Perot Museum of Nature and Science

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Lighting & Electrical

Faculty Advisor - Dr. Kevin Houser

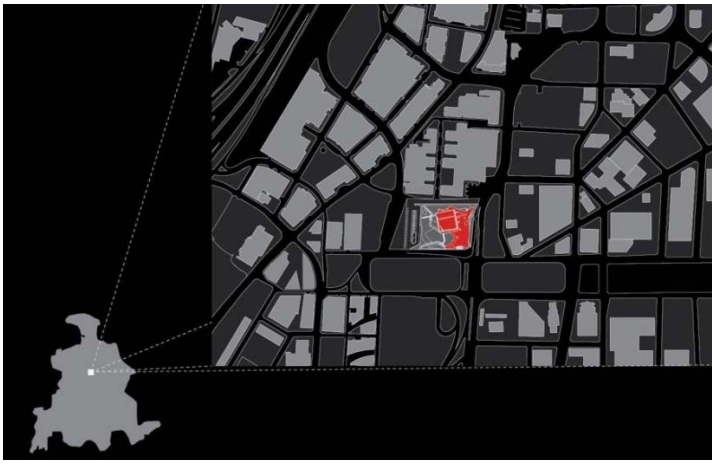
Technical Report 1 - Part 1

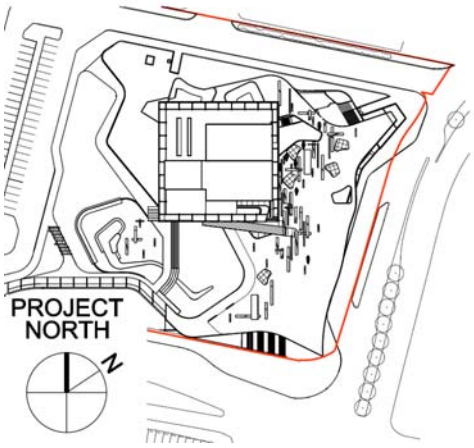
Lighting Proposal Memo

9/8/2013

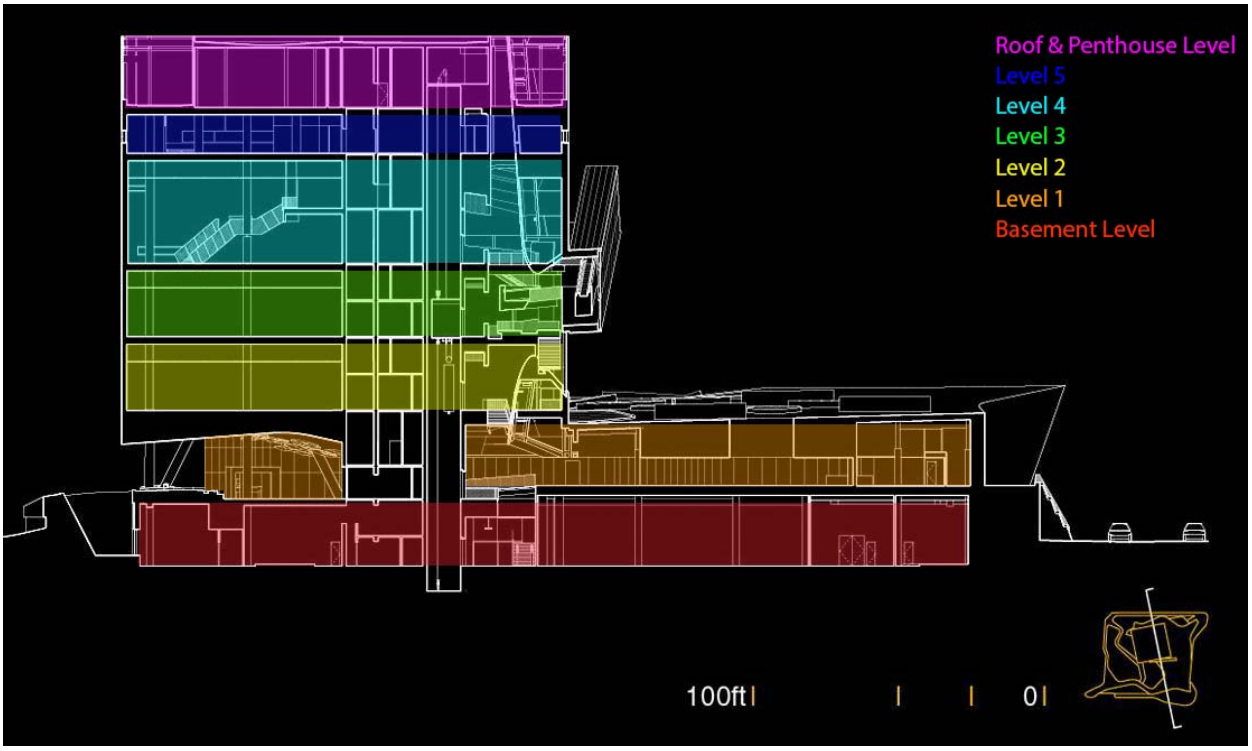
Introduction

The Perot Museum of Nature and Science is located in downtown Dallas, TX. The overall site consists of an 180,000 square feet museum built on a 4.7-acre site.





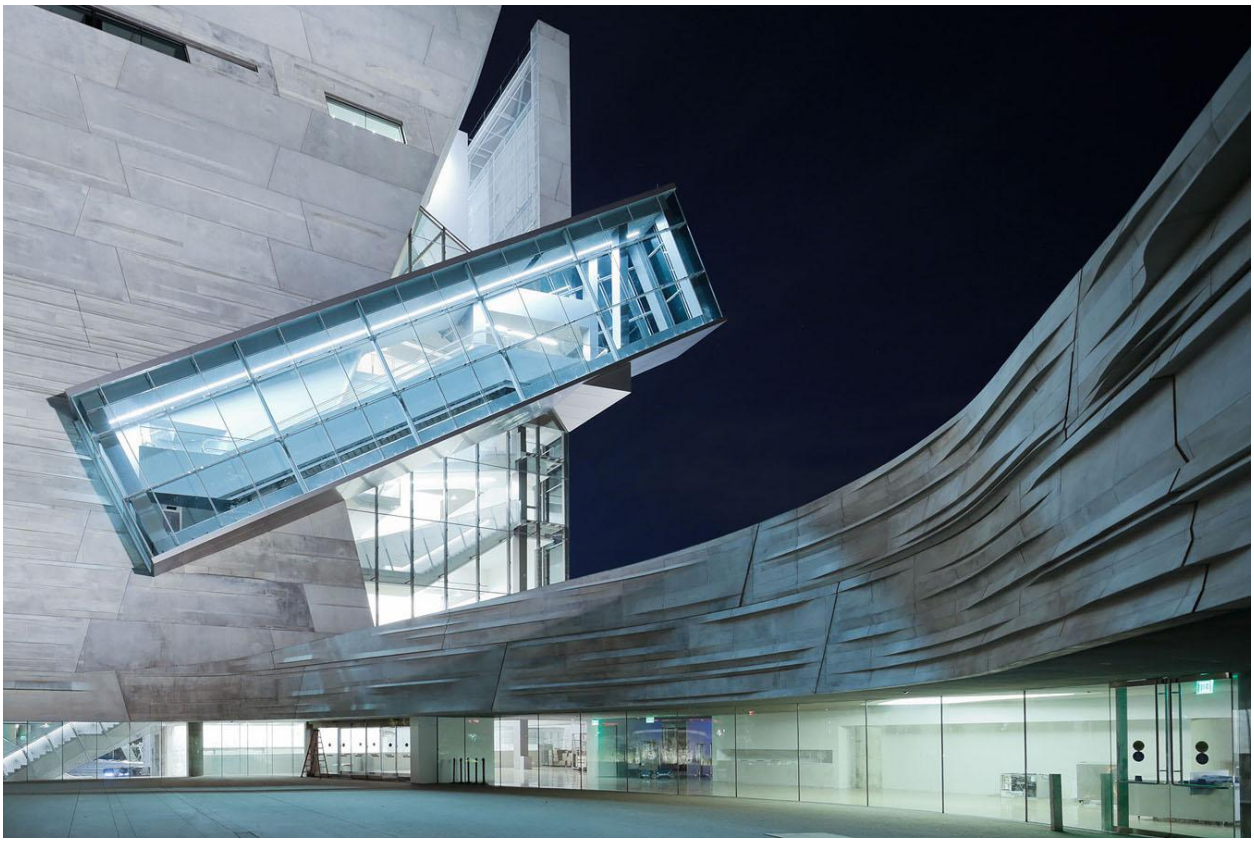
In order to distribute the storm water efficiently, the site level is set to be 20 feet above street level. Thus the landscape itself becomes part of the building mass erecting from the ground, embracing basement level within it while supporting 5 major floors above.



The lighting design for this project will focus on four major spaces, including the South Facade, Main Lobby, 3D Theater and Glass Escalator Cartridge.

South Facade

Space Description



The south facade of the museum offers a luxury integration of visual feasts prior to visitor's entry. Iconic precast concrete cladding and transparent curtain wall cerebrates the infinite possibility of science, yet the mottled off texture symbolizes bark and animal skins - the creation of nature. Plinth structure emerges from the south side as well, creating an elegant curvature extended from the cube. Moreover, south façade is the only façade allows a full visual access to the eye catching glass escalator cartridge.

Activities & Visual Task

Major activity under the south façade is transportation. Through south entrance visitors can get direct access to the main lobby as well as the theater. Large open space below the façade can also be used to host public events, especially at night after the museum is closed.

Therefore, the visual task of the south façade is to offer visitors a charming visual scene while provide enough ambient light on the ground to ensure security. The ability to cast spot light to the ground will also provide support to potential events hosted.

Space Dimension

South Façade: Length – 146ft, Height – 136ft.

Plinth Façade: Length – 206ft, Height – 8 to 13ft.

Glass Escalator Cartridge: Length – 114ft, Width – 11ft, Height – 24ft, Tilt Angle – 26 deg.

For more details, see attached reference drawings.

Material List

Metal Panels:
Alpolic by Mitsubishi Plastics Composites America

Curtain wall and Window wall:
Oldcastle BuildingEnvelope
Novum Systems

Precast concrete:
Gate Precast

Main Lobby

Space Description

Pass the south entrance, visitors will see the main lobby at the other end of the museum. Although there are similar spaces located on the upper floor, the main lobby has several unique characteristics that made it the best target for a work space lighting study.

First, if a visitor follows the standard museum route, he will head up to the roof level and tour downward, in which case, the main lobby will be his final destination, a great chance to impress them one last time using impressive exhibition and inspiring lighting effect.

Also, main lobby is the only exhibition spaces embraced by curtain wall. Since the curtain wall does not bear any structural load, the architect was able to set back curtain wall away from the building perimeter, thus defining the space in a more elegant way. Similarly, the curtain wall was also set back from the ground level, allowing exterior landscape plinth to merge into the main lobby, as presented on the photo above.

Activities & Visual Task

It is reasonable to assume that various of exhibitions will be hold in the main lobby. Considering that most of the visitor will leave the museum from this lobby, it is also important to help them adjust to the difference of interior and exterior light level.

Therefore, the major visual task of the main lobby is to design a lighting scheme that flexible in photometric distribution, color and control strategy to meet the expectation of different exhibitions. The light level should be gradually changed to match exterior light level as well.

Space Dimension

Main Lobby: North to South – 80 to 118ft, East to West Length – 112ft,
Ceiling Height – 20ft.

For more details, see attached reference drawings.

Material List

Curtain wall and Window wall:
Oldcastle BuildingEnvelope
Novum Systems

Precast concrete:
Gate Precast

Suspension grid:
Custom threaded rod and universal connection for wire mesh panels
Hunter Douglas Techstyle

Resilient flooring:
Forbo Marmoleum
VCT

3D Theater

Space Description

When it comes to theater lighting, designers tend to have more freedom for creation. This is partially because there will be rarely any activities going on in the seating area, allows designer to be playful with the ceiling without worrying about meeting target. For acoustical consideration, most theater often have their space highly enclosed and equipped with unique acoustical panels, in other words, a perfect dark house with preexisting texture. To lighting designers, that is equivalent to a rough diamond waiting to be polished.

Knowing the value of this space designed for special purposes, I believe it is worth it to carefully plan three schematic concepts for this space, ensuring that I can create a lighting scheme that make this diamond truly shine.

Activities & Visual Task

The main event takes place in this theater is the 3D movie shows. On regular season there will be 7 shows a day, with each movie lasts 25 minutes. The interval between shows is only 15 minutes, within which over 200 seats need to be evacuated and reseated. Considering that there is a 20 by 40 feet space available on the stage, it is reasonable to prepare for potential guest lectures and live performances.

Overall, I believe the key of the lighting functionality here is navigation. Simply avoid security issue is not enough. The lighting needs to act smartly, supervising the occupancy, making suggestions about empty seats. Lighting for live performance should be well hidden so that they will not disturb the regular 3D movies. Empty hanger should also be prepared so that customized fixture can be installed per performance. With all being said, the top challenge is how to achieve all these purpose while making the lighting itself an enjoyable experience.

Space Dimension

Auditorium: Stage to Exit Length – 69ft, Width at State – 43ft, Width at back seat – 64, Ceiling Height – 12ft.

For more details, see attached reference drawings.

Material List

Acoustical ceilings:

24” x 24” suspended custom metal wire mesh panels – Lobby and public spaces
Hunter Douglas Techstyle – Auditorium, Conference rooms, Offices

Carpet:

J+J Invision carpet tiles

Wall coverings:

Theater acoustic walls and ceilings – Fabritrak system with Knoll and Maharem fabric

Seating:

Irwin theater seats - Theater
Precast concrete bench - Built-in Lobby bench
Café and Auditorium chairs – Vitra 0.3 stackable chair

Glass Escalator Cartridge

Space Description

To most children, the concept of a museum is somewhere you will go with teacher and classmates. It might be interesting to learn some cool technology and fun to see a free standing dinosaur skeleton, but it's still different form the excitement they feel in a theme park. With the one of a kind escalator cartridge hanging in the air, your kids will realize that museum can be excited as well. Prepare yourself for the ultimate 100ft + sky ride takes you up to 75 feet high.

Unfortunately, with the current speed of the escalator, it is hard to create the similar excitement people feel in a roller coaster. That why a will designed lighting scheme at night can create psychological impressions to help 'speed up' the escalator, thus enchasing the heart beating experience within this circulation space.

Activities & Visual Task

When riding an escalator, there is no action required other than watch the step at the start and end. Therefore, the challenge is the keep visitors from getting board, especially when visitors have to travel 170 feet upward to the roof as the begging of their tour.

Therefore, the visual task here is to create an animated lighting effect that synchronizes with the escalator movement. The speed of light motion should be controlled so that viewer will not be distracted and cause danger. Instead, the focus here is how the light changes, not how fast. Eventually, the task here is to make this space more entertaining and possibly more independent from the exterior at night using modern technology, which creates a contrast with the peace people feel during the day looking out to nature.

Space Dimension

Glass Escalator Cartridge: Length – 113.6ft, Width – 11.2ft, Height – 24ft, Tilt Angle – 26 deg.

For more details, see attached reference drawings.

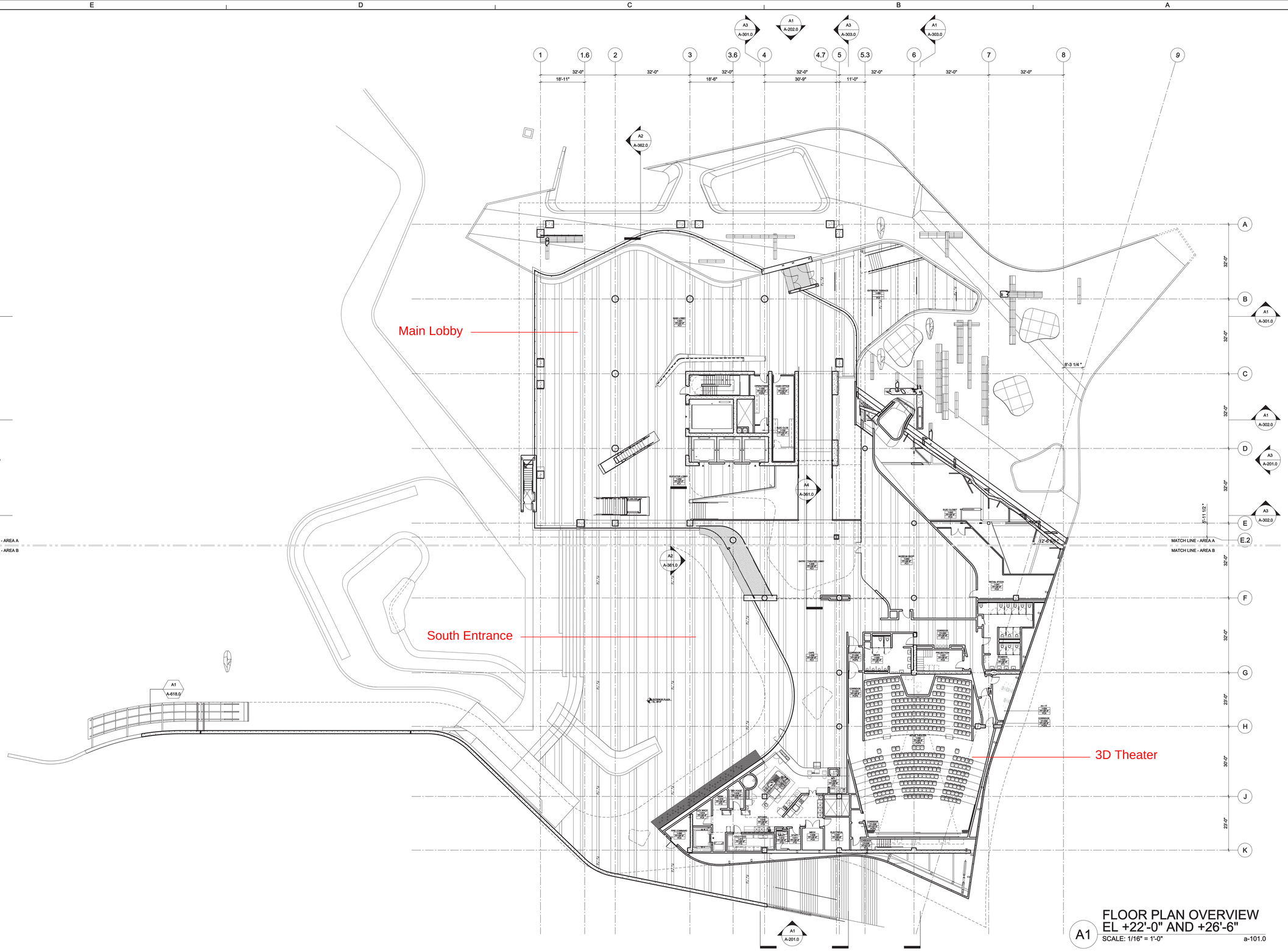
Material List

Curtain wall and Window wall:
Oldcastle BuildingEnvelope
Novum Systems

Glass:
Insulated units and laminated glass - Oldcastle BuildingEnvelope, Avic Sanxin Co.

Skylights:
Oldcastle BuildingEnvelope
Avic Sanxin Co.

Other:
Interior glass floor and framing: Trainor Glass Company



A1 FLOOR PLAN OVERVIEW
EL +22'-0" AND +26'-6"
SCALE: 1/16" = 1'-0" a-101.0

GENERAL NOTES:

1. REFERENCE REFLECTED CEILING PLANS FOR ADDITIONAL INFORMATION
2. REFERENCE FINISH SCHEDULE FOR FINISH INFORMATION
3. REFERENCE LIFE SAFETY DRAWINGS FOR FIRE RATINGS AND OTHER INFORMATION
4. REFERENCE BUILDING ELEVATIONS FOR EXTERIOR FACADE INFORMATION
5. REFERENCE A-005.0 AND A-005.1 FOR WALL PARTITION TYPES. WALL TYPE S4 U.N.O.
6. REFERENCE EDGE OF SLAB DRAWINGS FOR ADDITIONAL INFORMATION AND CONCRETE DETAIL REFERENCES.
7. REFERENCE A-900 SERIES FOR DEVICE AND EMBED LOCATIONS

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REGISTERED ARCHITECT
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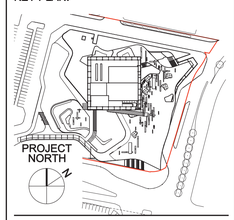
6463
STATE OF TEXAS

ISSUES / REVISIONS:

DATE	SYMBOL	DESCRIPTION
02-10-2010		100% DD GMP
05-10-2010		50% CD/REF ONLY
07-19-2010		80% CD/REF ONLY
09-10-2010		100% CD

KEY PLAN:

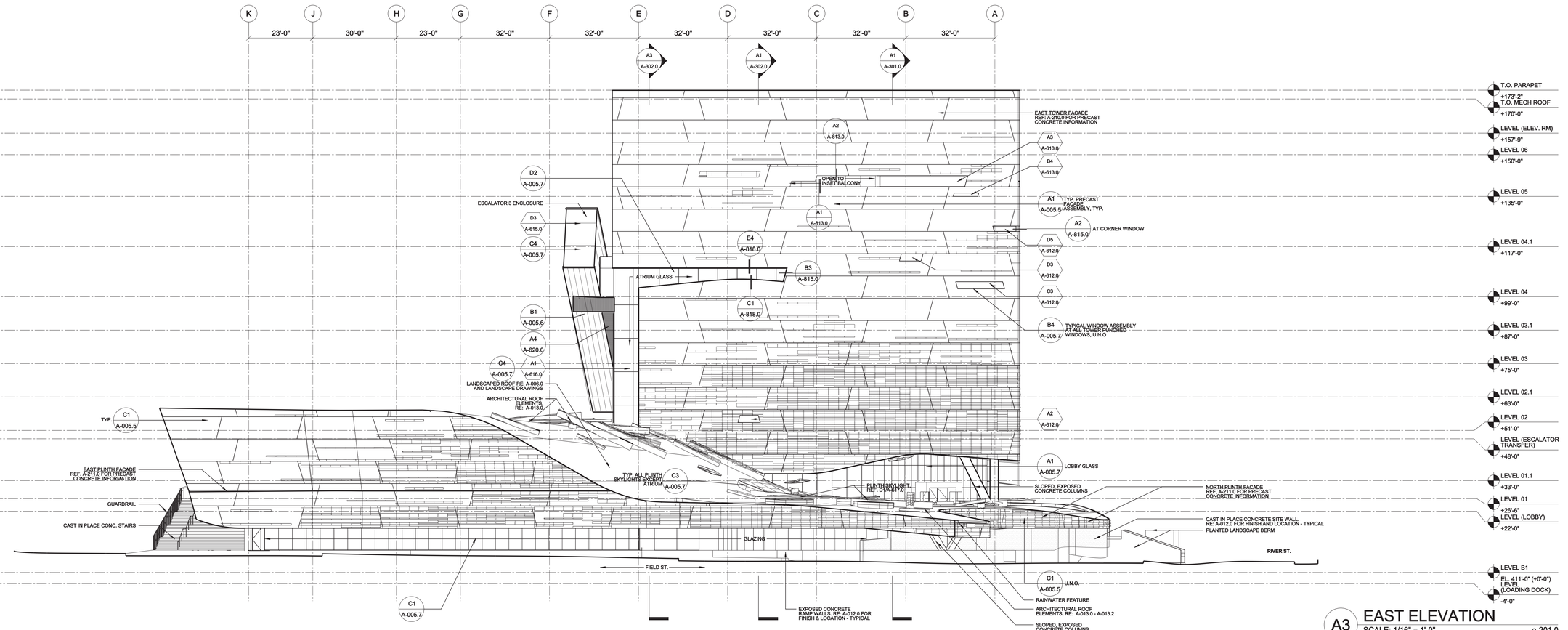


100% CONSTRUCTION DOCUMENTS

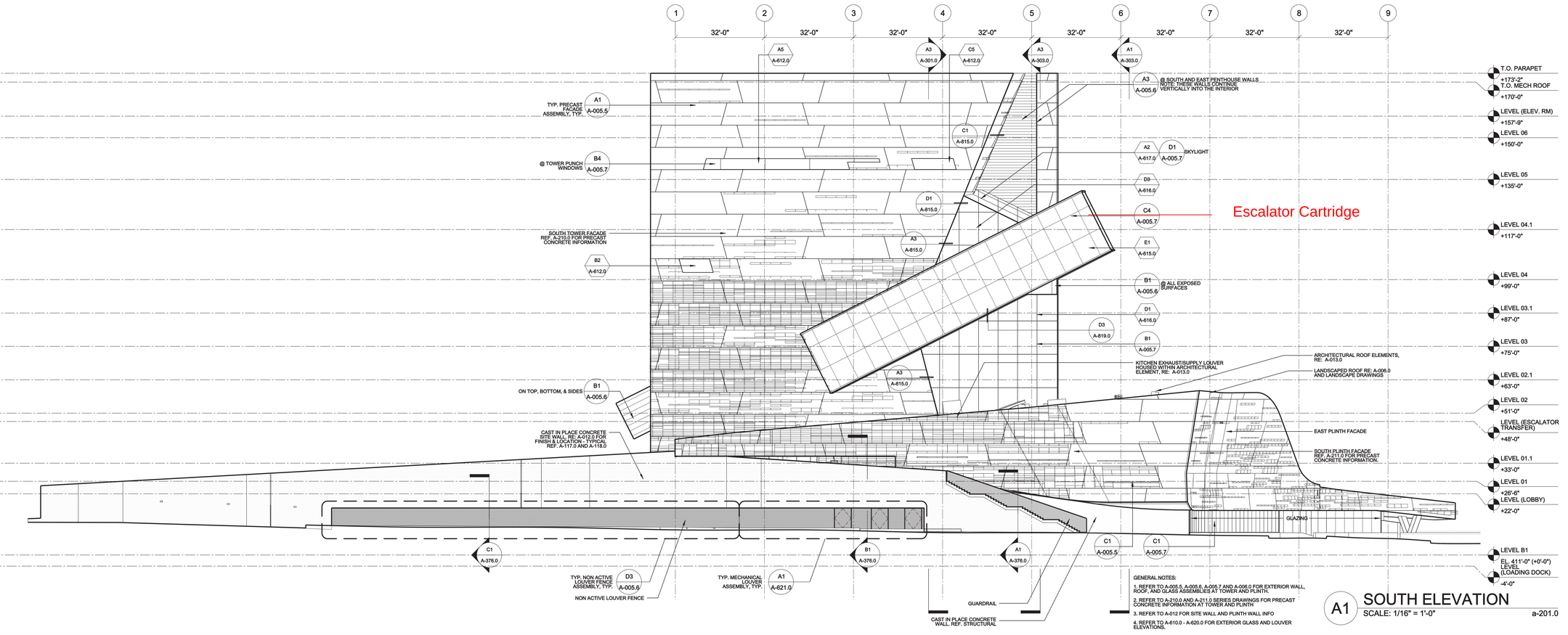
PROJECT NUMBER: 28350.00
PHASE: CONSTRUCTION DOCUMENTS
DATE: 09-10-2010
SCALE: 1/16" = 1'-0" @ 30"X42" SHEET

FLOOR PLAN OVERVIEW FIRST FLOOR

A-101.0



A3 EAST ELEVATION
SCALE: 1/16" = 1'-0" a-201.0



A1 SOUTH ELEVATION
SCALE: 1/16" = 1'-0" a-201.0

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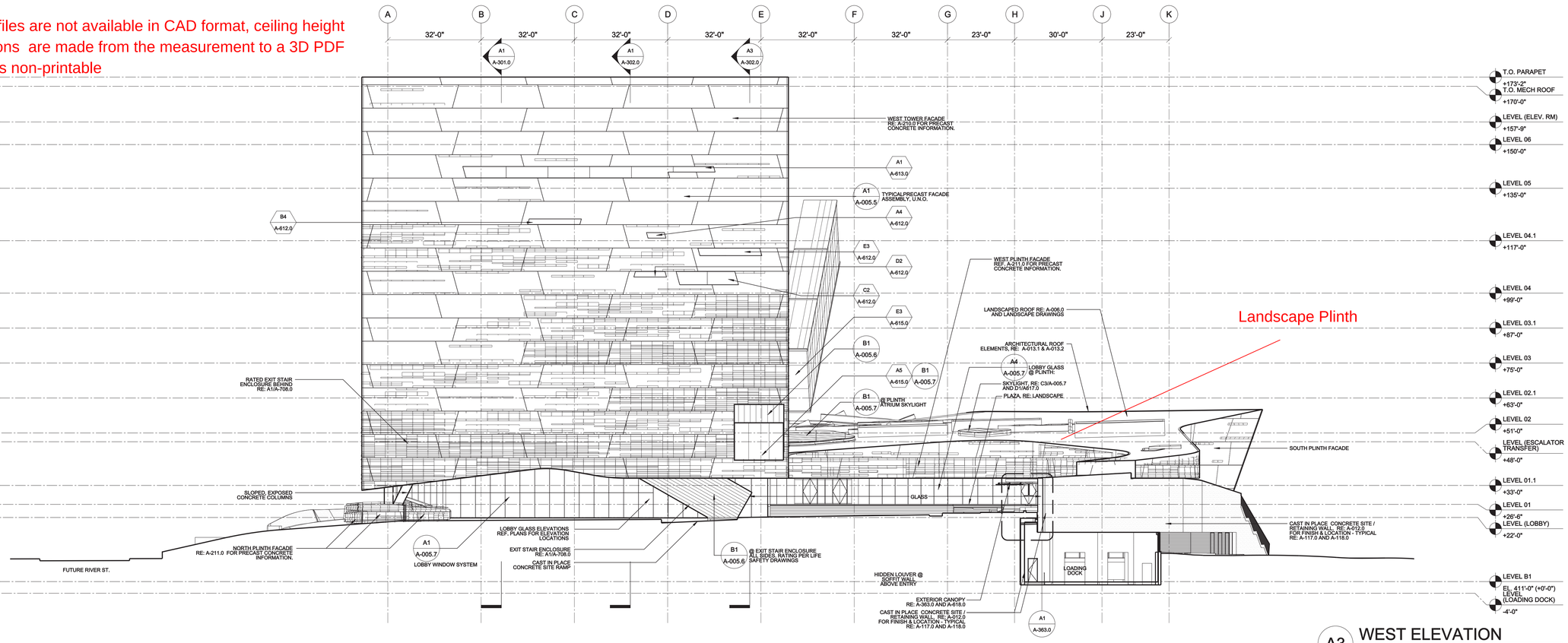
BUILDING ELEVATIONS

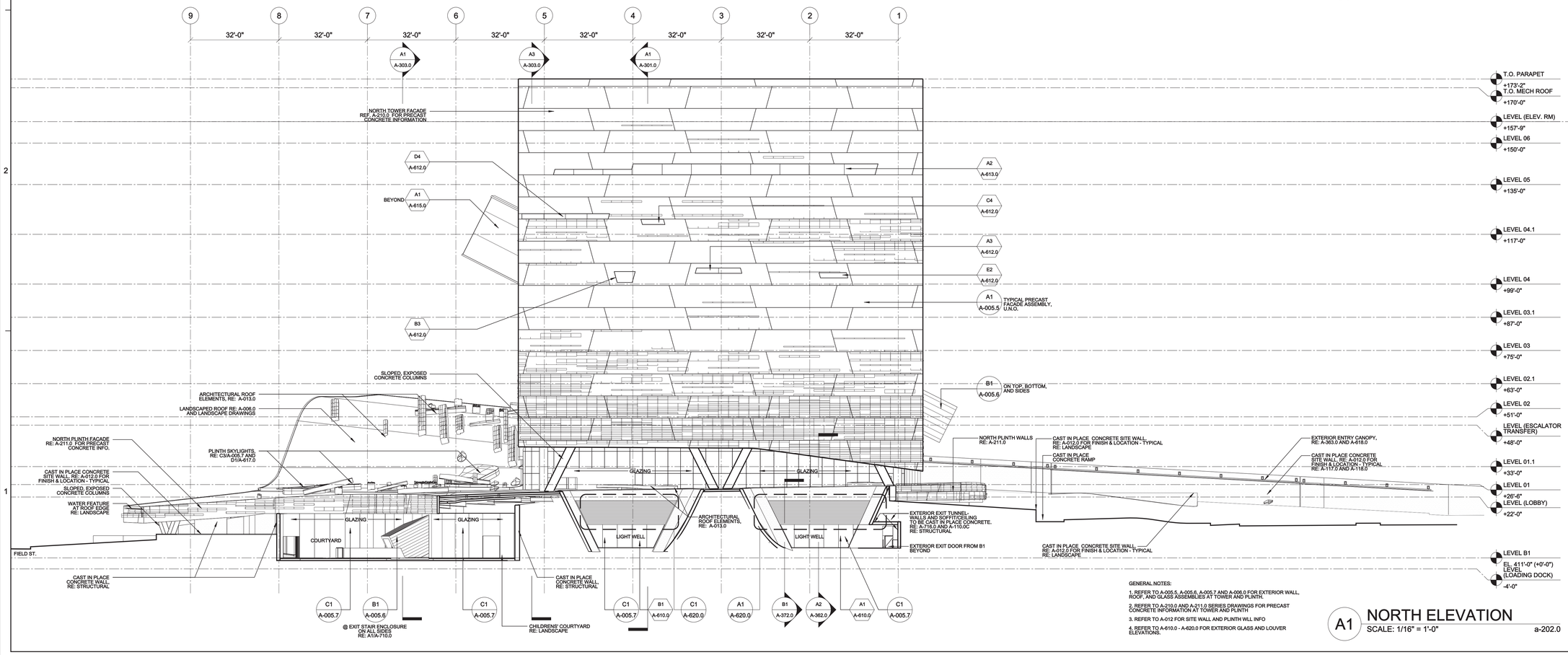
A-201.0

Section files are not available in CAD format, ceiling height estimations are made from the measurement to a 3D PDF file that is non-printable



A3 WEST ELEVATION

SCALE: 1/16" = 1'-0" a-202.0



GENERAL NOTES:

1. REFER TO A-005.5, A-005.6, A-005.7 AND A-006.0 FOR EXTERIOR WALL, ROOF, AND GLASS ASSEMBLIES AT TOWER AND PLINTH.
2. REFER TO A-210.0 AND A-211.0 SERIES DRAWINGS FOR PRECAST CONCRETE INFORMATION AT TOWER AND PLINTH
3. REFER TO A-012 FOR SITE WALL AND PLINTH WLL INFO
4. REFER TO A-610.0 - A-620.0 FOR EXTERIOR GLASS AND LOUVER ELEVATIONS.

A1 NORTH ELEVATION

SCALE: 1/16" = 1'-0" a-202.0

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BUILDING ELEVATIONS

A-202.0