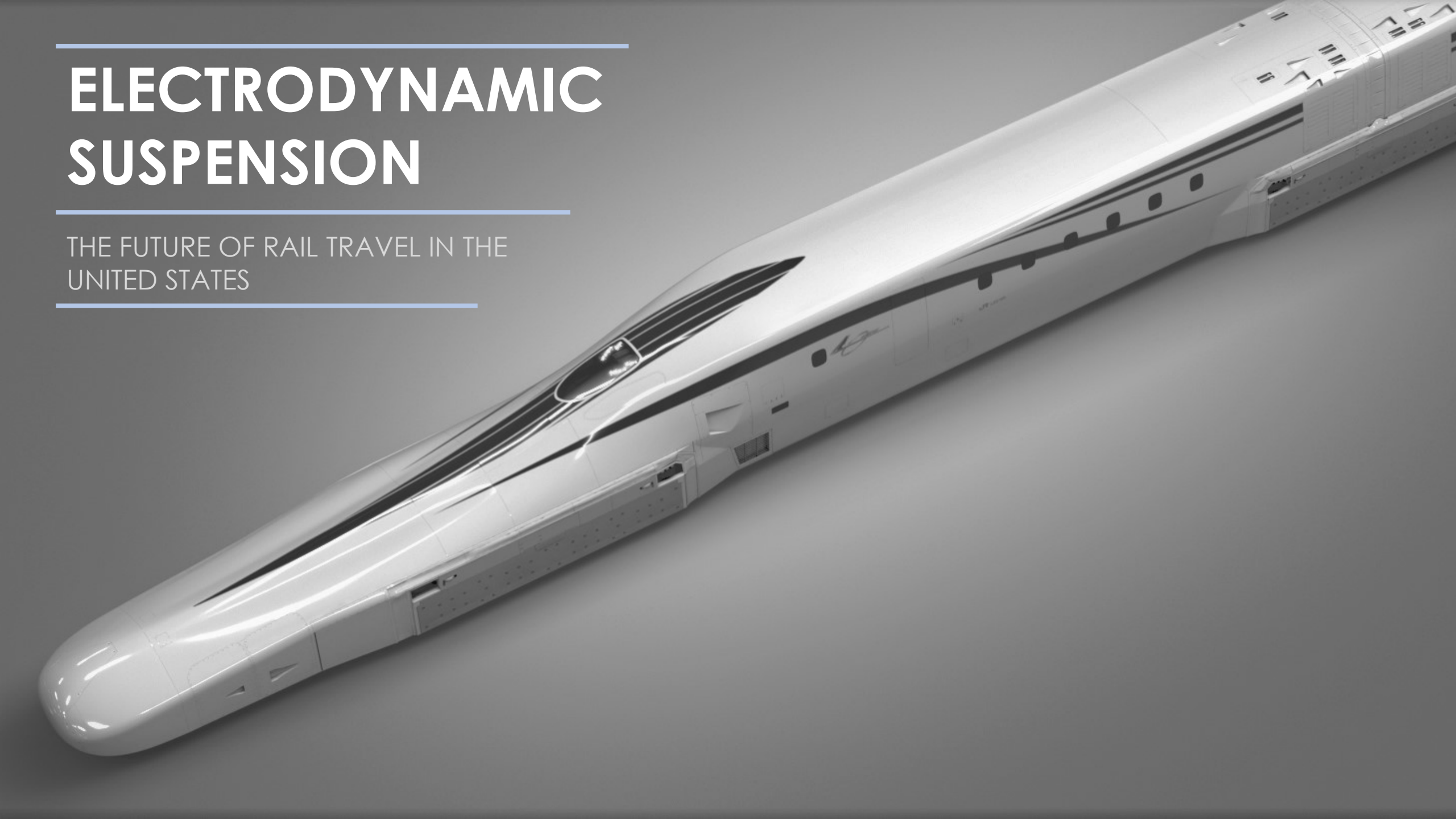
ELECTRODYNAMIC SUSPENSION

THE FUTURE OF RAIL TRAVEL IN THE UNITED STATES

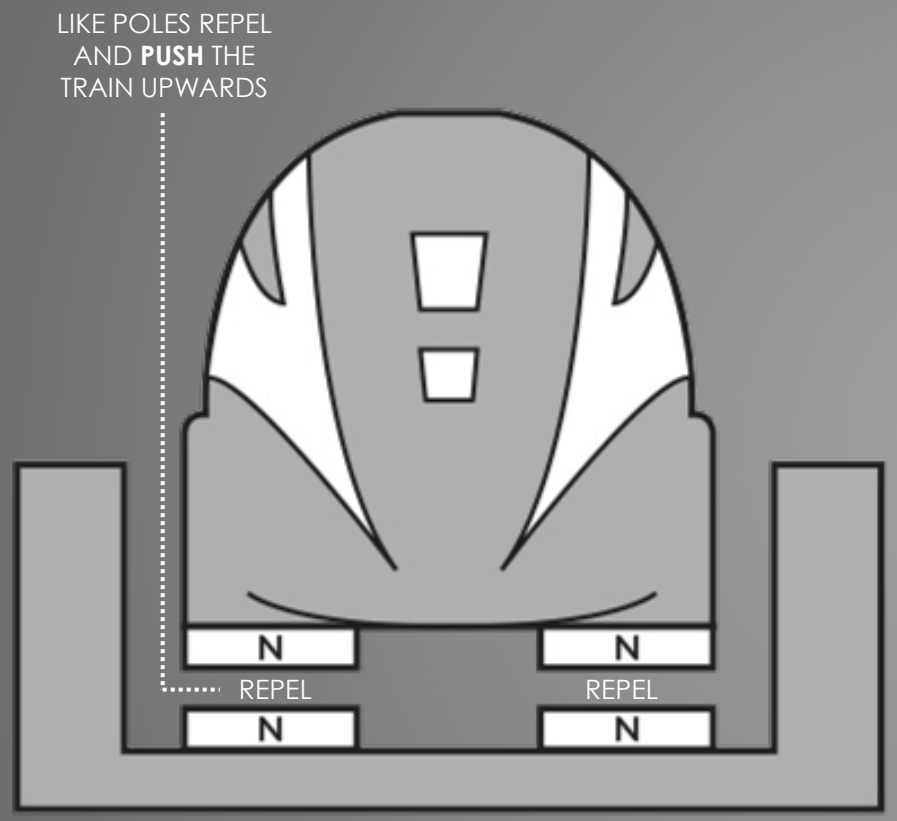


THEORETICAL PREMISE / UNDERLYING CONCEPT

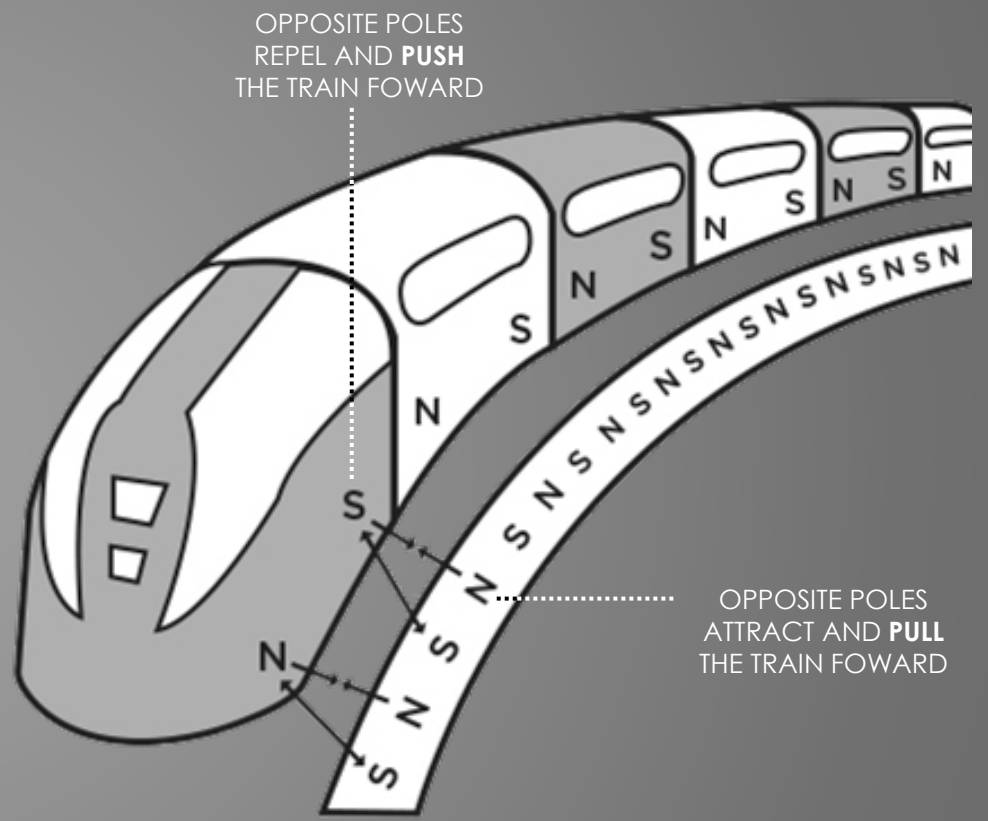
With the steady increase in population throughout the United States, the issue of transportation is becoming more of a problem. With how prevalent personal car ownership is American culture, the number of vehicles on the road are drastically increasing, contributing to a rise in pollution. Aircraft flying overhead also have a large impact on the environment with the sheer amount of people that need to travel long distance for either work or pleasure.

The underlying concept for this thesis project is the adoption of the latest technologies in magnetic levitation (maglev) in order to eventually replace the aging passenger rail system in the United States. With speeds in excess of 350mph, this technology can make passenger rail a more relevant choice compared to other transportation options such as car and plane.

HOW IT WORKS



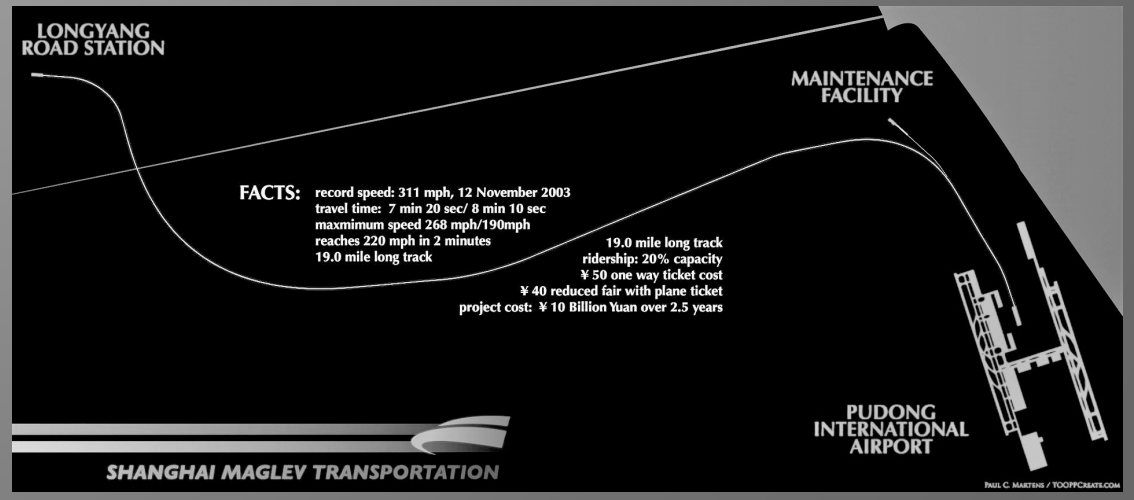
ELECTROMAGNETIC SUSPENSION (EMS)



ELECTRODYNAMIC SUSPENSION (EDS)

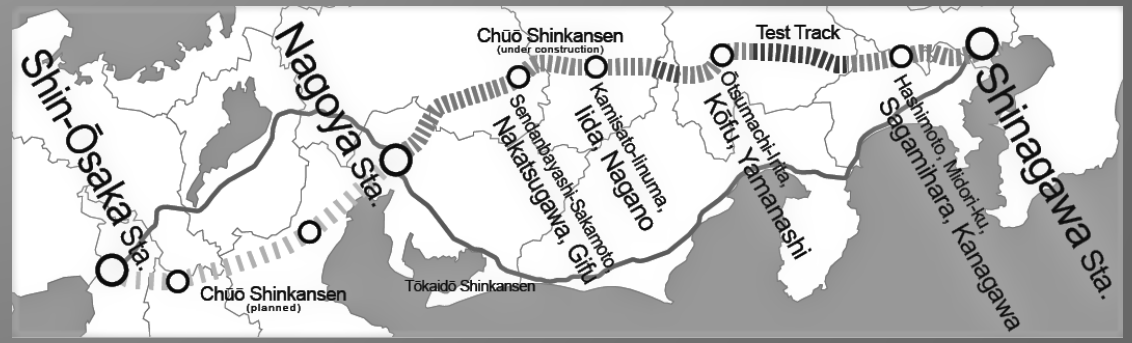
CASE STUDIES: SHANGHAI TRANSRAPID

Opened to the public in 2003, the Shanghai Maglev Train, otherwise known as Shanghai Transrapid, is the oldest commercial maglev train system still in operation. The rail line runs from Longyang Road Station to Pudong International Airport. Shanghai Transrapid runs on a dual-track guide-way for a total of 19 miles at speeds of up to 268 mph. The rail system runs in 15-minute intervals for 15 hours per day, seven days a week. It takes approximately 8 minutes for it to travel from the start of the rail line to the end.



CASE STUDIES: CHŪŌ SHINKANSEN

Chūō Shinkansen started off as a test track in the Miyazaki Prefecture in Japan at a length of 12 miles in 1990. Over 20 years later, the track was extended by 16 miles and was opened to the public via a lottery system in 2014. The track is currently being extended after a proposal in 2007 to link Tokyo and Nagoya with the rail line extending it to a length of 178 miles. The extension is expected to be finished in 2037.



CASE STUDIES: NORTHEAST MAGLEV

Given that maglev technology is a fairly new technology, many of the rail lines in existence are either proposals or concepts. Northeast Maglev's proposal is slightly further than both of those and is currently in development with Phase I of their rail line set to be constructed by 2028. The maglev system is identical that of Chūō Shinkansen's with both using L0 Series maglev trains, but in this case is meant to be operated overseas in North America. The rail line is expected to run up the Northeast Corridor from Washington D.C. to New York City.

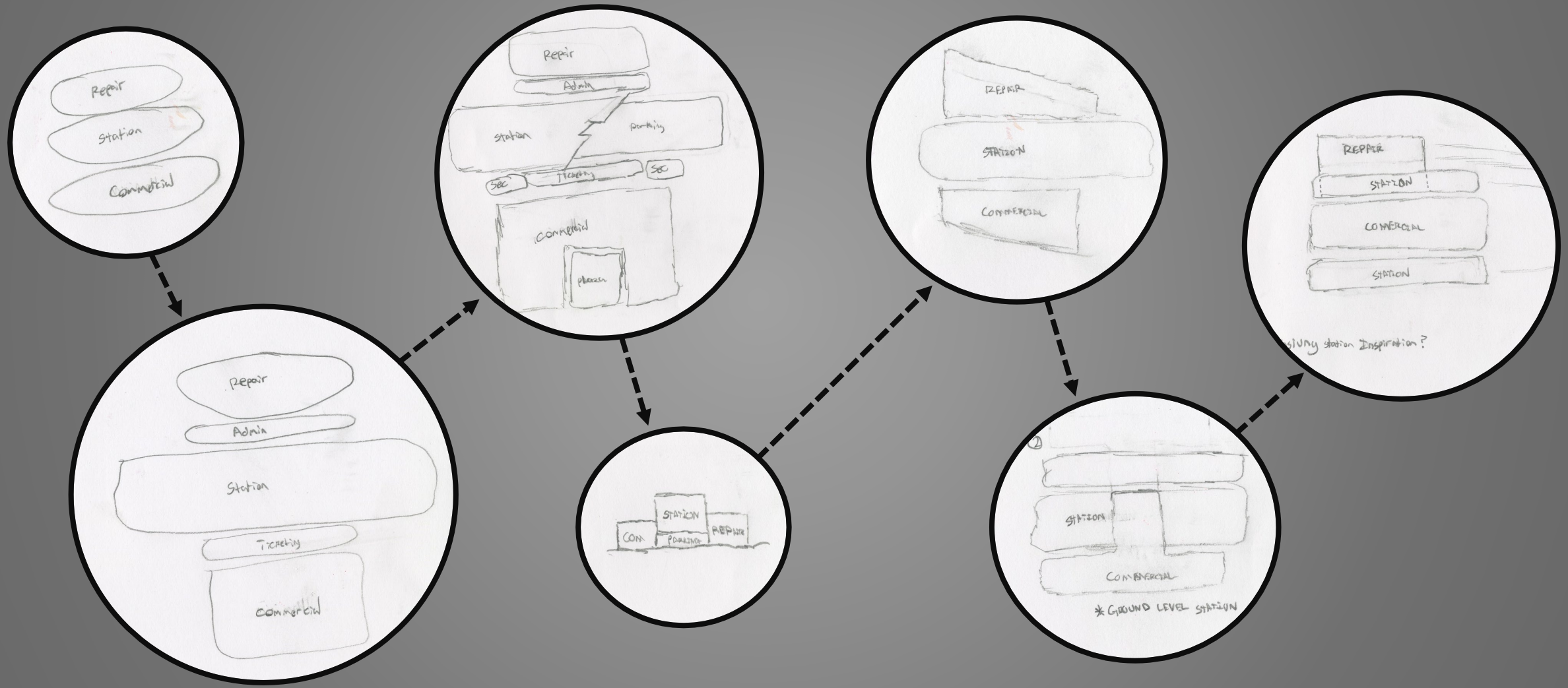
THESIS LOCATION

- SAN DIEGO, CA
- LOS ANGELES, CA
- LAS VEGAS, NV
- FLAGSTAFF, AZ
- ALBEQUERQUE, NM
- DALLAS, TX
- MEMPHIS, TN
- ST. LOUIS, MO
- CHICAGO, IL
- CLEVELAND, OH
- PITTSBURG, PA
- WASHINGTON D.C.
- BALTIMORE, MD
- PHILIDELPHIA, PA
- NEW YORK CITY, NY

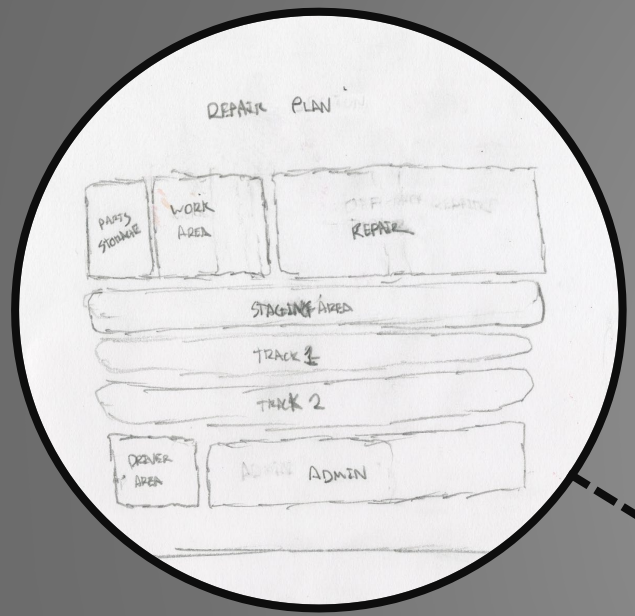
PERFORMANCE ANALYSIS

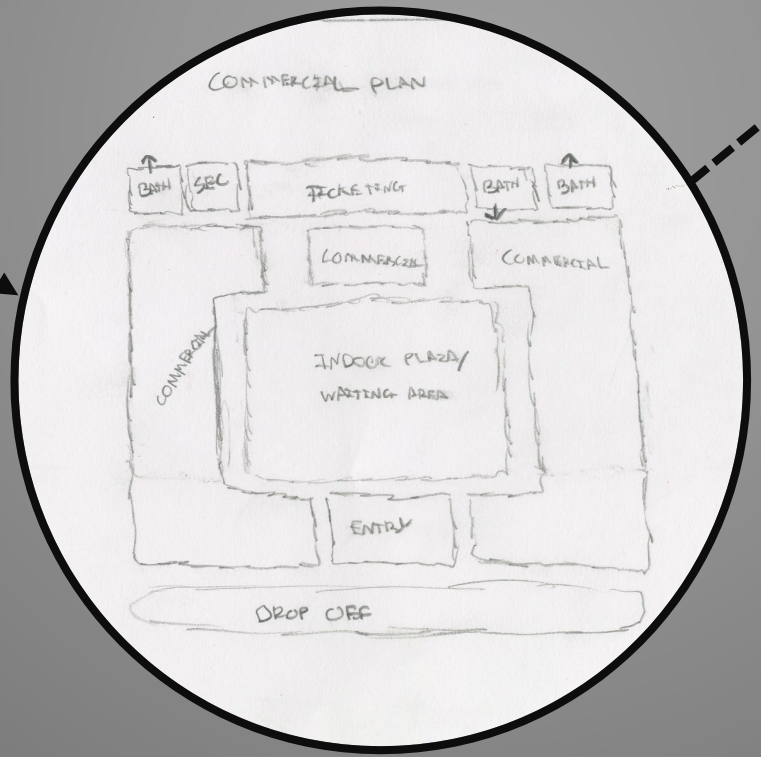
LOCATION	DISTANCE	TIME
1. SAN DIEGO, CA TO LOS ANGELES, CA	**120** MILES	**00** HR **20** MIN
2. LOS ANGELES, CA TO LAS VEGAS, NV	**235** MILES	**00** HR **38** MIN
3. LAS VEGAS, NV TO FLAGSTAFF, AZ	**210** MILES	**00** HR **34** MIN
4. FLAGSTAFF, AZ TO ALBEQUERQUE, NM	**285** MILES	**00** HR **46** MIN
5. ALBEQUERQUE, NM TO DALLAS TX	**589** MILES	**01** HR **34** MIN
6. DALLAS, TX TO MEMPHIS, TN	**421** MILES	**01** HR **08** MIN
7. MEMPHIS, TN TO ST. LOUIS, MO	**240** MILES	**00** HR **38** MIN
8. ST. LOUIS, MO TO CHICAGO, IL	**260** MILES	**00** HR **42** MIN
9. CHICAGO, IL TO CLEVELAND, OH	**340** MILES	**00** HR **55** MIN
10. CLEVELAND, OH TO PITTSBURG, PA	**120** MILES	**00** HR **20** MIN
11. PITTSBURG, PA TO WASHINGTON D.C.	**190** MILES	**00** HR **31** MIN
12. WASHINGTON D.C. TO BALTIMORE	**35** MILES	**00** HR **12** MIN
13. BALTIMORE, MD TO PHILIDELPHIA	**90** MILES	**00** HR **25** MIN
14. PHILIDELPHIA, PA TO NEW YORK CITY	**80** MILES	**00** HR **23** MIN
15. SAN DIEGO, CA TO NEW YORK CITY, NY	**3,215** MILES	**08** HR **35** MIN
16. SAN DIEGO TO NEW YORK CITY (BY PLANE)	**2,433** MILES	**05** HR **35** MIN

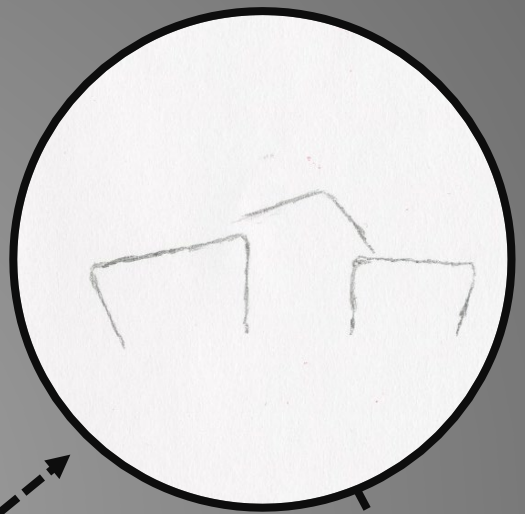
DEVELOPMENT

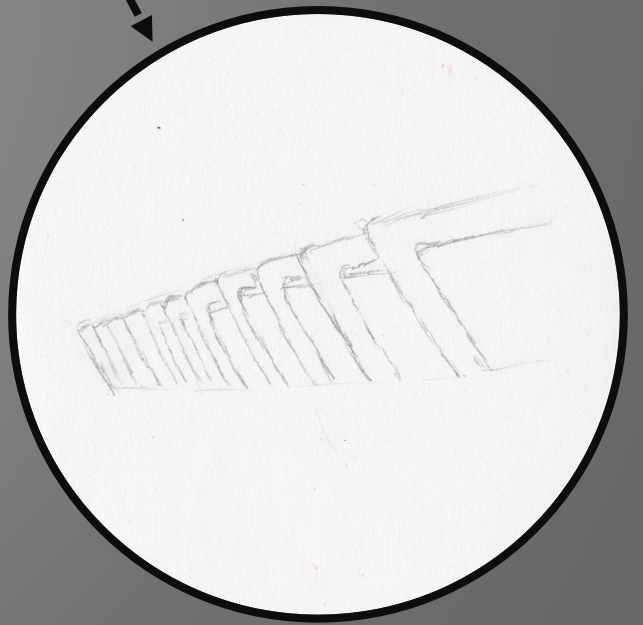


DEVELOPMENT

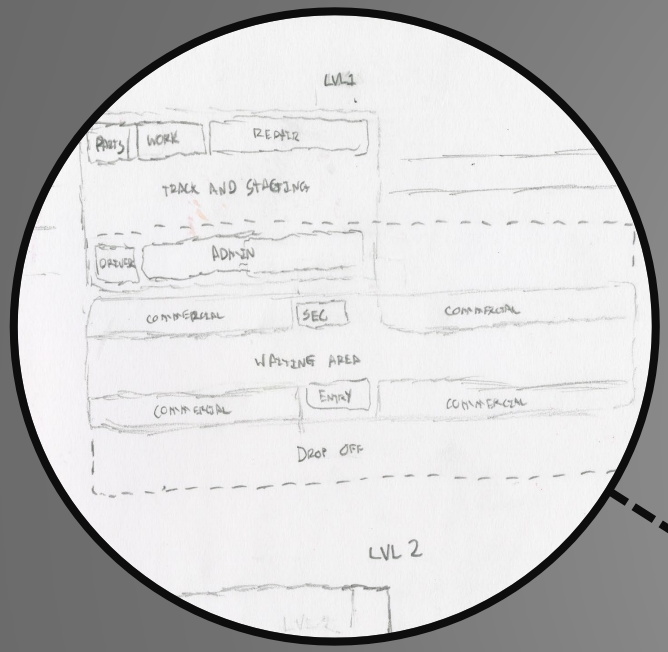


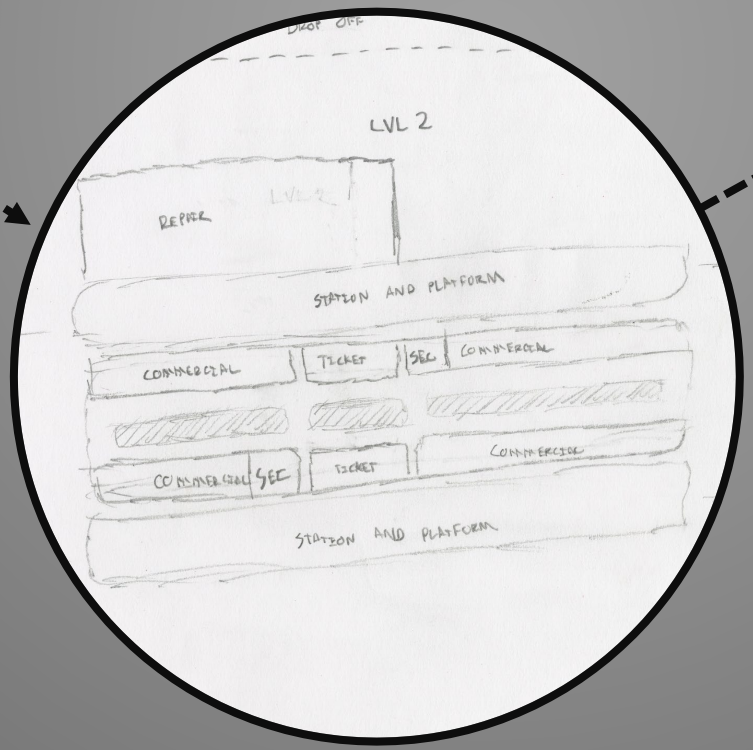


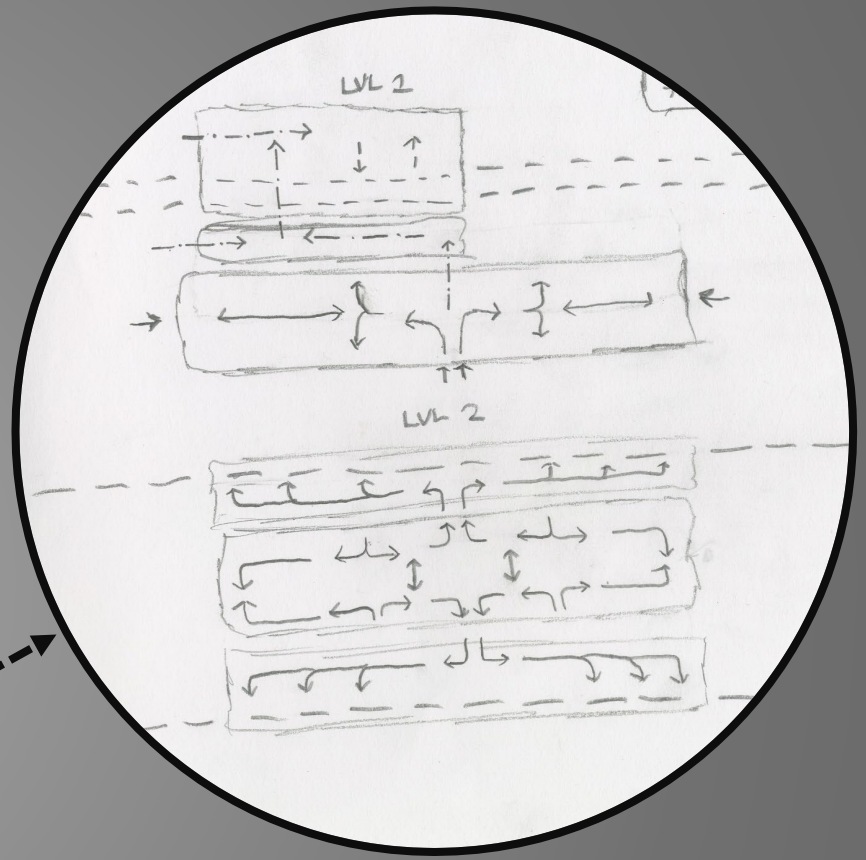




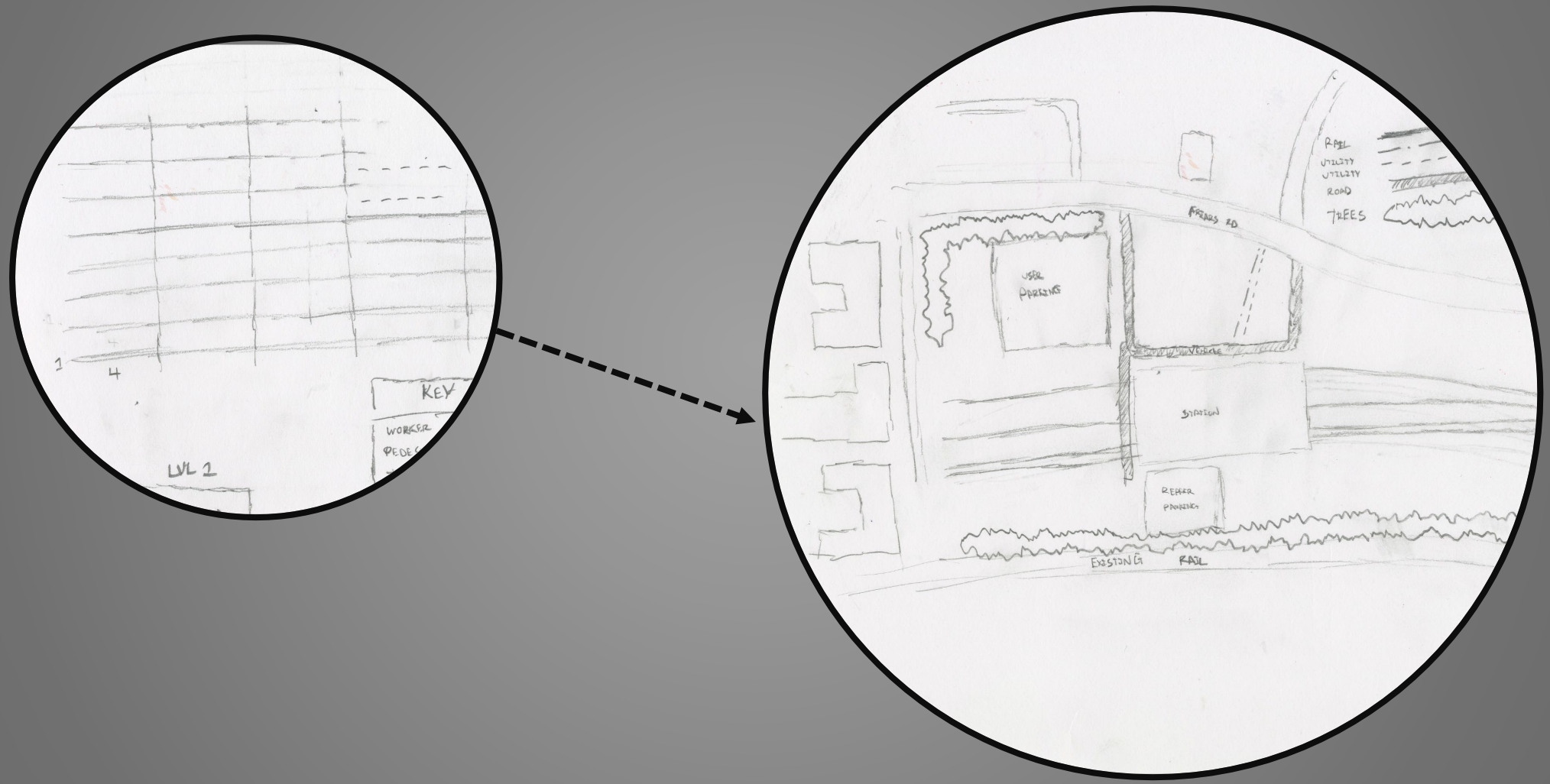
DEVELOPMENT





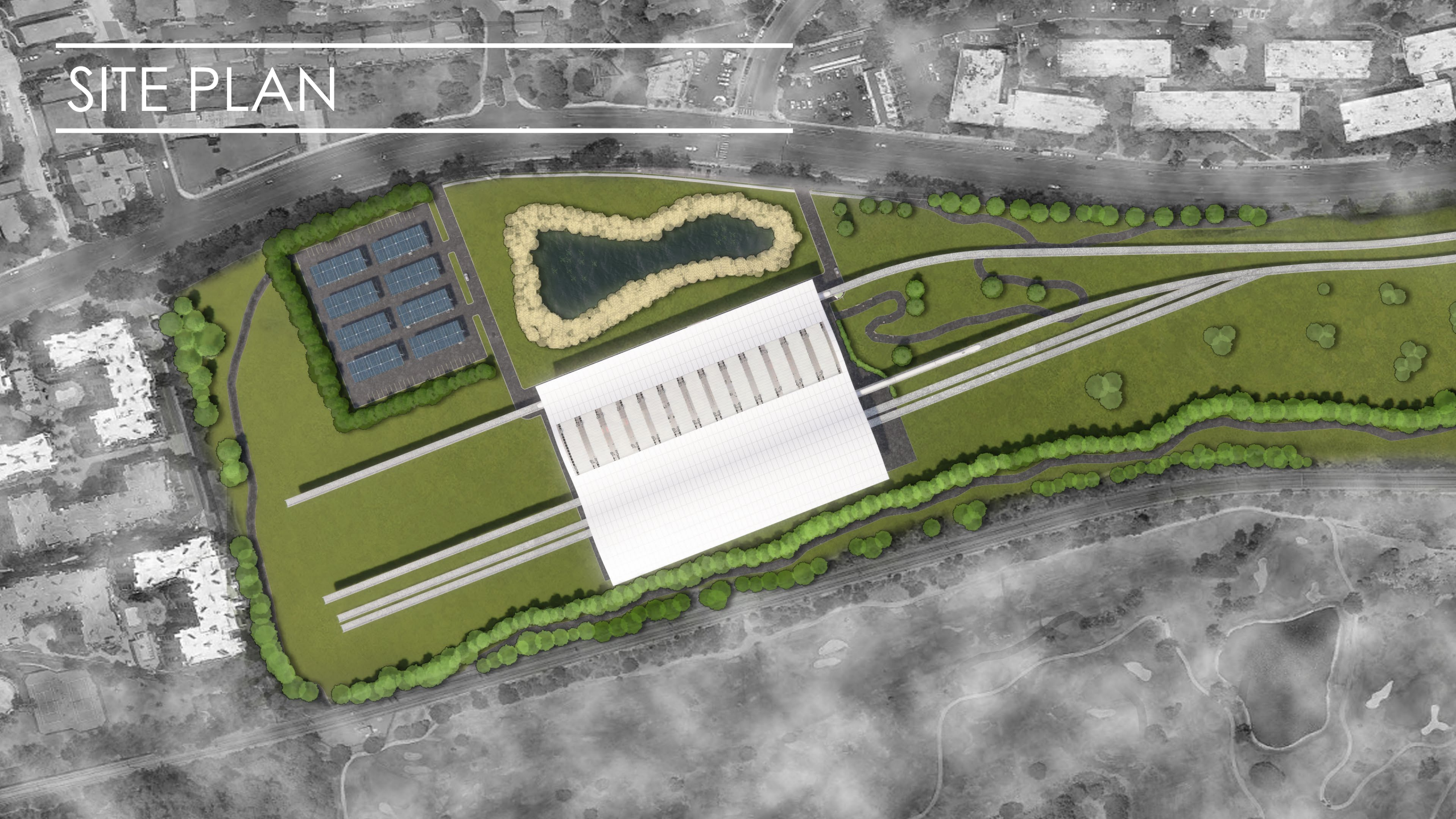


DEVELOPMENT

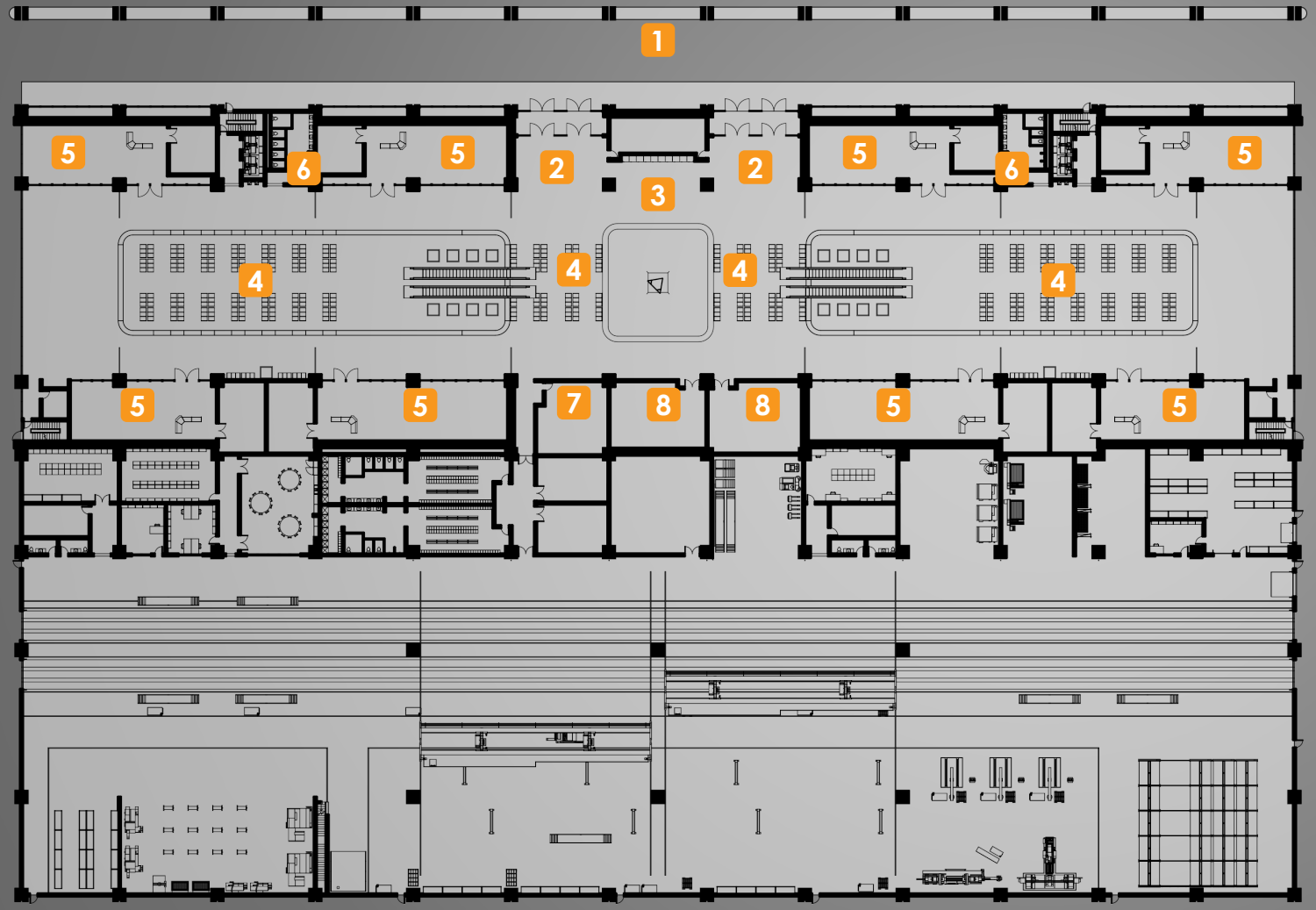


DESIGN SOLUTION

SITE PLAN



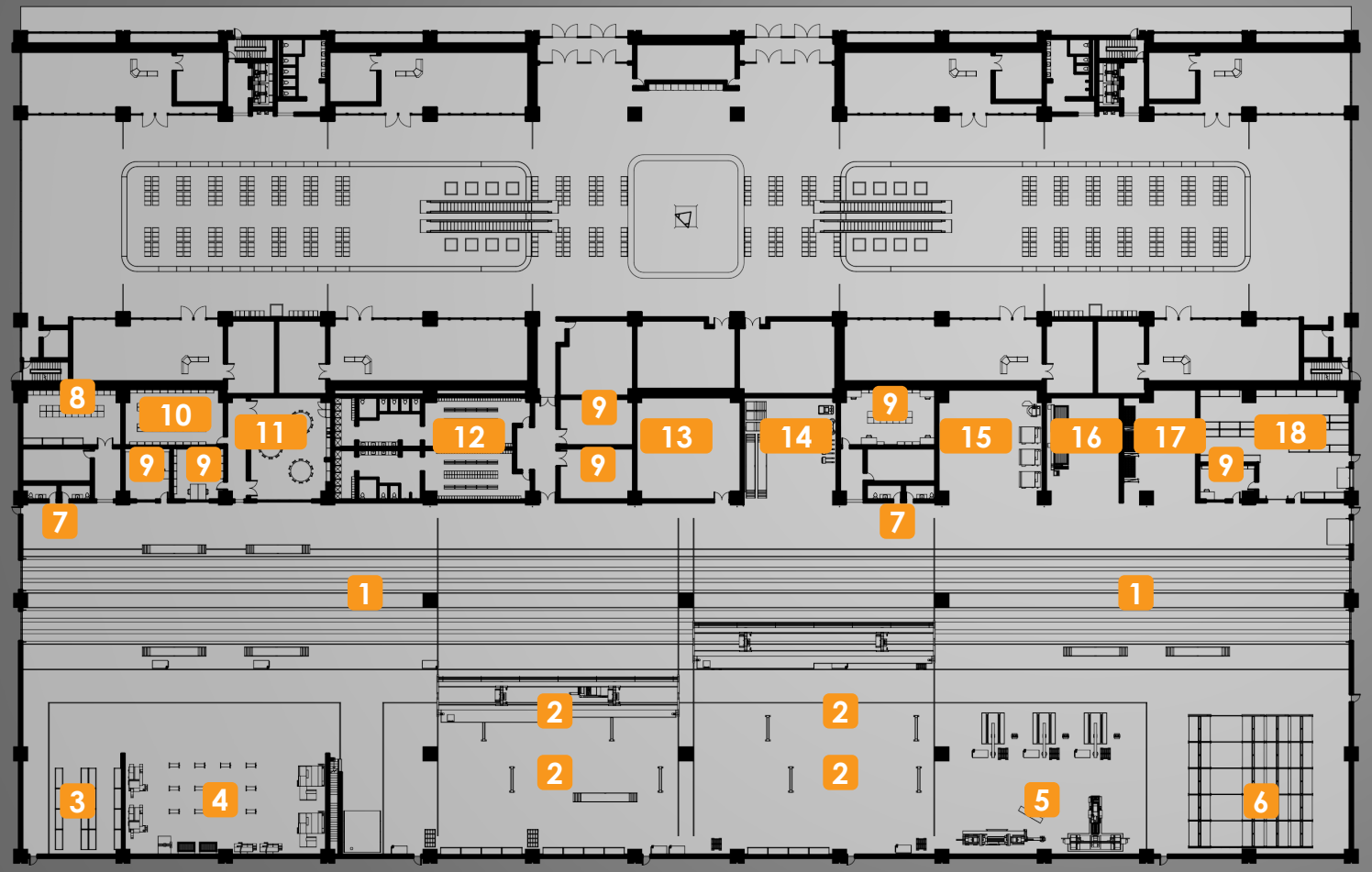
FLOOR PLANS



LEVEL 1: STATION

1. DROP-OFF
2. ENTRY
3. TICKETING
4. WAITING AREA
5. COMMERCIAL
6. BATHROOMS
7. ELECTRICAL
8. MECHANICAL

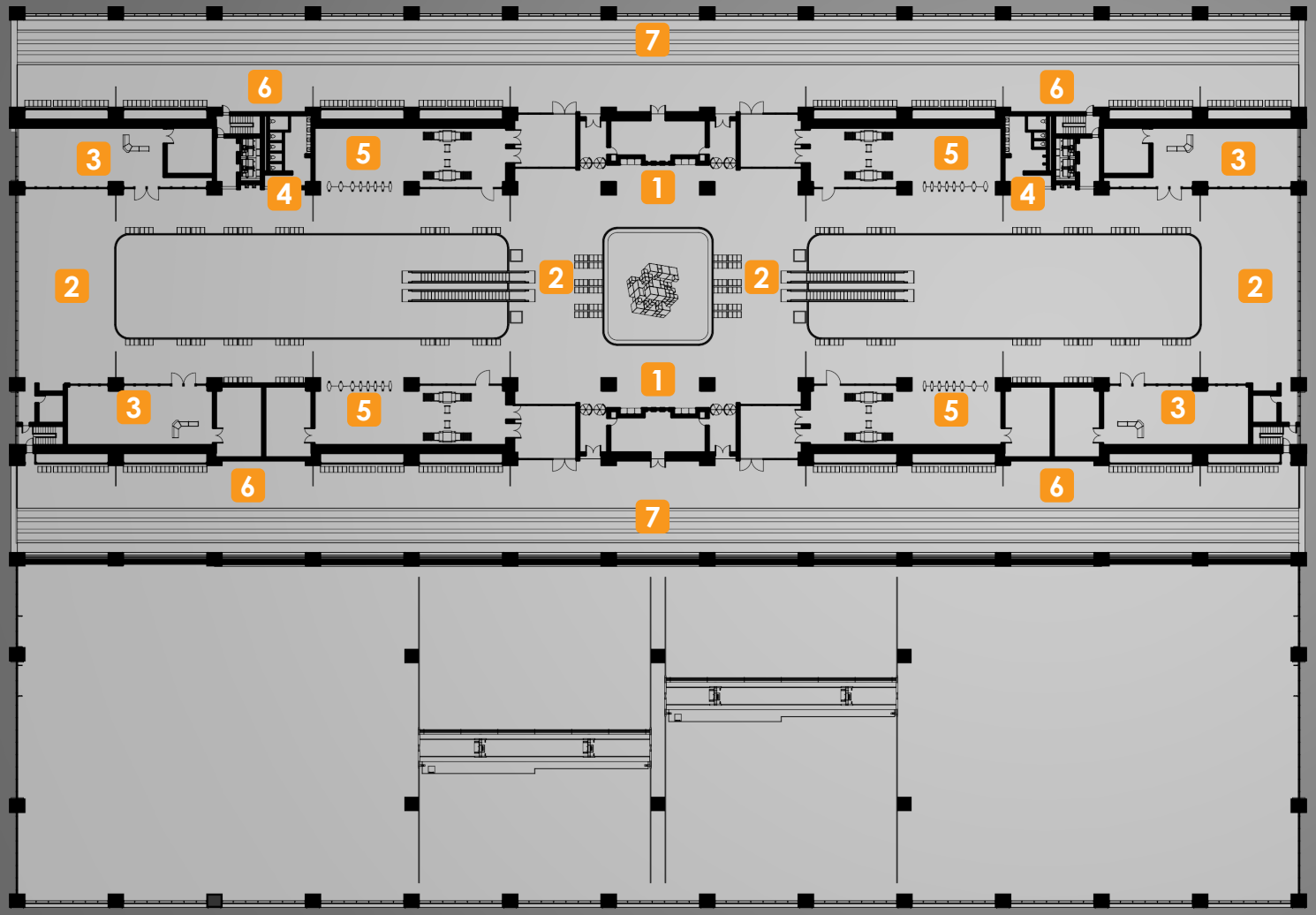
FLOOR PLANS



LEVEL 1: MAINTENANCE

1. MAGLEV TRACK
2. REPAIR BAY
3. ITEMS STORAGE
4. CNC MACHINING
5. HEAVY REPAIR
6. BULK STORAGE
7. BATHROOMS
8. TOOL SHOP
9. TECHNICAL DOCUMENT'S
10. MAINTENANCE OFFICE
11. BREAK ROOM
12. LOCKER ROOM
13. TOOLBOX STORAGE
14. COMMON WORK AREA
15. COMPONENT CLEANING
16. WATERJET MACHINES
17. WELDING AREA
18. SMALL PARTS STORAGE

FLOOR PLANS: FLOOR 2

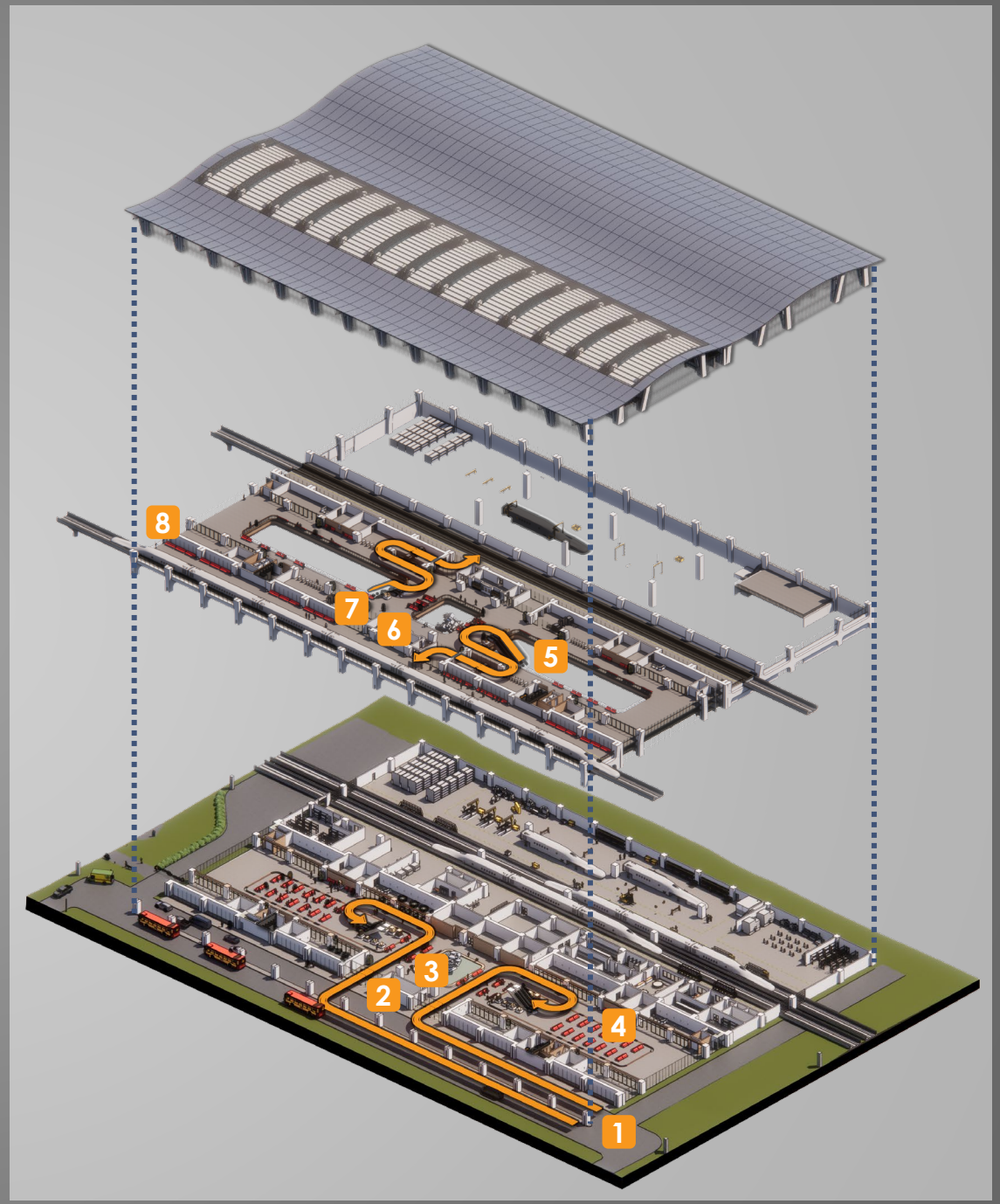


LEVEL 2: STATION

1. TICKETING
2. WAITING AREA
3. COMMERCIAL
4. BATHROOMS
5. SECURITY
6. PLATFORM
7. MAGLEV TRACK

CIRCULATION DIAGRAM

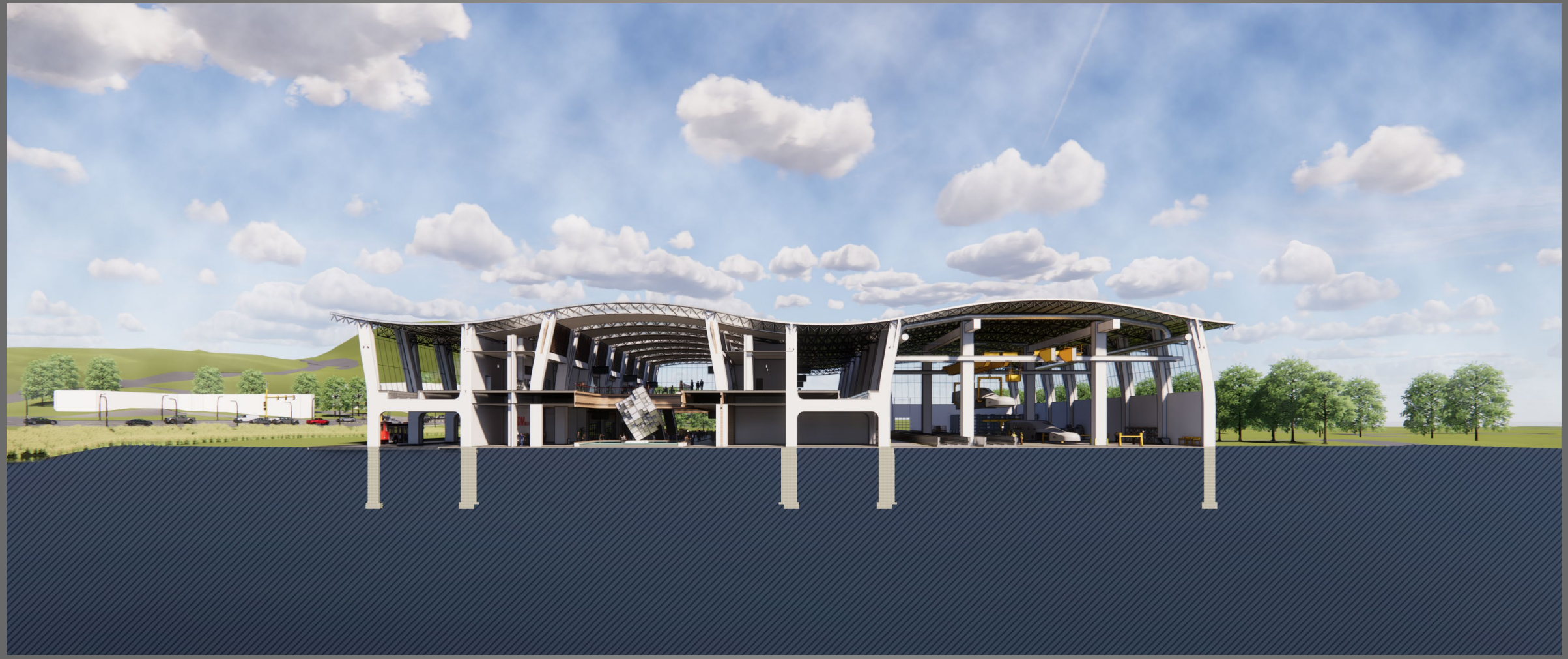
1. ENTER SITE
2. WALK THROUGH FRONT DOORS
3. AQUIRE TICKETS AT ENTRY
4. WAIT FOR TRAIN TO ARRIVE
5. ENTER SECURITY TO CHECK BAGS
6. WALK ONTO PLATFORM
7. BOARD TRAIN
8. DEPART FOR DESTINATION



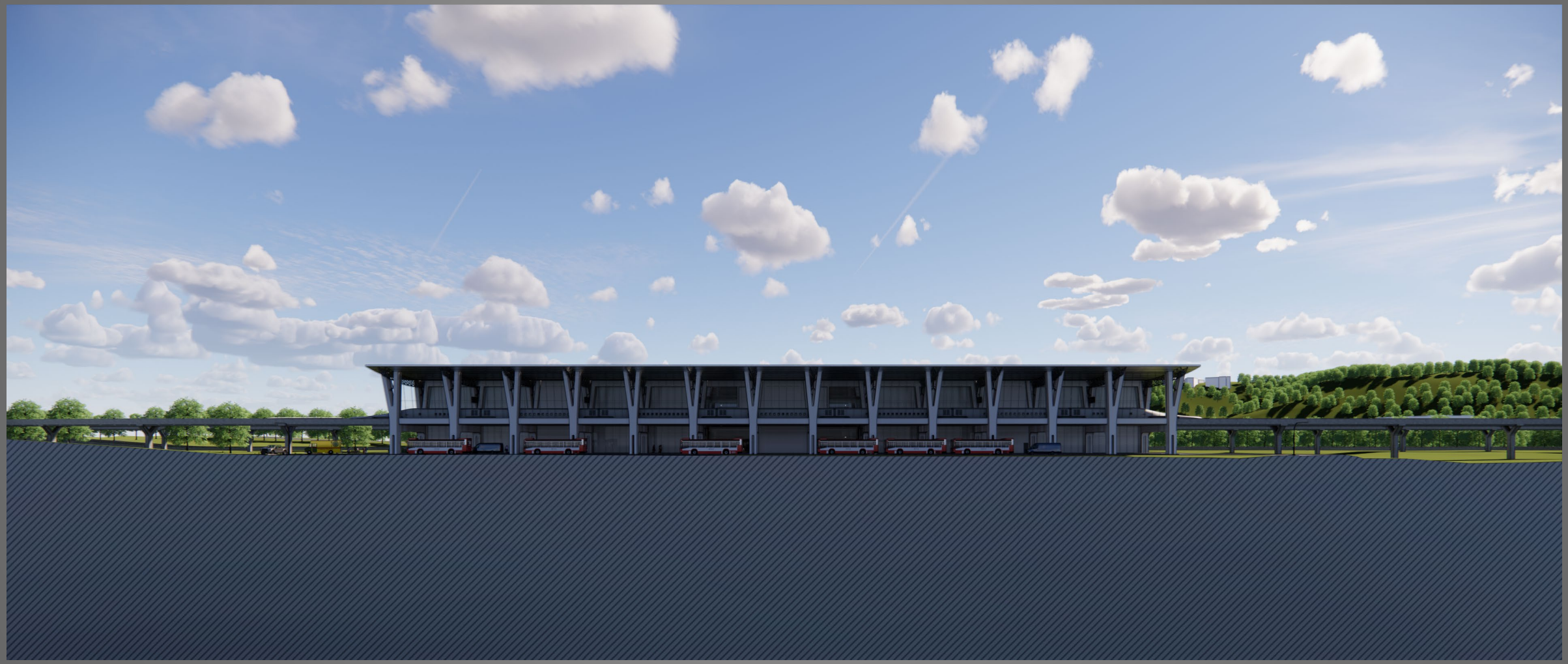
SECTION: STATION

SECTION: MAINTENANCE

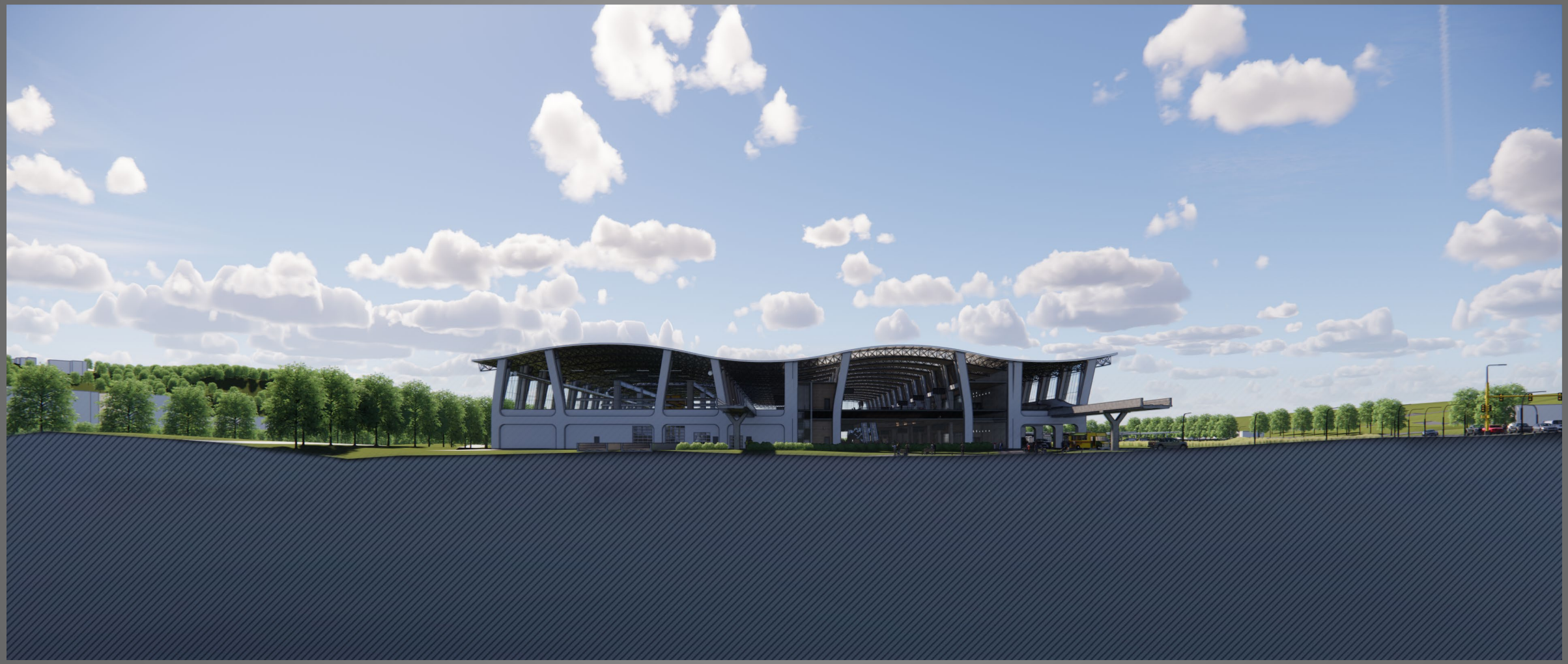
SECTION: TRANSVERSE



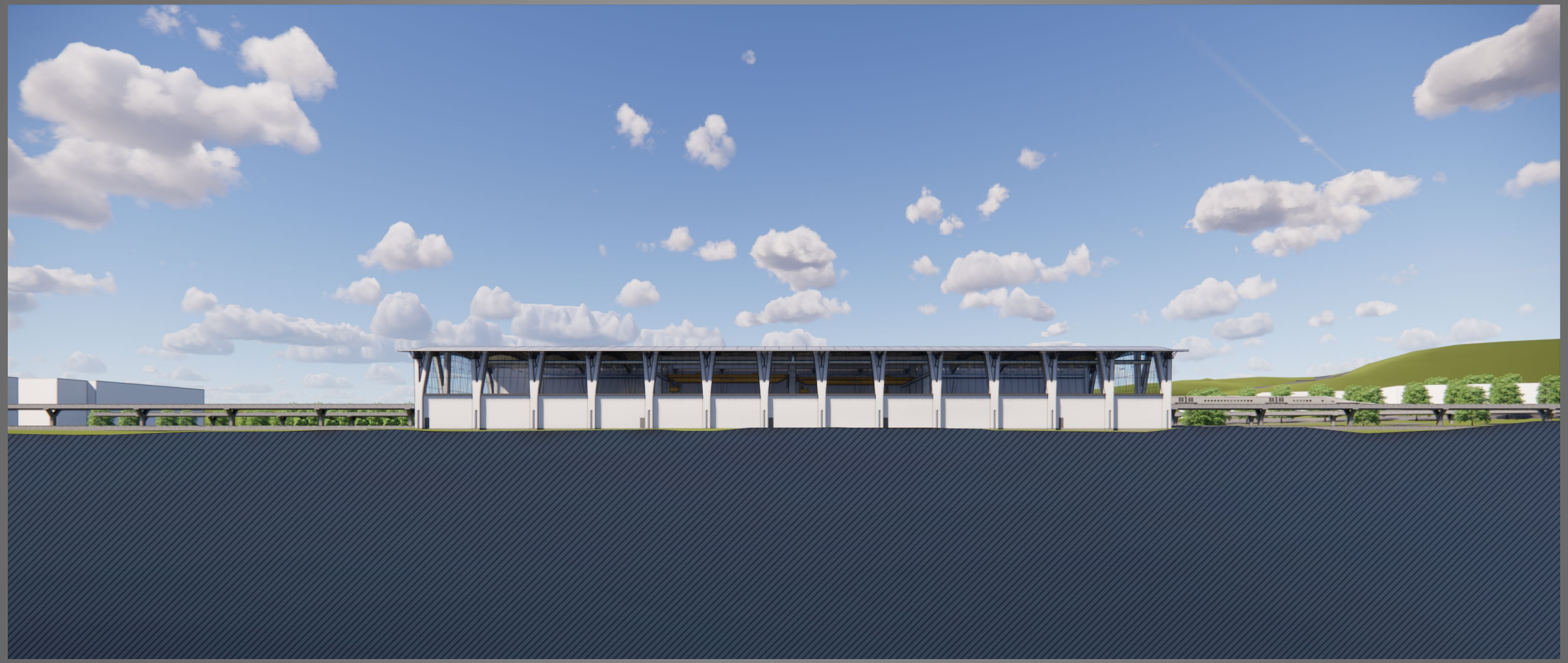
ELEVATIONS: NORTH



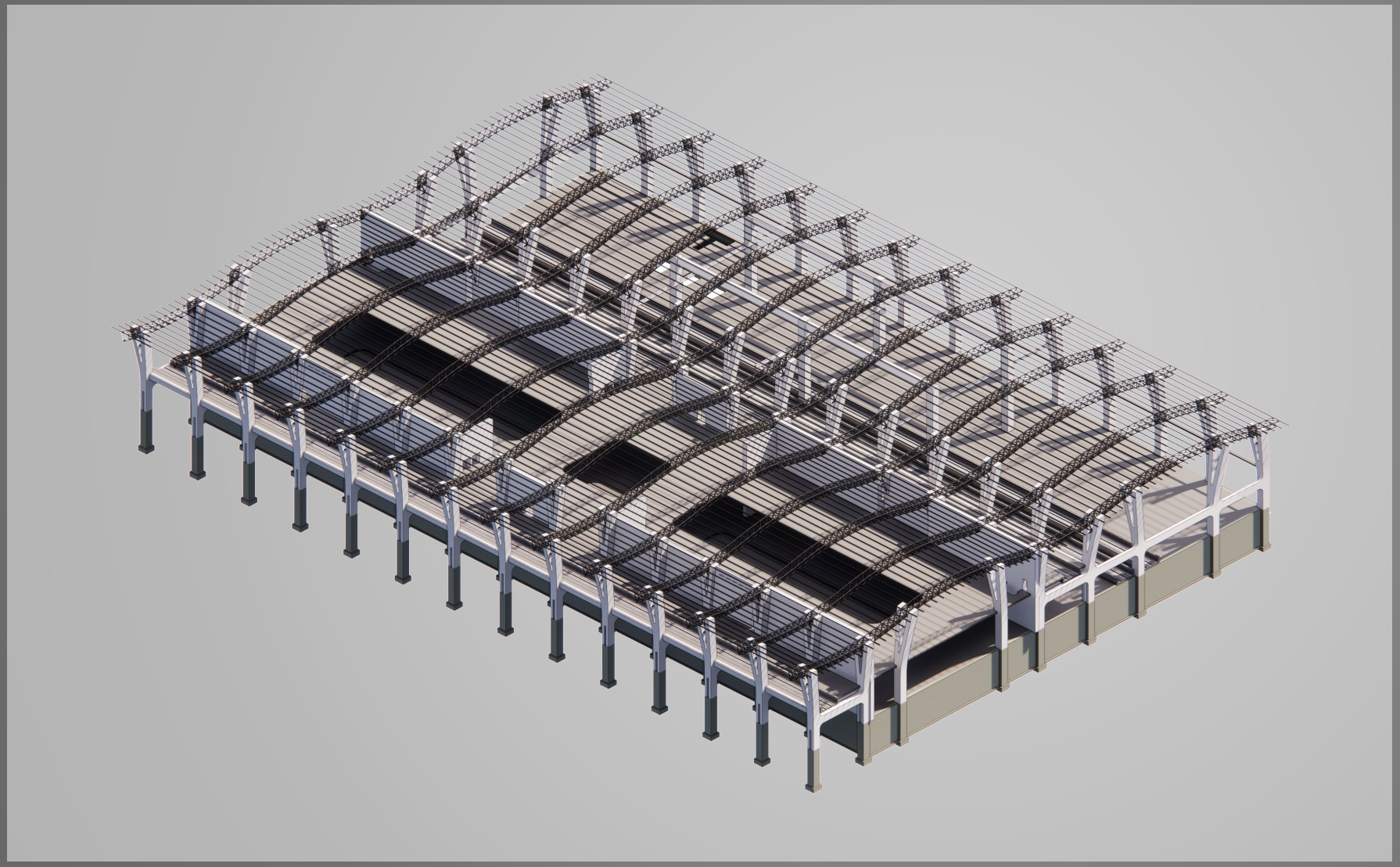
ELEVATIONS: EAST



ELEVATIONS: SOUTH



STRUCTURAL DIAGRAM



COLUMNS

- Consists of 15 structural bays spaced 40’-0” apart from one another.
- Columns are 5’-0” x 5’-0” in dimensions.
- Columns are only on the edges and middle of station.

ROOF AND FLOOR

- Roof is a space frame design connected to columns where they split apart.
- Second floor is cantilevered 40’-0” from column grid.
- Second floor maximum span is 140’-0”.

DEMONSTRATIVE MODEL

RENDERS: SITE VIEW

RENDERS: NIGHT

RENDERS: EXTERIOR

RENDERS: ENTRY

RENDERS: LOBBY

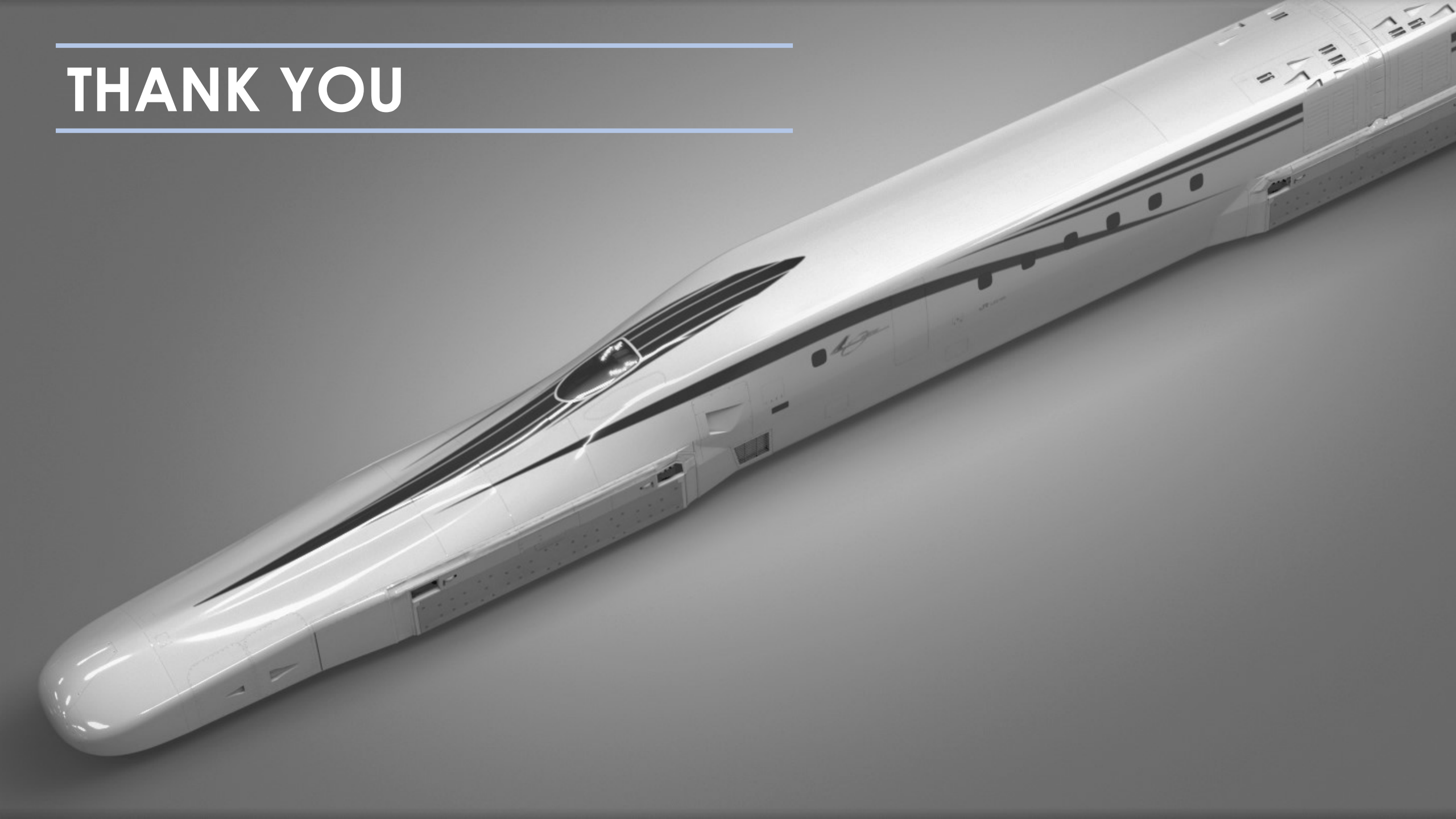
RENDERS: ATRIUM

RENDERS: SECOND FLOOR

RENDERS: PLATFORM

RENDERS: MAINTENANCE

THANK YOU



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