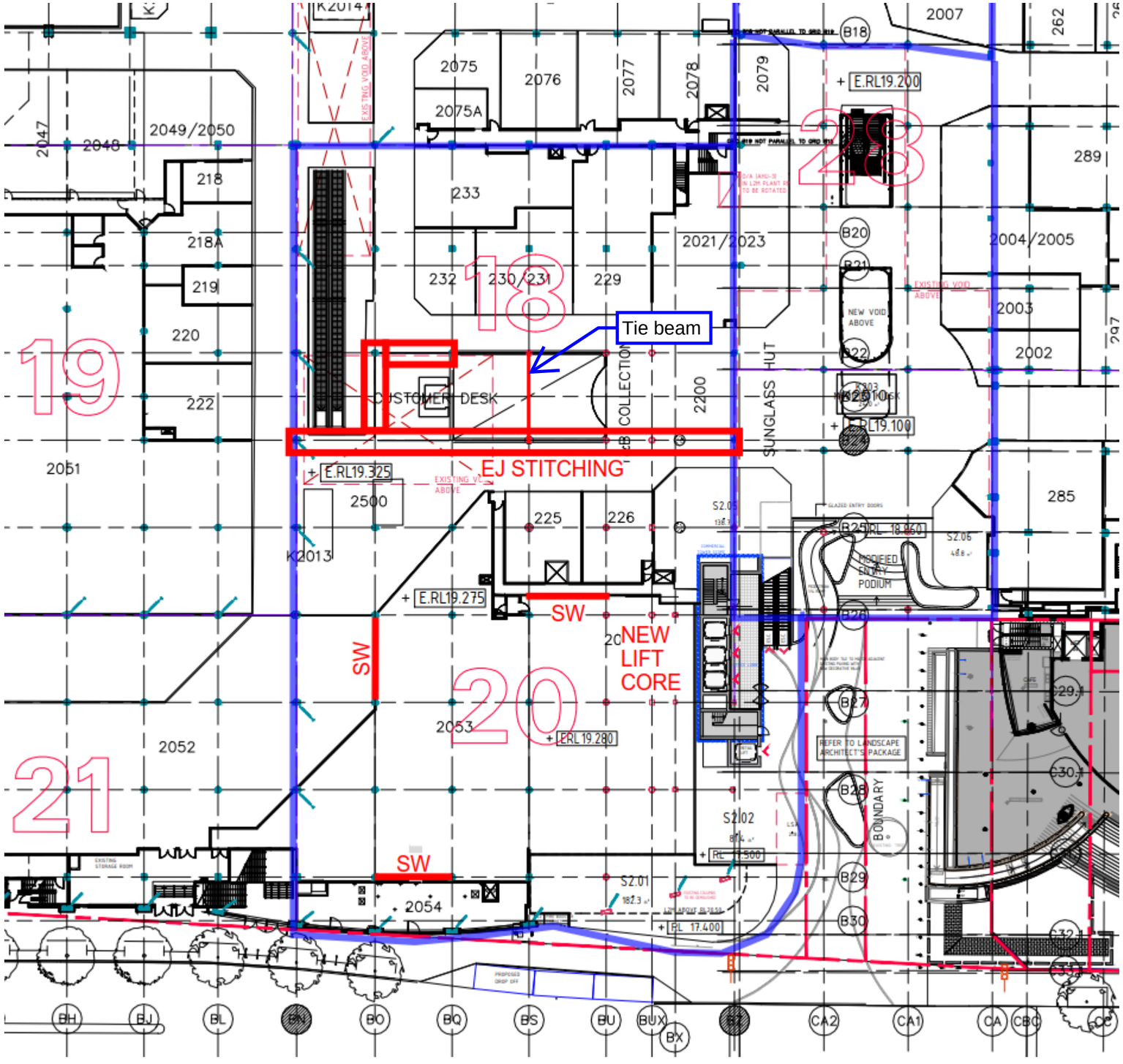


WESTFIELD LIVERPOOL ELP
EARTHQUAKE UPGRADE CONCEPT
BLOCKS 12, 14, 15, 29 & 30 LEVEL 3
MPN-11001-SK. E6
14.06.2019



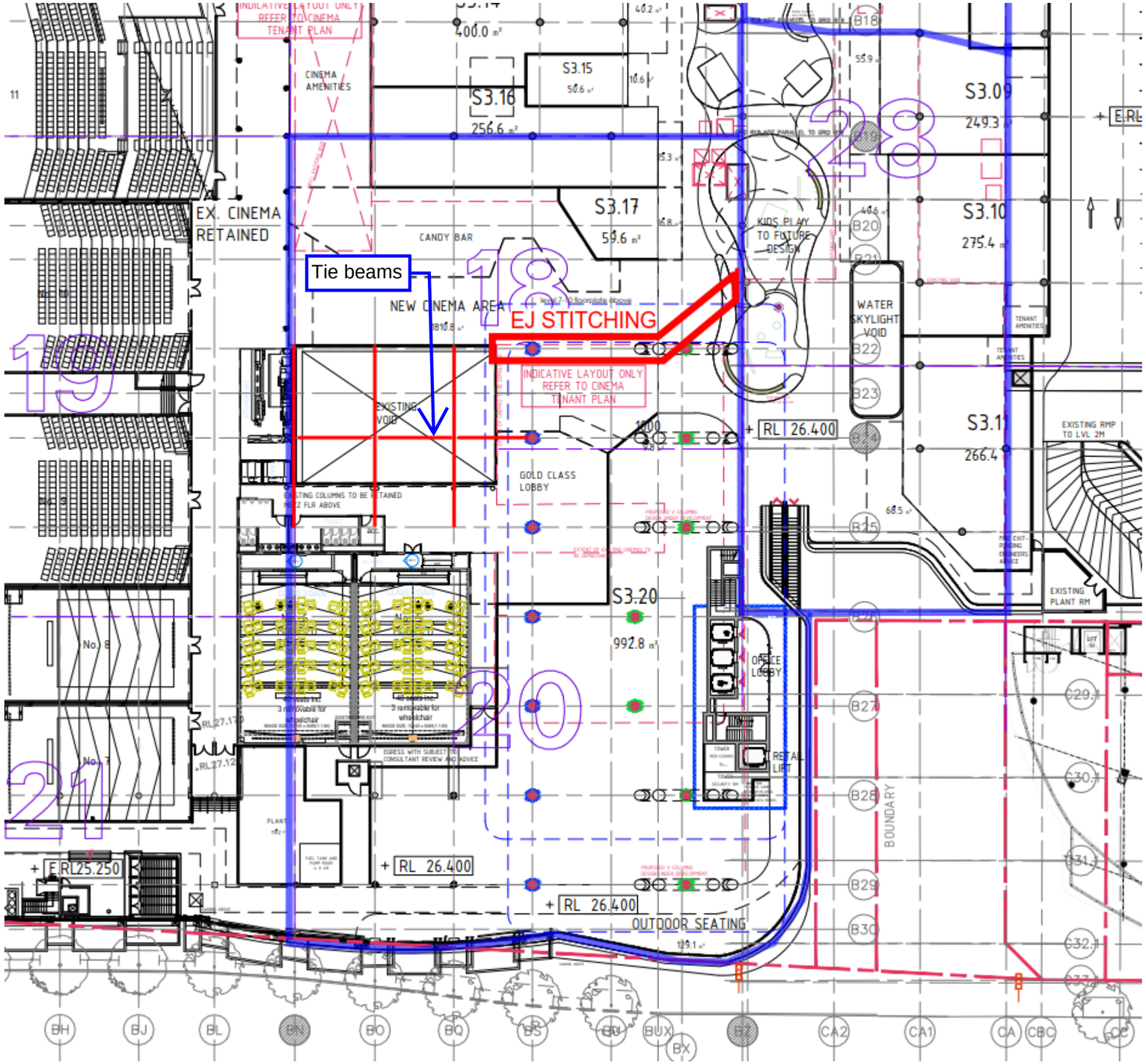
SW = NEW SHEAR WALL

WESTFIELD LIVERPOOL ELP
EARTHQUAKE UPGRADE CONCEPT
BLOCKS 18, 20 & 28 LEVEL 1
MPN-11001-SK. E7
14.06.2019



SW = NEW SHEAR WALL

WESTFIELD LIVERPOOL ELP
EARTHQUAKE UPGRADE CONCEPT
BLOCKS 18, 20 & 28 LEVEL 2
MPN-11001-SK. E8
14.06.2019



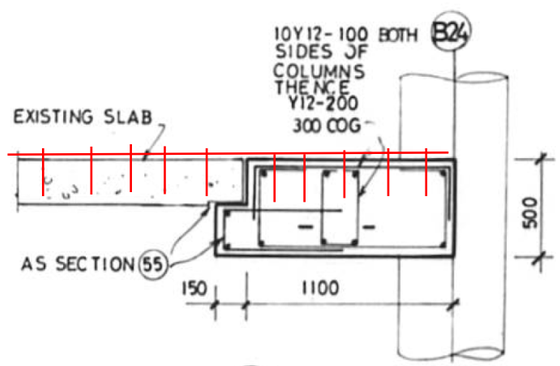
WESTFIELD LIVERPOOL ELP
EARTHQUAKE UPGRADE CONCEPT
BLOCKS 18, 20 & 28 LEVEL 3
MPN-11001-SK. E9
14.06.2019

Stitching plates on top of slab
(shown indicatively only)

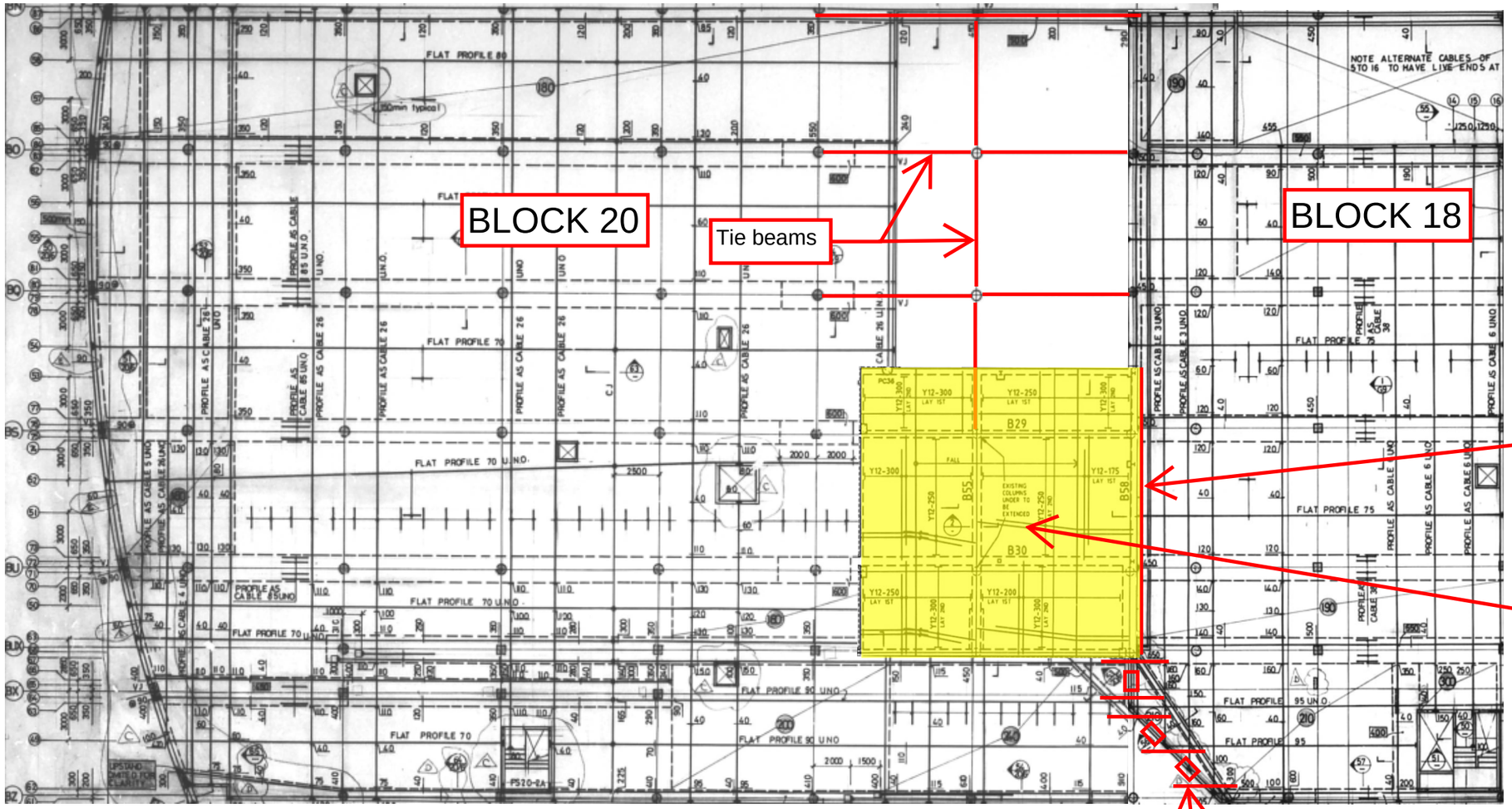
Tie beam

BLOCK 20

BLOCK 18



WESTFIELD LIVERPOOL ELP
BLOCK 18 TO 20 STITCHING CONCEPT
LEVEL R2
MPN-11001-SK. E10
14.06.2019

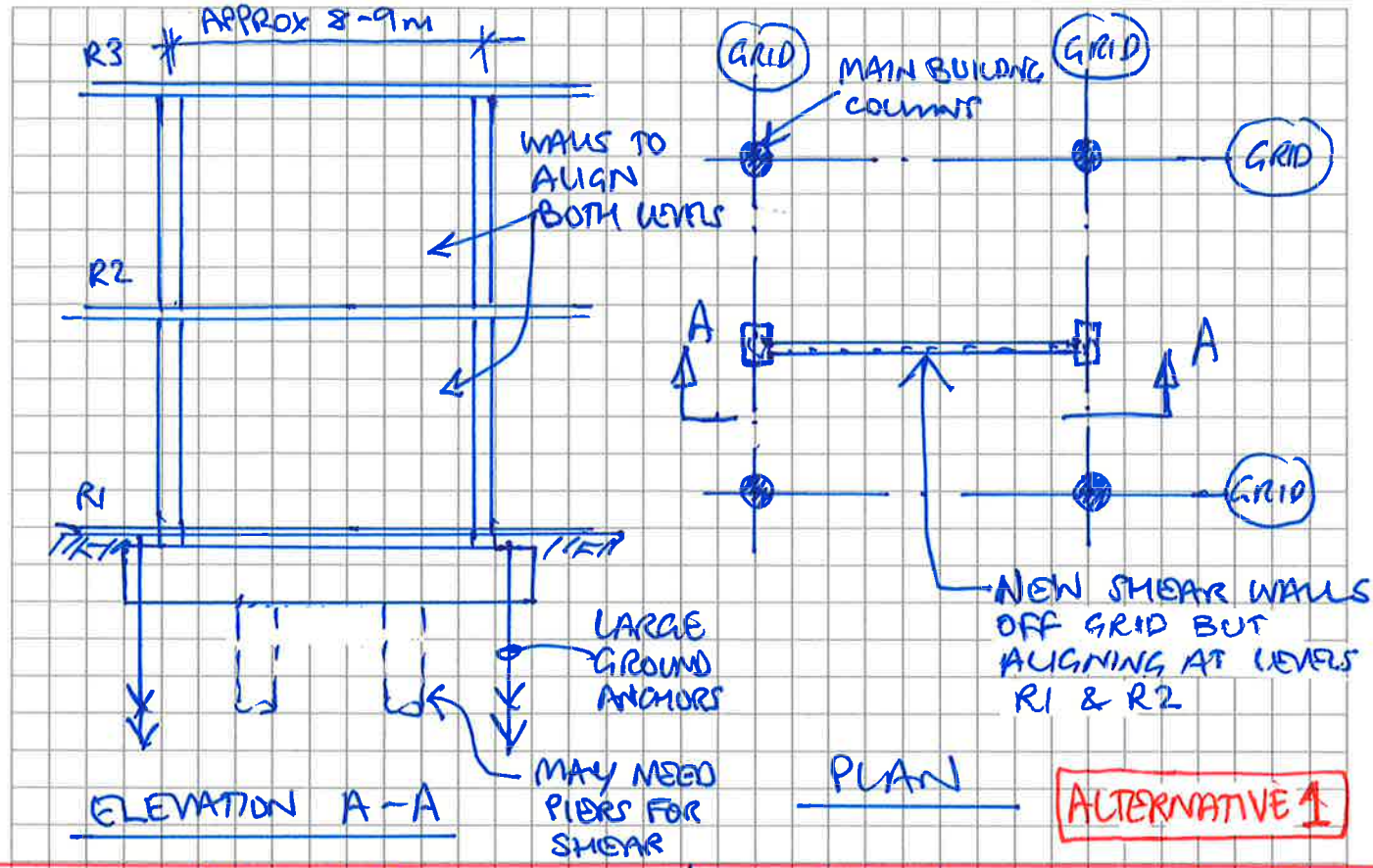


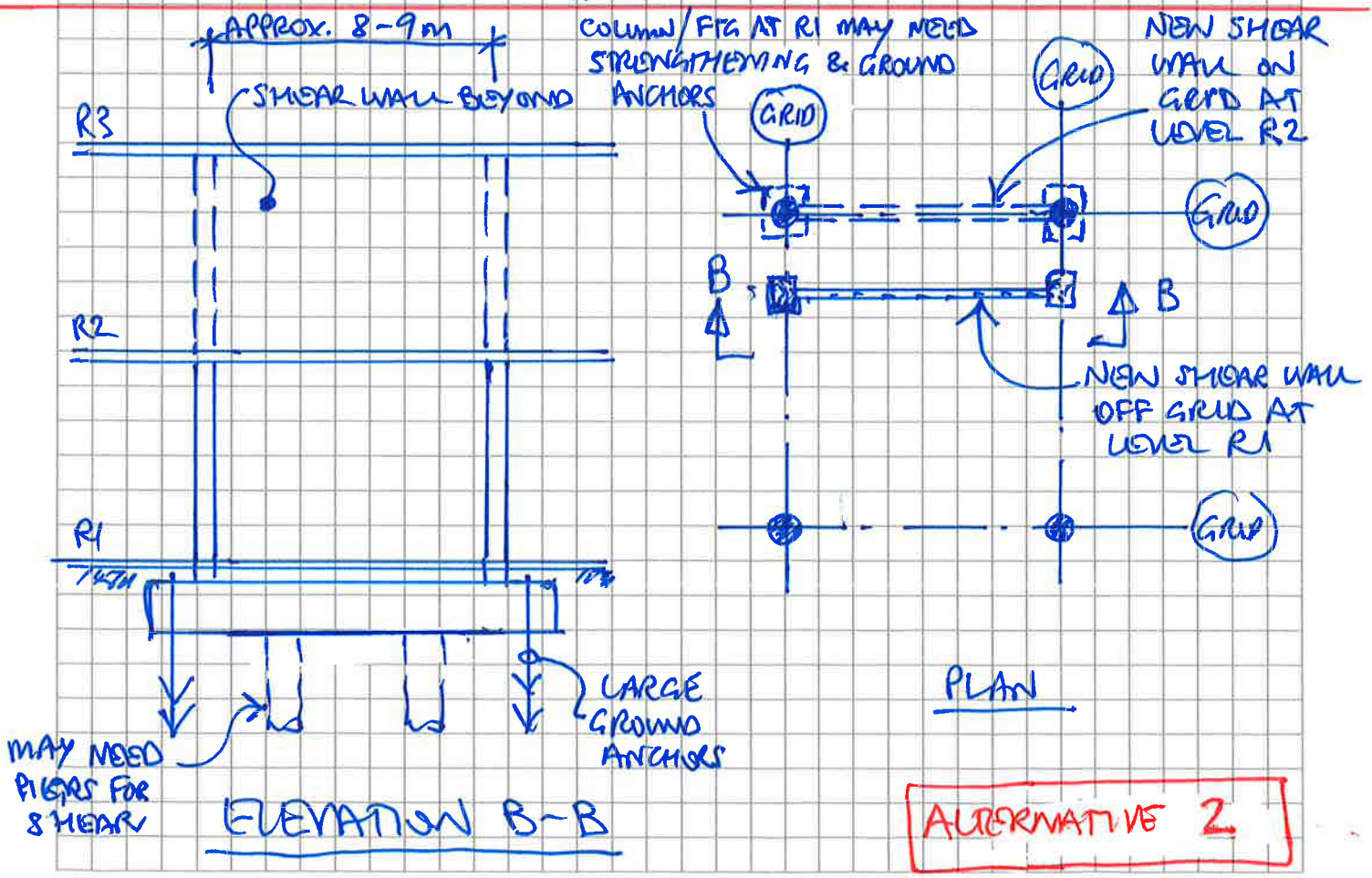
WESTFIELD LIVERPOOL ELP
BLOCK 18 TO 20 STITCHING CONCEPT
LEVEL R3
MPN-11001-SK. E11
14.06.2019

WESTFIELD LIVERPOOL ELP
TYPICAL SHEAR WALL ALTERNATIVES
MPN-11001-SK. E12
14.06.2019

MPN GROUP
Consulting Engineers
Structural and Civil
PO Box 462, NORTH SYDNEY NSW 2059
ACN: 001 568 878, ABN: 20 001 568 878

Job No: 11001 Title : WF LIVERPOOL – SHEAR WALL ALTERNATIVES Page :





GRID

GRID

EXISTING LEVEL 2

10 M20 CHEMSETS IN PAIRS (20 TOTAL) @ 250 CTS

AS OTHER SIDE

380 PFC

SPLICE

150 SHS

150 SHS

310UC 137

310UC 137

C

C

COLUMN BEYOND.

1200

650

850MIN

B

('A') = N12-300 TIES

('B') = N12-200 TIES E.S. COLUMN IN PAIRS

('C') = N12-200 TIES IN THREES AS (A)

('D') = N12-500 TIES IN THREES AS (A)

B

8M30 8.8/S CAST-IN BOLTS

A

ANCHORS DESIGNED AND INSTALLED BY OTHERS FOR AN ULTIMATE LOAD OF 850 KN EACH

600

4N28 + 2N20

600

1200

'A' 'B' 'C' 'D' 'C' 'B' 'A'

EXISTING LEVEL 1

200MIN CONCRETE OVERLAY

850MIN

4N28 + 2N20

3N28 EXTRA ALL ROUND.

650 ALL 4 SIDES

PILES BY OTHERS TO RESIST SHEAR LOADS (ALLOW 2 PER KBI)

BREAK BACK EXISTING PAD FOOTING ~230 MAX ALL AROUND TO EXPOSE MIN 150 LENGTH OF EXISTING PAD REINFORCEMENT. 8CFW WELD (120 LONG) NEW N20 COG BARS TO EACH OF THE EXISTING FOOTING BARS AS PER SECTION 'X' BELOW.

NEW BAR TO MATCH EXISTING

8mm CFW 120 LONG EACH SIDE.

EXISTING BAR.

'X'

K-BRACE

300

STRENGTHENED COLUMN BEYOND.

300

2N20

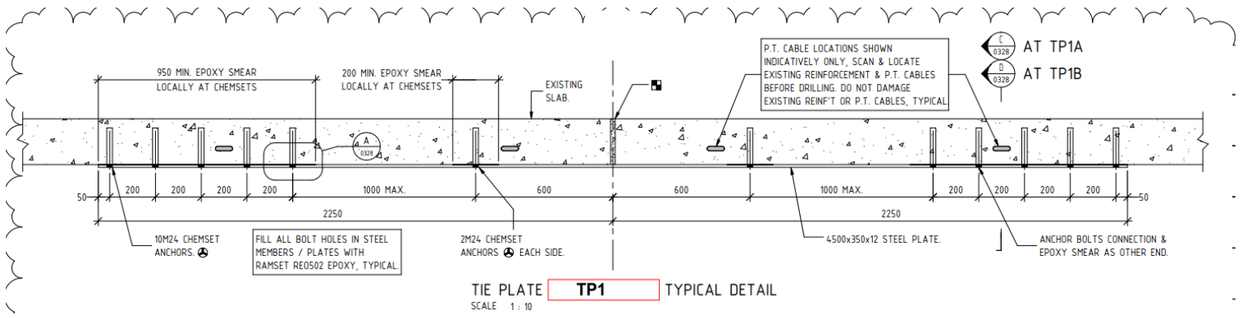
1200 AS NOTED ABOVE

~300

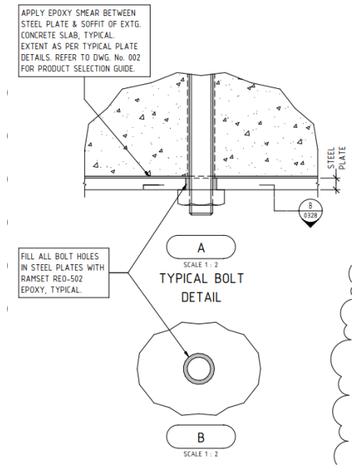
A

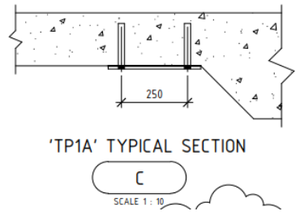
1150

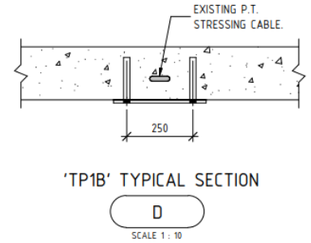
WESTFIELD LIVERPOOL ELP
EARTHQUAKE UPGRADE CONCEPTS
TYPICAL STEEL K-BRACE DETAILS
MPN-11001-SK. E13
14.06.2019

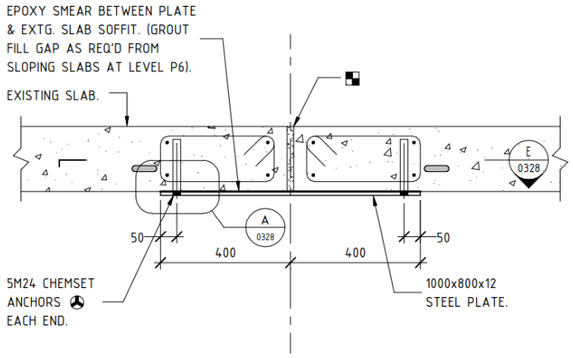


TIE PLATE **TP1** TYPICAL DETAIL
SCALE 1 : 10

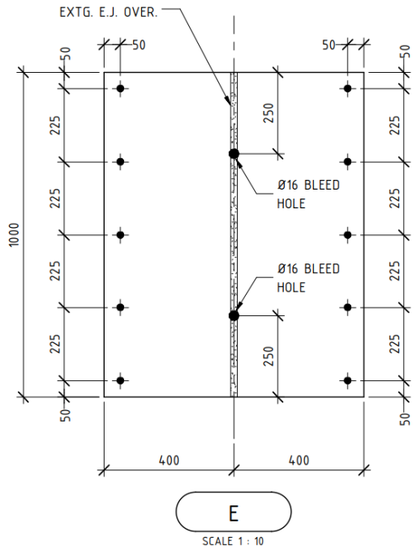


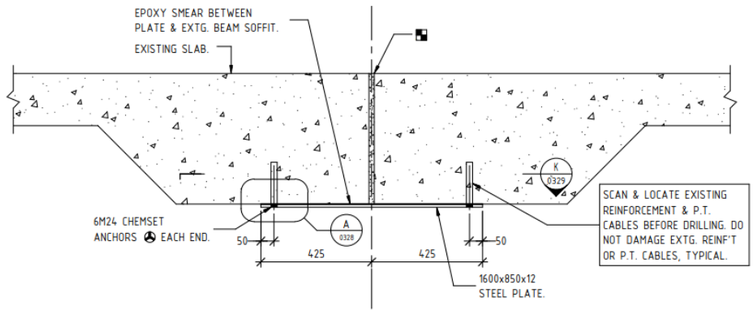




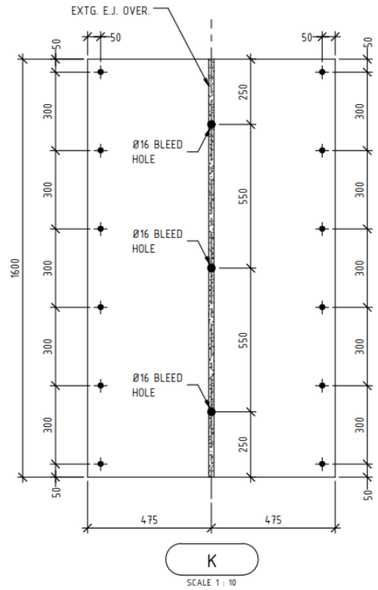


TIE PLATE **TP2** TYPICAL DETAIL
SCALE 1 : 10

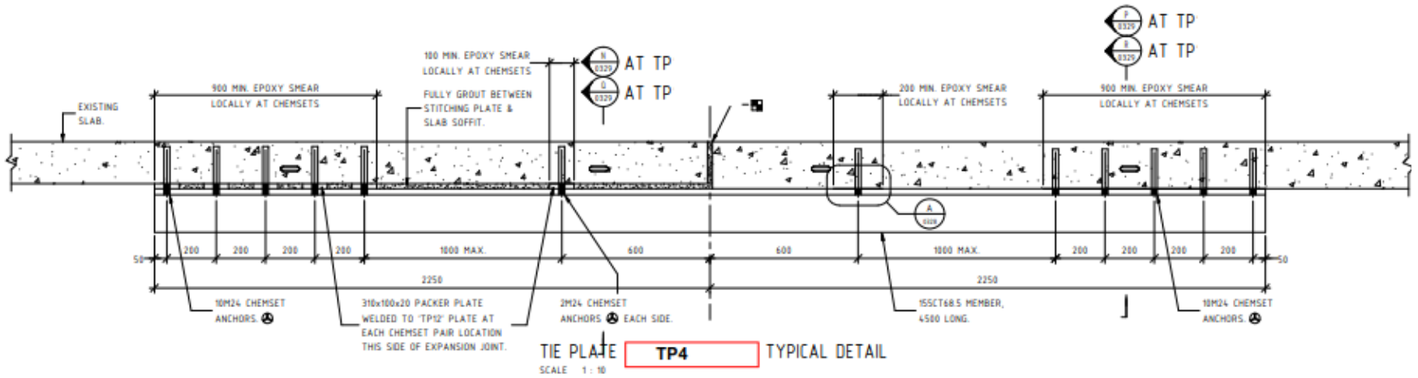




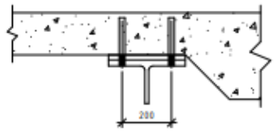
TIE PLATE **TP3** TYPICAL DETAIL



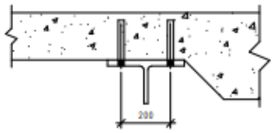
WESTFIELD LIVERPOOL ELP
EARTHQUAKE UPGRADE CONCEPTS
TYPICAL STITCHING DETAILS (1 OF 3)
MPN-11001-SK. E14
14.06.2019



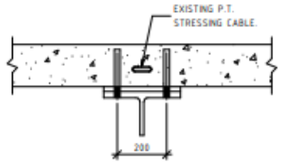
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SCALE 1 : 10



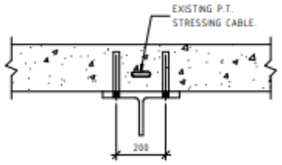
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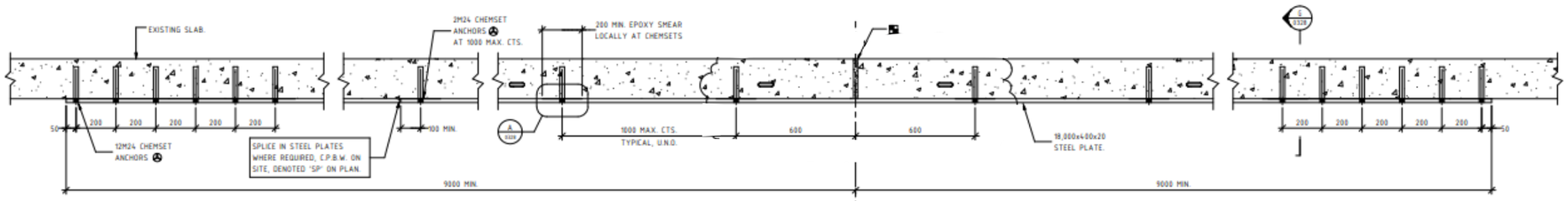
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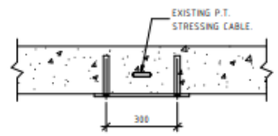


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SCALE 1 : 10



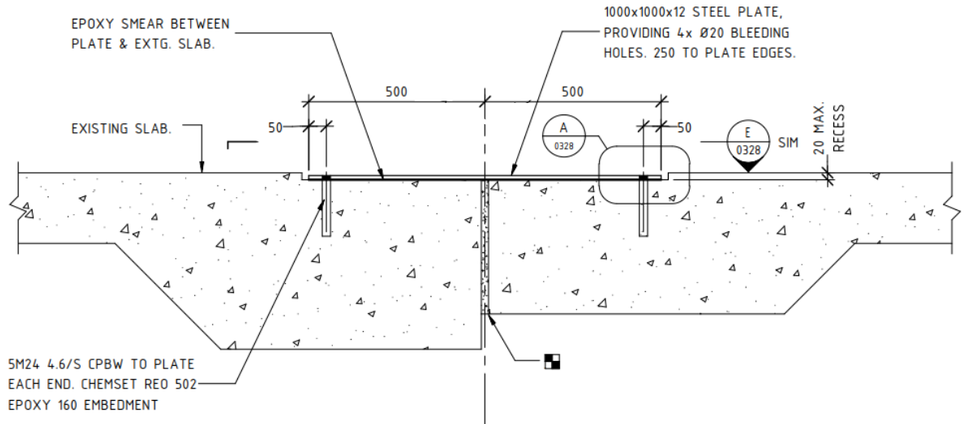
R
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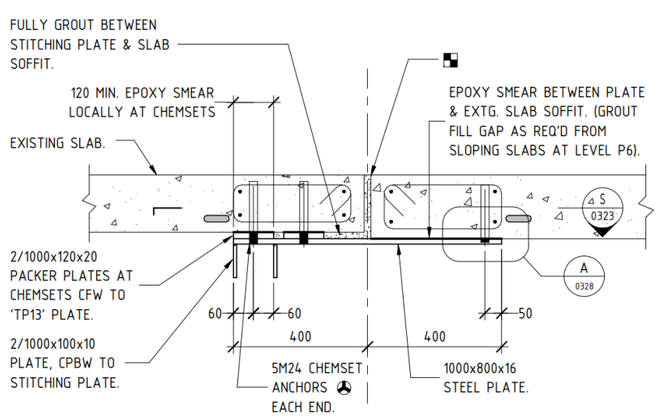


G
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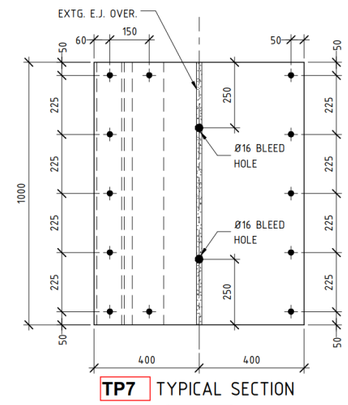
TIE PLATE **TP5** TYPICAL DETAIL
SCALE 1 : 10



TIE PLATE **TP6** TYPICAL DETAIL
SCALE 1 : 10



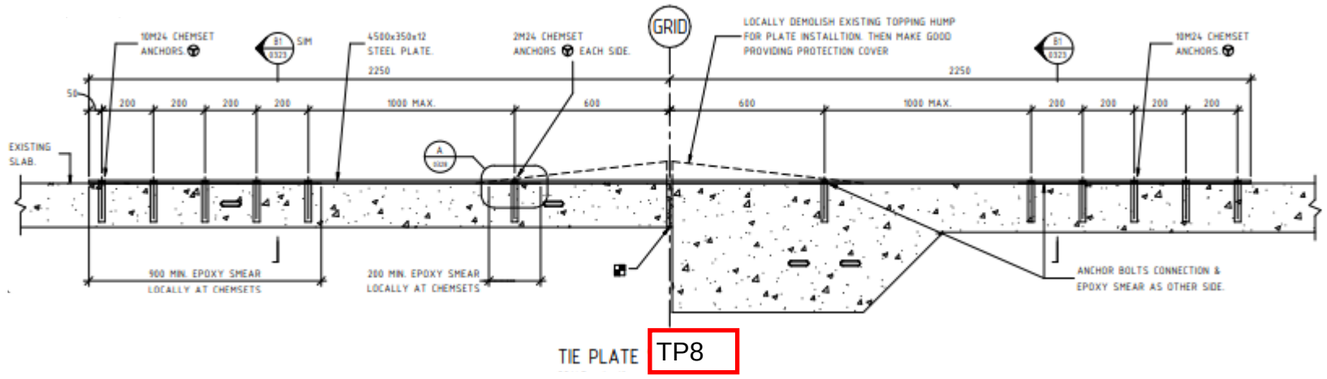
TIE PLATE **TP7** TYPICAL DETAIL
SCALE 1 : 10

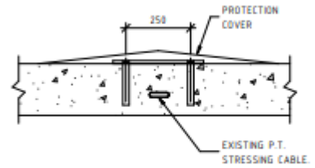


TP7 TYPICAL SECTION

S
SCALE 1 : 10

WESTFIELD LIVERPOOL ELP
EARTHQUAKE UPGRADE CONCEPTS
TYPICAL STITCHING DETAILS (2 OF 3)
MPN-11001-SK. E15
14.06.2019

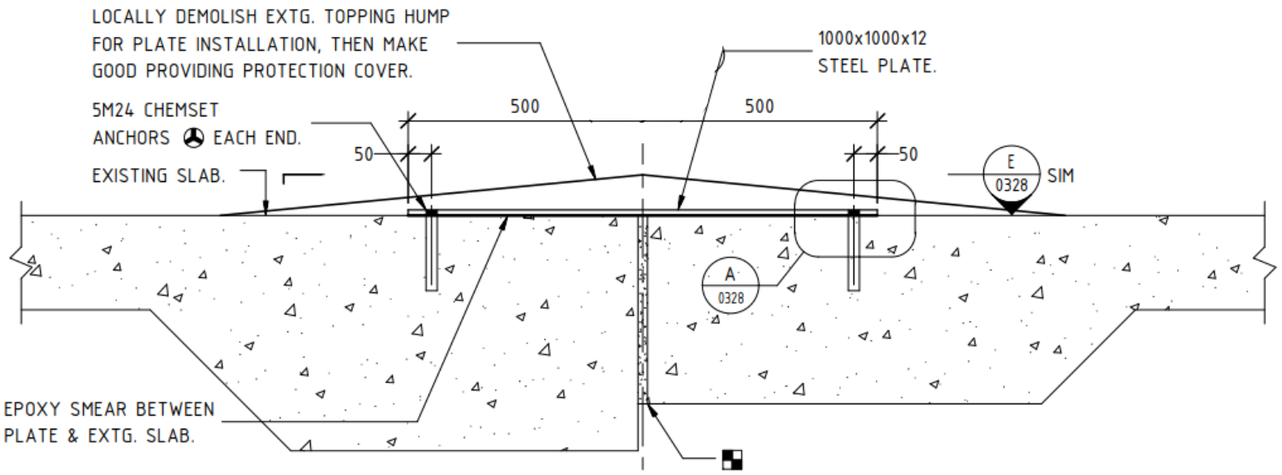


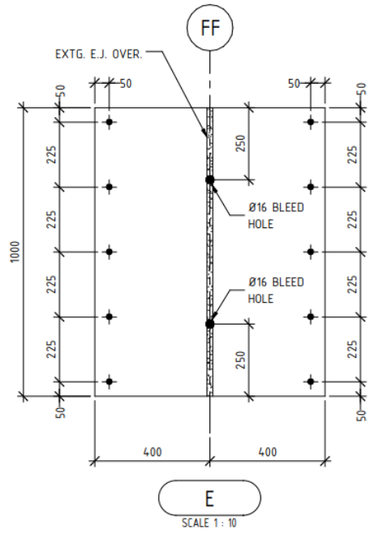


'TP17' TYPICAL SECTION

B1

SCALE 1 : 10





DENOTES EXISTING EXPANSION JOINTS ARE TO BE THOROUGHLY CLEANED TO REMOVE ALL LOOSE DEBRIS PRIOR TO GROUT FILLING. JOINTS ARE TO BE FULLY GROUTED WITH 'CONBEXTRA HS' HIGH FLOW CEMENTITIOUS GROUT BY PARCHEM, IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATION, TYPICAL.

WESTFIELD LIVERPOOL ELP
EARTHQUAKE UPGRADE CONCEPTS
TYPICAL STITCHING DETAILS (3 OF 3)
MPN-11001-SK. E16
14.06.2019