Chicago Union Station Master Plan Study

Final Report

Prepared For:

CDOT
CHICAGO DEPARTMENT
OF TRANSPORTATION

In Cooperation With:

AMTRAK

Metra

cta

Regional Transportation Authority

Chicago Metropolitan Agency for Planning

Illinois Department of Transportation

Metropolitan Planning Council

U.S. Department of Transportation
Federal Railroad Administration

The Department of HOUSING and ECONOMIC DEVELOPMENT

May 2012

UNION STATION
MASTER PLAN

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Prepared For:

Chicago Department of Transportation

In Cooperation With Stakeholders Including:

Amtrak

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Chicago Transit Authority

Regional Transportation Authority

Chicago Metropolitan Agency for Planning

Illinois Department of Transportation

Metropolitan Planning Council

U.S. Department of Transportation

City of Chicago Department of Housing and Economic Development

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Photographs were taken by TranSystems unless otherwise noted.

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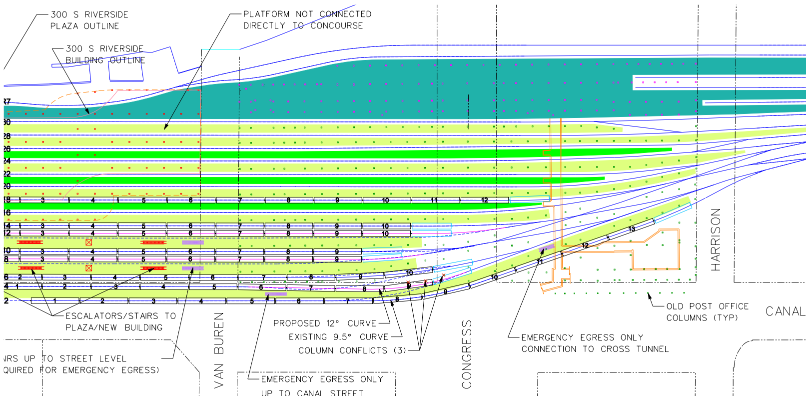


Overview

The Chicago Department of Transportation (CDOT) has conducted the Chicago Union Station Master Plan Study in a collaborative effort with extensive participation from Amtrak (the station's owner), Metra (the station's primary tenant), and other stakeholder organizations. The current planning efforts represent a continuation of the City of Chicago's longstanding interests in improving passenger transportation and interchange facilities in the Union Station area, consistent with the City's Central Area ACTION Plan of 2009 and the Chicago Metropolitan Agency for Planning's GO TO 2040 regional plan.

Union Station is one of the region's key transportation facilities and economic drivers. It is the third-busiest railroad terminal in the United States, serving over 300 trains per weekday carrying about 120,000 arriving and departing passengers – a level of passenger traffic that would rank it among the ten busiest airports in the U.S. Most travelers at Union Station take Metra commuter trains. The Station is also the hub of Amtrak's network of regional trains serving the Midwest as well as most of the nation's overnight trains, which connect to the Atlantic, Gulf, and Pacific coasts.

This Study identifies potential ideas for adding tracks and platforms, as well as possible opportunities for improving passenger flows. Short, medium, and long-term opportunities have been identified to assist Amtrak, Metra, and other station stakeholders in preparing for these future improvements.

Goals of the Study

* Provide sufficient capacity for significant increases in Metra and intercity passenger train ridership
    * Estimated 40% increase in trains by 2040
    * Possible significant further increases
* Make the terminal more inviting for passengers
* Provide more direct and convenient transfers to buses, CTA trains, taxis, shuttles, pick-up/drop-off
* Create a terminal that is vibrant, a civic asset, and a catalyst for growth in the West Loop and region

Existing Conditions

Today's Station originally opened in 1925, and was designed primarily to serve long distance trains, including large amounts of mail and express traffic. Significant alterations were made to the station's Concourse level, located east of Canal Street, in 1970. Soon after Amtrak was established in 1971, it concentrated all intercity passenger train operations in Chicago at Union Station. Amtrak gained ownership of Union Station in 1984 and completed a major re-modeling in 1992. Amtrak is currently planning further improvements to the station in 2012 and beyond.

Most passenger station activities today take place in the Concourse area of the station, which now often operates at or close to capacity. In addition, station activity is constrained by street-level conflicts between taxis, buses, automobiles, shuttles, pedestrians, and bicycles. Continuing growth in both commuter rail service and Amtrak long distance and intercity passenger rail service, combined with the potential for future growth in high-speed intercity passenger rail, has compelled the City and affected railroads to consider future options for accommodating further growth in station traffic.

South concourse in morning rush hour

Planned Short Term Station Improvements

Several station improvement projects currently have funding committed for implementation during the next few years.

Amtrak Improvements

Amtrak is currently making a number of improvements that will enhance passenger conditions and amenities within the Station and reduce crowding. Installation of air conditioning in the historic headhouse building was completed by Amtrak in 2011. During 2012-13, Amtrak plans to replace the unsightly and obstructive concrete security barriers at major station entrances with more functional bollards. Amtrak also plans to relocate its Metropolitan Lounge facility into the headhouse building. This lounge is where sleeping car passengers wait before boarding their train, and is very well used as Chicago is served by more overnight trains than any other Amtrak station. After this is move is completed the existing main waiting area will be nearly doubled in size, incorporating the space occupied by the old Metropolitan Lounge. The waiting room improvements and addition of new rest rooms are currently being budgeted and scheduled by Amtrak.

CDOT Improvements

Two upcoming CDOT projects will improve local street traffic flow and curbside access to Union Station. The Central Area East-West Bus Rapid Transit project will improve bus lanes adjacent to the station on Clinton and Canal streets and provide enhanced Chicago Transit Authority (CTA) bus connections between the station and the Central and East Loop areas. The Union Station Transportation Center project will create an off-street bus terminal located on the site of the existing surface parking lot south of Jackson, between Canal and Clinton (immediately north of the Amtrak-owned parking garage). It will provide direct, weather protected connections between the station and CTA buses while also relieving congestion on some of the nearby streets. Both of these CDOT-led initiatives are currently being designed and are scheduled for construction in 2013-2014.

Proposed Medium Term Station Improvement Ideas

This study has proposed several ideas for medium term improvements to be studied further and implemented over a 5-10 year horizon.

Convert baggage platforms for commuter use

Union Station features special baggage platforms that alternate with the passenger platforms on either side of the terminal tracks. Today many of these baggage platforms are seldom used, and the space they occupy could be better allocated to relieve crowding on the relatively narrow platforms that primarily serve commuter train passengers. It is proposed to remove two of the baggage platforms on south side tracks that are used almost exclusively by Metra commuter trains. Two tracks could then be relocated into the space now occupied by baggage platforms, allowing the adjacent passenger platforms to be widened to about 22 feet. That would be wide enough to permit the construction of stairs, escalators or elevators to provide direct access between the platforms and street level. These improvements would relieve overcrowding by both adding space and providing the opportunity for passengers to exit without going through the Station concourse.

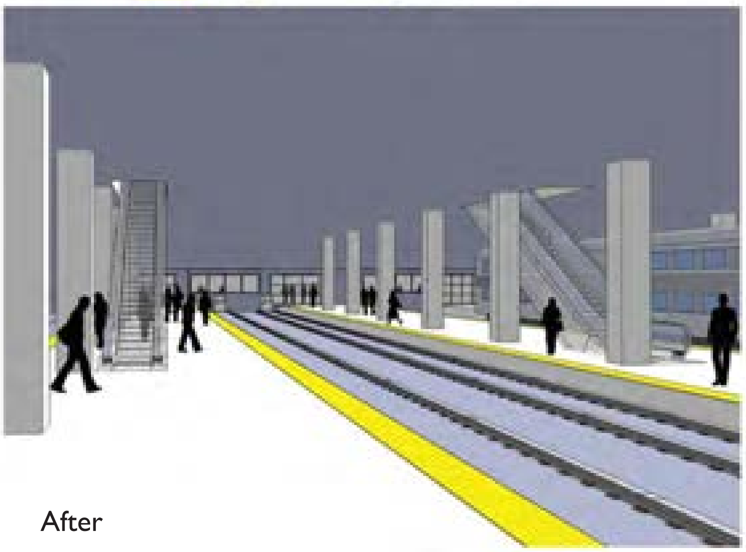
Convert unused mail platform for intercity passenger train use

Another vestige of an earlier time is the large unused "mail platform" located between the station's south tracks and the Chicago River. It is proposed to convert this space to passenger platforms served by tracks from both the north and south, which could add critical capacity to accommodate growth in intercity passenger train operations. Under the mail platform there is an existing underutilized basement area with high ceilings, as well as a below-grade passageway connecting this area to the basement under the existing passenger waiting areas. The space under the repurposed mail platforms could be redeveloped into a dedicated departure lounge and food service areas for the new passenger platforms, while the below-grade passageway could be renovated as a formal walkway connection to the existing station's concourse and waiting areas.

Enhance existing passenger station facilities to improve flow

This study has developed ideas to more boldly reconfigure space within the existing concourse area to increase capacity and overall station utility for peak period crowds. The goals would be to open up the concourse to:

* Improve circulation and relieve congestion, particularly during peak periods and in the event of a major train delay
* Improve sight lines, so that people can more easily see where they want to go
* Expand capacity to allow for bi-directional access at major points of vertical circulation



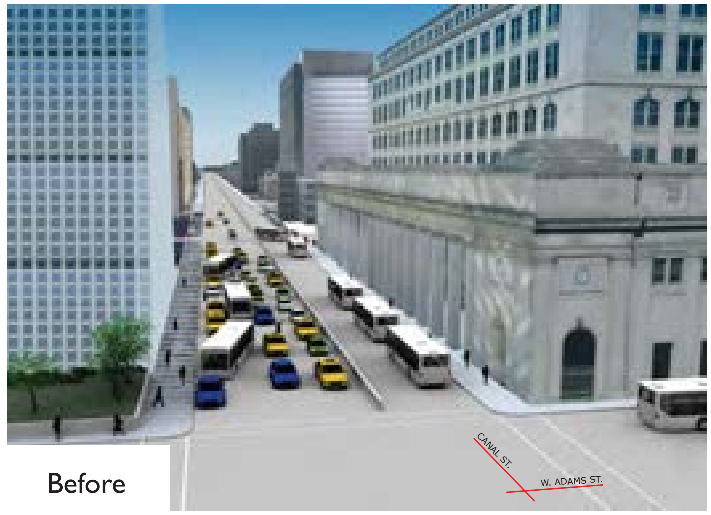
As shown in the BEFORE (top) and AFTER (bottom) images to the left, reallocating baggage platform space would allow for passenger platforms to be widened and vertical circulation to be added.

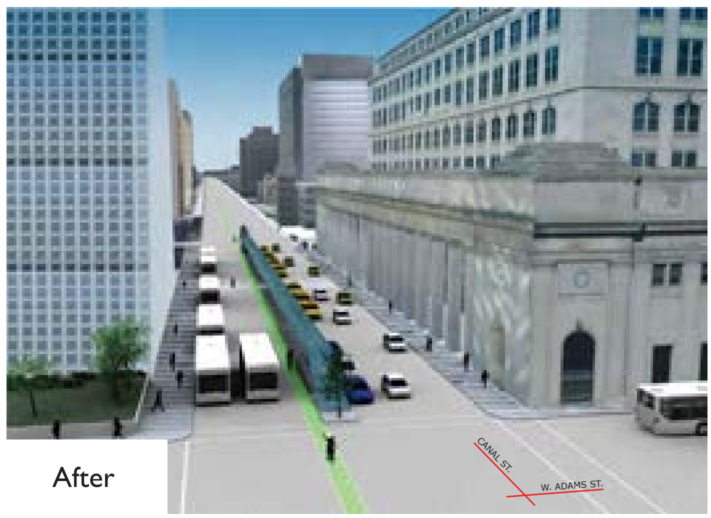
Some existing facilities on the concourse-level, such as Amtrak's ticket office, the passenger service area, rental car counter, and newsstand may be relocated to the historic headhouse to free up space for these circulation improvements in the concourse area.

Rebuild Canal Street viaduct in a manner that improves street access

Key segments of Canal Street are on a viaduct structure over Union Station's tracks. Constructing station tracks under the viaduct was an original design feature to increase the capacity of Union Station, and in the block between Adams and Jackson, the Canal Street viaduct forms the ceiling over an integral part of Union Station's passenger concourse. The viaduct was constructed in conjunction with the station, and is at the end of its design life. CDOT is planning to rebuild the viaduct later this decade and the Master Plan Study team has investigated whether some modifications could and should be made to the future replacement viaduct design to help in achieving the study goals, rather than simply replacing the structure exactly as it was originally built. Chief among these ideas would be creating traffic islands in Canal Street to add curb space for pick-up and drop-off traffic. This would be similar to pick up lanes at an airport terminal, with channelized traffic and parallel curbs. As part of the viaduct reconstruction project, direct stairs/escalators could be added between street level along Canal Street and the track/concourse level immediately below.

Planned reconstruction of Canal Street will provide an opportunity for improved street access as shown in the BEFORE (top) and conceptual AFTER (bottom) images to the right





Possible Long Term/Visionary Station Improvement Ideas

The study has developed concepts for increasing passenger handling capacity and improving the traveler experience by significantly expanding or completely replacing the existing intercity and/or commuter station facilities. These plans include two alternatives:

* Development of a new passenger train station facility in the 300 S. Riverside block, to be constructed on air rights over Union Station's south tracks (which are owned by Amtrak) and integrating parts of the existing office building on this block
* Development of a completely new commuter and intercity passenger train station in the 200 S. Riverside block (replacing the structures currently on this block)

The study has also investigated two concepts for adding additional track and platform capacity in underground alignments that bypass and augment Union Station's existing track and platform infrastructure. These plans would entail construction of functionally equivalent subway tunnels on one of two alternative alignments, Clinton Street or Canal Street.

Placemaking

The Union Station Master Plan Study team has worked closely with a Civic Advisory Committee established by the Metropolitan Planning Council to advance the goal of creating a transportation terminal that is vibrant, a civic asset, and a catalyst for growth in the West Loop and region, as well as exploring innovative financing strategies for the overall redevelopment effort. These placemaking principles call for the station's redesign to favor the creation of vibrant public spaces that have the potential to transform an imposing historic structure into one that invites interaction with its users and the surrounding city. Through the planned investments, the station should not only evolve into an efficient intercity and regional railroad hub, with easy connections to other transit modes, but also become a truly great place that attracts travelers and non-travelers alike.

Public Input

A public meeting was held as part of the Union Station Master Plan Study during the late afternoon/early evening of Thursday, December 15, 2011 at Union Station's Union Gallery Room. The meeting utilized an open house format so that attendees could browse through numerous exhibits and discuss issues individually with staff from stakeholder agencies and the consultant team. A narrated presentation was delivered at two times during the open house. Approximately 200 people attended the event, and 67 of the attendees completed questionnaires on site. Additional comments from 30 people were also submitted by the Midwest High Speed Rail Association at the meeting, and 30 more comments were received online at the project website. This feedback was incorporated into the study's findings and recommendations.

Next Steps

This master planning study has advanced and developed numerous ideas that are intended to address major functional and operational issues affecting Chicago Union Station in the short, medium, and long term. The next steps for these ideas vary, but all involve proceeding with further planning, design, and/or construction to achieve the expected benefits. The overarching objective is to move each of these projects from ideas into construction and operation.

The Short Term ideas described in this report are already well advanced in planning and design, and in the case of CDOT's off street bus terminal and improved bus lane projects grant funds have been obtained for their construction. Several near term Amtrak customer facility improvement projects have also had their design work largely completed, but construction is not yet funded. Obtaining funding to complete these initiatives, as well as addressing Amtrak's outstanding "state of good repair" needs throughout Union Station should be a priority next step.

The Medium Term projects that have been identified are all focused on resolving serious operational shortcomings that have a direct impact on the ability of Union Station to serve a growing number of passengers. These projects will require further planning analysis and design work before they are ready to be funded for construction. The next stage of the CDOT-led Union Station Master Plan Study, involving simulation of train, station, and nearby street operations, is to begin later this year. This analysis will more precisely quantify the capacity increase that may be expected from each of the Medium Term ideas. It will effectively determine just how long the "medium term" is likely to be, and how soon the stakeholders will need to begin more serious consideration of the "long term/visionary" ideas for increasing capacity and improving the station's functionality.

The Medium Term ideas have thus far been conceived such that each of them would complement and not preclude or make more difficult the implementation of any of the more complex and expensive Long Term/Visionary ideas. However, the Long Term/Visionary ideas include two mutually exclusive alternatives for adding track and platform capacity via new underground alignments, as well as two other mutually exclusive alternatives for creating new station building facilities in either the 200 or 300 block of South Canal Street. Further analysis and public/stakeholder consultation will be needed to assess and determine the relative merits of each of these proposals and to decide which alternatives should advance towards implementation.

A new intercity passenger train station could be constructed in the 300 S. Riverside block, integrating part of the existing office building on this block as well as Amtrak-owned air rights

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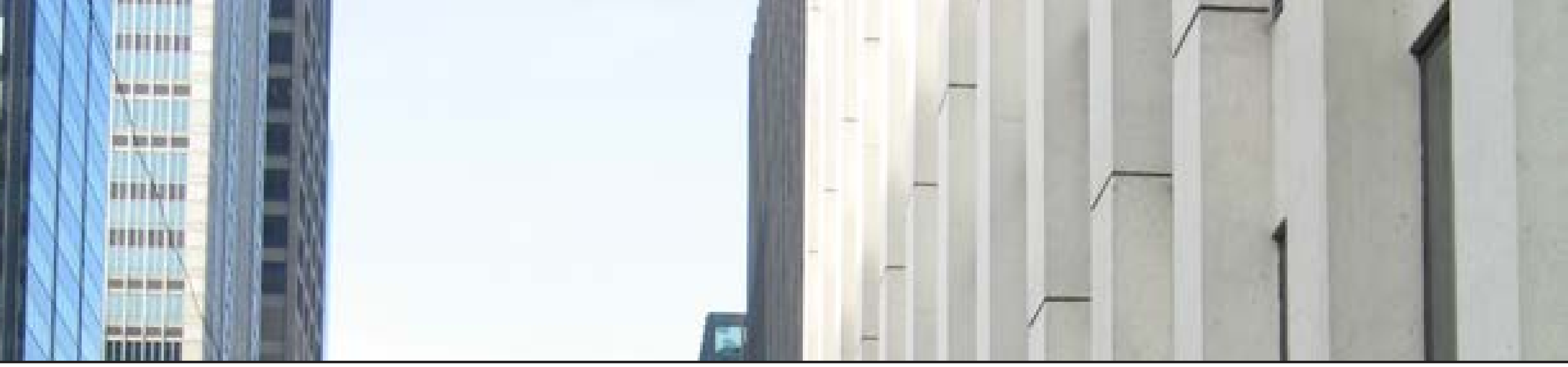

1 - Introduction

Main entrance to Union Station located on S. Canal Street

The City of Chicago's Department of Transportation has been conducting the Chicago Union Station Master Plan Study in a collaborative effort with extensive participation from Amtrak (the station's owner), Metra (the station's primary tenant), and other stakeholder organizations. All stakeholders were represented on a Technical Advisory Committee for this study, which met five times as the study progressed.

Union Station is one of the region's key transportation facilities and economic drivers. It is the third-busiest railroad terminal in the United States, serving over 300 trains per weekday carrying about 120,000 arriving and departing passengers – a level of passenger traffic that would rank it among the ten busiest airports in the U.S. Most travelers at Union Station take Metra commuter trains. The Station is also the hub of Amtrak's network of regional trains serving the Midwest as well as most of the nation's overnight trains, which connect to the Atlantic, Gulf, and Pacific coasts.

Today's Station originally opened in 1925, and significant alterations were made to the Concourse level, located east of Canal Street, in 1970. Soon after Amtrak was established in 1971, it concentrated all intercity passenger train operations in Chicago at Union Station. Amtrak gained ownership of Union Station in 1984 and completed a major re-modeling in 1992. Amtrak is currently planning further improvements to both the Concourse and the headhouse in 2012 and beyond.

Entrance to Union Station near W. Adams Street, existing conditions

Most passenger station activities today take place in the Concourse area of the station, which now often operates at or close to capacity. Continuing growth in both commuter rail service and Amtrak long distance and intercity passenger rail service, combined with the potential for future growth in high-speed intercity passenger rail, has compelled the City and affected railroads to consider future options for accommodating further growth in station traffic.

Based on passenger traffic, Union Station would currently rank among the ten busiest *airports* in the country.

The current planning efforts represent a continuation of the City of Chicago's longstanding interests in improving passenger transportation and interchange facilities in the Union Station area. The City's Central Area Plan of 2003, and related studies in the years immediately preceding its release, brought together a coordinated group of proposed transportation improvements in the West Loop under an overall concept called the "West Loop Transportation Center" (WLTC). The WLTC concept attracted wide publicity and support and was reaffirmed in the City's Central Area ACTION Plan of 2009 (CAAP). In addition to building upon the WLTC concept, the Union Station Master Plan Study addresses all related "Goals and Needs" identified in the CAAP:

* Improve transit in the Central Area
    * Serve growth in transit trips
    * Improve transit service coverage & options
* Increase regional transit capacity
* Improve the pedestrian environment
* Manage traffic circulation
* Encourage alternative modes (such as bicycles and water taxis)
* Improve national & international connections
    * Accommodate Midwest high-speed rail
    * Improve access to airports

In 2010 the Chicago region adopted its current comprehensive regional plan, *GO TO 2040*. This plan recognized that the West Loop Transportation Center would be necessary to meet significant regional transportation needs. WLTC was therefore identified as a regional priority and included on the list of Fiscally Constrained Projects which will move ahead towards implementation. This priority designation indicates that the WLTC concept has a higher status than other concepts which have not been adopted as a priority by the region. The following WLTC project description is excerpted from *GO TO 2040*:

> **West Loop Transportation Center**
>
> *The West Loop Transportation Center is a proposed transportation terminal located between the Eisenhower Expressway and Lake Street in Chicago. The terminal structure for the West Loop Transportation Center is envisioned to improve transfers between intercity rail, potential high-speed rail, commuter rail, rapid transit,*

and bus services. The proposal also includes increased capacity for Chicago Union Station, which serves several commuter and intercity passenger rail services.

This project will provide a focal point and a gateway into the Chicago region and facilitate movements and connections throughout the region. Incorporating and integrating seamless transit connections with elements of urban design focused on this transit center will be important to facilitating the Chicago region as the Midwest hub for high-speed rail, as well as increasing transit usage and promoting economic development opportunities. Travelers from outside the region can safely arrive at this station and have a number of connection options at their discretion to access the city or the suburbs. For those residents within the region, this project will offer easier access from Metra commuter trains and various points within the city whether by bus or El line. (GO TO 2040, p. 279)

The West Loop Transportation Center will help transform the West Loop/Union Station area into a gateway to Chicago and a well-functioning transportation hub. WLTC comprises a broad range of related improvements that may be implemented incrementally to achieve these goals.

This Master Plan Study addresses the WLTC goals and represents the next step in advancing WLTC implementation consistent with the *GO TO 2040* regional plan. The Study identifies ideas for adding tracks and platforms, as well as opportunities for improving passenger flows. Most passenger station activities today take place in the Concourse area of the station, which is now overcrowded during the busiest times of day. Short, medium, and long-term opportunities are identified ranging from re-purposing platforms originally designed for handling mail, to better connections to other rail and transit services, to the construction of new multilevel subways. In addition, the study examines strategies for transforming Union Station into a West Loop destination and thriving economic development engine. This Study, consistent with and building upon CDOT's previous planning efforts, will assist Amtrak, Metra, and other station stakeholders in preparing for these much needed future improvements.

Union Station Master Plan Study Goals

* Provide sufficient capacity for significant increases in Metra and intercity passenger train ridership
    * Estimated 40% increase in trains by 2040
    * Possible significant further increases
* Make the terminal more inviting for passengers
* Provide more direct and convenient transfers to buses, CTA trains, taxis, shuttles, pick-up/drop-off
* Create a terminal that is vibrant, a civic asset, and a catalyst for growth in the West Loop and region

2 - History

Interior of the original Chicago Union Station concourse building, facing west from the riverfront entrance

(University of Arizona Library/Fred Harvey Collection)

Chicago Union Station opened in 1925. It replaced the Union Depot that had been built on essentially the same site in 1882. It was necessary to replace that station because it lacked the capacity to handle the number of trains and passengers that had been growing rapidly during this period. The new station was built by the Chicago Union Station Company (CUSCo) which was established in 1913. CUSCo was owned by the Pennsylvania Railroad (50%), the Chicago, Burlington, and Quincy Railroad (25%), and the Chicago, Milwaukee, and St. Paul Railroad (25%). The Chicago and Alton Railroad, the only other user, was always a tenant.

The Station Layout

Several features that were incorporated in the new station's design retain their great significance today. The concept for the layout of tracks, platforms, and passenger facilities for Union Station was developed by the Pennsylvania Railroad. The station structure itself was designed by Graham, Burnham & Company. A major feature was the construction of many viaducts carrying roadways over the tracks, replacing older viaducts or, in two cases, creating new grade separations between rail routes and local streets. While the old Union Depot was basically a through station, it was not used in that way as no trains operated through. Thus, the new Station was created as essentially two stub-end stations. Only two through tracks were retained alongside the River, and only one of these is on a platform. The other was intended primarily to transfer freight and mail cars between railroads. To maximize space available for tracks the Station's headhouse, all of the station's support facilities (including the ticket office, waiting room, restaurants, shops, taxi courts,

Chicago Union Station, as it appeared upon completion in 1925. The Original Concourse Building, demolished in 1968, is in the foreground. (Chuckman Collection) and offices) were located west of Canal Street. Some of the Station's increase in capacity was achieved by locating some of its passenger platforms and tracks under a structure supporting Canal Street (the Union Depot had been entirely east of Canal). The headhouse and concourse were, in effect two separate buildings, functioning seamlessly as a single building below street level. From the inside there's no hint that part of the "building" is under Canal Street. For a time, 22 stories of office space were planned for construction above the headhouse but, in the end, this was reduced to eight stories. The final design of the station was produced by Graham, Anderson, Probst, and White, which succeeded the previous firm after Daniel Burnham's sons left the firm.

An 'L' station was located directly above the south tracks and connected to the concourse via a direct walkway, but was removed from service in 1958.

An 'L' station was located directly above the south tracks, midway between Jackson and Van Buren, with the concourse connected via a direct walkway protected from the weather. This was removed from service in 1958 when the Metropolitan 'L' branch was replaced by the Congress subway; since then the closest rapid transit station has been the subway station at Clinton/Congress.

When Union Station opened, the vast majority of trains were intercity passenger trains. Relatively few people lived in Chicago's suburbs and commuter train services were a very small proportion of the Station's activities. Virtually all trains carried U.S. Mail and express packages (express package service, similar to today's United Parcel Service or Federal Express, was handled by the Railway Express Agency, a nationwide company owned jointly by the railroads). Some trains were operated predominantly or, even, exclusively for this traffic. The Station was designed with features intended to allow this traffic to be handled efficiently. Separate "baggage platforms" were built alternating with the passenger platforms which allowed passengers to board or alight from one side of a train without conflicting with baggage mail and express handling activities, such as food service stocking, on the other side at the same time. The baggage platforms were designed free of column obstructions (which were, instead located on the passenger platforms) with a ramp down to the basement where baggage, express, and mail was sorted. This feature is thought to be unique to Chicago Union Station. The basement of the contemporary "mail handling building" (which was later integrated into the new main post office when it was subsequently constructed over the south tracks), was connected to the Union Station basement with a new tunnel designed for use by electrically drawn carts.

Separate platforms for handling baggage and mail were a unique feature of Union Station (Jack Delano, 1943 - Library of Congress)

The Metropolitan 'L' traveled east-west between Jackson and Van Buren but was replaced in 1958 by the Congress subway. The photo above is from 1924, prior to completion of Union Station so canopies do not yet cover the tracks and platforms below. To the left, the photo shows the sign in the concourse that directed passengers to the walkway to the 'L' station. The aerial image below, showing Canal 'L' station adjacent to Union Station, is from 1958, prior to demolition of the 'L'.

Top: CTA

Middle: Jack Delano, 1943 - Library of Congress

Bottom: Bruce Moffat Collection

The station handled voluminous amounts of mail
(Jack Delano, 1943 - Library of Congress)

Construction

Construction consisted of many projects, most of which were required to create the space required for the greatly increased amount of station track and platforms: new grade separation viaducts, new railroad freight houses, and utility relocations. Work started in 1915, but the process was painstakingly slow because of the need to maintain ongoing train operations at all times, several labor strikes, shortages of labor and material caused by World War I, the 26 month long period in which operation of the nation's railroads was taken over by the federal government, and the depression that followed the War. Work on the station buildings re-started in earnest in 1922. When the Station opened it was hailed as a great marvel. Railway Age magazine, the industry's primary trade journal, devoted an issue with a 22 page article (see Appendix A) describing its many features.

The first building to be built on air rights in Chicago was the Daily News Building (now the 2 N. Riverside Plaza building) built over the north end of the north platforms in 1929. The new Post Office (now the old Post Office), also built on air rights, was completed in 1932. This building integrated into the previous mail handling building, under which Union Station's mail platforms were located.

Station Usage

Although the growth in automobile usage was starting to affect intercity passenger train ridership, particularly on local trains, usage of Union Station was fairly constant (declining from about 390 to 365 trains per weekday) until the start of the Depression. There were major ridership declines and, in turn, The Union Station design reflected the fact that almost all trains used to carry U.S. Mail and express packages.

a significant number of trains were discontinued during the 1930's. A bright spot was the introduction of streamlined trains, starting with the Twin Cities Zephyr in 1935. This began the use of diesel locomotives, to replace steam.

Ridership on intercity trains increased tremendously during World War II, with over 100,000 passengers per day, on about 400 weekday trains. While the number of passengers today is higher (about 118,000 on weekdays) the number of trains is significantly lower (about 320) because of the greater number of passengers per train (many of today's commuter trains carry over 1500 passengers, using double-deck cars). With the focus now on commuter trains, today's operations are also much more concentrated in the peak periods.

After the end of the war intercity ridership resumed its decline despite the massive investment in streamlined trains with air conditioning and other former luxuries becoming common. The Burlington introduced dome cars in 1945, a feature quickly adopted by all of the western railroads, which had adequate clearances. The Burlington also developed bi-level commuter cars in 1950. These were designed, specifically, to reduce the number of cars required for its growing suburban service as CUSCo charges were based on the number of cars brought into the Station. Another efficiency in commuter train operation was the introduction of push-pull service, avoiding the need to turn locomotives. The conversion of all Union Station operations from steam to diesel locomotives was completed in the mid 1950's. The number of Milwaukee Road long distance trains increased temporarily with the 1955 switch of the Union Pacific's Western trains from the Chicago and Northwestern. However, on the Burlington and Milwaukee Road suburban trains, ridership increased markedly with the postwar development of the suburbs despite the construction of the expressway network. Development around Union Station also continued during this period and by the early 1960's the north side tracks disappeared from view with the construction of the 10 and 120 South Riverside buildings.

The 1960's were a hard time for intercity passenger trains with the near-completion of the Interstate Highway System, widespread use of jet aircraft and the wholesale cancellation of mail contracts (a major source of railroad revenue) by the Post Office in 1968. Intercity passenger trains were discontinued at a rapid pace during this decade. The Pennsylvania Railroad sold the air rights above Penn Station in New York City and it was demolished in 1964. Demolition of the Chicago Union Station Concourse Building followed in 1968 (the Penn Central Railroad, product of the 1968 merger of the Pennsylvania and New York Central Railroads, was still the majority owner of

During World War II 100,000 passengers per day passed through Chicago's Union Station
(Jack Delano, 1943 - Library of Congress)

Union Station). By that time, neither the Penn Central, nor its partners in the ownership of CUSCo, had a long term interest in continuing passenger train service and they allowed the developers of the air rights building built on the site of the Union Station concourse to provide minimal facilities for the handling of passengers -- in what was obviously the basement of their building. It was quickly apparent that passenger facilities that remained were woefully inadequate.

Intercity passenger trains were discontinued at a rapid pace during the 1960's.

Amtrak and Metra

In 1970 Congress passed the law that created Amtrak, the quasi-governmental agency that now operates all intercity passenger trains in the United States. The law's most immediate impact was a moratorium on the discontinuance of passenger trains. The U.S. Department of Transportation issued its map of the "Basic System" to be operated. Amtrak started service May 1, 1971, consolidating almost all of its service in Chicago at Union Station (the final Amtrak service relocation to Union Station was completed in 1972).

In 1976 the freight railroads of the northeastern United States were also consolidated into a government owned railroad called Conrail. The Milwaukee Road entered bankruptcy in 1977. In 1981 Congress passed key legislation resulting in major regulatory changes to Conrail and the entire freight rail industry. One result was that the ownership of CUSCo was turned over to Amtrak in 1984.

Meanwhile, a similar process occurred in the commuter rail field. In the Chicago area, the Regional Transportation Authority (RTA) was created in 1974. It took responsibility for funding operations of the commuter services previously provided by the private railroads. Over the next few years it purchased railroad assets used predominantly for commuter operations and in some cases directly hired the operating staff (this approach was utilized in the case of the Milwaukee Road's commuter lines at Union Station). In other cases, commuter railroad ownership remained with the private railroads but the operations were supported using purchase of service contracts (this applies to the former Burlington commuter service at Union Station, now operated by BNSF). In 1983 there was a major reorganization of the RTA which included the creation of Metra, a semi-autonomous "service board", with its own Board of Directors. This agency continues to have responsibility for Chicago's commuter rail network, including the six routes operated from Union Station (BNSF, Milwaukee District North, Milwaukee District West, SouthWest Service, North Central Service, and Heritage Corridor).

When Union Station opened, the majority of trains were intercity passenger trains traveling across the country. Today, most trains serve suburban commuters.

Metra opened the Madison Street entrance to six north side tracks in 1987. Also in 1987, Amtrak began a major remodeling of Union Station focused on improving the quality and passenger handling capacity of the "basement concourse" that had been created nearly 20 years earlier. This work was completed in 1991. As part of this effort all Amtrak and Metra passenger-handling functions (ticketing, waiting, and other support activities) were moved out of the Great Hall with the intent of redeveloping that side of the station complex separately from the passenger facilities. Since then, three successive developers have attempted to accomplish such a redevelopment. Key to all of them has been the concept of constructing 15 or more additional stories above the Great Hall. Of course, this was as originally planned by the station's architects and the building's caissons could support this. All of these redevelopment plans for the Great Hall building proposed multi-use facilities, typically combining retail, hotel, office, and condominium elements, but none included transportation facilities. However, none of those redevelopment efforts have been successful, and Amtrak's current plans call for re-integrating transportation functions into the Great Hall building in addition to mixed-use redevelopment.

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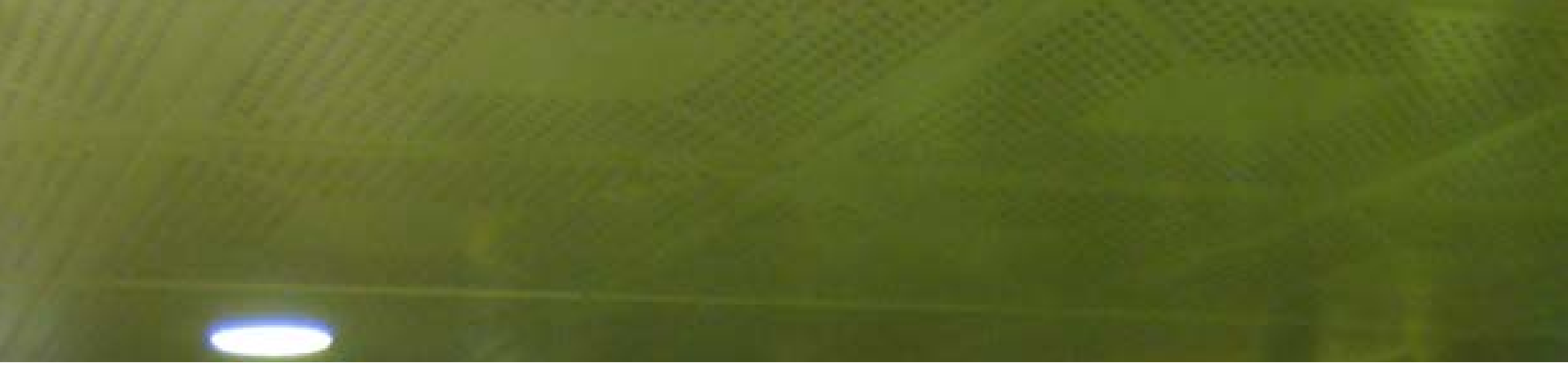
Kitt Chappell, Sally A., *Architecture and Planning of Graham, Anderson, Probst, and White*, 1912-1936, University of Chicago Press, 1992.

Review of the draft by Fred Ash is acknowledged with appreciation.



3 - Background

South Concourse in morning rush hour

Union Station now often operates at or close to capacity. Weekday rush hour ridership is higher now than at any time in the past and growth is expected to continue. Union Station will also be the hub for the planned network of improved and high speed intercity passenger rail routes in the Midwest. This is expected to further increase the rate of growth in train operations and passengers. A tabulation summarizing the estimated increases in ridership, and associated likely increases in train operations, is presented later in this chapter.

The issues that affect the current station facility can be grouped into the following categories:

* Street Access Issues
* Station Congestion Issues
* Track/Platform Issues

Many prior studies and analyses have documented and reflected the need for improvements to Union Station. These prior ideas have been recognized and taken into consideration as the Master Plan has been developed. The previously developed concepts have ranged from new underground station facilities to new office towers on top of a new intermodal transportation center.

An important component of the Master Plan study is the ability to leverage future station area improvements to support the economic development opportunities generated by a new intermodal transportation center. A supplemental report has been prepared that documents the past trends in real estate development in the West Loop area surrounding Union Station and discusses likely future directions and implications (see Appendix E).

Street Level Access Issues

As part of the Union station Master Plan Study a comprehensive Existing Conditions Report was prepared (see Appendix B). As the volume of commuters going through the station has increased over recent decades, weekday peak period traffic is now busier than ever before. Meanwhile, the capacity of the streets surrounding the Station has not changed.

The purpose of the Existing Conditions report was to document the traffic conditions on the streets and sidewalks surrounding Chicago Union Station, based on an analysis of collected data and field observations. The focus of this study was on the immediate area surrounding Union Station. This area is bounded on the west by S. Clinton St., the east by the Chicago River, the north by W. Monroe St., and the south by W. Van Buren Street.

The goal of this analysis was to understand current volumes and operating patterns of all the modes that affect street-level traffic operations. As the number of Metra and Amtrak riders grows, there will be increased stress on the street-level operations surrounding Union Station. The general behaviors and preferences of Union Station users can help determine where to focus street-level improvements.

Union Station now often operates at or close to capacity. Weekday rush hour ridership is higher now than at any time in the past and growth is expected to continue.

Canal Street in afternoon rush hour

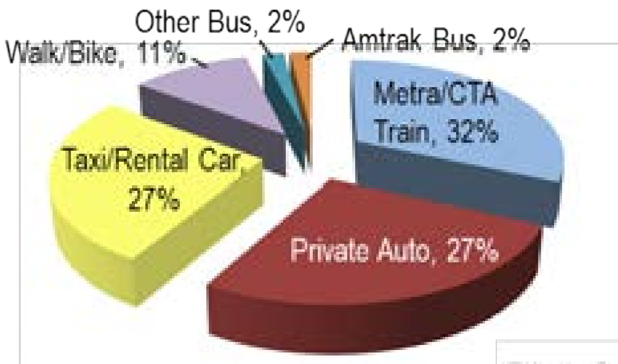
In addition to Amtrak and Metra trains, there are many other modes available to access the area around Union Station, including: walking (including walking to CTA rail), CTA bus, taxi, private vehicle, shuttle bus, and bicycle. Each of these modes affects the area in its own way. The effects of each mode on the station and on each other were examined.

Existing data sets for traffic and pedestrians were obtained from various sources. All the modes that contribute to the street-level activity were considered, focusing on weekday peak period and peak hour conditions. Because the street-level activity at Union Station is so complex, field observation was an important part of documenting the existing conditions.

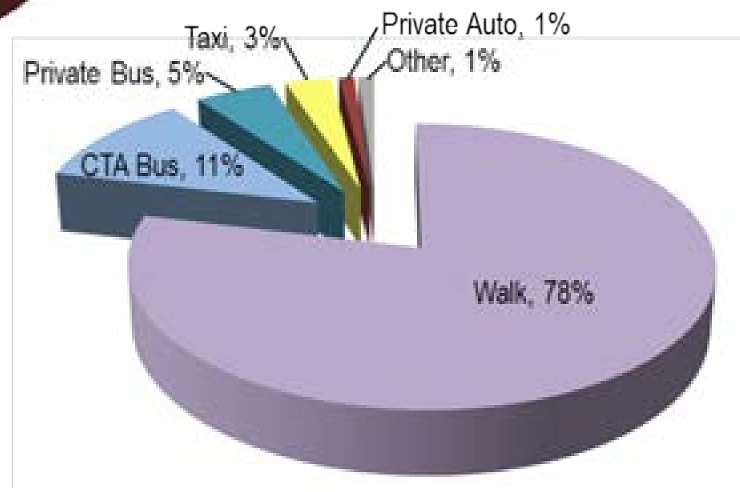
There are two primary causes for problems in the street-level activity at Union Station: capacity and conflict. Capacity involves the supply and demand of each individual mode in the system. Conflict involves the interaction between two or more modes in the system. For this study, the area around Union Station was separated into seven street intersections and eight street segments and each mode was rated for each location based on its capacity and demand as well as its conflicts with other modes. These ratings are relative and were developed specifically for this analysis.

The study of existing conditions resulted in several key findings that will help to focus the development of solutions. Some problems are limited to specific locations and some locations have multiple problems. All of these problems are the result of one or more modes exceeding the capacity available or two or more modes conflicting with each other.

A general problem at several locations in the area around Union Station is that there is not sufficient curb space to accommodate all of the modes that use a particular stretch of curb space. Prime curb space adjacent to principal access points for Union Station is limited, and often there is too much demand for the



Amtrak



Metra

Union Station Passenger Access Modes (Amtrak: 2008 CUS Modal Access data; Metra: 2006 Survey)

curb space available. Also, the demand is unbalanced. Streets directly adjacent to the 222 S. Riverside Plaza office building are the most convenient for station users and therefore have the most demand for use. At the same time, streets adjacent to the Union Station headhouse, or located across the street to the west or north, are not as convenient and are under-utilized. There are opportunities for both improving the management of existing curb space and increasing the overall supply of curb space.

With so many different modes sharing the area, conflicts also regularly occur even where there is sufficient curb space. This is because the intentions of different modes often conflict with each other. Although curb space is allocated for each mode, the space available is often insufficient to accommodate the physical interactions between modes. The intentions of each mode should be considered when developing proposed solutions. There are also significant temporal variations in curb space demand patterns. The situation during weekday peak periods and busy off-peak and weekend times is quite different. Commuters, who dominate the peak periods, follow regular patterns, and the access modes they use operate in a more orderly manner. Traffic at other busy times is dominated by occasional and intercity travelers. During busy off-peak times, traffic problems tend to be limited to Canal Street, where traffic conditions are often very chaotic.

Proposed solutions will also need to consider and address the different levels of ridership during the weekday and on weekends, as indicated on the following chart:

Passengers	Amtrak	Metra	Total
Weekday	9,000	109,000	118,000
Saturday	9,000	10,500	19,500
Sunday	9,000	7,000	16,000

Even with increased curb space and improved curb space allocation among the different modes, problems will still occur if there is not proper signage to direct users and if there is no enforcement to ensure that users comply. Supplying information is particularly important for private vehicle drop-offs and pick-ups, as these users are not as familiar with the area. Enforcement is particularly important for taxis and intercity buses, as these modes have a direct financial stake in the activity around Union Station. Signage and enforcement should be important components of all proposed solutions.

Some short term ideas and medium term ideas for improvements to street-level access issues have been developed.

Prior to the demolition of the concourse building in 1968, the concourse had been a wide open space with a 90-foot high ceiling and abundant light.

Congestion Issues Inside the Station

Over the years there have been major changes to the way Union Station functions from the point of view of the passenger. The most significant change was the demolition of the concourse building in 1968, near the end of the period of private ownership of the Station. Prior to this time the concourse had been a wide open space, with a 90-foot high ceiling and skylights providing abundant natural light. Navigating through the Station was simplified by direct sightlines to primary destinations (train gates, waiting rooms, exits, etc.). In case of uncertainty, an information counter staffed with well-trained agents was located in the center of the space. When the 222 S. Riverside Plaza office building was completed in 1970, the concourse had become a basement with bare concrete floors and unpainted concrete block walls. The former wide open spaces with high ceilings and natural light were replaced by a forest of columns, an obstacle course of restaurants and stores, and low ceilings with fluorescent light. The space had become very difficult for visitors (especially infrequent train riders) to navigate. By this time commuter rail ridership had begun to increase steadily, so the new station layout also suffered from rush hour congestion. By 1972 Amtrak had taken over nearly all remaining intercity train operations in the U.S. and had consolidated all Chicago service at Union Station, leading to an increase in intercity passengers – rather than the continued decline that had been anticipated when the old concourse was demolished.

After Amtrak gained control of Union Station, they began a major renovation that was completed in 1992. An effort was made to provide more direct routes from the gate areas to the street, in an attempt to facilitate commuter movements through the Station and separate commuters from intercity travelers. Several new escalators were installed to improve circulation. Station finishes were greatly upgraded. The restaurants were moved to a new food court on an expanded mezzanine. However, the low ceilings and forest of columns supporting the building above remained. In addition, much of the space in the concourse that was freed up by creating the mezzanine food court was re-filled with the creation of a large Amtrak waiting room and moving the ticket offices and other customer service facilities from the historic headhouse into the concourse area.

With the continuing increase in both Metra and Amtrak ridership during the past two decades, conditions in the concourse side of Union Station have become very congested. Poor performance of station facilities is particularly notable in the following areas:

* Morning rush hour congestion at the foot of the bank of three escalators on the south side, especially when more than one south side commuter train is unloading simultaneously
* Congestion on the two escalators and single staircase between the mezzanine level and the Adams Street exit
* Inadequate capacity of Amtrak's waiting rooms lead to an overflow of customers standing for long periods in the concourse level hallways during Amtrak's busiest periods (typically mid-afternoon). Some relief to this situation is currently in the works with the planned construction of Amtrak's new Metropolitan Lounge off the Great Hall. Upon relocation, the old Metropolitan Lounge space will be used to expand the general waiting room.
* There is currently no formal waiting area for Metra passengers. Normally, this is not a problem because commuters closely coordinate their arrival at the station with their train's departure time. However, when there is a service delay -- particularly in the afternoon rush hour, when thousands of commuters descend upon the station every few minutes, the very limited circulation space quickly becomes extremely congested with people, making movement very difficult.

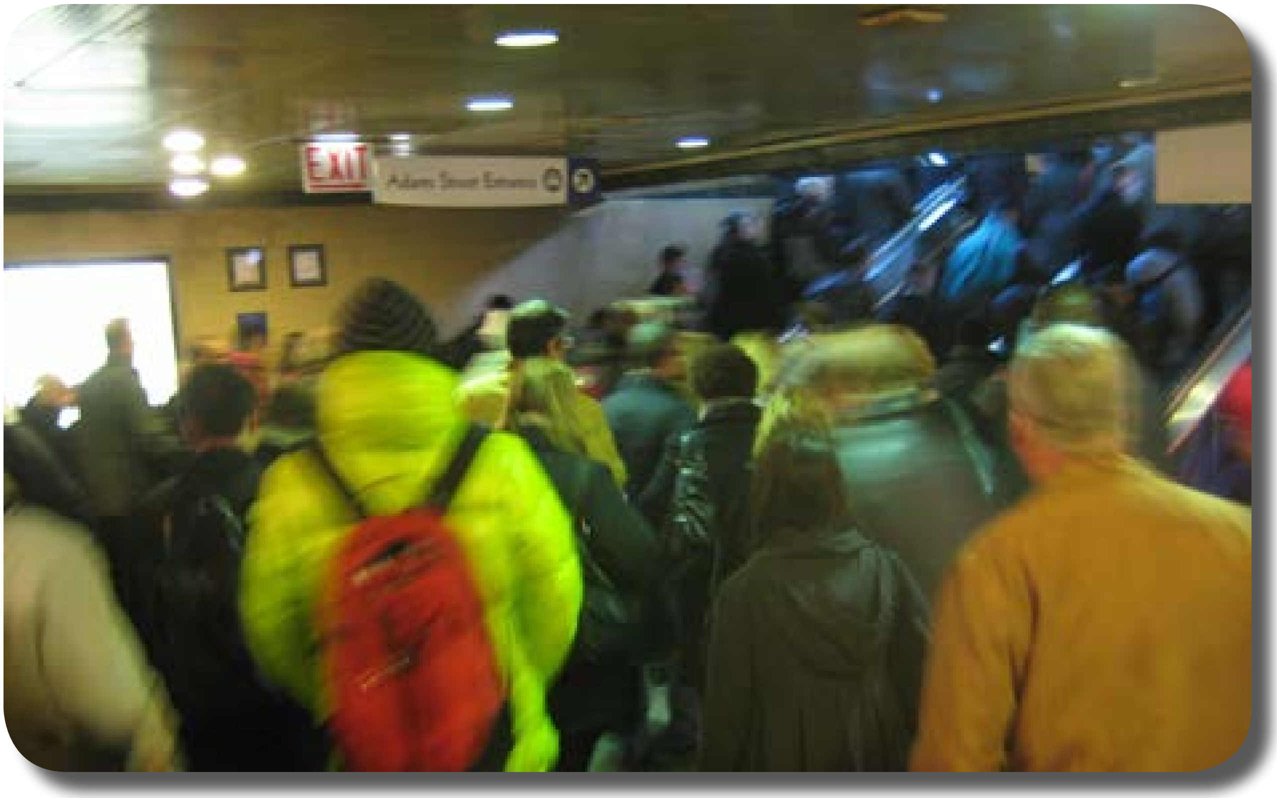
In addition to congestion, the complex layout of today's concourse building remains very confusing. Sight lines and natural light are very limited, there are multiple levels to navigate, and escalator banks only operate unidirectionally during peak periods. Overall, the environment is not particularly inviting and it is especially difficult for infrequent visitors to navigate through the tide of rush hour commuters.

Track/Platform Issues

The existing Union Station track and platform layout is, in large measure, unchanged since the station opened in 1925. The station has the same number of boarding tracks, and the passenger and baggage platforms are the same width. Probably the most significant change was the opening, in about 1987, of a Madison Street entrance that provides a second point of access to platforms serving six of the ten north side tracks.

In contrast with the physical plant, train operations at Union Station have changed a great deal over the years. The biggest change has been the shift in the share of traffic between intercity and commuter trains during peak periods -- especially in the AM peak, when many overnight trains used to arrive. Most of these overnight trains used to include many cars of mail and express packages which had been serviced from the baggage platforms or at the mail platforms.

The existing track and platform layout is, in large measure, unchanged since the station opened in 1925.



Adams Street exit in morning rush hour

Besides the big increase in number of commuter trains, today's commuter trains are longer than in the past (up to 11 cars) and they consist entirely of high-capacity double deck cars; many of these trains now carry over 1500 passengers during peak periods. A number of platforms are too short to accommodate the longer commuter trains. Another significant issue is that the platforms, at 12 feet in width, are too narrow to quickly unload these trains without overcrowding and delay. This issue also limits flexibility in train operations because dispatchers must avoid simultaneously bringing two trains onto tracks that share a platform since this could create overcrowding. With the limited number of tracks and platforms available for commuter operations, and the short length of several platforms, these factors all add up to a significant operational constraint. Similar to the additional egress/access point at Madison Street for three of the north side platforms, a second egress/access point could be a partial solution on the south side, where all platforms only have the single access point, at the connection to the concourse.

Another result of the increase in commuter operations, which are heavily concentrated during the morning and afternoon rush hours, is that there is now an overall shortage of platforms during these periods. This is particularly true on the south side of the station which hosts most of Amtrak's operations as well as the busier part of Metra's operations. It takes a minimum of 20 minutes to turn around a commuter train

> Today's commuter trains are larger than in the past and many now carry over 1,500 passengers during peak periods.

Passengers alighting from Metra BNSF train in morning rush hour, with unused baggage platform in foreground

including time for, unloading, attaching station power, light cleaning, flipping seats, a brake test, loading, detaching station power, and some tolerance for late arrival. There are several additional activities that intercity trains are involved in that may require these trains to sit longer in the station, particularly if it is turning for another trip, rather than coming from/going to the service/storage yard (activities required between runs of intercity passenger trains include longer unloading and loading times than commuter trains, as well as food service stocking, filling water tanks, inspection, etc.).

As noted, at one time the handling of mail was an important facet of passenger train operations. Amtrak wound down this function about 2002. Since that time the large mail platform (over 100 feet wide and 1300 feet long), located between the station south tracks and the Chicago River, has sat unused. While the only at-grade access to these platforms requires crossing active tracks, there is a below grade walkway (currently off-limits to passengers) that connects these platforms to the station's basement.

Prior Ideas

There have been several alternative concepts proposed for Union Station over the years. They go back to the time before the construction of the Union Station facilities that opened in 1925.

Changes in the Original Design

When construction of the headhouse building was started in 1919 the original design, from about 1913, was changed to add a 22 story office tower rising above the Great Hall. Caissons had already been installed without provision for this weight and extensive modifications to the foundation were required. Once the design was formalized, 192 additional caissons were installed to support the office tower. This concept was adapted from the Michigan Central Station in Detroit, built in 1912-13 with 18 floors intended for office

Proposal for Union Station with office tower (c. 1916)

space or a hotel. In the end, the railroads noted that the Michigan Central had been unsuccessful in its attempts to find a user for the tower above its Detroit station (it never did) and the Chicago Union Station headhouse building was significantly scaled back with the office portion reduced to the eight stories that the railroads committed to use themselves. Because the building was designed with this provision, future construction of an office tower above the Great Hall remains a possibility and would not necessarily be in conflict with Union Station's historic character. The three rounds of redevelopment proposals that were active in the period between about 1990 and 2008 all included plans for such a tower (or, in one case, two separate towers).

West Loop Transportation Center (2001)

A four level multi-purpose subway under Clinton Street, the west side of Union Station, was part of the original WLTC concept. Levels would include (from street level down):

Concourse Level – an area from about Van Buren to north of Madison, connected to the basement level of Union Station on the south and Ogilvie Transportation Center on the north. This level could, potentially, accommodate ticketing, retail/food service, waiting space, and/or connections to other buildings along Clinton, as well as access to/from the sidewalks above.

Bus/Streetcar Level – This facility was proposed to serve transit links to/from the River North/Navy Pier/ North Michigan Avenue area as well as to/from the Central Loop, with stops at Lake Street, Ogilvie, and Union Station, and a terminal on the block south of Jackson between Clinton and Canal. The relative merits of building such future links underground versus at street level remains a subject of analysis; current transit improvements in these corridors are focused on the street level.

Four-level subway, part of West Loop Transportation Center plan of 2001

Rapid Transit Level – This level was intended to accommodate improved rapid transit system access to the West Loop area, which continues to see robust growth in office-oriented development. This facility was conceived as supporting either a CTA Blue Line link (which would create a fourth side of an underground downtown Loop, and separate the Blue Line's O'Hare branch from the Forest Park Branch) or a route to accommodate a CTA Red Line "bypass" (which would diverge from the existing Red Line south of North/Clybourn station and converge back to the existing Red Line north of Cermak/Chinatown station. Two stops were proposed: at Ogilvie and at Union Station.

Railroad Level – This level would effectively add through track and platform capacity to Union Station for passenger and/or commuter trains. The new tracks would diverge from the Union Station north lead tracks at a point east of Racine (now part of Metra's Milwaukee District) and re-connect at about Taylor Street on the south. Through tracks have the potential to greatly increase capacity by eliminating time that is lost in changing the direction of a train's operation (for crew change, seat reversal, inspection, brake test, etc.). At the time of this proposal, Amtrak was still in the mail and express business, and a new underground alignment appeared to be the only way to significantly increase Union Station's capacity.

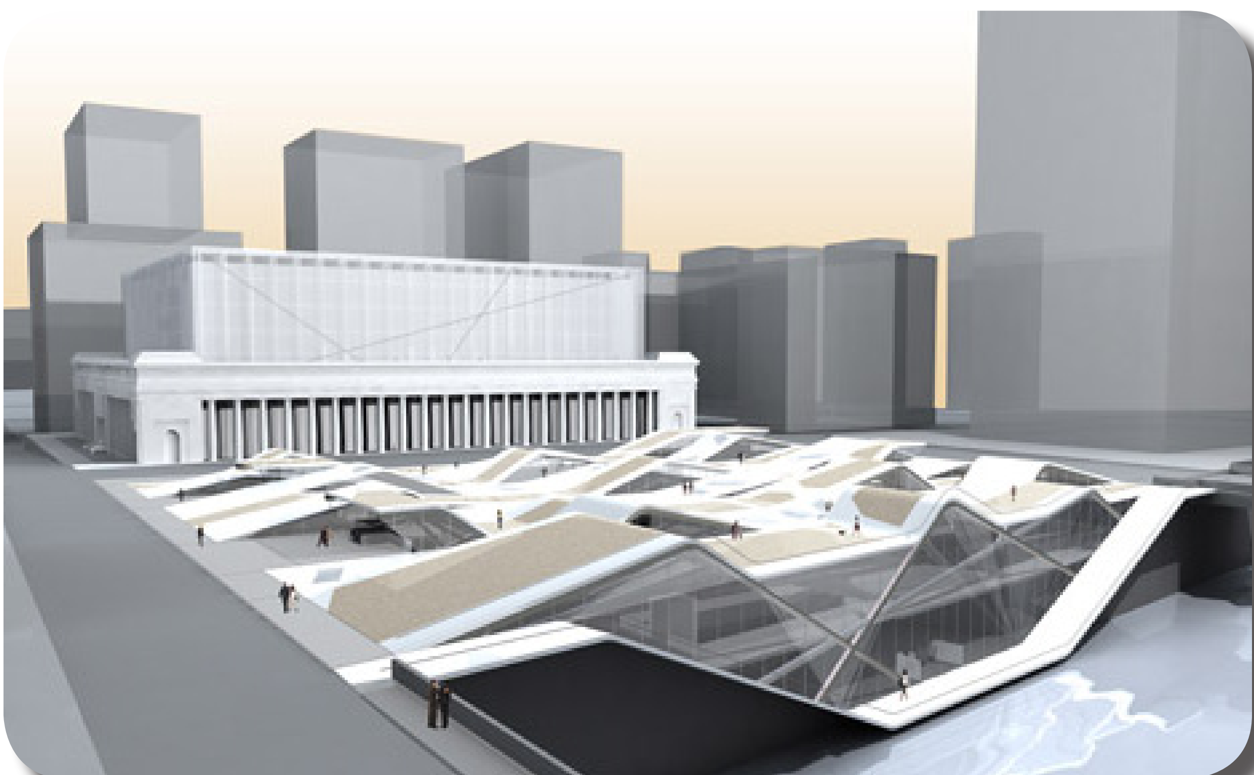
Consistent with the characterization of the West Loop Transportation Center in the current comprehensive regional plan, *GO TO 2040*, the Union Station Master Plan Study has considered a broader range of alternatives for accomplishing the goals of the original 2001 West Loop Transportation Center concept (see Introduction). Specifically, a Clinton subway is now identified as one of several possible implementation approaches to achieving these goals.

Old Post Office

There has been some consideration of using a portion of the old Post Office for a new intercity railroad station. The original main lobby is an attractive space and the building spans most of Union Station's south tracks. However, there are a number of complications with re-use of this space as a railroad station. A major disadvantage is that it would be awkward to provide a convenient connection to Union Station; the two facilities would have to function essentially as two separate stations, a major inconvenience for passengers. In recent times the building has been sold to a private owner based in the U.K. It is understood that he is pursuing a variety of possible paths for possible redevelopment of the building. None that have been revealed to date show any connection to the tracks below. Amtrak has indicated that it is not interested in pursuing such a connection.

Burnham Prize Union Station 2020 Competition, Chicago Architectural Club (2008)

Illustrated below is the winner of the first prize, a design created by Michael Cady, Elba Gil, David Lillie, and Andres Montana, employees of the Chicago office of Thompson Ventulett Stainback & Associates. UNION STATION 2020 asked for innovative solutions for the transformation of Union Station into a center of high speed rail traffic and related programs. It was not simply a question of designing an efficient and functional transit hub. Instead, the questions to address in the design included: how can this intermodal node become more than a mere knot of infrastructure? What role can this project play in the reconfiguration of Chicago's West Loop and of the city and region? How can an existing landmark building be transformed to accommodate and generate a new combination of activities while welcoming an unprecedented level of rail traffic?



Winner of Chicago's Union Station 2020 Design Competition (2009)

While the design is attractive, the implied track configuration would likely pose significant operational challenges relative to the present layout. The competition's assumption was that commuter rail service could be shifted somewhere else, which would likely prove much more challenging than removing the 222 S. Riverside building without an on-site replacement.

Helmut Jahn proposal for separate high speed rail station east of Old Post Office (2010)

Proposal for a Separate High Speed Rail Station (2010)

This proposal by noted architect Helmut Jahn was prepared for Reuben Hedlund, a civic-minded zoning lawyer who headed the Chicago Plan Commission from 1991 to 1997. Although, it was a very preliminary concept, it featured use of tracks in the area now occupied by the unused mail platform, an idea featured in this study. In his review the Chicago Tribune's Blair Kamin noted that the site's location, cut off from the Loop by its location south of the Expressway at Congress, was a major shortcoming. Connections to other trains at Union Station might also be difficult under this proposal.

Proposal for Station Replacing 222 S. Riverside (2011)

This proposal was developed by Chicago architecture firm Solomon Cordwell Buenz in cooperation with the Midwest High Speed Rail Association. It features a monumental glass structure on the site of the former Union Station Concourse Building and current 222 S. Riverside Plaza office building. It features 8 through tracks located where the concourse is now, with passenger circulation and service functions moved up to street level. The effect of so many through tracks on overall station capacity is unclear, and possibly negative. Such a radical change in train operations would also have major operating and capital cost implications for the train yards serving Union Station which were not addressed in the proposal. Similar to the Burnham Prize Competition winner, this proposal also implies a loss of income from the air rights development that currently occupies this space.

High Speed Rail Hub

The first modern high speed rail system was the initial Japanese "Shinkansen" (literally, New Trunk Line) route between Tokyo and Osaka, in 1964. In 1981 European high speed rail service started with the opening of the first TGV (Train à Grand Vitesse) route between Paris and Lyon. There a now 15 countries that regularly operate trains at speeds in excess of 155 mph (250 kph), although none are in the Americas. The newest systems are being built for operation at 220 mph.

The U.S. DOT started designating high speed rail corridors in 1992, with what has now become known as the "Chicago Hub Network" of routes in the first group. The Midwest Regional Rail Initiative (MWRRI), an interstate compact among State Departments of Transportation, was formed soon afterward and has been planning the development of a network of mixed freight and passenger routes (with passenger trains expected to operate at 110 mph) since that time. Federal capital dollars for high speed rail first became available in 2008, with a $100M program and the passage of the Passenger Rail Investment and Improvement Act. A much larger federal high speed and intercity passenger rail investment program ($8B)

Solomon Cordwell Buenz/MHSRA proposal (2011)

was included in the 2009 American Recovery and Reinvestment Act of 2009 (ARRA), and additional funds were included in the FY 2010 federal appropriations bill. The Midwest states (most notably Illinois and Michigan) have been very successful in competing for these grants and funding is now in place to bring most of the track in the Chicago-St. Louis and the Chicago-Detroit corridors up to 110 mph operation using new trains within the next few years. Even without these upgrades, ridership on Amtrak's network of existing Midwest corridors has grown rapidly in recent years. This growth is particularly apparent in Illinois where the state has funded a doubling of frequencies on three routes (Chicago to Springfield/St. Louis, Chicago to Champaign/Carbondale, and Chicago to Galesburg/Quincy). The new 110 mph services are expected to bring St. Louis and Detroit within about 4½ hours of Chicago, a travel time faster than driving, with increased service reliability. In addition to the upgraded track on these two routes, new trains are being purchased for the routes to Milwaukee, Champaign/Carbondale, and Galesburg/Quincy. New

1964 - First modern high speed rail system began in Japan

1981 - European high speed rail service began in France

2012 - 15 countries regularly operate high speed trains over 155 mph

Midwest Regional Rail Initiative - Connecting the Midwest Map

conventional speed (79 mph) service, with new trains, has also been funded for new passenger rail routes to the Quad Cities and to Rockford/Galena/Dubuque. Rail service will be very competitive with driving on all of these routes.

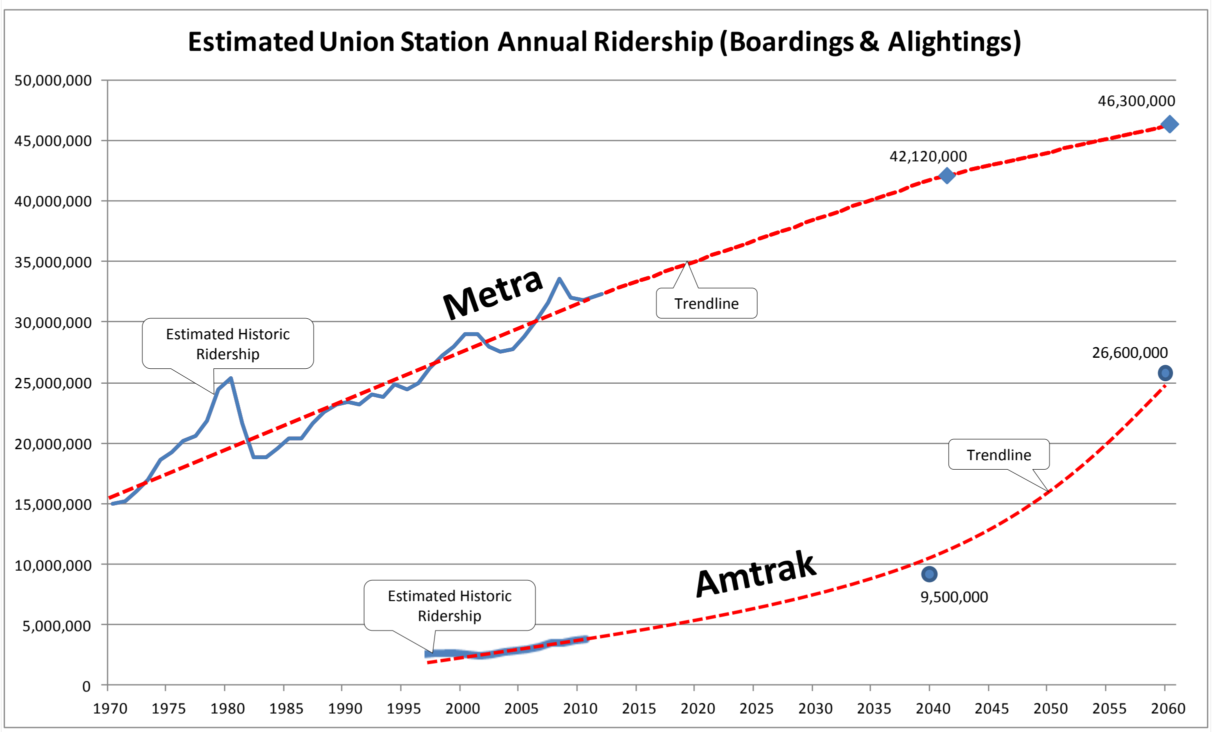
The State of Illinois has also started a study of a possible future dedicated passenger-only rail system designed for 220 mph operation. Such service would bring cities like Detroit, St. Louis and Indianapolis within two hours of Chicago (the Twin Cities would be less than 3 hours), making rail very competitive with air service in these corridors.

Ridership

Projections for ridership on trains arriving and leaving Union Station have been developed for 2020 and 2040, shown in the table and graph that follow. Different growth rates have been assumed for Metra, Midwest regional trains, and long distance overnight trains. The 2040 projection assumes that a 110 mph service is in place on the major Midwest Regional routes, while the 2060 estimate assumes that the major intercity routes have been upgraded to 220 mph operation.

	Annual			Average Weekday			Peak Hour		
	Current	Year 2040	Year 2060	Current	Year 2040	Year 2060	Current	Year 2040	Year 2060
Metra	30,400,000	41,900,000	46,300,000	109,000	150,000	165,500	27,200	34,400	36,400
Intercity	3,000,000	9,500,000	26,600,000	9,700	30,500	85,800	1,000	3,600	10,300
Total	33,400,000	51,400,000	72,900,000	118,700	180,500	250,800	28,200	37,500	45,000

In the table and graph, numbers are rounded and Metra ridership is based on weekday growth at 0.5% annually, with the assumption of a continuation of the long-term growth trend in Metra ridership. Boarding and alighting riders are counted separately; thus transfers (or thru riders) are counted twice (per airport usage practice). The sharp increase in intercity ridership reflects the significantly faster and more frequent Midwest corridor service that is proposed. The HSR portion of the 2040 intercity estimate is based on the proposed MWRRI network buildout; the 2060 estimate assumes that routes from Chicago to St. Louis, Detroit, Cleveland, Cincinnati, & Twin Cities are upgraded to 220 MPH service with HSR ridership projected to be 193% higher than the MWRRI 110 MPH estimates. These factors have been based on examples in Europe and the lower end of estimates for Midwest HSR in recent Siemens and SNCF studies. It may be noted that TGV trains carry 128 million passengers per year on a network similar in size and scope to that proposed for the Midwest, but with tracks nearly fully dedicated to passenger service.



The projected ridership increase has been translated into an estimate of the increased number of trains that would have to be accommodated in the morning and afternoon peak hour to estimate how much peak train handling capacity may be needed. These estimates are shown in the following table.

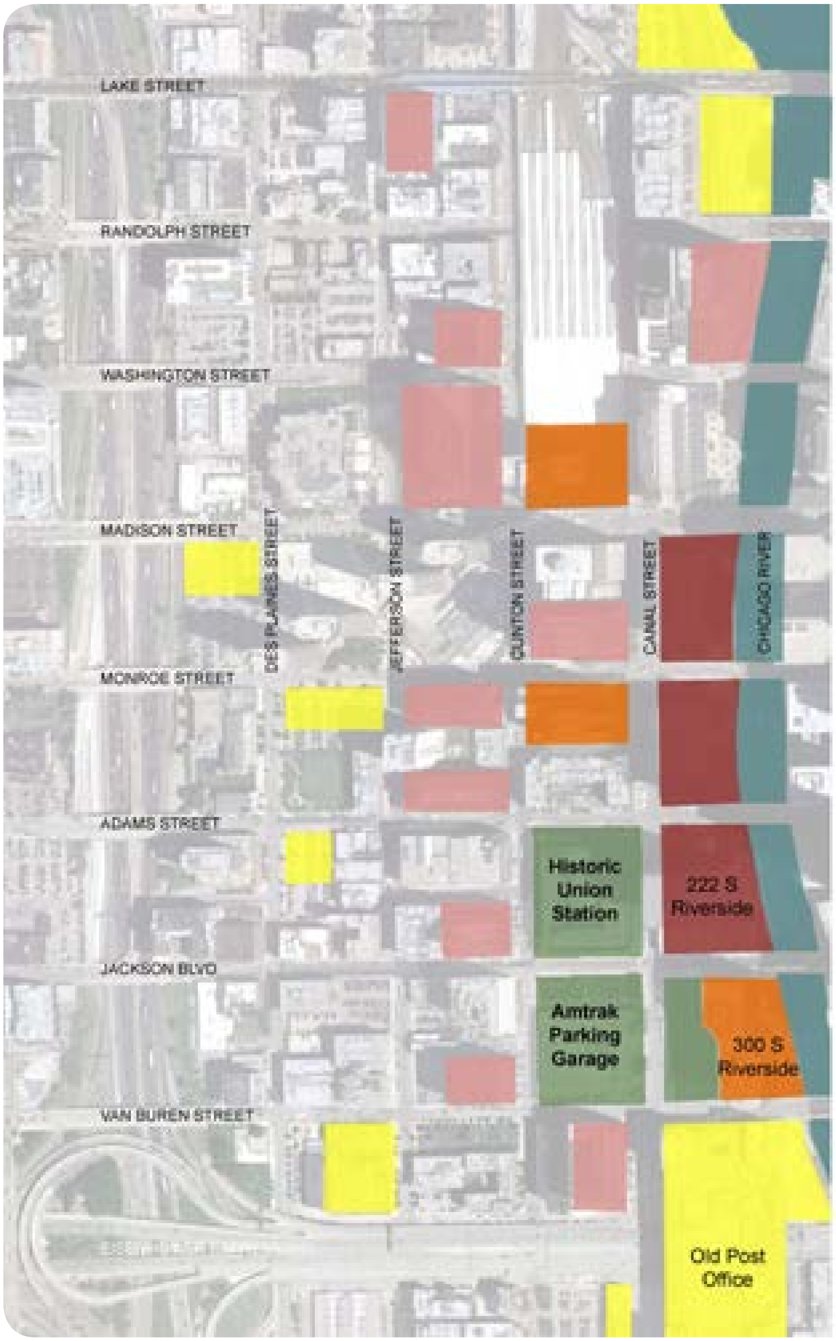
Existing (2011) Arrivals and Departures			
	Metra	Intercity	Total
Peak Morning	38	4	42
Peak Evening	36	5	41
2040 with MWRRI Build Out Arrivals and Departures			
	Metra	Intercity	Total
Peak Morning	53	7	60
Peak Evening	50	6	56
2060 with 220 mph HSR Arrivals and Departures			
	Metra	Intercity	Total
Peak Morning	58	14	72
Peak Evening	55	17	72

The overall increase is projected to be about 16 additional peak hour trains (40% more) in 2040 and 30 peak hour trains (over 70% more) in 2060. While such long range projections are subject to imprecision, they do provide an order of magnitude approximation of likely future capacity needs.

Projections estimate a need for about 16 additional peak hour trains (40% increase) in 2040 and 30 additional peak hour trains (70% increase) in 2060 at Union Station.

West Loop Development Context

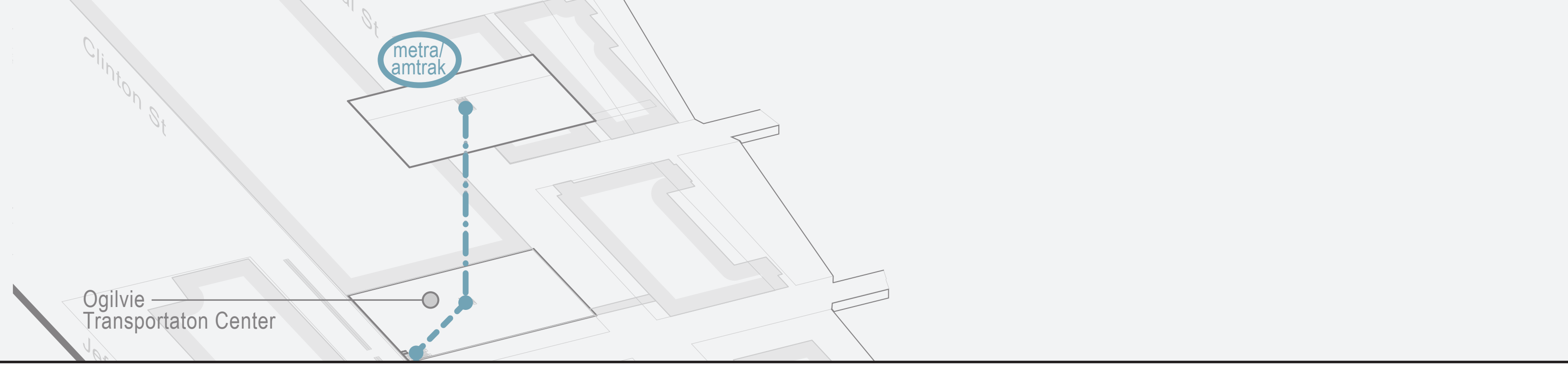
The following map provides insight into the development trend in the area surrounding Union Station. It shows that Union Station is in the center of an area with strong potential for high density development. The site owned by Amtrak west of 300 South Riverside and the Amtrak-owned garage west of Canal are at very valuable locations and have the potential to bring significant income, either on a sale or lease basis. This income could help offset the cost of realizing of one of the concepts for a new/improved railroad station discussed in this report. For more information, see the Goodman Williams Group report in Appendix E.



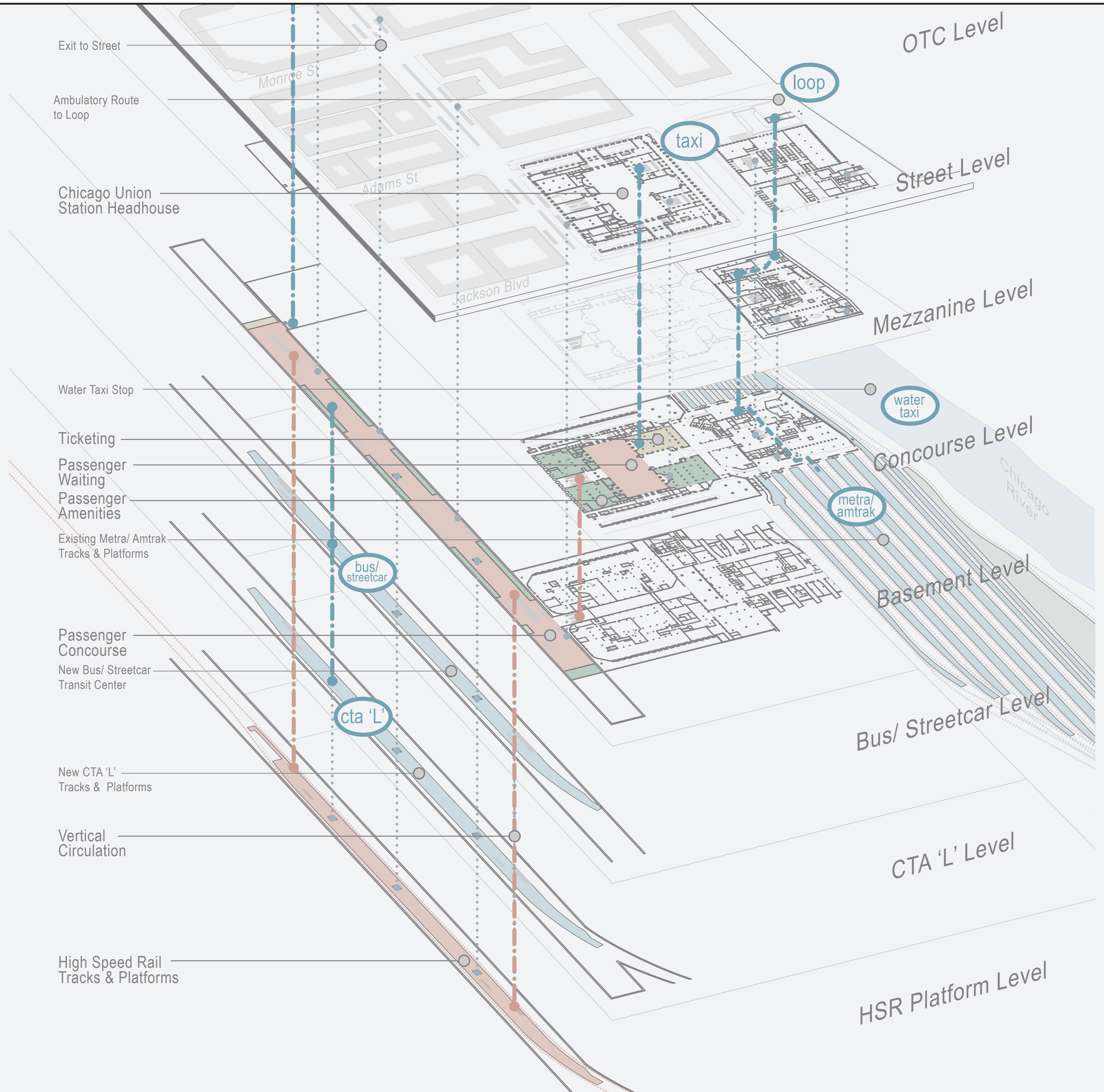
Union Station Development Context

Office Buildings

- completed 1960s-70s
- completed 1980s
- completed 1990s-2000s
- proposed developments
- Amtrak-owned parcels



4 - Ideas for Improvements



A number of ideas for future improvements to Chicago's Union Station have been incorporated in this study. Some ideas were originally developed in other studies and have been adopted, sometimes with modifications. Others were initiated in the process of the current study effort.

The Union Station Master Plan Study worked from the bottom up. The initial focus was on identifying track/platform layouts that could provide increased capacity for handling trains. Prior to the first meeting of the stakeholder's Technical Advisory Committee the consultant team developed a number of alternatives for consideration. These were revised, eliminated, or added to over the course of the study. The ones deemed most desirable were advanced to more detailed development and are described in this section. Conceptual design drawings for the preferred ideas appear in Appendix C and D. The brief descriptions and drawings of alternatives that were not advanced appear in Appendix F. Alternatives for stations were only developed in association with the track/platform alternatives that were advanced.

The ideas described in this section have been sorted by their rough time frames for implementation:

* Short Term
* Medium Term
* Long Term / Visionary

Short Term Ideas

These projects currently have funding committed for implementation during the next few years.

* *Amtrak Projects*: Amtrak is in the process of undertaking some improvements that will improve passenger conditions and amenities within the Station and reduce crowding. The first of these projects, announced in 2010 have already been completed.
* *CDOT Projects*: Two upcoming CDOT projects will improve local street traffic flow and curbside access to Union Station:
    * Central Area East-West Bus Rapid Transit project
    * Union Station Transportation Center

Amtrak Projects

The following improvements were announced by Amtrak in October 2010:

* Installation of air conditioning in the historic headhouse building was completed in 2011. While Union Station was one of the first air conditioned buildings in Chicago when it opened, the primitive original system failed sometime in the 1960's. The new system will support re-development of the entire headhouse building. The first facilities to occupy redeveloped space in the headhouse building were Amtrak's new Midwest Control Center and the return of Amtrak's Midwest offices from nearby rented office space. Both facilities opened in 2011.
* At street level, Amtrak plans to replace the concrete security barriers at major station entrances, which currently create an unsightly obstruction for people entering and leaving the station. The barriers will be replaced with more functional and aesthetically pleasing bollards. In addition, an expanded and more visible canopy is planned for the Main Entrance on the east side of Canal Street. These improvements are anticipated to be completed during 2012-13.
* Amtrak plans to nearly double the number of seats in its waiting rooms. This will greatly relieve the overflow conditions resulting from the inadequate capacity of Amtrak's waiting room off of the station concourse, as described in the Background section. The first step in this process will

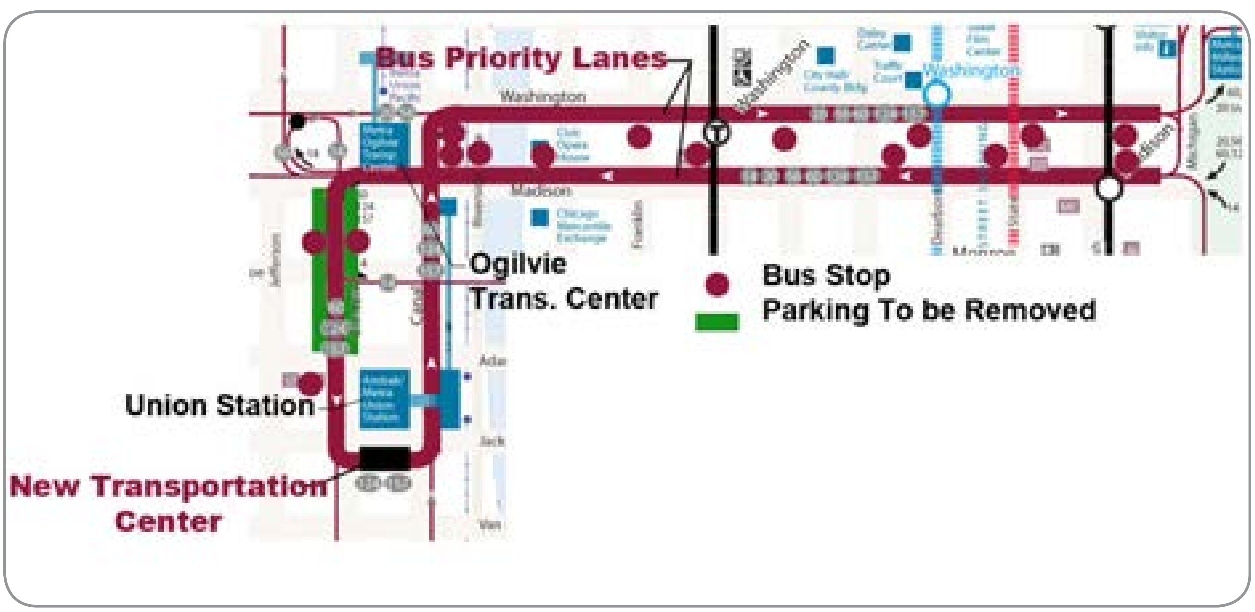
be to construct a new Metropolitan Lounge in the historic headhouse building. The Metropolitan Lounge is a facility for sleeping car passengers to wait before boarding their train. This is very important since Chicago is served by more overnight trains than any other Amtrak station. Many of these passengers also change trains in Chicago. The new facility will have two levels, connected by a circular staircase and elevators. After this is completed the existing main waiting area will be renovated, incorporating the space occupied by the current Metropolitan Lounge, greatly expanding its seating capacity.

* Construction of a new public rest room in the concourse area is also planned. The existing ones in the Amtrak waiting room and next to the Metra ticket office are overcrowded and there is significant inconvenience when they are closed for cleaning. The rest room and waiting room improvements are currently being budgeted and scheduled.

Central Area East-West Bus Rapid Transit (BRT) project

In July, 2010 the Federal Transit Administration announced the award of a grant to the City of Chicago for implementation of "bus rapid transit" improvements in a corridor connecting Union Station and the Central Loop. The key improvement is the designation of dedicated bus lanes on Washington and Madison Streets across the Loop and on Canal and Clinton Streets south to Union Station. As discussed in the Street Level Access Issues section, the blocks of Canal Street near Union Station are very congested. While establishing a dedicated bus lane in this block is very important, it is also very difficult due to the many other competing uses for the limited street space.

Providing sufficient space for peak period CTA bus activity is critical to the effective performance of Union Station. Among motorized modes, CTA buses account for the highest share of transfer connections by Metra customers. A proposed solution to the issue of insufficient street and curb space adjacent to Union Station is to expand off-street capacity to better accommodate peak period CTA bus activity. This may be achieved with the construction of an off-street bus terminal, the "Union Station Transportation Center" described further in the following section.



East-West BRT Corridor

A bus rapid transit (BRT) route will allow passengers to quickly move between Union Station and the Loop.

This Union Station Master Plan Study has also suggested a concept, subject to and contingent upon further traffic analysis, for relocating CTA buses that now terminate in the contraflow bus lane located on the west side of Canal in the block between Adams and Jackson. If feasible, this relocation would allow unidirectional traffic on this block, and the installation of a mid-street island to provide additional curb space for taxi and passenger car pick-up and drop-off at Union Station using the west side of the island. A mid-street island would also make it possible to dedicate the traffic and curb lanes east of the island exclusively for bus activity. Portions of the curb space in this block would be assigned to CTA, Amtrak's Thruway Bus service, and private shuttle buses.

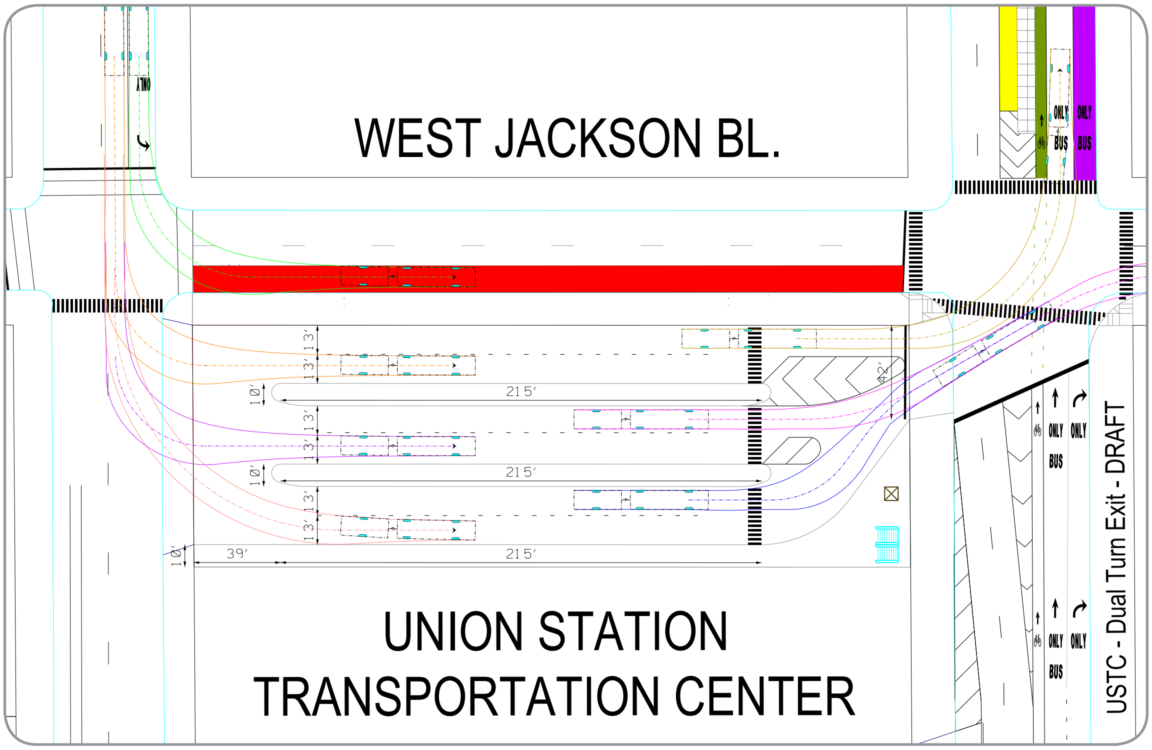
The concept of adding an island to provide additional curb space is taken from standard practice at airports (such as Chicago's O'Hare Airport). It is anticipated that the cost of construction of this island will not be major and that funding from the East-West BRT grant will be sufficient. A railing on the east side of the island, to limit people to crossing to the sidewalk at designated crosswalks, is also proposed for safety. If funding permits, it would also be desirable to provide a weather protection canopy on the island. The island could be enhanced further in the future by adding vertical circulation to take people directly to/from Union Station's concourse level, which is located directly below Canal Street in this area. It is proposed that such vertical access improvements be coordinated with the planned Canal Street Viaduct Reconstruction project, described in the medium term projects section of this report.

Union Station Transportation Center

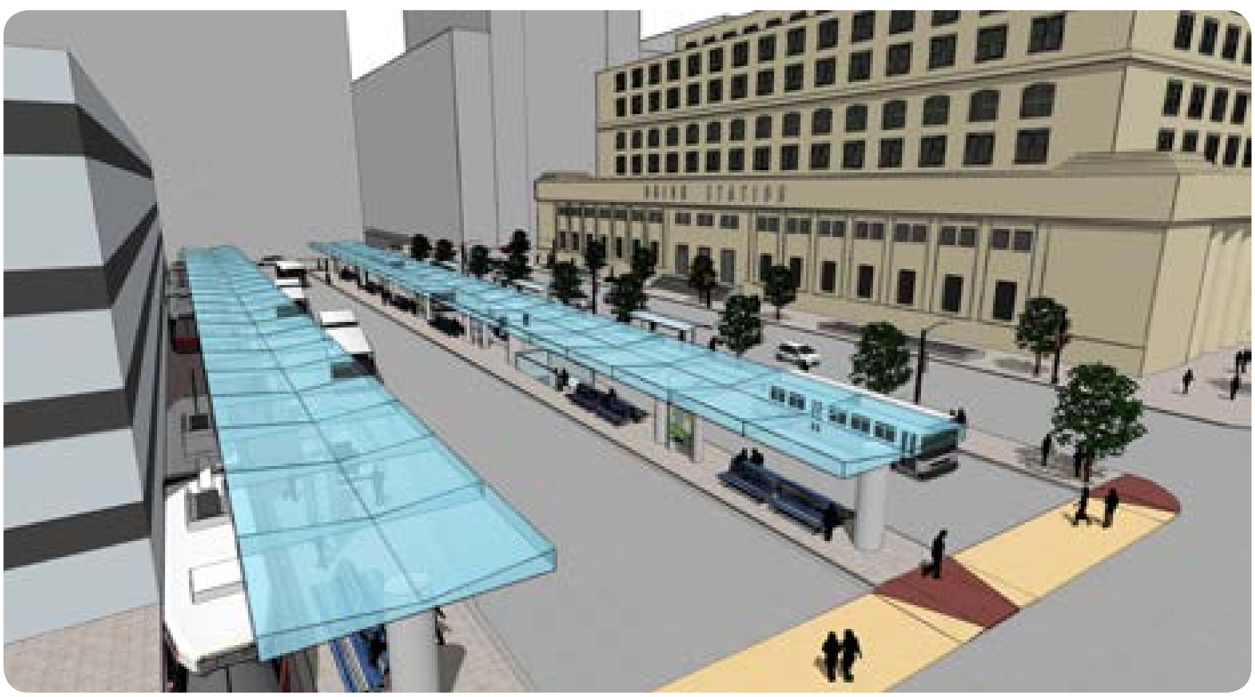
The Union Station Transportation Center project is closely-related to the East-West BRT project and is also fully funded from a recent Federal grant to CDOT. The Transportation Center, to be designed by CDOT in coordination with CTA, will be an off-street bus terminal located on the site of the existing surface parking lot that is south of Jackson, between Canal and Clinton (immediately north of the Amtrak-owned parking garage).

An off-street bus terminal located on an existing parking lot will help relieve traffic congestion around Union Station.

It is anticipated that the Transportation Center would relieve some of the nearby street congestion by expanding space for additional transit connections surrounding Union Station for buses that currently must lay over at the end of their routes on the streets near Union Station. Passenger access to buses using the Transportation Center would be provided at street level as well as via a direct stairway/elevator connection to the existing below grade walkway between the station's concourse level and the Amtrak parking garage.



Union Station Transportation Center concept plan



Conceptual rendering of the future Transportation Center proposed to be located on an existing parking lot on the southwest corner of Canal Street and Jackson Boulevard

While current plans call for this site to be converted relatively quickly to function as an off-street bus terminal, the potential also exists to construct a major new office/commercial building on air rights over the transit center sometime in the future. Such a future development could also be integrated with re-development of the site now occupied by the Amtrak parking garage, immediately to the south.

Medium Term Ideas (see Appendix C for more detailed plans)

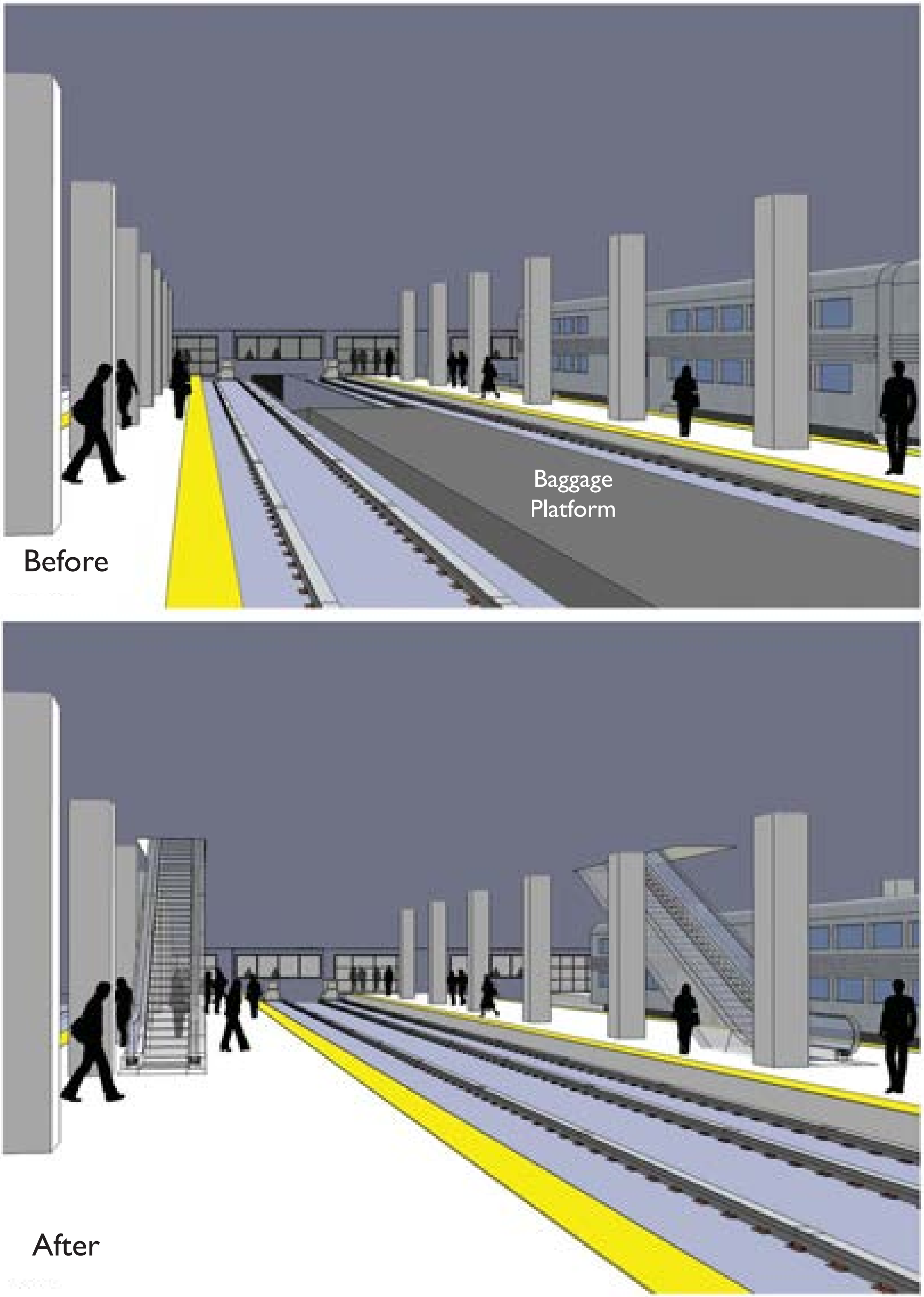
* Widen selected Metra platforms (using the area now occupied by unused baggage platforms) and add direct access to/from street level
* Create new station tracks and passenger platforms by converting unused former mail platform space
* Modify existing passenger station facilities to improve passenger flow and simplify wayfinding
* Coordinate further street access improvements with CDOT's planned Canal Street Viaduct reconstruction project

Widen Selected Metra Platforms

A unique characteristic of Union Station is that it features special platforms that were designed specifically for the handling of baggage, mail, and packages. These baggage platforms alternate with the passenger platforms on either side of the terminal tracks. Each of these "baggage platforms" leads to a ramp into the Station's basement. At the time Union Station was built most trains at the station were for longer-distance travel and handled checked baggage, mail, and express packages. As such, it was very useful to have platforms where these items could be handled without conflicting with passengers boarding or alighting from trains. Today, however, most trains at Union Station are Metra commuter trains. Some tracks are now almost exclusively used by Metra and there is no need for baggage platforms on those tracks. Meanwhile, Union Station's existing 12-foot wide passenger platforms are very narrow given the volumes of commuters they must accommodate. Some of Metra's peak period commuter trains operate with up to 11 cars, carrying an average of about 150 passengers per car. In addition, Union Station's south side platforms only have exits/entrances at one end. This can result in platform overcrowding during peak periods and extended times for commuter trains to load and unload.

> Union Station's existing 12-foot wide passenger platforms are very narrow. Changes could allow the platforms to be widened to 22 feet to alleviate overcrowding.

It is proposed to remove two of the baggage platforms (on the south side, between tracks 6 and 8 and between tracks 10 and 12). These tracks are currently used exclusively by Metra commuter trains. Tracks 8 and 12 would then be re-located to the east, into the space now occupied by baggage platforms. This would allow the passenger platforms to be widened to about 22 feet, which would be wide enough to permit the construction of stairs, escalators or elevators to provide direct access between the platforms and street level (i.e., the south side of Jackson Blvd). Together, the platform widening and addition of direct



As shown in the BEFORE (top) and AFTER (bottom) images, eliminating unused baggage platforms would allow for passenger platforms to be widened and vertical circulation to be added.

vertical access would relieve the overcrowding by both adding space and providing the opportunity for passengers to exit without going through the Station concourse. Three north side platforms at Union Station already have a secondary access/exit point at Madison Street, relieving what would otherwise be similar overcrowding issues for most north side commuters.

Discussions and analysis as part of this study have also suggested that it may be possible to construct direct vertical access to street level from the track 2 and 4 platform. Although this would require shortening this platform slightly, it is currently longer than needed for Metra's longest trains.

Such improved platforms could also increase Metra's operating flexibility. Associated changes in track geometry could also make the track 6-8 and 10-12 platforms one to two cars longer, and the wider platforms would make it possible for two trains to unload simultaneously or in rapid succession on both sides of the same platform, an operating practice that is used only sparingly today due to the overcrowding that results.

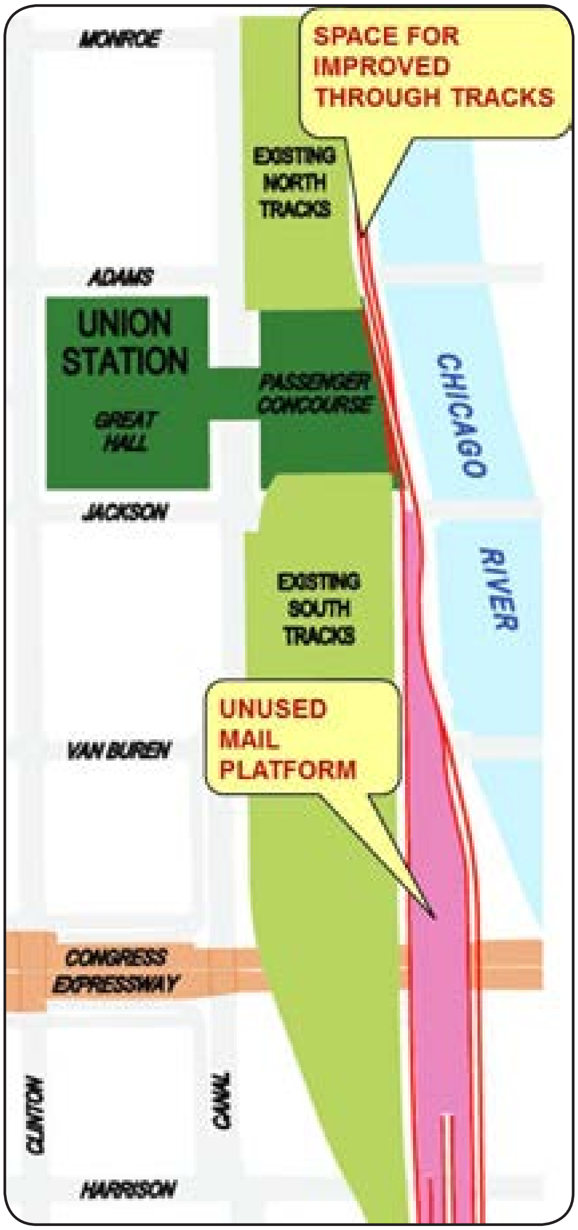
Convert Mail Platform

Another vestige of an earlier time is the large "mail platform" located between the station's south tracks and the Chicago River. This platform space was extremely busy during the years when large amounts of mail were transported as part of the railroads' passenger train business, but Amtrak wound down this function about ten years ago. Since that time the large platform (over 100 feet wide and 1300 feet long, and raised four feet to match the floor height of the mail cars), has sat unused.

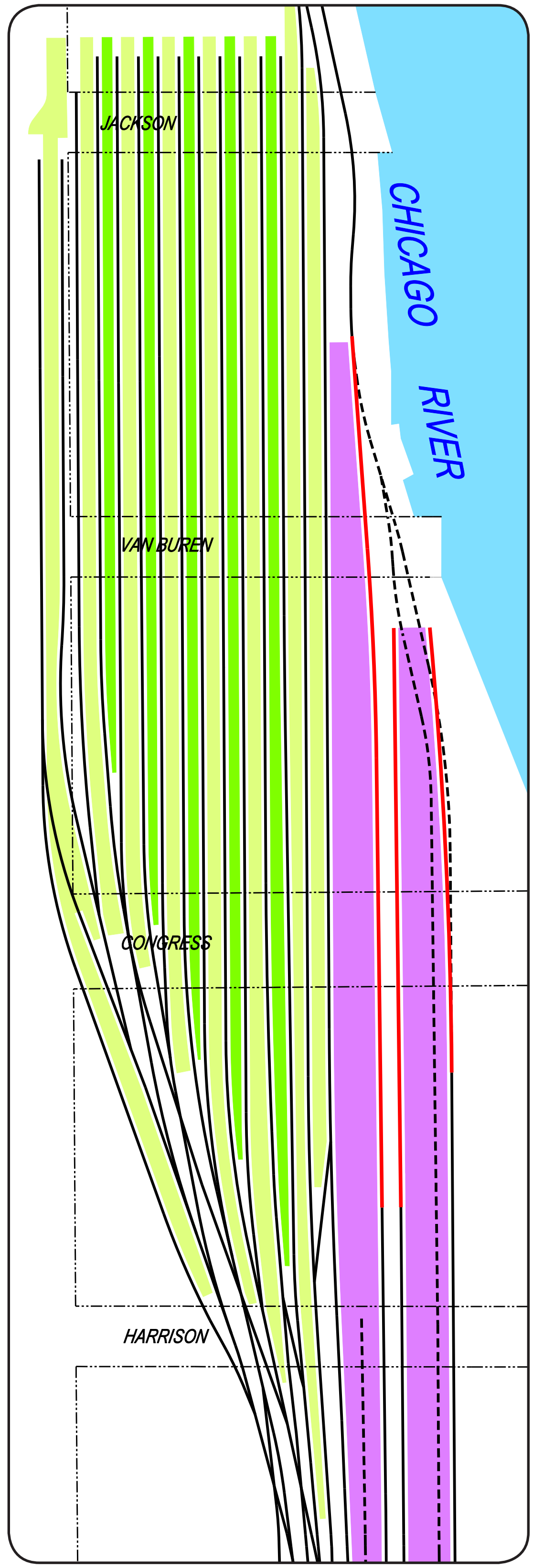
> New station tracks and passenger platforms could be created by converting unused former mail platform space.

It is proposed to convert this space to passenger platforms, which could add critical capacity to accommodate growth in intercity passenger train operations while also potentially freeing up some existing platform capacity for growth in commuter train use during peak periods. Parts of the old mail platform lie under various buildings: the old Post Office, the new Post Office, and 300 S. Riverside Plaza. It would be physically possible to extend two tracks that bisect the south end of the platform through to its north end, which would divide the existing extra-wide platform into two platforms of ample width to serve passengers, each served by tracks on both sides. This platform is also interrupted by numerous columns supporting the structures above, but relatively few would require relocation to make this proposed track and platform reconfiguration possible (these columns are located at the south end of the proposed east platform and support a portion of the 5-story new Post Office building).

Although it's located on the south side of Union Station, the mail platform – unlike nearly all existing passenger platforms – is served by tracks that run through to the north side of the station. Thus, the mail platforms, repurposed for passenger use, could become through-service platforms. Because of existing physical constraints, it would require substantially more work to run both tracks serving the eastern-most of two new platforms through to the north side. Therefore, it is proposed to initially construct the eastern platform tracks as stub tracks, accessible only from the south (which is the more congested portion of the station). At such time as a need for more through tracks is identified in the future, it would be physically possible to extend them to the north (although this would require additional column relocations



Converting the unused mail platform provides the opportunity to add passenger platform capacity and create new through tracks



and relocation of a segment of the river wall in this area). This additional work is proposed to be considered part of a Long term alternative.

Under the mail platform there is an existing underutilized basement area with high ceilings, as well as a below-grade passageway connecting this area to the basement under the existing passenger waiting areas. This space under the re-purposed mail platforms could be redeveloped into a departure lounge and food service areas for the new passenger platforms – a particularly useful amenity given that they will be over a block south of the existing Union Station concourse facilities. Vertical circulation (escalators/stairs/elevators) and gate control would be provided between the new lower-level departure lounge and the re-purposed mail platforms.

Existing below-grade passageway could be upgraded for passengers using converted mail platforms

The existing below-grade passageway could be renovated as a formal walkway connection to the existing station's concourse and waiting areas, allowing rail customers to avoid needing to cross active tracks to reach the new departure lounge and platforms. The future plans should also consider how to possibly introduce natural light into the long below-grade walkway and the proposed new lower level departure lounge.

Emergency exits from the new platforms, required to meet current codes, could be placed closer to their south ends, which would allow them to open onto the area of the plaza on the north side of the new Post Office (on the south side of Harrison Street).

Additional alternatives for accessing these platforms may be possible in the 300 South and/or 400 South (old Post Office) blocks. See the discussion of the New Station in the 300 S. Riverside Plaza block in the Long Term/Visionary Ideas section for further details. Amtrak has indicated that it is not interested in pursuing a connection to the old Post Office due to numerous complexities involved.

Improvements to the Existing Station

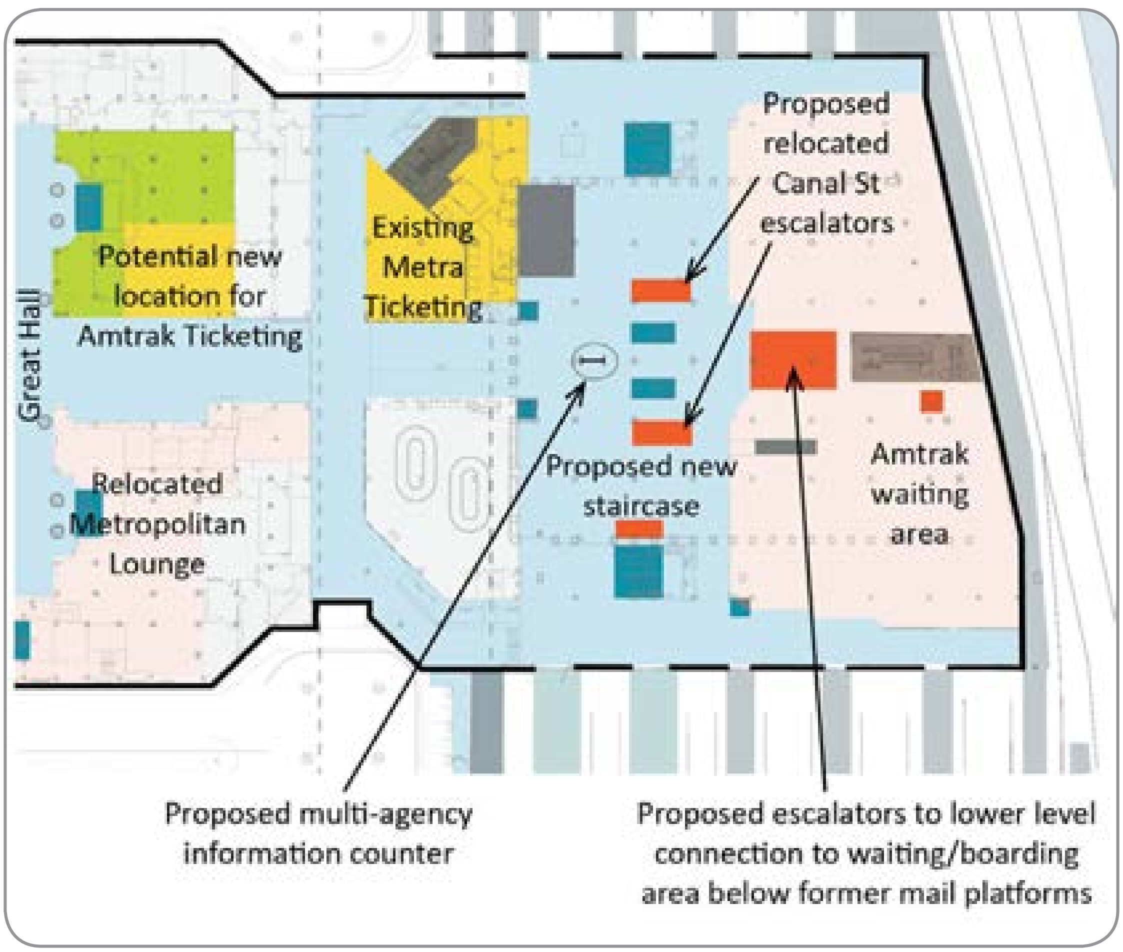
The Background Section featured a discussion of the factors contributing to severe peak period congestion and the difficulties in navigating within Union Station, especially in the passenger concourse areas east of Canal Street. As a first step towards addressing these issues, Amtrak has started to move some passenger waiting area functions out of the concourse level and back into the historic headhouse (see discussion in Short Term Ideas). This study has developed some further ideas to more boldly reconfigure space within the existing concourse area to increase capacity and overall station utility for peak period crowds (see conceptual space plan layout in Appendix C). The goals would be to open up the concourse to:

* Improve circulation and relieve congestion, particularly during peak periods and in the event of a major train delay
* Improve sight lines, so that people can more easily see where they want to go
* Expand capacity to allow for bi-directional access at major points of vertical circulation (currently major escalator banks need to operate uni-directionally in order to accommodate peak demand, and the "contraflow" escalator is difficult to find).

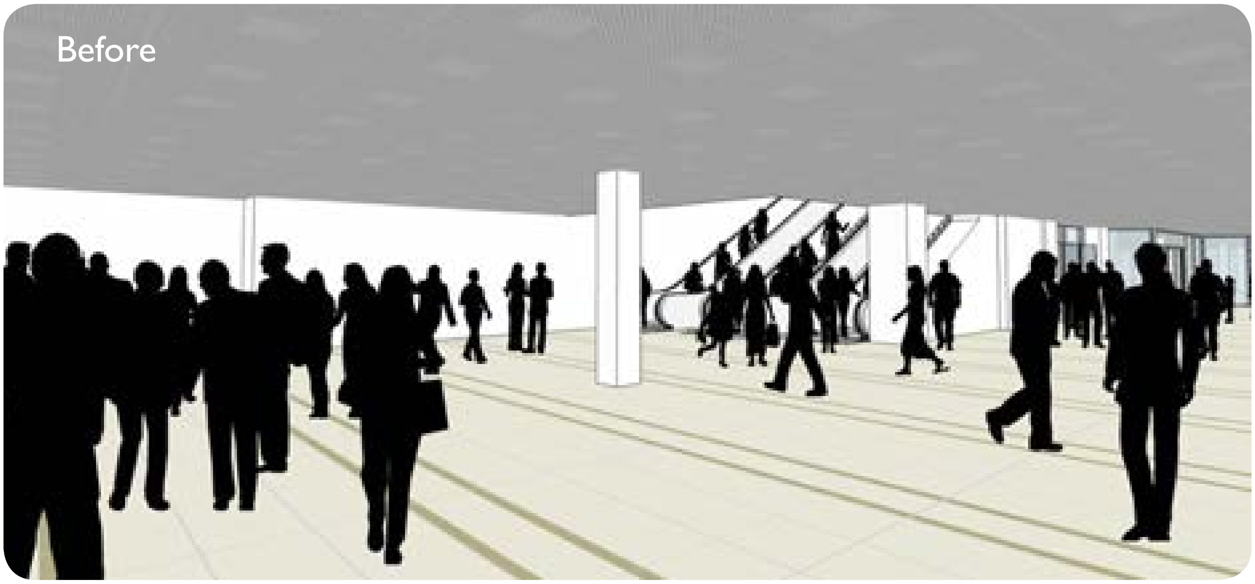
Key existing facilities on the concourse-level that may be candidates for relocation include:

* Amtrak Ticket Office – This could be returned to the historic headhouse building on the north side of the corridor connection to the concourse area under Canal Street. This space is now used by a restaurant, and is located across the corridor from where Amtrak's ticket windows had been prior to the start of the 1987-1991 station renovations – the area that is now to be repurposed for the new Metropolitan Lounge. Relocation of the ticket office may be facilitated by the fact that the number of ticket windows in service has gradually declined with the advent of automated "Quik Trak" ticket machines. This reduction is expected to continue with Amtrak's systemwide rollout of E-ticketing, planned for 2012.
* Passenger Service Area, Rental Car Counter, and Newsstand – These can be relocated to places out of the concourse level's main circulation area.

Using some of the space occupied by the current ticket counter it is proposed that the central (Canal Street) escalators be relocated north and south of the adjacent staircases, thereby opening up clear east-west sight lines between the soon-to-be expanded Amtrak waiting area on the east and the walkway to the Great Hall on the west. The information counter could be moved to the now more visible center of this space (perhaps about where the fountain is now), and much more room would be available for passenger movement.

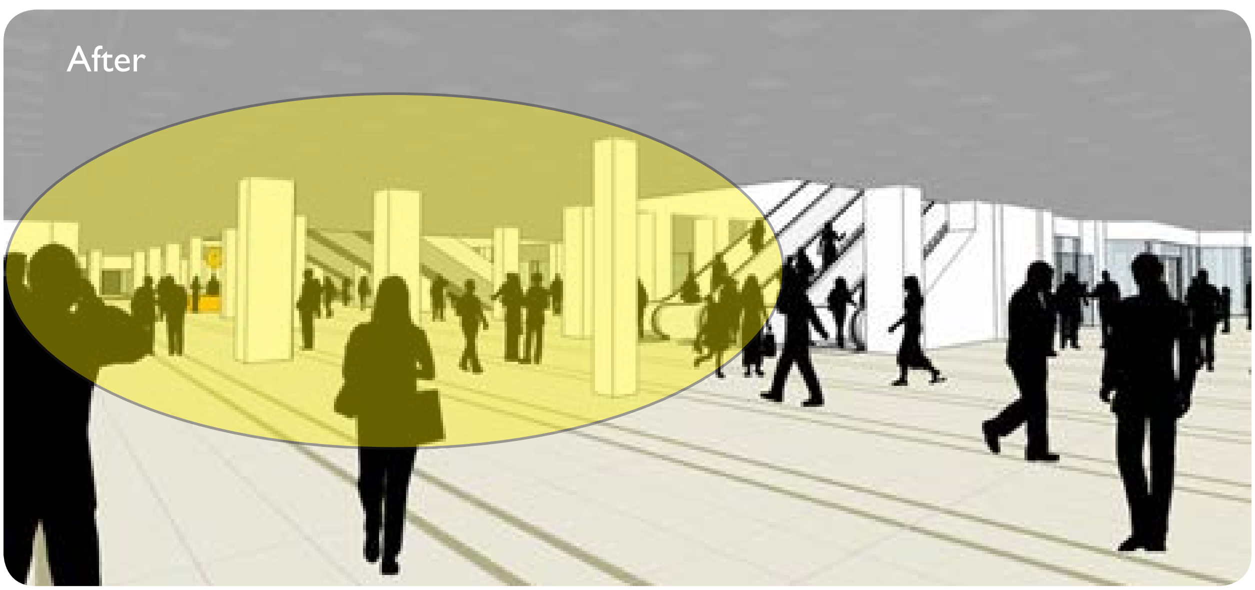


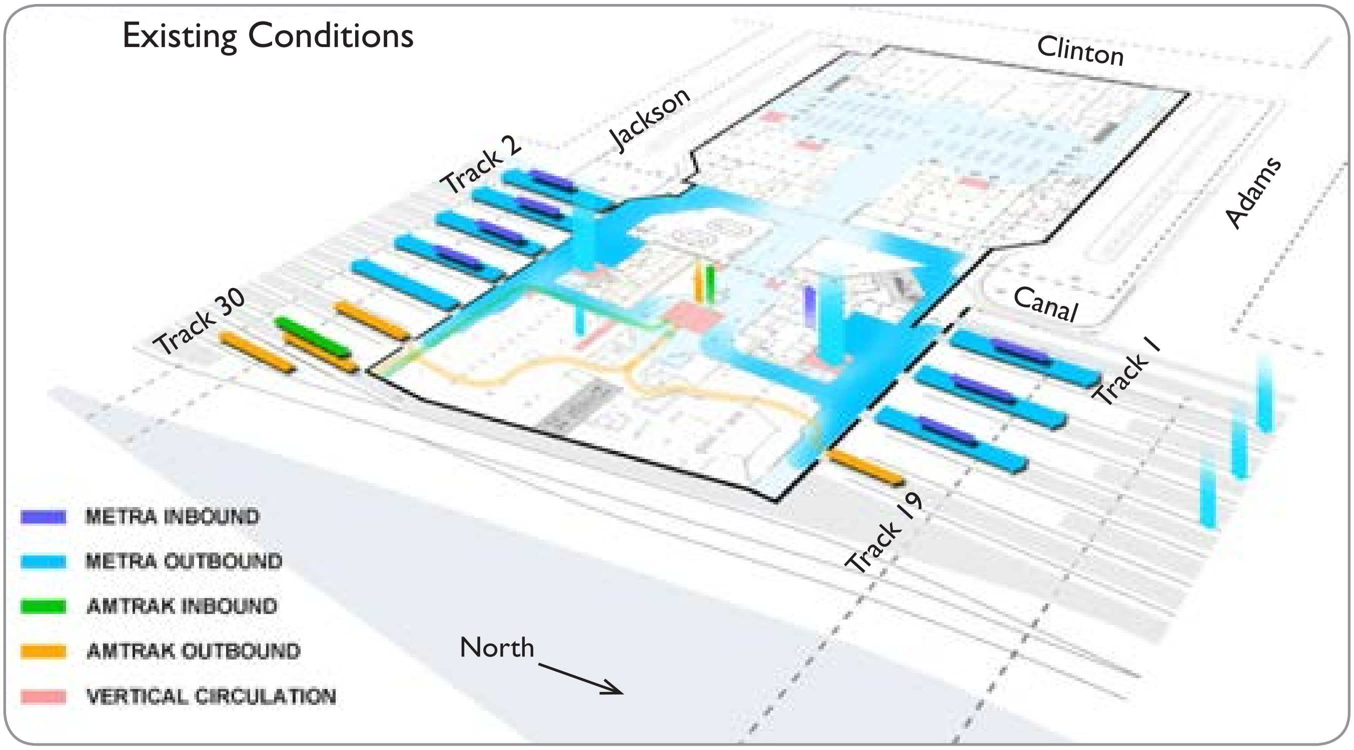
Conceptual plan for concourse area reconfiguration



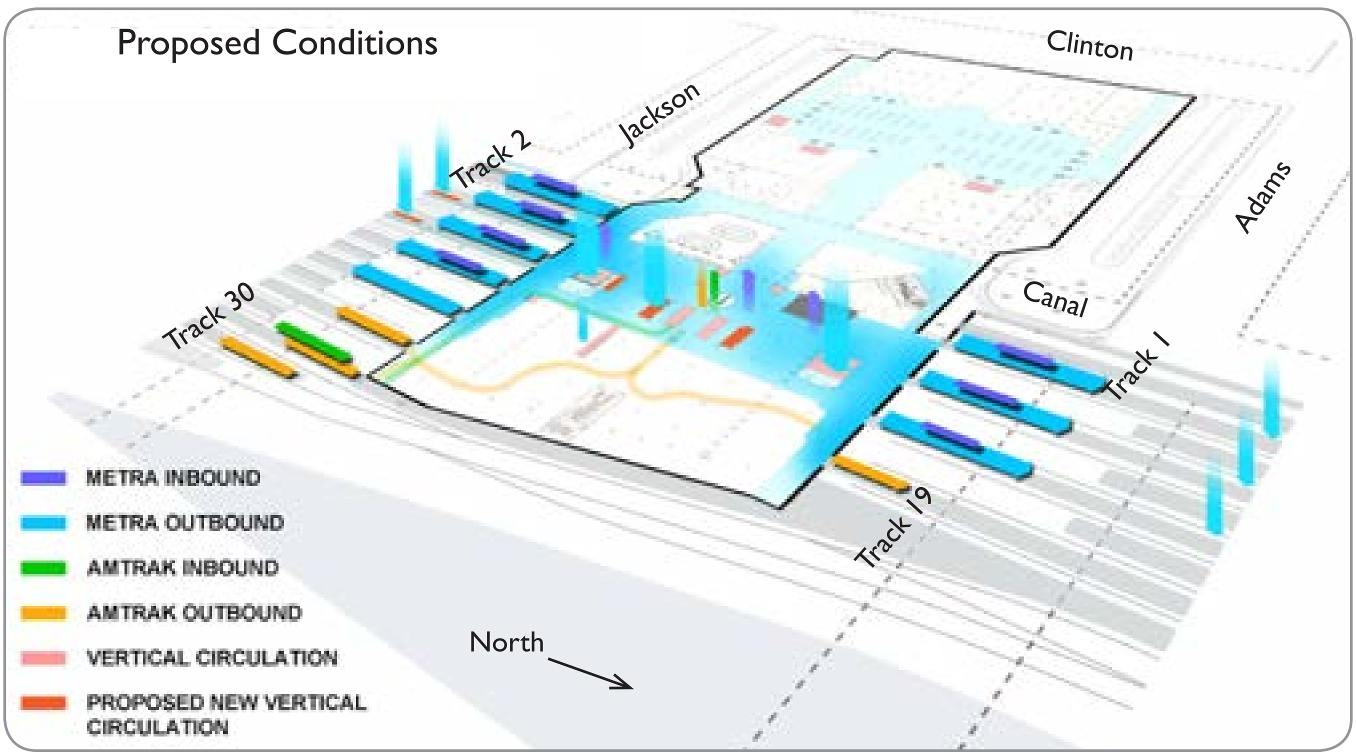
Above:*View looking north from southwest corner of concourse BEFORE proposed modifications including relocation of Amtrak ticket office.*

Below:*The effect of modifications is shown in the yellow area in the AFTER image. Relocation of the Amtrak ticket office could open up sight lines and allow more room for passenger movement.*





Conceptual illustration of Union Station concourse passenger flows in PM rush, when there are delayed Metra departures and late arrival of an Amtrak train



One positive feature of the existing concourse configuration is the way it subtly, but effectively, separates the main flow of commuters moving between trains on the west (lower numbered) tracks and the doorways next to the Adams and Jackson bridges from Amtrak's customers, most of whom arrive and depart through the Canal Street entrance or the Great Hall and use trains on the east (higher numbered) tracks. The problem is that the number of commuters has increased by more than 50% since this existing configuration was introduced during the 1987-1991 renovations. The current vertical circulation is also dependent on operating all of the station's escalators in the peak direction, except for one difficult to find contraflow escalator. Three of the station's four escalator banks have stairs that can be used by people traveling in the opposite direction from the commuter peaks, but there are no stairs between the concourse and mezzanine levels on the south side, which is the busiest escalator bank. By relocating some of the existing concourse-level facilities as described above there should be room to install additional vertical circulation between the mezzanine and concourse levels, facilitating station navigation, especially for travelers who are less familiar with the station.

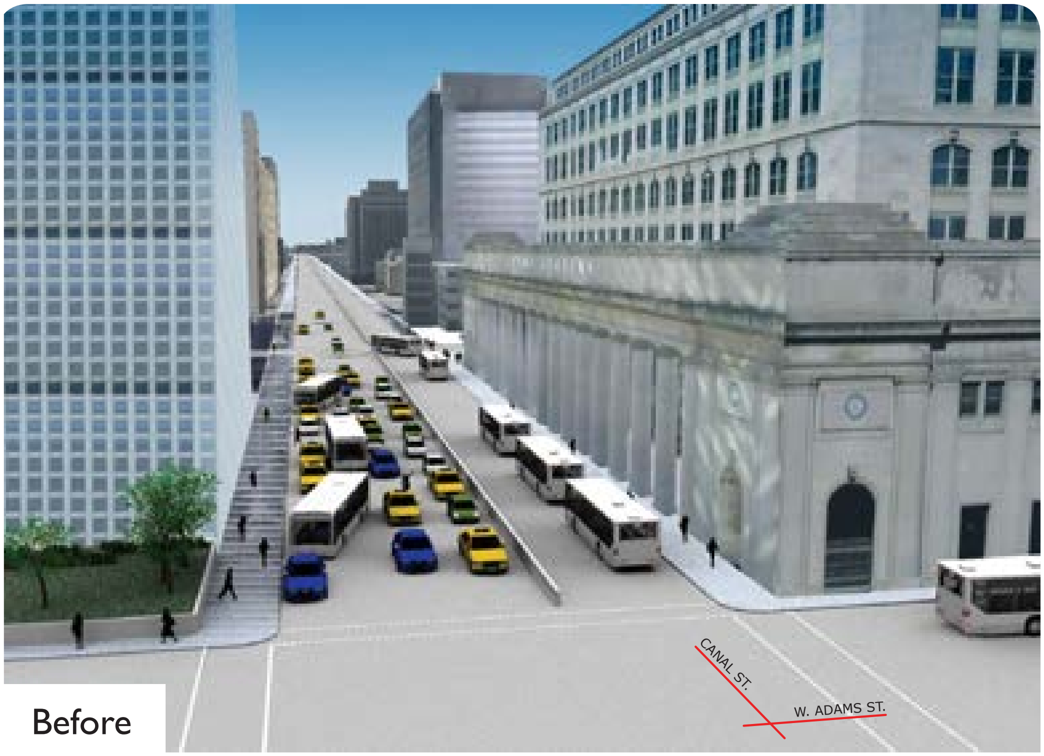
It should also be noted that the platform widening project described earlier will provide additional congestion relief in the station by creating direct exits to the street level from three busy south side platforms used overwhelmingly by Metra trains.

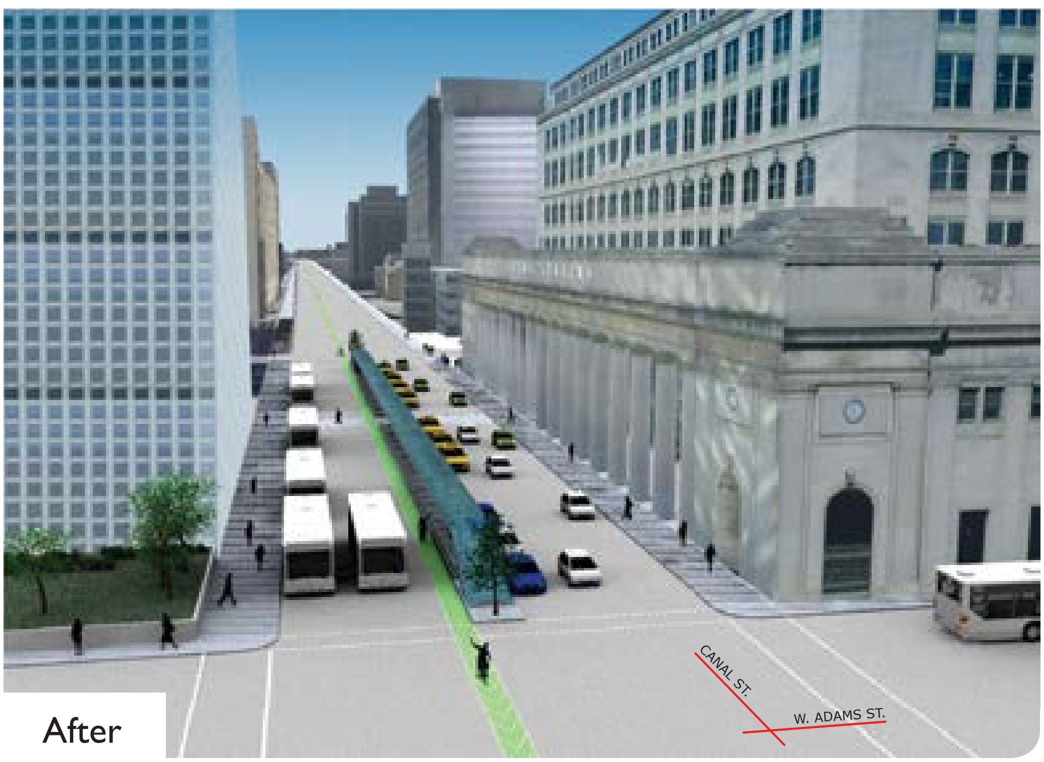
Canal Street Viaduct Reconstruction

Key segments of Canal Street are on a viaduct structure over Union Station's tracks. Constructing station tracks under the viaduct was an original design feature to increase the capacity of Union Station. The viaduct structure runs from Madison Street on the north to Taylor Street on the south. North of Harrison Street the structure generally runs only under the east half of the street, the section south of Harrison extends the full width of the street. In the block between Adams and Jackson the viaduct also spans the full width of Canal Street and forms the ceiling over an integral part of Union Station's passenger concourse. The viaduct was constructed in conjunction with the station, so it is nearing 90 years old, at the end of its design life. It needs and has received extensive maintenance attention and is prone to leaking during wet weather; it no longer fully protects facilities and passengers on station platforms from such weather conditions.

> The aging Canal Street viaduct will need complete replacement soon, providing an opportunity to incorporate vertical access and curbline changes to improve Union Station.

The Master Plan Study team has investigated whether some modifications could and should be made to the future replacement viaduct design to help in achieving the study goals, rather than simply replacing the structure exactly as it was originally built. As such, the main focus of this analysis has been on the portion of the viaduct structure north of Van Buren Street. In the Street Access portion of the Background section it was noted that a major problem is a lack of curb space proximate to major station entrances for vehicles of all types to drop off and pick up passengers. The concept of creating an island in Canal Street was suggested among the Short Term Ideas section to be implemented as part of CDOT's ongoing East





Reconstruction of Canal Street will provide an opportunity for improved street access as shown in the BEFORE (top) and conceptual AFTER (bottom) images above

West BRT project. This would be similar to pick up lanes at an airport terminal, with channelized traffic and parallel curbs.

An enhancement to this Short Term idea would be to add vertical circulation between street level along Canal Street and the track/concourse level below (especially in the block between Adams and Jackson, as well as immediately north and south). In this study two conceptual alternatives have been developed, one based on street operations remaining as they are (i.e., Canal continues to be a northbound street and Clinton southbound) while the other is based on reversing this traffic pattern (i.e., Canal southbound and Clinton northbound). Opportunities for additional islands with vertical circulation, in the blocks of Canal immediately north of Adams and south of Jackson, are also included in these alternatives.

Because the viaduct structure will need complete replacement, the incremental expense of incorporating vertical access and potential changes to curblines at the same time should be relatively small as a proportion of that project's overall costs.

Details of the design of the new Canal viaduct could and should also facilitate other possible projects identified in the Master Plan Study. For example, it appears that two existing Canal viaduct columns conflict with the location where a track would need to be shifted in conjunction with the Metra platform widening opportunity, another medium term idea. Careful placement of columns could also facilitate potential future construction of Canal or Clinton subways, two of the long term/visionary proposals.

Long Term / Visionary Ideas (see Appendix D for more detailed plans)

The study has developed concepts for increasing passenger handling capacity and improving the traveler experience by significantly expanding or completely replacing the existing intercity and/or commuter station facilities. These plans are described as:

* A new facility in the 300 S. Riverside block, to be constructed on air rights over Union Station tracks (which are owned by Amtrak) and integrated with the existing office building on this block
* Redevelopment of the 200 S. Riverside block with new intercity and commuter station facilities
* Construct a new fourth lead track on the north side of the station

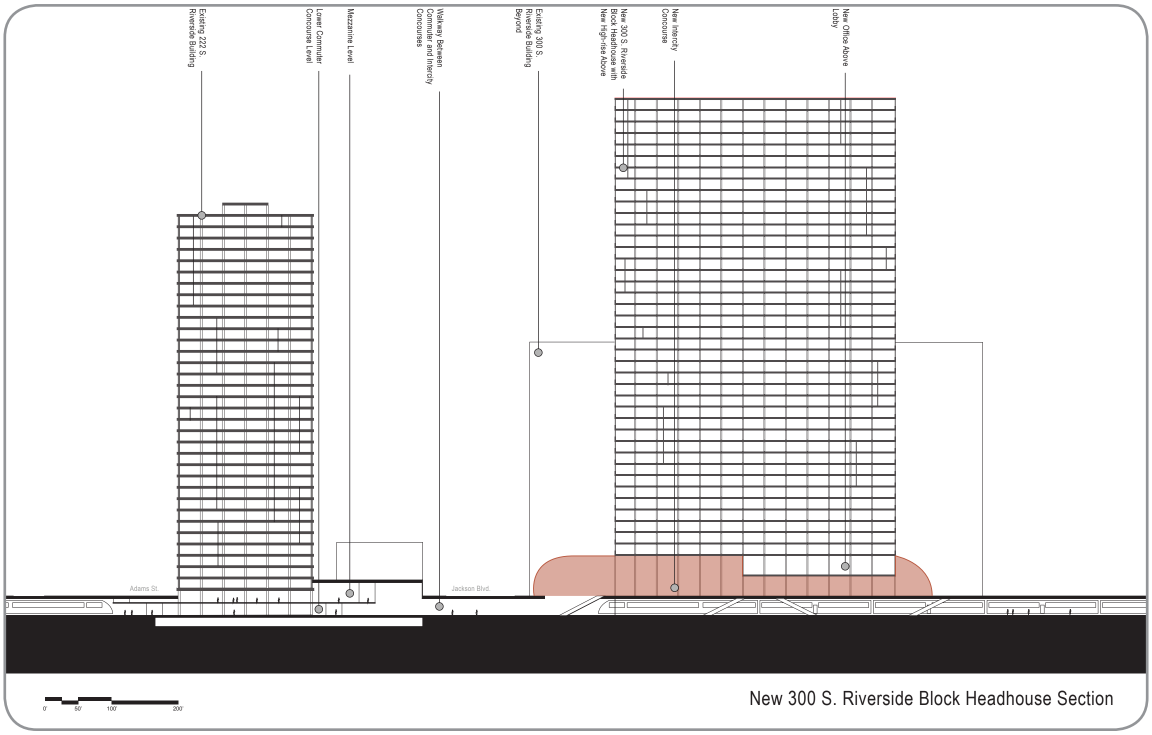
The study has also developed two concepts for adding additional track and platform capacity in underground alignments that bypass and augment Union Station's existing track and platform infrastructure. These plans are described as:

* Clinton Subway (per the original West Loop Transportation Center concept)
* Canal Subway

New Intercity Station in 300 S. Riverside Block

This concept would create a new intercity passenger train station in the 300 S. Riverside block (see space plan layout). It would not involve the demolition of any buildings, but rather would be constructed on the Amtrak-owned air rights on the west side of the block. This concept would also repurpose the lobby space of the existing 300 S. Riverside Plaza Building (which runs through from Jackson to Van Buren) into additional train station space, with a new office lobby constructed one floor up. This building is located above the mail platform that is proposed for conversion to two wide intercity passenger train platforms as a medium term idea.

Primary access to all of the south side platforms would be from above, requiring the widening of the existing platforms to provide room for stairs/escalators/elevators. A similar platform widening concept



A new intercity passenger train station could be constructed in the 300 S. Riverside block, integrating the existing office building as well as Amtrak-owned air rights

was also proposed as a medium term idea to serve Metra trains and riders, meaning a total of four more platforms would need to be widened as part of this project. Service access to these four platforms could be provided by constructing ramps to the existing but little-used "cross connect tunnel" which runs east-west under the south side platforms just south of Congress. This concept would provide opportunities for attractive and functional circulation space, waiting areas, and restaurant spaces along the riverfront at street level as well as one level up.

New building and station concept at 300 block of S. Canal / Riverside Plaza

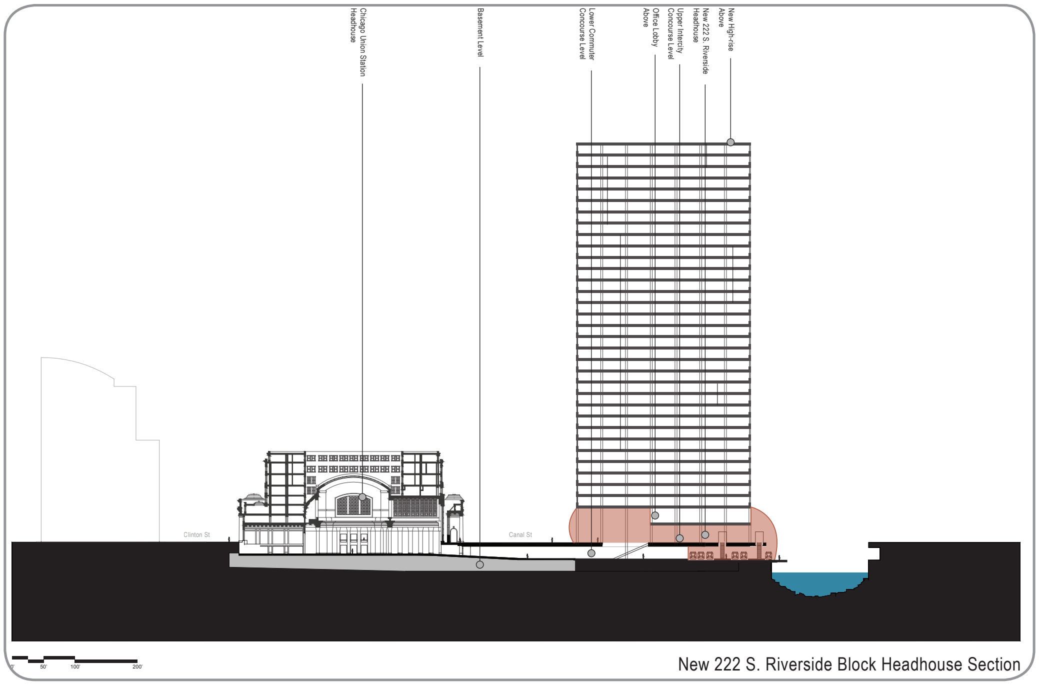
This new intercity passenger train station would be connected to the existing Union Station concourse below street level via a new wide walkway under Jackson Boulevard. The existing concourse would then be dedicated entirely to Metra passengers and could be reconfigured to optimize its utility for commuter train passenger and operations needs.

Amtrak owns the parking garage west of Canal Street, also in the 300 South block. Redevelopment of this prime parcel could also be integrated with the station facility, possibly including an above ground walkway across the street, a street-level bus transfer terminal, some Amtrak customer parking, and loading docks servicing both the new station site development as well as the parking garage site redevelopment. Such future redevelopment of the Amtrak parking garage site might also integrate air rights development over the adjacent transportation center currently being planned by the City of Chicago DOT, along with the potential for an expanded bus terminal.

New Intercity and Commuter Station in 200 S. Riverside Block

The demolition of Union Station's original Concourse Building in 1968, and its replacement by an office building that confined Chicago's most important railroad station to a column-filled basement, has been widely lamented. The Prior Ideas section of this report includes two visionary concepts for new stations proposed for the site of the old concourse building. Both would have replaced the existing 35 story 222 S. Riverside Plaza Building with an architecturally dramatic and visually iconic station structure. Both were based conceptually on linking most of the north and south side station tracks across the existing track-level concourse, thus shifting all of the passenger movements that now take place on the concourse, mezzanine, and street levels, to the street level. These ideas also called for not replacing the office space and would therefore have given up the associated economic impact from that existing asset.

This Study has assessed these prior proposals but has not found a feasible way to develop a track and platform layout plan that is operationally functional with so many and such long through tracks and platforms. Instead, this study proposes a somewhat different long term/visionary approach (see space plan layout in Appendix D) to removing the existing building and starting over on this site. This study's concept calls for largely retaining the current general track and platform configuration at Union Station, with most tracks remaining as stub-end tracks. However, it would provide the ability to have up to five through tracks, a significant increase from the one through track on a platform now available (there is another through track that does not have access to a platform), or the two through tracks that would be available in the mail platform conversion concept described under medium-term ideas. It should be noted that Metra has



A new station in the 200 S. Riverside block could retain the current general track and platform configuration while also providing additional through tracks.

indicated that commuter demand for through tracks is very limited. Stub tracks serve its needs best and two through tracks would be sufficient for future commuter needs.

In this concept, intercity operations would be moved to street level, leaving commuter services full use of the track level concourse area. The existing intercity passenger train ticketing and other support activities would be removed from track level, and the waiting room would be reconfigured to allow the track level commuter concourse to be largely open circulation space, as it was in the original concourse building. Some of the street level space could be left open, allowing daylight to reach the commuter concourse. Two small mezzanines would allow most commuters to walk to the Adams and Jackson bridges without disrupting the intercity passenger area. The new intercity train tracks converted from the mail platforms would be accessed from the new street-level intercity station via escalators as well as the re-purposed below grade walkway, as discussed in the medium term ideas section.

The new station facilities would be designed in a manner that would also allow a new office building to be constructed on air rights above the station, only this time with the needs of railroad users in mind (for example, with far fewer columns than the present building). The office building lobby would be one level above street level. Station food service, with a view of the Chicago River, might also share this level.

New building and station concept at 200 block of S. Canal / Riverside Plaza

Construct a New Fourth North Lead Track

One aspect of increasing the train handling capacity of Union station involves the ability to accommodate through train movements for regional intercity passenger trains. As discussed in the Railroad Level portion of the West Loop Transportation Center description, through tracks can have a higher train handling capacity than stub-end tracks, as through trains do not need to be turned around and a through platform's approach and departure tracks may be operated uni-directionally. However, through train movements could mean an increase in the number of trains using the north side approach tracks of Union Station. Additionally, commuter demand for through tracks is very limited, and the increased use of through tracks may require additional passenger waiting area in the station. Historically, the north side of the station has been much less busy than the south side and, as a result it has fewer lead tracks (there are currently 3 lead tracks on the north vs. more than 5 on the south). These three tracks are currently used to handle all of the Metra Milwaukee District and North Central Service trains (including movements to/from the Western Avenue train maintenance/storage facility for these trains as well as Heritage Corridor trains) and Amtrak's service to/from Milwaukee (seven daily Hiawatha service round trips and the daily Empire Builder train to/from Seattle/Portland). Future through trains could go to any of these destinations, or possibly to a future intercity passenger train station/terminal at or near O'Hare International Airport. A passenger train station at O'Hare would serve passengers connecting to air service for longer distance (including international) trips, as well as serving the 2+ million residents and the many businesses based in Chicago's Northwest suburbs.

Potential long term changes to Union Station could significantly improve capacity, enhance the passenger experience, and enrich the vitality of the Chicago region.

This study analyzed the potential for adding future track capacity to the northern approach to Union Station. There were originally four north lead tracks when Union Station was built. This number of tracks was needed for the Pennsylvania Railroad and Milwaukee Road to serve the many freight customers then located alongside the route (a flour mill on Carroll Avenue, east of Ogden, is the last one remaining and the fourth track now ends at Morgan St. – 1000W). Space for restoration of a fourth track is available west of Clinton Street. However, former railroad right-of-way has been sold off in the segment between Clinton and Lake Street and the existing right-of-way width through this curve is very restrictive. Nevertheless, it should still be geometrically possible to re-establish four approach tracks through this curve on an alignment that has been developed as part of this study. This new approach track alignment would require some right-of-way acquisition, and it would also conflict with a pier of the bridge that carries the Ogilvie Transportation Center north lead tracks. This bridge is over 100 years old and at such time as it may be replaced, the new span should be designed to accommodate a future four-track section below.

Subway Alternatives

Two alternatives have been developed based on constructing subterranean alignments, one with platforms under Clinton Street, the other with platforms under Canal Street. These would involve tunnels that completely bypass Union Station's existing tracks/platforms, connecting with Union Station's existing lead tracks on the south at Taylor Street and to the north and west at Racine and, thus, could be built completely independently of the other ideas described earlier in this section. Either of these alternatives would be substantially more expensive to build than the previously-described Ideas. Thus, it is anticipated that the surface level projects would be constructed first. The subway alternatives would become most important in the long term, after the limits of the capacity added by the surface track/platform projects is no longer adequate. The subway alternatives have two primary features that distinguish them from the surface alternatives:

* Because the new tracks and platforms would be located west of the concourse (or west of the Great Hall, through which a direct pedestrian connection is assumed, in the case of the Clinton subway) it would be able to more fully take advantage of the historic headhouse building's great spaces for transportation-related functions.
* The north end of the tunnel's railroad platforms would extend as far north as Ogilvie Station, making it convenient to develop direct connections to both Union Station at the south end of the new underground platforms as well as Ogilvie Station, Chicago's second-busiest commuter terminal, at the north.

Most of the right-of-way identified as being required for the subway concepts is already in public ownership (i.e. City, IDOT, Amtrak, or Metra).

Clinton Subway

The concept for a multilevel subway under Clinton Street was first introduced by CDOT as part of the original West Loop Transportation Center proposal in 2001. The vision for this project is described in the Prior Ideas section. In 2001 Amtrak was still in the mail and express business, so the mail platform area was thought to be unavailable for future conversion for passenger use. It appeared that the only way to add significant track and platform capacity to Union Station would be by constructing a subway routing for tracks and platforms that would bypass the existing station tracks. It was further envisioned that the new subway tunnel under Clinton Street could be built with multiple levels, and thereby also be able to accommodate other transit services, such as a new CTA rail rapid transit route (although such connections were assumed to be ultimately developed as part of separate projects.)

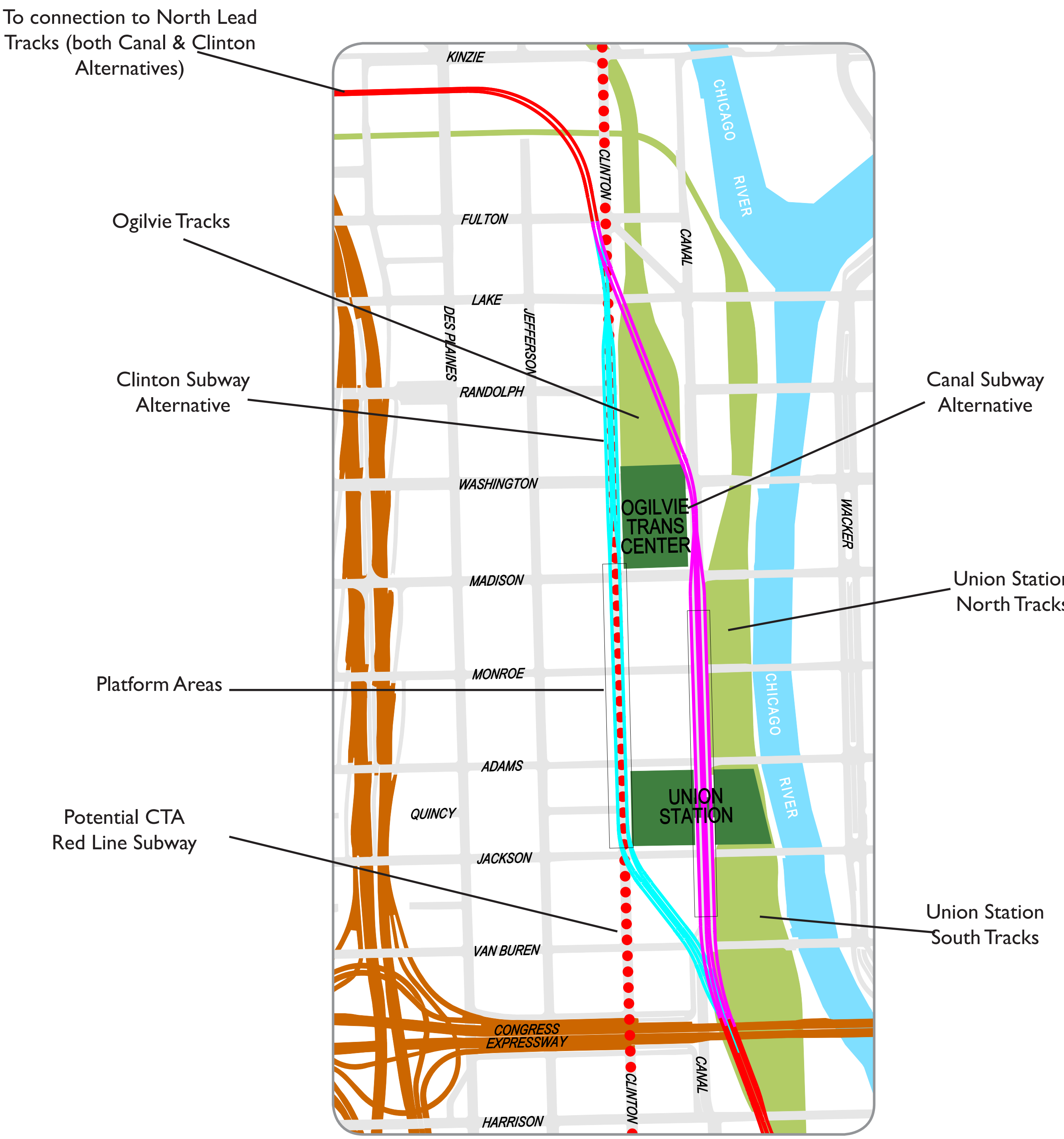
In the course of the current Study, the Clinton Street subway idea has been further refined. These modifications include:

* Removing the bus subway level, since current CDOT and CTA plans call for keeping bus operations on the surface to the greatest extent possible
* Adding a second railroad level, to increase capacity (providing a total of four platform edges served by four through tracks)
* Moving the rapid transit level to the bottom of the multi-level subway, eliminating a geometric conflict between the railroad and the existing CTA Blue Line tunnel under the River at Congress.

Trains on the upper level would encounter ruling grades of 2.5%; trains on the lower railroad level would face grades of close to 4% (see profile). About 1.3 miles of the route would be in tunnel. Because of the grades and the tunnel operation, electrified operation is likely to be essential to the future viability of this plan. The near 4% grades in particular would probably require use of electric multiple unit equipment as is used in many international high speed rail trains.

Canal Subway

Another alternative developed as part of this study is a concept for a subway tunnel carrying through tracks bypassing Union Station, with passenger platforms under Canal Street. It would be similar in function


To connection to North Lead Tracks (both Canal & Clinton Alternatives)
Ogilvie Tracks
Clinton Subway Alternative
Platform Areas
Potential CTA Red Line Subway
Canal Subway Alternative
Union Station North Tracks
Union Station South Tracks
KINZIE
FULTON
LAKE
RANDOLPH
WASHINGTON
MADISON
MONROE
ADAMS
QUINCY
JACKSON
VAN BUREN
CONGRESS EXPRESSWAY
HARRISON
DES PLAINES
JEFFERSON
CLINTON
CANAL
WACKER
CHICAGO RIVER
OGILVIE TRANS CENTER
UNION STATION

and operations to the Clinton Subway; the alignment would actually be the same north of Fulton Street, crossing over between Canal and Clinton Streets under the Ogilvie Transportation Center platforms. An advantage of using Canal Street for such a subway connection is that the street width is 100 feet, rather than 80 feet in the case of Canal. This is wide enough that it would be possible to construct four tracks and two island platforms on a single level, providing the same railroad capacity as the Clinton subway with a simpler design and less restrictive grades for all tracks (the ruling grade would be 2.5%; see profile). It is assumed that a CTA rapid transit route could still be built under Clinton Street, as proposed in the Clinton subway idea, but the projects would in this case be completely independent of each other.

Cost

The following table summarizes the costs associated with the improvements discussed.

Summary List of Improvement Ideas with Estimated Construction Cost Range

(in 2011 dollars)

	Less than $50M	$50 to 100M	$100 to 200M	$200 to 500M	$500M to 1B	$1 to 2B
Medium Term Ideas						
Reconfigure Existing Concourse to improve capacity and flow	X					
Widen Platforms 6/8 & 10/12 and add direct vertical access to street level		X				
Begin repurposing old mail platform for passenger use *Phase 1: Create connecting pedway, new waiting area, and two through tracks*			X			
Estimated Total Cost of Medium Term Ideas			X			
Long Term/Visionary Ideas						
Create a New Station Building Facility						
New Intercity Station in 300 Block* *Includes widening and adding direct vertical access to the platforms between tracks 14 and 28, and creating a modern high capacity station at street level above the existing south approach tracks with commercial joint development above (requires repurposing the street level of the existing commercial building on this block).*				X		
Complete repurposing old mail platform for passenger use *Phase 2: Create two additional through tracks (four in total)*		X				
Add a fourth lead track on the north side of the station	X					
Estimated Total Cost of New Station Building Facility - 300 Block				**X**		
or						
New Intercity and Commuter Station in 200 Block* *Includes removal and replacement of existing structures on this block and creation of a modern high capacity station with commercial joint development above.*					X	
Complete repurposing old mail platform for passenger use *Phase 2: Create two additional through tracks (four in total)*		X				
Add a fourth lead track on the north side of the station	X					
Estimated Total Cost of New Station Building Facility - 200 Block					**X**	
Add Track and Platform Capacity in a New Underground Alignment						
Clinton Subway						**X**
or						
Canal Subway						**X**

* Assumes that widening of Platforms 6/8 & 10/12 and Phase 1 of the Mail Platform conversion are already complete

5 - Public Involvement

A public meeting was held as part of the Union Station Master Plan study on Thursday, December 15, 2011 at Union Station's Union Gallery Room between 4:00-7:00 PM. The meeting utilized an open house format so that attendees could browse through numerous exhibits and discuss issues individually with staff from stakeholder agencies and the consultant team. A narrated presentation was made at 4:30 PM and 6:00 PM. Approximately 200 people attended throughout the event and 67 of those attendees completed questionnaires on site. The comments of 30 people were also submitted by the Midwest High Speed Rail Association at the meeting. Finally, 30 comments were submitted online at the project website UnionStationMP.org as of January 26, 2012. Feedback on the project from these 103 individuals is summarized below.

Goals and Issues

The public meeting and the website highlighted the project goals and key issues for the public, listed below.

Goals

* Provide sufficient capacity for significant increases in Metra and intercity ridership
    * Estimated 40% increase in trains by 2040
    * Possible significant further increases
* Make the terminal more inviting for passengers
* Provide more direct and convenient transfers to buses, CTA trains, taxis, shuttles, pick-up/drop-off
* Create a terminal that is vibrant, a civic asset, and a catalyst for growth in the West Loop and region

Issues and ideas for improvements were divided into those related to:

* Street access
* Station congestion
* Tracks/Platforms

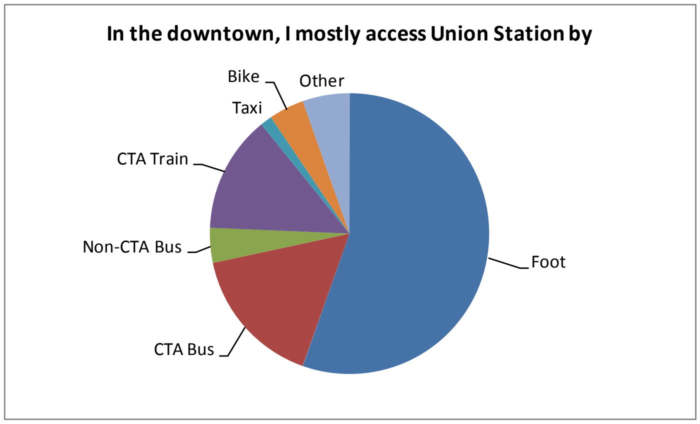
In addition to these goals and issues, meeting attendees and website respondents were encouraged to comment on any Union Station topic that they felt was important.

Public Meeting Attendees

Of the 67 people who provided information on questionnaires at the public meeting, 46 (69%) indicated that their primary interest in the study was because they were a "Metra rider". The second most common response, "Amtrak rider", was made by 24 people, or 36% (note that individuals could choose more than one interest). "Employer/employee working near Union Station" was another common response, made by 19 people (28%).

When asked how they usually access Union Station, the majority of respondents said that they walked. The second and third most common responses were "CTA Bus" followed by "CTA Train", as shown in the figure below.

Union Station Master Plan public meeting



Comment Overview

In order to get an overview of what topics were of most interest to the public, comments were transformed into a word cloud. A word cloud is a visual representation that gives greater prominence to words that appear more frequently in a given set of text. A word cloud generated from written comments submitted at the public meeting or online is shown below. The word cloud provides an introduction rather than a detailed perspective on comments.

One can see that "trains" and "platforms" were some of the most popular words used in written public comments. Perhaps the most interesting result of the word cloud is the prevalence of "platforms", which indicates that regardless of what people think about the platforms, the fact is that they commented about platforms more than many other topics. This is consistent with one of the key study issues – platforms that are insufficient for existing and future demand.

Word cloud of public comments (wordle.net)

Other popular words (beyond "Chicago", "Amtrak", and "Metra") mentioned in comments included "access" and "HSR (High Speed Rail)". "Access" highlights another key issue of the project. This could include "access" between the street and the station, station and platforms, or station and other modes of transportation. "High speed rail" is not directly listed in a project goal or issue, but it was on the minds of the public as shown in their comments.

For a transportation mode comparison, the word "trains" was mentioned six times more than "car" and eight times more than "bus". This could imply that transfers to cars and buses were not as important to the public as issues relating directly to trains at Union Station.

More detailed evaluation of comments is included in subsequent sections.

A questionnaire asked for public input regarding Union Station, including questions about entering and exiting the station, navigating the station interior and exterior, transferring to other transportation modes, directional signs, and amenities.

Questionnaire

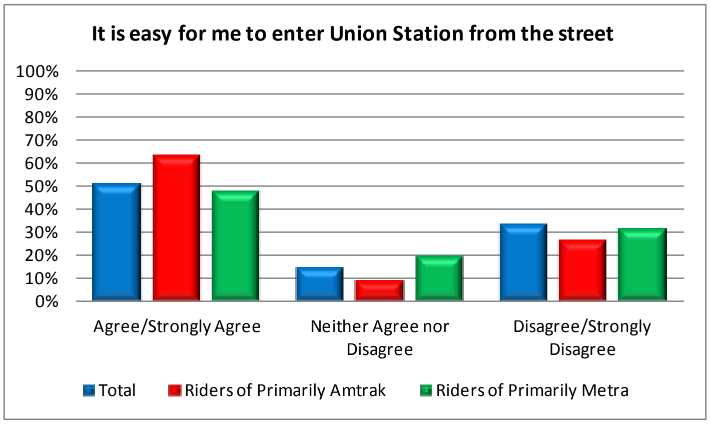
At the public meeting, the questionnaire asked respondents if they agreed or disagreed with several statements about existing conditions at Union Station. The statements were phrased in a positive manner (e.g. "it is easy for me") so if respondents agreed, then they were affirming that the existing Union Station is adequate. Responses below are divided into sections based on positive opinion, negative opinion, split opinion, and statements in which a majority of respondents did not have an opinion.

Responses were further evaluated for differences between riders who primarily ride Metra and riders who primarily ride Amtrak. Only responses that revealed interesting differences among types of riders are shown with a breakdown of responses in graphical form. For responses in which preferences did not vary between types of riders, only the responses for all respondents as a single group are displayed.

The questionnaire is included iat the end of this section.

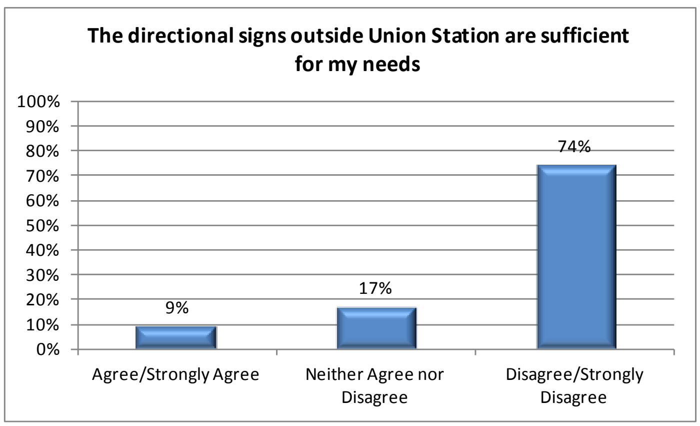
Positive Opinion

The question that received the most positive feedback, and the only statement in which over 50% of all respondents agreed or strongly agreed, concerned entrances as shown in the graph below. While 51% of all respondents answered that it is easy to enter the station, those who primarily ride Amtrak had a more favorable view of entering than those who primarily ride Metra.



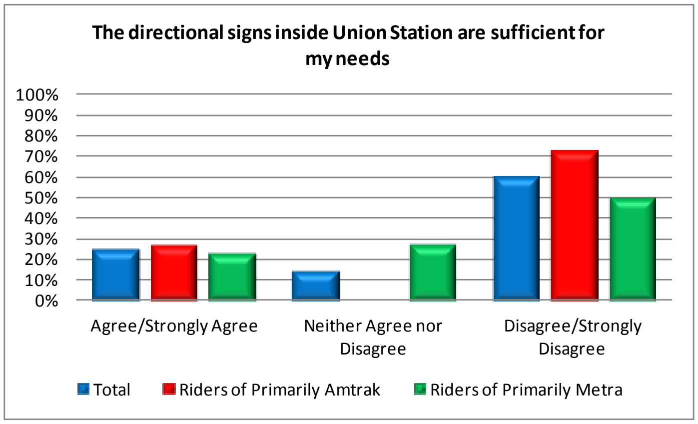
Negative Opinion

The statement that received the most negative feedback concerned directional signs outside of the station, as shown in the graph below. Three-quarters of respondents felt that directional signs outside of the station were lacking. Riders of Amtrak and Metra had similar negative opinions about this issue.

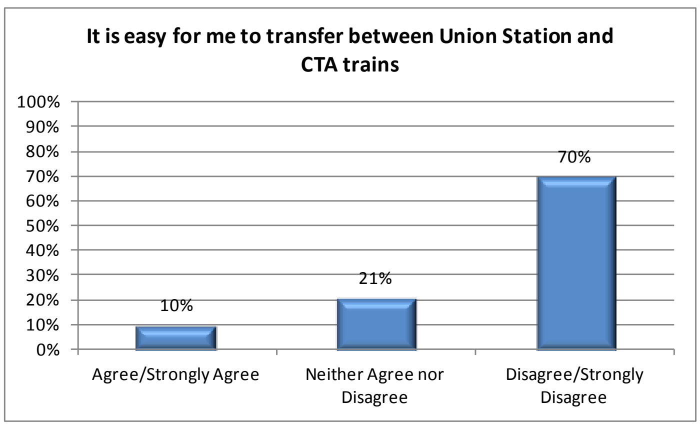


Perhaps the seemingly contradictory responses to the two questions above can potentially be reconciled by stating that if a person already knows where they are going, entering Union Station from the street is easy. If a person does not know and is looking for guidance from signs, then finding a way into the station is difficult.

Similarly, the graph below shows that respondents also think that signs inside the station are not sufficient. Respondents who primarily ride Amtrak had the most negative opinion of signs inside the station.



Another strong negative response was given regarding transferring to CTA trains, in which 70% of people thought it was difficult to do from Union Station (shown in the graph below). Given that a 5 minute to 8 minute walk across several city blocks is required to transfer, and the public believes that directional signs are insufficient, it is not surprising that people said that it is not easy to transfer to CTA trains. Improving transfers between modes is a goal of the project that the public clearly thinks is an important concern.



A smaller majority of questionnaire respondents, between 50%-59%, disagreed or strongly disagreed with the statements below:

- Traveler information services in Union Station are sufficient for my needs
    - *59% disagreed/strongly disagreed*
    - *Amtrak riders had a more unfavorable opinion than Metra riders*
- It is easy for me to move around within Union Station
    - *58% disagreed/strongly disagreed*
    - *Metra riders had a more unfavorable opinion than Amtrak riders*
- The dining options in Union Station are sufficient for my needs

   * *58% disagreed/strongly disagreed*
   * *Amtrak riders had a much more unfavorable opinion than Metra riders*
* The retail services in Union Station are sufficient for my needs
   * *57% disagreed/strongly disagreed*
* The waiting room within Union Station is sufficient for my needs
   * *57% disagreed/strongly disagreed*
   * *Amtrak riders had a more unfavorable opinion than Metra riders*
* Traffic congestion on streets near Union Station is not a problem for me
   * *55% disagreed/strongly disagreed*

All of the above statements relate to the project goal to make Union Station "more inviting to passengers". Simply put, across a variety of customer experiences, the public believes that Union Station is currently inadequate.

> Across a variety of customer experiences, the public believes that Union Station is currently inadequate.

Split Opinion

On some topics, respondents did not provide a clear consensus regarding their collective opinion. In these cases, responses were split without a clear majority between "agree"/"strongly agree", "neither agree nor disagree", and "disagree"/"strongly disagree". These questionnaire statements include:

* It is easy for me to exit Union Station to the street
* It is easy for me to get to the train platforms before boarding the train
* It is easy for me to transfer between Union Station and taxis

One statement, *"It is easy for me to leave the train platforms after getting off the train"*, also yielded a split result for the respondents as a whole. However, almost 70% of Metra riders disagreed or strongly disagreed with that statement, almost twice the percentage of Amtrak riders. This could potentially be explained by the overcrowding that occurs more frequently when Metra trains arrive than when Amtrak trains do.

Majority Neutral

More people chose "neither agree nor disagree" than other options for the following statements in the questionnaire, potentially implying that many respondents had no knowledge about the experience.

* It is easy for me to transfer between Union Station and CTA buses
* It is easy for me to transfer between Union Station and non-CTA buses

In order to discover more information about public opinion on these topics, a survey specifically directed at bus riders who transfer at Union Station may be needed.

Written Comments

The questionnaire asked respondents to state the one thing they would change about Union Station. The common themes across several written comments related to the following:

* Increase the capacity of train platforms because they feel overcrowded
    * Sample comment: "Increase platform foot traffic volume"
* Provide direct access and improve transfers between Union Station and CTA trains and buses
    * Sample comment: "Seamless connection to trains and buses"
* Improve wayfinding and directional signs to reduce confusion
    * Sample comment: "Vastly improved signage - every day I assist confused/lost passengers to the Amtrak or Metra gates"
* Enhance the overall customer experience: better dining options, improved waiting areas, a more welcoming atmosphere, and elimination of the feeling that people are walking through a "basement"
    * Sample comment: "More passenger friendly - better waiting areas & wayfinding"
* Better use of the Great Hall, which many respondents thought was an architectural gem that is currently underutilized
    * Sample comment: "It's very frustrating to go from the wonderful volume of the Great Hall down into the maze of the concourse"

When the questionnaire asked what dining or retail options people wanted in Union Station, the most respondents (12) wrote that they wanted an establishment in the style of a nice full-service sit-down restaurant. This was followed by requests for a pharmacy or grocery.

> Public comments commonly focused on the desire for a modern, grand, and efficient Union Station that is a suitable welcome for commuters and visitors to downtown Chicago.

Comments also included those in favor of through-routing commuter rail service and improved bicycle amenities at Union Station. Among website comments, one of the most prevalent opinions related to the desire for high-speed rail at Union Station. High-speed rail was particularly of interest in comments made by people who live outside of the Chicago region.

Only two people mentioned diesel exhaust as an issue of concern. This is surprising due to the relatively recent media attention that has focused on this issue.

Across all comments, people commonly focused on the desire for a modern, grand, and efficient facility that is a suitable welcome for commuters and visitors to downtown Chicago. For a variety of reasons described above, the public feels that Union Station needs various improvements to achieve these objectives.

Midwest High Speed Rail Association Letters

In addition, for several years the Midwest High Speed Rail Association has maintained a website downtownairport.com dedicated to promoting improvements to Chicago Union Station. It has always provided the opportunity to send a supporting email to Chicago's mayor. A copy of the email template that has been posted since December is shown in the appendix to this report. It calls on Mayor Emanuel "to think big as the master plan is developed, combining short-term fixes while seeking the funding to dramatically expand the station". Since December, 753 people have submitted the letter. Of these supporters, 269 live in Chicago, 188 are from Illinois residents from outside Chicago, and 159 are from other Midwest states. The rest are mostly travelers from other cities passing through Chicago whose impression of the City is formed by their experience at Union Station. The Association has recently submitted about 150 of these letters that have been personalized by the supporters, adding their own experiences and specific concerns beyond those mentioned in the template. The ones found to be mentioned most often included the overcrowded, hot Amtrak waiting room (21), Chicago's need for a world class station (11), the confusing layout of the station (5), the need for better 'L' connections (5), the importance of preserving the Great Hall (3), making the Great Hall more active (3), and the crowded platforms (3).

Common themes across several public comments:

* Increase the capacity of train platforms because they feel overcrowded
* Provide direct access and improve transfers between Union Station and CTA trains and buses
* Improve wayfinding and directional signs to reduce confusion
* Enhance the overall customer experience: better dining options, improved waiting areas, a more welcoming atmosphere, and elimination of the feeling that people are walking through a "basement"
* Better use of the Great Hall, which many respondents thought was an architectural gem that is currently underutilized

Survey of Public Meeting Participants - Chicago Union Station Master Plan Study – December 15, 2011

Public input is an important component of this study. Thank you for sharing your input below. This information will be used to further assess opportunities in preparation for performing more detailed analysis in the future.

I am interested in this study because:	Primary Interest	Secondary Interest
I am a Metra rider during peak periods (rush hours)	______	______
I am a Metra rider during off peak periods (mid-days, evenings, weekends)	______	______
I am an Amtrak rider	______	______
I am an employer/employee working near Union Station	______	______
I am a building owner/representative for a building that is near Union Station	______	______
I am a representative of a public sector agency	______	______
I am a representative of a transit advocacy group	______	______
I live nearby	______	______
Other (please specify): ____	______	______

In the downtown, I mostly access Union Station by (check one): ☐ Foot ☐ CTA bus ☐ non-CTA bus ☐ CTA train ☐ Taxi ☐ Other____

Please circle the number below that best represents how strongly you agree or disagree with each of the following statements:	**Strongly Agree**	**Agree**	**Neither Agree nor Disagree**	**Disagree**	**Strongly Disagree**
It is easy for me to enter Union Station from the street.	1	2	3	4	5
It is easy for me to exit Union Station to the street.	1	2	3	4	5
It is easy for me to move around within Union Station.	1	2	3	4	5
It is easy for me to get to the train platforms before boarding the train.	1	2	3	4	5
It is easy for me to leave the train platforms after getting off the train.	1	2	3	4	5
Traffic congestion on streets near Union Station is not a problem for me.	1	2	3	4	5
It is easy for me to transfer between Union Station and CTA buses.	1	2	3	4	5
It is easy for me to transfer between Union Station and non-CTA buses.	1	2	3	4	5
It is easy for me to transfer between Union Station and CTA trains.	1	2	3	4	5
It is easy for me to transfer between Union Station and taxis.	1	2	3	4	5
The directional signs **inside** Union Station are sufficient for my needs.	1	2	3	4	5
The directional signs **outside** Union Station are sufficient for my needs.	1	2	3	4	5
The waiting room within Union Station is sufficient for my needs.	1	2	3	4	5
Traveler information services in Union Station are sufficient for my needs.	1	2	3	4	5
The dining options in Union Station are sufficient for my needs.*	1	2	3	4	5
The retail services in Union Station are sufficient for my needs.**	1	2	3	4	5

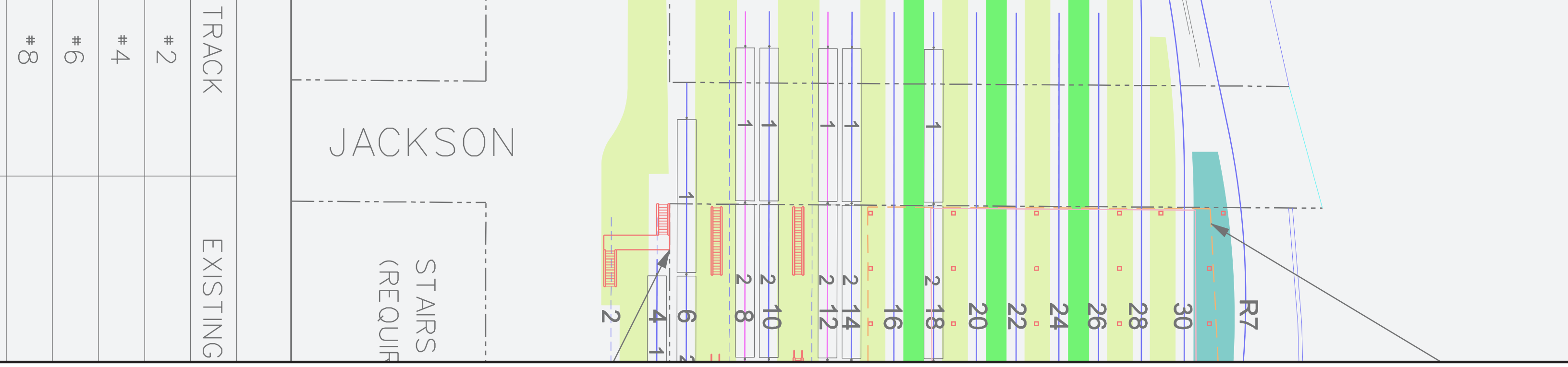
*I would most like to see this dining option added to Union Station (type of food or name of restaurant): ________________________________

** I would most like to see this retail service added to Union Station (e.g. grocery, pharmacy, clothing, etc.): ____________________________

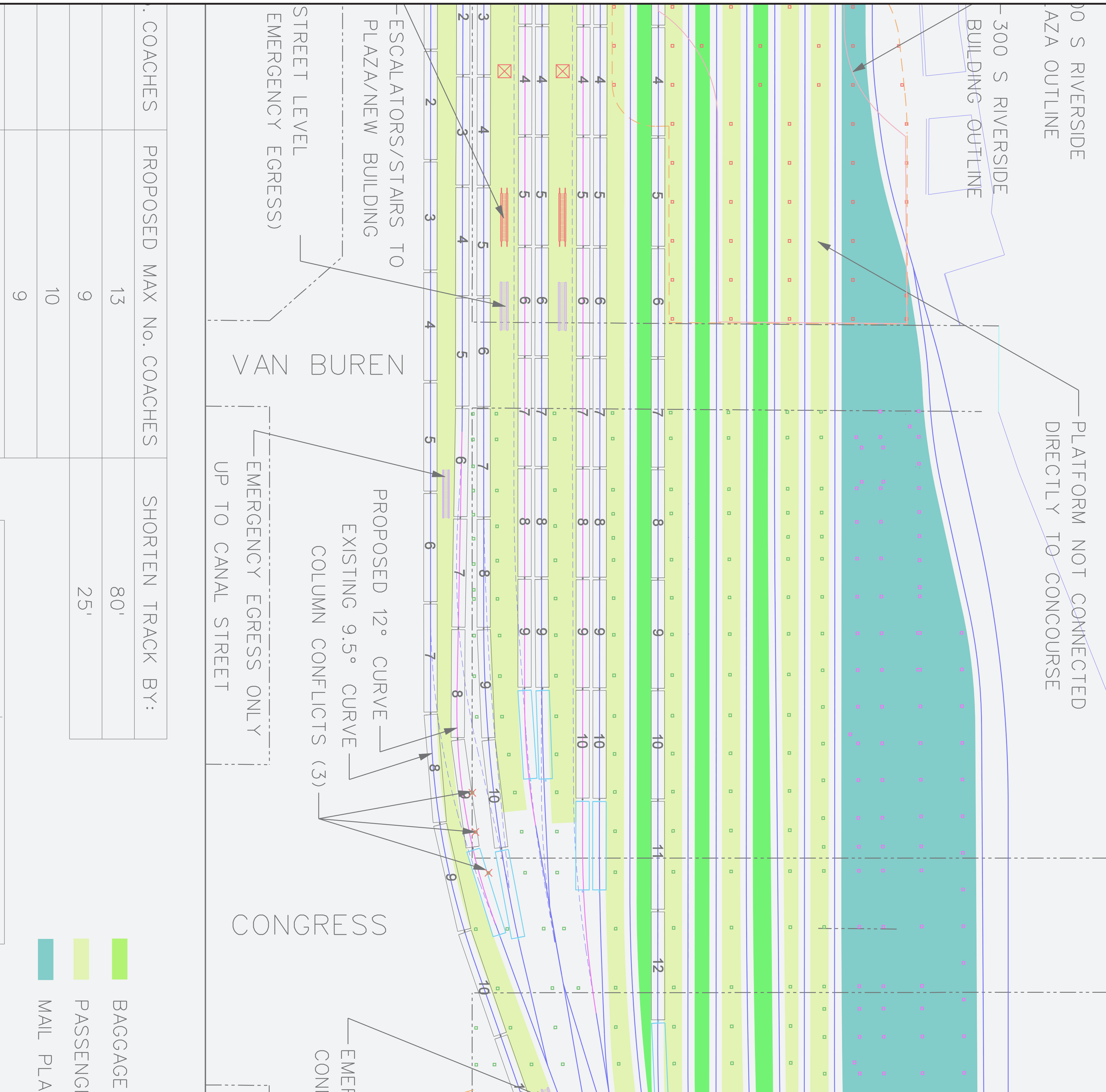
If I could change one thing about Union Station, it would be: ____

(Please write any additional comments or clarifications on the reverse side of this sheet.)

Questionnaire for public input



6 - Next Steps



This master planning study has advanced and developed numerous ideas that are intended to address major functional and operational issues affecting Chicago Union Station in the short, medium, and long term. The next steps for these ideas vary, but all involve proceeding with further planning, design, and/or construction to achieve the benefits identified in the preceding chapters. The overarching objective is to move each of these projects from ideas into construction and operation.

The Short Term ideas described in this report are already well advanced in planning and design, and in the case of CDOT's off street bus terminal and improved bus lane projects grant funds have been obtained for their construction. Several near term Amtrak customer facility improvement projects have also had their design work largely completed, but construction is not yet funded. Obtaining funding to complete these initiatives, as well as addressing Amtrak's outstanding "state of good repair" needs throughout Union Station should be a priority next step.

> "Medium Term" ideas in this study are focused on resolving serious operational shortcomings that have a direct impact on the ability of Union Station to serve a growing number of passengers.

The Medium Term projects that have been identified are all focused on resolving serious operational shortcomings (including train operations, congestion in the concourse, and street level access needs) that have a direct impact on the ability of Union Station to serve a growing number of passengers. These projects will require further planning analysis and design work before they are ready to be funded for construction. The following next steps are proposed for these ideas:

* Test each of the proposed ideas using simulation models to evaluate their ability to increase passenger and/or train capacity consistent with the projected increases in travel demand. This will be the focus of the next stage of the CDOT-led Union Station Master Plan Study.
* Once these ideas are refined further using the simulation models, the stakeholder agencies will need to identify which organization(s) will serve as the lead sponsor for each of the individual projects. These organizations in turn will:
  * Perform additional feasibility studies, as needed – especially to better understand any structural implications of the proposed improvements on the buildings above
  * Lead the preliminary engineering and final design efforts for individual projects, including obtaining any required environmental clearances
  * Secure funding for both design and construction, and oversee construction
  * Continue public outreach for individual projects.

The next stage of the Union Station Master Plan Study, involving simulation of train and station operations, will more precisely quantify the capacity increase that may be expected from each of the Medium Term ideas. Once the scale of these potential capacity improvements is known, the Union Station stakeholders will be able to compare the projected future growth in travel demand through the station with the cumulative potential capacity increase from these projects and effectively determine how many years worth of growth the Medium Term improvements will provide. In essence, the upcoming modeling analysis will define just how long the "medium term" is likely to be, and how soon the stakeholders will need to begin more serious consideration of the "long term/visionary" ideas for increasing capacity and improving the station's functionality.

Trains departing Union Station

The Medium Term ideas have thus far been conceived such that each of them would complement and not preclude or make more difficult the implementation of any of the more complex and expensive Long Term/Visionary ideas. However, the Long Term/Visionary ideas include two mutually exclusive alternatives for adding track and platform capacity via new underground alignments, as well as two other mutually exclusive alternatives for creating new station building facilities in either the 200 or 300 block of South Canal Street. Further analysis and public/stakeholder consultation will be needed to assess and determine the relative merits of each of these long term/visionary proposals and to decide which alternatives should advance towards implementation.

"Medium Term" ideas can improve Union Station without precluding future implementation of "Long Term / Visionary" ideas.

In addition to increasing capacity at Union Station, a primary function of the alternatives among the Long Term/Visionary proposals is placemaking. Either of the new/expanded station alternatives are intended to increase Union Station's visibility and provide a stronger sense of arrival than the current basement-level station which is difficult to navigate. In either of these new station alternatives, space would be available to create passenger facilities and customer amenities with appropriately grand views of the Chicago River and the surrounding downtown Chicago environment. Furthermore, the redevelopment of the station can serve as a catalyst for much needed adjacent development as well. In addition, the project will require the use of some innovative financing tools which are not well utilized in Chicago. The Union Station Master Plan Study team has worked closely with a Civic Advisory Committee established by the Metropolitan Planning Council to advance the placemaking goal and an innovative financing strategy.

The Civic Advisory Committee believes the station's redesign should favor the creation of vibrant public spaces that have the potential to transform an imposing historic structure into one that invites interaction with its users and the surrounding city. In other words, the station should evolve into both an efficient intercity and regional railroad hub, with easy connections to other transit modes, and a truly great place that attracts transit users and non transit users alike. Union Station should be transformed into an iconic destination that takes advantage of its riverfront location with places for people to gather, as well as internal spaces that draw people for dining and shopping as well as boarding trains. As major employers deliberately relocate to the area to be part of a dynamic urban fabric and be proximate to transportation, the station can act as an economic engine that has a positive impact not only on nearby blocks in the West Loop area, but on the City and the Chicago area as a whole.

New or expanded station facilities would be a large scale project, likely costing in the hundreds of millions of dollars that will increase the value of surrounding property. It therefore behooves the Union Station stakeholders and the civic community to seriously explore innovative approaches to project financing that will most effectively leverage the value that these improvements will add to nearby real estate. The analysis of Real Estate Issues and Opportunities (presented in Appendix E) and the report on Chicago Union Station Concepts in Context (presented in Appendix H) conducted as part of this Study, provide information regarding other major rail station projects around the U.S., and the world, including some discussion as to the methods used to finance these projects. Prospective new Chicago Union Station facilities could, for instance, be designed in a manner to allow an office tower to be constructed on air rights above the station and/or on adjacent Amtrak- and City-owned parcels, creating an iconic mixed-use development that is sensitive both to the needs of rail passengers as well as commercial real estate development opportunities.

The Metropolitan Planning Council, and its Union Station Civic Advisory Committee, is proactively assessing such Union Station-related development opportunities, with particular focus on methods of financing.

In addition to being a transportation hub, Washington D.C.'s Union Station features multi-level retail and dining opportunities (Marcin Wichary)

Tools such as value capture financing have been used successfully throughout the country to finance new or existing transportation infrastructure. It is good policy precisely because it connects the benefit (and benefactors) of the investment with its cost. Financing options under exploration include various forms of Public Private Partnerships (PPP), Tax Increment Financing (TIF), Special Assessment (SSA and SA), air rights, and federal infrastructure loan programs such as those available through the Transportation Infrastructure Finance and Innovation Act (TIFIA) program. Union Station's redevelopment could be part of a larger transportation district that would leverage opportunities on multiple transit-related sites to provide financial support for transportation improvements and other enhancements. At this stage of study, it appears that developing the air rights above the transportation improvements on the 300 south block and the Amtrak parking garage block should be a high priority. These two blocks represent attractive sites for future high-density office development. If structured appropriately, a portion of the proceeds from future private-sector development on these sites could help fund transportation improvements and advance the City's economic development objectives as described in the Central Area ACTION Plan.

"Long Term / Visionary" ideas will create an iconic railroad station that integrates placemaking principles and drives economic development.

Credits

City of Chicago, The Honorable Rahm Emanuel, Mayor

Chicago Department of Transportation

Gabe Klein, *Commissioner*

Luann Hamilton, *Deputy Commissioner*

Jeffrey Sriver, *Project Manager*

Richard Hazlett, *Past Project Manager (retired)*

Technical Advisory Committee

Jeffrey Sriver, *Chicago Dept of Transportation, Chair*

Richard Hazlett, *Chicago Dept of Transportation, Past Chair*

Akheel Ahmed, *Chicago Transit Authority*

Sid Birckett, *Amtrak*

Claire Bozic, *Chicago Metropolitan Agency for Planning*

Lynnette Ciavarella, *Metra*

Richard Cogswell, *Federal Railroad Administration*

Jon Czerwinski, *Chicago Transit Authority*

Wynne Davis, *Federal Railroad Administration*

Peter Fahrenwald, *Regional Transportation Authority*

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EJM Engineering, Inc.

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Goodman Williams Group

www.UnionStationMP.org

Appendix A

Historical Items

Article from *Railway Age,* July 4, 1925, regarding Union Station
1950s Union Station promotional brochure (collection of Dennis Popish)

The Station [illegible] from the River

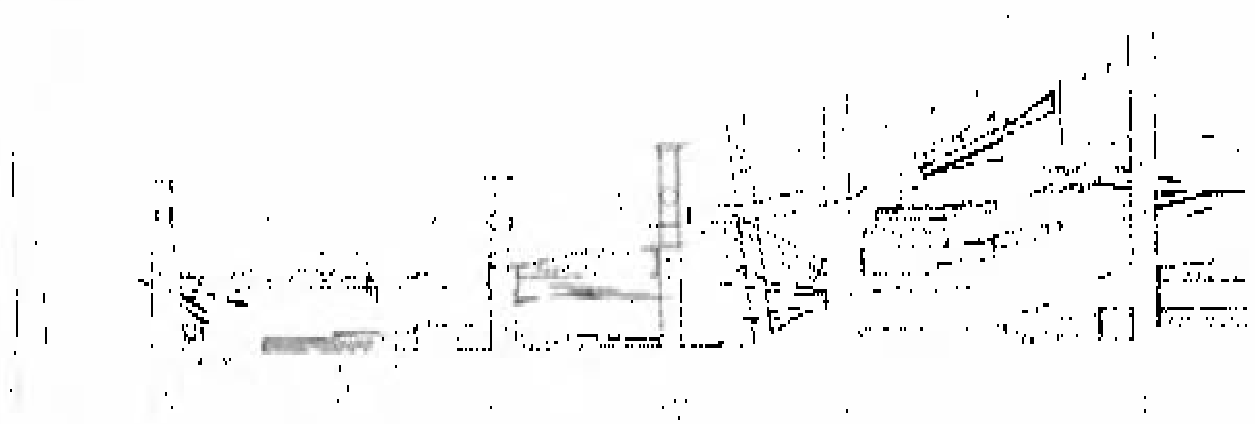
Noteworthy Passenger Terminal Completed at Chicago

Union station provided for Pennsylvania, Burlington, St. Paul and Alton roads

By Walter S. Lacher

THE opening of the Chicago Union Station on May 16 marked the successful completion of a $75,000,000 project which had its inception nearly 15 years ago. It represents the replacement of a passenger terminal, which had long served inadequately to meet the demands imposed on it, by a new plant of greatly increased capacity embodying the latest developments in the multiplication of facilities which can be provided to meet the heavy requirements of a rail gateway in a large city.

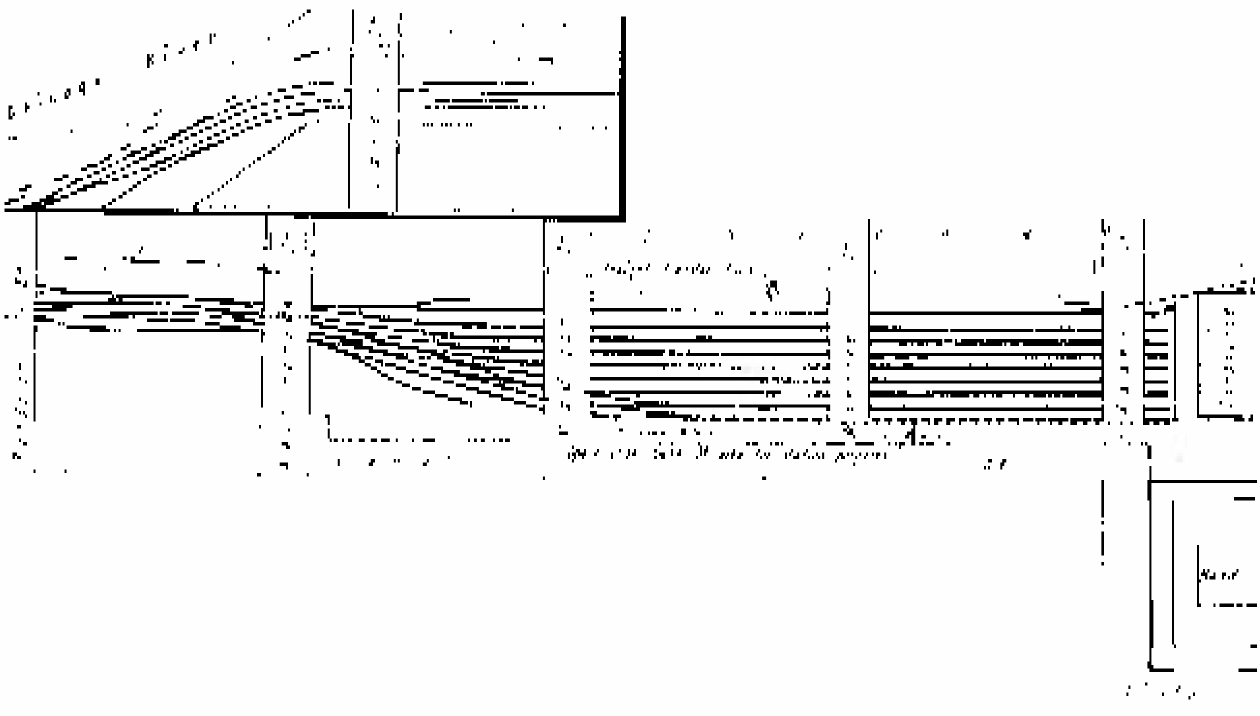
The importance of this station is definitely established by the fact that it serves as a terminal for four railroads in one of the world's largest cities. In point of number of stations [illegible] in the United States. From the standpoint of design it embodies much that is both novel and forward looking. It is the only double stub station in America, having two opposite yards of stub



Map of the Old Station, Showing How It Was Hemmed in by the Freight Facilities of the Pennsylvania, Burlington and Alton four tracks. It is the only station of first magnitude in which baggage and passengers are handled entirely on separate platforms, an arrangement which made it possible to introduce an ingenious ramp arrangement whereby trucking between platforms and the baggage room on a lower level is accomplished without the use of elevators. It embodies the most complete station facilities for handling mail found in any railway terminal on the continent. It is one of an extremely limited number of great passenger stations in which the platforms, concourse and waiting room are on a common level. It is provided with an entirely new form of train shed. It includes a system of interior driveways and vehicle platforms that practically eliminate the use of street curb space by street vehicles in the loading and unloading of passengers, mail and baggage. It includes a combined office and station building, which provides for what will be ultimately one of the most intensive developments of railway lands ever undertaken. But even more noteworthy than any of

station building located on Canal street between Adams and Monroe streets opposite the transverse axis of the station track layout which consisted primarily of through tracks connecting at either end with two approaches, one from the north and the other from the south. The Fort Wayne line of the Pennsylvania, and the Alton and the Burlington lines entered from the south over a four track line located on property formerly owned jointly by the Fort Wayne and the Alton, between Van Buren and Twenty-first street. The Burlington operated over this line as a tenant to a junction with its own line at Sixteenth street. The Panhandle line of the Pennsylvania and the St. Paul entered from the north on a two track line owned jointly by the Fort Wayne, the St. Paul and the Chicago & North Western, as far as a point on Canal street near Carroll avenue.

The tracks throughout this entire station area, except for a short distance at its northerly end, were depressed, all east and west streets being carried over them on via-



Map of the North End of the New Terminal. A Portion of the North Approach Is Shown in the Upper Left Corner

these distinctive features is the impression created by a study of the station as a whole and the problems which were imposed in the development of an effective terminal in the face of unusually severe obstacles.

The new station is owned by the Chicago Union Station Company, incorporated in 1913, the stock of which is held in four equal blocks by the Chicago, Burlington & Quincy, the Chicago, Milwaukee & St. Paul; and two corporate units of the Pennsylvania system. It serves as the Chicago passenger station for these three systems and a single tenant railway, the Chicago & Alton. It supersedes a station built in 1880 which was owned by the Pittsburgh, Ft. Wayne & Chicago (the Pennsylvania) and used by the other railroads as tenants.

Old Station Outgrown

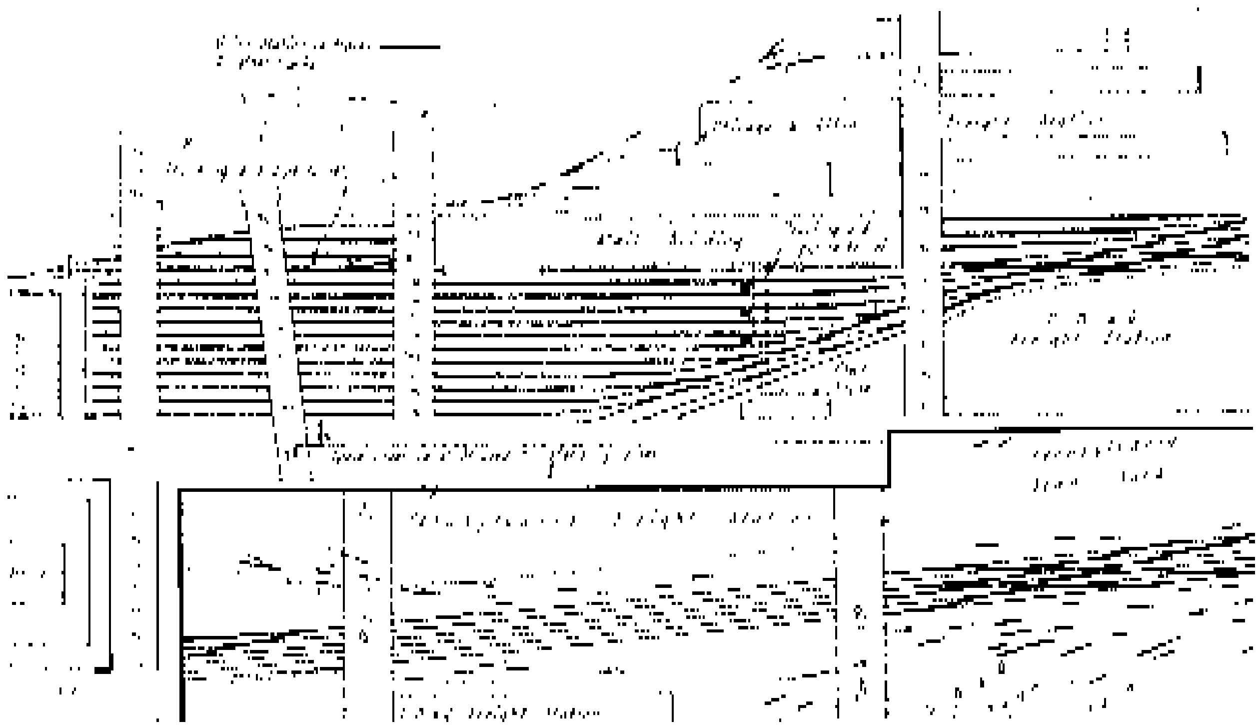
The old station was located on a strip of ground about 130 ft. wide adjacent to the east side of Canal street between Madison street and Van Buren street. The old

ducts which served also as the west approaches to bridges over the Chicago river which lies just east of the station property. The station building had a waiting room on the street level with three stairways leading down to a narrow concourse flanking the west side of the train shed. The physical layout was that of a through station but from the operating standpoint it was strictly a terminal station for all of the roads using it. However, the station tracks were all so short that long trains frequently occupied portions of the tracks both to the north and south of the axis of the station and consequently the handling of trains was much the same as in a through station.

Other Sites Were Urged

Concerted efforts were made at one time during the course of negotiations preliminary to the development of definite plans for the new project, to place the station on an entirely new site at a considerable distance from the location of the old one. This was objectionable from the standpoint of the railways for a number of reasons, chief among which is the strategic position of the original site immediately west of Chicago's business center and adjacent to east and west streets which constitute the main arteries of traffic between the loop district and the city's great west side. Furthermore, any project for a change in the location of the station was confronted with one important obstacle, the fact that the station has two approaches. For, whereas the problem of the replacing of a terminal of the stub type has frequently been simplified by withdrawing to a more favorable location on the single approach, the necessity for maintaining two approaches complicated rather than simplified the problem.

However, the various conditions which made the old site a favorable one from the traffic standpoint imposed serious obstacles in the development of an adequate plan for a new terminal as well as the conduct of the actual construction. Therefore, the decision to build the new station on the site of the old one immediately presented a



Map of the South End of the New Terminal, the South Approach Being Shown at the Lower Right

number of severe restricting conditions: (1) high land values, making the acquisition of the necessary additional ground area exceedingly expensive; (2) heavy street traffic, definitely precluding the closing of any streets crossing the terminal area. In fact, the terms of the terminal ordinance required the opening of one additional street (Monroe street) and the widening of two existing streets; (3) the impracticability of making any radical change in the relative grades of the streets and tracks; (4) the requirement that the layout of the station must be such that the station tracks would serve two approach routes; (5) the conduct of the construction work in and around the old station without interference with its operation.

Outline of the Plan Adopted

In consequence of these limiting conditions, the general track arrangement of the new station is basically the same as that of the old one, except that the layout has been enlarged sufficiently to effect a great increase in capacity and to permit of an entire elimination of the fundamental defects in the old plan. The primary requisite, that of adequate track capacity, was fulfilled by a process of expansion. The width of the track layout was increased to occupy the entire space between the east side of Canal street and the west bank of the Chicago river, while the length was extended sufficiently to avoid the penalties of a through layout for a station that serves as a terminal for all trains entering it, that is, to provide independent station tracks for trains entering from the north and from the south with adequate capacity to accommodate the longest trains and still leave room between the ends of these two groups of platform tracks to provide ample facilities for the dispatching of passengers and baggage to and from trains.

As it was neither practicable nor desirable to locate the entire headhouse facilities of the station entirely in the space between the two groups of tracks, only the passenger concourse was placed in the block bounded by Canal street, Jackson boulevard, Adams street and the river, the main waiting room and the necessary auxiliary facilities being accommodated in a separate structure on the only logical space available for this purpose, namely, the block on the west side of Canal street opposite the concourse, the two units of the station being connected by utilizing the space under the street between the two.

Exterior Appearance

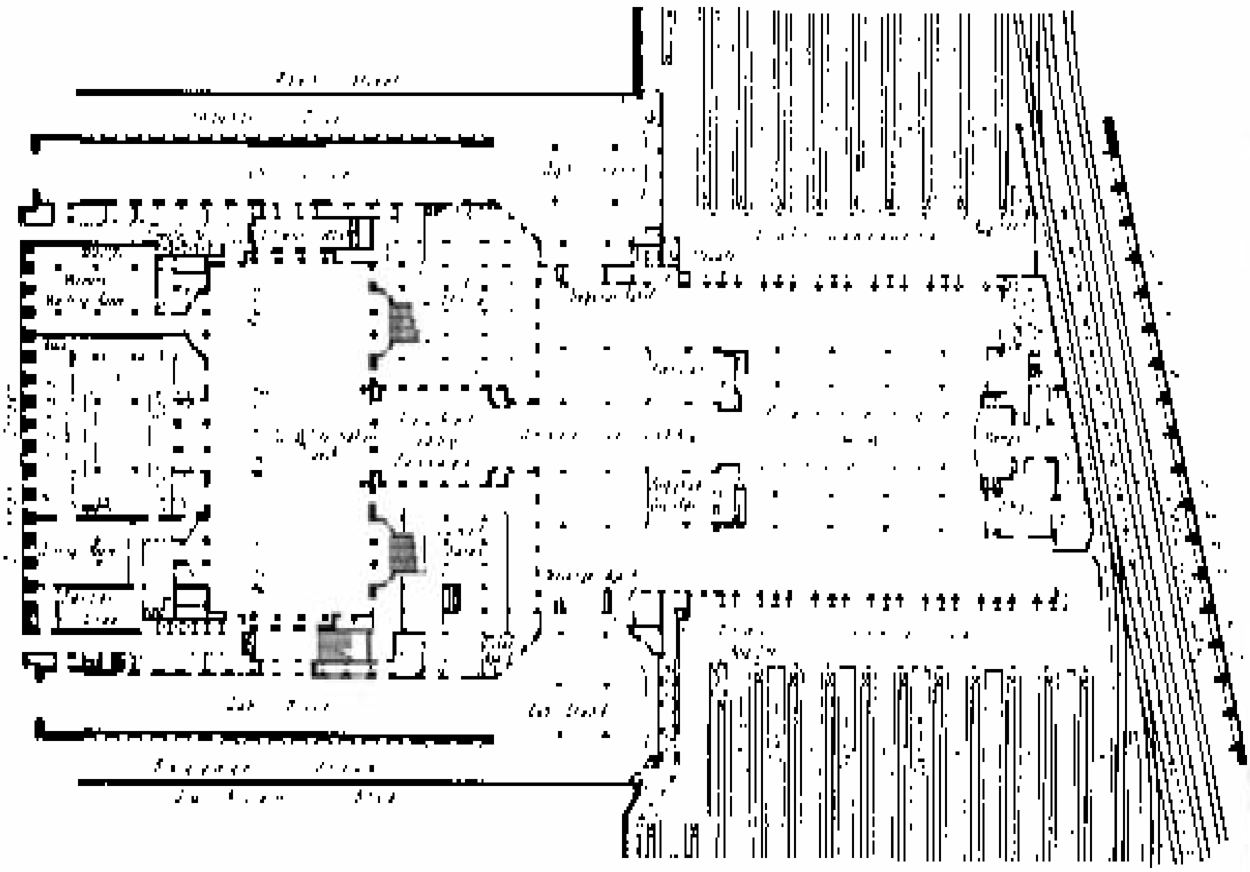
In outward appearance the headhouse and concourse are two separate structures of distinctly different outlines. Each occupies a block by itself and is surrounded on four sides by streets. However, the architectural treatment of the two is such as to present a harmonious effect, Bedford limestone being used for the exterior walls of both. The concourse structure is purely a station utility with its exterior outlines determined by the requirements of a spacious and lofty concourse, while the headhouse building has its proportions fixed by the demands of a dual occupancy, that of station facilities in the lower portion and office above.

The site is one that presents an unusually fine setting for a monumental piece of construction. The adoption of a low type of train shed, the construction of viaducts without structural members above the roadway level and the presence of the Chicago river immediately east of the station property afford unusual opportunity to view the headhouse and concourse from the south, east and north. The east elevation has been particularly enhanced by introducing a driveway between the east face of the concourse structure and the river, connecting Jackson boulevard and Adams street, with its supports along the river side emphasized by an arcade of 17 massive arches, supported on the dock wall along the river to afford an appropriate architectural base, while the parapets or railings of the street viaduct are of sufficient height to conceal the train sheds without interfering with the view of the building.

The concourse comprises a central mass extending to a height of 108 ft. above the street level, of applied Classic motive with its main axis east and west and flanked on the north and south by low wings. The main central portion has a flat gable roof and the east and west faces are treated as ornamental doorways emphasized by two Roman Doric columns with Doric pilasters on either side. The entablature above these columns and pilasters is carried entirely around the building at about three-fourths of its height and is surmounted by an attic emphasized on the east and west faces by a segmental arch opening occupied in part by a large clock. Saw-tooth skylights in the gable roof of the main portion are scarcely discernible above the parapets surmounting the walls, but the parapets of the wings are of sufficient height to conceal their flat skylight roofs.

The Headhouse Is a Large Structure

The headhouse structure comprises a hollow square with a central court, the base of which is occupied by the main waiting room. The base of the building occupies the entire block bounded by Canal, Jackson, Clinton and Adams streets, and has a length of 372 ft. north and south by 319 ft. 10 in. east and west. However, the mass of the building above the base, that is, the outline of the office building portion, which has been carried to a height of eight stories, is set back 30 ft. 1 in. on the Canal street side, 37 ft. on the Clinton street face and similar amounts on Jackson boulevard and Adams street, giving the effect of a terraced space extending practically to the fourth floor level. On Canal street this is treated as a portico comprising a colonnade of Roman-Doric columns 50 ft. high. Similar treatment is used on Clinton street except that the building wall is flush with the backs of the columns. The treatment on Jackson boulevard and Adams street is more severe and consists primarily of a continuous row of open windows which afford the necessary ventilation for the taxi driveways, which will be described later. Architectural emphasis is given to the two entrances to the cab driveways on the Clinton street facade by ornamental pavilions and for the sake of symmetry similar construction is provided on the two east corners.



Station Level Plan of the Headhouse and Concourse

Street Grades Influence Plan

In order to obtain a clear conception of the station plan it is necessary to have a definite understanding of the arrangement of the street grades in their relation to those of the tracks and to the Chicago river. The water level is normally at about Elevation minus 1½, Chicago city datum, while the streets on both sides of the river are at an elevation that averages about plus 15. However, to obtain adequate underclearance the roadways of the river bridges have been raised to an elevation ranging from 30 to 28, making it necessary to provide ascending grades on all street approaches to the river bridges. But on the west side of the river the street grades are continued at the higher elevation to the east side of Canal street to afford adequate overhead clearance for the station tracks. From the east side of Canal street the east and west streets descend to Elevation 15 at Clinton street one block west, while Canal street has an elevation ranging from plus 22 to plus 26 from Monroe street to Taylor street, with descending grades beyond these limits to meet the normal street grades at Washington street and Roosevelt road, respectively.

Because the tracks are below the streets and owing to the necessity for dividing the headhouse facilities into two units separated by Canal street, it was necessary and also most desirable to place the main floor of the station below the street level, since this affords the operating advantage of having the station on the same level as the tracks and, what was more important, provides a direct connection between the station facilities east and west of Canal street by a connecting concourse under the street. Accordingly, the floor of the passenger concourse east of Canal street was placed at Elevation plus 8, and the floor of the main waiting room in the center of the headhouse west of Canal street at Elevation plus 10, with a scarcely perceptible slope on the floor of the connecting concourse between the two. The baggage room occupies a basement under both the passenger concourse and the east end of the concourse lobby west of it, at Elevation minus 8.7.

Provide Numerous Entrances

With these conditions fixed the interior arrangement was influenced by the all-important requisite of effective and convenient entrances and the maximum simplicity of the entire interior arrangement. Special pains were taken to insure that the routing of the passengers through the station would not only be obvious, but would also afford direct access to the various facilities with practically no opportunity for confusion on the part of even the most inexperienced traveler. It is the opinion of the officers of the union station company that the efforts and expense incurred in developing the plan have been entirely warranted by the operating results obtained since the station has been placed in service.

The main waiting room is 100 ft. by 269 ft., back to back of the balconies, at each end, in the exact center of the block bounded by Canal, Clinton and Adams streets and Jackson boulevard. The passenger concourse is 210 ft. long by 192 ft. wide with its longitudinal axis east and west. It is flanked on the north and south by train concourses 29 ft. 9 in. wide, abutting on the ends of the station platforms. Under Canal street immediately west of the passenger concourse and connected with it by three broad archways is the concourse lobby, a space 192 ft. north and south by 100 ft. east and west, and continuing west from this on its east and west axis is the ticket lobby 199 ft. 10 in. long by 55 ft. wide, which serves, with the central portion of the concourse lobby, as the main corridor connecting the waiting room with the concourse lobby and the passenger concourse.

Both Stairways and Ramps in Concourse

The concourse has two main entrances from the street level, doorways on the east and west faces. Fronting on Canal street and the river drive, respectively, communicate with balconies overlooking the interior of the concourse, from which duplicate stairways to the left and right lead to the station floor level. These two entrances are supplemented by two others on Jackson boulevard and Adams street, respectively, near the east end of the building, where doorways in two kiosks afford entrance through two ramps descending on moderate grades, on the east and west axis of the building where they join at the floor level and emerge into the concourse through a wide archway directly under the balcony of the east stairway entrance.

The main entrance to the headhouse comprises duplicate entrance lobbies 40 ft. wide by 85 ft. long on Canal street, 70 ft. 10 in. to either side of the east and west axis of the building. These lobbies enclose broad stairways which lead directly to the waiting room. But more important than these entrances are the facilities for access by taxicabs, which were developed in a most effective manner by taking advantage of the variation in street grades. With Clinton street at Elevation 15, Canal street at Elevation 26 and the concourse at Elevation 8, it was possible to construct two taxi driveways entering the building at the two Clinton street corners with ramps just inside the north and south walls of the building leading to cab stands at the north and south ends of the concourse lobby directly under Canal street at the concourse grade. These taxi ramps may also be used to load and unload passengers at entrance lobbies on the north and south axes of the building that lead directly to the north and south ends of the main waiting room. Arcade entrances are also provided for pedestrians paralleling the taxi ramps and leading from Clinton street to the main waiting room.

Each taxi entrance is also used for access to the baggage and express rooms in the basement by means of a second leg of each ramp extending west outside the first leg and under the sidewalks on Jackson boulevard and Adams street, respectively, to Clinton street, thence along under the walk on that street to a junction of the two driveways on the east and west axis of the building and thence eastwardly to the baggage and express loading platforms in the basement. These driveways have an aggregate length of a half mile, all within the walls of the building, and all paved with brick.

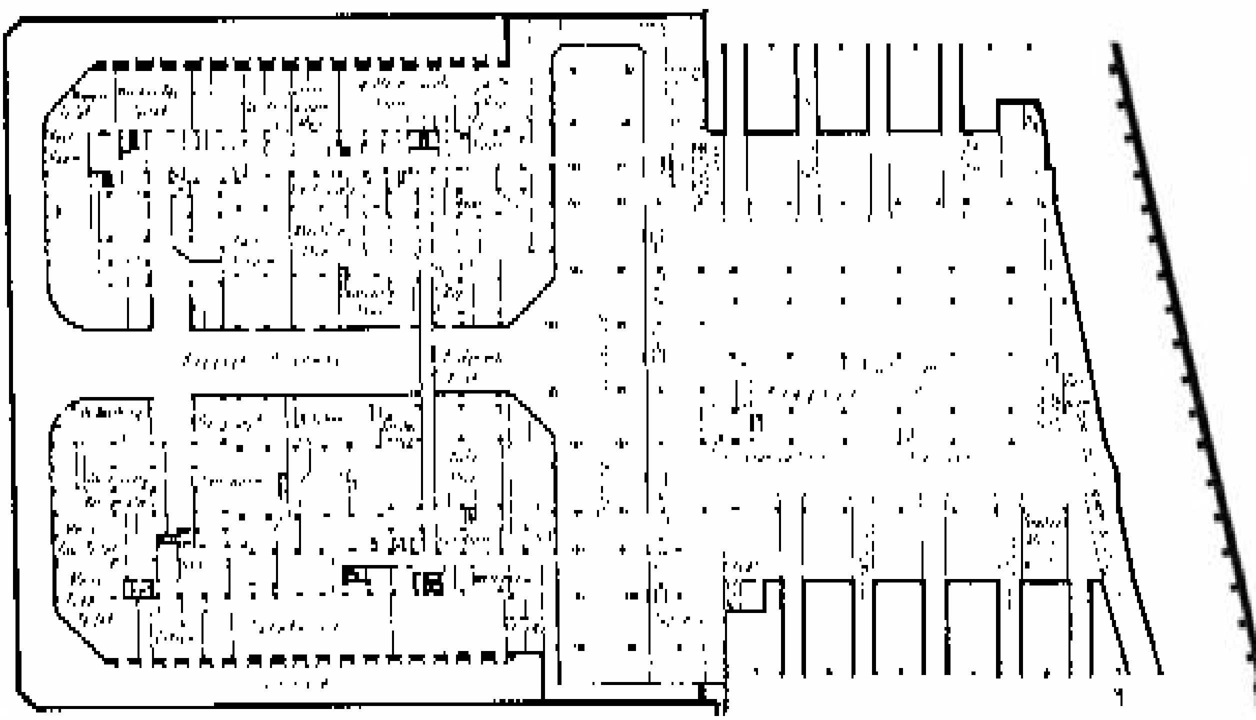
Separate Entrances to Office Building

To insure an effective segregation of the dual functions of the headhouse, that of a passenger station facility and a large office building, special pains were taken to isolate the entrances to the office building portion of the structure entirely from the station facilities. Accordingly, entrances to the offices have been provided in the center of the Jackson boulevard and Adams street sides of the building at a considerable distance from any of the entrances to the station proper. By providing for a flight of six steps from the sidewalk level, access was obtained to loggias with floors at Elevation 23.5, or sufficiently above the level of the inclined driveways from Clinton street so that these loggias span the driveways with adequate clearance for the vehicular traffic underneath. These loggias lead to entrance lobbies abutting on the ends of the waiting room but at an elevation of 13 ft. 9 in. above the waiting room floor level so that they give the general effect of balconies overlooking the waiting room. To the west of these lobbies are corridors leading to duplicate banks of five elevators each. The number of elevators is adequate to the office space in the building as now completed to a height of eight stories, but provision has been made for the addition of two more elevators in each group at any time that the height of the building is increased.

The auxiliary facilities of the station have been located with a view to the convenience of the patrons. Taken into particular consideration the use which the various classes of passengers desire to make of them. The passenger concourse has been kept entirely clear to afford ample unobstructed space for the movement of passengers to and from trains, particularly those using suburban service of the various railroads, who enter and leave via the ramps or the concourse stairways. Also outgoing passengers already having tickets, who enter the station in taxicabs and board trains immediately, or arriving passengers who depart at once in taxicabs, or via the concourse exits.

The parcel checking stand and the baggage counters are located in the concourse lobby to the north and south of the central passageway, while the ticket lobby is located between the main waiting room and the concourse lobby on the south side of the ticket lobby passage where it is within easy reach of passengers entering the station in taxicabs as well as persons occupying the waiting room.

other to the north. The south group, which is used by the trains of the Burlington, the Alton and the Pennsylvania, comprises 14 passenger tracks, while the north group, which is used by the trains of the St. Paul and a few trains of the Pennsylvania, embraces 10 tracks. Just east of the 14 passenger tracks in the south group are 5 tracks which serve the railway mail terminal, a long, narrow building located between Harrison and Van Buren streets. One of these is a through track extending the full length of the passenger tracks and passing to the east of the concourse to a connection with the easterly track of the north station group. The other four are stub tracks, two at the south end and two at the north end of the mail building, the two south tracks connecting into the south approach and the two north tracks into the track connecting with the north group. This arrangement affords the necessary access to the mail terminal tracks for



Basement Plan of Headhouse and Concourse

The other facilities immediately adjacent to the waiting room are those ordinarily required only for passengers who must spend some time in the station. These include a restaurant and supplemental accommodations for men and women on the west side of the waiting room.

A doorway in the center of the west wall leads to a large lunchroom for quick service while a corridor from the same doorway connects with a smaller dining room for more formal service. North of the entrance to the restaurant is a doorway for entrance into the women's waiting room, toilets and lavatories, while to the south a doorway opens into a lobby for access to a barber shop and by a stairway to a men's toilet room in the basement. No provision has been made for a men's waiting room or a smoking room, studies of large stations throughout the country indicating that the smoking room serves no essential need and is difficult to supervise and maintain in a cleanly condition.

Station Tracks in Two Groups

As stated previously, the station tracks are arranged in two groups, one to the south of the concourse and the

the handling of mail trains or cars entering or leaving the station via either approach.

The passenger tracks in the station have varying lengths so that they are capable of accommodating 7 to 18 car trains, with locomotives. The capacity of the passenger tracks is 198 cars at the south end and 144 cars at the north end.

Separate Baggage and Passenger Platforms

The distinctive feature of the track layout is the provision for a platform on each side of each track, alternate platforms being designed to serve exclusively as baggage and passenger platforms, respectively. The tracks are spaced 23 ft. 3 in. center to center across the passenger platforms, which are 13 ft. 9½ in. wide, and 21 ft. 3 in. across the baggage platforms, which are 10 ft. 7 in. wide.

The separation of the passenger and baggage platforms has the advantage that it permits the establishment of independent levels for these platforms at a height most suitable for the particular purpose. The baggage platforms were given a height of 1 ft. 8 in. from the top of rail to afford a reasonable height of baggage trucks constructed with their platforms at car floor level. In the cases of the longer platforms consideration was given to their construction at car floor level, but owing to through car traffic movement involving the use of cars from various connecting railroads in the west it was found that high platforms would entail extended changes in equipment by roads that do not use the station. Consequently it was decided to adopt a low passenger platform but with a type of construction that will readily permit of a change to high platforms whenever it is found desirable. These platforms are now constructed to a height of 7½ in. above the top of rail with ramps on an ascending grade of 7.12 per cent to connect with the concourse floor level. However, as this floor level is approximately five feet above the track level a future change to car floor level will have no other effect than to reduce the grade of the connecting ramps.

By far the most advantageous feature of the separation of passenger and baggage platforms is the opportunity it affords for direct access to the baggage room in the basement without the use of elevators, since this arrangement made it possible to introduce ramps at the ends of these platforms descending on a grade of 6.75 per cent to the baggage room floor level. These ramps are 10 ft. 5 in. wide and can be used simultaneously by trains of trucks moving in opposite directions.

A Vertical Section Through the East and West Axis of the Headhouse and Concourse

The Headhouse Facilities in Detail

The main waiting room is a plain rectangle in plan with doorways at each end and at three equally spaced intervals on each side to which architectural emphasis has been given by Corinthian columns and pilasters surmounted by an entablature carried around the four walls at a height of 45 ft. above the floor. The clerestory above this entablature is broken up by segmental arch openings forming vertical continuations of the doorways directly below them. The ceiling comprises a flat barrel vault with its crown 112 ft. above the floor. It consists entirely of skylights with the exception of one row of coffers extending around the sides and the ends. The central doorway in the east wall opens into the ticket lobby or main passageway to the passenger concourse and its coffered barrel vault ceiling, extending to a height of 75 ft. is readily discernible through the clerestory opening above the doorway. For the sake of symmetry this coffer treatment is repeated in a half dome niche behind the clerestory opening over the central doorway of the west wall. The other 15 arch openings in the clerestory serve as windows and are screened by brass grill work.

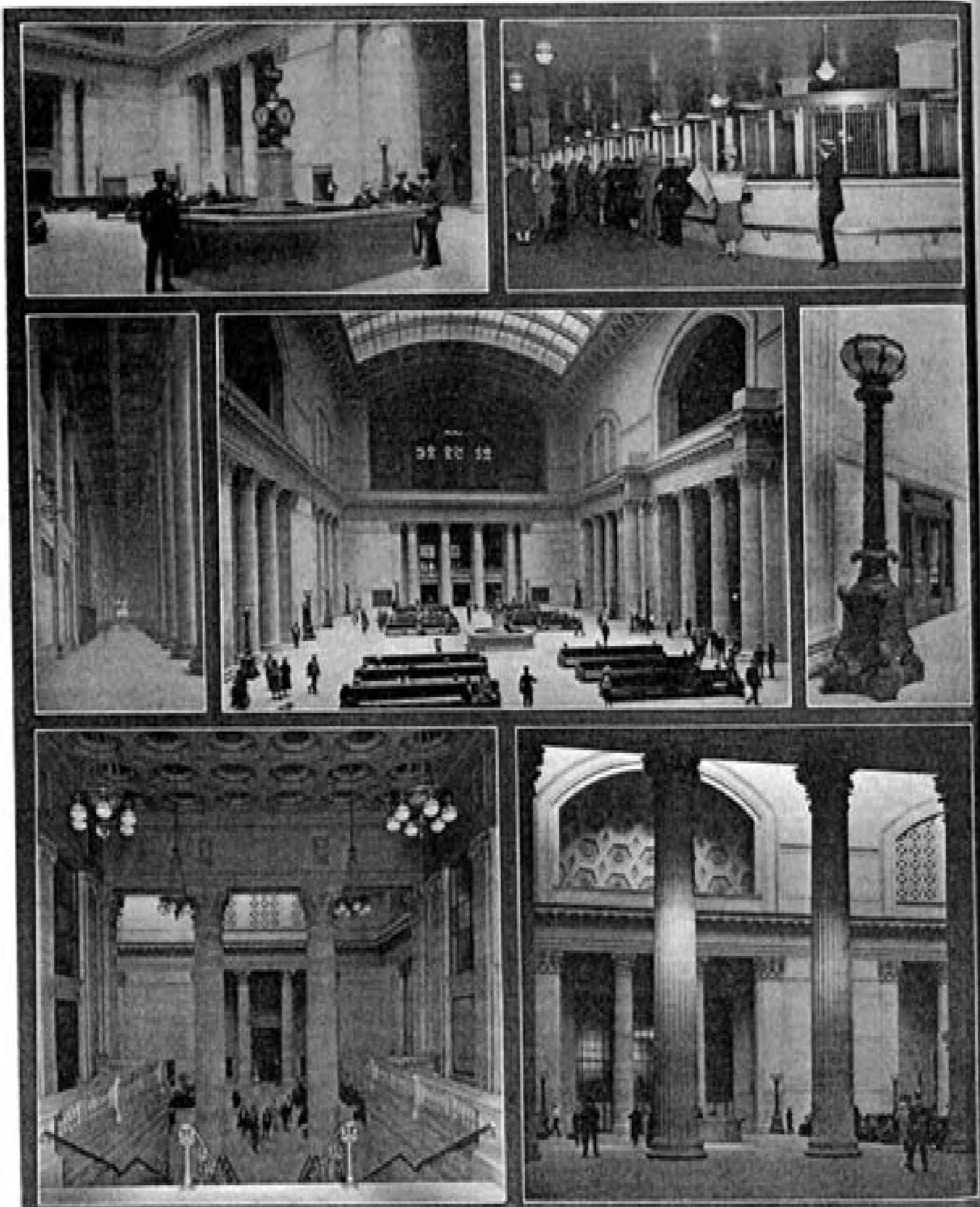
The floor of the waiting room is Tennessee marble. The walls to the height of the belt course and the shafts of the columns are of Italian travertine. The remainder of the walls and the ceiling are of plaster, finished in a warm buff tint, in keeping with the soft texture of the travertine. The exact center of the waiting room is occupied by an octagonal information counter with a pedestal in the center affording a support for a four-face clock. The counter and the clock standard are of Travernelle fleuri marble. Twenty double benches of American walnut afford a seating capacity of 450.

The ticket lobby passage and the two main stairway lobbies on either side of it are also finished with travertine stone with the exception of the ceilings which are of colored plaster. Similar treatment is used in the north and south entrance lobbies and in the office building entrance lobbies directly above them. The stairways from Canal street do not occupy the entire width of the stair lobbies but afford space on either side for balconies 8½ ft. wide at the street level to permit access to concession space reserved for shops.

A Unique Rest Room

Along the west side of the waiting room are three large rooms facing on Clinton street, all of which have a height of 40 ft. with large windows occupying the upper half of the west or Clinton street wall. The north room is 54 ft. by 71 ft. 5 in. and serves as the women's waiting or rest room. Special pains were taken to obtain a decorative treatment of subdued or restful characteristics. The walls have been subjected to but little ornamentation and are broken only by the high window openings on Clinton street and relatively small door openings in the east side. In fact, embellishment has been limited entirely to the ceiling which is coffered with a Pompeian type of decoration in blues, yellows, and dark reds, and to two large hangings of Belgian velvet in a deep red which occupy about one fourth of the upper half of the north and south walls. These are entirely plain save for a small panel into which the official seals of each of the four roads have been tastefully worked. The furniture is American walnut upholstered with blue silk mohair. From the south side of this room a stairway leads to a toilet room in the basement affording both free and pay service. The free toilets provide 21 closets and 11 lavatories and the pay toilets, 9 closets, 18 combination closet lavatories and two complete bathrooms.

The toilet room for men in the basement at the southwest corner of the building also provides free and pay service. The free toilets contain 38 closets, 86 urinals, 30 lavatories and one Bradley wash fountain. The pay toilets provide 26 closet lavatories, four of which are supplemented by shower baths. All of the toilet rooms have Tennessee marble walls and floors and plastered ceilings. Standard Sanitary Manufacturing Company's fixtures were used throughout. The barber shop, which opens off the main lobby to the men's toilet, is a room of unusual decorative treatment. The floor is Welsh quarry tile set with wide joints while a high wainscot is finished



The Headhouse Is a Monumental Structure

Upper Left, at the Information Counter; Upper Right, in the Ticket Lobby; Center, the Great Waiting Room; Lower Left, Looking Into the Waiting Room from One of the Canal Street Stair Lobbies; Lower Right, the Ticket Lobby Passage Affords a Broad Entrance Into the Waiting Room in Lorene tile having a buff body and green trim with recesses for toilet cabinets and open shelves. The ceiling and the walls above the wainscot are plastered with a sand float finish tinted in light cream. Space is provided for 16 barber chairs, with individual pedestal fixtures and mirrors, with black frames for each chair.

A Restaurant of Unusual Character

The largest room on the west side of the building is a lunch room 85 ft. by 111 ft., located symmetrically with respect to the east and west axis of the building. It has a low American walnut wainscot with a marble base, plastered walls and a coffered ceiling. The entire west side of this room for a width of 23 ft. 8 in. and a height of 15 ft. is occupied by a service kitchen, the remaining floor space being occupied primarily by three U-shaped lunch counters with space adjacent to the north and south walls and on the mezzanine floor above the kitchen occupied by tables. The counter and stools are of table-chair height. The top of the counter is a thick slab of green Vermont marble while the base is of gray travertine on the patrons' side and Tennessee marble on the serving side. The floor on the public side is Tennessee marble and on the service side it is rubber tile, the service space floor being depressed a sufficient amount below the level

Looking West in the Passenger Concourse Towards the Three Broad Archways Communicating with the Facilities Under Canal Street

of the public space floor to give the counter a convenient serving height.

To the south of the lunch room is a formal service dining room, 42 ft. 4 in. by 86 ft., which is decorated in a more subdued tone than the other rooms. It has a high wainscot of American walnut divided into small panels to offset the effect of the high ceiling. The walls are plastered and the ceiling is coffered in decorative plaster. Unusual pains have been taken by the concessionaire to give the room a dignified, distinguished air. Unusually rich furnishings have been provided in the form of tables, chairs and sideboards of antique Italian pattern. Access to this room is afforded by a corridor from the main waiting room as well as by a short corridor leading to the Clinton street entrance of the south arcade.

This dining room and the lunch room receive direct service from the service kitchen at the rear of the lunch room but the main kitchen, bakery, stores, dishwashing facilities, refrigerators, etc., are in the basement. The basement space assigned to the concessionaire, Fred Harvey, also embodies a large cafeteria, entrance to which is had by a stairway leading from the south lobby of the waiting room. All kitchen space in the basement is finished with red quarry tile floors and white glazed tile walls.

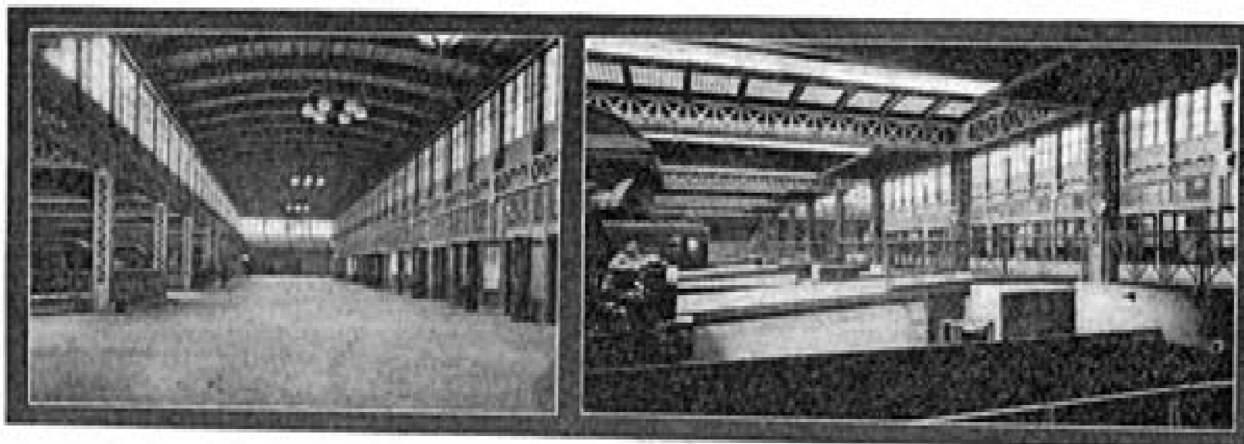
The Ticket Office

The ticket lobby occupies the entire southeast corner of the headhouse east of the main waiting room and south of the ticket lobby passage. Of this space a rectangular area 58 ft. by 100 ft. is occupied by the ticket offices, affording 150 ft. of counter length on two sides with 29 ticket windows. The face of the counter is travertine, the top is Belgian black marble and is surmounted by a brass grill backed with clear glass, thus affording a clear view of the entire interior. There are no fixed ticket cases. Each ticket clerk is assigned an individual case mounted on casters which is rolled into place adjacent to his window when he goes on duty and is locked up and removed to permit its replacement by a case assigned to the clerk who relieves him when his tour of duty is completed. The only segregation of the business done at the various ticket windows is to assign six windows to the sale of commutation and local tickets and assign all the rest of the windows to the sale of both railroad and sleeping car tickets. Each clerk is equipped to sell tickets for all roads using the station, his ticket case being stocked with tickets covering 98 per cent of the routes called for in the normal ticket sales. Tickets covering the remaining routes are kept in a special case placed in the center of the ticket office where they are available to all clerks. The clerks are provided with telephones for communication with the reservation bureau on the third floor where clerks in the employ of the four railroads record reservations on the car diagrams. A few minutes before train leaving time, the diagrams are transmitted by pneumatic tube to the passenger agents of the individual railroads who occupy offices at the south end of the concourse bldg., whence they are delivered to the Pullman conductors.

Space is also provided on the third floor for an information bureau. In this room 30 trunk lines from a Chicago telephone exchange are carried to 12 operator positions, 6 on each side of a long table, divided lengthwise by a rack equipped with time tables and rate sheets for ready reference. Each operator can handle a call coming in on any trunk by opening the proper keys.

has been provided. The walls for the most part are grey mottled terra cotta with some of the upper portions of plaster finished in imitation of stone. The windows have steel frames and sash.

The floor is of reinforced concrete with large areas of vault lights for the purpose of affording some natural light to the baggage room in the basement. The floor of the concourse is entirely unoccupied except for an information counter of terra cotta at the center, over which is mounted a train bulletin divided into panels assigned to the various railroads. This bulletin board is surmounted by a two-face clock. At the east end of the building, flanking the stairway are two low projections from the east wall, the lower portions of which are devoted to concession space occupied by Fred Harvey as a grill room, a



The South Train Concourse—Passenger Platforms Are Connected to the Train Concourse Floor by Means of Ramps
Enclosure for One of the Baggage Platform Ramps in Foreground

The concourse lobby under Canal street has a Terrazzo floor, terra cotta walls and a flat grooved ceiling finished in light grey. The baggage and parcel counters are constructed of laminated maple and steel plate with vertical sliding windows of rough wire glass set in steel frames.

A Spacious Concourse

The interior of the passenger concourse is of a design somewhat similar to the concourse of the Pennsylvania station in New York, except that opportunities were afforded for a greater refinement of detail in the Chicago station. The roof consists of five flat barrel vaults with their axes east and west and is supported by steel arches carried on steel columns, all of the steel work being entirely exposed. The framing of the main central portion of the structure is divided into three longitudinal aisles with a central span of 58 ft. and two side spans of 30 ft., the ceiling at the crown of the central span being 80 ft. above the floor and that of the two side spans somewhat lower. Flanking this central portion are two side aisles of 68 ft. span with ceilings 33 ft. above the floor. In the transverse direction the ceiling is divided into bays 38 ft. wide which are spanned by longitudinal girders. The arches are all open box trusses, and the column composite members are riveted on the inside, the framing being done in an unusually finished manner especially at the junction of the main arch trusses at the tops of the main columns. The roof is covered for the most part with Federal precast cement tile. In the main center span and in the two low side aisles the tile are exposed on the under side, while in the two 30 ft. aisles a plastered ceiling of flat dome shape

fountain, lunchcounter and a cigar, magazine and book shop.

Train Gates of Iron and Glass

Access to the train concourses on either side of the passenger concourse is provided by continuous lines of vestibules 7 ft. 3 in. deep with sliding doors on the inside and swinging doors on the track side. These vestibules are arranged in groups serving two tracks for each 38 ft. bay, providing two exits to the trains 4 ft. 8 in. wide next to the columns with an entrance from the trains in the center 12 ft. wide. A "Hutchinson" train indicator for each track separates the entrance and exit doors. The vestibule construction is entirely of iron and steel with glass panels in the doors set in steel frames.

The train concourses, which correspond in detail and construction with the passenger concourse, are entirely open on the track side except for iron railings at the ends of the tracks, which are carried partway down the sides of the passenger platform ramps.

The baggage room is 278 ft. wide north and south by 258 ft. long. Its width is expanded at the west end to provide a loading platform 100 ft. long abutting on the space for street vehicles. Under the prevailing operating arrangement the bulk of the express is handled in facilities provided by each of the individual railroads, consequently a space 47 ft. by 80 ft. partitioned off at the south end of the loading platform is adequate for the handling of such express matter as must be loaded or unloaded at the station platform. The baggage room is provided with three 2-ton elevators, with automatic door opening devices. Three of these are located along the loading dock, one in the express space, and the two others in the center of the room. The trucking equipment, including that required for handling mail, comprises 7 Elwell Parker tractors, 12 Mercury and 2 Elwell Parker elevating trucks, 300 Mercury caster type trailers, 50 double-end trailers with a tongue at each end and a number of other styles of smaller trailers.

How Baggage Is Handled

A pneumatic tube system comprises an important agency in the operation of the baggage room. This affords direct connection between weighing stations at the loading platforms and the exchange cashier's office, which is located in the baggage room directly below the checking counter enclosure on the station floor, between the exchange cashier and the checking counter and between the exchange cashier and the baggage master's clerks' office. Every piece of outbound baggage unloaded at the platforms is weighed by a receiving clerk on one of three automatic scales who makes out a weighing slip on which he records the weight and the number and name of the trucking company's check on the trunk. This weight slip is forwarded to the baggage counter for file until the passenger presents his duplicate check. When the duplicate of the trucking company's check is presented at the counter, it is taken up and dispatched to the exchange cashier with the duplicate of the railroad check presented to the passenger for identifying the trunk and attaching the new check.

Hand baggage checked at the counter is passed to the baggage room by means of a chute, while incoming hand baggage is delivered to the counter by an elevator and placed on compartment shelves until called for. The efficiency of this detail of the service is indicated by the fact that cases have been noted where hand baggage has been loaded out of baggage cars, trucked into the baggage room, elevated to the counter enclosure and stored before a passenger could climb from his train and walk the length of the platform and concourse to claim his baggage at the counter.

Well Designed Illumination

While natural lighting has been provided in abundance in the principal rooms of the station, careful study was given to insure that the artificial illumination would be equally effective. The lighting of the main waiting room is unique and embraces two independent systems. The ceiling and clerestory walls are lighted by two batteries of flood lights installed in balconies at the two ends of the room. Each bank contains thirty-five 500-watt X-ray reflectors and produces a well diffused light. The lower portion of the walls, the columns and entrances of the lobby are effectively lighted by lamps installed on the tops of 16 massive bronze torcheres or floor standards mounted on green Vermont marble bases and placed at uniform intervals along the walls. The lighting fixture is a glass bowl ribbed with bronze, which contains two 250-watt lamps mounted over a mirror reflector with four 100-watt lamps below the reflector to illuminate the sides of the bowl.

The coffered vault of the ticket lobby passage is lighted by twenty-four 250-watt X-ray projectors on top of the cornice along the two sides of the room, while the walls are illuminated by ornate bronze brackets secured to the walls about 14 ft. above the floor. The dining rooms and the women's rest room are lighted by ceiling fixtures of ornate design, while the concourse lobby is lighted by simple bowls in the centre of each panel of the coffered ceiling.

In the passenger concourse the lighting fixtures are a simple rugged design in distinct keeping with the open steel work which supports the roof. They consist of 12 opal glass spherical globes suspended from a tubular steel ring supported by chains from the roof trusses, being provided with lowering devices to facilitate cleaning. The passenger platforms are provided with two 500-watt lighting fixtures in each longitudinal panel. As no standard lighting unit was found to give a satisfactory distribution of the light, a special fixture furnished by the A. B. Boetter Manufacturing Company was designed for the installation. It consists of casting of special corrosion resisting metal with a polished interior to serve as a reflector with an acorn shaped rippled glass globe. The baggage platforms are lighted with standard R. L. M. reflectors fitted with clear glass covers.

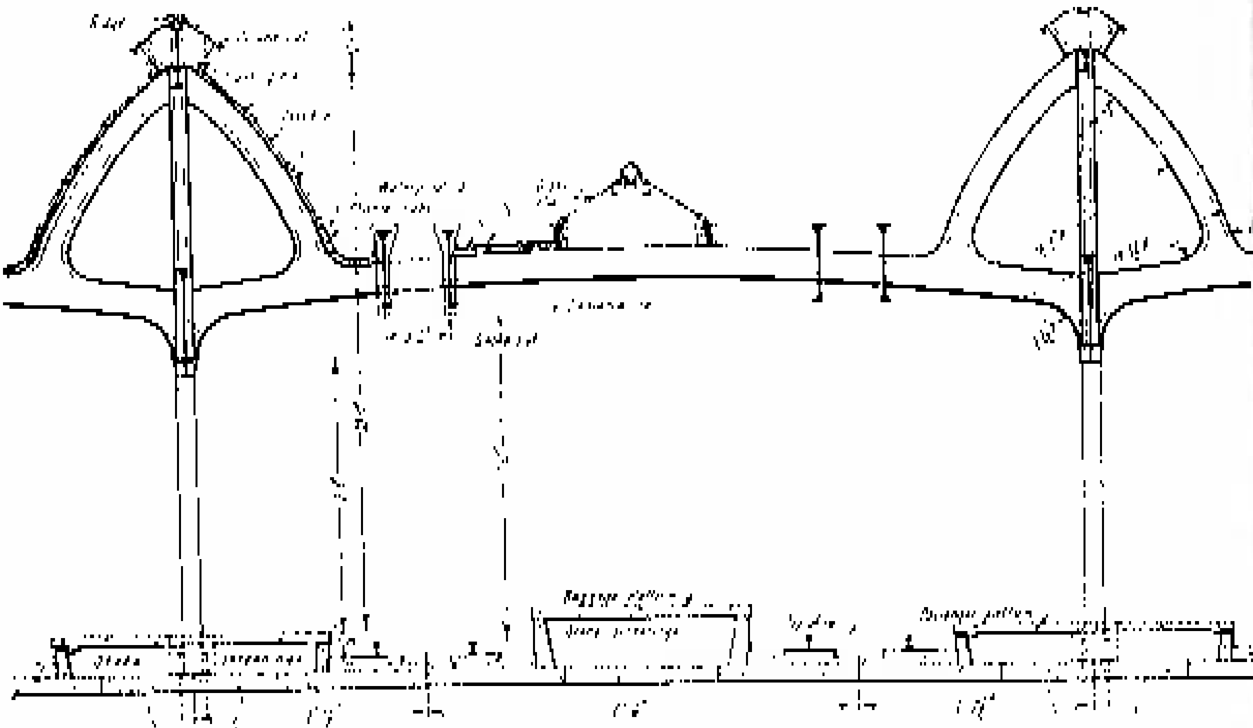
Street lighting has been provided in the form of 40 ornamental street lighting standards each supporting two G. E. "Novalux" basket type street lighting units with 600 candle power series lamps. The balustrade above the river drive is ornamented with stone pylons each of which is equipped with four 100 candlepower series lamps, while the office building entrances on Jackson Boulevard and Adams street are embellished by heavy bronze lighting standards of rugged design.

A New Type of Train Shed

One of the outstanding features in the design of the station is a new type of train shed which represents a development resulting from the unusual conditions imposed by the arrangement of the platforms and a sincere effort to effect an improvement over previous designs. It was desired to provide a low type of shed, and because the open umbrella or butterfly shed does not afford complete protection against cutting snow it was concluded that the best practice was the enclosed type with smoke slots just clearing the locomotive stacks to obtain an immediate discharge of smoke into the open air. It was also felt desirable to provide more headroom over the passenger platforms than is usually obtained in low sheds. Another [illegible] in the determination of the design was the width of the baggage platforms, which is not sufficient to permit the placing of any columns on them. Consequently the design had to be one in which the transverse roof span equals the distance between columns placed in the centres of the passenger platforms, or [illegible] ft. [illegible] in., a condition that at once introduced a serious problem to avoid excessively heavy and deep transverse girders to support the roof load.

These problems were solved by the development of a design which is not only meritorious from the standpoint of the structural engineer but is also unusually pleasing in appearance. The transverse load-carrying member comprises a flat arch girder affording a clearance of 17 ft. from top of rail, combined with two upward extending legs which are carried to a connection at the column at a height of 28 ft. above the platform. This arrangement provides a beam shaped strut over each column which performs two important functions. It provides a monitor over the passenger platform, producing the desired head room, more effective lighting and better ventilation, and it effects a marked shortening of the effective span of the transverse girders.

For the purpose of reducing the obstruction in the passenger platforms resulting from the presence of the shed columns, these were spaced as far apart as practical considerations would permit, 41 ft. 8 in. center to center, The load between the transverse frames is carried very largely on the longitudinal girders forming the sides of the smoke duct, but supplemented by such girders in the planes of the columns which frame into two struts connecting with the tops of the columns to form a ridge pole for the members over the passenger platforms. These longitudinal members support five equally spaced rafters conforming to the contour of the roof outline to provide the primary support for the roof covering. Particular



A Typical Cross Section of the Train Shed, Station Tracks and Platforms

commendation must be made of the manner in which the detailing and fabrication of the train shed frames were carried out. The frames have an exceptionally neat, graceful and finished appearance, one means to the end being the use of special sections of bulb beams for the curved rafters.

So [illegible] distinctive is the outline and framing of the sheds that the roof covering which consists of [illegible] tile throughout, for the profile of the roof cross section is such as to call for the exercise of ingenuity as well as accurate workmanship to provide precast tile that would insure a perfect fit to the curves and angles of the steel frame. It imposed the necessity of providing 11 varieties

The Concrete Tile and Glass Units Were Made to Fit Accurately to the Steel Frame of the Train Sheds.

of tile units for the standard portion of the steel and special units used in the portion of the sheds near the outer ends where it conforms to the curves of the converging tracks and where the sheds adjoin the street viaducts.

The top of the high monitor over the passenger platform has a ventilating hood which is covered by two curved slabs 1½ in. thick, 24 in. wide and 36 in. long, supported on the curve of this hood, with a special cap unit covering the joint at the ridge. The sides of the monitor for a width of three feet form a continuous skylight and are covered with three tiers of curved glass tile 1½ in. thick, 24 in. wide and 36 in. long, each of which contains a pane of ¼ in. rough wire glass, 20 in. by 30 in.

Over each baggage platform is a gable type skylight covered with interlocking tile 1½ in. thick, 24 in. wide and 82 in. long on each slope with a standard ridge cap at the ridge. Each third interlocking tile on both slopes is provided with a pane of glass 21 in. by 35 in. The remaining portion of the shed roof, namely, between the baggage platform skylights and the lower edge of the passenger monitor skylights exclusive of the smoke slot is covered with channel section slabs approximately 18 in. wide by 8 ft. long. In addition to these units flashing tile are provided under the edges of the baggage skylights and under the hood over the passenger monitor.

The channel slabs form gutters which provide the drainage for the roof, emptying into down spouts at the low end of each block. The gutters are provided with Johns-Manville built-up roofing which is flashed up under the skylight and up the sides of the smoke slot. All the rest of the tile-and-glass roof, a water-proof construction is assured by overlapping horizontal joints and filled vertical joints, together with the density of the concrete in the slabs themselves. The plastic joints are formed by projecting lips on the vertical edges of the slabs so shaped as to provide a groove which is filled with a special oil cement filler covered with a weather coating of elastic compound. The glass tiles are of particular interest because the glass is concreted into the slabs in manufacture and is protected against stresses set up by changes in temperature, wind pressure and other strains by dipping the edges of the glass in a hot asphalt preparation before inserting it into the concrete.

Another difficulty imposed in the construction of the train sheds was introduced in the provision for a covering for the girders of the smoke slots to protect them from the corrosive locomotive gases. Poured-in-place concrete was used for this purpose, the particular problem being to insure a high density in a concrete of such consistency that it would readily flow around the reinforcement and in an exceedingly narrow space between the forms and the sides of the girders. To obtain this the mixture was designed according to the Abrams method

Tracks Embody Interesting Innovations

The station tracks are all tangent and parallel to Canal street except where they connect with the ladder tracks. The elevation and grades of the tracks were controlled by an established vertical clearance from base of rail to the under side of the viaducts of 17 ft. and the maximum possible elevation of the viaducts over the tracks, as limited by the elevation of the river bridges and Canal street and the maximum permissible grades on the street between these points of fixed elevation and the point of crossing the nearest track. The most severe condition was encountered at Madison street where the controlling condition was the grade of Canal street, which could not be raised materially because of established grades at the station of the Chicago & North Western, which fronts on Madison street between Canal street and Clinton street. This condition resulted in the establishment of elevations for the tracks under Madison street, ranging from minus 2.88 to minus 0.30 for the west and east tracks, respectively. At Van Buren street it was necessary to establish the grade of the tracks at plus 0.75 as fixed by the elevation of the roadway on the Van Buren street bridge. At all other points advantage was taken of the opportunity to establish higher elevations for the tracks in order to obtain more favorable drainage conditions, but this introduced a more or less undulating grade line with grades ranging from 0.0 to 0.4 per cent, except in the sag at Madison street where considerably heavier grades are required for short distances.

New Approaches Afford Greater Capacity

The track approaches to the station have substantially the same location as the old ones, except that the alinement has been improved. However, primary change was that of providing six tracks in the south approach instead of four and four tracks in the north approach, used exclusively for passenger service instead of two which in the old layout were used both for passenger trains and for the freight transfer service now handled on two entirely independent tracks. The station company's south approach tracks terminate at Roosevelt road, where they join with four tracks owned jointly by the Pennsylvania and the Chicago & Alton and two tracks owned by the Burlington, and with passenger coach yards and engine terminals of the Pennsylvania and the Burlington to the east and west of the main tracks, respectively. The north approach terminates in the vicinity of Carroll avenue (vacated) on a curve connecting with a two-track main line owned jointly by the Pennsylvania and the Chicago, Milwaukee & St. Paul, extending to the west, and with a branch line of the Chicago, Milwaukee & St. Paul extending to the north.

In the case of both the north and the south approaches the axis of the approach tracks lies considerably to the east of the axis of the station tracks. Consequently, connection between the approaches and the platform tracks was made in each case by a single pair of ladder tracks running to the west. In most cases the platform tracks are arranged in pairs with a single connection to the two ladder tracks, the parent track of each pair crossing the inner ladder to a connection with the outer ladder and thus providing for simultaneous parallel movements in or out of any two of the platform tracks except the two tracks of any one pair. To permit direct connection between any approach track and any station track, double crossovers were provided in both directions at the throat of each yard as well as at the end of the station company's tracks at Roosevelt road and at Fulton street, the throat at Fulton street being complicated by the fact that it is required to serve the two transfer tracks as well as the station approach track.

Heavy Construction

The track construction is designed for heavy service. All track on the approaches and through the crossovers and switches is laid with 130-lb. rail with 100-lb. rail in the tracks paralleling the platforms, all rails being of the P. S. section. The ties are 7 in. by 9 in. by 8 ft. 6 in. of creosoted red oak, placed 20 to the 33-ft. rail with 11-in. by 7-in. by [illegible]-in. tie plates throughout. Through the diamond crossings the ties are 8 in. by 10 in. by 21 ft.

tion. In the case of all tracks adjoining station platforms, the rails are supported on blocks, 6 in. by 8 in. by 2 ft. 6 in. long, embedded in concrete and leaving a space about 2 in. to 3 in. wide between the inner ends of the two lines of blocks to facilitate drainage and the removal of rubbish. All rail joints are either of the continuous or [illegible] per cent type. The ballast for the approach tracks is broken stone, having a depth of 6 to 10 in. under the ties as is explained later.

In laying out the turnouts, slips and crossings special pains were taken to avoid special construction as far as possible and to avoid short radius curves, while making every effort to secure the maximum length of platform tracks. With the exception of two No. 7 frogs and two No. 6 frogs, all frogs are either No. 8 or No. 9. The design and construction of the slip switches and crossings introduced many serious problems, particularly because of the use of 130-lb. rail and the necessity for providing effective insulation at the many points where this was required. However, the construction is of a uniformly high grade and has rendered excellent service under heavy traffic.

Tracks Supported on Concrete Blanket

The most distinctive feature of the track construction is the special foundation provided in the form of a concrete blanket throughout a large part of the terminal area. This construction was applied not only to the station tracks, in which resort was had to the special construction referred to above, but also through most of the standard track construction and all of the turnouts, slips and diamond crossings, for which the concrete blanket or slab construction serves as the base upon which ordinary ballasted track is supported. It was described in detail in an article by J. D'Esposito, in Railway Engineering and Maintenance for September, 1925, page 353.

This unusual form of construction was adopted after a study of the unfavorable conditions imposed, which led to the conclusion that track maintenance would be exceedingly expensive and that it would be impossible to maintain the tracks in a satisfactory condition unless a more stable support was secured than that offered by the natural surface of the blue Chicago clay in a location so close to the Chicago river that it was constantly in a state of saturation and with the tracks at an elevation that would make satisfactory drainage impossible.

Covers Large Area

The total area of the concrete slab construction is 1,125,000 sq. ft., or approximately 25¾ acres. This area embraces all of the tracks from the north limits of the terminal property to Polk street and throughout the limits of the double crossover between Taylor street and Roosevelt road. In addition the slabs were provided to support the two joint transfer tracks from the north end to Harrison street.

This construction consists throughout of 10-in. slabs of concrete reinforced in both faces with wire mesh or bars and divided in units of convenient size for construction. All of the slab construction was laid on a bed of 6 in. of cinders. Where the tracks are ballasted the slabs are generally 13 ft. wide, corresponding to the track spacing, and 31 ft. long. Under the platform tracks they are 14 ft. wide with a slab of plain concrete under the platforms to fill out the space between adjoining track slabs. Superimposed on these platform track slabs is a second concrete slab of irregular section designed to hold and support the short blocks which carry the rails, while along either side is a curb wall to retain a fill of fine stone screenings which supports the slabs providing the surface for the platforms.

Difficult Drainage Problem

With a construction such as this, drainage is a matter of prime importance and entails special measures in that portion of the area between the north end of the train shed and Harrison street, where the track level was so low as to preclude gravity outflow into the city sewer. Throughout the length of the station platforms the tracks are on a sufficient grade to insure adequate flow to catch basins, but under the approach tracks it was necessary to slope the slabs independently of the track grade so that the depth of ballast varies from 6 in. at the ridges to 10 in. in the valleys. The drainage system consists of a series of lateral or cross drains of 2-in. cast iron pipe, spaced approximately 30 ft. center to center, with catch basins between the tracks in the ballasted construction and in the trough or center line gutter of the platform tracks. These cross drains discharge into 12-in. cast iron longitudinal drains which, in the case of the area south of Harrison street, empty directly into the city sewer. North of Harrison street the drains discharge into two sumps, one

The Train Shed Is of a Design Which Affords Ample Light and Air Over the Passenger Platforms

just south of Van Buren street near the mail building, and the other at Madison street, from which the water is pumped into the river by means of two automatic centrifugal type bilge pumps. These two pumps are also connected by a by-pass with an independent drainage system for the down spouts of the train shed, which discharges directly to the river, the only function of the bypass connection being to insure that the [illegible] drainage system is thoroughly drained after each rainfall.

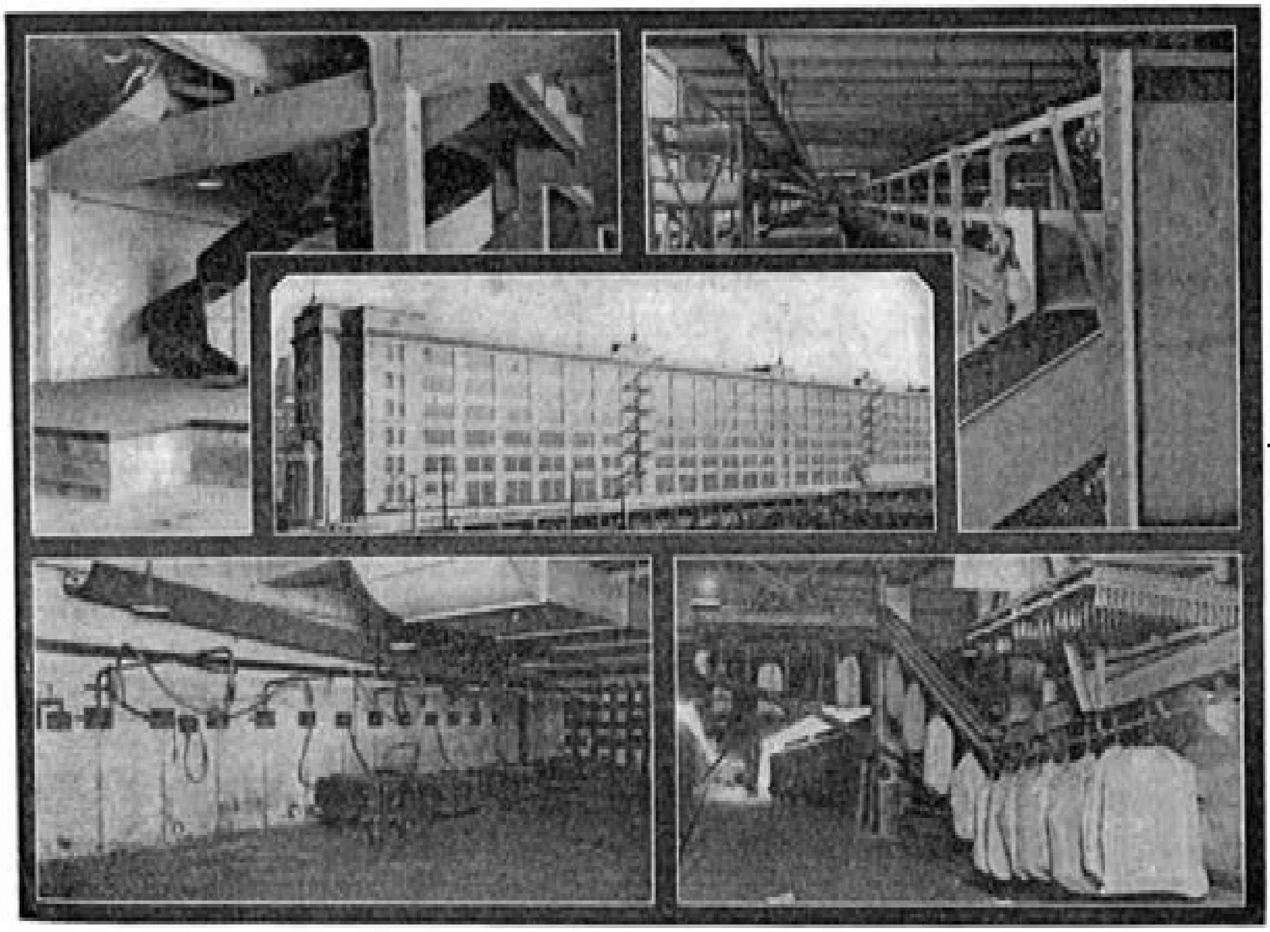
Results Justify Added Expense

A considerable portion of the track support has been in service for five years and the experience with it has fully justified the added expense for the construction. An unusual opportunity for a study of the results is af-

[illegible]ted to the fact that a portion of the tracks, namely, those between Polk street and Taylor street, which are supported directly on the natural foundation, were placed in service at about the same time. This stretch of track, which contains almost no frogs or switches, has required maintenance expenditures fully four times as great as that which has been necessary on the tracks in the block between Polk and Harrison street, which is supported on the slab construction and which embraces a large number of slip switches and four diamond crossings.

An Innovation in Mail Terminals*

With a development and construction period coincident with the decade during which the greatest impetus was given to the parcel post service, it became apparent early in the course of the project that the station facilities must include provision for the handling of mail far in excess of anything that had ever been considered necessary in the design of any other passenger station. Studies of the requirements made by the railroads and also by a committee representing the railway mail service led to the conclusion that the situation called for the development of a plant isolated as far as possible from the other station facilities and which would not only afford adequate capacity for the conduct of that portion of the mail handling which falls directly on the railways but which could be utilized in large part for a variety of postal operations definitely under the control of the postal department. In December, 1920, an agreement was drawn between the railway mail service and the Chicago Union Station Company under which the station company agreed to construct a large building comprising seven stories and a basement and to lease the upper six floors to the federal government, the track level and the basement to be reserved for its own use. Detailed plans were then prepared and contracts awarded and the building was placed in operation in December 1922.



Five Views of the Railway Mail Terminal

Upper Left, the Spiral Chutes; Upper Right, One of the Belt Conveyor Separating Units; Lower Left, the Battery Charging Station for Electric Trucks; Lower Right, the Trolley Conveyor System for Delivering Mail Sacks to Cars

Is of Unusual Size

The building is located just east of the station tracks [illegible] the south group and extends from Van Buren street to Harrison street. It is 798 ft. long and [illegible] ft. wide,

*A more complete description of the mail terminal appeared in the Railway Age of March [illegible], page [illegible].

contains 11 acres of floor area, has a cubical contents of 8,500,000 cu. ft. and is designed to handle 3,000 tons of mail matter each 24 hours. It is served on the second or street level floor by a driveway 55 ft. wide extending the full length of the building along its east side which affords 850 ft. of tailboard space or enough to serve 64 vehicles at one time. Platforms serving the two tracks provided exclusively for mail service and the easterly passenger tracks have a length sufficiently adequate to accommodate 63 cars.

The building has a steel frame containing 23,000 tons of structural steel, the most notable feature of which is a steel truss in the west wall 149 ft. 9 in. long spanning a crossover between a track inside the building and one outside. This truss carries a load of 4,050 tons and is the heaviest truss ever used in building construction. It weighs 365 tons.

Adopt Details of an Industrial Structure

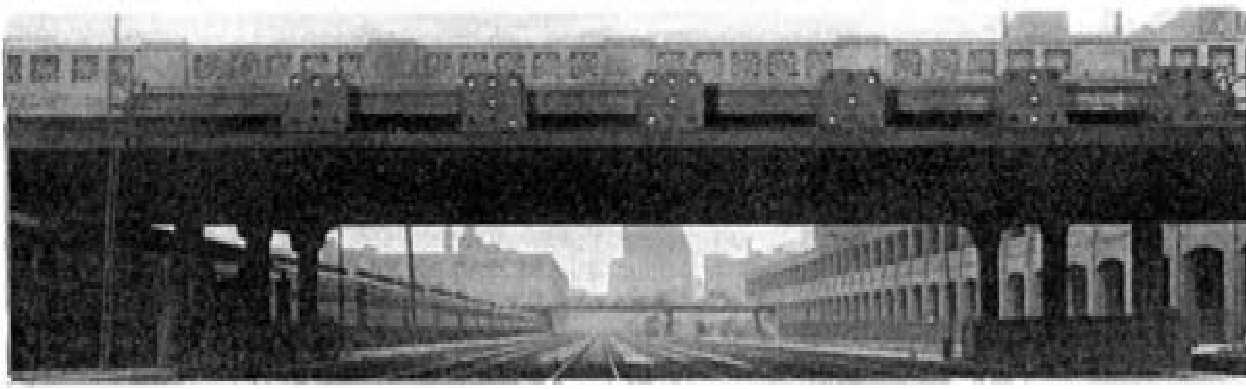
The building has brick walls faced with cream colored brick and reinforced concrete floors provided with a wearing surface of creosoted blocks. On the track level the building is open to the weather on the ends and along the west side. On the street level the open space along the delivery platform is provided with rolling doors. The windows afford large glass areas set in steel sash. The main entrance on Van Buren street and the minor entrance on Harrison street, as well as the cornices, belt courses, etc., have been finished in Indiana limestone.

While most mail handled is loaded and unloaded from cars spotted on the mail building tracks, provision is made for the handling of mail to and from cars and trains at points on the passenger tracks by means of trucks which deliver and receive mail in the basement, whence they are afforded access to the baggage platforms on the north and south passenger tracks by a tunnel extending from the mail building to the baggage room and thence via any one of the baggage platform ramps to the mail cars. More direct access to the south ends of the south station tracks is afforded by means of a tunnel leading west from the mail building to the power house, from which elevators communicate with the platform level.

Serves Many Purposes

The terminal has a variety of functions. From the standpoint of railway officers the feature of first interest is the handling of mail received from and delivered to trains at the union station. The portion of the work handled by union station employees consists primarily of the transfer of mail sacks from street vehicles to mail cars and vice versa. However, the great bulk of the operations at the terminal consist of the receipt, classification and dispatch of all papers, catalogs and parcel post mail originating in Chicago, as well as mail of these three classes passing through the city.

All classes of mail made up in bags for mail cars on lines served by the union station are received on the street level at the north end of the building where 18 chutes are available for transmitting the sacks direct to the track or basement level to be sorted and loaded on platform trucks for transfer to mail cars and to various trains. In



A View of the South Approach Tracks Showing Position Light Signals Mounted on the Fascia of the Taylor Street Viaduct. Pennsylvania Freighthouse in the Right Background

coming mail on trains entering the union station is sorted on the track or basement level, loaded on trucks and delivered to the upper floors of the building by any one of 15 Otis freight elevators. Sacks of mail properly sorted for other railway stations or for Chicago city delivery are delivered to the street level floor and trucked to the driveway space near the south end of the building for transfer to street vehicles.

Elaborate Mechanical Installation

The mail terminal owes its greatest distinction to the elaborate amount of mechanical equipment provided for the various operations of transporting, elevating, separating and chuting of mail matter in the operation of the plant under the direction of the postal service. This consists in large part of a system of 65 conveyor belts operated by independent electric motors and entailing the use of seven miles of belting. This equipment was designed and installed by the Lamson Company. It includes also five spiral chutes built by the Samuel Olson Company which delivered mail sacks either to the street level, the track level or the basement. One unique development in this connection is an overhead trolley conveyor system for the delivery of mail at the track level from the ends of the spiral chutes into the mail cars spotted along the various platforms. This consists of an overhead rail made of a cold rolled steel bar [illegible] in section supported from the canopy over the platform and extending to the handling platform located at the base of the spiral chutes.

The rail serves as a runway for a trolley which consists of a small bronze frame equipped at its upper end with a trolley wheel and at its lower end with a hook from which the mail sacks are hung by the same cord. The hook is mounted on a pin so that it may be tripped to release the sack whenever a projecting finger on the side of the trolley is made to engage with an obstruction on the course of its travel along the rail. This obstruction is introduced in the form of a portable tripping device which can be mounted on the trolley rail at any point in its length. This system, which was developed by the [illegible] Company of Chicago, has effected a marked saving in labor, since it does away with the loading of trucks at the chute, then pushing them to the mail cars and unloading at the cars.

Interlocking System Embraces New Features

The signaling and interlocking system for the operation of trains is divided into two parts, one controlling the station and approach tracks at the north end, the other governing those at the south end. As explained previously, the switches in both the north and the south tracks are arranged in two distinct groups, one group serving the ladders and cross-overs at the entrance to the trainshed and the other embracing the cross-overs at the ends of the station company's property.

The operation of the station requires that all passenger trains must be handled twice; outbound trains must first be backed in from the coach yards and incoming trains must be backed out after delivering passengers. This program requires a close co-ordination in the operation of the two groups of switches to give a smooth and complete movement between the station and coach yards and at the same time retain clear tracks for the movement of outbound and inbound trains. Careful consideration of this operating feature led to the adoption of one central point at each end of the station for the control of all switches and signals.

Extent of the Requirements

The plant governing traffic at the south end controls 36 high signals, 70 dwarf signals, 9 movable point frogs, 76 double slip ends and 47 single switches, covering a length of 4,200 ft. The plant governing the traffic at the north end controls [illegible] high signals, 57 dwarf signals, 15 movable point frogs, [illegible] double slip ends and [illegible] single switches, covering a length of [illegible] ft. Concentrating the control at one point eliminates the exchange of information necessary to co-ordinate train movements.

Both interlocking plants are of the electro-pneumatic type with semi-automatic signals, furnished by the Union Switch & Signal Company. Electric power for the operation of the plant is supplied from the Union Station company's substation at 2300-volt current is distributed to the interlocking system over two power lines each having its own transformers where the voltage is changed to 110 volts to serve the interlocking system. Compressed air at 70 lb. pressure is furnished by the Union Station company's power plant.

The Interlocking Towers

The interlocking towers are of reinforced concrete and steel construction with brick facing and tile roofs. The south tower is located just south of the railway mail building on columns, astride of one of the east side tracks serving the mail terminal. The north tower is located east of the tracks a short distance north of Lake street. These towers are two stories high with relay, motor generators and storage batteries on the lower floor and a Union Switch & Signal Company's Model 14 electro-pneumatic type interlocking machine on the upper floor. Each machine is equipped with two rows of lever lights which are used for providing a visual indication as to the condition of the section locking for the switches and the operation of the signals.

The track models are of the illuminated spot light type.

Looking North at the Throat of the South Station Tracks—Signal Tower in the Right Foreground, Railway Mail Terminal Building in the Center Background.

The south plant model has 191 spot lights for track circuits, 2 for traffic direction between plants and 29 for train starting, a total of 222 spot lights. The north plant model has [illegible] spot lights for track circuits, 2 for traffic direction lights between plants and [illegible] for train starting, a total of [illegible] spot lights. Spot lights placed as near the middle of each track circuit as possible show a green light when the track circuit is clear and a red light when the circuit is occupied. The lights for traffic direction also shows an arrow pointing to the direction in which the traffic is set up.

Auxiliary Equipment

Multiple unit type power instrument cabinets of steel construction with glass doors are placed back to back in rows at right angles to the interlocking machine, on the floor below. The switchboard, motor-generators and storage battery are all housed in the same room. Iron-clad Exide storage batteries of 300 ampere hour capacity, consisting of two sets of 14 volts each, assembled in sets of 5 and 4 cells, are mounted on a concrete platform 6 in. above the floor. These storage batteries are used to control the switch valve magnets, switch indications, signal control and route locking relays. The motor-generators and switchboard are of the General Electric Company's make, there being one motor generator for each set of batteries.

Switch movements are Union Switch & Signal Company's electro-pneumatic type-M. All of these switch movements are equipped with U. S. & S. separately mounted Stokes' cut-off type valves to effect economy in air consumption.

New Design of Position Light Signals

Position light signals were adopted and a special design for the high light signals of a new type was developed after a careful study of the conditions imposed by the necessity for placing them on the facias of the street viaducts crossing the tracks. Special pains have been taken to give these viaducts an attractive design and avoid the introduction of any features projecting above the top of an ornamental railing of uniform height. Consequently, it was highly desirable to develop a type of signal that could be supported against the outside of these railings without projecting above their tops. It was also desirable to provide signals for these tracks affording five indications, a requirement that would have required three arms in a semaphore type of signal, two units in a standard position light signal and three units in a color light signal.

The position light signal, as developed for the high signals, gives five aspects in a single unit. It consists of two horizontal rows of three lights each with a single light placed in the center and half way between the two horizontal rows.

Dwarf Signals Give Four Indications

The dwarf signal is a standard position light dwarf signal with four lights that afford four indications. The significance of these aspects is explained in the diagram. The addition of the fourth indication to the dwarf signal is a new development in signaling and makes the dwarf signal particularly suited for signaling a busy terminal to allow trains to occupy tracks to full capacity and the addition of the fourth indication allows the connecting of the dwarf signals into a complete signal system, giving complete information for the governing of traffic at the maximum speed at which it is desired to operate in the terminal territory.

The dwarf signal at *clear* indicates that the next signal is at clear or caution. The dwarf signal at *caution* indicates that the next signal is at stop but the track is unoccupied to the next signal. The dwarf signal at *permissive* indicates that the track is occupied immediately ahead and that the movement should be made with caution, prepared to stop short of a train or obstruction. The dwarf signal at *stop* indicates that the route is not set. Use is made of the permissive signal in governing movements to stub end mail tracks and coal tracks at the power house.

How Trains are Started

The system of inter-communication between conductors, gatemen and interlocking operators employs three indication colored light signals located adjacent to the station concourse, with one signal for each station track, two indication spot lights at the entrance gate for each track and two indication spot lights on the illuminated track model in the interlocking tower. Push button control switches are spaced approximately every 50 ft. on the train shed columns on the passenger platforms for the use of trainmen. The push buttons for gatemen are placed at the gates directly beneath the

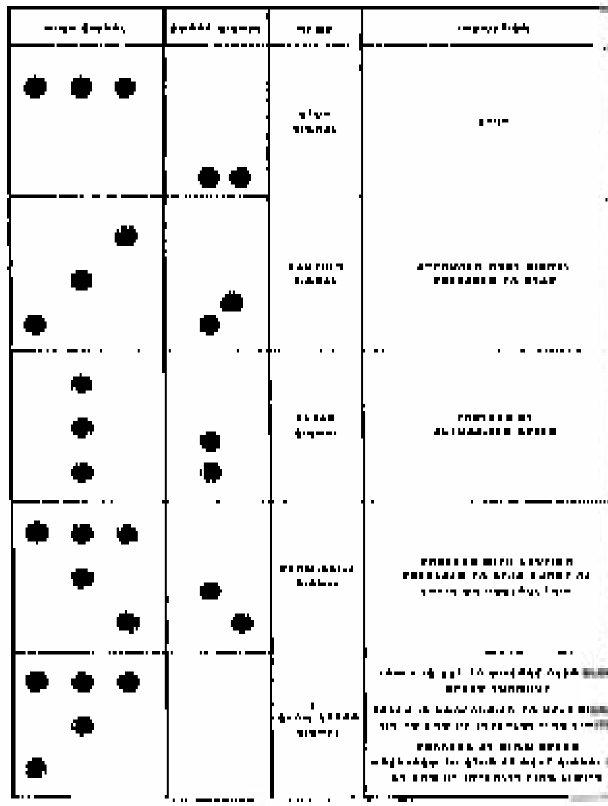


Diagram Showing the Indications Afforded by the High and Dwarf Signals.

spot-lights. The push buttons for tower operators are placed on the operator's desk in the interlocking tower. The manner of operation of the train starting system is as follows:

First. The conductor pushes the button nearest to his location on the platform, lighting the red spot light on the illuminated track diagram in the interlocking tower which is placed at the end of the track corresponding to the track from which the train is leaving and if the occupation is proceed at the tower the red light is lighted on the color light signal suspended in the train shed adjacent to the station, the concourse and beside the track from which the train is leaving.

Second. If the tower operator is prepared to handle the train he pushes the button on the operator's desk, thus changing the color light signal near the concourse to yellow, changing the light on the illuminated track diagram to yellow and lighting the yellow spot light at the gate.

Third. The gateman, after closing the gate, immediately pushes his button at the gate, changing the color light signal to green and the spot light at the gate to green, thus permitting the train to leave, providing the proper indication of interlocking signals has been received.

Fourth. The train, immediately upon accepting the first interlocking signal, automatically puts out all train starting lights.

Power Facilities Amply Provided For

The mechanical facilities in an establishment as large as the Chicago Union Station are necessarily of considerable magnitude and of a highly diversified character. The heating requirements are large and are complicated by the special importance of thorough ventilation, particularly in the basements of both the station building and the mail building and in the office space of the head house to the level of the top of the waiting room, where effective window ventilation was not readily obtainable. Ventilation is also of great importance because of the fact that the extensive system of driveways under the headhouse is constantly being used by motor vehicles.

The heating system in the station proper, which is primarily one of direct radiation, is supplemented in large part by a tempering of the large volume of air driven through the ventilating system. The radiators are placed at points of exposure such as the vestibules of the various entrances, exposed outside walls and the skylights where they serve the secondary purpose of preventing condensation on the glass.

A Million Cubic Feet of Air Per Minute

An idea of the magnitude of the ventilating system is afforded by the fact that the complete fan installation has an aggregate capacity of 1,500,000 cu. ft. of air per min. There are 35 fans in the station proper and 5 in the mail building, the largest of which has a capacity of 67,000 cu. ft. of air per min. In addition, 11 fans have been provided for exhausting smoke under the viaducts at Jackson boulevard and Adams street. The ventilation in the station structure embraces both plenum and exhaust systems. Fans in the basement take air from large shafts opening into the court above the waiting room and distribute it through a great network of ducts to the various rooms. A second set of fans in penthouses on the roof of the headhouse exhaust air from the building.

All fans, except those for exhausting smoke, were supplied by the Sturtevant Company. Those in the headhouse and concourse are driven by Westinghouse motors through Link Belt silent chain drives. Those in the mail building are direct driven by General Electric motors. All air passing through the plenum system is filtered by Reed air filters, which comprise cells of galvanized metal frames 18 in. square enclosing mats of oil coated steel wool. These filter mats are readily removable for the purpose of washing them with water and soap powder after which they are recoiled and replaced. Each fan is equipped with Vento heaters regulated by the Johnson Service Company's thermostatic control system.

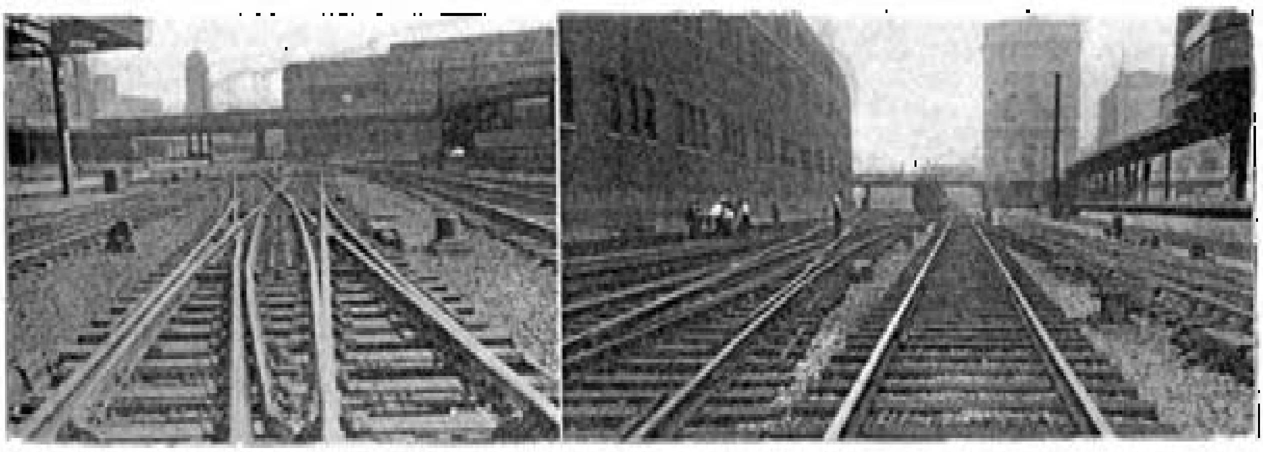
Hot Water Heat in Mail Building

The heating in the mail building is of a different character except for the basement which is heated and ventilated by tempered air in the same manner as in the main station. The upper six floors are heated by forced circulation hot water, this system being selected because of the fact that most of the street floor of the building is open to the air and unheated, which would have seriously complicated the return of the condensate from a steam heating system because of the danger of freezing. The water for this heating system is heated in Sims heaters and circulated by two American Steam Pump Company's centrifugal pumps driven by Terry steam turbines. Sims heaters are also used for heating domestic hot water supply in both the mail building and the headhouse.

Other equipment in the headhouse includes two American Carbonic refrigerator compressors with a capacity of 70 tons of ice per 24 hours for the restaurant service and one compressor of the same make having a capacity of 30 tons of ice for drinking water service. There are also three Worthington house pumps each with a capacity of 10,000 gal. per hour for building water supply, four International filters of the same unit capacity for filtering all water used in the building; a Fairbanks-Morse motor driven centrifugal fire pump with a capacity of 1500 gal. per min.; four Nash duplex centrifugal motor-driven pumps for the return of steam condensate to the power house, two 500-gal. Shone pneumatic sewage ejectors and two dry basin type centrifugal bilge pumps furnished by the Yeomans Brothers Company. Equipment of a substantially similar character is also provided in the mail building.

Power Plant for Heat Only

The supply of the energy required in the terminal, not only in the form of steam for heating but also the power for the operation of the pumps, fans, compressors, etc., is large and imposed an important problem with respect to the power supply, no small portion of which comprises the electric current for the lights, signals and the operation of the mechanical equipment. A careful in-



Some of the Slip Switches Have Been in Service for Five Years and Have Rendered Excellent Service vestigation by the station company led to the conclusion that the greatest economy and reliability of service would be afforded by the purchase of electrical power from the local public utility, the Commonwealth Edison Company, rather than to construct and operate its own central station plant. Consequently the power plant provided by the station company is designed solely to provide steam for heating the station buildings, to supply hot water for domestic use, steam heat supply for cars and for the operation of air compressors to supply compressed air for the operation of the switches in the interlocking system and for the charging of trains.

The steam plant is located on a small triangle of land fronting on Canal street a short distance north of Harrison street. It has a steel frame with brick walls and a radial brick chimney 227 ft. high by 12 ft. inside diameter supported on girders forming a part of the steel frame. The plant contains six Babcock & Wilcox, Stirling type water tube boilers of which four are 640 hp. and two are 528 hp. rated capacity each. They are fired by Green chain grate stokers. Coal and ashes are handled with equipment furnished by the Webster Manufacturing Co.

Engine Room Equipment

The engine room contains two Manistee rotary boiler feed pumps operated by Terry steam turbines, two Bury steam-operated air compressors with a capacity of 800 cu. ft. of free air per min. equipped with Reed air filters; two small Worthington pumps, one for boiler feed during periods of small steam demand and another for boiler washing, and a Warren Webster open type feed water heater.

The steam delivery service is provided by two lines of 10-in. pipe and a 6-in. condensate return extending from the boiler house through the tunnels and basement of the mail building and continuing to the basement of the headhouse, one of the 10-in. lines being provided purely for reserve. In addition an 8-in. line is carried from the boiler plant to the mail building with a 4-in. branch from the mail building to the headhouse for summertime low head service. Facilities for heating cars at the station tracks is afforded by steam lines along the ends of the tracks with outlets equipped with Barco flexible metallic couplings.

Electric power is supplied by the Commonwealth Edison Company at a sub-station in the sub-basement of the headhouse and another in the basement of the mail building, as three phase, 60 cycle, 12,000 volt current. In the headhouse sub-station the current is brought in over three independent cables to insure continuity of service. This sub-station is provided with all necessary equipment for transforming and converting the current supplied to 115-230 volt alternating current for station and other lighting, 250-volt direct current for power uses and 2,300 volt alternating current for the train shed and yard lighting and for the interlocking plants as previously described. The transformers and converters were supplied by Allis-Chalmers. The station has a capacity of 3,750 kw. with provision for increasing it to 4,000 kw.

The sub-station also contains two special Allis-Chalmers motor generator sets for supplying direct current at either 70 or 80 volts for train lighting and train battery charging. The current for this purpose is conducted to receptacles on each pumping post at the ends of the station tracks and is regulated by Allen Bradley rheostats.

The sub-station in the mail building has a capacity of 1,100 kw. and is similarly equipped. The general power service throughout the mail terminal is 230-volt direct current and in the power plant it is 440-volt alternating current. Charging equipment for the storage batteries of the trucks and tractors used in mail and baggage handling is located adjacent to the mail terminal sub-station.

A study of the speed requirements of the motors required for the various applications, such as the ventilating fans, pumps, refrigerating machinery, conveyors, elevators, etc., was responsible for the adoption of the direct current system. With few exceptions all motors in the main station are Westinghouse Type S K while those in the mail building are General Electric. The control equipment was furnished by the Smith Electric Company and each control panel is equipped with a Crouse enclosed externally operated circuit breaker.

Problems of the Construction Program

The period of nearly 11 years which has elapsed between the completion of negotiations with the city in September, 1914, and the opening of the station appears longer than necessary to complete a project of this kind, but there are many reasons why the work could not be carried out in less time. As seen on the map of the old terminal layout, the site was hemmed in on the east and south by freight stations which could not be abandoned and razed until new freight terminals could be completed to replace them. Moreover, the acquisition of the property occupied by the station, as well as the purchase of sites for the new freight station facilities by the various railroads, involved protracted negotiations and it was not until 1916 that these had been carried to a stage that permitted of active prosecution of the construction work. Furthermore, there was much construction of a preliminary nature that had to precede work on the actual station facilities. Under the contract ordinance with the city new sewers had to be built, viaducts had to be reconstructed to accommodate new track grades and a wall had to be built along the river front. In addition, the approach to a street car tunnel under the Chicago river had to be lowered to accommodate the lower elevation of the tracks and buildings had to be wrecked and removed from the site of the headhouse and large areas to be occupied by the station tracks and approaches.

The Freight Stations

The construction of new freight terminals for the Pennsylvania, Burlington and Alton comprised projects of large magnitude in themselves. The first of these to be completed and largest was that of the Pennsylvania and embraces a freight station 785 ft. by 120 ft. in plan five stories high extending from Polk street to Taylor street on the east side of the Union Station tracks. It is supplemented by a team yard between Taylor street and Roosevelt road which is now under construction. The Alton terminal occupies an irregular shaped area north of the Pennsylvania terminal with a freight house fronting on both sides of Harrison street.

The Burlington's new local freight facilities occupy all available space between the station tracks and Canal street from Harrison street to Roosevelt road as well as the track level space under Canal street within these limits. The new freight house occupies the space between Harrison street and Polk street with two small extensions south of Polk street, the remaining area being occupied suburban tracks. All of these freight stations are of the two-level type with tracks on the lower level and driveways on the upper level.

As the new Burlington freight house was built on ground largely occupied by old facilities, this road constructed a temporary station south of Taylor street which was used while the old houses were removed and the new one was built. But in the case of the Alton and the Pennsylvania the old stations were kept in service until the new facilities were ready for service.

Other Obstacles Encountered

Other conditions which arose during the course of the work were responsible for a large part of the delays. President Wilson's proclamation urging the cessation of all work unnecessary for the winning of the war led to a curtailment of activities in 1917 and a virtual cessation of operations from July, 1918, to the spring of 1919, but labor troubles caused the most serious obstruction to the completion of the work. Strikes on the Pennsylvania's new freight station delayed the completion of that project fully 18 months and caused a like delay in the removal of the old freight facilities on the passenger station site. These delays together with labor difficulties on the station resulted in a loss of time that aggregated at least four years.

Because of the loss of time in clearing the site of the new terminal and the necessity for avoiding any interference with the operation of the old station, the construction work had to be carried out in piece-meal fashion. The first track work was done on the south approach between Polk and Taylor streets. This was later extended to Van Buren street and toward Roosevelt road, but was not completed to the south end of the station property until the present year on account of a delay on the part of the city in carrying out plans for the rebuilding of the Roosevelt road viaduct. Work on the north approach could not be started until much later because the site had to be cleared by the removal of two large warehouses.

Owing to the limited track capacity of the old station it was out of the question to take any of the old station tracks out of service until other tracks could be completed to replace them. In the south unit this was carried out by completing the three westerly station tracks as far north as Jackson boulevard and constructing a temporary station for the use of suburban passengers, so that these three tracks could be turned over to suburban service. Following this the tracks for the mail terminal were completed, after which new tracks were completed toward the center of the layout, gradually transferring the trains to the new tracks as the old ones were taken up.

Many Difficulties Involved

North of the concourse the first step was to provide three temporary tracks next to the river bank on ground vacated by the removal of the Pennsylvania freight house. Requiring the release of an equivalent trackage along the west side for the construction of new tracks, this work was carried progressively eastward until all the new tracks were in place, except those which are to occupy the site of the old station. All of this work entailed considerable difficulty in providing for a continuity of connections to the new and old tracks and in providing means for passengers to reach trains on account of the difference in elevation of the new and old tracks, the new tracks being from 3 to 5 ft. lower than the old ones. From an engineering standpoint the work also involved considerable difficulty because of the special turnout construction. Many of the slip switches had to be installed in place when opportunity afforded, without connection to tracks on either end, which required that their location had to be so definitely established as to insure an accurate fit with track work carried out subsequently.

Started Work on Station Building in 1919

The work on the station building was started in 1919 with the excavation of the site and the sinking of caissons for foundations and the construction of retaining walls on the site of the headhouse. It was originally planned that the headhouse would comprise a structure used only for station purposes, its height being limited to that required for a waiting room with a high ceiling. The foundations for a structure so designed required 208 caissons containing 13,000 cu. yd. of concrete. However, shortly after this foundation work had been completed it was concluded that the air rights on the site occupied by this structure were so valuable that it would be unwise to construct a building which would not permit of their full development. Accordingly, it was decided to construct a building which would not only house the main waiting room and auxiliary facilities but would serve also as an office building, with an ultimate height of 22 stories. This decision at once introduced a serious problem because the loads to be imposed by a 22-story building were so much greater than those of the structure for which the foundations had been constructed that the piers already in place were entirely inadequate to carry the taller structure.

An Unusual Foundation Problem

A further complication was introduced by the fact that the new design of building entailed an extensive relocation of columns so that the position of many of the columns did not correspond to the location of the foundation piers. Under these circumstances an extensive reinforcement of the foundation was imperative.

Before undertaking this, careful consideration was given to the possibility of applying greater loads to the piers already in place than those for which they had been designed on the basis of the unit bearing pressure allowed by the building department of the city of Chicago for caissons supported on hardpan, namely six tons per square foot. This led to the construction and loading of an experimental caisson four feet in diameter by 71 ft. deep which had the support removed from beneath its bottom by digging a tunnel from a shaft sunk nearby so that the loads imposed on its top were supported entirely by the skin friction of the sides. The test made on this caisson showed that no movement occurred under loads producing a skin friction of 880 tons per sq. ft. of cylindrical surface and on the basis of these findings the city building commissioner authorized the increase in the allowable load on the caissons to 10 tons per sq. ft. The exact manner of making this test is explained in an article in the *Railway Age* for March 11, 1922, page 591.

Rebuild Foundation

However, in spite of this concession the work of strengthening the foundations was both difficult and expensive. It required the sinking of 102 additional piers from 4 to 10 ft. in diameter, some of them so close to the old ones as to introduce serious complications in excavation. In addition a large number of reinforced concrete girders had to be constructed to span across two or more of the piers for the support of columns in new locations. In such cases cantilever construction had to be resorted to as a means of relieving some of the old piers of a portion of the load applied.

This work was followed by the erection of the superstructure of the headhouse and the completion of the Canal street structure, after which work proceeded on the excavation and foundation work for the concourse. To permit the concourse work to proceed it was necessary to provide a temporary passageway for the passengers between the old station and trains entering the station from the south, which at this time were using the new south group tracks. This arrangement, which entailed a walk of about one block from the station to the head of the passenger tracks, was probably the most serious inconvenience to which passengers were subjected as a consequence of the construction operations. Practically no delays to trains were attributable to the construction work, in fact, after the old freight station had been removed there were more tracks available for passenger station use than were embraced in the old station facilities. As soon as the roof, walls and a portion of the floor of the new concourse were completed the passengers were provided with a passageway through this structure to the south train sheds.

Work Still to be Done

With the opening of the new station on May 16, opportunity was afforded for the wrecking of the old station and the excavation of the site for the construction of the tracks, platforms and trainsheds in the north group, upon which work could not proceed until the old station is removed. This work is now in progress. With this exception, the framework of the new train sheds is all in place and the concrete tile roof and skylights are being erected, temporary umbrella sheds being removed as fast as the new roof is completed.

The removal of the old station also makes it possible to proceed with the work of raising Canal street to the new level and widening it to 100 ft. in the block between Monroe street and Adams street, the only portion of the improvement of Canal street which has not been completed.

All of the various viaducts across the tracks are now complete with the exception of Adams street, upon which work will be undertaken shortly in connection with the construction of a new bridge across the Chicago river by the city. The conduct of these additional items of construction work will, however, result in little interference in the operation of the station.

Accessory Facilities

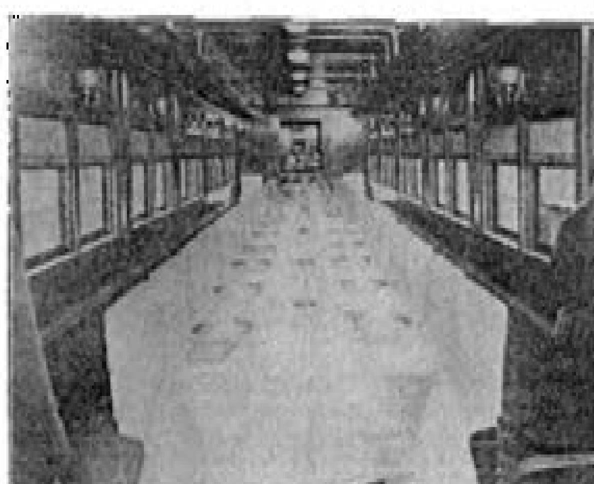
Among the supplemental facilities which have been provided to make the Chicago Union Station as complete as possible from the standpoint of service to the passengers, and which were not referred to in the earlier part of this article, are a hospital, a cell room and immigrant quarters. The cell room and immigrant quarters are in the basement, access to them being provided by a corridor leading from a stairway in the west platform of the south [illegible] track a short distance south of the train concourse. The former contains two cells, a toilet room and accommodations for police officers. The latter provides a small waiting room and toilets and lavatories for men and women. The hospital is located on the mezzanine floor at the northeast corner of the headhouse. It provides wards for both men and women, a [illegible] room, reception room and operating room.

The requirements of those employees for whom Chicago is an away from home terminal have also been considered in providing recreation, rest and locker rooms on the third floor. A lantern room where trainmen's lanterns are stored, cleaned and refilled, is provided in the basement.

Organization

During the course of negotiations with the city of Chicago in 1913, the Chicago Union Station Company was organized and J. J. Turner, first vice-president, Pennsylvania Lines West, was elected president. Thomas Rodd, chief engineer of the Pennsylvania Lines West, was also made chief engineer of the Chicago Union Station Company, with Joshua D'Esposito as assistant chief engineer in direct charge at Chicago. Graham, Anderson, Probst and White, Chicago, were retained as architects. In addition, an advisory board of engineers was organized which consisted of the chief engineers of the proprietary railroads, this board remaining in active service during the entire construction period. In 1919, upon the retirement of Thomas Rodd from active railway service and his appointment as consulting engineer, Mr. D'Esposito was made chief engineer. The staff which assisted him in the design of the various facilities and the conduct of the work included A. J. Hammond, principal assistant engineer, who resigned in October, 1922, and was succeeded by E. F. Stetson; I. Wedemann, engineer of buildings and structures; A. S. Holmes, assistant to the chief engineer; C. F. Cox, engineer of contracts and estimates; C. T. Noland, office engineer; F. Brock, mechanical engineer; Thomas Holt, signal engineer; C. W. Post, electrical engineer, and C. L. Swanson, chief clerk. Following the retirement of Mr. Turner in 1922, Samuel Rea was elected president of the Union Station Company.

The principal construction contractors on the project were as follows: John Griffiths & Son Company, general contractors for the headhouse and concourse; R. C. Wieboldt Company, general contractors for the mail building and foundation and steel erection contractors on the headhouse; W. J. Newman Company, contractors on excavation, wrecking, sewer construction and concrete track slab construction; Robert Gordon, Inc., heating and ventilating; O'Callaghan Brothers, plumbing; A. E. Coleman Company, ornamental iron work; Edward Moser Roofing Company, roofing; McNulty Brothers Company, plastering; Alfred Olson Company, painting; Hatfield Electric Company, electrical installation; Kelly-Atkinson Construction Company, Ketler-Elliott Construction Company and Overland Construction Company, structural steel erection; and the Underground Construction Company, foundation work.



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Banquet Car Originated by President Budd of the Great Northern

WHAT THE SIGNALS MEAN

NAME	CLEAR	APPROACH	SLOW CLEAR	SLOW APPROACH	RESTRICTING	STOP
HIGH TYPE SIGNAL						
DWARF TYPE SIGNAL						
MEANING	PROCEED AT NORMAL SPEED	PROCEED PREPARED TO STOP AT NEXT SIGNAL	PROCEED AT SLOW SPEED WITHIN INTERLOCKING LIMITS	PROCEED AT SLOW SPEED PREPARED TO STOP AT NEXT SIGNAL	PROCEED AT RESTRICTED SPEED	STOP

Safety is of the First Importance

CHICAGO UNION STATION COMPANY • 210 S. CANAL ST., CHICAGO, ILL.

When A Locomotive Whistles

(○ means short sound;
— means long sound)

It means . . .

○
Apply Brakes.

— —
Release brakes, proceed.

— ○ ○ ○
Flagman; Protect rear of train.

— — — —
Flagman: Return from south or west.

— — — — —
Flagman: Return from north or east.

○ ○
Answer to any signal not otherwise provided for.

○ ○ ○
(When standing) Answer to Conductor's back up signal.

○ ○ ○
(When moving) Answer to Conductor's signal to stop at the next station.

○ ○ ○ ○
A call for signals.

— — ○ —
Approaching public highway crossing at grade.

○ ○ ○ ○ ○ ○ ○ ○
Alarm to persons or livestock on tracks.

Cross-Roads

OF THE

NATION

CHICAGO UNION STATION

From this huge passenger terminal, trains of four great railroads span the nation

THE CONCOURSE

Standing majestically on the Chicago river at the edge of the famous "Loop" district is the $50 million structure of stone, steel and concrete that is Chicago's finest and most modern railroad passenger terminal: The Chicago Union Station.

From this convenient location at the edge of the busy downtown area, passengers may board streamlined, diesel powered passenger trains of four great railroads—the Pennsylvania, the Chicago, Burlington & Quincy, the Chicago, Milwaukee, St. Paul & Pacific and the Gulf, Mobile & Ohio, and travel, literally, to the ends of America: to the Atlantic or the Pacific, to Canada or Mexico. Yet Chicago Union Station is almost a city in itself for within its 35 acres of property, more than 1,500 people earn their livelihood serving railroad travelers.

The present station buildings are erected on the site of two previous Union Stations. The first structure, built in 1858 and the second, in 1880 by the Pittsburgh, Fort Wayne and Chicago Railroad (now part of the Pennsylvania). The great Chicago fire destroyed the original station in 1871. The second, completed in 1880 was, in its day, considered a splendid terminal. It was used also by the Burlington, the Milwaukee and the then Chicago & Alton (now G.M.& O.) on a rental basis.

But the city of Chicago grew so rapidly that by 1912 it became apparent that a new and greatly enlarged Union Station would be needed to serve its travel needs. In July, 1913, while many plans were being drawn up and considered, the present Chicago Union Station Company was formed to construct, maintain and operate the proposed new terminal. This company, owned together by the Pennsylvania, the Burlington and the Milwaukee, has successfully carried out this vast complex assignment.

Train service was maintained without interruption during the ten-year construction of the present buildings which began in 1914. Work, halted during World War I, was largely completed by 1925 and on May 17 of that year a man going to Pittsburgh, Pa., bought the first ticket sold in the new building. Since that time countless persons have come to the large ticket offices to purchase safe, comfortable train travel to towns both far and near.

THE SECOND UNION STATION—BUILT IN 1880 AND KNOWN ALSO AS THE "GENERAL PASSENGER DEPOT"—WAS, IN ITS DAY, AN OUTSTANDING CHICAGO LANDMARK.

THE MAIN WAITING ROOM TODAY. THIS SPACIOUS ROOM IS, EACH YEAR, THE SCENE OF CHRISTMAS CAROLING BY RAILROAD CHORAL GROUPS.

From the layout of its tracks, Chicago Union Station could almost be termed "two stations, back-to-back," for there are actually two train sheds, one to the north and one to the south of the station concourse. The "South End" (as railroad men call it) has 14 tracks for loading and unloading Pennsylvania, Burlington and G.M.& O. trains. Milwaukee Road trains use the ten tracks of the "North End". Two tracks, located at the river's edge, connect these "ends" for switching purposes.

On these 24 busy tracks arrive and depart more than 225 trains each day. Some are colorful streamliners for long-distance travel in luxurious coaches and sleeping cars. Others are local suburban trains that shuttle thousands of men and women between home and office each day. Still others carry many cars for handling mail, express and baggage to and from distant cities. Railroad men call this "head end" traffic. And in Union Station it is loaded and unloaded on special platforms entirely separate from those used by the passengers.

The station provides many lounges, restaurants, shops, and other accommodations for the convenience of its patrons. And "behind the scenes" there are still other facilities that contribute importantly to the smooth daily operation of Chicago's railway terminal. Some of these are described on the following pages . . .

THE INFORMATION BUREAU

In the very center of the concourse is the Information Bureau where specially-trained clerks answer thousands of detailed questions on train schedules, accommodations, fares and a host of other subjects as a matter of daily routine. From here come the many announcements that are carried to all parts of the main floor by the station's public address system. Seldom seen by passengers is an even larger information center on the third floor. There hundreds of daily telephone inquiries are handled.

FIRST AID STATION

First Aid Facilities are available in the Union Station for train travelers requiring emergency medical attention or convalescents waiting between trains. Experienced nurses are on duty the greater portion of each day, and doctors are available to be called on short notice. This service is without charge to the traveling public.

THE WOMEN'S LOUNGE

With homelike appointments equal to those of the finest clubs and hotels, Union Station's Women's Lounge is a quiet, inviting spot for reading, conversations with friends or perhaps a short letter to the folks back home. It is situated just off the huge main waiting room.

THE NURSERY

Very special accommodations for the youngest traveling set are provided in the Nursery located just below the Women's Lounge. There are day beds for the mothers who might desire to catch "forty winks" while their children rest or play under the watchful eye of the matron. The Nursery is purposely situated away from the bustle and hustle of the waiting room and concourse, and its lights are kept low so that mothers and children may enjoy a short nap between trains.

THE TICKET OFFICE

As many as 5,000 persons in a single day may visit these windows of Union Station's large ticket office. And the ticket sellers behind the windows must know how to figure the correct fare to any city or village in the United States, Canada and Mexico—and do it quickly! For some passengers, they also reserve parlor car, or coach seats—or perhaps one of the nine different types of sleeping car accommodations that are offered by the Union Station railroads. In view of this, it is not surprising that there is sometimes a short wait for ticket service during a rush period.

THE BAGGAGE CHECK COUNTER

Railroads do not expect passengers to carry all of their suitcases and trunks with them on the train. Instead they have a baggage checking system which enables passengers to have a liberal quantity of baggage handled by the baggage men. Here, behind the windows of the checking counter, experienced baggage men carefully make out the cards and checks that will guide each piece of baggage to its destination. Likewise, both in baggage cars and at stations where the passenger has a change of trains, records of each piece handled are carefully kept.

THE JAIL

While it seems unusual to have a jail in a railroad station, this two-cell lockup serves a very useful purpose. It is used as a "waiting room" for prisoners of the law who are being transported by train under police escort. It is one of the protective facilities maintained by the Chicago Union Station Company's police department, which also supervises auto traffic in the station driveways and maintains a constant patrol of all public rooms on the main floor. The department works closely with city, county, state and federal law enforcement agencies as well as the special agent and police departments of the railroads.

THE LUNCH ROOM

Fred Harvey

The restaurants and shops in Chicago Union Station have been operated by Fred Harvey since the station opened in 1925. A wide choice of restaurants await the traveler. They include the club-like dining room, the popular lunch room and the large cafeteria—all serving full meals; and the Streamliner Luncheonette, the Shoppers Mart soda fountain and the Fred Harvey cocktail lounge. There are also private dining rooms for special parties and business meetings. And far out of sight in the basement driveway is a little snack counter for the convenience of taxicab and truck drivers. On a typical day these many Fred Harvey eating places in Chicago Union Station will serve more than 8,000 patrons!

Fred Harvey also operates the Shoppers Mart—offering a wide selection of domestic and imported gifts, three newsstands where popular books as well as newspapers and magazines are available; eight different cigar and cigarette stands; and a large, modern barber shop.

Behind the scenes, and beneath the main floor, are blocks of neat, orderly storerooms, three gleaming kitchens, a bakery—and even a dairy! Dishes from the numerous restaurants travel to a centralized washing room on an elaborate automatic conveyor system.

THE SHOPPERS MART

Via PENNSYLVANIA . . .

TO—

Philadelphia New York
The Broadway The General The Trail Blazer The Admiral The Manhattan Limited The Gotham Limited The Pennsylvania Limited

Baltimore Washington
The Liberty Limited The Manhattan Limited The Pennsylvania Limited The Gotham Limited

Pittsburgh
The Golden Triangle The Fort Pitt

Nashville Birmingham Jacksonville Miami
The South Wind

Knoxville Atlanta Jacksonville Tampa St. Petersburg
The Southland

Indianapolis Louisville
The Kentuckian The Blue Grass Special The South Wind

Logansport Columbus
The Ohioan The Fort Hayes The Union

Dayton Cincinnati
The Southland The Red Bird The Union

Roanoke Lynchburg Norfolk
The Southland The Union

Via G.M.&O. . . .

TO—

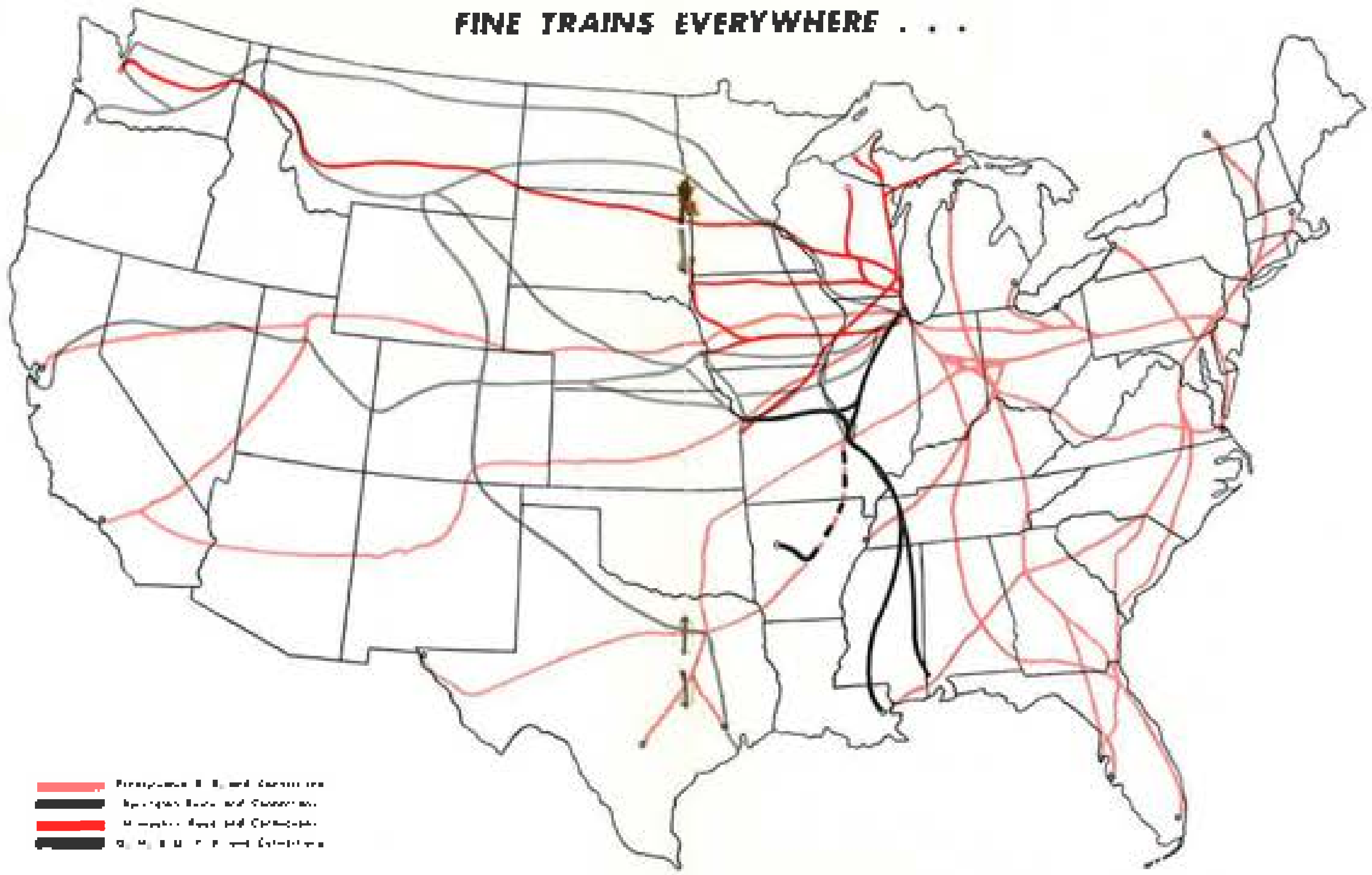
Little Rock Hot Springs
The Abraham Lincoln*

Jackson Meridian Mobile
The Alton Limited–The Gulf Coast Rebel*

Bloomington Springfield St. Louis
The Abraham Lincoln The Ann Rutledge The Alton Limited The Midnight Special

* Through sleeping cars only

FINE TRAINS EVERYWHERE . . .



Via BURLINGTON . . .

TO—

Salt Lake City San Francisco
The California Zephyr

Denver
The Denver Zephyr The California Zephyr

Burlington Ottumwa Omaha Lincoln
The Nebraska Zephyr The Ak-Sar-Ben Zephyr The Coloradan

Kansas City St. Joseph
The Kansas City Zephyr The American Royal Zephyr

Seattle Tacoma Spokane
The Empire Builder* The North Coast Limited† The Western Star* The Mainstreeter†

St. Paul Minneapolis
The Morning Zephyr The Afternoon Zephyr The Blackhawk

Galesburg Quincy Hannibal
Trains No. 3 2

* Via Great Northern † Via Northern Pacific

Via MILWAUKEE . . .

TO—

Spokane Seattle Tacoma
The Olympian Hiawatha

St. Paul Minneapolis
The Morning Hiawatha The Afternoon Hiawatha The Olympian Hiawatha The Pioneer Limited

Omaha Sioux City Sioux Falls
The Midwest Hiawatha The Arrow

Davenport Excelsior Springs Kansas City
The Southwest Limited

Houghton Calumet Sault Ste. Marie
The Copper Country Limited

Green Bay Iron Mountain
The Chippewa Hiawatha

Wisconsin Rapids Wausau Minocqua
The Tomahawk The North Woods Hiawatha

Charles City Mason City
The Sioux

Madison
The Varsity The Sioux

Milwaukee
9 Streamlined trains daily

THE BROADWAY LIMITED

This all-private-room sleeping car train, leader of the Pennsylvania Railroad's "Blue Ribbon" fleet serving Chicago, Philadelphia and New York, celebrated its Golden Anniversary in 1952. It began service between Chicago and New York in 1902, as a four-car train, hauled by light steam locomotives, that made the more-than 900 mile journey in the then sensationally short time of 20 hours. Today its powerful diesel and electric locomotives easily make this same run, with a train of 17 red and gold streamlined cars, in only 15½ hours.

The lounge car, shown at the right, is typical of the fine appointments of today's Broadway Limited. Below is shown one of the six types of sleeping rooms that are available to passengers. It is called a "Twin Bedroom". Others range from the Roomette and Duplex Room for one person, Double Bedroom, Compartment and Master Room (with private shower bath) for two, to the Drawing Room, for three. "Housekeeping" of the sleeping cars is done by The Pullman Company.

CHICAGO—PHILADELPHIA—NEW YORK

THE CALIFORNIA ZEPHYR

As famous trains go, the California Zephyr is a comparative youngster. When "born" in 1949, it was one of the first trains in the world to be extensively equipped with vista-dome cars, the two-story observation cars with the glass roof. The silvery diesel-powered streamliner was created to take over the run of an earlier train which inaugurated a new passenger route over Burlington tracks to Denver, thence via the Denver & Rio Grande Western through the Rocky Mountains to Salt Lake City and over Western Pacific rails through the high Sierras to Oakland and San Francisco. The California Zephyr follows this same scenic route today traversing the spectacular Rocky mountains (through famous Moffat Tunnel) and California's beautiful Feather River Canyon by daylight in both directions.

The car at the right is a Zephyr Vista-Dome coach. The lower picture shows how passengers enjoy the splendid view it offers. A special Vista-Dome lounge observation car is reserved for California Zephyr sleeping car passengers.

Burlington Route

CHICAGO—SALT LAKE CITY—SAN FRANCISCO

THE OLYMPIAN HIAWATHA

Through service from Chicago to Pacific Northwest cities such as Spokane, Seattle and Tacoma was inaugurated by the Milwaukee's Olympian and Columbian trains in 1911 soon after the company's rails were extended there from out of the midwest. Today the orange and maroon Super Dome Olympian Hiawatha is first-ranker of the road's Hiawatha streamliner "tribe."

The unique Skytop Lounge (shown at the right) is a popular gathering spot for those traveling in the all-room Pullman sleeping cars. For sleeping car travel at lower cost, the Olympian Hiawatha also carries "Touralux" cars (shown below prepared for day and night time occupancy). Touralux passengers share the distinctive Super Dome Cafe Lounge with other passengers including the budget-minded who choose to travel in the train's luxury coaches. Above the cafe lounge is a "rolling roof garden" a full-length glass-canopied observation deck where all passengers may enjoy an unrestricted view of magnificent mountain scenery.

THE MILWAUKEE ROAD

CHICAGO—SPOKANE—SEATTLE

THE ABRAHAM LINCOLN

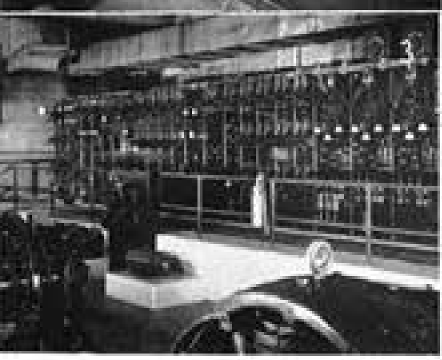
The Gulf, Mobile & Ohio operates five fast, comfortable trains daily between Chicago and St. Louis—led by the maroon and red streamliner Abraham Lincoln and its "sister" train, the Ann Rutledge. Here the Abraham Lincoln departs from Union Station on its 5-hour run to St. Louis. When this train went into service in July, 1935 it was the first streamliner to operate between Chicago and St. Louis.

As both these premier G.M.& O. streamliners are designed for day-time travel, they offer parlor car accommodations for first class passengers and reclining seat coaches for low-cost luxury travel. In the center picture, just beyond the train hostess, is a door leading to a parlor car drawing room—a special accommodation for private day-time travel for two or more persons. The needs of every passenger are cared for by specially trained G.M.& O. hostesses and attendants.

"Nothing could be finer than a dinner in the diner,"—for a dining car meal (below) is the highlight of any trip.

GM&O

CHICAGO—SPRINGFIELD—ST. LOUIS



BEHIND THE SCENES

TRAIN STARTING SIGNAL

Unseen by passengers, yet vital to the everyday job at Chicago Union Station, are the many employees who direct the movement of trains, who handle the mail, the baggage and the express, who keep its voluminous records and who serve passengers and patrons in countless ways. They function under the direction of the general manager, who heads the Station Company's organization.

Directing the movement of the trains and the redcap service, is the duty of the stationmaster and his staff. His office, like those of other supervisory officers of the company, keeps in close touch with activities everywhere on the property by means of a private loudspeaker system and "TelAutographs"—automatic message-writing machines.

The chief engineer and his staff care for the buildings, the electrical systems, the air-conditioning systems as well as the 12.91 miles of tracks and governing signals. Employee payrolls, tax payments and other financial records are the responsibility of the auditor-secretary and his staff. The general baggage and mail agent also has a large organization for handling the large volume of mail and baggage which passes through the station daily.

Close teamwork among these different departments is the key to smooth performance of Chicago Union Station's countless daily duties.

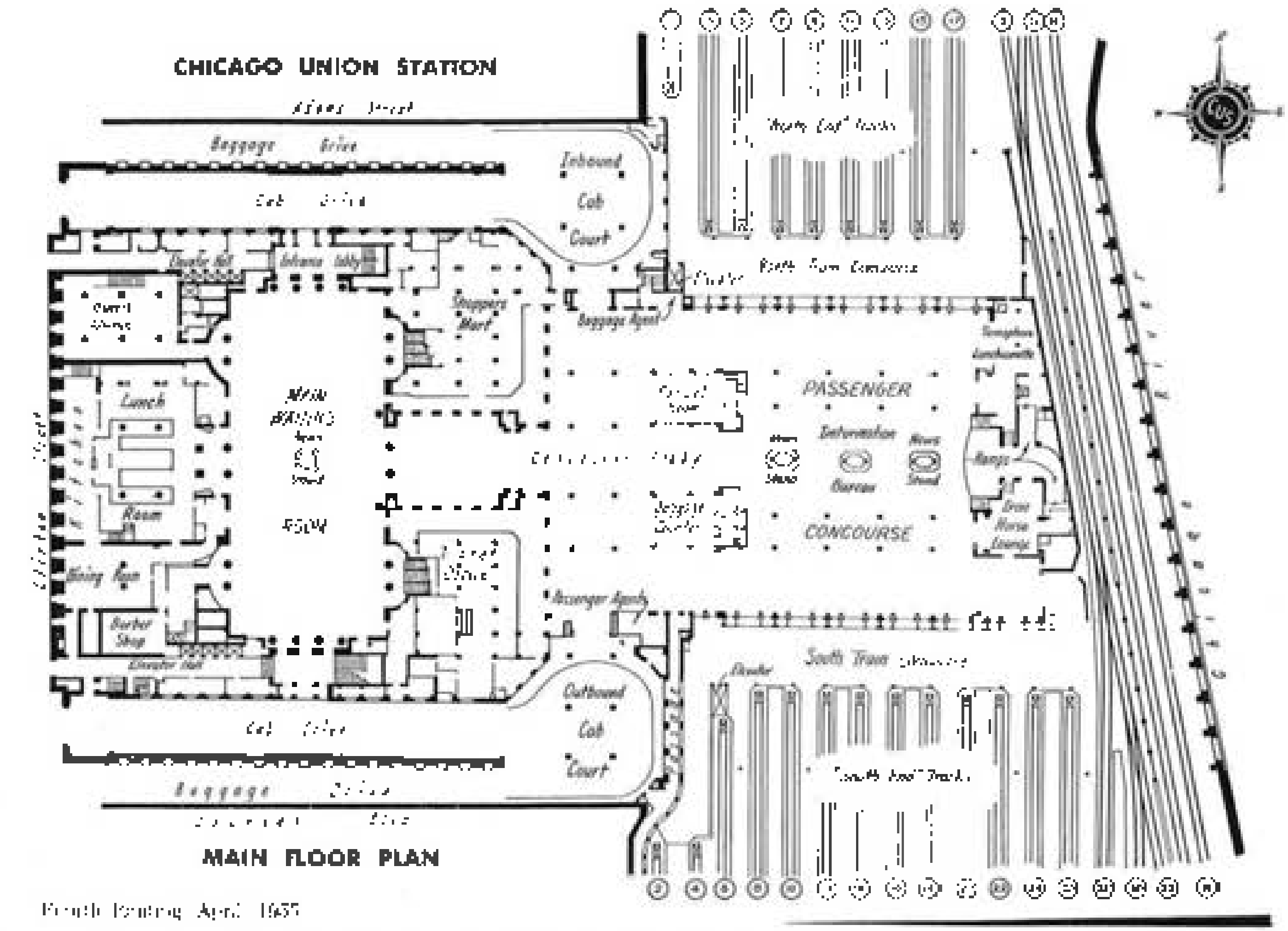
(1) LAKE STREET INTERLOCKING TOWER

(2) WORKING AN INTERLOCKER

(3) THE ELECTRICAL SUBSTATION

(4) SORTING U.S. MAIL

(5) LOADING EXPRESS



Fourth Printing April 1955

Appendix B

Street-Level Operations

Existing Conditions Report

November, 2011

CHICAGO UNION STATION

EXISTING CONDITIONS REPORT

For

STREET-LEVEL OPERATIONS

Prepared For:

CDOT
CHICAGO DEPARTMENT OF TRANSPORTATION

Prepared By:

EJM ENGINEERING, INC.

November 2011

In Association With: TranSystems

Table of Contents

1 Executive Summary

The purpose of this report is to present the traffic conditions on the streets and sidewalks surrounding Chicago Union Station, based on an analysis of collected data and field observations. The goal of this analysis is to understand current volumes and operating patterns of all the modes that affect the street-level operations. As the number of Metra and Amtrak riders grows, there will be increased stress on the street-level operations surrounding Union Station. The general behaviors and preferences of these riders can help determine where to focus improvements.

The focus of this study is on the immediate area surrounding Union Station. This area is bounded on the west by S. Clinton St., the east by the Chicago River, the north by W. Monroe St., and the south by W. Van Buren Street.

In addition to trains, there are many available modes of accessing the area around Union Station including walking, CTA bus, taxi, private vehicle, shuttle bus, and bicycle. Each of these modes affects the area in its own way. The affects of each mode on the station and on each other were examined.

Existing data sets for traffic and pedestrians were obtained from various sources. All the modes that contribute to the street-level activity were considered, focusing on weekday peak period and peak hour conditions. Because the street-level activity at Union Station is so complex, field observation was an important part of documenting the existing conditions.

There are two primary causes for problems in the street-level activity at Union Station: capacity and conflict. Capacity involves the supply and demand of each individual mode in the system. Conflict involves the interaction between two or more modes in the system. For this study, the area around Union Station was separated into seven intersections and eight segments and each mode was rated for each location based on its capacity and demand and its conflicts with other modes. These ratings are relative and were developed specifically for this study.

The study of existing conditions resulted in several key findings that will help focus the development of solutions. Some problems are limited to specific locations and some locations have multiple problems. All of these problems are the result of a mode exceeding the capacity available or the result of two or modes conflicting.

A general problem at several locations in the area around Union Station is that there is not sufficient curb space to accommodate those modes that use the curb space. Because it is located in the central business district, Union Station does not have the luxury of space. Often there is too much demand for the curb space available. Also, the demand is unbalanced. Streets directly adjacent to 222 S. Riverside Plaza are the most convenient for station users and therefore have the most demand for use. At the same time, streets adjacent to the Union Station headhouse are not as convenient and are under-utilized. Both improved management of existing curb space and increased loading capacity need to be pursued.

With so many different modes sharing the area, conflicts regularly occur even where there is sufficient curb space. The intentions of different modes often conflict with each other. Although curb space is allocated for each mode, the space is often not big enough to account for interactions between modes. The intentions of each mode should be considered when developing proposed solutions.

The situation during weekday peak periods and busy off-peak and weekend times is quite different. Commuters, who dominate the peak periods, follow regular patterns, and the access modes they use operate in an ordered pattern. The situation at other busy times is driven by occasional and intercity travellers. While problems are limited to Canal St. during these periods the situation is more chaotic. Proposed solutions will need to consider these different situations.

Even with sufficient curb space and a plan for how this curb space should be used by the different modes, problems will still occur if there is not proper signage to direct users and if there is no enforcement to ensure that users comply. Supplying information is particularly important for private vehicle drop-offs and pick-ups, when users are not as familiar with the area. Enforcement is particularly important for taxis and intercity buses, which have a direct financial stake in the activity around Union Station. Signage and enforcement should be important components of all proposed solutions.

2 Introduction

This report presents the existing traffic conditions on the streets and sidewalks surrounding Chicago Union Station, based on an analysis of collected data and field observations. The goal of this analysis is to understand current volumes and operating patterns of all the modes that affect the street-level operations.

Located in the central business district on the west side of the Chicago River between Adams St. and Jackson Blvd., Union Station is just blocks away from the Loop. The station is downtown Chicago's busiest transportation hub and one of the busiest terminals in America, handling over 100,000 passengers every day. Metra commuter trains, Amtrak intercity trains, and intercity buses bring in people from all over the region and the country. The ability for Union Station to accommodate future growth is crucial to the success of the downtown area, the City of Chicago and Northeastern Illinois as a whole.

Efficient street-level access to Union Station ensures that the public views the station as an attractive transit option. As the number of people who use Union Station grows, there will be increased stress on the street-level operations surrounding the station. In order to propose improvements to these street-level operations, it is important to understand the existing traffic conditions.

In addition to trains, there are many available modes of accessing the area including walking, CTA bus, taxi, private vehicle, shuttle bus, and bicycle. Each of these modes affects the area in its own way. In addition to these modes of access, the area needs to accommodate the typical operations of Chicago's Central Business District. This includes normal local and through traffic not associated with Union Station as well as delivery operations. The way these different modes of access interact with each other affects the efficiency of the street-level operations.

This report will achieve the following:

- Describe the project location, including limits and primary access routes
- Summarize the volume of Metra and Amtrak ridership and the modes their passengers use to arrive at and leave Union Station
- Define the modes of transportation that affect street-level operations, including their behavior and volumes
- Evaluate the factors that affect street-level operations by location
- Identify critical issues that need to be addressed

3 Project Location Description

3.1 Study Limits

The focus of this study is on the immediate area surrounding Union Station. This area is bounded on the west by S. Clinton St., the east by the Chicago River, the north by W. Monroe St., and the south by W. Van Buren Street.

Figure 1. Study Area Limits

3.2 Key streets

The following is a description of three key streets within these limits: Canal St., Jackson Blvd., and Adams Street.

Canal St., in the project vicinity, is primarily a northbound one-way street. Between Jackson Blvd. and Adams St., in the northbound direction, Canal St. has two through lanes, one bike lane, a curbside taxi stand for nine taxis, a curbside intercity (and shuttle) bus stop, and a curbside CTA bus stop. There are also two southbound contraflow lanes for use by CTA buses only. These lanes are separated from the northbound lanes by concrete barriers. Figure 2 shows Canal St., looking north to Adams Street. Between Van Buren St. and Jackson Blvd., Canal St. has two northbound through lanes, a northbound bike lane, a curbside bus stop for intercity buses and a curbside CTA bus stop on the east side, and one southbound through lane.

Figure 2. The various modes of accessing Union Station can be seen here in this view of Canal St. looking north to Adams St.

Adams St., between Clinton St. and the Chicago River, is a three-lane, one-way westbound street. The curb lane on the north side is a dedicated bus and right turn lane and there are two through lanes. The curb lane on the south side, between Canal St. and the Chicago River, is wide enough to serve as a through traffic lane, but is primarily used for taxi drop-off and pick-up, although there is not a designated taxi stand at this location. Adams St. serves as a link between the Loop and Union Station, as well as the Loop and the Kennedy Expressway (I-90/94) to the west of the study area.

Jackson Blvd., between Clinton St. and the Chicago River, is a four-lane, one-way eastbound street. The curb lane on the south side is a dedicated bus lane and there are two through lanes. The curb lane on the north side, between Canal St. and the Chicago River, consists of a tow zone, access to a loading dock, a loading zone and a designated taxi stand for up to five taxis.

3.3 Pedestrian Access to Union Station

Union Station is comprised of two buildings: the Union Station Headhouse and the 222 S. Riverside Plaza complex. The Union Station Headhouse, completed in 1925, is the original structure located on the west side of Canal St. between Adams St. and Jackson Boulevard. In the past this served as the Station's main waiting room and had several food service and other retail activities, but is now largely vacant. The Great Hall is used for large special events but remains available as a waiting room when none are scheduled. This building is primarily accessed through two doorways on Canal St., and two doors on Clinton Street. There are also very lightly used doors on Jackson Blvd. The Adams St. doors are closed. The trains are accessed through a walkway under Canal Street. Today, there is relatively little demand for access to this building.

The original concourse building, located on the east side of Canal St. between Adams St. and Jackson Blvd., was demolished in 1968. It was replaced with a multi-use complex consisting of a 35 story office tower with retail (Gateway Center III, 222 S. Riverside Plaza) and a separate building originally constructed to house the Mercantile Exchange which is now a health club (444 W. Jackson Blvd). As part of the redevelopment of this area Riverside Drive, which provided bus and auto access to the east side of the original concourse building, was replaced with a pedestrian plaza. Train operations remain on the lower level. Access is provided by one doorway on Canal St. (225 S. Canal St.), one doorway on Riverside Plaza at Jackson Blvd., and one doorway on Riverside Plaza at Adams Street. For simplicity, all references in this report to the buildings on the block bounded by the Chicago River and Canal St., between Jackson Blvd. and Adams St., are referred to as 222 S. Riverside Plaza. All of the doorways in 222 S. Riverside Plaza are connected to the concourse level, where the train platforms are located, by escalator. There is also access to three north side platforms used by Metra at the southeast corner of the intersection at Canal and Madison. Pedestrians generally access the Loop by the Adams St. and

Jackson Blvd. bridges. A more in-depth description of pedestrian behaviors, including data, is given in Chapters 6 and 7.

3.4 Vehicular Access to Union Station

Several types of vehicles access Union Station on a daily basis including CTA buses, taxis, private autos, private shuttle buses, and delivery trucks. From the Loop, access is available on Adams St. or Canal St. (from Van Buren). From the expressway, access is available on Clinton St. (from Monroe), Jackson Blvd., and Canal St. (from Jackson). A more in-depth description on vehicular behavior, including data, is given in Chapters 6 and 7.

4 Methodology

The limits of the study were chosen to focus on the area that is most greatly affected by Chicago Union Station (CUS). The study was restricted to the streets and sidewalks, and did not consider the operations inside Union Station except for when they affect the streets and sidewalks.

Existing data sets for traffic and pedestrians were obtained from various sources. New data on taxi and private bus operations was also collected. All the modes that contribute to the street-level activity were considered, focusing on weekday peak period and peak hour conditions.

It is important to determine a “peak hour” condition that properly describes the busiest hour of the morning and evening rush. Once the peak hour is determined, all the various types of data can be presented in a uniform manner. When all the data is formatted consistently, it becomes possible to draw relationships between the different modes that affect the street-level traffic. In addition to drawing relationships, a baseline condition can be created from the peak hour. This baseline condition provides a basis for comparison between present and future conditions. It will be used to measure the effectiveness of proposed alternatives.

The study drew primarily on data compiled for prior studies or for specific transportation operating purposes. As a result, a large variety of data was collected in many formats. Some data was presented as an annual sum or percentage, others in three hour intervals to five minute intervals. The first step was to identify which pieces of data could be displayed in a peak hour format. The individual peak hour was then determined for each item. Some data, such as vehicle and pedestrian movements at intersections, were only available for a given peak hour of 8:00-9:00 a.m. and 5:00-6:00 p.m. Other data, such as the Metra passenger volumes, were given in 15 minute increments and a peak hour could be determined by finding the busiest hour in the morning and the busiest hour in the evening. Chapter 5 provides detailed information on the data sources and the data analysis for the various modes.

It was decided to choose a peak hour that represents the time period with the most street-level activity. The chosen peak hours were determined from pedestrian counts performed in 2010 by Legion International for Amtrak. These counts were executed using closed-circuit TV cameras throughout Union Station to track pedestrian movements. This data was chosen for several reasons. The pedestrian counts are the most comprehensive and current data available for estimating the operating volume of Union Station. They reflect the patterns of both Metra and Amtrak passengers. Most importantly, this data provides detailed information on the number of people who enter Union Station at all street-level doorways for 2 hours during each of the weekday peak periods. Also included were platform level boarding and alighting counts which permitted street-level exiting volumes to be estimated. Based on the Legion counts, the chosen peak hour for the a.m. period is 7:30 to 8:30 a.m. The main movement of people in the a.m. is from the concourse level to the street. The chosen peak hour for the p.m. period is 4:45 to 5:45 p.m., with the main movement of people being from the street to the concourse.

As noted, because data for the various modes was collected independent of this study, time periods for which data was available varied among modes. In addition, peaking of demand varies among modes. The study team elected to set a "peak" hour that could reflect the busiest period within the study area, even if that meant slightly shifting the peak hour for some modes. For example, 296 taxis served the area between 4:30 and 5:30 p.m., and 269 taxis served the area between 4:45 and 5:45 p.m. The worst case scenario assumes that 296 taxis (the highest number) served the area between 4:45 and 5:45 p.m. (the chosen peak hour). This was assumed to represent the worst case scenario peak hour. Similar adjustments were made for other modes. Chapter 5 provides detailed information on the data sources and the data analysis for the various modes. Graphical descriptions of the peaking patterns for the major contributing factors are presented in the following two figures.

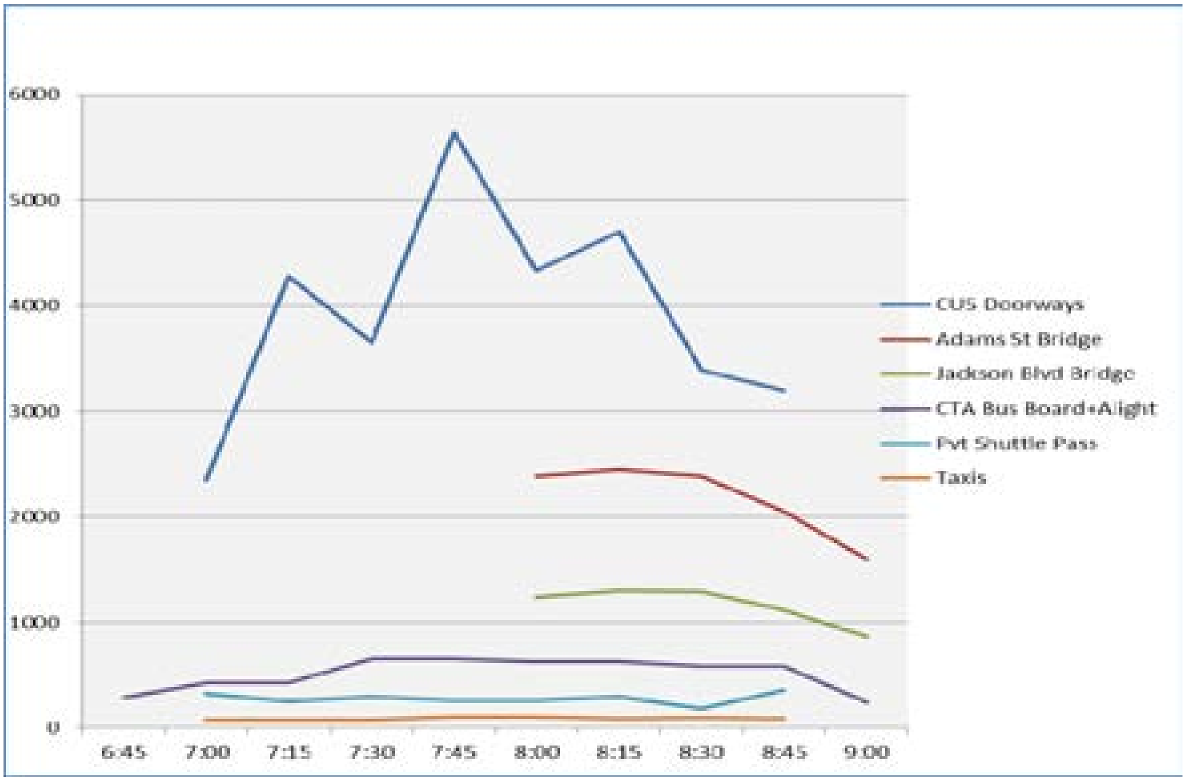


Figure 3. A.M. Peaking Pattern

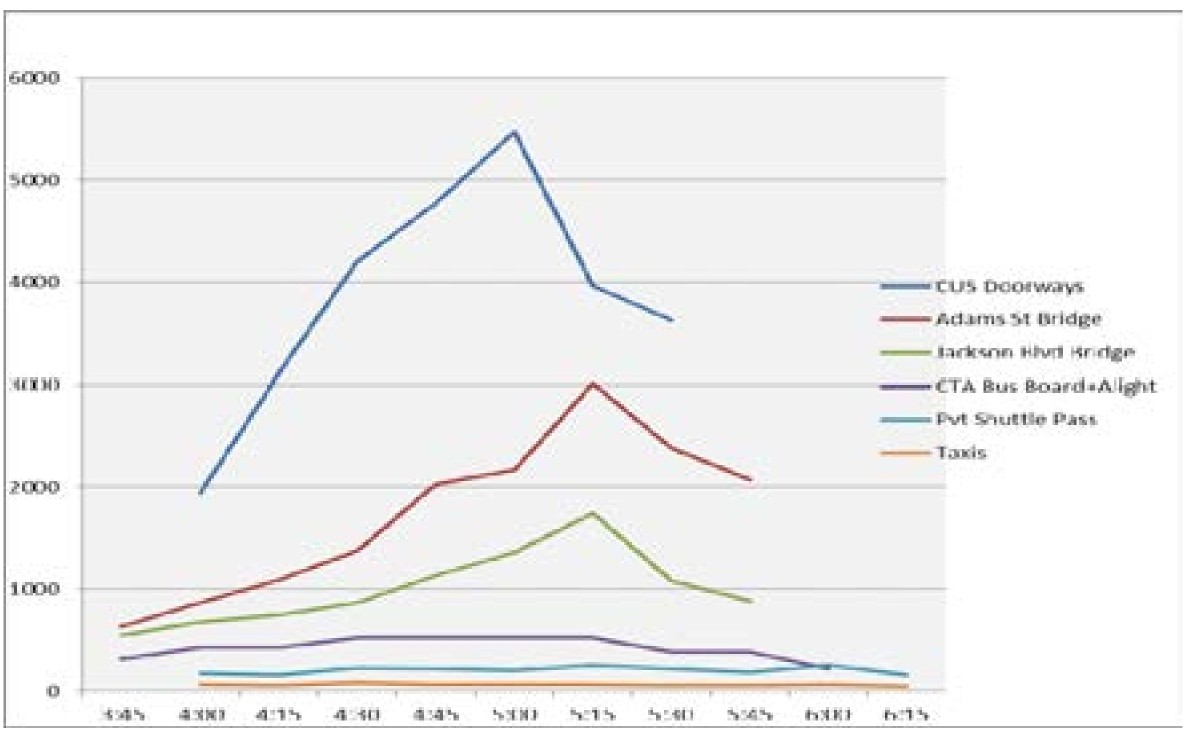


Figure 4. P.M. Peaking Pattern

After data was compiled, the study area was separated into intersections and segments. These locations were analyzed and given ratings for each mode. The ratings are relative and based on the apparent effect of that mode on the overall system.

Because the street-level activity at Union Station is so complex, field observation was an important part of documenting the existing conditions. Most of the critical issues were identified during these field observations. Traffic modeling software was not used for this analysis because of its limitations: the function of such software is to measure roadway capacity and delay for vehicles. It does not account for pedestrian activities or on-street drop off and pick up.

5 Metra and Amtrak Riders

This section describes the volumes of passengers for Metra and Amtrak and their general behaviors.

5.1 Metra Ridership Volumes

On an average weekday 108,870 passengers board or alight Metra trains at Union Station. Most of this activity (85%) occurs in the two peak periods (start of service to 9:15 a.m. in the morning and 3:30 to 6:45 p.m. in the evening), when 92,275 board or alight. The a.m. peak is very concentrated. The p.m. is peak is longer and smaller in total volume, with some commuters traveling before or after the peak period.

Metra data used in this report is drawn from counts done in the fall of 2006 and from an origin-destination survey done in 2006. Since 2006 Metra system ridership has been relatively flat, growing by 0.7% overall. Growth has occurred in the off-peak and on weekends, with peak volumes declining. The Metra lines that terminate at Union Station have fared better than the system-wide average, exhibiting overall growth of approximately 3 percent. Given that much of the growth is occurring outside the peak periods, the 2006 data is a reasonabled representation of today's peak period situation at Union Station.

5.2 Metra Passenger's Modes of Access and Egress

Walking is the predominant mode of access to and egress from the station, accounting for more than three-quarters of the passengers, followed by 11% on CTA Bus, 5% on private shuttle bus, 3% in taxis, 1% in private autos, and 1% using other modes. The exact percentages vary by: passenger destination, direction of travel and time of day. Looking at Metra's a.m. peak period, which extends from the start of service to 9:15 a.m., combined egress and access modes are presented in the following table.

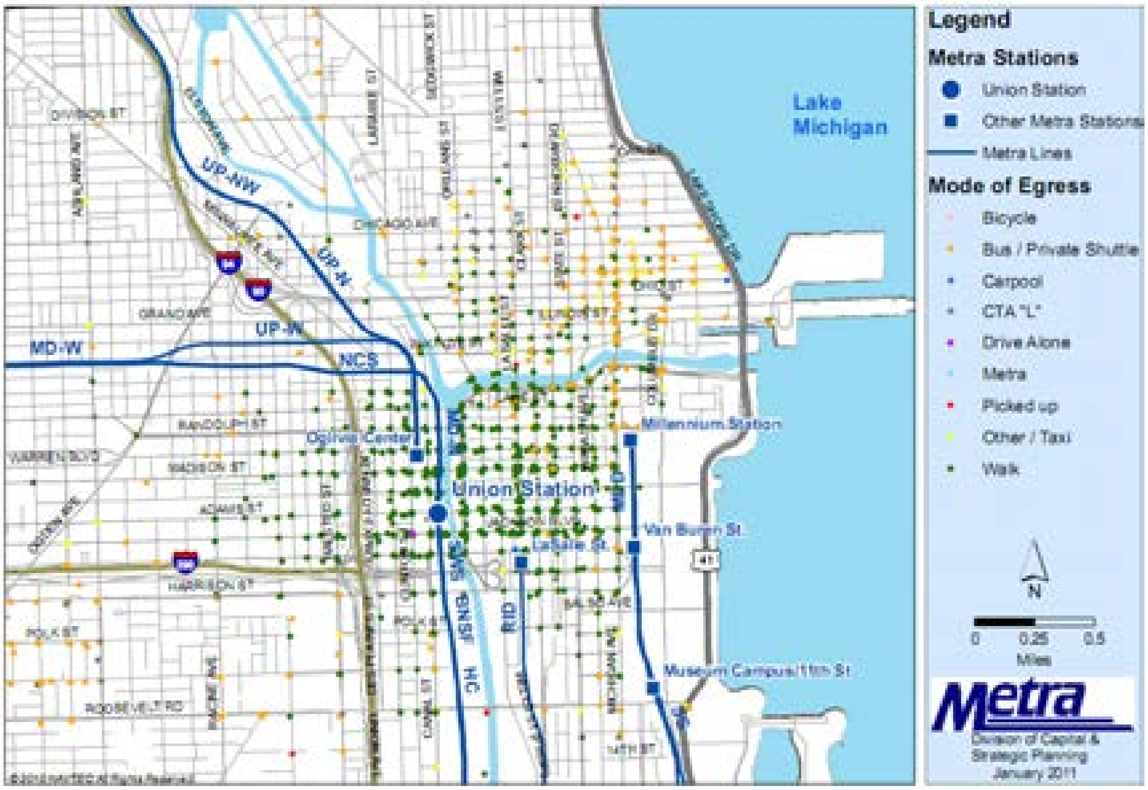
Table 1. Number of Metra Passengers for a.m. Peak Period by Mode of Access and Egress

Mode	# of Passengers	% of Total
Walk	36,376	78%
CTA Bus	5,312	11%
Private Bus	2,504	5%
Taxi	1,322	3%
Auto Driver	404	1%
Auto Passenger	372	1%
Other	342	1%
Total	**46,631**	

Source: Metra 2006 Survey

These volumes are taken from Metra's fall 2006 boarding and alighting counts and passenger origin-destination survey and provide a good summary of the patterns Metra passengers exhibit. The count and survey data have been adjusted to reflect the focus of this study. The mode of egress presented above is the one used to cross the study area boundary. The 1,200 passengers who reported using CTA Rapid Transit for travel between CUS and their final destination are included in the walk mode, since the two closest stations are outside the study area. Similarly, the 450 passengers who transferred to/from another Metra Line and the 1,500 who work at 222 S. Riverside were excluded from the total, since they do not cross the study area boundary on the surface or exit the buildings.

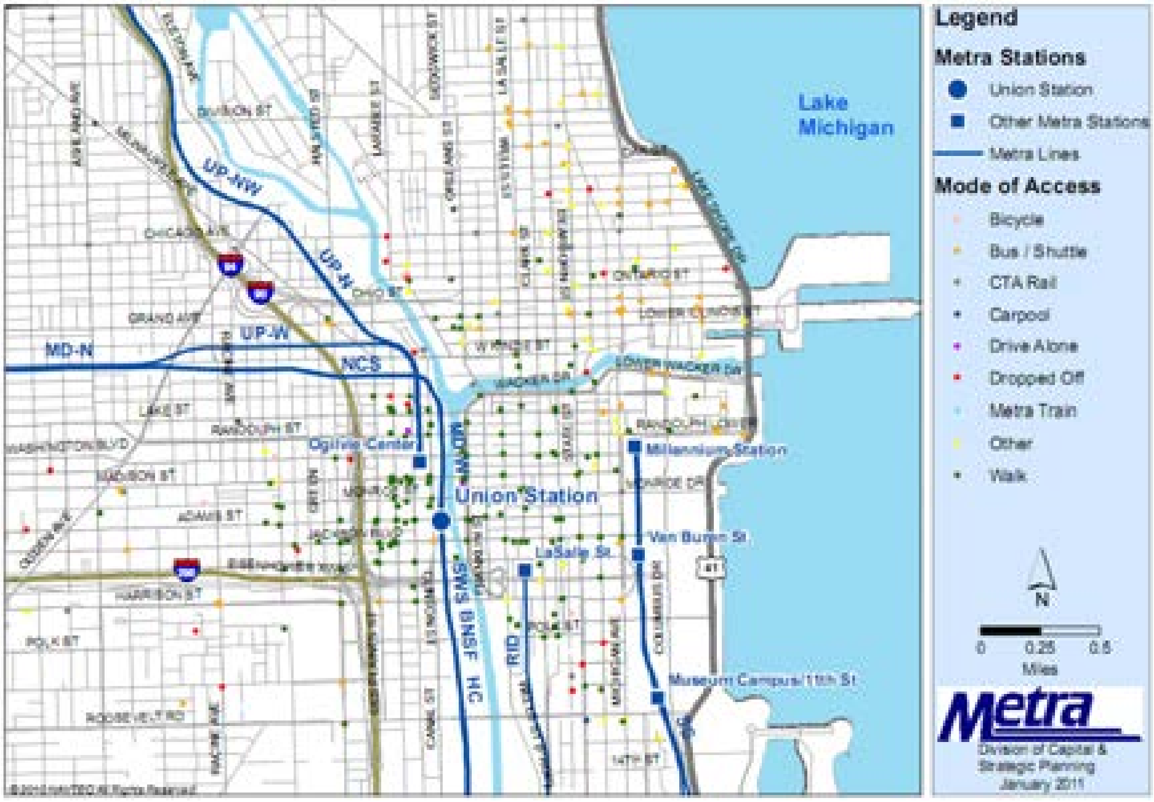
The final destinations and origins of Metra passengers alighting and boarding trains at Union Station in the morning are shown in the following two maps. These locations are from the 2006 origin-destination survey responses for the entire morning period. The first map shows the central area destinations of alighting passengers with their egress mode. The walk mode (green) dominates for destinations in the Loop and near west Loop. Bus (orange) and taxi (yellow) modes are strongest at greater distances from Union Station, in Illinois Center, along North Michigan Ave, in Streeterville, and River North.



Source: Metra 2006 Survey

Figure 5. Destinations of a.m. Metra Passengers Alighting at Union Station by Mode

The pattern of origins and access mode of the 2,300 passengers boarding trains at Union Station in the morning is strikingly different. These passengers include reverse commuters, workers with night time hours, and non-work travellers. Access mode shares are more evenly distributed and the origins are generally at greater distance from Union Station. The walk mode (including rapid transit users) accounts for 45%, followed by bus at 20%, taxi and auto passenger at 8% each. As in the previous map, walk access predominates for the closer distances, with bus, taxi and auto modes stronger at greater distances.



Source: Metra 2006 Survey

Figure 6. Origins of a.m. Metra Passengers Boarding at Union Station by Mode

5.3 Amtrak Passenger Volumes and Modes of Access and Egress

Union Station serves as the Midwest hub for Amtrak operations, with 28 arrivals and 28 departures per day. In FY 2008 Union Station handled 3.1 million Amtrak passengers. Average weekday boardings and alightings are estimated at 9,700, using an annualization factor of 310. As was the case with Metra passengers, the 3% of Amtrak passengers who transfer to another Amtrak train at Union Station have been excluded from this daily number. Although the number of Amtrak passengers is considerably smaller than Metra passengers, Amtrak riders play an important role in the street-level activities at Union Station. This is because of the large percentage of users who take a private vehicle, taxi, or rental car and the large amount of baggage involved. Amtrak passengers are also frequently less familiar with the area around the station and may spend some extra time walking around the area.

The most common access and egress modes are other train and auto / taxi. Almost one third of Amtrak passengers access or depart the station via Metra or CTA trains. This is followed by private auto and taxi/rental car at 27% each.

Table 2. Number of Amtrak Daily

Passengers by Mode of Access and Egress

Mode	# of Passengers	% of Total
Metra / CTA	3,089	32%
Private Auto	2,575	27%
Taxi / Rental Car	2,585	27%
Walk / Bike	1,051	11%
Other Bus	234	2%
Amtrak Bus	164	2%
Total	**9,696**	

Source: Amtrak CUS Modal Access 2008

Amtrak has a different peaking pattern than Metra, with arrivals concentrated in the mid morning hours and departures in the late afternoon and early evening. Thirteen of the 28 daily arrivals occur between 8:45 a.m. and 1:00 p.m., with only one arrival occurring before 8:45 a.m. Twelve of the 28 departures occur between 4:05 and 9:30 p.m. Since the arrivals are mostly occurring after the Metra a.m. peak, they do not tax Union Station's egress capacity. The period of the day with the most potential access issues is the two hour period from 5:00 to 7:00 p.m., when there are eight scheduled departures including two overnight trains which have higher passenger loads.

As the number of Metra and Amtrak riders grows, there will be increased stress on the street-level operations surrounding Union Station. The general behaviors and preferences of these riders can help determine where to focus improvements.

6 Street-Level Modes: Data

The traffic conditions surrounding Union Station are a result of many modes acting together. This section will describe the modes which play the biggest roles in street-level operations. On the next page, Exhibit 1 gives a graphical representation of how all these modes relate to each other.

6.1 Pedestrians

For this report, pedestrians are those entering and exiting Union Station and the study area (bounded by Clinton/Chicago River, Monroe/Van Buren) on foot, as well as those entering and exiting the study area by vehicular means, but circulating within the study area on foot. Examples of pedestrians include someone who walks from Union Station to an office outside the study area, someone who walks out of Union Station, crosses the street to a CTA bus stop, and then leaves the study area on a bus, and a worker from 222 S. Riverside Plaza completing an errand in the study area. Seventy-eight percent of Metra passengers reported walking to and from the station during the a.m. peak period (this includes passengers who use the CTA rail system).

In general, pedestrian paths are determined by the origin and destination of the pedestrian. The relationship between train operations and street-level pedestrian activity is represented by how many people use each doorway. Table 3 shows the number of passengers who use each doorway during the peak hour. The Adams Street Doorway has the largest share, which is consistent with the final destinations of Metra passengers discussed earlier. This pattern of relative usage of the different doorways has been quite stable over time. Counts conducted by the Chicago Area Transportation Study in 1979 had Adams St. accounting for 44.8%, Jackson Blvd – 19.8%, and Canal St. east – 13.8% of a.m. peak exiting pedestrians. One change since 1979 has been the addition of the Madison Street doorway accessible from three of the north platforms. This doorway, which is outside our study area, now handles 3,000 pedestrians over the two hour a.m. peak, providing significant additional capacity.

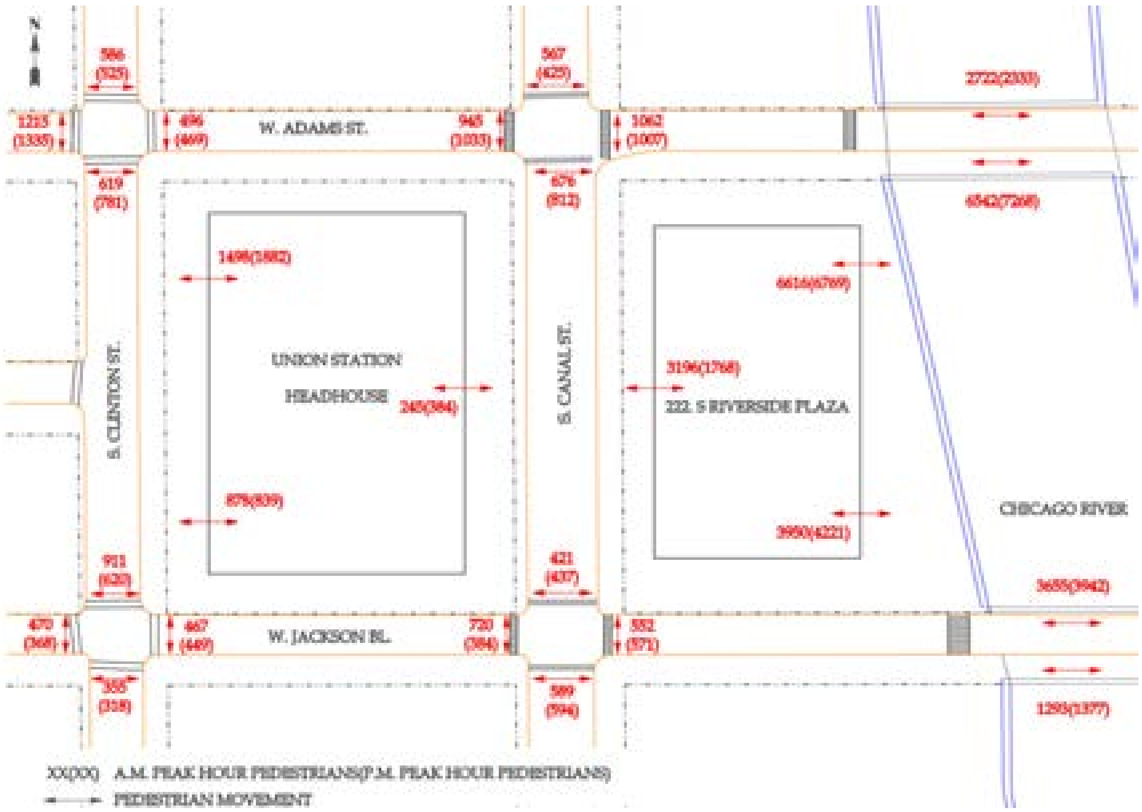
Table 3. Number of Peak Hour Union Station Passengers at Union Station Portals by Location

Portal	a.m. Volume	% of Total	p.m. Volume	% of Total
Adams Street	6,616	40.3%	6,769	42.5%
Jackson Blvd	3,950	24.0%	4,221	26.5%
Canal Street east	3,196	19.4%	1,768	11.1%
Canal Street west	245	1.4%	384	2.4%
Clinton Street north	1,498	9.1%	1,882	11.8%
Clinton Street south	878	5.3%	839	5.3%
Other exits	40	<1%	56	<1%
Total	**16,423**		**15,919**	

Source: 2010 Legion International

Pedestrians play a large role in street-level operations. Sidewalks, crosswalks, and entrances must have the capacity to handle the number of pedestrians who use them; traffic signals must accommodate pedestrians crossing the street; and the locations where taxis and private autos prefer to drop off passengers is based on how far the passenger is willing to walk after they have been dropped off. And most importantly, from a vehicle flow perspective, turning movements by vehicles are restricted by pedestrians. Figure 7 on the next page shows the pedestrian volumes for each movement during the peak hours, which for this data set are 8:00 to 9:00 a.m. and 5:00 to 6:00 p.m. These volumes are assumed to represent the conditions for the peak hours used in this study: 7:30 to 8:30 a.m. and 4:45 to 5:45 p.m.

There are also approximately 2000 Metra passengers who use CTA trains each day. These people will be treated as pedestrians because they enter and exit the study area by foot. There are two CTA rail stations in the vicinity of Union Station: Quincy/Wells (Brown, Purple, and Orange lines) and Clinton/Congress (Blue line).



Source: 2008 Metro Transportation Group Traffic Counts and 2007 CDOT Pedestrian Counts

Figure 7. Peak Hour Pedestrian Counts by Movement

6.2 CTA Buses

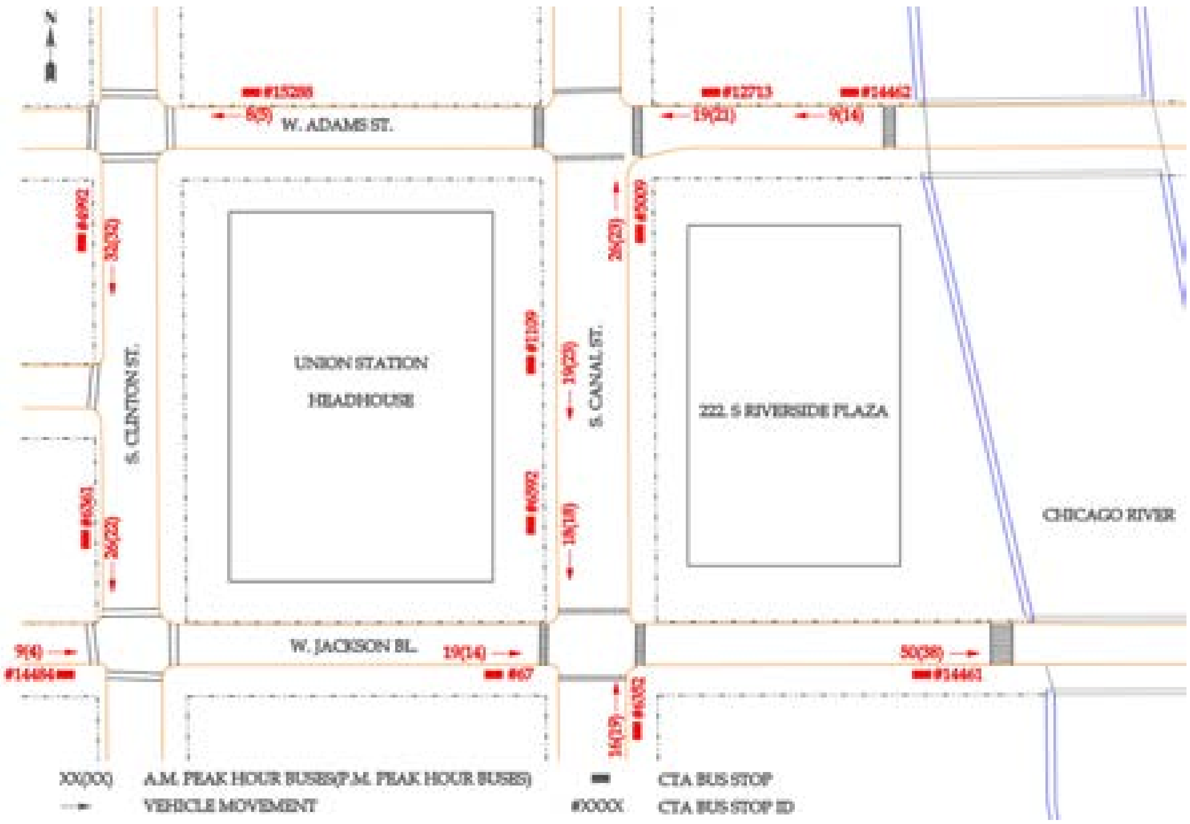
There are eighteen CTA bus routes serving eighteen stops within the study area. Table 4 on the next page shows a list of the bus stops located in the study area and the peak hour boarding and alightings for each stop. Eleven percent of Metra passengers reported using a CTA bus to get to and from the station during the a.m. peak period. Based on the number of boardings and alightings, the peak hours for CTA buses occur from 7:30 to 8:30 a.m. and 4:30 to 5:30 p.m. These volumes are assumed to represent the conditions for the chosen peak hours of 7:30 to 8:30 a.m. and 4:45 to 5:45 p.m. The number of buses in the total includes some double counting because some routes make more than one stop in the study area.

Table 4. Number of CTA Buses and Passengers Boarding and Alighting During Peak Hour for CTA Bus Stops in the Study Area

CTA Bus Stop (Stop ID)		a.m. Peak Hour		p.m. Peak Hour	
		Buses	Passengers	Buses	Passengers
Clinton at Van Buren (6362)		27	38	29	25
Canal at Van Buren (6351)		22	32	16	74
Van Buren at Canal (84)		5	7	3	3
Jackson at Clinton (14484)		9	13	4	2
Clinton at Jackson (6361)		26	277	22	35
Jackson at Canal (67)		19	206	14	41
NB Canal at Jackson (6352)		16	86	19	166
SB Canal at Jackson (6592)		18	177	18	149
Jackson at Chicago River (14461)		50	470	38	251
Clinton at Quincy (4992)		32	276	32	199
SB Canal btw. Adams/Jackson (1109)		19	101	23	126
NB Canal at Adams (5009)		26	392	23	218
Adams at Clinton (15288)		8	45	5	9
Adams at Canal (12713		19	198	21	228
Adams at Chicago River (14462)		9	48	14	284
Clinton at Monroe (5007)		23	142	21	56
Canal at Monroe (5010)		24	18	22	65
Monroe at Canal (16181)		4	25	11	166
	Total	**356**	**2551**	**335**	**2097**

Source: Fall 2010 CTA Strategic Planning Division, Bus Schedule and CTA bus counts

Figure 8 shows the number of buses that serve each stop during the peak hour. At the stop on Canal between Adams St. and Jackson Blvd., and the Canal at Jackson stop, routes #1, X28, and 151 use the contraflow bus lane as a layover point. CTA calculated layover space requirements by adding the lengths of standard (40’) and articulated (60’) buses based on scheduled arrival and departure times. During the a.m. peak hour, these routes are scheduled to require as much as 220 feet of curb space at one time for layovers. In the p.m. peak hour the scheduled layover requirement is 260 feet. Available curb space handles this demand with enough extra space to accommodate one additional articulated bus, if necessitated by deviations from schedule. This bus facility operates smoothly with no observed problems. Passengers of these routes typically use the Canal St. entrances to the Headhouse to access the station. There are dedicated bus lanes (shared with right turns) on Adams St. and Jackson Blvd. At the Jackson at Canal stop, routes 121, 123, 132, and some route 156 trips, use the Jackson St. bus lane as a layover point. During the a.m. peak hour, these routes require as much as 180 feet of curb space at one time for layovers. In the p.m. peak hour the maximum scheduled layover requires 160 feet.



Source: Fall 2010 CTA Strategic Planning Division Bus Schedule

Figure 8. Number of Peak Hour CTA Buses by Location

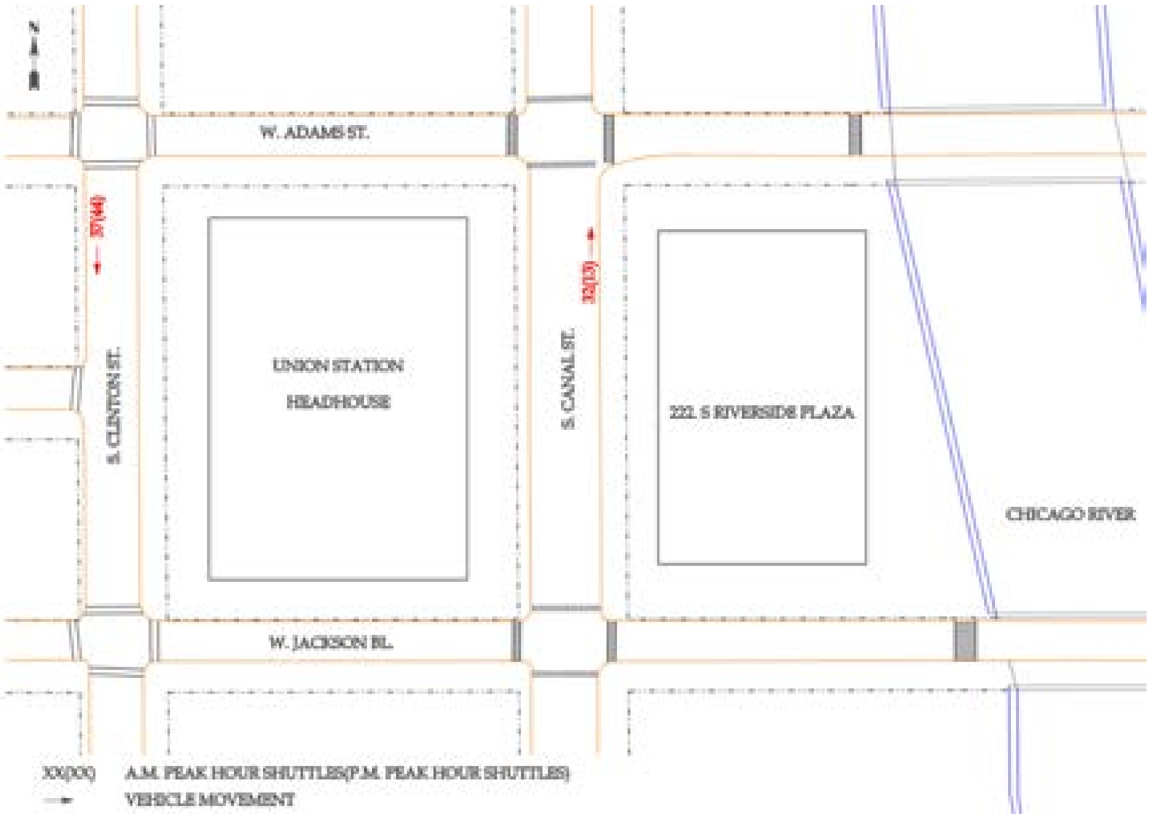
6.3 Private Shuttles

There are a number of private shuttle services that operate between Union Station and local office buildings, schools, and hospitals. Most are operated by contractors, with Coach USA the predominant operator at the time that data was collected for this study. The firm gave up this service effective July 15, being replaced by Free Enterprise System, Aries Charter, and Mid-America. They primarily use two designated areas for boarding and alighting. One area is on the east side of Canal St., mid-block between Adams St. and Jackson Blvd., and the other is on the west side of Clinton St. between Adams St. and Jackson Boulevard. Some services require users to present tickets and Coach USA has two people on Canal St in the a.m. peak to direct boarding and punch tickets (the replacement operators have continued this practice). Five percent of Metra passengers reported using a private shuttle to get to and from the station. Shuttles were counted for the a.m. and p.m. peak periods on Wednesday, January 26th and Thursday, January 27th, 2011. The number of shuttles that serve each location during the peak hours of 7:30 a.m. to 8:30 a.m. and 4:45 p.m. to 5:45 p.m. is summarized in Table 5. Although many of the private shuttles use one-door over-the-road coaches, the dwell time for private shuttles was typically less than two minutes. A full summary of these counts is contained in the Appendix of this report.

Table 5. Number of Private Shuttles During Peak Hour by Location

	a.m. Shuttles	p.m. Shuttles
Clinton St.	37	44
Canal St.	32	13

Source: 2011 EJM Data Collection (More information in Appendix A1)



Source: 2011 EJM Data Collection (More information in Appendix A1)

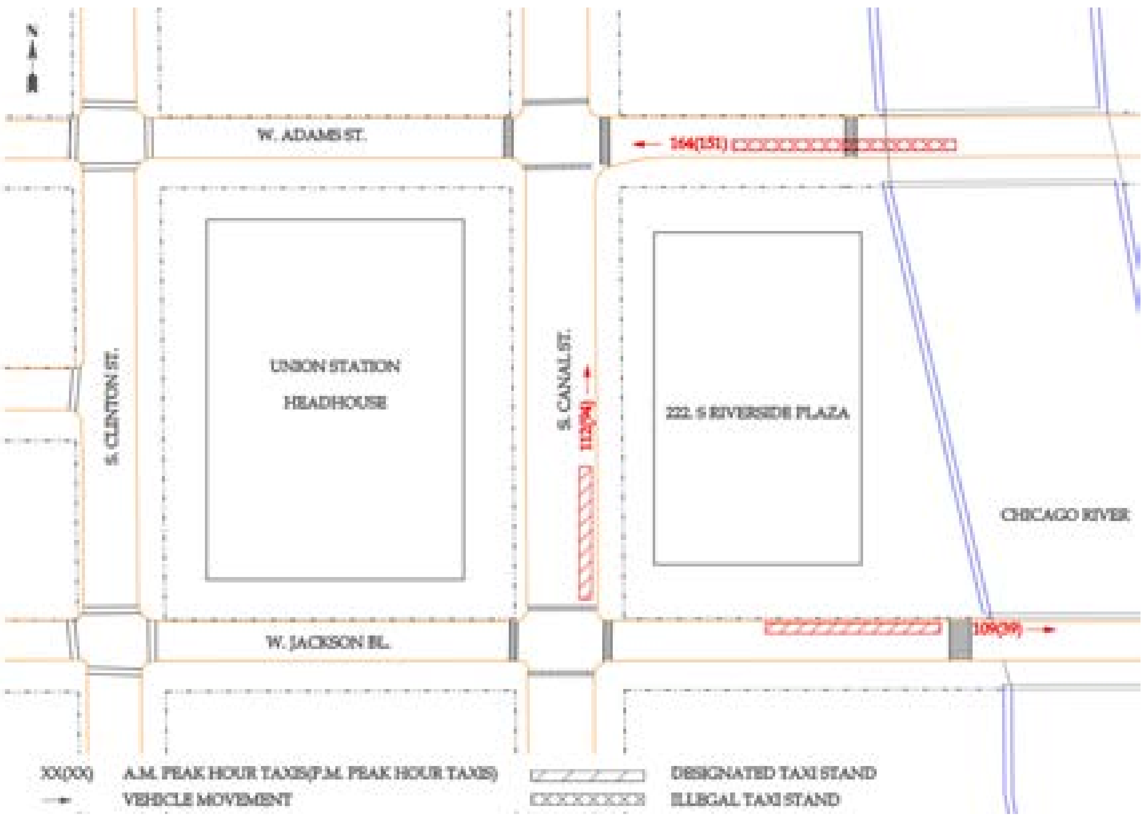
6.4 Taxis

Taxis play an important role in the street-level operations around Union Station. There are three areas where taxi pick-ups and drop-offs primarily occur. Canal St. has a designated taxi stand between Adams St. and Jackson Blvd. for nine taxis and Jackson Blvd. has a designated taxi stand between Canal St. and the Chicago River for five taxis. In addition, several hundred people get dropped off and picked up each day on Adams St. between Canal St. and the Chicago River, even though there is no designated taxi stand at this location. Taxi use at this location exceeds that at both the designated taxi stands. Three percent of Metra passengers reported using a taxi to get to or from the station during the a.m. peak period. Taxis were counted for the a.m. and p.m. peak periods on Wednesday, January 26th and Thursday, January 27th, 2011. The average number of taxis during the peak hours of 7:45 to 8:45 a.m. and 4:30 to 5:30 p.m. for the two days is summarized in Table 6. These volumes are assumed to represent the conditions for the chosen peak hours of 7:30 to 8:30 a.m. and 4:45 to 5:45 p.m. A full summary of these counts is contained in the Appendix of this report.

Table 6. Number of Taxis Picking Up and Dropping Off Passengers the During Peak Hour by Location

	a.m. Taxis	p.m. Taxis
Adams St.	164	151
Canal St.	112	94
Jackson Blvd.	109	39

Source: 2011 EJM Data Collection (More information in Appendix A1)



Source: 2011 EJM Data Collection

Figure 9. Number of Taxis Picking Up and Dropping Off Passengers the During Peak Hour by Location

6.5 Intercity Buses

As a major regional transportation hub for the City of Chicago, Union Station is served by several intercity bus companies. Megabus operates between Chicago and eighteen Midwestern cities. Their pick-ups and drop-offs occur on the curb on the east side of Canal St. between Jackson Blvd. and Van Buren Street. LEX operates between Chicago and Champaign-Urbana; Bloomington, IL; St. Louis; and Indianapolis from the same stop. Van Galder/Coach USA operates between Chicago and Madison, WI. Van Galder/Coach USA picks up and drops off passengers on the east side of Canal St. midblock between Adams St. and Jackson Boulevard. There are also a small number of Greyhound buses that stop at this location on Canal St., in addition to the Greyhound station located at Harrison St. and Des Plaines St. Bus trips stopping at this location are Amtrak Thruway routes, which have thru ticketing arrangements with Amtrak. All of these services load directly at the curb. There are no passenger amenities such as shelters, benches, or trash cans at these locations. All intercity bus operations are spread out evenly throughout the day, with buses arriving and departing at all times. However, each company has several buses arriving or departing during the peak hour. During the private shuttle counts, it was observed that three intercity buses used the designated Amtrak Thruway bus stop / shuttle drop off location on Canal Street during the p.m. peak hour. Dwell times for these buses ranged from a couple minutes to as much as a half an hour. Complete schedules for these bus services are included in the Appendix.

Although ridership data was not available for the intercity services was not available from the private operators, field observation found periodic large crowds of passengers waiting on the sidewalk, particularly on Fridays and Sundays. In addition, passengers using these services have their own modes of access and egress with considerable volumes of pick-up and drop-off by private autos. While Megabus now provides stationary “warming” and “cooling” buses for waiting passengers during the most extreme weather, conditions are often very unpleasant with no shelter provided.

6.6 Private Auto Drop Offs and Pick Ups

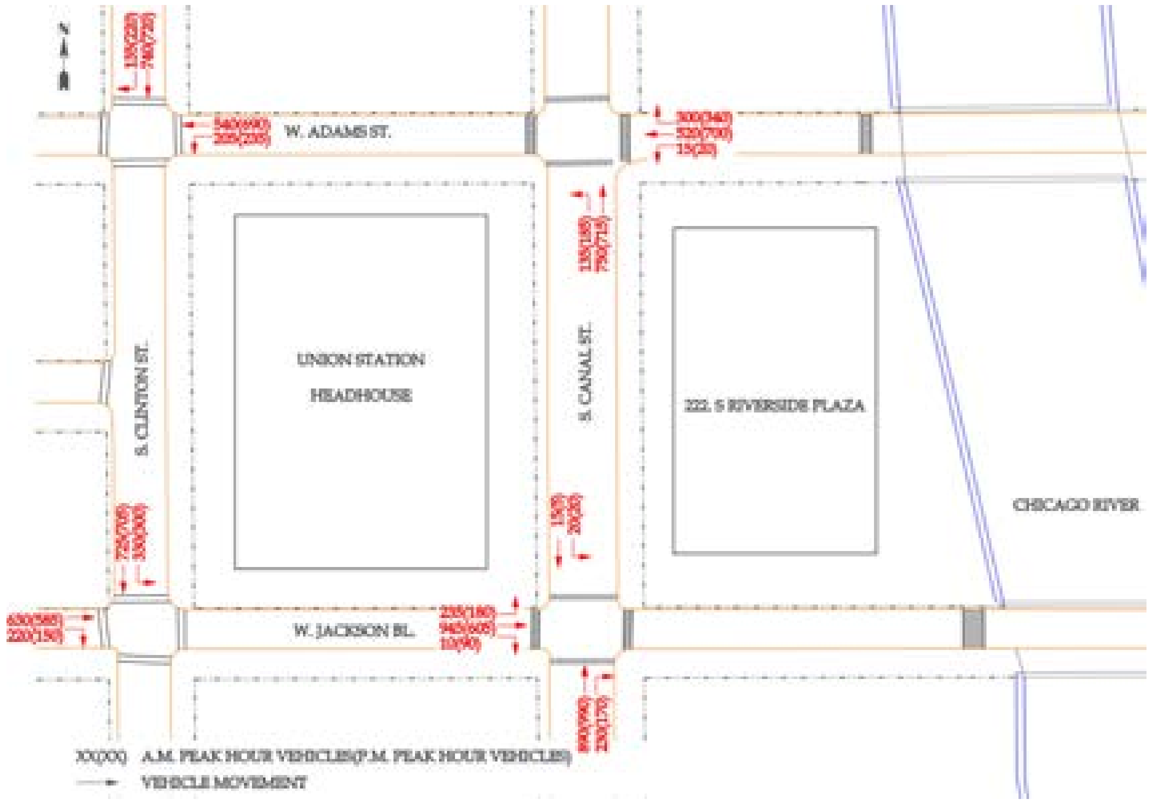
Private auto drop offs and pick-ups account for a small percentage of the total street-level traffic on weekdays, but they affect the area greatly. This is because private autos drop off and pick up people wherever possible, and are often unfamiliar with the other operations around them. Two percent of Metra passengers reported using a private vehicle to get to and from the station during the a.m. peak period. At twenty seven percent, a significant portion of Amtrak riders use a private vehicle to get to and from the station. These Amtrak riders typically carry baggage and take longer to load and unload than Metra passengers. As noted, intercity bus passengers also generate this type of traffic. ‘Trailblazer’ signs on surrounding streets direct drivers to the block of Canal between Jackson and Adams for Union Station. Although there is no signage that permits private autos to stand or, even, stop on this block, it is heavily used for that purpose in afternoon, evening, and weekend periods.

6.7 Delivery and Service Trucks

Delivery and service trucks access Union Station at two points. Functions for the headhouse occur from the loading dock beneath the building, which is accessed from entrance and exit ramps off Clinton St. The 222 S. Riverside Plaza building is served from the loading dock in the 444 W. Jackson St. building. This dock is accessed off Jackson Blvd. just east of Canal Street. There is a curbside loading zone just east of the dock access to store trucks that will not fit in or do not need to be in the loading dock.

6.8 Local and Through Traffic

In addition to the operations associated with Union Station, the study area also needs to accommodate normal local and through traffic not associated with the station. Vehicles coming from the Loop use Van Buren St., Canal St., and Adams St. to access the Eisenhower (I-290) and Kennedy (I-90/94) Expressways. Vehicles coming from the expressways use Jackson Blvd., Monroe St., and Clinton St. to access the Loop. Clinton St. and Canal St. are important corridors for north-south travel, and provide direct links to and from Ogilvie Transportation Center. Figure 10 shows the volumes for each movement during the peak hours of 8:00 to 9:00 a.m. and 5:00 to 6:00 p.m. These volumes are assumed to represent the conditions for the chosen peak hours of 7:30 to 8:30 a.m. and 4:45 to 5:45 p.m. These volumes do include all modes of transportation such as private autos, taxis, CTA buses, and private shuttles.



Source: 2008 Metro Transportation Group Traffic Counts

Figure 10. Peak Hour Vehicle Counts by Movement

6.9 Bicycles

There are two bike lanes in the study area. One is a northbound route on Canal St. between the curb lane and the next through lane. The other is a southbound route on Clinton St. between the curb lane and the next through lane. The location of the bike lane increases the friction between curbside operations and through traffic. The bike lanes on both streets are often occupied by buses loading / unloading during the weekday peak periods. While there are not a high number of people who report using a bike to get to and from Union Station, there is some through traffic on bicycles.

6.10 Curb Designations and Management

A crucial aspect of the street-level operations is the designated curb use and the way in which it is managed. Exhibit 2 on the next page highlights the some of the important curb uses in the area. These are enforced by several agencies including the Chicago Police Department, City Office of Emergency Management and Communications, and the CTA, as well as Metra Police, Amtrak Police, and staff from the private shuttle bus operators. However, there is no one directly responsible for managing all street-level operations.

7 Street-Level Modes: Capacity and Conflict

There are two primary causes for problems in the street-level activity at Union Station: capacity and conflict. Capacity involves the supply and demand of each individual mode in the system. Conflict involves the interaction between two or more modes in the system.

Capacity problems arise when the existing transportation facility is not sufficient to handle the demand of traffic. For this report, a transportation facility can be defined as any structure or system designed for a particular traffic use. Sidewalks for pedestrians, roadway lanes for through vehicles, and designated taxi stands for taxis are all examples of transportation facilities. When the demand for using a traffic facility is greater than the capacity available, traffic does not progress as intended. This can be a problem in and of itself. It creates queuing, breakdowns in flow, user discomfort, and potential safety hazards. It can also cause problems for other modes.

Conflict problems arise when there is friction between the intentions of two or more modes in the system. An example of a conflict is when pedestrians crossing a street at a crosswalk prevent vehicles from making a right turn. When considered alone, neither pedestrians crossing a street or vehicles making a right turn create a problem. However, the interaction between the two activities does create a problem.

Location plays the biggest role in capacity and demand as well as the conflict between modes. For the purposes of this evaluation, the area around Union Station was separated into seven intersections and eight segments, as seen in Figure 11, and each mode was analyzed for each location. The mode was then given a rating for that location based on the capacity and conflicts observed. Table 7 describes the rating system used to evaluate each location and Table 8 lists the locations. These evaluations are based on weekday peak period conditions.

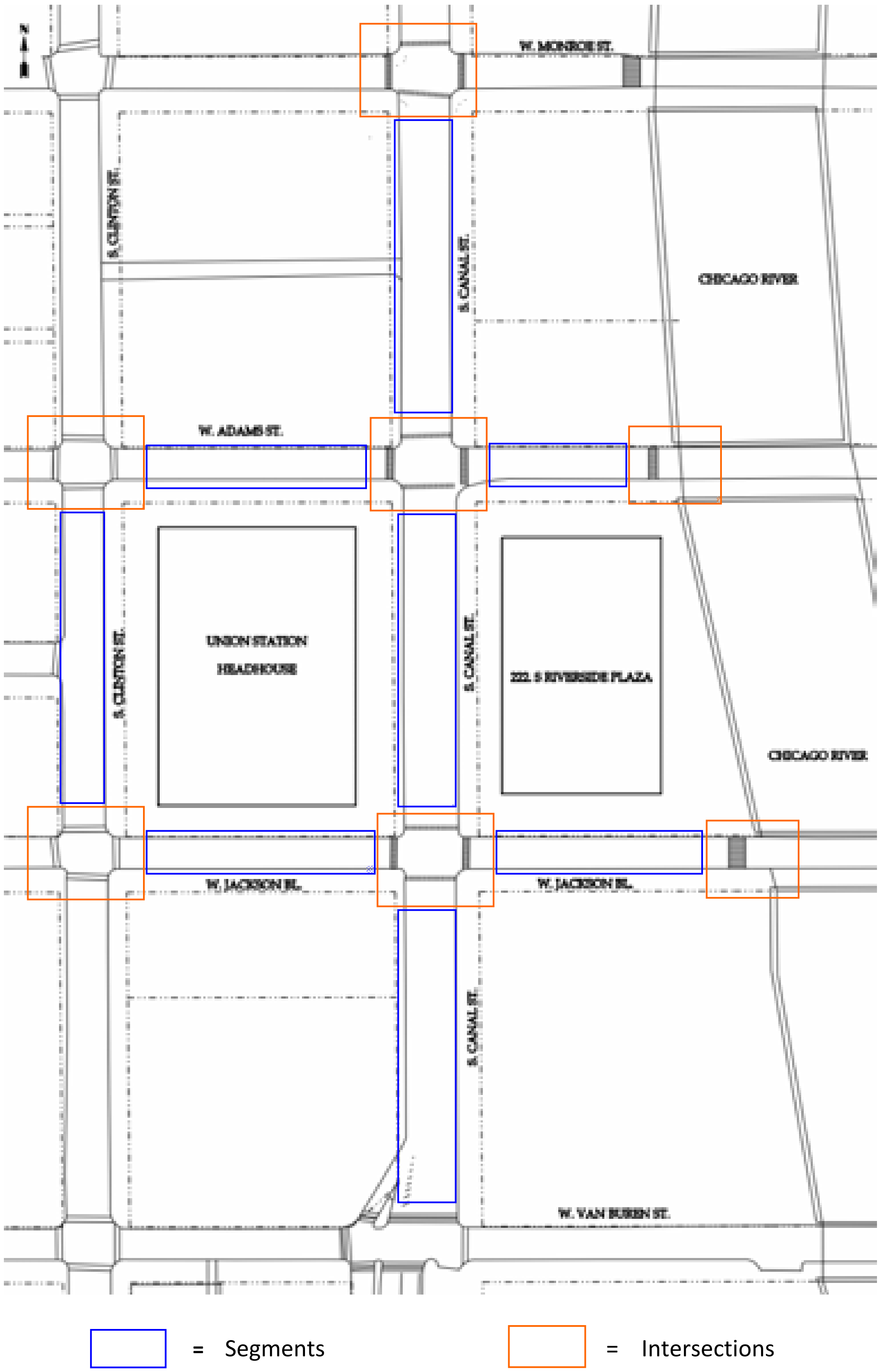


Figure 11. Intersection and Segment Locations

Table 7. Description of Rating System

Highest Efficiency	**5**	Mode is operating as efficiently as possible and not causing problems
↓	**4**	Mode is operating at average efficiency and not causing problems
	3	Mode is operating at below average efficiency and causing some problems
	2	Mode is operating poorly and causing major problems
Lowest Efficiency	**1**	Mode is operating at an unacceptable level

Table 8. Eight Segment and Seven Intersection Locations

Segments

- **Canal St.** – Monroe St. to Adams St.
- **Canal St. –** Adams St. to Jackson Blvd.
- **Canal St. –** Jackson Blvd. to Van Buren St.
- **Clinton St. –** Adams St. to Jackson Blvd.
- **Adams St. –** Clinton St. to Canal St.
- **Adams St. –** Canal St. to the Chicago River
- **Jackson Blvd. –** Clinton St. to Canal St.
- **Jackson Blvd. –** Canal St. to the Chicago River

Intersections

- **Adams St. and the Chicago River**
- **Jackson St. and the Chicago River**
- **Monroe St. and Canal St.**
- **Adams St. and Canal St.**
- **Jackson Blvd. and Canal St.**
- **Adams St. and Clinton St.**
- **Jackson Blvd. and Clinton St.**

7.1 **Canal St.** –Adams St. to Monroe St.

Mode	Rating	Description
CTA Buses	5	
Private Shuttles	N/A	
Taxi loading / unloading	5	
Intercity Buses	N/A	
Private Vehicle Drop Offs / Pick ups	5	
Delivery and Service Trucks	N/A	
Pedestrians in Street	5	
Pedestrian volumes on Sidewalks	5	
Local and Through Traffic volume capacity	5	

7.2 **Canal St.** – Jackson Blvd. to Adams St.

Mode	Rating	Description
CTA Buses	3	NB CTA buses at stop (ID 5009) block through lane when they cannot pull up to the curb completely
Private Shuttles	2	Private shuttles frequently block through lane when they cannot pull up to the curb completely. Higher volume of shuttles in a.m. peak, but with usually short dwell times.
Taxi loading / unloading	1	Taxi stand overflows blocking crosswalk; taxi loading and unloading in through lanes block through traffic and bike lane; taxis queue on Jackson and Canal and challenge each other for spots in the taxi stand and along curb
Intercity Buses	3	Intercity buses with long dwell times prevent CTA buses and private shuttles from pulling up to the curb completely
Private Vehicle Drop Offs / Pick ups	2	Private autos block through traffic and bike lane when dropping off / picking up, situation is chaotic at times
Delivery and Service Trucks	N/A	
Pedestrians in Street	2	Passengers of private auto and taxi drop offs unload in the street presenting a safety issue
Pedestrian volumes on Sidewalks	3	Pedestrians with luggage and jersey barriers on sidewalk often cause congestion at the Canal St. east doorways
Local and Through Traffic volume capacity	1	Only 1 thru lane available at times

7.3 **Canal St.** – Van Buren St. to Jackson Blvd.

Mode	Rating	Description
CTA Buses	4	Access to bus stop is sometimes blocked by intercity buses and private vehicle drop-offs and pick-ups
Private Shuttles	N/A	
Taxi loading / unloading	5	
Intercity Buses	3	Bus operations block northbound through traffic when there are too many buses to fit on the curb properly and when private autos block bus stop
Private Vehicle Drop Offs / Pick ups	3	NB private autos dropping off and picking up for bus block the curb space designated for intercity and CTA Bus operations as well as through lanes; SB private autos sometimes block single through lane
Delivery and Service Trucks	N/A	
Pedestrians in Street	5	
Pedestrian volumes on Sidewalks	2	Intercity bus passengers wait on sidewalk with no amenities (such as trashcans or shelters) and there is very little organization in the boarding process, causing the passengers to block normal sidewalk traffic.
Local and Through Traffic volume capacity	4	

7.4 **Clinton St.** – Adams St. to Jackson Blvd.

Mode	Rating	Description
CTA Buses	4	On occasion too many CTA buses and private shuttles arrive at the same time and the shuttles block one through lane
Private Shuttles	3	On occasion too many CTA buses and private shuttles arrive at the same time and the shuttles block one through lane
Taxi loading / unloading	5	
Intercity Buses	N/A	
Private Vehicle Drop Offs / Pick ups	5	
Delivery and Service Trucks	5	
Pedestrians in Street	2	Pedestrians exiting Clinton St. North doorway going to shuttles do not use crosswalk, but cross mid-block, presenting a safety concern.
Pedestrian volumes on Sidewalks	5	
Local and Through Traffic volume capacity	4	

7.5 **Adams St.** – Canal St. to Clinton St.

Mode	Rating	Description
CTA Buses	5	
Private Shuttles	N/A	
Taxi loading / unloading	5	
Intercity Buses	N/A	
Private Vehicle Drop Offs / Pick ups	5	
Delivery and Service Trucks	N/A	
Pedestrians in Street	5	
Pedestrian volumes on Sidewalks	5	
Local and Through Traffic volume capacity	4	

7.6 **Adams St.** – the Chicago River to Canal St.

Mode	Rating	Description
CTA Buses	3	Two CTA bus stops (ID's 12713 and 14462) in bus only lane occasionally block next through lane
Private Shuttles	N/A	
Taxi loading / unloading	1	Unofficial and unorganized taxi stand blocks through traffic in both curb lane and next lane. Taxis challenge each other for spots along curb and in next lane, backing up into pedestrian crossing
Intercity Buses	N/A	
Private Vehicle Drop Offs / Pick ups	4	Some private vehicle drop-offs occur in the thru lanes.
Delivery and Service Trucks	N/A	
Pedestrians in Street	2	Pedestrians crossing street outside of crosswalk and disobeying traffic signal to get to bus stop presents a safety issue and slows through traffic
Pedestrian volumes on Sidewalks	3	High peak period pedestrian volumes sometimes exceed capacity near the Adams St doorway
Local and Through Traffic volume capacity	2	

7.7 **Jackson Blvd.** – Clinton St. to Canal St.

Mode	Rating	Description
CTA Buses	4	Layovers in bus lane force thru buses to use adjacent travel lane
Private Shuttles	N/A	
Taxi loading / unloading	4	Taxis waiting for spots in the Canal St. taxi stand form queues on Jackson Blvd. during weekend and weekday off-peak hours
Intercity Buses	N/A	
Private Vehicle Drop Offs / Pick ups	5	
Delivery and Service Trucks	N/A	
Pedestrians in Street	5	
Pedestrian volumes on Sidewalks	5	
Local and Through Traffic volume capacity	4	Narrow lane widths

7.8 **Jackson Blvd.** – Canal St. to the Chicago River

Mode	Rating	Description
CTA Buses	3	Busy CTA bus stop (ID 14461) in bus only lane creates friction on through lanes
Private Shuttles	N/A	
Taxi loading / unloading	2	Taxi stand overflows into loading zone and blocks through lane
Intercity Buses	N/A	
Private Vehicle Drop Offs / Pick ups	3	Private autos block taxi stand and bus lane operations
Delivery and Service Trucks	2	Taxi stand overflows into loading zone and blocks through lane and when delivery trucks back into loading dock they slow through traffic. Delivery trucks observed parking in bus lane
Pedestrians in Street	2	Pedestrians crossing street outside of crosswalk and disobeying traffic signal to get to bus stop presents a safety issue and slows through traffic
Pedestrian volumes on Sidewalks	4	
Local and Through Traffic volume capacity	3	Taxi and loading activity reduces capacity. Congestion may be spilling back from Wacker intersection

7.9 Adams St. and the Chicago River

Mode	Rating	Description
CTA Buses	3	CTA bus stop (ID 14462) in bus only lane creates friction on through lanes
Private Shuttles	N/A	
Taxi loading / unloading	1	Unofficial taxi stand blocks through traffic, crosswalk, and proper operation of pedestrian traffic signal
Intercity Buses	N/A	
Private Vehicle Drop Offs / Pick Ups	4	
Delivery and Service Trucks	N/A	
Pedestrians in Crosswalks	2	High number of pedestrians disobeying signal and crossing outside crosswalk prevent proper operation of traffic signal and present a safety hazard
Pedestrian volumes on Sidewalks	2	High volumes of pedestrians, especially on south side, Adams St. bridge sidewalks causing congestion
Local and Through Traffic volume capacity	2	Friction from buses and taxi loading activity reduces capacity

7.10 Jackson Blvd. and the Chicago River

Mode	Rating	Description
CTA Buses	3	CTA bus stop (ID 14461) in bus only lane creates friction on through lanes
Private Shuttles	N/A	
Taxi loading / unloading	2	Taxi stand blocks through traffic, crosswalk, and proper operation of pedestrian traffic signal.
Intercity Buses	N/A	
Private Vehicle Drop Offs / Pick Ups	5	
Delivery and Service Trucks	N/A	
Pedestrians in Crosswalks	2	High volumes of pedestrians disobeying signal and crossing outside crosswalk prevent proper operation of traffic signal and present a safety hazard
Pedestrian volumes on Sidewalks	3	High volumes of pedestrians, especially on north side of Jackson Blvd. bridge sidewalks causing congestion
Local and Through Traffic volume capacity	3	

7.11 Monroe St. and Canal St.

Mode	Rating	Description
CTA Buses	2	Near side bus stop hinders right turns onto Monroe. Right turning activity hinder buses entering stop
Private Shuttles	N/A	
Taxi loading / unloading	5	
Intercity Buses	N/A	
Private Vehicle Drop Offs / Pick Ups	5	
Delivery and Service Trucks	5	
Pedestrians in Crosswalks	4	High volumes of pedestrians prevent right turns from Canal to Monroe
Pedestrian volumes on Sidewalks	5	
Local and Through Traffic volume capacity	4	

7.12 Adams St. and Canal St.

Mode	Rating	Description
CTA Buses	3	CTA buses block right through lane when they cannot pull up to the curb completely
Private Shuttles	3	Private shuttles block right through lane when they cannot pull up to the curb completely
Taxi loading / unloading	5	
Intercity Buses	3	Intercity buses block right through lane when they cannot pull up to the curb completely
Private Vehicle Drop Offs / Pick Ups	5	
Delivery and Service Trucks	N/A	
Pedestrians in Crosswalks	3	High volumes of pedestrians impede left turns from Canal to Adams and right turns from Adams to Canal
Pedestrian volumes on Sidewalks	4	
Local and Through Traffic volume capacity	2	

7.13 Jackson Blvd. and Canal St.

Mode	Rating	Description
CTA Buses	4	CTA Bus stop on Canal (ID 6352) prevents efficient right turn movement from Canal to Jackson
Private Shuttles	N/A	
Taxi loading / unloading	3	Taxis waiting to use stand on Canal often block pedestrian crosswalk and sometimes block the entire intersection
Intercity Buses	4	
Private Vehicle Drop Offs / Pick Ups	4	
Delivery and Service Trucks	N/A	
Pedestrians in Crosswalks	2	High volumes of pedestrians limit left turns from Jackson to Canal and right turns from Canal to Jackson
Pedestrian volumes on Sidewalks	4	
Local and Through Traffic volume capacity	3	

7.14 Adams St. and Clinton St.

Mode	Rating	Description
CTA Buses	4	On occasion too many CTA buses and private shuttles arrive on Clinton at the same time and shuttles block one through lane
Private Shuttles	3	On occasion too many CTA buses and private shuttles arrive on Clinton at the same time and shuttles block one through lane
Taxi loading / unloading	5	
Intercity Buses	N/A	
Private Vehicle Drop Offs / Pick Ups	5	
Delivery and Service Trucks	5	
Pedestrians in Crosswalks	4	High volumes of pedestrians impede left turns from Adams to Clinton
Pedestrian volumes on Sidewalks	5	
Local and Through Traffic volume capacity	4	

7.15 Jackson Blvd. and Clinton St.

Mode	Rating	Description
CTA Buses	5	
Private Shuttles	N/A	
Taxi loading / unloading	5	
Intercity Buses	N/A	
Private Vehicle Drop Offs / Pick Ups	5	
Delivery and Service Trucks	5	
Pedestrians in Crosswalks	4	High volumes of pedestrians impede left turns from Clinton to Jackson
Pedestrian volumes on Sidewalks	5	
Local and Through Traffic volume capacity	4	

7.16 Weekend and Weekday Off-Peak Conditions

Traffic volumes during the weekend and weekday off-peak times are much lower than they are during weekday peak periods, but many problems still occur. Most of these problems are restricted to Canal St. between Adams St. and Van Buren St., where the majority of activity in the weekend and weekday off-peak times takes place.

Since there are so many fewer Metra passengers on weekends, Amtrak and intercity bus passengers play the largest role in the street-level operations at this time. Over half of Amtrak passengers reported using a private vehicle, taxi, or rental car to get to and from the station. They also carry more baggage than the typical Metra passenger, causing a longer time to load and unload. As a result, Canal St in front of the 222 S. Riverside Plaza has major conflicts between taxis and private autos dropping off and picking up passengers. They are typically pushed into the second lane, which raises a safety concern. During the busiest weekend travel periods, all north bound lanes on Canal St. between Jackson Blvd. and Adams St. may be blocked, as well as the Jackson Blvd. and Canal St. intersection.

Intercity buses, their passengers, and related drop-off and pick-up activity cause congestion. Particularly on Canal St. between Van Buren St. and Jackson Blvd., intercity buses block the bike lane and create friction between the curbside operations and through traffic, dwelling for more than 15 minutes at times.

Informal "taxi starters" are civilians who offer to get a taxi for people coming out of Union Station, then request money for their service. During the mid-day and weekend they are constantly harassing people, creating an unpleasant situation.

Overall the situation during busy off-peak and weekend times is quite different from the peak periods. Commuters, who dominate the peak periods, follow regular patterns, and the access modes they use operate in an ordered albeit congested pattern. The situation at other busy times is driven by occasional and intercity travellers. While problems are limited to Canal St. during these periods, the situation is more chaotic.

8 Conclusions

The study of existing conditions has resulted in several key findings that will help focus the development of solutions. Some problems are limited to specific locations and some locations have multiple problems. All of these problems are the result of a mode exceeding the available capacity or the result of two or more modes conflicting.

A general problem at several locations in the area around Union Station is that there is not sufficient curb space to accommodate those modes that use the curb space. Because it is located in the central business district, Union Station does not have the luxury of space. Often there is too much demand for the curb space available. Also, the demand is unbalanced. Streets directly adjacent to 222 S. Riverside Plaza are the most convenient for station users and therefore have the most demand for use. At the same time, street curbs adjacent to the Union Station Headhouse are not as convenient and are under-utilized. Two of the four block faces around the Headhouse have paid street parking. One has a contraflow bus lane. Both improved management of existing curb space and increased loading capacity should be pursued.

With so many different modes sharing the area, conflicts regularly occur even where there is sufficient curb space. The activities of different modes often conflict with each other. Although curb space is generally allocated for each mode, the space is often not adequate to serve the needs of all modes. All modes should be considered when developing proposed solutions.

Even with sufficient curb space and a plan for how this curb space should be used by the different modes, problems will still occur if there is not proper signage to direct users and if there is not adequate enforcement to ensure that users comply. Supplying information is particularly important for private auto drop-offs and pick-ups, when users are not familiar with the area. Enforcement is particularly important for taxis and intercity buses, which have a financial stake in the activity around Union Station. Signage and enforcement should be important components of all proposed solutions.

8.1 Critical Issues by Location

Critical locations were identified in order to highlight the areas of greatest concern. Proposed solutions should focus on these locations.

Canal St. between Adams St. and Jackson Blvd. is the busiest segment in the study area and also contains the most problems. Private shuttles consistently block through lanes and the bike lane and taxis trying to leave the cab stand when they cannot pull up to the curb completely. Taxi loading, unloading and staging blocks through lanes and the pedestrian crosswalk, and also raises safety concerns when taxis drop off passengers in the middle of the street. Also, informal "taxi starters" create an unpleasant situation for station users. Private autos block through lanes and result in drop-offs and pick-ups in the middle of the street. Private autos often park in bus stops during off-peak periods. Intercity buses with long dwell times occupy large amounts of curb space forcing other modes off the curb and into the through lanes. The primary reason this segment operates very poorly is that demand for curb space on the east side of the street exceeds capacity by a factor of two during peak times. This imbalance exacerbates all of the conflicts observed between the different modes. During the p.m. peak hour, curb space demand totals approximately 682', and there is only 350' of existing curb on the east side. Demand is composed of:

- 23 CTA buses serving 218 passengers
- 13 private shuttles serving approximately 240 passengers
- 3 intercity coaches, averaging 19 minutes of observed dwell time
- 94 taxis handling 49 passenger drop-offs and 45 pick-ups
- Private auto passenger drop-offs and pick-ups

Accommodating this demand would require curb space for 2 CTA buses, 2 private shuttles, 2 intercity coaches, 3 taxi drop-offs, 9 taxis for pickups, and 7 private autos simultaneously. High demand results in the curb lane and the bike lane being occupied at all times and one of the thru lanes occupied for much of the peak period.

As noted in the performance ratings, there are many conflicts between the modes at this location. Buses are generally unable to fully berth at the curb resulting in blockage of the bike lane. The taxi stand is posted for 9 cabs, but in practice queues of 7 to 8 cabs were observed, with the 8th encroaching on the north pedestrian cross-walk. Private auto and taxi drop-offs often occur in the first thru lane. Private autos waiting to pick-up passengers and shuttle buses waiting to load can trap vehicles in the curb lane ready to depart.

Relocation of some of these modes and / or the creation of more loading space, combined with enforcement and clearer signage, will be necessary to improve the performance of this segment.

<u>Adams St. at the Chicago River and at the intersection of Canal St.</u> has problems that result from two major factors. Taxis that use the south curb lane, to drop off and waiting to pick up passengers, block that south lane and the first through lane to the north. Taxis often back up in this area in an effort to get closer to the exit from the Station exit. Higher peak period volumes of both passenger drop-off and pick-ups were observed at this undesignated taxi stand than at either of the two designated Union station stands. This often chaotic operation prevents proper flow of through traffic. On some days Chicago or Amtrak Police monitor this location, prohibiting taxi pick-ups or limiting particularly egregious operations.

This area has the highest pedestrian volumes in the study area. The Adams St. portal accounts for over 40% of all entries and exits to CUS during the peak periods. Pedestrian volumes on the Adams St. Bridge are extremely high. The south sidewalk, busiest in the study area, carries 2200 pedestrians in the p.m. peak 15 minutes. These pedestrian volumes are at capacity and the sidewalks very congested during the peak. Interruptions to flow cause backups and delay. The two CTA bus stops on the north side of Adams between Canal and the River handle large numbers of passenger alightings and boardings, 500 in the p.m. peak hour but only half that in the a.m. peak. Buses in the stop impede right turns by other traffic. Pedestrians crossing

Adams St. on the crosswalk at the Chicago River create a conflict with street traffic and prevent proper operation of the traffic signal. These pedestrians often cross against the signal and outside the designated crosswalk.

Jackson Blvd. at the River also presents similar issues. Like Adams St. west of the Chicago River, high volumes of pedestrians on the bridge result in congested conditions. The north sidewalk carries almost 1300 pedestrians in the p.m. peak 15 minutes. The CTA bus stop on the south side of Jackson is the busiest in the study area, with 50 buses stopping there during the a.m. peak hour, serving 470 passengers. Pedestrians often cross Jackson Blvd. against the signal and outside the designated crosswalk.

The taxi stand on the north curb is very active in the a.m. peak, with 107 pick-ups in the peak hour. This stand is posted for 5 taxis, even though only 4 taxis actually fit between the posted signs. However, queues of 9 to 11 cabs are common during the a.m. peak. This results in taxis occupying the loading zone, or if that is being used, backing up into the travel lane. Private autos occasionally stop in both the bus lane and the taxi stand / loading zone area. In spite of these incursions, the segment operates better than Adams Street, with most congestion likely due to downstream constraints.

The intersection at Jackson Blvd. and Canal St. has problems resulting from the interaction between pedestrians and vehicles. Taxis queuing on Canal St. back up into the northern pedestrian crosswalk crossing Canal, causing pedestrians to cross outside the crosswalk and creating a safety concern. The pedestrians on this crosswalk and the eastern crosswalk crossing Jackson can impede vehicle movements, preventing proper operation of the traffic signal.

8.2 Critical Issues by Mode

Critical problems for each mode were identified to highlight the user behaviors which cause the most problems. Proposed solutions should focus on these problems.

Taxis at all locations do not typically follow the guidelines they are supposed to follow. On Adams St. they stop where there is no designated taxi stand, on Canal St. they fight for positions on the curb and drop off in the middle of the street (sometimes picking up there, as well), and on Jackson Blvd. they overflow into the loading zone and block through lanes. The taxi issues on Canal St. appear to be worse during busy off-peak and weekend times.

Intercity bus passengers wait for buses, as well as board and alight from buses (and check and retrieve their baggage) with no weather protection. Intercity buses with long dwell times occupy large amounts of curb space. Also, private autos dropping off and picking up passengers for intercity buses often dwell illegally while they are waiting.

Private auto users are often unfamiliar with the area and drop off and pick up passengers in the middle of the street or in areas designated for other modes.

Pedestrians crossing crosswalks impede vehicle movements and raise safety concerns. High volumes of pedestrians on sidewalks create congestion and discomfort.

CTA buses occupy large amounts of curb space and conflict with movements of private autos. The longer dwell times at layover locations scheduled for certain periods contribute to curb space being under-utilized at other periods.

Understanding the existing conditions is important to developing solutions. Proposed solutions to the problems in street-level operations around Union Station should focus first on the critical locations and critical issues discussed in this report. As the number of people who use Union Station grows, there will be increased stress on these operations. Providing safe and efficient street-level access ensures that the public views the station as an attractive transit option and maintains Chicago Union Station as one of the Midwest's most important transportation hubs.

9 Appendix

Appendix A1. Photo Log

Appendix A2. Taxi and Private Shuttle Counts

Appendix A3. Inter-city Bus Schedules

Appendix A1. Photo Log

1. Informal "Taxi Starter"

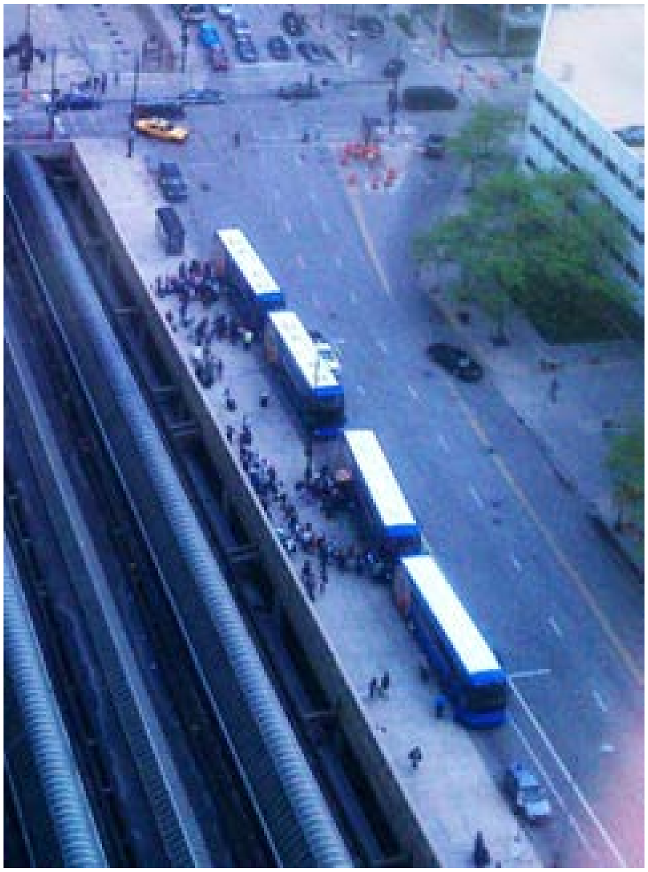
2. Taxi Blocking Crosswalk

3. Looking north on Canal St.

5. Looking south on Canal St.

4. Intercity bus unloading in the middle of the street

6. Shuttle unloading in the middle of the street



7. Intercity bus operations on Canal St. south of Jackson Blvd.

8. Intercity bus passengers crowd sidewalk on Canal St. south of Jackson Blvd.

10. Taxi unloading in bus lane on Jackson Blvd. east of Canal St.

9. Taxi stand on Jackson blocking through lane.

11. Autos on Canal turning right onto Monroe, blocking CTA bus stop.

Appendix A2. Taxi and Private Shuttle Counts

Chicago Union Station Study
Taxi Stand Data Collection

Key
Location C: W. Adams between S. Canal and the Chicago River
Location D: S. Canal between W. Adams and W. Jackson
Location E: W. Jackson between S. Canal and the Chicago River

Drop Offs: Number of taxis that drop off customers in the location area
Pick Ups: Number of taxis that pick up customers in the location area

January 26, 2011 AM

	Location C		Location D		Location E		
	Drop Offs	Pick Ups	Drop Offs	Pick Ups	Drop Offs	Pick Ups	
Time							
7:00 - 7:15	6	26	7	11	2	20	**72**
7:15 - 7:30	7	24	12	17	2	22	**84**
7:30 - 7:45	10	25	2	15	0	21	**73**
7:45 - 8:00	5	33	1	24	0	27	**90**
8:00 - 8:15	3	32	1	20	1	27	**84**
8:15 - 8:30	2	30	1	19	0	33	**85**
8:30 - 8:45	2	38	1	20	1	17	**79**
8:45 - 9:00	6	24	1	21	0	33	**85**
Total	41	232	26	147	6	200	

January 27, 2011 AM

	Location C		Location D		Location E	
	Drop Offs	Pick Ups	Drop Offs	Pick Ups	Drop Offs	Pick Ups
Time						
7:00 - 7:15	13	22	6	15	0	28
7:15 - 7:30	5	24	4	12	0	25
7:30 - 7:45	10	38	2	13	0	14
7:45 - 8:00	8	36	4	27	0	35
8:00 - 8:15	6	38	2	40	1	40
8:15 - 8:30	6	34	5	28	1	11
8:30 - 8:45	9	46	5	25	0	23
8:45 - 9:00	9	35	0	20	0	24
Total	66	273	28	180	2	200

January 26, 2011 PM

	Location C		Location D		Location E		
	Drop Offs	Pick Ups	Drop Offs	Pick Ups	Drop Offs	Pick Ups	
Time							
4:00 - 4:15	27	4	20	15	2	9	**77**
4:15 - 4:30	29	5	5	20	1	6	**66**
4:30 - 4:45	36	13	5	16	4	6	**80**
4:45 - 5:00	28	12	12	6	1	8	**67**
5:00 - 5:15	26	9	14	15	2	14	**80**
5:15 - 5:30	31	8	14	8	1	7	**69**
5:30 - 5:45	23	9	7	6	0	8	**53**
5:45 - 6:00	24	9	7	9	0	6	**55**
6:00 - 6:15	22	10	10	5	1	4	**52**
6:15 - 6:30	24	8	8	3	0	3	**46**
Total	214	78	77	68	9	56	

January 27, 2011 PM

	Location C		Location D		Location E	
	Drop Offs	Pick Ups	Drop Offs	Pick Ups	Drop Offs	Pick Ups
Time						
4:00 - 4:15	25	4	10	8	0	5
4:15 - 4:30	26	5	10	6	0	4
4:30 - 4:45	27	10	18	20	0	12
4:45 - 5:00	27	8	21	10	0	7
5:00 - 5:15	21	5	6	10	0	8
5:15 - 5:30	26	14	8	4	0	7
5:30 - 5:45	34	6	13	7	0	5
5:45 - 6:00	25	9	8	10	0	12
6:00 - 6:15	22	10	8	23	0	10
6:15 - 6:30	27	5	9	4	0	7
Total	209	67	91	88	0	68

Chicago Union Station Study
Private Buses Data Collection

Key
Location A: S. Clinton Between W. Adams and W. Jackson
Location B: S. Canal between W. Adams and W. Jackson

January 26, 2011 AM

	Location A	Location B
Time	# of Shuttles	# of Shuttles
7:00 - 7:15	9	12
7:15 - 7:30	7	9
7:30 - 7:45	9	9
7:45 - 8:00	9	7
8:00 - 8:15	9	8
8:15 - 8:30	10	7
8:30 - 8:45	6	6
8:45 - 9:00	11	12
Total	**70**	**70**

January 27, 2011 AM

	Location A	Location B
Time	# of Shuttles	# of Shuttles
7:00 - 7:15	7	11
7:15 - 7:30	7	8
7:30 - 7:45	10	8
7:45 - 8:00	9	7
8:00 - 8:15	9	6
8:15 - 8:30	8	11
8:30 - 8:45	4	6
8:45 - 9:00	9	11
Total	**63**	**68**

January 26, 2011 PM

	Location A	Location B
Time	# of Shuttles	# of Shuttles
4:00 - 4:15	8	2
4:15 - 4:30	8	3
4:30 - 4:45	9	2
4:45 - 5:00	9	4
5:00 - 5:15	8	5
5:15 - 5:30	13	1
5:30 - 5:45	9	4
5:45 - 6:00	9	4
6:00 - 6:15	11	3
6:15 - 6:30	10	1
Total	**94**	**29**

January 27, 2011 PM

	Location A	Location B
Time	# of Shuttles	# of Shuttles
4:00 - 4:15	9	2
4:15 - 4:30	6	4
4:30 - 4:45	12	1
4:45 - 5:00	11	3
5:00 - 5:15	10	3
5:15 - 5:30	15	3
5:30 - 5:45	12	2
5:45 - 6:00	10	1
6:00 - 6:15	15	4
6:15 - 6:30	7	2
Total	**107**	**25**

Appendix A3. Inter-city Bus Schedules

	Van Galder Schedule	
Madison to Chicago	**Chicago to Madison**	
5:50 AM	10:30 AM	
9:30 AM	12:35 PM	
11:00 AM	2:00 PM	
12:30 PM	5:00 PM	
1:45 PM	6:00 PM	
3:30 PM	7:00 PM	
5:15 PM	8:30 PM	
6:45 PM	10:15 PM	
8:30 PM		

*All buses are through routes

**Van Galder buses pick up and drop off at Jackson and Canal (on Canal St, North of Jackson)

*** During data collection it was observed Van Galder buses would stay at Union station for up to 30-40mins at a time.

LEX Schedule

Monday		Tuesday		Wednesday		Friday	
Departing from CUS	Route	Departing from CUS	Route	Departing from CUS	Route	Departing from CUS	Route
3:55am	Champaign	3:55am	Champaign	3:55am	Champaign	3:55am	Champaign
9:00am	Bloomington	6:30am	Champaign	6:30am	Champaign	7:10am	Champaign
9:30am	Champaign	9:00am	Bloomington	9:00am	Bloomington	9:00am	Bloomington
12:30pm	Champaign	9:30am	Champaign	9:30am	Champaign	9:45am	Champaign
12:55pm	Bloomington	12:30pm	Champaign	12:30pm	Champaign	12:30pm	Champaign
3:30pm	Bloomington/Champa	12:55pm	Bloomington	12:55pm	Bloomington	3:30pm	Bloomington/Champaign
6:30pm	Bloomington	3:30pm	Bloomington/Champa	3:30pm	Bloomington/Champa	6:00pm	Champaign
6:40pm	Champaign	6:30pm	Bloomington	6:30pm	Bloomington	6:20pm	Bloomington
9:30pm	Bloomington	6:40pm	Champaign	6:40pm	Champaign	6:15pm	Champaign
10:10pm	Champaign	9:30pm	Bloomington	9:30pm	Bloomington	8:00pm	Champaign
12:00am	Champaign	10:10pm	Champaign	10:10pm	Champaign	8:35pm	Bloomington
		12:00am	Champaign	12:00am	Champaign	9:30pm	Bloomington
						10:10pm	Champaign
						10:20pm	Champaign
						12:00am	Champaign

Summary:

	Departing/Arriving	
	Mon-Wed	**Friday**
AM Peak (6:30-9:00)	2	2
PM Peak (4:00-6:30)	1	3

* All buses arrive at CUS 5mins before departing to allow for both drop off and pick up. (Phone conversation with LEX)

** All buses pass through CUS and do not begin or terminate at CUS (phone conversation with LEX)

Megabus Schedule

	Departing From CUS			Arriving At CUS	
	Mon-Wed	Friday		Mon-Wed	Friday
Ann Arbor (Detroit)	8:30 AM 4:45 PM	8:30 AM 10:30 AM 2:00 PM 10:25 PM		12:40 PM 8:40 PM	11:10 AM 12:40 PM 8:40 PM 11:10 PM
Champaign	11:30 AM 10:15 PM	11:30 AM 10:15 PM		9:00 AM 7:45 PM	9:00 AM 7:45 PM
Cincinnati (Indianapolis)	7:00 AM 11:00 AM 3:30 PM	7:00 AM 11:00 AM 3:30 PM 10:00 PM		2:00 PM 7:15 PM 11:15 PM	6:20 AM 2:00 PM 7:15 PM 11:15 PM
Cleveland	8:15 AM 4:15 PM	8:15 AM 4:15 PM 11:30 PM		1:45 PM 11:00 PM	6:15 AM 1:45 PM 11:00 PM
Columbia (Kansas City)	8:45 AM	8:45 AM		9:40 PM	9:40 PM
Columbus	9:00 AM	9:00 AM 10:00 PM		4:30 PM	6:20 AM 4:30 PM
Des Moines	9:30 AM 5:00 PM	9:30 AM 5:00 PM		2:00 PM 11:00 PM	2:00 PM 11:00 PM
Detroit	8:30 AM 4:45 PM	8:30 AM 10:30 AM 2:00 PM 4:45 PM		12:40 PM 8:40 PM	11:10 AM 12:40 PM 11:10 PM
Indianapolis	7:00 AM 9:00 AM 11:00 AM 1:30 PM 3:30 PM 6:00 PM	7:00 AM 9:00 AM 11:00 AM 1:30 PM 3:30 PM 6:00 PM 10:00 PM		12:00 PM 2:00 PM 4:30 PM 7:15 PM 9:15 PM 11:15 PM	6:20 AM 12:00 PM 2:00 PM 4:30 PM 7:15 PM 9:15 PM 11:15 PM
Iowa City (Des Moines)	9:30 AM 5:00 PM	9:30 AM 5:00 PM		2:00 PM 11:00 PM	2:00 PM 11:00 PM
Kansas City	8:45 AM 11:55 PM	8:45 AM 11:55 PM		6:50 AM 9:40 PM	6:50 AM 9:40 PM
Madison (Minneapolis)	12:00 PM 10:30 PM	2:30 PM 1:00 AM		6:30 AM 7:30 PM	6:30 AM 7:30 PM
Memphis	11:30 AM 10:15 PM	11:30 AM 10:15 PM		9:00 AM 7:45 PM	9:00 AM 7:45 PM
Milwaukee (Minneapolis)	6:30 AM 3:00 PM	6:30 AM 3:00 PM		3:00 PM 1:15 AM	3:00 PM 1:15 AM

Minneapolis	6:30 AM 12:00 PM 3:00 PM 10:30 PM	6:30 AM 12:00 PM 3:00 PM 10:30 PM		6:30 AM 3:00 PM 7:30 PM 1:15 AM	6:30 AM 3:00 PM 7:30 PM 1:15 AM
Normal (St. Louis)	4:30 PM	4:30 PM		2:10 PM	2:10 PM
St. Louis	8:45 AM 4:30 PM 11:55 PM	8:45 AM 4:30 PM 11:55 PM		6:50 AM 2:10 PM 9:40 PM	6:50 AM 2:10 PM 9:40 PM
Toledo (Cleveland)	8:15 AM 4:15 PM	8:15 AM 4:15 PM 11:30 PM		1:45 PM 11:00 PM	6:15 AM 1:45 PM 11:00 PM

Summary:

	Departing From CUS		Arriving At CUS	
	Mon-Wed	**Friday**	**Mon-Wed**	**Friday**
AM Peak (6:30-9:00)	7	7	5	5
PM Peak (4:00-6:30)	5	5	2	2
AM Peak Hour (8-9 am)	6	6	2	2
PM Peak Hour (8-9 am)	2	2	0	0

***Megabuses pick up and drop off on Canal St., facing northbound, between Jackson and Van Buren.**

Appendix C

Medium Term Ideas

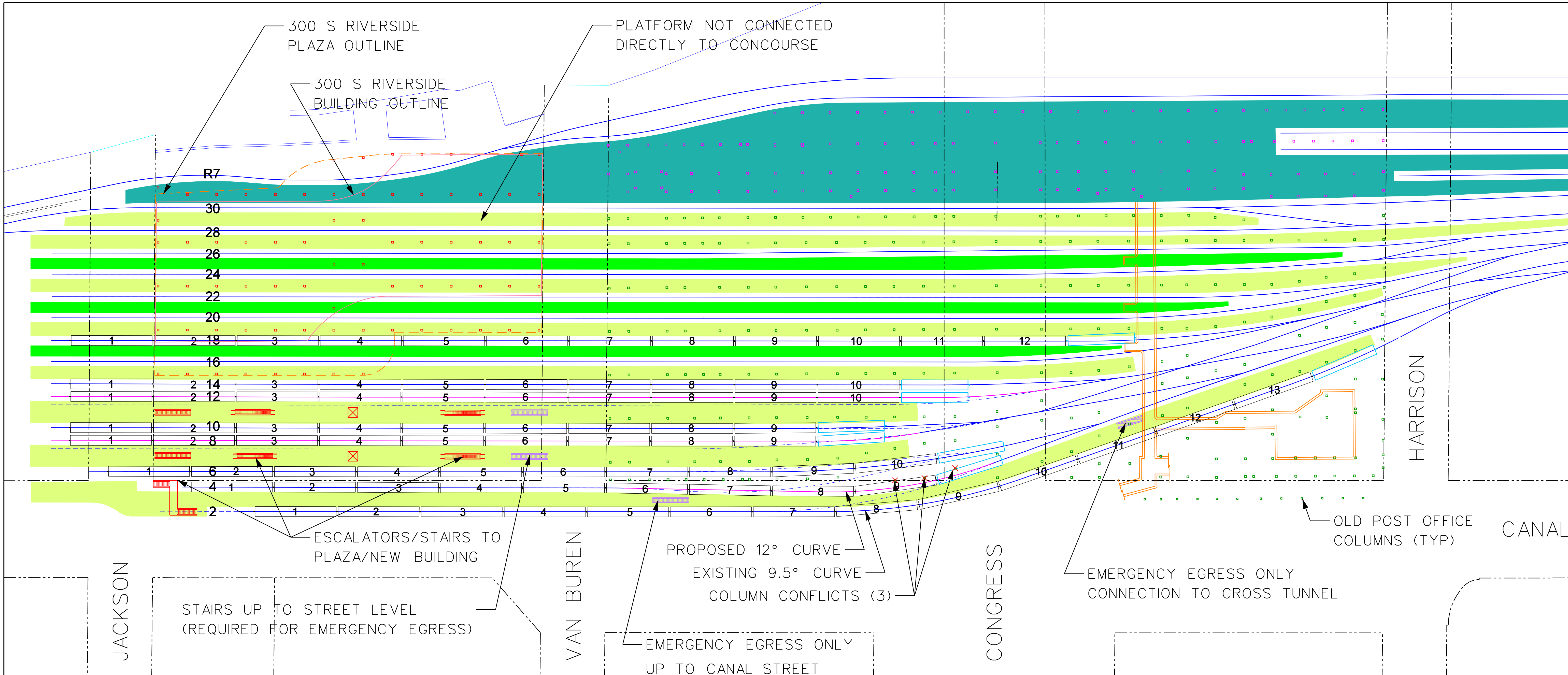
- Widen Tracks 6/8 and 10/12 platforms
- Convert mail platform – Phase 1
- Space planning concepts
- Canal St. viaducts concepts
    - Adams-Jackson block island, plan and section
    - Union Station area plan (assuming Canal operates southbound)

Note:
The Double Lane Concept exhibit for the Canal Street Island is a concept drawing only and will require further detailed analysis.

Note:
Due to the limited budget virtually no survey was performed specifically for this study. Rather, surveys, as-built drawings, and construction drawings were requested from owners and others. The primary grid for all of the project's work was created for the Central Area Survey (provided by CDOT). It establishes the street right-of way grid. All other surveys and drawings have been referenced to that.

The following sources are acknowledged, with great appreciation:

- CDOT (and its consultant – AECOM, and other City Departments, including the Departments of Planning, Water Management, and Buildings)
- Amtrak (and its contractor and consultants - Jones Lang LaSalle, Jacobs Engineering, Goettsch Partners, and Legion America)
- Chicago Transit Authority
- Metra (and its consultant Parsons Brinckerhoff)
- U.S. Postal Service
- Fifield Companies (and its consultants Pappageorge/Haymes and Chicago Guarantee Survey)
- Metropolitan Planning Council
- Skidmore Owings and Merrill



TRACK	EXISTING MAX No. COACHES	PROPOSED MAX No. COACHES	SHORTEN TRACK BY:
#2	13	13	80'
#4	7	9	25'
#6	8	10	
#8	8	9	
#10	8	9	
#12	10	10	
#14	10	10	
#16	12	12	
#18	12	12	

PROPERTY	COLUMN CONFLICTS
POST OFFICE	2
CONGRESS EXPY	1

BAGGAGE PLATFORM
PASSENGER PLATFORM
MAIL PLATFORM

EXISTING TRACK
TRACK REMOVAL
NEW TRACK

50 100 200 300
0 10

NO.	BY	DATE	DESCRIPTION

REVISIONS

CHICAGO UNION STATION MASTER PLAN

PROPOSED WIDENED PLATFORM (6-8) AND (10-12)

CONSULTANT:
222 South Riverside Plaza
Suite 2320
Chicago, Illinois 60606
(312) 669-9601

TranSystems

CITY OF CHICAGO

CDOT

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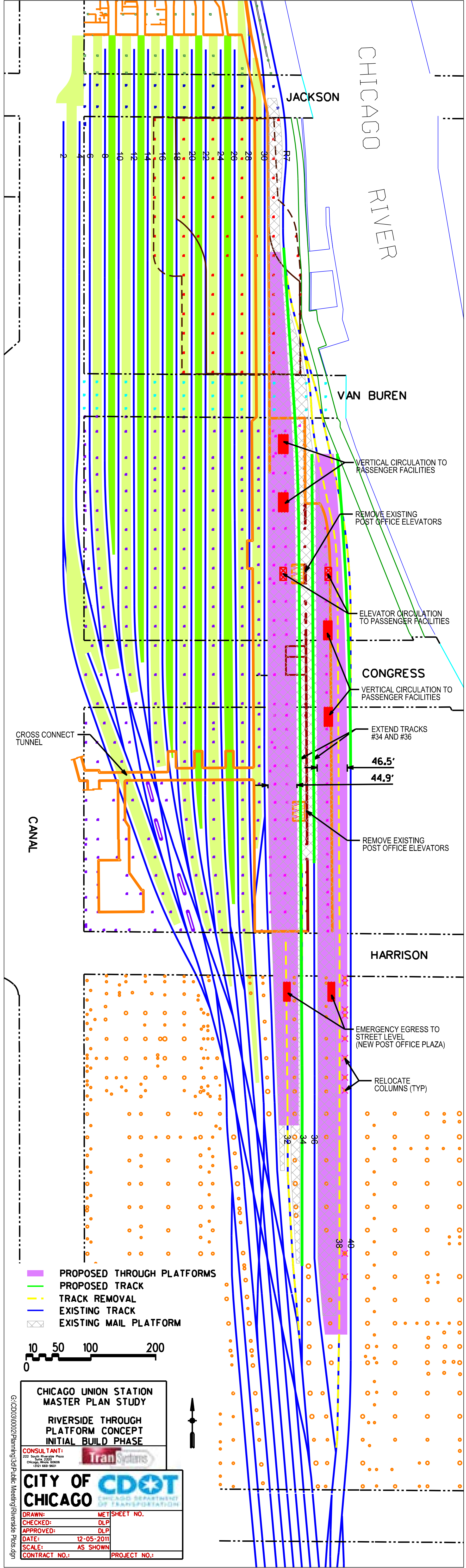
APPROVED: DLP
DATE: 10/13/2011
SCALE: AS SHOWN
CONTRACT NO.:
SHEET NO.
PROJECT NO.: CAP

$FILEL$



JACKSON
CHICAGO RIVER
VAN BUREN
VERTICAL CIRCULATION TO PASSENGER FACILITIES
REMOVE EXISTING POST OFFICE ELEVATORS
ELEVATOR CIRCULATION TO PASSENGER FACILITIES
CONGRESS
VERTICAL CIRCULATION TO PASSENGER FACILITIES
EXTEND TRACKS #34 AND #36
46.5'
44.9'
CROSS CONNECT TUNNEL
CANAL
REMOVE EXISTING POST OFFICE ELEVATORS
HARRISON
EMERGENCY EGRESS TO STREET LEVEL (NEW POST OFFICE PLAZA)
RELOCATE COLUMNS (TYP)
PROPOSED THROUGH PLATFORMS
PROPOSED TRACK
TRACK REMOVAL
EXISTING TRACK
EXISTING MAIL PLATFORM
0 10 50 100 200
CHICAGO UNION STATION MASTER PLAN STUDY
RIVERSIDE THROUGH PLATFORM CONCEPT INITIAL BUILD PHASE
CONSULTANT:
222 South Riverside Plaza Suite 2320 Chicago, Illinois 60606 (312) 669-9601
TranSystems
CITY OF CHICAGO
CDOT
DRAWN: MET
CHECKED: DLP
APPROVED: DLP
DATE: 12-05-2011
SCALE: AS SHOWN
CONTRACT NO.:
SHEET NO.
PROJECT NO.:
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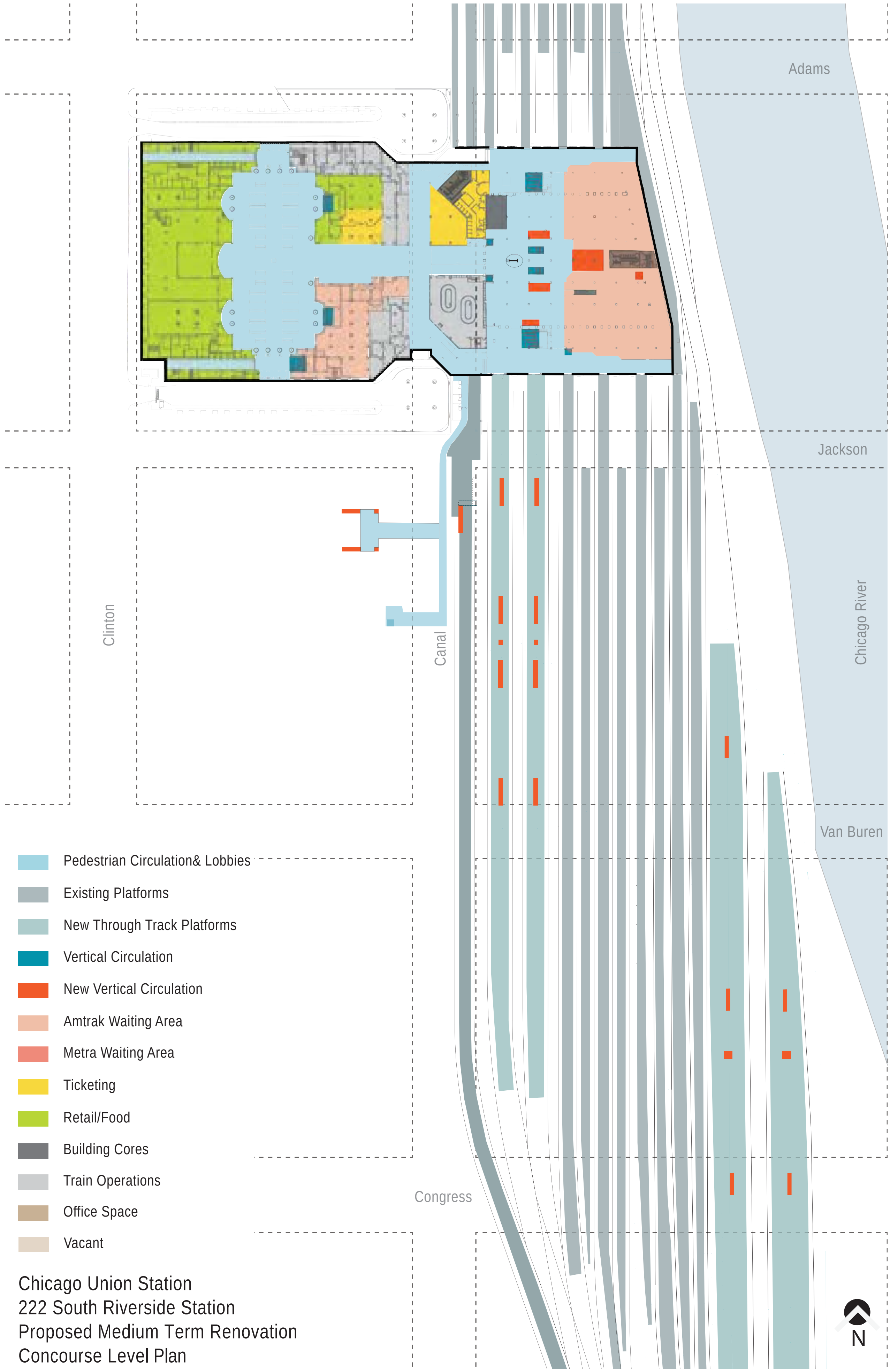
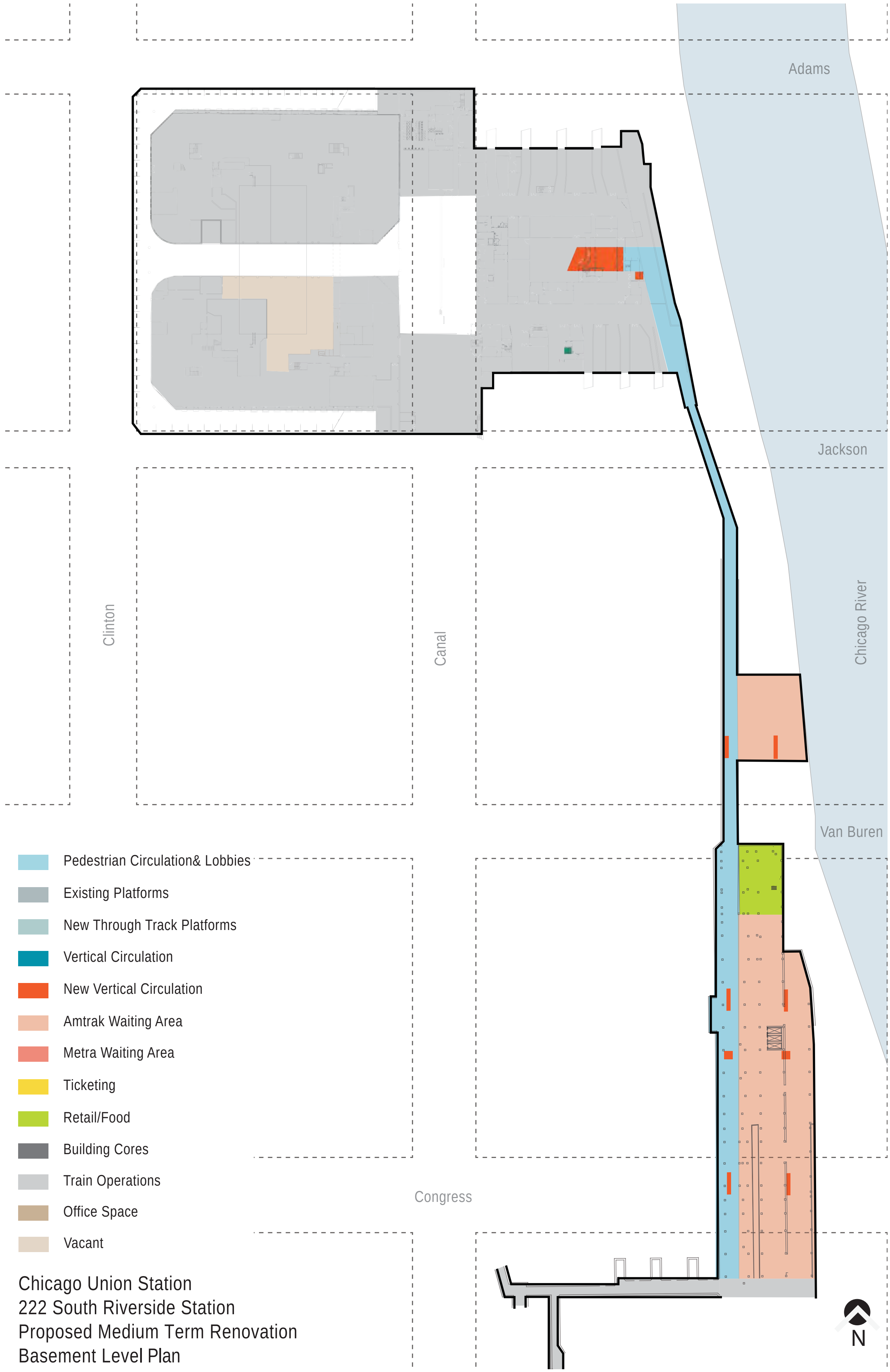
Chicago Union Station
222 South Riverside Station
Proposed Medium Term Renovation
Street Level Plan

Chicago Union Station
222 South Riverside Station
Proposed Medium Term Renovation
Mezzanine Level Plan



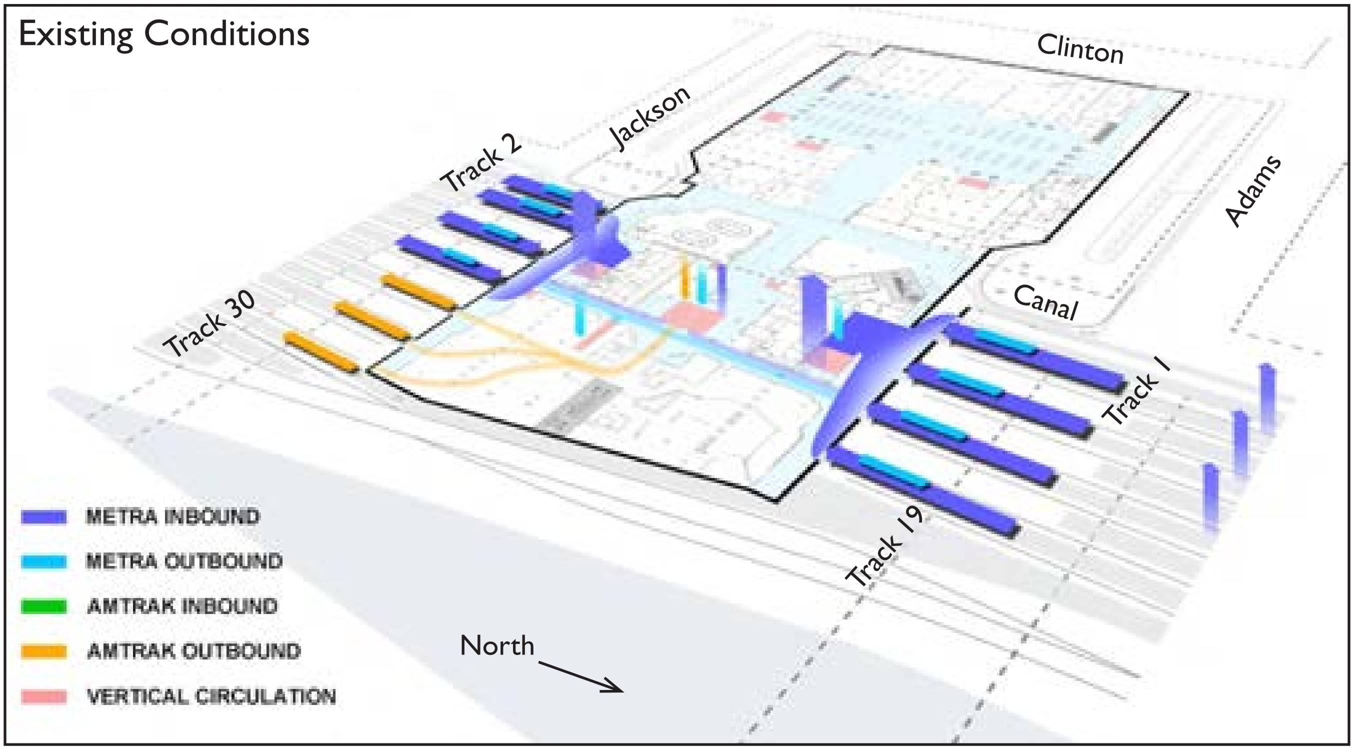
Pedestrian Circulation& Lobbies
Existing Platforms
New Through Track Platforms
Vertical Circulation
New Vertical Circulation
Amtrak Waiting Area
Metra Waiting Area
Ticketing
Retail/Food
Building Cores
Train Operations
Office Space
Vacant

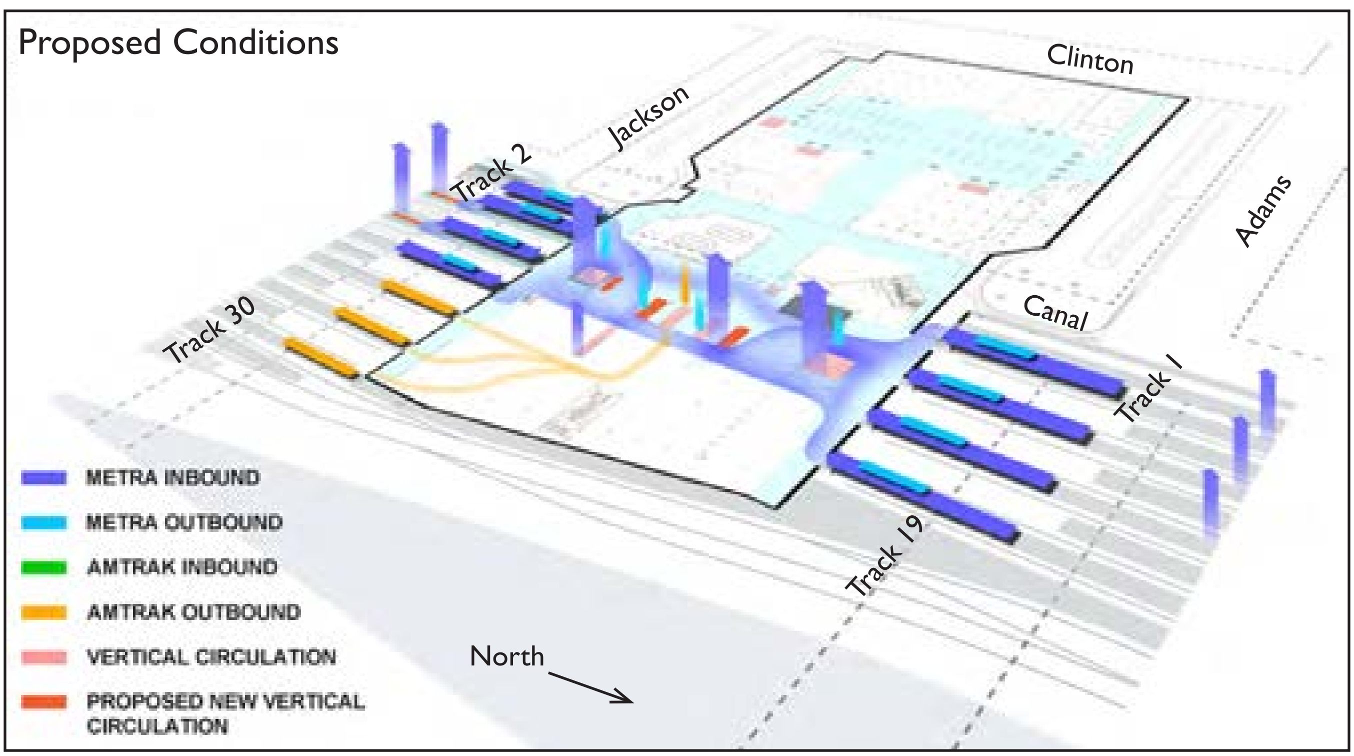
Chicago Union Station
222 South Riverside Station
Proposed Medium Term Renovation
Concourse Level Plan



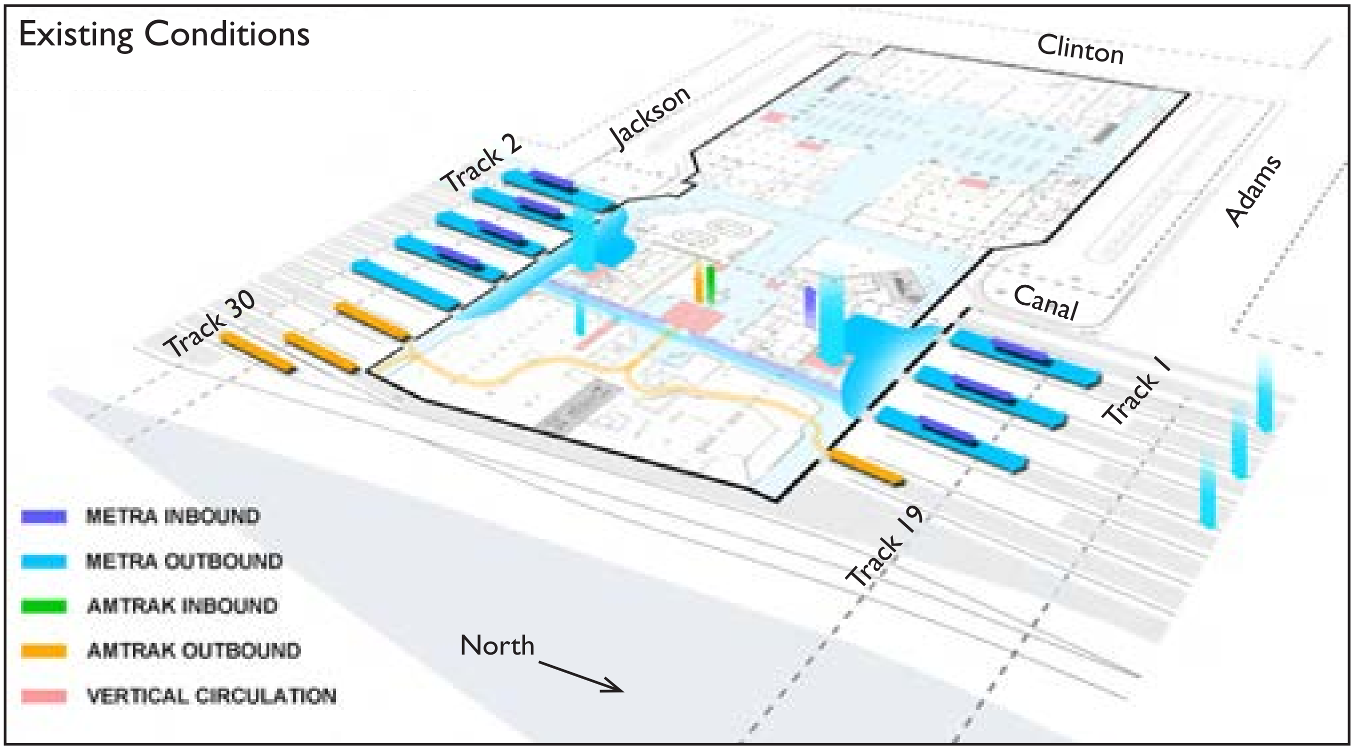
Chicago Union Station
222 South Riverside Station
Proposed Medium Term Renovation
Basement Level Plan

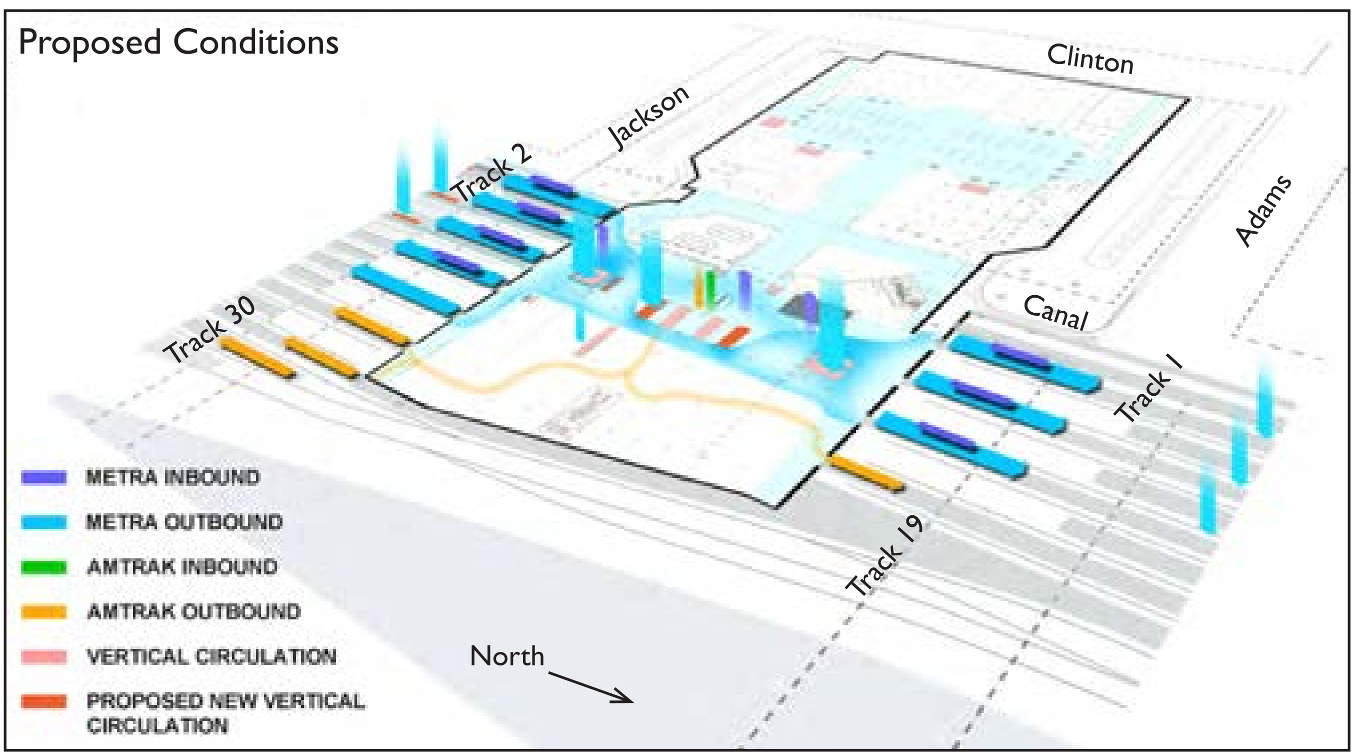
Union Station Concourse
Passenger flows in AM Rush (peak half hour)



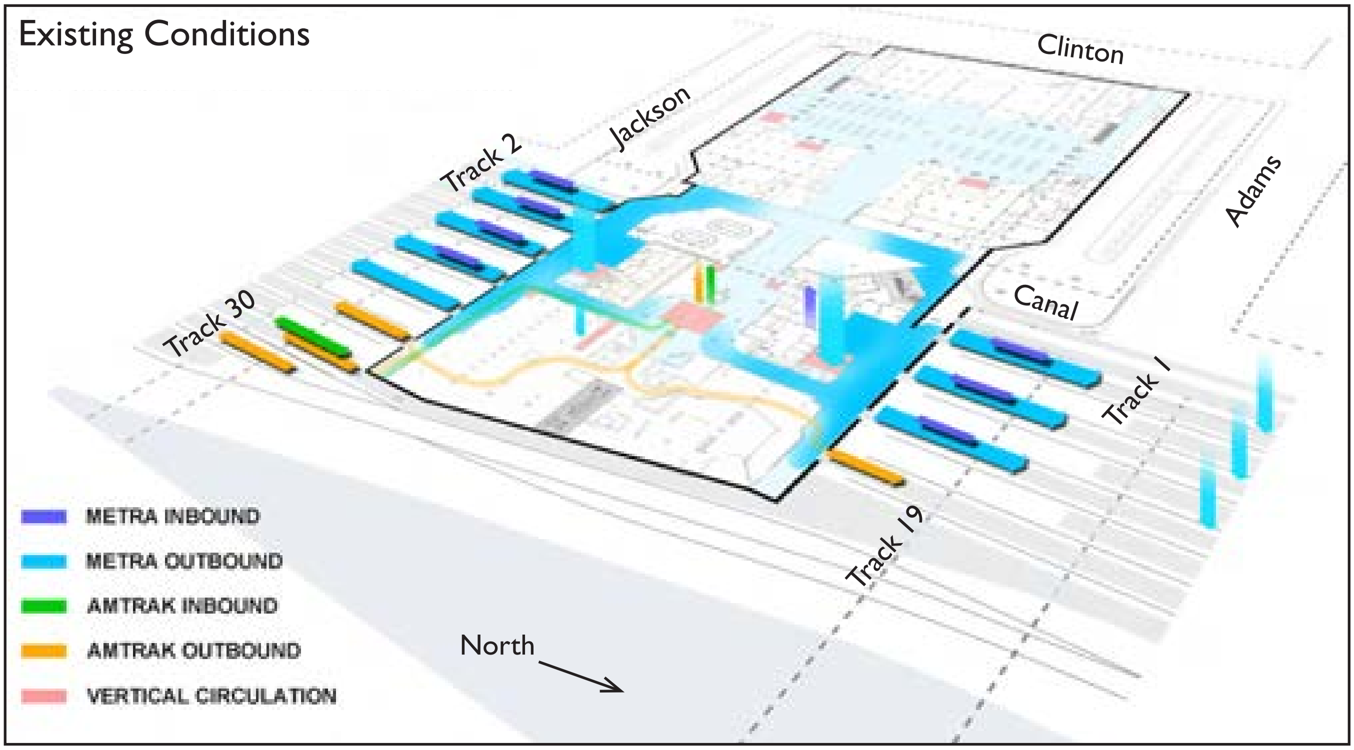


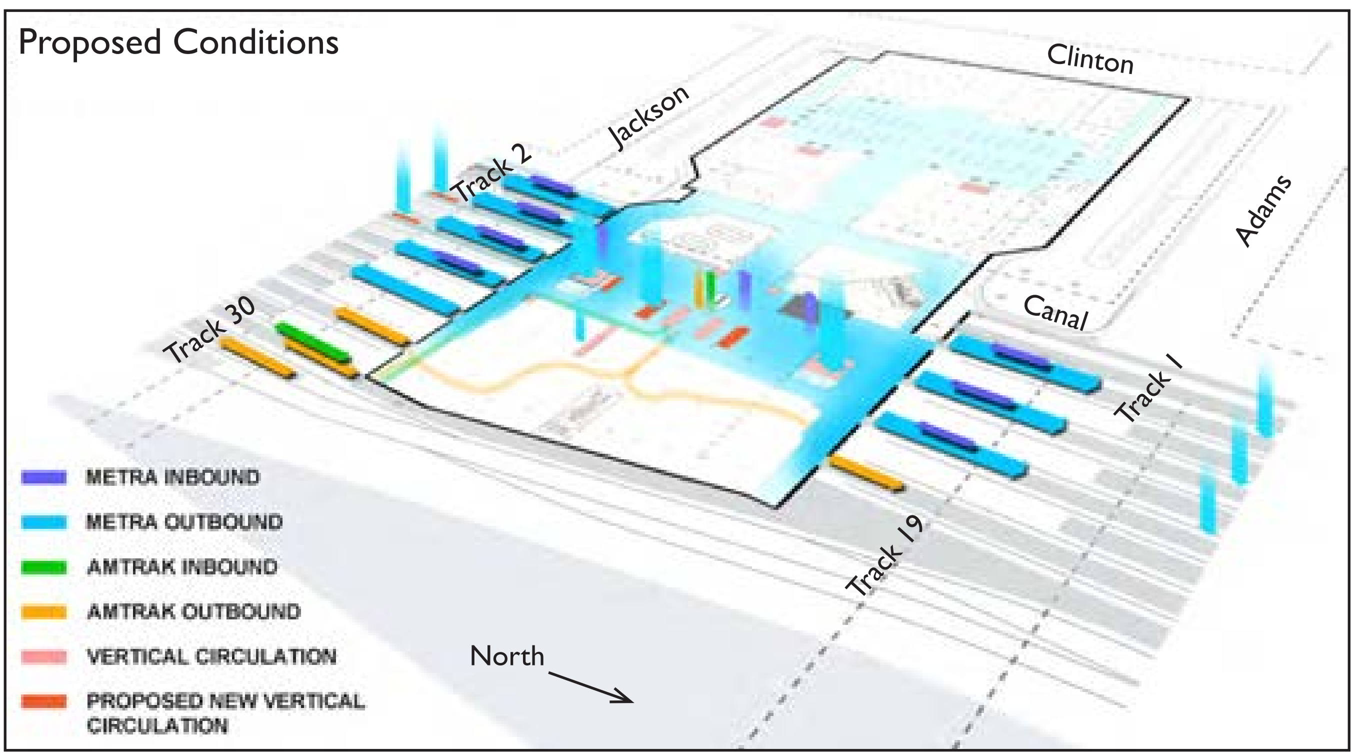
Union Station Concourse
Passenger flows in PM Rush (peak half hour)

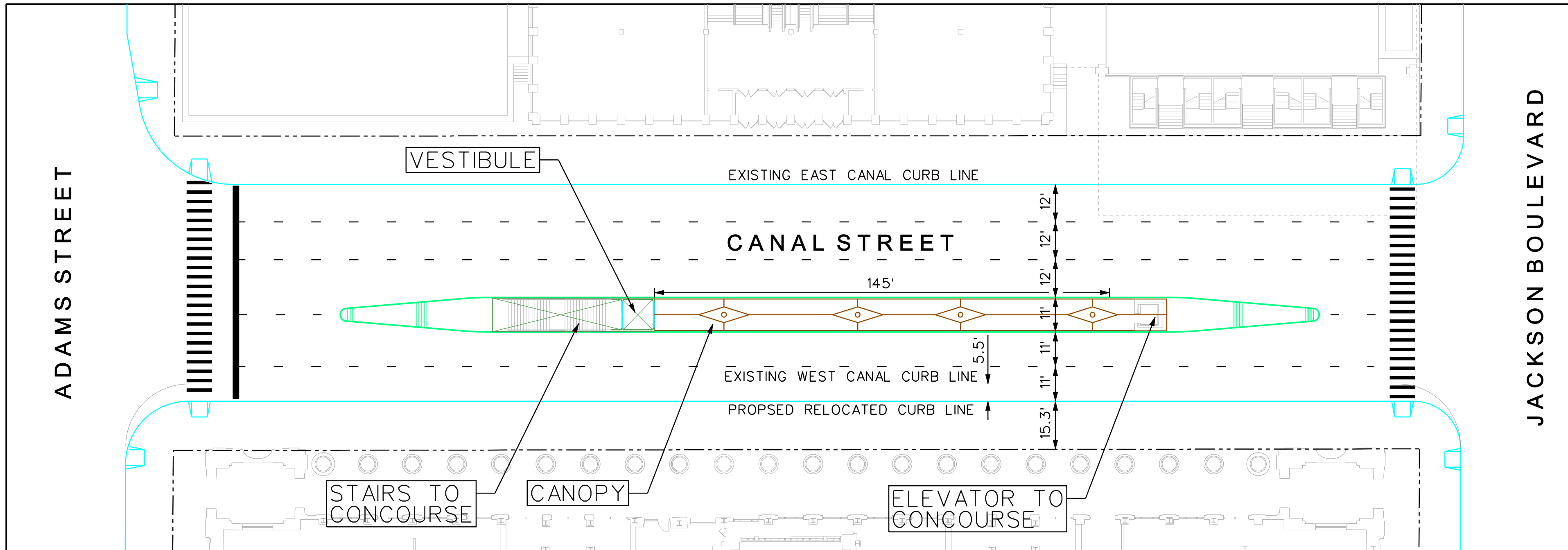




Union Station Concourse
Passenger flows in PM Rush
(with delayed Metra departures and late arrival of Amtrak train)

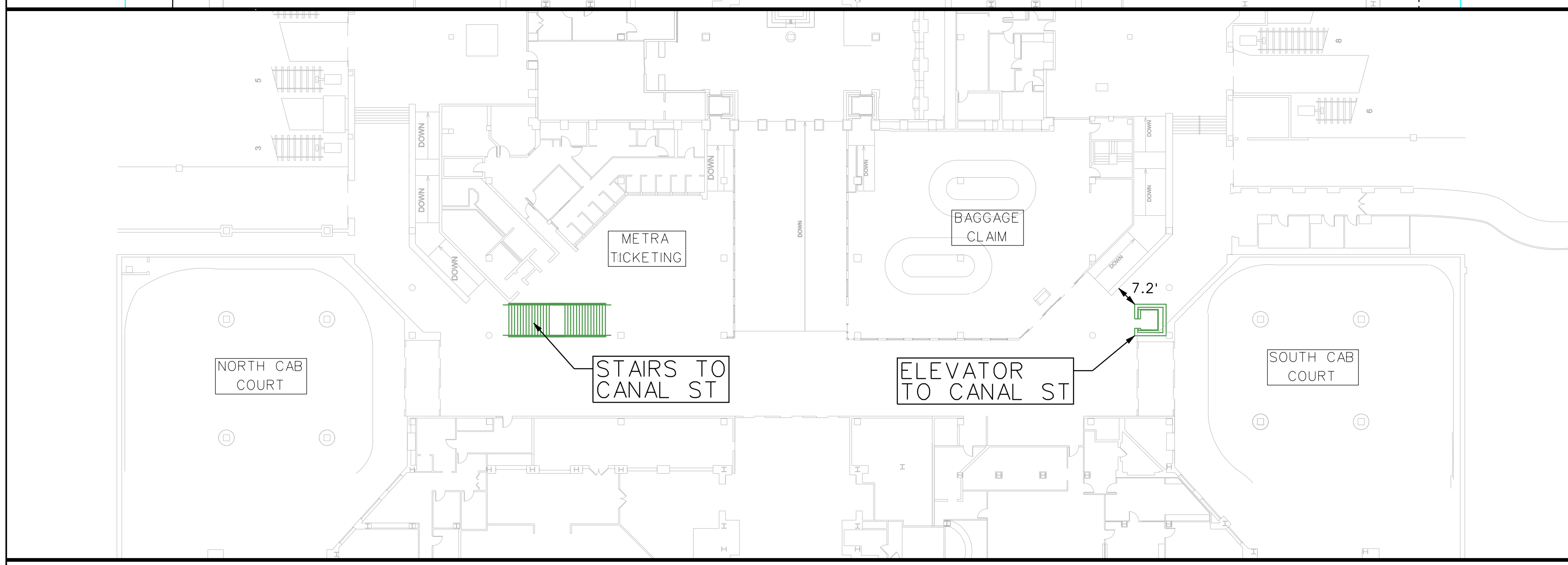






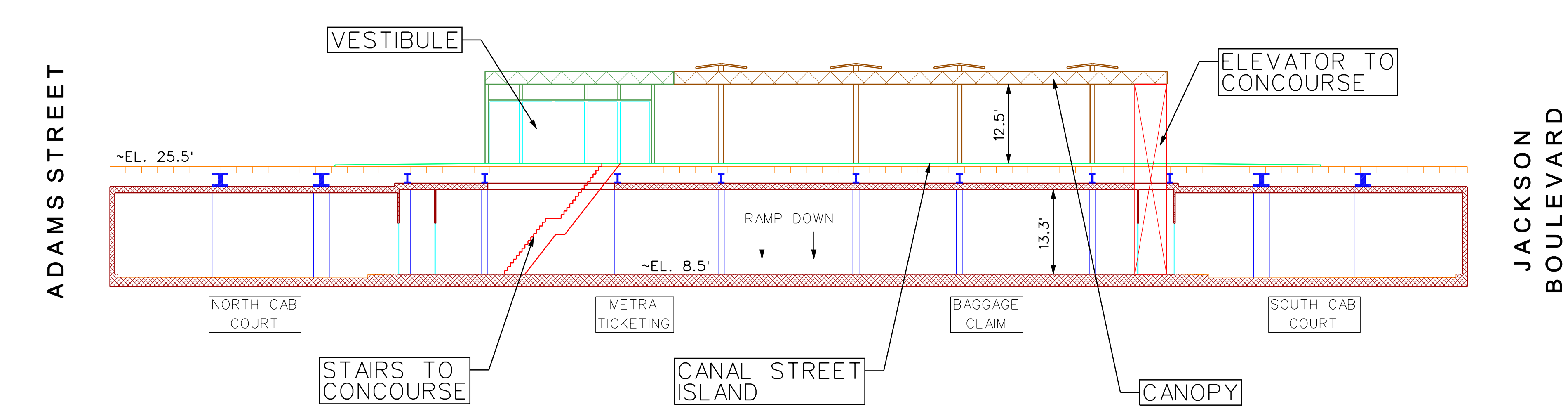
STREET LEVEL PLAN

50 100
0 10



CONCOURSE LEVEL PLAN

50 100
0 10



SIDE VIEW

H: 0 10 50 100
V: 0 20 100 200

NO.	BY	DATE	DESCRIPTION

REVISIONS

CHICAGO UNION STATION
CANAL STREET ISLAND

DOUBLE LANE CONCEPT

CONSULTANT:
222 South Riverside Plaza
Suite 2320
Chicago, Illinois 60606
(312) 669-9601

TranSystems

CITY OF CHICAGO

DEPARTMENT OF TRANSPORTATION

DRAWN:	MET
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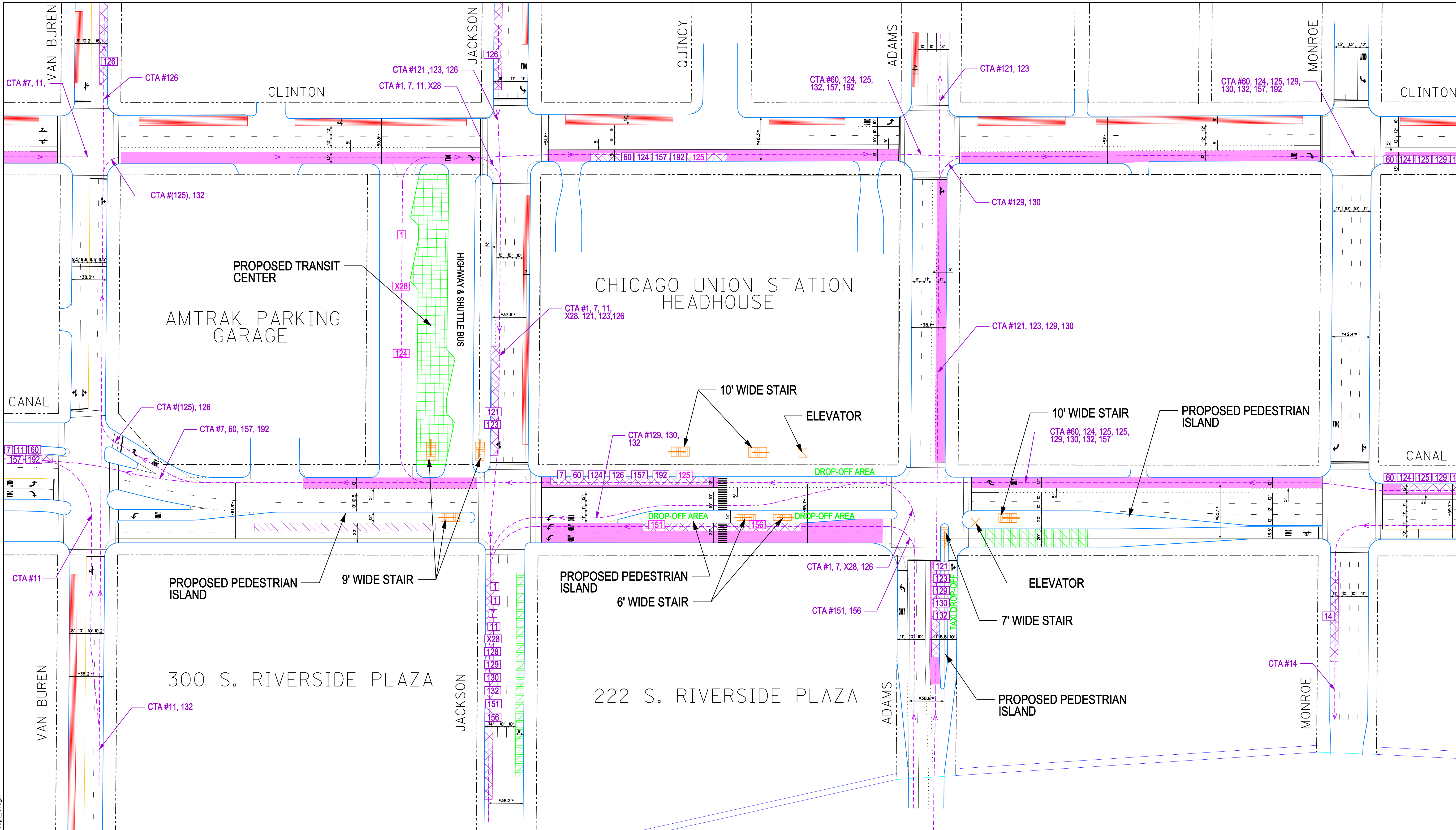
APPROVED:	DLP
DATE:	02-22-2011
SCALE:	AS SHOWN
CONTRACT NO.:	

SHEET NO.
EX-2

PROJECT NO.: CAP



CTA BUS STOP
BUS LANE
ON-STREET PARKING
TAXI STAND
HIGHWAY/SHUTTLE BUS STOP
00 CTA ROUTE BUS STOP
00 CTA ROUTE TERMINAL
ALL #XX.X'# DIMENSIONS DENOTE EXISTING ROADWAY WIDTH

0 20 100 200

G:\CD03\0002\Traffic\SHT-Concept_C.dgn

NO.	BY	DATE	DESCRIPTION
REVISIONS			

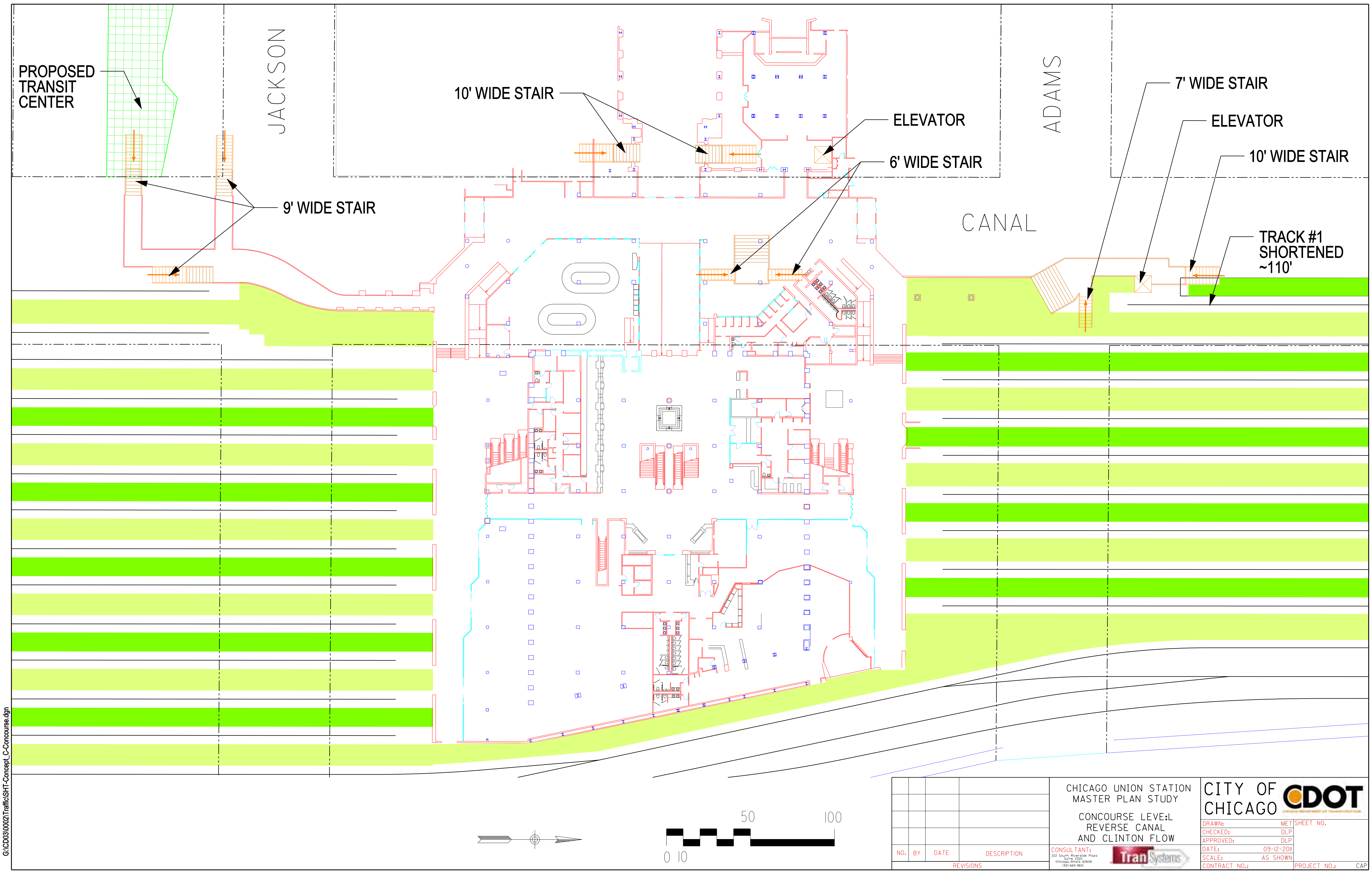
CHICAGO UNION STATION MASTER PLAN STUDY

TRAFFIC IMPACTS; REVERSE CANAL AND CLINTON FLOW

CONSULTANT: TranSystems, 222 South Riverside Plaza, Suite 2320, Chicago, Illinois 60606

CITY OF CHICAGO — CDOT

DRAWN:	MET	SHEET NO.
CHECKED:	DLP	
APPROVED:	DLP	
DATE:	9-12-2011	
SCALE:	AS SHOWN	
CONTRACT NO.:		PROJECT NO.: CAP


PROPOSED
TRANSIT
CENTER
JACKSON
10' WIDE STAIR
ELEVATOR
6' WIDE STAIR
ADAMS
7' WIDE STAIR
ELEVATOR
10' WIDE STAIR
9' WIDE STAIR
CANAL
TRACK #1
SHORTENED
~110'
0 10
50
100
G:\CD03\0002\Traffic\SHT-Concept_C-Concourse.dgn
CHICAGO UNION STATION
MASTER PLAN STUDY
CONCOURSE LEVE:L
REVERSE CANAL
AND CLINTON FLOW
CITY OF
CHICAGO
CDOT
NO. BY DATE DESCRIPTION
REVISIONS
CONSULTANT:
222 South Riverside Plaza
Suite 2320
Chicago, Illinois 60606
(312) 669-9601
TranSystems
DRAWN: MET
CHECKED: DLP
APPROVED: DLP
DATE: 09-12-2011
SCALE: AS SHOWN
CONTRACT NO.:
SHEET NO.
PROJECT NO.: CAP

Appendix D

Long Term/Visionary Ideas

- New 300 Block Station
  - Convert mail platform – Phase 2
  - Widen all platforms
  - Space planning concepts
  - Fourth North lead track
- New 200 Block Station
  - Space planning concepts
- Canal/Clinton Subway
  - Clinton Subway Profile
  - Clinton Subway Plan View (north-south segment)
  - Canal Subway Profile
  - Canal Subway Plan View (north-south segment)
  - Clinton & Canal subway plan view (east-west segment)
  - Constructability Analysis


CHICAGO RIVER
JACKSON
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 R7
RELOCATE COLUMNS (TYP)
EXTEND TRACK #36 AND #40
14.3
VAN BUREN
VERTICAL CIRCULATION TO PASSENGER FACILITIES
ELEVATOR CIRCULATION TO PASSENGER FACILITIES
CONGRESS
VERTICAL CIRCULATION TO PASSENGER FACILITIES
46.5'
48.7'
CANAL
HARRISON
EMERGENCY EGRESS TO STREET LEVEL (NEW POST OFFICE PLAZA)
PROPOSED TRACK
TRACK REMOVAL
EXISTING TRACK
0 10 50 100 200 300
34 36 40
CHICAGO UNION STATION
MASTER PLAN STUDY
MAIL PLATFORM CONCEPT
REVISED ALTERNATE C
FINAL BUILD PHASE
CONSULTANT:
TranSystems
CITY OF CHICAGO
CDOT
DRAWN: MET
CHECKED: DLP
APPROVED: DLP
DATE: 9-26-2011
SCALE: AS SHOWN
CONTRACT NO.:
SHEET NO.
PROJECT NO.:
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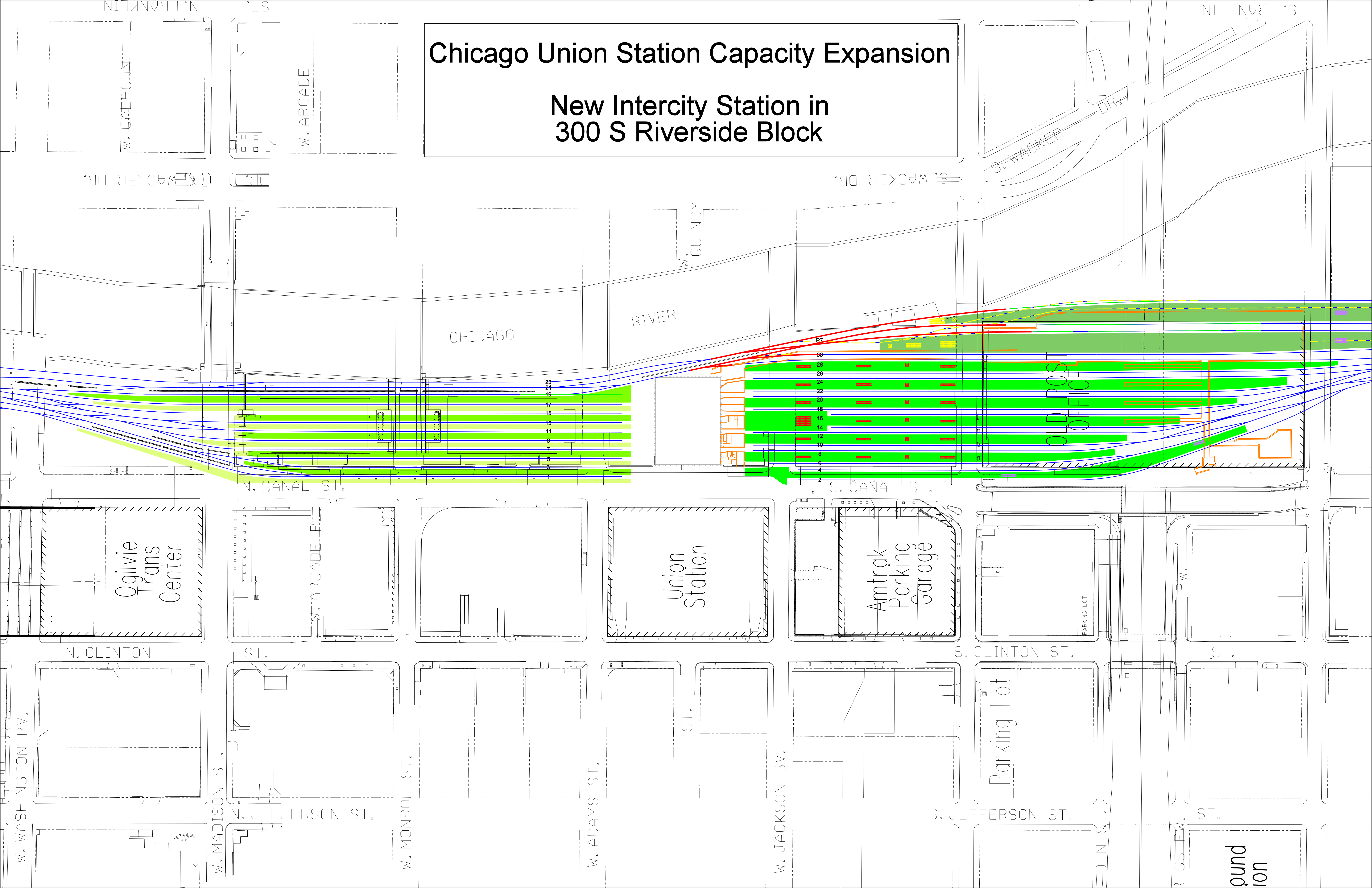
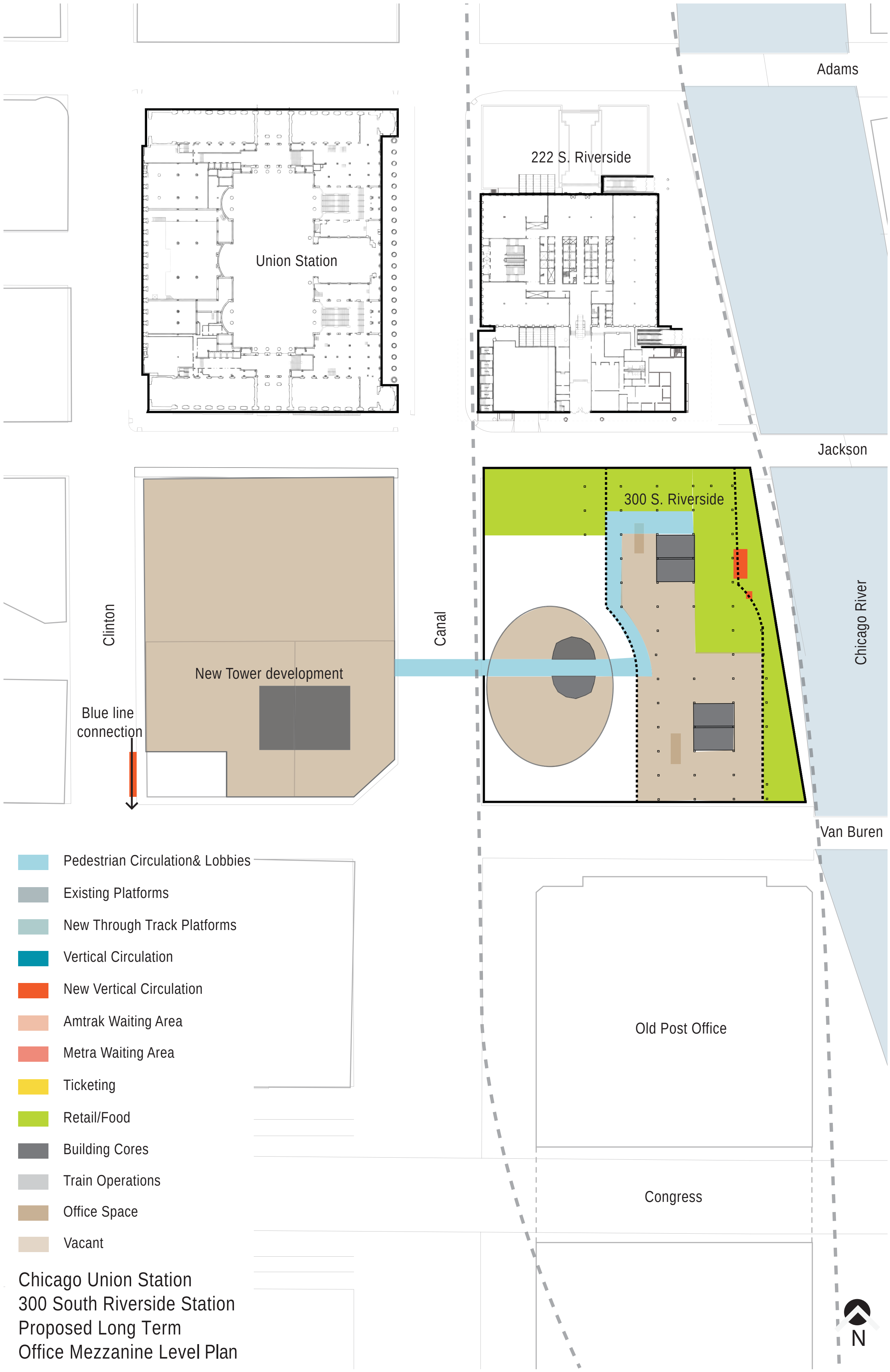
Chicago Union Station Capacity Expansion

New Intercity Station in 300 S Riverside Block

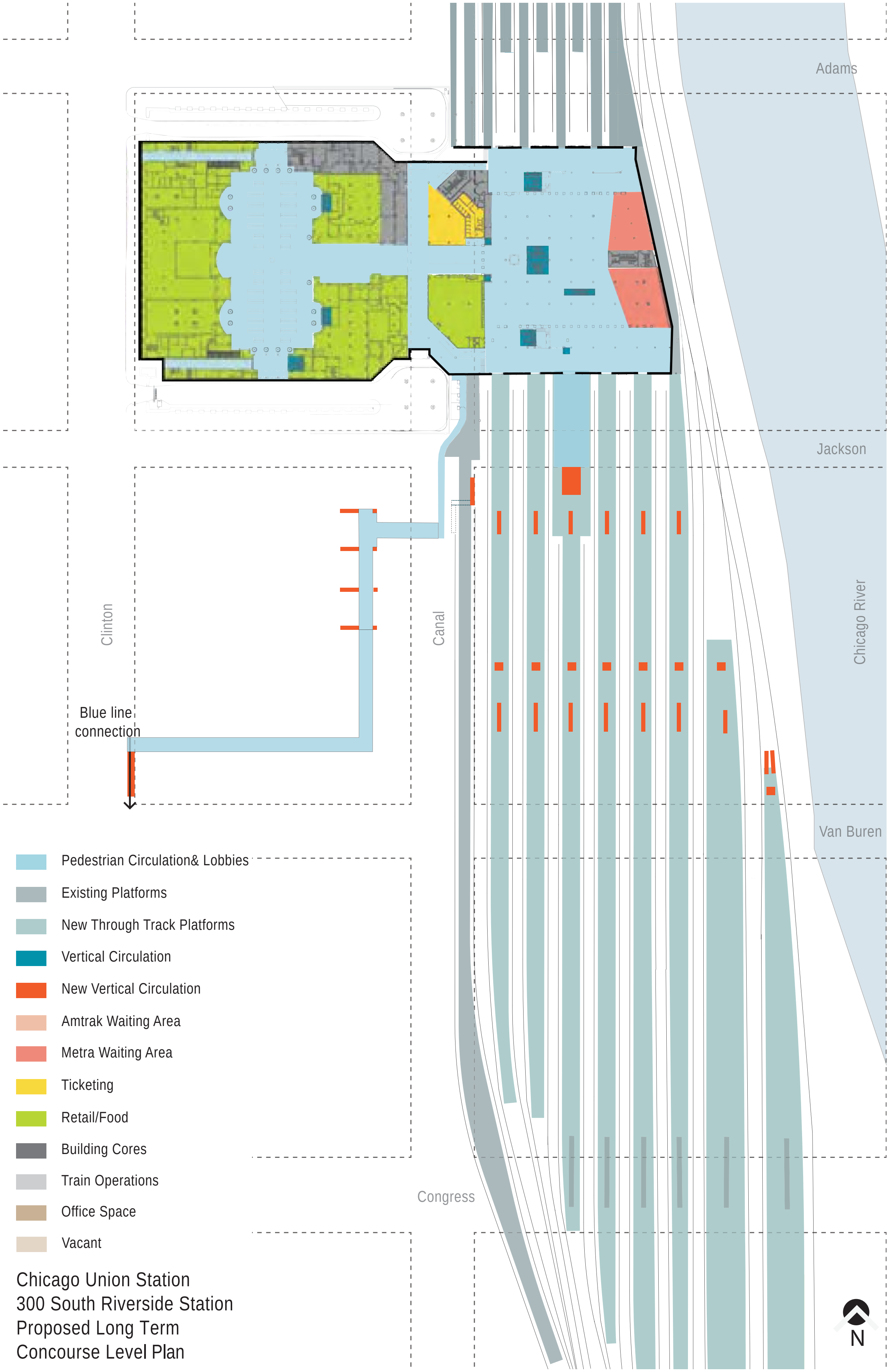


- Pedestrian Circulation& Lobbies
- Existing Platforms
- New Through Track Platforms
- Vertical Circulation
- New Vertical Circulation
- Amtrak Waiting Area
- Metra Waiting Area
- Ticketing
- Retail/Food
- Building Cores
- Train Operations
- Office Space
- Vacant

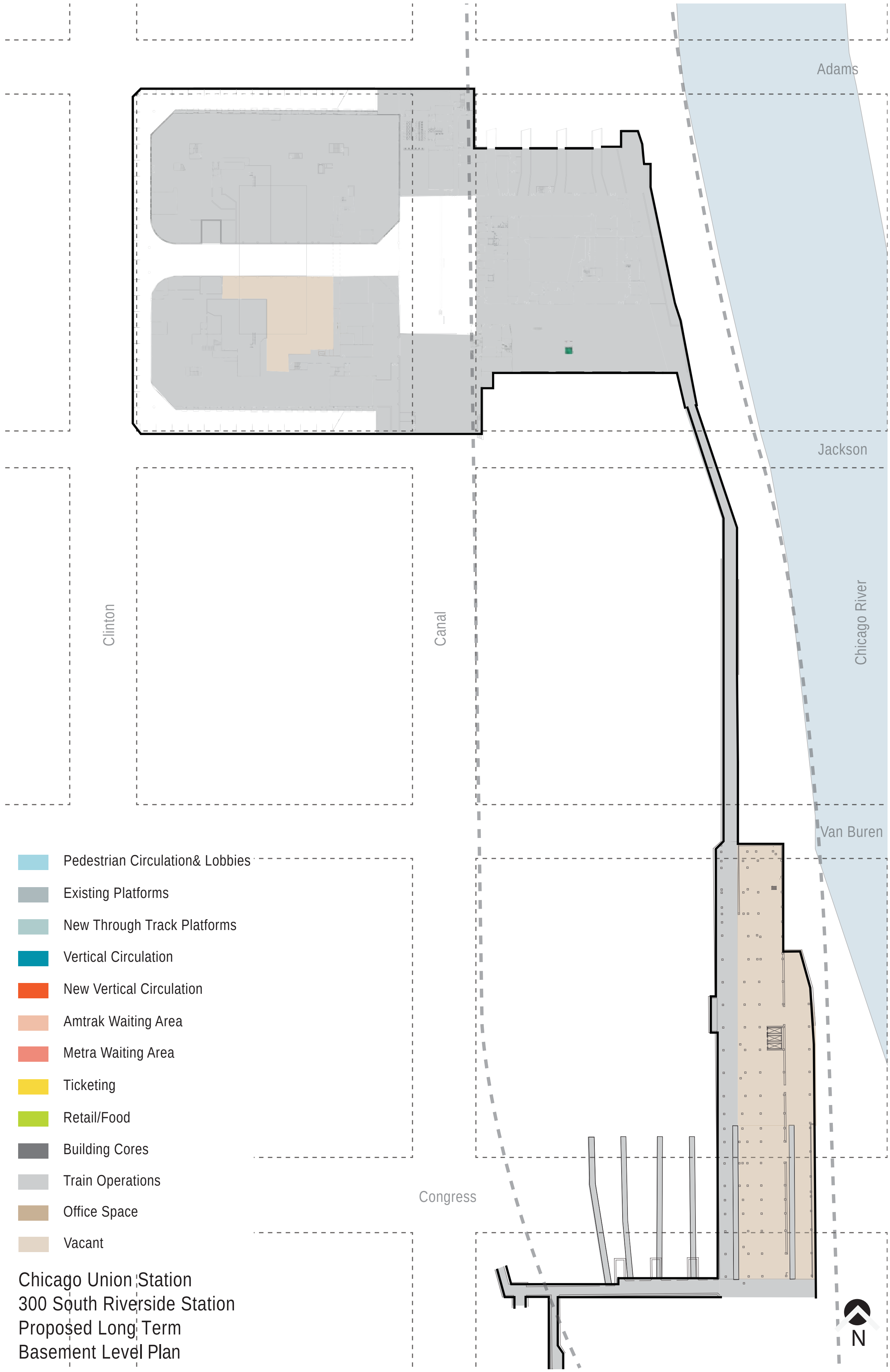
Chicago Union Station
300 South Riverside Station
Proposed Long Term
Street Level Plan



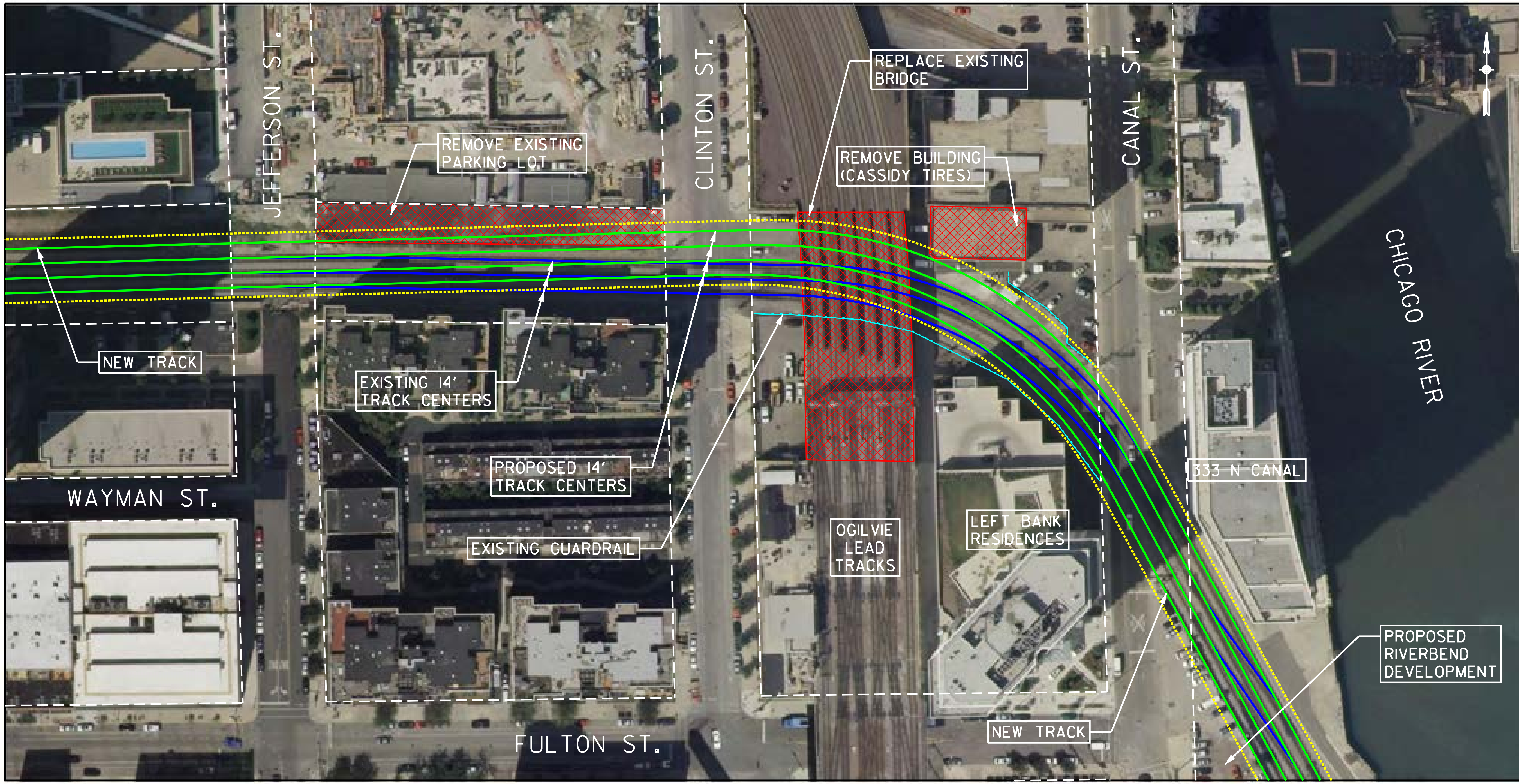
Chicago Union Station
300 South Riverside Station
Proposed Long Term
Office Mezzanine Level Plan



Chicago Union Station
300 South Riverside Station
Proposed Long Term
Concourse Level Plan



Chicago Union Station
300 South Riverside Station
Proposed Long Term
Basement Level Plan



0 20 100 200

NOTES:

1. EXISTING CURVES ARE APPROXIMATELY 16°.
2. PROPOSED CURVES ARE 15.5°.

LEGEND:

- EXISTING 3 TRACKS
- PROPOSED 4 TRACKS
- 9' CLEARANCE FROM CENTER OF OUTSIDE PROPOSED TRACK

NO.	BY	DATE	DESCRIPTION

REVISIONS

CHICAGO UNION STATION MASTER PLAN

4TH NORTH LEAD TRACK CONCEPTUAL DESIGN

CONSULTANT:
222 South Riverside Plaza
Suite 2320
Chicago, Illinois 60606
(312) 669-9601

TranSystems

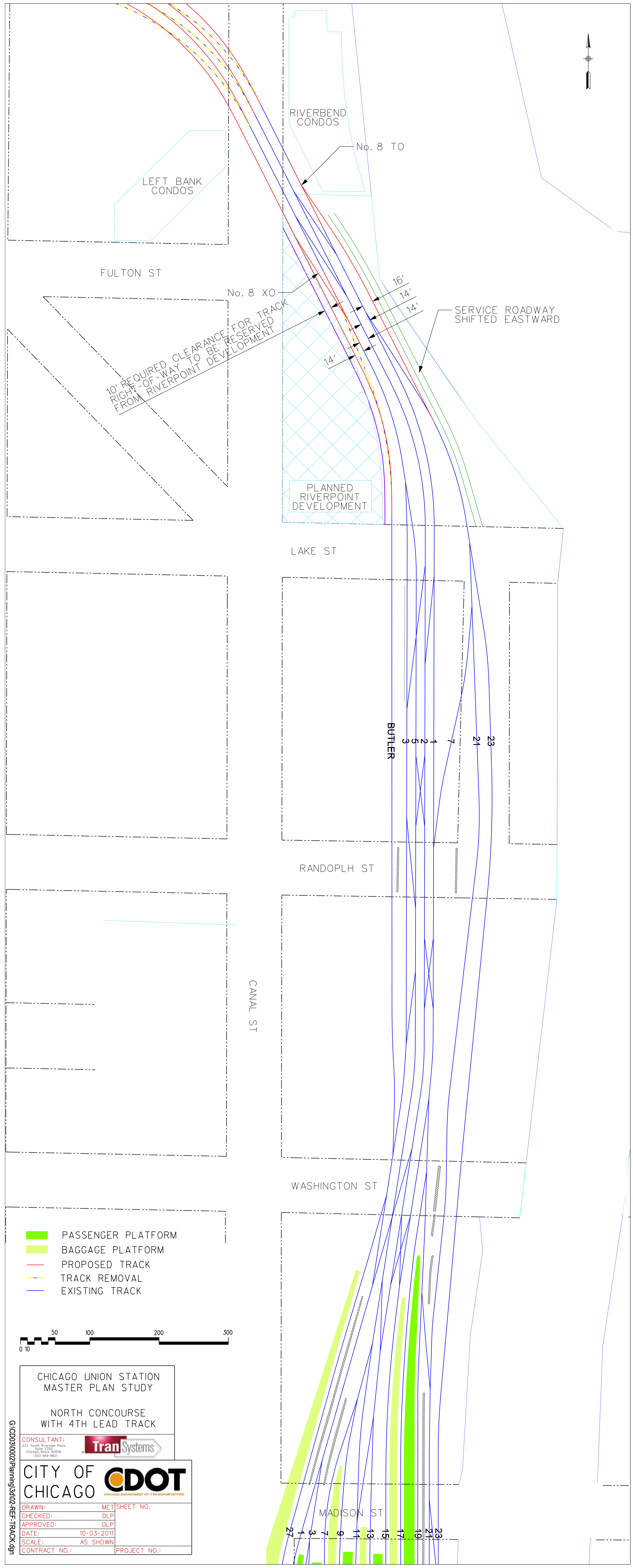
CITY OF CHICAGO

DEPARTMENT OF TRANSPORTATION

DRAWN:	MET
CHECKED:	DLP
APPROVED:	DLP
DATE:	3/25/2011
SCALE:	AS SHOWN
CONTRACT NO.:	

SHEET NO. EX-1

PROJECT NO.: CAP


RIVERBEND CONDOS
No. 8 TO
LEFT BANK CONDOS
FULTON ST
No. 8 XO
16'
14'
14'
14'
SERVICE ROADWAY SHIFTED EASTWARD
10' REQUIRED CLEARANCE FOR TRACK RIGHT-OF-WAY TO BE RESERVED FROM RIVERPOINT DEVELOPMENT
PLANNED RIVERPOINT DEVELOPMENT
LAKE ST
BUTLER
3
5
2
1
7
21
23
RANDOPLH ST
CANAL ST
WASHINGTON ST
MADISON ST
27
1
3
7
9
11
13
15
17
19
21
23
PASSENGER PLATFORM
BAGGAGE PLATFORM
PROPOSED TRACK
TRACK REMOVAL
EXISTING TRACK
0 10 50 100 200 300
CHICAGO UNION STATION MASTER PLAN STUDY
NORTH CONCOURSE WITH 4TH LEAD TRACK
CONSULTANT:
222 South Riverside Plaza
Suite 2320
Chicago, Illinois 60606
(312) 669-9601
TranSystems
CITY OF CHICAGO
CDOT
CHICAGO DEPARTMENT OF TRANSPORTATION
DRAWN: MET
CHECKED: DLP
APPROVED: DLP
DATE: 10-03-2011
SCALE: AS SHOWN
CONTRACT NO.:
SHEET NO.
PROJECT NO.:
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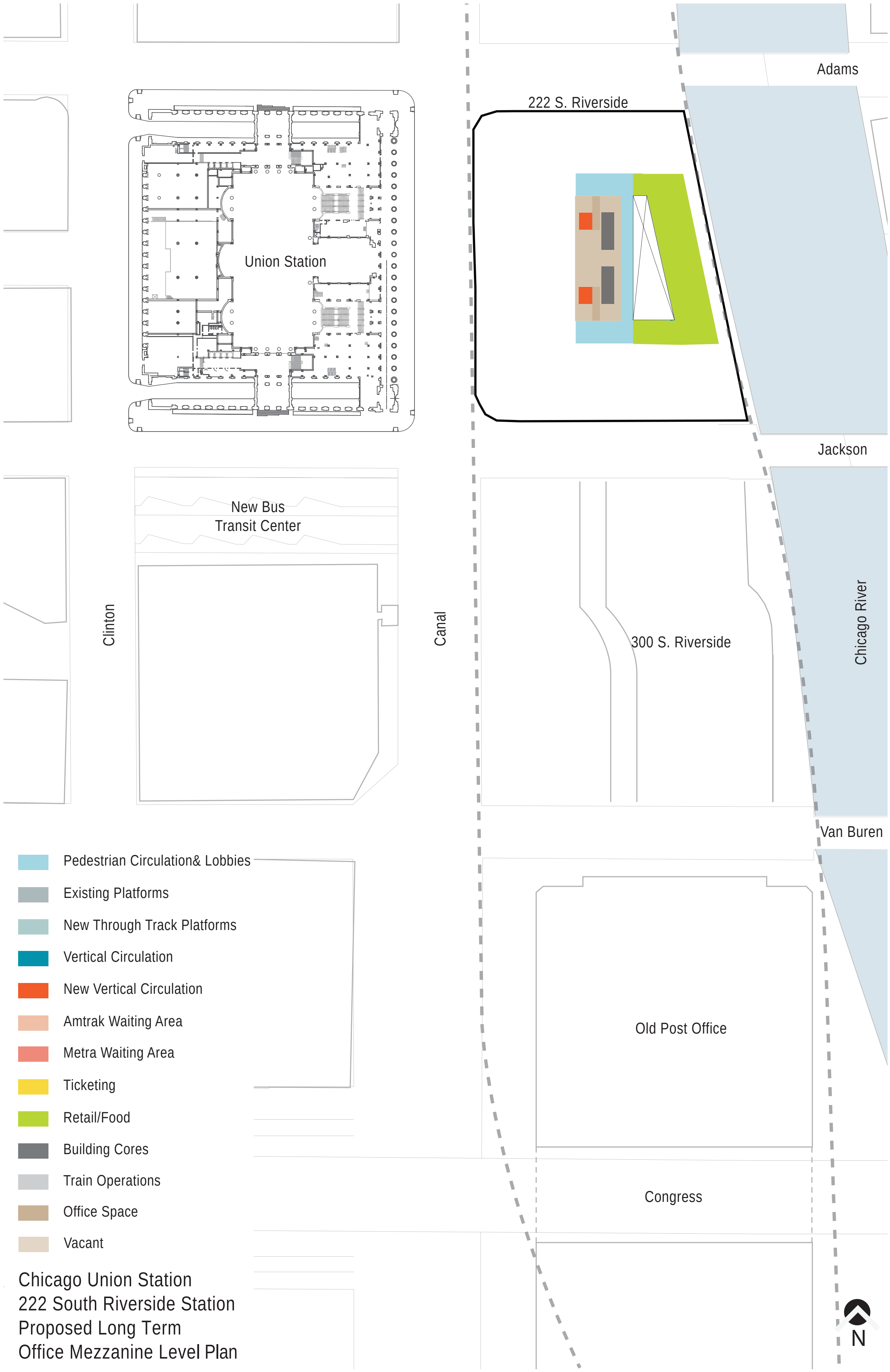
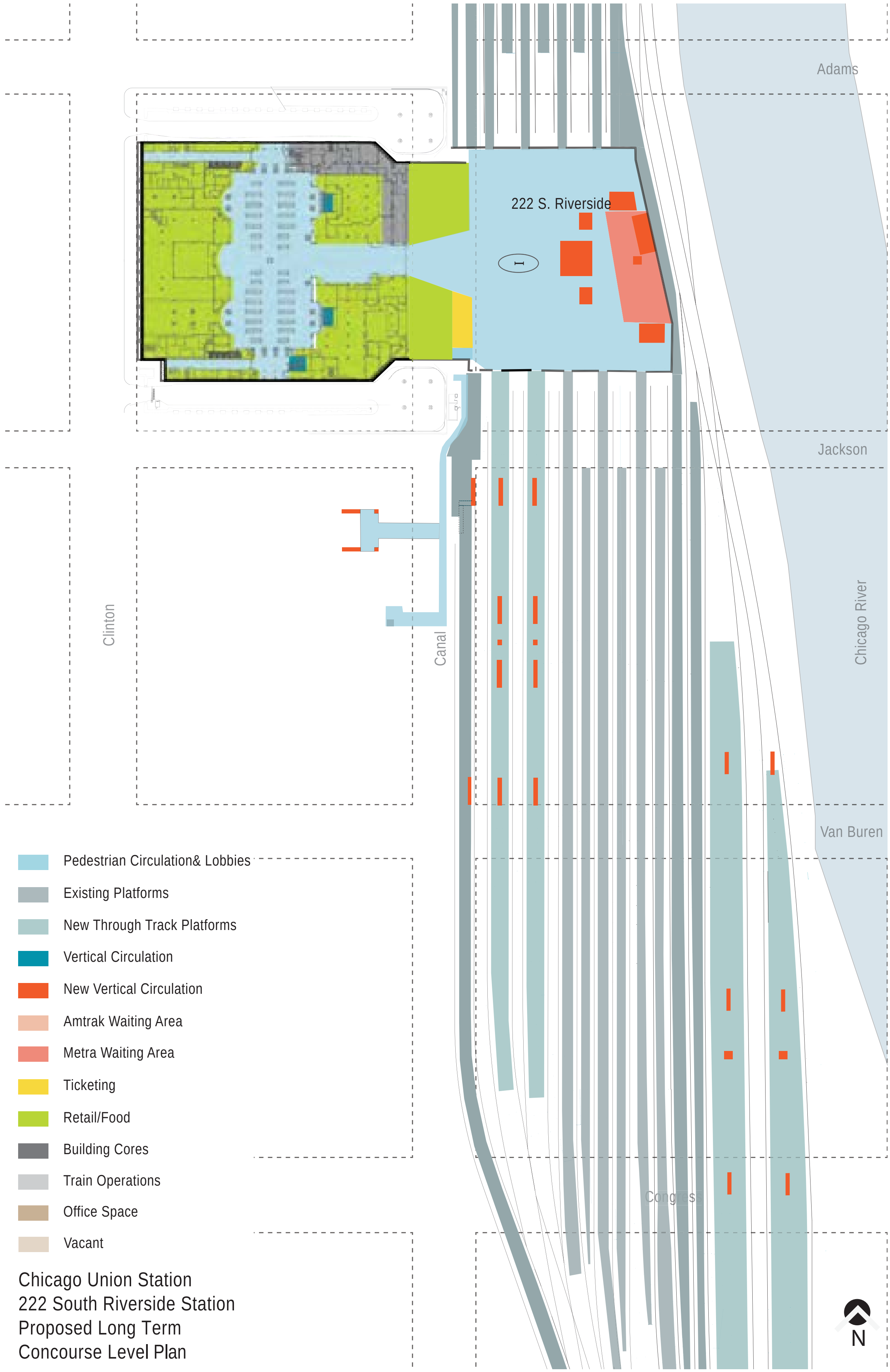
Chicago Union Station
222 South Riverside Station
Proposed Long Term
Street Level Plan

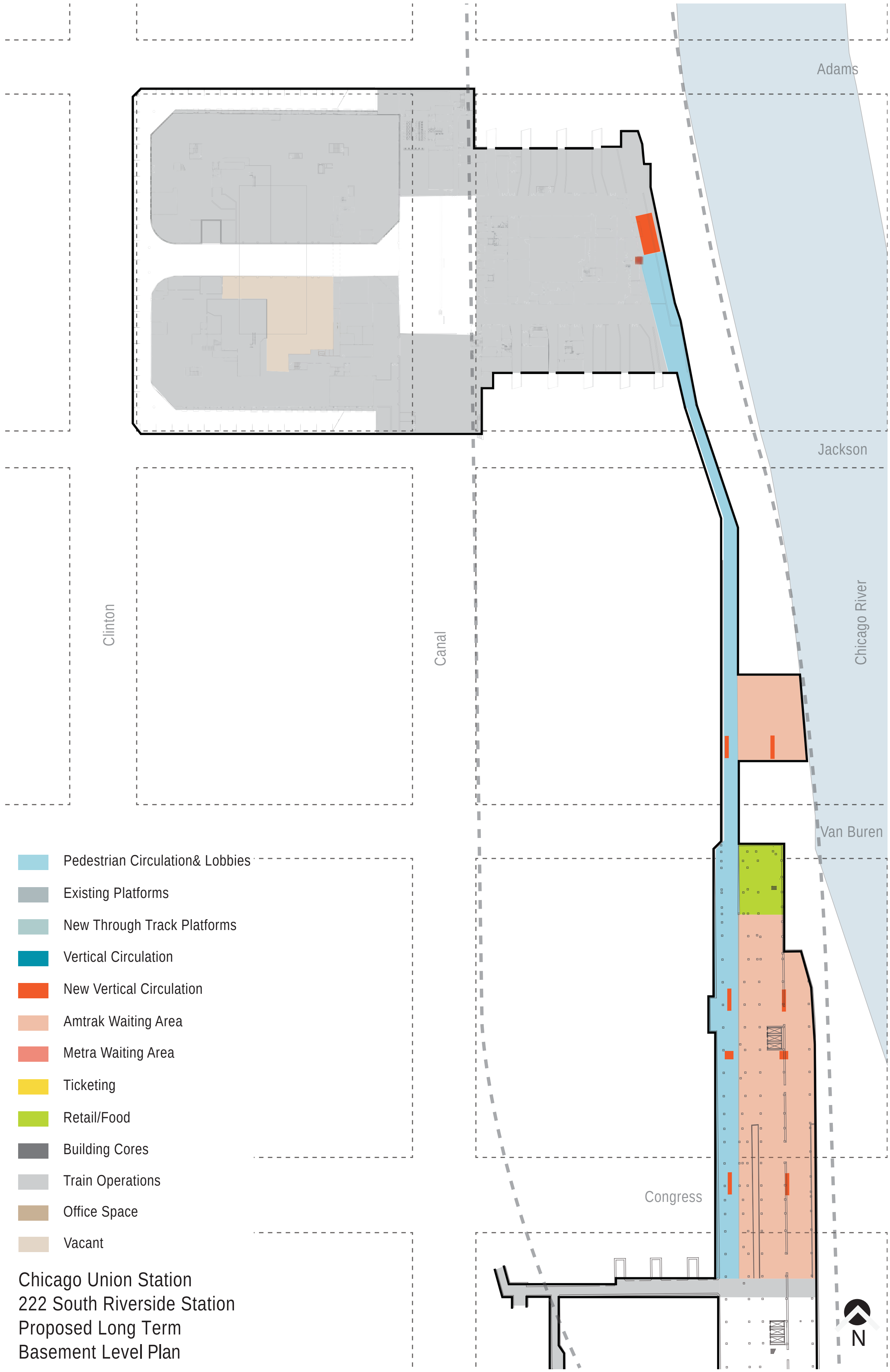


Chicago Union Station
222 South Riverside Station
Proposed Long Term
Office Mezzanine Level Plan



- Pedestrian Circulation& Lobbies
- Existing Platforms
- New Through Track Platforms
- Vertical Circulation
- New Vertical Circulation
- Amtrak Waiting Area
- Metra Waiting Area
- Ticketing
- Retail/Food
- Building Cores
- Train Operations
- Office Space
- Vacant

Chicago Union Station
222 South Riverside Station
Proposed Long Term
Concourse Level Plan



Chicago Union Station
222 South Riverside Station
Proposed Long Term
Basement Level Plan

MEMO

To	**David Phillips, TranSystems**
From	Derek Penrice
Date	November 18, 2011
Project #	268208
Page	1 of 197
CC	Mike Vitale
Subject	**Chicago Union Station Master Plan Project**

1. Introduction

This Memo provides technical discussion related to the provision of capacity expansion at the existing Union Station in Chicago. Opinions of probable construction methods and construction costs for two underground construction options, on Canal Street and Clinton Street Respectively are provided. All assumptions made relative to the extent of the construction methods and used in the calculation of the construction costs are presented herein.

Based on the assumptions, the calculated costs for excavating the tunnels, constructing the tunnel linings and provided associated ventilation facilities and tunnel operating systems are estimated to be as follows:

- Canal Street - $823-million
- Clinton Street - $841-million

These figures exclude contingency, soft costs and other elements of construction as described in Section 4.

2. Existing Conditions

General assumptions used in the development of approximate construction cost estimates for the underground construction options on Canal Street and Clinton Street are as follows:

a. Ground Conditions

Existing soil and groundwater conditions are as presented in the West Loop Transportation Center Corridor Right of Way Proofing Exercise, prepared on behalf of TranSystems Corporation by Arup in December of 2004.

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As measured from the surface, the site geology is generally expected to comprise of the following:

- Fill: 0-10 feet depth
- Clay, soft to medium: 10-50 feet
- Clay, hard: 50-100 feet
- Hardpan/limestone bedrock: 100 feet plus

The Arup report states that groundwater can be expected to be encountered at depths of 5 to 15 feet below ground surface, though the report goes on to state that groundwater was found within the fill in almost all borings, suggesting groundwater is generally at the shallower end of the range indicated. Correspondingly for the purposes of this study, groundwater is assumed to be 5 feet below ground surface.

b. Existing Infrastructure

From north to south, both the Canal Street and Clinton Street alignments pass under or adjacent to the following infrastructure, which must be protected in place during construction:

- The proposed alignment will pass under a structured parking deck between Union Street and Desplaines Street, and the Desplaines Street bridge/overpass. This may necessitate grade lowering, or the use of low headroom equipment to install the required support of excavation. The actual tunnel is proposed to start by entering a portal on the east ROW line of Desplaines Street.
- High rise rental apartment buildings have been constructed in the block bounded by West Kinzie Street to the north, Clinton Street to the east, Metra tracks to the south, and Jefferson Street to the west on both sides of the proposed passenger rail below grade alignment under a park and Jefferson Street. The towers were developed to accommodate the future guideway construction.
- The alignment passes directly under the Metra-owned three track surface passenger rail route (the north leads to Union Station).
- The alignment passes directly underneath the Fulton Station Condominiums, a recently constructed residential development comprising a series of 3, 5 and 7 story structures, all of which are supported on shallow foundations. The condominiums are bounded by Clinton Street to the east, the Metra tracks to the north and Fulton Street to the south.

- The proposed tunnel crosses the existing CTA Blue Line subway tunnel, which crosses Clinton Street at Fulton Street, at a 45˚skew. The proposed alignment will pass over the top of the subway tunnel. The Blue Line will require instrumentation/monitoring during construction.
- The alignment passes under the northeast corner of Clinton Lofts, a 5 story residential development located at the intersection of Clinton Street and Fulton Street. This building is estimated to be over 100 years old and is assumed to be supported on shallow foundations.
- The existing former C&NW railroad powerhouse is located on a site next to the Ogilvie Transportation Center track on a site east of Clinton Street, south of Milwaukee Avenue and north of Lake Street. The structure was built about 1910 and includes a chimney of approximately 10-12 stories in height. The condition of the chimney is unknown, but it is assumed that this structure is vulnerable to tunneling induced settlement. While abandoned for a number of years the site was recently redeveloped as a restaurant/bar, and includes a small amount of office space.
- At Lake Street, the alignment crosses under the CTA Green Line Clinton Street 'L' station. The station span of Clinton Street is supported on caissons which extend to the hardpan layer, consistent with standard City practice.
- The alignment passes under the Old Post Office Building, a historic structure supported upon caisson foundations. The building is currently unused, but has been purchased by a developer. Based upon the original alignments indicated in the March 2007 West Loop Transportation Center Conceptual Design Plans, several of the caissons appear to be in direct conflict with the track alignment. To mitigate this impact, some reframing of the superstructure, underpinning and installation of new foundations will likely be required to transfer load from the caissons, to permit removal during tunneling.
- The alignment also passes under the New Post Office Building. This structure is similarly supported on a series of columns aligned with the Union Station Platform locations which are in turn supported on caisson foundations. Again based on the March 2007 alignments, some of the caissons conflict with the tunnel construction. Per the Old Post Office a combination of reframing, underpinning and new foundations will be necessary to accommodate the tunnel construction.

In addition the Canal Street alignment impacts the following infrastructure:

- The alignment crosses the trainshed/platform area of the Ogilvie Transportation Center at a skew angle. The trainshed/platform area comprises a column supported elevated deck supported on columns and shallow footings.
- The alignment passes under the existing Union Station tracks (both north and south of the Station concourse. The trainshed area appears to be supported on a mat foundation. The trainshed will be partially demolished to support the Canal Street Station construction. The platforms/track and structure will be reinstated at the conclusion of the new Guideway and station construction.

The Clinton Street alignment has conflicts with the following infrastructure located immediately south of the Clinton Street Station.

- The southwest corner of the historic Great Hall building of the existing Union Station.
- The Amtrak parking garage located between Clinton and Canal Streets. However, the garage is proposed for demolition.
- The northeast corner of an approximately 15 story office building, located south of Van Buren Street immediately south of the parking structure.

These impacts are primarily a result of the Guideway widening to a four track alignment. It may be possible to revise the alignment such that some of the structure impacts can be avoided, in particular to the Great Hall, a historic structure of considerable importance.

The Arup Report indicates that for ease of construction, much of the existing infrastructure, particularly at the north of the alignment should be demolished. We would concur with that sentiment. However, understanding that there are also community issues to be taken into consideration, for the purposes of this study it is assumed that the identified infrastructure **must** remain, and be protected in place during tunnel construction. However, based upon the proposed rail profile, the difficulty of tunneling under the Fulton Station Condominiums at shallow depth cannot be understated.

c. Ventilation/Fire Life safety

The tunnels will be ventilated in a push-pull method. Ventilation plant will be provided at each end of the underground station at concourse level, and near each portal. These fixed ventilation facilities can be supplemented by jet fans as necessary, located within sections of cut and cover or stacked drift tunnel.

Emergency egress requirements will comply with NFPA 130. For the most part the tunnels and cross passages will comprise of two separate bores, or cells in cut and cover areas. Correspondingly emergency egress will be provided by means of cross passages located at a maximum of 800 feet on center.

3. Proposed Construction Methods

The underground sections of the Canal Street and Clinton Street Options each have an overall length of approximately 8,125 feet. As a result of the site and alignment constraints a number of different construction methods will be necessary to complete the Guideway. For the purposes of the study it is assumed that the following construction methods will be required:

a. U-Wall:

U-wall structures will be used to transition the rail profile from grade to a point where the structure can be fully buried. U-Wall concepts and their corresponding construction cost estimates shall be developed by TranSystems.

b. Cut and Cover Construction:

Cut and cover structures will be used in areas where the track profile is relatively shallow, in areas of complex track geometry, and for excavation of the Canal and Clinton Street Stations, the cross sectional openings for which are too large to be safely mined in the prevailing ground conditions at the profile depth indicated.

For the station and transition structures to either side, the sequence of construction will be complex. For the purposes of the study the following sequence of construction is assumed. This sequence has been developed relative to station concepts depicted for the Canal Street Station in exhibits EXI1-EXI6.

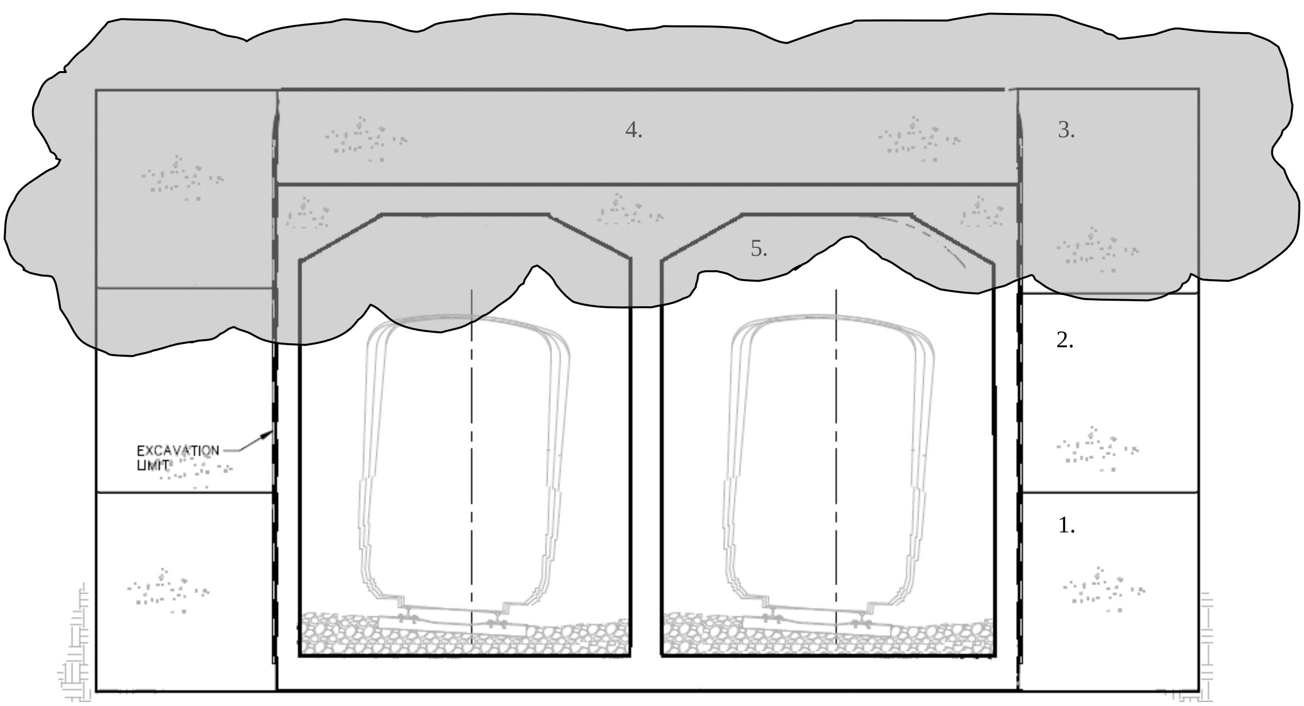
- Close Eastern side of Canal Street to surface traffic
- Take CUS north and south tracks 1, 2, 3, and 4 out of service, install safety barrier in trainshed at platform edge.
- Partially remove deck/surface local to east slurry wall location.
- Install east slurry wall. Soldier piles to project above trench to street level
- Shift traffic to east side of street (above tracks 1& 2 & west)
- Install west slurry wall
- Install temporary surface traffic decking, restore surface traffic pattern
- Sequentially excavate &install internal bracing to excavation invert

- Place invert waterproofing and cast permanent base slab
- Place partial internal walls (or use precast/other finishes to disguise slurry wall), columns, concourse slab and roof slab
- Reinstall CUS tracks

c. Stacked Drift Construction:

Stacked drift construction is a process of mining whereby a series of small adits are excavated in sequence to form a structural perimeter. The core of the arch can be subsequently excavated in safety to allow the construction of the permanent structure. This process is not often used due to its associated slow progress rates and correspondingly high costs. However, it is useful in areas where control of ground movements is essential. A representation of the stacked drift concept is included as Figure 1.

Figure 1: Stacked Drift Option



The construction sequence for the stacked drift tunnel will be as follows:

1. Perform permeation grouting, or other appropriate ground improvement methods, to stabilize fill and loose materials
2. Excavate left and right Adit 1 simultaneously from both ends. Once excavation is complete, concrete Adit 1.
3. Repeat for Adit 2
4. Excavate Adit 3. In conjunction with Adit 3 excavation and initial support, turn and excavate Cross Adits 4. Concrete cross adits as they are completed
5. Concrete 3.
6. Excavate core, including any part of Cross Adit 4.
7. Construct permanent structure.

As indicated this method of construction has been used infrequently. However there is precedent for its use. Specific examples of this type of construction include the Rio Pedrio Station, constructed as part of the Tren Urbano Project in Puerto Rico, and the Central Artery/Tunnel Project in Boston, where stacked drift methods were employed to underpin the existing Red Line subway tunnels prior to construction of the highway tunnels. This method of construction was also originally proposed for the Downtown Extension Project, part of the Transbay Transit Center Program in San Francisco. The construction process is indicated in Figures 2 and 3 below.

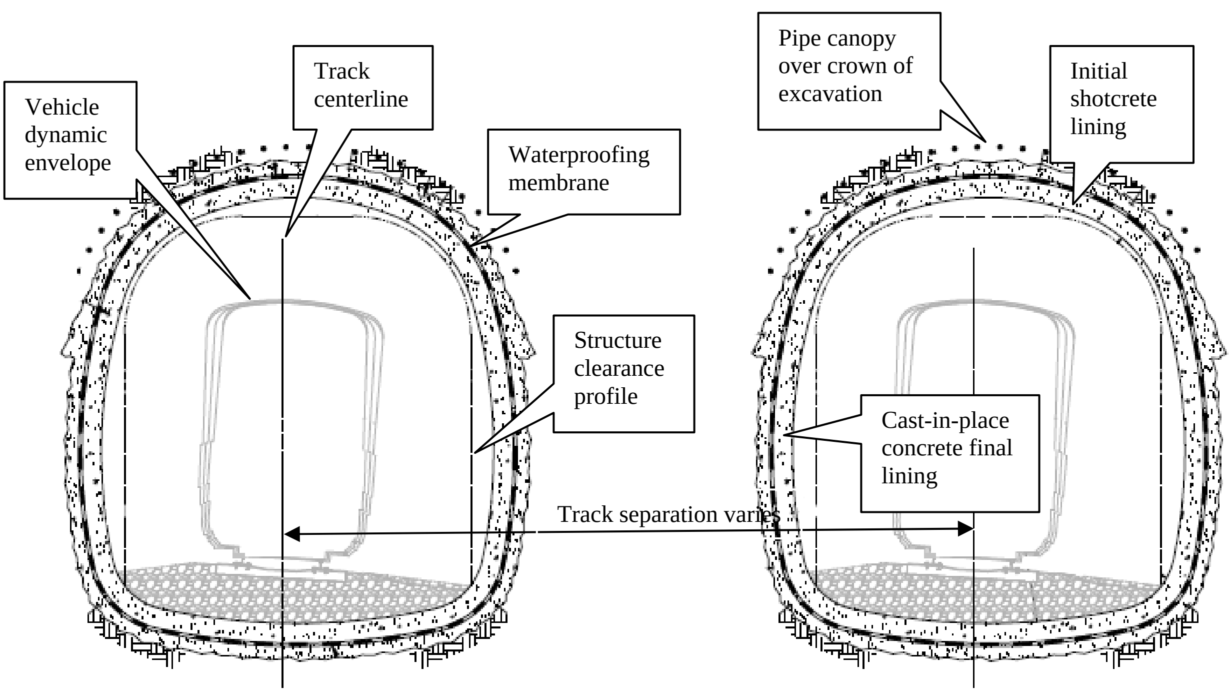
Figure 2: Excavation of Individual Drift

Figure 3: Excavation of Central Core

d. Sequential Excavation Methods (SEM):

Where greater ground cover exists between the surface and the crown of the tunnel, SEM will be adopted. It is assumed that each track will be maintained in a separate bore, to help minimize construction risk from ground movements. The full tunnel cross section will be excavated in a series of smaller adits for the tunnel crown, bench and invert. Additional ground support measures – pipe canopy, grouting, dewatering will also be required. A representation of the two track SEM configuration is presented in Figure 4.

Figure 4: Twin Cell SEM Option



Variations on the tunnel configuration indicated in the figure are achievable. The 'pillar' between the two bores can be reduced to zero, such that both bores would have a common dividing wall. This may be achievable but would necessitate more detailed analysis to confirm. Where the two single cell option may not be achievable, due to alignment constraints produced by existing building columns etc, then the configuration could be adjusted as necessary to a single bore section with both tracks located in a single opening .

e. Construction Methods - Canal Street Option

Based upon a review of the existing conditions, and the infrastructure on and adjacent to the alignment, a number of different construction methods are proposed for the construction of the Canal Street option, at least for cost estimating purposes. As the design continues, there may be opportunities to optimize the number of technologies proposed. The extent of each of the construction methods is presented in the Table below. Additional requirements/assumptions relative to the use of each of these construction methods are also provided.

Canal Street Option		
Approximate Stationing	**Construction Method**	**Additional Requirements/Assumptions**
54+90 – 59+00	U-wall	Construction within operating rail environment. Will require closure of tracks on the u-wall alignment and temporarily of tracks adjacent to the alignment.
59+00 – 62+50	Cut and cover	Transition from U-wall to SEM construction. Structure will widen from a basic two track U-wall configuration to accommodate the required bore separation of the SEM tunnels. A vent plant will be located over the cut and cover transition. The transition to SEM is assumed to be located immediately south of Polk street to minimize traffic/utility impacts.
62+50 – 78+50	SEM	SEM construction is proposed for tunneling under the existing and former Post Office facilities. A two track alignment is assumed, with each track in a single bore. This configuration shall be maintained until the alignment emerges into Canal Street.
78+50 – 82+00	Cut and cover	Transition from 2-track SEM tunnel to 4-track, 2-platform station similar to that indicated at the north of the station. Accommodate transition to 2-tracks within Canal Street to minimize SEM tunneling risk.
82+00 – 97+00	**Canal Street Station**	4-track, 2-platform station box. Station comprises a concourse level and platform level. Ventilation structures and other ancillary spaces will be provided at concourse level, either within the station or over the cut and

Canal Street Option		
Approximate Stationing	**Construction Method**	**Additional Requirements/Assumptions**
		cover transition structures. A separate ventilation plant will be provided at each end of the station.
97+00 – 100+50	Cut and cover	Transition from 2-track SEM tunnel to 4-track, 2-platform station. Station comprises a concourse level and a platform level. Transition to 2-track tunneling within Canal Street to minimize surface impacts – traffic and utilities.
100+50 – 116+70	SEM	SEM construction is proposed for tunneling under the existing Ogilvie Transportation Center to a limit at the south of Fulton Street. A two track alignment is assumed, with each track in a single bore.
116+70 - 118+50	Cut and cover	This structure will be used both as a construction shaft, and to enable a transition between the SEM and stacked drift construction methods to be made. The excavation will be decked over to maintain surface traffic. Construction will be directly over the existing Blue Line tunnels. Structure wider than regular 2-track tunnel to accommodate SEM tunnel bore separation.
118+50 – 121+50	Stacked Drift	Stacked drift tunnel under Fulton Street Condominiums, Single bore tunnel with 2 tracks within bore. Central dividing wall can be constructed to maintain ventilation flows.
121+50 – 129+00	Cut and cover	2-track cut and cover. Existing Metra tracks to be sequentially removed, underpinned and replaced, to allow construction under tracks. Development on Site A and Site B will accommodate cut and cover construction. A ventilation/egress structure will be provided at Station 122+00 approximately.
129+00 – 135+25	U-Wall	2 track transition from cut and cover portal to grade. Low headroom equipment may be necessary to construct excavation support under existing supermarket parking deck between Desplanes Street and Union Street

f. Construction Methods – Clinton Street Option

Between the following limits, the Clinton Street Option will be per the Canal Street Option:

- Station 54+00 and Station 77+00 (face of the Old Post Office Building)
- Station 118+50 at Fulton Street and Station 135+25

Between Station77+00 and Station 113+75, all construction will be by cut and cover methods to accommodate the proposed track and platform configuration. The two track leads split horizontally to provide a four track alignment. Once this is fully developed, the inner two tracks drop to accommodate a stacked platform arrangement. The extent of the various construction methods required for the Clinton Street Option is as follows:

Clinton Street Option		
Approximate Stationing	**Construction Method**	**Additional Requirements/Assumptions**
54+00 – 59+00	U-wall	Construction within operating rail environment. Will require closure of tracks on the u-wall alignment and temporarily of tracks adjacent to the alignment.
59+00 – 62+50	Cut and cover	Transition from U-wall to SEM construction. Structure will widen from a basic two track U-wall configuration to accommodate the required bore separation of the SEM tunnels. A vent plant will be located over the cut and cover transition. The transition to SEM is assumed to be located immediately south of Polk street to minimize traffic/utility impacts.
62+50 – 77+00	SEM	SEM construction is proposed for tunneling under the existing and former Post Office facilities. A two track alignment is assumed, with each track in a single bore. This configuration shall be maintained until the alignment emerges into Canal Street.
77+00 -87+00	Cut and cover	The cut and cover structure will transition from 2-tracked SEM to a four track vertically stacked (2+2 tracks) configuration in the following steps: • Turnouts transition the 2 tracks to a four track alignment. • Once the four track alignment is developed, the center tracks drop at maximum gradient to provide vertical separation. • One full vertical clearance/separation is achieved, the lower tracks move under the upper tracks to align with the station platforms.
87+00-102+00	**Clinton Street Station**	2-track, 1-platform wide station box. Platforms on 3 levels for commuter rail and CTA Red Line. Station comprises a concourse level and three platform levels. Ventilation structures and other ancillary spaces will be provided at concourse level, either within the station or over the cut and cover transition structures. A separate ventilation plant will be provided at each end of the station. Station and cut and cover construction to each side will include stubs for future CTA Red Line connections, which can be constructed with minimal impact to the ongoing station operation.
102+00-113+75	Cut and cover	The track configuration transitions to the 2 track stacked drift in the opposite sequence as that described for the cut and cover

Clinton Street Option		
Approximate Stationing	**Construction Method**	**Additional Requirements/Assumptions**
		section between Station 75+00 and 87+00. In addition the cut and cover section will include provision for a future CTA Red Line connection. Excavation will be as deep as for the Clinton Street station & the amount of structure required will be similar (approximately).
113+75 – 116+70	SEM	SEM construction is proposed for tunneling under the Clinton Lofts. A two track alignment is assumed, with each track in a single bore. At station 113+75 sufficient vertical separation can be maintained between the rail tunnel and the future CTA Red Line tunnels to allow the latter to be safely mined.
116+70 - 118+50	Cut and cover	This structure will be used both as a construction shaft, and to enable a transition between the SEM and stacked drift construction methods to be made. The excavation will be decked over to maintain surface traffic. Construction will be directly over the existing Blue Line tunnels. Structure wider than regular 2-track tunnel to accommodate SEM tunnel bore separation.
118+50 – 121+50	Stacked Drift	Stacked drift tunnel under Fulton Street Condominiums, Single bore tunnel with 2 tracks within bore. Central dividing wall can be constructed to maintain ventilation flows.
121+50 – 129+00	Cut and cover	A 2-track cut and cover structure. Existing Metra tracks to be sequentially removed, underpinned and replaced, to allow construction under tracks. Development on Site A and Site B will accommodate cut and cover construction. A ventilation/egress structure will be provided at Station 122+00 approximately.
129+00 – 135+25	U-Wall	2 track transition from cut and cover portal to grade. Low headroom equipment may be necessary to construct excavation support under existing supermarket parking deck between Desplanes Street and Union Street

4. Construction Cost Estimate Basis

a. Assumptions

The cost estimate assumes the following:

- Prices and rates provided are in $2011.
- Rates are assumed to be inclusive of Contractors other indirect costs, overhead and profit.
- It is assumed that appropriately sized construction staging areas can be made available for the Tunnel Contractor, and that the City will not enforce unusually restrictive conditions upon the Contractors means, methods, and hours of operation.

b. Inclusions

The construction costs developed for the cut and cover and mined tunnels are inclusive of the following:

- Contractor mobilization, capped at 5% of the General Construction Cost figure
- Excavation support wall, bracing, temporary traffic decking, excavation and backfill for cut and cover structures
- Excavation and initial ground support for mined tunnels
- Waterproofing system
- Final cast-in-place reinforced concrete lining for all structures

c. Allowances

Allowances have been made for items which will likely be required, but which cannot be accurately quantified at this stage in the project development. Allowances are based upon projects currently in design and construction, based upon relative percentages of the total construction cost for these projects. Allowances have been provided for the following items:

- Ventilation Structures and equipment
- Preconstruction surveys
- Instrumentation and monitoring
- Ground Improvement: Dewatering, permeation/consolidation grouting
- Contaminated soil removal and disposal

- Underpinning or other protection of adjacent and overlying buildings, including reframing of building superstructures and addition of new columns/foundation elements.
- Reconfiguration of existing building basements to provide access to Canal Street Station
- Remedial cosmetic repairs to buildings
- Tunnel operating systems including lighting, blue light station, standpipe etc
- Tunnel and station finishes and fit out (architectural finishes, escalators, elevators etc)

d. Exclusions

The estimate does not include the following items:

- Utility relocation, replacement or support work
- Street restoration – paving curbs etc.
- Track and rail
- Rail systems including overhead contact system, train control and communications
- Costs associated with Metra/Amtrak track outages, or force account work
- Soft costs such as Owner's administration and engineering staff, Financing costs, professional services (final design, construction management, etc), cost of legal, permits and interagency review,
- Financing costs
- Escalation

e. Unit Prices

Unit rates provided for major quantity items for the tunnel construction have been derived from a database of unit prices for recent, similar projects in the US maintained by Hatch Mott MacDonald. The estimates used to generate the comparison include figures from contractors bid tabs, construction cost estimates prepared by contracting firms, and Engineers Estimates for projects currently in design.

f. Contingency

Contingency has not been applied to the estimate to account for unanticipated costs, arising from uncertainties in the project scope, refinements in the design as it progresses through the DD, FD and Construction Documents phases of the project, unexpected material or labor cost increases, the bidding climate or level of competition at the time of bid, and to account for the potential for change orders and claims during construction. It is recommended at this stage in planning that a contingency of at least 35% be adopted.

5. Cost Estimates

More detailed construction cost estimates for the Canal Street and Clinton Street Options are included as Appendix A and Appendix B respectively. The construction cost totals for the options are as follows:

- Canal Street - $823-million
- Clinton Street - $841-million

While the geometry at and around the central station areas is significantly different, the cost differential is minor. While this may appear unusual, it can be explained as follows:
Of the 8,125 foot alignment, between Station 54+00 and 77+00 and between 113+75 and Station 135+25, or over a length of 4,450 feet the construction methods and costs are identical.

The Station box at 1,500 feet long itself comprises a significant portion of the remaining alignment. The price per foot and overall price of the two station concepts is similar. While the Clinton Street Station requires a very deep excavation to accommodate the concourse and platform levels, the Canal Street Station is 33% wider, and almost as deep as the Clinton Street Station based upon the track profiles developed. Correspondingly the costs of construction are similar. The costs of fitting out the Clinton Street Station are increased due to the increased number of levels, additional requirements for escalators, elevators, ventilation, finishes etc.

Of the remaining alignment there is little difference in unit price of the construction methods. For Canal Street SEM is required to pass under the Ogilvie Trainshed. For Clinton Street cut and cover construction is necessary to accommodate the changing track and structure geometry. The costs for each method are similar. The SEM excavation is expensive, to account for anticipated slow production rates, and the high level of risk associated with this construction – at relatively shallow depth under sensitive and important infrastructure.

It is expected that the cost differential between the two concepts will increase when other project cost elements, such as utilities, and surface reinstatement are introduced.

6. Conclusions/Recommendations

- Based upon the assumed construction methods indicated herein, the construction of the physical infrastructure necessary to support rail operations for the Canal Street and Clinton Street Station alignments may be in excess of $800-million, with the Canal Street Option priced at $823-million and the Clinton Street Option priced slightly higher at $841-million.
- A significant proportion of each of the estimates is made up of allowances. Many allowances are based upon similar level of effort for similar projects. However, the extent of the scope and work required within other allowances such as requirements for building protection and reconfiguration cannot be easily identified and quantified at this time. Correspondingly such allowances are considered as 'placeholders', and have been assigned a value which feels appropriate based upon the type of adjacent construction, the extent of the conflict, and the nature and significance of the existing facility.
- As the study is progressed, it is recommended that the track alignment be refined such that impacts upon existing infrastructure can be minimized – such as at the Great Hall, and the tower block south of the Amtrak parking garage. Correspondingly allowance figures can be reduced.
- Similarly, one of the major issues for construction contractors in this area will be the location of appropriate construction staging and laydown areas. Further consideration should be given to the acquisition/demolition of some of the structures noted as being at high risk of damage from construction such as the Clinton Lofts. While expensive, the costs would be offset by a corresponding reduction in construction costs through the ability to alter construction methods, and ultimately by the resale of the properties post-guideway construction.
- The above figures are exclusive of contingency. It is recommended that a contingency of at least 35% be included in the determination of an overall project cost/budget.

7. References

The following were used in the development of the construction methods and construction cost estimates:

- West Loop Transportation Center Conceptual Design Plans, TranSystems, March 2007

- West Loop Transportation Center Corridor Right of Way (ROW) Proofing Exercise, Arup, December 2004
- Exhibits EXI1-EXI6, Clinton Street Station, TranSystems, November 2010
- Transbay Transit Center Project, Final Tunnel Alternatives Evaluation Report, Jacobs Associates, July 2006

8. Limitations

This document has been prepared for the titled project or named part thereof and should not be relied upon or used for any other project without an independent check being carried out as to its suitability and prior written authority of Hatch Mott MacDonald being obtained. Hatch Mott MacDonald accepts no responsibility or liability for the consequence of this document being used for a purpose other than the purposes for which it was commissioned. Any person using or relying on the document for such other purpose agrees, and will by such use or reliance be taken to confirm his agreement to indemnify Hatch Mott MacDonald for all loss or damage resulting therefrom. Hatch Mott MacDonald accepts no responsibility or liability for this document to any party other than the person by whom it was commissioned.

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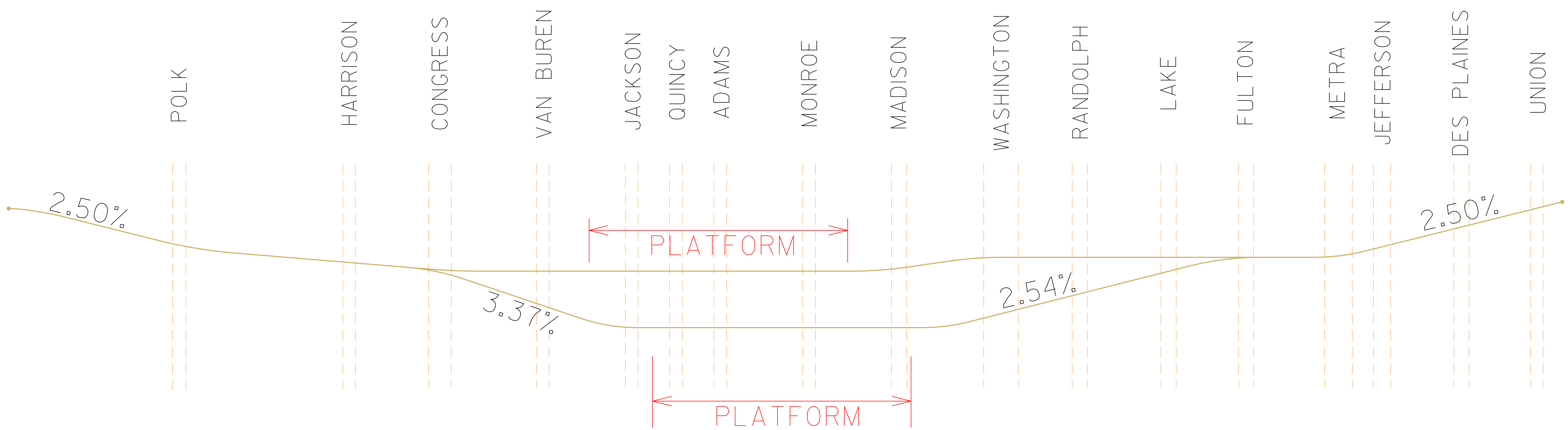
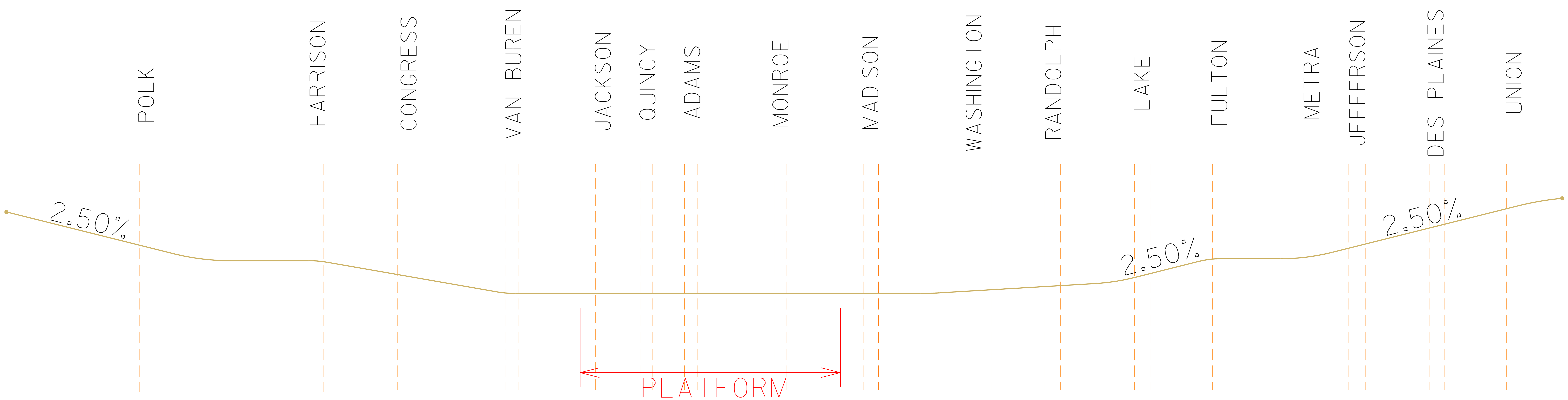
Chicago Union Station Capacity Expansion
Alternative A:
WLTC Through-Track Concept

Alt A2/A3: West Loop Transportation Center



Chicago Union Station Capacity Expansion
Alternative I:
Canal Street Through-Tracks

Alt I: New Thru Tracks Under Canal Street



Appendix E

Real Estate Issues and Opportunities

Union Station Master Plan

Real Estate Issues and Opportunities

Prepared as a Subcontractor to TranSystems
Contract No. 18660

For City of Chicago Department of Transportation

December 2011

GOODMAN WILLIAMS
GROUP
REAL ESTATE RESEARCH

Table of Contents

I. Introduction

TranSystems is under contract with the City of Chicago Department of Transportation (CDOT), to develop concepts to increase rail capacity at Chicago Union Station. The initial alternatives under investigation have identified a number of key parcels located near Union Station that may be impacted by enhancements to the rail infrastructure. Some of these sites are improved with multitenant office buildings and other commercial structures, while others represent underutilized parcels with future development potential.

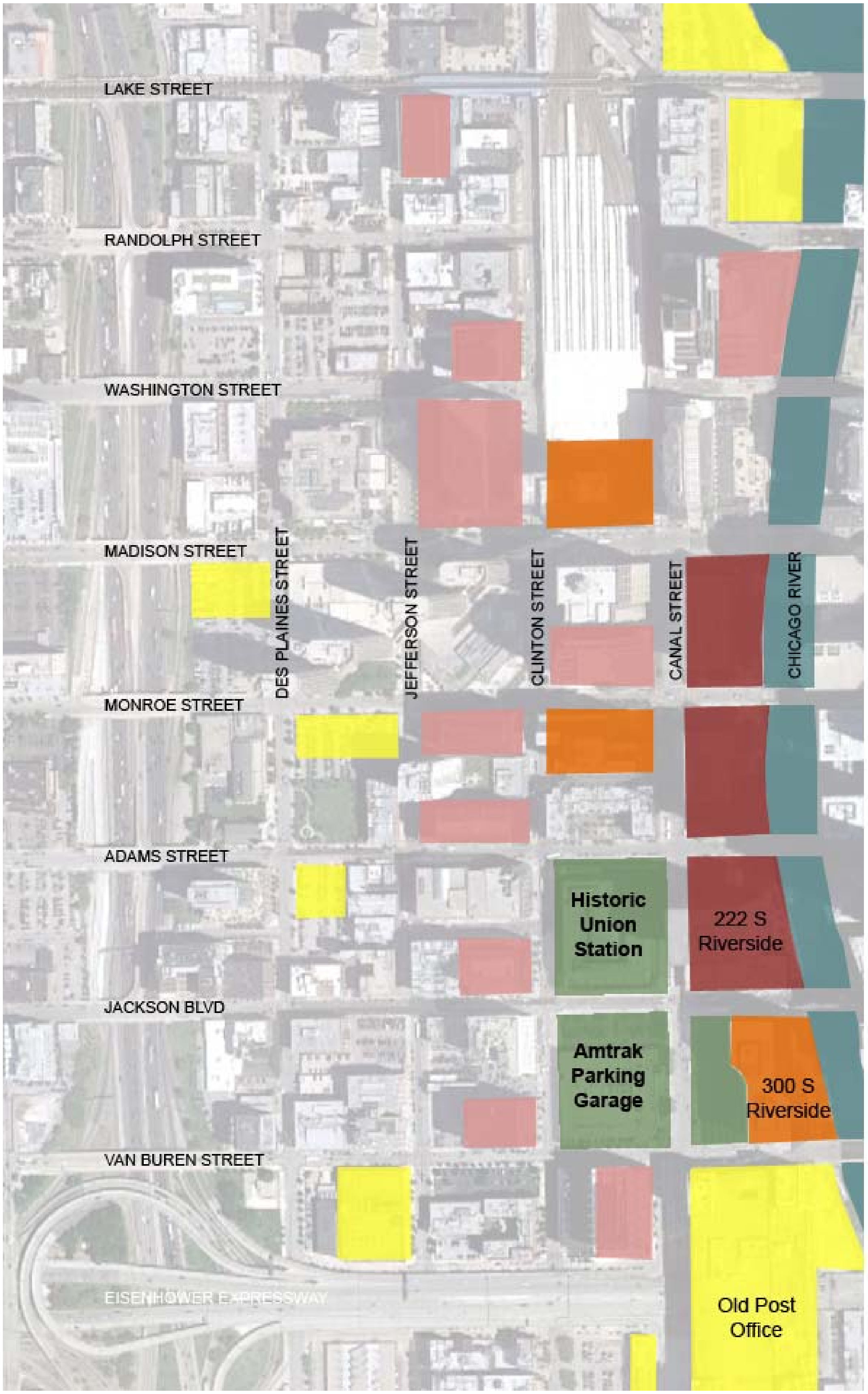
Goodman Williams Group has been retained as a subcontractor to TranSystems to provide real estate market input to the Chicago Union Station Master Plan Study. This report provides some development context as well as specific information on current ownership, recent transactions, and other relevant plans involving a number of properties near Union Station, including:

- 222 South Riverside Plaza and 444 West Jackson
- 300 South Riverside Plaza and the half block immediately west of this office structure
- The Union Station head house
- The block south of the Union Station head house (south of Jackson, between Clinton and Canal)
- The Old Post Office and adjacent properties south of Van Buren and West of the Chicago River

This report also provides information on recent sales of improved office buildings and developable land in the West Loop that can be used to inform future cost estimates and financial models for the various short- medium- and long-term transit alternatives presented in the TranSystems report.

A number of other cities in the U.S. have created districts around their rail stations and established public-private partnerships to construct major transportation terminals, enhance the surrounding neighborhoods, leverage the benefits of the transportation improvements, and help generate revenue to offset costs. Brief case studies on such efforts in San Francisco, Denver, and Atlanta are included in this report. This information is intended to foster discussion on how best to finance the improvements identified in the Master Plan Study, leverage future development, and enhance the area around Chicago's Union Station.

The following map shows Union Station and the adjacent properties in the West Loop and provides some historic context on office market development.



Union Station Development Context

Office Buildings

- completed 1960s-70s
- completed 1980s
- completed 1990s-2000s
- proposed developments
- Amtrak-owned parcels

II. Development Context

Overview of the West Loop Office Market

LaSalle Street is the traditional backbone of the Downtown Chicago office market. Beginning in the 1980s, however, Wacker Drive gained prominence as a business address, and the office market continued to grow in a primarily western direction.

Most real estate firms define the West Loop office submarket as extending from Wells Street on the East to the Kennedy Expressway (I-90/94) on the West. Jones Lang LaSalle's 3rd Quarter 2011 office market report stated that the West Loop submarket has a total of 40.9 million square feet of multitenant office space, 15.0% of which was vacant (excluding available sublease space). The entire Central Area has an inventory of 136.8 million square feet with a direct vacancy rate of 14.1%.

Office Development West of the River

The buildings at 10, 120, and 222 S. Riverside Plaza were built in the 1960s and 70s. Development of new office buildings west of the Chicago River gained momentum in the 1980s with the construction of 300 S. Riverside Plaza in 1983. In the ensuing decades, millions of square feet of new office space were constructed on the blocks between Canal and Clinton and later between Clinton and Jefferson. (Sites shown in a pink color on Development Context map).

As office development moved west, the buildings generally became smaller in size, and were less speculative in nature, with a single tenant occupying most or all of the space. As shown on the following table, Table 1, the five buildings constructed after 2000 all are about 500,000 square feet in size or less.

Residential Development

While most of the recent West Loop development has been office buildings, several significant residential buildings have established it as a mixed-use neighborhood. In 1986, construction was completed on Presidential Towers, a four tower apartment complex with 2,346 rental apartments located at 555 W Madison. Walmart Neighborhood Market recently opened a 27,000 square-foot store on the ground floor of this development.

Metropolitan Place, located at 130 S Canal Street, is a renovation of the former Florsheim Shoe Company headquarters. The project includes 212 condominium units and 22,000 square feet of first floor retail space leased to tenants including CVS, Starbucks and Kinko's. Other new construction residential towers have since been built on sites further to the north and west.

Table 1: INVENTORY OF SELECTED WEST LOOP OFFICE BUILDINGS

Building Address	Year Built/ Renovated	Square Feet	Stories	Occupancy Rate	Owners	Anchor Tenants
10 S Riverside Plaza	1965/1999	685,000	22	93%	Behringer Harvard REIT	Meijer; Zurich North America
120 S Riverside Plaza	1966/1984	692,778	22	91%	Behringer Harvard REIT	CDW; Arnstein & Lehr
222 S Riverside Plaza	1971/2001	1,184,432	35	96%	Behringer Harvard REIT	Deutsche Bank; Fifth Third Bank
444 W Jackson	1970/2001	51,000	2	100%	Behringer Harvard REIT	Fitness Formula Clubs
300 S Riverside Plaza	1983	1,048,357	23	97%	The Mizrachi Group	AIG, FDIC
Citigroup Center 500 W Madison	1987/2005	1,457,470	40	89%	GE Asset Management	Citicorp; Orbitz Worldwide
500 W Monroe	1991	973,099	44	67%	Piedmont Office Realty Trust	GE Capital
525 W Monroe	1983/2004	904,000	25	84%	Tishman Speyer	Katten Muchin Rosenman
Congress Center 525 W Van Buren	2000	522,000	16	93%	Grubb & Ellis	General Services Administration
Quaker Tower 555 W Monroe	2002	420,000	18	100%	Principal Financial Group	PepsiCo's Quaker Tropicana Gatorade division
USG Building 550 W. Adams	2006	479,000	18	92%	SEB Immobilien	USG; Humana
550 W Jackson	2001/2007	405,968	18	98%	601W Companies	Newedge USA
Union Tower 550 W Van Buren	2001	332,608	17	83%	Principal Financial Group	Kaplan University; Ticketmaster

Source: CoStar, October 2011

Future development sites

The Chicago Central Area Action Plan, which was adopted by the Chicago Plan Commission in 2003, noted:

> "Given the importance of the West Loop rail stations to commuters, and the increasing scarcity of available sites in the traditional core (of the Loop), continued westward expansion seems likely."

The Plan, in fact, promotes office over residential uses on sites west of the River.

The Development Context map shows the sites near Union Station where future office developments have been announced. As can be seen, the yellow sites are located between Jefferson and the Kennedy Expressway, extending a block further west from the previous wave of office development. The redevelopment of the Old Post Office, which is likely to include an office component, would extend the West Loop to the south.

Table 2 presents information on 8 proposed new office developments in the West Loop submarket, both east and west of the River. These eight buildings represent more than 8.5 million square feet of space, a significant increase in the Downtown office inventory.

Union Station lies at the geographic center of this next generation of office development. Proximity to this major commuter rail station will represent an important advantage as developers compete for anchor tenants and financing over the coming years.

Tax Increment Financing Districts

Union Station is located in the Canal Street/Congress Expressway Tax Increment Financing District. This irregularly shaped district that abuts the LaSalle Central and Jefferson/ Roosevelt TIF Districts. TIF funds may be used to support certain aspects of approved redevelopment projects. As of December 31, 2010, the balance in the Canal Street/Congress TIF was $53,766,168.

Table 2: PROPOSED OFFICE DEVELOPMENTS IN WEST LOOP SUBMARKET

Building	Developer	Stories	Square Feet	Comments
222 W Randolph	John Buck Company	40	800,000	NW corner of Randolph and Wells
301 S Wacker	Trammell Crow Co., InSite Real Estate	34	1,000,000	North of 311 S Wacker building
401 S Wacker	Development Resources Inc.	31	885,304	South of 311 S Wacker building
400 W Randolph (150 N Riverside)	John O'Donnell and Drew Nieman	54	1,900,000	In process of purchasing property from Reschke
				Disucssing plans with the City
444 W Lake	Hines Interests	52	1,100,000	William Blair was to be anchor tenant
601 W Monroe	Fifield Companies, CB Richard Ellis Investors	26	470,000	Purchased site in 2007 for $25 Million
			740,000	Second office tower proposed on site
625 W Adams	Alter Group, White Oak Realty Partners	20	490,000	Old St. Pat's property
645 W Madison	MR Properties	34	764,000	Partners with Park One Inc.
		24	422,000	Second office tower proposed on site

Source: Goodman Williams Group

III. Key Parcels Related to Union Station Master Plan

The following pages present photos and information on several of the previously identified properties located proximate to Union Station. Some key features of these developments are highlighted below:

- ***222 S Riverside Plaza***. The Union Station concourse is located in the basement of this fully-occupied 1.2 million square foot office building. It is currently owned by a Behringer Harvard REIT.

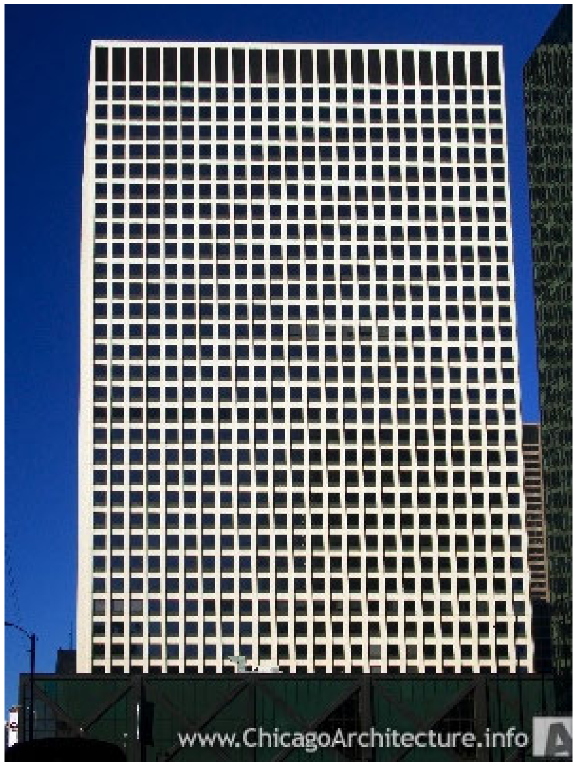
- ***300 S Riverside Plaza*** is also a fully-occupied office building constructed on air rights over the south tracks of Union Station. Originally known as Gateway IV, this 1-million-square-foot building is owned by a private investment group. In 1980, this development was permitted as the first phase of Business Planned Development No. 27. A second phase of the development called for a 47-story office building to be constructed with 1.2 million square feet of space fronting on Canal on air rights which are still owned by Amtrak. This second phase was never built, and prior approvals have expired.

- ***Old Post Office***. The Old Post office is a 2.7 million square foot landmark that has been vacant for nearly two decades. It is also built on air rights over Union Station's south tracks. In 2009, it was purchased by International Property Developers for $24 million, and redevelopment planning is in process.

- ***Union Station Headhouse***. The historic Headhouse is owned by Amtrak and managed by Jones Lang LaSalle. In 1991 Amtrak relocated all passenger facilities out of the building with the Great Hall remaining available as a waiting room when it is not rented out for events. Since then, several major redevelopment plans for the property have been announced, but subsequently abandoned. In fall 2011, Amtrak completed a renovation of two of the eight upper floors, and relocated its Chicago offices into the space. Plans for the remaining six upper floors have not yet been determined, but hotel and residential uses are being considered. Additional retail is planned for The Great Hall and street level spaces.

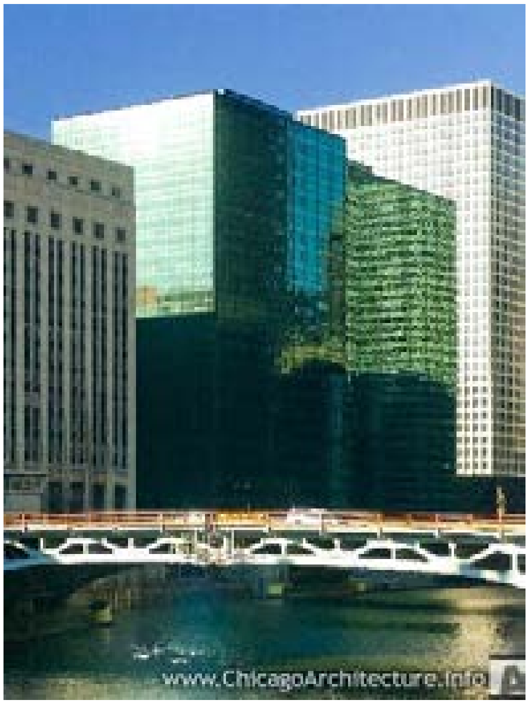
- ***Amtrak Parking Garage Block.*** Facing Jackson on the northern portion of this block, the City of Chicago is finalizing plans to build the Union Station Transportation Center. This bus station will serve as the terminus for several CTA bus routes, including the proposed East-West Bus Rapid Transit that will traverse the Central Area. On the southern portion of the block, Amtrak owns a five-story parking deck. Ultimately, this entire 85,000 square foot block represents a redevelopment site.

222 S. Riverside Plaza (Gateway Center III)



Address	222 S. Riverside Plaza
Year Built/Renovated	1971/2001
# of Stories	35
Sq. Footage	1,184,432
Reported Occupancy Rate	96%
Owner	Behringer Harvard REIT I, Inc.
Sales History	In 2006, Behring Harvard purchased the building from Beacon Capital Partners. Purchase price of $290 million included the 222 S Riverside Plaza Building and 444 W Jackson, an adjacent three-story building that now houses Fitness Formula Club. The purchase price equates to $222 per square foot for both buildings.
Management/Broker	Behringer Harvard REIT I, Inc.
Tenants	85 tenants. Fifth Third Bank leases 218,135 square feet and recently expanded and extended their lease through 2024. Other large tenants include Deutsche Bank and Trading Technologies International.

300 S. Riverside Plaza (Gateway Center IV)

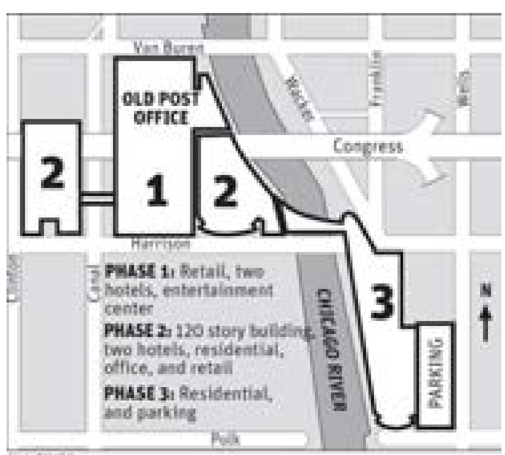


Address	300 S. Riverside Plaza
Year Built/Renovated	1983
# of Stories	23
Sq. Footage	1,048,357
Reported Occupancy Rate	97%
Owner	Group of Investors led by Joseph Mizrachi and David Werner
Sales History	In December 2010, the investment group purchased the building from Brookfield Office Properties reportedly for $190 million or $180 per square foot. In 2006, Brookfield Office Properties purchased the building for $135,003,500 or $129 per square foot. At the time, the building was only 76% leased.
Management/Broker	Cushman & Wakefield
Tenants	JP Morgan Chase; FDIC; US FDA; US SBA; US Treasury Dept. Counsel; AIG Rail Services

Old Post Office

Address	433 W Van Buren
Year Built/Renovated	1921 / 1932
# of Stories	9
Sq. Footage	2.7 million
Owner	International Property Developers
Tenants	Vacant
Recent Sales	Purchased in 2009 for $24.8 million

The following redevelopment concept appeared in a July 26, 2011 Chicago Sun-Times article.



Union Station Headhouse

Address	210 S. Canal St.
Year Built/Renovated	1925 / 1991
# of Stories	8 floors
Sq. Footage	515,835
Owner	Chicago Union Station Company, a wholly-owned subsidiary of Amtrak
Management/Broker	Jones Lang LaSalle

Amtrak recently relocated into two of the upper floors in this facility. Redevelopment plans for the remaining six upper floors and the Great Hall and Concourse have not been finalized. .

Amtrak Parking Garage

Address	310 S Canal St
# of Stories	5 floors
# of Spaces	1,660
Owner	Amtrak
Management	Central Parking System

The Union Station Transportation Center is planned for the northern end of the block. It will serve as an off-street bus terminal for the proposed East-West Bus Rapid Transit and other CTA bus routes.

IV. Land and Building Values in the West Loop

Land Sales

Prices paid for land depend on the size and shape of the parcel, location, and base zoning, among other factors. Table 3 presents information on the sale of redevelopment sites in the Central Area that closed between 2005 and 2010. While not indicative of the value of any specific parcel related to Union Station, these sales provide a range of values that have been paid for sites of various sizes and zoning designations.

Five sales were recorded on the east side of the River, west of Wells Street. These prime Loop sites all had base zoning of 16 FAR (Floor Area Ratio). The median price for these parcels calculated to $503 per square foot of land area.

Twenty sales were recorded west of the River between 2005 and 2010. These parcels varied widely, with base zoning ranging from a low of 3 FAR to a high of 12. Prices ranged from $54 to nearly $400 per square foot of land area, with a median price of $208.

The most recent sale of a development site west of the River closed in December 2011. The Prime Group sold 400 W Randolph to a developer who plans a major office building on the site. The $12.5 million price equates to $514 per square foot.

Prices were least expensive in the area south of Congress between Clark Street and the River. The seven sales shown on the table are mostly zoned for residential use, with a per-square-foot median price of $113.

Building Sales

A buyer of occupied office space is buying an income stream, and the price paid reflects the terms of the leases of the building's tenants and the outlook for future leases. The occupancy rate, condition of the building, and location are important considerations. Table 4 provides a summary of recent office building sales in the West Loop.

222 S Riverside Plaza was purchased as a package with the smaller 444 W Jackson in 2006. The price for these two assets was $222 per square foot. 300 S Riverside Plaza was sold in August 2006 for $129 per square foot, and then resold in late 2010 for $181 per square foot. The more prestigious Hyatt Center, located at 71 S Wacker Drive, also sold in December 2010 for $419 per square foot. This range of prices is representative of values for occupied West Loop office buildings.

The most recent purchase of a West Loop building will result in a new headquarters for a division of Sara Lee. Sterling Bay purchased 400 S Jefferson, a Class C, four-story building for $10 million. The total development cost is reportedly more than $30.1 million, or approximately $151 per square foot.

Table 3: SELECT CHICAGO CENTRAL AREA LAND SALES 2005-2010

LOOP SUBMARKET - Between the River and Wells Street

Address	New or Proposed Use	Sale Date	Sale Price	Land Size	Price per s.f. Land	Zoning
223 W Lake St	Existing Multi Tenant 6-story bldg.	2005	$3,500,000.00	7,200	$486.11	DC-16
235 W Van Buren	CMK Condo Tower	2005	$8,071,500.00	22,344	$361.24	DX-16
155 N Wacker & 312 W. Randolph	John Buck Co. development planned (Assemblage of 2 parcels)	2006	$33,000,000.00	39,600	$833.33	DC-16
28 North Franklin	Franklin Hotel	2007	$5,700,000.00	8,100	$703.70	DC 16
205-215 West Washington	Mixed use- Residential and Retail	2007	$16,350,000.00	32,509	$502.94	DC-16

WEST SUBMARKET - West of the River

Address	New or Proposed Use	Sale Date	Sale Price	Land Size	Price per s.f. Land	Zoning
300 N Canal St	The Left Bank Residences - 450 Unit Apartment Development	2005	$9,600,000.00	95,800	$100.21	PD 799
103 S Morgan St	Hold for development	2005	$1,450,000.00	8,850	$163.84	DX-3
532 W Roosevelt Rd	Harris Bank branch, 522 W. Roosevelt	2005	$2,725,000.00	20,305	$134.20	DS-3
555 W Roosevelt Rd	Retail Warehouse Site (Home Depot)	2005	$16,350,000.00	262,342	$62.32	PD 923
318 South Clinton		2006	$4,763,000.00	15,246	$312.41	DX-7
659 West Randolph	R+D659 (Condominiums and retail)	2006	$9,800,000.00	30,400	$322.37	DX-7
1035 West Van Buren	Rental apartments proposed	2006	$8,208,000.00	37,592	$218.34	PD 867
630 West Washington	Catalyst (residential and office)	2006	$5,900,000.00	23,000	$256.52	PD 1005
519 South Clinton	Residential	2007	$6,200,000.00	39,848	$155.59	DX-7
108 North Jefferson	108 - 116 N. Jefferson - 350 Rental Units	2007	$7,475,000.00	27,443	$272.38	DC-12
150 North Jefferson	Proposed hotel	2007	$4,100,000.00	11,700	$350.43	DX-7
815 West Madison		2007	$10,500,000.00	78,900	$133.08	DX-7
118 North Halsted	hold for development	2007	$1,775,000.00	8,734	$203.23	DX-5
524 West Harrison	Parking Lot	2007	$950,000.00	4,461	$212.96	DX-7
601-625 W Monroe	Proposed 26-story office tower	2007	$25,000,000.00	61,237	$408.25	DC-12
1000 W Madison	Parking Lot	2007	$3,100,000.00	19,487	$159.08	DX-5
640 W Washington	Vacant	2007	$9,625,000.00	35,485	$271.24	DX-7
630 Washington	Proposed Catalyst Condo	2008	$13,535,017.00	33,862	$399.71	PD 1005
1107 W Jackson	Former Fannie May Candy Factory - Proposed Target	2010	$9,300,000.00	173,200	$53.70	DX-5
543 W Lake	Parking Lot	2010	$1,550,000.00	10,934	$141.76	DX-7

SOUTH SUBMARKET - South of Congress, West of Clark Street

Address	New or Proposed Use	Sale Date	Sale Price	Land Size	Price per s.f. Land	Zoning
601- 637 S Wells St	Vetro - 233 Unit Condominium Site	2005	$7,100,000.00	24,174	$293.70	DX-12
600 S Wells St	Hold for development - D2 Realy Services	2005	$8,600,000.00	71,500	$120.28	DX-7
900 South Clark	AMLI Apartments	2006	$8,758,000.00	95,832	$91.39	PD 523
1000 S Clark	Curve on Clark - D2 Realty	2006	$10,400,000.00	110,207	$94.37	PD 523
800 South Clark	Three Buildings By AvalonBay Communities (Rental)	2007	$23,000,000.00	141,570	$162.46	PD 1022
Roosevelt & Wells	Roosevelt Collection (residential and retail)	2007	$31,500,000.00	522,720	$60.26	PD523
700 S Wells	Vacant. Part of Franklin Point	2008	$32,500,000.00	286,646	$113.38	DX-7

Source: Goodman Williams Group, October 2011. This information is obtained from reliable sources, but Goodman Williams Group does not guarantee its accuracy.

Table 4: SUMMARY OF WEST LOOP OFFICE BUILDINGS SALES

Building Address	Date of Sale	Buyer	Seller	Price	Square Feet	Price / SF	Class Bldg
222 S Riverside	June 2006	Behringer Harvard REIT I	Beacon Capital Partners	$277,500,000	1,184,400	$222	B
444 W Jackson					68,000		
	These two properties were purchased as a single sale.						
300 S Riverside	August 2006	Brookfield Office Properties	JPMorgan Chase & Co	$135,003,500	1,048,357	$129	A
500 W Monroe	July 2007	Broadway Partners Fund Manager	Shorenstein Realty Services	$335,000,000	973,000	$344	A
10 S Riverside	August 2007	Behringer Harvard REIT I	Beacon Capital Partners	$832,500,000	685,000	$264	B
120 S Riverside Plaza					692,778		B
200 S Wacker Drive					754,751		A
One Financial Place					1,019,325		A
	These four properties were purchased as a bulk portfolio sale.						
300 S Riverside	December 2010	Mizrachi Group	Brookfield Office Properties	$190,000,000	1,048,357	$181	A
71 S Wacker Drive (Hyatt Center)	December 2010	Irvine Company	Pritzker Realty Group	$625,000,000	1,490,825	$419	A
500 W Monroe	April 2011	Piedmont Office Realty Trust	Broadway Partners Fund	$22,500,000	973,000	$23	A
	The property transferred as a foreclosure on March 31, 2011 with a vacancy of 331,000 sf and an additional 308,000 sf slated to expire in 2012.						
200 S Wacker	June 2011	Equity Group Investments, Transwestern	Behringer Harvard REIT I	$95,500,000	754,751	$141	A
	Recapitalization of the outstanding mortgage. Boston Consulting Group vacated 89,000 sqare feet in 2010.						

Source: Goodman Williams Group. This information is obtained from reliable sources, but Goodman Williams Group does not guarantee its accuracy.

V. Transit-Related Public/Private Development Models

As the master planning process for Chicago Union Station continues, discussions will ensue on a number of broader topics:

- Transforming Union Station (both the Headhouse and future passenger facilities) into great urban spaces;
- Maximizing the economic impacts of these critical transportation assets;
- Leveraging private development opportunities to help pay for transportation and other improvements.

A number of other cities in the U.S. have established transit-related districts that include passenger rail terminals and surrounding blocks with opportunities for private real estate development. The following pages contain brief descriptions of on-going projects in San Francisco, Denver, and Atlanta, focusing on the roles of the various entities and the development plans.

While Chicago may ultimately choose a different model for redeveloping Union Station and surrounding blocks, elements of these efforts in other cities may merit consideration.

A. San Francisco Transbay Transit Center

Project: San Francisco Transbay Transit Center (TTC). The $4 billion project will replace the old Transbay Terminal with a new five-story Transit Center that will serve as a regional transportation hub linking commuter buses, BART, Muni city buses, commuter rail service and California High Speed Rail. Ultimately, the project will redevelop the neighborhood into a pedestrian-oriented environment that encourages the use of alternative modes of transportation, provides new downtown housing, and enhances the connections between the central city and Financial District with new office, hotel, commercial and retail development.

Partners in establishment: In April 2001, the City and County of San Francisco, the Alameda-Contra Costa Transit District and the Peninsula Corridor Joint Powers Boards-Caltrain entered into a Joint Powers Agreement to create the Transbay Joint Powers Authority (TJPA). TJPA was given the authority to develop, design, construct, renovate/rehabilitate, operate, manage and maintain a new regional transit terminal, which will provide expanded bus and rail services as well as direct access to transit on the site of the Transbay Terminal and/or property adjacent to it.

The San Francisco Redevelopment Authority is another stakeholder in the TTC project. The SFRA is an organization that enhances the urban living conditions and environment through the removal of blight. It is a separate legal entity from the City and County of San Francisco but performs certain tasks that are solely for and authorized by the City and County of San Francisco. The SFRA and the City Planning Department are the leads in planning the future development in the area surrounding the new Terminal.

Selection of Developer: In November 2006, TJPA launched an international design and development competition to choose a design team for the Transit Center and a development team for an adjacent tower development project. In September 2007, Pelli Clarke Pelli Architects was selected for the Transit Center project and Hines was selected for the adjacent tower development.

In July 2011, SFRA put out an RFP to buy two parcels near the new TTC and master develop a high-density residential project with ground floor retail and a child care center. The project calls for approximately 345 units of market rate rental housing in a 30-story tower and 100 to 150 affordable units in multiple low-to mid-rise buildings. The deadline for responses was October 5, 2011.

Development Plans: In June 2005, the City of San Francisco adopted the Redevelopment Plan for the Transbay Redevelopment Project Area, which is a 40-acre site encompassing the Transbay Transit Center. The plan calls for:

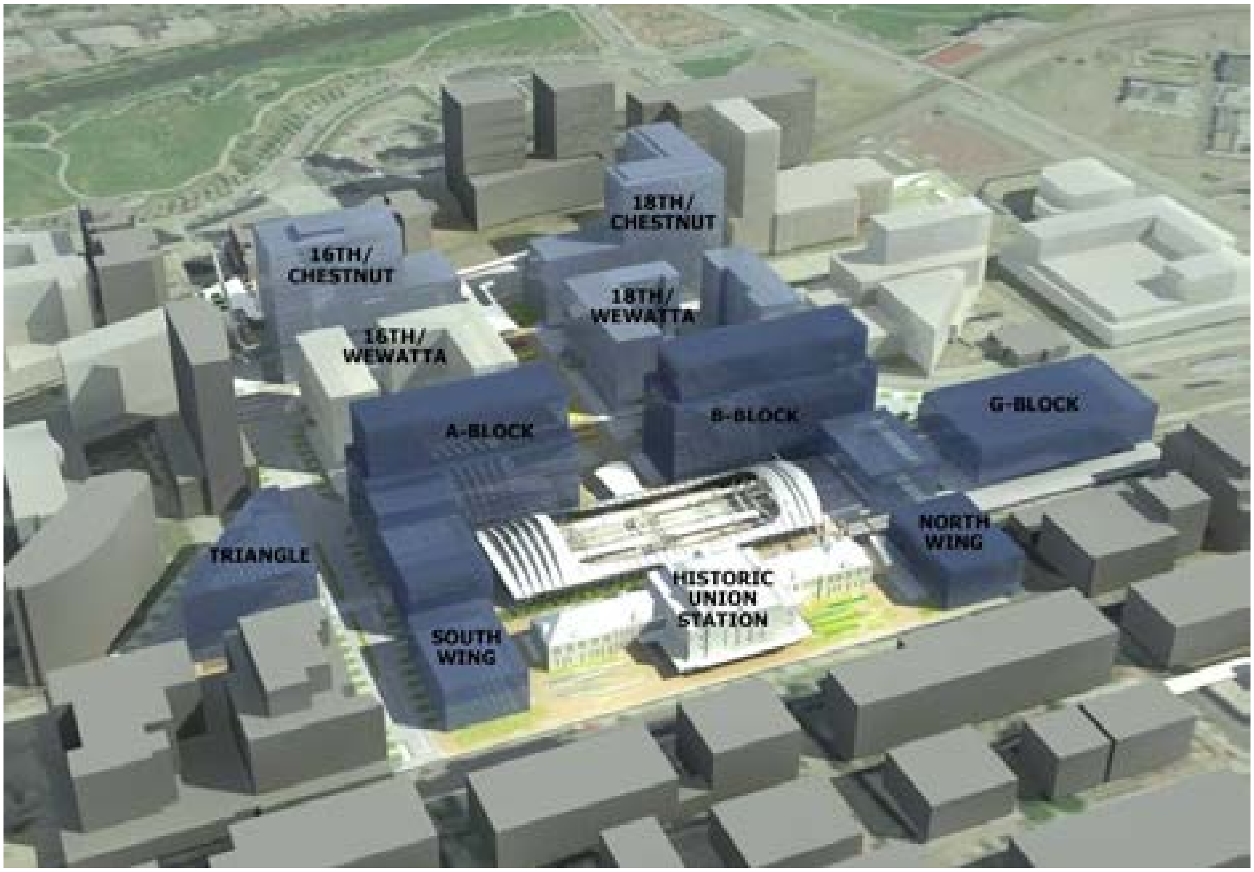
- 2,600 residential units, 35% of which will be affordable. The plan includes a mix of townhomes, low- and mid-rise buildings, and high rise towers.

- 3 million square feet of new office and commercial space

- 100,000 square feet of retail.

Status: Construction started in summer 2011.

B. Denver Union Station Project Authority



Project: Denver Union Station (DUS). The goals of the project include transforming DUS into a regional transportation hub and encouraging mixed-use redevelopment that complements the site and the historic components of the surrounding neighborhood. The project plans to accommodate pedestrian traffic from 10 modes of transportation and six public plazas. It is touted as one of the largest transportation redevelopment projects in the country.

Partners in establishment: Regional Transportation District (RTD), the City and County of Denver (CCD), the Colorado Dept of Transportation (CDOT), and the Denver Regional Council of Governments (DRCOG) are the main public partners involved in the project. RTD purchased Denver Union Station in 2001 with assistance of CCD, CDOT and DRCOG.

In 2008, the Denver Union Station Project Authority (DUSPA) was established to finance and implement the project. The 13-member agency consists of 6 members and 2 non-voting members from CCD, two members from RTD, 1 member from CDOT, 1 member from DRCOG and 1 member from DUS Metro District.

Selection of Master Developer: The selection of the Master Developer was an 18 month process. Developer RFQs were due in June 2005; and 11 teams provided responses. The RFP Part 1 was due in February 2006 and 5 teams submitted. The RFP Part 2 took place in July 2006.

In November 2006, Union Station Neighborhood Company, a joint venture established by East West Partners and Continuum, was selected as the Master Developer to head the redevelopment and preservation of DUS. The development team includes Kiewit Construction Co., SOM, DMJM HARRIS | AECOM, and Hargreaves Associates.

In August 2011, East West Partners formed a joint venture with Starwood Capital Group, a private investment firm, to help facilitate redevelopment efforts.

Development Plans: The Master Plan was adopted in September 2004 by the Partner Agencies. The plans for the 19.5-acre station site include the potential development of:

- Approximately 1 million square feet of office space (Class A and Class B)
- 300,000 square feet of residential, or about 250-300 units
- Boutique or business-oriented hotel with 120 to 200 rooms
- 100,000 square feet of retail and other commercial uses, including restaurant and entertainment venues, specialty retail, and TOD convenience retail.

C. Atlanta Downtown Multi-Modal Passenger Terminal

Project: Atlanta Downtown Multi-Modal Passenger Terminal (MMPT). The MMPT stakeholders hope that MMPT will ultimately:

- Replace insufficient and disconnected transportation facilities;
- Connect multiple modes of transportations while increasing ridership;
- Facilitate future transportation infrastructure investments
- Spur economic development.

Partners in establishment: On behalf of various stakeholders, Georgia Dept of Transportation (GDOT) conducted the search for a Master Developer to implement MMPT through its Public-Private Partnership (P3) program. Stakeholders identified include the City of Atlanta, MARTA, Central Atlanta Progress/Atlanta Downtown Improvement District (CAP/ADID), Georgia Regional Transportation Authority (GRTA), and the Atlanta Regional Commission (ARC).

Enabled by the Georgia Legislature in 2009, the P3 program allows GDOT to identify and select projects, procure proposals and maintain control over construction. P3 encourages competing teams of private partners to be innovative with their funding sources.

Selection of Master Developer: The selection of the Master Developer was a 9-month process. Notice of Intent was published at the end of August 2010. Developer RFPs were issued by P3 on December 1, 2010 with responses due by January 13, 2011. The three teams that submitted responses were given five weeks to submit their proposal plan.

In March, the team of Forest City/Cousins/INTEGRAL was selected to pursue negotiations with GDOT. The team also consisted of FX FOWLE, Kimley-Horn, Parsons Brinckerhoff, Cooper Carry, and Urban Collage. As of July 2011, negotiations on a Master Development Agreement were still proceeding.

Development Plans: The exact location and project area of MMPT will be determined by the Master Developer in the Phase 1 Scope of Work. The general location is 119-acres in downtown Atlanta, more specifically around the Five Point MARTA station, as determined by the MMPT Stakeholders. Specific uses, such as commercial/office, residential, office, hotel, will also be determined in the Scope of Work.

VI. Conclusions and Recommendations

Three key parcels surrounding Union Station are owned by Amtrak. As part of the longer-term planning process, consideration should be given on how best to unlock the near- and longer-term potential of these properties.

- ***The Historic Headhouse***. Efforts should continue to generate additional revenue and enhance the Headhouse as a destination. The Great Hall is one of the iconic spaces in Downtown Chicago.

- ***The Amtrak Parking Garage*** block south of Jackson. The planned bus terminal on the northern portion of this block should not preclude eventual redevelopment of the entire 85,000-square foot site.

- ***The 300 block of South Riverside Plaza.*** Amtrak owns the western portion of this block, which remains undeveloped despite previous plans for an office tower over the air rights.

Future enhancements to the passenger facilities, or eventual development of a new station for inter-city rail passengers, may impact some of the privately owned real estate on the blocks adjacent to Union Station. These include 222 S Riverside Plaza, 300 S Riverside Plaza, and the Old Post Office properties.

These privately-owned properties, together with Amtrak's development sites, should be master planned as a cohesive multi-modal transportation district. A private developer could facilitate commercial development that would support future transportation improvements and enhancements to the public spaces. A governance structure representing key public and private stakeholders needs to be established with the purpose of advancing shared transportation and economic development goals.

Appendix F

Alternatives Not Advanced

This Appendix contains drawings and brief descriptions of alternatives that were not advanced in the study.

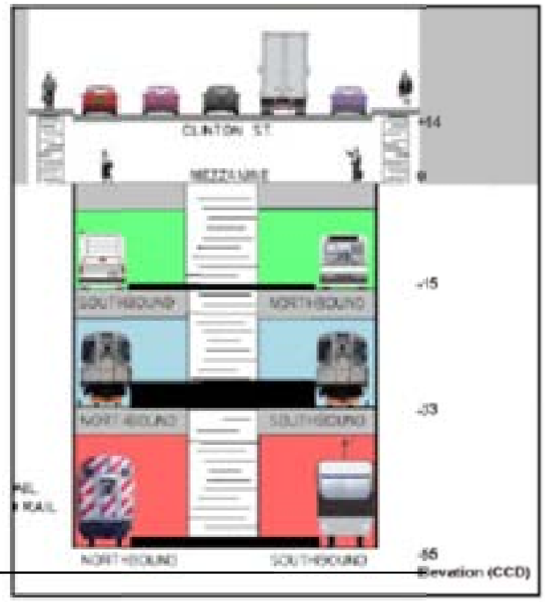
Clinton Subway, Alternative A

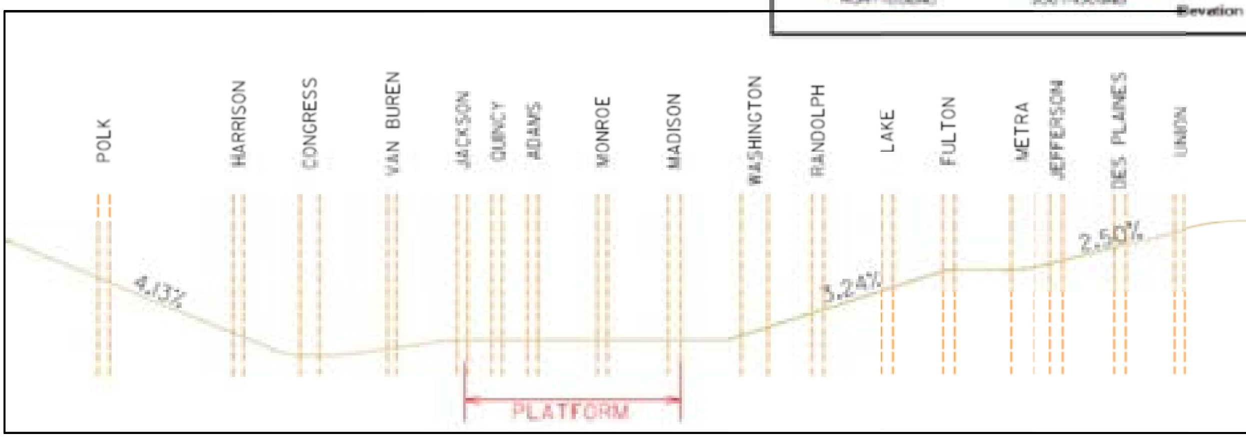
Sub-Alternatives Not Advanced

Original Concept

Designated A1 in this Study

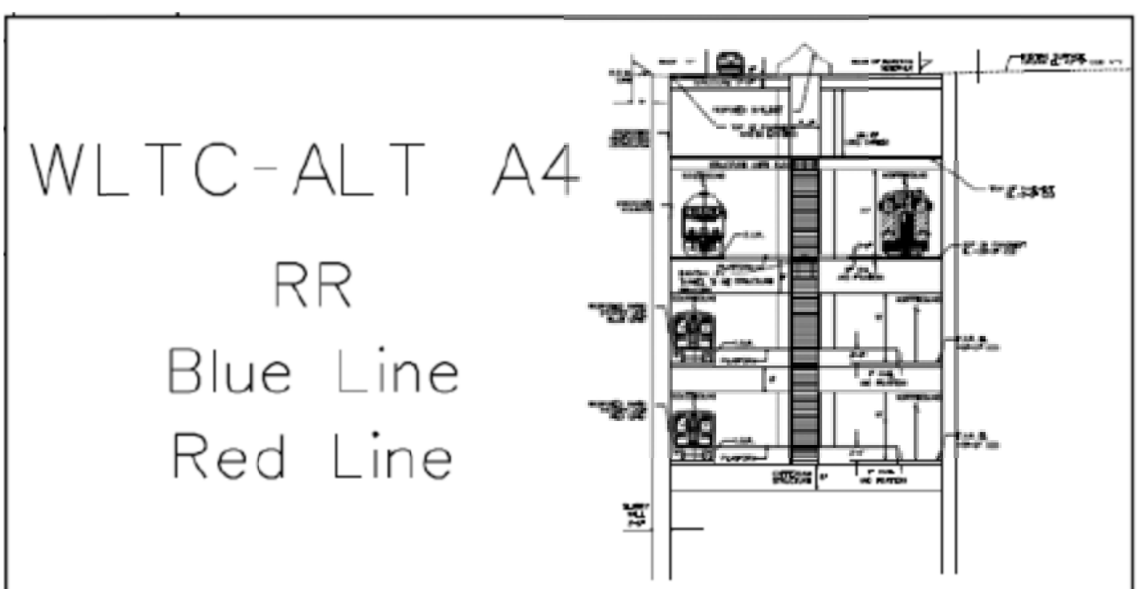
It was determined that the Clinton subway should have two railroad levels (four platform edges). Also, the arrangement with the railroad on the lowest level resulted in excessive grades at the south end.





A4

This alternative was also not advanced because it only had one railroad level.



Alternative D – Partial Through Track Concept

This alternative achieved the objective of providing a higher proportion of through tracks, but did not increase the number of station tracks on platforms. Thus, its ability to increase Union Station's capacity was quite limited. The new through tracks would conflict with the structure supporting the 222 S. riverside building, as well as the mezzanine (including the Jackson exit and, possibly, the Adams exit) and the Amtrak waiting room. Ultimately the alternatives based on converting the mail platform were found superior.

Alternative E – Partial Through (Hybrid) Track Concept

This alternative used the same track layout as Alternative D, but assumed that the 222 S. Riverside building would be removed. While this resolved the conflicts identified in Alternative D, the cost would be very high. Again, the alternatives based on converting the mail platform were found superior.

Alternative F – Full Through Track Concept

This alternative also assumed that the 222 S. Riverside building would be removed. It takes full advantage by running most tracks through. The station tracks would be kept to a manageable length by constructing crossovers where the concourse now stands. However, a satisfactory scheme for access to the station platforms could not be achieved.

Alternative G – Lower Riverside Through Track Concept

This alternative assumed that the tracks would be lowered enough to allow trains to run below the mezzanine (resolving a major concern of Alternative D). It began the concept of considering conversion of the mail platform. However, there were concerns with the concept of having these tracks several feet below the other station tracks and below the level of the adjacent Chicago River.

Alternative H – 222 Riverside Through Tracks

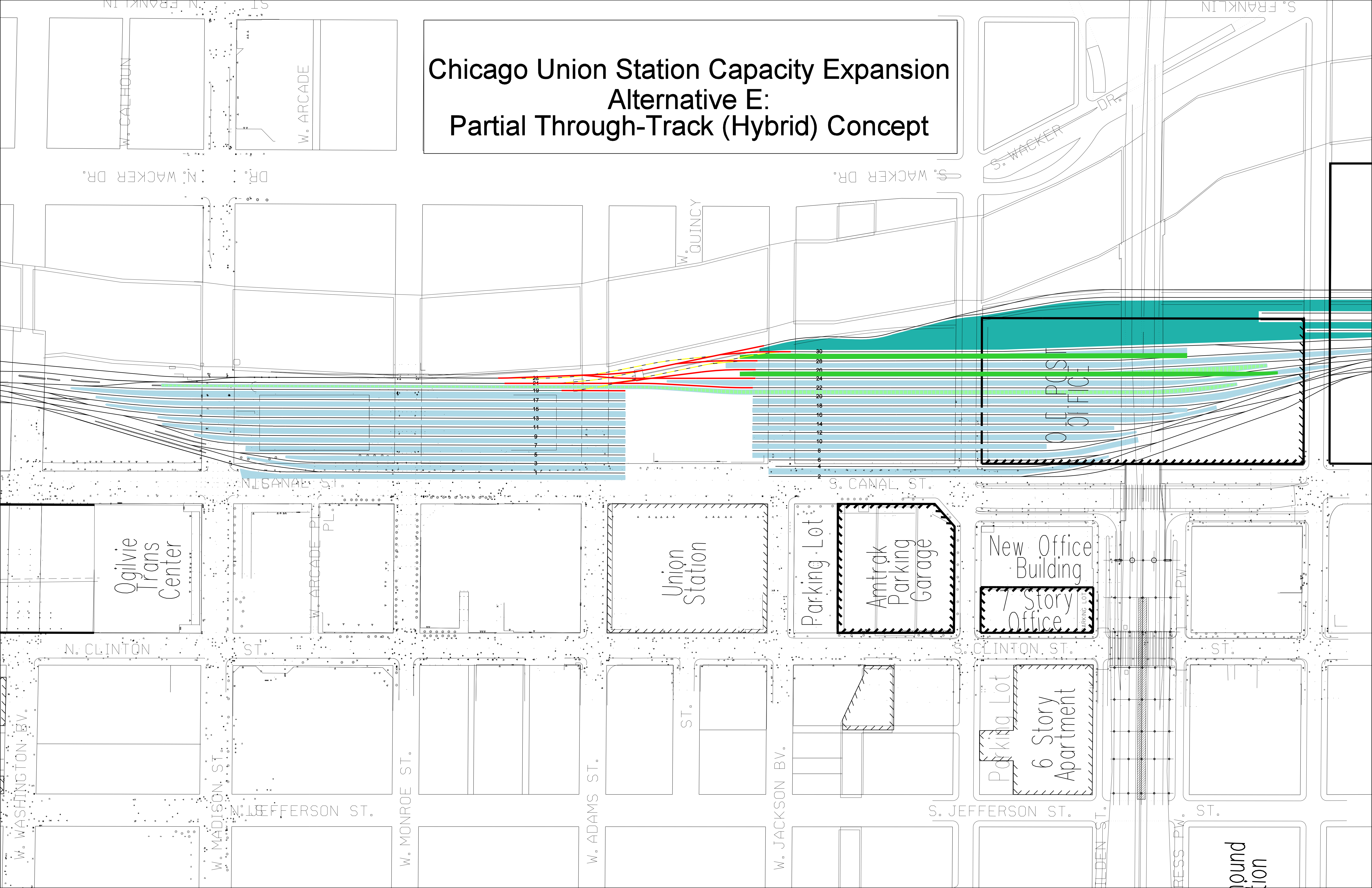
This concept was based on the idea of selectively removing some of the columns that support the 222 S. Riverside building, re-supporting them higher up. The tracks would have crossed the existing concourse, requiring a new means of access to the platforms. The tracks would have also have been extremely long. The overall effect would seem to require major re-construction of the building and would reduce capacity.

Alternative J - Riverside – Mail Platform Through Track Concept

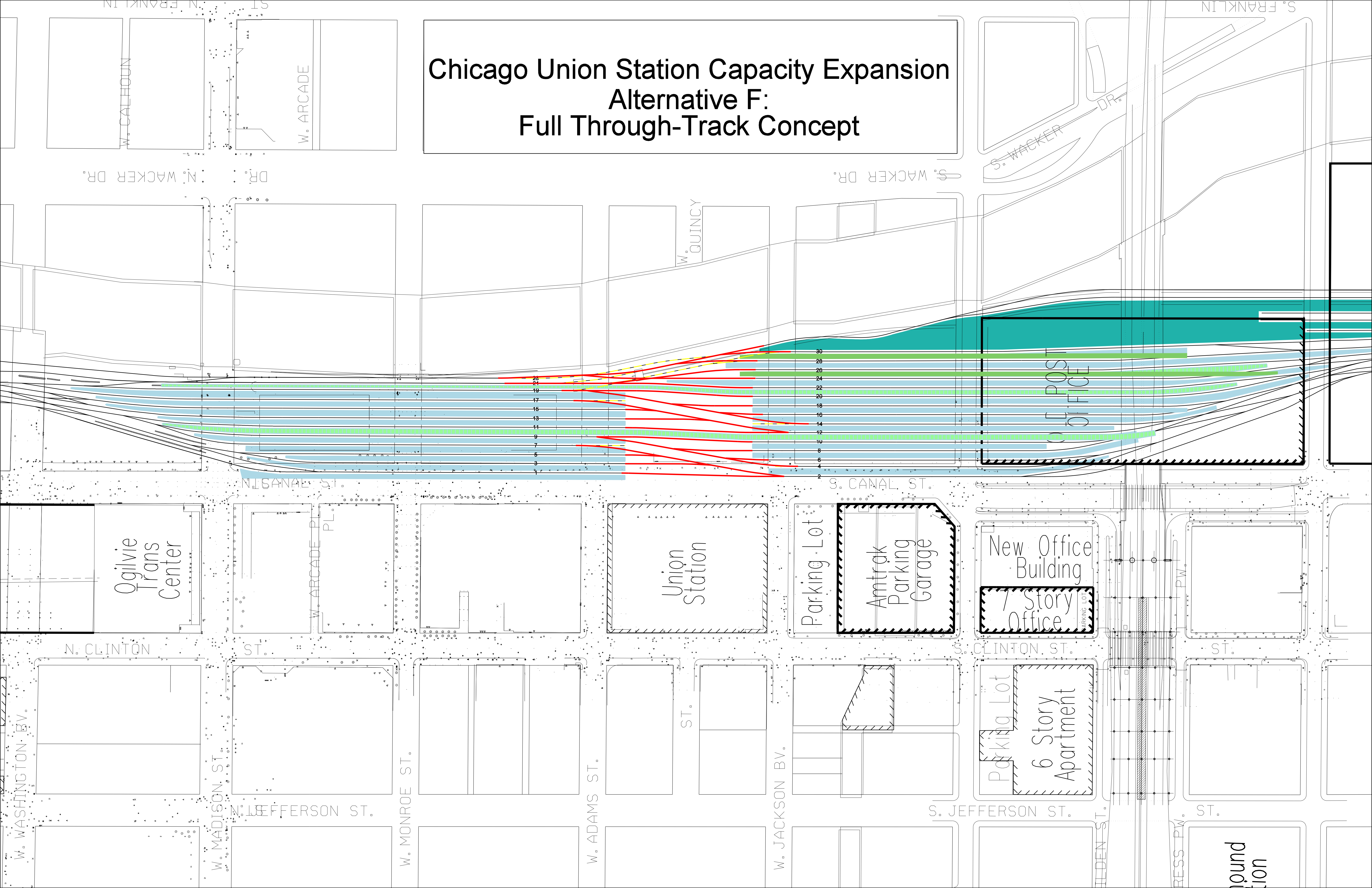
There were several variations on this concept of converting the mail platform and extending the tracks north of Jackson Boulevard, to be accessible from the concourse. It was concluded that this extension would require too much structural work and conflict with the existing mezzanine, as well as impinge on the concourse. The curves in the platforms were also a concern. It was concluded that the conversion of the mail platform, with access provided from new waiting and boarding space below (or, possibly, above) would be superior, and was recommended to be advanced.

Chicago Union Station Capacity Expansion
Alternative D:
Partial Through-Track Concept

Chicago Union Station Capacity Expansion
Alternative E:
Partial Through-Track (Hybrid) Concept



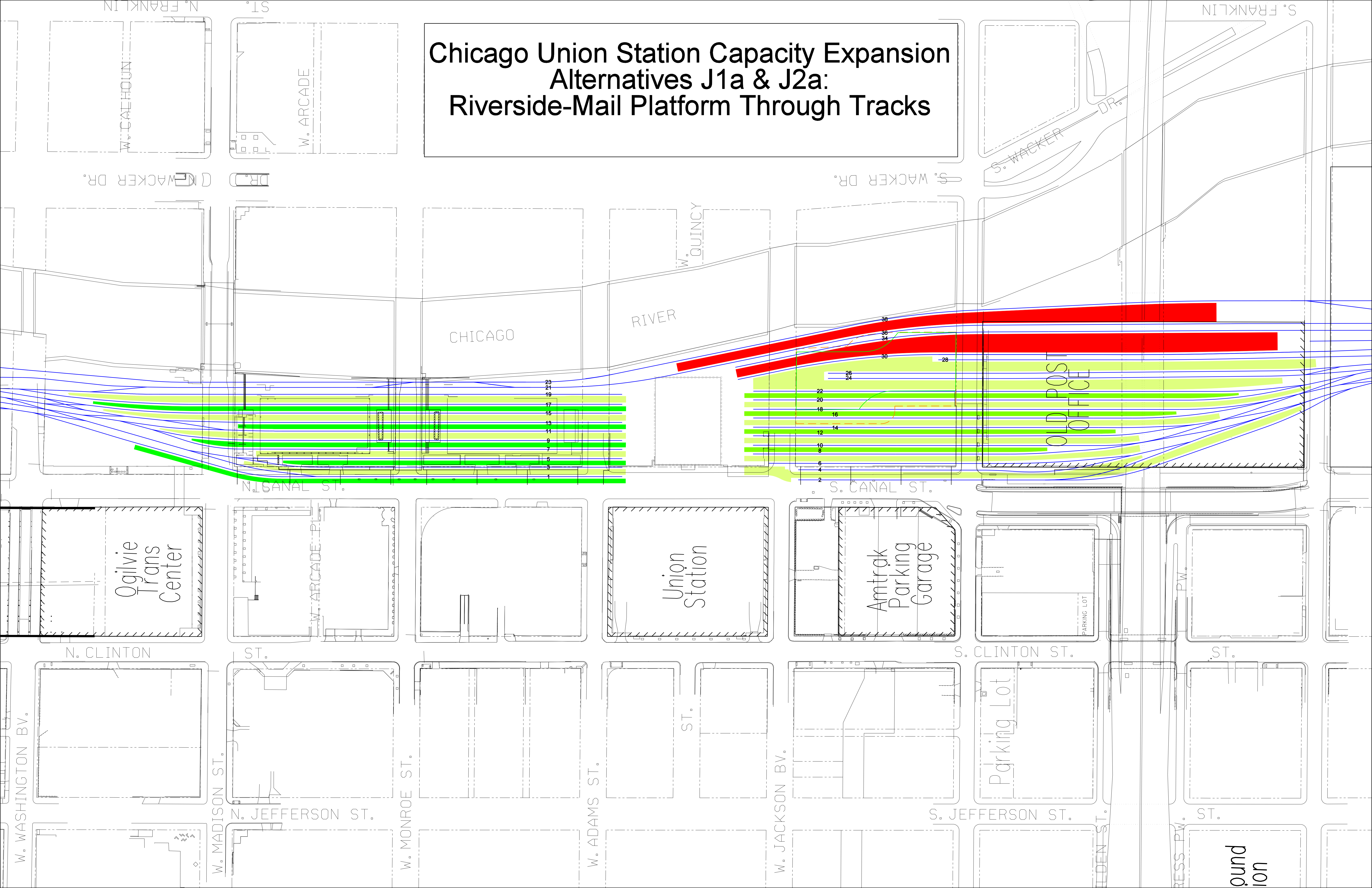
Chicago Union Station Capacity Expansion
Alternative F:
Full Through-Track Concept



Chicago Union Station Capacity Expansion
Alternative G:
Lower Riverside Through-Track Concept

Chicago Union Station Capacity Expansion
Alternative H:
222 Riverside Through-Tracks

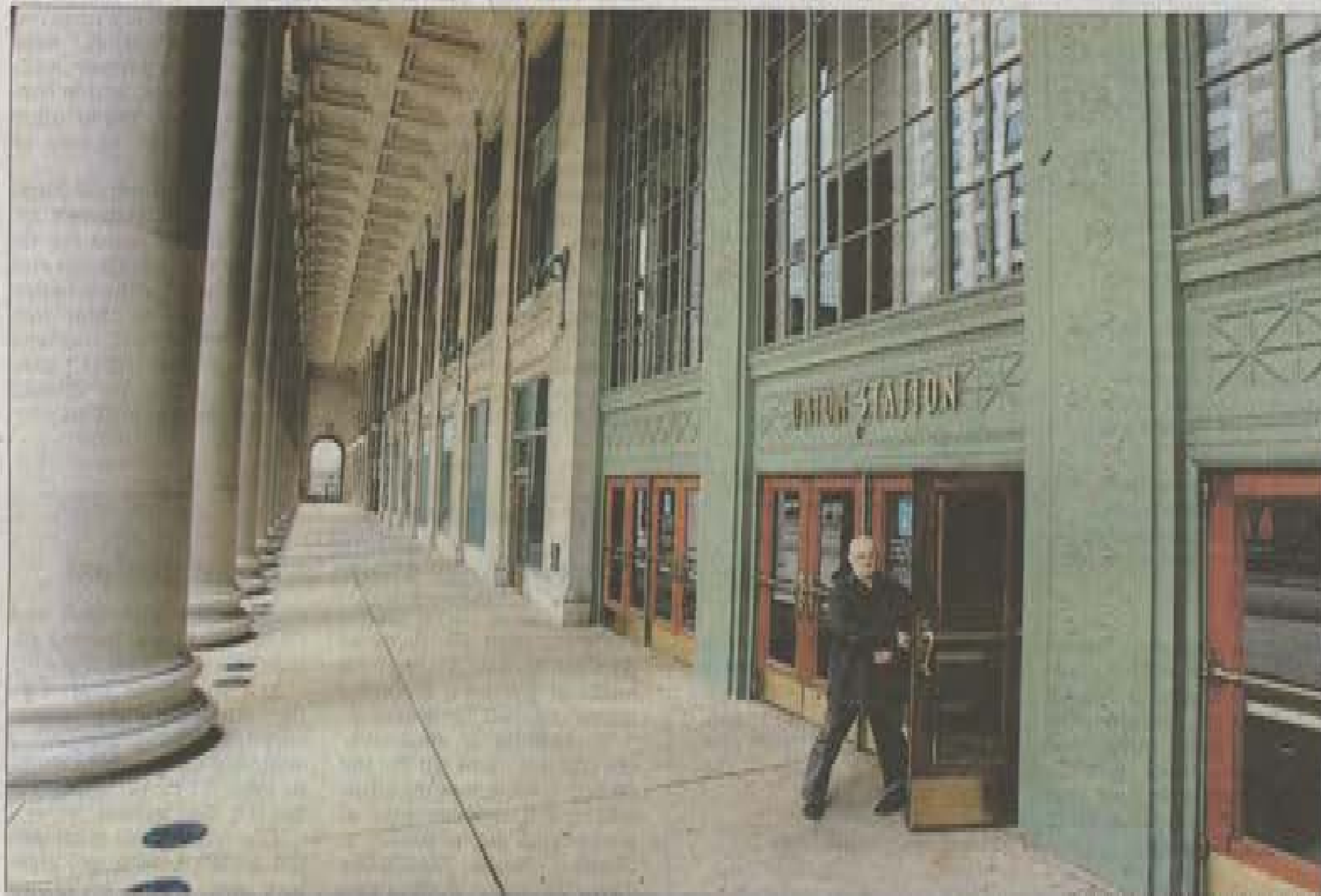
Chicago Union Station Capacity Expansion Alternatives J1a & J2a: Riverside-Mail Platform Through Tracks



Appendix G

Media Articles

Chicago Tribune
BUSINES
FRIDAY, MAY 2, 2008 | SECTION 3



Tribune photo by Charles Osgood

UNION STATION: Financing is proving elusive for a nearly half-billion-dollar renovation and expansion project.

Funding hinders projects

Developers, commercial properties run into money trouble as stricter lending practices come into play and fewer buyers place bids

By Robert Manor
TRIBUNE REPORTER

There is little doubt that the nation's credit crisis has cooled speculative real estate projects in Chicago, but now that chill has spread to developments with marquee tenants and backed by established companies.

Last week, the developer of a nearly half-billion-dollar project at Chicago's landmark Union Station said he has been unable to get financing, despite the American Medical Association's commitment to lease 275,000 square feet and the support of the city and Jones Lang LaSalle, the second-largest commercial property broker.

So far this year, Chicago has seen just one megadeal, the $540 million sale of the UBS tower at 1 N. Wacker Drive in February. "Right now, in this credit market, it is a meltdown," said one major office developer who spoke on condition of anonymity. He said even the strongest institutional borrowers are having difficulty getting money.

Developer Hossein Youssefi, who is leading the effort to renovate and expand Union Station, seems an ideal candidate to be able to raise money.

He is working to add an 18-story tower to Union Station with Jones Lang LaSalle, a Chicago-based firm experienced in similar projects including the redevelopment of Grand Central Terminal in New York and Washington's Union Station. Youssefi formerly worked with Jones Lang LaSalle in developing millions of square feet of commercial real estate.

Construction on the project, which calls for residential, retail and office space, is scheduled to start this summer.

In addition to the Jones Lang LaSalle partnership, the project has the backing of nearly $59 million in public funding, a sign that city officials will do what they can to help the project.

"As of right now, we do not have financing in place," Youssefi said.

Youssefi said he isn't giv-

PLEASE SEE **PROJECTS »** PAGE 4

Tribune file photo by Chuck Berman

AON CENTER: Piedmont Office Realty Trust, the owners of the tower, took the building off the market after being unable to obtain an acceptable price for the property.

Tribune file photo by William Rice

WATERVIEW TOWER & SHANGRI-LA HOTEL: Work on the project was held up as the developer took two years to secure a $300 million loan.

» PROJECTS

CONTINUED FROM PAGE 1

ing up, and Jones Lang LaSalle said the project will go forward. But Youssefi was blunt about the problems he faces.

"It is no secret that it is very difficult to obtain financing," he said. "Maybe we will have to re-engineer the financing."

That could involve obtaining financing from several sources, he said, or perhaps from foreign investors.

Jones Lang LaSalle faces its own problems.

After the markets closed Tuesday, the real estate services company reported net income of $2.8 million, or 9 cents per diluted share of common stock, for the quarter ended March 31, far below the net income of $27.4 million, or 83 cents per share, for the first quarter of 2007.

Jones Lang LaSalle said its business was "significantly impacted in the first quarter of 2008 by liquidity conditions in credit markets."

Lack of financing held up work on the Waterview Tower & Shangri-La Hotel, which is being built along the Chicago River at Wacker Drive and Clark Street.

Teng & Associates, the Chicago-based developer, took two years to secure a $580 million loan needed to finish the project.

And last month, the owners of the Aon Center, Piedmont Office Realty Trust, took the building off the market after they were unable to obtain an acceptable price for the property. At the time, they cited "capital markets" as one reason to hold on to the office tower.

Asked Wednesday if difficulty in getting loans has made it challenging for potential buyers to make an attractive offer, Raymond L. Owens, executive vice president of capital markets for Piedmont, had a simple and direct answer: "Of course. Yes."

Robert Dobilas, chief executive of credit rating agency Realpoint LLC, said the general weakness in home values is making it hard to get financing for commercial properties around much of the country.

"The longer the residential market worsens, it is going to trickle down into the commercial" realm, Dobilas said.

'The longer the residential market worsens, it is going to trickle down into the commercial' realm

—Robert Dobilas, chief executive of Realpoint LLC

"We are starting to see weakness in the retail sector, the hotel sector."

People whose net wealth is declining as their homes lose value are apt to cut back on discretionary spending, like recreational shopping or out-of-town vacations.

"The most difficult [market] is retail," said Al Vallejo, commercial division manager for Re/Max Team 2000.

"Because the economy is suffering the way it is, people are cutting back on luxury items," Vallejo said.

The AMA's plans to move to Union Station also raise the question of the future of its current headquarters at 515 N. State St. German investors have the 29-story building up for sale, and real estate observers estimate its value at perhaps $140 million.

An individual familiar with the AMA building says existing financing could make the structure an easy sell.

"A new buyer can walk in and assume the existing financing," said the source, who spoke on condition of anonymity. "It is at an attractive interest rate."

Less hurt by the credit slump are smaller projects or projects tied to industries with growth potential.

Self-storage projects, particularly climate-controlled properties in highly visible locations, are also easy to finance and sell, said Marc Boorstein, principal with MJ Partners.

Boorstein said Elmhurst Self Storage on Kingery Highway 83 near Oakbrook Center easily found construction financing, even though it did not have a single tenant.

The asking price for the state-of-the-art storage building, with 83,000 square feet of rentable space, is $10.5 million.

"We are already getting offers," Boorstein said.

rmanor@tribune.com

www.chicagotribune.com/health/ct-met-dirty-diesel-20101105,0,7261777.story

chicagotribune.com

Metra riders subjected to high amounts of diesel soot

Tribune testing found the air trapped inside the stainless-steel cars contains levels of diesel soot up to 72 times higher than on the streets outside

By Michael Hawthorne, Tribune reporter
8:56 PM CDT, November 5, 2010
Lead story, page 1, Sunday, November 7, 2010

Day after day, thousands of commuters are breathing high levels of toxic diesel pollution trapped in Chicago's two major rail stations and even inside the trains they ride, a Tribune investigation has found.

Testing by the newspaper found the amount of diesel soot lingering in the air steadily increases as commuters walk deeper into Union Station or the Ogilvie Transportation Center. Levels of the lung- and heart-damaging pollution jump higher on platforms, where acrid blue clouds of diesel exhaust hover between trains, many of them built in the 1970s.

It gets dramatically worse, not better, after boarding a train. As the doors close and the locomotive pulls out of the station, Tribune testing found, the air trapped inside the stainless-steel cars contains levels of diesel soot up to 72 times higher than on the streets outside.

Pollution levels remain high during most of the trips away from the city, the Tribune found. Exposure drops sharply only after getting off the train.

The testing sheds new light on the amount of pollution many people breathe as part of their daily routine. The U.S. Environmental Protection Agency considers diesel exhaust one of the most dangerous types of air pollution. Studies have linked exposure to a variety of health problems, including cancer, heart attacks, respiratory diseases, diabetes and brain damage.

Yet federal and state officials acknowledge they are woefully behind in assessing how breathing highly polluted air for short periods of time every day might affect a person's health.

Air quality on Chicago's commuter lines also isn't expected to improve significantly any time soon. Rather than replacing its disco-era locomotives with newer, cleaner models, Metra is refurbishing a third of its aging fleet to keep them chugging for at least another two decades.

Lack of ventilation at Union Station and the Ogilvie Center also remains a problem, keeping soot and toxic gases concentrated inside stations used by more than 245,000 people every weekday.

"It's horrible sometimes, especially at rush hour when all of those idling trains are backed into the station," said Kurt Kreis, a technology specialist at a Loop investment bank who has been riding Metra to and from southwest suburban Orland Park for more than a decade.

Metra officials told the Tribune they are doing their best on a limited budget. Locomotives push train cars into the station so the engines stay closer to the outside air, they said, and technology soon will allow some locomotives to shut down engines automatically after a certain period to reduce idling and save fuel.

"I'd like to do more, but we just can't with the money we have now," said Richard Soukup, Metra's chief mechanical officer.

Reacting to the Tribune's findings, the agency scheduled a meeting Tuesday with federal, state and local officials.

"It is my intention to fully investigate this matter, and assure you that Metra will remain proactive in this area," William Tupper, the agency's acting executive director, wrote in an invitation to the meeting.

Prized for their power, durability and fuel efficiency, diesel engines power not only locomotives but also long-haul trucks, school buses and construction equipment. Researchers estimate that more than half of people's daily exposure to diesel pollution comes during their commute, even though on average it accounts for just 6 percent of their day.

To take a snapshot of the diesel pollution Chicago-area commuters breathe every day, the Tribune rented a handheld device that measures black carbon, or soot, a key ingredient in diesel exhaust.

The testing device, manufactured by Magee Scientific, of Berkeley, Calif., is similar to ones used by researchers in peer-reviewed studies that pinpointed pollution hot spots near highways, rail yards, shipping ports and quarries.

During walks, drives and train rides, the Tribune found spikes of the pollution that far exceeded normal levels in Chicago and other U.S. cities.

For example, on one afternoon the amount of soot measured on Union Station's south platform was 21 micrograms per cubic meter of air, a tenfold increase from the street. After the doors closed on a train bound for Downers Grove, the figure jumped to 39, and then, shortly before the end of the 23-minute trip, to 72 micrograms per cubic meter.

By contrast, normal levels of diesel soot in Los Angeles, which has long suffered some of the nation's worst air pollution problems, are 1 to 2 micrograms.

Off the train in Downers Grove, the device registered soot levels of less than 2 micrograms per cubic meter. Other than a short burst when an eastbound train pulled into the station, levels stayed low during most of the return trip downtown.

Soot levels varied from trip to trip but always jumped dramatically as outbound trains left the city's crowded stations. Levels spiked as high as 50 micrograms per cubic meter on a train from Union Station to Schaumburg, 46 from Ogilvie to Arlington Heights and 21 from the LaSalle Street Station to Tinley Park. (Levels on the CTA's electric trains were consistently low.)

Pollution from diesel engines is a complex mix of toxic substances such as benzene, arsenic and formaldehyde, many of which can cause cancer. It also is filled with fine particles, commonly called soot, so small that thousands could fit on the period at the end of this sentence.

Studies increasingly are raising alarms about soot, which can lodge deeply in the lungs and penetrate the bloodstream. Breathing even small amounts can inflame the lungs and trigger asthma attacks, researchers have found. Several studies have linked soot exposure with heart attacks and premature death.

California officials estimate diesel exhaust is responsible for about 70 percent of the cancer risk people in that state face from breathing toxic air.

The effects of short-term exposure are still being studied, though scientists at Columbia University recently linked bursts of diesel soot with respiratory ailments suffered by New York City high school students.

"If you can see what you're breathing, it's especially bad for you," said Scott Fruin, an environmental health researcher at the University of Southern California who has studied air pollution during commuting and reviewed the Tribune's findings. "Even when you can't see it, these particles are getting into our bodies and causing damage."

The closest thing the EPA has to a standard for diesel exhaust is 5 micrograms per cubic meter of air, which the agency defines as a level of average daily exposure that could trigger health problems later in life.

Yet EPA officials acknowledged the agency has done little to track whether people are breathing levels of diesel pollution that exceed the safety limit. Agency scientists also said they need to better understand the potential health effects of brief-but-intense exposures.

Rather than trying to enforce the safety limit for diesel exhaust, government officials set separate legal standards for overall air pollution across entire counties. Federal and state regulations require cleaner factories, power plants, engines and fuels to help meet the air quality standards.

Chicago and its suburbs are chronic violators of those broader pollution standards. The region fails to meet federal soot limits, and Chicago also is the nation's only major metropolitan area that doesn't meet tough new standards for smog-forming nitrogen oxide, an ingredient in diesel exhaust.

Industry representatives and government regulators promise that cleaner diesel engines and fuels are on the way. But loopholes in federal rules will allow some of the oldest, dirtiest sources to keep churning out pollution for years to come, making it more difficult for Chicago and dozens of other urban areas to clean up the air.

For instance, though manufacturers must start building dramatically cleaner locomotives starting in 2015, rules adopted under President George W. Bush are far less stringent for older trains. Since diesel engines can remain on the rails and roads for decades, it will take years for people to see the full benefits of rules unveiled in 2008.

Millions of older, dirtier trucks, buses and construction equipment also will be permitted to keep operating without filters that can screen out most of the noxious exhaust.

Metra's plans to overhaul its oldest locomotives highlight what critics say are the regulatory shortcomings of the EPA's "clean diesel" initiatives, which agency officials hail as one of the most significant bids to improve air quality since the government ordered lead out of gasoline during the 1980s.

The rail service is spending federal stimulus money and state bond funds to overhaul 52 of its 1970s-era engines. Its rebuilt locomotives will be slightly cleaner, but new trains built to the latest EPA standards would emit 90 percent less soot and nitrogen oxide than Metra's refurbished fleet.

Citing stagnant federal and state support and political pressure to avoid higher fares, Metra officials said that a new locomotive costs about $4 million, more than twice the amount it costs to rebuild an old one.

"Why would you ever buy a new one?" John Partelow, a Metra director from Naperville, said during a September board discussion about the locomotive project.

Top officials at the rail service say their trains, like other forms of mass transit, help the environment in other ways. Metra trains reduce tailpipe pollution by keeping more than 62,000 cars off the roads every day, the agency estimates.

There have been some successful efforts between government and industry to reduce diesel pollution by cleaning up the dirtiest equipment, buying cleaner models and persuading drivers to limit idling. The EPA estimates it has spent $60 million during the past five years to clean up diesel engines in trucks, trains and other vehicles in the Midwest.

"These efforts not only cut emissions but save fuel," said Susan Hedman, the Obama administration's top EPA official in the region.

But such programs largely are voluntary. For every fleet of dirty buses and trucks that is cleaned up, scores of others remain on the roads with few, if any, pollution controls.

"This is an area where the government really can make a difference," said Brian Urbaszewski, director of environmental health for the Respiratory Health Association of Metropolitan Chicago, which helped persuade the Chicago Transit Authority to rely on cleaner diesel fuel for its bus fleet well before it was required nationwide.

"Cleaner technology is out there, even for trains," Urbaszewski said. "We just need the money and political will to get it in all of the old trains and trucks and bulldozers and tractors still operating. Without it, people will continue to breathe this dangerous pollution."

In the case of another notoriously sooty transit system, it took a federal lawsuit to prompt action. In August, two Boston-area agencies agreed to spend more than $2 million to settle a complaint from the EPA and the Justice Department about high levels of diesel pollution and excessive idling by the region's commuter trains.

The agencies will install equipment to limit idling, switch to the cleanest diesel fuel before it's required elsewhere and install cleaner engines on some of the dirtiest locomotives. One of the agencies also is spending federal stimulus money to overhaul the ventilation system at Boston's Back Bay station, where the air is thick with diesel exhaust trapped on the platforms.

As at Back Bay, the cramped tunnels of historic Union Station just make the problem worse.

"It's been a huge problem for years," said Doug Davidson, a retired Metra engineer who is a national official for the Brotherhood of Locomotive Engineers and Trainmen union. "Since soot builds up in the engine as it idles, you get these thick, black clouds blowing out of the locomotives when they power up to leave."

Union Station is owned by Amtrak, which shares the tracks with Metra. In response to questions, Amtrak provided a report on air-quality testing it conducted on the platforms during two days in July. The tests showed sharp spikes of diesel pollution between 4 and 6 p.m., when multiple trains are backed into the station.

But Metra and Amtrak officials said they have little control over ventilation systems designed to suck diesel exhaust out of Union Station's train tunnels. The giant vents and fans are supposed to be maintained by the owners of eight skyscrapers that rise above the tracks.

One of those buildings is 2 North Riverside, the old Chicago Daily News building owned by Sam Zell. Zell is chairman of Tribune Co., which owns the Chicago Tribune. David Contis, president of real estate for Zell's Equity Group Investments, said a fan at the bottom of the building's ventilation shaft was replaced earlier this year.

In addition to spending money to keep its oldest trains running, Metra is refurbishing its aging train cars, some of which date to the 1950s. Floors will be stripped, windows replaced and seats reupholstered.

One thing will stay the same: the old ventilation systems that help trap sooty air inside the cars.

mhawthorne@tribune.com

Chicago's Union Station: A Monument to Rail Travel

Union Station's massive train sheds nearly a century ago, as depicted in an early 20th Century postcard.

By Scott Bogren

"Make no small plans."
– Daniel Burnham

Chicago comes by its reputation as the nation's rail capital quite naturally. At the turn of the last century, the city hosted no fewer than seven major passenger rail terminals and more than 20 separate railroads had significant operations within the city. Of those seven stations, one remains the city's passenger rail capitol today: Chicago Union Station.

Designed by famed architect Daniel Burnham, Chicago Union Station was completed in 1925 as a dual structure train station — a concourse (which was demolished in 1969 to clear room for the air rights and office buildings) and the familiar passenger waiting area and grand hall made famous in films such as *The Untouchables*, *My Best Friend's Wedding*, and *Flags of Our Fathers*. But Chicago's monument to passenger rail has not yet been relegated to history. Last year, upwards of 100,000 daily passengers on the city's Metra commuter rail and Amtrak passed through Union Station's venerable halls, surpassing that of its supposed World War II heyday.

What stands today of Union Station has come, in many ways, to represent rail in Chicago. The building guards its greatness well, belying the magnificence of what's inside. Tucked in among the cavernous buildings that comprise Chicago's central business district — known locally as *The Loop* — Union Station has stood silent witness to the Windy City's rail pre-eminence, the slow dismantling of much of its infrastructure, and its current re-invigoration.

The modern incarnation of Chicago Union Station is not the first. The city's first Union Station, which pre-dates the current one by nearly 50 years, was conceived by a group of railroads that signed an agreement to build a joint station on land owned by the Pennsylvania Railroad's Pittsburgh, Fort Wayne and Chicago Railway between Van Buren and Madison Streets on the west side of the Chicago River. In addition to the Pennsylvania, the Burlington and Quincy Railroad, the Chicago and Alton Railroad and the Chicago, Milwaukee and St. Paul Railway agreed to use the new Union Station. But as was often the case during this early era, passenger rail demand soon outstripped the station's capacity.

Plans for a second, more modern and robust Union Station began well before ground was first turned in 1913 — again along the west side of the Chicago River, though this time between Adams and Jackson Streets. Burnham, whose famed works include Washington, D.C.'s Union Station and the Flatiron Building in New York City, took the design lead on the project yet never got to see his design take form. He died a year before construction began.

With Burnham's untimely passing, the job of seeing the project through fell to the architecture firm of Graham, Anderson, Probst and White. At more than nine city blocks, the mammoth project ended up taking more than a decade to complete. Strikes, labor shortages due to World War I and economic conditions led to these delays, but the end product was no less spectacular. On May 16, 1925, Chicago's Union Station opened, and with it came an entirely new approach to passenger rail station design with innovations that impact rail travel still today.

Chicago's Union Station is a signature structure in what is now known as the *American Renaissance* period of architecture – during which the concepts of nationalism, modernity and technology were fused together in a heretofore unique meeting of art and function. Among the neoclassical Union Station's most innovative features were its internal U-shaped driveways that allowed for the loading and unloading of passengers to avoid further entangling the city's streets. What emerged on the west side of the Chicago River was a full-service rail terminal foreshadowing a broader notion of today's intermodalism.

Author Janet Greenstein Potter, in her book, *Great American Railroad Stations*, notes about Chicago Union Station: "It was a micro-city filled with stores, restaurants, a nursery, a hospital and even a basement jail."

Union Station's Great Hall is one of the nation's most memorable and historic public spaces – and is

Photo courtesy Schenectady Museum

Photo courtesy Metra

Chicago's Union Station through the years. Top, the original Union Station pictured in a turn-of-the-century postcard; middle, the twin structures of the current Union Station soon after they were finished in 1925, the concourse in the foreground of the photo was demolished in 1969; bottom, Union Station today.

Photo courtesy Melanie Colburn

demolished for its air rights — two office buildings now occupy its place in the city. The temple-like structure sat on land that simply became too valuable as passenger railroad service ebbed in the 1960s. Today, the train concourse is connected to Union Station's great hall through a large tunnel with trains running parallel to the Chicago River.

A unique aspect of the station is that even in a city rich with local rail service like Chicago, Union Station has no direct connection with either subway or the city's famed El trains. Plans have been proposed for an entirely underground Circle Line — or outer loop — around the current downtown area that would call at Union Station. Proponents argue that it would help transfer Metra and Amtrak riders more seamlessly to their final destinations. That said, the city's downtown core is so dense that currently Metra riders can walk to most of their destinations upon disembarking from their trains.

The 1992 rehabilitation of Chicago Union Station was launched by the Chicago Union Station Company, which had been originally

Union Station's majestic Great Hall has been the backdrop for several films and exemplifies the American Renaissance period of architecture.

today's the building's undisputed signature. With its Indiana limestone façade, vaulted skylight, Tennessee marble floors, brass lamps, Corinthian columns and sturdy wooden benches, the Great Hall welcomes visitors to Chicago with proper grandeur and purpose. The Headhouse enjoyed a similar design to New York City's Pennsylvania Station — which is not all that surprising given the Pennsylvania Railroads central role in crafting Chicago Union Station. The structure housing the Great Hall remains today, having been updated and renovated in 1992. But the other of the two structures that made up Union Station met a different fate.

In 1969, the concourse was

Photo courtesy Alexander Craghead/route99west.com

Illustration by Don Jacot

Thousands of Metra commuter rail passengers pass through Chicago's Union Station everyday. Below, photo artist Mike Karlick simulates the spectrum of passenger rail equiment that works out of Union Station.

incorporated in 1913 to oversee replacement of the first Chicago Union Station. Now owned by Amtrak, the Corporation oversaw waiting room and restaurant façade updates and all-new retail areas for both commuter and long-distance train passengers.

Today, Union Station is home to many of Amtrak's most famous trains, including the California Zephyr,

Chicago's Union Station is more than a symbol of the city's stature as the American rail capitol, it is today an apt symbol of rail's future, with millions of people passing through its halls every year and a new-found intermodal future.

Photo courtesy Mike Karlick

Metra

On the Bi-Level

Published by Metra's Media Relations Department. Send letters, questions or feedback to On the Bi-Level, Metra, 547 W. Jackson, Chicago IL, 60661-5717. **Or e-mail onthebilevel@metrarr.com.**

We can't guarantee all letters will be printed or answered. Please keep letters to less than 200 words and include your first name, hometown and what line you ride. (Names are not required but strongly encouraged.) We reserve the right to edit letter for length and grammar.

SOUNDING BOARD

Got a question? We've got an answer

Clean the windows

In the past Metra has washed their train cars at least twice a week. I have noticed the cars that go out of the south side of Union Station are filthy. The windows and sides are covered in dirt and grime. People are starting to write messages in the dirty windows. Last time I saw cars being washed was last fall. Is this part of a cost-saving measure by Metra?

Richard

We're sorry about the conditions of those windows. We had to replace the car washer in the BNSF yard, and the new one is now being installed. It should be ready soon. We ask for your continued patience and understanding.

Clean the cars

I am riding on car 7810 on the UP Northwest line heading into Chicago. It is the car next to the engine. I have been a daily Metra passenger for more than 10 years and have never known Metra to put a car into service in this condition. There is dirt all over the seats. I mean visible granules of what looks like soil and grit. This looks like one of the old cars that was recently "rehabbed," but someone missed cleaning this one before putting it into service. The passengers are cleaning off the seats before sitting on them. I wanted Metra to know because I believe that it generally makes an effort to keep the cars clean. There must be a gap in inspections or cleaning.

Terry

Please accept our apologies for the condition of that car and our thanks for bringing it to our attention. You are correct that this is one of the rehabbed cars. What we think happened is that some of the material that was used to sandblast the old paint and corrosion ended up in the HVAC system. It was unnoticed until the car went into service, and when the system was turned on the fans blew the material into the car. We've had UP clean the car and we've asked them to keep a close eye on things until there is no more evidence of the material being present.

Platform congestion

So today I was lucky enough to be on BNSF No. 1220 for yet another round of "switch problems" and got downtown late. As I'm with the herd heading into the station, I look to my left and see the entire south concourse is full of empty tracks. Then I hear a horn behind us and I see that, ONCE AGAIN, the dispatcher decided he or she just had to bring the next train in on the tracks sharing the plaform with the one already full of people. When I finally got to the front of the line I looked to my right and saw that the right half of the south concourse was also empty. So with an entire train station full of empty tracks, what possessed the dispatcher to bring the train in on a set of tracks that already had a full platform?

Greg

We're sorry about what happened. But track assignments aren't as easy as they may appear, particularly when trains are late, because the longer trains can only use certain platforms. Train 1220 arrived on Track 12 with a 9-car set. The next train to arrive CUS after 1220 was train 1226. Train 1226 normally becomes Train 1225, departing on Track 12. We did not want to make a platform change on 1225 because people were already cueing up for it, and therefore we put 1226 on Track 10 to expedite the flip and minimize confusion. 1220 did not have anywhere else to go, because a 9-car set would not fit on Track 4 or 6, Track 8 was occupied with 1223, and Track 2 was saved for 1228, an 11-car set.

You think you're old?

Steve thinks he's an old-timer on Metra. According to his criteria, I'd be long overdue for the silver and gold medals, and approaching platinum. I wonder if Steve had even started grade school yet when I started my daily commute on what we now know as Metra Electric. Back in the mid-1970s we called it "the IC", and the cars we now call "old" still had that "new car" smell. Cars 1633 through 1666 were manufactured in the late 70s; I rode some of them on their maiden trips. Before they arrived, I'd occasionally get to ride some truly old cars – the green ones that were made in the 1920s. Steve's still a youngster in my book.

Clay

Without trying to settle this contest, we'd like to recongnize all our veteran riders. You've earned our thanks.

We still want you....

...to download a QR-reader app to your smartphone and then scan this image with your phone's camera. You'll be taken to our "My Metra" page, where you can sign up to receive alerts about service issues on your line. It's fast, easy and convenient.

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Metra will clear the air in its train cars

Railroad to install high-efficiency filters to reduce soot after Tribune investigation

By Michael Hawthorne, Tribune reporter

July 20, 2011

Metra appears to have found a way to dramatically clean up the air inside its stainless-steel cars, but spikes of lung- and heart-damaging diesel pollution will remain a lingering problem on the platforms at Chicago's major rail stations.

In response to a Tribune investigation, the rail service is switching to more efficient air filters that testing shows can reduce the average amount of diesel soot inside its cars by 75 percent during outbound trips. The new filters are among several equipment changes studied during the past six months to curb exposure to noxious smoke from Metra's fleet of dirty, disco-era locomotives.

The results are promising enough that Metra plans to spend $200,000 a year — less than two-hundredths of 1 percent of its $1.04 billion budget — to equip all of its cars with high-efficiency filters that screen out diesel pollution. The filters will be installed in every car within 90 days.

"We care about our customers, and we're showing by our actions that we take seriously the concerns you brought to our attention," Alex Clifford, Metra's executive director, said in an interview.

Researchers estimate that more than half of people's daily exposure to diesel pollution comes during their commute. More than 245,000 commuters move through Chicago's three downtown stations every weekday.

Tiny soot particles, so small that thousands could fit on the period at the end of this sentence, can lodge deeply in the lungs and penetrate the bloodstream. Breathing in even small amounts can inflame the lungs and trigger asthma attacks; chronic exposure can cause cancer, heart attacks, brain damage and premature death.

Metra employee unions have raised concerns about diesel pollution for decades. But until now little was done in response.

"We've got complaints about the trains at Union Station going back to the early 1970s," said Paul Piekarski, a statewide official with the Brotherhood of Locomotive Engineers and Trainmen union. "It's time to fix this problem once and for all."

During the latest round of testing, Metra consultants determined that more efficient filters, classified as MERV 13 by an industry rating system, were the only fix that substantially reduced the amount of diesel soot breathed in by commuters. Metra also tested hoods over air intakes, shields that deflected exhaust to the sides of the engine and equipment that automatically shut down ventilation systems during stops.

Without the filters, soot levels averaged about 67 micrograms per cubic meter in the first car behind the locomotive, according to a Metra slide presentation. The average amount of pollution dropped to about 16 micrograms per cubic meter once the more efficient filters were in place.

The filters also smoothed out spikes of diesel pollution to about 24 micrograms per cubic meter, down from 92.

By contrast, typical soot levels in urban areas like Chicago range between 1 and 2 micrograms per cubic meter.

"Even if we bought a brand-new locomotive, it might not solve the problem without these more-efficient filters," Clifford said.

Metra is excited about the filters but acknowledged that they won't help reduce exposure for people waiting for trains downtown.

Metra's testing confirmed that high soot levels at Union Station, the Ogilvie Transportation Center and LaSalle Street Station lead to higher amounts inside passenger cars during trips away from the city. The problem is especially noticeable at Union Station, where trains are cramped inside tunnels below eight skyscrapers.

Under agreements with Amtrak, the national passenger rail service that owns Union Station, building owners are required to maintain ventilation ducts and fans that suck diesel exhaust out of the tunnels. But Amtrak and Metra officials said that at the Old Post Office, just south of the station, the fans frequently break down or fail to operate.

The shuttered building was purchased in 2009 by Bill Davies, a British developer. In an email response to questions, an engineering firm hired by Davies' International Property Developers said the ventilation system is checked regularly, and blamed the problem on idling trains and other property owners.

"The intention is that IPD and Union Station will work together to ensure an increasingly safe environment as the development progresses," the email concluded.

In a letter Tuesday to Joseph Boardman, Amtrak's president and chief executive officer, Sen. Dick Durbin called for a more aggressive response to the ventilation problems. "Stations without proper ventilation, filtration and air flow can keep toxic gases trapped inside stations used by thousands of people each day," Durbin wrote.

During a May inspection, Amtrak discovered that two of the Old Post Office's eight fans weren't operating. Another inspection has been scheduled for early next month, said Marc Magliari, an Amtrak spokesman.

As part of its air quality testing during the past six months, Metra used the same handheld device rented by the Tribune to measure black carbon, or soot, a key ingredient in diesel exhaust. Manufactured by Magee Scientific, of Berkeley, Calif., the equipment is similar to devices used in peer-reviewed studies.

Metra's testing showed the worst pollution problems are on trains leaving the south platform at Union Station. The testing also shows that exposure to the dirtiest air depends on where commuters sit. Soot levels generally are highest inside the first car behind the locomotive, drop in the second car and decline substantially in the last car.

Compared with inbound trains, levels are significantly higher during outbound trips, largely because diesel pollution from idling locomotives collects inside the open passenger cars before departure. Diesel exhaust also is sucked into the cars as locomotives pull outbound trains toward the suburbs.

Metra says it doesn't have enough money to replace its aging locomotives with cleaner models. Instead, it is refurbishing a third of its fleet to keep the 1970s-era engines running for at least another quarter-century without pollution controls found on newer models.

But in response to concerns raised by the Tribune investigation, the rail service already has switched to cleaner diesel fuel that has reduced soot emissions by about 8 percent. Metra also is seeking federal funding to install technology that automatically shuts down the engines if they idle for longer than 10 minutes, another change that can reduce the amount of acrid blue smoke hovering inside the downtown stations.

Commuters frequently complain about diesel exhaust. One emailed a video to the Tribune this week that shows a burst of locomotive pollution enveloping commuters as they walk past a train revving up to leave Union Station.

"I try to hold my breath for as long as I can," said Laura Zeitler, a consultant who commutes between Naperville and Union Station. "If you wait too long on the platform, you feel like you are choking on all of that nasty pollution."

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New master plan emerges to transform Union Station

Commuters wait for an arriving Metra train at Union Station during the evening rush hour in Chicago on Friday, Dec. 9. (Chris Sweda, Chicago Tribune / December 9, 2011)

Jon Hilkevitch's Getting Around

December 12, 2011

Extravagant proposals to transform Union Station in Chicago from a 1920s passenger depot into a modern transportation center have come and gone like passing trains.

As the result of a lot of plans and little action over the years, Union Station, last remodeled in 1992, has become increasingly crowded and uncomfortable. Moves like the one announced last week by Sara Lee Corp. to soon relocate business offices to 400 S. Jefferson Street will undoubtedly attract more commuters who live in the suburbs to Union Station.

If the station, which was designed primarily to serve long-distance trains, continues to be virtually left untouched, it will be unable to accommodate planned growth in both Metra commuter rail service, Amtrak service and planned 110 mph rail service, officials said.

That's why this time around realistic improvements that can be made in a few years are a major focus of a new master plan study that will be presented to the public at Union Station, 210 S. Canal St., on Thursday during the evening rush period as commuters are going home.

The goals to create a more vibrant terminal that can be a catalyst for growth in the West Loop include:

•Expanding capacity to handle more trains and relieve congestion to make today's crowded concourses and mezzanines more inviting. Union Station handles more than 300 trains each weekday carrying more than 120,000 arriving and departing passengers.

Building an off-street CTA bus terminal on the existing surface parking lot south of Jackson Boulevard; and providing more convenient transfers to CTA trains as well as taxis and shuttles.

Launching an east-west bus rapid transit service from Union Station to Michigan Avenue and eventually Navy Pier.

Easing potentially dangerous conflicts with vehicles, pedestrians and bicyclists by reconfiguring how Canal Street is used.

Other projects that would follow include converting unused Amtrak baggage and mail-handling platforms to wider commuter platforms, adding direct access to and from the street level and building new tracks that for the first time would allow trains to pass through the station. (Trains currently approach from the north and south, but do not pass through.)

Yes, the master plan still contains a dreamier, long-term vision to build a new station in either the 200 or 300 blocks of South Canal and Riverside Plaza with a hotel, restaurants and other services, as well as multilevel subways under Clinton and Canal streets. Amtrak, which has owned Union Station since 1984, plans further improvements to both the concourses and the main building in future years.

But Chicago-area residents who have been around awhile have heard those unfulfilled promises before. Remember architect Helmut Jahn's proposal for a separate high-speed rail station east of the old post office? Or the original Daniel Burnham proposal for Union Station with an office tower? Union Station has seen more deconstruction, like the demolition of the original concourse building in 1968.

Amtrak did restore air conditioning to the Great Hall over the summer. It also plans to build more restrooms at track level and provide more seating throughout the concourses as part of a $40 million rehabilitation project paid with federal funds.

To finally get something major done, the whole idea is to steer away from the type of over-the-top, exorbitantly expensive proposals made in the past and instead focus on common-sense fixes that can be accomplished, officials said.

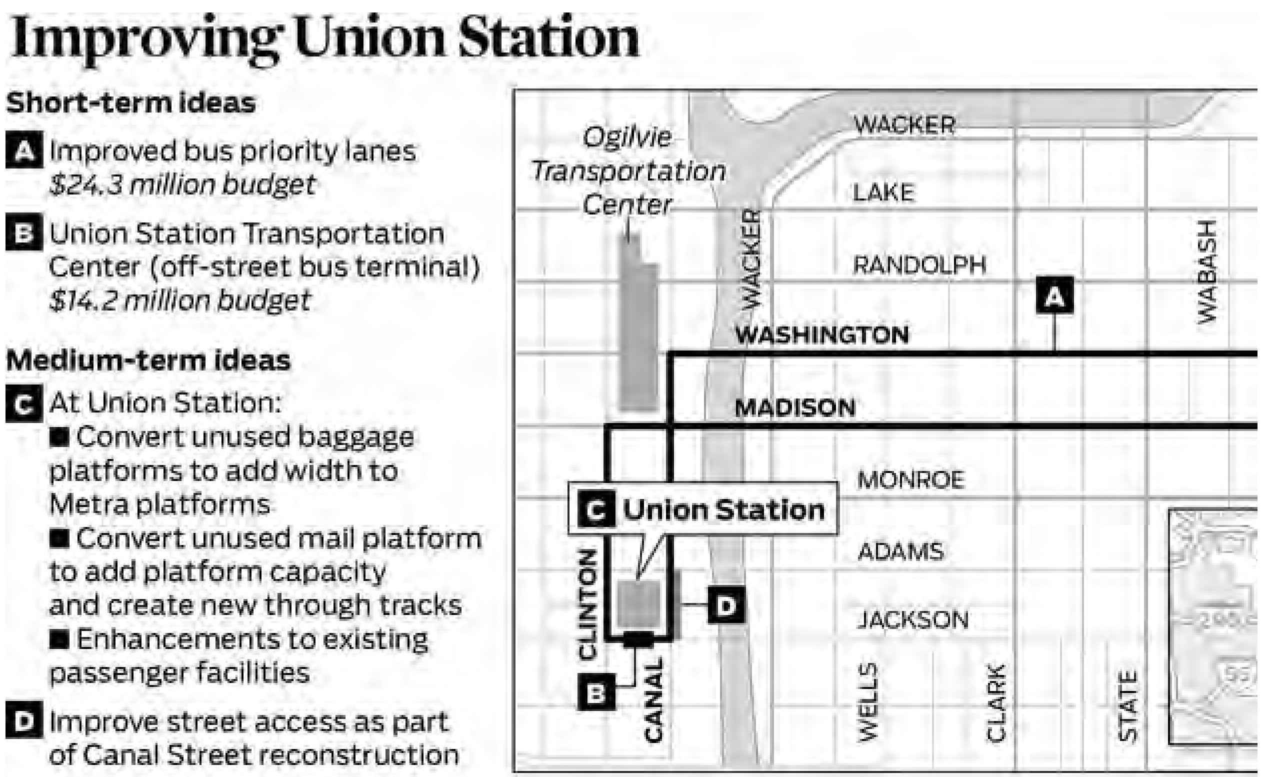
"There have been a lot of grandiose plans of what the vision could be for Union Station," said Jeffrey Sriver, project manager at the Chicago Department of Transportation for the Union Station master plan study. "Meanwhile, the station today is operating at or near capacity for key parts of the day.

"What nobody has done to this stage is to look at maximizing the physical assets we have now, then go to more grandiose plans in the future."

The public will get a chance to weigh in Thursday. CDOT and Amtrak will hold a public meeting from 4 to 7 p.m. in the Union Gallery, just off the Great Hall in Union Station. It will be an open-house format with experts and visuals explaining ideas under consideration. A narrated presentation will be made at 4:30 p.m. and again at 6 p.m.

"This is a chance for people to see the thinking that has gone into these issues" and offer feedback, Amtrak spokesman Marc Magliari said.

A final Master Plan report will be issued in early 2012, officials said.



SOURCE: Chicago Department of Transportation, Union Station Master Plan

Union Station is the third-busiest railroad terminal in the U.S. Its passenger traffic levels would rank it among the 10 busiest airports in the U.S. The number of trains serving Union Station is projected to grow 40 percent by 2040.

Separate from the master plan study, a new website produced by the Midwest High Speed Rail Association offers the group's vision for transforming Union Station. It says a revamped Union Station served by high-speed trains — eventually 220 mph bullet trains — could provide a strong alternative to air travel for many trips. The website isdowntownairport.com.

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suntimes

Metra board to look at plan for future of Union Station

BY TINA SFONDELES

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A vision for the future of Union Station — the third busiest railroad terminal in the country — includes handling the growing number of riders by running more trains on platforms previously used for mail.

The plan would also handle congestion — that throng of commuters seen packed like sardines in the station's concourse level — by converting some unused baggage platforms into wider passenger platforms and even creating access to the platforms from Canal Street.

Orchestrated by several agencies including the city's Department of Transportation and Amtrak, the Chicago Union Station Master Plan was first introduced to the public in December and will be presented to the Metra board on Friday.

No votes or decisions will be made, but board members simply wanted to know a little more about the study, Metra spokesman Michael Gillis said.

A top priority is dealing with massive growth, with a 40 percent increase in Metra and intercity ridership expected by 2040. The problem: Expansion will be difficult because Union Station is beneath a major high-rise office building.

The plan is broken into short-, medium- and long- term projects and hopes to evaluate the capacity of the concourse, the tracks serving train operations and the platforms.

One short-term idea has already received funding. The city's Central Area East-West Bus Rapid Transit project will give buses their own priority lanes, and priority at intersections on Canal, Clinton, Washington and Madison.

Also of note as a possible change for Union Station commuters — but not part of the study — is a proposal made last month that would allow riders to wait in the Great Hall when unforeseen delays occur.

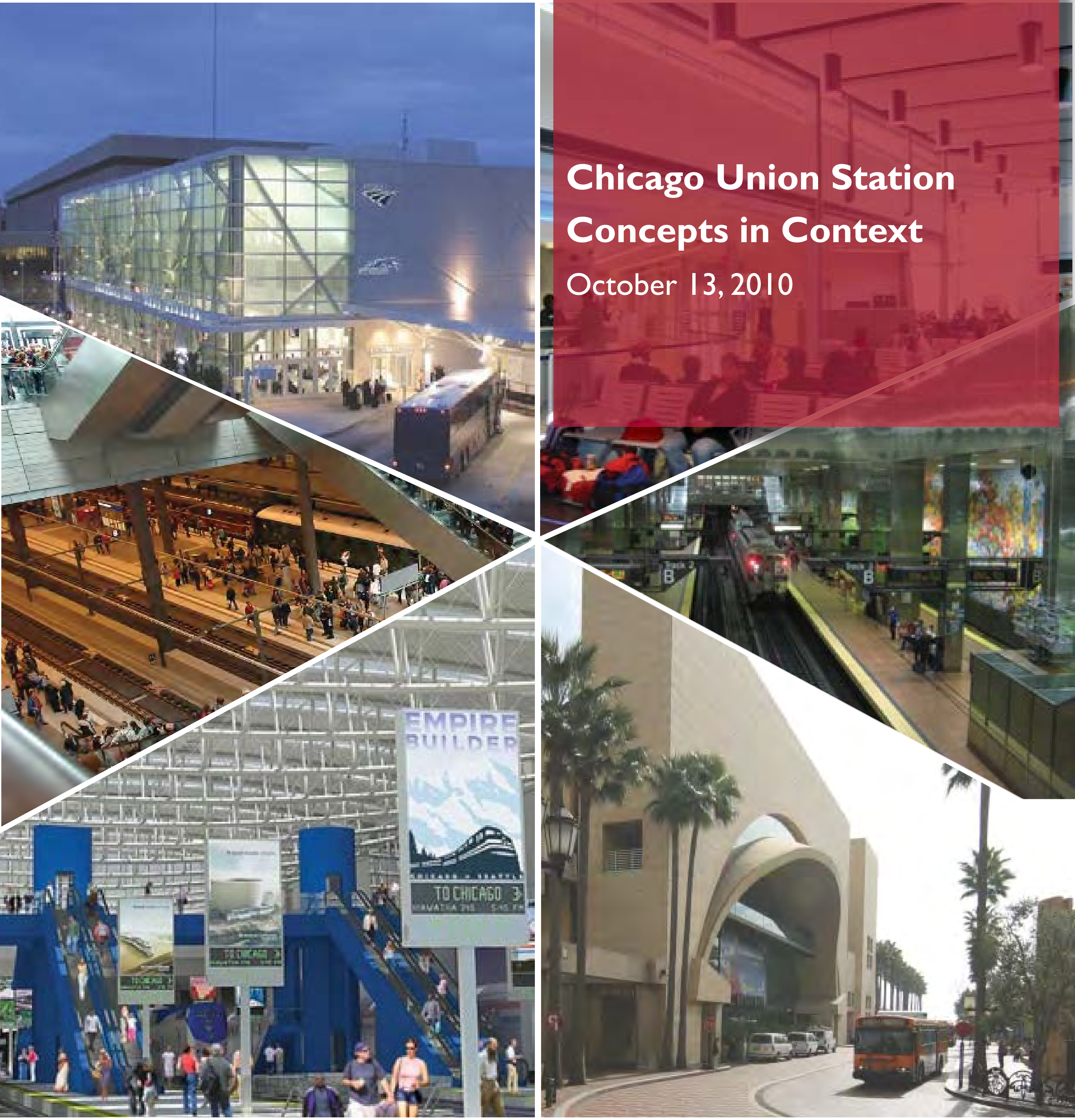
That comes after a Jan. 9 debacle — caused by a signaling problem — that left hundreds of commuters stranded.

Appendix H
Chicago Union Station
Concept in Context

This booklet was prepared early in the project to illustrate the wide variety of railroad passenger station projects that have been undertaken in recent years. Most are U.S. but selected overseas examples were also included.

Chicago Union Station Concepts in Context

October 13, 2010



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Introduction

This report has been prepared as part of the City of Chicago DOT's Chicago Union Station Master Plan project. There are a variety of capacity and quality of service issues that the study is intended to address. A range of solutions is being investigated but most are quite large in scale. This booklet is intended to provide local stakeholders with some background regarding railroad and multimodal station projects designed to increase station capacity and service quality around the Midwest, the U.S., and the world. It is likely that a project that will resolve the major issues that have been identified at Chicago Union Station will be quite large. However the alternatives that are developed should be viewed in relation to other major passenger rail projects. In this context it becomes apparent that investments of this scale have been, and continue to be made around the world in order to enhance the viability of the urban areas they serve.

This report provides highlights of information regarding a selection of projects that share characteristics with the possible solutions that will be considered as part of this study. Some major projects that could be considered peers are not considered, simply because they were constructed so long ago (i.e. Pennsylvania Station and Grand Central in New York and Washington Union Station). For that matter, construction of the present Chicago Union Station, including its approach tracks and supporting railyards, was a major undertaking that took many years between conception and completion. Each of the peer projects that are shown is unique. Two of the projects that are shown, Milwaukee and St. Louis, were chosen not because of their large scale, but because they illustrated that even here in the Midwest city governments have recently taken the lead in providing intercity rail stations. Two projects from the 1970s (San Francisco's Market Street subway and Philadelphia's Center City Connection) are included because they have key characteristics similarity to the proposed West Loop Transportation Center.

A key differentiator between projects, the factor that most affects cost, is the scope of changes to access tracks which is included in the project. In some cases no work (i.e. Milwaukee), or limited revision to the tracks used to access the station were required; the entire project consists of upgrades to the station structure itself. In other cases (i.e. St. Pancras, London) the construction of the access tracks were part of the cost of another project (the Channel Tunnel Rail Link). At the opposite extreme (i.e. the East Side Access Project in New York) the construction of deep, complex tunneling is included in the project cost.

Milwaukee Intermodal Station

The Milwaukee Intermodal Station reopened Nov. 26, 2007 after a $15.8 million renovation.

The station was one of the last large rail stations built in the U.S. prior to the creation of Amtrak. It is located three blocks from Wisconsin Avenue, a main artery in downtown Milwaukee. The station was built in 1965 by the Milwaukee Road as part of a relocation of its station to make room for expressway construction. The next year the Chicago and Northwestern (C&NW) moved in, vacating its separate station. The station has five tracks, accessible from three passenger platforms. Amtrak became a tenant after its creation in 1971. Train service to Chicago on the C&NW route via Kenosha and Chicago's North Shore suburbs was discontinued at that time. It is currently served by seven daily Hiawatha Service trains to Chicago, as well as the daily Chicago-Seattle/Portland Empire Builder. More than 500,000 Amtrak passengers per year use the facility. The condition of the station gradually declined over the years.

Completed Intermodal Station

The Wisconsin DOT purchased the station in 2003 for $1.4 million, announcing a plan for a renovation using a public/private partnership involving $2.6 million in state and federal funds and an $1.4 investment by Milwaukee Intermodal Partners, LLC which was assigned the task of managing the renovation and given a long term lease to operate the station. Thus the total cost of the project at this time was identified as $5.4 million.

Main Waiting Room

The City of Milwaukee subsequently expressed concerns regarding the limited scale of the proposed renovation. The City subsequently provided Tax Increment Financing (TIF) funding for enhancements to the project. As a result, increases were made in the scope of the project, including an expansion of the main waiting and the inclusion of a new nine berth facility for intercity buses. There is some retail space and food service, as well as some rental office space. Thus, the total cost of this phase of the project was identified as $16.9 millinon.

Additional improvements of the facility continue to be pursued. The DOT plans to updgrade the appearance of the trainshed to complement the renovated station and replace the ramps to/from the undertrack pedestrian walkway by an ADA compliant overhead walkway. This phase of the project is expected to cost $18 million, bringing the total to about $35 million. Phase 2 should be completed in 2012.

The station is expected to play a key role in the Midwest High Speed Rail network. Wisconsin DOT is hoping that a new high speed route to Madison will be constructed with stimulus funding. A study of restoration of commuter rail service on the former C&NW route has been completed and implementation efforts are now underway. In addition, the City of Milwaukee is working to implement a downtown circulation streetcar route, focused on the station.

Rendering showing planned rehabilitated trainshed and new overhead walkways

New station layout

Amtrak ticket window

St. Louis Gateway Transportation Center

After 30 years in temporary facilities, a new multimodal station opened in St. Louis in November, 2008.

St. Louis Union Station had opened in 1894. The building, listed in the National Register of Historic Places, features a clock tower 280 feet high and a barrel-vaulted waiting room with a 65 foot high ceiling. At its peak there were 42 active tracks. Amtrak moved out of Union Station in 1978 after it was sold to a developer for an adaptive reuse project consisting of a festival marketplace, restaurants, and a hotel.

For most of the interim period the station was replaced by a double-wide trailer. The City of St. Louis had the responsibility for constructing a new permanent station, which was planned as a multimodal facility, combining intercity bus, light rail, and city bus. The site, located on a side street adjacent to the main rail lines on the edge of downtown, under an interstate highway and its access ramps, was very constricted. The first design for a replacement station greatly exceeded the available budget. The situation remained in limbo for a number of years.

The new building is based on a completely different, scaled down design. The result is a modern, but modest, multimodal facility served by:

- Amtrak intercity trains (2 platforms/4 tracks)
- Intercity buses, primarily Greyhound (10 berths)
- Metrolink light rail east to downtown and Illinois, northwest to Lambert Airport, and west to Clayton and Shrewsbury
- City buses (6 berths/6 routes)

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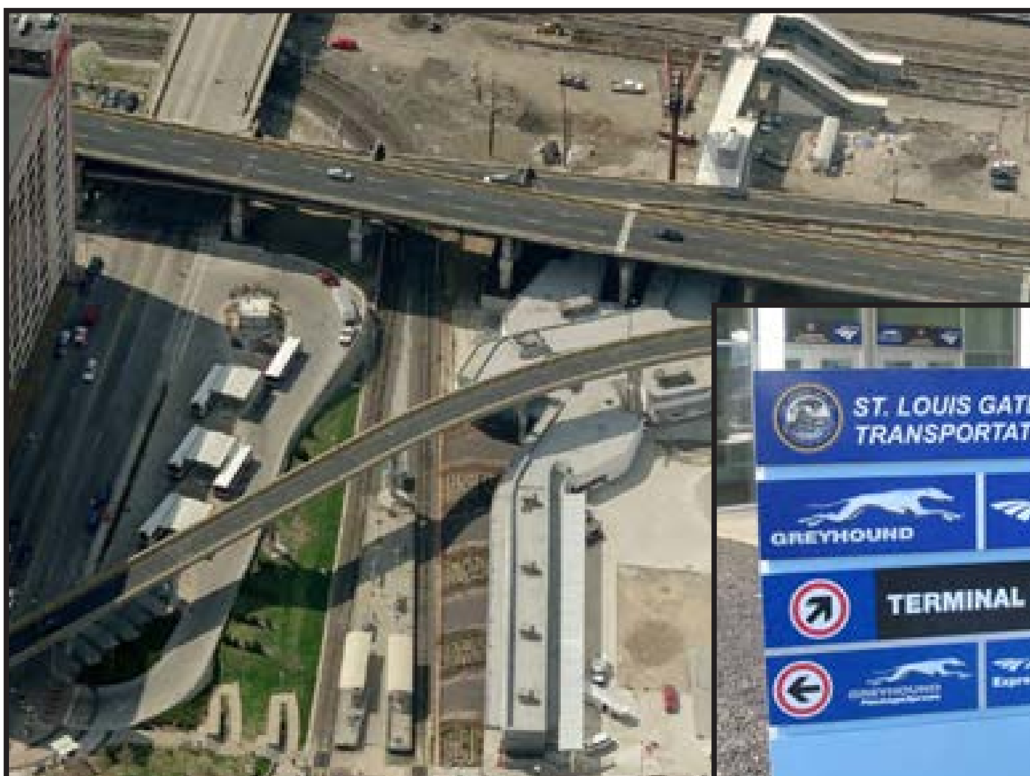


Aerial view of new station

Regional Projects - St. Louis Gateway Transportation Center

Total cost of the facility was $28.7 million, funded by a variety of federal (earmarks and FTA), state and local sources. This includes trackwork and construction of the adjacent Metro local bus terminal. Rail passengers have use of 70 seats in the main waiting room, plus a small first class lounge. Intercity bus passengers have an additional waiting area in the bus concourse. There is a food court with two fast food vendors located off the main waiting room.

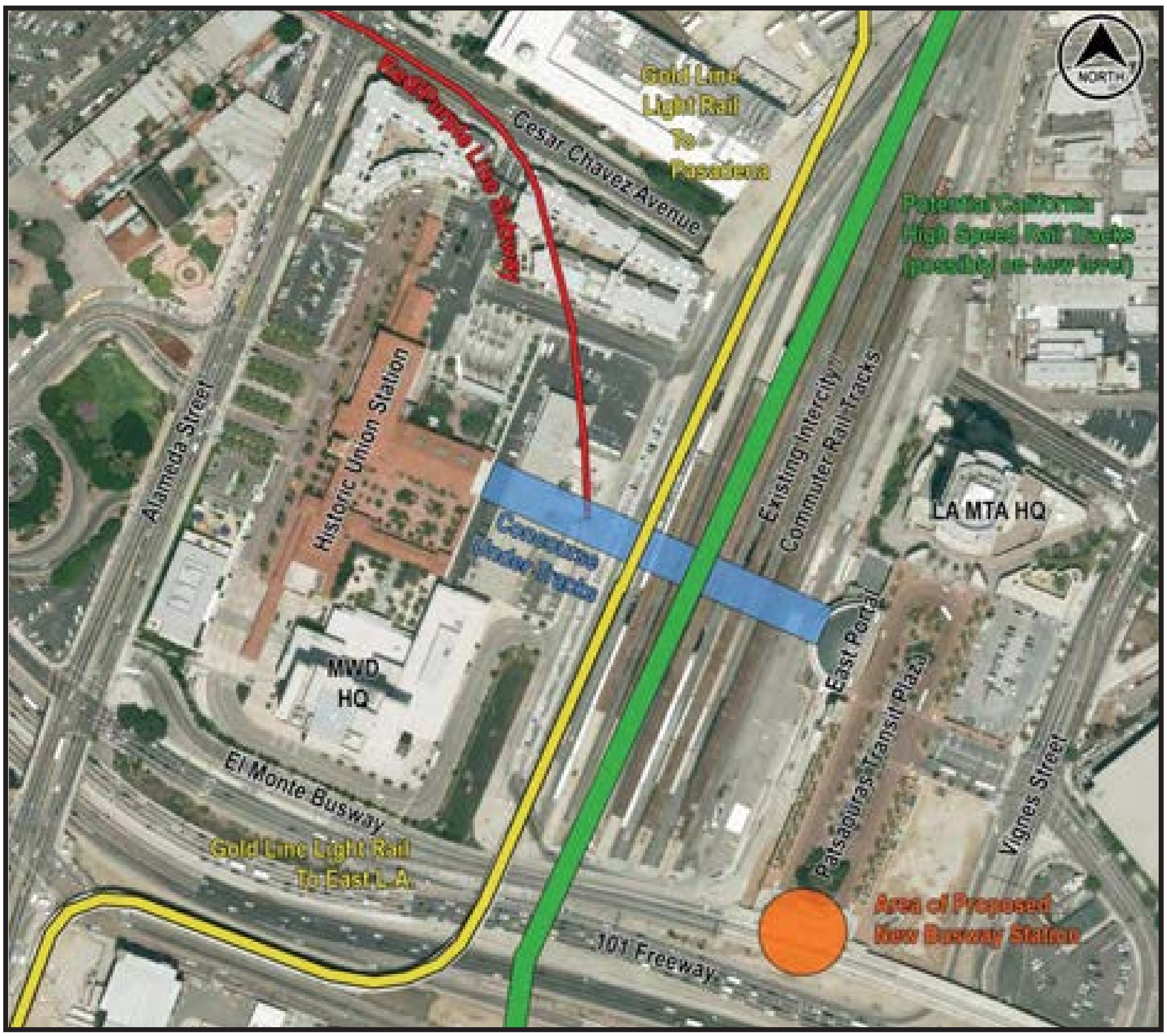
The Chicago-St. Louis route has been identified as one of the top priorities for high speed rail implementation of the Midwest Regional Rail Initiative using funding under the Stimulus program.

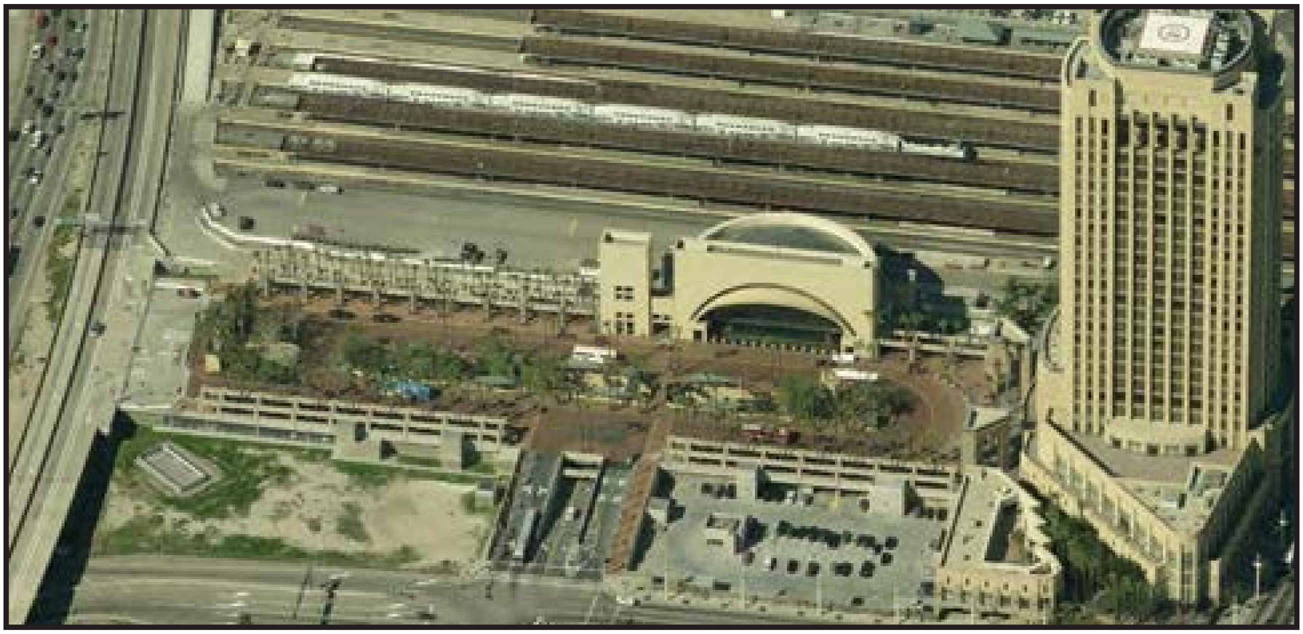
Intercity bus bays

Main waiting room

Los Angeles Union Station (LAUS)

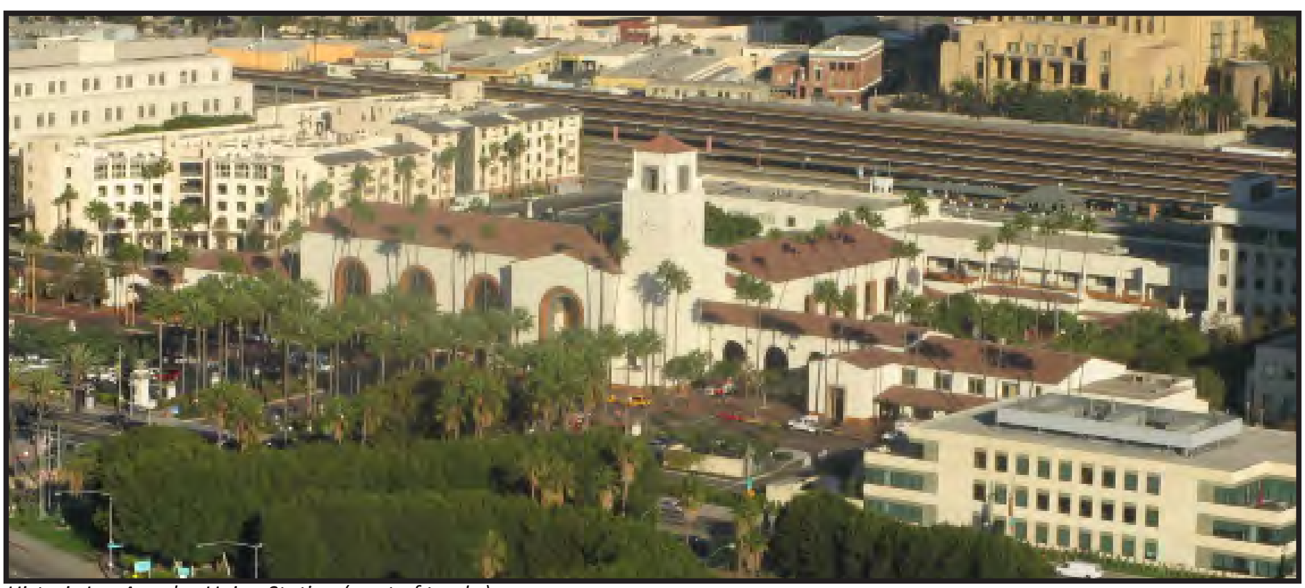
LAUS was built in 1939, at the end of the Great Depression and just before World War II, by two of the railroads that operated long distance trains to LA: the Santa Fe, and Southern Pacific. Some Pacific Electric interurban routes also terminated here and it was served by a number of city streetcar and bus routes. It is a stub end station. It was the last of the great Union Stations to open in the U.S. The design tastefully combines elements of Dutch Colonial Revival, Mission Revival, and Streamline Modern styles. Numerous movies and television programs have been filmed here.





L.A.M.T.A. headquarters (tower on right), East Portal, and Patsaouras Transit Plaza

Through the years usage declined and several tracks were removed. The decline bottomed out with the creation of Amtrak in 1971. Service to San Diego has since increased from two to 11 daily trains. The first commuter rail service in Los Angeles started in 1992. Ridership has boomed with 59 weekday departures on the six routes now operated. The Red Line subway route, which operates west through downtown and out Wilshire Boulevard, began service here in 1993. The Gold Line light rail route to Pasadena opened in 2003 and an extension to the Eastside of Los Angeles opened in 2009. This is the first rail service to operate out the south end of the station, with a bridge spanning the 101 Freeway. The station is also served by Bus Rapid Transit routes on the El Monte Busway as well as several "Metro Rapid" BRT routes.



Historic Los Angeles Union Station (west of tracks)

Gold Line light rail

Concourse under tracks

Red/Purple Line subway platform

The railroads sold 51 acre Union Station site to Catellus Development in 1990. The developer secured approval for 5.9 million square feet of new development on the site. Restoration of the landmark-designated Station was completed in 1992. A 26 story headquarters building for the L.A. MTA was built on the east side of the Station's tracks; at a cost of about $300M. This included the Patsaouras Transit Plaza, connected to the East Portal end of the concourse that provides access to the tracks. The Plaza consists of an open air bus plaza with numerous bus berths, most of which are assigned to longer distance express buses serving the City of Los Angeles and nearby municipalities. An important route, started by the Airport operator in 2006, is the FlyAway service, nonstop to LAX, utilizing carpool lanes most of the way. The route operates 24 hours per day, with service at least every 30 minutes all day and evening. Other buildings have been built on the site of some of the surface parking that originally surrounded the Station and Catellus continues to market remaining undeveloped areas.

Patsaouras Transit Plaza, with L. A. M.T.A headquarters tower

Union Station will be the Los Angeles station for the California High Speed Rail System, with routes north to San Francisco and Sacramento and south to San Diego and Alameda. To maximize capacity, and to provide the most direct service, the dedicated High Speed Rail tracks will be through tracks (rather than the stub end arrangement all tracks, except light rail, now use). A new station for the BRT routes, better integrated with Union Station, is under design.

Philadelphia Center City Commuter Tunnel

The Center City Commuter Connection, commonly referred to as "the commuter tunnel," is a passenger railroad tunnel built to connect Philadelphia's two separate regional commuter rail systems. These had previously been operated by two rival railroad companies: the Pennsylvania Railroad (PRR) and the Reading Railroad (RDG). It was built by the Southeastern Pennsylvania Transportation Authority (SEPTA) as part of its effort to unify the two systems. It was completed in 1984. Almost all of SEPTA's commuter rail lines are now through routed from what was originally a terminal on a PRR route to a terminal on a RDG route, passing through the four-track east-west commuter tunnel. One of the routes provides express service to the Philadelphia Airport. All trains serve two underground stations - Suburban Station and Market East Station, as well as the above-ground upper-level concourse at 30th Street Station, Philadelphia's main intercity passenger rail station. The intercity tracks are located below grade, in a north-south orientation, and are served by Amtrak's Northeastern Corridor

Market East was the only new station. It has 4 tracks/2 platforms.

Suburban Station, located at 16th Street and JFK Boulevard, was the stub end underground terminus of the commuter rail lines of the Pennsylvania Railroad (PRR). The Reading Company (RDG) ran trains on an elevated approach above city streets into the stub end Reading Terminal, located at 12th and Market Streets (one block west of where Market East Station, the only completely new station built as part of the project, is located).

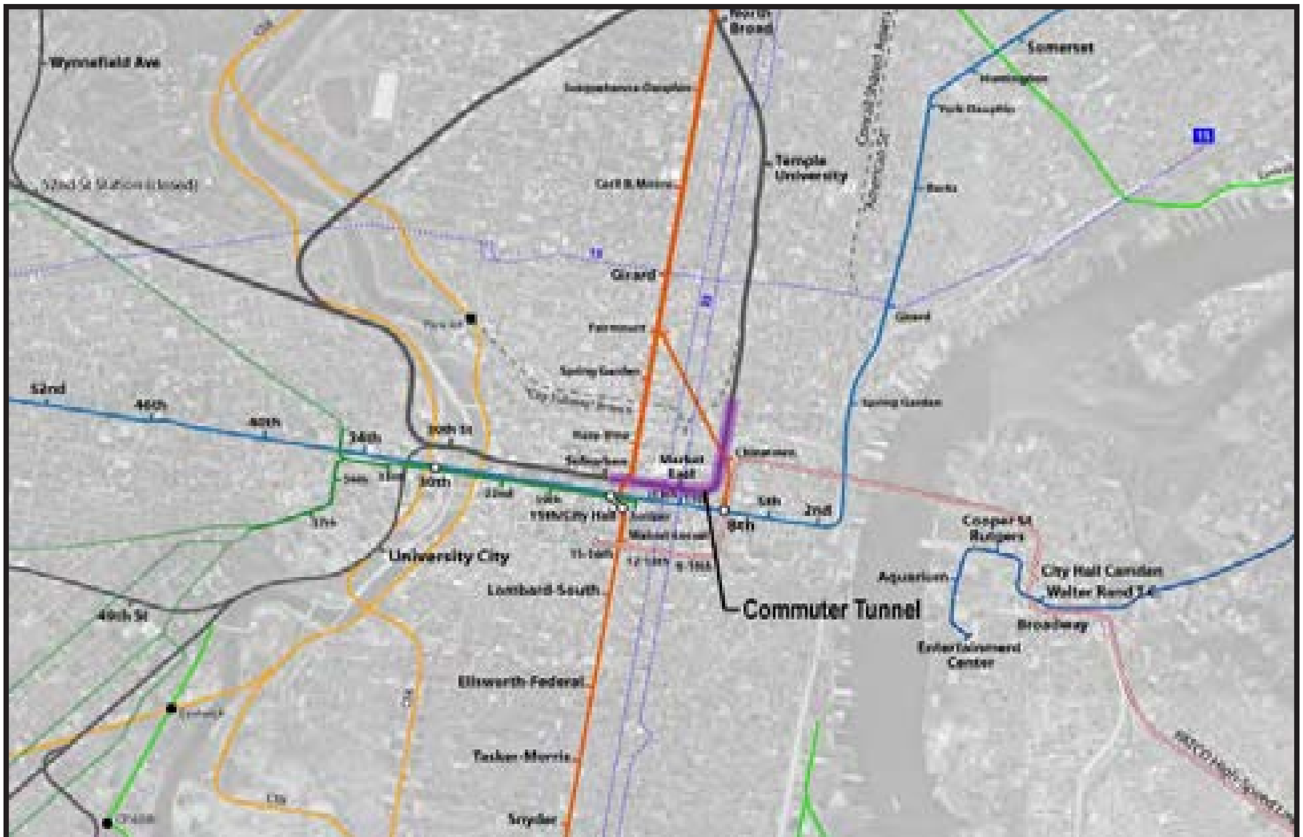
Pre-existing 30th Street Station upper level commuter train platform (one of two)

There already was a 0.8 mile subway from 16th Street to 20th Street, a portion of the trackage connecting Suburban Station with 30th Street Station to the west. The tunnel project extended four of Suburban Station's eight tracks 1.7 miles eastward. The tunnel addition turns slightly north as it passes under City Hall, one of the most massive buildings in the world, and then passes over the Broad Street Subway. The tracks run under Filbert Street, then curve to the north after 11th Street, pass under the Ridge Avenue Subway spur line, and run northward under 9th Street, ascending to join the RDG embankment near Spring Garden Street. All trains operating through the tunnel are electrically powered; most are operated with multiple unit (EMU) cars. Development of the tunnel was made easier by the fact that all PRR and RDG commuter lines were already electrified, using the same 11,000 volt AC power supply system. Maximum grades on the inclines coming out of the tunnel are 2.8%.

The concept for the project was made part of the city's Comprehensive Plan in 1960. Groundbreaking for the tunnel project was on June 22, 1978. It took six years to complete at a cost of $330 million. Federal funds paid for 80 percent of the project, state funds accounted for 16.66 percent of its cost, and city funds covered the remaining 3.33 percent. The connection formally opened for business on November 12, 1984. The old elevated approach to Reading Terminal was then abandoned. It is still mostly present, and is now known as the Reading Viaduct.

A 5 block long underground concourse connects the commuter rail tunnel stations with local subway and streetcar lines, both of which run in a parallel tunnel under Market Street, as well as the north-south Broad Street rapid transit subway, which also has a pedestrian concourse through the downtown area. The Market Street and Broad Street sections of the concourse all meet at the City Hall Concourse. Throughout the entire concourse are underground entrances to adjacent buildings, including the "Galleria" shopping center and the "MetroMarket," a group of small shops and eateries near Suburban Station.

SEPTA Regional network with center city tunnerl highlighted



Maps showing through-routing made possible by Center City Commuter Tunnel.


Galleria Shopping Center at Market East Station

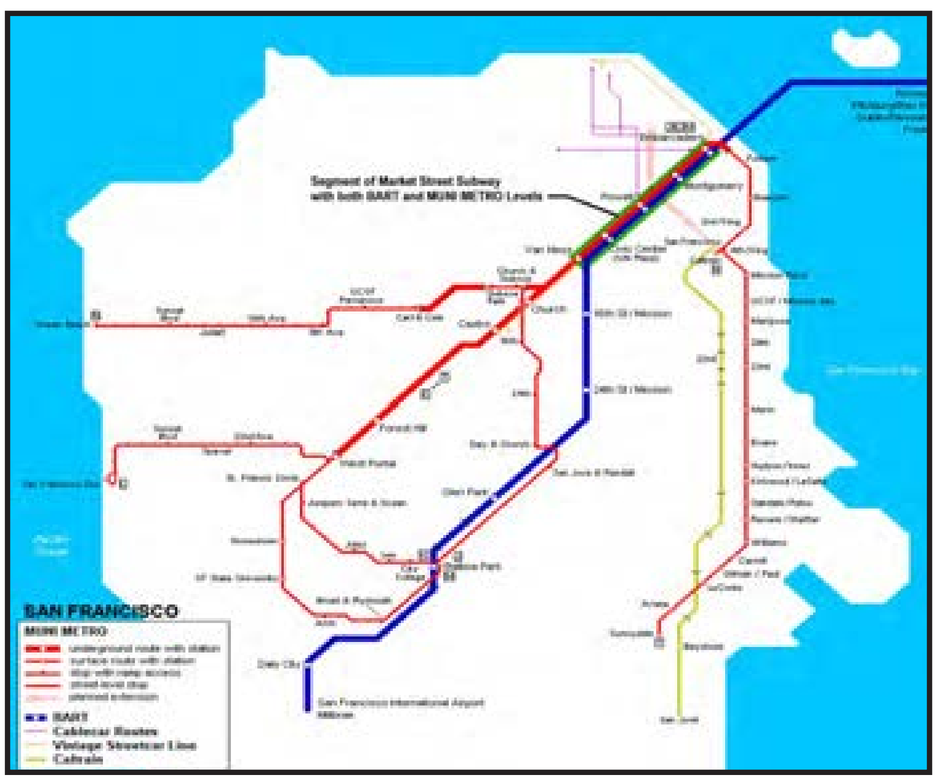
San Francisco Market Street Subway

The Market Street Subway is a tunnel that carries both rapid transit and light rail traffic in San Francisco, California. Market Street is San Francisco's historic Main Street. At one time it had four streetcar tracks (as did Chicago's State St.). The rapid transit service is operated by the Bay Area Rapid Transit District (BART) and the light rail service, called Muni Metro, is operated by the San Francisco Municipal Transportation Authority (SFMTA, a department of the City of San Francisco). It runs under the length of Market Street, for over three miles between Embarcadero Station and Castro Street Station. For about 2 miles the subway is used by both Muni on the upper level and BART on the lower level. There are four joint stations, with each agency having its own fare area collection on a shared mezzanine located below street level.

The eastern end of the BART level connects directly to the Transbay Tube, through which service runs to and from Oakland and the East Bay. BART service in San Francisco started in 1973, with the opening of the Transbay Tube to Oakland. Service now operates to the San Francisco Airport from the west end of the tunnel and to four braches in the East Bay. BART serves 43 stations with a 104 mile system.

It was not until seven years later, in 1980, that the Muni Metro level opened, when the first of five streetcar routes moved from operation on the surface of Market Street to the tunnel, effectively converting them to light rail service. Initially all of the routes terminated at the Embarcadero station. The southwestern end of the Market Street Subway connects to the much older Twin Peaks Tunnel used by three routes and to a ramp to the surface at Church Street, used by the other two routes. A portal to the surface at the Embarcadero was opened in 1998, and is used by two of the routes to serve surface streets along the Embarcadero. The western branches have a very basic streetcar alignment, with only two stops having full high-level platforms; at several others there are ramps which allow disabled passengers to board at the front door. The new branch from Embarcadero to Sunnydale runs on its own right-of-way with high-level platforms and can thus be properly classified as a light rail line. In the tunnel, Muni Metro vehicles are operated in Automatic Tran Operation (ATO) mode. Serving 156,900 passengers a day, Muni Metro is the second busiest light rail system in the United States.

It was anticipated that when the MUNI Metro opened surface tracks would be removed from Market Street. There is also extensive Muni



Map of Market Street Subway

Street. However, even before the transition was completed, part time historic streetcar service on Market Street had started. When the cable cars were shut down in 1982 for a total system overhaul, which lasted for almost two years, this became full-time. The surface tracks were subsequently rebuilt, with safety islands, as part of a Market Street streetscaping project. The historic streetcar service was extended north along the Embarcadero to Fishermen's Wharf in 2000, after the removal of the Embarcadero Freeway. This service is now extremely popular.

The most recent development involving the Market Street subway is the Central Subway, conisdered to be the second phase of the Third Street Light Rail Project, which opened in 2007. It will be a northern extension under Fourth Street, interesting Market Street perpendiculary, and terminating in Chinatown. Construction began in early 2010.

Historical streetcar operating on surface of Market Street

U.S. Projects - San Fransico Market Street Subway

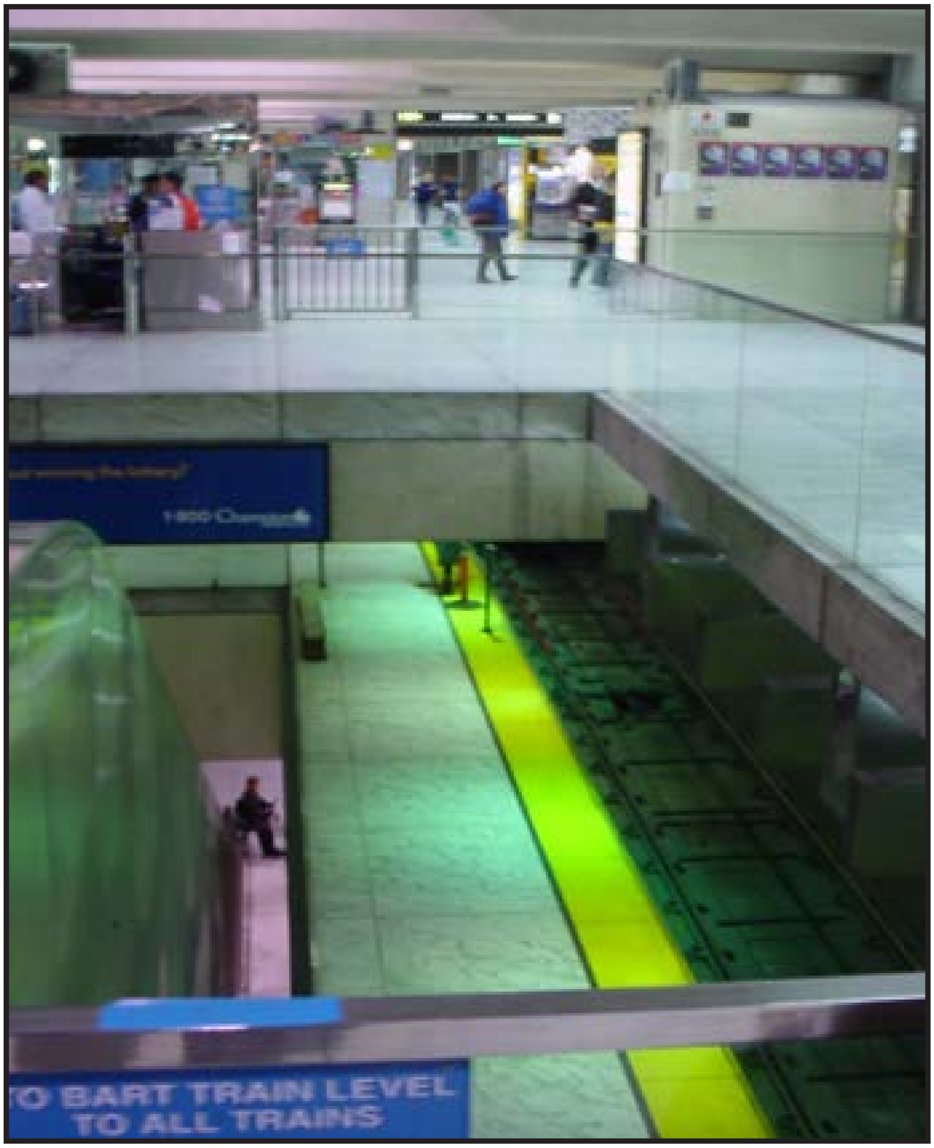
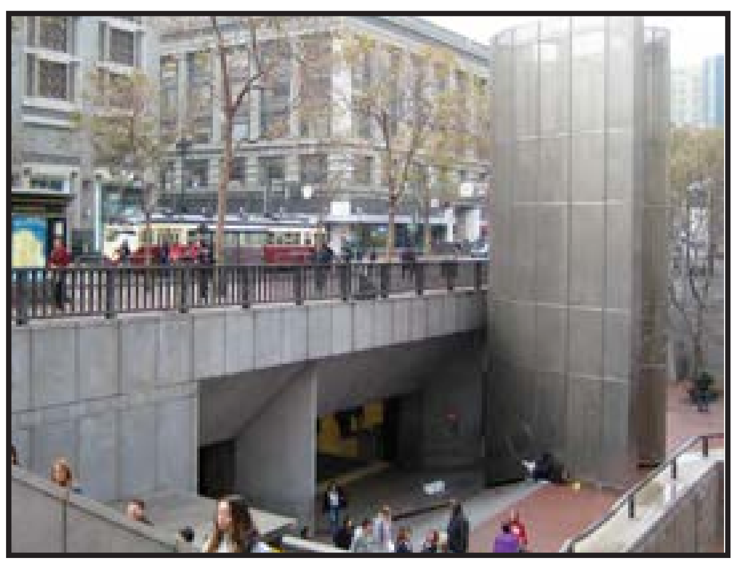


Photo showing 3 levels:

- *Concourse with separate fare collection for BART and Muni Metro*
- *Muni Metro*
- *BART (BART escalators pass through Muni Metro level)*



Powell Station with historical streetcar on surface, and entrance to concourse

Muni Metro light rail level with concourse above

BART level with escalators to concourse

San Francisco Transbay Transit Center


Transbay Terminal at opening, with trains in foreground and Bay Bridge in background

San Francisco's Transbay Terminal opened in 1939. It was built by the California Toll Bridge Authority in conjunction with the San Francisco-Oakland Bay Bridge which incorporated electric commuter rail tracks on the bridge's lower deck. It was paid for by Bridge tolls. The Terminal is located at 1st and Mission Streets, on the edge of the densest part of downtown.
The Terminal was designed to handle as many as 35 million people annually with up to 17,000 in the peak 20 minutes carried in 10 car trains operating at 63.5 second headways. During World War II the terminal handled up to 26 million passengers per year. Rail ridership declined to 4-5 million per year before rail service on the Bridge was discontinued in 1958, less than 20 years after it opened; the Terminal has been operated as a bus-only facility. Transbay rail service returned when the after which service in a new transbay tube started in 1974.

Transbay Terminal today, with buses

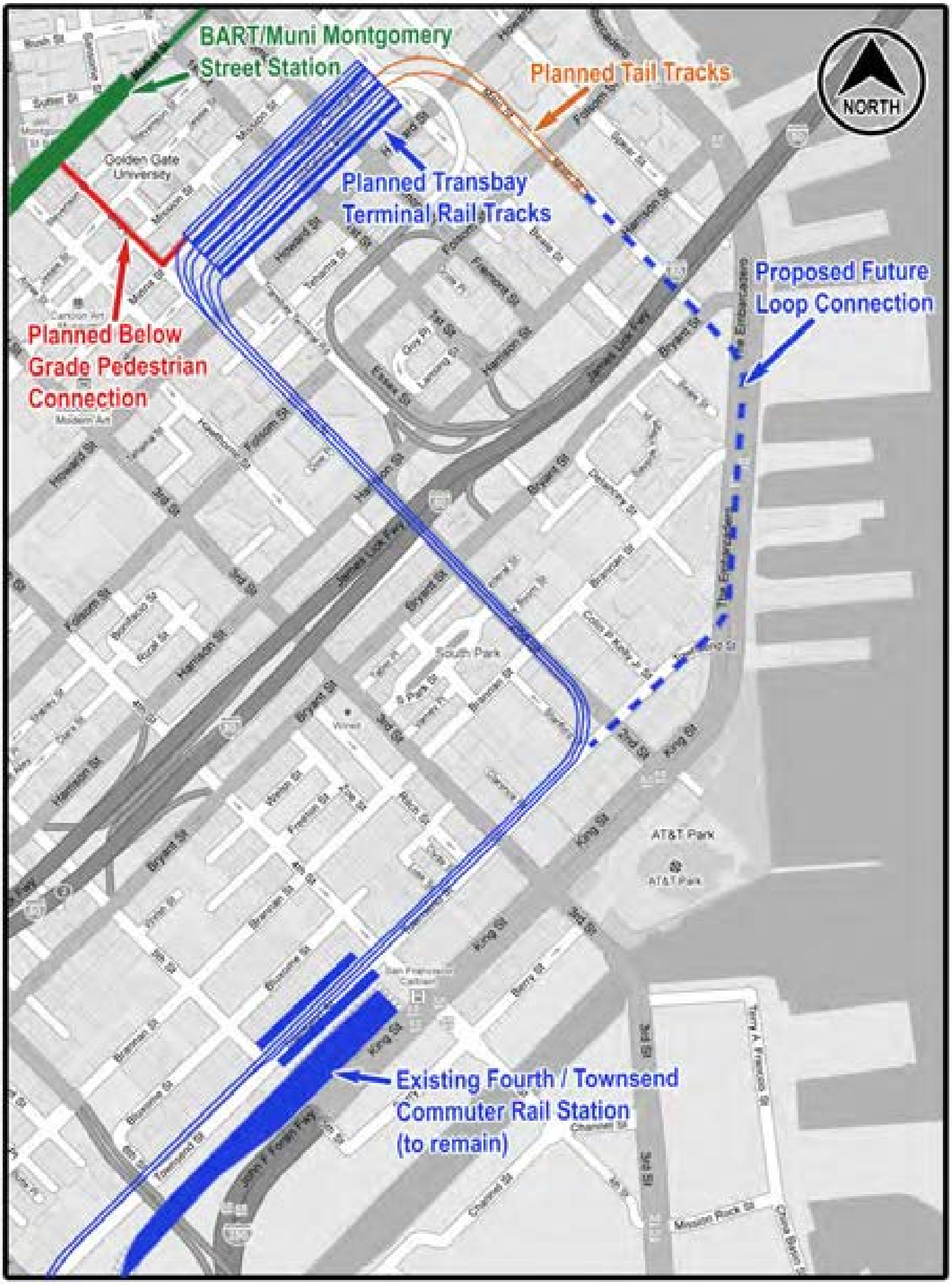

Caltrain commuter rail from the Peninsula terminates at Fourth and Townsend over a mile south of the Transbay Terminal, a significant distance from the heart of downtown. A special district, the Transbay Joint Powers Authority has begun construction of a new six level Transbay Transit Center on the site of the old Terminal. The project includes a 1.3 mile below grade extension of the Peninsula commuter rail service to the heart of downtown while continuing to accommodate Transbay buses as well as buses from the Peninsula and Marin County (which come into San Francisco over the Golden Gate Bridge), and Greyhound buses. A direct pedestrian connection to the Montgomery Street station on the BART/Muni subway under Market Street is included. The railroad level of the Transit Center will also serve as the San Francisco terminal of the California High Speed Rail route, which will allow passengers to reach Los Angeles in only 2 hours 40 minutes.

The rail level of the Terminal, located two levels below grade, is planned to have 6 stub end tracks, with four assigned to high speed rail and two for commuter rail. Because of the limited capacity of the station it is intended that some peak period commuter trains would continue to terminate at the existing Fourth and Townsend station. The bus level is planned to be located two levels above grade. A park is planned for the top level. An office tower is planned to be built next to the facility.

Rendering of Transbay Transit Cetner

Most of the Transbay Transit Center and the Caltrain Downtown Rail Extension Program are estimated at $4.185 billion, escalated to the year of expenditure (YOE). The project is being funded through local, regional, state and federal sources including significant contributions from Metropolitan Transportation Commission, the Federal Railroad Administration, Federal Highway Administration, Federal Transit Administration, San Francisco County Transportation Authority, San Mateo County Transportation Authority, Caltrans, and other sources. A design team was selected in 2007 through a competition.

Cross section of prTransbay Transit Center


BART/Muni Montgomery Street Station
Planned Tail Tracks
NORTH
Planned Transbay Terminal Rail Tracks
Proposed Future Loop Connection
Planned Below Grade Pedestrian Connection
Existing Fourth / Townsend Commuter Rail Station (to remain)
AT&T Park
South Park

Long Island Rail Road East Side Access – New York City

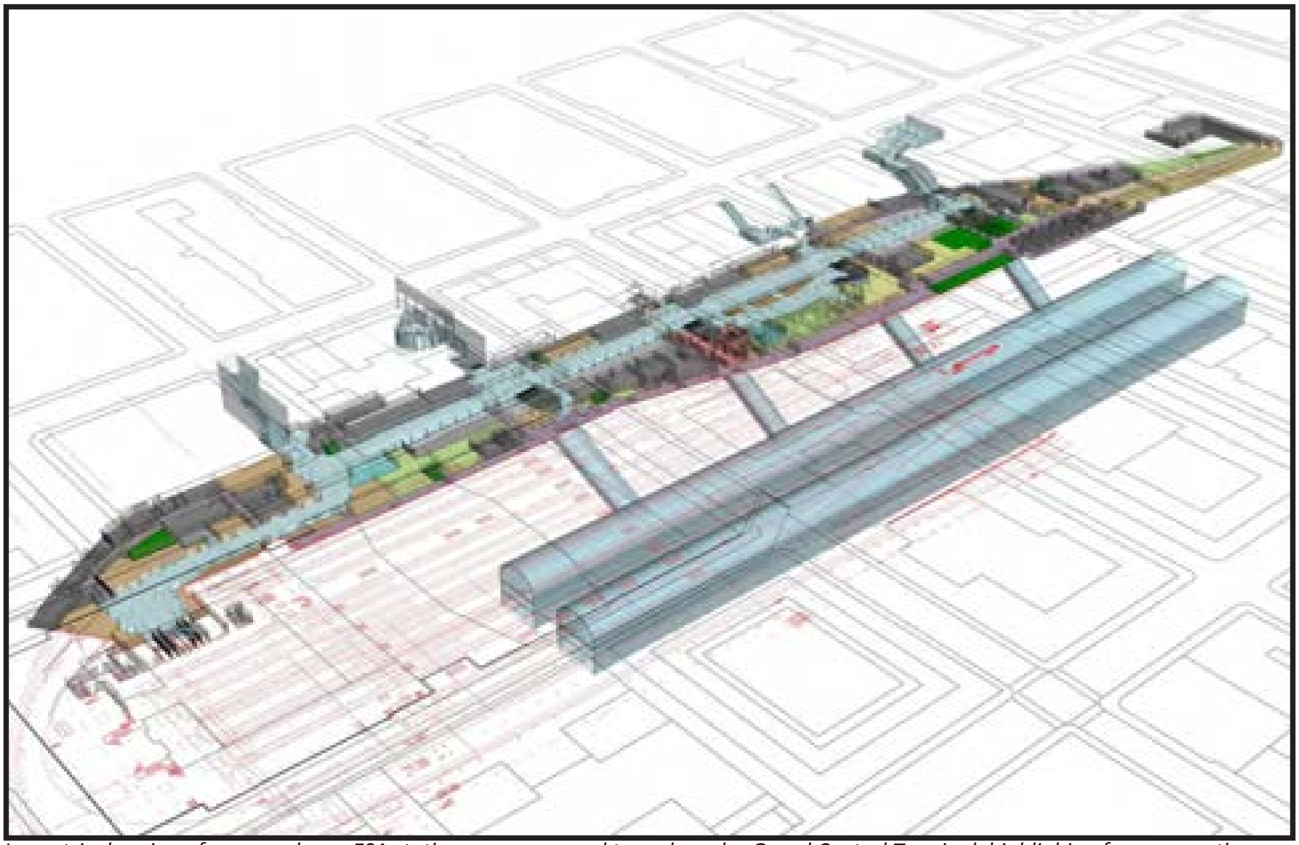
Access to the East Side of Manhattan has long been a wish of Long Island Rail Road (LIRR) riders who work there but must use the LIRR's Manhattan terminal at the congested Pennsylvania Station on the West Side, which is shared with Amtrak and NJ Transit riders. A 1998 study showed that only 36% of all jobs in Midtown are within walking distance of Penn Station, while almost 70% are within walking distance of Grand Central, the other major Manhattan rail terminal. (There is some overlap, and some jobs are not within walking distance of either facility.) Direct service to the East Side would allow many more riders to walk to work, and others to use fewer subway and bus transfers typically cutting up to 40 minutes off their daily travel time. The addition of a new Manhattan terminal will also increase overall capacity on the LIRR. Total cost of the project is currently estimated at $7.3 billion. Construction work is ongoing and a 2016 completion date is projected.

Construction of the LIRR line to Grand Central was begun in 1969 as part of the project to build a four-chamber tunnel under the East River to serve both a New York City Subway line and the LIRR. After a long delay caused by New York City's fiscal collapse of the 1970s, the subway line was completed in 2001.

The current East Side Access Project represents the construction effort to complete the LIRR line to Grand Central Terminal. After voters in New York approved a bond issue to provide state funds to the project, the construction contract for a one-mile tunnel in Manhattan west and southward from the long dormant lower level of the 63rd Street rail tunnel to the new station beneath Grand Central terminal was awarded in 2006. Tunnels to connect to a reconfigured Harold Interlocking, the connection with the existing LIRR route, are also under construction.

U.S. Projects - LIRR East Side Access - New York City

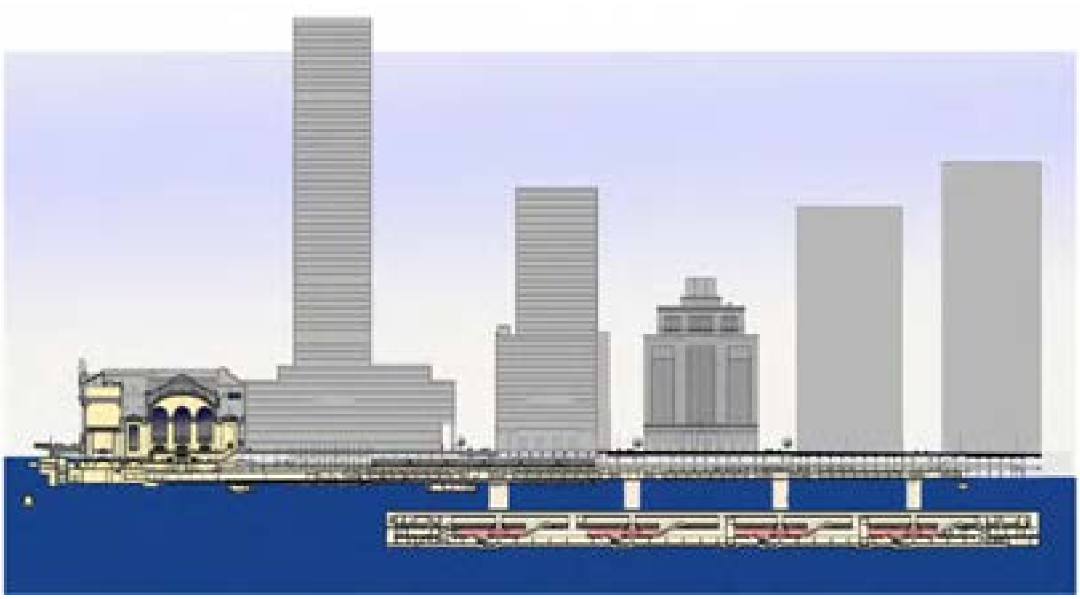
The new LIRR East Side station under Grand Central Terminal will offer new entrances, a concourse, eight tracks on four platforms lower than the existing Metro-North lower level tracks, and a mid-level mezzanine. This new station will also allow easier transfers for commuters travelling between Long Island and destinations on the Metro-North Railroad (in the Bronx, Westchester County, the Hudson Valley, and Connecticut), and much of the New York City subway system. Connections to AirTrain JFK at Jamaica Station in Jamaica, Queens, will facilitate travel to John F. Kennedy International Airport from the East Side of Manhattan. The new terminal will increase the number of tracks at Grand Central from 67 to 75.



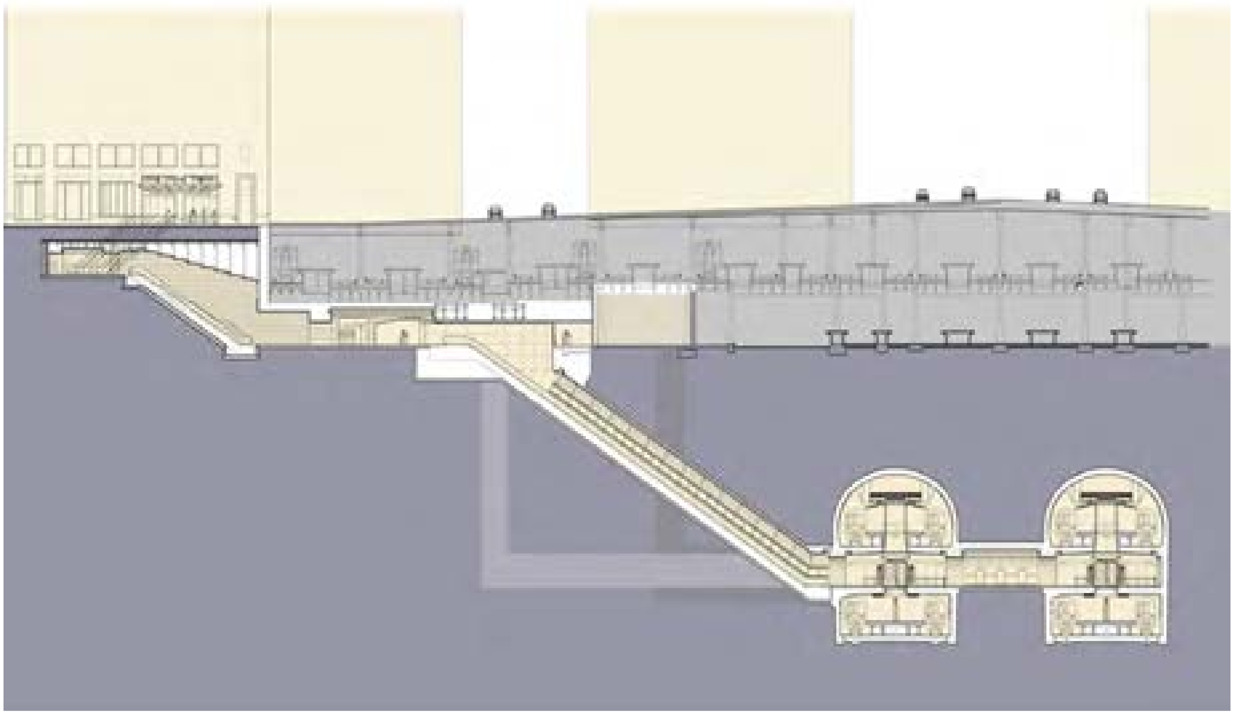
Isometric drawing of proposed new ESA station concourse and tunnels under Grand Central Terminal, highlighing four connecting escalator banks

The project involves over 7.7 miles of 22 foot diameter tunnels, at depths of up to 140 feet below grade. Current plans call for 24-trains-per-hour service to Grand Central Terminal during peak morning hours, with an estimated 162,000 passenger trips to and from Grand Central on an average weekday.

Access tunnels connect from railroad level of 63rd Street Tunnel under East River, completed in 1973



Linear section, showing historic Grand Central headhouse on left



Cross section showing 8 new tracks and 4 platforms on 2 levels under existing Grand Central tracks

Rendering showing mezzanine and lower platform of one of the LIRR station caverns

Major European Stations

A significant number of major passenger railroad station projects have been undertaken in Europe in recent years. Most have been designed to provide more direct routings for intercity trains, often replacing legacy stub terminal tracks with through tracks. Major passenger service upgrades and high quality architecture are universal features.

London St. Pancras - 2007

This major renovation was constructed as part of the completion of the new, largely underground, high speed rail link from London to the Channel Tunnel. Previously, the station was underutilized. Platforms are also used by domestic service on this line and are available for future high speed service to the British Midlands. Lower Level platforms are provided for early phases of the Thameslink suburban train service. Station Building Renovation cost £800M /$2B.

New pedestrian walkways under restored historic trainshed

Model showing St. Pancras and adjacent King's Cross

Berlin Hauptbahnhof - 2005

New north-south line (8 tracks) in tunnel meets the elevated main east-west line (6 tracks) 1200 trains/day are served. Total project cost €10B/$13B

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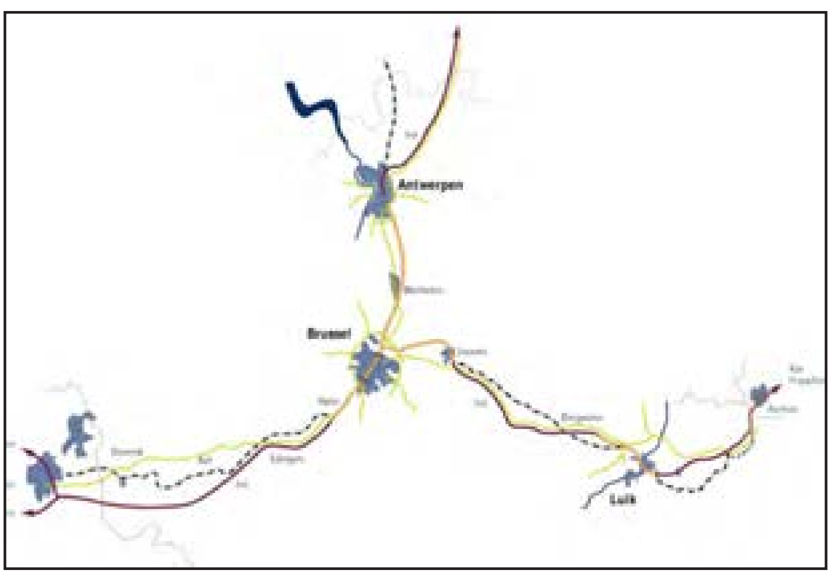
Cross section shows multiple levels

Photo illustrating multiple levels and open design.

East-west tracks on lowest level open to concourse and trainshed above.

Antwerp (Belgium) Centraal - 2007

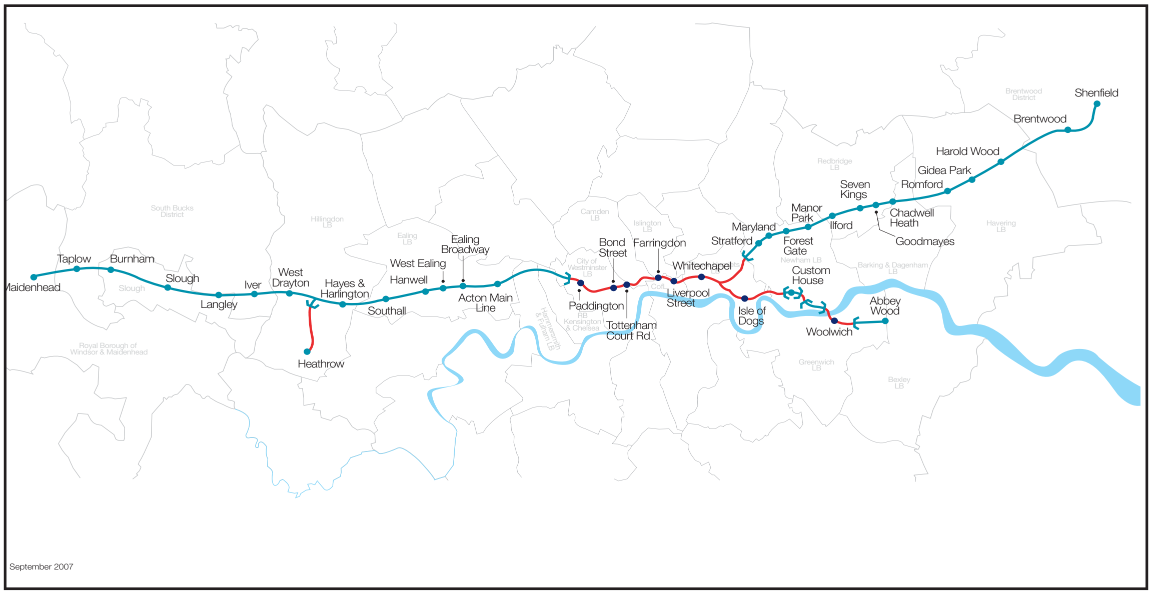
Trains on 3 levels (total of 10 stub tracks and 4 through tracks) constructed under existing historic Centraal Station. €720M/$940M. Reconstruction of Centraal was a key element of the European high speed rail network.



Maps of Projects Under Construction

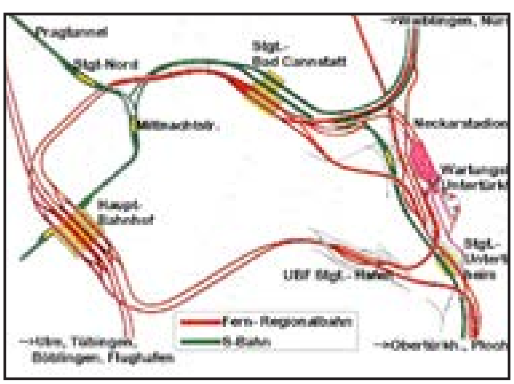
London Crossrail - 2017

15 miles of new tunnels will connect suburban routes that now terminate on west side of central London to those now terminating on the east side. 7 new below grade stations will connect with 10 different Underground routes, in addition to several intercity rail stations. £15.9B/approx $25B today. Crossrail is considered to be the largest and most expensive urban passenger rail project underway in the world today.



Stuttgart 21 - 2020

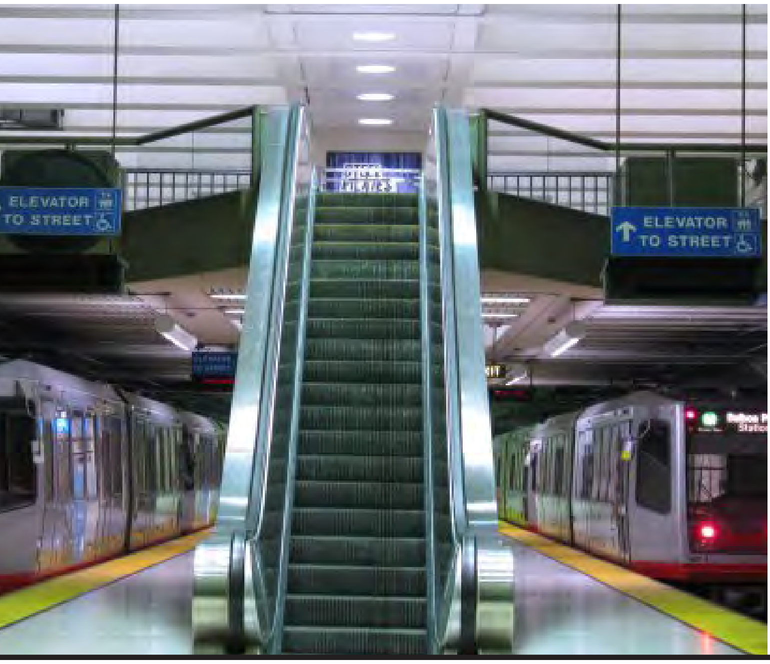
16 grade level stub end tracks are being replaced by 8 lower level through tracks on a different alignment under the historic Hauptbahnhof. €4.1B/$5.4B



Zurich Durchmesserlinie 2015

New 5.9 mile link, mostly below grade, is being built to relieve congestion for both suburban and intercity trains, utilizing existing main station (H.B.). A cross-city connection for suburban trains opened in the late 1980s. CHF2.03B in 2005/ approx. $2B today

City	Project	Completion	Cost	Description
Regional				
Milwaukee	Intermodal Station	Phase 1: Nov. 2007 Phase 2: 2012	$35M	Renovation of 1965 station, including addition of intercity bus bays. No track modifications required. 550,000 annual passengers. Trainshed upgrade (Ph. 2) continuing.
St. Louis	Gateway Transportation Center	Nov. 2008	$25.7M	This new multimodal station replaced the historic Union Station which became a festival marketplace and hotel. The new site required construction of some new surface track. 266,000 annual passengers.
U.S. National				
Los Angeles	Union Station	1939	TBD	Numerous projects over years since 1982 have turned this historic facility into the bustling hub of the reinvigorated transit and rail network serving the L.A. basin, including the planned California High Speed Rail system. About 1.1M Amtrak and 6.8M Metrolink commuter riders annually.
Philadelphia	Center City Connector	1984	$330M	Through routing of commuter rail services, with a new 4 track tunnel, increased operating efficiency.
San Francisco	Market Street subway	1973	?	Multi-level subway, mixing modes, allowed sharing of costs between agencies.
	Transbay Transit Center	2019	$4.185B	This new facility is planned for construction on the site previously occupied by the Transbay Terminal of 1939. The project includes a 1.3 mile three track below grade extension which will serve commuter rail and the California High Speed Rail system.
New York	East Side Access	2016	$7.3B	This project, which is well on its way to completion, will bring Long Island RR passengers to Midtown Manhattan, while relieving congestion at Penn Station. It involves over 7.7 miles of new tunnel. 160k daily riders anticipated.
Europe				
Berlin	Hauptbahnhof	May 2006	$13B	New north-south line (8 tracks) in tunnel meets the elevated main east-west line (6 tracks) plus another higher level for suburban trains at a spectacular new station. 1200 trains/day.
London	St. Pancras	Nov 2007	$2B	The major renovation of the station was performed as part of the completion of the new, largely underground, access to London of the Channel Tunnel High Speed Rail Link.
Antwerp (Belgium)	Centraal	Dec 2007	$940M	Trains on 3 levels (total of 10 stub tracks and 4 through tracks) replaced surface level tracks, served by the same historic station building.
Zurich	Durchmesserlinie	2015	$2B	New 9.6km link, mostly below grade, will relieve congestion for both suburban and intercity trains. The existing main station will continue in use.
London	Crossrail	2017	$25B	Over 15 miles of new tunnels will connect suburban routes that now terminate on west side of central London to those now terminating on the east side. No major new station building is being constructed under the project.
Stuttgart	Stuttgart 21	2020	$5.4B	The project will replace16 grade level stub end tracks with 8 low level through tracks, served by the same historic station building.



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