External Openings – Fall Protection policy

a. Steppable surface is any surface where a human being can step on with reasonable ease – generally, the accessible foot landing space of this surface should be at least 75 mm in depth.
b. For safety reasons, it is to be ensured that the height of the fall protection for all external openings is at least 1050 mm from the final height (finished) of the last steppable surface (if building height exceed 100 m above ground, 1200 mm fall protection to be used).

c. To ensure that last steppable surface is not above the finished floor level, adequate care needs to be taken with respect to the structural design (because edge beams / ledges can raise the last steppable surface) and the location of the railing (should be as close as feasible to the point where the structure becomes higher than the general finished floor level).

d. If there is a deck/accessible surface of min. 1.2m depth outside the window line, a railing is to be provided at the edge of the deck/accessible surface (height as per b.).

e. If there is no deck/accessible surface outside the window line (or these is a flower bed or equivalent < 1.2m), following options are available:
    i. Window should start only at height of 1050/1200 mm (see applicable height as per b.) above the last steppable level. In such cases, grill as per ii. below is required only from if needed from marketing perspective, but not from fall protection perspective.

    ii. In exceptional cases, if window start at height < 1050/1200 mm (see applicable height as per b.) above last steppable surface , following options can be used:

        1. An internal railing with location such that the floor level inside the room becomes the last steppable surface and the height such that the requirements of b. above are fulfilled.
        2. Alternatively, if the window is not a sliding window and has restricted opening (max. 200 mm) such that no child > 2 years can possibly go through the opening, the railing shall not be needed. It should be noted that in such cases, the window is itself acting as railing/protection due to its limited opening.

Guidelines for railing design:

a. For any area falling outside a wall+window enclosure eg. decks, utility etc., following types of railing/edge protection are to be used:

	Crown/Casa	**Aspirational/Premium/ Luxury**	**Offices & Retail (all types)**
Deck / Sky Garden / equivalent	MS railing details as per Case-1,& 2	Frameless glass railing Details as per Case-4	Any of the details can used be as per Case-1,2,3 or 4 on the of basis design and budget
Utility with AC ODU's, Service slab with AC ODU's	If said area is not visible from road side (external or internal), then MS railing only with height as per External Openings – Fall Protection Policy. If the said area is visible from road side (external or internal), then full height fins/louvers are to be used to 'block the view' and two horizontal MS railing bars are to be placed for 'safety', with upper one as per top height required as per External Openings – Fall Protection Policy and second bar at halfway between the top bar and the finished floor level.		
Utility without AC ODU's, Service slab without AC ODU's	RCC Parapet wall with height as per External Openings – Fall Protection Policy. If the said area is visible from road side (external or internal), then fins/louvers are to be used to 'block the view'.		

b. **For MS railings, MS plate inserts are to be placed in the RCC at time of RCC casting, in order to receive the MS railing vertical members.** The vertical members are to be welded prior to floor finishing, so that the welding joint is hidden through the floor finishing.

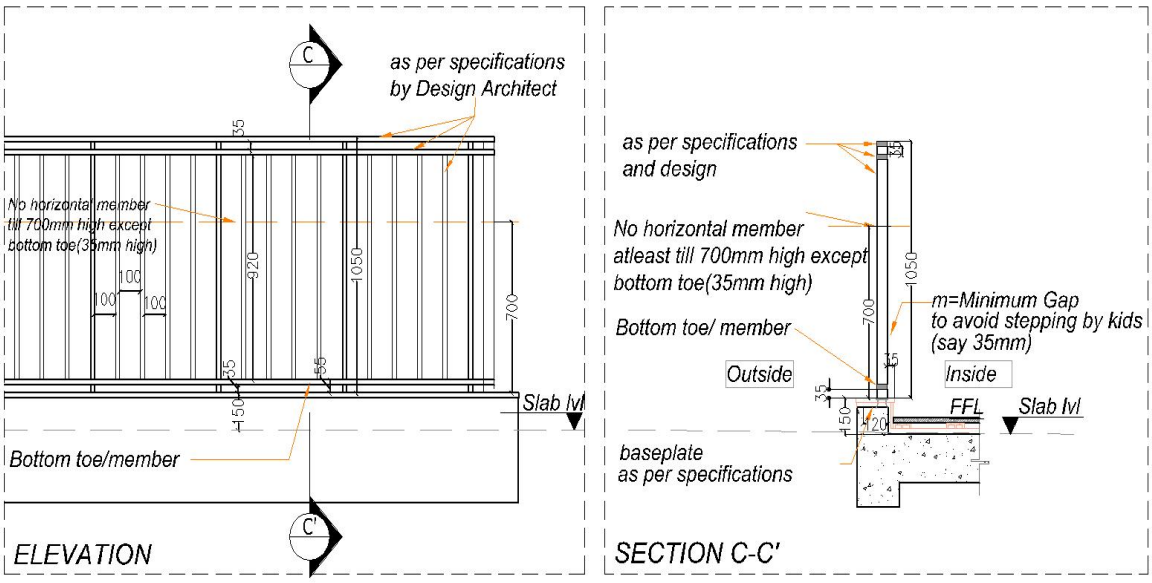
c. Up stand width of preferably 175 mm width (min. 150 mm) should be provided to ensure there is sufficient surface area to bolt on the railing's vertical members.

d. Glass used in all railing shall be laminated toughened glass.

e. These inserts are to be placed at 900-1200 mm apart, in multiples of 50 mm, depending on the dimensions of the area. This spacing has to be decided by the Architect.

f. In case of railing with vertical members (not glass), the members should not be more than 150 mm (clear) apart. In case of railing with horizontal members, the clear gap between railing members should not be more than 250 mm.

g. Illustrative Diagram for MS Railing:



h.Ignore 100 mm gap shown in image between vertical members – this can be 150 mm clear.

The various railing options which can be considered in our projects have been collated for ready reference with emphasis on minimum structural requirement which must be provided for supporting the external railings.

1. In cases where customized railings are to be provided then design must be finalized in coordination with facade and structural teams.
2. Provision of insert plates is recommended to avoid any post drilling at site. However Railing vendor should be on board along with civil contractor to design, supply and fix the insert plates. If not then the standard insert plate design (**refer sketch 1B as suitable**) shall be followed and supply and installation of insert plates should be included in Civil contractors scope. Also Architect must finalize the location of baluster in advance so that the inserts can be cast in the correct location.
3. Laminated toughened glass with SGP (sentry plus glass) to be considered wherever glass railings are to be provided as per External fall protection policy.

Detailed for railing design with differing upstand widths:

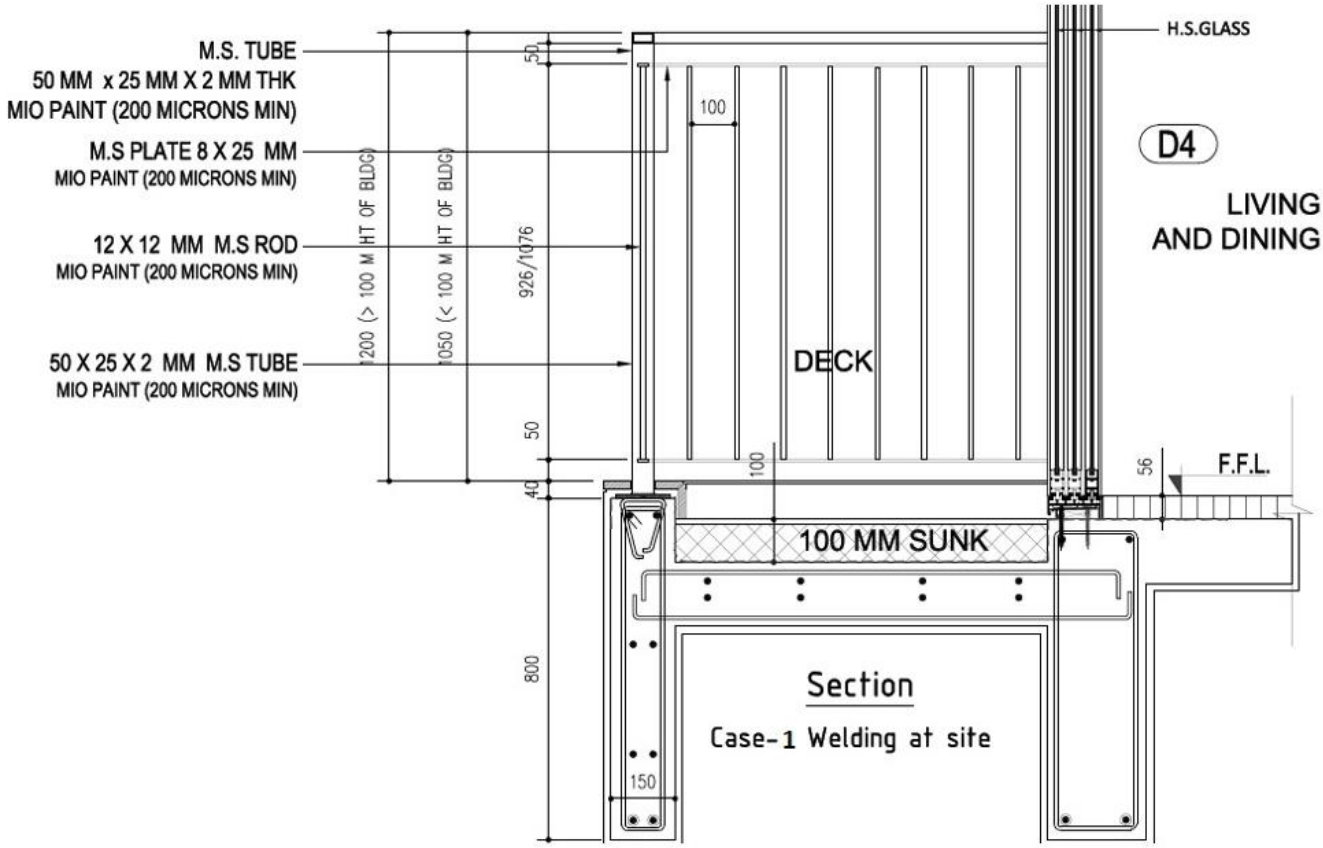
1) **CASE-1**- **M.S railing on 200mm width RCC upstand**- (refer sketch-01A & 01B)
Post drill anchoring of baluster base plate. Recommended for projects wherein in RCC up stand of 200mm width is provided. Railing baluster needs to be anchored to the RCC upstand.

2) **CASE-2**- **M.S railing on 150mm width RCC upstand**- (refer sketch-02A & 02B)
Provide M.S insert plates at locations specified by architect. Recommended for projects wherein in RCC up stand of 150mm width is provided. Railing baluster needs to be welded on to the insert plate.

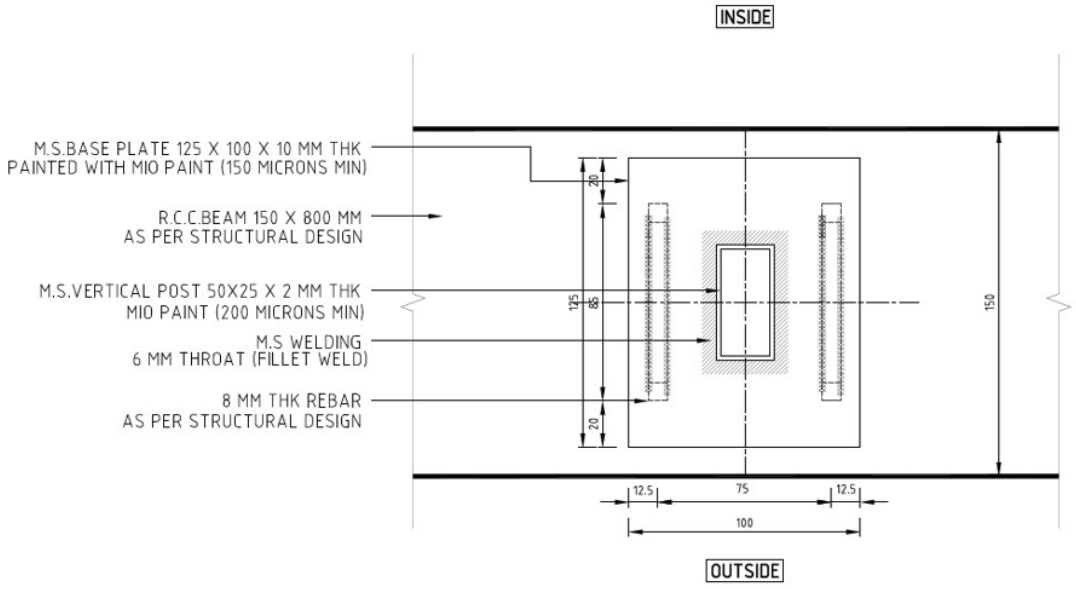
3) **CASE-3**- **RCC parapet** if there is a limitation in providing up stand width of not more than 100mm. (refer sketch-03A) This is to be avoided.

4) **CASE-4-Frameless glass railing on 150mm width RCC upstand**-(refer sketch-04A & 4B)
Recommended for projects wherein RCC up stand of 150mm width is provided & has side RCC walls as shown. Bottom aluminum U channel need to be anchored in RCC up stand.

Insert Plate Detail for Railing Case-01

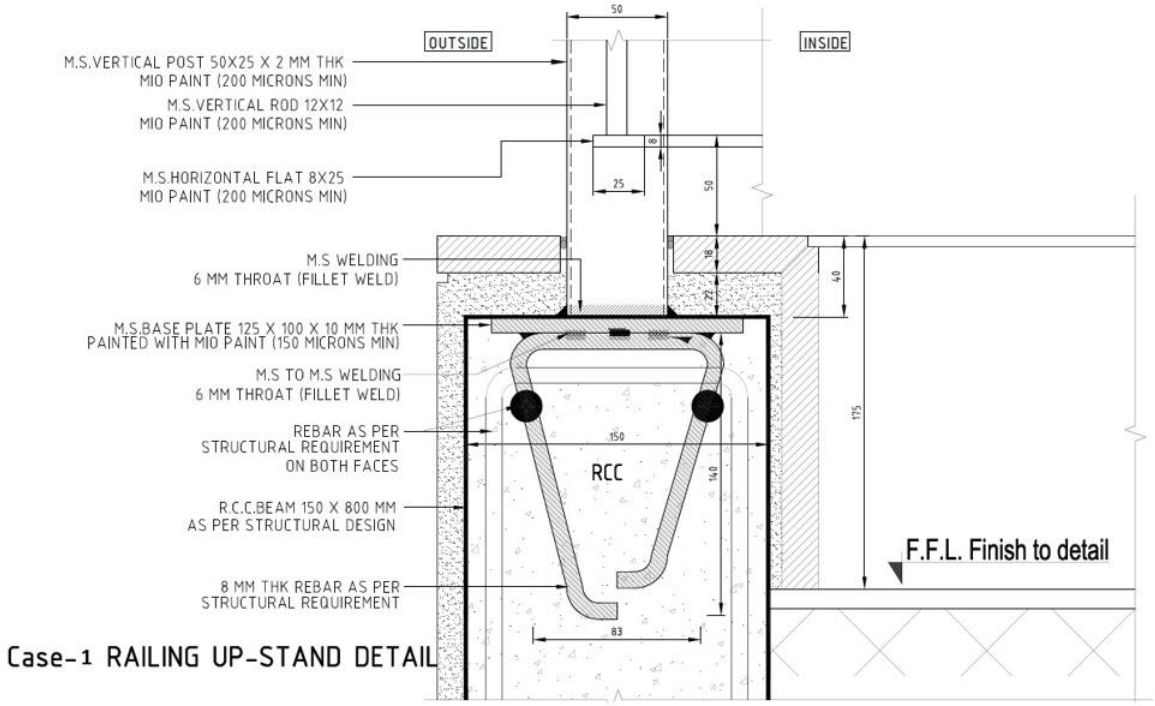


SKETCH-01-A-PLAN



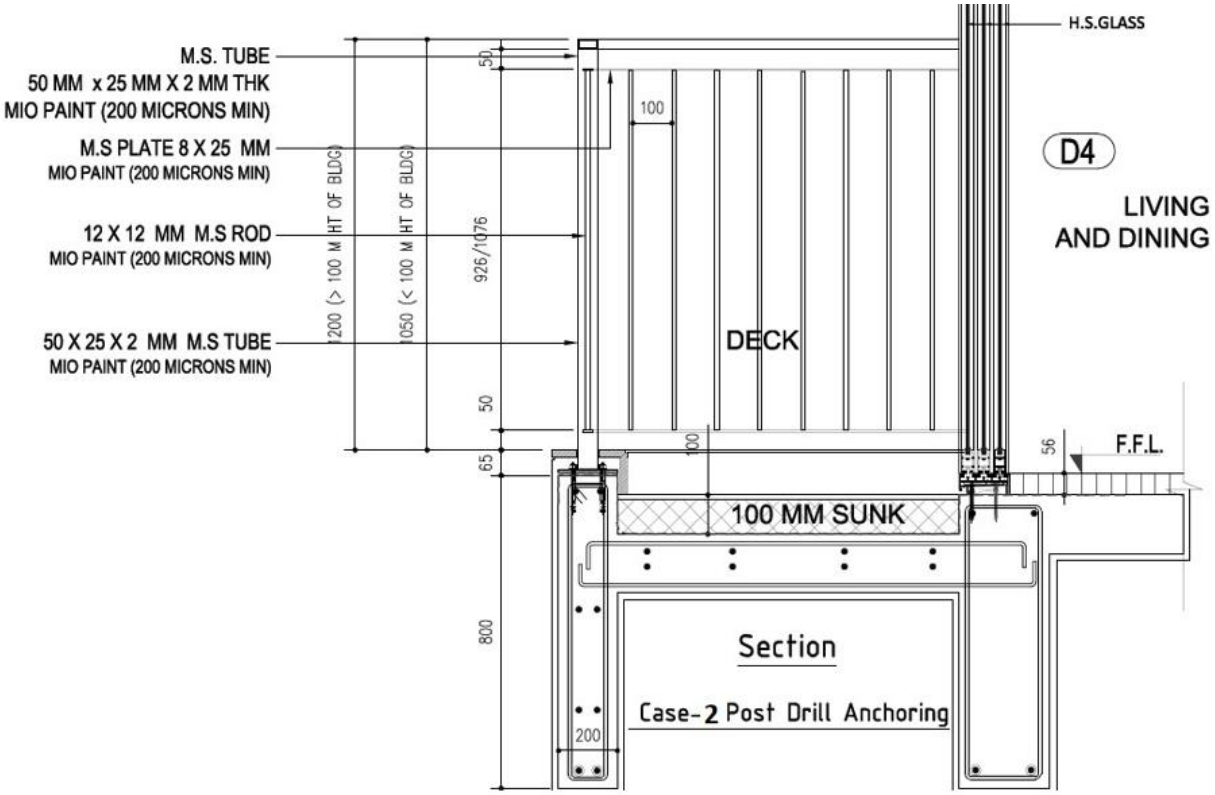
Case-1 RAILING BASE PLATE DETAIL

SKETCH-01-B-SECTION

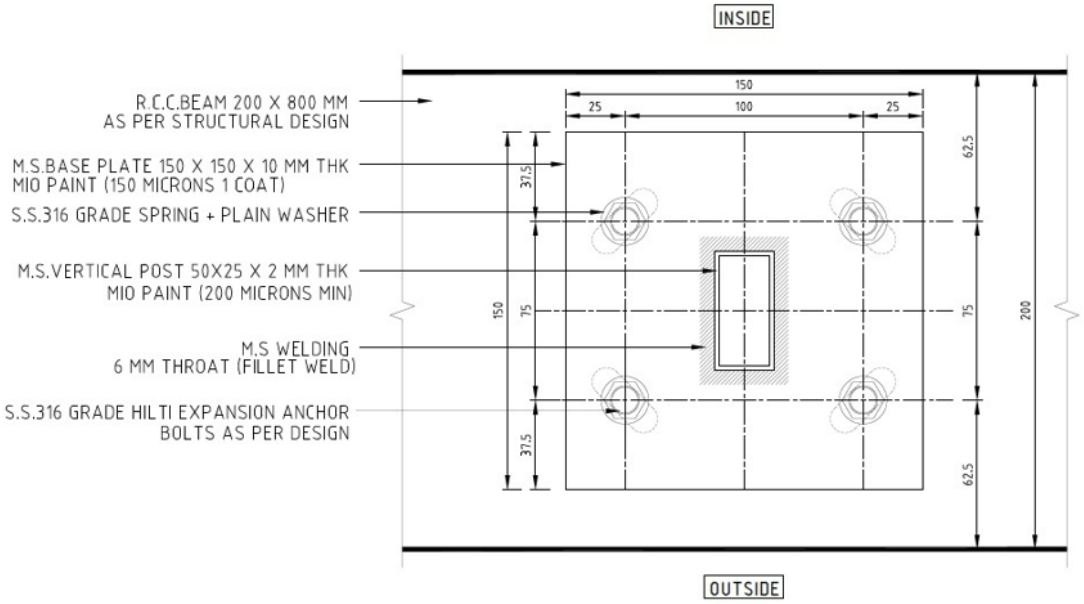


Case-1 RAILING UP-STAND DETAIL

SKETCH-02-A-POST DRILL ANCHORING

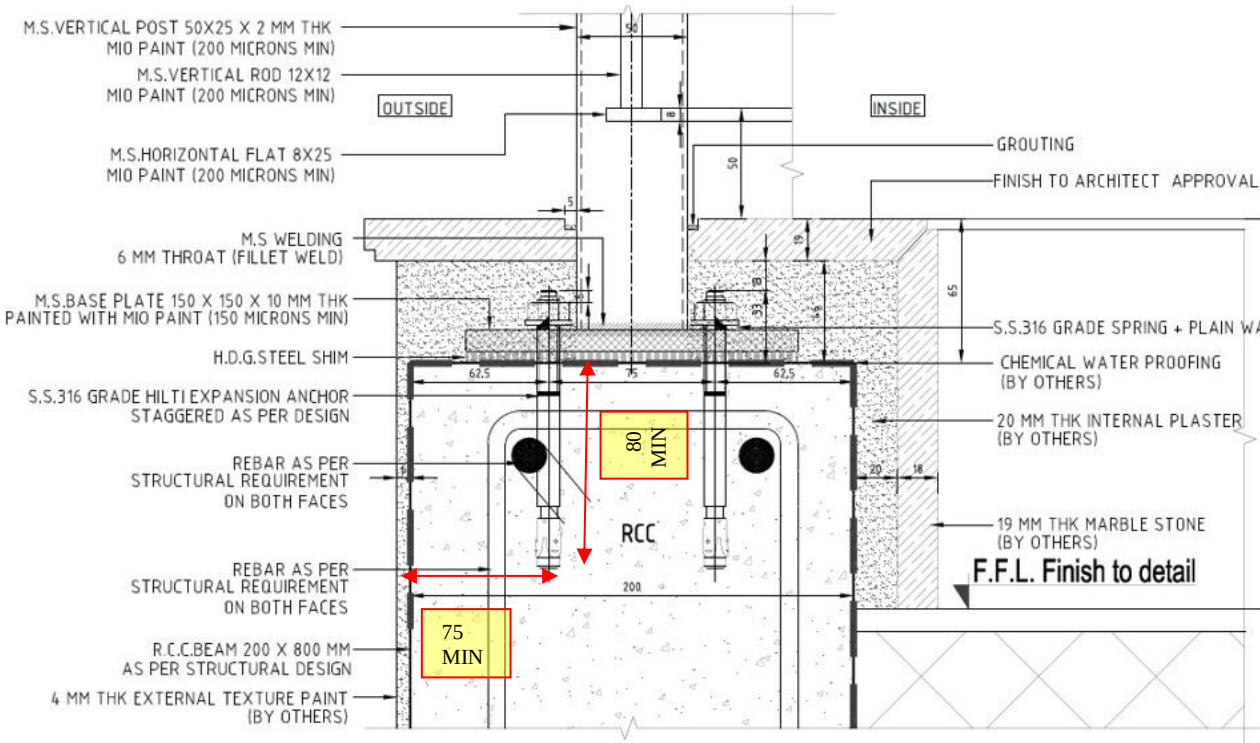


SKETCH-02A-PLAN



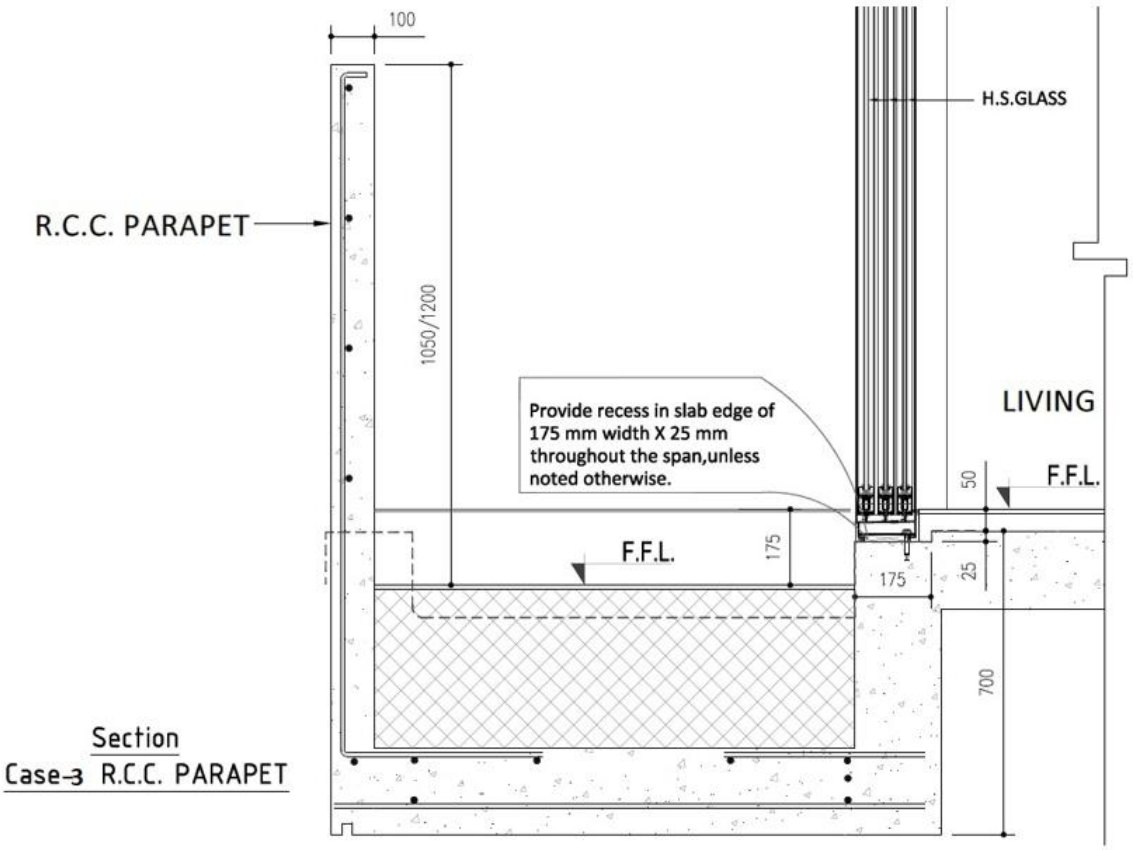
Case-2 RAILING INSERT PLATE DETAIL

SKETCH-02B-SECTION

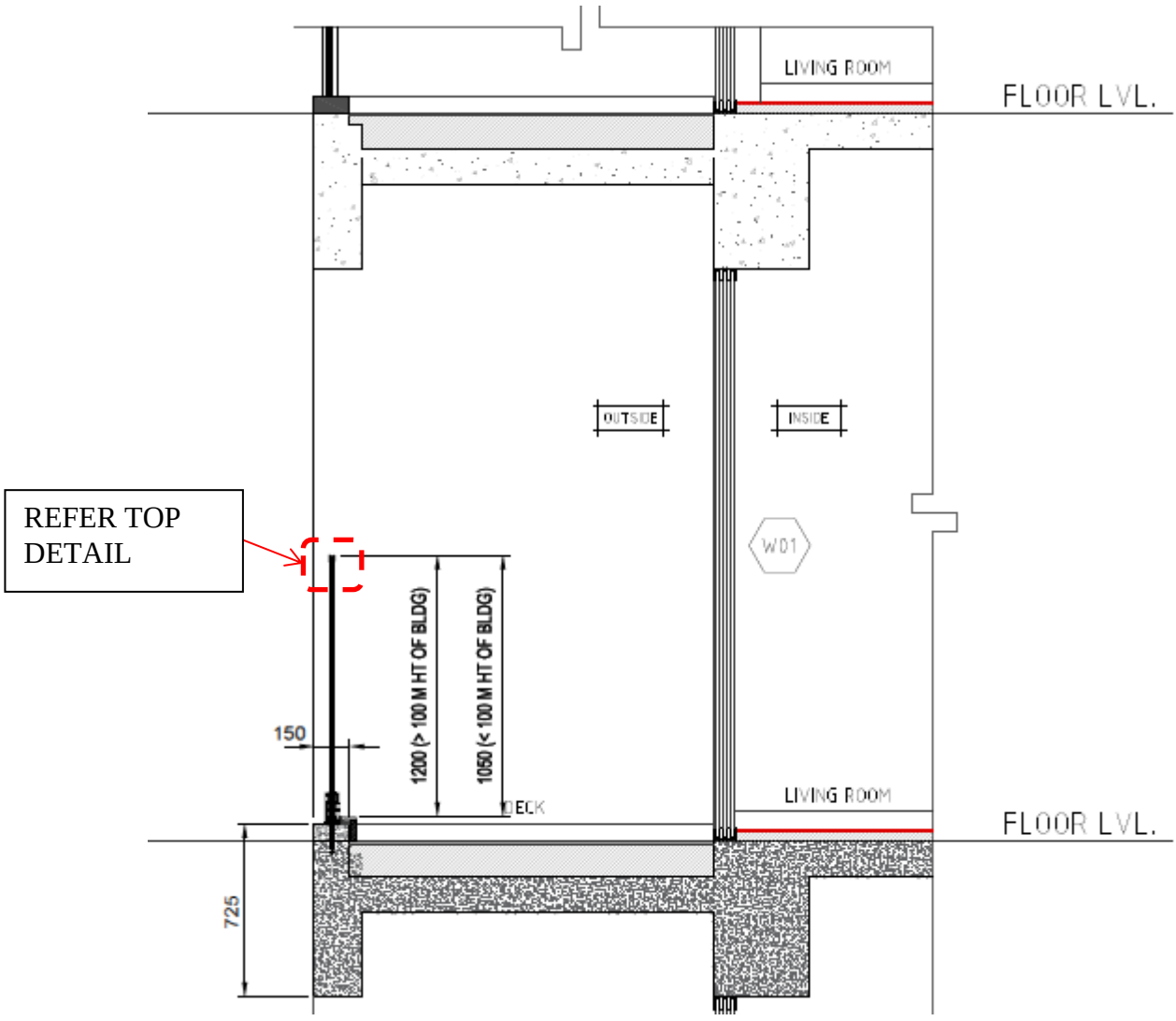


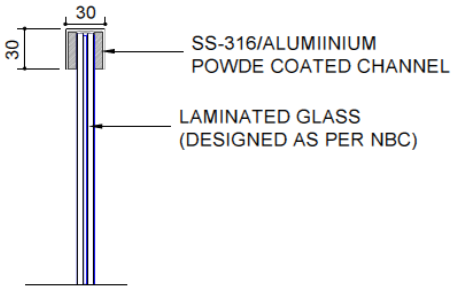
Case-2 RAILING UP-STAND DETAIL

SKETCH-03-RCC PARAPET



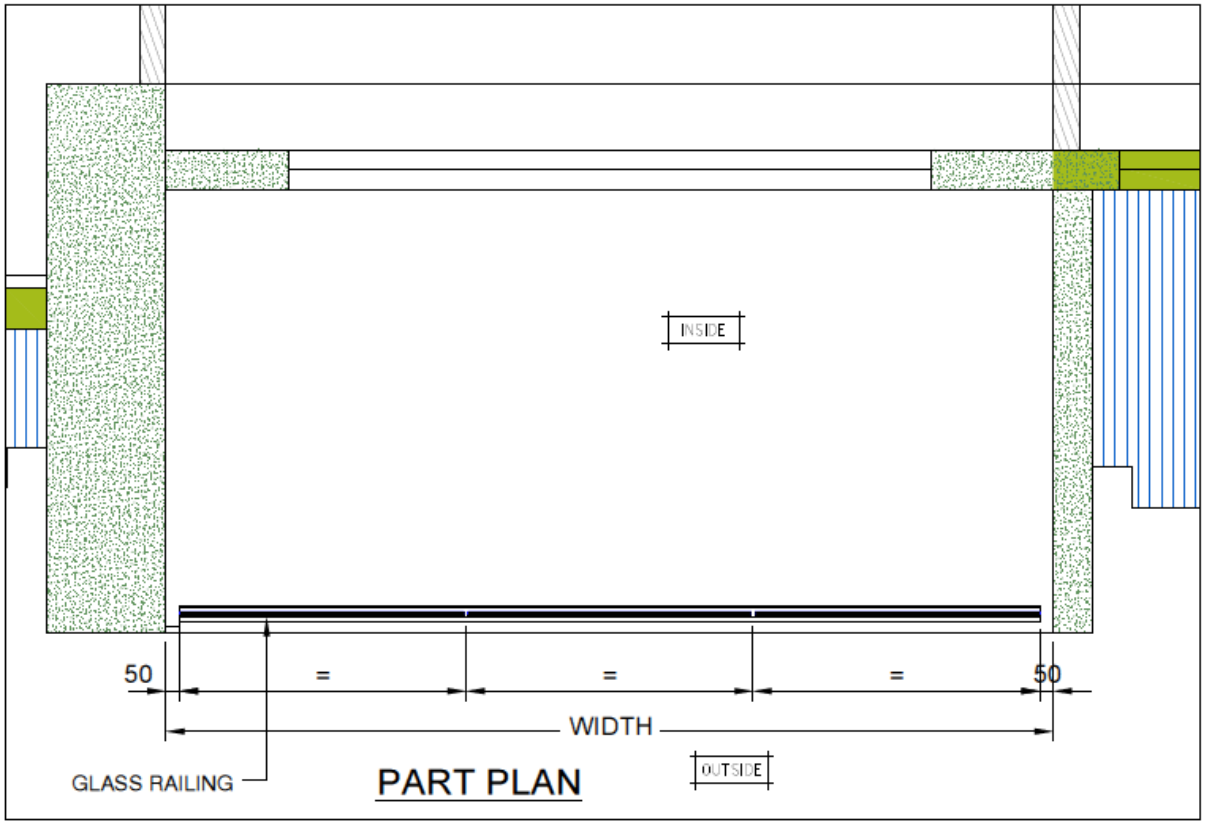
SKETCH-04-FRAMELESS GLASS RAILNIG WITHOUT HANDRAIL(FOR STRAIGHT /U SHAPE BALCONIES)



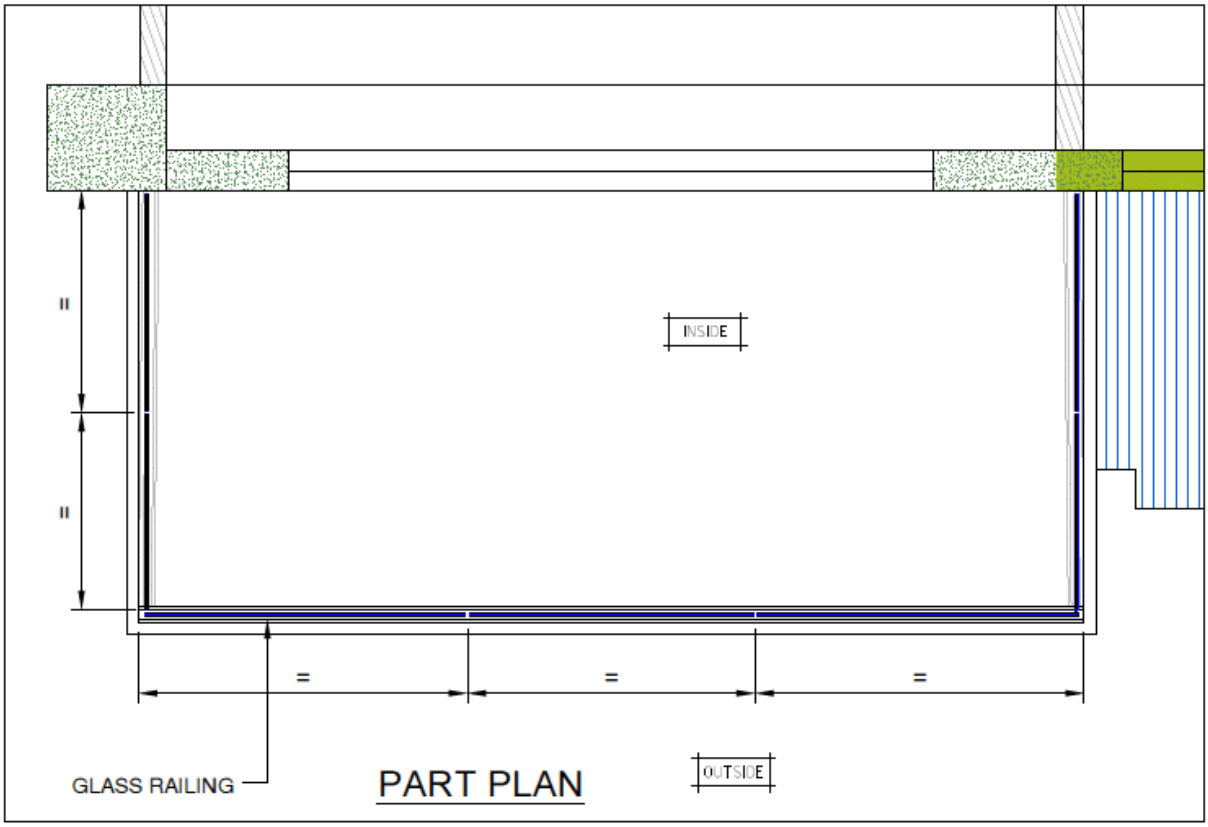


CASE-4 TOP DETAIL

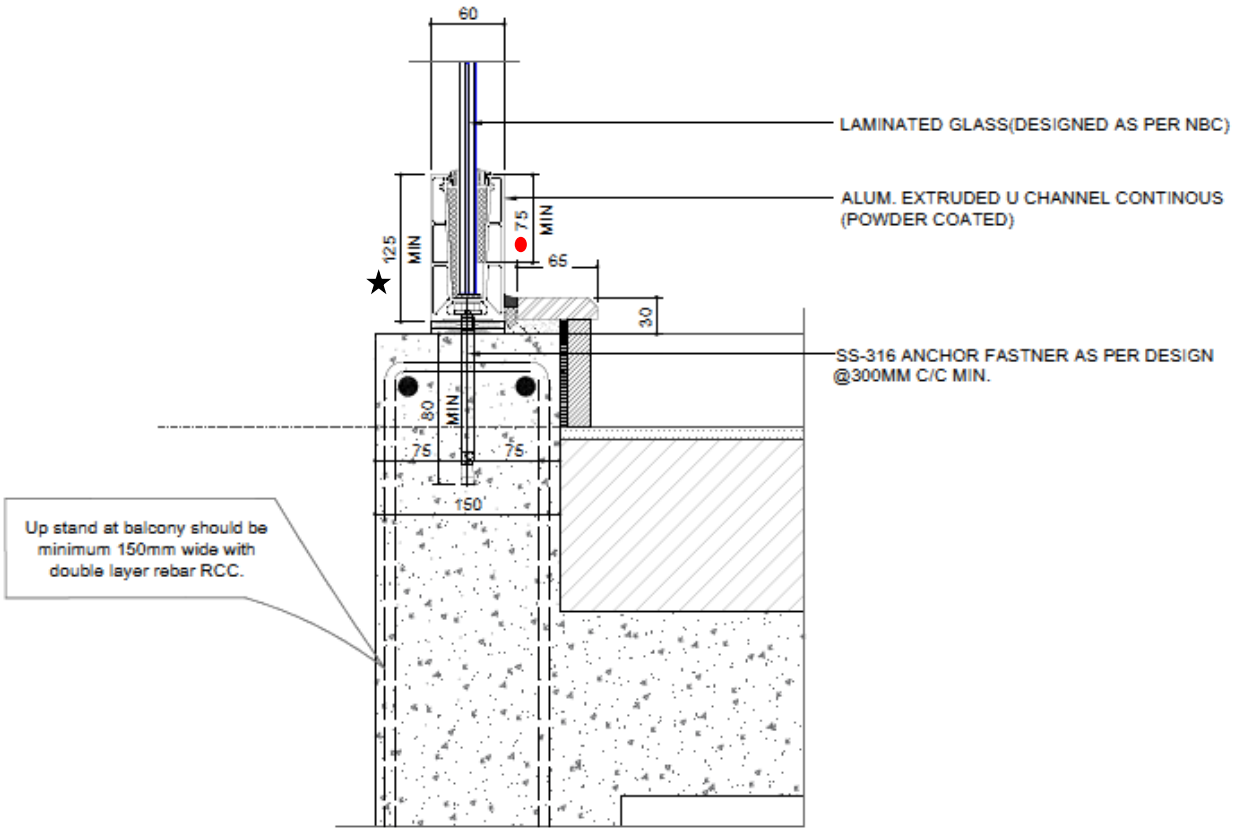
SKETCH-04A-FRAMELESS GLASS RAILNIG PLAN WITHOUT HANDRAIL(FOR STRAIGHT BLACONIES)



SKETCH-04B-FRAMELESS GLASS RAILNIG PLAN WITH HANDRAIL (FOR U SHAPE BALCONIES)



CASE-04 BOTTOM DETAIL



CASE-4 BOTTOM DETAIL

★125mm minimum required however to be checked as per calculation

● 75mm minimum glass bite size required however to be checked as per calculation

Frameless railing to be designed as per NBC 2016 Annexure H guidelines considering following loads:

Table 36 Minimum Horizontal Imposed Loads for Parapets, Barriers and Balustrades

(Clauses H-4.2 and H-4.4)

Sl No.	Type of Occupancy for Part of the Building or Structure	Examples of Specific Use	Horizontal Uniformly Distributed Line Load kN/m	Uniformly Distributed Load Applied to the Infill kN/m^2	A Point Load Applied to Part of the Infill kN
(1)	(2)	(3)	(4)	(5)	(6)
i)	Domestic and residential activities	a) All areas within or serving exclusively one single family dwelling including stairs, landings, etc, but excluding external balconies and edges of roofs	0.36	0.5	0.25
		b) Other residential, that is, houses of multiple occupancy and balconies, including Juliette balconies and edges of roofs in single family dwellings	0.74	1.0	0.5
ii)	Offices and work areas not included elsewhere, including storage areas	a) Light access stairs and gangways not more than 600 mm wide	0.22	—	—
		b) Light pedestrian traffic routes in industrial and storage buildings except designated escape routes	0.36	0.5	0.25
		c) Area not susceptible to overcrowding in office and institutional buildings, also industrial and storage buildings except as given above	0.74	1.0	0.5
iii)	Areas where people might congregate	Areas having fixed seating within 530 mm of the barrier, balustrade or parapet	1.5	1.5	1.5
iv)	Area with tables or fixed seatings	Restaurants and bars	1.5	1.5	1.5
v)	Areas without obstacles for moving people and not susceptible to overcrowding	a) Stairs, landings, corridors, ramps	0.74	1.0	0.5
		b) External balconies including *balconets* and edges of roofs. Footways and pavements within building curtilage adjacent to basement/sunken areas	0.74	1.0	0.5
vi)	Areas susceptible to overcrowding	a) Footways or pavements less than 3 m wide adjacent to sunken areas	1.5	1.5	1.5
		b) Theatres, cinemas, discotheques, bars, auditoria, shopping malls, assembly areas, studio. Footways or pavements greater than 3 m wide adjacent to sunken areas.	3.0	1.5	1.5
vii)	Retail areas	All retail areas including public areas of banks/building societies or betting shops	1.5	1.5	1.5
viii)	Vehicular	Pedestrian areas in car parks, including stairs, landings, ramps, edges or internal floors, footways, edges of roofs	1.5	1.5	1.5

Frameless railing to be tested for following performance tests as per guidelines in NBC 2016:

1. Horizontal static load test
2. Uniform load test
3. Concentrated load test
4. Short bag impact test
5. Pendulum impact test

Guidelines for safety grills:

a. Generally safety grills are not provided by Lodha.
b. In case of units on ground level (garden apartment) or any other level where it is easy for 3rd parties to access the unit from adjacent horizontal surface (eg. Apartment on podium top), **safety grills shall be provided by Lodha**.
c. To protect the external façade of the building, grills are generally not allowed to be installed outside the window since they affect the façade of the building (internal safety grills are permitted). However, since home owners tend to have concerns about their safety and also don't want the internal safety grill since they tend to think it affects the aesthetics of their room, a standardized external safety grill design is to be provided by Lodha Design to HFM (who will in turn provide it to the unit occupiers, if so requested) **in Casa and Aspi residential projects only** and this can be fitted by them outside their window (where there is no deck outside such window) at their own cost and exactly adhering to such design. Some sample designs are provided below (from a Casa project) – the design can be improved from time to time but it should be ensured that the depth of the grill outside the window does not exceed 100 mm (this is to prevent the grill area being used for storage etc.):



F-03 Anx A Typical Grill design.pdf
F-03 Anx B Grill design with emergency exit.pdf
F-03 Anx C Grill design for accessible duct.pdf

Guidelines for Bird Net:

Bird net / Pigeon net (customer scope): can be considered for balconies (along railings) and shafts so as to prevent birds from entering the balcony / shafts and /or avoid birds from sitting on the balcony beam upstand / cornice.

1. The bird net should be installed on outer face of railing (limited to within the extent of the opening i.e. beam bottom to the top of floor beam upstand. Refer Image 2 below).
2. In the case of shafts, bird nets may be installed on the inner face of shaft fins.
3. The net should be good quality nylon net, transparent / white colour and be appropriately installed by the customer at his cost with utmost care so as not to damage the façade finishes. Reference images below.

Image 1:



Image 2:

