Appendix G
Description of Construction and Phasing for Build Alternatives

RED AHEAD
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Red Line Extension

Chicago Red Line Extension Project

Description of Construction and Phasing for Build Alternatives

July 28, 2015

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Abbreviations

ADA	Americans with Disabilities Act
AREMA	American Railway Engineering and Maintenance-of-Way Association
BRT	bus rapid transit
Chicago DIGGER	Chicago Utility Alert Network
CMAP	Chicago Metropolitan Agency for Planning
CN	Canadian National
CTA	Chicago Transit Authority
EIS	Environmental Impact Statement
IDOT	Illinois Department of Transportation
JULIE	Joint Utility Locating Information for Excavators
MWRD	Metropolitan Water Reclamation District of Greater Chicago
NB	northbound
NEPA	National Environmental Policy Act
NICTD/CSS & SBRR	Northern Indiana Commuter Transportation District Chicago South Shore & South Bend Railroad
OUC	Office of Underground Coordination
RLE	Red Line Extension
ROW	right-of-way
SB	southbound
UPRR	Union Pacific Railroad
WB	westbound

Section 1 Introduction

The Chicago Transit Authority (CTA) is proposing to extend the heavy rail Red Line from the 95th Street Terminal to the vicinity of 130th Street, subject to the availability of funding. The proposed Red Line Extension (RLE) Project would include four stops. Each stop would include bus transfer and parking facilities. This project is one part of the Red Ahead Program to extend and enhance the entire Red Line.

The project area is 11 miles south of the Chicago central business district (commonly referred to as the Loop) and encompasses approximately 20 square miles. The boundaries of the project area are 95th Street on the north, Ashland Avenue on the west, Stony Island Avenue on the east, and the Calumet-Sag Channel/Little Calumet River and 134th Street on the south. The I-57 Expressway (I-57) and I-94 Bishop Ford Freeway (I-94) cross the western and eastern edges of the project area, respectively. Lake Calumet is in the eastern portion of the project area. Figure 1-1 shows the project area.

The project area encompasses parts of nine community areas in the City of Chicago and the eastern section of the Village of Calumet Park. Chicago community areas include Beverly, Washington Heights, Roseland, Morgan Park, Pullman, West Pullman, Riverdale, and South Deering. The project area comprises residential (primarily single family), industrial (both existing and vacant), transportation (including freight), and commercial development.

The Description of Construction summarizes analysis for the following alternatives (shown in Figure 1-2) that emerged from the Alternatives Analysis and National Environmental Policy Act (NEPA) scoping process. This list includes alternatives considered but not pursued.

- No Build Alternative
- Bus Rapid Transit (BRT) Alternative
- Union Pacific Railroad (UPRR) Rail Alternative
  - Right-of-Way (ROW) Option
  - East Option
  - West Option
- Halsted Rail Alternative

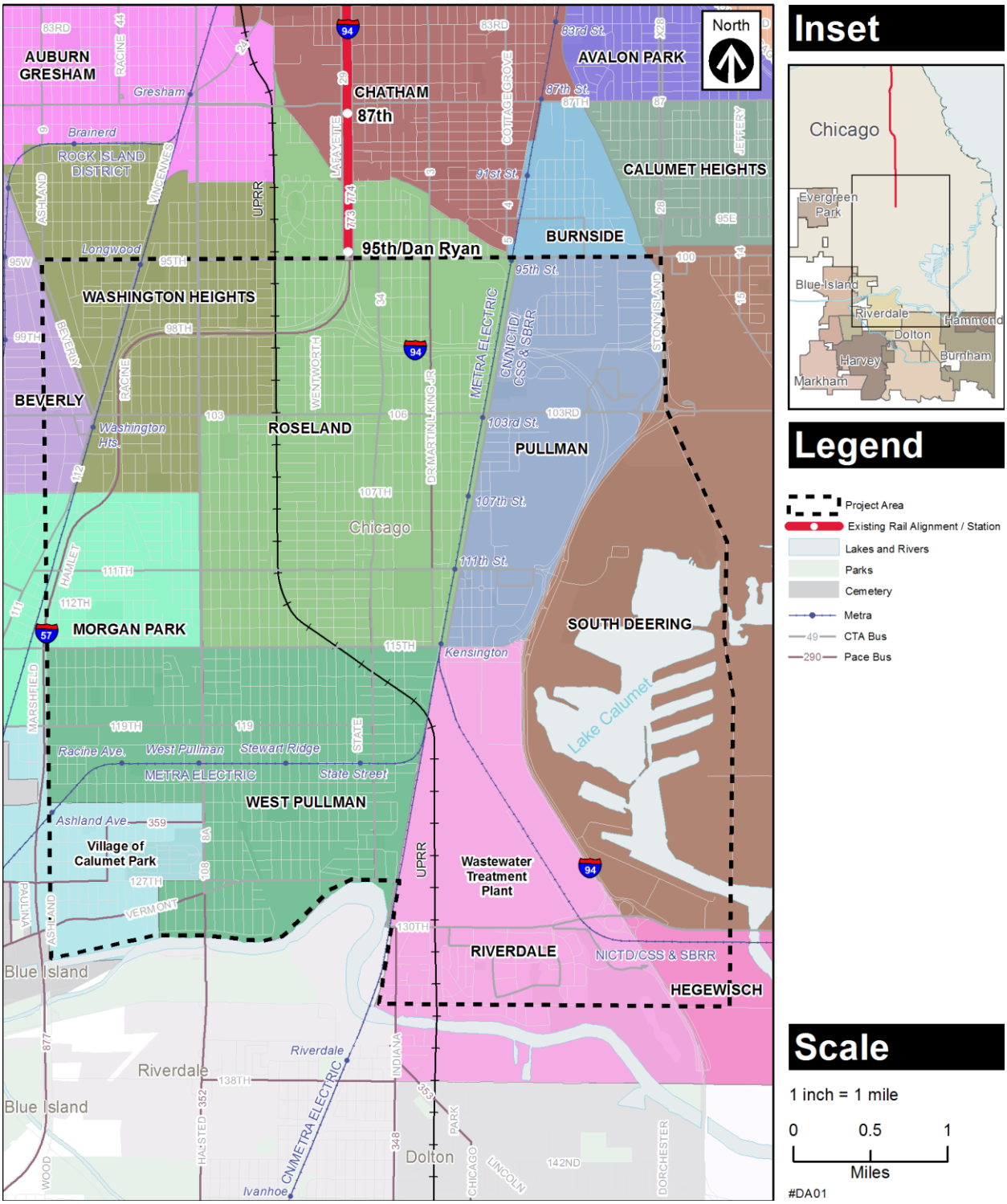


Figure 1-1: RLE Project Area and Community Areas within the City of Chicago

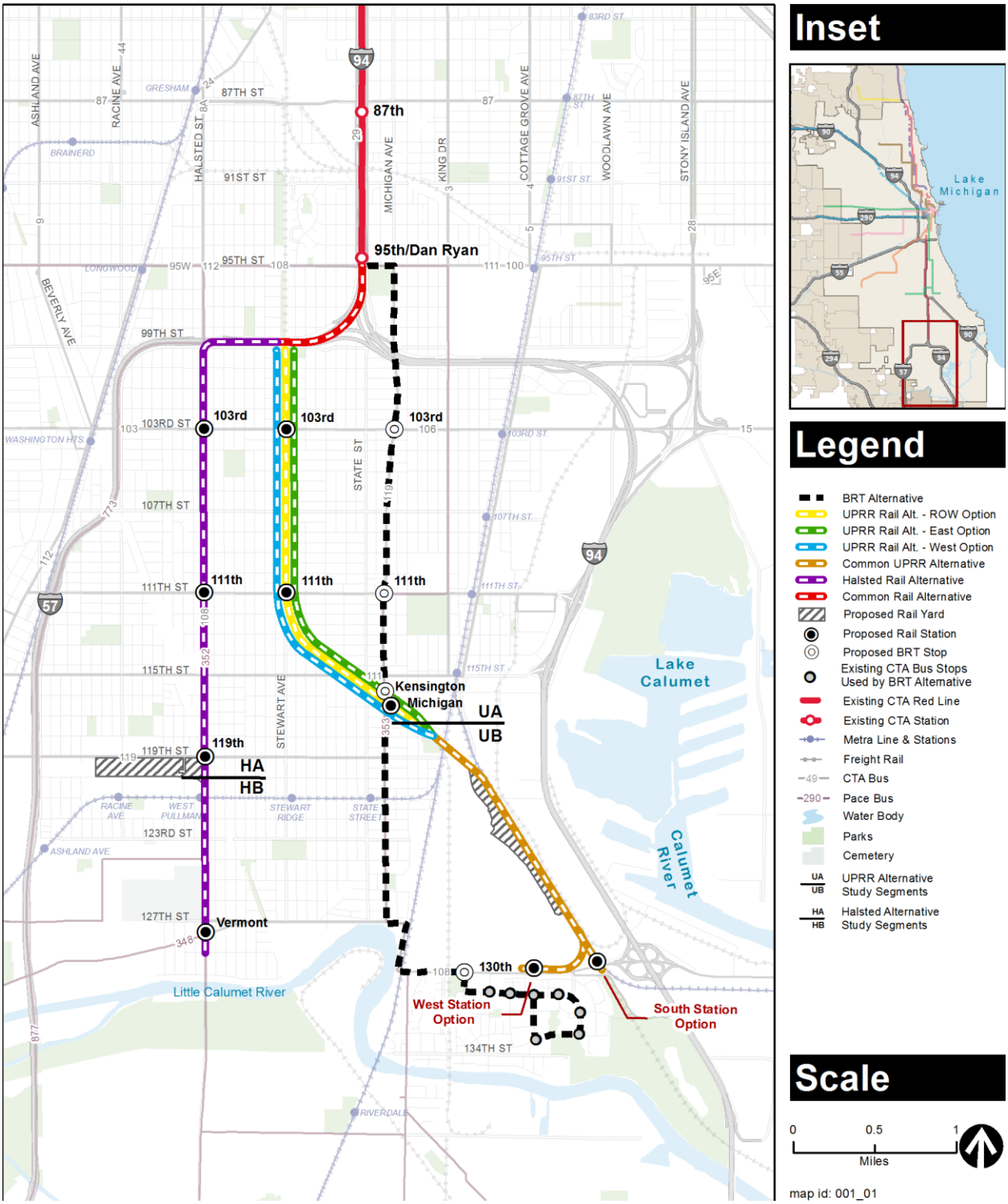


Figure 1-2: RLE Project Alternatives

Section 2
Description of Build Alternatives

The following three alternatives are discussed in this technical memorandum: BRT Alternative, UPRR Rail Alternative, and Halsted Rail Alternative. One of the alternatives, the UPRR Rail Alternative, has three options. For a more detailed description of the alternatives, including the proposed transit operations, refer to the *Description of Alternatives*. Two alternatives and one option are no longer being pursued (for reasons stated in the Draft Environmental Impact Statement: BRT Alternative (Section 2.1), UPRR Rail Alternative – ROW Option (Section 2.2.1.1), and Halsted Rail Alternative (Section 2.3 including the 119th Street Yard and Shop). The UPRR Rail Alternative West Station Option is also no longer being pursued.

2.1 BRT Alternative

The proposed BRT Alternative is a 5.5-mile long BRT alternative that would operate between the existing 95th Street Terminal and 130th Street via 95th Street, Michigan Avenue, 127th Street, Indiana Avenue, and 130th Street. Four stops with improved bus shelters would be built at 103rd Street and Michigan Avenue, 111th Street and Michigan Avenue, Kensington Avenue and Michigan Avenue, and 130th Street and Eberhart Avenue. The bus route would continue through Altgeld Gardens with stops at 131st Street and Langley Avenue, 131st Street and Corliss Avenue, 131st Street and Ingleside Avenue, 132nd Street and Ellis Avenue, 133rd Street and Ellis Avenue, and 133rd Place and Corliss Avenue. The BRT Alternative is illustrated in Figure 2-1.

The streets on which the BRT Alternative would operate are summarized in Table 2-1.

Table 2-1: BRT Alternative Street Summary

Street	Width (feet)	Number of Lanes	Center Turn Lane	Parking
95th Street	80	4	Yes	No
Michigan Avenue	40	2	No	Yes
127th Street	40	4	No	No
Indiana Avenue	40	4	No	No
130th Street	60	4	Yes	No

2.1.1 Infrastructure

Projects already committed through the Chicago Metropolitan Agency for Planning Fiscal Year 2010–2015 Transportation Improvement Program would be constructed. Regular maintenance of existing track and structures would continue.

No new dedicated bus lanes would be provided for the BRT Alternative. Parking lanes would be removed along some portions of the alignment.

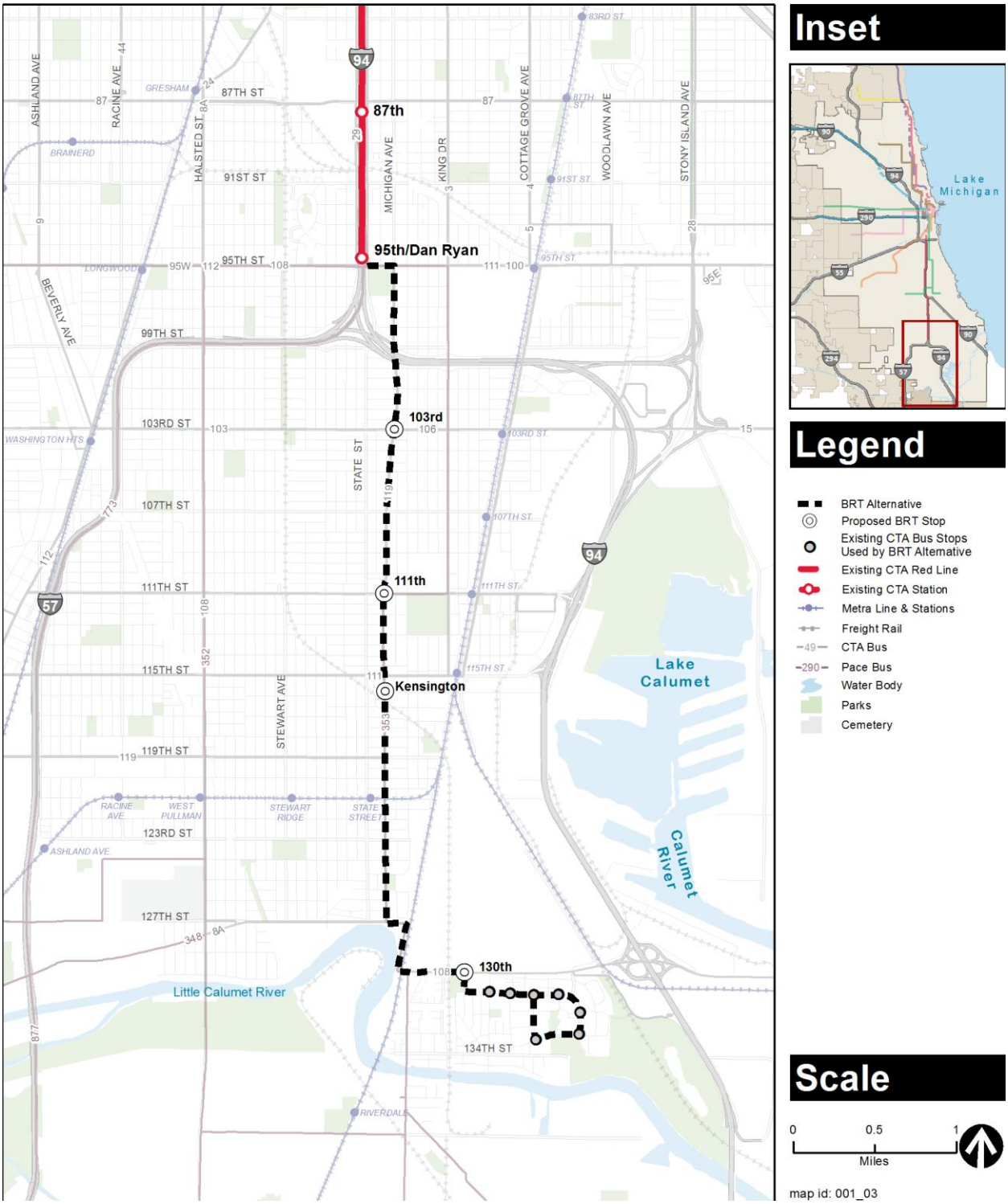


Figure 2-1: BRT Alternative

2.1.2 Stops

Improved bus shelters would be provided at the 103rd Street, 111th Street, Kensington Avenue, and 130th Street stops. Park & ride facilities with a total capacity of 700 parking spaces in the year of construction and up to 2,800 parking spaces in a later year (2030) would be constructed at the stop locations, as shown in Table 2-2.

Table 2-2: BRT Alternative Park & Ride Facilities

Location	Construction Year	Horizon Year (2030)
103rd Street	100	200
111th Street	100	200
Kensington Avenue	100	1,000
130th Street	400	1,400
Total	**700**	**2,800**

2.1.3 Yard

The 98th Street yard and shop at the south end of the existing Red Line would continue to be used for Red Line trains. Currently all Red Line cars are operated and maintained from the Howard and 98th Street facilities. The 98th Street shop facility is more than 40 years old, having been constructed in 1969 as part of the original Dan Ryan Line construction project. The 98th Street shop is within an expressway median and is difficult to access for material delivery because of its grade separation from local streets. The 98th Street yard and shop would eventually need to be replaced regardless of the RLE Project. There is capacity at existing CTA bus garages to store buses for the BRT Alternative, and the 103rd Street Garage would be primarily used.

2.2 UPRR Rail Alternative

The UPRR Rail Alternative would extend the heavy rail transit Red Line from the existing 95th Street Terminal to a terminal location at 130th Street. The Chicago Transit Board adopted the UPRR Rail Alternative as the Locally Preferred Alternative at its August 12, 2009 meeting.

The UPRR Rail Alternative is a 5.3-mile extension of the existing Red Line. The Red Line would operate on an elevated structure heading south from 95th Street along I-57 for nearly ½ mile until reaching the UPRR corridor in the vicinity of Eggleston Avenue. It would then turn south along the UPRR corridor to approximately 111th Street where it would head southeast. East of Prairie Avenue, the alignment crosses over the Canadian National (CN)/Metra Electric tracks near 119th Street, where it would transition to an at-grade profile and then continue southeast alongside the Northern Indiana Commuter Transportation District Chicago South Shore & South Bend Railroad (NICTD/CSS & SBRR) ROW using a portion of Norfolk Southern Railway and Consolidated Rail Corporation right-of-ways to terminate at 130th Street. Four stations are planned at 103rd Street, 111th Street, Michigan Avenue, and 130th Street. The UPRR Rail Alternative is illustrated in Figure 2-2.

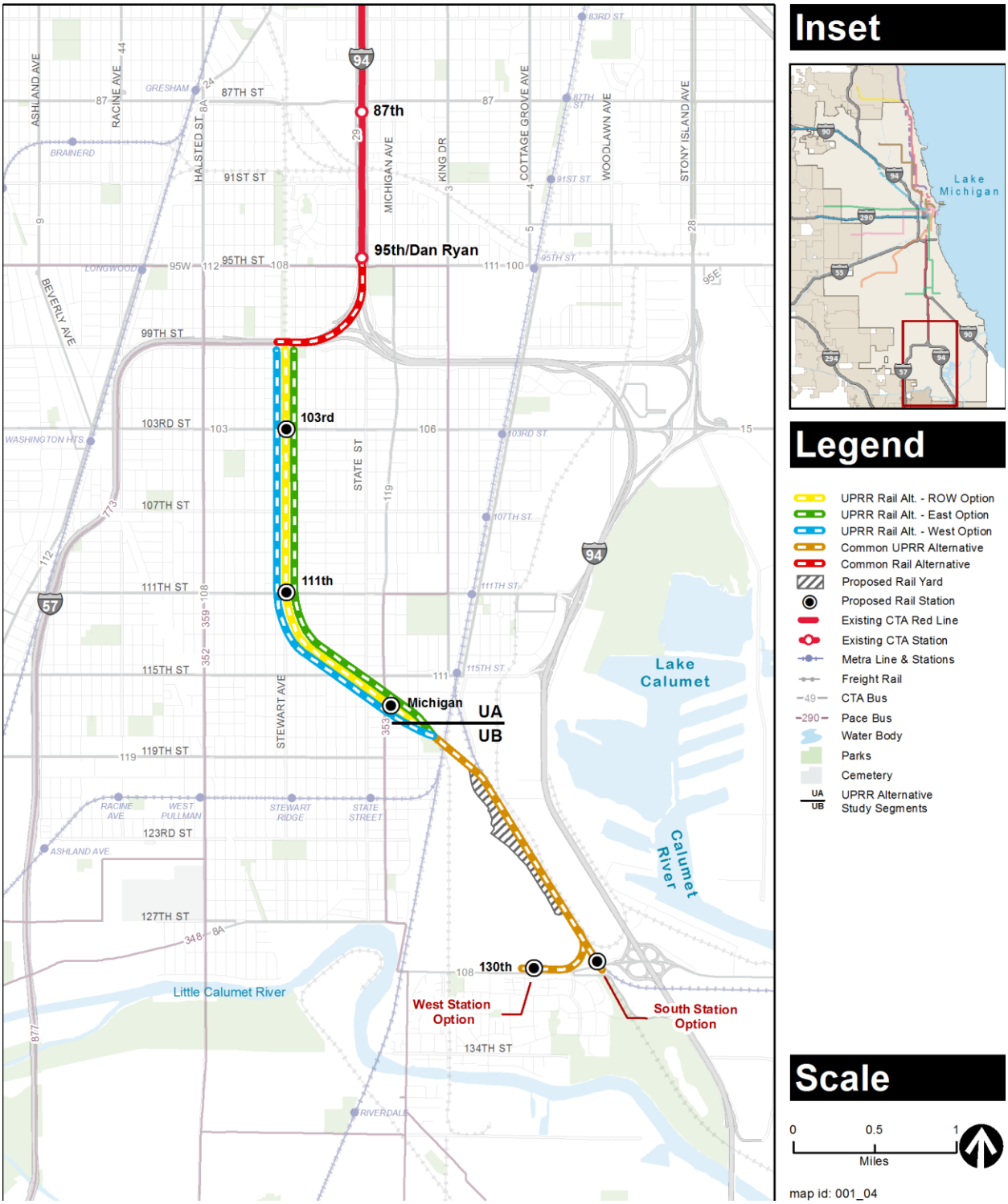


Figure 2-2: UPRR Rail Alternative with ROW, East, and West Options

Three UPRR Rail Alternative options for the length between I-57 and the CN/Metra Electric tracks will be studied in the EIS:

- ROW Option: CTA tracks placed in the UPRR ROW; UPRR trains would relocate to another corridor as part of a separate, independent project under study by the City of Chicago
- East Option: CTA tracks placed immediately adjacent to the UPRR ROW to the east
- West Option: CTA tracks placed immediately adjacent to the UPRR ROW to the west

Two options for the 130th Street station would be studied in the EIS:

- South Station Option: located to the west of the NICTD/CSS & SBRR ROW at 130th Street
- West Station Option: located along the north side of 130th Street to the west of the NICTD/CSS & SBRR route

2.2.1 Infrastructure

All three UPRR Rail Alternative options would include operations on elevated structure from 95th Street to the CN/Metra Electric tracks near 119th Street. The alignment would then continue at grade through an industrial area with no public through streets. Existing service driveways and Metropolitan Water Reclamation District of Greater Chicago (MWRD) access roads would be grade separated.

The elevated substructure would consist of reinforced cast-in-place concrete hammerhead piers on drilled shafts or steel piles. The superstructure would consist of steel girders with a concrete deck supporting direct fixation track. A typical cross section is shown on Figure 2-3.

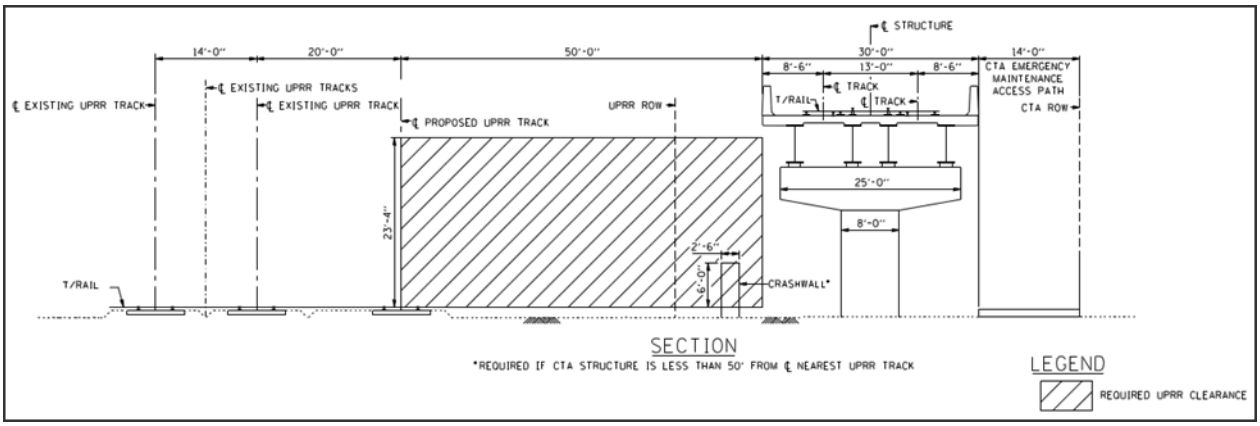


Figure 2-3: UPRR Rail Alternative Side Option Typical Cross Section

The minimum vertical clearances are 14 feet 9 inches for local roadways and 16 feet 9 inches for freeways. At locations where the alignment would cross UPRR tracks, the minimum vertical clearance would be 23 feet 4 inches in accordance with UPRR standards. The minimum vertical

clearance for all other railroads is 23 feet 0 inches. IDOT has requested a minimum of 27'-0" from existing edge of pavement along I-57 to the face of any pier to preserve room for future widening.

Spans between piers are expected to typically be 60 to 100 feet, and as long as 140 feet. Span length is based on site conditions, geometrics, and clearance requirements.

2.2.1.1 ROW Option

As part of the UPRR Rail Alternative ROW Option, the CTA tracks would be placed in the UPRR ROW between I-57 and the CN/Metra Electric tracks. The UPRR tracks may be relocated to another corridor as part of a separate, independent project under study by the City of Chicago.

Substations are tentatively proposed at the following locations: to the west of the CTA tracks between 104th and 105th Street; to the west of the CTA tracks between Perry Avenue and Lafayette Avenue; and to the west of the CTA tracks north of the proposed parking structure for the South Station Option, or along the curve of the CTA tracks near 130th Street for the West Station Option. An additional substation is proposed within the 120th Street yard and shop facility.

2.2.1.2 East Option

As part of the East Option, the CTA tracks would be placed immediately adjacent to the UPRR ROW to the east between I-57 and the CN/Metra Electric tracks. UPRR anticipates adding a third track to the east of their existing two tracks. The distance between the centerline of the proposed UPRR third track and the CTA structure would be 50 feet except for the following locations: 103rd Street station (approximate stationing 154+00 to 181+00 and between State Street and Michigan Avenue (approximate stationing 255+00 to 270+00).

Substations are proposed at the following locations: 98th Street Yard and Shop, near 101st Street, near 107th Street, near Lafayette Avenue, within the 120th Street yard and shop area, and near the 130th Street station.

2.2.1.3 West Option

As part of the West Option, the CTA tracks would be placed immediately adjacent to the UPRR ROW to the west between I-57 on the north end and the UPPR tracks near Kensington Park on the south end. The distance between the UPRR centerline of existing west track and the proposed CTA structure would be 50 feet except for the following locations: 99th Street (approximate stationing 138+00 to 142+00) and at the Prairie Avenue/UPRR crossing (approximate stationing 275+00 to 285+00).

Substations are proposed at the following locations: 98th Street Yard and Shop, near 101st Street, near 107th Street, near Lafayette Avenue, within the 120th Street yard and shop area, and near the 130th Street station.

2.2.2 Stations

Four stations are proposed for the UPRR Rail Alternative options: 103rd Street, 111th Street, Michigan Avenue, and 130th Street. Two station options are under evaluation for the 130th Street station: a South Station Option and a West Station Option.

All intermediate stations are proposed as island platforms, 26 feet wide and 520 feet long. Platforms would be built to accommodate ten-car trains. All stations would be Americans with Disabilities Act (ADA) accessible with elevators.

Bus transfer and park & ride facilities are planned for all stations with a capacity of 1,500 parking spaces in the year of construction and up to 3,700 parking spaces in a later year (2030), as shown in Table 2-3.

Table 2-3: UPRR Rail Alternative Park & Ride Facilities

Location	Construction Year	Horizon Year (2030)
103rd Street	200	200
111th Street	200	200
Michigan Avenue	200	1,000
130th Street	900	2,300
Total	**1,500**	**3,700**

A brief description of the stations and parking is provided below. For more details, please refer to the *Description of Alternatives*.

2.2.2.1 103rd Street Station

The primary entrance to the 103rd Street station would be located on the north side of 103rd Street, and the auxiliary entrance would be located on the north side of 103rd Place. The station would be ADA accessible with elevators.

As part of the ROW Option, two surface parking lots would be located to the northeast and southwest of the intersection of 103rd Street with the UPRR tracks. A bus turnaround for CTA bus route #9 would be included at the northeast parking lot.

As part of the East Option, a surface parking lot would be located to the east of the tracks north of 103rd Street and a second surface parking lot would be located to the west of the tracks between 103rd Street and 103rd Place. A bus turnaround for CTA bus route #9 would be included at the northeast parking lot.

As part of the West Option, a surface parking lot would be located to the west of the tracks between 103rd Place and 104th Street. A bus turnaround for CTA bus route #9 would be included at the northeast corner of the 103rd Street and UPRR tracks intersection.

2.2.2.2 111th Street Station

For the ROW and West Options, the primary entrance to the 111th Street station would be located near 110th Place. The auxiliary entrance would be located north of 110th Street. For the East Option, the primary entrance to the 111th Street station would be located at 110th Street. The auxiliary entrance would be located between 109th Street and 109th Place. The station would be ADA accessible with elevators.

As part of the ROW Option, two surface parking lots would be located to the northeast and northwest of the intersection of 111th Street with the UPRR tracks. A bus turnaround for Pace bus route #352 would be included at the northwestern parking lot.

As part of the East Option, a surface parking lot would be located to the east of the tracks north of 110th Place, and a second surface parking lot would be located to the west of the tracks between 111th Street and 110th Street. A bus turnaround for Pace bus route #352 would be included at the northwestern parking lot.

As part of the West Option, a surface parking lot would be located to the west of the tracks between 110th Place and 110th Street. A bus turnaround for Pace bus route #352 would be included at the parking lot.

2.2.2.3 Michigan Avenue Station

For the ROW and West Options, the primary entrance to the Michigan Avenue station would be located on the west side of Michigan Avenue, and the auxiliary entrance would be located on the south side of 116th Street. For the East Option, the primary entrance to the Michigan Avenue station would be located on the east side of Michigan Avenue. The auxiliary entrance would be located on the north side of 116th Street. The station would be ADA accessible with elevators.

As part of the ROW Option, a three-story parking garage would be constructed. The ground level of the parking garage would be available for retail and/or community facilities and would include a bus turnaround facility for CTA route #119 and Pace route #359. A second surface lot would be located to the east of the tracks, between 116th Street and Kensington Avenue.

As part of the East Option, a three-story parking garage would be constructed. The ground level of the parking garage would be available for retail and/or community facilities, and would include a bus turnaround facility for CTA route #119 and Pace route #359. A second surface lot would be located to the east of the tracks, between 116th Street and Kensington Avenue.

As part of the West Option, a five-story parking garage would be constructed. The ground level of the parking garage would be available for retail and/or community facilities, and would include a bus turnaround facility for CTA route #119 and Pace route #359.

2.2.2.4 130th Street Station

Two options for the 130th Street station are being studied in the EIS:

- South Station Option: located along the west side of the NICTD/CSS & SBRR ROW, just north of 130th Street
- West Station Option: located to the west of the NICTD/CSS & SBRR ROW and along the north side of 130th Street

As part of both station options, the station building would be approximately 15,000 square feet (200 feet by 75 feet), which would follow CTA's typical design standards for stations. The station house would provide sufficient space for CTA customer operations, maintenance, mechanical rooms, staff offices, and areas for small retail stores. The retail area would primarily serve commuters and local residents.

Both the South and West Station Options would be configured with three tracks, creating a 600-foot-long side and center platform arrangement. The boarding platform would allow for ten-car trains. The primary entrance to the station house would be ADA accessible.

Each station option would include a bus terminal with four bus bays and an overhead canopy. Buses would queue directly outside the primary entrance of the station to provide the closest possible connection between the rail line and bus routes. An auto drop-off area would be located near the station house in addition to a park & ride facility. Secure, weather-protected bicycle parking would be provided.

2.2.2.4.1 South Station Option

The South Station Option site would be between the MWRD facility (on the west) and the NICTD/CSS & SBRR rail track (on the east), using a portion of the Indiana Harbor Belt alignment. There would be a primary station entrance north of 130th Street at 130th Place, and an auxiliary entrance south of 130th Street between 130th Street and Doty Avenue; the tracks and platforms would extend beneath 130th Street. The ADA-accessible auxiliary entrance on Doty Avenue would provide a more convenient and direct access to Altgeld Gardens and Carver Military Academy.

The South Station Option site is constrained due to its tight location between the MWRD drying ponds and the train tracks. The parking area would be located to the east of the existing MWRD fence. The parking area would be would consist of a multi-story parking garage with capacity for 2,300 vehicles.

Bus and vehicle traffic would enter and leave the station area from the current intersection of 130th Street and Cottage Grove Avenue. Cottage Grove Avenue, which primarily provides access to the MWRD drying ponds and semi-truck traffic, would be relocated to circulate around the station.

2.2.2.4.2 West Station Option

The West Station Option site would be on the north side of 130th Street across from Evans Avenue, nearly ¼ mile west of the South Station Option site. The site is west of where Evans Avenue meets 130th Street, across from Altgeld Gardens. The West Station Option site is nearly

twice the size of the South Station Option site, primarily due to available open land along the north side of 130th Street, south of the MWRD facility. The dimensions of the station, bus terminal, and surface parking areas would be similar in total area to those in the South Station Option. The station area would be located outside the existing MWRD fence. Parking would include a surface parking lot that could accommodate up to 350 parking spaces and a multi-storage garage that could accommodate 1,950 parking spaces.

There are no crosswalks on 130th Street between Indiana Avenue and Cottage Grove Avenue. As a result, a signal and pedestrian crosswalk is proposed at the intersection of 130th Street and Evans Avenue to accommodate pedestrians from the south side of 130th Street. The proposed pedestrian crossing and signalized intersection would be located south of the primary station entrance.

2.2.3 120th Street Yard and Shop

A yard (with capacity for up to 340 cars) and shop facility would be located on a combination of industrial and vacant land to the east of the CN/Metra Electric tracks and west of the NICTD/CSS & SBRR tracks at approximately 120th Street and Cottage Grove. The yard would be entirely at grade. A nominal amount of parking for employees would be included at the yard. The proposed yard location is shown in Figure 2-2. A tentative substation is proposed within the 120th Street yard on the west of the existing railroad tracks and to the east of the proposed shop facility.

2.3 Halsted Rail Alternative

The proposed Halsted Rail Alternative is a 5-mile extension of the existing Red Line. The Red Line would operate on an elevated structure heading south from 95th Street along I-57 until Halsted Street. It would then turn south and continue along Halsted Street past the intersection of Halsted Street and Vermont Avenue and end near 129th Street. Four stations are planned: for 103rd Street, 111th Street, 119th Street, and Vermont Avenue. The Halsted Rail Alternative is illustrated in Figure 2-4.

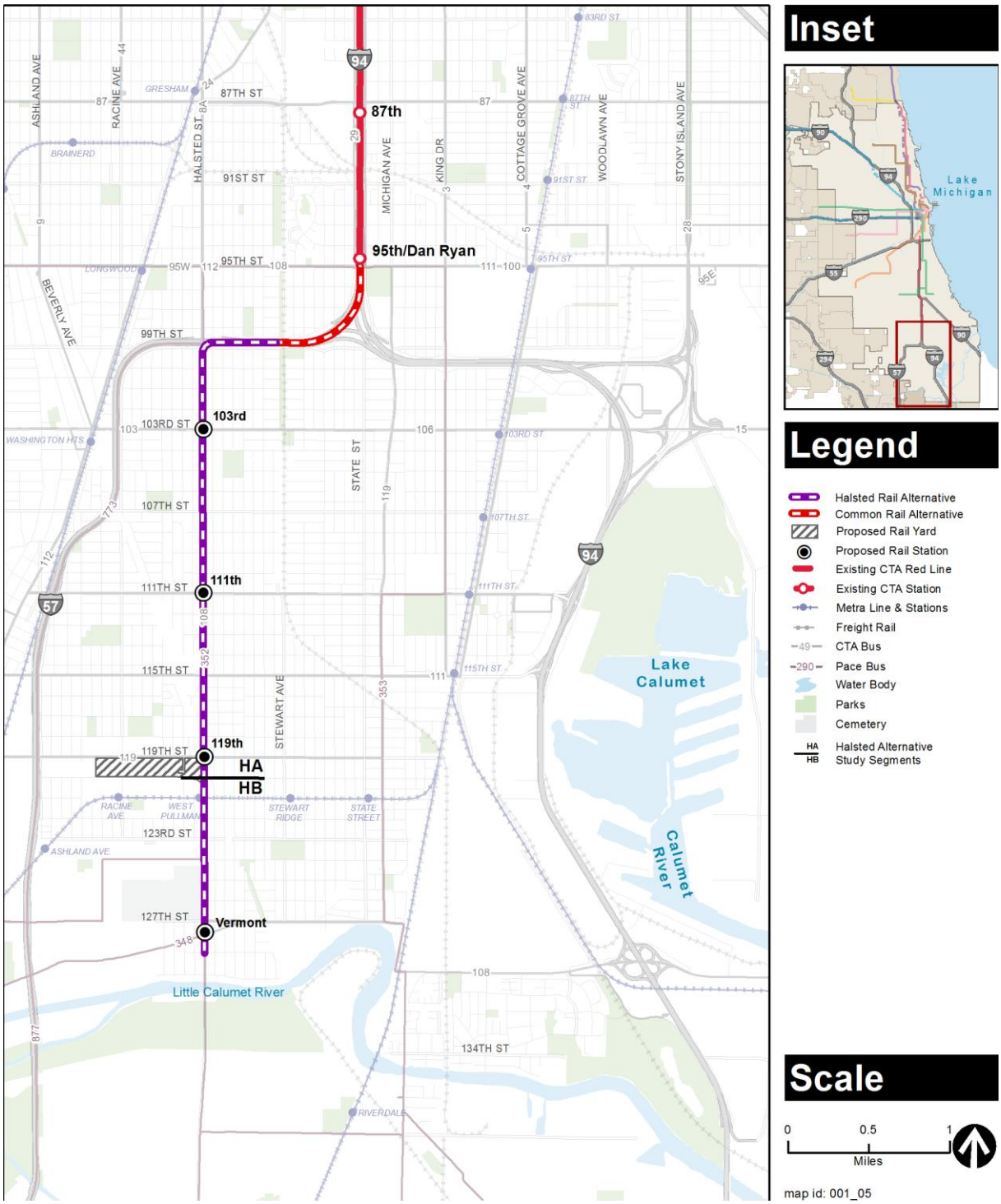
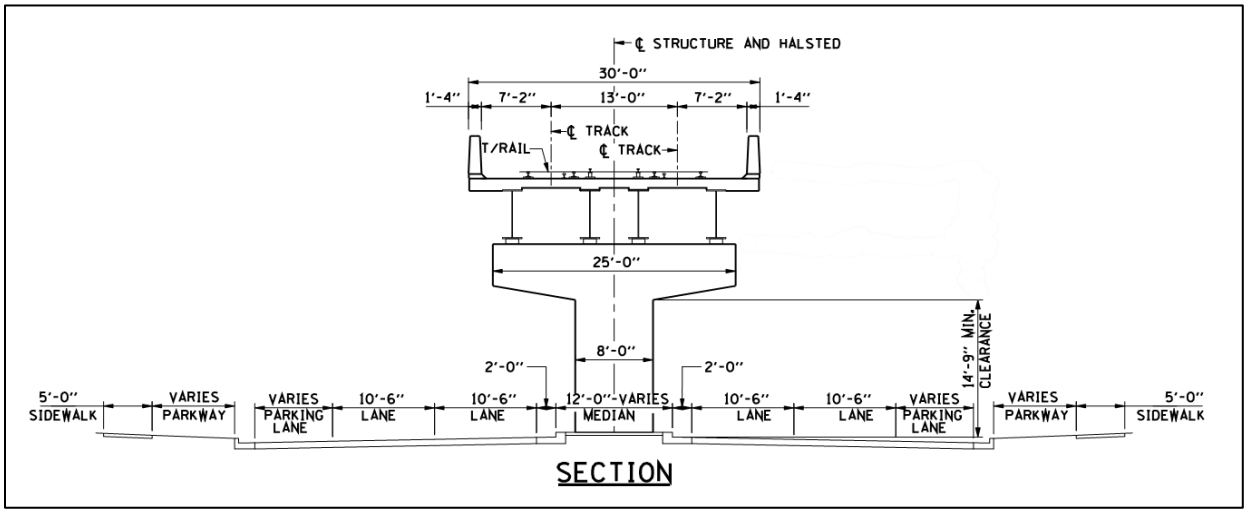


Figure 2-4: Halsted Rail Alternative

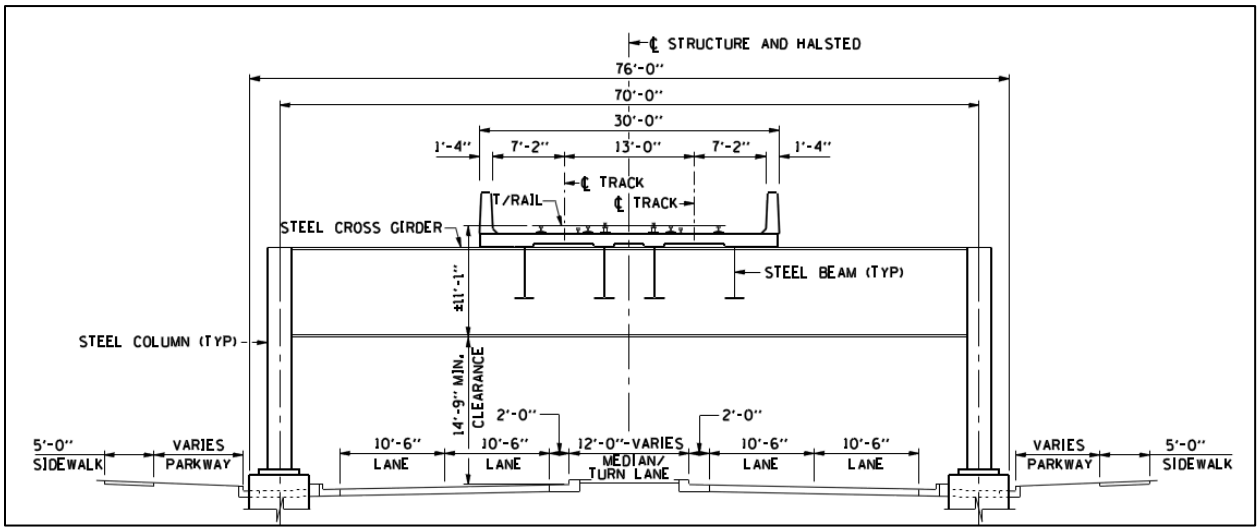
2.3.1 Infrastructure

The proposed corridor would be elevated and would be required to span over I-94 and I-57, UPRR and Metra Electric, local roads, and pedestrian facilities. A typical section is shown on Figure 2-5 and Figure 2-6.



Source: *Red Line Extension Plans and Profiles*

Figure 2-5: Typical Hammerhead Cross Section for Halsted Rail Alternative



Source: *Red Line Extension Plans and Profiles*

Figure 2-6: Typical Straddle Bent Cross-Section for Halsted Rail Alternative

The proposed typical structure required for the elevated section is anticipated to be similar to sections on the CTA's elevated Orange Line. Spans between piers are expected to typically be 60 to 100 feet, and as long as 140 feet. Span length is based on site conditions, geometries, and clearance requirements. At specific locations, steel cross girder bents would be used. Lengths

would be based on geometries, horizontal clearances, and the use of pier protection crash walls per American Railway Engineering and Maintenance-of-Way (AREMA) manual.

The substructure would consist of reinforced cast-in-place concrete hammerhead piers on drilled shafts or steel piles. The superstructure would consist of steel girders with a concrete deck supporting direct fixation track. Crossing I-57 at Halsted Street, the profile height would be approximately 22 feet over Halsted Street pavement, and approximately 34 feet over the expressway.

Minimum vertical clearances would be 14 feet 9 inches above local roads and 16 feet 6 inches above urban expressways. At locations where the Halsted Rail alignment would cross the UPRR, the minimum vertical clearance would be 23 feet 4 inches, per the UPRR standards. The minimum vertical clearance for the Metra Electric tracks would be 23 feet zero inches per AREMA standards.

Substations are proposed at the following locations: the northeast corner at the intersection of 101st Street and Halsted Street, the southeast corner at the intersection of 110th Street and Halsted Street, along Halsted Street between 120th Street and Metra Electric tracks, the southeast corner at the intersection of 126th Street and Halsted Street, and at the entrance to the yard along Peoria Street.

2.3.2 Stations

Four stations are proposed for the Halsted Rail Alternative: 103rd Street, 111th Street, 119th Street, and Vermont Avenue. All stations are proposed as side platforms, each a minimum of 14 feet wide and 520 feet long with shelters. Bus and park & ride facilities are planned for all stations. The anticipated number of parking spots is provided in Table 2-4.

Table 2-4: Halsted Rail Alternative Park & Ride Facilities

Location	Construction Year	Horizon Year (2030)
103rd Street	200	200
111th Street	200	200
119th Street	200	1,000
Vermont Avenue	900	2,300
Total	**1,500**	**3,700**

2.3.2.1 103rd Street Station

Station entrances to the 103rd Street station would be located on the east and west sidewalks of Halsted Street at the intersection with 103rd Street. The primary station entrances would be north of the intersection and the auxiliary entrances would be south of the intersection. Each entrance area would be on street level and would contain an elevator and stairs.

The 103rd Street station would have a park & ride lot on the northwest parcel adjacent to the station at the intersection of 103rd Street and Halsted Street. This lot would provide

approximately 200 new parking spaces. A bus turnaround for CTA bus route #9 would be included at the northeast parking lot.

2.3.2.2 111th Street Station

Station entrances to the 111th Street station would be located on the east and west sidewalks of Halsted Street at the intersection with 111th Street. The primary station entrances would be north of the intersection and the auxiliary entrances would be south of the intersection. Each entrance area would be on street level and would contain an elevator and stairs.

The 111th Street station would have a park & ride lot on the northwest parcel adjacent to the station at the intersection of 111th Street and Halsted Street. This lot would provide approximately 200 new parking spaces.

2.3.2.3 119th Street Station

Station entrances to the 119th Street station would be located on the east and west sidewalks of Halsted Street between 118th Street and 119th Street. The primary station entrances would be north of 119th Street and the auxiliary entrances would be south of 118th Street. Each entrance area would be on street level and would contain an elevator and stairs.

The 119th Street station would have a new multi-story park & ride facility that would hold approximately 1,000 parking spaces. The lot would be on the southwest parcel at the intersection of 119th Street and Halsted Street. A bus turnaround for Pace bus route #359 would be included at the parking lot.

2.3.2.4 Vermont Avenue Station

Station entrances to the Vermont Avenue station would be located on the east and west sidewalks of Halsted Street between the 128th Street and Vermont Avenue. The primary station entrances would be south of Vermont Avenue and the auxiliary entrances would be north of 128th Street. Each entrance area would be on street level and would contain an elevator and stairs.

The Vermont Avenue station would have a new, multi-story park & ride facility with approximately 2,300 parking spaces. The lot would be located on the south side of the intersection of Halsted and Vermont Avenues. The ground level of the parking garage would be available for CTA office space as well as retail and/or community facilities. Bus bays for CTA bus route #8A and Pace routes #348 and #352 would be included at the station.

2.3.3 119th Street Yard and Shop

The 119th Street yard and shop would be located south of the 119th Street station and north of the Vermont Avenue station to the west of Halsted Street. The parcel on which the yard would be constructed is west of the proposed park & ride facility at the 119th Street station. Track height would transition from elevated at station height to at grade between Halsted Street and Morgan Street, through the proposed park & ride facility. The yard would be entirely at grade. A nominal

amount of parking for employees would be included at the yard. The location of the proposed yard is shown in Figure 2-4.

The 98th Street yard and shop at the south end of the existing Red Line would continue to be used for Red Line trains. The CTA is considering utilizing the existing 98th Street shop for non-revenue equipment repairs once a new revenue equipment shop is constructed at 119th Street.

Section 3
Description of Construction

3.1 Construction Phasing and Segments

Section 3.3 describes the anticipated construction activities and methods of construction. Please refer to Section 3.3 for more details regarding construction methods. The estimated quantities and potential equipment are summarized in Attachment A.

3.1.1 Construction Assumptions For All Alternatives

The following are the major constructability, construction sequencing, and phasing assumptions. Phasing and construction segments may change due to refined engineering, available funding, and other factors later in the project implementation stage.

3.1.1.1 Constructability Assumptions

The coordinated construction of infrastructure and stations is a key component of planning and design. Assumptions that affect design solutions include the following:

- Ultimate station, park & ride facility, and yard locations.
- Ultimate aerial structure type. New construction of elevated structure includes foundation, columns, superstructure, and deck. New construction of retained fill structures includes foundation and two parallel reinforced concrete retaining walls with fill in between.
- The ability to construct facilities in sequences and phases to facilitate CTA operations, specifically around the 95th Street Terminal and 98th Street yard and shop. This includes systems (trackwork, traction power, signals and communications).
- The ability to construct facilities in sequences and phases to facilitate UPRR operations.
- The location and size of proposed foundations and structural members, potentially limited by clearance requirements (e.g., caisson size and depth, concrete pour access, steel piece weight and size, etc.)
- The ability to construct structures in sequences and phases to facilitate vehicular traffic operations on I-94 and 1-57.

The following parameters have been assumed for all build alternatives:

- The methods of construction required along the proposed alignments are anticipated to be conventional, utilizing standard construction methods and materials including cast-in-place concrete, pre-cast concrete, and structural steel.

- Streets with adjacent alleys would be used for site access during construction. New construction in and around the 95th Street Terminal would require some tracks to be taken out of service or realigned to access and perform the work. To perform this work in an efficient manner while maintaining reasonable service and access to the 98th Street yard and shop, it is anticipated that construction would be sequenced and phased to maintain access to the 98th Street yard and shop.

- Space for storage and staging of construction materials, equipment, and temporary facilities would be needed within and/or adjacent to the ROW. Construction material storage and contractor yard areas appear to be available along the alignments through a combination of publicly owned and privately owned properties. Construction access adjacent to the ROW could be required, especially during embankment, viaduct, and station construction durations.

- During construction, access to work zones adjacent to the expressway would require shoulder and lane closures. For the superstructure erection over expressway traffic lanes, temporary shutdown of all traffic would be required. Temporary shutdown of traffic would occur at nighttime and low traffic volume intervals per Illinois Department of Transportation (IDOT) approval. Construction adjacent to or over railroads would require flagging operations and scheduled track closures.

- It is anticipated that streets crossed by stations and viaducts, along with adjacent alleys, would be closed temporarily or the number of travel lanes would be reduced during heavy construction. Viaduct construction activities, along with all construction access, would be centered upon or phased around these streets and alleys.

Prior to construction, advance work would be necessary to verify existing site conditions, relocate and protect utilities, provide any temporary modifications to signal systems including the 95th Street Terminal as well as along or across any viaduct or roadway crossings, and provide special or temporary trackwork at required construction interface zones.

Constructability is a key issue that must be coordinated with the design to ensure the ability to construct facilities in sequences and phases as required in facilitating CTA, UPRR, and highway operations.

3.1.2 BRT Alternative

3.1.2.1 Construction Segments

Construction activities would be grouped by type of work and location. Overall schedule and coordination of all construction segments would be phased and scheduled to maintain CTA operations at the 95th Street Terminal and 98th Street yard and shop, and vehicular traffic on affected expressways and roadways. Construction for the single segment could be sequenced to coordinate with CTA operations at the 95th Street Terminal.

The corridor is divided into one segment for the purposes of describing construction activities. The construction segment for the BRT Alternative is shown on Figure 3-1. The conceptual engineering plans for the alternative have been provided separately.

3.1.2.2 Construction Phasing

Work activities within the single segment for the BRT Alternative are described below.

Segment BRT-B-1: From the 95th Street Terminal to the Eberhart Avenue stop.

Work Activities

- New construction of BRT shelters and amenities at BRT stops
- New construction of park & ride facilities
- New construction of pavement markings and crosswalks
- New construction of signage
- New construction of sidewalk improvements at BRT stops
- New construction of ADA-compliant ramps at BRT stops
- New construction of bus pads at BRT stops
- New construction of lighting at BRT stops
- New construction of a traffic signal at the 130th Street/Eberhart Avenue intersection
- New construction of transit signal priority detectors and improvement of traffic signal controllers at existing signalized intersections
- Utility relocation or new construction at BRT stops, park & ride facilities, and signalized intersections
- Removal of on-street parking spaces at BRT stops

Construction Phasing

All of the construction work activities may require temporary shutdown of traffic. Temporary shutdown of traffic would occur at nighttime and low traffic volume intervals per IDOT approval. Work zones along the BRT Alternative would likely require temporary lane closures. Work would be sequenced to minimize impacts on adjacent roadways and both commercial and residential buildings.

Existing utilities would be protected during construction of the BRT stations, park & ride facilities, and traffic signal improvements.

3.1.3 UPRR Rail Alternative

3.1.3.1 Right-Of-Way Option

3.1.3.1.1 Construction Segments

Construction activities would be grouped by type of work and location. Overall schedule and coordination of all construction segments would be phased and scheduled to maintain CTA operations at the 95th Street Terminal and 98th Street yard and shop, and vehicular traffic on affected expressways and roadways. Special or temporary trackwork may be required between the 95th Street Terminal and the 98th Street yard and shop. Construction for single segments or groups of adjacent segments could be sequenced to coordinate with CTA operations at the 95th Street Terminal.

The corridor is divided into seven segments for the purposes of describing construction activities. The construction segments discussed in the proceeding sections do not correspond to Segments UA and UB that are being used in the environmental analysis for the UPRR Rail Alternative. Segments UA and UB are described in the *Description of Alternatives*. Construction segments for the three UPRR Rail Alternative Options are shown on Figure 3-1. The conceptual engineering plans for each of the alternatives and options have been provided separately.

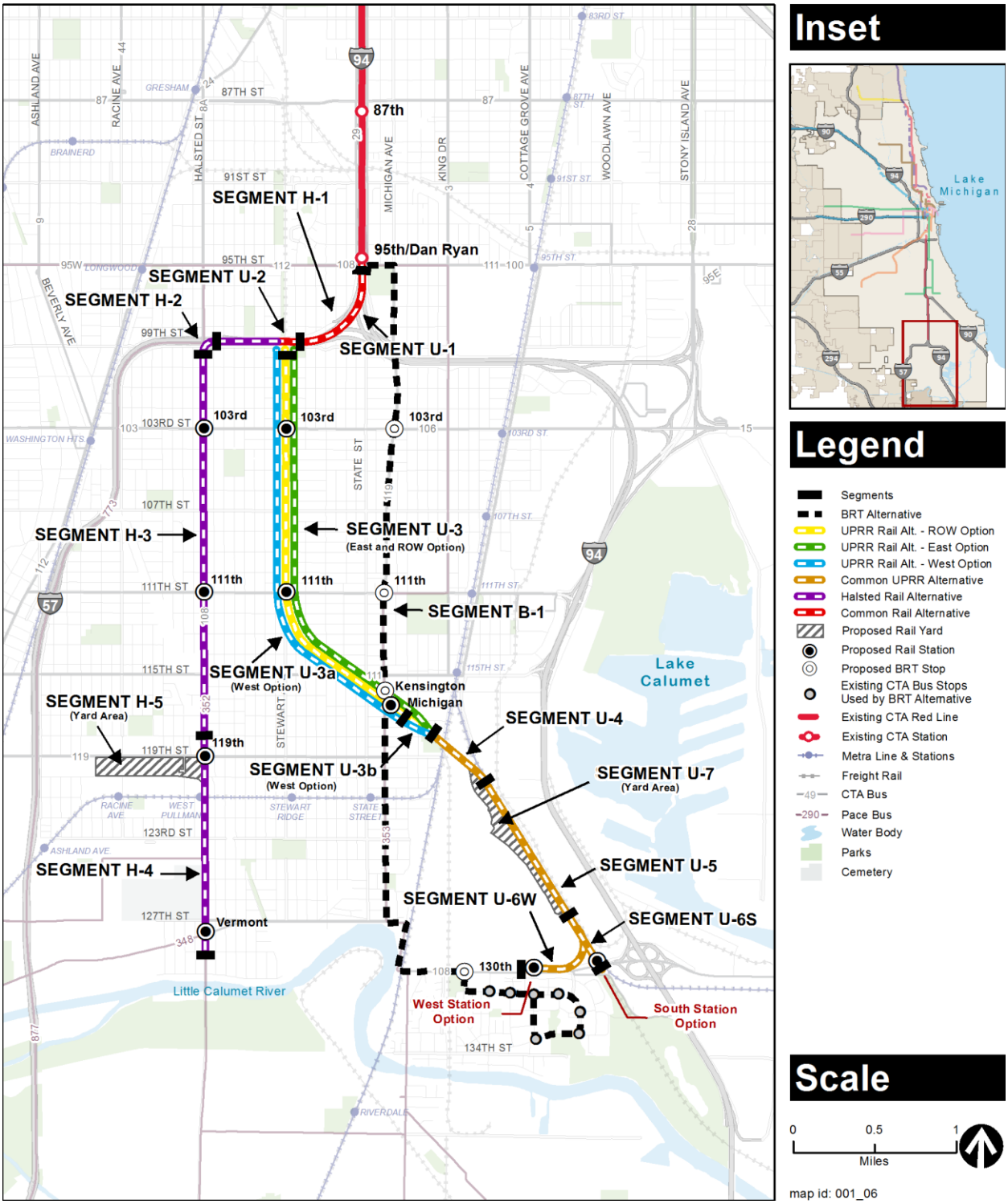


Figure 3-1: RLE Alternatives Construction Segment Map

3.1.3.1.2 Construction Phasing

Work activities within the eight segments for the ROW Option are described below.

Segment UPRR-ROW-U-1: From the 95th Street Terminal to the beginning of the horizontal curve at the UPRR crossing (approximate stationing 96+60 to 132+00)

Work Activities

- New trackwork and signals to tie into the 95th Street Terminal.
- Possible relocation of trackwork between 95th Street Terminal and the 98th Street yard and shop.
- New construction of retained fill structure south of 95th Street Terminal.
- New construction of single track, elevated structures over existing CTA tracks leading to the 98th Street yard and shop and over the existing CTA/SB I-94 tunnel.
- New construction of dual track, elevated structure through the I-94/I-57 interchange, across the westbound (WB) I-57 entrance ramp from northbound (NB) I-94, and along the I-57 corridor.
- Proposed structure construction would be sequenced to minimally affect traffic flow on the WB I-57 entrance ramp from NB I-94. For superstructure erection over expressway traffic lanes, temporary shutdown of all traffic would be required. Temporary shutdown of traffic would occur at nighttime and low traffic volume intervals per IDOT approval.

Construction Phasing

It may be necessary to relocate trackwork leading from the 95th Street Terminal to the 98th Street yard and shop to allow construction of proposed substructure within CTA ROW. Tying proposed trackwork and structure into existing trackwork at the 95th Street Terminal would be sequenced to provide rail car access to the 98th Street yard and shop. Proposed structure construction would be sequenced to maintain operating routes from the 95th Street Terminal to the 98th Street yard and shop as well as maintain traffic flow on I-94 through the tunnel.

Superstructure erection over the CTA tracks, I-94, the WB I-57 entrance ramp from NB I-94, and Wentworth Avenue would require temporary shutdown of CTA non-revenue operations and traffic. Temporary shutdown of traffic would occur at nighttime and low traffic volume intervals per IDOT approval. CTA non-revenue operations would be shutdown during off-peak hours or weekends. Work would be sequenced to minimize impacts on traffic flow on the I-57/I-94 interchange as well as in the I-57 corridor. Work zones adjacent to the expressway would require shoulder and probably lane closures.

The existing 6.5-foot-diameter sewer underneath both 99th Street and 102nd Street would be protected during construction. See Section 3.4 for more information regarding the protection of utilities during construction.

Segment UPRR-ROW-U-2: The horizontal curve at the UPRR crossing (approximate stationing 132+00 to 142+19)

Work Activities

- New construction of dual track, elevated structure consisting of multiple types of superstructure and substructure spanning along and across I-57 and within the UPRR corridor

Construction Phasing

Work would be sequenced to minimize impacts on traffic flow on I-57. Work zones adjacent to the expressway would require temporary shoulder and lane closures. Superstructure erection over I-57 would require temporary shutdown of northbound traffic.

The existing 10-foot-diameter Stewart Avenue water tunnel would be protected during construction of the foundations. See Section 3.4 for more information regarding the protection of utilities during construction.

Segment UPRR-ROW-U-3: From the end of the horizontal curve at the UPRR crossing to the CN/Metra Electric crossing (approximate stationing 142+19 to 286+12)

Work Activities

- New construction of elevated structure within the UPRR corridor
- New station construction at 103rd Street, 111th Street, and 115th Street
- New construction of surface parking lots and bus turnarounds at 103rd Street station and 111th Street station and new construction of a structured parking lot and bus turnaround at 1115th Street station
- New construction of two substations (approximate stationing 174+50 and 254+50)

Construction Phasing

Signaling would need to be replaced following construction of viaducts for the following at-grade UPRR crossings: 101st Street, 103rd Street, 107th Street, 109th Street, 111th Street, 115th Street, and State Street.

All existing structures and underground utilities will be identified. All existing utilities would be protected or relocated. The following known existing utilities and structures would be protected

during construction activities. Section 3.4 discusses methods for protecting nearby utilities and structures.

- 10-foot-diameter Stewart Avenue water tunnel
- Roseland Pumping Station and the associated underground pipes and vaults
- 10-foot-diameter sewer underneath Wentworth Avenue near 114th Street
- 17.5 foot, horseshoe shaped, MWRD Calumet Intercepting Sewer tunnel

Segment UPRR-ROW-U-4: From the CN/Metra Electric crossing to at-grade track (approximate stationing 286+12 to 310+03)

Work Activities

- New construction of dual track, elevated structure within the UPRR corridor, branching off and running along the east side of the corridor and over CN/Metra Electric
- New construction of elevated structure to 120th Street yard and shop track tie-in
- New construction of retained embankment structure to carry elevated structure to grade

Construction Phasing

Construction at the CN/Metra Electric crossing would be phased to minimize impacts on CN and Metra operations. Construction over and adjacent to the railroads would require flagging operations and potential limited track closures.

Segment UPRR-ROW-U-5: From at-grade track to the beginning of 130th Street station options (approximate stationing 310+03 to 360+02)

Work Activities

- Removal of Norfolk Southern Railway and Consolidated Rail Corporation right-of-way tracks. New construction of track roadbed at grade (including removal of any unsuitable soils, as applicable).
- New construction of the MWRD access road and bridge over the proposed CTA tracks and the NICTD/CSS & SBRR crossing (approximate stationing 357+00)

Construction Phasing

Coordination with MWRD is necessary to maintain operations during new track roadbed construction. If necessary, construction would be sequenced to construct the proposed access road and bridge over the CTA tracks first to allow MWRD facilities to continue operation.

Coordination with the NICTD/CSS & SBRR would be necessary as construction over and adjacent to the railroads would require flagging operations and scheduled track closures.

Segment UPRR-ROW-U-6S: South Station Option (approximate stationing 360+02 to 380+29)

Work Activities

- New construction of track roadbed
- New construction of the 130th Street station
- New construction of parking lots and a multi-story garage for the 130th Street station
- New construction for land development, bus bays, and road access for the 130th Street station
- New construction of the MWRD access road to 130th Street
- New construction of a substation (approximate stationing at 365+60)

Construction Phasing

Coordination with MWRD would be necessary to maintain current operations during new track roadbed construction and during the new road access for the 130th Street station. If necessary, construction would be sequenced to construct the proposed MWRD access road to the west of the proposed station first, allowing MWRD facilities to continue operation. Coordination with the NICTD/CSS & SBRR is also necessary as construction over and adjacent to the railroads would require flagging operations and scheduled track closures.

Segment UPRR-ROW-U-6W: West Station Option (approximate stationing 380+29 to 395+40)

Work Activities

- New construction of track roadbed
- New construction of the 130th Street station
- New construction of parking lots and a multi-story garage for 130th Street station
- New construction for land development, bus bays, and road access for the 130th Street station
- New construction of the MWRD access road and bridge to 130th Street
- New construction of a substation (approximate stationing at 375+50)
- New construction of crosswalks and signalized intersection at 130th Street and Evans Avenue

Construction Phasing

Coordination with MWRD would be necessary to maintain current operations during new track roadbed construction and during the new road access for the 130th Street station. If necessary, construction would be sequenced to construct the proposed MWRD access road and bridge crossing the proposed CTA tracks near station 371+00 first, allowing MWRD facilities to continue operation. Coordination with the NICTD/CSS & SBRR is also necessary as construction over and adjacent to the railroads would require flagging operations and scheduled track closures.

Segment UPRR-ROW-U-7: 120th Street yard and shop (approximate stationing 291+85/45+00 to 352+69/106+12)

See Section 3.2 for construction phasing and group information.

3.1.3.2 East Option

3.1.3.2.1 Construction Segments

Construction activities would be grouped by type of work and location. Overall schedule and coordination of all construction segments would be phased and scheduled to maintain CTA operations at the 95th Street Terminal and 98th Street yard and shop, and vehicular traffic on affected expressways and roadways. Special or temporary trackwork may be required between the 95th Street Terminal and the 98th Street yard and shop. Construction for single segments or groups of adjacent segments could be sequenced to coordinate with CTA operations at the 95th Street Terminal.

The corridor is divided into seven segments for the purposes of describing construction activities. Construction segments for the three UPRR Rail Alternative Options are shown on Figure 3-1.

3.1.3.2.2 Construction Phasing

Work activities within the eight segments for the East Option are described below.

Segment UPRR-E-U-1: From the 95th Street Terminal to the beginning of the horizontal curve at the UPRR crossing (approximate stationing 96+60 to 132+00)

Work activities (same as Segment UPRR-ROW-U-1)

- New trackwork and signals to tie into the 95th Street Terminal. Possible relocation of trackwork between the 95th Street Terminal and the 98th Street yard and shop.
- New construction of retained fill structure south of 95th Street Terminal.
- New construction of single track, elevated structures over existing CTA tracks leading to the 98th Street yard and shop and over the existing CTA/southbound (SB) I-94 tunnel.
- New construction of dual track, elevated structure through the I-94/I-57 interchange, across the WB I-57 entrance ramp from NB I-94, and within the I-57 corridor.

- Proposed structure construction would be sequenced to minimally affect traffic flow on the WB I-57 entrance ramp from NB I-94. For superstructure erection over expressway traffic lanes, temporary shutdown of all traffic would be required. Temporary shutdown of traffic would occur at nighttime and low traffic volume intervals per IDOT approval.

Construction Phasing (same as Segment UPRR-ROW-U-1)

It will be necessary to relocate trackwork leading from the 95th Street Terminal to the 98th Street yard and shop to allow construction of proposed substructure within CTA ROW. Tying proposed trackwork and structure into existing trackwork at 95th Street Terminal would be sequenced to provide rail car access to 98th Street yard. Proposed structure construction would be sequenced to maintain operating routes from 95th Street Terminal to 98th Street yard and maintain traffic flow on I-94 through the tunnel.

Superstructure erection over the CTA tracks, I-94, the WB I-57 entrance ramp from NB I-94, and Wentworth Avenue would require temporary shutdown of CTA non-revenue operations and traffic. Temporary shutdown of traffic would occur at nighttime and low traffic volume intervals per IDOT approval. Work would be sequenced to minimize impacts on traffic flow on the I-57/I-94 interchange as well as in the I-57 corridor. Work zones adjacent to the expressway would require shoulder and probably lane closures. Work activities would also affect traffic flow on the north frontage road to I-57 (also called Lafayette Avenue and 98th Place).

The existing 6.5-foot-diameter sewer underneath both 99th Street and 102nd Street would be protected during construction. See Section 3.4 for more information regarding the protection of utilities during construction.

Segment UPRR-E-U-2: The horizontal curve at the UPRR crossing (approximate stationing 132+00 to 142+00)

Work Activities (same as Segment UPRR-ROW-U-2)

- New construction of dual track, elevated structure consisting of multiple types of superstructure and substructure spanning along and across I-57 and within the UPRR corridor

- For the East Option, this construction segment crosses the western portion of Wendell Smith Park

Construction Phasing

Work would be sequenced to minimize impacts on traffic flow on I-57 and UPRR operations. Work zones adjacent to the expressway may require temporary shoulder and lane closures. Superstructure erection over I-57 would require temporary shutdown of northbound traffic. Construction adjacent to railroads would require flagging operations and scheduled track closures.

The existing 10-foot-diameter Stewart Avenue water tunnel would be protected during construction of the foundations. See Section 3.4 for more information regarding the protection of utilities during construction.

The construction activities in the western portion of Wendell Smith Park would include construction of foundations, placement of beams, and construction of the superstructure. Activities require access of a variety of construction equipment, material delivery, haul trucks, and labor. Construction fencing would be required to separate activities occurring in the eastern portion of the park from the construction activities in the western portion.

Segment UPRR-E-U-3: From the end of the horizontal curve at the UPRR crossing to the CN/Metra Electric crossing (approximate stationing 142+00 to 285+00)

Work Activities

- Demolition of existing buildings and structures in the proposed ROW where necessary. The conceptual engineering plans and profiles (provided separately) show the proposed ROW and construction easements necessary to conduct this work.
- Demolition or relocation of the communication tower currently located in Block Park.
- New construction of dual track, elevated structure consisting of multiple types of superstructure and substructure along the east side of the UPRR corridor. New construction of elevated structure includes foundation, columns, and deck.
- New station construction of stations at 103rd Street, 111th Street, and 115th Street.
- New construction of surface parking lots and bus turnarounds at 103rd Street station and 111th Street station and new construction of a structured parking lot and bus turnaround at 115th Street station.
- New construction of two substations (approximate stationing 174+30 and 253+60) with ductbanks to be constructed beneath the UPRR tracks.
- UPRR at-grade crossing gate and signal infrastructure replacement at seven crossings.

Construction Phasing

Work would be sequenced along the UPRR corridor to minimize impacts on UPRR operations. Construction adjacent to railroads would require flagging operations and scheduled track closures. Flagging operations would be needed to replace existing at-grade crossing gates and signals during construction of viaducts for the following at-grade UPRR crossings: 101st Street, 103rd Street, 107th Street, 109th Street, 111th Street, 115th Street, and State Street.

All existing structures and underground utilities will be identified. All existing utilities will be protected or relocated. The following known existing utilities and structures would be protected during construction activities:

- 10-foot-diameter Stewart Avenue water tunnel along the UPRR corridor
- Former Griffith Natatorium
- Roseland Pumping Station and the associated underground pipes and vaults
- 10-foot-diameter sewer underneath Wentworth Avenue near 114th Street
- 17.5 foot, horseshoe shaped, MWRD Calumet Intercepting Sewer tunnel

Segment UPRR-E-U-4: From the CN/Metra Electric crossing to at-grade track (approximate stationing 285+00 to 308+83)

Work Activities

- Demolition of existing buildings and structures in the proposed ROW where necessary. The conceptual engineering plans and profiles (provided separately) show the proposed ROW and construction easements necessary to conduct this work.
- New construction of dual track, elevated structure along the east side of the UPRR corridor and over the CN/Metra Electric tracks. Construction of track bed may include removal of unsuitable soils (as applicable).
- New construction of CTA yard and shop and substation construction.
- New construction of retained embankment structure to carry elevated structure to grade.

Construction Phasing

Construction at the CN/Metra Electric crossing would be phased to minimize impacts on CN and Metra operations. Construction over and adjacent to the railroads would require flagging operations and potential limited track closures.

Segment UPRR-E-U-5: From the at-grade track to the beginning of the 130th Street station options (approximate stationing 308+83 to 359+00)

Same as Segment UPRR-ROW-U-5. See Section 3.1.3.1 Segment UPRR-ROW-U-5 for more information.

Segment UPRR-E-U-6S: South Station Option (approximate stationing 359+00 to 379+27)

Work Activities (same as Segment UPRR-ROW-U-6S)

- Remove Norfolk Southern Railway and Consolidated Rail Corporation right-of-way tracks. New construction of track roadbed (including removal of any unsuitable soils as applicable) and systems elements
- New construction of the 130th Street station
- New construction of the parking lot and multi-story garage for 130th Street station
- New construction for land development, bus bays, and road access for the 130th Street station
- New construction for the MWRD access road to 130th Street
- New construction of a substation (approximate stationing at 365+60)

Construction Phasing (same as Segment UPRR-ROW-U-6S)

Coordination with MWRD would be necessary to maintain current operations during new track roadbed construction and during the new road access for the 130th Street station. If necessary, construction would be sequenced to construct the proposed MWRD access road to the west of the proposed station first, allowing MWRD facilities to continue operation. Coordination with the NICTD/CSS & SBRR would be necessary as construction over and adjacent to the railroads would require flagging operations and scheduled track closures. Construction of access roads will require temporary shoulder and lane closures.

Segment UPRR-E-U-6W: West Station Option (approximate stationing 379+27 to 394+38)

Work Activities (same as Segment UPRR-ROW-U-6W)

- New construction of track roadbed
- New construction of the 130th Street station
- New construction of parking for the 130th Street station
- New construction for land development, bus bays, and road access for the 130th Street station
- New construction of the MWRD access road and bridge to 130th Street
- New construction of a substation (approximate stationing at 375+50)
- New construction of crosswalks and signalized intersection at 130th Street and Evans Avenue

Construction Phasing (same as Segment UPRR-ROW-U-6W)

Coordination with MWRD would be necessary to maintain current operations during new track roadbed construction and during the new road access for the 130th Street station. If necessary, construction would be sequenced to construct the proposed MWRD access road and bridge crossing proposed CTA tracks (approximate stationing 370+00) first, allowing MWRD facilities to continue operation. Coordination with the NICTD/CSS & SBRR would be necessary as construction over and adjacent to the railroads would require flagging operations and scheduled track closures

Segment UPRR-E-U-7: 120th Street yard and shop (approximate stationing 290+26/45+00 to 351+67/106+79)

See Section 3.2 for construction phasing and group information for the 120th Street yard and shop.

3.1.3.3 West Option

3.1.3.3.1 Construction Segments

Construction activities would be grouped by type of work and location. Overall schedule and coordination of all construction segments would be phased and scheduled to maintain CTA operations at the 95th Street Terminal and 98th Street yard and shop, and vehicular traffic on affected expressways and roadways. Special or temporary trackwork may be required between the 95th Street Terminal and the 98th Street yard and shop. Construction for single segments or groups of adjacent segments could be sequenced to coordinate with CTA operations at the 95th Street Terminal.

The corridor is divided into seven segments for the purposes of describing construction activities. Construction segments for the three UPRR Rail Alternative Options are shown on Figure 3-1.

3.1.3.3.2 Construction Phasing

Work activities within the segments for the West Option are described below.

Segment UPRR-W-U-1: From the 95th Street Terminal to the beginning of the horizontal curve at the UPRR crossing (approximate stationing 96+60 to 132+00)

Work Activities (same as Segment UPRR-ROW-U-1)

- New trackwork and signals to tie into the 95th Street Terminal.
- Modifications of trackwork traction power and signals between the 95th Street Terminal and the 98th Street yard and shop.
- New construction of retained fill structures south of 95th Street Terminal.
- New construction of single track, elevated structures over existing CTA tracks leading to the 98th Street yard and shop and over the existing CTA/SB I-94 tunnel. New construction of dual

track, elevated structure through the I-94/I-57 interchange, across the WB I-57 entrance ramp from NB I-94 and along the I-57 corridor.

- Proposed structure construction would be sequenced to minimally affect traffic flow on the WB I-57 entrance ramp from NB I-94. For superstructure erection over expressway traffic lanes, temporary shutdown of all traffic would be required.

Construction Phasing (same as Segment UPRR-ROW-U-1)

It will be necessary to relocate trackwork leading from the 95th Street Terminal to the 98th Street yard and shop to allow construction of proposed substructure within CTA ROW. Tying proposed trackwork and structure into existing trackwork at 95th Street Terminal would be sequenced to provide rail car access to 98th Street yard and shop. Proposed structure construction would be sequenced to maintain operating routes from the 95th Street Terminal to the 98th Street yard and shop and maintain traffic flow on I-94 through the tunnel.

Superstructure erection over CTA tracks and I-94, the I-57 ramp, and Wentworth Avenue would require temporary shutdown of operation and traffic. Work would be sequenced to minimize impacts on traffic flow on the I-57/I-94 interchange as well as in the I-57 corridor. Work zones adjacent to the expressway would require shoulder and probably lane closures. Work activities would also affect traffic flow on the north frontage road to I-57 (also called Lafayette Avenue and 98th Place).

The existing 6.5-foot-diameter sewer underneath 99th Street and 102nd Street would be protected during construction. See Section 3.4 for more information regarding the protection of utilities during construction.

Segment UPRR-W-U-2: Horizontal curve at the UPRR crossing (approximate stationing 132+00 to 142+43)

Work Activities (same as Segment UPRR-ROW-U-2)

- New construction of dual track, elevated structure consisting of multiple types of substructure spanning along and across I-57 and the UPRR corridor

Construction Phasing

Work zones adjacent to the expressway and Eggleston Avenue may require temporary shoulder and lane closures. Superstructure erection over I-57 would require temporary shutdown of northbound traffic. Construction adjacent and across railroads would require flagging operations and scheduled track closures.

The existing 10-foot-diameter Stewart Avenue water tunnel would be protected during foundation construction. See section 3.4 for more information regarding the protection of utilities during construction.

Segment UPRR-W-U-3a: From the end of the horizontal curve at the UPRR crossing to the Prairie Street crossing (approximate stationing 142+43 to 275+00)

Work Activities

- Demolition of existing buildings and structures in the proposed ROW where necessary. The conceptual engineering plans and profiles (provided separately) show the proposed ROW and construction easements.
- New construction of dual track, elevated structure along the west side of the UPRR corridor.
- New construction of stations at 103rd Street, 111th Street, and Michigan Avenue.
- New construction of surface parking lots and bus turnarounds at 103rd Street station and 111th Street station and new construction of a structured parking lot and bus turnaround at 115th Street station.
- New construction of two substations and ductbanks beneath the UPRR ROW (approximate stationing 179+00 and 256+00).

Construction Phasing

Work would be sequenced along the UPRR corridor to minimize impacts on UPRR operations. Construction adjacent to railroads would require flagging operations and scheduled track closures. Flagging operations would be needed to replace existing at-grade crossing gates and signals during construction of viaducts for the following at-grade UPRR crossings: 101st Street, 103rd Street, 107th Street, 109th Street, 111th Street, 115th Street, and State Street.

The underground pipes and vaults associated with the Roseland Pumping Station and the 10-foot-diameter sewer underneath Wentworth Avenue near 114th Street would be protected during construction.

Segment UPRR-W-U-3b: From the Prairie Street crossing to the CN/Metra Electric crossing (approximate stationing 275+00 to 287+20)

Work Activities

- New construction of dual track, elevated structure along the east and west side of the UPRR corridor as well as across the UPRR tracks would consist of multiple types of super- and substructure spanning along and across the UPRR corridor and Prairie Avenue.

Construction Phasing

Work would be sequenced along and across the UPRR corridor to minimize impacts on UPRR operations. Construction adjacent to railroads would require flagging operations and scheduled

track closures. Work zones adjacent to Prairie Avenue may require lane closures and may cause temporary shutdown of all traffic.

The existing 17.5 foot, horseshoe shaped, MWRD Calumet Intercepting Sewer tunnel would be protected during construction.

Segment UPRR-W-U-4: From the CN/Metra Electric crossing to at-grade track (approximate stationing 287+20 to 311+02)

Work Activities

- Demolition of existing buildings and structures in the proposed ROW where necessary. The conceptual engineering plans and profiles (provided separately) show the proposed ROW and the construction easements.
- New construction of dual track, elevated structure along the east side of the UPRR corridor and over the CN/Metra Electric tracks.
- New construction of 120th Street yard and shop track tie-in and substation.
- New construction of retained embankment structure to carry elevated structure to grade.

Construction Phasing

Construction at the CN/Metra Electric crossing would be phased to minimize impacts on CN and Metra operations. Construction over and adjacent to the railroads would require flagging operations and potential limited track closures.

Segment UPRR-W-U-5: From the at-grade track to the beginning of the 130th Street station options (approximate stationing 311+02 to 361+19)

Same as Segment UPRR-ROW-U-5. See Section 3.1.3.1 Segment UPRR-ROW-U-5 for more information.

Segment UPRR-W-U-6S: South Station Option (approximate stationing 361+19 to 381+46)

Same as Segment UPRR-ROW-U-6S. See Section 3.1.3.1 Segment UPRR-ROW-U-6S for more information.

Segment UPRR-W-U-6W: West Station Option (approximate stationing 381+46 to 396+57)

Same as Segment UPRR-ROW-U6W. See Section 3.1.3.1 Segment UPRR-ROW-U-6W for more information.

Segment UPRR-W-U-7: 120th Street yard and shop (approximate stationing 292+45/45+00 to 353+86/106+79)

See Section 3.1.3.4 description of construction for the 120th Street yard and shop.

3.1.3.4 120th Street Yard and Shop

Overall schedule and coordination of construction for the 120th Street yard and shop would be scheduled in order to maintain operations at the MWRD facilities.

Work Activities

- Preparation of site (including removal of unsuitable soils, as applicable) and installation of drainage systems.
- Construction of the new yard and trackwork
- Construction of the new shop building
- Construction of the yard and shop access roads and parking
- Construction of new substation (approximate stationing at 320+90)

Construction Phasing

Work would be sequenced to minimize impacts on adjacent roadways and both commercial and residential buildings.

3.1.4 Halsted Rail Alternative

3.1.4.1 Construction Segments

Construction activities would be grouped by type of work and location. Overall schedule and coordination of all construction segments would be phased and scheduled to maintain CTA operations at the 95th Street Terminal and 98th Street yard and shop, and vehicular traffic on affected expressways and roadways. Special or temporary trackwork may be required between the 95th Street Terminal and the 98th Street yard and shop. Construction for single segments or groups of adjacent segments could be sequenced to coordinate with CTA operations at the 95th Street Terminal.

The corridor is divided into five segments for the purposes of describing construction activities. Construction segments for the Halsted Alternative are shown on Figure 3-1. The construction segments discussed in the proceeding sections do not correspond to Segments HA and HB that are being used in the environmental analysis for the Halsted Rail Alternative. Segments HA and HB are described in the *Description of Alternatives*.

3.1.4.2 Construction Phasing

Work activities within the five segments for the Halsted Alternative are described below.

Segment H-1: From the 95th Street Terminal to the beginning of the horizontal curve at the I-57 crossing (approximate stationing 96+60 to 158+00)

Work Activities

- New trackwork and signals to tie into the 95th Street Terminal. Possible relocation of trackwork between the 95th Street Terminal and the 98th Street yard and shop.
- New construction of retained fill structure south of 95th Street Terminal.
- New construction of single track, elevated structures over the existing CTA tracks leading to the 98th Street yard and shop and over the existing CTA/SB I-94 tunnel.
- New construction of dual track, elevated structure through the I-94/I-57 interchange, across the WB I-57 entrance ramp from NB I-94, and along the I-57 corridor.
- Proposed structure construction would be sequenced to minimally affect traffic flow on the WB I-57 entrance ramp from NB I-94. For superstructure erection over expressway traffic lanes, temporary shutdown of all traffic would be required. Temporary shutdown of traffic would occur at nighttime and low traffic volume intervals per IDOT approval.

Construction Phasing

It may be necessary to relocate trackwork leading from the 95th Street Terminal to the 98th Street yard and shop to allow construction of proposed substructure within CTA ROW. Tying proposed trackwork and structure into existing trackwork at 95th Street Terminal would also be sequenced to provide rail car access to 98th Street yard and shop. Proposed single track, elevated structure construction would be sequenced to maintain CTA operation between the 95th Street Terminal and the 98th Street yard and shop as well as to maintain vehicular traffic flow on I-94 through the tunnel. Superstructure erection over the existing CTA/SB I-94 tunnel would require temporary shutdown of vehicular traffic and CTA non-revenue operations to and from the 98th Street yard and shop.

Work would be sequenced to minimize impacts on traffic flow on the I-57/I-94 interchange, in the I-57 corridor, and in the I-57 corridor. Work zones adjacent to the expressway would require shoulder and probably lane closures. Superstructure erection over the I-57 ramp and Parnell Avenue would require temporary shutdown of traffic. Temporary shutdown of traffic would occur at nighttime and low traffic volume intervals per IDOT approval. Superstructure erection over and construction near the UPRR structure would require flagging operations and scheduled track closures.

The existing 6.5-foot-diameter sewer underneath both 99th and 102nd Streets would be protected during construction. See Section 3.4 for more information regarding the protection of utilities during construction.

Segment H-2: The horizontal curve at the I-57 crossing (approximate stationing 158+00 to 168+00)

Work Activities

- New construction of dual track, elevated structure consisting of multiple types of super- and substructure spanning along and across I-57 and across Halsted Street

Construction Phasing

Work zones adjacent to and across the expressway may require shoulder and lane closures. Superstructure erection would require temporary shutdown of NB traffic on I-57 and at the intersection of 99th Street and Halsted Street.

Segment H-3: From the end of the horizontal curve at the I-57 crossing to 119th Street station (approximate stationing 168+00 to 285+00)

Work Activities

- New construction of dual track, elevated structure consisting of multiple types of substructure along the Halsted Street corridor
- New construction of stations at 103rd Street and 111th Street
- New construction of surface parking lot and bus turnaround at 103rd Street station
- New construction of surface parking lot at 111th Street station
- New construction of two substations (approximate stationing 175+00 and 237+00)

Construction Phasing

Work would be phased to minimize traffic impacts on Halsted Street and adjoining streets. Elevated structure construction would require lane and street closures. Parking would potentially be eliminated along Halsted Street during construction to increase traffic flow. Superstructure erection would require temporary shutdown of all traffic along segments of Halsted Street during off-peak or weekend hours. Traffic would be detoured to the next major north/south roadway to minimize traffic impacts. Detour routes for Halsted Street would be identified in a Maintenance of Traffic Plan as part of final engineering.

Segment H-4: From 119th Street station to Vermont Avenue station (approximate stationing 285+00 to 367+30)

Work Activities

- Work will be tied into adjacent improvements.
- New construction of dual track, elevated structure consisting of multiple types of substructure along the Halsted Street corridor.
- New construction of stations at 119th Street and Vermont Avenue.
- New construction of surface parking lot and bus turnaround at 119th Street station.
- New construction of both surface and structured parking lots as well as bus bays at Vermont Avenue station.
- New construction of two substations (approximate stationing 293+50 and 343+00).
- New construction of three track, elevated structure south of the Vermont Avenue station.

Construction Phasing

Work would be phased to minimize traffic impacts on Halsted Street and adjoining streets. Elevated structure construction would require lane and street closures. Parking would potentially be eliminated from Halsted during construction to increase traffic flow. Superstructure erection would require temporary shutdown of all traffic along Halsted Street. Detour routes for Halsted Street would be identified as part of final engineering.

Segment H-5: 119th Street Yard and Shop (approximate stationing 299+47/500+00 to 306+96/1014+64)

See Section 3.1.4.3 for construction phasing and group information for the 119th Street yard and shop.

3.1.4.3 119th Street Yard and Shop

For analysis of construction, the 119th Street yard and shop has been separated from the Halsted Rail segments.

Work Activities

- Demolition of existing buildings and structures in the proposed ROW where necessary
- Construction of the new yard and track
- Construction of the new shop building

- Construction of the yard and shop access road and parking

Construction Phasing

Work would be sequenced to minimize impacts on adjacent roadways and buildings.

3.2 Potential Construction Staging Areas

Construction staging would be within the proposed ROW or within construction easements of stations and alternative alignments as indicated on the plan and profile drawings (provided separately). Construction staging areas are required to function for the following basic use criteria:

- Provide access to the construction work for construction personnel. Staging areas would include areas for office trailers, subcontractor site trailers, personnel facilities, and similar.
- Provide access to the construction work for construction equipment. This would include on-site storage of equipment being used on a continuous basis.
- Provide room for the construction personnel and equipment to perform the construction work.
- Provide access for trucks and associated loading equipment to remove materials generated on site, such as demolition salvaged materials and debris and excavation spoils. This type of material handling typically requires on-site segregation and interim on-site storage.
- Provide access, if possible, to store excavated material acceptable for reuse on the site.
- Provide access to receive and store permanent construction materials such as backfill and sub-base aggregates, steel reinforcing bars, and structural steel.
- Provide access to receive and store temporary construction materials such as concrete forms, shoring materials, scaffolding, and excavation support items.

Each construction site would have specific attributes to be accommodated, including the design of the proposed structure, existing conditions such as adjacent structures, and limited access from both an off-site and an on-site perspective. A productive and useful site access plan, with actual known requirements, would be developed after the proposed structure design is complete and adjacent property site conditions are known. Construction access is a critical contractor requirement that directly equates to an efficient construction process.

While the specific design and adjacent land uses at the time of construction would ultimately dictate the access plan, the following provides a general description of the types of properties typically targeted for construction staging in order to minimize impacts:

- CTA-acquired parcels, obtained for increased future infrastructure envelopes. Whole parcels or groups of parcels may be acquired and utilized during construction. After construction, residual property may be sold.

- Nearby parking lots may be used through the establishment of temporary construction easements.

- Abandoned adjacent parcels may be used through the establishment of temporary construction easements.

Because of limited available space adjacent to the construction site, off-site CTA, municipal, or privately owned storage yards may need to be provided for the contractor's use. This would allow secure storage of an equipment fleet or permanent materials needing large storage or assembly areas.

Attempts to define required access limits may not prove to be effective at this time due to lack of a constructible design.

3.2.1 BRT Alternative

The BRT Alternative has been divided into one construction segment, as defined in Section 3.1.2.1. Segment BRT-B-1 consists of new construction from the 95th Street Terminal to the Eberhart Avenue stop. The construction of the BRT segment may require limited temporary construction easements on adjacent streets and on parcels, including parking lots, abandoned properties, and other adjacent properties.

3.2.2 UPRR Rail Alternative

3.2.2.1 ROW Option

The ROW Option has been divided into eight construction segments, as defined in Section 3.1.3.1.

Segment UPRR-ROW-U-1 consists of all new construction south of the 95th Street Terminal within the CTA ROW, over the CTA track/I-94 tunnel, the WB I-57 entrance ramp from NB I-94, and Wentworth Avenue structure within the I-57 corridor. These construction segments may require the following:

- Numerous temporary construction easements on the adjacent expressway, requiring shoulder and lane closures as well as temporary shutdown of traffic.

- Off-site construction materials storage yards, due to limited space adjacent to the construction site. Storage yards may be located on parcels acquired for the project in adjacent construction segments to minimize impacts on the surrounding neighborhoods and communities.

Segment UPRR-ROW-U-2 consists of all new construction along the I-57 corridor, across NB I-57 and along Wendell Smith Park. This construction segment may require the following:

- Numerous temporary construction easements on the adjacent expressway requiring shoulder and lane closures as well as temporary shutdown of traffic.
- Off-site construction materials storage yards due to limited space adjacent to the construction site. Storage yards may be located on parcels acquired for the project in adjacent construction segments to minimize impacts on the surrounding neighborhoods and communities.
- Numerous temporary construction easements on adjacent streets, parks, and parcels including parking lots, abandoned properties, and other adjacent properties.

Segment UPRR-ROW-U-3 consists of new construction along the east side of the UPRR corridor. This construction segment may require the following:

- Numerous temporary construction easements on adjacent streets, parks, and parcels including parking lots, abandoned properties, and other adjacent properties.

Segment UPRR-ROW-U-4 consists of new construction over the CN/Metra Electric tracks. This construction segment may require the following:

- CTA-acquired parcels would provide most required access needs.
- Temporary construction easements on adjacent parcels including abandoned properties, MWRD property, and other adjacent properties.

Segments UPRR-ROW-U-5, UPRR-ROW-U-6S, and UPRR-ROW-U-6W consist of new construction along the NICTD/CSS & SBRR tracks and in the vicinity of the 130th Street station option. These construction segments may require the following:

- CTA-acquired parcels would provide most required access needs.
- A limited amount of temporary construction easements on adjacent parcels including abandoned properties and MWRD property.

Staging requirements of Segment UPRR-ROW-U-7 are discussed in Section 3.2.3.

3.2.2.2 East Option

The East Option has been divided into eight construction segments, as defined in Section 3.1.3.2.

Possible staging area requirements for Segments UPRR-E-U-1 and UPRR-E-U-2 are the same as those for Segments UPRR-ROW-U-1 and UPRR-ROW-U-2, respectively.

Segment UPRR-E-U-3 may require more temporary construction staging areas than Segment UPRR-ROW-U-3 because the UPRR ROW provides space for construction needs.

Possible staging area requirements for Segments UPRR-E-U-4, UPRR-E-U-5, UPRR-E-U-6S, and UPRR-E-U-6W are the same as those for Segments UPRR-ROW-U-4, UPRR-ROW-U-5, UPRR-ROW-U-6S, and UPRR-ROW-U-6W, respectively.

Staging requirements of Segment UPRR-E-U-7 are discussed in Section 3.2.3.

3.2.2.3 West Option

The West Option has been divided into seven construction segments, as defined in Section 3.1.3.3.

Possible staging area requirements of Segments UPRR-W-U-1 and UPRR-W-U-2 match those of Segments UPRR-ROW-U-1 and UPRR-ROW-U-2, respectively.

Segment UPRR-W-U-3a staging area requirements match those of Segment UPRR-ROW-U-3.

Segment and UPRR-W-U-3b consists of new construction of crossings over the UPRR tracks and Prairie Avenue. These construction segments may require the following:

- Temporary construction easements on adjacent streets and parcels including parking lots, abandoned properties, and other adjacent properties. Temporary lane closures and shutdown of traffic may be required on Prairie Avenue.

Possible staging area requirements for Segments UPRR-W-U-4, UPRR-W-U-5, UPRR-W-U-6, and UPRR-W-U-7 match those of Segments UPRR-E-U-4, UPRR-E-U-5, UPRR-E-U-6S, and UPRR-E-U-6W, respectively.

Staging requirements of Segment UPRR-W-U-7 are discussed in Section 3.2.3.

3.2.3 120th Street Yard and Shop

The 120th Street yard and shop is considered construction segments UPRR-ROW-U-7, UPRR-E-U-7, and UPRR-W-U-7 for the UPRR Alternative options.

Possible staging area requirements for the yard and shop are minimal. Parcels would be acquired by CTA in the area and would provide most construction area requirements.

3.2.4 Halsted Rail Alternative

The Halsted Rail Alternative has been divided into five segments, as defined in Section 3.1.6.

Possible staging area requirements of Segment H-1 match Segment UPRR-ROW-U-1. Segment H-2 consists of new construction within the I-57 corridor and across northbound I-57 and Halsted Street. This construction segment may include the following:

- Temporary construction easements on the adjacent expressway requiring shoulder and lane closures as well as temporary shutdown of traffic.
- Temporary construction easements on adjacent streets, parks, and parcels including parking lots, abandoned properties, and other adjacent properties.

Segment H-3 and Segment H-4 consist of new construction within the Halsted Street corridor. These construction segments may require the following:

- Temporary construction easements on Halsted Street and adjacent streets, parking lots, abandoned properties, and other adjacent properties. Temporary lane closures and shutdown of traffic may be required on streets.

3.2.5 119th Street Yard and Shop

The 119th Street yard and shop is Segment H-5 for the Halsted Rail Alternative. Possible staging area requirements for the yard and shop are minimal. Parcels would be acquired by CTA in the area and would provide most construction area requirements.

3.3 Description of Anticipated Construction Activities and Methods

3.3.1 Basic Construction Activities and Methods

Construction for the UPRR Rail Alternative options and the Halsted Rail Alternative would be very similar. Construction activities and methods for these alternatives are discussed interchangeably in this section unless otherwise noted.

Off-site and staging yard assembly of construction items would be performed to the fullest extent possible, especially in Segments U-1 and U-2 of each alternative and Segment H-3 and Segment H-4 based on site-specific access requirements.

The construction matrix for each build alternative is presented as Attachment A. The construction matrix summarizes the construction activities that would be completed including potential construction equipment; estimated quantities of soil, concrete, and steel based on conceptual engineering; and estimated duration of construction activities. Section 4 presents the estimated construction schedule for the alternatives.

3.3.2 Preconstruction Activities

Contractor preconstruction activities would include development of construction schedules, quality plans, and procurement schedules. Process plans would be developed for coordination of

work activities to match construction constraints and site access. Existing conditions would be verified for design and construction interface criteria. Survey control establishment would be essential to the verification of site, existing conditions, and utility conflict/relocation information.

Utility protection/relocation information would be coordinated and verified in the sequence of scheduled construction, far in advance of the early construction activities.

Community notifications would be initiated by the CTA and the contractor as early as possible to afford the community best fit conditions for understanding the construction schedule, neighborhood conditions, and related environmental impacts.

Demolition and building permits would be obtained at the earliest opportunity. Office of Underground Coordination requirements (e.g., shoring designs, support of excavation, drilled shaft procedures) must all be coordinated and approved before permits are issued.

The proposed UPRR Alignments are in a residential area coexisting with various homes, parks, schools, and businesses. Therefore, construction activities would be evaluated locally to ensure that the local dynamics of the area and the needs of the property owners and businesses, as well as the end users, are incorporated into the project. While the Halsted Rail Alternative would primarily affect commercial buildings, the aforementioned applies to the Halsted Rail Alternative as well.

Construction activities would include new, at grade, retained embankment, and elevated structure, station, substation, parking, yard, and access road construction. The following construction activities would be expected for the infrastructure and station construction.

3.3.3 Traffic Rerouting

During construction, vehicles, pedestrians, and buses may need to be rerouted around the construction site. Rerouting of traffic is normally done by using detours and complete street closures. The street closures may include main streets, side streets, and alleys and access points. To help mitigate the impacts on traffic routes, station and viaduct construction activities would be sequenced around these street and alley closures. However, complete closure of streets may not always be possible because residents and businesses would still need access. Therefore, temporary traffic lanes, temporary access points, or staged construction would be used. The following activities would be part of traffic rerouting activities:

- Construction signage and temporary traffic barriers.
- Temporary reduction (from two to one) in the number of thru-traffic lanes in each direction, if feasible.
- One-way traffic may be implemented on a temporary basis.
- Detours/complete street closures including alleys and access points.

- Temporary traffic lanes.
- Designated space for storage and staging of construction materials, equipment, and temporary facilities within and/or adjacent to the ROW.
- Construction vehicle access points within and/or adjacent to the ROW.
- Business, residential, and pedestrian impacts including limited parking or parking bans.

3.3.4 Demolition

All RLE alternatives require complete removal or partial demolition of existing buildings or structures. The demolition process would result in increased noise and debris. Work would be performed in accordance with local ordinances for construction activities. In general, pedestrian and vehicular traffic would not be allowed into demolition areas.

The demolition process may include concrete removal, requiring construction workers to saw cut, jackhammer, and/or knock out the existing concrete, cut or remove the existing reinforcement, or completely demolish existing concrete structures.

For removal of foundations and/or streets, to relocate existing utilities, or excavate existing ground, the contractor would excavate using bulldozers, compact tractors, or backhoes to dig and remove earth. The disposal material would be placed in dump trucks and trucked off-site. During excavation, temporary shoring may be required to protect adjacent buildings or structures.

Construction vehicles would access the construction site on a regular basis and would require special hauling routes to deliver materials and equipment to the site and remove the debris from the site. The routes may require complete street closures, temporary street shutdowns, or traffic rerouting. Depending on the type of material being removed, special handling of waste may be necessary. For example, older buildings with asbestos would require special handling. All materials would be disposed of in the proper manner, following federal, state, and local regulations.

3.3.5 Temporary Shoring

During demolition and excavation, temporary shoring may be required to protect adjacent property. The shoring would consist of steel sheet piling driven into the ground with a vibratory pile driver. The rig may be located within the construction zone or outside the ROW depending on the space limitations and access points. The temporary shoring may require the use of tiebacks. Tiebacks are long rods that would be drilled through the sheet piling, embedded into sound rock, or other approved materials, and then grouted into place.

3.3.6 Foundations

Due to the variety of structures, including CTA elevated structure, buildings, and parking garages, there would be a variety of foundations on the RLE Project. Foundations can consist of concrete

spread footings, steel pile foundations, or concrete drilled shafts. Foundation type depends on site conditions and location. To determine the geotechnical properties of the soil, a geotechnical engineer would drill exploratory borings and take soil samples. The geotechnical engineer would then test the samples, determine soil properties, and make recommendations on the type of foundation to use, as part of the design process.

All types of spread or shallow type foundations would require excavation and removal of earth to form the concrete footings. As stated above in Section 3.3.4, the use of bulldozers, bobcats, or backhoes would be used to dig and remove earth. The earth may be placed in dump trucks and shipped off-site or stored for use on the construction site for backfill. Materials shipped off-site for disposal would be handled through approved facilities.

Large cranes with pile driving leads that help guide the piles into position would be used for installation of pile foundations. A diesel hammer would drive the piles into the ground by impact. A test pile would be driven to test the pile length and capacity. Based on soil properties, the test pile would determine whether piles would be driven to a different elevation, designed to a different capacity, or would encounter rocks or boulders in the ground. Pile shoes or pile tips would be added to the end of the piles or a pre-drilled hole supported by a steel casing would be used to aid the pile installation process. It is very important for the contractor to locate existing utilities such as sewer, or cable lines before excavation or pile installation to avoid damaging the services. Evaluation of nearby foundations may be required to prevent damage to existing structures during new foundation construction.

Drilled shaft construction is performed with a crane-mounted drill rig. An auger of the design diameter would be drilled into the ground and soil would be piled nearby for removal. As the auger advanced, extensions would be added to the supporting shaft. The drill hole would be fitted with a lining where required by unsuitable soils. A pre-formed reinforcement cage would be installed and concrete would be placed to form the drilled shaft support.

3.3.7 Concrete Placement

Part of the construction logistics and process plan would be to determine the concrete plant based on location and availability of the required concrete mix. The plant would supply and deliver the concrete to the site using concrete trucks. Temporary street closures and truck routes may need to be established to access the construction site. Coordination of multiple trucks may be necessary for large pours and may require special access and scheduling. The contractor may elect to create an on-site ready mix plant to supply the concrete if space limitations and location of the nearest concrete plant require it.

Before the concrete can be poured, all necessary reinforcement and concrete forms would need to be in place. The reinforcement would be delivered on large flatbed trucks and would be stored on-site in bundles. The contractor would assure that the number of bars (and the size of bars, spacing of bars, edge clearances, etc.) is per contract documents before the concrete is poured. The formwork may consist of large steel panels or plywood to hold the wet concrete in place. To

maintain the weight of the concrete until it cures, the formwork would be braced or temporarily supported.

After arriving on-site, the truck would be positioned at the location required for the pour. If the truck could not access the location of the pour, the concrete would need to be placed by pump, conveyor system, or other method. Concrete would need to be poured within 1 to 1.5 hours after loading depending on the outside temperature and whether the truck has a retarder. During the pouring, workers would push and move the concrete into position. The concrete would be vibrated to eliminate any voids and smoothed to obtain a good finish. The concrete may need to cure for a week before forms can be removed. Concrete is typically not loaded for 28 days after placement.

3.3.8 Structural Steel Erection

Standard structural steel erection would be required for most new construction on the RLE Project. Structural steel can consist of plates, angles, girders, beams, columns, cross frames, and related elements. The steel can vary in size, length, weight, and use.

Steel members would be delivered to the site on large flatbed trucks or semi-trucks and could require special hauling permits. The construction zone would require special access areas so that the steel could be delivered, assembled on-site, stored, or moved into position. Cranes would be used to pick the pieces off the trucks, move the material overhead, and place into position. Iron workers would be located on the structure to help move the pieces into place by bolting or welding the members. The ironworkers would perform most of the steel erection procedures, which could consist of framing, bolting, welding, coping, cutting, hammering, and similar activities.

3.3.9 Equipment Definition

Demolition - Heavy equipment, efficiently sized to match available access and reach requirements, including cranes with a demolition ball, front-end loaders, shears mounted to backhoes, concrete breakers mounted to combination tractors or backhoes, dump trucks, and off-site tractors with dump trailers.

Excavation - Heavy equipment, efficiently sized to match available access and reach requirements, including backhoes, front-end loaders, concrete breakers mounted to combination tractors or backhoes, dump trucks, and off-site tractors with dump trailers.

On-site hoisting - Heavy equipment used to hoist or move materials about the construction site, efficiently sized to match available access and reach requirements, including telehandlers, front-end loaders, mobile cranes of varying sizes, crawler-mounted cranes, and track-mounted equipment.

Concrete Placement - Heavy equipment efficiently sized to match available access and reach requirements. If concrete trucks cannot directly access the pour location, concrete would typically

be placed utilizing a truck/trailer mounted concrete pump(s) or truck/trailer mounted concrete /material type conveyors.

Steel Erection - Heavy equipment, efficiently sized to match available access and reach requirements, including truck cranes, all-terrain cranes, and mobile cranes of varying sizes. Crawler-mounted cranes would typically be used to hoist and erect steel members under normal conditions, while track-mounted equipment (rail-borne equipment) may be used where platform steel and precast materials, including canopy steel framing, track work materials, and similar cannot be reached from normal ground access locations or where there are limited staging area restrictions.

3.4 Methods for Protecting Nearby Utilities and Adjacent Structures

Methods for protecting nearby utilities and adjacent structures include standard industry practice techniques. These techniques include coordinating with existing utilities and field verifying locations. The Office of Underground Coordination (OUC) requires a review of foundations that are within two feet of the property line. Dig requests must be submitted to Chicago DIGGER (Chicago Utility Alert Network) for areas within the limits of the City of Chicago and JULIE (Joint Utility Locating Information for Excavators) for areas outside the City of Chicago limits before any excavation can begin.

3.4.1 Utility Identification

Major utilities can be found on the conceptual engineering plan and profile sheets for each of the build alternatives. Further work would be required to verify the location of all utilities for each alternative.

3.4.2 Industry Practice

- Designer of Record/Owner - Identify existing location (and condition) during preliminary engineering phase for foundation design. Develop review criteria for further coordination of new underground structures, for example, foundations, cable trenches, and ductwork.
- Coordination with existing utilities.
- Leave as is if no conflict.
- Field verify locations, if a potential conflict exists, during preliminary design phase.
- Determine need to protect, redesign to clear, or relocate to allow completion of design. May require a cost impact analysis for redesign versus relocate costs.
- Plat of Survey with location of existing underground structures, with size and location of all existing private and public utilities (below and above ground).

- OUC Review.
- Department of Water Management Review with water review and sewer review.
- Preconstruction - with contractor identification and location.
- Utility contact with digger location.
- Relocation cost.
- Coordination with contractor.
- Field verify locations.
- Pothole at caisson location prior to placing temporary liner.
- Coordination with all parties.
- Identify and protect/relocate away from construction zone all known cables/systems (typically: cable TV, AT&T, gas, electric, Chicago sewer and water, fiber optic, CTA signals, CTA communications, CTA traction power, and similar). May need specific plan written into project specifications delineating contractor responsibility.

3.4.3 Adjacent Structures

New structure protection would be provided along the UPRR track for structures within 50 feet of the centerline of the adjacent UPRR track. Structure protection would be a crash wall running parallel to the UPRR track per the AREMA Manual. If the proposed CTA structure would come within 18 to 25 feet of the centerline of the adjacent UPRR track, pier protection would be provided per the Manual for Railway Engineering (AREMA 2012) and Guidelines for Railroad Grade Separation Projects (BNSF Railway and UPRR, 2007).

For conflicts with existing adjacent structures, field verification of structure location during the design phase would be necessary to evaluate the potential conflict.

3.4.4 Foundations at Interface Areas

An OUC review is required for foundations within two feet of the property line within the City of Chicago. Earth retention systems, with a named sheeting contractor and with sealed earth retention design, are to comply with OUC restrictions.

3.4.5 Monitoring of Adjacent Structures

- The contractor would develop, obtain CTA approval for, and institute a program for monitoring settlement, noise, and vibration of buildings and structures on or adjacent to the ROW. Prior to mobilization, the contractor would survey (both physically and with photos and videos) existing conditions of all areas that are to be occupied, worked on, restored or

affected in any way. The contractor would be responsible for and must repair or replace any portions of such areas damaged by his acts.

- Monitoring for settlement, noise, and vibration of buildings and structures on or adjacent to the ROW would start prior to the start of excavation, foundation work, work requiring the use of heavy equipment, or work which may cause damage to CTA or adjacent structures. Monitoring would accommodate vertical and horizontal controls.
- Settlement and vibration monitoring programs for specific structures and locations would be defined during design.
- Special provisions would be included in the construction documents to ensure that all monitoring requirements are completely outlined for contractor clarity.

Section 4
Project Schedule

The estimated project schedule to construct the proposed alternatives is presented in Attachment B. The schedule is based on unconstrained funding and design limitations. The schedule for each alternative assumes advance work that may take one to two years. The final engineering and advance work could start in 2018 and go through 2021. The advance work would consist of utility relocations, land acquisition, and other work necessary prior to starting heavy construction work. The heavy construction work is estimated to require three years and could be phased according to construction in the work segments. It is anticipated that the heavy construction work may occur during the 2022 through 2025, including one year of testing. With this construction schedule, the opening year of the RLE would be 2026.

Section 5
References

AREMA. 2012. Manual for Railway Engineering.

BNSF Railway and Union Pacific Railway. 2007. Guidelines for Railroad Grade Separation Projects. Accessed at http://www.uprr.com/reus/roadxing/industry/process/grade_separation.shtml.

CMAP. 2012. Transportation Improvement Program (2010-2015). Accessed at http://www.cmap.illinois.gov/tip.

Attachment A
Construction Activity Matrices for the Build Alternatives

UPRR HRT ROW Option Construction Activity	Duration (Months)	Construction Equipment								Soil (CY)	Concrete (CY)	Structural Steel (LB)	Avg Truck Trips Per Work Day	Avg Workers Per Work Day
		Haul Truck	Concrete Truck	Front End Loader	Excavator	Crane	Drill Rig	Compressor	Flatbed					
Segment U-1: 95th Street Station to Beginning of Horizontal Curve at UPRR (96+60 to 132+00)	**12-36**													
Advance Work														
Signal/cross-over installation; utility relocation; staging	12	x				x							1	5-10
At Grade														
Single Track	12-18	x		x	x	x		x	x	6,830	50	500	1	5-10
Retained Embankment														
Single Track	24	x	x	x	x	x	x	x	x	1,750	1,750	500	5-10	10-15
Elevated Concrete Structure														
Single Track-Rehab/Modify Existing CTA/IDOT tunnel	24	x	x	x	x	x	x	x	x	2,600	1,300	500	5-10	10-15
Elevated Steel Structure														
Single Track - Hammerhead Substructure	24	x	x	x	x	x	x	x	x	4,100	7,870	2,012,500	5-10	10-15
Double Track - Hammerhead Substructure	24-36	x	x	x	x	x	x	x	x	6,090	11,917	3,701,705	5-10	10-15
Segment U-2: Horizontal Curve at UPRR (132+00 to 142+19)	**12-30**													
Advance Work														
Utility relocation; staging	12	x				x							1	5-10
Elevated Steel Structure														
Double Track - Hammerhead Substructure	24-30	x	x	x	x	x	x	x	x	600	1,174	364,700	5-10	10-15
Double Track - TPG, Hammerhead Substructure	24-30	x	x	x	x	x	x	x	x	1,000	2,070	1,825,800	5-10	10-15
Double Track - Straddle Bent Substructure	24-30	x	x	x	x	x	x	x	x	170	457	892,100	5-10	10-15
Segment U-3: End of Horizontal Curve to Metra/CN Crossing (142+19 to 286+12)	**12-36**													
Advance Work														
Utility relocation; staging	12	x				x							1	5-10
Stations														
Construct - 103rd Street	24-36	x	x	x	x	x	x	x	x	7,800	9,967	3,484,100	5-10	20-30
Construct - 111th Street	24-36	x	x	x	x	x	x	x	x	7,800	9,967	3,484,100	5-10	20-30
Construct - Michigan Avenue	24-36	x	x	x	x	x	x	x	x	7,800	9,967	3,484,100	5-10	20-30
Parking														
Construct - 103rd Street	12	x	x	x	x			x		9,300	3,100		2-5	5-10
Construct - 111th Street	12	x	x	x	x	x		x	x	9,300	3,100		2-6	5-11
Construct - Michigan Avenue (2 lots)	24	x	x	x	x			x		18,600	6,200		2-7	5-12
Elevated Steel Structure														
Double Track - Hammerhead Substructure	36	x	x	x	x	x	x	x	x	43,200	84,528	26,258,400	50-100	30-35
Traction Power														
Substation - 175+00	24	x	x	x	x	x		x	x	5,000	1,100	160,000	2-5	10-15
Substation - 254+00	24	x	x	x	x	x		x	x	5,000	1,100	160,000	2-5	10-15

UPRR HRT ROW Option Construction Activity	Duration (Months)	Construction Equipment								Soil (CY)	Concrete (CY)	Structural Steel (LB)	Avg Truck Trips Per Work Day	Avg Workers Per Work Day
		Haul Truck	Concrete Truck	Front End Loader	Excavator	Crane	Drill Rig	Compressor	Flatbed					
Segment U-4: Metra/CN Crossing to At Grade Track (286+12 to 310+03)	**12-36**													
Advance Work														
Retained Embankment														
Double Track	24	x	x	x	x	x	x	x	x	2,771	926		5-10	10-15
Double Track - Hammerhead Substructure	24-36									6,300	12,327	3,829,350		
Double Track - TPG, Hammerhead Substructure	24-36									400	895	730,320		
Segment U-5: At Grade Track to 130th Street Station Options (310+03 to 360+02)	**12-36**													
Advance Work														
	12													
Double Track										22,950				
Access Road														
Crossing proposed tracks at 358+00	12-24	x	x	x	x			x		6,778	2,260		5-10	5-10
Bridge for Access Road, Crossing at 358+00	24	x	x	x	x	x		x	x	3,105	4,610	495,000	5-10	10-15
Connector access road, West of Proposed CTA tracks	12	x	x	x	x			x		717	239		5-10	5-10
Segment U-6S: 130th Street South Station Option (360+02 to 380+29)	**12-36**													
Advance Work														
	12	x				x							1	5-10
Station														
Construct - 130th Street South Station Option										6,773	2,653	696,305		
Construct - 130th Street South Station Option	24	x	x	x	x			x					2-5	5-10
Double Track	24-36									5,400				
Triple Track	24									7,000				
Access Road														
At South Station Option	12-24	x	x	x	x			x		5,778	1,926		5-10	5-10
Segment U-6W: 130th Street West Station Option (380+29 to 395+40)	**12-36**													
Advance Work														
	12	x				x							1	5-10

UPRR HRT ROW Option Construction Activity	Duration (Months)	Construction Equipment								Soil (CY)	Concrete (CY)	Structural Steel (LB)	Avg Truck Trips Per Work Day	Avg Workers Per Work Day
		Haul Truck	Concrete Truck	Front End Loader	Excavator	Crane	Drill Rig	Compressor	Flatbed					
Station														
Construct - 130th Street West Station Option	24-36	x	x	x	x	x	x	x	x	3,148	1,565	467,055	5-10	20-30
Parking														
Construct - 130th Street West Station Option (2 lots)	24	x	x	x	x			x					2-5	5-10
At Grade														
Double Track	24-36	x		x	x			x	x	12,600				
Triple Track	24	x		x	x			x	x	6,300				
Access Road														
At West Station Option	12-24	x	x	x	x			x		6,512	2,171		5-10	5-10
Bridge for Access Road, Crossing at 371+00	24	x	x	x	x	x		x	x	1,553	2,305	247,500	5-10	10-15
Segment U-7: 120th Street Yard and Shop (291+85/45+00 to 352+69/106+12)	**12-36**													
Advance Work														
Utility relocation; staging	12	x				x							1	5-10
Access Road														
Construct	12-24	x	x	x	x			x		10,977	3,659		5-10	5-10
At Grade														
Single Track	36	x		x	x	x		x	x	89,500	1,000		5-10	10-15
Double Track	36	x		x	x	x		x	x	8,100			5-10	10-15
Retained Embankment														
Double Track	24	x	x	x	x	x	x	x	x	2,771	926	500	5-10	10-15
Elevated Steel Structure														
Double Track - Hammerhead Substructure	24	x	x	x	x	x	x	x	x	2,100	4,109	1,276,450	5-10	10-15
Shop Facility														
Construct-Shop Building	24-36	x	x	x	x	x	x	x	x	10,380	3,114	1,038,000	5-10	20-30
Parking														
Construct - Shop	24	x	x	x	x			x		9,300	3,100		2-5	5-10
Traction Power														
Substation - Yard	24	x	x	x	x	x		x	x	5,000	1,100	160,000	2-5	10-15
Final Phase - 95th Street station to 130th Street (96+50 to 380+50/396+00)	**10 - 12**													
Signal/Communication														
Signal/Interlocking	10 - 12							x	x	--	--	--	2-5	10 - 20
Communication System	10 - 12							x	x	--	--	--	2-5	10 - 20

UPRR HRT East Side Option Construction Activity	Duration (Months)	Construction Equipment								Soil (CY)	Concrete (CY)	Structural Steel (LB)	Avg Truck Trips Per Work Day	Avg Workers Per Work Day
		Haul Truck	Concrete Truck	Front End Loader	Excavator	Crane	Drill Rig	Compressor	Flatbed					
Segment U-1: 95th Street station to Beginning of Horizontal Curve at UPRR (96+60 to 132+00)	**12-36**													
Advance Work														
Signal/cross-over installation; utility relocation; staging	12	x				x							1	5-10
At Grade														
Single Track	12-18	x		x	x	x		x	x	6,830	50	500	1	5-10
Retained Embankment														
Single Track	24	x	x	x	x	x	x	x	x	1,750	1,750	500	5-10	10-15
Elevated Concrete Structure														
Single Track-Rehab/Modify Existing CTA/IDOT tunnel	24	x	x	x	x	x	x	x	x	2,600	1,300	500	5-10	10-15
Elevated Steel Structure														
Single Track - Hammerhead Substructure	24	x	x	x	x	x	x	x	x	4,100	7,870	2,012,500	5-10	10-15
Double Track - Hammerhead Substructure	24-36	x	x	x	x	x	x	x	x	6,090	11,917	3,701,705	5-10	10-15
Segment U-2: Horizontal Curve at UPRR (132+00 to 142+00)	**12-36**													
Advance Work														
Utility relocation; staging	12	x				x							1	5-10
Elevated Steel Structure														
Double Track - Hammerhead Substructure	24-30	x	x	x	x	x	x	x	x	300	587	182,350	5-10	10-15
Double Track - TPG, Hammerhead Substructure	24-30	x	x	x	x	x	x	x	x	1,000	2,070	1,825,800	5-10	10-15
Double Track - Straddle Bent Substructure	24-30	x	x	x	x	x	x	x	x	170	457	916,100	5-10	10-15
Segment U-3: End of Horizontal Curve to Metra/CN Crossing (142+00 to 285+00)	**12-36**													
Advance Work														
Utility relocation; staging	12	x				x							1	5-10
Stations														
Construct - 103rd Street	24-36	x	x	x	x	x	x	x	x	9,000	11,767	4,030,800	5-10	20-30
Construct - 111th Street	24-36	x	x	x	x	x	x	x	x	9,000	11,767	4,030,800	5-10	20-30
Construct - Michigan Avenue	24-36	x	x	x	x	x	x	x	x	9,000	11,767	4,030,800	5-10	20-30
Parking														
Construct - 103rd Street	12	x	x	x	x			x		9,300	3,100		2-5	5-10
Construct - 111th Street	12	x	x	x	x			x		9,300	3,100		2-6	5-11
Construct - Michigan Avenue (2 lots)	24	x	x	x	x			x		18,600	6,200		2-7	5-12
Elevated Steel Structure														
Double Track - Hammerhead Substructure	36	x	x	x	x	x	x	x	x	32,700	63,983	19,876,150	50-100	30-35
Traction Power														
Substation - 175+00	24	x	x	x	x	x		x	x	5,000	1,100	160,000	2-5	10-15
Substation - 254+00	24	x	x	x	x	x		x	x	5,000	1,100	160,000	2-5	10-15

UPRR HRT East Side Option Construction Activity	Duration (Months)	Construction Equipment								Soil (CY)	Concrete (CY)	Structural Steel (LB)	Avg Truck Trips Per Work Day	Avg Workers Per Work Day
		Haul Truck	Concrete Truck	Front End Loader	Excavator	Crane	Drill Rig	Compressor	Flatbed					
Segment U-4: Metra/CN Crossing to At Grade Track (285+00 to 308+83)	**12-36**													
Advance Work														
													1	
Double Track	24									2,771	926			
Double Track - Hammerhead Substructure	24-36									6,300	12,327	3,829,350		
Double Track - TPG, Hammerhead Substructure	24-36									400	897	730,320		
Segment U-5: At Grade Track to 130th Street Station Options (308+83 to 359+00)	**12-36**													
Advance Work														
	12													
At Grade														
Double Track										22,950				
Access Road														
Crossing proposed tracks at 357+00	12-24	x	x	x	x			x		6,778	2,260		5-10	5-10
Bridge for access Road, Crossing at 357+00	24	x	x	x	x	x		x	x	3,105	4,610	495,000	5-11	10-15
Connector access road, West of Proposed CTA tracks	12	x	x	x	x			x		717	239		5-10	5-10
Segment U-6S: 130th Street South Station Option (359+00 to 379+27)	**12-36**													
Advance Work														
	12	x				x							1	5-10
Station														
Construct - 130th Street South Station Option										6,773	2,653	696,305		
Parking														
At South Station Option	24	x	x	x	x			x		13,900	4,700		2-5	5-10
At Grade														
Double Track	24-36								x	4,500				
Triple Track	24								x	7,700				
Access Road														
At South Station Option	12-24	x	x	x	x			x		5,778	1,926		5-10	5-10
Segment U-6W: 130th Street West Station Option (379+27 to 394+38)	**12-36**													
Advance Work														
	12	x				x							1	5-10
Station														
Construct - 130th Street West Station Option										3,148	1,565	467,055		

UPRR HRT East Side Option Construction Activity	Duration (Months)	Construction Equipment								Soil (CY)	Concrete (CY)	Structural Steel (LB)	Avg Truck Trips Per Work Day	Avg Workers Per Work Day
		Haul Truck	Concrete Truck	Front End Loader	Excavator	Crane	Drill Rig	Compressor	Flatbed					
Parking														
At West Station Option (2 lots)	24	x	x	x	x			x		27,800	9,400		2-5	5-10
At Grade														
Double Track	24-36									12,150				
Triple Track	24									6,300				
Access Road														
At West Station Option	12-24	x	x	x	x			x		6,512	2,171		5-10	5-10
Bridge for Access Road, Crossing at 369+50	24	x	x	x	x	x		x	x	1,553	2,305	247,500	5-10	10-15
Segment U-7: 120th Street Yard and Shop (290+26/45+00 to 351+67/106+79)	**12-36**													
Advance Work														
Access Road														
Construct	12-24	x	x	x	x			x		10,977	3,659		5-10	5-10
At Grade														
Single Track		x		x	x	x		x	x	89,500	1,000		5-10	
Double Track		x		x	x	x		x	x	8,100			5-10	
Retained Embankment														
Double Track	24									2,771	926	500		
Elevated Steel Structure														
Double Track - Hammerhead Substructure	24									2,100	4,109	1,276,450		
Shop Facility														
Construct-Shop Building										10,380	3,114	1,038,000		
Parking														
Construct - Shop	24	x	x	x	x			x		9,300	3,100		2-5	5-10
Traction Power														
										5,000	1,100	160,000		

UPRR HRT West Side Option Construction Activity	Duration (Months)	Construction Equipment								Soil (CY)	Concrete (CY)	Structural Steel (LB)	Avg Truck Trips Per Work Day	Avg Workers Per Work Day
		Haul Truck	Concrete Truck	Front End Loader	Excavator	Crane	Drill Rig	Compressor	Flatbed					
Segment U-1: 95th Street Station to Beginning of Horizontal Curve at UPRR (96+60 to 132+00)	**12-36**													
Advance Work														
Signal/cross-over installation; utility relocation; staging	12	x				x							1	5-10
At Grade														
Single Track	12-18	x		x	x	x		x	x	6,830	50	500	1	5-10
Retained Embankment														
Single Track	24	x	x	x	x	x	x	x	x	1,750	1,750	500	5-10	10-15
Elevated Concrete Structure														
Single Track-Rehab/Modify Existing CTA/IDOT tunnel	24	x	x	x	x	x	x	x	x	2,600	1,300	500	5-10	10-15
Elevated Steel Structure														
Single Track - Hammerhead Substructure	24	x	x	x	x	x	x	x	x	4,100	7,870	2,012,500	5-10	10-15
Double Track - Hammerhead Substructure	24-36	x	x	x	x	x	x	x	x	6,090	11,917	3,701,705	5-10	10-15
Segment U-2: Horizontal Curve at UPRR (132+00 to 142+43)	**12-36**													
Advance Work														
Utility relocation; staging	12	x				x							1	5-10
Elevated Steel Structure														
Double Track - Hammerhead Substructure	24-30	x	x	x	x	x	x	x	x	600	1,174	364,700	5-10	10-15
Double Track - TPG, Hammerhead Substructure	24-30	x	x	x	x	x	x	x	x	1,000	2,070	1,825,800	5-10	10-15
Double Track - Straddle Bent Substructure	24-30	x	x	x	x	x	x	x	x	340	951	1,581,000	5-10	10-15
Segment U-3A: End of Horizontal Curve to Prairie/UPRR Crossing (142+43 to 275+00)	**12-36**													
Advance Work														
Utility relocation; staging	12	x				x							1	5-10
Stations														
Construct - 103rd Street	24-36	x	x	x	x	x	x	x	x	9,000	11,767	4,030,800	5-10	20-30
Construct - 111th Street	24-36	x	x	x	x	x	x	x	x	9,000	11,767	4,030,800	5-10	20-30
Construct - Michigan Avenue	24-36	x	x	x	x	x	x	x	x	9,000	11,767	4,030,800	5-10	20-30
Parking														
Construct - 103rd Street	12	x	x	x	x			x		9,300	3,100		2-5	5-10
Construct - 111th Street	12	x	x	x	x	x		x	x	9,300	3,100		2-5	5-10
Construct -Michigan Avenue (2 lots)	24	x	x	x	x			x		18,600	6,200		2-5	5-10
Elevated Steel Structure														
Double Track - Hammerhead Substructure	36	x	x	x	x	x	x	x	x	29,700	58,113	18,052,650	50-100	30-35
Traction Power														
Substation - 180+00	24	x	x	x	x	x		x	x	5,000	1,100	160,000	2-5	10-15
Substation - 260+00	24	x	x	x	x	x		x	x	5,000	1,100	160,000	2-5	10-15

UPRR HRT West Side Option Construction Activity	Duration (Months)	Construction Equipment								Soil (CY)	Concrete (CY)	Structural Steel (LB)	Avg Truck Trips Per Work Day	Avg Workers Per Work Day
		Haul Truck	Concrete Truck	Front End Loader	Excavator	Crane	Drill Rig	Compressor	Flatbed					
Segment U-3B: Prairie/UPRR crossing to Metra/CN Crossing (275+00 to 287+20)	**24-36**													
Advance Work														
Utility relocation; staging														
Elevated Steel Structure														
Double Track -Hammerhead Substructure	36									1,200	2,438	729,400		
Double Track - Straddle Bent Substructure	36									1,020	3,014	3,948,600		
Segment U-4: Metra/CN Crossing to At Grade Track (287+20 to 311+02)	**12-36**													
Advance Work														
Utility relocation; staging														
Retained Embankment														
Double Track	24	x	x	x	x	x	x	x	x	2,771	926		5-10	10-15
Elevated Steel Structure														
Double Track - Hammerhead Substructure	24-36									5,700	11,153	3,464,650		
Double Track - TPG, Hammerhead Substructure	24-36									400	895	730,320		
Segment U-5: At Grade Track to 130th Street Station Options (311+02 to 361+19)	**12-36**													
Advance Work														
Utility relocation; staging	12													
At Grade														
Double Track										23,400				
Access Road														
Crossing proposed tracks at 360+00	12-24	x	x	x	x			x		6,778	2,260		5-10	5-10
Bridge for Access Road, Crossing at 360+00	24	x	x	x	x	x		x	x	3,105	4,610	495,000	5-10	10-15
Connector access road, West of Proposed CTA tracks	12	x	x	x	x			x		717	239		5-10	5-10
Segment U-6S: South 130th Street Station Option (361+19 to 381+46)	**12-36**													
Advance Work														
Utility relocation; staging	12	x				x							1	5-10
Station														
Construct - 130th Street South Station Option										6,773	2,653	696,305		
Parking														
Construct - 130th Street South Station Option	24	x	x	x	x			x		13,900	4,700		2-5	5-10
At Grade														

UPRR HRT West Side Option Construction Activity	Duration (Months)	Construction Equipment								Soil (CY)	Concrete (CY)	Structural Steel (LB)	Avg Truck Trips Per Work Day	Avg Workers Per Work Day
		Haul Truck	Concrete Truck	Front End Loader	Excavator	Crane	Drill Rig	Compressor	Flatbed					
Double Track	24-36									5,400				
Triple Track	24									7,700				
Access Road														
At South Station Option	12-24	x	x	x	x			x		5,778	1,926		5-10	5-10
Segment U-6W: West 130th Street Station Option (381+46 to 396+57)	**12-36**													
Advance Work														
Utility relocation; staging	12	x				x							1	5-10
Station														
Construct - 130th Street West Option										3,148	1,565	467,055		
Parking														
Construct - 130th Street West Option (2 lots)	24	x	x	x	x			x		27,800	9,400		2-5	5-10
At Grade														
Double Track	24-36	x		x	x			x	x	13,050				
Triple Track	24	x		x	x			x	x	5,600				
Access Road														
At West Station Option	12-24	x	x	x	x			x		6,512	2,171		5-10	5-10
Bridge for Access Road, Crossing at 372+00	24	x	x	x	x			x		1,553	2,305	247,500	5-10	10-15
Segment U-7: 120th Street Yard and Shop (292+45/45+00 to 353+86/106+79)	**12-36**													
Advance Work														
Utility relocation; staging														
Access Road														
Construct	12-24	x	x	x	x			x		10,977	3,659		5-10	5-10
At Grade														
Single Track		x		x	x	x		x	x	89,500	1000		5-10	10-15
Double Track		x		x	x	x		x	x	8,100			5-10	10-15
Retained Embankment														
Double Track	24									2,771	926	500		
Elevated Steel Structure														
Double Track - Hammerhead Substructure	24									2,100	4,109	1,276,450		
Shop Facility														
Construct-Shop Building										10,380	3,114	1,038,000		
Parking														
Construct - Shop	24	x	x	x	x			x		9,300	3,100		2-5	5-10
Traction Power														
Substation - Yard										5,000	1,100	160,000		

UPRR HRT West Side Option Construction Activity	Duration (Months)	Construction Equipment								Soil (CY)	Concrete (CY)	Structural Steel (LB)	Avg Truck Trips Per Work Day	Avg Workers Per Work Day
		Haul Truck	Concrete Truck	Front End Loader	Excavator	Crane	Drill Rig	Compressor	Flatbed					
Final Phase - 95th Street Station to 130th Street (96+50 to 382+30/396+50)														
Signal/Communication														
Signal/Interlocking														
Communication System														

Halsted Street HRT Construction Activity	Duration (Months)	Construction Equipment								Soil (CY)	Concrete (CY)	Structural Steel (LB)	Avg Truck Trips Per Work Day	Avg Workers Per Work Day
		Haul Truck	Concrete Truck	Front End Loader	Excavator	Crane	Drill Rig	Compressor	Flatbed					
Segment H-1: 95th Street Station to Beginning of Horizontal Curve at Halsted (96+60 to 158+00)	**12-36**													
Advance Work														
Signal/cross-over installation; utility relocation; staging	12	x				x							1	5-10
At Grade														
Single Track	12-18	x		x	x	x		x	x	6,830	50	500	1	5-10
Retained Embankment														
Single Track	24	x	x	x	x	x	x	x	x	1,750	1,500	500	5-10	10-15
Elevated Concrete Structure														
Single Track-Rehab/Modify Existing CTA/IDOT tunnel	24	x	x	x	x	x	x	x	x	2,600	1,300	500	5-10	10-15
Elevated Steel Structure														
Single Track-Hammerhead Substructure	24	x	x	x	x	x	x	x	x	2,381	7,870	2,012,500	5-10	10-15
Double Track - Hammerhead Substructure	24-36	x	x	x	x	x	x	x	x	8,344	26,820	8,625,155	5-10	10-15
Segment H-2: Horizontal Curve at Halsted (158+00 to 168+00)	**12-36**													
Advance Work														
Utility relocation; staging	12	x				x							1	5-10
Elevated Steel Structure														
Double Track -TPG, Hammerhead Substructure	24-30	x	x	x	x	x	x	x	x	1,000	2,070	1,825,800	5-10	10-15
Double Track - Straddle Bent Substructure	24-30	x	x	x	x	x	x	x	x	340	914	1,664,200	5-10	10-15
Segment H-3: End of Horizontal Curve to 119th Street Station (168+00 to 285+00)	**12-36**													
Advance Work														
Utility relocation; staging	12	x				x							1	5-10
Stations														
Construct - 103rd Street	24-36	x	x	x	x	x	x	x	x	2,903	4,052	4,764,000	5-10	20-30
Construct - 111th Street	24-36	x	x	x	x	x	x	x	x	2,903	4,052	4,764,000	5-10	20-30
Parking														
Construct - 103rd Street	12	x	x	x	x			x		9,300	3,100		2-5	5-10
Construct - 111th Street	12	x	x	x	x			x		9,300	3,100		2-5	5-10
Elevated Steel Structure														
Double Track - Hammerhead Substructure	24-36	x	x	x	x	x	x	x	x	12,600	23,814	7,658,700	50-100	30-35
Double Track - Straddle Bent Substructure	24-36	x	x	x	x	x	x	x	x	13,104	32,261	45,252,480	50-100	30-35
Traction Power														
Substations - 101st Street	24	x	x	x	x	x		x	x	5,000	1,100	160,000	2-5	10-15
Substations - 110th Street	24	x	x	x	x	x		x	x	5,000	1,100	160,000	2-5	10-15

Halsted Street HRT Construction Activity	Duration (Months)	Construction Equipment								Soil (CY)	Concrete (CY)	Structural Steel (LB)	Avg Truck Trips Per Work Day	Avg Workers Per Work Day
		Haul Truck	Concrete Truck	Front End Loader	Excavator	Crane	Drill Rig	Compressor	Flatbed					
Segment H-4: 119th Street station to Vermont Avenue station (285+00 to 367+30)	**12-36**													
Advance Work														
	12													
Stations														
Construct - 119th Street										2,903	4,052	4,764,000		
Construct - Vermont Avenue										3,363	3,914	4,741,000		
Parking														
Construct - 119th Street	12									9,300	3,100		2-5	5-10
Construct - Vermont Avenue	24									13,900	4,700		2-5	5-10
Double Track - Hammerhead Substructure	24-36									8,400	15,876	5,105,800		
Double Track - Straddle Bent Substructure	24-36									8,736	21,507	30,168,320		
Triple Track - Straddle Bent Substructure	12-24									1,260	3,420	5,875,200		
										5,000	1,100	160,000		
										5,000	1,100	160,000		
Segment H-5: 119th Street Yard and Shop (299+47/500+00 to 306+96/1014+64)	**12-36**													
Advance Work														
Single Track		x		x	x	x		x	x	87,000	1,000		5-10	
Double Track		x		x	x	x		x	x	3,150			5-10	
Double Track	24									3,709	1,242	500		
Double Track - Hammerhead Substructure	24									3,300	6,237	2,005,850		
Double Track - Straddle Bent Substructure	24-36									2,520	6,204	8,702,400		
Parking														
Construct - Shop	24	x	x	x	x			x		9,300	3,100		2-5	5-10
Construct-Shop Building	24-36	x	x	x	x	x	x	x	x	8,075	2,423	807,500	5-10	20-30
Access Road														
Construct	12-24	x	x	x	x			x		7,041	2,347		2-5	5-10
										5,000	1,100	160,000		

Halsted Street HRT		Construction Equipment												
Construction Activity	Duration (Months)	Haul Truck	Concrete Truck	Front End Loader	Excavator	Crane	Drill Rig	Compressor	Flatbed	Soil (CY)	Concrete (CY)	Structural Steel (LB)	Avg Truck Trips Per Work Day	Avg Workers Per Work Day

Conditions/Assumptions used in the Construction Matrix

The intent of this Construction Matrix is to provide a general level of construction activity that may occur with each alternative and is to be used for the NEPA process. The Construction Matrix identifies a range of potential impacts based on currently available information and is not intended to be used for scheduling construction nor is it intended to be used for cost estimating construction.

Activity

Segments and grouping of activities based on the Conceptual Engineering Plan and Profile Drawings, July 2012, revised September 2012.
Work elements based on the Conceptual Engineering Plans.
Stationing based on the Conceptual Engineering Plan and Profile Drawings.
Trackwork is included with the listed activity.

Duration (Months)

Estimate of the expected duration of work for the activity row.
Activities are not sequential except for Advance Work if required in the segment.
Construction implementation and maintaining operations will have a significant impact on construction durations.

Construction Equipment

Possible types of construction equipment that may be used for some duration within an activity.

Soil (CY)

Represents the potential soil or aggregate that may be excavated, removed, or fill. Concrete removed is included in quantity.
Includes caisson and foundation excavation.

Concrete(CY)

Represents the potential quantity of new concrete including caissons.
Concrete at stations includes building and platforms. Concrete for track support included in Elevated Structure

Structural Steel (LB)

Represents the potential quantity of new structural steel.
Structural Steel at stations includes building and platforms. Structural Steel for track support included in Elevated Structure.

Avg Truck Trips Per Work Day

Estimated average number of truck trips for an activity per work day. Excludes minor vehicles and worker vehicles.

Ave. Workers Per Work Day

Estimated average number of workers for an activity per work day.

Attachment B
Construction Schedules for the Build Alternatives

Bus Rapid Transit (BRT) Alternative Construction Schedule	Duration (Weeks)	Quarter Years											
		1			2			3			4		
		1	2	3	4	5	6	7	8	9	10	11	12
Advance Work													
Utility relocation; staging	12												
Stop													
Construct - 103rd Street	8												
Construct - 111th Street	8												
Construct - Kensington Avenue	8												
Construct - 130th Street	8												
Parking Lot													
Construct - 103rd Street	12												
Construct - 111th Street	16												
Construct - Kensington Avenue	20												
Construct -130th Street	26												
Signal/Communication													
Traffic Signal Prioritization													
Upgrade-Lafayette Ave	3												
Upgrade-State Street	3												
Upgrade-Michigan Avenue	3												
Upgrade-99th Place	3												
Upgrade-100th Street	3												
Upgrade-103rd Street	3												
Upgrade-107th Street	3												
Upgrade-111th Street	3												
Upgrade-115th Street	3												
Upgrade-119th Street	3												
Upgrade-127th Street	3												
Traffic Signal													
Construct-130th Street	4												
Roadway													
Pavement Markings	2												
ADA compliance													
103rd Street	2												
Kensington Avenue	2												
130th Street	2												

Stop Assumptions:

Stops will be constructed one direction of traffic at a time to reduce traffic due to construction activities and to reduce disturbance to existing bus services.

Stop construction start dates are staggered to reduce disturbance to existing bus service.

Traffic Signal Assumptions:

Eberhart Avenue signal constructed once 130th Street parking lot is near completion. Possible entrance of parking lot at Eberhart Avenue therefore signal shall be constructed after entrance to parking lot is constructed.

Traffic Signal Prioritization Assumptions:

Traffic signal prioritization assumes that light poles will be upgraded with detector and equipment. The installation is staggered to reduce traffic during construction activities.

UPRR HRT ROW Option Construction Schedule	Duration (Months)	YEARS 1	2	3	4	5
Segment U-1: 95th Street Station to Beginning of Horizontal Curve at UPRR (96+60 to 132+00)	**12-36**					
Advance Work						
Signal/cross-over installation; utility relocation; staging	12					
At Grade						
Single Track	12-18					
Retained Embankment						
Single Track	24					
Elevated Concrete Structure						
Single Track-Rehab/Modify Existing CTA/IDOT tunnel	24					
Elevated Steel Structure						
Single Track - Hammerhead Substructure	24					
Double Track - Hammerhead Substructure	24-36					
Segment U-2: Horizontal Curve at UPRR (132+00 to 142+19)	**12-36**					
Advance Work						
Utility relocation; staging	12					
Elevated Steel Structure						
Double Track - Hammerhead Substructure	24-30					
Double Track - TPG, Hammerhead Substructure	24-30					
Double Track - Straddle Bent Substructure	24-30					
Segment U-3: End of Horizontal Curve to Metra/CN Crossing (142+19 to 286+12)	**12-36**					
Advance Work						
Utility relocation; staging	12					
Stations						
Construct - 103rd Street	24-36					
Construct - 111th Street	24-36					
Construct - Michigan Avenue	24-36					
Parking						
Construct - 103rd Street	12					
Construct - 111th Street	12					
Construct - Michigan Avenue (2 lots)	24					
Elevated Steel Structure						
Double Track - Hammerhead Substructure	36					
Traction Power						
Substation - 175+00	24					
Substation - 254+00	24					
Segment U-4: Metra/CN Crossing to At Grade Track (286+12 to 310+03)	**12-36**					
Advance Work						
Utility relocation; staging	12					
Retained Embankment						
Double Track	24					
Elevated Steel Structure						
Double Track - Hammerhead Substructure	24-36					
Double Track - TPG, Hammerhead Substructure	24-36					
Segment U-5: At Grade Track to 130th Street Station Options (310+03 to 360+02)	**12-36**					
Advance Work						
Utility relocation; staging	12					
At Grade						
Double Track	24-36					
Access Road						
Crossing proposed tracks at 358+00	12-24					
Bridge for Access Road, Crossing at 358+00	24					
Connector access road, West of Proposed CTA tracks	12					
Segment U-6S: 130th Street South Station Option (360+02 to 380+29)	**12-36**					
Advance Work						
Utility relocation; staging	12					
Station						
Construct - 130th Street South Station Option	24-36					
Parking						
Construct - 130th Street South Station Option	24					
At Grade						
Double Track	24-36					
Triple Track	24					
Access Road						
At South Station Option	12-24					
Segment U-6W: 130th Street West Station Option (380+29 to 395+40)	**12-36**					
Advance Work						
Utility relocation; staging	24					
Station						
Construct - 130th Street West Station Option	24-36					
Parking						
Construct - 130th Street West Station Option (2 lots)	24					
At Grade						
Double Track	24-36					
Triple Track	24					
Access Road						
At West Station Option	12-24					
Bridge for Access Road, Crossing at 371+00	24					
Segment U-7: 120th Street Yard and Shop (291+85/45+00 to 352+69/106+12)	**12-36**					
Advance Work						
Utility relocation; staging	24					
Access Road						
Construct	12-24					
At Grade						
Single Track	36					
Double Track	36					
Retained Embankment						
Double Track	24					
Elevated Steel Structure						
Double Track - Hammerhead Substructure	24					
Shop Facility						
Construct-Shop Building	24-36					
Parking						
Construct - Shop	24					
Traction Power						
Substation - Yard	24					
Final Phase - 95th Street Station to 130th Street (96+50 to 380+50/396+00)	**10 - 12**					
Signal/Communication						
Signal/Interlocking	12					
Communication System	12					

UPRR HRT East Side Option Construction Schedule	Duration (Months)	YEARS 1	2	3	4	5
Segment U-1: 95th Street Station to Beginning of Horizontal Curve at UPRR (96+60 to 132+00)	**12-36**					
Advance Work						
Signal/cross-over installation; utility relocation; staging	12					
At Grade						
Single Track	12-18					
Retained Embankment						
Single Track	24					
Elevated Concrete Structure						
Single Track-Rehab/Modify Existing CTA/IDOT tunnel	24					
Elevated Steel Structure						
Single Track - Hammerhead Substructure	24					
Double Track - Hammerhead Substructure	24-36					
Segment U-2: Horizontal Curve at UPRR (132+00 to 142+00)	**24-36**					
Advance Work						
Utility relocation; staging	12					
Elevated Steel Structure						
Double Track - Hammerhead Substructure	24-30					
Double Track - TPG, Hammerhead Substructure	24-30					
Double Track - Straddle Bent Substructure	24-30					
Segment U-3: End of Horizontal Curve to Metra/CN Crossing (142+00 to 285+00)	**12-36**					
Advance Work						
Utility relocation; staging	12					
Stations						
Construct - 103rd Street	24-36					
Construct - 111th Street	24-36					
Construct - Michigan Avenue	24-36					
Parking						
Construct - 103rd Street	12					
Construct - 111th Street	12					
Construct - Michigan Avenue (2 lots)	24					
Elevated Steel Structure						
Double Track - Hammerhead Substructure	36					
Traction Power						
Substation - 175+00	24					
Substation - 254+00	24					
Segment U-4: Metra/CN Crossing to At Grade Track (285+00 to 308+83)	**12-36**					
Advance Work						
Utility relocation; staging	12					
Retained Embankment						
Double Track	24					
Elevated Steel Structure						
Double Track - Hammerhead Substructure	24-36					
Double Track - TPG, Hammerhead Substructure	24-36					
Segment U-5: At Grade Track to 130th Street Station Options (308+83 to 359+00)	**12-36**					
Advance Work						
Utility relocation; staging	12					
At Grade						
Double Track	24-36					
Access Road						
Crossing proposed tracks at 357+00	12-24					
Bridge for Access Road, Crossing at 357+00	24					
Connector access road, West of Proposed CTA tracks	12					
Segment U-6S: 130th Street South Station Option (359+00 to 379+27)	**12-36**					
Advance Work						
Utility relocation; staging	24					
Station						
Construct - 130th Street South Station Option	24-36					
Parking						
At South Station Option	24					
At Grade						
Double Track	24-36					
Triple Track	24					
Access Road						
At South Station Option	12-24					
Segment U-6W: 130th Street West Station Option (379+27 to 394+38)	**12-36**					
Advance Work						
Utility relocation; staging	12					
Station						
Construct - 130th Street West Station Option	24-36					
Parking						
At West Station Option (2 lots)	24					
At Grade						
Double Track	24-36					
Triple Track	24					
Access Road						
At West Station Option	12-24					
Bridge for Access Road, Crossing at 369+50	24					
Segment U-7: 120th Street Yard and Shop (290+26/45+00 to 351+67/106+79)	**12-36**					
Advance Work						
Utility relocation; staging	24					
Access Road						
Construct	12-24					
At Grade						
Single Track	36					
Double Track	36					
Retained Embankment						
Double Track	24					
Elevated Steel Structure						
Double Track - Hammerhead Substructure	24					
Shop Facility						
Construct-Shop Building	24-36					
Parking						
Construct - Shop	24					
Traction Power						
Substation - Yard	24					
Final Phase - 95th Street Station to 130th Street (96+50 to 379+70/394+53)	**10 - 12**					
Signal/Communication						
Signal/Interlocking	12					
Communication System	12					

UPRR HRT West Side Option Construction Schedule	Duration (Months)	YEARS 1	2	3	4	5
Segment U-1: 95th Street Station to Beginning of Horizontal Curve at UPRR (96+60 to 132+00)	**12-36**					
Advance Work						
Signal/cross-over installation; utility relocation; staging	12					
At Grade						
Single Track	12-18					
Retained Embankment						
Single Track	24					
Elevated Concrete Structure						
Single Track-Rehab/Modify Existing CTA/IDOT tunnel	24					
Elevated Steel Structure						
Single Track - Hammerhead Substructure	24					
Double Track - Hammerhead Substructure	24-36					
Segment U-2: Horizontal Curve at UPRR (132+00 to 142+43)	24-36					
Advance Work						
Utility relocation; staging	12					
Elevated Steel Structure						
Double Track - Hammerhead Substructure	24-30					
Double Track - TPG, Hammerhead Substructure	24-30					
Double Track - Straddle Bent Substructure	24-30					
Segment U-3A: End of Horizontal Curve to Prairie/UPRR Crossing (142+43 to 275+00)	**12-36**					
Advance Work						
Utility relocation; staging	12					
Stations						
Construct - 103rd Street	24-36					
Construct - 111th Street	24-36					
Construct - Michigan Avenue.	24-36					
Parking						
Construct - 103rd Street	12					
Construct - 111th Street	12					
Construct -Michigan Avenue (2 lots)	24					
Elevated Steel Structure						
Double Track - Hammerhead Substructure	24-36					
Traction Power						
Substation - 180+00	24					
Substation - 260+00	24					
Segment U-3B: Prairie/UPRR crossing to Metra/CN Crossing (275+00 to 287+20)	**36**					
Advance Work						
Utility relocation; staging	24					
Elevated Steel Structure						
Double Track -Hammerhead Substructure	24					
Double Track - Straddle Bent Substructure	36					
Segment U-4: Metra/CN Crossing to At Grade Track (287+20 to 311+02)	**24-36**					
Advance Work						
Utility relocation; staging	24					
Retained Embankment						
Double Track	24					
Elevated Steel Structure						
Double Track - Hammerhead Substructure	24-36					
Double Track - TPG, Hammerhead Substructure	24-36					
Segment U-5: At Grade Track to 130th Street Station Options (311+02 to 361+19)	**12-36**					
Advance Work						
Utility relocation; staging	24					
At Grade						
Double Track	24-36					
Access Road						
Crossing proposed tracks at 360+00	12-24					
Bridge for Access Road, Crossing at 360+00	24					
Connector access road, West of Proposed CTA tracks	12					
Segment U-6S: South 130th Street Station Option (361+19 to 381+46)	**24-36**					
Advance Work						
Utility relocation; staging	24					
Station						
Construct - 130th Street South Station Option	24-36					
Parking						
Construct - 130th Street South Station Option	24					
At Grade						
Double Track	24-36					
Triple Track	24					
Access Road						
At South Station Option	12-24					
Segment U-6W: West 130th Street Station Option (381+46 to 396+57)	**12-36**					
Advance Work						
Utility relocation; staging	24					
Station						
Construct - 130th Street West Option	24-36					
Parking						
Construct - 130th Street West Option (2 lots)	24					
At Grade						
Double Track	24-36					
Triple Track	24					
Access Road						
At West Station Option	12-24					
Bridge for Access Road, Crossing at 372+00	24					
Segment U-7: 120th Street Yard and Shop (292+45/45+00 to 353+86/106+79)	**12-36**					
Advance Work						
Utility relocation; staging	24					
Access Road						
Construct	12-24					
At Grade						
Single Track	36					
Double Track	36					
Retained Embankment						
Double Track	24					
Elevated Steel Structure						
Double Track - Hammerhead Substructure	24					
Shop Facility						
Construct-Shop Building	24-36					
Parking						
Construct - Shop	24					
Traction Power						
Substation - Yard	24					
Final Phase - 95th Street Station to 130th Street (96+50 to 382+30/396+50)	**10 - 12**					
Signal/Communication						
Signal/Interlocking	12					
Communication System	12					

Halsted Street HRT Construction Schedule	Duration (Months)	YEARS 1	2	3	4	5
Segment H-1: 95th Street Station to Beginning of Horizontal Curve at Halsted (96+50 to 158+00)	**12-36**					
Advance Work						
Signal/cross-over installation; utility relocation; staging	12					
At Grade						
Single Track	12-18					
Retained Embankment						
Single Track	24					
Elevated Concrete Structure						
Single Track-Rehab/Modify Existing CTA/IDOT tunnel	24					
Elevated Steel Structure						
Single Track-Hammerhead Substructure	24					
Double Track - Hammerhead Substructure	24-36					
Segment H-2: Horizontal Curve at Halsted (158+00 to 168+00)	**12-30**					
Advance Work						
Utility relocation; staging	12					
Elevated Steel Structure						
Double Track -TPG, Hammerhead Substructure	24-30					
Double Track - Straddle Bent Substructure	24-30					
Segment H-3: End of Horizontal Curve to 119th Street Station (168+00 to 285+00)	**12-36**					
Advance Work						
Utility relocation; staging	12					
Stations						
Construct - 103rd Street	24-36					
Construct - 111th Street	24-36					
Parking						
Construct - 103rd Street	12					
Construct - 111th Street	12					
Elevated Steel Structure						
Double Track - Hammerhead Substructure	24-36					
Double Track - Straddle Bent Substructure	24-36					
Traction Power						
Substations - 101st Street	24					
Substations - 110th Street	24					
Segment H-4: 119th Street station to Vermont Avenue station (285+00 to 367+30)	**12-36**					
Advance Work						
Utility relocation; staging	12					
Stations						
Construct - 119th Street	24-36					
Construct - Vermont Avenue	24-36					
Parking						
Construct - 119th Street	12					
Construct - Vermont Avenue	12					
Elevated Steel Structure						
Double Track - Hammerhead Substructure	24-36					
Double Track - Straddle Bent Substructure	24-36					
Triple Track - Straddle Bent Substructure	12-24					
Traction Power						
Substations - 118th Place	24					
Substations - 126th Street	24					
Segment H-5: 119th Street Yard and Shop (299+47/500+00 to 306+96/1014+64)	**12-36**					
Advance Work						
Utility relocation; staging	12					
At Grade						
Single Track	24-36					
Double Track	24-36					
Retained Embankment						
Double Track	24					
Elevated Steel Structure						
Double Track - Hammerhead Substructure	24					
Double Track - Straddle Bent Substructure	24-36					
Parking						
Construct - Shop	24					
Shop Facility						
Construct-Shop Building	24-36					
Access Road						
Construct	12-24					
Traction Power						
Substations - Yard	24					
Final Phase - 95th Street Station to 129th Street (STA 96+50 to 367+00)	**10 - 12**					
Signal/Communication						
Signal/Interlocking	12					
Communication System	12					

Attachment C
2014-2015 Red Line Extension Project Update

2014–2015 Red Line Extension Project Update

From 2012–2014, CTA evaluated benefits and impacts of four alternatives: the No Build Alternative, the Bus Rapid Transit Alternative (along Michigan Avenue), the Union Pacific Railroad (UPRR) Rail Alternative, and the Halsted Alternative. CTA evaluated three options of the UPRR Rail Alternative: Right-of-Way Option, East Option, and West Option. CTA also evaluated two options of the UPRR Rail Alternative 130th Street station: a South Station Option and a West Station Option. Based on the project description provided in Section 2 of this technical memorandum, CTA analyzed the impacts of these alternatives and station options. The benefits and impacts are included in the technical memoranda prepared in 2012–2014.

In August 2014, based on the technical analysis and public input, CTA announced the NEPA Preferred Alternative—the UPRR Rail Alternative. Additional conceptual engineering was conducted on the UPRR Rail Alternative to refine the East and West Option alignments. In addition, CTA is considering only the South Station Option of the 130th Street Station.

In late 2014 and early 2015, CTA conducted additional engineering and revised assumptions on the East and West Options to refine the alignments. The refinement of the East and West Options consisted of the following items:

- For the segment of the alignment along I-57, CTA shifted the proposed alignment from the median of I-57 to the north side of I-57 within the existing expressway right-of-way. The construction would be less complex, safer for construction workers, and have a shorter duration. The shift would also allow for fewer impacts to Wendell Smith Park for the East Option, and would allow for no permanent impacts to Wendell Smith Park for the West Option.

- CTA modified the curve speeds as the alignment heads south from I-57 along the UPRR tracks. The curve speed for both the East and West Options would be 35 mph.

- CTA shifted the East Option alignment near 103rd Street station to minimize impacts to Block Park and the Roseland Pumping Station.

- CTA modified the curves south of 103rd Street for both the East and West Options to 55 mph to maximize the train speed.

- CTA refined the layout of the 120th Street yard and shop to optimize yard operations. The refined layout of the yard would accommodate 340 train cars.

The refinement of the East and West Option alignments minimizes potential impacts to parks while providing flexibility for future design phases. The Draft Environmental Impact Statement contains the benefits and impacts of the refined East and West Option alignments and supersedes information presented in other chapters of this technical memorandum.

The refined East and West Option alignments would have no additional or different impacts from those described in the technical memoranda for the following resource areas: construction, transportation, land use and economic development, historic and cultural resources, safety and security, hazardous materials, indirect and cumulative, air quality, floodplains, vegetation and wildlife habitat, threatened and endangered species, and geology and soils.