



# MONTAGUE PARK - RUGBY STADIUM

## CHATTANOOGA, TN

ELIZABETH WILK, AMANDA KIGHT AND GREG WELLS - ADVANCE DESIGN STUDIO - PROFESSOR FAORO - SPRING 2013





SPANISH STEPS - Rome, Italy

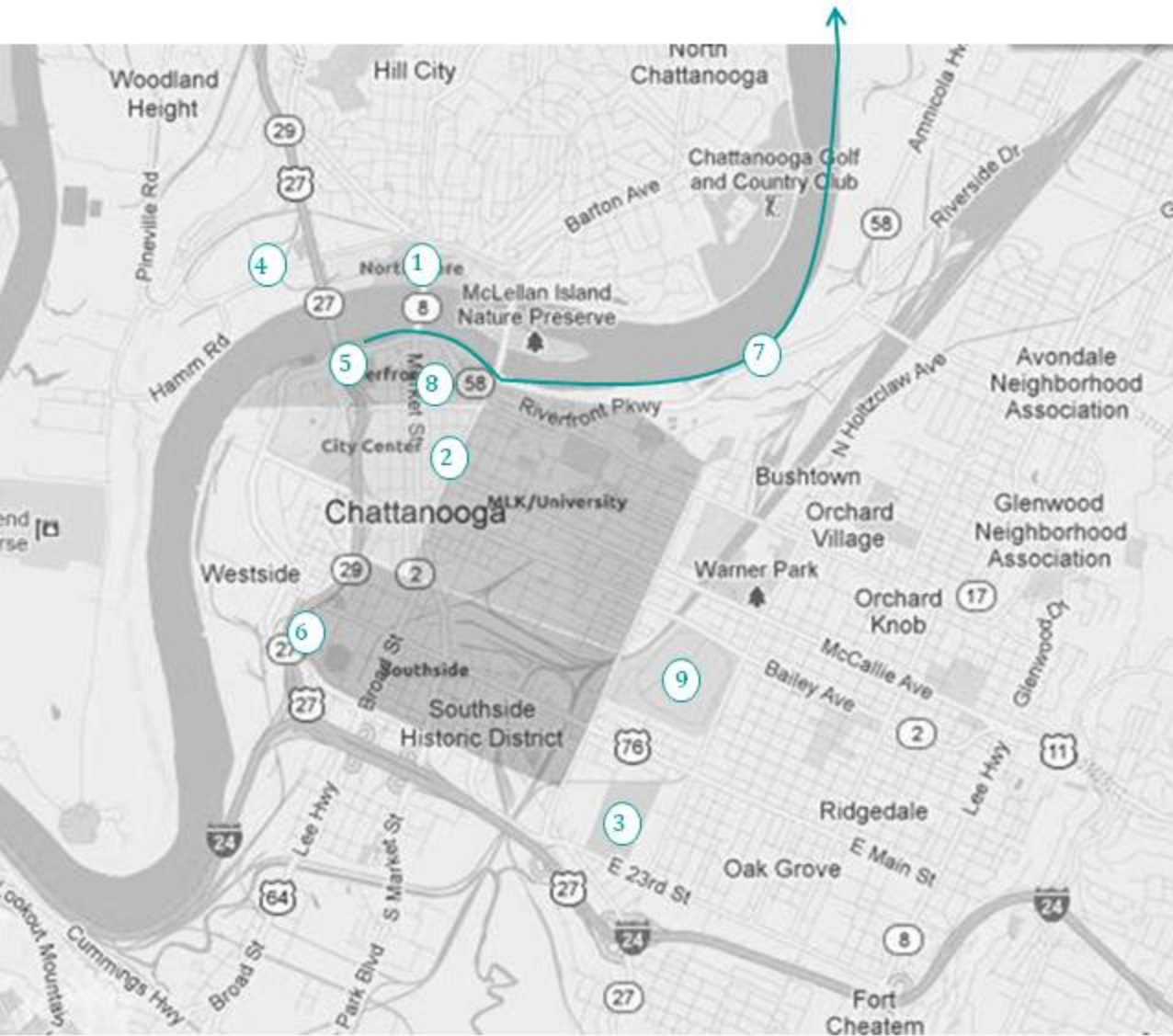


CENTRAL PARK - New York City

**SENSE OF PLACE** : IS ABOUT CONTEXT, IDENTITY AND UNIQUE CHARACTERISTICS OF A BUILDING OR SPACE THAT CREATE MEANING FOR AN OCCUPANT.

- ❑ CONNECTING TO THE NATURAL AND CULTURAL RESOURCES OF A COMMUNITY
- ❑ UNDERSTANDING PEOPLE'S PERCEPTIONS AND EXPERIENCES OF AN ENVIRONMENT.
- ❑ RESPONSE TO THE ENVIRONMENT'S FEATURES, THE ROLE THAT A PLACE PLAYS IN SATISFYING HUMAN NEEDS, HISTORICAL MEANINGS AND SYMBOLISM EMBEDDED IN THE LOCATION, AND THE POSSIBILITIES FOR INDIVIDUALS AND GROUPS TO IDENTIFY WITH THE SPACE.
- ❑ SCALE, MATERIALS AND VERNACULAR DESIGN ELEMENTS ALL CONTRIBUTE TO CREATING A SENSE OF PLACE.<sup>19</sup>





- ①. COOLIDGE PARK - includes a restored historic carousel, and interactive water feature, a multi-purpose pavilion, a canoe/kayak launch, a floating restaurant, curving walkways, green meadows and river overlooks.
- ②. MILLER PLAZA - 5,600-square-foot enclosed Waterhouse Pavilion and massive outdoor performance stage
- ③. **MONTAGUE PARK** - 45+ acre site nestled in the Southside arts district with an iconic backdrop of Lookout Mountain.
- ④. RENAISSANCE PARK - consists of grassy hills, picnic areas, nature trails and historic markers, one of the 21st Century Waterfront Plan.
- ⑤. ROSS'S LANDING PLAZA - tells the story of the community's evolution with artifacts and text depicting the Trail of Tears, Civil War and railroad heritage
- ⑥. SANCTUARY SKATE PARK - features an on-site Pro Shop for skateboards, in-line skates, BMX gear and related equipment
- ⑦. TENNESSEE RIVERPARK AND RIVERWALK - runs for 13 miles from Ross's Landing to the Chickamauga Dam featuring picnic areas, playgrounds, fishing piers, river and stream overlooks, wetlands, rowing centers, public parking and restrooms
- ⑧. WALNUT STREET BRIDGE - The oldest and largest surviving truss bridge in the South, the more than 100-year-old Walnut Street Bridge was renovated as a pedestrian bridge
- ⑨. CHATTANOOGA NATIONAL CEMETERY - established in 1863 after the Civil War Battles of Chattanooga and became Chattanooga National Cemetery in 1867<sup>20</sup>

<http://www.downtownchattanooga.org/new/play/parks-and-recreation>

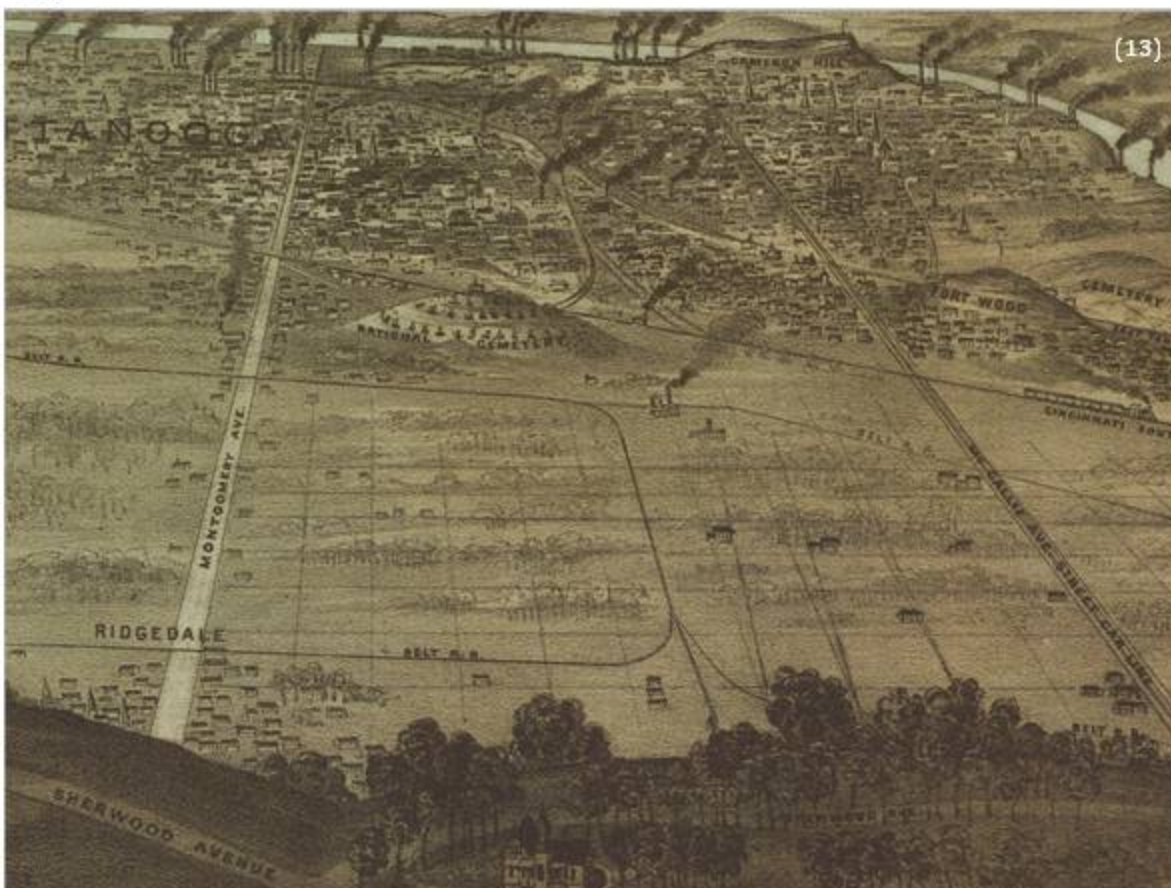




1871



1887



- **ESTABLISHED:** (unknown)
- **NAME ORIGIN:** A LAND BUYER FROM THE 19<sup>TH</sup> CENTURY NAMED T.G. MONTAGUE AND HIS PARTNER C.V. BROWN STARTED PURCHASING PLOTS OF LAND AROUND THE MONTAGUE PARK SITE, CREATING SOME OF THE NOW HISTORIC NEIGHBORHOODS OF CHATTANOOGA. LATER MONTAGUE AND BROWN DUE TO THE GROWING INTEREST IN THE AREA FORMED THE HIGHLAND PARK LAND COMPANY AND CONTINUED TO PURCHASE LAND IN THE SURROUNDING AREA <sup>13</sup>
- **LOCATION:** SOUTHEAST CHATTANOOGA @ POLK ST AND 23<sup>RD</sup> ST 1141 E 23<sup>RD</sup> ST CHATTANOOGA, TN 37408
- **SIZE:** 45+ acres

1941



1969





MARIO GANDELSONAS

THE READING MECHANISM:  
GANDELSONAS' METHOD OF "READING  
THE CITY"

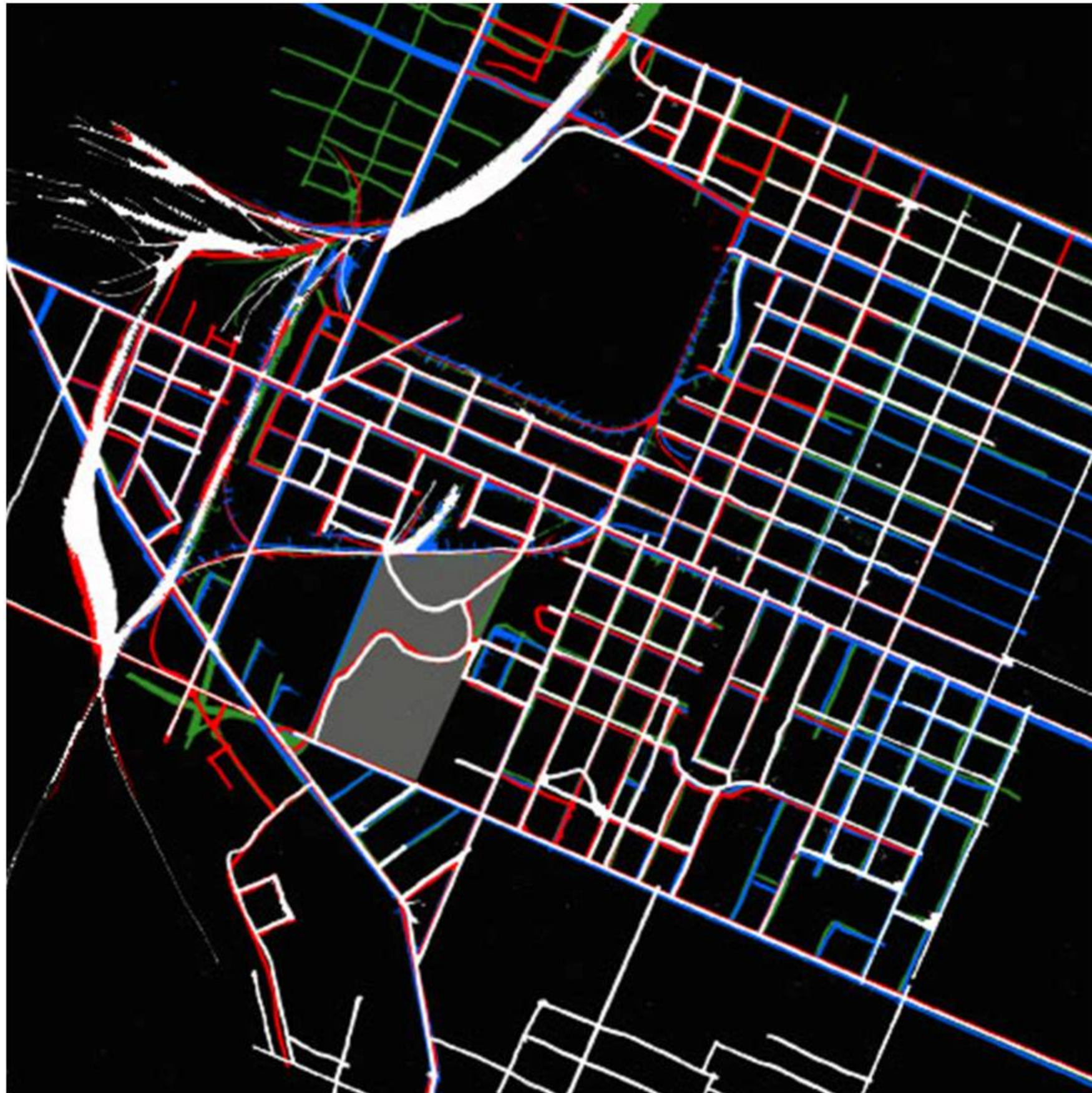
- The drawings are written as a dialogue between two discourse, in an attempt to reveal the unknown and submerged contents of the urban fabric
- Gandelsonas uses abstractions and mutations as analogies to convey meaning and purpose to the urban environment – the diagonals cut through the grid (railroad and streets)
- Gandelsonas aims to represent a new vision through the abstraction of the past and the future. Gandelsonas's works tend to embrace both the past and present, bridging the gap in analyzing the city.<sup>11</sup>

1936

1941

1958

1969







- OPERATED AS A LANDFILL FROM THE MID-1940'S TO THE MID-1960'S<sup>8</sup>
- STARTING AROUND 1975 THE PARK EXISTED AS A SOFTBALL COMPLEX
- IN 2003 THE PARK WAS CLOSED BY THE STATE WHEN METHANE LEAKS WERE FOUND AT THE BALL FIELDS<sup>1</sup>
- IT WAS DETERMINED WHEN THE PARK WAS CLOSED THAT THE LANDFILL HAD BEEN IMPROPERLY "CAPPED"<sup>1</sup>. THE CAP WAS NONEXISTENT IN SOME AREAS, INCONSISTENT THROUGH OUT THE PARK AND DID NOT MEET THE CURRENT STANDARD
- IN 2008 THE CITY AND STATE REACHED AN AGREEMENT ON HOW TO RETURN THE PARK TO A USABLE STATE. ACCORDING TO THE TENNESSEE DEPARTMENT OF ENERGY AND CONSERVATION A NEW 3-FOOT CAP NEEDED TO BE PLACED ACROSS THE AFFECTED AREA.<sup>14</sup> THE CAP NEEDED TO CONSIST OF 2 FEET OF COMPACTED SOIL AND 1 FOOT TO SUPPORT VEGETATION.<sup>1</sup>
- THE CAPPING OF MONTAGUE PARK HAS LEFT IT A RATHER FLAT PARK.
- THE PARK HAS BEEN SLOWLY RESTORED TO A USEABLE STATE DUE TO TWO GROUPS WILLING TO VOLUNTEER THEIR HOURS, THE CHATTANOOGA RUGBY CLUB AND THE SCULPTURE PARK OF MONTAGUE<sup>14</sup>







### CYPRESS CORNERS

- A MIXED-USE COMMUNITY OF ARTISTS, ARTS ORGANIZATIONS AND CREATIVE BUSINESSES
- COMMUNITY: THE STRUCTURE GROUP AND JOHN HENRY SCULPTOR, INC.
- SUPPORT AND PROMOTE THE ARTS
- CREATING AN ARTIST HUB <sup>7</sup>



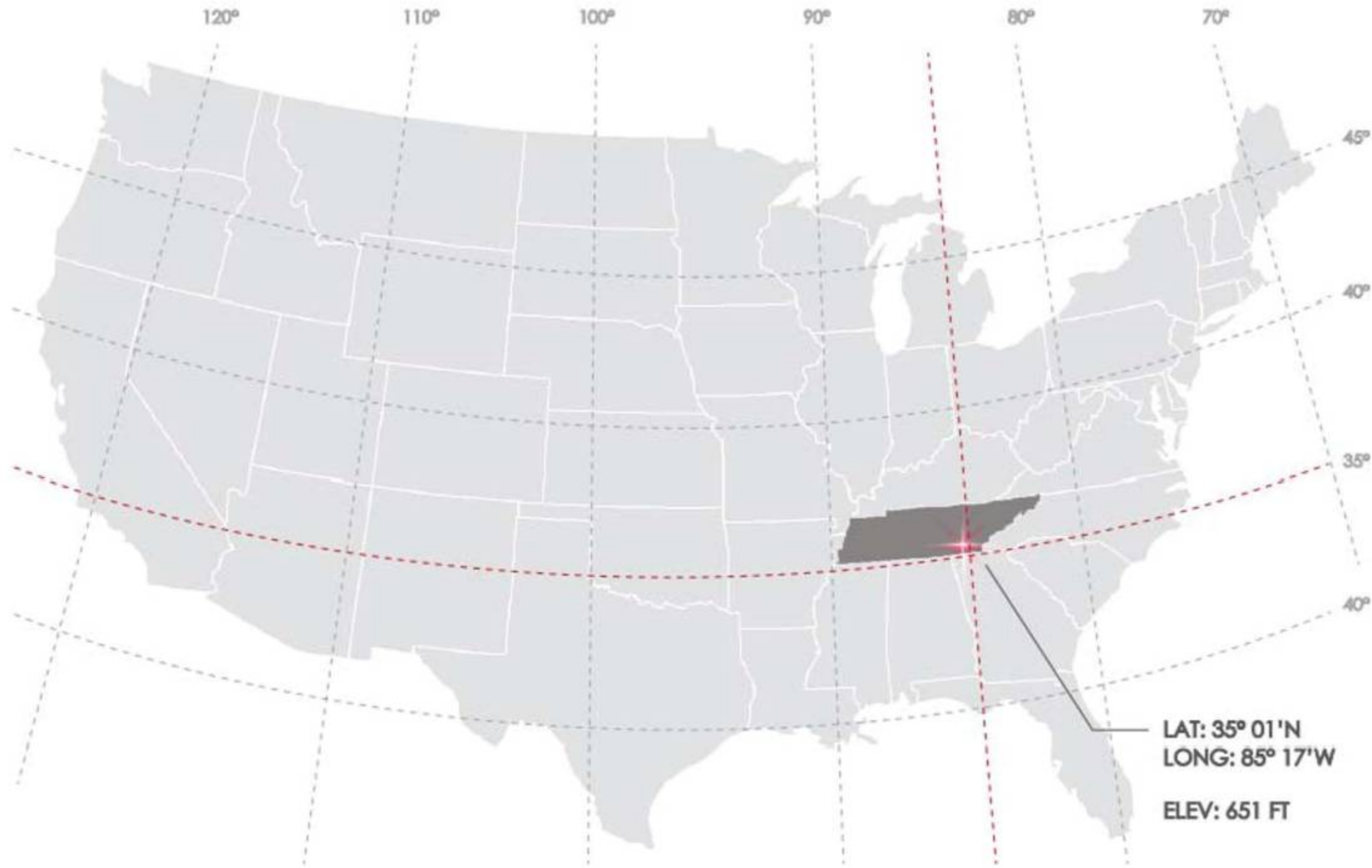
*"The focus of Cypress Corners is to build a mixed-use community of artists, arts organizations, and creative businesses that will enhance the vitality and cultural awareness of the community at large."*

[http://www.cypresscorners.com/About\\_Us.html](http://www.cypresscorners.com/About_Us.html)





# SITE ANALYSIS



SOURCE:  
Andrea Elichi, MODULE 01





# SITE ANALYSIS

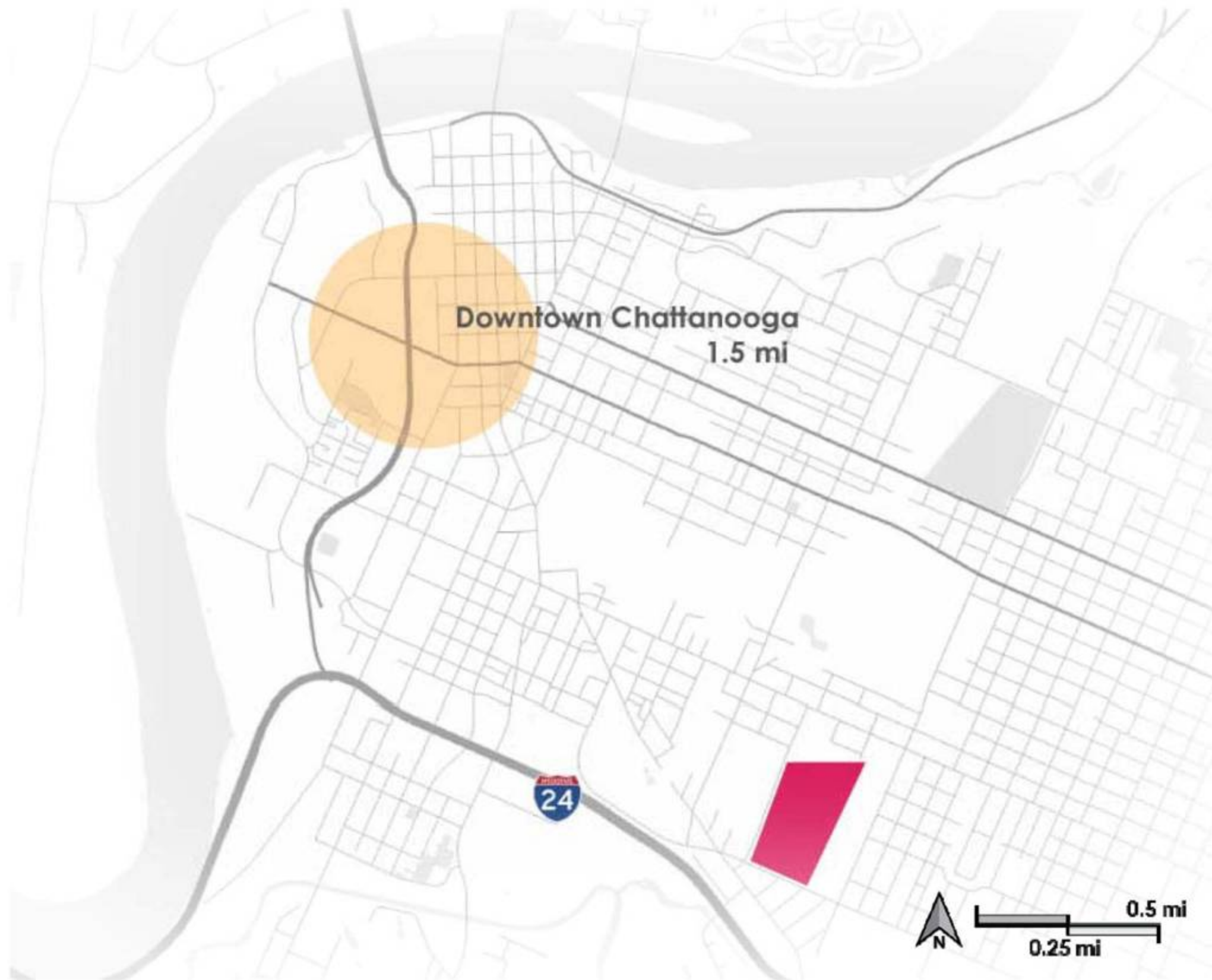
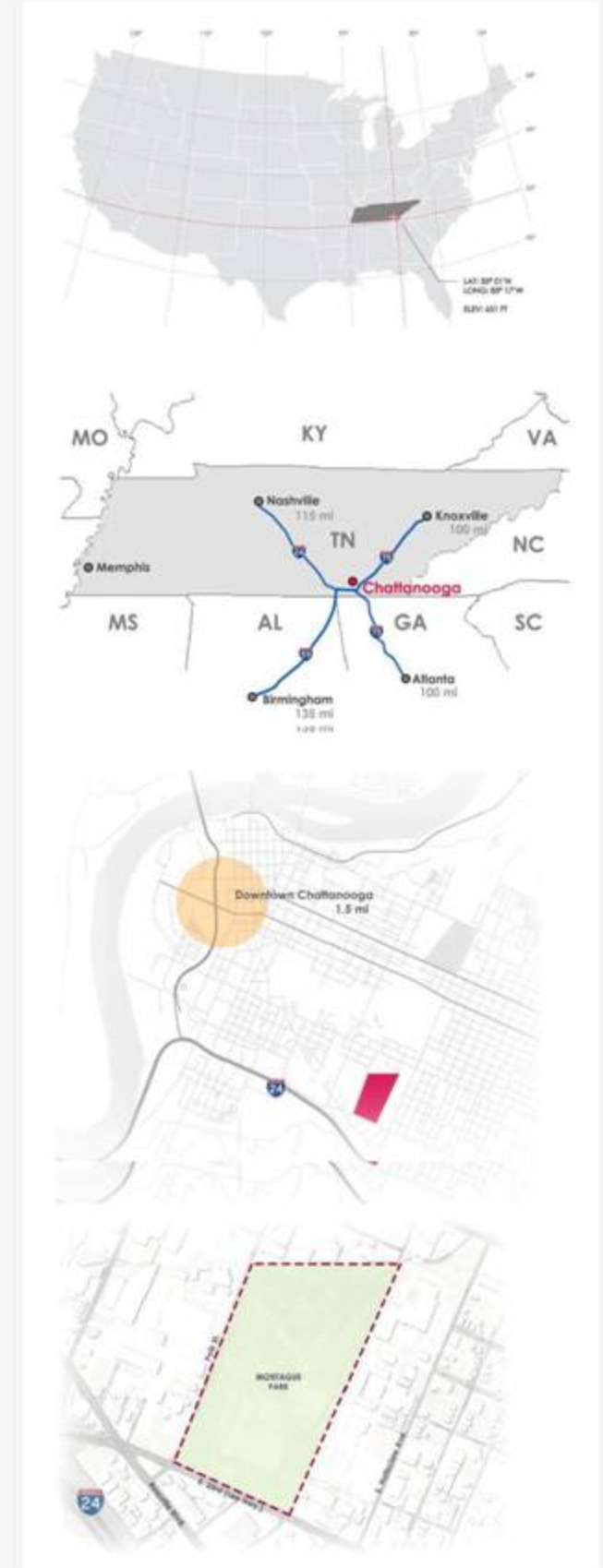


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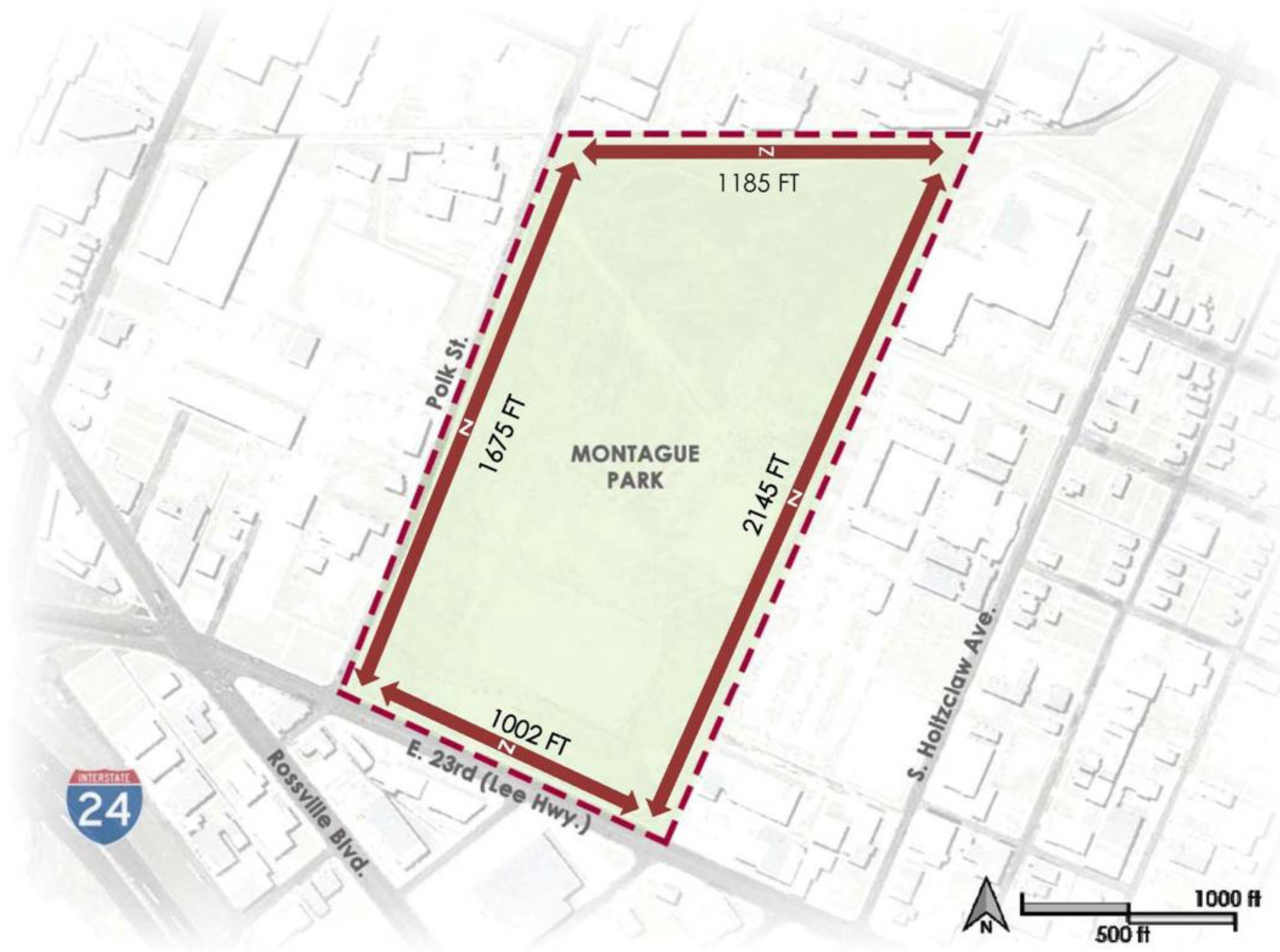
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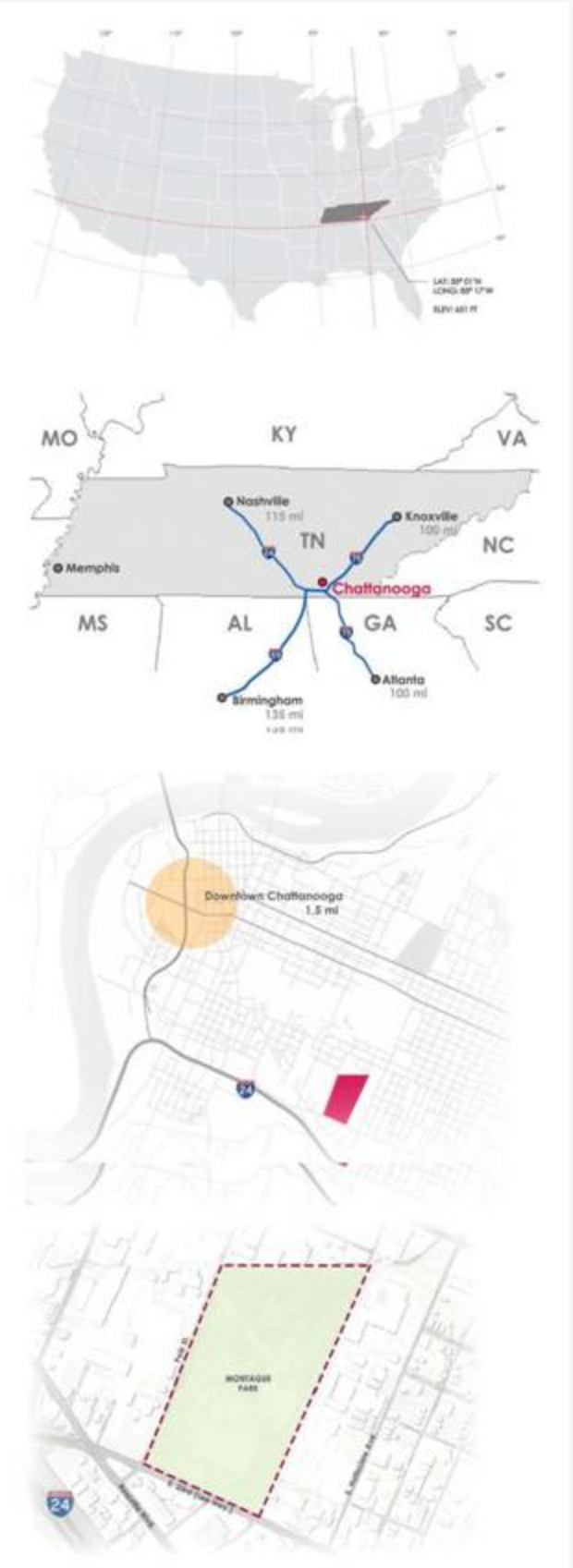
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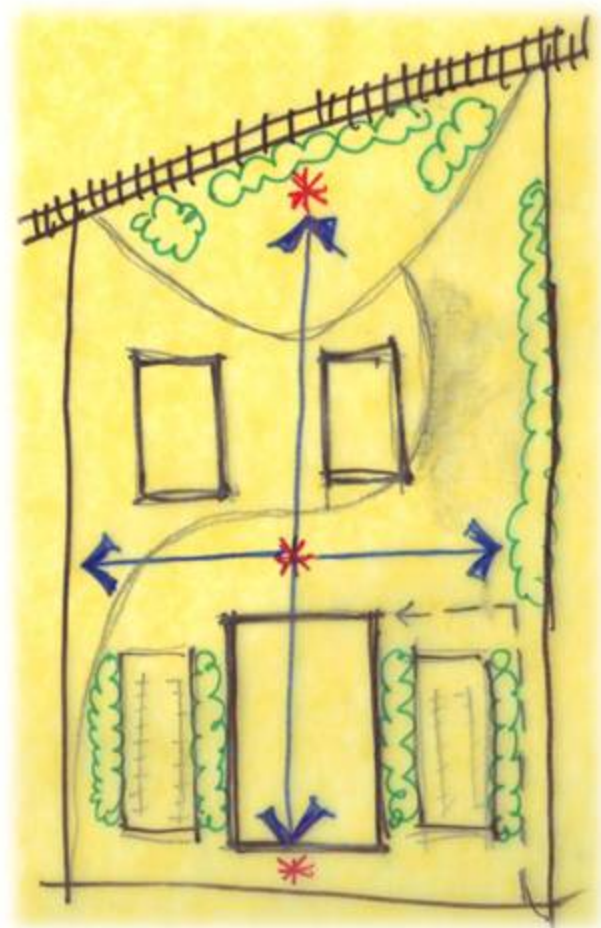
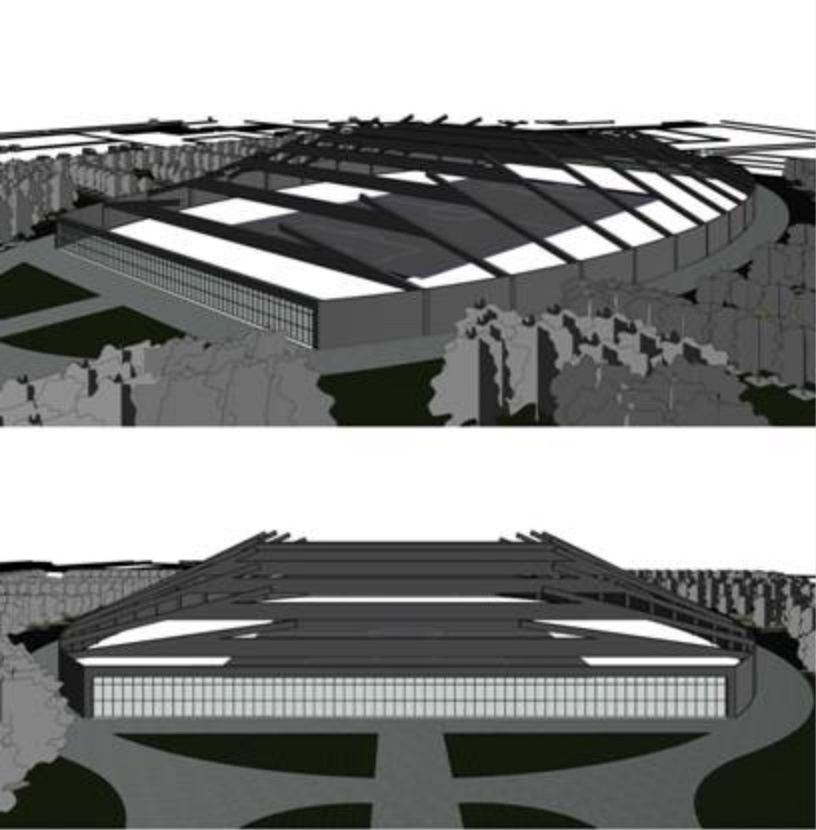
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## aesthetic and spatial : **ALTERNATE**

### CONCEPT: A Set Piece

- Creating a strong separation between the building and the landscape
- Symmetrical form



PRELIMINARY DESIGN CONCEPTS



# aesthetic and spatial : **ALTERNATE**

## CONCEPT: Figural

- Combine systems to maximize efficiency, lower footprint and impact
- Maximize natural light into stadium
- Replace typical materials with energy producing or materials that increase building efficiency

PRELIMINARY DESIGN CONCEPTS

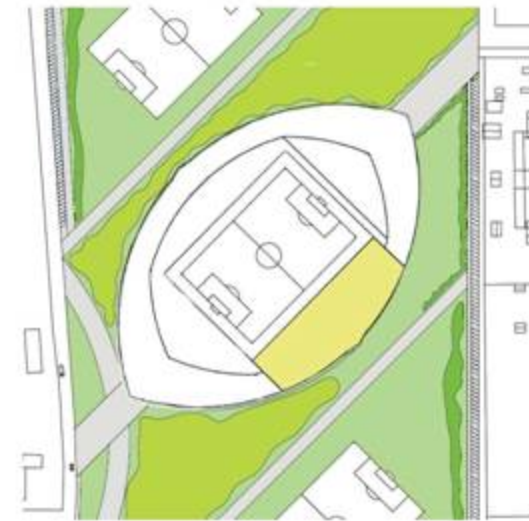
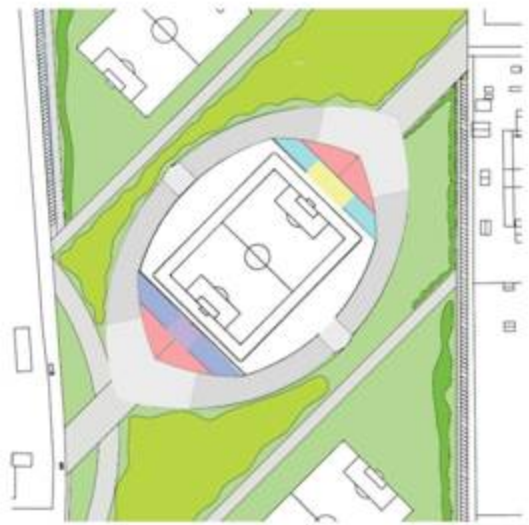


### Program Key

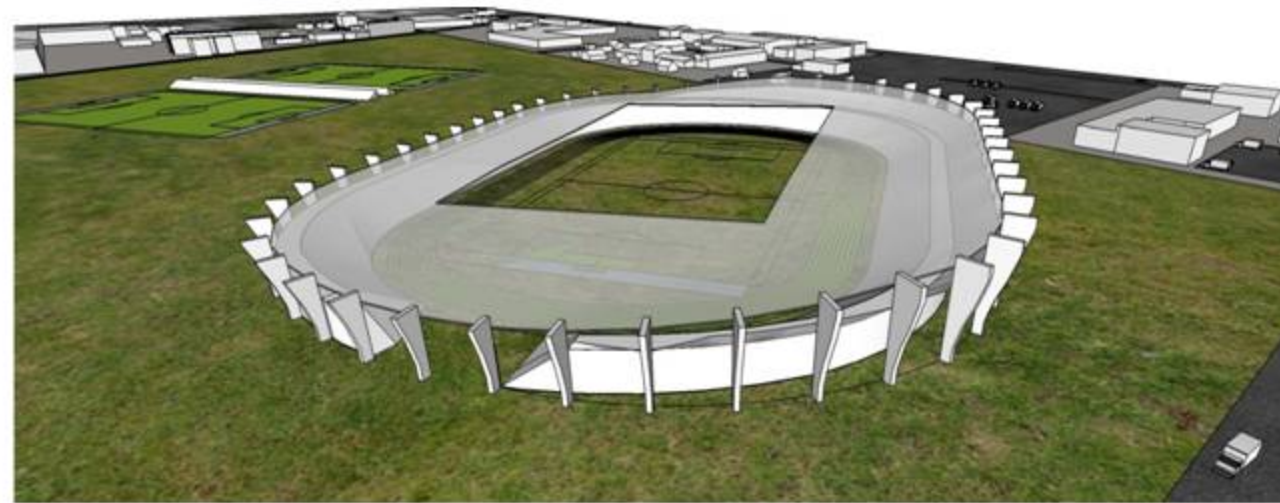
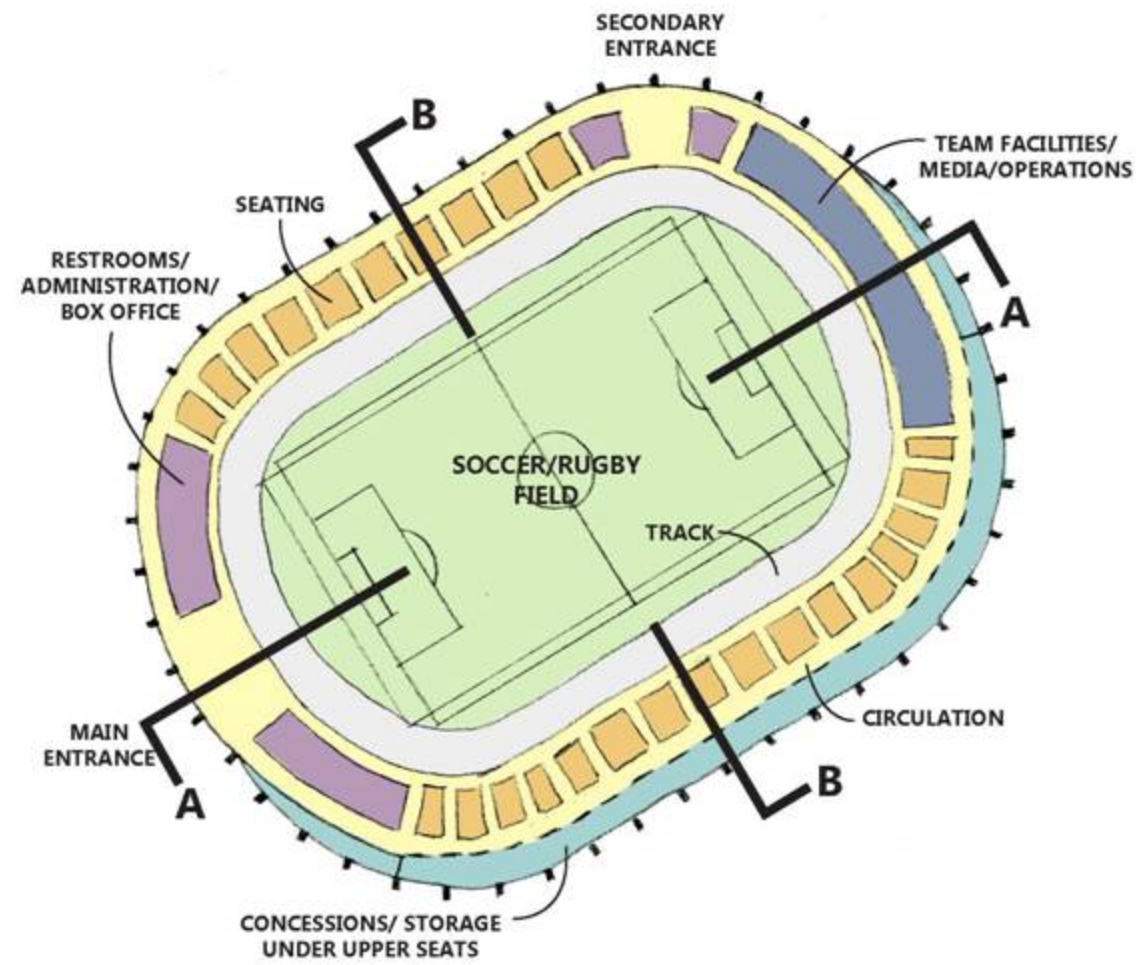
- Seating Bowl
- Concessions
- Operations Support
- Team Facilities
- Medical Facilities
- Suites
- Restrooms
- Field Storage

### Site Plan Key

- Vegetation
- Sculptor Area
- Building footprint







PRELIMINARY DESIGN CONCEPTS



## MONTAGUE STADIUM AND MONTAGUE COMMUNITY PARK

The Montague Park stadium is oriented perpendicular to Lee Highway and the axes are derived from the site property lines. At key intersections and destinations, large sculptures help define the site and connect to the nearby artist community. A community garden, with paths that relate to the history of the site, will engage the nearby residents.

Upon entering and exiting the stadium, visitors pass through the exterior envelope and they engage and interact with the structural frame. All spectator seating is covered and provides views to the daylight playing field. Low walls with glass allow for views to the field for those on the main concourse. Restaurant and pro-shop spaces are provided to create additional draw to the destination. Vendors and concessions are mobile to allow for flexibility and decreased energy load, and are located under the upper seating on the first floor. A large flexible area is provided for patio and/or party seating.

Geothermal wells are located on-site to alleviate the heating and cooling loads. Based on sun angles, some of the panels inset in the structural frame are photovoltaic to harness solar energy. Rain water is collected at the base of the stadium structure in grates on grade and held in cisterns underground. The harvested rainwater is then used throughout the site for the practice fields, community garden and such.



### CONCEPT: A Set Piece

- Creating a strong separation between the building and the landscape
- Symmetrical form

### OBJECTIVES:

- Create a visual connection to the surrounding areas (downtown, artist district and Lookout Mtn)
- Develop connections to community and artist district through site access (road and proposed bridge)
- Place sculptures along the site to allow for directed flow and visual through site, highlighting key points
- Derive influences from the history of the site through paths, helping determine division of site
- Design the stadium for flexible use of spaces and operations
- Utilize the benefits of the sun through solar panels and optimizing natural daylighting

*BRINGING A NEW BEGINNING TO A HISTORIC LOCATION .....*

CONCEPT



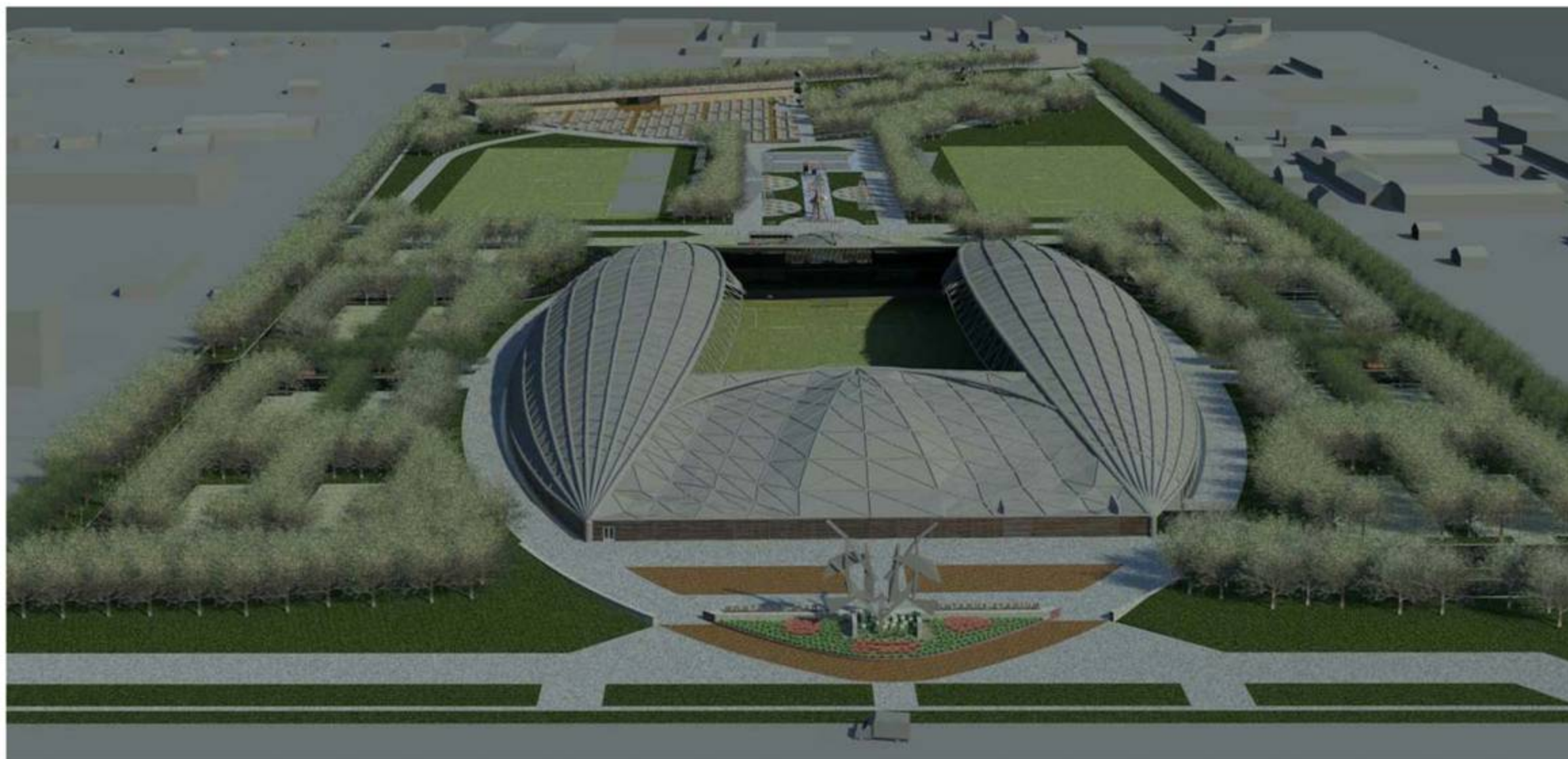


## SITE ELEMENTS

- ELEVATED STADIUM 5 FEET
- PLACED AN 8 FOOT EARTH BERM AT THE NORTH EDGE OF THE SITE
- ELEVATED PARKING WITH GRADE

SITE PLAN



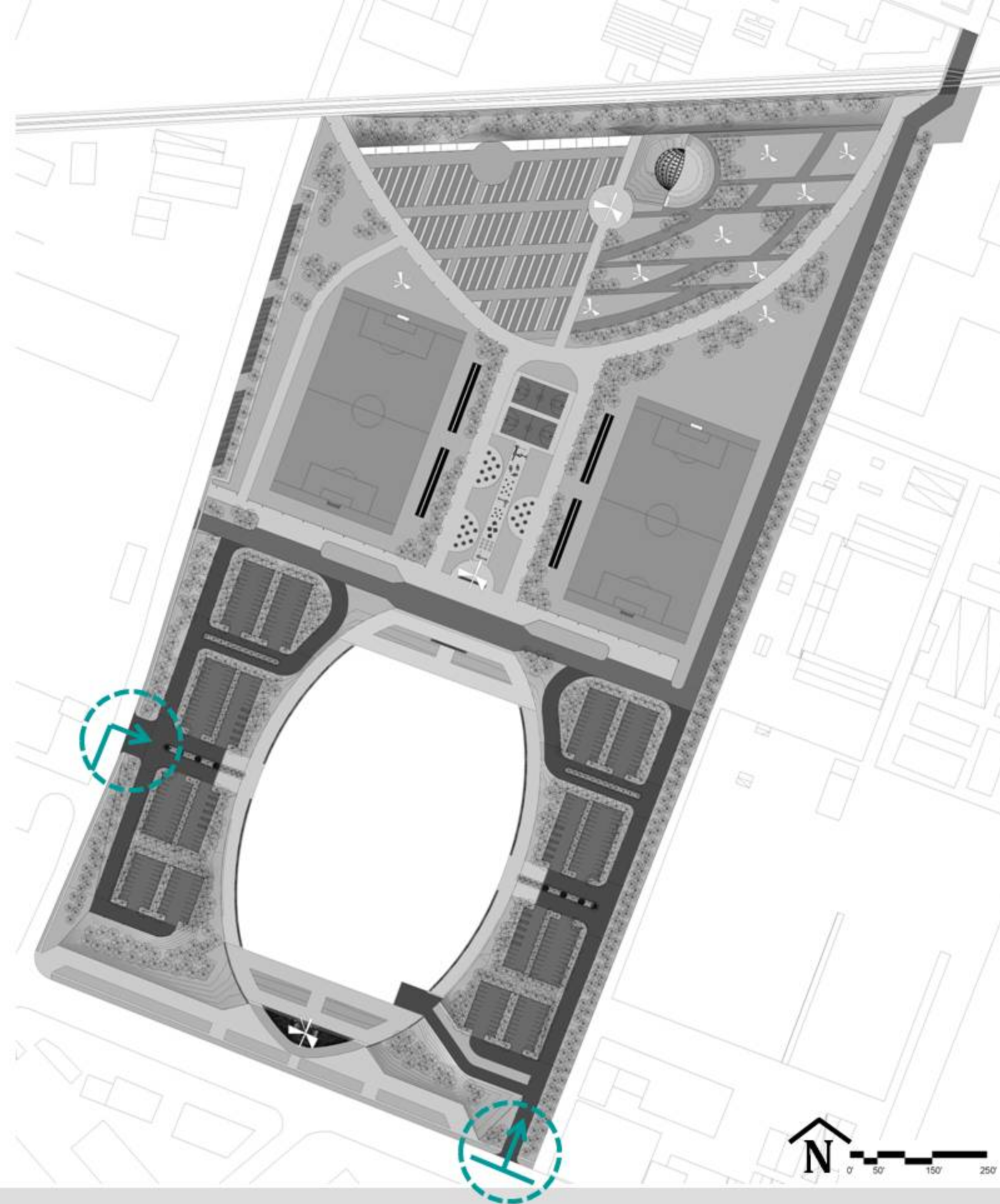


LOCATION MAP



OVERALL SITE



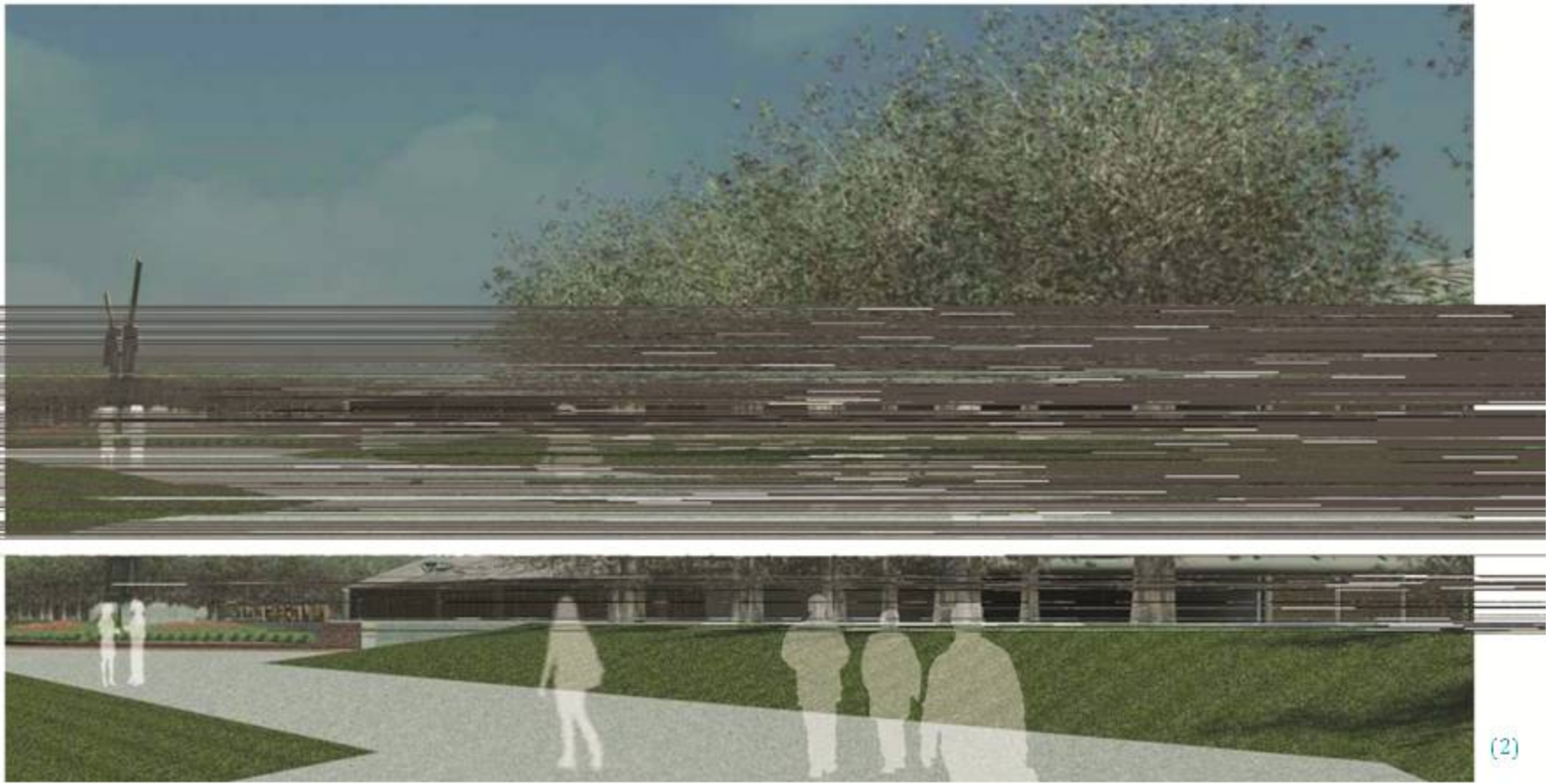


## SITE ACCESS

- MAIN VEHICULAR ACCESS
  - POLK STREET
  - 23<sup>RD</sup> STREET
- PROPOSED ROAD THROUGH SITE INTO ARTIST DISTRICT
- PEDESTRIAN SITE ACCESS
- STREET PARKING ON POLK (36 SPOTS)
- SITE PARKING (384)
  - 40 SERVICE (WEST)
  - 40 PLAYERS/TEAM (EAST)
  - 268 VISITOR PARKING
- DROP-OFFS/TURN AROUNDS
- SERVICE/LOADING

SITE PLAN - ACCESS

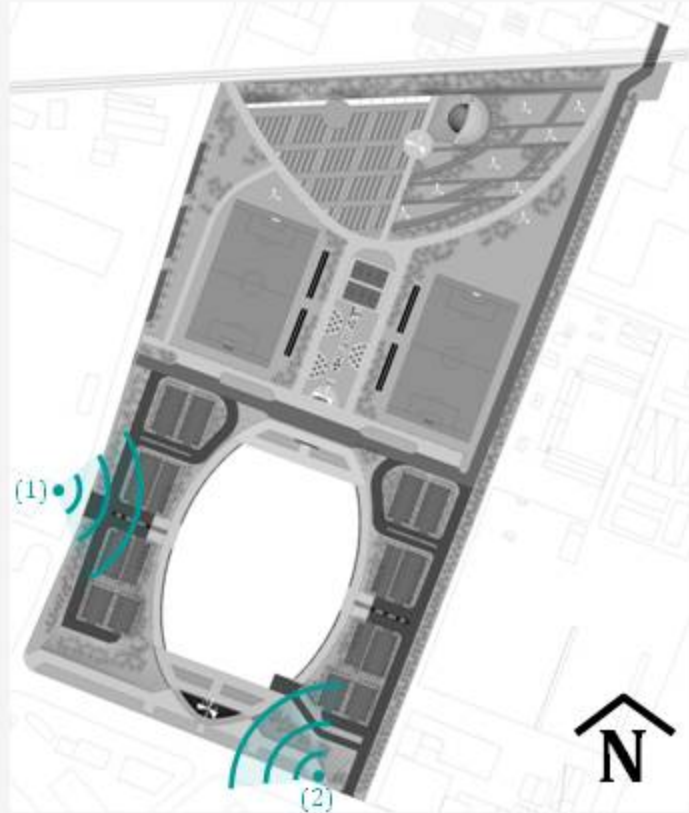




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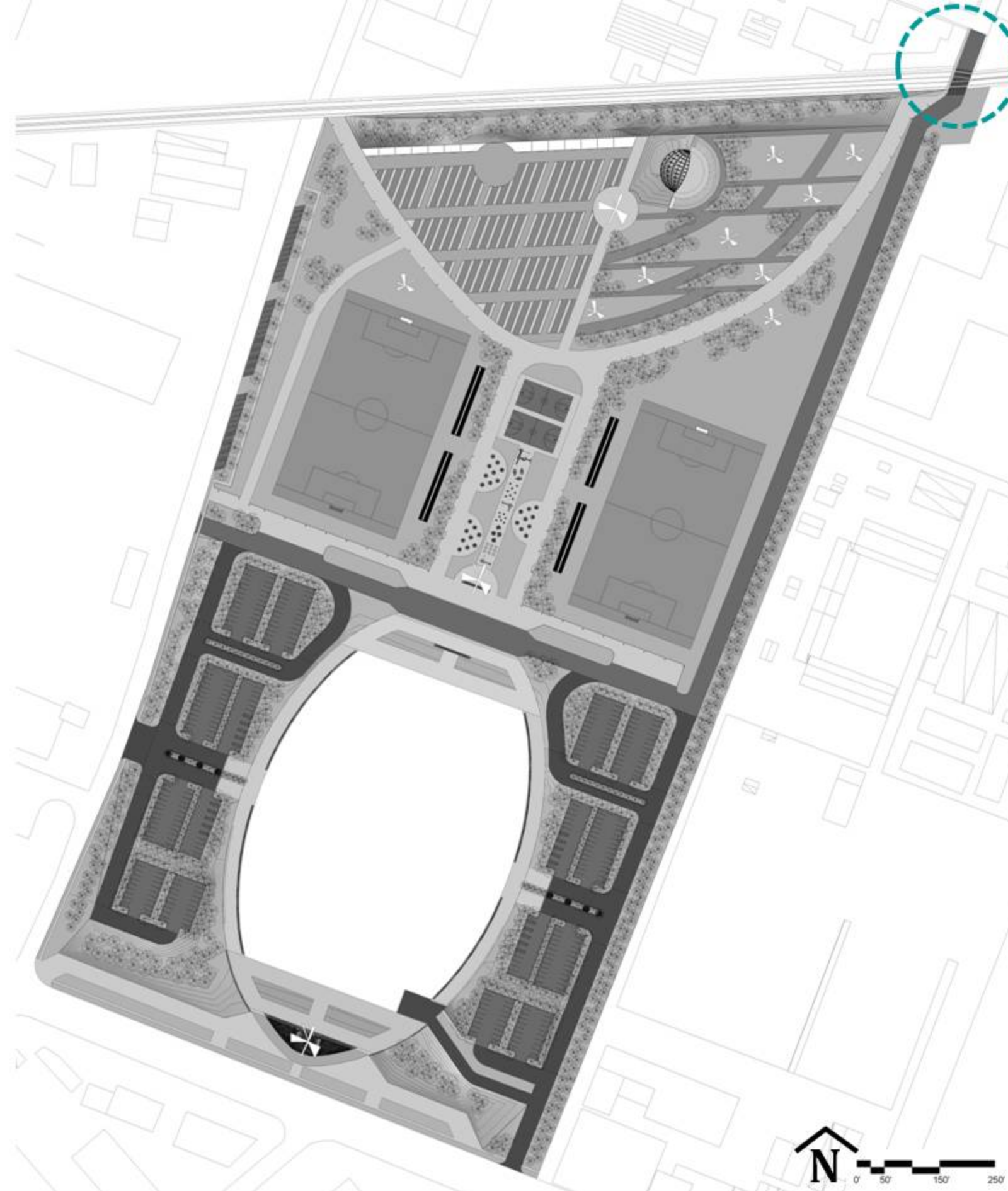
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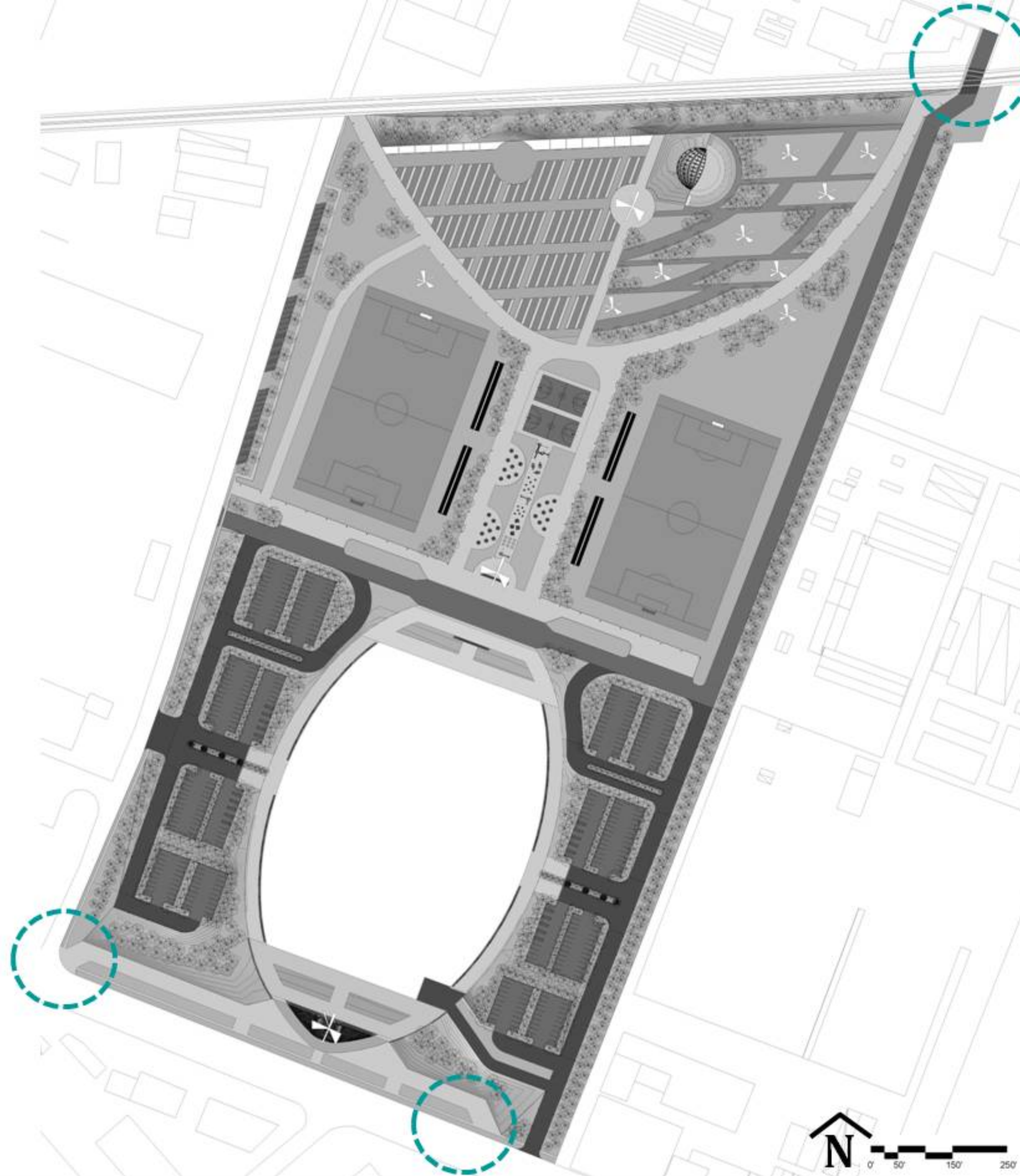
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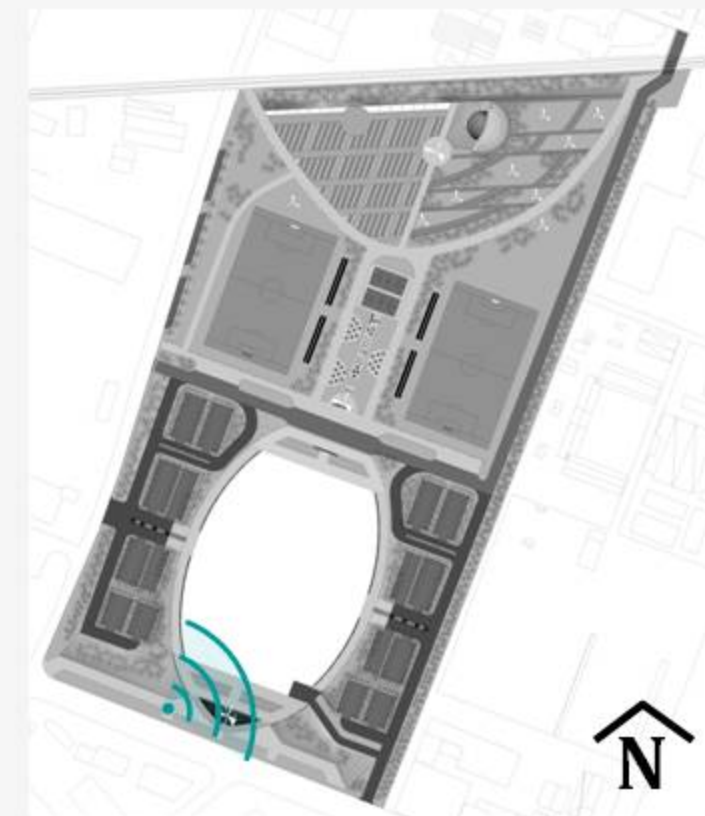




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## LOCATION MAP



## SITE PLAN - ACCESS





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LOCATION MAP



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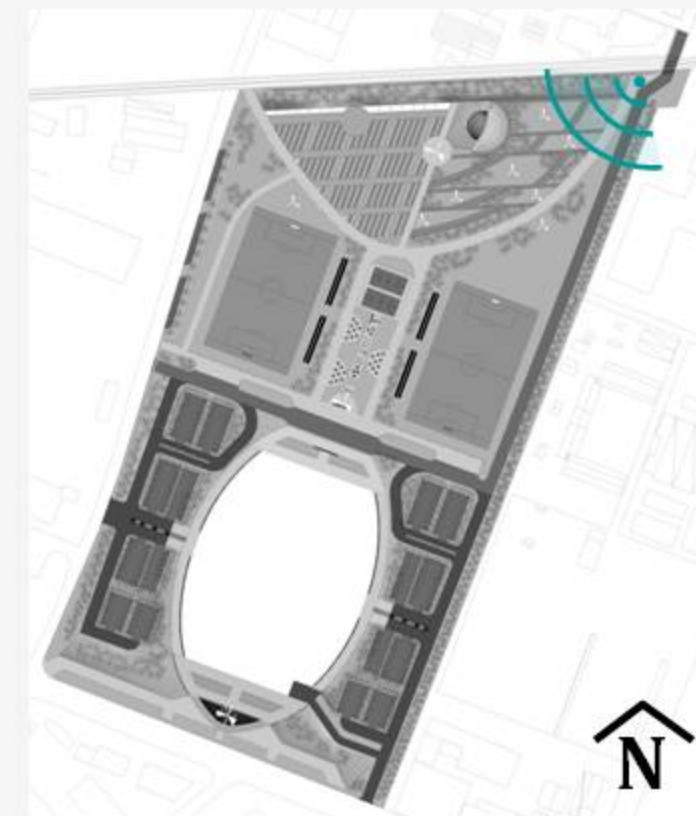




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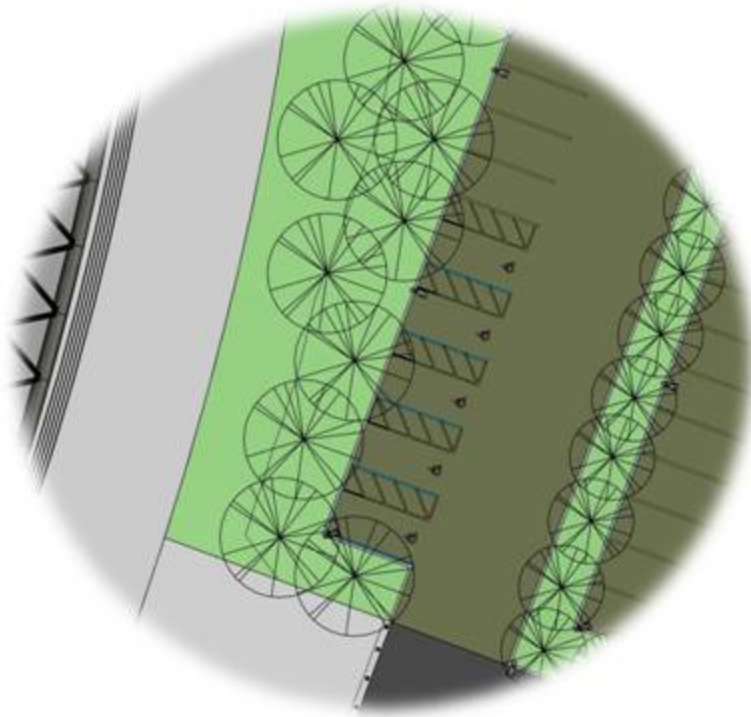
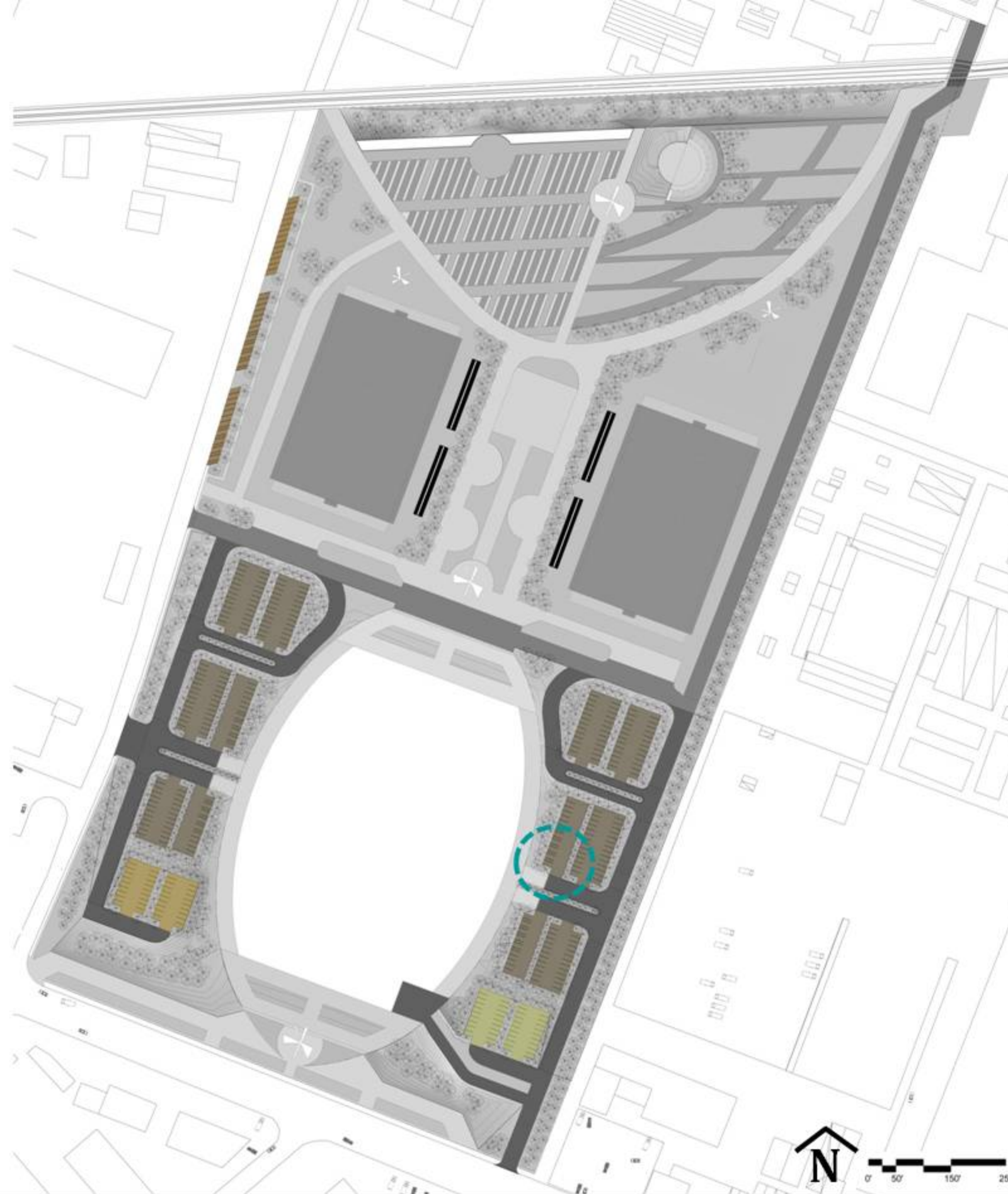


IMAGE SOURCE:  
<http://landscapeonline.com/research/article/15741>

#### KEY ELEMENTS OF PARKING:

- STREET PARKING (36)
- SERVICE PARKING – WEST (40)
- SPECTATOR PARKING (268)
- TEAM PARKING – EAST (40)



#### SITE ACCESS

- MAIN VEHICULAR ACCESS
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- PEDESTRIAN SITE ACCESS
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SITE PLAN - ACCESS





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## SHARED PARKING:

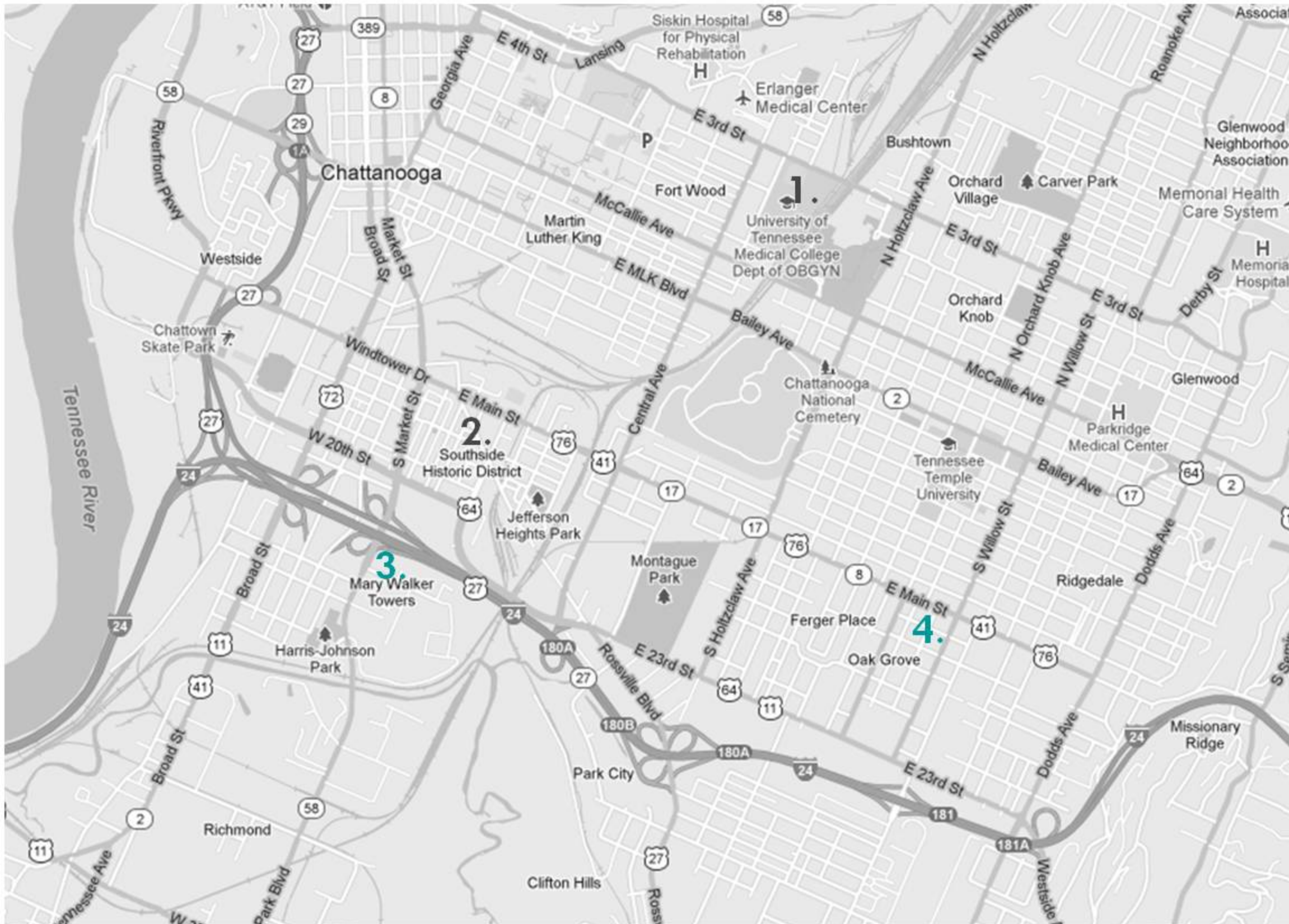
1. Electric Motor Sales = 38 spaces
2. **The Mill = 87 spaces**
3. Jeffan International = 70 spaces
4. Hamilton County Child Support = 75 spaces
5. **National Guard = 193 spaces**
6. Service Heating & Air Conditioning = 44 spaces
7. **Church (Polk & Rossville) = 20 spaces**
8. **Vacant Tire Center (open lot) = 48 spaces**

TOTAL = 575 SPACES

**TOTAL USED = 348 SPACES**

SHARED PARKING





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## SHUTTLE PARKING:

1. University of Tennessee/ Engel Field (1.6 miles) = 563 spaces
2. Koch Foods (1.2 miles) = 140 spaces
3. **Howard School of Academics Technology (1.4 miles) = 193 spaces**
4. **East Side Elementary School (1.5 miles) = 131 spaces**

TOTAL = 1027 SPACES

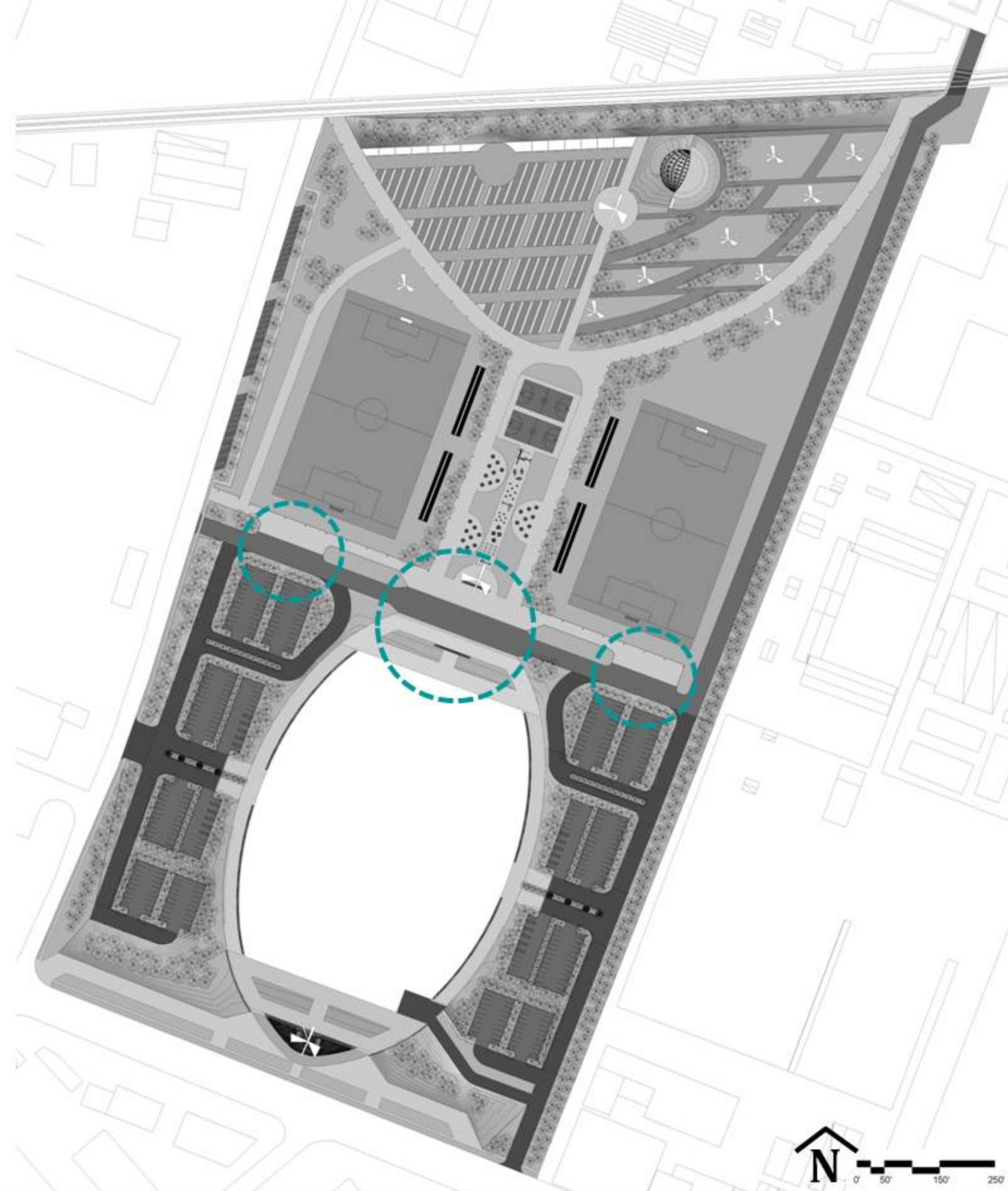
**TOTAL USED = 324 SPACES**

SHARED PARKING





IMAGE SOURCE:  
<http://landscapeonline.com/research/article/15741>  
<http://www.edsuk.com/cat.php?id=47>



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  - 40 PLAYERS/TEAM (EAST)
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SITE PLAN - ACCESS





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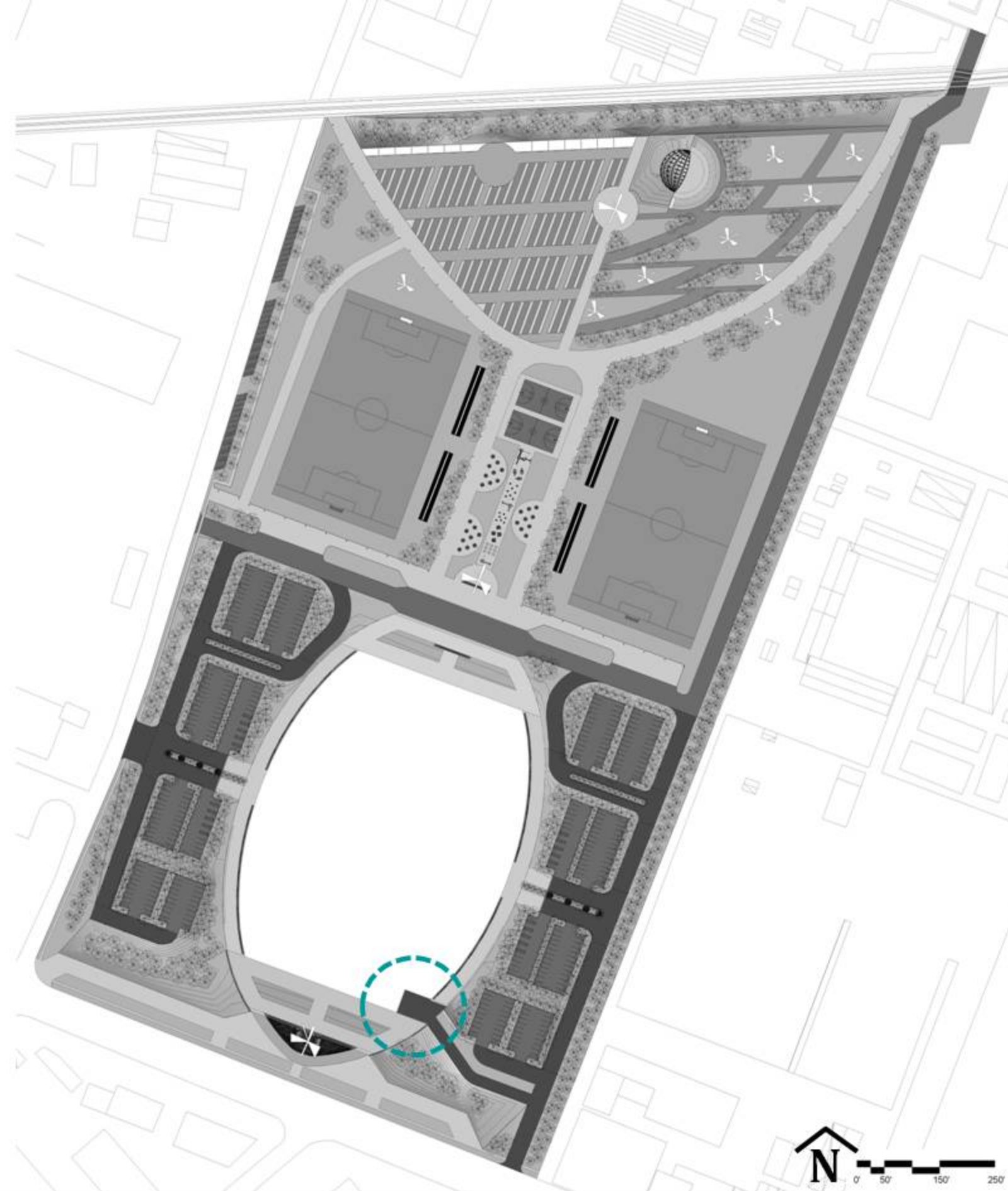
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## LOCATION MAP



## SITE PLAN - ACCESS





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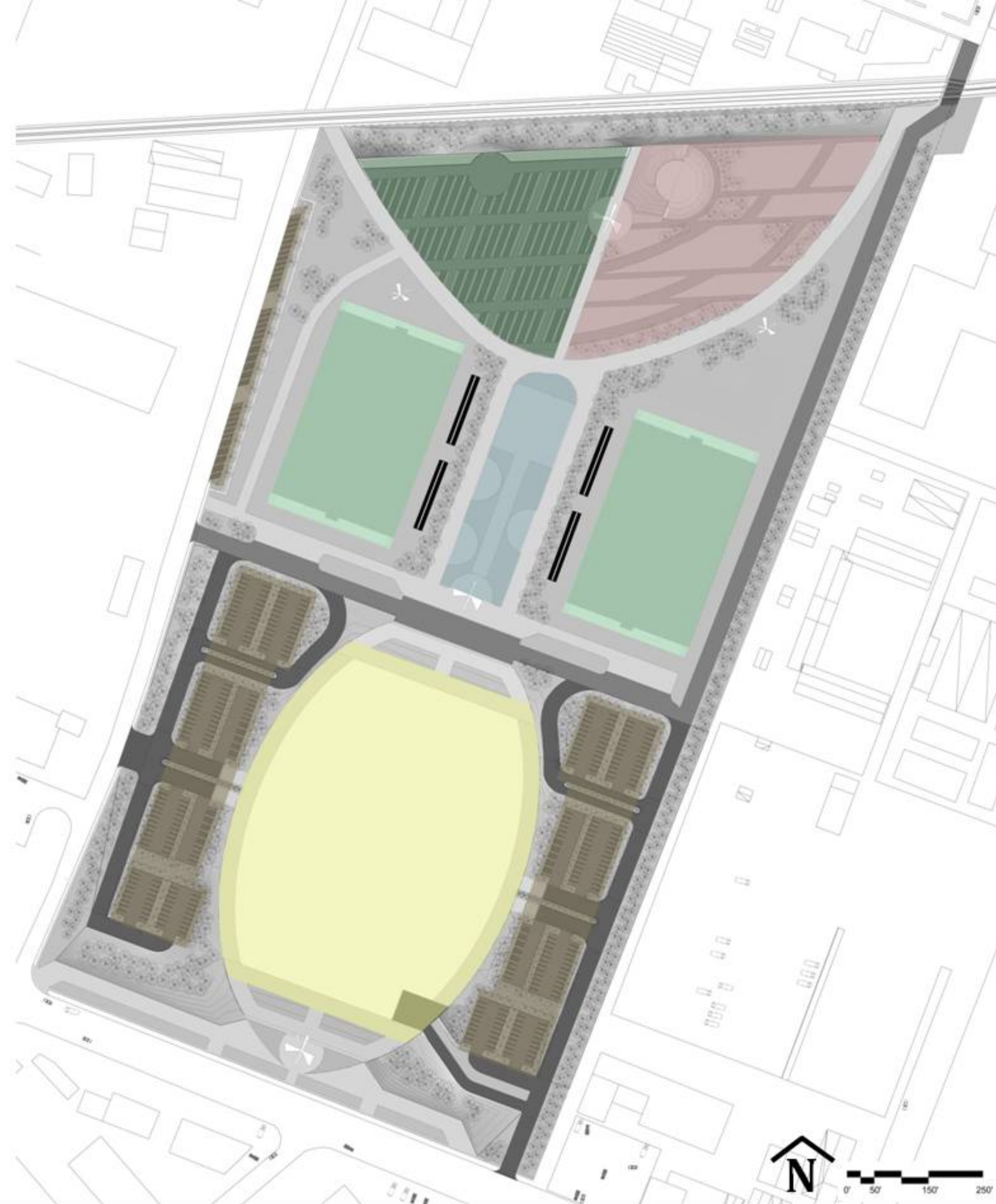
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SITE PLAN - ACCESS



KEY ELEMENTS OF SITE:

- STADIUM
- PARKING
- PRACTICE FIELDS
- HALFTIME ZONE
- COMMUNITY GARDEN
- SCULPTURE GARDEN/AMPHITHEATRE

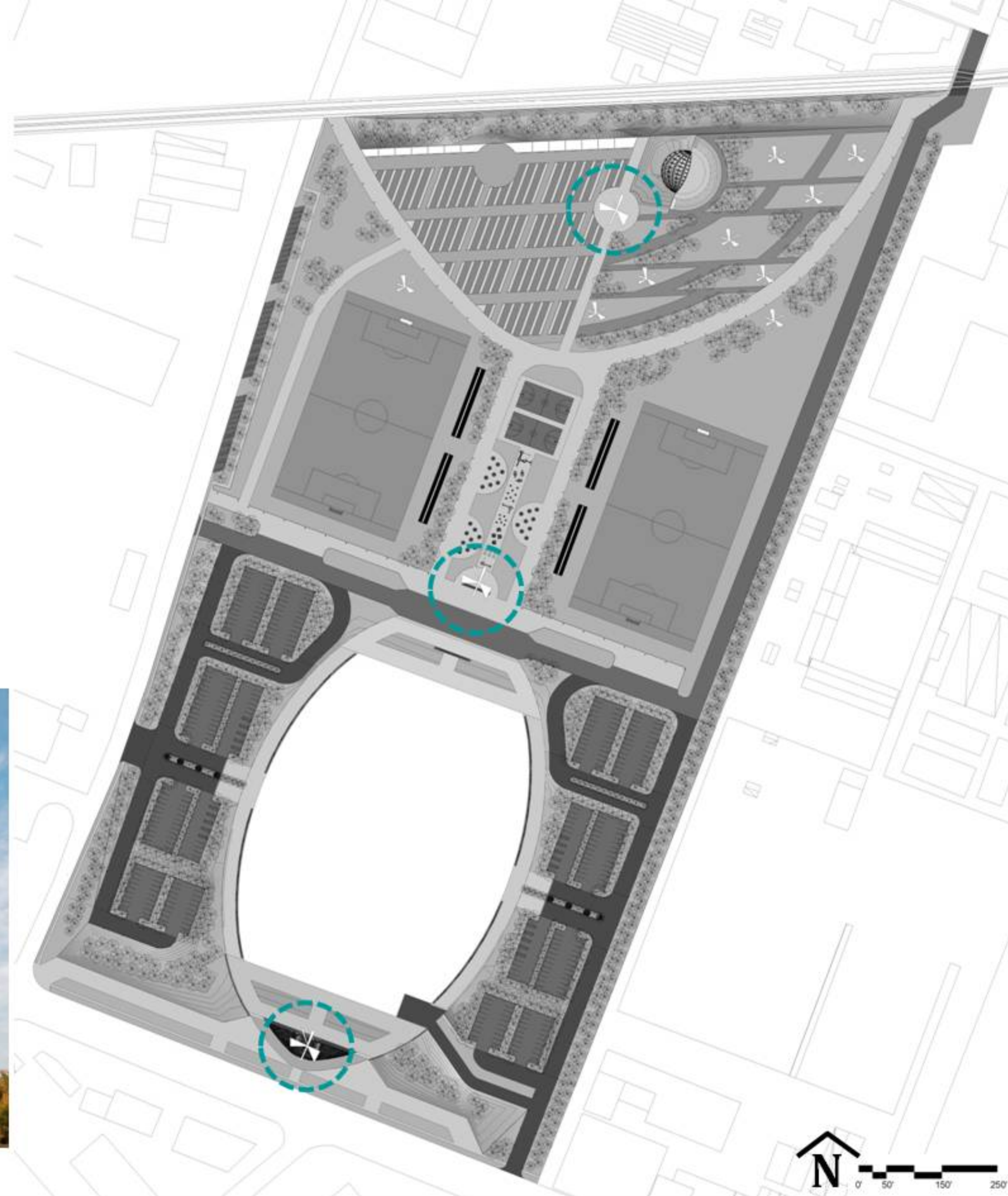


SITE PLAN - SPACES





IMAGE SOURCE:  
<http://johnhenrysculptor.com/>



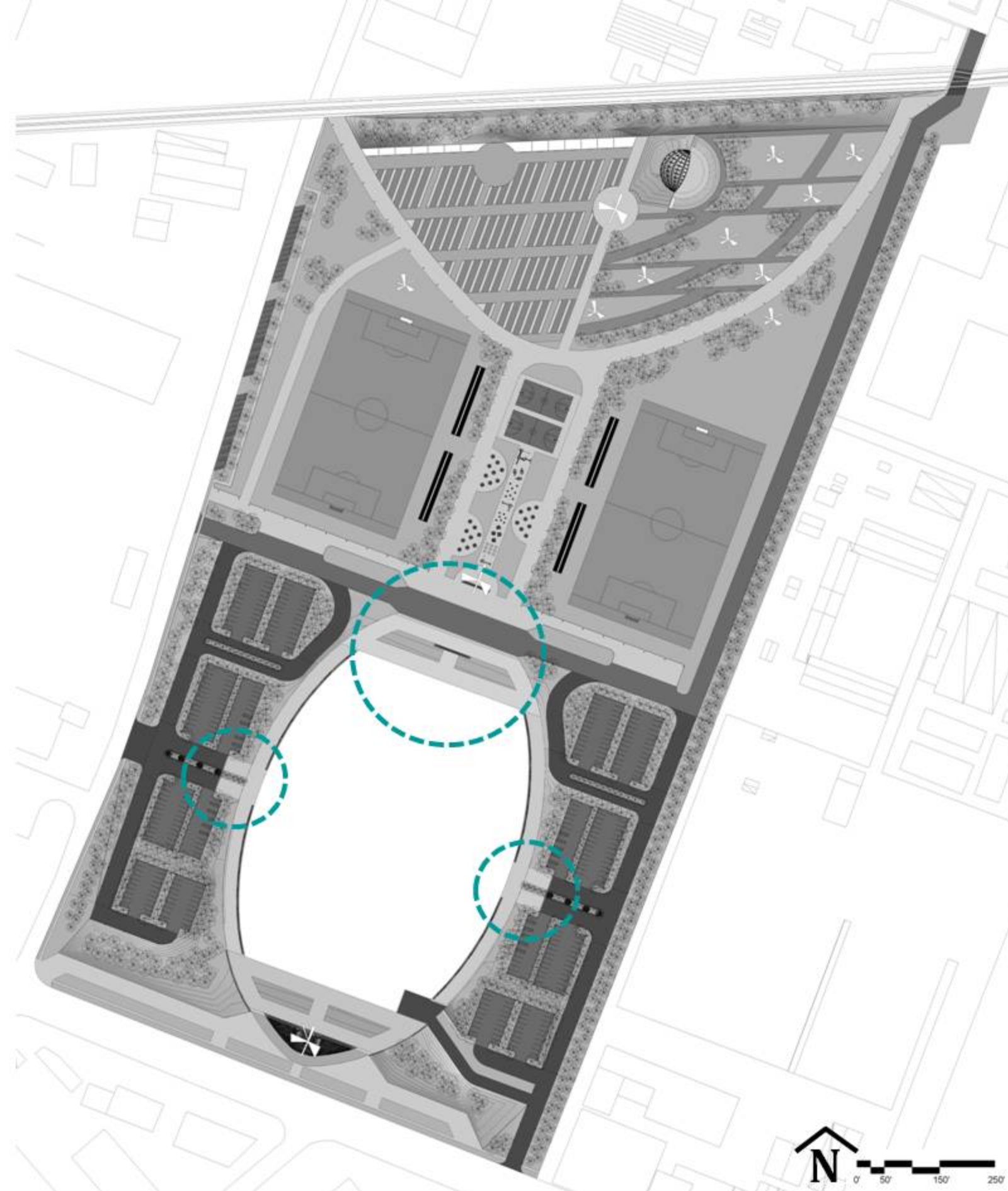
## SPACES

- FOCAL POINT SCULPTURES
- STADIUM ENTRANCES
- PRACTICE FIELDS
  - BLEACHERS
  - PROPOSED FACILITIES STORAGE AND RESTROOM
- HALFTIME ZONE
  - PICNIC TABLES
  - GREEN SPACE
  - PLAYGROUND EQUIPMENT
- AMPHITHEATRE
- SCULPTURE PARK
- COMMUNITY GARDENS
  - RAISED FLOWER/VEGETABLE BEDS
  - LEARNING CIRCLE
  - STORAGE



SITE PLAN - SPACES





## SPACES

- FOCAL POINT SCULPTURES
- **STADIUM ENTRANCES**
- PRACTICE FIELDS
  - BLEACHERS
  - PROPOSED FACILITIES STORAGE AND RESTROOM
- HALFTIME ZONE
  - PICNIC TABLES
  - GREEN SPACE
  - PLAYGROUND EQUIPMENT
- AMPHITHEATRE
- SCULPTURE PARK
- COMMUNITY GARDENS
  - RAISED FLOWER/VEGETABLE BEDS
  - LEARNING CIRCLE
  - STORAGE

SITE PLAN - SPACES



## SPACES

- FOCAL POINT SCULPTURES
- **STADIUM ENTRANCES**
- PRACTICE FIELDS
  - BLEACHERS
  - PROPOSED FACILITIES STORAGE AND RESTROOM
- HALFTIME ZONE
  - PICNIC TABLES
  - GREENSPACE
  - PLAYGROUND EQUIPMENT
- AMPHITHEATRE
- SCULPTURE PARK
- COMMUNITY GARDENS
  - RAISED FLOWER/VEGETABLE BEDS
  - LEARNING CIRCLE
  - STORAGE

## LOCATION MAP



## SITE PLAN - SPACES







## SPACES

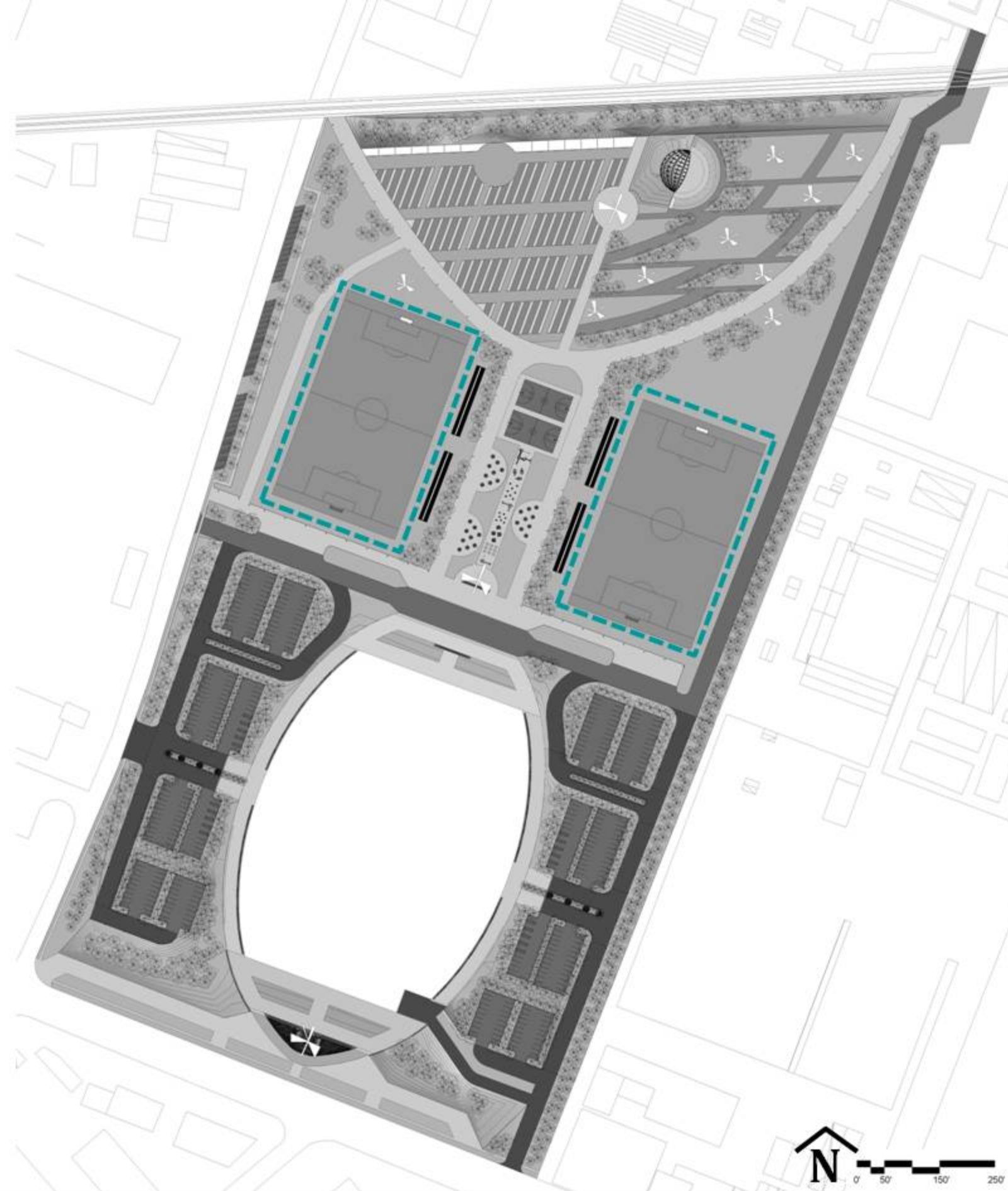
- FOCAL POINT SCULPTURES
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## LOCATION MAP



## SITE PLAN - SPACES





## SPACES

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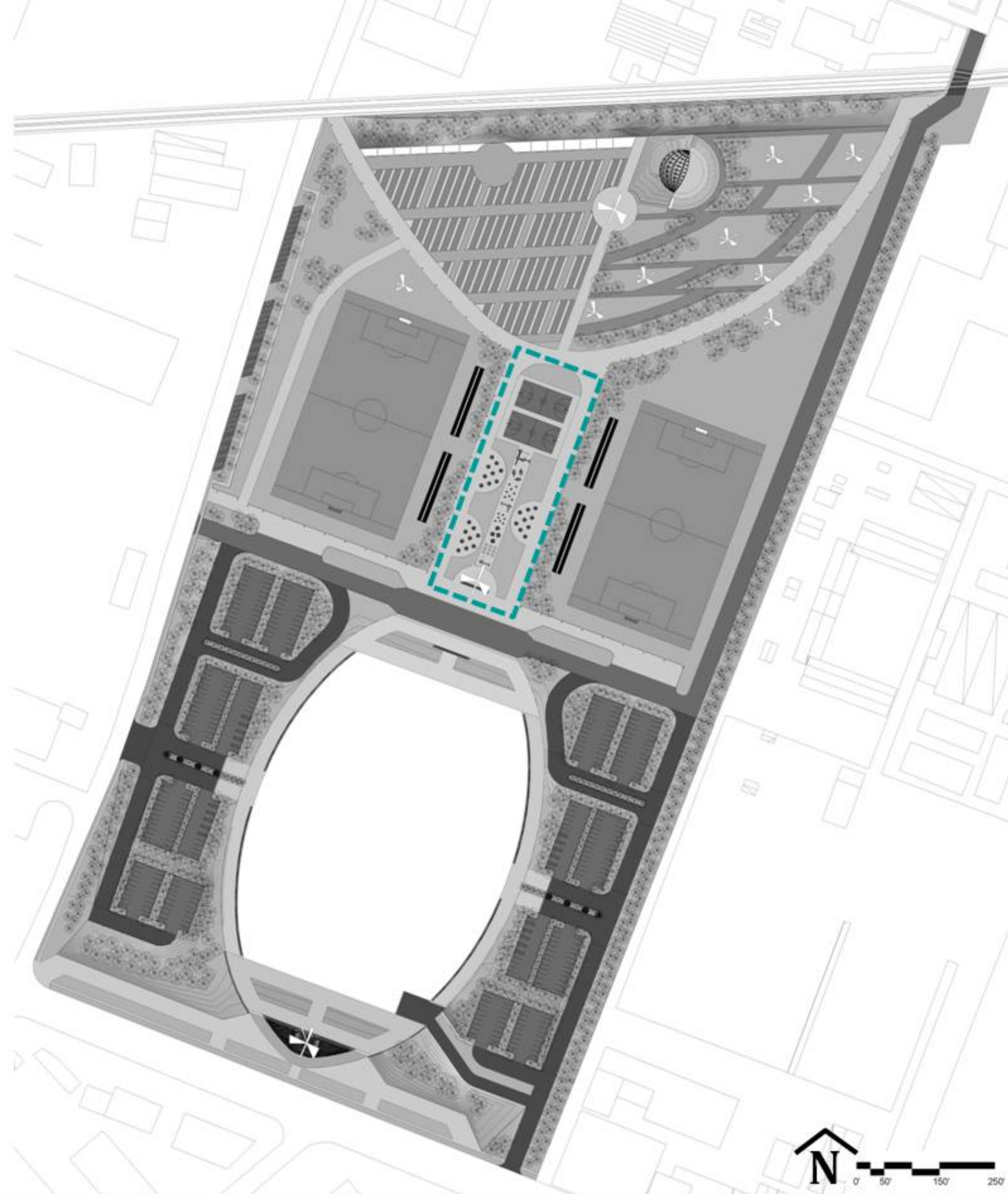
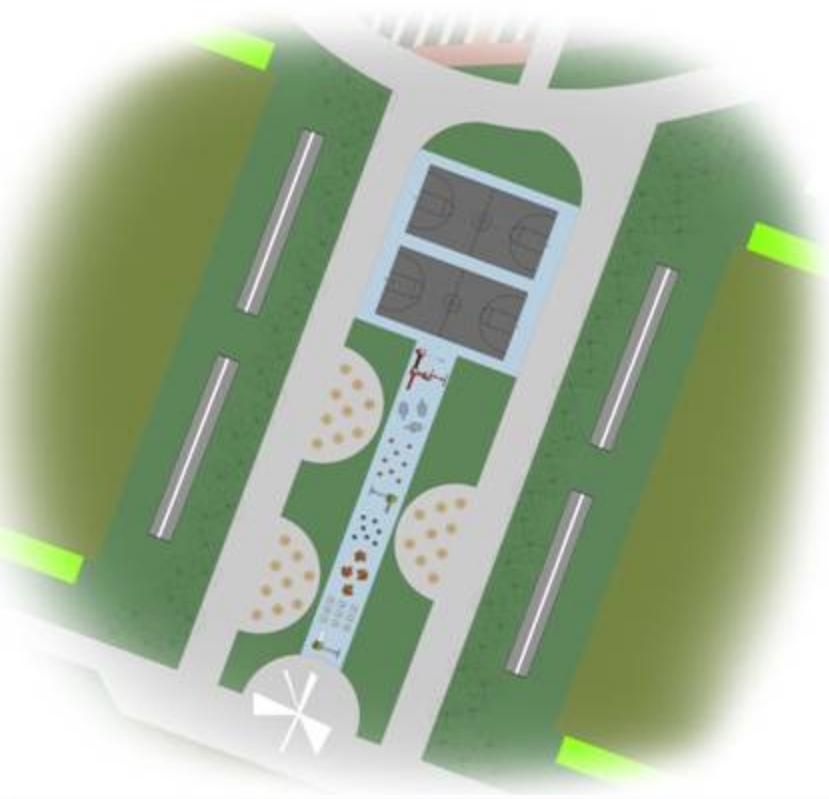
SITE PLAN - SPACES



## PLAY EQUIPMENT:

### BY BIG TOYS

- 75% RECYCLED STEEL
- 100% RECYCLED PLASTIC



## SPACES

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SITE PLAN - SPACES

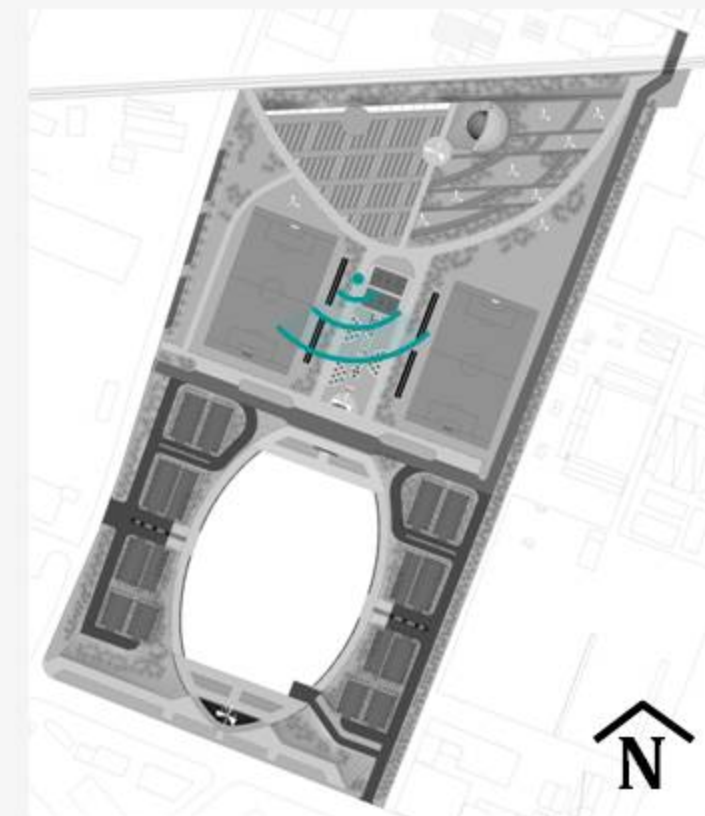


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## SPACES

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## LOCATION MAP



## SITE PLAN - SPACES



## SPACES

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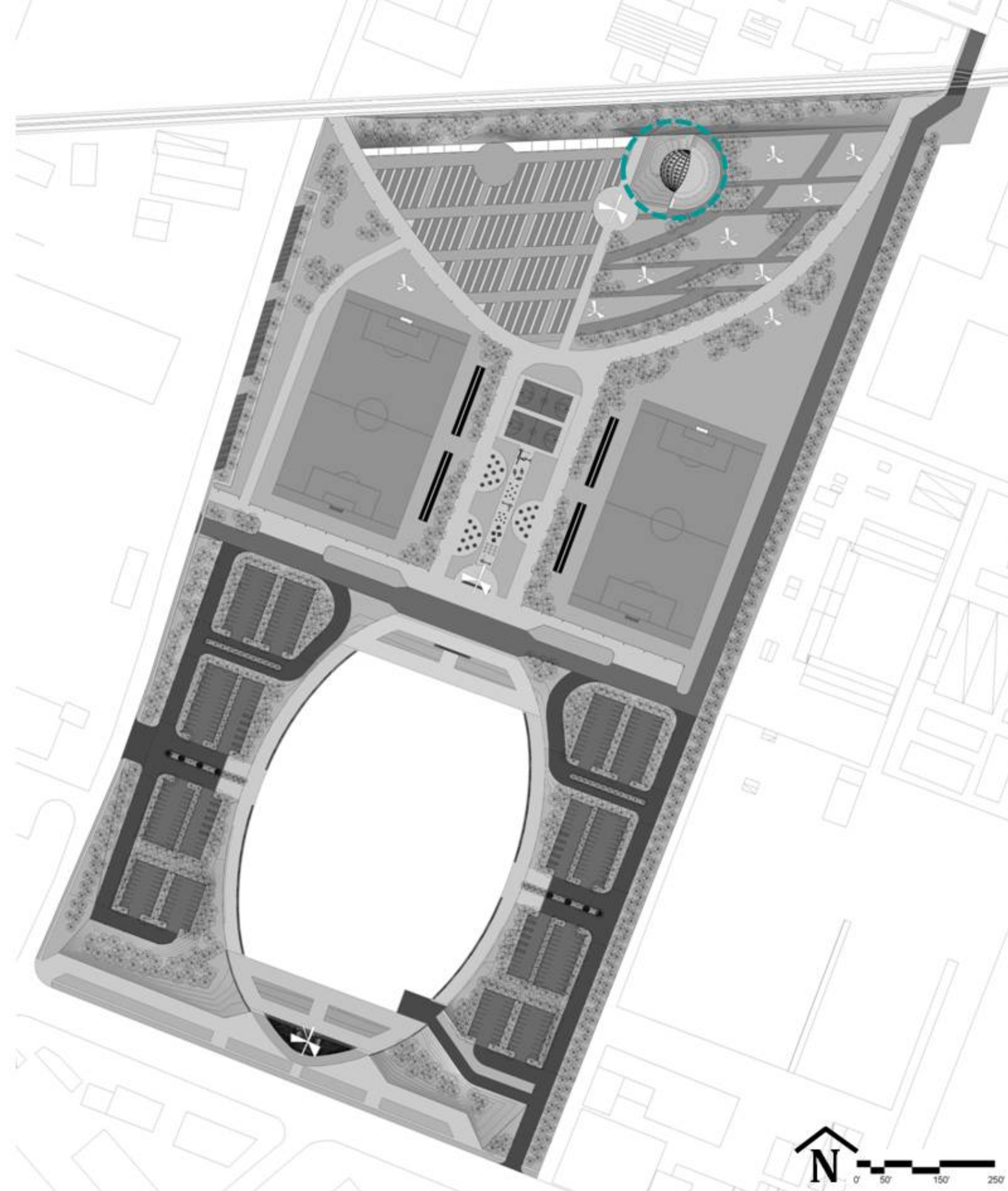
## LOCATION MAP



## SITE PLAN - SPACES





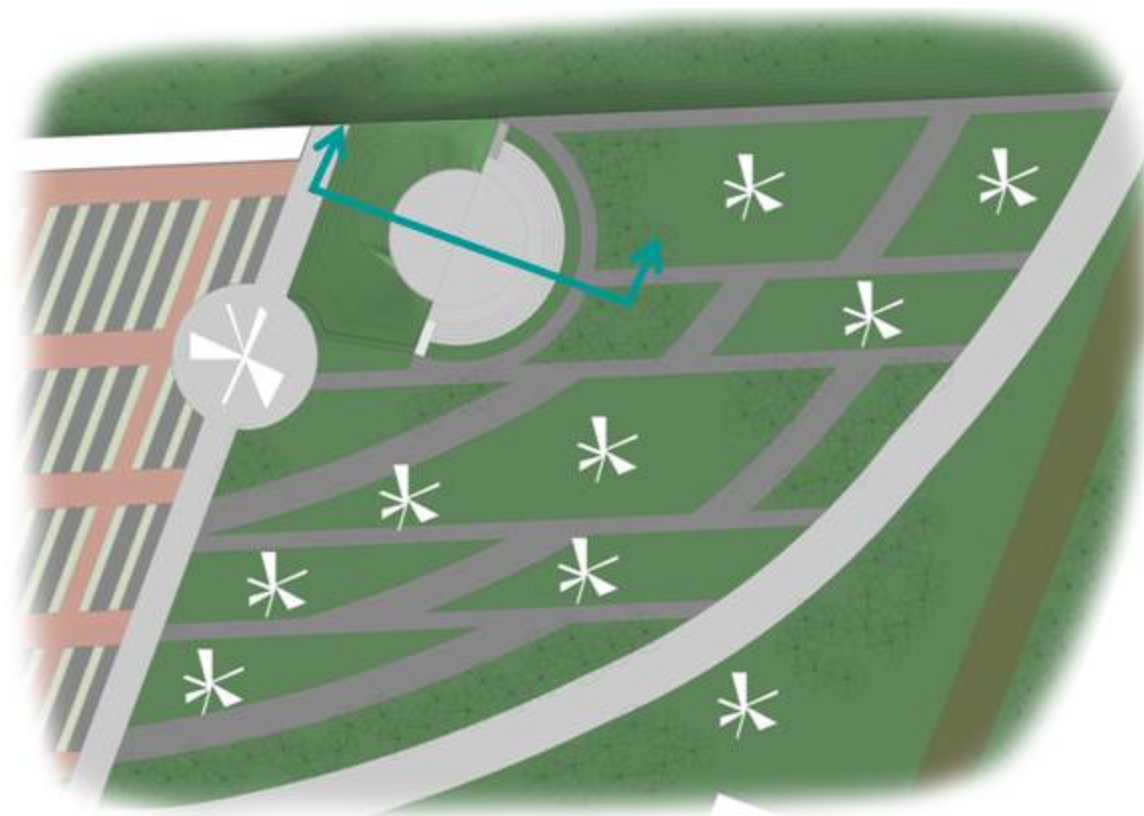


## SITE SPACES

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SITE PLAN - SPACES





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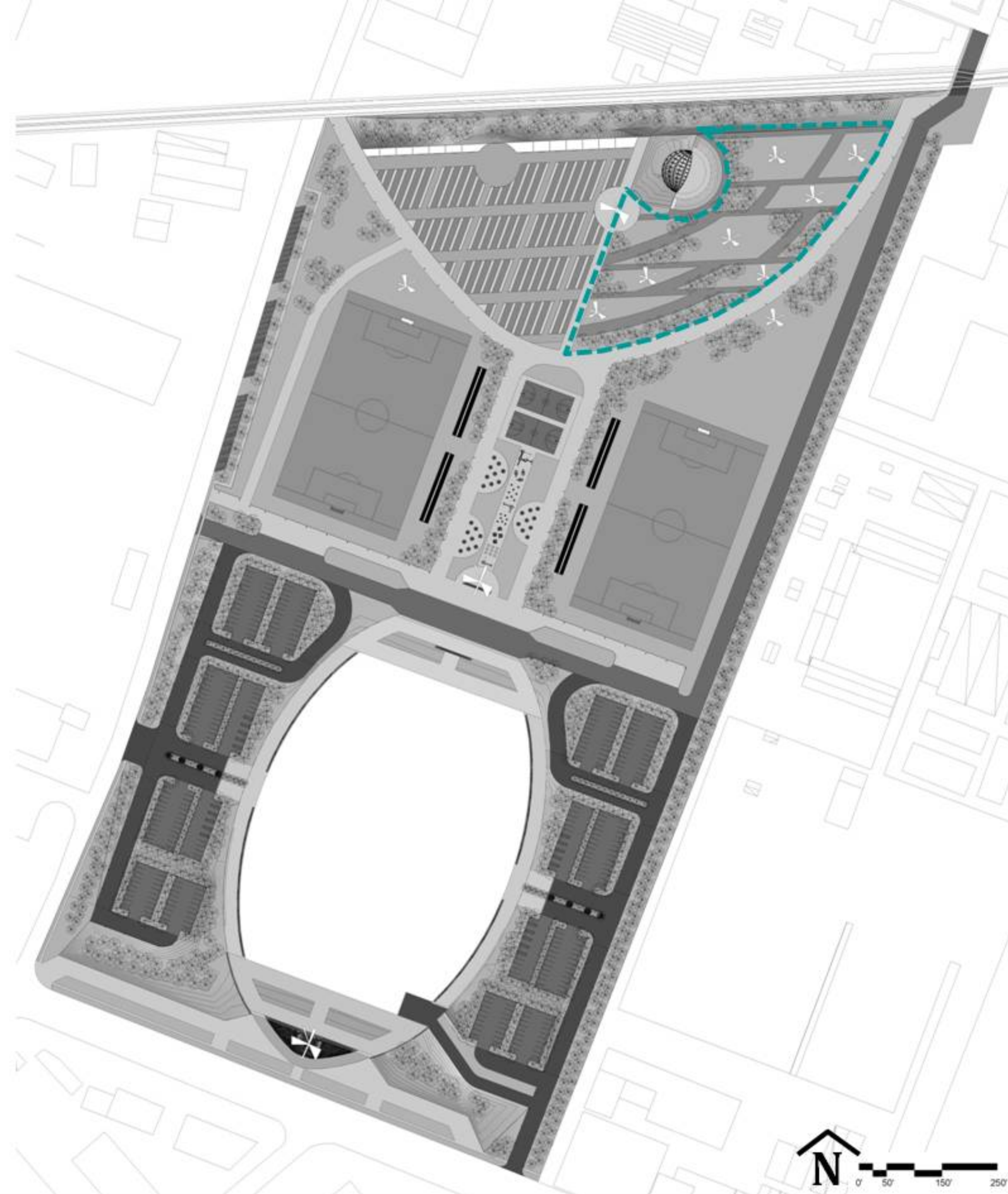


## SITE PLAN - SPACES





IMAGE SOURCE:  
<http://johnhenrysculptor.com/>

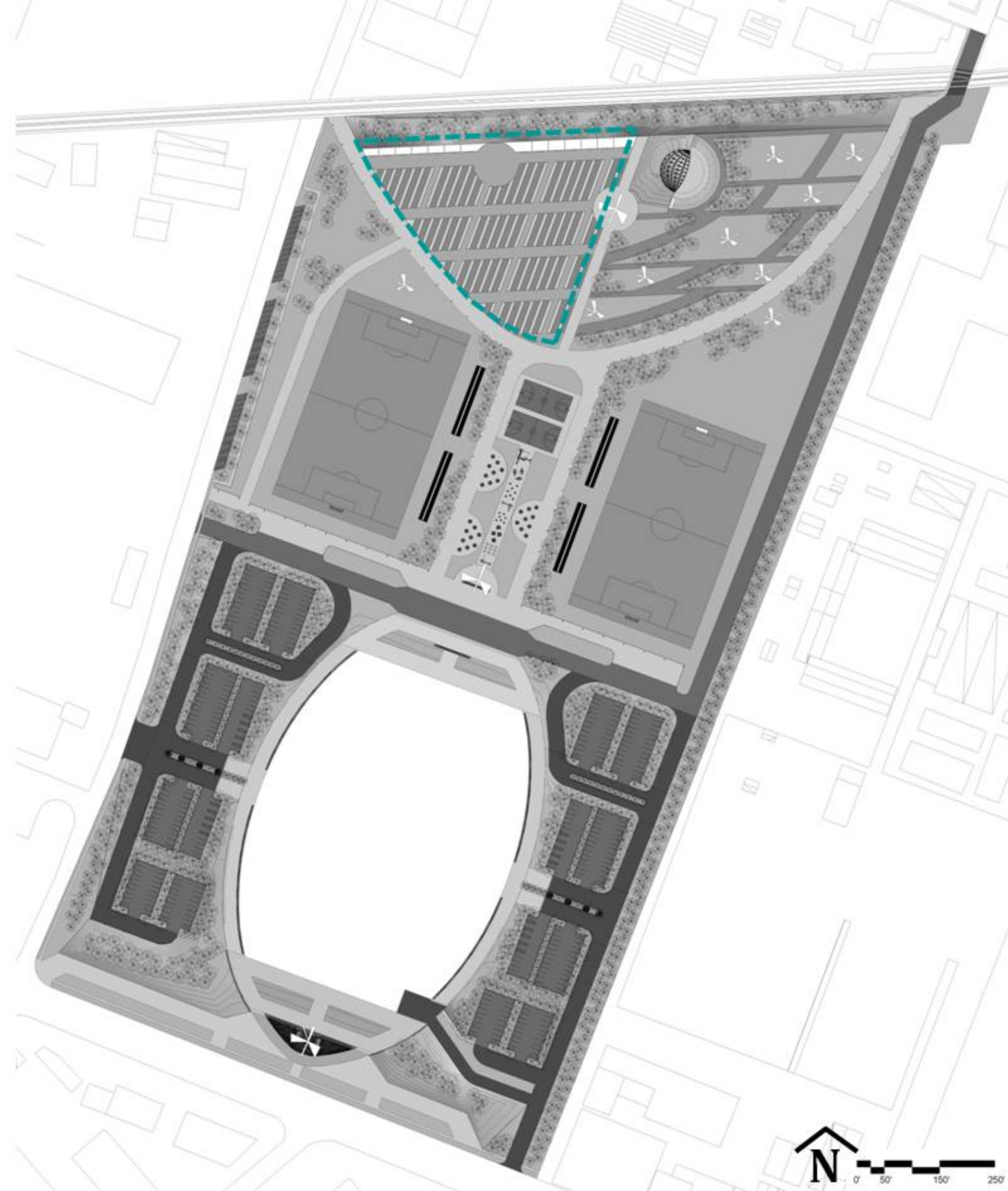


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SITE PLAN - SPACES





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SITE PLAN - SPACES



IMAGE SOURCE:  
<http://www.compuware.com/about/lafayette-greens/the-garden.html>

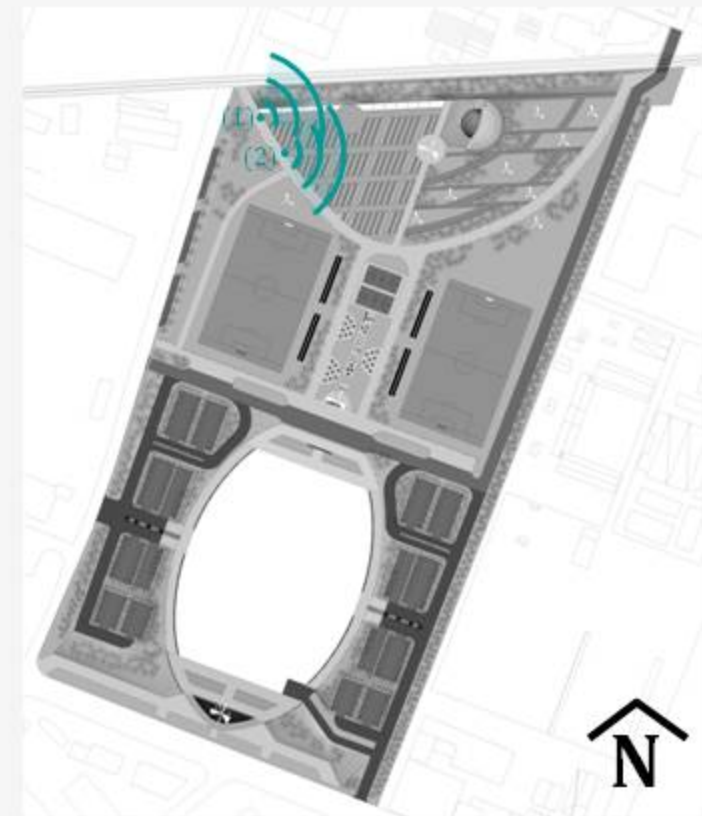




## SITE SPACES

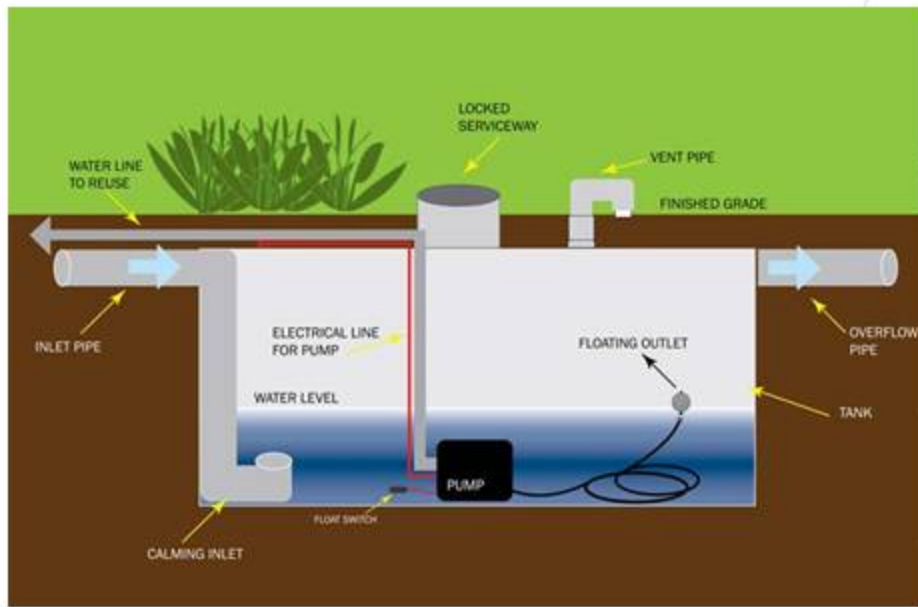
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  - **RAISED FLOWER/VEGETABLE BEDS**
  - **LEARNING CIRCLE**
  - **STORAGE**

## LOCATION MAP



## SITE PLAN - SPACES





SOURCE:  
<http://indytilth.org/Links/CisterSizing.pdf>



### RAINWATER HARVESTING

- 123,258 SQFT ROOF
- 4.5" AVERAGE RAINFALL
- 101,788 GALLONS OF POTENTIAL RAINWATER COLLECTION A MONTH

### STADIUM WATER USAGE

- 87,837 GALLONS/YR
- 7,320 GALLONS/MONTH

### TANKS

- (4) 2,000 GALLON TANKS
- SIZE: 13.5'x11.8"x2'
- LOCATED UNDER THE ELEVATED STADIUM

### COLLECTION POINTS

- GRATES AT THE BASE OF THE STRUCTURE AT GRADE

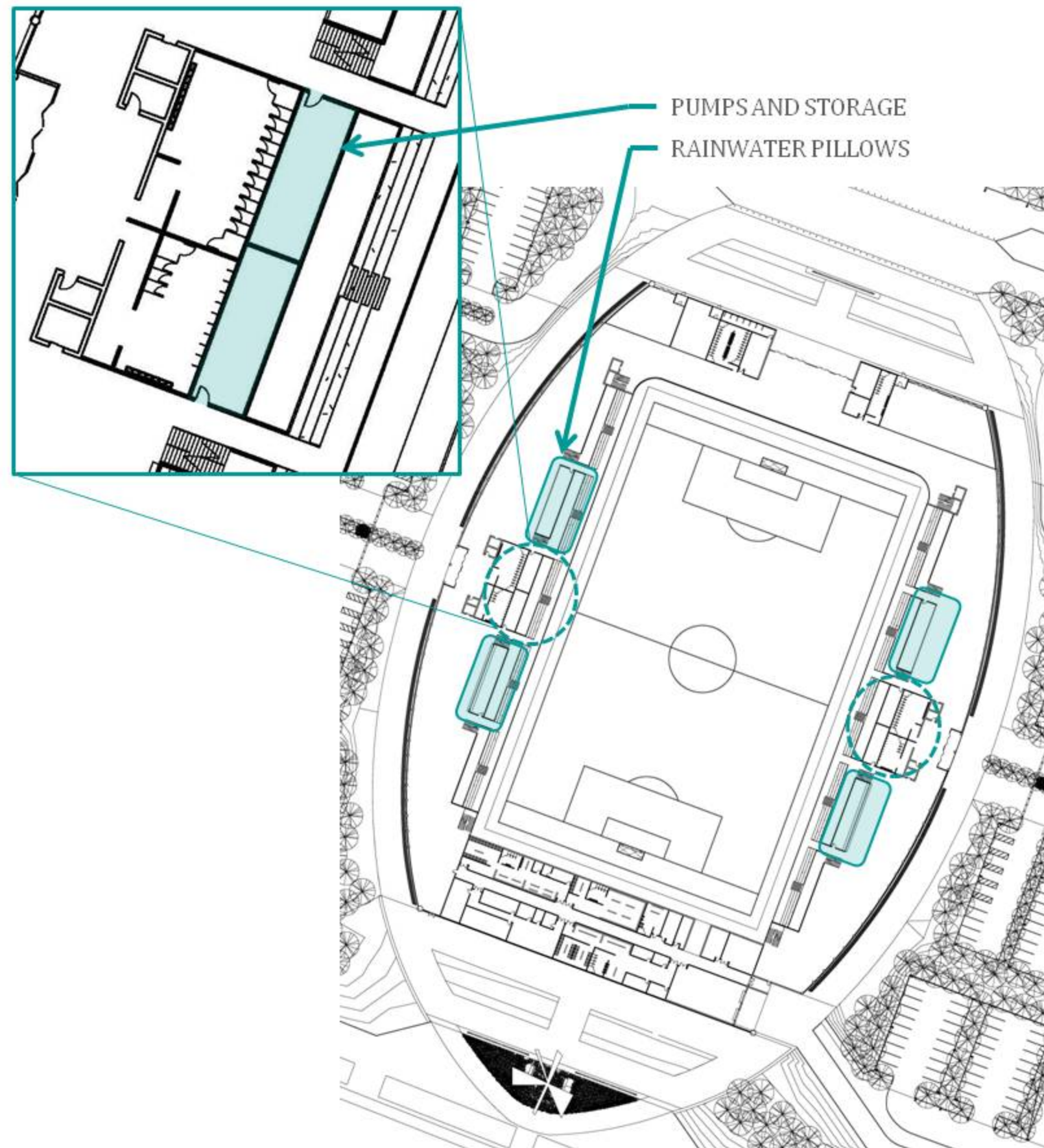
### UTILIZATION OF WATER

(INTERIOR/EXTERIOR)

- FIXTURES
- WASHING DOWN SEATING TIERS
- IRRIGATION/LANDSCAPE WATERING

SITE PLAN - INNOVATION





## RAINWATER HARVESTING

- 123,258 SQFT ROOF
- 4.5" AVERAGE RAINFALL
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## UTILIZATION OF WATER

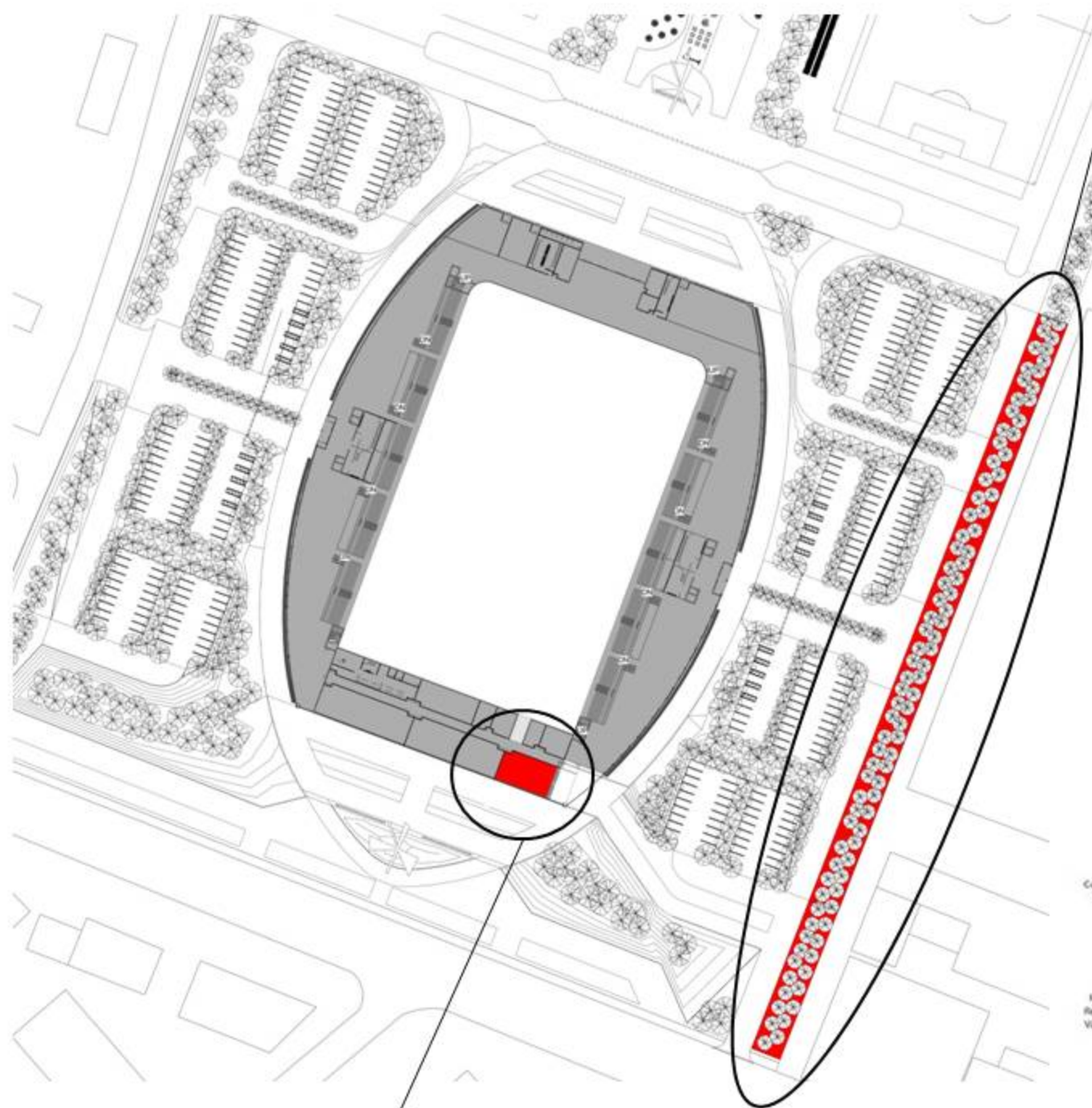
(INTERIOR/EXTERIOR)

- FIXTURES
- WASHING DOWN SEATING TIERS
- IRRIGATION/LANDSCAPE WATERING

WATERPILLOWS-INNOVATION

SOURCE:  
<http://www.rainwaterpillow.com/>

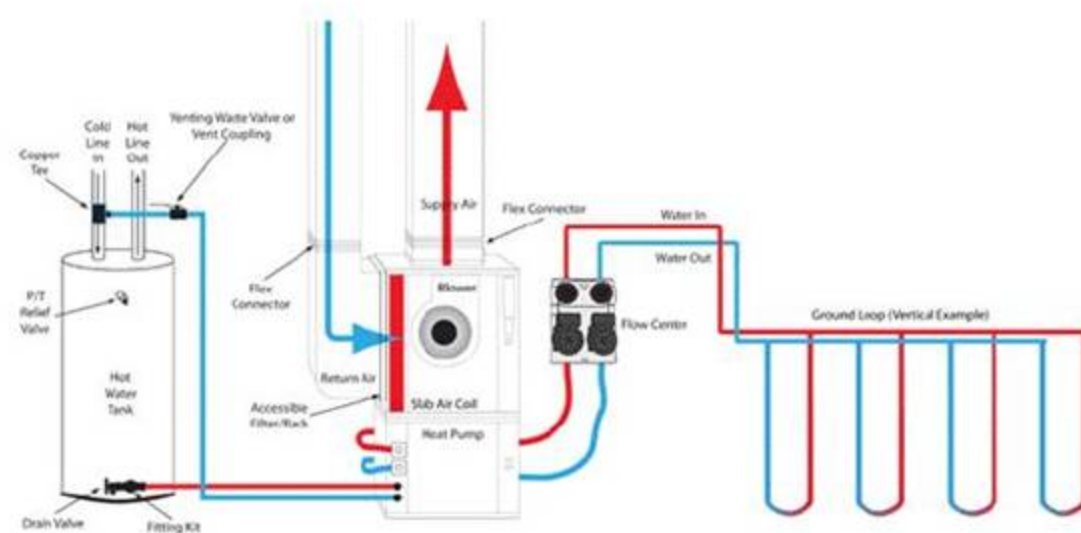




WELL LOCATIONS

EQUIPMENT LOCATION

## LOCATIONS



<http://haltonenvironment.com/wp-content/uploads/geothermal.jpg>

## HEAT GAIN CALCULATION

- Total Square Footage = 26,695 SqFt.
- Conversion to Tons = 26,695 SqFt.  
  - /500 =
  - 53.39 Tons
- Conversion to BTU = 53.39 Tons  
  - x 12,000 =
  - 640,680 Btu
- Heat Gain (People) = 300 people  
  - x 380Btu =
  - 114,000 Btu
- Heat Gain (Equipment) = 4,800 Btu
- Total Btu's = 640,680 Btu  
 + 114,000 Btu  
 + 4,800 Btu =  
 759,480 Btu's

## NUMBER OF WELLS CALCULATION

- Tonnage Conversion= 759,480 Btu  
  - \ 12,000 =
  - 63.29 Tons
- Required Bore Feet = 200 Bore Ft  
  - X 63.29 Tons=
  - 12,658 Bore Ft
- Required Wells = 12,658 Bore Ft  
  - /300 =
  - 43 Wells
- Space Required = 20' X 20'  
  - x 43 Wells
  - = 17,200 SqFt
- Supplied Space = 31,154 SqFt.

## GEO-THERMAL WELLS



### BOLLARDS:

ANNAPOLIS BY LANDSCAPE FORMS

- OFF GRID
- SOLAR
- LED'S



### PARKING LOT AND PATH FIXTURES:

20/20 AND GREENWAY BY SOL, INC

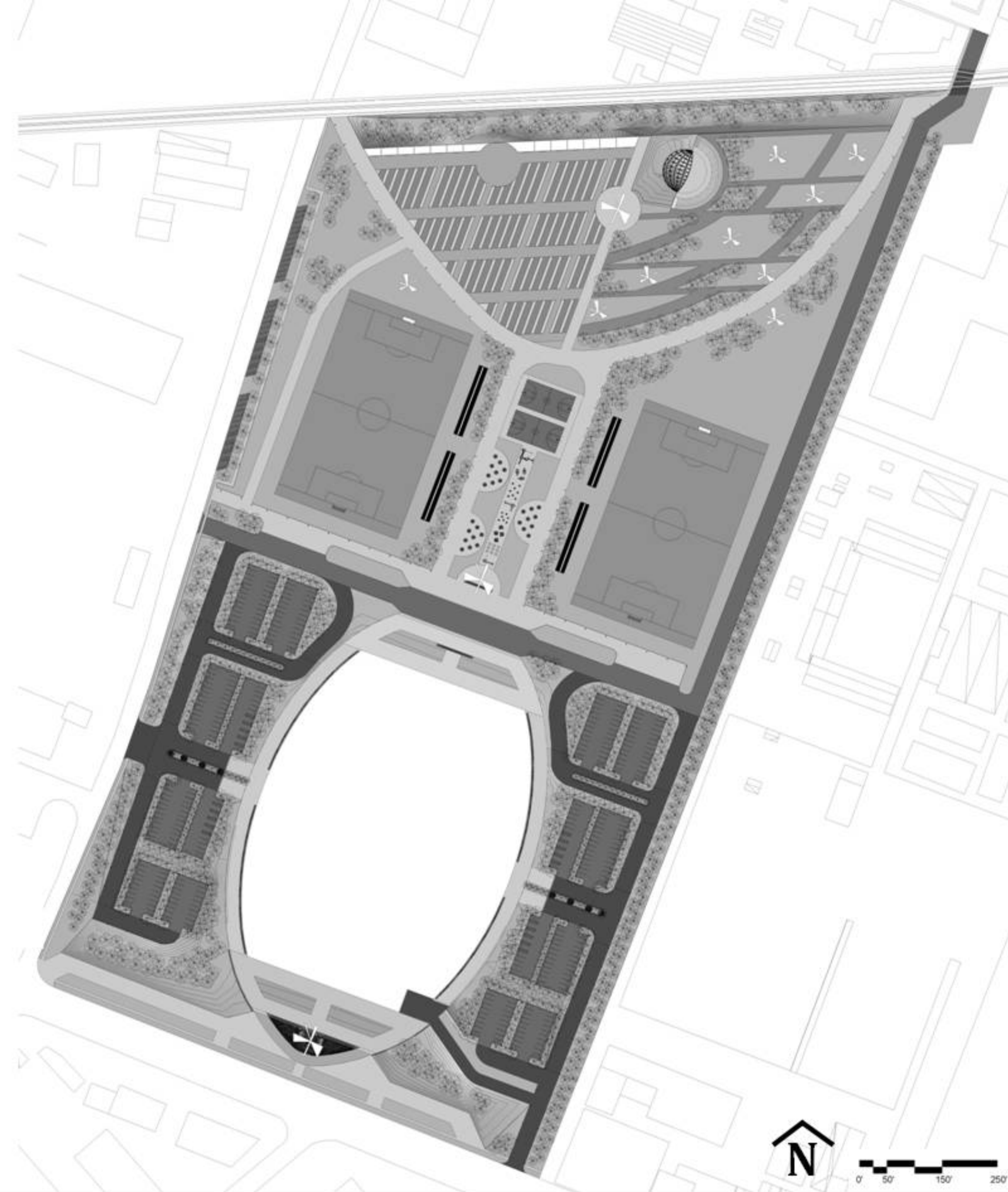
- OFF GRID
- SOLAR
- MAINTENCE FREE BATTERIES
- LED'S



SOURCE:  
<http://indytilth.org/Links/CisterSizing.pdf>

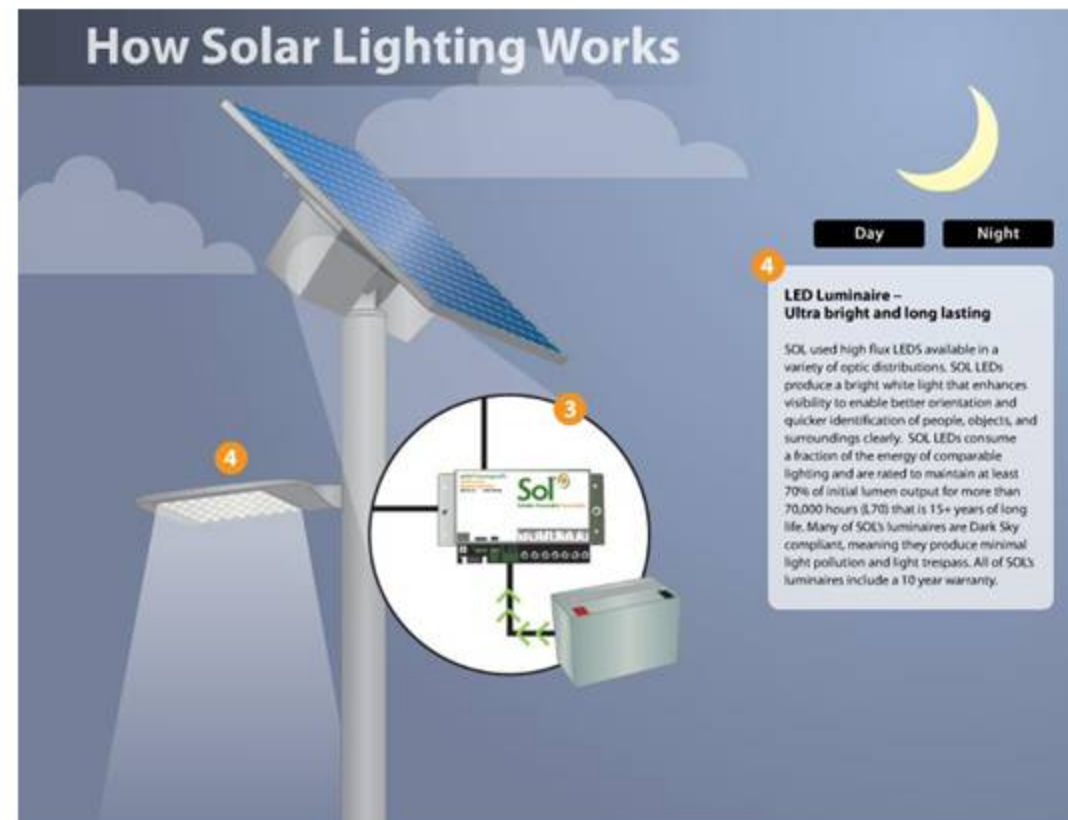
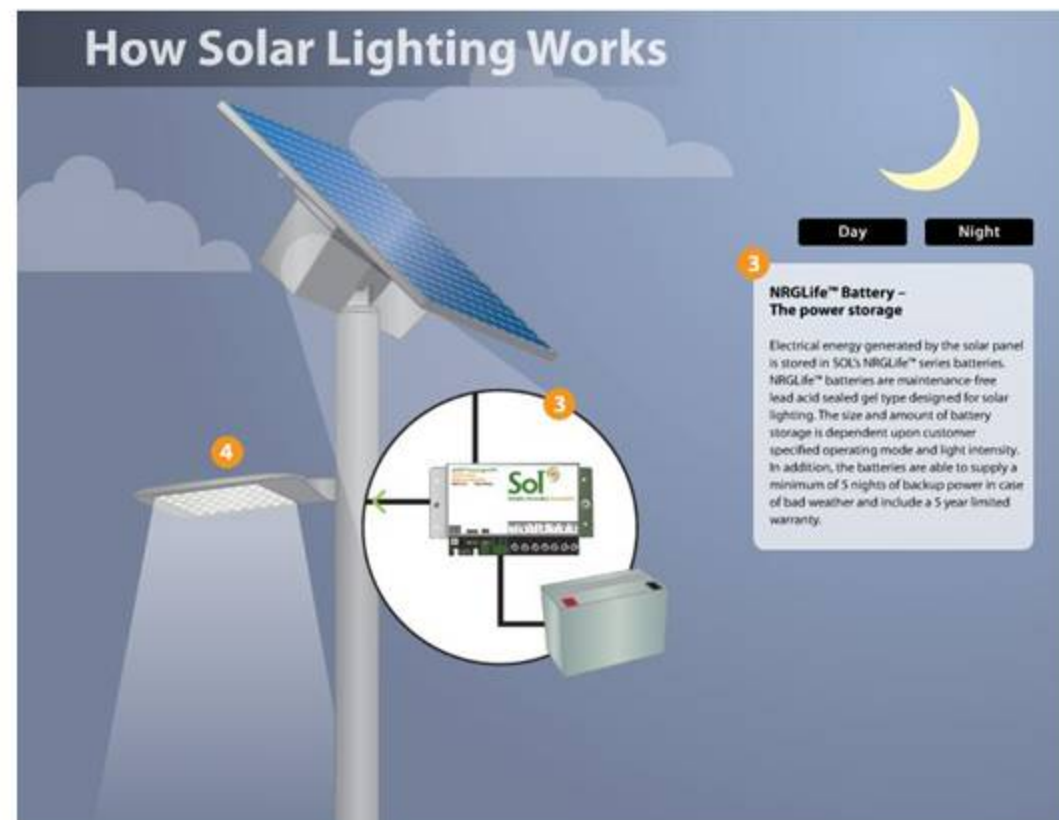
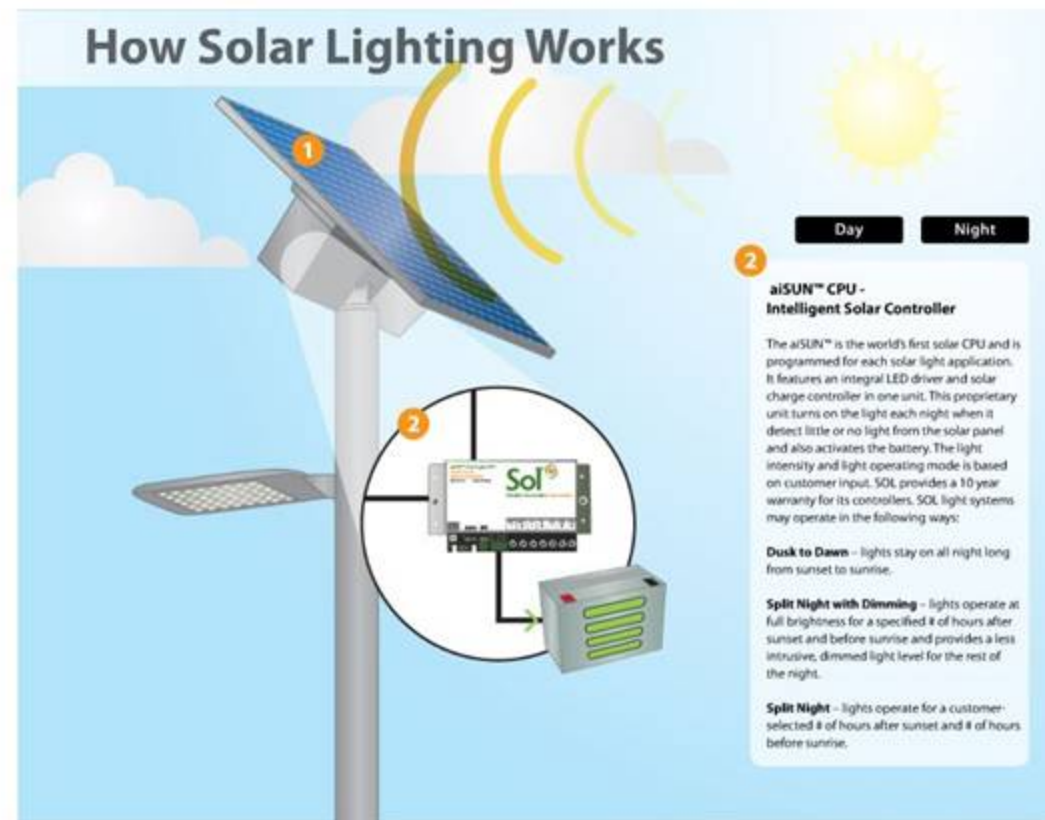
### SITE LIGHTING

- PARKING LOT LIGHTING
- PATH AND WALKWAYS LIGHTING
- SAFETY BOLLARDS



SITE PLAN - LIGHTING





SOURCE:  
<http://www.solarlighting.com>

## SITE LIGHTING

- PARKING LOT LIGHTING
- PATH AND WALKWAYS LIGHTING
- SAFETY BOLLARDS

SITE PLAN - LIGHTING



PARKING LOT LIGHTING - SAVINGS

Your Results			
On-Grid Lighting		Solar Lighting with Sol	
Material	\$13,900	Material	\$30,000
Installation*	\$36,150	Installation	\$1,400
Utility Charges**	\$49	Utility Charges	\$0
Total Cost	\$50,050	Total Cost:	\$31,400
Benefit of Going Solar**		\$18,650	
CO <sub>2</sub> Saved (per year)†		62 lbs.	

PATH LIGHTING - SAVINGS

Your Results			
On-Grid Lighting		Solar Lighting with Sol	
Material	\$17,800	Material	\$60,000
Installation*	\$59,550	Installation	\$2,800
Utility Charges**	\$98	Utility Charges	\$0
Total Cost	\$77,350	Total Cost:	\$62,800
Benefit of Going Solar**		\$14,550	
CO <sub>2</sub> Saved (per year)†		125 lbs.	

SOURCE:  
<http://www.solarlighting.com>

SITE LIGHTING

- PARKING LOT LIGHTING
- PATH AND WALKWAYS LIGHTING
- SAFETY BOLLARDS

SITE PLAN - LIGHTING



### LEED POTENTIAL:

- HEAT ISLAND EFFECT  
(CREDIT 7.1/SS CREDIT 7.1)
- RECYCLED CONTENT  
(MR CREDIT 4.1, 4.2)
- REGIONAL MATERIALS  
(MR CREDIT 5.1, 5.2)
- STORM WATER DESIGN  
(LEED SS CREDIT 6.1, 6.2)
- INNOVATION IN DESIGN  
(LEED ID CREDIT 1.1, 1.4)

### KEY OF SITE MATERIALS:

- GRAVEL
- RUBBER
- BRICK PAVERS
- GRASS PAVERS
- POROUS ASPHALT
- PERVIOUS CONCRETE

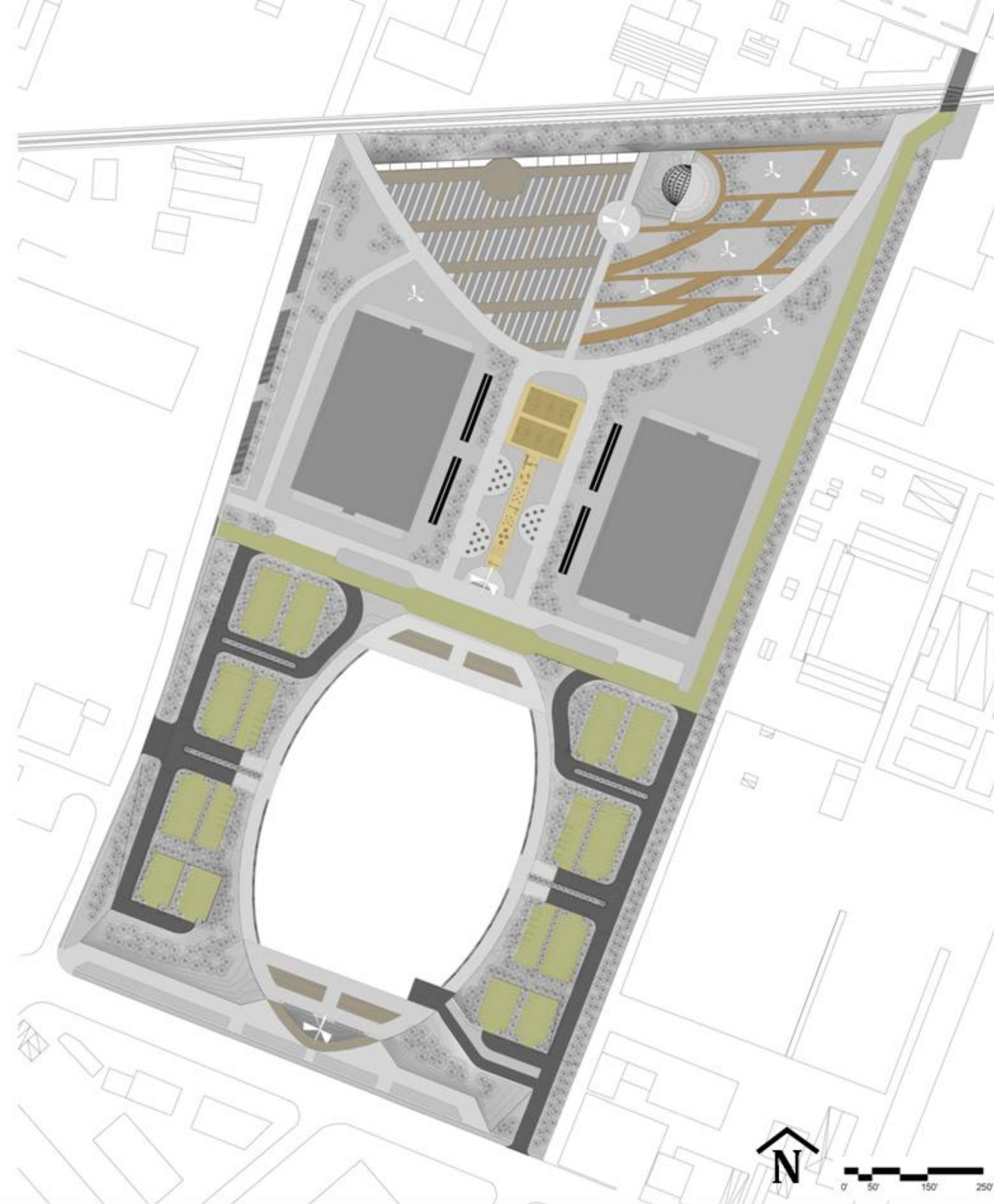
### SITE MATERIALS

#### PERVIOUS/PERMEABLE SURFACES

- GRASS PAVERS
- BRICK PAVERS
- PERVIOUS CONCRETE
- POROUS ASPHALT
- RUBBER
- GRAVEL

#### FUNCTION

- FILTERS SURFACE WATER BACK INTO SUB-SOIL

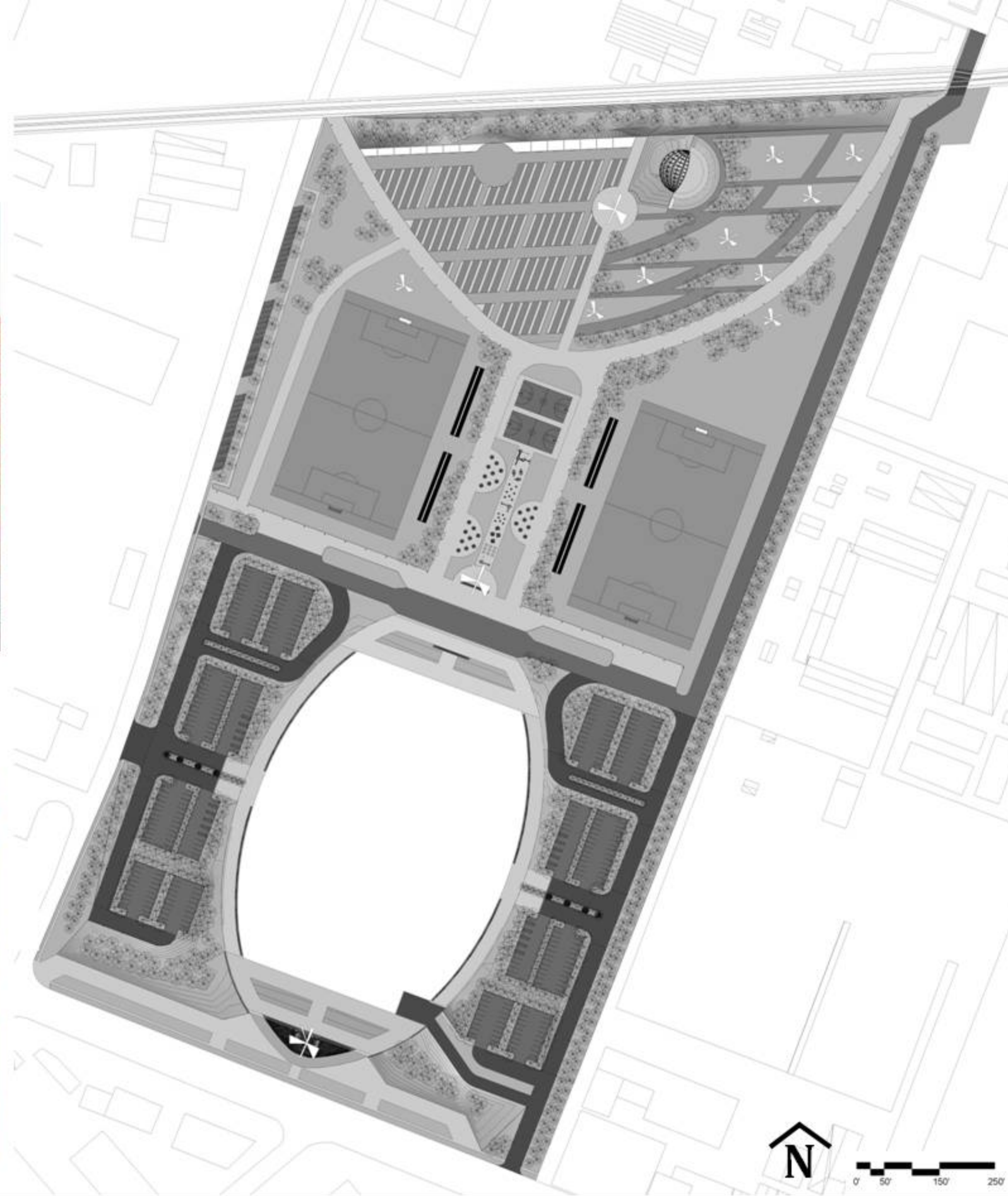


SITE PLAN - MATERIALS





SOURCE:  
<http://www.tva.gov>



## NATIVE PLANTS

### SCREENING – EAST / NORTH SIDE

- VIRGINIA PINE
- LOBLOLLY PINE
- EASTERN REDCEDAR

### COMMON SITE TREES

- WHITE OAK
- TULIP POPLAR (FLOWERING)
- RED MAPLE
- SERVICEBERRY (EARLY BLOOM)
- SASSAFRASS
- REDBUD
- FLOWERING DOGWOOD

### FLOWERING

- TALL IRONWOOD
- PURPLE CONEFLOWER
- FRINGE TREE
- BUTTERFLY WEED

## SITE PLAN - LANDSCAPING



LEGEND

- CIRCULATION

SEATING TIERS

SUITES

ADMINISTRATION

RESTROOMS
- CONCESSIONS

TEAM FACILITIES

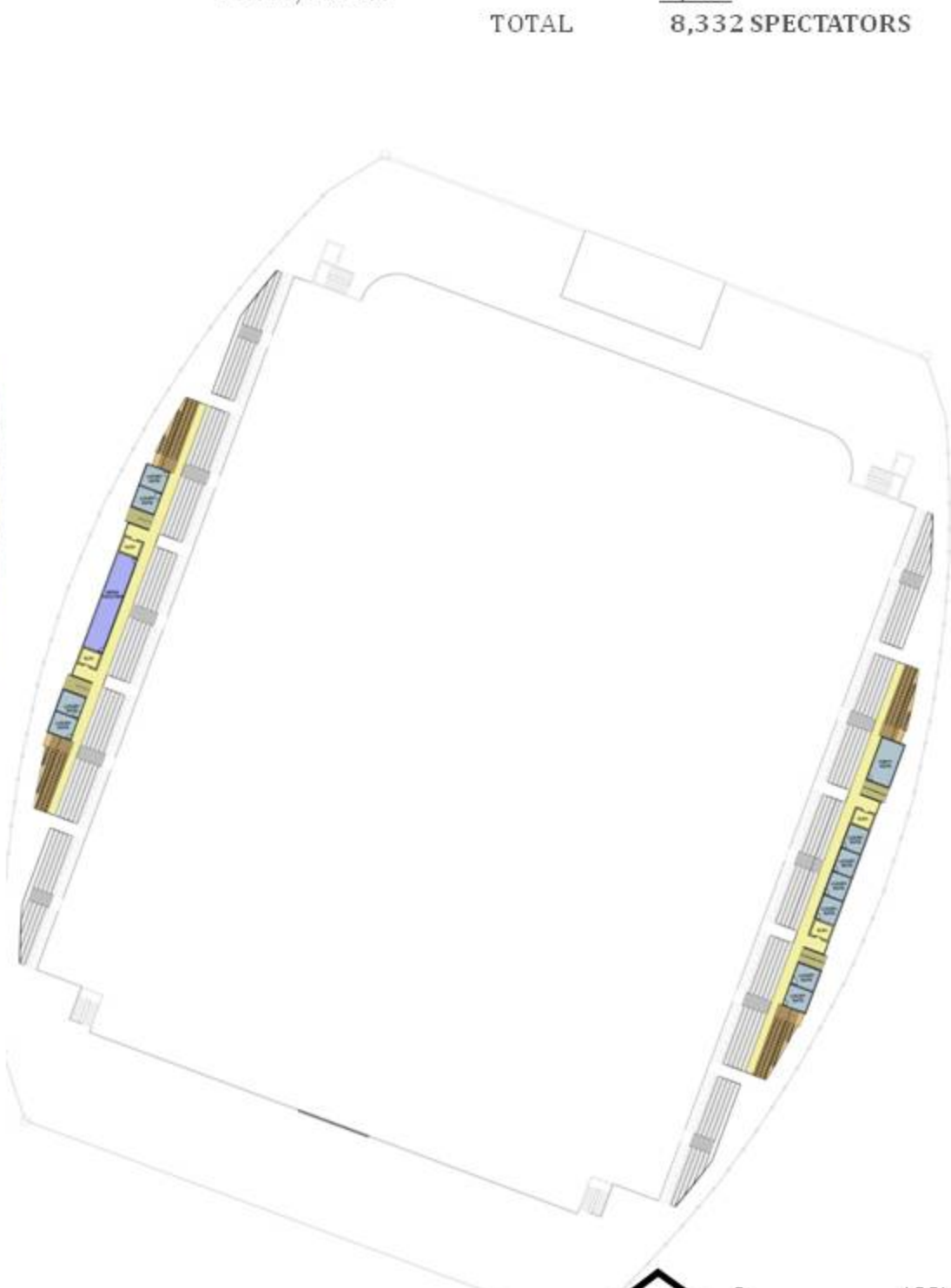
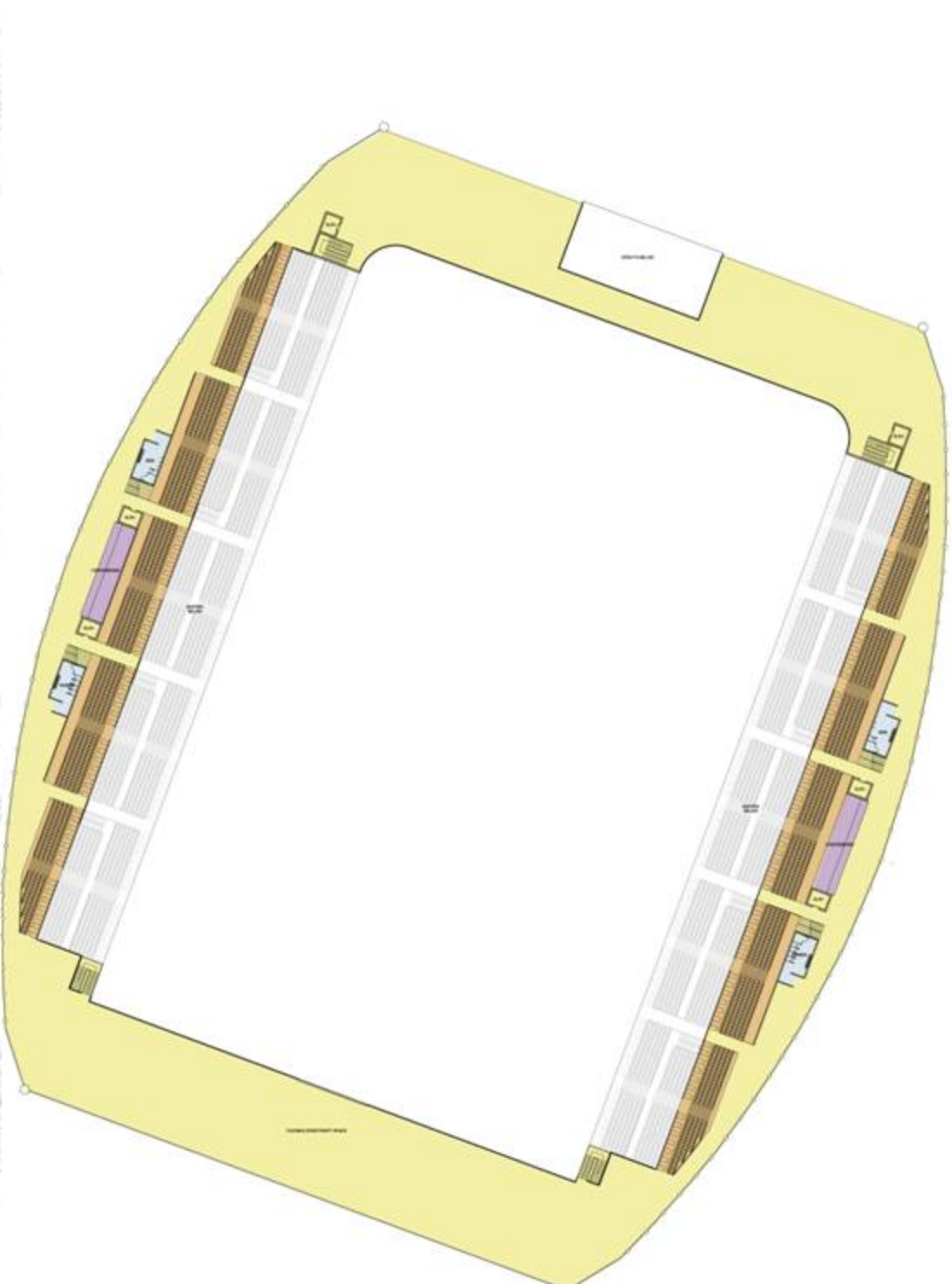
MEDIA FACILITIES

BUILD-OUT AREAS

OPERATIONS

SPECTATOR COUNT:

SEATING BOWL	6,608
ACCESSIBLE SEATING	320
SUITE SEATING	404
PATIO/EVENT	1,000
TOTAL	8,332 SPECTATORS



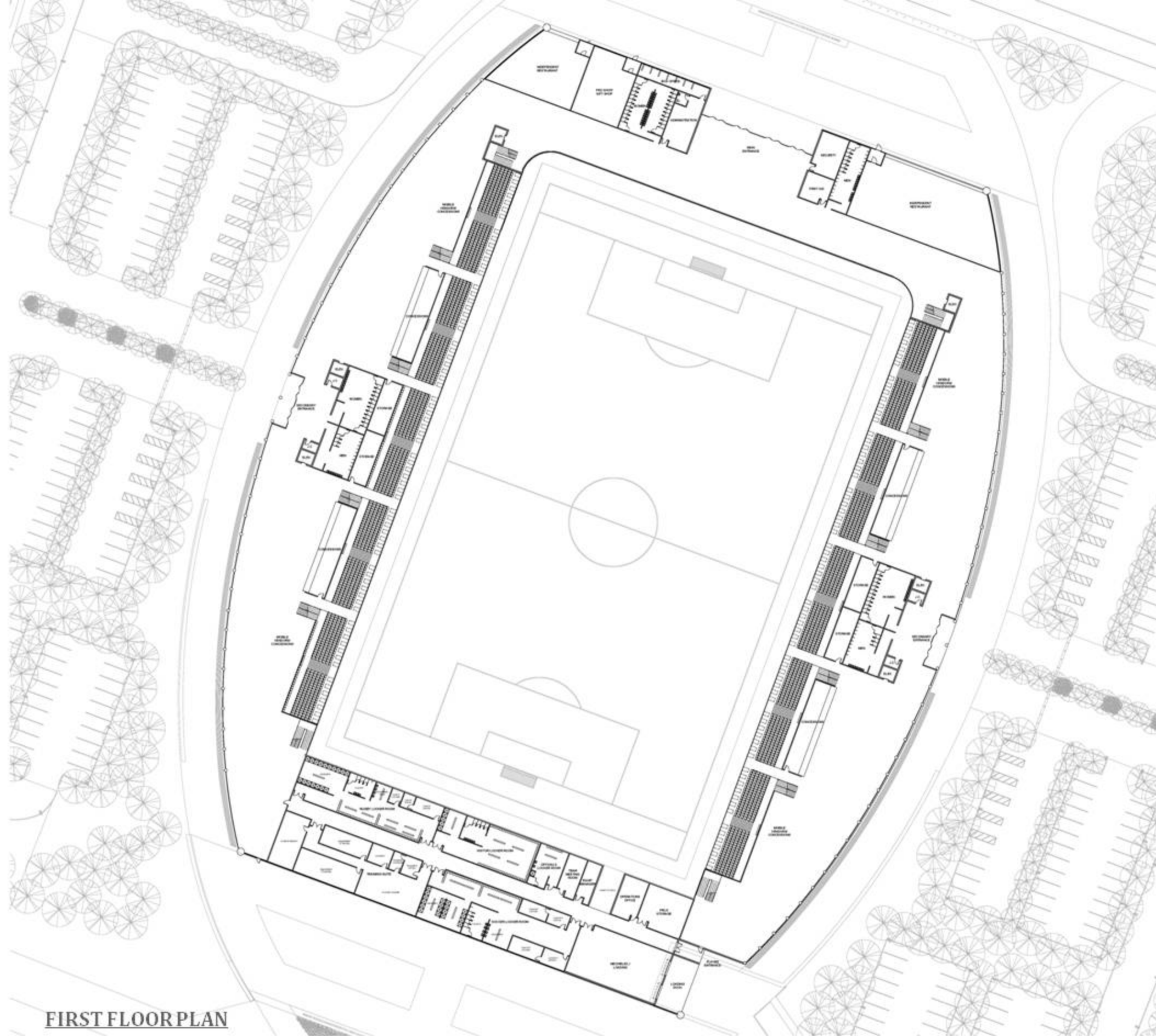
FIRST FLOOR PLAN

SECOND FLOOR PLAN

THIRD FLOOR PLAN

FLOOR PLANS





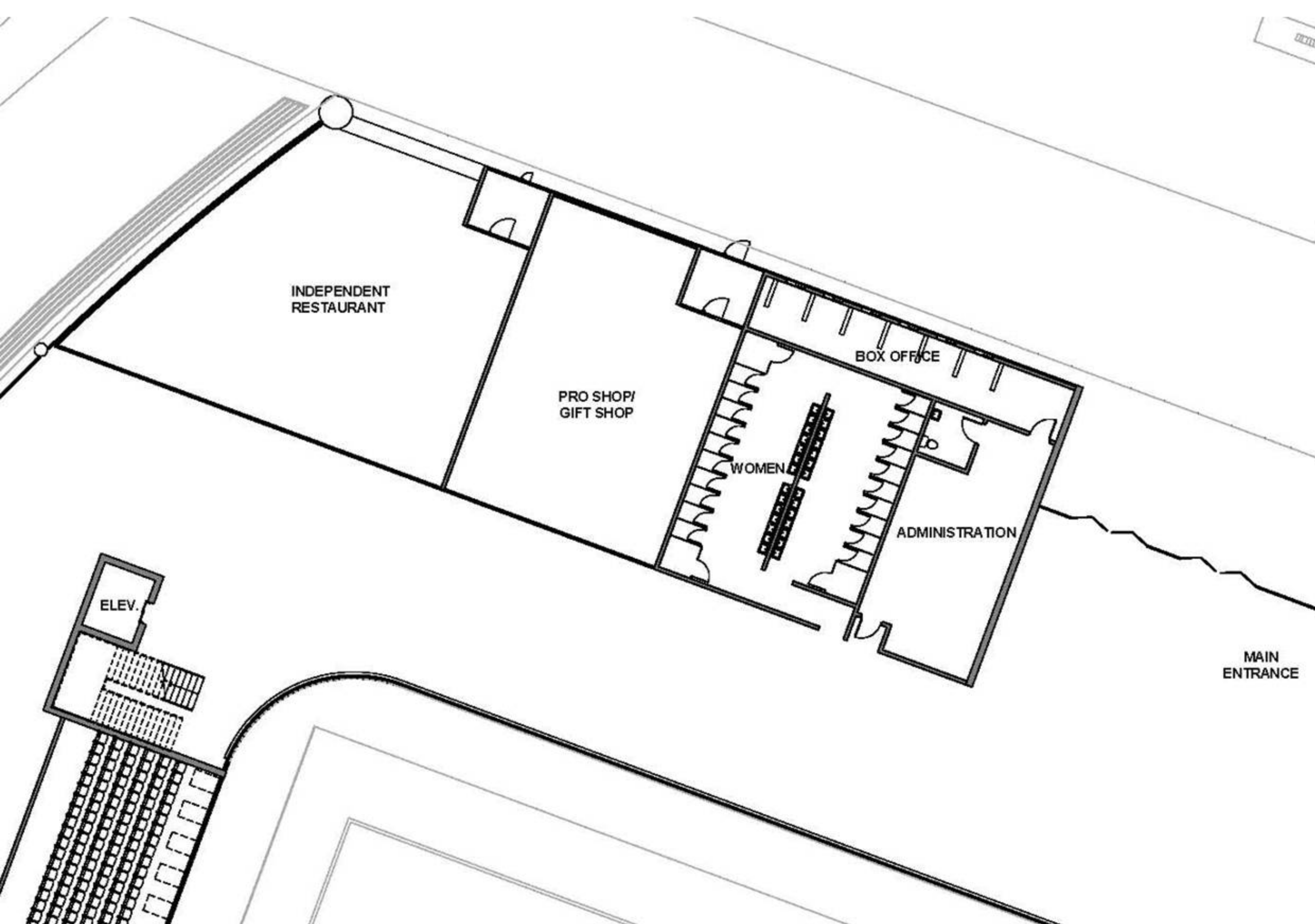
## FEATURES:

- Large Main Entrance and two Secondary Entrances
- Symmetrical form
- First Aid and Security near Main Entrance
- Box Office parallel to pedestrian entry
- Dedicated player entrance
- Team facilities adjacent to field
- Accessible seating area provided at base of seating tier
- Centrally located restrooms at Main and Secondary Entrances
- Direct view to the playing field from the entrance and concourse
- Pro Shop / Gift Shop provided
- Two restaurant build-out spaces with walk-up access
- Both permanent and flexible concessions spaces
- Service drive and loading dock located near Lee Hwy. entrance

FIRST FLOOR PLAN



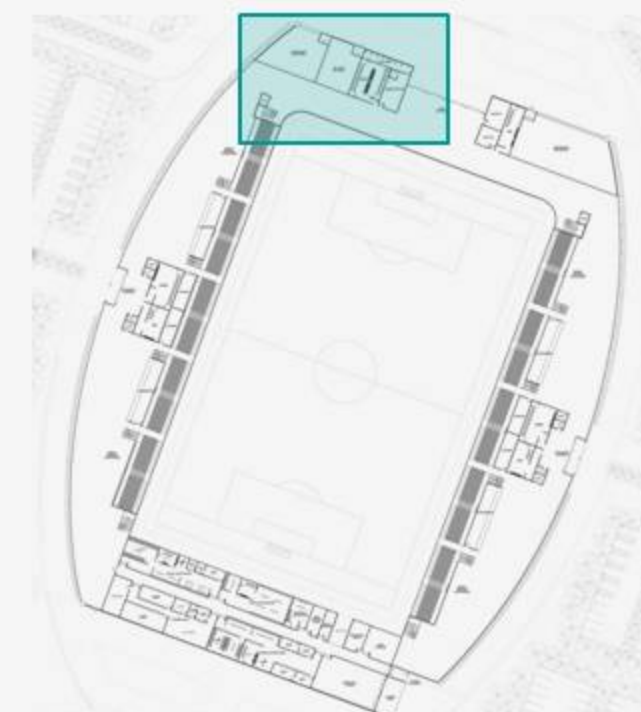




PARTIAL FIRST FLOOR PLAN

#### FEATURES:

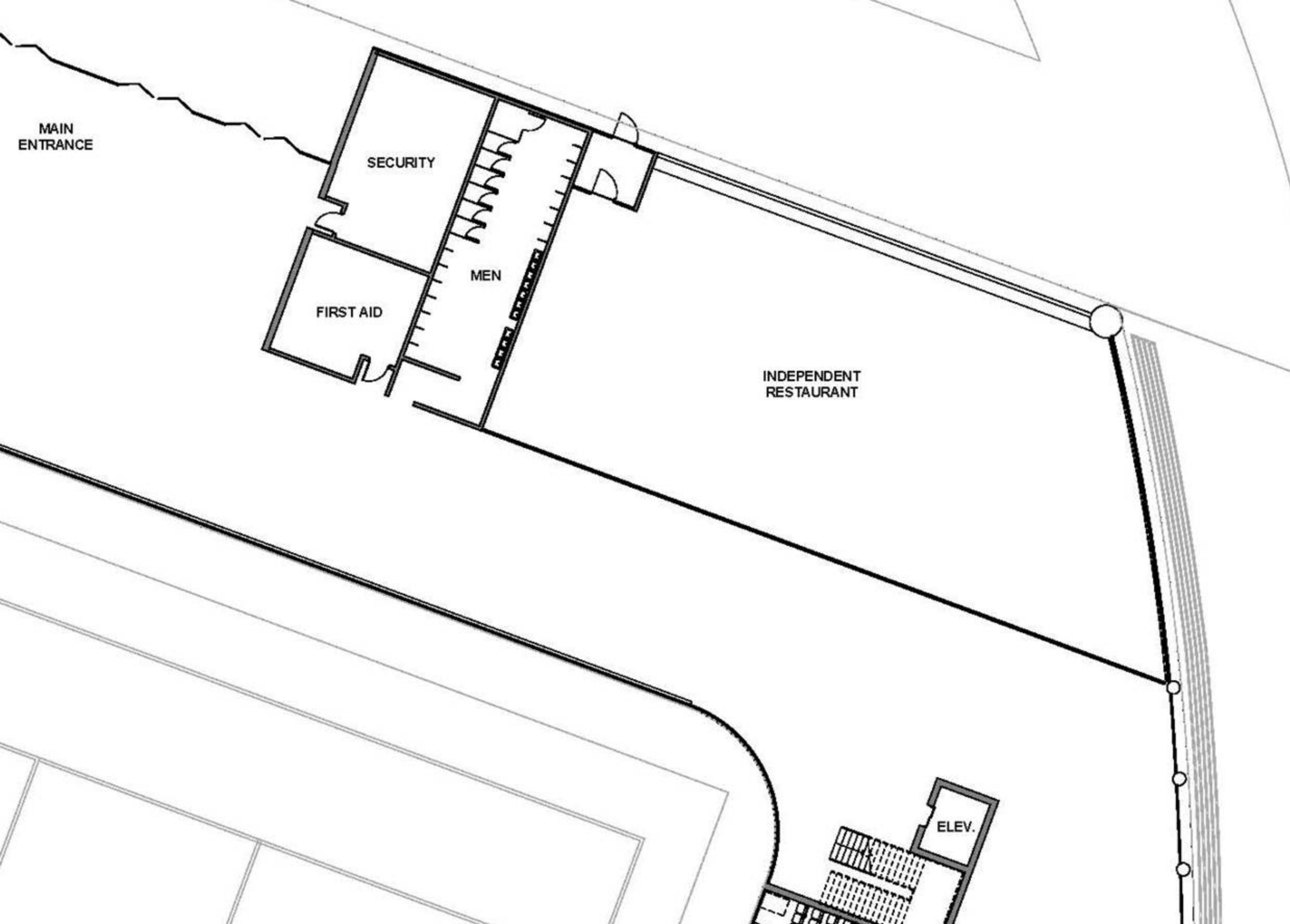
- Large Main Entrance at North end of building incorporates operable mesh panels
- Administration is adjacent to entry and has a dedicated restroom
- Box Office parallel to pedestrian entry
- Centrally located restrooms at Main Entrance
- Direct view to the playing field from the entrance and concourse
- Pro Shop/ Gift Shop provided
- Two restaurant build-out spaces with walk-up access



FIRST FLOOR







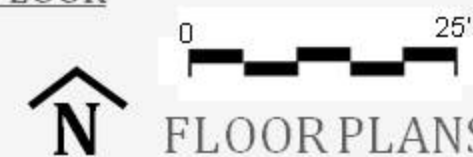
PARTIAL FIRST FLOOR PLAN

#### FEATURES:

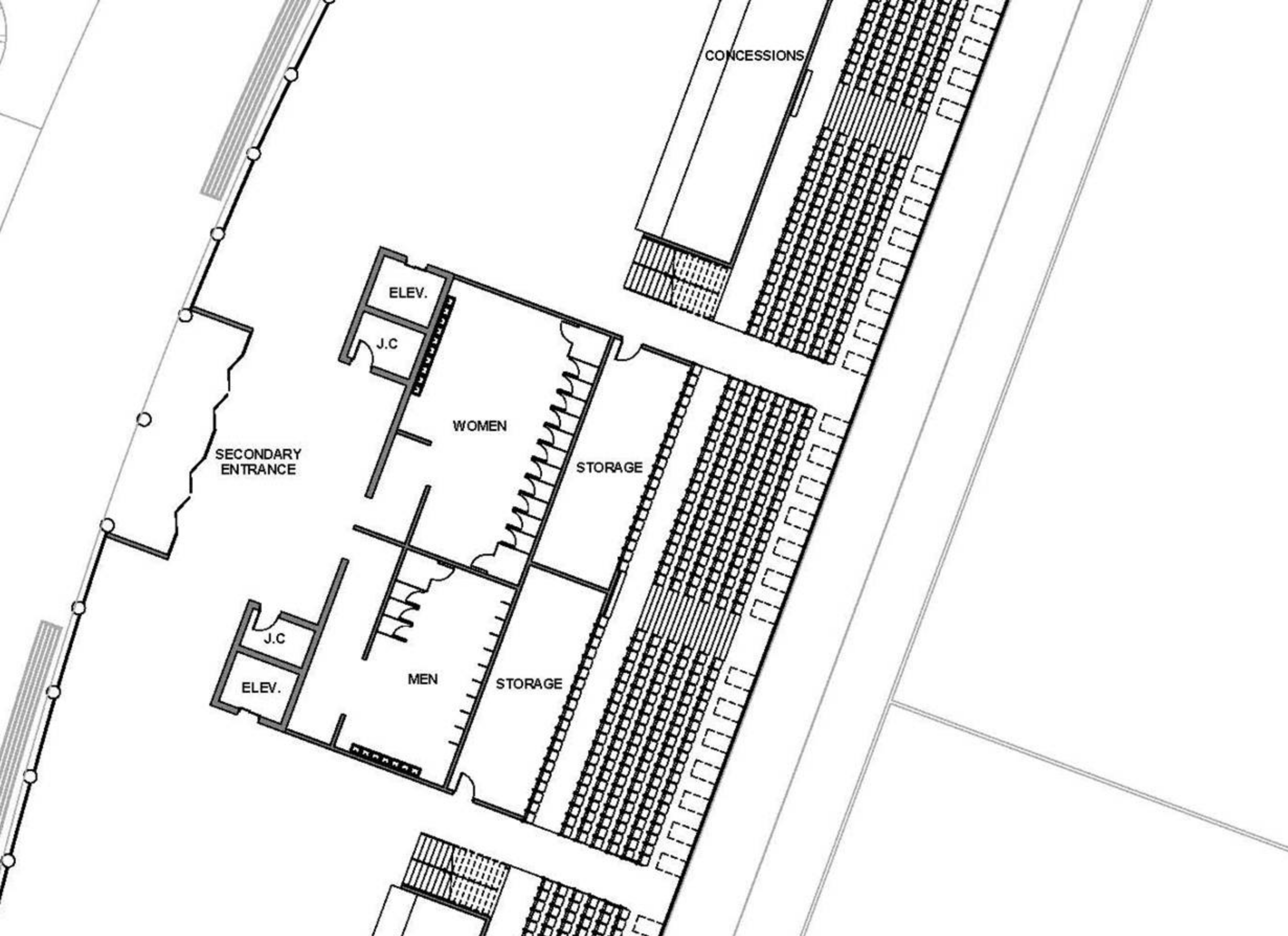
- Large Main Entrance at North end of building incorporates operable mesh panels
- First Aid and Security near Main Entrance
- Centrally located restrooms at Main Entrance
- Direct view to the playing field from the entrance and concourse
- Two restaurant build-out spaces with walk-up access



FIRST FLOOR



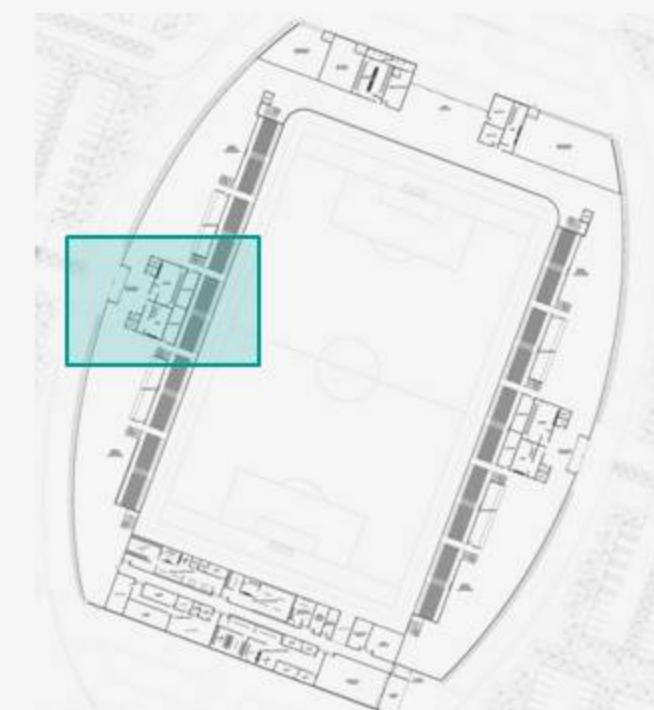




PARTIAL FIRST FLOOR PLAN

## FEATURES:

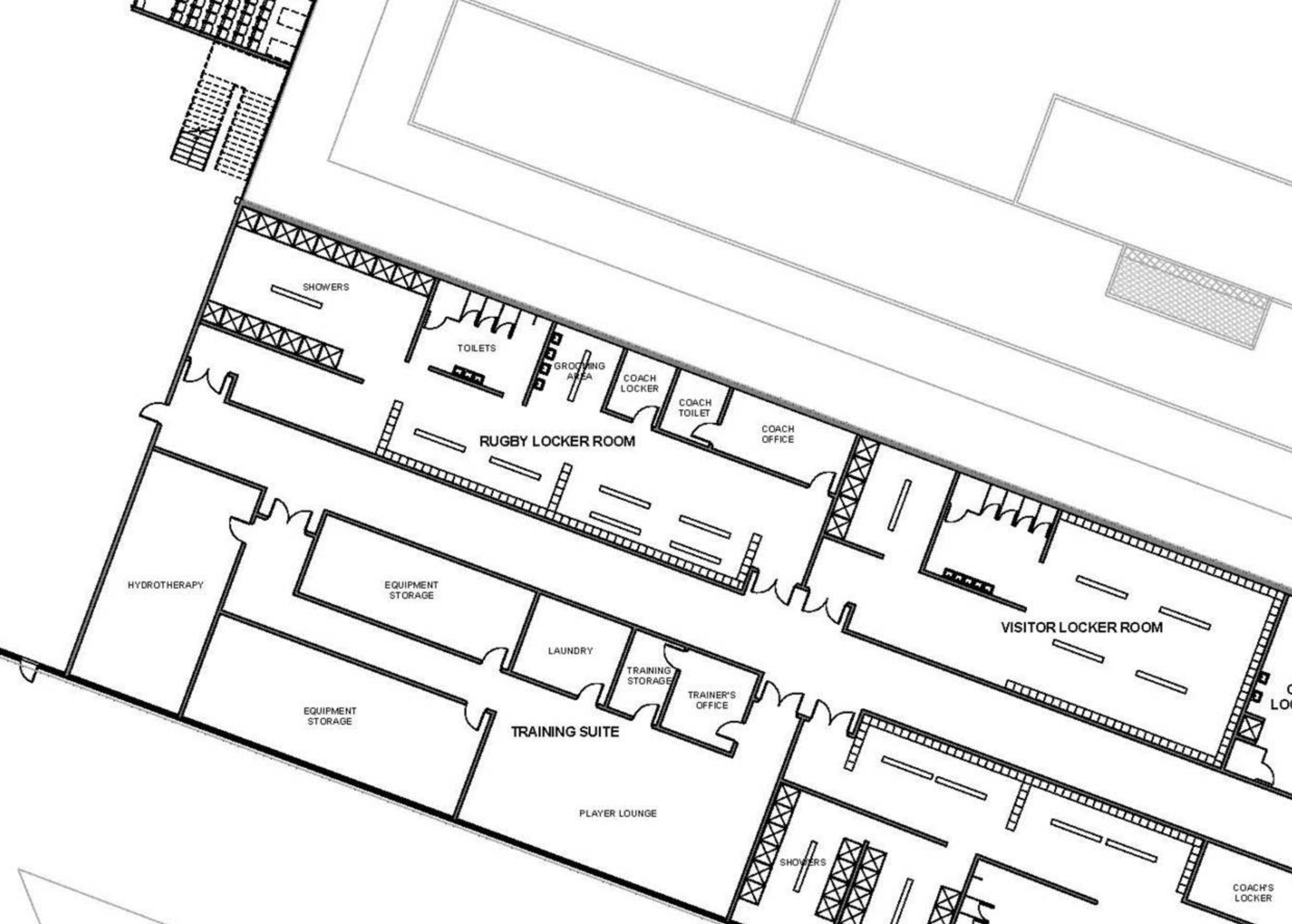
- Secondary Entrances incorporating operable mesh panels
- Accessible seating area provided at base of seating tier
- Centrally located restrooms at Secondary Entrances
- Centrally located elevators
- Both permanent and flexible concessions spaces
- Additional storage located under seating tiers



FIRST FLOOR



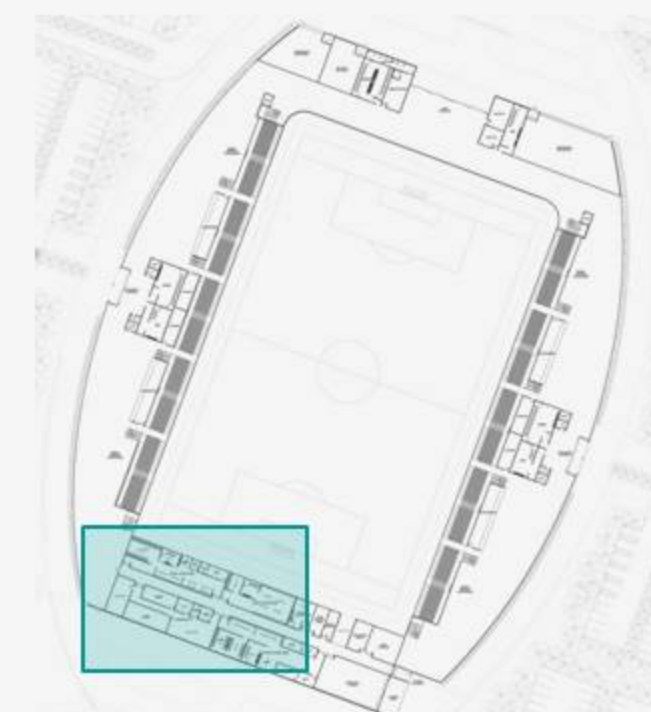




PARTIAL FIRST FLOOR PLAN

## FEATURES:

- Dedicated player entrance at South end of building
- Team facilities adjacent to field
- Locker Rooms and Team Facilities along secure, dedicated corridor
- Clerestory windows and curtainwalls provide natural daylight into the Locker Rooms and Training Suite

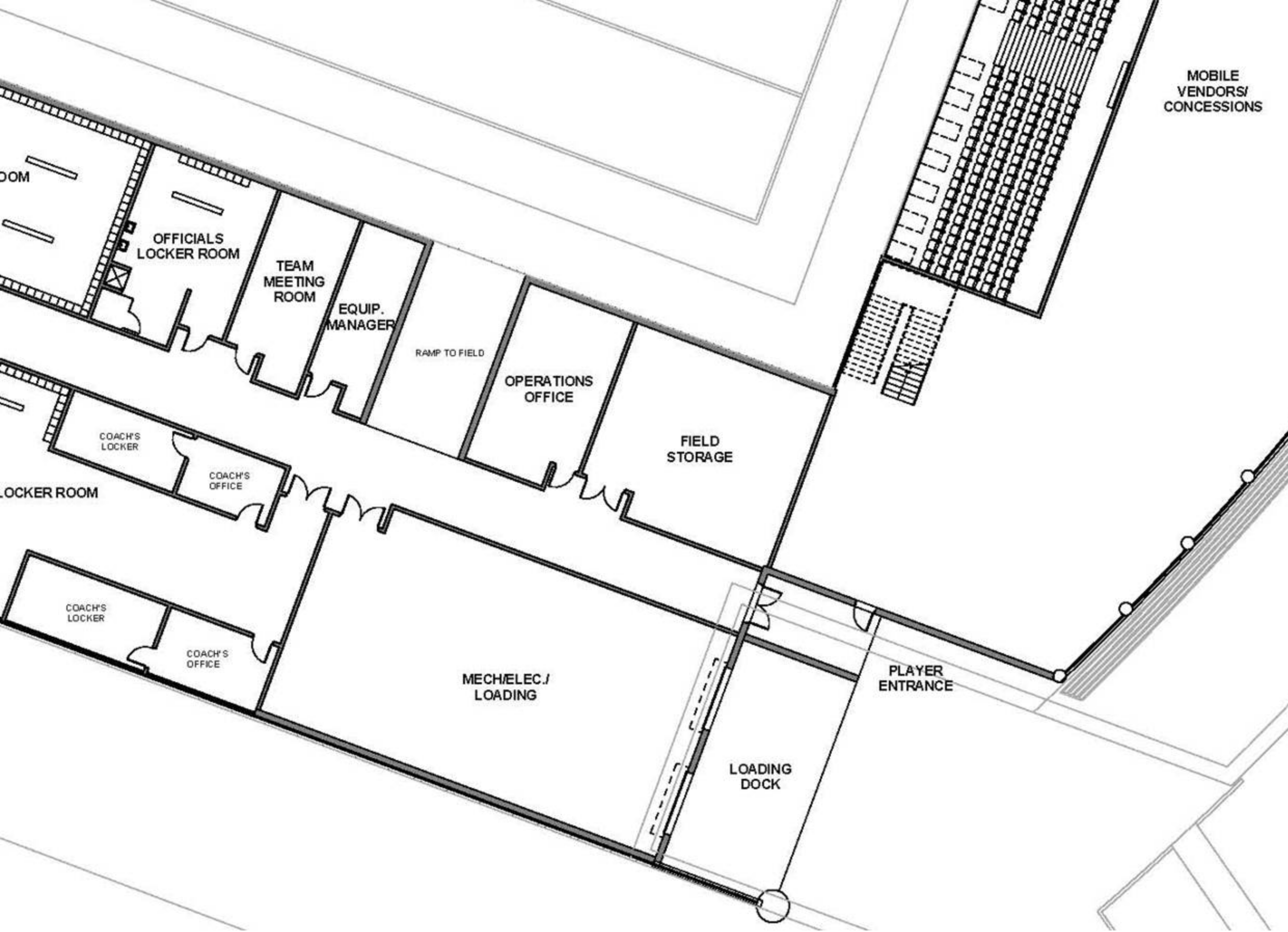


FIRST FLOOR



FLOOR PLANS

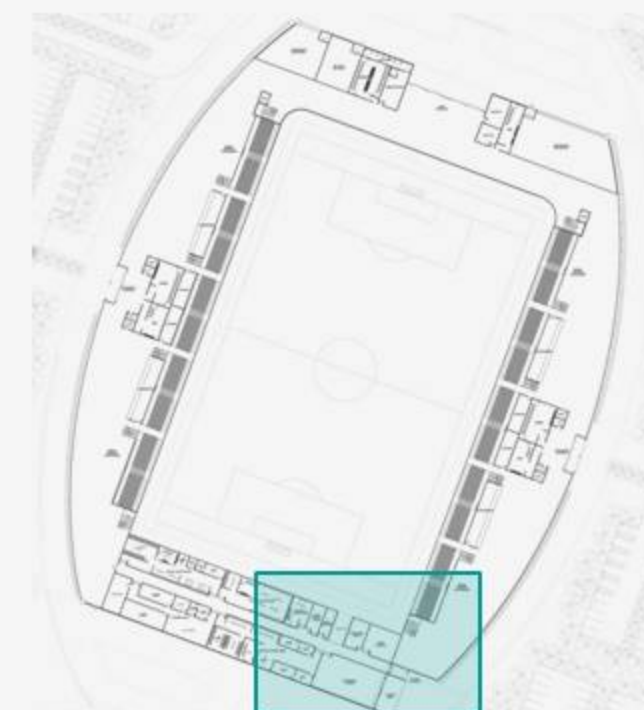




PARTIAL FIRST FLOOR PLAN

# FEATURES:

- Dedicated player entrance at South end of building
- Team facilities adjacent to field
- Locker Rooms and Team Facilities along secure, dedicated corridor
- Clerestory windows and curtainwalls provide natural daylight into the Locker Rooms and Training Suite
- Service drive and loading dock located near Lee Hwy. entrance

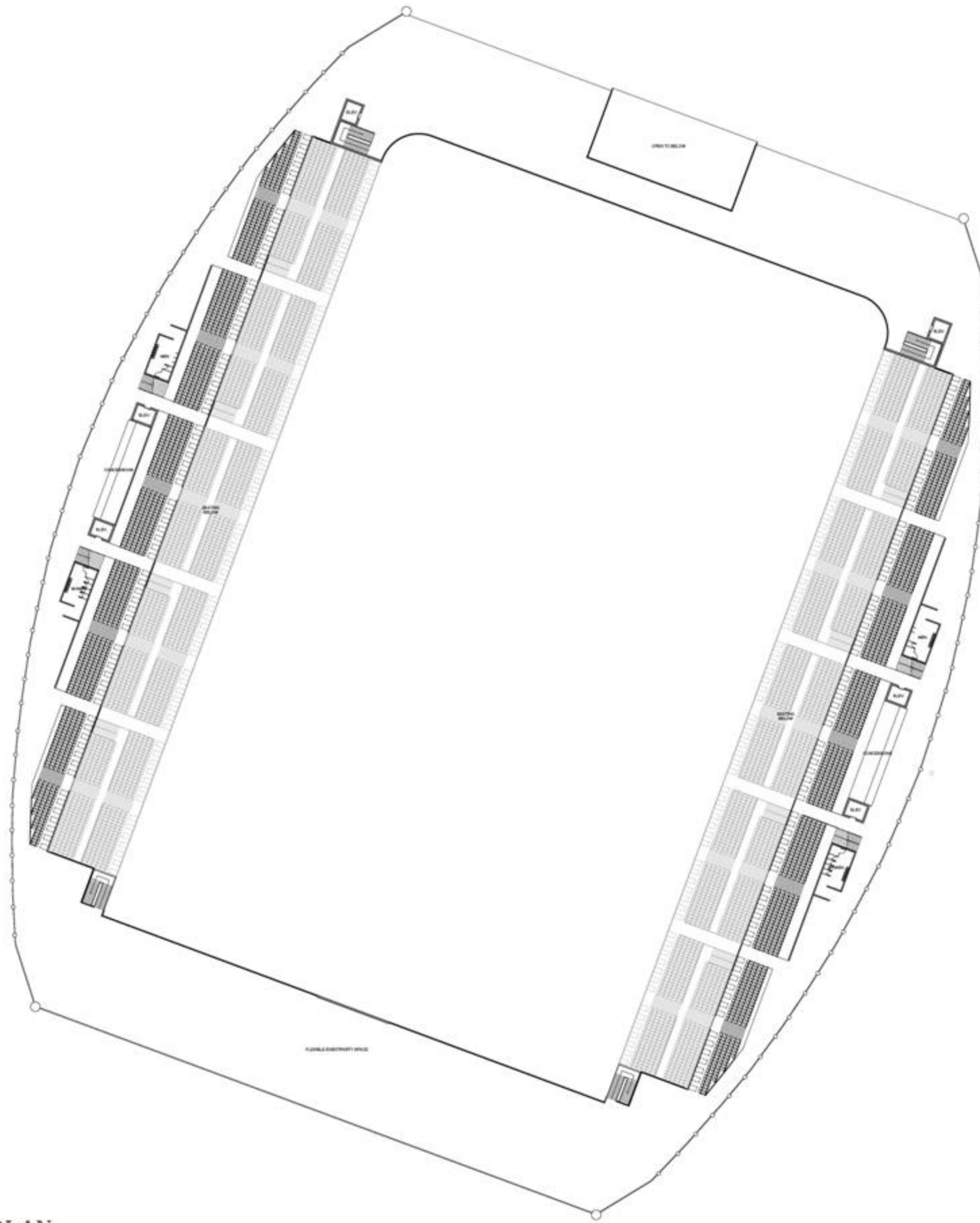


FIRST FLOOR



FLOOR PLANS





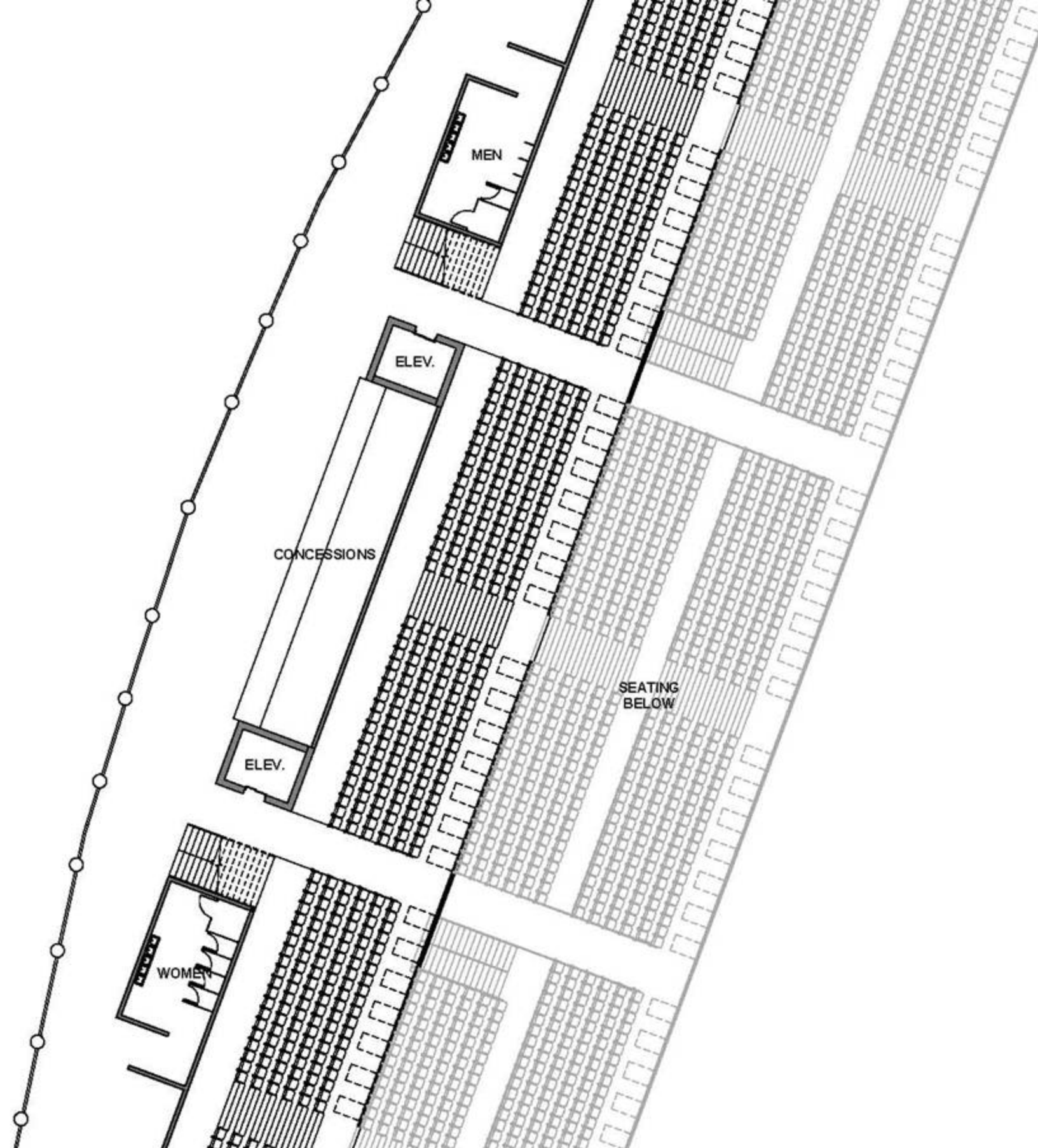
**SECOND FLOOR PLAN**

#### FEATURES:

- Main concourse incorporates views below to the main entrance
- Centrally located permanent concessions
- Accessible seating area provided at base of seating tier
- Centrally located restrooms and elevators
- Flexible Party /Event area on mezzanine balcony



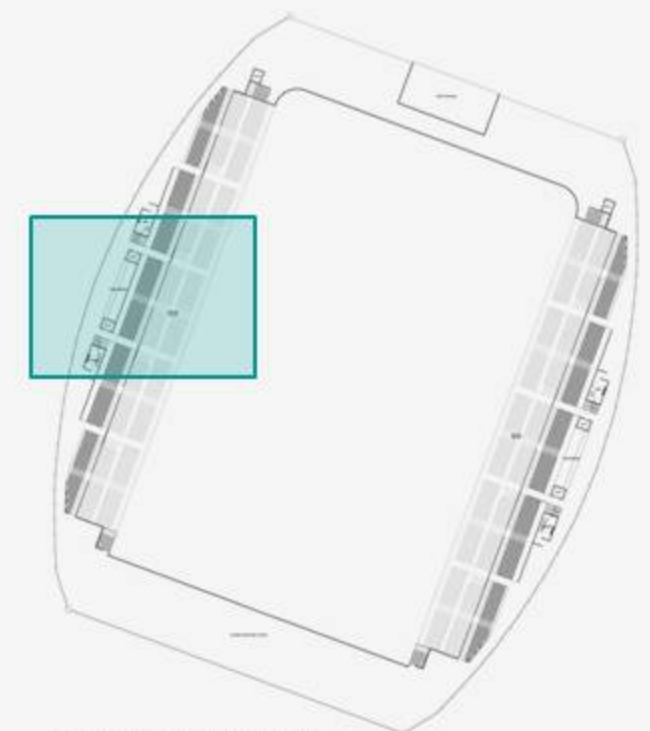




PARTIAL SECOND FLOOR PLAN

#### FEATURES:

- Main concourse incorporates views below to the main entrance
- Centrally located permanent concessions
- Accessible seating area provided at base of seating tier
- Centrally located restrooms and elevators

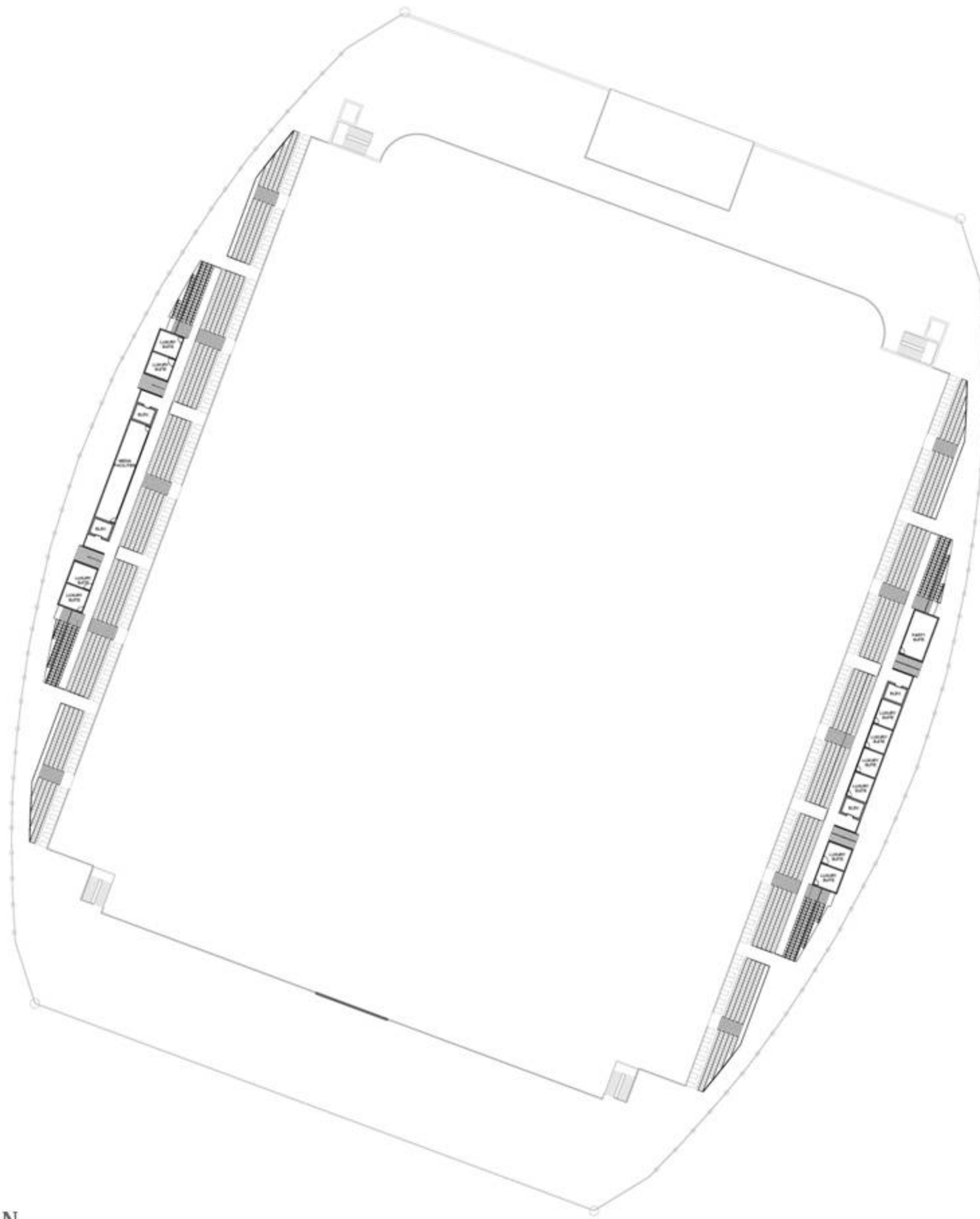


SECOND FLOOR



FLOOR PLANS





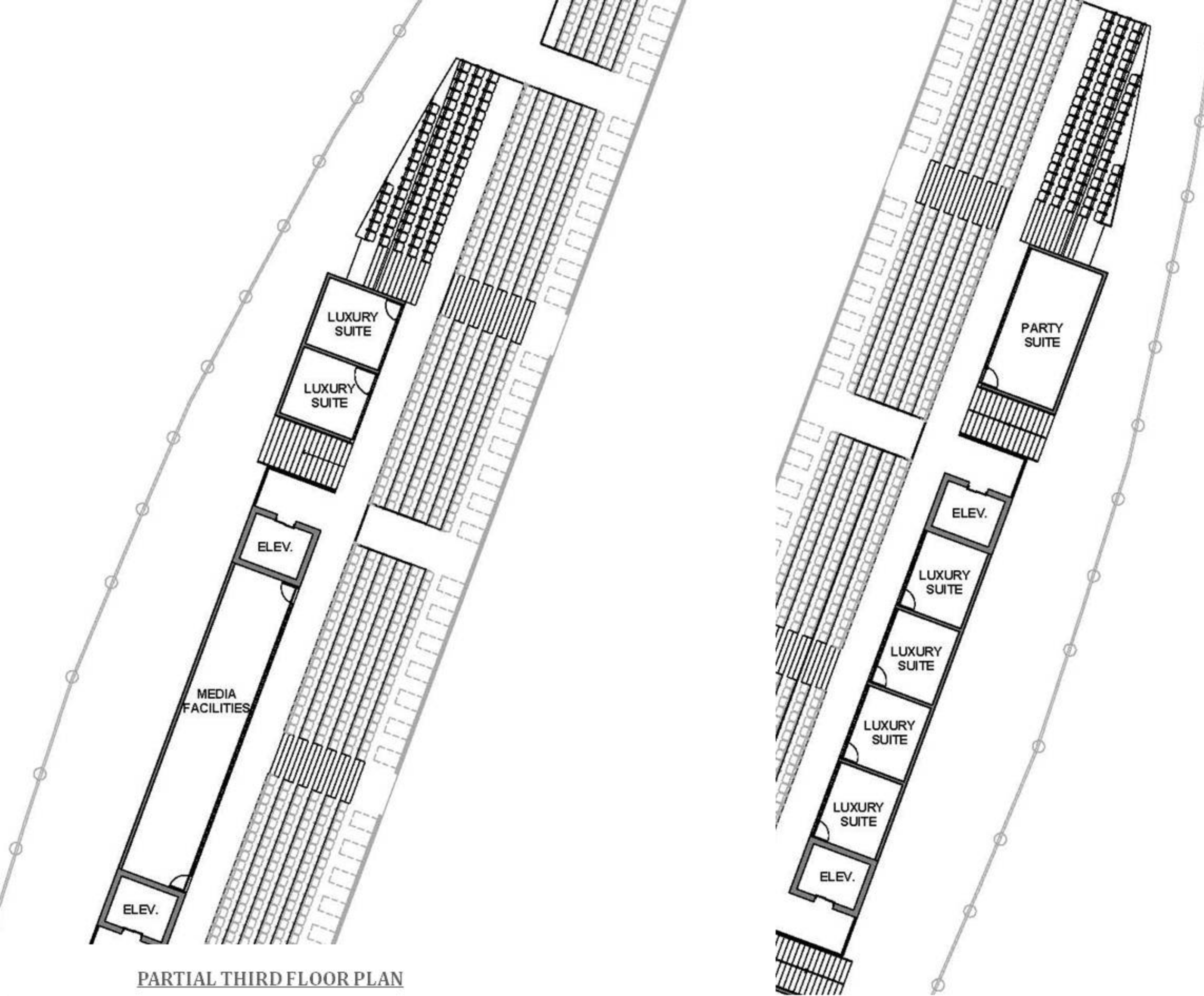
**THIRD FLOOR PLAN**

#### FEATURES:

- Eight Luxury Suites with dedicated seating
- One large Party Suite with dedicated seating
- Dedicated level centered on the elevators
- Centrally located with glass walls look to the field for optimum visibility
- Media facilities centered and at the highest level provides views of the entire field



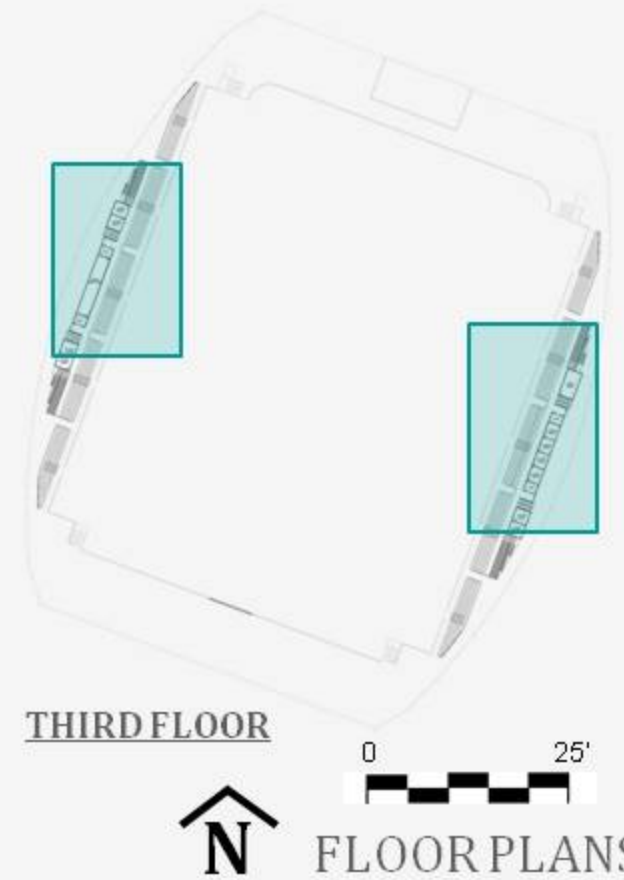




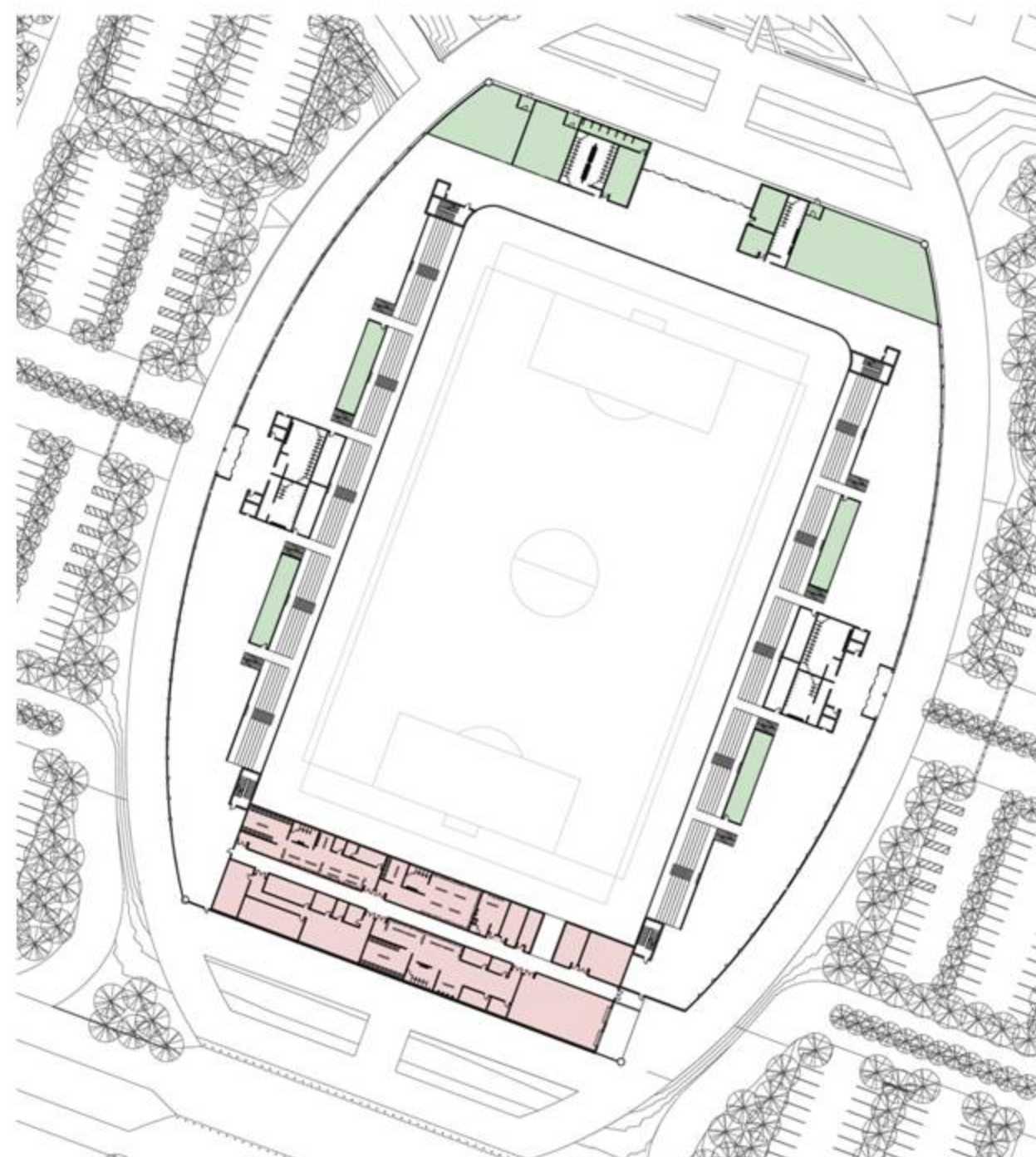
PARTIAL THIRD FLOOR PLAN

#### FEATURES:

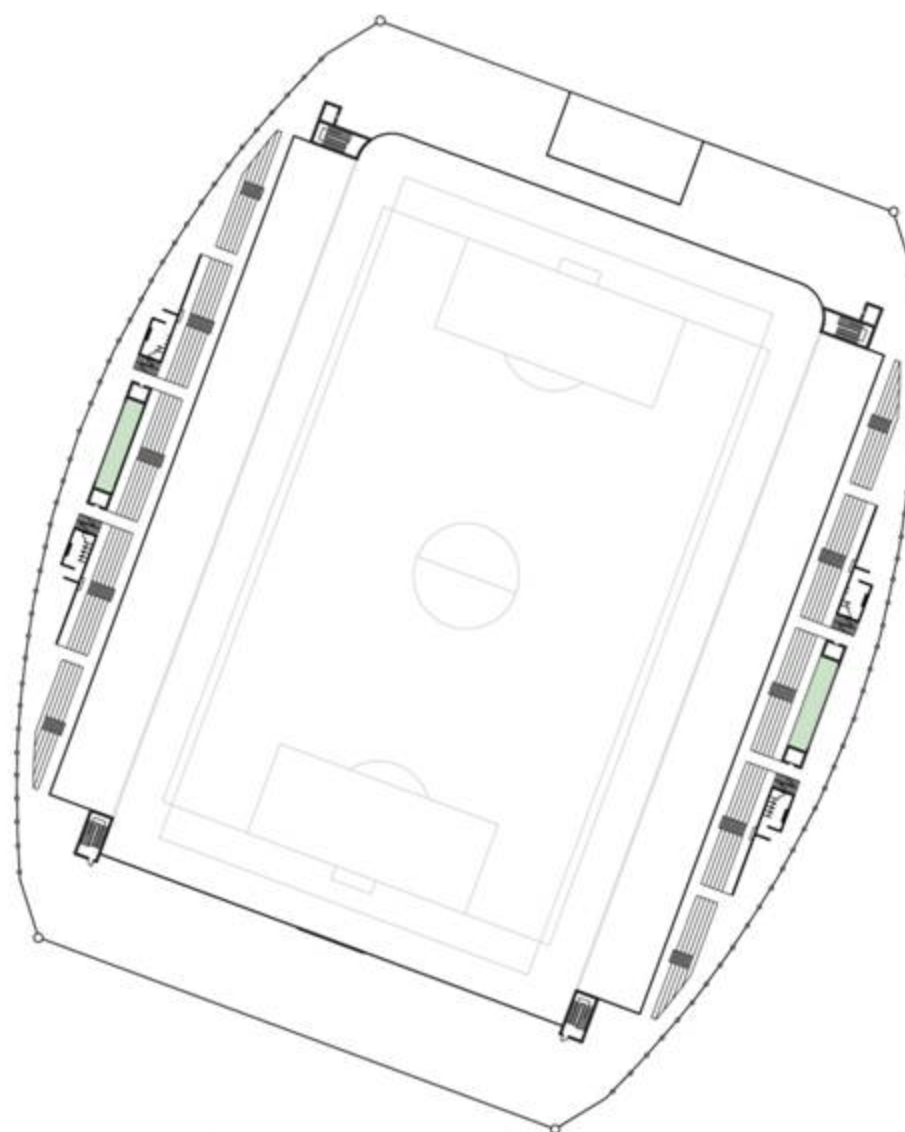
- Eight Luxury Suites with dedicated seating
- One large Party Suite with dedicated seating
- Dedicated level centered on the elevators
- Centrally located with glass walls look to the field for optimum visibility
- Media facilities centered and at the highest level provides views of the entire field



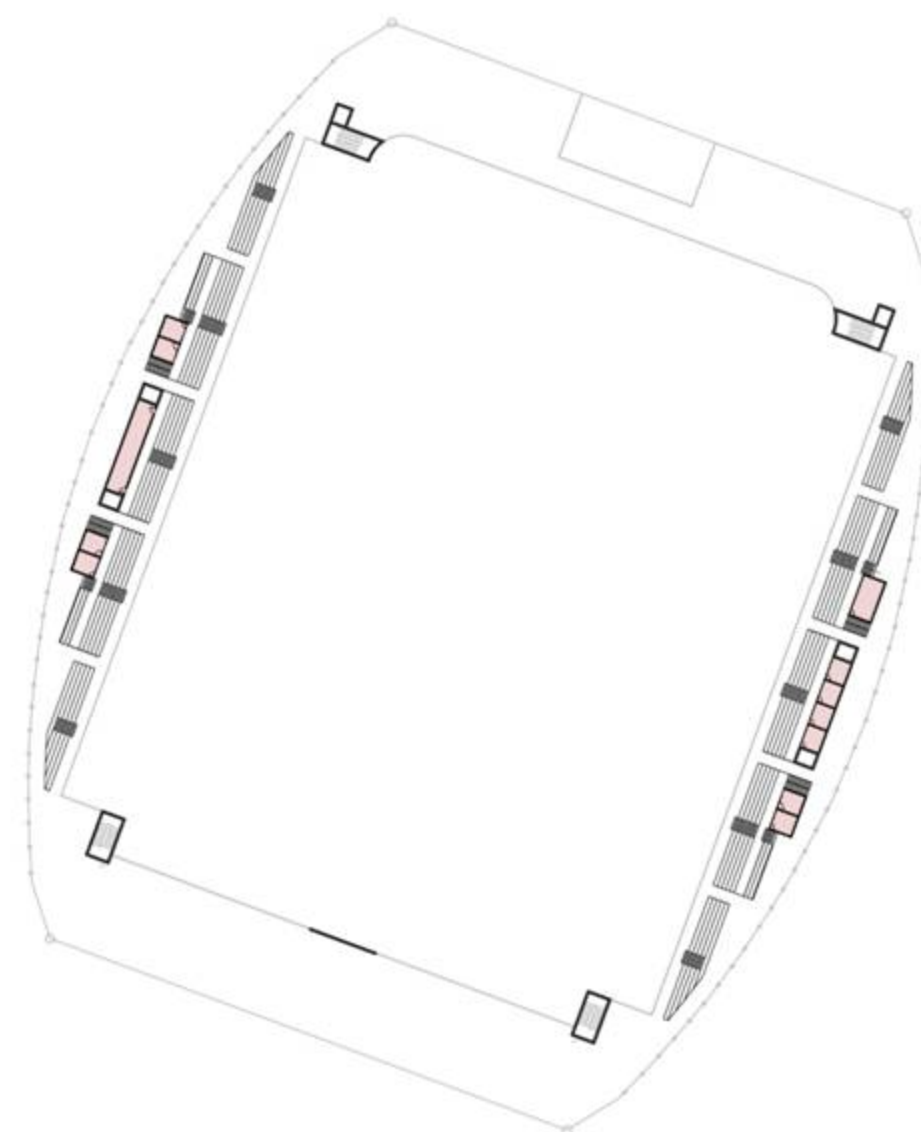




FIRST FLOOR PLAN



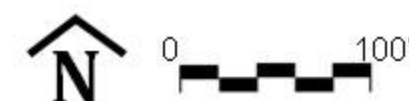
SECOND FLOOR PLAN



THIRD FLOOR PLAN

CONDITIONED VIA SPACE HEATERS  

 CONDITIONED VIA GEOTHERMAL

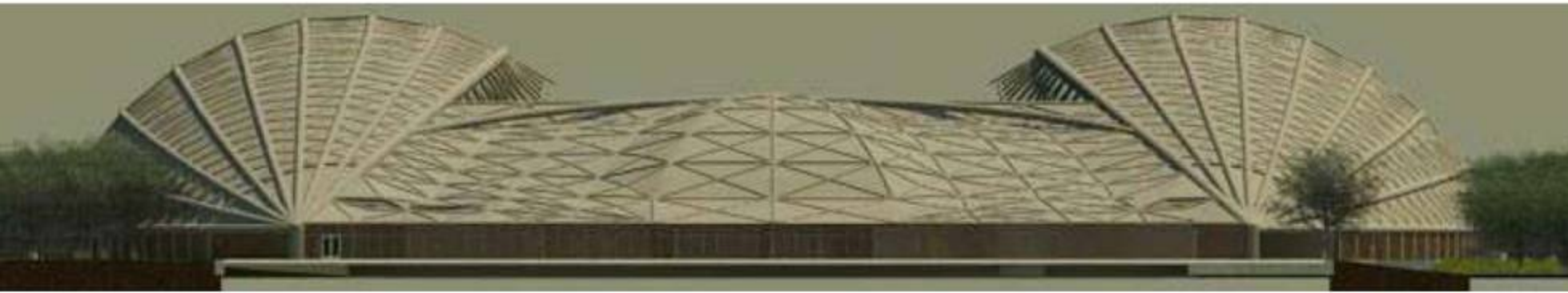


CONDITIONED SPACE





NORTH ELEVATION



SOUTH ELEVATION



WEST ELEVATION



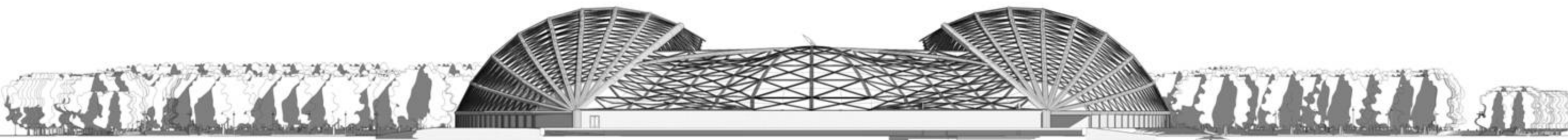
EAST ELEVATION

ELEVATIONS

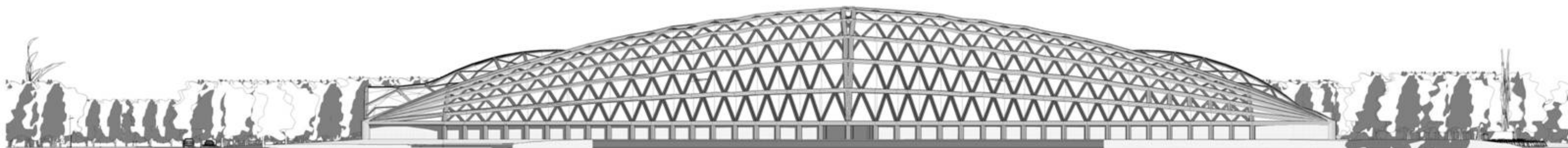




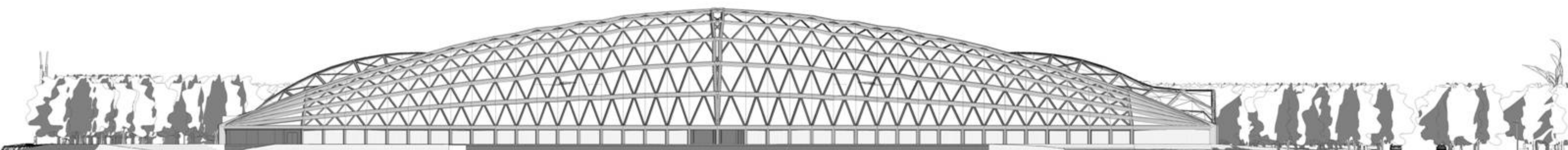
NORTH ELEVATION



SOUTH ELEVATION



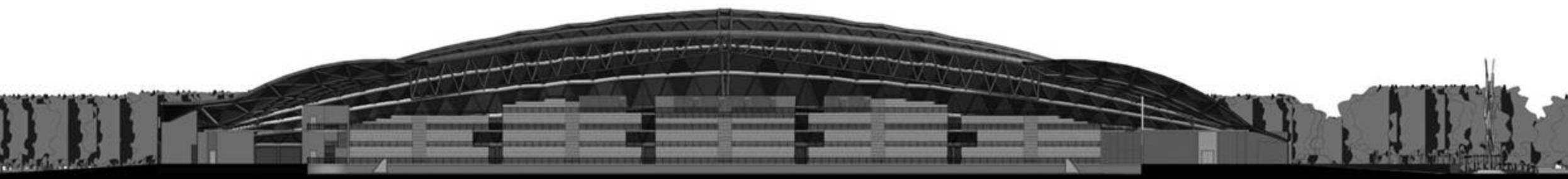
WEST ELEVATION



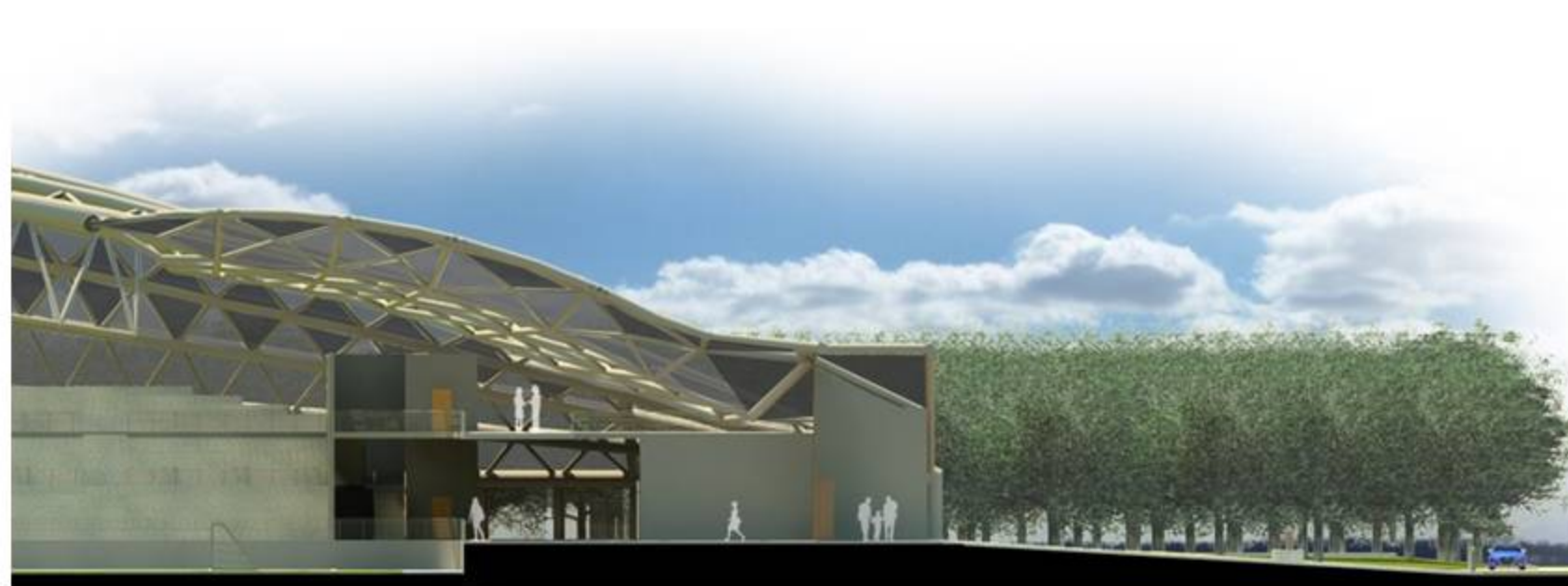
EAST ELEVATION

ELEVATIONS





SECTION - NORTH/SOUTH

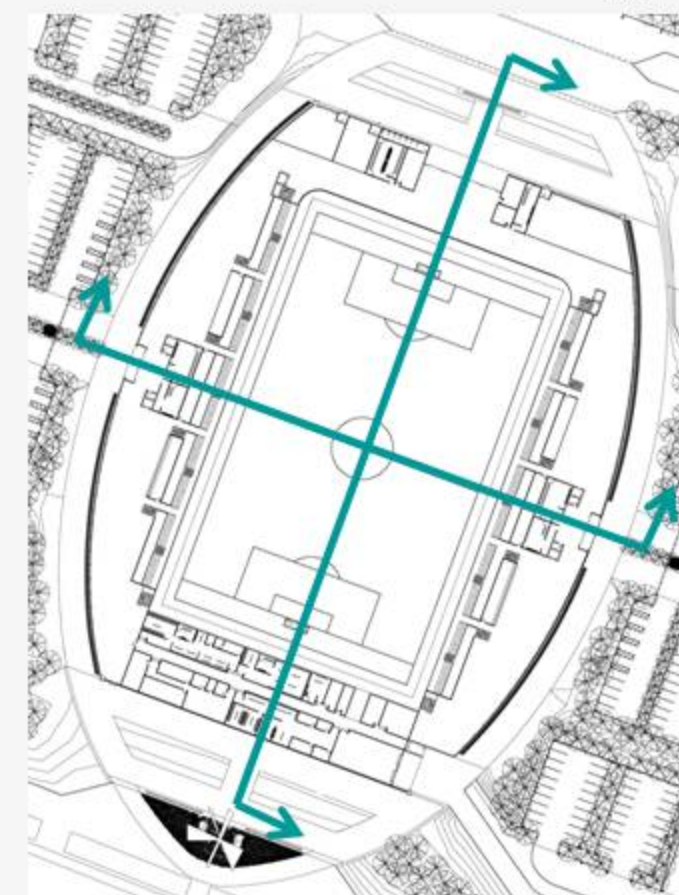


ENLARGED SECTION @ MAIN ENTRANCE



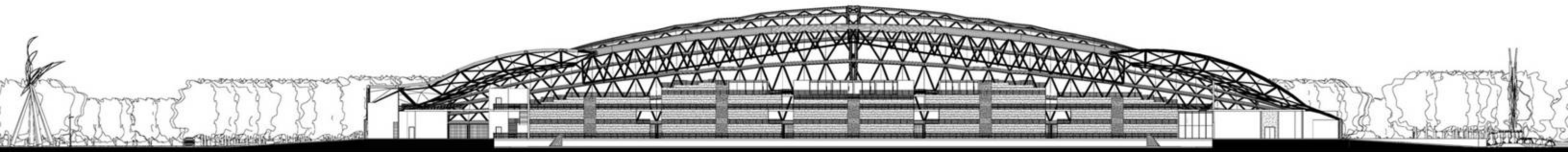
SECTION - WEST/EAST

LOCATION MAP 

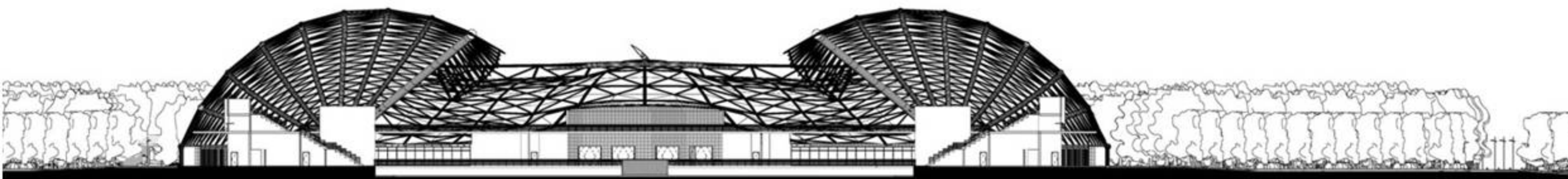


SECTIONS

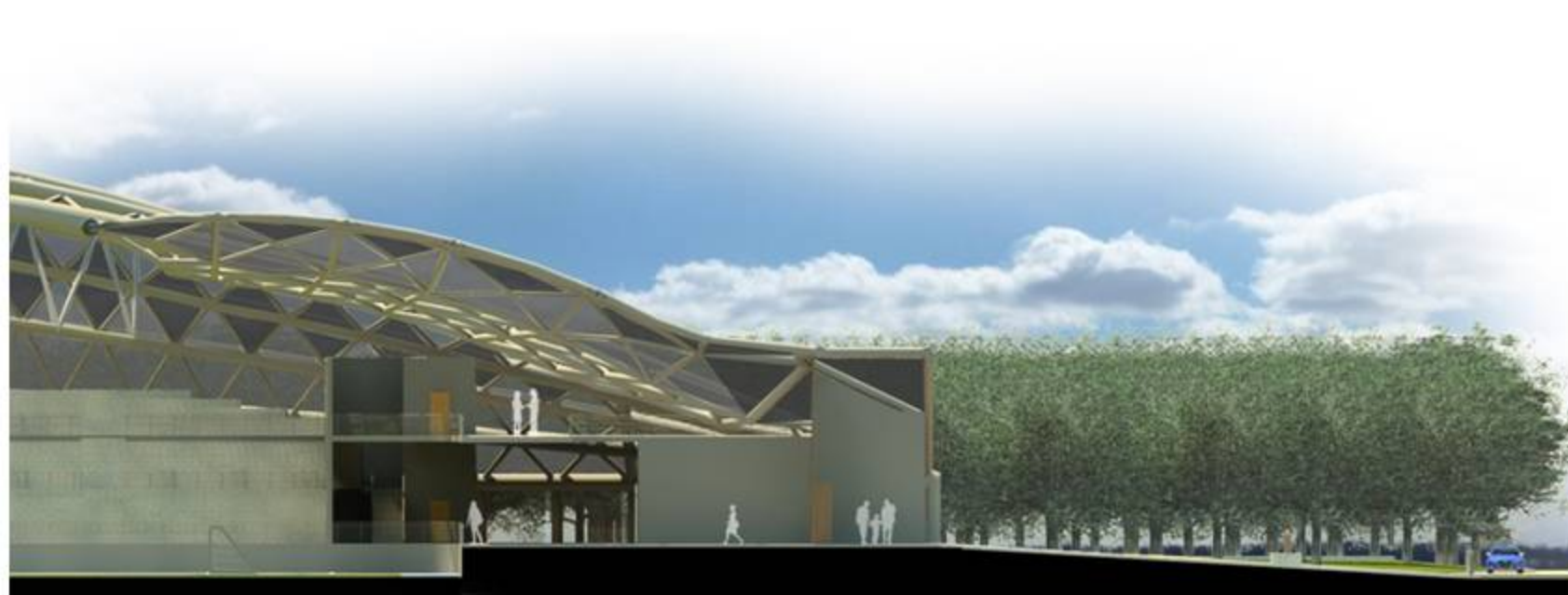




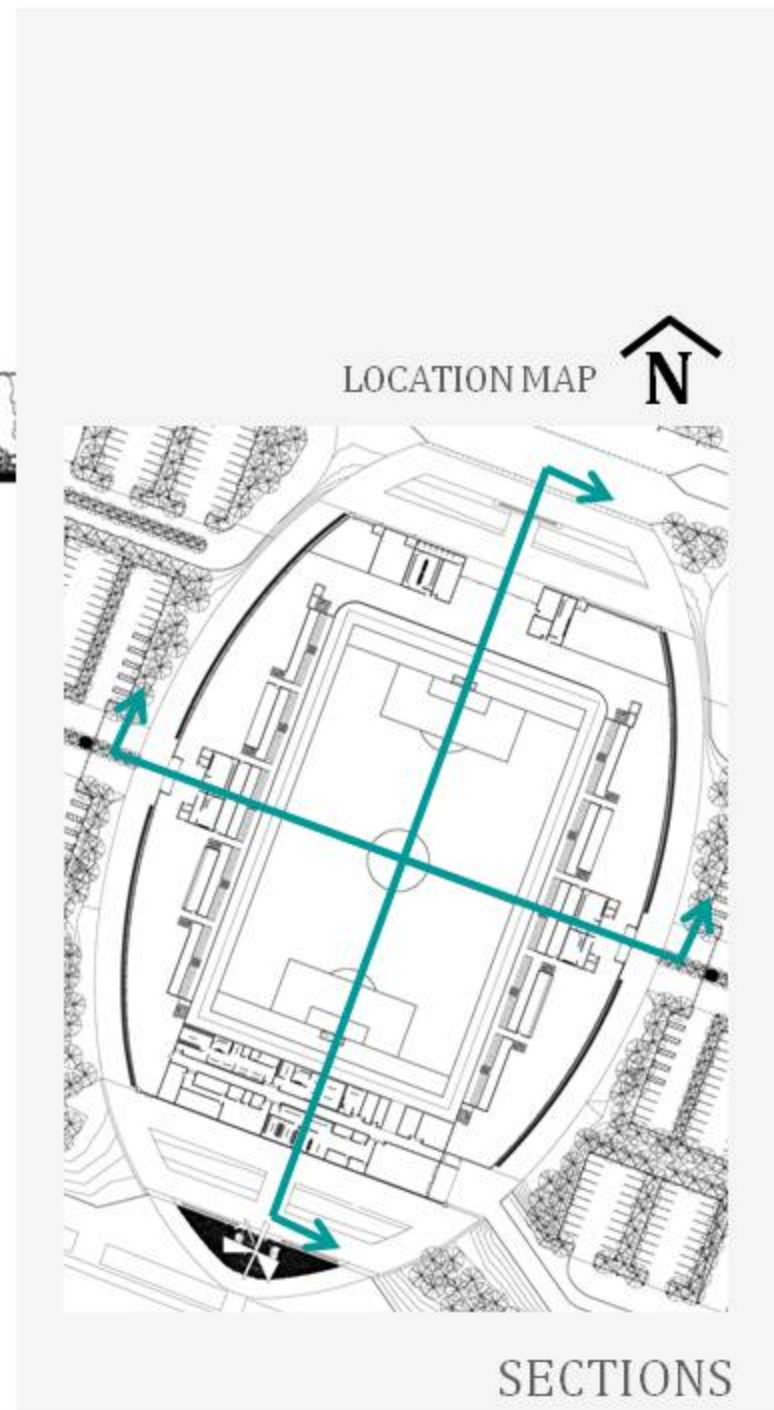
SECTION - NORTH/SOUTH



SECTION - WEST/EAST

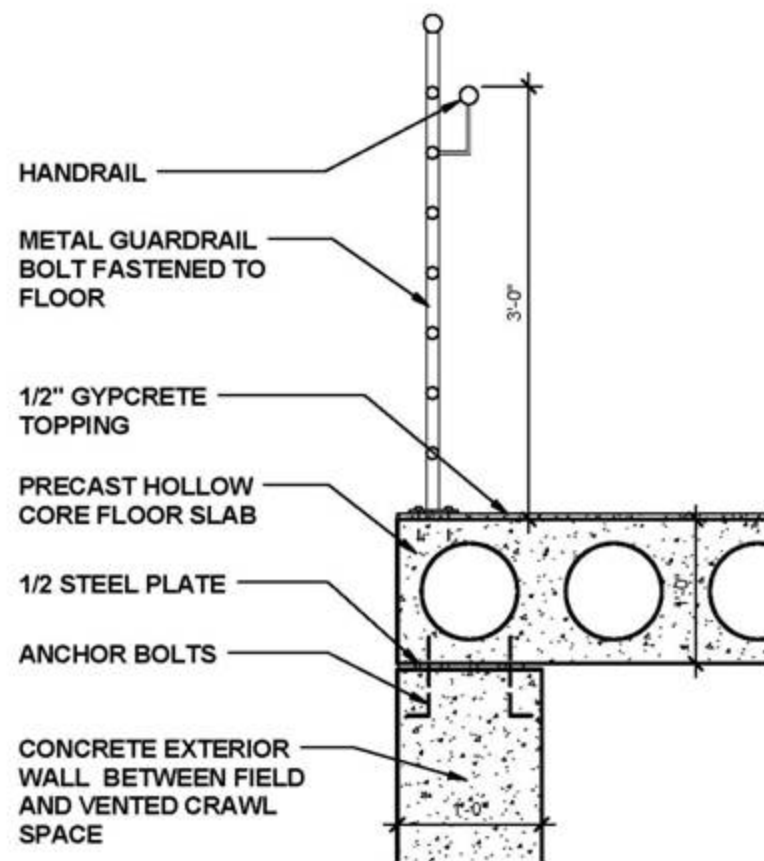


ENLARGED SECTION @ MAIN ENTRANCE

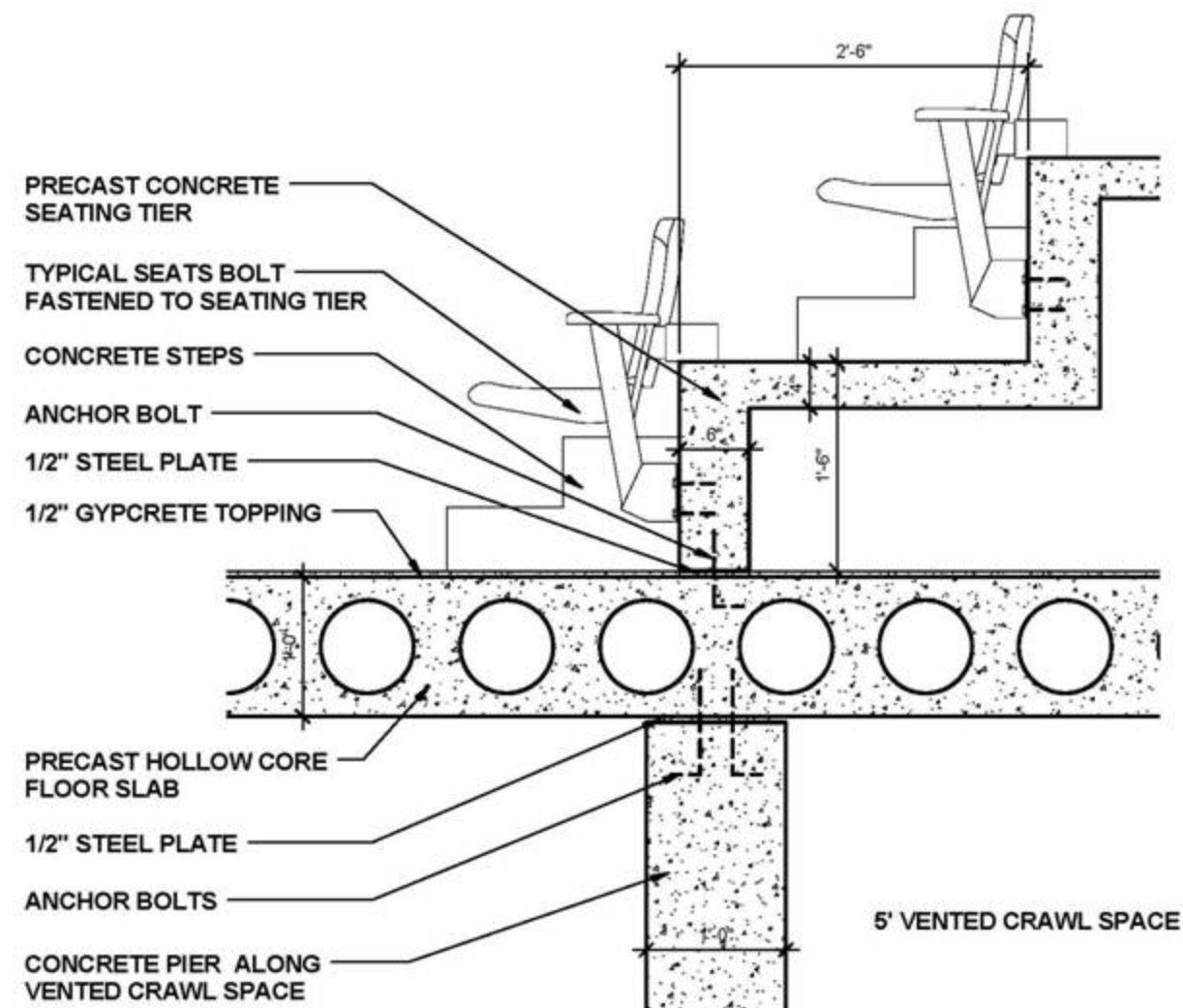


SECTIONS



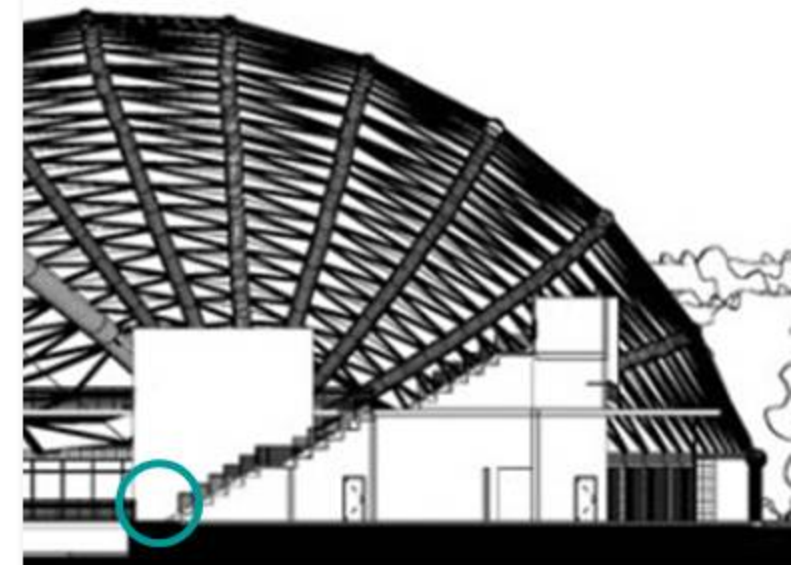


ENLARGED SECTION @ RAILING: 3/4" = 1'-0"



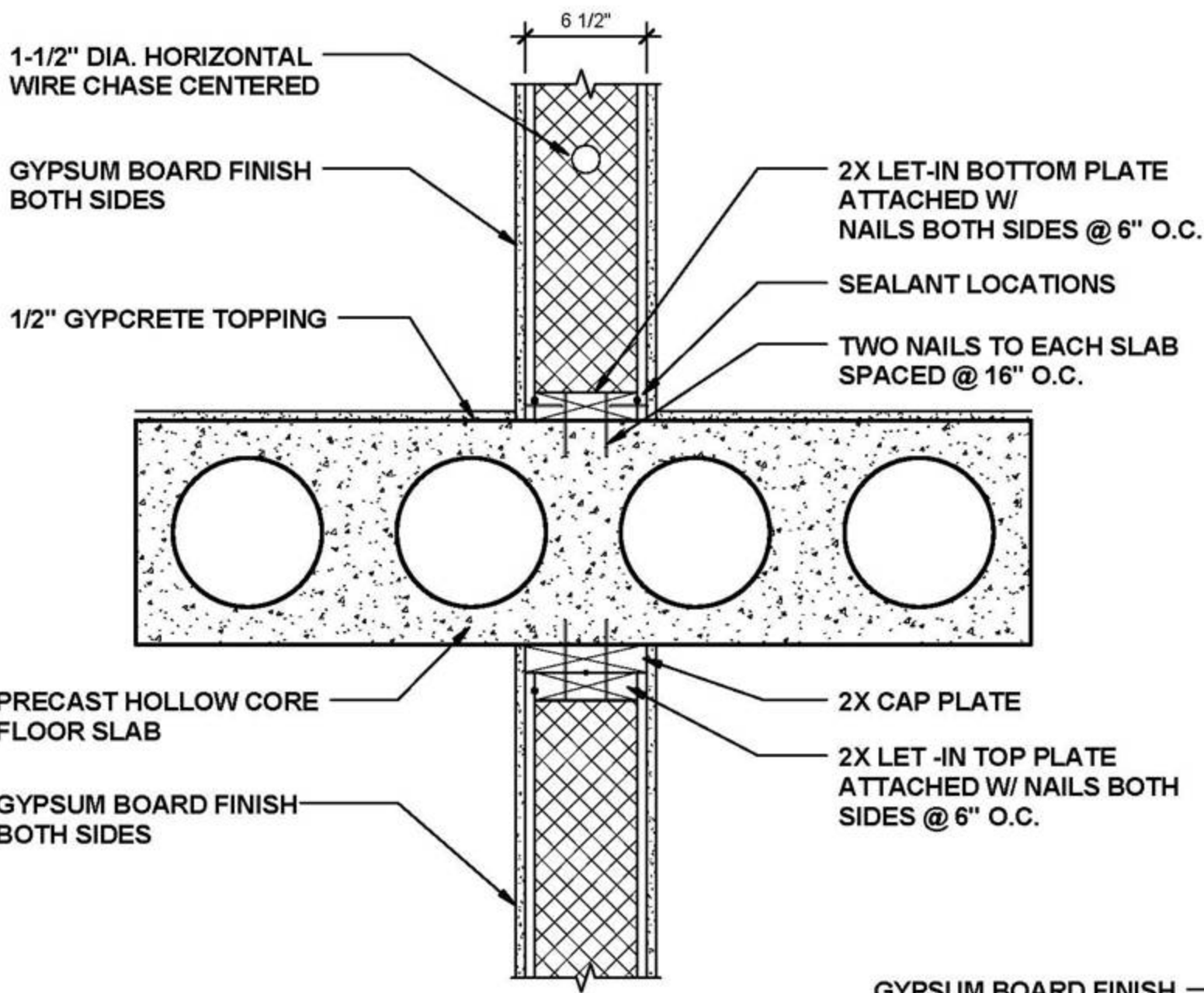
ENLARGED SECTION @ SEATING: 3/4" = 1'-0"

LOCATION KEY

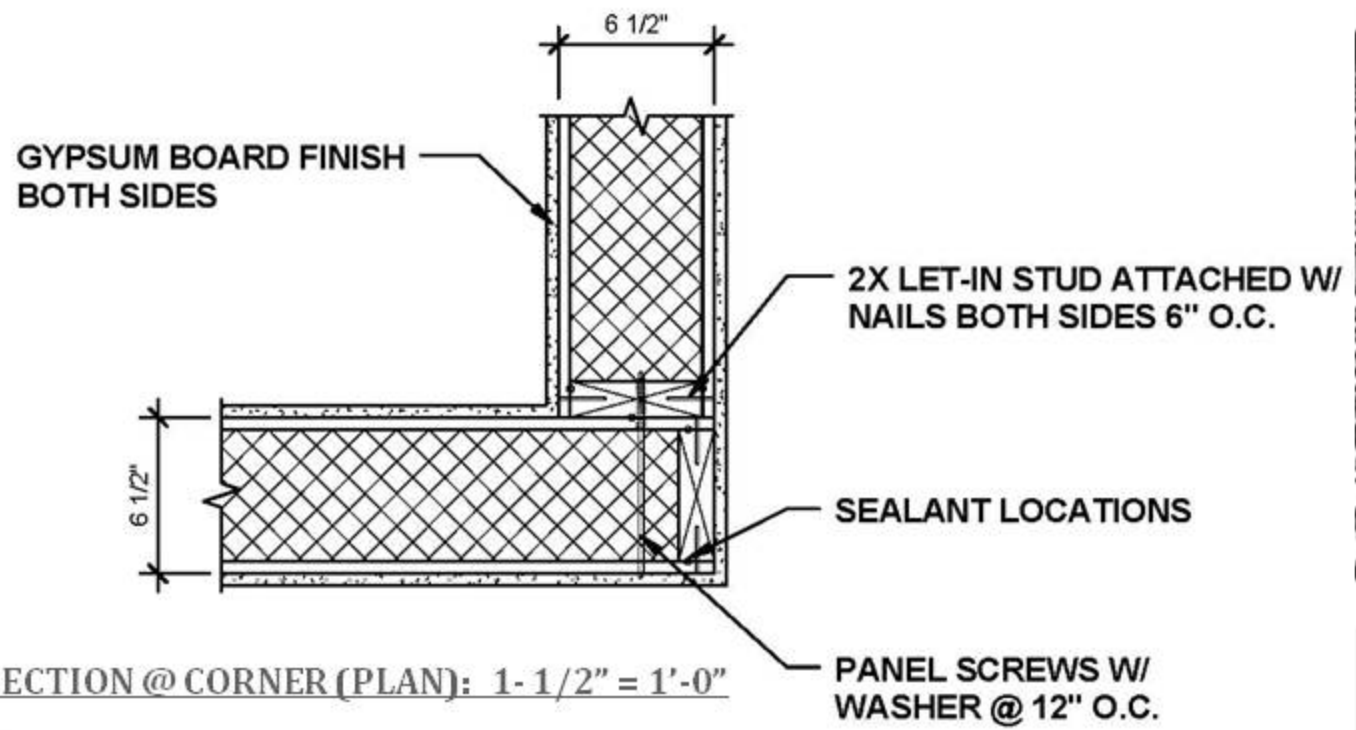


DETAIL SECTIONS



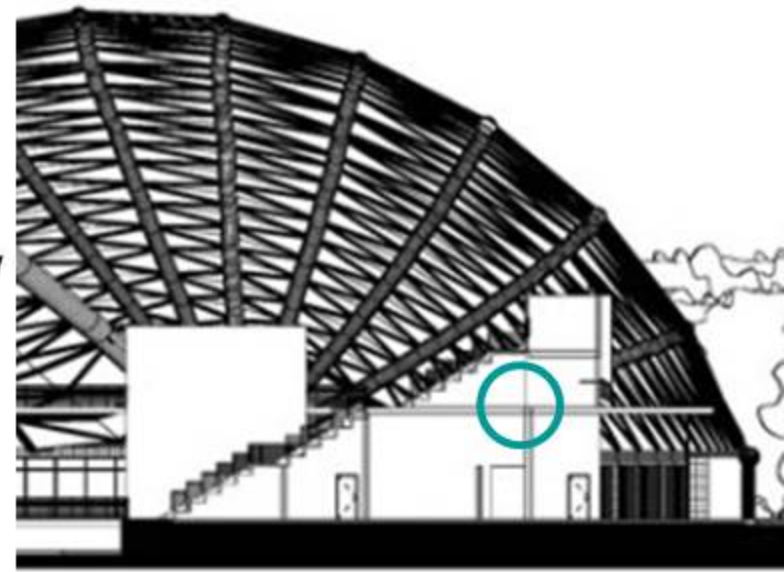


ENLARGED SIP SECTION @ UPPER FLOOR: 1-1/2" = 1'-0"



ENLARGED SIP SECTION @ CORNER (PLAN): 1-1/2" = 1'-0"

LOCATION KEY



DETAIL SECTIONS





VIEW FROM MAIN ENTRANCE

#### FEATURES:

- Mobile Perforated Panels at Main Entrance
- Circulation is unconditioned but protected from the elements via the steel and ETFE panel roof structure
- Direct view to the playing field from the entrance and concourse
- First Aid and Security near Main Entrance
- Second Floor concourse provides area open to below
- Centrally located restrooms at Main and Secondary Entrances
- Egress stairs are provided on each side of the Main Entrance



FIRST FLOOR

INTERIOR VIEWS





VIEW ALONG FIRST FLOOR SEATING TIER

#### FEATURES:

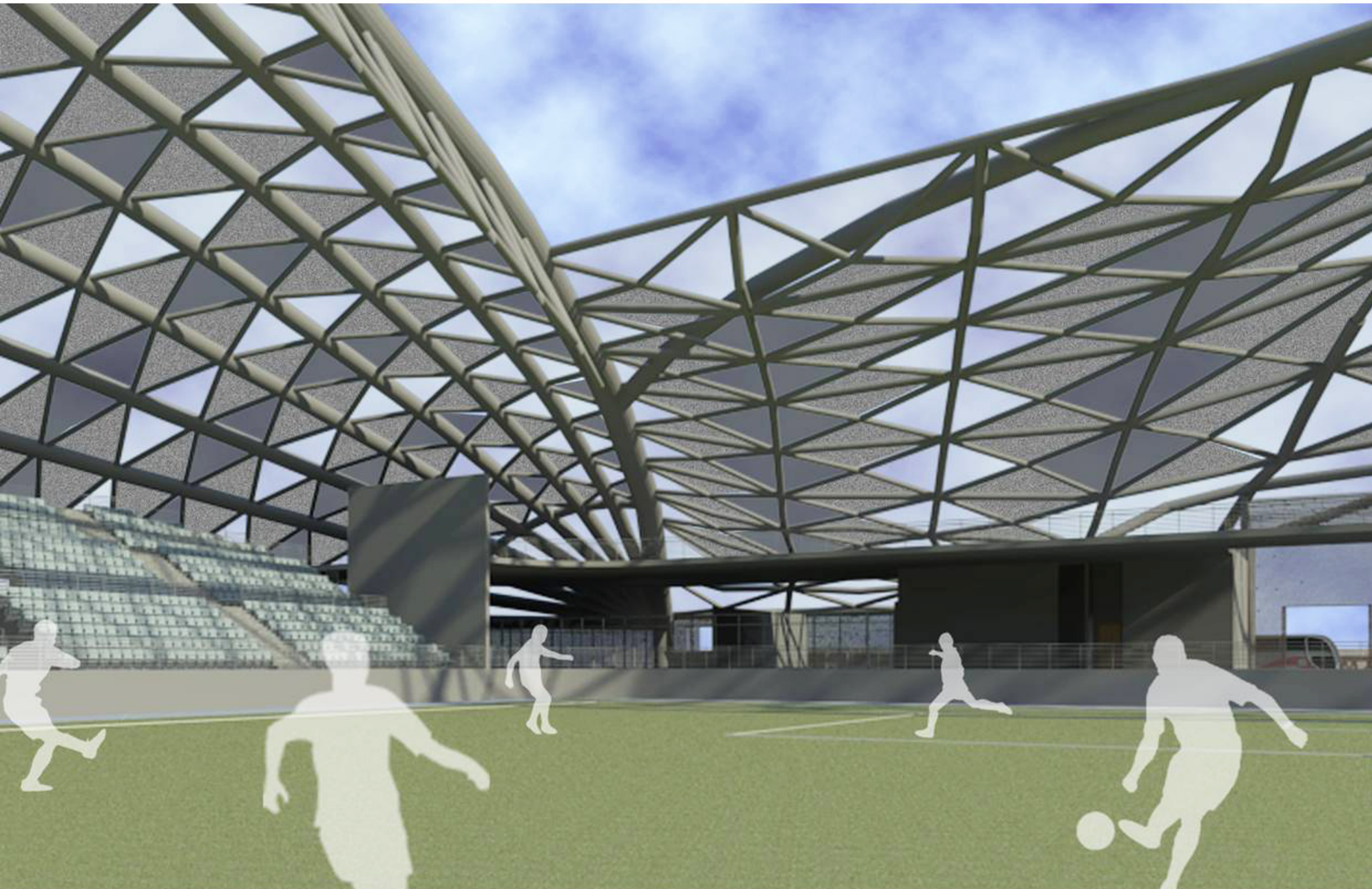
- Seating tiers are fully covered by the steel and ETFE roof
- First Floor is located five feet above the playing field
- Barrier free seating space is provided at the base of each floor
- Circulation aisles are provided at 20 seat intervals



FIRST FLOOR

INTERIOR VIEWS





VIEW FROM CENTER OF FIELD

#### FEATURES:

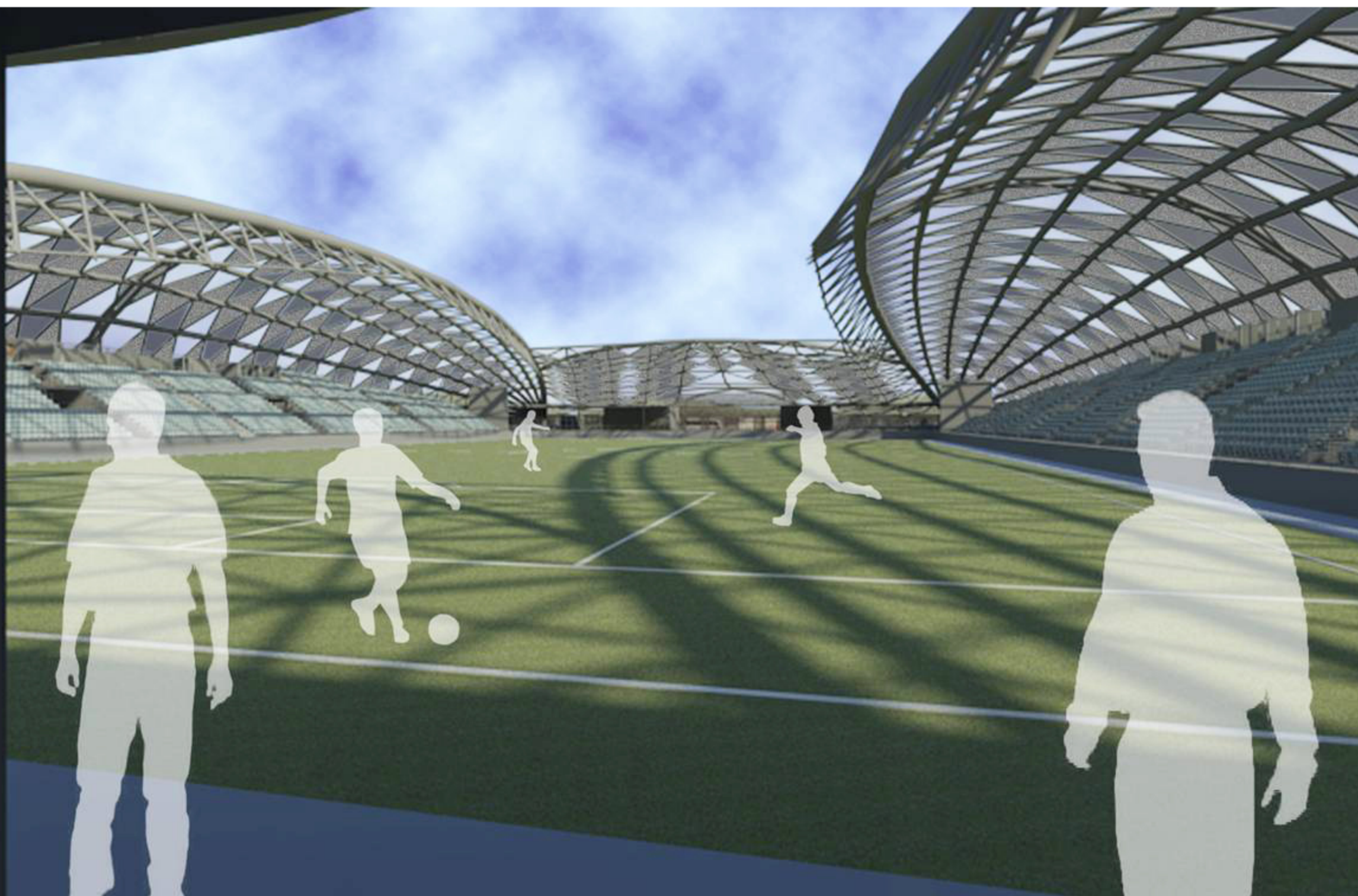
- Playing field is set five feet below the First Floor
- Steel structure with ETFE panels provides protection from the elements for spectators
- Direct views to the concourse and seating tiers
- Retractable roof over the center of the field provides event flexibility and additional daylighting opportunities



FIRST FLOOR

INTERIOR VIEWS





VIEW FROM PLAYERS' ENTRANCE

## FEATURES:

- Players enter from a ramp that leads to the adjacent locker rooms
- Playing field is set five feet below the First Floor
- Steel structure with ETFE panels provides protection from the elements for spectators
- Direct views to the concourse and seating tiers
- Retractable roof over the center of the field provides event flexibility and additional daylighting opportunities



FIRST FLOOR

INTERIOR VIEWS





VIEW ALONG SECOND FLOOR CONCOURSE

#### FEATURES:

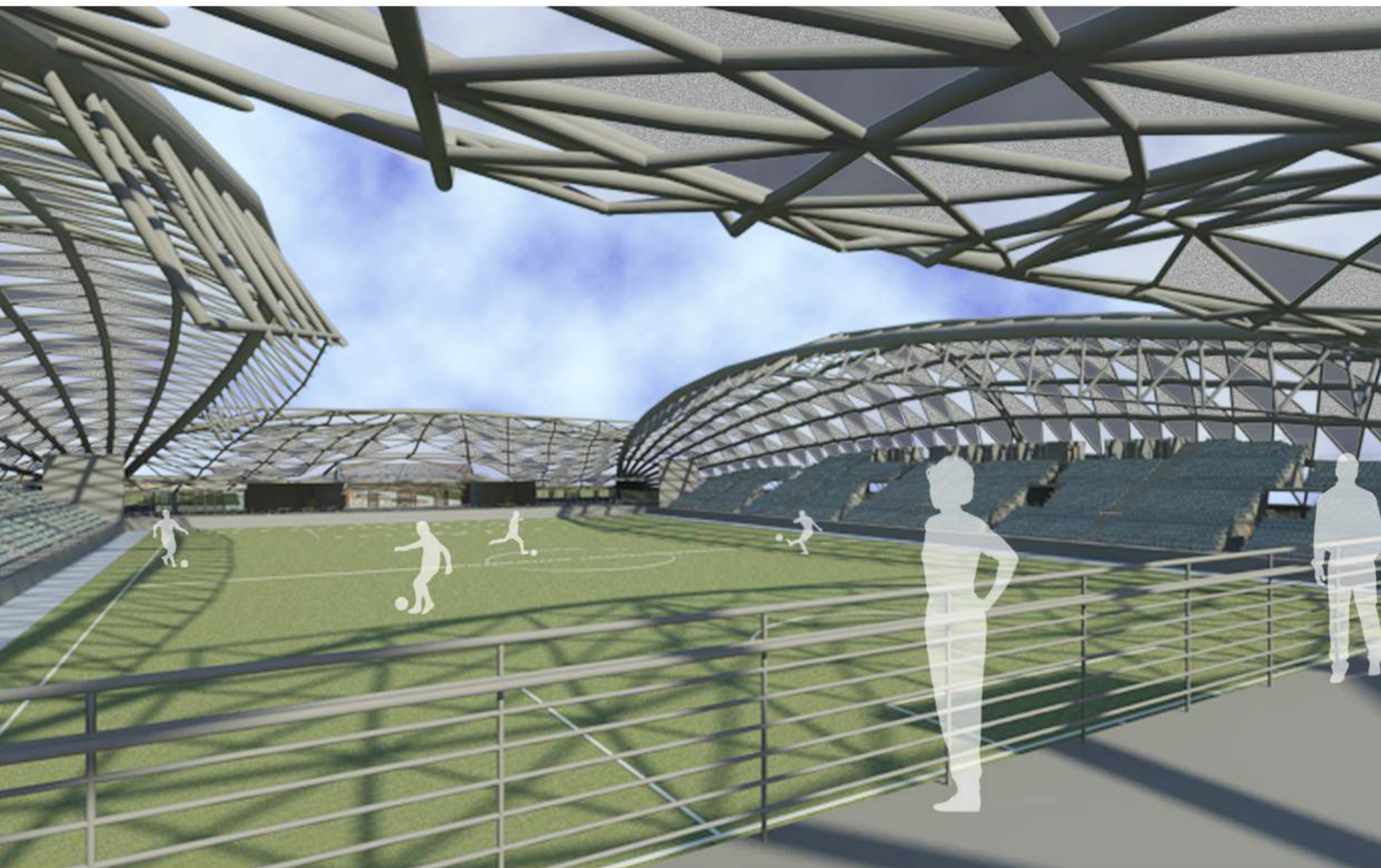
- Second Floor concourse is around the perimeter of the building
- Visitors interact with the structure and translucent panels allow visibility to the outside
- Concessions and restrooms are centrally located along the concourse



SECOND FLOOR

INTERIOR VIEWS





VIEW FROM PARTY/EVENT BALCONY

#### FEATURES:

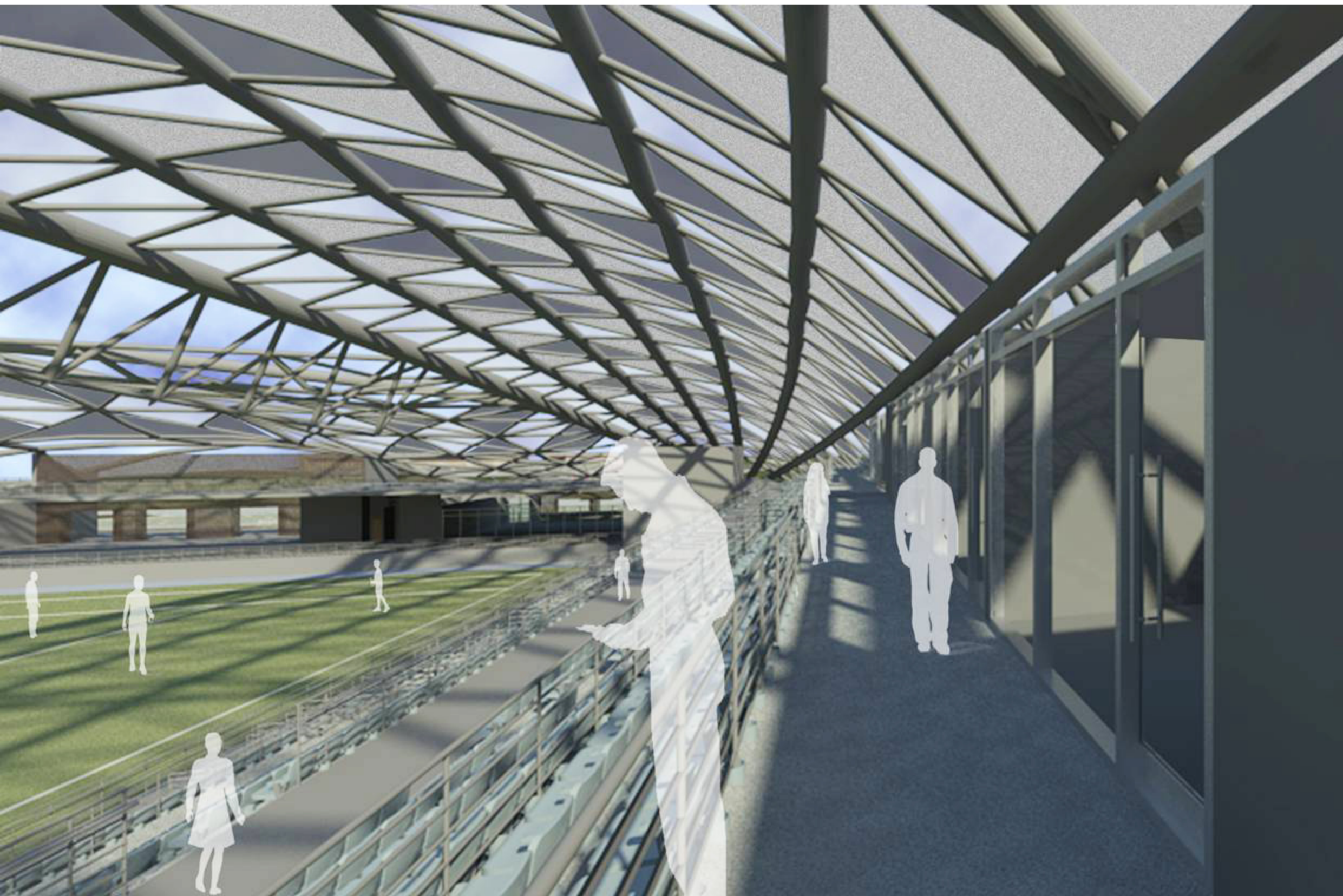
- Large mezzanine area located on Second Floor
- Flexible, open floor can be partitioned to create smaller event spaces
- Steel and ETFE structure projects over the mezzanine
- Offers full view of the stadium and playing field



SECOND FLOOR

INTERIOR VIEWS





VIEW ALONG LUXURY SUITES

#### FEATURES:

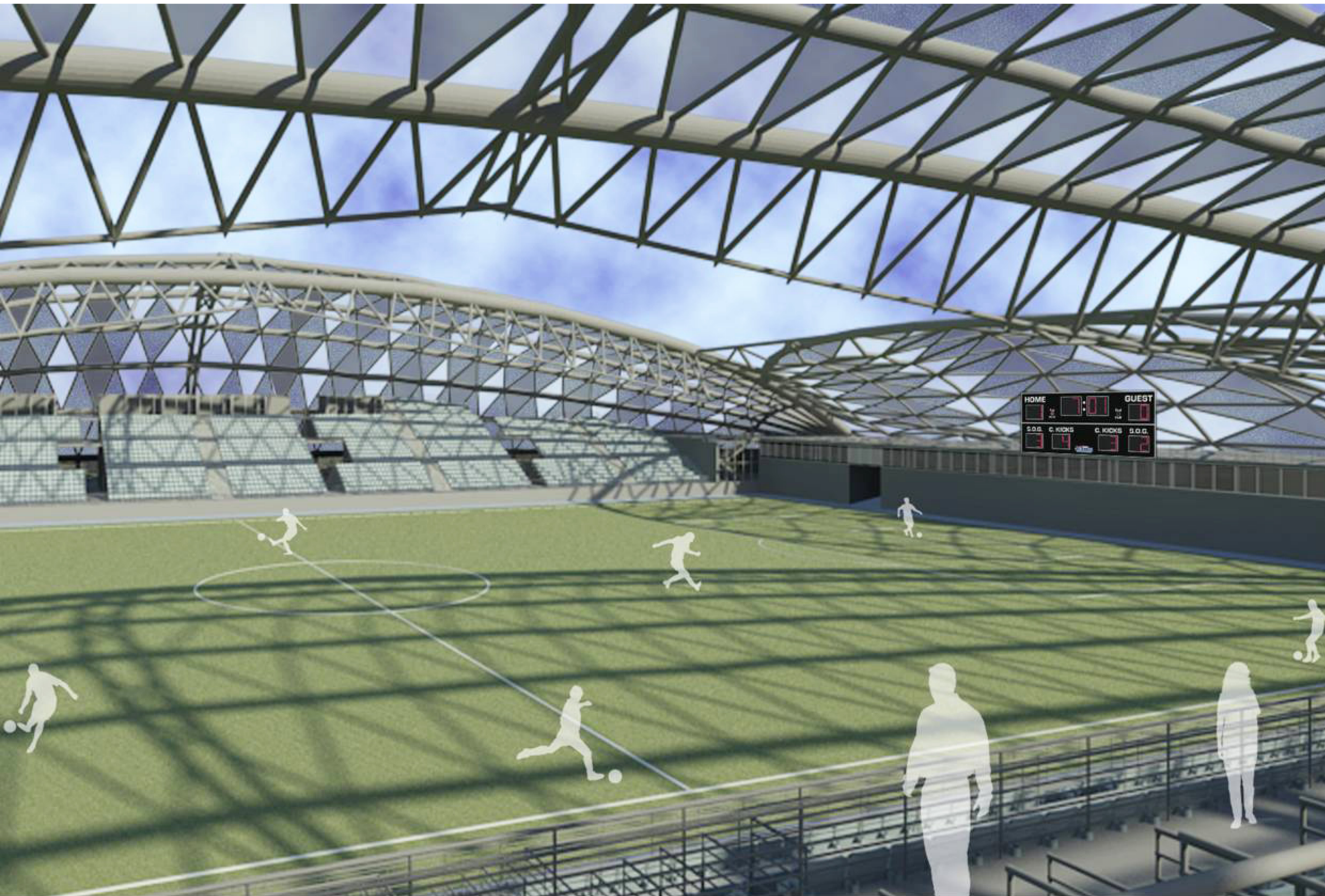
- Luxury suites are on a dedicated floor centered on the elevators
- Located centrally for optimum views of the field
- Storefront style walls provide unobstructed views to the field
- Spaces are conditioned via geothermal wells on site
- Railings separate the suite seating from the general seating



THIRD FLOOR

INTERIOR VIEWS





VIEW FROM MEDIA AREA AND LUXURY SUITES

#### FEATURES:

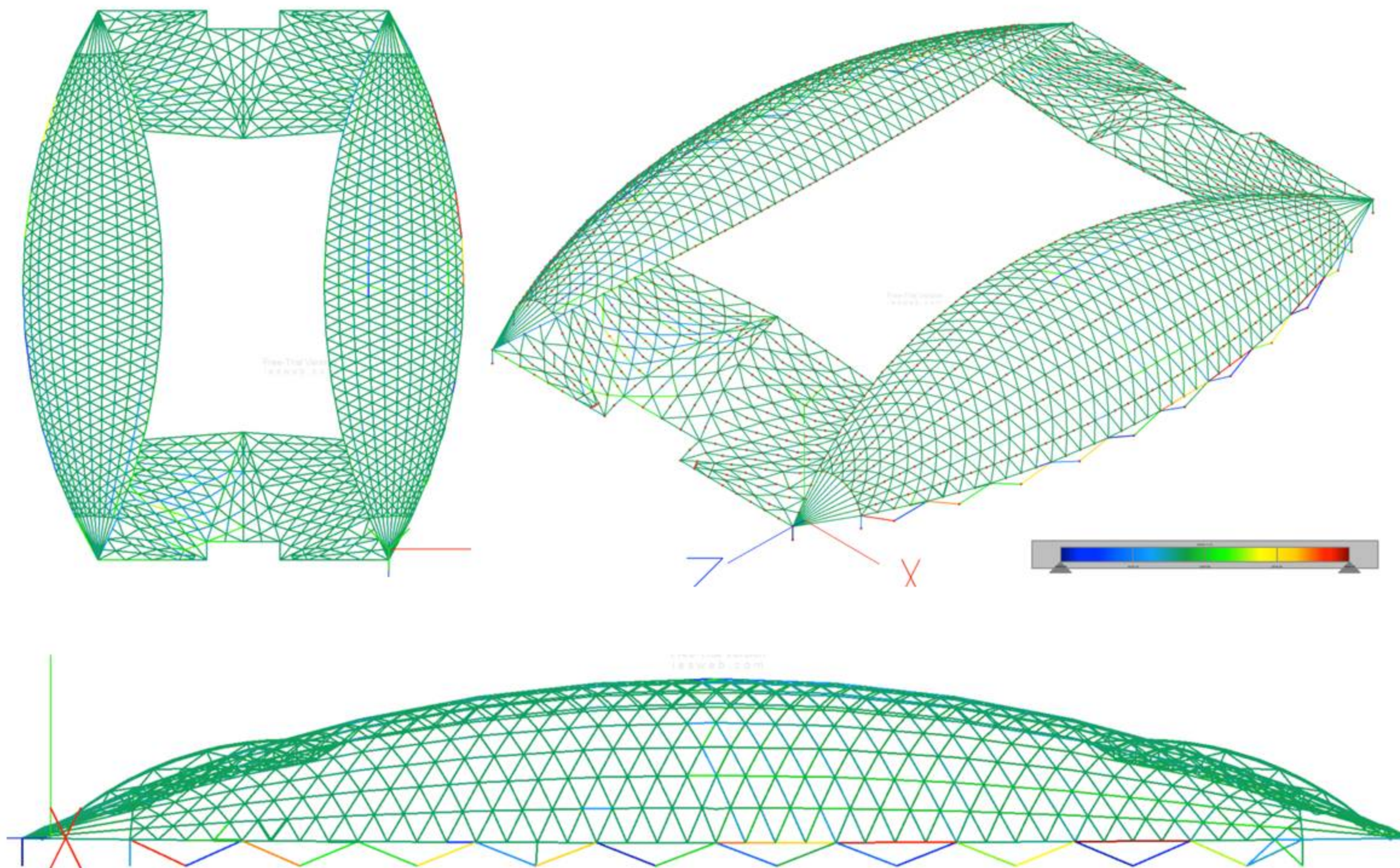
- Media facilities and luxury suites are on a dedicated floor
- Located centrally for optimum views of the field
- Spaces are conditioned via geothermal wells on site
- Railings separate the suite seating from the general seating



THIRD FLOOR

INTERIOR VIEWS





## DESIGN RESULTS

## SIMULATION PARAMETERS

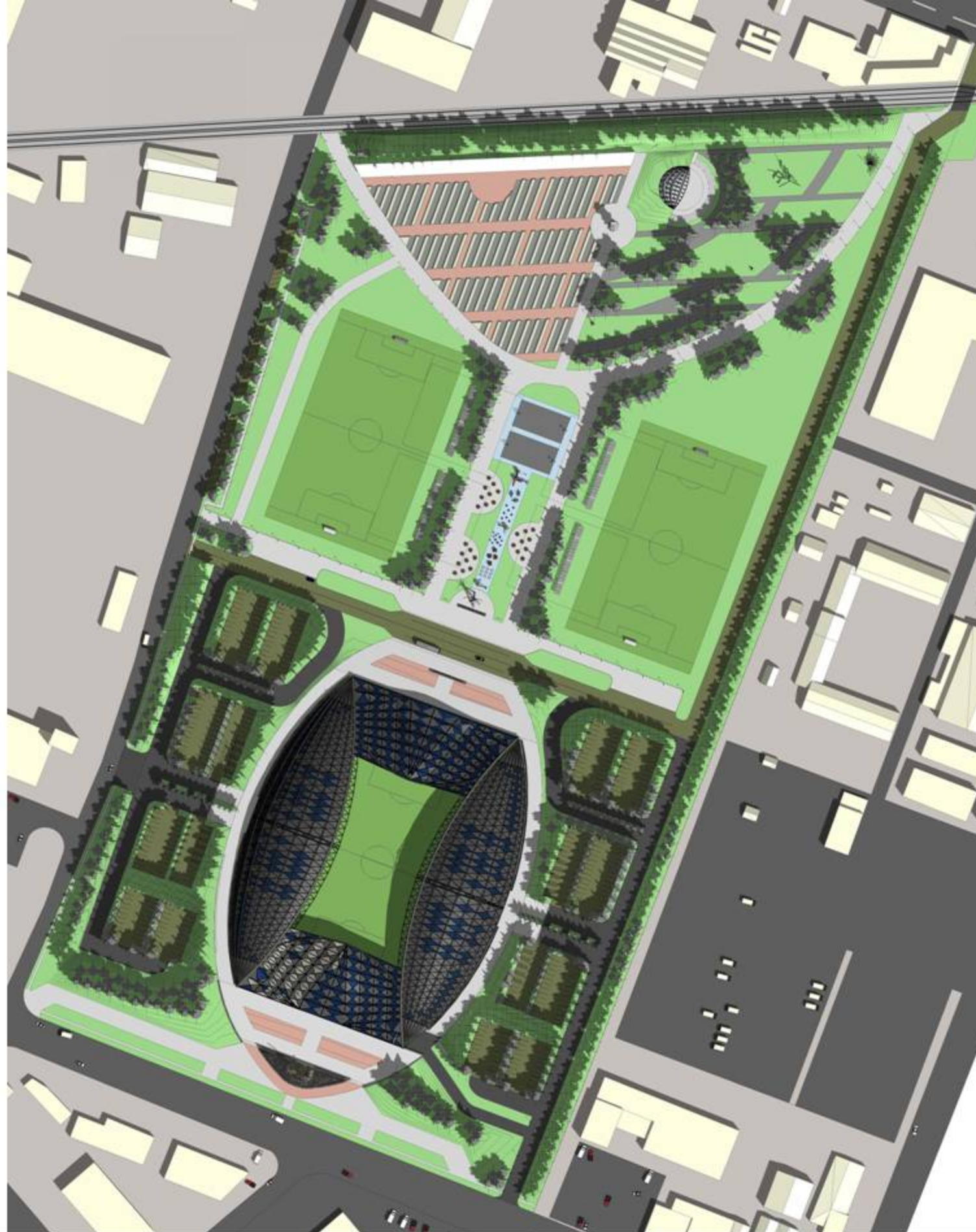
- Structure = HSS10X.625
- Total Self-Weight of Structure = 42,663 K
- Total Self-weight of Panels = 374,448 K
- Total Number of Connections 2,187 Nodes
- All Connections are Rigid Connections
- X Displacement - Fixed
- Y Displacement - Fixed
- Z Displacement - Fixed
- X Rotation - Free
- Y Rotation - Free
- Z Rotation - Free
- Live Loading - 7 PSF

## SIMULATION RESULTS

- Low Side Member Ex (K) - 1,030,733
- High Side Member Ex (K) - 970,216
- Median Member Ex (K) - 30,258
- 1 Heat Island Effect - Non-Roof
- 1 Water Efficient Landscaping
- 1 For Recycled Content
- 1 For Regional Materials

STRUCTURE DIAGRAM SIMULATIONS





FALL EQUINOX  
September 22<sup>nd</sup>

SHADOW STUDY

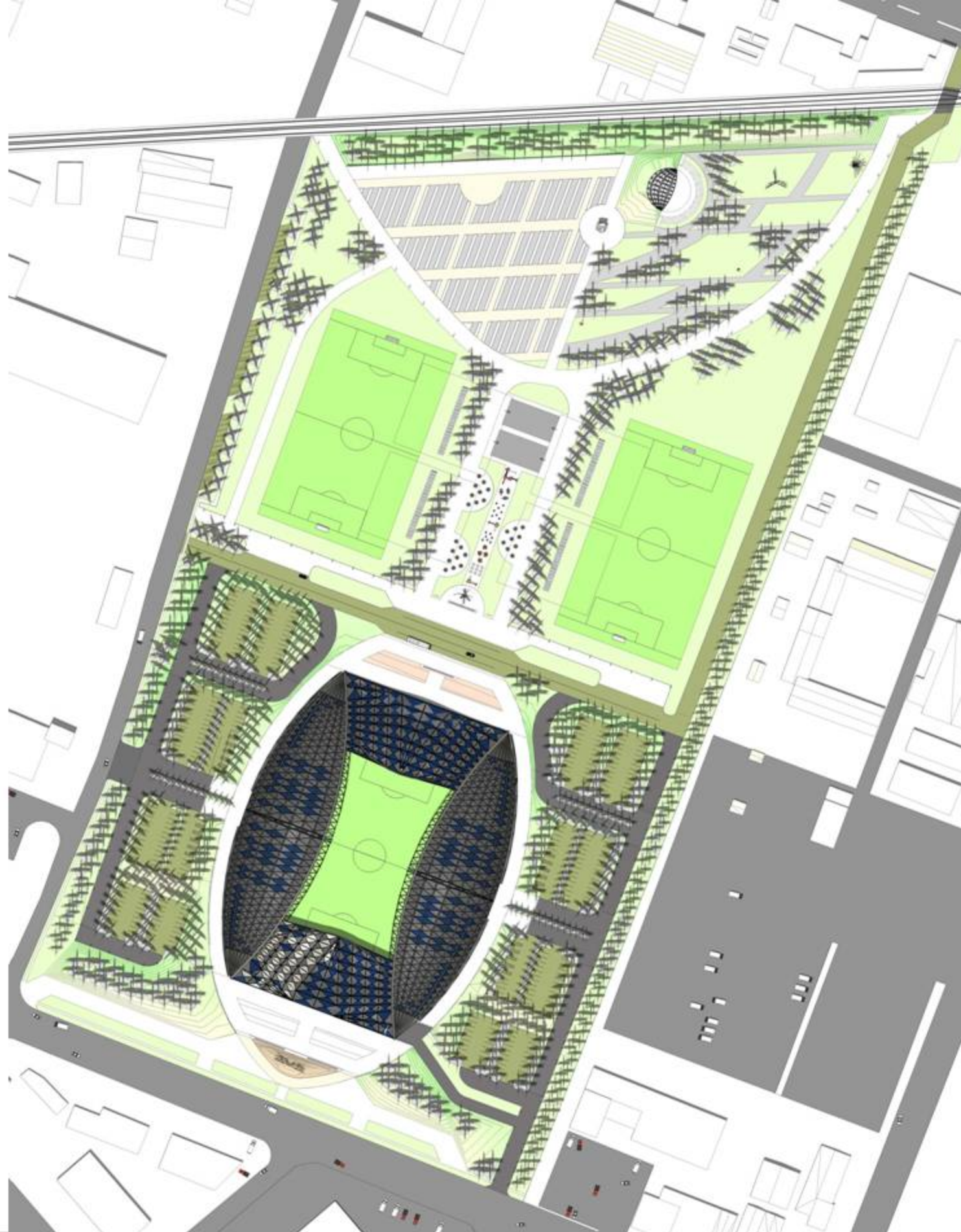




 **SPRING EQUINOX**  
March 20<sup>th</sup>

SHADOW STUDY

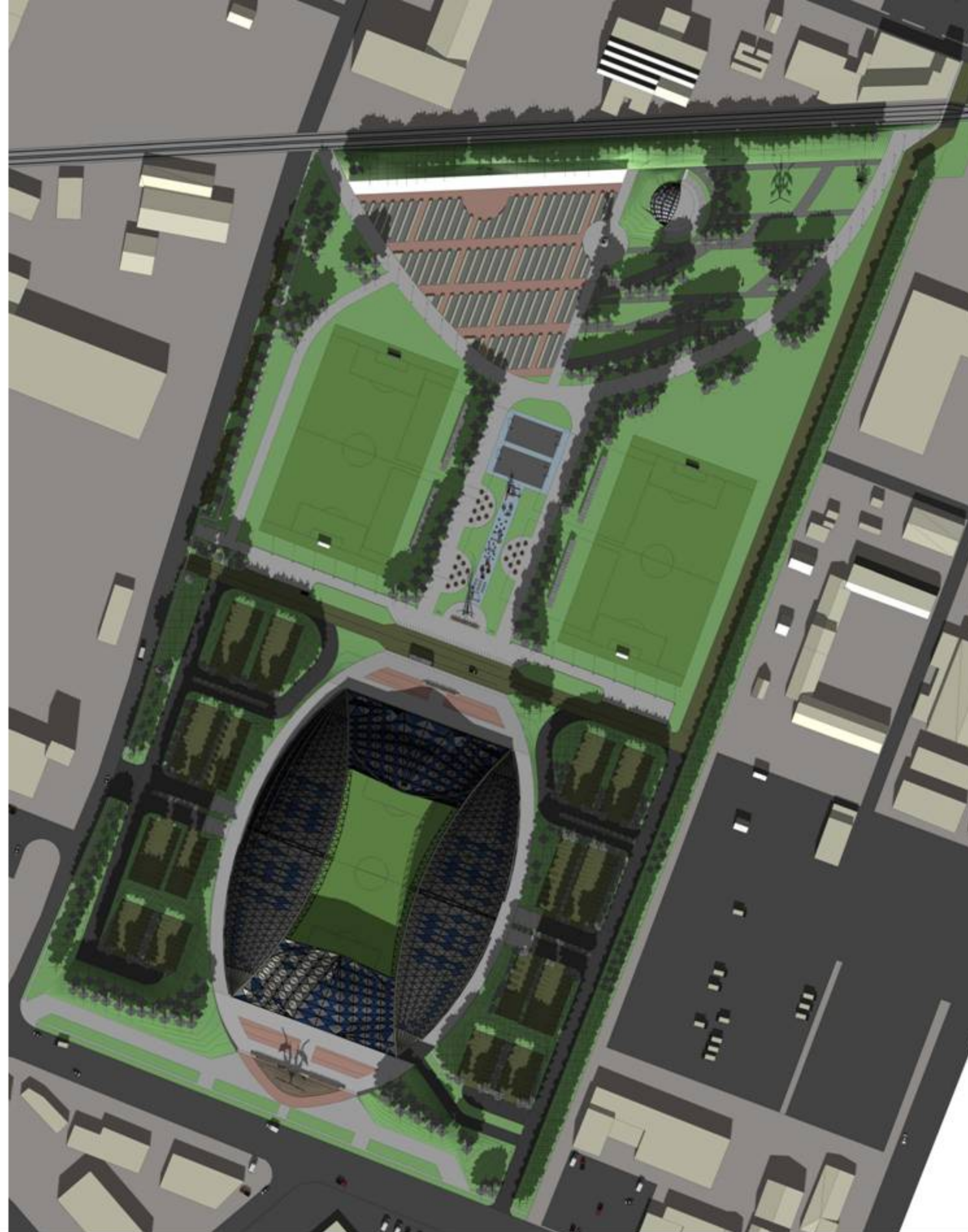




SUMMERSOLSTICE  
June 21<sup>st</sup>

SHADOW STUDY





WINTER SOLSTICE  
December 21<sup>st</sup>

SHADOW STUDY





# LEED 2009 for New Construction and Major Renovations

## Project Checklist

Montague Stadium and Park : Project Name

04/21/2013 : Date

## LEED POTENTIAL

- POTENTIAL 75 POINTS FROM CATEGORIES
- GOLD CERTIFICATION 60-79 POINTS

LEED POINTS

### 26 Sustainable Sites Possible Points: 26

Y	?	N			
Y			Prereq 1	Construction Activity Pollution Prevention	
Y			Credit 1	Site Selection	1
Y			Credit 2	Development Density and Community Connectivity	5
Y			Credit 3	Brownfield Redevelopment	1
Y			Credit 4.1	Alternative Transportation—Public Transportation Access	6
Y			Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	1
Y			Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles	3
Y			Credit 4.4	Alternative Transportation—Parking Capacity	2
Y			Credit 5.1	Site Development—Protect or Restore Habitat	1
Y			Credit 5.2	Site Development—Maximize Open Space	1
Y			Credit 6.1	Stormwater Design—Quantity Control	1
Y			Credit 6.2	Stormwater Design—Quality Control	1
Y			Credit 7.1	Heat Island Effect—Non-roof	1
Y			Credit 7.2	Heat Island Effect—Roof	1
Y			Credit 8	Light Pollution Reduction	1

### 10 Water Efficiency Possible Points: 10

Y			Prereq 1	Water Use Reduction—20% Reduction	
Y			Credit 1	Water Efficient Landscaping	2 to 4
Y			Credit 2	Innovative Wastewater Technologies	2
Y			Credit 3	Water Use Reduction	2 to 4

### 17 Energy and Atmosphere Possible Points: 35

Y			Prereq 1	Fundamental Commissioning of Building Energy Systems	
Y			Prereq 2	Minimum Energy Performance	
Y			Prereq 3	Fundamental Refrigerant Management	
Y			Credit 1	Optimize Energy Performance	1 to 19
Y			Credit 2	On-Site Renewable Energy	1 to 7
			Credit 3	Enhanced Commissioning	2
			Credit 4	Enhanced Refrigerant Management	2
			Credit 5	Measurement and Verification	3
			Credit 6	Green Power	2

### 7 Materials and Resources Possible Points: 14

Y			Prereq 1	Storage and Collection of Recyclables	
			Credit 1.1	Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 3
			Credit 1.2	Building Reuse—Maintain 50% of Interior Non-Structural Elements	1
Y			Credit 2	Construction Waste Management	1 to 2
			Credit 3	Materials Reuse	1 to 2

### Materials and Resources, Continued

Y	?	N			
Y			Credit 4	Recycled Content	1 to 2
Y			Credit 5	Regional Materials	1 to 2
Y			Credit 6	Rapidly Renewable Materials	1
			Credit 7	Certified Wood	1

### 15 Indoor Environmental Quality Possible Points: 15

Y			Prereq 1	Minimum Indoor Air Quality Performance	
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	
Y			Credit 1	Outdoor Air Delivery Monitoring	1
Y			Credit 2	Increased Ventilation	1
Y			Credit 3.1	Construction IAQ Management Plan—During Construction	1
Y			Credit 3.2	Construction IAQ Management Plan—Before Occupancy	1
Y			Credit 4.1	Low-Emitting Materials—Adhesives and Sealants	1
Y			Credit 4.2	Low-Emitting Materials—Paints and Coatings	1
Y			Credit 4.3	Low-Emitting Materials—Flooring Systems	1
Y			Credit 4.4	Low-Emitting Materials—Composite Wood and Agrifiber Products	1
Y			Credit 5	Indoor Chemical and Pollutant Source Control	1
Y			Credit 6.1	Controllability of Systems—Lighting	1
Y			Credit 6.2	Controllability of Systems—Thermal Comfort	1
Y			Credit 7.1	Thermal Comfort—Design	1
Y			Credit 7.2	Thermal Comfort—Verification	1
Y			Credit 8.1	Daylight and Views—Daylight	1
Y			Credit 8.2	Daylight and Views—Views	1

### Innovation and Design Process Possible Points: 6

			Credit 1.1	Innovation in Design: Specific Title	1
			Credit 1.2	Innovation in Design: Specific Title	1
			Credit 1.3	Innovation in Design: Specific Title	1
			Credit 1.4	Innovation in Design: Specific Title	1
			Credit 1.5	Innovation in Design: Specific Title	1
			Credit 2	LEED Accredited Professional	1

### Regional Priority Credits Possible Points: 4

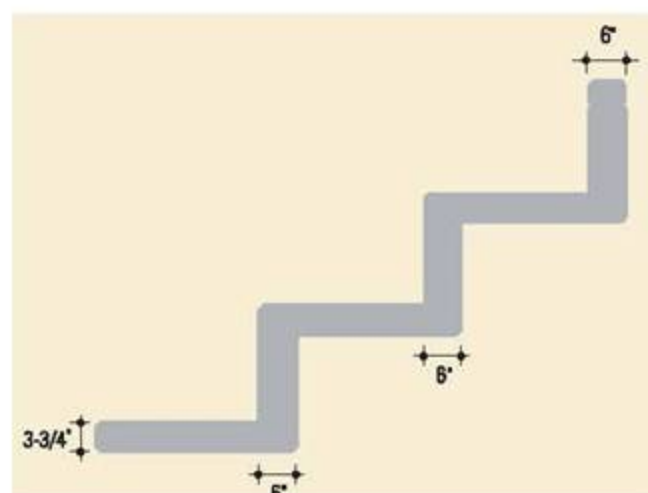
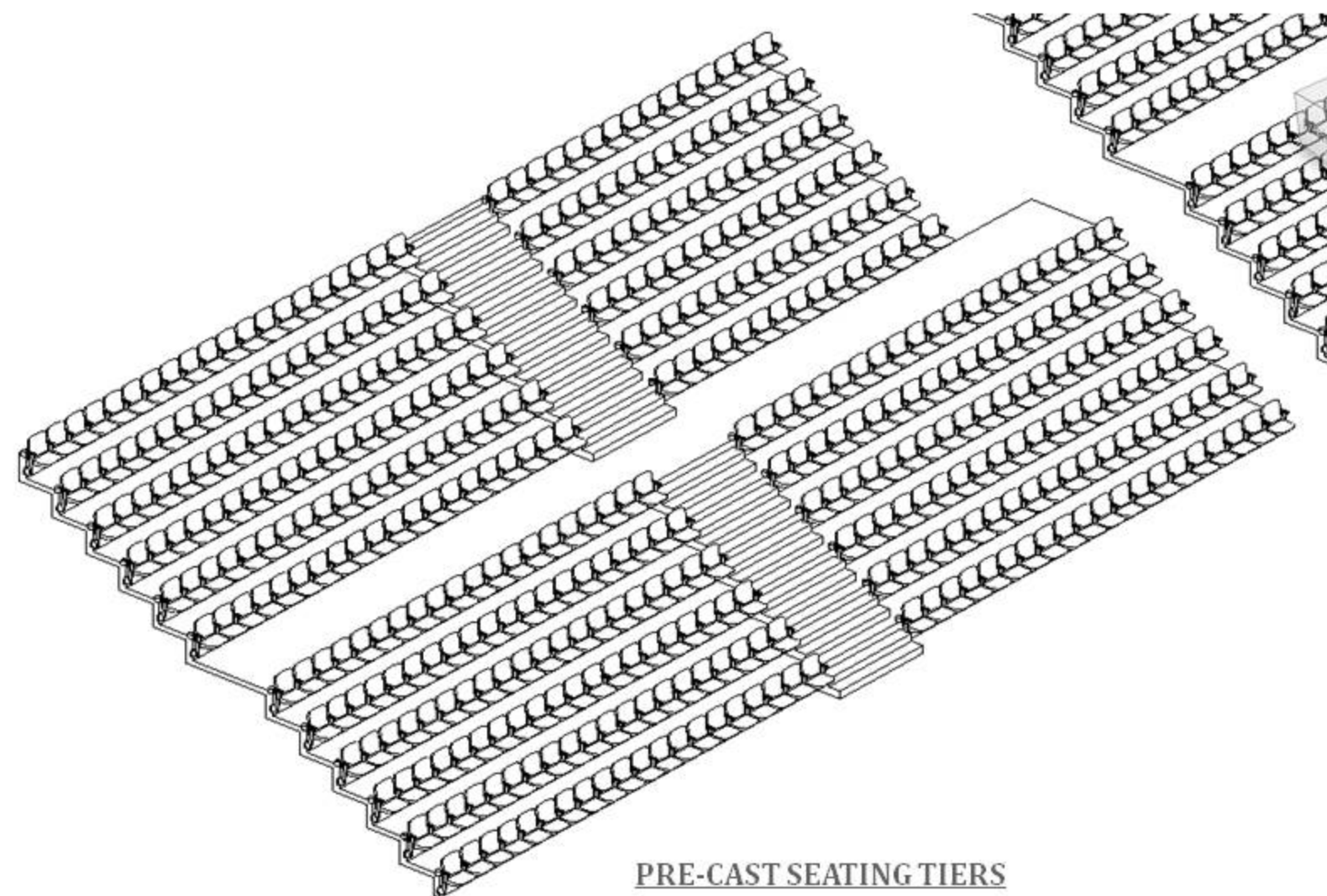
			Credit 1.1	Regional Priority: Specific Credit	1
			Credit 1.2	Regional Priority: Specific Credit	1
			Credit 1.3	Regional Priority: Specific Credit	1
			Credit 1.4	Regional Priority: Specific Credit	1

### 75 Total Possible Points: 110

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110

Montague Park: CHATTANOOGA, TN





Typical Grandstand Section—Type B



Stadia Triple Tread



#### LEED® PROJECT CHECKLIST: PRECAST CONCRETE POTENTIAL POINTS

LEED Category	Credit or Prerequisite Title	Points Available	
		LEED NC v2.2	LEED 2009
Sustainable Sites	SS Credit 5.1: Site Development: Protect or Restore Habitat	1	1
	SS Credit 7.1: Heat Island Effect: Non-Roof	1	1
	<b>SS Subtotal</b>	<b>2</b>	<b>2</b>
Energy and Atmosphere	EA Prerequisite 2: Minimum Energy Performance	Required	Required
	EA Credit 1: Optimize Energy Performance	1-10	1-19
	<b>EA Subtotal</b>	<b>10</b>	<b>19</b>
Materials and Resources	MR Credit 2.1: Construction Waste Management: Divert 50% From Disposal	1	1
	MR Credit 2.2: Construction Waste Management: Divert 75% From Disposal	1	1
	MR Credit 4.1: Recycled Content: 10% (post-consumer + pre-consumer)	1	1
	MR Credit 4.2: Recycled Content: 20% (post-consumer + pre-consumer)	1	(1)
	MR Credit 5.1: Regional Materials: 10% Extracted, Processed, & Manufactured Region	1	1
	MR Credit 5.2: Regional Materials: 20% Extracted, Processed, & Manufactured Region	1	1
	<b>MR Subtotal</b>	<b>6</b>	<b>6</b>
Indoor Environmental Quality	EQ Credit 3.1: Construction Indoor Air Quality Management Plan: During Construction	1	1
	<b>EQ Subtotal</b>	<b>1</b>	<b>1</b>
Innovation and Design Process	ID Credit 1.1: Innovation & Design Provide Specific Title	1*	1
	ID Credit 1.2: Innovation & Design Provide Specific Title	1*	1*
	ID Credit 1.3: Innovation & Design Provide Specific Title	1*	1*
	ID Credit 1.4: Innovation & Design Provide Specific Title	1*	1*
	ID Credit 1.5: Innovation & Design Provide Specific Title	-	1*
	ID Credit 2: LEED® Accredited Professional	1	1
	<b>ID Subtotal</b>	<b>1</b>	<b>2</b>
<b>Project Totals</b>		<b>20</b>	<b>29</b>

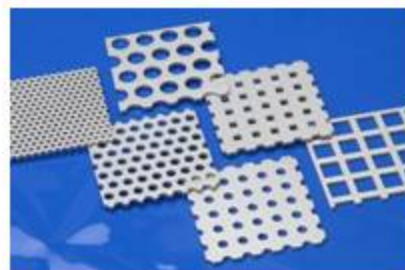
\*Up to 4 additional points can be earned, must be submitted and approved (not included in total).  
LEED NC v2.2: LEED Certified = 26 points LEED 2009: LEED Certified = 40 points  
(\*) Number of additional points earned, obtained in ID.

#### FEATURES:

- Manufactured by li-HIGH CONCRETE GROUP, LLC.
- Pre-cast concrete tiers to be assembled on site
- Optimum seating angle
- LEED points available for recycled content, waste management, and regional materials
- Accessible seating is provided at the bottom of each tier

#### SEATING TIERS





SOURCE:  
<http://www.crl-arch.com/>

05 73 00 Hand Rails and Railings	LEED® Statement	Potential Points
Material and Resources Credit 4: Recycled Content	C.R. Laurence Hand Rails and Railings are factory fabricated out of aluminum made from a minimum of 50% post-consumer recycled content. Stainless Steel made from a minimum of 65% post-consumer recycled content.	2
Material and Resources Credit 5: Regional Materials	C.R. Laurence Hand Rails and Railings are manufactured in Los Angeles, CA. Location of the project will determine the points applicable.	2
Indoor Environmental Quality Credit 3.1: Construction Management Plan	C.R. Laurence Hand Rails and Railings are factory fabricated. Because of this, no cutting, drilling or filing is required on-site, increasing indoor air quality for the trades people and other occupants.	1
Indoor Environmental Quality Credit 4.2: Low-Emitting Materials	C.R. Laurence Hand Rails and Railings are factory finished, requiring no field finishing. All VOC's are filtered and incinerated allowing no escape into the environment.	1
07 42 00 Composite Panel Systems		
Material and Resources Credit 4: Recycled Content	C.R. Laurence Composite Panels attachment contains a minimum of 50% post-consumer recycled content. Our composite materials contain a minimum of 45% pre-consumer recycled content.	2
Material and Resources Credit 5: Regional Materials	C.R. Laurence Composite Panels are manufactured in Los Angeles, CA. Location of the project will determine the points applicable.	2
Indoor Environmental Quality Credit 3.1: Construction Management Plan	C.R. Laurence Composite Panel Systems are factory fabricated because of this, no cutting, drilling or filing is required on-site, increasing indoor air quality for the trades people and other occupants.	1
Indoor Environmental Quality Credit 4.2: Low-Emitting Materials	C.R. Laurence Composite Panel Systems are factory finished, requiring no field finishing. All VOC's are filtered and incinerated allowing no escape into the environment.	1
08 41 00 Entrances and Storefronts		
Material and Resources Credit 4: Recycled Content	C.R. Laurence Entrances and Storefronts are factory fabricated out of aluminum and extrusions made from a minimum of 50% post-consumer recycled content. Stainless Steel made from a minimum of 65% post-consumer recycled content.	2
Material and Resources Credit 5: Regional Materials	C.R. Laurence Entrances and Storefronts are manufactured in Los Angeles, CA. Location of the project will determine the points applicable.	2
Indoor Environmental Quality Credit 3.1: Construction Management Plan	C.R. Laurence Entrances and Storefronts are factory fabricated because of this, no cutting, drilling or filing is required on-site, increasing indoor air quality for the trades people and other occupants.	1
Indoor Environmental Quality Credit 4.2: Low-Emitting Materials	C.R. Laurence Entrances and Storefronts are factory finished, requiring no field finishing. All VOC's are filtered and incinerated allowing no escape into the environment.	1
Indoor Environmental Quality Credit 8.1: Daylight and Views - Daylight	C.R. Laurence Entrances and Storefronts enhance daylight penetration into building spaces to achieve a greater daylight factor.	1

All details and specs available at [crlaurence.com](http://crlaurence.com).  
 LEED and the related logo is a trademark owned by the U.S. Green Building Council and used with Permission.

1

## STADIUM CLADDING

### PERFORATED ALUMINUM PANELING

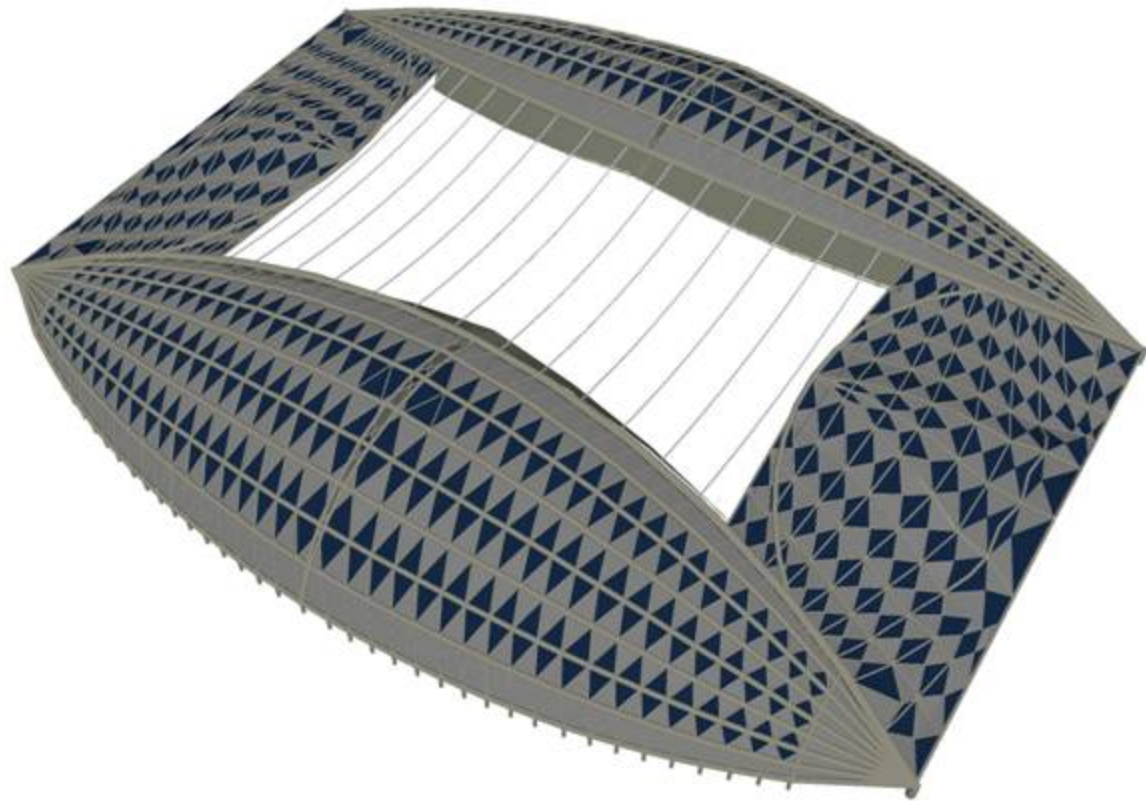
- NATURAL VENTILATION
- NATURAL LIGHT
- SHADING DEVICE REDUCING INTERIOR HEAT

### QUALITIES

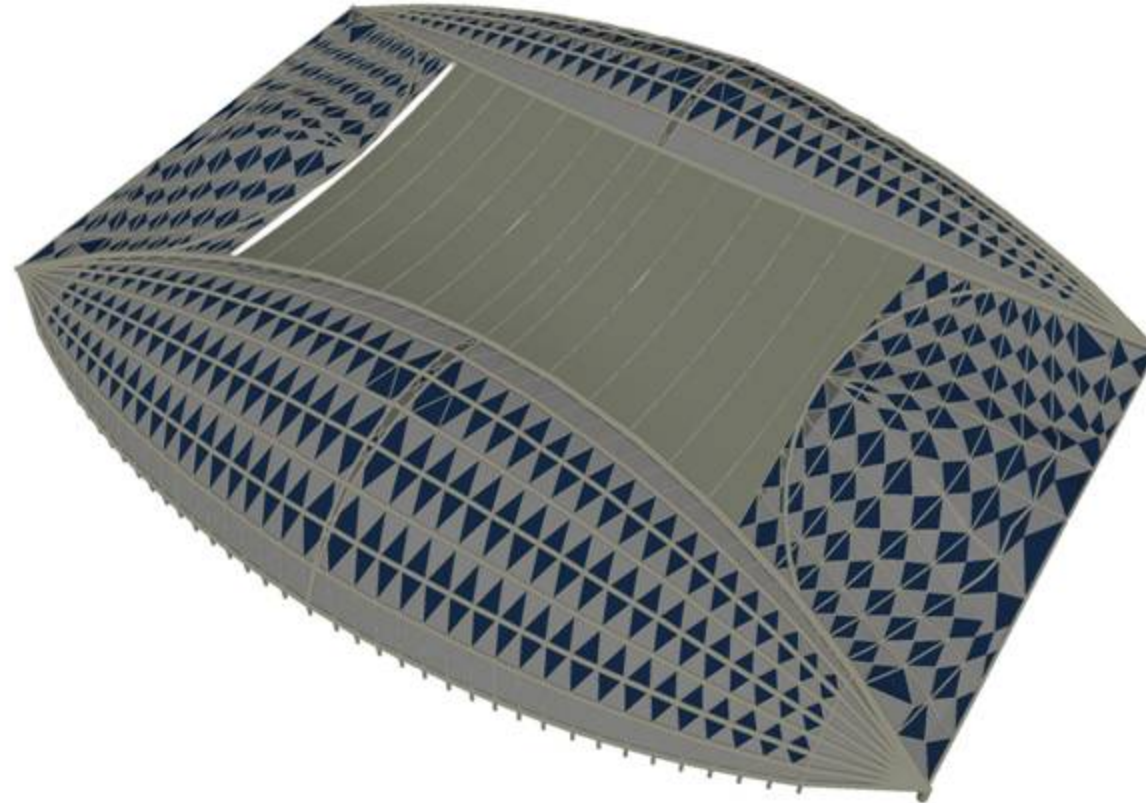
- RECYCLED CONTENT
- LOW-EMITTING MATERIALS

## STADIUM - MATERIALS

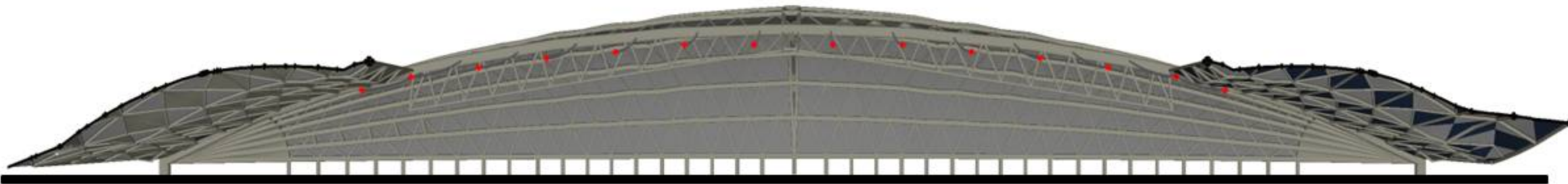




OPEN ROOF



CLOSED ROOF



ROOF SECTION

### BENEFITS

- Lower Embodied Energy
- Faster Pay Back Period
- Reduced Weight
- Flexibility
- Resilience

### LEED POTENTIAL

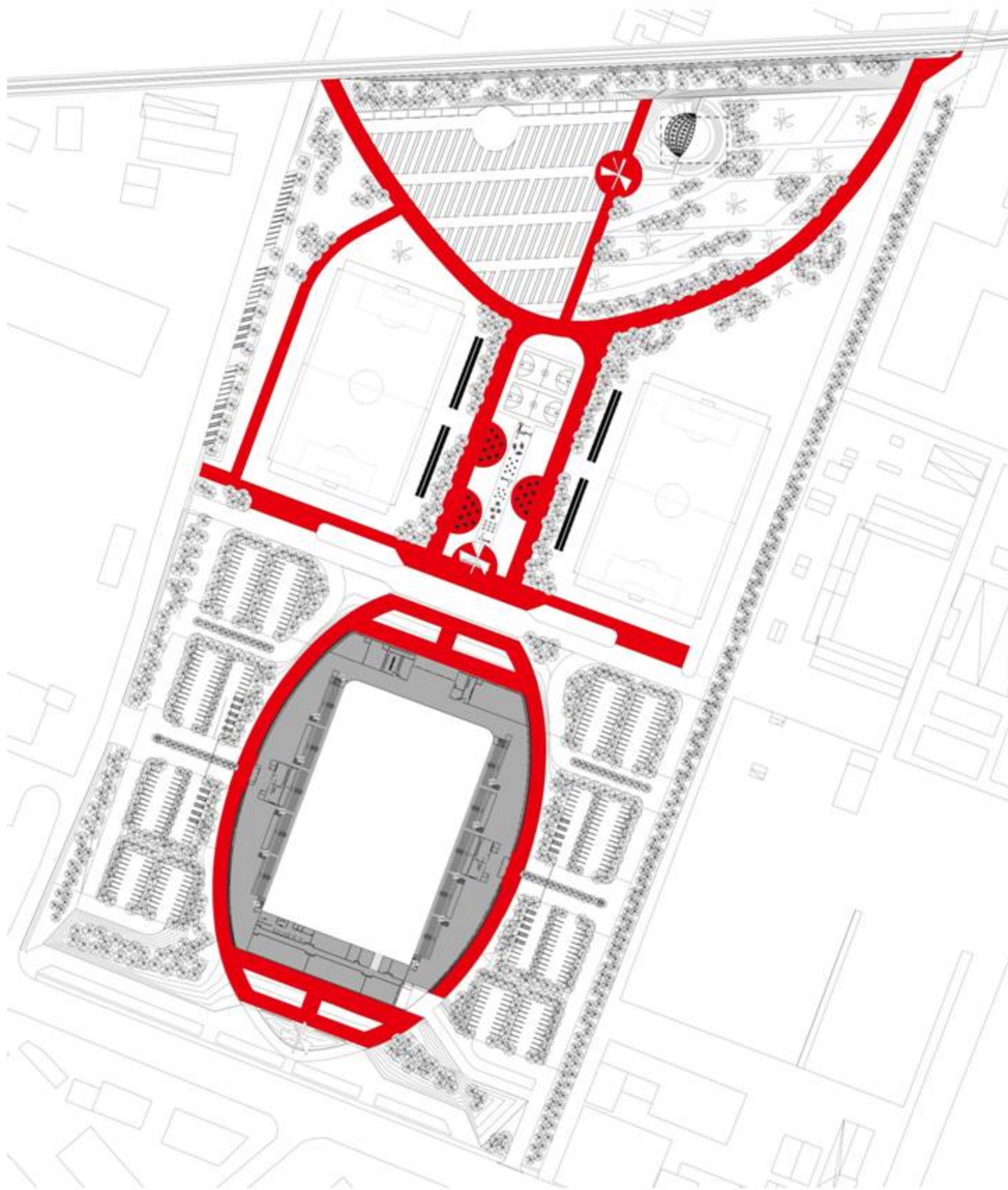
- 1 Minimum Energy Performance
- 1-7 On-Site Renewable Energy
- 2 Green Power
- 1-5 Innovation in Design

### PRODUCTION

- Square Footage of Roof = 60,000 SqFt
- Energy Potential of Site =  
- 440 w/hr/SqFt/day
- Energy Produced = 26,400 Kwh/day
- Efficiency 60% = 15,840 Kwh/day

RETRACTABLE ROOF





## LOCATIONS

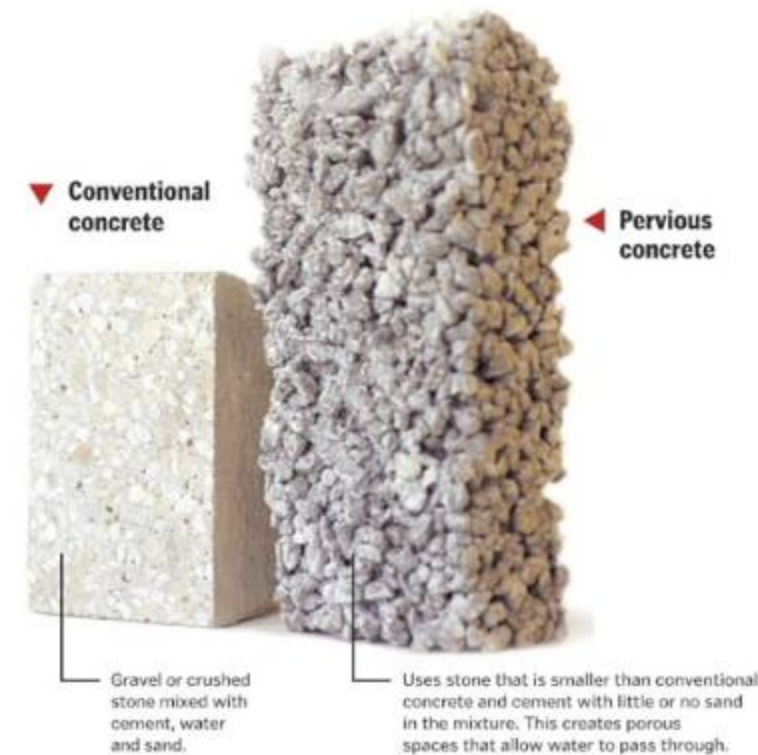


IMAGE SOURCE:  
[http://www.greentechnolog.com/2011/10/bay\\_area\\_pervious\\_concrete.html](http://www.greentechnolog.com/2011/10/bay_area_pervious_concrete.html)

## BENEFITS

- Reduces Rain Water Run Up
- Eliminates the Need for Retention Ponds, Swales, and other Stormwater Management Devices
- Recycled Content
- Traps Contaminates and Allows for Natural Filtration
- Reduces Heat Island Effect

## LEED POTENTIAL

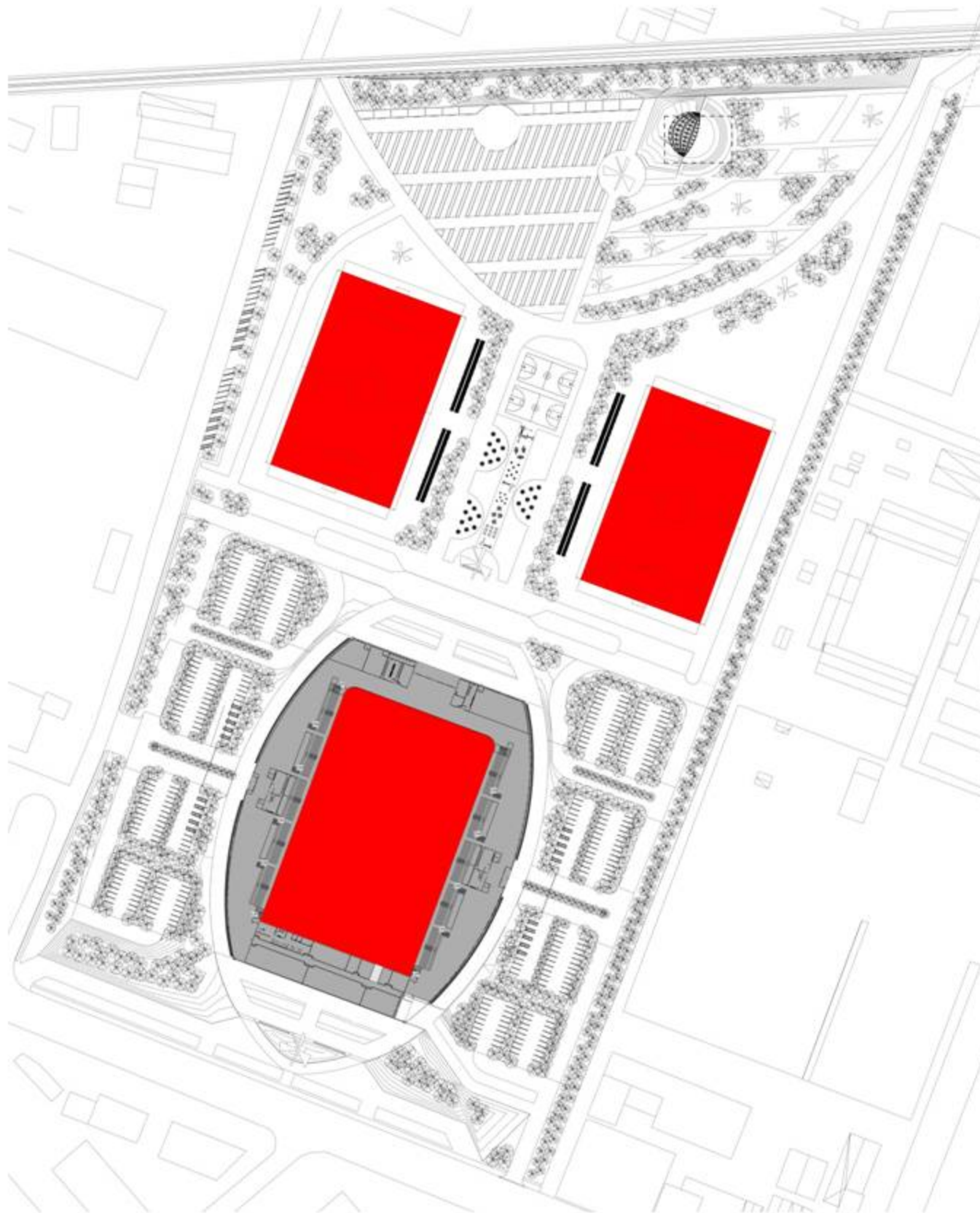
- 1 Stormwater Design
- 1 Heat Island Effect – Non-Roof
- 1 Water Efficient Landscaping
- 1 For Recycled Content
- 1 For Regional Materials

## HIGH PERFORMANCE BUILDING CODE

- Requirement – 50% of Paving Material SRI of 29%
  - 40% of Paving Material to be Pervious
- Performance – SRI Value Starts at 35
  - 90% of Paved Surface is Pervious

## PERVIOUS CONCRETE MATERIAL





## LOCATIONS

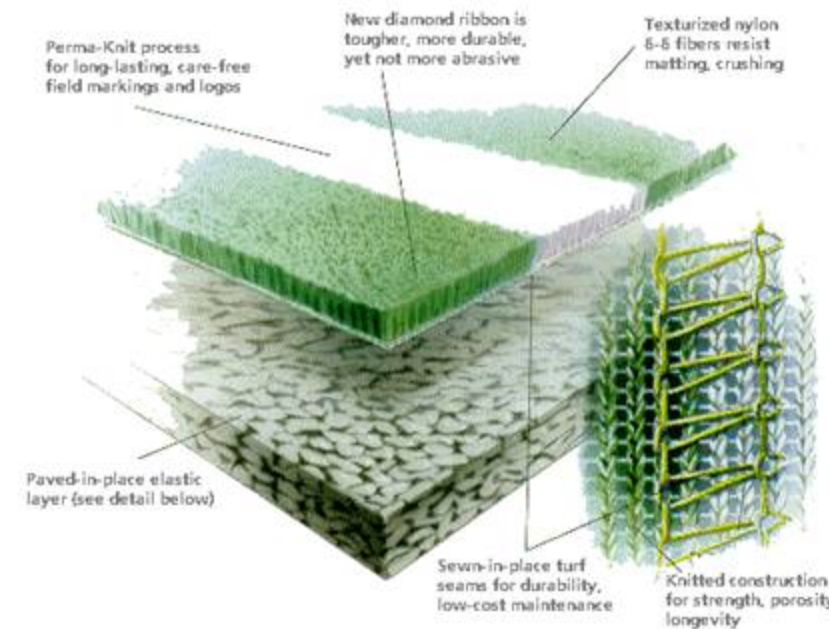


IMAGE SOURCE:  
<http://www.astroturf.com/products>

## BENEFITS

- Requires little to no maintenance
- There is no need for watering or use of pesticides or fertilizers
- High durability
- Recycled Content
- Surface can be used year round
- Improved Surface Traction

## LEED POTENTIAL

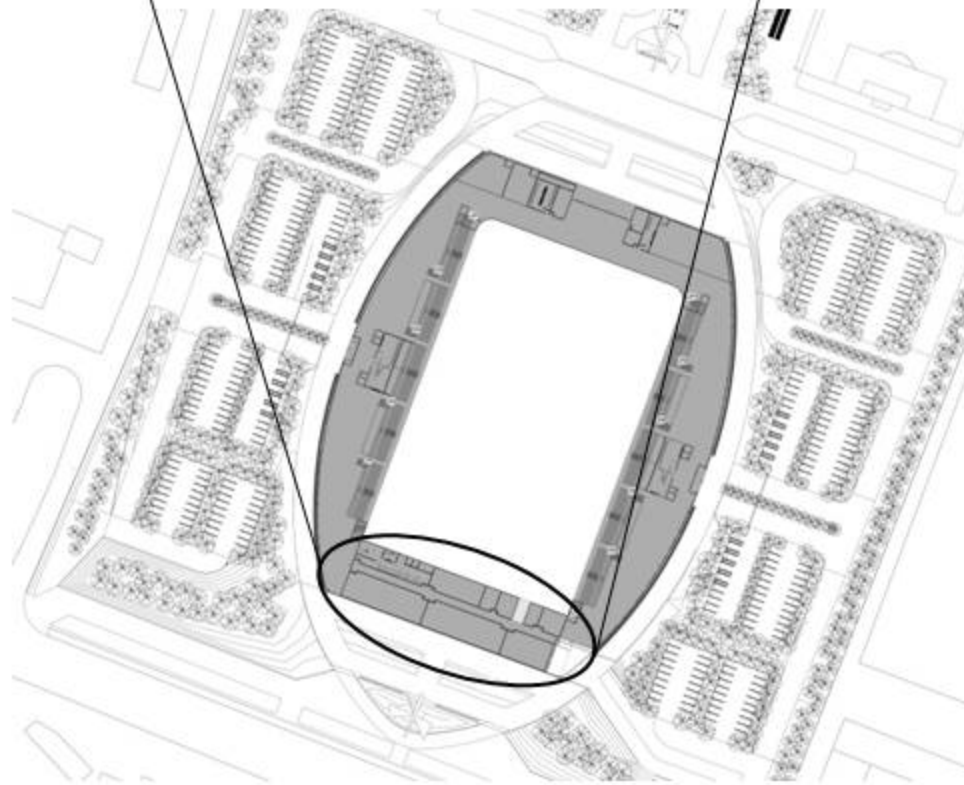
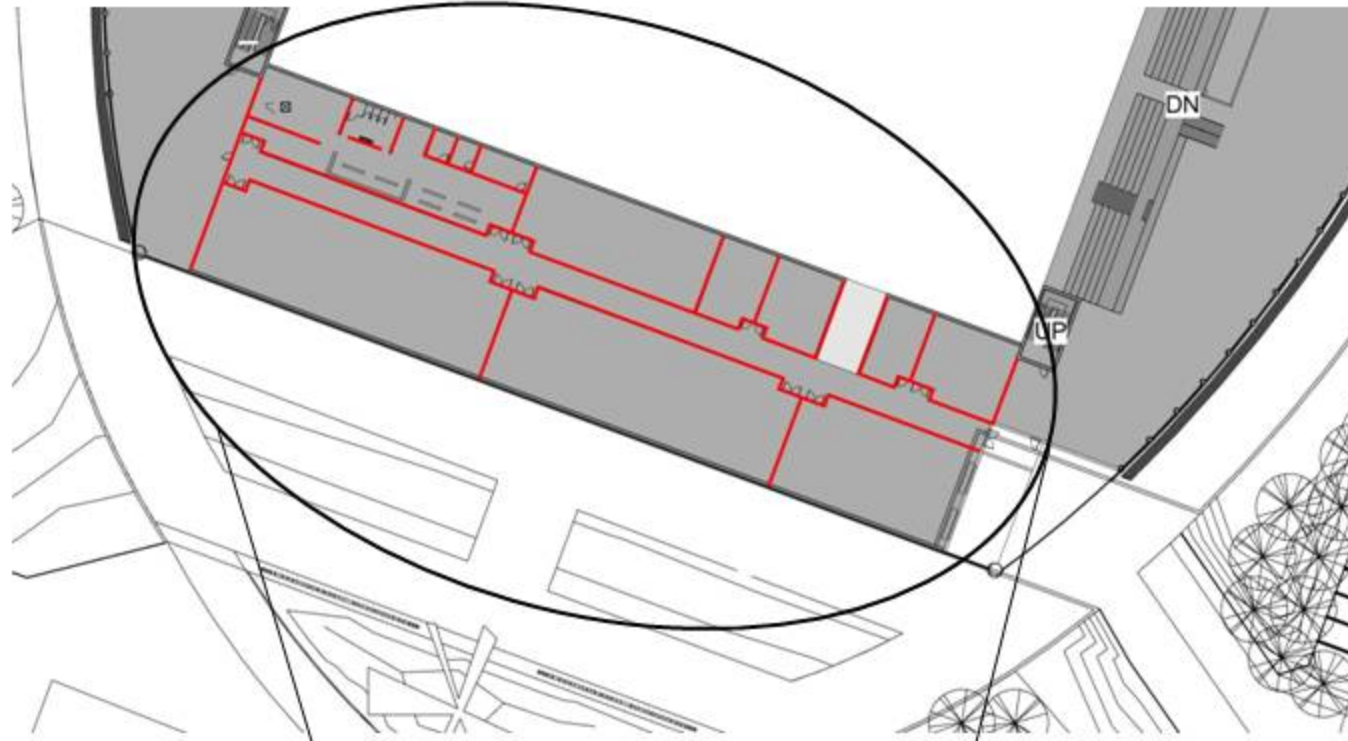
- 1 For Water Efficiency Landscaping
- +1 For No Potable Water or Irrigation
- 1 Construction Waste Divert
- 1 For Material Reuse
- 1 For Recycled Content
- 1 For Regional Materials

## HIGH PERFORMANCE BUILDING CODE

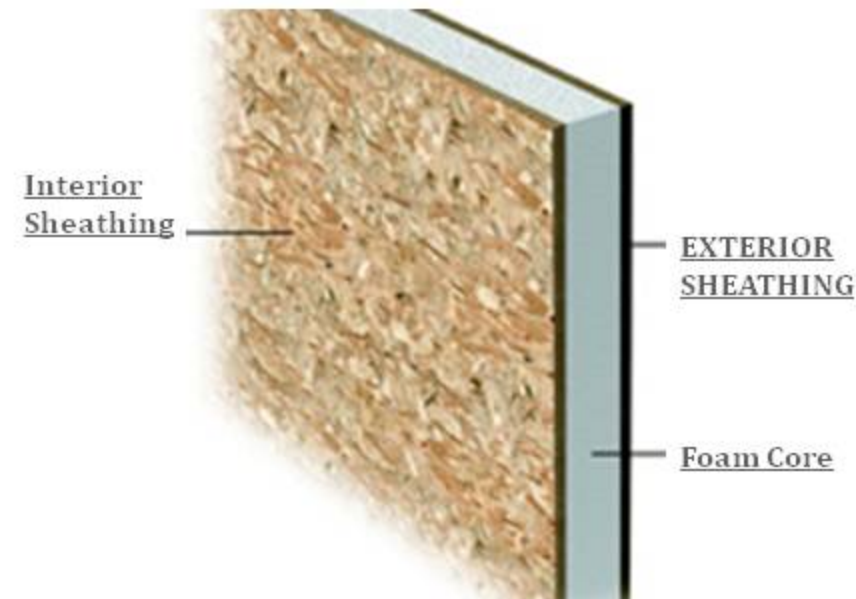
- Requirement – Potable Water can be used to water 1/3 of landscape
- Performance – 0% of Landscape is Irrigated with Potable Water

## ASTRO TURF MATERIAL





LOCATIONS



(SIP) PANEL CONSTRUCTION

## BENEFITS

- Composite material used from recycled content
- Prefabrication reduces waste on the job site and decreases installation time
- Tighter building construction reducing energy needed to heat or cool space
- OSB stronger than traditional wall framing methods
- Higher overall R-value

## LEED POTENTIAL

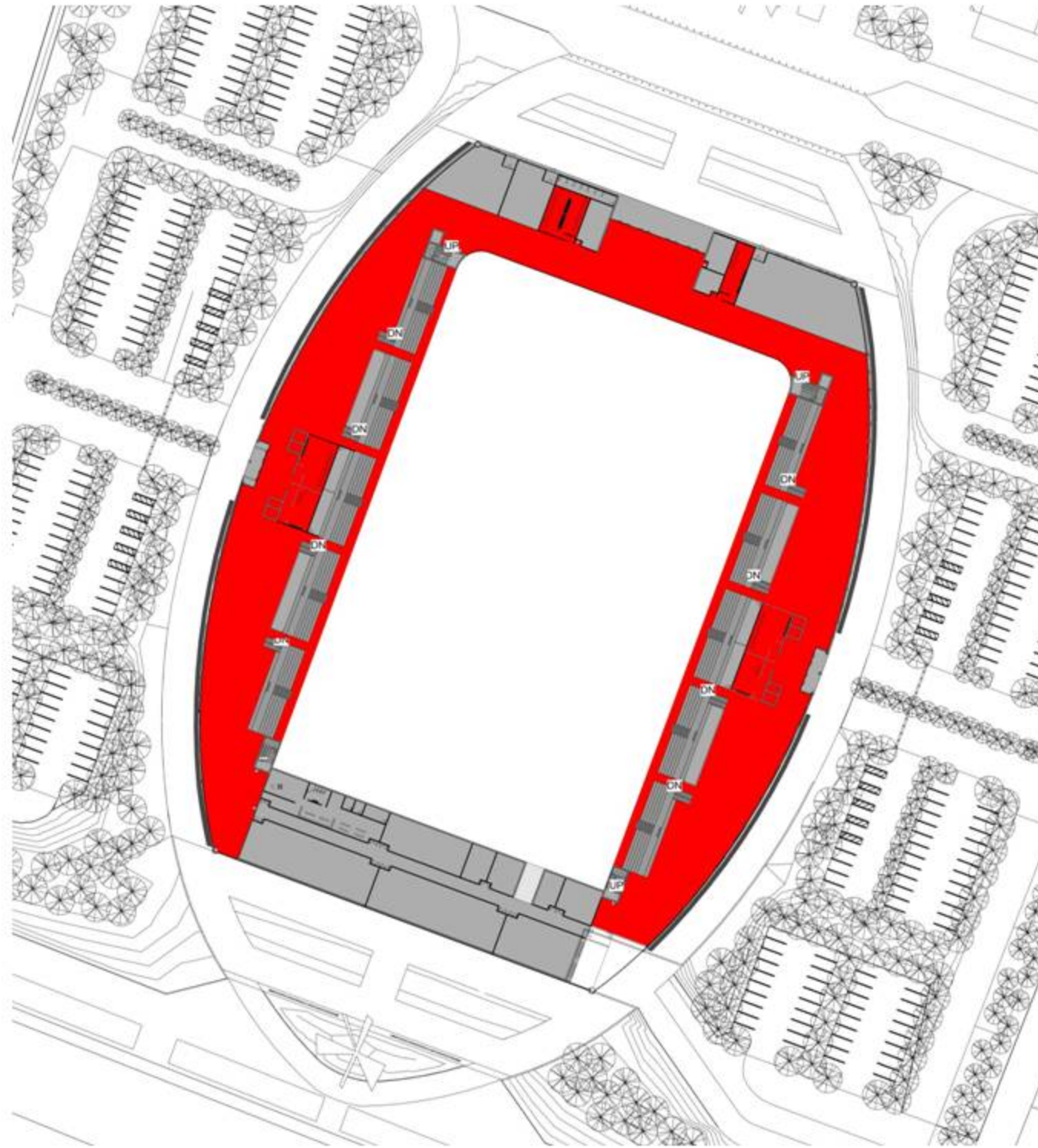
- 1-19 For Optimize Energy Performance
- 1-2 For Construction Waste Management
- 1-2 For Regional Materials
- 1 For Certified Wood
- 1 For Low Emitting Materials

## HIGH PERFORMANCE BUILDING CODE

- Requirement - R-Value of 13
- Performance - 4 ½" = R-Value of 16  
6 ½" = R-Value of 23

## STRUCTURAL INSULATED PANELS





LOCATION



IMAGE SOURCE:  
<http://www.generalprecastconcrete.com/productshollow.php>

## BENEFITS

- Increased Span Length
- Lower Sound Transmission
- Fire Resistance
- Rapid Insulation
- Increased Thermal Mass
- Less Material

## LEED POTENTIAL

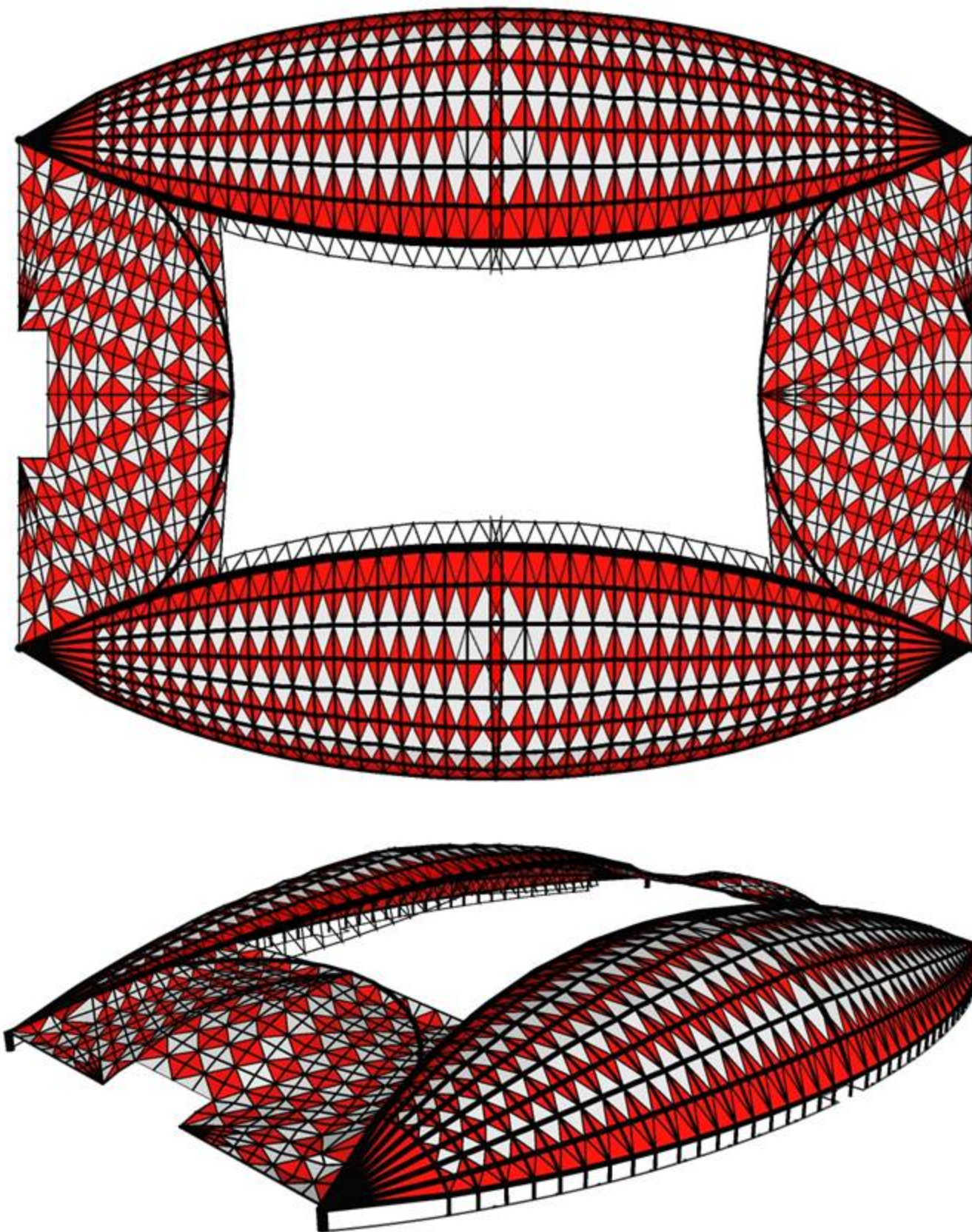
- 2 Recycle Content
- 1 Construction Waste Reduction
- 1-10 Optimized Energy Performance

## HIGH PERFORMANCE BUILDING CODE

- Requirement – R-Value of 10.4% with Continuous Insulation
- Performance – R-Value OF 14.3% with 2" Rigid Insulation Top

PRE-STRESSED HOLLOW CORE  
CONCRETE PLANKS





## LOCATION



IMAGE SOURCE:  
<http://www.dezeen.com>



IMAGE SOURCE:  
<http://www.archdaily.com>

## BENEFITS

- Light Weight
- Self-Cleaning
- Lower Carbon Footprint
- Rapid Insulation
- Easily Customize Surface Pattern and Opacity

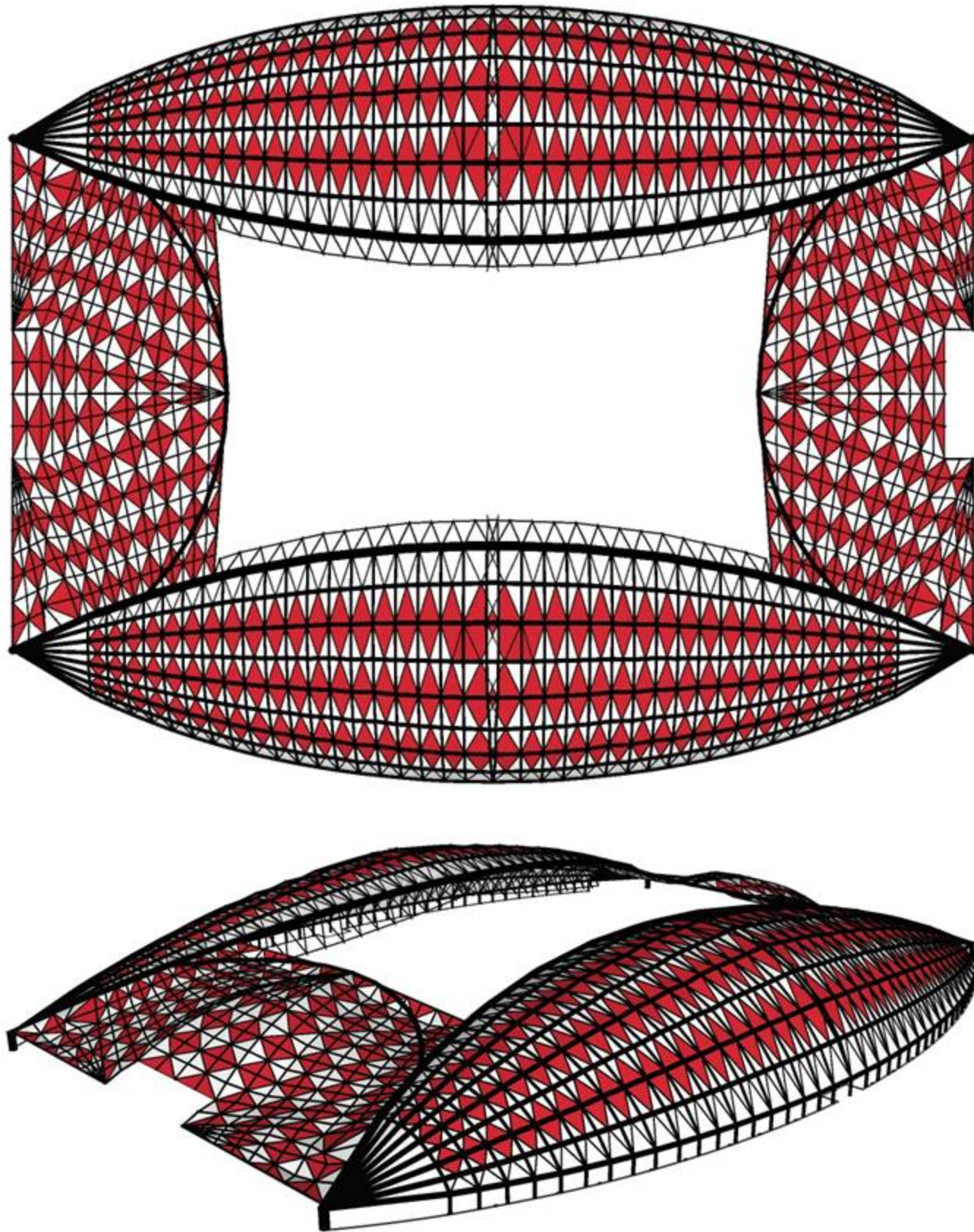
## LEED POTENTIAL

## HIGH PERFORMANCE BUILDING CODE

- Requirement – 75% of Unused Roof SRI of 78
- Performance – R-Value OF 14.3% with 2" Rigid Insulation Top

ETFE PANELS





## LOCATION



IMAGE SOURCE:  
<http://cleantechnica.com/2013/05/12/renesola-allowed-to-commence-solar-leasing/>

## BENEFITS

- Low Maintenance
- Lower Carbon Footprint
- Rapid Insulation

## LEED POTENTIAL

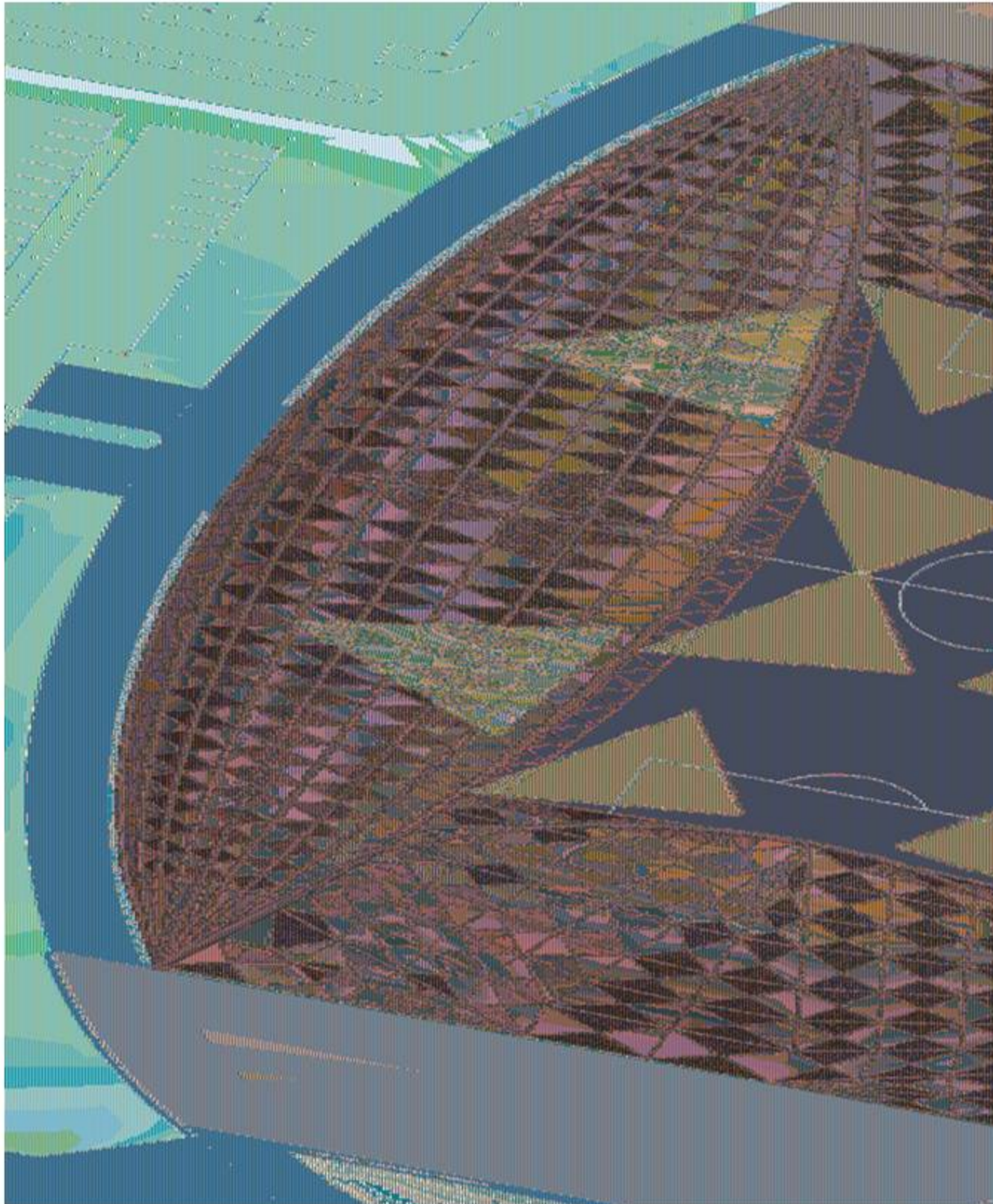
- 1 Minimum Energy Performance
- 1-7 On-Site Renewable Energy
- 2 Green Power
- 1-5 Innovation in Design

## PRODUCTION

- Square Footage of Roof = 40,000 SqFt
- Energy Potential of Site =  
 - 440 w/hr/SqFt/day
- Energy Produced = 17,600 Kwh/day
- Efficiency 80% = 14,080 Kwh/day

SOLAR PANELS





## LOCATIONS

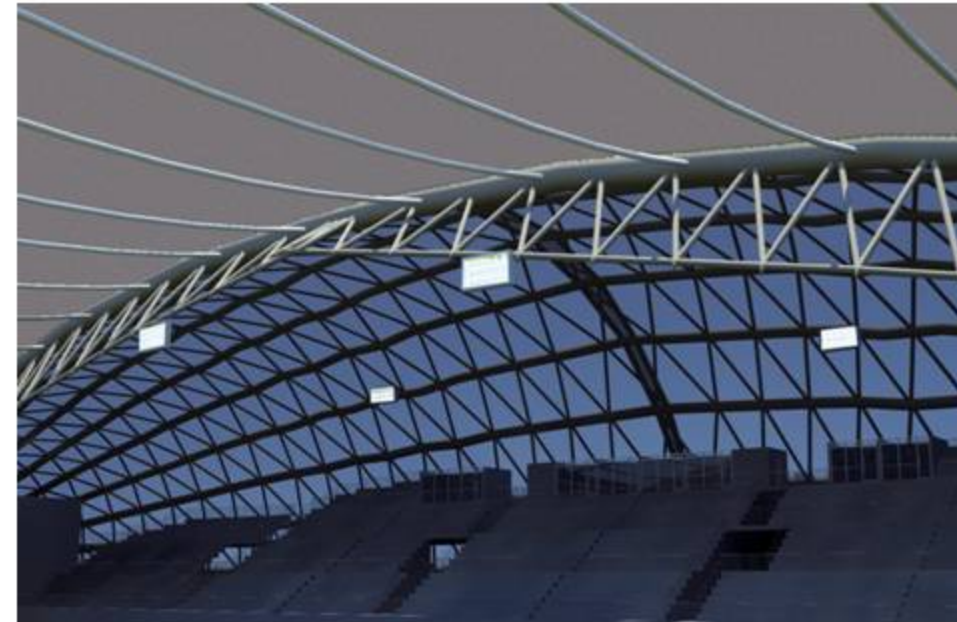


IMAGE SOURCE:  
<http://www.lylled.com/high-power-300w-led-flood-light-for-stadium-lighting.html>

## BENEFITS

- 60 Degree Light Spread
- 500 Watt Replaces 1500 Watt Metal Halogen
- Long Life Span
- Reduced Weight
- Reduced Heat Admission
- Closer Color Index to Natural Sun

## LEED POTENTIAL

- 1-10 Energy Efficiency

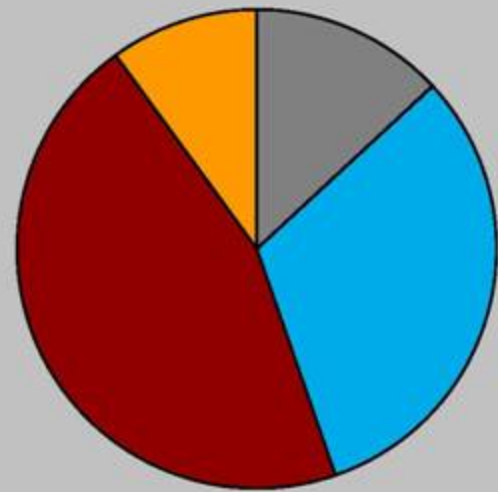
STADIUM LIGHTING

Montague Park: CHATTANOOGA, TN



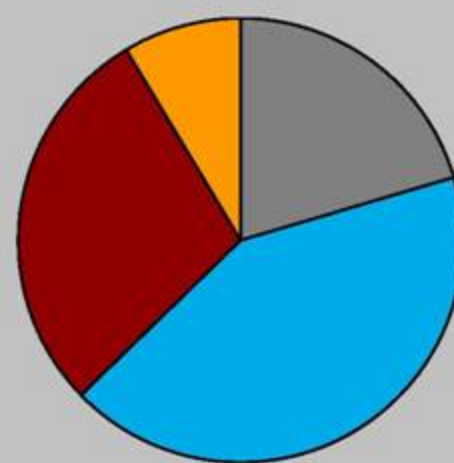
## ENVIRONMENTAL IMPACT SUMMARY

ASSEMBLY	Total area	Fossil Fuel Consumption (MJ) TOTAL	GWP (tonnes CO2eq) TOTAL	Acidification Potential (moles of H+ eq) TOTAL	Human Health Criteria (kg PM10 eq) TOTAL	Eutrophication Potential (g N eq) TOTAL	Ozone Depletion Potential (mg CFC-11 eq) TOTAL	Smog Potential (kg NOx eq) TOTAL
Foundations & Footings	134,131	4,702,962	578	142,552	2,032	81,415	5,132	32,909
Columns & Beams	0	0	0	0	0	0	0	0
Intermediate Floors	188,581	11,347,948	1,198	417,334	2,646	386,661	6,462	132,537
Exterior Walls	137,040	16,274,928	811	629,765	6,572	535,824	5,528	201,374
Windows	0	0	0	0	0	0	0	0
Interior Walls	83,690	3,598,380	243	67,623	2,004	66,809	1,149	12,659
Roof	0	0	0	0	0	0	0	0
<b>TOTALS</b>		<b>35,924,219</b>	<b>2,830</b>	<b>1,257,273</b>	<b>13,255</b>	<b>1,070,709</b>	<b>18,271</b>	<b>379,480</b>



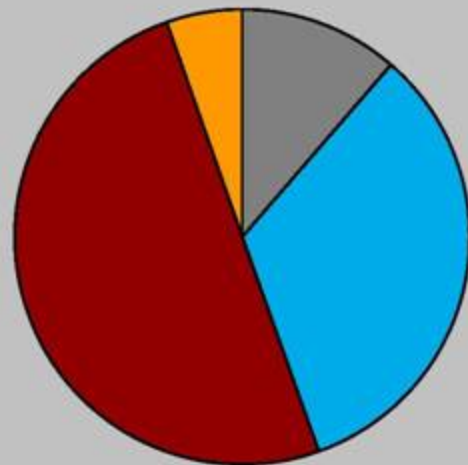
**Fossil Fuel Consumption**

Foundations & Footings  
Columns & Beams  
Intermediate Floors  
Exterior Walls  
Windows  
Interior Walls  
Roof



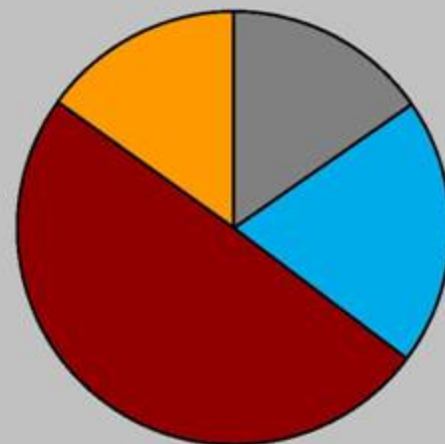
**Global Warming Potential**

Foundations & Footings  
Columns & Beams  
Intermediate Floors  
Exterior Walls  
Windows  
Interior Walls  
Roof



**Acidification Potential**

Foundations & Footings  
Columns & Beams  
Intermediate Floors  
Exterior Walls  
Windows  
Interior Walls  
Roof



**Human Health Criteria**

Foundations & Footings  
Columns & Beams  
Intermediate Floors  
Exterior Walls  
Windows  
Interior Walls  
Roof

SOURCE:  
[www.athena5MI.org](http://www.athena5MI.org)

## LIFE CYCLE ASSESSMENT

"THE PROCESS OF ACCOUNTING FOR THE IMPACTS OF A PRODUCT, MATERIAL OR PROCESS BASED ON THE EFFECTS OF OBTAINING THE RAW MATERIALS FROM WHICH IT IS MADE, THE PROCESSES THROUGH WHICH THOSE RAW MATERIALS GO TO BECOME USABLE PRODUCTS, THE ASSEMBLY OF THOSE PRODUCTS INTO A STRUCTURE, THE MAINTENANCE AND OPERATIONS REQUIRED TO MAINTAIN THOSE PRODUCTS, THE EFFECTS OF DISPOSING THE PRODUCT AFTER ITS FORESEEABLE LIFE AND THE TRANSPORTATION IMPACTS THAT ARISE BETWEEN EACH OF THOSE PHASES"

- ATHENA ECO-CALCULATOR

## IMPACT CATEGORIES

- ENERGY CONSUMPTION
- GLOBAL WARMING IMPACTS
- ACIDIFICATION POTENTIAL
- HUMAN HEALTH CRITERIA
- AQUATIC EUTROPHICATION POTENTIAL
- OZONE DEPLETION POTENTIAL
- SMOG POTENTIAL

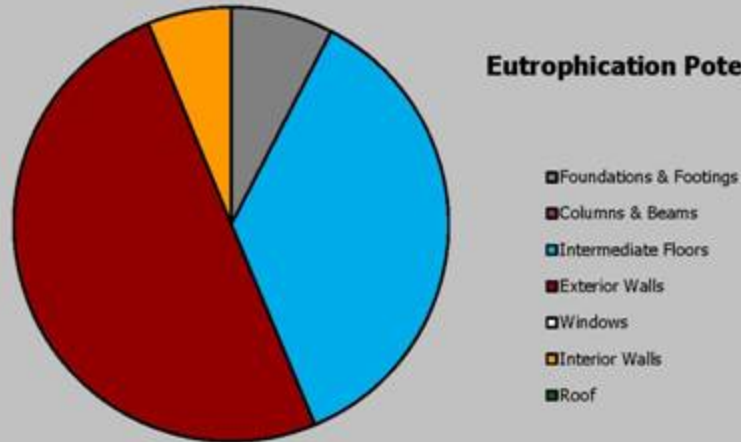
ATHENA ECO-CALCULATOR



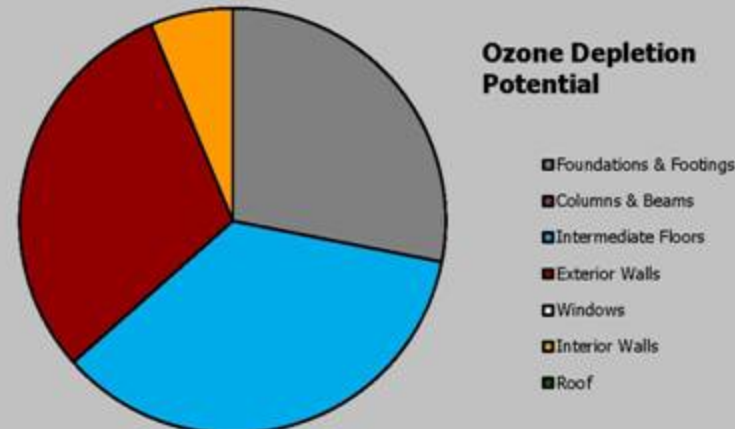
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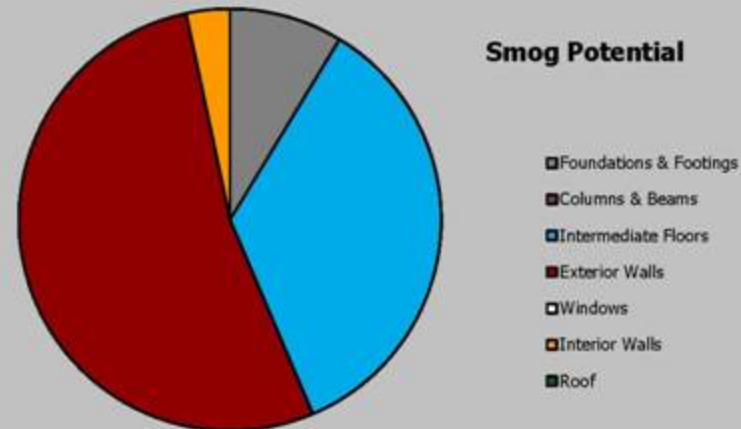
**Eutrophication Potential**



**Ozone Depletion Potential**



**Smog Potential**



SOURCE:  
www.athenaSMI.org

## LIFE CYCLE ASSESSMENT

### MODIFICATIONS

- EXTERIOR WALLS ARE ETFE BUT WE ENTERED THEM IN AS A VINYL CLADDING
- INTERIOR WALLS ARE SIP PANELS WE ENTERED THEM IN AS WOOD STUD WALL
- NOT ABLE TO ENTER IN SOLAR PANELS, METAL STRUCTURE, RECYCLED CONTENT OF MATERIALS, ETC

### SUMMARY

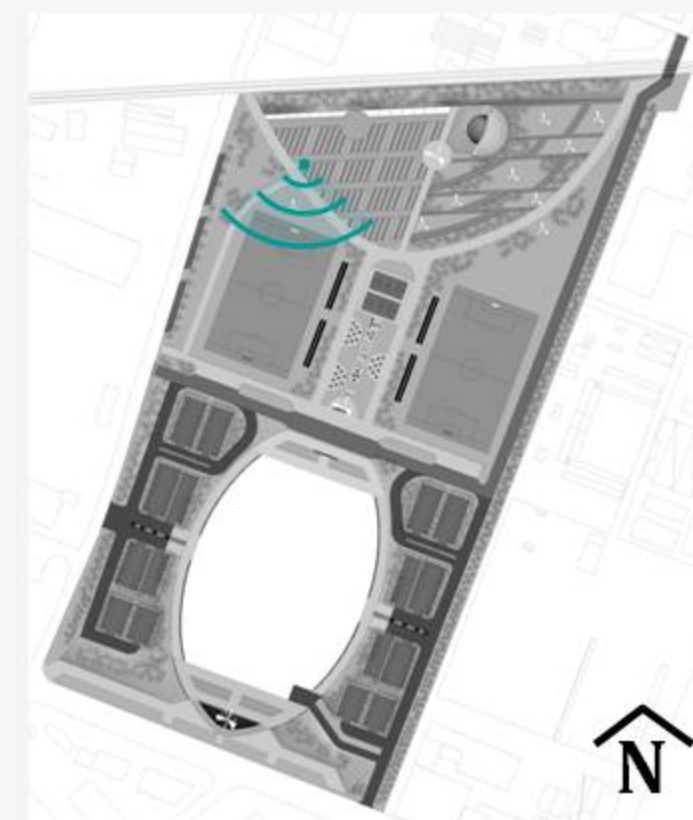
- LOOK FOR LESS IMPACTFUL MATERIALS
- MORE EFFECTIVE ASSEMBLIES

ATHENA ECO-CALCULATOR



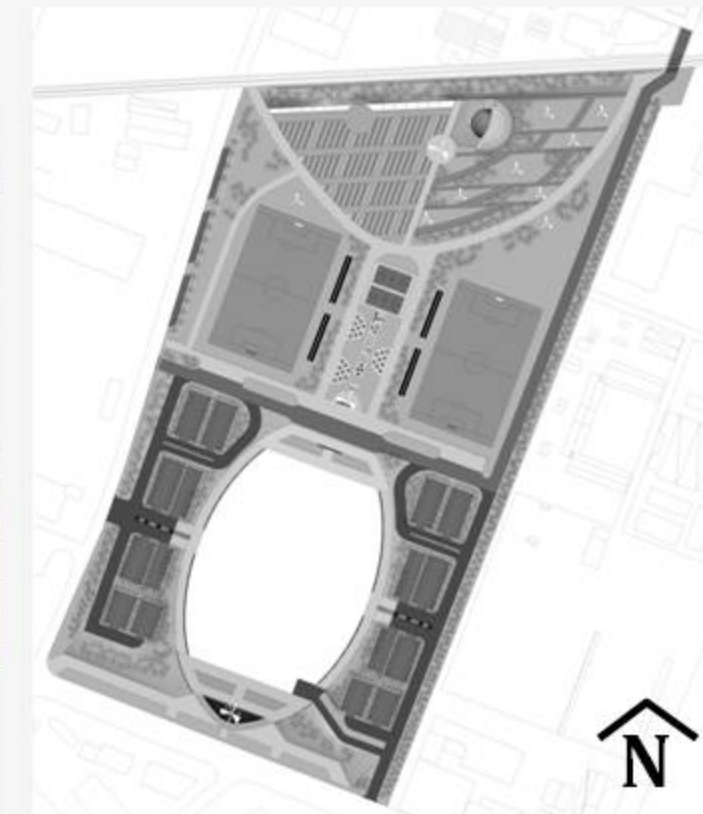
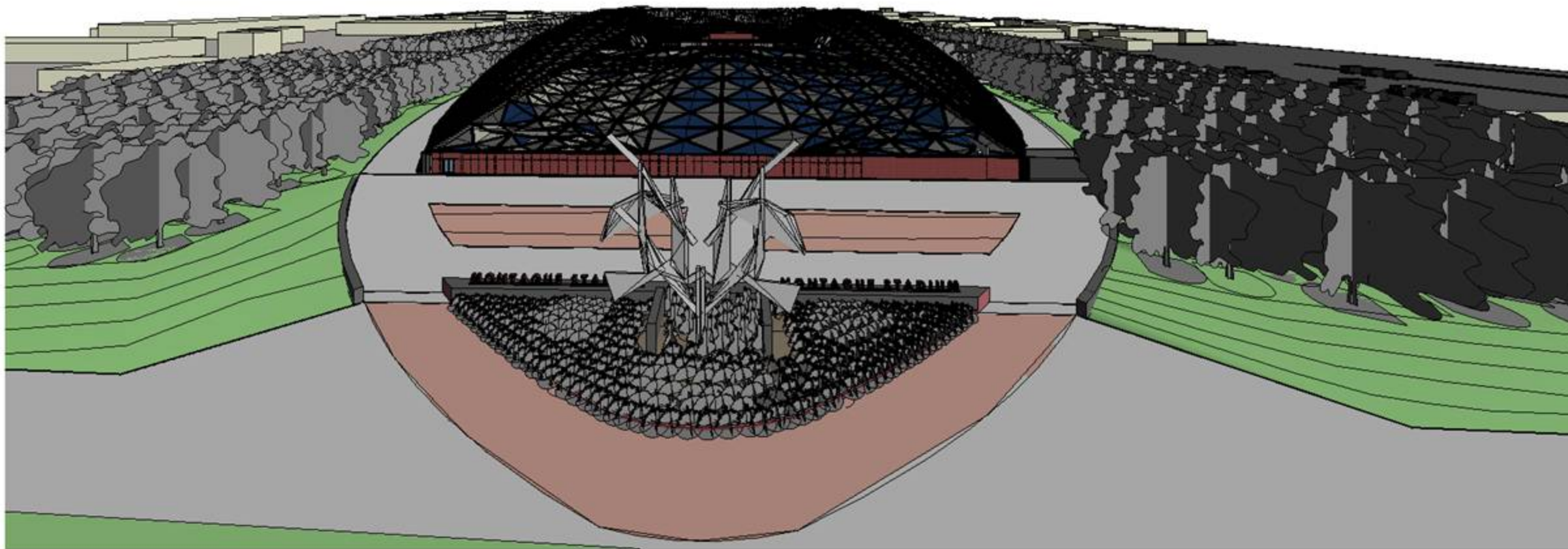


LOCATION MAP



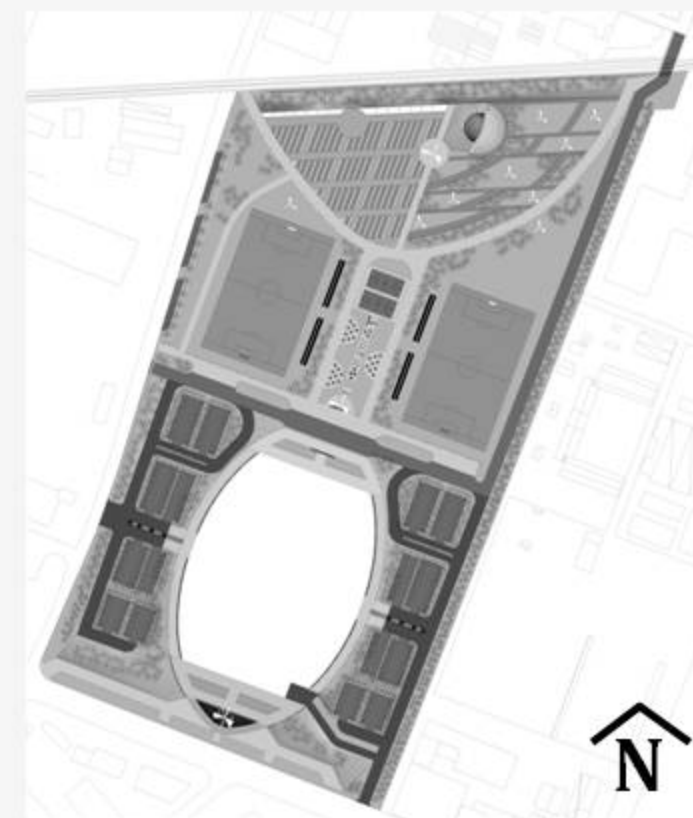
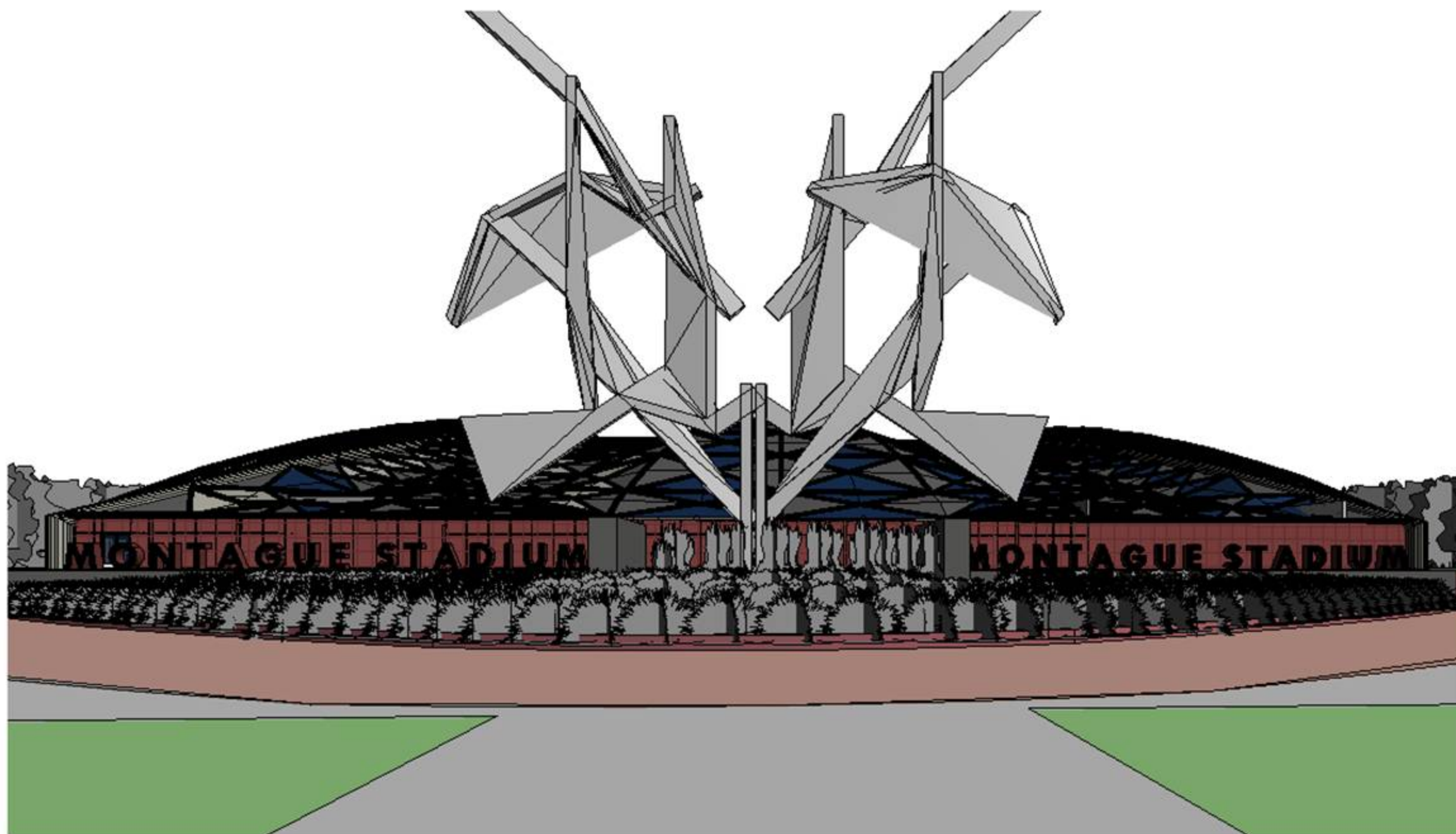
OVERALL





WALKTHROUGHS





WALKTHROUGHS