

IPED Annual Historic Tax Credit Summit 2018

CINCINNATI UNION TERMINAL

GBBN



TODAY

Context and Historical Significance
of the Building

Existing Conditions
Assessment

Documentation

Scope



DESIGN & CONSTRUCTION TEAM

Union Terminal Corporation (UTC, LLC)

Ownership Structure for Historic Tax Credits

GBBN Architects

Design and Executive Architect

John G. Waite Associates, Architects

Preservation Architect

Silman Associates

Structural Preservation

ARUP with Heapy Engineering

Mechanical / Electrical / Plumbing /
Fire Protection

THP Limited

Structural Engineering

Kleingers Group / TruScan

Civil and Landscape / 3D Scanning

Turner Construction Co.

Construction Manager

Facilities Management and Planning Services

Owner's Representative

Ellington Management Services

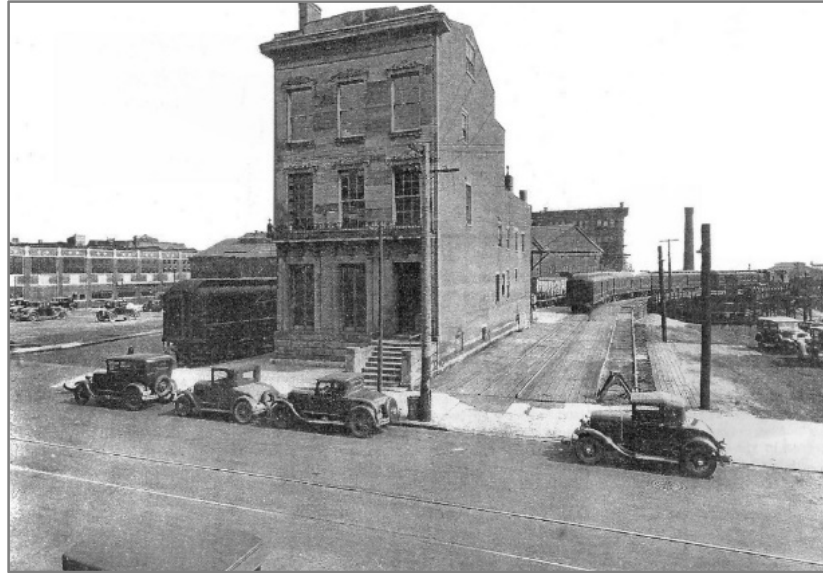
Inclusion Consultants



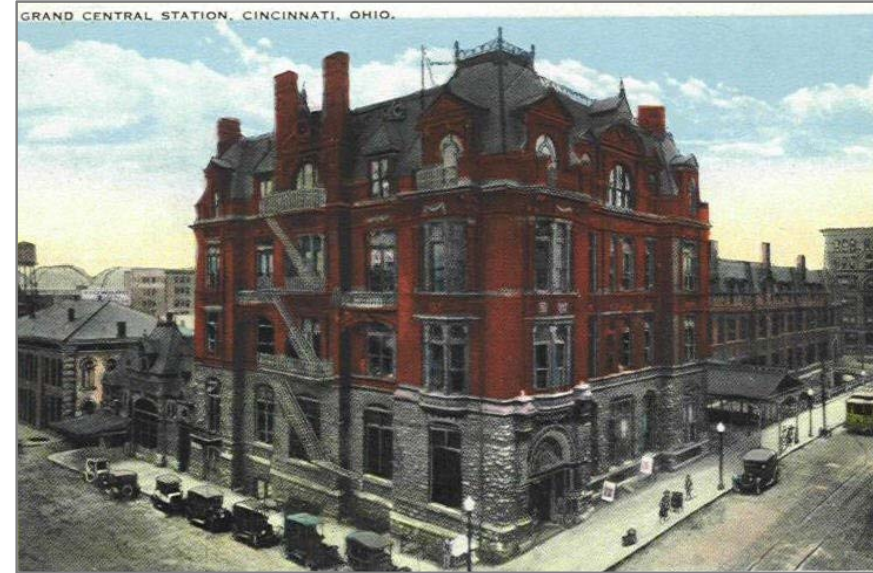
CONTEXT

BEFORE UNION TERMINAL MANY STATIONS

C&O Fourth Street Station



Central Union Depot, 1884



Court Street Station



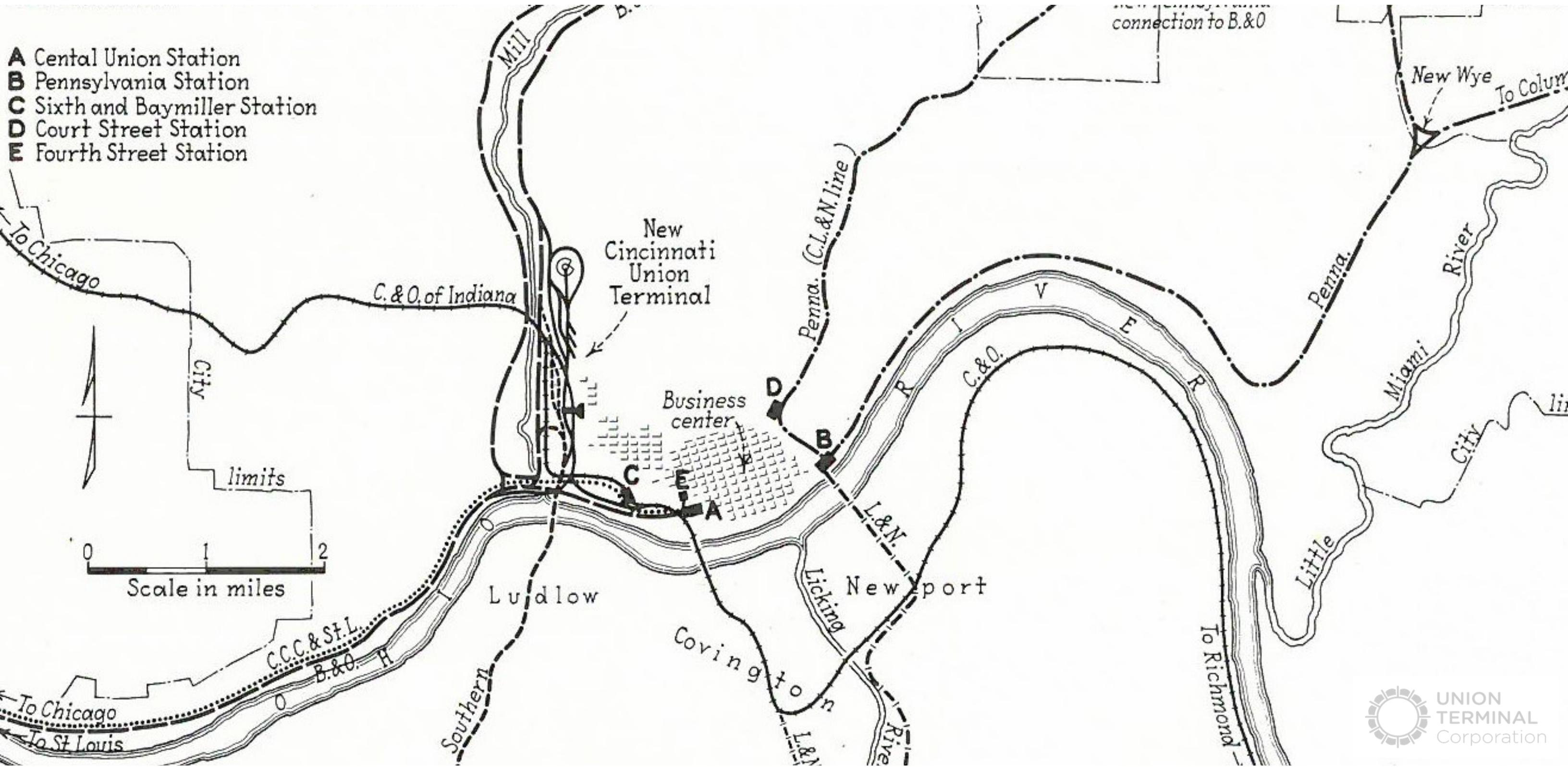
C.H. & D Depot, 1859



Pennsylvania Station, 1880

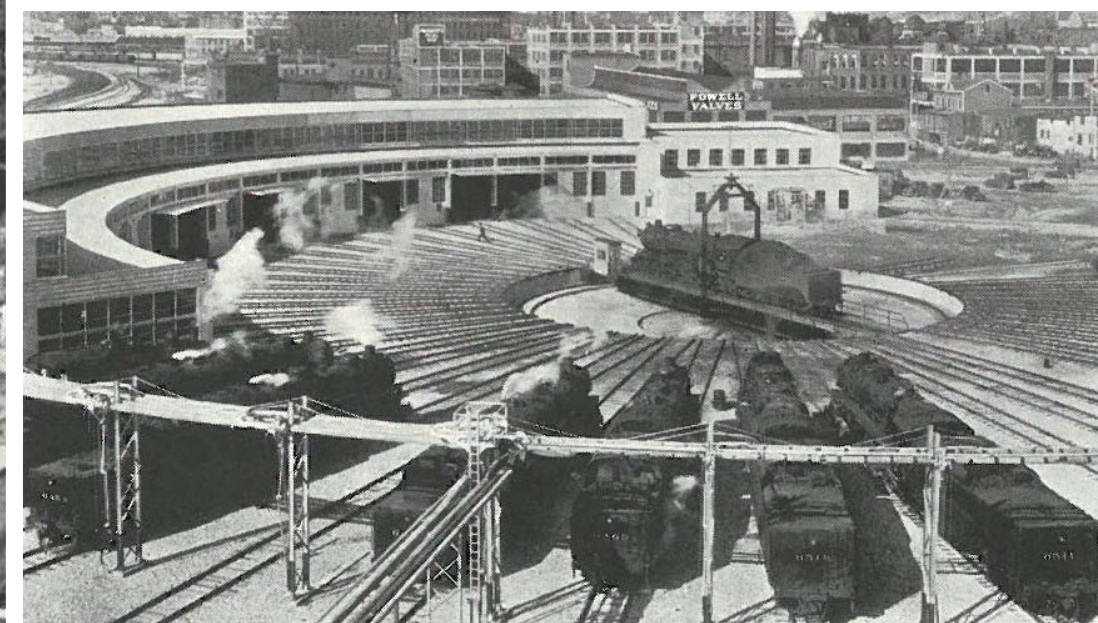
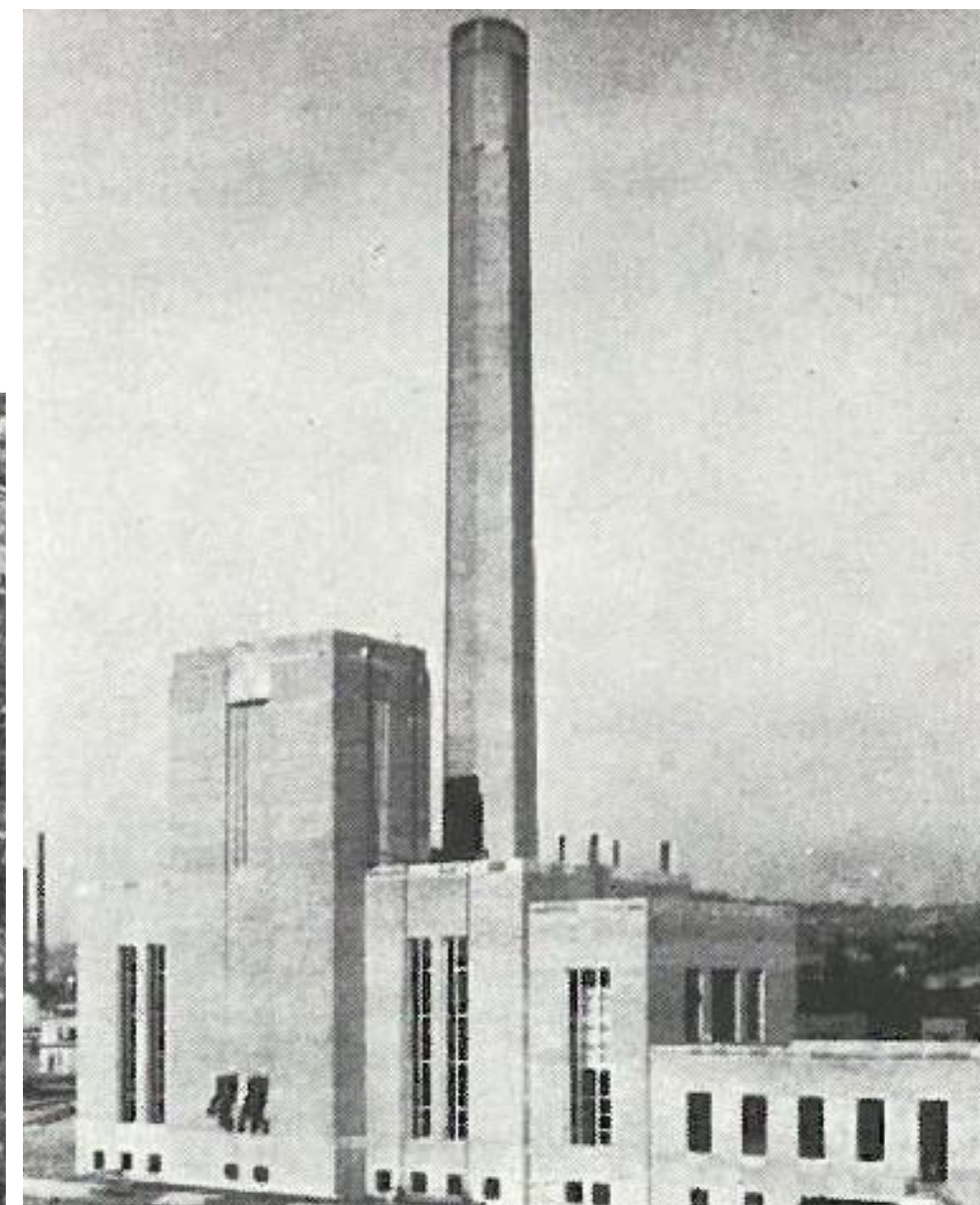
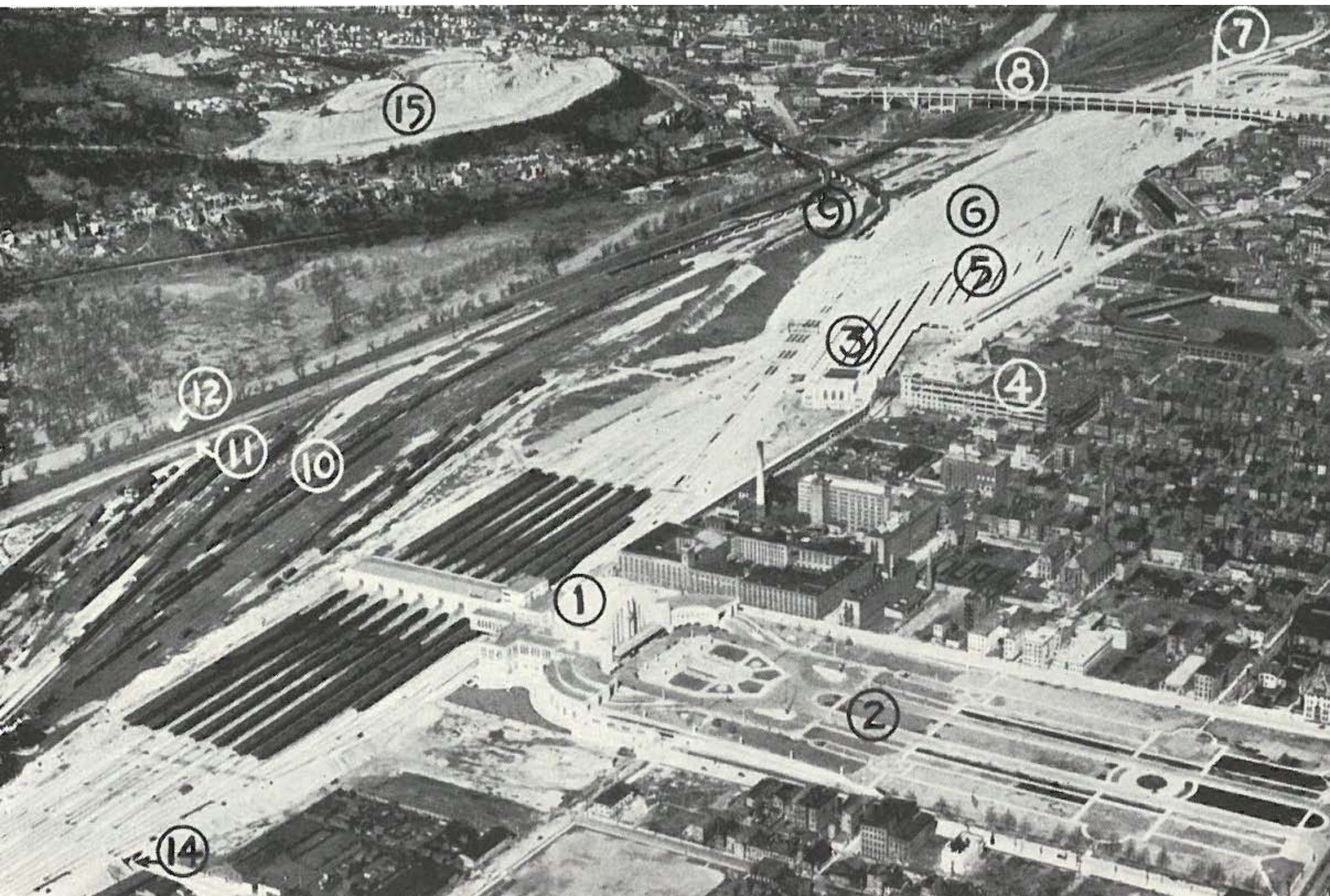


BEFORE UNION TERMINAL MAP OF STATIONS



THE UNION TERMINAL COMPLEX

22 BUILDINGS, \$41,000,000



HISTORICAL SIGNIFICANCE



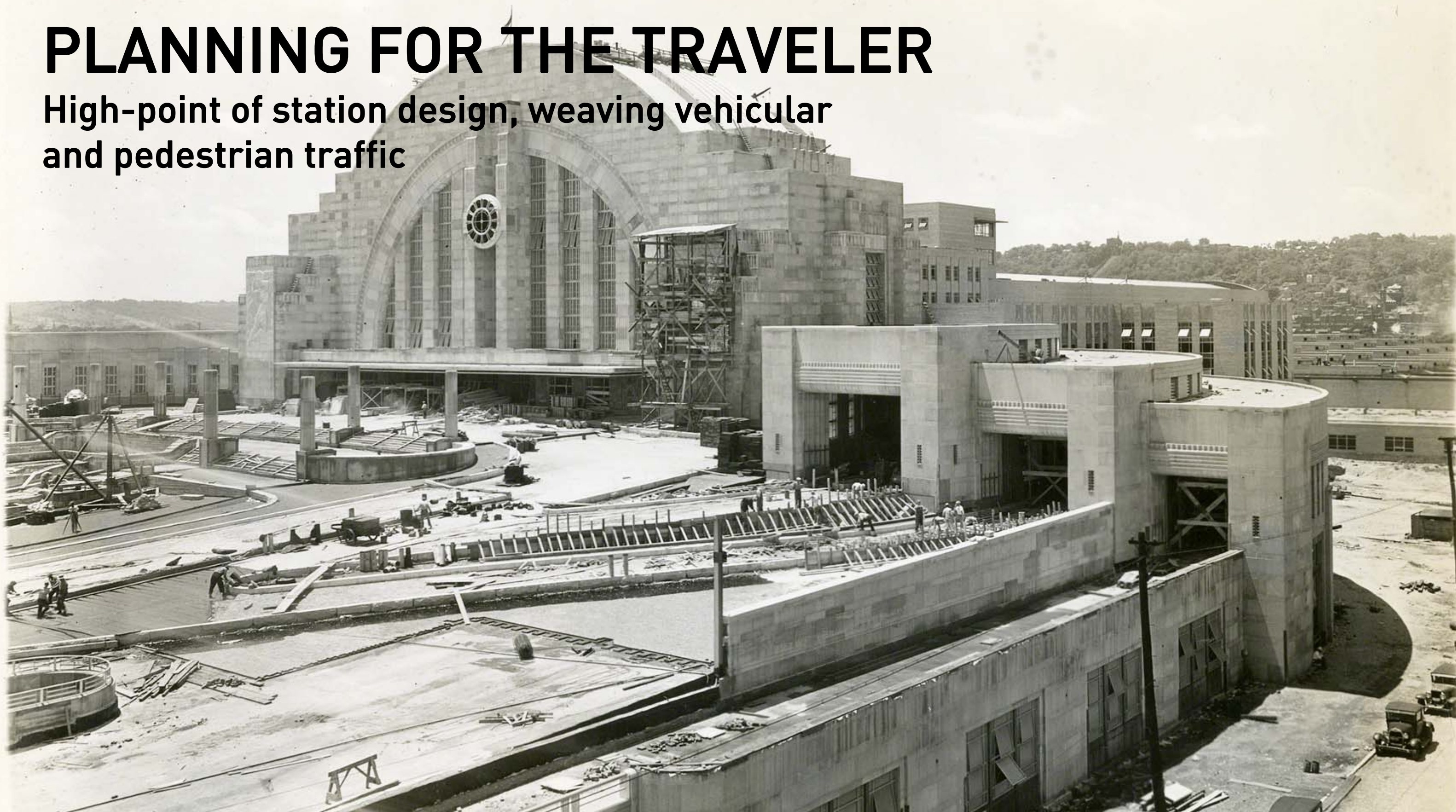
PLANNING FOR THE TRAVELER

High-point of station design, weaving vehicular and pedestrian traffic



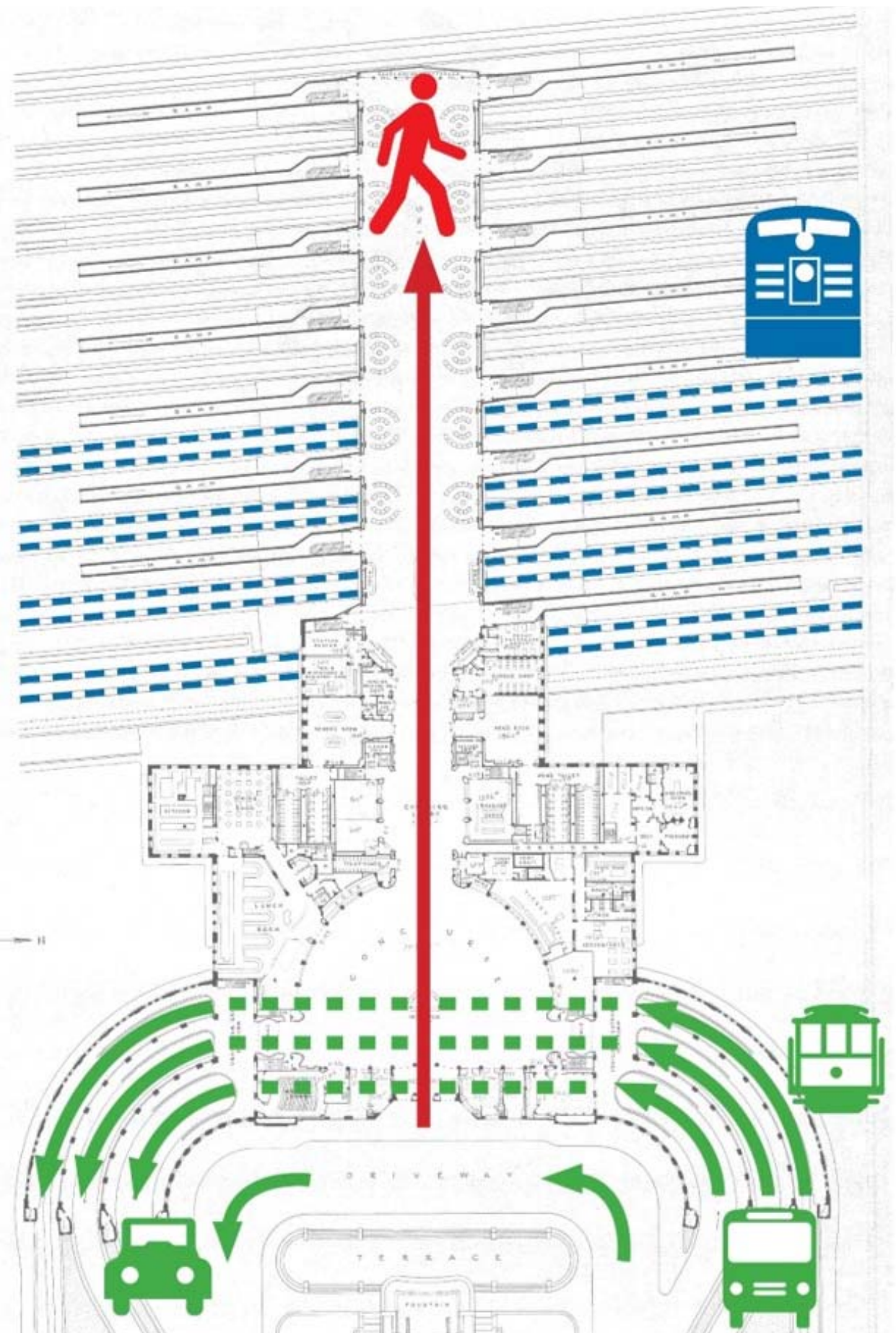
PLANNING FOR THE TRAVELER

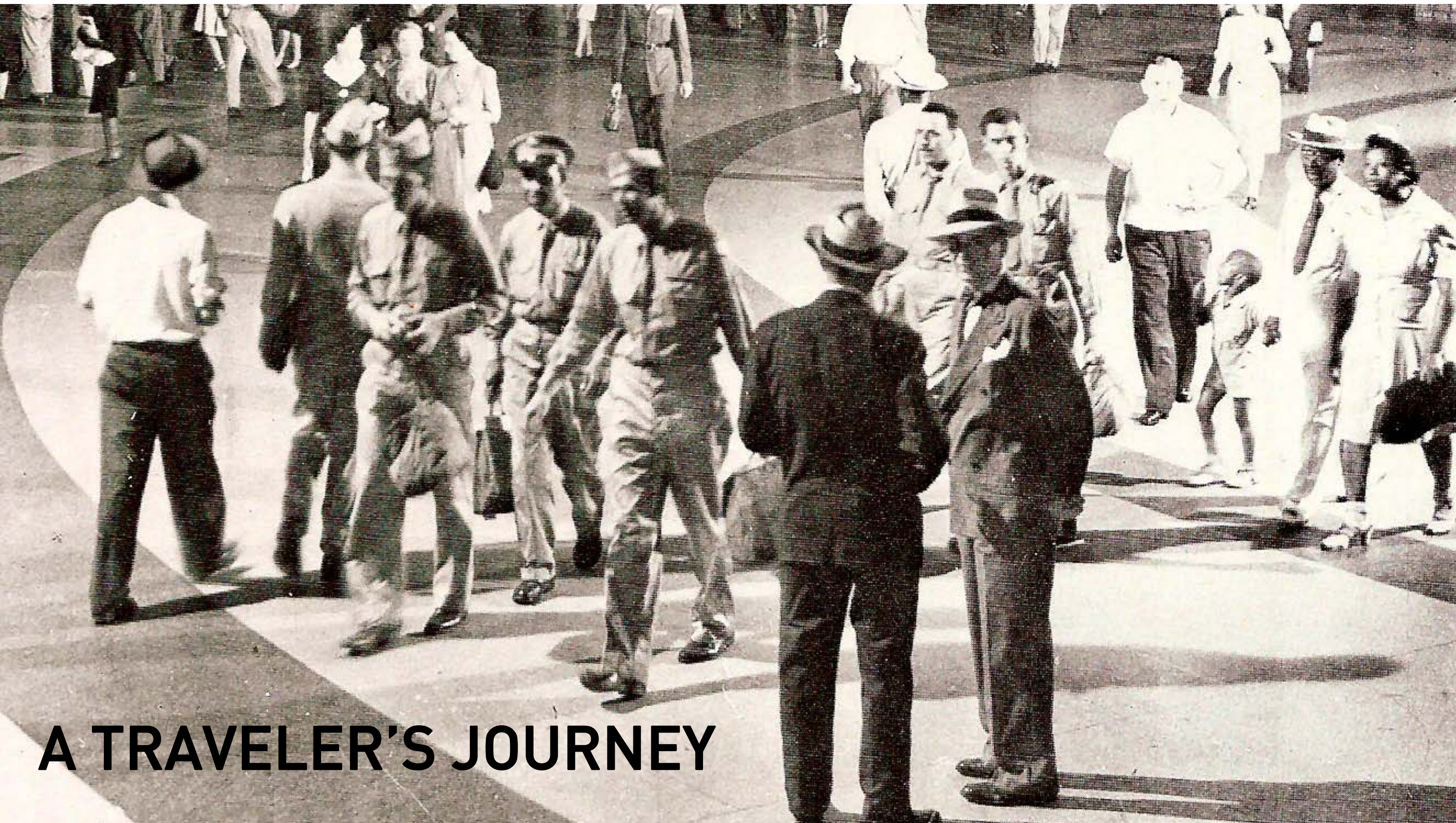
High-point of station design, weaving vehicular and pedestrian traffic



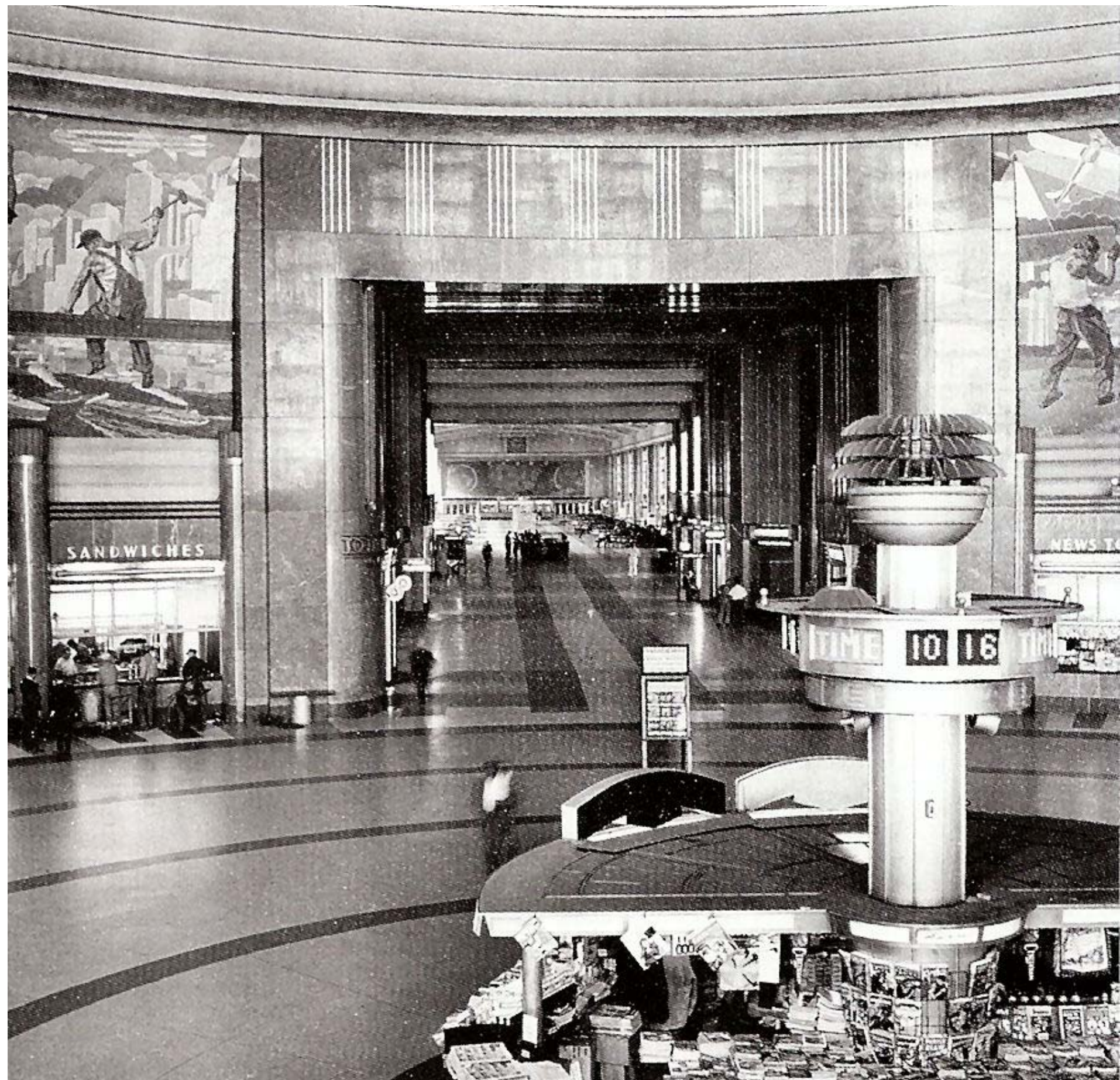


VEHICULAR APPROACH





A TRAVELER'S JOURNEY

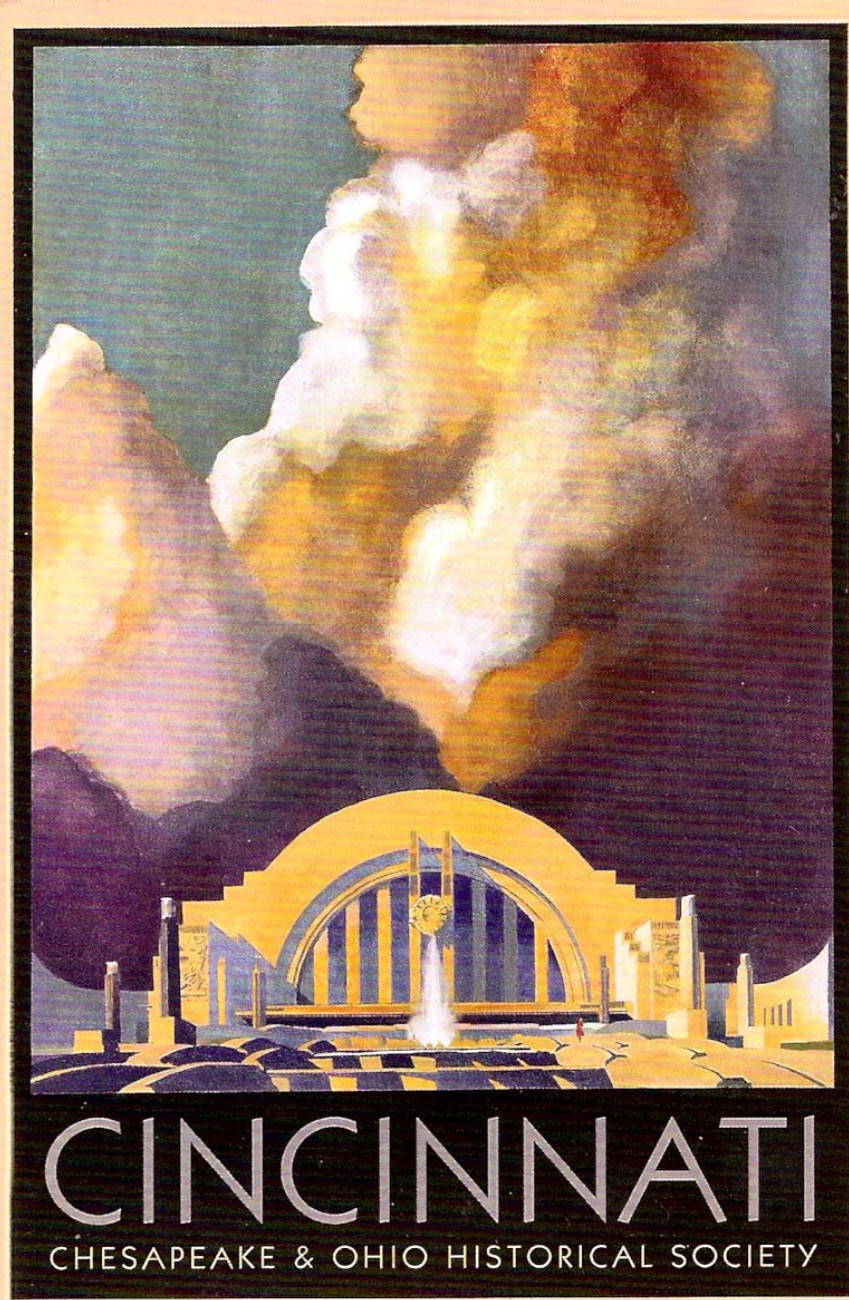




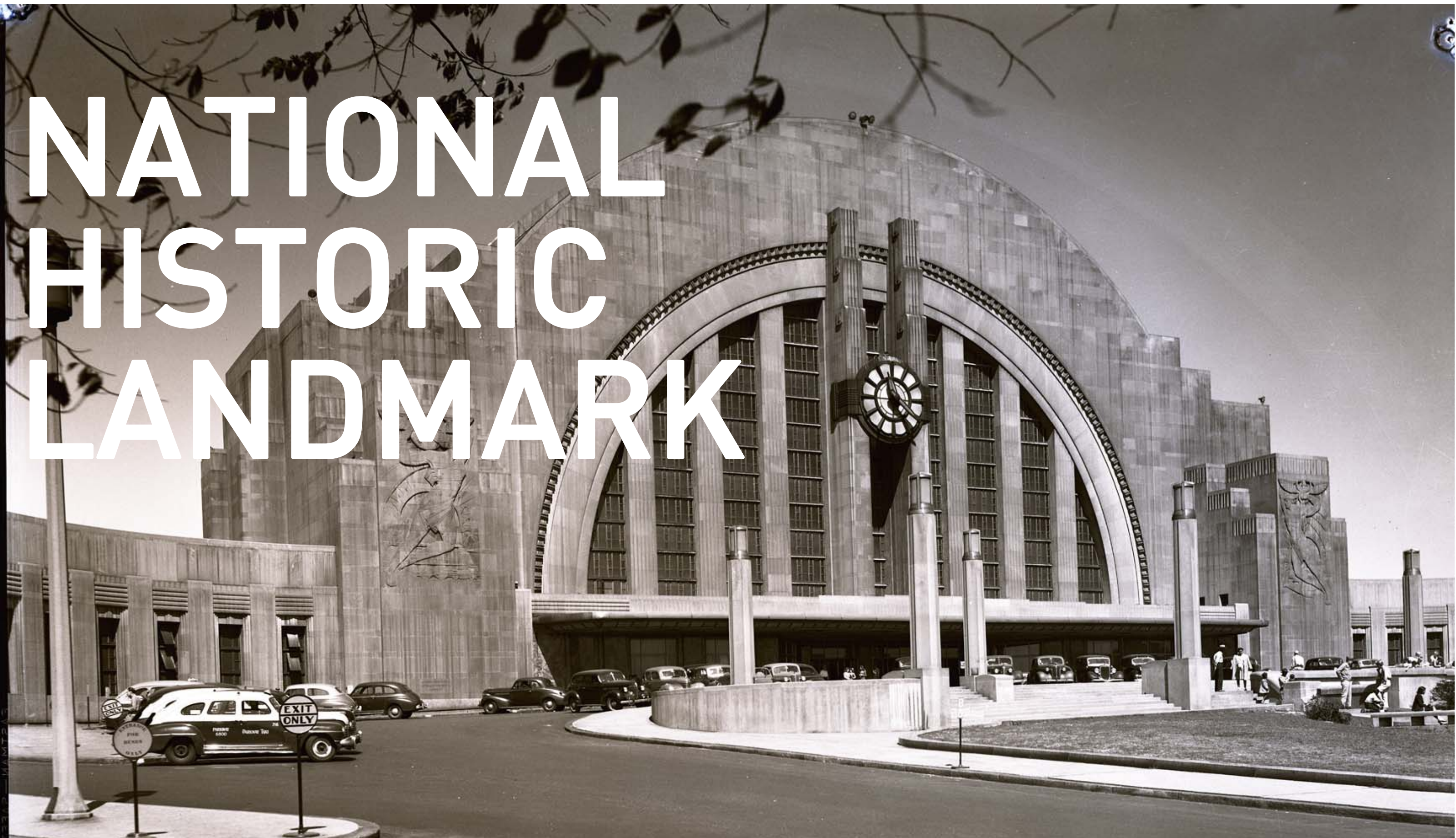




Welcome to Cincinnati!



NATIONAL HISTORIC LANDMARK



Parallel Trusses Carry Dome of Cincinnati Station

By C. S. Poyzant
 A SEMI-DOME type of roof adopted for the station building at Cincinnati, Ohio, presented special problems in the design of the structural-steel trusses. In the main floor, the normal ground elevation of the surrounding area is at the head of a landscaped approach incline, as described in *Engineering News-Record* of Feb. 26, 1931, p. 348. In this plaza entrance the central part is reserved for the use of persons on foot and in automobiles. Triple loops at the sides of the plaza and passing through the station at lower elevations provide for street cars, buses and taxicabs. A driveway loop at the ground level serves the heavy trucking.

As the requirements for occupancy did not warrant a high or monumental building, it became necessary to adopt some lofty type of roof to give architectural prominence to the city front of the building. In the general layout of the main floor or concourse is level with the train concourse that spans the

to the entrance of the train. On account of this semi-dome a truss-supported semi-dome conceived as supplying adequacy for the interior and being cylindrical or curved face.

In the structural design of the common arrangement radiating from a central hub is (1) no break in a continuous radial members; (2) the interior space is rectangular with a center point of the radial an open space; (3) the considerable horizontal portion at the crown transfer the top of the high barrel entirely open below, present with largely indeterminate it was not considered feasible by means of base and arched radial members at position of their springing building; (3) the plan of of the dome at the concourse from with an

Parallel arched trusses, largely of H-section members and of varying spans, are placed at different elevations to fit the curved outline of the dome, while the highest and largest trusses carry a barrel-arch or cylindrical extension of the dome. This great ground in section of trunk-line (twenty-two feet). Besides the station about \$80 and improvement with freight



In both the president's office, above, and his secretary's office, right, the floors are of varying shades of brown cork. The walls in the former are of gumwood veneer, and the furniture is upholstered in light tan, with drapes to match the floor colors. The desk is of walnut and hawwood. In the secretary's office, the pillars, door trim, and wainscoting are of hawwood, with aluminum base and trim. The wall panels are stipple painted plaster.

UNION TERMINAL
 CINCINNATI, OHIO
 ALFRED FELLHEIMER &
 STEWARD WAGNER, ARCHITECTS



Heating and Ventilating the New Cincinnati Union Terminal

By LESLIE J. HART†

The main concourse is a room generally semi-circular and a semi-circular from the front. The quarter-sphere. The occupies half of the semi-circular contains the offices of the lunch room

Prospective passengers wishing to use the station will arrive, if on foot or in a private automobile, at the main entrance in the center of the facade; if in a taxicab or bus they will arrive under cover in the wing to the right. Alighting from a public vehicle they will walk up a ramp to the main concourse floor, while the vehicle will continue under the main floor to a similar wing on the opposite side for taking on departing passengers.

the train concourse from which they will gain access to a stair or ramp to the train platforms below. The terminal is built on the through-station principle and the tracks and platforms pass at right angles under the train concourse.

The main concourse and train concourse are rooms of large volumes presenting unusual requirements in the way of heating and ventilating apparatus. This article will be largely limited to an attempt to describe these rooms and the conditions leading to the solutions reached.

The Train Concourse

The train concourse presented the greatest difficulty in the way of heating of any section of the entire station design. It is approximately 450 ft. long by 78 ft. wide by 37 ft. high; it is exposed on roof, floor, and all but one side; it contains 16, four-door-wide vestibules opening to the ramps and stairs below, and as it

Cincinnati Terminal Interlocking



The east front of the new station

One electro-pneumatic interlocking serves entire station and throats—Machine on fifth floor of station—A-C. power supply with rectifiers for d-c. control circuits

THE NEW passenger terminal of the Cincinnati Union Terminal Company, which was placed in service on April 1, involves an entirely new track layout and station, as well as a coach yard and engine terminal. The station is located west of the business section of the city and handles all the passenger trains of the seven roads serving Cincinnati. The station is of modernistic design, the central unit of the building enclosing the main concourse having a floor area of a semi-circular shape with a radius of 90 ft. This concourse is flanked by various services such as ticket offices and restaurants, while the taxi cabs and baggage trucks op-

erate through subways underneath, with passenger ramps leading to doorways opening on the concourse. The waiting room, 78 ft. wide and 410 ft. long, extends from the rear of the concourse out over the tracks, gateways leading to ramps descending to the various tracks. The interior of the station is artistically decorated, including mosaics illustrating the history of transportation, the growth of Cincinnati, and several of the important industries of the city.

The terminal is of the through type with a connection at the north end with the Baltimore & Ohio, which is used by the trains of that road and those of the Big Four

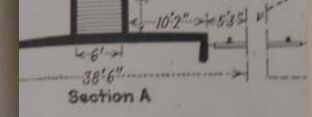
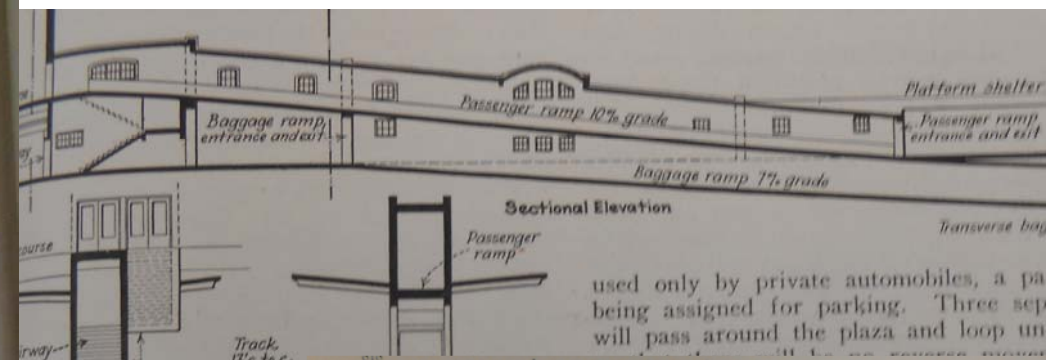


Fig. 5—Concourse

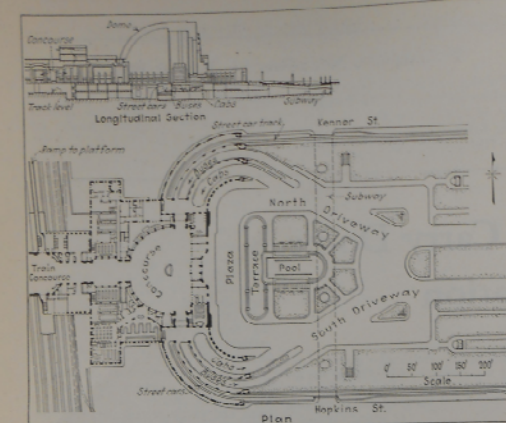


Fig. 2—Plaza approach to Cincinnati union station includes a park and provides for separation of vehicle traffic.

sections to the point where the maximum permissible thrust movement was attained and confining the lateral displacement within the predetermined limit. At truss 3 (Fig. 5), the largest segment of the dome, this permissible movement was fixed at 3/4 in., an amount estimated to be within the limit of danger of cracking masonry applied to the truss. It was further calculated that when the truss elongated this amount it would have sufficient rigidity to resist any further movement requiring consideration. To permit this stretch, all trusses were erected from fixed pin points at their north ends. Where the buttress support from the adjoining framing was insufficient to guarantee the immovability of the north pin of the truss, additional temporary anchorage by steel cables and turnbuckles was employed.

Upon the roof framing is a 2-in. concrete slab reinforced with wire mesh. This is covered with a layer of waterproofing and then with terra cotta tile. The slab was in circular sections, beginning at the center and extending in directions from the longitudinal lines, one end not being allowed to advance more than 10 ft. beyond the other. In this way the trusses were equally. This same practice was followed with the domed plaster beneath the trusses. Live load, for example, is taken as 25 lb. per sq. ft. of horizontal projection. Dead load comprises the weight of the trusses, the weight of the plaster, the weight of the terra cotta tile, and the weight of the concrete slab.

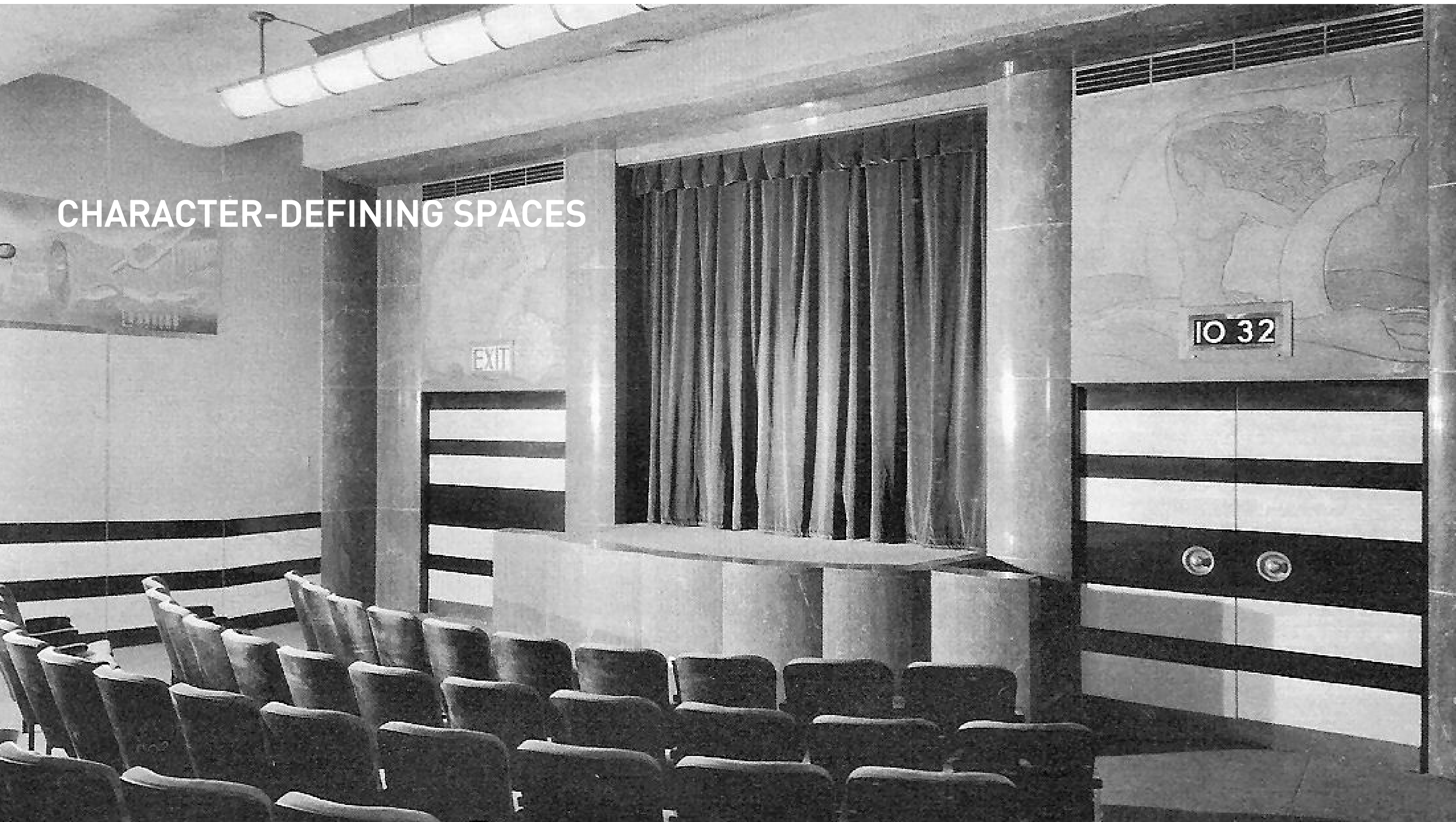


HISTORICAL RESEARCH

CHARACTER-DEFINING SPACES



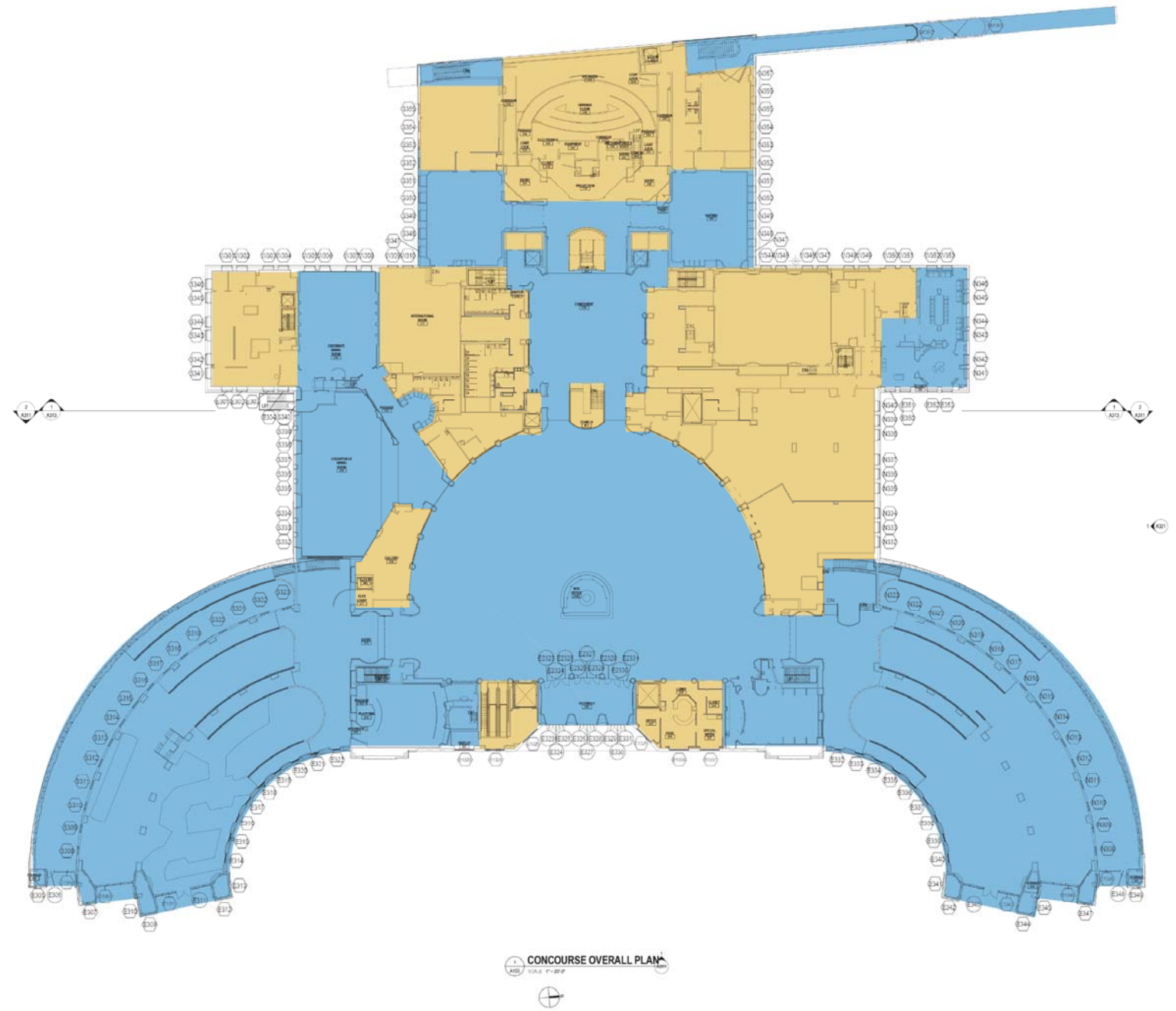
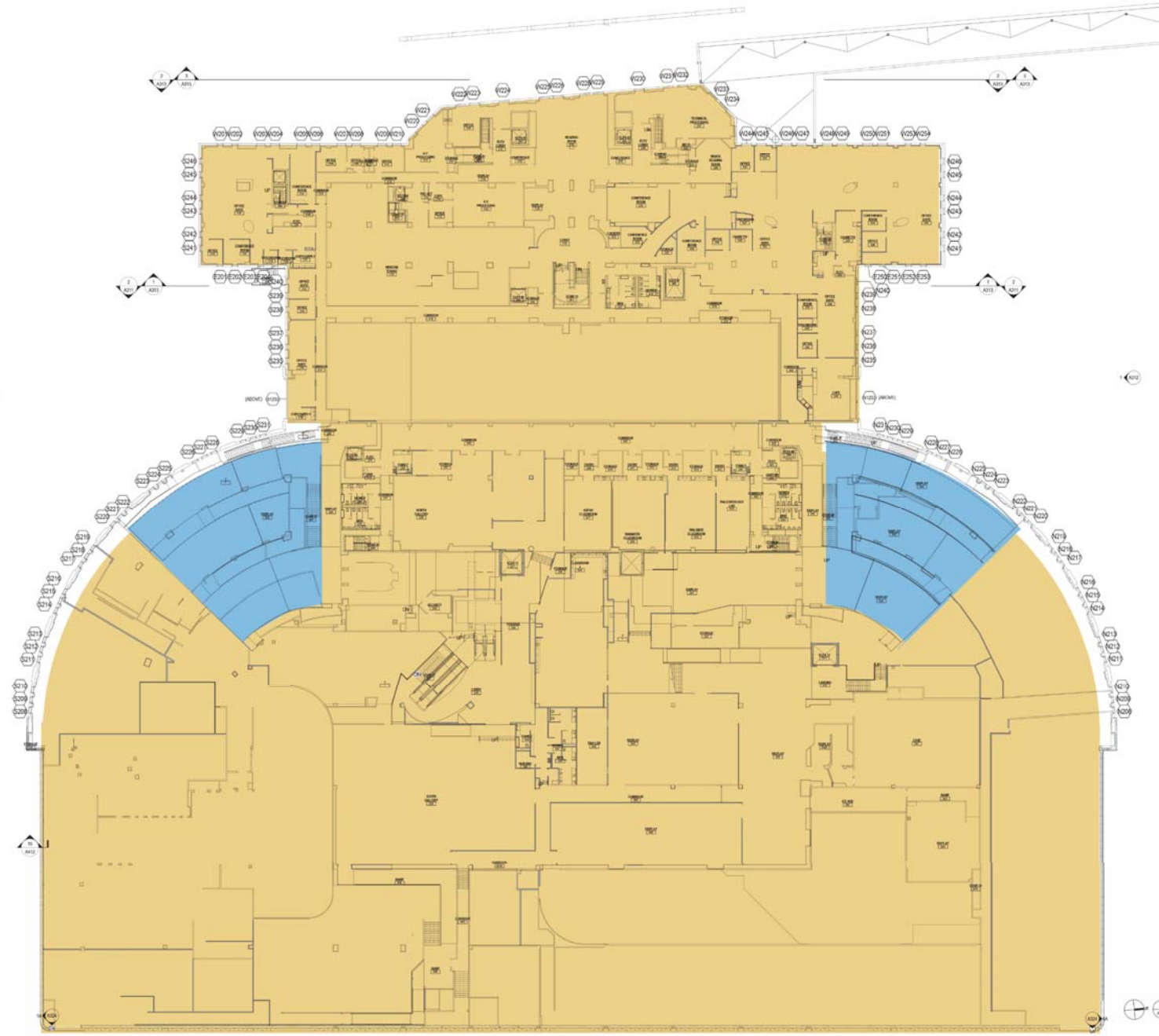
CHARACTER-DEFINING SPACES



CHARACTER-DEFINING SPACES



PRESERVATION AND REHABILITATION ZONES



Probe: A-11/S-11 Project 1 Parapet

Purpose: Remove portion of brick wall to verify construction of parapet and determine cause of excessive lime leaching.

Findings: Diagonal brick and headers were used to tie the masonry wythes of the parapet together. Existing mortar is mealy in texture. Fabric membrane at roof slab level is deteriorated.

Conclusion: Project One parapets to be partially rebuilt. Remaining brick masonry to receive spot repointing.



Probe: A-12a Upper Office Wall

Purpose: Remove portion of brick wall to expose and verify condition of structural steel beyond.

Findings: Existing steel is in good condition, with minor surface rust.

Conclusion: While steel structure at many building corners and parapets exhibit significant rusting, steel structure between these areas does not exhibit the same level of deterioration.

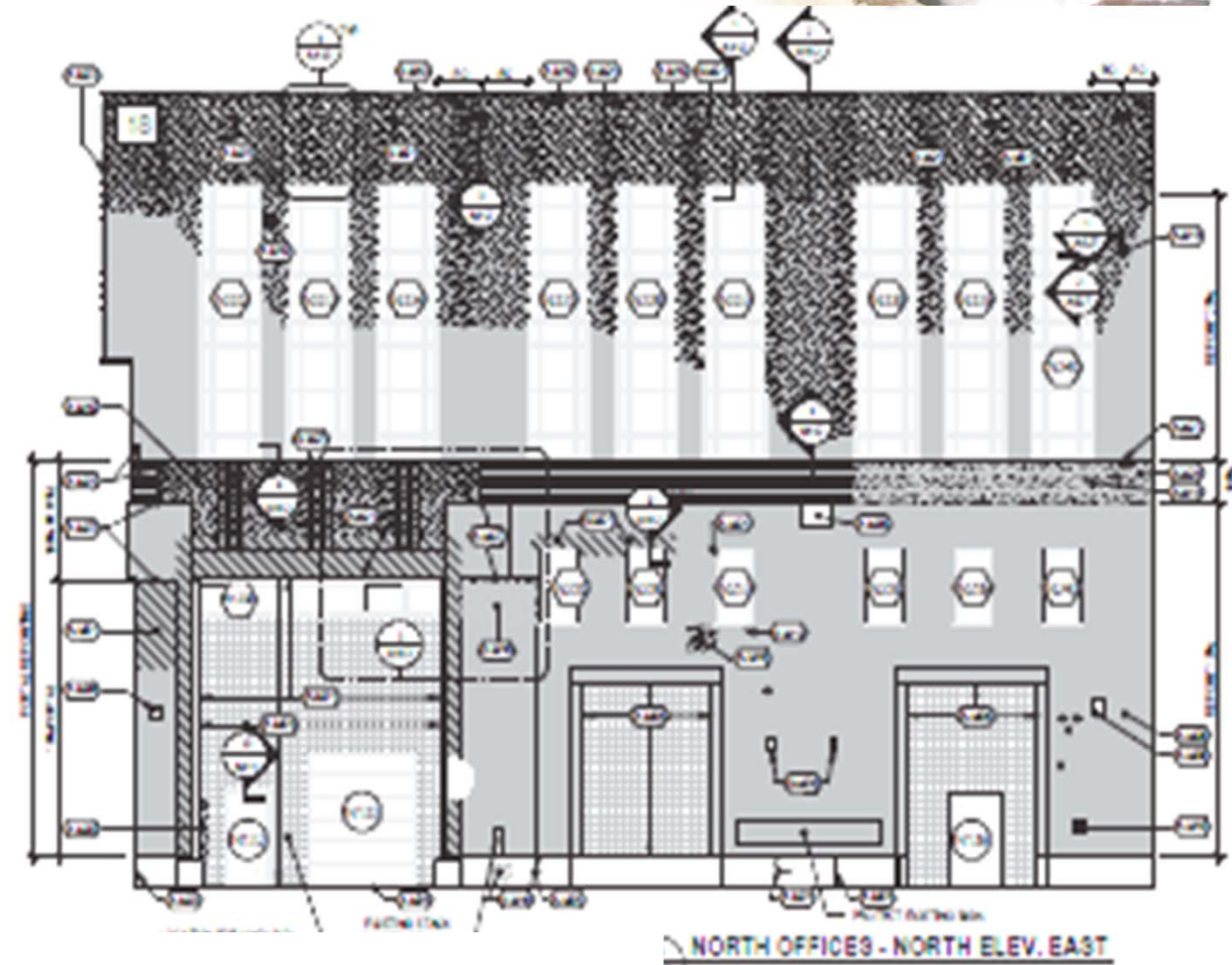


Probe: A-12 Upper Office Parapet

Purpose: Remove portion of brick wall to verify construction of parapet to expose structural steel beyond. Determine cause of cracking and brick displacement above upper windows.

Findings: Existing steel framing at the roof level has deteriorated and is displacing masonry. Over 1/2-inch of pack rust was observed on the spandrel beam and the backup brick was displaced outward up to 1 inch.

Conclusion: Parapets need to be rebuilt and surface brick properly tied to steel structure and backup masonry. Steel should be exposed, prepared, and painted at parapet locations. Steel should be reinforced at areas of substantial section loss. New waterproofing and backup masonry should be installed.



BUILDING DOCUMENTATION

- REVIT input of 1930's documents
- Point-Cloud laser scans of entire building

3D LASER
SCANNING

4.3+
BILLION
DATA POINTS

1/16"
ACCURACY


DRONE IMAGERY

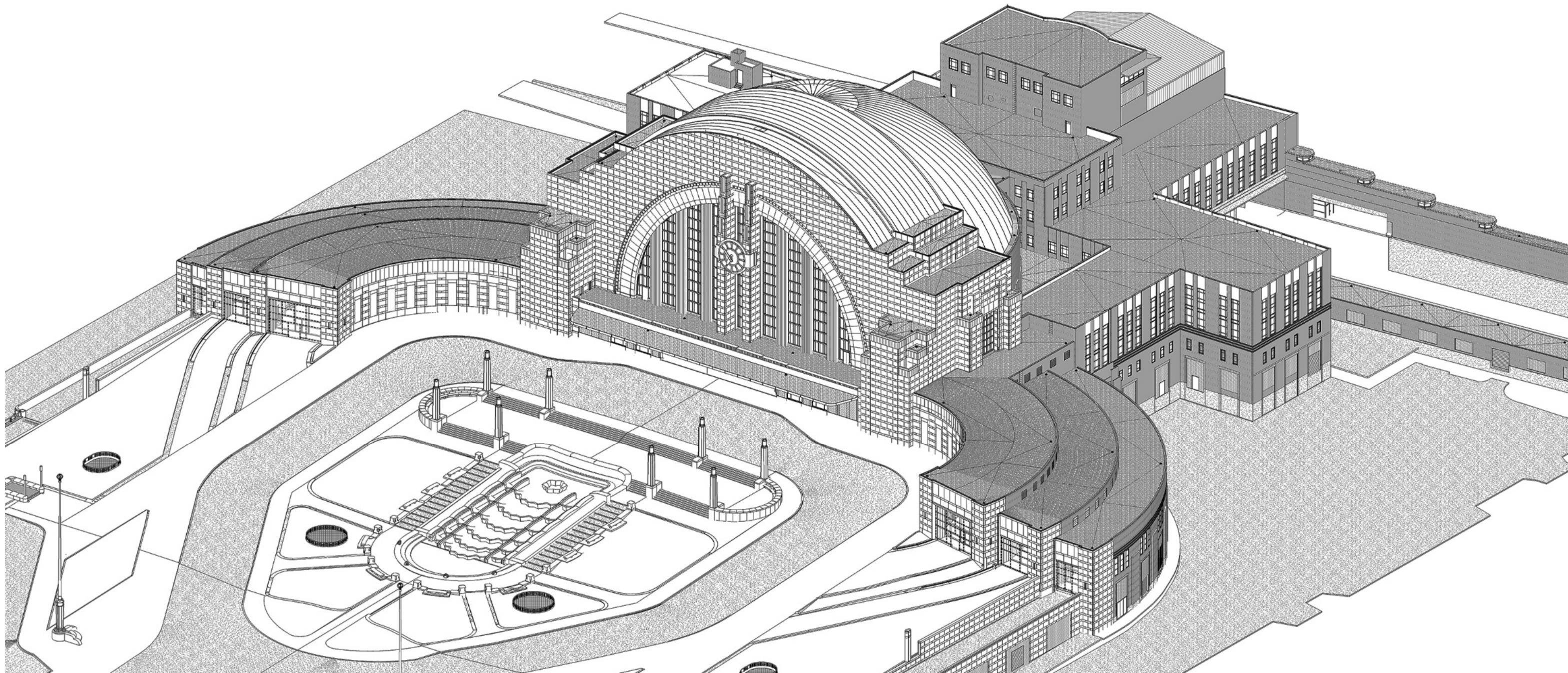
2+
TERABYTES
DATA IN POINT CLOUD

2,300+
SCANNING STATIONS

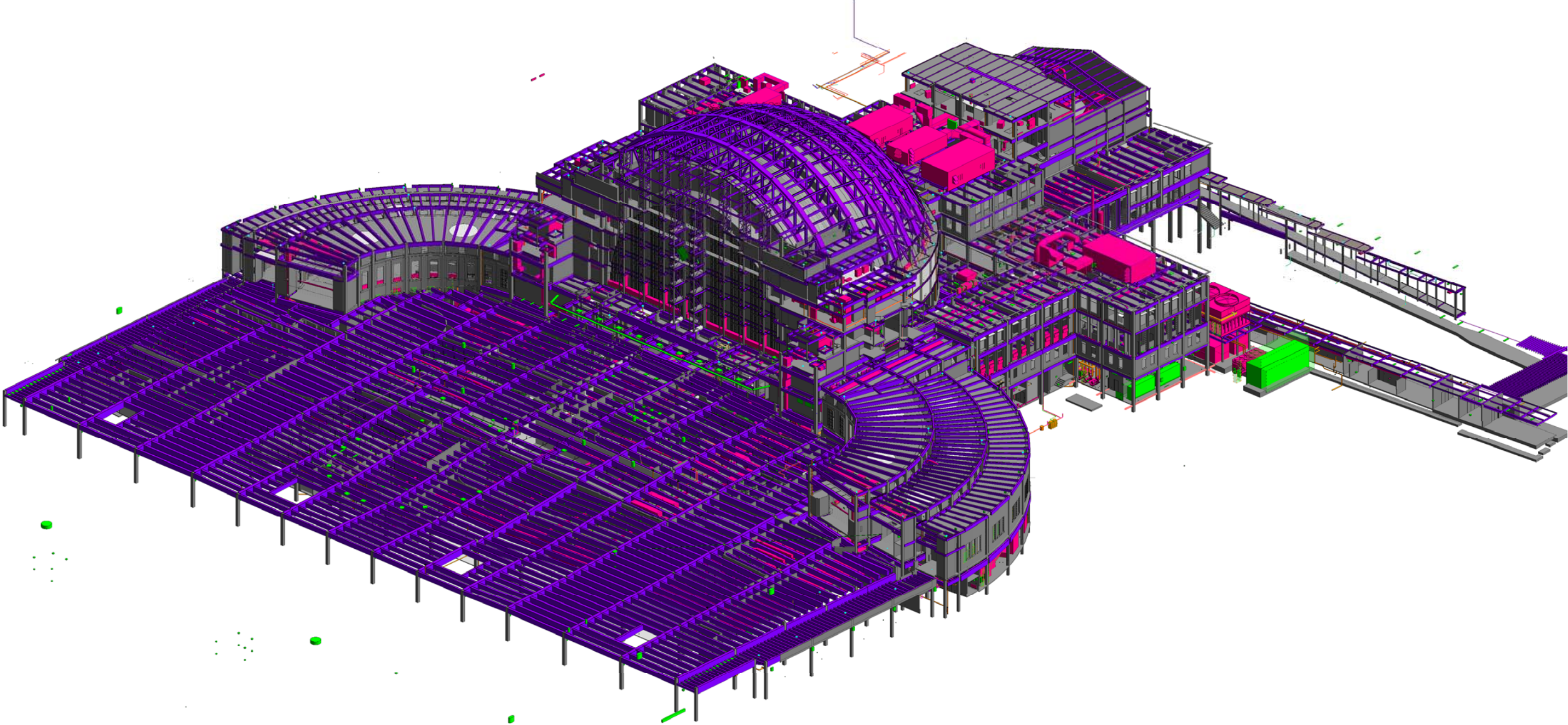




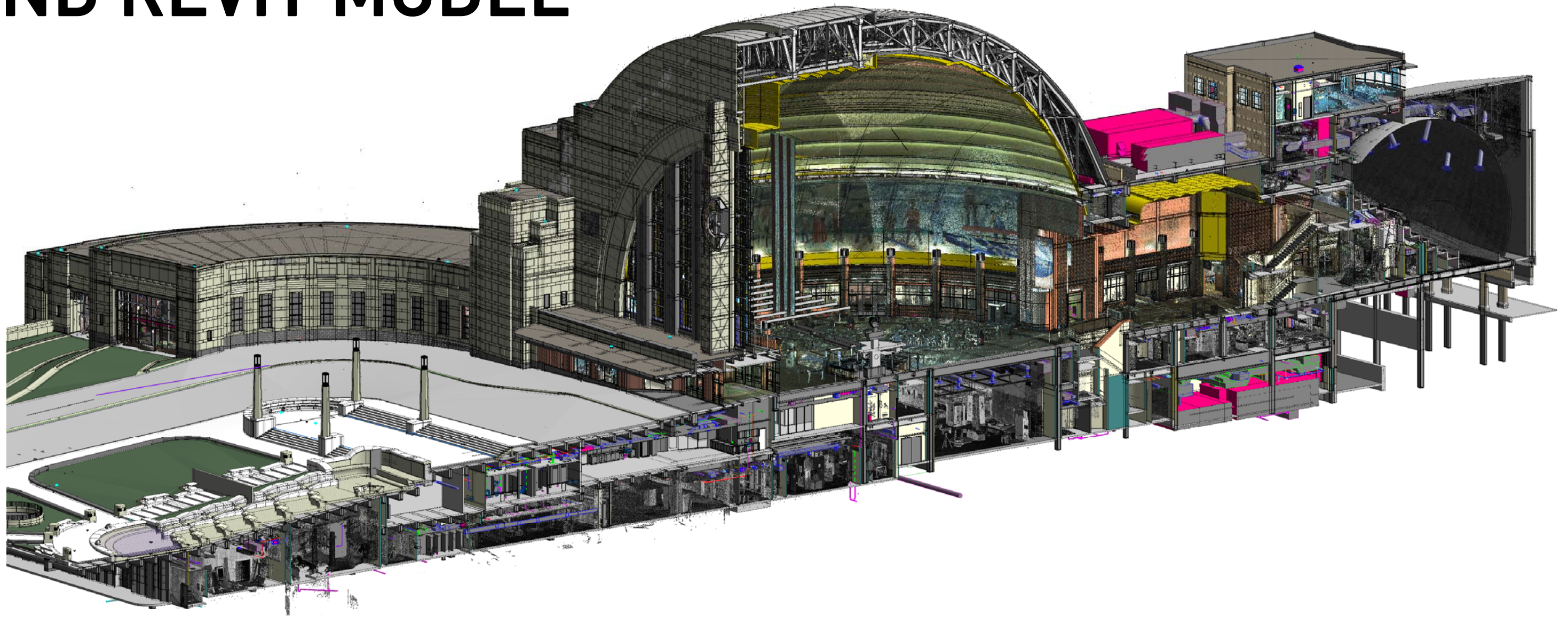
EARLY EXTERIOR REVIT MODEL



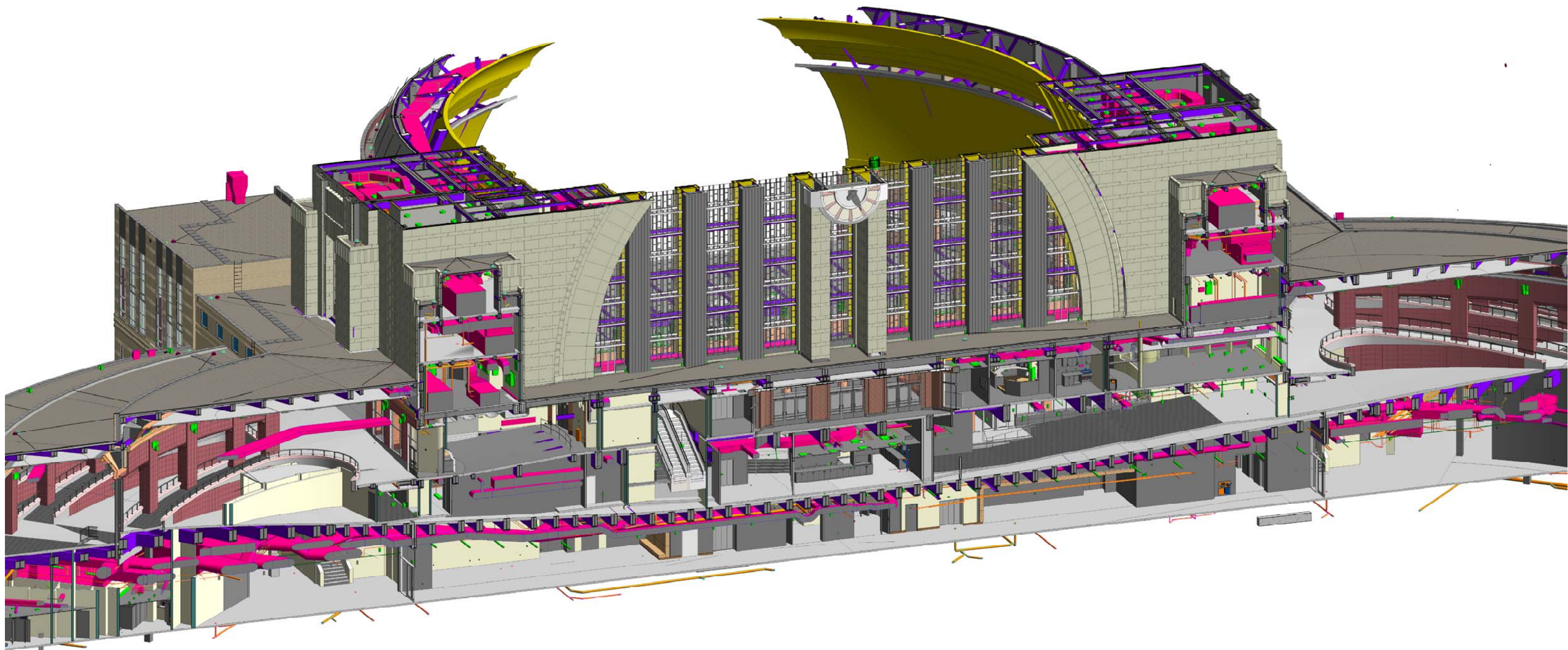
COMBINED MODELS



INTEGRATED POINT-CLOUD AND REVIT MODEL



MODEL DETAIL VIEW



PROJECT GOALS

VISION AND STEWARDSHIP

1. Preserve the Cincinnati Union Terminal building.
2. Maintain the building's landmark status & maximize historic tax credit resources.
3. Enhance the CMC guest experience.
4. Increase operational efficiency of building systems and CMC staff.
5. Stabilize and increase CMC revenue.
6. Provide for long-term flexibility.
7. Communicate with and engage the regional community.
8. Provide for long-term protection of artifacts and collections.
9. Maintain safety and security during construction.
10. Enhance CMC's standing as an internationally-renowned institution.
11. Provide maximum value within the limits of a fixed budget.



EXTERIOR

BUILDING SYSTEMS

INTERIORS

Make the building water-tight.

Modernize for efficiencies.

Improve visitor experience.

WALLS

MECHANICAL

HISTORIC PRESERVATION

WINDOWS

ELECTRICAL

MUSEUM RECONFIGURATION

ROOFS

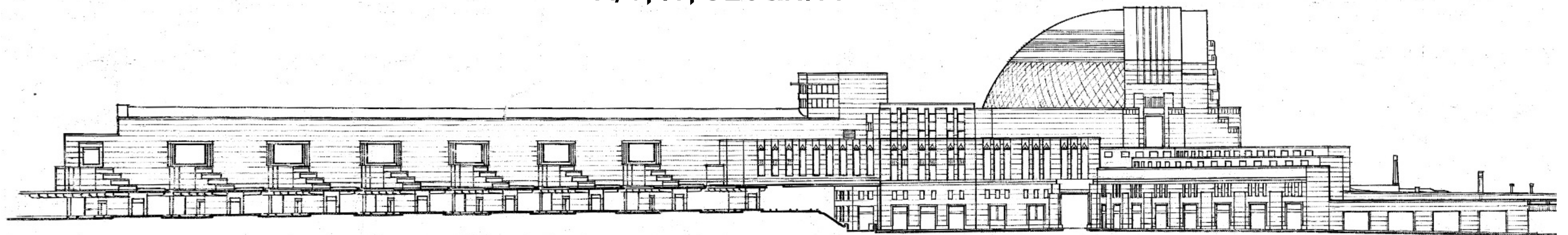
PLUMBING

AMENITIES

PLAZA
RECONSTRUCTION

FIRE PROTECTIONS

A/V, IT, SECURITY



PLAZA RECONSTRUCTION



PLAZA RECONSTRUCTION



Decorative Concrete

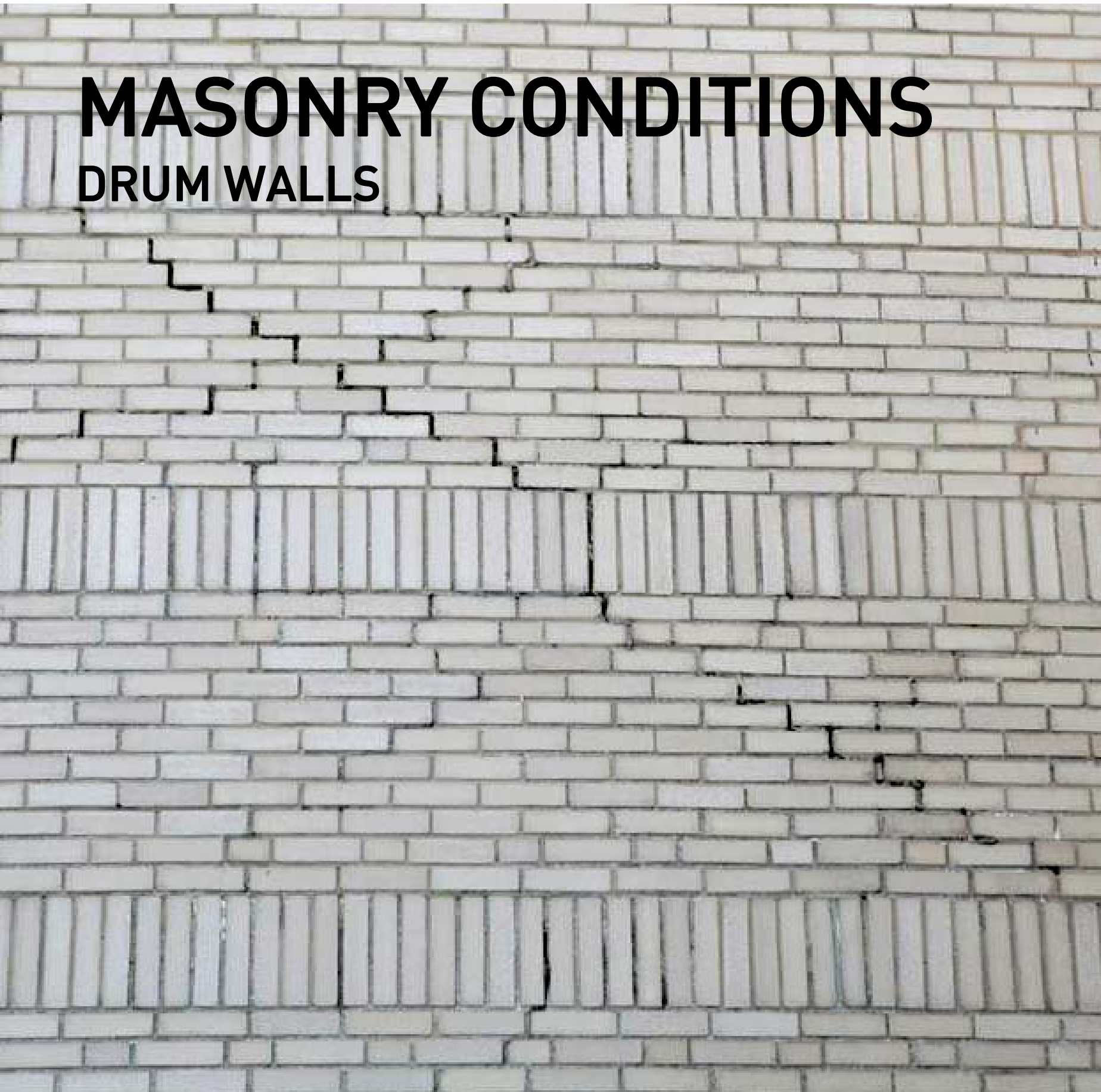


EXTERIOR RESTORATION



MASONRY CONDITIONS

DRUM WALLS



MASONRY RESTORATION

DRUM WALLS



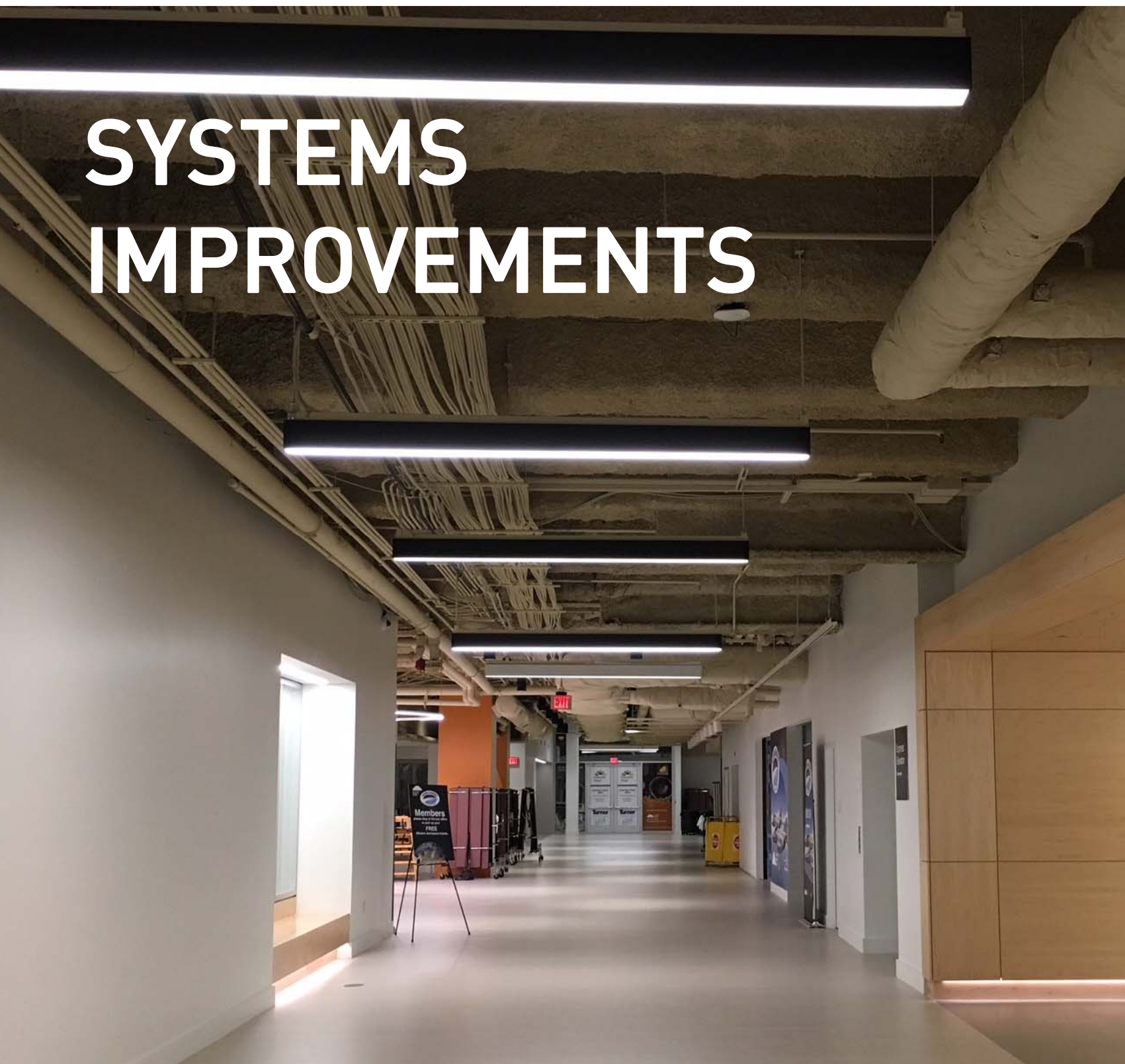
MASONRY AND WINDOWS



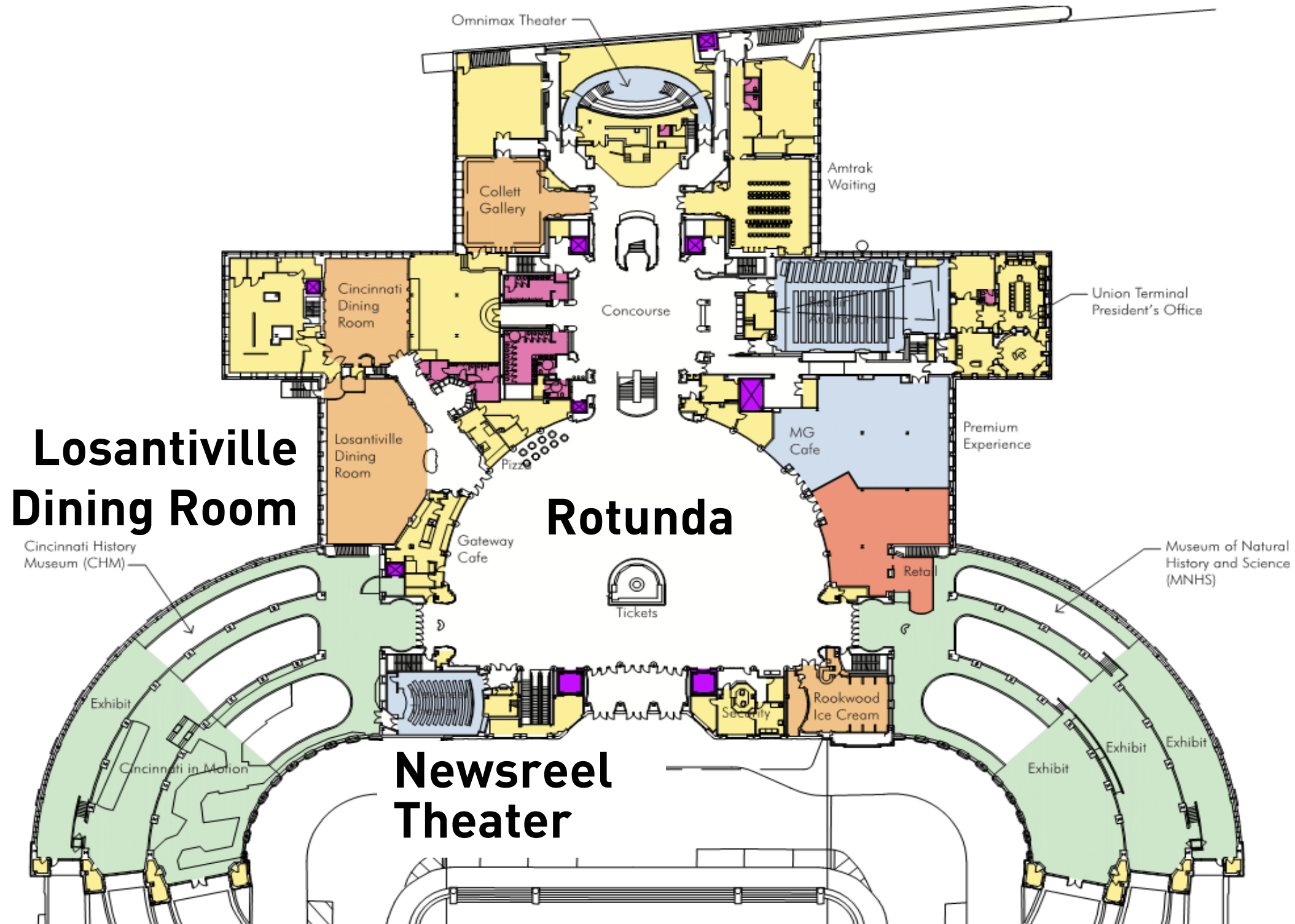
SYSTEMS IMPROVEMENTS



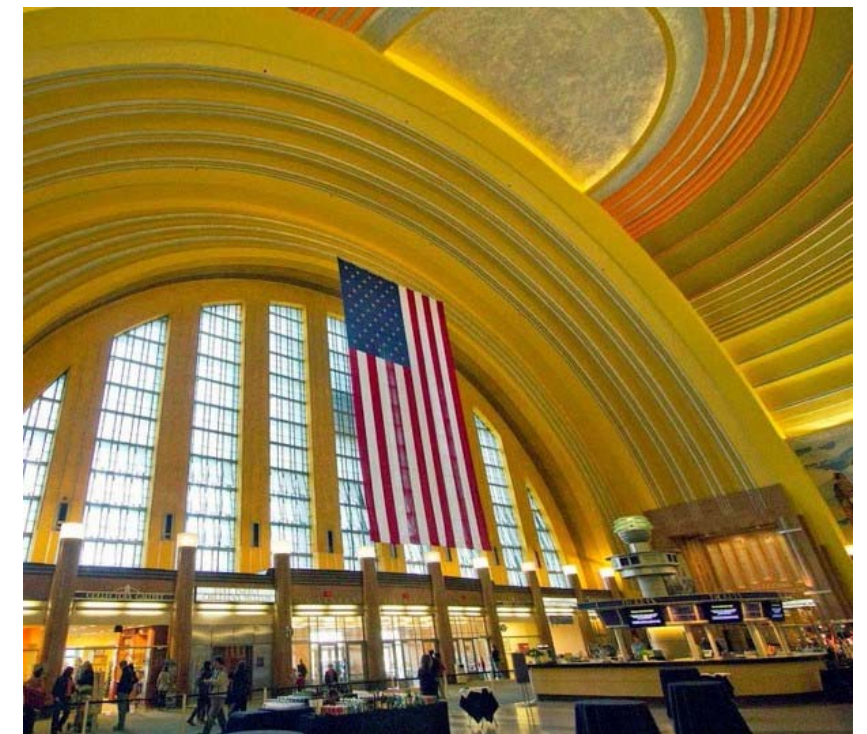
SYSTEMS IMPROVEMENTS



RESTORATION



ROTUNDA



LOSANTIVILLE DINING ROOM



NEWSREEL THEATER



NEW LOBBY SPACES



NEW GALLERIES



DINOSAURS





THANK YOU