



RTA/Pace I-294 Tri State Market & Facilities Feasibility Study

Infrastructure Design Concepts Technical Memorandum

Regional Transportation Authority and Pace Suburban Bus



Regional
Transportation
Authority



pace

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Prepared for:

Regional Transportation Authority and Pace Suburban Bus

Prepared by:

AECOM
303 East Wacker Drive, Suite 1400
Chicago, IL 60601
aecom.com

Prepared in association with:

Connetics Transportation Group, Inc.

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1. Study Background and Purpose

The Regional Transportation Authority (RTA) / Pace Bus I-294 Tri-State Market & Facilities Feasibility Study (Study) identified and evaluated ways that Pace buses can capitalize on roadway improvements being constructed by the Illinois State Toll Highway Authority (Illinois Tollway) on portions of the I-294 Tri-State Tollway.

The Tri-State Tollway is a north-south roadway in the Chicago region, providing access to major employment centers and O'Hare International Airport. In 2016, Illinois Tollway initiated its Central Tri-State (I-294) Project, which includes the 22-mile segment between Balmoral Avenue and 95th Street ([Central Tri-State Project](#)). This segment carries the heaviest volume of passenger and freight traffic and has twice the amount of congestion delays compared to the entire Tollway system. The Central Tri-State Project will incorporate a number of innovations, including Flex Lanes, which will be available to Pace buses to avoid congestion. Flex Lanes are the left inside shoulder of the roadway; Pace buses are directed to the Lane by the Illinois Tollway's traffic operations center. Pace has identified I-294 as a critical corridor because of its place as a primary travel corridor and the opportunity that Flex Lanes present.

From this study, the agencies identified and evaluated several options that will allow Pace buses to benefit from the Central Tri-State improvements. Pace bus use of the Flex Lanes when traffic is congested will help make service in this corridor a competitive and affordable alternative to driving.

Recommendations from this study include:

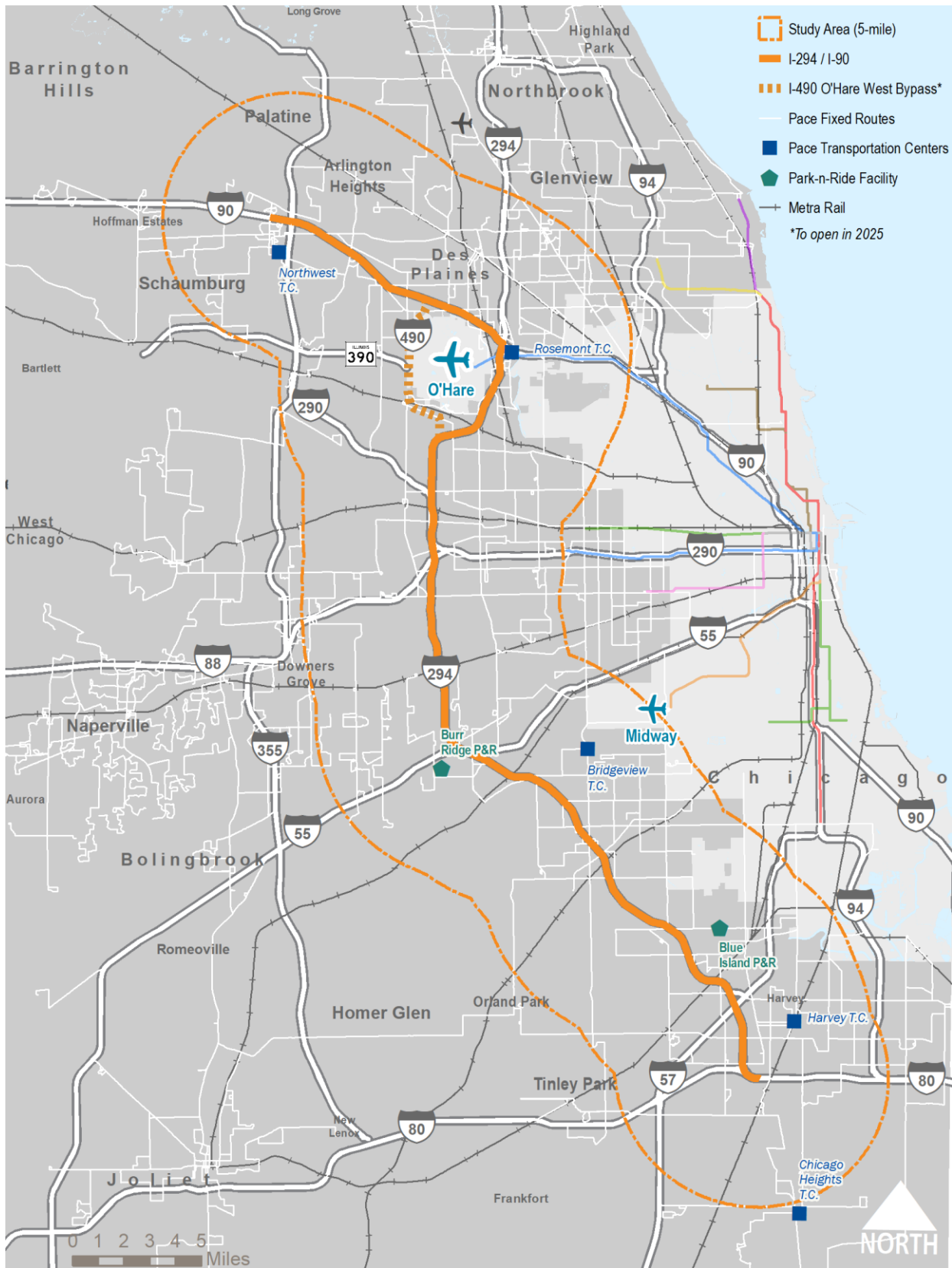
- Pace Express bus service concepts that primarily operate along the I-294 Tri-State Tollway
- Stations, roadways, and other infrastructure needed to support proposed bus services and provide improvements in passenger comfort, bus speeds, travel times, and access to jobs and other transit connections.
- A plan for implementing proposed bus services and associated support infrastructure

These recommendations were derived from a robust market analysis of existing and predicted travel patterns in the study area, computer modeling of concepts, and engineering assessments of potential site locations. Pace and RTA also coordinated with the Tollway throughout the study's development.

1.1 Study Area

As shown in Figure 1-1, the study area covered a 5-mile radius centered along the 48-mile I-294/I-90 corridor between Harvey and Schaumburg. The roadway study alignment also included I-490, which by 2025 will connect the I-90 Jane Addams Memorial Tollway, the IL-390 Elgin-O'Hare expressway, and the I-294 Tri-State Tollway along the west side of O'Hare Airport.

Figure 1-1. Pace I-294 Market & Facilities Feasibility Study Area



1.2 Task Overview

The Study involves five tasks that are listed below, including the relevant sub-tasks for Task 1.

Task 1: Existing Conditions and Travel Market

- 1.1 Transit Service
- 1.2 Traffic Conditions
- 1.3 Market Analysis

Task 2: Conceptual Service Design and Infrastructure

- 2.1 Service Plans
- 2.2 **Generic Infrastructure Concepts**
- 2.3 Station Concepts

Task 3: Implementation Plan

Task 4: Public Outreach and Marketing

Task 5: Summary Report

Task 2.2 provided a generic review of infrastructure concepts that can be considered to complement proposed I-294 service plans. The focus was on the layout of bus stations in limited-access roadways, including key station elements such as boarding platforms and passenger access. The Technical Memorandum includes the following sections,

1. Stations Types,
2. Station Layout Examples,
3. Center Station Sketch, and
4. Assessment of Layout Types.

2. Station Types

An aspect of this study's service planning will be to consider in-line stations that enable passengers to board and alight buses without deviating from the roadway. Research shows that riders are sensitive to travel time delay when commuter services leave an alignment to serve a park-and-ride, transit facility, or an intermediate destination. Developing stations that are integrated into the roadway facility (i.e., in-line stations), would offer distinct operational and market benefits, although off-line facilities may also be warranted for certain locations. In-line stations will need to be physically and operationally feasible, acceptable to the Illinois Tollway, and safe and convenient for passengers to use. This technical memorandum will review examples of freeway bus stations from across the country and identify key design features that will need to be considered for possible I-294 facilities to advance.

Three basic types of station designs were evaluated, including,

1. Center Stations where one median platform, or two side platforms, are situated in the center of the roadway (i.e., between the directional sets of traffic lanes),
2. Station with Outside Platforms, involving one platform on each of the outer edges of the roadway, and
3. Adjacent Station with direct access ramps.

A bus station with center platforms requires separating directional traffic lanes to create a space to accommodate one median or two side platforms. Several platform configurations are possible, including

- A median platform would be shared by buses operating in both directions. Since Pace buses use right-side doors, buses would be required to enter the station from the left. One solution to address this issue is to have buses switch sides using crossover lanes before and after the bus station. An alternative is to acquire buses with left-side doors. While feasible, this would require that Pace have a sub-set fleet of vehicles that would be initially dedicated to the I-294 corridor.
- Two side platforms would also be possible and would facilitate conventional right-side bus entry. The disadvantage of this design is the need to expand the roadway's overall cross-section to accommodate a second boarding platform. Also, vertical platform access by passengers would require facilities for each platform (i.e., stairs, ramps, elevators, or escalators).
- A variation of the two side platform design approach would be to stagger or offset the platforms to minimize the cross-sectional roadway width required.

The center station design allows vehicles to operate without deviation and would permit passengers to board and alight from the same location. Stations using outside platforms also allow vehicles to operate without deviation, but passengers would be alighting from a location on the opposite side of the roadway (i.e., the roadway's outside shoulder) from where they boarded. This distance could exceed 200 feet depending on the number of lanes of the roadway.

The adjacent station design would require route deviation, with the impact on passenger delay being a function of the distance from the roadway and configuration of the access ramps.

Another design concept could involve transfer facilities for bus routes serving different destinations. This would facilitate a trunk route operating on I-294 connecting with routes that

have different destinations. For example, a route originating at the Harvey Transportation Center and destined for Rosemont could make a timed connection en-route with a bus destined for Oak Brook.

3. Station Layout Examples

Examples of different bus station designs in freeways follow. Photos are used to illustrate station elements.

3.1 Center Station – Median Platform

Metro Transit, I-35 & 46th Street, Minneapolis, MN

I-35 is depressed at this location, and 46th Street bridges overhead. Multiple express bus routes use this stretch of I-35 South and represents Metro Transit’s busiest commuter corridor. Infrastructure for the line is being upgraded through an FTA grant, transforming the service into the Bus Rapid Transit (BRT) Orange Line. Connecting Route 46 provides local service on 46th Street.

This center station design involves a median platform accessed from 46th Street. Bus lane crossovers facilitate right-side bus entry at the platform. Station bus lanes are separated from general travel lanes by concrete barrier wall.



MVTA & Metro Transit Cedar Grove Transit Center, SR 77, Eagan, MN

The Cedar Grove Transit Station serves the Minnesota Valley Transit Authority (MVTA) bus system and the Metro Red Line bus rapid transit system to Mall of America). MVTA express and Red Line buses pick up/drop off passengers at the in-line station on Cedar Avenue. The station's single center platform allows right-side boarding, with buses performing a crossover maneuver to have left-hand running through the station area. The overhead pedestrian bridge connects to the Cedar Grove Transit Center to the east.



3.2 Center Station – Side Platforms

LA Metro Rosecrans Silver Line Station, I-110

Rosecrans is a Metro Silver Line Transitway station located in the median of I-110 (Harbor Freeway) under Rosecrans Avenue in Los Angeles, near Gardena. Service is operated by the Los Angeles County Metropolitan Transportation Authority (Metro).

The Silver Line Transitway is used by multiple routes serving downtown Los Angeles. Metro Local Route 125 operates on Rosecrans Avenue. Station access is from Rosecrans Avenue using stairs and elevators. The Station has two side platforms with right-side bus entry. A 338-space park-and-ride is adjacent to the station.



I-5 Mountlake Terrace Freeway Station, Seattle

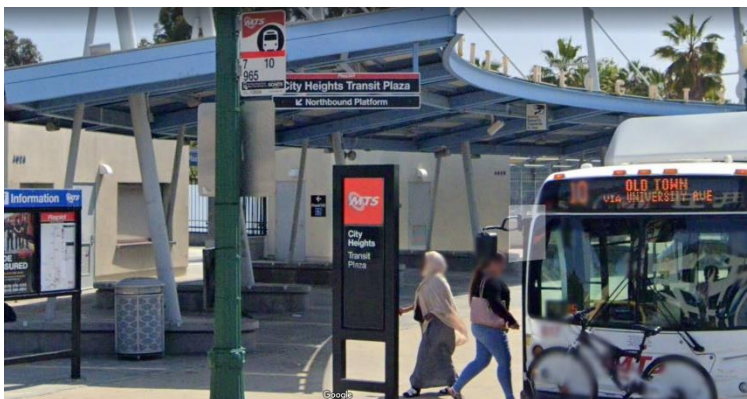
The Mountlake Terrace I-5 Freeway Station is served by Sound Transit Express and Community Transit commuter routes connecting Snohomish County to downtown Seattle, WA. The station is served by two side platforms accessed by stairs and elevators that connect it to an 890-space parking lot via an overhead pedestrian bridge. Station access is limited to the east side of the roadway.



3.3 Center Station – Offset Side Platforms

San Diego SR 15 University Avenue

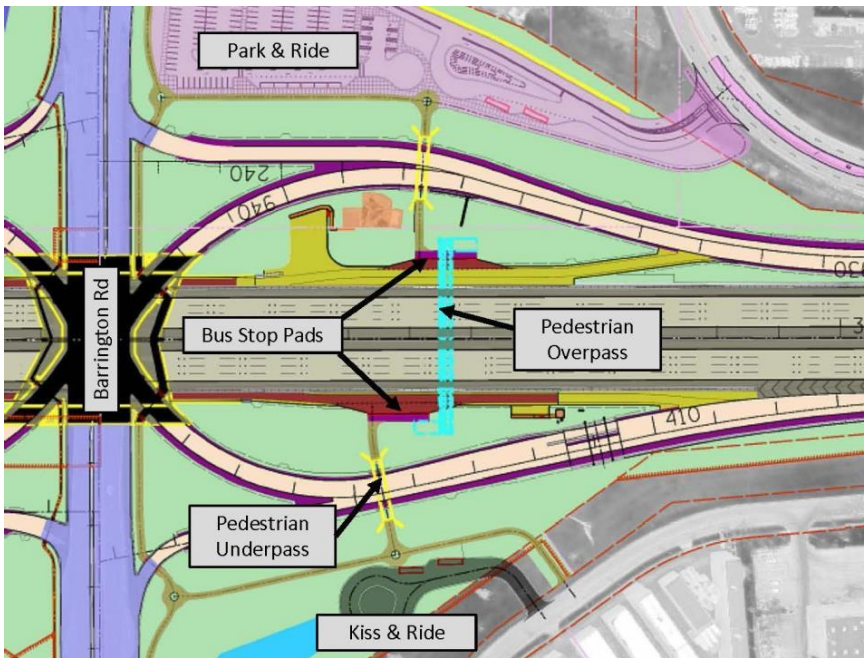
The University Avenue Station is on the SR 15/I-15 Corridor, part of the San Diego *Rapid* system, and connects the suburban City of Escondido to downtown San Diego. Transit-only lanes are provided in the median from I-805 to I-8. Access to the station is from the overhead cross-street, University Avenue. The station layout involves two side platforms, which are staggered. This allows use of right-side doors and minimizes the cross-sectional width of the station elements between the general travel lanes. The northbound platform is north of University Avenue, and the southbound platform south. Extended height barrier walls separate the station's bus lanes from the general traffic lanes for passenger comfort.



3.4 Outside Station Platforms

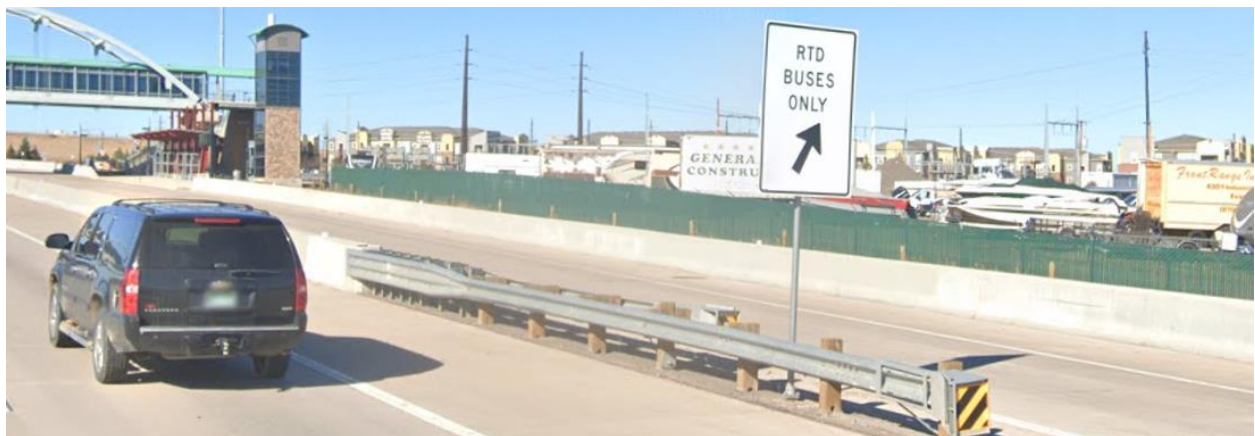
Pace I-90 Barrington Road Park-n-Ride Station

Opened in 2018, this Pace facility includes platforms on the outer edges of I-90. The station is supported by a park-n-ride facility north of the station and a kiss-n-ride facility on the south. This was the first in-line freeway bus station in Illinois and is served by multiple Pace routes. A pedestrian bridge lets passengers access express routes traveling in either direction as well as local routes serving additional boarding areas. Buses use slip ramps from I-90/Barrington Road ramps. Development of the station and associated elements was accommodated by the availability of vacant land.



US 36 Broomfield Bus Station, Broomfield, CO

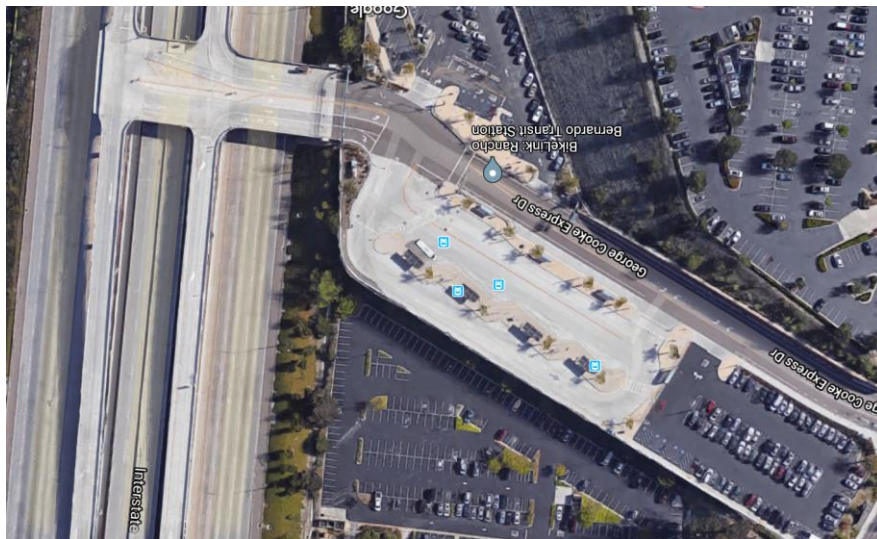
The Flatiron Flyer opened in 2016, an 18-mile express bus service between Denver and Boulder with some elements of BRT. The service uses the US 36 Express Lanes, which allow for free passage for cars with three or more people and tolled passage for cars with one or two. The Broomfield Station, with a 1,500 space parking garage, is served by exclusive bus slip ramps, and a pedestrian bridge that provides access across the freeway to the parking garage. Vehicle access to the outside platforms is via stairs and elevators. Service is operating by the Denver Regional Transit District (RTD).



3.5 Adjacent Stations

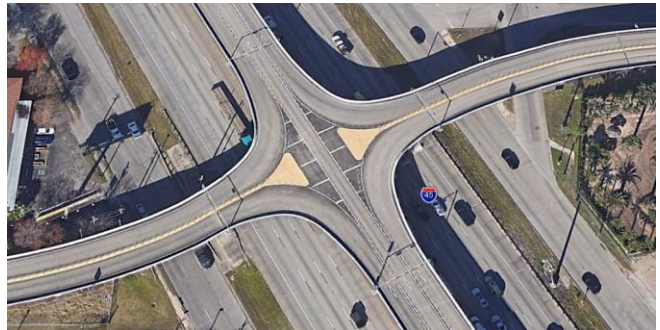
Rancho Bernardo Park-n-Ride, San Diego

The Rancho Bernardo Station is served by Metropolitan Transit System *Rapid* system buses in San Diego and is the end of line for Route 290 to downtown San Diego. The station serves a park-n-ride facility and includes retaining walls and bridge connections.



Houston METRO Monroe Park-n-Ride, I-45 Gulf Freeway

METRO's HOV lanes are located in the center of most major Houston freeways; lanes typically are barrier-separated and allow buses to move higher volumes of passengers to and from downtown. Most of the 113-mile network is single lanes that operate directionally (to downtown in the AM / from in the PM). Metro has four routes that serve long approach ramps from the roadway median facility to the off-line facility



4. Center Station Sketch

To assess how an in-line center station could physically fit within the Central I-294 roadway, a concept drawing for a station at the Hinsdale Oasis site was prepared. This location was selected for illustration purposes and is not meant to suggest that this would be candidate location for a Pace express bus station. Two exhibits are provided:

- Figure 4-1 Overview - roll plot exhibit showing the full limits of the concept,
- Figure 4-2 Detailed - close-up view with added dimensioning of proposed lane widths, platform widths, etc.

For both exhibits, the conceptual station design is shown in color; the future Central Tri-State roadway design on the westbound side (top of drawing) is shown in black.

The assumptions for insertion of a bus station included the following,

- Northbound Central Tri-State facilities would shift east to create space for the station
- Taper rate in the Oasis area 15:1 (30mph design speed)
- Platform tangent length 100 feet; northbound and southbound platforms would be offset
- Median barrier wall would separate bus lanes in station
- Flex lanes are the bus lanes in station area; no separate thru-Flex lanes would be provided
- The future Central Tri-State design geometry on the southbound side (west, or top), would not be impacted

The drawing concludes that northbound lanes would need to shift by 21 feet east to accommodate the boarding platforms. Also, the Flex lanes would be only available for Pace buses operating through the station area.

Figure 4-1. Overview Concept, Center Station Drawing – Hinsdale Oasis

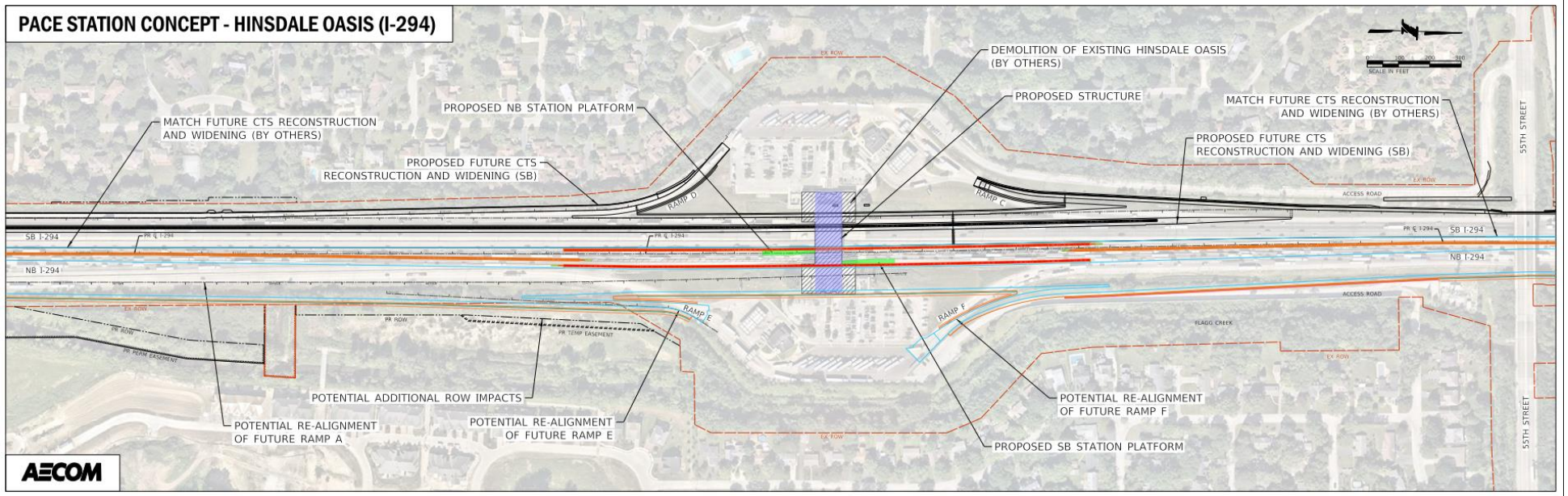
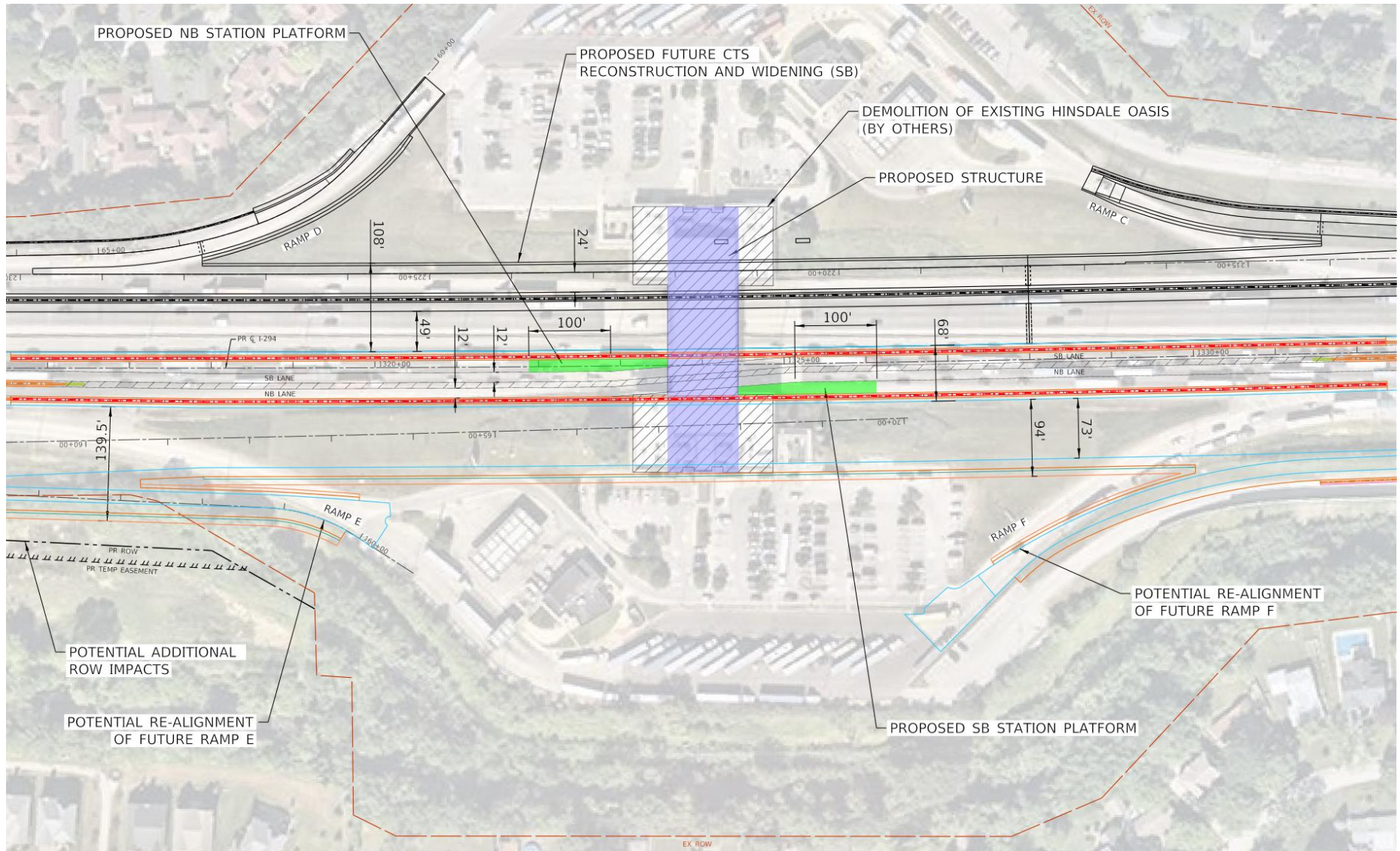


Figure 4-2. Detailed Concept, Central Station Drawing – Hinsdale Oasis



5. Assessment of Station Layout Types

The alternative concepts provide tradeoffs from multiple perspectives, which are highlighted by Table 5-1.

Table 5-1. Evaluation of Bus Station Types

Station Location & Platform Arrangement	Most Suitable as an In-Line Station	Minimize Bus Route Deviation	Minimize Walk Distance for Bus Riders	Minimize Impact to Existing Travel Lanes	Opportunities for Joint / TOD Development
Center - one median platform	*****	*****	***	**	*
Center - two side platforms	*****	*****	***	*	*
Center - two side platforms offset	*****	*****	***	***	*
Outside - one platform each side	***	****	*	****	***
Adjacent with direct access ramps	*	*	*****	*****	*****
Transfer Station	*	*****	N/A	*****	*

*****best meeting criteria; *least meeting criteria; N/A: Not Applicable

A narrative assessment of each of the design follows.

Center – One Median Platform | This is a very effective in-line layout and would eliminate the need for route deviation for pick-up and drop-off of passengers. Works best when access is from a roadway over or under freeway with local bus service (versus from a ped bridge). Use of right-side bus entry is an issue; cross-over lanes to resolve adds other issues. Advantage relative to use of two platform design is that only one set of vertical access means is required (e.g., stairs / elevator). Walk-on and park-n-ride access requires some additional walking. Retrofitting this design into an existing roadway would require lane shifts to create the required space for platform and bus lanes. Very limited opportunity for transit-oriented development (TOD).

Center - Two Side Platforms | This design option has many of the same in-line station characteristics as the Center Platform design. An advantage is right-side bus entry, so the crossover lanes before and after the station would not be required. Disadvantages would be the extra width required for a second platform, and the need for a second set of vertical access means (e.g., stairs / elevator). Similar to the One Center Platform design, there would be limited potential for TOD.

Center - Two Side Platforms Offset | This option would be very similar to the Two Side Platform option, with that exception of placing the platforms offset from one-another. This would provide the advantage of reducing the cross-sectional width of the station between the roadway's general travel lanes.

Outside – One Platform each Side | This option would not require deviating from the roadway for pick-up / drop-off but use of the center Flex lane for express operation could be problematic based on traffic conditions. The separation of AM versus PM boarding/alighting locations would be somewhat inconvenient for riders. A major advantage is the roadway travel lanes would not require shifting. There

could be opportunities for TOD, although the separation of boarding and alighting locations could be somewhat of a limiting factor.

Adjacent with Direct Access Ramps | The principal disadvantage of this design is that buses would be required to leave the roadway for pick-up/drop-off; the added travel time would be a function of the location of the off-line station and the design of the on/off ramps. Walk access from park-n-ride facilities would be minimized and the station itself would have no impact on the general travel lanes. However, access ramps to serve the station could be an issue, depending on the site conditions of the area. The ramp systems would likely be costly to build. There would be opportunity for TOD.

Transfer Station | This would be a very feasible design to implement but would offer relatively few benefits given that passengers would not be able to access or egress the location. This could provide some operational efficiencies, which would be offset by the addition of another seat ride for affected passengers.

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