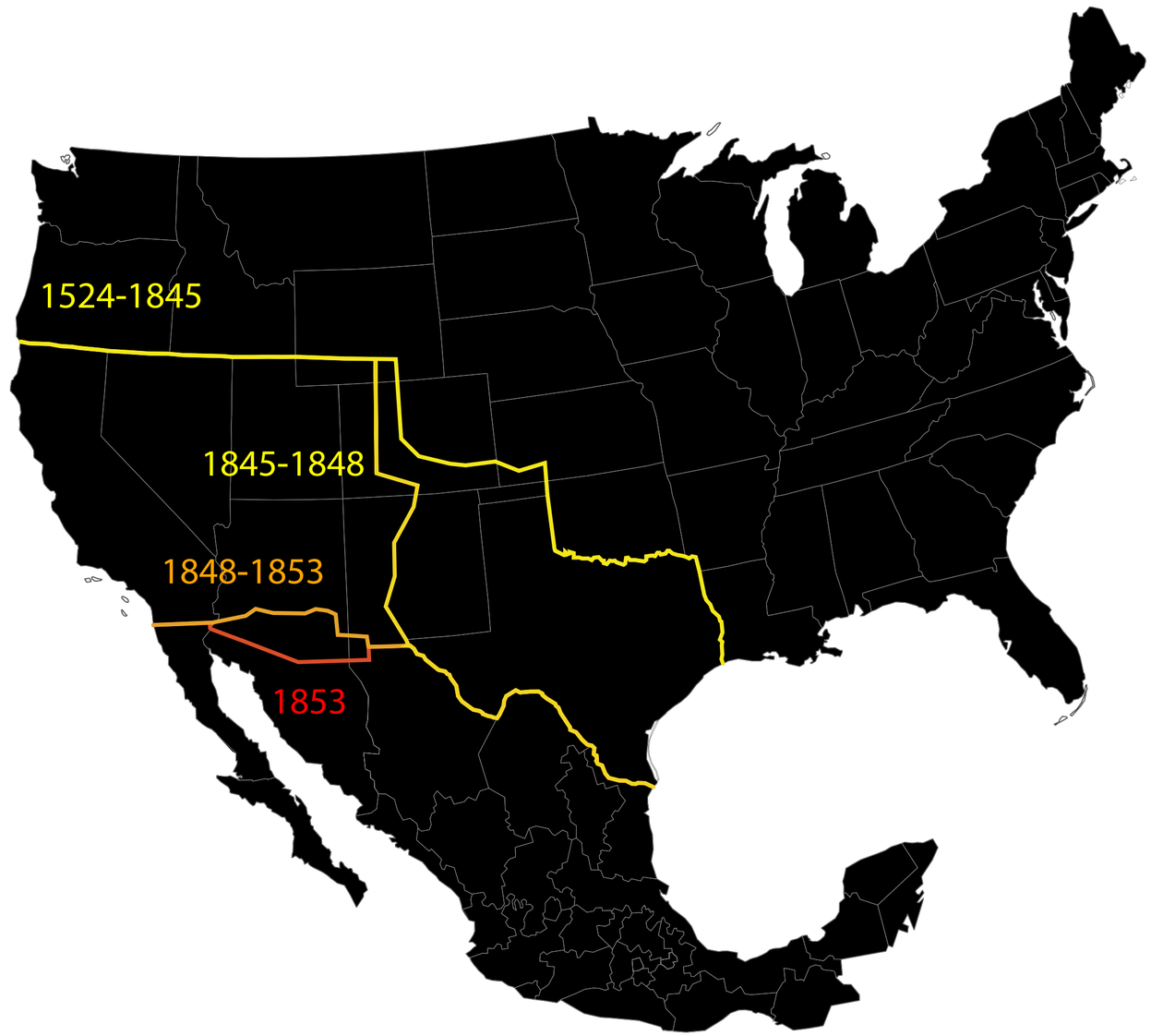
P5 GRADUATION PRESENTATION

JORDY VOS | JULY 2ND 2015

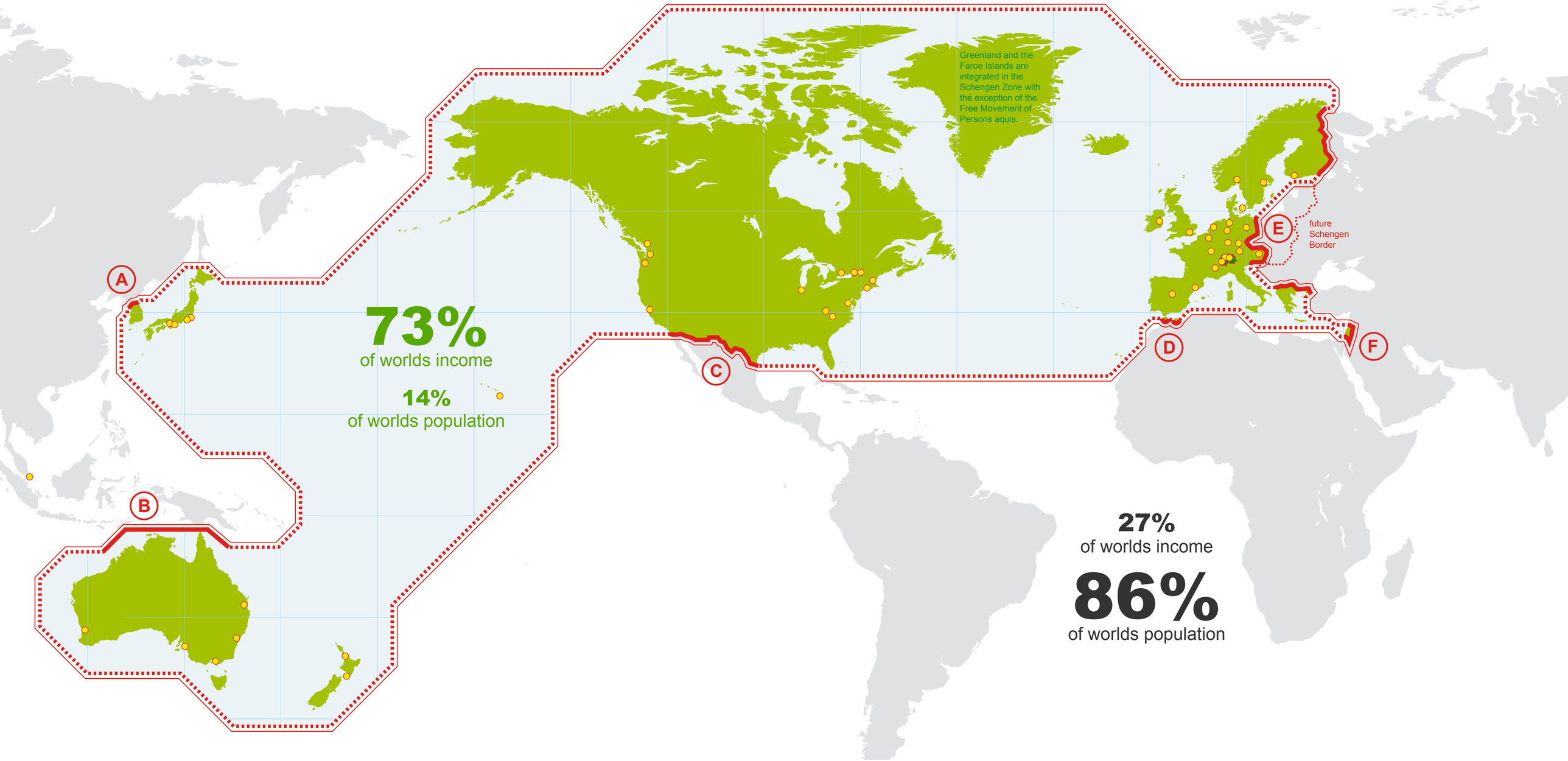
CHAMIZAL ESTADIO DE LA COMUNIDAD

Chamizal community stadium

U.S. - MEXICO BORDER



The US-Mexican border over centuries



A walled world

reference: TD-Archtitecs.eu, retrieved on 11-12-2014

The border devides

U.S. PASSPORTS & INTERNATIONAL TRAVEL

U.S. DEPARTMENT OF STATE · BUREAU OF CONSULAR AFFAIRS

Your U.S. Passport | Before You Go | Country Information

Passports > Alerts and Warnings > **Mexico Travel Warning**

Print Email

Mexico Travel Warning

LAST UPDATED: DECEMBER 24, 2014

The U.S. Department of State warns U.S. citizens about the risk of traveling to certain places in Mexico due to threats to safety and security posed by organized criminal groups in the country. U.S. citizens have been the target of violent crimes, such as

REPORTERS

Latest update : 2014-11-03 Mexico USA - US midterm elections

USA - Mexico: A danger-ridden border

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news > u.s.

U.S.-Mexico Border Crossing Grows More Dangerous

SEPTEMBER 21, 2009

TED ROBBINS

Spotlight On Mexico As Violence Erupts Close To The U.S. Border

AP | By CHRISTOPHER SHERMAN

Posted: 04/30/2014 5:32 pm EDT | Updated: 04/30/2014 5:59 pm EDT

Shocking Photos of Violence along the United States / Mexican Border

Southwest Border Tours

WARNING VIEWER DISCRETION SHOULD BE USED

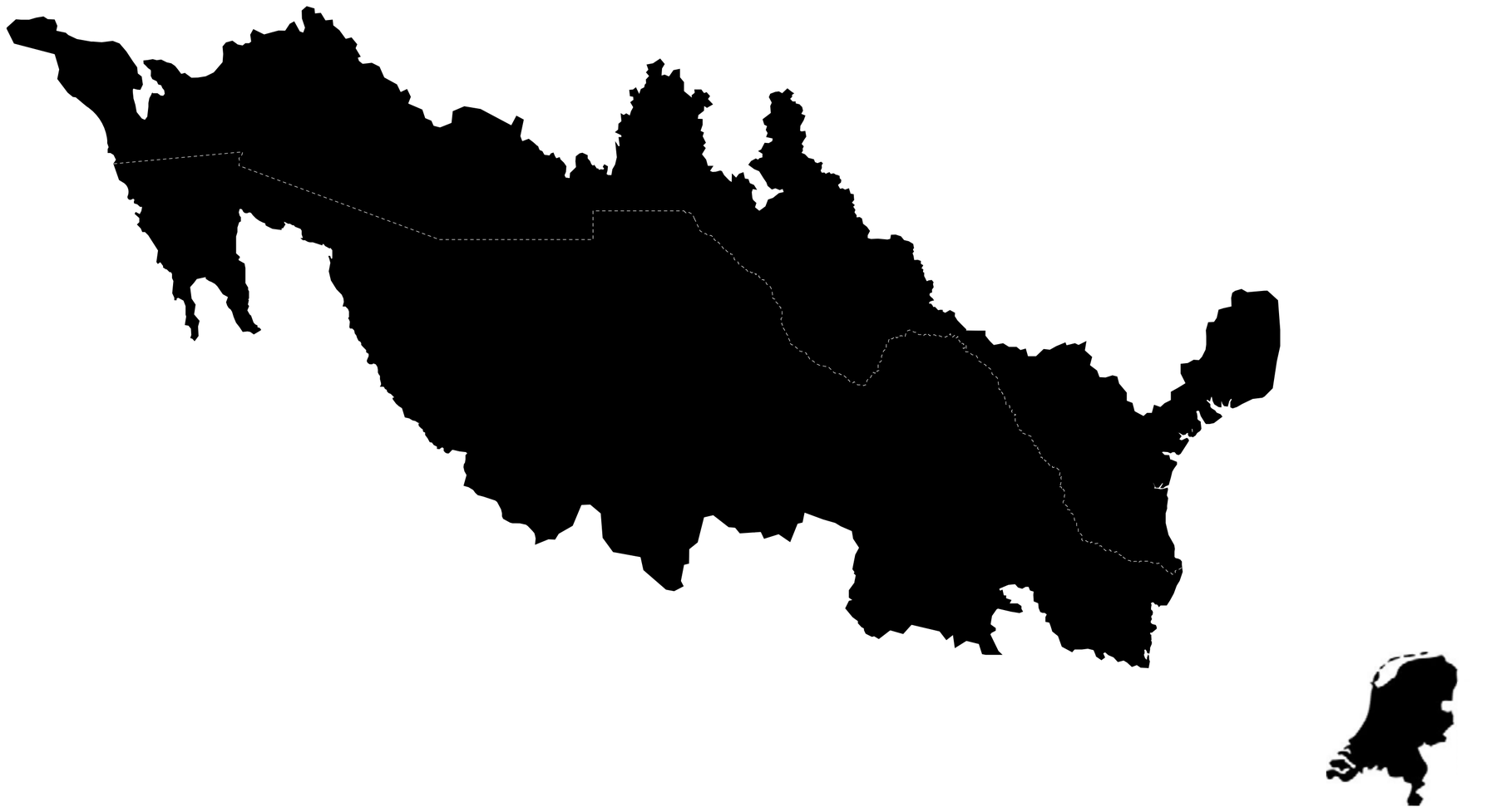
The images below are extremely graphic

The Most Dangerous Place On Earth: The Brutal Drug War Raging On The U.S. Border

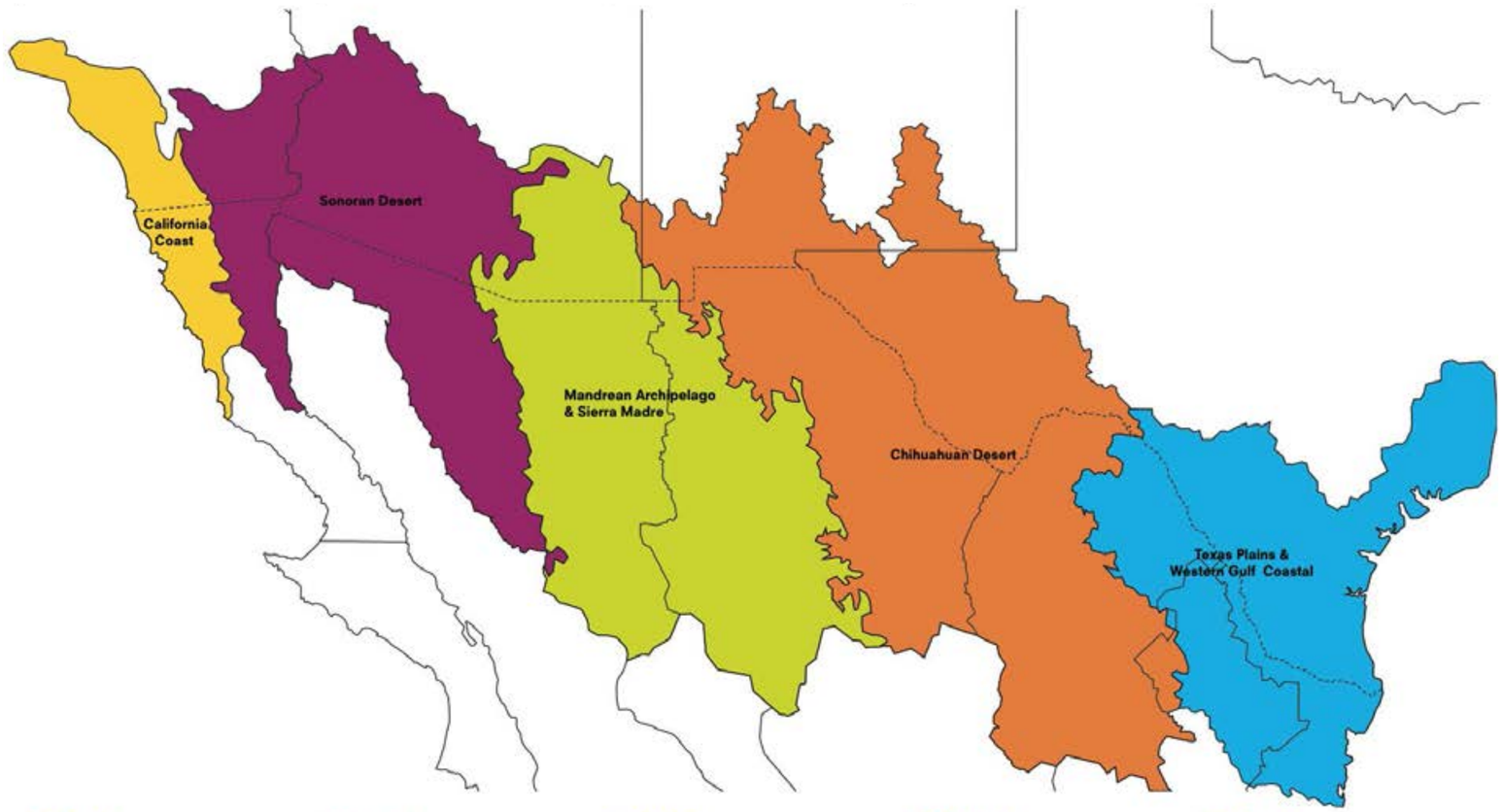
By Michael Snyder, on November 6th, 2010

US-Mexico border perception

The US-Mexican border

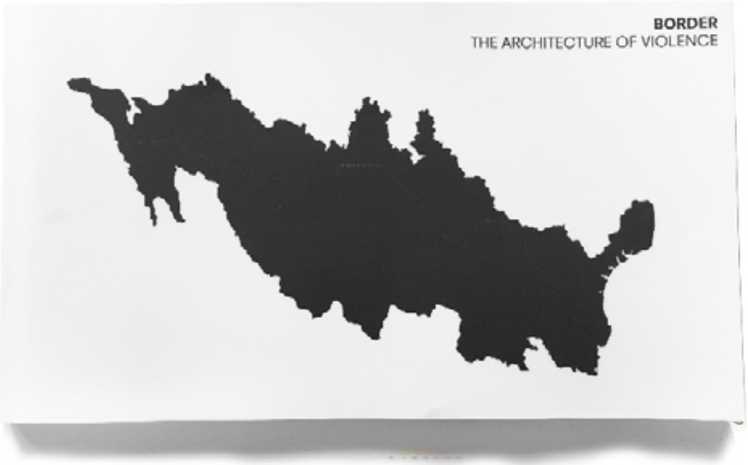


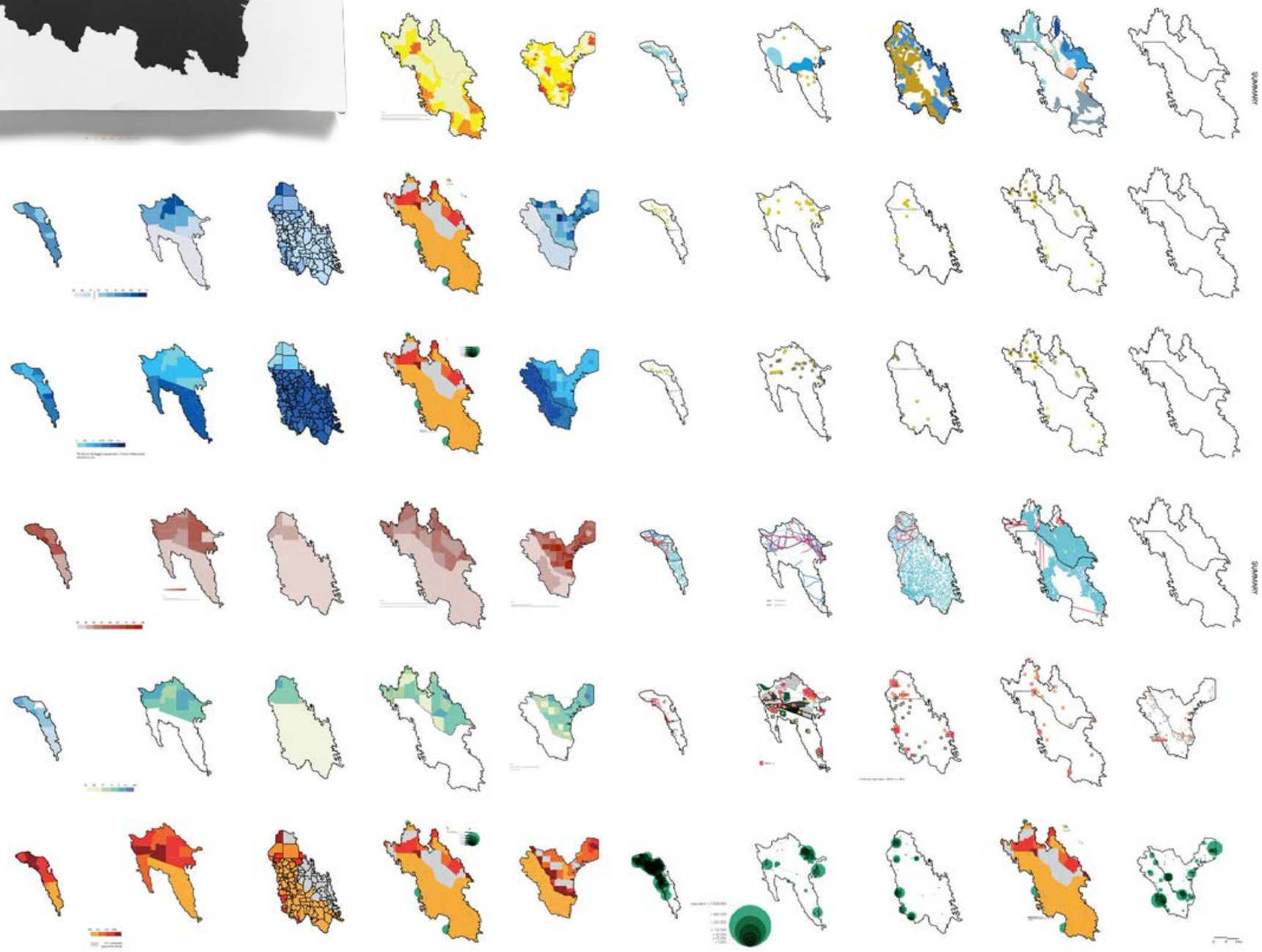
Border region compared to the Netherlands



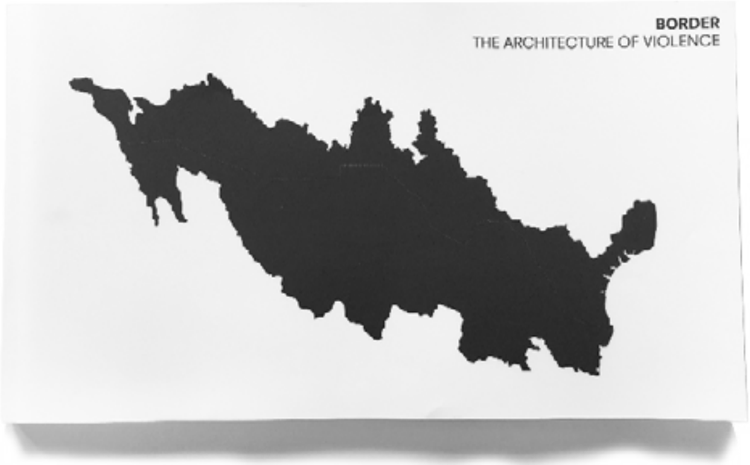
Scale reference

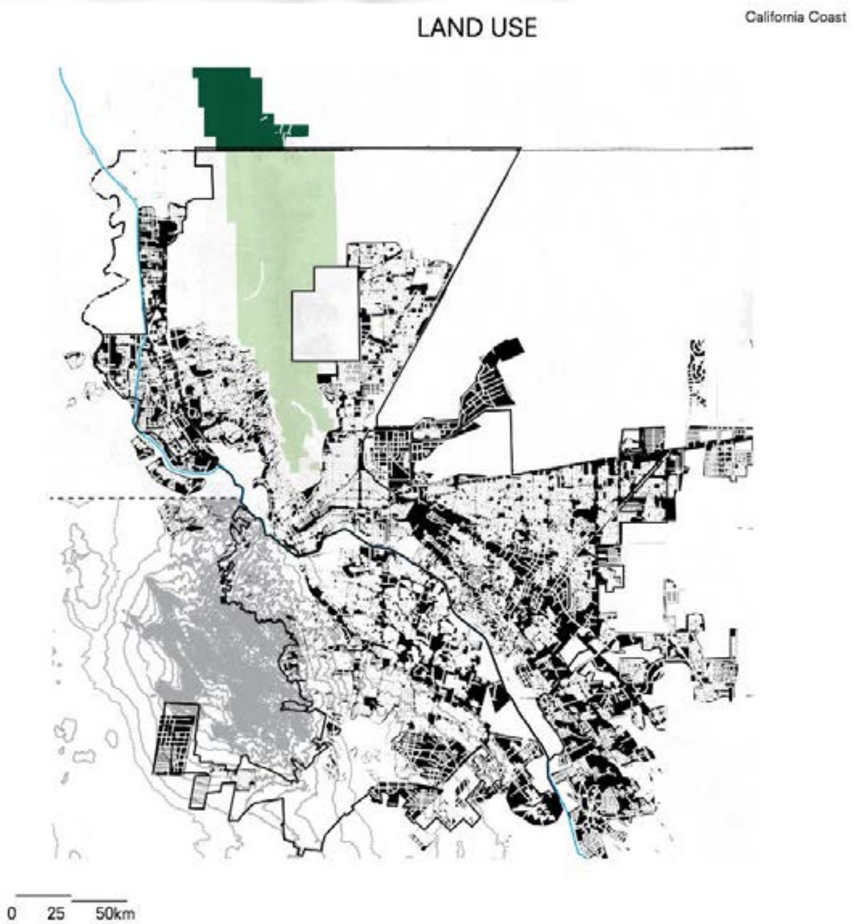
Border region defined by five ecoregions

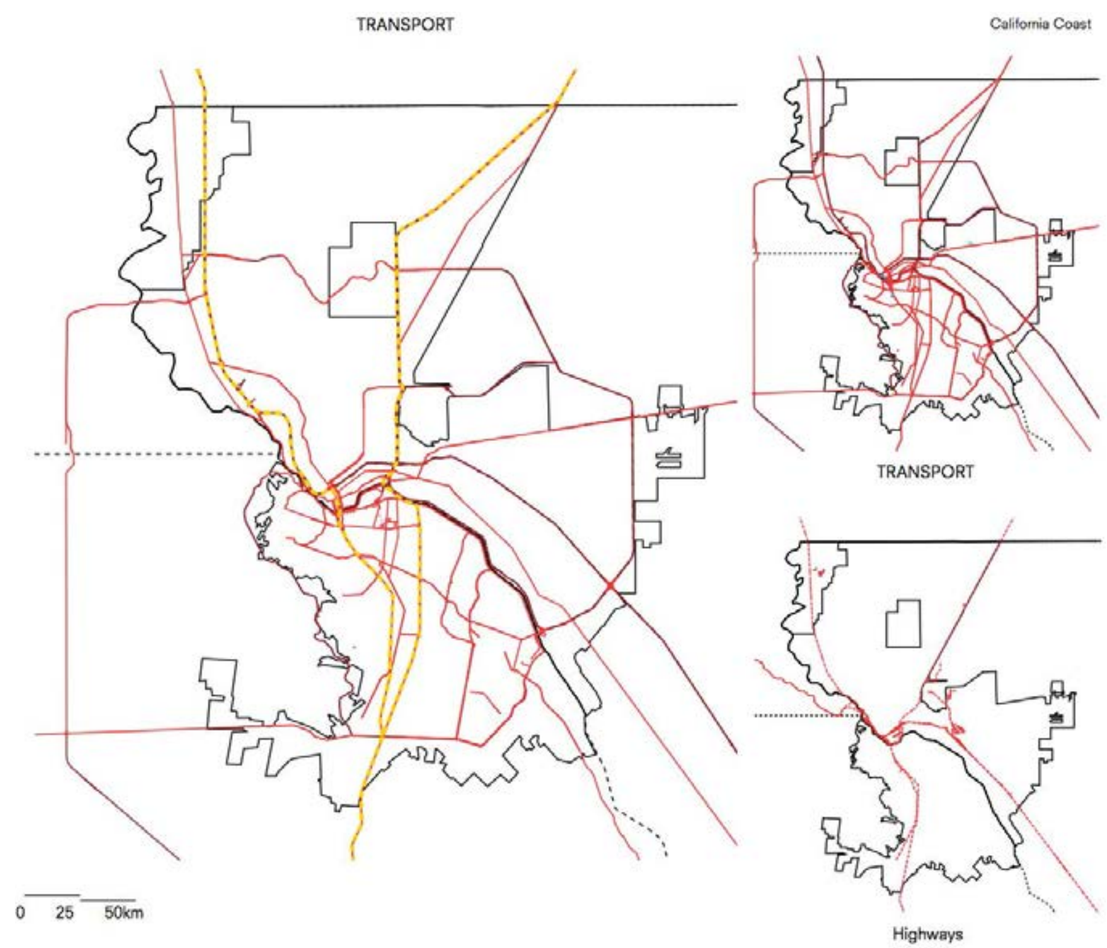




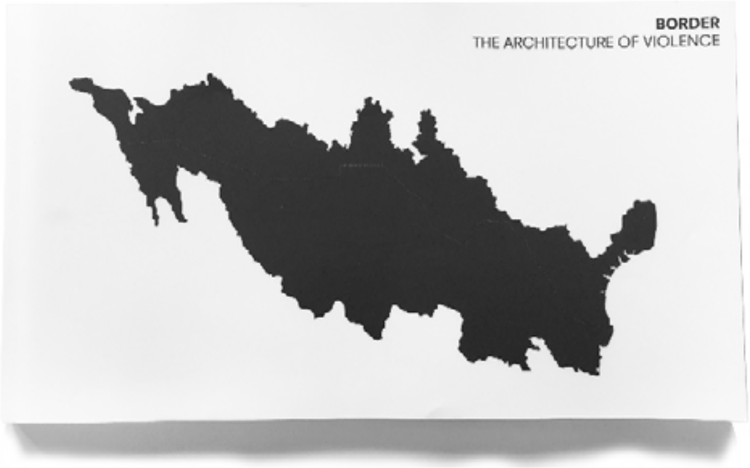
Research of hard and soft data - combined into an atlas
Ecoregion scale

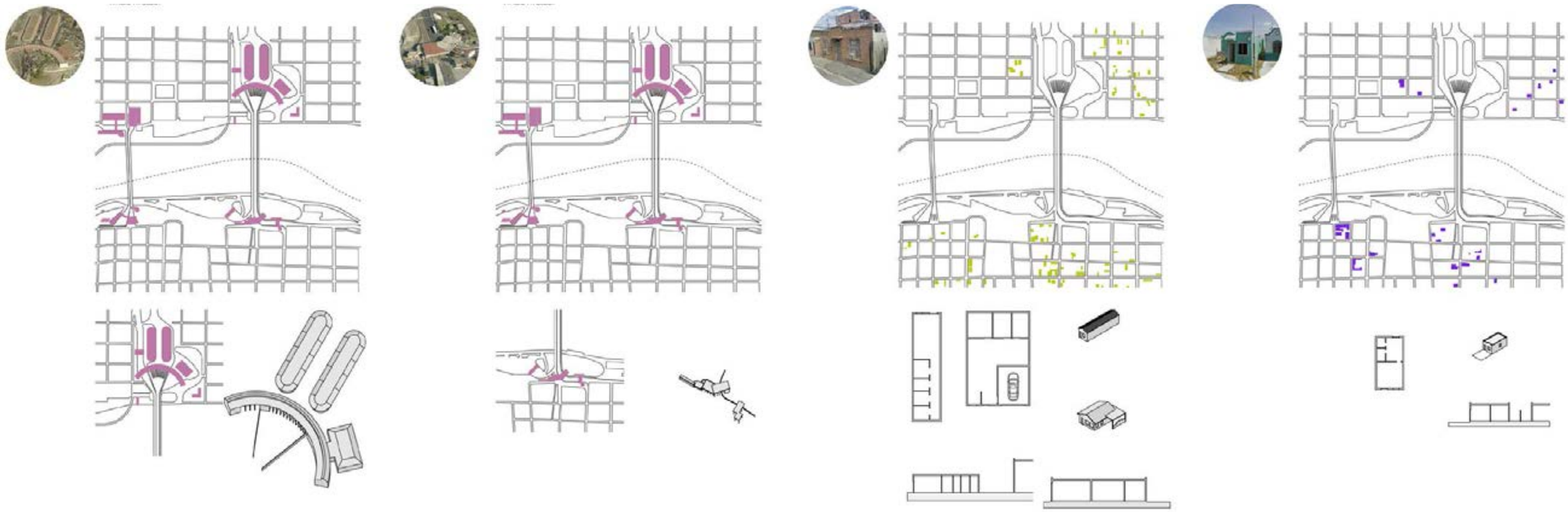




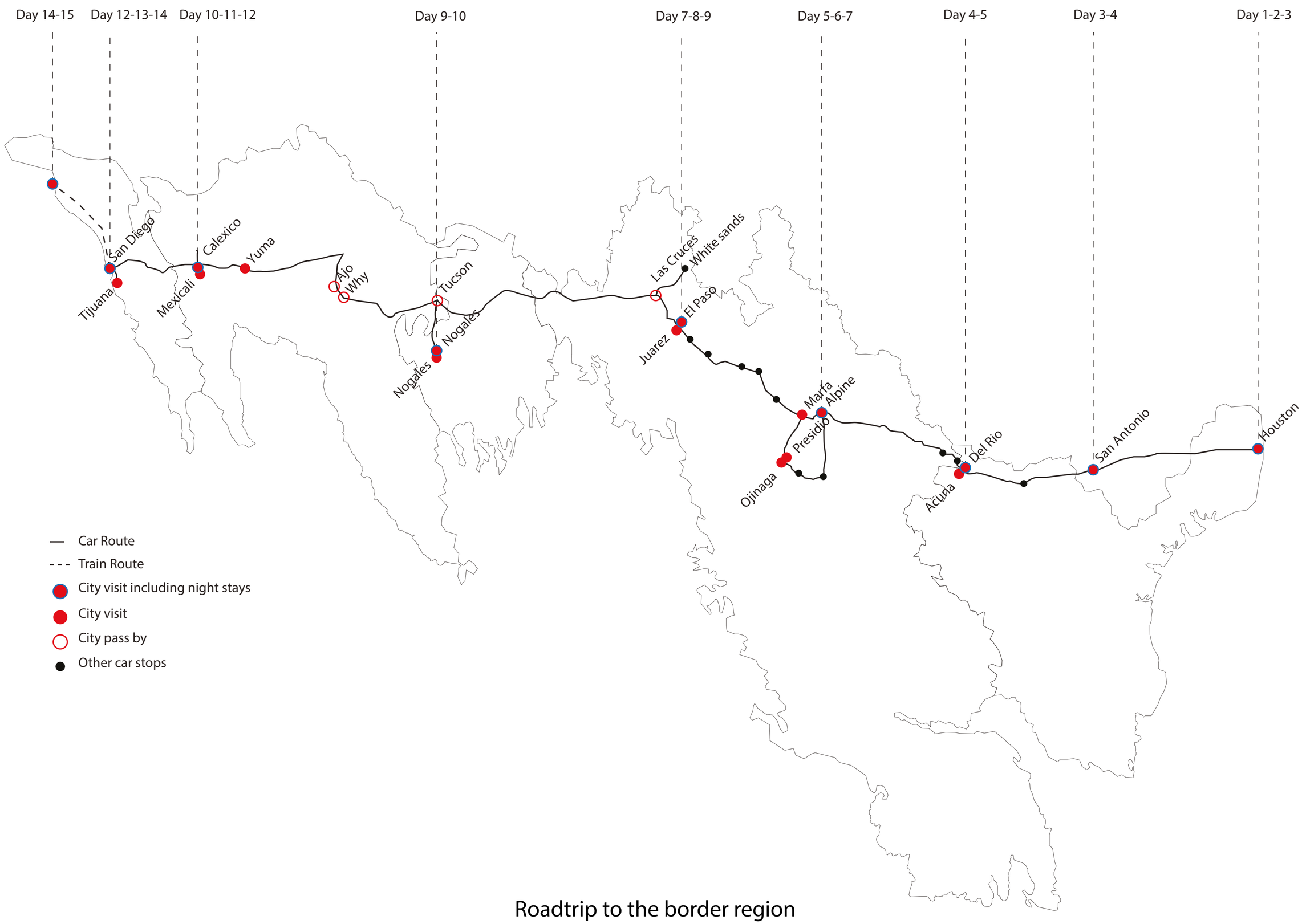


Research of hard and soft data - combined into an atlas
City scale

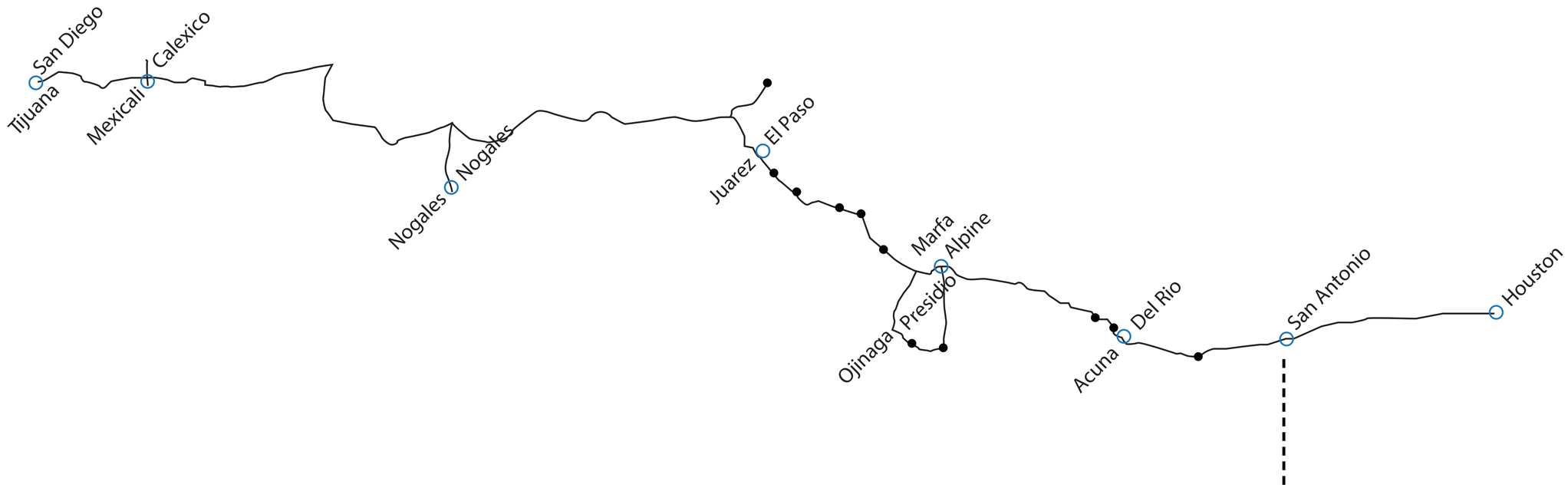


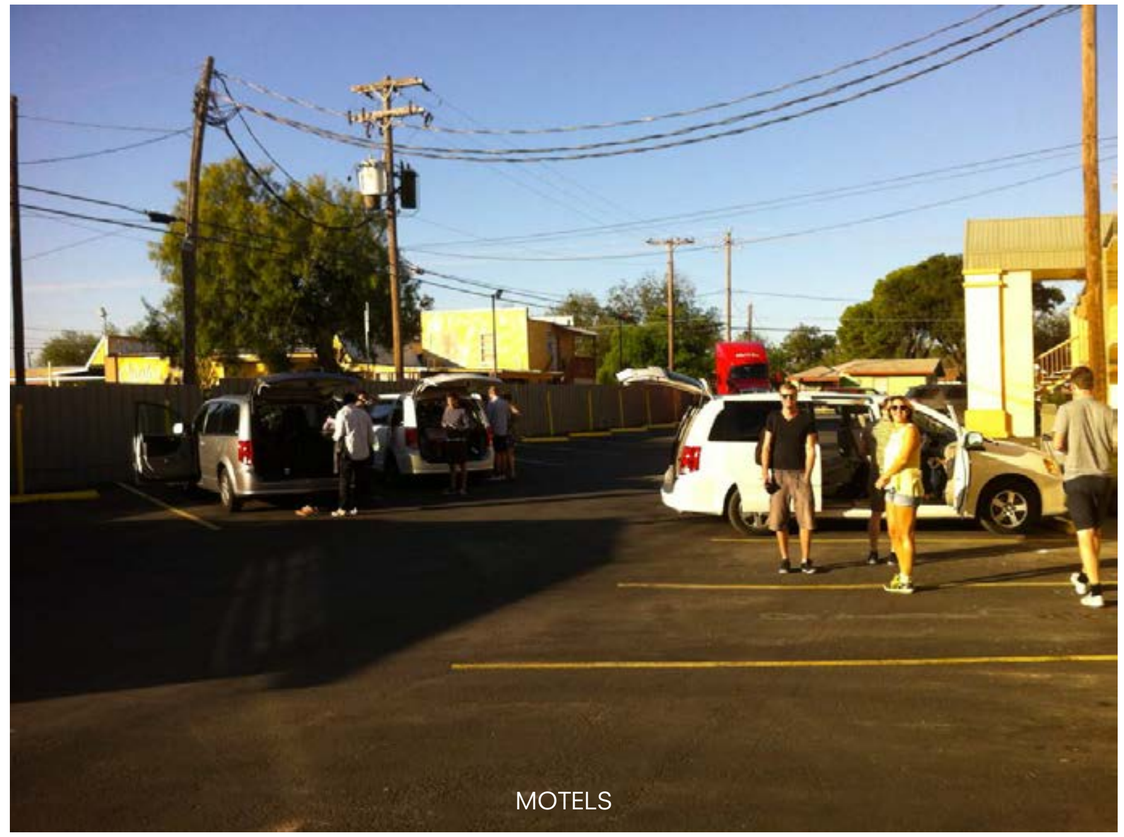


Research of hard and soft data - combined into an atlas
Neigborhood scale



Roadtrip to the border region





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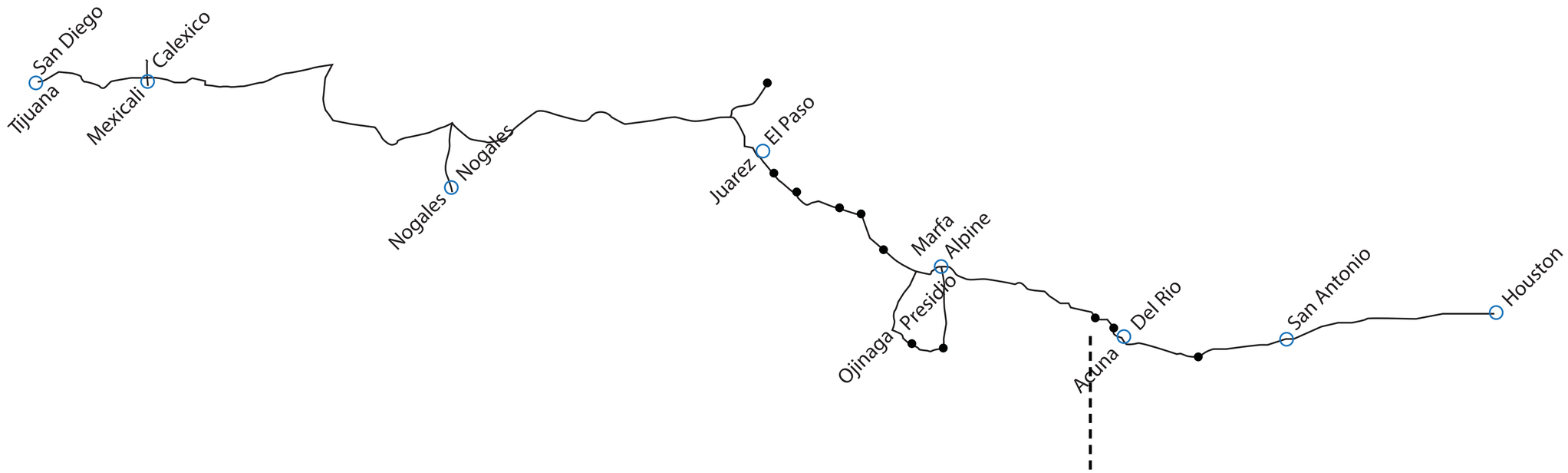
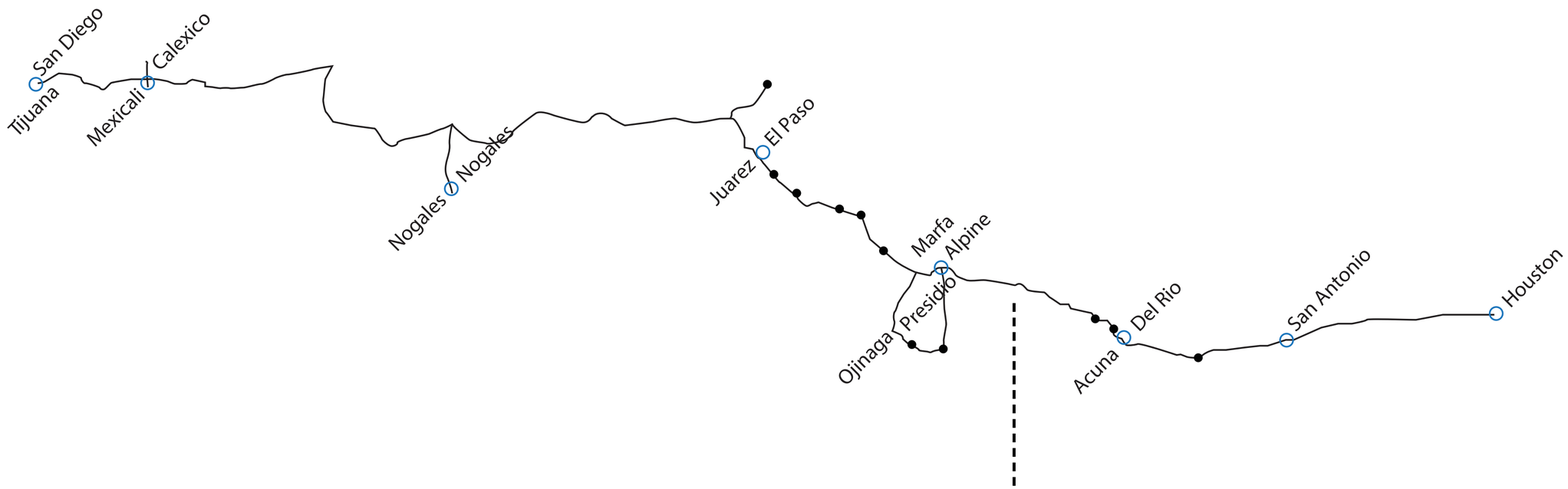
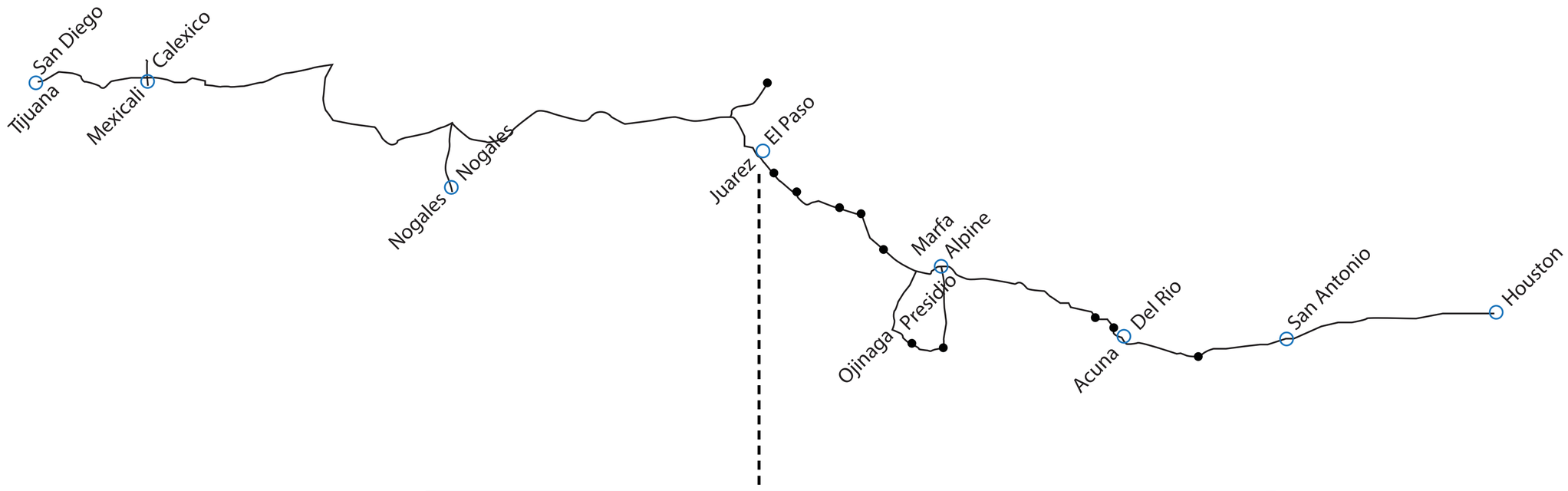


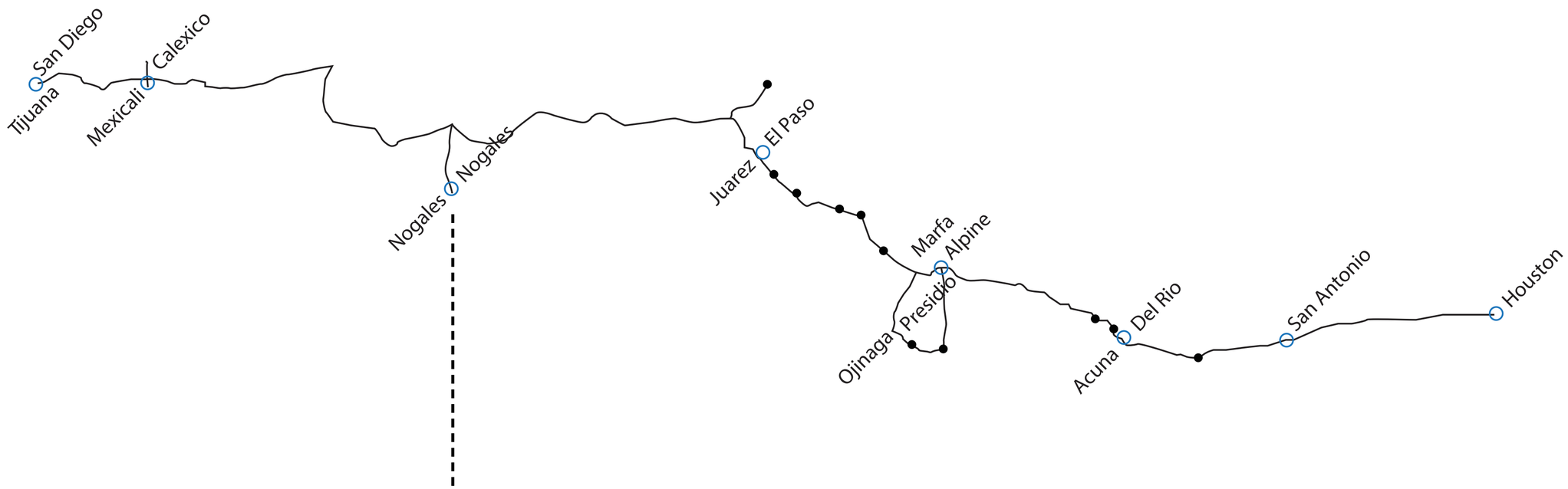
Roadtrip to the border region



Roadtrip to the border region

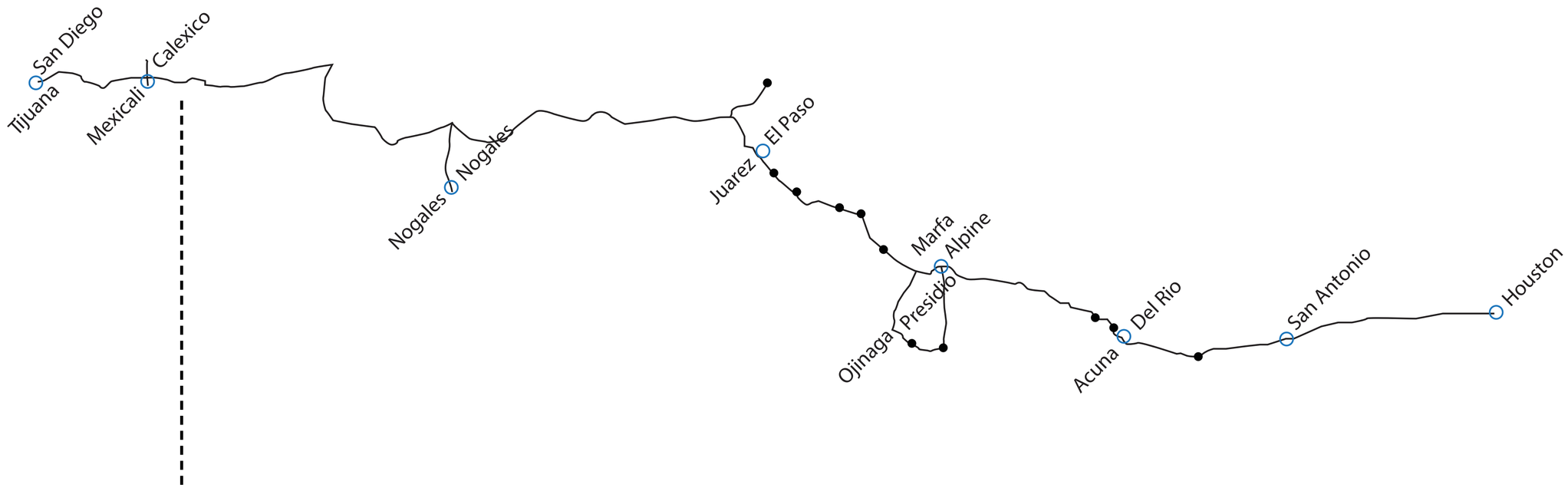


Roadtrip to the border region

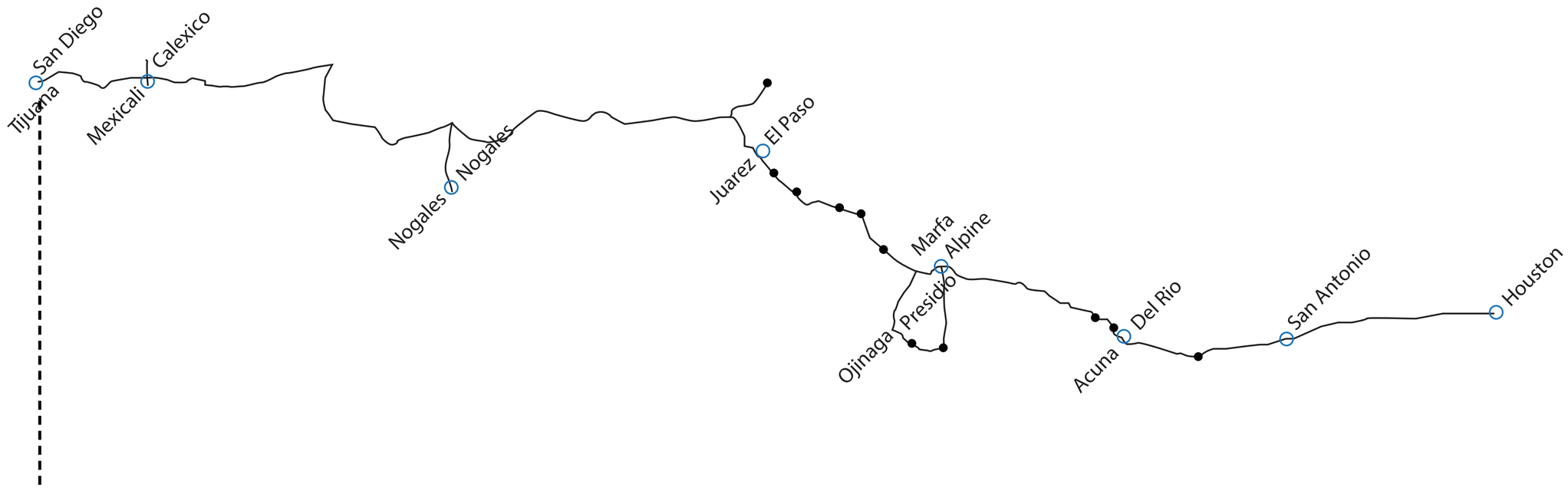


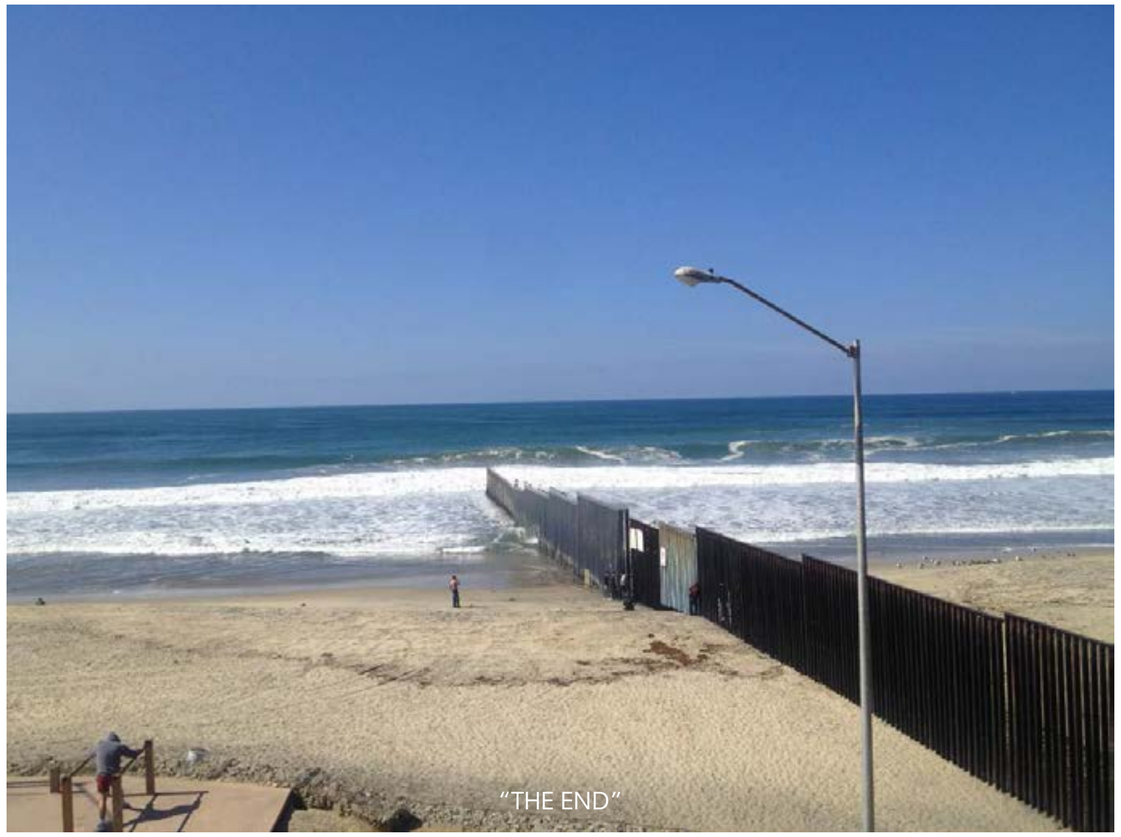
Roadtrip to the border region

Roadtrip to the border region

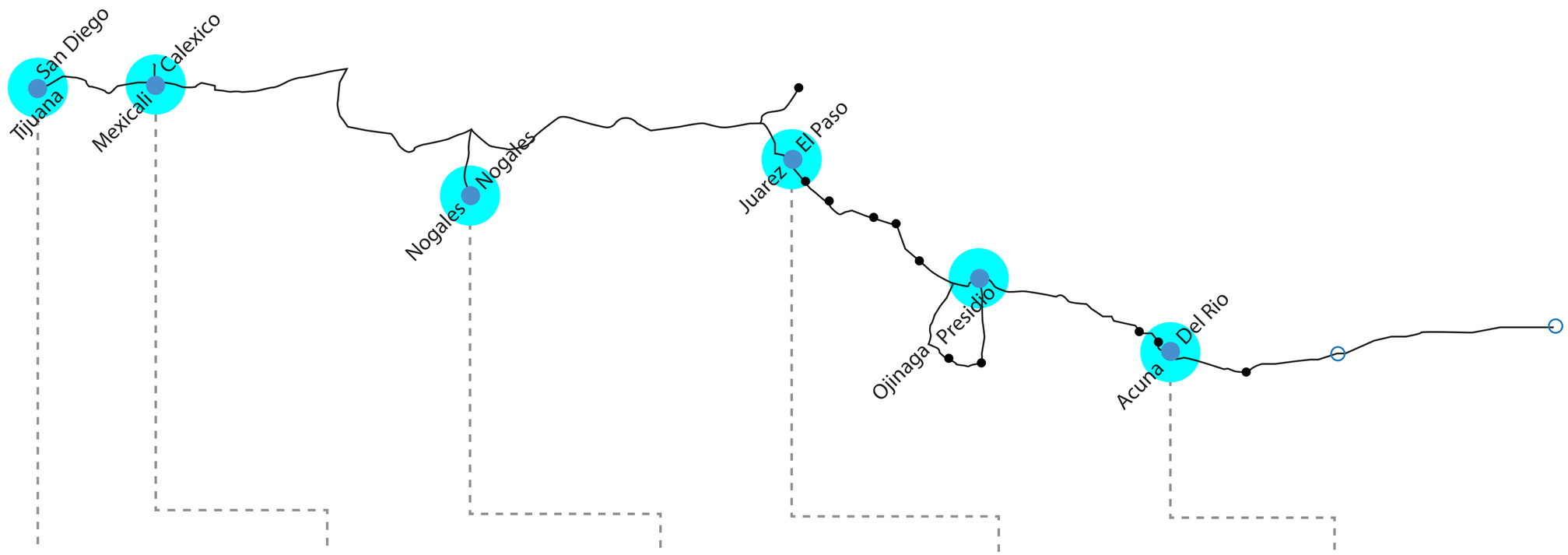


Roadtrip to the border region

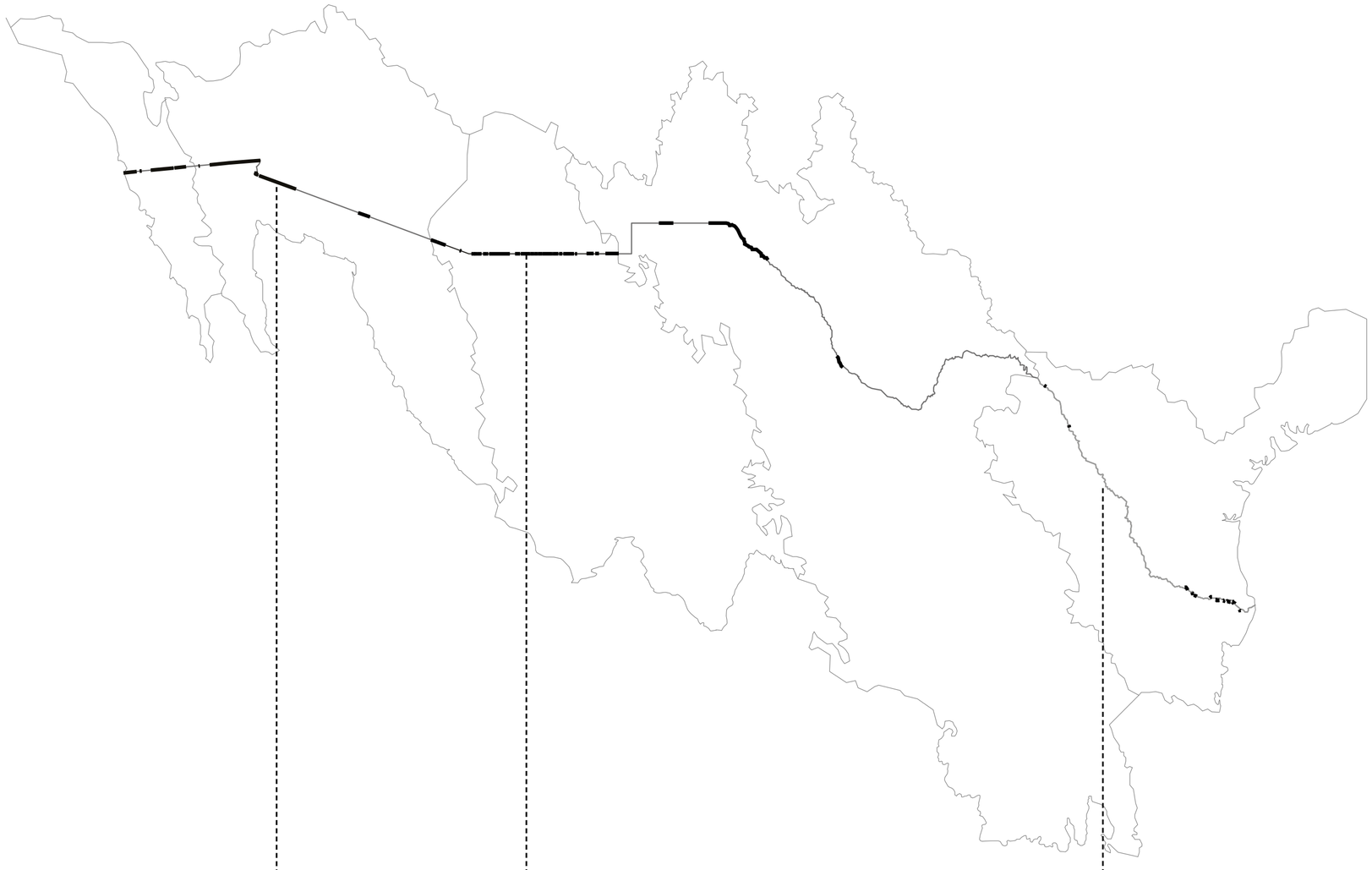




Roadtrip to the border region



Roadtrip to the border region: crossing the border



Border typology

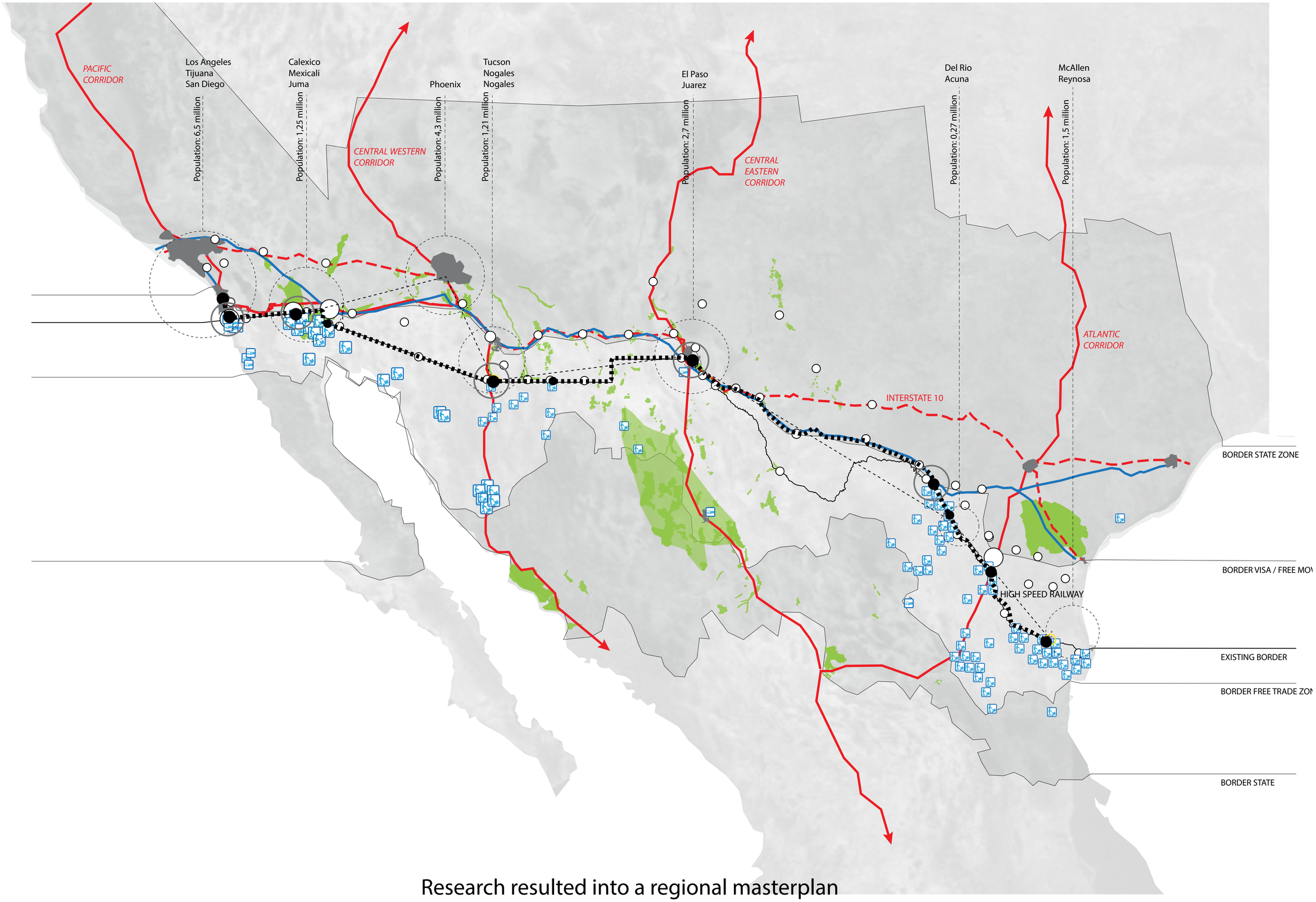
TRIP + ATLAS

$$\underbrace{\qquad\qquad}$$

ELEGANT SUSPICION

THE BORDER AREA IS A REGION WHERE PEOPLE FROM TWO NATIONS FUNCTION AS ONE, BUT ARE OBSTRUCTED BY THE BORDER FENCE AND POLITICS.

Problem statement



Research resulted into a regional masterplan

US-MEXICO
BORDER
MAYORS
ASSOCIATION

BORDER
GOVERNORS
CONFERENCE

US-MEXICO-
BORDER HEALTH
ORGANIZATION

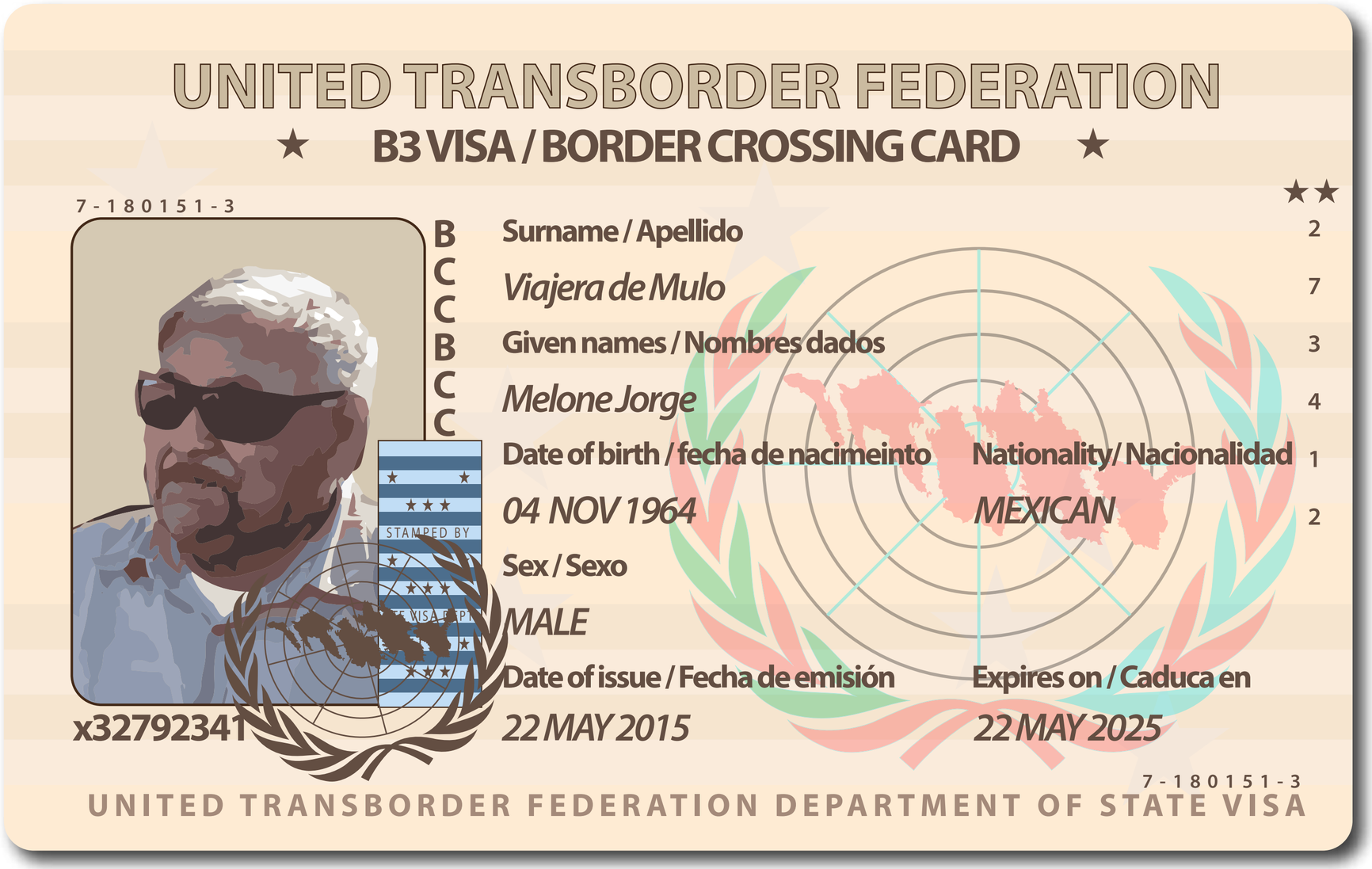
BORDER
ENVIRONMENT
COOPERATION
COMMISION

US-MEXICO-
PHILANTHROPHY
PARTNERSHIP

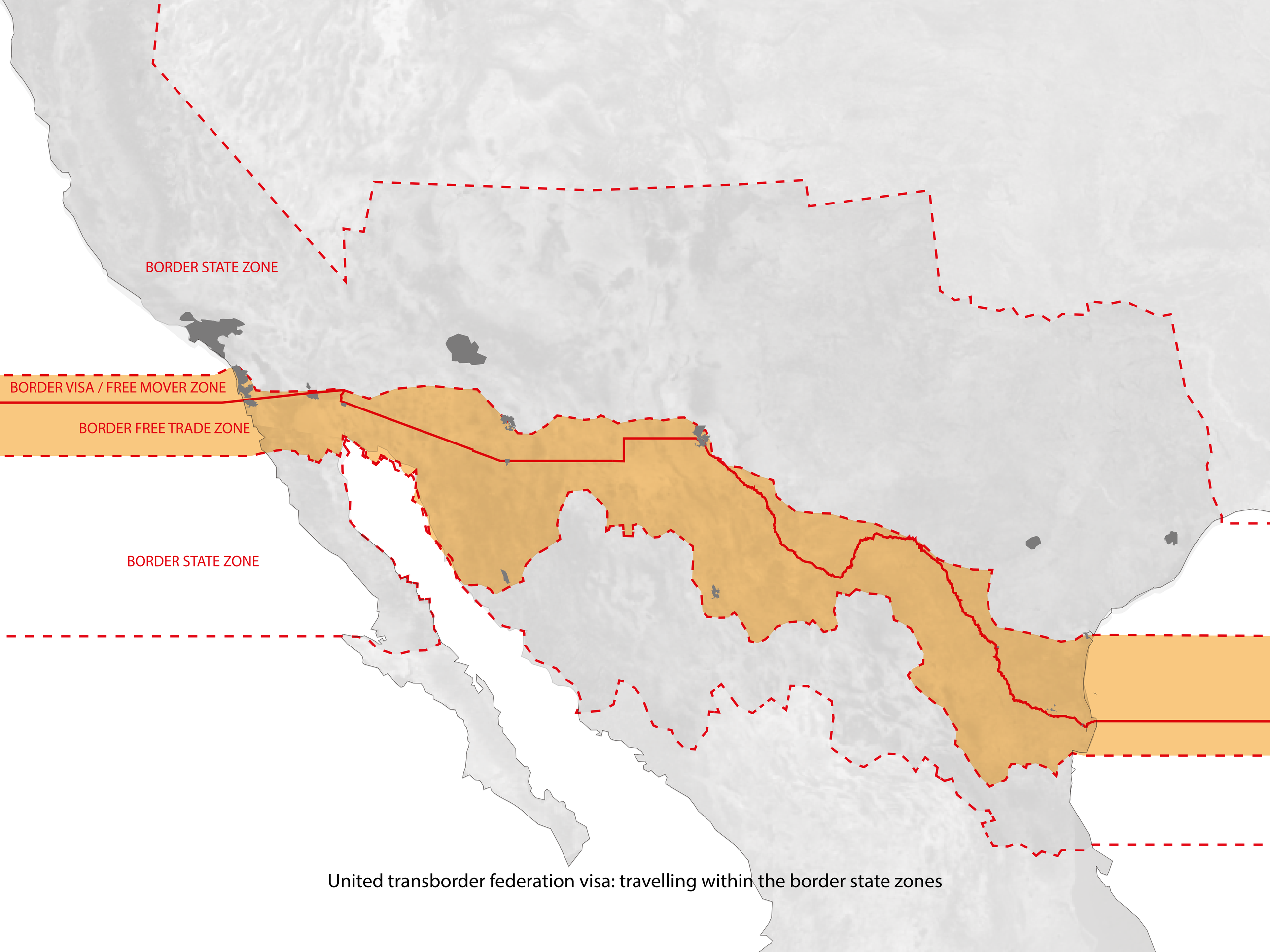
Regional plan: a myriad of organisations

UNITED TRANSBORDER FEDERATION

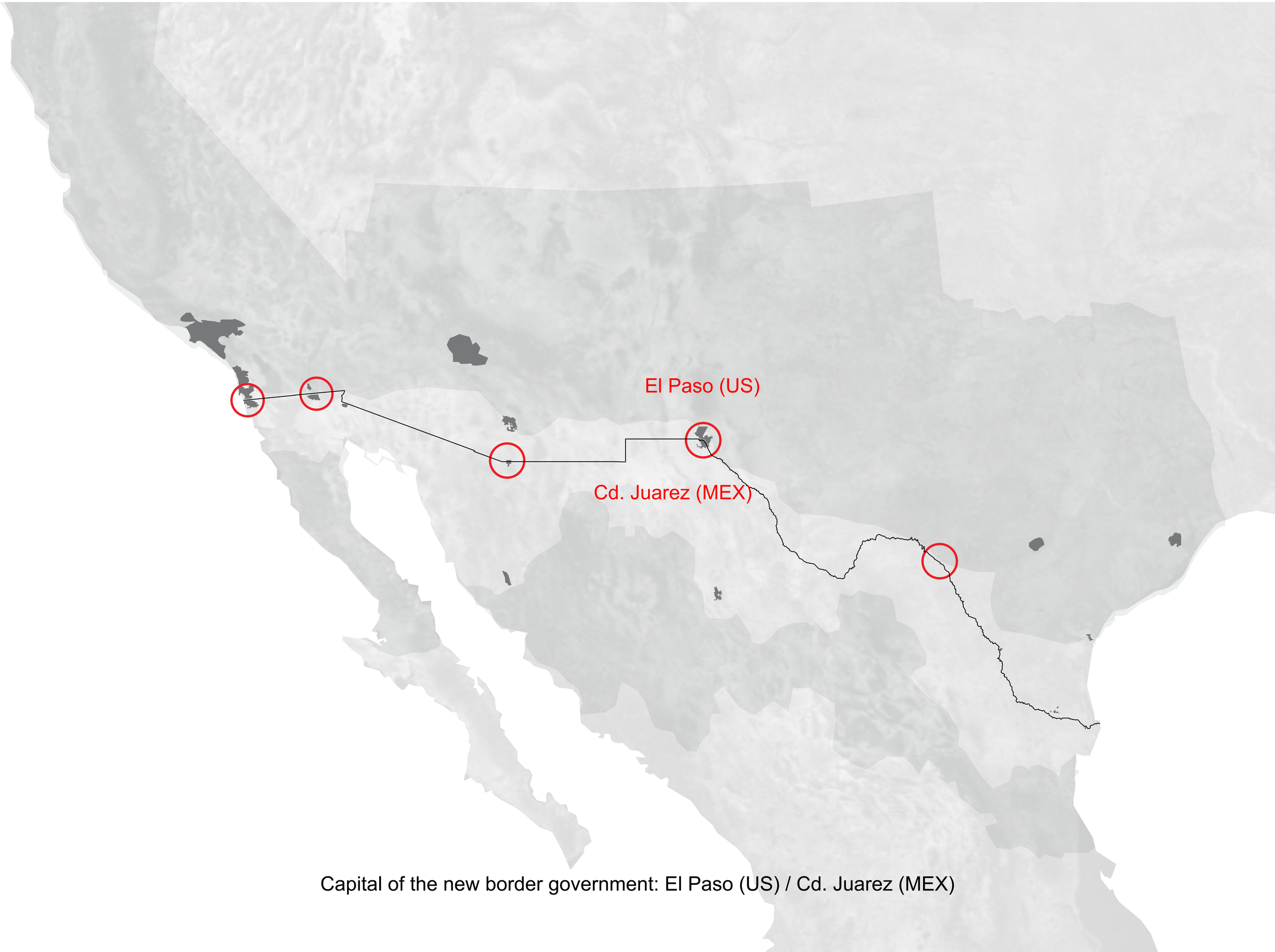
Regional plan: a new government for the border region



United transborder federation visa: crossing the border within minutes



United transborder federation visa: travelling within the border state zones



Capital of the new border government: El Paso (US) / Cd. Juarez (MEX)

CAR CULTURE

FOOD CULTURE

Let’s Move initiatives to reverse America’s obesity epidemic.

Move! El Paso - Walking Trails is an initiative of the City of El Paso Department of Public Health in collaboration with communities.

United States-México Border Health Commission

Border Health

Health conditions on the Texas-Mexico border are among the worst in the U.S. In El Paso, for example, portions of the City are federally designated "medically underserved areas."

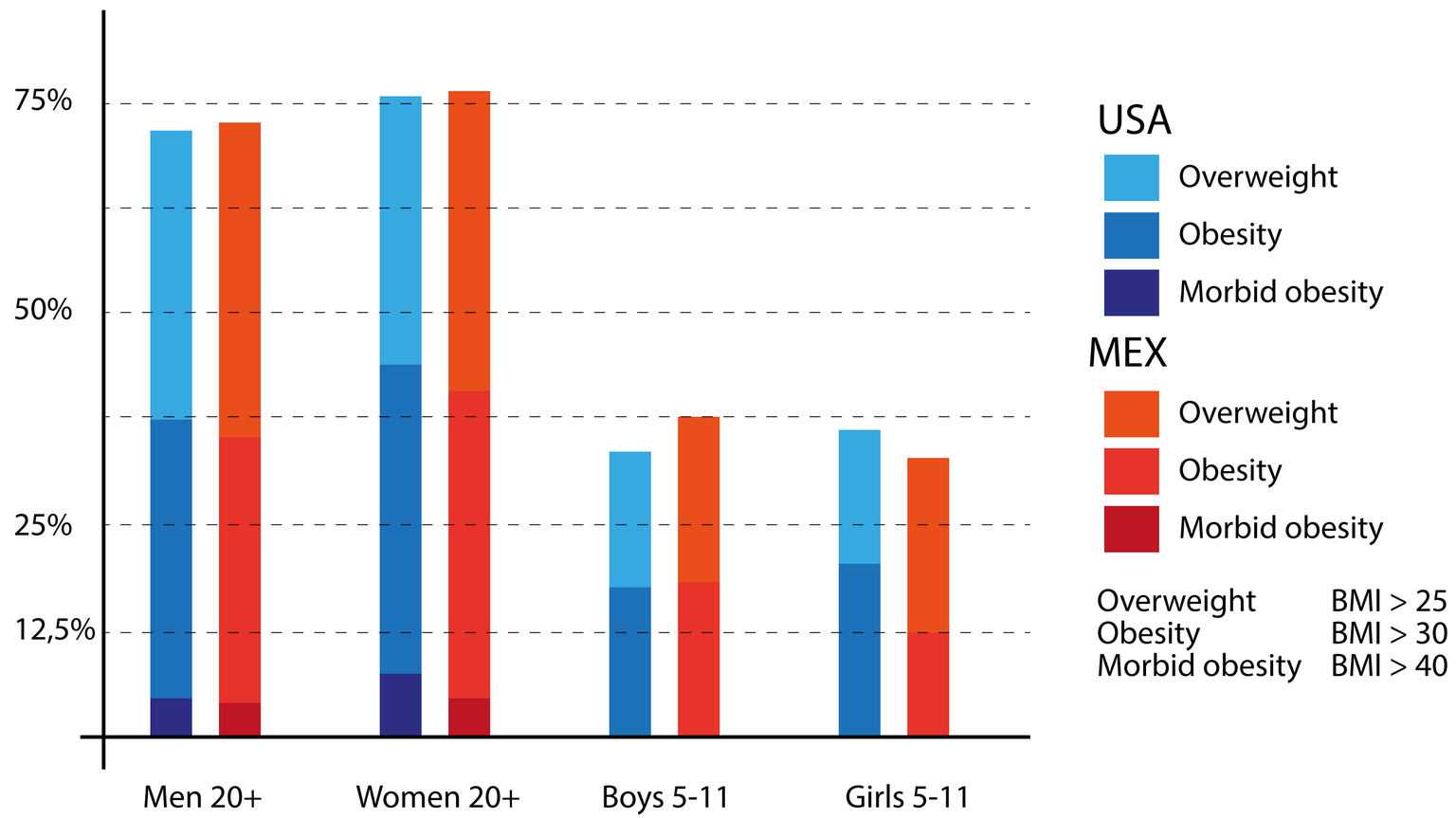
GOAL: **ASSURE THAT THERE ARE SUFFICIENT PREVENTIVE AND HEALTH CARE RESOURCES ON BOTH SIDES OF THE BORDER.**

Source: El Paso State article: One People One Community 2010, pag 37

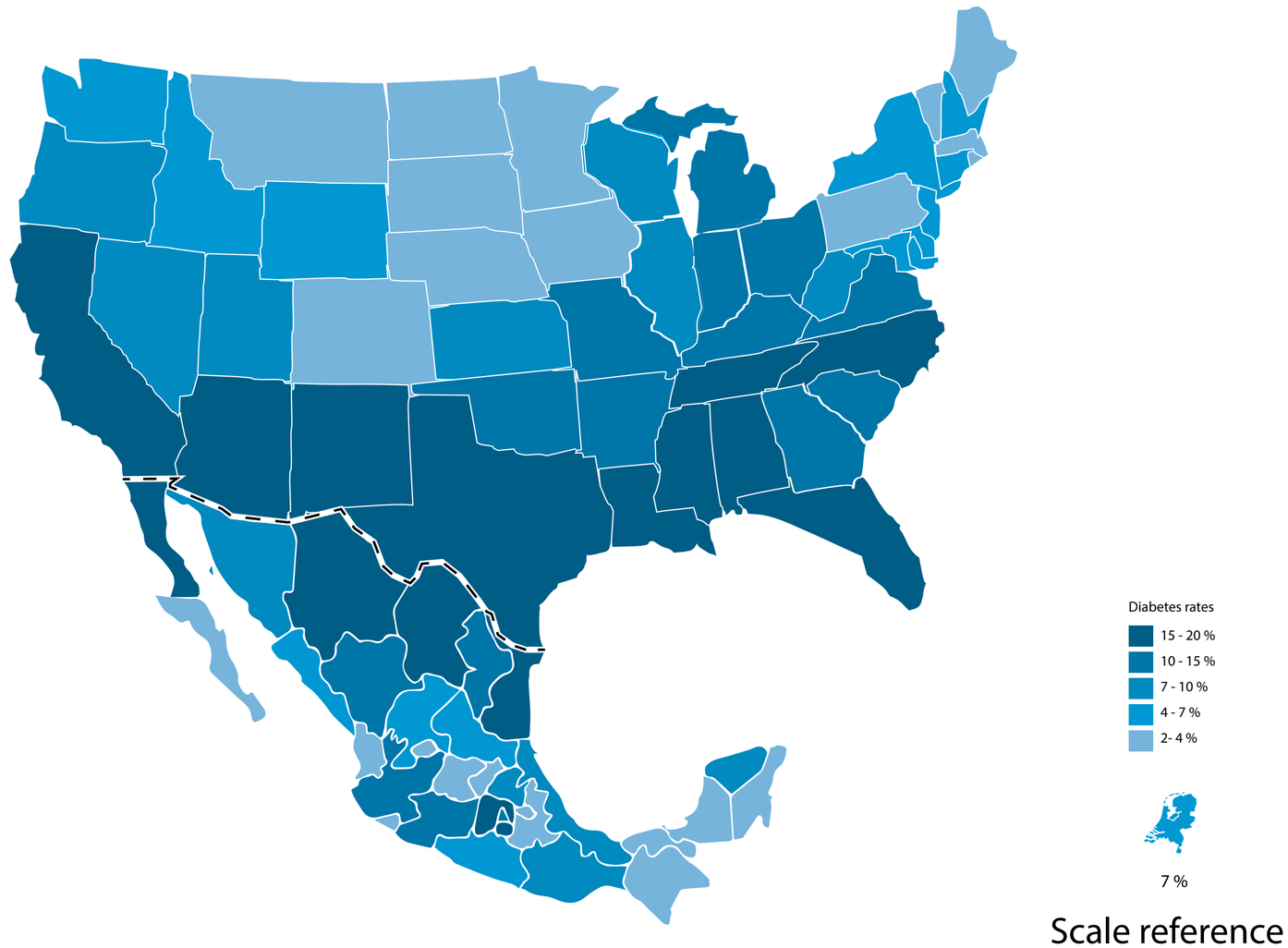
Border health: US-MEX Border health commision sets a goal to increate health conditions

Obesity rates US and Mexico

Source: World Obesity, accessed 27 november 2014, "http://www.worldobesity.org/".



Obesity statistics - >80% of people diagnosed with diabetes



‘The prevalence rate for diabetes along the US-Mexican border is ***nearly 50% higher*** than the rates of the rest of the United States.

Source: NCBI, accessed 30-11-2014, “NCBI.NLM.nih.gov”

Border health: Diabetes rates

Washington University in St.Louis

June 22 2015

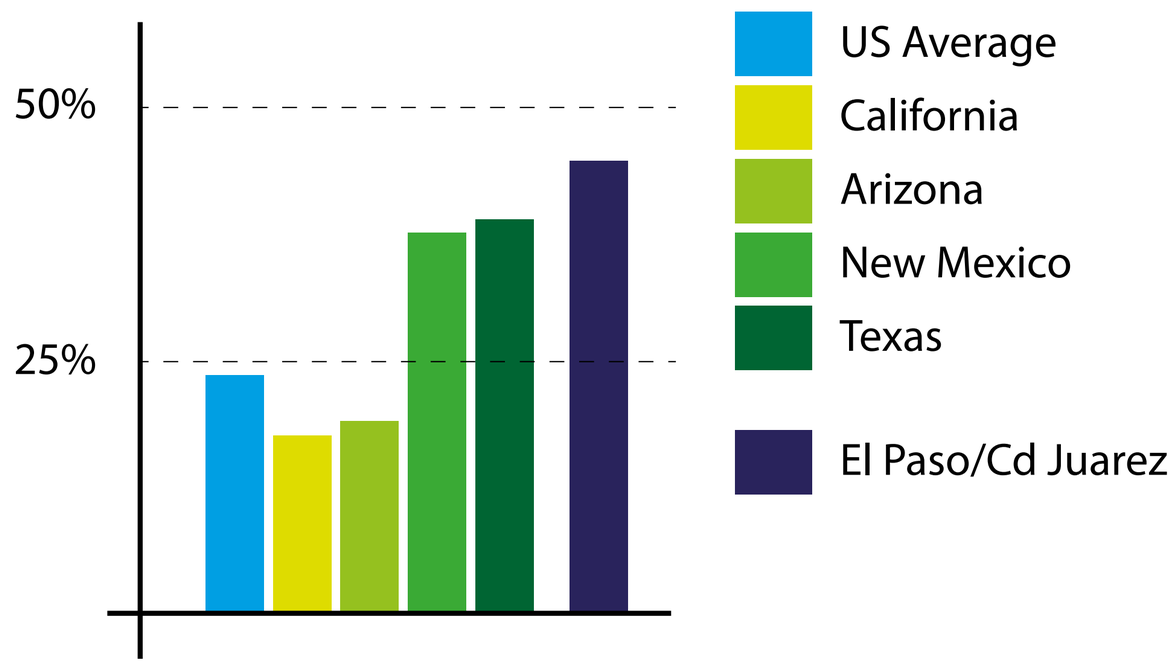
‘Adult Americans who are obese now **outnumber** those who are considered overweight, estimating 67.6 million Americans over the age of 25 are obese and an additional 65.2 million are overweight.’

Source: Washington university: https://news.wustl.edu/news/Pages/Obesity-excess-weight-in-US-continue-upswing.aspx, retrieved 23-06-2015

Causes of diabetes (in most cases > 85%)

Source: Robert Wood Johnson Foundation, *Researching the triggers for obesity and diabetes.* Feb 15 2013: Gary Taubes. Accessed 29-11-2014, "www.RWJF.org

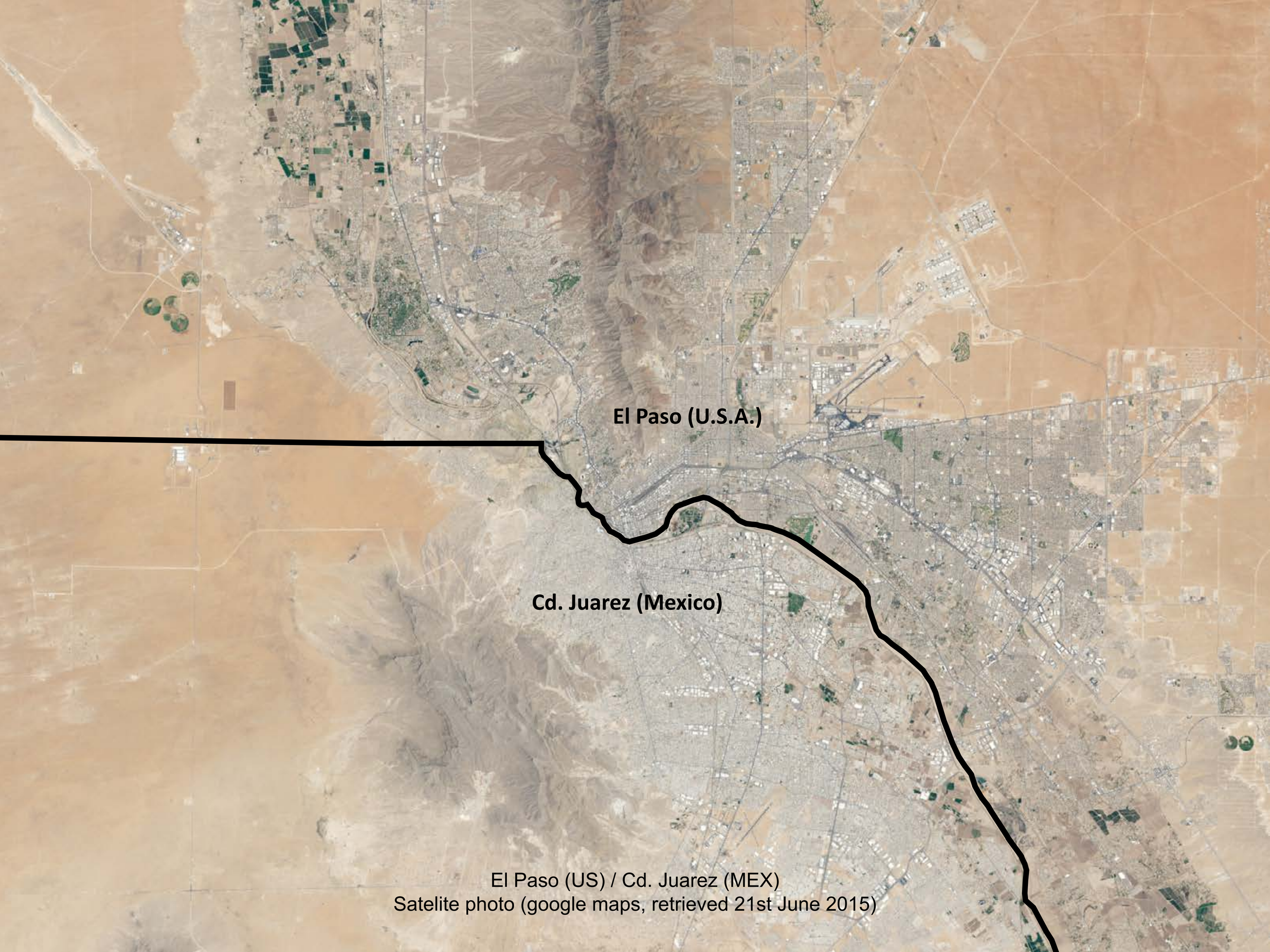
1. SES - Socio-economic status
2. Lifestyle (physical activity)
3. Diet



2010: 234.051 deaths with diabetes certificates
(9% of total deaths in the US in 2010)

Border health : Mortality rate per 100.000 population

El Paso (US) / Cd. Juarez (MEX)
Satelite photo (google maps, retrieved 21st June 2015)



El Paso (US) / Cd. Juarez (MEX)
Satelite photo (google maps, retrieved 21st June 2015)

El Paso (US) / Cd. Juarez (MEX)
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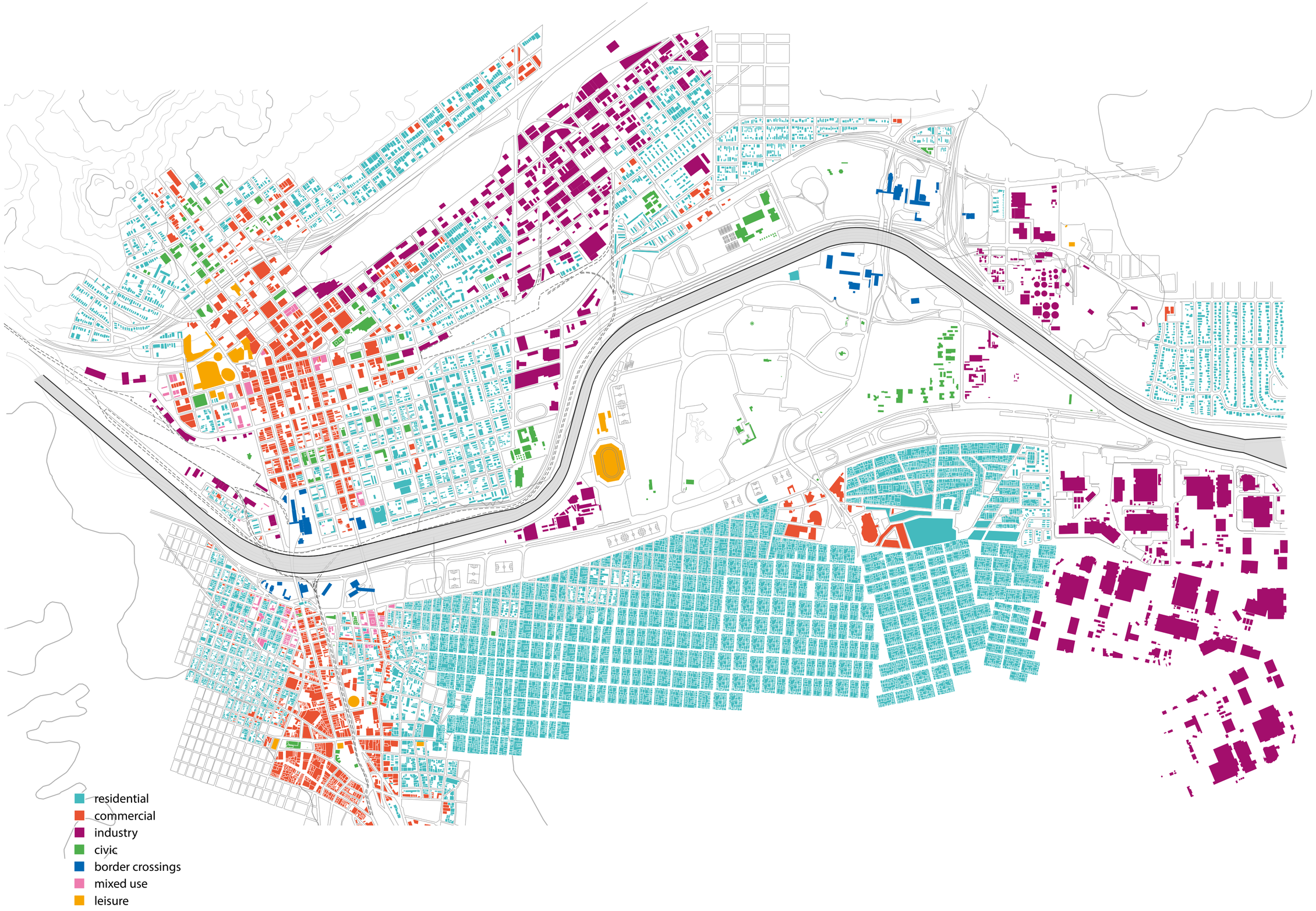


El Paso (US) / Cd. Juarez (MEX)
Landuse map

El Paso (US) / Cd. Juarez (MEX)
Chamizal zone

New rio grande channel dug in 1968

Concrete ditch today

Besides industry and a large green zone, the chamizal is mostly used for informal sports

Chamizal area: vast empty plots of land

Chamizal: old stadium is used 4 times a month but doens’t interact with communities

Chamizal: old stadium is used 4 times a month but doens’t interact with communities

Chamizal: view towards the stadium

PROPOSAL CHAMIZAL ZONE

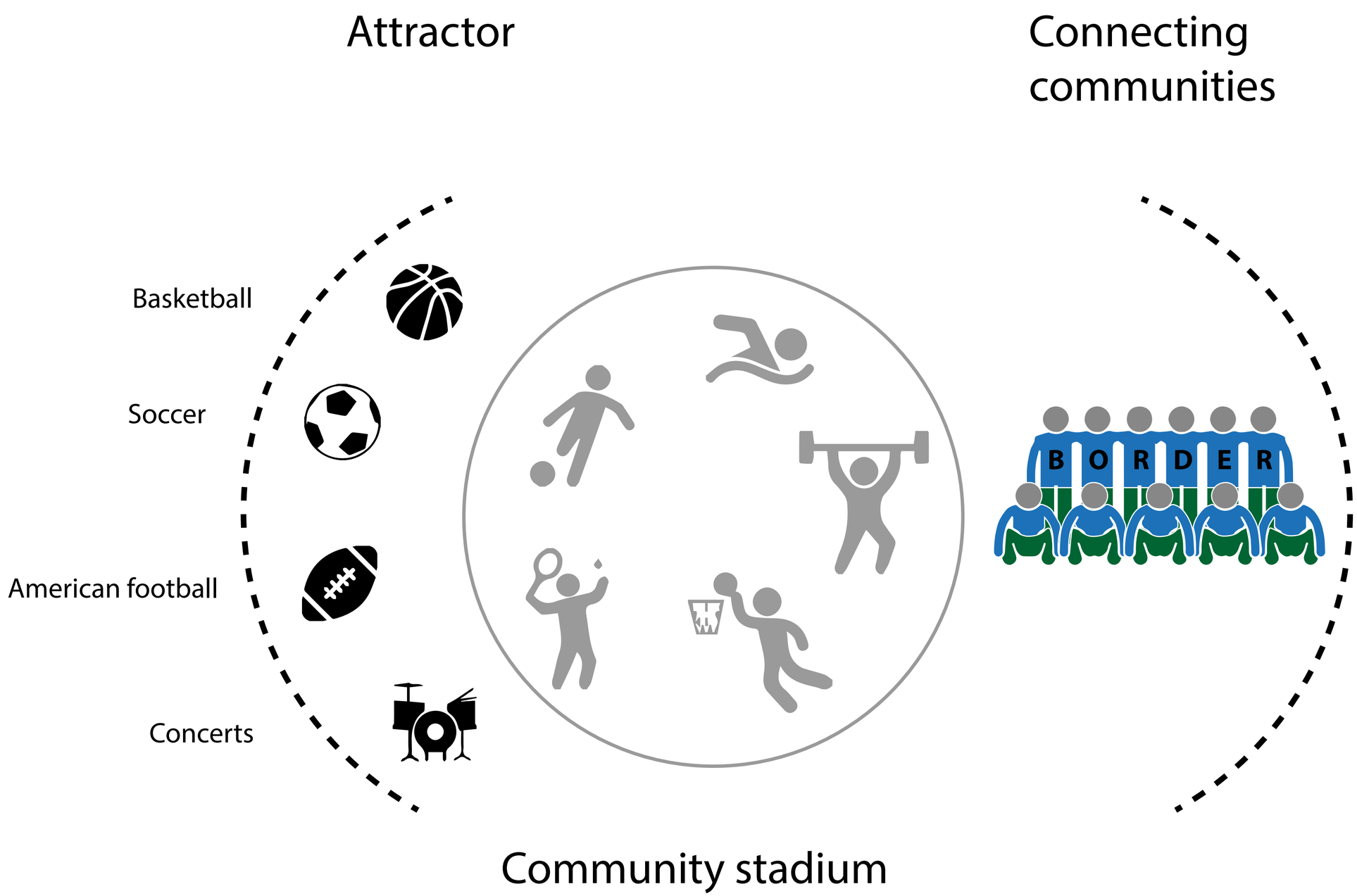
CONCEPT

Communities El Paso

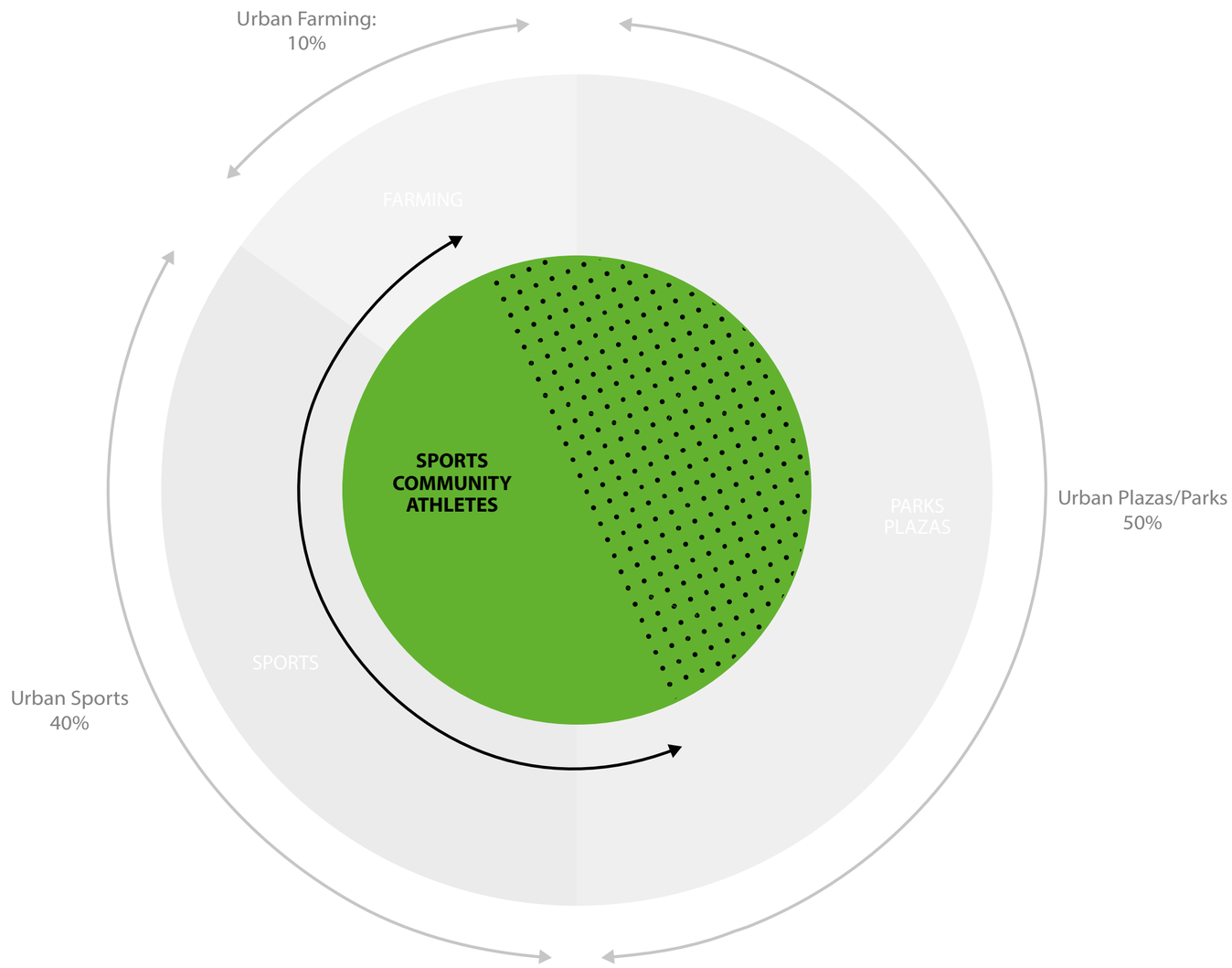
Communities Cd. Juarez

Community sportshub

Ambition: creating a sportshub for the communities of Cd. Juarez and El Paso

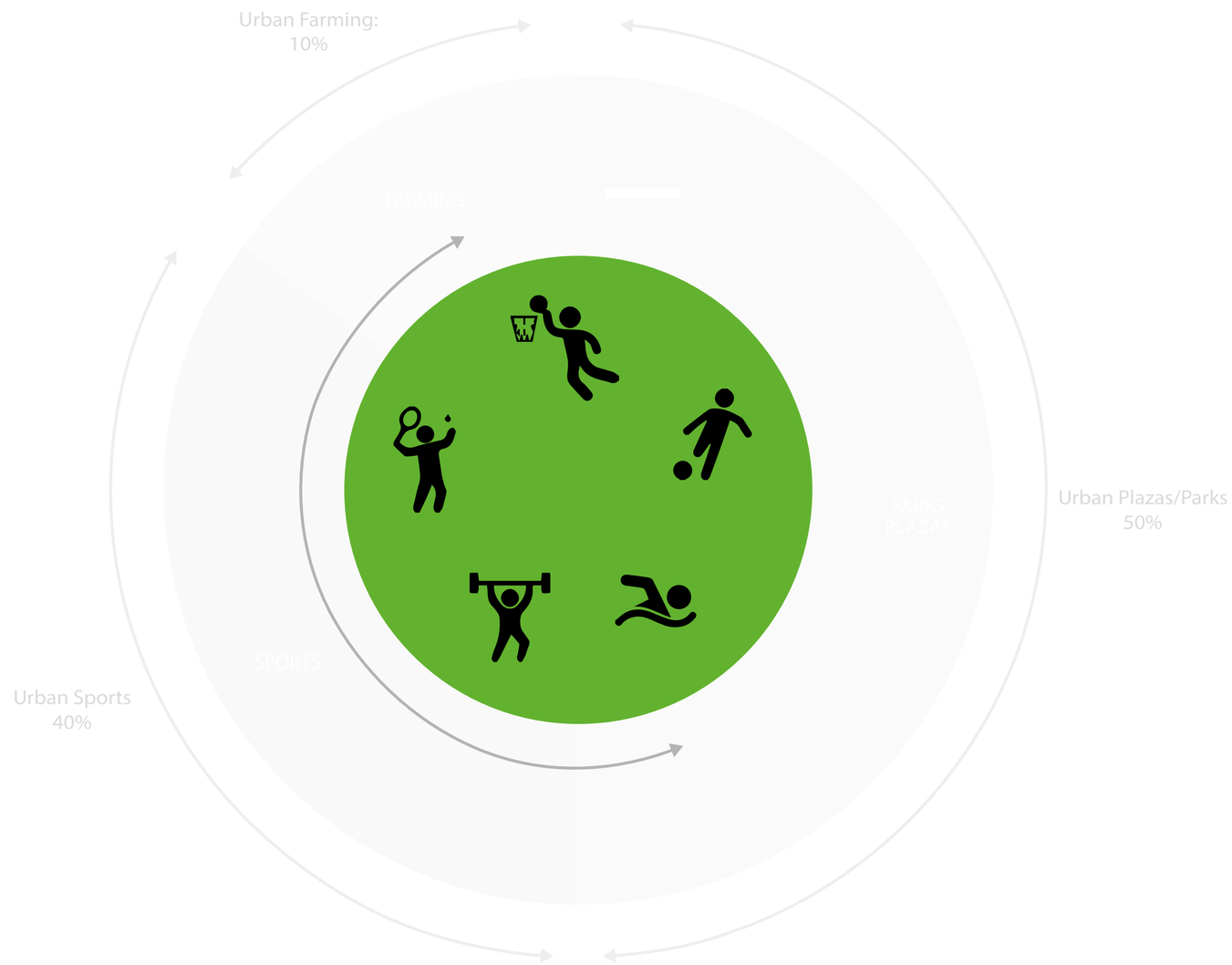


Ambition: Adding attractors and connecting communities



Program sportshub

Method: Program of sportshub/stadium

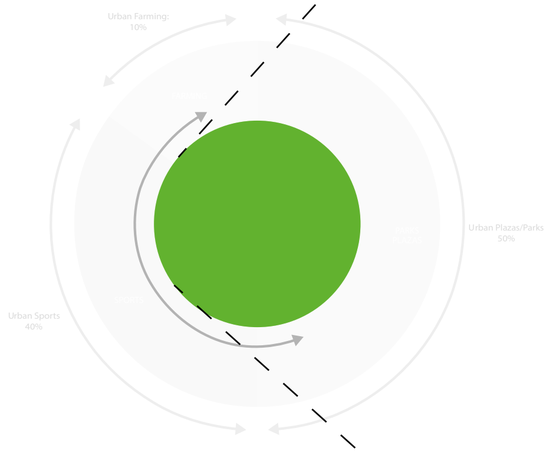


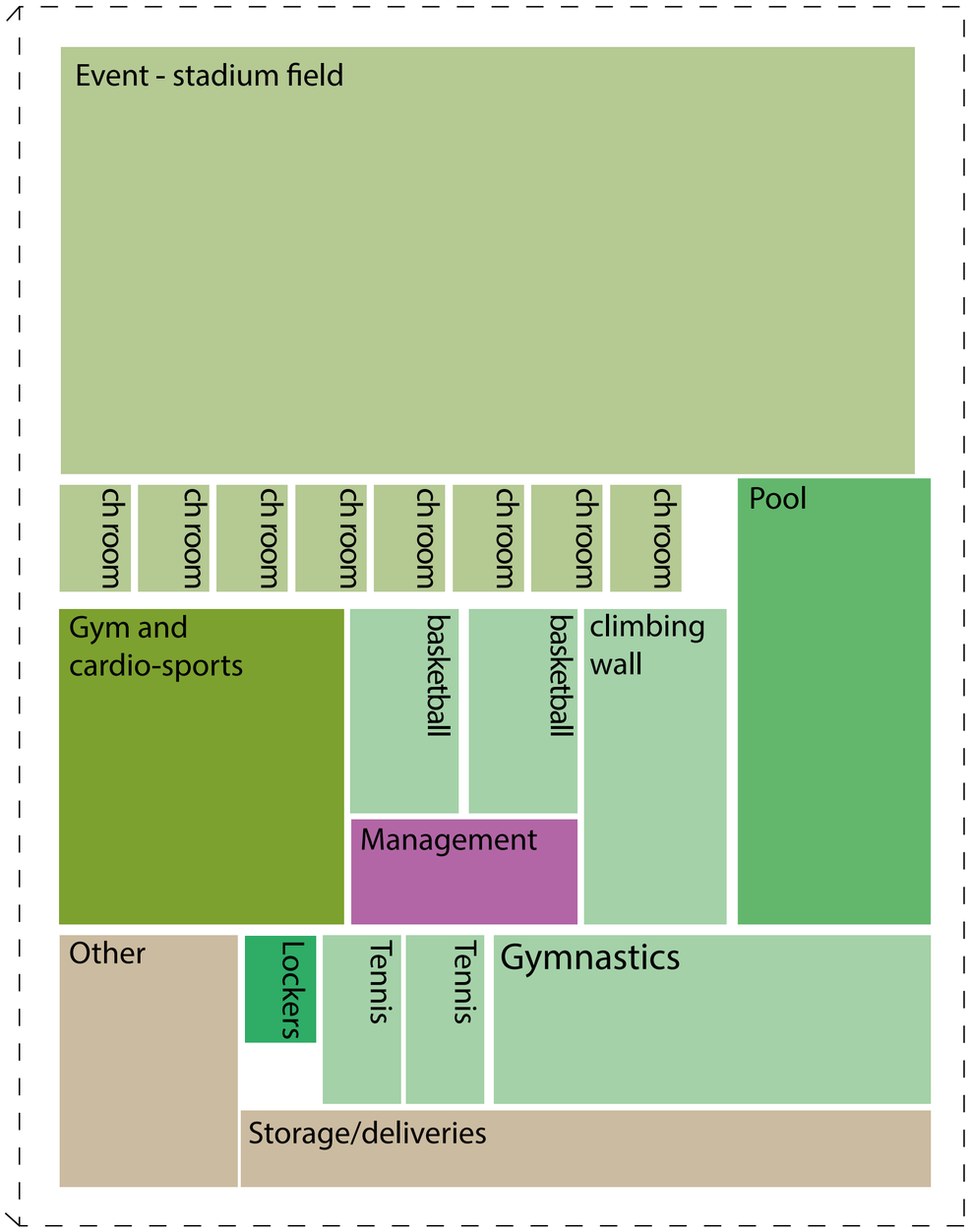
Community sports

Method: Program of sportshub/stadium

Grand sport events

Method: Program of sportshub/stadium





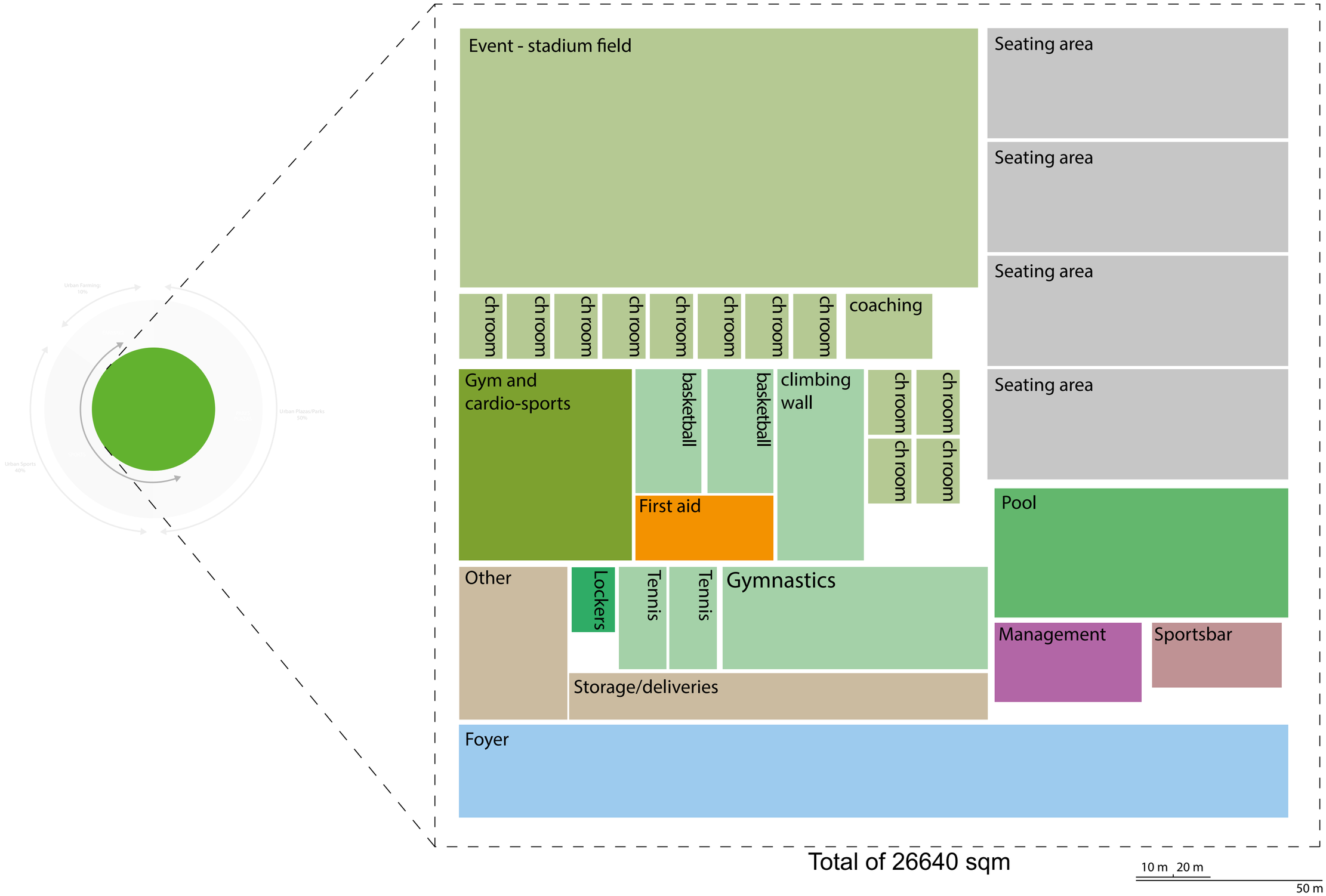
+ stadium program

Program community sports

10 m 20 m

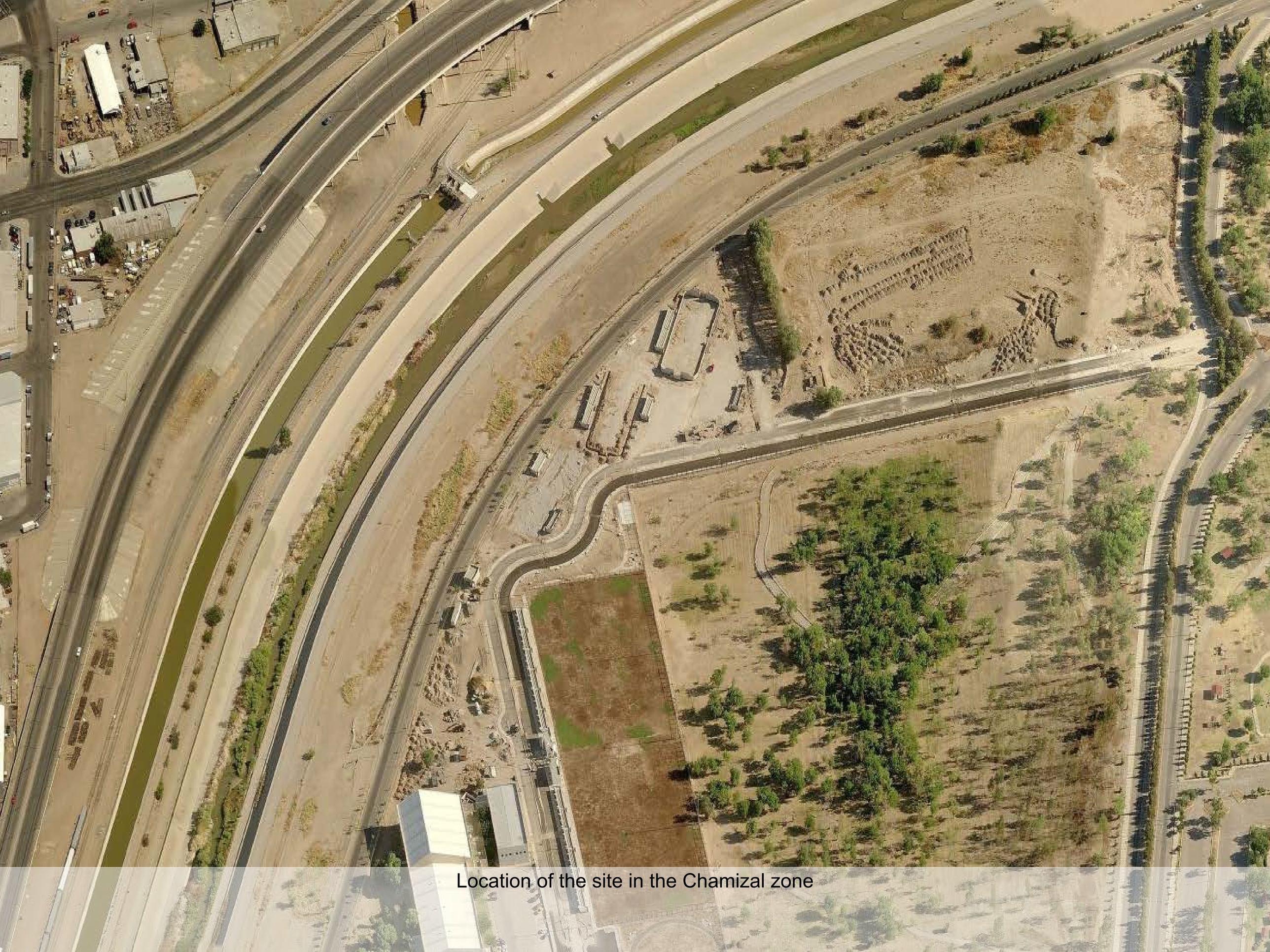
50 m

Method: Program of sportshub/stadium

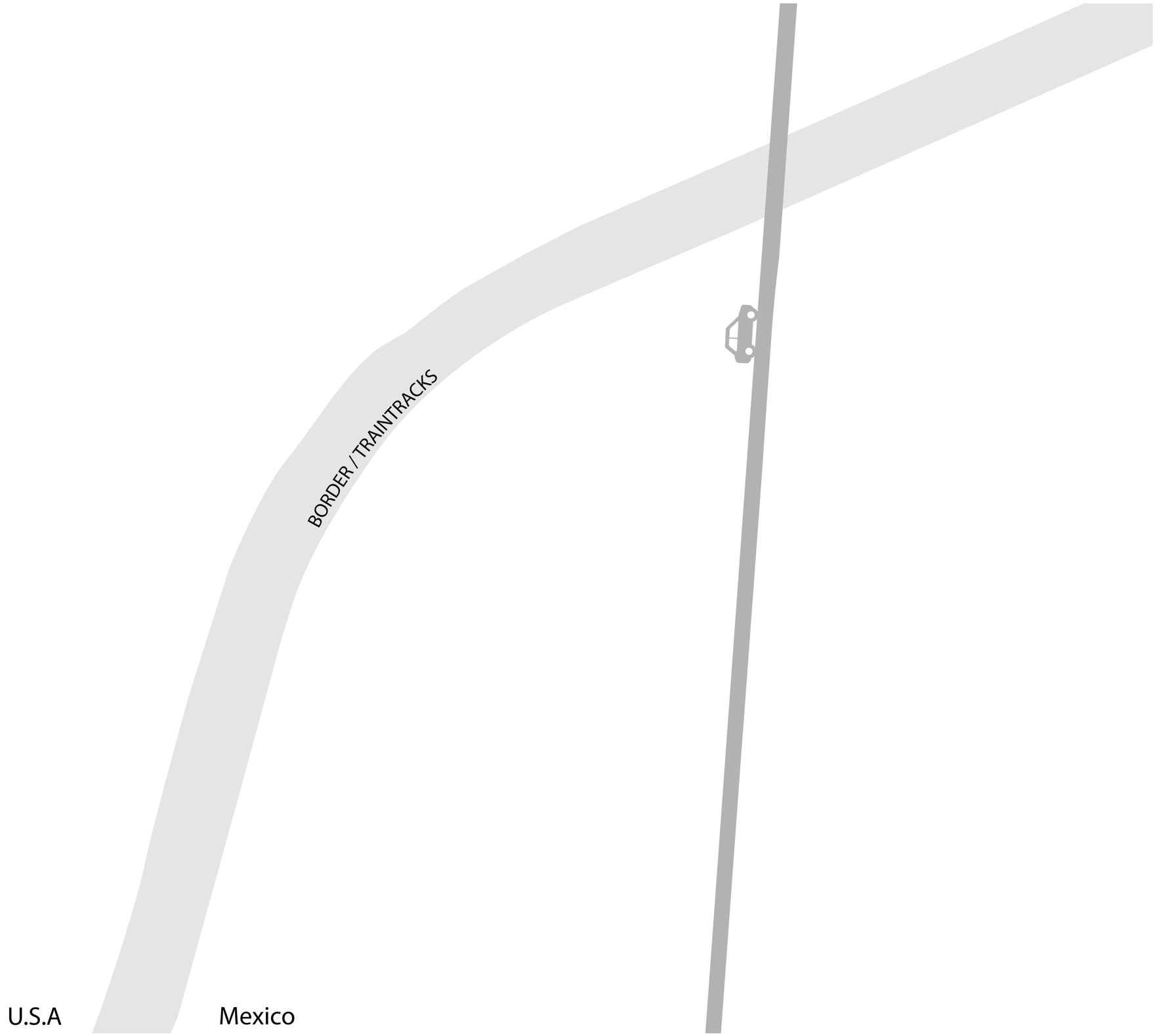


Method: Program of sportshub/stadium

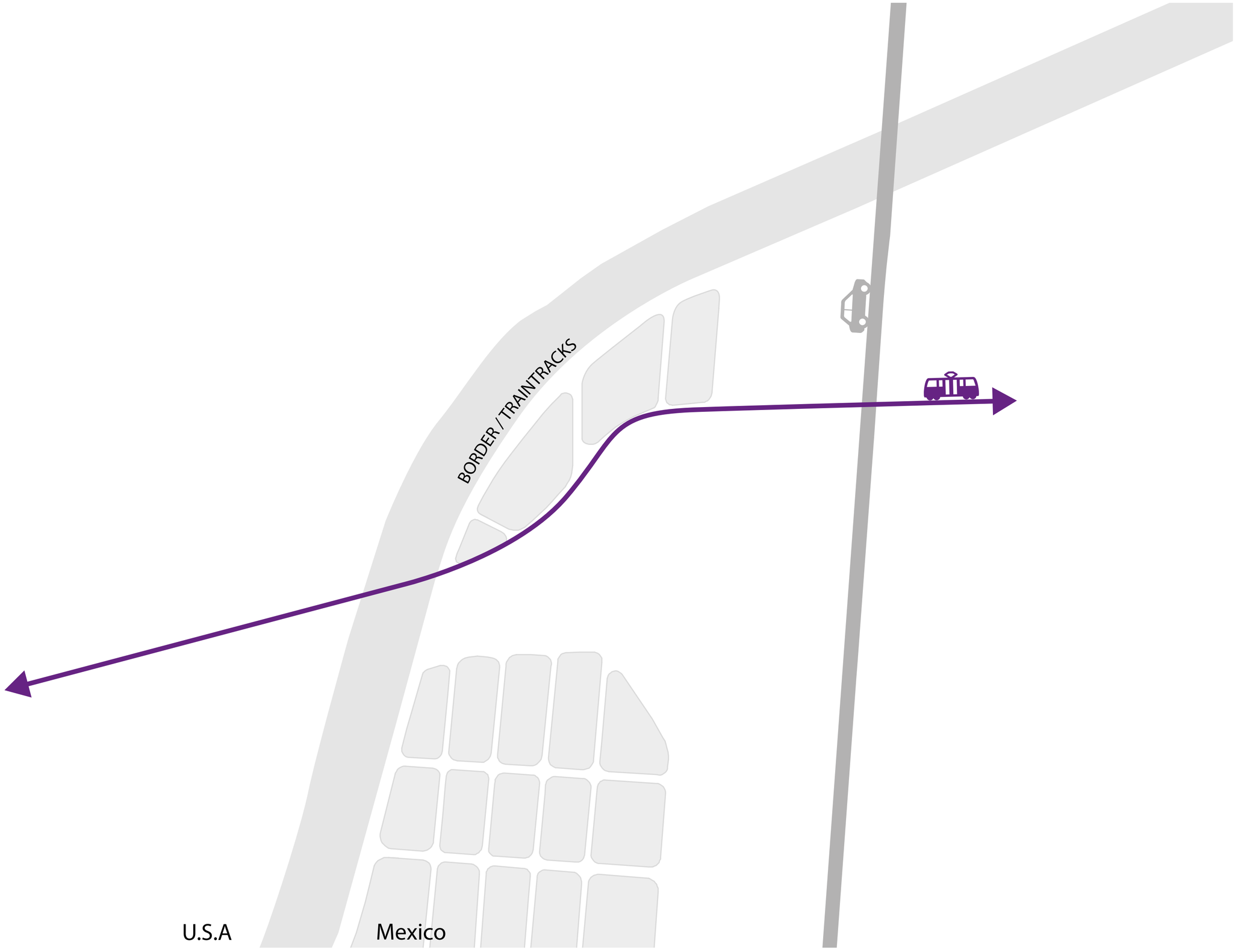
Site in the proposal of the Chamizal Zone



Location of the site in the Chamizal zone

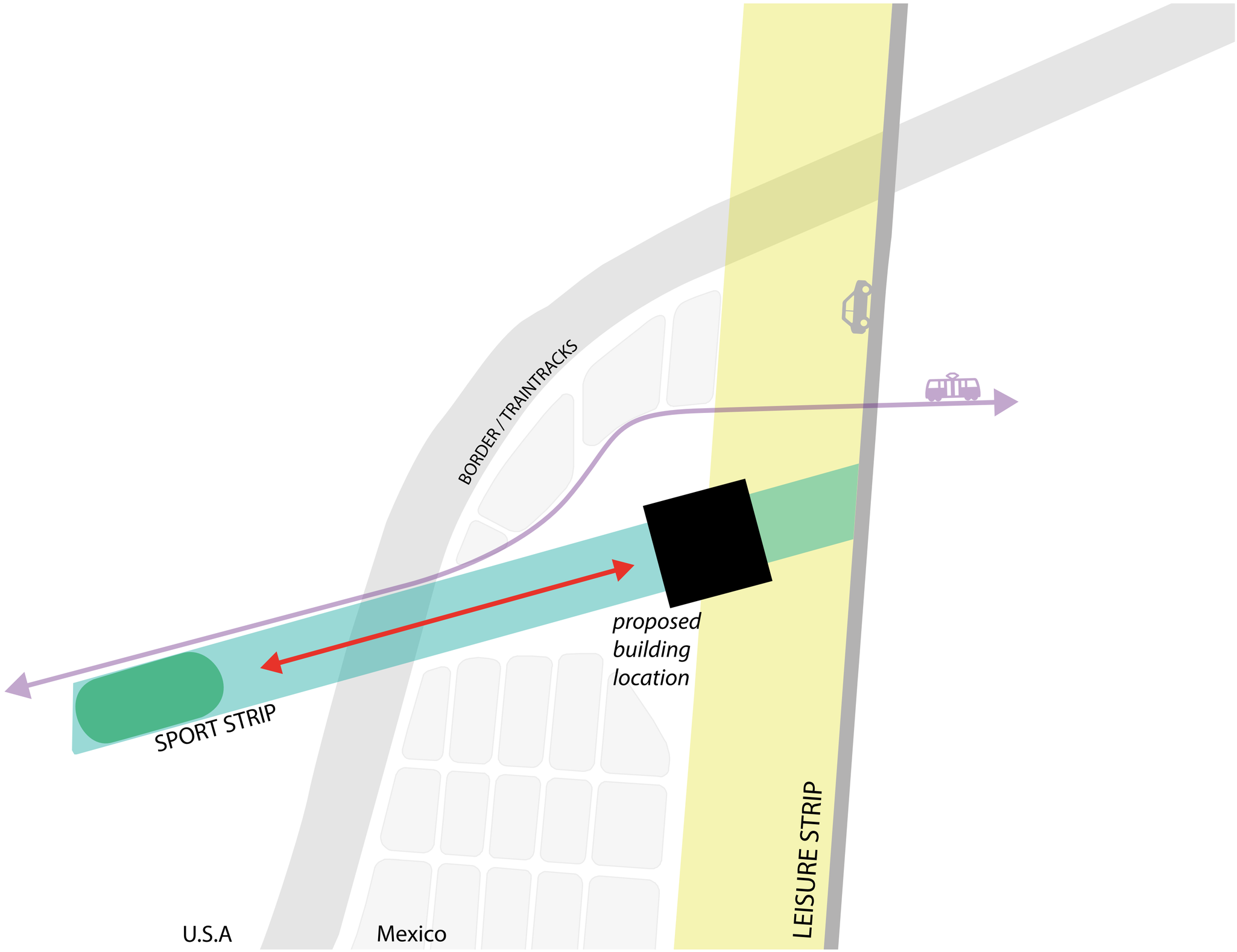


Masterplan: site

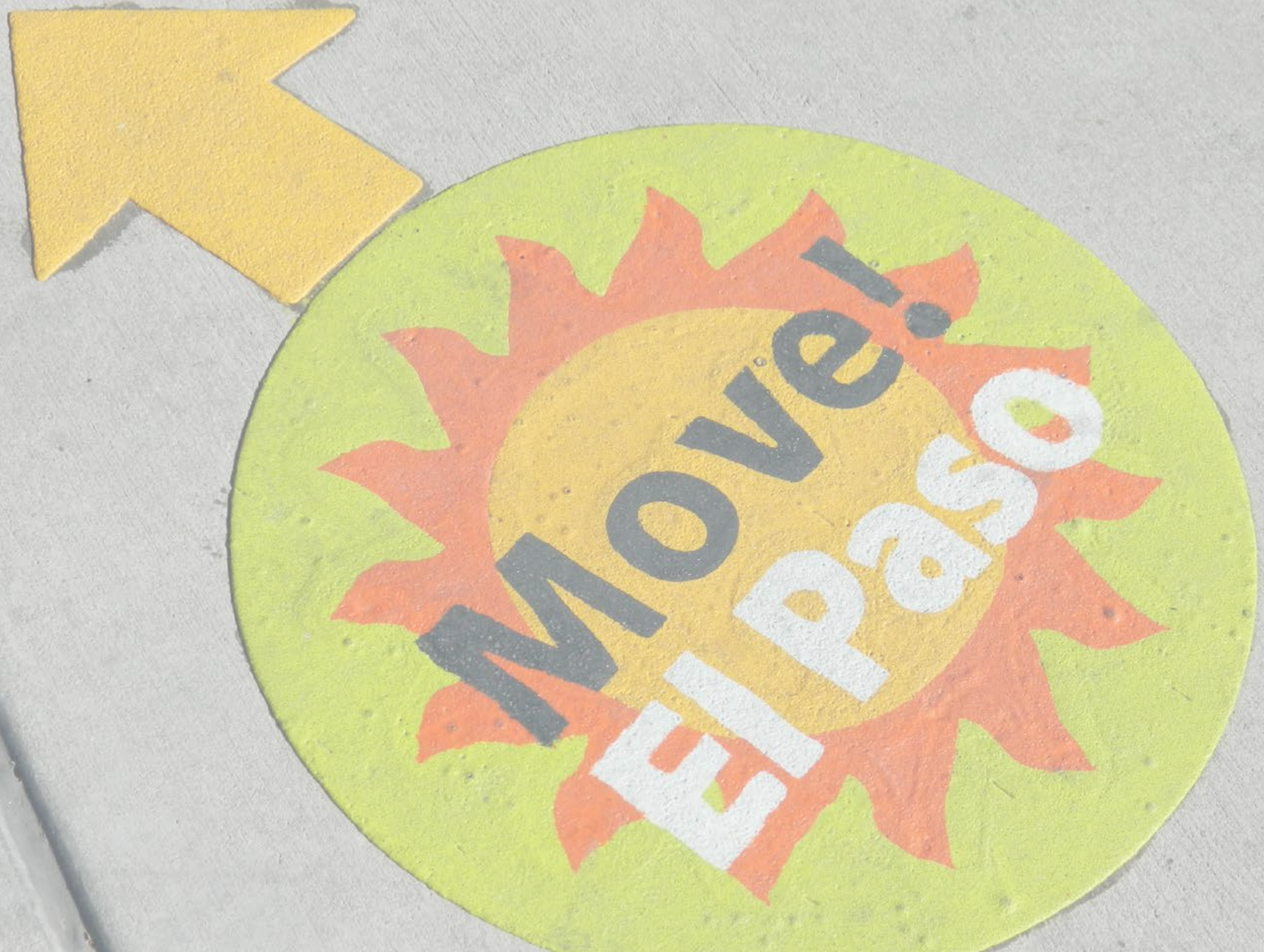


Masterplan: adding residential area and public transport

Masterplan: 2 axis



Masterplan: proposed building location



INTERACTIVITY

Continuing on existing initiatives

Move! El Paso

"10,000 steps a day improves physical and mental wellbeing"

Source: http://www.elpasotexas.gov//moveelpaso

Interactivity: 10.000 steps a day

Move! El Paso

"10,000 steps a day improves physical and mental wellbeing"

Source: http://www.elpasotexas.gov//moveelpaso

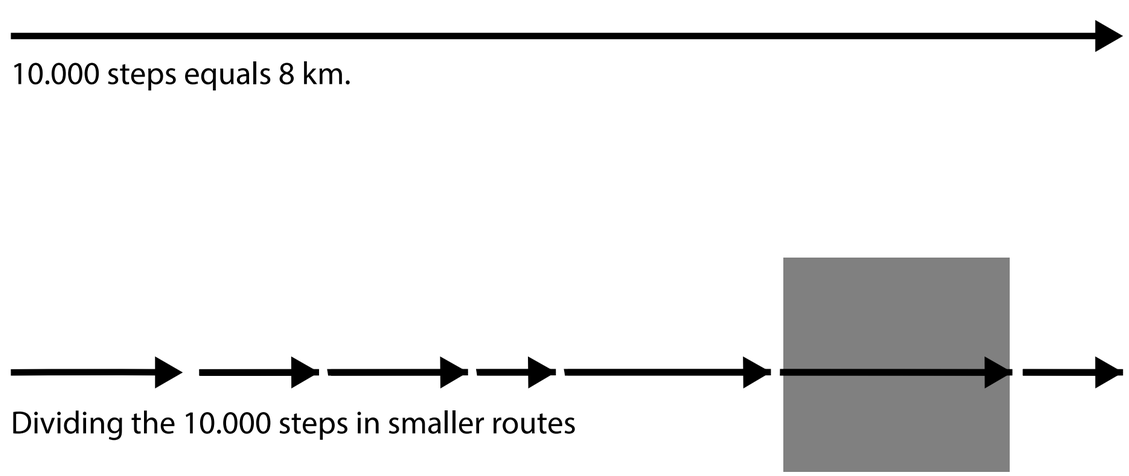
10.000 steps equals 8 km.

Interactivity: 10.000 steps a day

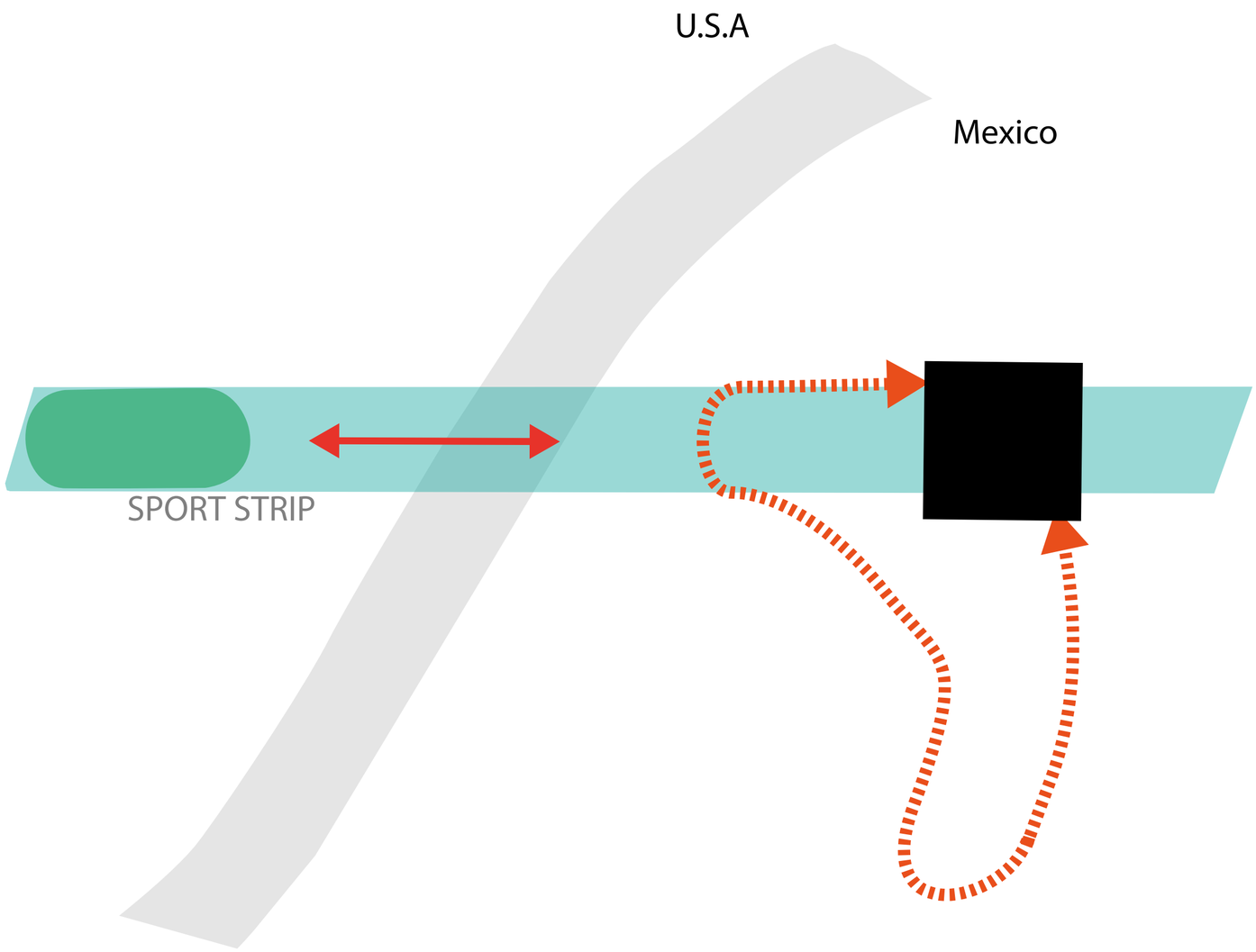
Move! El Paso

"10,000 steps a day improves physical and mental wellbeing"

Source: http://www.elpasotexas.gov//moveelpaso



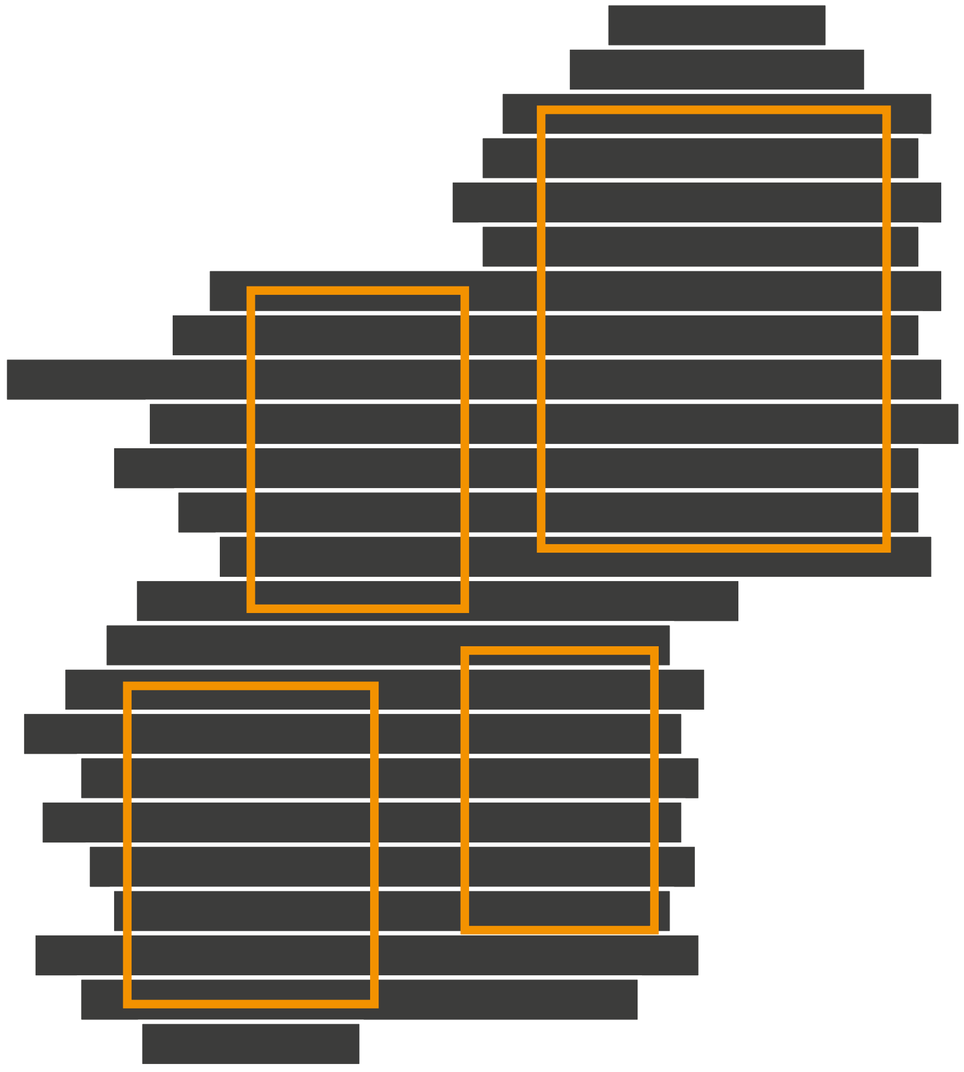
Interactivity: 10.000 steps a day



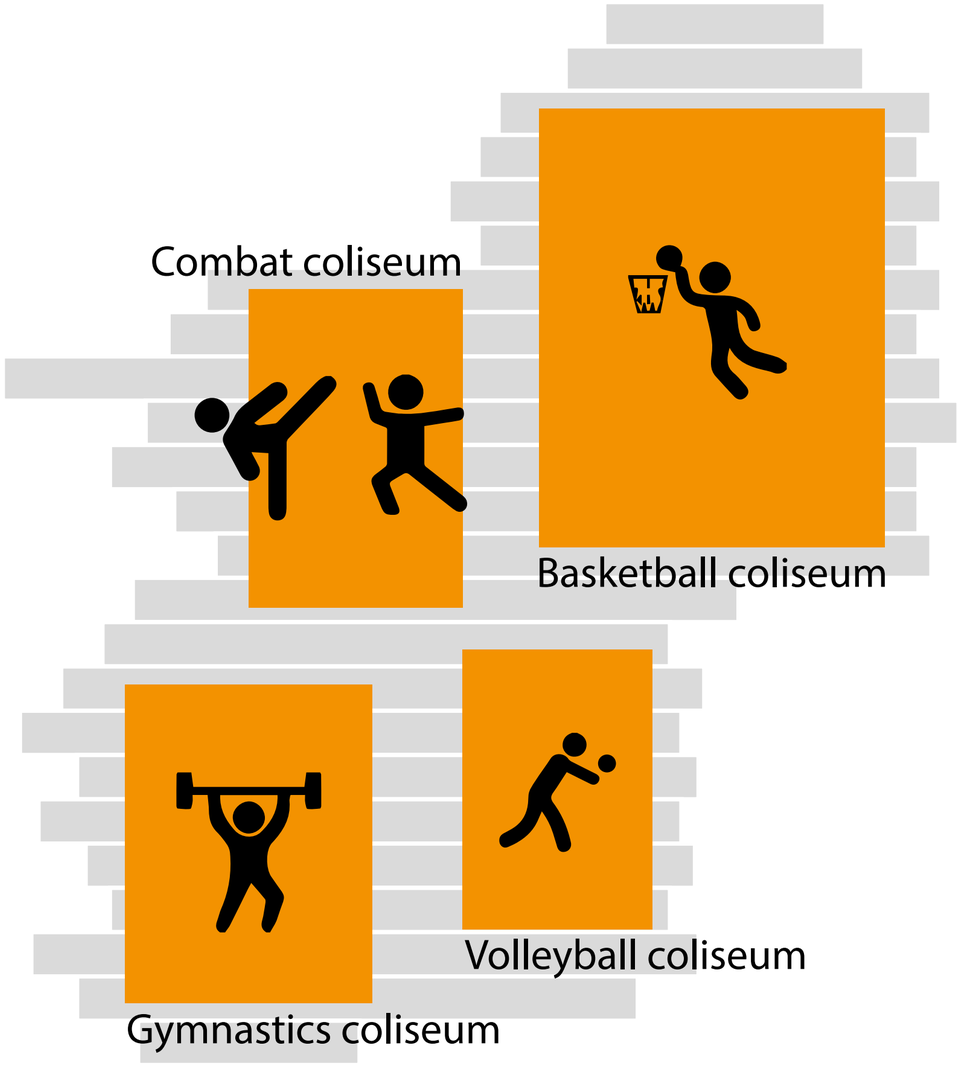
Interactivity at all scales

MEDELLIN
4 SPORT SCENARIOS

Giancarlo Mazzanti | Felipe Mesa | 2010

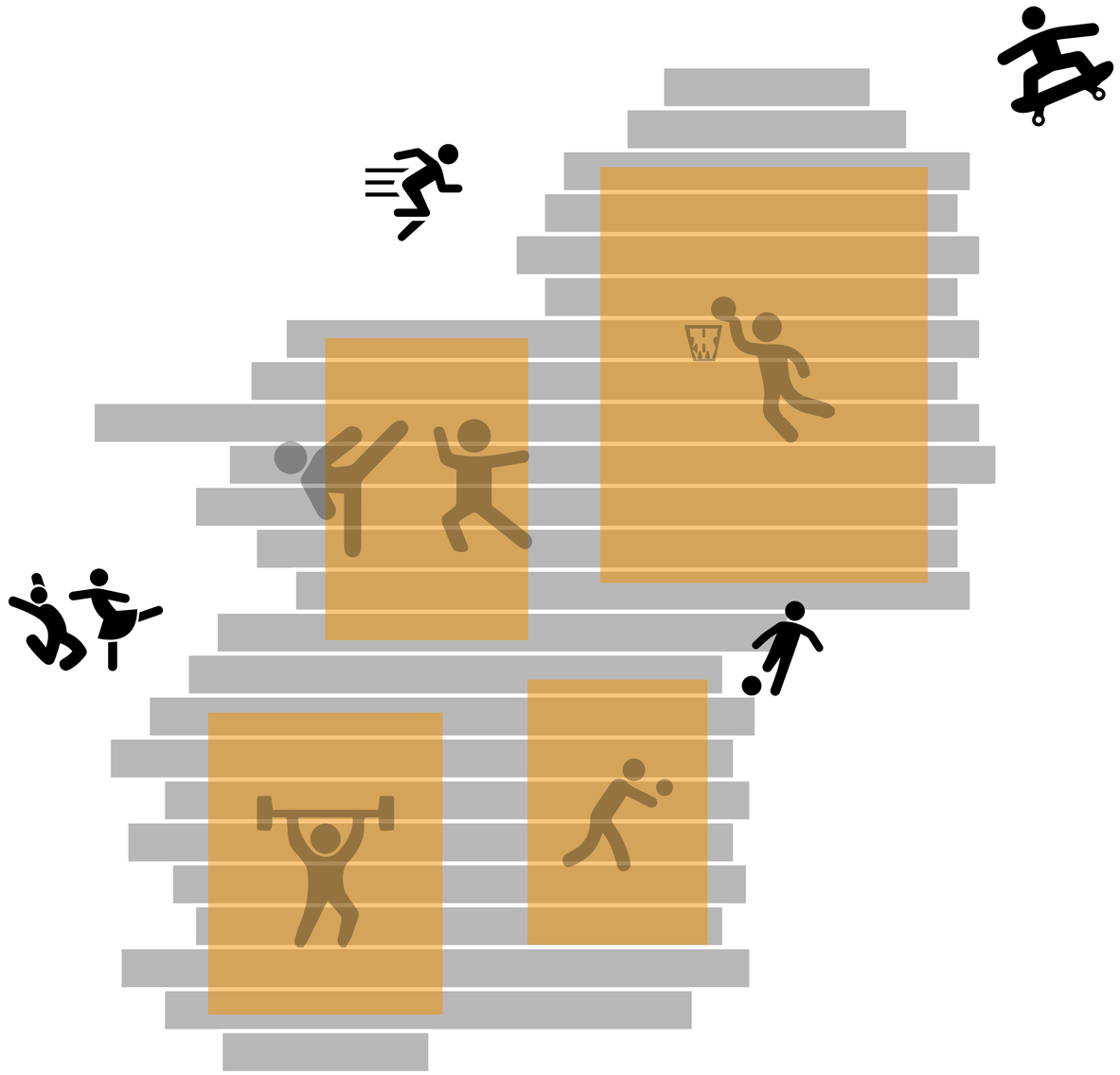


Program Medellin: four sports scenarios



Four coliseums for events and sportclubs (paid)

Program Medellin: four sports scenarios

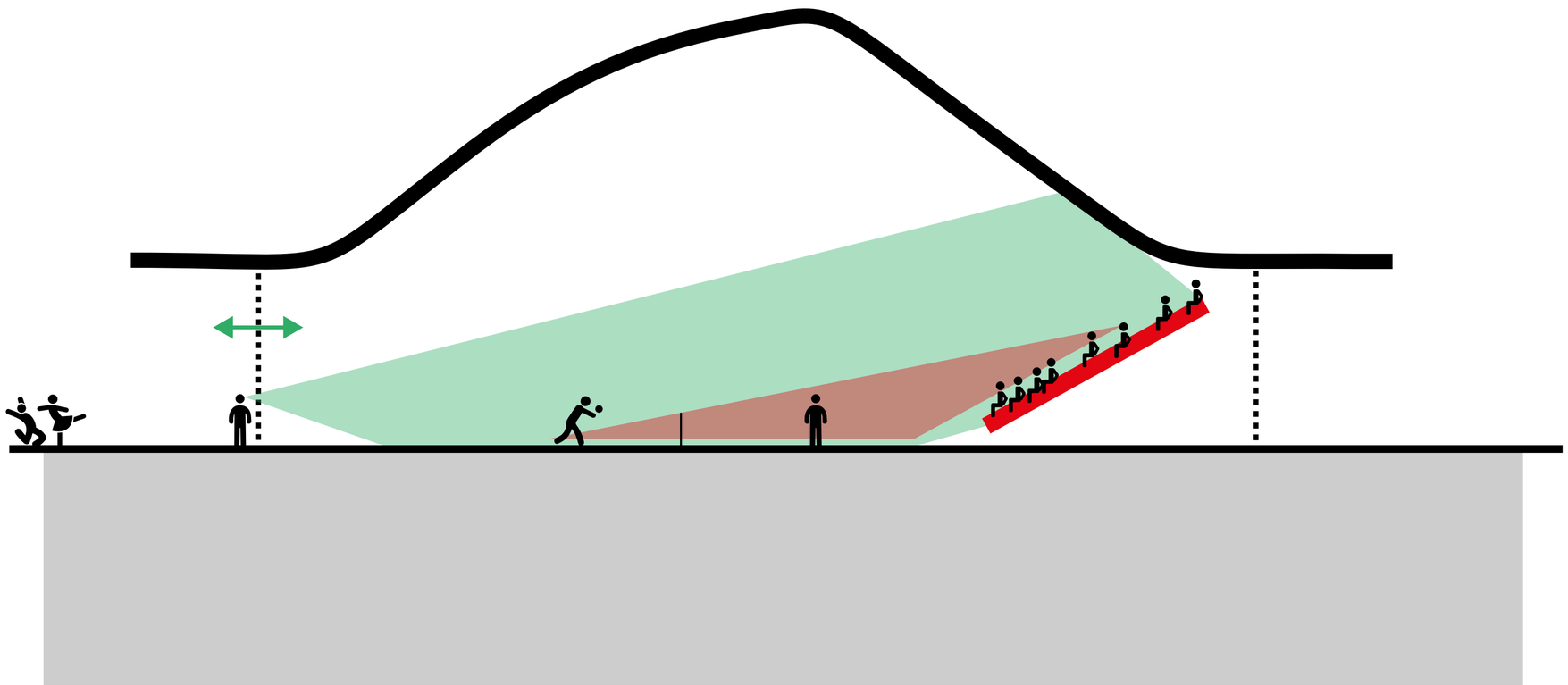


Covered roof creates public recreational activities

Program Medellin: four sports scenarios

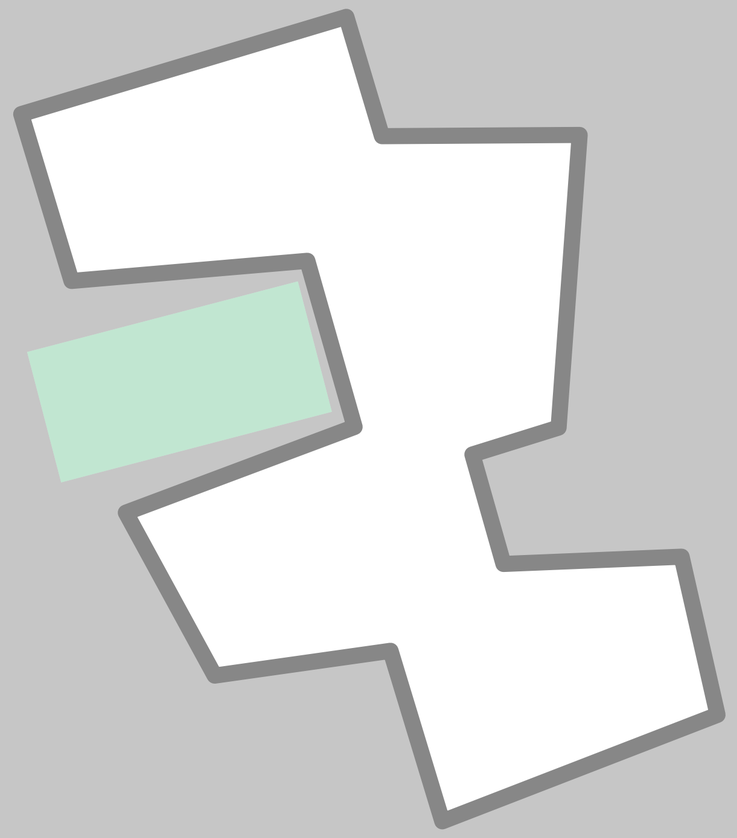
Program Medellin: Perforated facades to blur the interior with exterior activites

Program Medellin: Interior view of the gymnastics coliseum



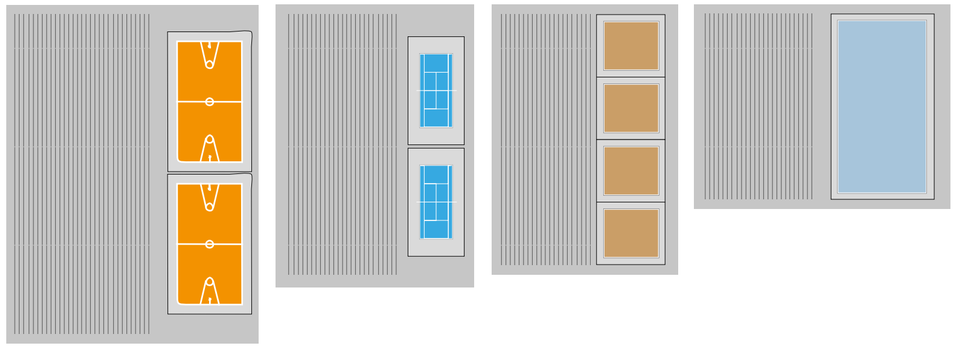
Facade creates interaction of interior and exterior spaces

Program Medellin: diagram

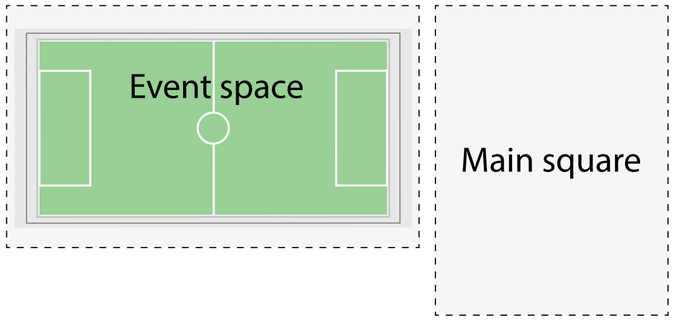


PROCESS

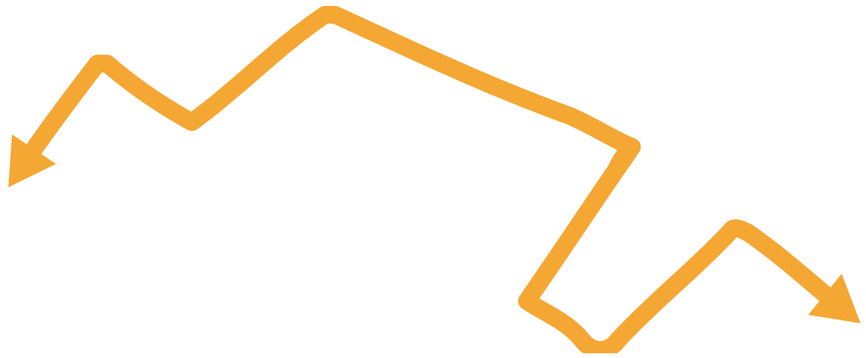
4x sportshall



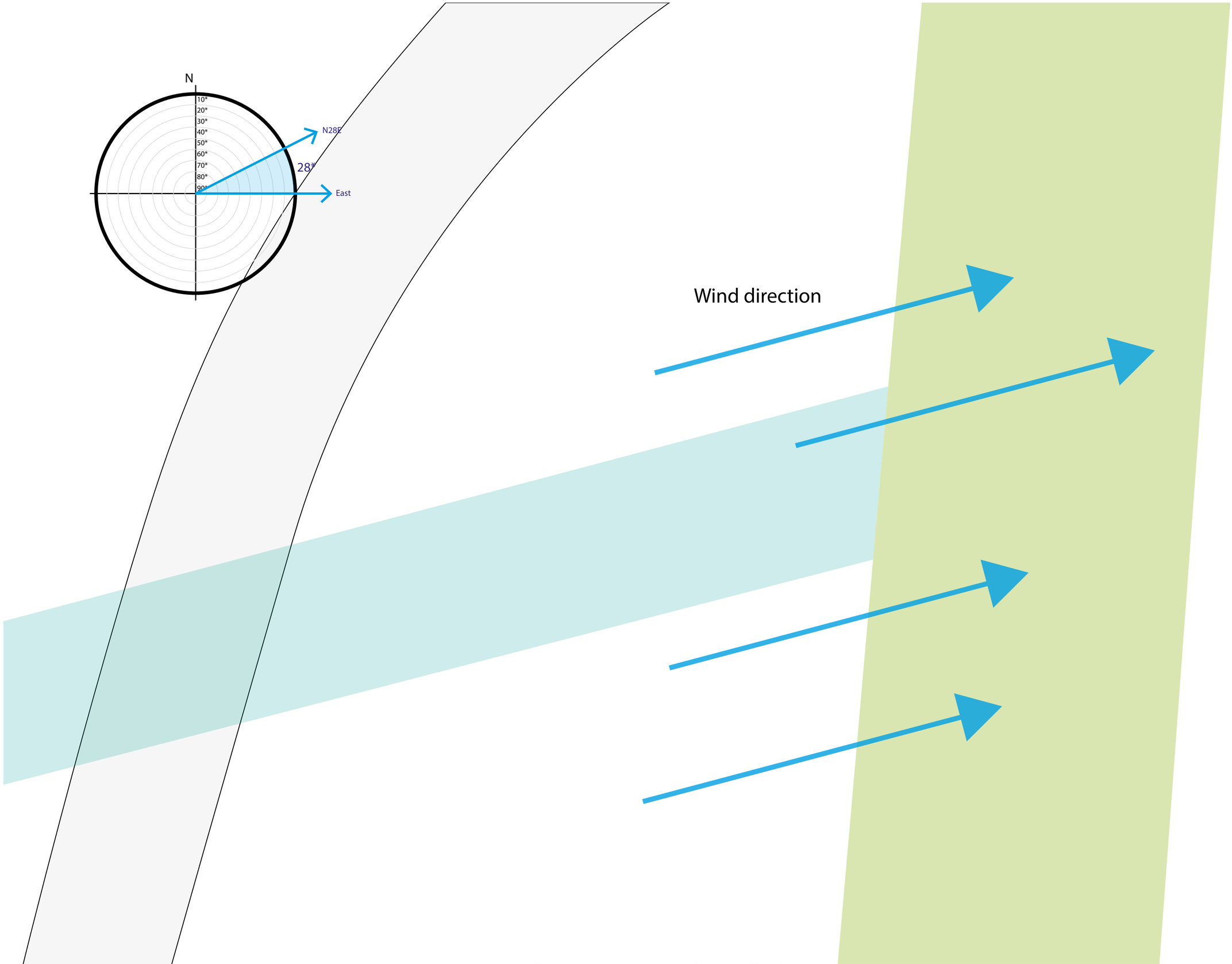
2 x void



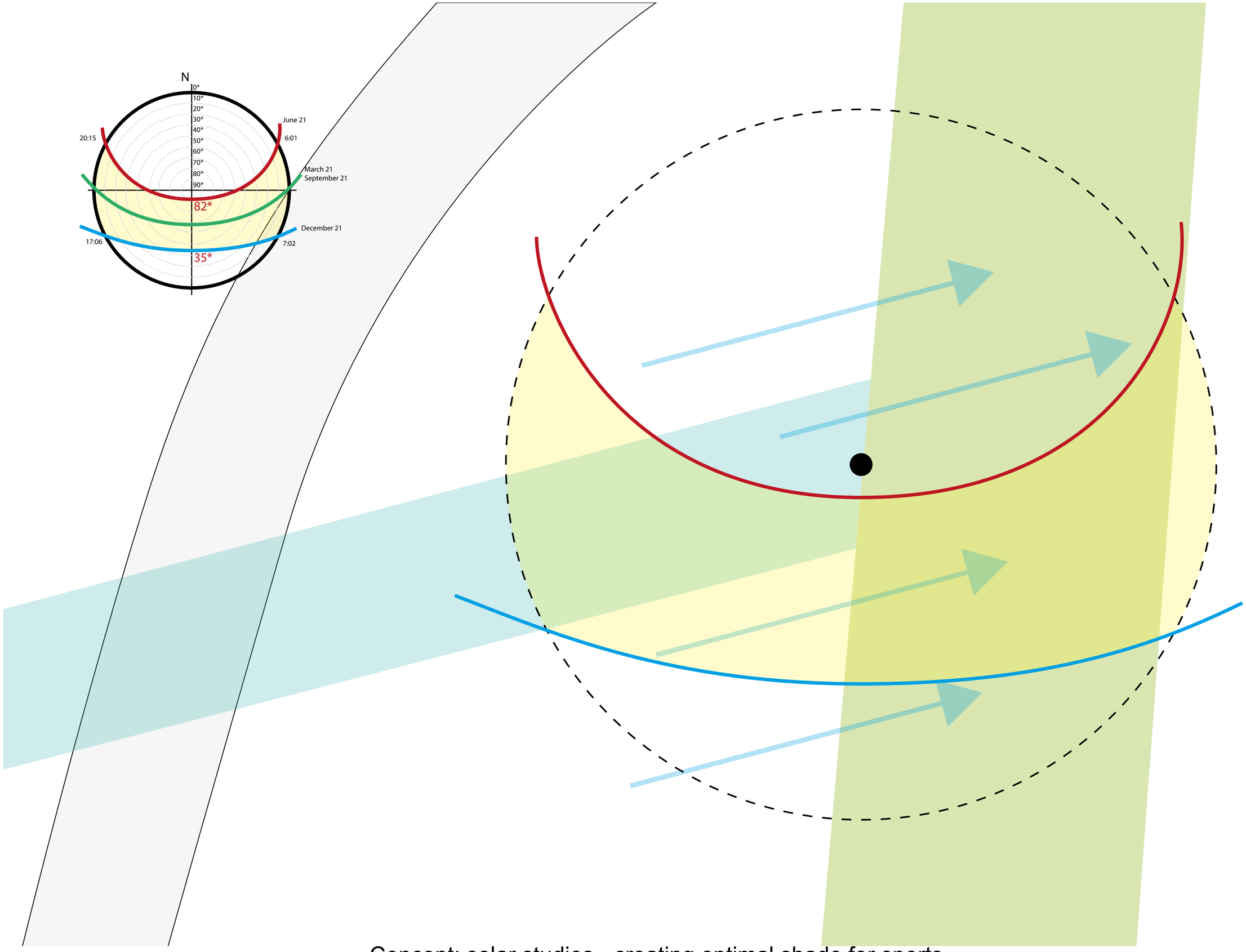
1x circulation



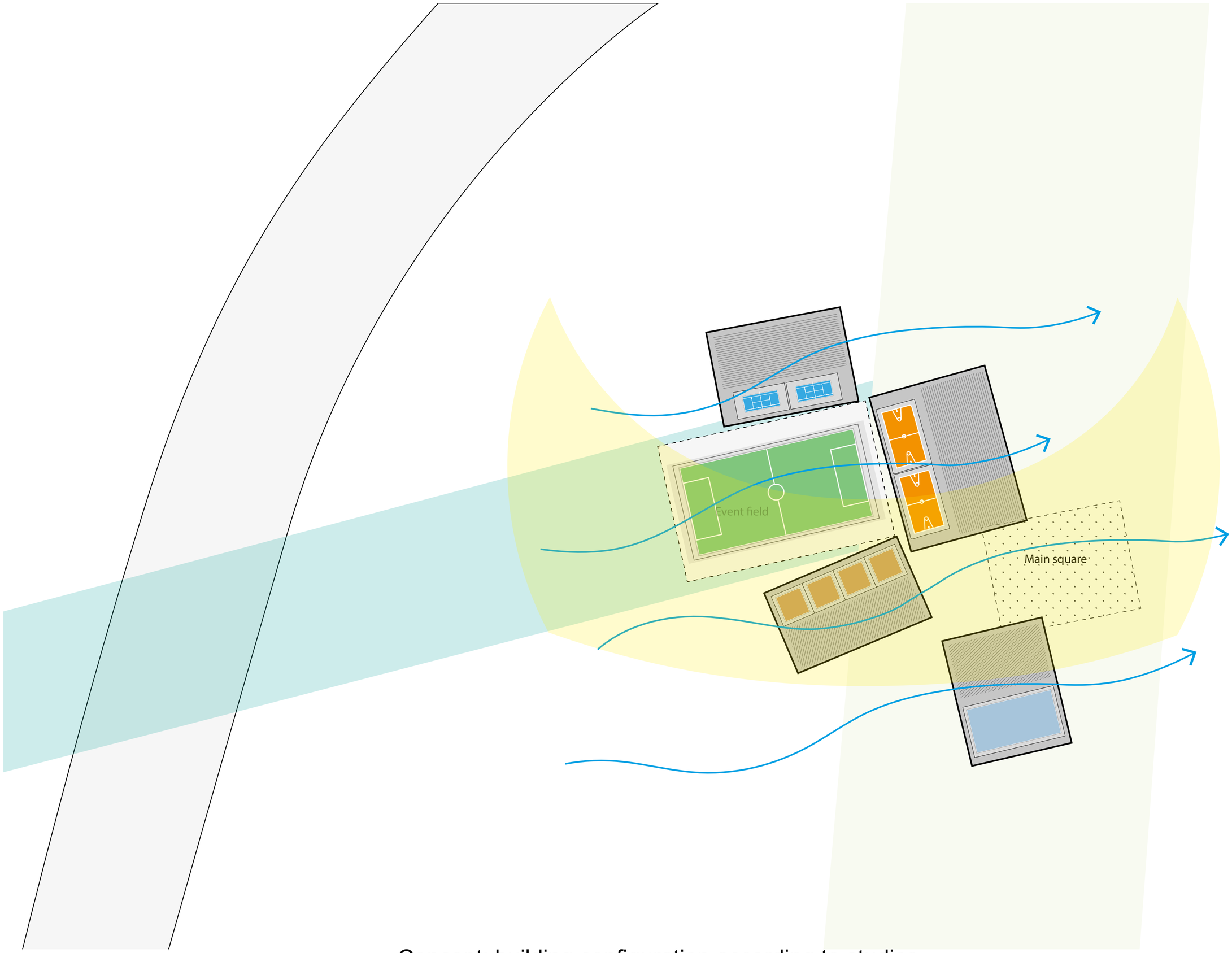
Concept: building elements



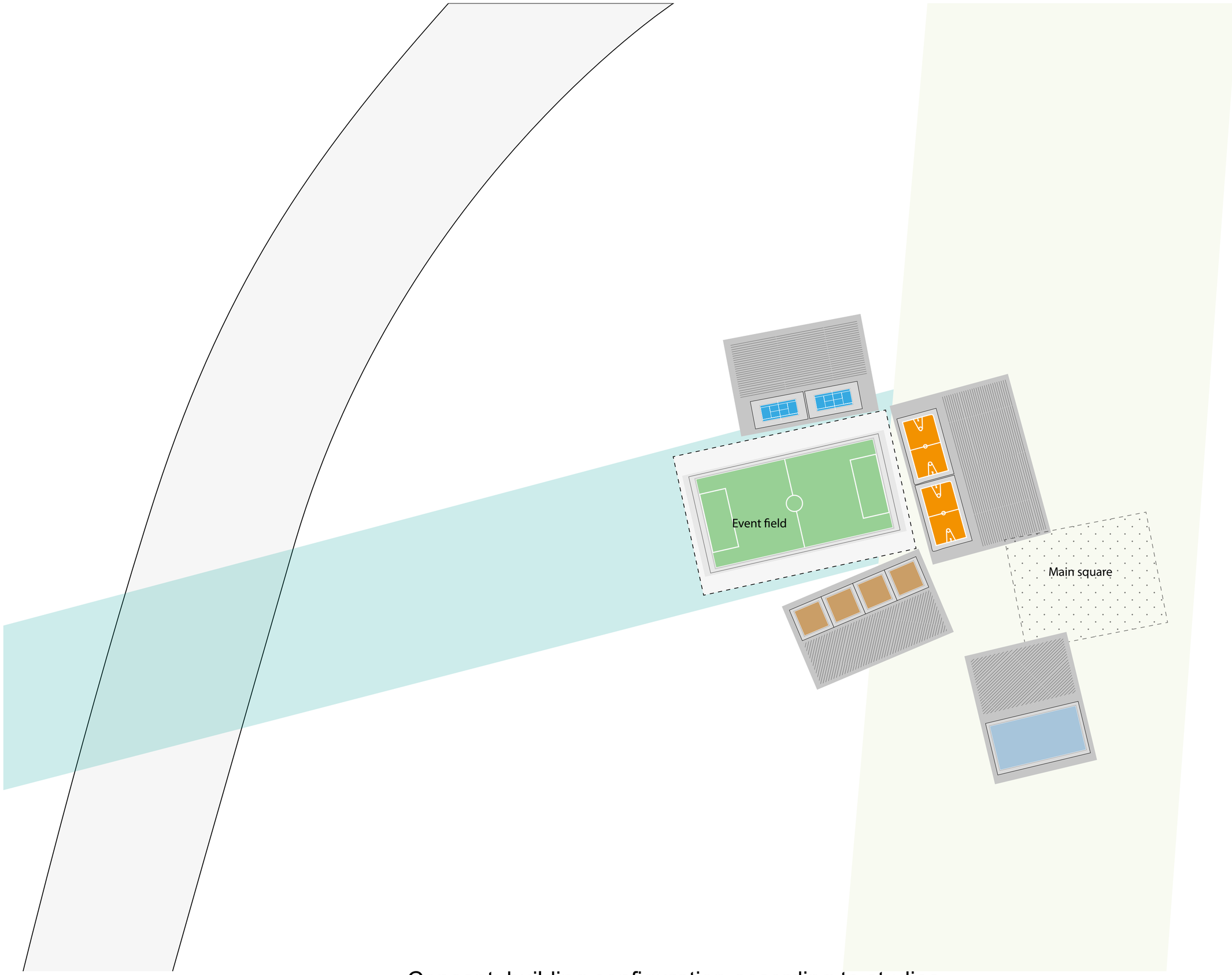
Concept: natural ventilation



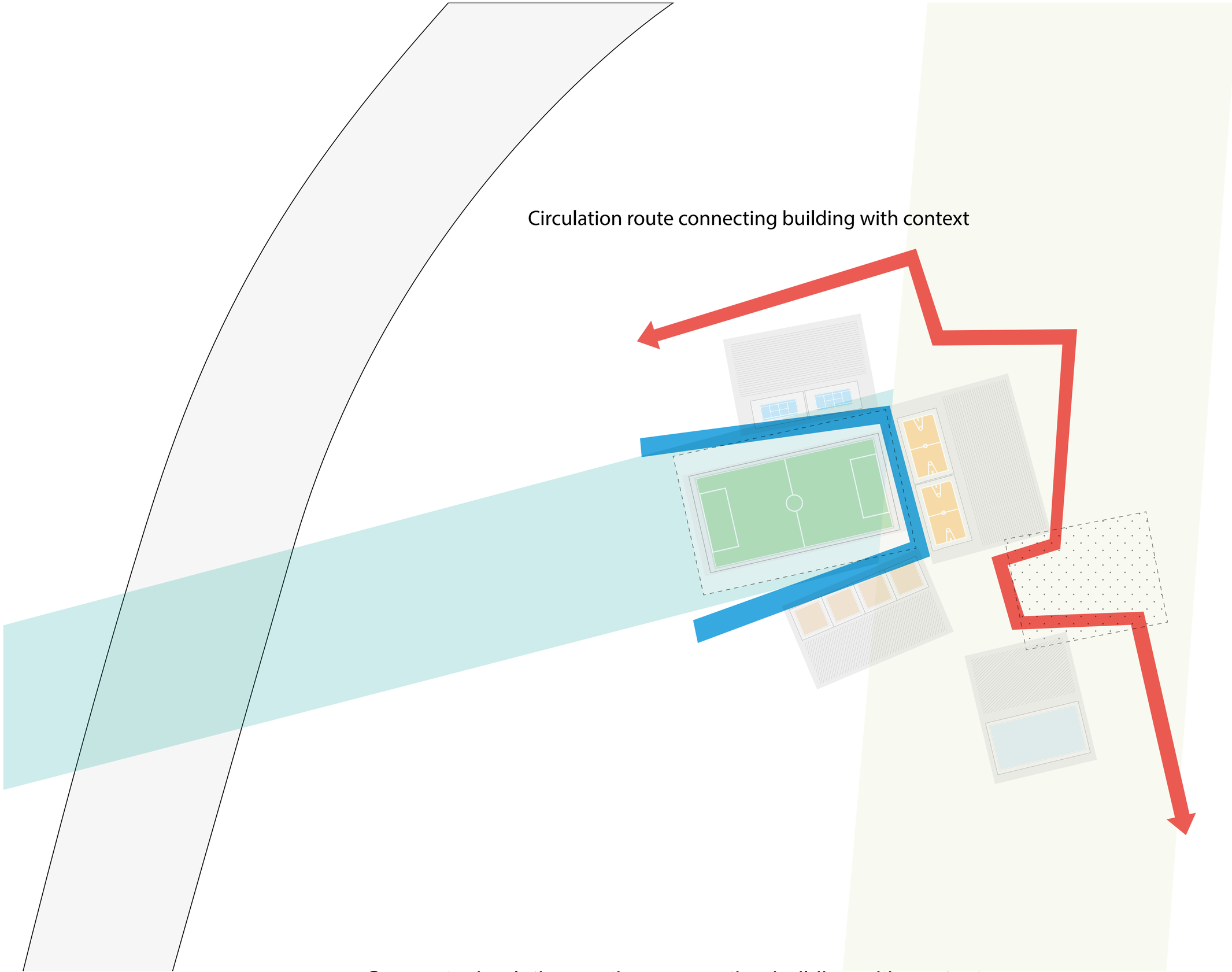
Concept: solar studies - creating optimal shade for sports



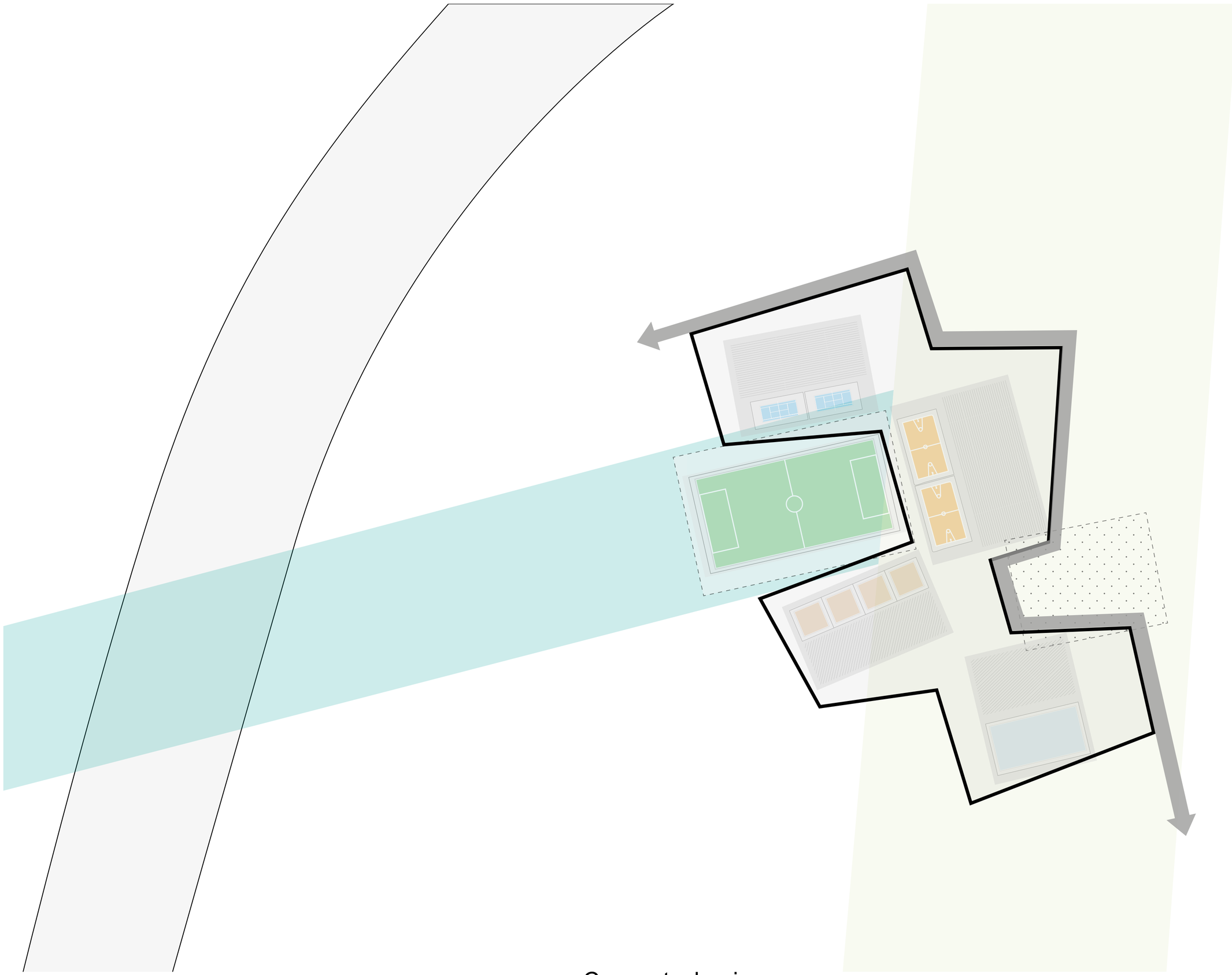
Concept: building configuration according to studies



Concept: building configuration according to studies



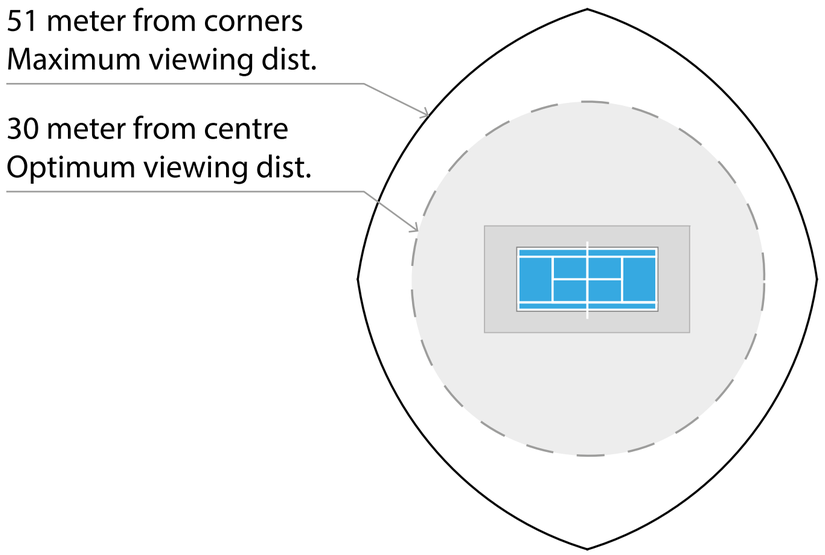
Concept: circulation routing connecting building with context
Defining open and more closed facades



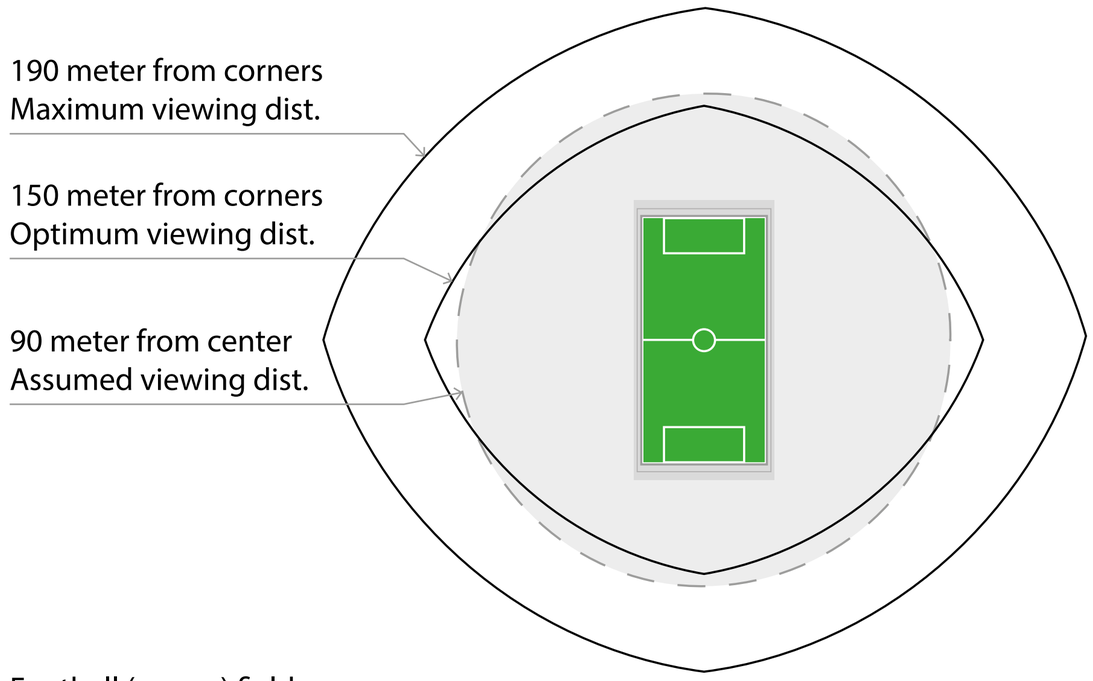
Concept: shaping

Concept: seating capacities

Main guiding concept: extentable tribunes
Community sportscenter and stadium in one building

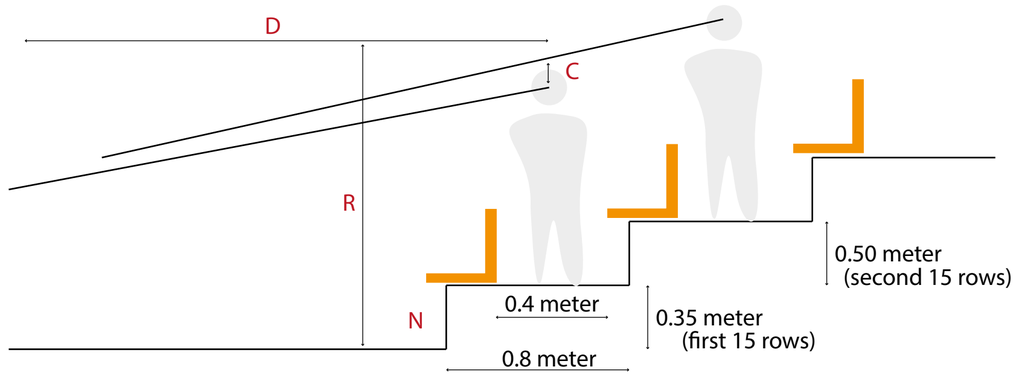


Tennis court
Maximum and optimum viewing distances



Football (soccer) field
Maximum and optimum viewing distances

Source:
Gerhaint, J et al. Stadia: The Populous Design and Development Guide, Architectural press (Oxford,2013)



Prefered layout
US law: 20 seats per row (stairs and exits on each side)
MEX law: unknown

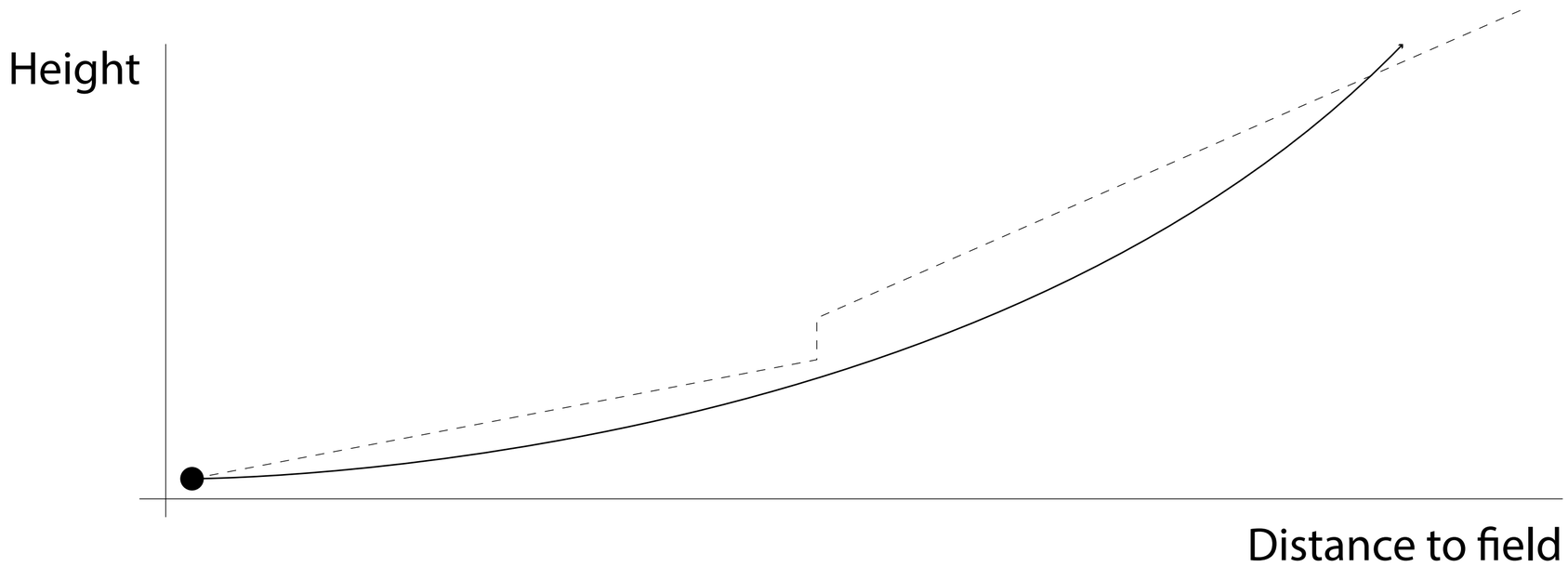
Optimal angle for spectators

Calculation riser 'N':

$$N = \frac{(R+C)(D+T)}{D} - R$$

N = riser in meter
R = height between eyes and field
C = sightline (typically 0.15 m, for wheelchairs 0.9m
D = distance from eye to point of view on field.
T = depth of seating row

Source:
Gerhaint, J et al. Stadia: The Populous Design and Development Guide, Architectural press (Oxford,2013)

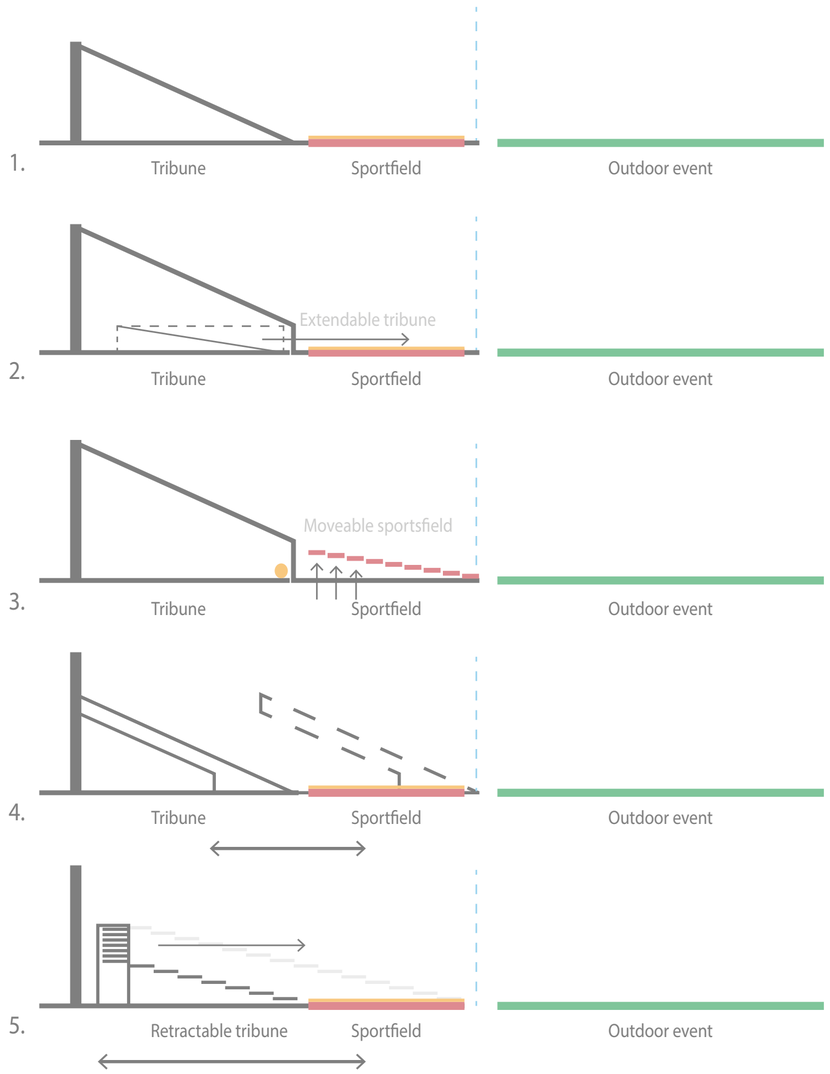


Source:
Gerhaint, J et al. Stadia: The Populous Design and Development Guide, Architectural press (Oxford,2013)

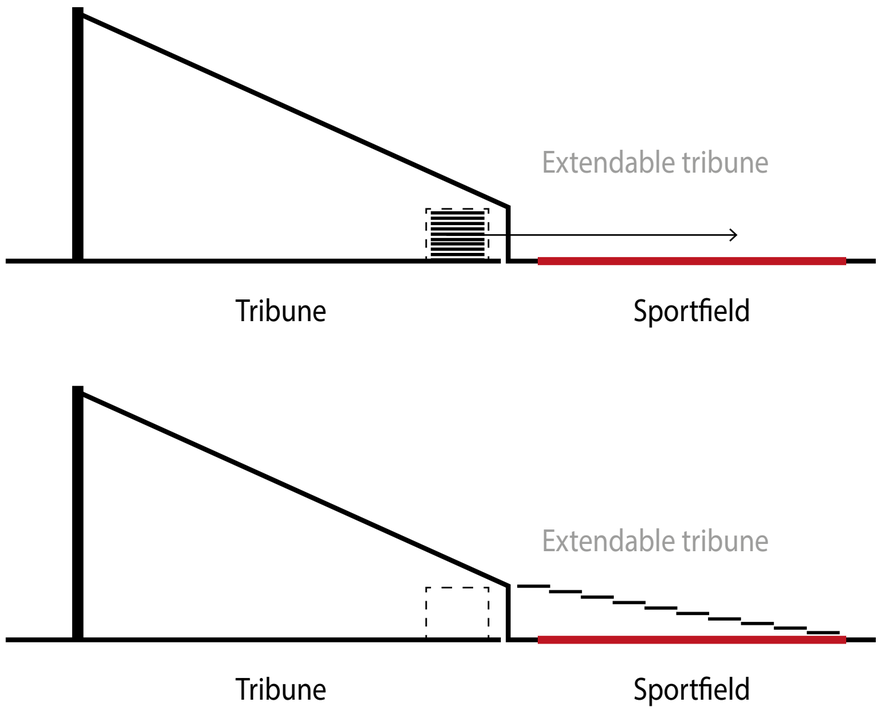
Result of calculation riser: most ideal tribune layout

Research into sightlines and seating angles

Options



Chosen

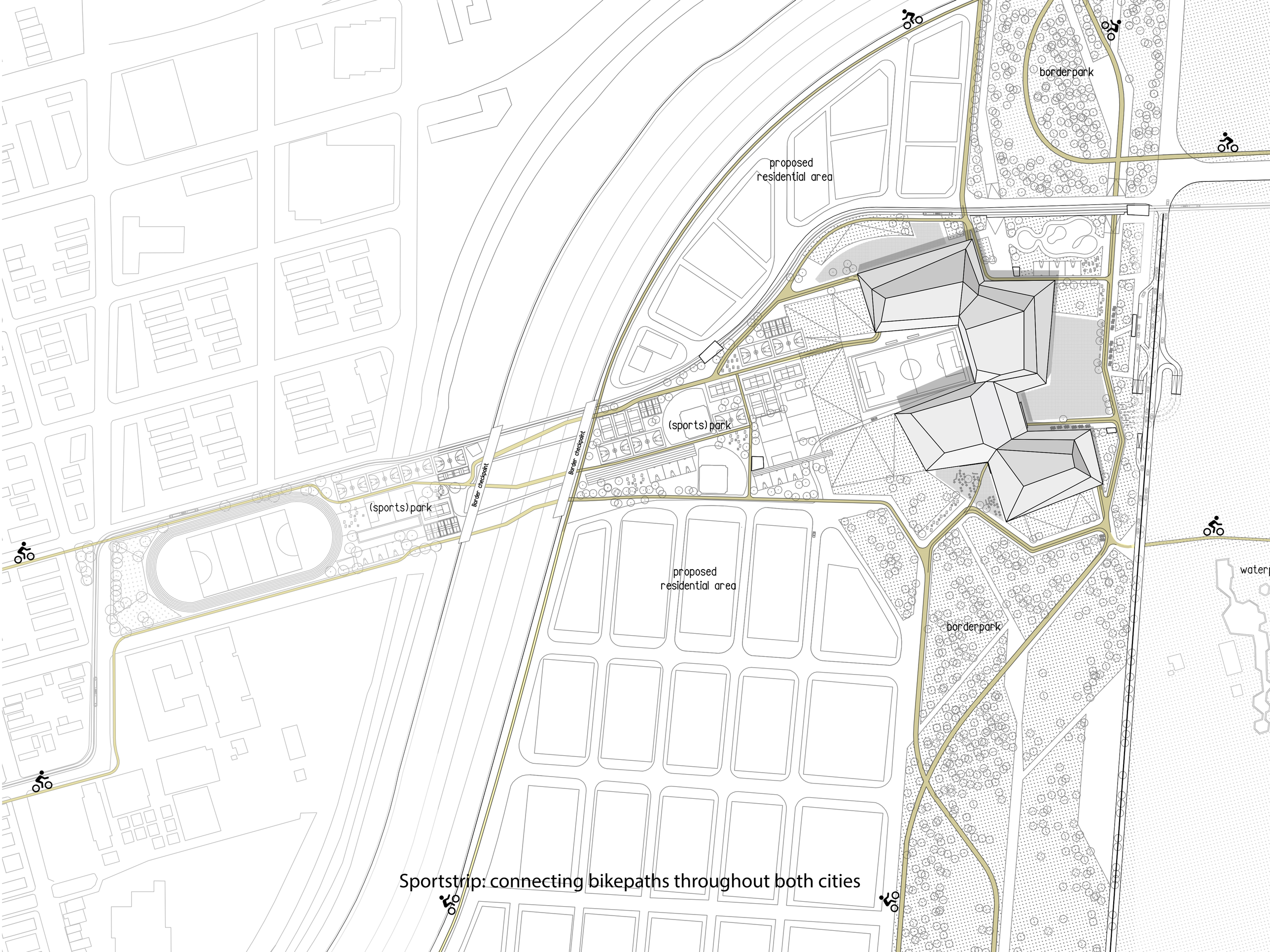


Research into retractable seating

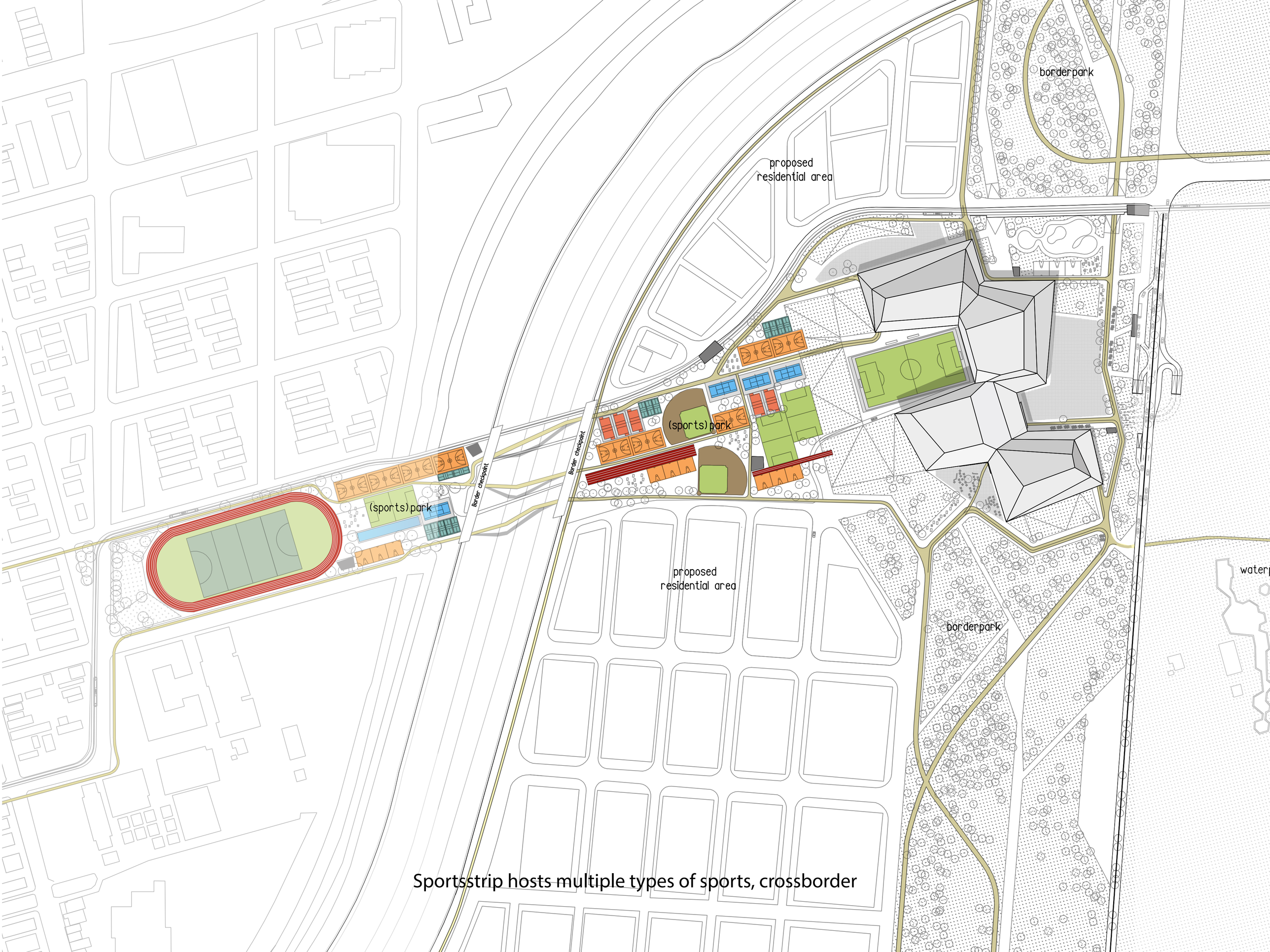
COMMUNITY SPORTS HUB - DAY

STADIUM - NIGHT

SPORTSSTRIP



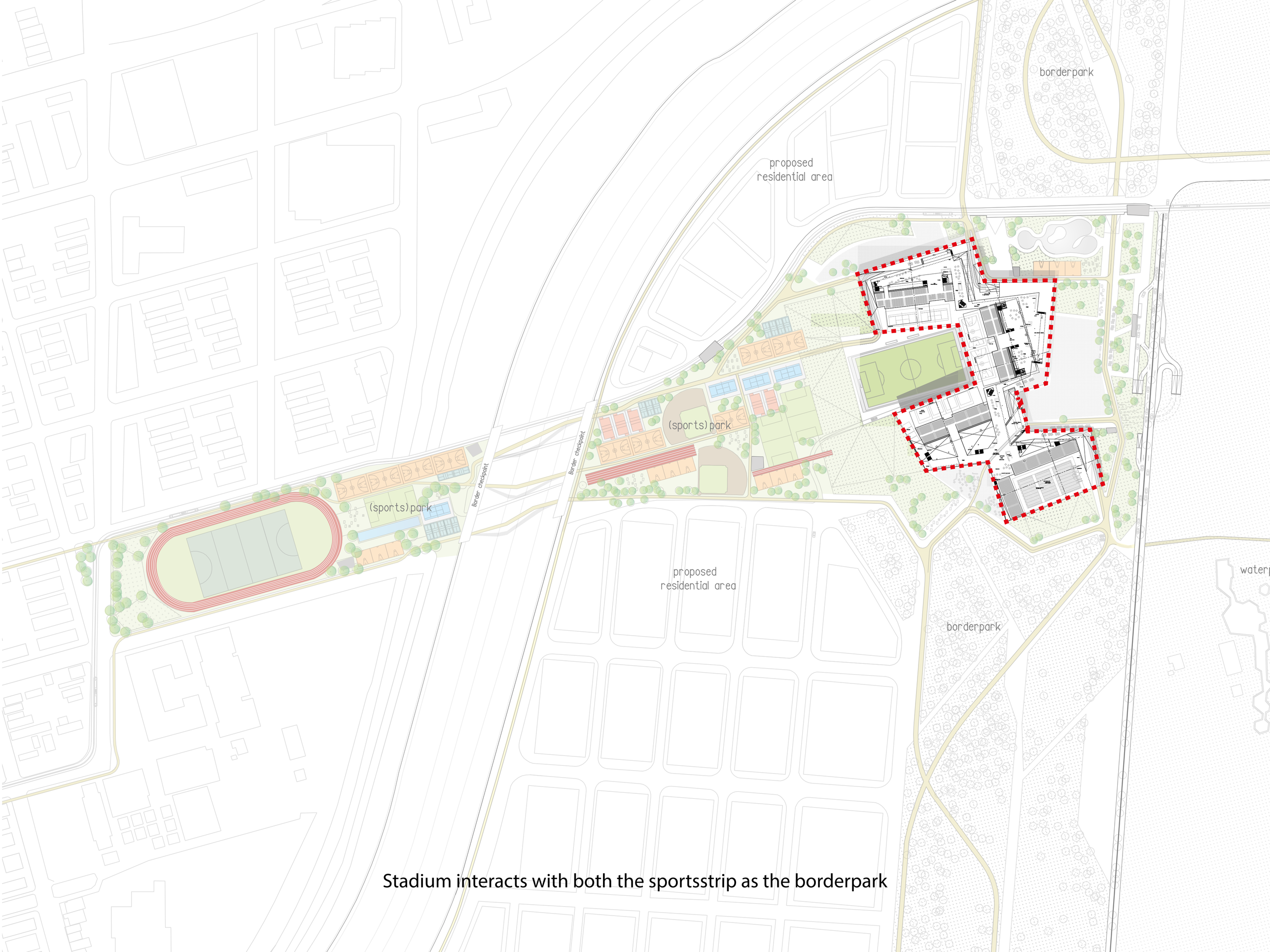
Sportstrip: connecting bikepaths throughout both cities



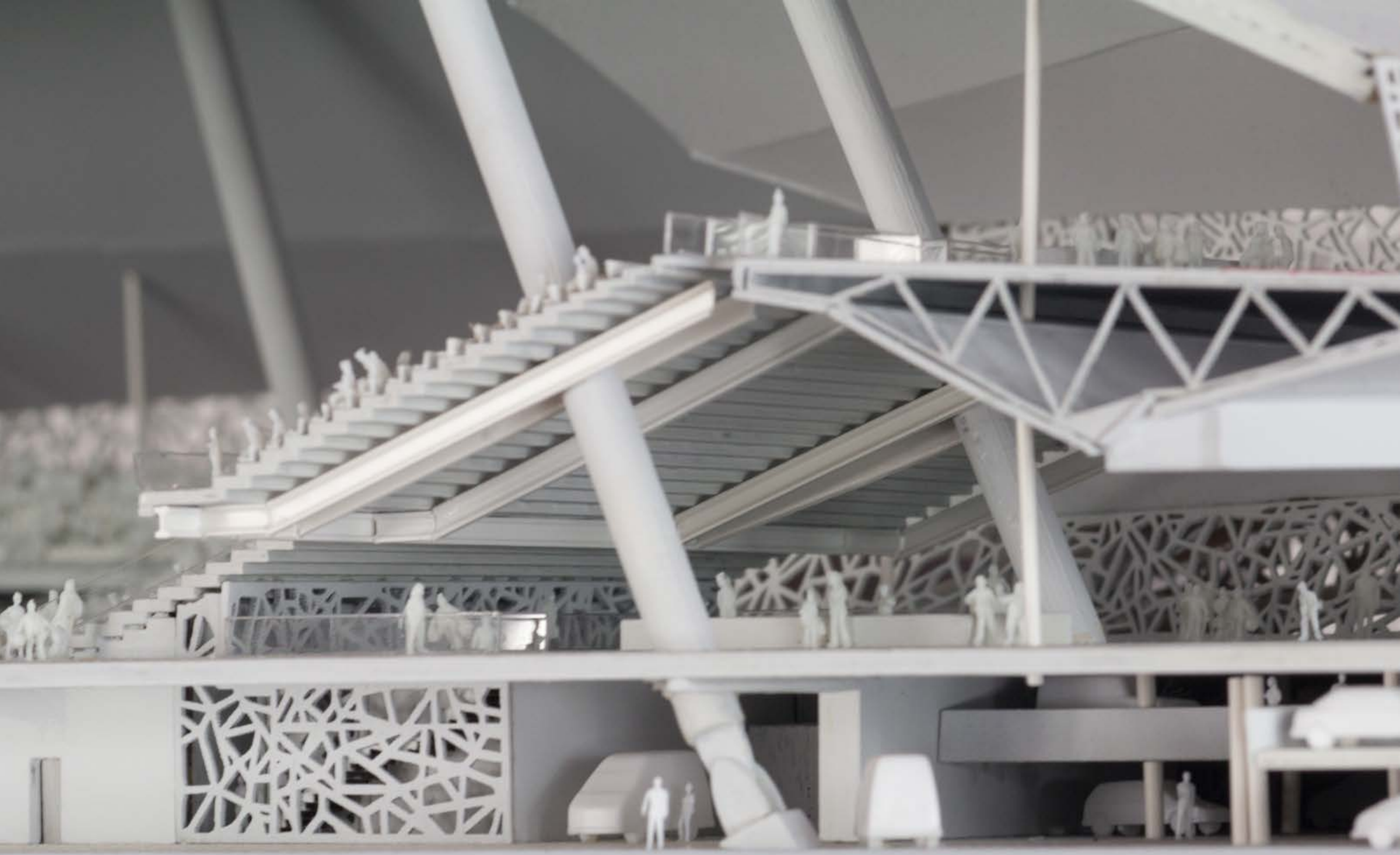
Sportsstrip hosts multiple types of sports, crossborder

Sportsstrip hosts multiple types of sports, crossborder
Park feeling

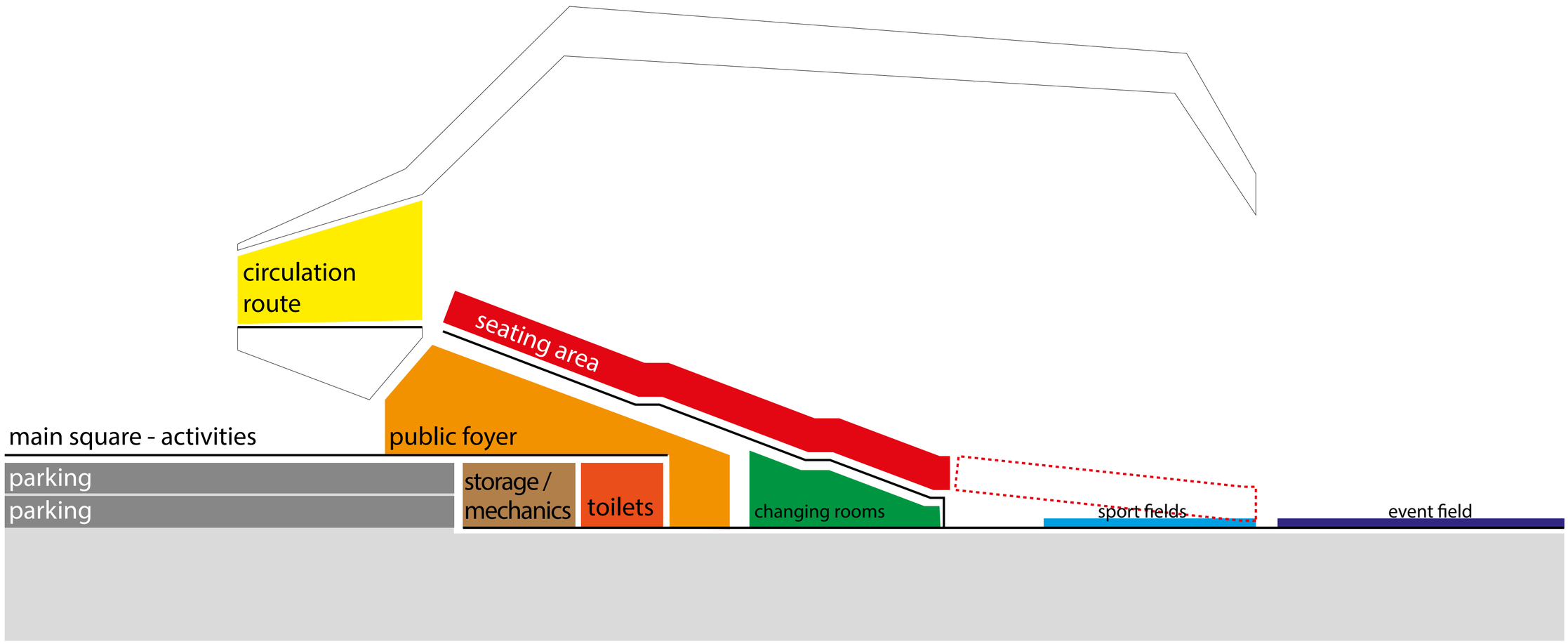
borderpark
proposed
residential area
(sports)park
Border checkpoint
(sports)park
Border checkpoint
proposed
residential area
borderpark
Sportsstrips intersects with border park



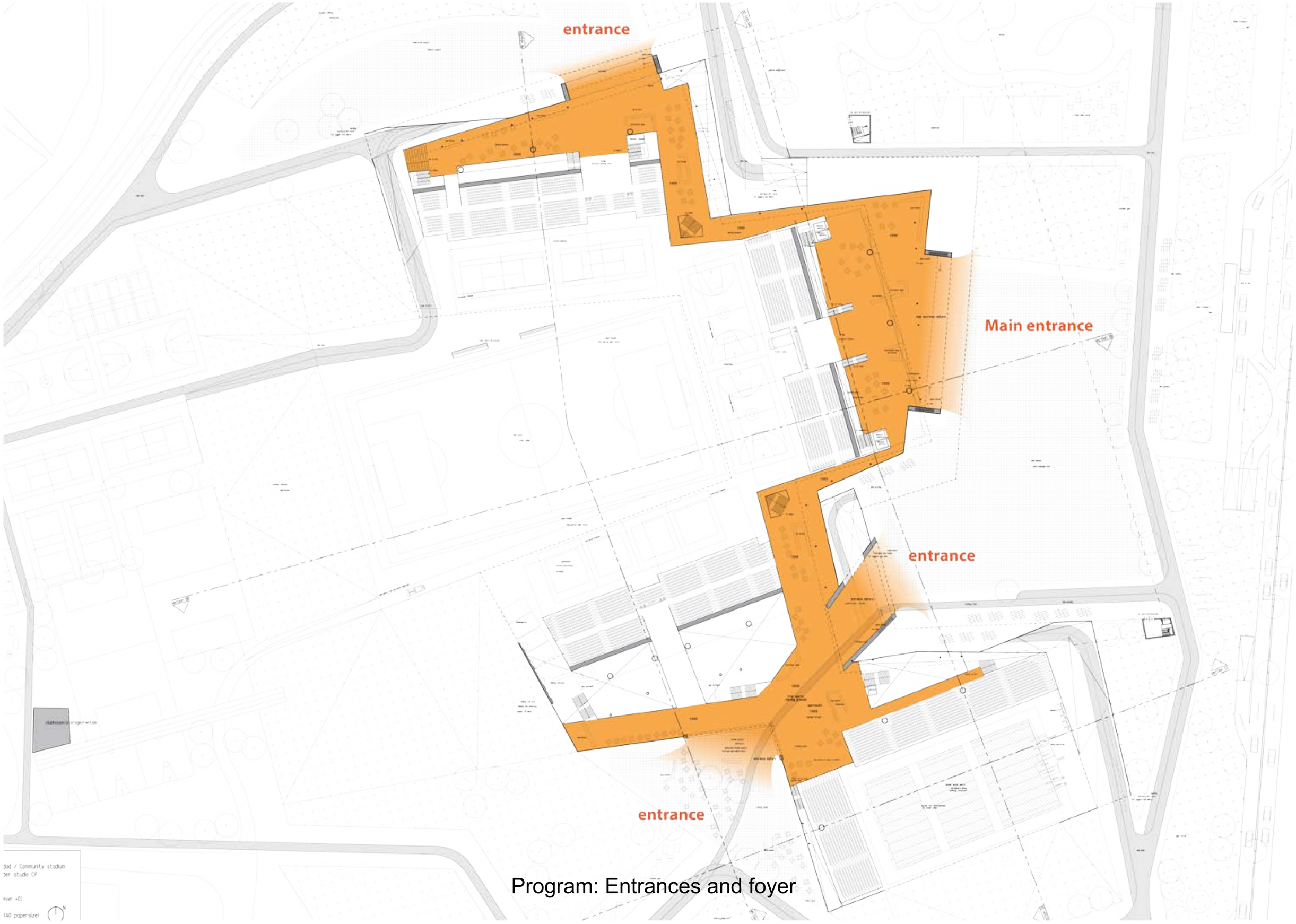
Stadium interacts with both the sportsstrip as the borderpark



PROGRAM



Typical section: program diagram



Program: Entrances and foyer

Program: Stairs to lower level

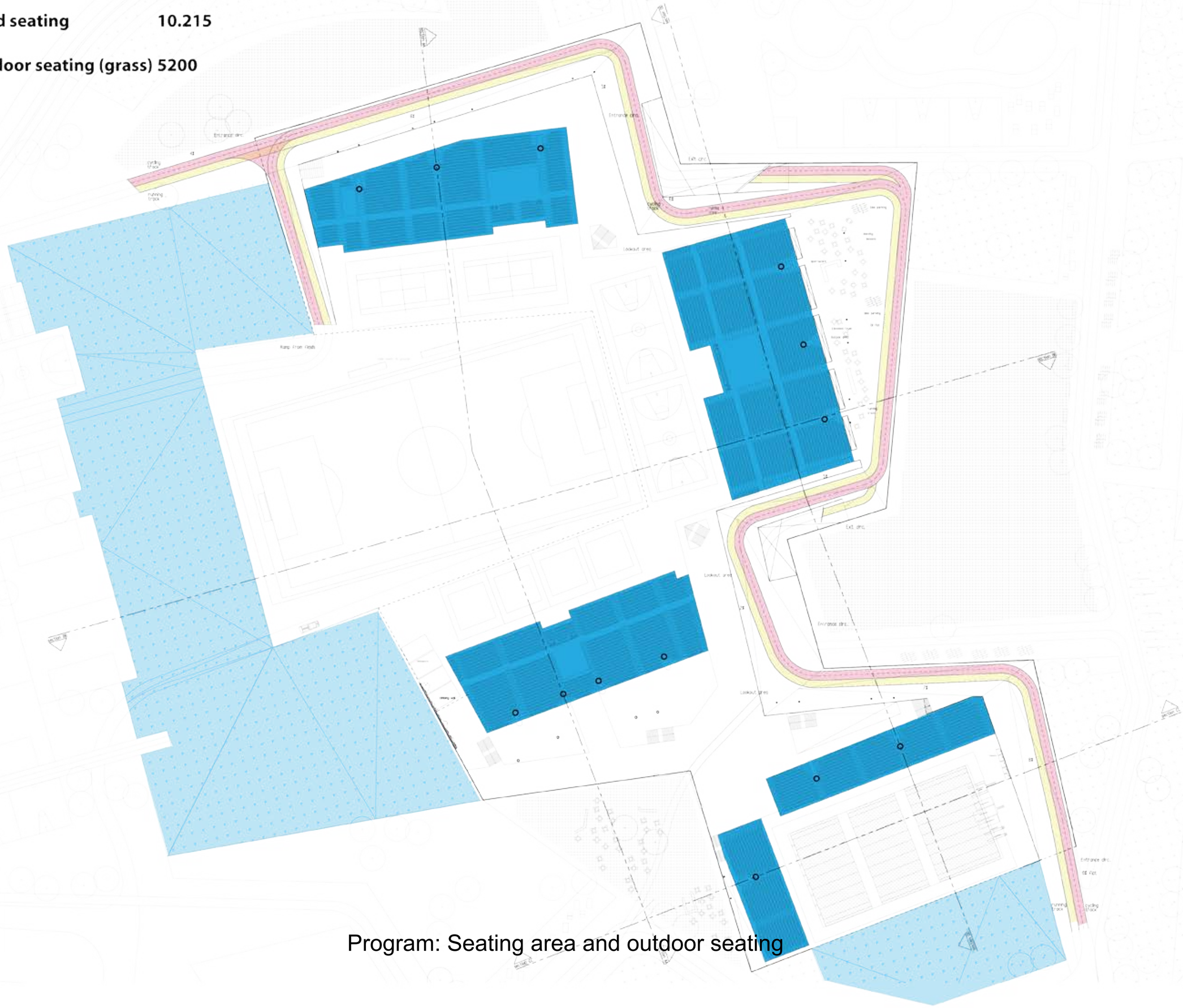
Program: Types and location of kind of sports

Program: Changing rooms and public toilets

Program: Mechanics, staff, storage and first aid

Program: Circulation route and entrances

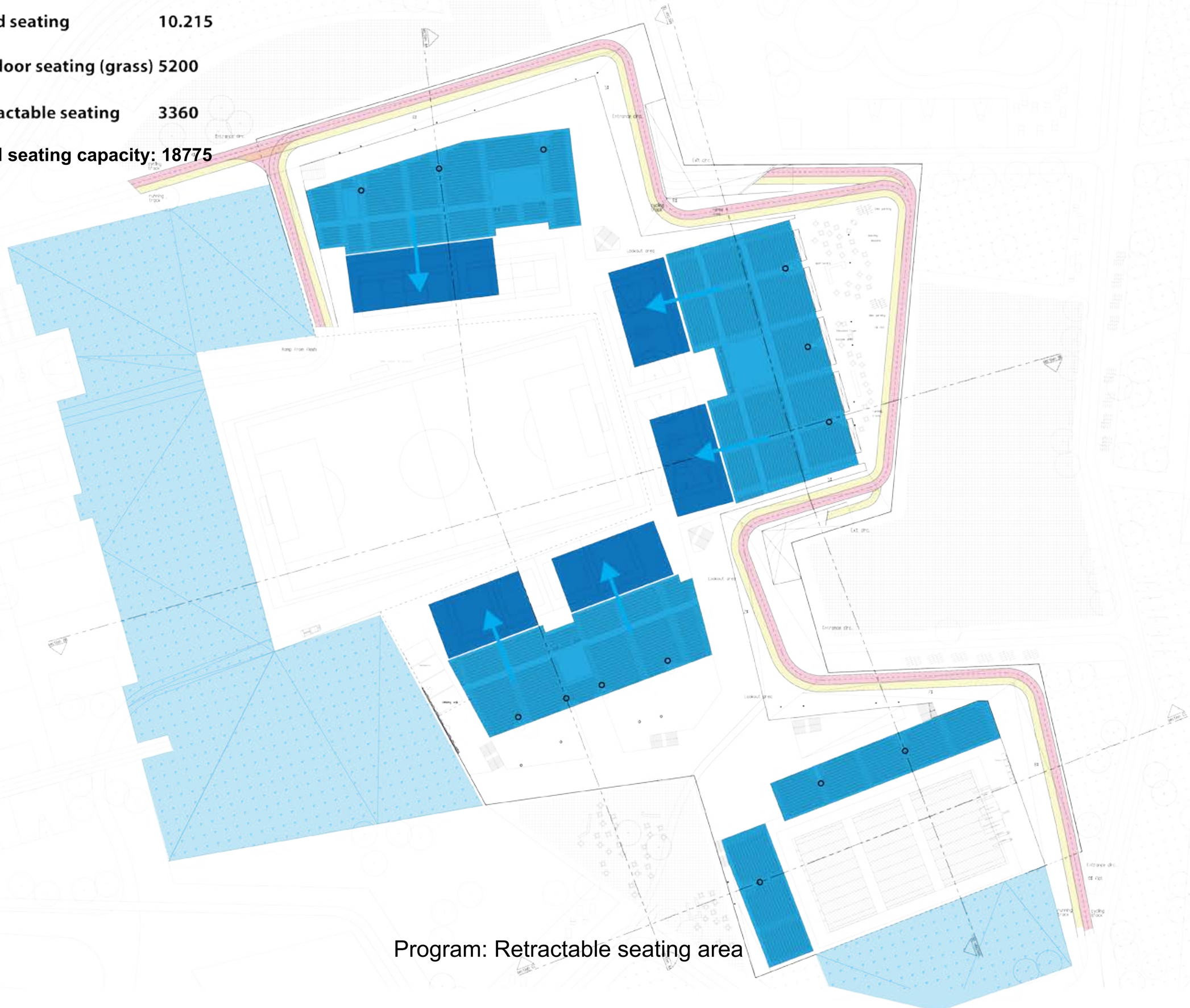
	Capacity
Fixed seating	10.215
Outdoor seating (grass)	5200



Program: Seating area and outdoor seating

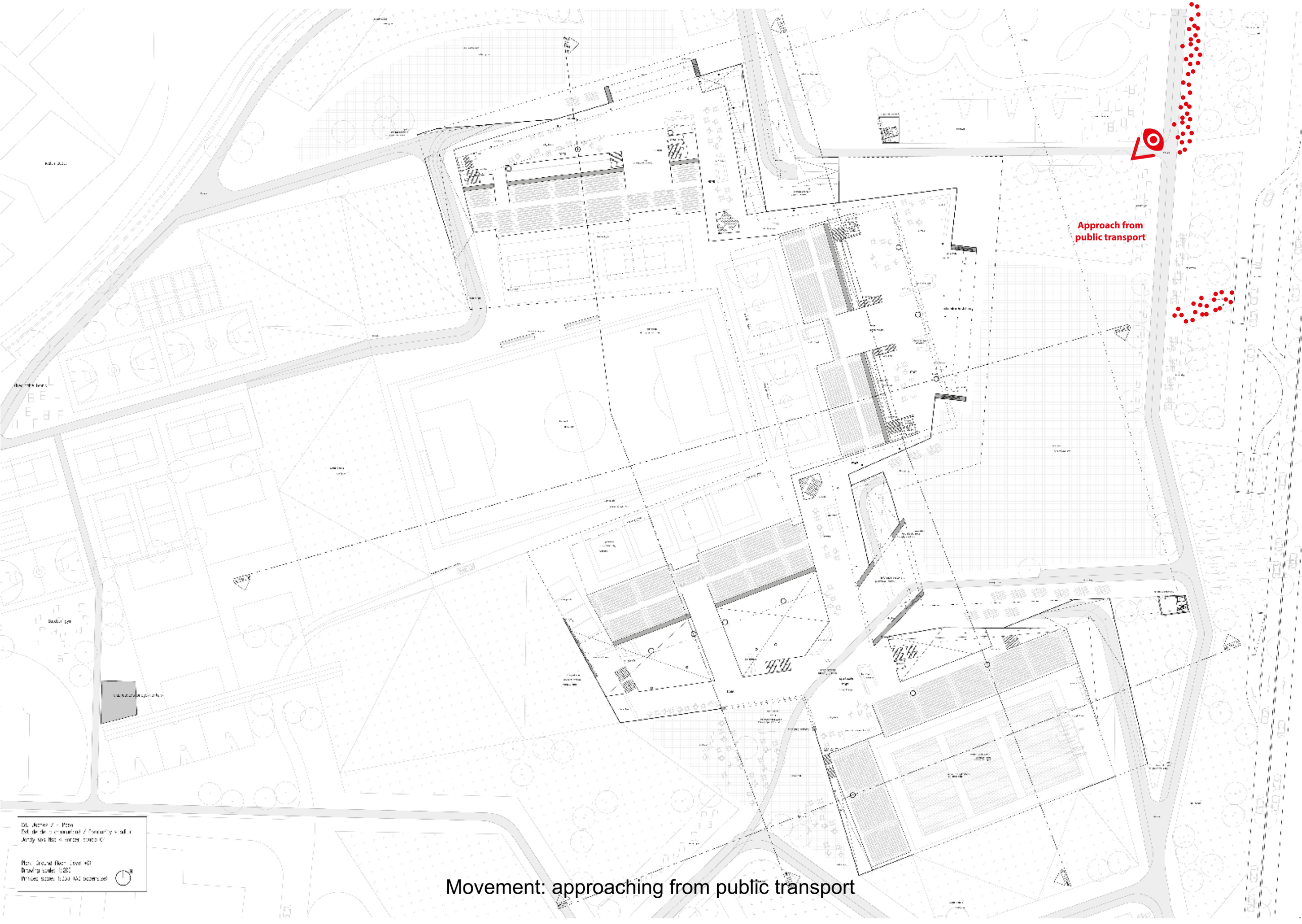
	Capacity
Fixed seating	10.215
Outdoor seating (grass)	5200
Retractable seating	3360

Total seating capacity: 18775



Program: Retractable seating area

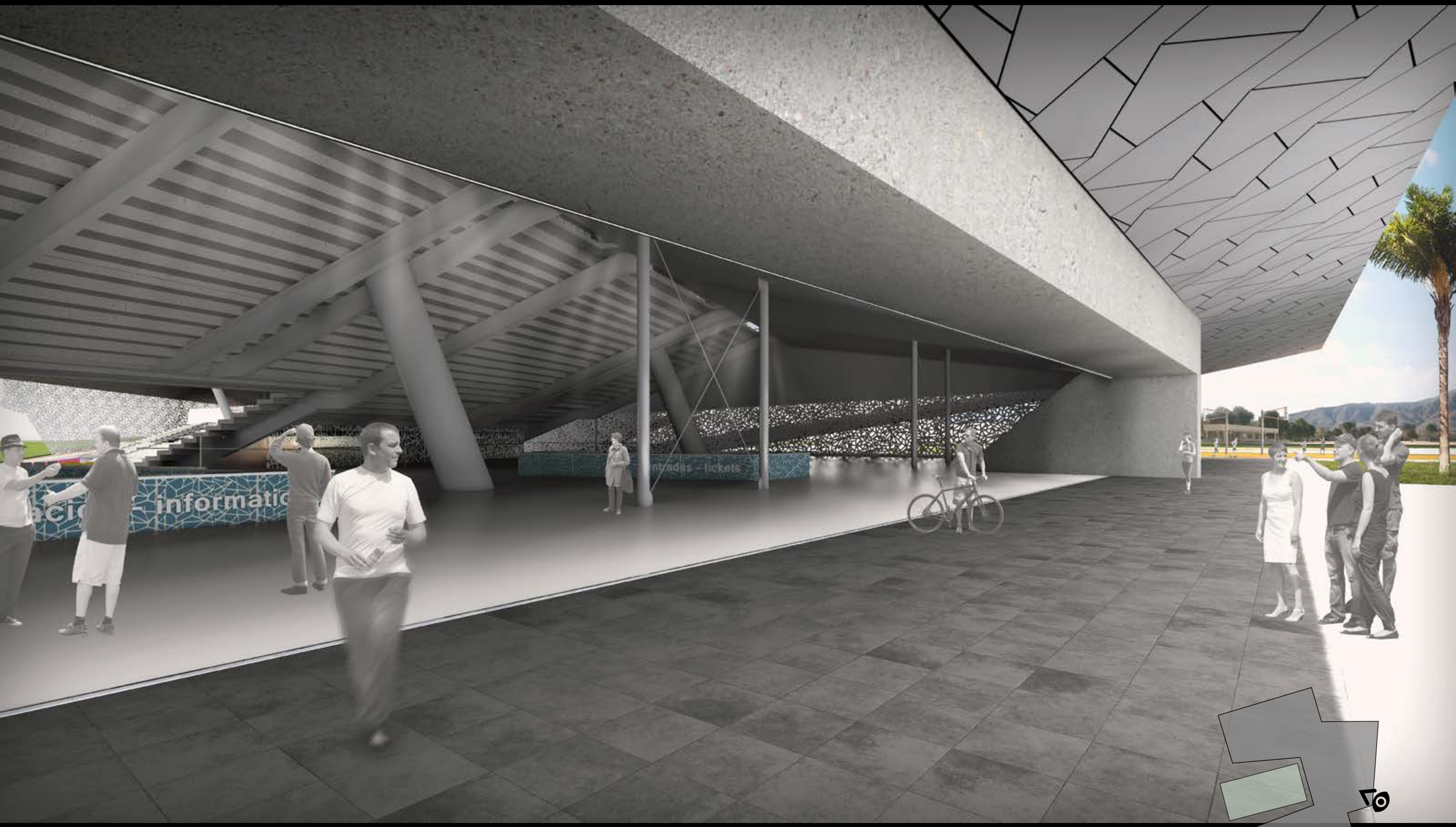
JOURNEY OF A VISITOR | ATHLETE



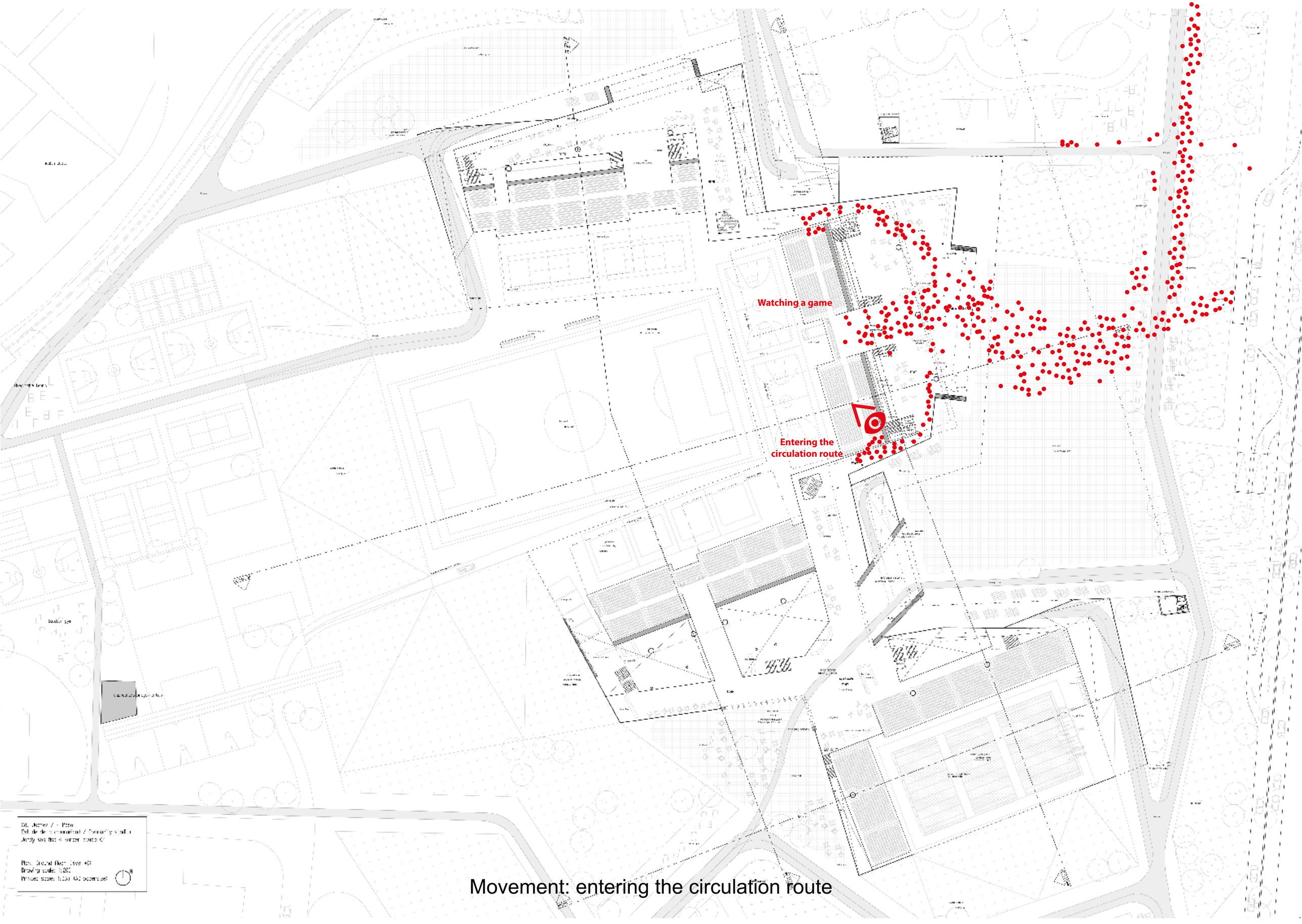
Movement: approaching from public transport

MAIN SQAURE | ENTRANCE

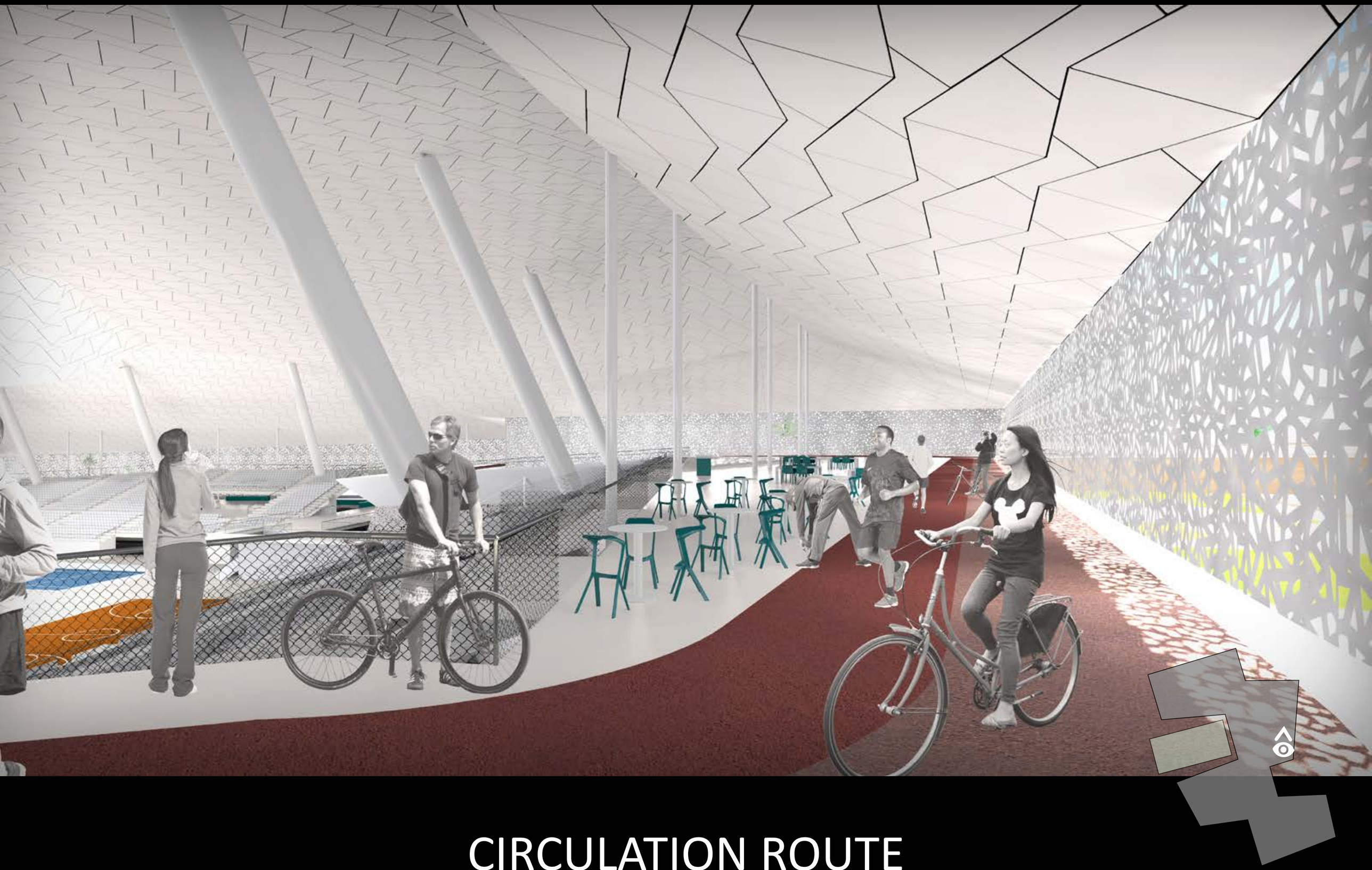
Movement: approaching the main entrance



MAIN ENTRANCE

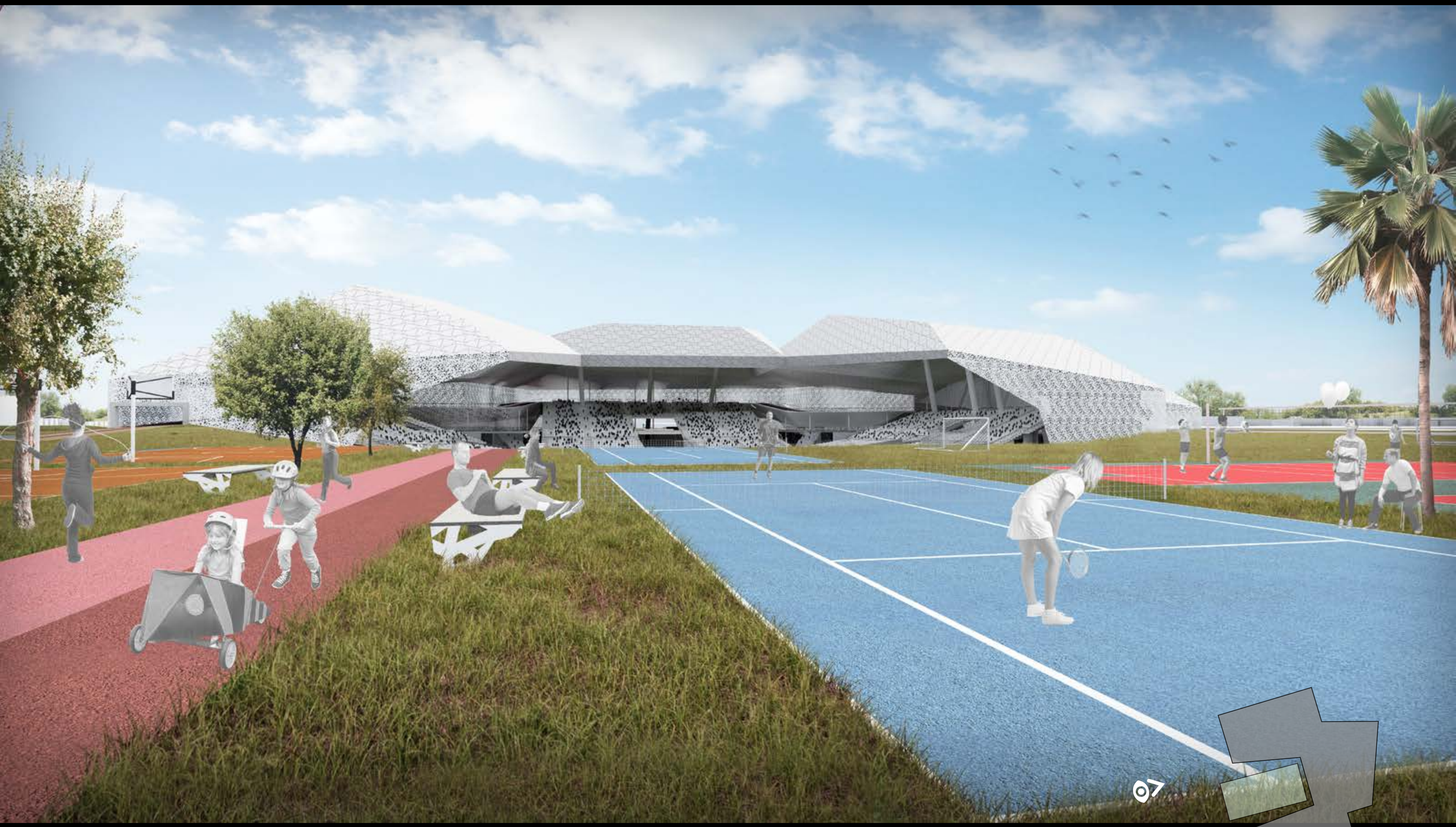


Movement: entering the circulation route



CIRCULATION ROUTE

Movement: approaching from the sports strip

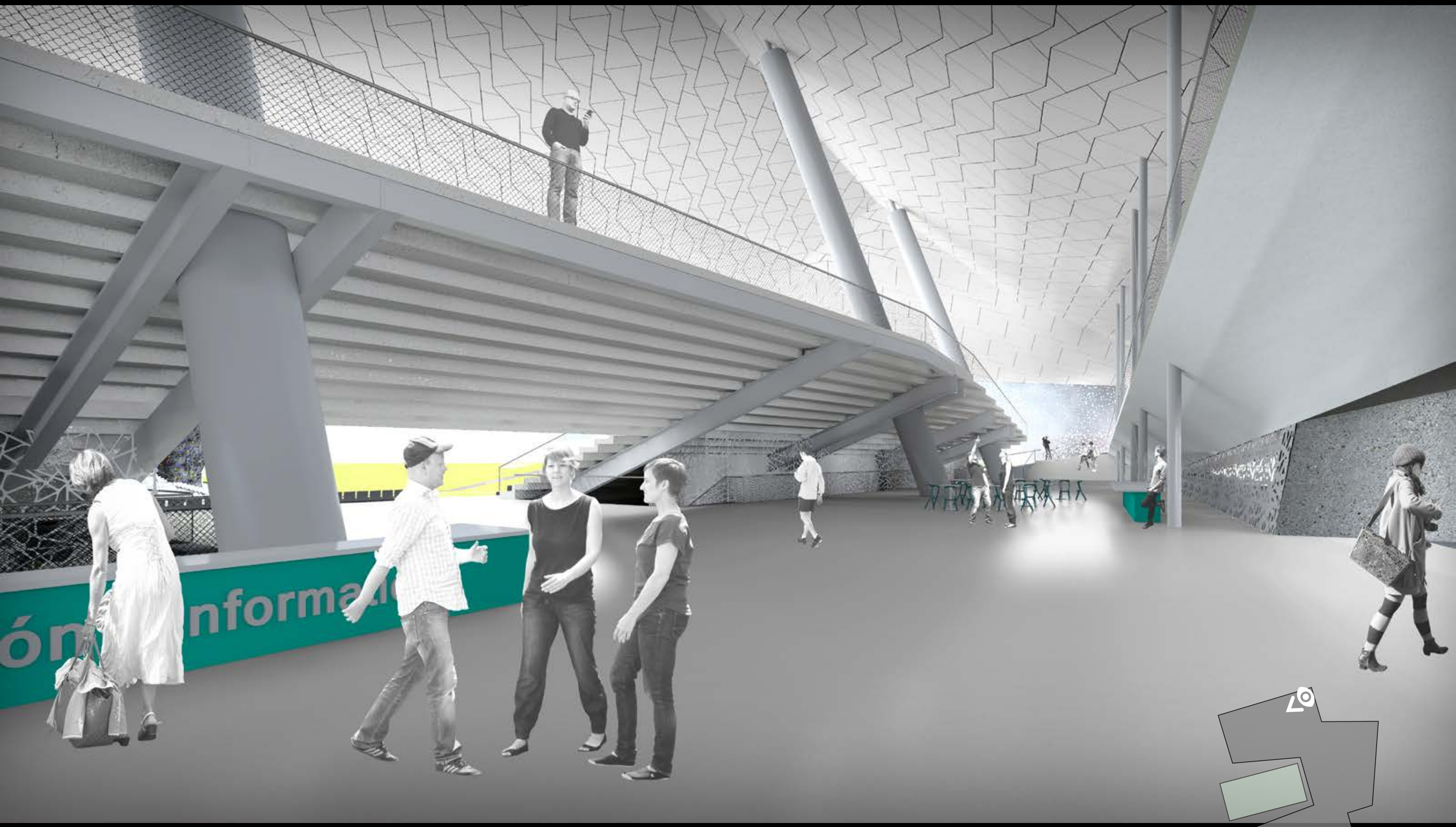


THE SPORTSSTRIP

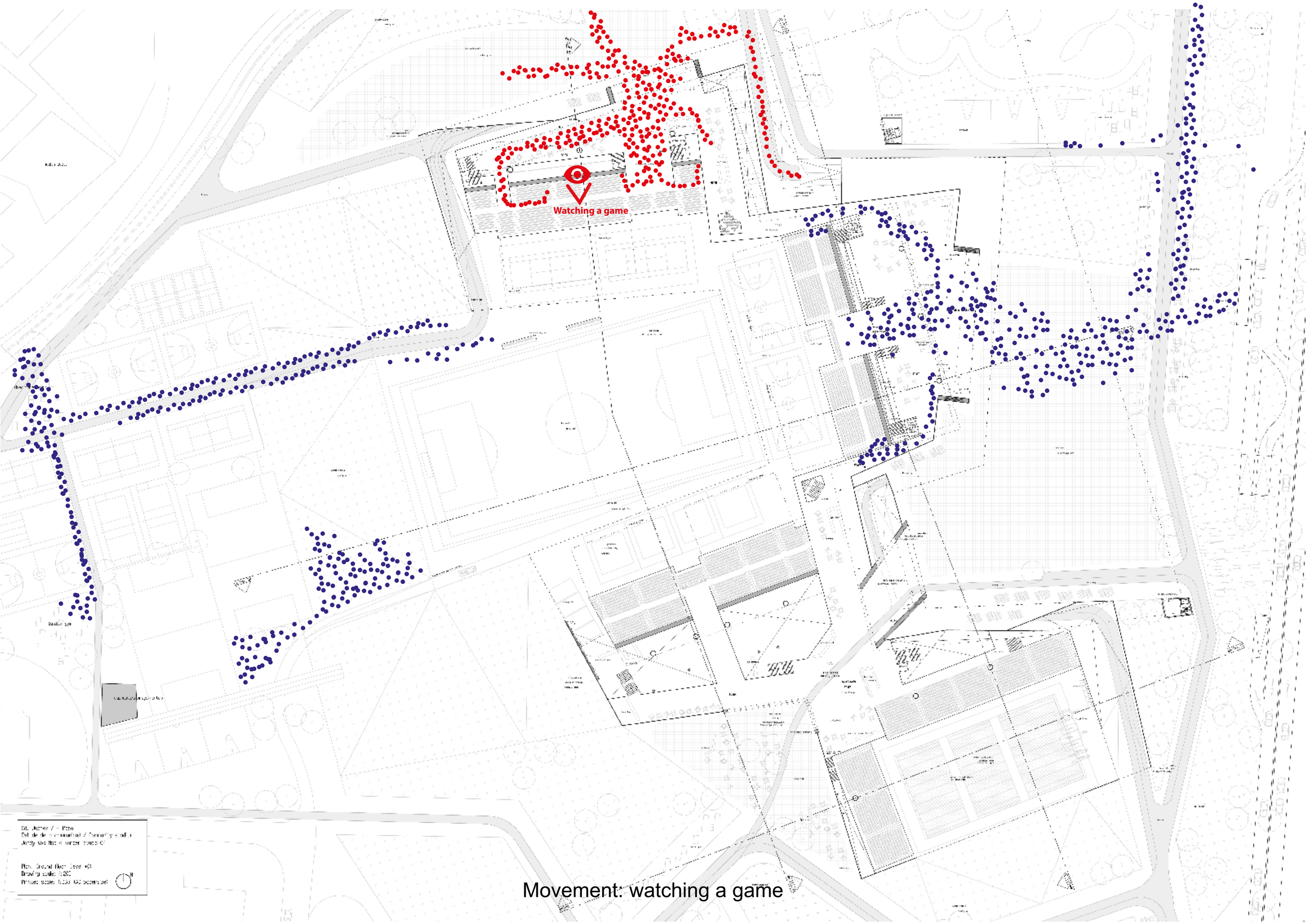
Movement: approaching from the border park

BORDERPARK ENTRANCE (NORTH)

Movement: getting some information in the foyer

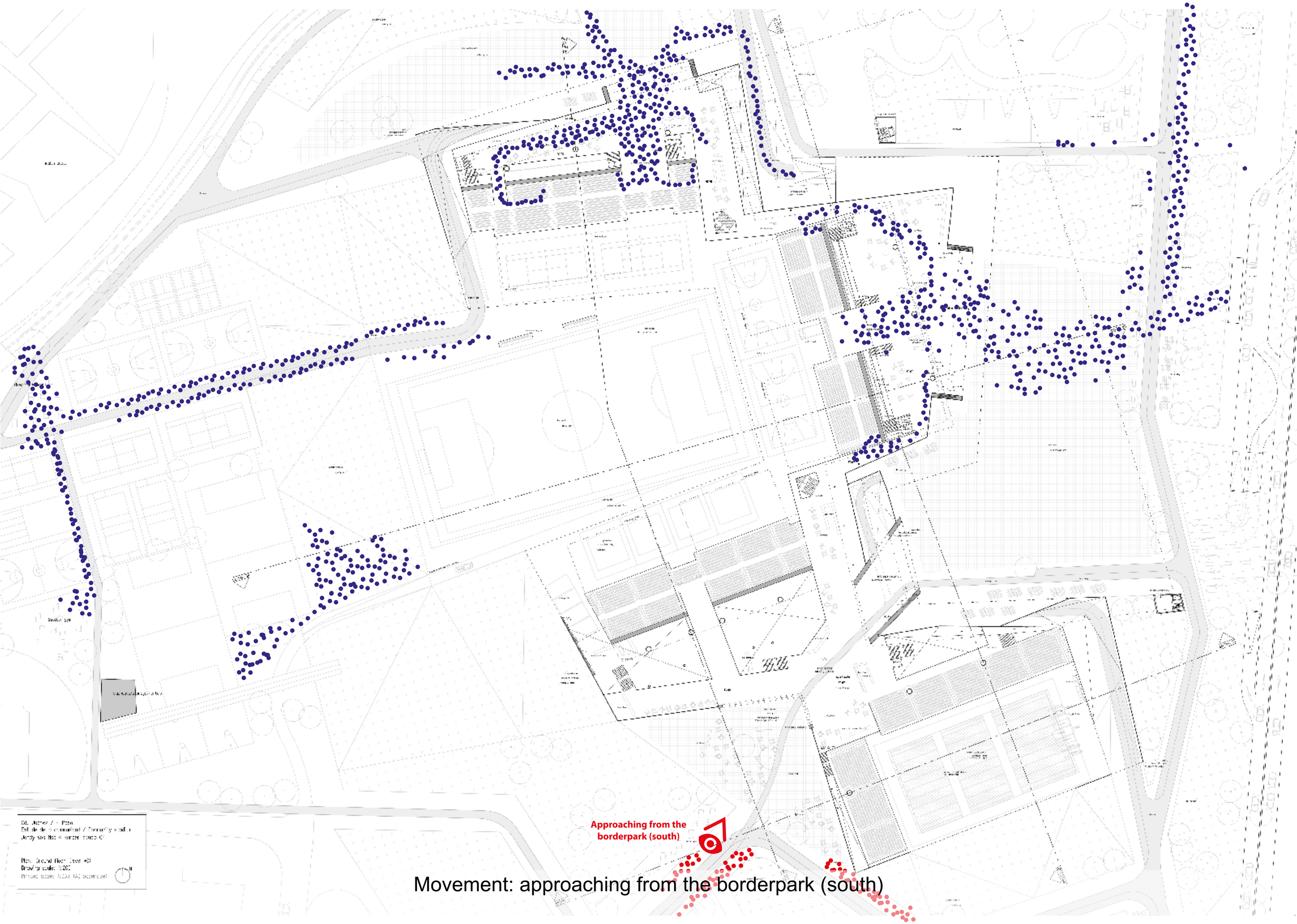


FOYER TENNIS HALL

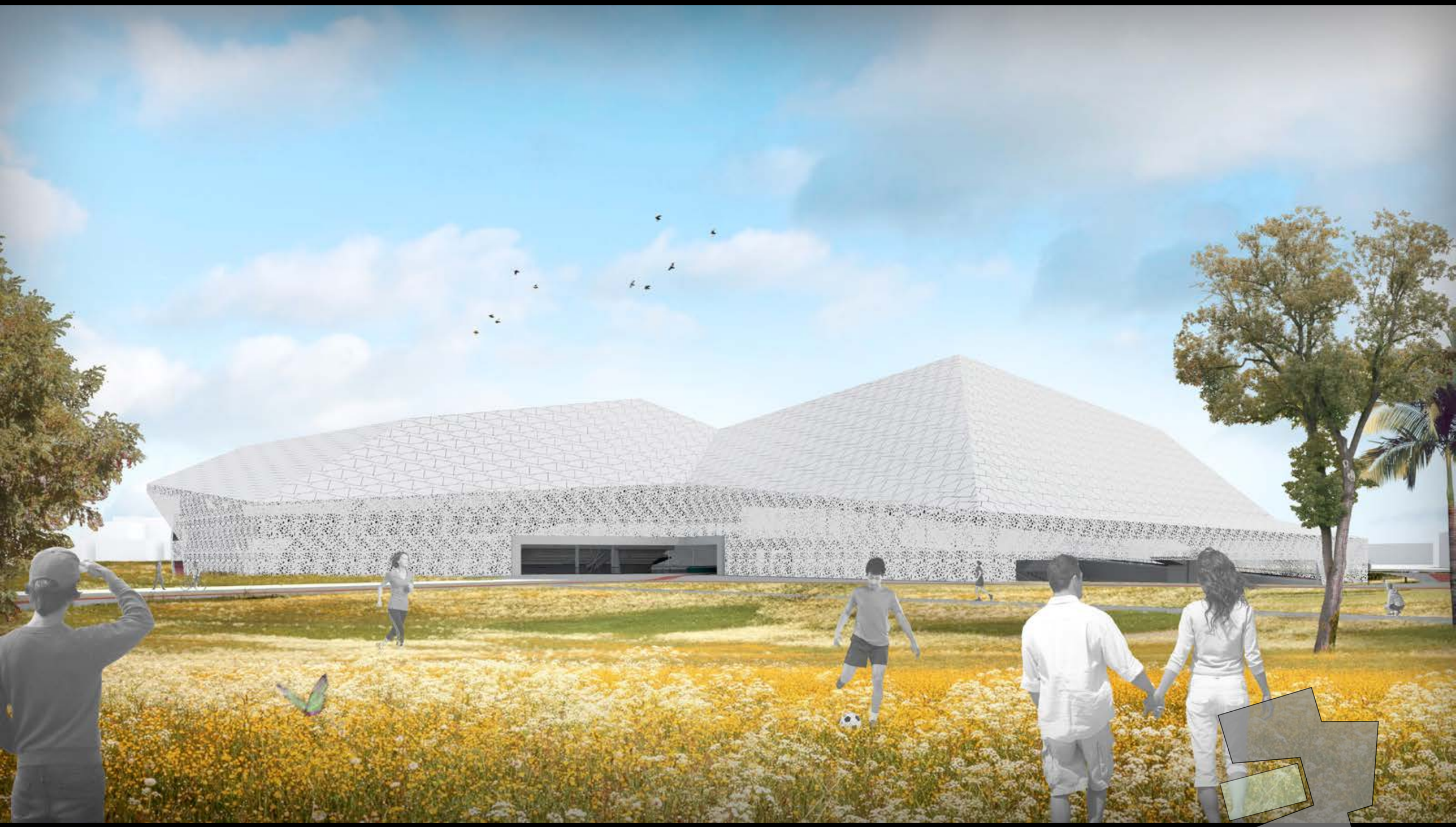


Movement: watching a game

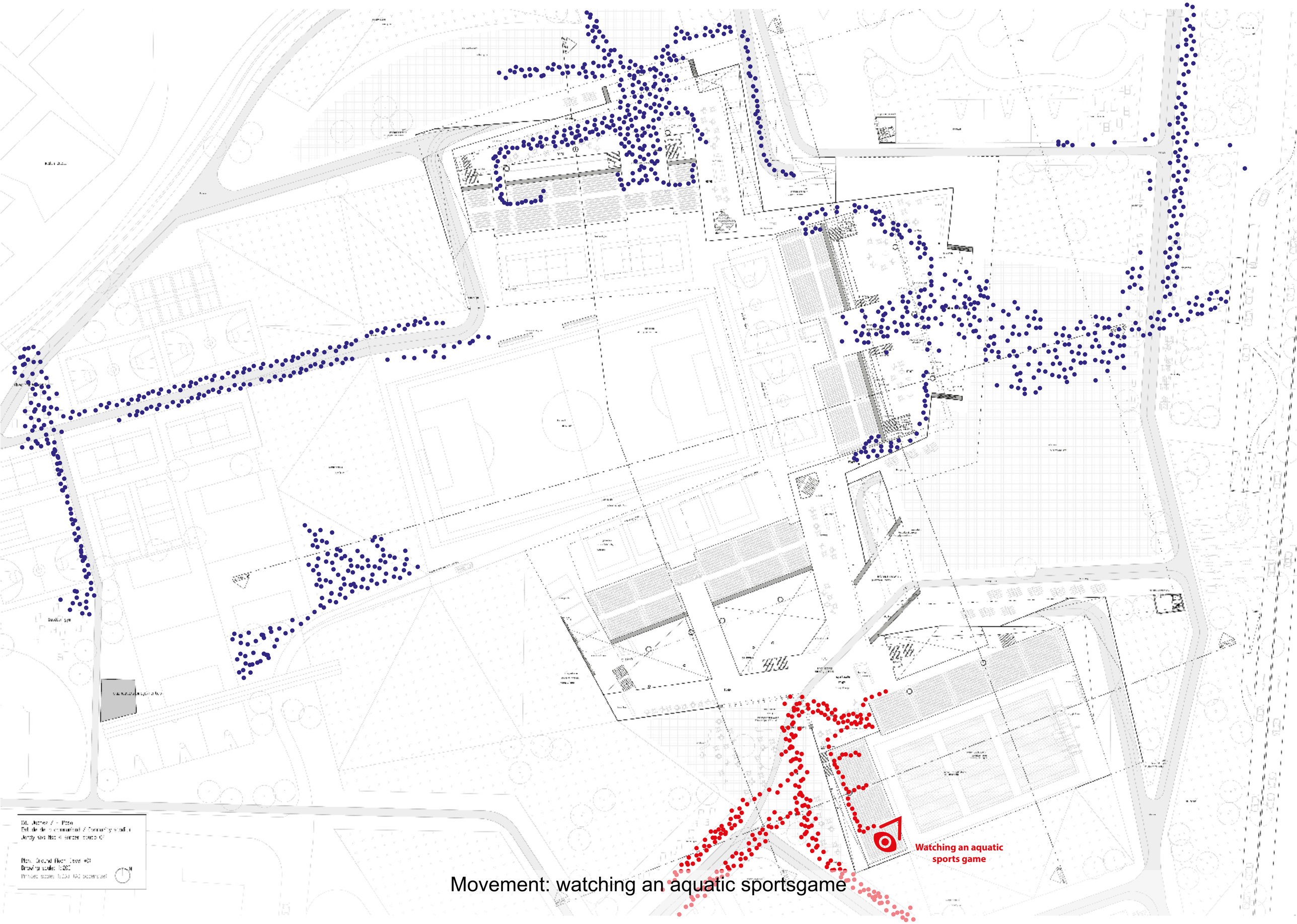
WATCHING A GAME



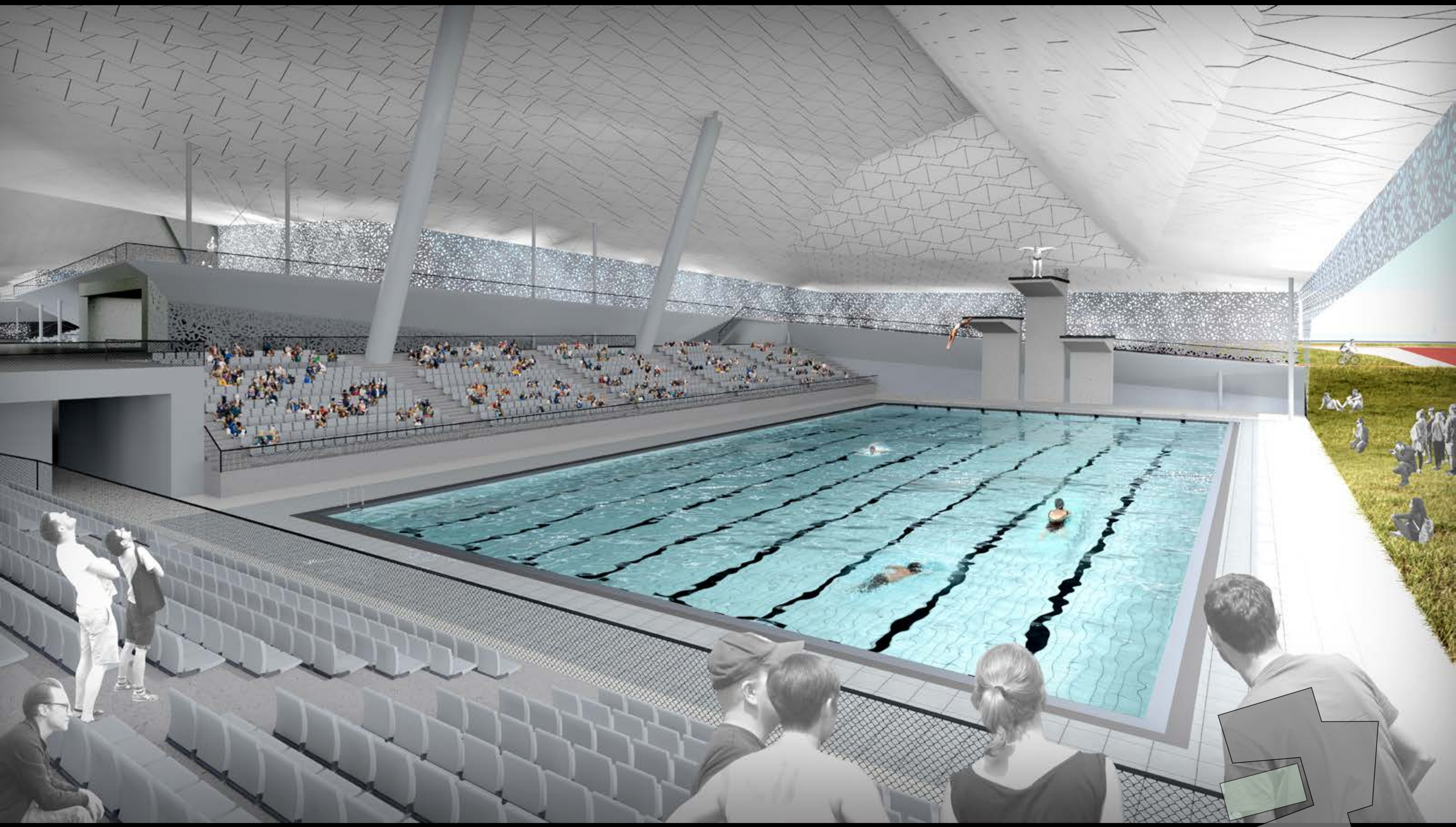
Movement: approaching from the borderpark (south)



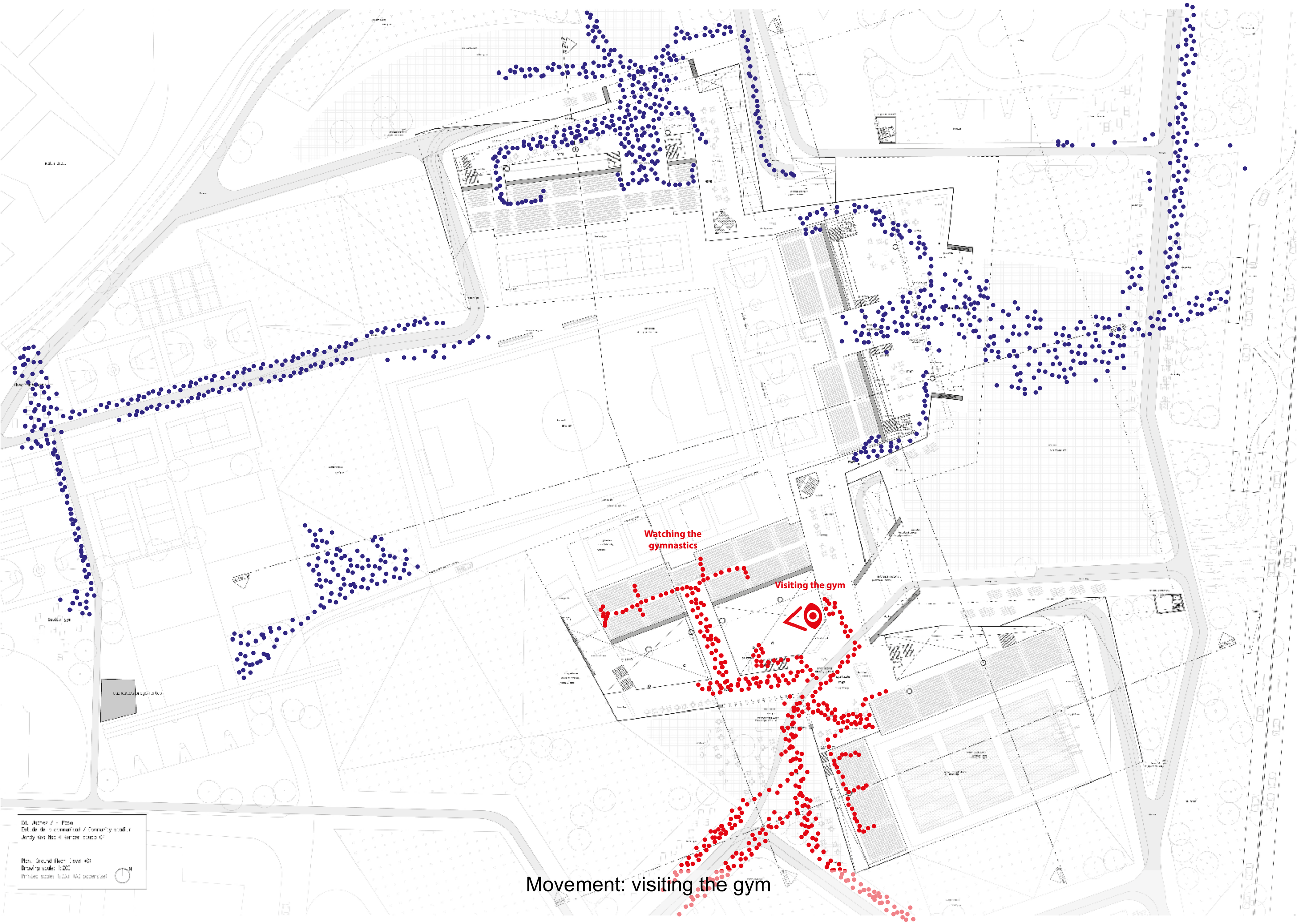
BORDERPARK ENTRANCE (SOUTH)



Movement: watching an aquatic sportsgame

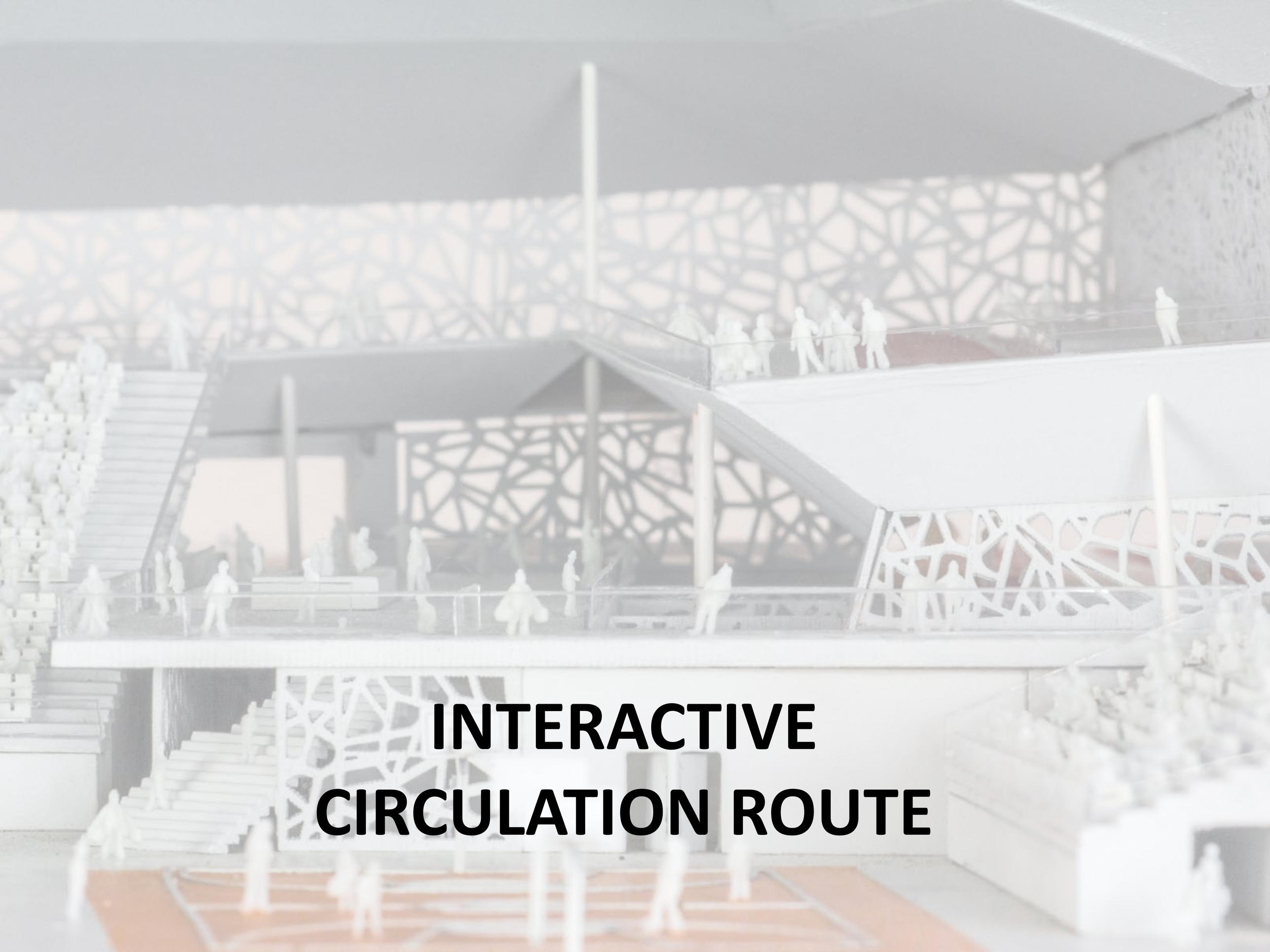


AQUATIC SPORTS

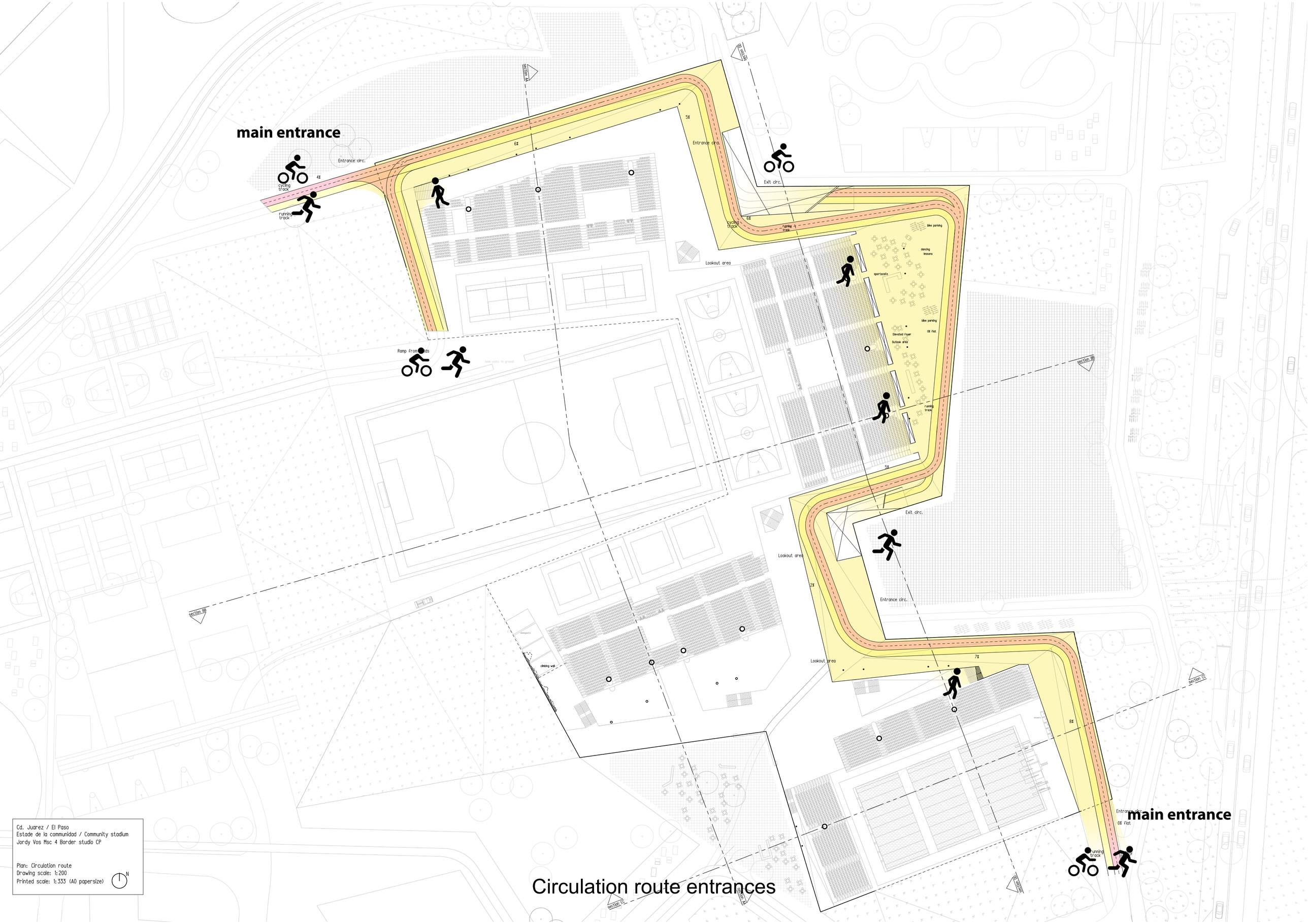


Movement: visiting the gym

GYM AND CROSSFIT



INTERACTIVE CIRCULATION ROUTE



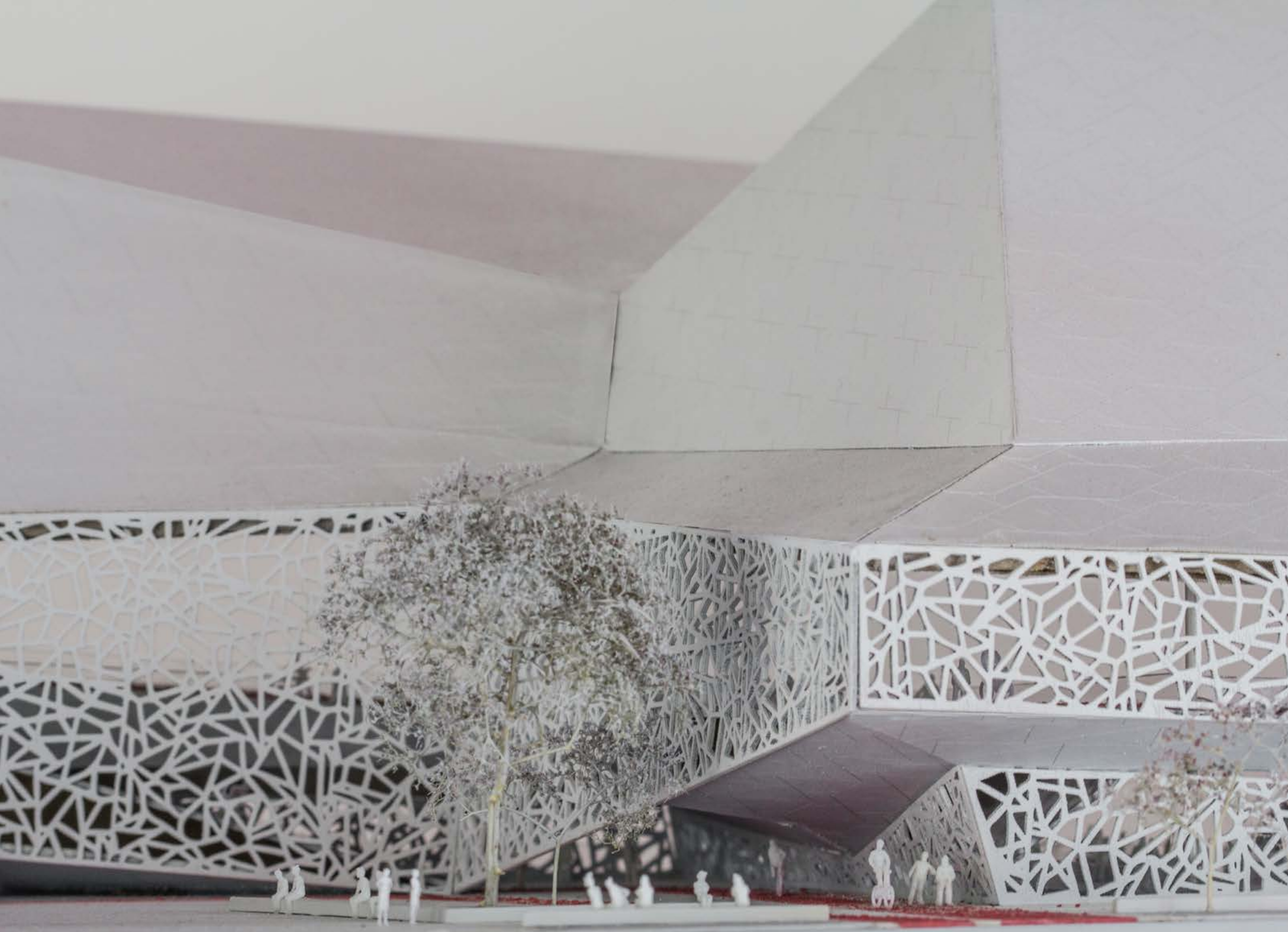
Cd. Juarez / El Paso
Estade de la communidad / Community stadium
Jordy Vos Msc 4 Border studio CP

Plan: Circulation route
Drawing scale: 1:200
Printed scale: 1:333 (A0 papersize)

N

Circulation route entrances

Circulation route steepness

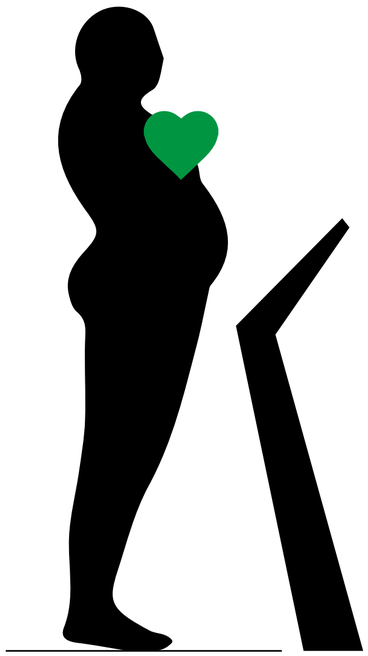


Ramp entrance for super-athletes

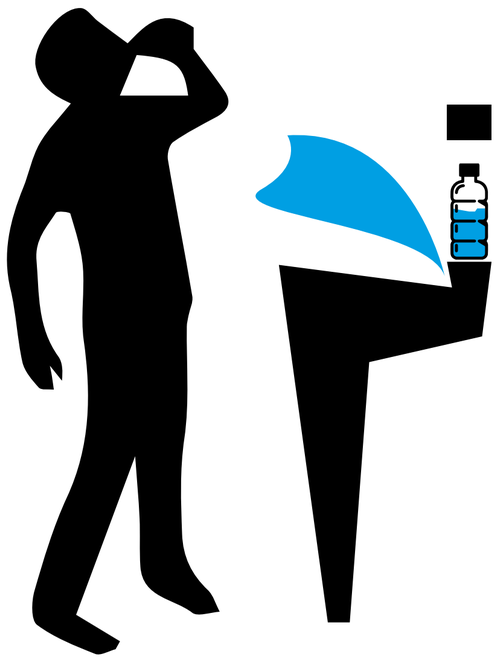
Speed monitoring on
running and cycling tracks

Connecting to the park wifi enables
people to use GPS and Lap paces

Circulation route: A smart route



Weighing and heart rate machines
along the circulation route



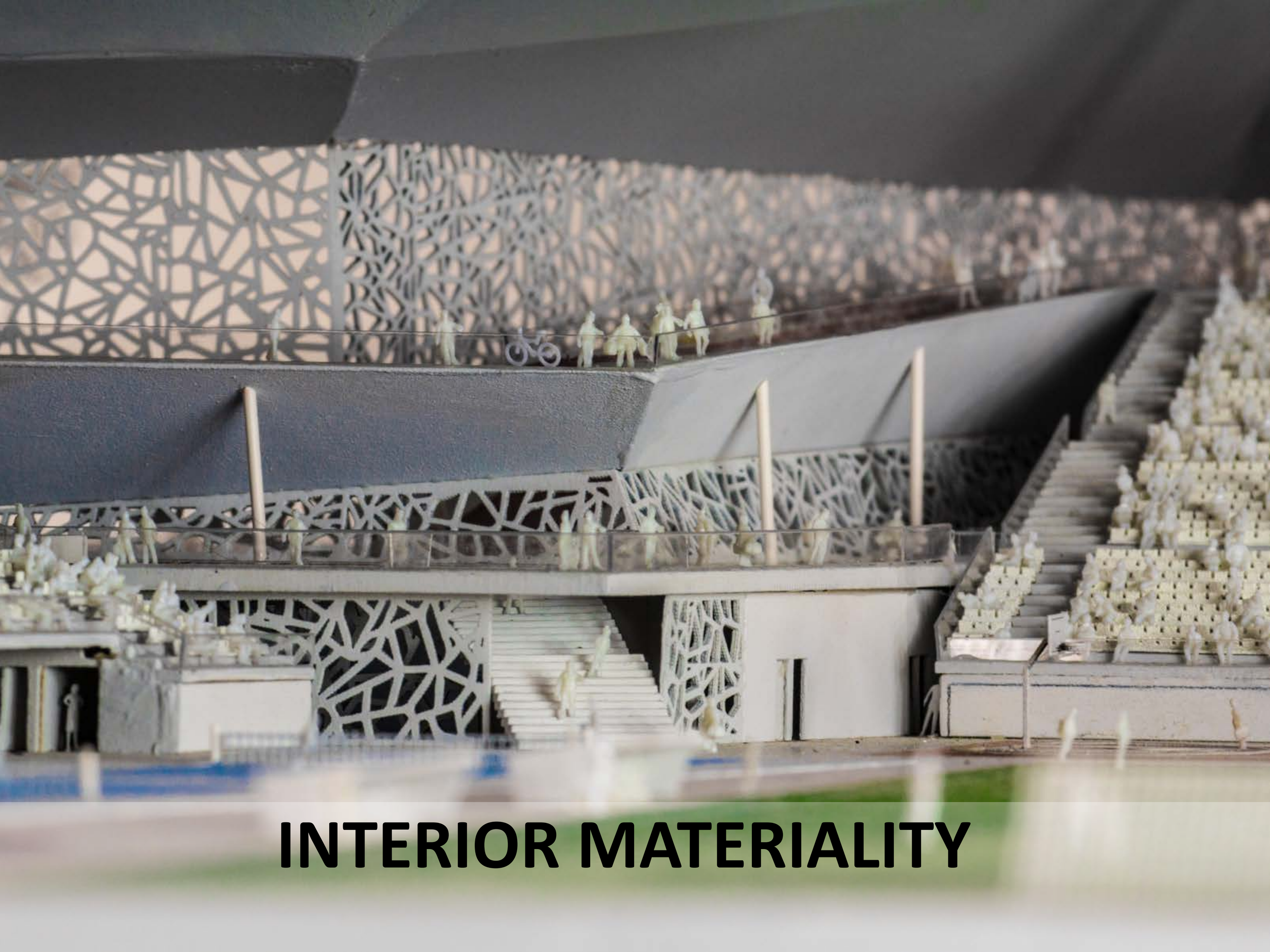
Water stations on the sport strip and
along the circulation route

Circulation route: An healthy route

Circulation route: A route for more than just athletes

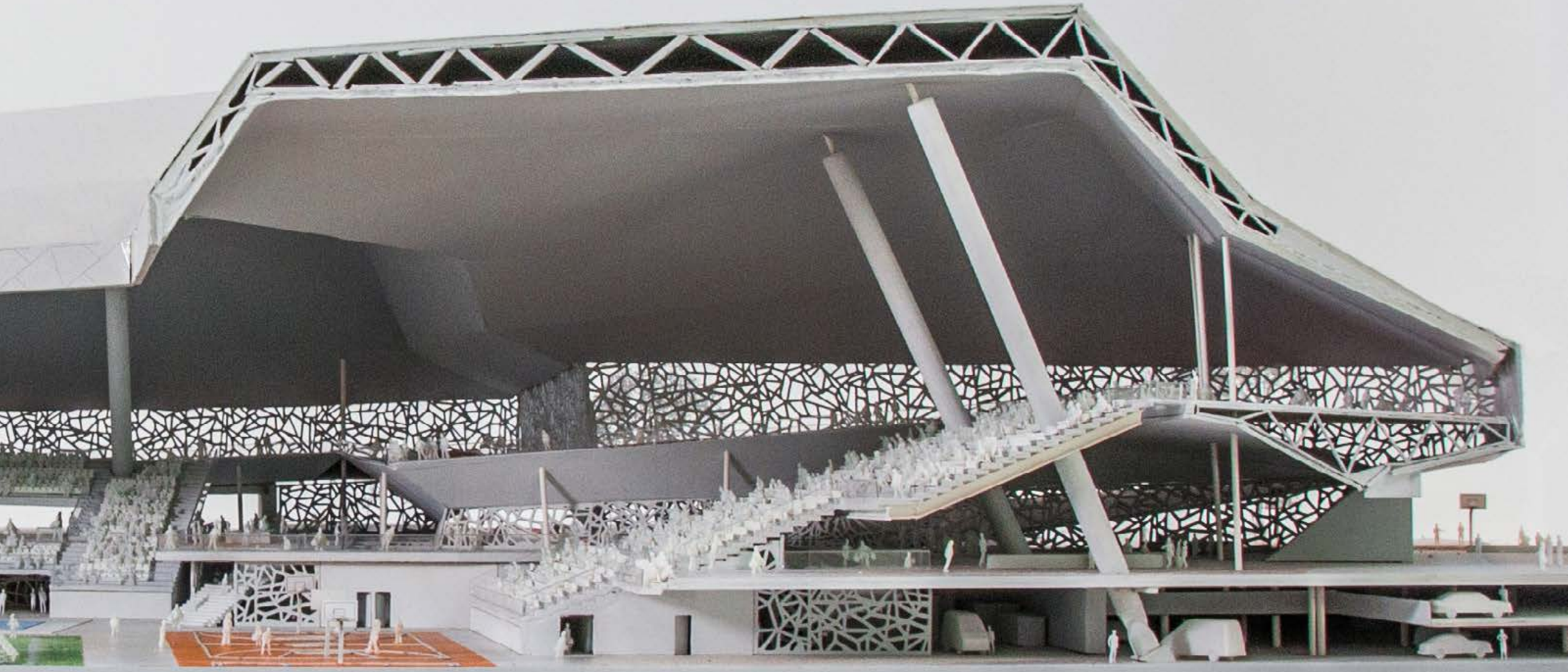
Entrance circulation route from sportsstrip

Entrance circulation route from borderpark

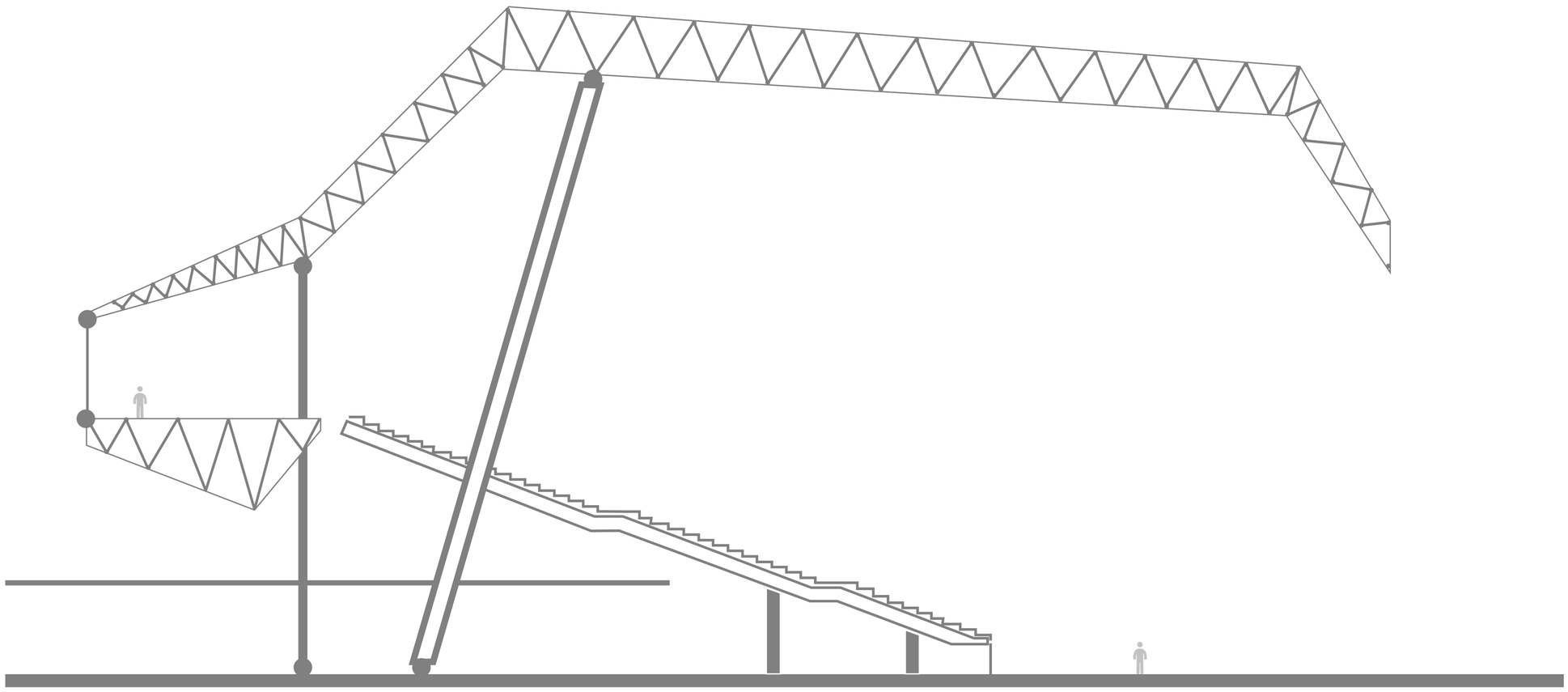


INTERIOR MATERIALITY

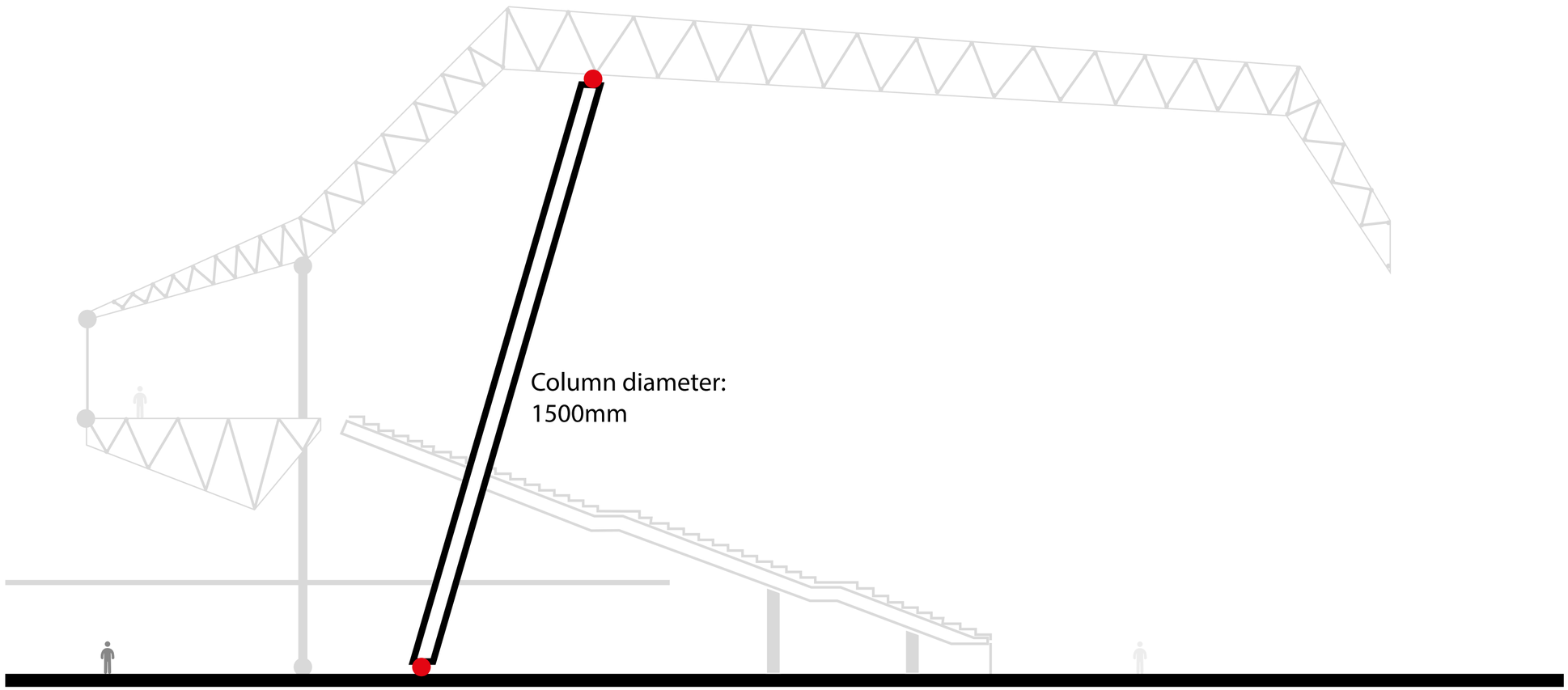
Colour derives from sports



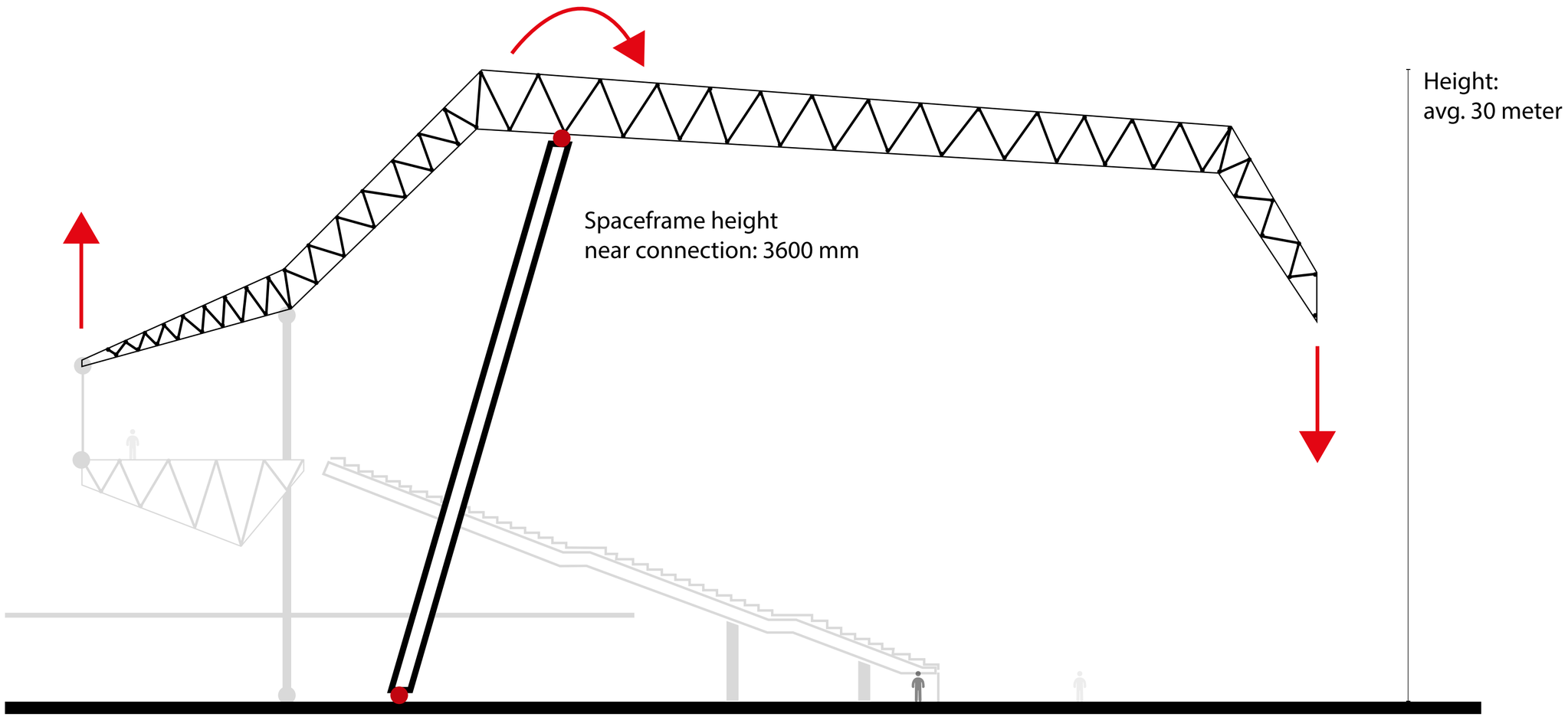
Colour derives from sports



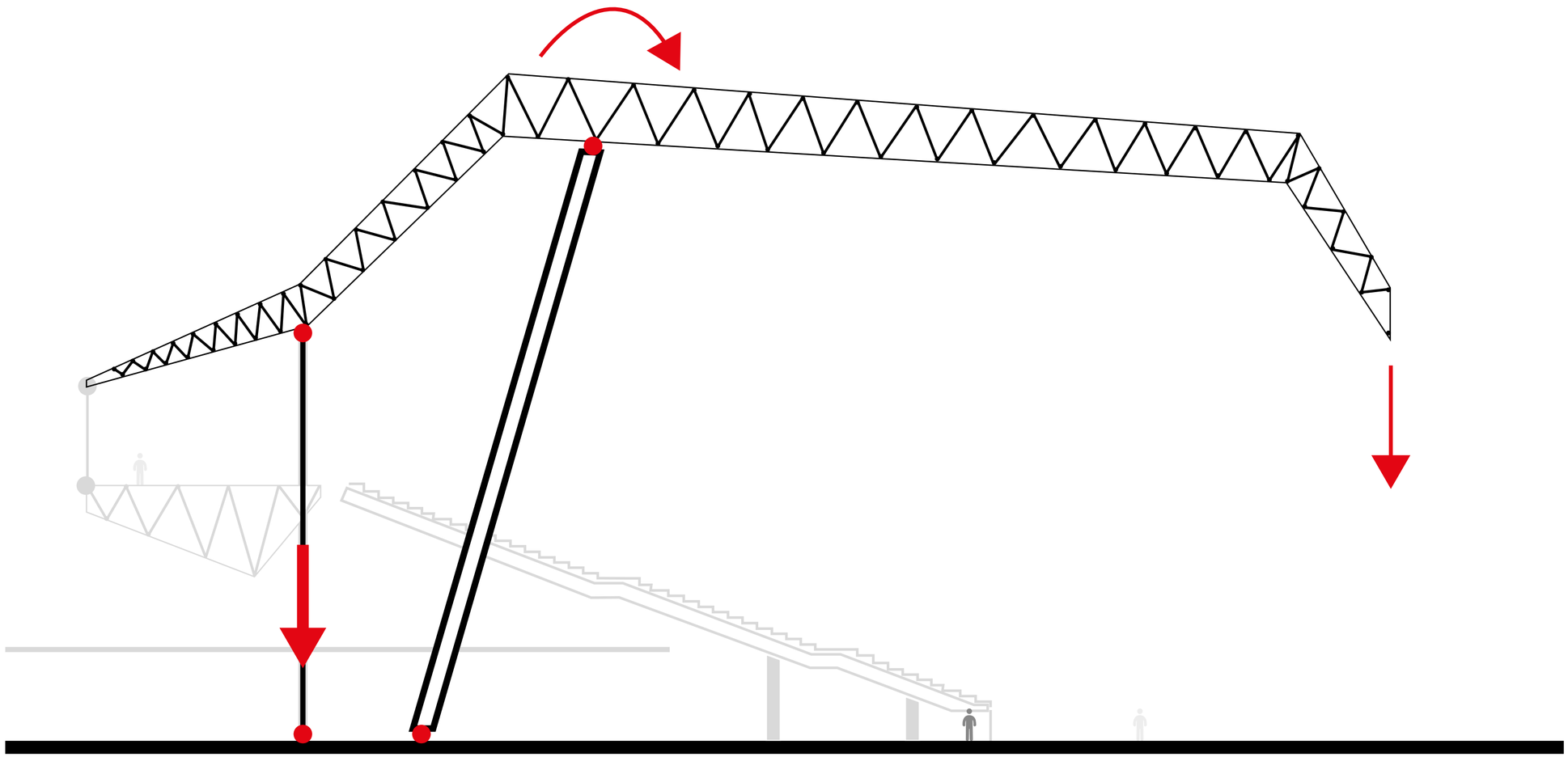
STRUCTURE



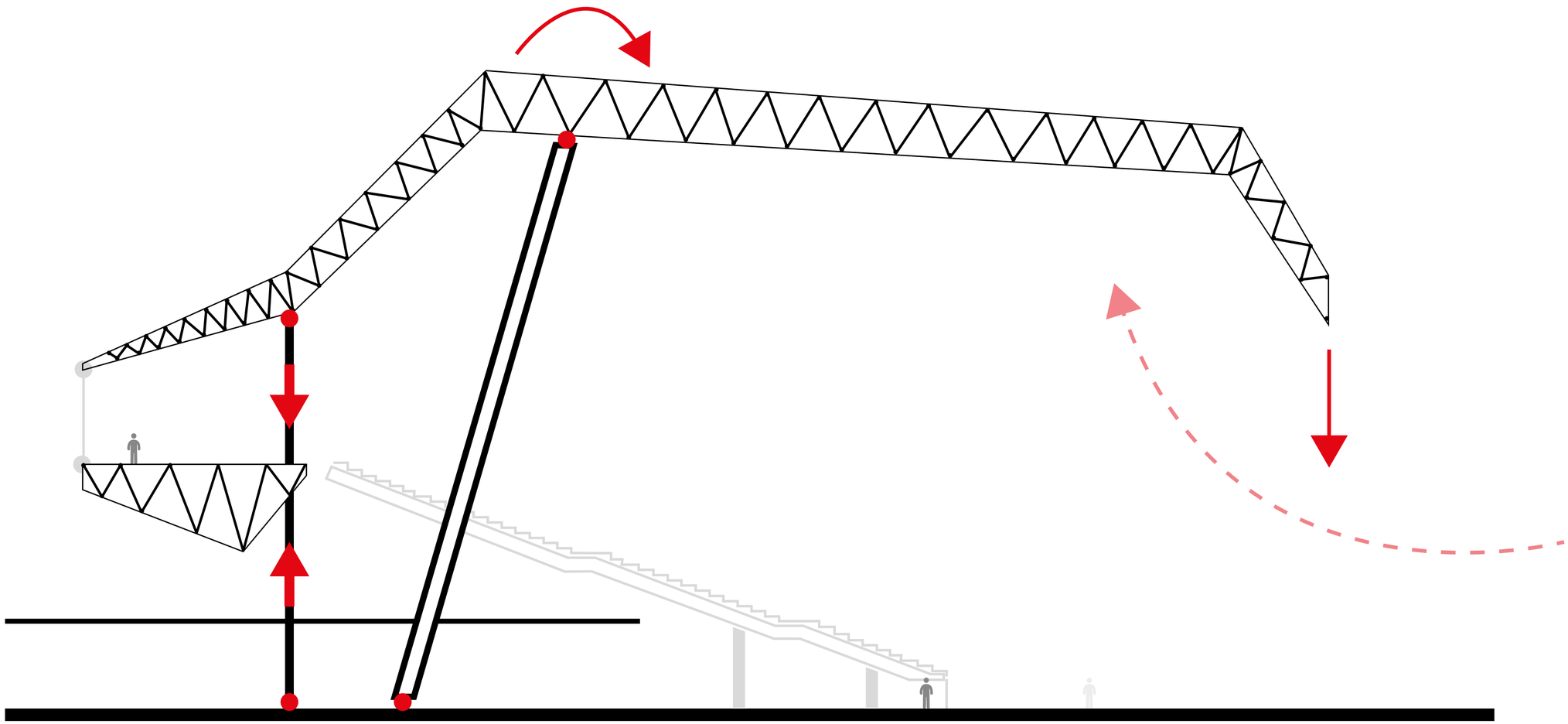
Structure: adding 13 columns



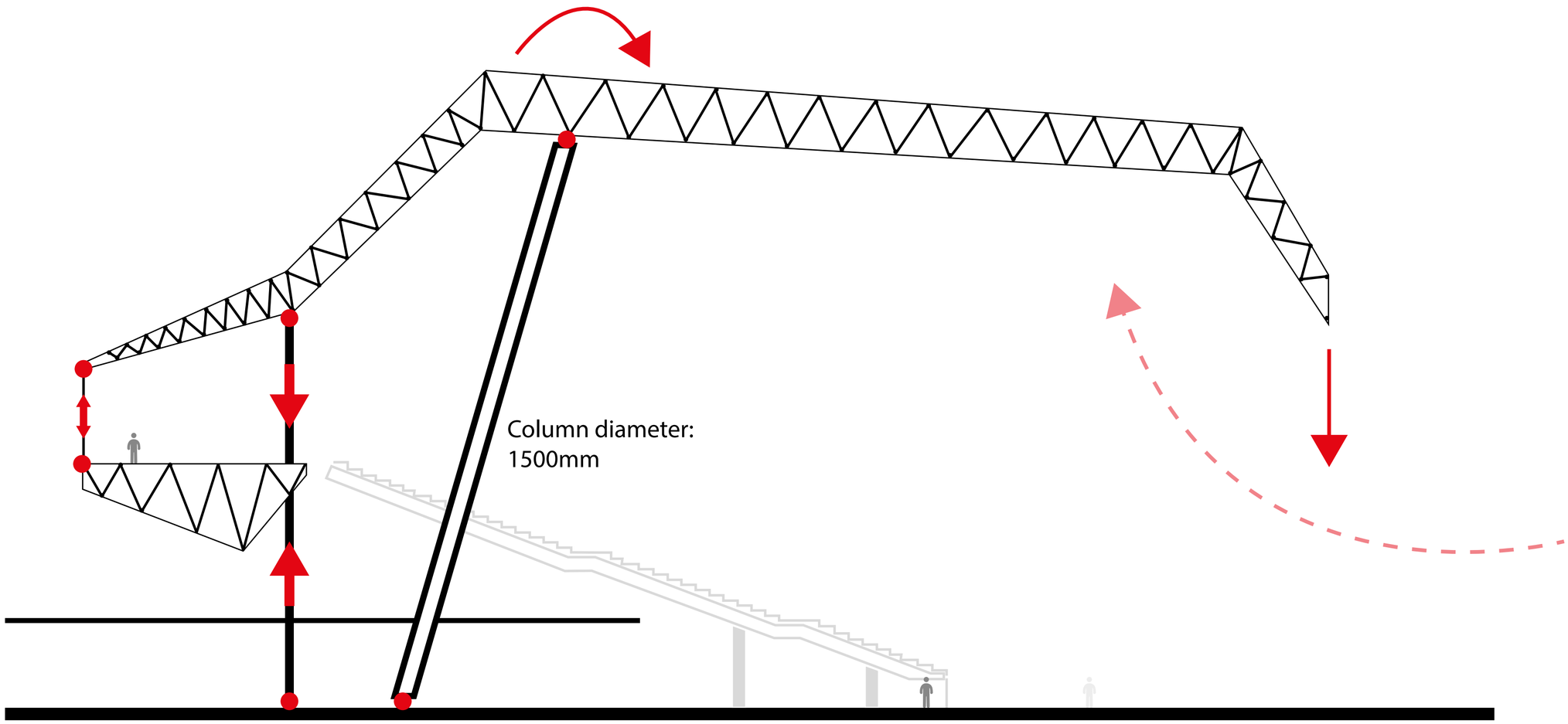
Structure: Roof spaceframe



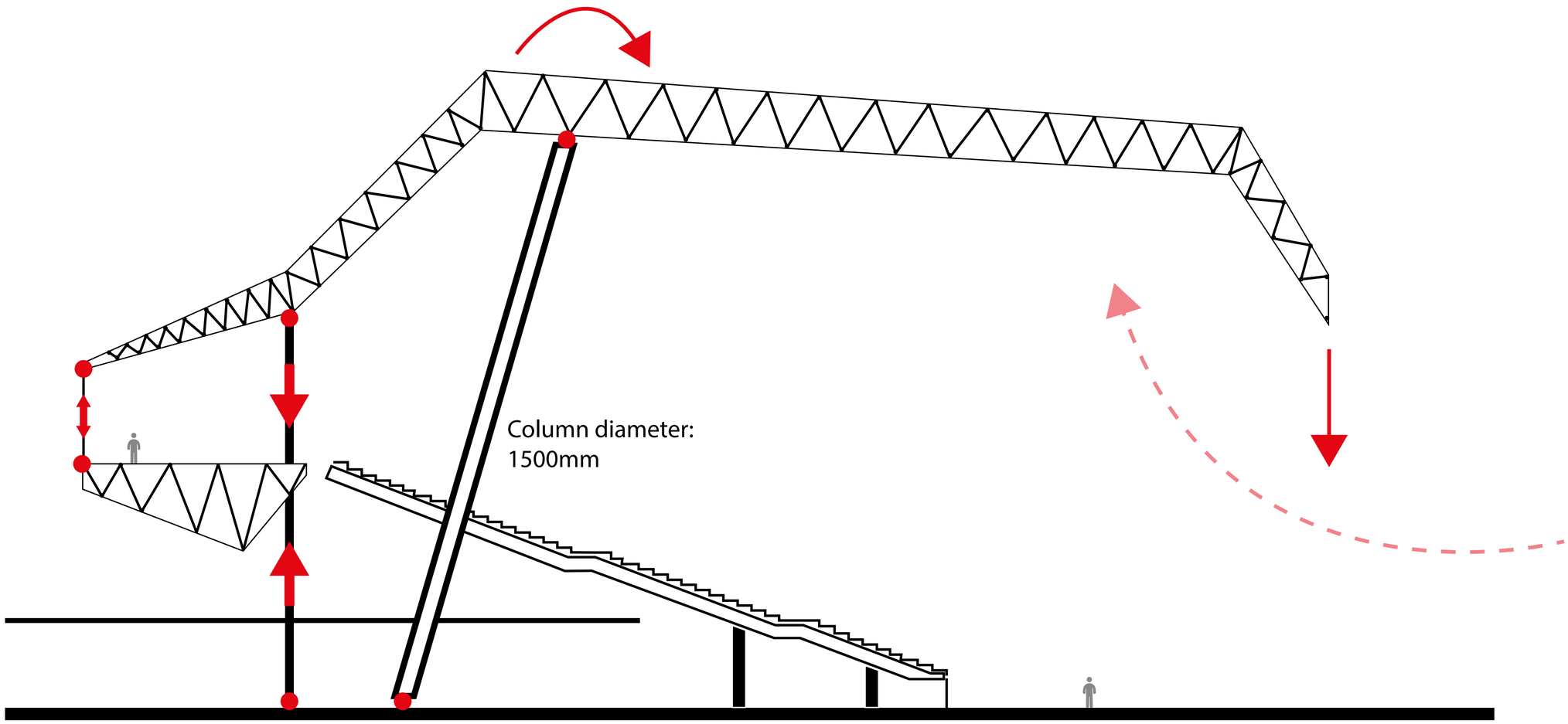
Adding a tensile bar to create balance



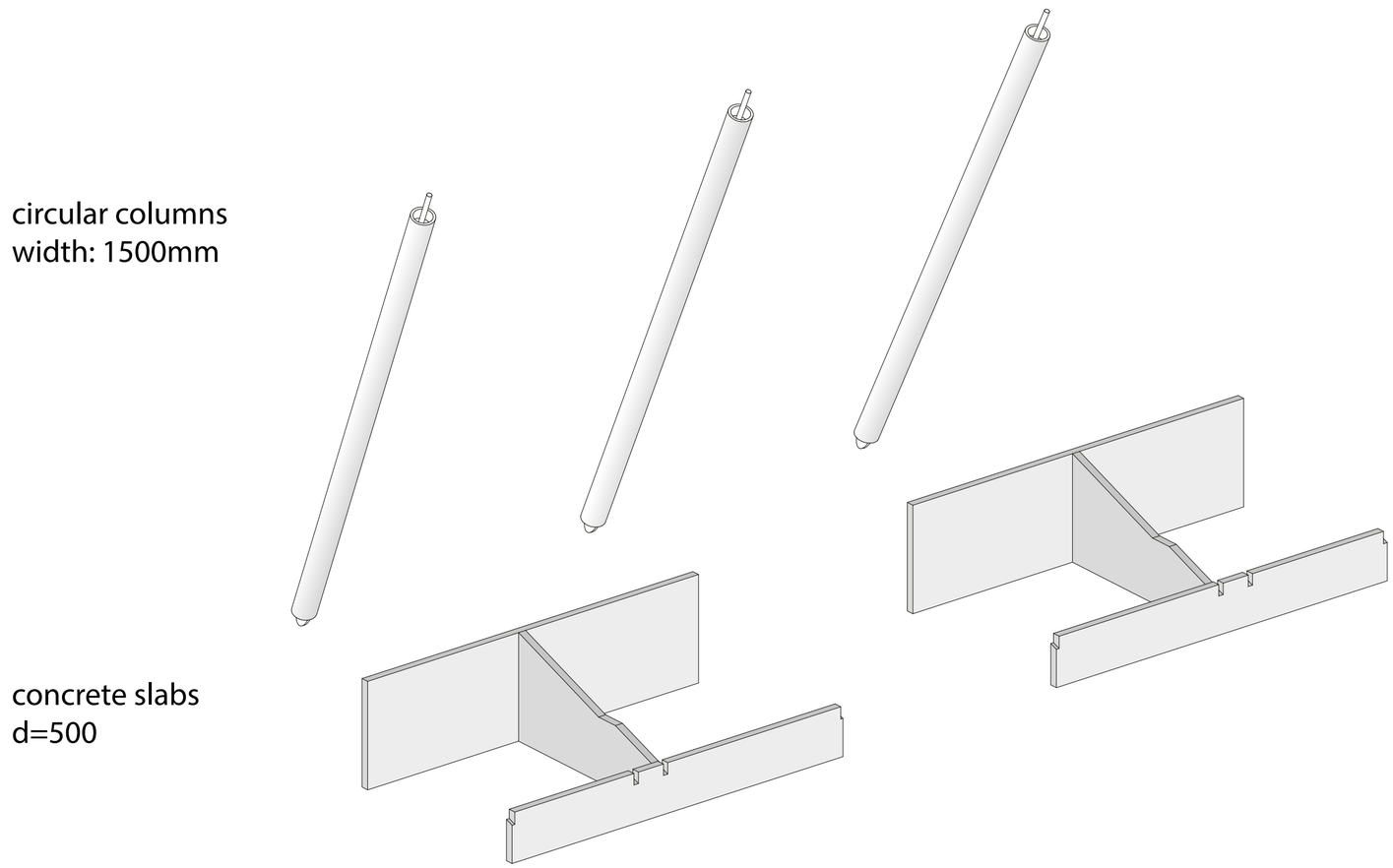
Tensile bar to Tie column, supporting the circulation route
and being able to resist hard high winds



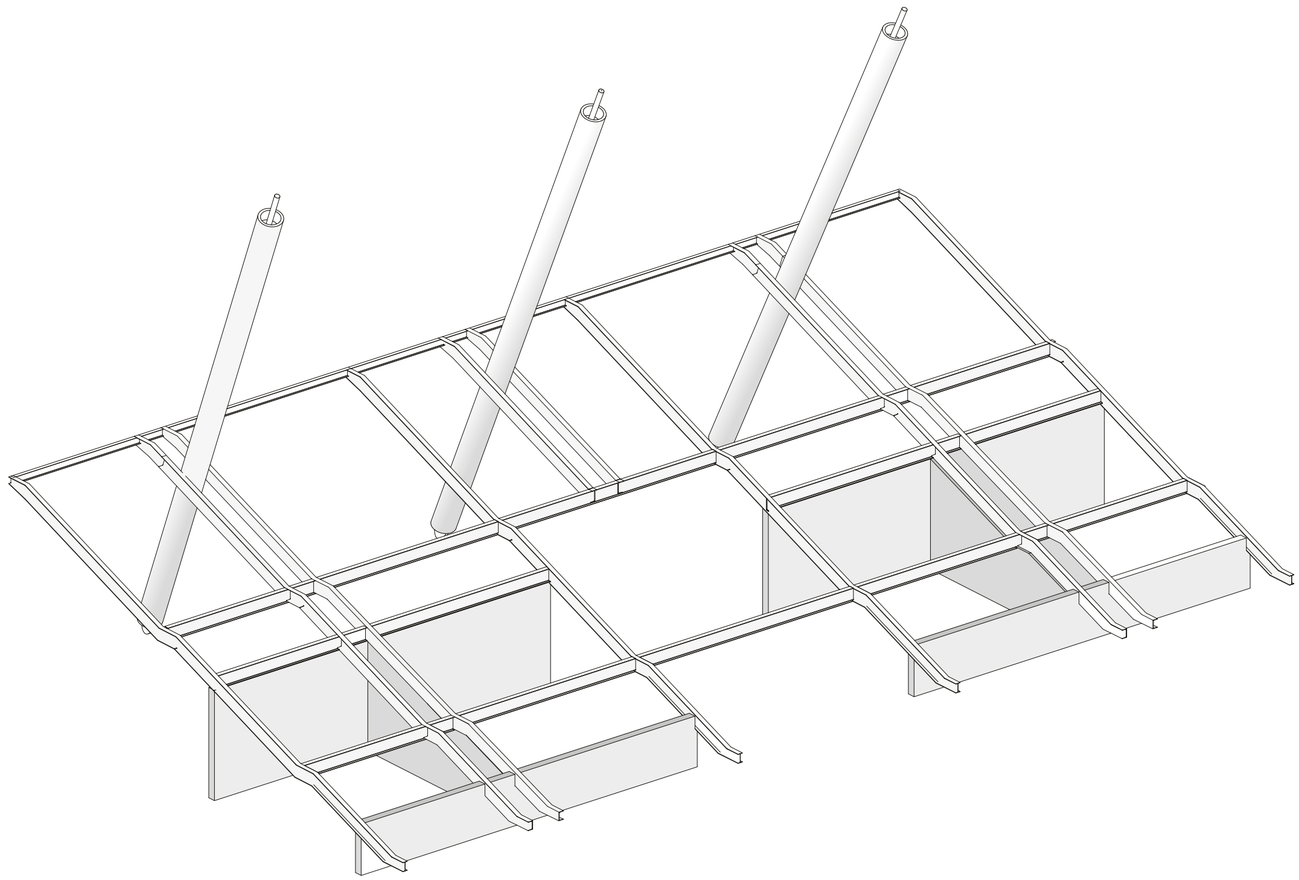
To support the circulation route, it is being connected with tensile bars
creating even more balance to the main structure.



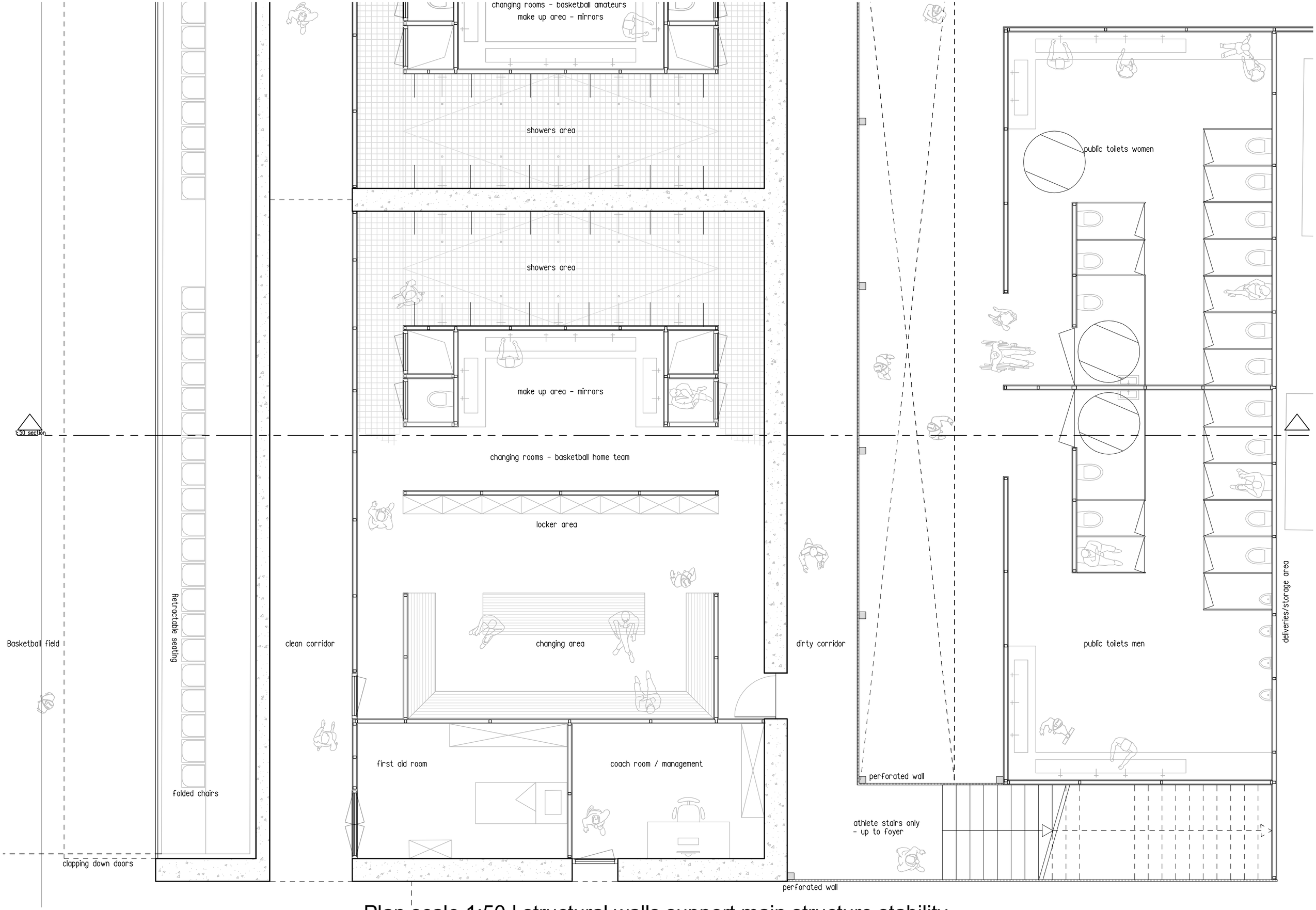
Seating area stabilizes the structure



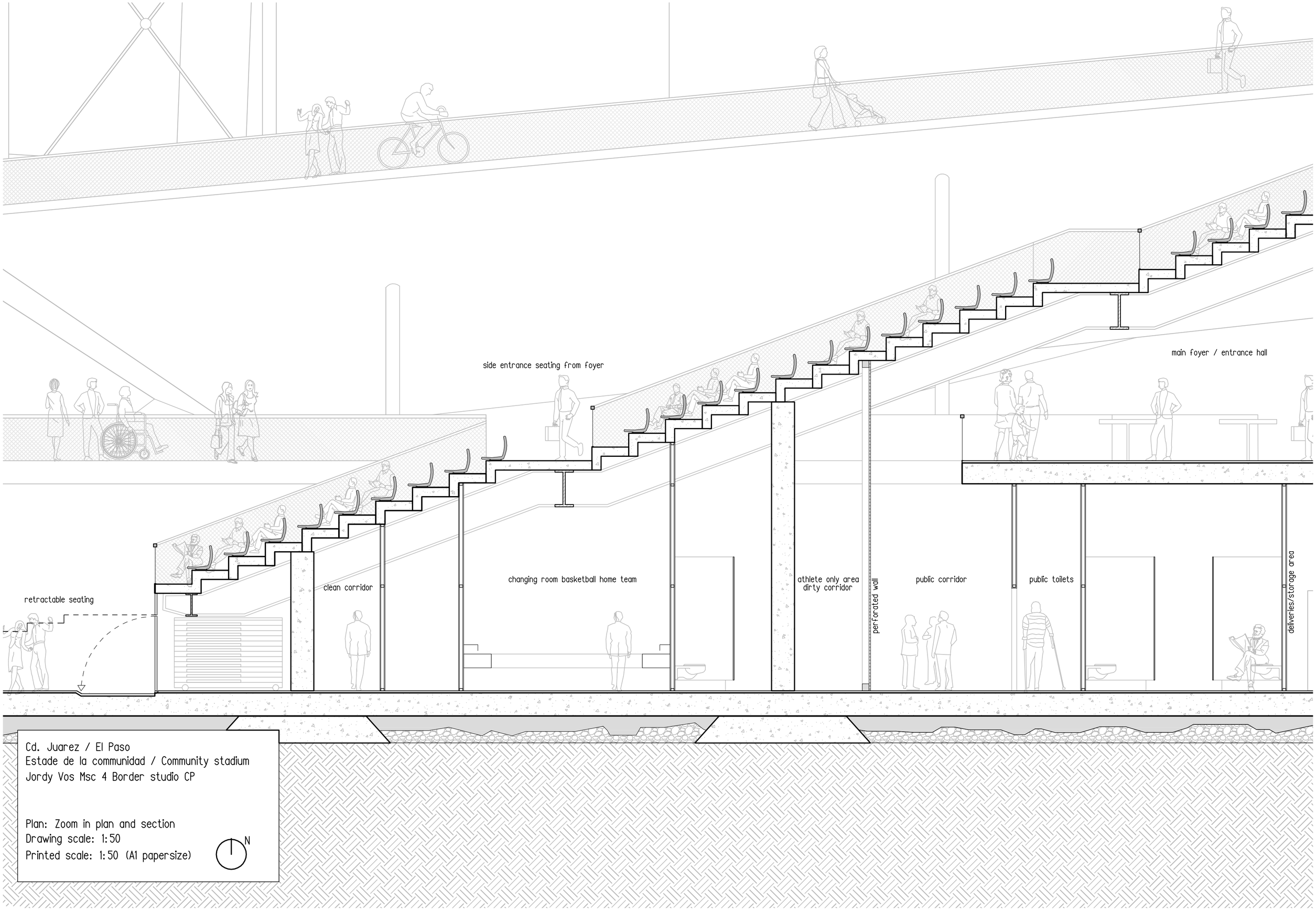
Concrete slabs serve as solids



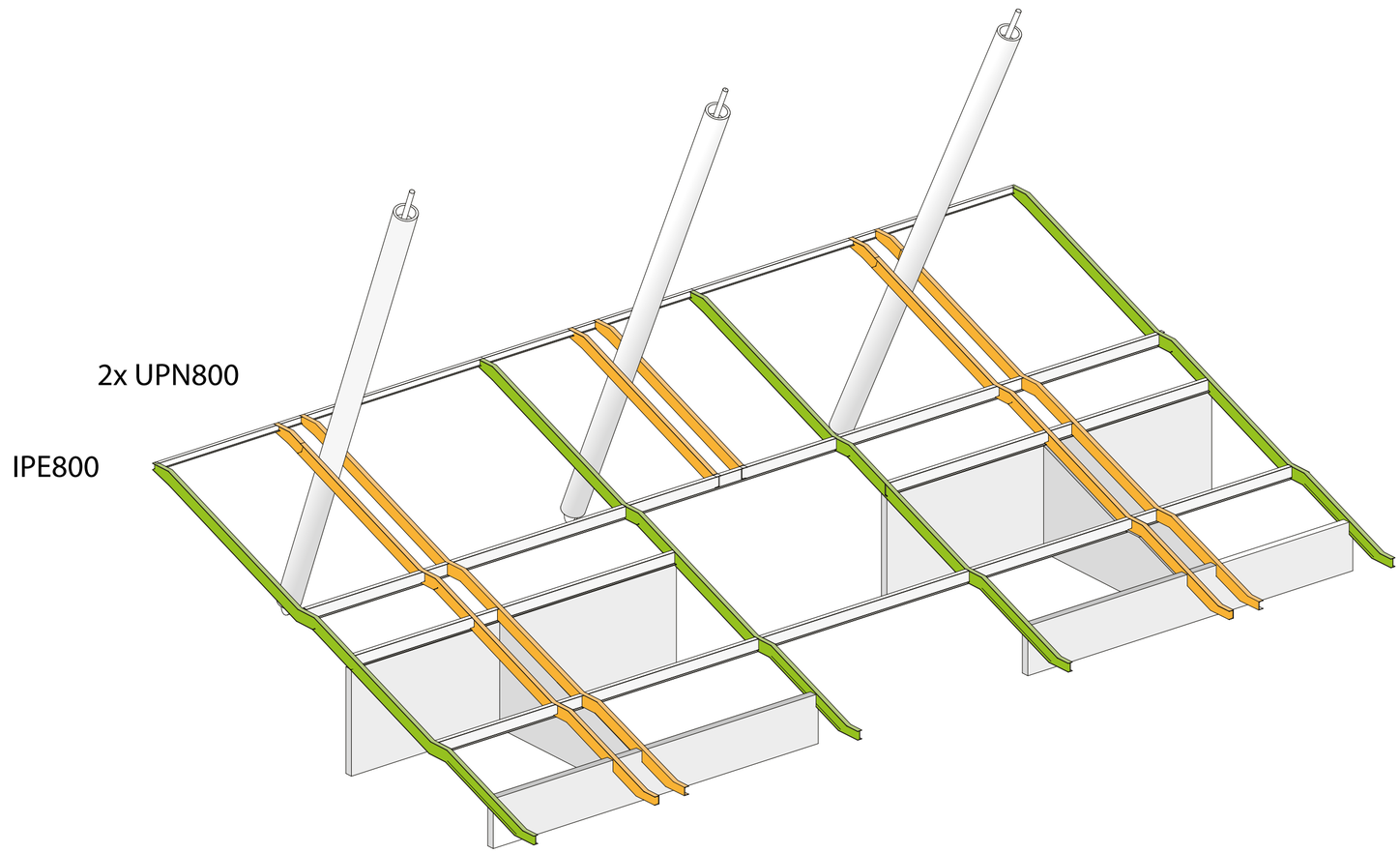
Steel structure (combination of UPN and IPE profiles) to create
a strong and stable structure for the seating area



Plan scale 1:50 | structural walls support main structure stability

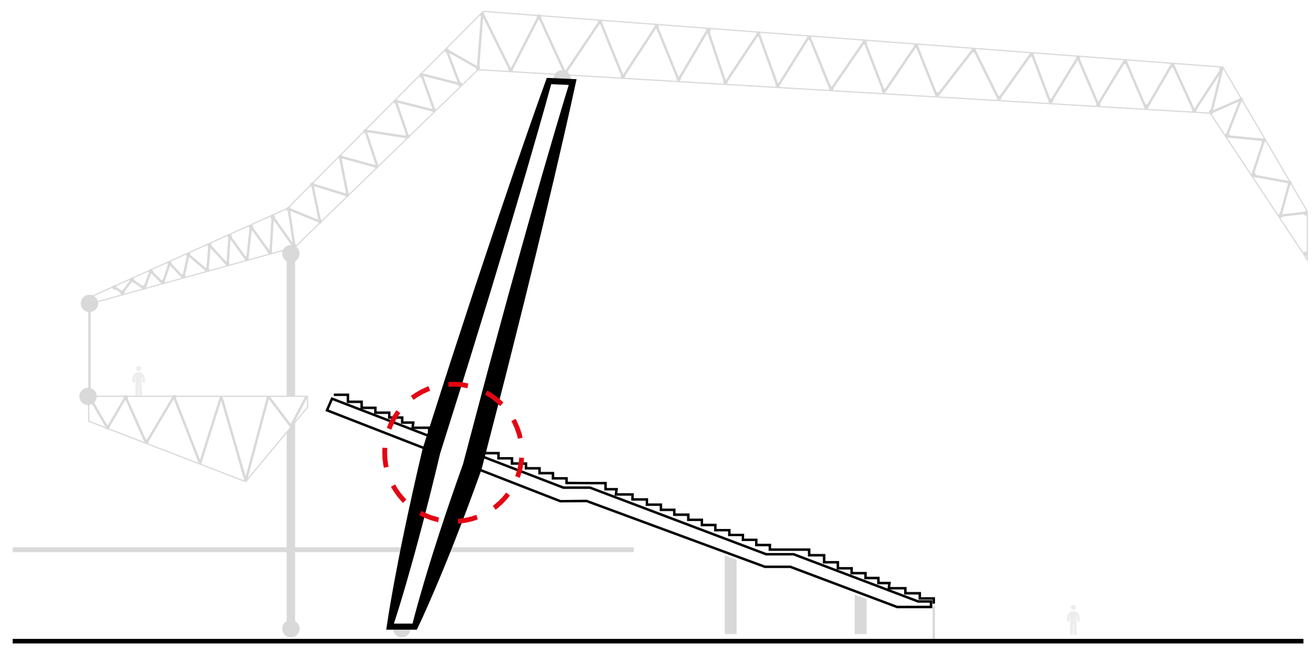


Section scale 1:50 | structural walls support main structure stability



Steel structure (combination of UPN and IPE profiles) to create
a strong and stable structure for the seating area

Column
Lenght: 35.000mm
Diameter: 1500mm



Column build up

Column
Lenght: 35.000mm
Diameter: 1500mm

Given:

Average column length: 35.000 mm
Buckling length: $1/30 \cdot l$ -> 25.000 mm
Total forces spaceframe roof + additional weight/forces (snow, wind) = $2\ kN\ +\ 2\ kN\ =\ 4\ kN$
Total roof surface area: $29.529\ sqm$
Chosen steel: high quality steel = $250\ =\ \sigma$
Total amount of columns = 13

F = Total forces per column = $\frac{4\ kN \cdot 29529}{14}\ =\ \frac{118116\ kN}{14}\ =\ 9085\ kN$
A = Needed inner diameter according to F = $\frac{F}{\sigma}\ =\ \frac{9085}{250}\ =\ 36343\ mm^2$
d = Column outer diameter = 1500mm
d_i = Column inner diameter = $\frac{A}{\pi d}\ =\ \frac{36343}{3.14 \cdot 1500}\ = 7.7\ mm$

$$I_x\ =\ I_y\ =\ \frac{\pi(d^4\ -\ d_i^4)}{64}\ =\ 10049\ \cdot\ 10^6\ mm^4$$

Buckling force per column = $\frac{\pi^2 \cdot e \cdot I}{buckling\ length^2}\ =\ \frac{\pi^2 \cdot 210 \cdot 10^3 \cdot I_x}{25.000^2}\ =\ \frac{\pi^2 \cdot 210 \cdot 10^3 \cdot \frac{\pi(d^4 - d_i^4)}{64}}{25.000^2}$ **> 5F**

Buckling force per column = $\frac{\pi^2 \cdot 210 \cdot 10^3 \cdot \frac{\pi(1500^4 - 7.7^4)}{64}}{25.000^2}\ =\ 33290\ kN\ =\ 3.66\ F$

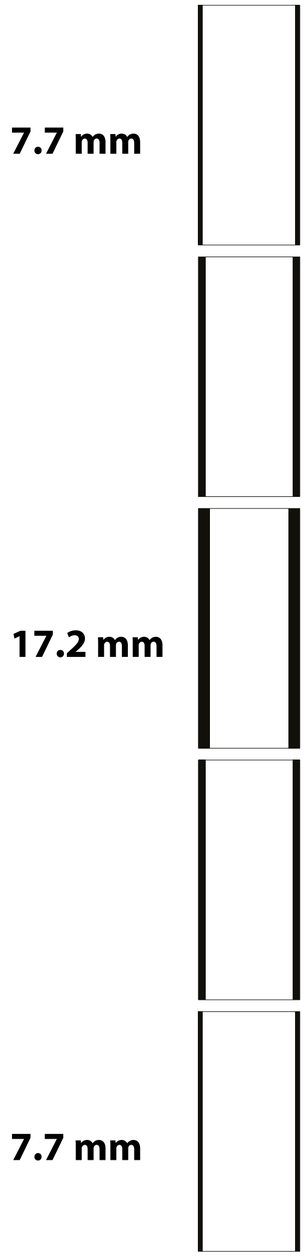
We want the buckling forces to be at least 8 F.

$8\ F\ = 72680\ kN\ =\ \frac{\pi^2 \cdot 210 \cdot 10^3 \cdot I_x}{25.000^2}$ → $I_x\ =\ \frac{8F \cdot 25.000^2}{\pi^2 \cdot 210 \cdot 10^3}$ = 21974148000 = $\frac{\pi(1500^4 - d_i^4)}{64}$

d_i = Column inner diameter $= 17.2\ mm$

Column calculation

Column
Lenght: 35.000mm
Diameter: 1500mm



Given:

Average column length: 35.000 mm
Buckling length: $1/30 \cdot l$ -> 25.000 mm
Total forces spaceframe roof + additional weight/forces (snow, wind) = $2\ kN\ +\ 2\ kN\ =\ 4\ kN$
Total roof surface area: $29.529\ sqm$
Chosen steel: high quality steel = $250\ =\ \sigma$
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F = Total forces per column = $\frac{4\ kN \cdot 29529}{14} = \frac{118116\ kN}{14} = 9085\ kN$

A = Needed inner diameter according to F = $\frac{F}{\sigma} = \frac{9085}{250} = 36343\ mm^2$

d = Column outer diameter = 1500mm

d_i = Column inner diameter = $\frac{A}{\pi d} = \frac{36343}{3.14 \cdot 1500} = 7.7\ mm$

$$I_x = I_y = \frac{\pi(d^4 - d_i^4)}{64} = 10049 \cdot 10^6\ mm^4$$

Buckling force per column = $\frac{\pi^2 \cdot e \cdot I}{buckling\ length^2} = \frac{\pi^2 \cdot 210 \cdot 10^3 \cdot I_x}{25.000^2} = \frac{\pi^2 \cdot 210 \cdot 10^3 \cdot \frac{\pi(d^4 - d_i^4)}{64}}{25.000^2}$ **> 5F**

Buckling force per column = $\frac{\pi^2 \cdot 210 \cdot 10^3 \cdot \frac{\pi(1500^4 - 7.7^4)}{64}}{25.000^2} = 33290\ kN = 3.66\ F$

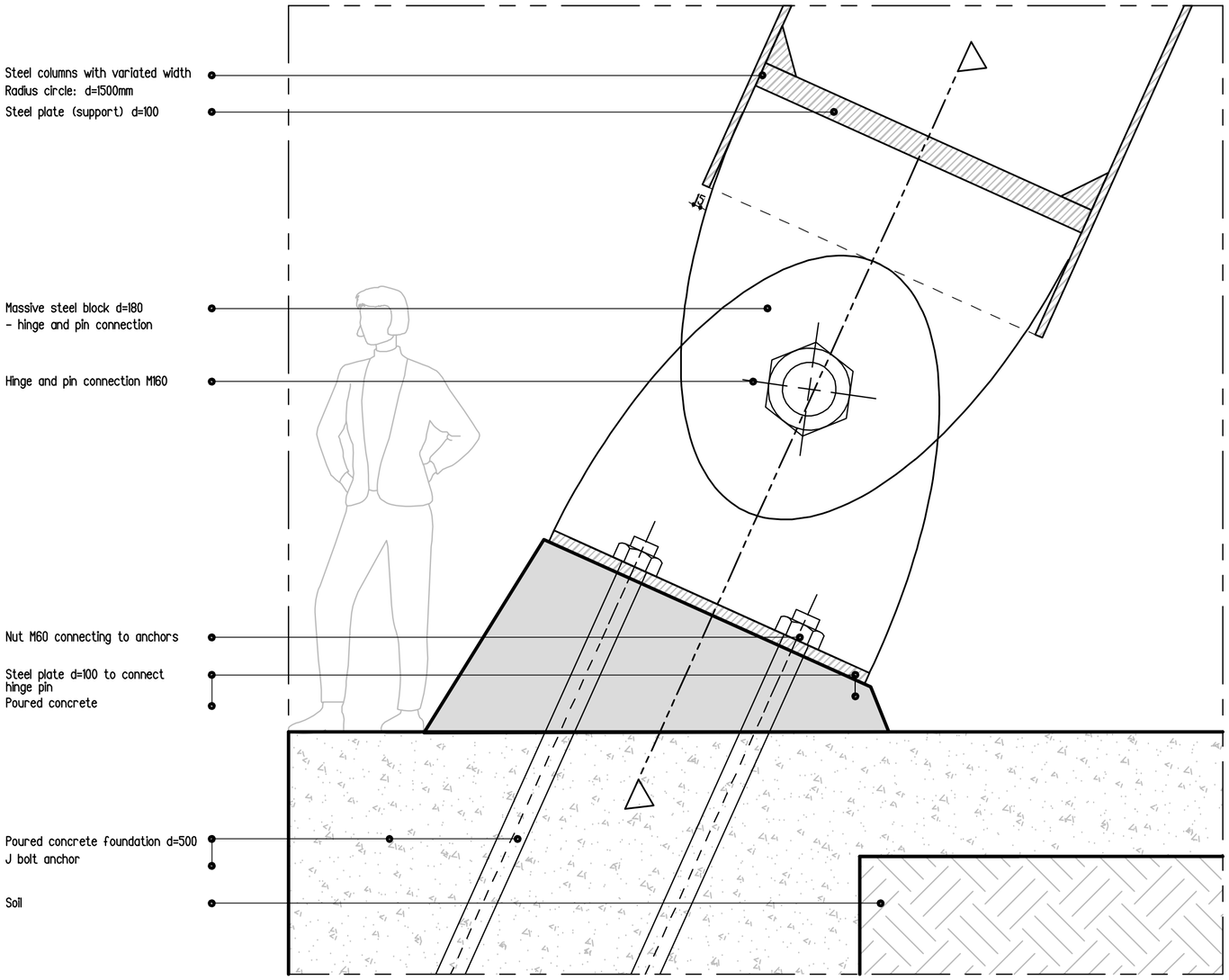
We want the buckling forces to be at least 8 F.

$8\ F = 72680\ kN = \frac{\pi^2 \cdot 210 \cdot 10^3 \cdot I_x}{25.000^2} \rightarrow I_x = \frac{8F \cdot 25.000^2}{\pi^2 \cdot 210 \cdot 10^3}$ = 21974148000 = $\frac{\pi(1500^4 - d_i^4)}{64}$

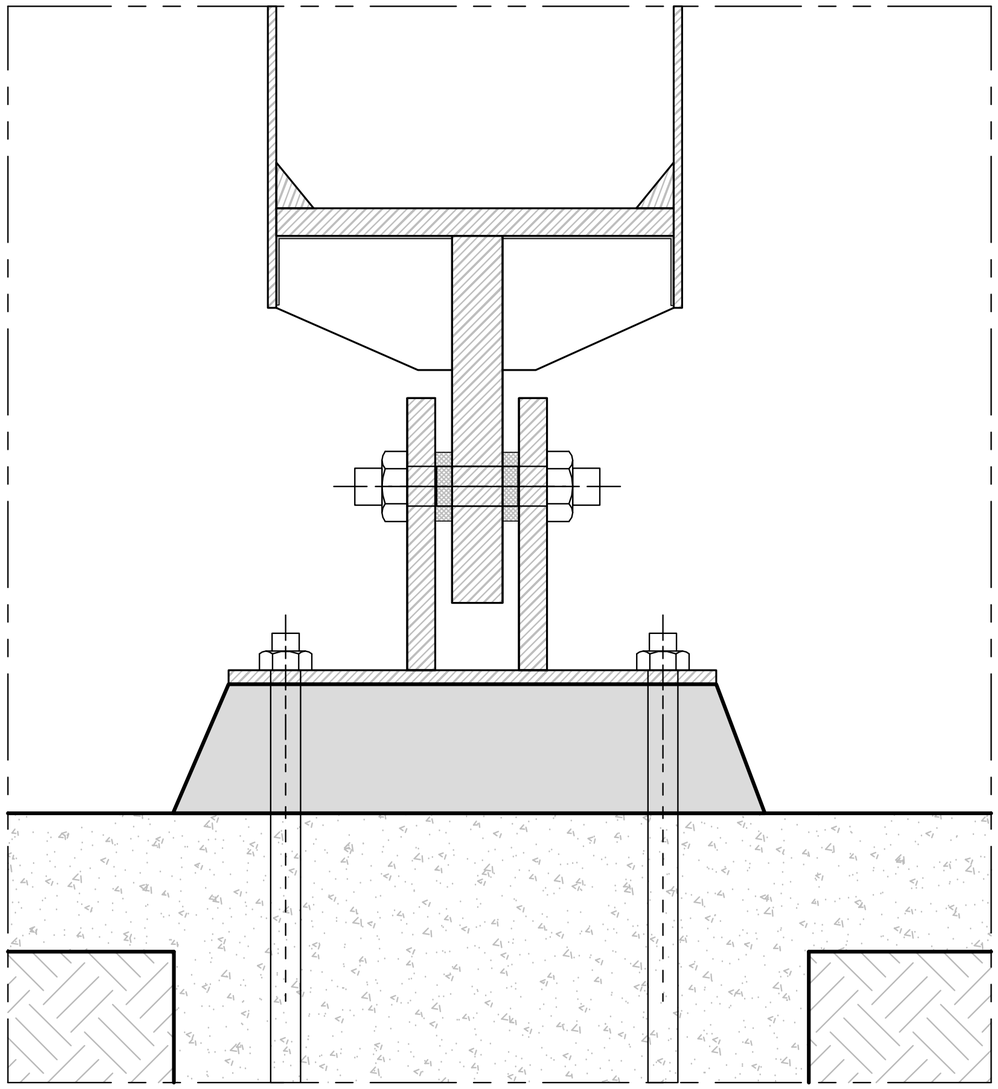
d_i = Column inner diameter = $17.2\ mm$

Column calculation

Detail E1 | scale 1:20

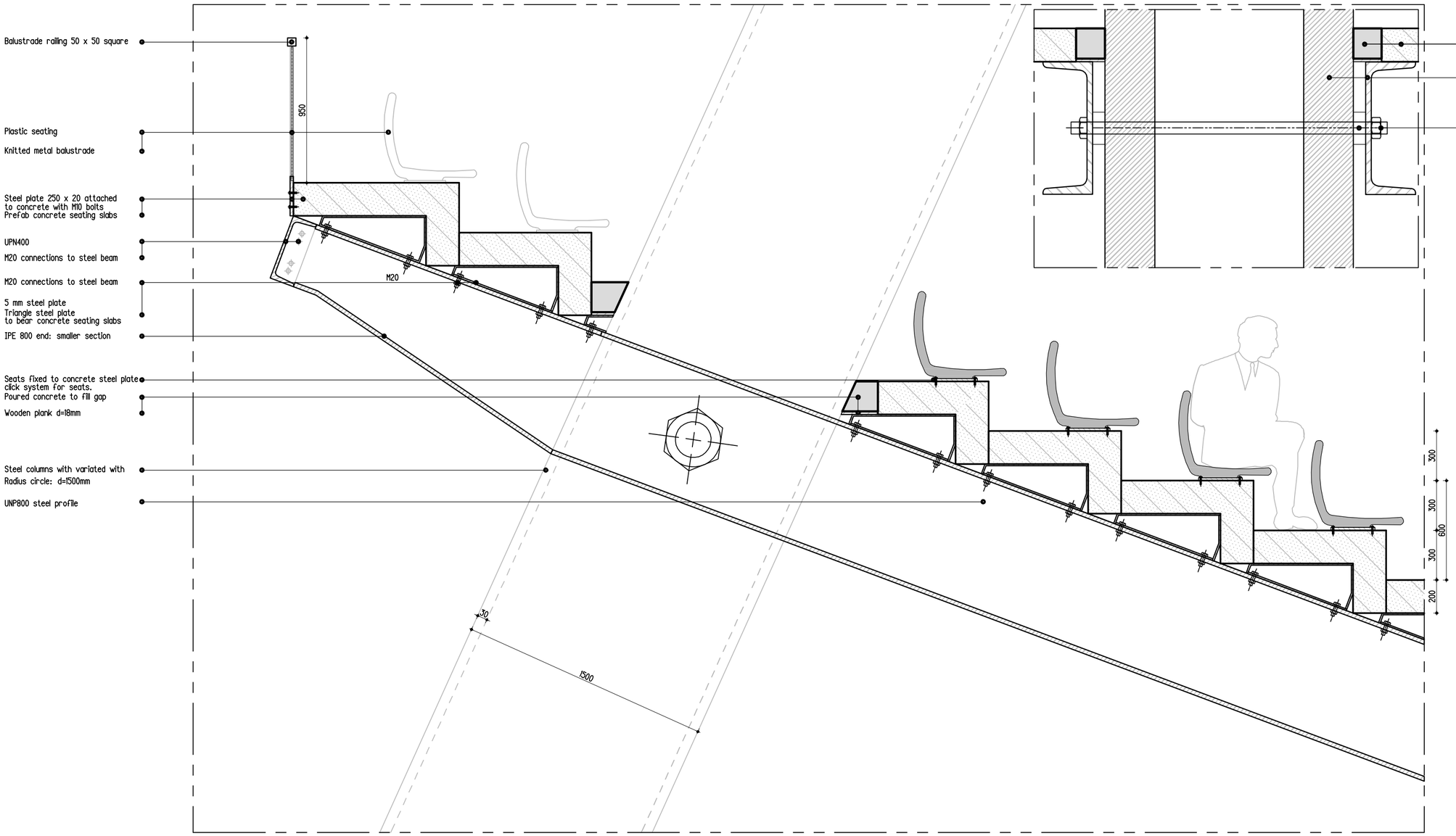


Detail E2 | scale 1:20

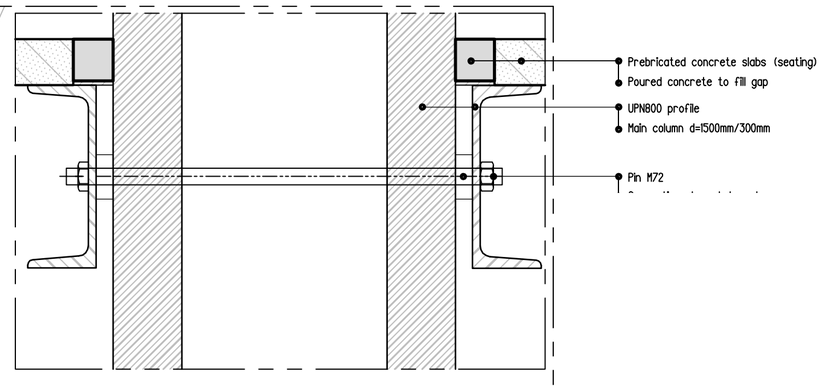


Detail: connection main columns to foundations

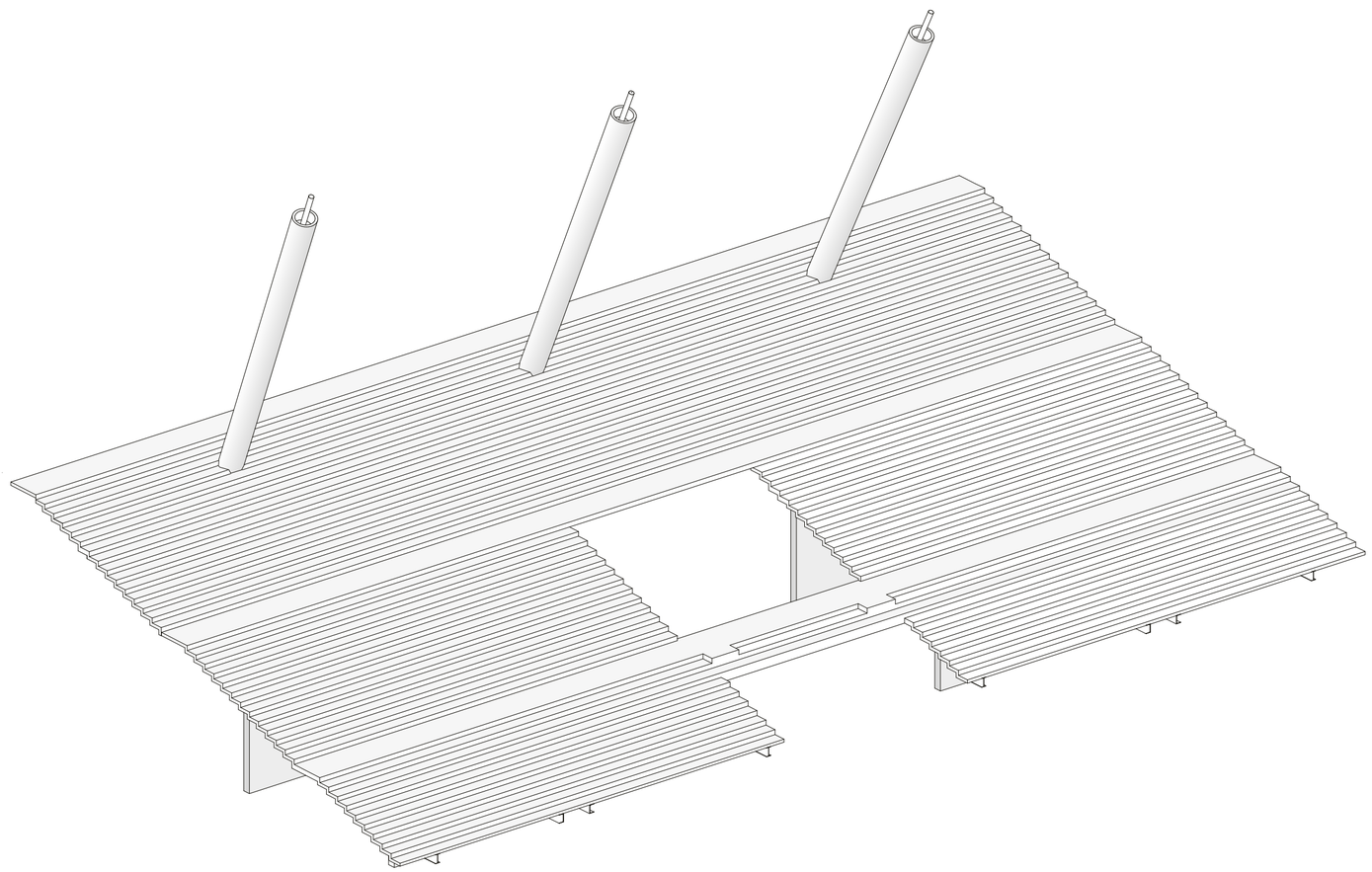
Detail D1 | scale 1:20



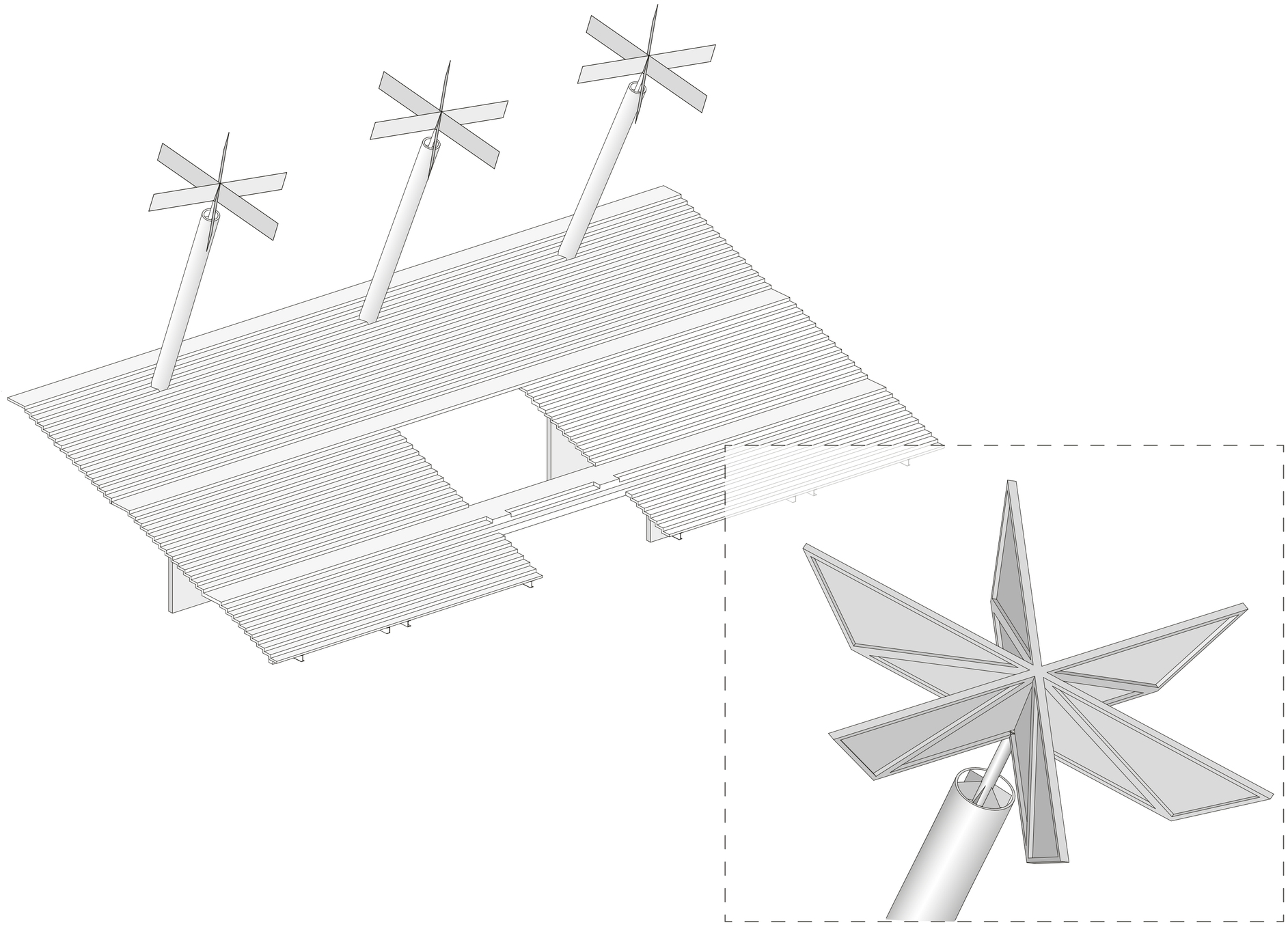
Detail D2 | scale 1:20



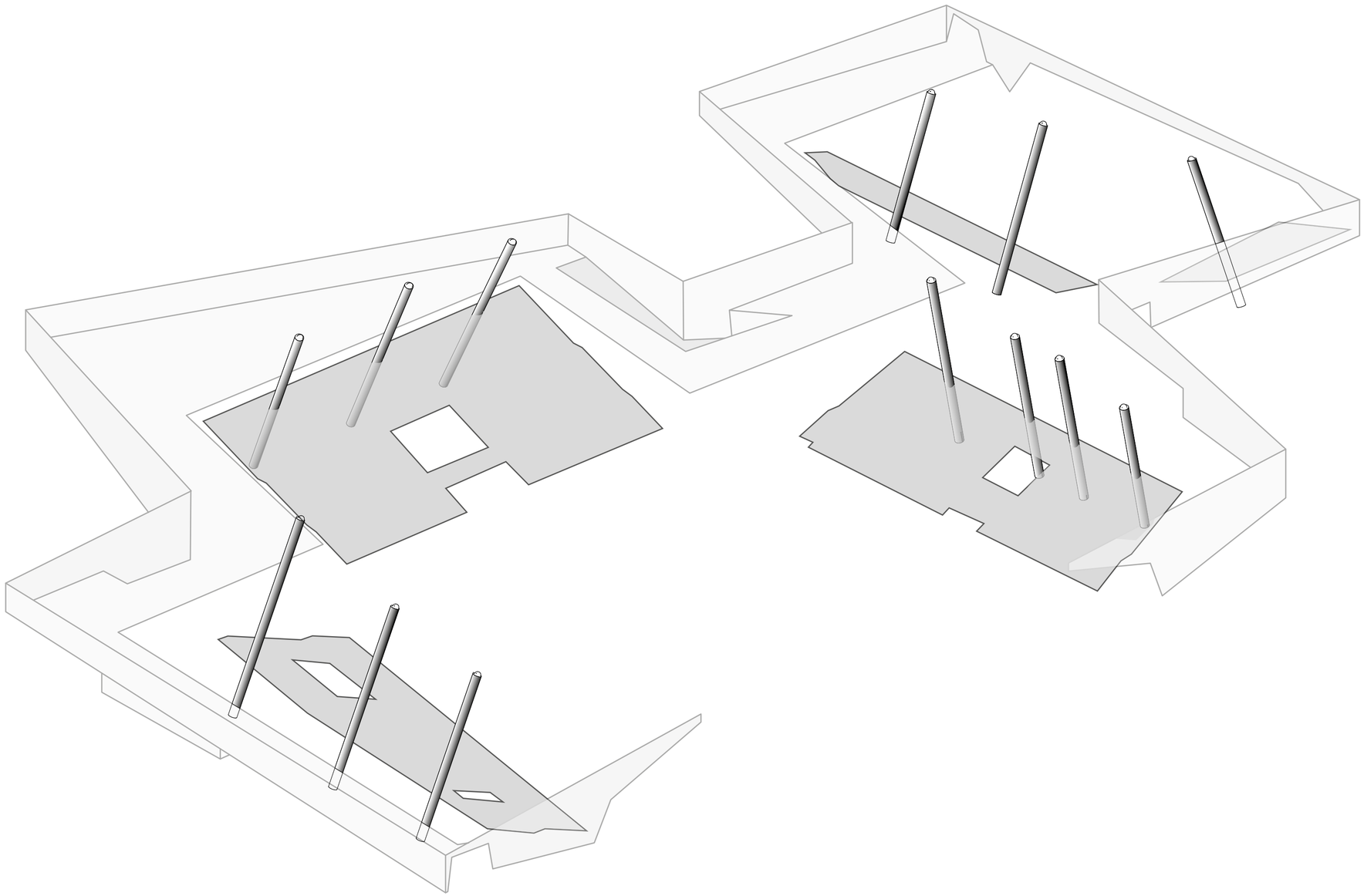
Detail: connection UPN beams with main columns



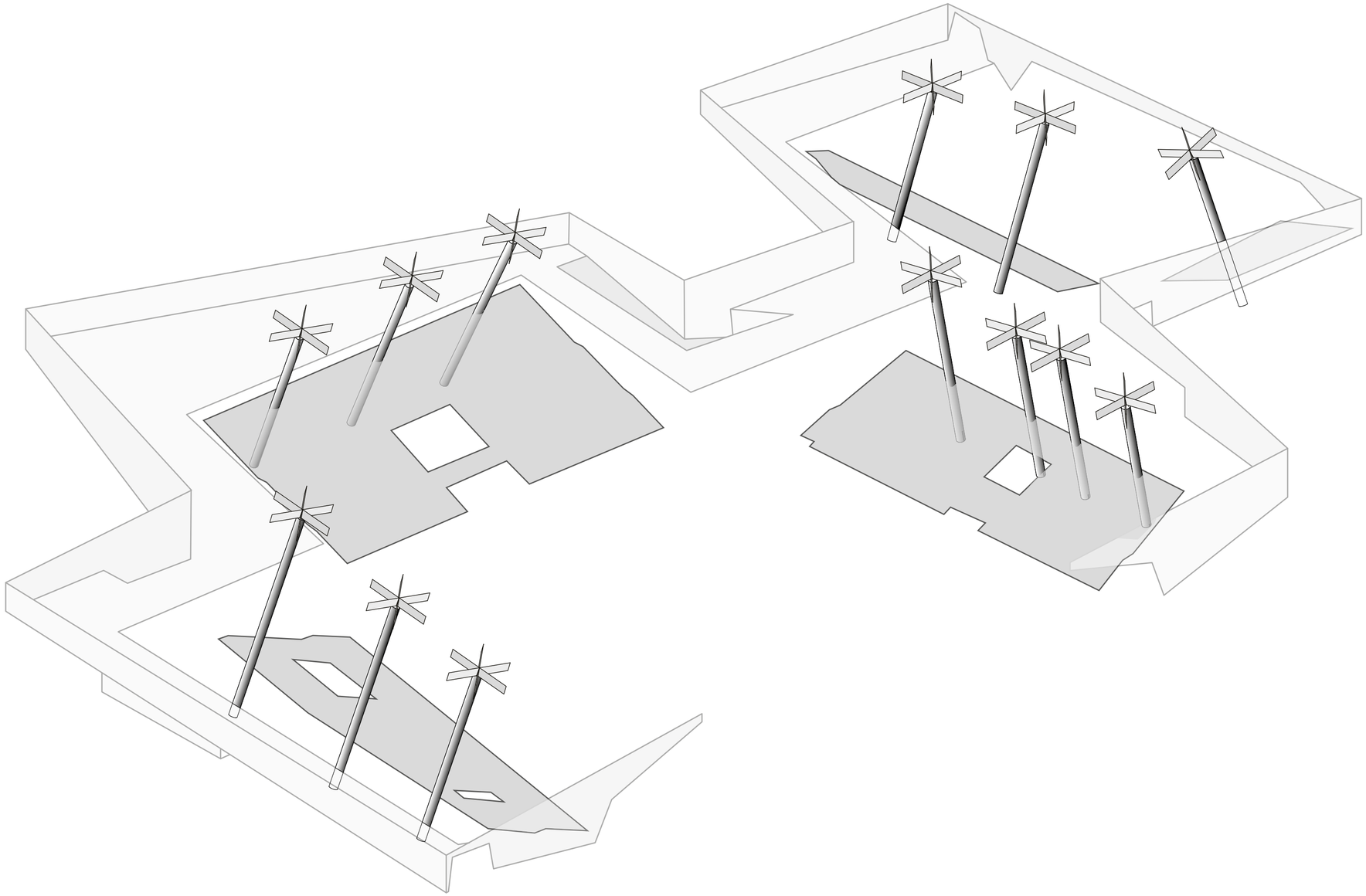
Prefabricated concrete slabs finish the seating area,
giving it even more stability



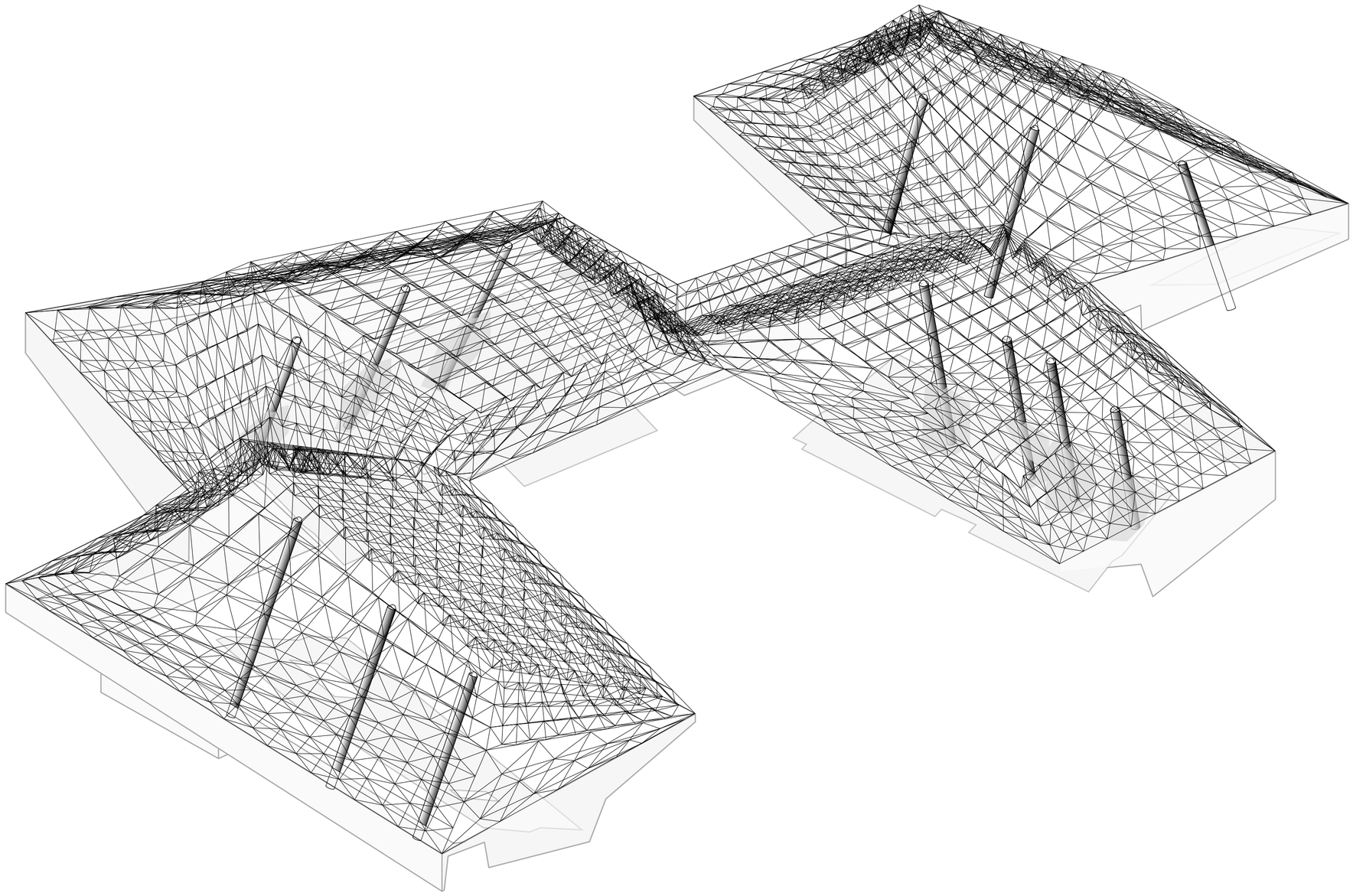
Steel star-element as intermedior between column and roofing system



5 tribunes, 13 columns bearing the roof structure



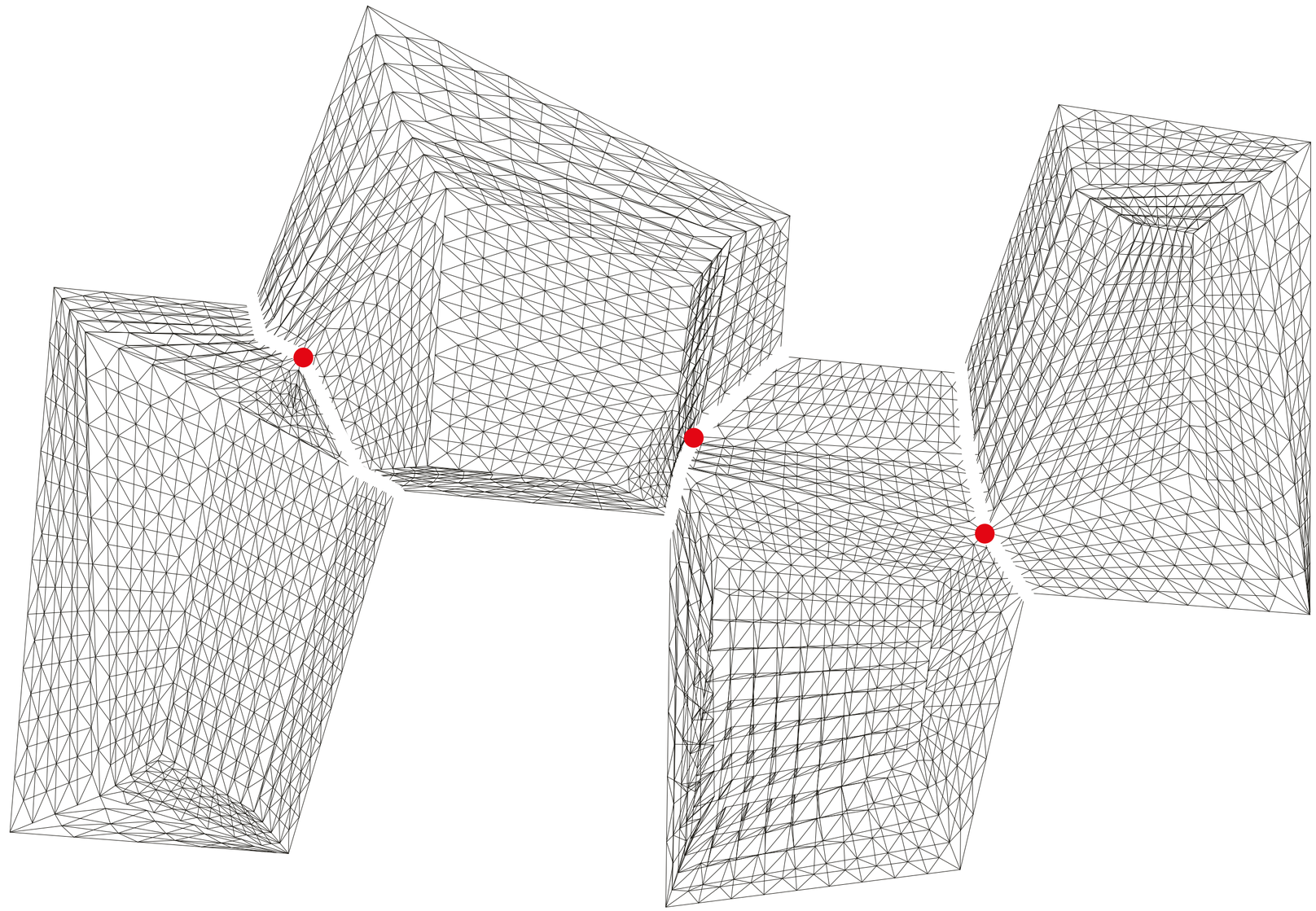
5 tribunes, 13 columns bearing the roof structure



5 tribunes, 13 columns bearing the roof structure

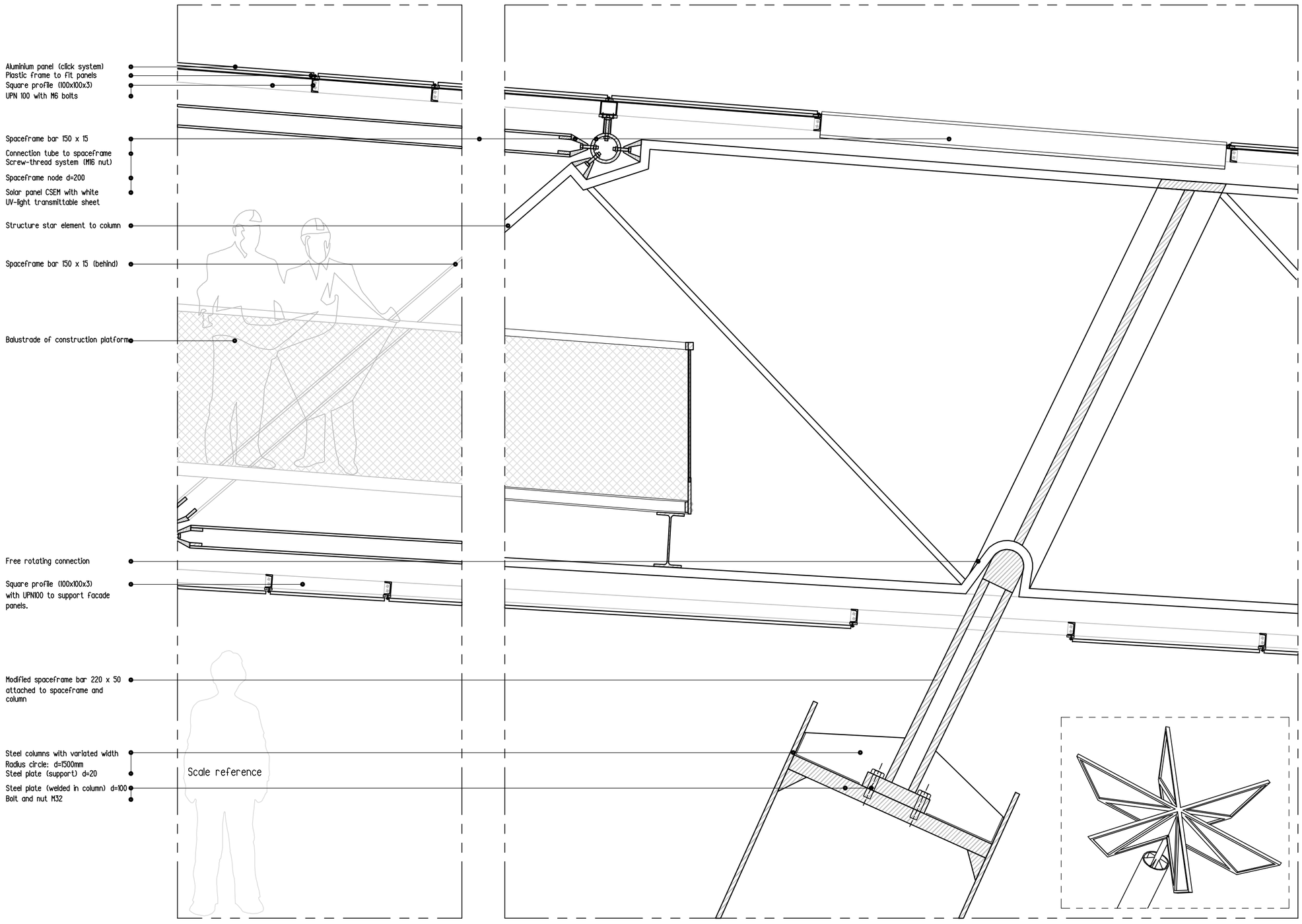
Thermal expansion
(-10 / + 50 C)
0.0749 meter

Length
104 meter

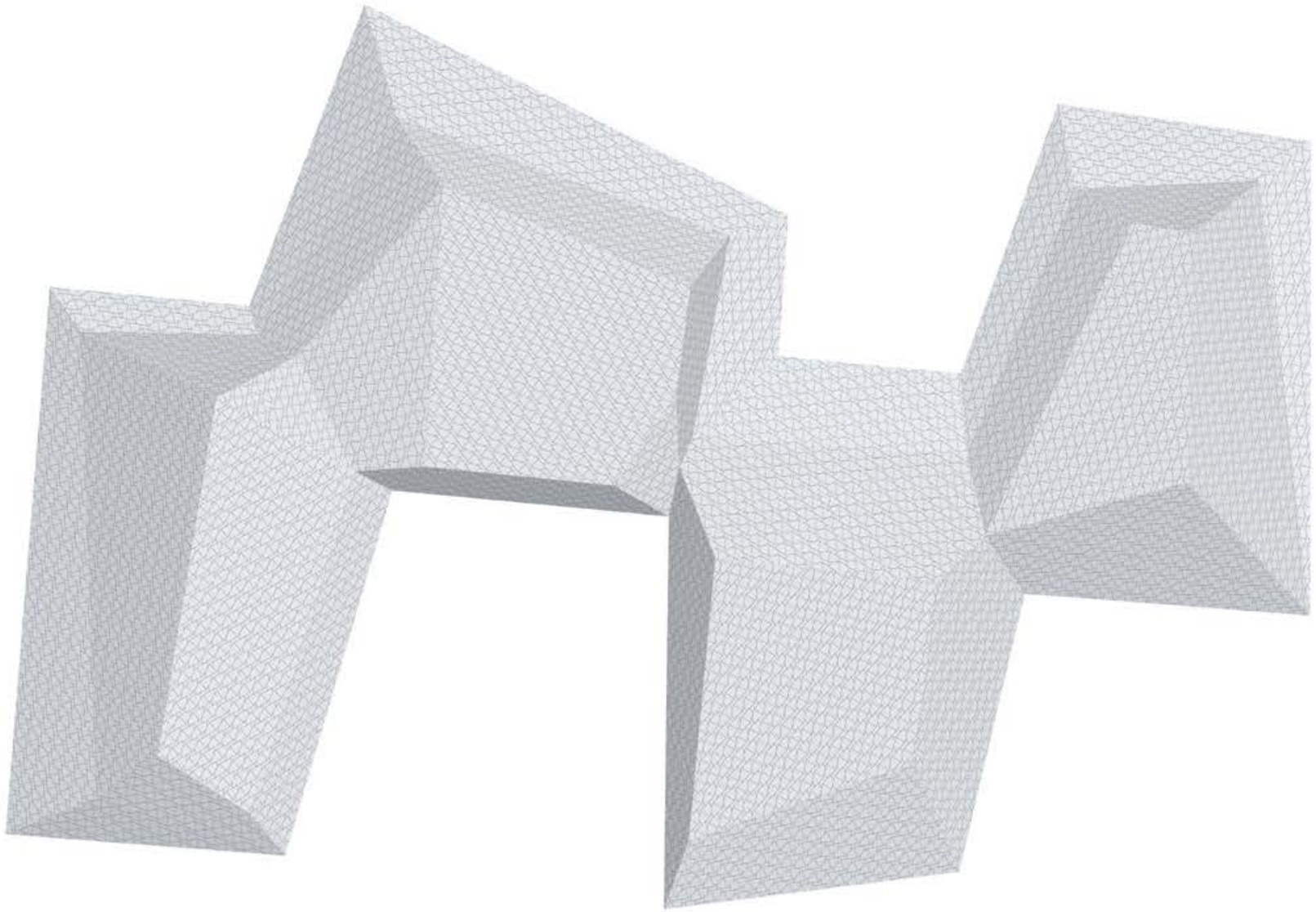


Spaceframe divided into four parts

Detail C | scale 1:20

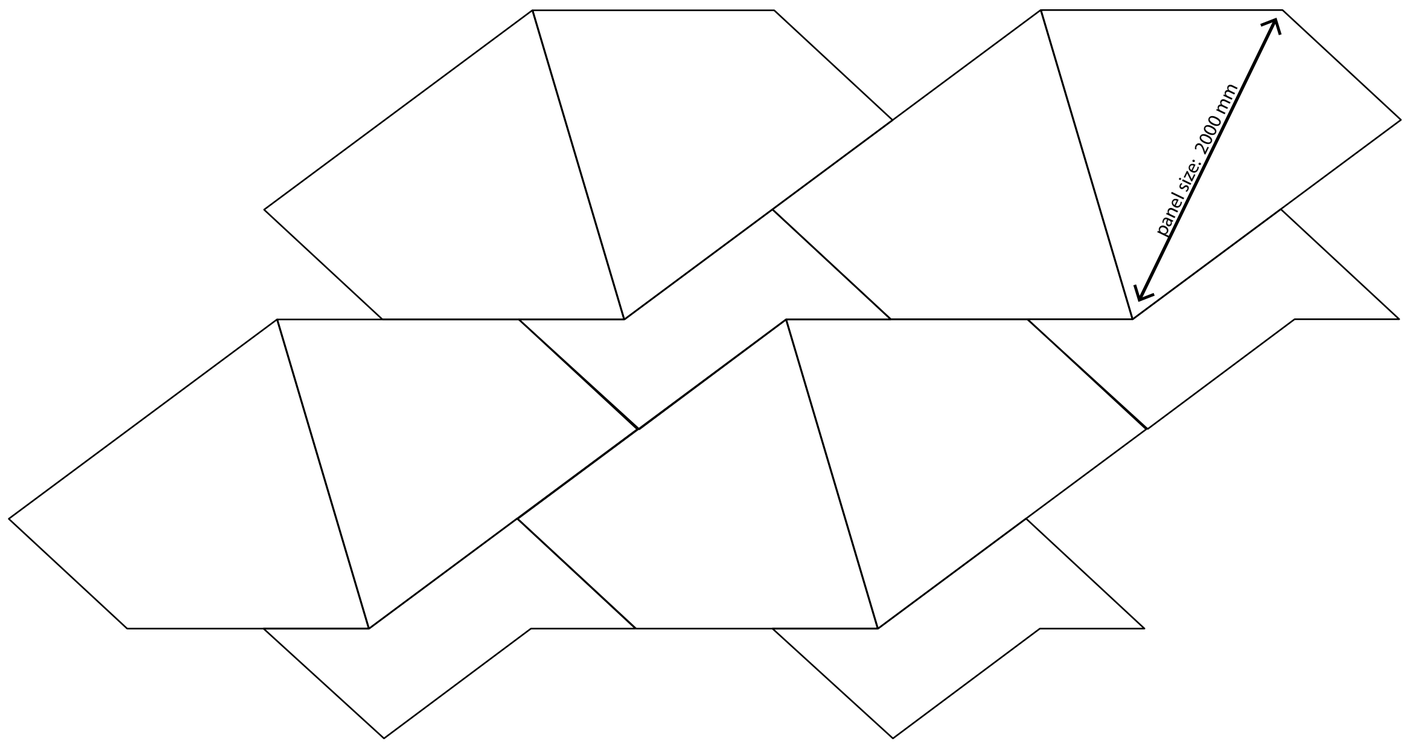


Detail: connection main columns to spaceframe

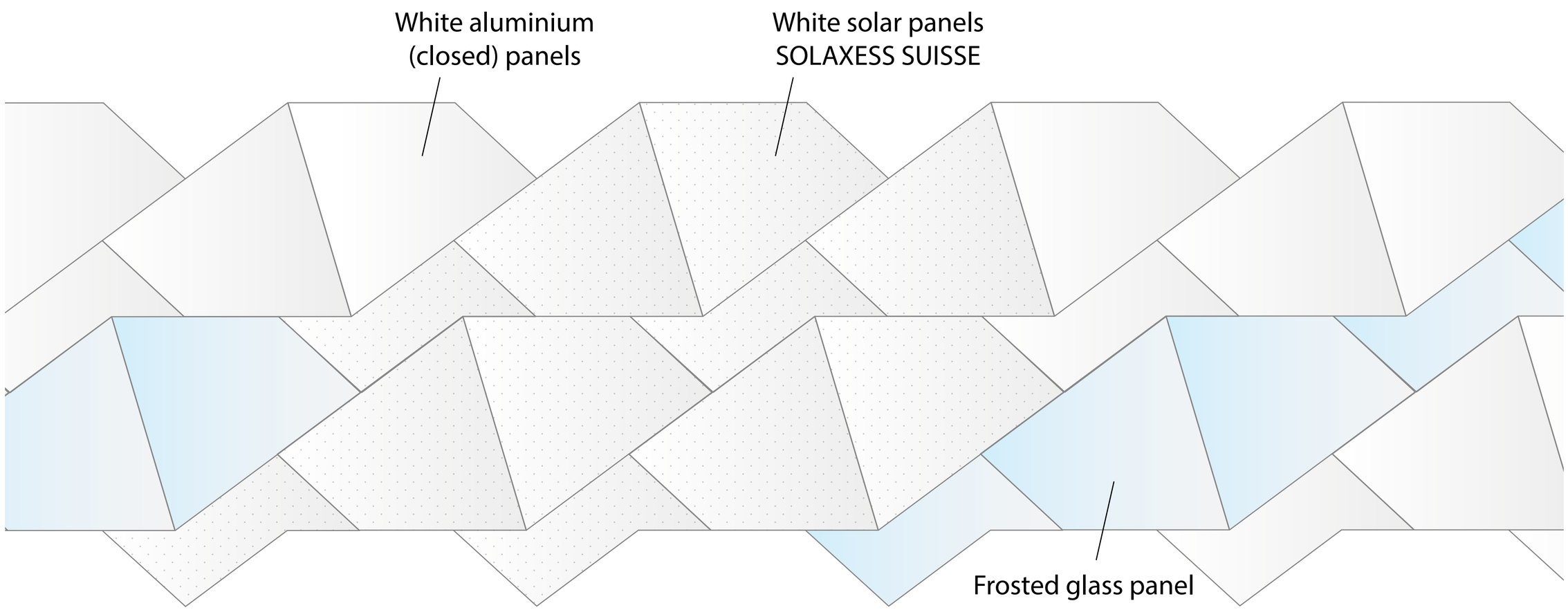


Spaceframe covered with panel system

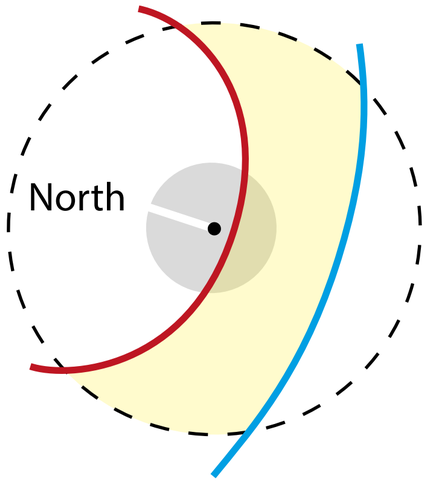
2 panel types

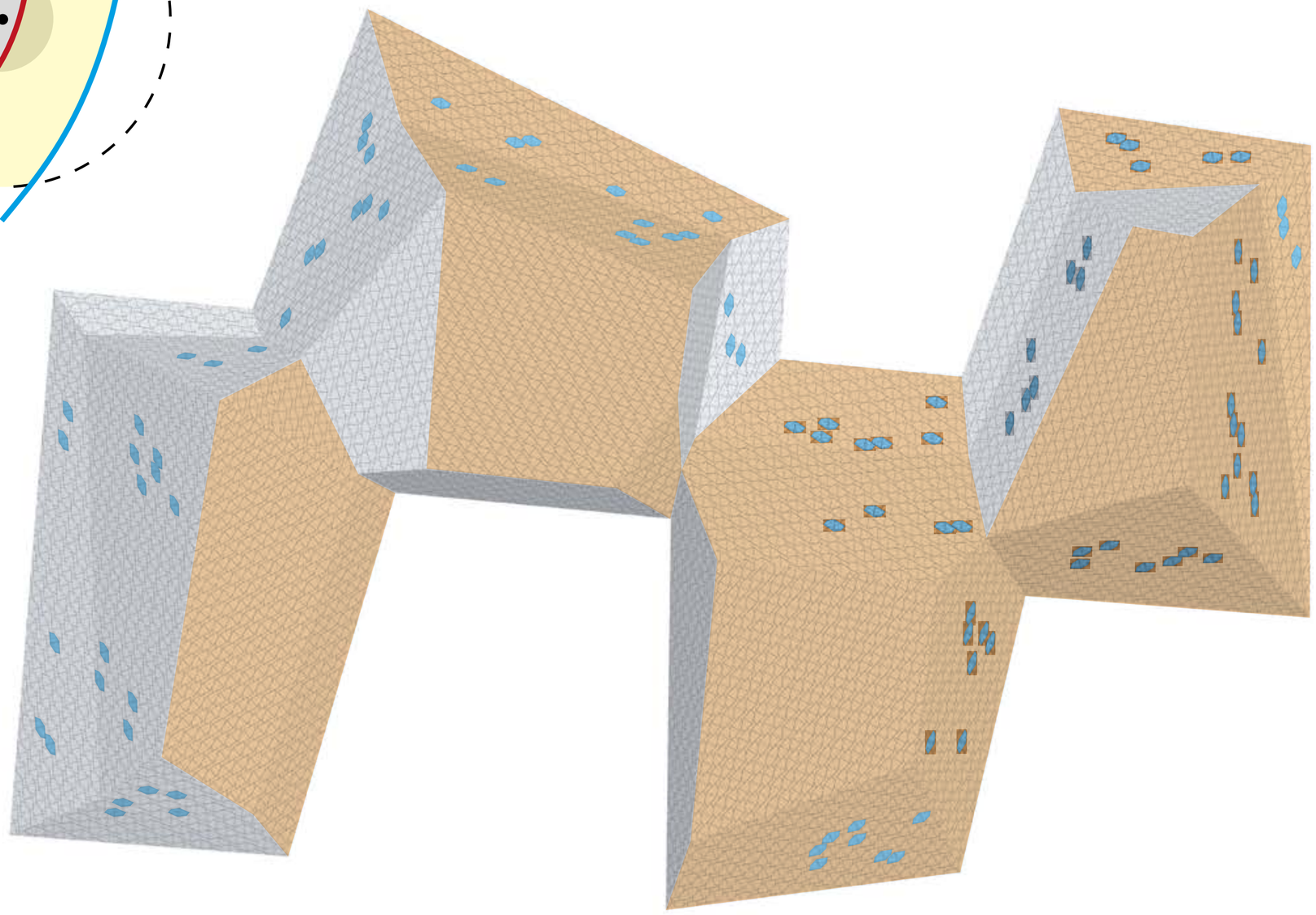


Roof/ceiling panel system



Three types of panels: closed, glass and solar panels

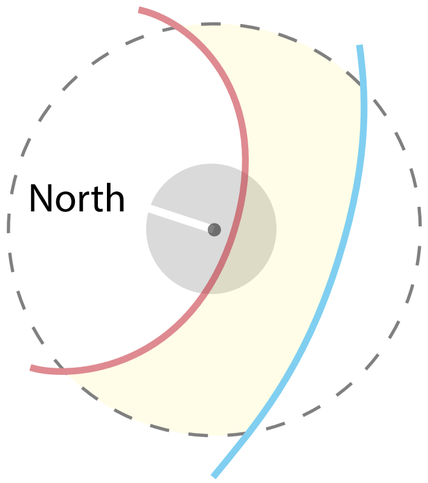


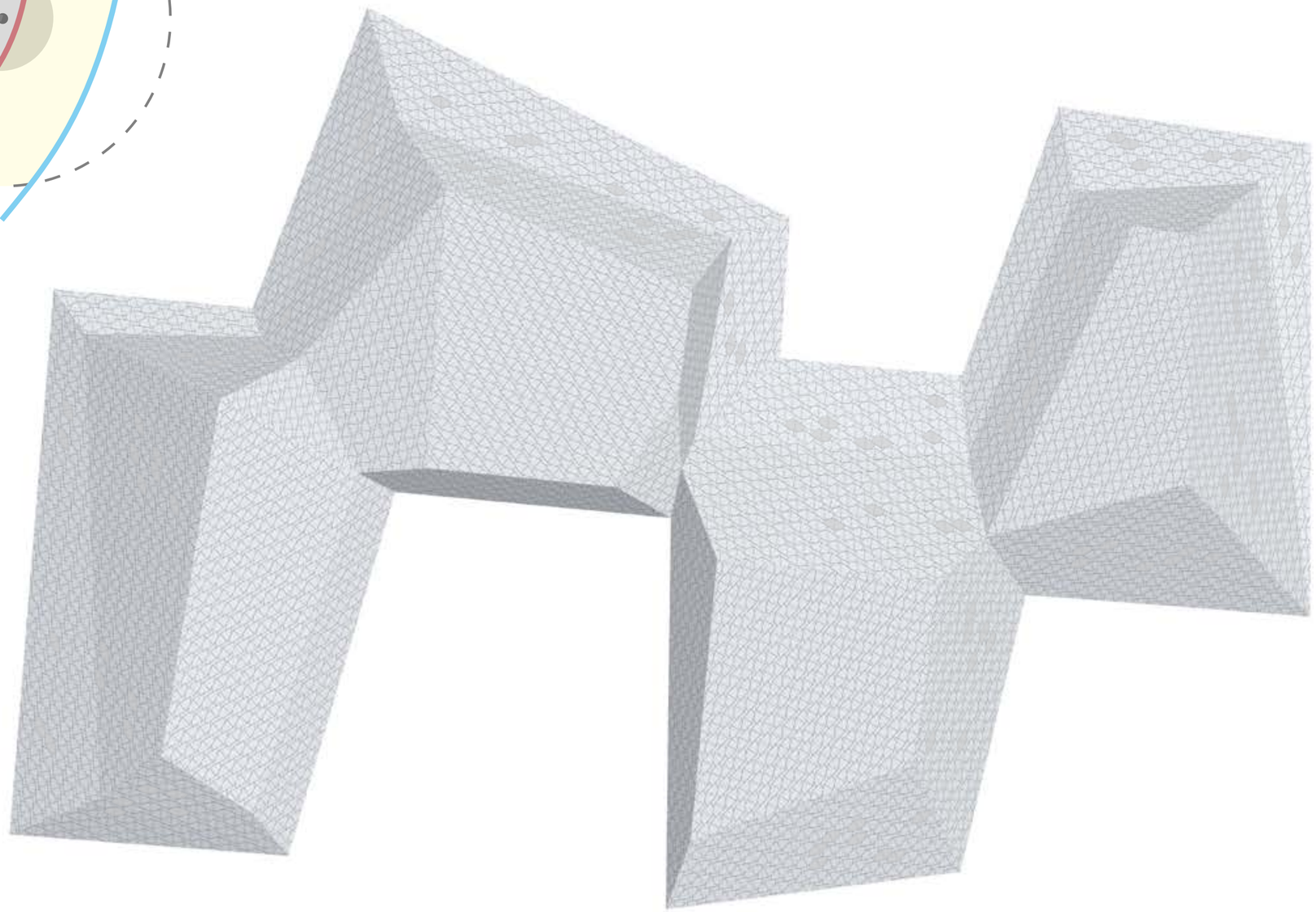


Solar panels: total of 18.380 sqm providing 15315 kWh
- 15315 kWh providing energy to 925 households -

Solar panels
Roof openings

Roofplan panel system
Openings situated to create random interior light effects

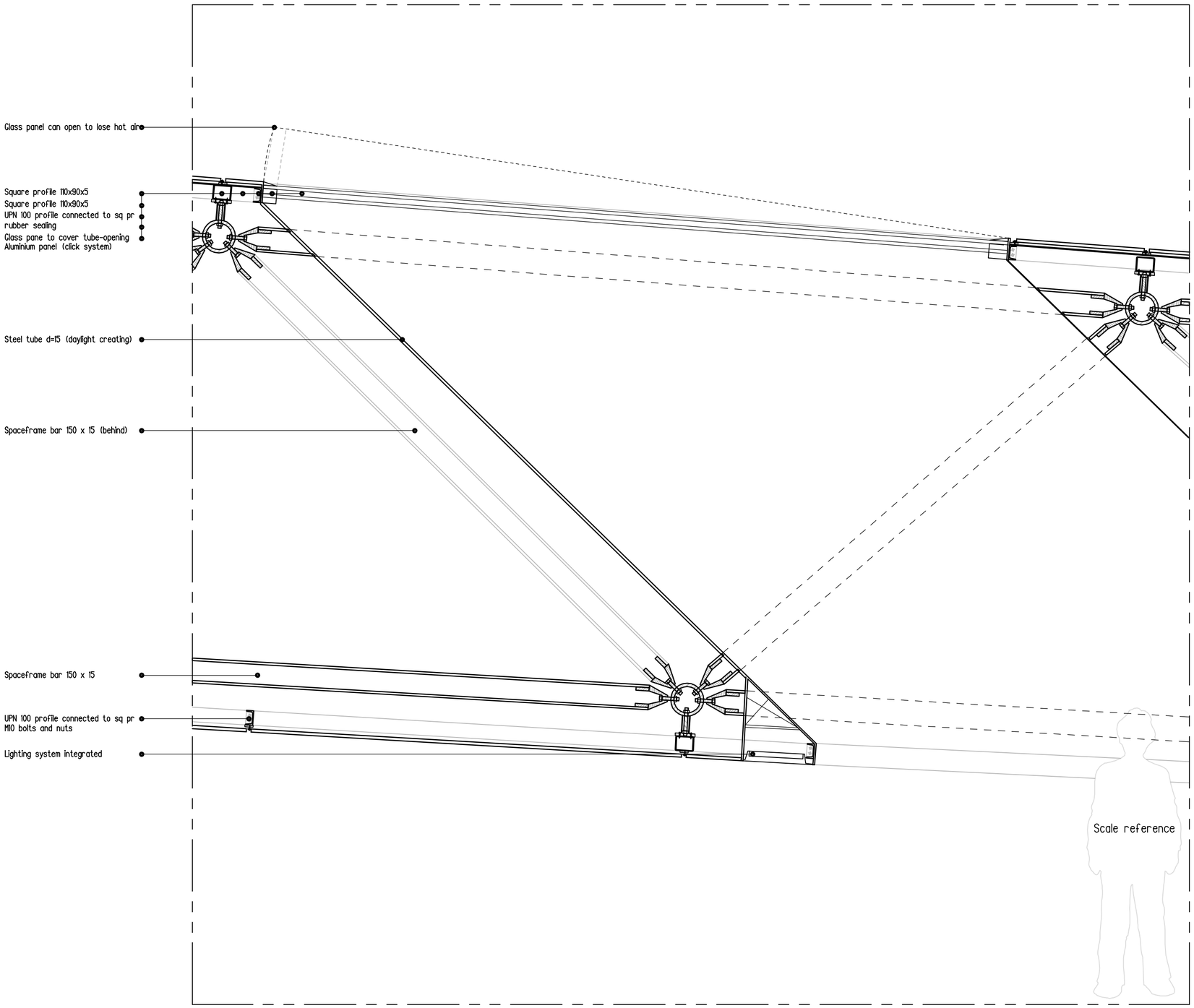




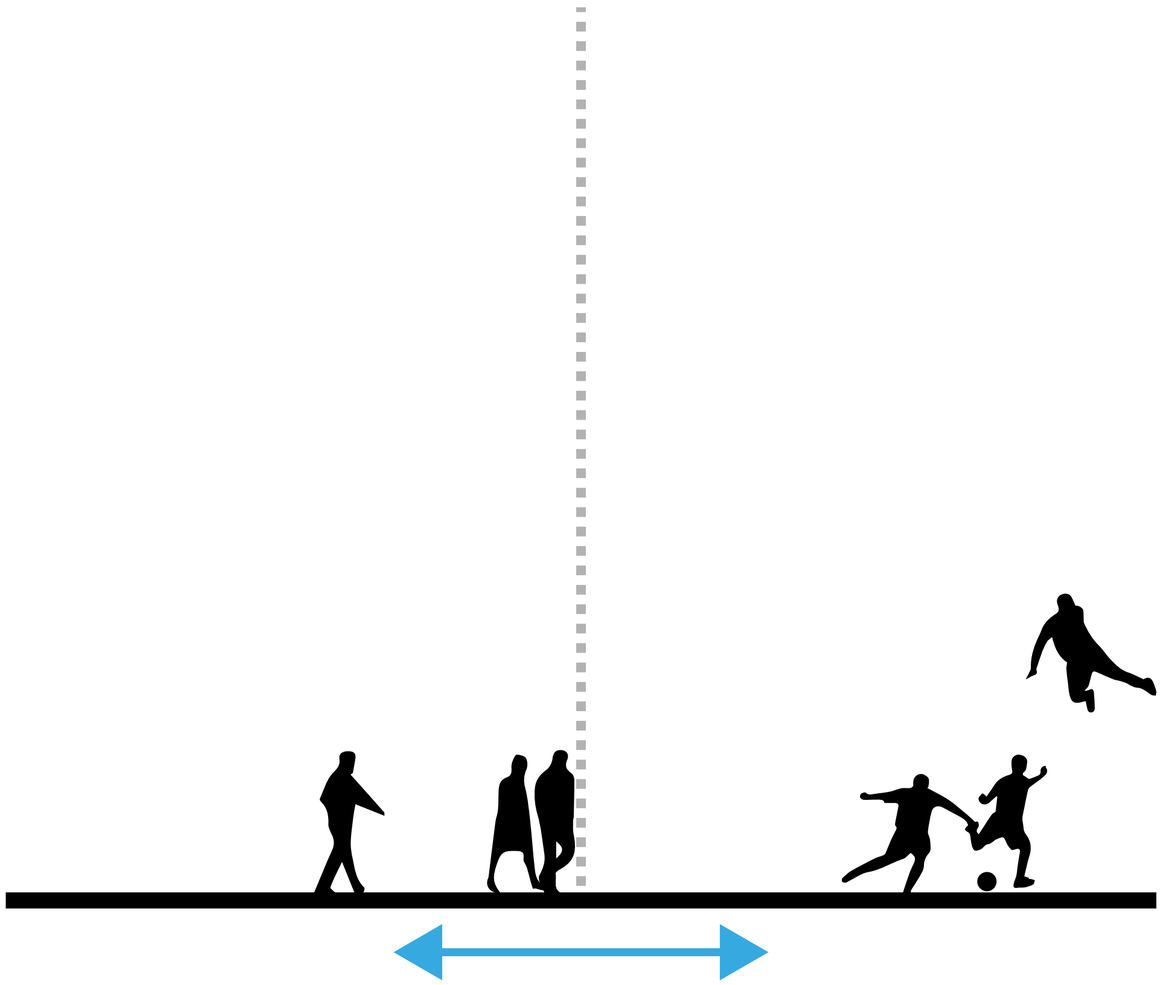
Solar panels: total of 18.380 sqm providing 15315 kWh
- 15315 kWh providing energy to 925 households -

Roofplan panels: the view

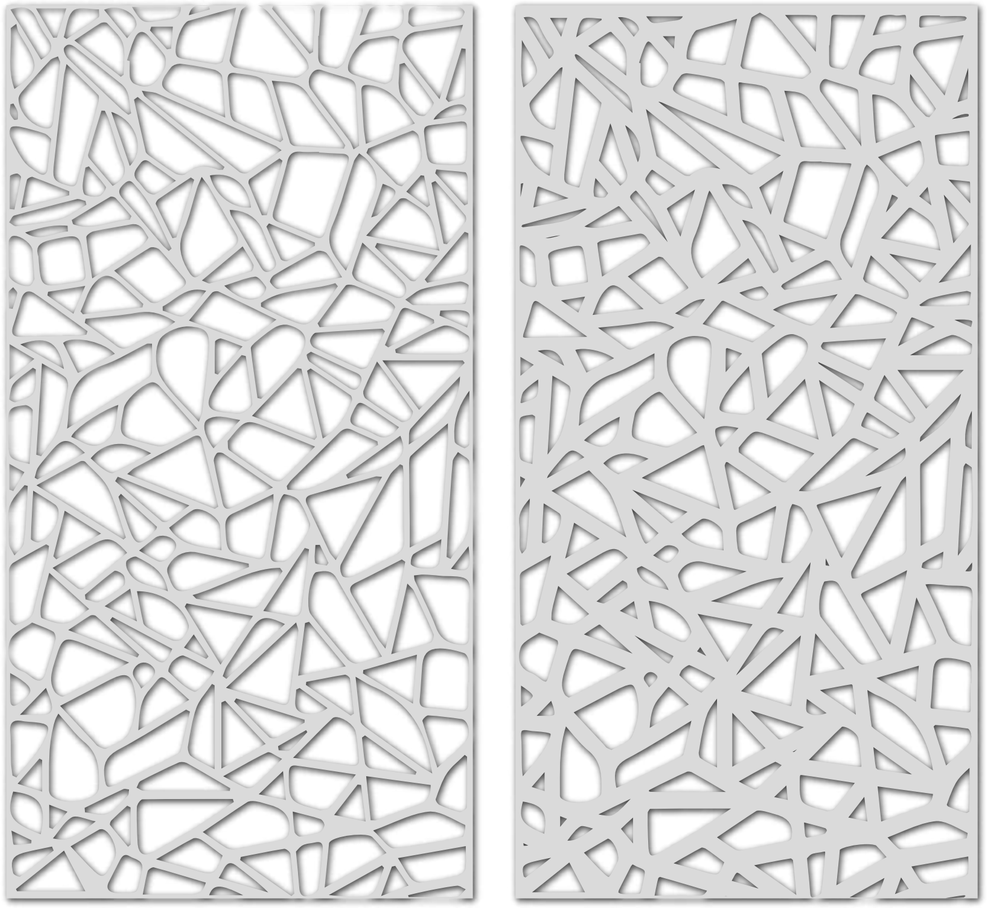
Detail F | scale 1:20



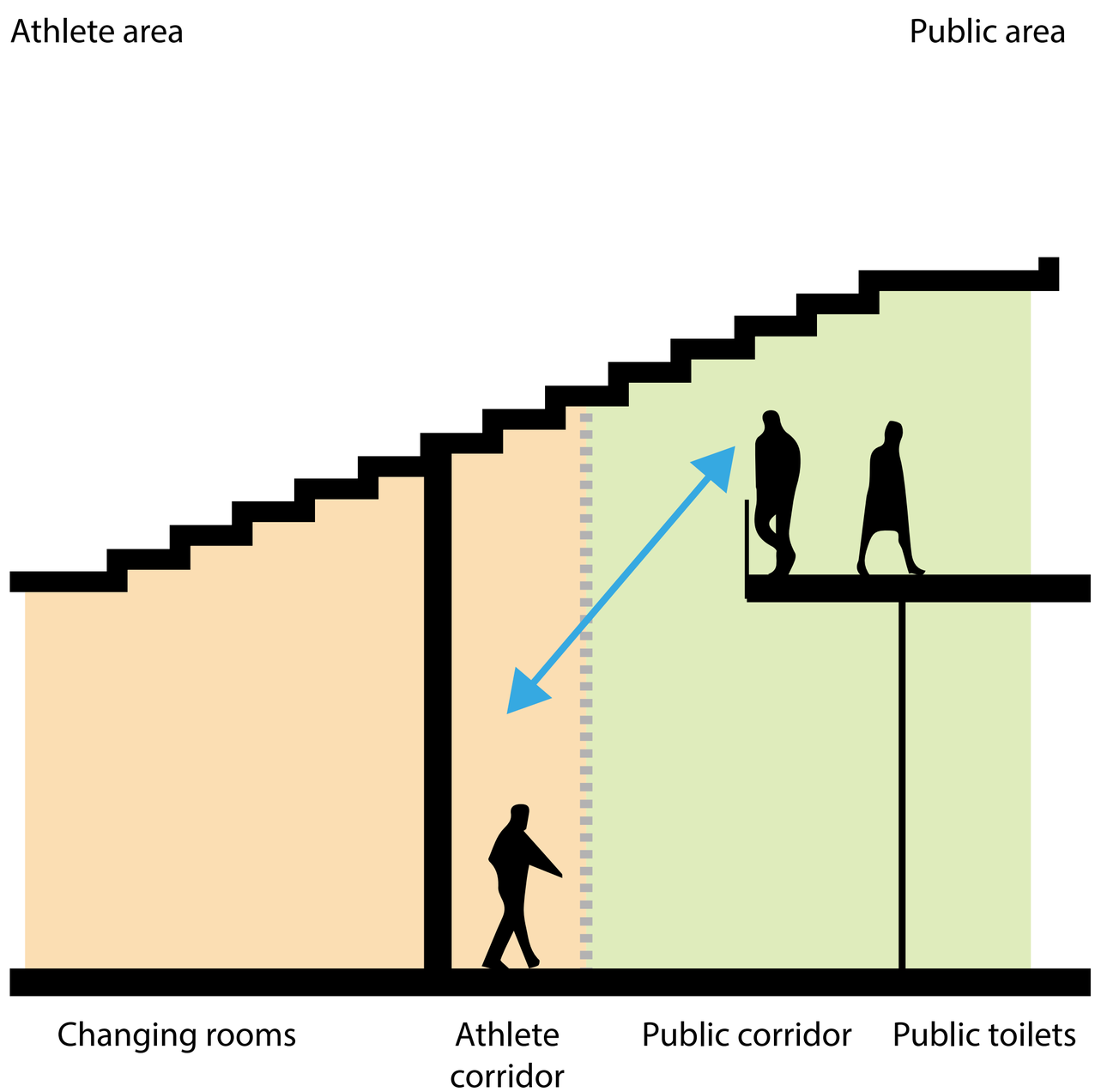
Detail: roof glass panel



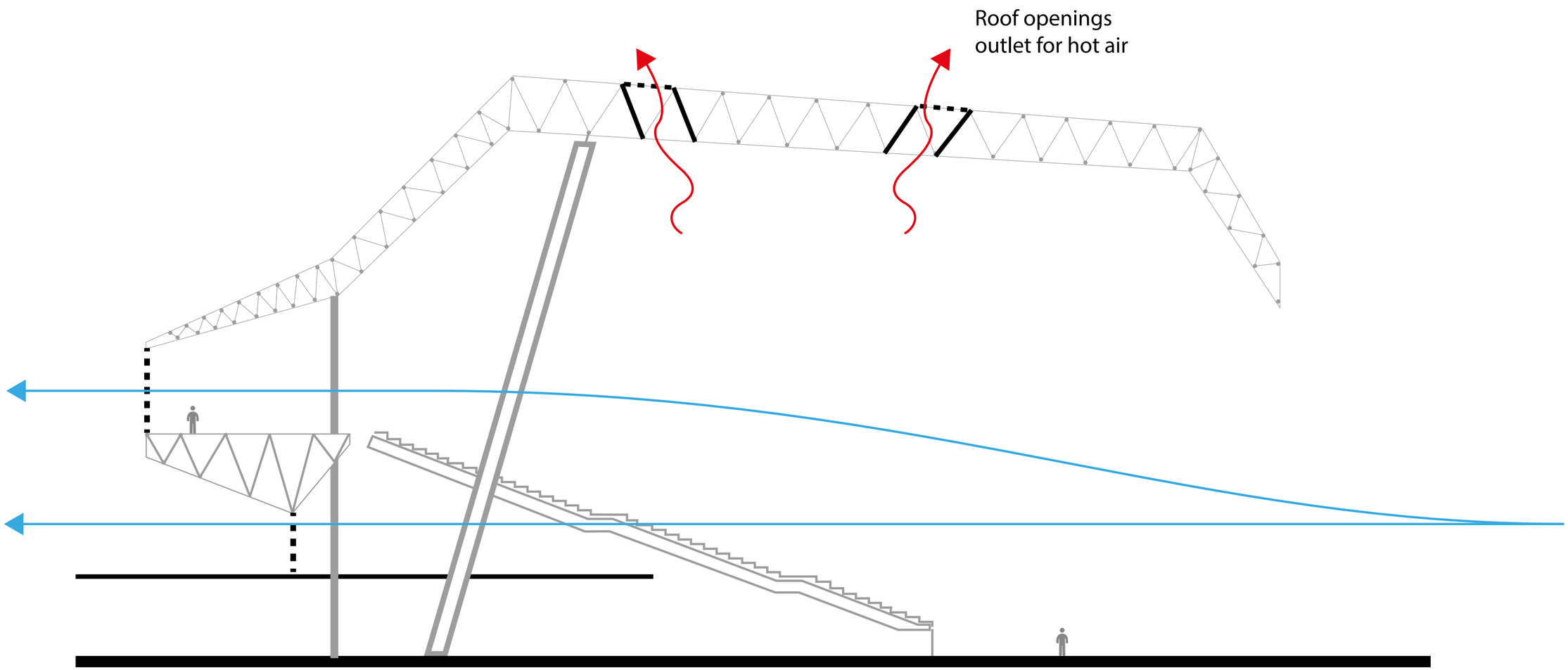
Facade creates **interactivity**



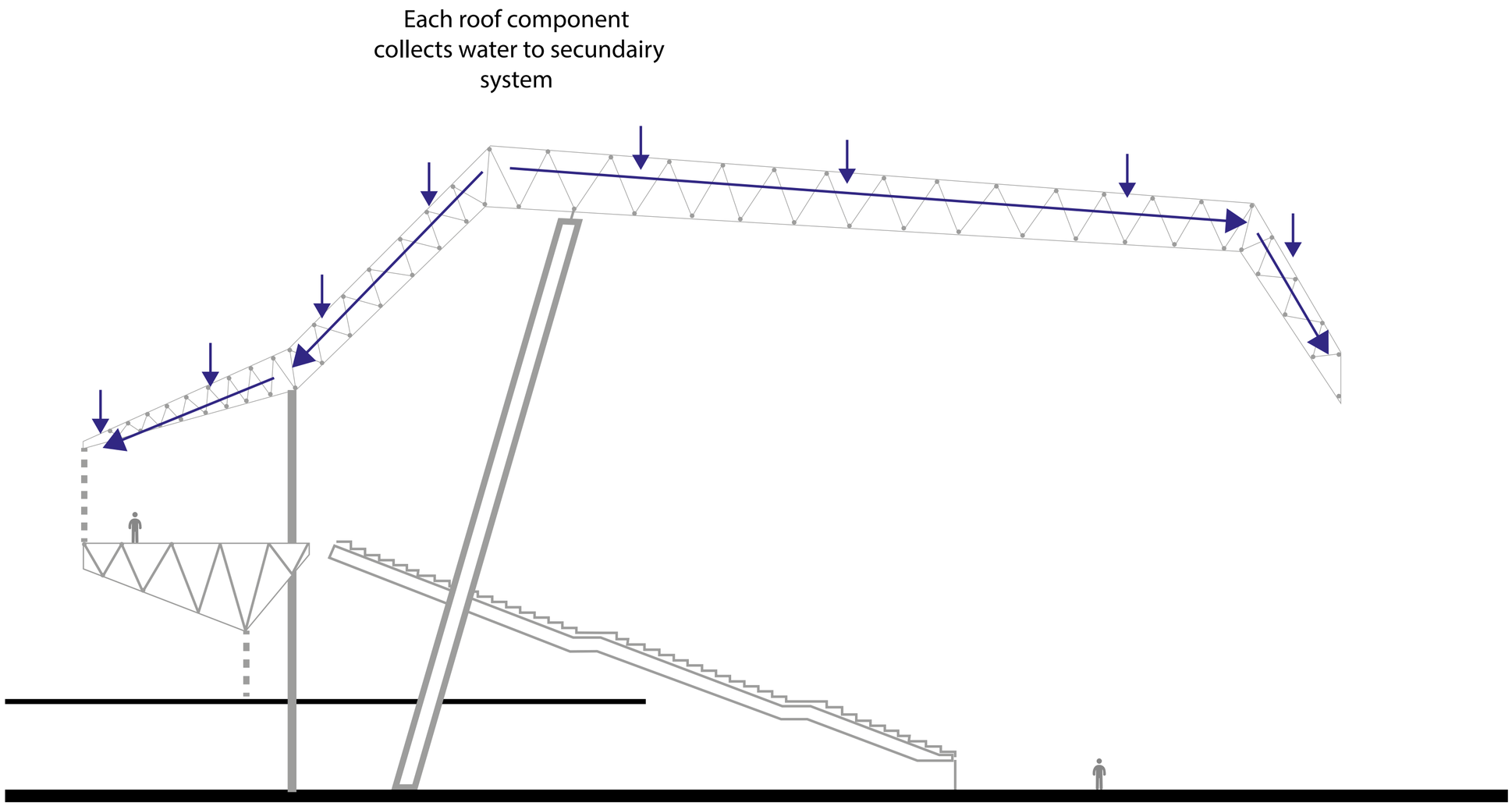
Facade and interior perforated panels



Interior perforated panels blend public and privat zones

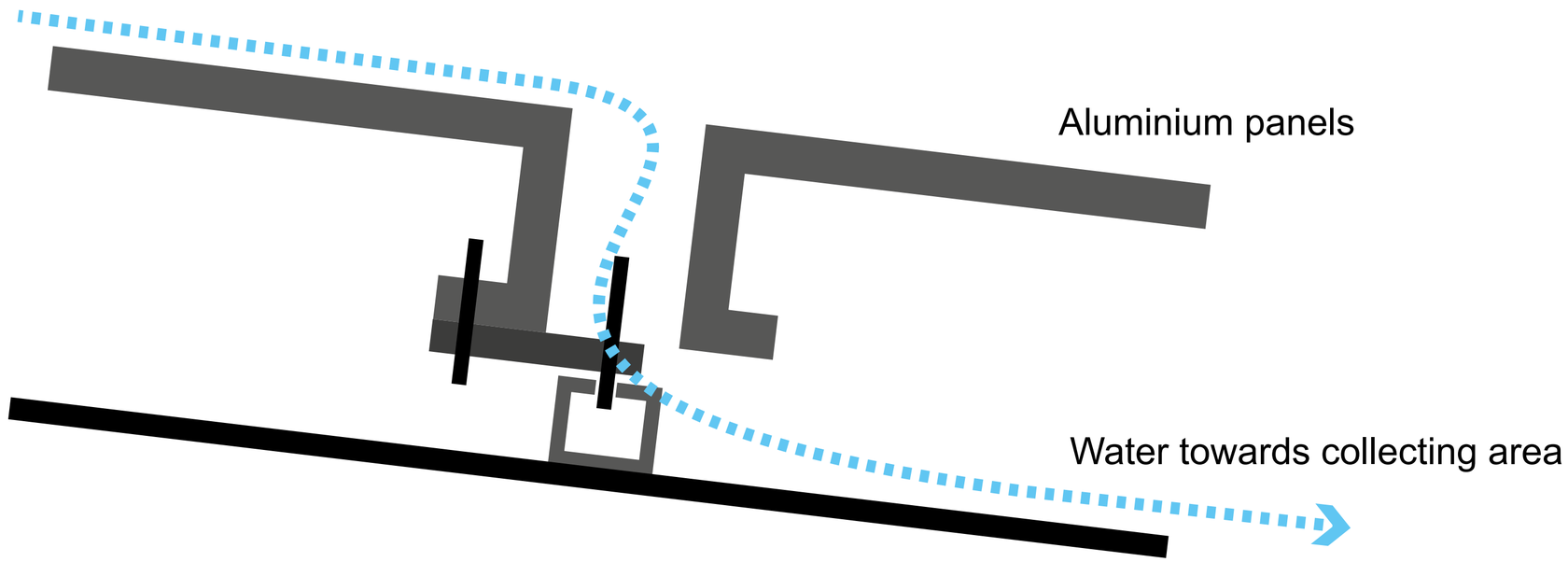


Perforated facade promotes ventilation



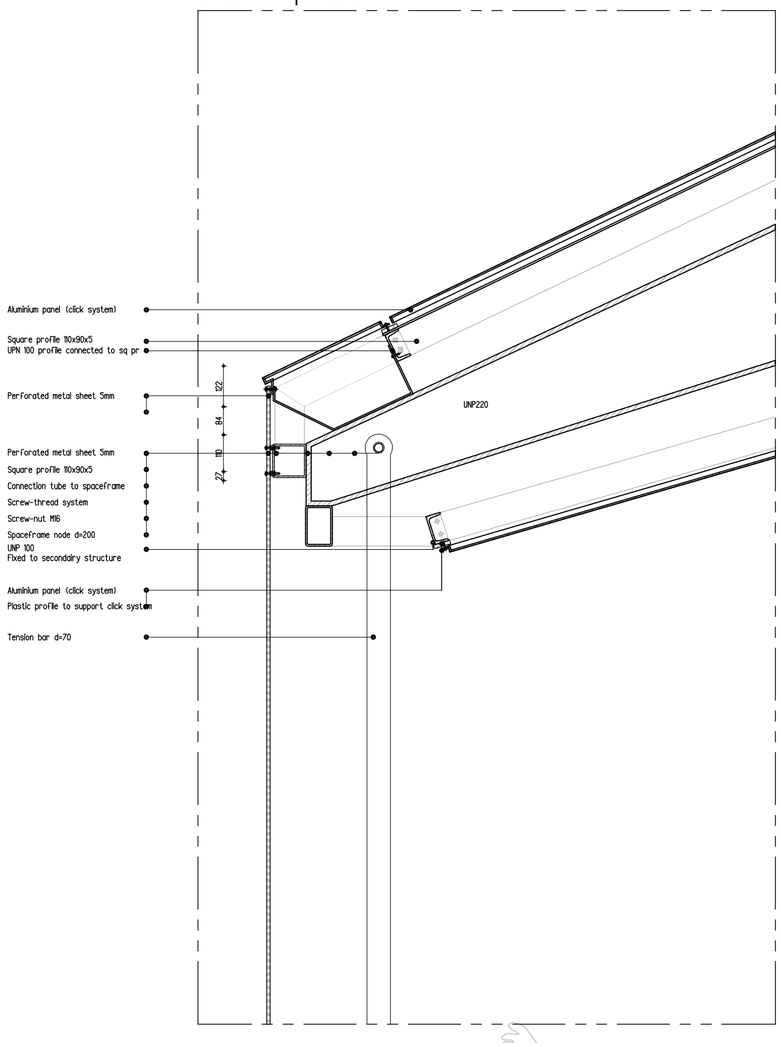
Footprint building: 25050 sqm
Total avg. annual rainwater collecting: 5.7 million liters
This will be enough to water the event field 44 times annually.

Rainwater collecting

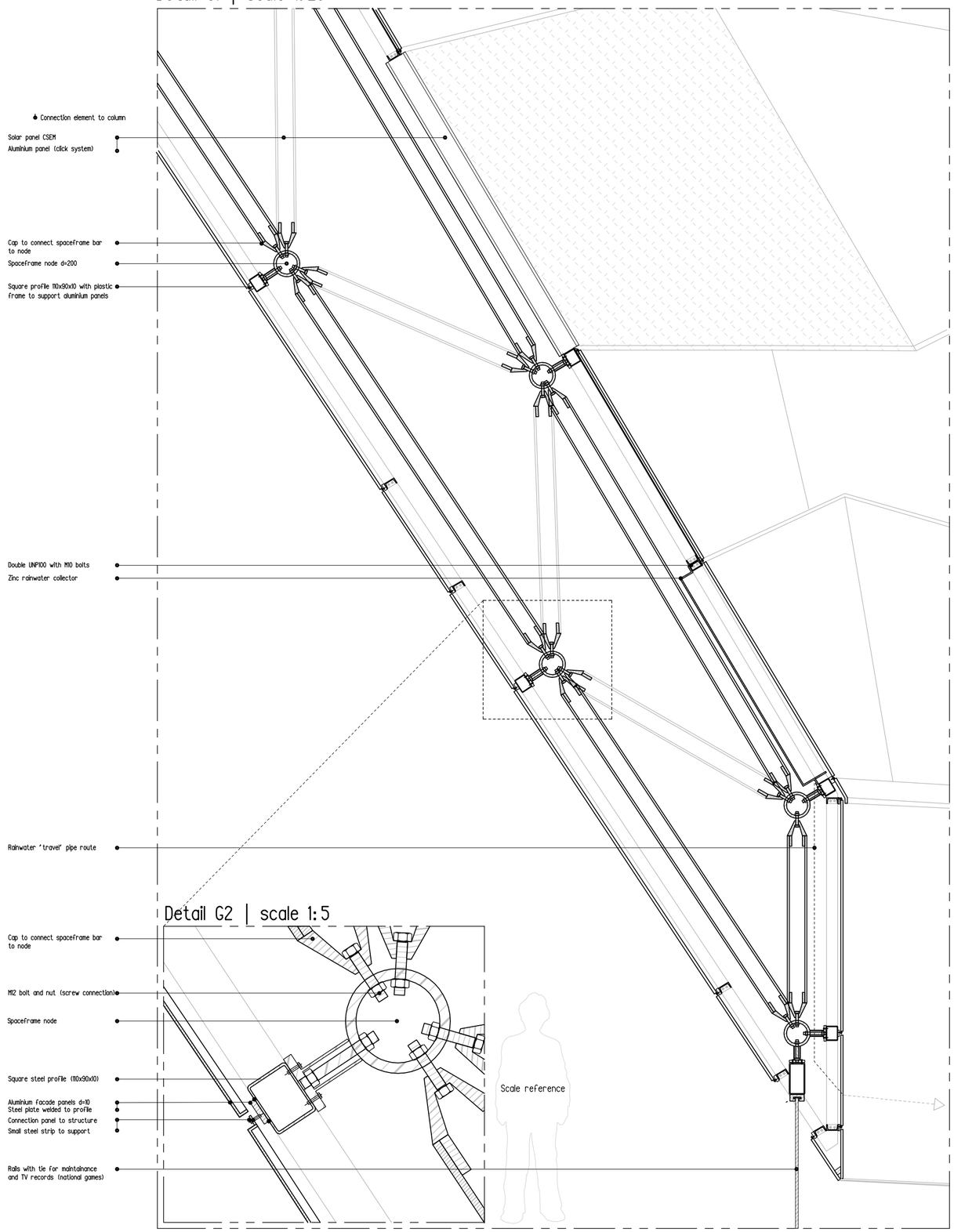


Rainwater collecting : zoom in panel

Detail A1 | scale 1:10

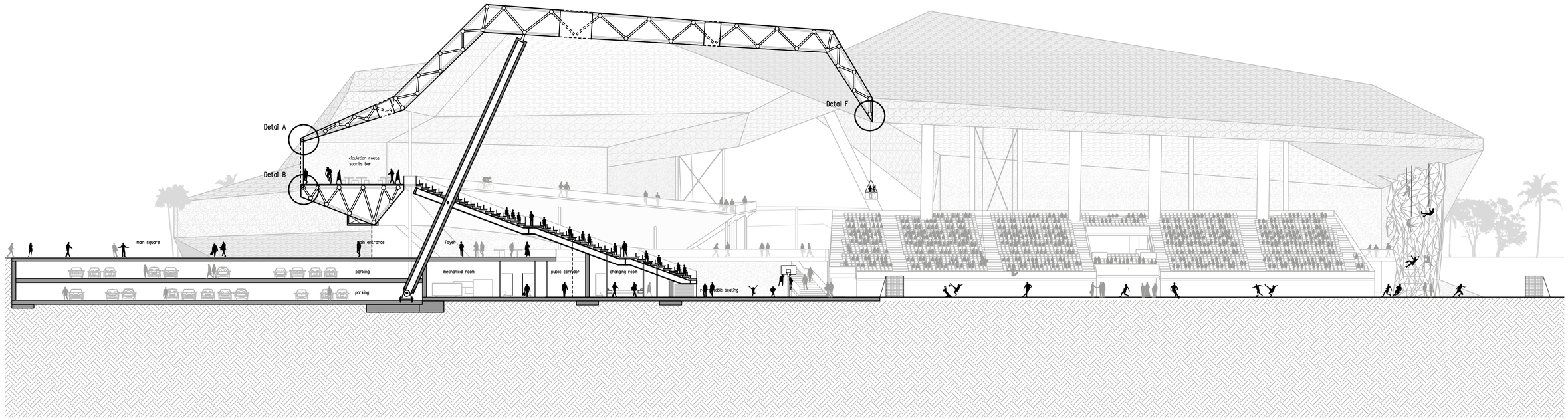


Detail G1 | scale 1:20

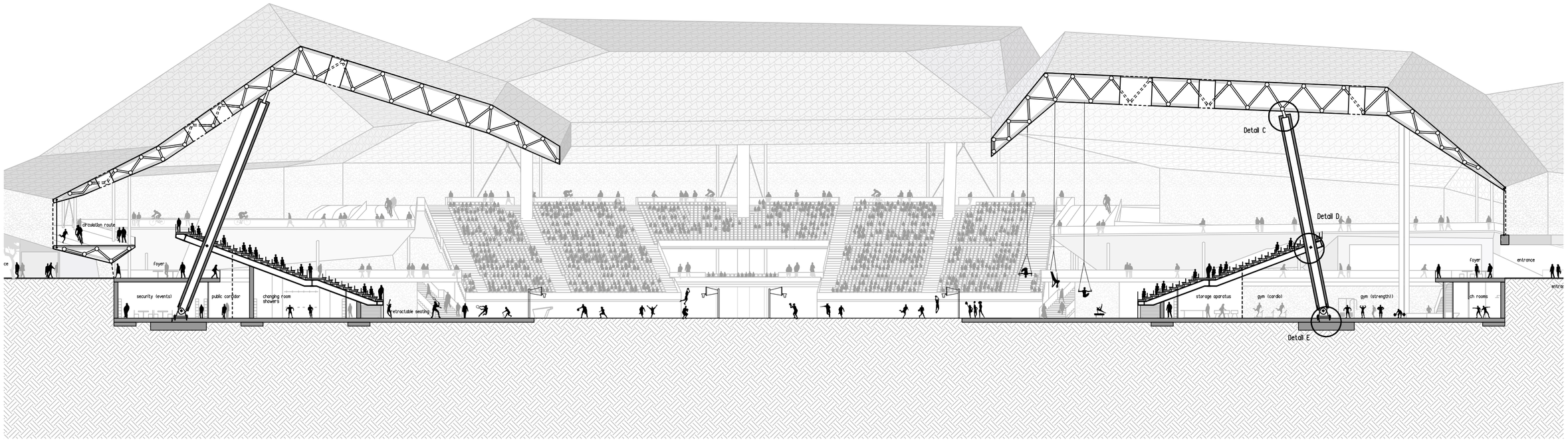


Detail G2 | scale 1:5

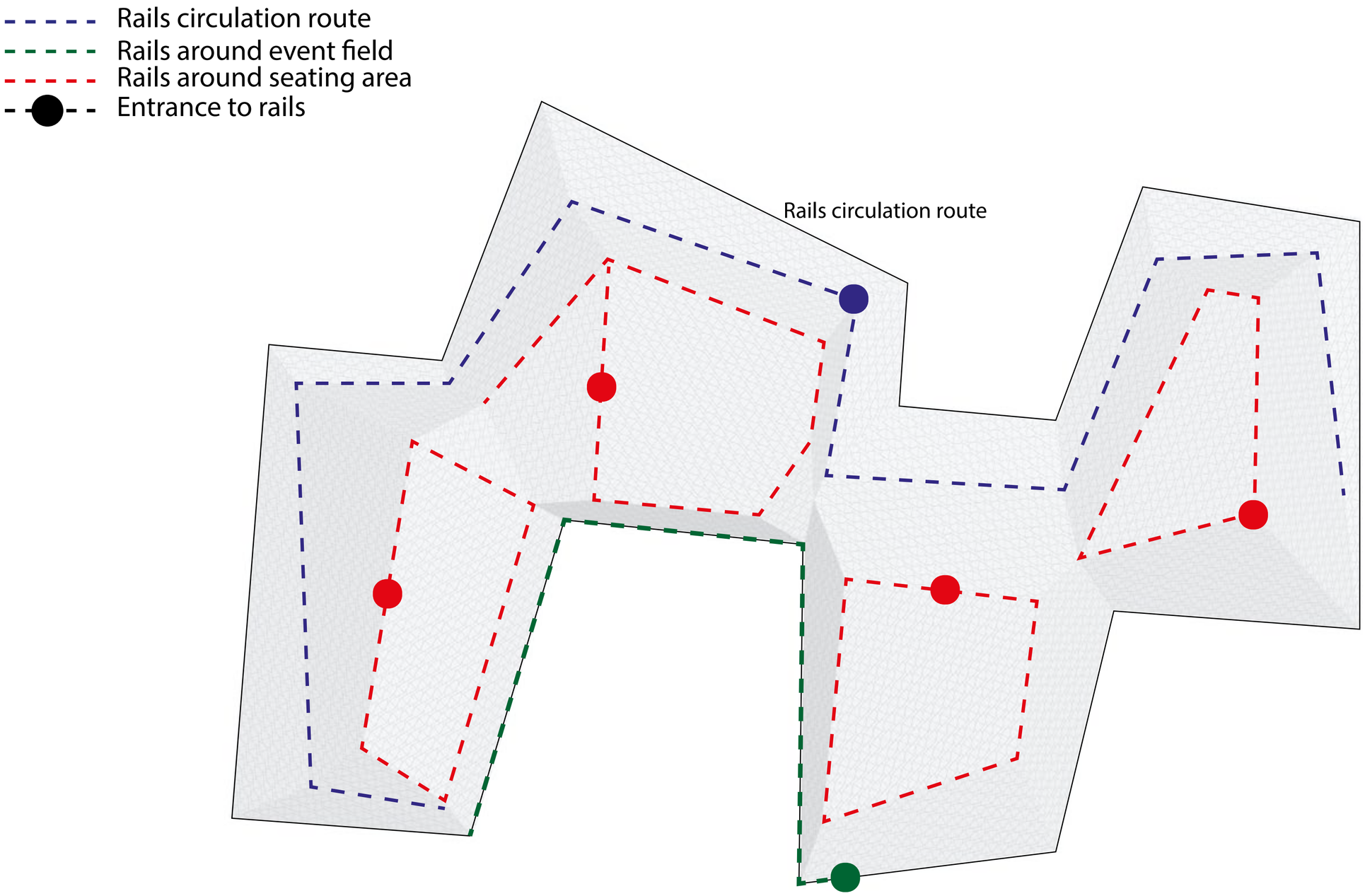
Detail: roof edge
Water collecing and rails for maintainance and tv-records



Section AA - part

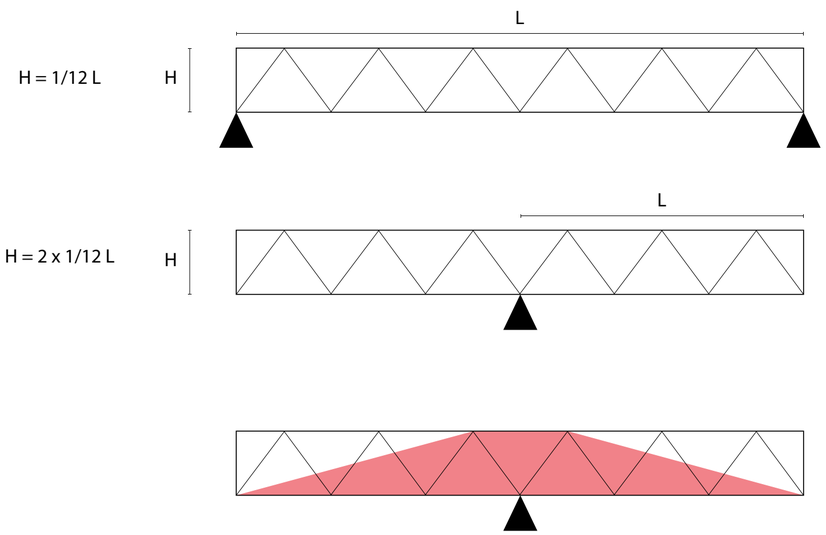


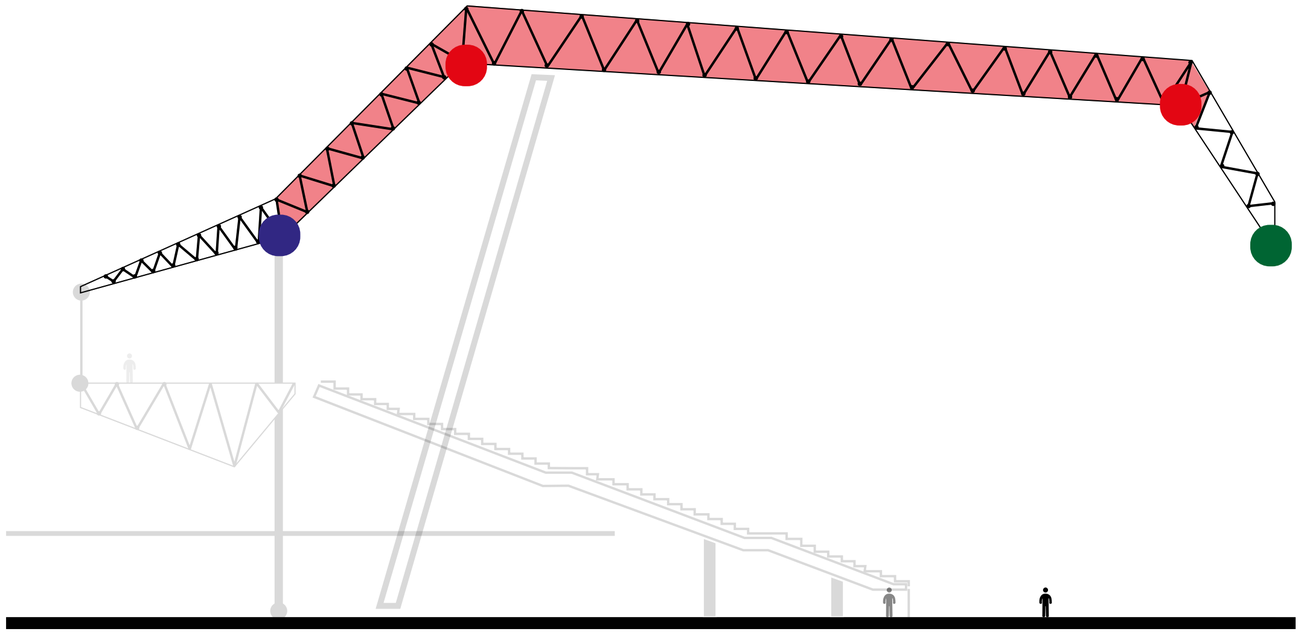
Section BB - part



Maintainance: rails inner roof

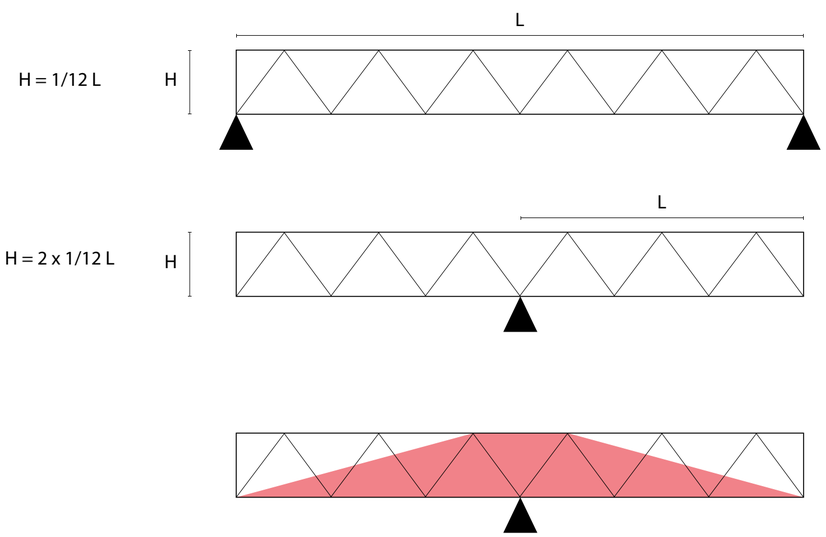
- - - - - Rails circulation route
- - - - - Rails around event field
- - - - - Rails around seating area
- -●- - Entrance to rails

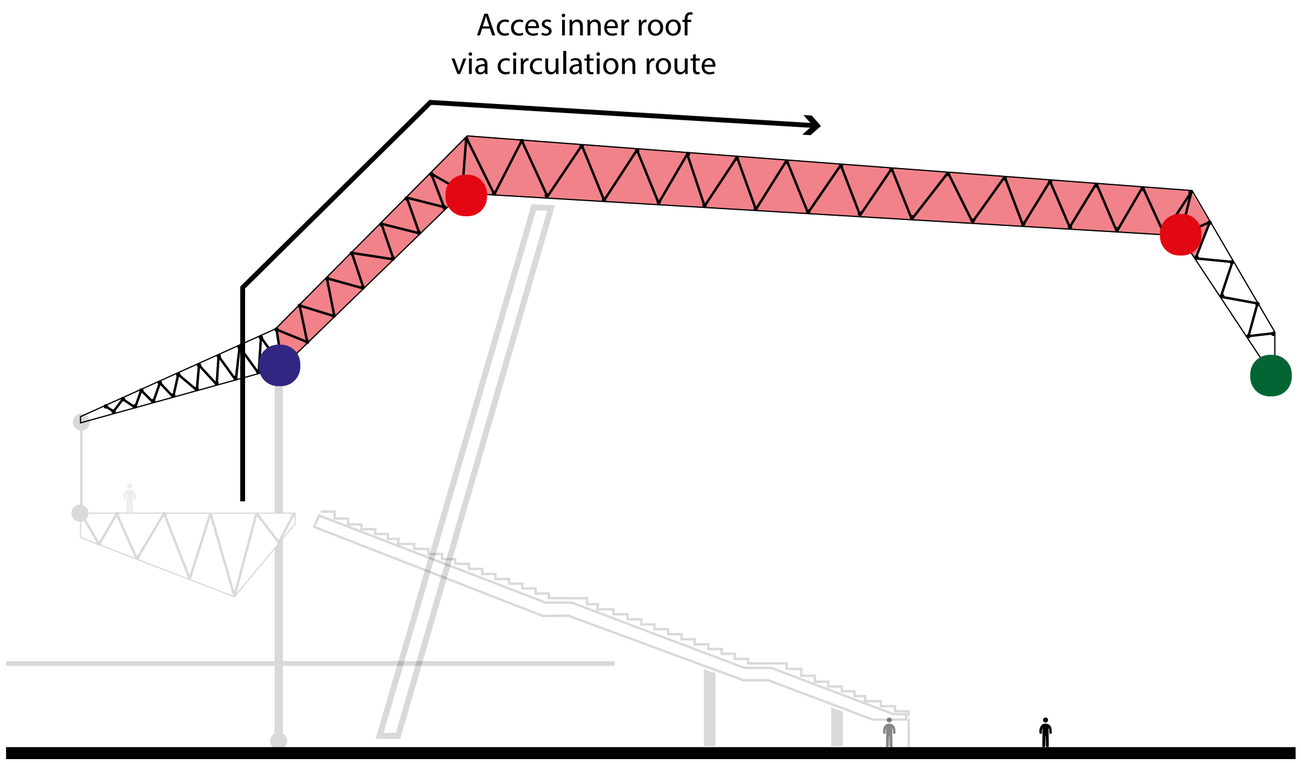




Maintainance: accesability inner roof

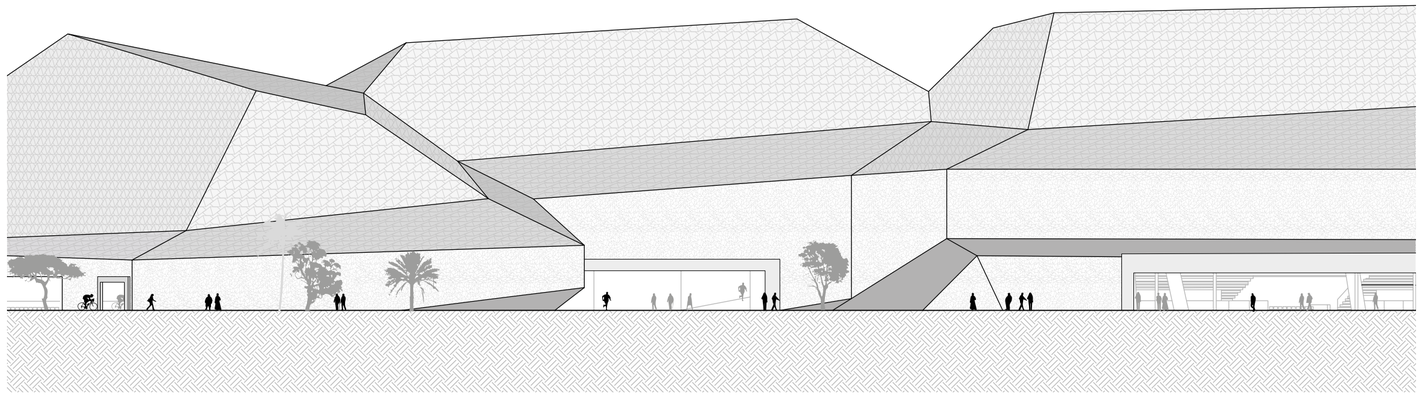
- - - - - Rails circulation route
- - - - - Rails around event field
- - - - - Rails around seating area
- -●- - Entrance to rails

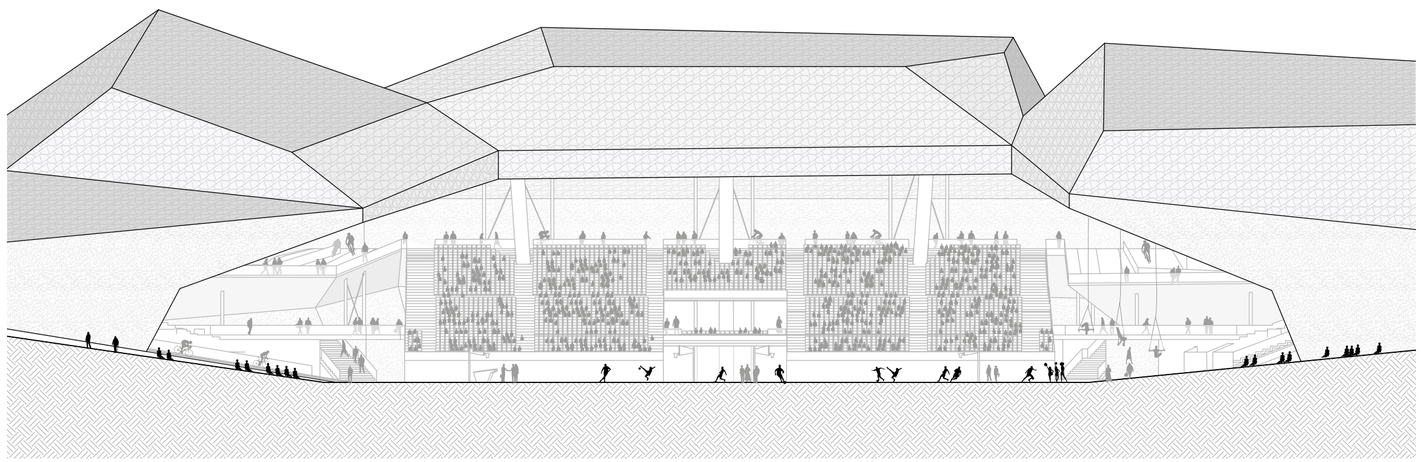


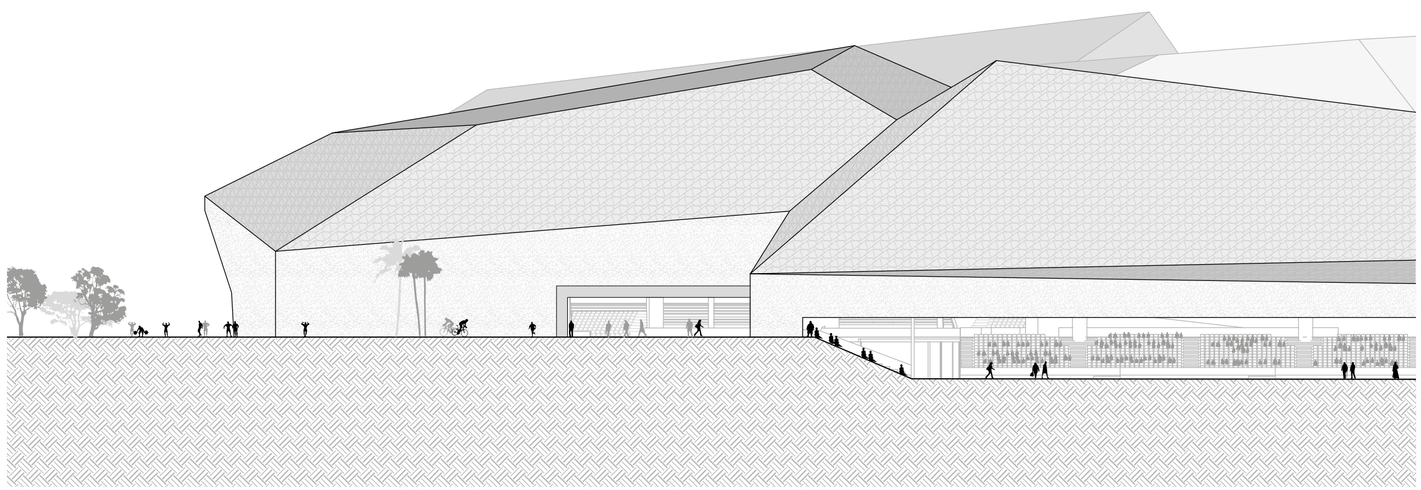


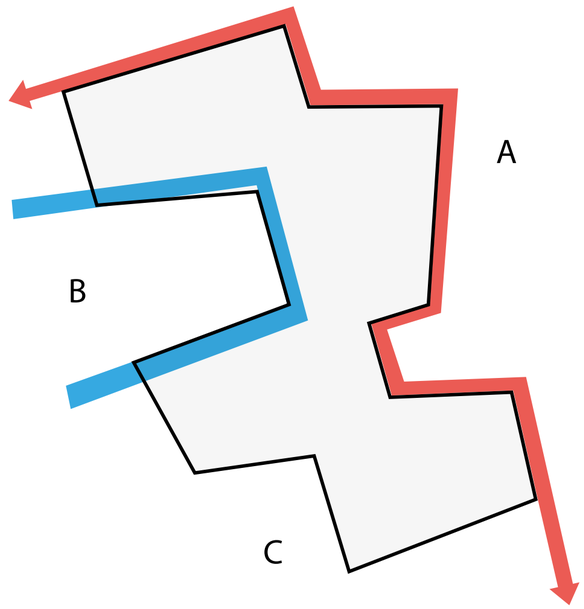
Maintainance: accesability inner roof via circulation route

BUILDING FRAMEWORK



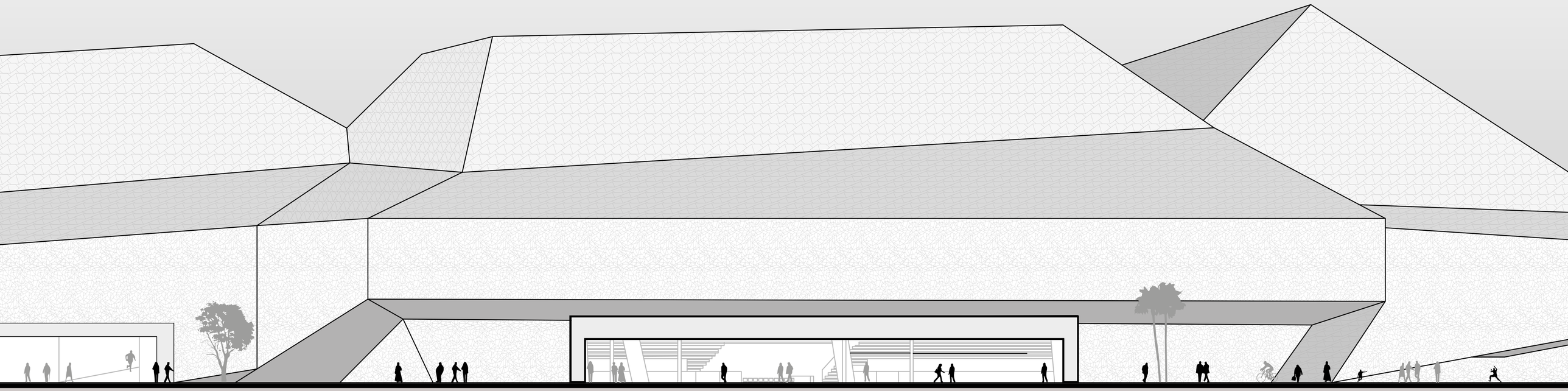




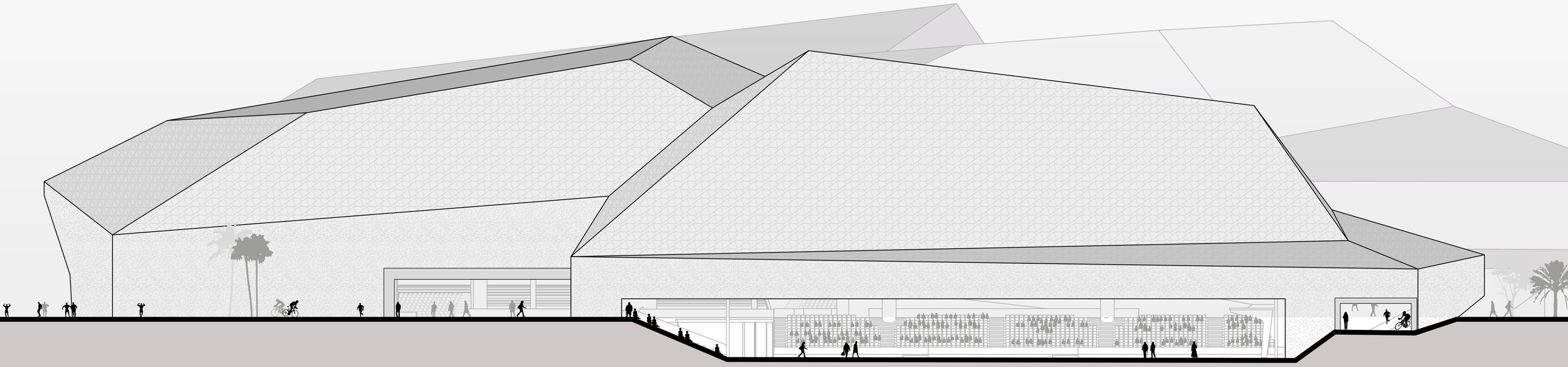


A. Elevated circulation route (mostly closed)
B. Event field (open)
C Closed

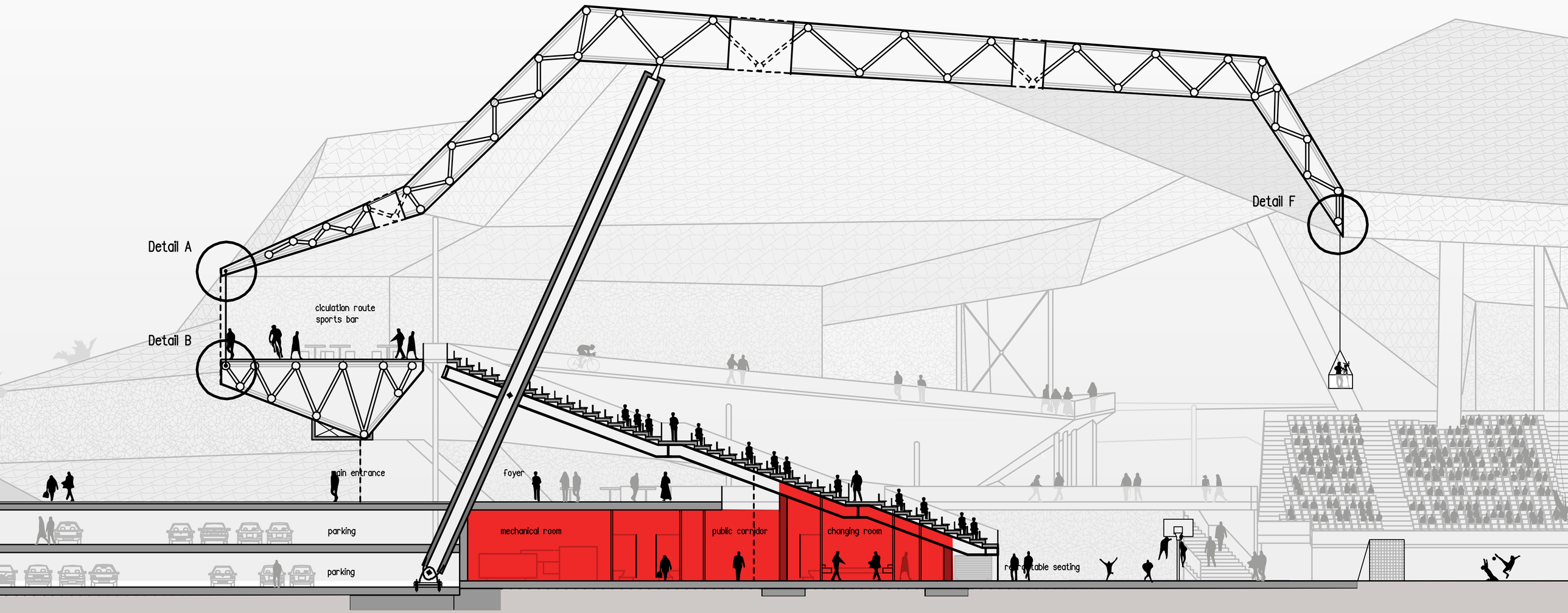
Three facade systems.



Portals | openings in the facades

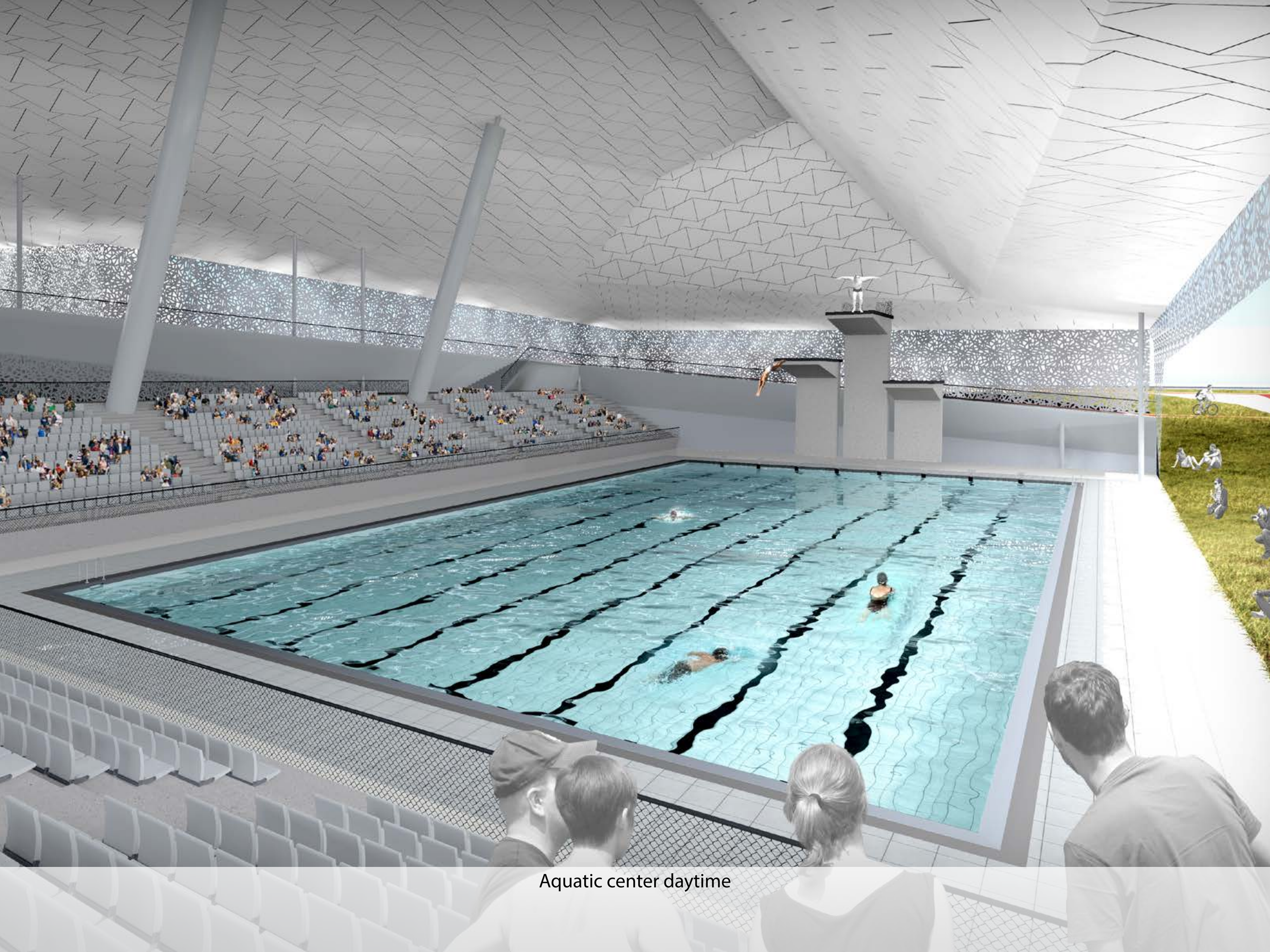


Portals | openings in the facades

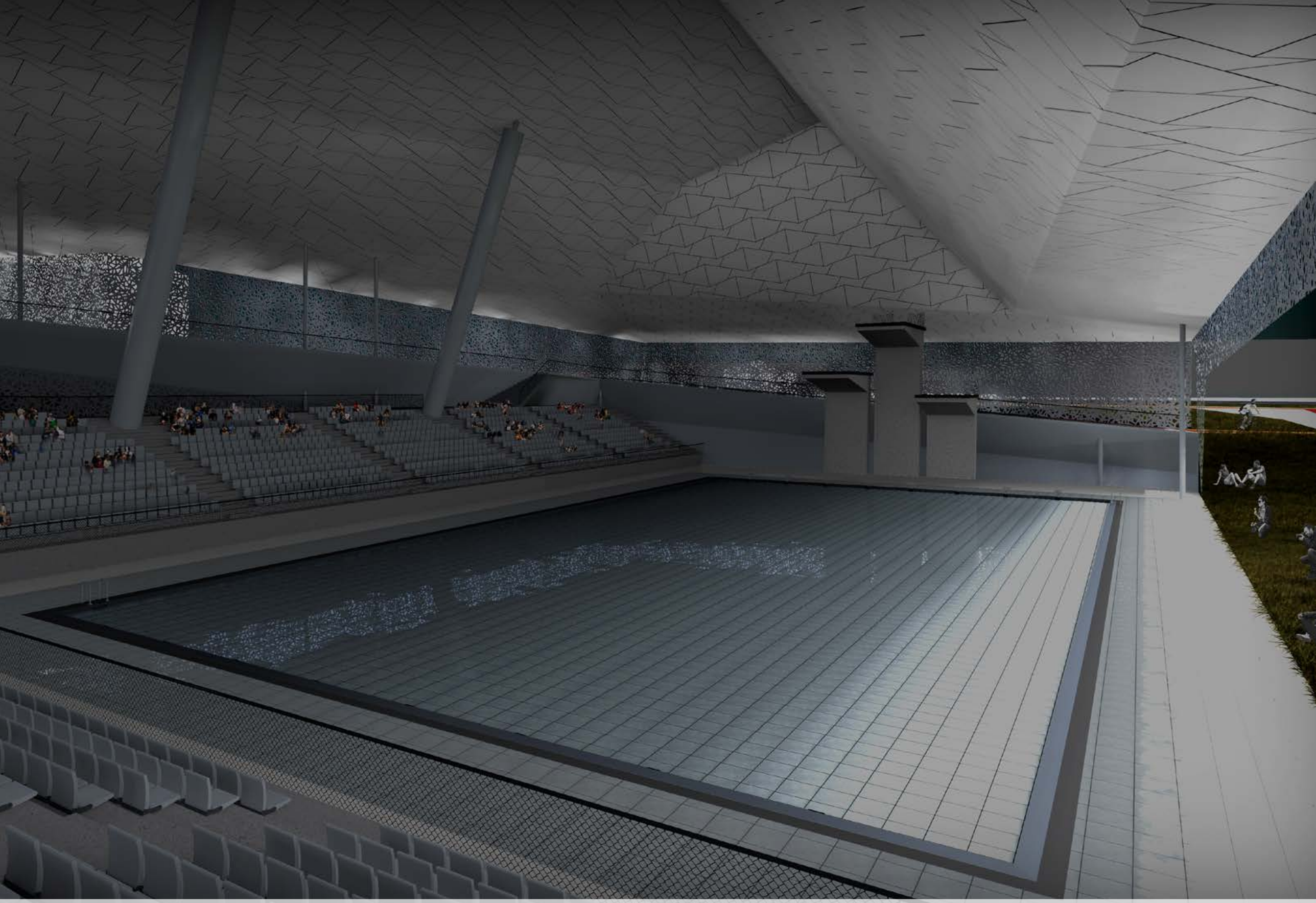


Night: basement level partly closed

Night: basement level partly closed



Aquatic center daytime



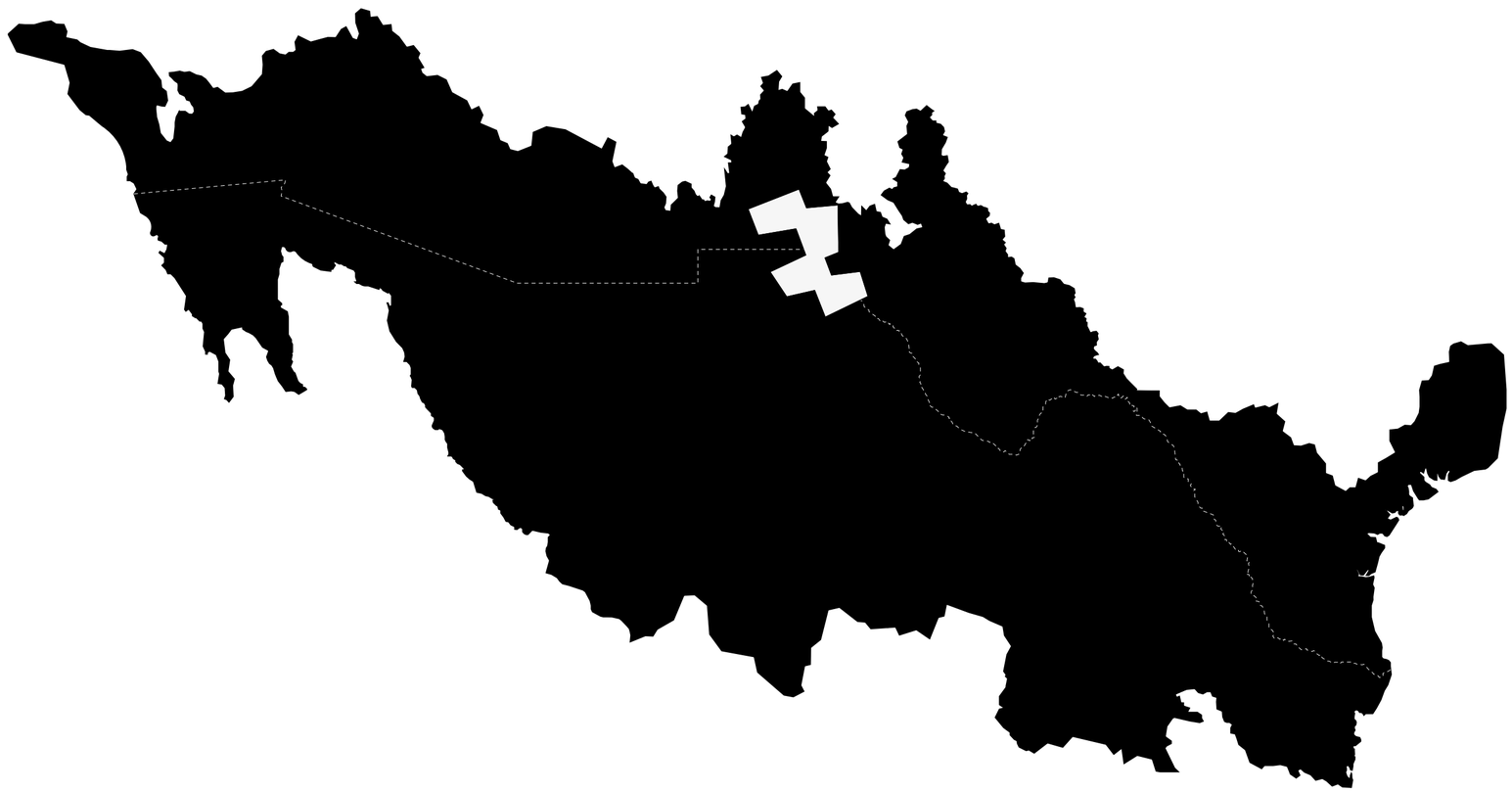
Aquatic center nighttime

Aquatic center winter: iceskating and icehockey

INTERACTION

MOTIVATION

HEALTHIER COMMUNITIES



Project at multiple levels as a starting point to increase health in the border region