

**METRO**

**arquitetura e expografia**













30

LEME







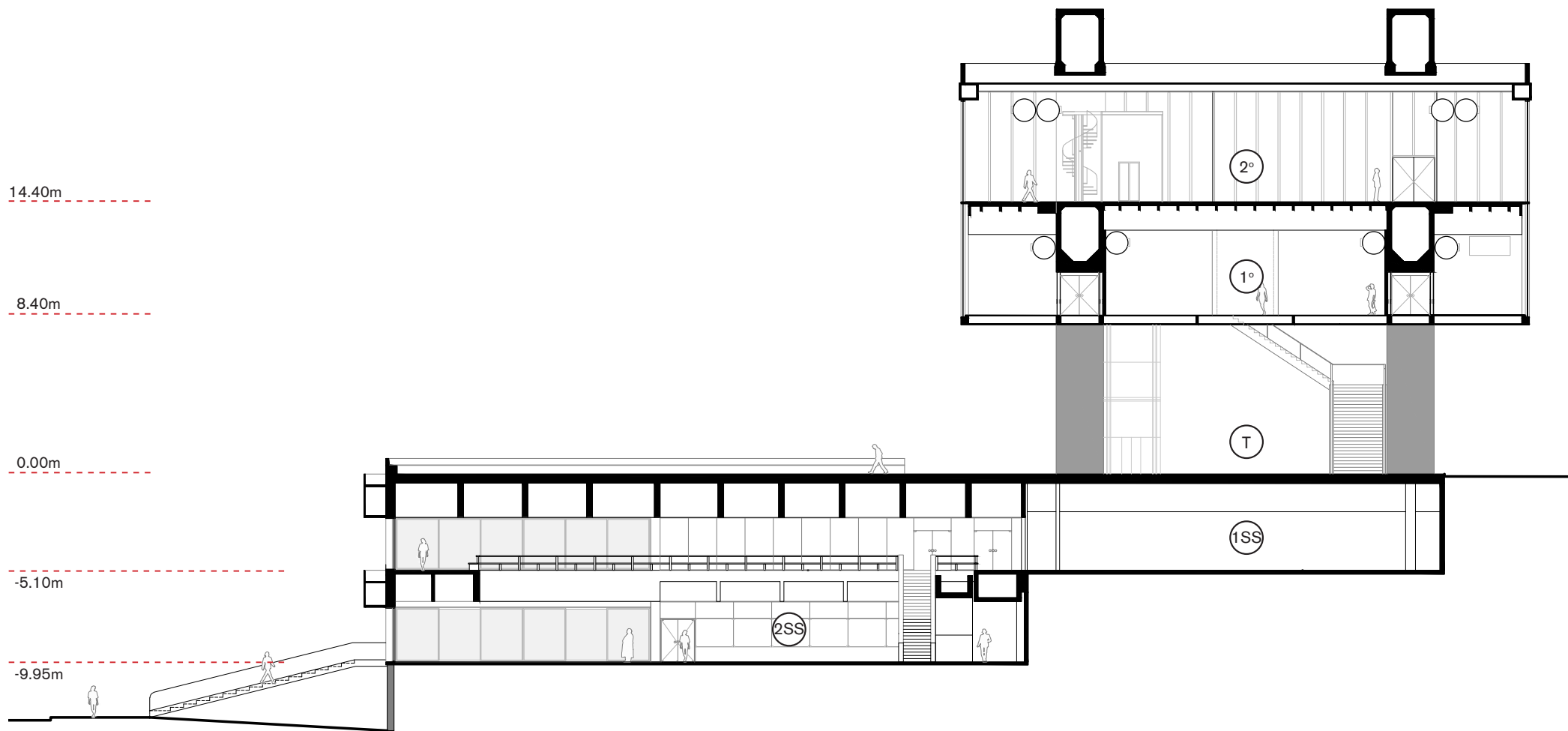








**masp**



**CORTE TRANSVERSAL | TRANSVERSAL SECTION**

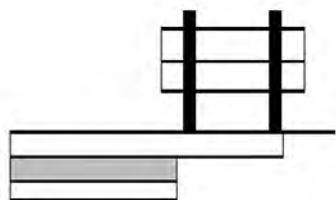
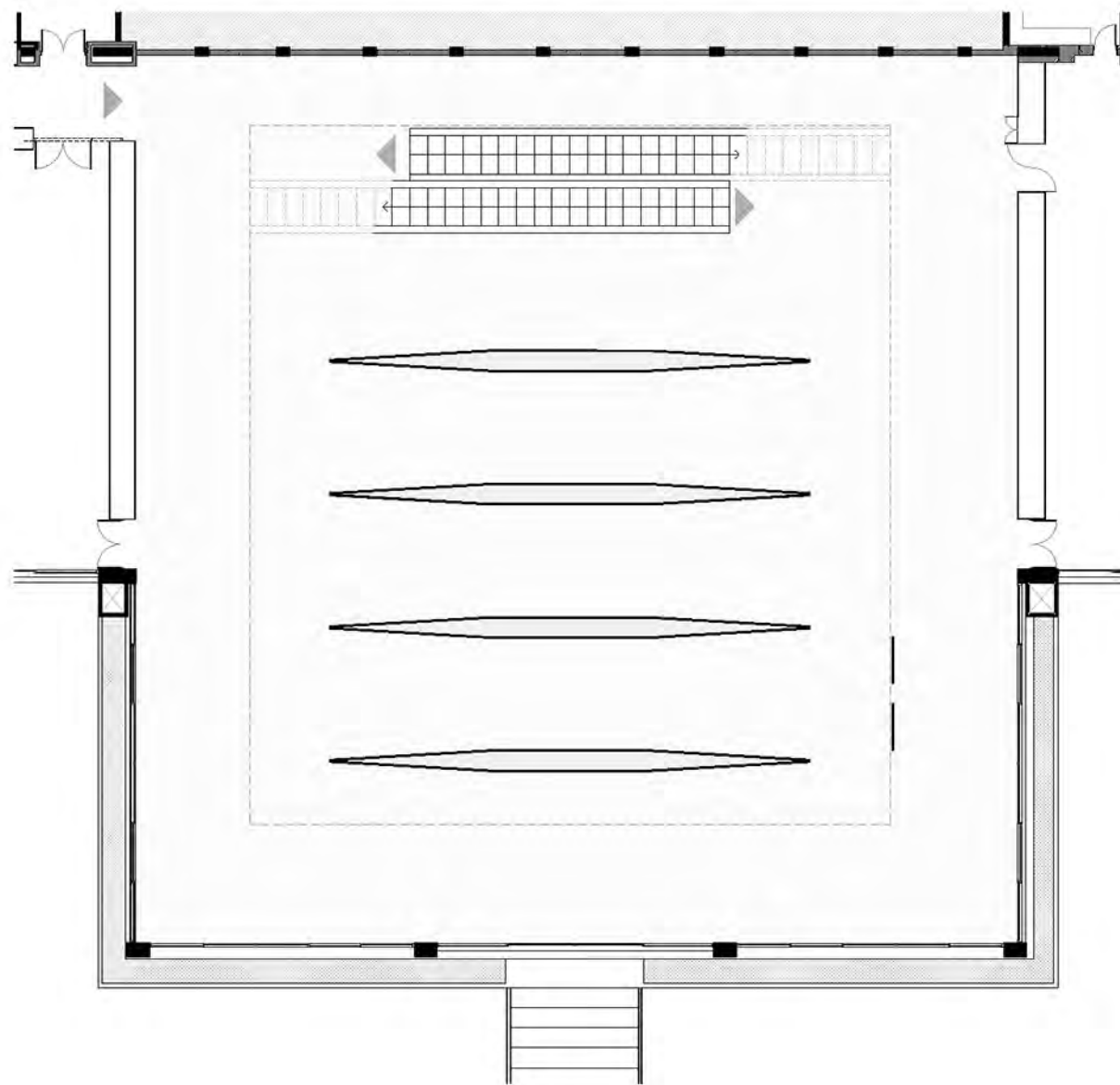
- ⊙ 2º 2º PAVIMENTO | 2<sup>ND</sup> FLOOR
- ⊙ 1º 1º PAVIMENTO | 1<sup>ST</sup> FLOOR
- ⊙ T TÉRREO | GROUND FLOOR
- ⊙ 1SS 1º SUBSOLO | 1<sup>ST</sup> SUBFLOOR
- ⊙ 2SS 2º SUBSOLO | 2<sup>ND</sup> SUBFLOOR

**ESCALA | SCALE // 1:300**



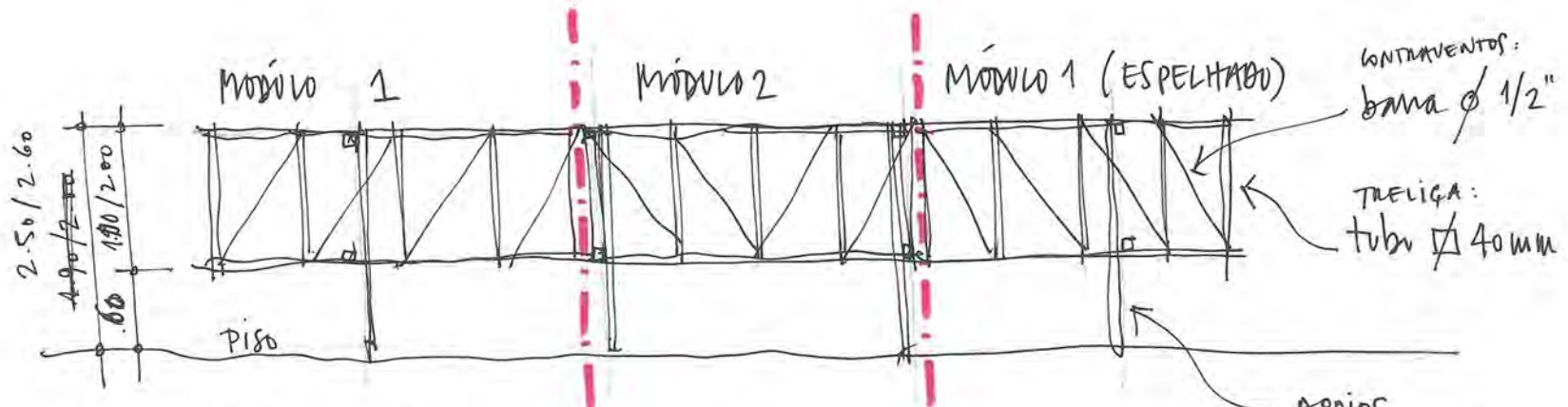






0 2 5 15

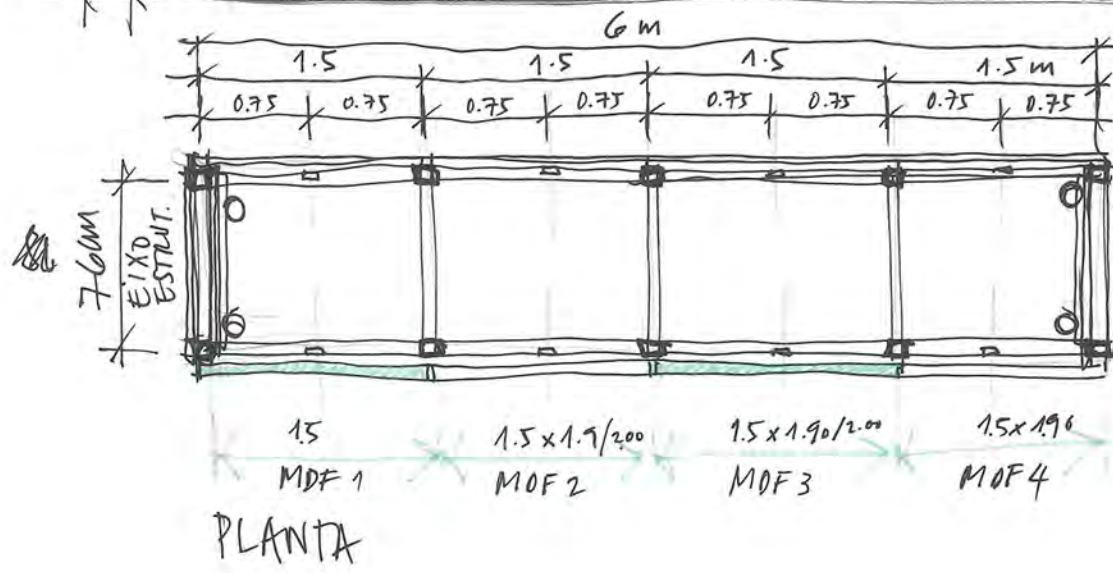
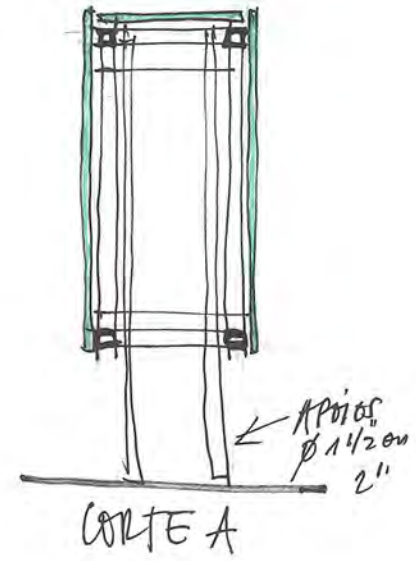
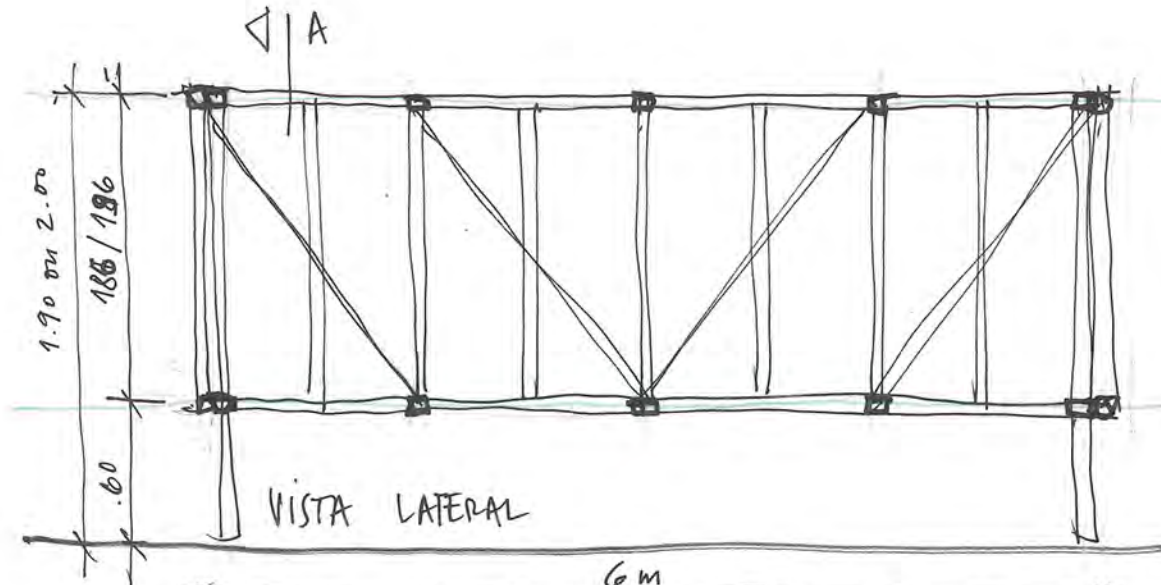




ESTRUTURA PANEL FRAP/MASP

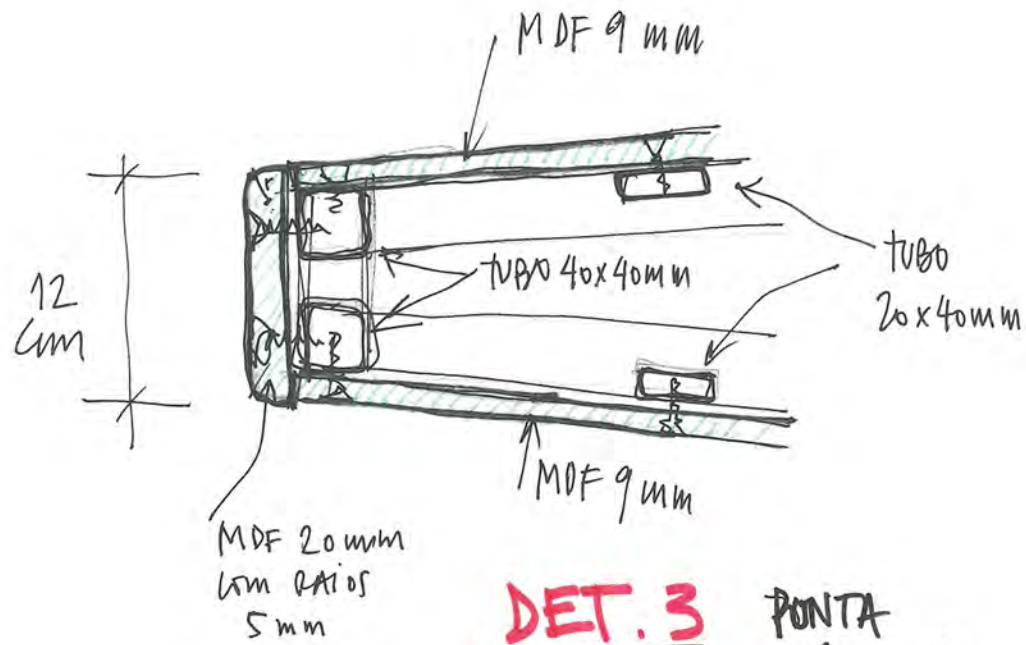
VISTA FRONTAL  
sem escala

Apoios  
tubo  $\phi$  1 1/2"  
2"  
espessura de parede  
 $\neq$  3mm



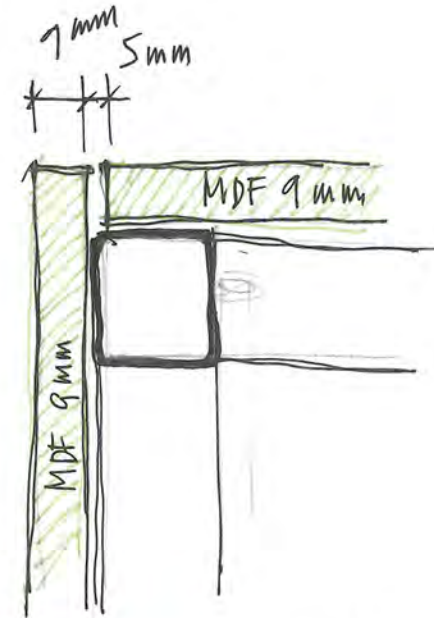
80 cm  
EXTRADO À ESTRUTURA

PANEL FAAP  
MÓDULO 2



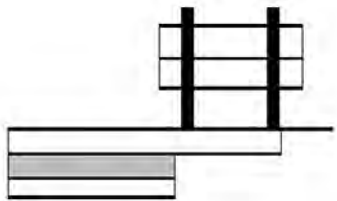
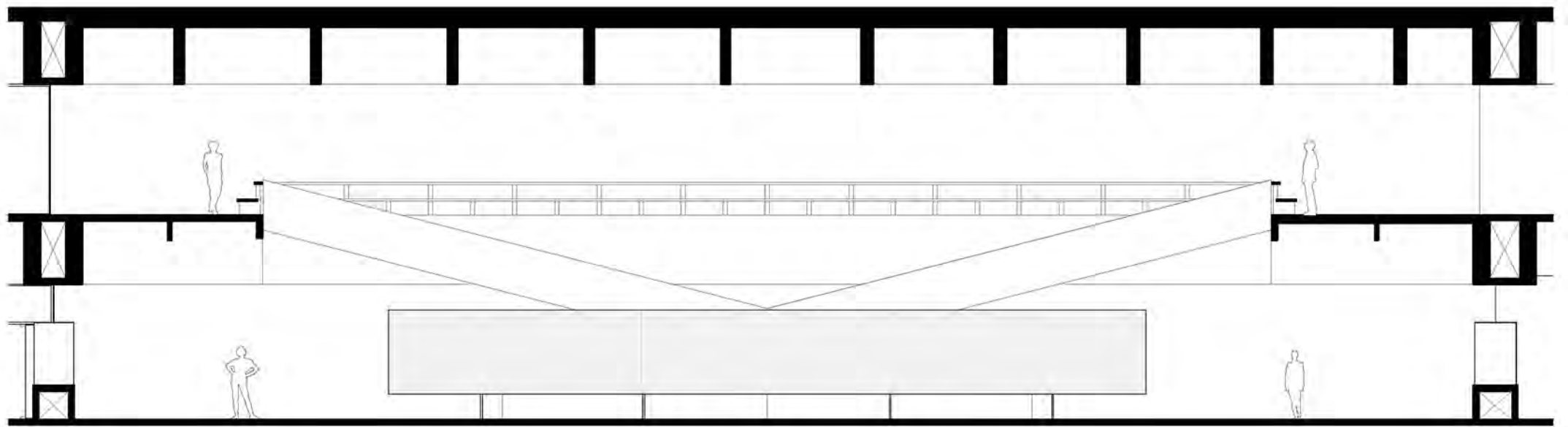
**DET. 3**

PONTA  
MÓDULO 1



**DET. 4**

TAMPA  
SUPERIOR  
PAINEL







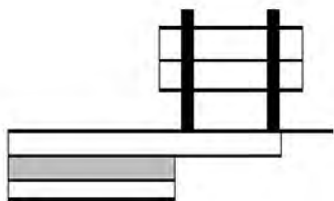
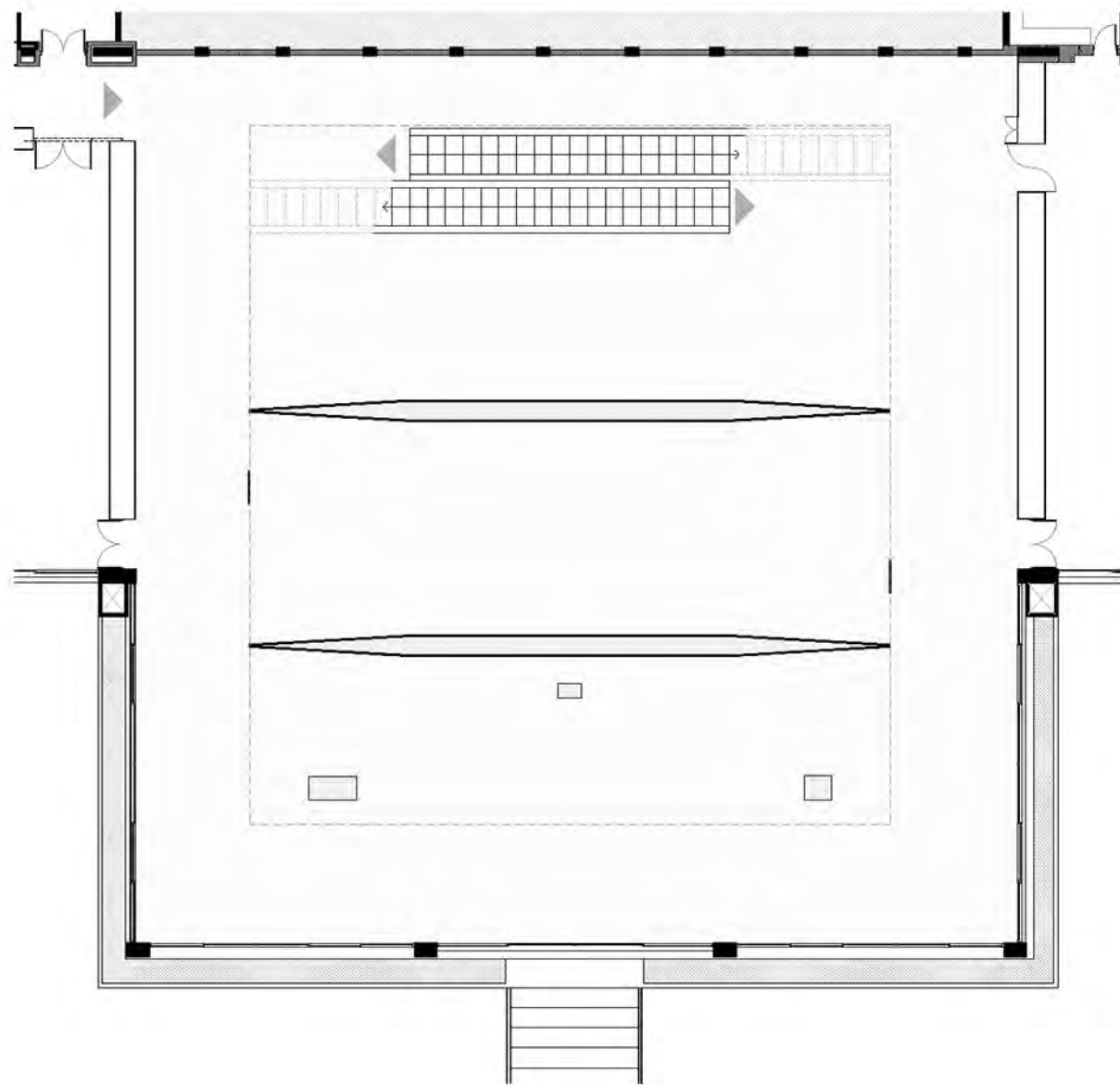
ARTE DO BRASIL ATÉ 1900





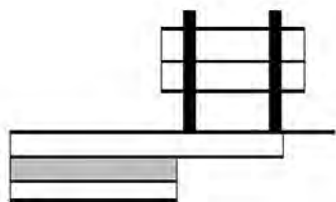
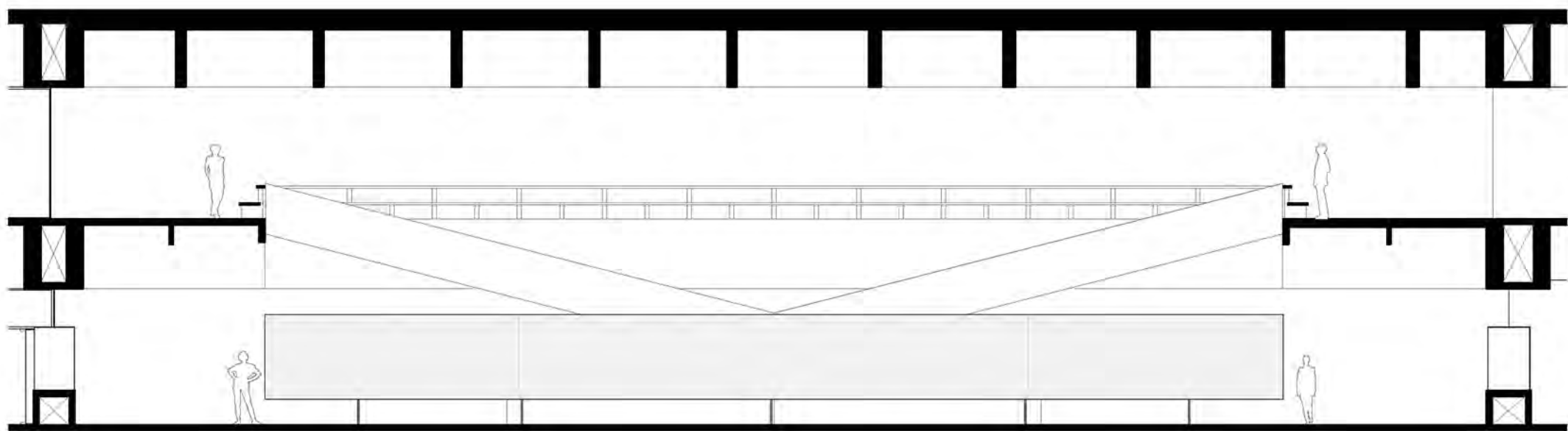






0 2 5 15





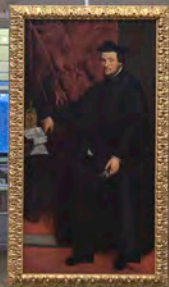


**ARTE  
DA ITÁLIA:  
DE RAFAEL  
A TICIANO**

[ART FROM ITALY:  
FROM RAFAEL  
TO TITIAN]

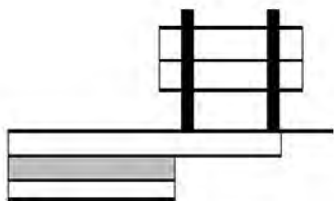
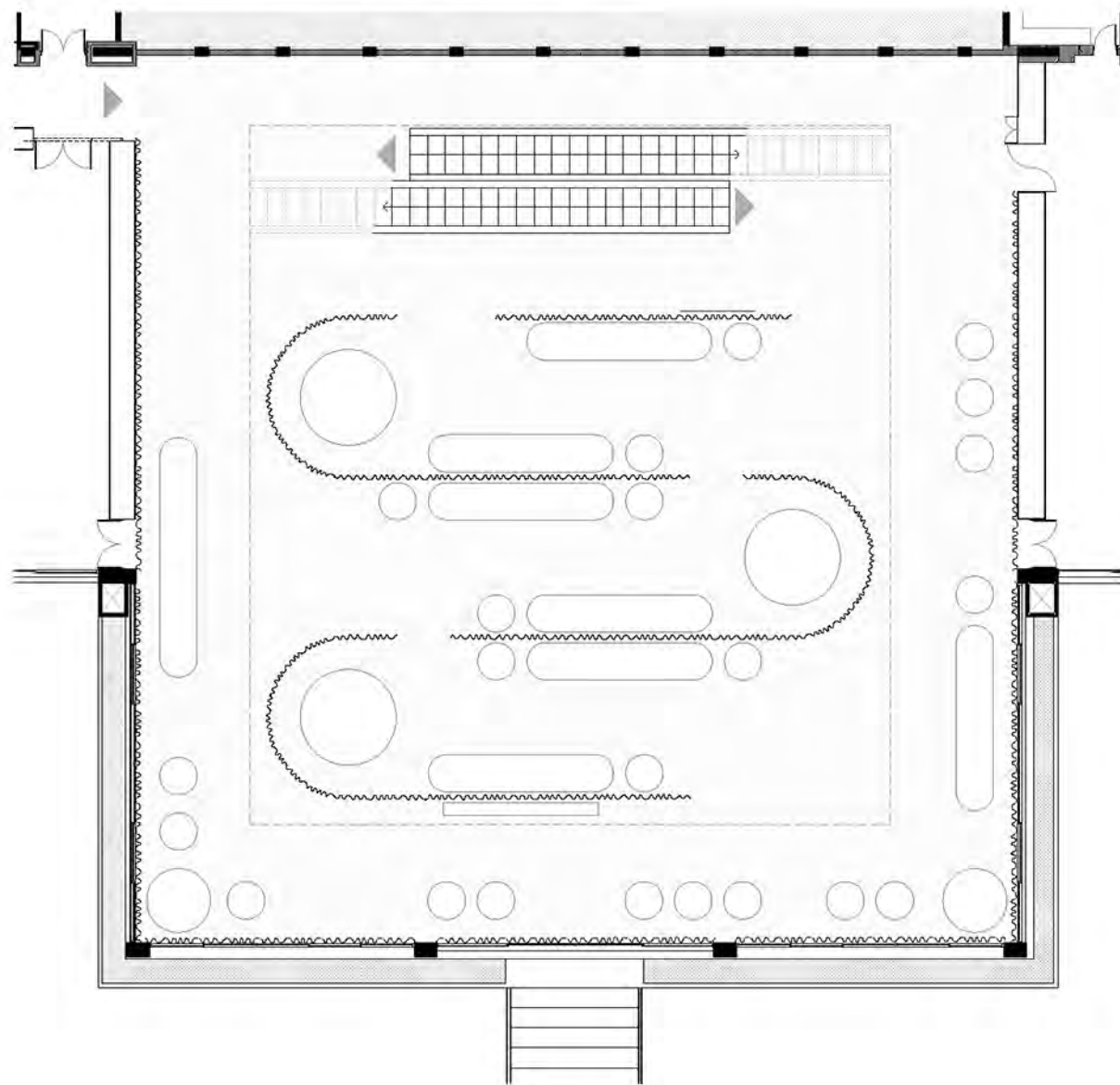
Textual content on the informational panel, likely providing details about the exhibition and the artists featured.







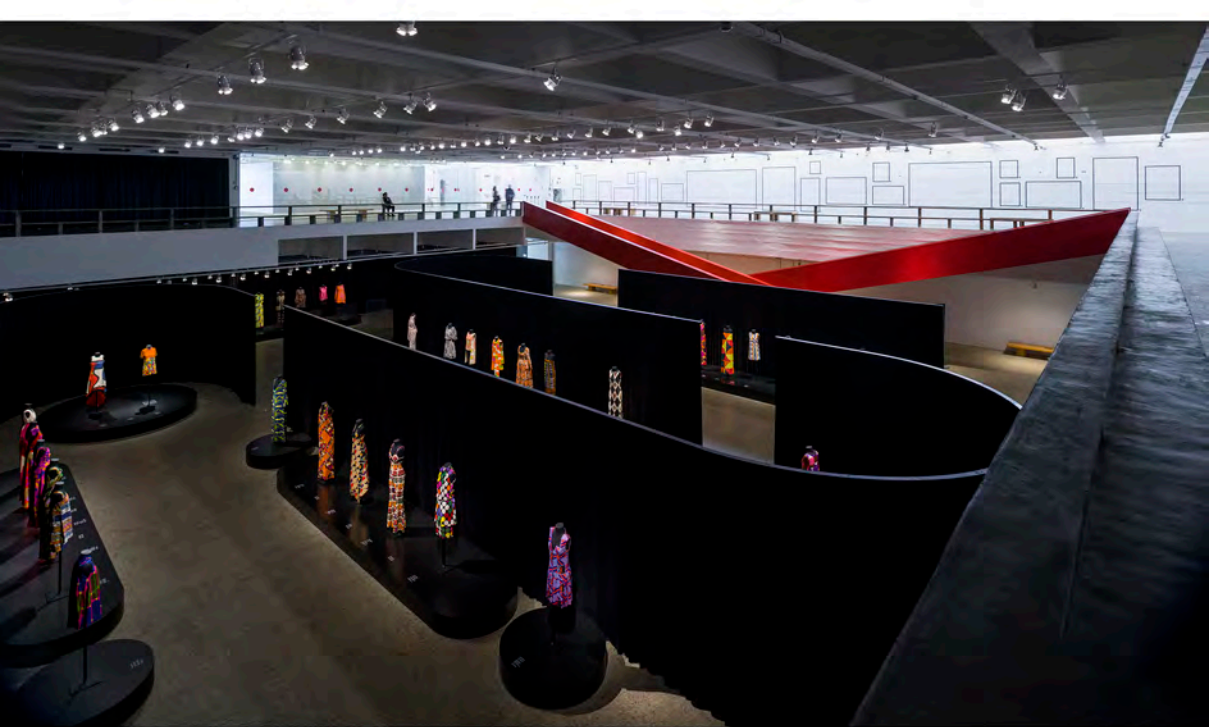


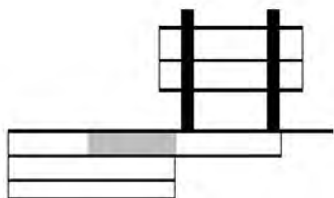
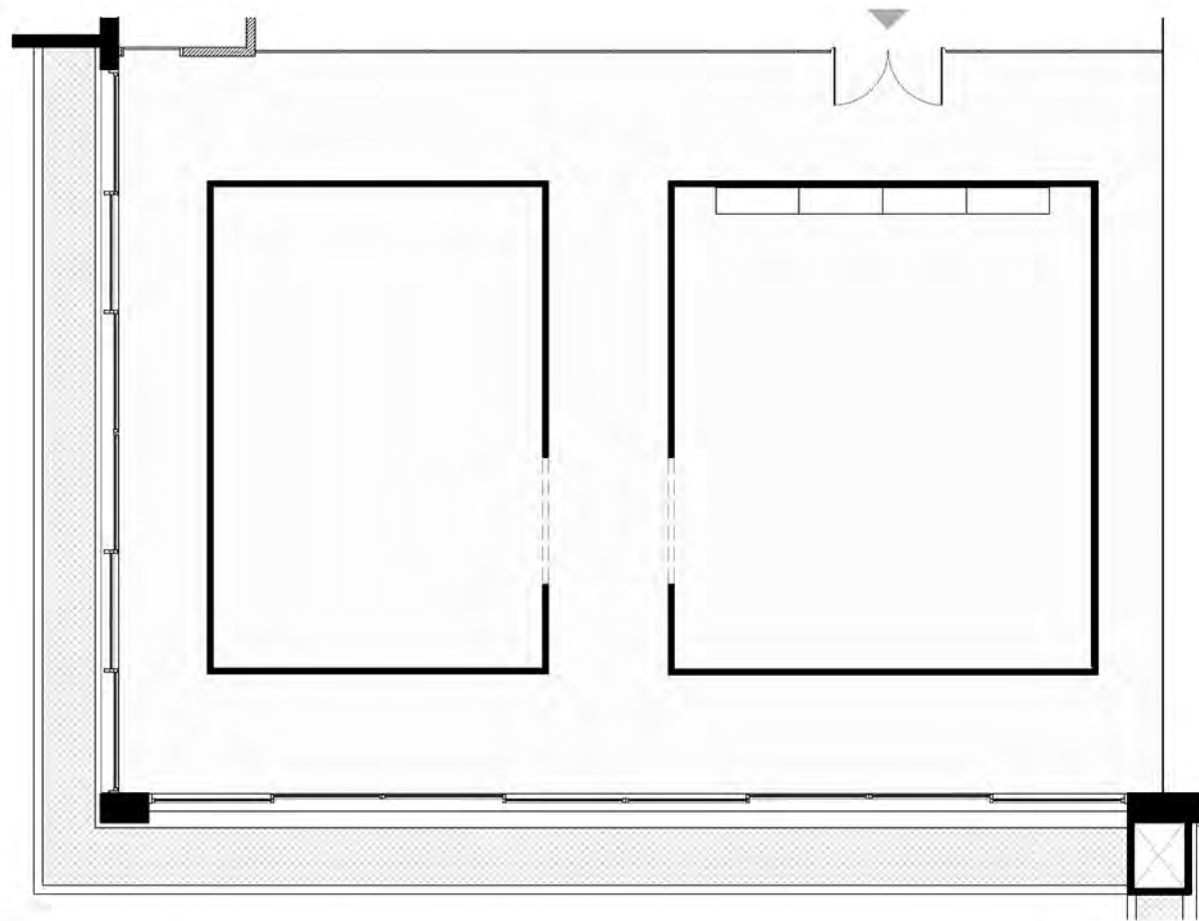


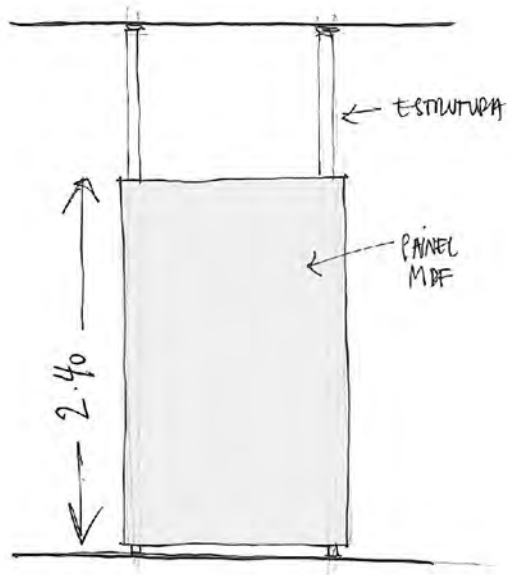
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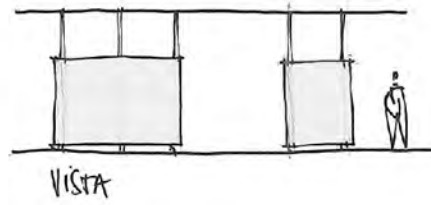




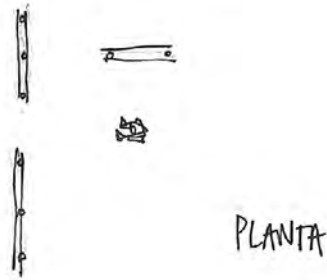




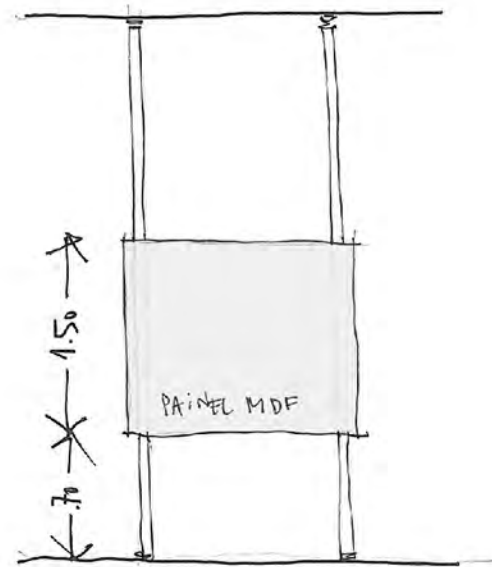
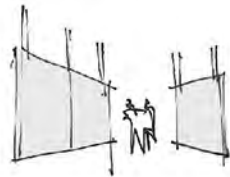
PAINEL BAIXO



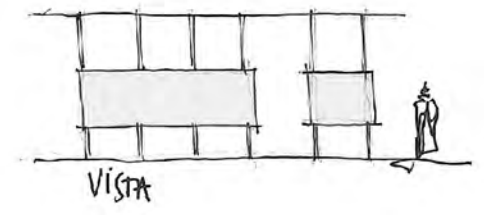
VISTA



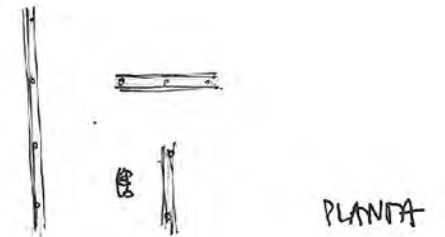
PLANTA



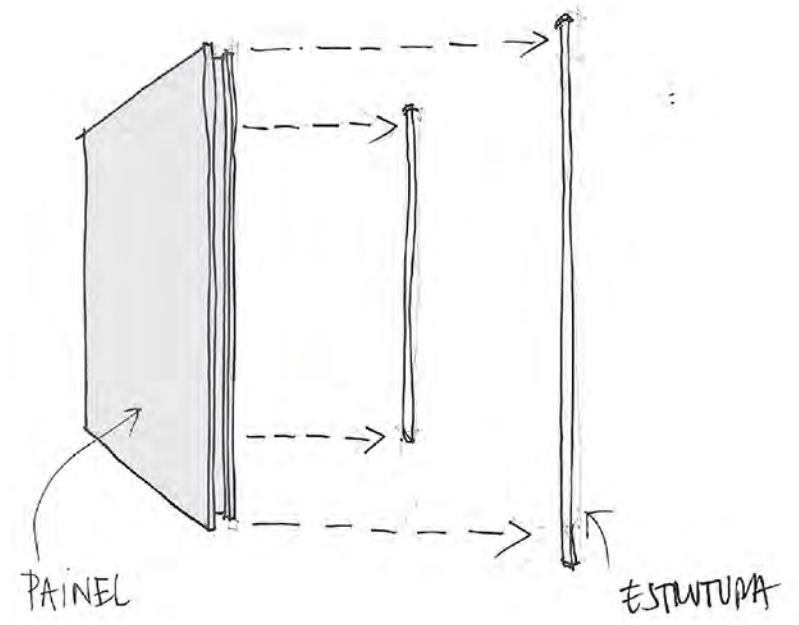
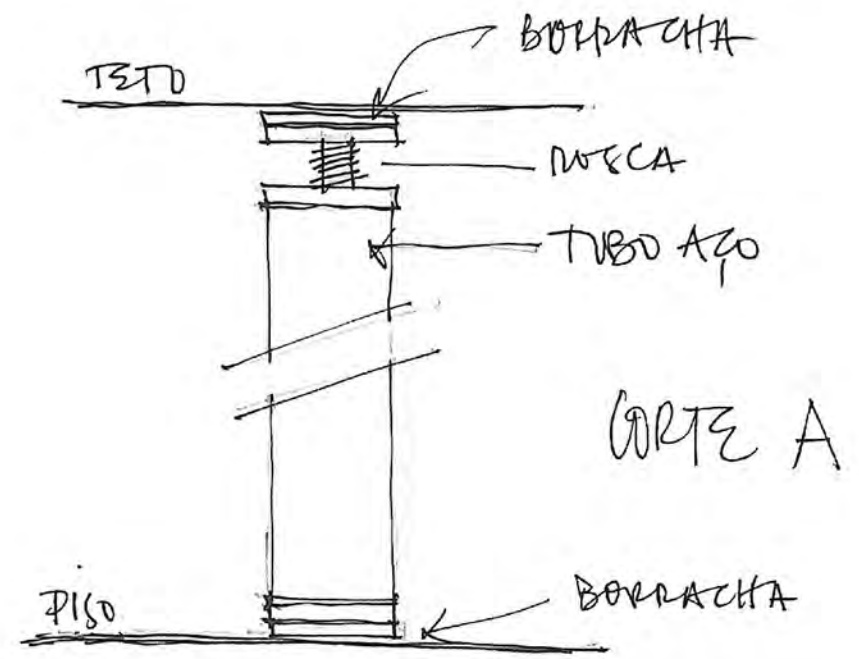
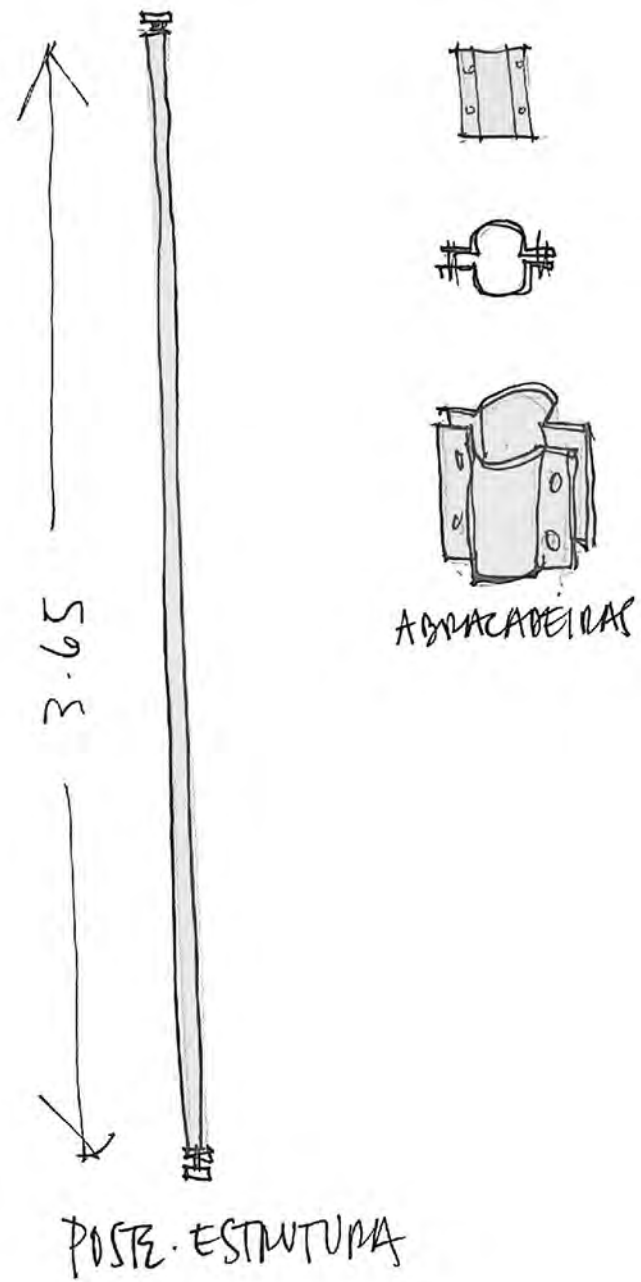
PAINEL

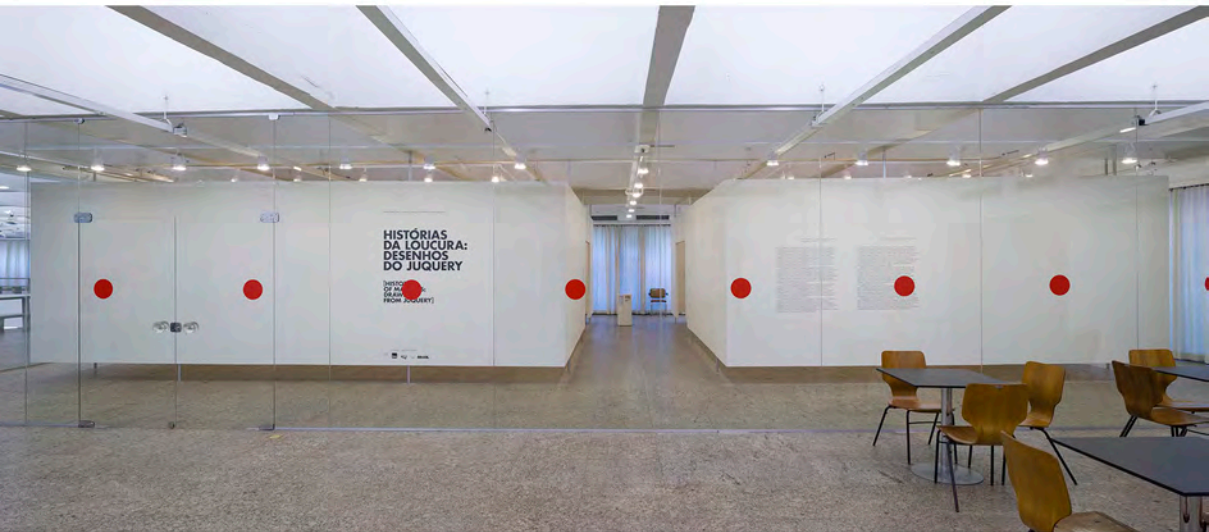


VISTA



PLANTA





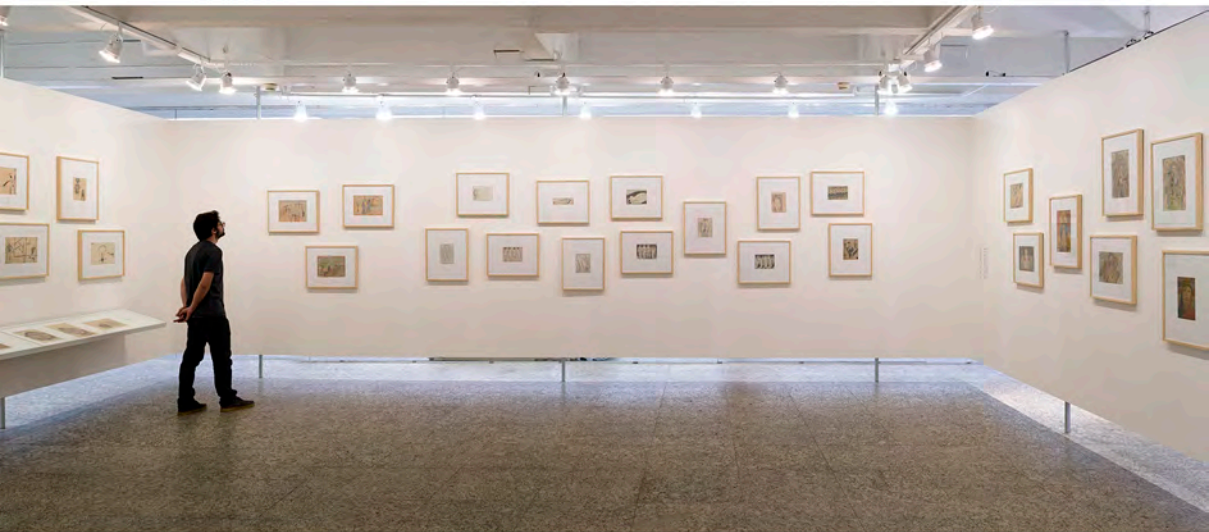
**HISTÓRIAS  
DA LOUCURA:  
DESENHOS  
DO JUQUERY**

EXPOSIÇÃO  
DE ARQUITETURA  
E DESENHO  
DO JUQUERY

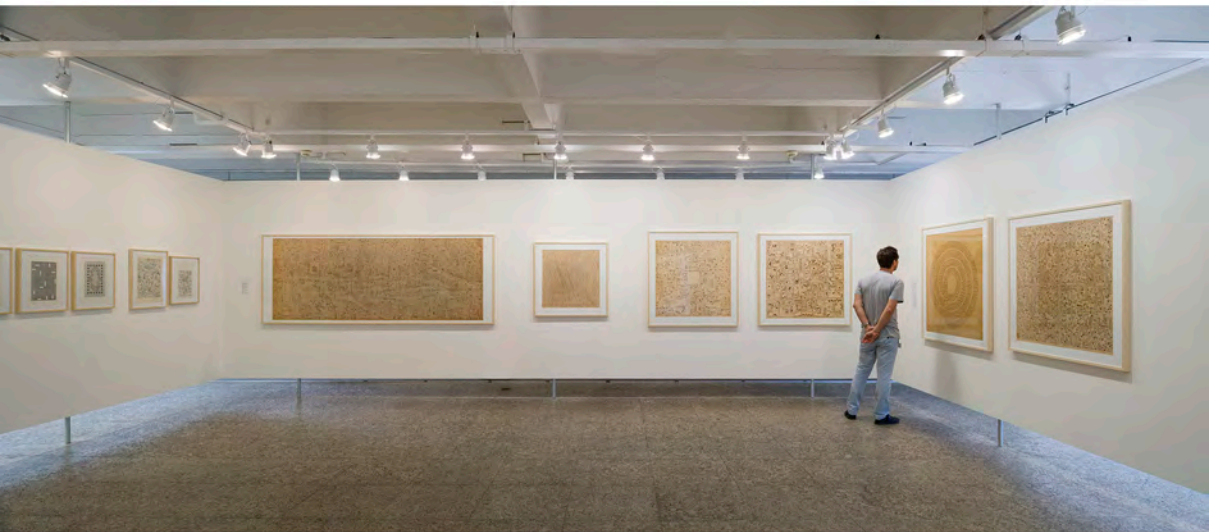
MAU.PT

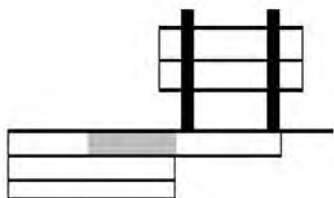
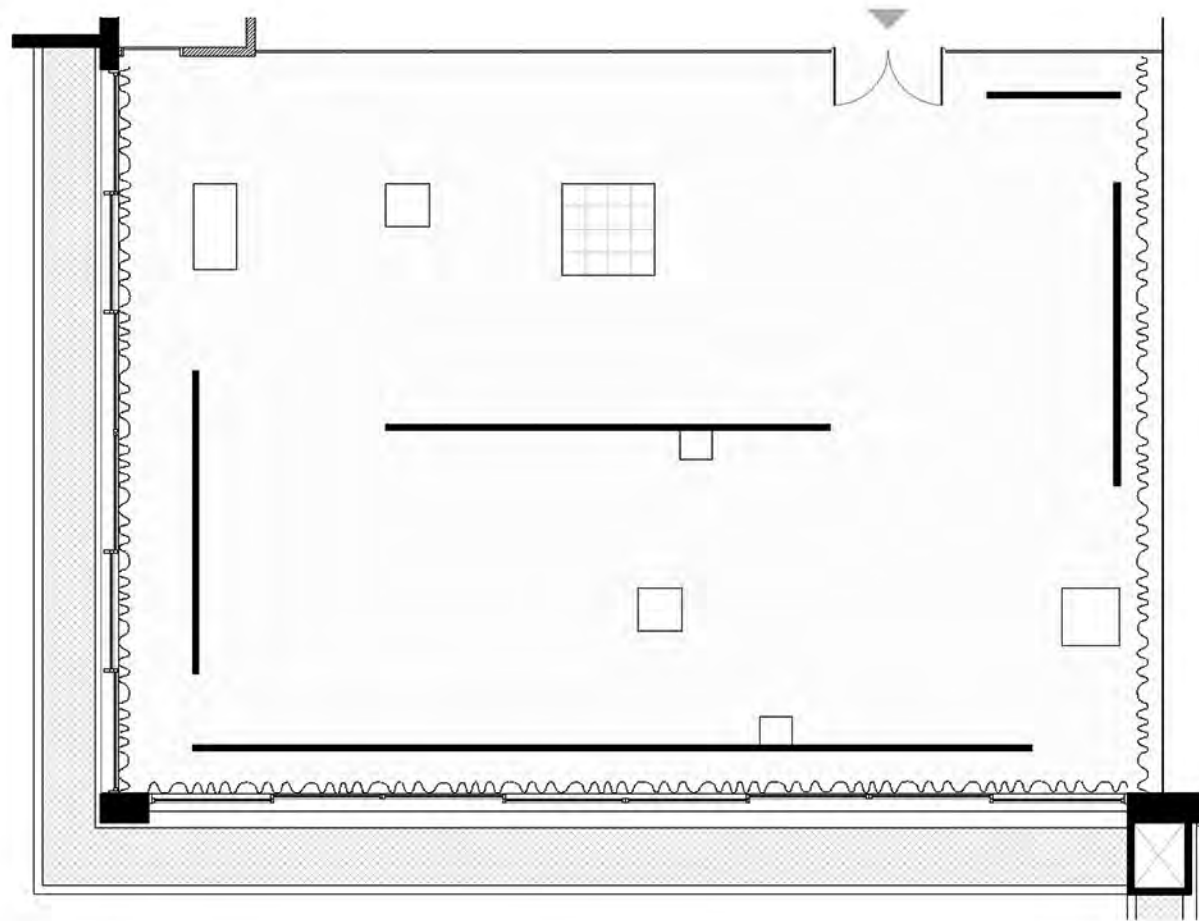




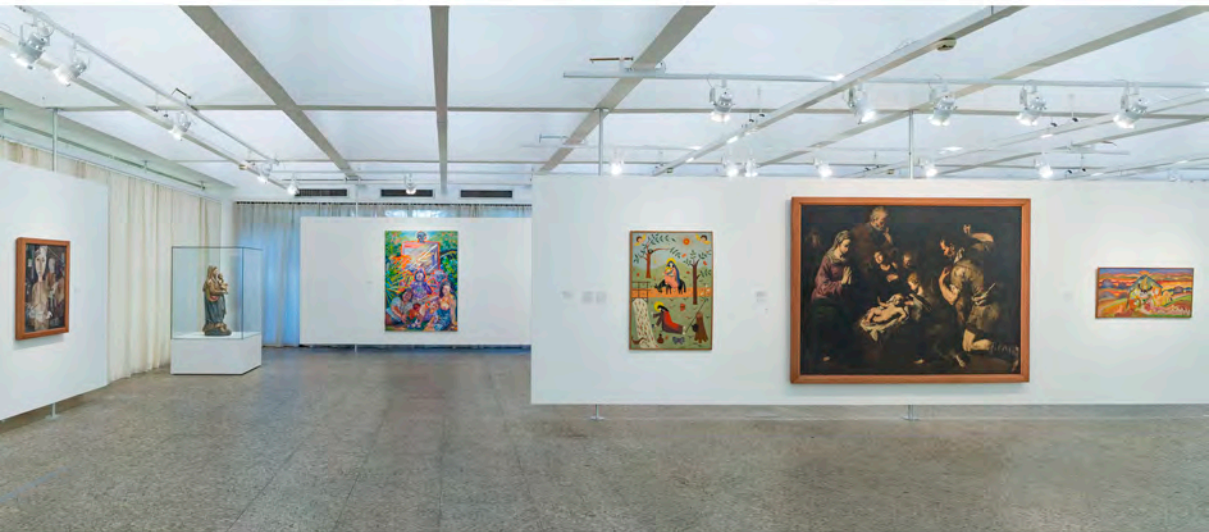


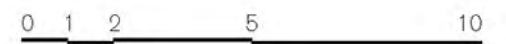
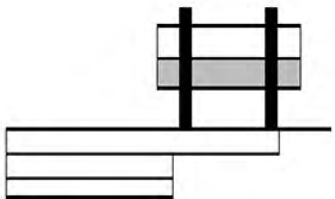
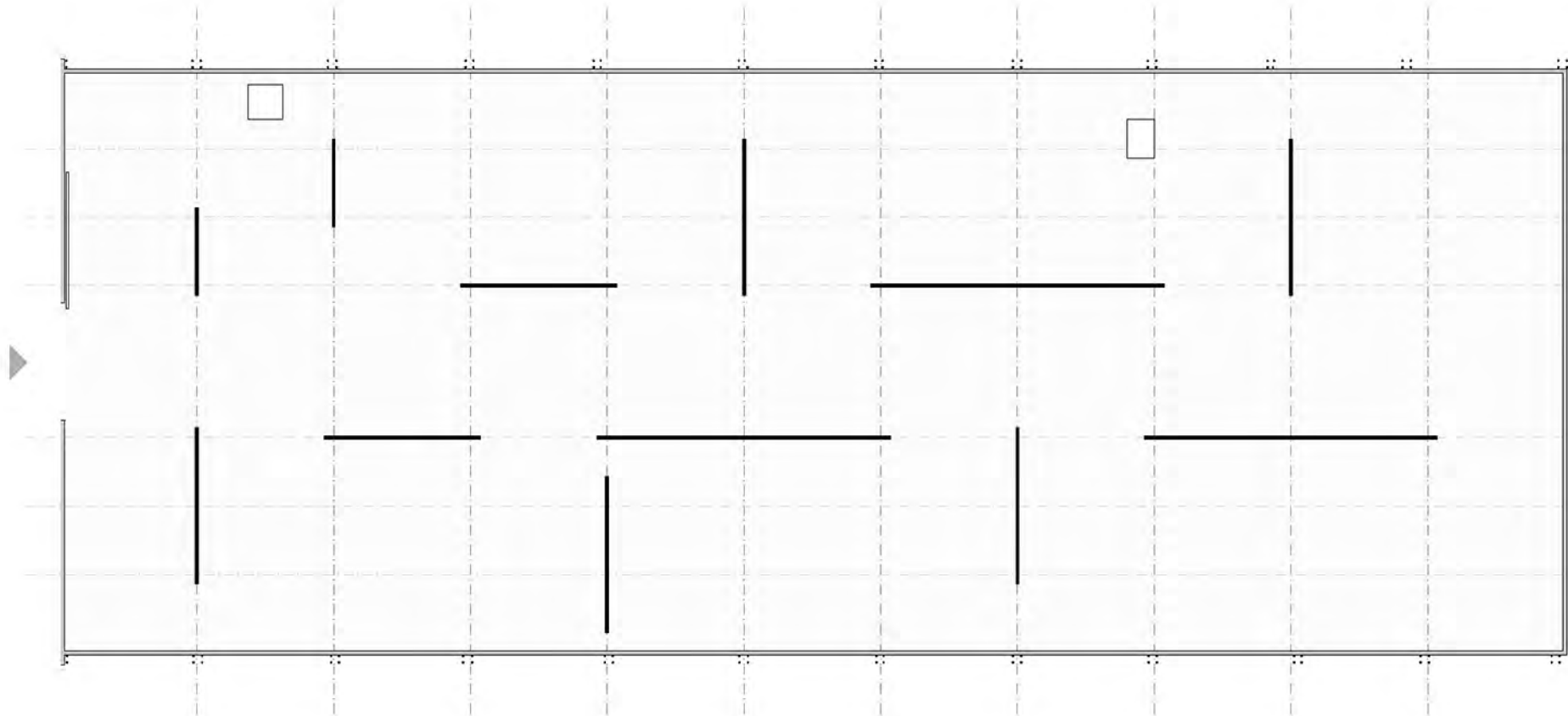






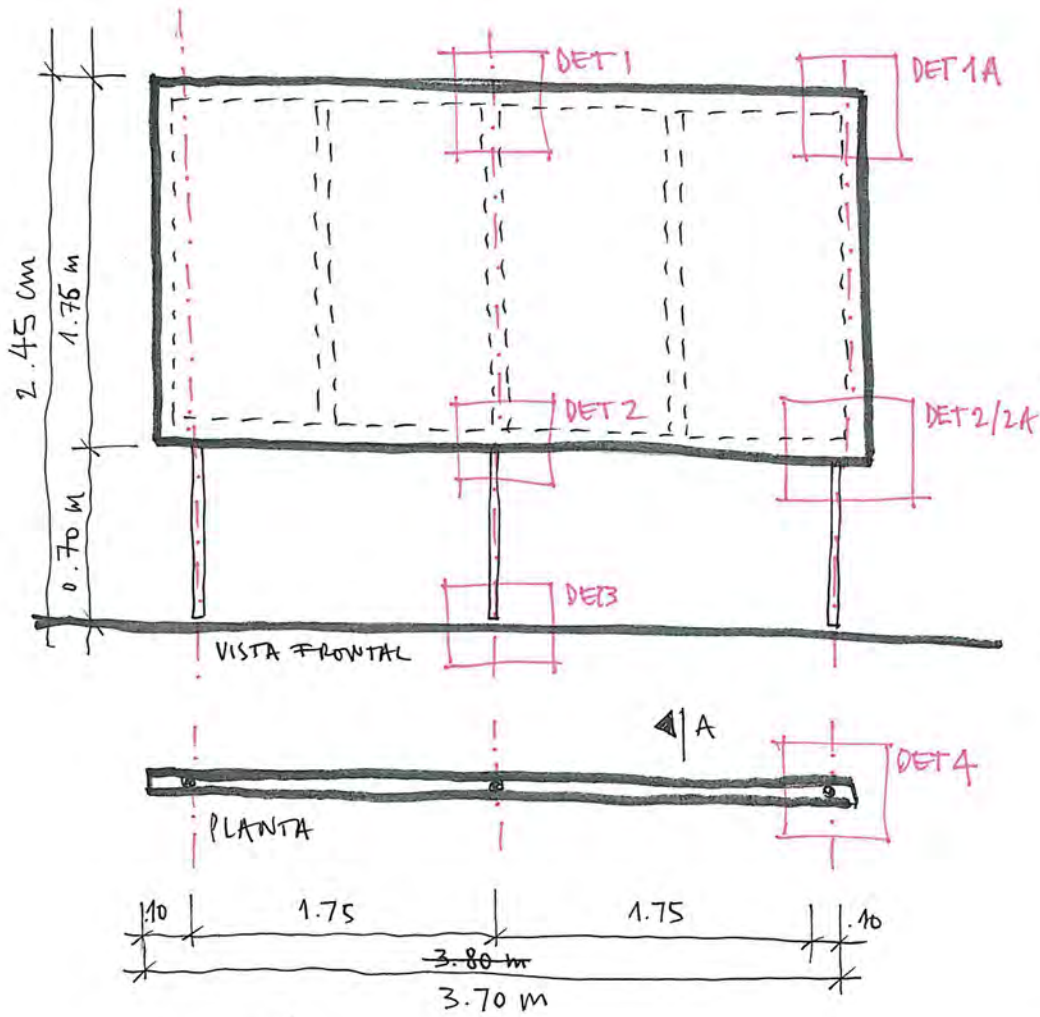




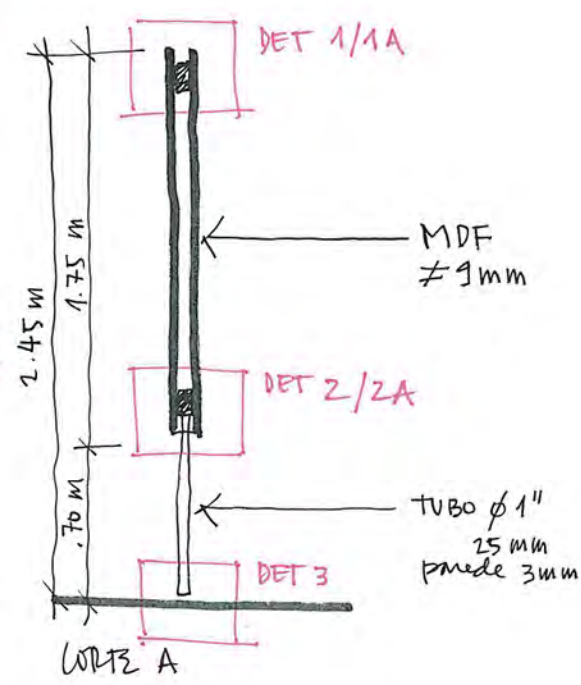






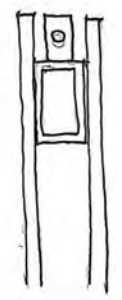
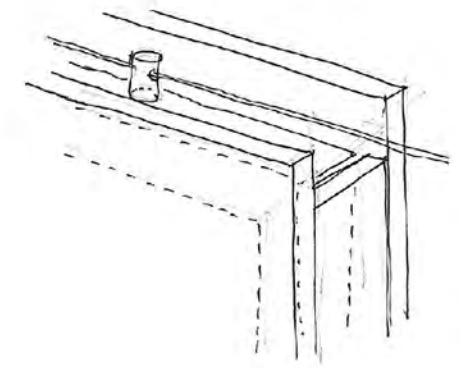


sem escala



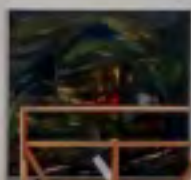
PAINEL TIPO 1 [3.70 m]  
 QUANTIDADE:

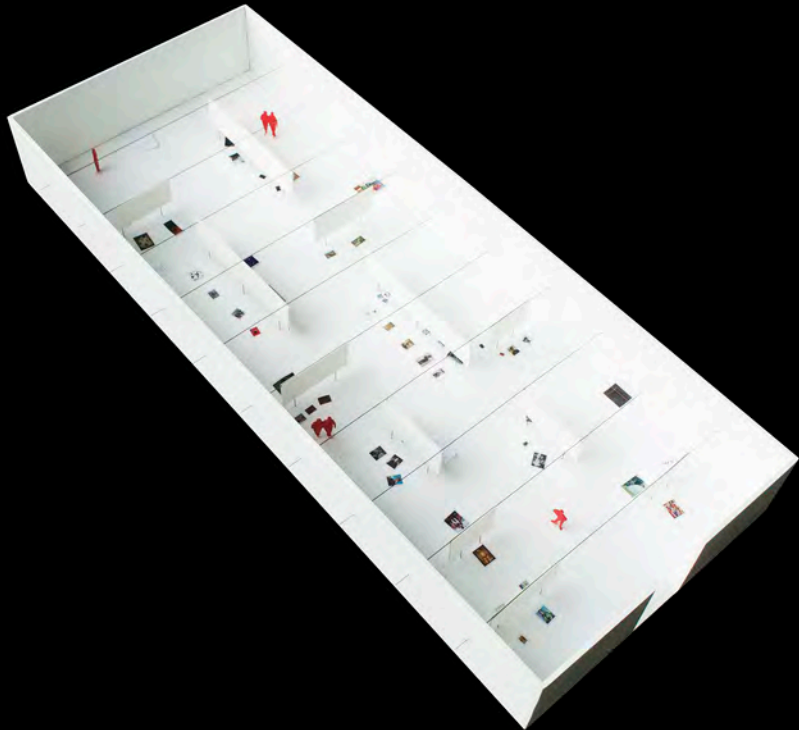
MASP [7 de Abril]



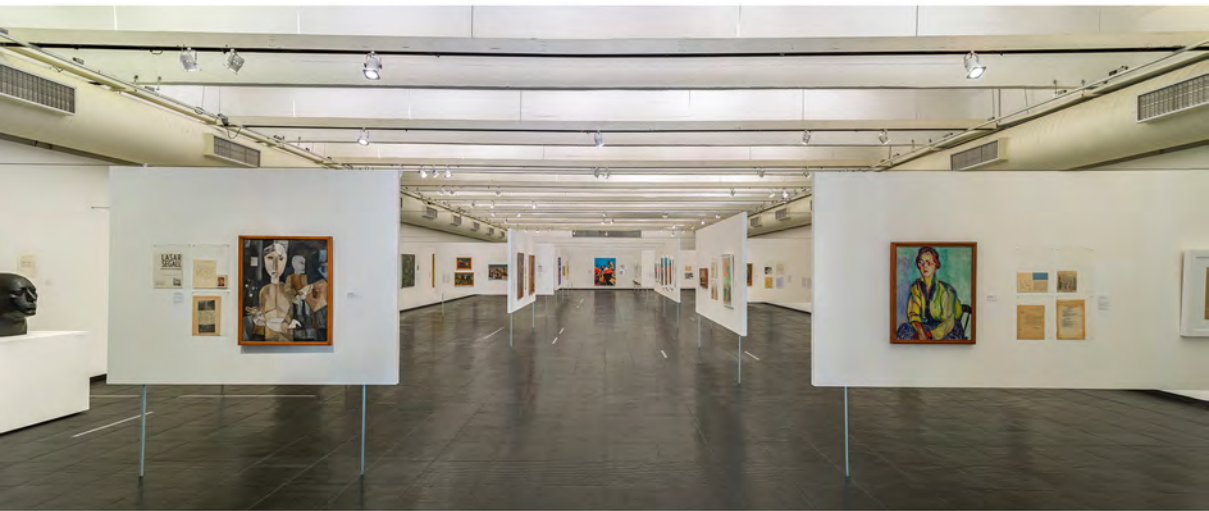


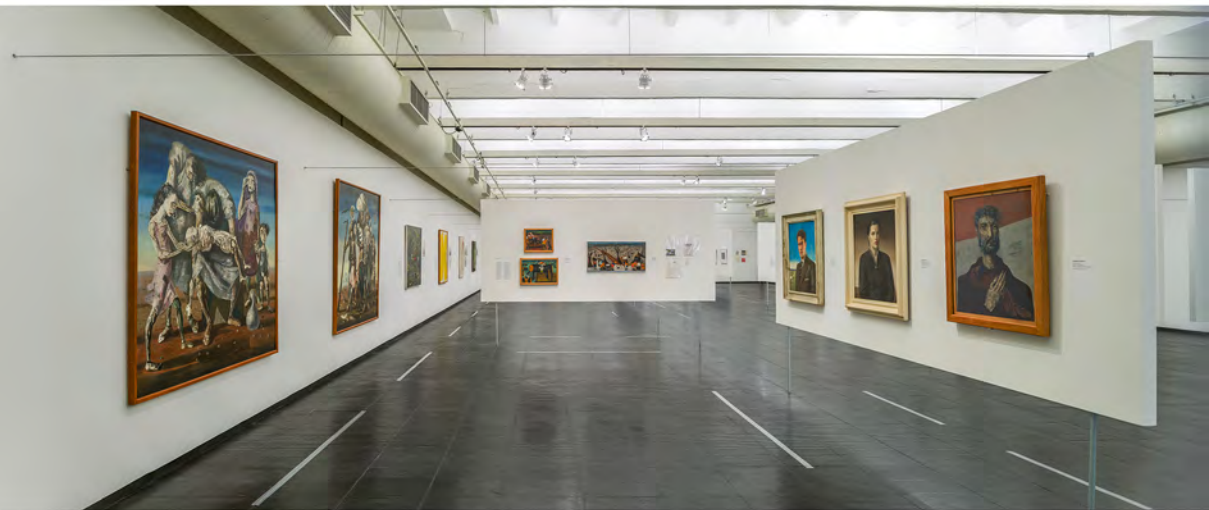




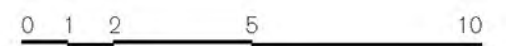
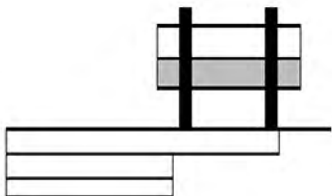
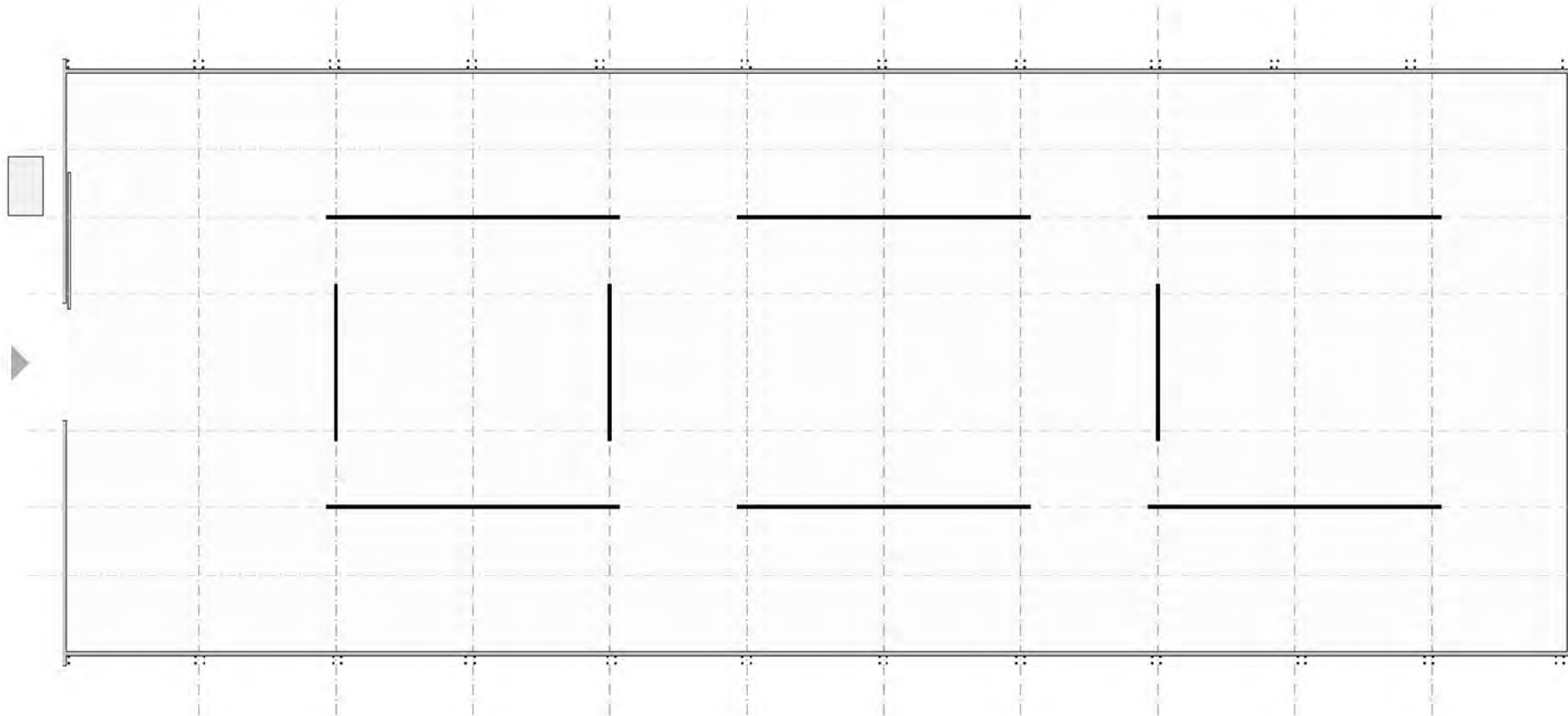














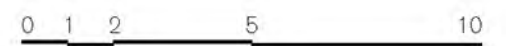
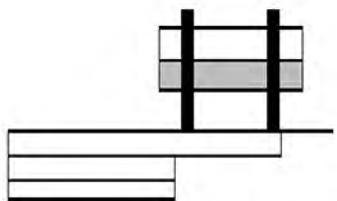
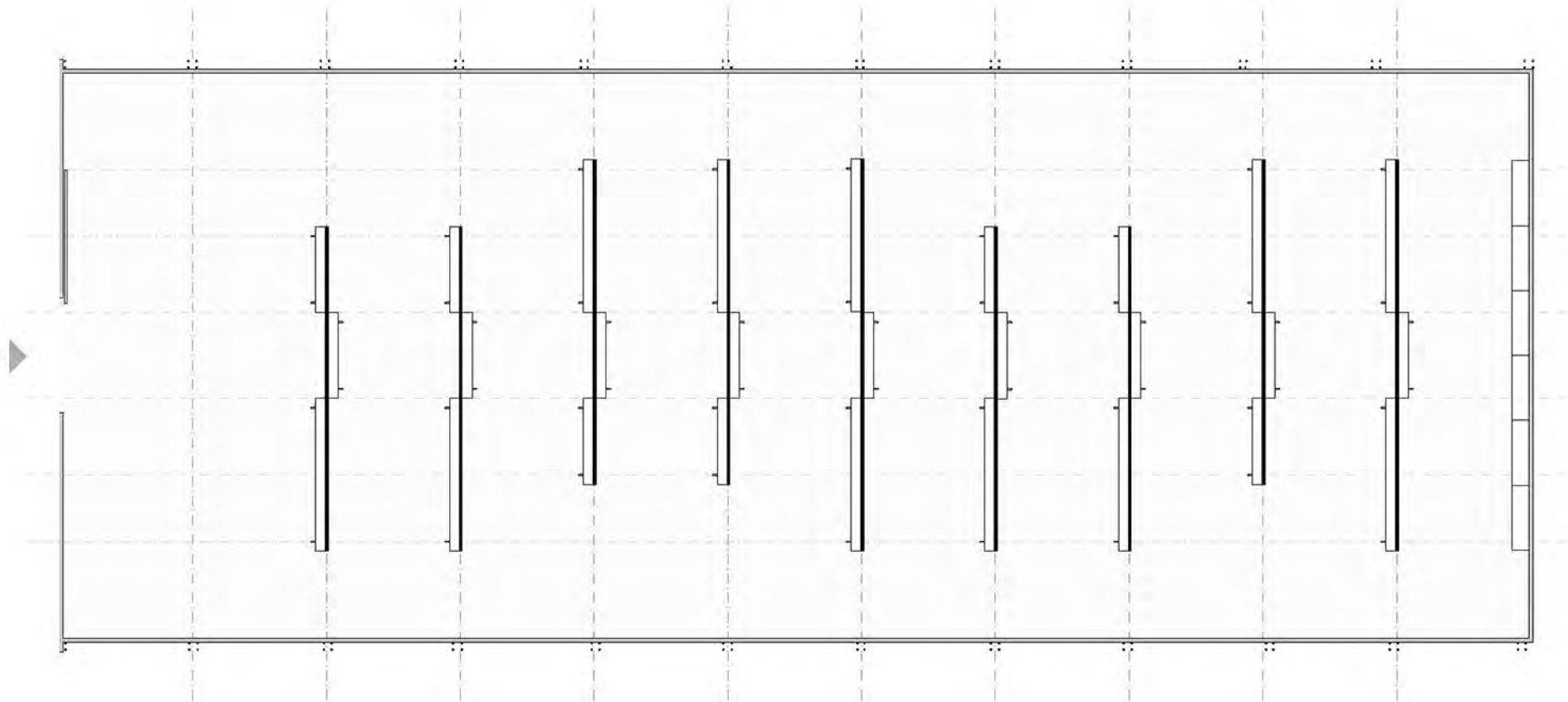
**ARTE DA FRANÇA:  
DE DELACROIX  
A CÉZANNE**

(ART FROM FRANCE:  
FROM DELACROIX  
TO CÉZANNE)

















1952



1955





2° PAVIMENTO

2<sup>ND</sup> FLOOR

1° PAVIMENTO

1<sup>ST</sup> FLOOR

TÉRREO

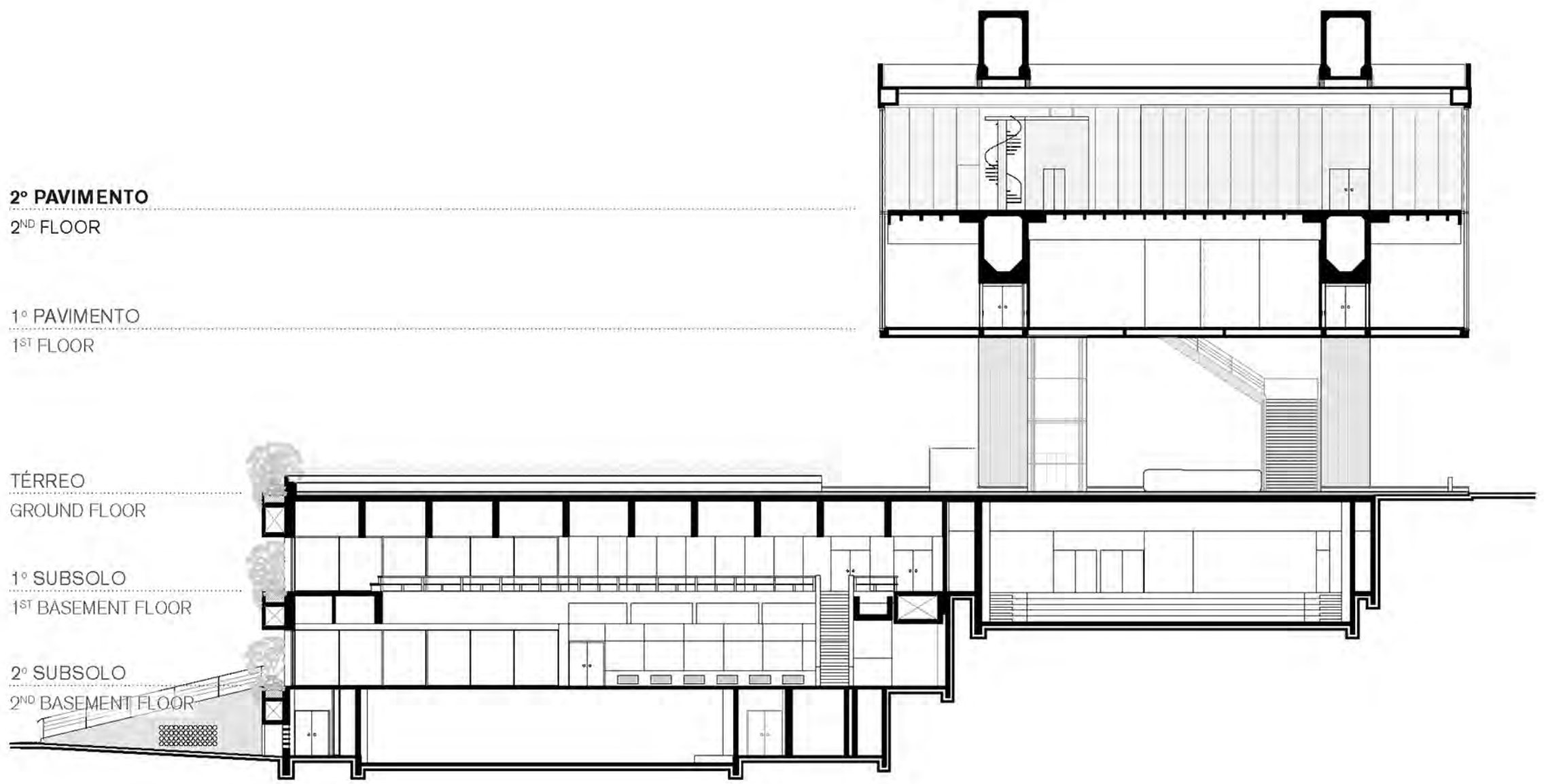
GROUND FLOOR

1° SUBSOLO

1<sup>ST</sup> BASEMENT FLOOR

2° SUBSOLO

2<sup>ND</sup> BASEMENT FLOOR



0 2 5 15









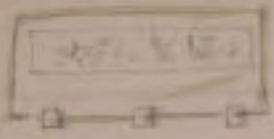






Planos e elevações?  
 "Empilhados"?

Elementos para  
 planta quadrada



os quadros  
 são formados  
 por



por painéis

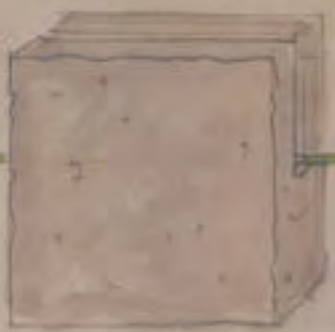
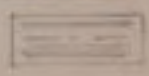


Elementos para  
 planta quadrada  
 com colunas

Carvalho W  
 muro norte de São Paulo

Julho 19/5

80 x 2,00  
 Rua... de São Paulo



Placa de concreto  
**CONCRETO**

...  
 ...  
 ...

...  
 ...

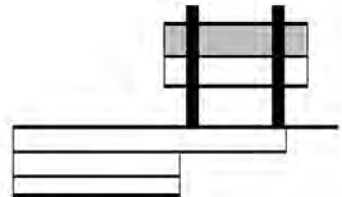
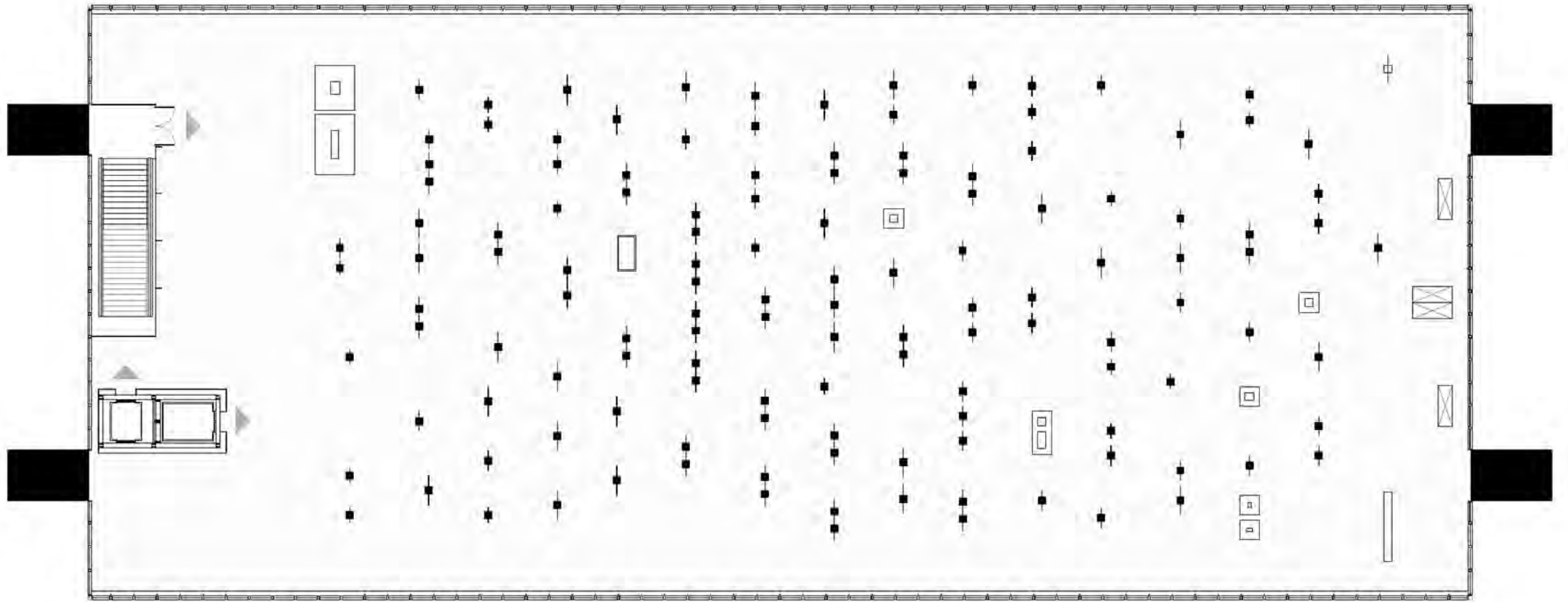
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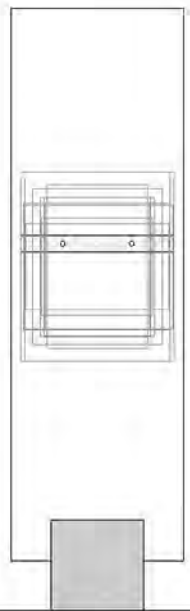
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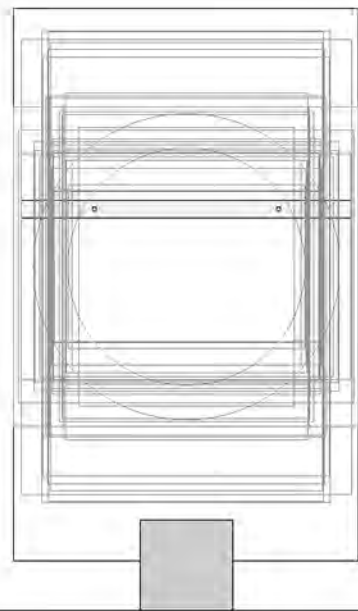




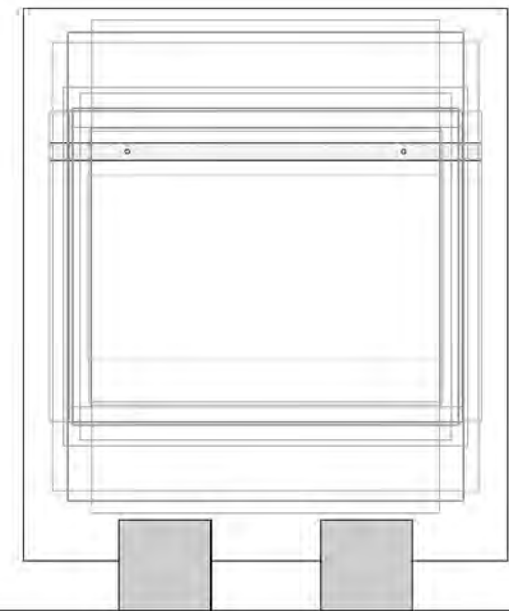
VIDRO/GLASS **A**



VIDRO/GLASS **B**

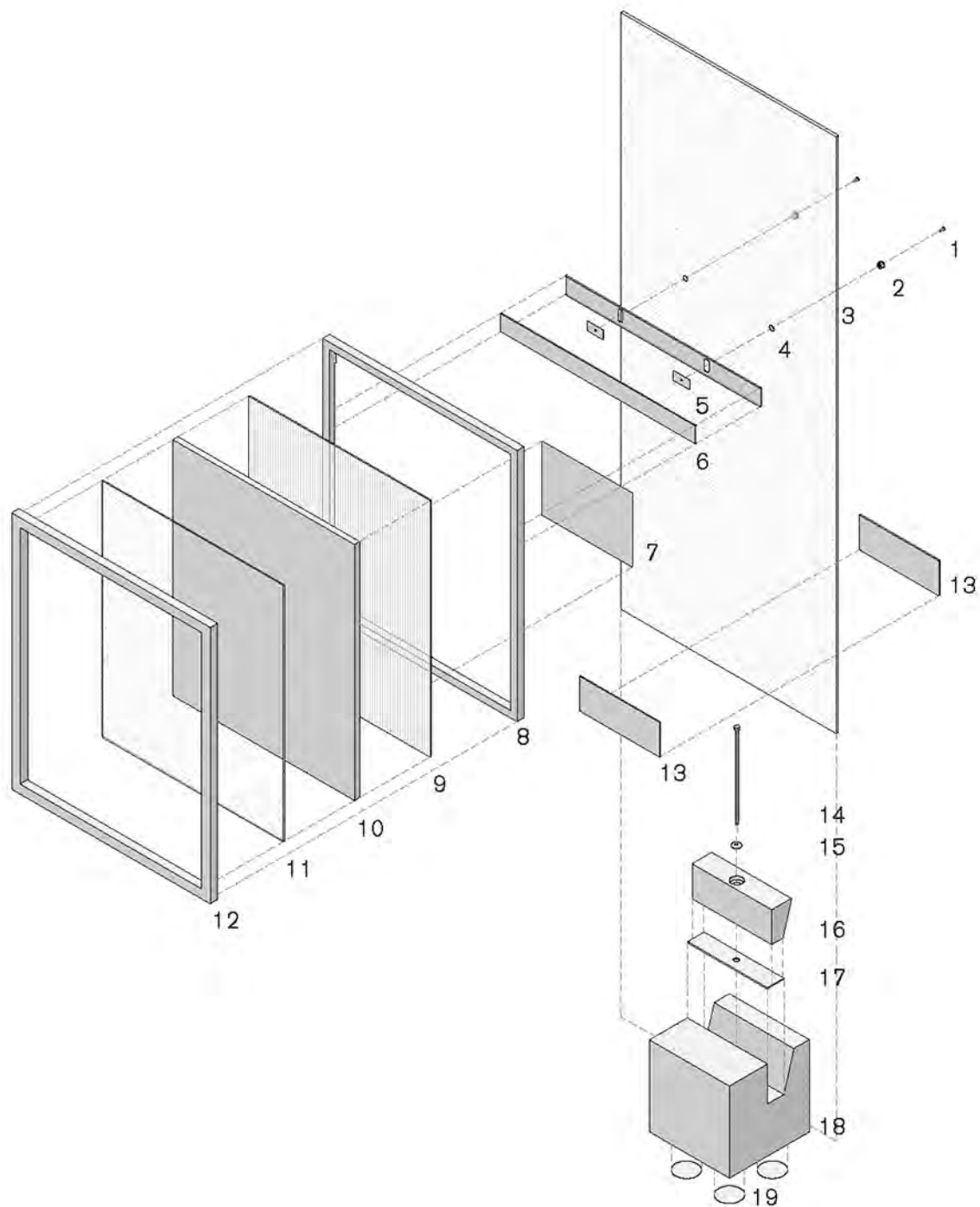


VIDRO/GLASS **C**

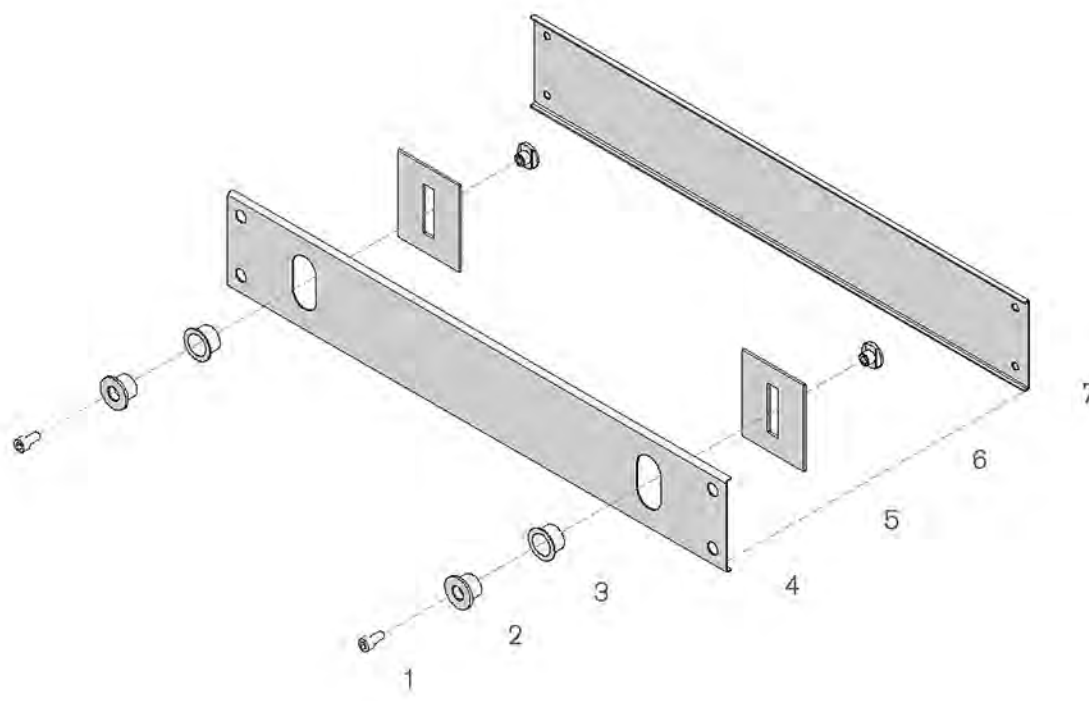


VIDRO/GLASS **D**

0 0,5 1 2,5m



1. parafuso allen M6  
allen stainless steel m6 bolt
2. bucha em aço inox com capa em nylon  
stainless steel and nylon sleeves
3. vidro temperado incolor espessura 10mm  
10mm thick tempered glass
4. furação padronizada  
holes in standard position
5. porca especial  
specially designed nuts
6. travessa em duplo "c" com furos oblongos  
stainless steel bars
7. legenda  
caption
8. contra moldura  
back frame
9. policarbonato para proteção  
polycarbonate protection
10. obra  
painting
11. vidro antirreflexo  
non-reflective glass
12. moldura  
original frame
13. folha de neoprene  
neoprene
14. parafuso em aço inox  
stainless steel bolt
15. arruela com furo oblongo  
oblong hole washer
16. cunha em madeira  
wooden wedge
17. folha de neoprene  
neoprene
18. base em concreto armado com insert em aço inox  
reinforced concrete block
19. discos de neoprene para nivelamento e absorção de vibração  
neoprene leveling and vibration absorbent disks



1. parafuso allen M6  
allen stainless steel m6 bolt
2. bucha em aço inox  
stainless steel sleeves
3. capa em nylon  
nylon sleeves
4. travessa: "c" com furos oblongos  
stainless steel bars
5. peça transmissão pressão  
special piece
6. porca especial  
specially designed nuts
7. travessa: "c" fechamento  
stainless steel bars



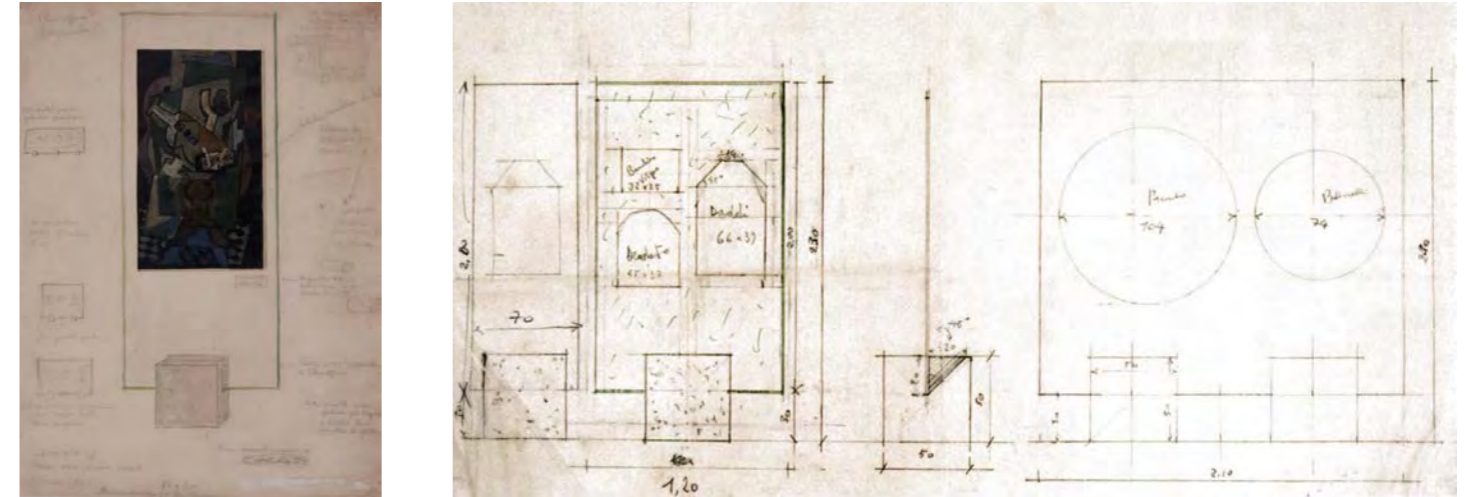
# CAVALETES DE CRISTAL

## HISTÓRICO

“Como responsável pelo projeto do Museu e pelo projeto do cavalete de cristal (porque é um cavalete e um quadro nasce no ar, num cavalete) com painel didático, para a exposição dos quadros, quero esclarecer que no projeto do Museu foi minha intenção destruir a aura que sempre circunda um museu, apresentar a obra de arte como trabalho, como profecia de um trabalho ao alcance de todos.”

(Lina Bo Bardi)

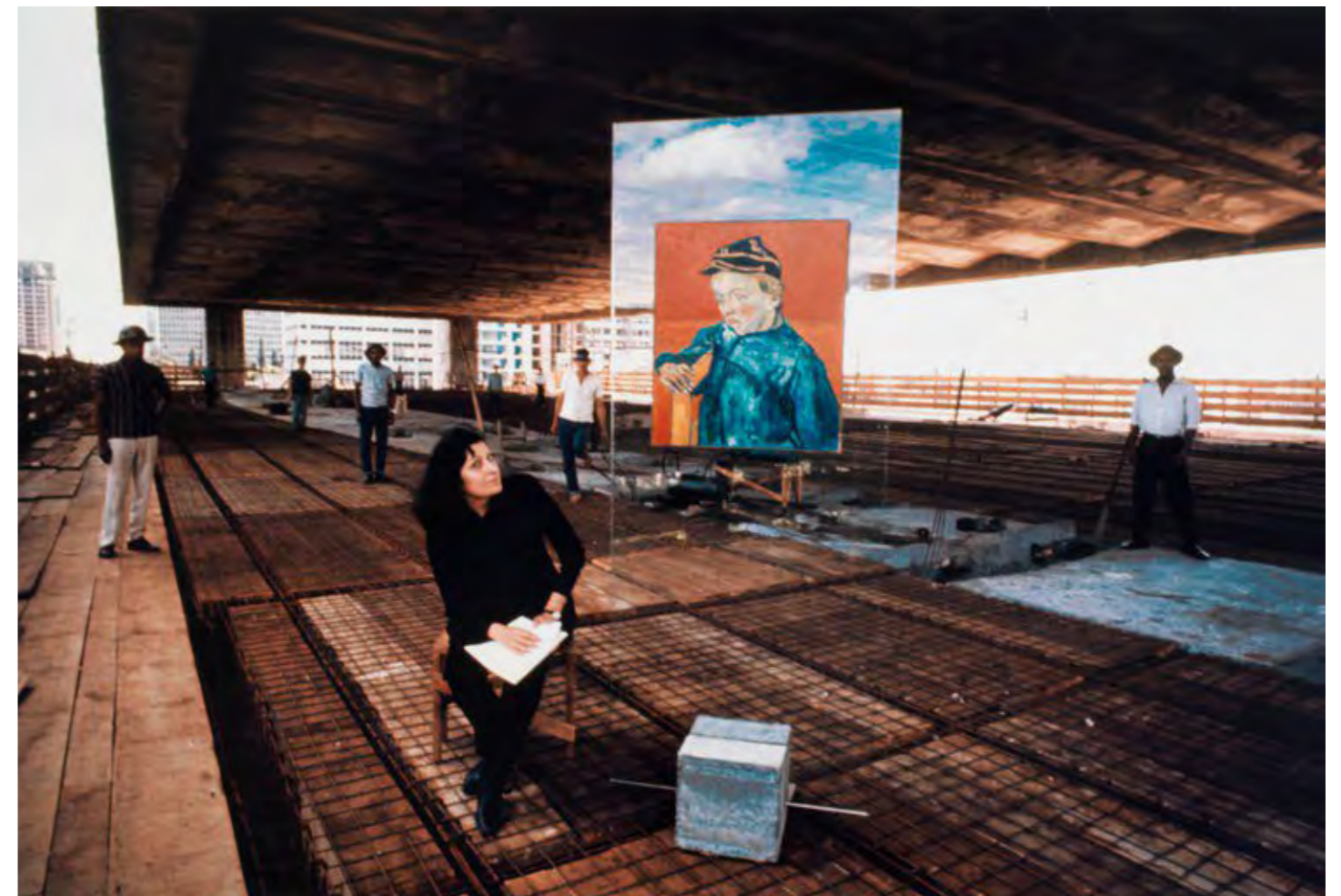
**Croquis** do cavalete de cristal



**Protótipo** feito na Galeria 7 de Abril



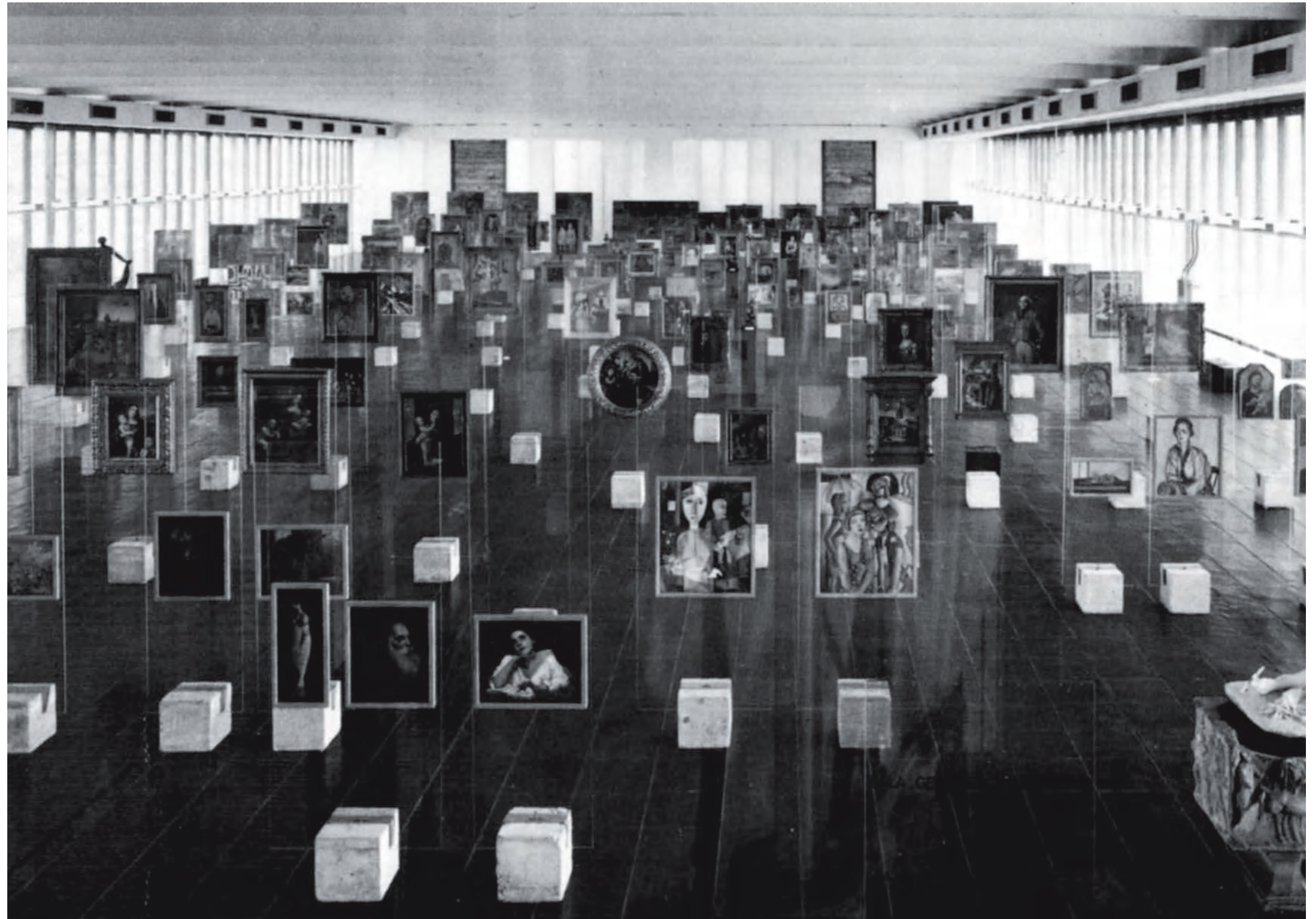
**Lina** durante as obras do MASP



# CAVALETES DE CRISTAL

## HISTÓRICO

Montagem realizada na Pinacoteca na década de 60

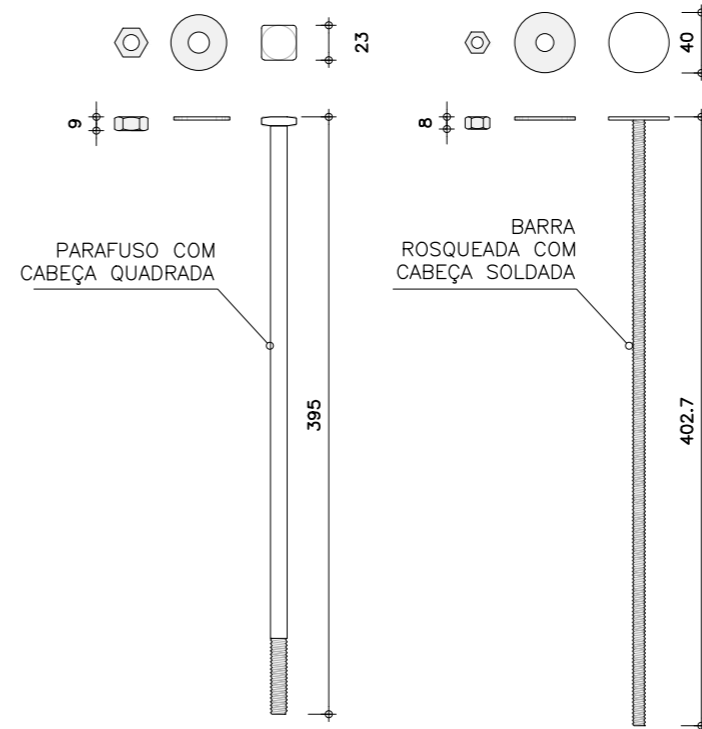


# CAVALETES DE CRISTAL

## LEVANTAMENTO

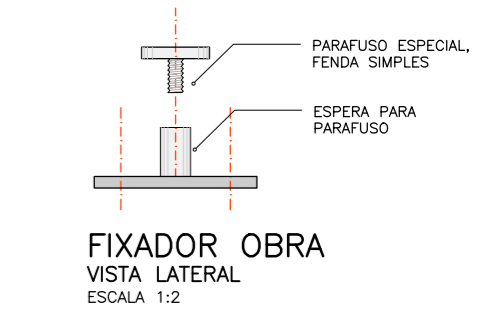
As bases levantadas apresentam pequenas diferenças dimensionais entre si. Isso porque, fora o precário estado de conservação da maioria das peças encontradas, foram utilizados mais de um tipo de concreto [com armação ou sem], madeira [mais ou menos mole] e ferragens na sua produção. Buscamos de registrar aqui a gama mais relevante de variações.

Além disso, a falta de precisão do sistema faz com que existam diversos tipos de calços, de diferentes materiais e dimensões. As borrachas que protegem os vidros têm cortes imprecisos e muitas vezes fora de esquadro. O parafuso que conecta a cunha de madeira à base de concreto muitas vezes entorta devido a uma falha de alinhamento entre os furos existentes nessas duas peças.

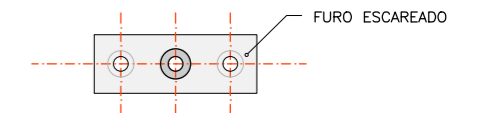


**FERRAGENS TIPO 01**  
VISTAS SUPERIOR E LATERAL  
ESCALA 1:5 - MEDIDAS EM MM

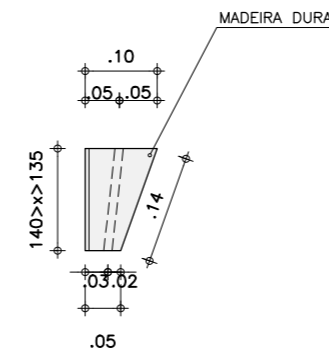
**FERRAGENS TIPO 02**  
VISTAS SUPERIOR E LATERAL  
ESCALA 1:5 - MEDIDAS EM MM



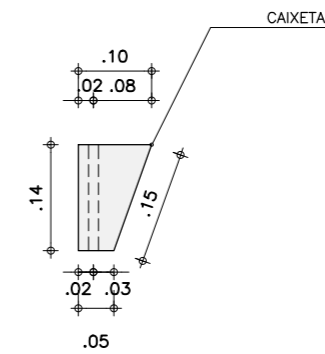
**FIXADOR OBRA**  
VISTA LATERAL  
ESCALA 1:2



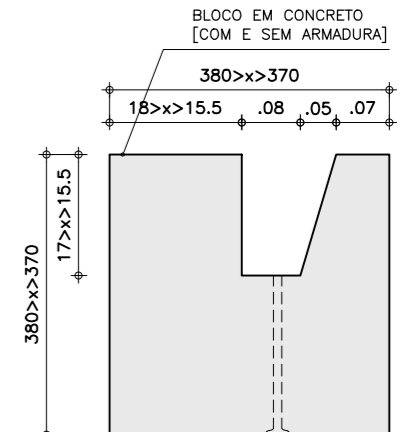
**FIXADOR OBRAS**  
VISTA SUPERIOR BASE  
ESCALA 1:2



**CUNHA 01 [ANTIGA]**  
VISTA LATERAL  
ESCALA 1:5 - MEDIDAS EM MM



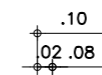
**CUNHA 02 [NOVA]**  
VISTA LATERAL  
ESCALA 1:5 - MEDIDAS EM MM



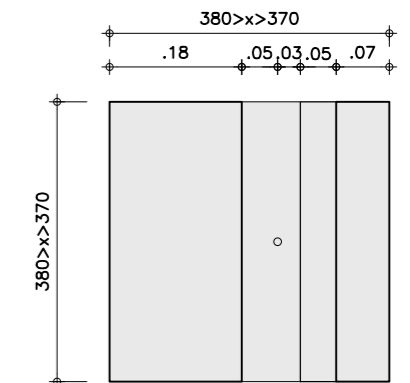
**CUBO CONCRETO**  
VISTA LATERAL  
ESCALA 1:5 - MEDIDAS EM MM



**CUNHA 01 [ANTIGA]**  
VISTA LATERAL  
ESCALA 1:5 - MEDIDAS EM MM



**CUNHA 02 [NOVA]**  
VISTA LATERAL  
ESCALA 1:5 - MEDIDAS EM MM



**CUBO CONCRETO**  
PLANTA BAIXA  
ESCALA 1:5 - MEDIDAS EM MM

# CAVALETES DE CRISTAL

## LEVANTAMENTO

Estado de conservação dos cavaletes existentes



Diferenças entre bases



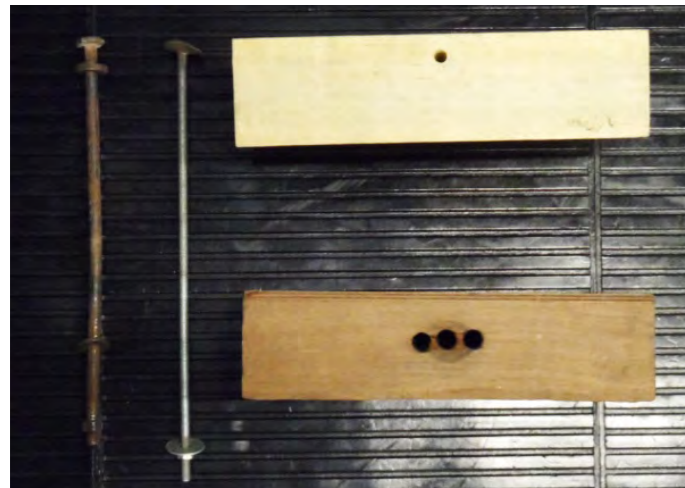
Diferenças entre bases



Cunhas, calços e borrachas de diversos tipos



Diferenças entre peças

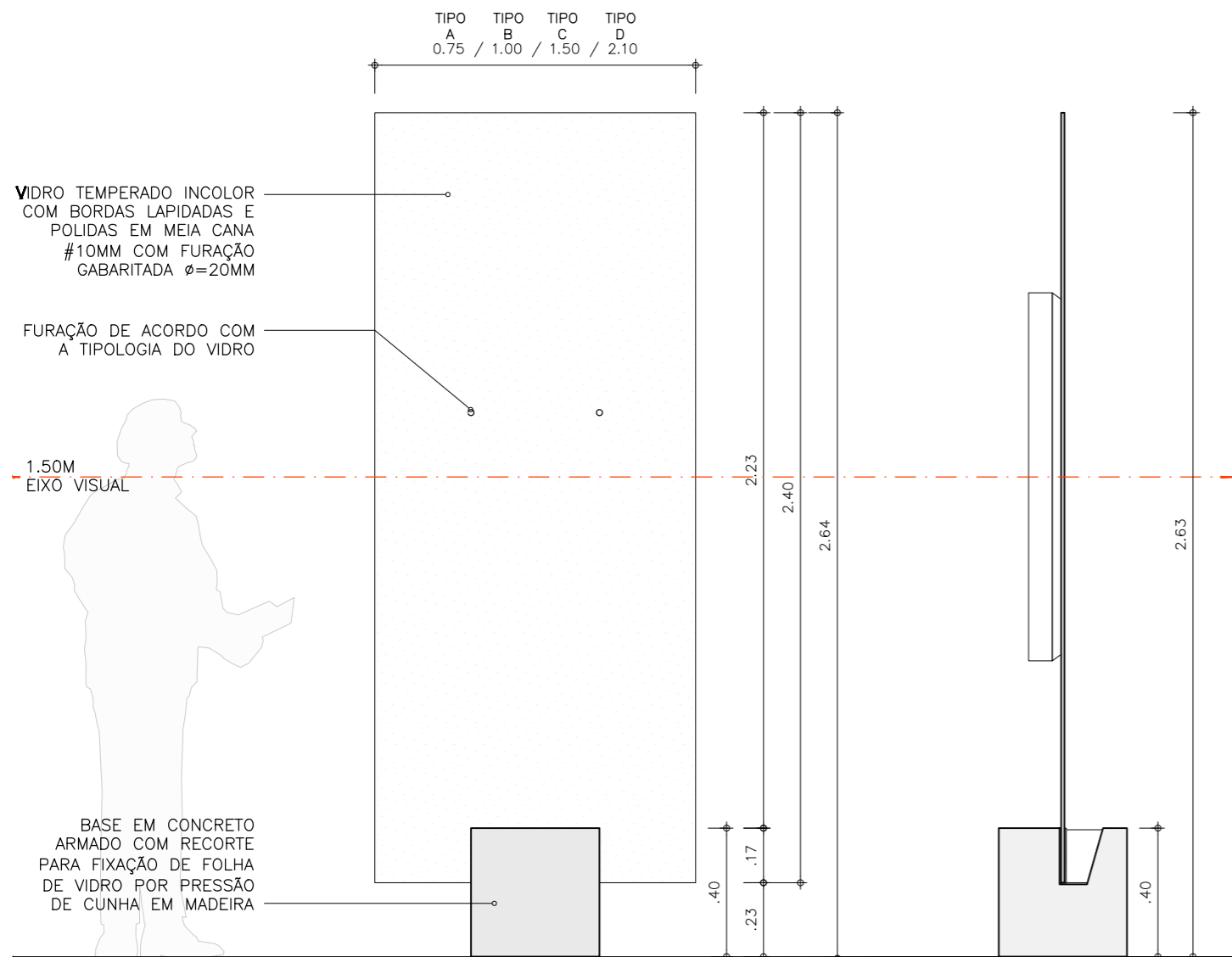


Diferenças entre peças



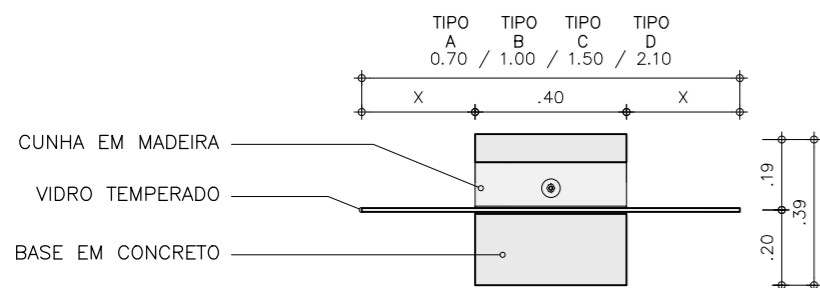
# CAVALETES DE CRISTAL

## PEÇAS

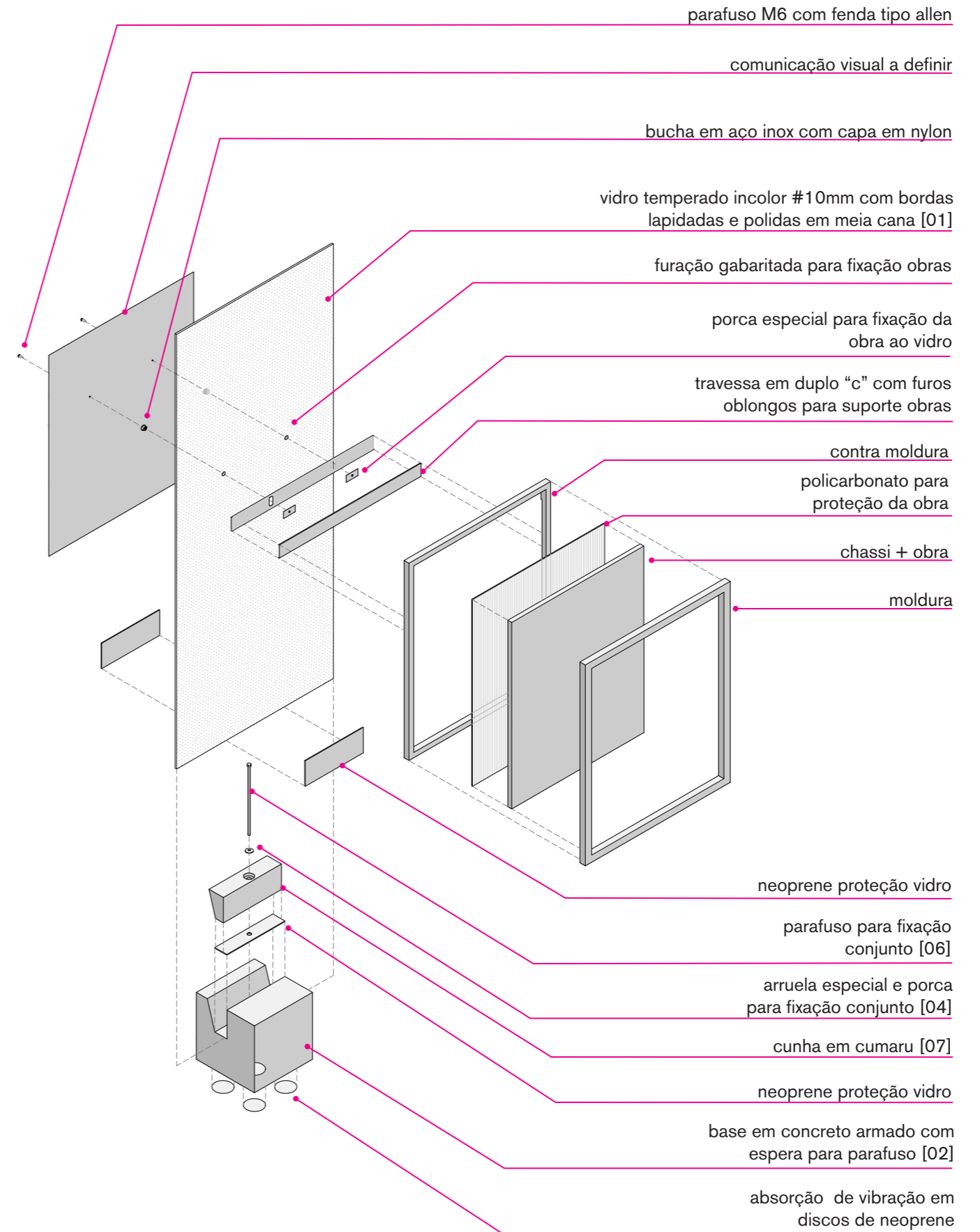


CAVALETE  
VISTA FRONTAL COM VIDRO  
ESCALA 1:20

CAVALETE  
VISTA LATERAL  
ESCALA 1:20



PLANTA  
ESCALA 1:20

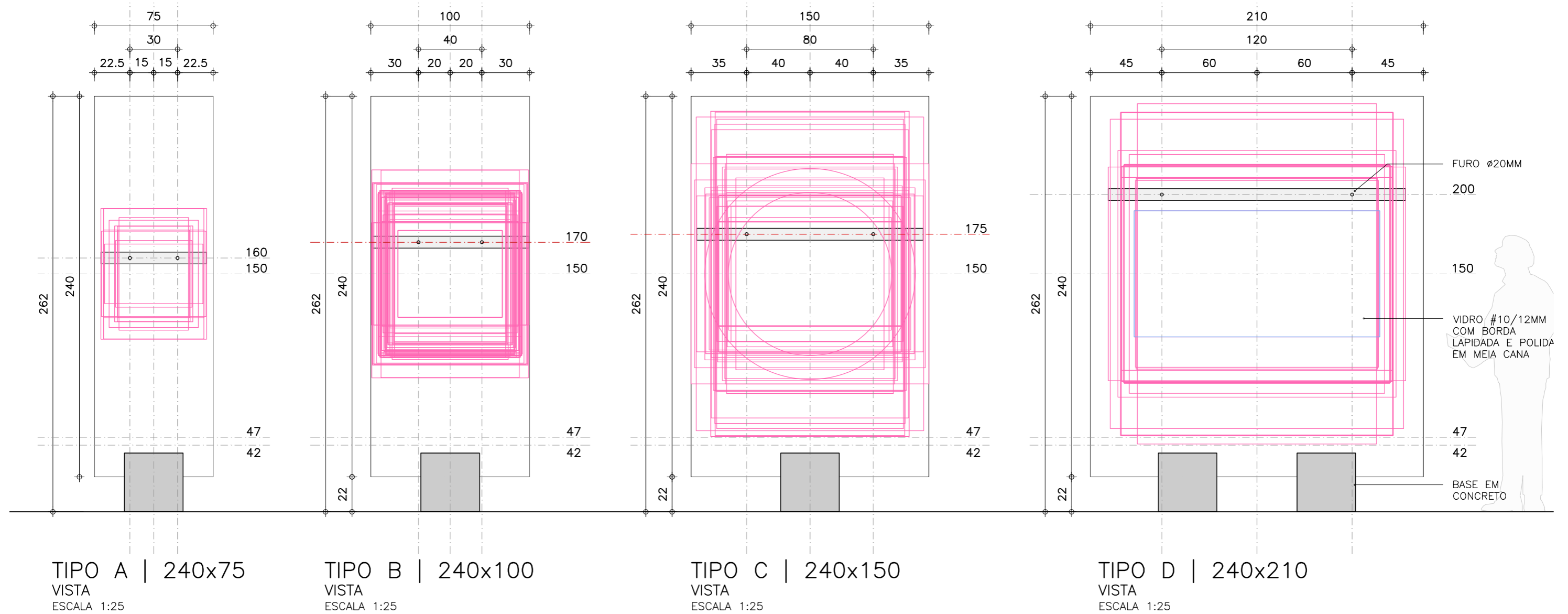


# CAVALETES DE CRISTAL

## TIPOS

O desenho abaixo representa a sobreposição das obras pré-selecionadas para serem expostas nos cavaletes, mantendo seu eixo a 1.50m de altura.

As obras foram divididas de acordo com a relação entre a sua dimensão e a do vidro. O desenho ao lado serviu de base para definirmos a posição das furações das folhas de vidro.



# CAVALETES DE CRISTAL

## 1.VIDROS

Teremos 04 tipos de vidros, a fim de garantir maior flexibilidade para exposição de obras.

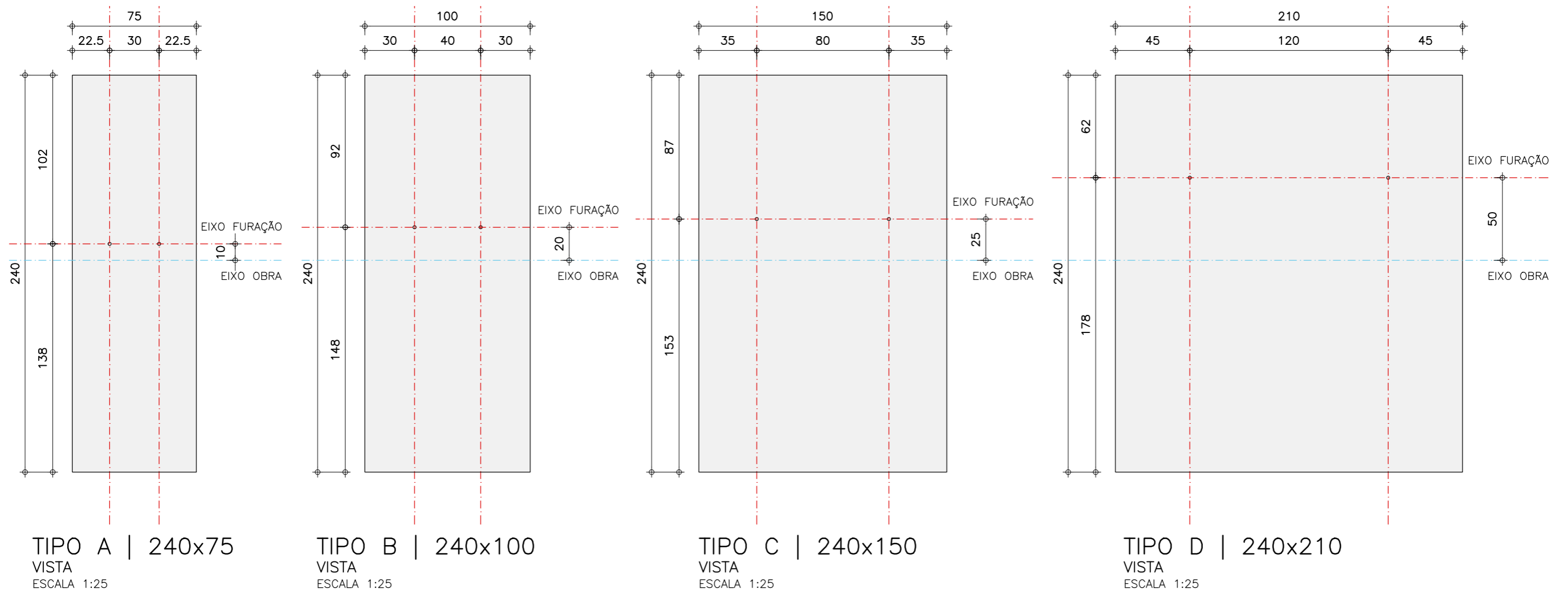
**TIPO A** | 240x75cm | 20 unidades

**TIPO B** | 240x100cm | 90 unidades

**TIPO C** | 240x150cm | 60 unidades

**TIPO D** | 240x210cm | 25 unidades

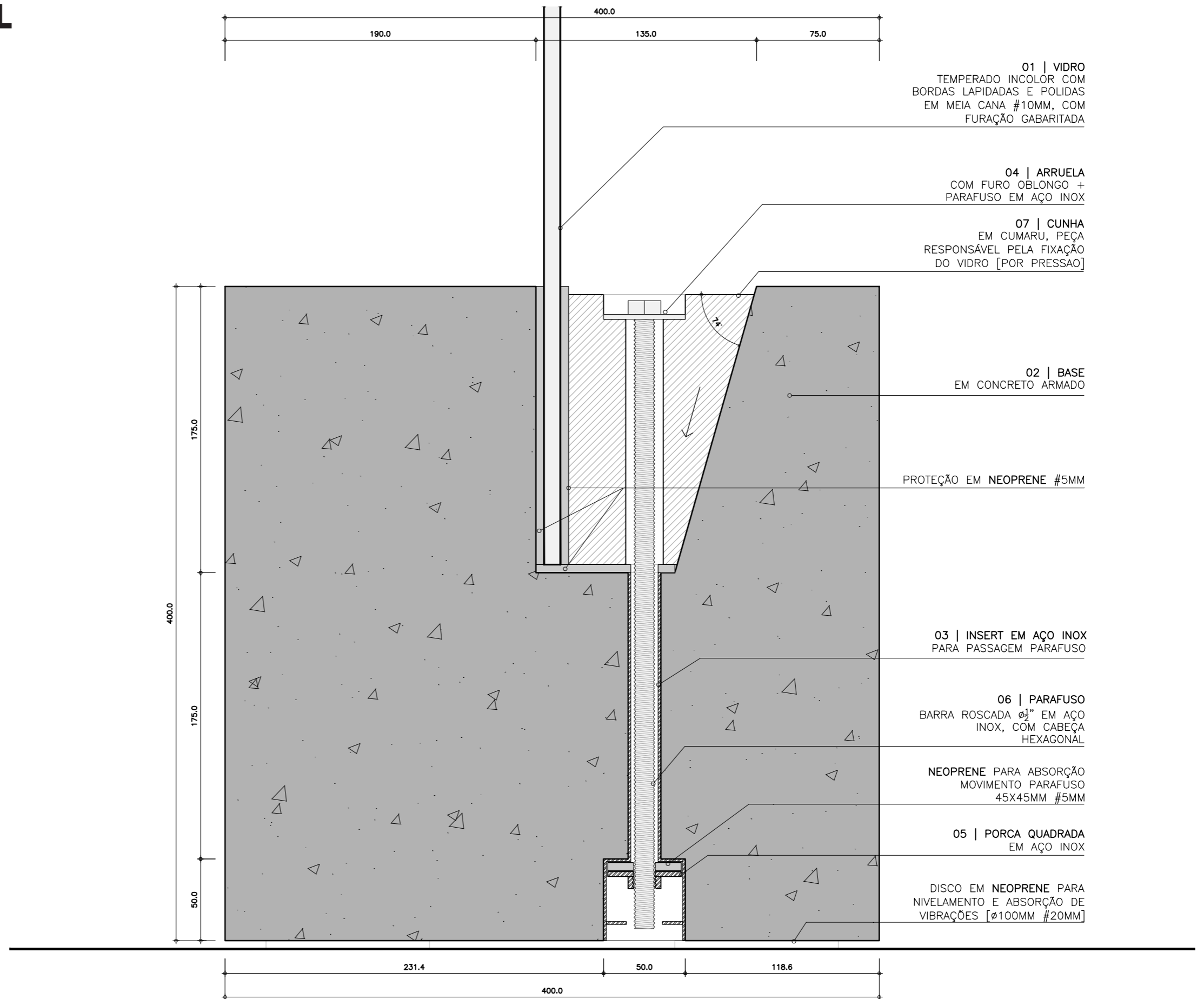
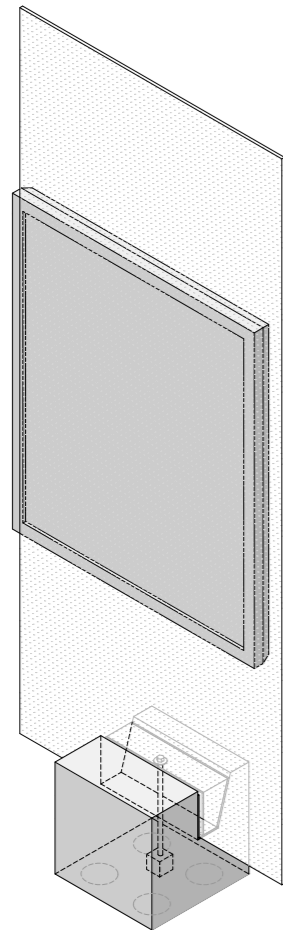
Todas as peças deverão ser produzidas em vidro temperado incolor, espessura 10mm, com bordas lapidadas e polidas em meia cana, com furação gabaritada [d=20mm].



# CAVALETES DE CRISTAL

## 2. BASE CONCRETO

Base com insert em aço inox para fixação da cunha em madeira por meio de parafuso com cabeça sextavada e porca quadrada.



2 | BASE  
CORTE TRANSVERSAL AMPLIADO  
ESCALA 1:2.5 - MEDIDAS EM MM



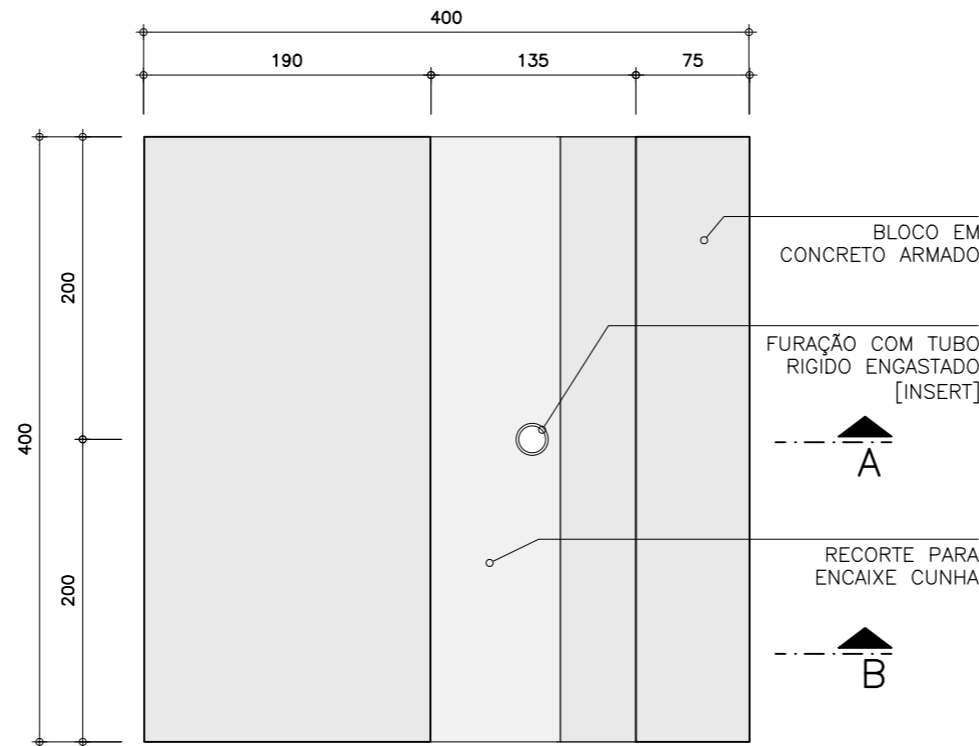
# CAVALETES DE CRISTAL

## 2. BASE CONCRETO

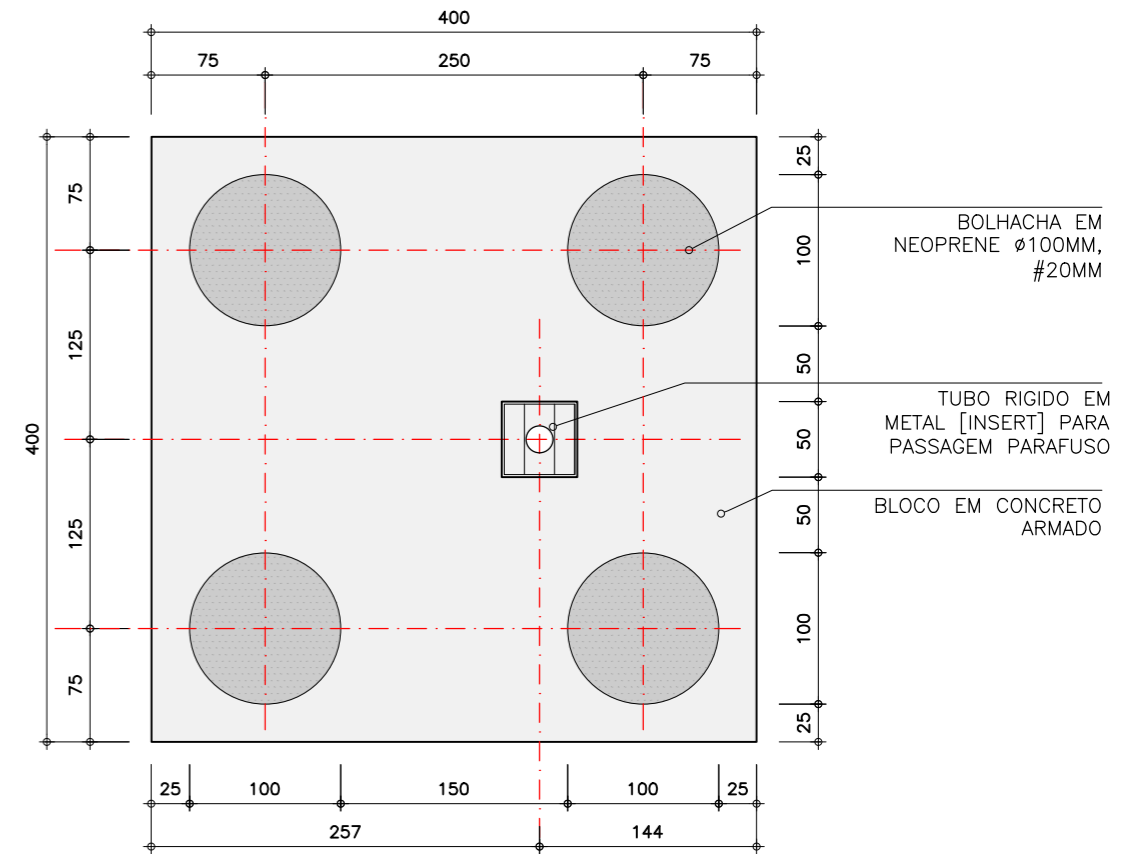
As bases dos cavaletes serão construídas em concreto armado, com dimensão total de 40x40cm, e recorte para encaixe de cunha em madeira e folha de vidro. Cada base pesará aproximadamente 140kg.

O traço do concreto para a base deverá ter a seguinte proporção: 1:2:3:0.4 [concreto : areia : brita : água].

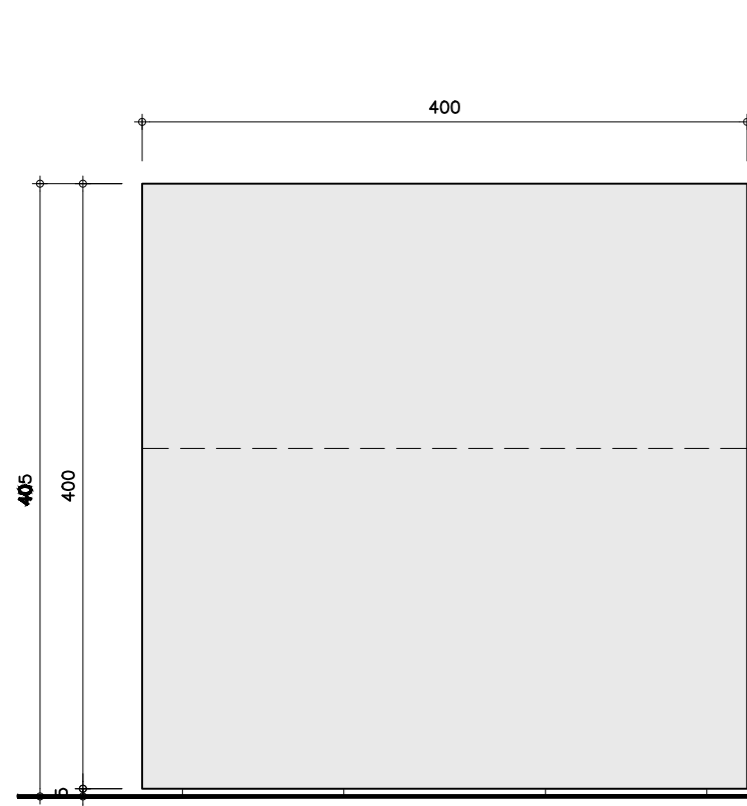
É importante, para o bom funcionamento do conjunto, que o desenho ao lado tenha as medidas seguidas, e mantenha os ângulos vivos, para que o encaixe dos outros elementos do sistema possa acontecer sem problemas.



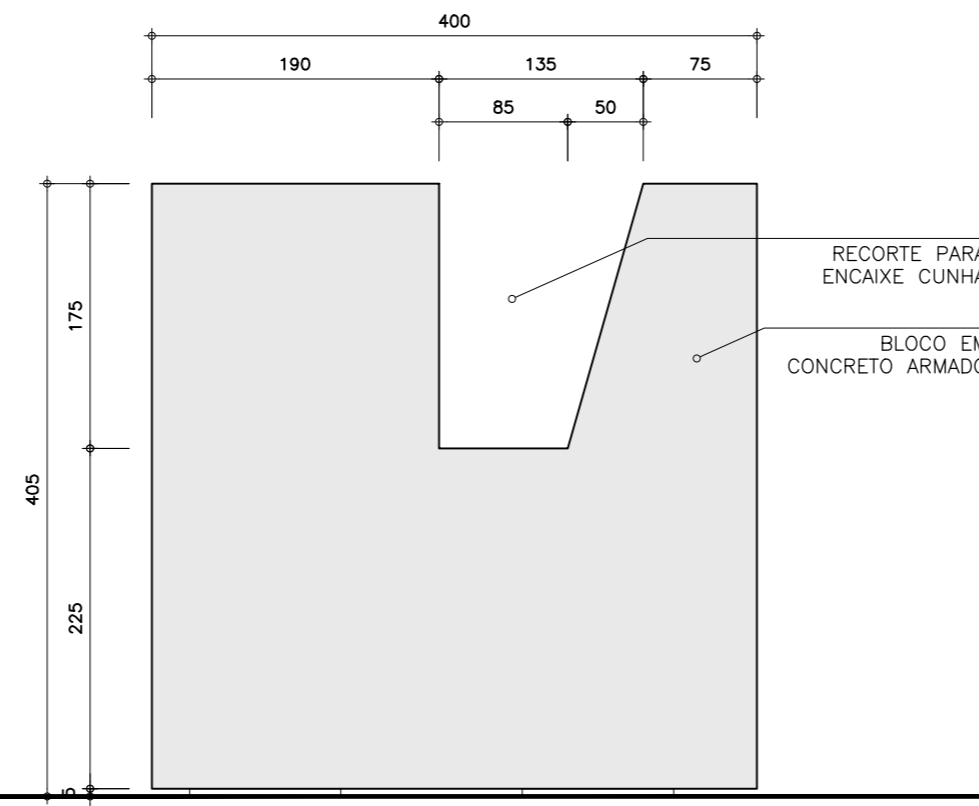
2 | BASE  
PLANTA BAIXA  
ESCALA 1:5 - MEDIDAS EM MM



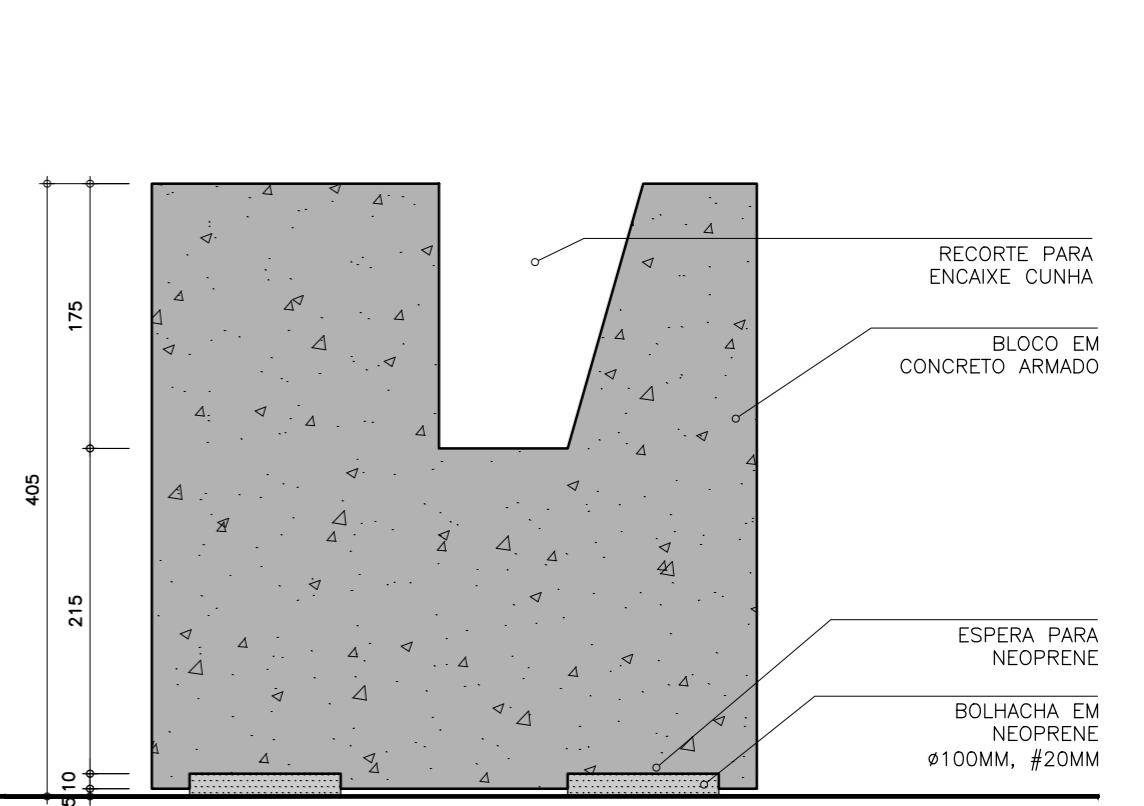
VISTA INFERIOR  
ESCALA 1:5 - MEDIDAS EM MM



VISTA FRONTAL  
ESCALA 1:5 - MEDIDAS EM MM



VISTA LATERAL  
ESCALA 1:5 - MEDIDAS EM MM



CORTE B  
ESCALA 1:5 - MEDIDAS EM MM

# CAVALETES DE CRISTAL

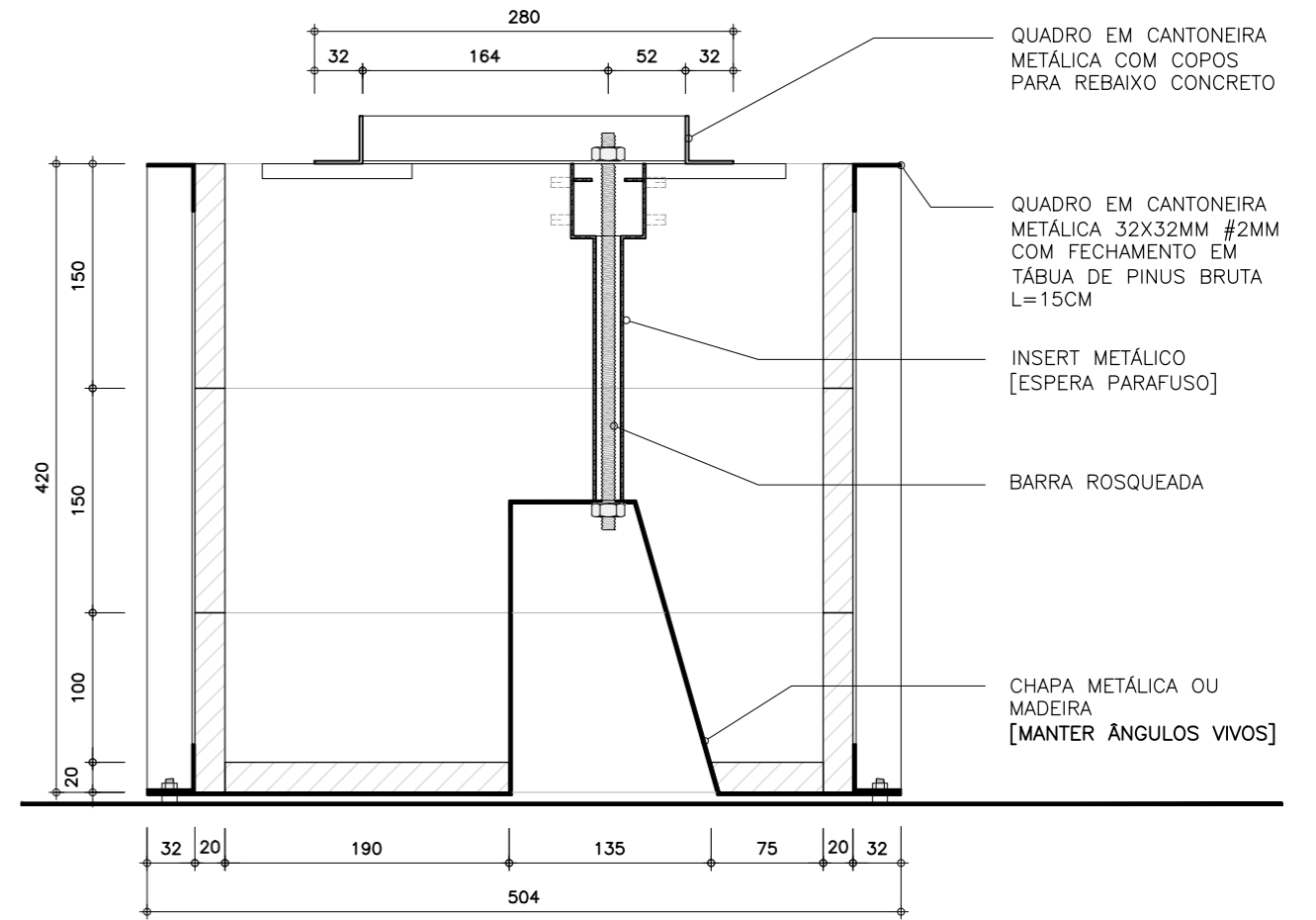
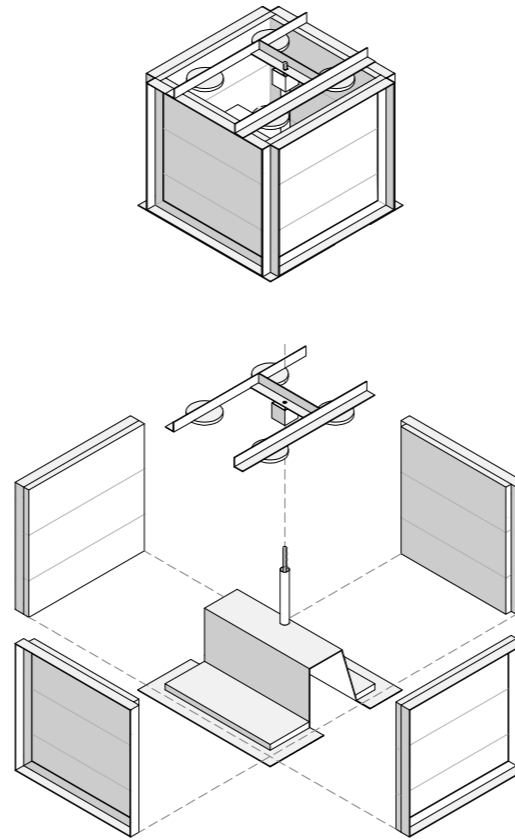
## 2. BASE CONCRETO

### 2.1 ARMAÇÃO

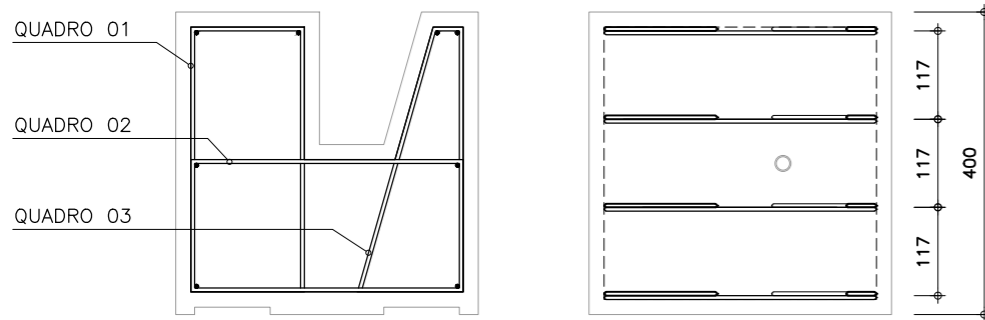
Os estribos serão produzidos em bitolas de 5,0 mm em aço CA 60 nervurado, sendo que a geometria do cubo será dividida em três quadros, que deverão ser unidos entre si através da utilização de arame recozido. Os estribos terão afastamento de aproximadamente 12cm, e cobertura de 2cm.

### 2.2 FORMA

A forma deverá ser construída utilizando quadros de cantoneiras fixos entre si, fechados com tábuas de pinus bruto de 15cm de largura [20cm na face superior]. A forma deverá ser reaproveitada, e "copos" para rebaixo concreto deverão receber camada de desformante antes da concretagem.

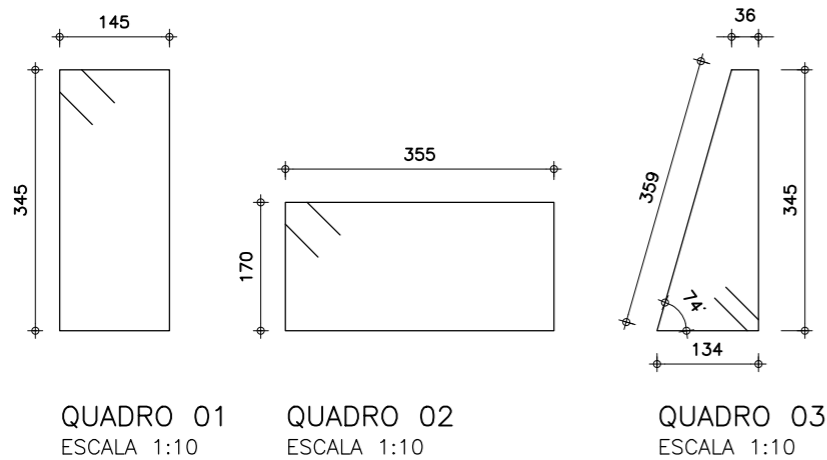


FORMA  
CORTE A  
ESCALA 1:5



ESTRIBOS  
CORTE A  
ESCALA 1:10

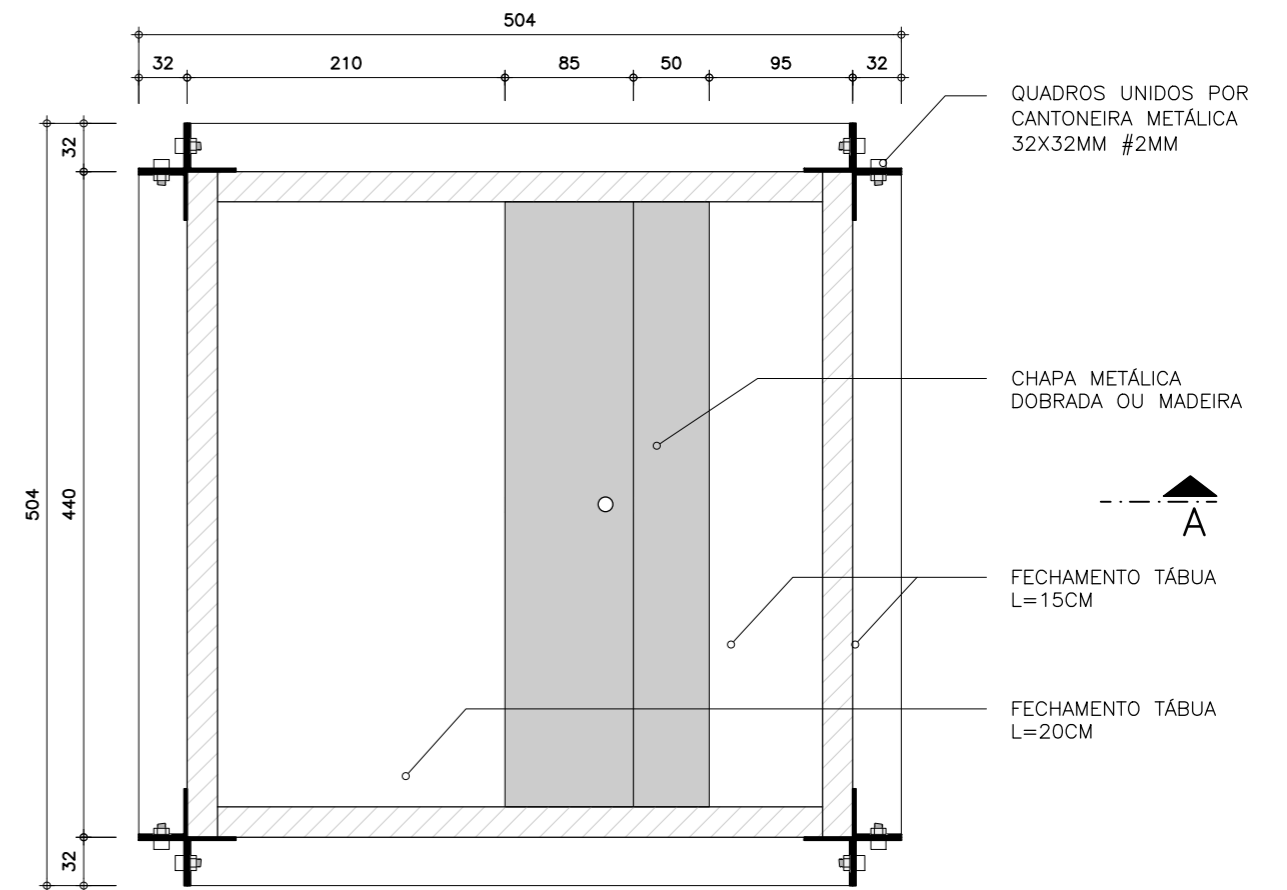
PLANTA  
ESCALA 1:10



QUADRO 01  
ESCALA 1:10

QUADRO 02  
ESCALA 1:10

QUADRO 03  
ESCALA 1:10

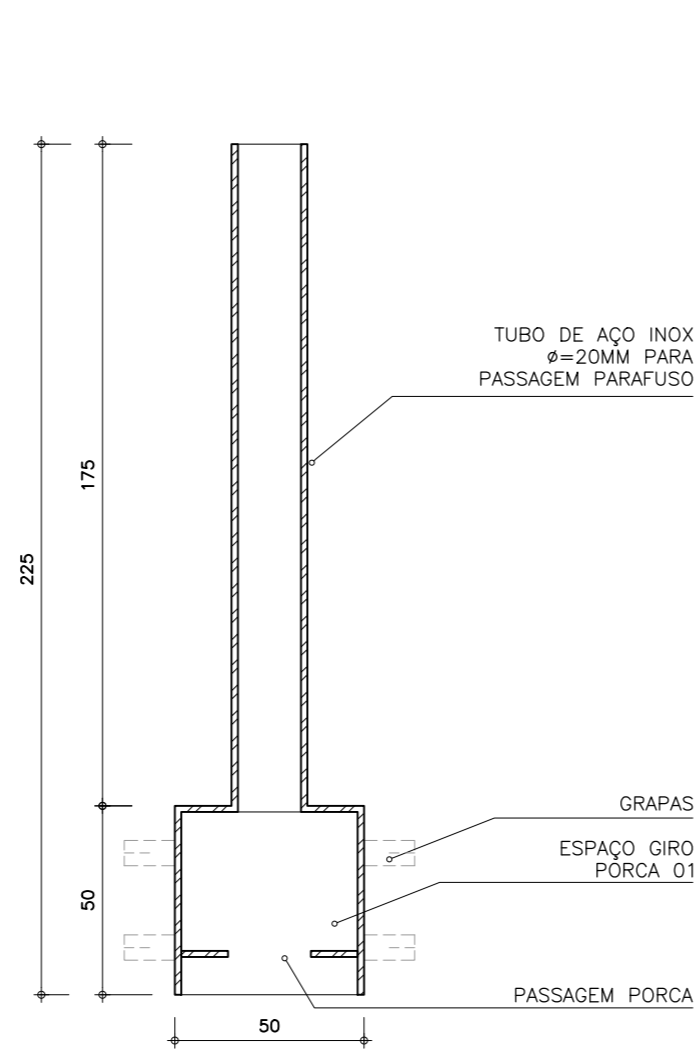


PLANTA  
ESCALA 1:5

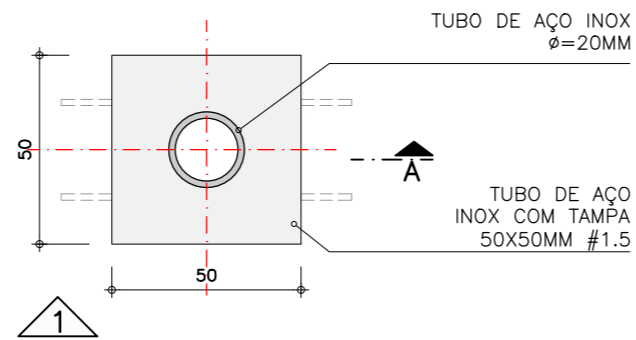
# CAVALETES DE CRISTAL

## PEÇAS METÁLICAS BASE

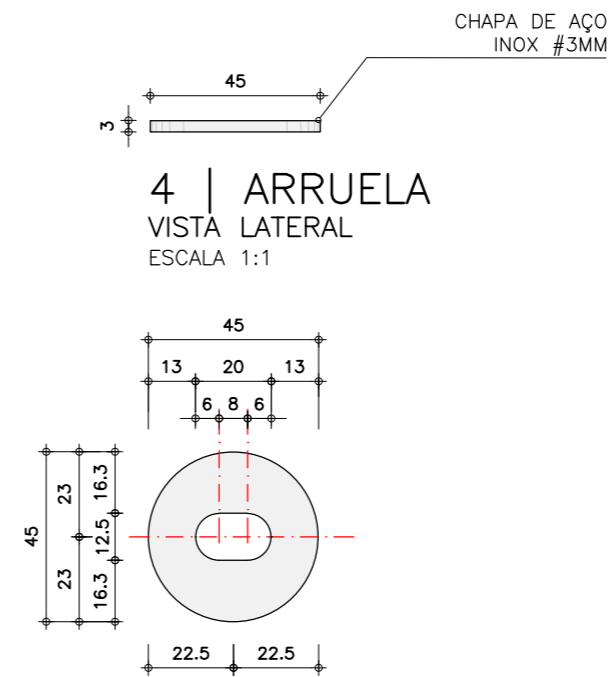
O parafuso é responsável por fixar a cunha à base de concreto. O conjunto será montado com a cabeça [sextavada] do parafuso para cima. Uma porca quadrada ficará no insert existente na base. Esse conjunto será montado com auxílio da arruela com furo oblongo, detalhada ao lado.



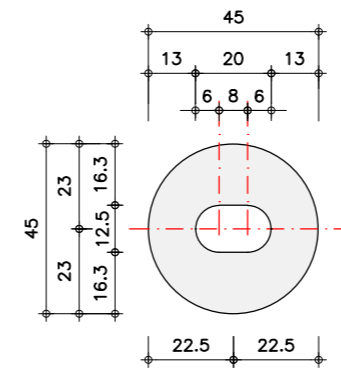
3 | INSERT  
CORTE A  
ESCALA 1:2



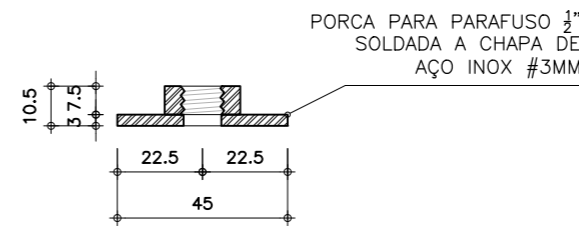
3 | INSERT  
VISTA 01  
ESCALA 1:2



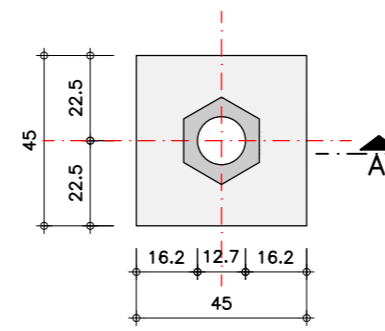
4 | ARRUELA  
VISTA LATERAL  
ESCALA 1:1



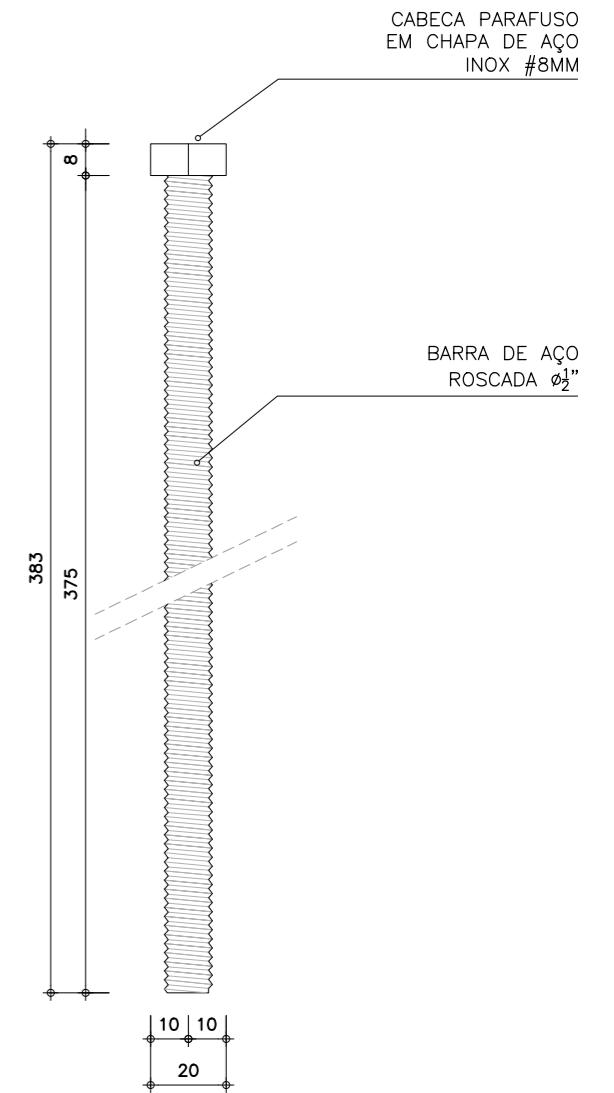
4 | ARRUELA  
VISTA SUPERIOR  
ESCALA 1:2



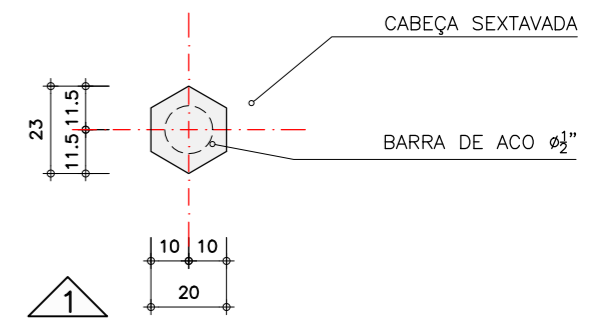
5 | PORCA QUADRADA  
CORTE A  
ESCALA 1:2



5 | PORCA QUADRADA  
VISTA SUPERIOR  
ESCALA 1:2



6 | PARAFUSO  
VISTA 01  
ESCALA 1:2

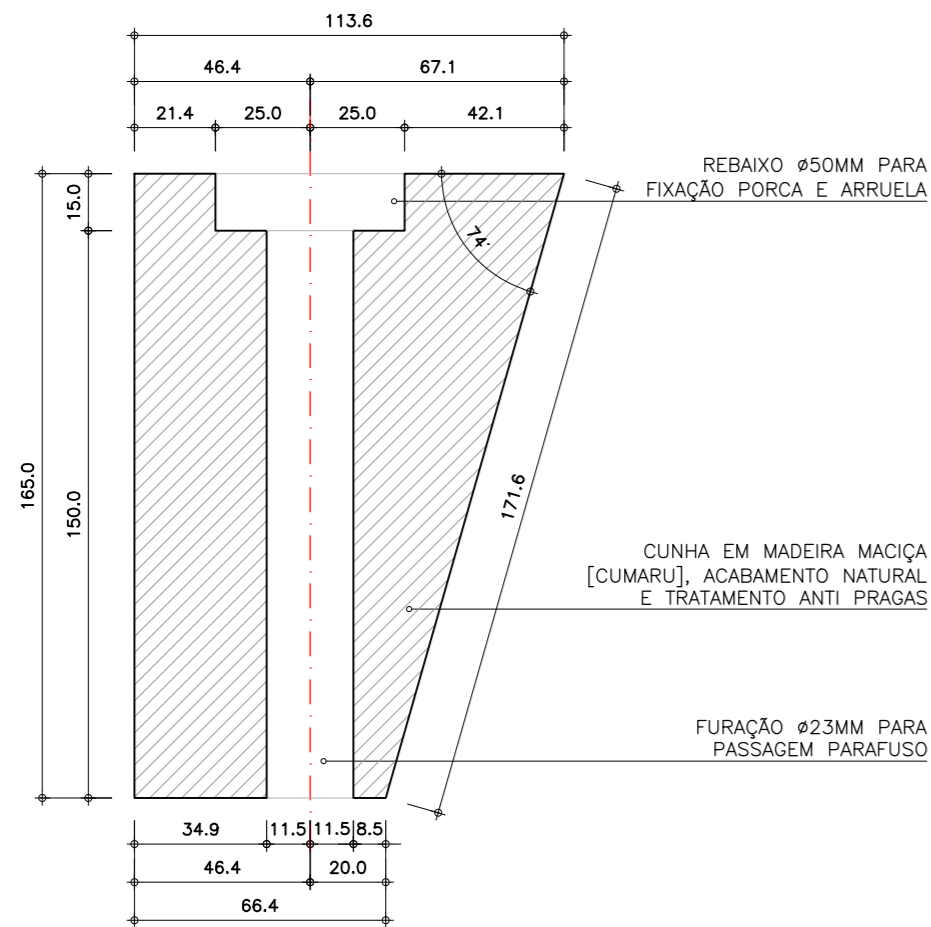


6 | PARAFUSO  
VISTA SUPERIOR  
ESCALA 1:2

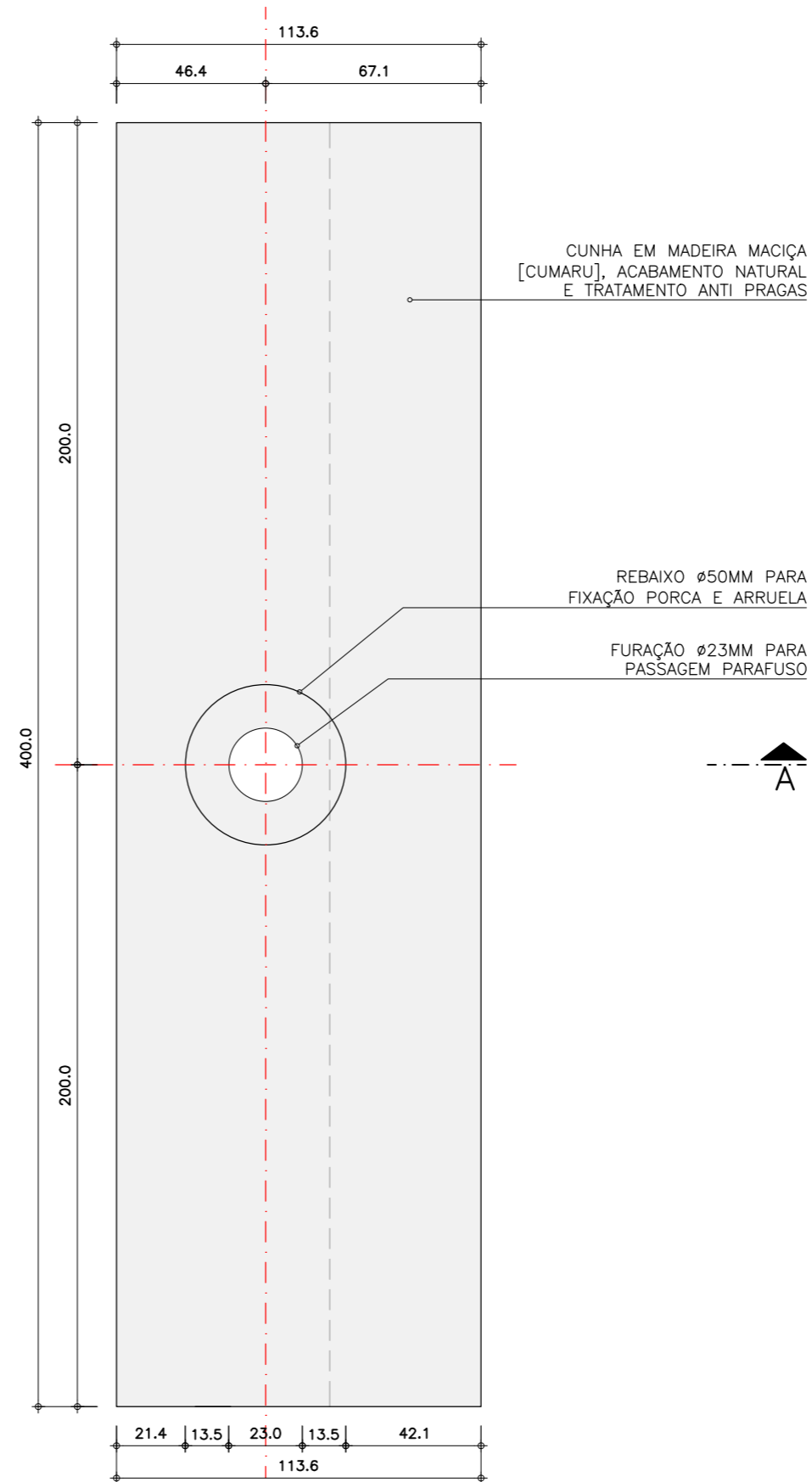
# CAVALETES DE CRISTAL

## 7. CUNHA

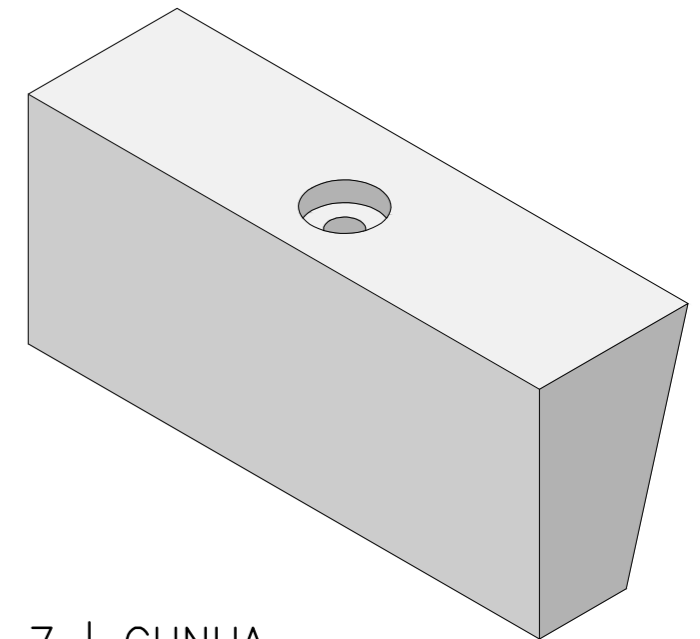
A cunha é responsável pela fixação do vidro na base de concreto. Ela é fixada à base por meio de parafuso especial, que aplica a pressão necessária à estabilização do conjunto. A cunha deverá ser construída em cumaru, madeira dura e resistente. Pode ser necessário ajustar minimamente as medidas das peças no momento da montagem do conjunto.



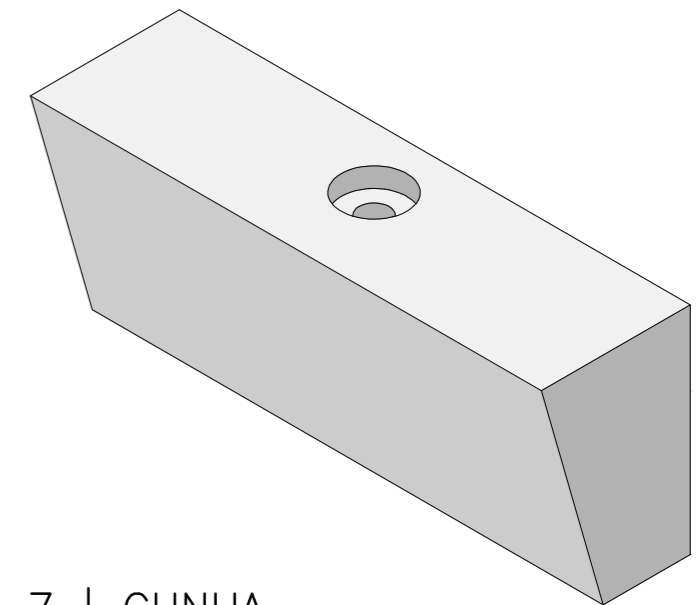
7 | CUNHA  
CORTE A  
ESCALA 1:2



7 | CUNHA  
VISTA SUPERIOR  
ESCALA 1:2



7 | CUNHA  
PERSPECTIVA 01  
ESCALA 1:5

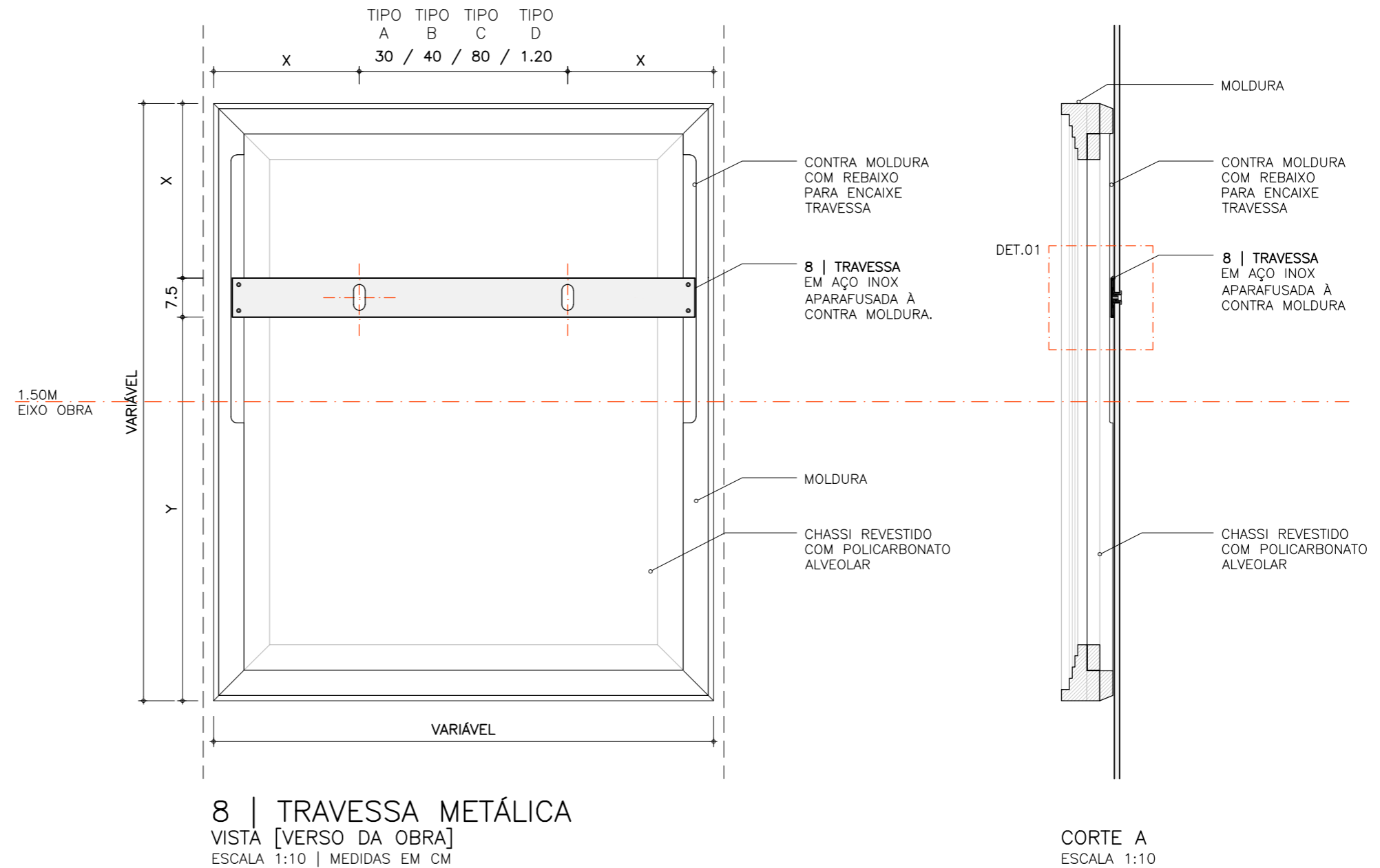


7 | CUNHA  
PERSPECTIVA 02  
ESCALA 1:5

# CAVALETES DE CRISTAL

## PEÇAS METÁLICAS PARA FIXAÇÃO OBRA

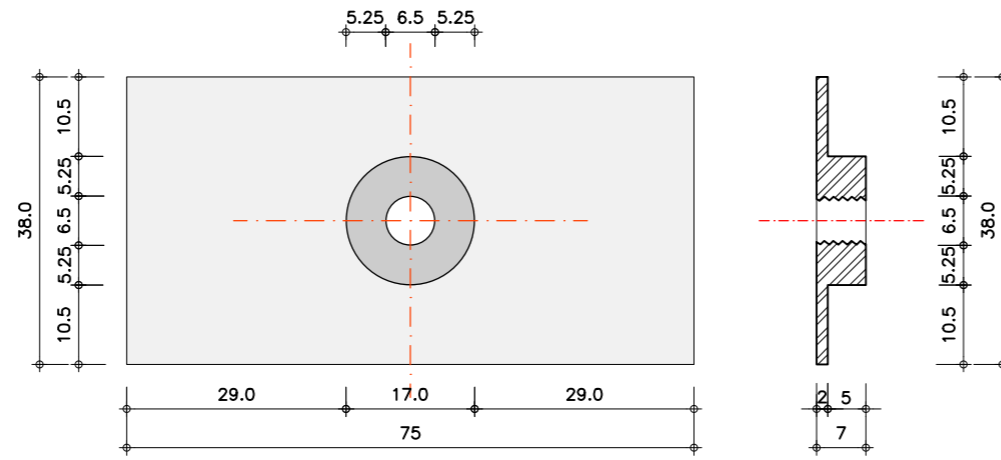
A obra será fixada ao vidro por meio de um sistema composto por travessa em aço inox e um conjunto de porcas e parafusos.



# CAVALETES DE CRISTAL

## PEÇAS METÁLICAS

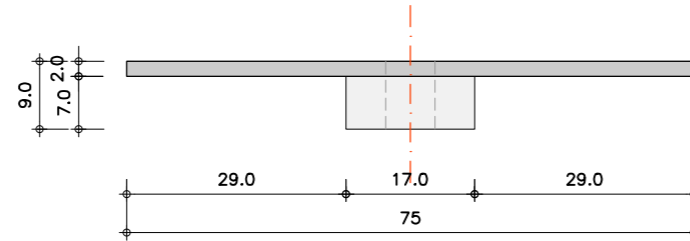
As travessas [08] serão fixadas ao vidro com o auxílio de outras peças: uma bucha [10] em aço inox e uma porca especial [09] garantirão a fixação da travessa, enquanto uma capa em nylon [11] garantirá a proteção do vidro [01].



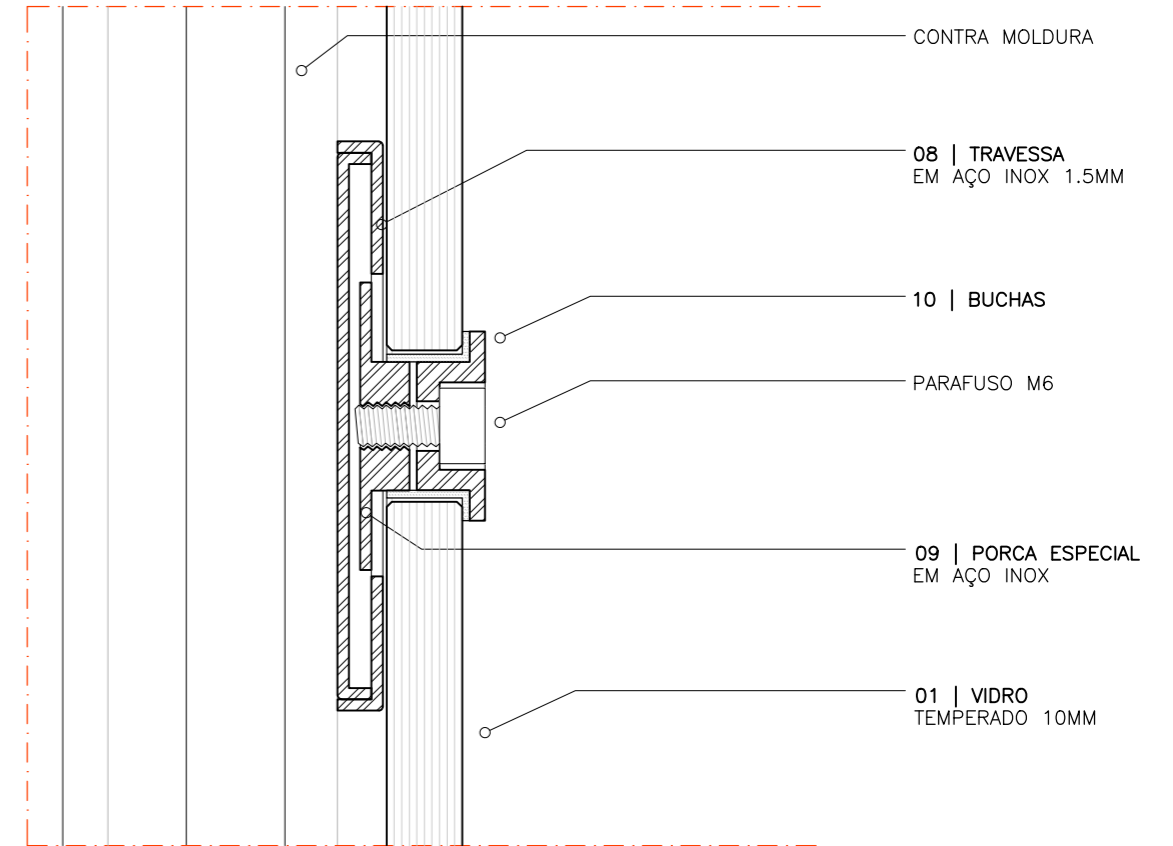
### 9 | PORCA ESPECIAL

VISTA  
ESCALA 1:1

VISTA  
ESCALA 1:1

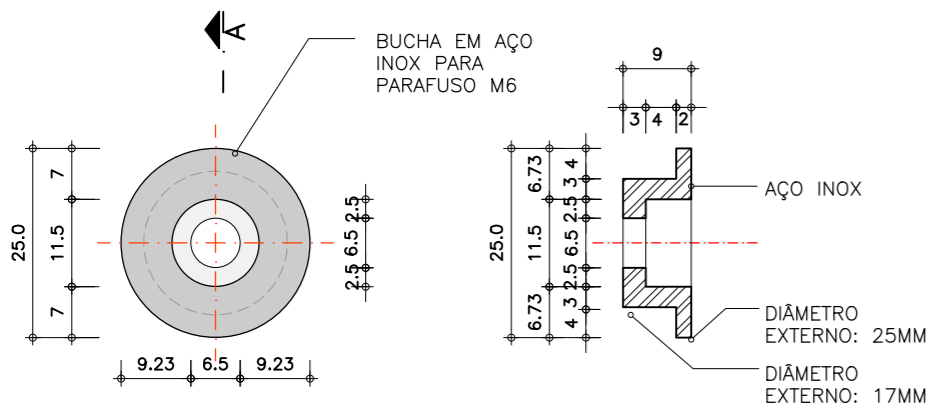


PLANTA  
ESCALA 1:1



### DET.01

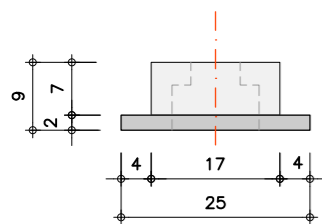
CORTE  
ESCALA 1:1



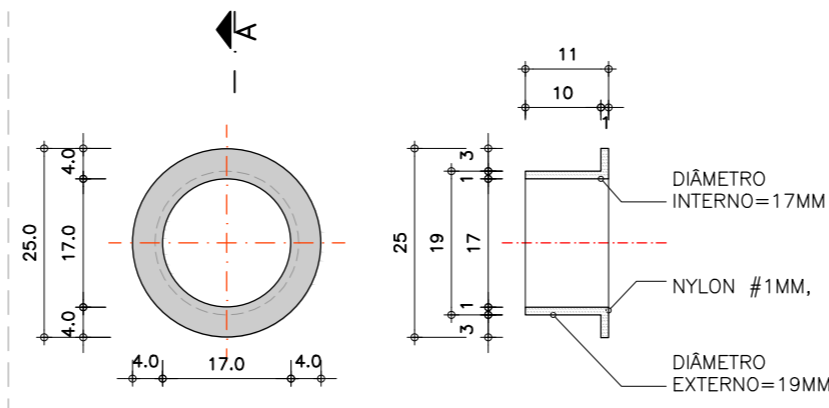
### 10 | BUCHA

VISTA  
ESCALA 1:1

CORTE A  
ESCALA 1:1



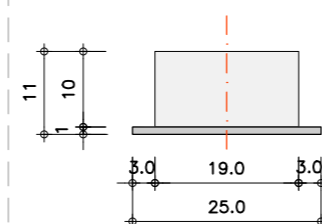
PLANTA  
ESCALA 1:1



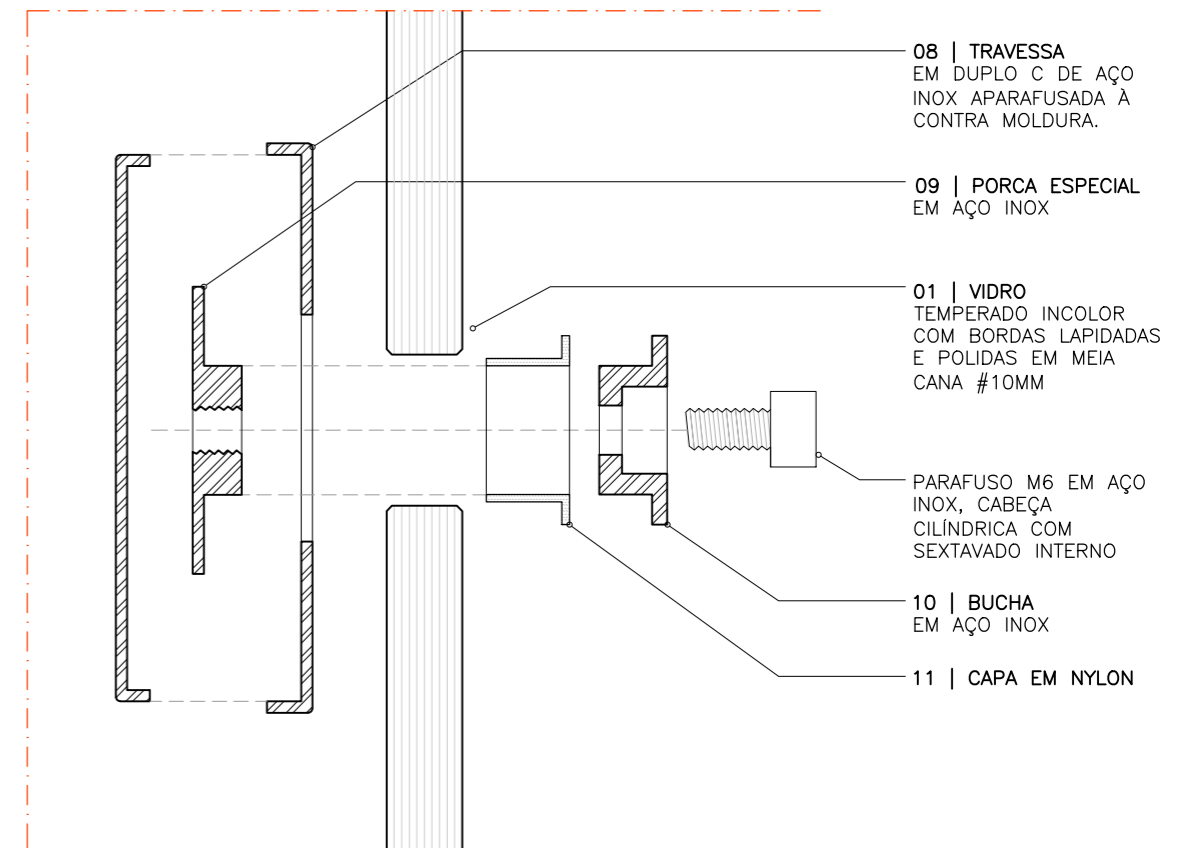
### 11 | CAPA NYLON

VISTA  
ESCALA 1:1

CORTE A  
ESCALA 1:1



PLANTA  
ESCALA 1:1



### DET.01 | ESQUEMA MONTAGEM

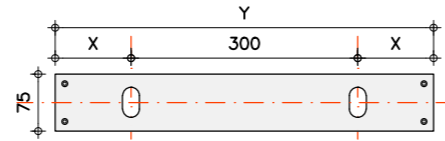
CORTE  
ESCALA 1:1

# CAVALETES DE CRISTAL

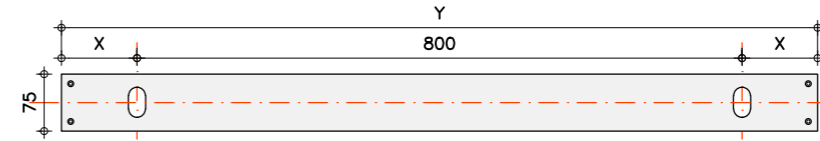
## 8. TRAVESSA METÁLICA

As travessas consistirão em tubo formado por dois perfis C em aço inox, e terão, no total, 6mm de espessura. Com furação oblonga modulada, a travessa permitirá a fixação da obra ao vidro com o mínimo afastamento, além de garantir um pequeno ajuste da posição das obras.

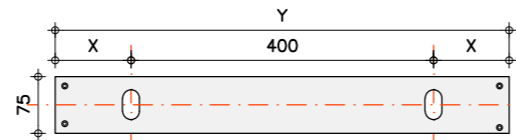
Existirão 04 tipos de travessa, cada uma correspondente a um tipo de vidro. O que determina o tipo de travessa é o afastamento entre furos oblongos. Cada obra deverá receber travessa com comprimento específico, que deverá ser fixada à sua contra-moldura.



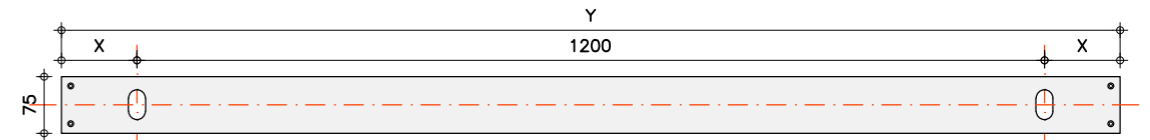
TRAVESSA METÁLICA TIPO A  
VISTA  
ESCALA 1:10



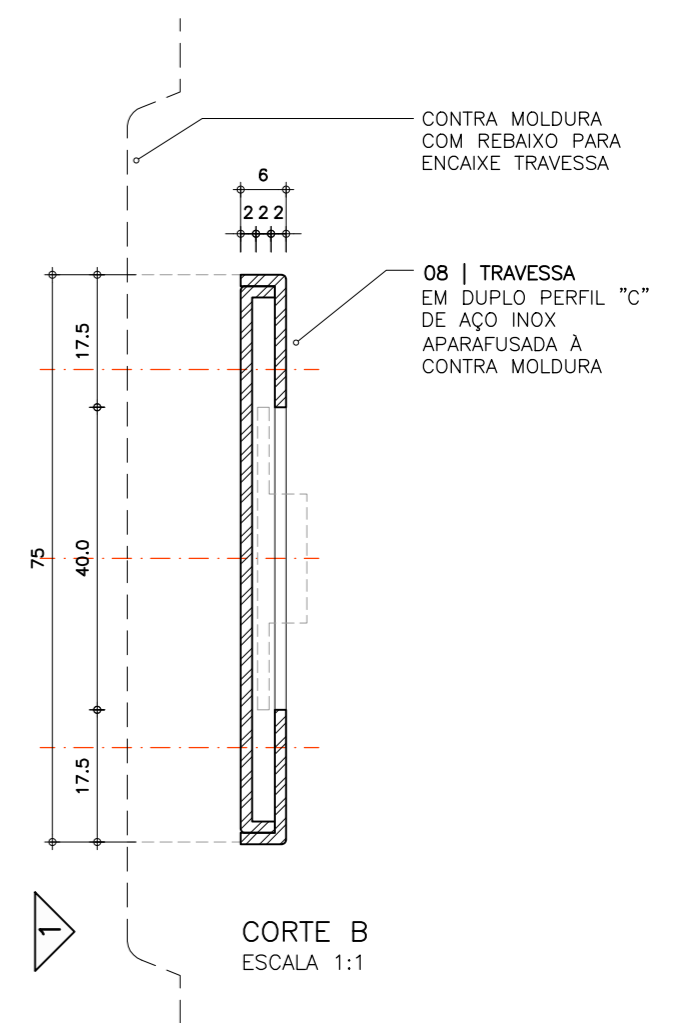
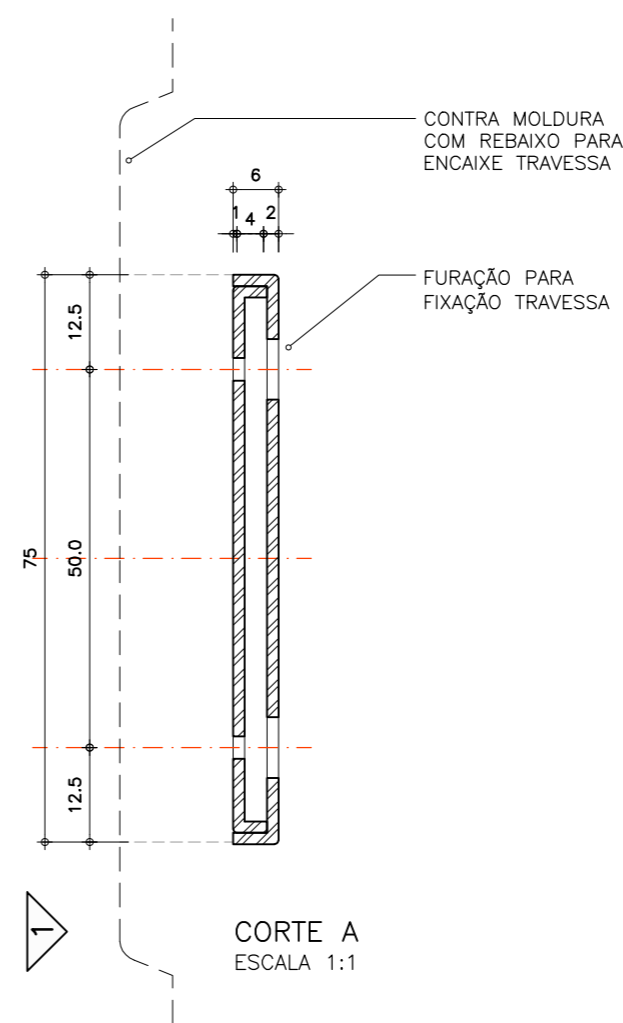
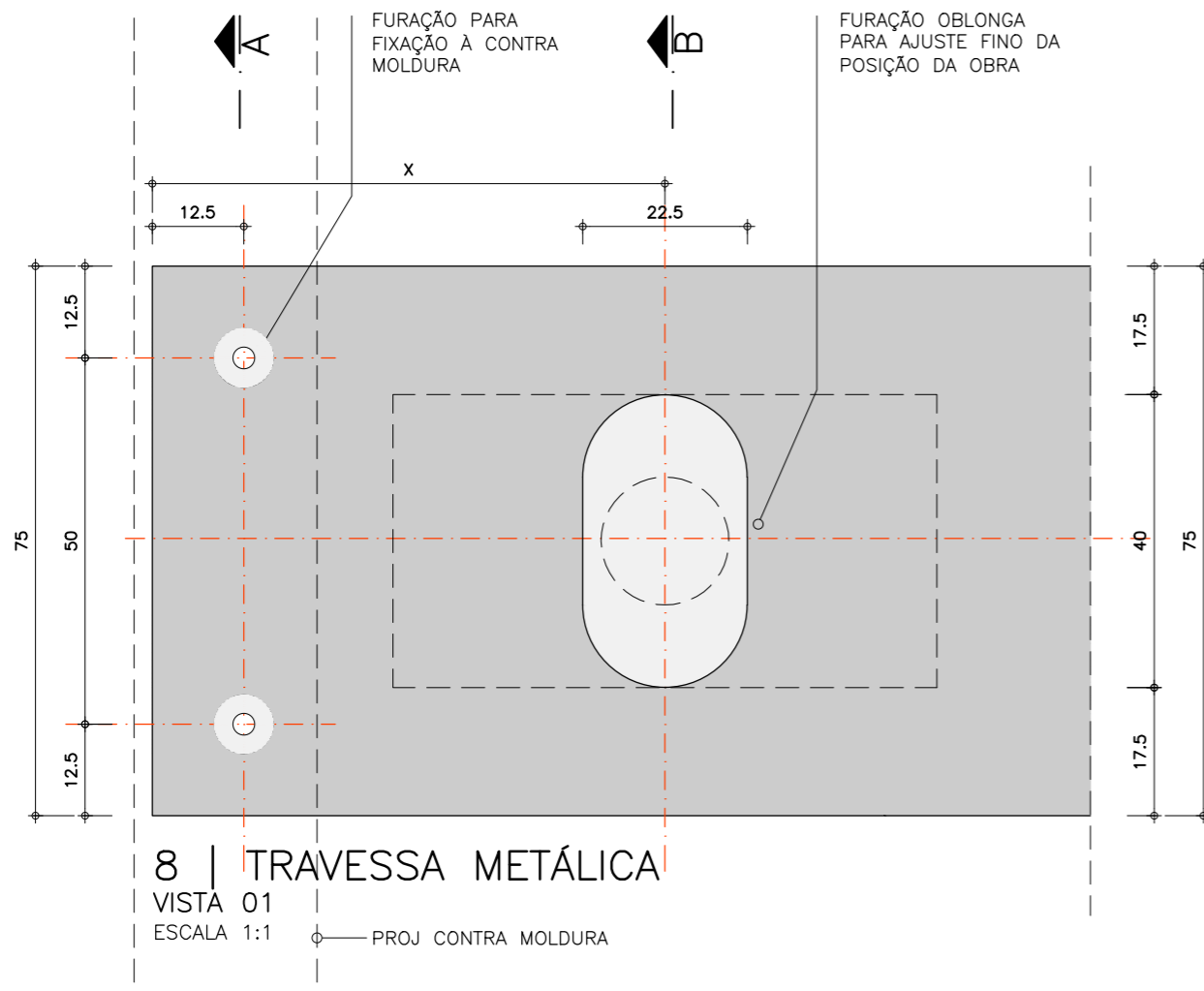
TRAVESSA METÁLICA TIPO C  
VISTA  
ESCALA 1:10



TRAVESSA METÁLICA TIPO B  
VISTA  
ESCALA 1:10



TRAVESSA METÁLICA TIPO D  
VISTA  
ESCALA 1:10



# CAVALETES DE CRISTAL

## PROTÓTIPOS

As fotos desta página foram tiradas durante o período de testes dos protótipos, durante o mês de agosto do presente ano. A partir dos testes realizados, chegamos à revisão do projeto apresentado neste caderno.

travessa metálica



bucha em aço inox e capa em nylon



furação travessa em aço inox



conjunto montado



madeira maciça sendo desempenada



cunha em cumaru, ainda sem furação



furação para passagem parafuso



armação da base



base ainda na forma



base sendo desenhada









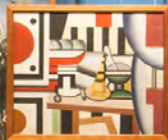
C.E.F.S.P.  
285

ANDT  
no. de torção - nascença

IVOP







**Beenderen van Rijn  
in een ijzervat**

De beenderen van Rijn zijn gevonden in een ijzervat dat in 1868 in de rivier de Rijn bij de plaats Rijn (bij Rotterdam) werd gevonden.

Beenderen die gevonden zijn op de rivier de Rijn (bij Rotterdam) zijn gevonden in een ijzervat dat in 1868 in de rivier de Rijn bij de plaats Rijn (bij Rotterdam) werd gevonden.

De beenderen van Rijn zijn gevonden in een ijzervat dat in 1868 in de rivier de Rijn bij de plaats Rijn (bij Rotterdam) werd gevonden.







