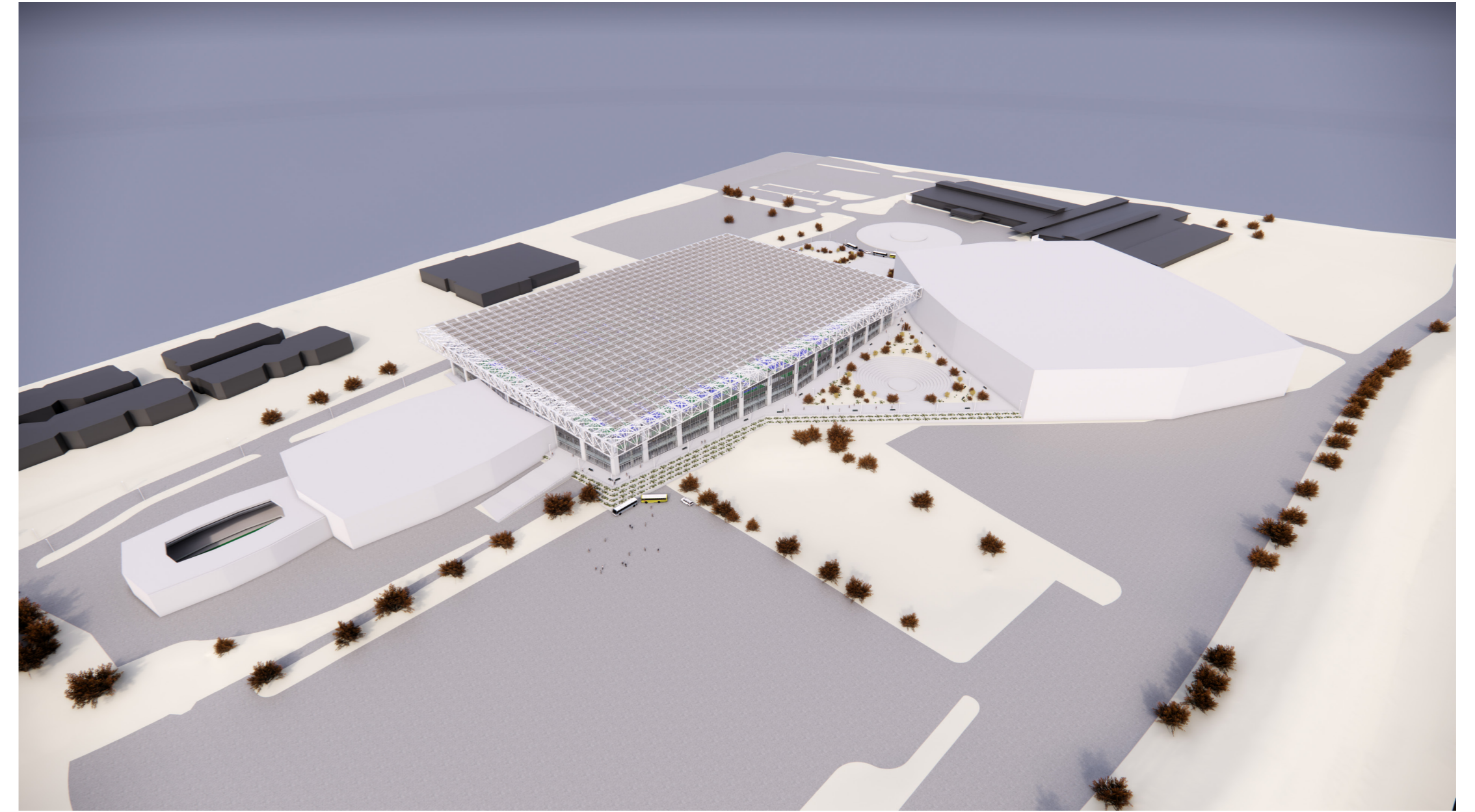


SPORTS & EXHIBITION COMPLEX AT WESTWORLD

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AAU ID 04254688, Spring 2020

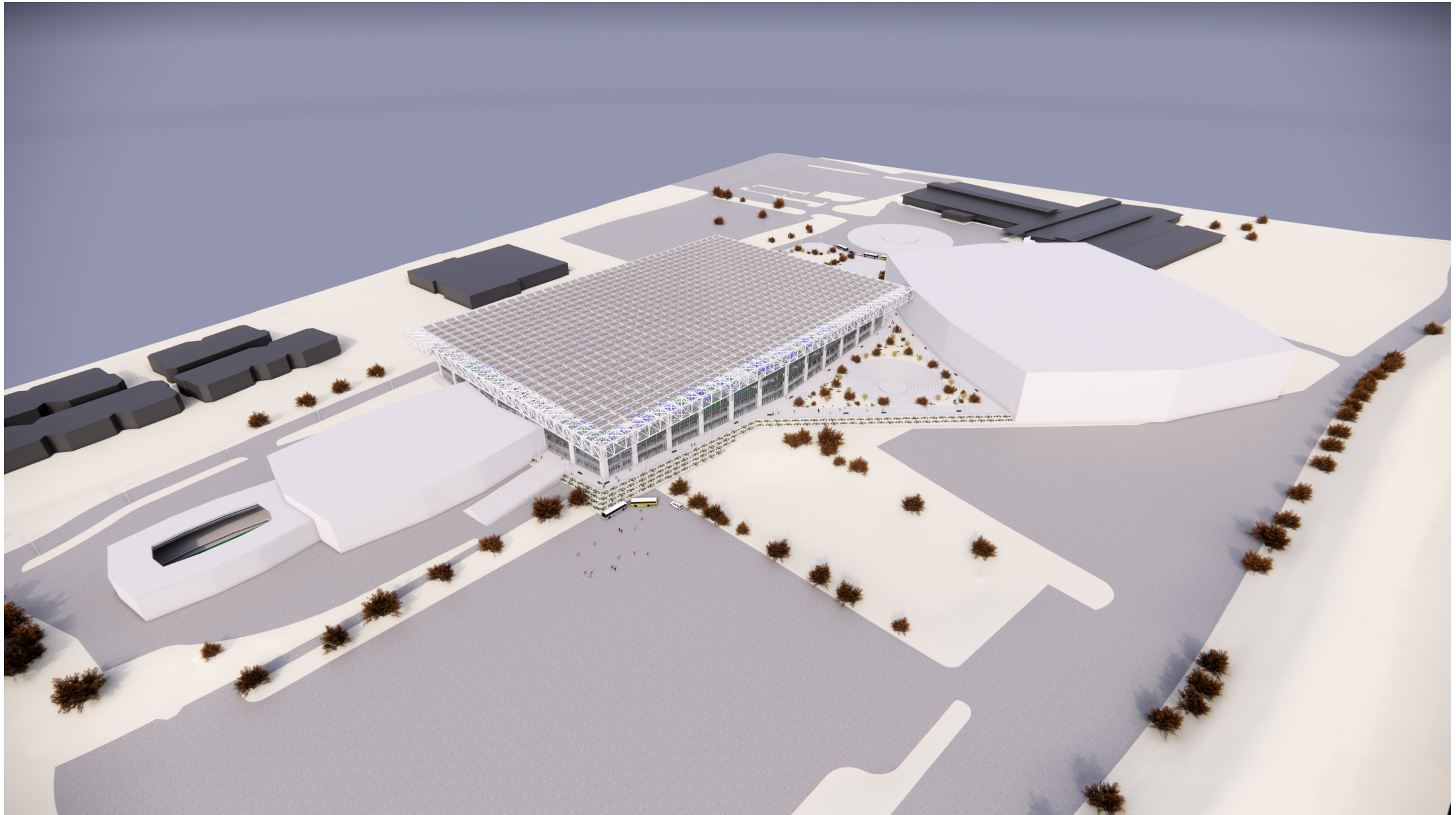
ROZANSKY

AAU ID 04254688, Spring 2020

GEORGE F ROZANSKY

SPORTS & EXHIBITION COMPLEX AT WESTWORLD

A living building in the desert exploring the phenomenology of tennis creating a new spatial typology.



Thank you to my family and friends who have supported me in my endeavors in the field of architecture.

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The concept behind this thesis project is connecting the physics of tennis with the phenomenology and spatial typology of site and architecture, exploring the threshold and processional and engagement qualities of the experience of a facility that accommodates the activities surrounding tennis and adapting to the local desert climate with new technology and concepts with a holistic approach to sustainability by creating a living building. Visitors to the project engage in a processional experience as they pass through various thresholds as they make their way to the indoor tennis stadium as they travel from the entry plaza through the building, either around the pools and past the training courts or down the ramps through the immersive museum and return to the ground level, and pass under the training facility before entering the stadium.

Along with the main programming area of the tennis facility, there are other elements to a greater master planned area that includes an indoor soccer stadium and exhibition space to replace the existing tent structure at the site, and indoor tennis stadium that can also host other indoor sports activities including volleyball and room for an Olympic sized pool, a partially open roof tennis stadium with room for other sports and activities including half an Olympic sized pool.

Other master programming items include a transportation hub, multi-story parking garages, undeveloped area to be dedicated as a natural preserve, elevated and covered pedestrian walkway along a tram service line connecting the parking areas with the new buildings and the existing equestrian center., relocated RV parking, hook-up, and restroom and laundry facilities, and a reclaimed area to be converted back to natural landscape. Other master planned items include community garden and education areas to be offered outside of the proposed project as opportunities will also be included specific for that project.

TIMELINE OF STUDY

	<p>SPRING 2016</p> <p>ARH 652 OL1: MS: ARCHITECTURAL TECTONICS ALVARO BONFIGLIO BARDIER</p> <p>ARH 654 OL1: MS: DESIGN PROCESS & 3D MEDIA PETER SUEN</p>	<p>FALL 2017</p> <p>ARH 604 OL1: MATERIALS AND METHODS OF CONSTRUCTION: BUILDING DETAILING PAUL RIVERS</p> <p>ARH 614 OL1: ARCHITECTURAL PROFESSIONAL PRACTICE ELIZABETH TIPPIN</p> <p>ARH 640 OL1: ARCHITECTURAL HISTORY - INTRODUCTION JAMES MALLERY</p>	<p>SPRING 2018</p> <p>ARH 609 OL2: INTERMEDIATE DESIGN STUDIO 1 JAIME DAROCA</p> <p>ARH 610 OL1: PROGRAMMING AND SPACE PLANNING HANS SAGAN</p> <p>GR 875 OL1: DESIGN SEMINAR/PORTFOLIO JEREMY STOUT</p>	<p>SPRING 2019</p> <p>ARH 605 OL1: GRADUATE DESIGN TECHNOLOGY 2: ENVIRONMENTAL CONTROLS STEVE GROSS</p> <p>ARH 619 OL1: ADVANCED DESIGN STUDIO 2 - CONCEPT & COMPREHENSIVENESS DAVID GILL</p>	<p>FALL 2019</p> <p>ARH 601 OL1: SPATIAL COMPOSITION MICHAELA MACLEOD</p> <p>ARH 642 OL1: ARCHITECTURAL THEORY ANA MAYORAL MORATILLA</p> <p>ARH 690 OL2: THESIS PREPARATION & DEVELOPMENT NICOLE LAMBROU</p>
<p>FALL 2015</p> <p>ARH 650 OL2: MS: INTRODUCTORY DESIGN STUDIO 1 KEVIN BARDEN</p> <p>ARH 651 OL2: MS: DESIGN PROCESS AND 2D MEDIA JONATHAN ODOM</p>	<p>FALL 2016</p> <p>ARH 620 OL1: DIGITALLY GENERATED MORPHOLOGY PETER SUEN</p> <p>ARH 653 OL2: INTRODUCTORY DESIGN STUDIO 2 JOSE RAMON SIERRA GOMEZ DE LEON</p>	<p>SPRING 2017</p> <p>ARH 602 OL1: GRADUATE DESIGN TECHNOLOGY 1: STRUCTURES CARL WILFORD</p> <p>ARH 659 OL1: DIGITALLY GENERATED FABRICATION BENJAMIN RICE</p>	<p>FALL 2018</p> <p>ARH 608 OL1: ADVANCED DESIGN STUDIO 1 - CONCEPT, CONTEXT, & TYPOLOGY NICOLE LAMBROU</p> <p>ARH 641 OL1: ARCHITECTURAL HISTORY: MODERNISM AND ITS GLOBAL IMPACT DORA JONES</p>	<p>SUMMER 2019</p> <p>ARH 606 OL1: CONSTRUCTION DOCUMENTS AND BUILDING CODES ERIC REEDER</p> <p>ARH 900 OL1: INTERNSHIP: ARCHITECTURE (ONSITE & ONLINE) ERIC LUM</p>	<p>SPRING 2020</p> <p>IAD 625 OL1: SURVEY OF SUSTAINABLE DESIGN MICHAEL SAMMET</p> <p>ARH 810: MASTER OF ARCHITECTURE THESIS NICOLE LAMBROU</p> <p>EXPECTED GRADUATION - SPRING 2020</p>
2015	2016	2017	2018	2019	2020

MASTER OF ARCHITECTURE 1, ARCHITECTURE: TRACK 2 - 87 UNITS

CONCEPT STATEMENT

Conceptual Idea

The conceptual idea is intended to challenge architecture on multiple fronts by creating a facility with programming and sustainable ideas set in a desert environment of the southwest in the United States. The project is not meant to revisit the sports and training venue typology but as an expansion of it. It is meant to connect the essence of the sport of tennis with the phenomenological experiences of architecture to incorporate and serve cultural needs and experiences.

The concept analyzes, considers, and identifies the cycle of the sport from physics concepts, site context, and cultural implications for the sports, vicinity, and geographic region. Factors part of the study includes the analysis of the motion of the players and ball around the court and the physics of the player, and the tennis ball, and resulting movement from the game itself. These elements are not inherently restricted by the rules of the game nor restricted by the physical attributes of the court and the lines as many of these elements are abstract or happen in a split second.

Programming Goals

Aspects of this project are appropriate to the program, site, and user group due to the study and research involving the programming, development, and use of a tennis facility that serves multiple purposes including hosting other sports. Associated activities include training, practice, pro shop, food service, museum, and stadiums for indoor and outdoor practice spaces, matches, and other formal and informal events.

Need

The idea of the tennis facility came from a need that appears to be present in the area and the desire to fulfill that need.

Due to changes in the existing and past uses of facilities, many have removed courts as the use of the facilities changes. Some of these changes may be as a result of remodeling or no longer using a facility as originally intended as it has changed owners or from a different use.

Removing courts due to remodeling may be as a desire by management or the user groups to bring in new things to keep their customers and users engaged such as pickleball.

As many of these changes have occurred, the number of facilities to host events, clubs, and practices has been reduced or consolidated leaving people lost or without a sport home or destination.

The harsh desert climate also presents challenges as outdoor facilities are the primary staple of facilities found in the region. Indoor spaces are adapting general spaces or existing sport facilities for use by tennis but may be over capacity and cost prohibitive.

Phenomenology/Spatial Typology

Visual - Slow moving cars from side streets, fast moving from the highway, materials and texture, tectonics, day/night cycle, clouds/light changes. People walking, running stopping. Movement of transportation vehicles. Sport activities. Surrounding site context and adjacent development, natural vegetation, power lines.

Sound - Sounds of traffic, road noises, airplanes, sound of the ball on the court, off the racket, from the arena, open to the courtyards, hear the crowd, particularly in the museum, silence, doors opening and closing, people talking, eating, making contact with materials and objects, reactions, doors, echoes, rain/weather.

Touch - Material under your feet, the paths of travel and changes in elevation. The material of the elements one needs to engage with such as seats, doors handles, faucets, drinking fountains, food, equipment. Air moving through the spaces, temperature, water is wet, and sweat. Natural landscape features and vegetation.

Taste - Food and drinks from working out, being a spectator, or athlete. Salty sweat. Edible vegetation.

Smells - Food, drinks, fragrances, cleaning supplies, soaps, body odor, vegetation, building materials.

Environmental Context

Challenges

- Solar radiation and energy exposure can be harsh, intense, and destructive
- Dry air slows decomposition of organic and carbon based compounds
- Humidity develops and can bring rain, heavy flooding
- Monsoons occur twice a year, weather patterns change direction
- Sea breeze/Land breeze effect daily
- Heavy winds during storms and occasional gusts
- Sandstorms and sand deposits
- Minimal seismic activity
- Animals - snakes, bobcats, coyotes, javelinas, spiders, termites, rodents

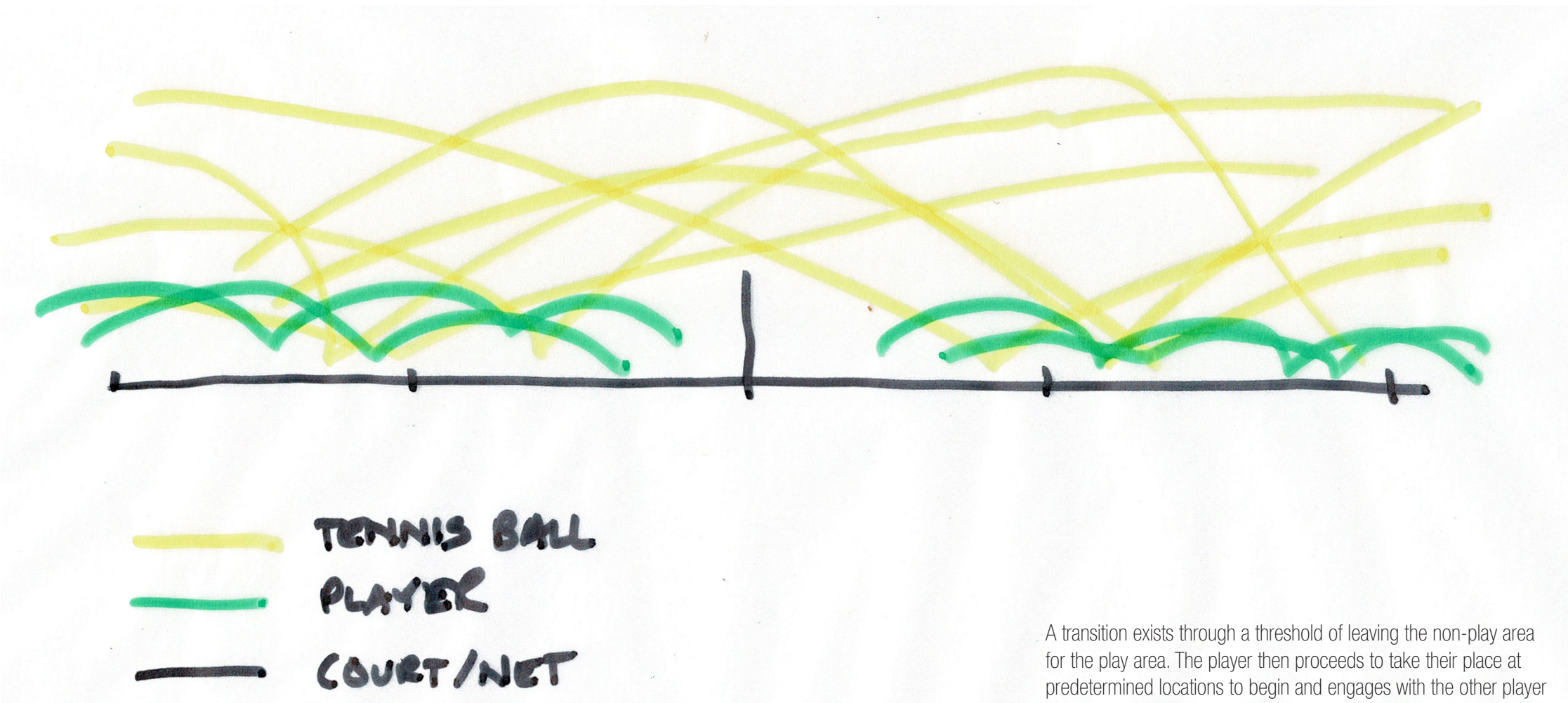
Solutions

- Automated building controls
- Below ground and semi-recessed structures
- Swales and washes to divert and collect water
- Solar energy collection and storage
- Natural ventilation devices
- Durable materials

CONCEPT STATEMENT

Basic Physics

Threshold - Side Movement Breakdown



As the players cross back and forth along movement across the court from side to side in the horizontal, the vertical can be just as perplexing. The players feet and movement nearly bounces with each step during play while the rackets meets the ball to create a neutral/no spin, top spin, or back spin creating a trajectory of a straight, fade, or slice direction across the net. Sometimes, the ball go out of bounds or is stopped by the net or the occasional tap of the top of the net and continues to the other side of the court. In either the horizontal or vertical, no movement is exactly the same as before as there are virtually infinite possibilities for the combination of trajectories and vectors of movement much like architecture.

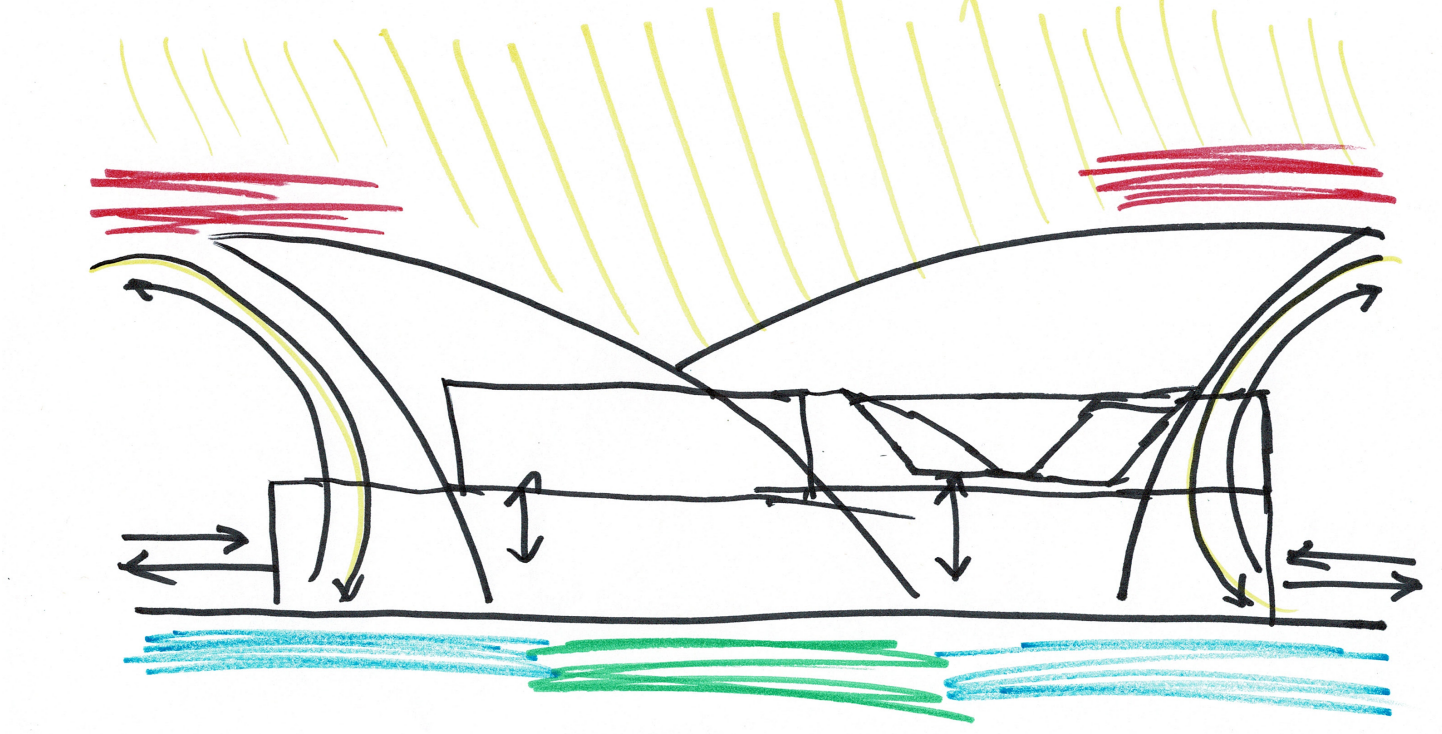
Source:
 RFtennis1001. "ATP World Tour Finals Federer v Nadal Championship Point." YouTube. YouTube, December 1, 2010. <https://www.youtube.com/watch?v=3deJQ0dCDU>.

A transition exists through a threshold of leaving the non-play area for the play area. The player then proceeds to take their place at predetermined locations to begin and engages with the other player through the tennis match.

A serve begins where the ball crosses the net to the opposite side of the court in both the x-axis and y-axis through the z-axis. The ground remains stationary and organized by the court boundaries and net established by the rules creates a threshold for the player and the ball.

Concept Diagram

OASIS
 COMMUNITY/CULTURE
 SHARED EXPERIENCES



The audience, spectators, officials, and others also follow paths of threshold, procession, and engagement as they enter the property, park their cars or are dropped off, enter the building, make their way toward their destination to engage in their chosen activities.

Every moment plays a particular role and in order to provide protection, an oasis of sorts, from the extreme environmental elements of the desert. This oasis is to foster a community and culture of the surrounding area and bring people together for a shared experience in the excitement of sport, to engage in learning more, and practicing to refine and better themselves.

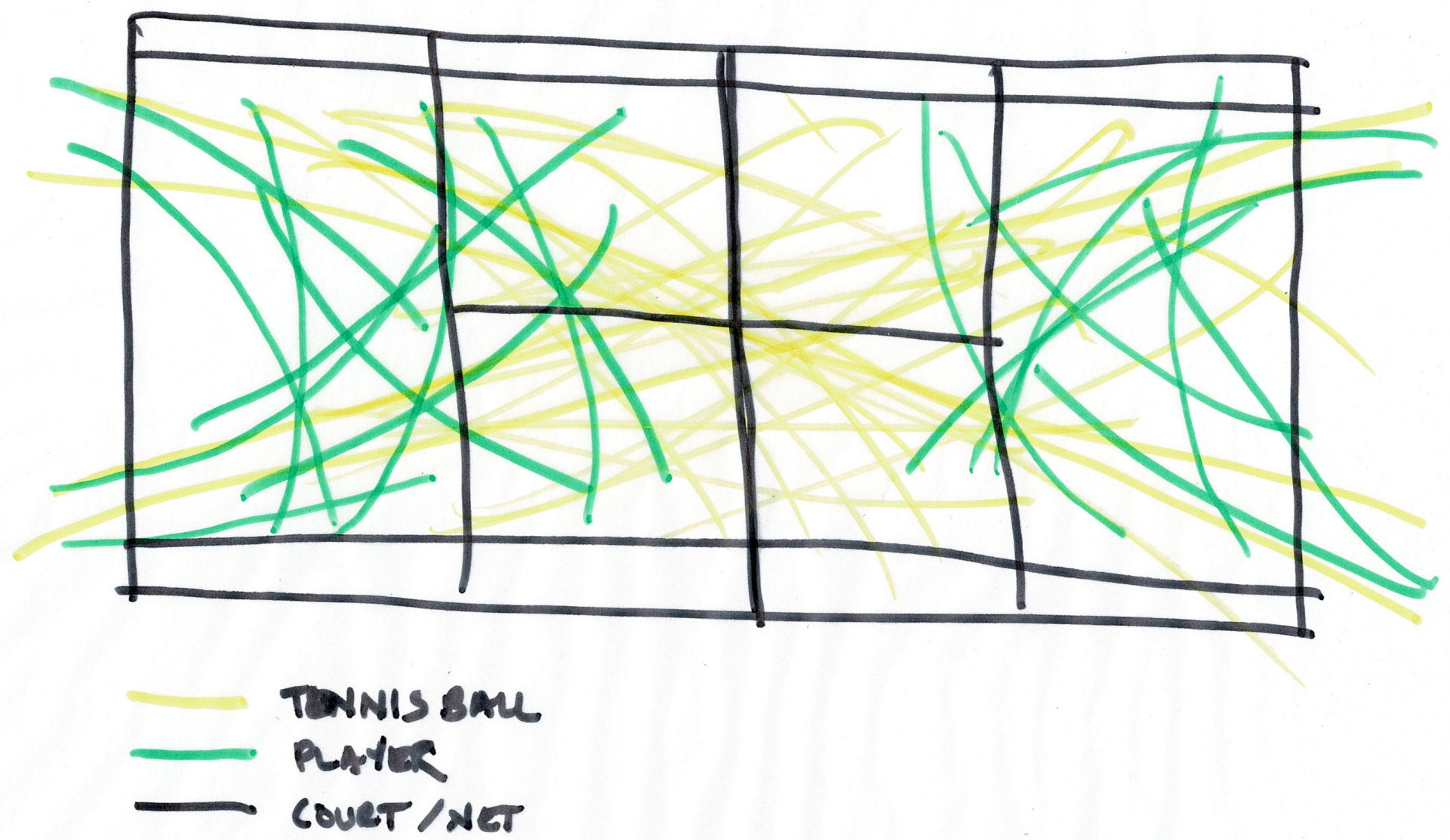
Users of the building should find themselves able to traverse across the programming in a clear direction being without becoming lost. They shall find a comfortable environment to enjoy their visit and want to come back to build upon their experience and memories. The architecture found should be as exciting as the events they come to observe or participate.

Experiences should be transparent yet mysterious and engages with the natural environment.

CONCEPT STATEMENT

Basic Physics

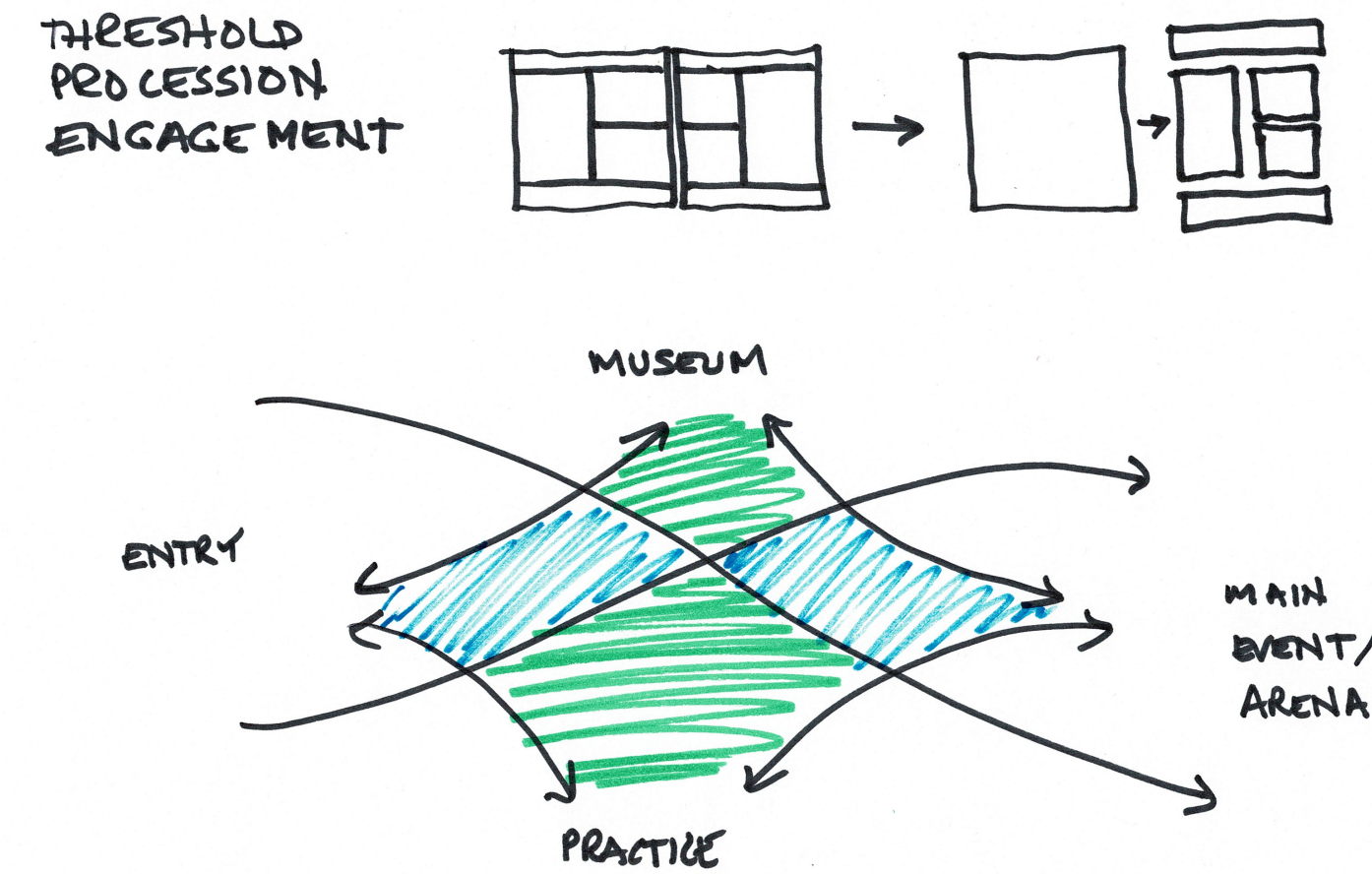
Procession - Top-Down Movement Breakdown



In observation, tennis is expressive in three dimensions, it takes witnessing many serves and volleys to appreciate the complexity of a rather simple concept of hitting a tennis ball back and forth, crossing from one side to the other and the next hit taking a different trajectory than the one just made. The relationship between the court, players, scoring, referees, audience (other witnesses), weather (sun, clouds, rain, and wind) is complex and can have an active and passive effect on one another. A player accepts the successful serve, otherwise faults, and hits it back while the server returns until one scores a point. The pacing of the start and stopping in between bouts of scoring has its own rhythm and repetition until the end.

Source:
 RFTennis1001. "ATP World Tour Finals Federer v Nadal Championship Point." YouTube. YouTube, December 1, 2010. <https://www.youtube.com/watch?v=3deJ0Q0dCDU>.

Concept Diagram



Inspired by the movement of the player and ball around the court during play, concepts are starting to develop in the exploration of the relationship between the movement and progression through the potential spaces.

Tennis represents a chaotic situation of square courts, specific rules, and organized scoring yet the action is very complex and wild. The player has movement that moves in multiple directions as well as swings a racket that involves additional forces applied to a ball which then traverses across the court in a mostly predictable fashion.

The diagram to the left may seem obvious but to the person once entering the facility and able to view most of the spaces and building it has to offer and connecting one area to another, it provides another step in leading to engagement that began with the threshold.

Sustainability is given a glimpse with the use of an open campus plan with much of the interior programming under an undulating and functional canopy. Water features assist in giving organization to the circulation, a place to engage, and assist natural ventilation.

The engagement is the sum of the activities.

Threshold/Progression



Courtyard from the East

Engagement



Courtyard from the Northwest

USER GROUP NARRATIVE

There is a need in the greater Phoenix area for an indoor/outdoor tennis facility to host major events, local clubs and leagues, training, shops, restaurant, and an a museum. Over the years, many of the public locations have been closed, resorts have been converting land to house more rooms or adding pools, and some are left to the few facilities remaining to host events including private country clubs that may have their own small stadiums for events. The greater Phoenix metropolitan area could use a 1,000-5,000 spectator capacity for matches and other sports. Some of the facilities around there are country clubs that can hold a couple hundred people and then there are arenas and others than can host 20,000 people and greater.

Being in Arizona, there are not many facilities that offer both an indoor and outdoor accommodations. Outdoors is the primary option but can get too hot to be used year round. Many facilities around here are hard to book because of expense and excess capacity for professional and non-professional sports such as tennis, swimming, and volleyball among other club sports. This building would provide other opportunities for people to get training in proper facilities they would not otherwise have access to due to the dwindling supply of courts, lack of membership, and location among other considerations.

Users At-A-Glance

2014 U.S. data¹
 Total Tennis Economy: \$5.73 Billion
 Total Participation: 17.9 Million
 Youth Tennis Participation
 Ages 6-12: 2.14 Million
 Ages 13-17: 2.23 Million
 Core Tennis Players (10+ times/year): 9.91 Million
 Cardio Tennis: 1.62 Million
 Manufacturer Year-End Wholesale Shipments (units)
 Tennis Racquets: 2.96 Million
 Tennis Balls: 124 Million
 Red, Orange, Green Balls: 5.54 Million
 Tennis Strings: 3.16 Million

Top Reasons Players Played More in Previous Year:

1. Had more time.
2. Found someone/new people to play with.
3. Joined a tennis league.
4. Took tennis lessons.

Top Reasons Players Played Less in Previous Year:

1. Injury/health problem.
2. Not enough time.
3. No one to play with at my skill level.
4. Moved where courts/players were less accessible.

Where do players live?

City: 38%
 Small town: 47%
 Suburb: 8%
 Rural: 7%

Source: 2013 USTA/TIA Participation Study.²

Sources:
 1. Francesconi, Peter. "2015 State of the Industry." Tennis Industry Association. 2015. PDF
 2. Tennis Industry Association. "Getting to Know Frequent Players." Accessed October 13, 2019. <http://www.tennisindustry.org/cms/index.cfm/research/>.

Demographics

Income:
 > \$150K USD: 26%
 \$100K-149K: 24%
 \$75K-99K: 19%
 \$50K-74K: 16%
 \$40K-49K: 6%
 \$25K-39K: 7%
 < 24K: 3%

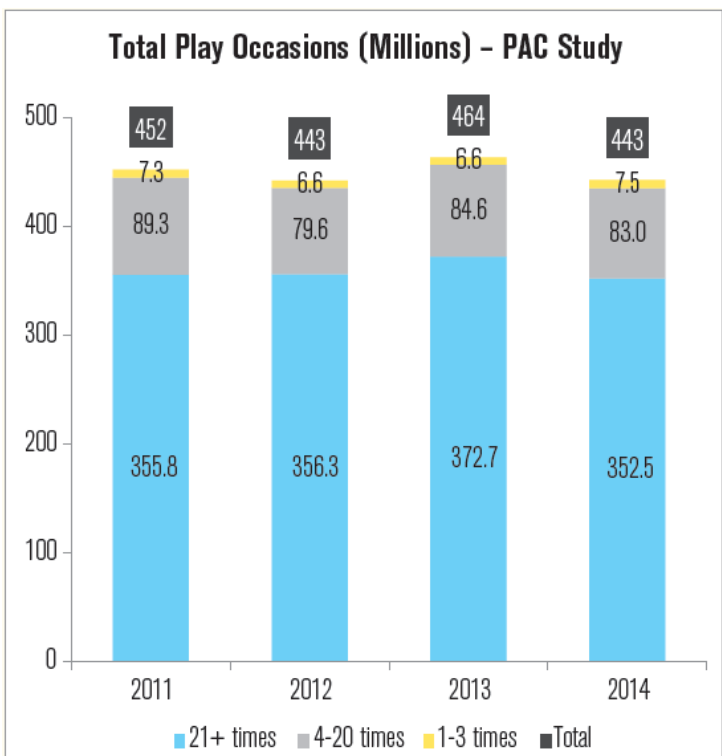
Age:
 50+: 20%
 35-49: 27%
 25-34: 15%
 18-24: 10%
 12-17: 18%
 6-11: 10%
 47% of frequent players are aged 35+
 33 is the average age of a frequent player aged 6+

Source: 2013 USTA/TIA Participation Study.²

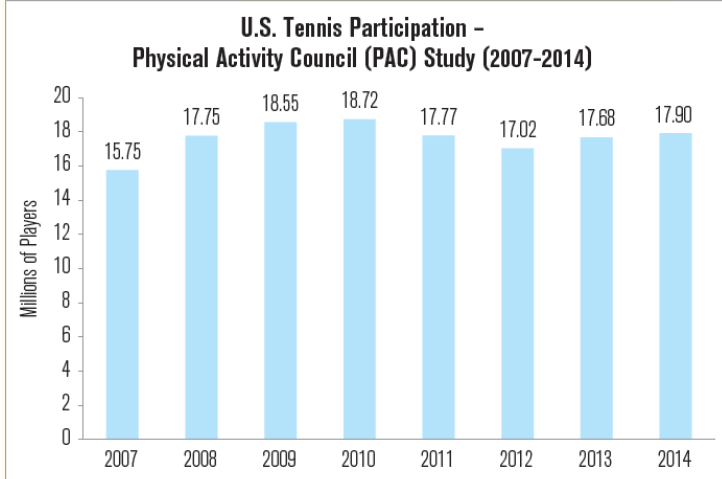
Education:
 Post-Graduate: 18.7%
 College Graduate: 28.2%
 1-3 Years of College: 19.7%
 High School Graduate: 10.0%
 1-3 Years of High School: 10.4%
 8th Grade or Below: 12.5%
 Other: 0.5%

Source: 2013 Physical Activity Council Participation Study.²

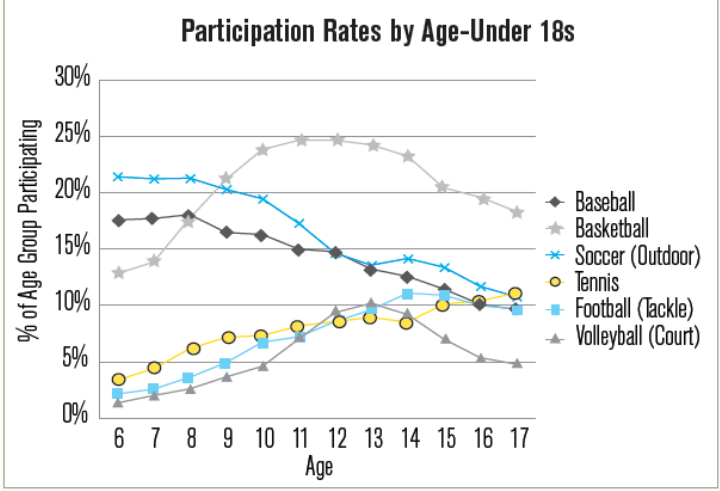
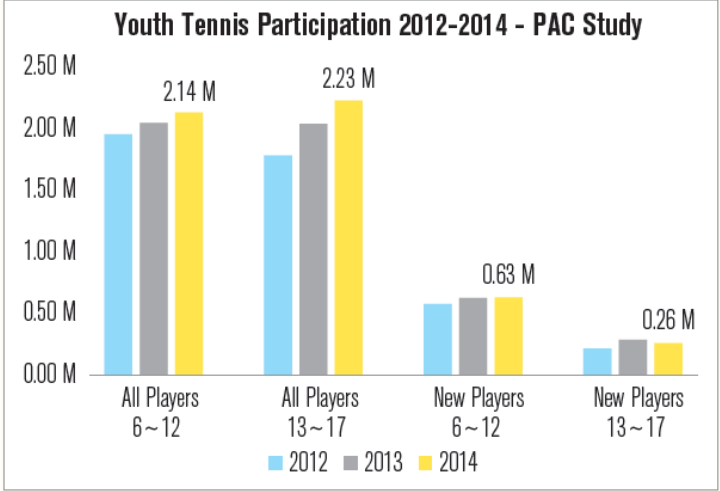
Trends



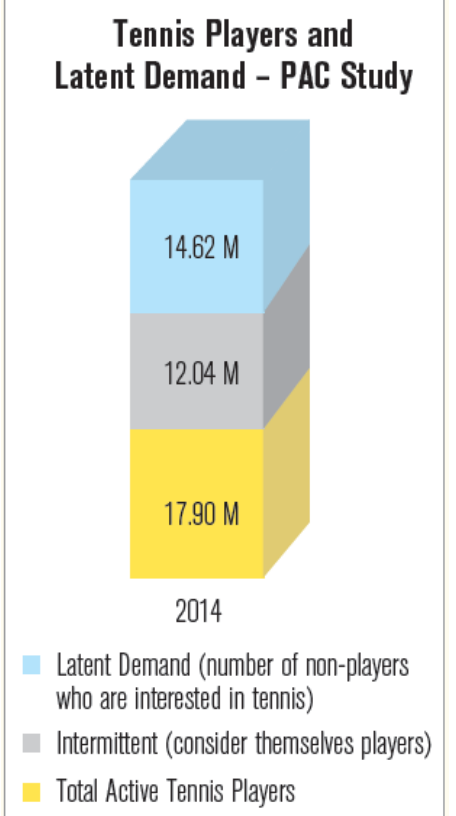
Source: Tennis Industry Association.¹



Source: Tennis Industry Association.¹



Source: Tennis Industry Association.¹



Source: Tennis Industry Association.¹

Core Players at a Glance (PAC Study)	
Total # of Players	9.91M
Male	48%
Female	52%
Average Age (6+)	33.9
Average Age (18+)	40.5
Ethnicity	White - 66% Black - 11% Asian - 11% Hispanic - 9%
Median Household Income (adults)	\$78,749
Core Player Play Occasions	413M
Average Times Played in 2014	41.72
Est. Annual Tennis Expenditure/Player	\$448

Source: Tennis Industry Association.¹

USER GROUP NARRATIVE

Facilities At-a-Glance¹

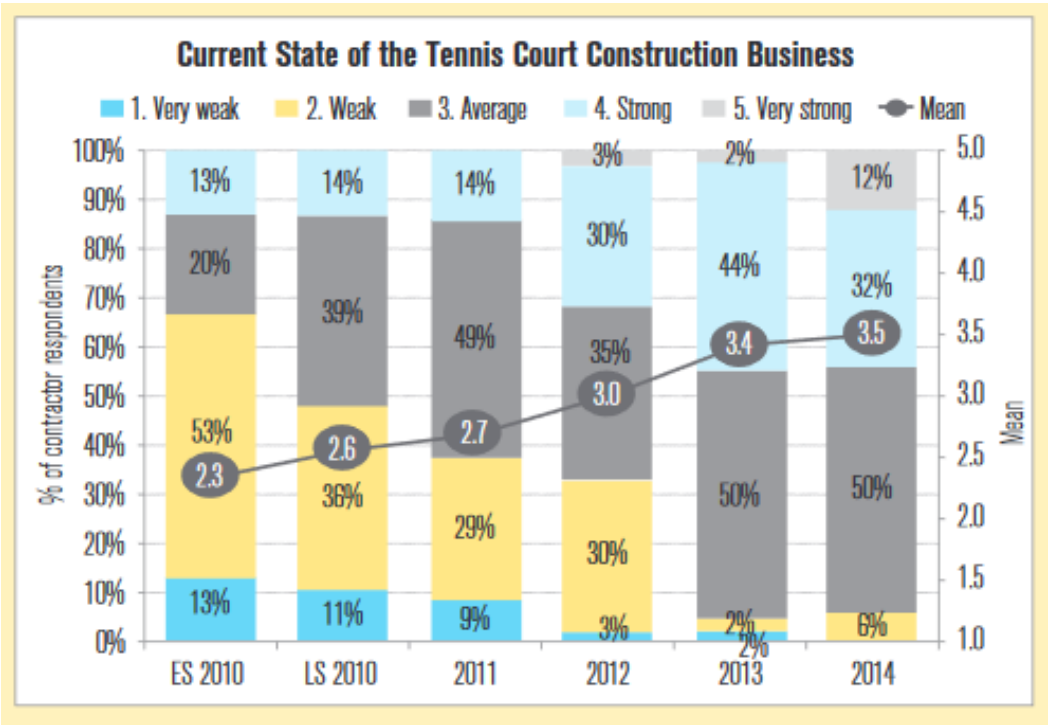
Estimated Tennis Courts in the US: 270,000.

Participating facilities offering programming & instruction: About 14,000 representing 92,000 courts

Estimated Number of courts at additional facilities offering programs: 25,000

Estimated number of courts at facilities including private residential, apartment and condos complexes, hotels, and community locations: 150,000

Construction Trends



Source: Tennis Industry Association.²

- Sources:
1. Tennis Industry Association. "TIA National Database Court Report." Accessed October 13, 2019. <http://www.tennisindustry.org/cms/index.cfm/research/>.
 2. Francesconi, Peter. "2015 State of the Industry." Tennis Industry Association. 2015. PDF
 3. "Resources & Tools." Resources & Tools. Accessed October 13, 2019. <https://preview.usta.com/content/usta/en/home/organize/program-resources/national/resources---tools.html#/CTA>.

Breakdown¹

Data from 14,717 facilities in the United States:

Total Tennis Courts - 101043

Indoor Courts

- Total Indoor Hard Courts - 9350
- Total Indoor Clay Courts - 1060
- Total Indoor Other Courts - 491

Outdoor Courts

- Total Outdoor Hard Courts - 74040
- Total Outdoor Clay Courts - 15037
- Total Outdoor Grass Courts - 321
- Total Outdoor Other Courts - 967
- Total Outdoor Lighted Courts - 34426

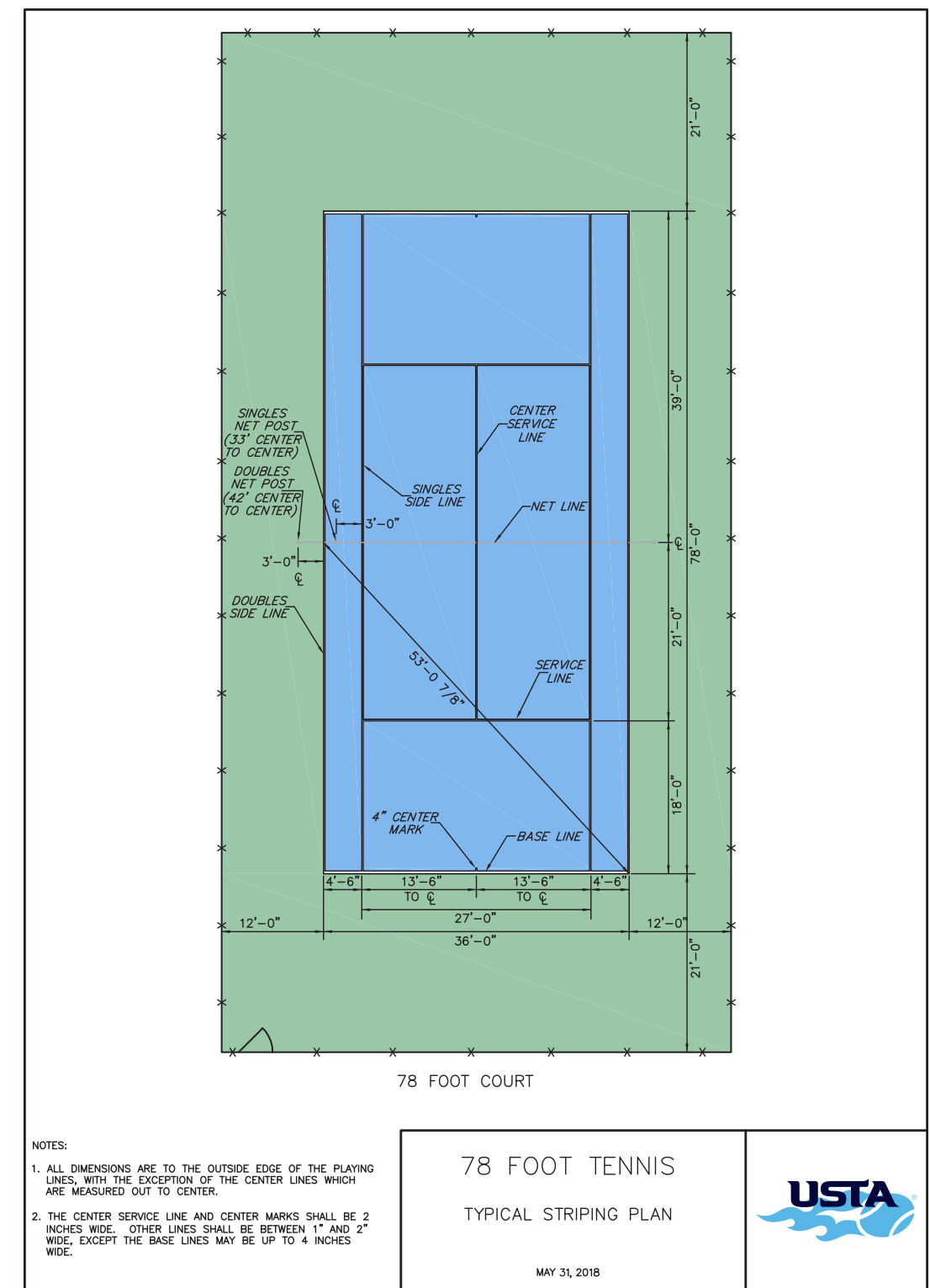
Courts by Facility Type

- Total Private Facilities - 4307
- Total Public Facilities - 4727
- Total Commercial Facilities - 257
- Total Other Facility Type - 6745

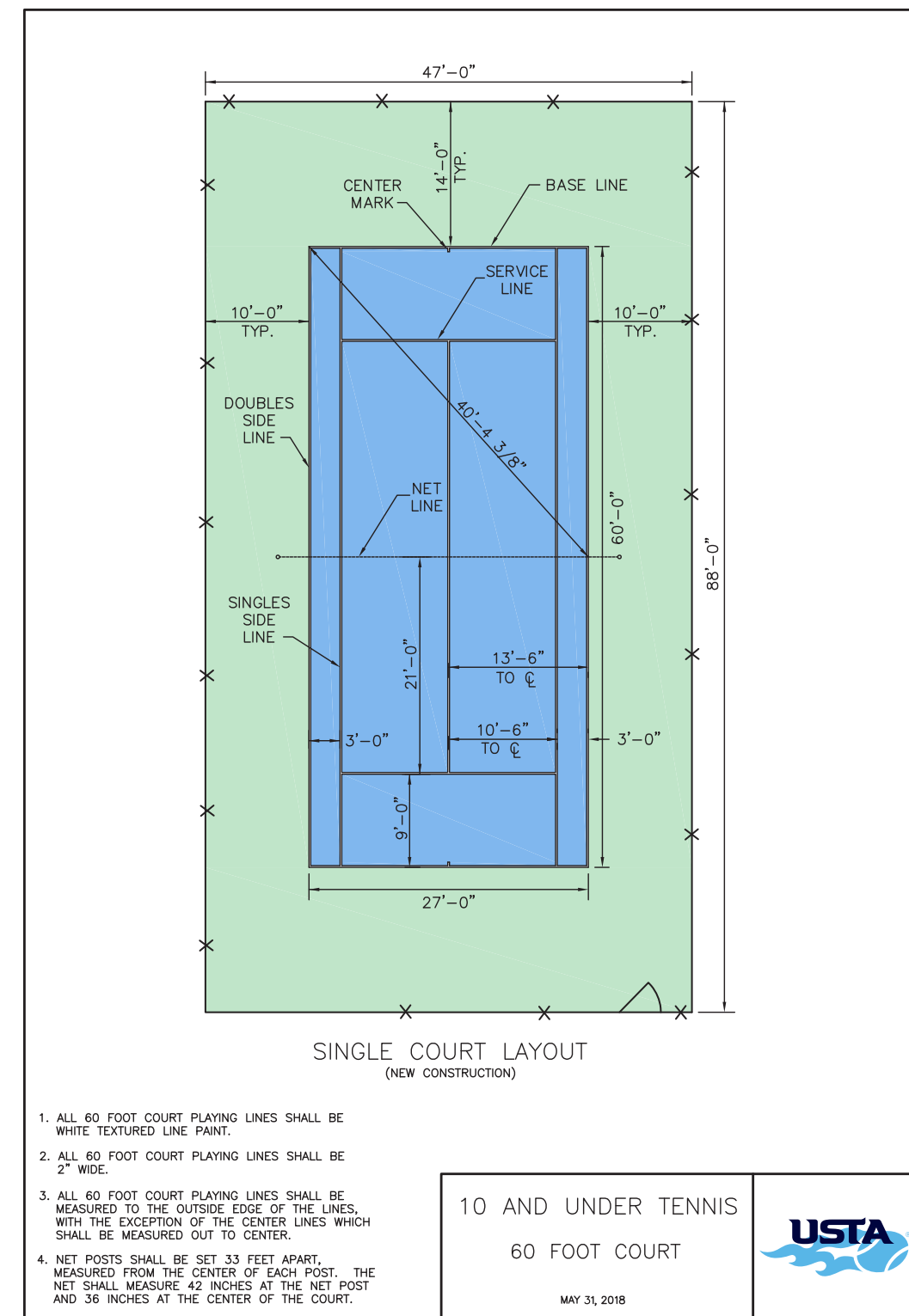
Facilities Number of Courts

- Four or Less Courts - 7382
- Five to Nine Courts - 6312
- Ten to Nineteen Courts - 2447
- Twenty or more Courts - 348

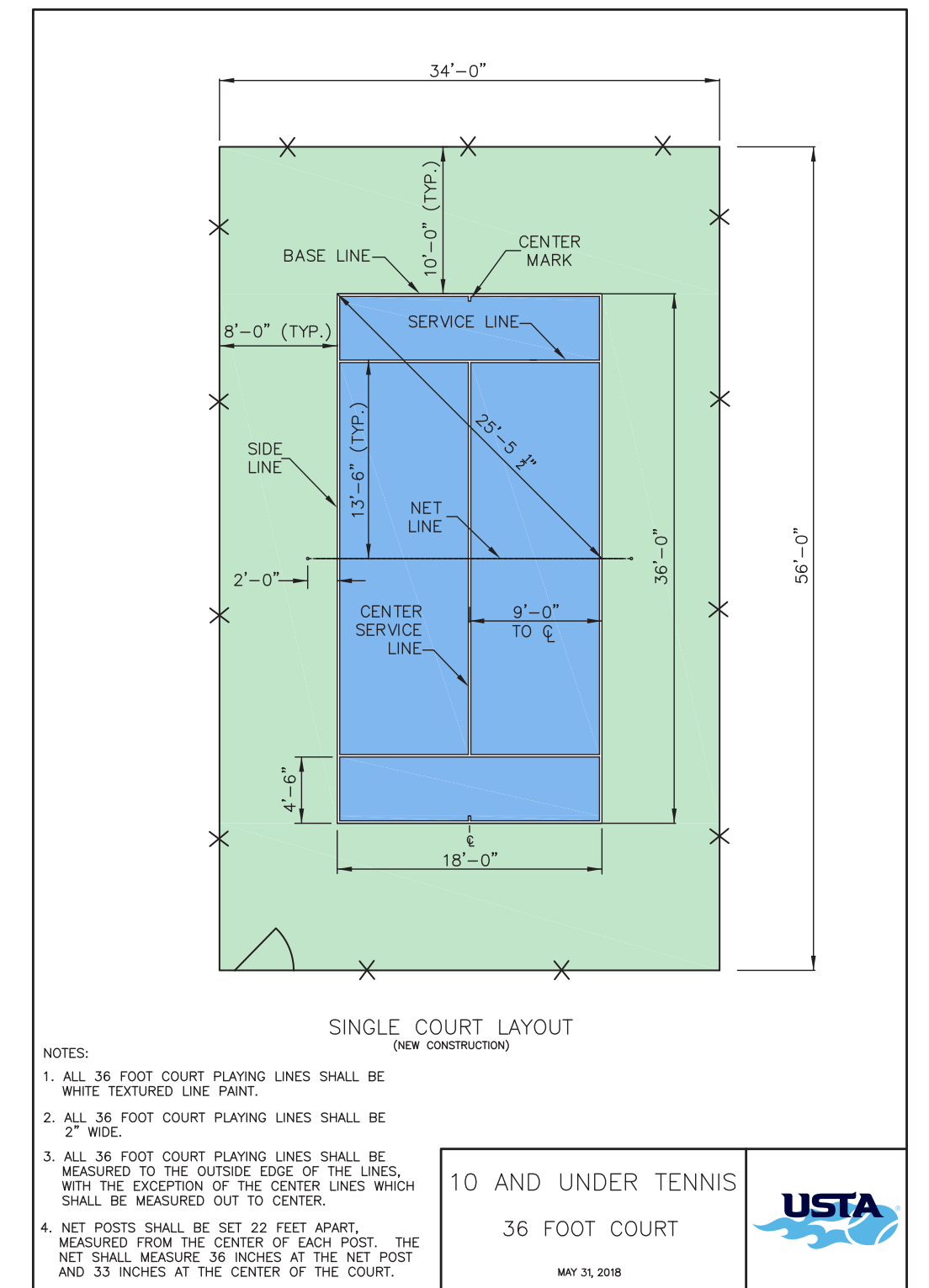
Court Sizing



78' Court Layouts.³



60' Court Layouts.³



36' Court Layouts.³

USER GROUP NARRATIVE

Surfaces

Type	Description
Acrylic/Polyurethane ^a	Textured, pigmented, resin-bound coating.
Artificial clay ^b	Sand-dressed and/or rubber-dressed surface with the appearance of clay.
Artificial grass ^b	Synthetic surface with the appearance of natural grass.
Asphalt ^c	Bitumen-bound aggregate.
Carpet	Textile or polymeric material supplied in rolls or sheets of finished product.
Clay ^d	Unbound mineral aggregate.
Concrete ^c	Cement-bound aggregate.
Grass	Natural grass grown from seed.
Hybrid clay	Clay-dressed systems supported by a carpet matrix.
Other	E.g. modular systems (tiles), wood, canvas.

Notes:

All surfaces may be porous or non-porous, with the exception of 'Clay' and 'Grass', which are always porous.

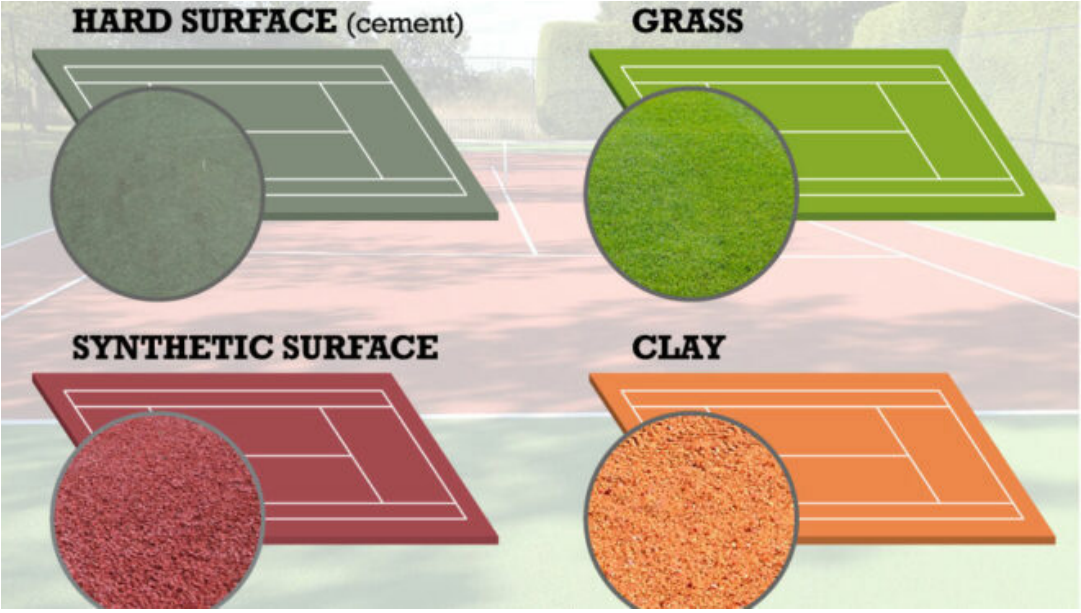
a. Normally forms only the uppermost few millimetres of a court.

b. "Appearance" relates only to the form of the up permost surface material and not other characteristics (e.g. colour). These surfaces are typically composed of a carpet matrix dressed/filled with sand and/or rubber aggregate.

c. Used only when the material itself forms the playing surface. When used as a base for other surfaces (e.g. acrylic), reference will be made only to the playing surface.

d. This term denotes a type of surface that is constructed from naturally-derived materials, and includes an unbound fine gritty material as the uppermost (playing) layer, e.g. fast-dry. The integrity of the surface shall not be reliant on the addition of a carpet or membrane layer to the structure.

Source: International Tennis Federation.¹



Main tennis court surface types.⁵

Surface Pace

Category 1 - Slow

Surfaces with an ITF Court Pace Rating of 0 to 29.
Examples: Most clay courts and other types of unbound mineral surface.

Category 2 - Medium-Slow

Surfaces with an ITF Court Pace Rating of 30 to 34.

Category 3 - Medium

Surfaces with an ITF Court Pace Rating of 35 to 39.
Examples: Most acrylic coated surfaces plus some carpet surfaces

Category 4 - Medium-Fast

Surfaces with an ITF Court Pace Rating of 40 to 44.

Category 5 - Fast

Surfaces with an ITF Court Pace Rating of 45 or more.
Examples: Most natural grass, artificial grass and some carpet surfaces.

Source: International Tennis Federation.²

Types



Winchester Tennis Arena, Singapore.³

Outdoor

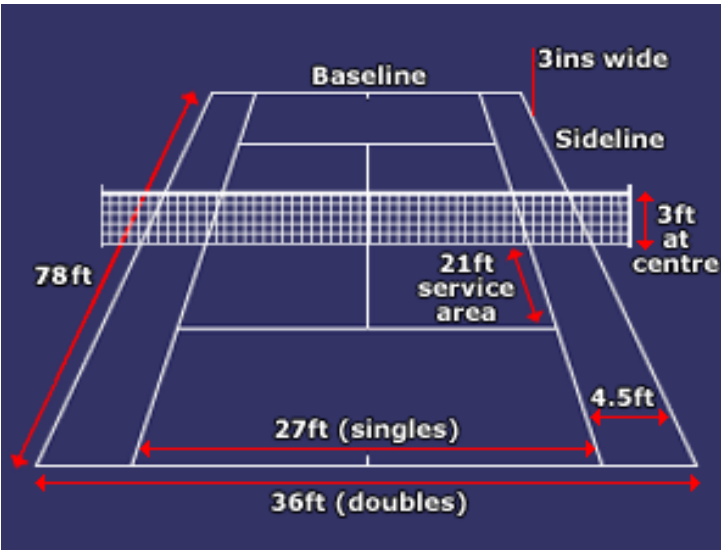


Domain Tennis Centre, Hobart, Tasmania.⁴

Court Terminology

Technical terms associated with tennis courts:

- Advantage service box
- Alley
- Back court
- Baseline
- Center service line
- Center mark
- Deuce service box
- Middle T
- Service box
- Service line
- Side T



Tennis Court, Typical Dimensions.⁶

Sources:

1. "Surface Type." itftennis.com. International Tennis Federation. Accessed October 13, 2019. <https://www.itftennis.com/technical/courts/surface-type.aspx>.
2. International Tennis Federation. "ITF Approved Tennis Balls, Classified Surfaces & Recognised Courts: A Guide to Products & Test Methods." London, 2019. PDF.
3. "Winchester Tennis Arena: Book-an-Indoor Tennis Court in Singapore -." TAG International Tennis Academy. Accessed October 13, 2019. <https://tagtennis.org/winchester-tennis-arena-book-indoor-tennis-court/>.
4. "Domain Tennis Centre." Domain Tennis Centre. Accessed October 13, 2019. <https://domaintennis.com.au/>.
5. Tennisadmin. "The Different Types of Tennis Court Surfaces." IA Tennis Academy, May 7, 2019. <https://iatennis.net/the-different-types-of-tennis-court-surfaces/>.
6. "BBC SPORT | Tennis | Rules and Equipment | A Guide to a Tennis Court." BBC News. BBC, September 12, 2005. http://news.bbc.co.uk/sport2/hi/tennis/rules_and_equipment/4222680.stm.

PRECEDENT STUDIES

Stadium/Arena/Training Facility

Typical Inventory of Spaces - Historical & Modern

- Primary
 - Entry/Exits/Circulation
 - Field/Stage - Primary/Secondary/Temp.
 - Fixed or Non-fixed seating/Assembly
- Public Areas
 - Entry
 - Retail/Shops
 - Restrooms
 - Food Service
 - Restaurants
 - Other Assembly/Conference
 - Fitness
- Private Areas
 - Offices
 - Restrooms
 - Deliveries
 - Locker Rooms
 - Training
 - Media
- Utility
 - Storage
 - Equipment
 - Mechanical/Electrical/Plumbing

Stadiums¹ are typically open air, enclosed venues that host sporting events.

Arenas² are typically fixed roof, enclosed venues that host non-sporting events.

Stadiums having sports attached to their use will often be accompanied by training or fitness facilities and facilities to host media companies for broadcasting or recording. Typ. hosted activities:

- Sports Games/Matches (Football, Baseball)
- Concerts/Conventions/Graduations
- Other Special Events

Arenas having sports attached to their use will have the same support services as Stadiums. Non-sporting Arenas may have green/changing rooms or practice rooms for concerts and other performing arts. Typ. hosted activities:

- Sports Games/Matches (Basketball, Hockey)
- Concerts/Conventions/Graduations
- Other Special Events

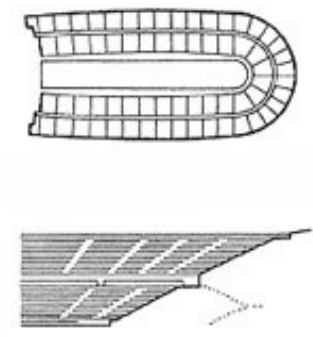
Subclassifications (layout, type, material):

- Layout:
- Square
 - Rectangular (Typ. Stadium)
 - Round (Typ. Arena)
 - Oval (Typ. Stadium)
 - U-Shaped (Ancient/Historical Stadium)

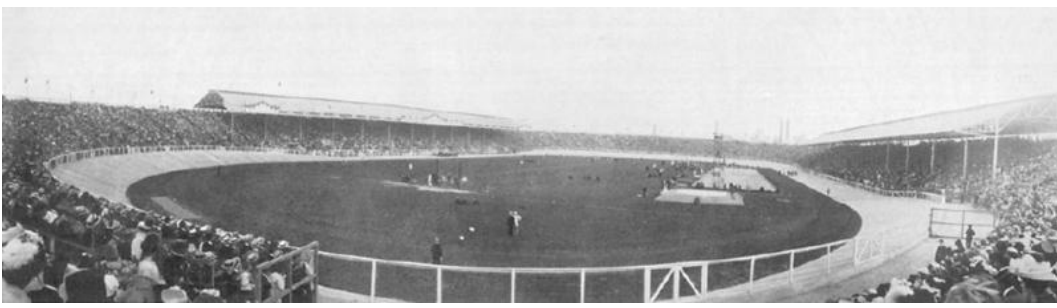
- Type:
- Open Air (Typ. Stadium)
 - Fixed Roof (Typ. Arena)
 - Retractable Roof (Partially or Fully)
 - Dome/Vaults/Arches (Fixed or Air Supported)

- Material:
- Concrete
 - Steel
 - Glass
 - Wood/Timber

Stadiums and Arenas may require special zoning districts in some jurisdictions with various setbacks, restrictions, and benefits that vary depending on local needs and characteristics.



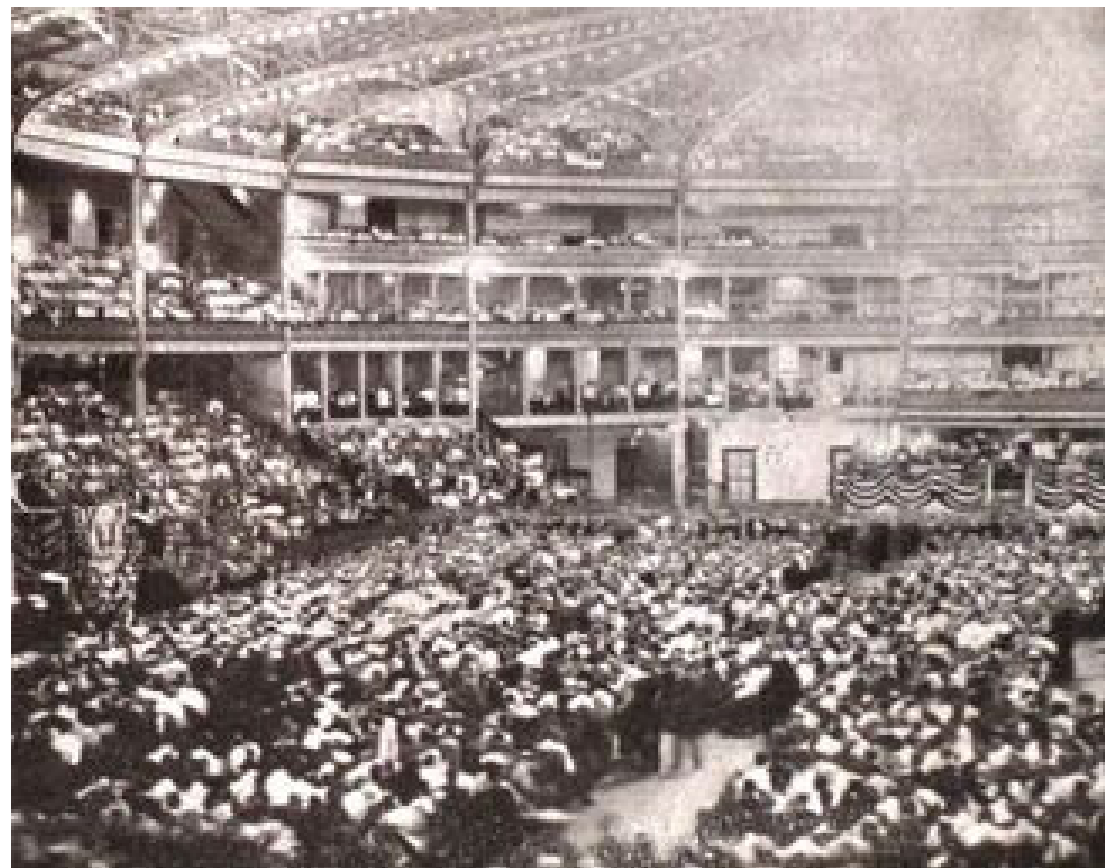
Stadium at Olympia, Greece. c. 776 BCE.³



One of the first modern stadiums hosting the 1908 Olympic Games. White City Stadium, 1908, London, United Kingdom.⁴



U.S. Bank Stadium, Minn., MN, 2016, HKS, Inc.. Photo: Andy Clayton-King, AP.⁵



Madison Square Garden (Arena), New York, NY, 1890, c. 1905.⁶



T-Mobile Arena, Las Vegas, NV, 2016, Populous. Image: Jeff Goldberg.⁷

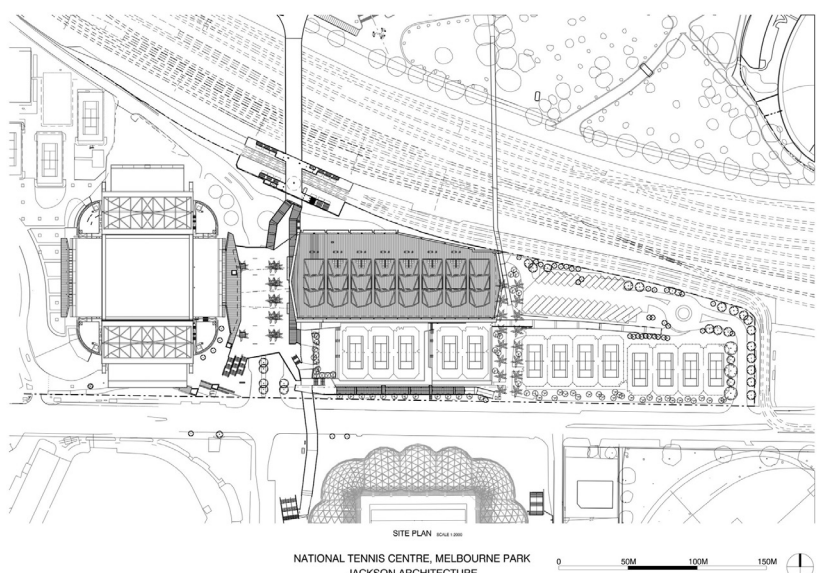
Sources:

1. "Stadium." Merriam-Webster. Merriam-Webster. Accessed December 4, 2019. <https://www.merriam-webster.com/dictionary/stadium>.
2. "Arena." Merriam-Webster. Merriam-Webster. Accessed December 4, 2019. <https://www.merriam-webster.com/dictionary/arena>.
3. World Stadiums - Architecture :: Stadium history. Accessed December 4, 2019. http://worldstadiums.com/stadium_menu/architecture/historic_stadiums.shtml.
4. Warnes, Pete, Roger Hossick, Ivo Ogrin, Peter Brown, and Steve Roberts. "White City Stadium." The Stadium Guide. Accessed December 4, 2019. <https://www.stadiumguide.com/whitcitystadium/>.
5. Sepic, Matt. "At U.S. Bank Stadium, It's First down and Looking Good." MPR News. Minnesota Public Radio, August 29, 2016. <https://www.mprnews.org/story/2016/08/29/at-us-bank-stadium-first-down-and-looking-good>.
6. "Madison Square Garden (1890)." American Football Database. Accessed December 4, 2019. [https://americanfootballdatabase.fandom.com/wiki/Madison_Square_Garden_\(1890\)](https://americanfootballdatabase.fandom.com/wiki/Madison_Square_Garden_(1890)).
7. "T-Mobile Arena." Populous. Accessed December 4, 2019. <https://populous.com/project/t-mobile-arena>.

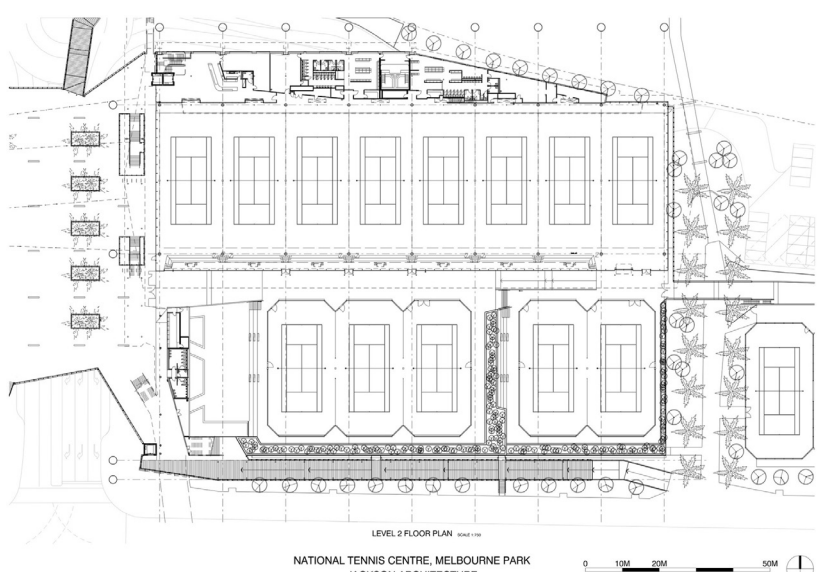
PRECEDENT STUDIES

Project 1: National Tennis Centre

Date of Completion: 2012
 Architect: Jackson Architecture
 Location: Melbourne, Australia

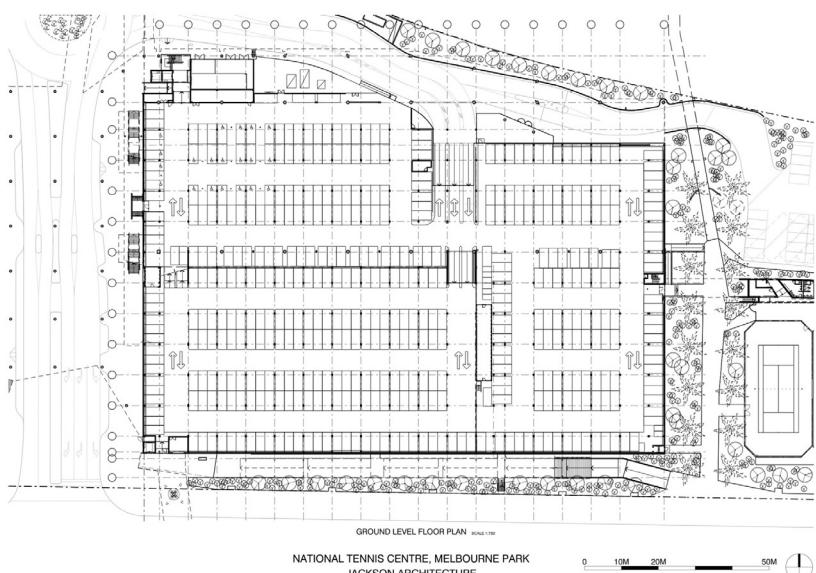


Site Plan.¹

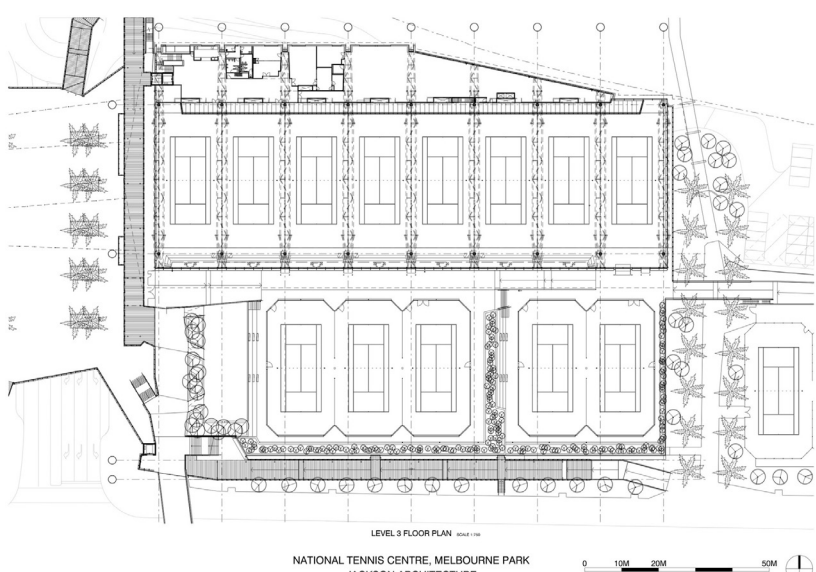


Second Floor Plan.¹

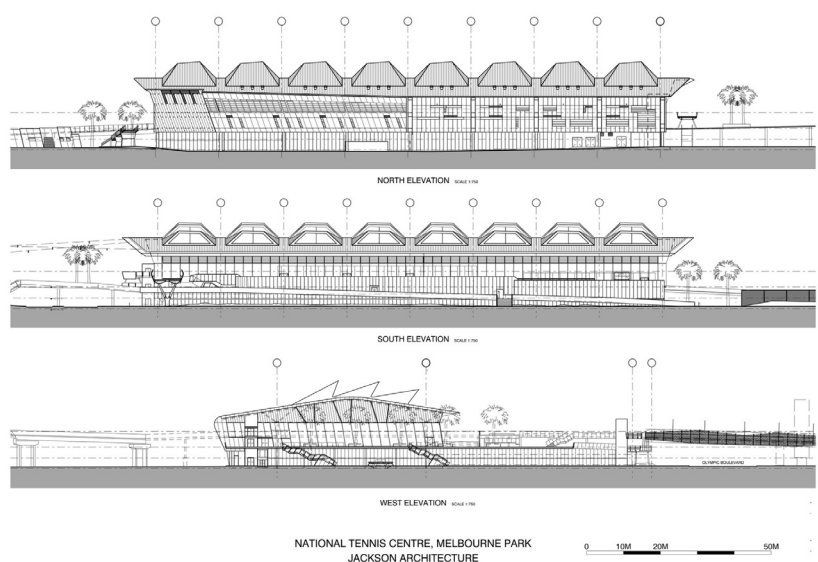
Construction Type: Multi-story, concrete and steel building.
 Main Materials: Concrete, steel, glass.
 Relevance: World class training center that is connected through bridges, ramps, and walkways to an existing arena and nearby entertainment venues in the Olympic Parks precinct.
 Main Architectural Features: A public plaza, 21 indoor & outdoor tennis courts, and 1000 space carpark and public bus access.
 Concept: Transparent pavilion in a park that is sited in such a way not to overpower the visual connection with the neighboring arena.



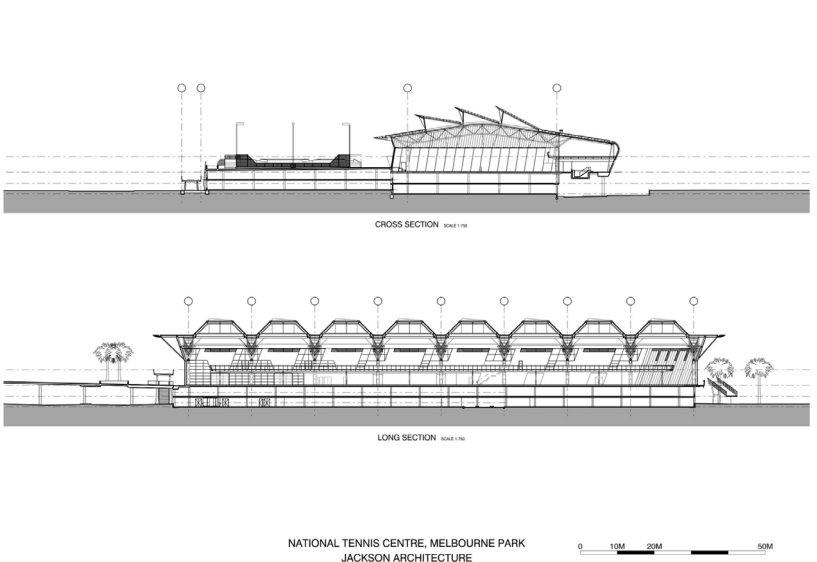
Ground Floor Plan.¹



Third Floor Plan.¹



Elevations.¹



Sections.¹



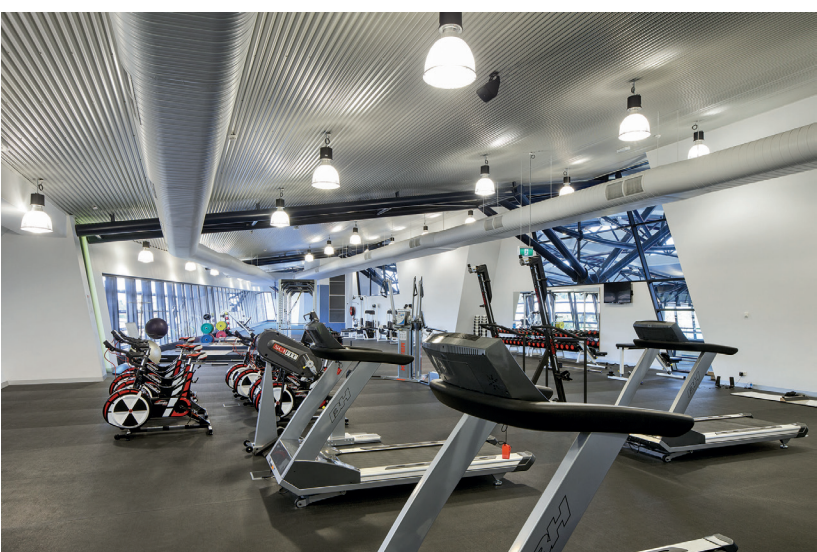
Exterior Photo: John Gollings.¹



Exterior Photo: John Gollings.¹



Interior Photo: John Gollings.¹



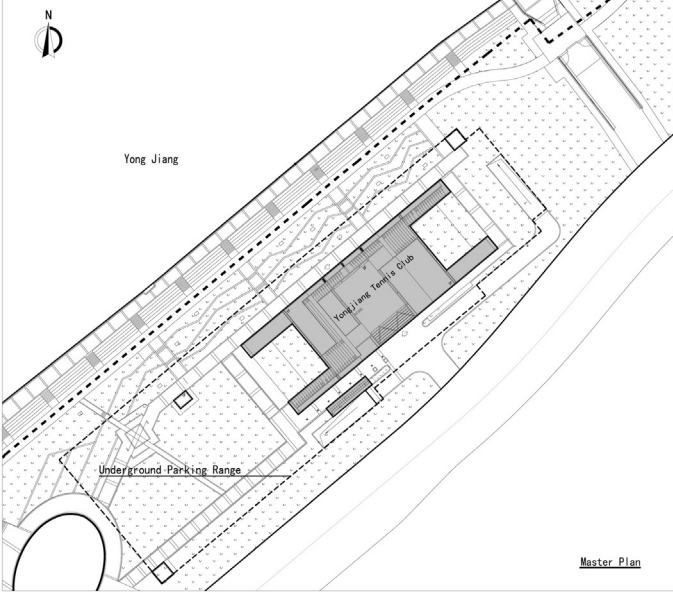
Interior Photo: John Gollings.¹

Sources:
 1. Sánchez, Daniel. "National Tennis Centre / Jackson Architecture." ArchDaily. ArchDaily, July 2, 2013. <https://www.archdaily.com/394179/national-tennis-centre-jackson-architecture>.
 24 GEORGE F ROZANSKY

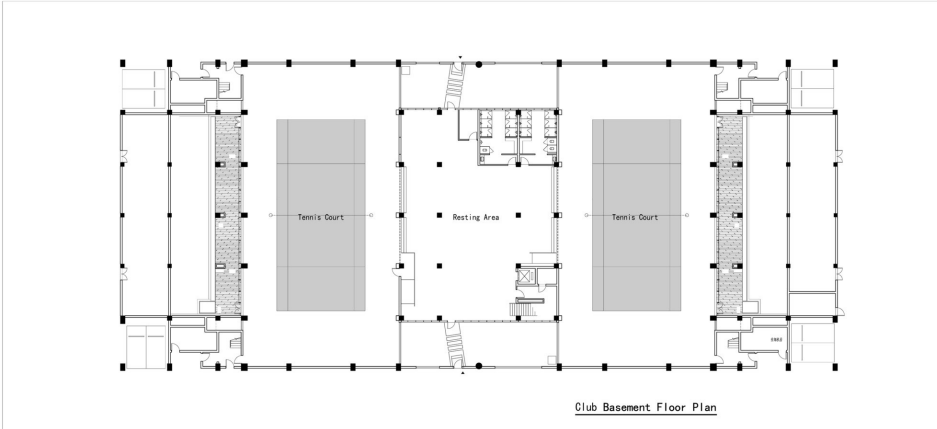
PRECEDENT STUDIES

Project 2: Yongjiang Tennis Club

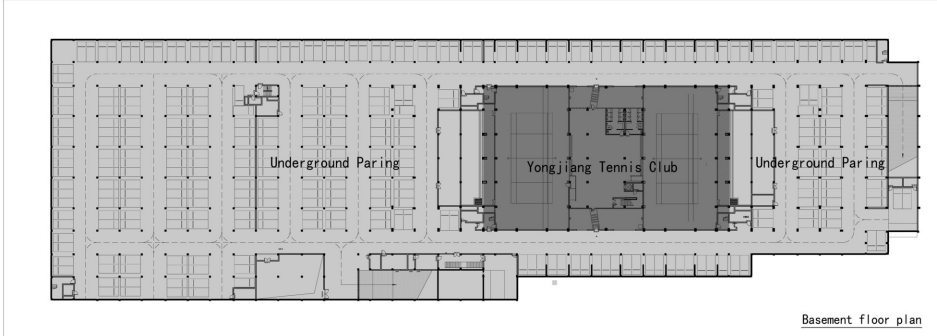
Date of Completion: 2013
 Architect: Zhang Jingang
 Location: Ningbo, China



Site Plan.¹
 N.T.S.

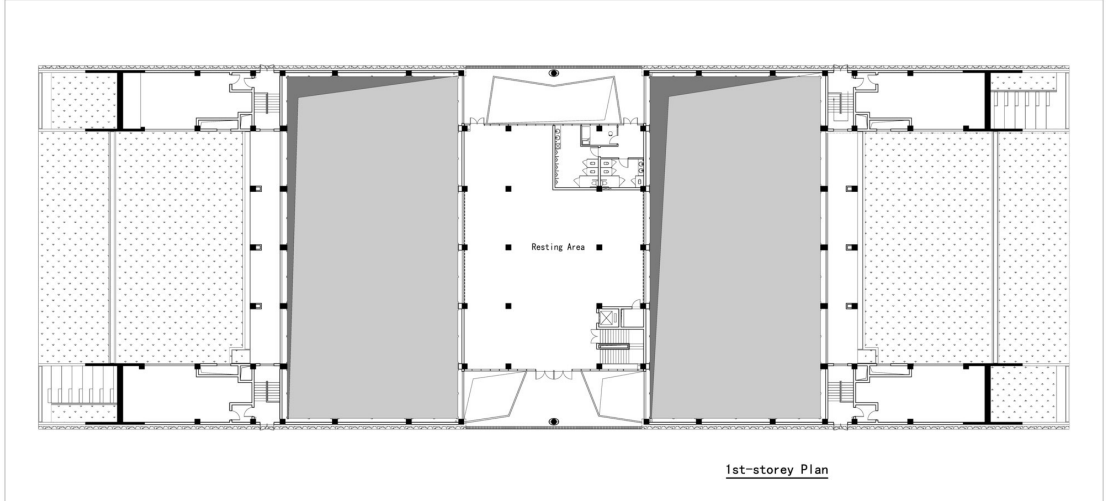


Club Basement Floor Plan.¹
 N.T.S.

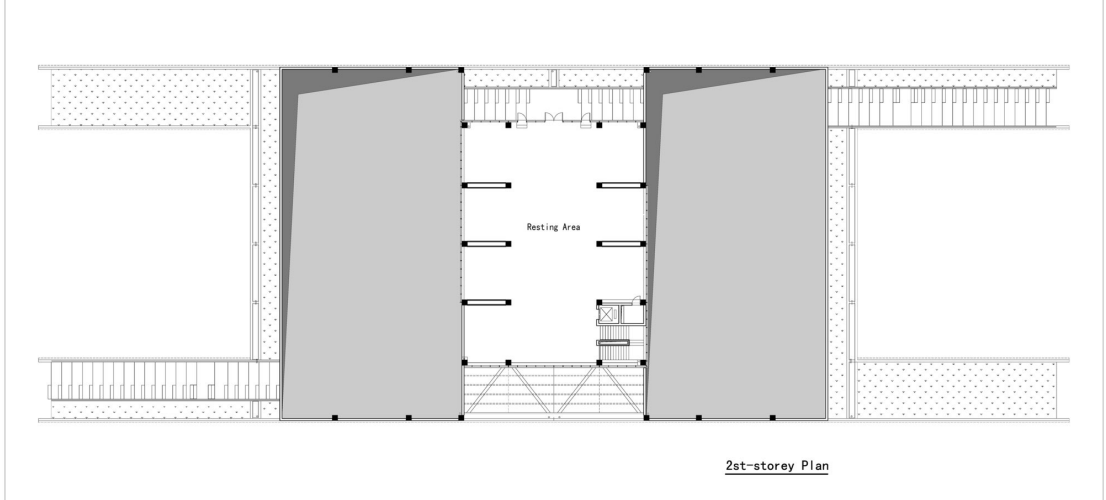


Basement Floor Plan.¹
 N.T.S.

Construction Type: Multi-story, concrete and steel? building.
 Main Materials: Concrete, steel?, and glass.
 Relevance: Sports club located in a green belt along the Yongjiang River.
 Main Architectural Features: Underground parking garage, event hall, two tennis courts, and support areas.
 Concept: Tall sports building set below ground extending above to integrate with the green belt landscaping with green roof that serves pedestrians.

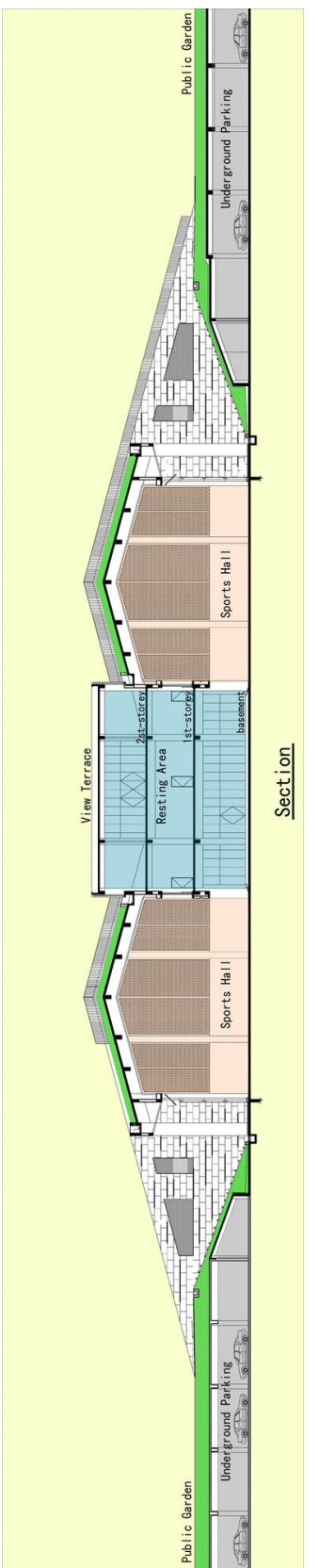


First Floor Plan.¹
 N.T.S.

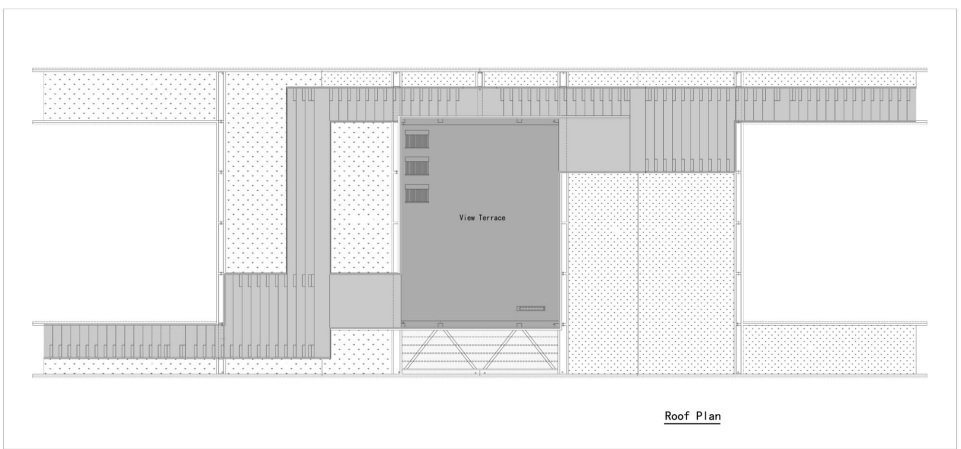


Second Floor Plan.¹
 N.T.S.

Sources:
 1. Aguilar, Cristian. "Yongjiang Tennis Club / Zhang Jingang." ArchDaily, ArchDaily, January 13, 2014. <https://www.archdaily.com/464235/yongjiang-tennis-club-zhang-jingang>.



Section.¹
 N.T.S.



Roof Plan.¹
 N.T.S.



Exterior Photo: Zhang Jingang.¹



Exterior Photo: Zhang Jingang.¹



Exterior Photo: Zhang Jingang.¹



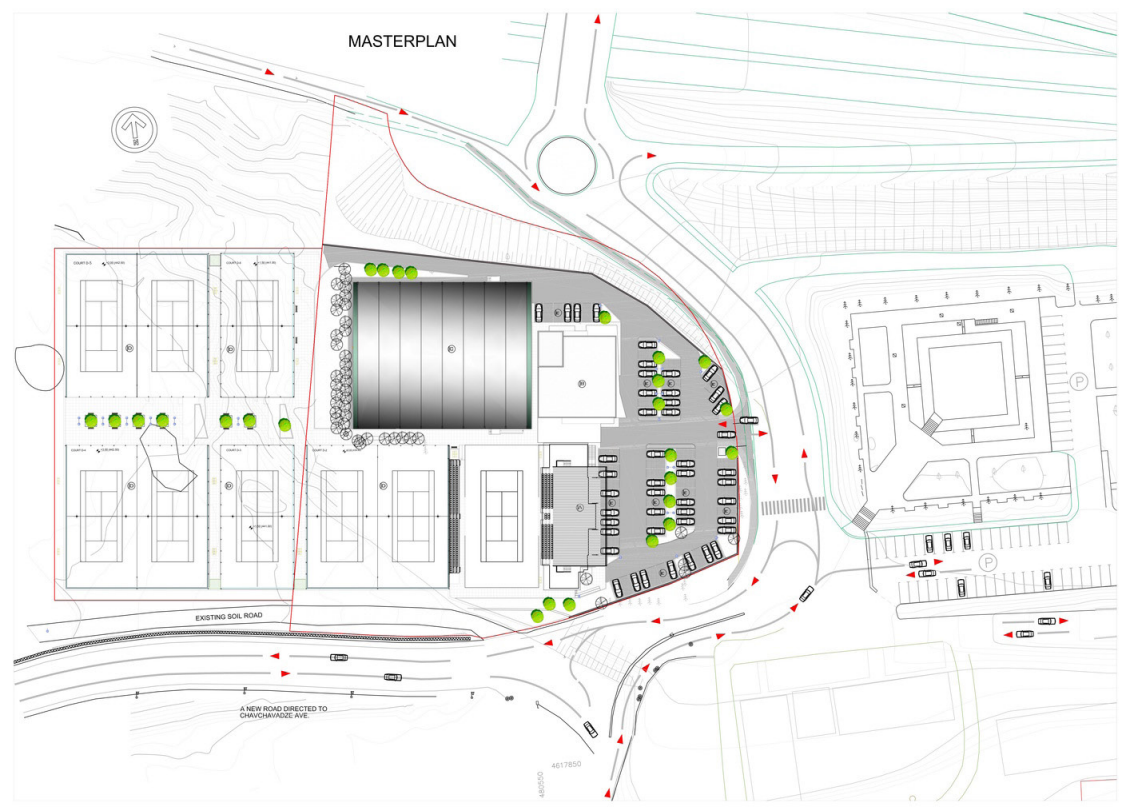
Interior Photo: Zhang Jingang.¹

PRECEDENT STUDIES

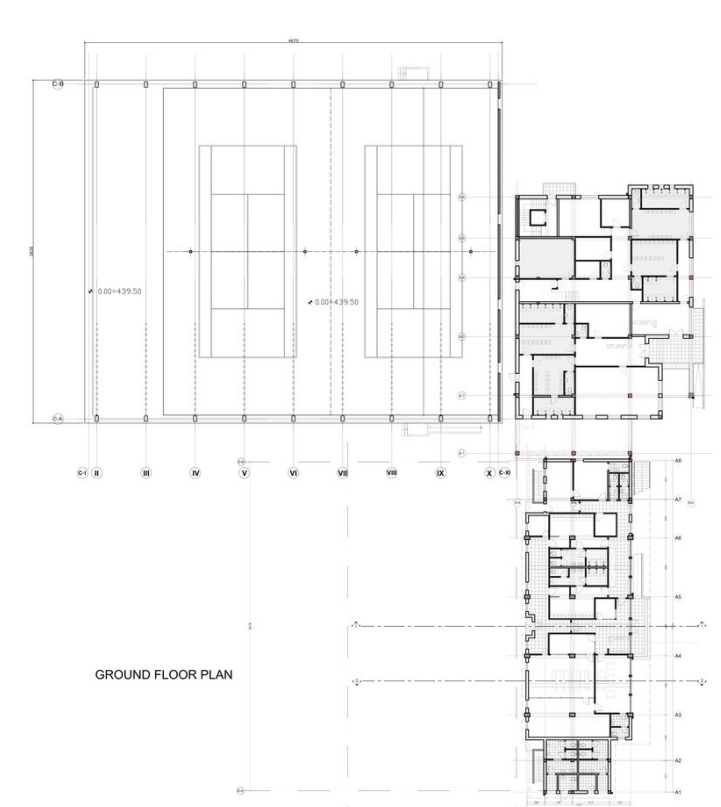
Project 3: Olympic Tennis Court

Date of Completion: 2015
 Architect: Artstudio Project
 Location: Tbilisi, Georgia

Construction Type: Multi-story, concrete, steel, and glass building.
 Main Materials: Concrete, steel, and glass.
 Relevance: Georgian Olympic Committee and the Tennis Federation facility for event, training, and offices.
 Main Architectural Features: Corner condition with frontage on three sides. Nine courts with two enclosed, one stadium (tribune). Administrative building for training and offices.
 Concept: Terraced arrangement of tennis courts. Closed courts uses wood arch structure. Reinforced concrete pillars with metal truss roof for tribune.



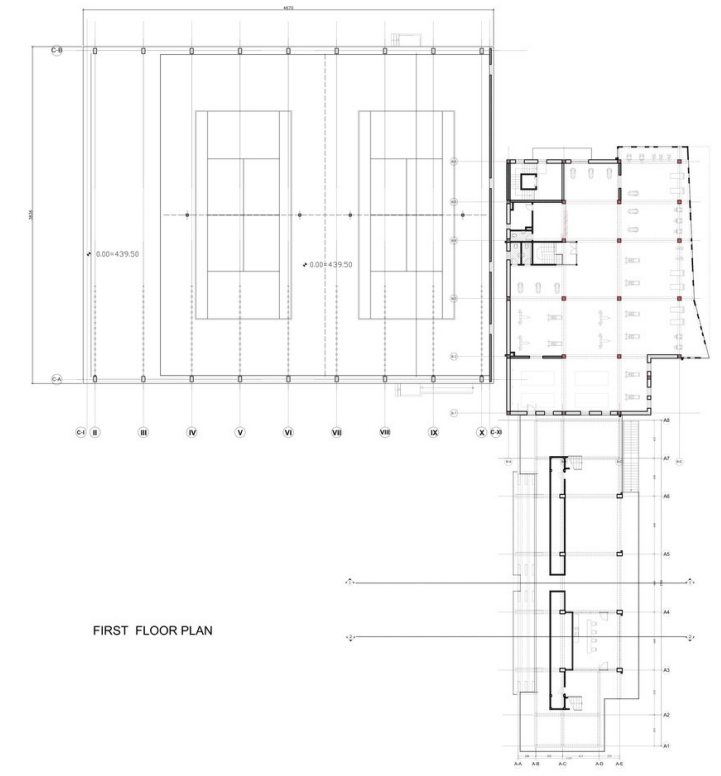
Site Plan.¹
 N.T.S.



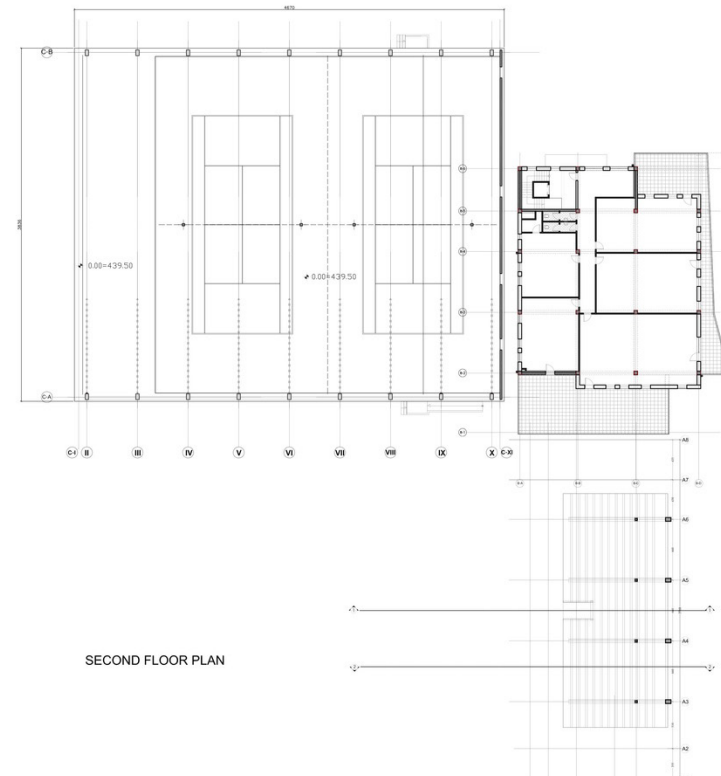
Ground Floor Plan.¹
 N.T.S.



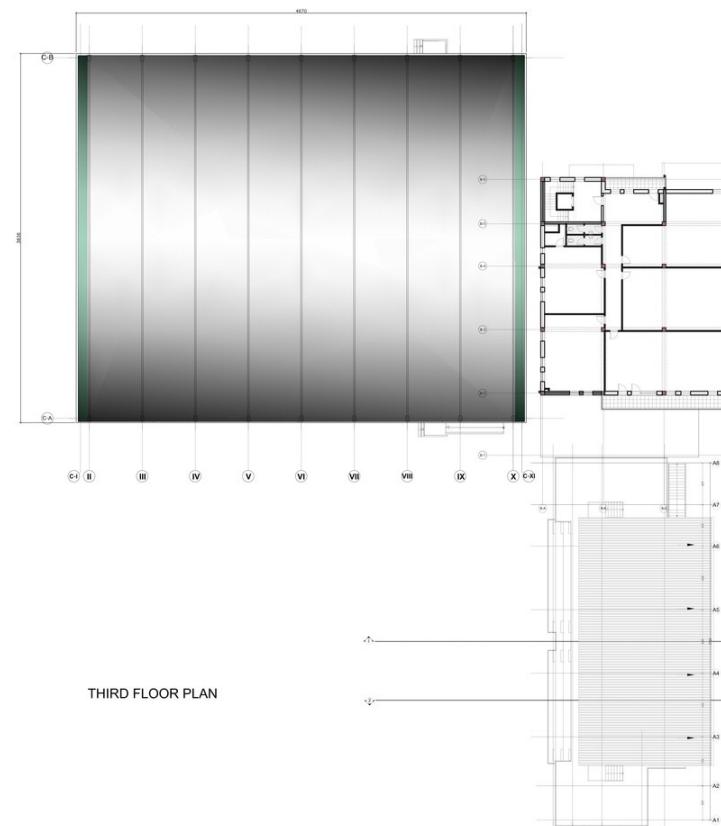
East Exterior Elevation.¹
 N.T.S.



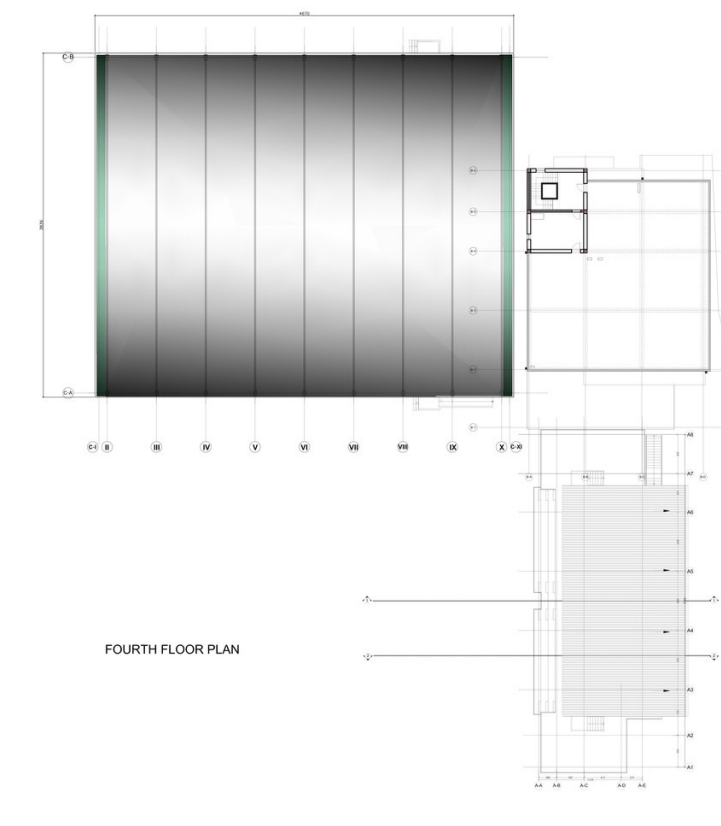
First Floor Plan.¹
 N.T.S.



Second Floor Plan.¹
 N.T.S.



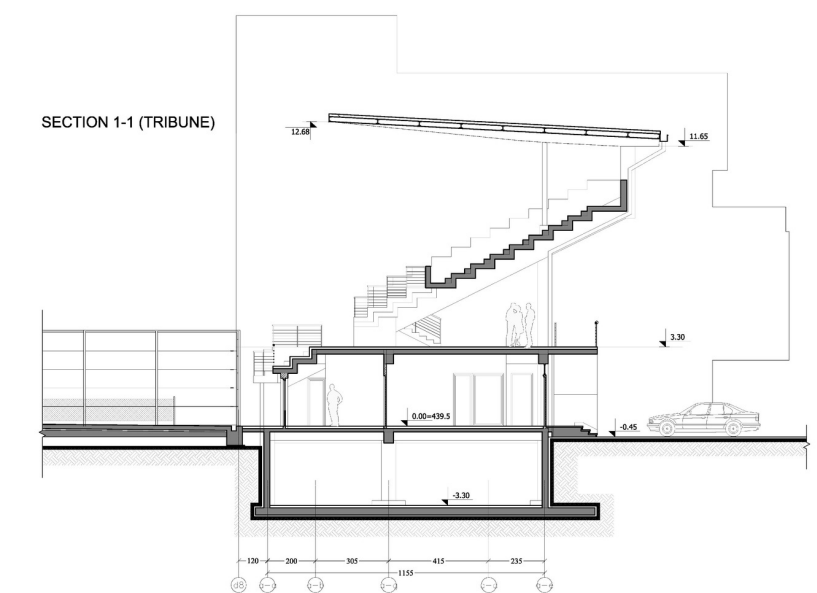
Third Floor Plan.¹
 N.T.S.



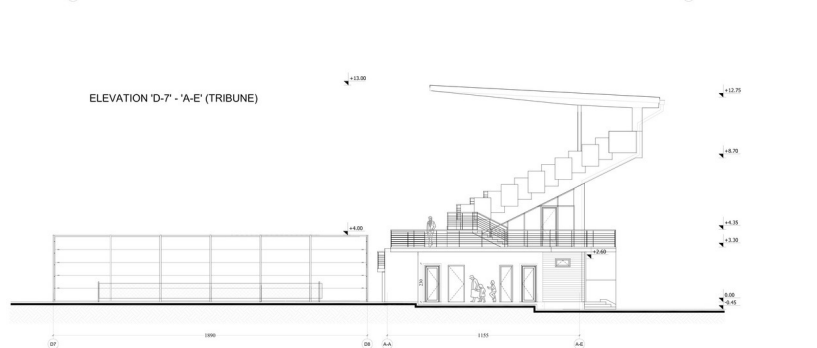
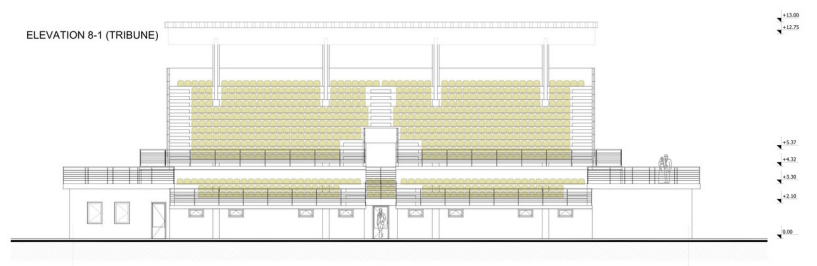
Fourth Floor Plan.¹
 N.T.S.

Sources:
 1. Mena, Florencia. "Olympic Tennis Court / Artstudio Project." ArchDaily. ArchDaily, August 26, 2016. <https://www.archdaily.com/791222/olympic-tennis-court-artstudio-project>.
 28 GEORGE F ROZANSKY

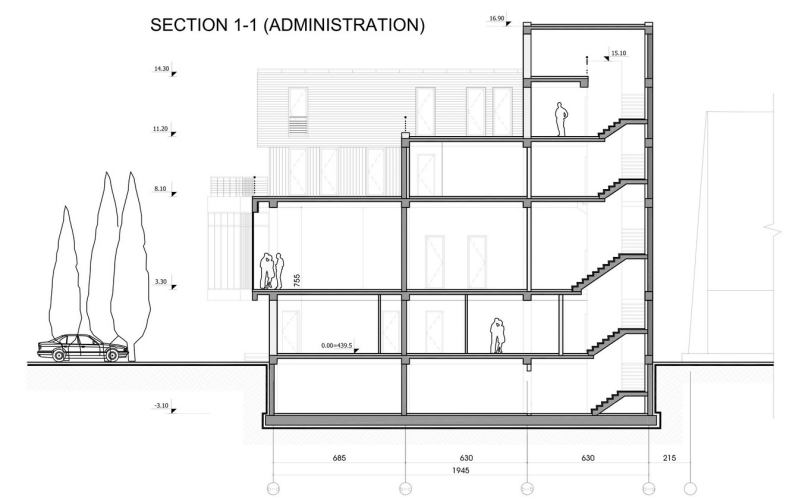
PRECEDENT STUDIES
 Project 3: Olympic Tennis Court



Court Section.¹
 N.T.S.



Court Section.¹
 N.T.S.



Administration Section.¹
 N.T.S.



North Exterior Elevation.¹
 N.T.S.



Exterior Photo: Sandro Sulaberidze.¹



Exterior Photo: Sandro Sulaberidze.¹



Court Photo: Sandro Sulaberidze.¹



Interior Photo: Sandro Sulaberidze.¹

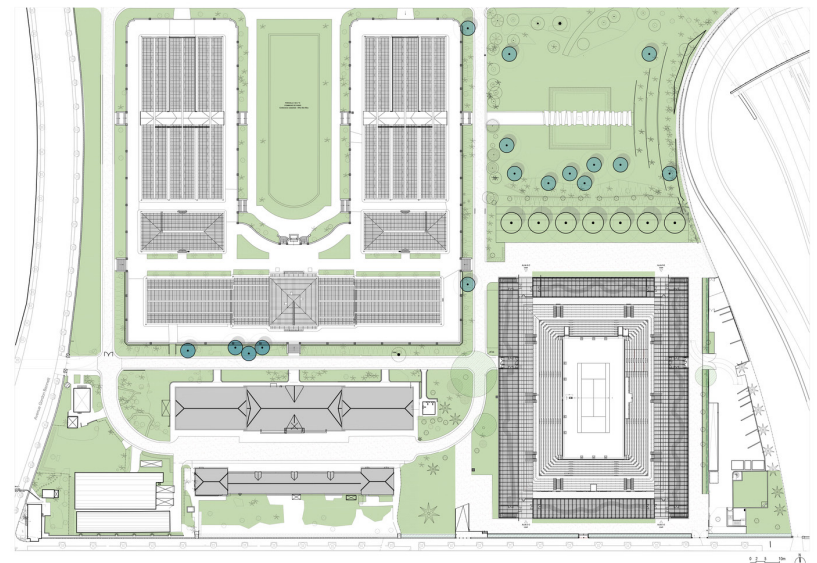
Sources:
 1. Mena, Florencia. "Olympic Tennis Court / Artstudio Project." ArchDaily. ArchDaily, August 26, 2016. <https://www.archdaily.com/791222/olympic-tennis-court-artstudio-project>.
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PRECEDENT STUDIES

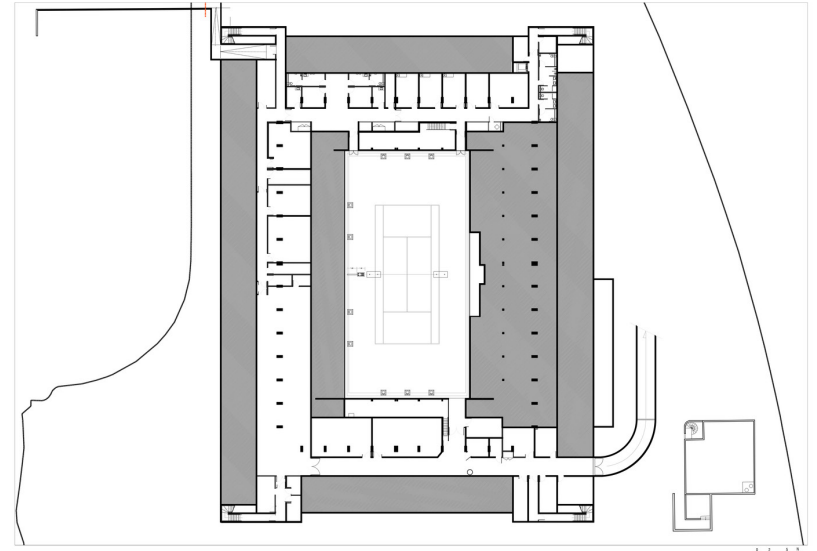
Project 4: Simone-Mathieu Tennis Court at Roland Garros

Date of Completion: 2018
 Architect: Marc Mimram
 Location: Paris, France

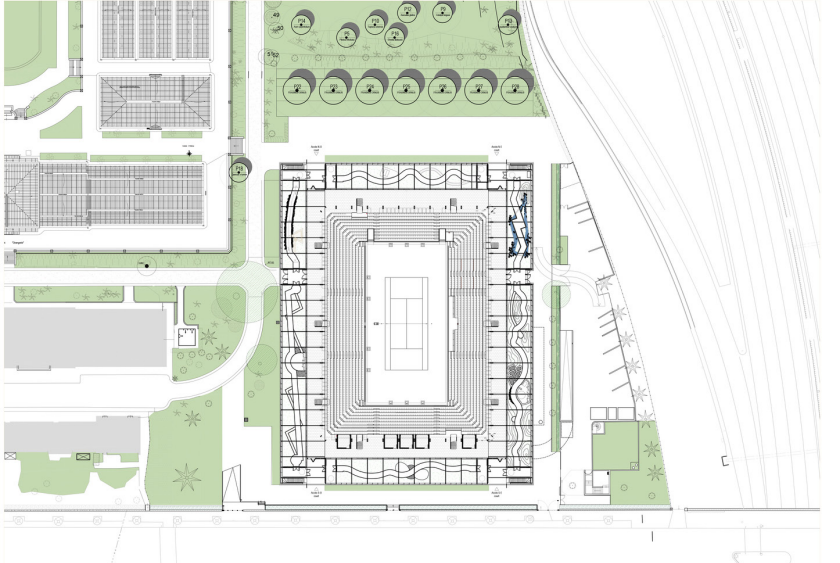
Construction Type: Multi-story, concrete, steel, and glass building.
 Main Materials: Concrete, steel, and glass.
 Relevance: Revitalize existing botanical site and extend to host tennis tournaments and the intention to open gardens and create a link to the city.
 Main Architectural Features: 5,000 seat stadium partly below ground surrounded by terraced concrete platforms with a steel structure and canopies adjacent to the existing greenhouses.
 Concept: Inspired by the existing glass and iron hothouses and the Crystal Palace in London which is reminiscent of the 19th century use of metal and glass in architecture.



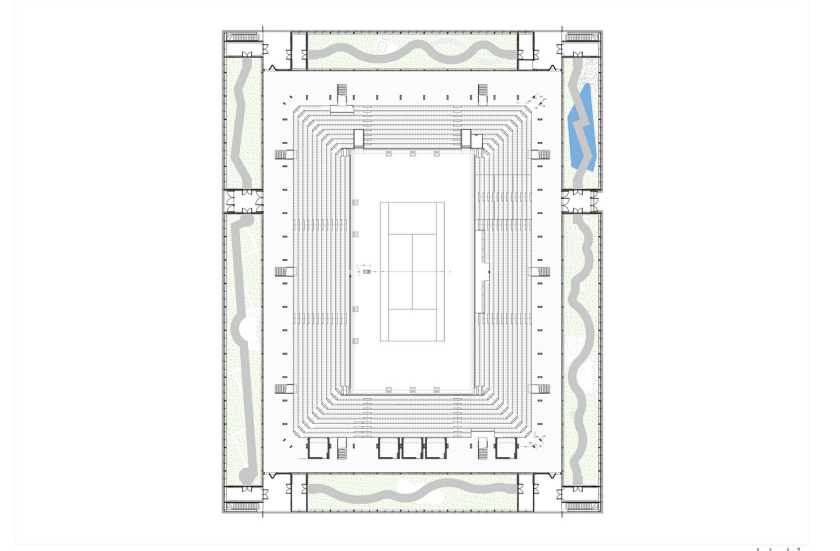
Context Plan.¹
 N.T.S.



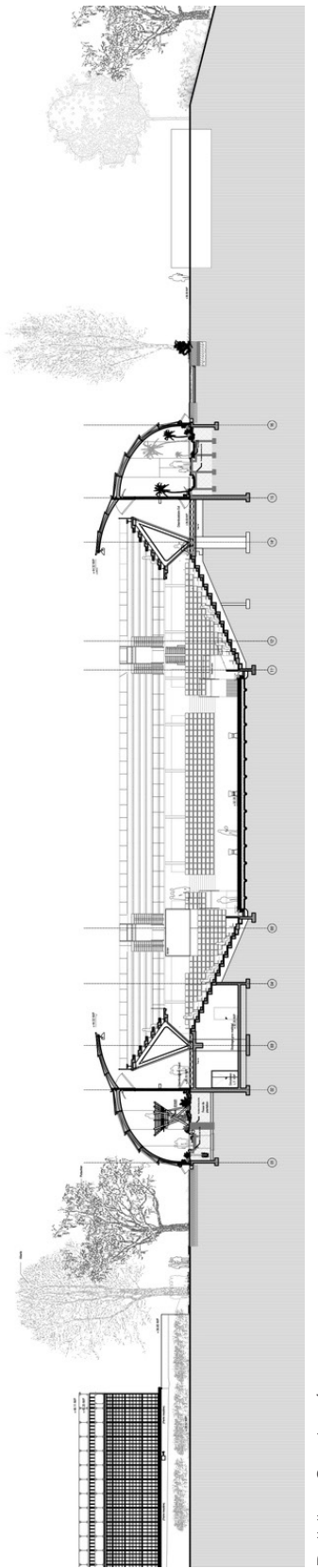
Lower Level Plan.¹
 N.T.S.



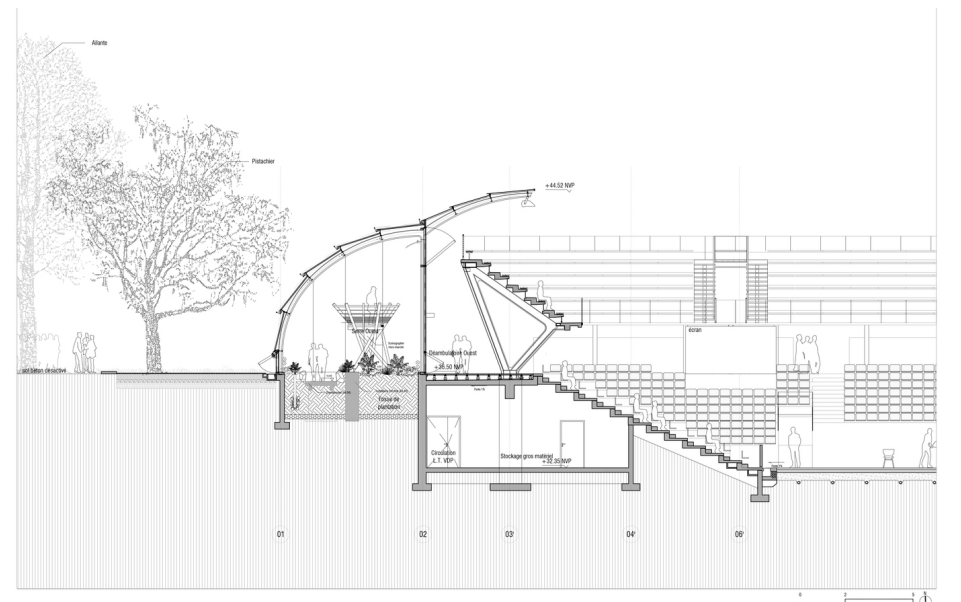
Site Plan.¹
 N.T.S.



Ground Floor Plan.¹
 N.T.S.



Building Section.¹
 N.T.S.



Partial Building Section.¹
 N.T.S.



Exterior Photo: Erieta Attali.¹



Exterior Photo: Erieta Attali.¹



Exterior Photo: Erieta Attali.¹



Court Photo: Erieta Attali.¹



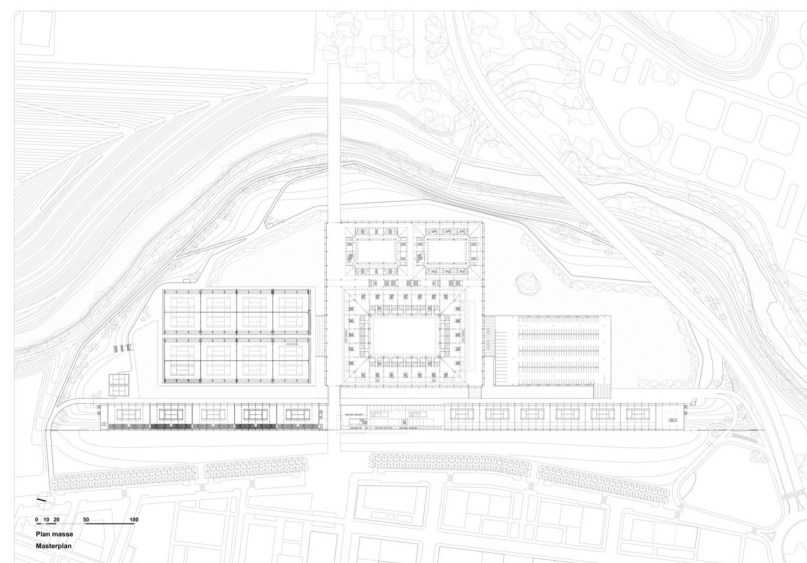
Interior Photo: Erieta Attali.¹

Sources:
 1. Pintos, Paula. "Simonne-Mathieu Tennis Court at Roland Garros / Marc Mimram." ArchDaily, ArchDaily, May 28, 2019. <https://www.archdaily.com/917789/simonne-mathieu-tennis-court-roland-garros-marc-mimram>.
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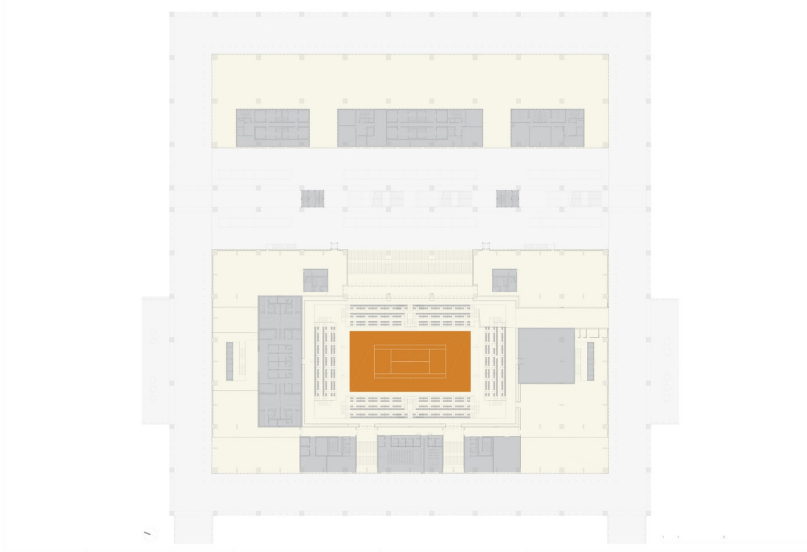
PRECEDENT STUDIES

Project 5: Olympic Tennis Centre

Date of Completion: 2009
 Architect: Dominique Perrault Architecture
 Location: Madrid, Spain

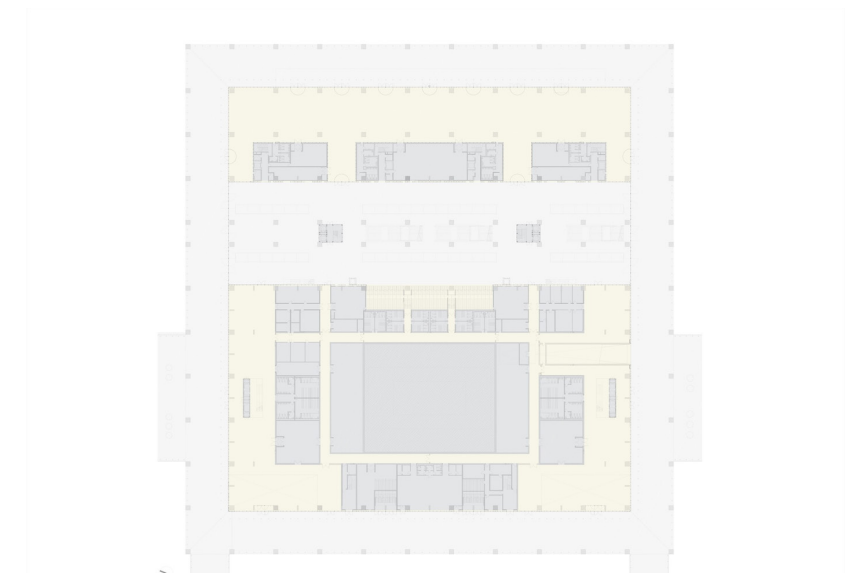


Site Plan.¹
 N.T.S.

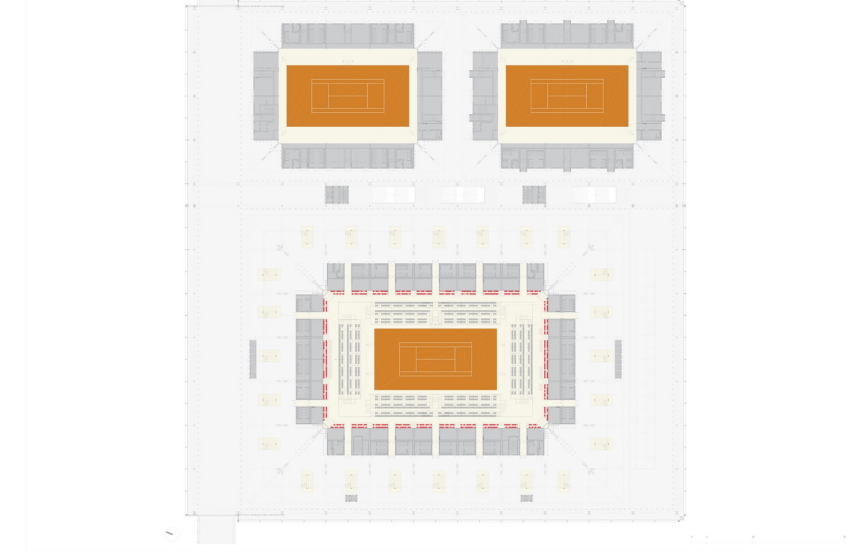


Floor Plan 2.¹
 N.T.S.

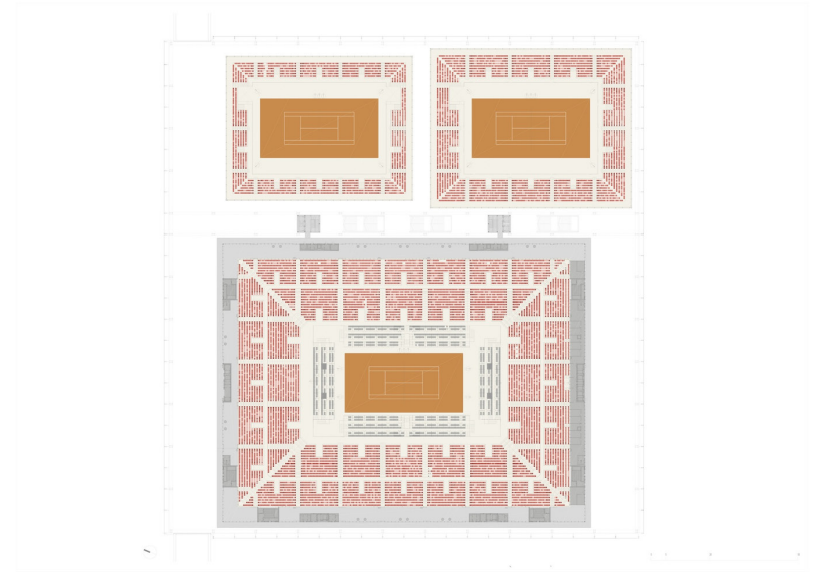
Construction Type: Multi-story, concrete, steel, and glass building.
 Main Materials: Concrete, steel, and glass.
 Relevance: Facility created to host tennis events and part of the bid to host the international games in 2016. Tennis Federation headquarters, media, restaurant, school, and practice.
 Main Architectural Features: Mobile skin filters light and functions as a wind screen and shelter. Horizontal reference plane created by water. Framing of the surrounding scenery.
 Concept: Reflecting a "magic box" concept that encloses sports and multi-use spaces and opens and changes shape based upon use to be a changing element in the cityscape.



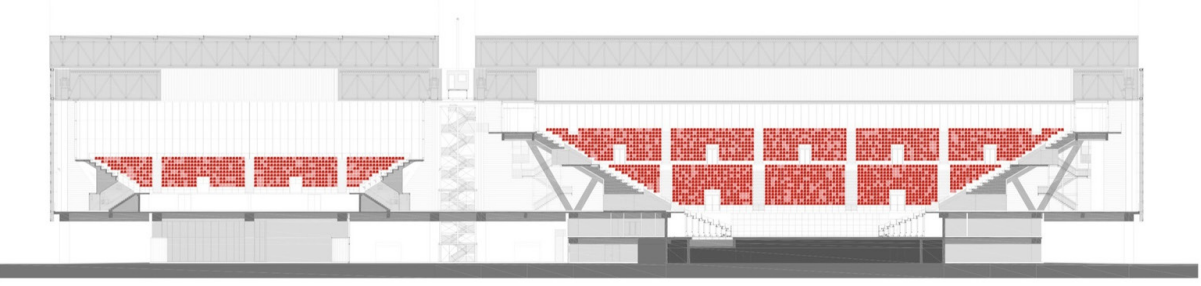
Floor Plan 1.¹
 N.T.S.



Floor Plan 3.¹
 N.T.S.

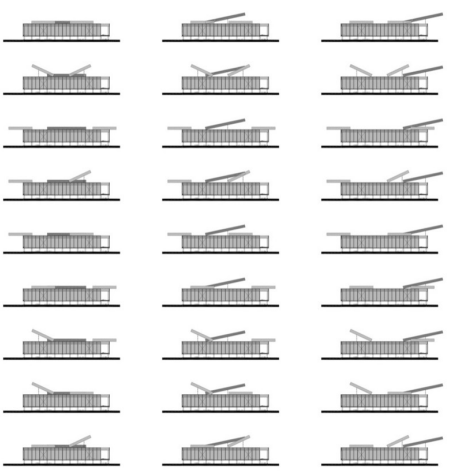


Floor Plan 5.¹
 N.T.S.



Building Section.¹
 N.T.S.

LES 27 POSITIONS DE LA BOITE MAGIQUE



Potential Roof Positions.¹
 N.T.S.



Exterior Photo (Roof Closed): Unknown.¹



Exterior Photo (Roof Open): Unknown.¹



Interior Photo (Roof Open): Unknown.¹



Interior Photo: Unknown.¹

Sources:
 1. J, Sebastian. "Olympic Tennis Centre / Dominique Perrault Architecture." ArchDaily, ArchDaily, May 18, 2012. <https://www.archdaily.com/235544/olympic-tennis-centre-dominique-perrault-architecture>.
 GEORGE F ROZANSKY

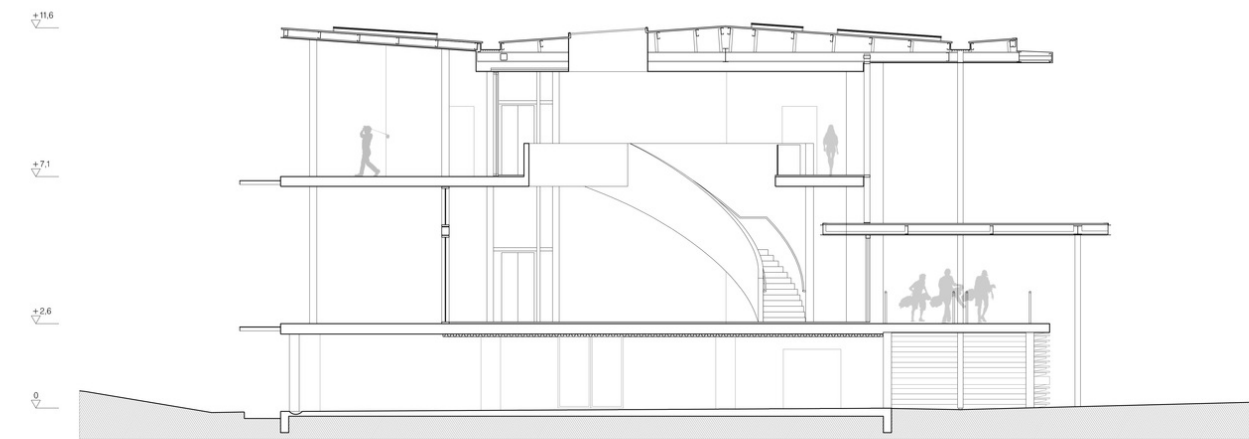
PRECEDENT STUDIES
 Project 6: KDV Golf and Tennis Academy

Date of Completion: 2016
 Architect: Shiro Architects
 Location: Carrara, Australia

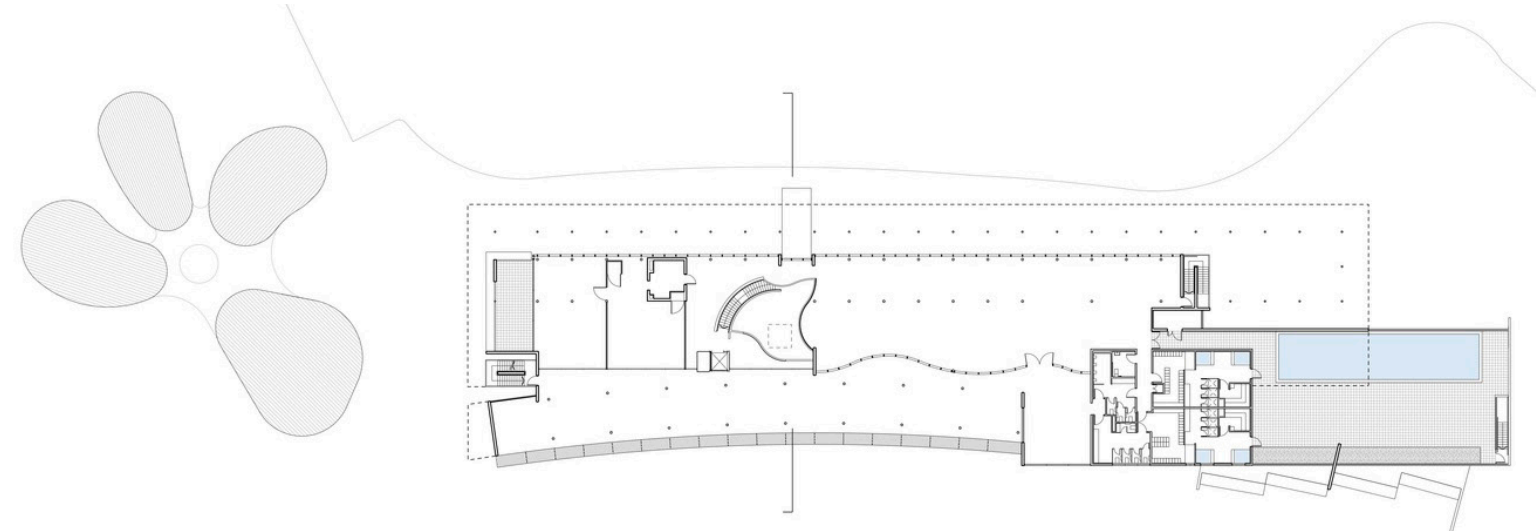
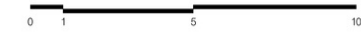
Construction Type: Multi-story, concrete, steel, and glass building.
 Main Materials: Concrete, steel, and glass.
 Relevance: Overhaul of the previous facility for the Carrara Gardens Golf Course.
 Main Architectural Features: Flexible plan allowing multi-purpose spaces. Glass transparency and reflections of the mirrored soffit contrasts with the concrete. Bring outside in.
 Concept: Inspired by the "architecture of silence" by Mies van der Rohe.



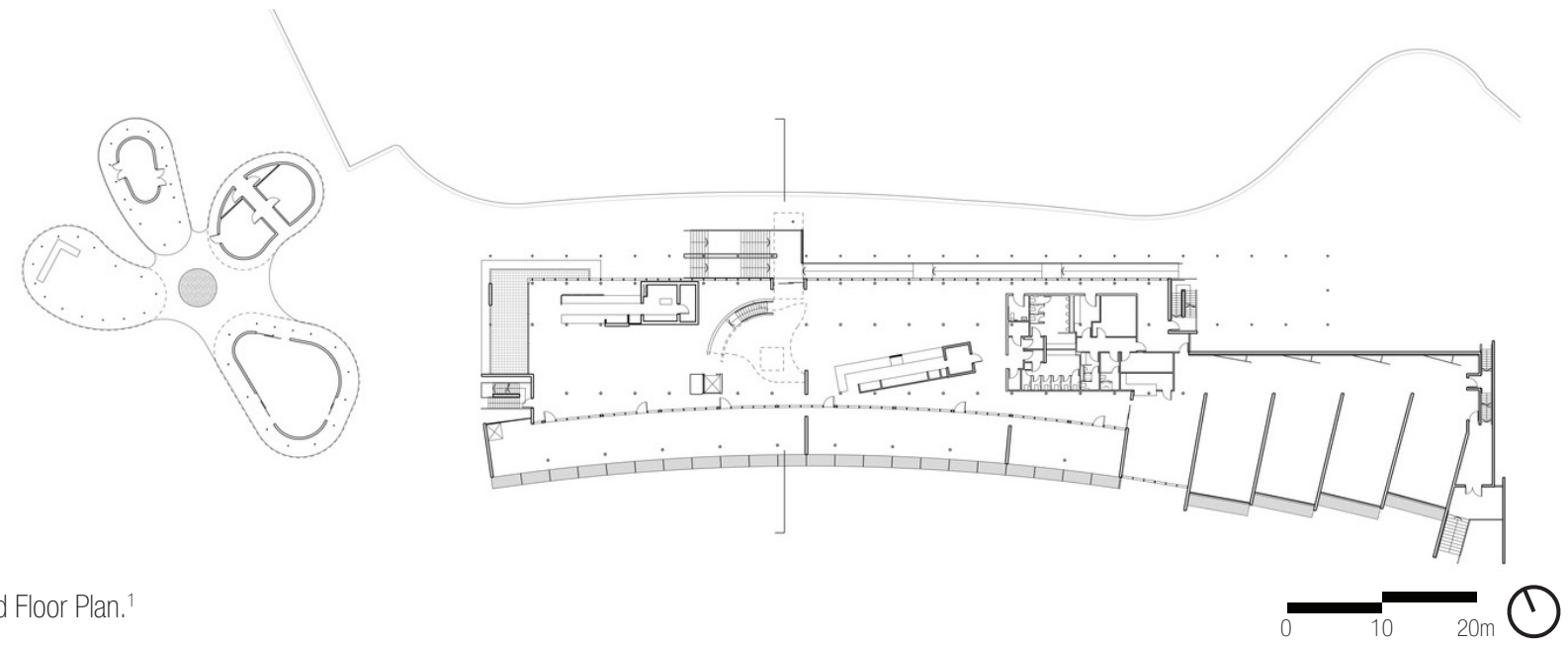
Site Plan.¹



Building Section.¹



First Floor Plan.¹



Ground Floor Plan.¹



Exterior Photo: Richard Glover.¹



Exterior Photo: Richard Glover.¹



Interior Photo: Richard Glover.¹



Rooftop Photo: Richard Glover.¹

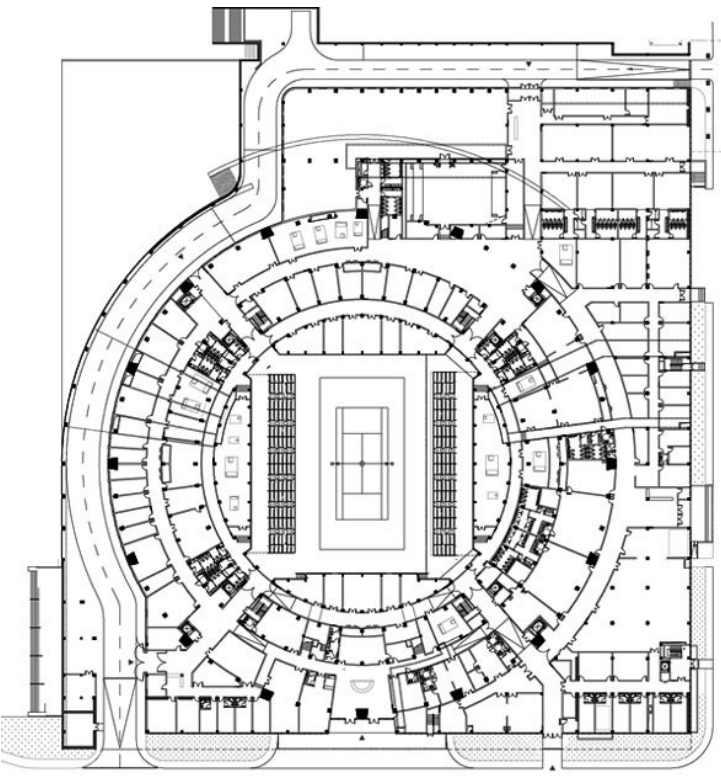
Sources:
 1. Rojas, Cristobal. "KDV Golf and Tennis Academy / Shiro Architects." ArchDaily, ArchDaily, November 8, 2016. <https://www.archdaily.com/799006/kdv-golf-and-tennis-academy-shiro-architects>.
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PRECEDENT STUDIES

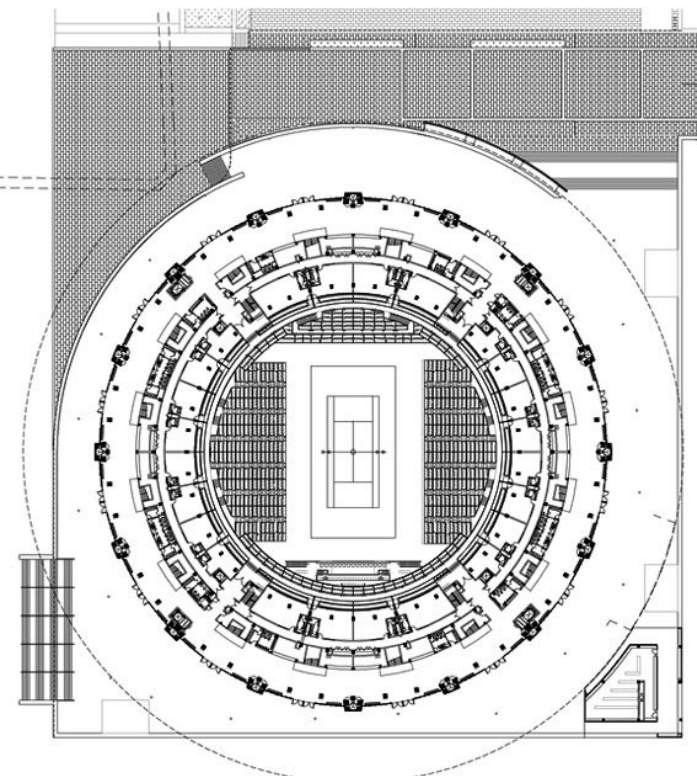
Project 7: Diamond Arena

Date of Completion: 2011
 Architect: Atelier 11
 Location: Beijing, China

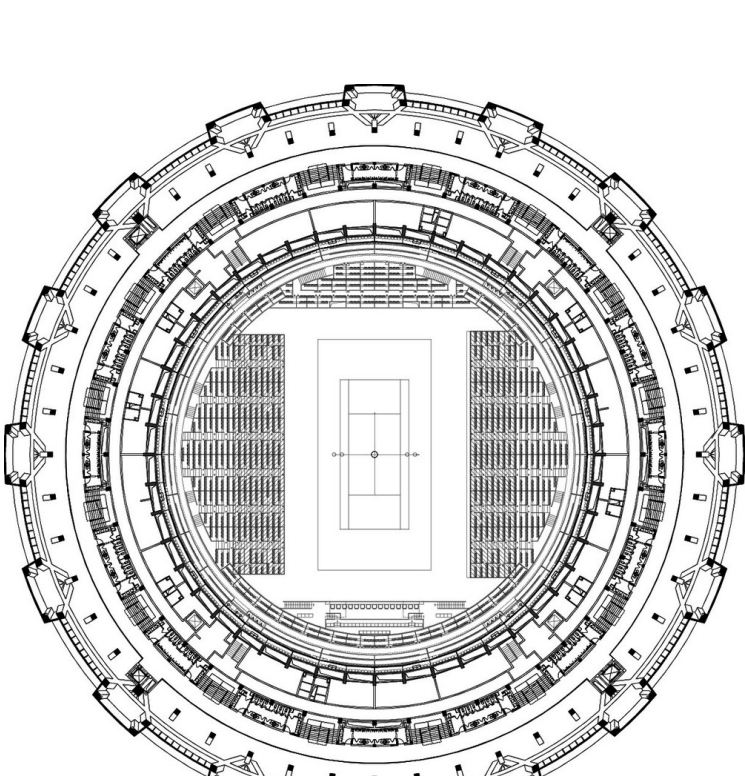
Construction Type: Multi-story, concrete, steel, and glass building.
 Main Materials: Concrete, steel, and glass.
 Relevance: Addition to the Olympic Park.
 Main Architectural Features: 16 sets of V-shaped columns. Movable steel roof with translucent material to allow daylight. Circular observation deck at the 7th floor allowing parks views.
 Concept: To create a triangular motif resulting in a diamond shape which is an important symbol for Chinese sports. To eliminate unnecessary decorations and balance form and materials.



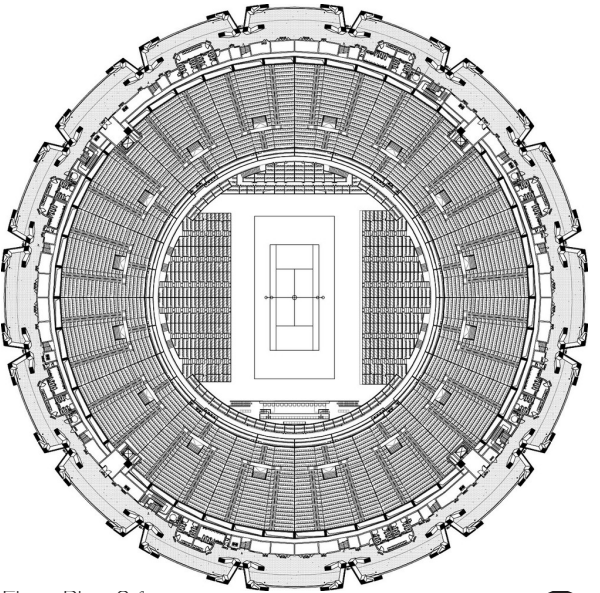
Site Plan.¹
 N.T.S.



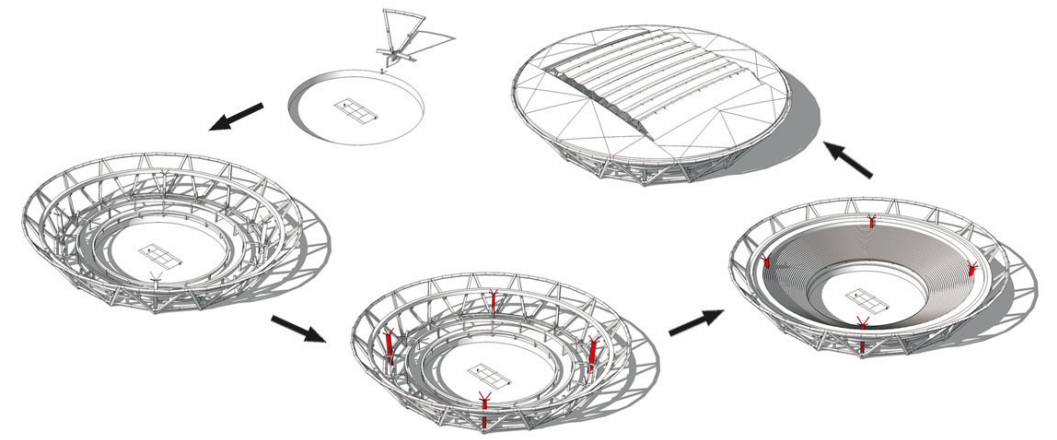
Floor Plan 1.¹
 N.T.S.



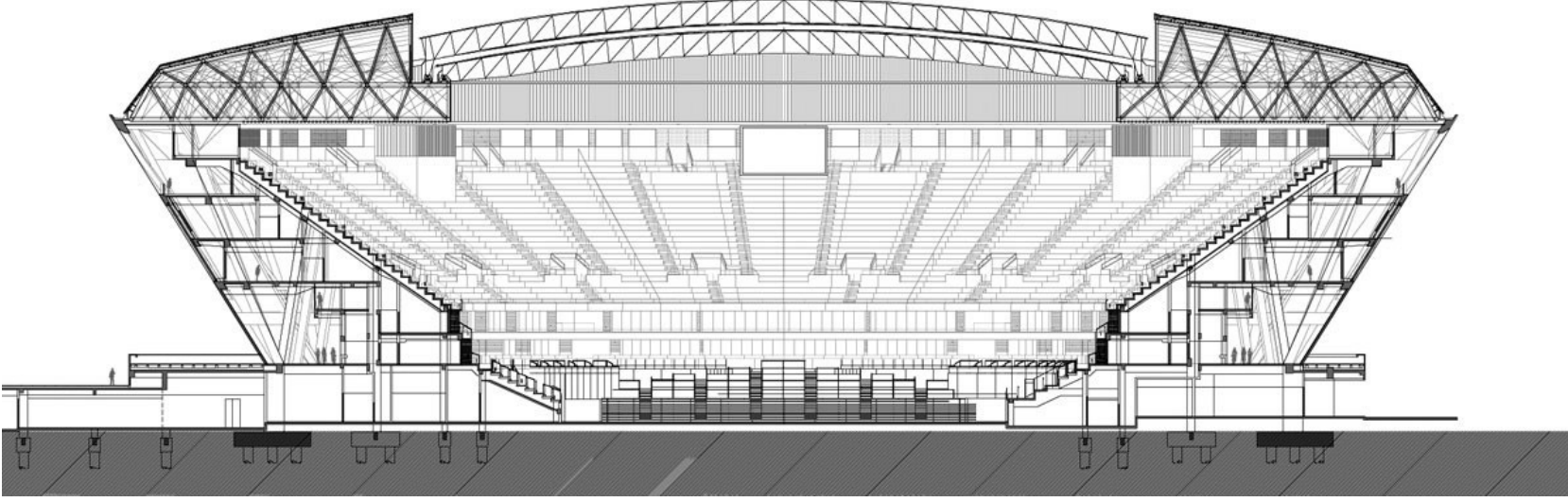
Floor Plan 2.¹
 N.T.S.



Floor Plan 3.¹
 N.T.S.



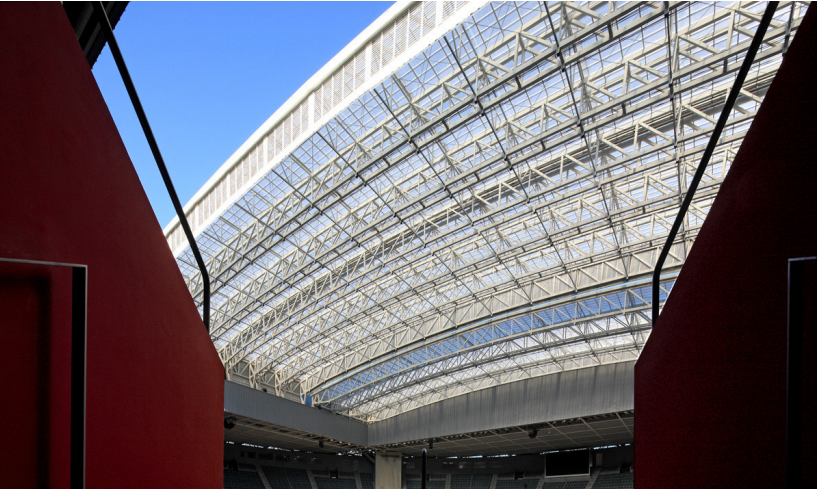
Structural diagram.¹
 N.T.S.



Building Section (Roof Open).¹
 N.T.S.



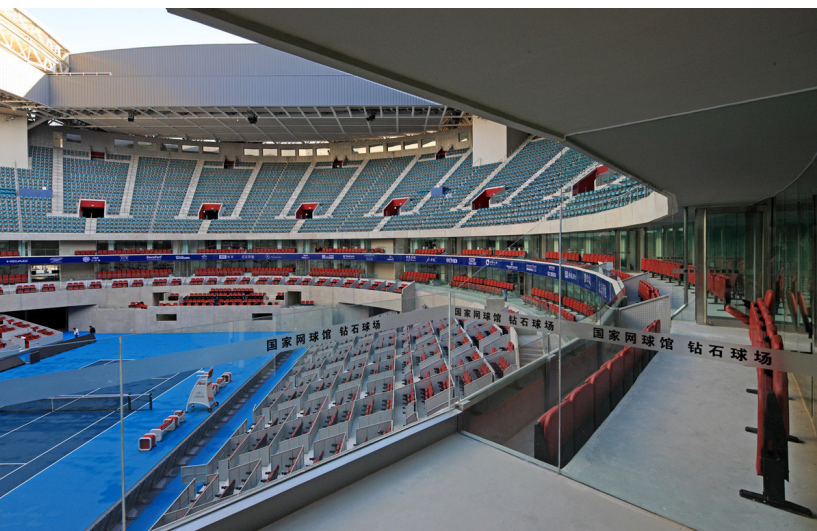
Exterior Photo: atelier 11.¹



Interior Photo: atelier 11.¹



Interior Photo: atelier 11.¹



Interior Photo: atelier 11.¹

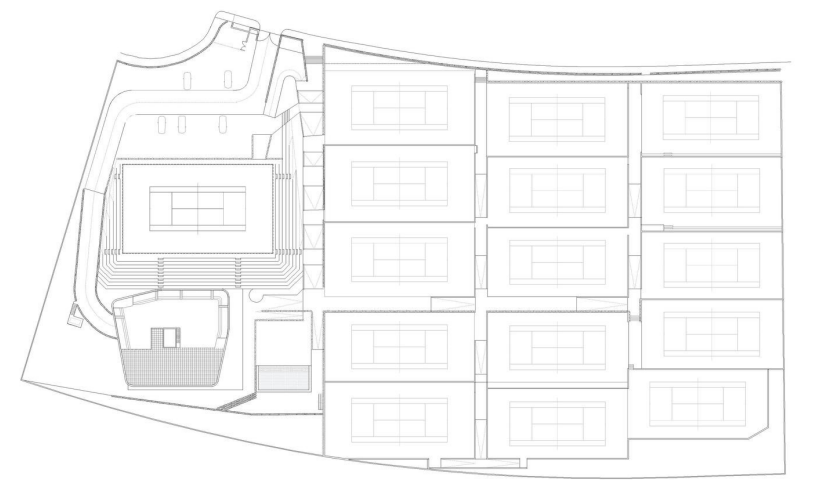
1. Jett, Megan. "Diamond Arena / Atelier 11." ArchDaily. ArchDaily, October 3, 2011. <https://www.archdaily.com/173290/diamond-arena-atelier-11>.

PRECEDENT STUDIES

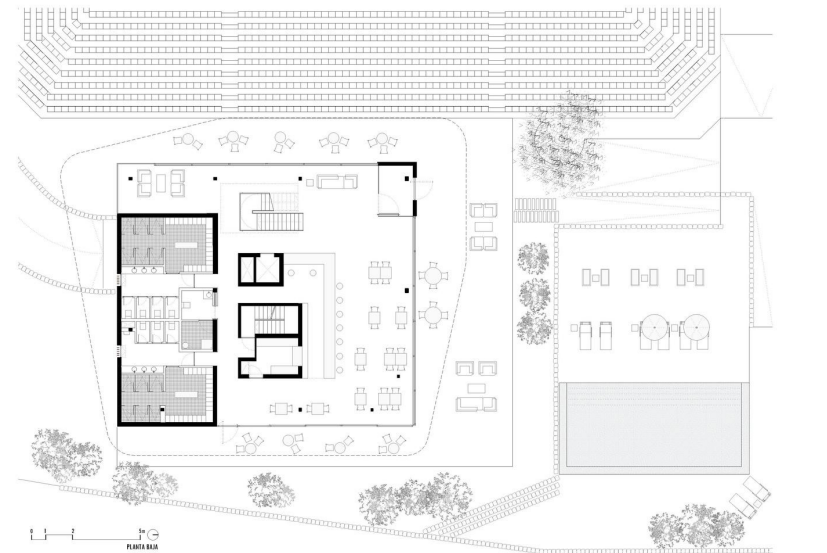
Project 8: Tennis Terraces

Date of Completion: 2016
 Architect: GRAS arquitectos
 Location: Santa Ponsa, Spain

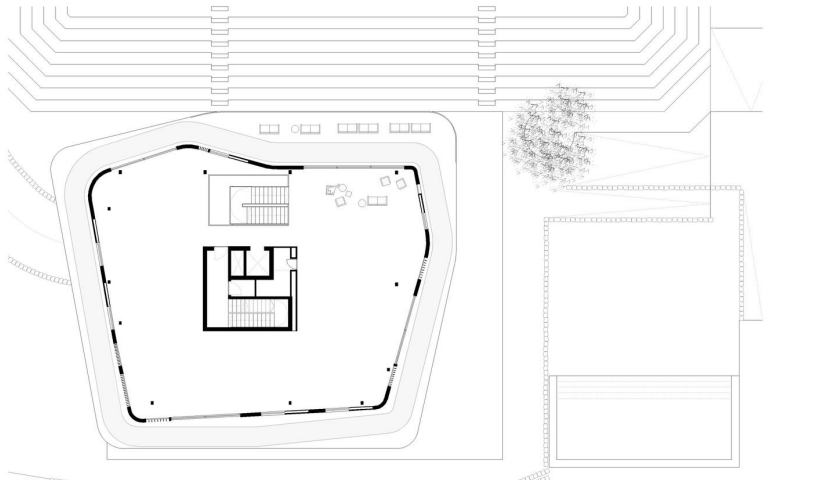
Construction Type: Multi-story, concrete, steel, wood, stone, and glass building.
 Main Materials: Concrete, steel, wood, stone, and glass.
 Relevance: A new outdoor tennis club providing 17 courts of a variety of grass, clay, and hard surfaces with interior dressing areas, multi-purpose room, lounge, and restaurant.
 Main Architectural Features: Cantilevered concrete slabs creating two floating terraces. Terraced steps in the natural landscape to form the courts and seating with natural stone.
 Concept: Terraced levels to fit within the site context of the natural topography with the Centre Court at the heart of the project invoking Greek outdoor seating.



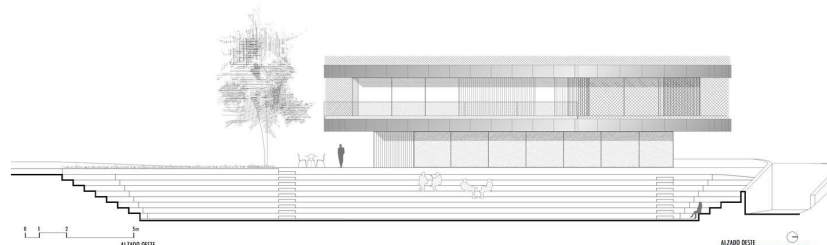
Site Plan.¹



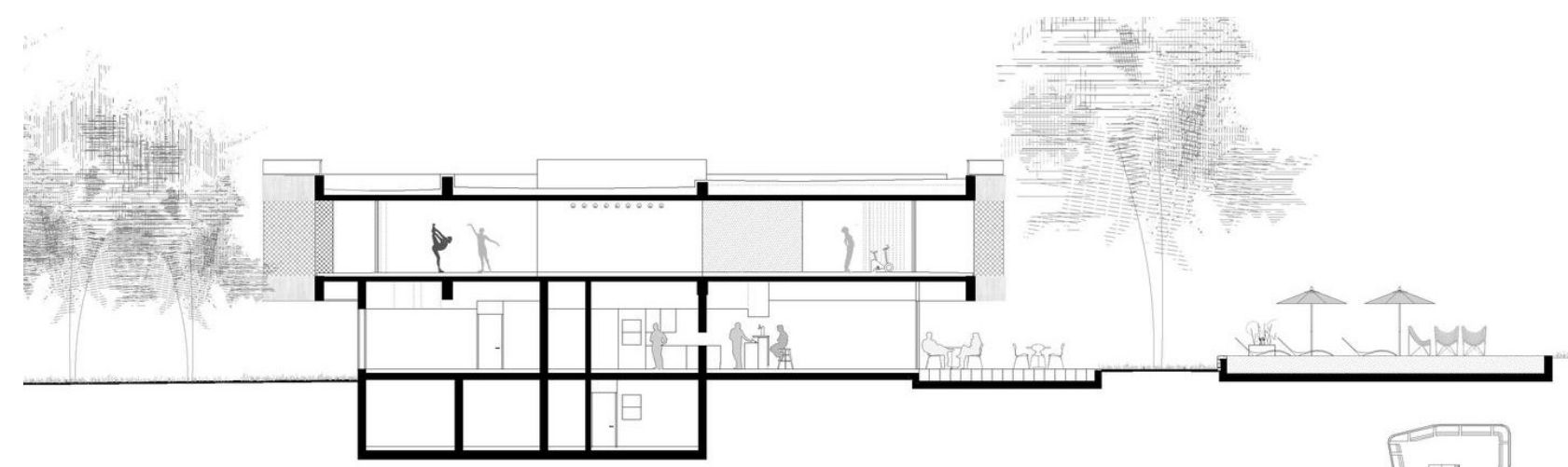
Ground Floor Plan.¹



First Floor Plan.¹



West Exterior Elevation.¹



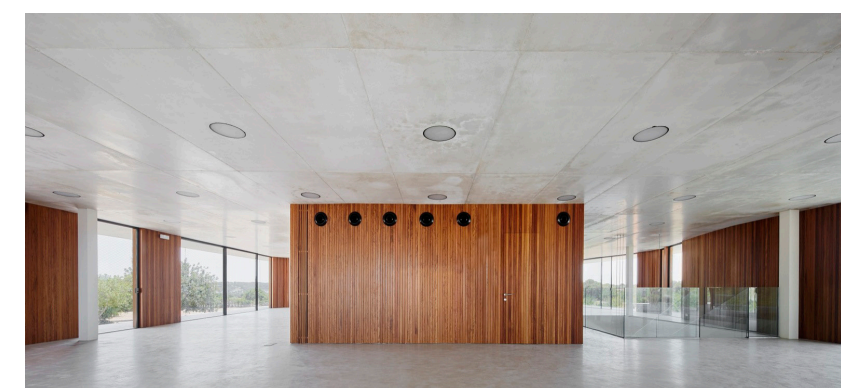
Building Section.¹



Exterior Photo: José Hevia.¹



Exterior Photo: José Hevia.¹



Interior Photo: José Hevia.¹



Interior Photo: José Hevia.¹

Sources:
 1. Rojas, Cristobal. "Tennis Terraces / GRAS Arquitectos." ArchDaily. ArchDaily, November 23, 2016. <https://www.archdaily.com/799917/tennis-terraces-gras-arquitectos>.
 40 GEORGE F ROZANSKY

PRECEDENT STUDIES

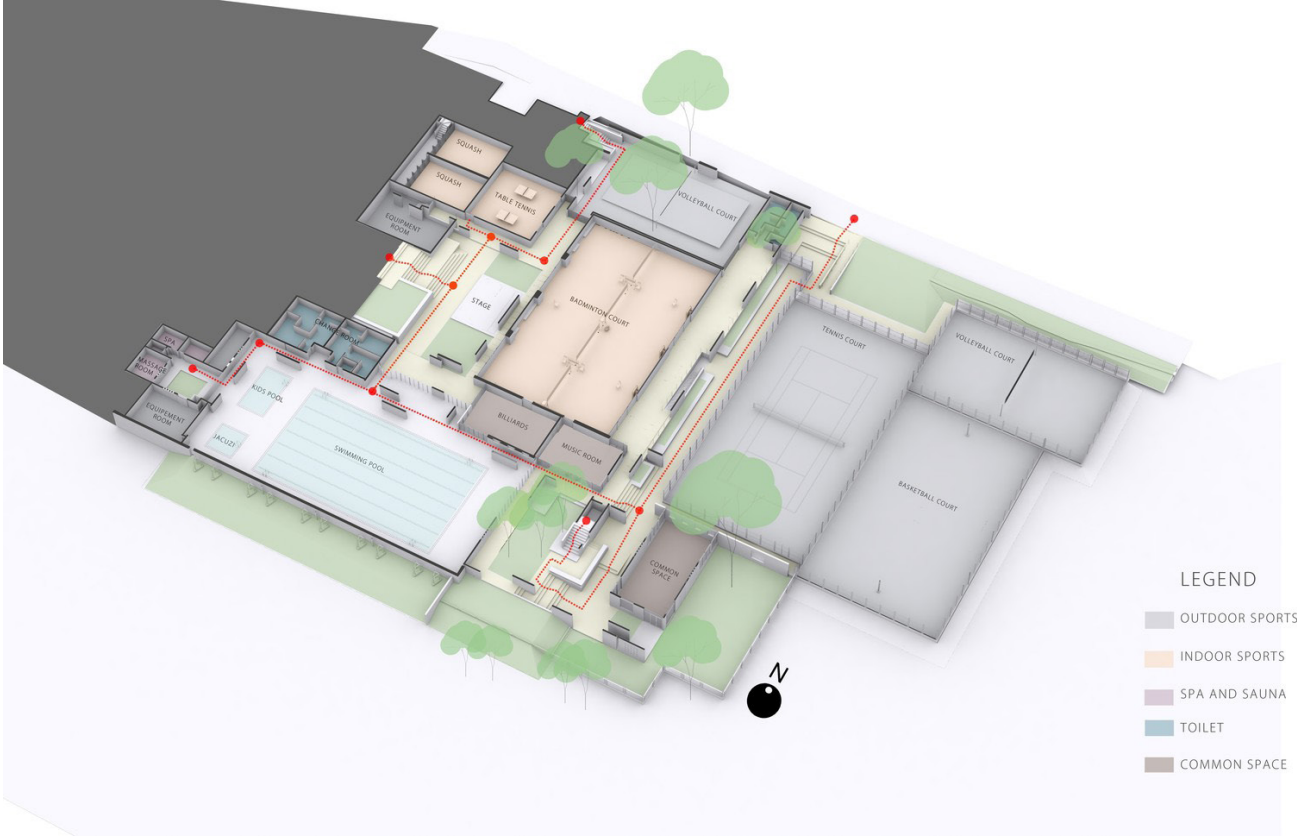
Project 9: IIM Sports Center

Date of Completion: 2016
 Architect: Mindspace
 Location: Bengaluru, India

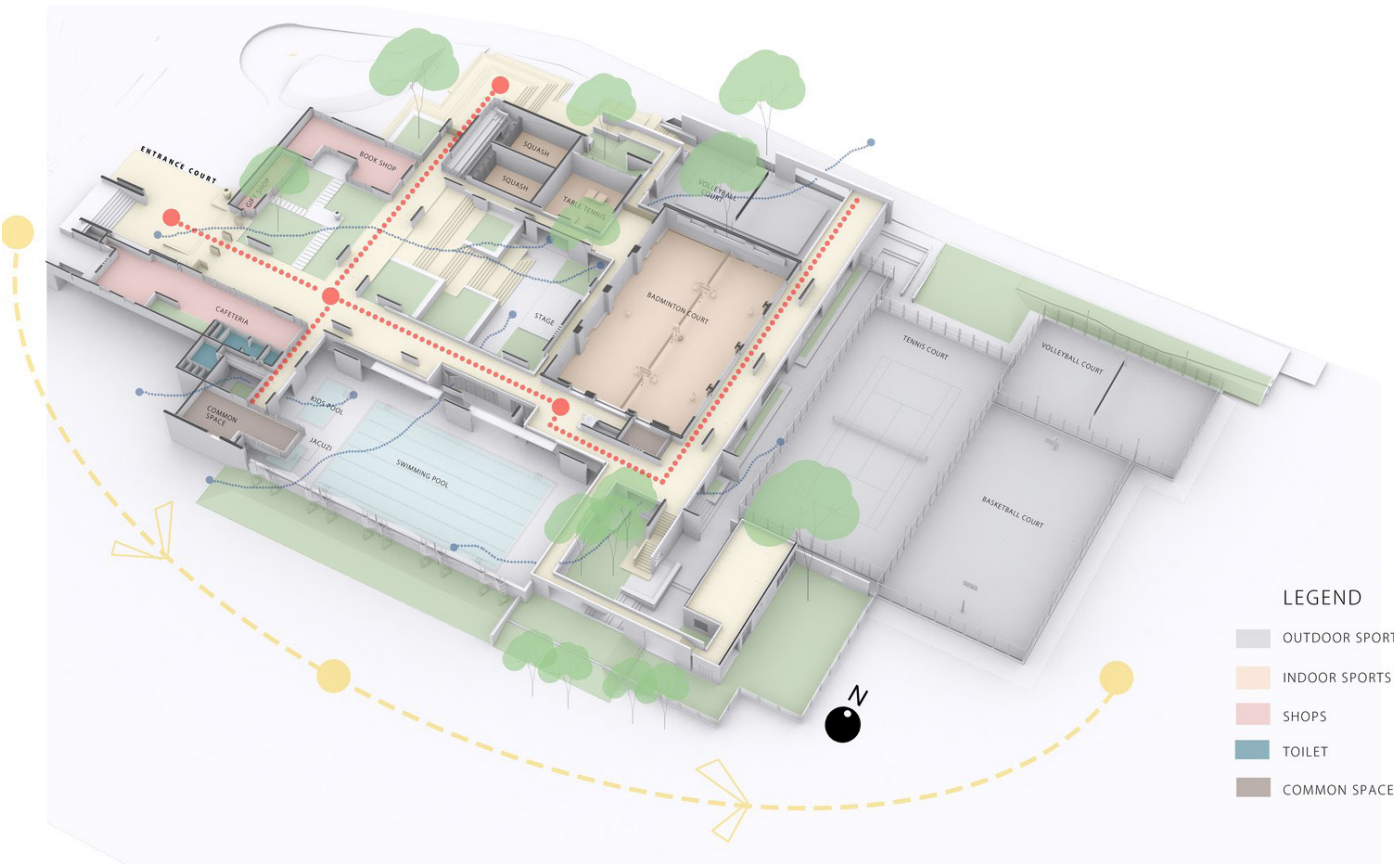
Construction Type: Multi-story concrete and stone building.
 Main Materials: Concrete and stone.
 Relevance: Sports facility in between two hostel blocks in a natural area that connects with the environment.
 Main Architectural Features: Building rises up into two levels from the ground through wide steps and platforms to host activities culminating into the enclosed sports space.
 Concept: Gradual transition of the facility rising from the contours on the site with two access points using trees as points of focus.



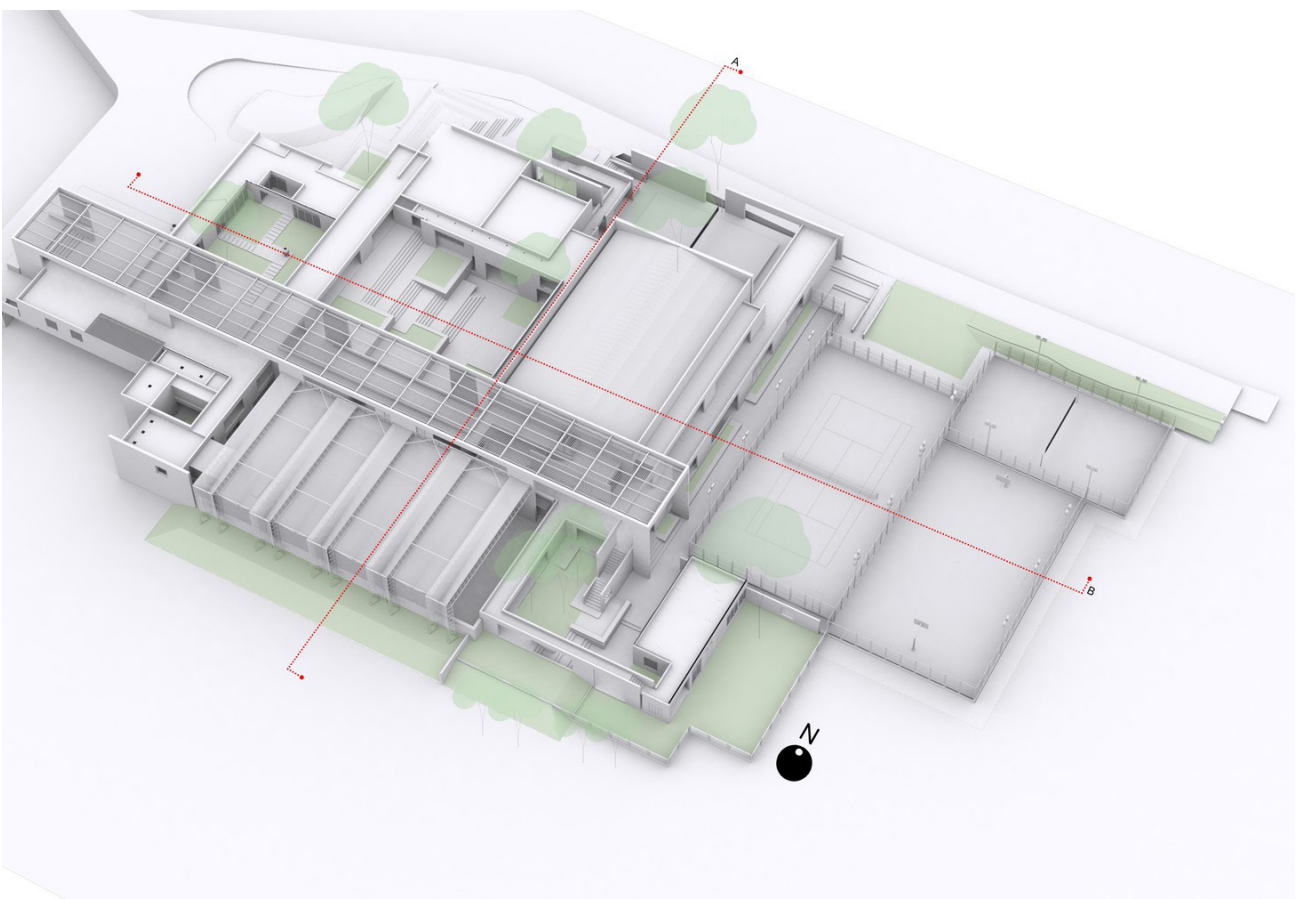
Site Context Plan.¹
 N.T.S.



Ground Floor Plan.¹
 N.T.S.



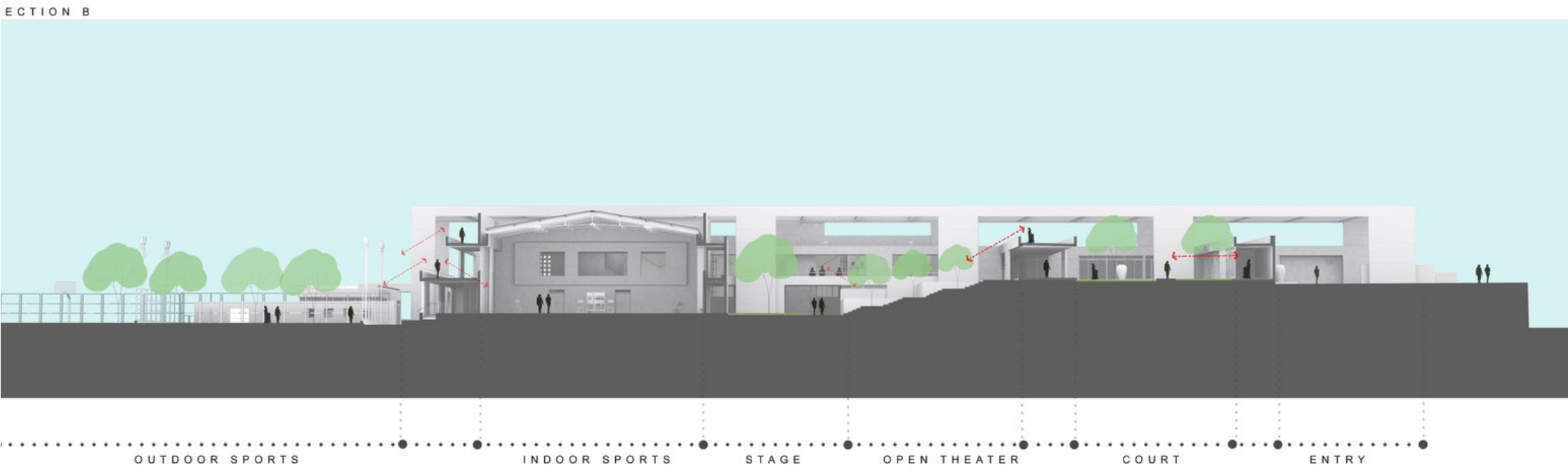
First Floor Plan.¹
 N.T.S.



Terrace Floor Plan.¹
 N.T.S.

Sources:
 1. Caballero, Pilar. "IIM Sports Center / Mindspace." ArchDaily. ArchDaily, May 17, 2019. <https://www.archdaily.com/917189/iim-sports-center-mindspace>.
 42 GEORGE F ROZANSKY

PRECEDENT STUDIES
 Project 9: IIM Sports Center



Building Sections.¹
 N.T.S.
 Sources:
 1. Caballero, Pilar. "IIM Sports Center / Mindspace." ArchDaily. ArchDaily, May 17, 2019. <https://www.archdaily.com/917189/iim-sports-center-mindspace>.
 44 GEORGE F ROZANSKY



Exterior Photo: PHX india, Mindspace.¹



Exterior Photo: PHX india, Mindspace.¹



Interior Photo: PHX india, Mindspace.¹

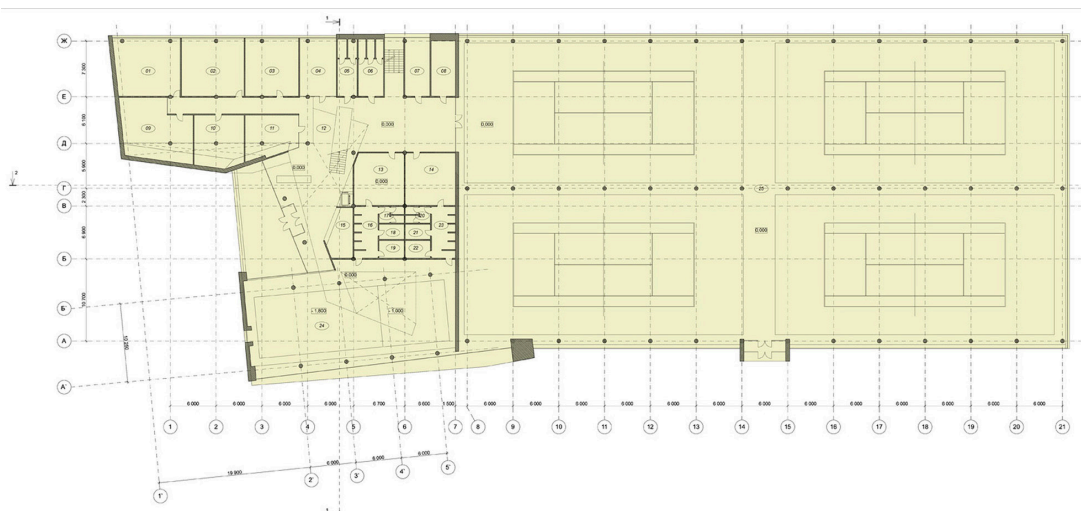


Exterior Photo: PHX india, Mindspace.¹

PRECEDENT STUDIES

Project 10: Istra Tennis Club

Date of Completion: 2014
 Architect: Za Bor Architects
 Location: Moscow, Russia

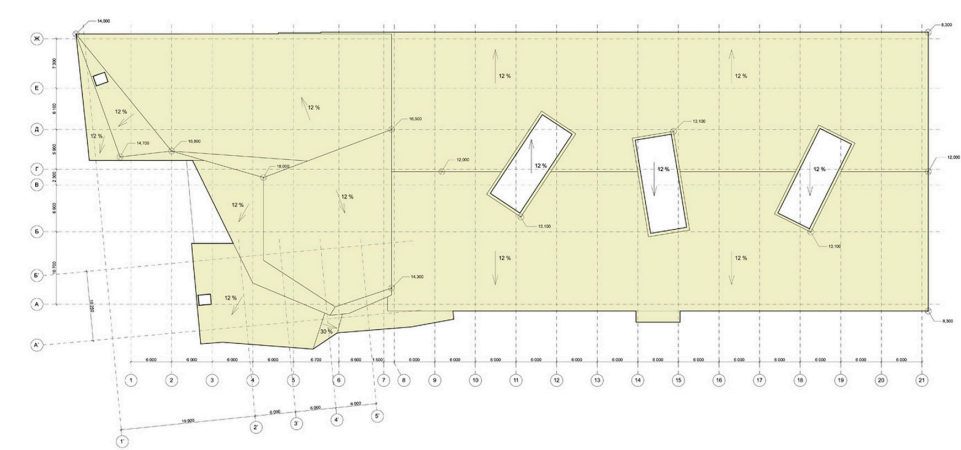


Floor Plan 1.¹
 N.T.S.

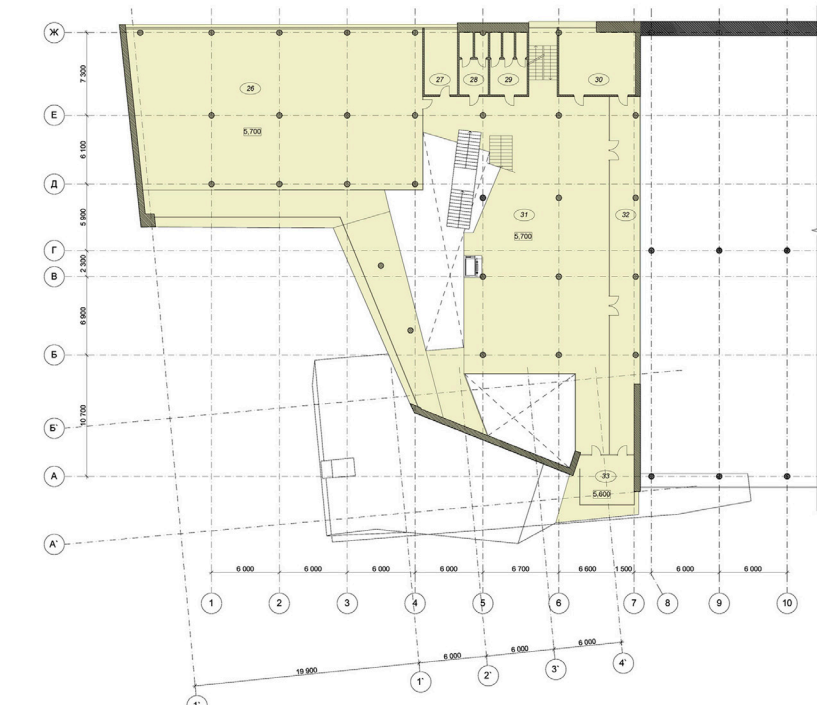


Floor Plan 2.¹
 N.T.S.

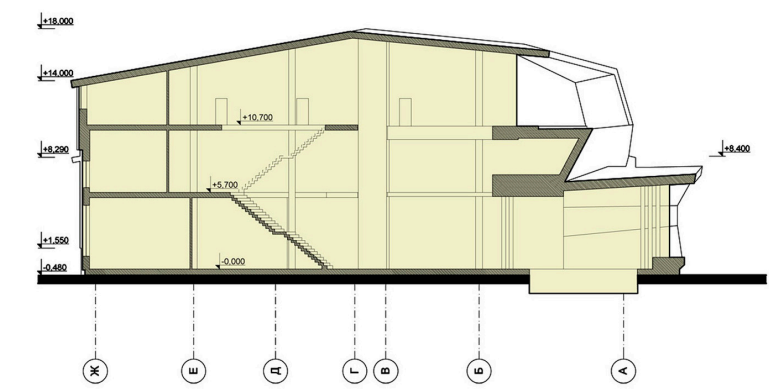
Construction Type: Multi-story concrete and stone building.
 Main Materials: Concrete and stone.
 Relevance: Sports facility in between two hostel blocks in a natural area that connects with the environment.
 Main Architectural Features: Building rises up into two levels from the ground through wide steps and platforms to host activities culminating into the enclosed sports space.
 Concept: Gradual transition of the facility rising from the contours on the site with two access points using trees as points of focus.



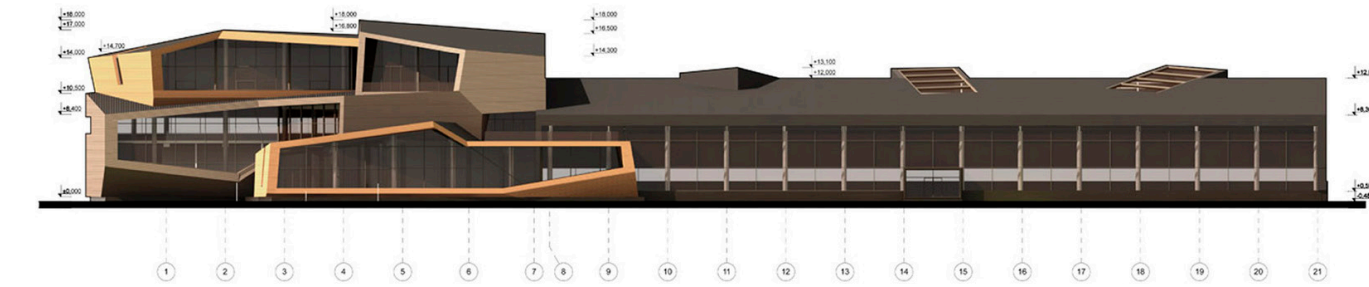
Roof Plan.¹
 N.T.S.



Floor/Roof Plan.¹
 N.T.S.



Building Section.¹
 N.T.S.



Exterior Elevation.¹
 N.T.S.



Exterior Photo: Za Bor Architects.¹



Interior Photo: Za Bor Architects.¹



Interior Photo: Za Bor Architects.¹



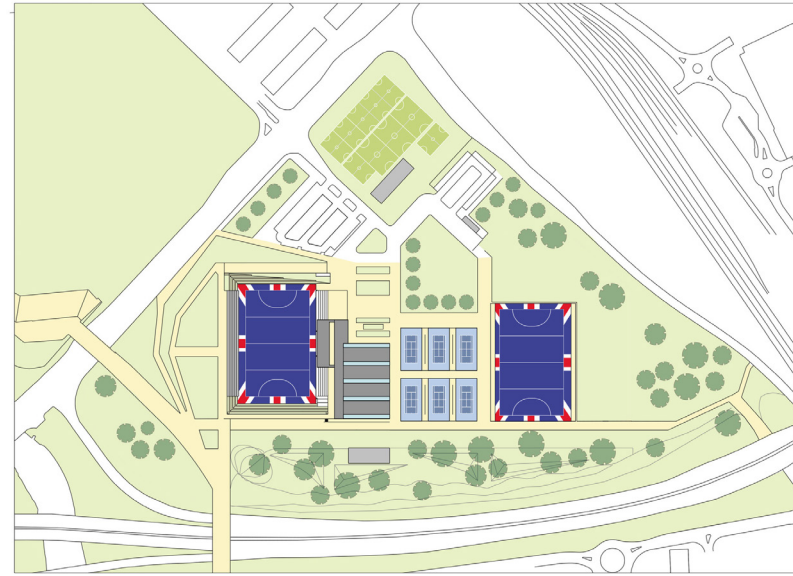
Interior Photo: Za Bor Architects.¹

Sources:
 1. Aguilar, Cristian. "Istra Tennis Club / Za Bor Architects." ArchDaily. ArchDaily, May 9, 2014. <https://www.archdaily.com/504011/istra-tennis-club-za-bor-architects>.

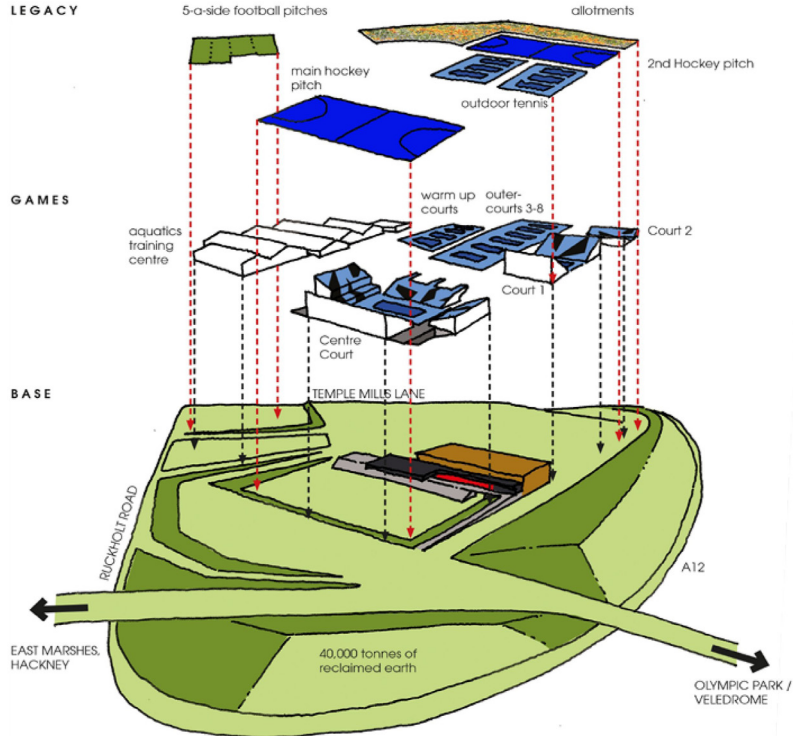
PRECEDENT STUDIES

Project 11: Lee Valley Hockey and Tennis Centre

Date of Completion: 2014
 Architect: Stanton Williams
 Location: London, United Kingdom



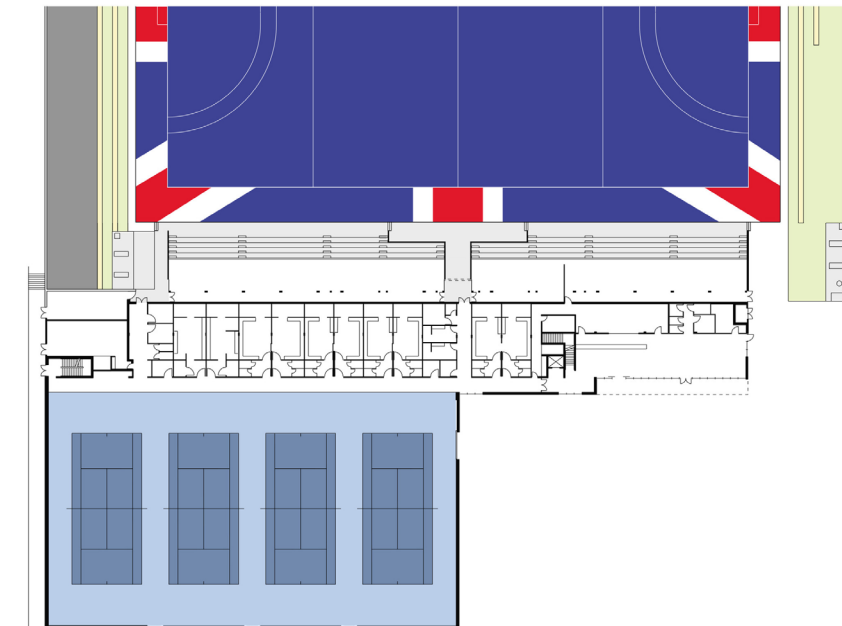
Site Plan.¹
 N.T.S.



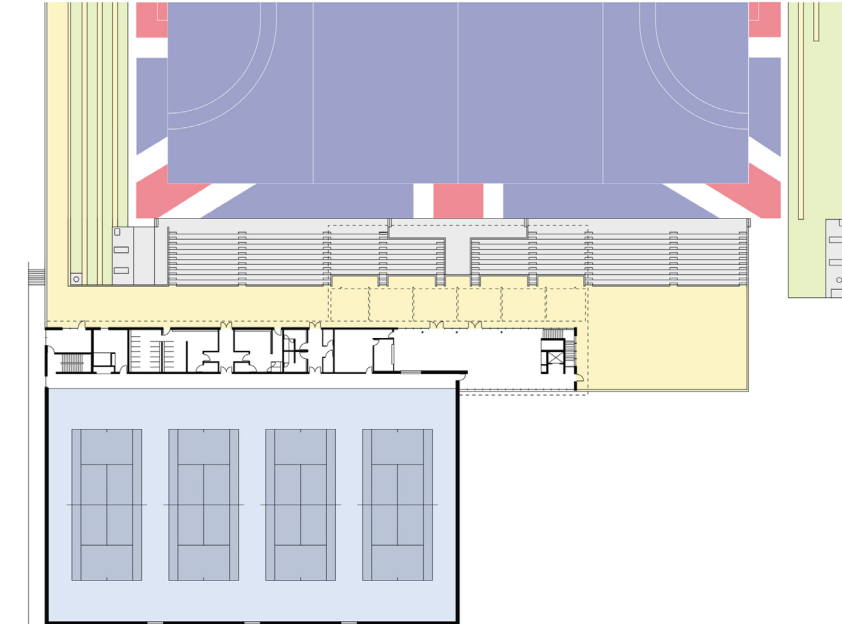
Site Diagram.¹
 N.T.S.

Sources:
 1. Aguilar, Cristian. "Lee Valley Hockey and Tennis Centre / Stanton Williams." ArchDaily. ArchDaily, June 23, 2014. <https://www.archdaily.com/518441/lee-valley-hockey-and-tennis-centre-stanton-williams>.

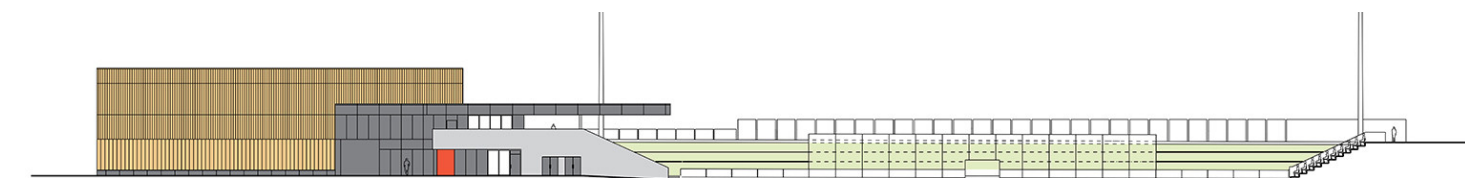
Construction Type: Multi-story, concrete, steel, and timber building.
 Main Materials: Concrete, steel, and timber.
 Relevance: Northern gateway into Queen Elizabeth Olympic Park and London 2012 legacy venue and transition into a world-class facility for sports, specifically hockey and tennis.
 Main Architectural Features: Steel canopy. Redevelop site to reconnect with site context with improved visibility and access. Intersecting block massing. Layering of site/building.
 Concept: Layered development of legacy and temporary London 2012 transformation without loss of identity with the indent to build only once with temporary removed without issue.



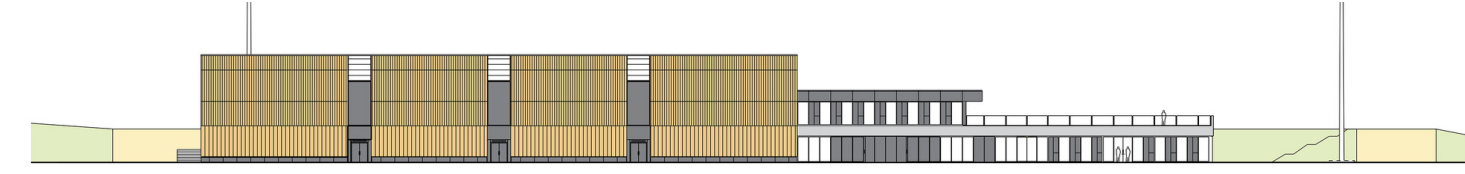
Ground Floor Plan.¹
 N.T.S.



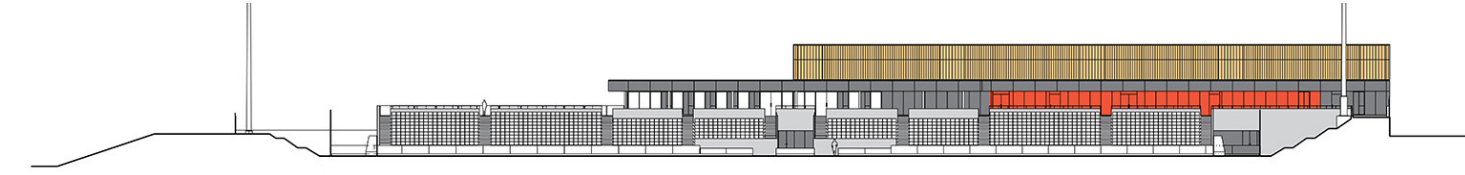
First Floor Plan.¹
 N.T.S.



North Exterior Elevation.¹
 N.T.S.



East Exterior Elevation.¹
 N.T.S.



West Exterior Elevation.¹
 N.T.S.



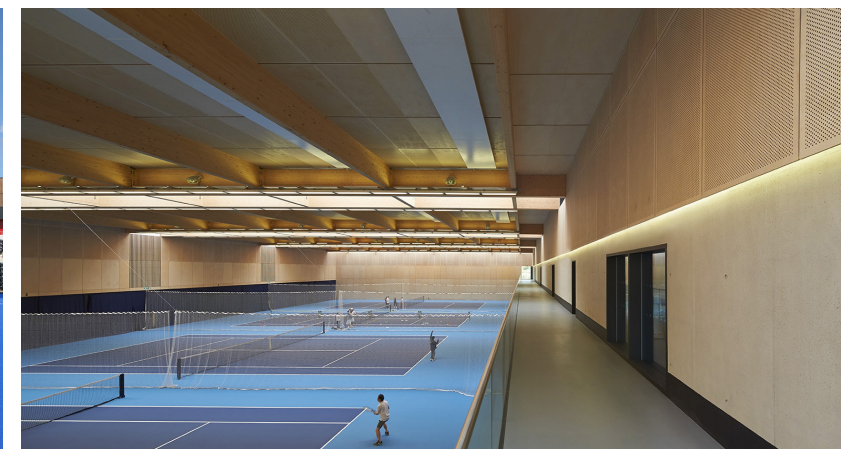
Exterior Photo: Hufton+Crow.¹



Interior Photo: Hufton+Crow.¹



Exterior Photo: Stanton Williams.¹



Interior Photo: Hufton+Crow.¹

PRECEDENT STUDIES

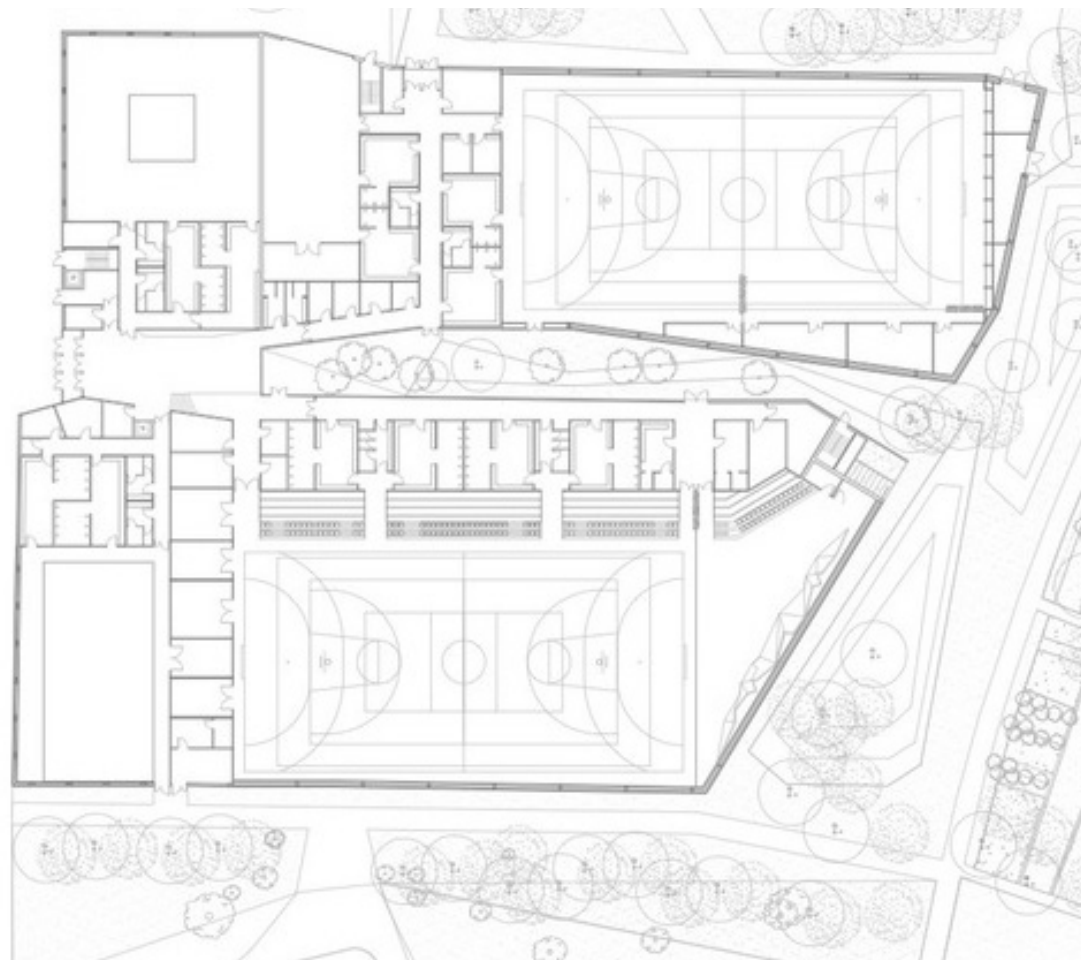
Project 12: La Fontaine Sports Complex

Date of Completion: 2018
 Architect: archi5 + Tecnova Architecture
 Location: Antony, France

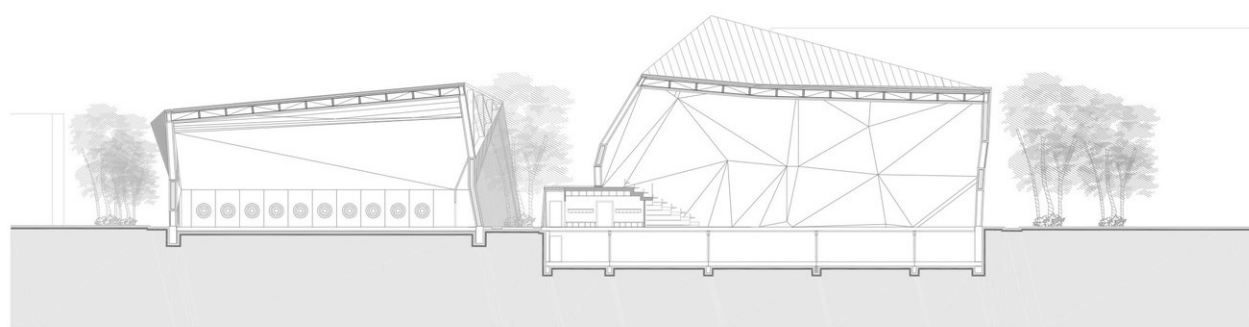
Construction Type: Multi-story, concrete, steel, and glass building.
 Main Materials: Concrete, metal alloy, steel, and glass.
 Relevance: Created out of a desire for a new focal point for a neighborhood as a response to a desire for urban revitalization for sports and activities.
 Main Architectural Features: Multi-faceted surface planes on the exterior. Exterior gap separating sides with circulation. Transparency and permeability of the interior/exterior.
 Concept: Nature should be visible from all aspects of the form and function of the building as a multi-faceted, single structure as a planted precious stone to contrast with the site context.



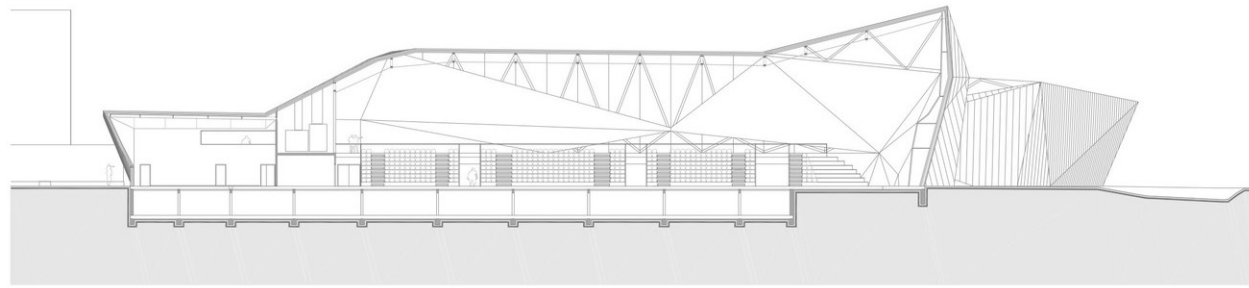
Site Plan.¹
 N.T.S.



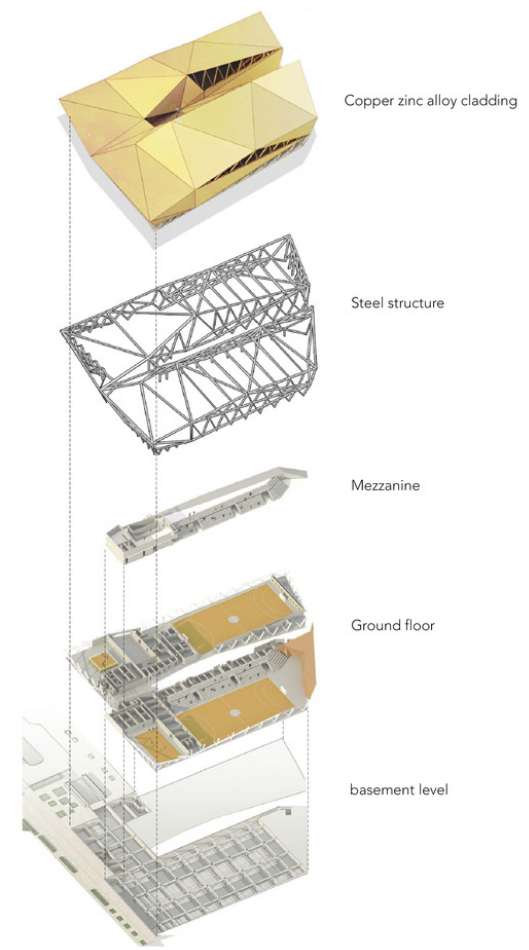
Ground Floor Plan.¹
 N.T.S.



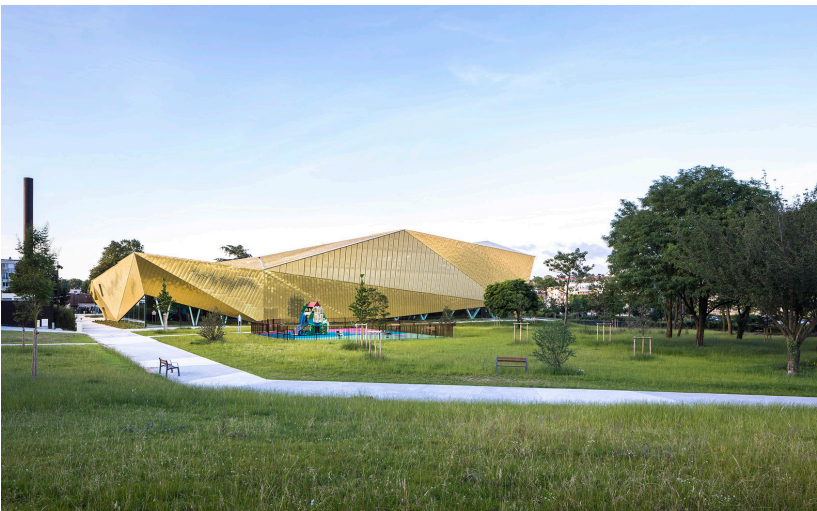
Building Section.¹



Building Section.¹



Structural Diagram.¹
 N.T.S.



Exterior Photo: Sergio Grazia.¹



Exterior Photo: Sergio Grazia.¹



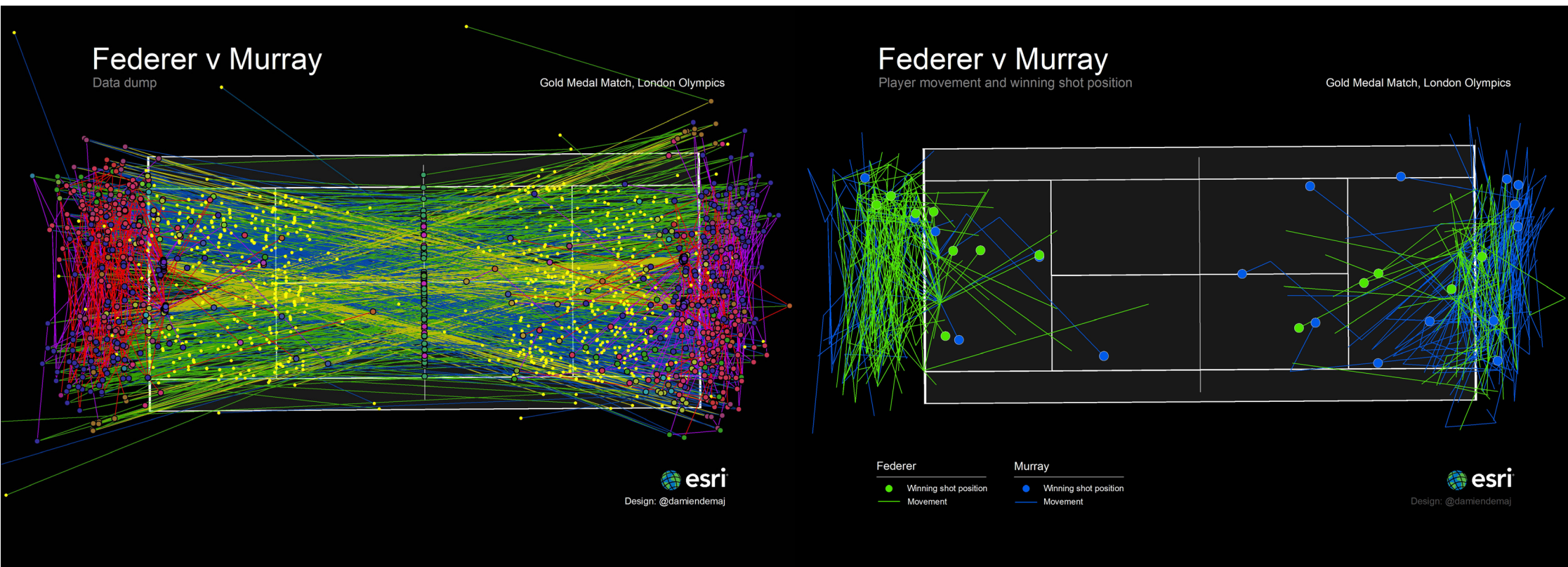
Interior Photo: Sergio Grazia.¹



Interior Photo: Sergio Grazia.¹

Sources:
 1. Maggiora, Marita Vial della. "La Fontaine Sports Complex / archi5 Tecnova Architecture." ArchDaily. ArchDaily, January 28, 2019. <https://www.archdaily.com/910229/la-fontaine-sports-complex-archi5-plus-tecnova-architecture>.
 GEORGE F ROZANSKY

Physics of Tennis
Top-Down Movement Analysis



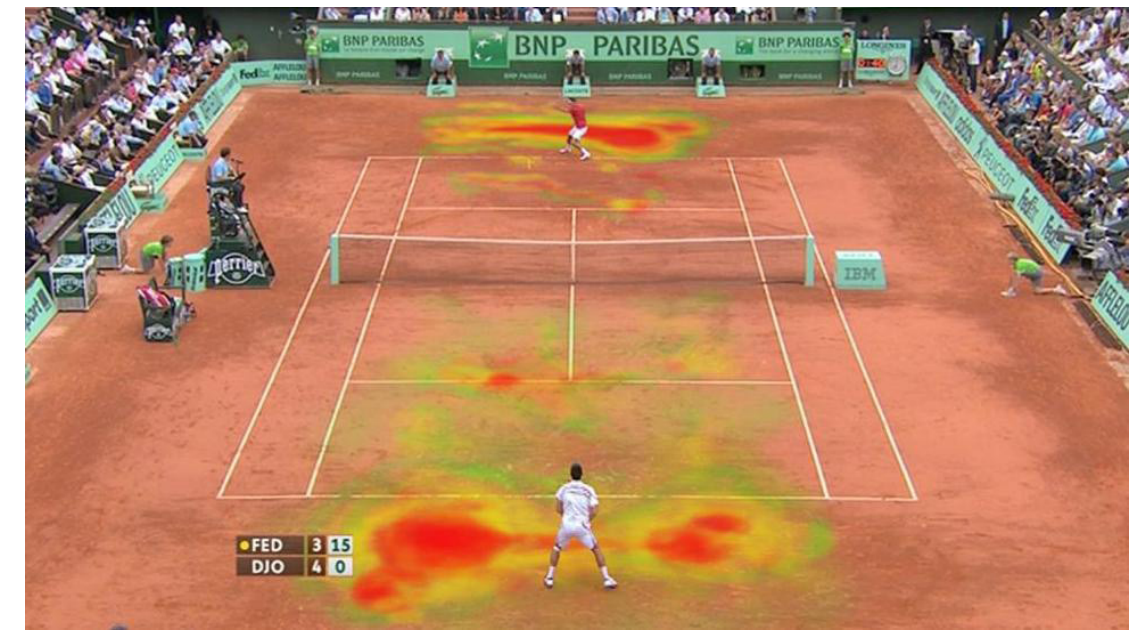
The output collected and then analyzed of the 1,700+ data points during the 2012 Olympic Gold Medal Tennis Match. Image: esri/ArcGIS.¹

Winning shot position and player movement during the 2012 Olympic Gold Medal Tennis Match. Image: esri/ArcGIS.¹

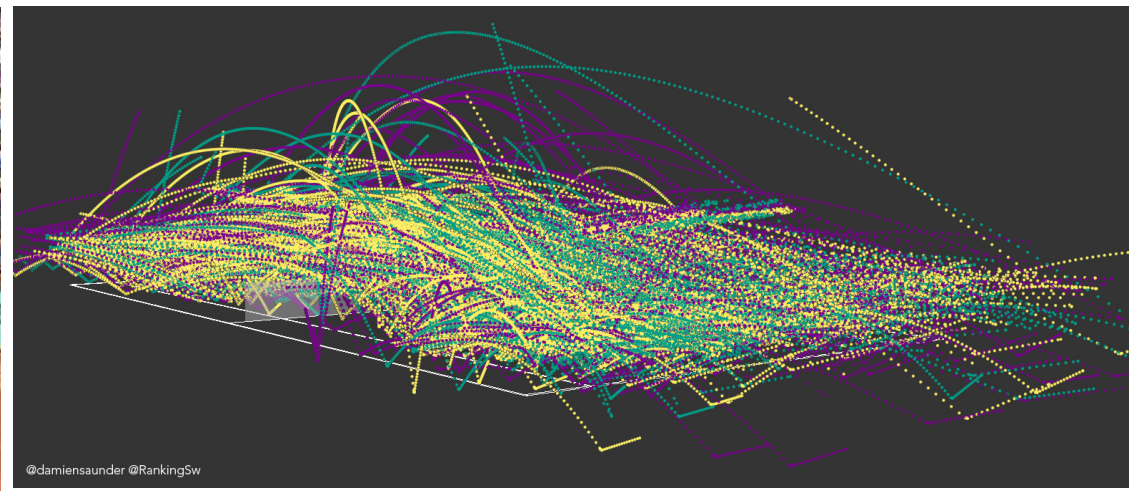
Sources:

1. Demaj, Damien. "Using Spatial Analytics to Study Spatio-Temporal Patterns in Tennis." GameSetMap, February 19, 2013. <http://gamesetmap.com/?p=56>.
2. "The Best Thing to Happen in Tennis Is Hawk-Eye." Hawk-Eye. Accessed December 10, 2019. <https://www.hawkeyeinnovations.com/products/ball-tracking/electronic-line-calling>.
3. Demaj, Damien. "An Interview with Courtney Walsh at the US Open." GameSetMap, September 29, 2014. <http://gamesetmap.com/?p=863>.
4. Colligan, Tom. "Tennis Physics: Anatomy of a Serve." Popular Mechanics. Popular Mechanics, November 14, 2017. <https://www.popularmechanics.com/adventure/sports/a2072/4221210/>.

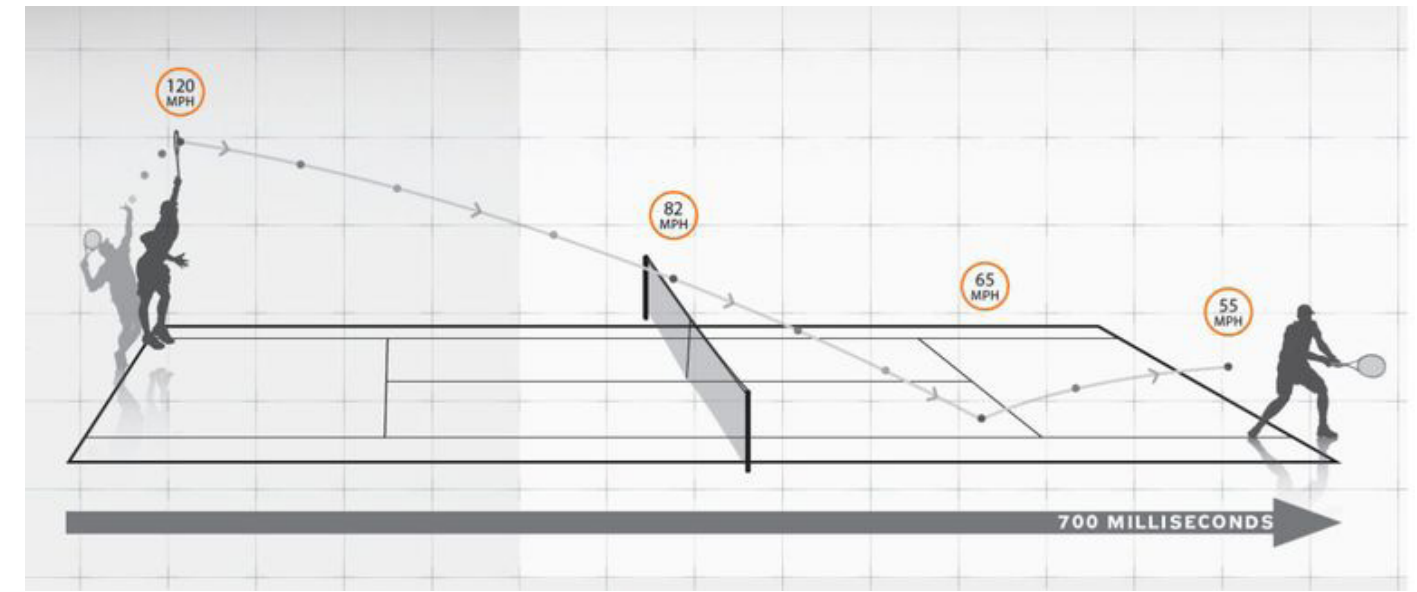
Physics of Tennis
Location Analysis



Heat map of player positions from sensor and data collecting equipment by Hawk-Eye Innovations.²

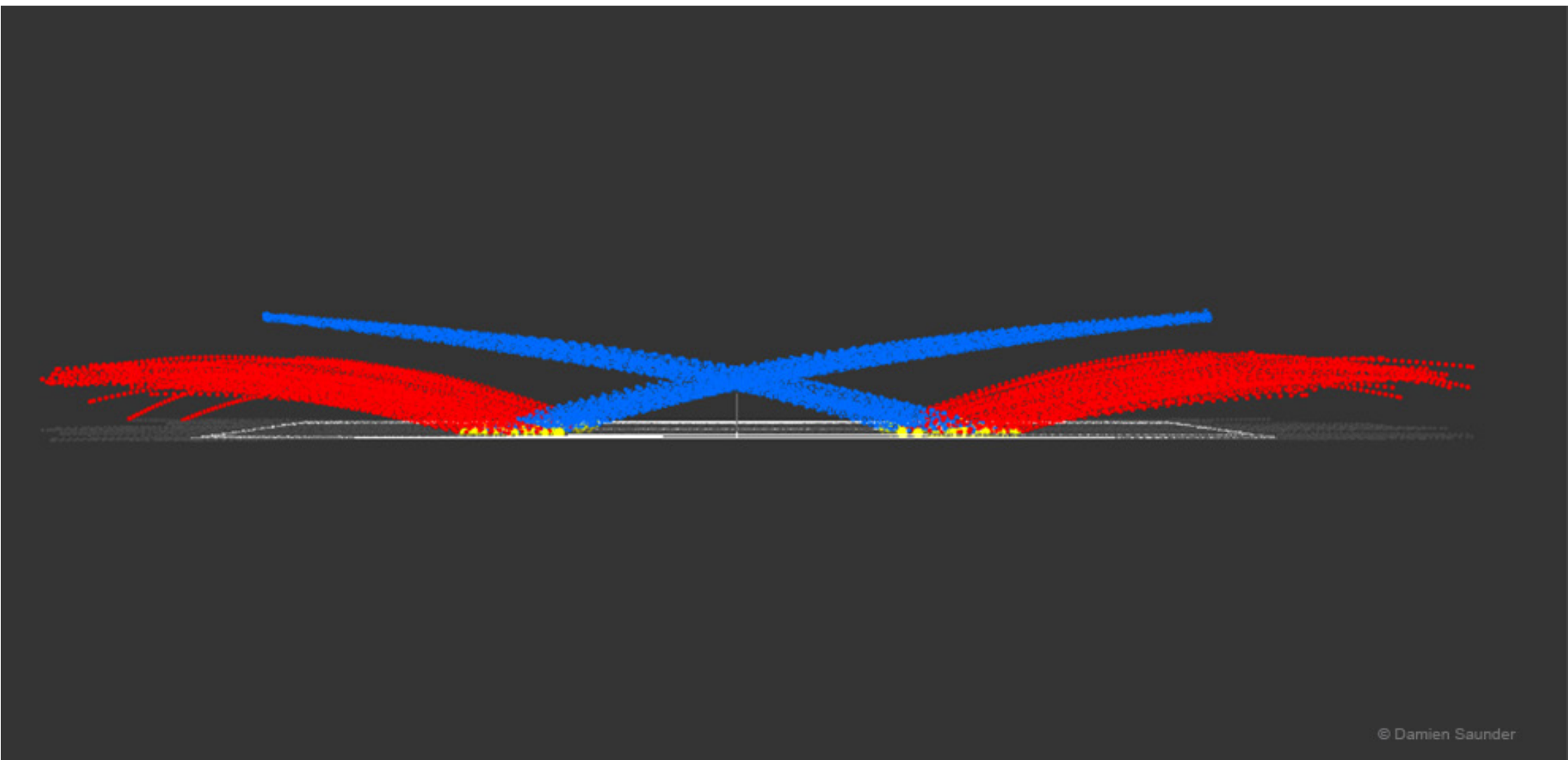


Raw ball trajectory data from Hawk-Eye.³



Serve speed analysis. Image: Intoaroute.⁴

Physics of Tennis
Ball Movement Analysis



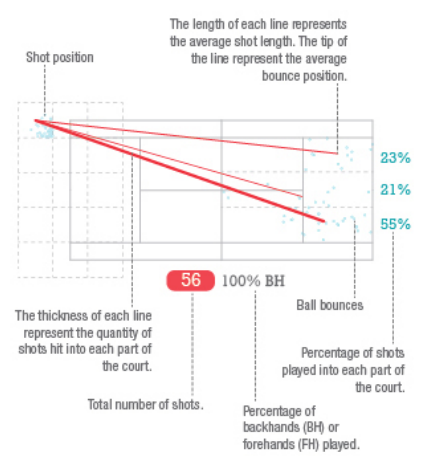
Symmetry of a tennis serve.¹
 Blue dots represent trajectories of the serve.
 Yellow dots represent service bounce locations.
 Red lines represent trajectories of ball bounces.

Sources:
 1. Demaj, Damien. "The Symmetry of The Tennis Serve." GameSetMap, February 26, 2015. <http://gamesetmap.com/?p=1098>.
 2. Demaj, Damien. "Shot Charts in Tennis." GameSetMap, December 2, 2015. <http://gamesetmap.com/?p=1222>.



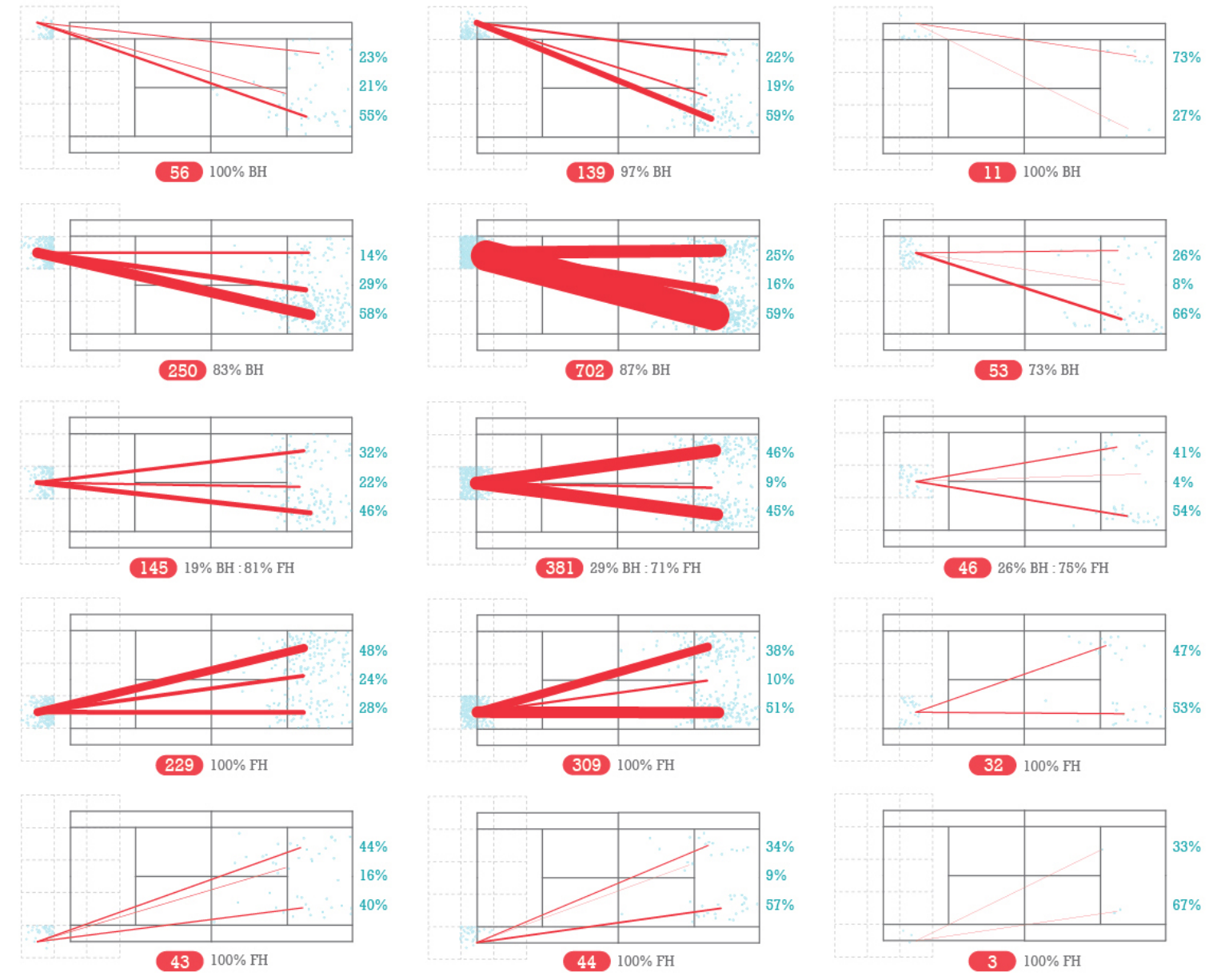
Kei Nishikori Shot Charts
 錦織圭のショットチャート

Shot charts are critical in understanding a player's on court behaviour. They are frequently used to map shot patterns from particular areas of the court. These patterns are of particular interest to coaches and players for pre and post match tactical analysis. Here we present 2,443* shots from Kei Nishikori that were played over a period of 6 months in 2014-15 against opponents like Federer, Djokovic, Murray and Wawrinka.

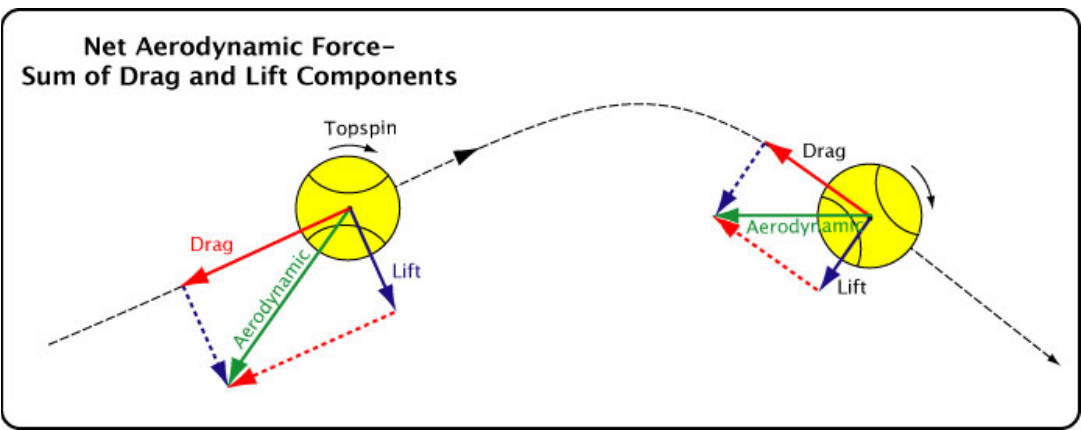


Analysis: Damien Saunder (gamesetmap.com)
 Source: Hawk-Eye
 Photo: Getty Images
 * Shots that landed out are not included.
 Serve and serve returns are not included.
 Only shots that occurred within the grid are shown.

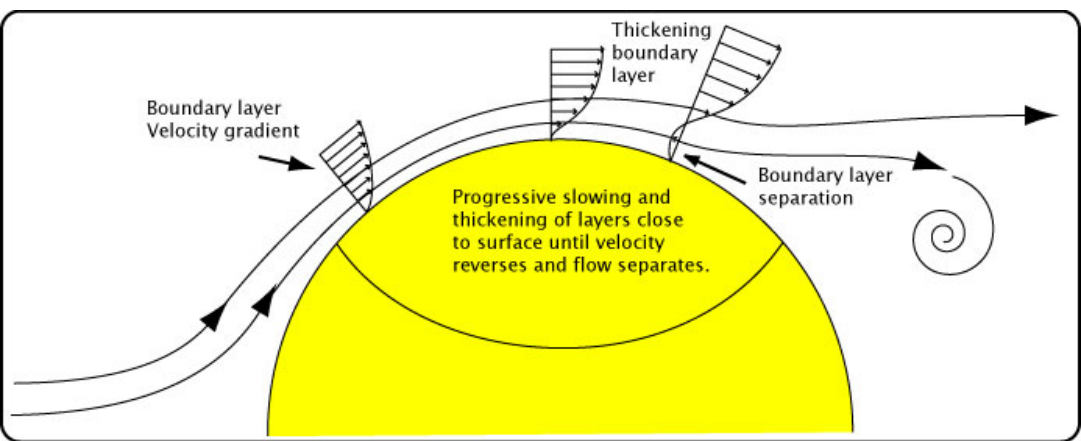
Kei Nishikori Shot Charts.²



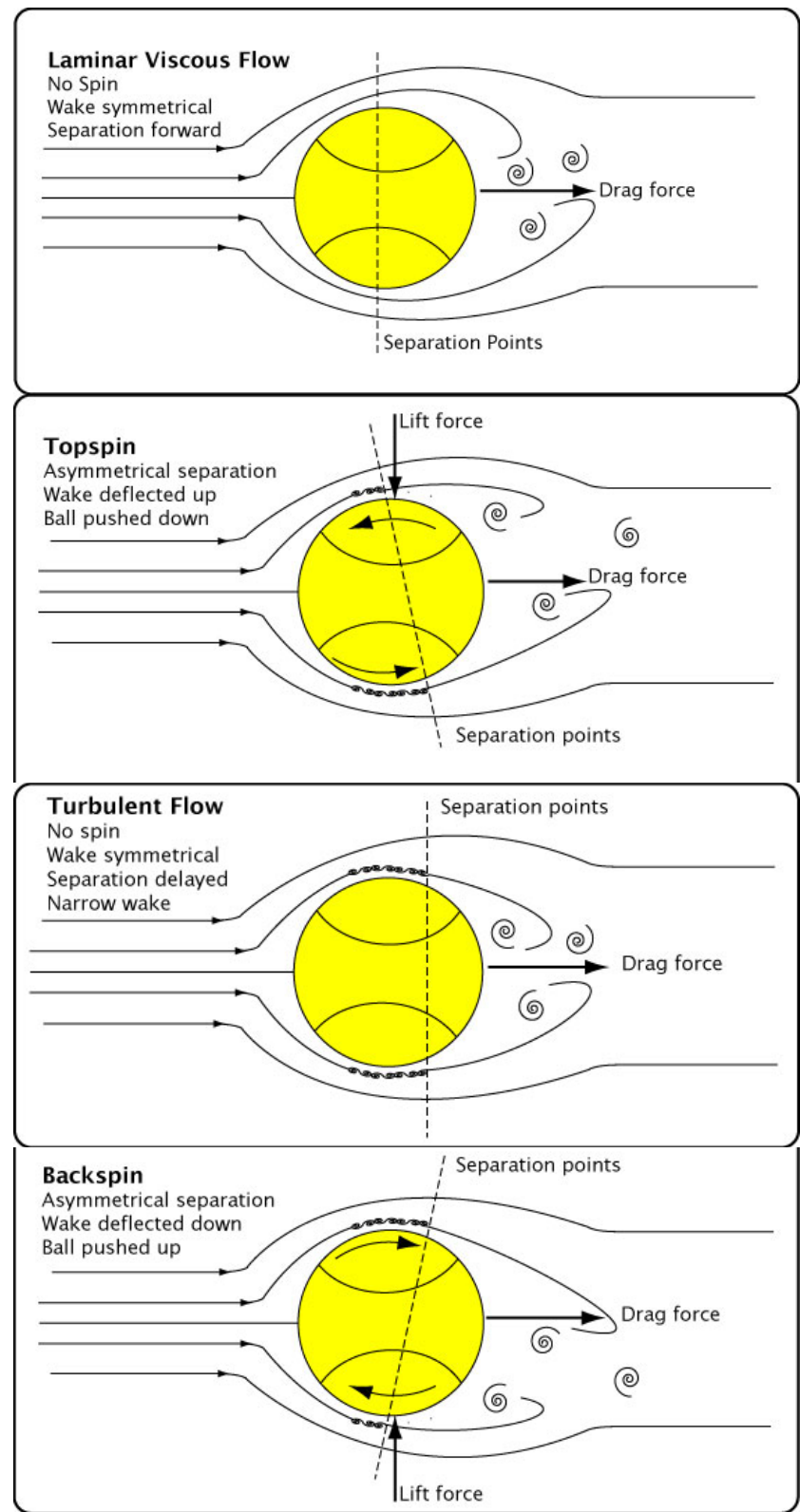
Physics of Tennis
Ball Movement



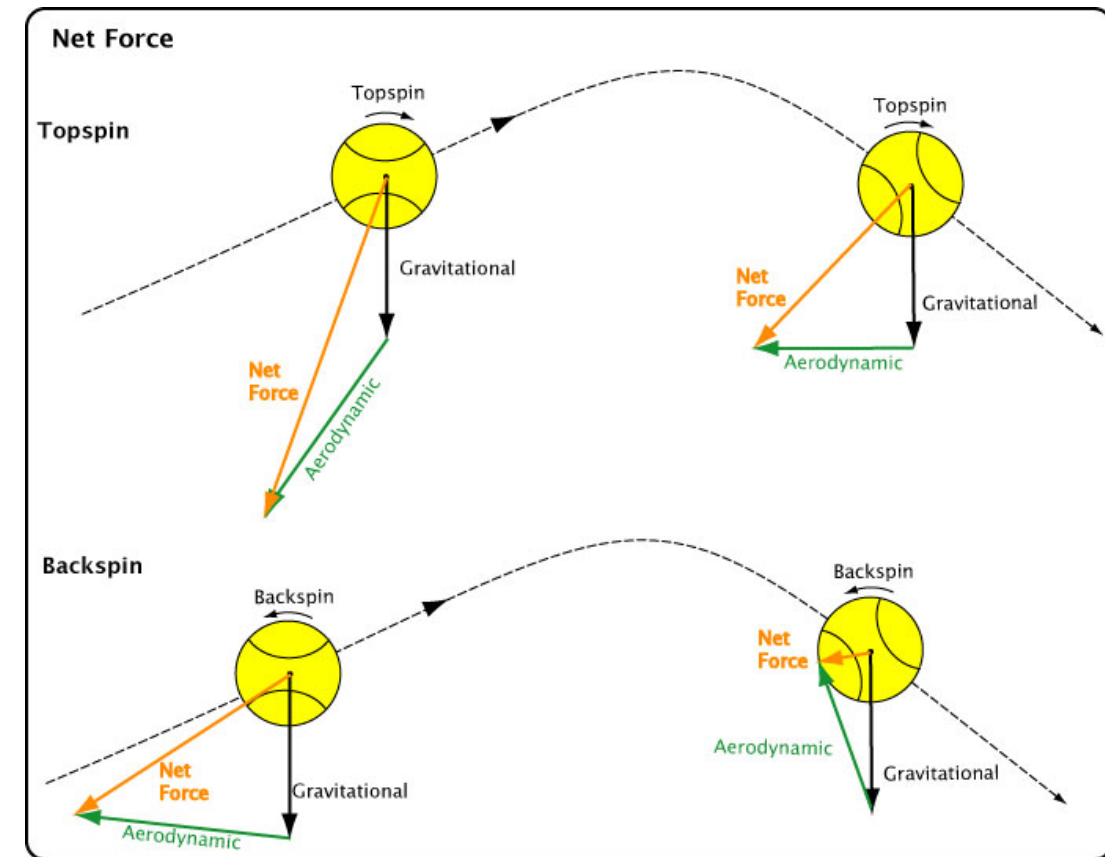
Source: Figure 4, Net aerodynamic force acting on a topspin shot in flight.¹



Source: Figure 11, Boundary layer velocity gradient.¹



Source: Figure 10, Types of air flow on tennis ball.¹

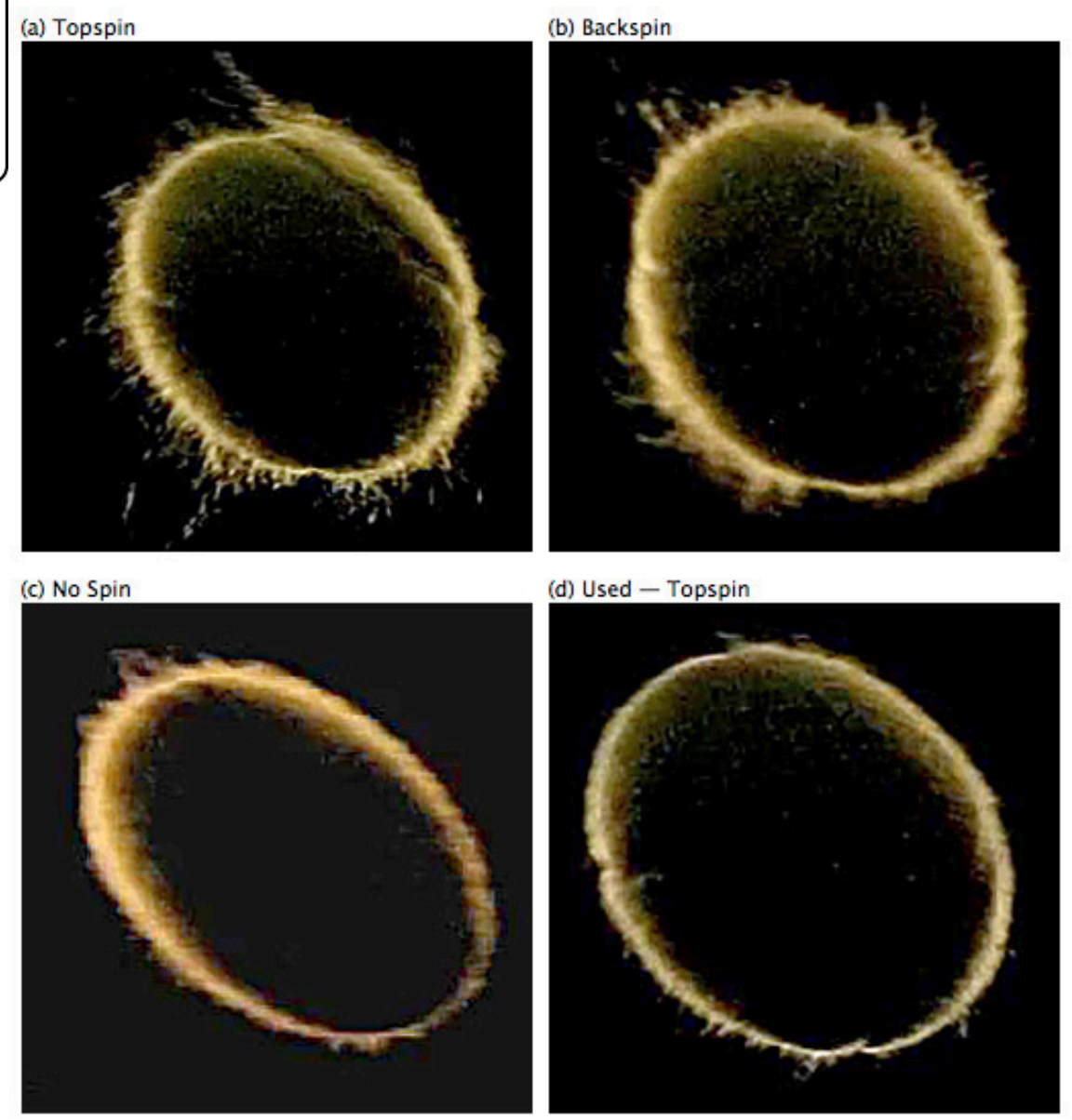


Source: Figure 5, Net of all forces acting on a tennis ball in flight.¹

The location of the players and the racquets are complex with their own set of physics, but tennis balls have specific movements that are difficult to capture let alone observe. With the different forces at play in the direction of associated movements, the tennis ball also change shape when hit by the racquets when moving through the air, coming into contact with the ground, hit by the opposing players racquets, or other objects it comes into contact with while in motion. The elements that affect the tennis ball are all relationships that without one or more would radically change what is known as tennis. The relationships are dependent upon one another like the adjacencies one might find in architecture programming.



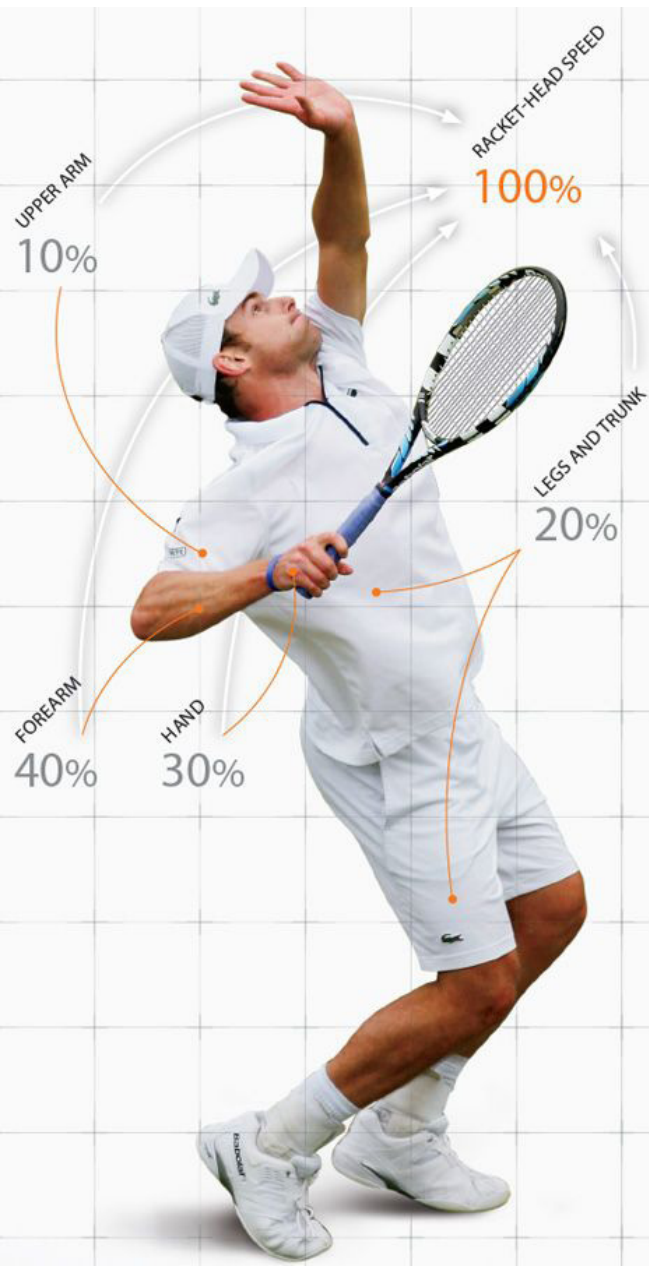
Tennis Ball Impact on Court Showing Elasticity.²



Source: Figure 12, Mid-flight fuzz alignment.¹

Sources:
 1. Cross, Rod, and Crawford Lindsey. "Tennis Ball Trajectories - The Role of Aerodynamic Drag and Lift in Tennis Shots." Tennis Warehouse University, December 22, 2013. http://twu.tennis-warehouse.com/learning_center/aerodynamics2.php.
 2. "Basic Tennis Physics." The Physics of Tennis I Basic Tennis Physics. Accessed December 10, 2019. http://ffden-2.phys.uaf.edu/webproj/211_fall_2014/Max_Hesser-Knoll/max_hesserknoll/Slide2.htm.

Physics of Tennis
Player/Raquet Movement



Left: Breakdown of energy that encompasses racket-head speed to impact the tennis ball. Image: Getty Images. Illustration: Intoaroute.¹

Not shown: The movement of the player and the racket is characterized as a double pendulum motion.²

Right: Raquet friction and angular effects on ball movement.³

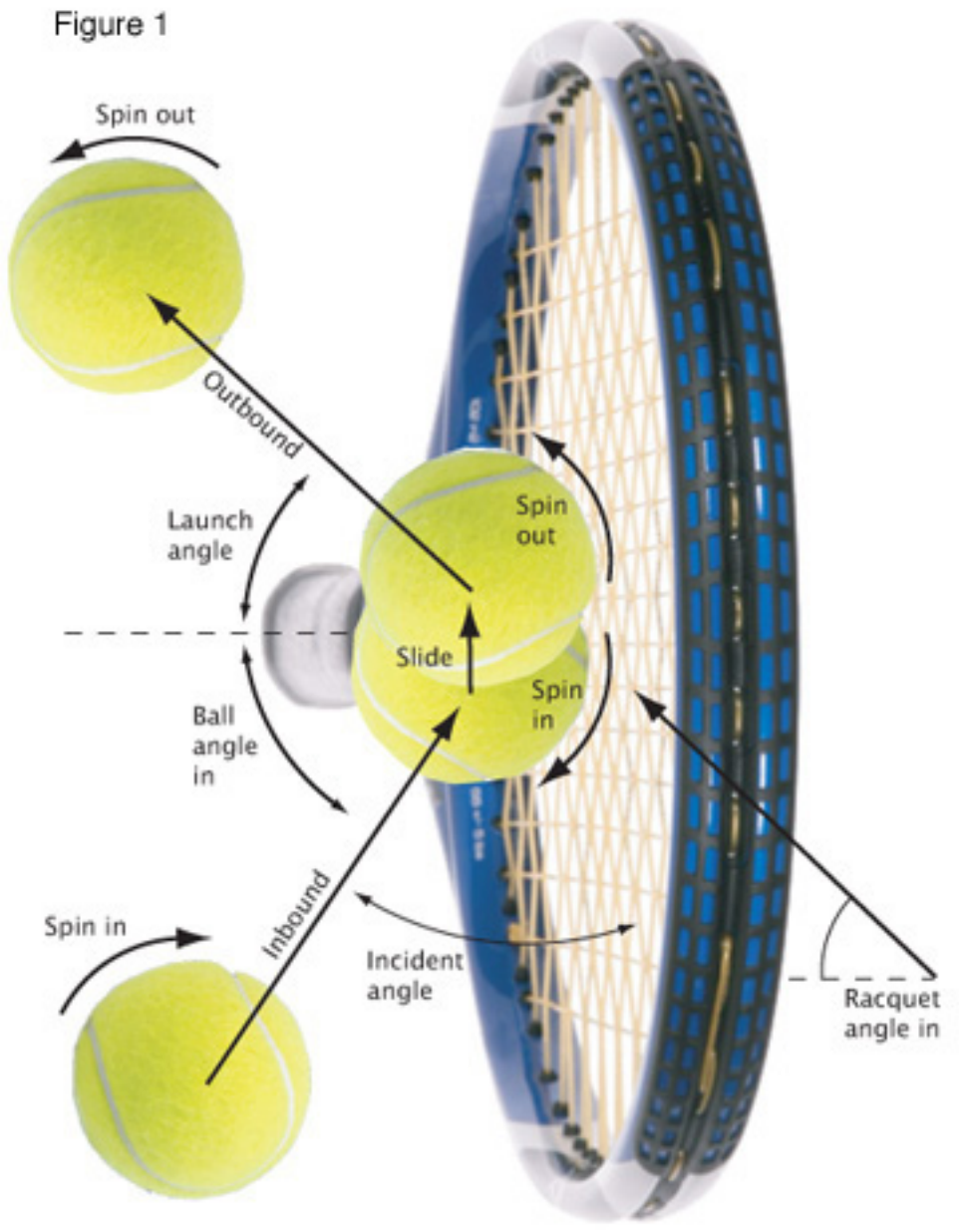
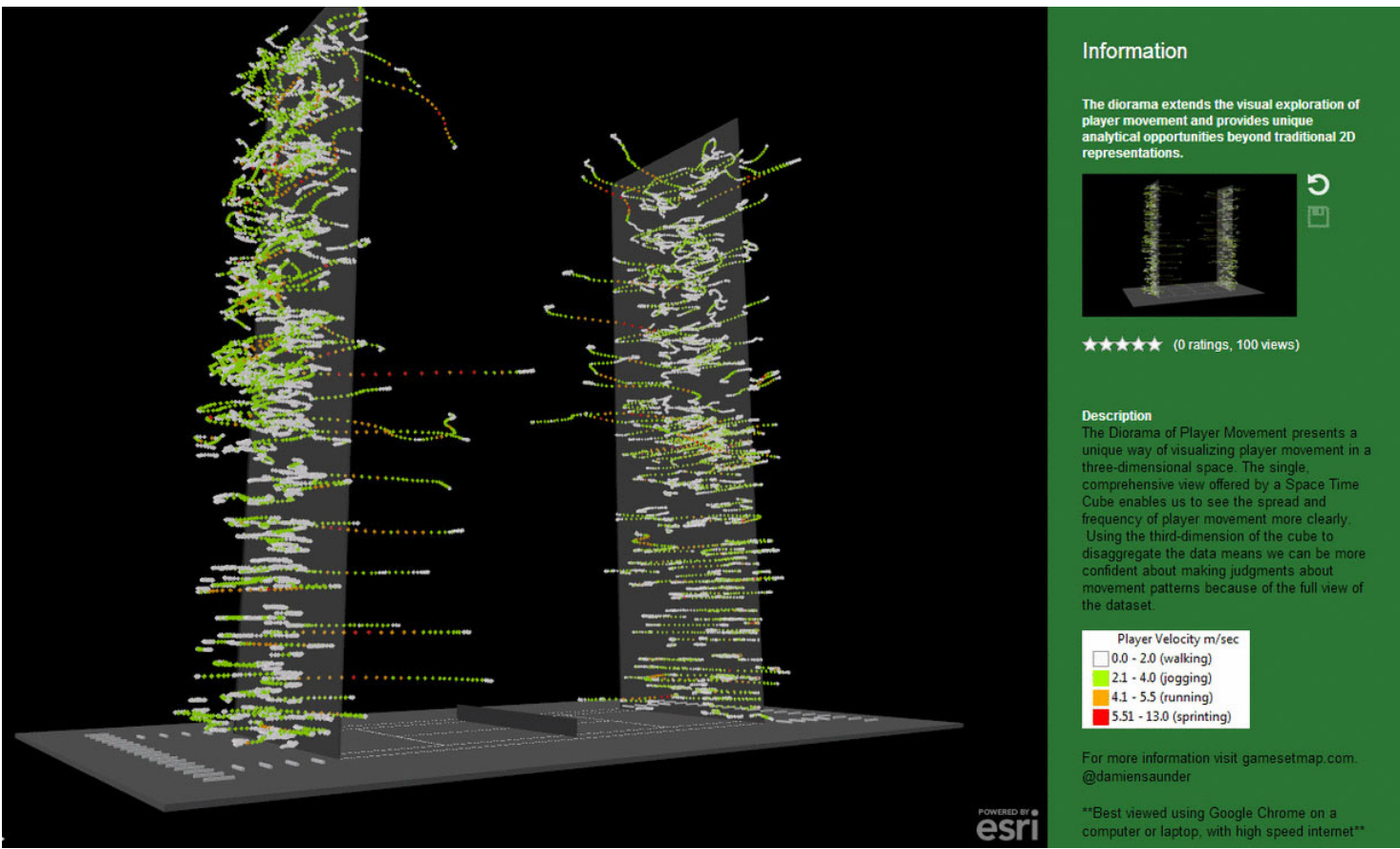


Figure 1



Diorama of player movement.⁴

Sources:

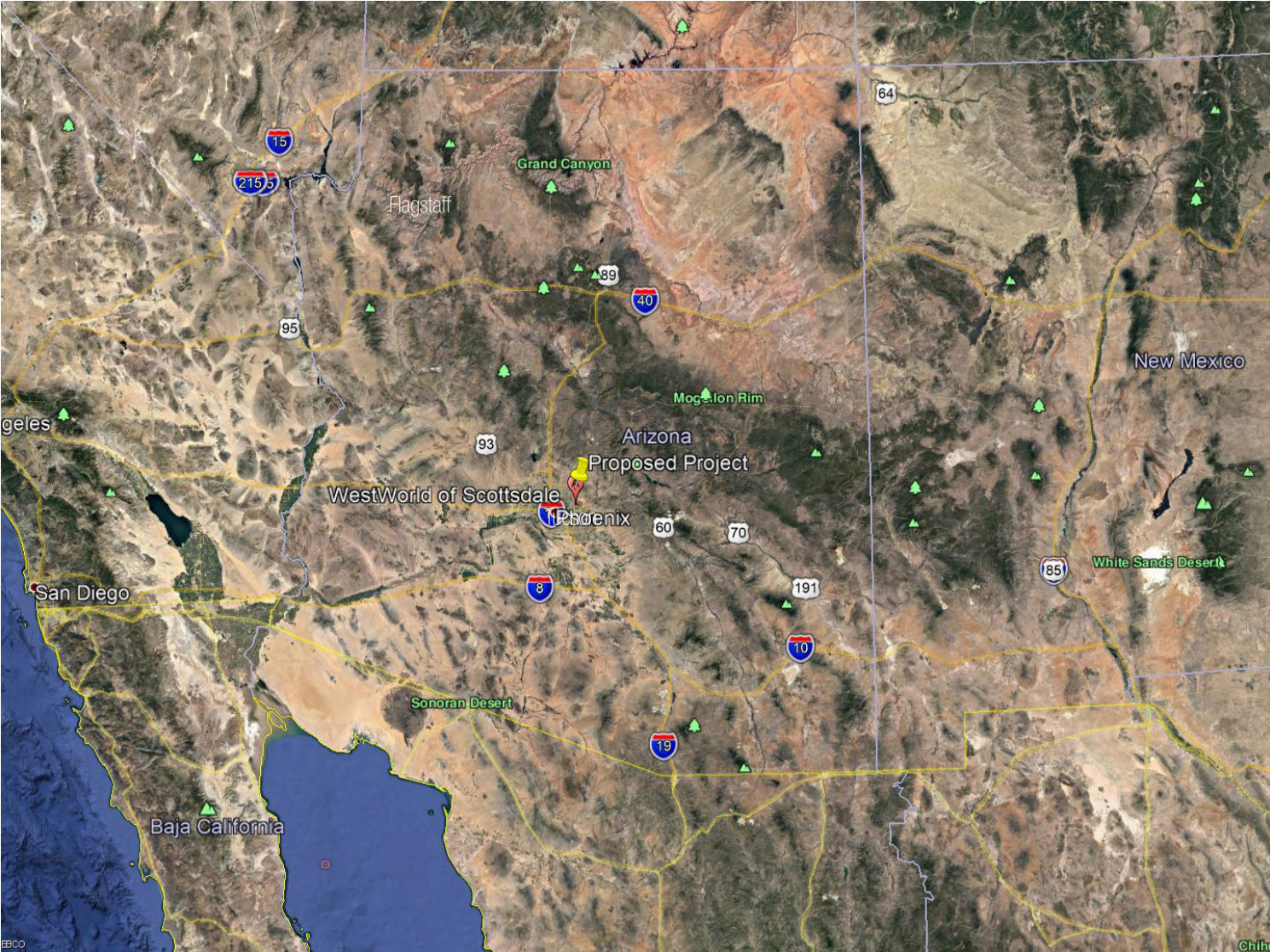
1. Colligan, Tom. "Tennis Physics: Anatomy of a Serve." Popular Mechanics. Popular Mechanics, November 14, 2017. <https://www.popularmechanics.com/adventure/sports/a2072/4221210/>.
2. Cross, Rod. "The Double Pendulum In Tennis." Tennis Warehouse University, June 9, 2011. http://twu.tennis-warehouse.com/learning_center/doublependulum.php.
3. "Friction." The Physics of Tennis. Accessed December 10, 2019. <http://physicssoftennis.yolasite.com/friction.php>.
4. Demaj, Damien. "Presenting a Diorama of Player Movement in Sport." GameSetMap, February 19, 2014. <http://gamesetmap.com/?p=725>.

Mark V. Sunkel is a partner at CORE Realty Partners that specializes in the retail sector. He works with many firms and developers on the real estate end in various stages, needs, and locations. We were catching up with each when I started to discuss the thesis project. He reminded me about someone who he used to work for that had passed away in the last two or three years. I knew about him but what I did not know is that he was a former tennis professional. Mark informed me that what I was looking to do with a tennis facility and arena is pretty close to an idea that the person he used to work for had been discussing with various parties before his passing. He was not sure of the specifics as he was not directly involved except for a few items here and there. He did seem to think that there was some demand.

Mark and I discussed some of the issues such finding a site that could accommodate such a large facility, regardless of zoning, that was near the highway, and not too far out of town that locals would not be able to reach relatively easily. The Phoenix Metro area is a large area and it can take an hour or more to travel from one end to the other in any direction, depending on weather and traffic conditions. The commute time via highway could be reduced to 30 minutes or less for a large portion of the population, especially those that fit within the demographics but also reach out to those who are interested or not able to afford the sport.

Sunkel, Mark V. Interview by George F Rozansky. In-person. October 22, 2019.

State Level Map



Proposed Site, State Level Map.¹

Site is located in the Sonoran Desert in the desert southwest of the United States of America.

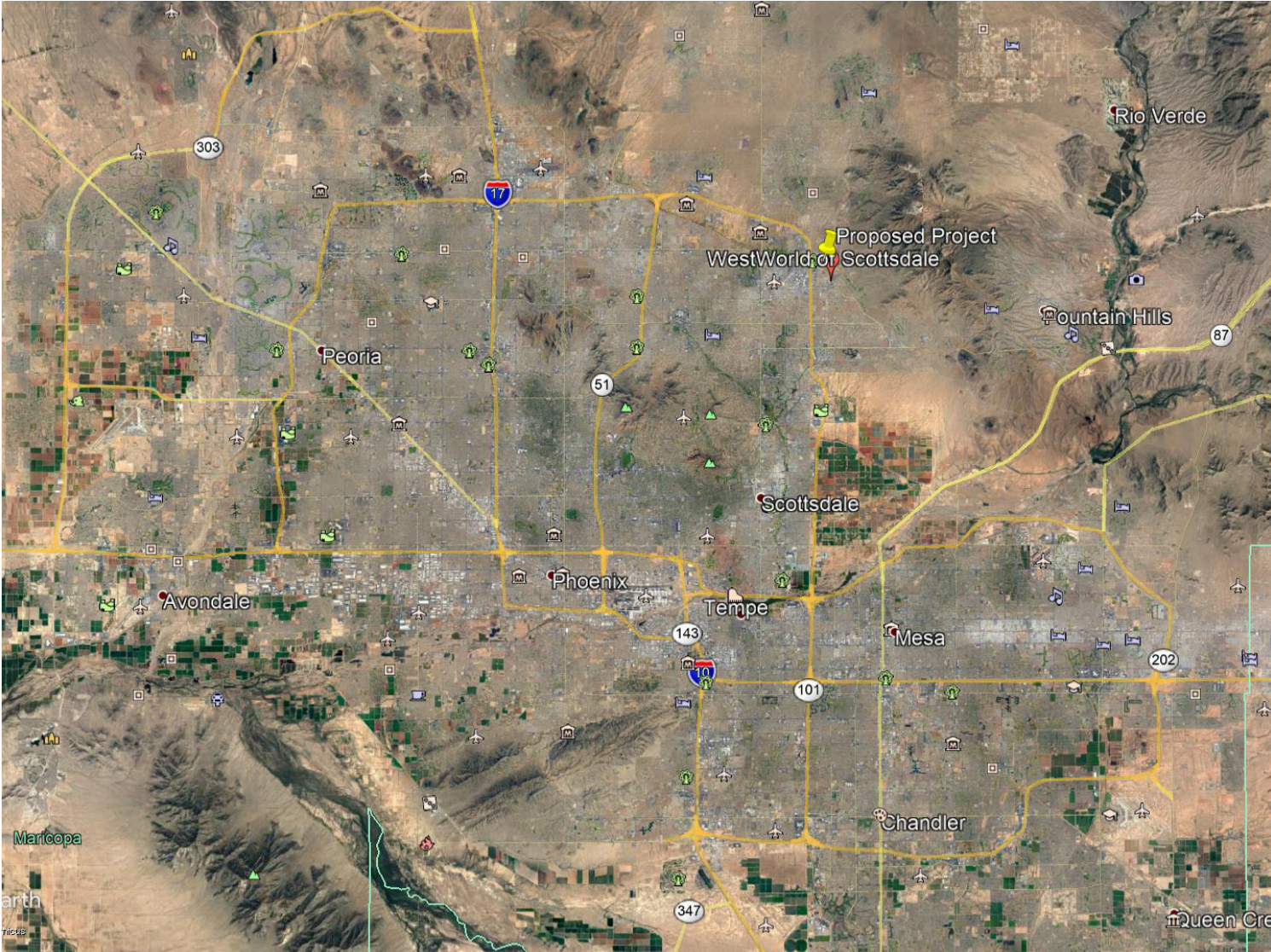
The City of Scottsdale is in a valley at the northern edge of the Sonoran desert with many mountain ranges surrounding the valley and additional mountains and hills scattered throughout the valley.

Arizona is a formerly active volcanic and earthquake prone region.

Tree forests exist in the northern part of the state with federal national forests throughout different regions.

The top soil is sandy and a little further down is particularly hard with clay. Volcanic rocks including granite, slate, quartz, and other minerals are known to exist in the mountain areas.

City Level Map



Proposed Site, City Level Map.¹

Within the Phoenix metropolitan region, the site is located in the northeast part of the Valley of the Sun.

No natural lakes exist nearby but several lakes are in the region that were created through the use of dams. The Salt River runs far east of the city stretching west past the city with the Gila River to the far west southwest. Several creeks feed into the river. Many dry washes and creeks exist. Many artificial lakes have been created.

Water sources include deep groundwater for well water with the major water supply coming from the Central Arizona Project canal that feeds the city from the Colorado River in the north part of the state that runs through the Grand Canyon.

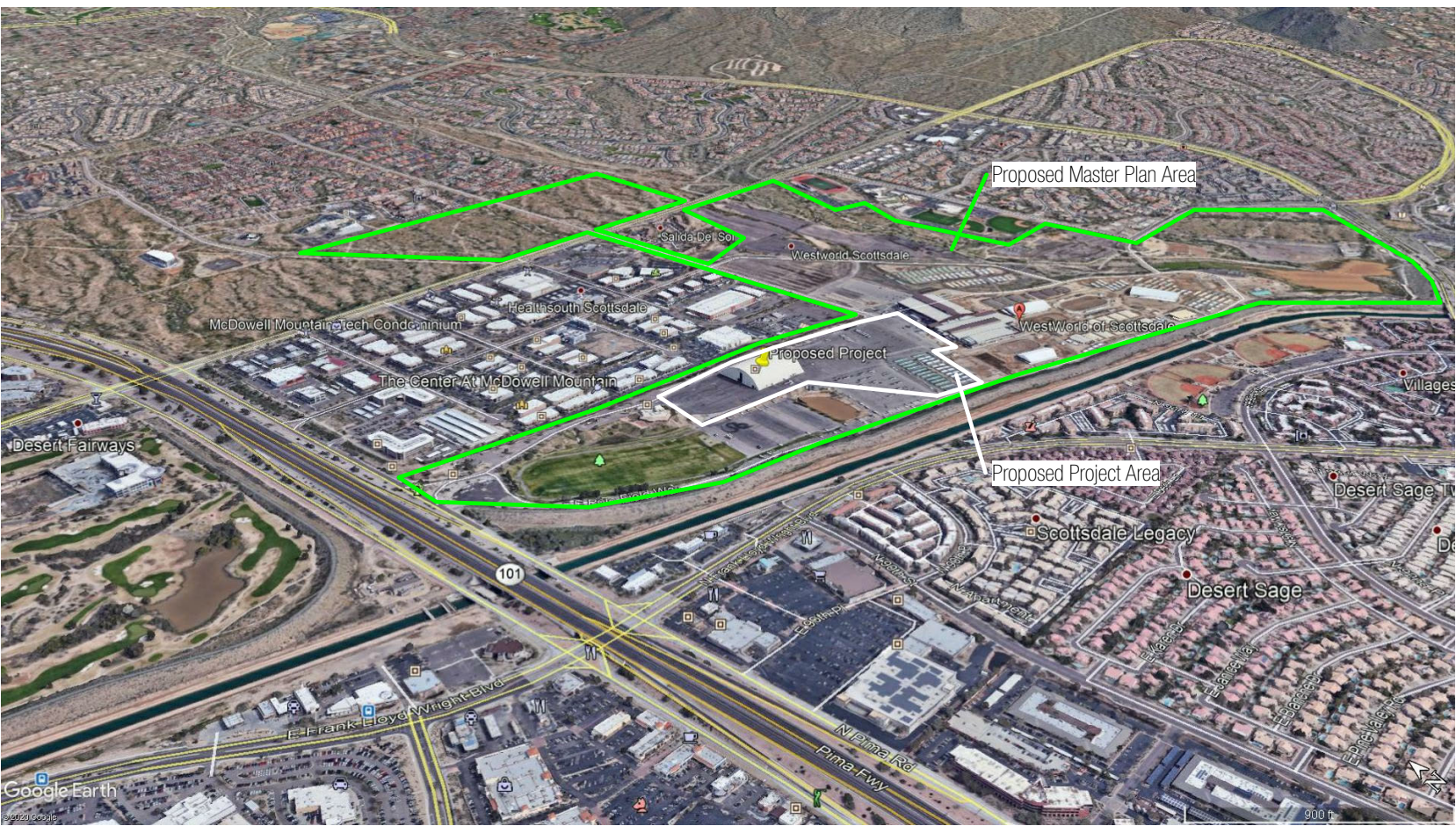
The Tonto National Forest is located further north in the far northeast part of the city as you exit the Sonoran Desert and proceed into the higher elevations.

Sources:
 1. WestWorld of Scottsdale. Google Earth Pro. Version 7.3.2.5776. Google LLC.
 2. Other information on this page comes from general knowledge acquired through living in the state since 2005.

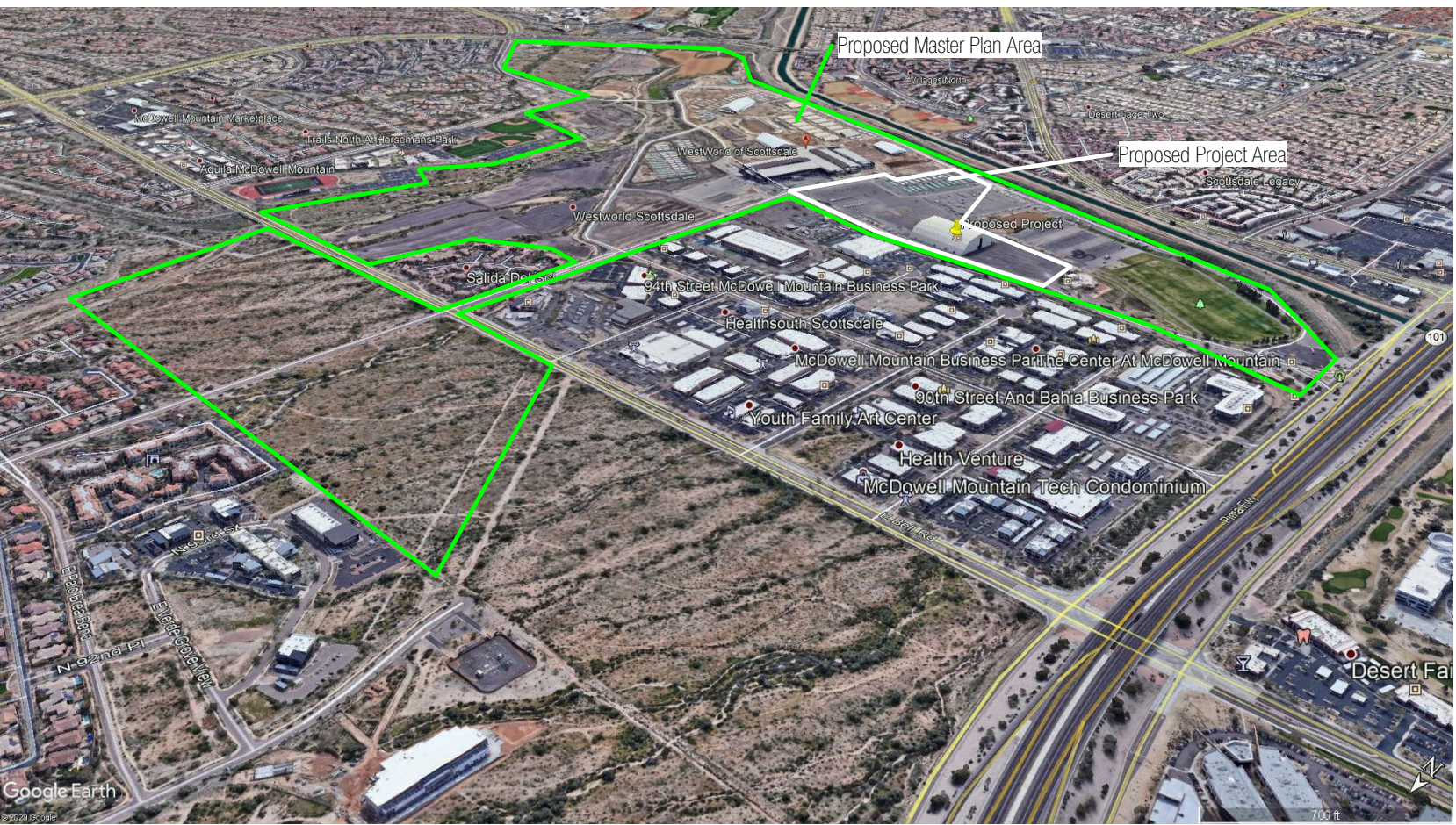
SITE AND CONTEXT ANALYSIS

WestWorld of Scottsdale, E. Bell Rd. & N. 94th St., Scottsdale, Arizona

Site Views



Proposed Site, Southwest Bird's-Eye.¹



Proposed Site, Northwest Bird's-Eye.¹

Sources:
 1. WestWorld of Scottsdale. Google Earth Pro. Version 7.3.2.5776. Google LLC.

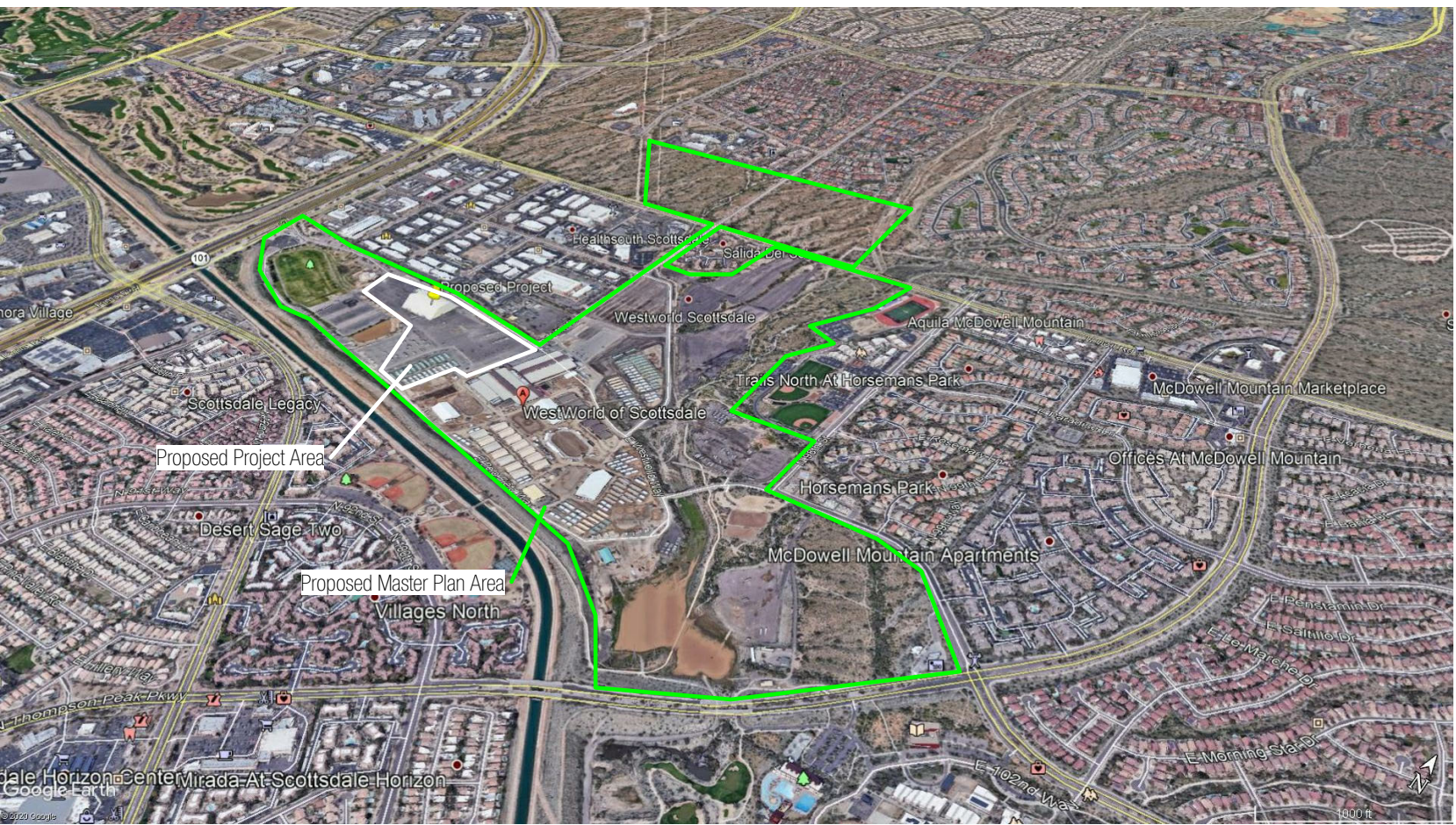
SITE AND CONTEXT ANALYSIS

WestWorld of Scottsdale, E. Bell Rd. & N. 94th St., Scottsdale, Arizona

Site Views



Proposed Site, Northeast Bird's-Eye.¹



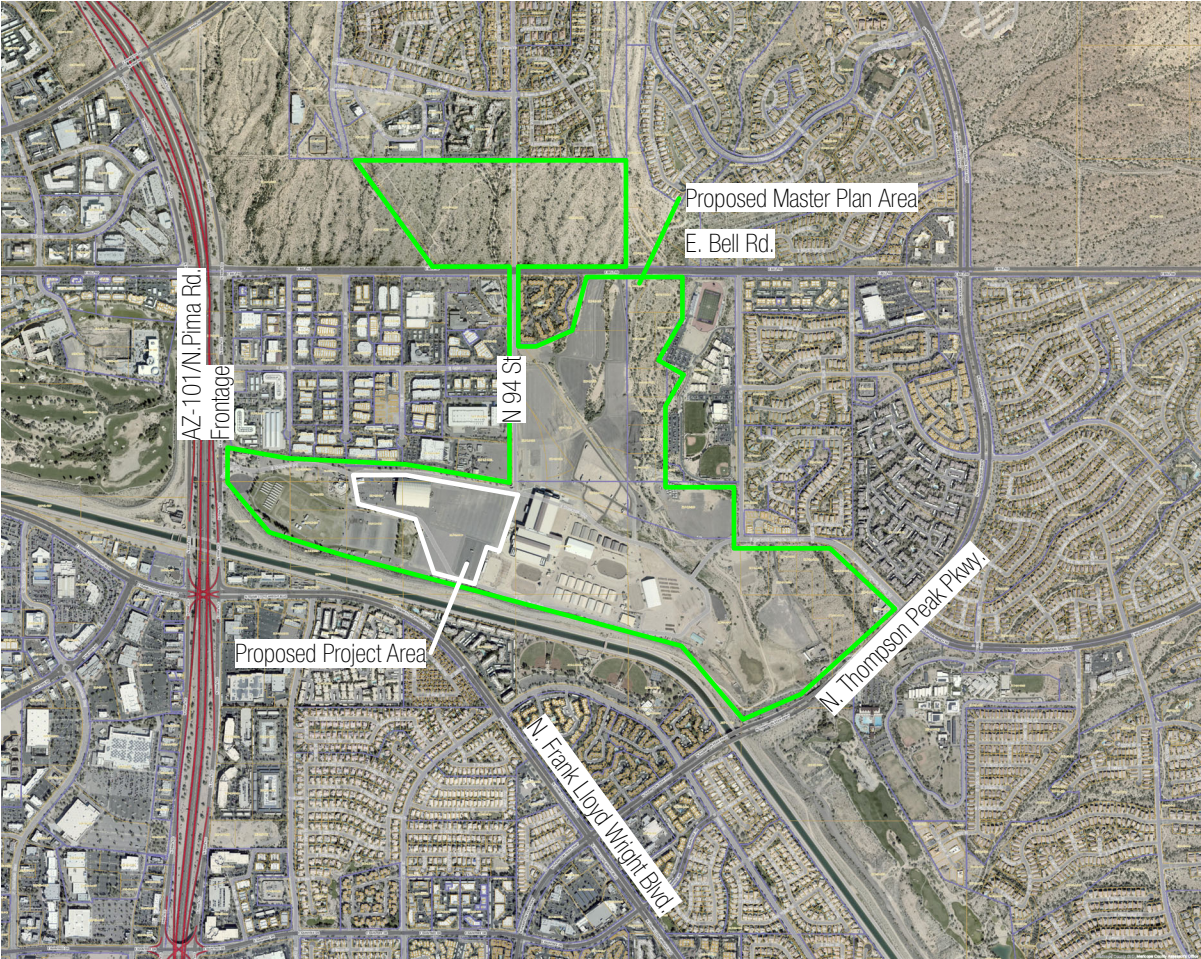
Proposed Site, Southeast Bird's-Eye.¹

Sources:
1. WestWorld of Scottsdale. Google Earth Pro. Version 7.3.2.5776. Google LLC.

SITE AND CONTEXT ANALYSIS

WestWorld of Scottsdale, E. Bell Rd. & N. 94th St., Scottsdale, Arizona

Site Information



Aerial Map.¹

The proposed site is located within the WestWorld of Scottsdale which is part of the Western Theme Park zoning within the City of Scottsdale. The site is located off highway AZ-101 with primary entry off E. Bell Rd. from the north and N. 94th St running north/south while the secondary entry is off AZ-101 frontage road, N. Pima Rd., from the west on E Westworld Way running east-west. A third entry is located at the eastern end from E McDowell Mountain Ranch Rd. The site is adjacent to offices and other facilities to the north; park/trail access, residential neighborhoods, and three schools (public elementary and middle school and a catholic high school) to the east; the Arizona Canal to the south; and the highway to the west. On property is an administration office, station for the Scottsdale horse mounted patrol, various horse stables and related structures, RV/camping office, maintenance building, restroom facility, and the Tony Nelssen Equestrian Center and North Hall by the architecture firm Populous, and "Impulsion" statue by Scottsdale artist Jeff Zischke.



Site Data¹

Address:	16601 N Pima Rd., Scottsdale, AZ 85260
Parcel:	Proposed Master Planned Area (MPA): > 15 parcels Proposed Project Area (217-13-022B, 217-13-023B, 217-13-039B, 217-13-024, 217-13-040, 217-13-024)
Current Owner:	United States Bureau of Reclamation (USA-BOR), Arizona State Land Department (northeast in MPA), City of Scottsdale (Various in MPA), Others (Various in southeast MPA)
Jurisdiction:	Scottsdale, AZ
Current Zoning:	Western Theme Park (WP), Other Zoning in MPA - Some (ESL)*
Lot Size:	2,399,721 sq. ft. (55.09 acres) - Proposed Project Area
Total MPA Lot Size:	460 acres (386 acres, WestWorld + 74 acres, two E. Bell Rd. lots)
Special:	Permission from USA-BOR, potential variances for building height and building set backs.
Utilities:	City water, septic, power, phone, cable, gas.
Program/Use:	Proposed Project Area - Tennis training, courts, and museum. MPA - stadia, arena, and other site improvements. Unused area to be dedicated to preserve/park space.
Advantages:	Close to the highway, close to amenities 20-30 min. from major airport, 2 smaller airports nearby Location conducive to sustainable concepts Provide economic benefit for the immediate areas Near potential users Existing developed property with areas that can be dedicated to preservation
Disadvantages:	Not centrally located in the metropolitan area Located in the USA-BOR drainage/flood area Limited footprint area Parking is close but requires assistance/protection from the weather Unique zoning and coordination effort between agencies/lot owners Regular events would require rescheduling or temporary relocation

WestWorld/Western Theme Park Zoning

WestWorld of Scottsdale²:

Greater than 300,000 sq. ft. of exhibition space

386 acres below the McDowell Mountains

Major events hosted at WestWorld (including but not limited to):
Barrett-Jackson Collector Car Auction
Scottsdale Arabian Horse Show
International Motorcycle Show,
Good Guys Car Show
International Sportsmen's Expo
Home and garden shows

Tony Nelssen Equestrian Center and North Hall that is world-renowned and recently has been host to more than 90 equestrian events encompassing greater than 247 use days with 220,000+ attendees.

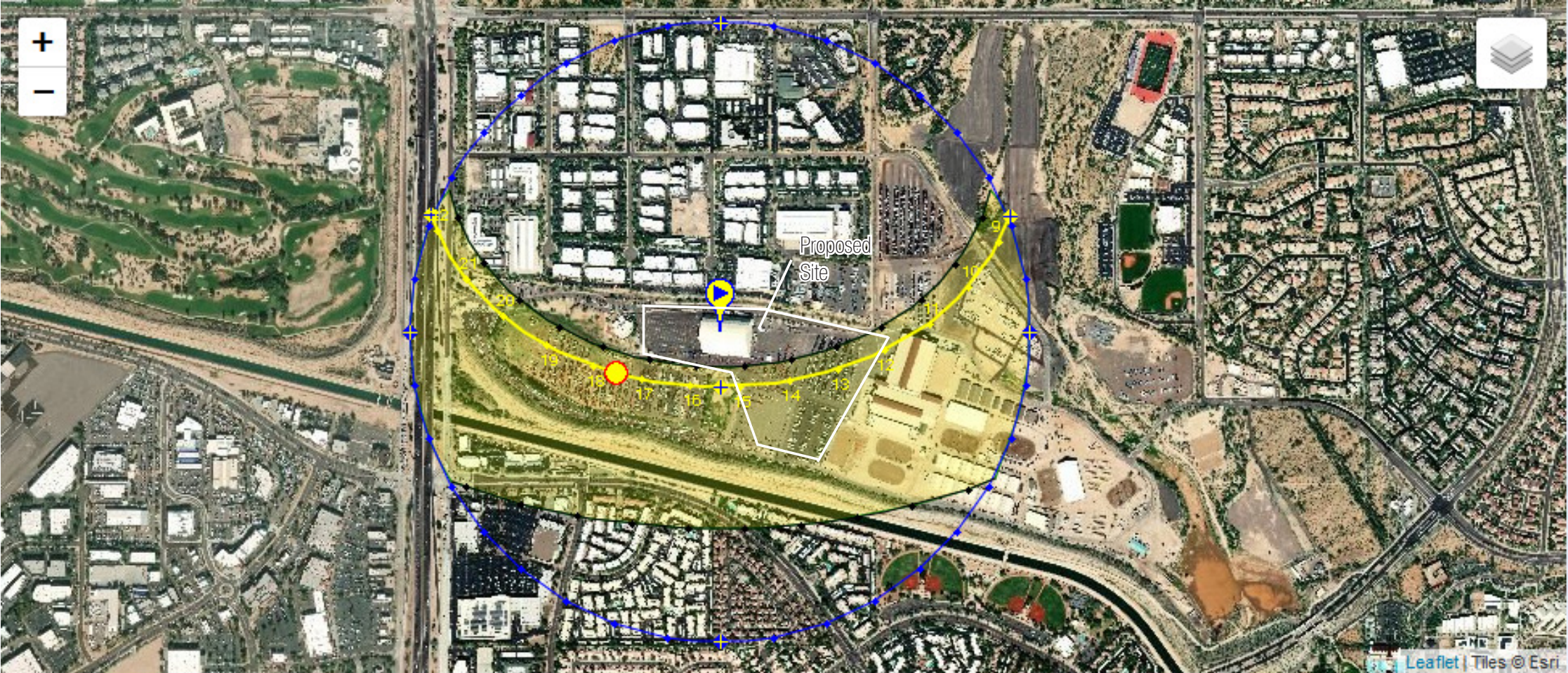
According to the Zoning Ordinance³:

This WP District shall be applied to sites of a minimum size of one hundred sixty (160) gross acres and is intended to provide for multi-purpose facility(ies) capable of accommodating a mixture of equestrian, recreation, convention meetings, conferences and/or major exhibitions, auction(s), trade show and other similar events for international to local sized group functions within a major southwestern themed park. The WP District also recognizes the importance of unique land uses in a campus/theme park setting to Scottsdale's economy and quality of life and it is the purpose of this WP District to provide for quality development; to encourage imaginative, innovative site planning and to balance the protection of the environment with the provision of unique land uses. These uses include, but are not limited to convention/tourism/conference centers, and cultural, educational, and recreational uses containing, within the limits outlined below, a broad variety of thematic recreational, entertainment and ancillary general commercial uses. These general commercial uses would be similar to those found in other commercial districts, which would lend themselves to a pedestrian atmosphere with adequate on-site facilities to accommodate diverse user groups and event sizes. The WP District would also encourage development in keeping with the natural amenities of its locale that preserves the unique resources of the facility. It is further intended to provide open space areas so that the uses are located and site improvements made to lessen the impact of more intense land uses from residential areas and so that highway frontage promotes a desirable image of the community.

*Environmentally Sensitive Land, subject to additional zoning ordinance considerations.

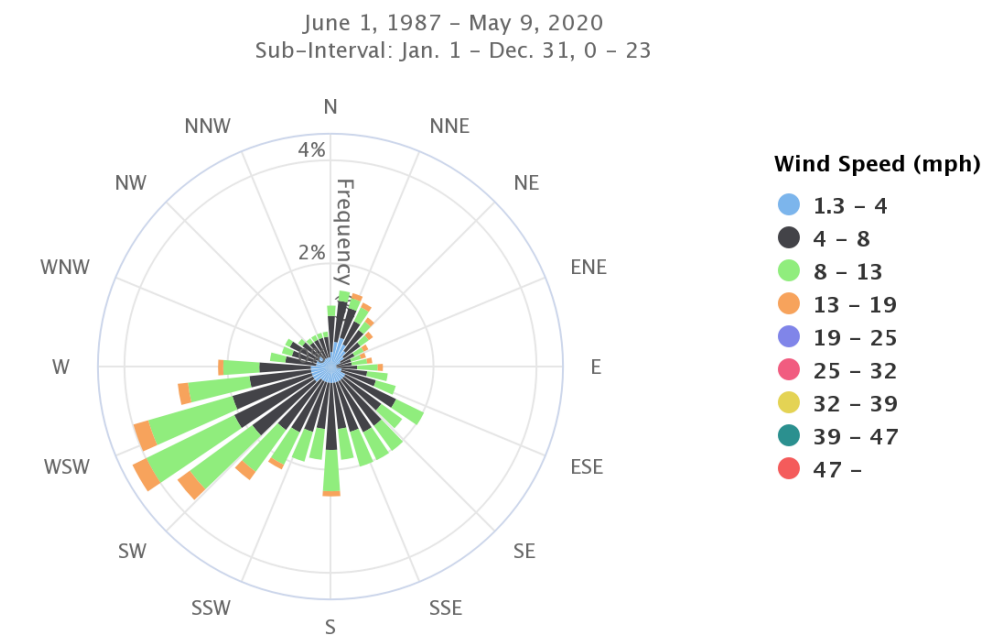
Sources:
 1. Maricopa County Assessor's Office. "Parcel Visualization." Parcel Visualization. Maricopa County. <https://maps.mcassessor.maricopa.gov/>.
 2. "WestWorld of Scottsdale." WestWorld of Scottsdale. City of Scottsdale. Accessed May 9, 2020. <https://www.westworldaz.com/#about>.
 3. "Sec. 5.2801. - Purpose. I Code of Ordinances | Scottsdale, AZ | Municode Library." Municode Library. Municode Library. Accessed May 9, 2020. https://library.municode.com/az/scottsdale/codes/code_of_ordinances?nodeId=VOLI_APXBBAZOO_ARTVDIRE_S5.2801PU.

Weather



Annual Sun Path.¹

SCOTTSDALE MUNI AP (AZ) Wind Rose



Wind Rose, nearby airport (across AZ-101 to the west a couple miles).²

Temperature	High	118°F	7/21/2006
	Low	22°F	1/14/2007
Wind	Peak Wind Gust	38 MPH	6/26/2006
	Dewpoint	Maximum Dewpoint	85°F
			8/26/2014

All-Time Records (1998-2018).³

Month	Maximum Temp	Mean Temp ¹	Minimum Temp	Peak Wind		Mean Avg Wind ²
	°F	Date(s)	°F	°F	Date(s)	MPH
January	84	1/31/03	55	22	1/14/07	29
February	88	2/26/16	57	15	2/15/98	25
March	97	3/16/07	64	12	3/7/98	30
April	105	4/22/12	70	33	4/2/99	31
May	110	5/31/12	79	41	5/1/99	28
June	116	6/29/13	89	52	6/5/99	38
July	118	7/21/06	92	63	7/1/04	37
August	117	8/8/12	90	41	8/27/98	34
September	111	9/1/11	86	53	9/21/04	29
October	103	10/1/15	74	38	10/29/09	28
November	94	11/3/09	64	28	11/30/06	24
December	81	12/5/12	54	26	12/28/03	29

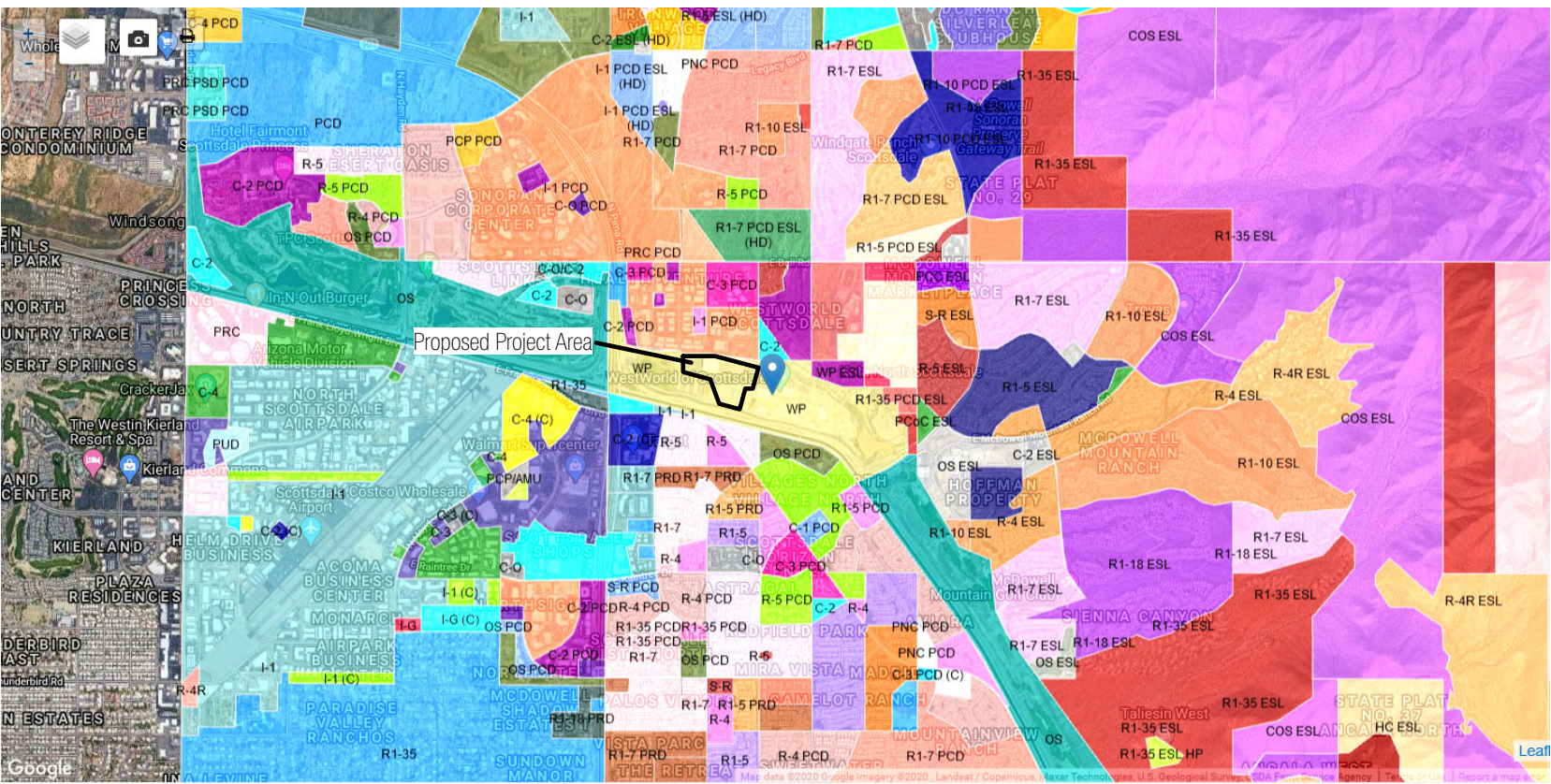
The daily mean temperature is calculated by averaging each day's 15-minute values (96 if all are received). The monthly mean temperature is calculated by averaging all temperatures in that month (96 * # of days). The mean temperature for each month is calculated by averaging the monthly mean temperatures from all years.

Average daily wind speed is calculated by dividing the number of hours in a day into the recorded miles of wind run. Monthly average wind speed is calculated by averaging all daily average wind speeds in that month. The average wind speed for each month is calculated by averaging the monthly average wind speeds from all years.

Monthly Statistics (1998-2018).³

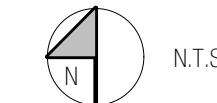
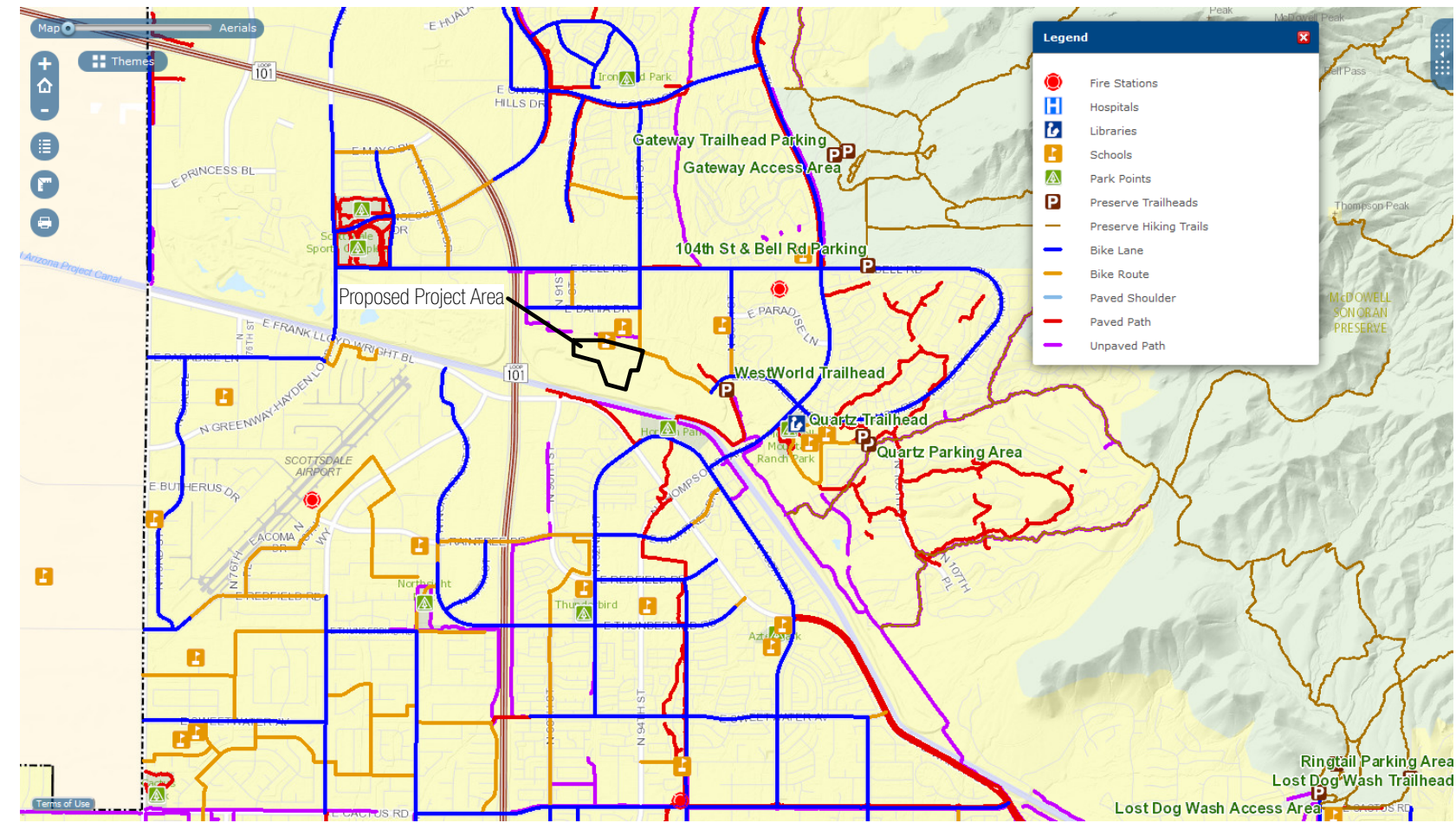
Sources:
 1. SunEarthTools.com. <https://www.sunearthtools.com/>.
 2. cli-MATE: MRCC Application Tools Environment. Midwestern Regional Climate Center. <https://mrcc.illinois.edu/CLIMATE/>.
 3. Climate Summary Report: Pima at Jomax Weather Station. Weather Sensor Data. Maricopa County. <https://www.maricopa.gov/3769/Weather-Sensor-Data>.

Zoning/Use Map¹

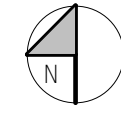
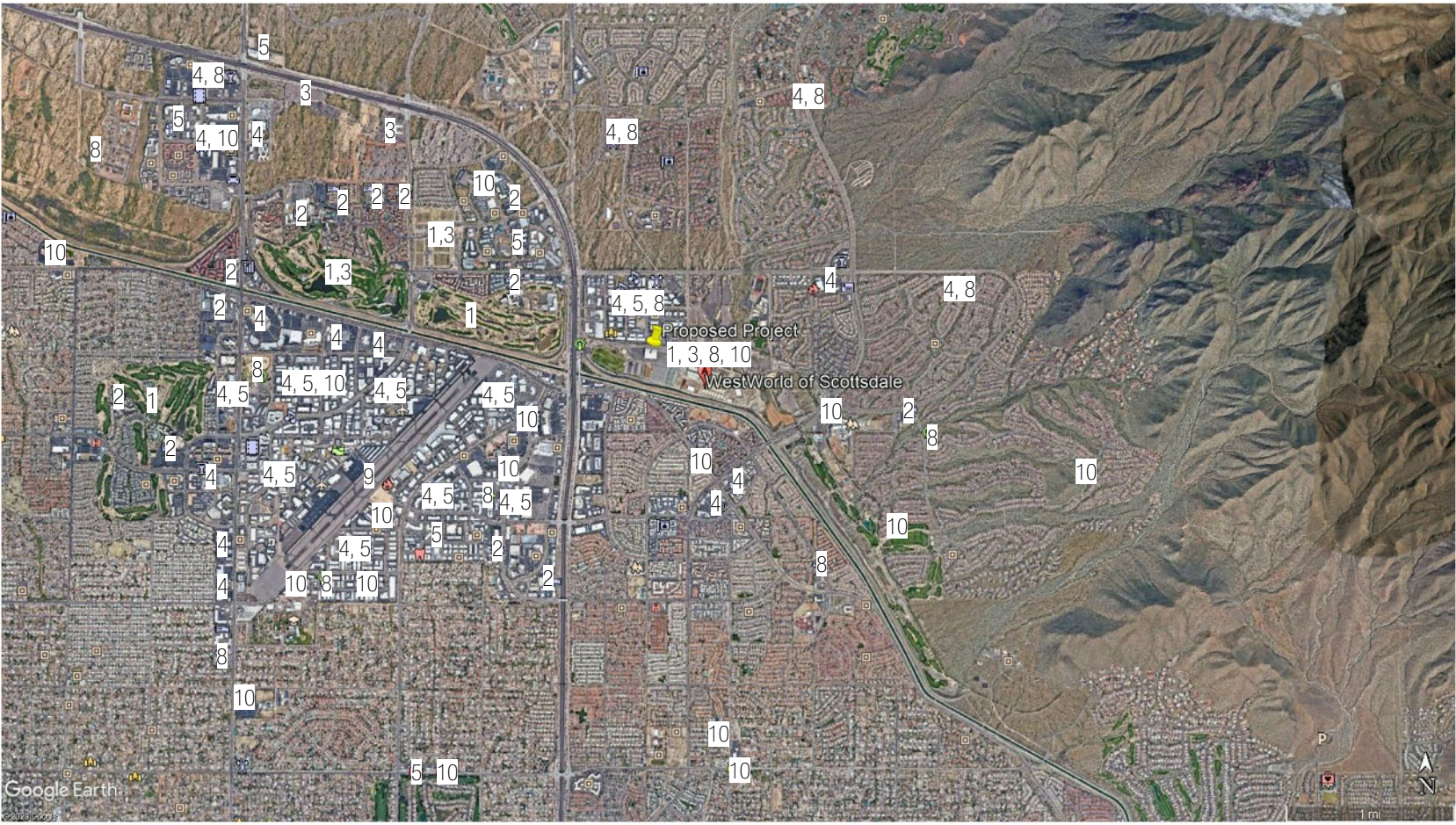


Sources:
 1. "ZoningInformation." ZoningInformation. Zoneomics. Accessed May 9, 2020. <https://www.zoneomics.com/zoning-maps/arizona/scottsdale>.
 2. "Interactive Map." COS Maps. City of Scottsdale. Accessed May 9, 2020. <https://eservices.scottsdaleaz.gov/maps#>.

Public Service Amenities²



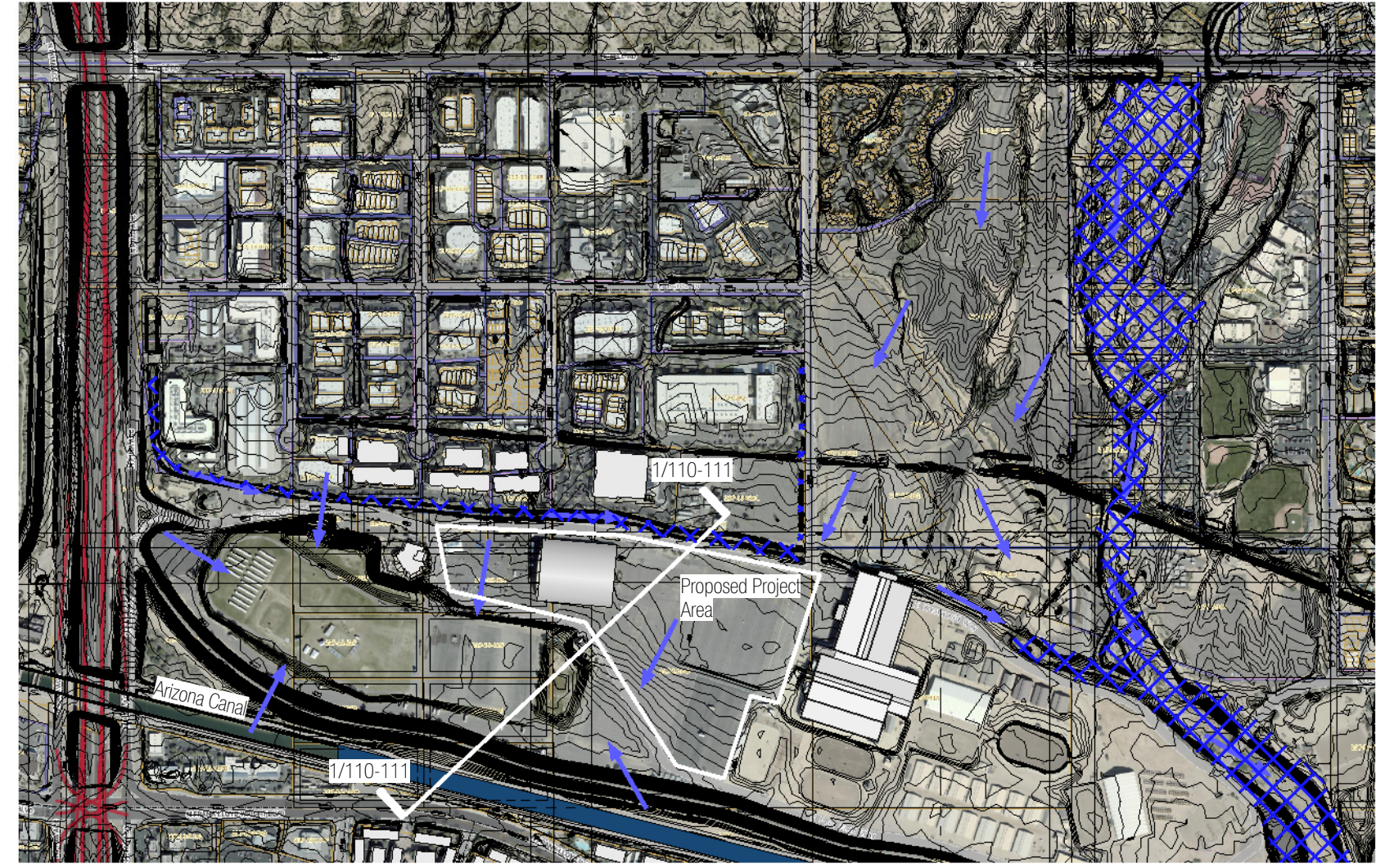
Vicinity Amenities Map¹



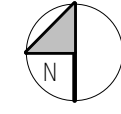
Major Local Amenities

- 1. Sports
- 2. Hotel
- 3. Event Venue
- 4. Retail/Restaurant/Entertainment
- 5. Office/Dental/Medical
- 6. Not Used
- 7. Hospital (3 nearby, not pictured)
- 8. Fitness
- 9. Airport/Aviation
- 10. Culture

Site Features



- Water Flow/Slope
- Wash/Ditch Area



Aerial: Maricopa County Assessor's Office. "Parcel Visualization." Parcel Visualization. Maricopa County. <https://maps.mcasessor.maricopa.gov/>.

Sources:
1. WestWorld of Scottsdale. Google Earth Pro. Version 7.3.2.5776. Google LLC.

Project Site Topography



1 Project Site Section
1" = 100'-0"



Vegetation

Cactus

- Barrel Cactus¹
- 0.5-3m in height
 - Large barrel shaped with vertical ribs
 - Hooked or non-hooked spines
- Cholla Cactus (Teddy Bear Cholla Variant)¹
- Stems, cylindrical with many branches (al)
 - Up to 1.8m tall in height
 - Unchained fruit
- Prickly Pear Cactus¹
- Stems are flat and wide
- Saguaro Cactus¹
- Vertical ribs
 - Stem taller than wide (at least 10 times taller)
 - Very tall, potentially 45' tall (~200 years)²
 - One main trunk with potential several branches (arms) high up on the trunk
 - Slow growth, ~10 years: grow 1", 70 years: potentially 6.5' & first flowers, 95-100 years: 15-16' & first arm²
 - Protected, requires permit to move

Trees

- Palo Verde (state tree), native, Sonoran Desert:
- Blue Palo Verde¹
- Blue-green bark and branches
 - 4-8cm leaflets
 - 3 or less pairs of leaflets per stem
- Foothills Palo Verde¹
- Yellow-green bark and branches
 - 3mm or less long leaflets long or less
 - 4-8 pairs of leaflets per stem
- Ironwood¹
- Up to 9m in height
 - Trunk, Up to diameter of 45 cm
 - Gray bark (may be stringy) and leaflets
 - Spines, not yellow, potential slight curve
- Velvet Mesquite¹
- Up to 3m in height
 - Leaflets and bark (not stringy) are not gray
 - Uncurved spines are yellowish
 - Zig-zag pattern growth for branches

Shrubs

- Ocotillo¹
- Up to 6m in height
 - Vertical branches connecting at ground
 - Many spines along vertical branches
 - Oval green leaves up to 5 cm in length
 - Leafless most of the year
- Canyon Ragweed¹
- Up to 1m in height
 - Green leaves are hairy and are elongated lanced-shaped and toothed, 12.7cm length and 2.5cm in width
- Creosote Bush¹
- Up to 3m in height
 - Dark green to yellow-green leaves
 - Leaves waxy and resinous with three leaflets joined at the base, up to 10mm in length
 - Strong scent



Saguaro Cactus. Photo: National Park Service.²



Velvet Mesquite. Photo: Sue Smith.³



Ocotillo. Photo: Ricraider.⁴

Sources:

1. "Vegetation." Ecology Explorers. Accessed December 10, 2019. <https://sustainability.asu.edu/ecologyexplorers/ecology-activities/vegetation/>.
2. "Saguaro Cactus." National Parks Service. U.S. Department of the Interior. Accessed December 10, 2019. <https://www.nps.gov/orpi/learn/nature/saguaro-cactus.htm>.
3. Schalau, Jeff. Backyard Gardener - Enjoy Velvet Mesquite Trees - January 9, 2019. Accessed December 10, 2019. <https://cals.arizona.edu/yavapai/anr/hort/byg/archive/mesquite2019.html>.
4. Ricraider. "Fouquieria Splendens." Wikipedia. Wikimedia Foundation, June 3, 2019. https://en.wikipedia.org/wiki/Fouquieria_splendens#/media/File:Ocotillo_GB.jpg.

Vegetation should be drought resistant, can withstand the full sun, native, and be not invasive or noxious.

Some non-native vegetation has been brought into the area including varieties of palm trees. Many locations no longer allow.

Scottsdale - Demographics¹

Population (2017): 249,950 (97% urban, 3% rural)
 Population change since 2000: +23.3%

Phoenix-Mesa-Chandler, AZ Metropolitan Statistical Area (2019 estimate)²:
 4,948,203

Males: 126,045 (50.4%); Females: 123,905 (49.6%)

Median resident age: 46.0 years Arizona median age: 37.7 years

Estimated median household income (2017): \$88,407 (\$57,484 in 2000); Scottsdale: \$88,407; AZ: \$56,581

Estimated per capita income in 2017: \$58,773 (\$39,158 in 2000)

Estimated median house or condo value in 2017: \$473,300 (\$205,000 in 2000); Scottsdale: \$473,300; AZ: \$223,400

Mean prices (2017): all housing: \$598,293; detached houses: \$697,112; attached units: \$369,743; 2-unit structures: \$199,471; 3-to-4-unit structures: \$236,872; 5-or-more-unit structures: \$244,420; mobile homes: \$80,653

Median gross rent (2017): \$1,315

Cost of living index (March 2019): 98.6, near average (U.S. average is 100)

Percentage of residents living in poverty (2017): 7.8% (7.2% for White Non-Hispanic residents, 8.9% for Black residents, 26.0% for Hispanic or Latino residents, 8.3% for American Indian residents, 44.9% for other race residents, 15.1% for two or more races residents)

Ancestries: German (11.9%), American (7.3%), Irish (6.8%), Italian (6.5%), English (5.9%), European (5.2%)

Foreign born residents: 27,275 (2.7% Europe, 2.7% Latin America, 1.7% Asia, 1.6% North America)

Local Time Zone: Mountain Standard Time (MST) (no DST)
 Area code: 480

Incorporated in 1951
 Land area: 184.2 square miles

Population density: 1,357 people per square mile (low)

Median real estate property taxes paid (mortgaged housing units, 2017): \$2,392 (0.5%)
 Median real estate property taxes paid (unmortgaged housing units, 2017): \$2,476 (0.5%)

Nearest cities: Paradise Valley, AZ (2.2 miles, south/southwest); Salt River, AZ (2.9 miles, east); Fountain Hills, AZ (3.1 miles, east); Phoenix, AZ (3.4 miles, west); Tempe, AZ (3.8 miles, south); Mesa, AZ (3.9 miles, southeast); Rio Verde, AZ (3.9 miles, northeast); Carefree, AZ (4.0 miles,north)

Latitude: 33.59 N, Longitude: 111.90 W

Nickname (official): The West's Most Western Town

Commuting population change during the day: +72,738 (+29.1%)
 Workers who work and reside in the city: 58,891 (45.9%)

Most common industries in Scottsdale, AZ (%)

Health care (12.3%); Professional, scientific, technical services (12.0%); Finance & insurance (9.9%); Educational services (8.1%); Accommodation & food services (8.1%); Real estate & rental & leasing (5.2%); Administrative & support & waste management services (4.0%)

Most common occupations in Scottsdale, AZ (%)

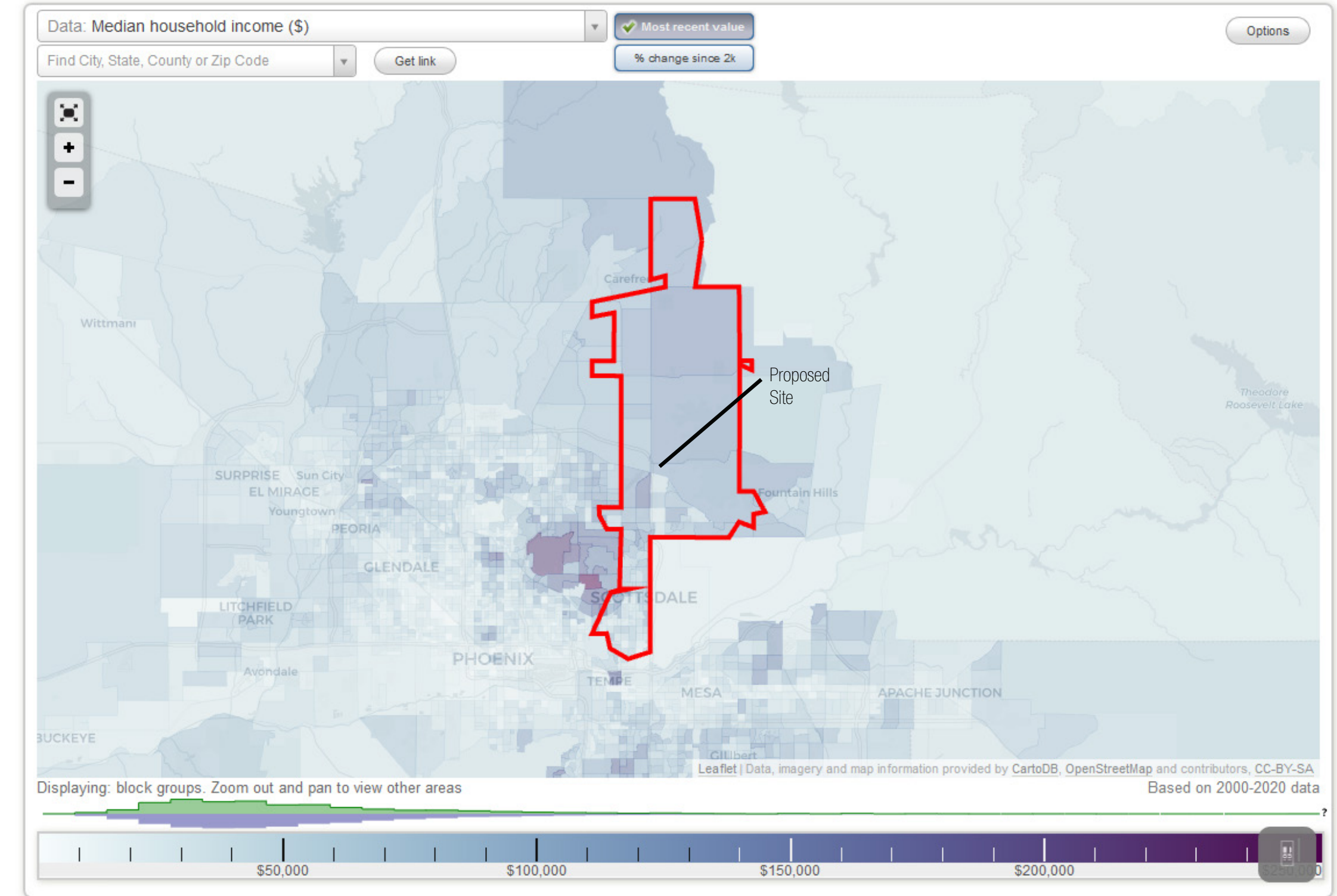
Other management occupations (except farmers and farm managers) (8.5%); Top executives (4.7%); Computer specialists (4.2%); Retail sales workers (except cashiers) (3.3%); Other sales and related occupations (including supervisors) (2.8%); Sales representatives, services, wholesale and manufacturing (2.8%); Other financial specialists (2.5%)

Earthquake Information

Scottsdale-area historical earthquake activity: 430% greater than the overall average for the U.S. but nearly average for Arizona.

Natural Disasters

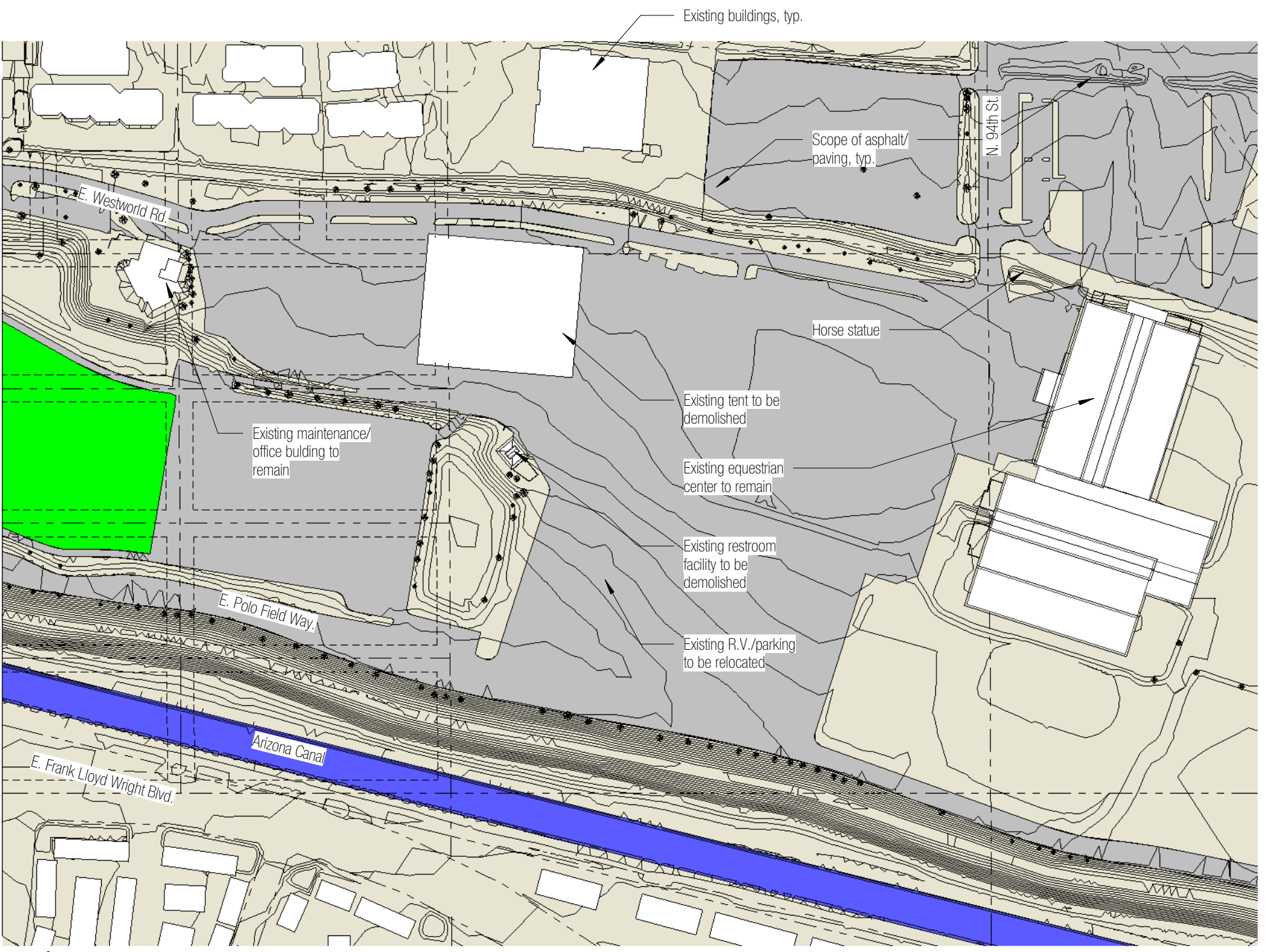
The number of natural disasters in Maricopa County (15) is near the US average (13). Major Disasters (Presidential) Declared: 11
 Emergencies Declared: 1 Causes of natural disasters: Floods: 10, Storms: 9, Fires: 3, Flash Flood: 1, Heavy Rain: 1, Hurricane: 1, Tornado: 1, Wind: 1. Some incidents may be counted in more than a single category.



Median Income Heat Map.¹

Sources:
 1. Scottsdale, Arizona. City-Data.com. Advameg, Inc. <http://www.city-data.com/city/Phoenix-Arizona.html>.
 2. US Census Bureau. "Metropolitan and Micropolitan Statistical Areas Totals: 2010-2019." The United States Census Bureau, March 26, 2020. <https://www.census.gov/data/tables/time-series/demo/popest/2010s-total-metro-and-micro-statistical-areas.html>.
 GEORGE F ROZANSKY

EXISTING SITE CONDITION SITE PLAN & CONTEXT PHOTOS



View from the Southeast



View from the Northeast



View from the Southwest



View from the Northwest (above), View of Horse Statue (right)

Master Site Development Plan

From a master plan view, the project is to redevelop part of the WestWorld property to expand the use and provide greater opportunities on-site, culturally, and better connect the community and the surrounding metropolitan region.

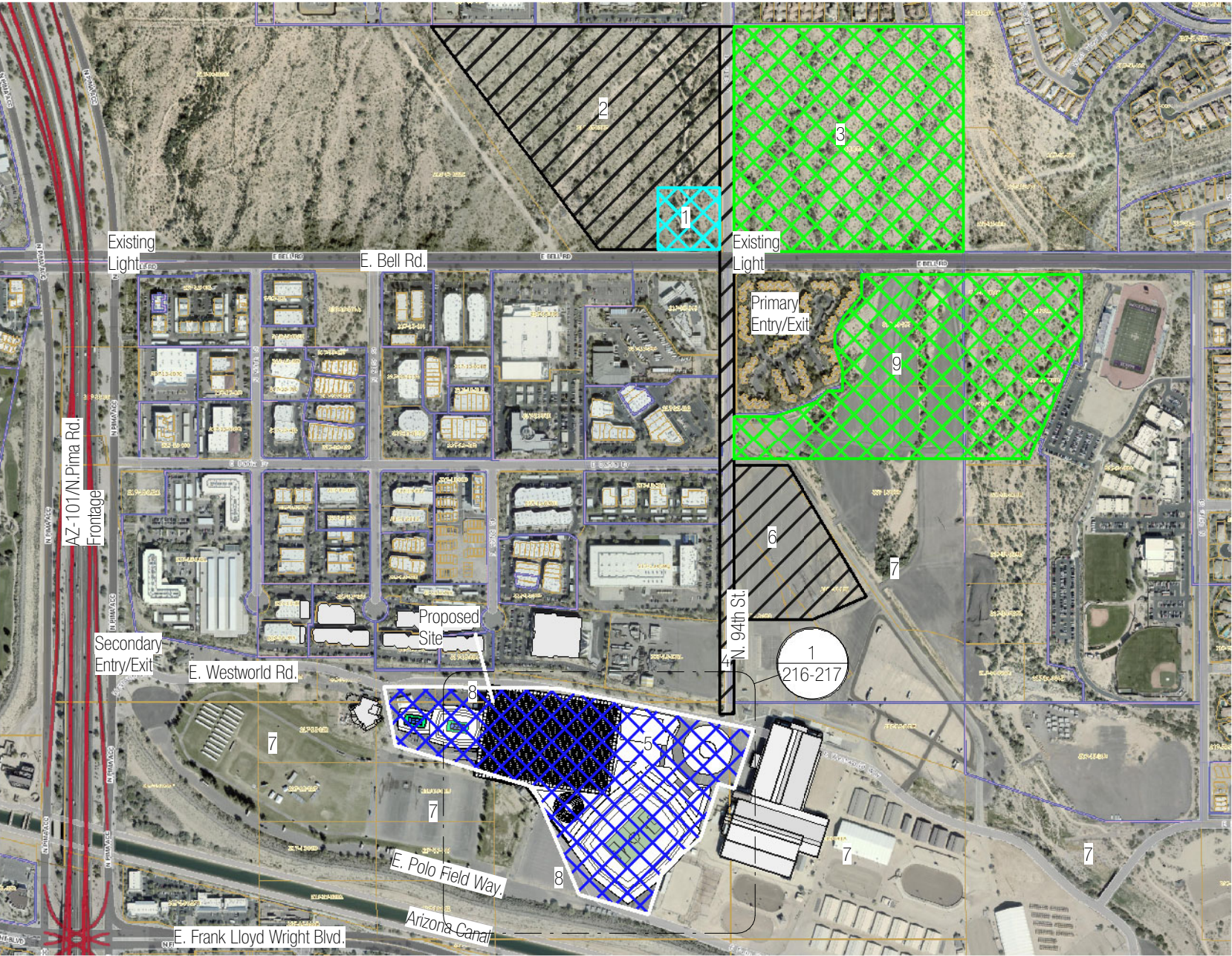
The property currently has an approximately 300,000 SF exhibition tent that is in the northwest corner of the proposed tennis training facility portion of the master plan. This spaced is being replaced by the proposed indoor soccer stadium/exhibition center to replace the existing programming with a modern modern facility that allows for expanded use than what the current facility provides.

The existing equestrian facilities, including the newer Tony Nelssen Equestrian Center by Populus, 2013, supporting equestrian facilities, and the RV camping areas, and parking make up the other functions of the eastern and southeastern portions of the property.

The indoor soccer stadium is located over an RV parking and hook-up area to be relocated per the item on the right. The restroom facility that supports this and the tent are to be relocated with the RV parking area.

The existing maintenance building and administration offices to the west are to replace as is the stables for the mounted police patrol west of the administration office, just inside the secondary entrance.

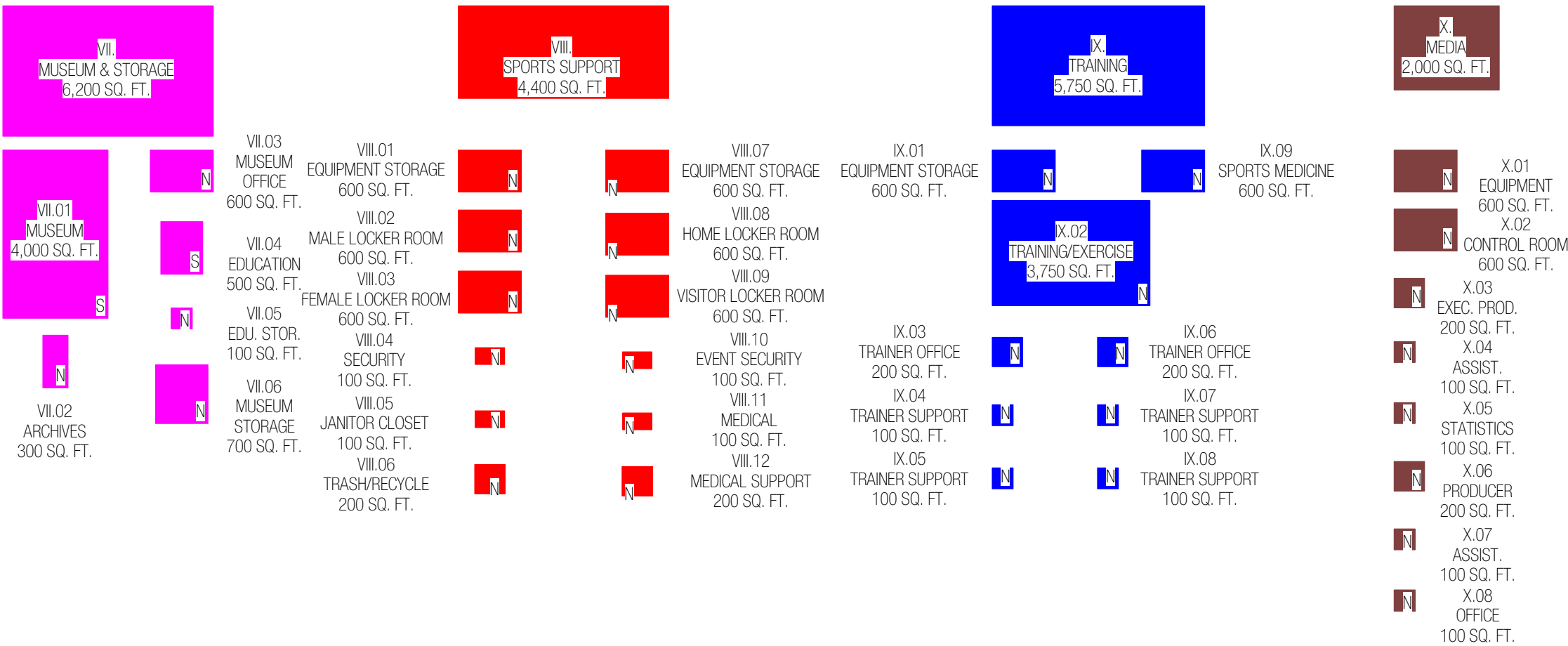
1. New transportation hub. Facilities include but not limited to access to buses and bus transfers, restrooms, secure bike storage and showers, carpool parking, and electric vehicle chargers. Solar panel covered and storage for use by structures and electric vehicle charging. Parking may also be used for surrounding businesses for events or as needed outside of the primary use for WestWorld of Scottsdale.
2. New multi-story parking garages with public gathering space and amenities including but not limited to restrooms, splash pad, and playground equipment. Parking garages may have some levels underground pending civil engineering/drainage analysis.
3. Undeveloped area to be dedicated as a natural preserve per Living Building Challenge Imperative.
4. Elevated and covered pedestrian walkway and tram service moving people from the parking garages to the proposed project area. Stations to be at either end. Trams to be electric/Maglev for noise reduction to the neighboring properties.
5. Proposed Project area that include the tennis training facility; indoor soccer stadium and exhibition center; indoor tennis, olympic swimming, and flex use stadium; and the semi-covered tennis and half-olympic swimming stadium, two plaza, and roundabout at the entry plaza for the tennis facility and the indoor soccer stadium and exhibition center.
6. Relocated RV parking/hookups dislocated by the new indoor soccer stadium and exhibition center. New WestWorld of Scottsdale entry and welcome signage/display.
7. Existing areas to remain as-is - potential for additional development in the future as needs of the equestrian center changes.
8. Delivery and parking areas for the new Proposed Project Area.
9. Area to be reclaimed as part of the Living Building Challenge Imperative and to restore the natural landscape with native and other non-noxious plants and natural features. These steps provides a natural, open space buffer between developments and assist the natural drainage. This developed area may be swapped with the area designated in item 2. In this area is where the community garden and education center is to be located. This is another Living Building Challenge Imperative item for certification.



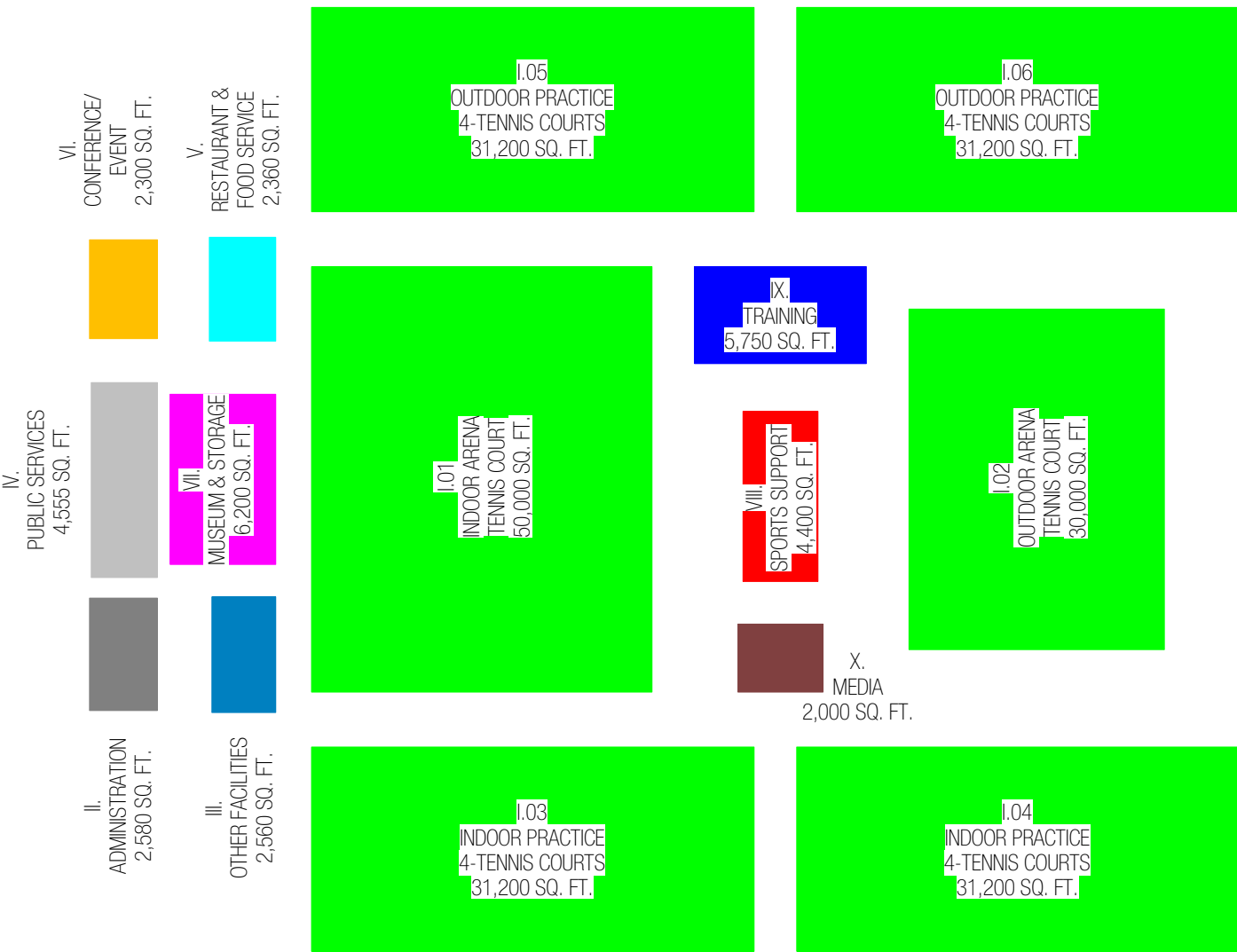
2 Master Site Development Plan
1" = 800'-0"

Aerial: Maricopa County Assessor's Office. "Parcel Visualization." Parcel Visualization. Maricopa County. <https://maps.mccassessor.maricopa.gov/>.

Program Diagrams



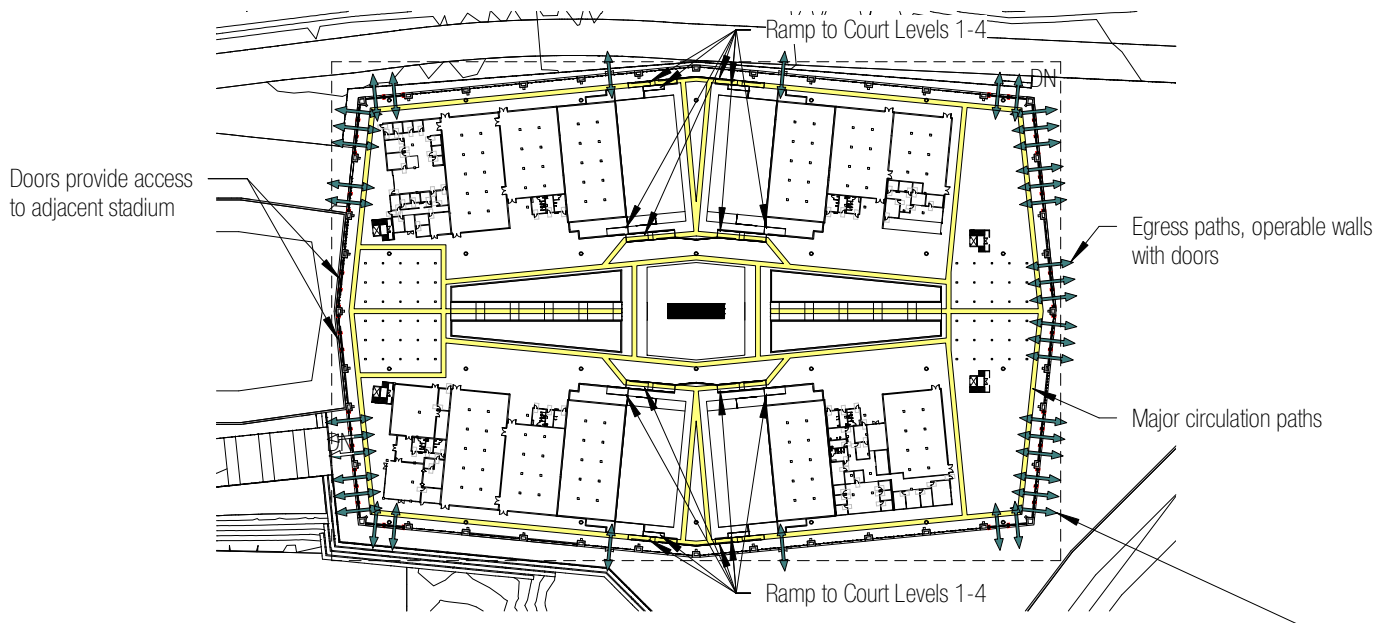
Adjacency Diagram



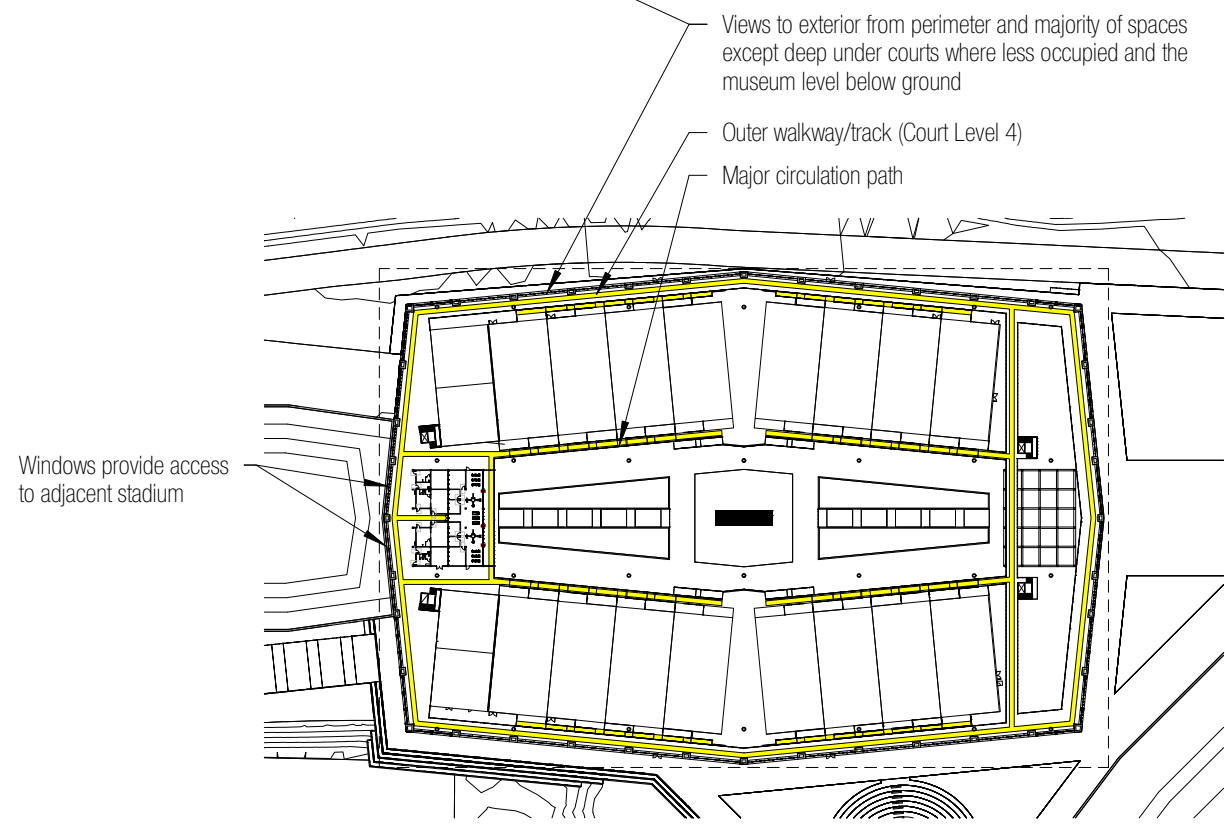
INDOOR AREA, SQ. FT.	
ADMINISTRATION	2,580
OTHER FACILITIES	2,560
PUBLIC SERVICES	4,555
RESTUARANT & FOOD SERVICE	2,360
CONFERENCE/EVENT	2,300
MUSEUM & STORAGE	6,200
SPORTS SUPPORT	4,400
TRAINING	5,750
MEDIA	2,000
SUBTOTAL	32,705
INDOOR ARENA	50,000
INDOOR COURTS	62,400
SUBTOTAL	112,400
TOTAL INDOOR	145,105
OUTDOOR AREA, SQ. FT.	
OUTDOOR ARENA	30,000
OUTDOOR COURTS	62,400
SUBTOTAL	92,400
TOTAL	237,505 SQ. FT.

Spatial Diagrams

Space Number	Programmed Spaces	Public	Semi-Public	Private	Below Ground	Ground Level	Above Ground
I.	Sports Courts		Green			Green	Green
II.	Administration	Grey		Grey		Grey	
III.	Other Facilities	Blue		Blue	Blue	Blue	Blue
IV.	Public Services	Light Grey		Light Grey		Light Grey	
V.	Restaurant & Food Service	Cyan	Cyan			Cyan	
VI.	Conference/Event	Orange	Orange			Orange	
VII.	Museum & Storage	Magenta	Magenta			Magenta	
VIII.	Support	Red	Red			Red	
IX.	Training			Blue			Blue
X.	Sports Stadiums (Master Plan Area)	Dark Green	Dark Green	Dark Green	Dark Green	Dark Green	Dark Green

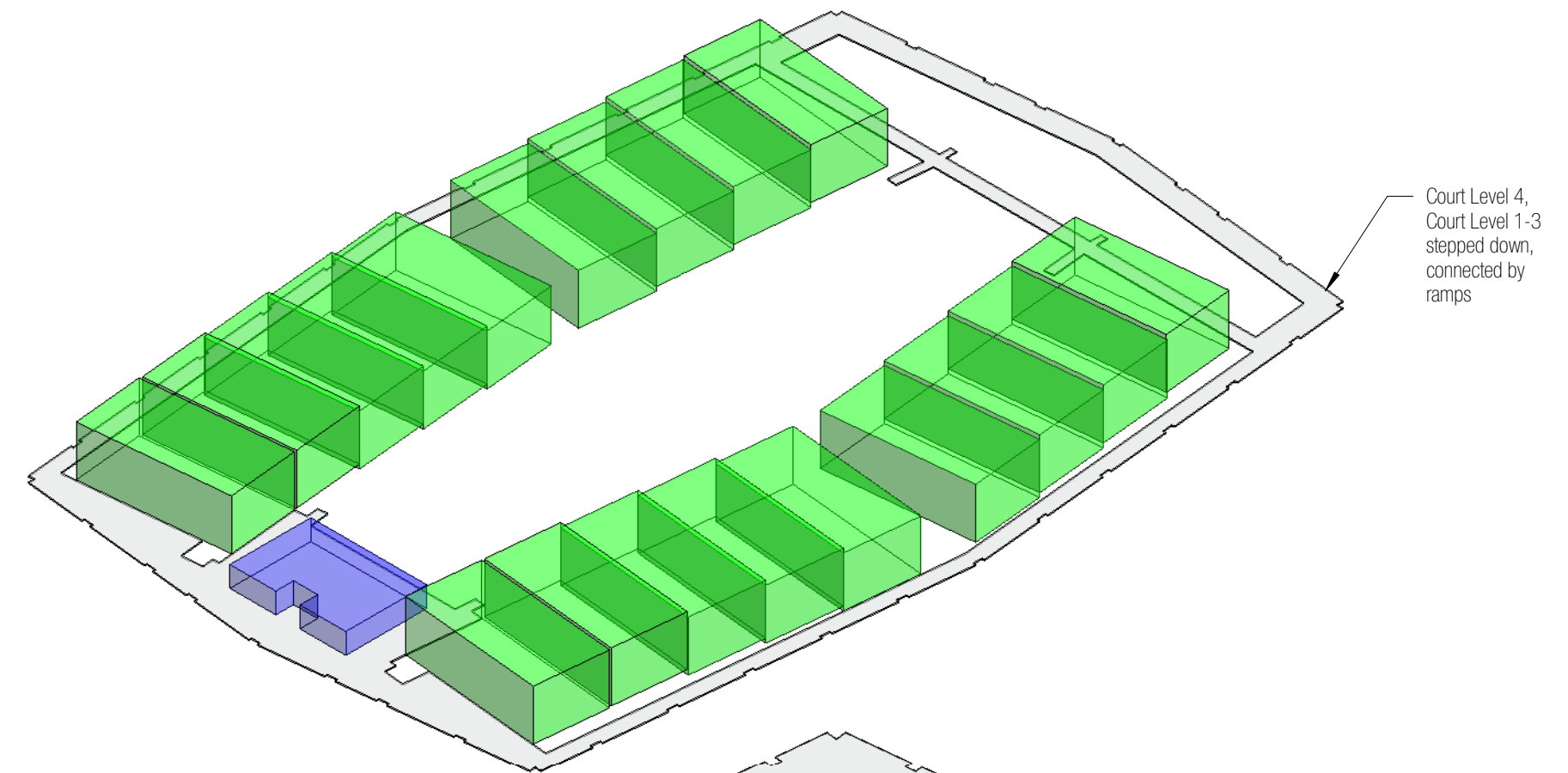
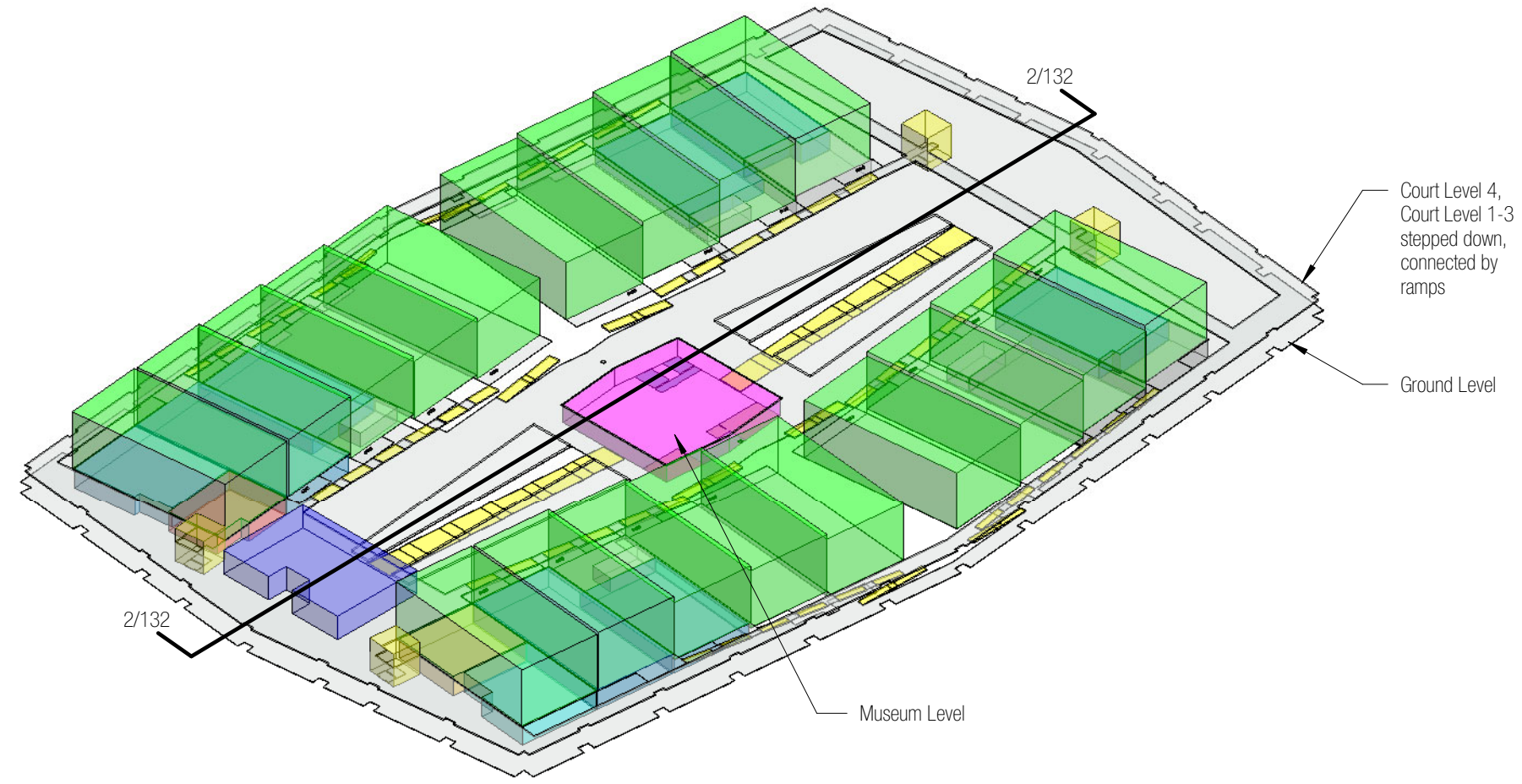


2 Ground Level - Egress/Circulation

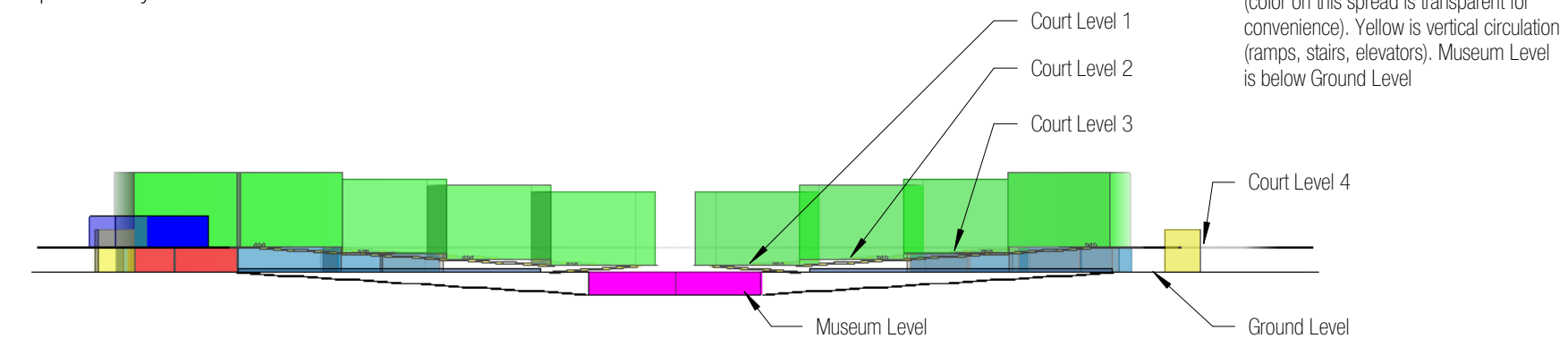


3 Court Level 1-4 - Views/Circulation

Spatial Diagrams

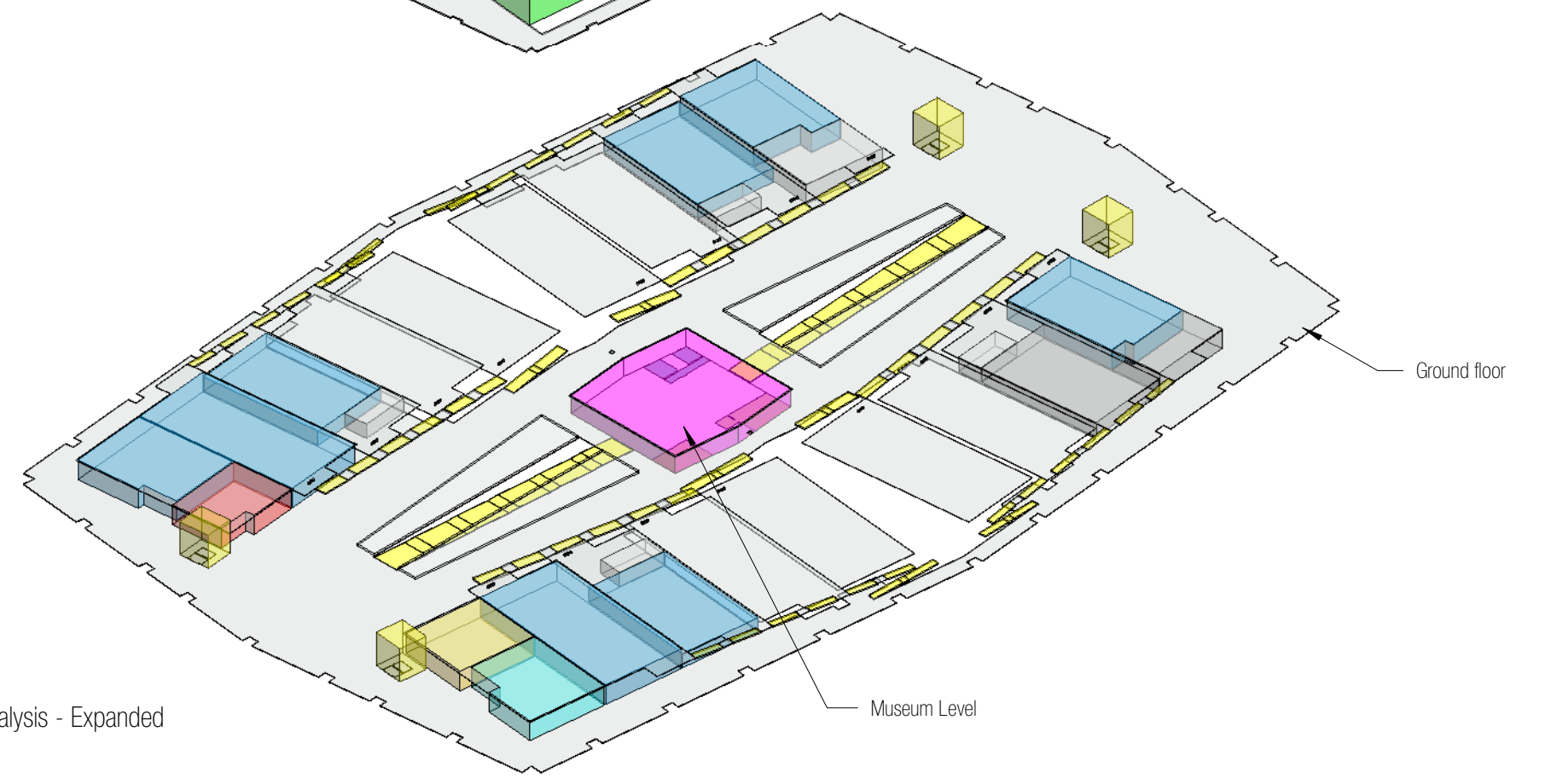


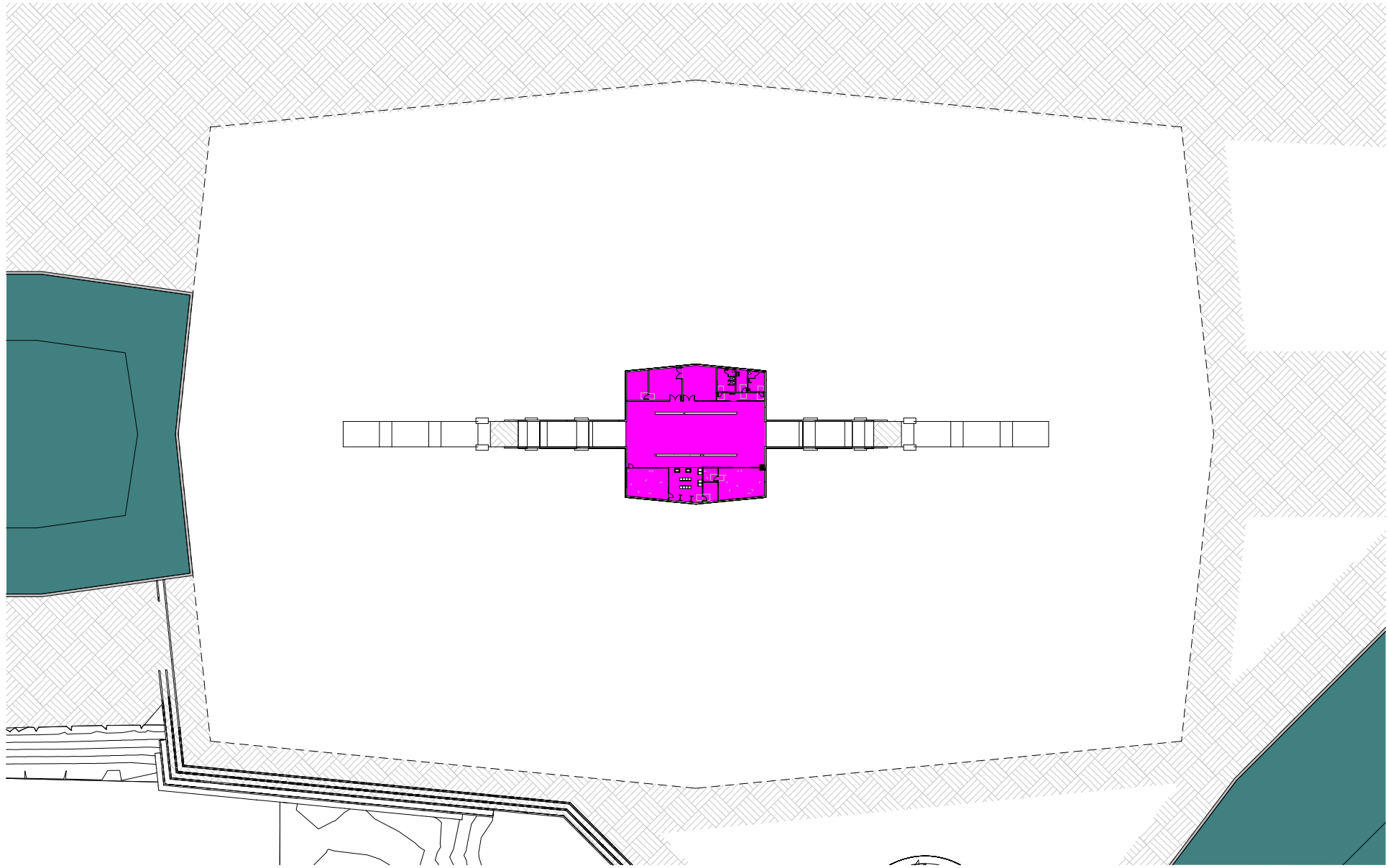
1 Spatial Analysis



2 Spatial Analysis - East-West Building Section

3 Spatial Analysis - Expanded





- Programmed Area
- Museum & Storage
 - Sports Stadium

0 25' 50' 100' 200'
SCALE: 1"=100'-0"

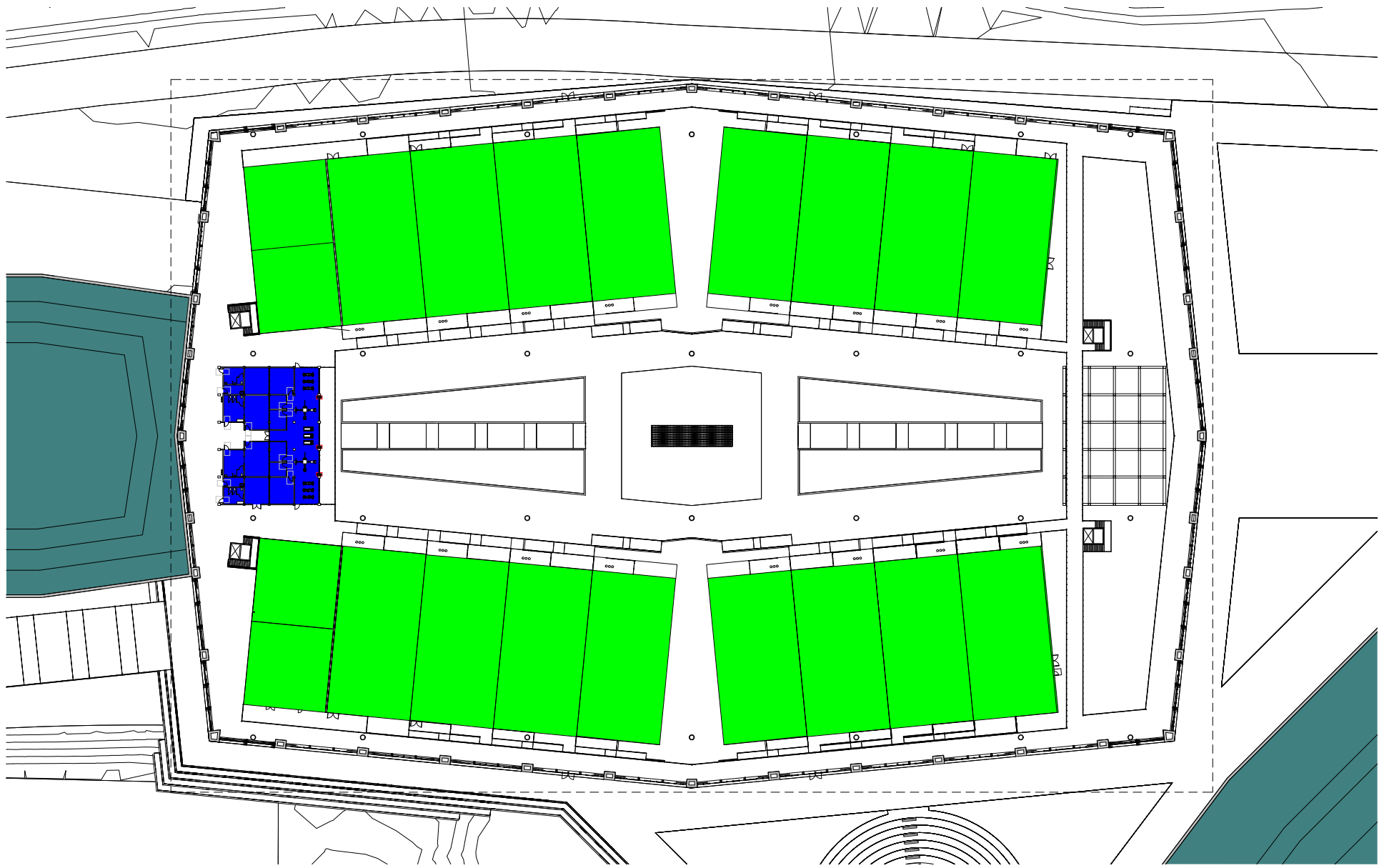
1 Museum Level - Spatial Analysis
1" = 100'-0"



- Programmed Area
- Administration
 - Conference/Event
 - Open Circulation
 - Other Facilities
 - Public Services
 - Restaurant & Food Service
 - Sports Courts
 - Sports Stadium
 - Support

0 25' 50' 100' 200'
SCALE: 1"=100'-0"

2 Ground Level - Spatial Analysis
1" = 100'-0"



- Programmed Area
- Open Circulation
 - Other Facilities
 - Sports Courts
 - Sports Stadium
 - Training

0 25' 50' 100' 200'
SCALE: 1"=100'-0"

1 Court Level 1-4 - Spatial Analysis
1" = 100'-0"

SPATIAL ANALYSIS

Program Summary

SPACE NUMBER	PROGRAMMED SPACES	AREA (SF)	HEIGHT (FT)	NOTES	VOLUME (CF)	SPACE NUMBER	PROGRAMMED SPACES	AREA (SF)	HEIGHT (FT)	NOTES	VOLUME (CF)	SPACE NUMBER	PROGRAMMED SPACES	AREA (SF)	HEIGHT (FT)	NOTES	VOLUME (CF)	SPACE NUMBER	PROGRAMMED SPACES	AREA (SF)	HEIGHT (FT)	NOTES	VOLUME (CF)		
I.	Site/Sports Program	204,800			5,746,000	IV.	Public Services	4,555			68,325	VIII.	Sports Support	4,400			66,000								
I.01	Indoor Arena	50,000	50		2,500,000	I.V.01	Entrance Lobby	800	15		12,000	VIII.01	Equipment Storage	600	15		9,000								
I.02	Outdoor Arena	30,000	Open (25' Stands)	Open Above	750,000	I.V.02	Ticket Sales & Shop	300	15		4,500	VIII.02	Male Locker Room	600	9	Open Above Ceiling	5,400								
I.03	Indoor Courts (4 Courts)	31,200	25		780,000	I.V.03	Shop Storage	75	9	Open Above Ceiling	675	VIII.03	Female Locker Room	600	9	Open Above Ceiling	5,400								
I.04	Indoor Courts (4 Courts)	31,200	25		780,000	I.V.04	Event Security	300	15		4,500	VIII.04	Security	100	15		1,500							6,240,485	
I.05	Outdoor Courts (4 Courts)	31,200	Open (15' Fence)	Open Above	468,000	I.V.05	Lockers	100	9	Open Above Ceiling	900	VIII.05	Janitor Closet	100	15		1,500							74,173	
I.06	Outdoor Courts (4 Courts)	31,200	Open (15' Fence)	Open Above	468,000	I.V.06	Toilet F	240	9	Open Above Ceiling	2,160	VIII.06	Trash/Recycle	200	15		3,000							6,314,658	
						I.V.07	Toilet M	280	9	Open Above Ceiling	2,520	VIII.07	Equipment Storage	600	15		9,000								
						I.V.08	ADA Restroom	60	9	Open Above Ceiling	540	VIII.08	Home Locker Room	600	9	Open Above Ceiling	5,400								
II.	Administration	2,580			30,960	I.V.09	Toilet F	600	15		9,000	VIII.09	Visitor Locker Room	600	9	Open Above Ceiling	5,400								
II.01	Open Office	250	12		3,000	I.V.10	Toilet M	600	15		9,000	VIII.10	Event Security	100	15		1,500								
II.02	Director	180	12		2,160	I.V.11	Toilet F	600	15		9,000	VIII.11	Medical	100	9	Open Above Ceiling	900								
II.03	Director	180	12		2,160	I.V.12	Toilet M	600	15		9,000	VIII.12	Medical Support	200	9	Open Above Ceiling	1,800								
II.04	Admin.	120	12		1,440	V.	Restaurant & Food Service	2,360			35,400	IX.	Training	5,750			115,000								
II.05	Admin.	120	12		1,440	V.01	Restaurant	1,400	15		21,000	IX.01	Equipment Storage	600	20		12,000								
II.06	Admin.	120	12		1,440	V.02	Prep. Kitchen	500	15		7,500	IX.02	Training/Exercise	3,750	9	Open Above Ceiling	33,750								
II.07	Admin.	120	12		1,440	V.03	Restaurant Storage	200	15		3,000	IX.03	Trainer Office	200	9	Open Above Ceiling	1,800								
II.08	Admin.	120	12		1,440	V.04	Staff Room	260	15		3,900	IX.04	Trainer Support	100	9	Open Above Ceiling	900								
II.09	Admin.	120	12		1,440							IX.05	Trainer Support	100	9	Open Above Ceiling	900								
II.10	Lounge/Break Room	400	12		4,800							IX.06	Trainer Office	200	9	Open Above Ceiling	1,800								
II.11	Print Room	100	12		1,200	VI.	Conference/Event	2,300			46,000	IX.07	Trainer Support	100	9	Open Above Ceiling	900								
II.12	Office Storage	200	12		2,400	VI.01	Conference	2,000	20		40,000	IX.08	Trainer Support	100	9	Open Above Ceiling	900								
II.13	Staff Facilities	250	12		3,000	VI.02	Auxiliary Room	150	20		3,000	IX.09	Sports Medicine	600	20		12,000								
II.14	Toilet F	150	12		1,800	VI.03	Chair Storage	150	20		3,000														
II.15	Toilet M	150	12		1,800	VII.	Museum & Storage	6,200			93,000	X.	Media	2,000			24,000								
III.	Other Facilities	2,560			51,200	VII.01	Museum	4,000	15		60,000	X.01	Equipment	600	12		7,200								
III.01	Mech./Elec.	800	20		16,000	VII.02	Museum Storage	700	15		10,500	X.02	Control Room	600	12		7,200								
III.02	Trash/Recycle	200	20		4,000	VII.03	Archives	300	15		4,500	X.03	Executive Producer	200	9	Open Above Ceiling	1,800								
III.03	Service Equip.	110	20		2,200	VII.04	Museum Office	600	15		9,000	X.04	Assistant	100	9	Open Above Ceiling	900								
III.04	Storage	100	20		2,000	VII.05	Education	500	15		7,500	X.05	Statistics	100	9	Open Above Ceiling	900								
III.05	Cleaning	100	20		2,000	VII.06	Education Storage	100	15		1,500	X.06	Producer	200	9	Open Above Ceiling	1,800								
III.06	Security	100	20		2,000	VII.07	Toilet F	150	9	Open Above Ceiling	1,350	X.07	Assistant	100	9	Open Above Ceiling	900								
III.07	Shipping	300	20		6,000	VII.08	Toilet M	150	9	Open Above Ceiling	1,350	X.08	Office	100	9	Open Above Ceiling	900								
III.08	Receiving	500	20		10,000																				
III.09	Handling	200	20		4,000																				
III.10	Toilet F	100	9	Open Above Ceiling	900																				
III.11	Toilet M	100	9	Open Above Ceiling	900																				

Zoning^{1,2}

Parcel Numbers:	Please see page 67, this booklet	Accessibility:	Fully accessible.
Project Address:	16601 N. Pima Rd., Scottsdale, AZ 85260	Lot sizes, etc.:	Please see page 67, this booklet
Current Use:	Mixed-use - equestrian center, exhibition center, park, RV camping, special events	Setbacks:	Front yard - 0' Side yard - 300', some exceptions Rear yard - 300', some exceptions
Proposed Use:	Commercial	Lot Coverage:	40% maximum plus 10% for parking canopies or structure
Governing Agencies:	United States Bureau of Reclamation Arizona State Land Trust (Master Plan Area) City of Scottsdale, Arizona Maricopa County, Arizona State of Arizona	FAR:	Limited to eight-hundredths (0.08) of the net lot area
Building Codes:	2015 International Building Code (IBC) 2014 National Electrical Code (NEC) 2015 International Mechanical Code (IMC) 2015 International Plumbing Code (IPC) 2015 International Fire Code 2015 International Fuel Gas Code (IFGC) 2015 International Energy Conservation Code (IECC) 2015 International Existing Building Code (IEBC) 2015 International Green Building Code (IGBC) City of Scottsdale Amendments Maricopa County Environmental Health Code 2010 ADA Standards for Accessible Design	Volume Limit:	Limited to the net lot area in square feet multiplied by ninety-six-hundredths (0.096) feet for any building
Current Zoning:	Western Theme Park (WP)	Required Open Space:	
		Total open space	Minimum: 0.10 multiplied by the net lot area
		Total open space is distributed as follows:	Frontage open space minimum: 0.50 multiplied by the required total open space The remainder of the total open space, less the frontage open space, shall be common open space
			Parking areas and parking lot landscaping are not included in the required open space
			NAOS may be applied towards the required open space

Design Criteria²

Height limits:	No building shall exceed 36 feet in height except as allowed in Article VII or approved otherwise by the city council or approved development plan
Zoning Regulations:	City of Scottsdale Zoning Ordinance
Current Zoning Use Map:	Please see page 70, this booklet.
Special Use:	See zoning map
Historical Preservation:	See zoning map
Sign District:	See zoning map
Environment Health:	Maricopa County
Spinklered:	Yes

Climatic and Geographic Design Criteria - 2015 IBC

Ground snow load:	N/A
Wind Speed(mph):	120
Seismic Design Category:	Engineer to calculate
Frost line depth:	0
Termite:	Moderate to heavy
Winter design temperature:	34F
Flood Hazards:	See city code
Mean annual temperature:	71.2F

Sources:
 1. Maricopa County Assessor's Office. "Parcel Visualization." Parcel Visualization. Maricopa County. <https://maps.mccassessor.maricopa.gov/>.
 2. "Building Code Information." City of Scottsdale - Building Code Information. City of Scottsdale. Accessed May 11, 2020. <https://www.scottsdaleaz.gov/codes/building-code>.

Occupancy Loads

Occupant Loads - Sports Stadium

Department	Number	Name	Occupancy	Area	Load Factor	Occupant Load	Exit Width Required
Sports Stadium	X.01	Indoor Soccer Stadium		308,524 SF			
Sports Stadium	X.02	Indoor Tennis Stadium		64,455 SF			
Sports Stadium	X.03	Outdoor Tennis Stadium		23,247 SF			
				396,227 SF		0	0.0 in

Occupant Loads - Open Circulation

Department	Number	Name	Occupancy	Area	Load Factor	Occupant Load	Exit Width Required
Open Circulation	0.00	Open Circulation	ACC.	212,651 SF			
				212,651 SF		0	0.0 in

Occupant Loads - Sports Courts

Department	Number	Name	Occupancy	Area	Load Factor	Occupant Load	Exit Width Required
Sports Courts	I.01	North Tennis Court 1	A-3	7,426 SF	100 SF	75	15.0 in
Sports Courts	I.02	North Tennis Court 2	A-3	7,426 SF	100 SF	75	15.0 in
Sports Courts	I.03	North Tennis Court 3	A-3	7,441 SF	100 SF	75	15.0 in
Sports Courts	I.04	North Tennis Court 4	A-3	7,441 SF	100 SF	75	15.0 in
Sports Courts	I.05	North Tennis Court 5	A-3	7,442 SF	100 SF	75	15.0 in
Sports Courts	I.06	North Tennis Court 6	A-3	7,442 SF	100 SF	75	15.0 in
Sports Courts	I.07	North Tennis Court 7	A-3	7,566 SF	100 SF	76	15.2 in
Sports Courts	I.08	North Tennis Court 8	A-3	7,444 SF	100 SF	75	15.0 in
Sports Courts	I.09	South Tennis Court 1	A-3	7,426 SF	100 SF	75	15.0 in
Sports Courts	I.10	South Tennis Court 2	A-3	7,426 SF	100 SF	75	15.0 in
Sports Courts	I.11	South Tennis Court 3	A-3	7,459 SF	100 SF	75	15.0 in
Sports Courts	I.12	South Tennis Court 4	A-3	7,439 SF	100 SF	75	15.0 in
Sports Courts	I.13	South Tennis Court 5	A-3	7,442 SF	100 SF	75	15.0 in
Sports Courts	I.14	South Tennis Court 6	A-3	7,418 SF	100 SF	75	15.0 in
Sports Courts	I.15	South Tennis Court 7	A-3	7,566 SF	100 SF	76	15.2 in
Sports Courts	I.16	South Tennis Court 8	A-3	7,444 SF	100 SF	75	15.0 in
Sports Courts	I.17	Backboard Court 1	A-3	3,658 SF	100 SF	37	7.4 in
Sports Courts	I.18	Backboard Court 2	A-3	3,659 SF	100 SF	37	7.4 in
Sports Courts	I.19	Backboard Court 3	A-3	3,660 SF	100 SF	37	7.4 in
Sports Courts	I.20	Backboard Court 4	A-3	3,660 SF	100 SF	37	7.4 in
				133,884 SF		1350	270.0 in

Occupant Loads - Administration

Department	Number	Name	Occupancy	Area	Load Factor	Occupant Load	Exit Width Required
Administration	II.01	Lobby/Reception	B	519 SF	15 SF	35	7.0 in
Administration	II.02	Admin. Corridor	ACC.	1,589 SF			
Administration	II.03	Lounge/Break Room	A-2	321 SF	15 SF	22	4.4 in
Administration	II.04	Storage	S-1	294 SF	300 SF	1	0.2 in
Administration	II.05	F Toilet	ACC.	234 SF			
Administration	II.06	Janitor	B	140 SF	300 SF	1	0.2 in
Administration	II.07	M Toilet	ACC.	210 SF			
Administration	II.08	Bicycle Storage	S-1	220 SF	300 SF	1	0.2 in
Administration	II.09	Staff Facilities	ACC.	226 SF			
Administration	II.10	Open Office	B	1,057 SF	100 SF	11	2.2 in
Administration	II.11	Admin.	B	114 SF	100 SF	2	0.4 in
Administration	II.12	Admin.	B	118 SF	100 SF	2	0.4 in
Administration	II.13	Admin.	B	124 SF	100 SF	2	0.4 in
Administration	II.14	Admin.	B	124 SF	100 SF	2	0.4 in
Administration	II.15	Admin.	B	118 SF	100 SF	2	0.4 in
Administration	II.16	Admin.	B	118 SF	100 SF	2	0.4 in
Administration	II.17	Print Room	B	113 SF	100 SF	2	0.4 in
Administration	II.18	Office Supply Storage	S-1	116 SF	300 SF	1	0.2 in
Administration	II.19	Waiting Area	B	281 SF	100 SF	3	0.6 in
Administration	II.20	Director	B	222 SF	100 SF	3	0.6 in
Administration	II.21	Director	B	223 SF	100 SF	3	0.6 in
Administration	II.22	Conference Room	A-2	491 SF	15 SF	33	6.6 in
				6,971 SF		128	25.6 in

Occupant Loads - Other Facilities

Department	Number	Name	Occupancy	Area	Load Factor	Occupant Load	Exit Width Required
Other Facilities	III.01	Service Equip.	B	103 SF	300 SF	1	0.2 in
Other Facilities	III.02	Trash/Recycle	B	101 SF	300 SF	1	0.2 in
Other Facilities	III.03	Shipping	B	323 SF	100 SF	4	0.8 in
Other Facilities	III.04	Handling	B	148 SF	100 SF	2	0.4 in
Other Facilities	III.05	Janitor	B	109 SF	300 SF	1	0.2 in
Other Facilities	III.06	Security	B	109 SF	100 SF	2	0.4 in
Other Facilities	III.07	Receiving	B	258 SF	100 SF	3	0.6 in
Other Facilities	III.08	Mech./Elec. - Northeast	S-1	5,396 SF	300 SF	18	3.6 in
Other Facilities	III.09	Storage	S-1	92 SF	300 SF	1	0.2 in
Other Facilities	III.10	F Toilet	ACC.	101 SF			
Other Facilities	III.11	M Toilet	ACC.	101 SF			
Other Facilities	III.12	Dock/Storage	S-1	2,594 SF	300 SF	9	1.8 in
Other Facilities	III.13	Mech./Elec. - Northwest	S-1	7,164 SF	300 SF	24	4.8 in
Other Facilities	III.14	Mech./Elec. - Southwest	S-1	7,164 SF	300 SF	24	4.8 in
Other Facilities	III.15	Storage - Southwest	S-2	5,397 SF	300 SF	18	3.6 in
Other Facilities	III.16	Storage - Northwest	S-2	5,397 SF	300 SF	18	3.6 in
Other Facilities	III.17	Storage - Northeast	S-2	4,403 SF	300 SF	15	3.0 in
Other Facilities	III.18	Mech./Elec. - Southeast	S-1	5,218 SF	300 SF	18	3.6 in
				44,176 SF		159	31.8 in

Occupancy Loads

Occupant Loads - Public Services

Department	Number	Name	Occupancy	Area	Load Factor	Occupant Load	Exit Width Required
Public Services	IV.01	Entrance Lobby	B	722 SF	15 SF	49	9.8 in
Public Services	IV.02	Ticket Sales & Shop	M	596 SF	60 SF	10	2.0 in
Public Services	IV.03	Shop Storage	S-1	214 SF	300 SF	1	0.2 in
Public Services	IV.04	Security	B	275 SF	100 SF	3	0.6 in
Public Services	IV.05	Lockers	B	177 SF	50 SF	4	0.8 in
Public Services	IV.06	F Toilet	ACC.	135 SF			
Public Services	IV.07	M Toilet	ACC.	111 SF			
Public Services	IV.08	Locker Storage	B	101 SF	50 SF	3	0.6 in
Public Services	IV.09	F Toilet	ACC.	234 SF			
Public Services	IV.10	Public Services Corridor		331 SF			
Public Services	IV.11	Janitor	B	136 SF	300 SF	1	0.2 in
Public Services	IV.12	M Toilet	ACC.	210 SF			
Public Services	IV.13	F Toilet	ACC.	244 SF			
Public Services	IV.14	Janitor	B	136 SF	300 SF	1	0.2 in
Public Services	IV.15	M Toilet	ACC.	211 SF			
Public Services	IV.16	F Toilet	ACC.	234 SF			
Public Services	IV.17	Janitor	B	136 SF	300 SF	1	0.2 in
Public Services	IV.18	M Toilet	ACC.	210 SF			
Public Services	IV.19	F Toilet	ACC.	234 SF			
Public Services	IV.20	Janitor	B	136 SF	300 SF	1	0.2 in
Public Services	IV.21	M Toilet	ACC.	210 SF			
				4,992 SF		74	14.8 in

Occupant Loads - Restaurant & Food Service

Department	Number	Name	Occupancy	Area	Load Factor	Occupant Load	Exit Width Required
Restaurant & Food Service	V.01	Restaurant Lobby	A-2	664 SF	15 SF	45	9.0 in
Restaurant & Food Service	V.02	Restaurant	A-2	1,492 SF	15 SF	100	20.0 in
Restaurant & Food Service	V.03	Prep. Kitchen	B	473 SF	200 SF	3	0.6 in
Restaurant & Food Service	V.04	Restaurant Storage	B	100 SF	300 SF	1	0.2 in
Restaurant & Food Service	V.05	Staff Room	B	309 SF	15 SF	21	4.2 in
Restaurant & Food Service	V.06	F Toilet	ACC.	191 SF			
Restaurant & Food Service	V.07	Janitor	B	115 SF	300 SF	1	0.2 in
Restaurant & Food Service	V.08	M Toilet	ACC.	172 SF			
				3,517 SF		171	34.2 in

Occupant Loads - Conference/Event

Department	Number	Name	Occupancy	Area	Load Factor	Occupant Load	Exit Width Required
Conference/Event	VI.01	Conference	A-2	2,362 SF	15 SF	158	31.6 in
Conference/Event	VI.02	Auxiliary Room	B	263 SF	100 SF	3	0.6 in
Conference/Event	VI.03	Chair Storage	S-1	350 SF	300 SF	2	0.4 in
				2,975 SF		163	32.6 in

Occupant Loads - Museum

Department	Number	Name	Occupancy	Area	Load Factor	Occupant Load	Exit Width Required
Museum & Storage	VII.01	Museum	A-3	4,856 SF	30 SF	162	32.4 in
Museum & Storage	VII.02	Archives	S-2	324 SF	300 SF	2	0.4 in
Museum & Storage	VII.03	Museum Storage	S-2	548 SF	300 SF	2	0.4 in
Museum & Storage	VII.04	F Toilet	ACC.	218 SF			
Museum & Storage	VII.05	Janitor	B	126 SF	300 SF	1	0.2 in
Museum & Storage	VII.06	M Toilet	ACC.	173 SF			
Museum & Storage	VII.07	Education	B	743 SF	20 SF	38	7.6 in
Museum & Storage	VII.08	Museum Office	B	662 SF	100 SF	7	1.4 in
Museum & Storage	VII.09	Education Storage	ACC.	105 SF			
Museum & Storage	VII.10	Museum Shop	M	603 SF	60 SF	11	2.2 in
Museum & Storage	VII.11	Museum Shop Storage	M	145 SF	300 SF	1	0.2 in
Museum & Storage	VII.12	Museum Staging	B	600 SF	300 SF	2	0.4 in
				9,102 SF		226	45.2 in

Occupant Loads - Support

Department	Number	Name	Occupancy	Area	Load Factor	Occupant Load	Exit Width Required
Support	VIII.01	Check-In/Waiting	B	181 SF	15 SF	13	2.6 in
Support	VIII.02	Support Corridor	ACC.	593 SF			
Support	VIII.04	Equipment Storage	S-1	474 SF	300 SF	2	0.4 in
Support	VIII.05	Medical Support	B	183 SF	100 SF	2	0.4 in
Support	VIII.06	Trash/Recycle	B	176 SF	300 SF	1	0.2 in
Support	VIII.07	Security	B	160 SF	100 SF	2	0.4 in
Support	VIII.08	Event Security	B	153 SF	100 SF	2	0.4 in
Support	VIII.15	Medical	B	151 SF	100 SF	2	0.4 in
Support	VIII.16	F Toilet	ACC.	97 SF			
Support	VIII.17	Janitor	B	96 SF	300 SF	1	0.2 in
Support	VIII.18	M Toilet	ACC.	97 SF			
				2,361 SF		25	5.0 in

Occupant Loads - Training

Department	Number	Name	Occupancy	Area	Load Factor	Occupant Load	Exit Width Required
Training	IX.01	Training/Exercise	A-3	2,185 SF	50 SF	44	8.8 in
Training	IX.02	Sports Medicine	B	344 SF	100 SF	4	0.8 in
Training	IX.03	Female Locker Room	B	442 SF	50 SF	9	1.8 in
Training	IX.04	Male Locker Room	B	447 SF	50 SF	9	1.8 in
Training	IX.05	North Equipment Storage	S-1	342 SF	300 SF	2	0.4 in
Training	IX.06	Trainer Office	B	174 SF	100 SF	2	0.4 in
Training	IX.07	Trainer Support	B	124 SF	100 SF	2	0.4 in
Training	IX.08	Training Equipment	S-1	344 SF	300 SF	2	0.4 in
Training	IX.09	South Equipment Storage	S-1	342 SF	300 SF	2	0.4 in
Training	IX.10	Trainer Office	B	171 SF	100 SF	2	0.4 in
Training	IX.11	Trainer Support	B	124 SF	100 SF	2	0.4 in
Training	IX.12	F Toilet - South Training	ACC.	176 SF			
Training	IX.13	Janitor - South Training	B	98 SF	300 SF	1	0.2 in
Training	IX.14	M Toilet - South Training	ACC.	285 SF			
Training	IX.15	F Toilet - North Training	ACC.	285 SF			
Training	IX.16	Janitor - North Training	B	98 SF	300 SF	1	0.2 in
Training	IX.17	M Toilet - North Training	ACC.	176 SF			
				6,157 SF		82	16.4 in

Egress & Plumbing Calculations

Building Summary

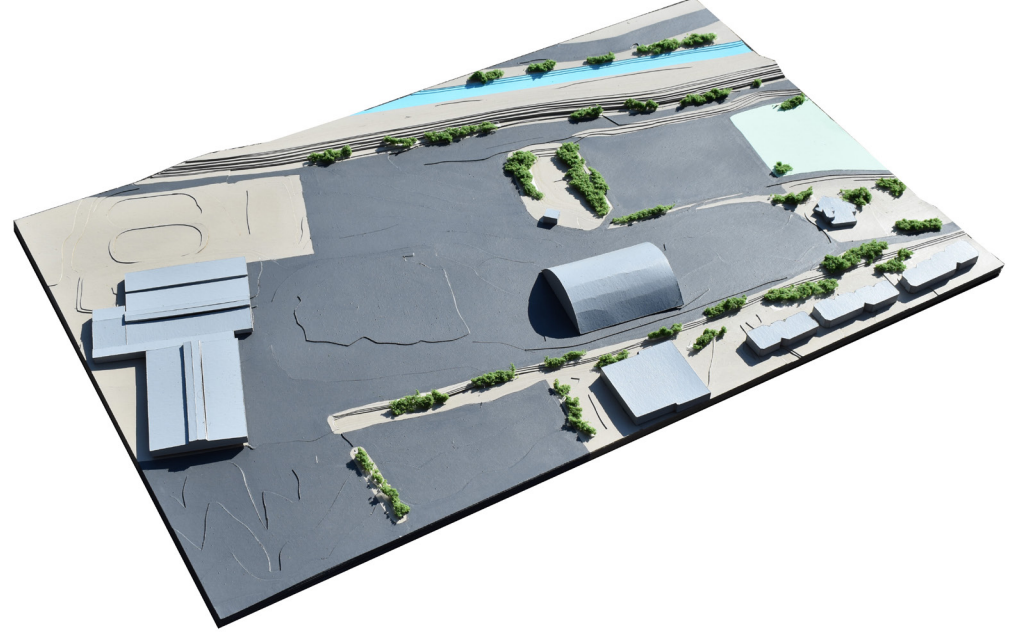
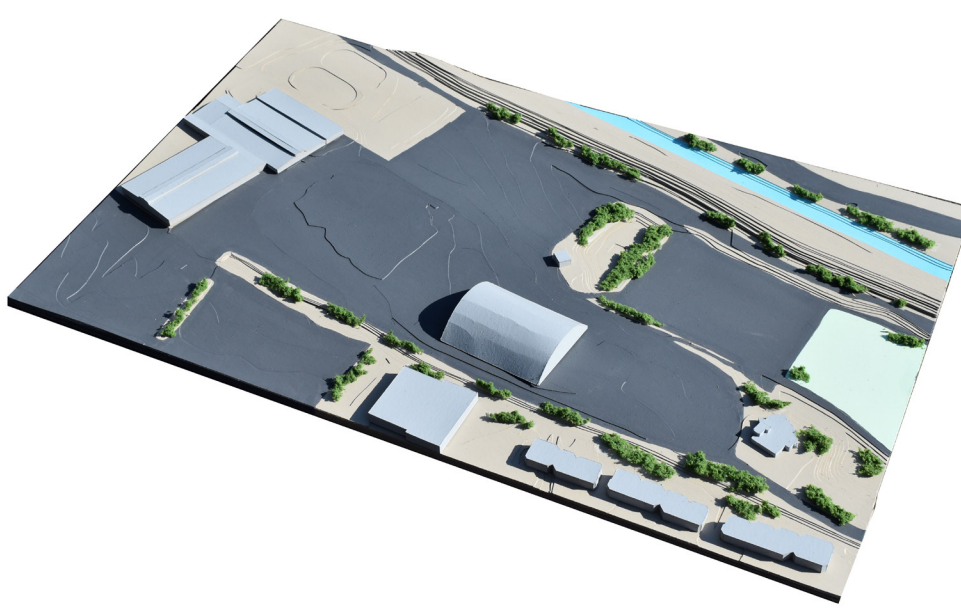
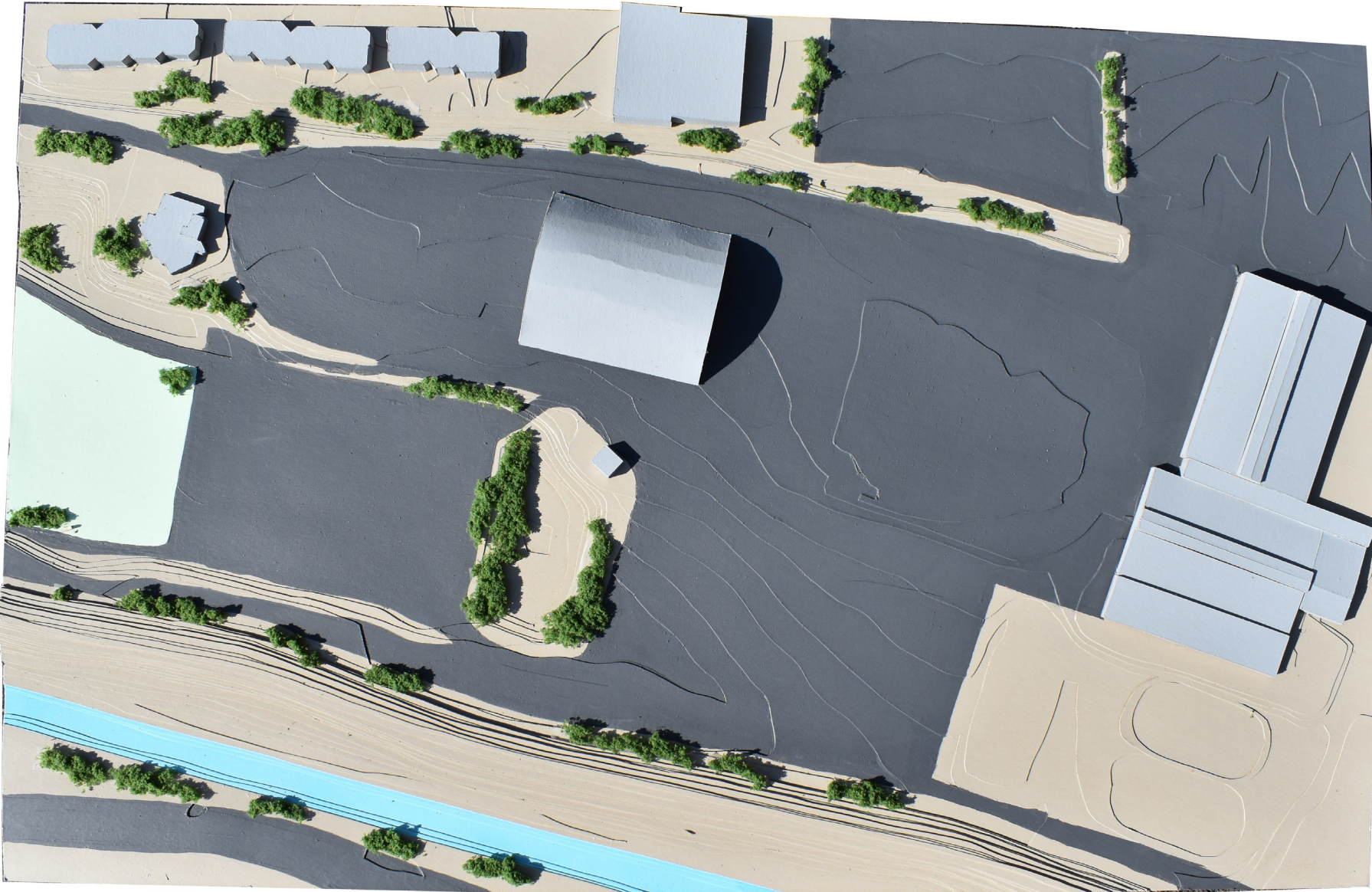
Construction Type:	I-A
Sprinkler:	Fully Sprinklered
Occupancy Type:	A-3
	Includes A-2 - Indoor A-3 - Indoor B - Offices M - Retail S-1 - Storage S-2 - Storage
Building Height:	67' - 4" +/-
Lot Coverage:	345,507 SF (14.4%, Tennis Facility, Proposed Project Area)

Egress Information

TOTAL OCCUPANTS:	2,380
NUMBER OF EXITS REQUIRED:	5
NUMBER OF EXITS PROVIDED:	9 (6 MAIN)
EXIT WIDTH REQUIRED:	476"
EXIT WIDTH PROVIDED:	1,530" > 484"
DOORS IN OPERABLE WALLS	
EXIT (MAIN, EAST) - 34" X 6	204"
EXIT (NORTH) - 34" X 4	136"
EXIT (EAST) - 34" X 12	408"
EXIT (SOUTH) - 34" X 4	136"
EXIT (WEST) - 34" X 11	374"
DOUBLE DOORS	
EXIT (NORTH) - 68" X 2	136"
EXIT (SOUTH) - 68" X 2	136"
MAXIMUM TRAVEL DISTANCE: (SPRINKLERED)	250'
MAXIMUM TRAVEL DISTANCE: (PROVIDED, COMMON PATH)	228' - 0"
BUILDING DIAGONAL:	833' - 3"
1/3 DISTANCE: (MAXIMUM DISTANCE BETWEEN EXITS)	277' - 9"
MAXIMUM EXIT DISTANCE: (PROVIDED)	219' - 6"

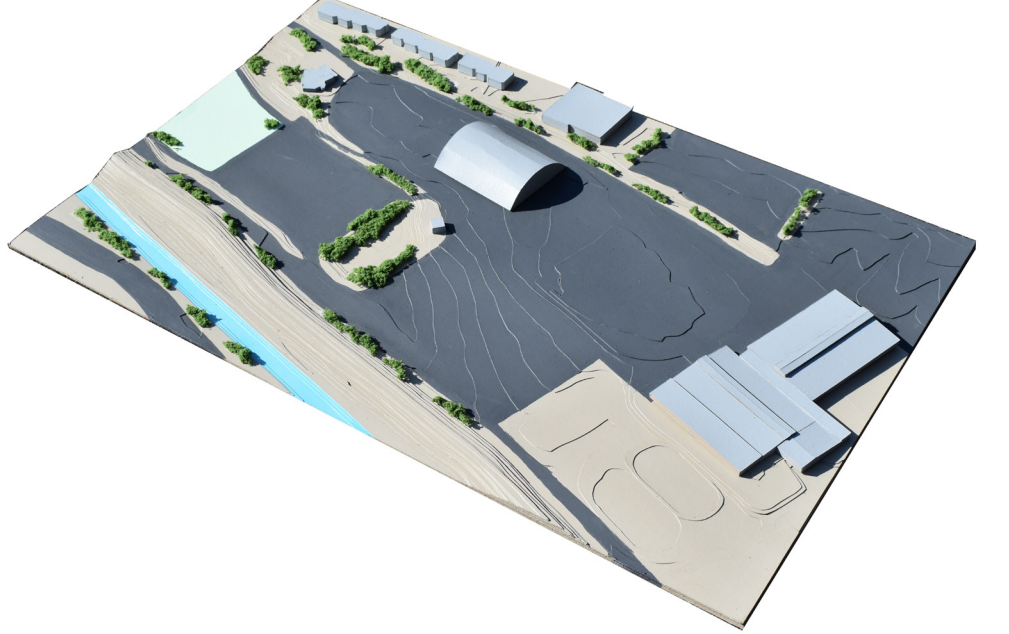
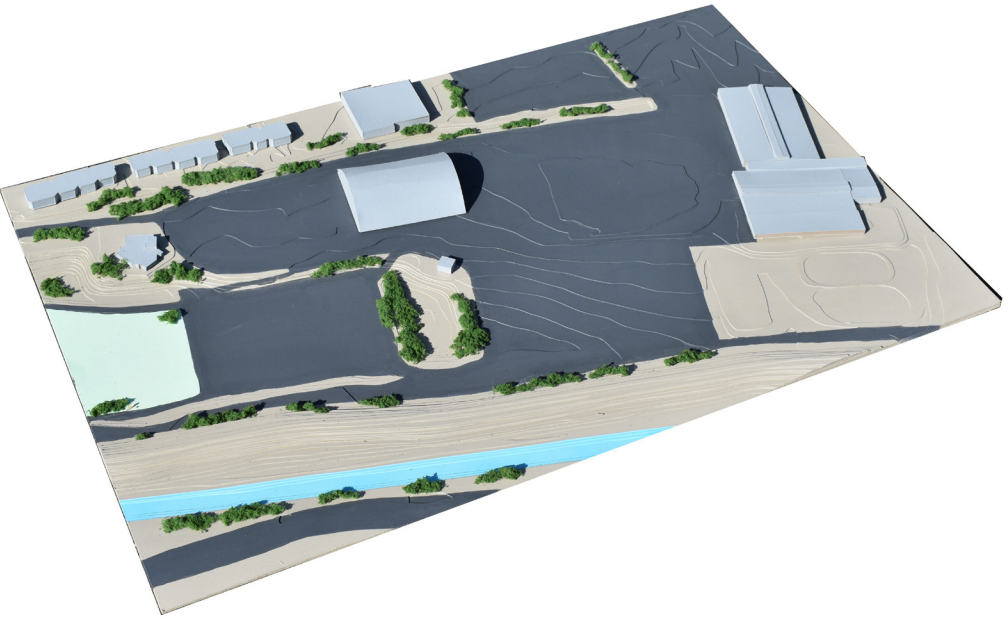
Plumbing Fixture Requirements

OCCUPANCY:	A-3	
OCCUPANCY LOAD:	2,380	1,190 MALE / 1,190 FEMALE
FIXTURES	REQUIRED M, REQUIRED F	PROVIDED M, PROVIDED F
WATER CLOSETS	1 PER 125 (10), 1 PER 65 (19)	10, 29
LAVATORIES	1 PER 200 (6), (6)	10, 23
DRINKING FOUNTAINS	1 PER 500 (3)	9 (HIGH/LO)
SERVICE SINKS	1	8



Northwest Bird's-Eye View

Northeast Bird's-Eye View



Southwest Bird's-Eye View

Southeast Bird's-Eye View

Aerial



Physical Site Model - 1/64" = 1'-0", 2' Contours
 Material: 1/32" Chipboard Chipboard Base.
 Sand Color: Krylon, Fusion All-In-One, Matte River Rock
 Road Color: Artist's Loft, Acrylic, Academic Level, Grey
 Exist. Bldg. Color: Rust-Oleum, Painter's Touch 2x Paint Cover, Flat Gray Primer

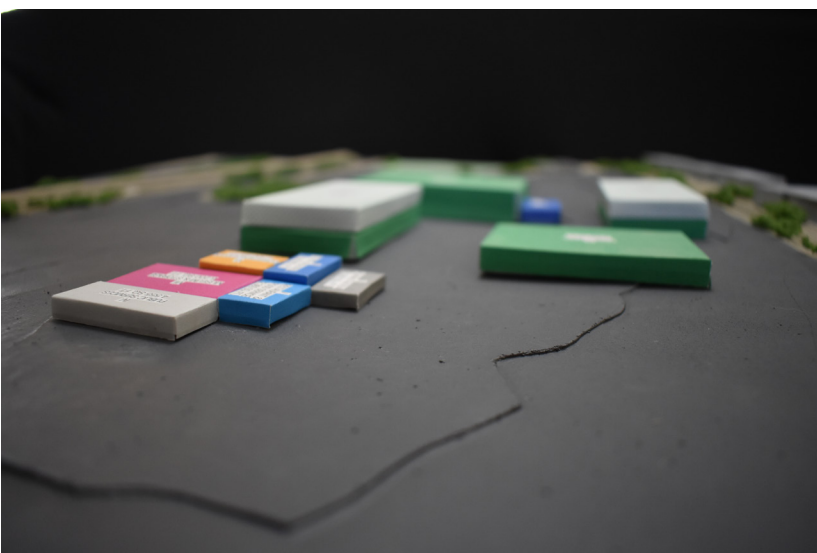
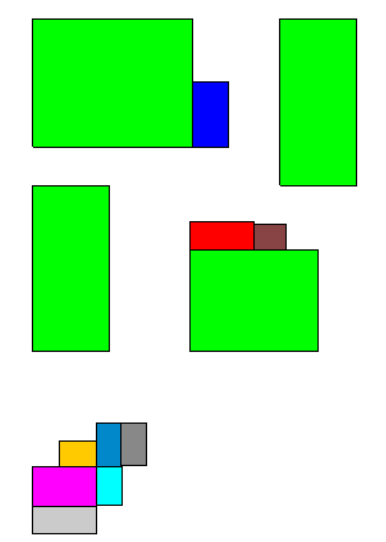
Grass Color: Rust-Oleum, Painter's Touch 2x Paint Cover, Gloss Modern Mint
 Water Color: Rust-Oleum, Painter's Touch 2x Paint Cover, Satin Aqua
 Vegetation: JTT Scenery Products, Foliage-Fiber Clusters, Light Green - Coarse

MASSING STUDY MODELS: PHYSICAL MODELS

Physical Model



Plan View



Section View



MASSING LEGEND

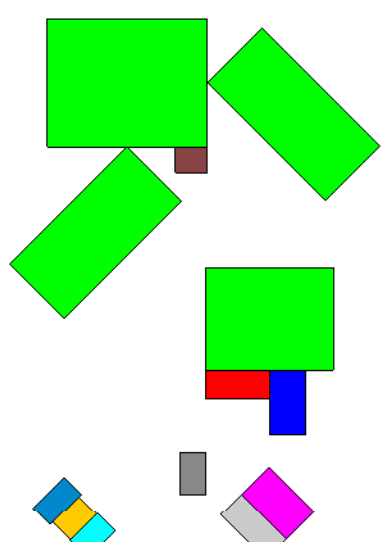
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CONFERENCE	PUBLIC SERVICES	TRAINING
MEDIA	RESTAURANT & FOOD SERVICE	
MUSEUM	SITE/SPORTS	

Architectural Concept: Open Campus/Landscape
108 GEORGE F. ROZANSKY

Physical Model



Plan View



Section View



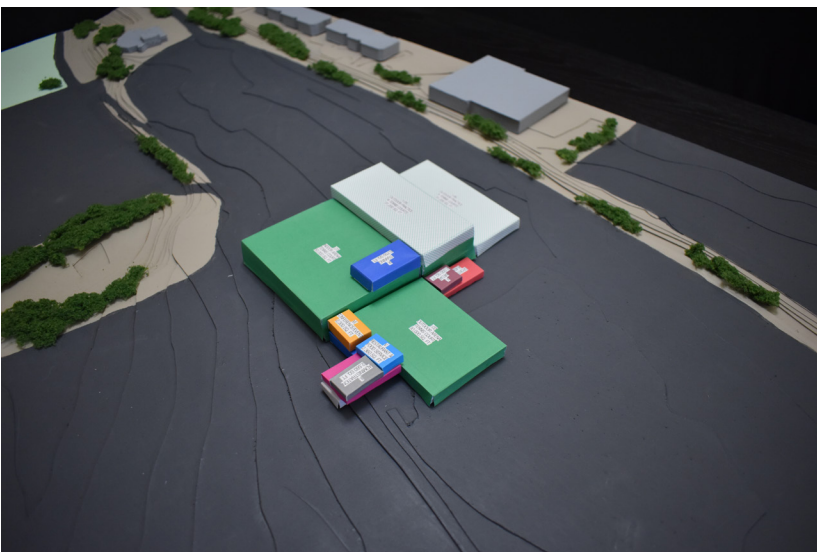
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ADMINISTRATION	OTHER FACILITIES	SPORTS SUPPORT
CONFERENCE	PUBLIC SERVICES	TRAINING
MEDIA	RESTAURANT & FOOD SERVICE	
MUSEUM	SITE/SPORTS	

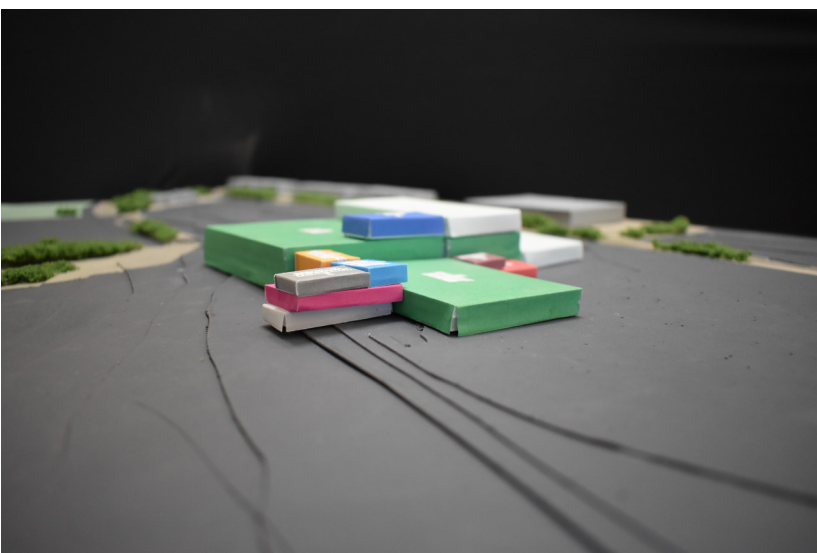
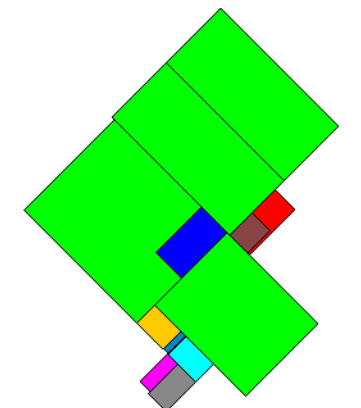
Architectural Concept: Open Campus/Landscape

MASSING STUDY MODELS: PHYSICAL MODELS

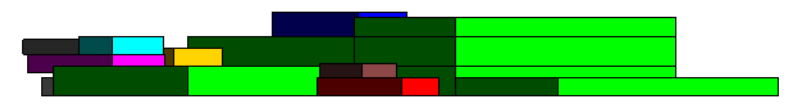
Physical Model



Plan View



Section View

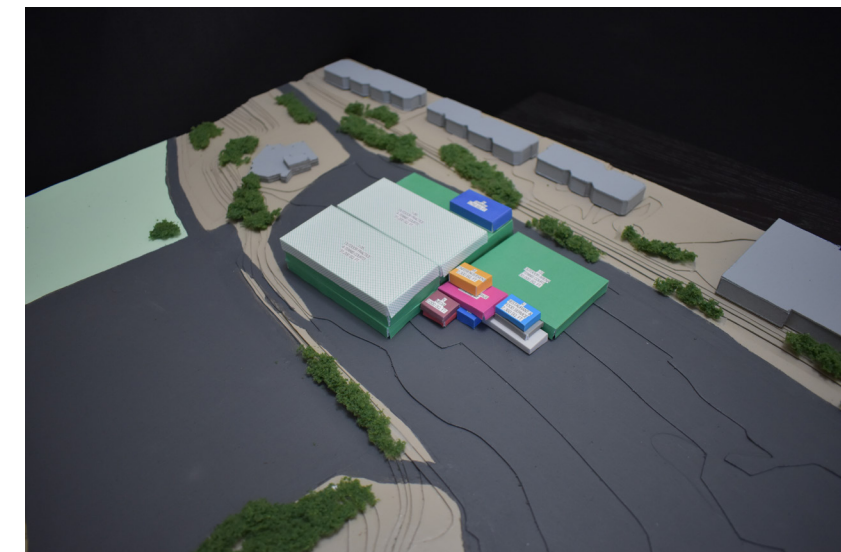


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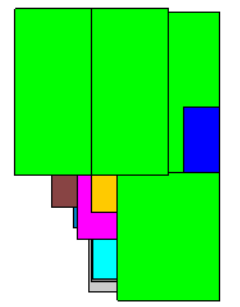
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CONFERENCE		PUBLIC SERVICES		TRAINING	
MEDIA		RESTAURANT & FOOD SERVICE			
MUSEUM		SITE/SPORTS			

Architectural Concept: Tower
110 GEORGE F. ROZANSKY

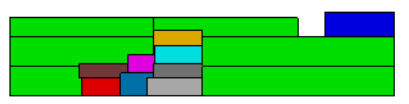
Physical Model



Plan View



Section View



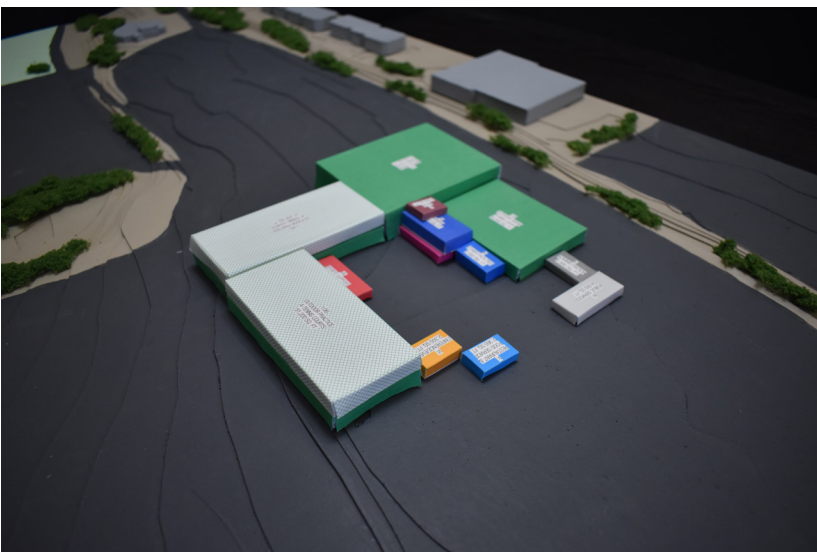
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MEDIA		RESTAURANT & FOOD SERVICE			
MUSEUM		SITE/SPORTS			

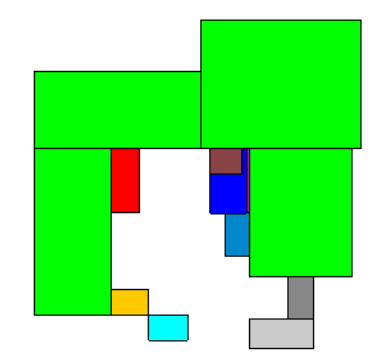
Architectural Concept: Tower

MASSING STUDY MODELS: PHYSICAL MODELS

Physical Model



Plan View

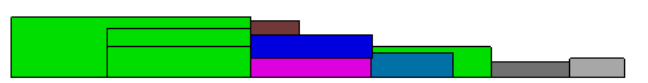


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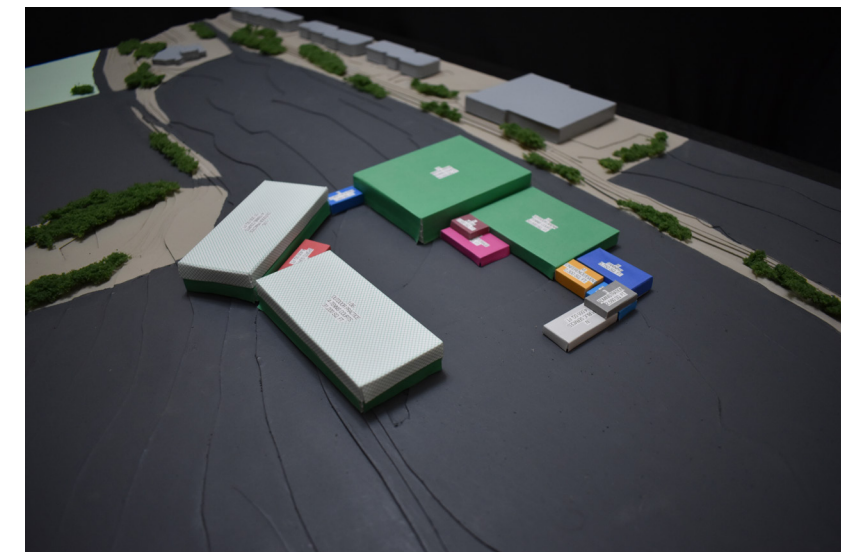
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MUSEUM		SITE/SPORTS			

Architectural Concept: Courtyard
112 GEORGE F. ROZANSKY

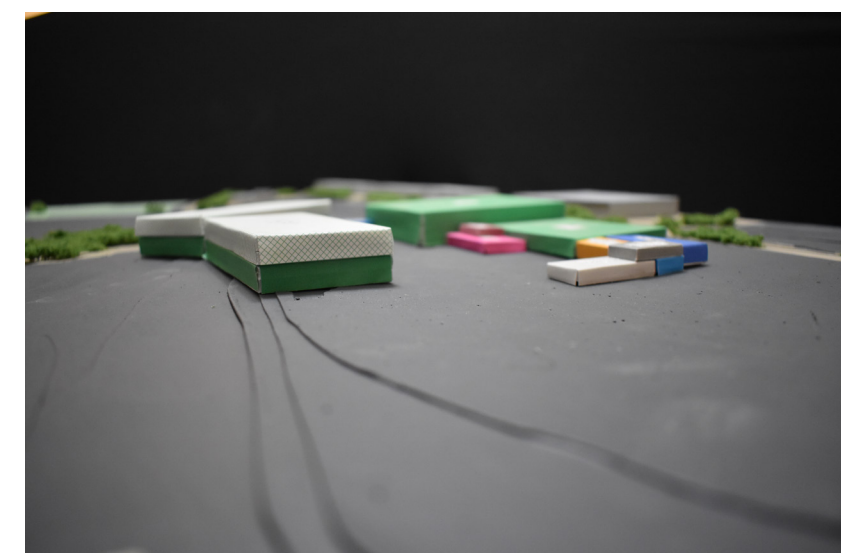
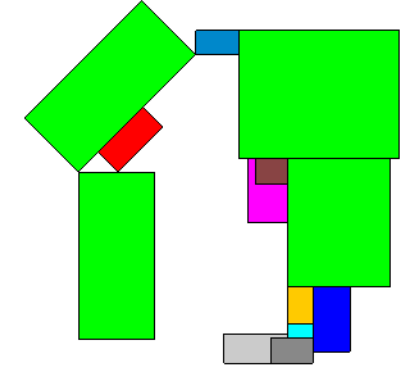
Section View



Physical Model



Plan View



MASSING LEGEND

ADMINISTRATION		OTHER FACILITIES		SPORTS SUPPORT	
CONFERENCE		PUBLIC SERVICES		TRAINING	
MEDIA		RESTAURANT & FOOD SERVICE			
MUSEUM		SITE/SPORTS			

Architectural Concept: Courtyard

Section View

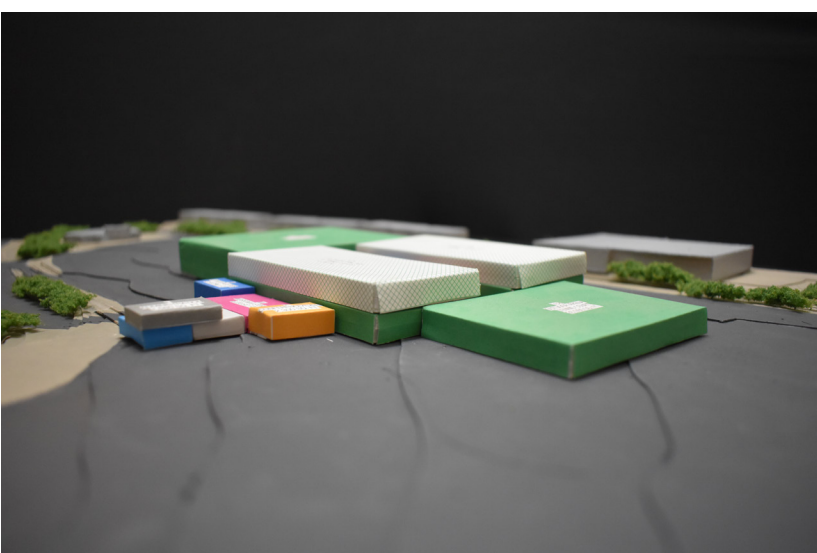
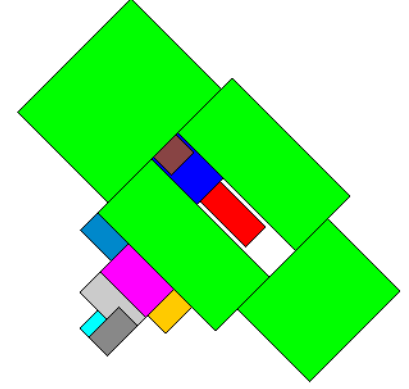


MASSING STUDY MODELS: PHYSICAL MODELS

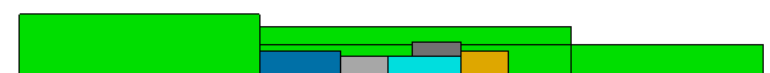
Physical Model



Plan View



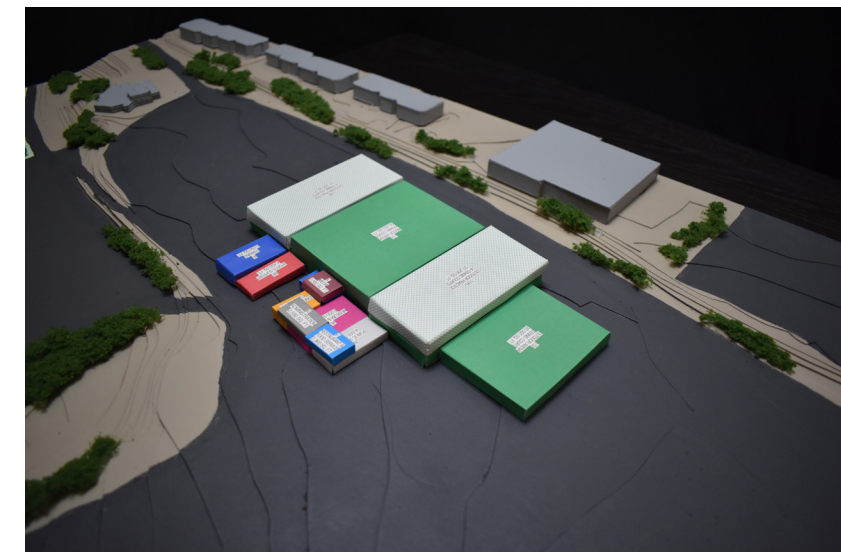
Section View



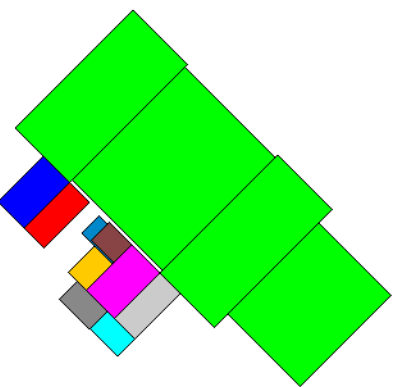
MASSING LEGEND

ADMINISTRATION		OTHER FACILITIES		SPORTS SUPPORT	
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MEDIA		RESTAURANT & FOOD SERVICE			
MUSEUM		SITE/SPORTS			

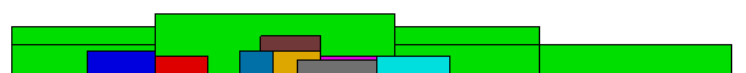
Physical Model



Plan View



Section View

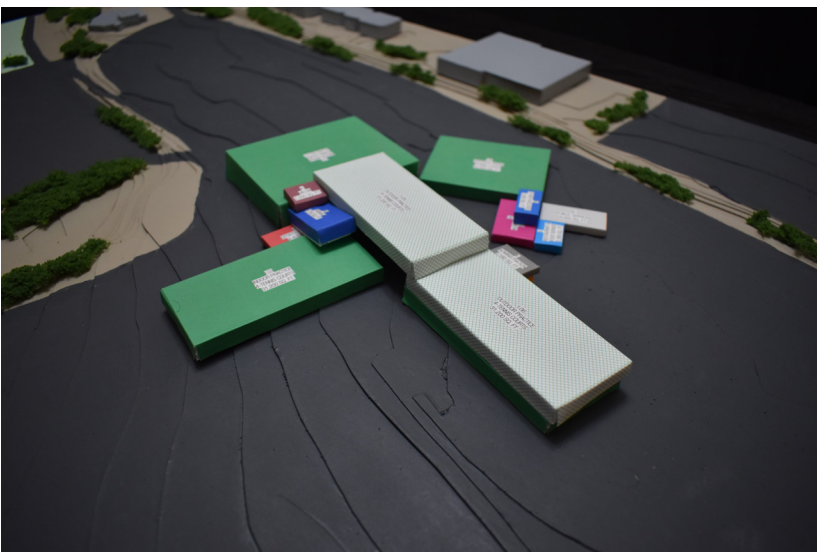


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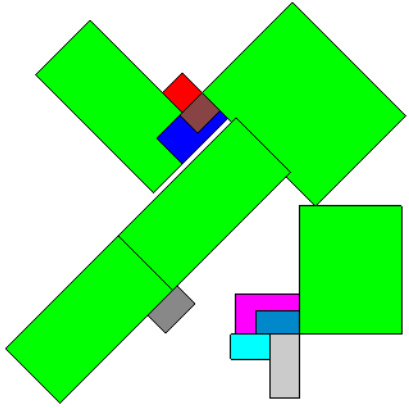
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MEDIA		RESTAURANT & FOOD SERVICE			
MUSEUM		SITE/SPORTS			

MASSING STUDY MODELS: PHYSICAL MODELS

Physical Model



Plan View



Section View



MASSING LEGEND

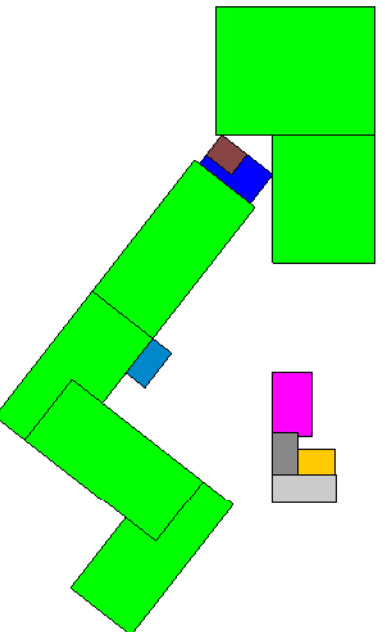
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CONFERENCE		PUBLIC SERVICES		TRAINING	
MEDIA		RESTAURANT & FOOD SERVICE			
MUSEUM		SITE/SPORTS			

Architectural Concept: Bridge
116 GEORGE F. ROZANSKY

Physical Model



Plan View



Section View

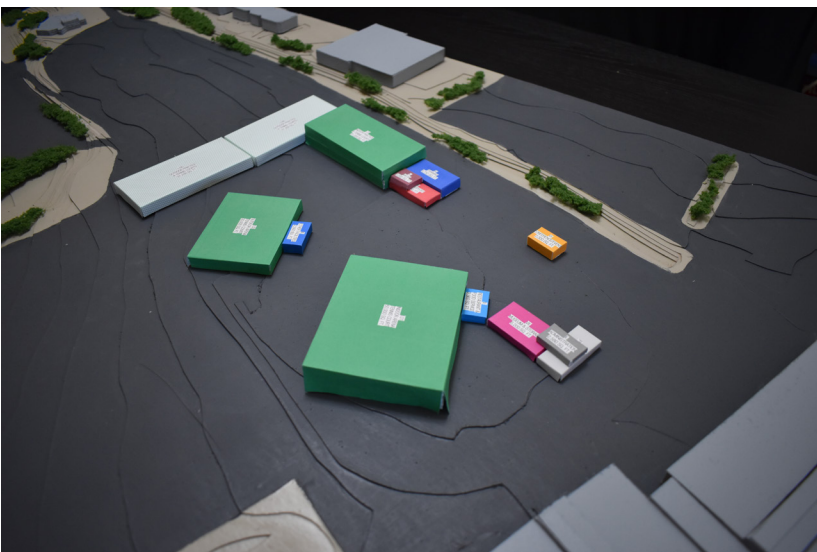


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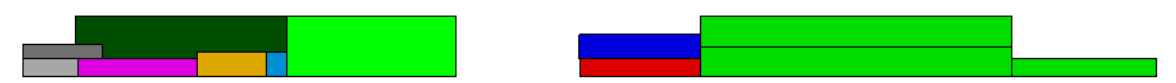
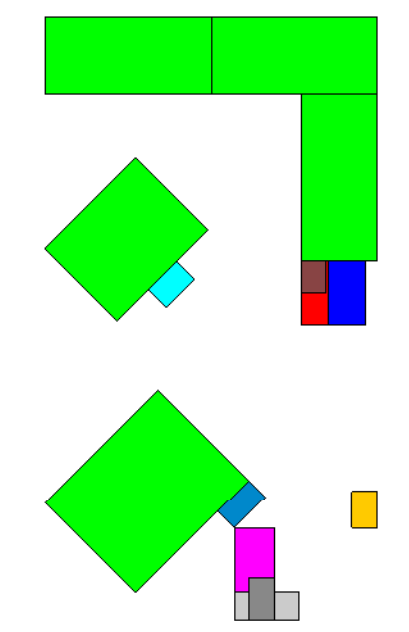
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CONFERENCE		PUBLIC SERVICES		TRAINING	
MEDIA		RESTAURANT & FOOD SERVICE			
MUSEUM		SITE/SPORTS			

Architectural Concept: Bridge

Physical Model



Plan View



Section View



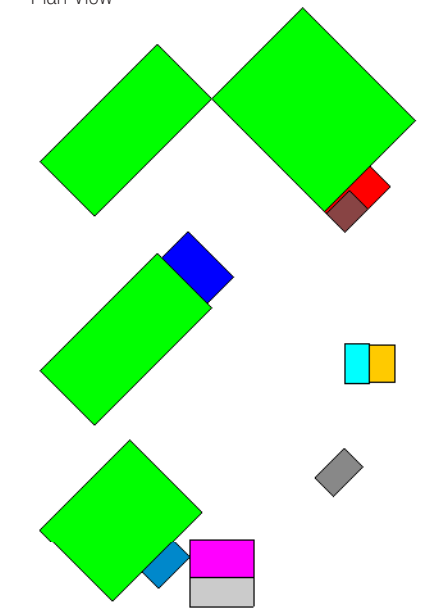
MASSING LEGEND

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CONFERENCE		PUBLIC SERVICES	
MEDIA		RESTAURANT & FOOD SERVICE	
MUSEUM		SITE/SPORTS	

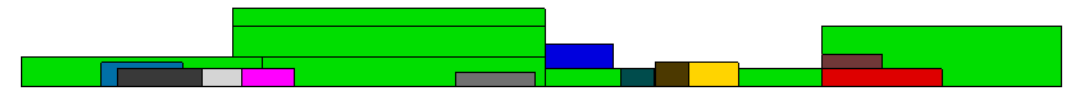
Physical Model



Plan View



3 Site - Massing Model 12
1" = 300'-0"



Section View

MASSING LEGEND

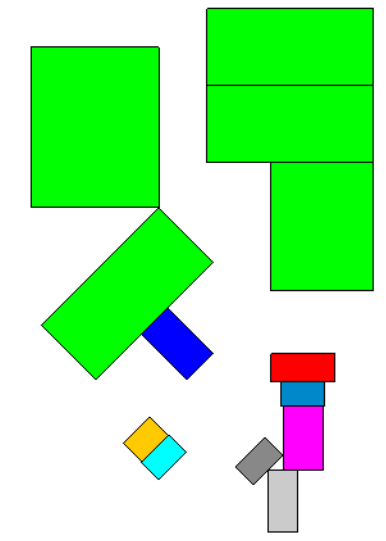
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MEDIA		RESTAURANT & FOOD SERVICE	
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MASSING STUDY MODELS: PHYSICAL MODELS

Physical Model



Plan View



MASSING LEGEND

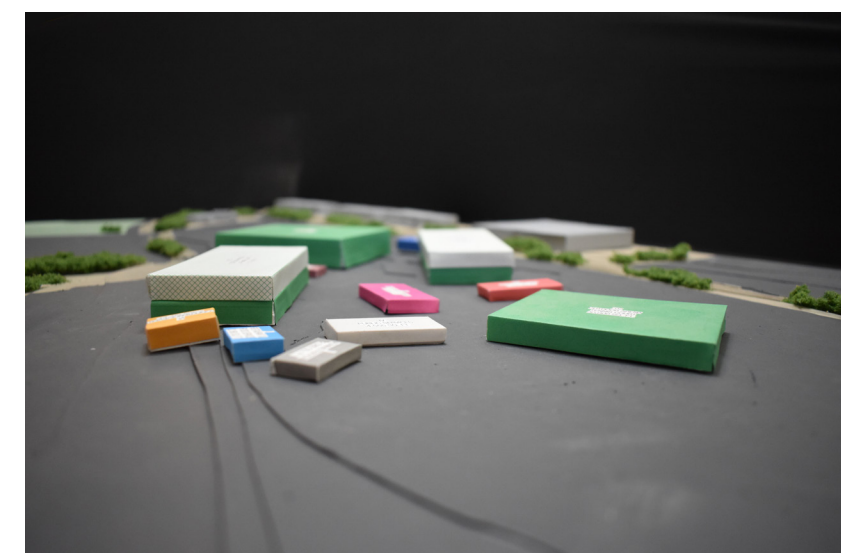
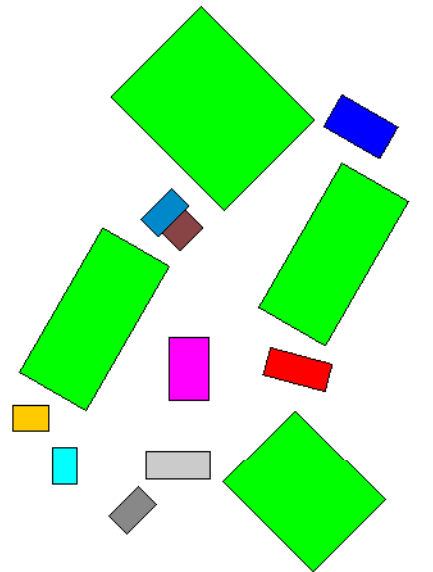
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CONFERENCE		PUBLIC SERVICES		TRAINING	
MEDIA		RESTAURANT & FOOD SERVICE			
MUSEUM		SITE/SPORTS			

Architectural Concept: Open Campus/Landscape

Physical Model



Plan View



MASSING LEGEND

ADMINISTRATION		OTHER FACILITIES		SPORTS SUPPORT	
CONFERENCE		PUBLIC SERVICES		TRAINING	
MEDIA		RESTAURANT & FOOD SERVICE			
MUSEUM		SITE/SPORTS			

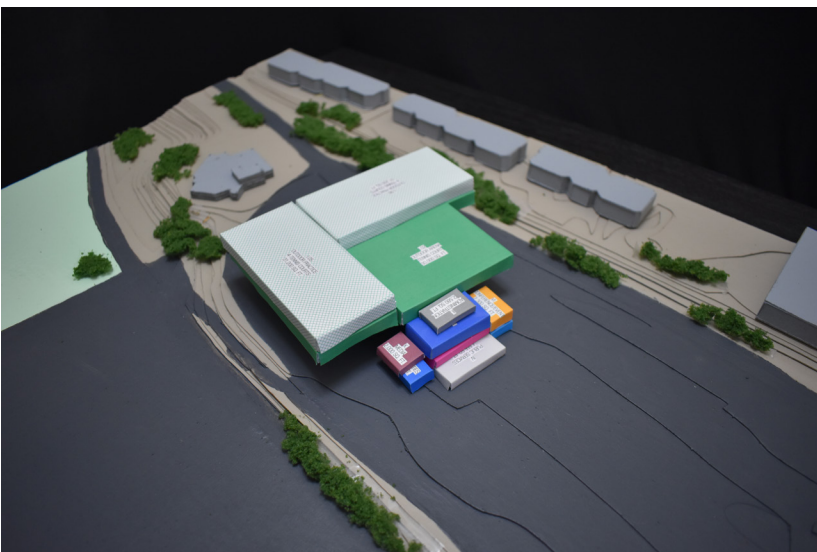
Architectural Concept: Open Campus/Landscape

Section View

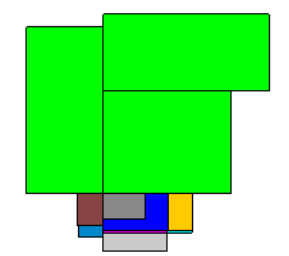


MASSING STUDY MODELS: PHYSICAL MODELS

Physical Model



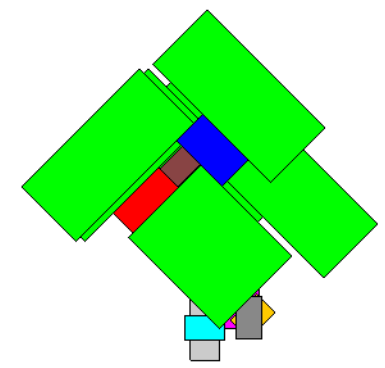
Plan View



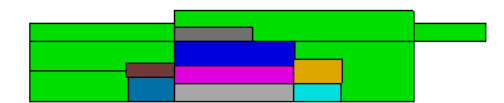
Physical Model



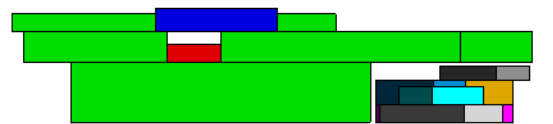
Plan View



Section View



Section View



MASSING LEGEND

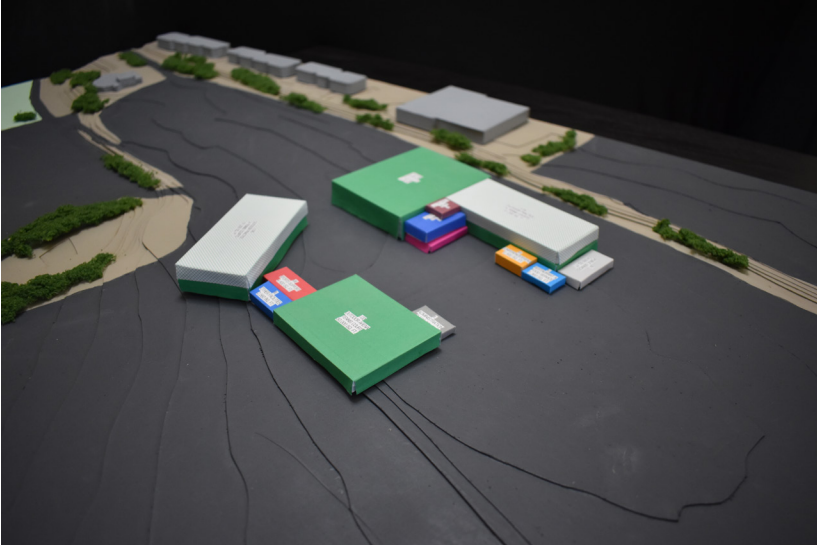
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MASSING LEGEND

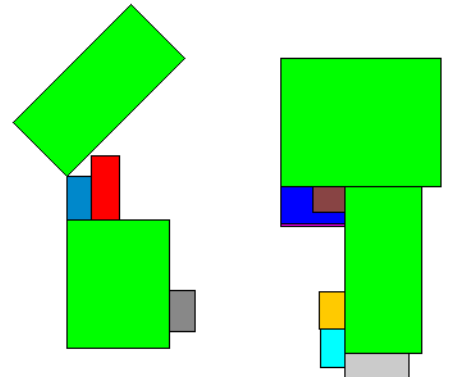
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MASSING STUDY MODELS: PHYSICAL MODELS

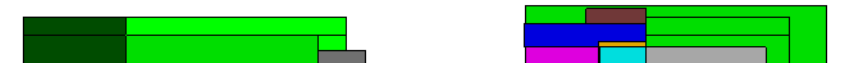
Physical Model



Plan View



Section View

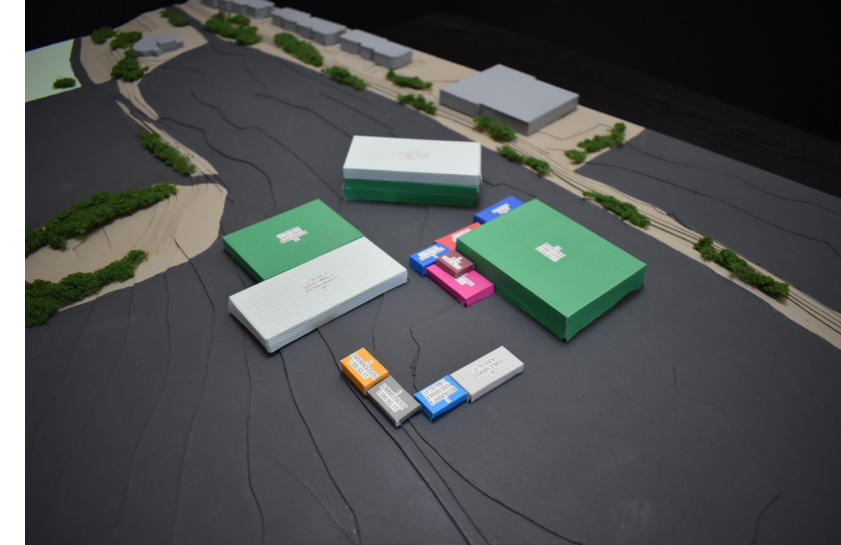


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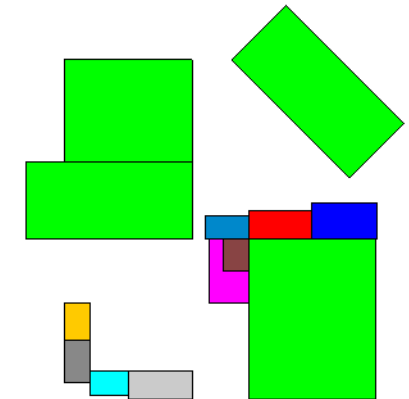
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Architectural Concept: Courtyard
124 GEORGE F. ROZANSKY

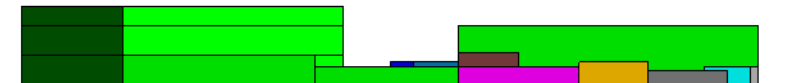
Physical Model



Plan View



Section View



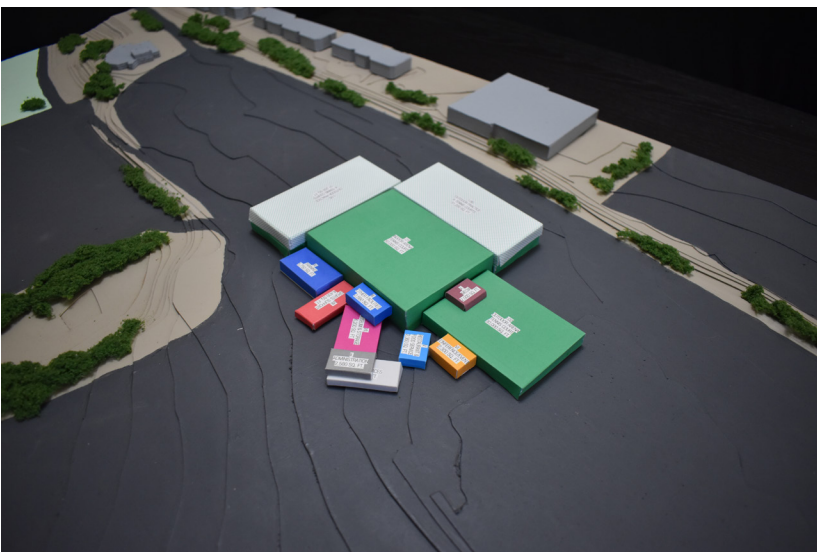
MASSING LEGEND

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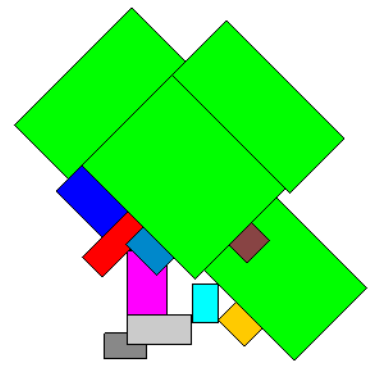
Architectural Concept: Courtyard

MASSING STUDY MODELS: PHYSICAL MODELS

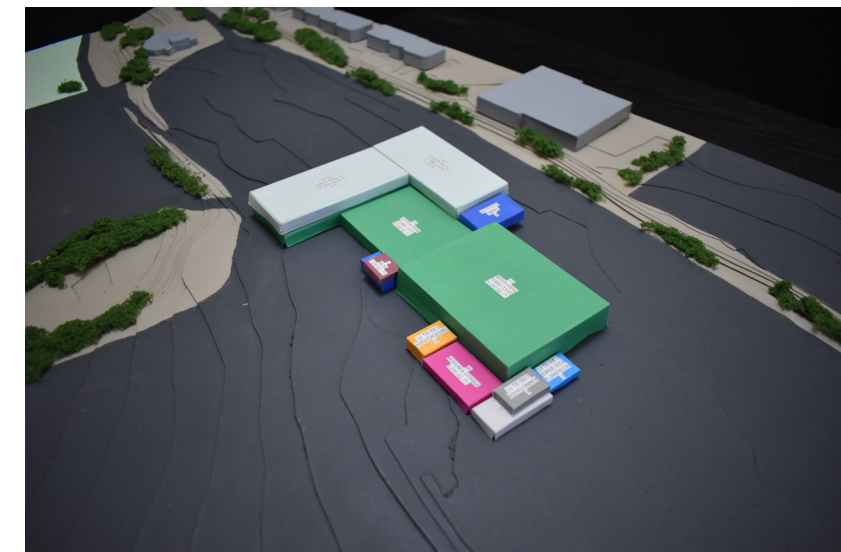
Physical Model



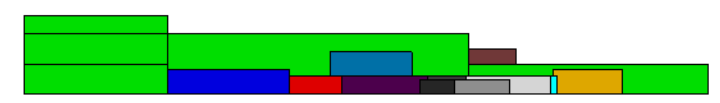
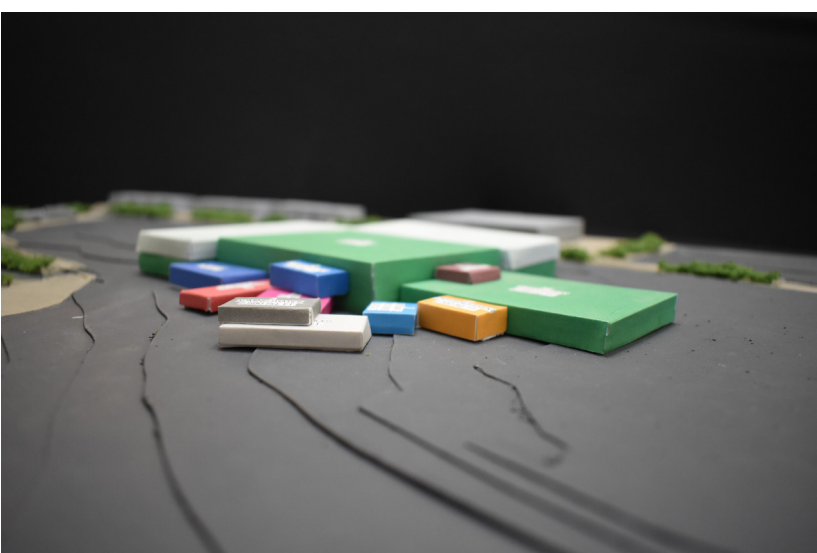
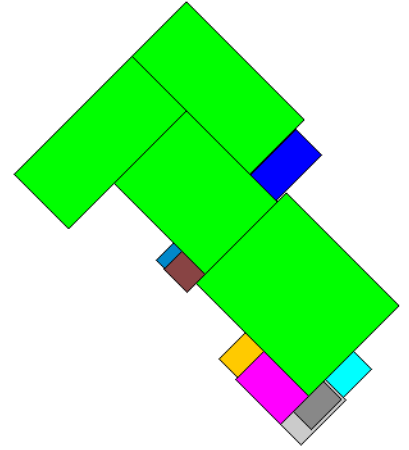
Plan View



Physical Model



Plan View

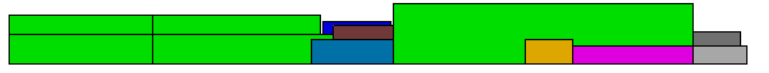
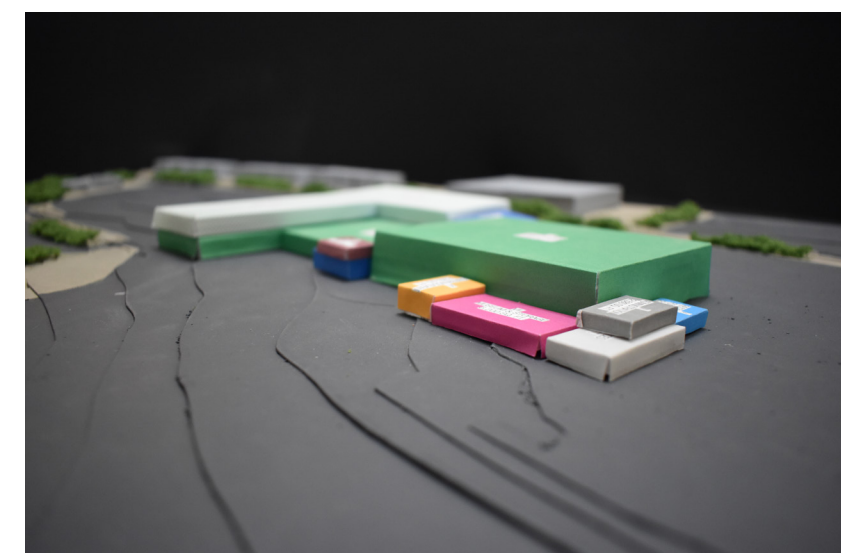


Section View

MASSING LEGEND

ADMINISTRATION		OTHER FACILITIES		SPORTS SUPPORT	
CONFERENCE		PUBLIC SERVICES		TRAINING	
MEDIA		RESTAURANT & FOOD SERVICE			
MUSEUM		SITE/SPORTS			

Architectural Concept: Linear
126 GEORGE F. ROZANSKY



Section View

MASSING LEGEND

ADMINISTRATION		OTHER FACILITIES		SPORTS SUPPORT	
CONFERENCE		PUBLIC SERVICES		TRAINING	
MEDIA		RESTAURANT & FOOD SERVICE			
MUSEUM		SITE/SPORTS			

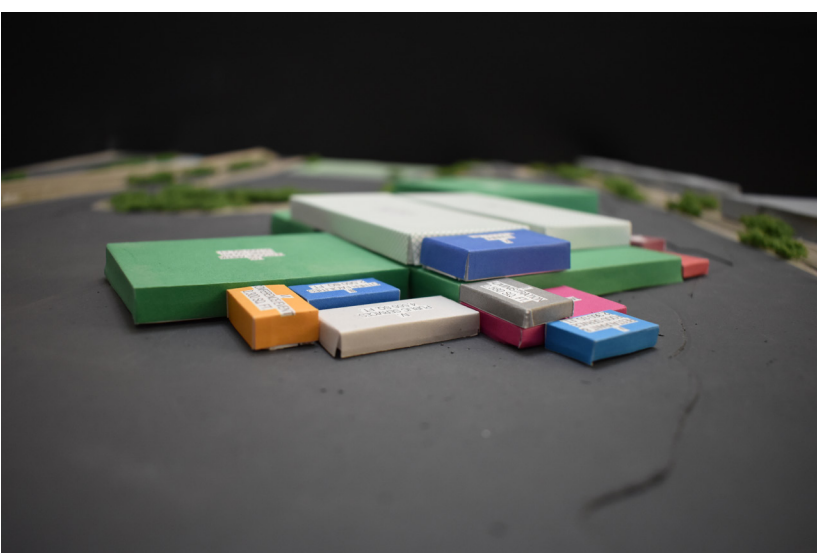
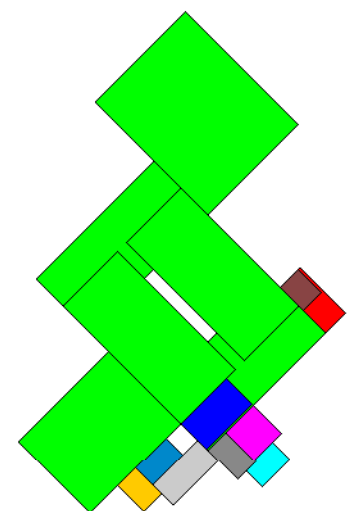
Architectural Concept: Linear

DEVELOPMENT MODELS

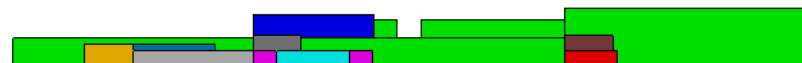
Physical Model



Plan View



Section View



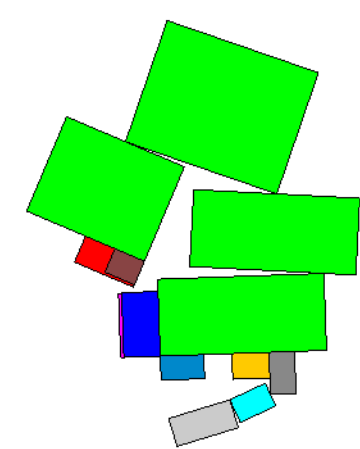
MASSING LEGEND

ADMINISTRATION		OTHER FACILITIES		SPORTS SUPPORT	
CONFERENCE		PUBLIC SERVICES		TRAINING	
MEDIA		RESTAURANT & FOOD SERVICE			
MUSEUM		SITE/SPORTS			

Physical Model



Plan View



Section View

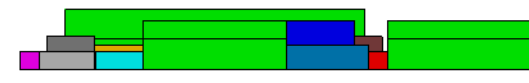
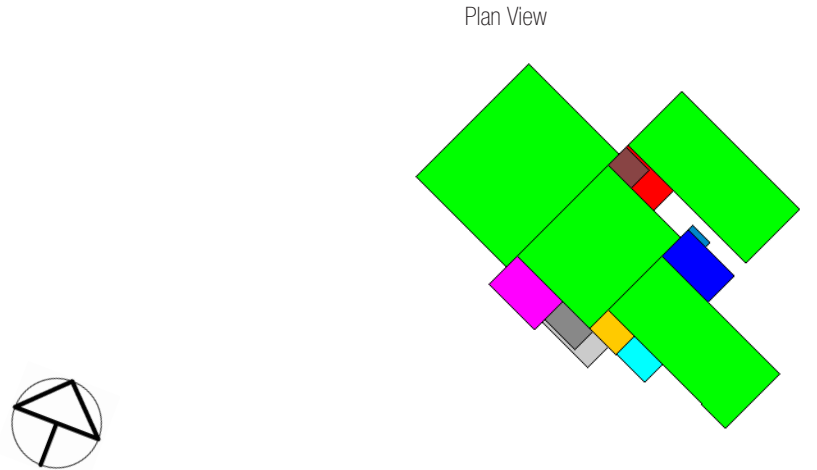


MASSING LEGEND

ADMINISTRATION		OTHER FACILITIES		SPORTS SUPPORT	
CONFERENCE		PUBLIC SERVICES		TRAINING	
MEDIA		RESTAURANT & FOOD SERVICE			
MUSEUM		SITE/SPORTS			

DEVELOPMENT MODELS

Physical Model



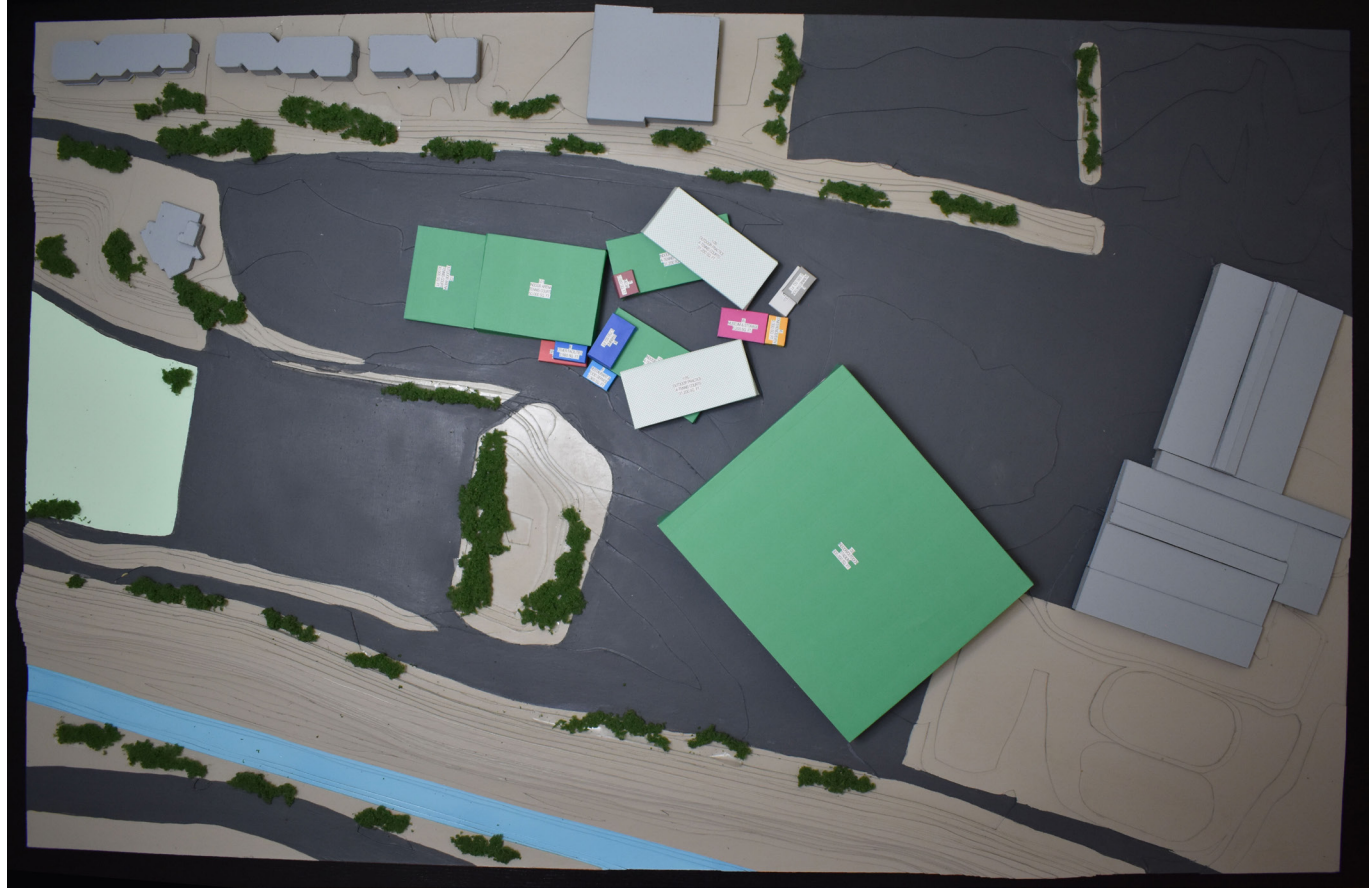
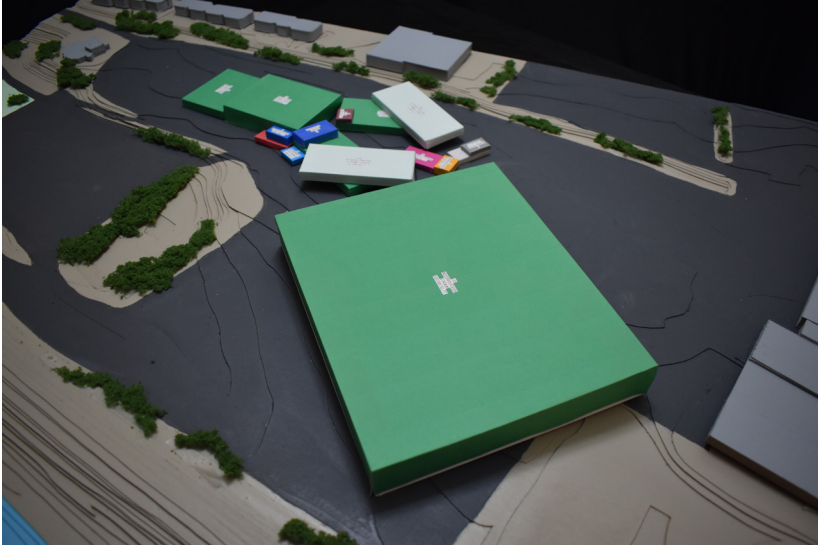
MASSING LEGEND

ADMINISTRATION		OTHER FACILITIES		SPORTS SUPPORT	
CONFERENCE		PUBLIC SERVICES		TRAINING	
MEDIA		RESTAURANT & FOOD SERVICE			
MUSEUM		SITE/SPORTS			

Architectural Concept: Linear
130 GEORGE F. ROZANSKY

Section View

Physical Model



MASSING LEGEND

ADMINISTRATION		OTHER FACILITIES		SPORTS SUPPORT	
CONFERENCE		PUBLIC SERVICES		TRAINING	
MEDIA		RESTAURANT & FOOD SERVICE			
MUSEUM		SITE/SPORTS			

Architectural Concept: Bridge

Physical Model



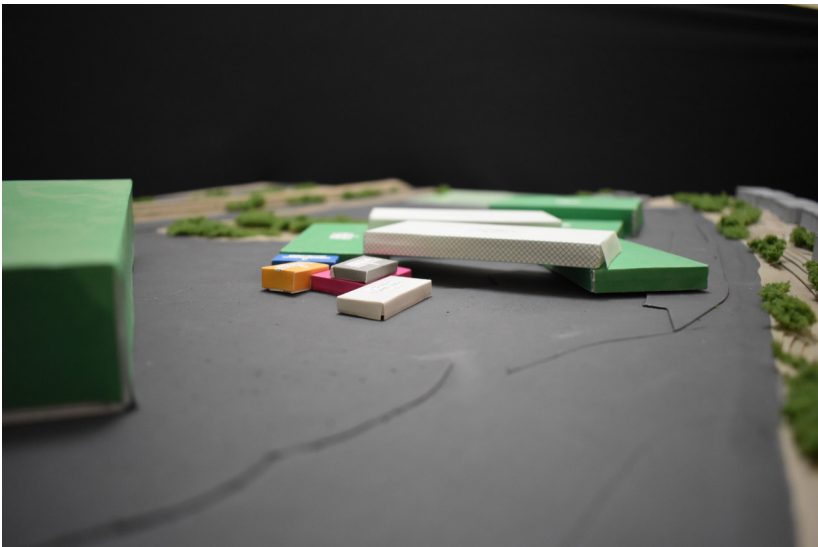
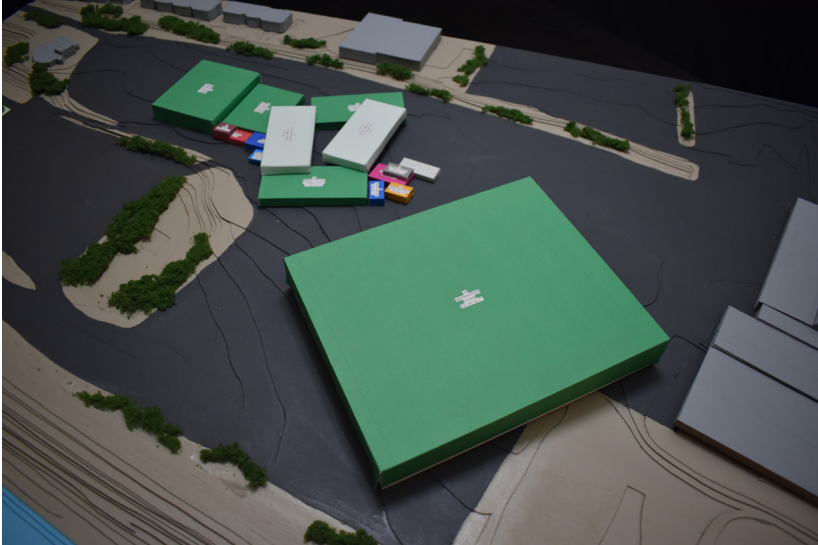
MASSING LEGEND

ADMINISTRATION		OTHER FACILITIES		SPORTS SUPPORT	
CONFERENCE		PUBLIC SERVICES		TRAINING	
MEDIA		RESTAURANT & FOOD SERVICE			
MUSEUM		SITE/SPORTS			

Architectural Concept: Bridge
132 GEORGE F. ROZANSKY



Physical Model



MASSING LEGEND

ADMINISTRATION		OTHER FACILITIES		SPORTS SUPPORT	
CONFERENCE		PUBLIC SERVICES		TRAINING	
MEDIA		RESTAURANT & FOOD SERVICE			
MUSEUM		SITE/SPORTS			

Architectural Concept: Bridge



DEVELOPMENT MODELS

Physical Model



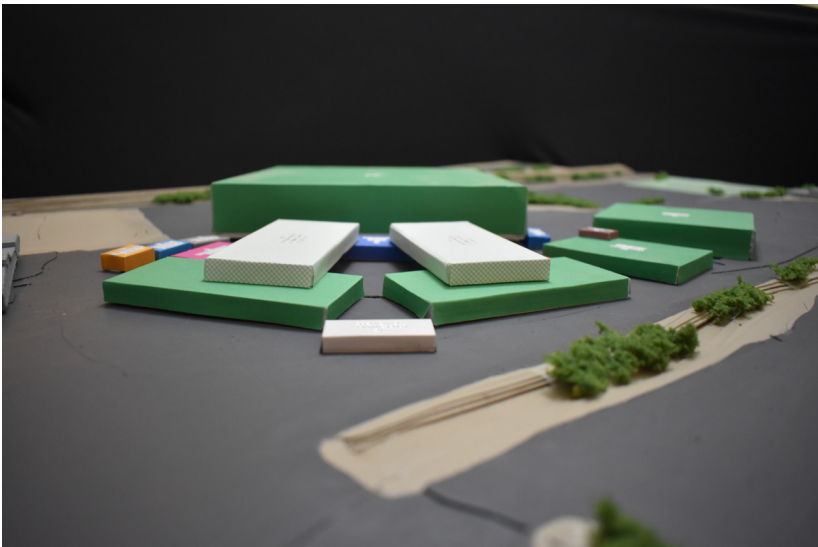
MASSING LEGEND

ADMINISTRATION		OTHER FACILITIES		SPORTS SUPPORT	
CONFERENCE		PUBLIC SERVICES		TRAINING	
MEDIA		RESTAURANT & FOOD SERVICE			
MUSEUM		SITE/SPORTS			

Architectural Concept: Bridge
134 GEORGE F. ROZANSKY



Physical Model



MASSING LEGEND

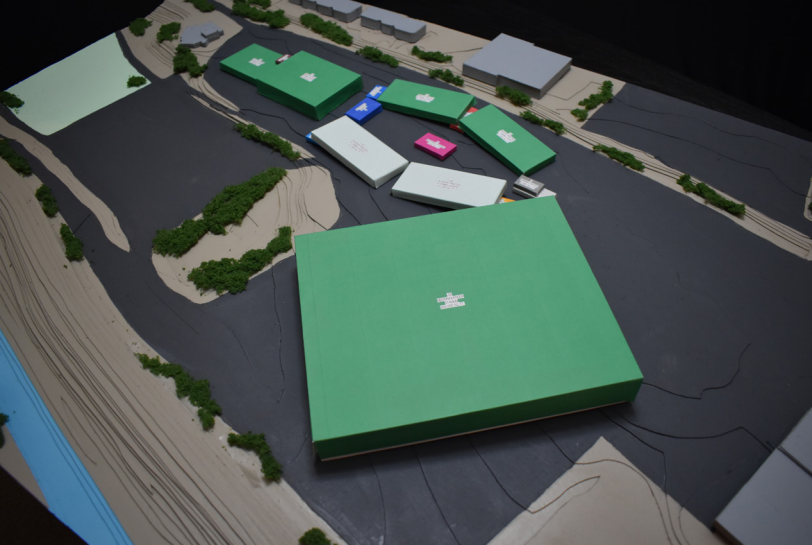
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CONFERENCE		PUBLIC SERVICES		TRAINING	
MEDIA		RESTAURANT & FOOD SERVICE			
MUSEUM		SITE/SPORTS			

Architectural Concept: Bridge



DEVELOPMENT MODELS

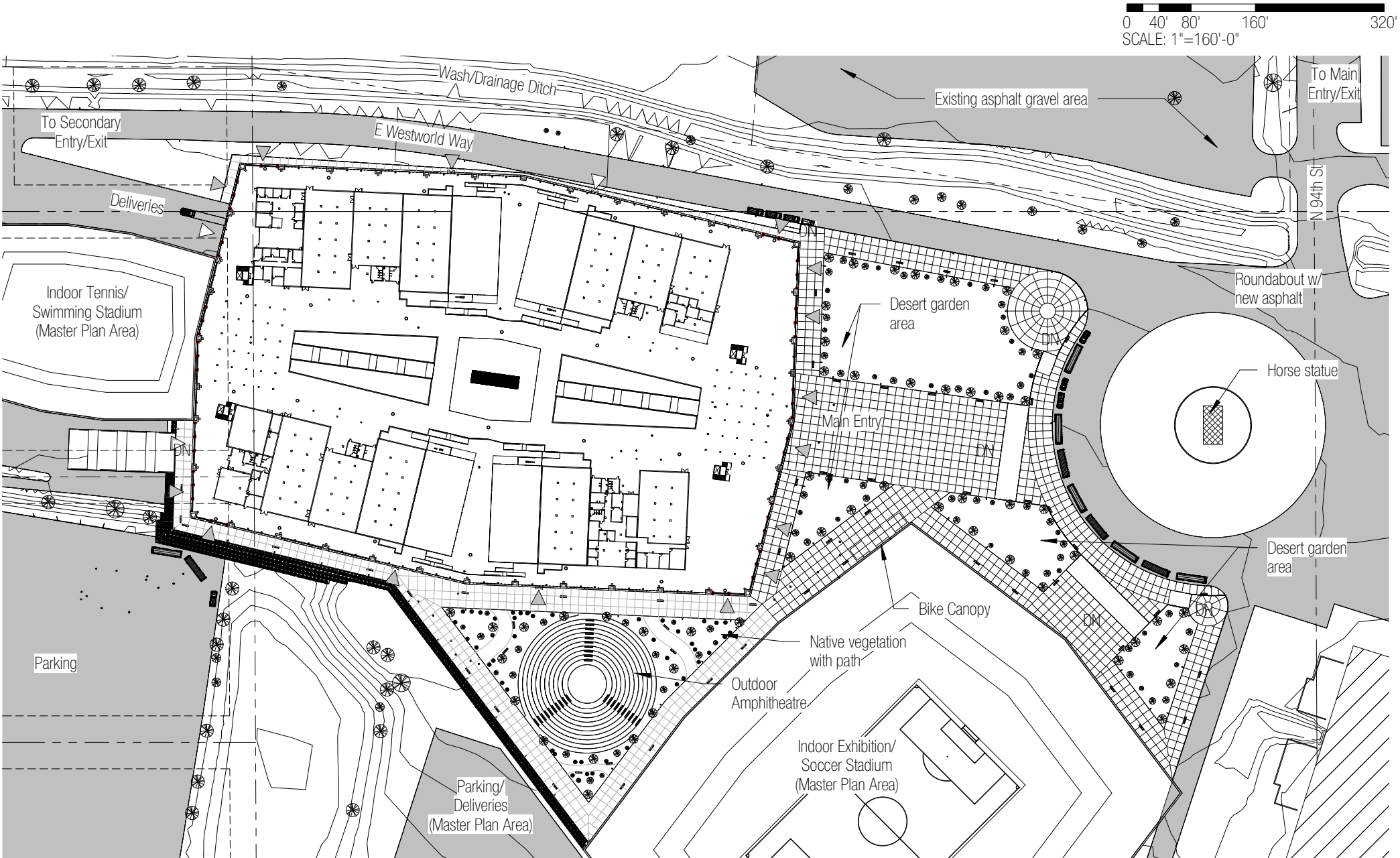
Physical Model











MASSING LEGEND

ADMINISTRATION		OTHER FACILITIES		SPORTS SUPPORT	
CONFERENCE		PUBLIC SERVICES		TRAINING	
MEDIA		RESTAURANT & FOOD SERVICE			
MUSEUM		SITE/SPORTS			

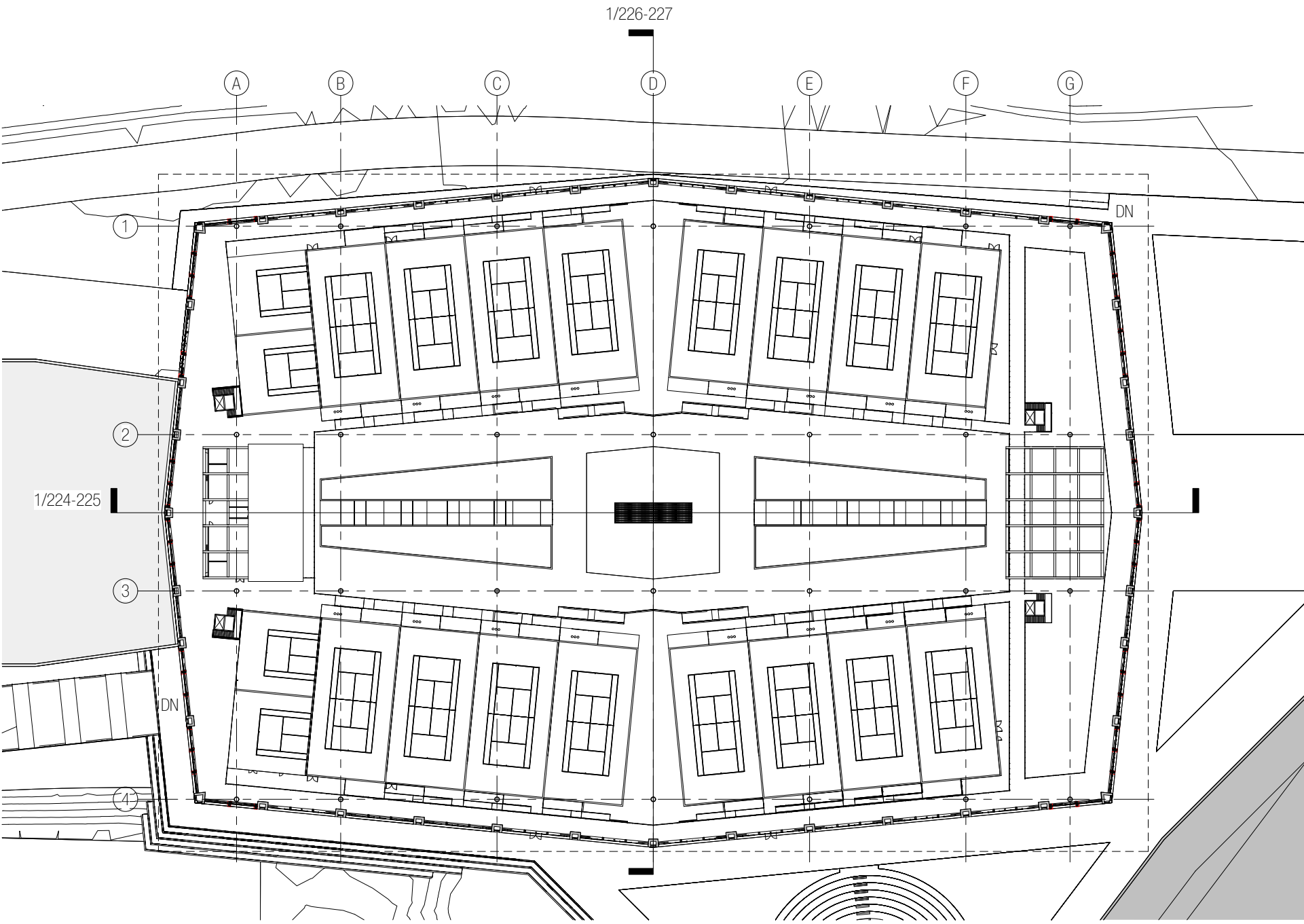
SITE PLAN



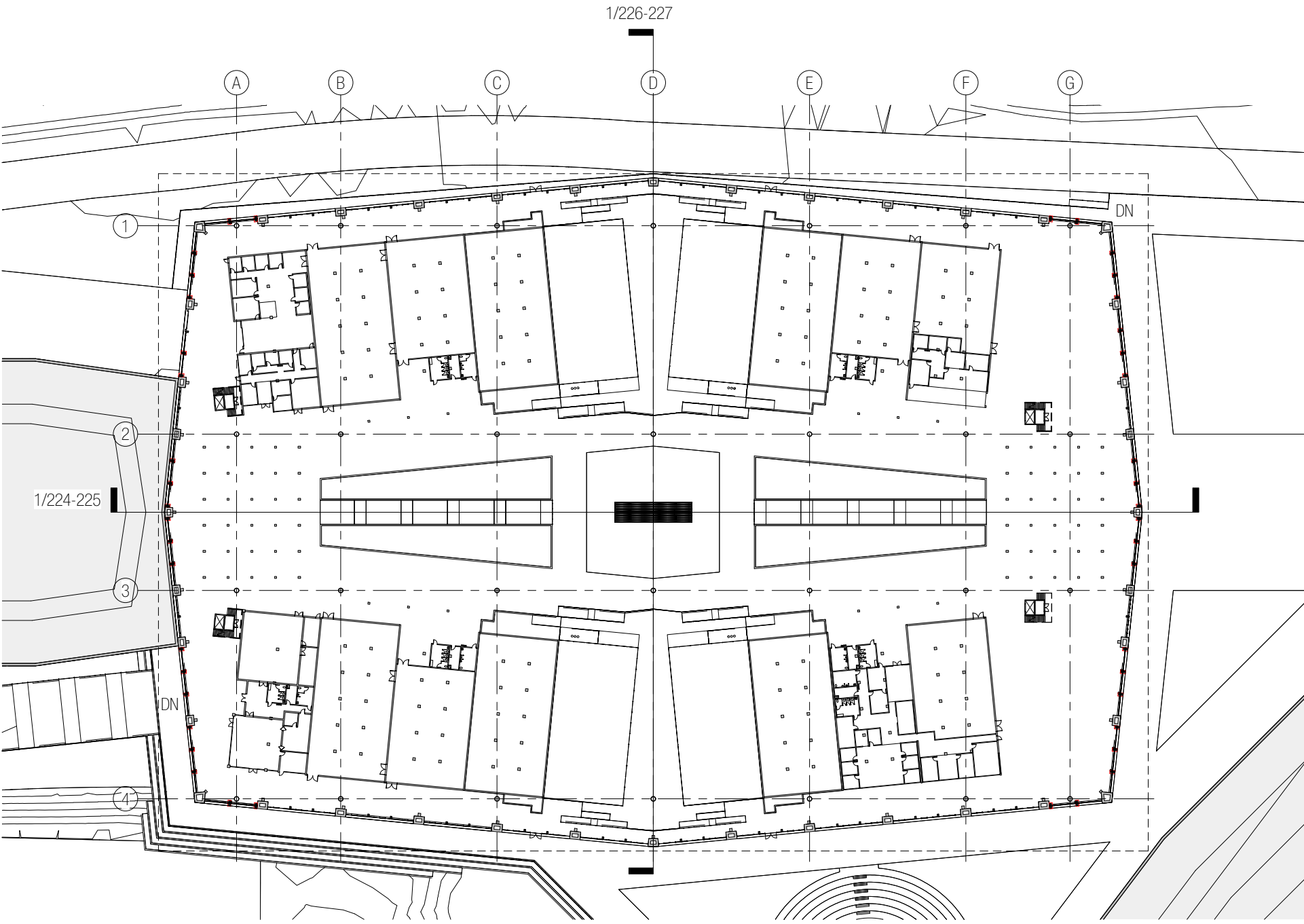
Site Plan Legend

-  Tree/Vegetation
-  LED Site Pole Light
-  Entry
-  Hardscape (Pedestrian/ADA)
-  Existing Adjacent Buildings
-  Existing asphalt
-  Existing Wall
-  Bench

1 Site Plan - Enlarged
1" = 160'-0"

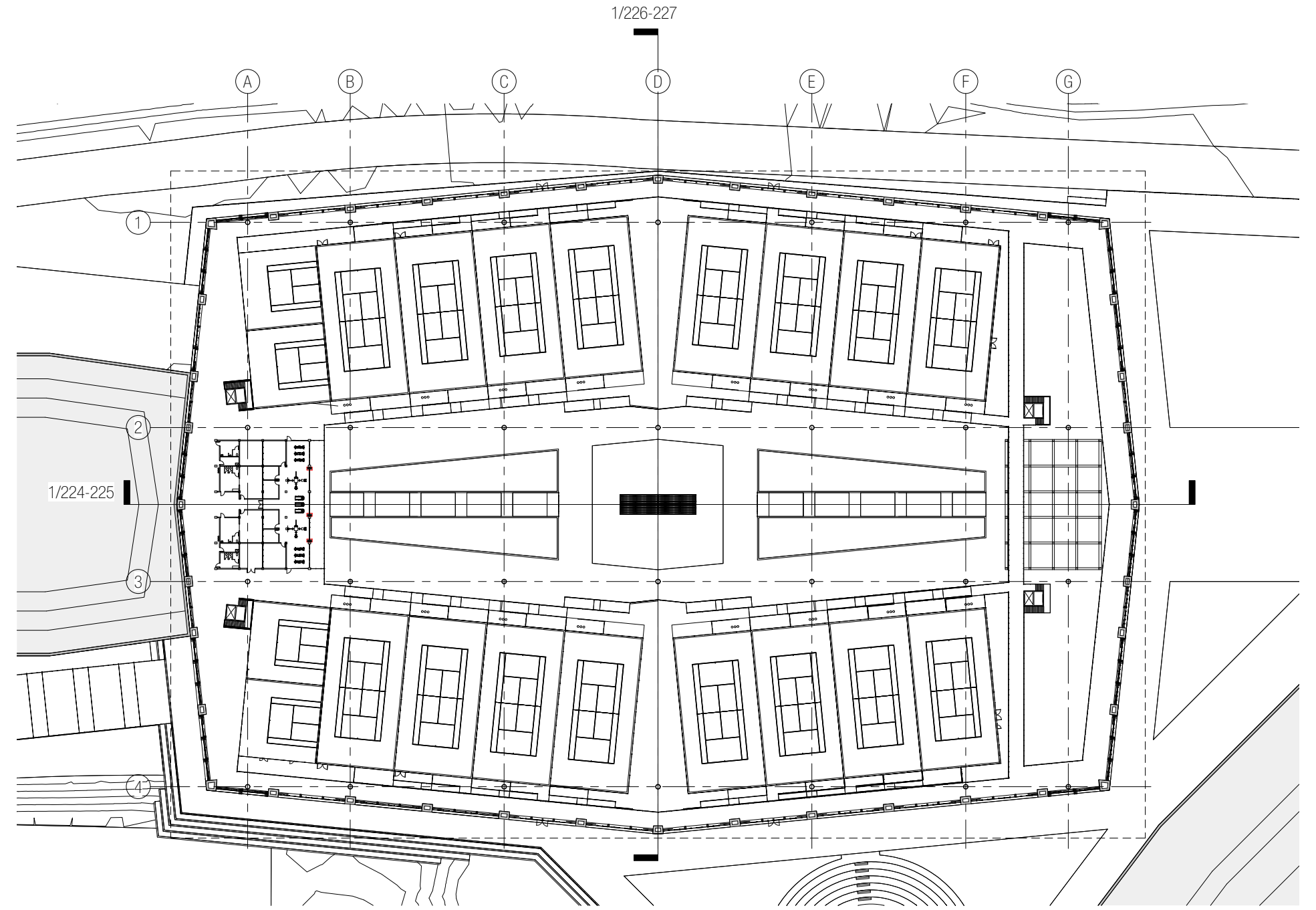


1 Overall Floor Plan
1" = 100'-0"

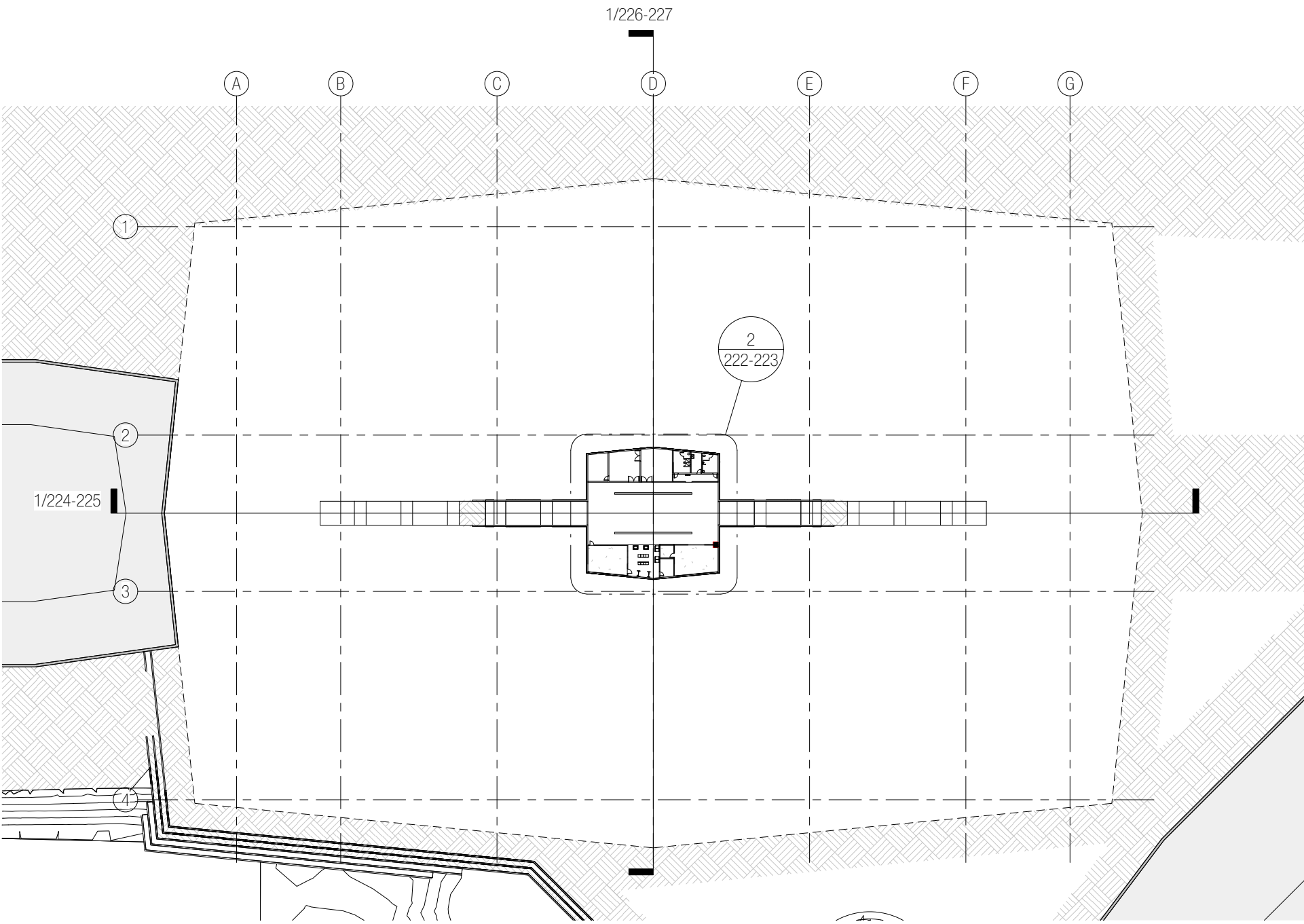


0 25' 50' 100' 200'
 SCALE: 1"=100'-0"

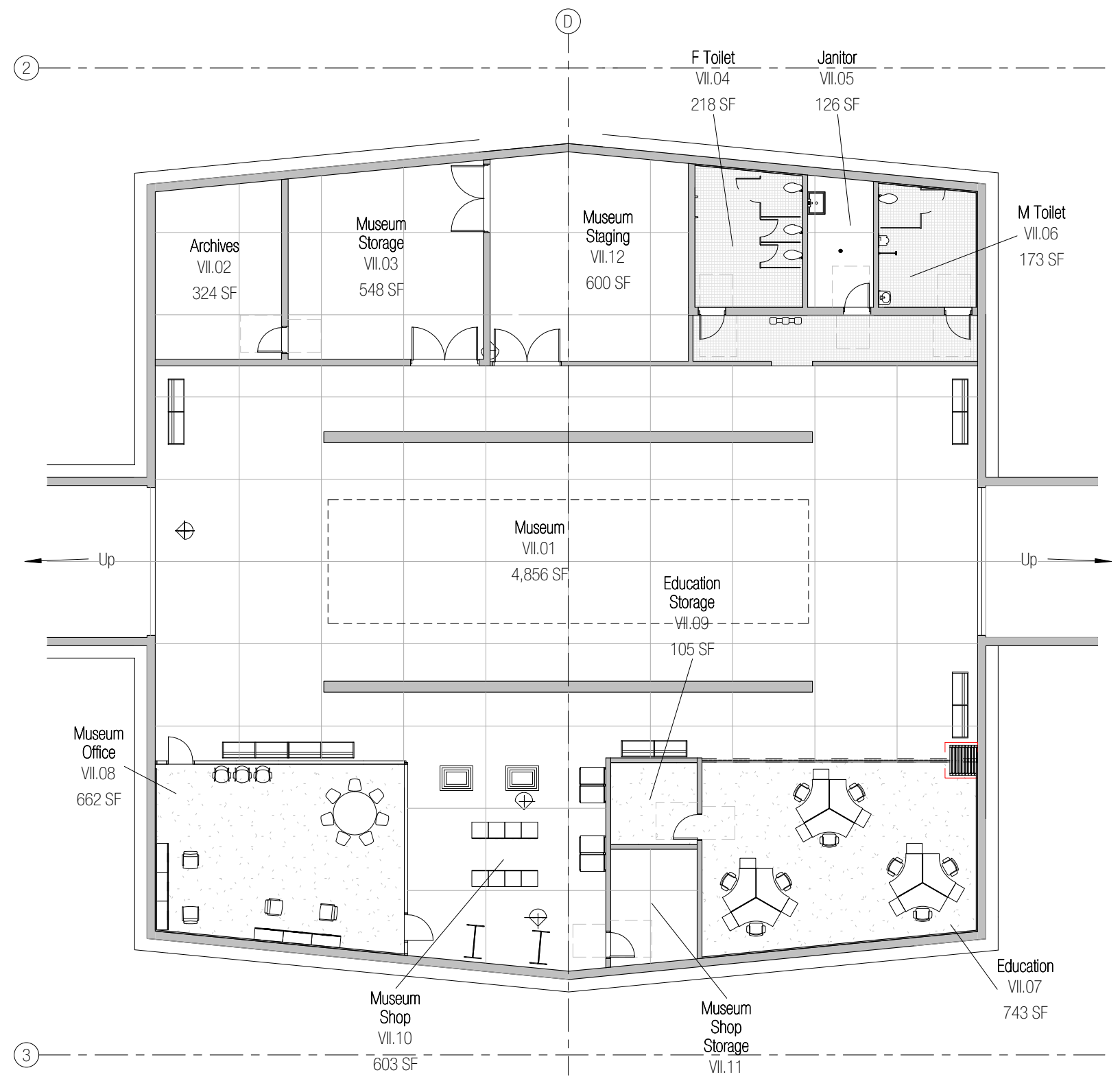
1 Ground Level
 1" = 100'-0"



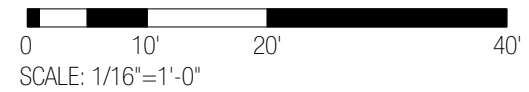
2 Court Level 1-4
 1" = 100'-0"

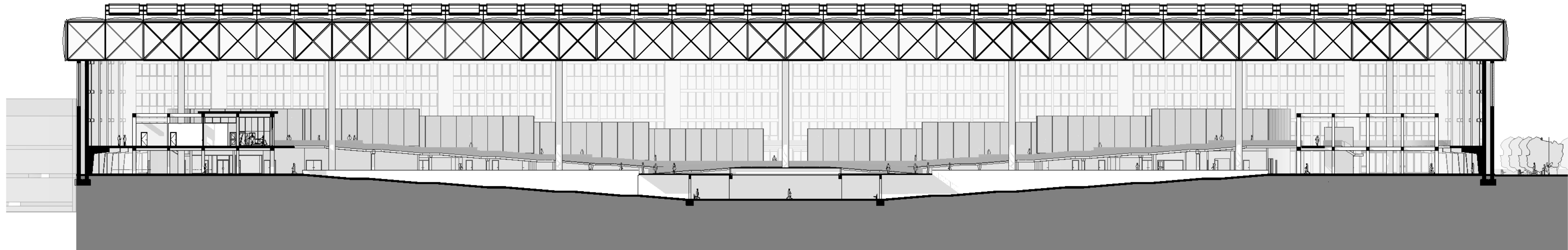


1 Museum Level
1" = 100'-0"



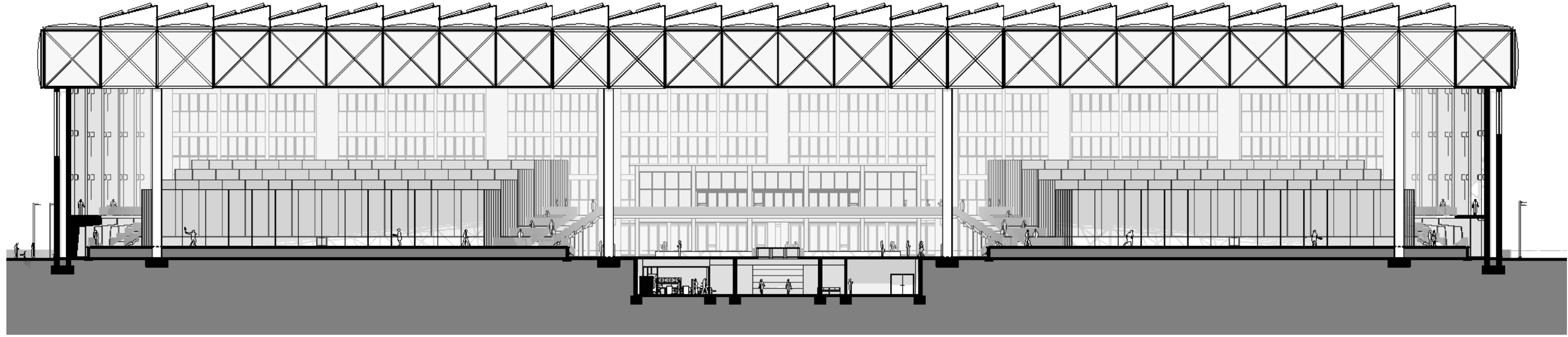
2 Museum Level - Enlarged
1/16" = 1'-0"



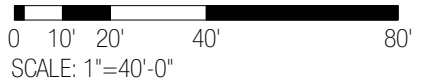


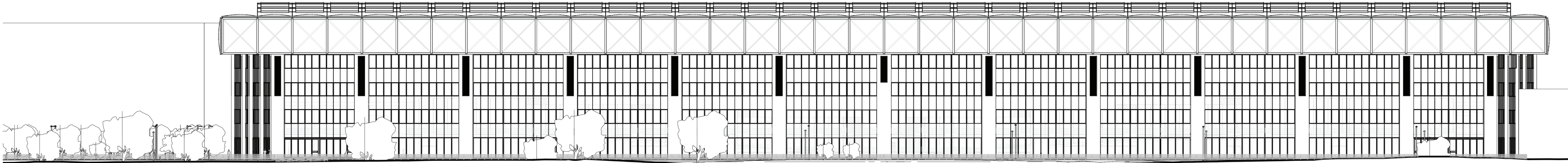
1 East-West Building Section
1" = 40'-0"

0 10' 20' 40' 80'
SCALE: 1"=40'-0"

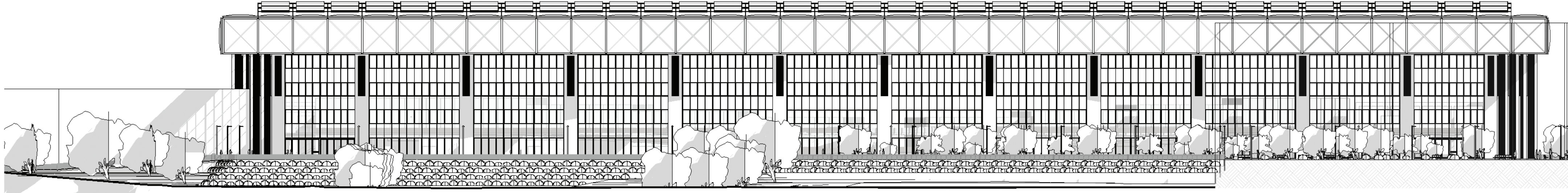


1 North-South Building Section
1" = 40'-0"



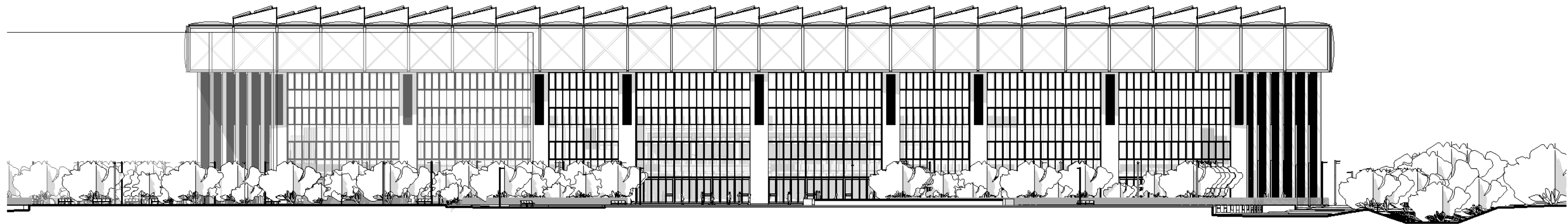


1 North Exterior Elevation
1" = 40'-0"

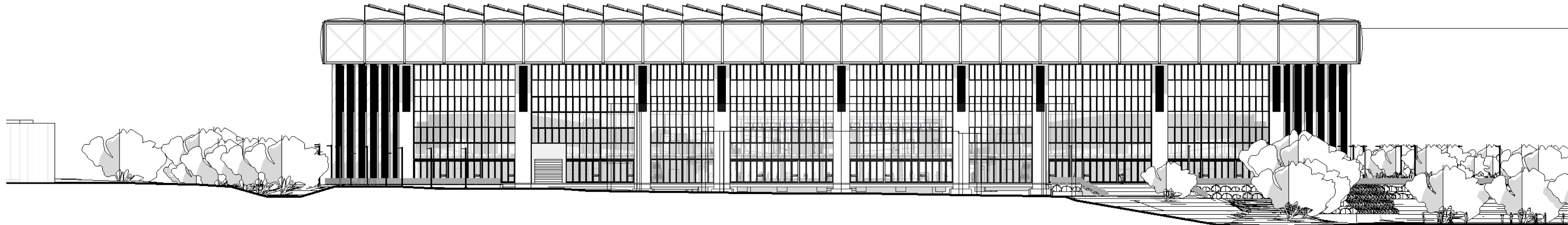


2 South Exterior Elevation
1" = 40'-0"

0 10' 20' 40' 80'
SCALE: 1"=40'-0"



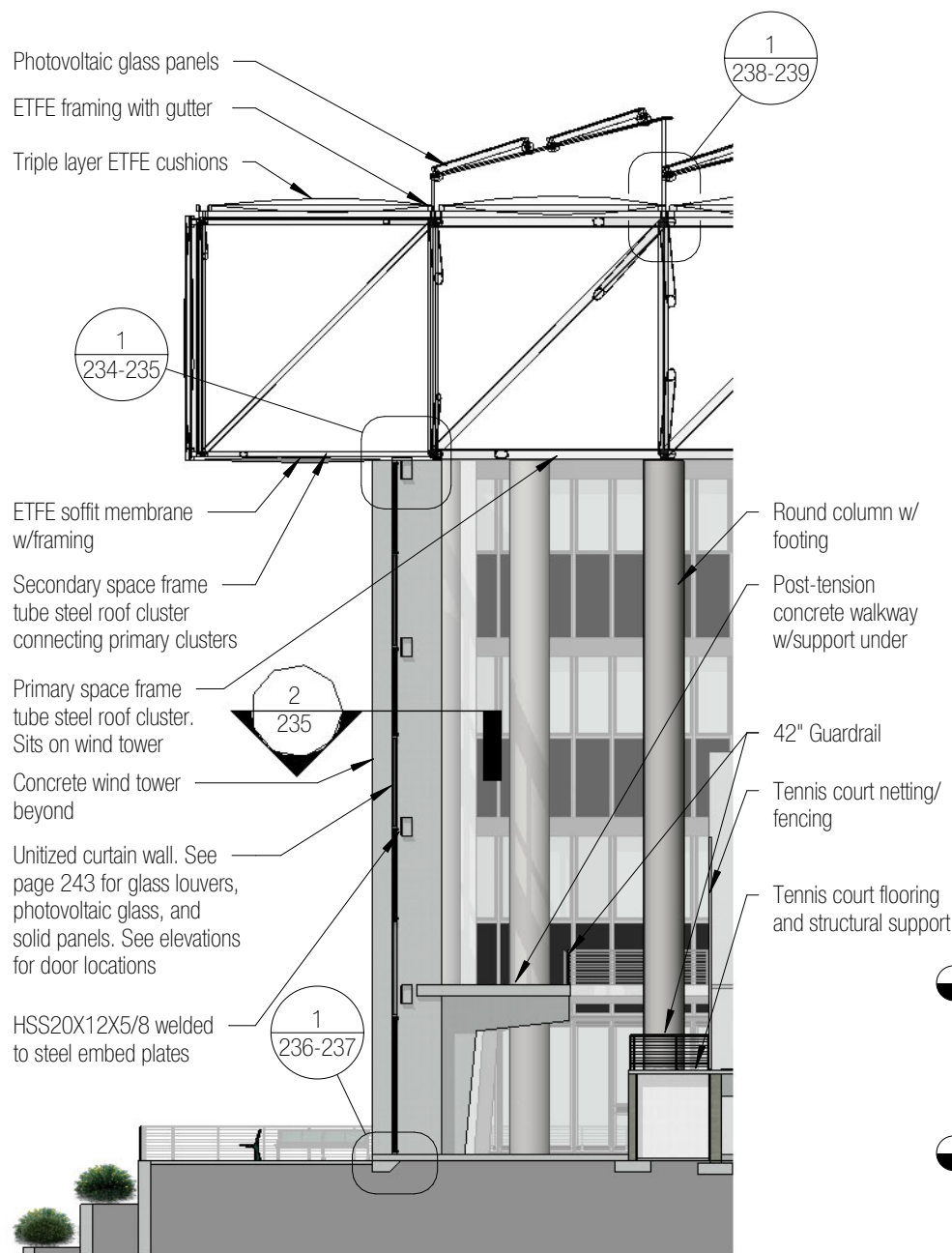
1 East Exterior Elevation
1" = 40'-0"



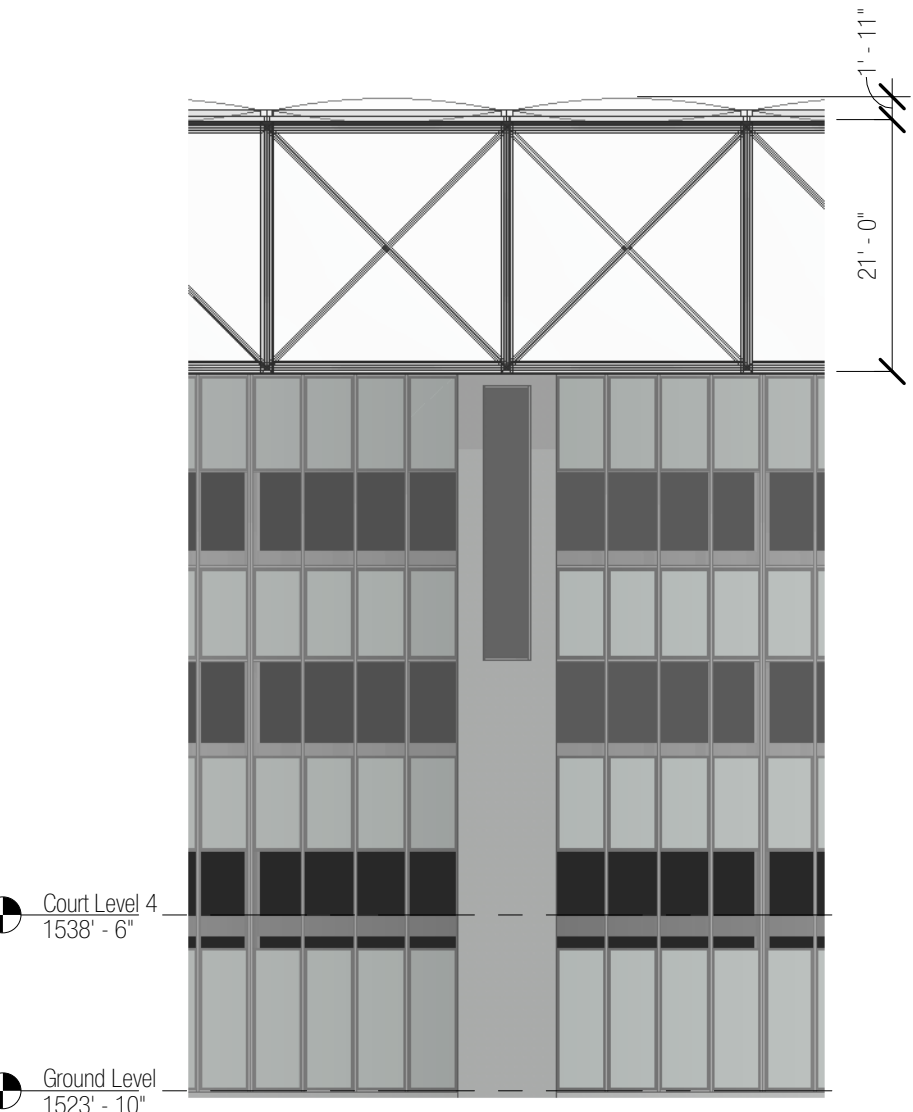
2 West Exterior Elevation
1" = 40'-0"

0 10' 20' 40' 80'
SCALE: 1"=40'-0"

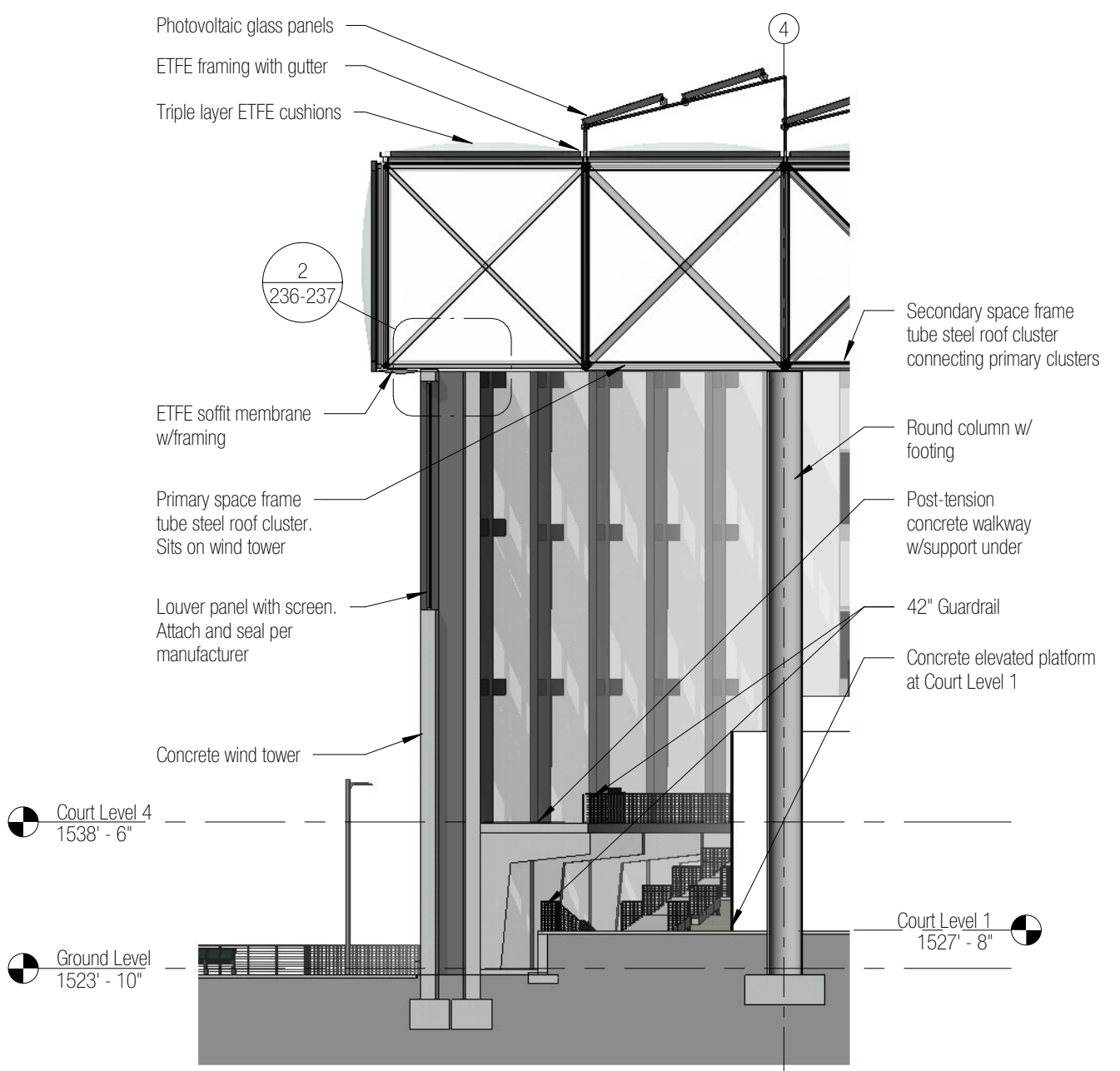
WALL SECTION & PARTIAL ELEVATION



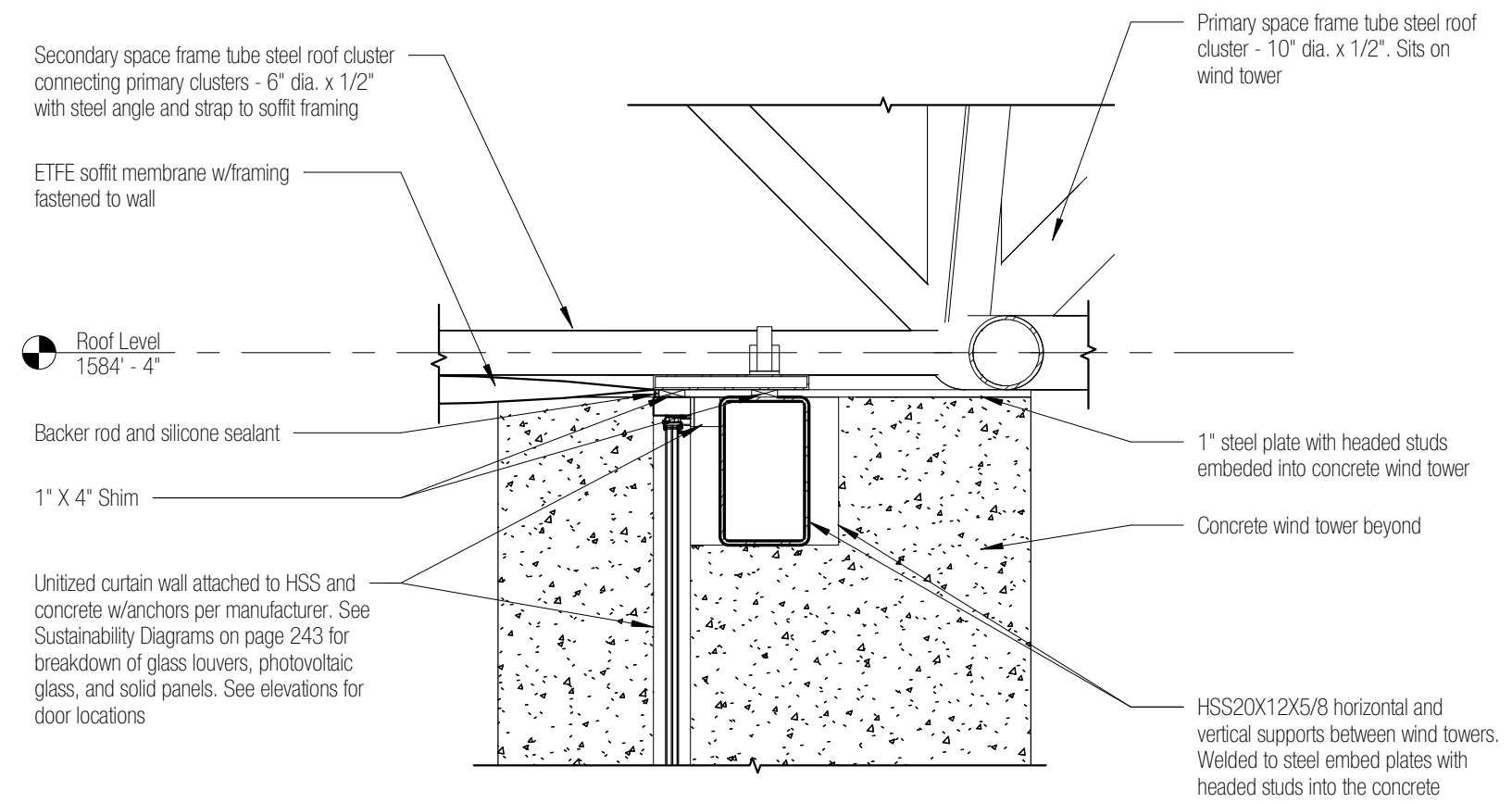
1 Exterior Wall Section
 1/16" = 1'-0"



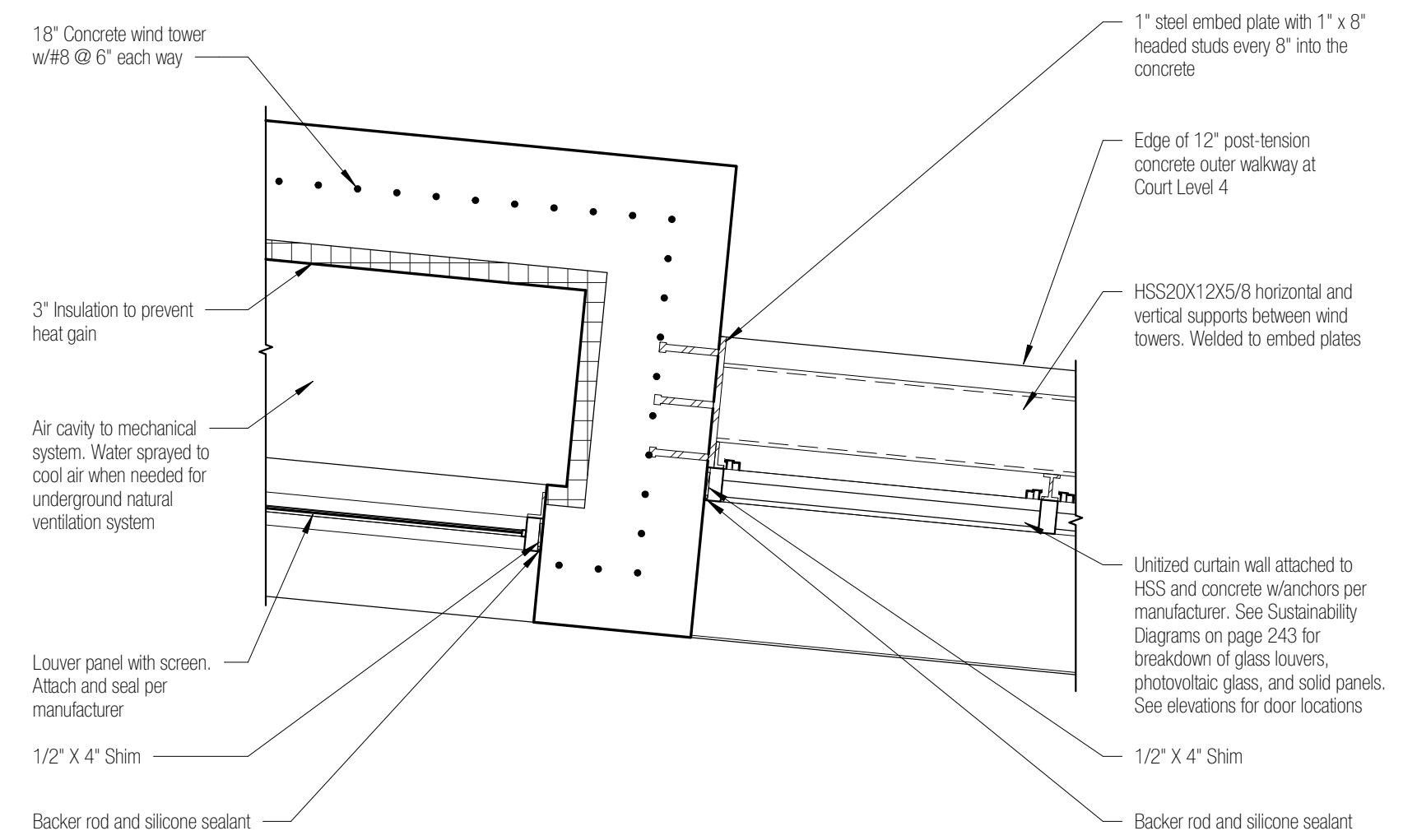
2 Exterior Partial Wall Elevation
 1/16" = 1'-0"



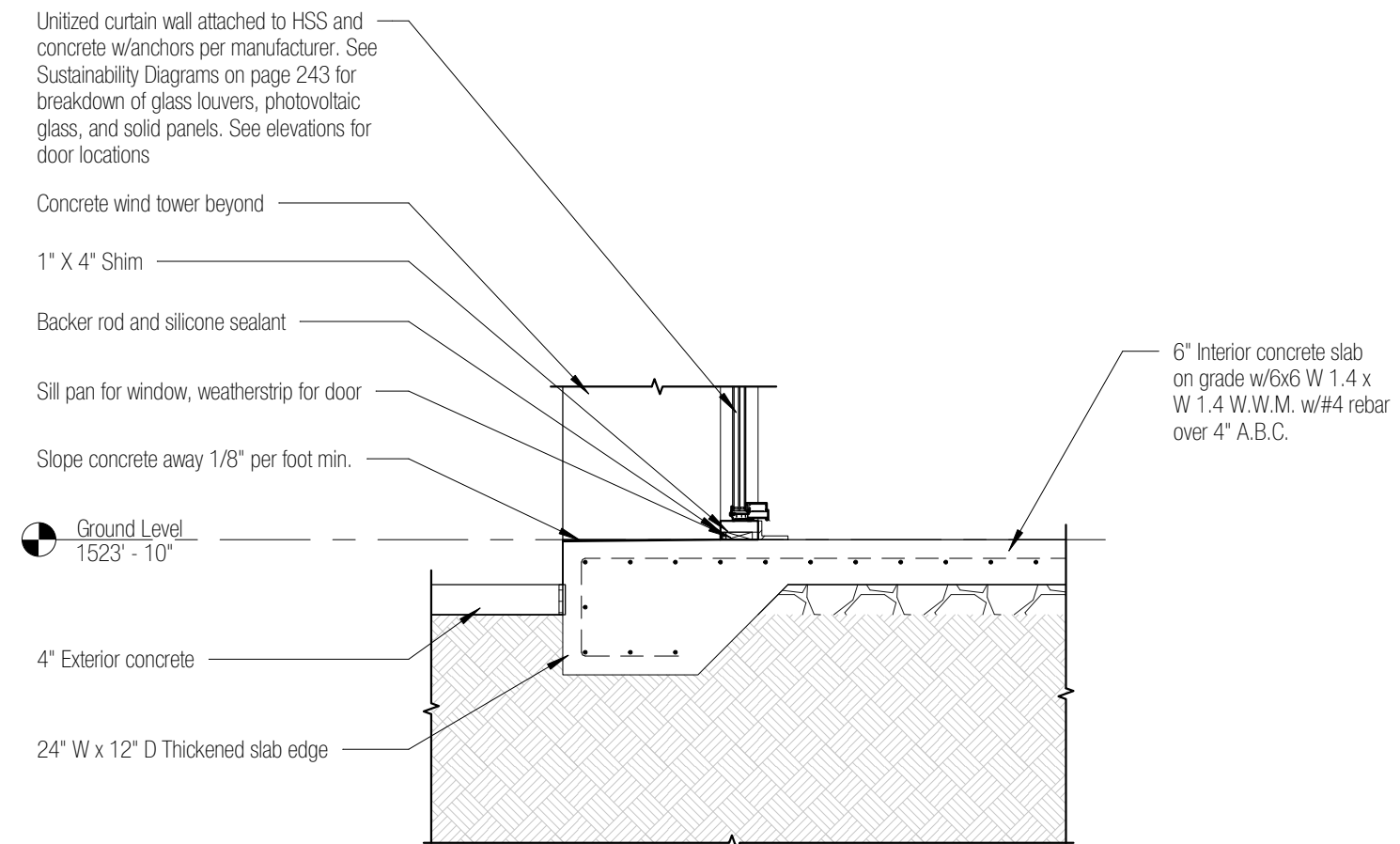
3 Window Tower Section
 1/16" = 1'-0"



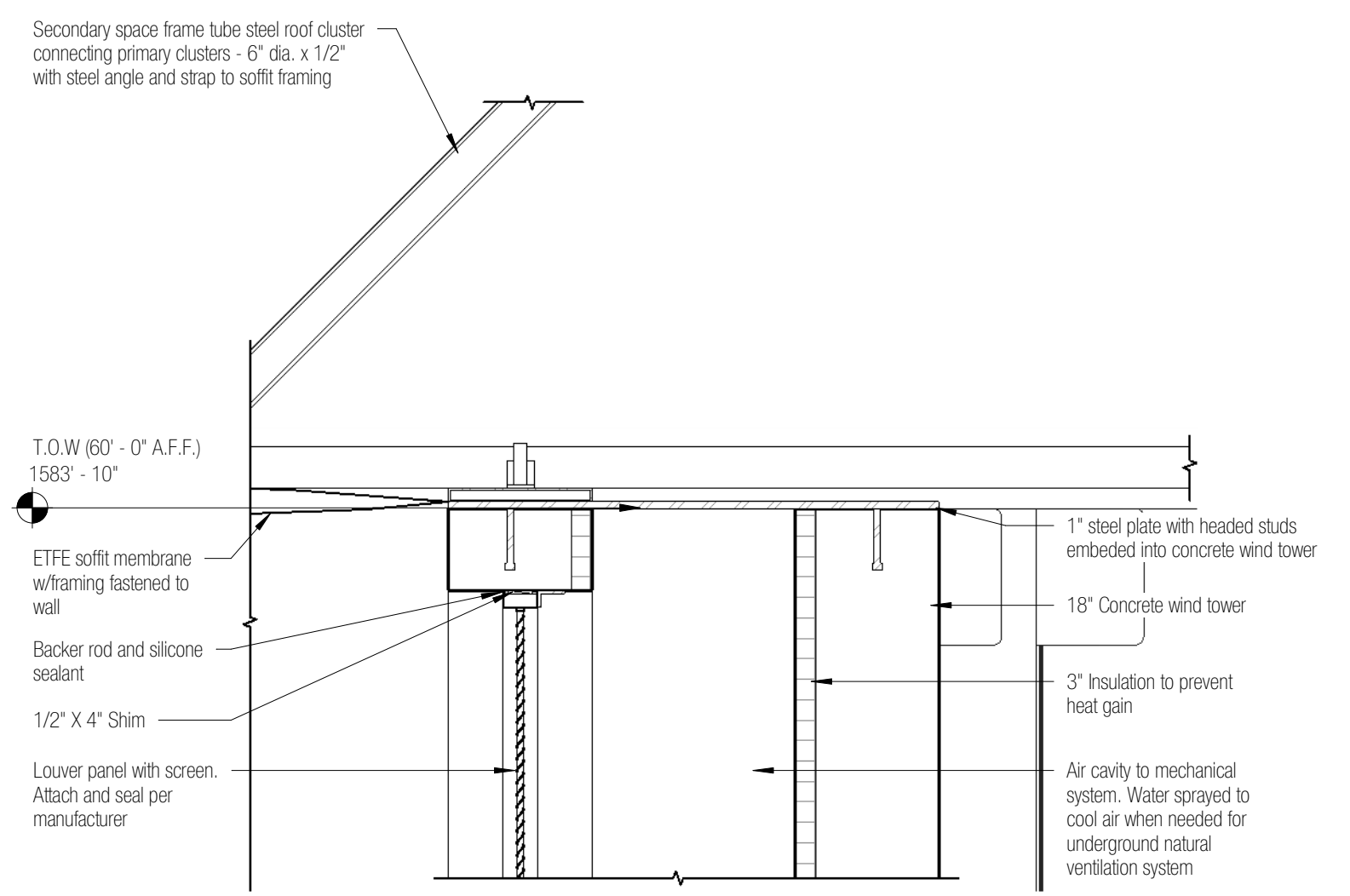
1 Envelope Detail - Roof Connection and Window Header
1/2" = 1'-0"



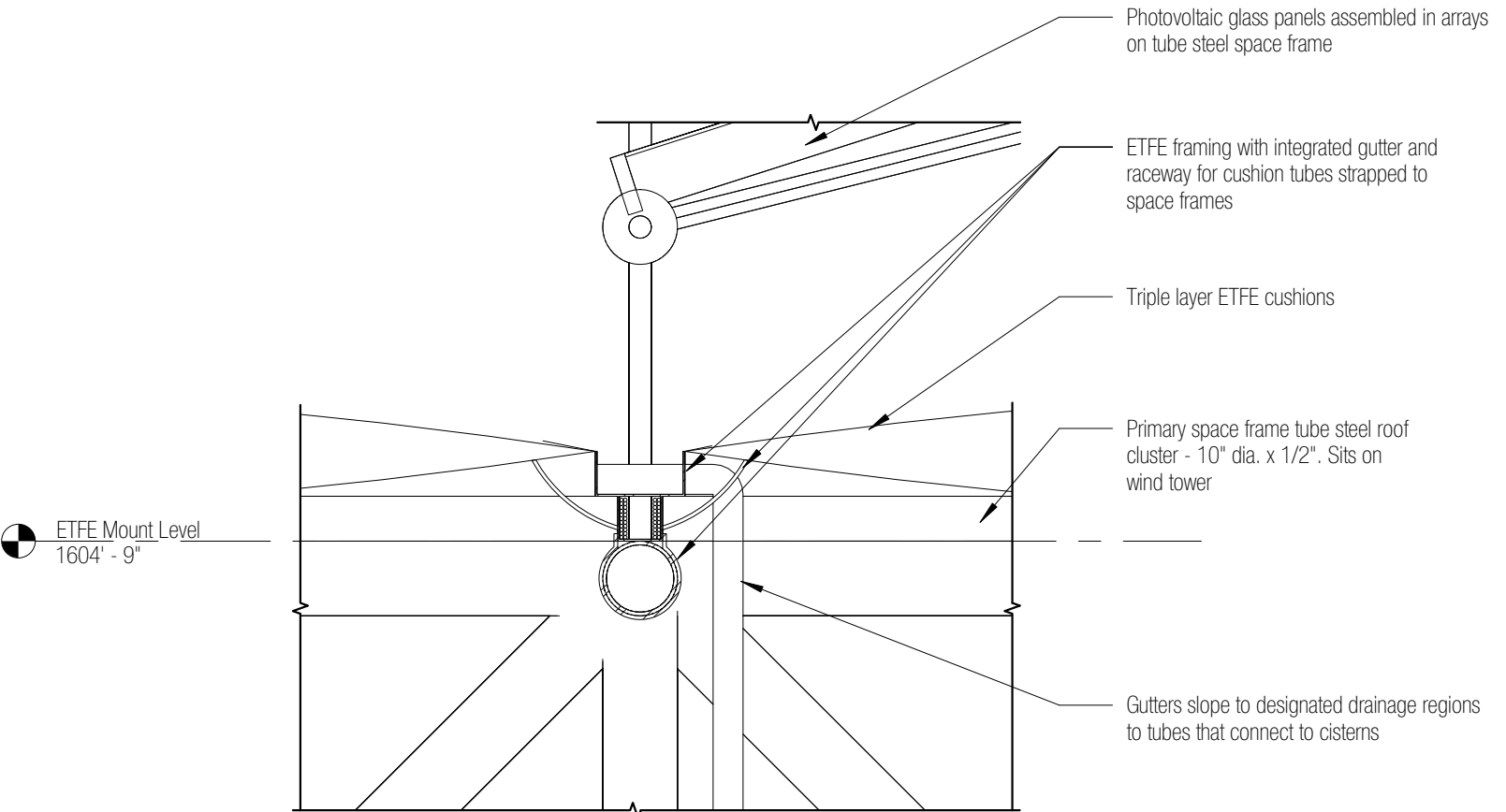
2 Envelope Detail - Louver and Window Jamb
1/2" = 1'-0"



1 Envelope Detail - Foundation and Window Sill
1/2" = 1'-0"

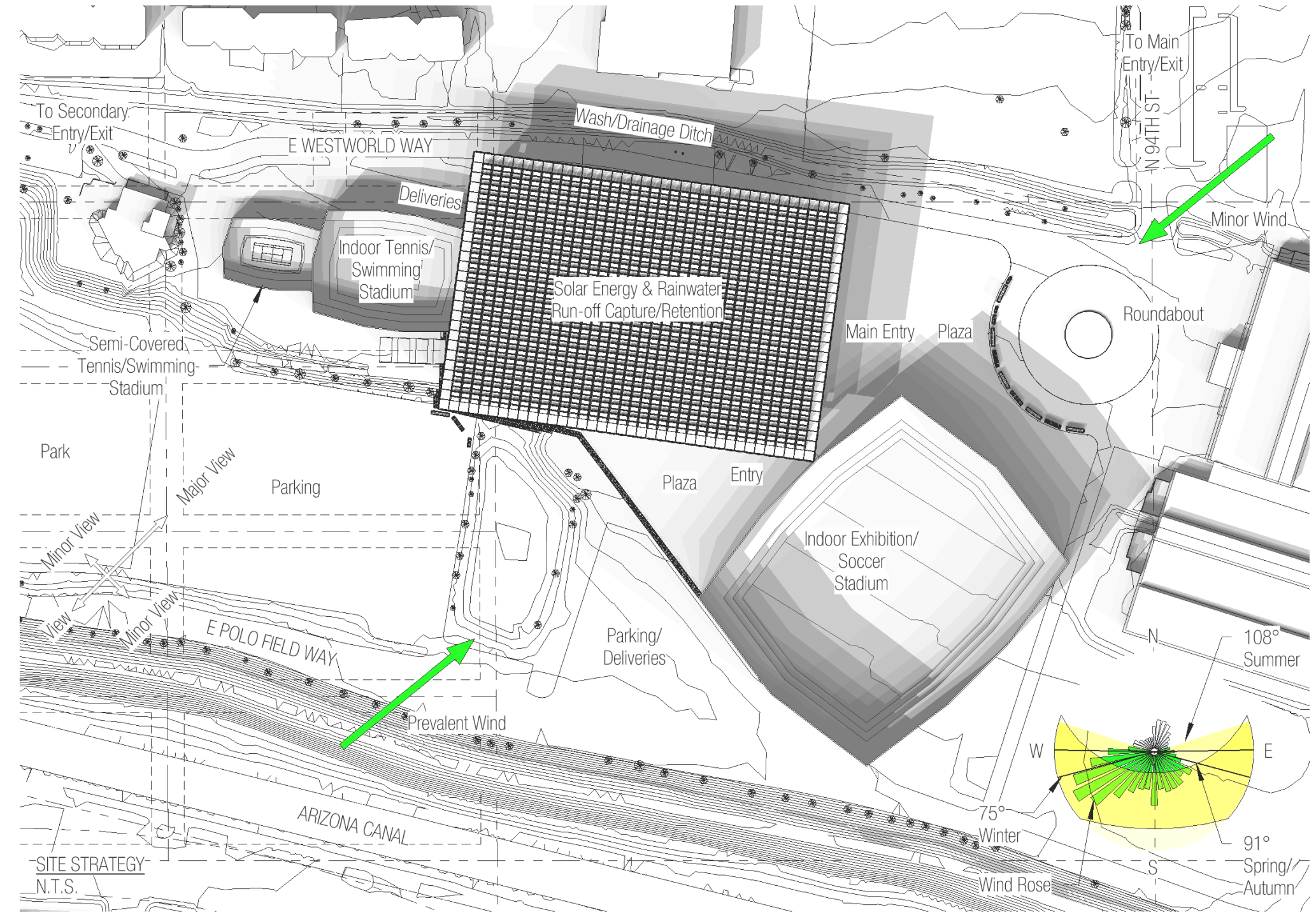


2 Envelope Detail - Wind Tower and Roof Connection
1/2" = 1'-0"

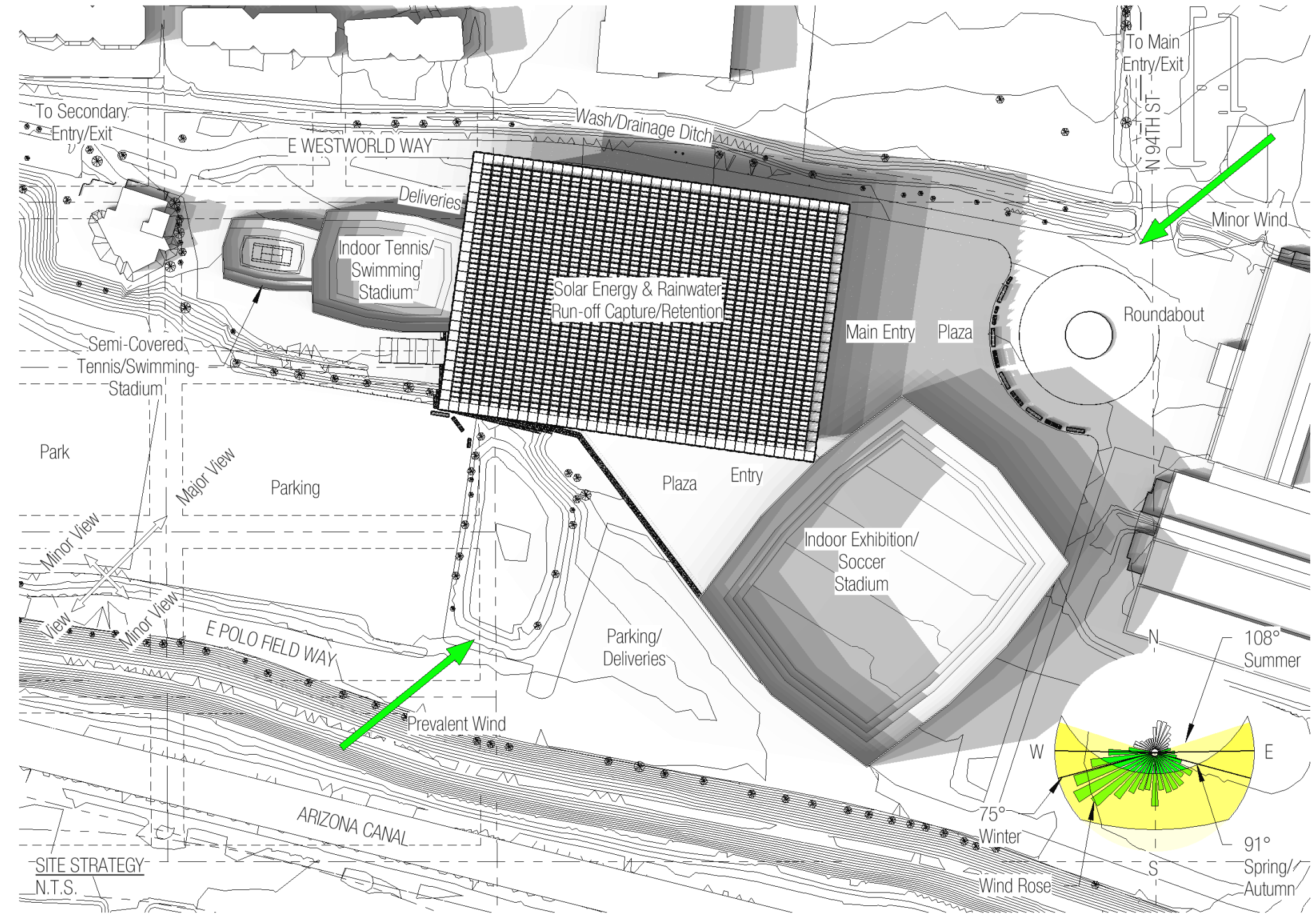


1 Envelope Detail - ETFE Roof/Gutter
1/2" = 1'-0"

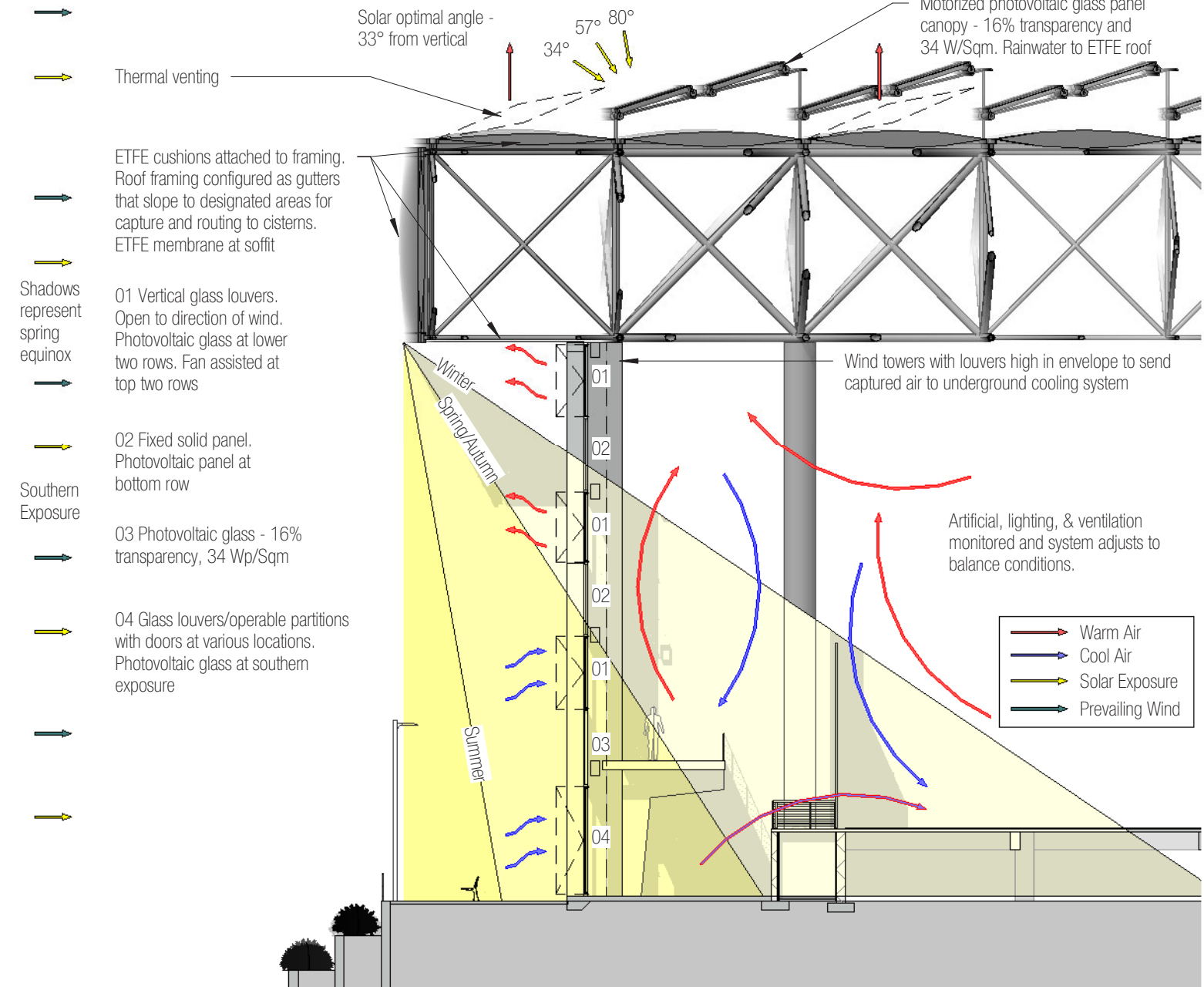
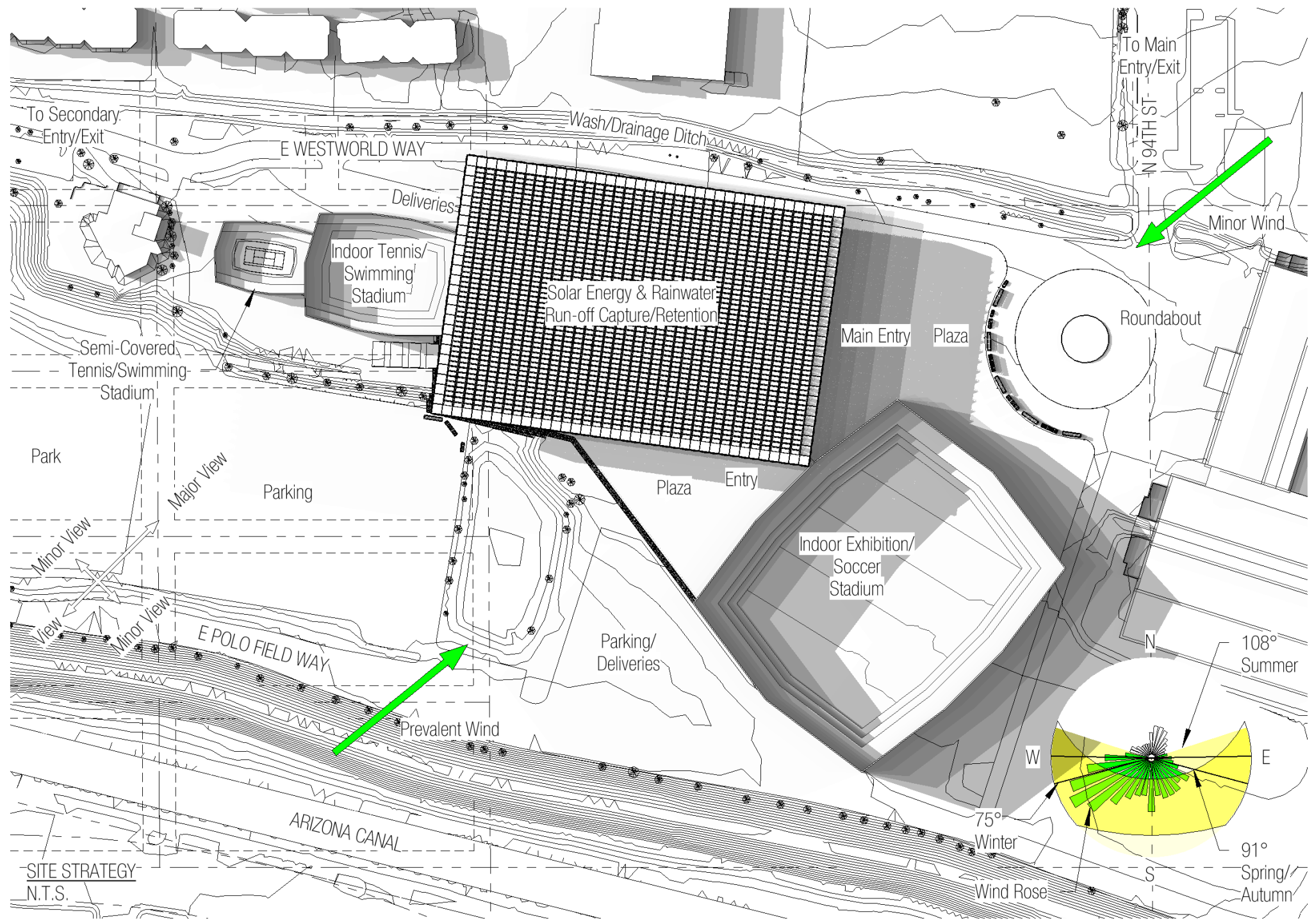
Winter Solstice Solar Study



Spring/Fall Equinox Solar Study

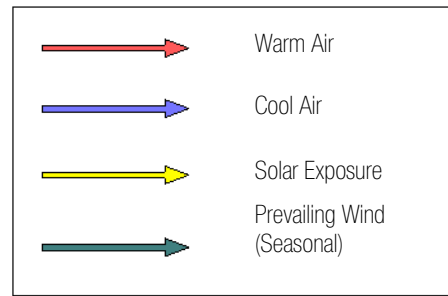


Summer Equinox Solar Study



BUILDING ENVELOPE STRATEGY
N.T.S.

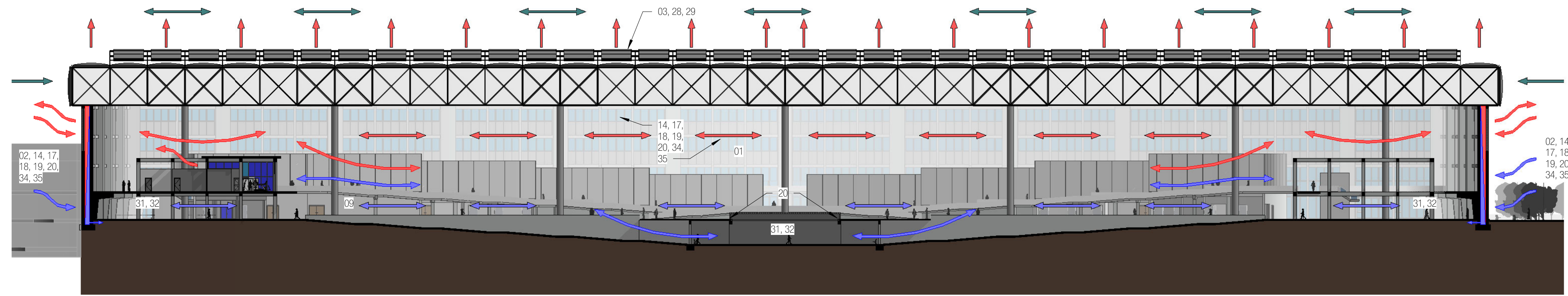
- Focus Areas/Goals
- Integrated and holistic approach between climate, context, materials, forms, and systems
 - Primarily Regenerative, Secondary Net-Zero
 - Passive before active mechanical
 - Living Building Challenge 4.0 - Certified Living
 - LEED 4.1 Platinum



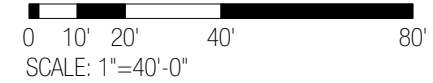
- Orientation & Massing
- 01 Interior open campus/plan configuration
 - 02 Optimize wind and solar exposure for ventilation and solar energy
 - 03 Building mass or structure shading
 - 04 Building footprint reduction (programming and buildings, increase density of existing)
 - 05 Parking footprint reduction*
- Site & Water
- 06 Water metering and reduction strategies (restrooms and restaurant)
 - 07 Gray/ground/rain water retention and reuse management*
 - 08 Heat island and light pollution reduction
 - 09 Open visually and physically on ground floor, connect with site
 - 10 Provide opportunities for activities inviting at public facing sides
 - 11 Natural and native vegetation*
 - 12 Green/electrical vehicle parking*
 - 13 Rideshare/public transportation designated area

- Ventilation
- 14 Efficient passive (priority) and mechanical ventilation (slow moving fans at top two rows) - seasonal
 - 15 Passive ventilation for exposed areas, outdoor circulation*
- Envelope
- 16 Sustainable materials
 - 17 Fenestration optimized for efficiency, assist in other strategies
 - 18 Automatic/adaptive systems
 - 19 High performance glazing
 - 20 Indoor green (desert) roof/use space
- Materials
- 21 Recyclable, from recycled
 - 22 Low-emitting
 - 23 Waste recycling/reduction program during construction/occupancy
 - 24 Hi-tech and innovative materials and building systems

- Lighting & Power
- 25 Daylighting with controls to offset power demand
 - 26 LED, blue light filtered
 - 27 Efficient equipment selection
 - 28 Solar collection, wind capture, and storage (building use)
 - 29 Power provided from sun with on-site systems or green energy source backup (utility)
 - 30 Charging stations for electric vehicles*
- Heating & Cooling
- 31 Partial floor temperature regulation (under 8')
 - 32 Radiant heating and under floor cooling
 - 33 Minimize ignition-based fuel source for heating
 - 34 HVAC performance management system
 - 35 System changes to adapt to changing conditions
 - 36 Indoor air quality monitoring
- * Master Plan Area



1 Sustainability Diagram
1" = 40'-0"



Living Building Challenge (LBC 4.0)¹

SUMMARY MATRIX

The Living Building Challenge is composed of 20 Imperatives grouped into seven petals. Some Imperatives are not required for all Typologies.

PETAL	IMPERATIVE	TYPOLOGY			
		New Building	Existing Building	Interior	Landscape + Infrastructure
PLACE	1 Ecology of Place	Imperative Required	Requirement Dependent	Not Required	Imperative Required
	2 Urban Agriculture	Imperative Required	Imperative Required	Not Required	Not Required
	3 Habitat Exchange	Imperative Required	Imperative Required	Imperative Required	Imperative Required
	4 Human Scaled Living	Imperative Required	Requirement Dependent	Requirement Dependent	Not Required
WATER	5 Responsible Water Use	Imperative Required	Imperative Required	Imperative Required	Imperative Required
	6 Net Positive Water	Imperative Required	Imperative Required	Not Required	Imperative Required
ENERGY	7 Energy + Carbon Reduction	Imperative Required	Imperative Required	Imperative Required	Imperative Required
	8 Net Positive Energy	Imperative Required	Imperative Required	Imperative Required	Imperative Required
HEALTH + HAPPINESS	9 Healthy Interior Environment	Imperative Required	Imperative Required	Imperative Required	Not Required
	10 Healthy Interior Performance	Imperative Required	Imperative Required	Imperative Required	Not Required
	11 Access to Nature	Imperative Required	Imperative Required	Imperative Required	Not Required
MATERIALS	12 Responsible Materials	Imperative Required	Imperative Required	Imperative Required	Imperative Required
	13 Red List	Imperative Required	Imperative Required	Imperative Required	Imperative Required
	14 Responsible Sourcing	Imperative Required	Imperative Required	Imperative Required	Imperative Required
	15 Living Economy Sourcing	Imperative Required	Imperative Required	Imperative Required	Imperative Required
	16 Net Positive Waste	Imperative Required	Imperative Required	Imperative Required	Imperative Required
EQUITY	17 Universal Access	Imperative Required	Requirement Dependent	Requirement Dependent	Requirement Dependent
	18 Inclusion	Imperative Required	Imperative Required	Imperative Required	Imperative Required
BEAUTY	19 Beauty + Biophilia	Imperative Required	Imperative Required	Imperative Required	Imperative Required
	20 Education + Inspiration	Imperative Required	Imperative Required	Imperative Required	Imperative Required

- CORE IMPERATIVE
- SCALE JUMPING ALLOWED
- HANDPRINTING IMPERATIVE
- IMPERATIVE REQUIRED FOR TYPOLOGY
- REQUIREMENT DEPENDENT ON SCOPE
- NOT REQUIRED FOR TYPOLOGY

Sources:
 1. "Living Building Challenge 4.0 Basics." International Living Future Institute, February 20, 2020. <https://living-future.org/lbc/basics4-0/>.

Place Petal

Imperative 1 - Ecology of Place

This project is intended to replace part of an existing development with a high density one and to convert some land into agriculture use for the community garden and desert preservation and reclamation. The master plan area also aims to reconfigure parking and allow for future expansion in existing disturbed areas.

The Tennis Facility and the adjacent master planned structures enhance the existing use of the site and provide for growth opportunities and further engagement of the site and facilities by the community and visitors including a community garden and education center.

Imperative 2 - Urban Agriculture

The designated area of the master plan area will be used for a community garden to be access by applicable parties to provide healthy and local food to community organizations and residents. Educational opportunity in the community and through local schools for students and their families will be made available including workshops.

Imperative 3 - Habitat Exchange

Redevelopment of the master planned site would allow for the opportunity to set land aside for preservation in an area greater than the project area.

Imperative 4 - Human Scaled Living

Project increases the density of the existing site and the master planned area connexcts the project in a greater way to encourage pedestrian use and connection to existing amenities in the area through transit access points. The project adds places for occupants to gather and connect with each other, including the community. Dry storage for human-powered vehicles and facilities for showering and lockers are provided. Sufficient electrical vehicle charging stations are provided in multiple locations. Existing parking will be condensed into multi-story parking garages and shuttles and tram access to the main facilities as no parking will be provided for the proposed project at the building site. Existing asphalt, loose gravel (except as required for the equestrian center), and impervious surfaces to be converted to pervious and required planted areas with native and desert/arid vegetation to be provided.

Water Petal

Imperative 5 - Responsible Water Use

Tennis Facility and master planned adjacent buildings:

Low flow faucets, showeheads, and toilets, greywater recycling for non-potable water uses including irrigation, closed loop system for on-site treatment of blackwater. Blackwater is treated and used on-site or by others off-site.

Imperative 6 - Net Positive Water

Master planned site is an existing area retention basin and drainage area with a long history of development and use.

Tennis Facility and adjacent master planned buildings will capture rainwater/stormwater from roofs, and on-site flows and retain them in storage tanks, treated as required, and available for use on-site and connected to municipal water on in case nothing other option is available such as drought or less than expected rainwater/stormwater production. Excess capacity can be used to provide for demand of existing structures and potentially future development.

Energy Petal

Imperative 7 - Energy + Carbon Reduction

Construction and building materials, processes, and products shall reduce energy and carbon consumption, including embodied carbon. Battery storage of on-site electric generation and other forms of energy including biogas and underground heating and cooling systems from natural ventilation. Adopt passive before active strategy.

Imperative 8 - Net Positive Energy

Photovoltaic panel inserts and solar glass to provide power generation. Excess demand to be filled by power company's green power options or carbon offsets. Excess capacity is stored for use by the project and master plan area, used in future development, and sent to the grid. Estimated 300kWh demand at 1 watt per square foot. System capacity expected to be no less than 700kWh based upon chosen glass and square footage of surface area provided.

SUSTAINABILITY STRATEGY

Health + Happiness Petal

Imperative 9 - Healthy Interior Environment

The project shall be in compliance with ASHRAE 62 current version, put together a Healthy Indoor Environment Plan, Prohibit smoking in buildings and enclosed spaces and within 25' of building openings and air supply vents, daylighting strategies through the use of floor to ceiling and clerestory windows, direct exhaust for restrooms and kitchens, and include environmentally friendly and certified products such as Declare. labels and/or another acceptable certification.

Imperative 10 - Healthy Interior Performance

Indoor Air Quality tests to consist of readings from an indoor air quality system that is continuously monitored. The project shall comply with the CDPH Standard Method v1.1-2010 for 90% of interior building products with potential for emitting volatile organic compounds (VOCs). A cleaning protocol to be implemented using cleaning products that comply with the EPA Safer Choice label.

Imperative 11 - Access to Nature

Nearby trail system, plenty of glass and ventilation and physical access between exterior and interior.

The windows allow for views of nature and the property has greens paces, including the community garden with outdoor seating that allows someone and opportunities to step outside for fresh air and to enjoy those areas. Building occupants in non-accessory areas are not far from daylighting, views, natural ventilation, and ease of physical access between exterior and interior which the plan encourages.

Materials Petal

Imperative 12 - Responsible Materials

Electing targeting of all Materials Imperatives so this section is superseded by Imperatives 13-16.

Imperative 13 - Red List

Products are intended to be Red List-free but may be subject to exceptions due to availability or proprietary claims. The precautionary principle shall rule otherwise.

Imperative 14 - Responsible Sourcing

Products are intended to be responsibly sourced per various certifications as part of the LBC program. Non-conforming products should be changed.

Materials Petal (continued)

Imperative 15 - Living Economy Sourcing

Materials are to be primarily locally sourced with various percentages restricting distances.

Imperative 16 - Net Positive Waste

Materials Conservation Plan to be implemented to explain how project materials are to be optimized in the project phases and divert materials from the landfill through various programs to integrate waste back into an industrial or natural process loop.

Equity Petal

Imperative 17 - Universal Access

The project implements a strategy where all open spaces are accessible to the public including seating and ADA accessible bathrooms and drinking fountains for public use. Project is ADA accessible without separate entrances or paths. Multiple levels are accessible without the need for stairs and elevators but are provided for emergencies and moving equipment. Areas of Refuge are provide at each stair location. The project also allows access to the project for the public to access eath plaza and can enter the building. During certain times, the training area and courts may be closed off but the open circulation areas and the museum will remain open. The project does not impede access to sunlight or air for adjacent buildings and properties and is less than the height of the existing tent structure to be demolished. The project also does adversely affect the air quality through noxious emmissions preventing adjacent properties from using natural ventilation. The project also does not emit noise pollution in excess of what is expected from operation and will takes measures to mitigate as needed during special events when activities are held outdoors.

Imperative 18 - Inclusion

The project will create consistent and high-paying jobs with job security for the local community and support local, diverse businesses in transacting business. Project team organizations will also have or will obtain a Just label with integral roles in the design and construction phases with five others to complete the self-assessment process. The project will contract with Just organizations with diversity categories, participate in workforce programs, and/or donate 0.1% of the project costs to a regional or community-based non-profit that focuses on equity and inclusion.

Beauty Petal

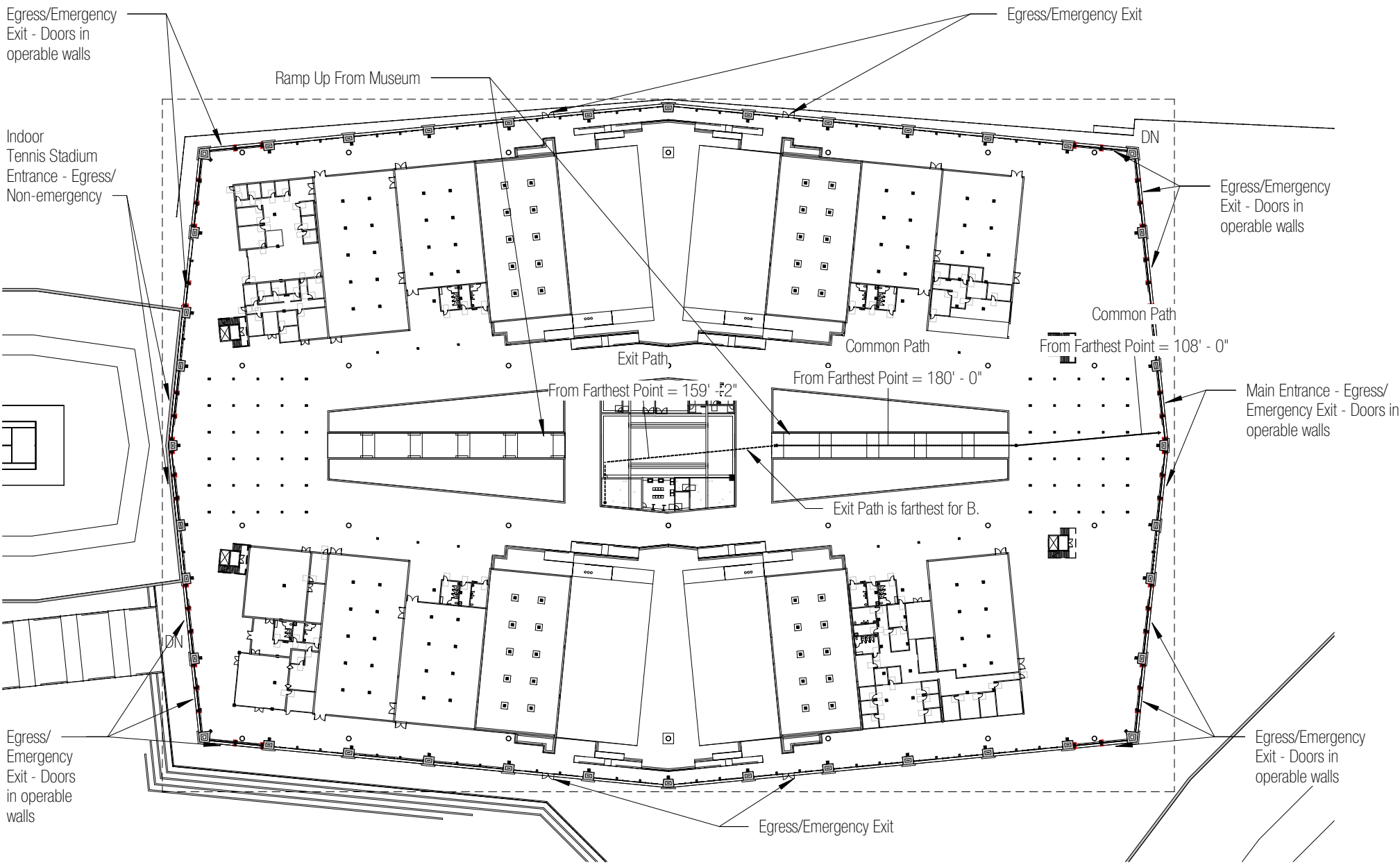
Imperative 19 - Beauty + Biophilia

The project takes clues from the local and regional environment being in an arid desert climate, in particular the Saguaro cactus, natural vegetation, and the natural ventilation the desert can provide while harnessing the power of the sun and capturing, using, and reusing rainwater and stormwater. A connection with nature has been established and encourages the human/nature connection through the plazas that open up as well as the other means of egress that are meant to encourage easily crossing between the exterior and interior, greenspaces through the accessible existing park, community garden, views from multiple vantage points, daylighting, natural materials and processes, and the inclusion in water for assisting natural ventilation and enjoyment by the occupants and guests. The project shall the incorporate other required elements of this Imperative including project teams engaging in a day of exploration to discover additional oppportunities in the biophilic framework such as including nature in Environmental Features, Light and Spare, and Natural Shapes and Forms; incoporating Natural Patterns and Processes and Evolved Human-Nature Relationships.; and connection to place, climate, and culture through Place-Based Relationships and including public art exhibition and features intended for the delight by humans and celebrating the culture, spirit, and place appropriate for the project. These opportunities including the museum that explores the rich and diverse history of the sport of tennis.

Imperative 20 - Education + Inspiration

Part of the function of the project is education for the community garden as well as the training facility for learning a sport and what it takes to become an athlete at various levels and research and development through the training program. There are outreach and educational programs, along with tours, that will be offered to the public, the community, and academic programs from early education to the univerisity level for the sports activities as well as how the building functions in an environmentally friendly way. The project shall also comply with the other requirements of this Imperative including a LBC Cast Study, annual open house, a copy of operations and maintenance manuals, a brochure about the related design and features, interpretive signage that teaches elements of the project, and develop and make public a website about the project.

EGRESS DIAGRAM

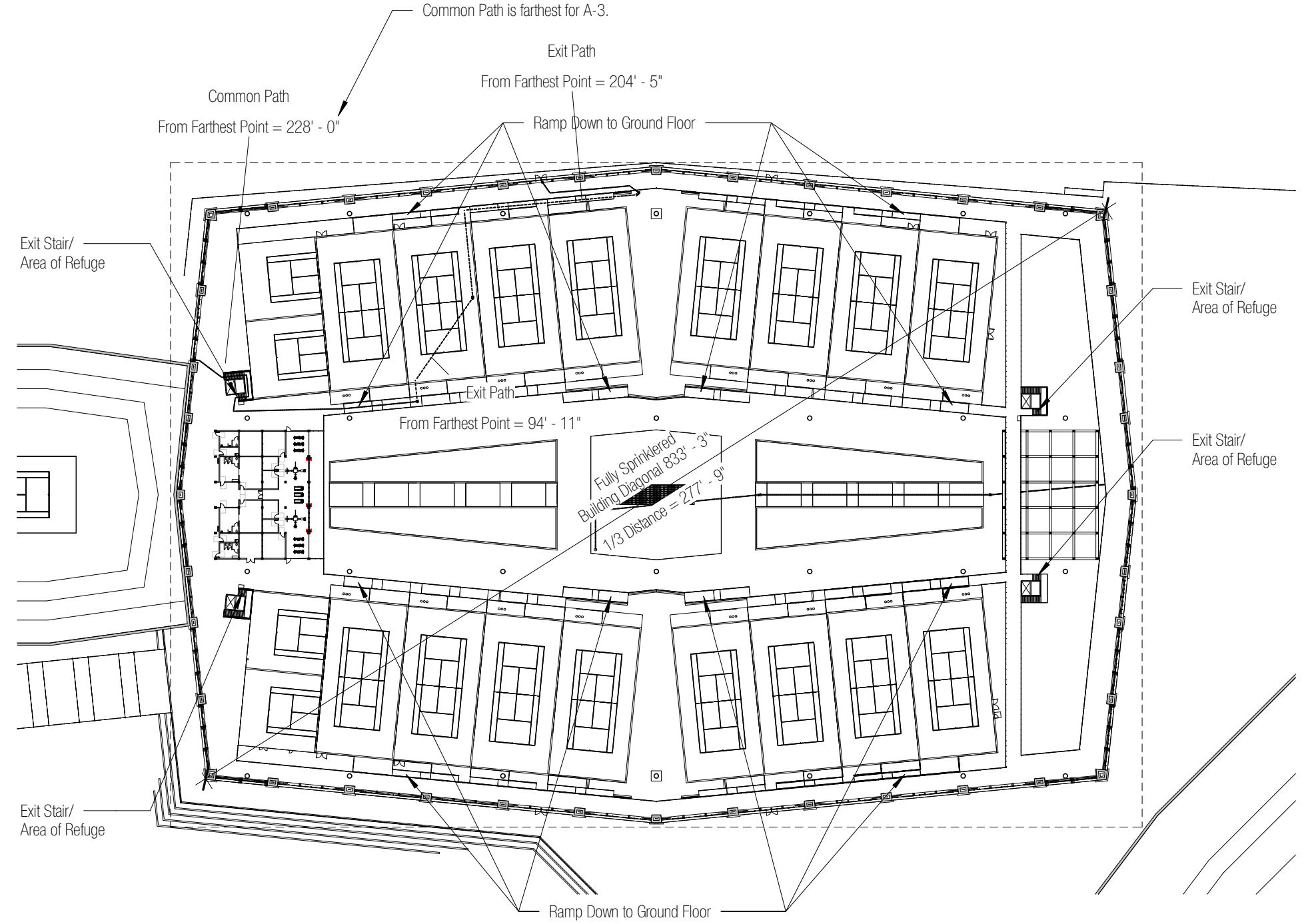


0 25' 50' 100' 200'
SCALE: 1" = 100'-0"

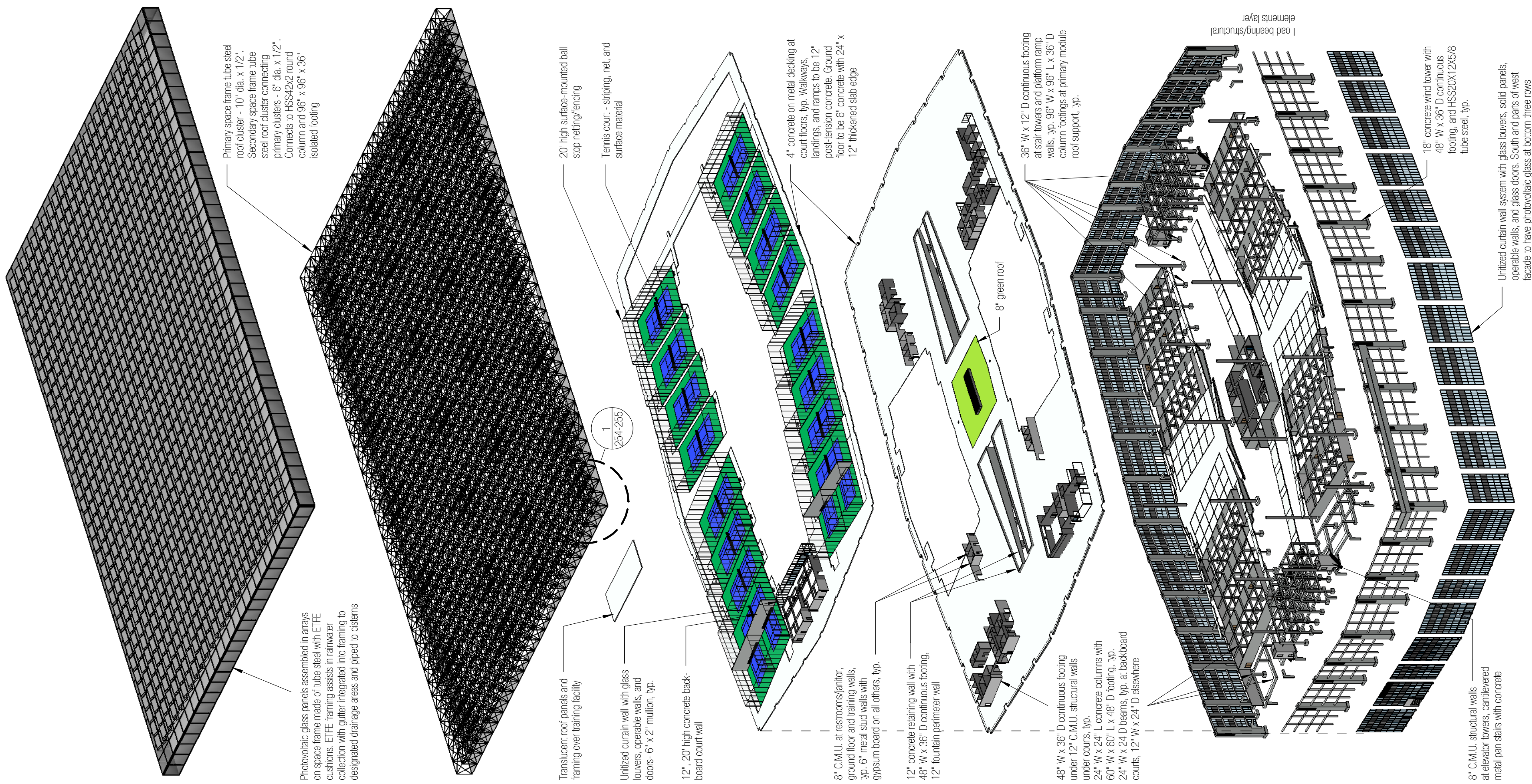
For occupant loads, calculations, and other information, please see pages 100-105.

Accessibility: The project implements a strategy where all open spaces are accessible to the public including seating and ADA accessible bathrooms and drinking fountains for public use. Project is ADA accessible without separate entrances or paths. Multiple levels are accessible without the need for stairs and elevators but are provided for emergencies and moving equipment. Areas of Refuge are provide at each stair location.

1 Ground/Museum Level - Egress Diagram
1" = 100'-0"



2 Court Level 1-4 - Egress Diagram
1" = 100'-0"



Primary space frame tube steel roof cluster - 10" dia. x 1/2". Secondary space frame tube steel roof cluster connecting primary clusters - 6" dia. x 1/2". Connects to HSS42x2 round column and 96" x 96" x 36" isolated footing

Photovoltaic glass panels assembled in arrays on space frame made of tube steel with ETFE cushions. ETFE framing assists in rainwater collection with gutter integrated into framing to designated drainage areas and piped to cisterns

20' high surfaces-mounted ball stop netting/fencing

Tennis court - striping, net, and surface material

Translucent roof panels and framing over training facility

1
254-255

Unitized curtain wall with glass louvers, operable walls, and doors- 6' x 2' mullion, typ.

12", 20' high concrete back-board court wall

4" concrete on metal decking at court floors, typ. Walkways, landings, and ramps to be 12" post-tension concrete. Ground floor to be 6" concrete with 24" x 12" thickened slab edge

8" C.M.U. at restrooms/janitor, ground floor and training walls, typ. 6" metal stud walls with gypsum board on all others, typ.

12" concrete retaining wall with 48" W x 36" D continuous footing, 12" fountain perimeter wall

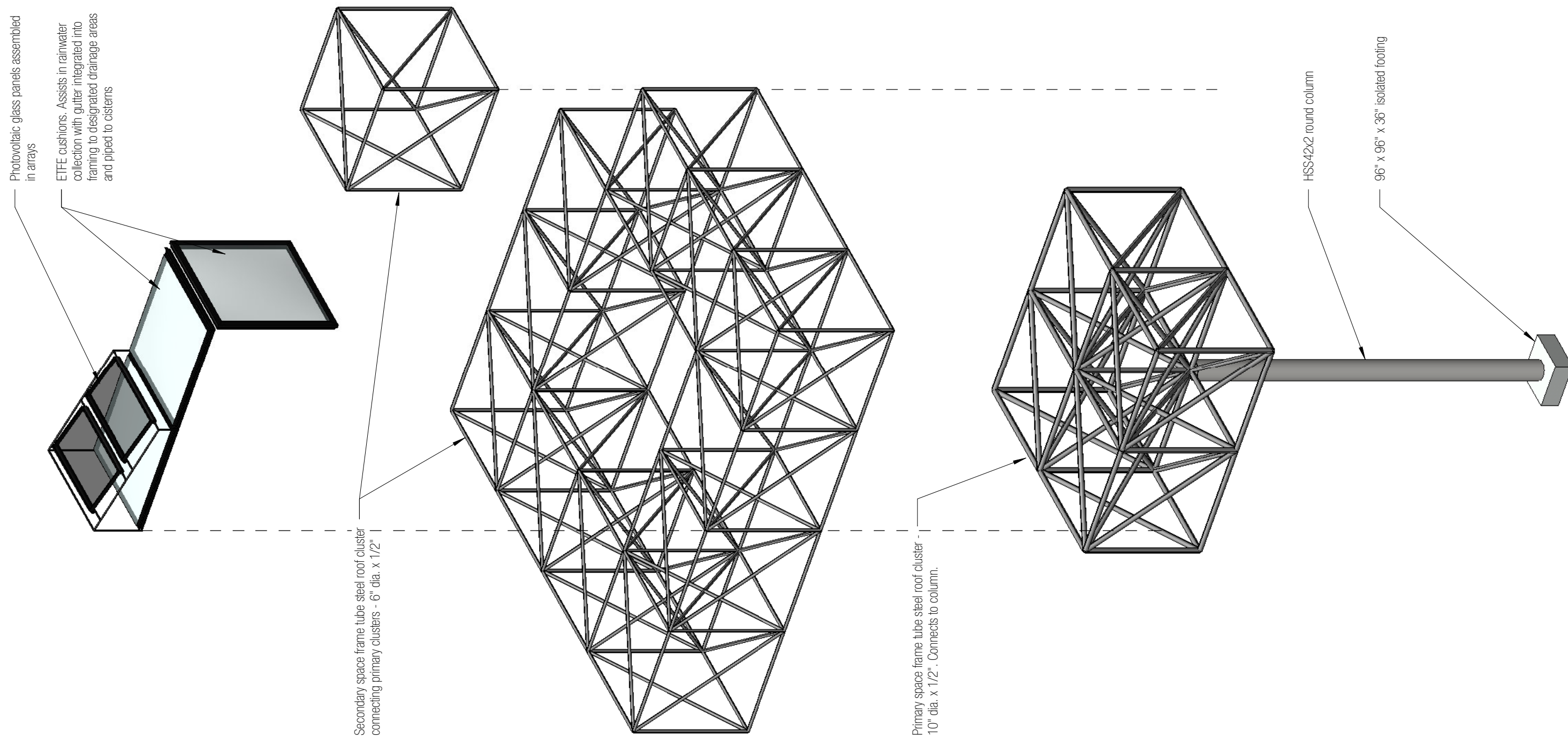
36" W x 12" D continuous footing at stair towers and platform ramp walls, typ. 96" W x 96" L x 36" D column footings at primary module roof support, typ.

48" W x 36" D continuous footing under 12" C.M.U. structural walls under courts, typ. 24" W x 24" L concrete columns with 60" W x 60" L x 48" D footing, typ. 24" W x 24" D beams, typ. at backboard courts, 12" W x 24" D elsewhere

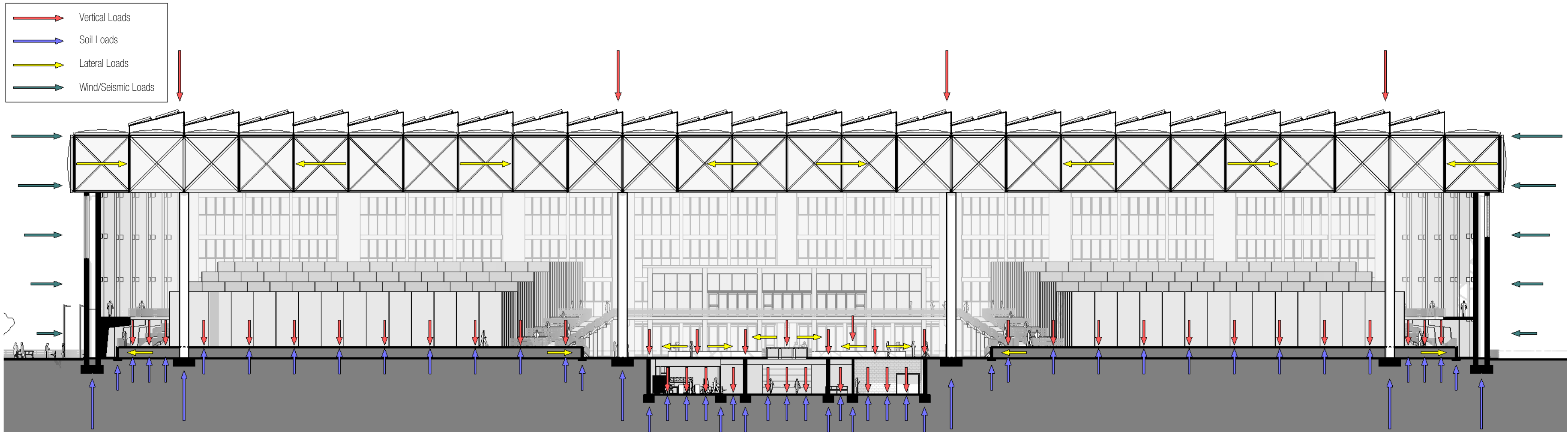
18" concrete wind tower with 48" W x 36" D continuous footing, and HSS20X12X5/8 tube steel, typ.

8" C.M.U. structural walls at elevator towers, cantilevered metal pan stairs with concrete

Note: Concrete to use fly-ash mixture



1 Structural Diagram - Roof Support

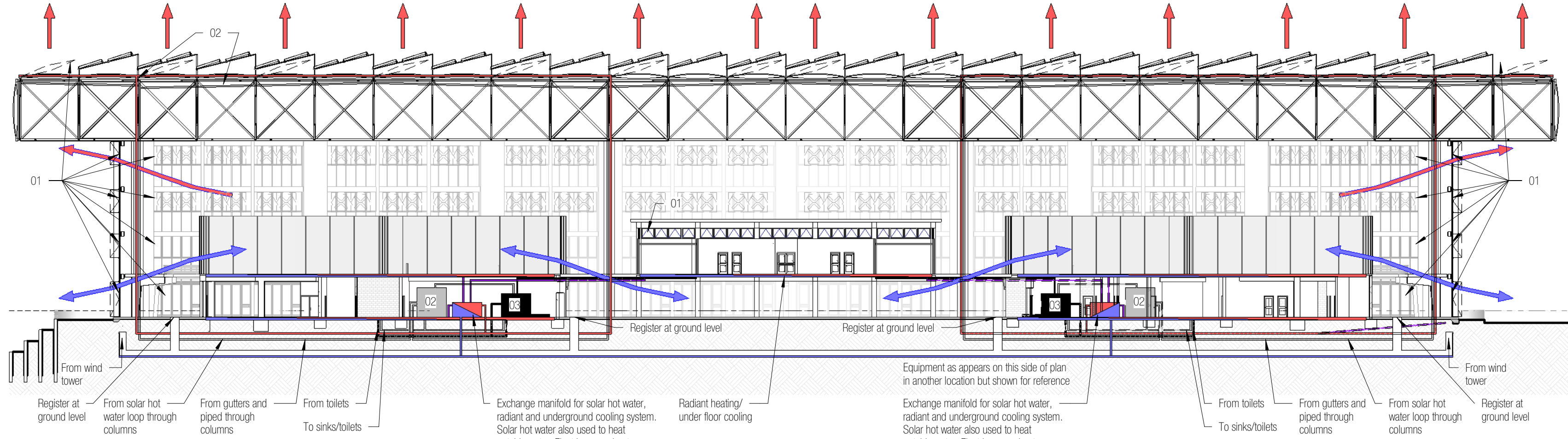
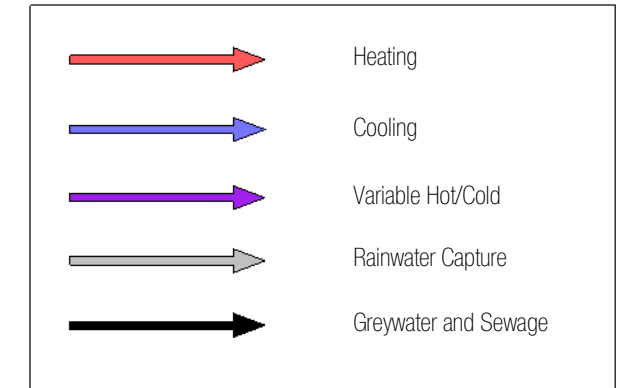


1 Structural North-South Building Section
1" = 30'-0"

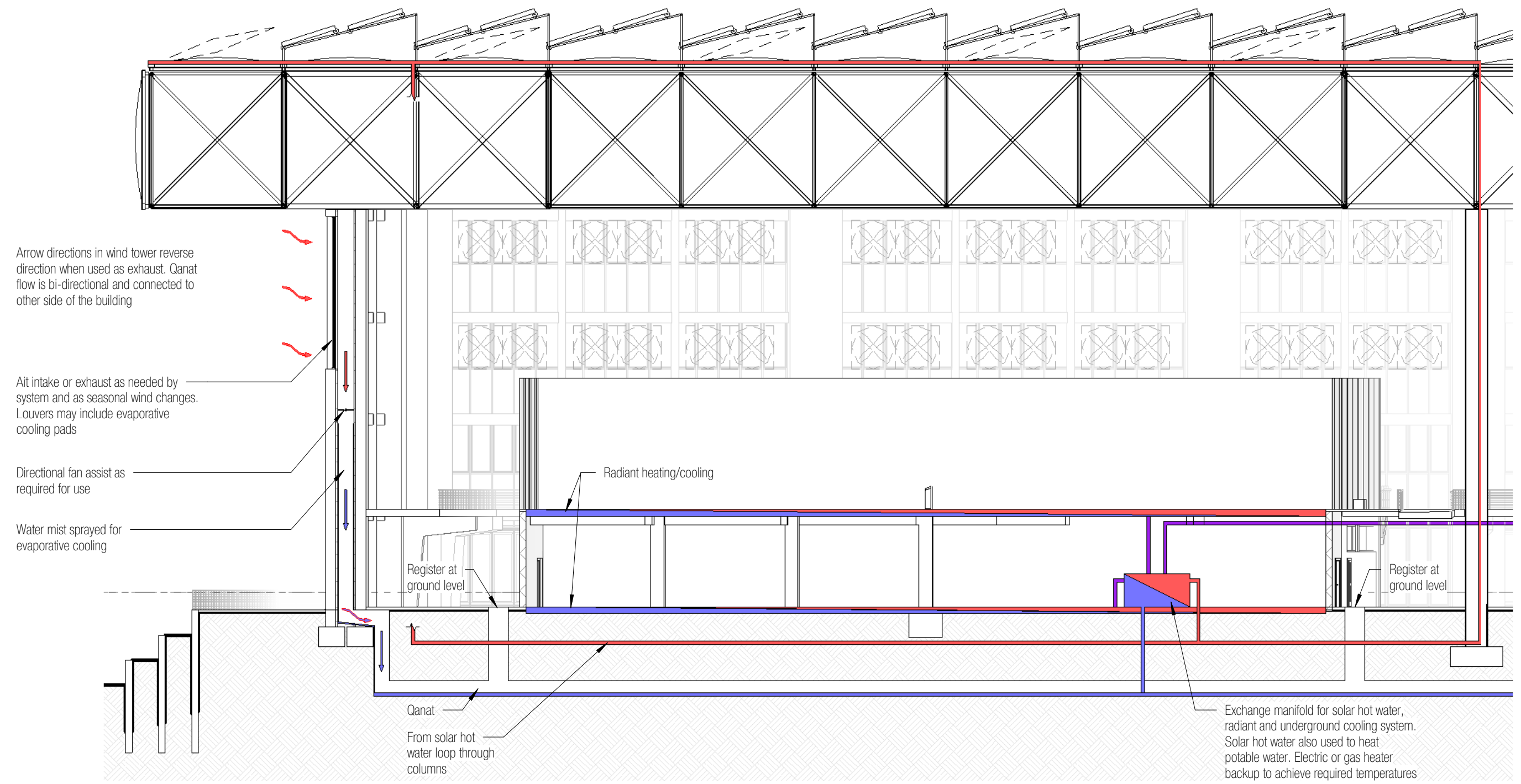
Mechanicals Systems Features

- Passive before active mechanical - active monitoring/auto adjustment (manual override)
- Condition the lower 8'-10' of space where occupied - radiant heating, underfloor/ground cooling
- Water features in central courtyard assist with natural/cooling ventilation (see Sustainability Diagram on pages 242-243)
- Wind towers (see Sustainability Diagram on pages 242-243) provide air to underground system (warm air cooled in towers with water spray), used as system exhaust when needed
- Wind and water captured and conditioned to be used in exchange manifolds for radiant heating and under floor cooling

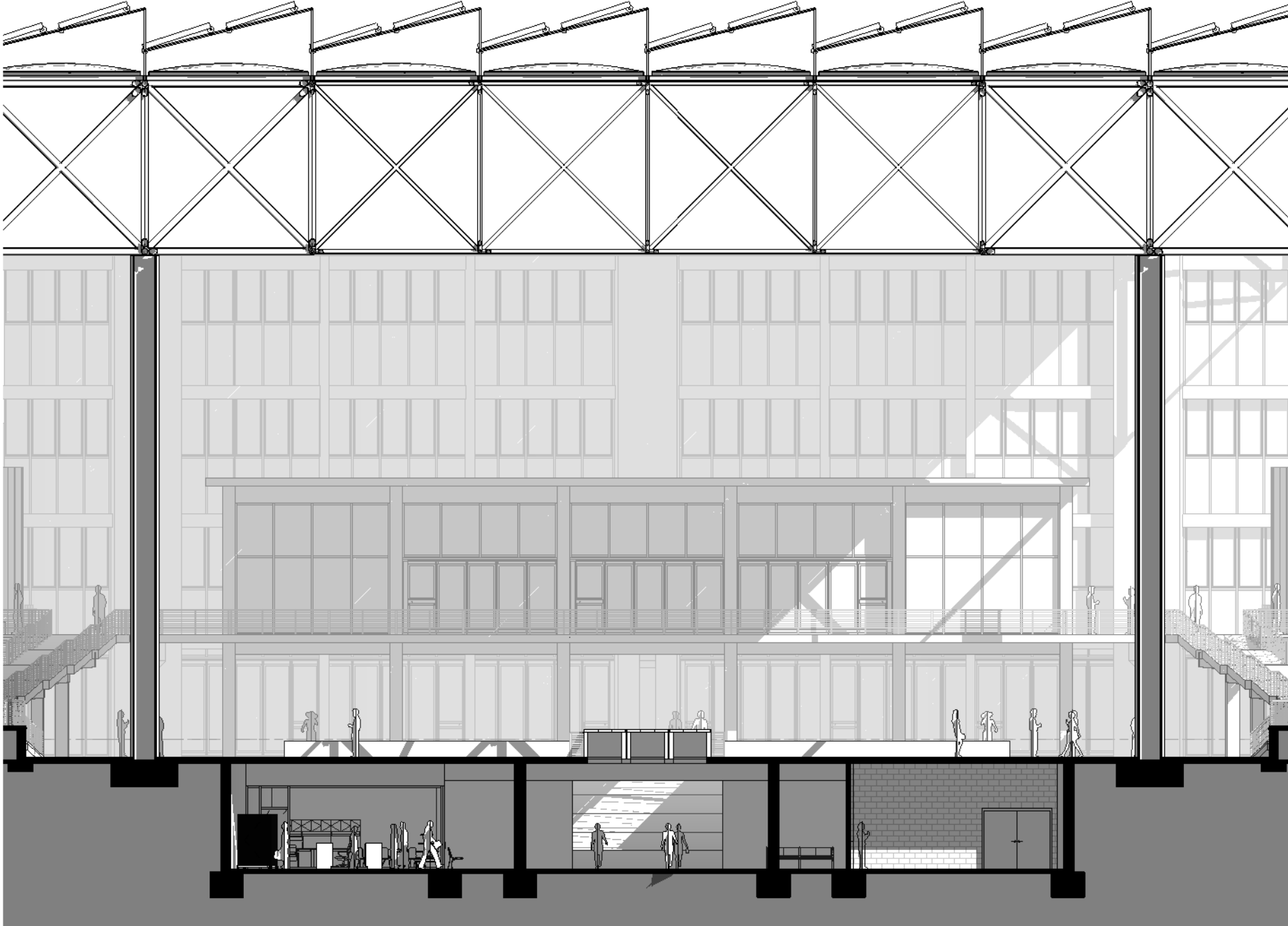
- 01 Glass louvers at walls and venting in ETFE roof (sun heating roof helps to draw air to exhaust through stack effect, create vacuum)- tied to monitoring - slow moving fans inside of higher part of facade to assist in cross ventilation and flow
- 02 Rainwater capture to cisterns to be reused in building. Water from treated greywater/sewage. Processed into potable water
- 03 Greywater and sewage treatment and storage for reuse or send out for additional processing and use by others - vacuum assisted compost, natural processes with living machines in mechanical rooms



1 Mechanical Diagram - Cross Section/Riser
1" = 30'-0"

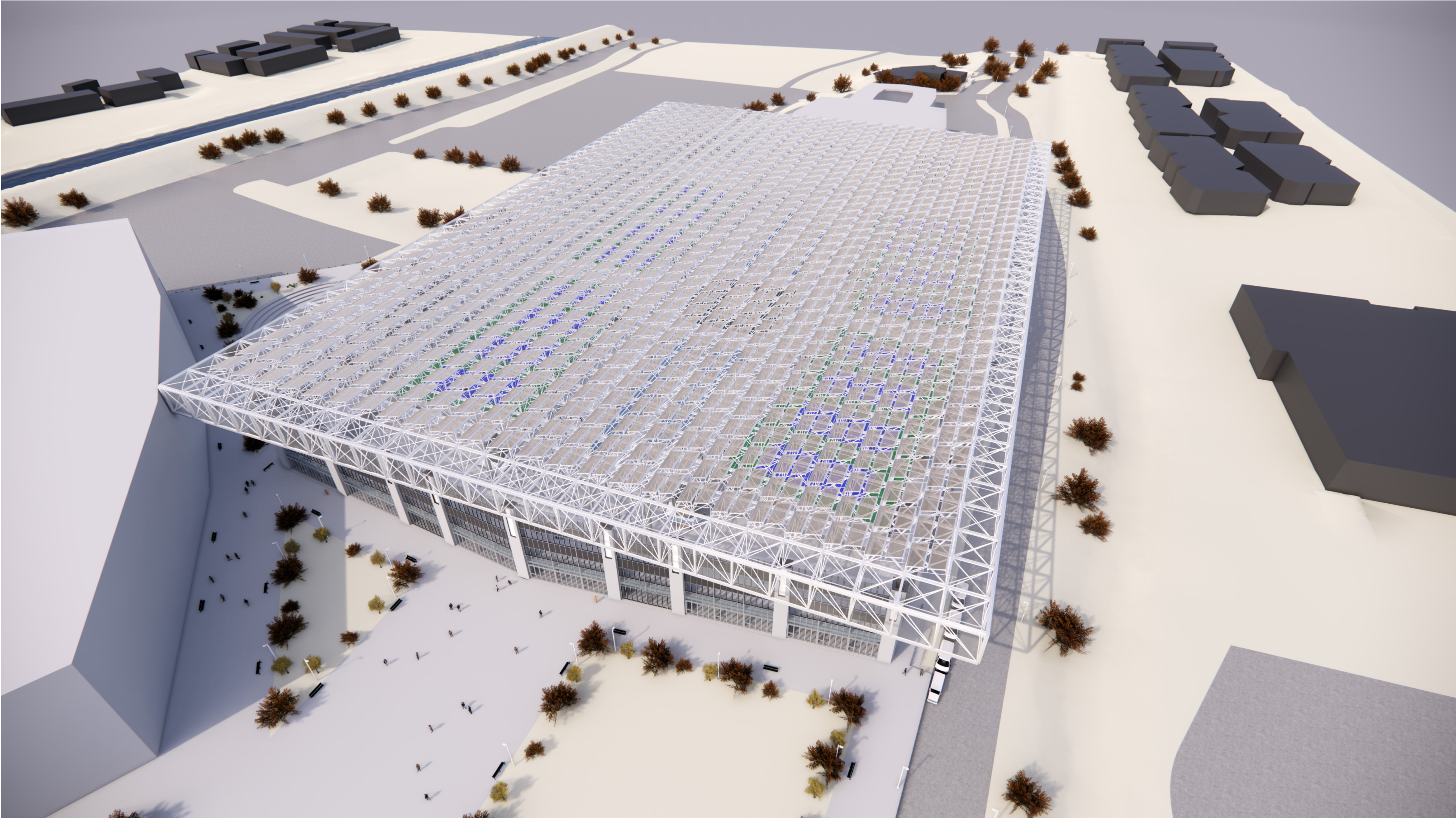


1 Mechanical Diagram - Wind Tower
1/16" = 1'-0"



1 Building Section of a Public Space
1/16" = 1'-0"

0 10' 20' 40'
SCALE: 1/16"=1'-0"



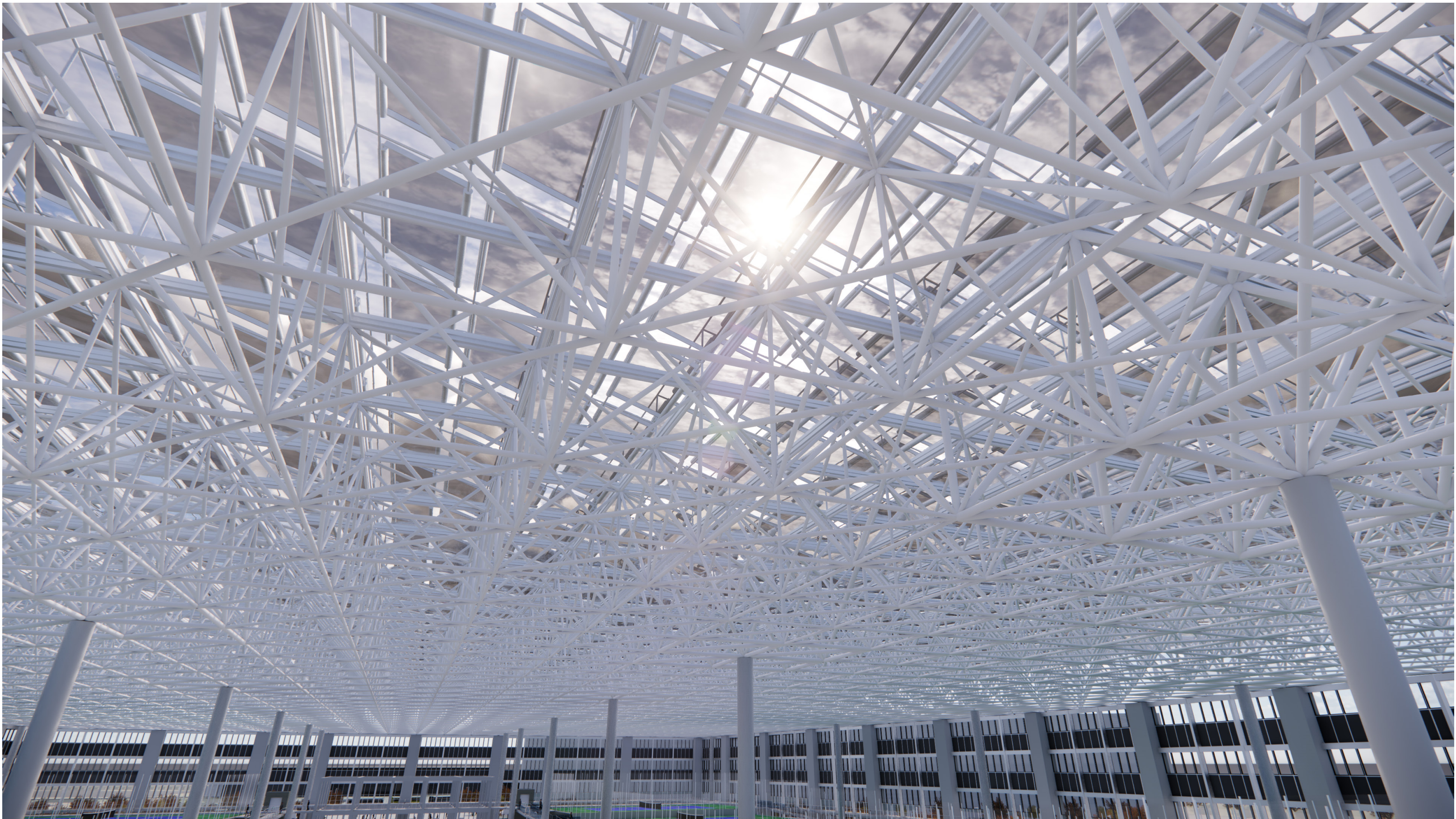
Northeast Birds Eye



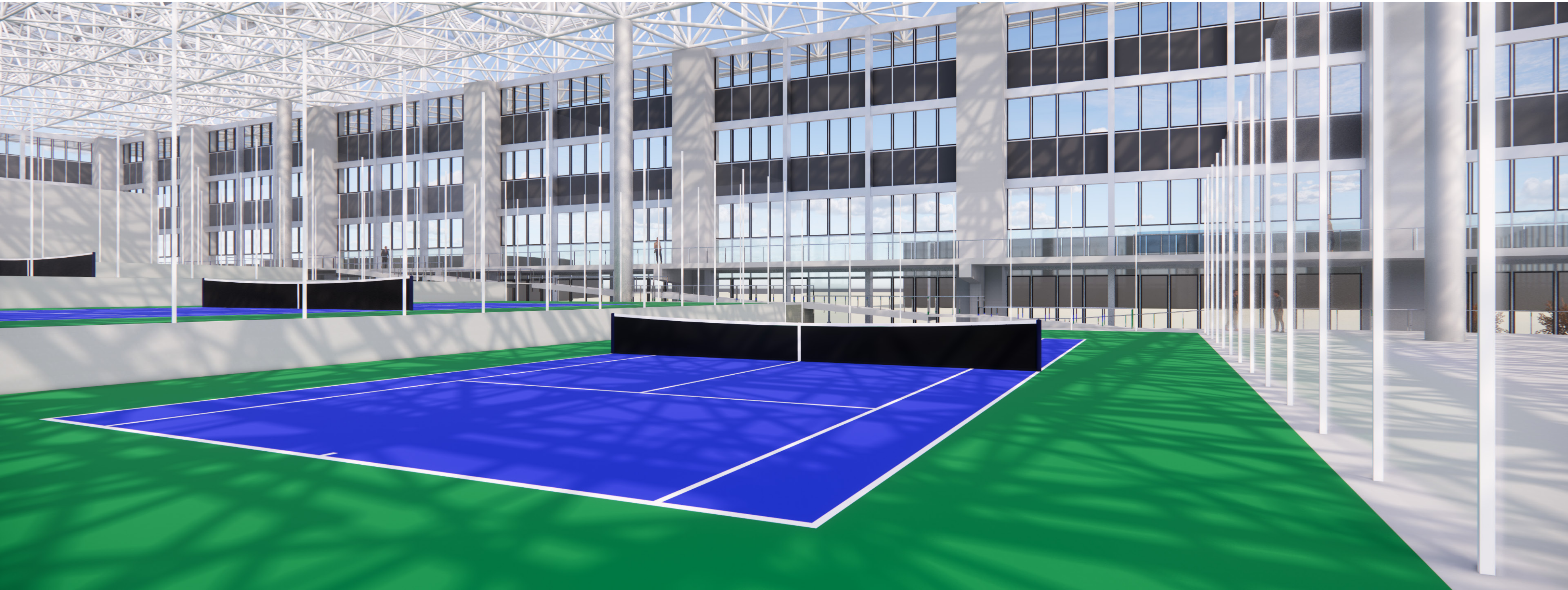
Southwest on the Ground



Courtyard from Training



Underside of Roof from the Top of the Training Facility



Tennis Court from the Southeast

Thank you for looking at my thesis. I appreciate the time you have taken to review and consider the concepts and supporting material presented in my effort to advance architecture. Please feel free to visit my website at georgerozansky.com to view my latest work or to contact me. You are also invited to follow me on various social media networks.

GEORGE F ROZANSKY

