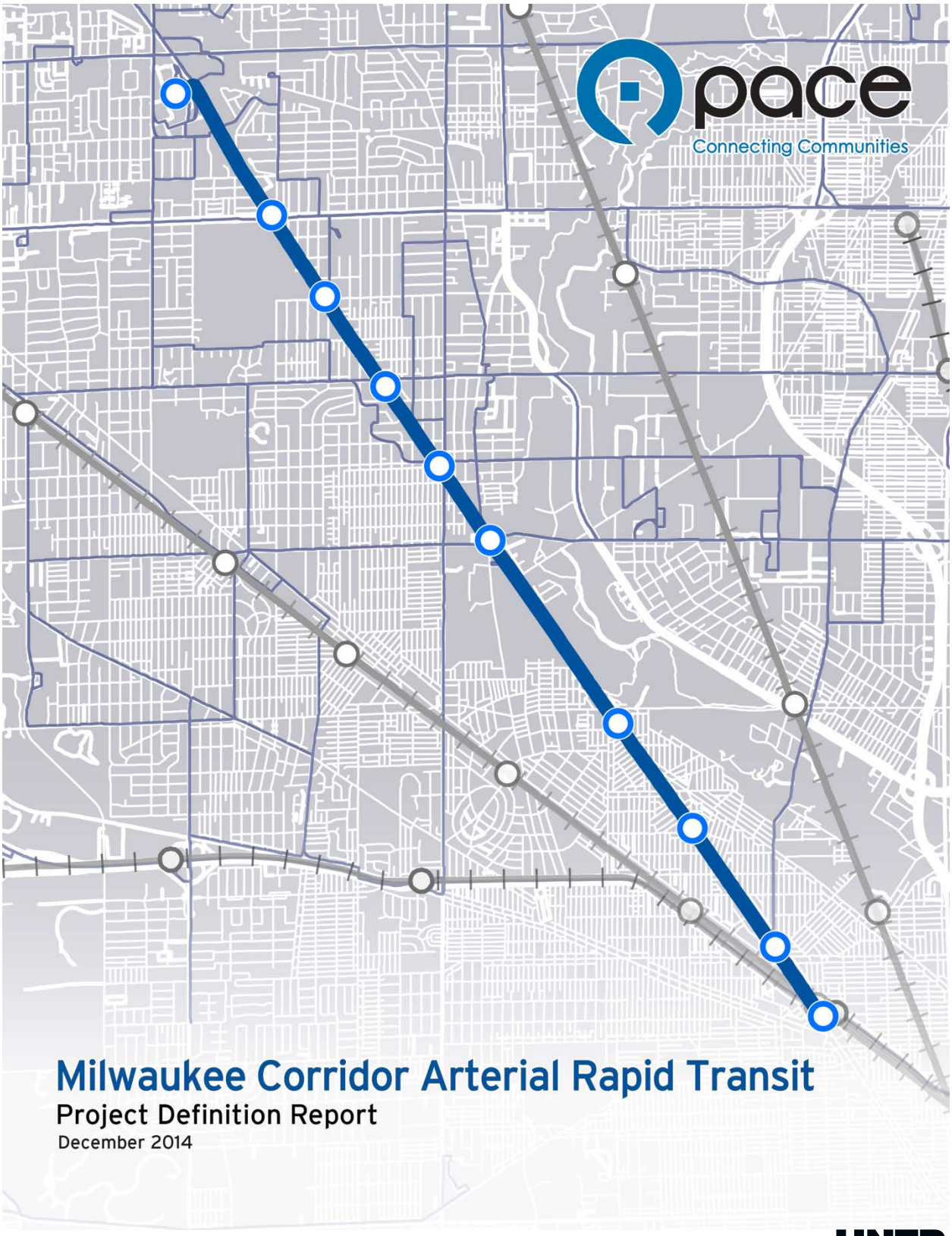

Milwaukee Corridor Arterial Rapid Transit

Project Definition Report

December 2014

Prepared by HNTB

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Table of Contents

List of Tables

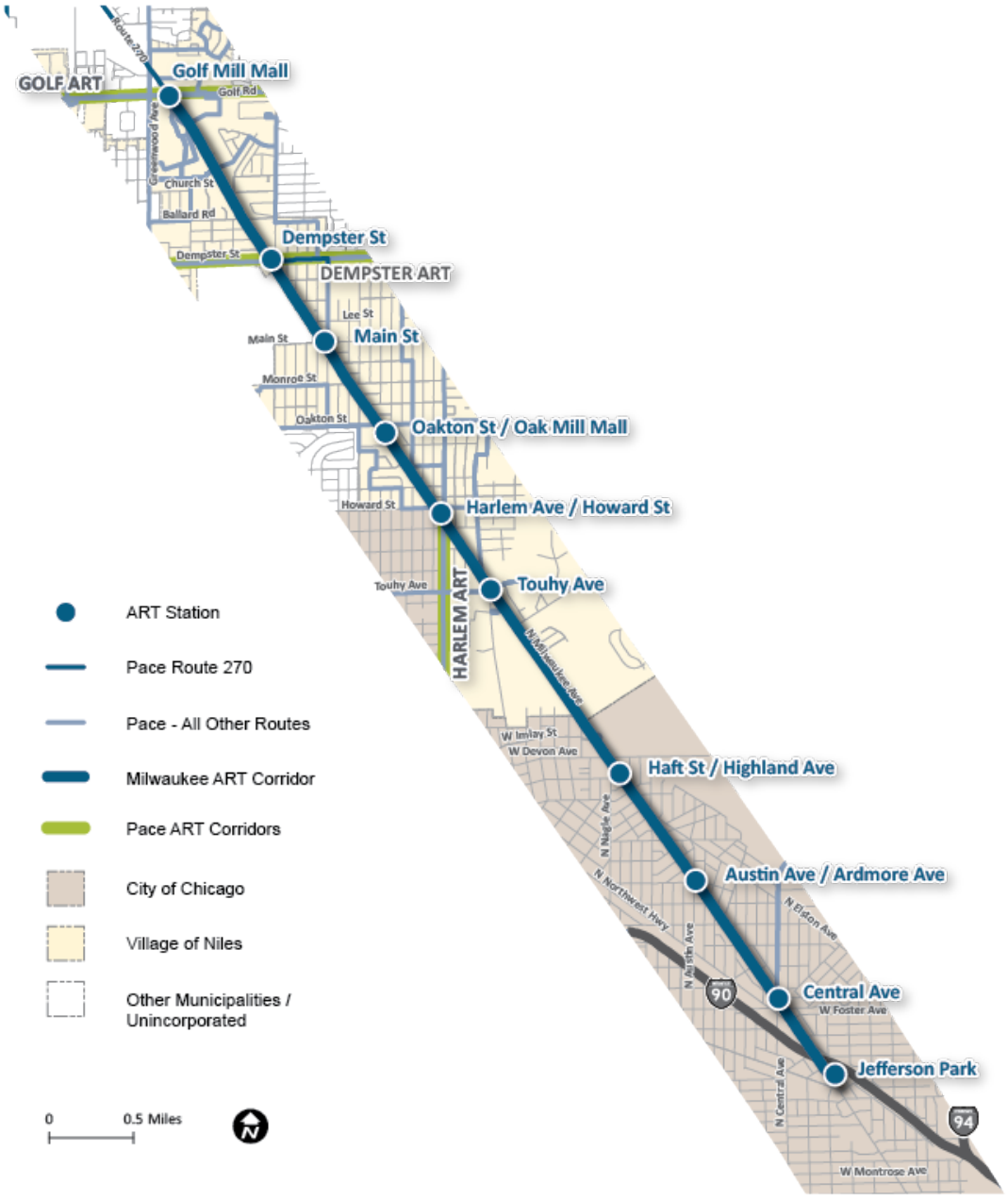
List of Figures

Executive Summary

The Project

In 2001, Pace published Vision 2020, which identified the Milwaukee Corridor ART project as one of 24 corridors that would enhance the regional transit network and intersuburban travel. In 2009, Pace's Arterial Rapid Transit Study evaluated and prioritized these corridors for phased implementation. The Milwaukee Corridor ART was identified as the first ART project to be implemented (see Figure ES.1).

Figure ES.1: Milwaukee Corridor and Existing Transportation Network



The Milwaukee Corridor ART is defined by the following characteristics:

- 7.6 miles in length.
- 10 station locations including two terminals and 8 intermediate station pairs.
- Runs southeast from Golf Mill Shopping Center in the Village of Niles to Jefferson Park Transit Center in Chicago.
- Connects to the CTA Blue Line, Metra Northwest Line, and numerous local bus routes at Jefferson Park Transit Center.

As Pace's first ART route, it will improve connectivity and increase transit service levels through high-frequency service, travel time savings, and station and rider amenities. The Milwaukee Corridor ART will eventually connect to three additional planned ART routes including the Golf, Dempster and Harlem Corridors.

Defining the Project

In 2014, Pace undertook a planning effort to define the features and characteristics of the Milwaukee Corridor ART, which is documented in this Project Definition Report. This report details the selection of station locations and station amenities, as well as the application of brand elements and the development of station design guidelines, vehicle specifications, technology requirements, operating plan, and cost estimates. The Project Definition Report is intended to serve as a reference and resource for Pace, project stakeholders and the general public.

Project Features and Characteristics

CAPITAL IMPROVEMENTS

The Milwaukee Corridor ART service will operate in a mixed traffic running way, with two off-street terminal stations at Golf Mill Shopping Center and Jefferson Park Transit Center and eight intermediate station pairs for a total of 18 stations. Figure ES.2 illustrates a typical station which will occupy a footprint of 12 feet by 60 feet, including a 12 inch near-level boarding platform with ADA-accessible ramps at both ends that connect the station to the surrounding sidewalk network. Smaller, more compact stations with a modified feature set will be used where necessary.

Figure ES.2: Typical Station Layout

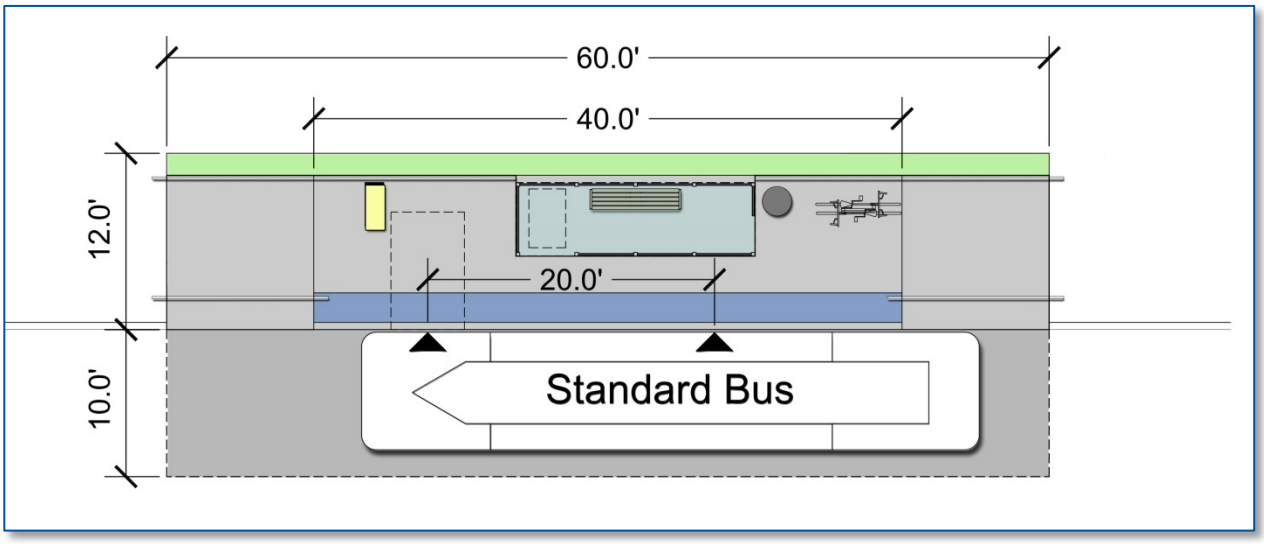


Figure ES.3: Typical Station Layout Rendering

Planned station amenities include the following features (see Figure ES.3):

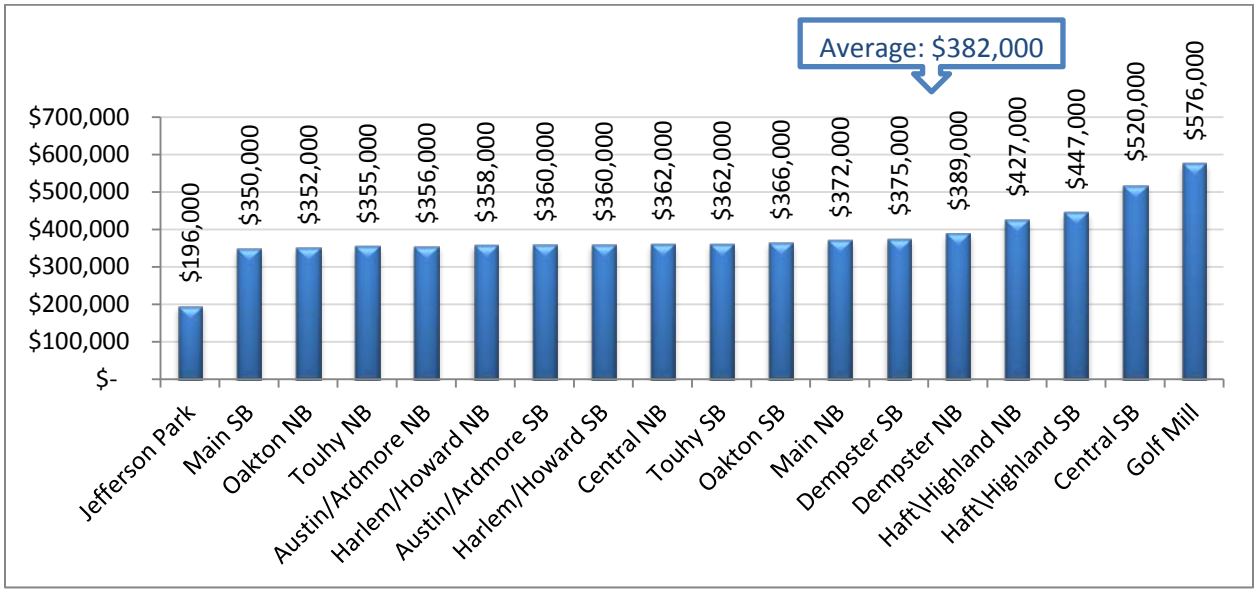
- Raised platform for near-level boarding to enable passengers to enter the bus without the need to step up.
- Semi-custom branded shelters.
- Benches, trash receptacles, and bicycle racks.
- A vertical marker conveying the ART brand and featuring real-time next-bus signage and ART route information.
- Infrared heating within the shelter.
- Electric pavement snow-melt system.
- Railings along the back of the platform and along both sides of the access ramps.
- Landscaping.

FINANCIAL PLAN

Pace has identified potential funding sources to finance the Milwaukee Corridor ART project that include local, regional, and federal sources. A federal Congestion Mitigation and Air Quality (CMAQ) grant totaling approximately $9.5 million will be used for station capital costs. If needed, additional funding sources include a Regional Transportation Authority (RTA) Innovation, Coordination, and Enhancement (ICE) grant as well as Federal Transit Administration Section 5307 formula funds.

A capital cost estimate was developed to a level of detail appropriate for the Project Definition phase. As shown in Figure ES.4, the average cost of the 18 preferred stations is $382,000. The capital cost estimate for station construction is $7.986 million in 2014 dollars, and based on a 3% inflation rate, would increase to $8.47 million in the year 2016 and $8.73 million in the 2017 year of expenditure.

Figure ES.4: Total Construction Cost by Station (Excluding Contractor Costs)



OPERATING PLAN

A preliminary operating plan, based on running time and ridership analysis, reflects implementation of the new ART service and corresponding changes to local Routes 270 and 272 services. Reducing the average number of intermediate stops from approximately 15 to eight enables time savings while providing improved service to nearly all existing riders. Implemented through a separate project, traffic signal priority (TSP) is anticipated to improve schedule reliability for the ART route. TSP is anticipated to be implemented in late 2016.

Average weekday ridership on Route 270 was approximately 3,400 daily boardings in 2013 with 57% of the boardings occurring at either Jefferson Park Transit Center or Golf Mill Shopping Center. Ninety-one percent of the all Route 270 boardings occur within the ART corridor (i.e. at or between Golf Mill Shopping Center and Jefferson Park Transit Center). Eighty-five percent of Route 270 boardings within the ART corridor are within 1/8 mile of a proposed ART station and 93% are within 1/4 mile of a proposed ART station.

"85% of Route 270 boardings within the ART corridor are within 1/8 mile of a proposed ART station and 93% are within 1/4 mile of a proposed ART station."

The ART service will operate on weekdays between the hours of 5 a.m. and midnight with 10 minute headways during rush hours, 15 minute headways during non-peak hours until 10:00 pm, and 30 minute headways from 10:00 pm to midnight. On Saturdays, service will begin at 5:30 a.m. On Sundays, service will begin at 6 a.m. Service on both Saturday and Sundays will run until midnight. On weekends and holidays ART will run every 15 minutes until 10 p.m. when the headway will transition to 30 minutes.

Operations and Maintenance (O&M) costs were estimated based on revenue-hours of service and indicate that the Baseline Operating Plan will result in a net increase of approximately $1.58 million in total O&M costs.

RIDERSHIP

The ridership forecast for the Milwaukee Corridor ART project was developed using the Federal Transit Administration's Simplified Trips-on-Project Software (STOPS) model. The model incorporated the proposed baseline operating plan, including proposed service reductions on Route 270, as well as demographic and trip data. Milwaukee Corridor ART is expected to generate nearly 4,900 weekday boardings, an increase of approximately 33% compared to existing corridor ridership.

"The Milwaukee Corridor ART is expected to generate nearly 4,900 weekday boardings, an increase of approximately 33% over existing corridor ridership."

STAKEHOLDER INVOLVEMENT PROCESS

Throughout the Project Definition phase, stakeholder involvement activities for the Milwaukee Corridor ART focused on outreach with select property owners and coordination with government agencies at the local, state, and federal level.

As the project proceeds, stakeholder involvement and outreach efforts will be a priority as the National Environmental Policy Act (NEPA) documentation is prepared and submitted and the conceptual design of the stations is further advanced. Coordination with communities, government officials, public agencies, and individual interest groups will continue and emphasis will be placed on public involvement and broad community outreach. Guided by established plans, Pace will connect with its customers, the general public, affected property owners, and business groups through outreach activities including a project website, fact sheets, project newsletters, public meetings, and one-on-one stakeholder meetings.

NEXT STEPS

Utilizing a design-bid-build delivery method, the Milwaukee Corridor ART project will enter its federally mandated environmental review process and into the engineering phase in the coming months. The NEPA documentation is expected to be approved in mid-2015 with engineering continuing into 2016. Construction is anticipated to begin in late 2016 and be complete by the second quarter of 2017 when service will begin (see Figure ES.5).

Figure ES.5: Milwaukee Corridor ART Project Timeline

1.0 Introduction

The Milwaukee Corridor ART Project Definition, as summarized in this report, defines Pace's first Arterial Rapid Transit (ART) project. Supported by a series of technical memoranda, this report describes the major features and functional requirements of the Milwaukee Corridor ART project and establishes a basis for design and engineering activities to be conducted under the next phase of project development. Initial coordination with environmental review agencies has commenced and the environmental documentation required will be conducted in the next phase of work, before the engineering phase begins.

While this document describes the decisions made with regard to the features and requirements specific to the Milwaukee Corridor service, it also serves a broader purpose. As the first corridor in a network of more than 20 planned ART corridors, the selected design elements will establish a precedent for the implementation of future ART corridors. A consistent design standard featuring a prominent, premium transit brand, will create a highly visible ART identity throughout the Pace service area. The design and implementation of the Milwaukee Corridor ART will establish level of service expectations and a physical and operational standard for subsequent corridors. It will also serve as a model for effectively partnering with local communities to achieve mutual benefits from transit investments. Lessons learned throughout the Milwaukee Corridor ART project will be instrumental in developing subsequent Pace ART services.

This phase of project development served to verify assumptions, establish the scope of work for the design of the Milwaukee Corridor ART service, develop schematic designs and cost estimates for purposes of planning and financial analysis, and establish project construction and implementation schedules. Upon completion of the project definition phase, the project will enter the environmental documentation and review phase and then the engineering phase. Construction will begin in late 2016 and be complete by the second quarter of 2017 when service will start.

1.1 Vision 2020 and Previous Arterial Rapid Transit Planning

In 2001, Pace published *Vision 2020*[1], a blueprint for its vision of expanded transit mobility in the greater Chicago region. Vision 2020 articulated Pace's long-term goal of developing line-haul rapid transit routes on both arterial streets and expressways. An accompanying 2002 bus rapid transit (BRT) study defined the functional elements of these rapid bus services and a preliminary list of potential corridors.

In the 2009 *Arterial Rapid Transit Study*[2], Pace further refined 24 proposed rapid transit corridors and prioritized these corridors for phased implementation, based upon the following evaluation factors: institutional support, community support, support within and technical/management capabilities of the division, regional connectivity, current ridership, ridership potential, travel time savings and right-of-way impacts. The study identified Milwaukee Avenue as the first corridor, prioritized a near-term segment between Jefferson Park Transit Center in Chicago and Golf Mill Shopping Center in Niles, and outlined

[1] http://www.pacebus.com/sub/vision2020/study_contents.asp

[2] *Arterial Rapid Transit Study*, prepared for Pace by STV Incorporated, May 2009.

medium- and long-term extensions to Wheeling and Gurnee, respectively. Additional near-term corridors were designated on segments of Dempster Street, Harlem Avenue, Halsted Street, and 95th Street. A corridor connecting western Cook County with the Oak Brook area was also designated as the J Route or J Line with an undetermined alignment that was to be defined at a later date.

The *ART Implementation Plan*[3] completed later in 2009 confirmed Milwaukee Avenue as the first ART corridor to be implemented and provided guidance to Pace with regard to next steps in undertaking this project.

Pace conducted an internal Station Location Selection study in 2010 which identified preliminary, generalized ART station locations for the near-term Milwaukee Corridor ART. That study is attached as Appendix A – Station Location Selection Study for the Milwaukee Corridor ART (2010). This Project Definition Report addresses the same near-term project alignment. Potential northward extensions of the Milwaukee Corridor ART will be addressed in future phases.

Figure 1.1 shows the proposed station locations for the Milwaukee Corridor ART service, which were initially identified in 2010 and have been validated and refined in the current phase of project development.

Figure 1.1: Milwaukee ART Proposed Station Locations

1.2 ART Implementation

The analysis and conceptual design documented in this study has been undertaken to answer several key questions with regard to future ART service along Milwaukee Avenue. These questions and the responses to them are summarized below and should be considered in the context of the broader ART network that will be impacted by the implementation of the Milwaukee Corridor.

[3] *ART Implementation Plan*, prepared for Pace by AECOM, December 31 2009.

What purpose will ART serve in the Milwaukee Corridor? How will local stakeholder input and preferences be engaged in the design and operation of the service? As documented in the purpose and need statement, the purpose of the Milwaukee Corridor ART is to provide an enhanced and cost-effective bus rapid transit (BRT) service in the Milwaukee Avenue corridor that includes improved frequency, reliability and travel time of bus transit service, as well as improved bus transit facilities. A Milwaukee Corridor ART Stakeholder Involvement Plan has been created to engage a variety of stakeholders including transit users, property owners, business owners, government agencies, and special interest groups. The execution of the public involvement plan will include one-on-one stakeholder meetings as well as public meetings, a project website, newsletters and fact sheets. These efforts and materials will be used to gather stakeholder input on the design and operation of the service, which will help inform the final design and service plan.

What will the Milwaukee Corridor ART service look like? Conceptual design elements have been identified to facilitate the preparation of cost estimates and guide the engineering design. ART service in the Milwaukee corridor, and in future corridors, will have a number of premium features that will provide rider amenities, increase rider comfort and decrease travel times. These features, to be discussed in greater detail in subsequent sections of this report, include: near-level boarding at upgraded and clearly branded stations; a dedicated, branded sub-fleet of new 40-foot vehicles with on-board WiFi; passenger conveniences including real-time bus information and vicinity maps at stations; and a distinct ART identity conveyed through both physical infrastructure and printed and on-line information.

How will the Milwaukee Corridor ART service operate? An operating plan has been developed that includes weekday service of 10 minute peak headways and service from 5:00 am to midnight, which reflects the frequent, all-day service envisioned and improved on-time performance facilitated by transit signal priority (TSP) in the corridor. The ART operating plan has been coordinated with a service reallocation plan that coordinates with the overlapping Route 270 service and other existing transit service on Milwaukee Avenue.

How much will the Milwaukee Corridor ART service cost? Capital and operations and maintenance (O&M) cost estimates have been prepared reflecting the preferred design elements and operating plan. Contingencies reflecting the early phase of project development are also included. In 2014 dollars, the cost of constructing the capital improvements for the Milwaukee Corridor total $7.986 million. The O&M cost estimate has been prepared on the basis of cost per unit of service, to facilitate the refinement of project assumptions as appropriate. Preliminary O&M cost estimates indicate that the Baseline Operating Plan will result in a net increase of approximately $1.58 million in total O&M costs.

How will the Milwaukee Corridor ART service be implemented? A financial plan has been prepared, reflecting capital costs and anticipated funding sources that include Congestion Mitigation and Air Quality funds as the primary funding source. The project will be delivered following a design-bid-build process with service set to begin in second quarter 2017. After publication of this Project Definition Report, the project will move into the environmental documentation phase, followed by engineering, property acquisition and then construction.

1.3 Milwaukee Corridor Project Goals

Building on the overall Pace ART goals articulated in previous studies, specific project goals for the Milwaukee Corridor have been developed:

1. Increase the **visibility** of transit in the Milwaukee Avenue corridor, making it more legible and accessible to transit users.
2. Improve the **performance** of transit in the Milwaukee Avenue corridor, resulting in increased speed, reliability, and convenience.
3. Encourage **"placemaking"** in the development of Milwaukee Corridor ART stations, providing passenger amenities for transit users that support the ART brand while reflecting the local context.
4. Enhance transit user **safety** in the Milwaukee Avenue corridor, through coordinated provision of improved pedestrian crossings and sidewalks in conjunction with ART station development.
5. Facilitate **multi-modal connections** between commercial and employment centers along the Milwaukee Avenue corridor, in support of local and regional plans.

1.4 Organization of this Plan Document

The following sections of this Project Definition Report are generally organized around the seven "elements of BRT"[4] that distinguish premium bus service: stations, running way, vehicles, fare collection, technology, operating plan and branding. Following the branding discussion, the stakeholder involvement process, National Environmental Policy Act (NEPA) documentation, and project delivery are addressed. Technical memoranda available under separate cover, as noted throughout the report, document technical analyses and findings in more detail. This Project Definition Report serves to summarize the relevant conclusions that will inform design and engineering in the next phase of the planning process.

The following sections present initial assumptions based on past analyses, summarize additional analysis, and document confirmed and pending decisions. The general content of the sections that follow is described briefly below:

- **Corridor Context**: An overview of existing conditions in the corridor is presented, including physical infrastructure, land uses, existing and planned transit service, and local plans and studies of the corridor.
- **Stations:** Functional requirements and conceptual layouts for both terminal stations and intermediate stations are defined. Based on workshop sessions with Pace staff, station design standards document the strategy for not only the Milwaukee Corridor ART but also for subsequent ART corridors. The functional requirements inform the cost estimates and serve as the basis of design for the engineering phase.

[4] Transportation Research Board. Transit Cooperative Research Program. *Bus Rapid Transit Practitioner's Guide* (*TCRP Report 118).* Transportation Research Board, 2007.

- **Running Way:** After conducting physical conditions and travel time inventories, a strategy for station area roadway treatments is identified, including right-of-way requirements, curb reconstruction needs and crosswalk and sidewalk improvements.
- **Vehicles:** Preliminary requirements for ART vehicles, based upon specifications used in recent Pace vehicle purchases while ensuring a unique ART identity, are documented.
- **Fare Collection:** Based upon research into the practices of peer agencies and coordination with the Chicago Transit Authority (CTA), a range of potential ART fare collection strategies are documented. Carefully considering the installation and maintenance requirements of each approach, a preferred fare collection strategy is identified that strikes a balance between operation considerations and potential travel time savings, and reflects use of the Ventra fare payment system currently in use by Pace and the CTA.
- **Technology:** A technology strategy developed for the Milwaukee Corridor ART service, incorporates the following elements: real-time arrival information, next stop announcement systems that consider existing technologies already in use; and ART implementation of Pace's existing vehicle video surveillance, vehicle passenger WiFi and automatic passenger counter (APC) systems. Information on the RTA's TSP Implementation Program (RTSPIP) and its application in the Milwaukee Corridor is also discussed for reference
- **Operating Plan:** To meet FTA guidance for BRT service frequency, the ART service will operate at 10 minutes peak and 15 minutes off-peak frequency and for at least 14 hours per day. Travel time savings distinguishes ART service from local service. The operating plan provides a preliminary schedule that reflects ART frequency and service span, station locations and fleet requirements, and also includes service reallocation recommendations for the overlapping local Route 270 and other connecting services.
- **Branding:** Based on a branding strategy being developed concurrently, the Project Definition report documents brand elements which will be updated as they are established.
- **Stakeholder Involvement Process:** Outreach and coordination with federal, state, and local agencies; municipalities; interest groups; and the general public, are described.
- **NEPA Documentation:** The Purpose and Need Statement and Categorical Exclusion checklist documentation required to meet NEPA requirements are summarized.
- **Financial Plan:** Preliminary capital cost estimates for the initial project phase document provisions for stations, technology equipment, street modifications, property acquisition, vehicles, other physical elements, and estimated costs of engineering and other professional services. An operations and maintenance (O&M) cost estimate for the initial phase of implementation includes provisions for vehicle operations, fuel, vehicle maintenance, station maintenance, technology elements, fare collection, and allocated general administration costs.
- **Ridership Forecast:** A ridership forecast for the initial year of operation was developed by applying a forecasting method that pivots from Route 270 ridership, reflecting service enhancements planned for the corridor and BRT experience in similar corridors elsewhere.
- **Project Delivery:** A project schedule provides key elements of the various project delivery phases and discusses relevant considerations and recommendations regarding intergovernmental agreements.

2.0 Corridor Context

The Milwaukee Corridor ART begins at Jefferson Park Transit Center in Chicago and runs 7.6 miles to the northwest along Milwaukee Avenue to Golf Mill Shopping Center in the Village of Niles. Eighteen enhanced ART stations, consisting of two terminals and eight pairs of intermediate stations are proposed to serve this near-term corridor. In future phases, ART service may be extended further northwest on Milwaukee from Golf Mill Shopping Center to Wheeling and eventually to Gurnee.

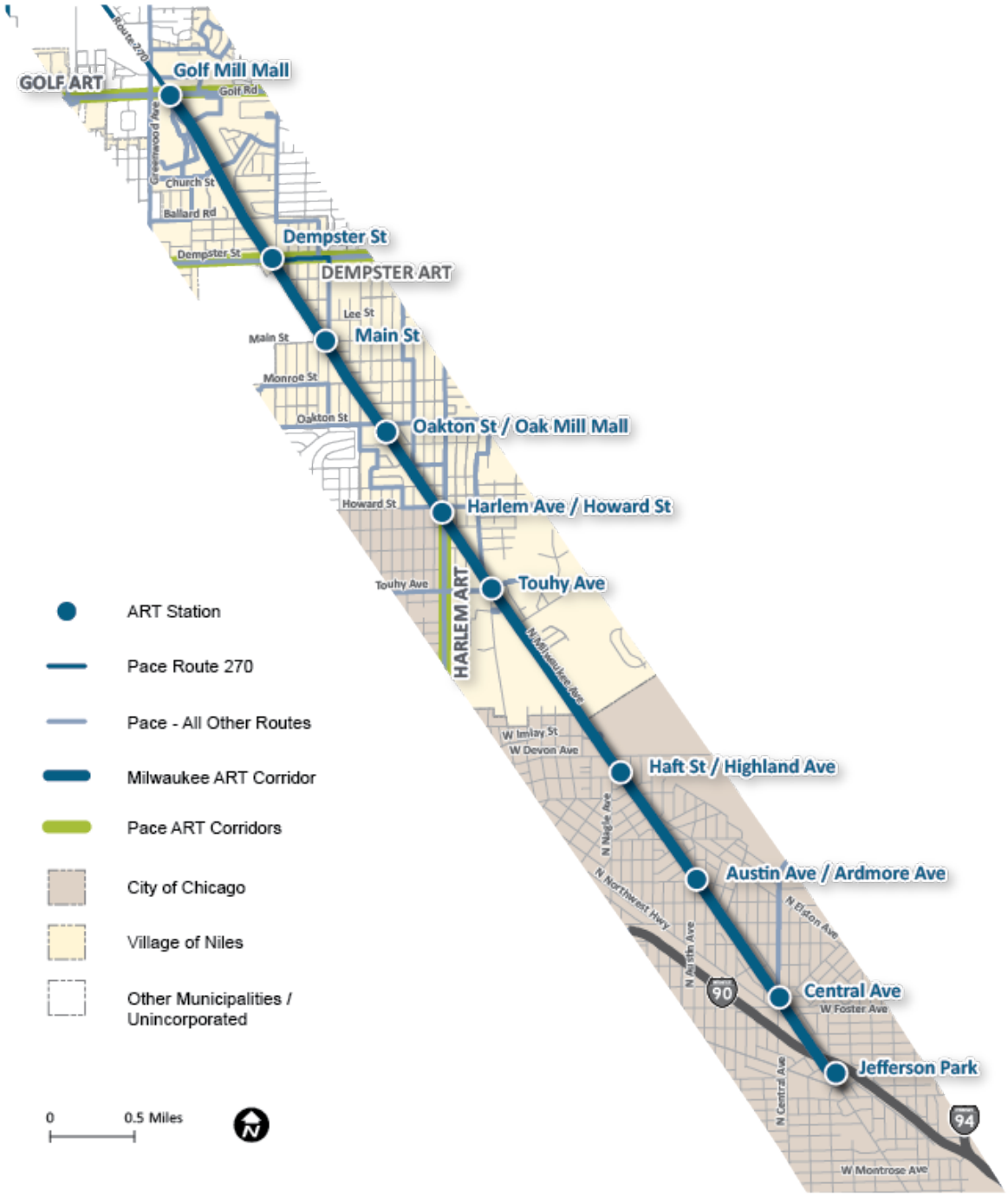
2.1 Roadway Conditions

The southern portion of the corridor is located in the City of Chicago and extends from the southern terminus to just north of Devon Avenue, with four proposed ART stations located within the City. North of Devon Avenue, the majority of the remaining corridor is located in the Village of Niles, with a small portion that crosses into the City of Chicago near Harlem Avenue. There are six additional proposed stations along this portion of the corridor.

Figure 2.1 highlights the existing roadway network along the Milwaukee Avenue corridor. Because Milwaukee is a radial arterial route, it intersects with both north-south and east-west arterials, often in offset and sometimes complex intersections. As a result, the Milwaukee Corridor ART intersects numerous north-south and east-west transit routes, as well as radial rapid transit and commuter rail lines, and will improve transit network connections to a variety of commuter destinations.

The ART route crosses over the Kennedy Expressway (I-90) and under the Metra Union Pacific Northwest (UP-NW) commuter rail line just north of the Jefferson Park Transit Center. For most of the corridor, Milwaukee Avenue is a four- or five-lane arterial. On-street parking is accommodated for much of its length within the City of Chicago and in a limited segment within the Village of Niles. In commercial areas of the Niles segment, frequent and wide curb cuts (and in some areas direct pull-in parking) are predominant.

Figure 2.1: Milwaukee Corridor and Existing Transportation Network



2.2 Land Use Character

The corridor has a mixed use and commercial character in Chicago, with traditional street wall development on most blocks, and more recent "strip mall" type development primarily at intersections.

North of Devon Avenue, as the route enters the Village of Niles, the character of the corridor changes. The Caldwell Woods Forest Preserve and large scale development flank the route to the east up to approximately Touhy Avenue and a cemetery flanks the route to the west from approximately Albion Avenue to Harts Road. The Touhy Avenue intersection is a major commercial and civic node for the Village of Niles. Older and smaller scale commercial uses are found north of Touhy Avenue, and are primarily auto-oriented. Oak Mill Mall is a significant destination at the southwest corner of Milwaukee Avenue and Oakton Street. Continuing north, the corridor transitions to residential uses from Monroe Street to Dempster Street, with another large cemetery adjacent to the west. Auto-oriented commercial uses are present north of Dempster Street, including the Golf Mill Shopping Center to the west and two shopping centers across the street to the east from Golf Mill at the northern end of the ART route.

2.3 Existing and Planned Transit Service

Pace's Route 270 currently serves the Milwaukee Corridor with weekday service every 10 to 20 minutes throughout the day. ART will serve the enhanced stations with frequencies equal to or better than the existing Route 270 service at all times. With the introduction of ART, local service to some existing bus stops will be reduced, based upon service reallocation recommendations prepared during the project definition phase and described in Chapter 8.0.

Route 272 provides additional Milwaukee Avenue service north of Golf Mill Shopping Center, including a portion that overlaps with Route 270 between Golf Mill Shopping Center and Lake Street in Glenview.

Numerous additional Pace local routes make connections along Milwaukee Avenue, including Routes 208, 210, 225, 226, 240, 241, 250, 290, and 423. In the future, it is anticipated that ART service on Dempster Street, Golf Road, Touhy Avenue, and Harlem Avenue will intersect with the Milwaukee Corridor ART at various points along the route. A future transit center in the vicinity of Golf Mill Shopping Center will serve as a transfer point between two ART routes and multiple local Pace routes.

The Village of Niles operates three community circulator routes, collectively referred to as the Niles Free Bus and designated as Pace routes 411, 412 and 413. Pace and the Village of Niles recently completed a Niles Circulator Modernization Study concurrent with this project definition effort, aimed at recommending changes to improve the efficiency of the Niles Free Bus service, boost ridership, and better complement the planned ART service. The recommendations from that study are currently being considered by the Village.

In addition to Pace connections, the Milwaukee Corridor ART will also make connections at the Jefferson Park Transit Center to Metra's UP-NW Line traveling from downtown Chicago to Harvard and McHenry, to the CTA Blue Line traveling between downtown Chicago and O'Hare International Airport, and to CTA routes 56, 68, 81, 81W, 85, 85A, 88, 91, and 92.

2.4 Supporting Local Plans

One reason that the Milwaukee Corridor was selected as the initial ART corridor during previous Pace evaluations was the consistent commitment of the Village of Niles to improving mobility options for Village residents. Recent studies conducted by the Village describe desired mobility improvements either directly related to or in support of ART. These studies are briefly described in this section.

The *Milwaukee Avenue Study*[5], completed in early 2006 with funding support from the Regional Transportation Authority (RTA), proposed planning initiatives for Milwaukee Avenue in the context of a three-pronged strategy to improve transit access, traffic operations, and redevelopment potential. Seven "urban character" districts were identified, with recommendations customized to conditions in each district. Recommendations included: continuing to coordinate with and support Pace's ART planning efforts; improving traffic flow and access to businesses by adding additional left turn lanes; improving site planning and parking lot access controls; seeking additional right-of-way capacity when redevelopment projects occur; and establishing priority redevelopment sites and development standards.

The Village of Niles Bicycle and Pedestrian Plan[6], completed in 2014, provides detailed guidance regarding initiatives to improve pedestrian and bicycle mobility and safety throughout the Village, including a section specifically addressing Milwaukee Avenue. Recommendations include: a phased strategy to eliminate gaps in the existing sidewalk network to be coordinated with bus stop locations; an improved on-street bicycle network; locations and standards for pedestrian- and bicycle-friendly crossing and signal enhancements, with an emphasis on Milwaukee Avenue; reduced curb cuts and increased parkways along Milwaukee Avenue; site development standards that emphasize multi-modal access, development of transit-accessible locations and urban design enhancements; and, revisions to bus shelter contracts to allow Pace route information to be posted. The plan specifically addresses the intersection of Dempster Street and Milwaukee Avenue as a challenging location for pedestrians and in need of upgrades as part of a related project such as ART. While it is not the responsibility of Pace to implement the Village's plan, recommendations to improve the pedestrian environment at Dempster are incorporated into the proposed ART station designs due to the importance of establishing safe and functional stations. As design progresses and the cost of the improvements are better defined, they need to be discussed and coordinated with Niles to determine how these improvements will be executed and the potential for cost sharing/coordination.

The Chicago Department of Transportation (CDOT) is undertaking a project to upgrade bicycle and pedestrian accommodations on the portion of Milwaukee Avenue between Lawrence Avenue and Elston Avenue, in support of a city-wide strategy to improve multi-modal mobility and pedestrian safety. Chicago's recently developed *Streets for Cycling* standards will be reflected in the plans based on Milwaukee Avenue's designation as a "spoke route" in Chicago's growing bicycle mobility network. This project is proceeding on a timeline similar to the development of the Milwaukee Corridor ART project,

[5] http://www.vniles.com/Content/templates/?a=823
[6] *Village of Niles Bicycle and Pedestrian Plan*, March 2014, Sam Schwarz Engineering and Farr Associates.

offering the opportunity for collaboration to ensure that mutual goals of improved pedestrian safety and access to transit, and coordinated bicycle and transit operations, are achieved in this segment of Milwaukee Avenue. A final proposed design for the CDOT project is anticipated at the end of 2014 /early 2015, with construction in 2015.

2.5 Detailed Conditions Inventory

The conditions inventory contains detailed descriptions of existing conditions along the Milwaukee Avenue ART corridor. Existing conditions are described within segments of the corridor in the sections that follow. Table 2.1 summarizes the existing conditions for each segment within the corridor.

Table 2.1: Milwaukee Corridor Conditions Inventory Summary

Milwaukee Ave Segment	Lane Configuration	Annual Average Daily Traffic (2006-2013)	On- Street Parking	Sidewalks
Golf Road to Maryland Street	Six through lanes, center turn lanes	32,100	None	East side only
Maryland Street to Dempster Street	Four through lanes, center and right turn lanes, grade separation at Dempster St.	32,100	None	Both sides (except portion of east side)
Dempster Street to Oakton Street	Four through lanes	32,300	Partial on both sides	Partial both sides
Oakton Street to Touhy Avenue	Four through lanes, center turn lanes	27,600	None	Both sides
Touhy Avenue to Devon Avenue	Four through lanes, center turn lanes	23,800	Partial on both sides	Both sides (except portion of east side)
Devon Avenue to Elston Avenue	Four through lanes, center turn lanes	24,600	Partial on both sides	Both sides
Elston Avenue to Central Avenue	Two through lanes, center turn lanes	13,200	Both sides	Both sides
Central Avenue to Gale Street	Two to four through lanes, center turn lanes, partial bus only turn lane	17,600	Both sides	Both sides
Jefferson Park Transit Center	Two through lanes, dedicated bus center turn lane	n/a	n/a	n/a

2.5.1 Golf Road to Maryland Street – Golf Mill Shopping Center

This segment of Milwaukee Avenue encompasses the northern terminus of the Milwaukee ART corridor. Golf Mill Shopping Center, a major activity center and hub for Pace fixed route services is on the west side of the street. On the east side, several national retail chain stores, strip malls, and an auto dealership sit across from the mall.

This segment of Milwaukee Avenue has three through lanes in each direction with left turn lanes at the three Golf Mill Shopping Center entrances and at the intersection of Golf Road and Maryland Street. South of the southernmost entrance to Golf Mill Shopping Center, Milwaukee Avenue narrows to two through lanes in each direction with a dedicated center turn lane. Signalized intersections are at Golf Road, the three Golf Mill Shopping Center entrances, and Maryland Street.

There is no on-street parking available on this segment of Milwaukee Avenue. There are also no bicycle facilities. Sidewalks exist along the east side of Milwaukee Avenue but are not present along the west side of Milwaukee Avenue. There are no sidewalks to access Golf Mill Shopping Center from Milwaukee Avenue. Crosswalks are located at the Milwaukee and Maryland Avenue intersection. The crosswalks are striped in the standard pattern (double line). Annual average daily traffic (AADT) along this segment of Milwaukee Avenue is 32,100 vehicles as of 2013, according to the Illinois Department of Transportation (IDOT).

Land uses within this segment of the corridor are heavily auto oriented. Golf Mill Shopping Center is set back approximately 400 feet from Milwaukee Avenue, or about two-thirds of a standard City of Chicago block. The land use itself is commercial throughout the segment. Bus stops and average weekday boardings[7] on Route 270 in this segment are summarized in Table 2.2.

Table 2.2: Bus Stops between Golf and Maryland

Posted Stop	Direction	Average Weekday Boardings (2013)		Treatment	
		NB	SB	NB	SB
Milwaukee/Golf	NB/SB	3	3	Sign	Sign
Milwaukee/Four Flaggs	NB	0	--	Sign	--
Milwaukee/Ford	SB	--	1	--	Sign
Milwaukee/Golf Mill	NB/SB	1	0	Sign	Sign
Golf Mill/J.C. Penney	NB/SB	71	574	Shelter	Shelter
Maryland/Milwaukee	NB/SB	1	4	Sign	Shelter

[7] Source: Pace, Automated Passenger Counter Data, 2013.

There are seven Pace routes that serve Golf Mill Shopping Center, all of which operate on portions of this segment of Milwaukee Avenue. Route 270, Milwaukee Avenue, serves the entire corridor from Golf Mill Shopping Center to the Jefferson Park Transit Center. The remaining routes are:

- Route 272 – Milwaukee Avenue North
- Route 208 – Golf Road
- Route 240 – Dee Road
- Route 241 – Greenwood-Talcott
- Route 411 – Niles Local Service
- Route 412 –Niles Shopper's Special.

Ridership at Route 270 stops outside Golf Mill Shopping Center are very low, indicating that the primary destination for Route 270 passengers in this area is the mall itself, as well transfers to other Pace routes.
Maryland Street to Dempster Street

Throughout this segment, Milwaukee Avenue has two through lanes in each direction with the exception of the approach at Dempster Street where there is a third auxiliary through lane in both directions. There is a median left turn lane between Maryland Street and Ballard Street as well as dedicated left turn lanes at Oak Avenue, Elizabeth Avenue, and Dempster Street. There are no on-street parking spaces and no bicycle facilities on this segment. Sidewalks are present on both sides of Milwaukee Avenue except for the east side of Milwaukee Avenue south of Elizabeth Avenue to Dempster Street. AADT is 32,100 vehicles as of 2013, according to IDOT.

Land uses in the segment are primarily retail- and service-oriented, with primarily smaller detached buildings. Buildings on both sides of Milwaukee Avenue typically have smaller setbacks than in the vicinity of Golf Mill Shopping Center. On the east side of Milwaukee Avenue between Ballard Street and Elizabeth Avenue is the Assi Plaza shopping center which has a large grocery store and liquor store as tenants. It is setback from Milwaukee Avenue by a small parking lot, with a much larger parking lot occupying a second parcel immediately to its south.

Bus stops and Route 270 ridership are described in Table 2.3.

Table 2.3: Bus Stops between Maryland Street and Dempster Street

Posted Stop	Direction	Average Weekday Boardings (2013)		Treatment	
		NB	SB	NB	SB
Milwaukee/Courtland	NB/SB	1	8	Sign	Sign
Milwaukee/Ballard	NB/SB	3	19	Sign	Sign
Milwaukee/Elizabeth	NB/SB	4	27	Sign	Sign
Milwaukee/Dempster	NE/NW	35	80	Sign	Sign
Milwaukee/Dempster	SE/SW	2	6	Sign	Sign

2.5.2 Milwaukee Avenue and Dempster Street Intersection

Milwaukee Avenue and Dempster Street is a grade separated intersection with Dempster Street passing underneath Milwaukee Avenue. A Dempster Street frontage road provides access to and from Milwaukee Avenue via an at-grade signalized intersection.

The intersection has three Milwaukee Avenue through lanes in each direction over Dempster Street. Dedicated left turn lanes facilitate turning movements onto the Dempster Street frontage roads. There are channelized right-turn lanes in both the northbound and southbound directions of Milwaukee Avenue onto the Dempster Street frontage road. The westbound frontage road on Dempster Street has two lanes: a dedicated right turn lane and a left through lane that allows left turns. The eastbound frontage road on Dempster Street also has two lanes with the same road geometry and striping as the westbound Dempster Street frontage road.

On Milwaukee Avenue, sidewalks are present on the northeast and southwest four corners of the Milwaukee Avenue and Dempster Street intersection. On Dempster Street, sidewalks are provided on all corners except the southwest corner, which is adjacent to the Maryhill Cemetery. Parallel solid white line crosswalk striping is faded on all four sides of the intersection and it appears the crossings do not comply with Americans with Disabilities Act (ADA) standards.

The Village of Niles Bicycle and Pedestrian Plan identifies this intersection as substandard for pedestrians, noting the long crossing distances, multiple legs of intersecting roadways, lack of wheelchair access, lack of pedestrian countdown timers, and faded crosswalks.

Pace Route 250 runs along Dempster Street and passes through this intersection, intersecting Milwaukee Avenue via the frontage roads before continuing through and returning to Dempster Street. There are eight Pace bus stops at this intersection, as both Routes 250 and 270 stop on both sides of the intersection as they pass through. The only bus shelters are located on the southwest corner of the intersection, where there are two shelters to serve both the Route 250 and Route 270 stops on the corner. All stops at this intersection, and Route 270 ridership, are summarized below in Table 2.4.

Table 2.4: Route 270 Bus Stops at the Milwaukee/Dempster Intersection

Posted Stop	Direction	Average Weekday Boardings (2013)		Treatment	
		NB	SB	NB	SB
Milwaukee/Dempster	NE/NW	35	80	Sign	Sign
Milwaukee/Dempster	SE/SW	2	6	Sign	Sign

2.5.3 Dempster Street to Oakton Street

Milwaukee Avenue south of Dempster Street narrows from three through lanes in each direction to two through lanes in each direction without a median turn lane. There is a dedicated left turn lane at Main Street and Oakton Street.

This segment is the only one where street parking is available in Niles. On the northbound side, street parking is provided from the Walgreens at Oakton Street to Keeney Street and from Kedzie Street to Elmore Street. On the southbound side, a smaller supply of street parking is available from Elmore Street to Lee Street. Parking is free and unrestricted. Sidewalks are available on both sides of Milwaukee Avenue for most of the segment with the exception of Maryhill Cemetery from Dempster Street to Main Street on the west side of Milwaukee Avenue. Sidewalks are also missing on the west side of Milwaukee Avenue from Keeney Street to Oakton Street and on the east side from Keeney Street to Monroe Street. In both places, the parking lot merges with the street with a block long curb cut. The AADT in this segment is 32,300 vehicles as of 2013, according to IDOT. Signalized intersections are at Dempster Street, Main Street, and Oakton Street.

The Village of Niles Bicycle and Pedestrian Plan notes that this segment of Milwaukee Avenue features multiple long stretches without crosswalks and a sizable gap in the sidewalk network along the cemetery property. The plan recommends new signalized pedestrian crossings at Greenleaf Street and Monroe Street.

Land uses vary throughout this segment. There are retail and restaurant uses at the southeast corner of Milwaukee Avenue and Dempster Street and small retail shops on both sides of Milwaukee Avenue from Monroe Street to Oakton Street. The remainder of the segment is characterized by single-family and small multi-family homes. Maryhill Cemetery is located on the west side of Milwaukee Avenue from Dempster Street to Main Street. The main entrance to the cemetery is just south of Greenleaf Street.

Between Monroe Street and Oakton Street, land uses transition to a mix of residential and small retail, giving way to an entirely commercial section in the vicinity of Oakton Street. On the east side of Milwaukee Avenue from just north of the Walgreens store to Keeney Street, buildings are constructed up to the lot lines. From Keeney Street to Monroe Street, the buildings are set back with a row of perpendicular parking in front of the buildings. On the west side of Milwaukee Avenue south of Monroe Street, buildings are set back with a row of perpendicular parking. Three buildings on this block are mixed use with retail uses on the ground floor and apartments on a second floor.

Pace has posted bus stops as summarized below in Table 2.5.

Table 2.5: Bus Stops between Dempster and Oakton

Posted Stop	Direction	Average Weekday Boardings (2013)		Treatment	
		NB	SB	NB	SB
Milwaukee/Crain	NB/SB	4	31	Sign	Shelter
Milwaukee/Greenleaf	NB/SB	2	8	Sign	Sign
Milwaukee/Main	NB/SB	4	15	Shelter	Shelter
Milwaukee/Kedzie	NB/SB	0	1	Sign	Sign
Milwaukee/Monroe	NB/SB	4	8	Sign	Sign
Milwaukee/Oriole/Cleveland	SB	--	3	--	Sign
Milwaukee/Keeney	NB	4	--	Sign	--
Milwaukee/Oakton	NB/SB	16	30	Sign	Shelter

Milwaukee/Oakton is the busiest stop in the segment, serving local retail destinations as well as transfer opportunities with Route 226 (Oakton Street) which crosses Milwaukee Avenue. There are more than 30 daily boardings on Route 270 at Milwaukee/Crain in the southbound direction despite the fact that the shelter cannot be reached by sidewalk and there are no nearby crosswalks.

2.5.4 Oakton Street to Touhy Avenue

Milwaukee Avenue from Oakton Street to Touhy Avenue has two through lanes in each direction and left turn lanes at Oakton Street, Oak Mill Mall, Howard Street, Harlem Avenue, and Touhy Avenue. Milwaukee Avenue is a signed state route (Illinois Route 21) north of Harlem Avenue, although the Illinois Department of Transportation maintains jurisdiction of Milwaukee Avenue throughout this segment. Signalized intersections are at Oakton Street, Oak Mill Mall, Howard Street, Harlem Avenue, Waukegan Road, and Touhy Avenue. Milwaukee Avenue briefly passes through the City of Chicago between Howard Street and Harlem Avenue. The remainder of the segment is in Niles.

Sidewalks are available on both sides of Milwaukee Avenue throughout the segment while on-street parking is not available in this segment. Likewise, there are no bicycle facilities along this segment; though Howard Street is a designated bicycle route as it crosses Milwaukee Avenue. As of 2013, according to IDOT, AADT is 27,600 vehicles from Oakton Street to Harlem Avenue. Between Harlem Avenue and Touhy Avenue, the most recent IDOT estimate of AADT is from 2010 and indicates 23,800 vehicles per day.

Land uses are dominated by retail uses of varying sizes. On the southwest corner of Oakton Street and Milwaukee Avenue, Oak Mill Mall is a major activity center with a large grocery store and smaller retail and medical services within the mall. On the southeast corner are a McDonald's restaurant and Jerry's Fruit and Garden. Other land uses in the segment include a residential apartment/condo building on the northeast corner of Milwaukee Avenue and Touhy Avenue and the Niles Police Department on the northwest corner of Milwaukee Avenue and Touhy Avenue. The Niles Recreation Center is located east of Milwaukee Avenue just south of Oakton Street, although the main facility entrance is on Odell Avenue. Both Pace Routes 270 and 411 run in this segment. Pace has posted stops at the locations noted in Table 2.6. Pace Route 423 crosses Milwaukee Avenue at Harlem Avenue, Route 413 at Waukegan Road and Touhy Avenue, and Route 290 at Touhy Avenue. Harlem Avenue and Touhy Avenue are also proposed future ART corridors.

Table 2.6: Bus Stops between Oakton and Touhy

Posted Stop	Direction	Average Weekday Boardings (2013)		Treatment	
		NB	SB	NB	SB
Milwaukee / Oak Mill Mall	NB/SB	20	52	Sign	Shelter
Milwaukee / Mulford	NB/SB	2	2	Sign	Sign
Milwaukee / Jonquil	NB/SB	2	8	Sign	Sign
Milwaukee / Howard	NB/SB	3	9	Shelter	Sign
Milwaukee / Harlem	NB	5	--	Sign	--
Milwaukee / Birchwood	NB/SB	6	29	Sign	Shelter
Milwaukee / Jarvis	NB/SB	4	9	Sign	Sign
Milwaukee / Neva	NB/SB	2	4	Sign	Sign
Milwaukee / Touhy	NB/SB	59	57	Shelter	Shelter

2.5.5 Touhy Avenue to Devon Avenue

Milwaukee Avenue from Touhy Avenue to Devon Avenue has two through lanes in each direction without a median turn lane. Dedicated left turn lanes are at Touhy Avenue, Eagle Pointe, and Devon Avenue. There are signalized intersections at Touhy Avenue, Hart Road, and Devon Avenue. Political jurisdiction changes from Niles to Chicago south of Albion Avenue. Signalized intersections are at Touhy Avenue, Hart Road, and Devon Avenue. Additionally, the intersection of Milwaukee Avenue and Devon Avenue is regulated by a red light camera.

On-street parking is allowed in the segment between Imlay Street to just north of Devon Avenue on the west side of Milwaukee Avenue. There is capacity for approximately 30 vehicles. On the east side of Milwaukee Avenue between the bus turnaround at Imlay Street and Devon Avenue, it is unclear as to whether parking is legally allowed as parking is not defined. Based on field observations, few vehicles park along this stretch. Sidewalks are available on both sides of Milwaukee Avenue throughout the segment with the exception of the east side of Milwaukee Avenue from Imlay Street south to Devon Avenue adjacent to the Forest Preserve. AADT is 23,800 vehicles per day in this segment as of 2010, according to IDOT.

Land uses are predominantly retail with adjacent residential development, both single- and multi-family. In addition to these land uses, there is a significant amount of protected open space within the segment. On the west side of Milwaukee Avenue from just south of Newark Avenue to just north of the Chicago city boundary is the St Adalbert Cemetery. On the east side of Milwaukee Avenue from Albion Avenue south to Devon Avenue is Caldwell Woods, part of the Forest Preserve District of Cook County.

There is a bus turnaround on the east side of Milwaukee Avenue at Imlay Street that is currently used as a layover facility for CTA Route 86 (Narragansett/Ridgeland). Pace routes 270 and 411 operate on Milwaukee Avenue. Bus stops and Route 270 ridership within the segment are summarized in Table 2.7.

Table 2.7: Bus Stops between Touhy and Devon

Posted Stop	Direction	Average Weekday Boardings (2013)		Treatment	
		NB	SB	NB	SB
Milwaukee / Newark	SB	--	0	--	Sign
Milwaukee / Harts Rd	NB/SB	2	2	Sign	Sign
Milwaukee / Ebinger	NB/SB	3	2	Sign	Sign
Milwaukee / White Eagle	NB/SB	1	2	Sign	Sign
Milwaukee / Bunker Hill	NB	2	--	Sign	--
Milwaukee / 6702 North	SB	--	3	--	Sign
Milwaukee / Albion	NB/SB	8	16	Shelter	Sign
Milwaukee / Imlay	NB/SB	12	18	Sign	Sign

2.5.6 Devon Avenue to Elston Avenue

Milwaukee Avenue through this segment has two through lanes in each direction and intermittent left turn lanes for several local streets. From Nagle Avenue to Elston Avenue the corridor also has on-street bicycle lanes and on-street parking. The intersections of Devon Avenue/Nagle Avenue and Elston Avenue/Holbrook Avenue are signalized. Sidewalks are available on both sides of the street throughout the segment. The most recent IDOT traffic count estimate for this segment dates to 2006, with an estimated AADT of 24,600 vehicles. A bicycle count conducted in 2009 at Haft Street, one block south of Devon Avenue, showed 155 daily bicycles[8].

Land uses are a mix of small retail establishments with upper floor residences, and a grocery store at Devon Avenue. There are no setbacks for the most part as buildings front the sidewalk.

Pace Route 270 is the only route that runs in this segment. CTA Route 86 intersects the corridor at Nagle/Devon. Route 270 stops and ridership are noted in Table 2.8.

Table 2.8: Bus Stops between Devon and Elston

Posted Stop	Direction	Average Weekday Boardings (2013)		Treatment	
		NB	SB	NB	SB
Milwaukee/Nagle/Devon	NB/SB	14	20	Sign	Sign
Milwaukee/Haft	NB/SB	13	50	Sign	Shelter
Milwaukee/Raven	NB/SB	7	28	Sign	Sign
Milwaukee/Elston/Holbrook	NB/SB	5	38	Sign	Shelter

2.5.7 Elston Avenue to Central Avenue

Milwaukee Avenue from Elston Avenue to Central Avenue has two through lanes in each direction and intermittent median left turn lanes at numerous signalized and uncontrolled intersections. On-street

[8] 2009 Chicago Automatic Bicycle Counts, Bicycleways & Crashes, Steve Vance. http://geocommons.com/maps/54027

bicycle lanes are present in both directions for the length of this segment as is on-street parking. Milwaukee Avenue changes road jurisdictions in this segment. North of Elston Avenue, Milwaukee Avenue is under the jurisdiction of IDOT. South of Elston Avenue, Milwaukee Avenue is under the jurisdiction of and maintained by CDOT. The intersections at Elston Avenue, Austin Avenue, Bryn Mawr Avenue, and Central Avenue are signalized. AADT in the segment is 13,200 vehicles as of 2010, according to IDOT; this is significantly lower than AADT on segments to the north and south.

This segment of Milwaukee Avenue is part of the CDOT *Streets for Cycling* project to improve cycling and pedestrian accommodations on Milwaukee Avenue. Planned improvements are still being designed but are likely to include buffered bicycle lanes, shortened pedestrian crossings, and safety enhancements such as high-visibility crosswalks and median refuge islands.

Land uses in the segment are mostly small ground floor retail with apartments above and a mix of single-family homes and multi-family homes. A greater concentration of retail establishments are grouped into strip mall developments at Austin Avenue/Ardmore Avenue, Bryn Mawr Avenue, and Central Avenues. Most of the segment has buildings abutting the sidewalk. Sidewalks are available throughout the segment.

Pace Route 270 is the only bus route that operates in the segment, while four additional bus routes intersect the corridor at Central Avenue, continuing south via Milwaukee Avenue to the Jefferson Park Transit Center. Route 270 stops and ridership are shown in Table 2.9.

Table 2.9: Bus Stops between Elston and Central

Posted Stop	Direction	Average Weekday Boardings (2013)		Treatment	
		NB	SB	NB	SB
Milwaukee / Peterson	NB/SB	9	37	Shelter	Sign
Milwaukee / Medina	NB/SB	4	28	Sign	Sign
Milwaukee / Austin	NB/SB	19	63	Shelter	Shelter
Milwaukee / Mason	NB/SB	5	11	Sign	Sign
Milwaukee / Bryn Mawr	NB/SB	11	34	Sign	Shelter
Milwaukee / Menard	NB/SB	13	11	Sign	Sign
Milwaukee / Manila/ Parkside	NB/SB	7	14	Sign	Shelter
Milwaukee / Central	NB/SB	20	6	Shelter	Sign

2.5.8 Central Avenue to Jefferson Park Transit Center

Milwaukee Avenue from Central Avenue to the Union Pacific/Metra railroad bridge has two through lanes in each direction and an intermittent median left turn lane at several signalized and uncontrolled intersections. South of the railroad underpass, Milwaukee Avenue has two through lanes and no turn lanes, with the exception of a southbound bus-only left turn lane into the transit center.

On-street parking and sidewalks are generally available throughout the segment on both sides of Milwaukee Avenue. Between the I-90 underpass and Gale Street, on-street parking is allowed in the right lanes during certain times, which effectively reduces the road capacity at Milwaukee Avenue and

Gale Street during off-peak hours. Standard pattern crosswalks are available at intersections with traffic control and also at Northwest Highway, which has a ladder pattern crosswalk for higher visibility. AADT in this segment is 17,600 vehicles as of 2010, according to IDOT. Signalized intersections are at Central Avenue, Foster Avenue, and Gale Street.

A bicycle lane is provided in both directions between Central Avenue and Carmen Avenue (just north of the railroad underpass). Shared lane markings ("sharrows") are provided south of this location to the Jefferson Park Transit Center. This segment of Milwaukee Avenue is part of the CDOT *Streets for Cycling* project to improve cycling and pedestrian accommodations on Milwaukee Avenue. Planned improvements are still in design but are likely to include buffered bicycle lanes, shortened pedestrian crossings, and safety enhancements such as high-visibility crosswalks and median refuge islands.

Land uses are comprised of strip malls around Central and Foster Avenues, some industrial uses at Northwest Highway, a Chicago Police Department district station south of Foster Avenue, and dense mixed use, ground floor retail south of I-90. There are no building setbacks within this segment with the exception of a strip mall on the southeast corner of Milwaukee and Central Avenues, at Milwaukee and Gettysburg, and at the McDonald's restaurant at Milwaukee Avenue and Gale Street. Pace Route 270 serves the segment along with Pace Routes 225 (Central-Howard) and 226 (Oakton Street) and CTA Routes 68 (Northwest Highway), 85 (Central), 85A (North Central), and 92 (Foster Avenue). Milwaukee Avenue bus stops and Route 270 ridership in this segment are summarized in Table 2.10.

Table 2.10: Bus Stops between Central and Gale

Posted Stop	Direction	Average Weekday Boardings (2013)		Treatment	
		NB	SB	NB	SB
Milwaukee/Foster	NB/SB	6	10	Sign	Shelter
Milwaukee/Northwest Hwy	NB/SB	22	3	Shelter	Sign
Milwaukee/Carmen	NB/SB	1	0	Sign	Sign
Milwaukee/Gale	NB/SB	26	3	Sign	Sign

2.5.9 Jefferson Park Transit Center

The Jefferson Part Transit Center is the southern terminus of the Milwaukee Avenue ART corridor. The Jefferson Park Transit Center is a major multimodal transit hub on Chicago's northwest side. It connects all of the region's transit service providers in one station: CTA rapid transit, CTA buses, Metra commuter rail, and Pace buses. Buses serve the transit center at South and North Terminals facing Milwaukee Avenue, divided in the middle by a sheltered waiting area leading to the CTA and Metra rail stations. Pace Route 270 currently enters the transit center and utilizes the South Terminal, while Pace Routes 225 and 226 serve the North Terminal. Ten CTA bus routes also serve the transit center.

Pace Route 270 has over 1,300 average weekday boardings at Jefferson Park, the second highest number of boardings for routes serving the Jefferson Park Transit Center; CTA Route 92 has nearly 1,500 boardings at the transit center.

3.0 Stations

In 2010, Pace completed a study of potential ART station locations for the Milwaukee Corridor. The 2010 Station Location Selection study identified intersections where ART stations should be located, as well as a preferred northbound and southbound site at each of the intersections. The proposed sites were assessed at a high level in the 2010 study, and consisted of a near-side or far-side recommendation. Specific station dimensions and layouts were not proposed and detailed analyses of constructability and property impacts were not performed.

The April 2010 recommendations were reviewed in more detail to assess the suitability of each proposed station in the context of other transit services and recent developments. For many locations at least one additional northbound and southbound station location was identified for consideration. In some cases it is recommended that an alternative location be selected in place of the original location identified by Pace, while in other cases more than one potential location should remain under consideration until other key decisions are made. Each station area is addressed in the sections that follow.

This chapter presents the functional requirements for a typical ART station, preferred station sites for each ART station, and the conceptual site plans that have been developed for each proposed station site.

3.1 Station Site Selection

Prior to the identification of generalized station locations in 2010, Pace conducted an analysis of stop-level ridership data for the existing Route 270 to identify the intersections at which ART stations should be placed. Station locations were identified based on ridership (intersections at which ridership exceeded 30 passengers per day), station spacing (with a goal of ½ mile average spacing), and connections to existing transit service. Pace's preliminary recommendations for generalized station locations have served as the basis for the recommendations for detailed station locations contained in this Project Definition report. The general locations for proposed ART stations were shown previously in Figure 1.1.

The focus of this study has been on identifying specific station sites at each general station location; for each station location the previously identified Pace-preferred sites are noted as well as one or more potential alternative sites. Strengths and weaknesses of each potential site were evaluated and documented. One or more sites were recommended for continued consideration subject to Pace approval and subsequent coordination with other project stakeholders, including CDOT, CTA, Village of Niles, Illinois Department of Transportation (IDOT), and the Federal Transit Administration (FTA). Following feedback from the stakeholders, preliminary site plans were developed. Based on discussion with Pace and subsequent coordination with the Village of Niles and CDOT, a preferred preliminary site plan has been identified for each station site. For locations where the preferred site may be particularly challenging or where key information or stakeholder decisions have yet to be finalized, an alternative station site and/or site plan may be further developed in subsequent phases of the project.

3.2 Station Site Considerations

Detailed station sites were selected based on a number of considerations addressing operations, constructability, aesthetics, passenger convenience, impacts on adjacent properties, and local context. The following specific factors were taken into consideration when evaluating and recommending station locations:

- Sufficient curb length and sufficient right-of-way width between curb and property line for development of a station. It was assumed that an ART station would require a contiguous space of approximately 60 feet in length and 12 feet in width, subject to refinement during the ongoing station design process;
- Transit signal priority (TSP) applicability, particularly for locations where TSP is recommended. Far-side stations are necessary for these intersections in order to maximize TSP performance. Far-side stations were also favored at locations where preliminary analysis did not result in the recommendation of TSP, in order to allow flexibility for future signal priority or other intersection treatments;
- Sidewalk connections;
- Proximity to major trip generators;
- Proximity to station in the opposite direction of travel;
- Proximity to other local bus routes, including the potential for a shared station to also serve connecting local buses;
- Potential connections to proposed ART corridors on Harlem Avenue, Dempster Street, and Golf Road;
- Potential impacts on adjacent property owners, particularly the potential need to relocate or close driveways. These impacts should be minimized unless substantially outweighed by other positive attributes of a particular location;
- Aesthetic considerations and place-making potential; and
- The *Streets for Cycling* preliminary design concept for Milwaukee Avenue currently under development by CDOT. CDOT's proposal to modify the configuration of Milwaukee Avenue could potentially impact ART stations at Central Avenue and Austin/Ardmore Avenues.

3.3 Station Types

The Milwaukee ART will include eight pairs of intermediate stations, a south terminal station at the Jefferson Park Transit Center, and a north terminal station serving Golf Mill Shopping Center, for a total of 18 unique stations.

3.3.1 North Terminal Station

The Golf Mill Shopping Center was recently sold and station improvements will need to be discussed with the new owner. There is the potential for a future transit center at or near Golf Mill Shopping Center where two ART lines (Golf and Milwaukee) may eventually converge, as well as up to eight local bus routes. The transit center facility will be pursued in a future phase; in the interim, Pace anticipates upgrading the existing stop (see Figure 3.1 and Figure 3.2) to reflect the ART brand and provide enhanced passenger amenities. The typical station design would be modified to accommodate the large number of local and ART buses that will serve and layover at the station.

Figure 3.1: Existing Golf Mill Shopping Center Bus Stop

Figure 3.2: Golf Mill Shopping Center ART Station Concept

3.3.2 South Terminal Station

It is anticipated that the Milwaukee Corridor ART will be allotted space at the existing off-street bus terminal at the Jefferson Park Transit Center, which currently serves both Chicago Transit Authority (CTA) and Pace buses. The transit center also serves the CTA Blue Line and the Metra Union Pacific / Northwest commuter rail line. The Jefferson Park Transit Center accounts for approximately one-third of all existing boardings on Pace's Route 270 service.

Jefferson Park Transit Center is owned and managed by the CTA. Due to planned upcoming renovations to the Jefferson Park terminal as part of the Blue Line reconstruction project, the CTA cannot currently commit to a location or design for a Pace ART station at the transit center. Based on coordination meetings with CTA staff, the renovations at Jefferson Park are anticipated to begin construction in the second or third quarter of 2016, which is ahead of the Milwaukee Corridor's planned construction schedule. The overall scope of improvements to the bus boarding area has not been finalized, but is

anticipated to include a vertical marker (or a variation thereof) as well as aesthetic improvements and pavement replacement, but no major reconfiguration of the facility. Continued coordination with CTA will be necessary to ensure that an ART station or a vertical marker is incorporated into the CTA's planned renovations, or that a location is identified where Pace may later construct an ART station. As the project approaches and construction schedules for both projects are better defined, it may be necessary to identify an interim solution for both the form and location of a Jefferson Park ART station that will support ART at the commencement of service until a long-term solution can be constructed in coordination with the redevelopment of the transit center.

3.3.3 Intermediate Stations

Intermediate stations along the Milwaukee Corridor ART route will typically consist of curbside stations serving buses in a mixed traffic lane. Stations at some locations will be served by buses stopping in the right-hand travel lane, while other locations will require buses to pull into the parking lane to board and alight passengers. Both conditions are consistent with existing Route 270 service along the corridor.

Specific site conditions and jurisdictional preferences and requirements will necessitate minor deviations from the standardized "typical" station design. However, it is the consistent and distinct conveyance of a brand at these highly visible intermediate stations that will most influence rider perceptions of ART as a premium transit service. Milwaukee Avenue is under the jurisdiction of IDOT north of Elston Avenue in Chicago and for the entirety of the project corridor in Niles, and is signed as Illinois Route 21 north of Harlem Avenue. Milwaukee Avenue is controlled by the City of Chicago south of Elston Avenue. Both agencies have been consulted in the development of these design criteria and continued coordination will be needed throughout the station design, permitting, and construction processes.

3.4 Station Functional Requirements

Station facilities will be among the most visible physical elements associated with ART service throughout the Pace system. Stations in the Milwaukee Corridor will establish a precedent that will eventually be far-reaching in the region and should balance the need to express permanence and consistency throughout the ART system with a desire to accommodate local community context and preferences.

At station workshops held in December 2013, February 2014, and October 2014, Pace staff identified priorities for station design that address passenger comfort, safety, operations, and branding. These design priorities include station layout, amenities, and aesthetic considerations. These design priorities informed the development of the station feature set, i.e. the station functional requirements, and also provided insight in developing appropriate site-specific station solutions at the terminal stations, transit centers, or other stations that otherwise must differ from the standard layout. They also helped guide the development of design options that offer opportunities for local communities to customize some elements of the stations to reflect local community context.

The following bulleted lists describe the key design considerations that guided the development of preliminary station layouts and site plans.

3.4.1 Passenger Comfort and Safety Considerations

- The Chicago region's climate requires that adequate station shelter be provided for waiting passengers.
- Stations must be fully compliant with the ADA, including shelters.
- Safety shall be a primary consideration in all shelter designs.
- Nearby driveways may present challenges at some station locations and may require more specific design solutions to ensure that pedestrian-vehicle conflicts are minimized.
- Stations must preserve adequate sight distance and visibility for pedestrians, cyclists, bus drivers, and motorists.
- Stations in the vicinity of bicycle lanes must be designed to minimize bicycle-pedestrian conflicts as well as bus-bicycle conflicts.

3.4.2 Operational Considerations

- Local bus routes operating within the corridor will stop at ART stations where appropriate. This may include buses operated by both Pace and CTA.
- Stations must provide appropriate drainage for rain and snow within the public right-of-way and cannot direct drainage toward buildings.
- The use of heated pavement should be considered wherever feasible for de-icing. The additional power requirements for all station heating elements must be proactively considered during station planning and design.
- Station platforms should be designed for clear, intuitive operational usage.
- Stations shall be located to minimize impact to adjacent properties, sidewalks and access drives.
- Stations and the adjacent roadway must be laid out to ensure safe operation of the bus as it approaches, dwells, and departs the station.

3.4.3 Branding Considerations

- Stations must provide a consistent user experience, even if their physical configuration will vary due to unique site or service conditions.
- Vertical markers that are separate from the shelter structure will serve as the primary visual expression of the ART brand, with near-level boarding platforms as another key distinguishing feature.
- Branding elements will be applied to the vertical marker, detectable warning strip, shelter finish, and shelter front panels.
- Communities' design options for stations could potentially include railing insert panels, shelter panels, artwork, landscaping elements, and pavement treatments.

3.5 Station Feature Set

Decisions regarding the station feature set that were made during the three workshops include the following:

3.5.1 Shelters

- Each station shall include a partially enclosed, four-sided, fully accessible cantilevered shelter structure to include rear, side, and front panels for weather protection. The shelter will be approximately 16 feet long and five feet deep. The shelter is to be furnished and installed by the construction contractor hired by Pace, based on approved design and palette options. If a double-length or otherwise enhanced station shelter is desired, it will be based upon the selected typical ART shelter.
- Front and rear shelter panels will be transparent glass, and the side panel toward the departing end of the platform will be a two-sided advertising/information panel. Communities may opt to include an additional rear display panel or community-expression related graphics applied to the rear glass panels. For cleanliness and comfort, there should be a gap of approximately two to four inches between the shelter walls and the platform.
- All glass shelter panels should be vandal-resistant and have an anti-graffiti film or coating.
- A wheelchair waiting area, bench, and additional standing waiting area will be accommodated within the shelter. Shelter bench seats will be flat, have seat dividers, and be made of recycled plastic.
- Shelter interiors must be wheelchair accessible and ADA-compliant.
- Shelters will be illuminated via interior lighting integrated within the structure.
- Advertising panels on the shelter and the “Next Bus” sign on the vertical marker should be positioned to maximize visibility and sight lines at the stations.
- Shelters will have an angular roof that is sloped toward the back, and made of metal and glass or other approved materials. Shelters will not have flat or curved roofs.
- If required in the City of Chicago, Pace may accept JC Decaux shelters as long as the separate vertical marker and other station improvements are generally consistent with other ART stations.
- Shelters will provide overhead infrared heating for passenger comfort in cold weather. Durable, tamper-proof activation mechanisms, such as motion sensors or piezoelectric buttons, will be considered along with theft deterring hardware. The provision of overhead or other heating will be further evaluated during the design process.
- Pace will coordinate with communities to determine if cameras/call boxes are desired at the shelters. If desired, Pace can provide pre-wired accommodations but will not pay for, monitor or maintain any such cameras/security systems.
- A speaker and audio activation button connected to the real-time information sign on the vertical marker will be installed in the interior of the shelter with cabling routed within the raceways of the shelter’s structural members. See Section7.2 for more information on the real-time arrival sign and audio system.

3.5.2 Station Platforms and Loading Areas

- Each station shall include a vertical marker or signage element placed at each station so as to indicate to the bus driver the general front-door boarding location. (See Section 3.5.3 for more information on the vertical marker.)
- Flag signs for local Pace routes do not need to be provided at ART stations. Transfer connections to local routes stopping at an ART station will be indicated on the vertical marker if applicable. CTA may continue to require flag signs at stations where CTA buses will stop; this should be coordinated with CTA.
- The typical station platform will provide near-level boarding at a height of 12" above the roadway surface, which is six inches above the adjacent sidewalk, and will be accessed by accessible pedestrian ramps at a 1:20 slope at either end. Alternative pedestrian access options will be considered on a case-by-case basis to accommodate site constraints. The 12" boarding platform will be constructed of concrete atop four inches of compacted granular sub-base.
- Standard concrete is assumed for platforms. The station pavement can be customized and serve as a community expression opportunity to include decorative color, scoring, and finish. Any customization that introduces substantial additional cost, such as brick pavers, will be coordinated with project partners, subject to cost sharing and partnership agreements.
- The platform will be separated from the surrounding pedestrian zone by pipe railing as the standard design, allowing for community expression in the form of panels mounted to the railing along the back of the platform.
- Railings will be provided along both sides of ramps, with railings placed far enough from the curb to provide clearance for buses and other passing vehicles.
- Per individual station site plans, concrete curb and gutter will be removed and reconstructed with gutter widths matching existing conditions (either B6.12 or B6.24) unless otherwise specified. The height of the barrier curb will follow the height of the proposed platform and slope from the existing curb height to the 12 inch curb along the boarding platform area.
- A detectable warning strip will be provided at the open boarding edge of the raised platform. The strip will be of a uniform color which is yet to be determined pending completion of the ART system branding process. The warning strip will feature a contrasting color segment indicating the front door boarding area.
- An electric pavement heating system sufficient for prevention of snow and ice buildup will be embedded in the concrete platform and ramps, thus mitigating slip hazards (see Appendix G – Product Information Sheets for information on the pavement heating system). Sites such as the Jefferson Park Transit Center, with existing snow removal service, are exceptions to the need for a snow melt system. Snow melt elements can be detected prior to any future concrete penetrations, and can be repaired if inadvertently damaged. However, due to the uncertainty regarding the capital and ongoing operations and maintenance costs of such a system, it is recommended that it be included in all station designs as a bid alternate.

- The pavement heating systems and shelter heaters will be significant power draws when in operation (between 200A and 250A). Therefore, the local energy utility, ComEd, will need to evaluate the impact on the power distribution system along the corridor; coordination with ComEd will also be needed to locate a 120/240V power source and determine how it will route to the utility meters. The exception to this is at the Jefferson Park Station where no pavement heating is planned.

- A concrete bus loading pad 60 feet long and at least 10 feet wide (similar to the loading pad shown in Figure 3.3) will be installed adjacent to each station platform to provide for consistent platform-to-roadway height tolerance at the loading edge of the platform and a durable pavement solution for bus operations. Per Chicago Department of Transportation (CDOT) standards, the bus pad will consist of 10 inches of concrete pavement atop 8 inches of granular sub-base. The concrete pad is to be tied to the existing pavement and curb & gutter with dowel bars, and joint sealer is to be poured around the perimeter of the pad. The bus pad should extend at least 10 feet from the gutter, or to the pavement joint, whichever distance is greater.

Figure 3.3: Concrete Bus Loading Pad

3.5.3 Station Furnishings and Amenities

- Bicycle storage will be provided at every station where feasible. Although a standard bicycle rack will be included in the typical ART station design, community or citizen groups may be involved in designing or selecting racks that may differ from the standard selection. Racks will allow for both front and rear wheel attachment, rather than being narrow in configuration. At least one rack, capable of accommodating two bicycles, will be provided at each typical ART station.
- Metal-body trash receptacles will be provided at every station. Trash receptacles should be 30 to 40 gallons and fire resistant. Receptacles shall be bolted to the station platform and have a removable liner.
- The typical station will include an 18-inch wide landscaping strip located along the back edge of the ramps and the boarding platform where space allows and where appropriate based on the surrounding context. The landscaping will be irrigated in part via runoff from the shelter roof and shall feature drought-tolerant plants requiring minimal upkeep. The landscaping shall also provide a community expression option (subject to local commitments for ongoing maintenance).
- Each station shall include a vertical marker or signage element, incorporating the ART brand and informational signage. The vertical marker will be designed by Pace's contracted designer and will be installed at an agreed-upon location. Details will be included in the construction plans

and specifications which will be bid for construction. Said locations and details will be subject to local permit approval.

  - The vertical marker will be placed at each station so as to indicate to the bus driver the general front-door boarding location.
  - Sign height ordinances may limit the height of the vertical marker in some communities in the region. The height of the vertical marker is within the ordinance limits for the Village of Niles and the City of Chicago. However, for future ART corridors, design options may be needed and the placement of reduced height markers will be considered to maximize visibility of the station.
  - "Next Bus" signs will be located within the vertical marker and visible from the platform and the street. The signs should be visible from both sides of the marker.
  - In addition to the Next Bus display, additional signage incorporated in the vertical marker may include a static route map, wayfinding signage, and information on connecting CTA and Pace routes. All static information should be easily updated and modified.
  - If feasible, the vertical marker should be designed so that it can accommodate electrical power and control equipment sufficient to supply all electrical components at the station, except for those needed for the shelter heating and pavement snow melt system. This would allow for a separate electrical cabinet to have a more modest size to accommodate special items such as the shelter and pavement snow melt systems or would entirely eliminate the need for a separate electrical cabinet if shelter and pavement snow melt systems are eliminated from the station design.
  - If the vertical marker cannot be designed to accommodate all electrical power and control equipment, a power and control cabinet will be installed. Where possible this enclosure will be installed behind the shelter, facing away from the road. This will avoid obstructing movement on the platform and minimize its visual appearance. The cabinet shall be a NEMA 4X enclosure and shall be made of a brushed stainless steel designed for exterior installation with extra corrosion resistance to road salt. The enclosure will be mounted on a solid concrete foundation, which in most cases will be an extension of the boarding platform.

- If the vertical marker cannot be designed to serve as an electrical cabinet and a separate cabinet is needed, the power and control cabinet will be located behind the shelter in line with the landscape strip, with the approximate dimensions of 84" H x 60" W x 18" D. The power and control cabinet will be equipped with two doors: one side of the cabinet will contain power distribution equipment, while the other side will be designated for various control and communication equipment. The site's utility meter will be installed on the side of the cabinet adjacent to the 120/240V distribution panel. The dimensions indicated assume that all planned electrical components will be included in the station. If certain components, particularly the shelter heaters and/or pavement snow melt system are excluded, the required size of the electrical cabinet will be reduced.

- As noted in Section 3.5.1, if local communities desire to provide cameras/call boxes at ART stations, they should notify Pace prior to shelter procurement so that pre-wired accommodations can be provided.
- A Ventra™ fare vending machine has been procured by Pace for installation at the Golf Mill Shopping Center. It will be installed prior to commencement of Milwaukee Corridor ART service and may need to be relocated during construction of the Golf Mill station platform. Relocation of the Ventra machine will be coordinated during the design process. The weather proof cabinet may be installed on the station platform between the two shelters or at an alternate location selected by Pace and the property owner.

3.6 Station Layout Concepts

Station layout concepts were developed and refined through discussions with Pace at three station design workshops – held on December 10, 2013, February 11, 2014, and on October 7, 2014 – and subsequent conversations with staff. From these discussions, two station layout concepts (a "Typical" layout and a "Compact" layout) were established and have been used as the basis for the development of site-specific station layouts. The resulting Typical and Compact station layouts are presented in Figure 3.4 and Figure 3.5, respectively.

The "Typical" layout reflects the preferred station configuration as described in Section 3.5 and will be used in locations where the available right-of-way is not constrained. The "Compact" layout reflects a station configuration to be used in locations where right-of-way width and/or length are limited.

The **Typical Station Layout**, with a footprint of 60 feet in length by 12 feet in width, will consist of the following elements (all as described above):

- A fully accessible 16 feet long and five feet deep cantilevered shelter structure.
- A raised platform with railings.
- A free-standing vertical marker.
- A trash receptacle.
- A single bicycle rack.
- A landscaped bed.
- An electric snow melt system.

The **Compact Station Layout**, with a footprint of 45 feet by 10.5 feet, differs from the Typical Station Layout only in the following ways:

- The shelter structure is shorter (12 feet long instead of 16 feet), with the same depth as the typical station shelter, and providing adequate space for a bench and wheelchair waiting area.
- The raised platform is reduced in length, with access ramps at a 1:12 slope at both ends.
- The bicycle rack on the raised platform is eliminated.
- The landscape bed is eliminated.

Some individual station designs will require further deviations from these two basic templates to accommodate unique site characteristics and right-of-way constraints. In some cases where multiple local bus routes are expected to share an ART station, a larger station is proposed to accommodate the additional vehicular and passenger traffic.

Pace has also identified a station template that provides for additional bicycle storage. This option, accomplished by moving bicycle storage behind a narrowed access ramp, is depicted in Figure 3.6.

Figure 3.4: Typical Station Layout

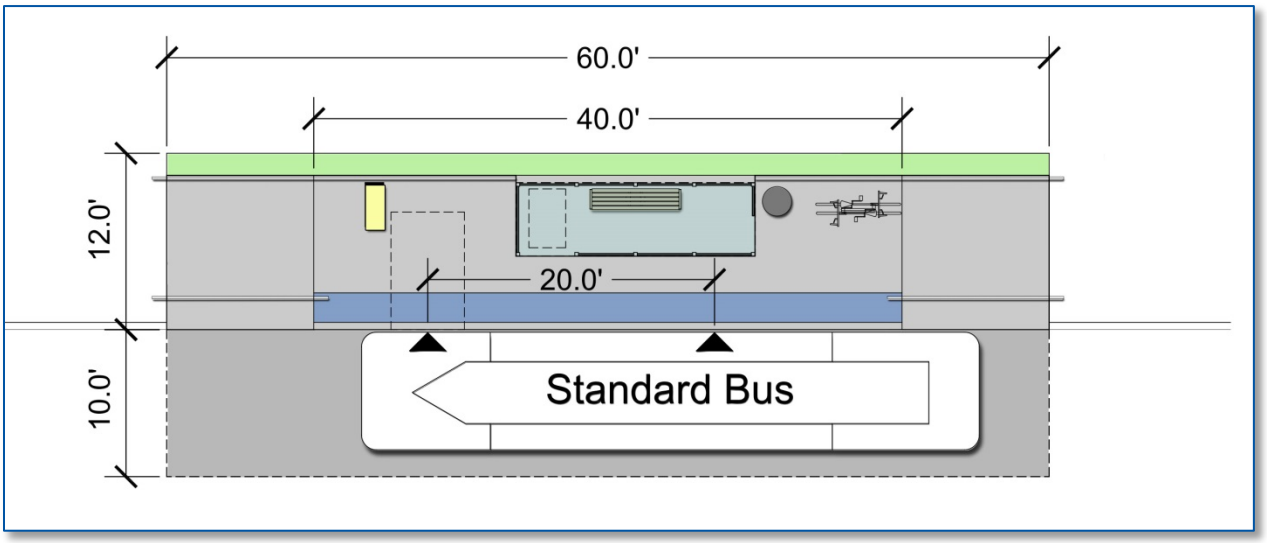


Figure 3.5: Compact Station Layout

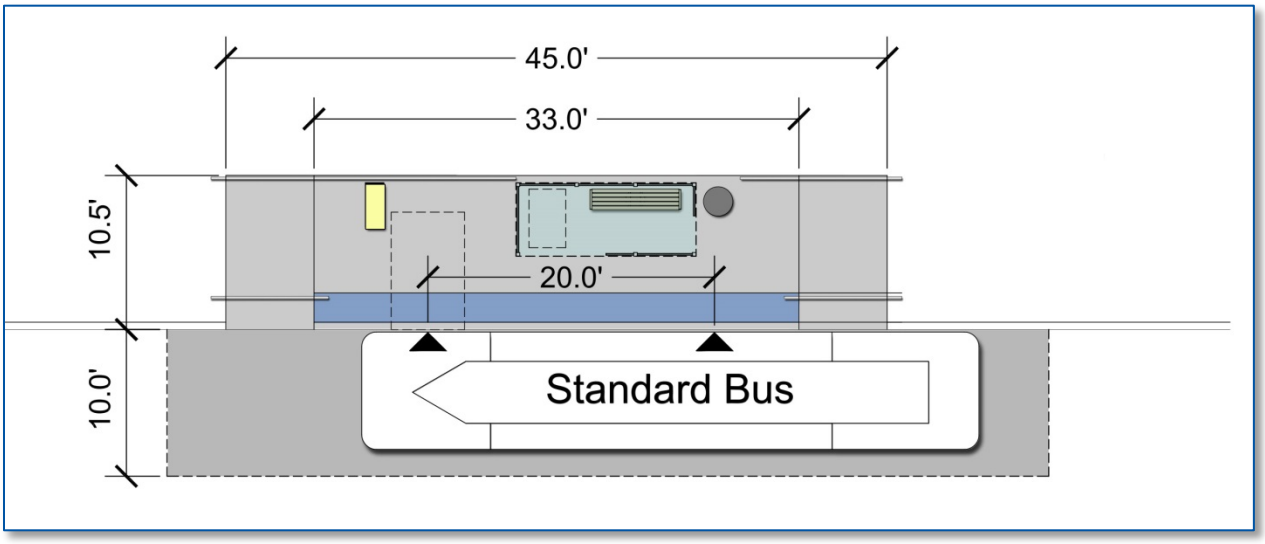


Figure 3.6: Typical Station Layout Featuring Additional Bicycle Storage

3.7 Site-specific Station Layouts

Based on discussion with Pace and subsequent coordination with the Village of Niles and CDOT, a preferred site plan has been developed for each station site. These plans represent continued refinement through multiple rounds of review.

The following sections present the station sites currently preferred by Pace as well as the preliminary site plan for each station site. A brief summary of the current status of planning at each site is presented, as well as an assessment of potential property impacts, utility impacts, and right-of-way impacts. The detailed preliminary site plans for each station are contained in Appendix B – Conceptual Station Site Plans – and are referenced frequently in the following sections.

For the station locations where more than one site remains under consideration or where multiple plans for the same site have been developed, a preferred site plan is presented, along with an identified alternate. In the appendix, the alternate site plans are presented following the full set of preferred site plans, under a separate “Alternative Station Layouts” flysheet.

It should be noted that the preliminary station designs include upgrades for ADA compliance that are not directly related to the proposed station but would provide for pedestrian safety enhancements in the vicinity of the station. These improvements have been considered and included in the preliminary capital cost estimates documented in Section 12.1. However, those not required by permitting agencies may be eliminated during the design phase if cost prohibitive and/or if no cost sharing agreement with local jurisdictions has been established. Therefore, it is recommended that in the engineering and construction phases, ancillary ADA improvements be included as a bid alternate.

3.7.1 Golf Mill Shopping Center

- Municipality: Village of Niles
- Owner: Golf Mill Shopping Center
- Cross Section: Parking lot, 2-lane perimeter drive

At system startup, the northern terminal of the Milwaukee Corridor ART will use the existing Pace stop on the south side of the Golf Mill Shopping Center. The stop is located within the mall parking lot directly south of the entrance to the J. C. Penney store, as shown in Figure 3.7.

As shown on the station layout sheet (see Appendix B – Conceptual Station Site Plans), the proposed layout for the Golf Mill station consists of an elongated version of the Typical Station to accommodate multiple simultaneous arrivals, due to the high volume of buses that serve the site. The site plan also proposes to remove approximately five parking stalls adjacent to the station, which would allow for the creation of a larger landscaped area and a walkway to the mall entrance. Such improvements, while not necessary to establish a functional station, would enhance the site and better establish it is a terminal serving both ART and multiple local routes. The station layout also includes two shelters, extra bicycle storage, and a Ventra ticket vending machine.

As an action independent of the Milwaukee Corridor ART project, several potential locations for a transit center at or near the shopping center were evaluated though Pace is not pursuing this at this time. The evaluation of these locations is documented in a separate memorandum, Golf Mill Transit Center Station Location Options, which was transmitted to Pace on January 24, 2014.

Site Considerations

The station design includes proposed new ADA accessible sidewalks on the north and south end of the station platform. Approximately 200 feet of new curb and gutter construction would be required to construct the expanded passenger waiting area and surrounding landscaping. As previously noted, five parking spaces would be eliminated with this design.

The proposed station at Golf Mill Shopping Center is located within a privately owned parking lot. No underground utility information was obtained for this location. Potential utility conflicts at this site should be investigated by means of a survey conducted during the design phase and in coordination with the property owner.

Next Steps

The preliminary site plan has not yet been presented to the current owner of the mall, which was recently sold. Coordination meetings should be scheduled between Pace, the Village of Niles, and the new owners. A coordination meeting was held in January 2014 with the management company for the previous owner, in which general support was voiced for the ART concept and the proposal for a station at the current site. However, it is unknown whether the change in ownership will impact that support. Pace is coordinating with the Village of Niles to arrange a meeting with the new owners of the mall.

Figure 3.7: Proposed Station Site, Golf Mill Shopping Center

3.7.2 Dempster Street

- Municipality: Village of Niles
- Jurisdiction: IDOT
- Cross Section: 7 lanes
- Parking: none

Preferred station sites have been identified for Dempster Street, but are contingent upon improvements to the pedestrian environment at the intersection. With the current local service, bus stops are provided on both sides of the intersection in both directions of travel due to the inhospitable and unsafe pedestrian environment at the intersection. There are also gaps in the sidewalk network and numerous local access driveways that make the placement of an ART station challenging.

Figure 3.8 shows the preferred Dempster Street station sites, which are located on the far side of the intersection in each direction. The northbound station is located several hundred feet beyond the intersection based on the lack of a suitable site closer to the intersection. If the preferred sites are infeasible due to significant challenges in improving the pedestrian conditions, the alternative station sites at Ballard Road are also shown.

To address the deficiencies in pedestrian accommodations across Dempster Street, the station designs and preliminary capital cost estimate for the Dempster ART stations include upgraded pedestrian access including restriped crosswalks and a full set of new, ADA compliant curb ramps.

Figure 3.8: Preferred Dempster Street Station Site and Alternative Ballard Road Sites

Site Considerations

Northbound Station

The preferred northbound station at Dempster Street is located at the northern end of the existing Budget Rental Truck property (see Figure 3.9). This is the only location where a station would not adversely impact ingress, egress, or circulation within existing parking lots. The station platform would be constructed along the existing curb line, and buses would stop in the existing auxiliary travel lane. A typical 60 foot platform length is anticipated, with the 18 inch landscaping strip removed due to space constraints, resulting in a 10.5 foot platform width rather than the typical 12 foot platform width.

Figure 3.9: Preferred Northbound Dempster Street Station Site Photograph

The station would be sited between an existing sign post in the Budget parking lot and the existing curb line. The sign post currently creates unusable space and limits the circulation on this property; siting of the station in this space will not further impact site circulation. The station will also not adversely impact access to a gated area where trucks are parked or to the two existing parking spaces located on the southwest corner of the property. The station would require a permanent easement for it to be constructed partially on private property.

For adequate pedestrian access, approximately 200 feet of new sidewalk must be added beginning at the Dempster intersection and extending north. In order to install a 5-foot sidewalk, two existing IDOT street lights must be moved. There is sufficient space within the existing right-of-way to relocate the lights to the back of the sidewalk and still provide a minimum four foot clearance for ADA accessibility. There is no alternative to relocating the light poles, since the right-of-way is extremely constrained in this area. However, a lighting analysis study should not be required for this relocation as the minimal distance for the lights to be relocated should yield a negligible impact on street lighting conditions.

Reconstruction of three existing driveways south of the proposed station will be required, totaling 515 square feet. An additional 570 square feet of asphalt will also need to be replaced in front of the Niles Auto Parts store.

Southbound Station

The preferred southbound station at Dempster Street is located at the southwest corner of Milwaukee Avenue and Dempster Street (see Figure 3.10). Records provided by IDOT and the Niles GIS data appear to show that the cemetery fence line does not follow the property line, indicating that the station would be constructed partially on private cemetery property in spite of the design not impacting the existing fence line. A permanent easement would therefore be needed. No adverse impacts would occur within the fenced area of the cemetery. It should be noted that the above referenced records also indicate that

the existing bus shelters on both the Dempster Street and Milwaukee Avenue sides of the corner may have been built partially on private property.

One light pole would require relocation of approximately one to two feet, which should not require a lighting analysis study. Because of the lack of sidewalk connectivity to the south and west of this station location, it is especially important that safe pedestrian access across Milwaukee Avenue and Dempster Street be provided. Furthermore, the current pedestrian crossing across Dempster Street is not ADA compliant. Improvements to the Dempster Street and Milwaukee Avenue pedestrian crossings to make them ADA compliant will be necessary and must be coordinated with IDOT during the design phase.

Figure 3.10: Preferred Southbound Dempster Street Station Site Photograph

Ballard Road Alternative

Should the preferred Dempster Street station locations be infeasible due to constructability, permitting, or pedestrian access constraints, alternative northbound and southbound stations would be sited at Ballard Road, approximately one quarter mile north of the preferred sites. These stations would be constructed within the existing right-of-way, primarily along the parkway between the sidewalk and the roadway. Station site plans for the Ballard Road Alternative are shown in the Alternative Station Layouts section of Appendix B – Conceptual Station Site Plans.

In the northbound direction, a compact 12 foot by 45 foot station platform is proposed. A longer platform would require relocation of an additional light pole. In the southbound direction, a typical 12 foot by 60 foot station platform is proposed. No significant impacts on right-of-way, utility, and property are anticipated.

3.7.3 Main Street

- Municipality: Village of Niles
- Jurisdiction: IDOT
- Cross Section: 5 lanes
- Parking: Northbound side only

The southbound and northbound stations will both be located north of Main Street, as shown on Figure 3.11. Both stations will be located within the existing curb line.

Figure 3.11: Proposed Station Sites, Main Street

Site Considerations

Northbound Station

The northbound station at Main Street is located in the parkway just to the north of the existing gas station driveway (see Figure 3.12). The station would be located within the existing curb line and the bus would stop in the parking lane, outside of the right travel lane. A typical 12 foot by 60 foot station platform is proposed. There is sufficient right-of-way available to construct a station here without property impacts. This location contains street parking, and the station would displace several parking spaces. The design of this station will be coordinated with the Village of Niles to consider the potential effect and mitigation measures for this loss of parking. Removal of a nearby Pace bus stop south of Main Street may allow for the restoration of some displaced parking.

Figure 3.12: Northbound Main Street Station Site Photograph

One street light would need to be relocated approximately 10 feet. A water valve manhole and a sanitary manhole would need to be raised and incorporated into the station platform. A tree would also need to be removed. Locating the station further north to avoid utility impacts was investigated. However, since the residential units all have water and sewer service connections, there was no advantage to relocating the station. As currently designed, water and sewer lines run under the proposed concrete pad location and should be verified during design. Two six foot by 12 foot sidewalk segments would be constructed to connect the station platform to the existing sidewalk.

Southbound Station

The southbound station at Main Street is located on the northwest corner of the intersection, adjacent to Maryhill Cemetery (see Figure 3.13). The near side location was selected due to space constraints and driveway impacts on the far side of the intersection. The proposed station will be located just to the north of the existing bus shelter location, which will provide sidewalk access to the level boarding platform. The station would be located within the existing right-of-way, maintaining the current curb line. The bus would stop in the existing right travel lane, consistent with the existing service pattern. A

10.5 foot by 60 foot station platform is proposed. The landscaping strip included in the typical station design would be excluded due to right-of-way constraints.

Figure 3.13: Southbound Main Street Station Site Photograph

There is currently no sidewalk along the cemetery to the north of the existing bus stop. This may be added by the Village of Niles or the cemetery in the future. The station platform will be constructed with a northern ramp providing access to any future sidewalk.

No utility relocations or adjustments would be necessary at this location. Water and sewer lines run under the proposed concrete pad location and these should be verified by means of a survey during design and prior to construction.

3.7.4 Oakton Street / Oak Mill Mall

- Municipality: Village of Niles
- Jurisdiction: IDOT
- Cross Section: 5 lanes
- Parking: None

The proposed station sites for the Oakton Street / Oak Mill Mall ART stations are shown in Figure 3.14. The sites are proposed for the far side of the signalized Oak Mill Mall entrance intersection.

Figure 3.14: Proposed Station Site, Oakton Street / Oak Mill Mall

Site Considerations

Northbound Station

The northbound station site is north of the signalized intersection with the Oak Mill Mall entrance (see Figure 3.15). The station would be placed along the sidewalk between the two driveways to the parking lot serving Jerry's Fruit & Garden and McDonald's. A 10.5 foot by 60 foot station platform is proposed. The landscaping strip included in the typical station design would be excluded due to right-of-way constraints. The platform would cover both the parkway and the existing sidewalk.

There are no utility impacts anticipated for this station. However, water main and sewer run under the proposed concrete pad. These utility locations should be verified during design and prior to construction. With over 100 feet of existing curb line between the two driveways, adverse impacts to sight distances and safe access/egress to the parking lots are not anticipated. No reconstruction of existing curb and gutter is required.

Figure 3.15: Northbound Oakton Street/Oak Mill Mall Station Site Photograph

Source: Google Street View

Southbound Station

In the southbound direction, the station will be constructed south of the signalized entrance to the Oak Mill Mall, adjacent to the mall property, where a Pace bus stop and bus shelter are currently located (see Figure 3.16). The station would be constructed on the parkway within the existing right-of-way and maintaining the current curb line. A sidewalk would continue behind the station. A typical 60 foot station platform is proposed, with the landscape strip expanded beyond its typical 18 inch width to meet the existing sidewalk. A sidewalk would continue behind the station. There are no utility impacts anticipated for this station.

Figure 3.16: Southbound Oakton Street/Oak Mill Mall Station Site Photograph

3.7.5 Harlem Avenue / Howard Street

- Municipality:
  - City of Chicago (Preferred Northbound site)
  - Village of Niles (Southbound and Alternative Northbound sites)
- Jurisdiction: IDOT
- Cross Section: 5 lanes
- Parking: None
- Current Chicago Alderman: Mary O'Connor, 41st Ward

Figure 3.17 shows the proposed station sites at the intersection of Milwaukee Avenue, Harlem Avenue, and Howard Street. This location is also the northern terminus of the proposed near-term Harlem ART corridor. Therefore, in addition to site suitability considerations, the optimal station site should be as close to Harlem Avenue as possible to facilitate future transfers between ART routes as well as the potential for long term development of a shared station facility.

Figure 3.17: Proposed Station Sites, Harlem Avenue / Howard Street

Site Considerations

Northbound (Central Platform Option)

The preferred northbound station site is immediately west of Harlem Avenue adjacent to the White Castle restaurant parking lot (see Figure 3.18). To facilitate transfers between the Milwaukee and Harlem ART corridors, a shelter would be located in the landscaped triangular area south of the restaurant and parking lot, between Milwaukee and Harlem avenues. Because the restaurant has a large sign post located within the triangular area, a permanent easement would be the appropriate mechanism for constructing the station on this privately owned land. Outright acquisition would be infeasible without impacting the White Castle sign.

This location is within the City of Chicago although most surrounding land is in Niles. To provide additional clearance for the bus in the right travel lane, the existing B6.12 curb and gutter would be moved back one foot and reconstructed from the corner to the first driveway to provide a 24 inch gutter. The travel lane itself would remain unchanged. One light pole would also need to be relocated. Water and sewer locations should be verified during design and prior to construction. A future sidewalk could be extended across the White Castle property under a permanent easement to connect to the Harlem Avenue ART station.

Figure 3.18: Preferred Northbound Harlem Avenue/Howard Street Station Site Photograph

Northbound (Alternative Location)

If the preferred station location is not possible due to unsuccessful coordination with the landowner or other constructability concerns, an alternate location is proposed north of Howard Street, in Niles. The station site plan for the alternative northbound Harlem/Howard station is shown in the Alternative Station Layouts section of Appendix B – Conceptual Station Site Plans.

A typical 60 foot by 12 foot station platform would be proposed at this site, with the existing sidewalk passing through the station. One light pole would need to be relocated in order to use this location. No

other utility impacts are expected. Water mains are located under the proposed station location, but would not be impacted by the construction.

Southbound

The southbound station is located immediately east of Harlem Avenue, adjacent to a small landscaped parcel (see Figure 3.19). The parcel is owned by the City of Chicago, but is located within the Village of Niles and leased to the Village. Existing Pace bus stops are located adjacent to this parcel on both the Milwaukee Avenue and Harlem Avenue sides. A typical 60 foot by 12 foot station platform is proposed. Based on coordination discussions with CDOT, a relocated sidewalk will be constructed behind the platform. The station will require the granting of a permanent easement or intergovernmental agreement from the City of Chicago for the portion of the station that extends outside the public right-of-way.

The proposed location would require relocation of a light pole, two benches, and a trash receptacle. One tree would need to be removed. There is a sewer line running below the proposed concrete pad, which should be verified during design and prior to construction.

Figure 3.19: Southbound Harlem Avenue/Howard Street Station Site Photograph

3.7.6 Touhy Avenue

- Municipality: Village of Niles
- Jurisdiction: IDOT
- Cross Section: 5 lanes
- Parking: None

Figure 3.20 shows the proposed station sites at Touhy Avenue. Both station sites are located south of the intersection, adjacent to existing Pace bus stops.

Figure 3.20: Proposed Station Sites, Touhy Avenue

Site Considerations

Northbound

The northbound station is located adjacent to a retail development which has a pedestrian plaza and outdoor seating along Milwaukee Avenue (see Figure 3.21). A compact 45 foot by 12.5 foot station platform is proposed to preserve appropriate circulation around and through the outdoor seating area. Private property acquisitions are not anticipated, though a permanent pedestrian easement may be required. There is an existing Pace bus shelter located in the pedestrian area. It would need to be removed and one light pole would need to be relocated. There are underground gas and electric lines below the proposed station location. These should be verified during design and prior to construction.

Figure 3.21: Northbound Touhy Avenue Station Site Photograph

Southbound

The southbound station is located approximately 30 feet south of the Niles Veterans Memorial and public plaza, in the vicinity of the existing Pace bus stop and shelter (see Figure 3.22). The station would also be immediately east of Newark Avenue, which ends in a cul-de-sac adjacent to Milwaukee Avenue. A typical 60 foot by 12 foot station platform is proposed. The station platform would obstruct the existing pedestrian connection to the cul-de-sac, and a replacement connection is proposed at the south end of the platform. The existing Milwaukee Avenue sidewalk would pass through the station platform.

In addition to the relocated sidewalk connection to the cul-de-sac, one light pole would need to be relocated. There are water and electric lines below the proposed station location, and sewer lines under the concrete pad location. These should be verified during design and prior to construction.

Figure 3.22: Southbound Touhy Avenue Station Site Photograph

3.7.7 Haft Street / Highland Avenue

- Municipality: City of Chicago
- Jurisdiction: IDOT
- Cross Section: 5 lanes
- Parking: Both sides
- Current Chicago Alderman: Margaret Laurino, 39th Ward

Figure 3.23 shows the proposed station sites at Highland Avenue and Haft Street. These station sites serve the nearby major intersection of Milwaukee Avenue, Devon Avenue, and Nagle Avenue. These sites were selected as the nearest locations where a station could be feasibly constructed without major impacts on the right-of-way and private property.

Figure 3.23: Proposed Station Sites, Haft Street / Highland Avenue

The station designs for this location have evolved through multiple rounds of stakeholder feedback and revision, reflecting input from CDOT. In coordination meetings, CDOT officials expressed concern they and the local alderman have about the lack of safe pedestrian crossings in the immediate vicinity of the station, as well as potential bus-bicycle conflicts arising from the existing bicycle lane on Milwaukee Avenue.

In response to those comments and in consultation with CDOT, a revised station design concept was developed for both the northbound and southbound stations at Haft Street and Highland Avenue. Whereas the previous design showed the ART stations constructed within the existing roadway atop the parking lane, the revised designs move the stations further into the roadway while routing the bicycle lane behind the station in the space between the station and the sidewalk. In addition, new pedestrian amenities are proposed, including a high-visibility crosswalk at Haft Street and a rectangular rapid-flashing beacon (RRFB). Product information for RRFBs is provided in Appendix G – Product Information Sheets.

Site Considerations

Northbound

The northbound station is located at the southeast corner of Milwaukee and Highland Avenue, just north of an existing Pace bus stop and approximately 500 feet south of Devon Avenue (see Figure 3.24). A 60 foot by 10.5 foot station platform is proposed, to be constructed on a "transit island" within the existing roadway. The transit island would extend to the curbside edge of the existing right-hand travel lane, atop an existing bicycle lane and parking lane. The bicycle lane would be rerouted behind the ART station, which would require removal of approximately three feet out of the existing 13-foot wide sidewalk. Constructing a transit island at this location is consistent with both the City of Chicago's Complete Streets goals and Pace's Transit-Supportive Design Guidelines. The design would maintain a separate pedestrian zone behind the station and within the existing public right-of-way. To facilitate safe pedestrian access to the ART station, the bicycle lane would be elevated to the height of the sidewalk as it passes behind the station, but would still be below the height of the station platform (see Figure 3.24). This, combined with high-visibility crosswalks connecting the station to the sidewalk, would act as visual cues to remind cyclists that pedestrians have the right-of-way.

Approximately 310 feet of curb and gutter will have to be replaced to construct the bulb out. The existing bike lane will be restriped south of the station and will be tabled at sidewalk height immediately behind the station platform. A trench drain will likely be needed where the bike lane abuts the station platform. Approximately 1,200 feet of ADA accessible sidewalk, curb ramp and tabled bicycle lane is required. An existing drainage structure will also need to be relocated to the new curb line.

There is a water main below the proposed concrete pad location, but this will likely not be impacted by the proposed construction. Underground electric conduit also runs under the concrete pad. This should be verified during design and prior to construction.

Figure 3.24: Northbound Haft / Highland Station Rendering

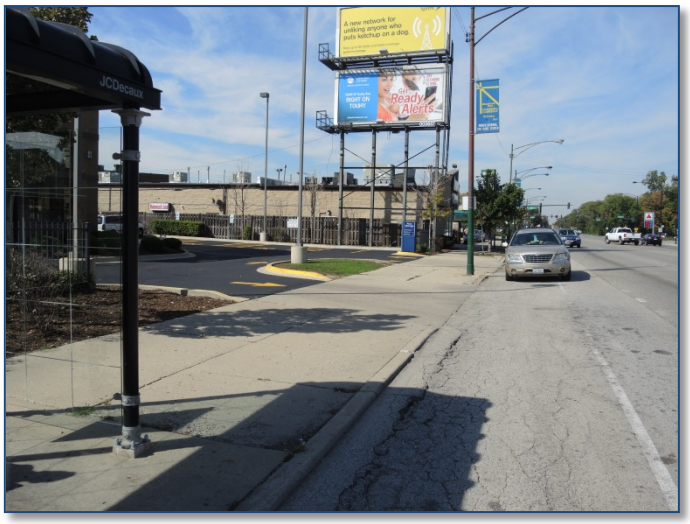
Southbound

The southbound station is located to the north of Haft Street in the vicinity of an existing Pace bus stop and shelter (see Figure 3.25). A 60 foot by 10.5 foot station platform is proposed, constructed on a transit island aligned with the curbside of the southbound right-hand travel lane. Similar to the northbound station, the southbound bicycle lane would be routed behind the ART station, requiring removal of approximately three feet of the 13 foot wide sidewalk. This design would allow for a separate pedestrian zone behind the station without acquiring right-of-way or permanent easement from the abutting First Chicago Bank and Trust. The proposed rerouted bicycle lane would be elevated to the height of the adjacent sidewalk as it passes behind the ART station, but would still be below the height of the station platform. High-visibility crosswalks would connect pedestrians across the bicycle lane from the sidewalk to the station.

The bank currently has two driveways, one of which would need to be closed in order to accommodate the proposed station. The driveway proposed for closure is an exit-only driveway, while the adjacent driveway is currently configured for two-way traffic. Closure of the one-way driveway will not impact vehicle circulation in the parking lot. The remaining driveway may need to be widened slightly to a 24-foot width, which is recommended to accommodate two-way traffic.

Approximately 250 feet of curb and gutter will have to be replaced, to construct the transit island and rerouted bicycle lane. A trench drain will likely be needed where the bike lane abuts the station platform. The existing lane will be restriped north of the station and will be tabled at sidewalk height immediately behind the station platform. Approximately 3,075 feet of ADA accessible sidewalk, curb ramp and tabled bicycle lane is required. Two existing drainage structures, one on each side of the station platform will also need to be relocated to the new curb line.

Figure 3.25: Southbound Haft Street/Highland Avenue Station Site Photograph



A 60 square foot ADA accessible crosswalk in the ladder pattern will be constructed across Milwaukee Avenue at Haft Street to connect the two stations. An 80 square foot center pedestrian island will be constructed in the median of Milwaukee Avenue. A gas line is present below the proposed concrete pad location. This should be verified during design and prior to construction.

3.7.8 Austin Avenue / Ardmore Avenue

- Municipality: City of Chicago
- Jurisdiction: CDOT
- Cross Section: 5 lanes
- Parking: Both sides
- 2015 Chicago Alderman: John Arena, 45th Ward

The proposed station sites at Austin Avenue and Ardmore Avenue are shown in Figure 3.26. This complex intersection encompasses the junctions with both Austin Avenue and Ardmore Avenue. Both stations are proposed for the far sides of the intersection, past both intersecting roads.

Figure 3.26: Proposed Station Sites, Austin Avenue / Ardmore Avenue

As shown in Figure 3.26, the station locations at this intersection remain classified as “preferred” rather than “selected”. This distinction reflects the ongoing design process being conducted by CDOT as part of the Milwaukee Avenue *Streets for Cycling* project. CDOT’s project has the potential to modify the existing roadway cross-section, impacting the proposed station sites and layouts at the Austin / Ardmore

location. The preliminary designs presented in this report are based upon existing conditions and are intended to be compatible with a range of future roadway configurations currently being considered by CDOT.

Additionally, in an effort to address CDOT concerns regarding bicycle-bus conflicts, alternative designs have also been prepared which route the existing bicycle lane behind the ART station. The alternative designs presented for this station location were based on the prototype design developed for Haft Avenue and Highland Street. Pending review comments from CDOT on these designs, the alternative Austin/Ardmore designs may become the preferred alternatives. A hybrid approach drawing on elements from both the Preferred and Alternative designs is also a possibility. The station site plans for the alternative Austin/Ardmore stations are shown in the Alternative Station Layouts section of Appendix B – Conceptual Station Site Plans.

Site Considerations

Northbound (Preferred Alternative)

The northbound station is located on the corner west of Austin Avenue (see Figure 3.27). A typical 12 foot by 60 foot station platform is proposed. All station improvements would be within the public right-of-way, atop the existing sidewalk. The station is adjacent to the Chase Bank parking lot, which contains a small park/seating area at the southern point of the triangle-shaped parcel. ADA sidewalk access would occur via the platform area rather than behind it, due to right-of-way constraints. Buses serving this station would pull out of the travel lane and stop within the existing parking lane. This would impact approximately six existing unmetered parking spaces.

There are water main and electric lines under the proposed station and concrete pad location, which should be verified during design and prior to construction. However, adverse impacts to these utilities are not anticipated.

Figure 3.27: Preferred Northbound Austin Avenue/Ardmore Avenue Station Site Photograph

Northbound (Pedestrian Treatment Alternative)

An alternative design for the northbound station was developed to reduce bicycle-bus conflicts by moving the ART station into the roadway on a transit island, with the existing bicycle lane routed behind the station. This would require the removal of approximately four to five feet of the existing 14-foot wide sidewalk, but would also preserve a separate pedestrian zone behind the station, which does not exist under the preferred design. The bicycle lane would elevate to sidewalk height as it passes behind the ART station, but would still be below the height of the station platform. High visibility crosswalks would link the sidewalk to the station platform.

With this alternative, approximately 2,500 square feet of reconstructed sidewalk and raised bicycle lane would be required, in addition to approximately 200 linear feet of relocated curb and gutter. The relocated sidewalk would impact an existing traffic signal, one light pole, and one tree.

Southbound (Preferred Alternative)

The southbound station is east of Austin Avenue in front of the corner parcel, which is currently occupied by Illinois Title Loan (see Figure 3.28). Space for a station is significantly constrained by the available length of curb between the intersection and a nearby driveway, as well as by the proximity of the adjacent business to the property line. Therefore, a 40 foot by 12 foot compact station and a bus bulb are proposed to minimize impacts to the property. The station would be further shortened by eliminating one of two ADA access ramps to avoid routing pedestrian traffic into the path of the adjacent driveway. The eliminated ramp, on the departing end of the platform, would be replaced by a step directly off the rear of the platform.

Figure 3.28: Preferred Southbound Austin Avenue/Ardmore Avenue Station Site Photograph

This layout would avoid impacts to the adjacent parking lot as well as the business abutting the station to the west. The proposed bus bulb would extend approximately six feet into the roadway, atop an existing parking lane, and would be aligned with the curbside edge of the existing bicycle lane. A separate pedestrian zone would be preserved behind the station via a remaining nine foot wide sidewalk. A fire hydrant would need to be relocated to accommodate the bus bulb.

Curb and gutter north of the station would need to be reconstructed as well as a section of sidewalk measuring approximately six feet by 31 feet. A smaller six foot by three foot section of sidewalk would be constructed south of the station platform. A tree pit would also be removed to accommodate the station platform.

Southbound (Pedestrian Treatment Alternative)

As with the northbound station, an alternative design was developed for the southbound station at Austin Avenue and Ardmore Avenue which moves the ART station further into the roadway with the existing bicycle lane rerouted and elevated to sidewalk height as it passes behind the station, but set below the height of the station platform. The station would be aligned with the curbside edge of the southbound right-hand travel lane. A swath of existing sidewalk approximately five feet in width would be removed to accommodate the relocated bicycle lane.

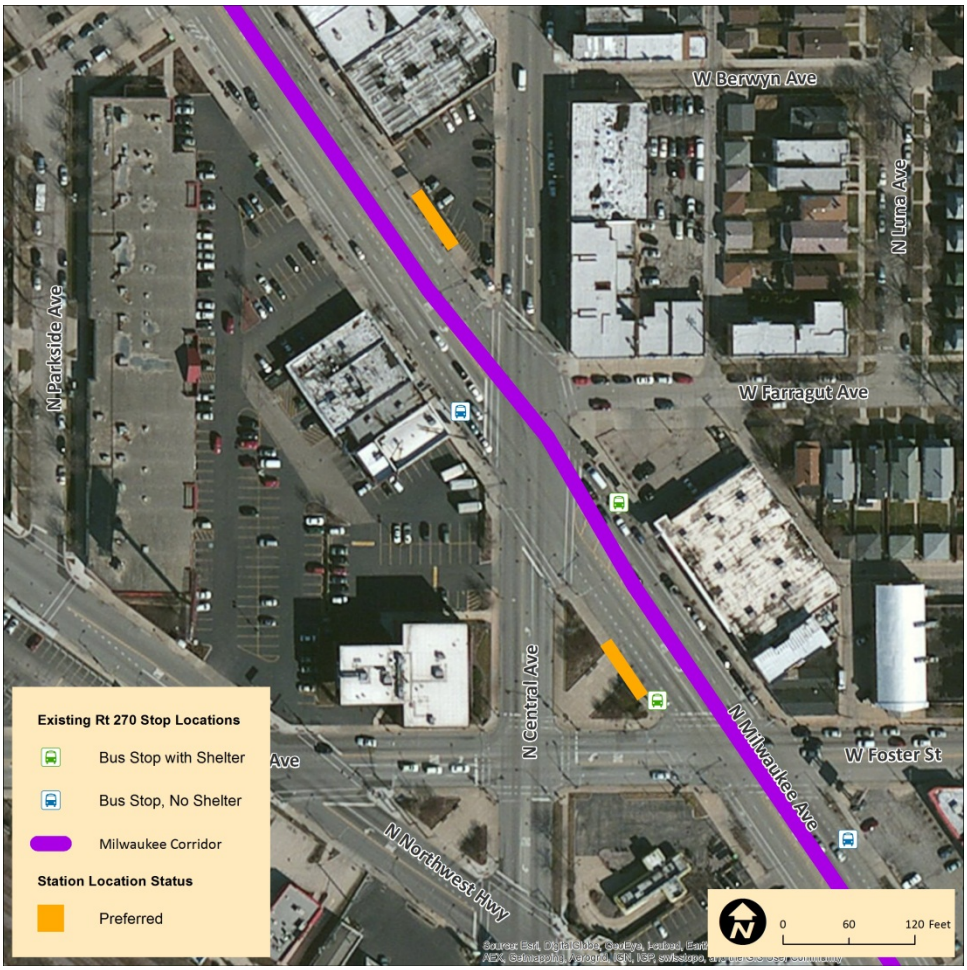
Under this alternative design, approximately 2,120 square feet of sidewalk and raised bicycle lane would be reconstructed, as well as approximately 350 square feet of asphalt driveway and 200 linear feet of curb and gutter. An existing traffic signal, fire hydrant, light pole, and drainage structure would need to be relocated.

3.7.9 Central Avenue

- Municipality: City of Chicago
- Jurisdiction: CDOT
- Cross Section: 5 lanes
- Parking: Both sides
- Current Chicago Alderman: John Arena, 45th Ward

The proposed Central Avenue station sites are shown in Figure 3.29. Both stations are proposed for the far side of the intersection. As previously noted, CDOT is currently in the design phase of a planned reconfiguration of Milwaukee Avenue which may alter the roadway cross section in the vicinity of the Central Avenue intersection. Therefore, the final decision regarding the station location at Central Avenue will be made in coordination with CDOT and with CTA, which also operates several bus routes through this intersection.

Figure 3.29: Proposed Station Sites, Central Avenue



As with the location at Austin Avenue and Ardmore Avenue, alternative designs for both the northbound and southbound Central Avenue ART stations have been developed which incorporate additional pedestrian-friendly design elements and reduce bus-bicycle conflicts. Pending review comments from CDOT, these alterative designs may become the preferred designs.

Site Considerations

Northbound (Preferred Alternative)

The northbound station is located west of Central Avenue (see Figure 3.30). A private parking lot is located adjacent to the proposed station. The parking lot is shared by a liquor store and a restaurant, and includes two driveways accessing Milwaukee Avenue with a third driveway accessing Central Avenue. A typical 60 foot by 12 foot station platform is proposed, which would be located within the existing right-of-way and aligned with the curb line atop the existing sidewalk. Pedestrian circulation would be through the station platform, rather than behind it, due to right-of-way constraints.

Figure 3.30: Northbound Central Avenue Station Site Photograph

The proposed station location would require closure of the driveway on the south end of the parking lot accessing Milwaukee Avenue. To mitigate this impact, a new exit-only driveway is proposed on Central Avenue. Preliminary discussions with CDOT indicate that the agency is also looking at closure of this driveway due to its proximity to the intersection. The proposed driveway relocation would have no net impact on parking spaces in the private lot.

The proposed station would also require removal of one tree. Gas lines, underground electric, and a water main run beneath the proposed concrete pad area. These should be verified during design and prior to construction.

Northbound (Pedestrian Treatment Alternative)

The alternative design for the northbound Central Avenue station relocates the boarding platform from the sidewalk to a transit island atop the existing parking lane, with the platform curb aligned to the northbound right-hand travel lane. A 60 foot by 10.5 foot station is proposed. As with other stations with this type of configuration, routing the bicycle lane behind the station would require the removal of

approximately four feet of existing sidewalk, leaving nine feet of remaining sidewalk width. As with the other designs, the bicycle lane would be set below the height of the station platform. This design also preserves a separate pedestrian zone, as opposed to the preferred alternative in which pedestrians would pass through the platform itself.

The alternative design would still require the closure of one of the two driveways on Milwaukee Avenue, which would be relocated to Central Avenue.

The design would require the reconstruction of approximately 2,205 square feet of sidewalk and raised bicycle lane, 245 square feet of existing asphalt driveway, and 205 linear feet of curb and gutter. One traffic signal, one light pole, and two trees would need to be removed and/or relocated with this design.

Southbound (Preferred Alternative)

The southbound station is located on a publicly owned triangular parcel bounded by Milwaukee Avenue to the northeast, Central Avenue to the west, and Foster Avenue to the south (see Figure 3.31). This is the site of an existing bus stop with shelter, shared by several Pace and CTA bus routes. Given the high volume of buses at this location, a longer version of the typical 12 foot wide platform is proposed at a length of 110 feet. A second ART shelter, bicycle rack, and bench are proposed for this enlarged station. The station would be constructed on the existing sidewalk and buses would serve the station from the existing auxiliary travel lane, which is currently used primarily by buses at this stop.

To maintain separate pedestrian circulation through this busy station, approximately 435 square feet of new sidewalk is proposed behind the station. There are no anticipated utility impacts at this location.

Figure 3.31: Southbound Central Avenue Station Site Photograph

Southbound (Pedestrian Treatment Alternative)

The alternative design for the southbound Central Avenue station relocates the boarding platform from the sidewalk to a transit island atop the existing auxiliary travel lane. A 10.5 foot by 94 foot platform is proposed, with the platform curb aligned to the edge of the right-hand southbound through travel lane.

Relocating the platform into the roadway necessitates a somewhat shorter platform than the 110 foot platform proposed in the preferred alternative. To accommodate the bicycle lane behind the ART platform, five feet of the existing sidewalk width would be removed, with a 6.5 foot wide sidewalk remaining behind the ART platform. The bicycle lane would be elevated to sidewalk height, with high visibility crosswalks linking the sidewalk to the ART station, but would still be below the height of the station platform.

This alternative would require the reconstruction of approximately 1,840 square feet of sidewalk and raised bicycle lane and 230 linear feet of curb and gutter. In addition, two traffic signals and one drainage structure would need to be relocated.

3.7.10 Jefferson Park Transit Center

- Municipality: City of Chicago
- Owner: CTA
- Cross Section: Off-street bus terminal
- Current Chicago Alderman: John Arena, 45th Ward

At the Jefferson Park Transit Center, the preferred ART station location is in the north terminal curbside bay currently used by CTA Route 68, which is adjacent to the building where near-level boarding could be accommodated and there is an existing warming shelter (see Figure 3.32). The preliminary design for the Jefferson Park ART station assumes a 10.5 foot by 60 foot platform. Because it would be sited within an existing transit center, only a basic boarding platform and vertical marker would be included.

Additionally, it would be optimal if the Route 270 boarding location were relocated to the adjacent bay to provide passengers with maximum convenience and flexibility when boarding northbound Milwaukee Avenue buses (see Figure 3.33).

Figure 3.32: CTA Route 68 Bay at Jefferson Park Transit Center

Figure 3.33: Existing and Proposed Jefferson Park Transit Center Bus Bay Assignments

Existing

Proposed

Site Considerations

Pace and CTA have held multiple meetings to coordinate the Milwaukee Corridor ART project with CTA's planned renovations of the Jefferson Park Transit Center, and to discuss Pace's preferred ART bus bay assignments. CTA is currently considering bus bay reassignments at Jefferson Park and has solicited Pace's feedback on the proposed reconfiguration, which would relocate Route 270 and ART to the north terminal. A decision has not been finalized yet.

Based on coordination meetings with CTA staff, the renovations at Jefferson Park are anticipated to begin construction in the second or third quarter of 2016, which is similar to the anticipated schedule for construction of the Milwaukee Corridor ART service. The overall scope of improvements to the bus boarding area has not been finalized, but is anticipated to include aesthetic improvements and pavement replacement, but no major reconfiguration of the facility. Continued coordination with CTA will be necessary to ensure that an ART station or vertical marker is incorporated into that project's design, or that a location is identified where Pace may later construct such a station. As the project approaches and a construction schedule is developed, it may be necessary to identify an interim solution for both the form and location of a Jefferson Park ART station that will support ART at the commencement of service until the long-term planned redevelopment of the transit center is completed. The proposed station at the Jefferson Park Transit Center is located within CTA property and is pending approval and coordination with CTA. No underground utility information was obtained for this location. Potential utility conflicts at this site should be investigated in coordination with CTA during design and prior to construction.

The current Jefferson Park ART station development plan includes obtaining electrical power for any Pace equipment (e.g. vertical marker) from the CTA facility as well as having snow removal at the ART boarding platform performed manually by CTA maintenance staff. During design it will be necessary to investigate viable 120/240V, one phase 20A power supply options from the CTA facility, and to document an inter-agency agreement between Pace and CTA.

3.8 Local Stop Consolidation

New ART stations will in some cases replace an existing local stop, while in other cases a new ART station may be located between existing local stops. In the latter case, some existing local stops are recommended for removal. Additional stop consolidations not directly related to the Milwaukee Corridor ART project may also be proposed by Pace or by CDOT in conjunction with the Milwaukee Avenue *Streets for Cycling* project. Table 3.1 summarizes the existing local stops that are anticipated to be affected based on the current proposed station locations and site plans, the following existing local stops will be affected.

Table 3.1: Proposed Local Bus Stop Consolidation

ART Station	Existing Bus Stop	Proposed Impact
Golf Mill	Golf Mill/J.C. Penney	Convert to ART station
Dempster NB	Milwaukee/Dempster SE	Eliminate
	Milwaukee/Dempster NE	Eliminate
	Milwaukee/Elizabeth (NB)	Eliminate
Dempster SB	Milwaukee/Elizabeth (SB)	Eliminate
	Milwaukee/Dempster NW	Eliminate
	Milwaukee/Dempster SW	Convert to ART station
Main NB	Milwaukee/Main (NB)	Eliminate
Main SB	Milwaukee/Main (SB)	Convert to ART station
Oakton / Oak Mill NB	Milwaukee/Oak Mill (NB)	Eliminate
	Milwaukee/Oakton (NB)	Eliminate
Oakton / Oak Mill SB	Milwaukee/Oakton (SB)	Eliminate
	Milwaukee/Oak Mill (SB)	Convert to ART station

Harlem / Howard NB	Milwaukee/Harlem	Convert to ART station
Harlem / Howard SB	Milwaukee/Birchwood (SB)	Convert to ART station
Touhy NB	Milwaukee/Touhy (NB)	Convert to ART station
Touhy SB	Milwaukee/Touhy (SB)	Convert to ART station
Haft / Highland NB	Milwaukee/Haft (NB)	Convert to ART station
	Milwaukee/Nagle/Devon	Eliminate
Haft / Highland SB	Milwaukee/Haft (SB)	Convert to ART station
Austin / Ardmore NB	Milwaukee/Austin (NB)	Eliminate
Austin / Ardmore SB	Milwaukee/Austin (SB)	Eliminate
Central NB	Milwaukee/Central (NB)	Eliminate
Central SB	Milwaukee/Central (SB)	Eliminate
	Milwaukee/Foster (SB)	Convert to ART station
Jefferson Park	Jefferson Park CTA Station (south terminal)	Relocate to North Terminal, Convert to ART station

3.9 Station Planning Next Steps

As the Milwaukee Corridor ART project advances into the environmental documentation and engineering phases, various avenues of stakeholder coordination are needed to finalize pending

decisions and advance the design, land/easement acquisition and permitting process. These include the following:

- Coordination with CTA on planned renovations at Jefferson Park Transit Center to develop a coordinated plan for an ART station at the transit center. Outstanding issues include the assigned ART bus bay, potential relocation of the Route 270 bus bay to complement ART service, and long-term ART station improvements.
- Coordination with CDOT on all locations within the City of Chicago, and particularly the Central and Austin / Ardmore stations, which are within the project limits of CDOT's ongoing Milwaukee Avenue *Streets for Cycling* project. Pace and CDOT have already held several preliminary discussions and will continue to closely coordinate these two related projects.
- Coordination with aldermen from the 39th, 41st, and 45th wards to confirm preliminary station designs and coordinate outreach with affected residents, business owners, and local civic groups.
- Direct outreach to affected property owners, particularly those whose properties will be affected by a proposed driveway relocation, construction easement, or a permanent easement. These include the following:
    - Golf Mill Shopping Center (easement or other agreement)
    - Dempster Northbound (easement)
    - Dempster Southbound (easement)
    - Harlem Northbound (easement)
    - Harlem Southbound (easement)
    - Touhy Northbound (easement)
    - Touhy Southbound (easement)
    - Haft / Highland Southbound (driveway relocation)
    - Central Northbound (driveway relocation)
    - Central Southbound (easement / IGA)
    - Jefferson Park Transit Center (CTA property)
- Coordination with CDOT and JC Decaux to discuss station shelter advertising and maintenance within the City of Chicago.
- Submission of advanced conceptual designs to IDOT and CDOT for review and feedback prior to final engineering and permit submittal.
- Public meetings to solicit feedback on the station locations and layouts, as well as the overall service proposal and operating plan. These meetings are anticipated to take place in early 2015.

4.0 Running Way

4.1 Vehicle Operations

Based on early discussions with Pace and stakeholder agencies with jurisdiction over Milwaukee Avenue, it was determined that the ART corridor will not include such priority running way improvements as dedicated bus lanes and intersection queue jumps. Milwaukee Corridor ART will operate in mixed traffic, with the vehicle generally occupying the right travel lane of Milwaukee Avenue. The station designs presented in Chapter 3.0 include locations where the bus will move into a parking lane to board and alight passengers, and other locations where the boarding platform will be constructed to align with the travel lane and the bus will not be required to pull over.

4.2 Station-Related and Collateral Improvements

Because the Milwaukee Corridor ART service will not feature dedicated running ways or queue jumps, the majority of improvements within the public right-of-way will be directly related to station construction. These include substantial curb and gutter reconstruction; driveway closures and/or relocation; and construction of new raised bus bulb and/or transit island structures within the right-of-way at several locations.

In addition, collateral improvements are proposed in the vicinity of many proposed ART stations, primarily to facilitate safe and hospitable pedestrian access to the stations. These include high-visibility crosswalks; upgraded, ADA compliant curb ramps; and a pedestrian refuge island. In most cases, these improvements are not required for the construction of ART stations or operation of the service, but are highly desirable to create a pedestrian-friendly environment in the vicinity of corridor stations. This is especially important in the Milwaukee Corridor as the scope of the collateral station improvements implemented on this corridor will establish a precedent for the regional ART network. It is expected that the City of Chicago and the Village of Niles will share some of the cost for these improvements when not required for the actual construction of the ART stations.

4.3 Chicago Department of Transportation *Streets for Cycling* Project

The Chicago Department of Transportation (CDOT) is undertaking a project to upgrade bicycle and pedestrian accommodations on the portion of Milwaukee Avenue between Lawrence Avenue and Elston Avenue, in support of a city-wide strategy to improve multi-modal mobility and pedestrian safety. Chicago's recently developed *Streets for Cycling* standards will be reflected, based on Milwaukee Avenue's designation as a "spoke route" in Chicago's growing bicycle mobility network. This project is proceeding in advance of the Milwaukee Corridor ART project with construction anticipated to be complete in mid-2015.

Preliminary plans have been shared with Pace in coordination meetings with CDOT. Based on a review of these plans, it is likely that the final design for the *Streets for Cycling* corridor project will involve changes to the right-of-way that may impact the ART project. These include attached curb extensions, detached curb extensions, and bus stops relocated from the parking lane to the travel lane. Based on

the anticipated timeline for the CDOT project, these improvements will be in place prior to the start of ART station design and construction. Through ongoing coordination between CDOT and Pace, CDOT intends to develop a design that will preserve functional space for the proposed ART stations.

The coordination and timing of these projects offers an opportunity for collaboration to ensure that mutual goals of improved pedestrian safety and access to transit, and coordinated bicycle and transit operations, are achieved in this segment of Milwaukee Avenue. The progress of this project will be monitored and any changes to the existing roadway geometry resulting from the improvements will be picked up during the survey and reflected in the station drawings developed in the engineering phase. In the event that this project is not constructed by mid-2015 Pace will need to more closely coordinate design elements to avoid a negative impact to Pace's construction schedule.

4.4 Transit Signal Priority

Pace has been an active participant in regional coordination for Transit Signal Priority (TSP), which has been led by the Regional Transportation Authority (RTA). TSP is planned for Milwaukee Avenue, and development of the TSP system will proceed in a manner that is consistent with the Regional TSP Standards and Implementation Guidelines, which were developed under the Regional Transit Signal Priority Implementation Program (RTSPIP). The TSP technology requirements will be developed as part of a separate TSP program led by Pace and RTA and will be based on the requirements defined by the RTA. When TSP is implemented on Milwaukee Avenue, it will be utilized by local services in addition to ART. TSP is currently anticipated to be operational on Milwaukee Avenue by the end of 2016, before the planned start of service of the Milwaukee Corridor ART.

Further details on the Pace/RTA TSP program can be found in Chapter 7.0.

5.0 Vehicles

At this time it is anticipated that Pace will obtain ART vehicles as part of its regular vehicle replacement program. This means that the model of the ART vehicle will be the same as other newly purchased 40 foot low-floor buses currently entering the Pace fleet. However, the ART vehicle will be modified in several important and highly visible ways to provide passengers with an enhanced experience and to clearly differentiate the ART service and vehicle fleet from traditional fixed route Pace bus service.

This chapter outlines the interior and exterior components of the vehicle, and in particular how they will differ from the regular Pace fixed route fleet. Next steps for vehicle procurement are also presented.

5.1 General Vehicle Specifications

The first vehicles procured for ART service will be powered by diesel fuel. Pace is currently in the process of replacing its Northwest Division garage with a new facility that would be capable of storing and fueling vehicles powered by compressed natural gas (CNG). However, CNG capabilities may not be available at the start of ART service. This issue may be revisited as the Northwest Garage replacement project advances.

The initial fleet of Milwaukee Corridor ART vehicles will be ElDorado Axess 40-foot low floor buses. These vehicles include the following design specifications:

- Minimum expected life of 12 years or 500,000 miles, whichever comes first
- Capacity of up to 43 seated passengers
- 14 inch step height at both doors
- ADA compliant front and rear passenger doors with passenger lift

Additionally, a number of features common to the entire Pace bus fleet will include:

- Compatibility with Pace's Intelligent Bus System (IBS)
- In-vehicle passenger information
- Vehicle video surveillance
- Automatic passenger counters

Several additional technology features specific to the ART fleet will enhance the service reliability and the passenger experience. These include:

- In-vehicle WiFi
- Transit Signal Priority compatibility

Information on technology requirements is further detailed in 7.0.

5.2 ART Vehicle Exterior

Vehicles procured for ART service will provide a distinctive look that is differentiated from Pace's regular fixed route service. These vehicles will carry the ART branding and have a distinctive profile. Details on

the ART brand are provided in Chapter 9.0. When procured, the vehicles will be painted with Pace's standard paint scheme in preparation for a wrap and to allow for flexibility of use over the course of their useful life. The wrap will integrate the brand and vehicle exterior. The wrap option was chosen because it is easier to remove and/or modify, and also allows the design to cover the vehicle's windows and doors. The wrap will carry the service brand graphics and color scheme.

In an effort to further distinguish the ART vehicle from other Pace buses, particularly the front of the bus as it approaches stations, a modified full-color destination sign is also recommended. This would make ART vehicles easily distinguishable from a distance of several hundred feet.

5.3 ART Vehicle Interior

It is anticipated that finish options throughout the interior of the bus will differ in appearance from standard Pace buses. Modified interior aesthetics could be applied to the seat fabric, floors, poles and stanchions at little or no additional cost. These specific modifications will be determined following the completion of the brand development process, which is still ongoing.

5.4 Vehicle Procurement Schedule

As discussed in Section 8.4.1, eight dedicated ART vehicles will be needed at the commencement of Milwaukee Corridor ART service. Pace has an existing contract with ElDorado National to procure new 40 foot low floor buses in the next several years, and it is anticipated that ART vehicles will be obtained through this existing contract. In order to obtain eight ART vehicles out of the existing contract, and to have those vehicles received in time for ART service in 2017, the vehicles must be ordered in spring 2016. Currently, vehicle finish options and other procurement decisions are on track to be finalized by March 2015.

5.5 Specialized Tools, Equipment and Training Needs

Because the initial ART vehicle fleet will be procured through Pace's regular bus replacement program, no specialized training, equipment, or tools are anticipated.

6.0 Fare Collection

A consistent fare collection policy will facilitate ART service throughout the Pace system. Initial implementation in the Milwaukee Corridor will establish a precedent that will eventually be far-reaching in the region. A range of potential ART fare collection options have been researched, discussed, and applied to the context of the eventual broader ART network. This process included examining the fare collection policies, best practices, and lessons learned of several peer agencies that operate BRT routes with similarities to the Milwaukee Corridor. As a result, Pace's ART fare collection system will be identical to its standard fixed route fare collection system at the time of ART system startup. Considerations for establishment of this fare collection policy are outlined in this chapter. A technical memorandum[9] available under separate cover provides an overview of Pace's current fare collection policy and describes the ongoing transition to Ventra™ as a regional transit fare medium.

6.1 Fare Collection Considerations

A variety of fare collection approaches have been employed by peer systems throughout the United States. These range from traditional on-board, front-door fare collection to barrier-protected off-board payment or barrier-free off-board proof-of-payment (POP). These approaches vary in the level of complexity, technological requirements, staffing, and enforcement requirements.

As a result of peer agency research, several considerations arise for Pace in selecting a fare collection strategy for ART service:

- The ART fare collection system must be compatible with other Pace services and with the CTA to facilitate transfers. Pace and the CTA both recently transitioned to the Ventra™ fare collection system, and any fare collection protocol for ART must utilize Ventra™ as the predominant method of payment. Ventra™ allows the use of branded fare-cards as well as contactless bank cards to pay fares at tap readers that may be located on board the vehicle or at a station.
- As Milwaukee Corridor ART is the first of many planned ART corridors, the fare collection strategy utilized in the corridor must be broadly applicable to the variety of corridors and geographic settings that will eventually exist.
- As Ventra™ usage rates continue to increase over time, it may be necessary to continue to offer an on-board cash payment option, as this has historically represented the payment method of choice for a sizable share of Pace customers. Pace has encouraged widespread adoption of Ventra™ by eliminating free and reduced transfers for customers who pay with cash.
- Pace does not intend to adopt a zone-based fare structure for ART or other services, which simplifies the requirements of any fare collection strategy by eliminating location or distance traveled from the computation of fares.
- Data provided by Ventra™ tap readers, used in combination with Pace's automatic passenger counters (APCs) would offer a useful mechanism for assessing potential fare evasion if a POP system were to be implemented, by providing near real-time tracking of fare payments.

[9] *Draft Fare Collection Technical Memorandum*, November 8, 2013.

- Pace has no existing enforcement staff, administrative procedures, or enabling authority with which to pursue enforcement of a POP system. At present, Pace addresses enforcement issues through local police departments as needed. Establishing a new set of staff functions and training requirements, which would likely be required to implement a POP system, would be onerous. As the ART network expands over time, there may be greater efficiencies in developing a POP enforcement unit.
- A POP or barrier-based off-board payment system would require the widespread deployment of Ventra™ vending machines and/or tap readers at all stations for fare pre-payment. This would introduce higher capital, operations, and maintenance costs as compared with traditional on-board fare payment.

6.2 Preferred Fare Collection Strategy

With due consideration of the issues and context presented in the previous section, the preferred fare collection strategy for the Milwaukee Corridor can be summarized as follows:

1. Ventra™ tap readers will be provided at the front entry door of each ART vehicle, in addition to cash fare collection equipment
2. As previously noted in Section 3.5.3, one weather proof Ventra™ fare vending machine has been procured by Pace for installation at the Golf Mill Shopping Center. It will be installed prior to commencement of Milwaukee Corridor ART service and may need to be relocated during construction of the Golf Mill station platform. Relocation and siting of the Ventra machine will be coordinated during the design process. The weather proof cabinet may be installed on the station platform between the two shelters or at an alternate location selected by Pace and the property owner. Ventra™ machines are already provided at the Jefferson Park Transit Center.
3. The addition of more Ventra™ retail locations along the corridor will be encouraged.
4. When ART service commences, ridership levels and preferred methods of payment will be monitored. At such time as is warranted due to increasing ridership volume, the following will be considered:
    a. The addition of a second Ventra™ tap reader at the rear door of some or all ART vehicles to facilitate faster boarding at busy stations.
    b. Additional Ventra™ fare vending machines at the Jefferson Park Transit Center and/or the Golf Mill Shopping Center station.
    c. One or more Ventra™ fare vending machines at other station locations where peak hour boarding supports the investment in passenger convenience.

This approach will leverage the benefits of faster boarding as the rate of cash payments continues to decrease system-wide, while minimizing maintenance obligations related to having off-board Ventra™ equipment at each station. No new fare enforcement mechanism will be required. As a result of employing this strategy, fare payment on ART service will be identical to that offered on regular Pace buses.

7.0 Technology

This chapter provides a summary of the key technologies that Pace will use to support the Milwaukee Corridor ART service, including Transit Signal Priority, Real-time bus arrival signage, in-vehicle passenger information systems and video surveillance, as well as passenger WiFi. The technology elements summarized here and detailed in a separate Technology Requirements technical memorandum which was issued in draft form on February 6th and October 24th and finalized on December 31, 2014.

7.1 Transit Signal Priority

Pace has been an active participant in regional coordination for Transit Signal Priority (TSP), which has been led by the RTA. The Milwaukee Corridor ART project will proceed in a manner that is consistent with the Regional TSP Standards and Implementation Guidelines, which were developed under the Regional Transit Signal Priority Implementation Program (RTSPIP). The TSP technology requirements for the Milwaukee Corridor ART project will be developed as part of a separate TSP program led by Pace and RTA and will be based on the requirements defined by the RTA. Information on the TSP program provided in this report is provided for reference only.

The Pace TSP program will develop a proof of concept, which includes a small-scale implementation to work out the detailed solutions for items such as server interfaces and backhaul communications for the Priority Request Generator (PRG) and Priority Request Server (PRS). The lessons learned will be incorporated in a full TSP deployment plan. The TSP program is being coordinated with the RTA as well as with vendors to develop the standard message set. The proof of concept is anticipated to be completed in 2016, which should allow the results to be incorporated into the Milwaukee Corridor ART project deployment in 2017.

TSP has been a major focus of the RTA's recent regional coordination efforts and can serve as a key technology component at certain signalized intersections in the Milwaukee Corridor ART project. TSP involves interfaces among numerous subsystems, including the Automated Vehicle Location (AVL) system, Priority Request Generator (PRG), Priority Request Server (PRS), traffic signal controllers, and central system management software. TSP also requires a variety of communications to exchange data, which can be categorized into three types:

1. Vehicle to Intersection (V2I) communications involves TSP requests and responses between the PRG on a Pace bus and the PRS at the roadside traffic signal controller cabinet.
2. Intersection to Intersection (I2I) communications involves relaying data between a backhaul point to the center and each signalized intersection location within a given system.
3. Intersection to Center (I2C) communications involves the backhaul link between the system in the field and the central monitoring facility.

Pace is coordinating with RTA and other partners to develop the requirements for these technologies. Preliminary TSP requirements are summarized in the Technology Requirements technical memorandum. These preliminary requirements are for general informational purposes only and will be superseded by the ongoing work developed under the Pace/RTA TSP program.

7.2 Real-Time Arrival Information

In addition to TSP, the primary differentiating technology for the Milwaukee Corridor ART will be vertical markers that display real time bus arrival information in addition to providing route maps and local and regional wayfinding. The real-time bus arrival information systems will be built into the vertical marker and will include an electronic real-time bus arrival time sign, controller, speaker, noise sensor, audio activation button, and communications equipment.

Although the ART real-time bus arrival information displays shall be incorporated into the station vertical markers, the displays shall be deployed in a similar manner to the information signage Pace is deploying at some of its existing shelters and transit centers as part of a broader regional program. The minimum requirements of the Milwaukee Corridor ART bus station audio/video real-time arrival system are provided below. These requirements incorporate the technical specifications from Pace's transit center and shelter real-time bus information signage projects. Coordination with the transit center and shelter bus information signage projects should continue to benefit from any lessons learned during installation.

1. General
    a. The real-time bus arrival information system shall be compliant with the federal Americans with Disabilities Act (ADA).
    b. The bus information sign shall be integrated into the space designated for it in the station vertical marker.
    c. The vertical marker manufacturer shall contact the bus information sign manufacturer and speaker manufacturer to coordinate the mounting designs.
    d. Cabling shall be routed within raceways and concealed from public view inside the housing of the vertical marker. There shall be no exposed conduits.
    e. The installed sign shall appear as an integral part of the vertical marker as opposed to an obvious add-on.
    f. The marker opening shall closely match the dimensions of the sign's viewable display and there shall be no visible gap. No portion of the viewable display of the sign shall be covered by the vertical marker housing. The marker opening around the sign shall have a water-tight seal. The method of sealing shall result in a clean appearance and shall not detract from the aesthetic appearance of the vertical marker design.
    g. Each station shall provide unique bus arrival information, which is specific to the particular station.
    h. All electronic components shall be rugged and shall include protection to be vandal and weather resistant. Electronics shall be housed in NEMA 4 enclosures.
    i. All components of the real-time bus arrival system shall be mounted securely to prevent theft.
    j. The real-time bus arrival information system shall operate from a 120VAC main power source.

k. All components of the real-time bus arrival information system shall fully operate from -20° C to +60° C with 95% relative humidity.
l. A detailed description of the proposed system meeting the requirements, including the type, make, and model of components and their communications capabilities, shall be submitted in advance to Pace.
m. The accuracy of the bus arrival time shall be less than 1 minute. The supporting communications system must have ample bandwidth to accommodate a sufficiently frequent polling rate to enable the accuracy.

2. Bus Arrival Sign
   a. The sign shall display the real-time arrival information of the next three buses. The information for each bus shall be displayed on a single line. The minutes remaining before the arrival of each bus shall be displayed. The sign shall accommodate up to eight lines of text, at least 96 pixels per line, and no more than 8 mm LED pitch. The size of letters and numbers on the displays shall be ADA compliant. The sign size and text size shall be coordinated with Pace for compatibility with the existing central software.
   b. The bus information sign shall consist of two full-matrix LED displays (mounted back-to-back) and shall be capable of displaying scrolling messages. The scroll time shall be configurable by the system administrator.
   c. The sign shall include a photocell for automatic brightness control.
   d. The sign shall have 30° horizontal and 30° vertical viewing angles.
   e. The electronic sign shall include an onboard local controller and wireless communications equipment to receive information from the Pace operations center software regarding bus location and estimated time of arrival to a given ART station.
   f. The sign controller shall interface with the existing Pace Intelligent Bus System (IBS) and utilize the same data source, so that information is consistently disseminated to the public among all tools (e.g., Bus Tracker WebWatch system).
   g. The LEDs shall be amber color and utilize aluminum indium gallium phosphide (AlInGaP) technology. LEDs shall have a 100,000-hour life expectancy.
   h. The sign face shall be laminated glass with anti-reflection UV-sensitive film and no more than 0.25” thick. The sign face shall be replaceable by the party responsible for maintenance in the event of damage.
   i. The words, “Pace Bus Tracker” shall be clearly printed in white directly below the sign display.
   j. All display hardware and appurtenances shall be included with the real-time bus arrival information system.
   k. The bottom of the sign display shall be at least 80 inches above grade.
   l. The system shall support an interface with the CTA bus arrival system, so Pace and CTA bus information can be displayed at station signs and transit center monitors at shared locations.

3. Audio System
   a. The system shall include three outdoor speakers at each ART station.

i. The location of one speaker shall be inside the shelter and aimed toward the interior center of the shelter. Cabling shall be routed within raceways inside the structural members of the shelter. There shall be no exposed conduits. The speaker shall have a finish that is consistent with the appearance of the bus shelter. The installed speaker shall appear as an integral part of the bus shelter as opposed to an obvious add-on.

ii. Two outdoor speakers shall be integrated into the space designated for them in the station vertical marker. One speaker shall be on each side of the vertical marker. Cabling shall be routed within raceways and concealed from public view inside the housing of the vertical marker. There shall be no exposed conduits. The installed speakers shall appear as integral parts of the vertical marker as opposed to obvious add-ons. The marker openings shall closely match the dimensions of the speakers and there shall be no visible gaps. The speakers shall be carefully positioned in the marker opening such that the audio quality is not impacted by the speakers being obstructed by the vertical marker housing. The marker openings around the speakers shall be secured with a water-tight seal. The method of sealing shall result in a clean appearance and shall not detract from the aesthetic appearance of the vertical marker design.

b. A noise sensor shall be included on the vertical marker. The noise sensor shall be used to measure ambient noise levels and provide input to the audio announcement controller for automated volume adjustment of the outdoor speakers. The thresholds and adjustment levels shall be user-configurable by Pace.

c. Three audio activation buttons shall be provided at each ART station. Each button shall be installed with an audio locator tone to assist visually-impaired patrons with finding the audio activation button.

i. An audio activation button shall be provided in the shelter. The button shall activate an audio announcement on the shelter speaker of the estimate wait time for the next bus. The button shall be installed adjacent to the designated wheelchair space in compliance with ADA requirements.

ii. Two audio activation buttons shall be provided on the vertical marker. One button shall be on each side of the vertical marker. Each button shall activate an audio announcement of the estimate wait time for the next bus on the vertical marker speaker on the same side as the button. The button shall be installed in compliance with ADA requirements.

iii. Each button shall be equipped with an ambient noise sensor to automatically adjust the locator tone volume. The thresholds and adjustment levels shall be user-configurable by Pace.

iv. The activation force for the button shall be compliant with MUTCD 2009 – 4E.

v. The button shall be rugged and shall be compliant with NEMA TS 2 mechanical shock and vibration requirements.

vi. The button enclosure shall be weather resistant and shall be NEMA 6P rated.

vii. The button switch operating life shall be a minimum of 300 million activations.

d. An announcement of the bus arrival shall be automatically made on all station speakers when the bus arrives at the station.

4. Communications
   a. The Pace ART real-time bus arrival information system will be managed by the Trapeze content management software, OnStreet.
   b. The communications between the Pace IBS and the ART real-time bus arrival information signs shall be capable via cellular modem with static IP address or through the existing Time-Division Multiple Access (TDMA) technology running on a Radio Network Controller (RNC) at the station. The service provider for the cellular modem shall be a major U.S. carrier and shall utilize Pace's existing cellular service account and data plans. OnStreet will be controlled by the IBS and will configure what route, direction, and arrival time information will be displayed on the sign. The existing TDMA connection shall be evaluated for adequate bandwidth and performance. Cellular service shall be deployed if the existing TDMA connection cannot deliver reliable and performance as determined by Pace.
   c. The RNC shall be securely housed and protected inside the vertical marker to be theft-proof and tamper-proof.
   d. The cellular modem used for communications shall be compatible across multiple cellular service carriers for improved reliability.
   e. The sign communications shall receive alerts from the Pace operations center, which will be displayed and announced at the ART station.
   f. In the event of down communications, the local sign controller shall default to the displaying the current time of day in 12-hour format and scheduled bus arrival. During such conditions, the message shall clearly indicate the information is based on the bus schedule, not the real-time arrival system.
   g. The outdoor communications antenna shall be mounted at the top of the vertical marker. The antenna type shall be specifically designed for optimum compatibility with Pace's 800 MHz radio network. The antenna shall be installed to provide maximum signal strength for the best communications and information reliability. Cabling shall be routed inside the marker and shall not be visible to the public.
   h. Data feed from Pace's Intelligent Bus System (IBS) is available for the real-time bus arrival information system. Pace will be responsible for additional license fees for Pace's data feed from its IBS to the signs and monitors.
   i. The selected communications shall have sufficient bandwidth to reliably support frequent updating of the bus arrival information.

7.3 In-Vehicle Passenger Information

Pace buses are currently equipped with Automatic Voice Annunciation (AVA) systems that automate on-board passenger announcements, and are coordinated with LED signage on board the bus to give riders real-time information about upcoming stops and general passenger information (e.g., date and time).

The AVA equipment has been installed as a retrofitted enhancement on Pace's existing fleet vehicles. The system is fully automated so that bus operators are free to concentrate on driving and other tasks requiring their attention. Milwaukee Corridor ART vehicles shall be equipped with in-vehicle passenger information system components that are fully compatible with the existing AVA system.

Some of the general features and requirements of the AVA system include:

1. Full compatibility with the Pace IBS.
2. ADA compliant.
3. Automatic voice announcements and stop announcements. No vehicle operator interaction will be required for automated announcements.
4. Annunciation of on-board passenger information and, at a minimum, will include the following information items:
    a. The next stop on the route.
    b. Transfer opportunities.
5. Activation by geographic proximity as configured by Pace. This will allow Pace to determine when to activate a voice announcement as the vehicle approaches a stop.
6. Fully integrated with the vehicle's public address system and "stop requested" signal system, including microphone and interior and exterior speakers.

ART vehicles shall also be equipped with on-board LED passenger displays that show upcoming stops and general passenger information (e.g., date, time).

For more detailed information on the in-vehicle passenger information systems, including the AVA system and the LED displays, please refer to the Technology Requirements technical memorandum.

7.4 Vehicle Video Surveillance

Following Pace's standard for new fixed route fleet vehicles, Milwaukee Corridor ART vehicles will be equipped with an onboard vehicle video surveillance system for safety and security. The video system will provide continuous, real-time monitoring for the vehicle operator, offline review for security investigations, and remote support from the Pace operations center. For more information on the vehicle video surveillance functional requirements, refer to the Technology Requirements technical memorandum.

7.5 Vehicle Passenger WiFi

The new ElDorado Axess vehicles to be used for Milwaukee Corridor ART service will be delivered with the capability to provide onboard passenger WiFi. Providing passenger WiFi service on the ART vehicles will be enabled via the addition of a cellular network card.

8.0 Preliminary Operating Plan

This chapter presents the operating plan for Pace's proposed Milwaukee Corridor ART service, including projected schedules, operating statistics, and operations and maintenance (O&M) costs. A baseline service plan is presented which includes the new ART service and corresponding changes to the local Route 270 service in the corridor following implementation of ART. In addition, an alternative service scenario is presented in which local service is further adjusted on Routes 270 and 272 following implementation of the proposed ART service. Both scenarios reflect the results of extensive running time and ridership analysis, which is also summarized in this chapter.

8.1 Existing Ridership Analysis

A detailed analysis of Route 270 boardings and alightings for calendar year 2013 was conducted using APC data collected throughout the year. The analysis examined overall ridership patterns throughout the corridor, ridership at or near proposed ART stations, hourly and peak-period ridership patterns, and bus loading characteristics. Detailed tables are presented in Appendix C – Ridership and Running Time Analysis of this report, while the findings are summarized in this section.

Average weekday ridership on Route 270 was approximately 3,400 daily boardings in 2013. 57% of these boardings occurred at either Jefferson Park Transit Center or Golf Mill Shopping Center. Approximately 1,300 weekday boardings and 980 alightings occur at Jefferson Park, collectively representing two thirds of all trips on the line. Assuming that most one-way trips correspond to a return trip in the opposite direction, this suggests that nearly 100% of all trips either begin or end at Jefferson Park or Golf Mill, and that many trips travel the full length between the future ART termini. 60% of all boardings are within the City of Chicago. This is largely driven by northbound boardings at Jefferson Park. 87% of all northbound boardings are in Chicago, compared to only 27% of southbound boardings.

8.1.1 Route 270 – ART Corridor

This section pertains specifically to the portion of Route 270 between Jefferson Park Transit Center and Golf Mill Shopping Center, which is coterminous with the proposed Milwaukee Corridor ART route. Table 8.1 summarizes Route 270 ridership relative to ART station locations.

Table 8.1: Route 270 Average Weekday Ridership at ART Stations

Total Northbound + Southbound– Ridership	Number	%
Total Route 270	3,398	
North of Golf Mill	294	9%
ART Corridor (Jefferson Park to Golf Mill)	3,104	91%
ART corridor, within 1/8 mile of ART station	2,639	85% [10]
ART corridor, within 1/4 mile of ART station	2,876	93% [10]

Boardings near Proposed ART Stations

As shown in the table above, 91% of Route 270 boardings are within the ART corridor (excluding northbound boardings at Golf Mill Shopping Center). Of the Route 270 boardings within the ART corridor, 85% are within 1/8 mile of a proposed ART station and 93% are within 1/4 mile of a proposed ART station.

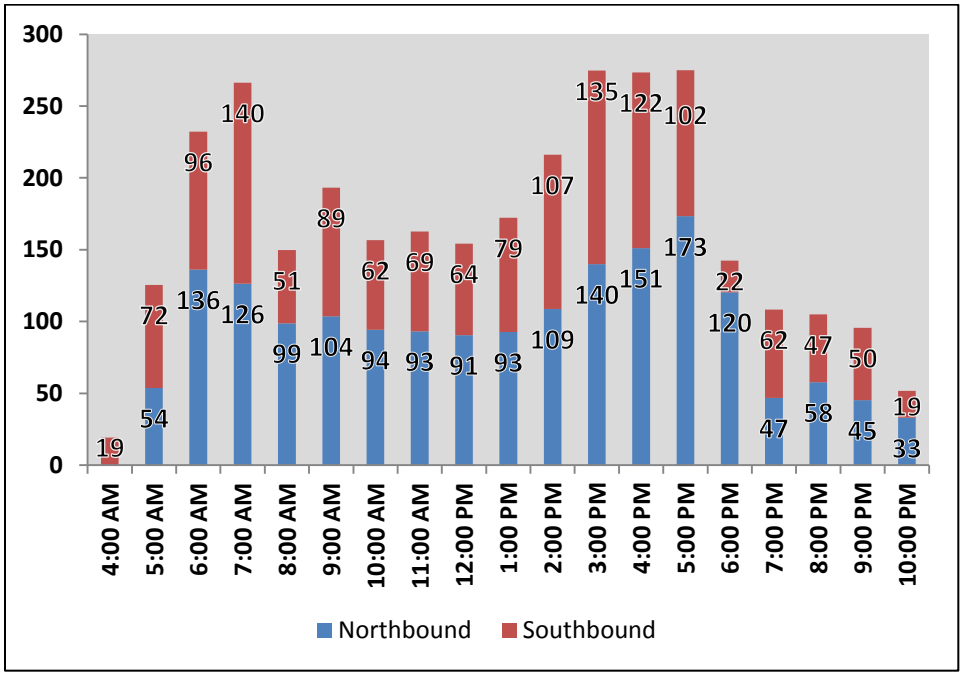
The proposed intermediate ART stations at Touhy Avenue and Dempster Street each have 100 or more average daily boardings within 1/8 mile of the proposed station locations. Higher ridership stops outside of the 1/4 mile range of a proposed ART station include Bryn Mawr (45 boardings) and Menard (24 boardings); Holbrook/Elston (43 boardings); Imlay (30 boardings); and Ballard (22 boardings). Collectively, these four locations account for approximately 4% of total ART corridor boardings. All other locations outside the 1/4 mile radius had average weekday boardings of fewer than 20 passengers.

Boardings by Hour and Direction

Examining the weekday boardings by hour, there are distinct morning and afternoon peaks, but midday ridership and evening weekday ridership are strong, remaining above 150 boardings per hour during midday hours and above 100 boardings per hour until 10 p.m. Boardings are higher in the northbound direction for all hours except for 4 a.m., 5 a.m., 7 a.m., 7 p.m., and 9 p.m. Ridership is high during off-peak periods likely because of the tremendous draw of Golf Mill Shopping Center for employees and customers. Figure 8.1 illustrates average weekday ridership by hour on Route 270.

[10] Percentage of trips within the ART corridor is reported. Trips north of Golf Mill Shopping Center are excluded from this calculation.

Figure 8.1: Route 270 Average Weekday Boardings per Hour



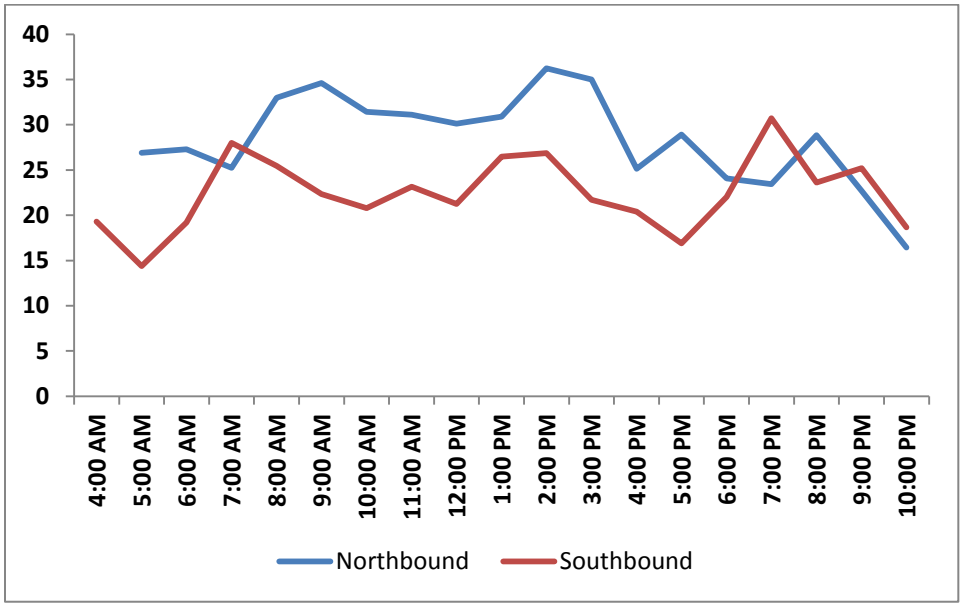
Surveys conducted on Route 270 show a high proportion of non-work trips (primarily shopping), which support the finding of high midday ridership and directional balance. Evening ridership is also fairly strong relative to many Pace services. The final weekday northbound trip departing at 10:50 p.m. has an average of 16 boardings. The final southbound trip departing at 10:20 p.m. has an average of 19 boardings.

Vehicle Loadings

Boardings per *bus trip* remain relatively stable throughout the day, indicating that the frequency of service at different hours is proportional to travel demand in those hours. The highest per-trip boardings occur in the "shoulder" hours just outside the peak when demand remains high but headways are longer. Northbound per-trip boardings peak at 2 p.m. with 36 passengers per bus trip. Southbound per-trip boardings peak at 7 p.m. with 31 passengers per bus trip (see Figure 8.2).

Average boardings per bus trip are higher in the northbound direction for most of the day outside of brief periods during the peak travel periods, supporting the idea that Golf Mill Shopping Center is an attractive activity destination. This also suggests that ART service is not only serving the "traditional" commute pattern from suburbs to city, but is useful to various work and non-work trips throughout the day.

Figure 8.2: Average Boardings by Hour per Weekday Trip



Maximum passenger loads per trip trend closely with total boardings per trip. This is because at all times of the day, the majority of northbound riders board at Jefferson Park and the majority of southbound riders alight there. Therefore the bus tends to reach its maximum load just north of Jefferson Park, gradually decreasing as the vehicle proceeds north. The maximum average vehicle loads occur in the same hours as the peak boardings per trip, 2 p.m. northbound and 7 p.m. southbound. The average peak loads in these hours are 36 passengers northbound and 31 passengers southbound, respectively. Peak hour demand and passenger loads show that there is substantial excess capacity in a standard 40 foot transit bus that seats over 40 passengers.

Ridership Findings

The majority of passengers currently using Route 270 will be well served by the Milwaukee Corridor ART service based on the proposed station locations. While a formal origin-destination survey was not performed, it is reasonable to conclude that nearly 100% of trips have at least one end at a proposed ART station, especially given that more than half of all one-way trips begin at Golf Mill Shopping Center or Jefferson Park Transit Center. Therefore, the only trips within the ART corridor not well served by the proposed ART service will be the 7% of trips that begin more than 1/4 mile from an ART station.

Given the limited time savings that is anticipated for ART versus local service, most passengers waiting at an ART station are likely to board whichever vehicle arrives first, whether it is a local or ART bus. To maximize ART ridership and the benefits to passengers, local buses should depart shortly after an ART trip rather than before or at more evenly spaced intervals.

Average boardings per bus trip show that there is excess capacity at all times. Local Route 270 service currently operates at 10 to 15 minute peak headways and 20 to 30 minute off-peak headways. Given the lack of constrained vehicle capacity in the corridor, increases in service with ART were determined as a matter of policy rather than based on projected demand. The generally accepted standards for bus rapid transit service in the United States call for peak headways of 10 minutes or better and off-peak headways of 15 minutes or better.

Ridership during the 10 p.m. hour suggests there may be demand for later service, as the last trips of the evening are well utilized. Whether this service is provided by ART or Route 270 is largely a policy decision; it would be unnecessary to operate both services in the late evening.

8.1.2 Route 270 – North of Golf Mill

North of Golf Mill Mall, Route 270 serves Glenbrook Hospital on Pfingsten Road via Lake Avenue, Willow Road, and Sanders Road (see Figure 8.3).

Figure 8.3: Service North of Golf Mill Shopping Center

Boardings and Alightings by Location

Average boardings north of Golf Mill Shopping Center were 223 per weekday in 2013, representing 7% of total Route 270 boardings. 71 additional boardings occur at Golf Mill Shopping Center in the northbound direction. Combined, travel north of the mall comprises 9% of total corridor ridership. Approximately two thirds of these boardings were in the southbound direction, indicating a large number of through trips from this segment to points south of Golf Mill.

Among Southbound boardings, approximately half occur south of the intersection of Milwaukee Avenue and Dearlove Road. These boardings are primarily along the Dearlove-Lyman-Harrison-Dee-Central loop. The highest ridership location north of Golf Mill Shopping Center is at the Heritage Point and Crestwood housing complexes along Lyman Avenue, where 52 passengers board on an average weekday. Other locations with greater than ten boardings per average weekday are Milwaukee Avenue and Lake Avenue; Sanders Road and Winkelman Road (Allstate campus); and Glenbrook Hospital.

Ridership by Hour and Direction

Even with the inclusion of northbound boardings at Golf Mill Shopping Center, southbound boardings exceed northbound throughout the day. Total hourly weekday ridership peaks at 41 passengers during the 4 p.m. hour. This is the peak ridership hour for both northbound and southbound boardings.

Activity north of Golf Mill exhibits moderate rush hour peaking, with ridership exceeding 20 boardings per hour in the hours beginning 5 a.m., 7 a.m., 9 a.m., and 2 p.m. through 5 p.m. During midday hours, ridership ranges between 14 and 17 boardings per hour.

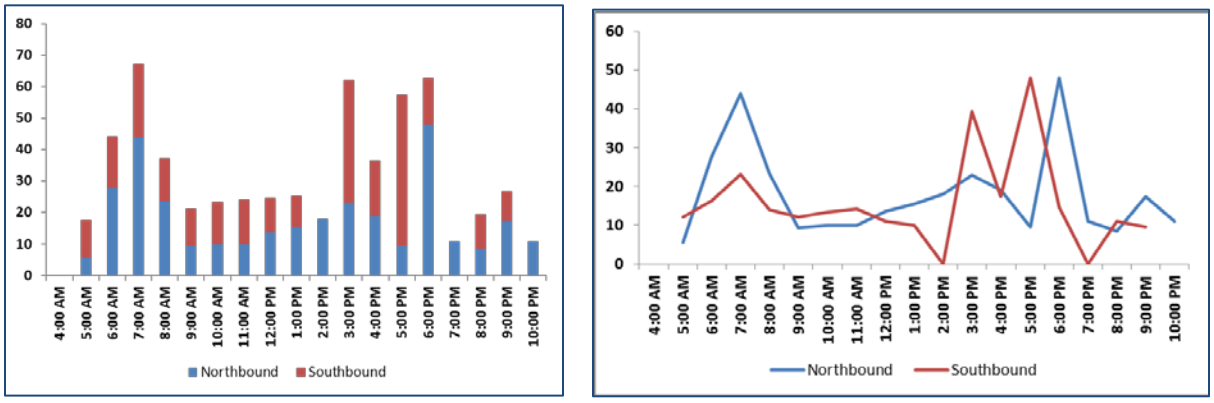
8.1.3 Route 272

Route 272 travels Milwaukee Avenue from Golf Mill Shopping Center north to Westfield Hawthorn Shopping Center in Vernon Hills. Route 272 overlaps with Route 270 between Golf Mill and Sanders Road in Glenview. Total average weekday ridership in 2013 was 592 boardings. Approximately half of these boardings are within the area of overlap with Route 270. Ridership at individual stops is very low. Out of 187 stops along the route, only twelve have average weekday ridership of ten or more passengers.

Most Route 272 boardings within the Route 270 overlap area are connecting to points north of Sanders Road. Of nearly 300 boardings within that area, fewer than 30 were in the southbound direction. Likewise, while over 200 southbound passengers alighted along this segment, only 45 northbound passengers did so. This indicates that most local trips between Golf Mill and Sanders Road are served by Route 270.

Per hour ridership exhibits peaking typical of a "traditional" commute (see Figure 8.4). Per hour boardings are highest in the 7 a.m. hour as well as during the 3 p.m. through 6 p.m. peak periods. Mid-day and evening boardings are low.

Figure 8.4: Route 272 Average Weekday Boardings per Hour



8.2 Travel Time Analysis

This section addresses existing running times on Route 270 through the ART corridor, as well as potential travel time savings to be realized upon commencement of ART service.

8.2.1 Travel Time Survey

Existing travel times were obtained from four key sources:

- On-Time Performance (OTP)
- Onboard travel time survey
- Existing published schedules
- Operator feedback

The existing schedule dictates a Route 270 running time between 24 and 30 minutes between Jefferson Park Transit Center and Golf Mill Shopping Center, depending on the time of day. OTP data revealed that buses generally do not experience significant delays relative to scheduled times. In fact, based on the OTP data, it appears that buses frequently leave a terminus several minutes behind schedule and then make up time during the trip. This finding was corroborated by input from bus operators.

In order to obtain a more targeted dataset of travel times on Route 270, a smartphone application was developed which allowed users to tabulate the time spent by the bus under five possible categories for travel conditions:

- Moving
- Dwell time at bus stop
- Stopped at a traffic signal
- Moving slowly in congestion
- Stopped in congestion

Pace staff conducted assessments of travel times and conditions by riding the bus and selecting the appropriate travel condition for the course of each run. In all, 44 trips were recorded for typical weekday service, of which four were conducted during p.m. peak service. Summary results are provided in

Table 8.2. The table also contrasts the observed conditions of the existing local service to the assumed conditions for BRT service, including the average number of stops per trip and the average dwell time per stop.

The survey data confirms that Route 270 does not experience significant delay due to roadway congestion; congested conditions were only recorded during roughly one percent of the total travel time across all runs, even during the afternoon peak. Overall running time is longer during the afternoon peak, which may indicate a combination of generally slower-moving traffic as well as the longer scheduled running time, which is 30 minutes during the afternoon compared with 26 to 28 minutes in the morning peak.

The reduction in the number of intermediate stops on ART service is likely to yield travel time savings. Route 270 buses stopped an average of 14 to 15 times on surveyed runs, whereas planned ART service will feature 8 intermediate stations. This translates to between three and four minutes of dwell time per trip, or an average of roughly 15 seconds per stop. Due to the reduction in stops, it is expected that ART dwell time will consume between 2 minutes and 2 minutes, 40 seconds of the total running time.

Table 8.2: Travel Time Survey Results

	Typical Weekday	PM Peak
Run Time	28:18	29:28
Average stops per trip	14	15
Average total dwell time per trip	3:36	3:12
Average dwell time per stop	15 seconds	13 seconds
Stops with dwell > 60 seconds	0.2	0.0
Congested conditions (% of run)	1%	1%

8.2.2 Transit Signal Priority

It is assumed that traffic signal priority (TSP) will be operational for the benefit of all Pace and CTA buses through the ART corridor. Pace anticipates using TSP to ensure schedule reliability, not necessarily as a travel time savings method. The impact to running time based on the existing Route 270 schedule is expected to be minimal. However, additional savings can be achieved through more aggressive scheduling. For current purposes, TSP travel time savings will be assumed at 30 seconds for all trips, and greater than that for trips that are currently scheduled for longer running times. These assumptions are reflected in the service plan section that follows.

8.2.3 Potential for Schedule Tightening

In anticipation of future TSP implementation, traffic signals on the Milwaukee corridor were recently optimized to existing traffic conditions. These adjustments have yielded positive benefits for Route 270, as illustrated by the relatively consistent on-time performance currently experienced. Based on the observed on-time performance and the potential for TSP to reduce schedule volatility, there may be an opportunity to shorten the scheduled running time for both ART and Route 270, particularly during the afternoon peak period when scheduled running times currently reach 30 minutes per direction. Because

such adjustments require further route reconnaissance and coordination with Pace's operations and service planning staff, they are not reflected in this document.

8.3 Proposed Operating Plan

The preliminary Milwaukee Corridor operating plan reflects the analysis presented in earlier sections of this chapter combined with extensive discussions among Pace staff on appropriate ART and local service levels. The assumptions summarized in this section reflect the best available information at the time the plan was developed.

8.3.1 Summary of Key Assumptions

ART Service

- ART service will operate in mixed traffic on Milwaukee Avenue between Jefferson Park Transit Center and Golf Mill Shopping Center in Niles. Between these two termini, eight intermediate stations are planned.
- The ART service will operate on weekdays between the hours of 5 a.m. and midnight. The first northbound trip of the morning will leave Jefferson Park at 5 a.m. and the first southbound trip will leave Golf Mill at 5 a.m. On Saturdays, service will begin at 5:30 a.m. On Sundays, service will begin at 6 a.m. Service on both Saturday and Sundays will run until midnight.
- ART will operate at 10 minute headways during rush hours (6 a.m. to 9 a.m. and 3 p.m. to 6:30 p.m.) and 15 minute headways during other time periods until 10 p.m. Between 10 p.m. and midnight the headway will be 30 minutes. On weekends and holidays ART will run every 15 minutes until 10 p.m. when the headway will transition to 30 minutes.
- ART would be operated by the Pace Northwest Division with operating costs per revenue hour of service based on the average for that division.

Local Service

- Local service changes will primarily affect Route 270 between Jefferson Park and Golf Mill Shopping Center. Changes to service north of Golf Mill Shopping Center, including adjustments to Routes 270 and/or Route 272, were also evaluated and are proposed under the Alternative Operating Plan section described below.
- Between Jefferson Park Transit Center and Golf Mill Shopping Center, Route 270 will operate between approximately 5 a.m. and 10 p.m. on weekdays, between 5:30 a.m. and 10 p.m. on Saturdays, and between 6 a.m. and 10 p.m. on Sundays and holidays.
- Route 270 will operate every 30 minutes on weekdays and 60 minutes on weekends for all service hours between Jefferson Park Transit Center and Golf Mill Shopping Center.

Implementation

It is assumed that all service changes will be implemented simultaneously, concurrent with the start of ART service. At this time, the start of service is anticipated in the second quarter of 2017.

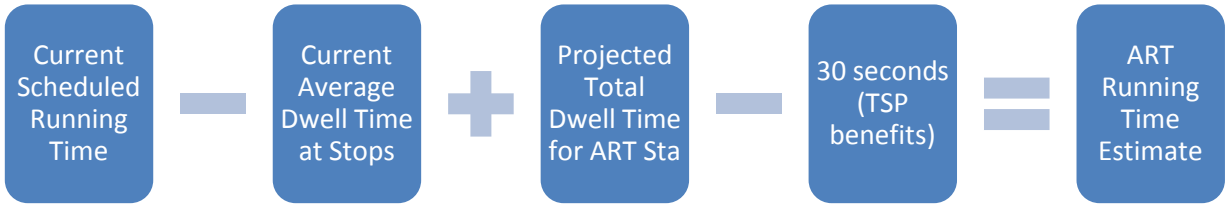
The key assumptions are summarized below in Table 8.3.

Table 8.3: Existing and Proposed ART Corridor Transit Service

Milwaukee Corridor ART	Existing Conditions	Proposed Operating Plan
Peak/Off-Peak/Evening Headways	N/A	10/15/30
First Northbound/Southbound Trips	N/A	5 a.m. / 5 a.m.
Last Northbound/Southbound Trips	N/A	12 a.m. / 11:59 p.m.
Route 270		
Peak/Off-Peak/Evening Headways	10/15-20/30[11]	30/30/30
First Northbound/Southbound Trips	5:30 a.m. / 4:58 a.m.	5:28 a.m. / 5 a.m.
Last Northbound/Southbound Trips	10:50 p.m. / 10:20 p.m.	10:54 p.m. / 10:27 p.m.

8.3.2 Running Time Estimate

End-to-end one-way running time for the ART service is estimated between 22.5 and 28.5 minutes. This was derived by taking the current scheduled running times for various times of day, deleting the current average total dwell time at stops, adding the projected total dwell time for eight intermediate ART stations, and subtracting 30 seconds to account for TSP benefits.



Aggressive scheduling in coordination with the TSP system may further reduce running times during periods of elevated congestion, particularly during the afternoon. Running times for the existing Route 270 will be reduced by 30 seconds for all trips to account for TSP benefits. The scheduled ART recovery

[11] Existing Route 270 schedule operates at 10 minute peak headways for approximately four hours per weekday. There is a transition period where 15 minute headways exist, followed by 20 minute midday headways.

time will be approximately 5 to 15 minutes per round trip, as needed to efficiently connect trips, or roughly 10% of total cycle time on average. Scheduled recovery times for Route 270 will range from seven minutes to 20 minutes per round trip (starting and ending at Glenbrook Hospital), or roughly 10% of total cycle time on average (see Table 8.4).

Table 8.4: Estimated Running Time between Jefferson Park Transit Center and Golf Mill Shopping Center (Minutes)

	ART	Route 270
Running Time	22.5 - 28.5	24 - 30
Recovery Time	5-15	7-20
TSP Time Savings	0.5	0.5
Assumed Station Dwell Time	2:30	3:30 (est. avg)

8.3.3 Local Service Reallocation

Following implementation of ART, adjustments to local service should be made to reflect the addition of this substantial new service on Milwaukee Avenue. This will involve changes to Route 270 between Jefferson Park Transit Center and Golf Mill Shopping Center, and may also include adjustments to other feeder and circulator routes that connect with Route 270 (and ART) at Golf Mill. Following discussions among Pace staff, it was determined that the service reallocation strategy would be limited to Milwaukee Avenue services, which encompass Routes 270 and 272. Two plans were developed for local service on Milwaukee Avenue, which are described in the following sections.

Baseline Operating Plan

Under existing conditions, Route 270 operates at ten and 15 minute peak period headways between Jefferson Park Transit Center and Golf Mill Shopping Center. 20 minute headways are maintained throughout the midday, and service operates every 30 minutes in the evening with the final departures at 10:20 (southbound) and 10:50 (northbound). On Saturdays and Sundays, service operates at 20 minute headways throughout the day and 30 minute headways in the evenings until approximately 11 p.m. North of Golf Mill Shopping Center, Route 270 currently operates every 30 minutes during weekday peak hours and every 60 minutes during midday hours and on Saturdays. There is no service north of Golf Mill Shopping Center after 7 p.m. on weekdays and Saturdays, and no service on Sundays.

Under the Baseline Operating Plan, Route 270 would operate at a reduced 30 minute weekday headway throughout the day between Jefferson Park Transit Center and Golf Mill Shopping Center. Service would end slightly earlier than existing conditions, as late evening trips would be provided by the ART service. On weekends, Route 270 would operate at 60 minute headways with a similar span of service.

North of Golf Mill Shopping Center, current service levels would be maintained with 30 minute peak weekday service and 60 minute off-peak and Saturday service continuing to Glenbrook Hospital. There would be no service north of Golf Mill Shopping Center after 7 p.m. or on Sundays.

Alternative Operating Plan

The Alternative Operating Plan was intended to balance lower passenger demand north of Golf Mill Shopping Center with an appropriate level of transit service. Under existing conditions, Routes 270 and 272 overlap between Golf Mill Shopping Center and Lake Avenue in Glenview, with the two routes poorly coordinated, and providing a higher combined frequency of service on this segment than is warranted by passenger demand.

Under the Alternative Operating Plan, the service changes involve eliminating Route 270 service north of Dearlove Road, concentrating on serving neighborhoods immediately to the north of Golf Road where demand is highest. To maintain service at Glenbrook Hospital – the other Route 270 location north of Golf Mill with moderate transit demand – this destination would now be served by Route 272.

The Alternative Operating Plan includes the following service changes, including routing changes depicted in Figure 8.5:

- Route 270 would be scaled back from its current northern terminus at Glenbrook Hospital to terminate on the Dearlove-Lyman-Harrison-Dee-Central loop. Buses proceeding north on Milwaukee Avenue would turn left on Dearlove Road, returning to Milwaukee Avenue via Central Road, Lyman Avenue, Harrison Street, Dee Road, and Central Road. By reversing the current direction through this neighborhood loop, the route length is reduced by approximately ½ mile.
- Route 272 would be modified to serve Glenbrook Hospital by way of a loop from the intersection of Milwaukee Avenue and Lake Avenue in Glenview. The route would also serve the Allstate campus along Sanders Road before returning to Milwaukee Avenue via Winkelman Road. This would increase the total route length of Route 272 by approximately three miles.
- Route 272 would be transitioned from current operations, which are provided jointly by the Northwest and North divisions, to be entirely operated by the Northwest Division. Interlining with Route 574 would be eliminated in order to facilitate a more consistent schedule of 30 minute peak headways.
- Service to Pfingsten Road and Willow Road, which generate extremely low ridership on Route 270, would be eliminated.

This operating plan is summarized in Table 8.5.

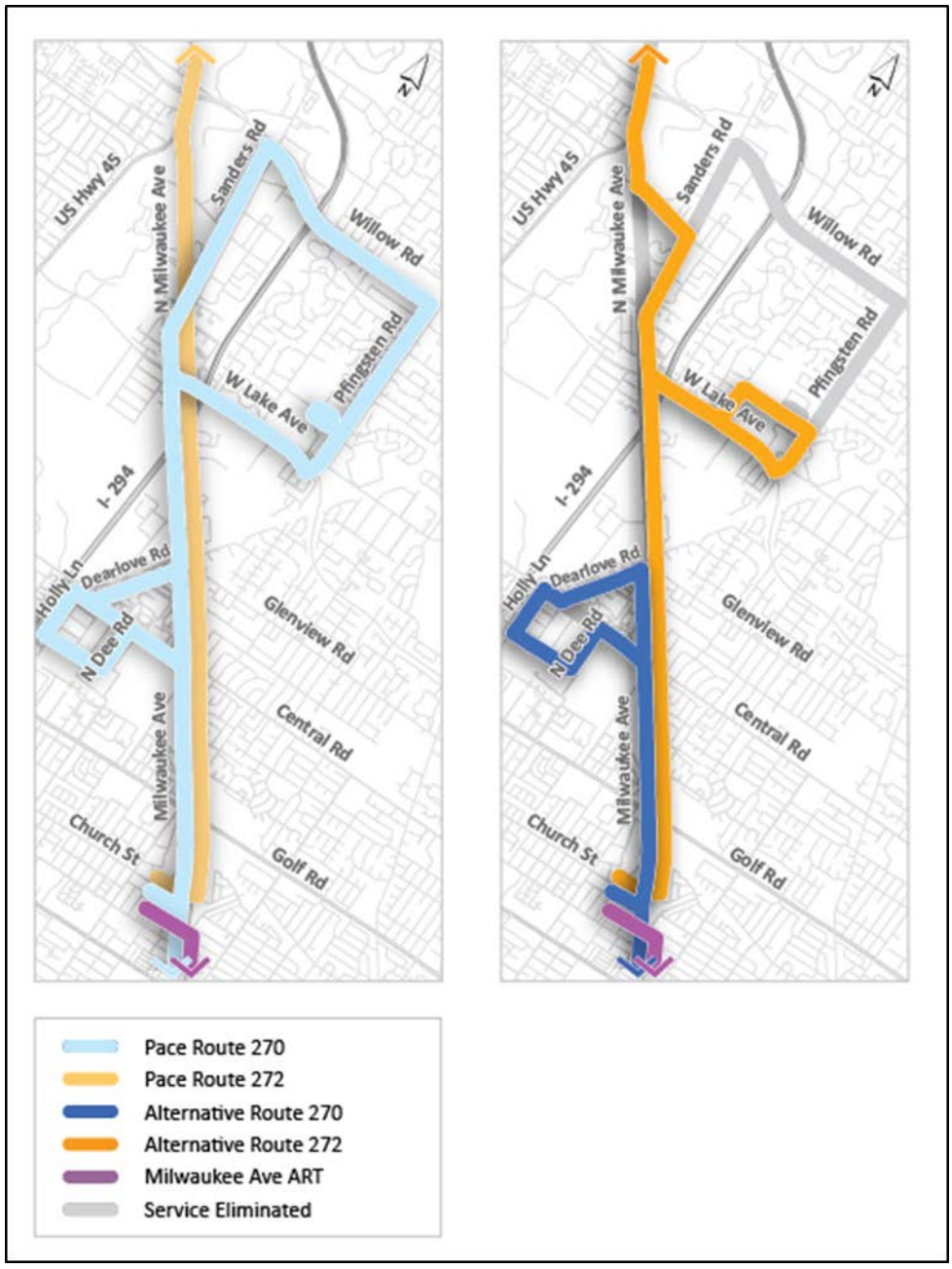
Table 8.5: Summary of Existing and Proposed Weekday Schedules

	Existing Conditions	Baseline Operating Plan	Alternative Operating Plan
Milwaukee Corridor ART			
Peak/Off-Peak/Evening Headways	N/A	10/15/30	10/15/30
First Northbound/Southbound Trips	N/A	5 a.m. / 5 a.m.	5 a.m. / 5 a.m.
Last Northbound/Southbound Trips	N/A	12 a.m. / 11:59 p.m.	12 a.m. / 11:59 p.m.
Route 270			
Peak/Off-Peak/Evening Headways	10/15-20/30[12]	30/30/30	30/30/30
Headways North of Golf Mill	30/60/No service	30/60/No service	30/30/No service
First Northbound/Southbound Trips	5:30 a.m. / 4:58 a.m.	5:28 a.m. / 5 a.m.	5:29 a.m. / 4:56 a.m.
Last Northbound/Southbound Trips	10:50 p.m. / 10:20 p.m.	10:54 p.m. / 10:27 p.m.	10:24 p.m. / 9:56 p.m.
Route 272			
Peak/Off-Peak/Evening Headways	30/60/60[13]	30/60/60[15]	30/60/60
First Northbound/Southbound Trips	5:29 a.m. / 5:42 a.m.	5:29 a.m. / 5:42 a.m.	5:25 a.m. / 5:30 a.m.
Last Northbound/Southbound Trips	10 p.m. / 9:10 p.m.	10 p.m. / 9:10 p.m.	10:20 p.m. / 10:20 p.m.

[12] Existing Route 270 schedule operates at 10 minute peak headways for approximately four hours per weekday. There is a transition period where 15 minute headways exist, followed by 20 minute midday headways.

[13] Existing Route 272 schedule has inconsistent headways but these values approximate the overall frequency of service. Under the Baseline Operating Plan Route 272 would remain unchanged.

Figure 8.5: Route 270 and 272 Service Reallocation



Under this scenario, Route 270 would follow a similar service pattern to the Baseline Operating Plan on weekdays, with 30 minute headways throughout the day between Jefferson Park Transit Center and Golf Mill Shopping Center. North of Golf Mill Shopping Center, service would operate at 30 minute headways throughout the day until 7 p.m. This is an increase over existing service, which currently operates hourly north of Golf Mill. Eliminating service north of Dearlove Road makes it possible to increase frequency between Golf Mill Shopping Center and Dearlove Road while still reducing total operating costs.

On Saturdays, Route 270 would operate at 45 minute headways between Jefferson Park Transit Center and Dearlove Road until 7 p.m. and hourly between Jefferson Park and Golf Mill in the evening. The 45 minute headway north of Golf Mill Shopping Center represents an increase over existing conditions; once again, this is a benefit of eliminating Route 270 service north of Dearlove Road. On Sundays, Route 270 would be unchanged as compared with the Baseline Operating Plan, with no service north of Golf Mill Shopping Center.

Route 272 service under the Alternative Operating Plan would offer a similar overall level of service on the route, but with a simplified and more consistent schedule than is provided today. By operating Route 272 as a standalone route (no interlining with other North division routes), service could be offered at fixed 30 minute peak and 60 minute off-peak headways, over a similar span of service to what is offered under existing conditions (approximately 5:30 a.m. to 10 p.m.). Saturday service would operate at 60 minute headways as it does today and there would continue to be no service on Sundays.

It should be noted that the Alternative Operating Plan assumes that Route 272 would be operated entirely out of the Northwest Division with minimal interlining of other routes. Route 272 is currently operated jointly between the North and Northwest Divisions, with North Division operating the majority of trips, and many are interlined with Route 574. Eliminating the Route 574 interline would benefit Route 272 by enabling a more predictable and regular schedule, but would have service planning repercussions for the North Division. Pursuant to discussions with Pace, the impacts of other North Division operations were not analyzed as part of this proposal.

8.4 Detailed Service Plan

Bus schedules for Milwaukee Corridor ART, Route 270, and Route 272 were developed for both the Baseline Operating Plan and the Alternative Operating Plan. These schedules are provided in Appendix D – Proposed Bus Schedules and summarized in Table 8.5 above.

Based upon these schedules, each route's total revenue-hours, revenue-miles, and peak vehicles (not including spares) were computed and are summarized in Table 8.6. It should be noted that the revenue-hours and miles shown for Existing Conditions do not match Pace-published values precisely. However, in order to provide a direct comparison between existing and proposed services, a consistent methodology was used. For both routes 270 and 272, estimated annual revenue-hours of service for existing conditions are within 3% of Pace reported values.

8.4.1 Fleet Requirements

As shown in Table 8.6, Milwaukee Corridor ART service is expected to require six vehicles in service during peak hours. Because the ART fleet will be distinct from other Pace fixed route vehicles, it will require its own spares, rather than depending on a shared pool of spare vehicles. Therefore, eight ART vehicles will be required at the commencement of service.

Table 8.6: Summary Operating Statistics

	Existing Conditions	Baseline Operating Plan	Alternative Operating Plan
Milwaukee Corridor ART			
Revenue Hours[14]	0	25,267	25,267
Revenue Miles	0	393,933	393,933
Peak Buses (excluding spares)	0	6	6
ART Spares	0	2	2
Route 270			
Revenue Hours[4]	24,055	15,197	12,259
Revenue Miles	381,580	260,402	195,244
Peak Buses (excluding spares)	12	4	3
Route 272			
Revenue Hours[4]	10,306	10,306	13,174
Revenue Miles	224,617	224,617	282,240
Peak Buses (excluding spares)	4	4	5
Total Revenue Hours	34,361	50,770	50,700
Net change		16,410	16,340
Total Revenue Miles	606,197	878,952	871,417
Net change		272,755	265,220
Total Fleet Required (Includes spares for ART but not 270/272)	16	16	16

Service reductions on Route 270 and/or Route 272 will reduce the fleet requirements for those routes. Under both the Baseline and Alternative operating plans, fleet requirements for those routes are expected to decrease from 16 vehicles under current operations to eight vehicles upon commencement of ART service. This does not include spares, because these routes draw from the overall pool of 40 foot vehicles maintained by their respective operating divisions.

8.4.2 Support Facility Requirements

Because ART vehicles will be the standard vehicle type already in use by the Northwest Division, no dedicated support facilities will be required. It is anticipated that the ART fleet will be maintained and serviced in the same manner and at the same level as other Pace fixed route buses.

[14] Revenue-hours of service does not include layover time, which is consistent with Pace's methodology for internal reporting.

No new layover facilities should be required to provide the level of service described in this operating plan. Peak-hour ART service will be identical to what is currently provided on Route 270. The addition of ART to existing (albeit reduced) local service may lead to some crowding at the Golf Mill Shopping Center terminal. This should be analyzed by Pace operations staff. Pace has a long term vision to develop a larger transit center at Golf Mill.

9.0 Branding

Branding for the Milwaukee Corridor ART is being developed by Pace, through its branding design contractor, Noble Communications. Noble developed a branding process informed by market research, focus groups, an internal survey, and a branding workshop.

9.1 Market Research, Focus Groups and Brand Identity

In January of 2014, focus groups were held to solicit feedback on Pace and its proposed ART service. The focus groups were comprised of current riders, occasional riders, and non-riders of Pace throughout the region. Among the positive characteristics of ART described by all three focus groups was frequency of service and station and vehicle amenities. Among the negative ART characteristics were fewer bus stops.

The internal survey among Pace employees and the project team identified the marketing objectives for ART service. The top objective was gaining new riders followed by motivating occasional riders to ride more frequently, and converting current local fixed route riders to ART service. The chief motivating factor to ride ART was fast and frequent service.

Following the survey and focus groups, a branding workshop was held on February 7, 2014 with key project staff to outline the brand strategy and confirm the marketing objectives. Other BRT services around the country were analyzed based on brand distinction, service attributes, and concepts. Noble presented the idea of a brand identity model and led Pace through an exercise to define the imagery and ideas that would define the brand identity model.

Using feedback from the branding workshop, Noble synthesized the imagery and brand attributes into a unified brand promise and identity. The brand identity was defined as ***A Better Time Machine***, and the brand promise was described as follows:

> *With faster routes and more frequent service, Pace's new ART service will help you make better use of your time.*

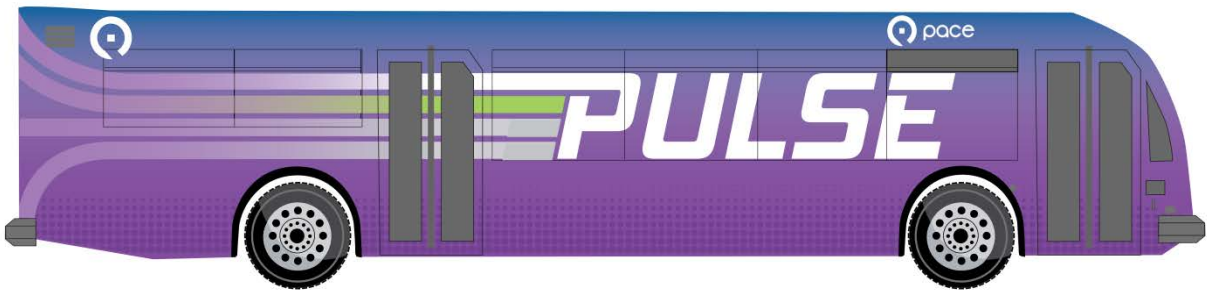
9.2 Brand Name Selection

Based on the brand identity, Noble generated over 200 potential brand names across three categories: *Fast/Perception of Speed; Frequency of Service;* and *In Control.* These were further pared down to 22 candidates which were presented to Pace staff. After multiple rounds of review and narrowing of candidates, ***Pulse*** was selected as the ART brand name.

In selecting a final brand name, Pace staff were presented with a range of potential graphical treatments for each name. Following the naming selection, additional preliminary treatments were developed for the Pulse brand. The selected logo and vehicle graphic treatment are pending final approval by the Pace Board of Directors and are shown in Figure 9.1 and Figure 9.2.

Figure 9.1: Pace ART Brand Name and Preliminary Logo

Figure 9.2: Branded Vehicle Wrap



9.3 Brand Application Guidelines

The development of the brand logo and color scheme also served as a key input to finalizing the ART station design. As shown in Figure 3.4: Typical Station Layout, the branding will be incorporated into elements such as the vertical marker, which will reflect the overall look and feel of the brand name and logo.

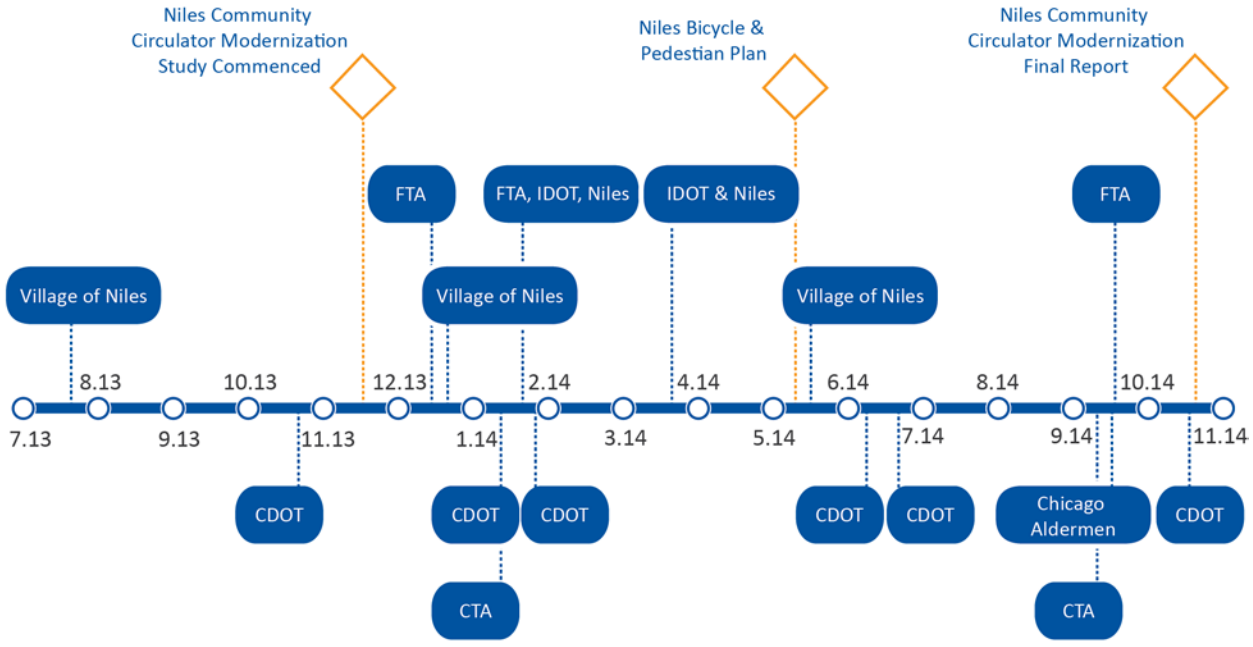
The branding process will continue into early 2015 and will be detailed in the brand application guidelines, which will further define the application of the brand to ART vehicles, stations, informational materials, and the Pace website.

10.0 Stakeholder Involvement Process

The stakeholder involvement process for the Milwaukee Corridor ART has thus far been focused on outreach and coordination with government agencies at the federal, state, and local level as well as select property owners. These include the Village of Niles; the City of Chicago and the Chicago Department of Transportation (CDOT); the Chicago Transit Authority (CTA); Golf Mill Shopping Center; the Illinois Department of Transportation (IDOT); and the Federal Transit Administration (FTA). Summaries of the outreach and coordination activities that have occurred thus far are detailed below along with the broad plan for future outreach.

Figure 10.1 shows a timeline of the outreach meetings / coordination activities that have occurred thus far, including related studies. These meetings and activities are detailed in the sections that follow.

Figure 10.1: Stakeholder Involvement Timeline



10.1 Agency Coordination and Outreach

10.1.1 Village of Niles

Within the Village of Niles, there will be one terminal ART station and nine intermediate stations. The northern terminal of the corridor will be at Golf Mill Shopping Center. Intermediate ART stations in the Village will include the Dempster (north and southbound), Main Street (north and southbound), Oakton Street / Oak Mill Mall (north and southbound), Touhy (north and southbound), and the southbound Harlem / Howard stations. The preferred northbound site for the Harlem / Howard station is located in the City of Chicago, while the alternative site is located within the Village of Niles.

Early in the planning process for the Milwaukee Corridor ART, Pace began coordinating with the Village of Niles on the overall route and these station locations in particular, in order to seek feedback and inform related plans and activities being undertaken by Pace and the Village. As a result of these early coordination activities, the Village of Niles developed a bus oriented development plan for Milwaukee Avenue. Among the Milwaukee Avenue Plan's (2005) recommendations were strategies to improve transit facilities and service, provide new pedestrian facilities and streetscaping, and encourage transit supportive development along the corridor. In 2011, the Village updated their comprehensive plan to reflect the planned Milwaukee Corridor ART and then engaged in a planning process to develop a Bicycle and Pedestrian Plan that called for pedestrian improvements and traffic control devices to support non-motorized mobility in the Village.

During the summer of 2013, Pace attended a Niles Village Board meeting and presented an update on the ART Program and the development of the Milwaukee Corridor service as well as pending updates to the Niles Free Bus. Later that year, in December of 2013, Pace met with Village staff to discuss Niles' Bicycle and Pedestrian Plan and implications and opportunities associated for coordination with ART, including station locations and transit oriented development. The final Bicycle and Pedestrian Plan was published in May 2014. It referenced the planned ART corridor service and stations and made recommendations for zoning changes to support walkable, transit-friendly development; improvements to the sidewalk network; and enhancements to shelters and station amenities, including route maps and passenger information.

In late 2013, Pace and the Village of Niles initiated the Niles Community Circulator Modernization study. The purpose of the study was to assess the existing conditions of the Niles Free Bus routes and make recommendations for improving the efficiency of those services and to support their integration with the Milwaukee Corridor ART service. As part of the study, a Community Outreach Plan was established and used to engage community residents and stakeholders through interviews, surveys, media, material distribution, pop-up meetings, public meetings and a breakfast meeting with local businesses. The public meetings and Niles breakfast meeting provided an opportunity for Pace to share Milwaukee Corridor ART project information, which was followed by a brief question and answer period. As of this writing, the Niles Community Circulator Modernization study recommendations have been shared with the Village of Niles and a final study report will be issued in fall 2014.

Pace has also regularly engaged Niles staff in ART-specific planning activities. In January 2014, Pace and the Village met with the management of the Golf Mill Shopping Center; Niles representatives also participated in a Milwaukee Corridor interagency coordination meeting attended by FTA and IDOT. In March of 2014, Niles and Pace held another coordination meeting with IDOT staff at their District One offices to discuss station locations and preliminary station concepts. Following this coordination meeting, preliminary station concepts, renderings, and layouts were prepared and at a May 2014 meeting Pace shared them with Niles for feedback.

10.1.2 City of Chicago

The Milwaukee Corridor ART service will traverse the 39th, 41st, and 45th aldermanic wards in the City of Chicago. The station to be located in the City's 41st ward is the preferred northbound site for the Harlem / Howard station. The 39th ward stations will include north and southbound Haft Street / Highland Avenue stations. The remaining stations will be located within the 45th ward and include north and southbound Austin Avenue / Ardmore Avenue, north and southbound Central Avenue, and the southern terminal at Jefferson Park Transit Center.

CDOT is currently planning pedestrian and bicycle infrastructure improvements for the corridor to support the City's *Streets for Cycling* initiative and anticipates construction to begin in 2015. These improvements will impact the intersection geometry at the Austin / Ardmore and Central Avenue stations and may have broader implications on ART operations if the number of lanes on Milwaukee Avenue is modified. In October of 2013, Pace met with representatives from CDOT to introduce the Milwaukee Corridor ART project and discuss CDOT's planned improvements. In five subsequent meetings with CDOT (through October 2014), Pace continued this coordination with CDOT and have since identified opportunities to align the agencies' project plans. These meetings also provided a forum for discussions related to station design and maintenance, shelters (including advertising agreements and opportunities), and the City's permitting and review process. As both projects advance, Pace will continue to coordinate with CDOT to refine and align plans.

In September 2014, Pace senior leadership met with Aldermen Laurino (39th ward) and Arena (45th ward) to introduce the project (Alderman O'Connor – 41st ward – was invited but unable to attend). Each alderman received ART project information documenting the project's goals, features and benefits as well as a preliminary implementation schedule.

10.1.3 Chicago Transit Authority

Pace met with the Chicago Transit Authority (CTA) in January of 2014 to provide project information and discuss the CTA's bus rapid transit program as well as Pace's anticipated use of the Jefferson Park Transit Center as a terminal location. In September of 2014, coordination efforts with the CTA continued and focused on the CTA's Your New Blue program, including improvement plans and schedules for upgrades to the Jefferson Park Transit Center and the Blue Line. CTA anticipates renovation to the bus terminals at the Jefferson Park Transit Center in 2016. Coordination between Pace and CTA on this shared facility will continue as both projects advance.

10.1.4 Federal and State Agencies

As noted above, Pace has held several coordination meetings with IDOT and FTA. IDOT and FTA both attended a January of 2014 interagency coordination meeting. Subsequently, Pace and Niles staff met with IDOT in March of 2014 to discuss station locations, potential pedestrian improvements, and IDOT's design review and permitting process.

In addition to the interagency coordination meeting in January of 2014, Pace has coordinated with FTA Region 5 staff over a number of meetings to discuss project status as well as National Environmental Policy Act (NEPA) requirements and documentation (See Chapter 11.0, NEPA Documentation). These meetings include a December 2013 conference call, the January 2014 interagency meeting, and subsequent coordination meetings in March and September of 2014.

10.2 Property Owners and Interest Groups

In January of 2014, Pace met with the management of the Golf Mill Shopping Center to provide an overview of the Niles Community Circulator Modernization study and the Milwaukee Corridor ART project, including enhancements planned for the current Pace facilities located at the southern end of the shopping center property. This improved facility would serve as the northern terminal of the Milwaukee Corridor ART. Since that January meeting, the Golf Mill Shopping center was sold to a private equity real estate firm in August of 2014. Pace is coordinating with Niles staff to arrange a meeting with the new owners to engage in discussions about Pace services and station locations that will serve the facility.

As noted above in Section 10.1.1, Pace also presented a project overview to Niles businesses as part of the Village of Niles' annual business breakfast.

10.3 Future Stakeholder Involvement Activities

As the project proceeds into the NEPA documentation and advanced conceptual design phases, stakeholder involvement and outreach will be a priority and the ART Program Communications Plan and the Milwaukee Corridor Stakeholder Involvement Plan will guide the process. During these phases, Pace will continue to involve and coordinate with communities, government officials, public agencies, and individual interest groups. However, a greater emphasis will be placed on public involvement and broad community outreach, including affected property owners, business groups, Pace customers, and the general public. Planned outreach activities include the development of a project website, fact sheets, project newsletters, public meetings, and one-on-one stakeholder meetings.

11.0 National Environmental Policy Act (NEPA) Documentation

The FTA has determined that the Milwaukee Corridor ART project may qualify for a Categorical Exclusion (CE) under 23 CFR 771.118(d) of the National Environmental Policy Act (NEPA) and related regulations. To support this determination by the FTA, Pace developed a Purpose and Need statement, conducted initial explorations of conditions in the corridor and the anticipated impacts of the project improvements, and presented evidence to the FTA that the project qualifies as a CE. Based on FTA's concurrence, Pace will conduct the required impact analyses as identified and required in the CE checklist provided by FTA. The preliminary schedule for submitting to FTA a fully documented CE checklist is June 2015, pending the issuance of a task order and Notice to Proceed for the PMO to conduct the analysis. For a more detailed schedule see Appendix E – NEPA Categorical Exclusion Documentation Schedule.

11.1 Purpose and Need Statement

Sections 11.1.1 through 11.1.4 reflect the document submitted to the FTA in May of 2014 as the Milwaukee Corridor ART project Purpose and Need Statement.

11.1.1 Purpose Statement

The purpose of the Milwaukee Corridor ART project is to provide an enhanced and cost-effective bus rapid transit (BRT) service in the Milwaukee Avenue corridor through the improved frequency, reliability and travel time of bus transit service, as well as improved bus transit facilities.

11.1.2 Need Elements

The proposed action must address the following needs:

- Improve the frequency of bus transit service;
- Improve the reliability of bus transit service;
- Improve travel time of bus transit service vehicles; and
- Improve the quality of bus transit facilities.

The need to improve bus service and the quality of bus transit facilities in the Milwaukee Avenue corridor (Pace Bus Route 270) dates back to 2001, when Pace published *Vision 2020*[15]. The Milwaukee Corridor ART project was identified as one of 24 corridors that would provide a regional network of premium transit services across Pace's six county service area. Over the next several years, Pace completed additional planning studies[16] to develop a specific action plan for implementation of the ART corridors. The studies completed by Pace helped to better define the infrastructure improvements and

[15] http://www.pacebus.com/sub/vision2020/study_contents.asp
[16] Other studies completed by Pace include *Arterial Rapid Transit Study* (May 2009) and *ART Implementation Plan* (December 2009).

design elements that would be feasible and would provide cost-effective transit investments throughout Pace's service area.

Six priority ART corridors were identified:

- Milwaukee Avenue – Jefferson Park Transit Center to Golf Mill Shopping Center
- Dempster Street – Davis Street Chicago Transit Authority (CTA) Purple Line station to O'Hare Kiss 'n' Fly Lot
- Oak Brook – CTA Blue Line/Pink Line to Yorktown
- Harlem Avenue – Milwaukee Avenue to 95th Street
- 95th Street – 95th Street/Dan Ryan CTA Red Line to Harlem Avenue ART
- Halsted Street – 95th Street/Dan Ryan CTA Red Line to 159th Street

The proposed J-Route from Schaumburg/O'Hare to Oak Brook and Naperville was also identified as a potential priority ART corridor, but was not associated with a specific alignment at the time.

The Milwaukee Avenue ART corridor was identified as the top priority for implementation due to several factors, including strength of existing transit service, benefits to local and regional transit connectivity, existing and projected ridership, and local community support.

11.1.3 Goals and Objectives

The following goals and objectives have been identified through a review of Pace's past transit planning efforts, as well as discussions with local planning officials. The goals and objectives identified below are not the core transportation needs the proposed action is intended to address. However, they were used to shape the project's purpose and need statement and will be used in conjunction with the identified needs to evaluate the proposed action.

The following goals and objectives have been identified for the Milwaukee Corridor ART project:

- Encourage suburban transit usage through the establishment of a network of higher-quality line-haul routes;
- Improve the visibility and perception of suburban bus transit service; and
- Support transportation, land use and growth objectives identified in the study corridor.

11.1.4 Logical Termini

Based on ridership and operational data, the limits of the transit improvement project will be the Jefferson Park Transit Center on the south end and the Golf Mill Shopping Center on the north end. The Jefferson Park Transit Center serves as an existing transit hub with connections to Pace bus, CTA bus, CTA rail, and Metra regional rail routes. On the other end of the corridor, Golf Mill Shopping Center is a major trip generator/destination and is anticipated to serve as a future transit hub for Pace local bus and ART services. Pace Bus Route 270 service runs from Jefferson Park Transit Center on the south to Glenbrook Hospital on the north. However, approximately 93% of the Pace Bus Route 270 boardings occur between Jefferson Park Transit Center and Golf Mill Shopping Center. These factors make these

points logical termini for any potential infrastructure improvements necessary to provide enhanced transit service in the Milwaukee Avenue corridor. The designated termini are also sufficient to allow for appropriate consideration of environmental conditions and effects/benefits.

11.2 Categorical Exclusion Checklist Documentation

Pace is conducting the required analyses as identified and required in the Categorical Exclusion checklist provided by FTA. The documentation for the CE will discuss the affected environment (existing conditions), environmental consequences (impacts) of the proposed project, as well as any potential mitigation measures for unavoidable impacts. The analysis will utilize available data to establish community context, identify existing resources, and assess the potential for unusual circumstances or important impacts associated with the project improvements, as they have been defined thus far. Supporting technical analysis will be incorporated by reference and included as an attachment to the CE document. Within the context of the project corridor, the documentation will cover the following topics:

- Air Quality
  - Summary of regional conformity status.
- Land Use/Zoning
  - Summary of existing land use and zoning.
- Transportation Impacts
  - Description of the potential impacts of the project. Due to the anticipated minimal effect of the project on the roadway network, no traffic operations analysis will be completed to support the environmental analysis.
- Historic Resources
  - Introduction to the Area of Potential Effects (APE), description of any cultural, historic, or archaeological resources located within the APE, and assessment of the potential impacts of the proposed project on those resources.
- Visual
  - Description of the visual setting, any sensitive views/viewers, and the visual impact of the proposed project.
- Noise
  - Description of the noise impact analysis.
- Vibration
  - Brief explanation that vibration impacts from additional bus transit vehicles are not anticipated due to vibration isolation provided by rubber tires and suspension systems of buses.
- Land Acquisition, Relocations, and Easements
  - Brief discussion of the need for land acquisition or easements (if any).
- Hazardous Materials
  - Description of the results of the hazardous waste studies, including the hazardous materials screening completed using existing environmental databases.
- Social Impacts and Community Disruption

  - Summary of demographic characteristics of the affected communities and any potential impacts to businesses (e.g., driveway closure and consolidation, loss of on-street parking, etc.) and community resources.
- Environmental Justice
  - Description of identified concentrations of low-income and minority populations in the area and assessment of the potential for disproportionately high and adverse impacts.
- Section 4(f) and Section 6(f)
  - Summary and discussion of existing public parks, recreational areas, wildlife refuges, and trails, as well as any potential impacts to these resources.
- Wetlands
  - Summary and discussion of potential wetlands and corresponding impacts.
- Floodplains
  - Discussion of identified potential encroachments and corresponding impacts to 100-year floodplains.
- Water Quality, Navigable Waters, & Coastal Zones
  - Description of any existing water resources in the project area and any potential impacts.
- Ecological Resources
  - Description of any natural areas near the proposed project and assessment of the potential for impacts.
- Threatened and Endangered Species
  - Description of any potential habitat for federally identified threatened and endangered species.
- Safety and Security
  - Description of any measures needed to provide for the safe and secure operation of the project after its construction.
- Utilities
  - Summary of potential conflicts with existing major utilities.
- Construction Impacts
  - Description of temporary construction-related impacts of the proposed project, including the potential for lane closures, detours, and dust. Summary of best management practices that could be used to minimize temporary construction impacts, such as dust and erosion control measures. The Traffic Management Plan (TMP) will be developed during final design and coordinated with the City of Chicago, the Illinois Department of Transportation, and the Village of Niles.
- Environmental Commitments
  - Summary of any environmental commitments to mitigate or offset potential negative impacts.

In addition to the above analyses and documentation, the CE checklist will also include documentation of the Stakeholder Involvement Process, including tools and methods used to engage project

stakeholders as well as brief summaries of outreach activities and events. This could include, but may not be limited to, the following topics (as applicable):

- Project Mailing List;
- Project Initiation/Agency Scoping Letters;
- Limited English Proficiency (LEP) Outreach;
- Stakeholder or Small Group Meetings (e.g., neighborhoods, businesses, etc.);
- Public Information Meetings;
- Agency Coordination;
- Elected Official Briefings;
- Newsletters; and
- Social Media.

12.0 Financial Plan

Local, regional, and federal funding sources have been identified for possible contributions toward the capital and vehicle procurement costs of the Milwaukee Corridor ART project. A federal Congestion Mitigation and Air Quality (CMAQ) grant totaling approximately $9.5 million is expected to be sufficient to cover all station costs. Additional funding sources are available if necessary and include a Regional Transportation Authority (RTA) Innovation, Coordination, and Enhancement (ICE) grant as well as Federal Transit Administration Section 5307 formula funds allocated to Pace for capital expenses. Table 12.1 includes the possible funding sources, area of application, and approximate amount available.

The list of anticipated funding sources and approximate contributions, though not yet committed, provide one important indication of project viability. The Milwaukee Corridor ART project will benefit from Transit Signal Priority (TSP) work, and related costs, that will be administered as a separate regional project led by the RTA. In addition, the CMAQ grant is not assumed to cover the cost of ART vehicles, which will be procured as part of Pace's regular vehicle replacement program. During preliminary corridor planning, it was assumed that $5.3 million in Section 5307 funds would be needed for this purpose, based on an assumed need for 10 vehicles at a cost of $526,000 per vehicle. Based on the current ART operating plan, only eight vehicles are needed, reducing this estimated cost to $4.2 million. At a 3% annual inflation rate, the cost of vehicles is estimated at $4.5 million in 2016.

Table 12.1: Milwaukee Corridor ART Anticipated Funding Sources

Source	Purpose	Available Amount
CMAQ Grant	Roadway & station improvements	$9,500,000
RTA ICE Grant	Real time signage	$500,000
Pace 5307	Shelters	$1,000,000
Total Station Capital Available		$11,000,000
Total Station Estimated Capital Cost (2016 US Dollars)		$8,472,000
Pace 5307	Vehicles 8 ART vehicles @ $526,000 = $4.2 million ($4.5 million in 2016 dollars)	$5,300,000

12.1 Capital Cost Estimate

The capital cost estimate is based on the conceptual station designs discussed in Chapter 3.0 and presented in detail in Appendix B – Conceptual Station Site Plans. The Milwaukee Corridor ART project

will include 18 stations, consisting of two terminals and eight pairs of intermediate stations. Nine of the 16 intermediate stations have a single preferred location and station layout. The seven remaining intermediate stations currently have a preferred site and layout as well as one alternative site and/or layout under consideration. Capital costs were estimated for each of these 25 candidate locations and designs. Table 12.2 identifies and summarizes the status for the identified stations.

Table 12.2: Milwaukee Corridor ART Station Names and Selection Status

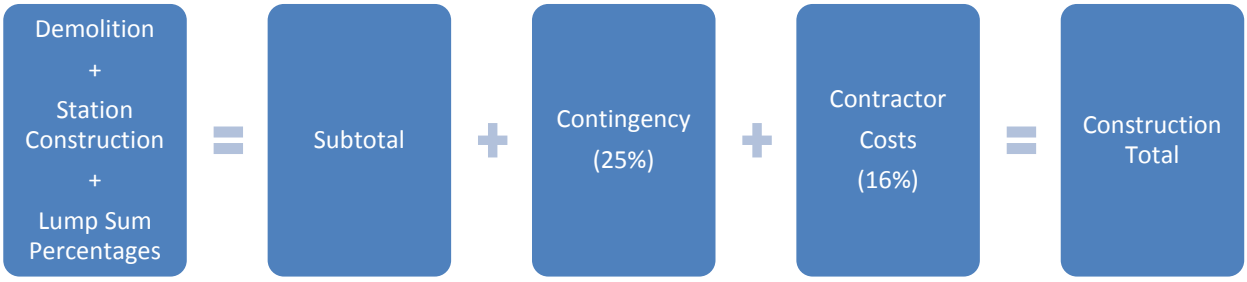
Station Name	Sites and/or Designs Under Consideration
Golf Mill Shopping Center Terminal	1
Dempster Street Northbound (Alternate at Ballard Street)	2
Dempster Street Southbound (Alternate at Ballard Street)	2
Main Street Northbound	1
Main Street Southbound	1
Oakton Street/Oak Mill Mall Northbound	1
Oakton Street/Oak Mill Mall Southbound	1
Harlem/Howard Northbound	2
Harlem/Howard Southbound	1
Touhy Avenue Northbound	1
Touhy Avenue Southbound	1
Haft/Highland Northbound	1
Haft/Highland Southbound	1
Austin/Ardmore Northbound	2
Austin/Ardmore Southbound	2
Central Avenue Northbound	2
Central Avenue Southbound	2
Jefferson Park Transit Center Terminal	1

The capital cost estimate developed here has been developed to a level of detail appropriate for the current Project Definition phase, and utilizes station layout drawings with aerial imagery that reflect the individual sites' proposed features, requirements, and limitations and provides an indication of the work anticipated to occur at each station along the corridor. The capital cost estimate will be refined as the design progresses, with the completion of a topographic survey, and as existing conditions, such as

underground utilities, are identified through agency coordination. Detailed project cost estimates will be further refined by the architectural engineering firm hired by Pace.

The cost estimate uses unit and percent-based costs to estimate anticipated *demolition*, *station construction*, *lump sum percentage-based costs*, as well as *contingency* and *contractor costs* and fees. Figure 12.1 summarizes the capital cost estimation process. All dollar amounts are reported in 2014 dollars, unless otherwise noted.

Figure 12.1: Milwaukee Corridor ART Capital Cost Estimate Inputs



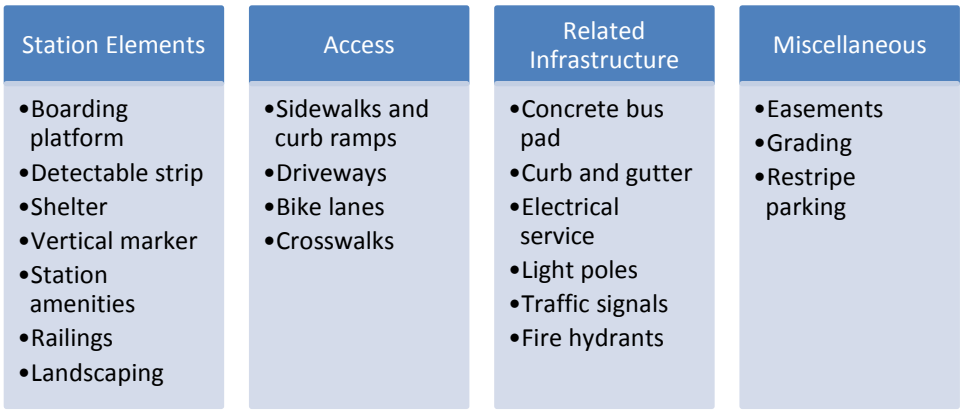
12.1.1 Demolition

The estimate for *demolition* work included site preparation and removal of existing features to prepare for construction of ART stations. The estimate included the demolition of sidewalk, curb and gutter; roadway pavement; driveways; existing Pace shelters and pads; trees; light poles; traffic signals; and fire hydrants. All of these elements are indicated on the layout drawings shown in Appendix B – Conceptual Station Site Plans.

12.1.2 Station Construction

The estimate for *station construction* included station elements and amenities; access features; related infrastructure requirements; and other miscellaneous tasks. Figure 12.2 summarizes the features and tasks included in the *station construction* category.

Figure 12.2: Station Construction Cost Estimate Elements



As described in Section 3.5, Pace selected a set of station features to enhance passenger comfort, address safety and operations, and apply ART branding within the Milwaukee Corridor. Individual station designs apply the station features with consistency while accommodating individual site requirements and community preferences. Table 12.3 includes more detailed information about station features.

Table 12.3: Milwaukee Corridor ART Station Features, Unit Cost, and Percent of Total Capital Cost Estimate

Station Feature	Unit Cost (2014 US Dollars)	Percent of Total Capital Cost
ART shelter	$35,000	8%
Vertical marker	$60,000	14%
Real-time sign	$12,000 (two per station)	6%
Bench	$1,650	< 1%
Trash receptacle	$1,600	< 1%
Bicycle rack	$1,300	< 1%
Infrared heat	$12,000 (two per shelter)	6%
Pavement snowmelt	$12,000	3%
Railing	$120/linear foot	2%
Landscaping	$15/square foot	< 1%

12.1.3 Lump Sum Percentages

Lump sum percentages are used at the project's current level of design as substitutes for detailed known costs. The estimate for the lump sum percentages cost category was calculated as a percentage of the *station construction* costs. The lump sum percentage tasks included site work such as clearing and grubbing, utility relocations, drainage structures, mobilization/demobilization, traffic control, and erosion control. These were applied uniformly to the total station construction cost for each individual station. Table 12.4 identifies the tasks calculated as a lump sum and the corresponding percentage of station construction costs applied.

Table 12.4: Percentage-Based Tasks and Applied Percentage

Lump Sum Percentage-based Task	Applied Percentage of Station Construction Cost
Clearing and Grubbing	1%
Miscellaneous Utility Relocations	2%
Drainage Structures	8%
Mobilization/Demobilization	4%
Traffic Control	5%
Erosion Control	2%

12.1.4 Contingency

For each station, a *contingency cost* of 25% was added to the subtotal of the demolition, station construction, and lump sum percentage-based costs. The 25% rate is appropriate for the project's current level of design. This contingency cost was uniformly applied to each station as an allowance for unanticipated or unavailable costs.

12.1.5 Contractor Costs

The capital costs (including contingency) for all stations in the corridor were subtotaled and 16% was added to reflect the *contractor's costs* and fees. These costs include general condition, overhead and profit, general liability and other insurance.

12.1.6 Corridor Capital Cost

The *demolition*, *station construction*, percentage-based *lump sum*, *contingency*, and *contractor* costs were combined to develop an estimate for the total construction cost for the Milwaukee Corridor ART. This summary is shown below in Table 12.5 for the preferred station sites and designs. The individual station cost estimates as well as the station-level cost estimates shown in Table 12.5 do not include the

16% assumed contractor costs. These are calculated on the corridor subtotal, which includes contingencies, and are shown at the bottom of the table. The stations costs included in the total cost estimate refer to the preferred station locations and designs. Where there are alternate station locations or designs still under consideration, these shown below in Table 12.6.

Table 12.5: Milwaukee Corridor ART Total Construction Cost

Station & Cost Description	Estimated Cost (2014 US Dollars)
Golf Mill Shopping Center Terminal	$576,409
Dempster Street Northbound	$389,493
Dempster Street Southbound	$375,202
Main Street Northbound	$372,400
Main Street Southbound	$350,212
Oakton Street/Oak Mill Mall Northbound	$352,370
Oakton Street/Oak Mill Mall Southbound	$365,665
Harlem/Howard Northbound	$357,880
Harlem/Howard Southbound	$359,849
Touhy Avenue Northbound	$354,905
Touhy Avenue Southbound	$361,812
Haft/Highland Northbound	$426,525
Haft/Highland Southbound	$446,839
Austin/Ardmore Northbound	$356,305
Austin/Ardmore Southbound	$360,480
Central Avenue Northbound	$361,789
Central Avenue Southbound	$520,475
Jefferson Park Transit Center Terminal	$195,909
Subtotal for Preferred Stations	$6,884,520
Contractor's General Condition 5%	$344,226
Contractor's Overhead & Profit 10%	$688,451
Contractor's General Liability & Other Insurance 1%	$68,845
Total Construction Cost	$7,986,043

Table 12.6: Alternative Station Design Capital Costs

Station	Preferred Design Estimated Cost[17] (2014 US Dollars)	Alternate Site Estimated Cost[17] (2014 US Dollars)	Difference in Cost if Alternative is Selected
Ballard Street Northbound Alternate to Dempster NB	$389,493	$351,461	-$38,032
Ballard Street Southbound Alternate to Dempster SB	$375,202	$356,759	-$18,443
Harlem/Howard Northbound Alternate Location	$357,880	$358,567	$687
Austin/Ardmore Northbound Pedestrian Treatment Alternative	$356,305	$418,415	$62,110
Austin/Ardmore Southbound Pedestrian Treatment Alternative	$360,480	$408,170	$47,690
Central Avenue Northbound Pedestrian Treatment Alternative	$361,789	$429,025	$67,236
Central Avenue Southbound Pedestrian Treatment Alternative	$520,475	$636,700	$116,225

12.1.7 Cost Analysis

Table 12.7 illustrates how the various cost categories contribute to the total estimated construction cost of the corridor. Costs are summarized by category for the entire corridor and the percentage of the total construction cost that each category accounts for. It is noted that the *station construction* category constitutes more than half of the total construction cost while *demolition* work requires the lowest amount of investment. Contingencies and contractor costs also constitute nearly one third of the cost estimate.

The total construction cost per station, excluding the contractor's costs, is shown in Figure 12.3. Across the 18 preferred stations, the average cost of the stations is $382,000. When comparing the costs for these stations, the majority are relatively comparable to one another. The exceptions are Golf Mill Shopping Center, Central Avenue Southbound, and Jefferson Park Transit Center.

The Golf Mill Shopping Center terminal requires the greatest amount of capital investment due to the extended platform, customer accessibility improvements, and additional shelter provided to accommodate the large number of connecting routes at this location. Similarly, the Central Avenue Southbound station's cost is higher than the average because the high number of connecting routes necessitates a larger station platform and additional passenger amenities. Conversely, due to fewer

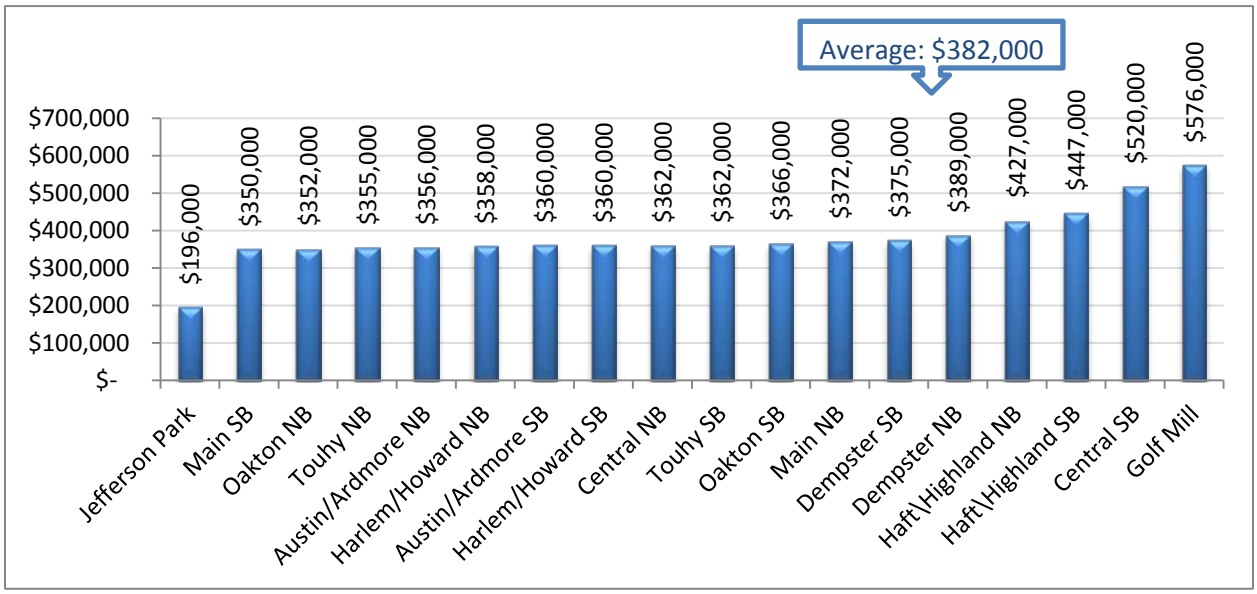
[17] Preferred and Alternate Site Total Construction Cost excludes contractor costs.

opportunities to apply ART features and amenities, the Jefferson Park Transit Center terminal was identified as requiring the lowest amount of capital investment.

Table 12.7: Estimated Milwaukee Corridor ART Construction Cost by Category

Cost Category	Estimated Corridor Cost (2014 US Dollars)	Percent of Total Construction Cost
Demolition	$131,000	2%
Station construction	$4,407,000	55%
Lump sum percentages	$970,000	12%
Contingency	$1,377,000	17%
Subtotal	$6,885,000	86%
Contractor's cost	$1,102,000	14%
Total	$7,986,000	100%

Figure 12.3: Total Construction Cost by Station (Excluding Contractor Costs)



12.1.8 Cost Escalation

As previously stated, all capital costs have been presented in present year (2014) dollars. To escalate the estimated costs to the time of construction – currently anticipated to fall predominantly within the year 2017 – an assumed inflation rate of 3% per year was used. Based on this assumed inflation rate, the capital cost estimate for station construction is $7.986 million in 2014 dollars and would increase to $8.73 million in the year of expenditure.[18]

12.1.9 FTA Standard Cost Categories

The capital cost estimate presented in this section has also been prepared in accordance with the Federal Transit Administration's Standard Cost Categories (SCC) format. The SCC format includes additional cost categories including professional services and vehicles that were not included in the preceding sections because they are anticipated to be funded from other sources. Appendix F – Capital Cost Estimate, FTA Standard Cost Category Format contains the SCC summary table.

12.2 Operations and Maintenance Cost Estimate

12.2.1 Methodology

Operations and Maintenance (O&M) costs were computed in accordance with input from staff within Pace's Strategic Services Division. O&M costs were estimated based on revenue-hours of service, using dollars per hour as reported in Pace's 2nd Quarter 2014 Route Profile report. These represent fully allocated O&M costs that were developed by Pace at the route level.

The following particular assumptions were made:

- The O&M cost per hour for the Milwaukee Corridor ART was assumed to be equal to the average for the Northwest Division, which was $103.54 per revenue hour in the 2nd Quarter 2014 Route Profile report.
- Route 270 would operate at the same $103.54 hourly rate under all service change scenarios, compared with the current cost of $108.38 per revenue hour.
- Under Existing Conditions and the Baseline Operating Plan, Route 272 would continue to operate at its current rate of $104.91 per revenue hour, which reflects North Division operations. Route 272 is unchanged from existing conditions under the Baseline Operating Plan.
- Following restructuring of Route 272 under the Alternative Operating Plan, it was assumed that Route 272 would be fully operated by the Northwest Division and would operate at the Division average rate of $103.54 per revenue hour.

[18] A separate Capital Cost Technical Memorandum was submitted on November 26, 2014, at which time the anticipated year of construction was 2016, with an estimated year of expenditure capital cost of $8.47 million. Due to subsequent changes in the project schedule, the capital cost has been updated to reflect construction in 2017.

12.2.2 O&M Cost Estimate

Table 12.8 shows a summary of the estimated O&M costs under existing conditions, the Baseline Operating Plan, and the Alternative Operating Plan, using the methodology and assumptions described above. As shown, it is anticipated that the Baseline Operating Plan will result in a net increase of approximately $1.58 million in total O&M costs. The Alternative Operating Plan results in somewhat lower O&M costs, reflecting a combination of reduced service north of Golf Road and an assumed reduction in the cost per revenue hour to operate Route 272 after that route is fully shifted to the Northwest Division.

Table 12.8: Summary O&M Costs (2014 dollars)

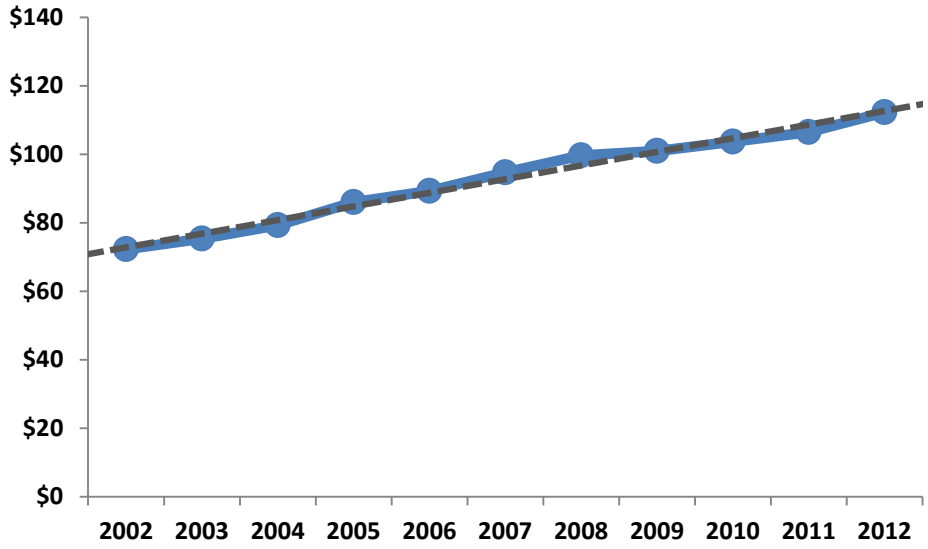
	Existing Conditions	Baseline Operating Plan	Alternative Operating Plan
Milwaukee Corridor ART	$0	$2,616,000	$2,616,000
Route 270	$2,607,000	$1,574,000	$1,269,000
Route 272	$1,081,000	$1,081,000	$1,364,000
Total O&M Cost	$3,688,000	$5,271,000	$5,250,000
Incremental Increase	N/A	$1,583,000	$1,561,000

Future Year Cost Escalation

To estimate O&M costs in the opening year of 2017 and beyond, past increases in unit O&M costs at Pace were analyzed. Using historical data on O&M costs and service levels provided as reported to the National Transit Database (NTD), a linear regression analysis was performed using data for the years 2002 through 2012 (the latest available NTD data for Pace). The historical data is shown in Figure 12.4.

This analysis resulted in an estimated annual growth in O&M costs per revenue-hour of service of between 3% and 4% per year, in year-of-expenditure dollars. Based on this analysis, total O&M costs for the years 2017 through 2019 are shown in Table 12.9. It should be noted that full-year costs are shown for 2017, as the precise date of ART system startup is not yet certain.

Figure 12.4: Annual Growth in O&M Cost per Revenue Hour of Service (with Trendline)



Source: National Transit Database

Table 12.9: Estimated Annual O&M Cost for Years 2017 through 2019 (Year of Expenditure Dollars)

	Existing Conditions	Baseline Operating Plan	Alternative Operating Plan
2014	$3,688,000	$5,271,000	$5,250,000
2017	$4,053,000	$5,793,000	$5,769,000
2018	$4,176,000	$5,966,869	$5,942,678
2019	$4,297,000	$6,141,000	$6,116,000

13.0 Ridership Forecast

This chapter presents the ridership estimate for the Milwaukee Corridor ART service. Ridership is built off of the assumptions in the operating plan, as documented in Chapter 8.0. The ridership model reflects, and was calibrated, to the full range of transit services in the Chicago region, and the forecast considered changes to both ART and local Route 270.

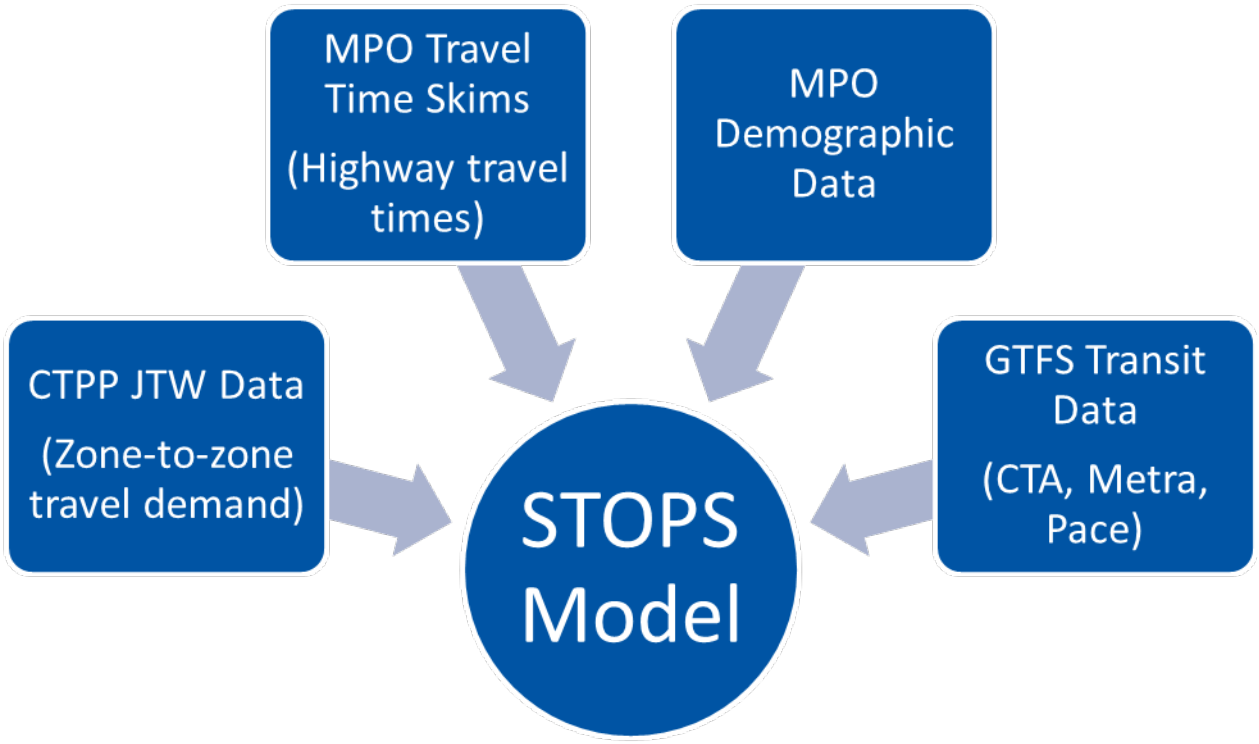
13.1 Forecast Approach and Methodology

The ridership forecast was developed using the Federal Transit Administration's Simplified Trips-on-Project Software (STOPS) model to estimate the ridership of the Milwaukee Corridor ART. STOPS is quite similar in structure to traditional four-step models and includes many of the same inputs and computations of transit level-of-service and market share found in model sets maintained by metropolitan planning organizations like the Chicago Metropolitan Agency for Planning (CMAP). The STOPS model follows a simplified approach with the following differences compared to a traditional four-step model:

- Estimates of total origin-to-destination travel are derived from Census data rather than trip generation and destination choice procedures. This avoids the need to calibrate these tools to the degree of accuracy required to estimate transit ridership.
- Representations of transit levels-of-service are derived from timetable information, bypassing the need to develop detailed transit networks in the planning environment. Timetable information is already available through the General Transit Feed Specification (GTFS) and is much more accurate than the representations of travel time and frequencies contained in typical planning networks. GTFS data prepared by Pace for use by the public were utilized for this process.
- The model calibrates itself to represent current conditions. This means that the significant time spent developing and documenting effective forecast tools that are found in most regional models can be avoided.
- STOPS uses travel times as the primary factor in establishing mode choice. Because it is calibrated to existing conditions, the model is not sensitive to changes in fuel costs, tolls, transit fares, or other operating costs. It cannot be used to run sensitivity analyses associated with changes in these cost factors.

STOPS model inputs are summarized in Figure 13.1.

Figure 13.1: STOPS Model Inputs for Milwaukee Avenue ART



Inputs come from a variety of sources including the Census Transportation Planning Package (CTPP) journey-to-work (JTW) data; population, employment, and travel time data from CMAP; and GTFS data from Pace, Metra, and the Chicago Transit Authority (CTA). To represent the Milwaukee Corridor ART service in the model, the GTFS files were prepared representing the build scenario, adding new services and modifying and/or deleting current services.

Existing and build conditions along Milwaukee Avenue were modeled and calibrated to existing bus and rail service in the vicinity of the corridor. Utilizing Pace's GTFS data, the new service for the Milwaukee Corridor ART was defined as well as a "Milwaukee Local" which replaces existing Route 270 with a different service plan (see Table 13.1). Only the Baseline Operating Plan, as documented in Chapter 8.0, was modeled.

Under the Baseline Operating Plan, ART service will run 10 minute peak headways in the morning and evening peak periods, 15 minute off-peak headways, and 30 minute headways late night during the week. The weekday span of service is from 5 a.m. to midnight. On Route 270, headways would decrease from existing conditions of 10 minute peak, 15 to 20 minute off-peak, and 30 minute late night to 30 minute headways throughout the day with existing conditions span of service maintained. Service north of Golf Mill Shopping Center would remain largely intact under this scenario.

Table 13.1: Service Plan for ART and Local Services

	Existing Conditions	Baseline Operating Plan
Milwaukee Corridor ART		
Peak/Off-Peak/Evening Headways	N/A	10/15/30
First Northbound/Southbound Trips	N/A	5 a.m. / 5 a.m.
Last Northbound/Southbound Trips	N/A	12 a.m. / 11:59 pm
Route 270		
Peak/Off-Peak/Evening Headways	10/15-20/30[19]	30/30/30
Headways North of Golf Mill	30/60/No service	30/60/No service
First Northbound/Southbound Trips	5:30 a.m. / 4:58 a.m.	5:28 a.m. / 5 a.m.
Last Northbound/Southbound Trips	10:50 p.m. / 10:20 p.m.	10:54 p.m. / 10:27 p.m.

13.1.1 Key Model Parameters

The following list summarizes key parameters that were used in creating the STOPS model scenario for the Milwaukee Corridor ART project:

- Milwaukee Corridor ART was coded in GTFS as a bus (Route Type 3). GTFS does not contain a route type code for bus rapid transit (BRT), leaving the model operator with the option to code the project as either a bus or a light rail/streetcar service. Based on the infrastructure and service assumptions associated with this project, particularly the lack of a dedicated or fixed guideway and lack of existing light rail service against which to calibrate in the region, the decision was made to code it as a bus.
- Default STOPS parameters for “fixed guideway visibility” were used.
- Default STOPS parameters for the relative proportions of various trip purposes and car ownership statuses were used.
- The forecast year was 2013, representing the latest year of available demographic data from CMAP.

[19] Existing Route 270 schedule operates at 10 minute peak headways for approximately four hours per weekday. There is a transition period where 15 minute headways exist, followed by 20 minute midday headways.

- Golf Mill Shopping Center was coded as an "Unsanctioned PNR Lot". This particular designation, as opposed to a formal park-and-ride facility, limits the catchment area for PNR trips to a radius of three miles around the station. All other ART stations were assumed not to offer park-and-ride accommodations.
- Under the Build scenario, Route 270 service was modeled by removing existing Route 270 trip records from the GTFS files and creating new Golf Mill Local and Glenbrook Local trips operating at frequencies that match the existing service levels in the corridor.

As noted in the operating plan technical memorandum, existing local service was assumed to operate 30 seconds faster than existing conditions for all time periods, reflecting the running time and schedule reliability benefits of planned transit signal priority (TSP) in the corridor.

13.2 Projected Corridor Ridership

Based on the model inputs into STOPS, the following ridership estimates have been developed and are shown in Table 13.2.

Table 13.2: Average Weekday Boardings, Existing Conditions and ART Baseline Operating Plan

	Existing Conditions	Baseline Operating Plan
ART Ridership	N/A	3,646
Local 270 Ridership	3,689	1,247
Corridor Total	3,689	4,893 (+33%)

Under the assumptions in the service plan and the underlying demographic and trip data, ART is expected to generate between 3,600 and 3,700 average weekday boardings, similar to the existing Route 270 weekday ridership. Corresponding to proposed service reductions on Route 270, STOPS estimates that Route 270 would generate an additional 1,200 weekday boardings, for a corridor total of nearly 4,900 weekday boardings, an increase of approximately 33% compared to existing corridor ridership.

Two sensitivity tests were performed to understand what might happen to ridership under certain alternative scenarios. The first such scenario models ridership if Milwaukee ART had BRT characteristics more akin to a streetcar or light rail service. A change in coding of the project in the GTFS files from Route Type 3 (bus) to Route Type 0 (streetcar/LRT) was tested, assuming the same baseline operating plan. Under this scenario, corridor ridership reaches over 7,300 weekday boardings, an increase of 50% over the baseline operating plan and a 100% increase over existing conditions. This substantial increase in ridership with no change to the running time or operating plan reflects the STOPS model's nationwide calibration data which shows that, all things being equal, fixed guideway projects generate significantly

more ridership than traditional mixed traffic bus projects. The projected ridership under this sensitivity scenario was deemed unrealistic and strengthened the credibility of the base model parameters.

The second sensitivity test scenario models the potential elimination of Route 270 service within the ART corridor. Under this scenario, Route 270 is entirely eliminated south of Golf Mill Shopping Center. To maintain the existing service between Golf Mill Shopping Center and Glenbrook Hospital, a "Glenbrook Shuttle" service was created. Under this scenario, ART ridership increases approximately 10% to just over 4,000 weekday boardings. Due to the reduction in overall service between Jefferson Park Transit Center and Golf Mill Shopping Center under this scenario, total corridor ridership declines approximately 14% to approximately 4,200 weekday boardings (see Table 13.3).

Table 13.3: Summary of Sensitivity Tests

	ART Ridership	Jefferson Park-Glenbrook Local Ridership	Corridor Total
Baseline Operating Plan	3,646	1,247	4,893
Code ART as Rail (Route Type 0)	5,895	1,456	7,351
Eliminate Route 270 South of Golf Mill	4,011	181	4,192

14.0 Project Delivery

14.1 Project Delivery Approach

Implementation of the Milwaukee Corridor ART will utilize a design-bid-build delivery method. Pace intends to procure a designer in 2015 to complete project engineering, which would then be followed by the procurement of a construction contractor. Pace has a goal of implementing the Milwaukee Corridor ART and beginning revenue service in the second quarter of 2017. A preliminary implementation schedule required to achieve this goal is shown in Appendix H – Milwaukee Corridor Implementation Schedule.

14.1.1 Conceptual Design, NEPA Clearance, and Public Involvement

Conceptual design of the Milwaukee Corridor is substantially complete and is being documented and finalized in this Project Definition. To continue to advance the project through NEPA clearance and to support achievement of the 2017 implementation timeline, a survey and advanced conceptual design will be completed in the first half of 2015. For advanced conceptual design, the conceptual station layout plans discussed in Chapter 3.0 and presented in Appendix B – Conceptual Station Site Plans will be updated to reflect the conditions documented in the survey to a preliminary level of detail to support the environmental analysis. The Station Design Criteria document and capital cost estimate will also be updated to reflect changes to the conceptual station layouts.

The NEPA analysis and documentation will commence pending the issuance of a task order and Notice to Proceed to Pace's Program Management and Oversight (PMO) contractor. Additional public involvement and stakeholder outreach will be conducted as part of the NEPA effort in order to obtain stakeholder input on impacts, particularly related to affected properties.

14.1.2 Engineering

Pace has prepared an engineering scope of work to be incorporated into a Request for Letters of Interest and Qualifications (LIQ) to procure a project designer. The scope of work is based on the October 10th Station Design Criteria technical memorandum and conceptual station layout drawings. It is anticipated that the Pace Purchasing Department will place the LIQ out for bid in early to mid-January 2015.

Once a designer is procured, a project manager from Pace's Capital, Financing and Infrastructure (CFI) department will manage the work of the designer and the delivery of the engineering scope of work with support from the PMO.

Throughout the engineering phase, Pace's External Relations division and the PMO will support the CFI Project Manager by coordinating community outreach and stakeholder involvement efforts appropriate to the engineering phase, including the development of intergovernmental agreements and the acquisition of any required easements or land.

14.1.3 Construction

As the engineering phase draws to a close, Pace will procure a construction contractor to build the Milwaukee Corridor ART project. In order to achieve the implementation timeline of second quarter 2017 noted in Appendix H – Milwaukee Corridor Implementation Schedule and begin construction in the fourth quarter of 2016, early planning and procurement coordination will be required.

As with the engineering phase work, Pace's External Relations division and the PMO will support the CFI project manager by coordinating community outreach and stakeholder involvement efforts appropriate to the construction phase.

14.1.4 Operations

At the close of project construction, Pace will conduct testing of the capital facilities associated with the Milwaukee Corridor and will train staff on corridor operations. With the beginning of revenue service, Pace will focus on the launch of the service, evaluating the performance of the service and making any necessary adjustments.

14.2 Intergovernmental Coordination

A consistent strategy for negotiating and administering community partnerships will need to be established to facilitate implementation of ART service throughout the Pace service area. Implementation of the Milwaukee Corridor as the first ART corridor will establish a precedent that will eventually be far-reaching in the region.

Milwaukee Corridor ART vehicles will operate on roadways that are under the jurisdiction of CDOT and IDOT. The routes will serve and connect the Village of Niles and the City of Chicago. Continuous involvement and coordination with municipal representatives and the appropriate roadway authorities have been pursued by Pace during the planning phase and will be continued during the NEPA, engineering, and construction phases of the ART project. Roadway design modifications, right-of-way improvements, and the construction of station facilities will require intergovernmental agreements (IGAs) with the partnering entities in advance of construction. Future ART projects will necessitate IGAs between Pace and additional agencies, including other municipalities, county departments of transportation, and the Illinois State Toll Highway Authority (ISTHA), based on the precedents developed for the Milwaukee Corridor ART project.

The partnership framework needed to facilitate the implementation of the Milwaukee Corridor ART will include several parties, each with a unique perspective and ability to facilitate the service. Pace will need to develop, negotiate, and execute IGAs with these parties as appropriate. Generally, coordination and support in the following areas will be critical to ensure maximum mutual benefit from Pace's ART investments:

- Facilitating efficient ART transfers at the Jefferson Park Transit Center in conjunction with CTA's renewal of its Blue Line.

- CDOT and IDOT investments in providing and maintaining appropriate roadway access and conditions, including coordination of right-of-way acquisition or easements with local jurisdictions in advance of construction.
- Support for ART station improvements including construction within the public right-of-way and partially on publicly or privately owned property outside of the right-of-way limits in some station locations.
- Permission for Pace to access and maintain station facilities within the public right-of-way as needed.
- Proactive coordination of agency activities that could impact access to or use of ART station facilities to ensure minimal service impacts.
- Local community investments in "last mile" mobility, ensuring adequate sidewalk and crosswalk access to ART stations.
- Local community investments in making station areas attractive, safe and comfortable, which may include but is not limited to: snow plowing, trash removal, landscape maintenance, security, and public art installation.
- A coordinated strategy to mutually publicize and reinforce the Pace ART brand, while also providing opportunities for local branding and advertising.

14.2.1 Pace Responsibilities

Pace's responsibilities related to implementing ART will include (but not be limited to) the following:

- Station area construction that complies with state and local codes/standards and permitting requirements.
- Timely and reasonable requests for variances, if needed.
- Coordination with local and other authorities, as appropriate, regarding the following:
    - Utility service to the station/shelter during and after construction, and any needed relocation of existing utility infrastructure.
    - Demolition, clearing and earthwork at the station site.
    - Connection to the existing sidewalk network in an ADA-compliant manner adjacent to the station site.
    - Containment, mitigation, or removal and appropriate disposal of any hazardous materials disturbed during station site construction.
    - Installation and removal of any required temporary facilities associated with station site construction.
- Consideration during construction, minimizing disruption to nearby property owners and the existing transportation network as a result of ART construction activities.
- Construction of the station shelter, platform, vertical marker and other associated amenities, which may or may not include the following:
    - Bicycle storage.
    - Trash receptacles.
    - Real-time bus information signage (on the vertical marker).

    - Other transit information signage including periodic updates to local route information as needed (on the vertical marker).
- Maintenance of the vertical marker and associated transit-related signage.
- Guarantee of a minimum number of years of ART service in response to local infrastructure investments (pending discussion between Pace and local agencies).
- Release of ART operations-related liability for local governments and DOTs (pending discussion between Pace and local agencies).

14.2.2 Local Municipality Responsibilities

In order to facilitate ART across the region and in the Milwaukee Corridor, Pace will need to form partnerships with local communities and coordinate on the provision of mutually beneficial improvements. While construction of the station improvements will be Pace's primary responsibility, local municipalities may be relied upon to deliver, facilitate or support some or all of the following:

- Timely reviews and a streamlined permitting process, and approval of reasonable variances when needed (for example, to accommodate the height of the vertical marker, if needed, and ART-related electronic signage).
- Location and marking of any existing underground utilities in the station area prior to commencement of construction (Pace will bear no responsibility for impacts to existing utilities not accurately marked in advance by others).
- Provision and maintenance of sufficient street lighting near the station platform area for visibility of and for ART passengers.
- Facilitation of agreements with JCDecaux (City of Chicago) and IC&SC (Village of Niles) for station and shelter maintenance.
- Regular cleaning and sweeping of ART shelter structure and surrounding area (loose trash, landscape debris), if not provided for in a service agreement with JCDecaux, IC&SC or Titan.
- Regular trash collection (frequency to be negotiated with Pace based upon anticipated ridership level).
- Timely snow and ice removal when needed, including salting/sanding for slip resistance. (The station snow melt system planned for the stations will melt snow falling at a moderate rate, but significant snow events will require manual clearing of snow and ice.)
- Any locally desired security measures, potentially to include: security cameras, emergency call boxes, and emergency response (Pace will provide supporting conduit runs in the standard shelters to enable local installation and maintenance of security related equipment. Pace will be provided "read only" access as requested to video feed from security cameras and will bear no responsibility for responding to calls for emergency assistance).
- Installation and maintenance of public art and/or local maps and information (on panels affixed to the shelter structure, in coordination with Pace).
- Installation and maintenance of local advertising (on panels affixed to the shelter structure, in coordination with Pace).
- Provision of ADA-accessible sidewalk access routes to the station.

- Provision of at least one fully marked and signalized pedestrian crossing across an arterial roadway within 200 feet of a station platform with crossing locations to be mutually agreed upon by Pace and the local municipality.
- Installation of missing segments, or upgrades to existing segments, of the broader pedestrian and bicycle access network within a one-quarter (1/4) mile area surrounding each station location.
- Coordination with local plans and programmed roadway improvements:
    - Transit signal priority (TSP).
    - Turn lane and other roadway configuration coordination.
- Facilitation of use agreements with adjacent private property owners where temporary and/or permanent off-street station access is needed.
- Facilitation of right-of-way acquisition or easement negotiations as needed (and potentially acquiring right-of-way or easements on Pace's behalf, as appropriate).
- Development of transit-supportive land uses along the ART corridor and TOD-friendly zoning amendments.

14.2.3 Transportation Department Responsibilities

Departments of Transportation, in this case IDOT and CDOT, have a critical role to play in facilitating the development of ART, which may include, but not limited to, the following;

- Timely reviews and permitting.
- Allowing reasonable use of and access to the right-of-way:
    - Allowing installation and use / maintenance of structures within the right-of-way.
    - Coordinating with Pace with regards to any changes to the station improvements or access and ensuring that Pace will have continued access to and use of such improvements
    - Facilitating transit signal priority, bus pads, curb bump outs, and other roadway treatments as appropriate.
- Supporting the right-of-way acquisition process.

14.2.4 Transit Agency Responsibilities

Other transit agencies, specifically the Chicago Transit Authority (CTA) and Regional Transit Authority (RTA), also have a role to play in facilitating ART, including (but not limited to) the following:

- Commitment by the CTA through an IGA to implement effective ART transfers at the Jefferson Park Transit Center in conjunction with CTA's renovation of the bus terminals at Jefferson Park:
    - Allocation of current CTA Route 68 bus bay to ART.
    - Relocation of Pace Route 270 to the bus bay occupied by CTA Route 88.
    - Allocation of space for a vertical marker and/or other ART signage.
    - Provision of utilities to support ART at Jefferson Park.

- Commitment by Metra to work cooperatively to facilitate effective ART transfer opportunities at the Jefferson Park Transit Center.
- Commitment by the RTA to support ART throughout the suburban market where demand has been identified:
    - Provide general support and funding for Bus Rapid Transit projects throughout the region.
    - Provide support for interagency signage where two or more transit services meet, facilitating IGAs when needed (i.e. CTA and Pace, Metra and Pace).

14.2.5 Intergovernmental Agreements (IGAs)

ART implementation will require more complex and varied IGAs than have been needed for Pace service coordination in the past, with a new emphasis on the construction and maintenance of physical infrastructure located primarily within the public right-of-way. IGAs with local and agency stakeholders needed to support ART-related improvements may include (but are limited to) those listed below.

IGAs developed for use on the Milwaukee Corridor ART project can serve as templates for the implementation of future ART projects. The IGAs will serve to clarify the respective roles and responsibilities of the various parties involved in ART implementation, both during the construction phase and during ongoing operations. Key aspects of ongoing operations will need to be negotiated and agreed to with executed IGAs prior to the commencement of station construction in each municipality.

Potential Construction IGAs

1. Utility locating, relocation and/or extension.
2. Hazardous material testing, and mitigation or removal as needed.
3. Temporary or permanent easements.
4. Temporary construction facilities and/or detours.
5. Installation of TSP.
6. Roadway construction and maintenance (curb bumpouts, bus pads, etc.).
7. Local provision of pedestrian crossings and sidewalk connections.
8. Upgrades from basic station amenities (custom platform paving, additional bicycle racks, custom railing-mounted panels, etc.), with local municipalities bearing (or securing funding support for) the incremental increase in cost.
9. Public art installation by the local municipality.

Potential Operations IGAs (Ongoing)

1. Utilities
    - Reliable service and emergency procedures
    - Maintenance procedures
    - Billing procedures
    - Cost sharing
2. Local advertising signage
    - Rotation schedule
    - Content standards
    - Revenue sharing
    - Allowable use of Pace and ART brand/logo/colors
3. Local Information signage
    - Installation and rotation schedule
    - Content standards
4. Station and shelter maintenance
    - Cleaning and sweeping (trash, leaves, etc.)
    - Graffiti removal, vandalism repair
5. Trash removal
6. Snow and ice removal
7. Street lighting
    - Ambient light level
    - Emergency backup light source(s)
8. Security equipment
    - Local installation and maintenance
    - Local response to emergency calls
    - Pace access to video feed

15.0 Next Steps

Next steps related to the Milwaukee Corridor ART are varied, and involve many stakeholders. The outcome of the Milwaukee Corridor ART implementation process will lay the groundwork for consistent deployment of ART system-wide. Key steps to continue the implementation process beyond this Project Definition Report include (but are not limited to) the following:

1. Continue the procurement of a design contractor to design the station improvements in the engineering phase.
2. Begin the NEPA analysis process to identify environmental impacts and obtain approval of a documented Categorical Exclusion. Completion of this step will move the project into the engineering phase.
3. Prepare a land survey to delineate the right-of-way and identify parcel boundaries.
4. Identify any easements, land acquisitions, and driveway consolidations needed to support the construction of the stations and shelters.
5. Solicit feedback from aldermen in the 39th, 41st, and 45th wards of the City of Chicago and from the Village of Niles, to finalize the location and configuration of each station and shelter.
6. Update conceptual station layouts, capital cost estimates and station design criteria to incorporate and respond to survey information.
7. Develop intergovernmental agreement (IGA) templates for use in negotiations with local communities, CDOT, IDOT, and other agencies to address the varied aspects of ART, as described above.
8. Complete NEPA documentation process and FTA approval.
9. Award design contract to designer and begin engineering phase.
10. Acquire any easements, right-of-way and complete any driveway closures or consolidations needed to support the construction of the stations and shelters.
11. Complete the engineering for the station improvements.
12. Procurement a construction contractor to fabricate and construct the station improvements.
13. Secure permits for utilities and/or permanent structures in the right-of-way.
14.
15. Construct the station improvements.
16. Complete operational test of facilities.

By employing these steps in a timely manner, Pace can both pursue the specific implementation of ART in the Milwaukee corridor and lay effective groundwork for development of ART in other corridors of the system.

Appendix A – Station Location Selection Study for the Milwaukee Corridor ART (2010)

Station Location Selection for the Milwaukee ART

General Information Existing Route 270

Description of core segment recommended for Arterial Rapid Transit (ART):

In North Cook County Pace Route 270, operated by Pace's Northwest Garage, serves the Jefferson Park CTA Blue Line Station and the UP/Northwest Line Metra Station to Golf Mill Mall and Glenbrook Hospital. Existing routing is as follows:

Milwaukee → Central → Harrison → Dee →Dearlove →Lake → Pfingsten → Willow → Sanders.

The core segment recommended for ART would provide northwest/southwest service along Milwaukee Avenue between Jefferson Park (Chicago)[*] and Golf Mill (Niles). The portion of the route operating north of Golf Mill Mall would be structured as a local fixed route service or circulator in the short-term of ART network development.

Existing Route 270 Statistics

One Way Core Route Mileage:	**7**
Number of Peak Buses	**8 in the AM/10 in the PM**
Blocks	**30 All Day**
One Way Core Schedule Running Time (All Day)	**27 Minutes**
Current Weekday Frequency, Peak/Off Peak	**Peak: 10 Minute, Off Peak: 20 Minute**
Current Weekend Core Frequency, Peak/Off Peak	**Peak: 20 Minute, Off Peak: 20 Minute**
Hours of Core Operation, Weekday, Saturday, Sunday	**Weekday: 4:56 AM - 11:14 PM**
	Saturday 5:25 AM - 11:43 PM
	Sunday 6:10 AM - 11:25 PM

Railroad Grade Crossing Locations:
None

Major Ridership Generators for Proposed Service:
Jefferson Park CTA/Metra Stations, Oak Mill Mall, Golf Mill Mall.

[*] Route 270 enters the Chicago City limits from Milwaukee and Albion to Jefferson Park. CTA Coordination will be required between Jefferson Park and Milwaukee and Imlay CTA turn around with CTA #56A

Adjacent and Connecting Service

Other Routes operating on Milwaukee Avenue or parallel roads:

- **CTA Route 56A:** Full overlap with 270 on Milwaukee Avenue between Jefferson Park and Milwaukee and Imlay.
- **CTA Route 68:** Operates parallel to 270 on Northwest Highway between Jefferson Park and Park Ridge.

Pace, CTA and Metra Connections:

- At Jefferson Park, 270 connects with the CTA Blue Line, CTA #56, 56A, 68, 81, 81W, 85, 85A, 88, 91 and 92, Pace Routes 226 and 225 and with the Metra UP/Northwest Line.
- At Milwaukee and Central, 270 connect with Pace Routes 225 and 226.
- At Milwaukee and Devon, 270 connect with CTA #56A.
- At Milwaukee and Touhy, 270 connect with Pace Route 290 and Niles 411 & 413.
- At Milwaukee and Harlem/Howard connect with Pace Route 423 and Niles Free 411.
- At Milwaukee and Oakton, 270 connect with Pace Route 226.
- At Milwaukee and Dempster, 270 connect with Pace Route 250.
- At Milwaukee and Main, 270 connect with Niles Free Bus 411.
- At Golf Mill Mall, 270 connect with Pace Routes 208, 240, 241, Niles Free Bus Service 411 and 412.

Recommendations for Implementation of Milwaukee ART

- This route was part of the Village of Niles 2005 Milwaukee Avenue Corridor Study. The Camiros Consulting team worked within the confines of this study to create and foster an environment that encourages travel within the corridor using public transportation as the primary means of travel. Recommend coordinating with this study in developing station locations.
- Coordination with CTA and City of Chicago on stops located within City of Chicago is recommended;
- Coordination with the Village of Niles on stops located within the Village of Niles Chicago is recommended;
- The Niles Free Bus service Routes 411, 412 & 413 are recommended to be restructured to become the feeder service to the main line ART

Issues to be resolved for Implementation of Milwaukee ART

- Service to Glenbrook Hospital needs to be addressed.
- Work with CTA in securing a permanent bus bay close to walk ways leading to Jefferson Park Station. Currently Route 270 utilizes the bay farthest east at the station.

- Golf Mill Mall needs to be reviewed for new end point/transfer location with enough space to house ART service accompanied by local service and potential future ART service along Golf Road.
- Specifically connection with Route 272 at Golf Mill Mall will need to be resolved in terms of station location.

ART Station Selection Process

Preparation

Prior to going out in the field staff dedicated approximately 16 hours to preparing and evaluating ridership data at all stops along the proposed ART corridor. Eight locations (in addition to the 2 terminals) were identified as potential station locations based on the following reasons:

- High Ridership activity (Typically any stop with more than 30 riders per day spaced at least 1 mile from the previous stop).
- Distance from previous stop (The goal is to maintain approximately 0.5 miles between proposed station locations)
- Connections with existing service

Each location was evaluated in the field to determine if it was the optimal place to install an ART station.

During March and April, the Pace ART station location selection team performed 5 field trips. During each field trip the selection team was able to evaluate approximately three potential station locations in the north and southbound directions (total of 6 locations).

ART station location selection team included at various times:

- Adam Eichenberger, team leader, (Senior Planner/ART Station Location Project Manager)
- Charlotte O'Donnell (Planner II and note recorder)
- Mike Strauss (Northwest Division Safety Training Manger)
- Leo Miranda (Northwest Division Safety Training Manager)
- Oliver Frye (Northwest Dispatch/Supervisor)
- Phil Zawada (Sign & Shelter Maintenance Technician/provided all pictures of the corridor stops)
- Taqhi Mohammed (Transportation Engineer)
- Karen Shinners (Planning Supervisor)
- Robert Huffman (Manager Service Planning)

Stop selection:[†]

The selection team evaluated the proposed station locations using the following principles:

1. Pace's goal is to improve travel time by applying Transit Signal Priority (TSP) on ART routes; therefore, the preferred station location is far side of the intersection.
2. The goal is to locate ART stations adjacent to major ridership generators in order to maximize ridership while improving travel time.
3. Proposed stations must be located in an area that is safe for both pedestrians and Pace vehicles.

[†]Based on the experiences of this process and results a data collection template for ART station location selection is being developed. This template and the station selection process will be refined on the Dempster corridor.

In addition, the following criteria were also evaluated:

- Are the stations located at intervals that are spaced far enough apart to realize faster travel times but allow accessibility?
- Is the proposed station located in the City of Chicago or not?
- What is the density of the surrounding area?
- What are the land use characteristics of the surrounding area?
- Do sidewalk connections currently exist to the proposed station location?

Below are the recommendations of the team as of April 1, 2010.

ART Station Selection: Milwaukee ART

Milwaukee Ave at Central Ave **Date: March 4, 2010**

DIRECTION: NB__X__ SB____

CURRENT STOP: Nearside__X__ Farside_____ Not a bus stop____

RECOMMENDED STOP: Nearside___ Farside__X

CURRENT BUS ROUTES AT THIS LOCATION: CTA 56 A, Pace Route 270

SIGNALIZED INTERSECTION: Yes__X__ No____

IS TSP PLANNED FOR THIS INTERSECTION: Yes__X__ No____

LIST CURRENT AMENITIES AT THIS STOP: Sign____ shelter____ ad shelter____

pad____ bench____ sidewalk____ transit light on pole____ other_____

CURRENT AVERAGE DAILY PASSENGER ACTIVITY: 49 passengers

MILEAGE: Jefferson Park to Recommended Stop = .6

DESCRIBE WHAT IS NEXT TO PROPOSED STOP: Foremost Liquor Center

COMMENTS ABOUT PROPOSED STOP:

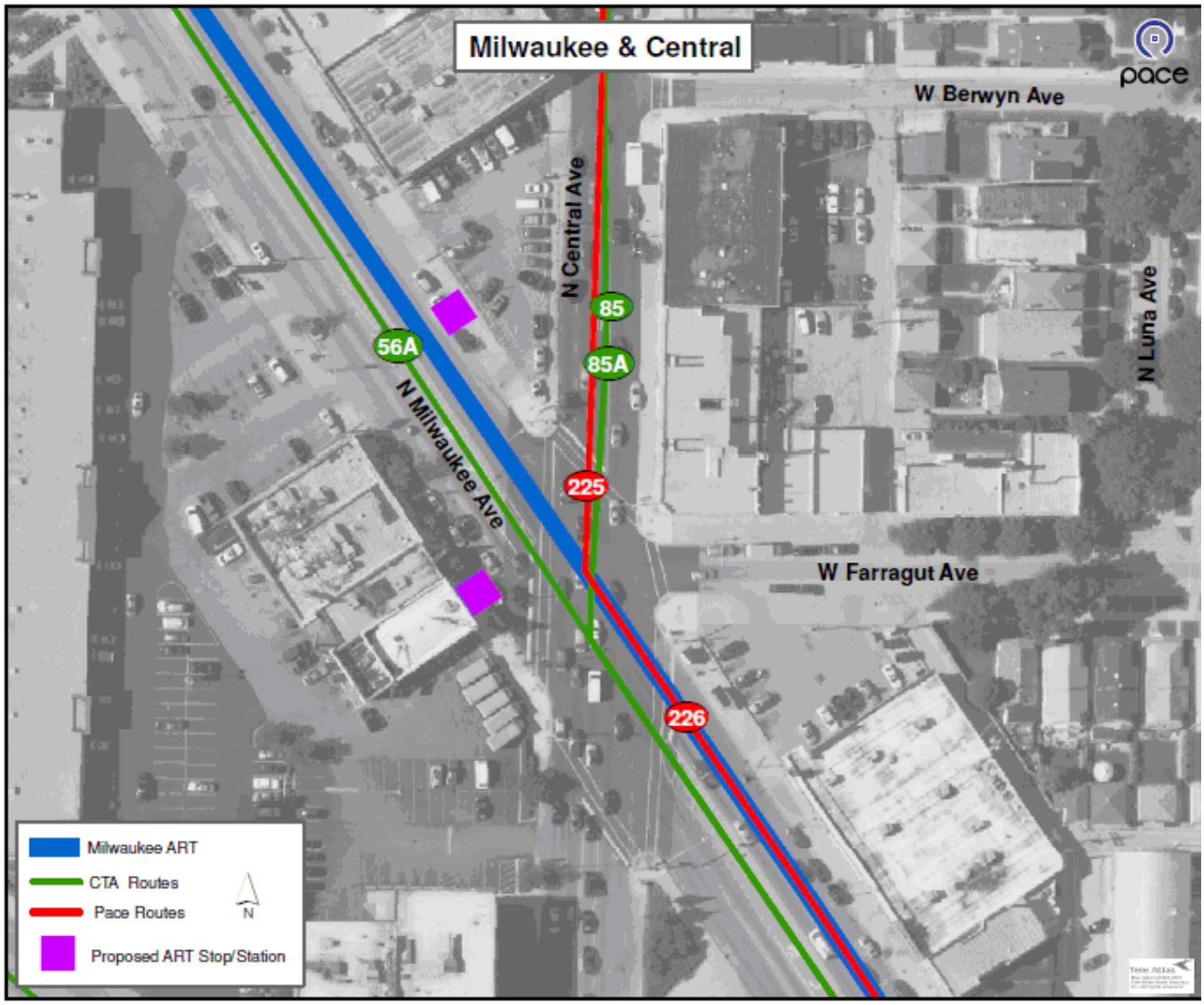
- This stop is within City of Chicago it is recommended that stop be place here to provide connectivity with Pace Routes 225 and 226.
- Space is limited at this location for a potential station area.
- A farside stop is recommended to support TSP operations.

ADJACENT LANDUSES

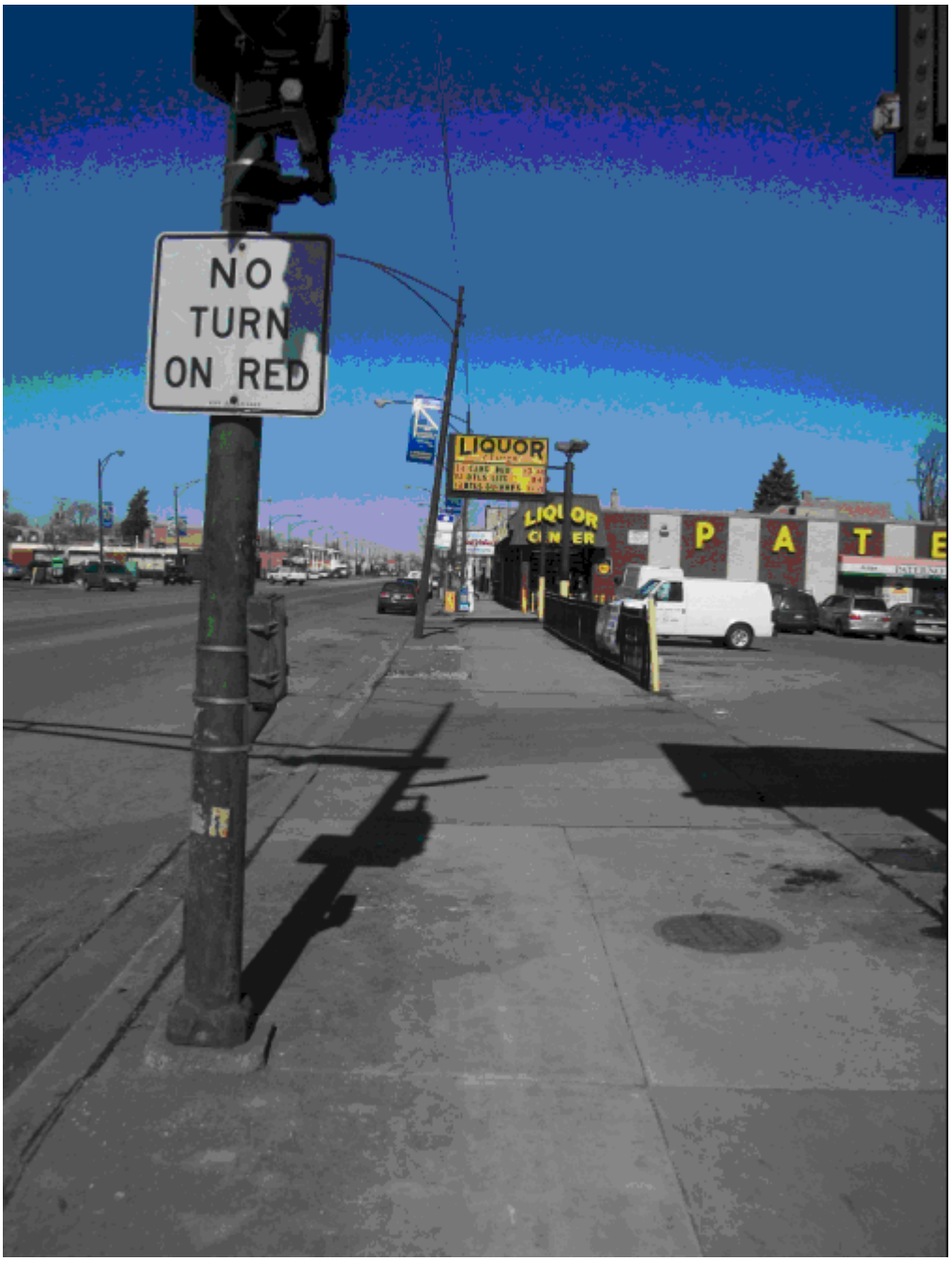
The proposed stop has high density [‡]suburban commercial uses with small setbacks and good sidewalk connectivity. Just east of the intersection there are medium density single family residences situated on narrow rectangular lots.

[‡] High to low density is understood in the suburban context.

Milwaukee at Central Northbound



Milwaukee at Central Northbound



ART Station Selection: Milwaukee ART

Milwaukee Ave at Central Ave **Date: March 4, 2010**

DIRECTION: NB___ SB__X

CURRENT STOP: Nearside__X__ Farside_____ Not a bus stop____

RECOMMENDED STOP: Nearside __X__ Farside ____

CURRENT BUS ROUTES AT THIS LOCATION: CTA 56 A, Pace Route 270

SIGNALIZED INTERSECTION: Yes__X__ No____

IS TSP PLANNED FOR THIS INTERSECTION: Yes__X__ No____

LIST CURRENT AMENITIES AT THIS STOP: Sign __X__ shelter____ ad shelter____

pad____ bench____ sidewalk____ transit light on pole____ other_____

CURRENT AVERAGE DAILY PASSENGER ACTIVITY: 73 passengers

MILEAGE: From Milwaukee and Admore to recommended stop: .8

DESCRIBE WHAT IS NEXT TO PROPOSED STOP: American – Thermal Windows & Doors, Western Union Currency Exchange & Blue Angel Restaurant

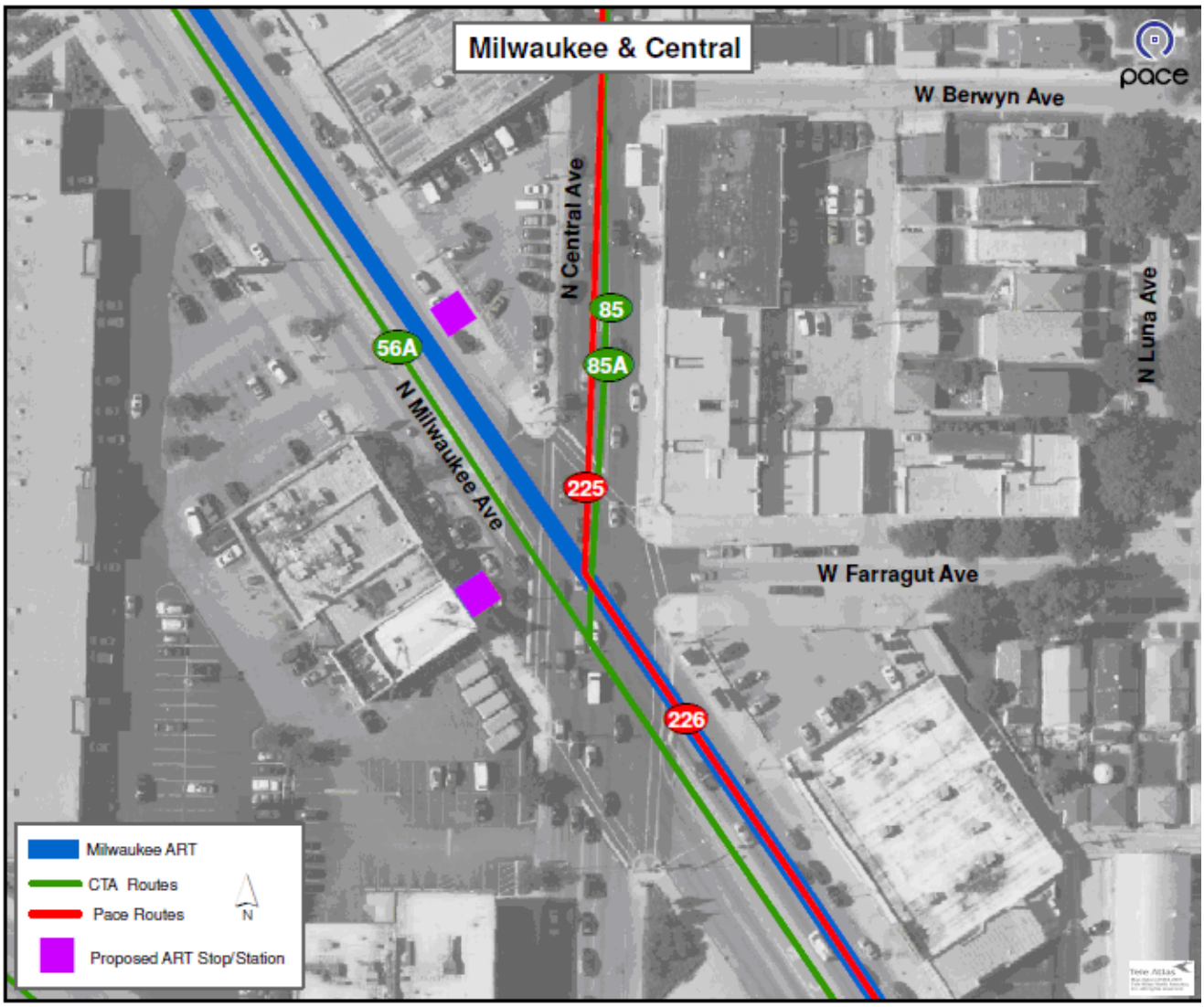
COMMENTS ABOUT PROPOSED STOP:

- This stop is within City of Chicago
- Connections can be made with Pace Routes 225 and 226
- Space is limited at this location for a potential station area.
- Existing sidewalk connections to proposed station area
- A farside stop is recommended to support TSP operations.

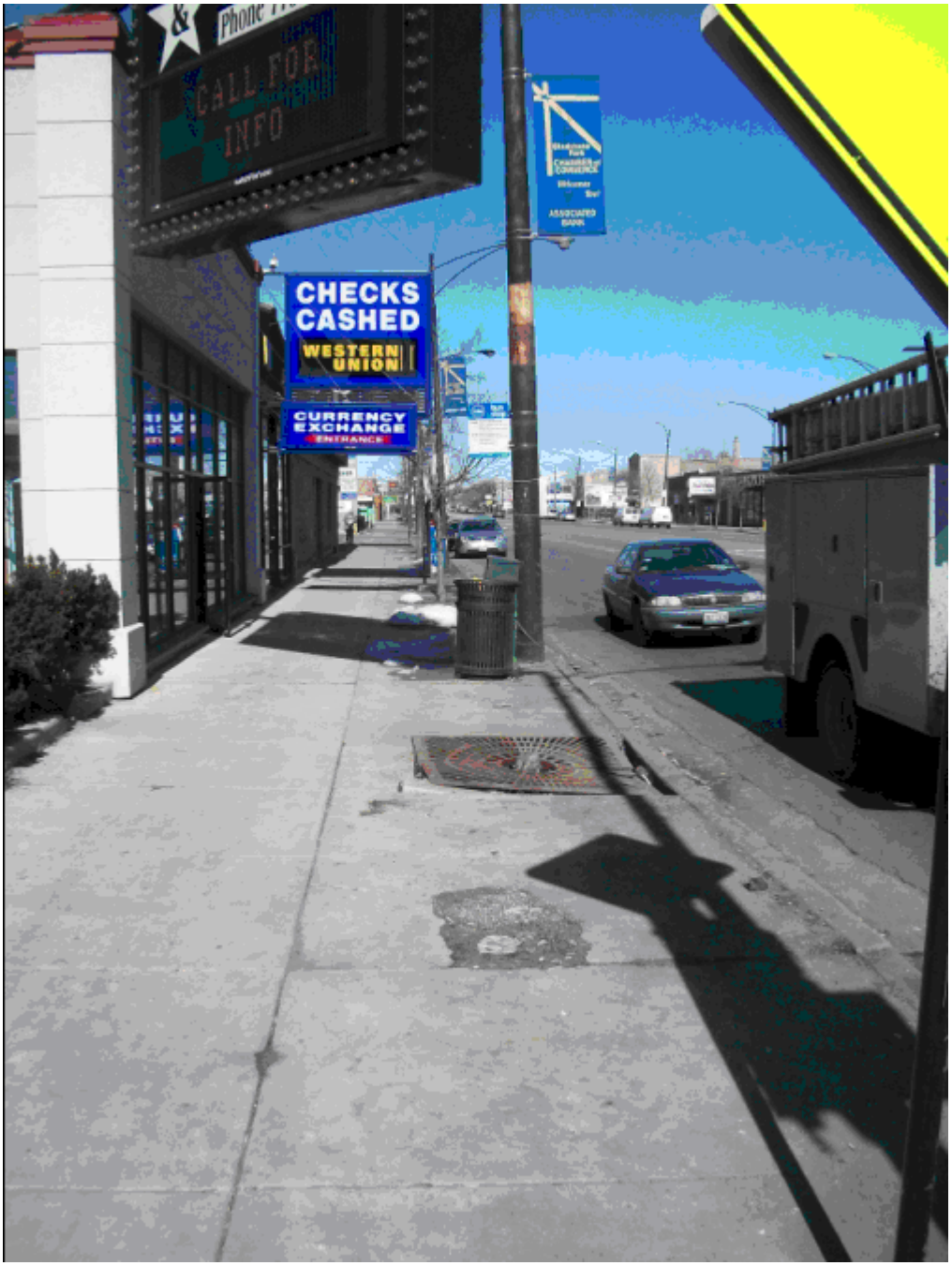
ADJACENT LANDUSES

The proposed stop has high density suburban commercial uses with small setbacks and good sidewalk connectivity. Just east of the intersection there are medium density single family residences situated on narrow rectangular lots.

Milwaukee at Central Southbound



Milwaukee at Central Southbound



The view is looking north on southbound Milwaukee just before Central Avenue. Stop would be located just south of Western Union location.

ART Station Selection: Milwaukee ART

Milwaukee Ave at Austin Ave **Date: March 4, 2010**

DIRECTION: NB X SB____

CURRENT STOP: Nearside__X__ Farside_____ Not a bus stop____

RECOMMENDED STOP: Nearside ____ Farside__X

CURRENT BUS ROUTES AT THIS LOCATION: CTA 56 A, Pace Route 270

SIGNALIZED INTERSECTION: Yes__X__ No____

IS TSP PLANNED FOR THIS INTERSECTION: Yes__X__ No____

LIST CURRENT AMENITIES AT THIS STOP: Sign __X__ shelter____ ad shelter____

pad____ bench____ sidewalk____ transit light on pole____ other_____

CURRENT AVERAGE DAILY PASSENGER ACTIVITY: 54 passengers

MILEAGE: Milwaukee and Central to recommended stop: .8

DESCRIBE WHAT IS NEXT TO PROPOSED STOP: Chase Bank is north of the Milwaukee Aveune/Austin intersection and the stop is to be placed on parkway adjacent to the sidewalk. East of the side walk is the Chase Bank parking lot.

COMMENTS ABOUT PROPOSED STOP:

- This stop is within City of Chicago.
- Connections can be made with CTA Route 56A
- Ranks high in passenger demand due to dense business and residential area.
- Existing sidewalk connections to proposed station area
- A farside stop is recommended to support TSP operations

ADJACENT LANDUSES

The proposed stop has high density commercial uses with small setbacks and good sidewalk connectivity. The streets adjacent to the intersection contain medium density single family residences as well as small apartment buildings situated on narrow rectangular lots.

Milwaukee & Austin Northbound

Milwaukee & Austin Northbound

The view is looking north on Milwaukee just after Austin Avenue. Stop would be located on parkway south of Chase Bank/west of shown parking lot.

ART Station Selection: Milwaukee ART

Milwaukee at Ardmore **Date: March 4, 2010**

DIRECTION: NB___ SB__X

CURRENT STOP: Nearside__X__ Farside____ Not a bus stop____

RECOMMENDED STOP: Nearside ____ Farside__X

CURRENT BUS ROUTES AT THIS LOCATION: CTA 56 A, Pace Route 270

SIGNALIZED INTERSECTION: Yes__X__ No____

IS TSP PLANNED FOR THIS INTERSECTION: Yes__X__ No____

LIST CURRENT AMENITIES AT THIS STOP: Sign __X__ shelter____ ad shelter____

pad____ bench____ sidewalk____ transit light on pole____ other_____

CURRENT AVERAGE DAILY PASSENGER ACTIVITY: 69 passengers

MILEAGE: Milwaukee and Haft to Recommended Stop = .8

DESCRIBE WHAT IS NEXT TO PROPOSED STOP: Title Loans building.

COMMENTS ABOUT PROPOSED STOP:

- This stop is within City of Chicago,
- Ranks high in passenger demand due to dense business and residential area.
- Connections can be made with CTA Route 56A
- Existing sidewalk connections to proposed station area
- A farside stop is recommended to support TSP operations

ADJACENT LANDUSES

The proposed stop has high to medium density commercial uses as well as some mixed use structures with medium density apartment housing occupying the upper stories of buildings. The streets adjacent to the intersection contain medium density single family residences as well as small apartment buildings situated on narrow rectangular lots.

Milwaukee & Ardmore Southbound

Milwaukee & Ardmore Southbound

The view is looking north on Milwaukee just after Ardmore Avenue. Stop would be located on adjacent parkway by Title Loans Company.

ART Station Selection: Milwaukee ART

Milwaukee at Highland Ave **Date: March 4, 2010**

DIRECTION: NB__X__ SB___

CURRENT STOP: Nearside__X__ Farside____ Not a bus stop____

RECOMMENDED STOP: Nearside __X__ Farside___

CURRENT BUS ROUTES AT THIS LOCATION: CTA 56 A, Pace Route 270

SIGNALIZED INTERSECTION: Yes____ No__X

IS TSP PLANNED FOR THIS INTERSECTION: Yes____ No____

LIST CURRENT AMENITIES AT THIS STOP: Sign __X__shelter____ ad shelter____

pad____ bench____ sidewalk____ transit light on pole____ other_____

CURRENT AVERAGE DAILY PASSENGER ACTIVITY: 157 passengers (pedestrian sidewalk links lead to the proposed stop from Devon & Imlay).

MILEAGE: Milwaukee and Austin to Recommended Stop = .8

DESCRIBE WHAT IS NEXT TO PROPOSED STOP: National City Bank and some mixed residential. Highland is roughly 50 feet north of the current and proposed stop.

COMMENTS ABOUT PROPOSED STOP:

- Stop is within City of Chicago. It is the first/last stop at the edge of suburbs/City of Chicago.
- Connections can be made with CTA Route 56A
- Stop ranks high in passenger demand
- The stop at the CTA/Imlay turnaround was evaluated and not recommended due to the low passenger activity.
- Existing sidewalk connections to proposed station area
- Due to the location of a forest preserve at the farside of Devon Ave a nearside stop was proposed at Highland Ave to still realize the benefits of TSP at Devon even though a farside stop at this intersection was not feasible. This stop supports TSP operation.

ADJACENT LANDUSES

The proposed stop has high to medium density commercial uses as well as some mixed use structures with medium density apartment housing occupying the upper stories of buildings. The streets adjacent to the intersection contain medium density single family residences as well as small apartment buildings situated on narrow rectangular lots.

Milwaukee & Highland Northbound

Milwaukee & Highland Northbound

South View

North View

Show two views one looking north and one looking south both about 50 feet from Highland/Milwaukee. Stop would be located on adjacent parkway next to mixed uses residential and businesses.

ART Station Selection: Milwaukee ART

Milwaukee Ave at Haft **Date: March 4, 2010**

DIRECTION: NB___ SB_X_

CURRENT STOP: Nearside__X___ Farside____ Not a bus stop____

RECOMMENDED STOP: Nearside ____ Farside _X_

CURRENT BUS ROUTES AT THIS LOCATION: CTA 56 A, Pace Route 270

SIGNALIZED INTERSECTION: Yes____ No__X

IS TSP PLANNED FOR THIS INTERSECTION: Yes____ No____

LIST CURRENT AMENITIES AT THIS STOP: Sign __X__shelter__X_ ad shelter__X_

pad____ bench____ sidewalk____ transit light on pole____ other_____

CURRENT AVERAGE DAILY PASSENGER ACTIVITY: 123 passengers

MILEAGE: Milwaukee and Touhy to Recommended Stop = 1.4

DESCRIBE WHAT IS NEXT TO PROPOSED STOP: First Chicago Bank and Trust & Dunkin Donuts.

COMMENTS ABOUT PROPOSED STOP:

- Stop is within City of Chicago. It is needed due to the connectivity with CTA service at Devon/Milwaukee it is the last stop at the edge of suburbs/City of Chicago.
- The stop ranks high on passenger demand.
- CTA 56A continues south along Milwaukee to Jefferson Park. Currently between Jefferson Park and Devon southbound buses will only drop off passengers at posted stops (no boardings) and northbound buses will only pick up passengers at posted stops (no off's) upon signal to driver.
- The stop at CTA/Imlay turnaround was evaluated and not recommended due to the low passenger activity
- Good sidewalk connections exist.
- A far side stop is recommended to support TSP operations

ADJACENT LANDUSES

The proposed stop has both high and medium density commercial uses as well as some mixed use structures with medium density apartment housing occupying the upper stories of buildings. The Dominicks grocery store located just to the north of this intersection is the dominate land use in the area however.

Milwaukee & Haft Southbound

Milwaukee & Haft Southbound

The view is looking south on Milwaukee just before Haft. Stop would be located as shown in this picture.

ART Station Selection: Milwaukee ART

Milwaukee Ave at Touhy Ave **Date: March 4, 2010**

DIRECTION: NB__X__ SB___

CURRENT STOP: Nearside__X__ Farside____ Not a bus stop____

RECOMMENDED STOP: Nearside __X__ Farside___

CURRENT BUS ROUTES AT THIS LOCATION: Pace Route 270 and 290

SIGNALIZED INTERSECTION: Yes__X__ No____

IS TSP PLANNED FOR THIS INTERSECTION: Yes__X__ No____

LIST CURRENT AMENITIES AT THIS STOP: Sign __X__shelter____ ad shelter____

pad____ bench____ sidewalk____ transit light on pole____ other_____

CURRENT AVERAGE DAILY PASSENGER ACTIVITY: 209 passengers

MILEAGE: Milwaukee and Highland to Recommended Stop = 1.1

DESCRIBE WHAT IS NEXT TO PROPOSED STOP: CVS & currently unoccupied Bank.

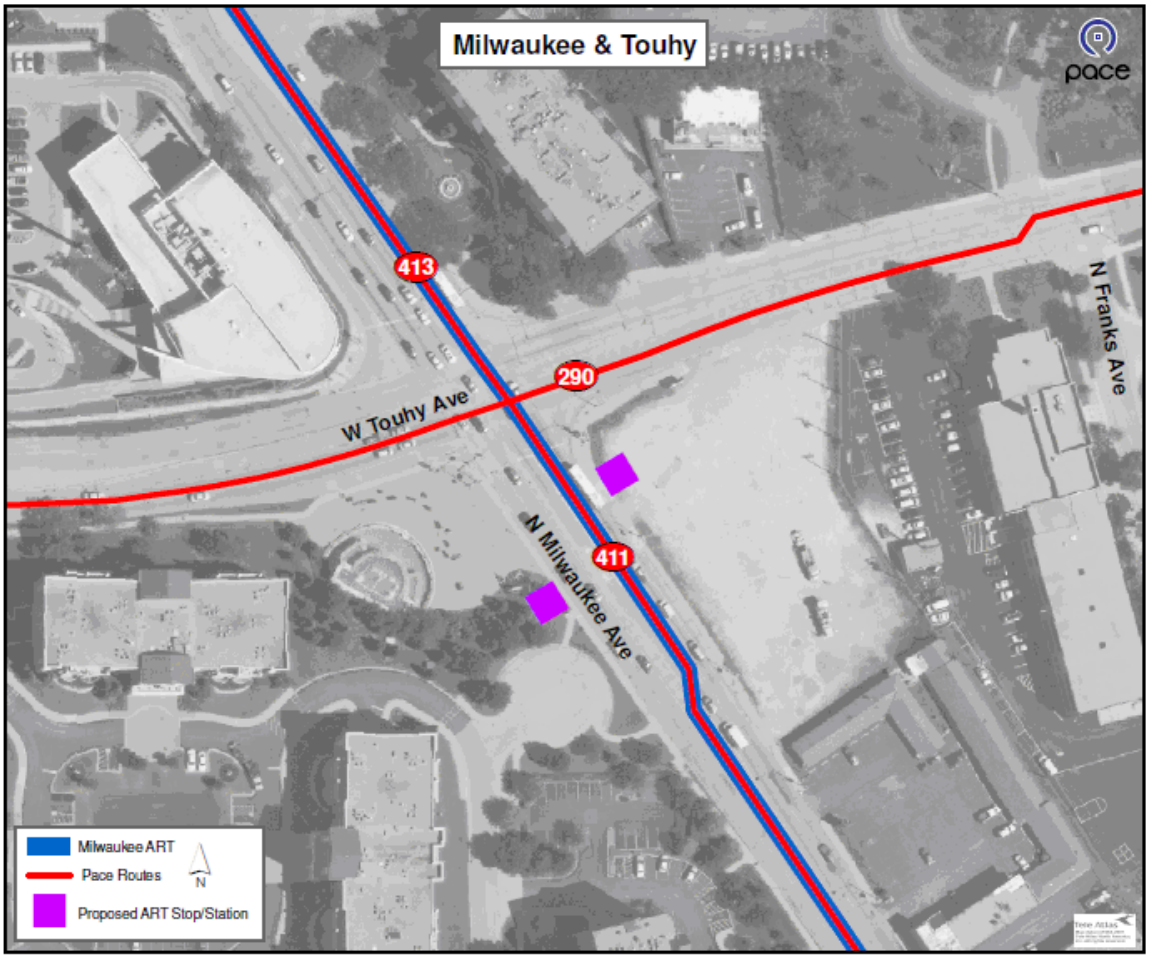
COMMENTS ABOUT PROPOSED STOP:

- A nearside stop was selected at Touhy northbound due to the lack of available land farside
- Passengers able to transfer to eastbound Route 290 at the nearside stop
- Sidewalk connections do exist but developments are situated along access roads more conducive to automobile usage

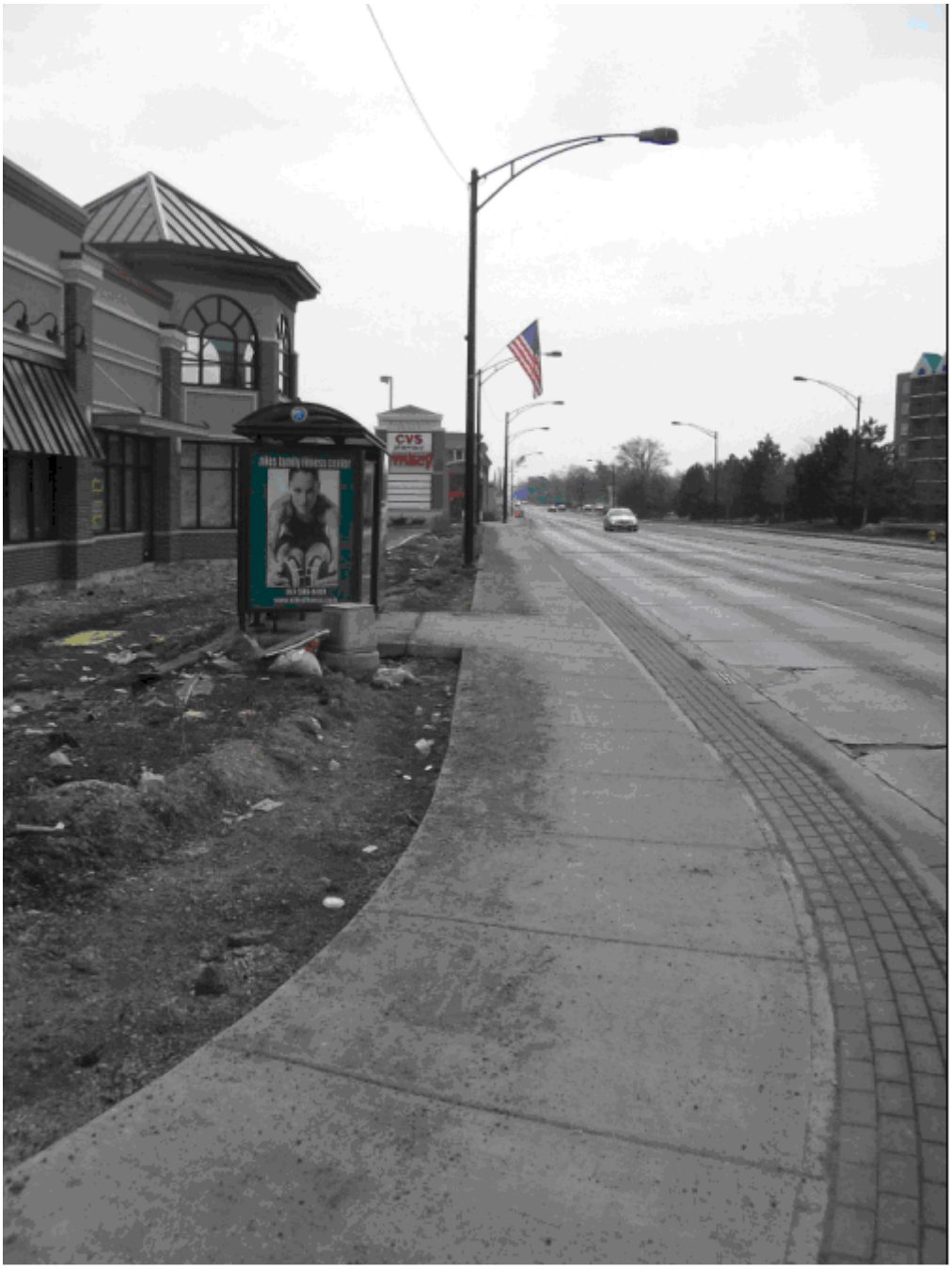
ADJACENT LANDUSES

The adjacent land uses are medium density commercial and high density residential apartment housing. The intersection also contains some municipal facilities with relatively small setbacks and good sidewalk connectivity. As you move from the intersection densities begin to decline and setbacks increase.

Milwaukee & Touhy Northbound



Milwaukee & Touhy Northbound



The view is looking south on Milwaukee. Stop would be located as shown in this picture.

ART Station Selection: Milwaukee ART

Milwaukee Ave at Touhy Ave **Date: March 4, 2010**

DIRECTION: NB___ SB_X_

CURRENT STOP: Nearside_____ Farside__X__ Not a bus stop____

RECOMMENDED STOP: Nearside ___ Farside__X_

CURRENT BUS ROUTES AT THIS LOCATION: Pace Route 270 and 290

SIGNALIZED INTERSECTION: Yes__X__ No____

IS TSP PLANNED FOR THIS INTERSECTION: Yes__X__ No____

LIST CURRENT AMENITIES AT THIS STOP: Sign __X__shelter__X _ ad shelter____ pad_ X ___ bench____ sidewalk_X ___ transit light on pole____ other_____

CURRENT AVERAGE DAILY PASSENGER ACTIVITY: 253 passengers

MILEAGE: Milwaukee and Harlem to Recommended Stop = .5

DESCRIBE WHAT IS NEXT TO PROPOSED STOP: War Memorial Apartments.

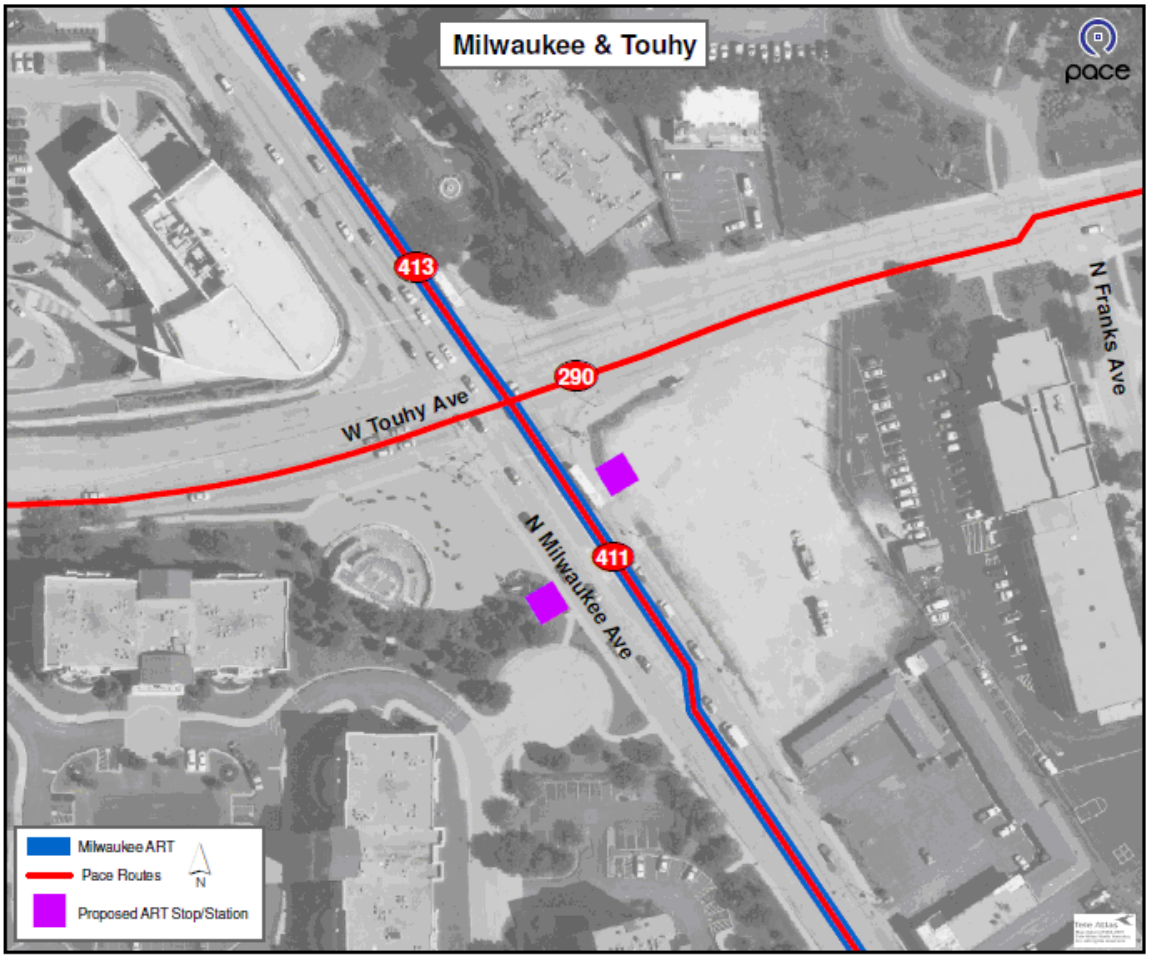
COMMENTS ABOUT PROPOSED STOP:

- Existing public plaza potential station area
- Sidewalk connections do exist but developments are situated along access roads more conducive to automobile access.
- A farside stop is recommended to support TSP operations

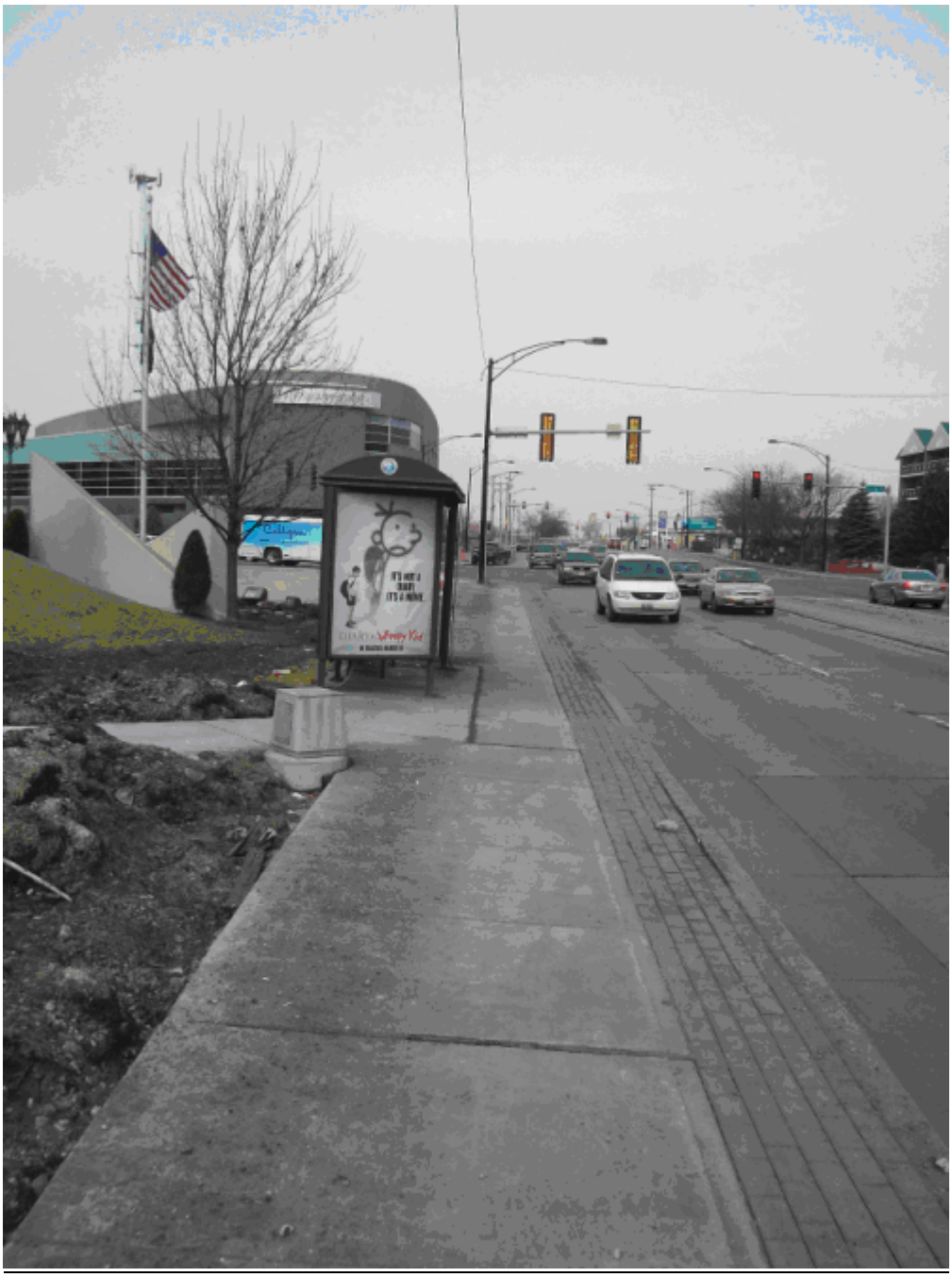
ADJACENT LANDUSES

The adjacent land uses are medium density commercial and high density residential apartment housing. The intersection also contains some municipal facilities with relatively small setbacks and good sidewalk connectivity. As you move from the intersection densities begin to decline and setbacks increase.

Milwaukee & Touhy Southbound



Milwaukee & Touhy Southbound



The view is looking north on Milwaukee just before Touhy. Stop would be located as shown in this picture.

ART Station Selection: Milwaukee ART

Milwaukee Ave at Howard St **Date: March 4, 2010**

DIRECTION: NB__X__ SB___

CURRENT STOP: Nearside__X__ Farside____ Not a bus stop____

RECOMMENDED STOP: Nearside ____ Farside__X_

CURRENT BUS ROUTES AT THIS LOCATION: Route 226 comes 1 block south on at Harlem.

SIGNALIZED INTERSECTION: Yes__X__ No____

IS TSP PLANNED FOR THIS INTERSECTION: Yes__X__ No____

LIST CURRENT AMENITIES AT THIS STOP: Sign ___shelter____ ad shelter____

pad____ bench____ sidewalk____ transit light on pole____ other_____

CURRENT AVERAGE DAILY PASSENGER ACTIVITY: 68 passengers

MILEAGE: Milwaukee and Touhy to Recommended Stop = .6

DESCRIBE WHAT IS NEXT TO PROPOSED STOP: Parkway Bank.

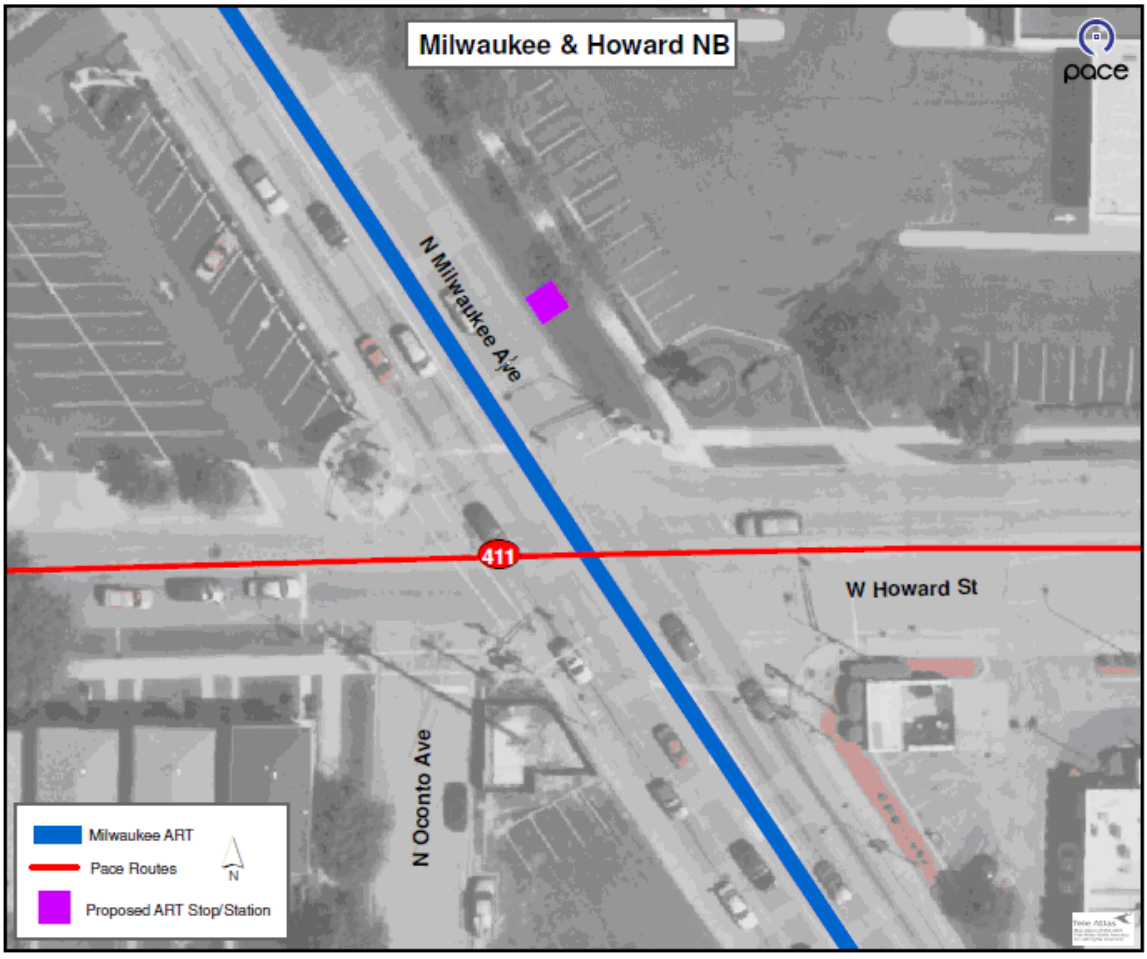
COMMENTS ABOUT PROPOSED STOP:

- Location was chosen over Harlem due to the availability of parkway for an ART station
- Connects with Route 226
- Sidewalk access to uses at this intersection is available to a certain extent; however, pedestrians are forced to traverse parking lots to access buildings
- A farside stop is recommended to support TSP operations

ADJACENT LANDUSES

There are a variety of commercial uses at this intersection all with large parking areas.
The adjacent neighborhoods contain medium density single family homes and small apartment buildings situation on narrow rectangular lots.

Milwaukee & Howard Northbound



Milwaukee & Howard Northbound

The view is looking south on Milwaukee. Stop would be located along the parkway area

ART Station Selection: Milwaukee ART

Milwaukee Ave at Harlem Ave **Date: March 4, 2010**

DIRECTION: NB___ SB_X_

CURRENT STOP: Nearside_____ Farside__X__ Not a bus stop____

RECOMMENDED STOP: Nearside ___ Farside__X_

CURRENT BUS ROUTES AT THIS LOCATION: Pace Route 270 and 423

SIGNALIZED INTERSECTION: Yes__X__ No____

IS TSP PLANNED FOR THIS INTERSECTION: Yes__X__ No____

LIST CURRENT AMENITIES AT THIS STOP: Sign __X__shelter__X _ ad shelter_X__ pad_ X ___ bench____ sidewalk_X ___ transit light on pole____ other_____

CURRENT AVERAGE DAILY PASSENGER ACTIVITY: 86 passengers

MILEAGE: Milwaukee and Oak Mill Mall to Recommended Stop = .5

DESCRIBE WHAT IS NEXT TO PROPOSED STOP: Strip Mall

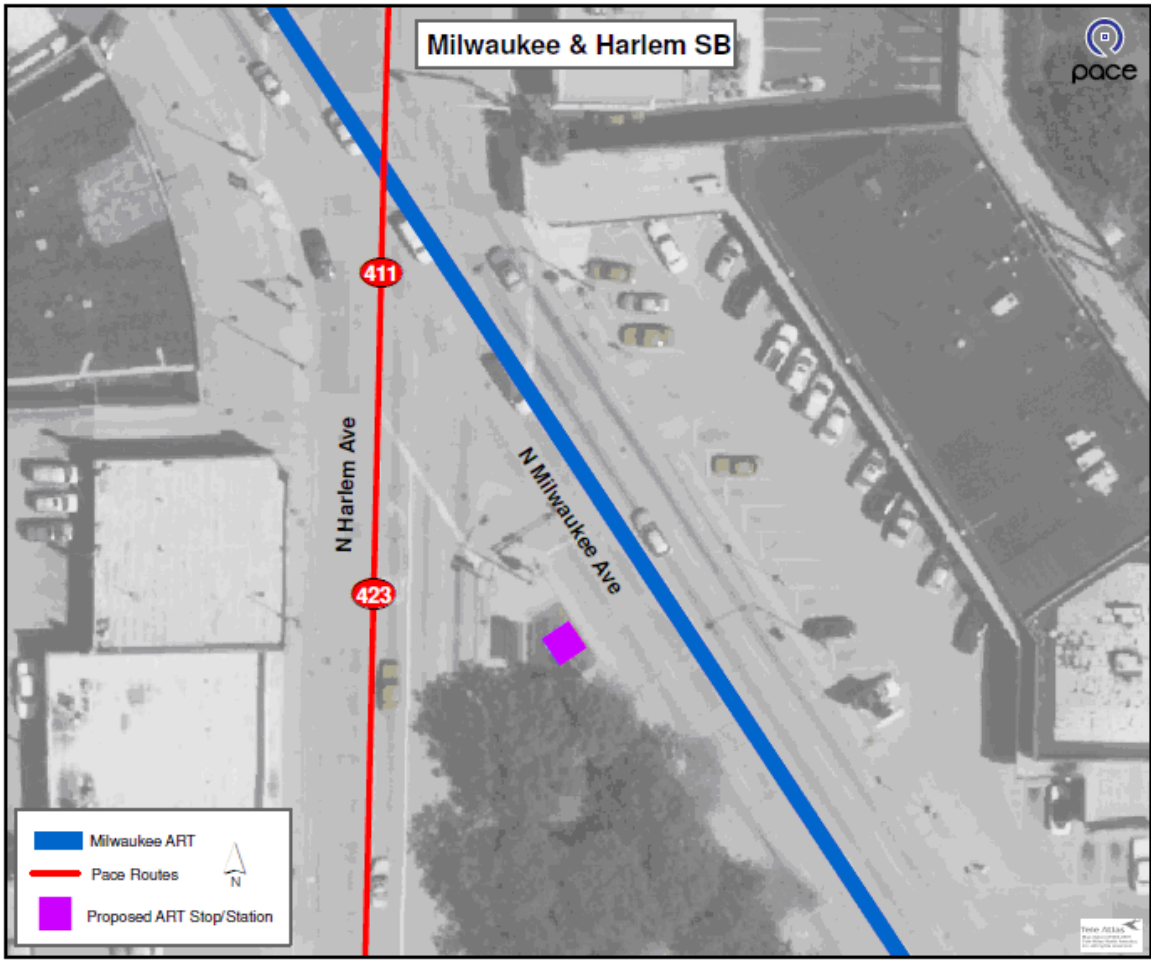
COMMENTS ABOUT PROPOSED STOP:

- Connections can be made with Route 423
- Ample parkway for station location
- Sidewalk access is available at proposed station area
- A farside stop is recommend to support TSP operations

ADJACENT LANDUSES

The majority of commercial uses at the intersection has small setbacks and are easily accessible by pedestrians. The adjacent neighborhoods contain medium density single family homes and small apartment buildings situation on narrow rectangular lots

Milwaukee & Harlem Southbound



Milwaukee & Harlem Southbound

The view is looking south on Milwaukee just after Harlem. Stop would be located as shown in this picture.

ART Station Selection: Milwaukee ART

Milwaukee Ave at Oakton Ave **Date: March 4, 2010**

DIRECTION: NB__X__ SB___

CURRENT STOP: Nearside__X__ Farside____ Not a bus stop____

RECOMMENDED STOP: Nearside ____ Farside__X_

CURRENT BUS ROUTES AT THIS LOCATION: Route 226 and 270

SIGNALIZED INTERSECTION: Yes__X__ No____

IS TSP PLANNED FOR THIS INTERSECTION: Yes__X__ No____

LIST CURRENT AMENITIES AT THIS STOP: Sign ___shelter____ ad shelter____

pad____ bench____ sidewalk____ transit light on pole____ other_____

CURRENT AVERAGE DAILY PASSENGER ACTIVITY: 250 passengers

MILEAGE: Milwaukee and Howard to Recommended Stop = .6

DESCRIBE WHAT IS NEXT TO PROPOSED STOP: Walgreens Pharmacy

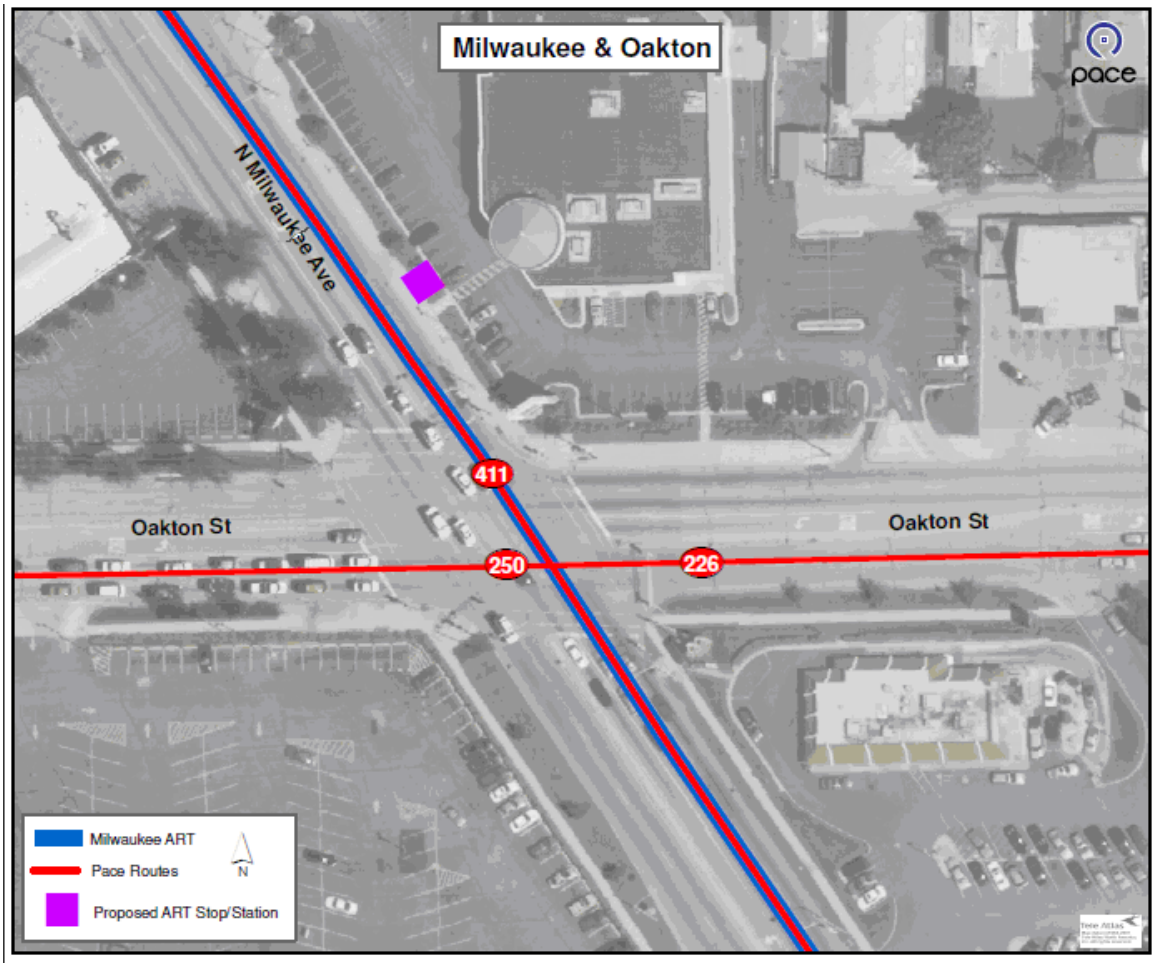
COMMENTS ABOUT PROPOSED STOP:

- Connections can be made with Route 226
- Available parkway exists for potential station
- Sidewalk connections to proposed station area are in place
- A farside stop is recommended to support TSP operations

ADJACENT LANDUSES

The adjacent neighborhoods contain medium density single family homes and small apartment buildings situation on narrow rectangular lots.

Milwaukee & Oakton Northbound



Milwaukee & Oakton Northbound

The view is looking south on Milwaukee just before after Oakton. Stop would be located in parkway area.

ART Station Selection: Milwaukee ART

Milwaukee Ave and Oak Mill Mall **Date: March 4, 2010**

DIRECTION: NB___ SB_X_

CURRENT STOP: Nearside__X__ Farside____ Not a bus stop____

RECOMMENDED STOP: Nearside ___ Farside__X_

CURRENT BUS ROUTES AT THIS LOCATION: Pace Route 270. Route 226 is less than a mile north of the proposed stop

SIGNALIZED INTERSECTION: Yes__X__ No____

IS TSP PLANNED FOR THIS INTERSECTION: Yes__X__ No____

LIST CURRENT AMENITIES AT THIS STOP: Sign __X__shelter__X _ ad shelter_X__ pad_ X ___ bench____ sidewalk_X ___ transit light on pole____ other_____

CURRENT AVERAGE DAILY PASSENGER ACTIVITY: 260 passengers

MILEAGE: Milwaukee and Main to Recommended Stop = .7

DESCRIBE WHAT IS NEXT TO PROPOSED STOP: Oak Mill Mall which includes many shops, a cleaners and Subway Shop are right near the stop and Jerry's Food Store is across the street. Northbound passengers wishing to access the Oakton Mall property however will be forced to traverse a parking lot to reach the entrance to the shopping at this facility.

COMMENTS ABOUT PROPOSED STOP:

- Connections can be made with route 226
- Available parkway for potential station
- Sidewalk connections to proposed station area are in place
- A farside stop is recommended to support TSP operations

ADJACENT LANDUSES

The adjacent neighborhoods contain medium density single family homes and small apartment buildings situation on narrow rectangular lots.

Milwaukee & Oak Mill Mall Southbound

Milwaukee & Oak Mill Mall Southbound

The view is looking north on Milwaukee just after Oak Mill Mall entrance. Stop would be located along parkway near the tree in the picture.

ART Station Selection: Milwaukee ART

Milwaukee Ave and Main St **Date: March 4, 2010**

DIRECTION: NB__X__ SB___

CURRENT STOP: Nearside__X__ Farside____ Not a bus stop____

RECOMMENDED STOP: Nearside ____ Farside__X_

CURRENT BUS ROUTES AT THIS LOCATION: Route 270, Route 411

SIGNALIZED INTERSECTION: Yes__X__ No____

IS TSP PLANNED FOR THIS INTERSECTION: Yes__X__ No____

LIST CURRENT AMENITIES AT THIS STOP: Sign ___shelter____ ad shelter____

pad____ bench____ sidewalk____ transit light on pole____ other_____

CURRENT AVERAGE DAILY PASSENGER ACTIVITY: 28 passengers

MILEAGE: Milwaukee and Oakton to Recommended Stop = .6

WHAT IS NEXT TO PROPOSED STOP: Medium density suburban apartments and a small neighborhood gas station.

COMMENTS ABOUT PROPOSED STOP:

- Connections can be made with Route 411.
- Available parkway for potential station location
- Sidewalk connections to proposed station area are in place
- A farside stop is recommended to support TSP operations

ADJACENT LANDUSES

The dominate land uses surrounding this intersection are a mixture medium density single family residential and medium density apartment housing. The northwest quadrant of this intersection also contains a cemetery that is fenced off from the street. All of the homes are oriented towards the street with small setbacks and all are accessible by sidewalks.

Milwaukee & Main Northbound

Milwaukee & Main Northbound

The view is looking north on Milwaukee just after Main Street. Stop would be located in front of apartment building on parkway.

ART Station Selection: Milwaukee ART

Milwaukee Ave at Main St **Date: March 4, 2010**

DIRECTION: NB___ SB_X_

CURRENT STOP: Nearside__X___ Farside____ Not a bus stop____

RECOMMENDED STOP: Nearside _X__ Farside___

CURRENT BUS ROUTES AT THIS LOCATION: Pace Route 270, Route 411

SIGNALIZED INTERSECTION: Yes__X__ No____

IS TSP PLANNED FOR THIS INTERSECTION: Yes__X__ No____

LIST CURRENT AMENITIES AT THIS STOP: Sign ____shelter___ ad shelter__
pad_ ___ bench____ sidewalk_____ transit light on pole____ other_____

CURRENT AVERAGE DAILY PASSENGER ACTIVITY: 33 passengers

MILEAGE: Milwaukee and Dempster to Recommended Stop = .5

DESCRIBE WHAT IS NEXT TO PROPOSED STOP: South end of the cemetery with sidewalk link.

COMMENTS ABOUT PROPOSED STOP:

- Connections can be made with Route 411. Available parkway for potential station location
- Sidewalk connections to proposed station area are in place
- Nearside stop was selected due to lack of available space to develop a station on the farside. Private property and residential curb cuts limit the amount of parkway available for public infrastructure. In addition, the available parkway narrows further south from the southwest corner.

ADJACENT LANDUSES

The dominate land uses surrounding this intersection are a mixture medium density single family residential and medium density apartment housing. The northwest quadrant of this intersection also contains a cemetery that is fenced off from the street. All of the homes are oriented towards the street with small setbacks and all are accessible by sidewalks.

Milwaukee & Main Southbound

Milwaukee & Main Southbound

The view is looking south on Milwaukee just before Main Street. Stop would be located as shown in this picture.

ART Station Selection: Milwaukee ART

Milwaukee Ave at Dempster Ave **Date: March 4, 2010**

DIRECTION: NB__X_ SB___

CURRENT STOP: Nearside__X__ Farside____ Not a bus stop____

RECOMMENDED STOP: Nearside ____ Farside__X_

CURRENT BUS ROUTES AT THIS LOCATION: Route 250

SIGNALIZED INTERSECTION: Yes__X__ No____

IS TSP PLANNED FOR THIS INTERSECTION: Yes__X__ No____

LIST CURRENT AMENITIES AT THIS STOP: Sign ___shelter____ ad shelter____

pad____ bench____ sidewalk____ transit light on pole____ other_____

CURRENT AVERAGE DAILY PASSENGER ACTIVITY: 251 passengers

MILEAGE: Milwaukee and Main to Recommended Stop = .6

DESCRIBE WHAT IS NEXT TO PROPOSED STOP: Restaurant and Auto Parts store.

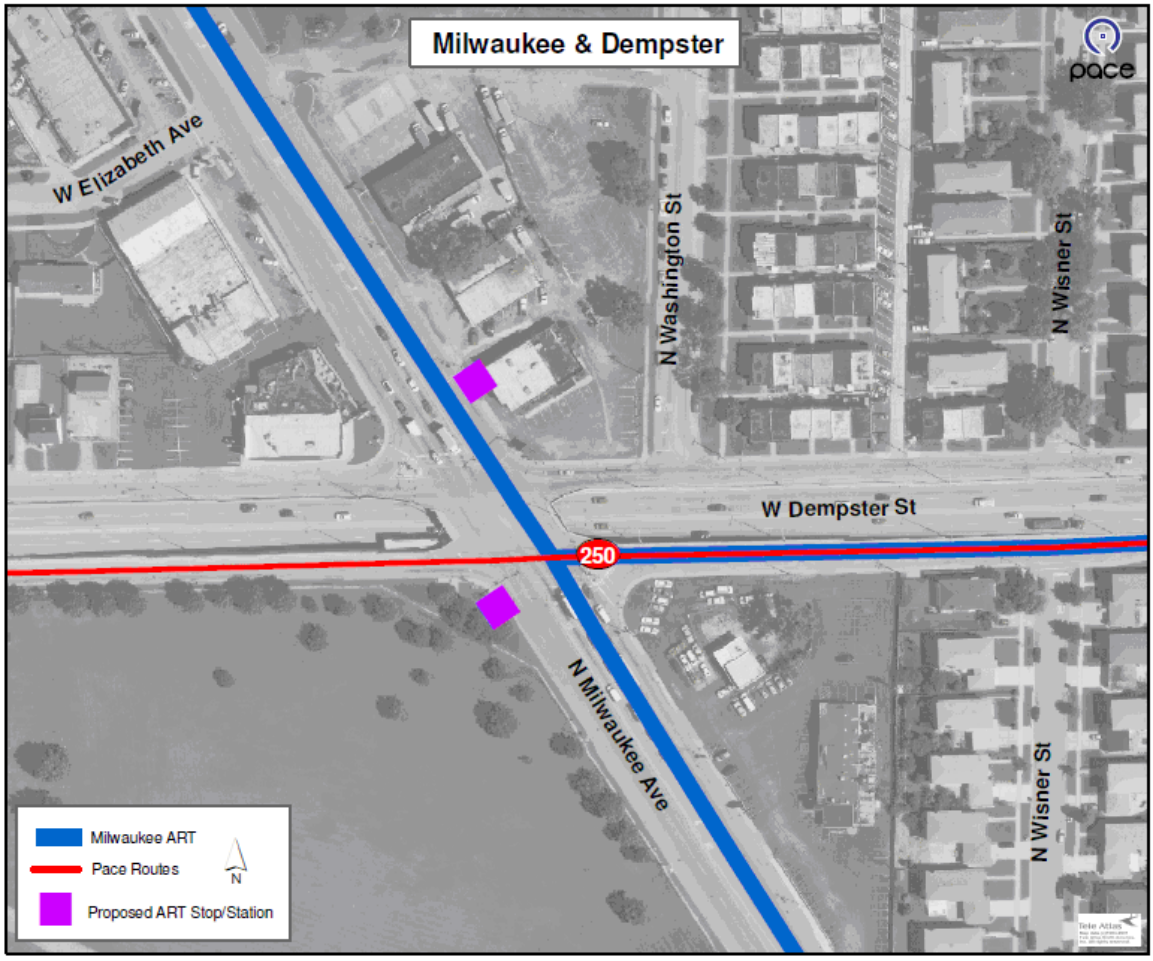
COMMENTS ABOUT PROPOSED STOP:

- Connections can be made with Pace Route 250
- Potential conflicts with driveways, recommend curb cuts be reconfigured
- Sidewalk connections to proposed station area are in place; however, more sidewalks need to be installed along the street side of the cemetery
- A far side stop is recommended to support TSP operations

ADJACENT LANDUSES

The uses surrounding this intersection include medium density commercial uses with small setbacks and good sidewalk connectivity. Adjacent properties contain medium density single family home situated on narrow rectangular lots.

Milwaukee & Dempster Northbound



Milwaukee & Dempster Northbound

The view is looking north on Milwaukee just after Dempster. Stop would be located in area near restaurant entrances. Reconfiguration of entrances and curb cut design is recommended.

ART Station Selection: Milwaukee ART

Milwaukee Ave at Dempster Ave **Date: March 4, 2010**

DIRECTION: NB___ SB_X_

CURRENT STOP: Nearside__X__ Farside____ Not a bus stop____

RECOMMENDED STOP: Nearside ___ Farside__X_

CURRENT BUS ROUTES AT THIS LOCATION: Pace Route 270, Pace Route 250

SIGNALIZED INTERSECTION: Yes__X__ No____

IS TSP PLANNED FOR THIS INTERSECTION: Yes__X__ No____

LIST CURRENT AMENITIES AT THIS STOP: Sign ____shelter___ ad shelter___
pad____ bench____ sidewalk____ transit light on pole____ other_____

CURRENT AVERAGE DAILY PASSENGER ACTIVITY: 251 passengers

MILEAGE: Golf Mill Mall to Recommended Stop = 1.0

DESCRIBE WHAT IS NEXT TO PROPOSED STOP: There is currently a bus stop/sign/shelter in the eastbound direction for Route 250.

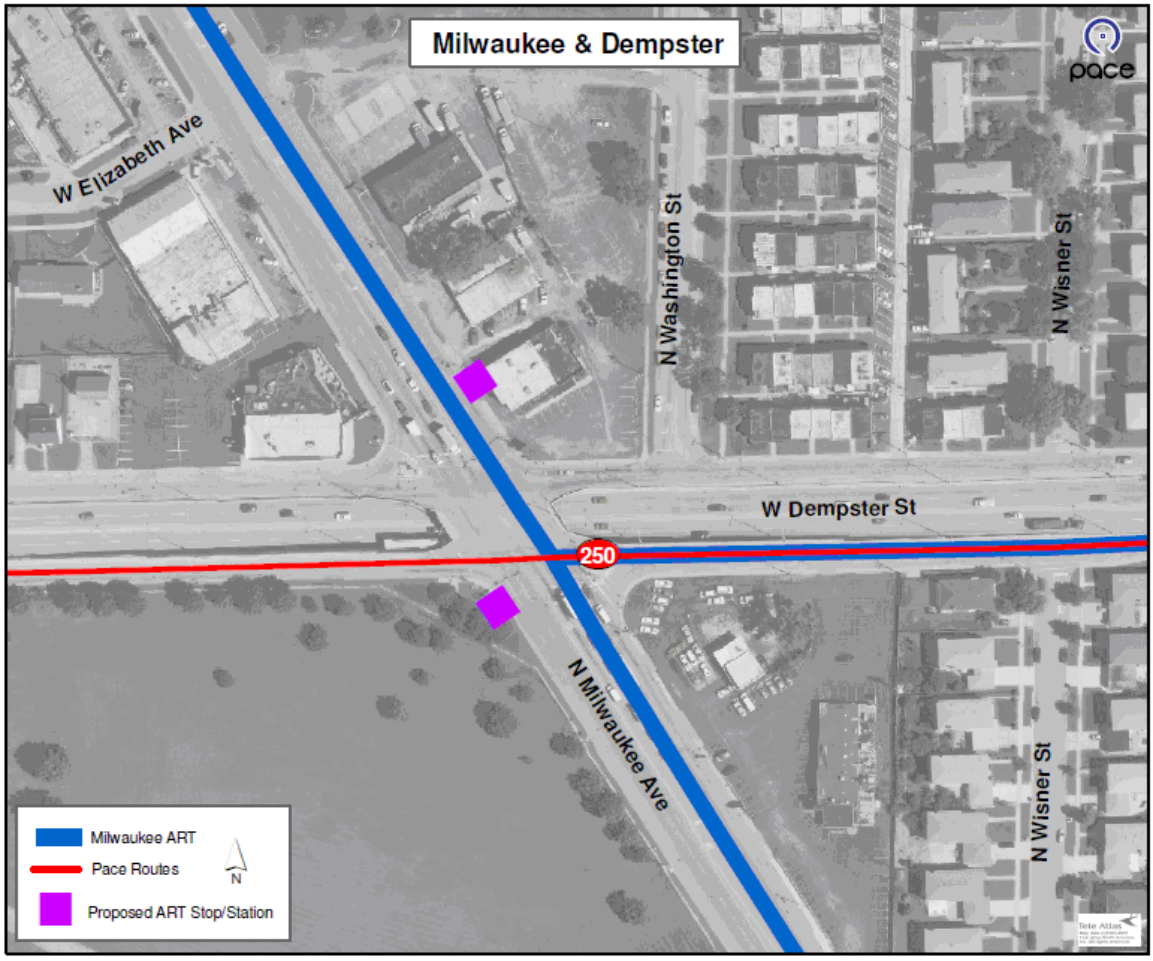
COMMENTS ABOUT PROPOSED STOP:

- Connections can be made with Route 250 at this location.
- Available parkway exists for a station location
- Sidewalk connections to proposed station area are in place
- A farside stop is recommended to support TSP operations

ADJACENT LANDUSES

The uses surrounding this intersection include medium density commercial uses with small setbacks and good sidewalk connectivity. Adjacent properties contain medium density single family home situated on narrow rectangular lots. The southwest quadrant of the intersection contains a cemetery fenced off from the street.

Milwaukee & Dempster Southbound

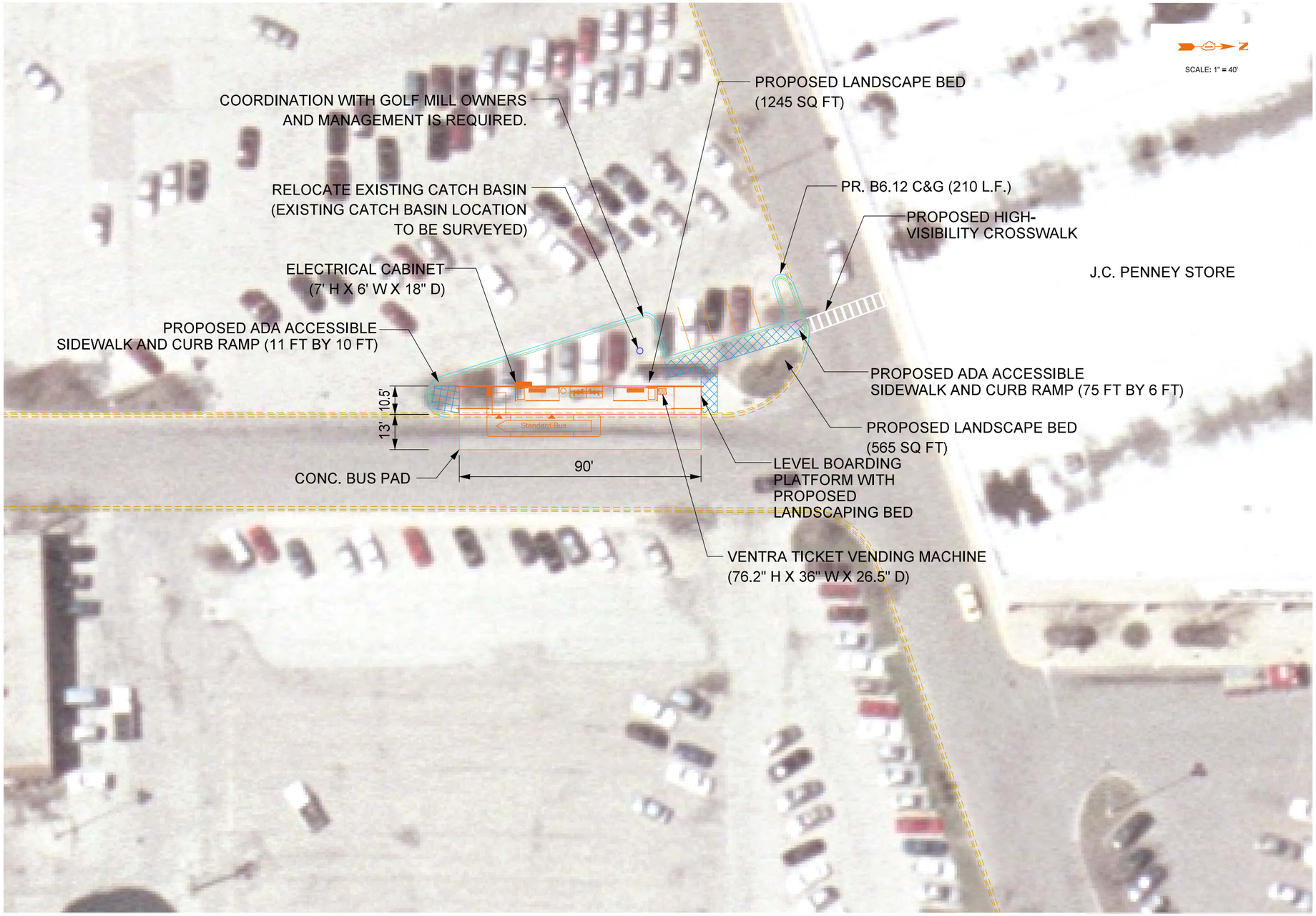


Milwaukee & Dempster Southbound

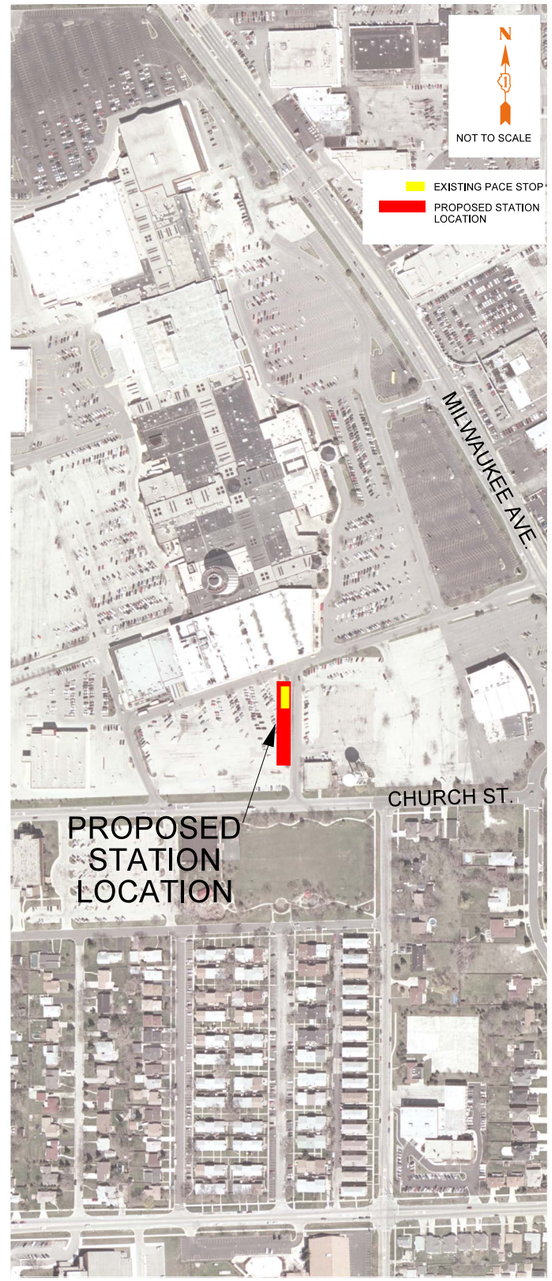
The view is looking south on Milwaukee just after Dempster. Stop would be located parkway location with extension of sidewalk to station recommended.

Appendix B – Conceptual Station Site Plans

STATION LAYOUT DETAIL



LOCATION MAP



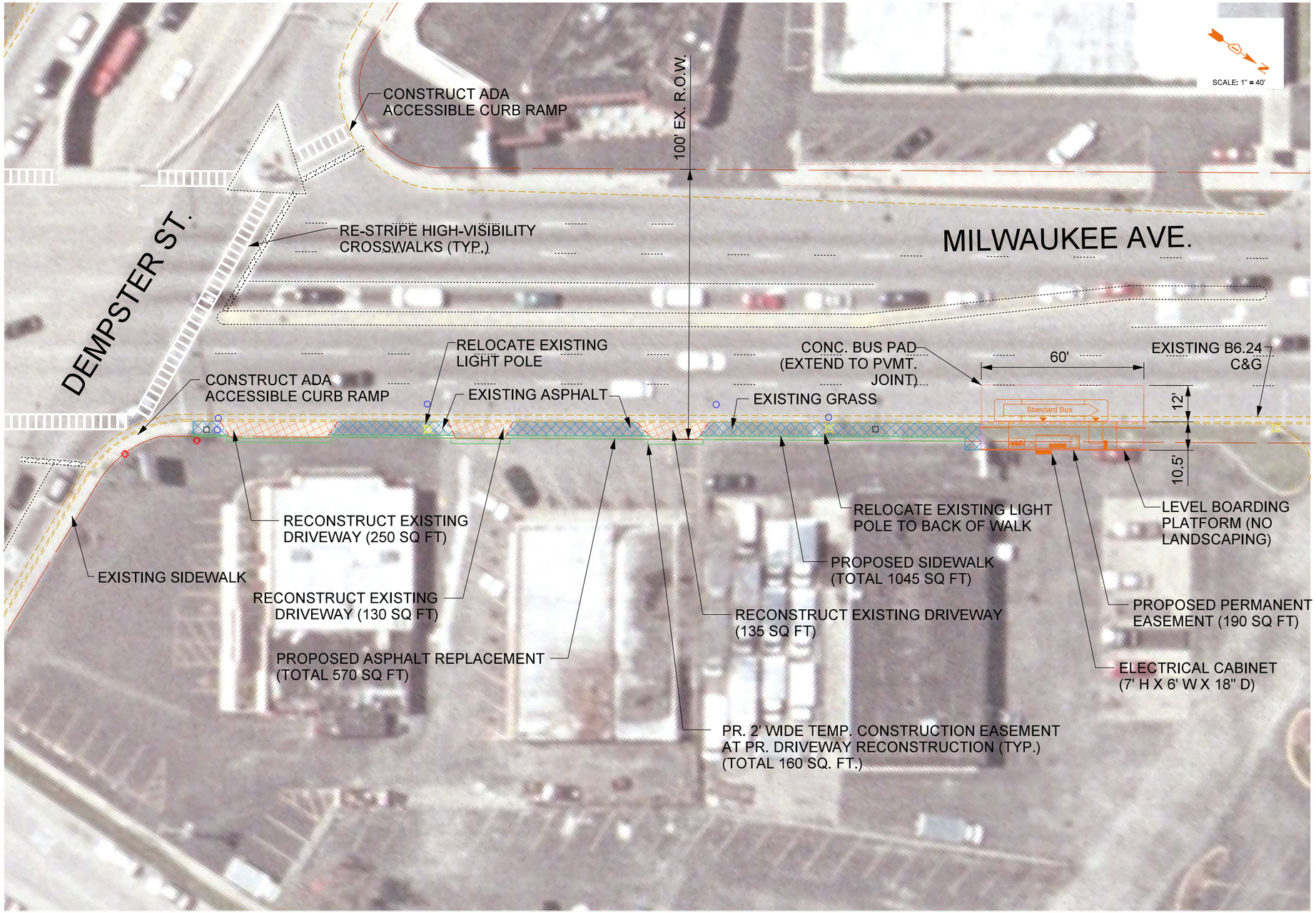
NOTE:
1. EXISTING CONDITIONS ARE ASPHALT PARKING LOT (1850 SQ FT) AND CONCRETE WALK AT PARKING LOT ISLAND (2415 SQ FT) AT PROPOSED BOARDING PLATFORM, PARKING STALLS AND LANDSCAPE BED LOCATION.

DESIGNED BY: BCC
DRAWN BY: JB
CHECKED BY: SH
DATE: 09-25-2014

MILWAUKEE AVENUE ARTERIAL RAPID TRANSIT
STATION LAYOUTS

NORTHBOUND
GOLF MILL STATION

STATION LAYOUT DETAIL



LOCATION MAP

NOTE:

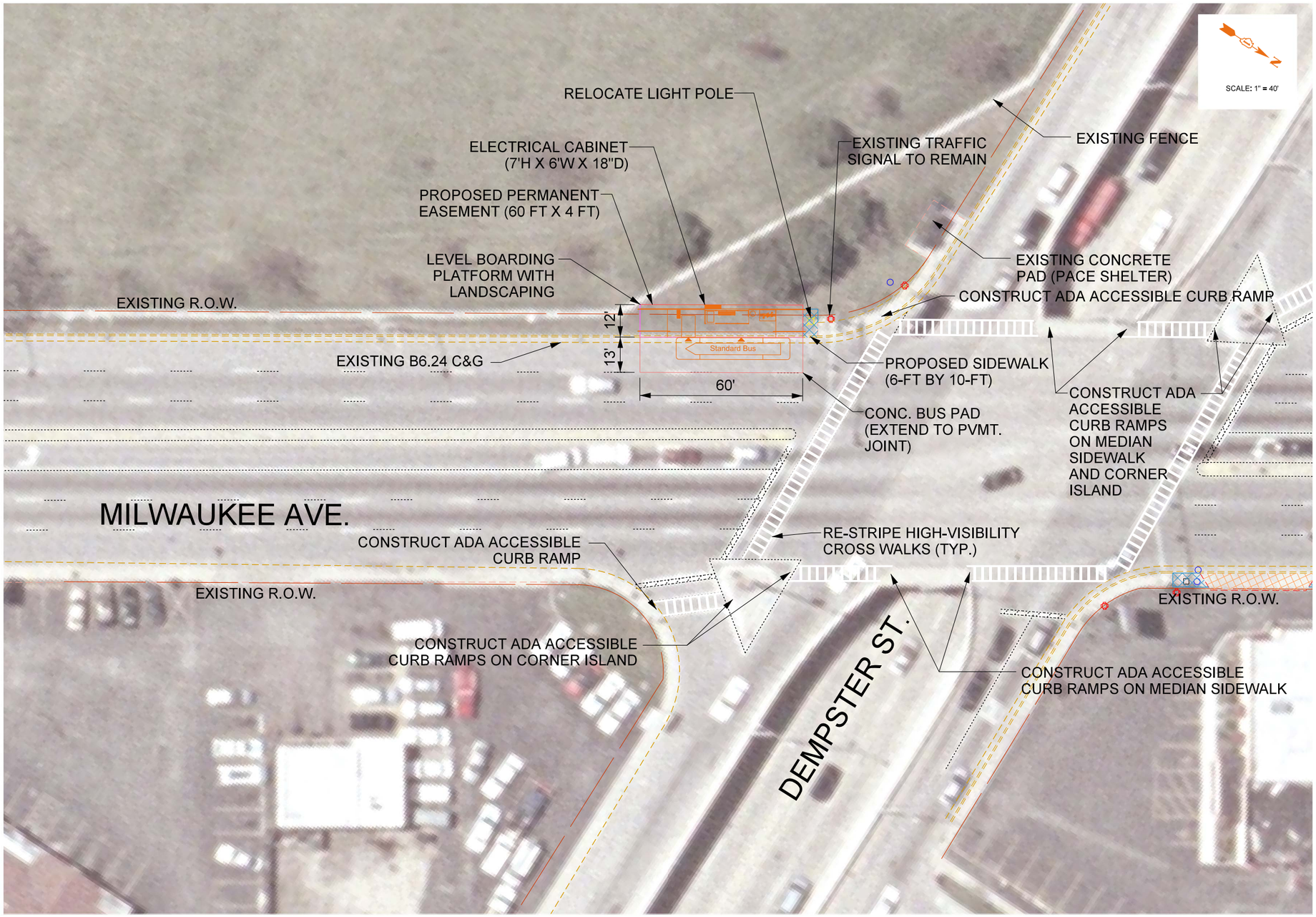
1. EXISTING CONDITIONS ARE GRASS (450 SQ FT), ASPHALT PAVEMENT (210 SQ FT) AND CONCRETE BARRIER CURB (60 LF) AT PROPOSED BOARDING PLATFORM LOCATION

DESIGNED BY: BCC
DRAWN BY: BCC
CHECKED BY: SH
DATE: 09-25-2014

MILWAUKEE AVENUE ARTERIAL RAPID TRANSIT
STATION LAYOUTS

NORTHBOUND
DEMPSTER STATION

STATION LAYOUT DETAIL



LOCATION MAP

NOTE:

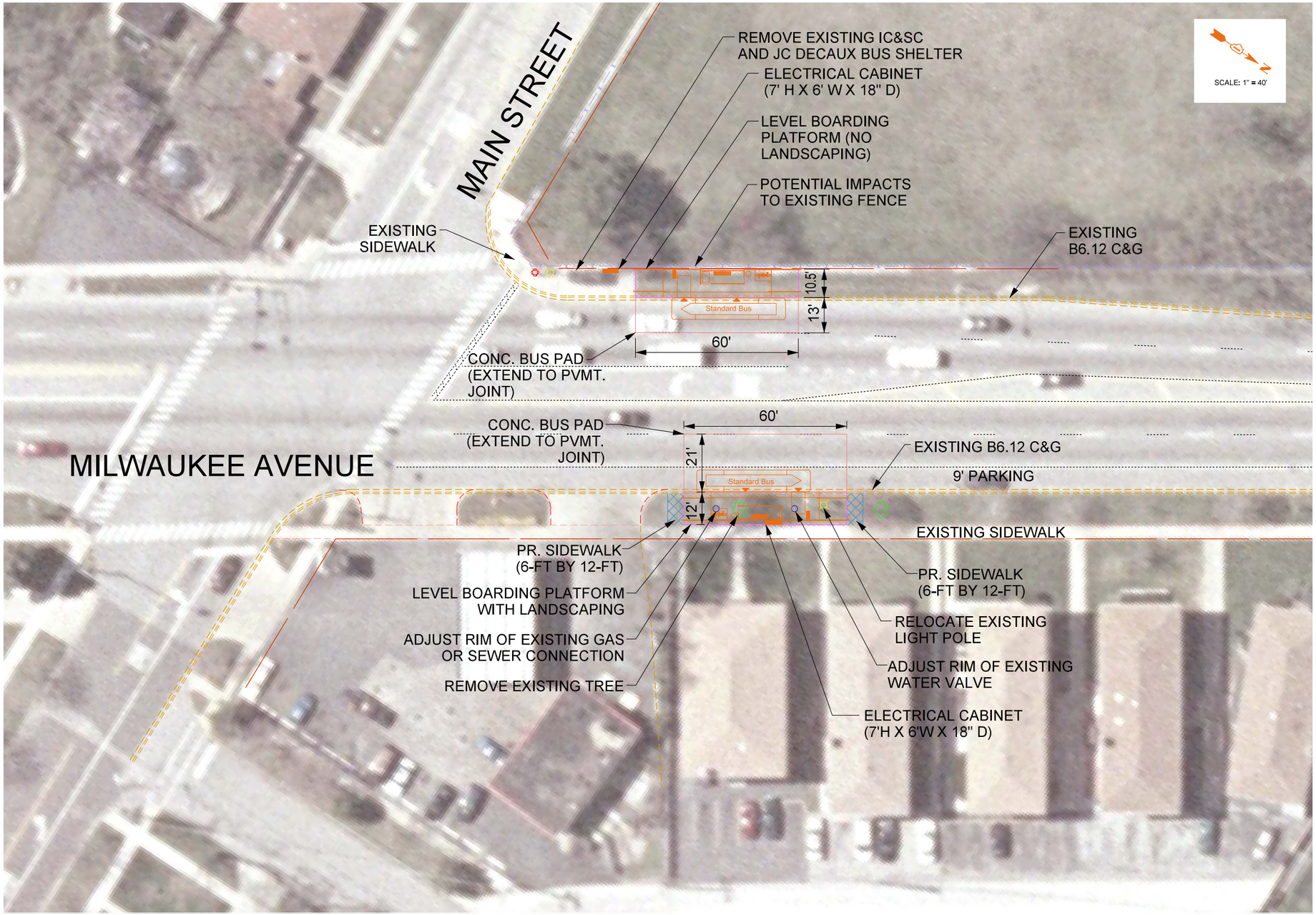
1. EXISTING CONDITION IS GRASS AT PROPOSED BOARDING PLATFORM AND SIDEWALK LOCATION (780 SQ FT)

DESIGNED BY: BCC
DRAWN BY: AMJ
CHECKED BY: SH
DATE: 09-25-2014

MILWAUKEE AVENUE ARTERIAL RAPID TRANSIT
STATION LAYOUTS

SOUTHBOUND DEMPSTER STATION

STATION LAYOUT DETAIL



LOCATION MAP

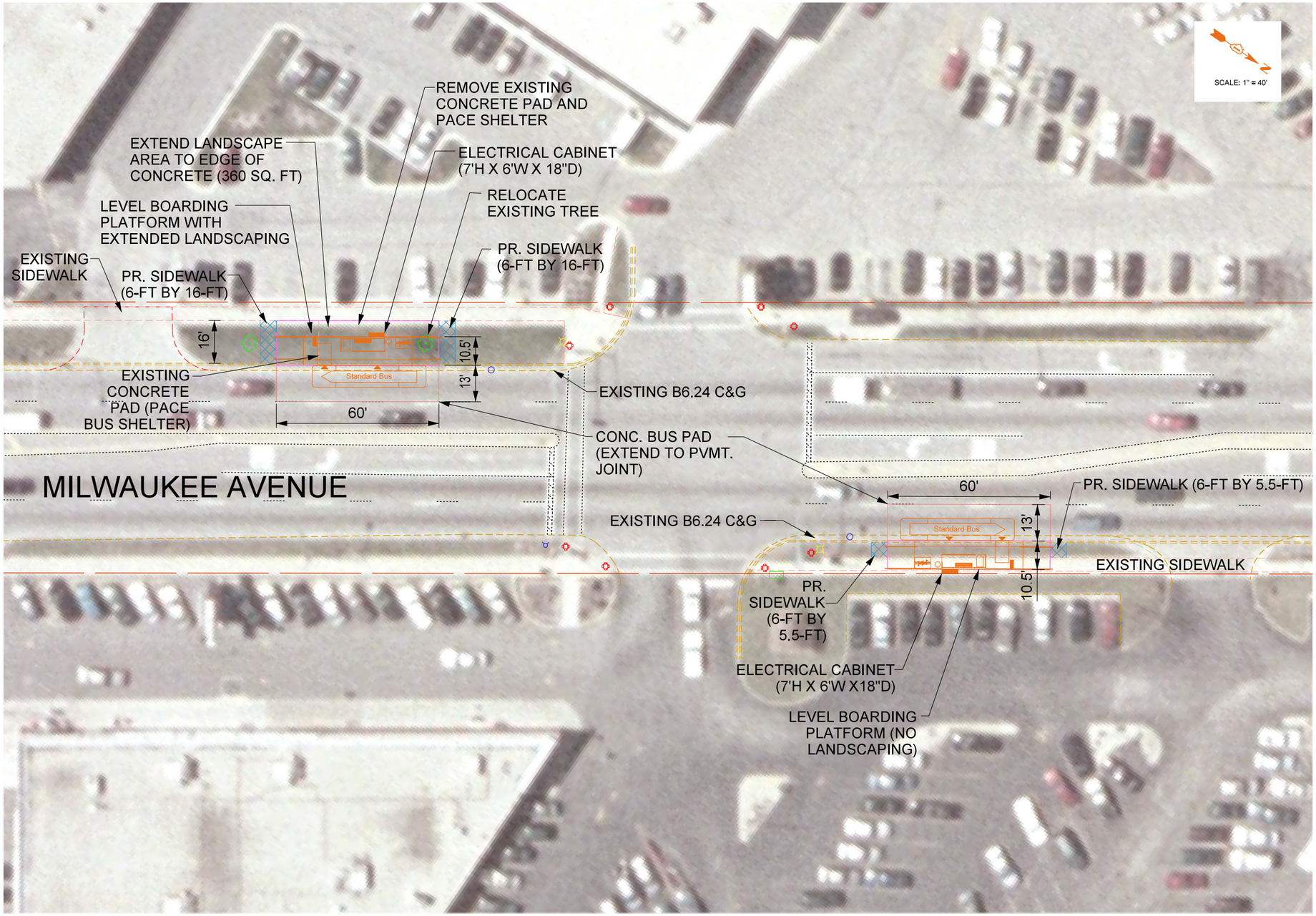
NOTE:
1. EXISTING CONDITIONS ARE GRASS AT THE PROPOSED NORTHBOUND AND SOUTHBOUND BOARDING PLATFORMS AND PROPOSED SIDEWALK LOCATION.

DESIGNED BY: BCC
DRAWN BY: BCC
CHECKED BY: SH
DATE: 09-25-2014

MILWAUKEE AVENUE ARTERIAL RAPID TRANSIT
STATION LAYOUTS

NORTHBOUND & SOUTHBOUND MAIN STREET STATIONS

STATION LAYOUT DETAIL



LOCATION MAP

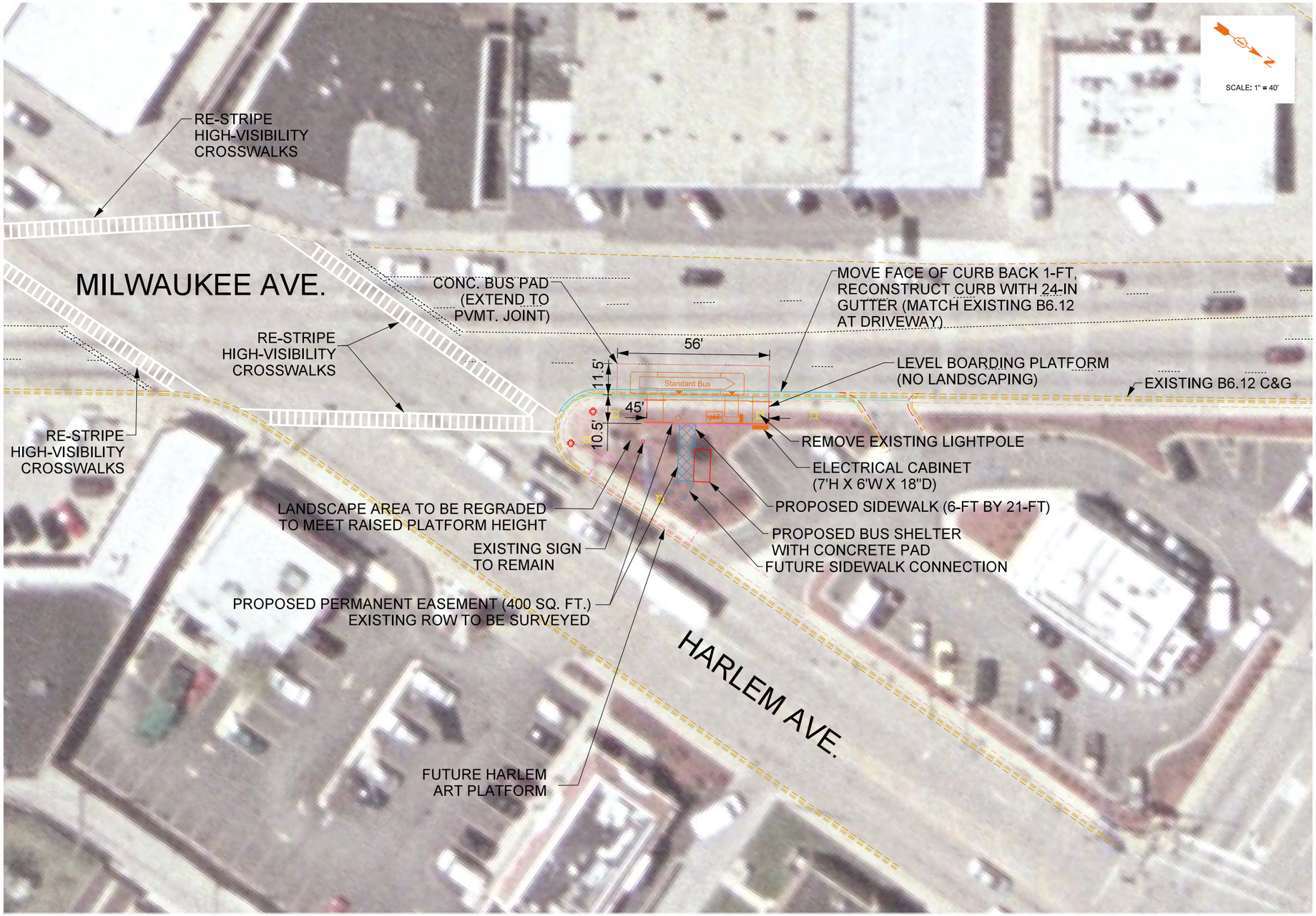
NOTES:
1. UTILIZE PLATFORM FOR ADA SIDEWALK ACCESS AT NORTHBOUND STATION
2. EXISTING CONDITIONS ARE GRASS (390 SQ. FT.) AND CONCRETE SIDEWALK AT PROPOSED NORTHBOUND BOARDING PLATFORM LOCATION
3. EXISTING CONDITION IS GRASS (1152 SQ. FT.) AT PROPOSED SOUTHBOUND BOARDING PLATFORM AND PROPOSED SIDEWALK LOCATION

DESIGNED BY: BCC
DRAWN BY: AMJ
CHECKED BY: SH
DATE: 09-25-2014

MILWAUKEE AVENUE ARTERIAL RAPID TRANSIT
STATION LAYOUTS

NORTHBOUND & SOUTHBOUND
OAKTON STREET / OAK MILL MALL STATIONS

STATION LAYOUT DETAIL



LOCATION MAP

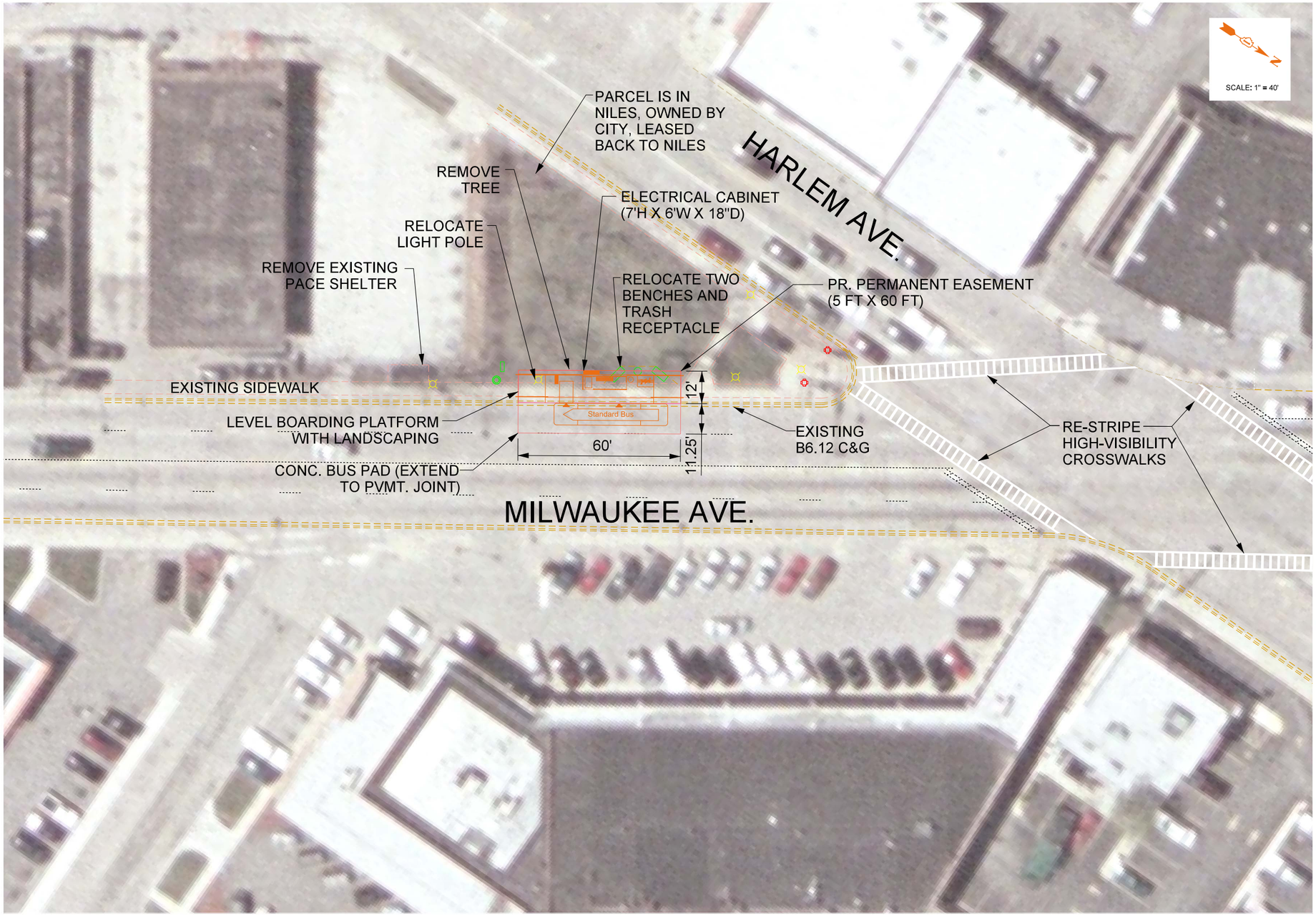
NOTES:
1. UTILIZE PLATFORM FOR ADA SIDEWALK ACCESS.
2. EXISTING CONDITIONS ARE CONCRETE SIDEWALK (225 SQ. FT.) AND LANDSCAPING (400 SQ. FT.) AT PROPOSED BOARDING PLATFORM, SIDEWALK, AND BUS SHELTER LOCATION.

DESIGNED BY: BCC
DRAWN BY: AMJ
CHECKED BY: SH
DATE: 09-25-2014

MILWAUKEE AVENUE ARTERIAL RAPID TRANSIT
STATION LAYOUTS

NORTHBOUND
HARLEM/HOWARD STATION
CENTRAL PLATFORM OPTION

STATION LAYOUT DETAIL



LOCATION MAP

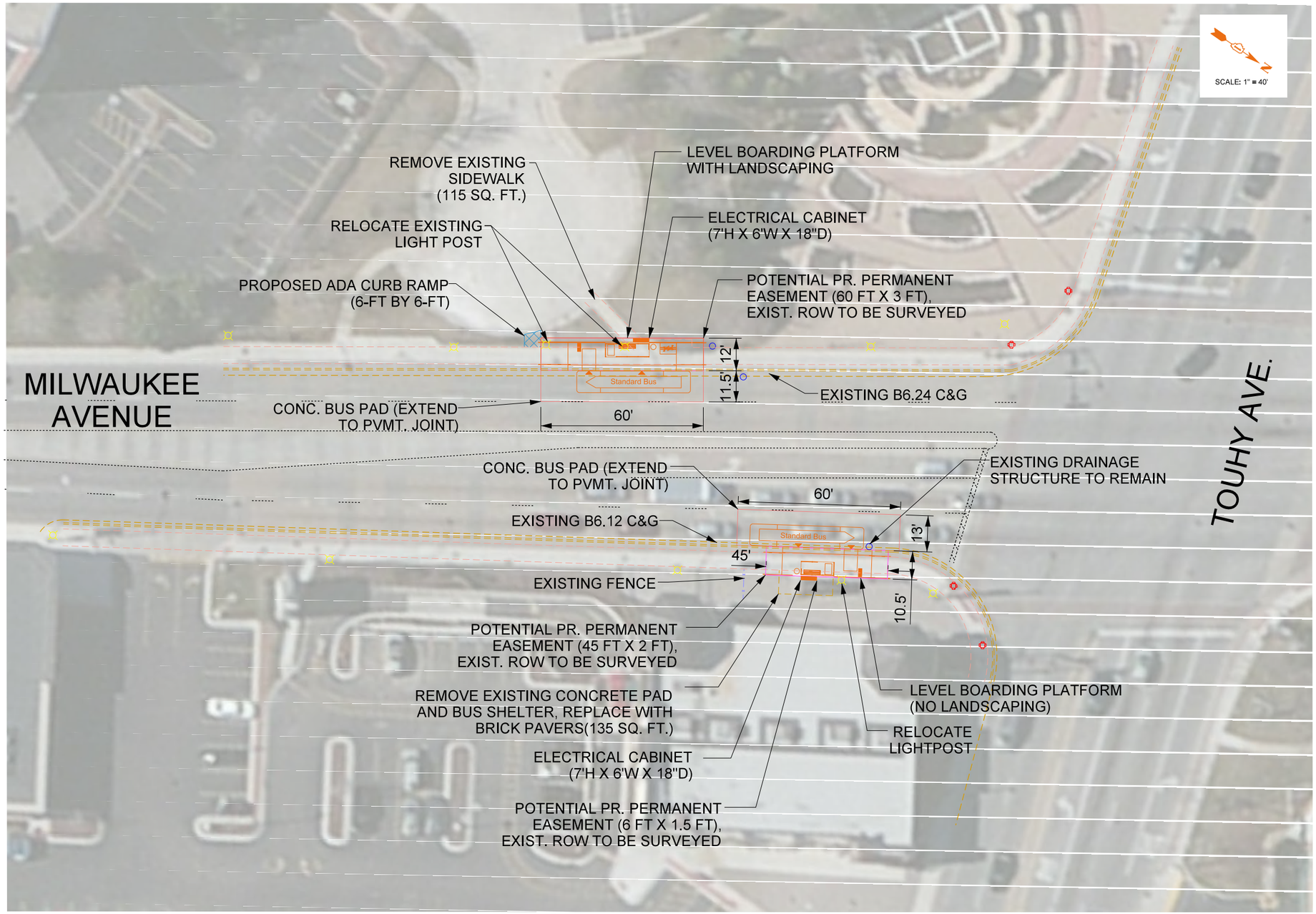
NOTES:
1. UTILIZE PLATFORM FOR ADA SIDEWALK ACCESS
2. EXISTING CONDITIONS ARE GRASS (300 SQ. FT.), CONCRETE SIDEWALK (300 SQ. FT.), AND STAMPED, COLORED CONCRETE (120 SQ. FT.) AT PROPOSED BOARDING PLATFORM LOCATION

DESIGNED BY: BCC
DRAWN BY: AMJ
CHECKED BY: SH
DATE: 09-25-2014

MILWAUKEE AVENUE ARTERIAL RAPID TRANSIT
STATION LAYOUTS

SOUTHBOUND
HARLEM / HOWARD STATION

STATION LAYOUT DETAIL



LOCATION MAP

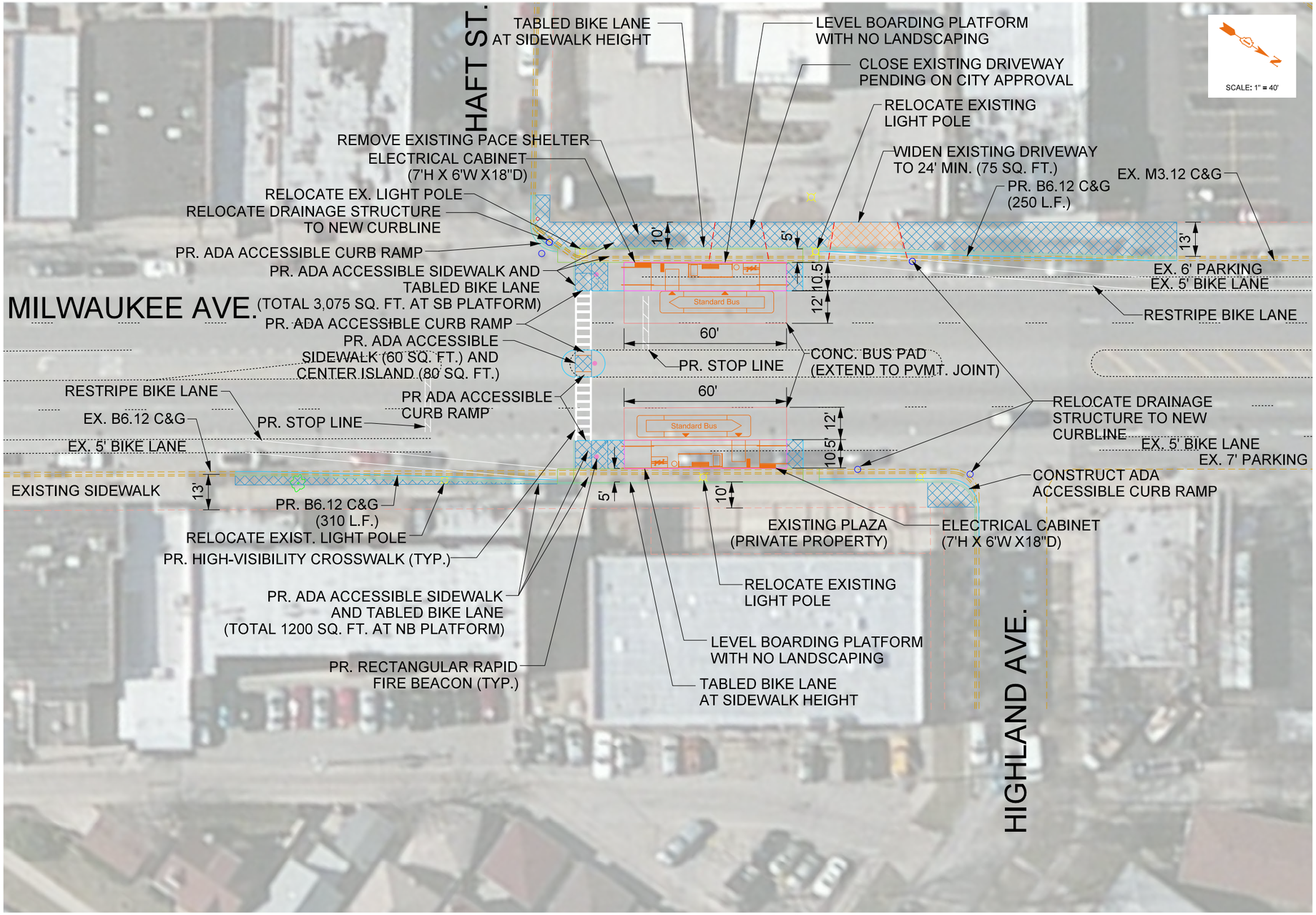
NOTES:
1. UTILIZE PLATFORMS FOR ADA SIDEWALK ACCESS
2. EXISTING CONDITIONS ARE CONCRETE SIDEWALK (270 SQ. FT.) AND BRICK PAVERS (190 SQ. FT.) AT PROPOSED NORTHBOUND BOARDING PLATFORM LOCATION
3. EXISTING CONDITIONS ARE CONCRETE SIDEWALK (500 SQ. FT.), BRICK PAVERS (120 SQ. FT.) AND GRASS (70 SQ. FT) AT PROPOSED SOUTHBOUND BOARDING PLATFORM LOCATION

DESIGNED BY:	BCC
DRAWN BY:	AMJ
CHECKED BY:	SH
DATE:	09-25-2014

MILWAUKEE AVENUE ARTERIAL RAPID TRANSIT
STATION LAYOUTS

NORTHBOUND & SOUTHBOUND TOUHY AVENUE STATIONS

STATION LAYOUT DETAIL



LOCATION MAP

NOTE:

1. EXISTING CONDITION IS ROADWAY PAVEMENT AT PROPOSED BOARDING PLATFORM LOCATION

DESIGNED BY: BCC
DRAWN BY: AMJ
CHECKED BY: SH
DATE: 09-25-2014

MILWAUKEE AVENUE ARTERIAL RAPID TRANSIT
STATION LAYOUTS

NORTHBOUND & SOUTHBOUND HAFT/HIGHLAND STATION

STATION LAYOUT DETAIL

LOCATION MAP

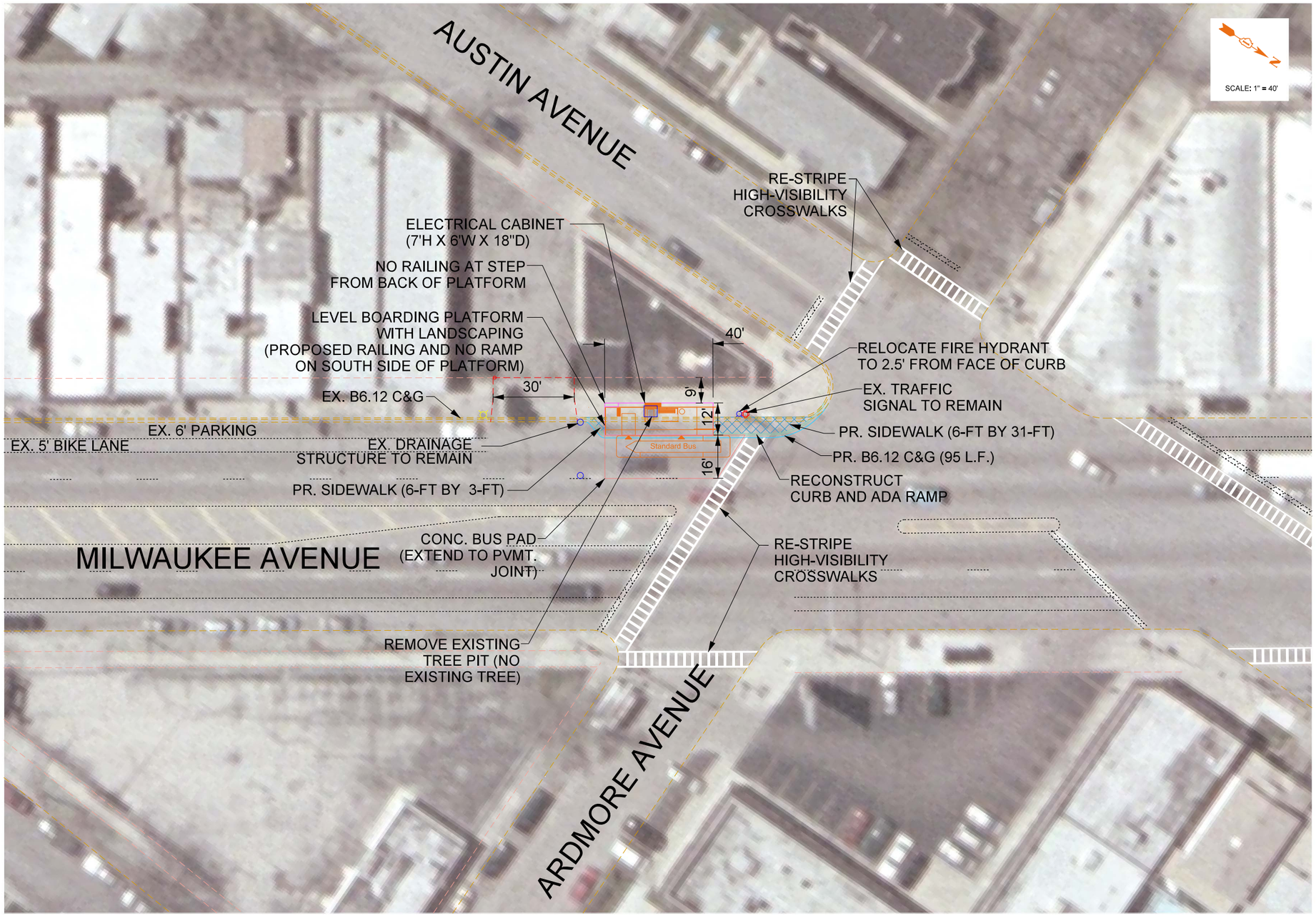
NOTES:
1. UTILIZE PLATFORM FOR ADA SIDEWALK ACCESS
2. EXISTING CONDITION IS CONCRETE SIDEWALK AT PROPOSED BOARDING PLATFORM LOCATION

DESIGNED BY: BCC
DRAWN BY: AMJ
CHECKED BY: SH
DATE: 09-25-2014

MILWAUKEE AVENUE ARTERIAL RAPID TRANSIT
STATION LAYOUTS

NORTHBOUND
AUSTIN/ARDMORE STATION

STATION LAYOUT DETAIL



LOCATION MAP

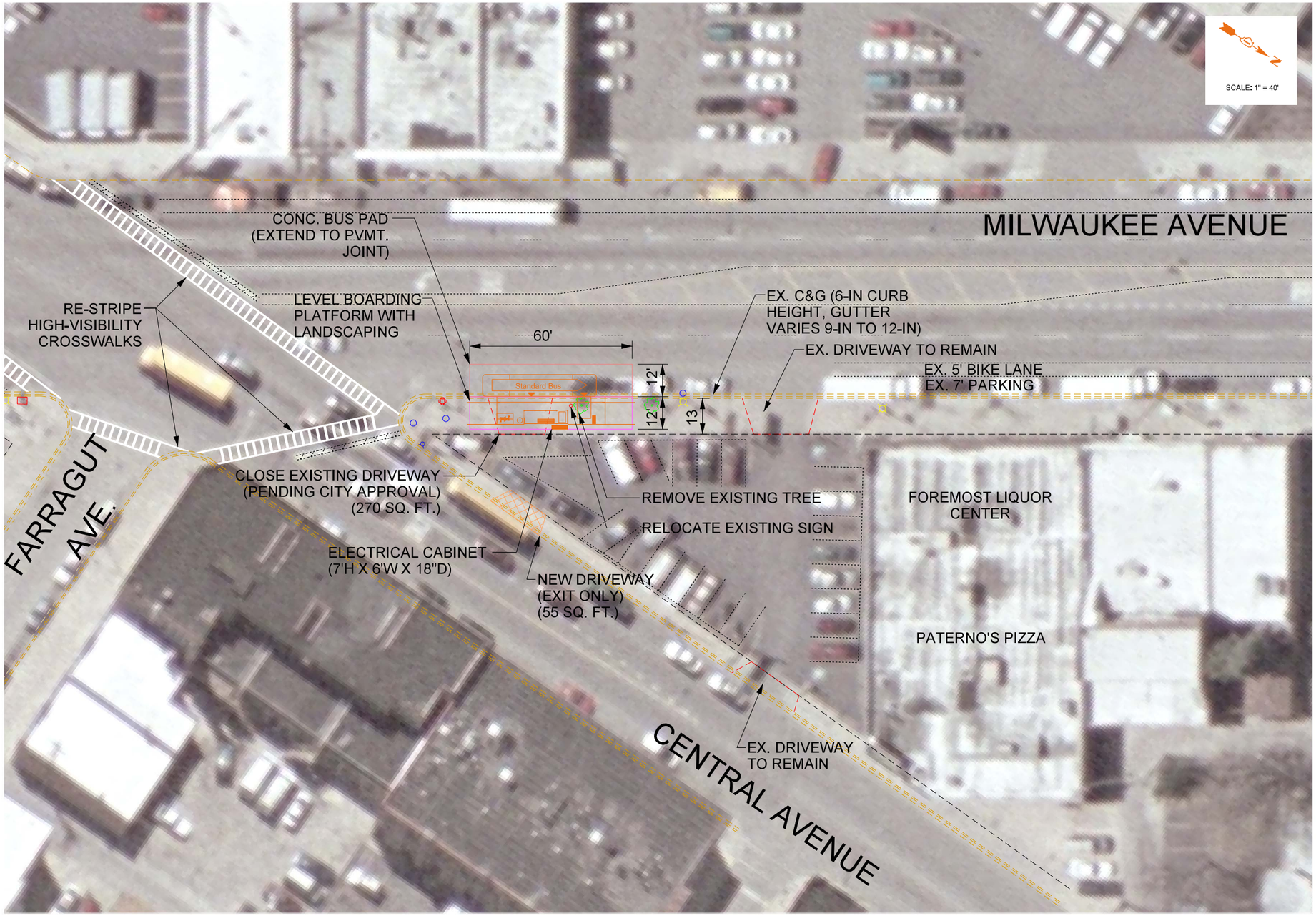
NOTES:
1. EXISTING CONDITIONS ARE ROADWAY PAVEMENT (200 SQ. FT.) AND CONCRETE SIDEWALK (215 SQ. FT.) AT PROPOSED BOARDING PLATFORM LOCATION
2. EXISTING CONDITION IS ROADWAY PAVEMENT AT PROPOSED SIDEWALK

DESIGNED BY: BCC
DRAWN BY: AMJ
CHECKED BY: SH
DATE: 09-25-2014

MILWAUKEE AVENUE ARTERIAL RAPID TRANSIT
STATION LAYOUTS

SOUTHBOUND
AUSTIN / ARDMORE STATION

STATION LAYOUT DETAIL



LOCATION MAP

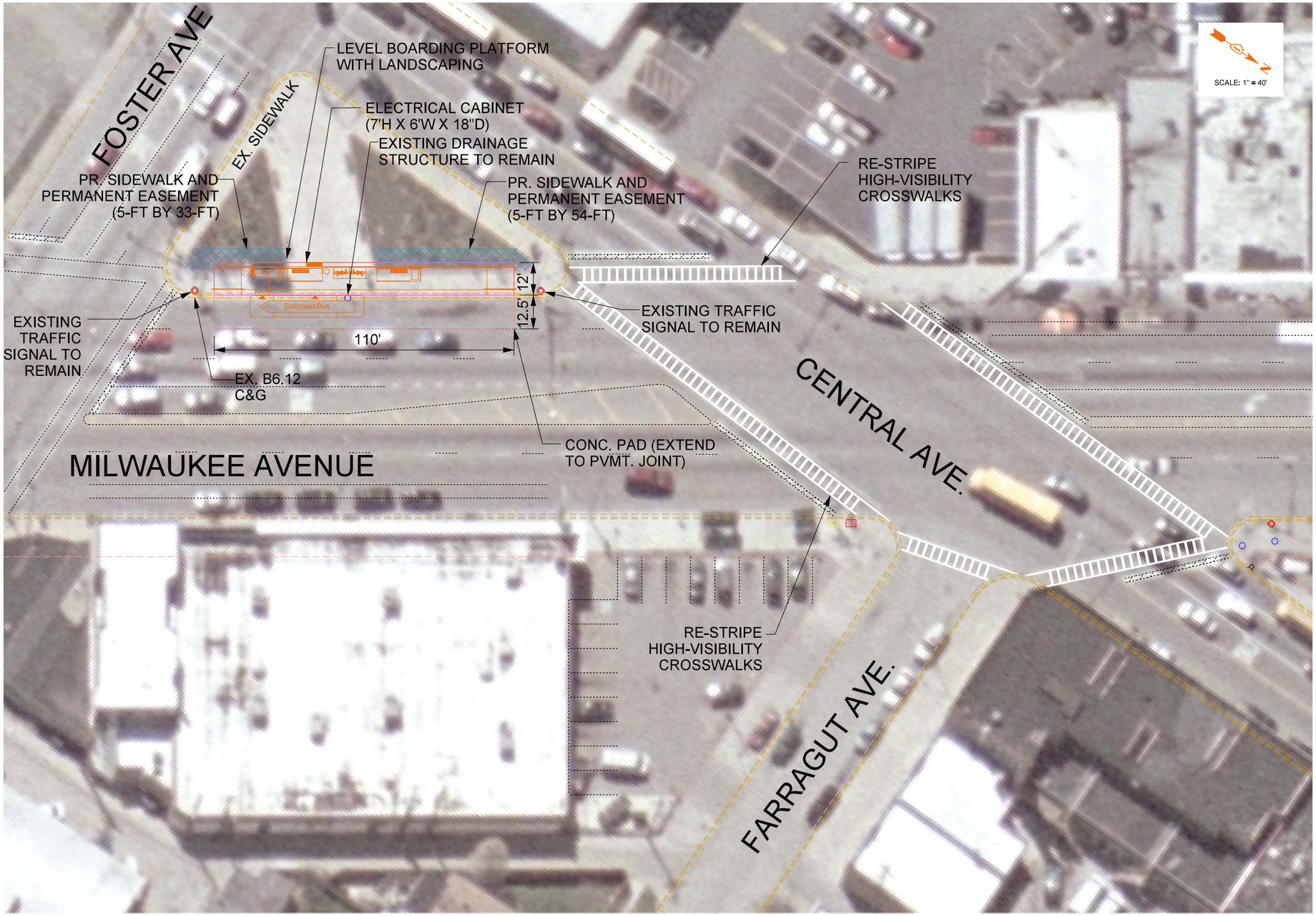
NOTES:
1. UTILIZE PLATFORM FOR ADA SIDEWALK ACCESS
2. THE EXISTING CONDITION IS CONCRETE SIDEWALK AT PROPOSED BOARDING PLATFORM LOCATION

DESIGNED BY: BCC
DRAWN BY: AMJ
CHECKED BY: SH
DATE: 09-25-2014

MILWAUKEE AVENUE ARTERIAL RAPID TRANSIT
STATION LAYOUTS

NORTHBOUND
CENTRAL AVENUE STATION

STATION LAYOUT DETAIL



LOCATION MAP

NOTES:
1. EXISTING CONDITIONS ARE CONCRETE SIDEWALK (1035 SQ. FT.) AND GRASS (235 SQ. FT.) AT PROPOSED BOARDING PLATFORM LOCATION
2. EXISTING CONDITION IS GRASS AT PROPOSED SIDEWALK

DESIGNED BY: BCC
DRAWN BY: AMJ
CHECKED BY: SH
DATE: 09-25-2014

MILWAUKEE AVENUE ARTERIAL RAPID TRANSIT
STATION LAYOUTS

SOUTHBOUND
CENTRAL AVENUE STATION

NOTES:
1. IMPACTS EXISTING BAY ASSIGNED TO ROUTE 68
2. EXISTING CONDITION IS CONCRETE WALK

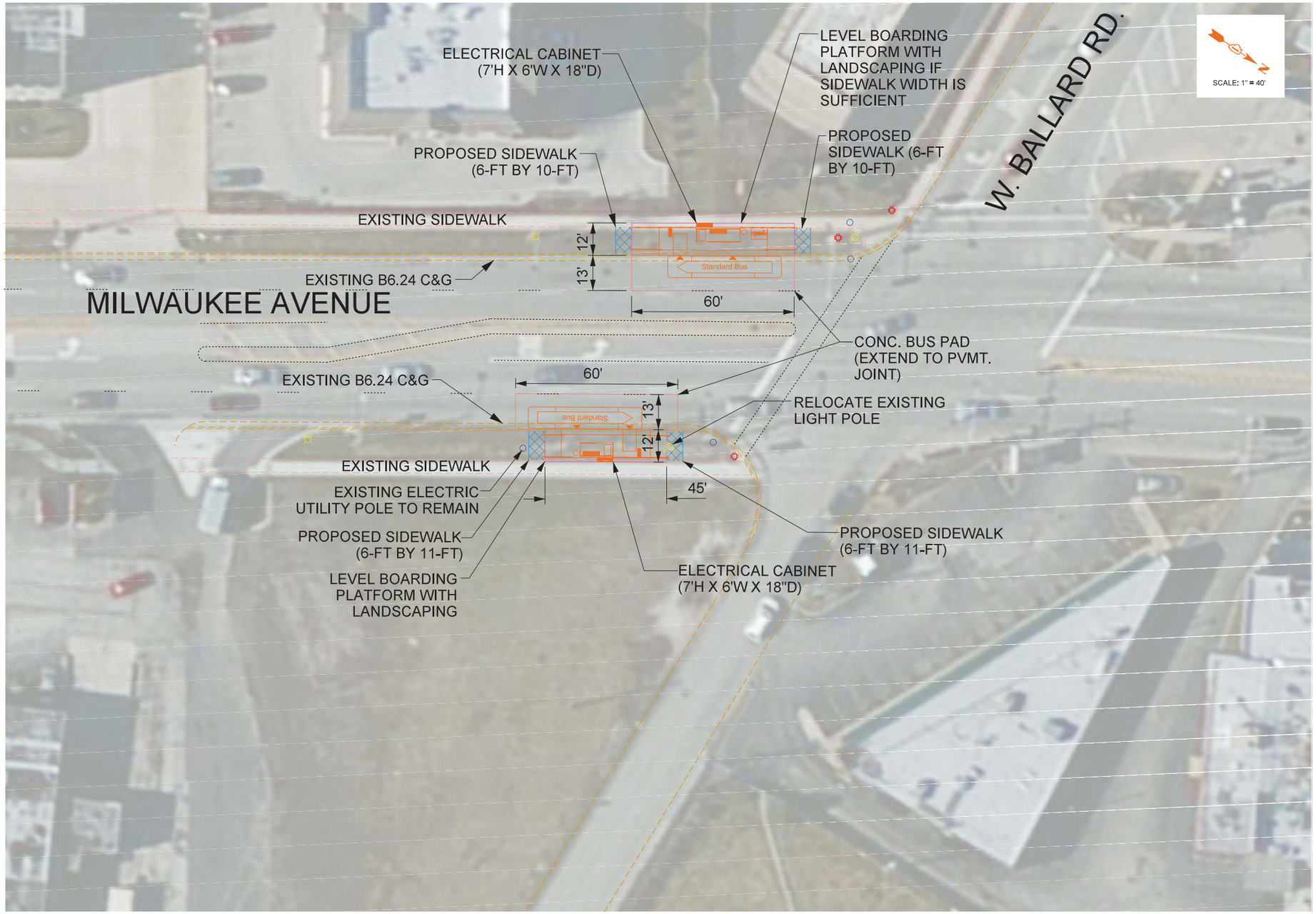
DESIGNED BY: BCC
DRAWN BY: AMJ
CHECKED BY: SH
DATE: 09-25-2014

MILWAUKEE AVENUE ARTERIAL RAPID TRANSIT
STATION LAYOUTS

JEFFERSON PARK STATION

Alternative Station Layouts

STATION LAYOUT DETAIL



LOCATION MAP

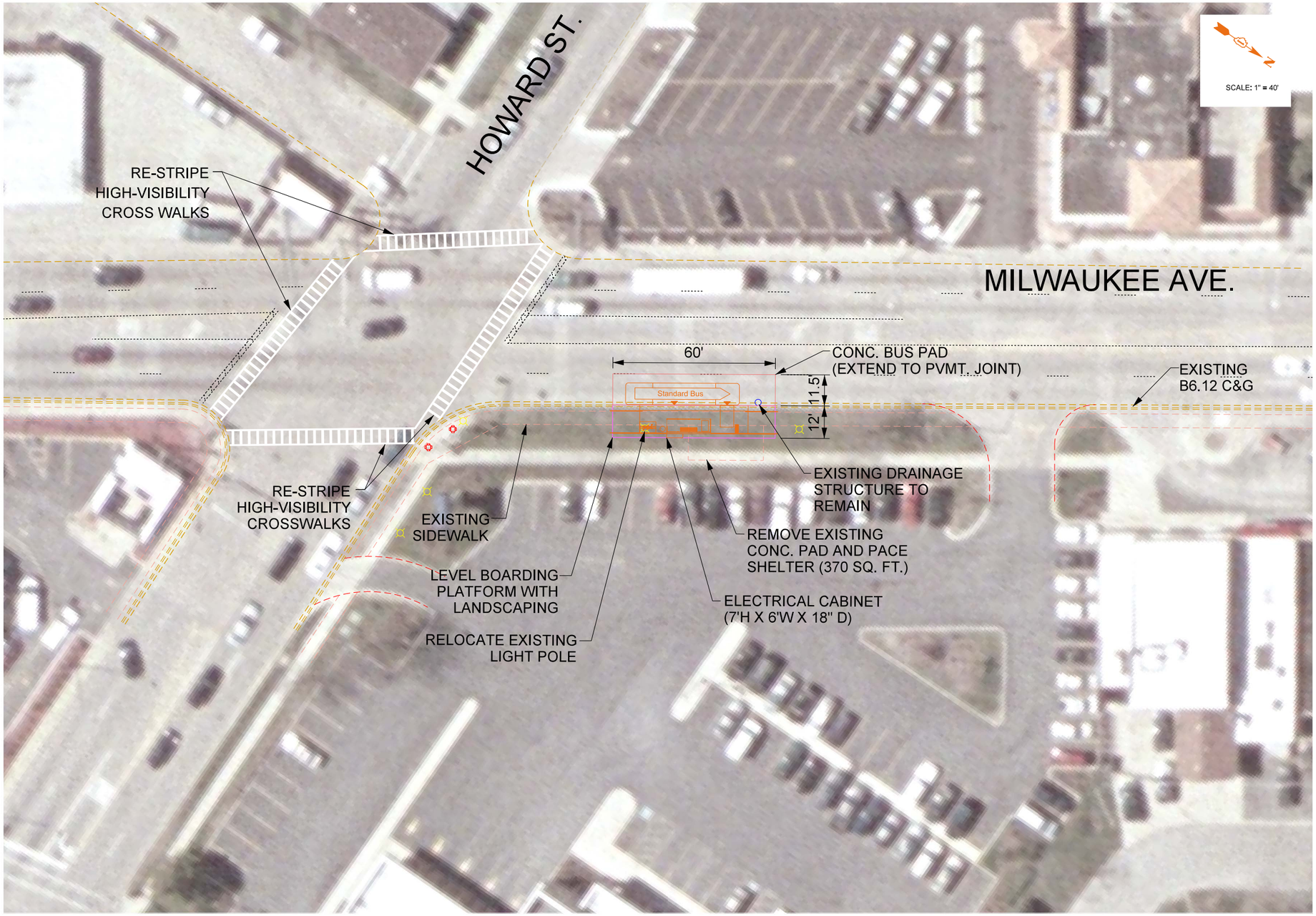
NOTE:
1. EXISTING CONDITION IS GRASS AT PROPOSED NORTHBOUND AND SOUTHBOUND BOARDING PLATFORM LOCATIONS

DESIGNED BY: BCC
DRAWN BY: AMJ
CHECKED BY: SH
DATE: 09-25-2014

MILWAUKEE AVENUE ARTERIAL RAPID TRANSIT
STATION LAYOUTS

NORTHBOUND AND SOUTHBOUND BALLARD STATIONS (ALTERNATE TO DEMPSTER STA.)

STATION LAYOUT DETAIL



LOCATION MAP

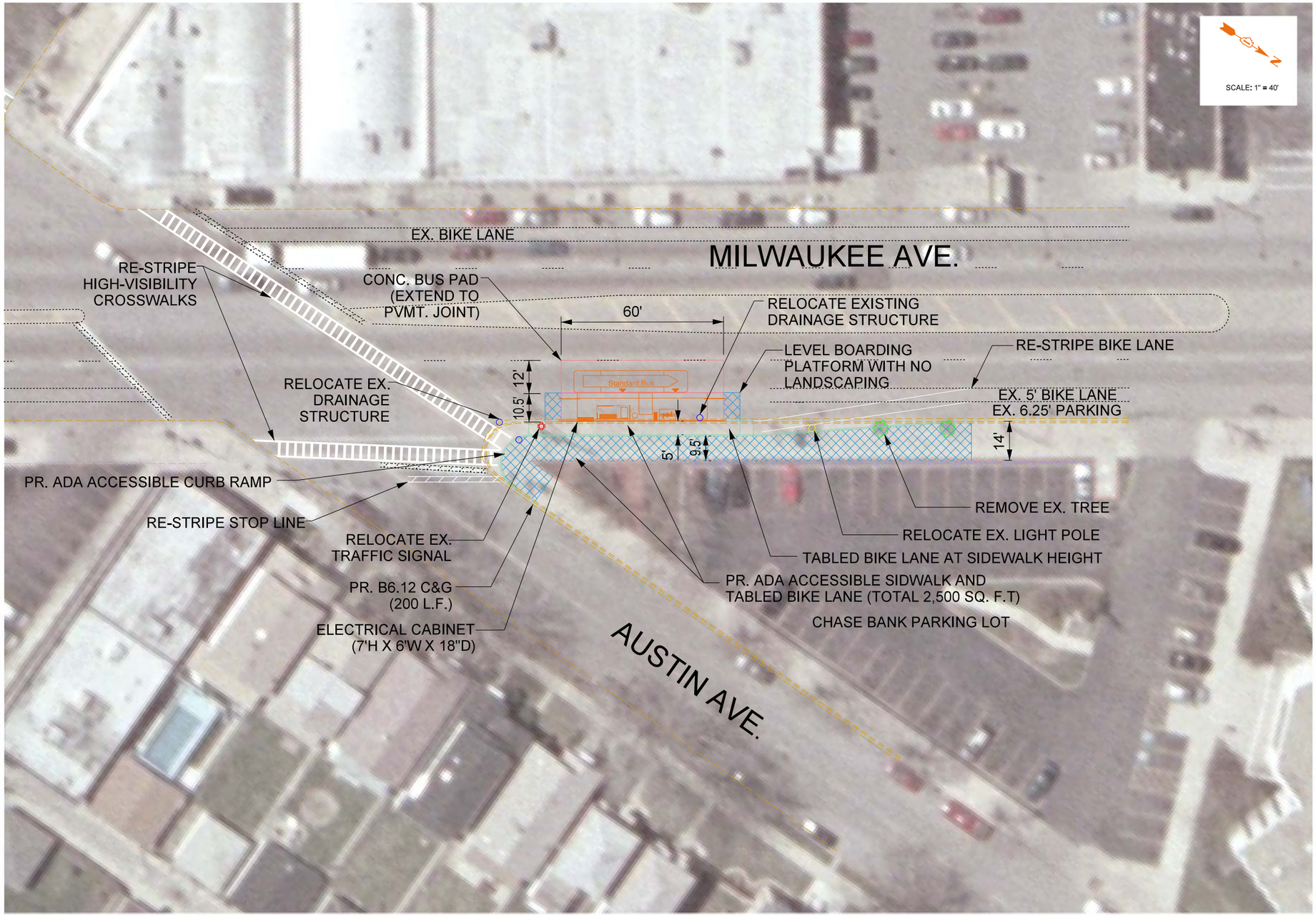
NOTES:
1. UTILIZE PLATFORM FOR ADA SIDEWALK ACCESS
2. EXISTING CONDITIONS ARE CONCRETE SIDEWALK (300 SQ. FT.) AND GRASS (390 SQ. FT.) AT PROPOSED BOARDING PLATFORM LOCATION

DESIGNED BY: BCC
DRAWN BY: AMJ
CHECKED BY: SH
DATE: 09-25-2014

MILWAUKEE AVENUE ARTERIAL RAPID TRANSIT
STATION LAYOUTS

NORTHBOUND HARLEM/HOWARD STATION ALTERNATE LOCATION OPTION

STATION LAYOUT DETAIL



LOCATION MAP

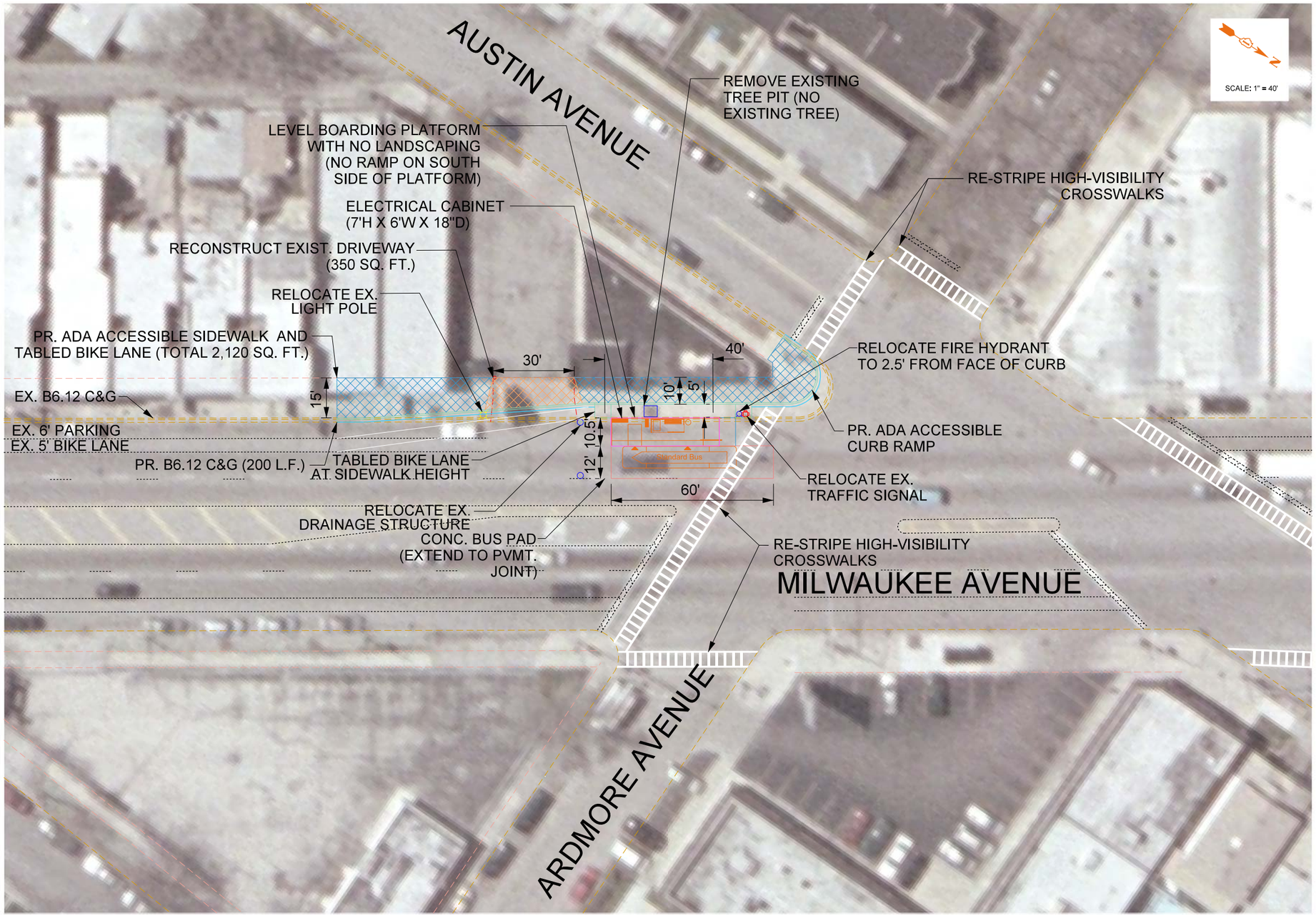
NOTES:
1. EXISTING CONDITION IS ROADWAY PAVEMENT AT PROPOSED BOARDING PLATFORM LOCATION.
2. EXISITING CONDITION IS CONCRETE SIDEWALK AT PROPOSED SIDEWALK AND TABLED BIKE LANE LOCATION.

DESIGNED BY: BCC
DRAWN BY: AMJ
CHECKED BY: SH
DATE: 09-25-2014

MILWAUKEE AVENUE ARTERIAL RAPID TRANSIT
STATION LAYOUTS

NORTHBOUND
AUSTIN/ARDMORE STATION
PEDESTRIAN TREATMENT ALTERNATIVE

STATION LAYOUT DETAIL



LOCATION MAP

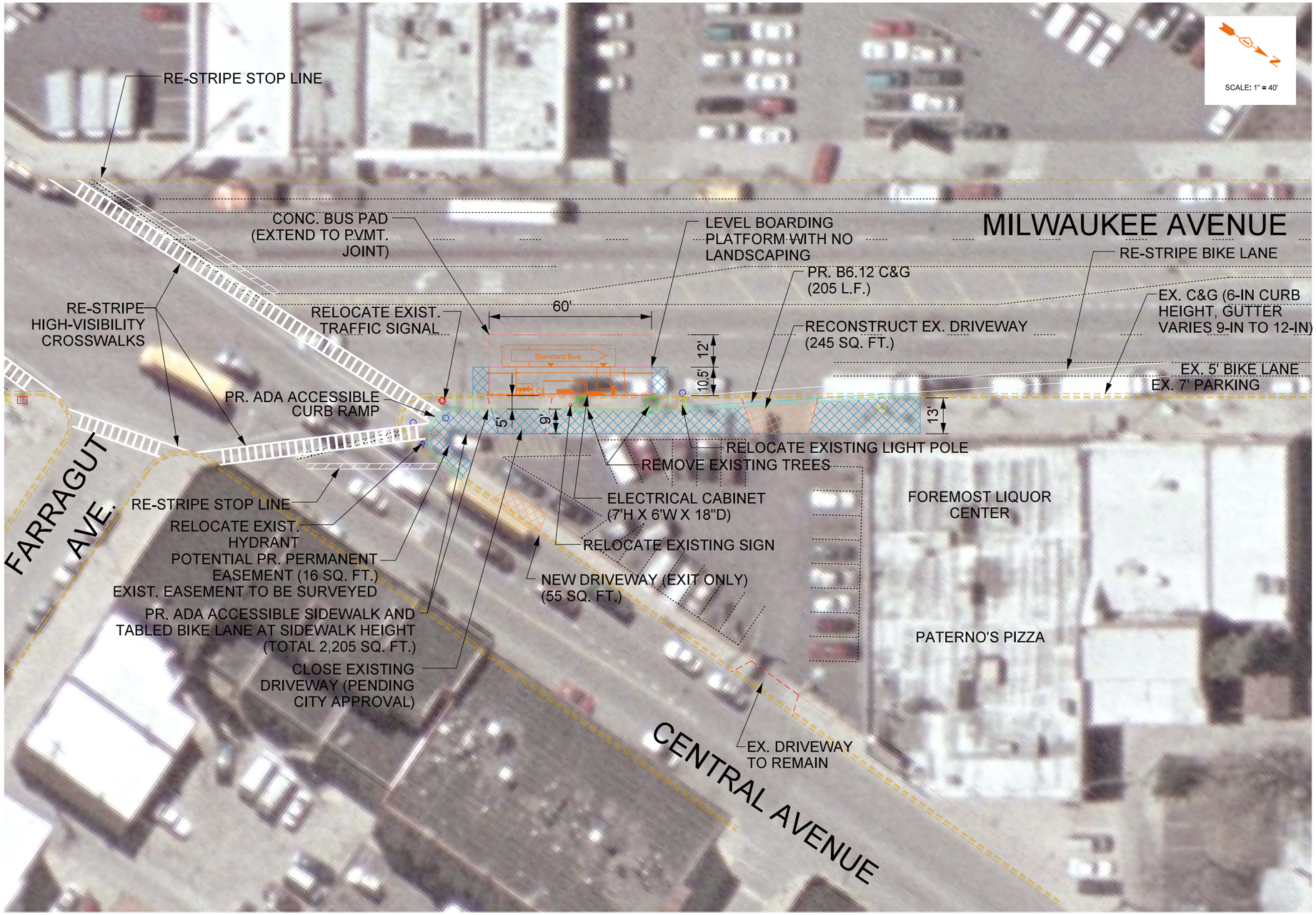
NOTES:
1. EXISTING CONDITION IS ROADWAY PAVEMENT AT PROPOSED BOARDING PLATFORM LOCATION
2. EXISTING CONDITION IS CONCRETE SIDEWALK AT PROPOSED SIDEWALK AND TABLED BIKE LANE LOCATION

DESIGNED BY: BCC
DRAWN BY: AMJ
CHECKED BY: SH
DATE: 09-25-2014

MILWAUKEE AVENUE ARTERIAL RAPID TRANSIT
STATION LAYOUTS

SOUTHBOUND
AUSTIN / ARDMORE STATION
PEDESTRIAN TREATMENT ALTERNATIVE

STATION LAYOUT DETAIL



LOCATION MAP

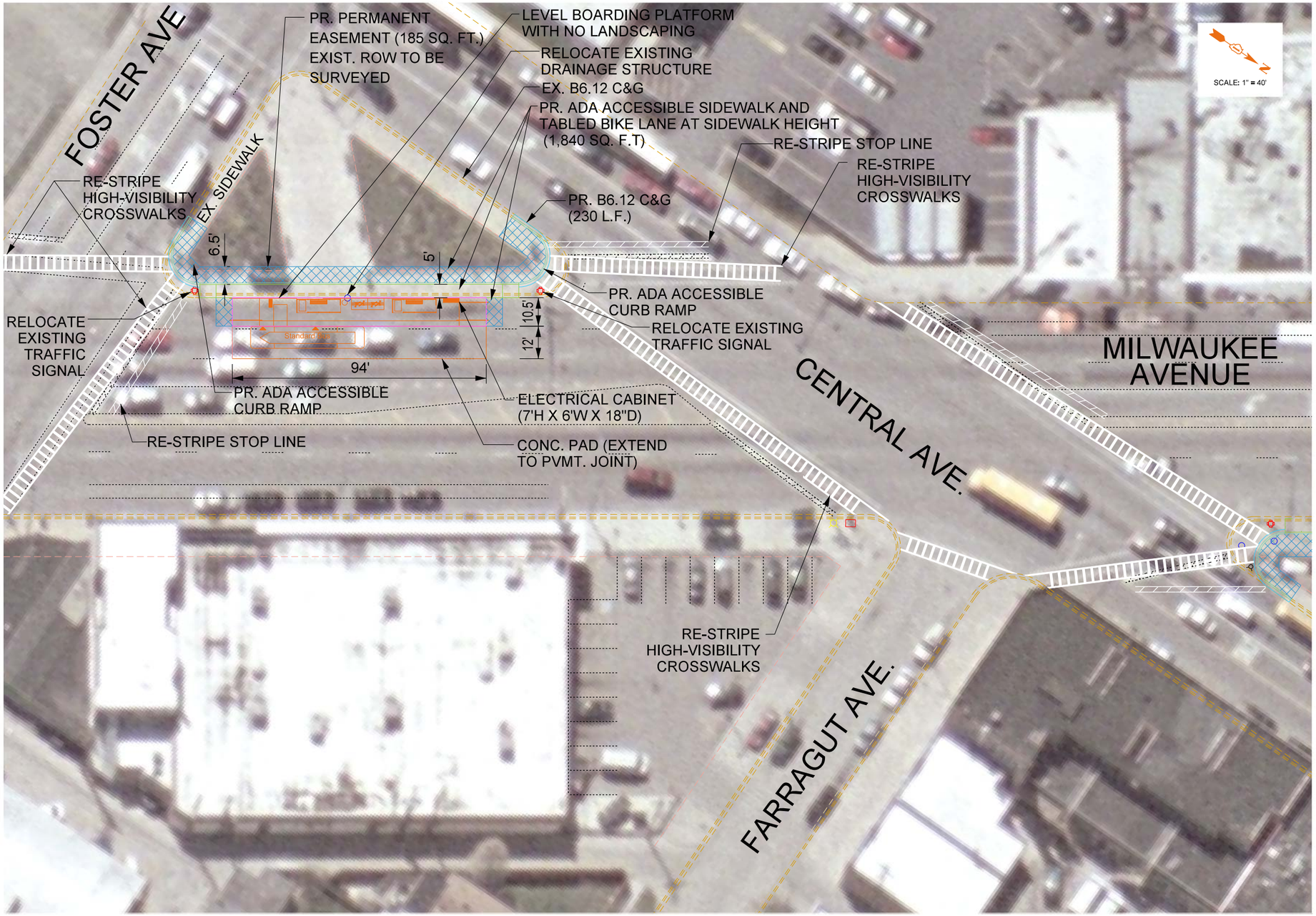
NOTES:
1. EXISTING CONDITION IS ROADWAY PAVEMENT AT PROPOSED BOARDING PLATFORM LOCATION.
2. EXISTING CONDITION IS CONCRETE SIDEWALK AT PROPOSED BOARDING PLATFORM AND TABLED BIKE LANE

DESIGNED BY: BCC
DRAWN BY: AMJ
CHECKED BY: SH
DATE: 09-25-2014

MILWAUKEE AVENUE ARTERIAL RAPID TRANSIT
STATION LAYOUTS

NORTHBOUND
CENTRAL AVENUE STATION
PEDESTRIAN TREATMENT ALTERNATIVE

STATION LAYOUT DETAIL



LOCATION MAP

NOTES:
1. EXISTING CONDITION IS ROADWAY PAVEMENT AT PROPOSED BOARDING PLATFORM LOCATION
2. EXISTING CONDITIONS ARE GRASS (105 SQ. FT.) AND CONCRETE SIDEWALK (1840 SQ. FT.) AT PROPOSED SIDEWALK AND TABLED BIKE LANE LOCATION

DESIGNED BY:	BCC
DRAWN BY:	AMJ
CHECKED BY:	SH
DATE:	09-25-2014

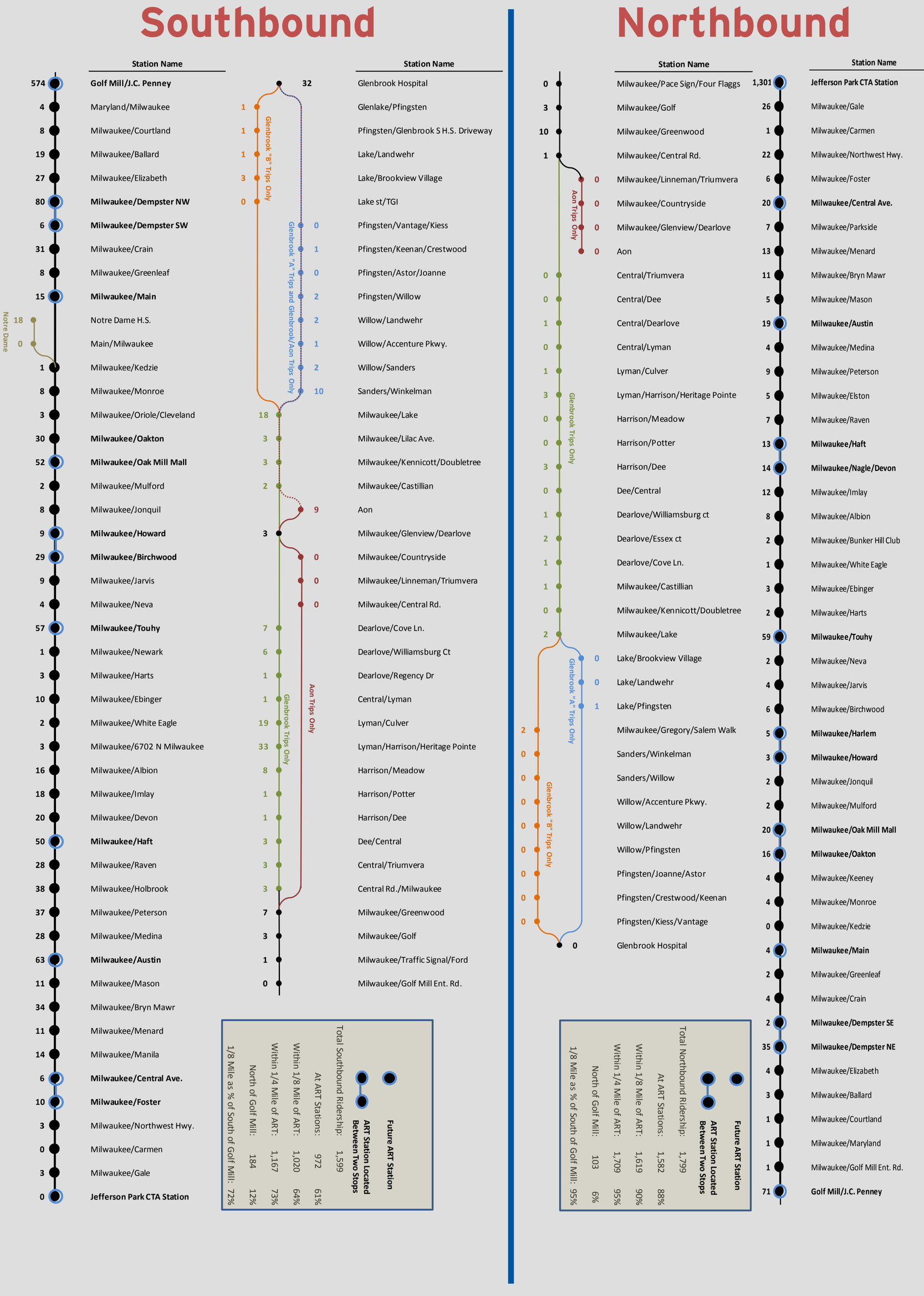
MILWAUKEE AVENUE ARTERIAL RAPID TRANSIT
STATION LAYOUTS

SOUTHBOUND
CENTRAL AVENUE STATION
PEDESTRIAN TREATMENT ALTERNATIVE

Appendix C – Ridership and Running Time Analysis

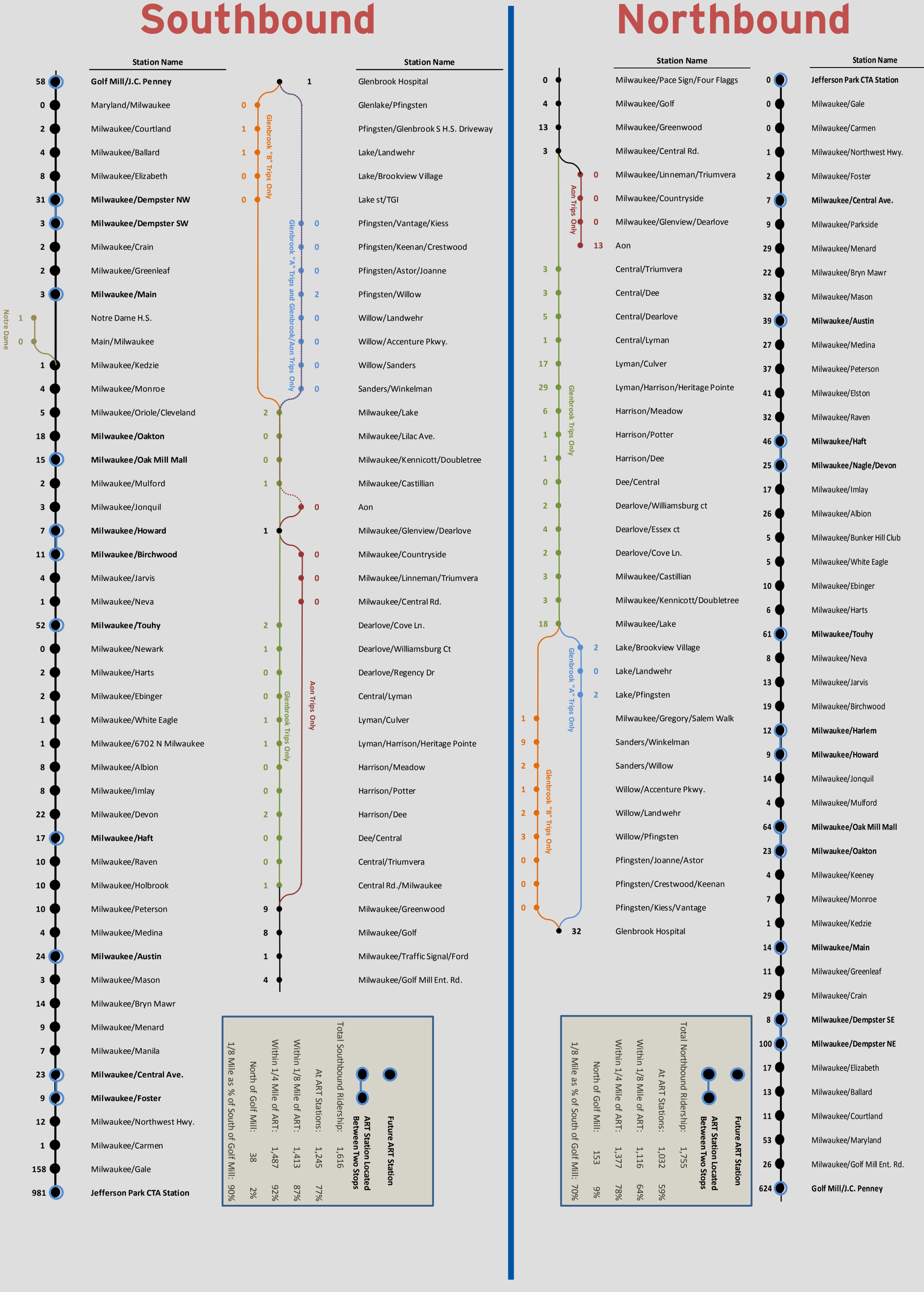
Total Daily Boardings

Average Weekday



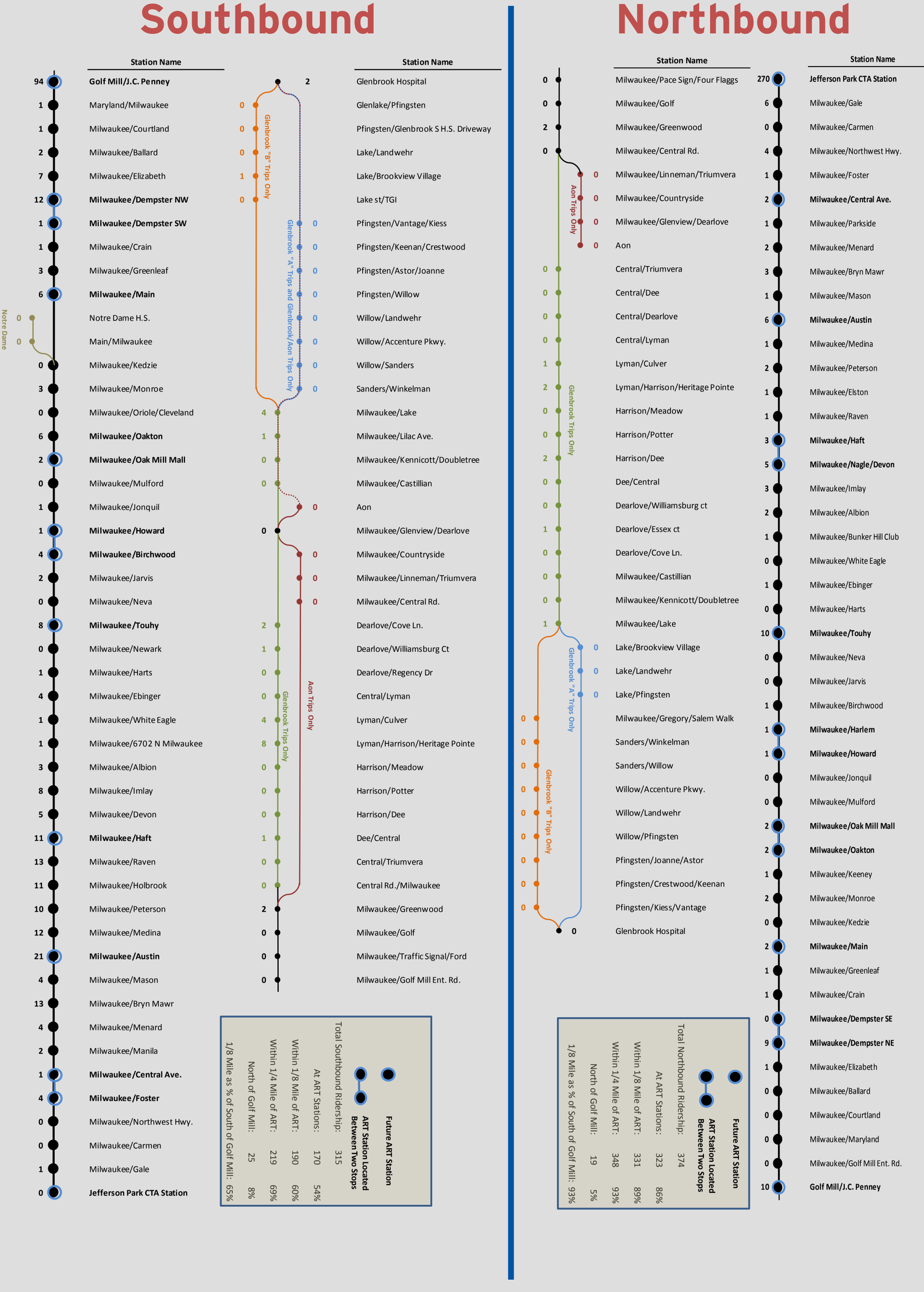
Total Daily Alightings

Average Weekday



Total AM Peak Boardings

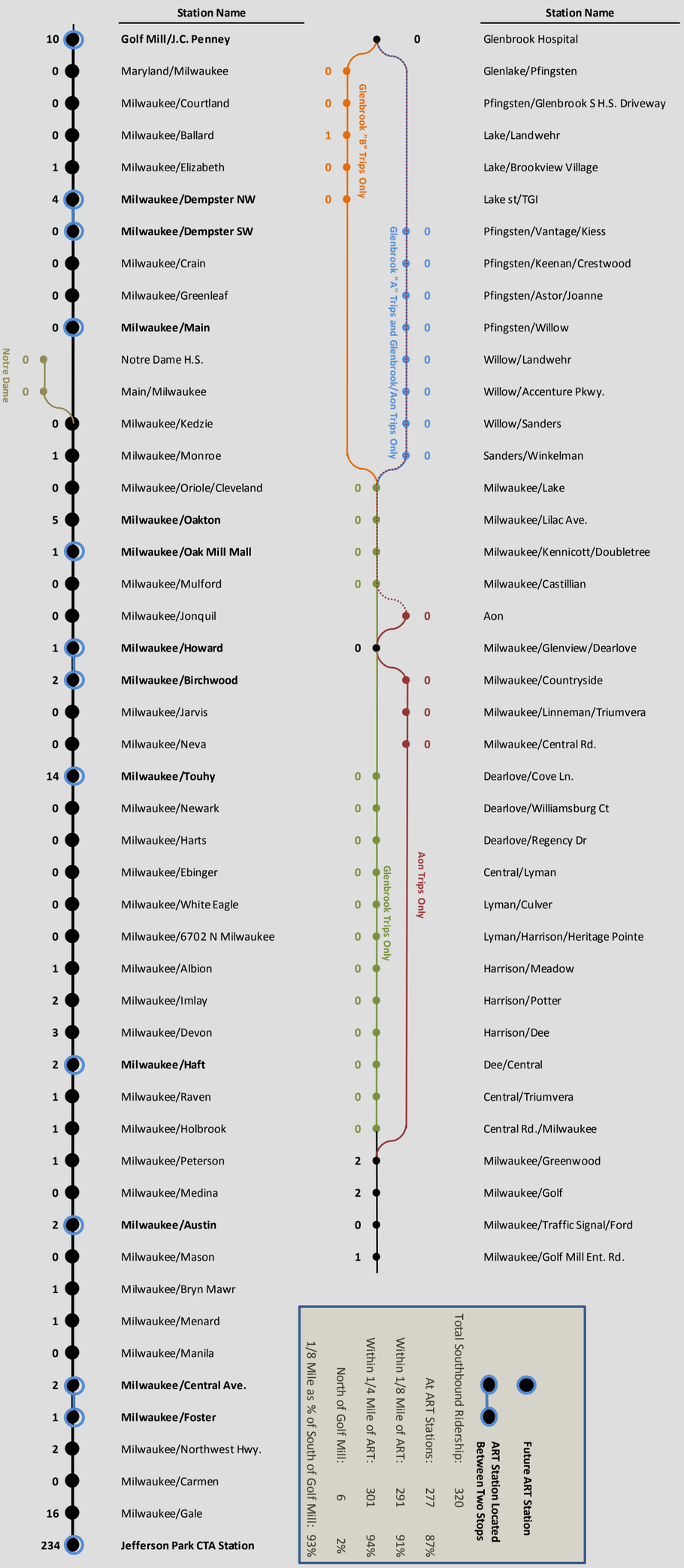
Average Weekday



Total AM Peak Alightings

Average Weekday

Southbound

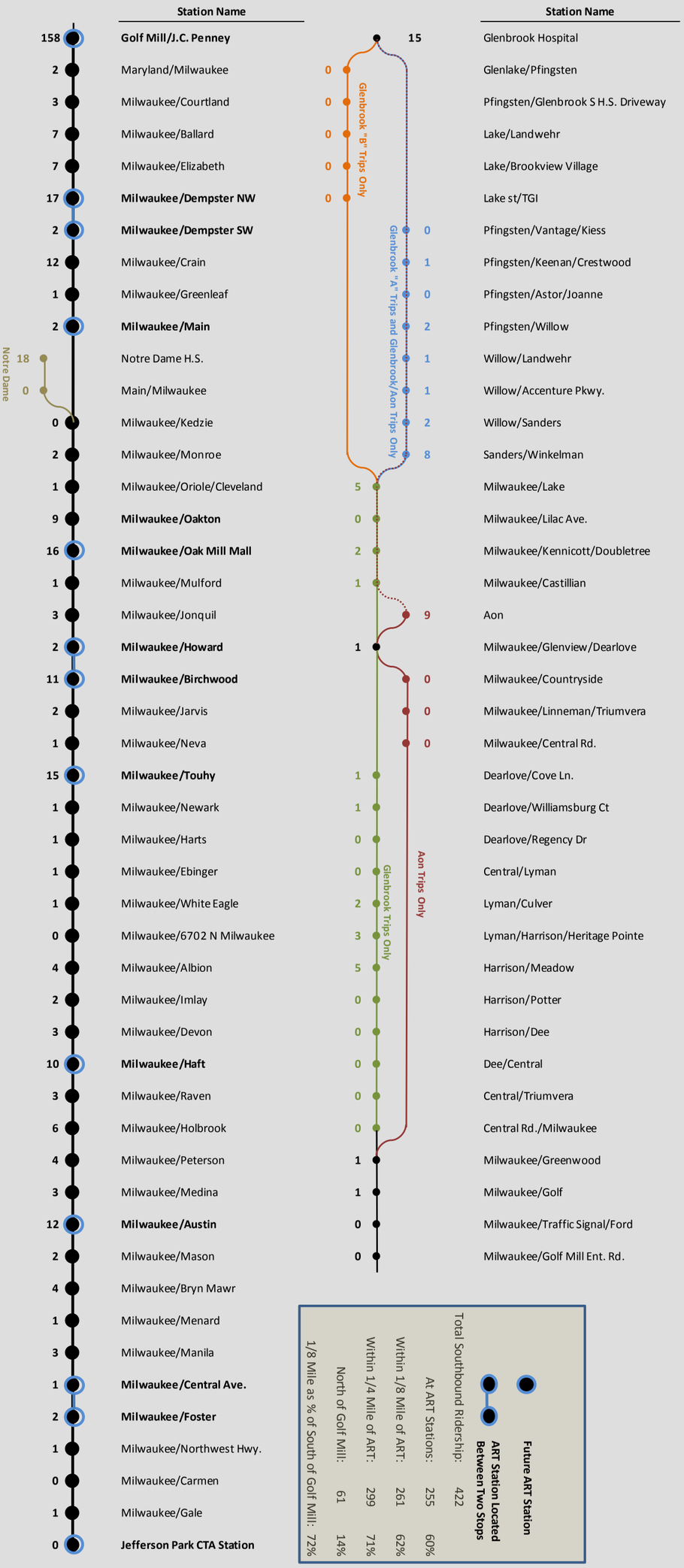


Northbound

Total PM Peak Boardings

Average Weekday

Southbound



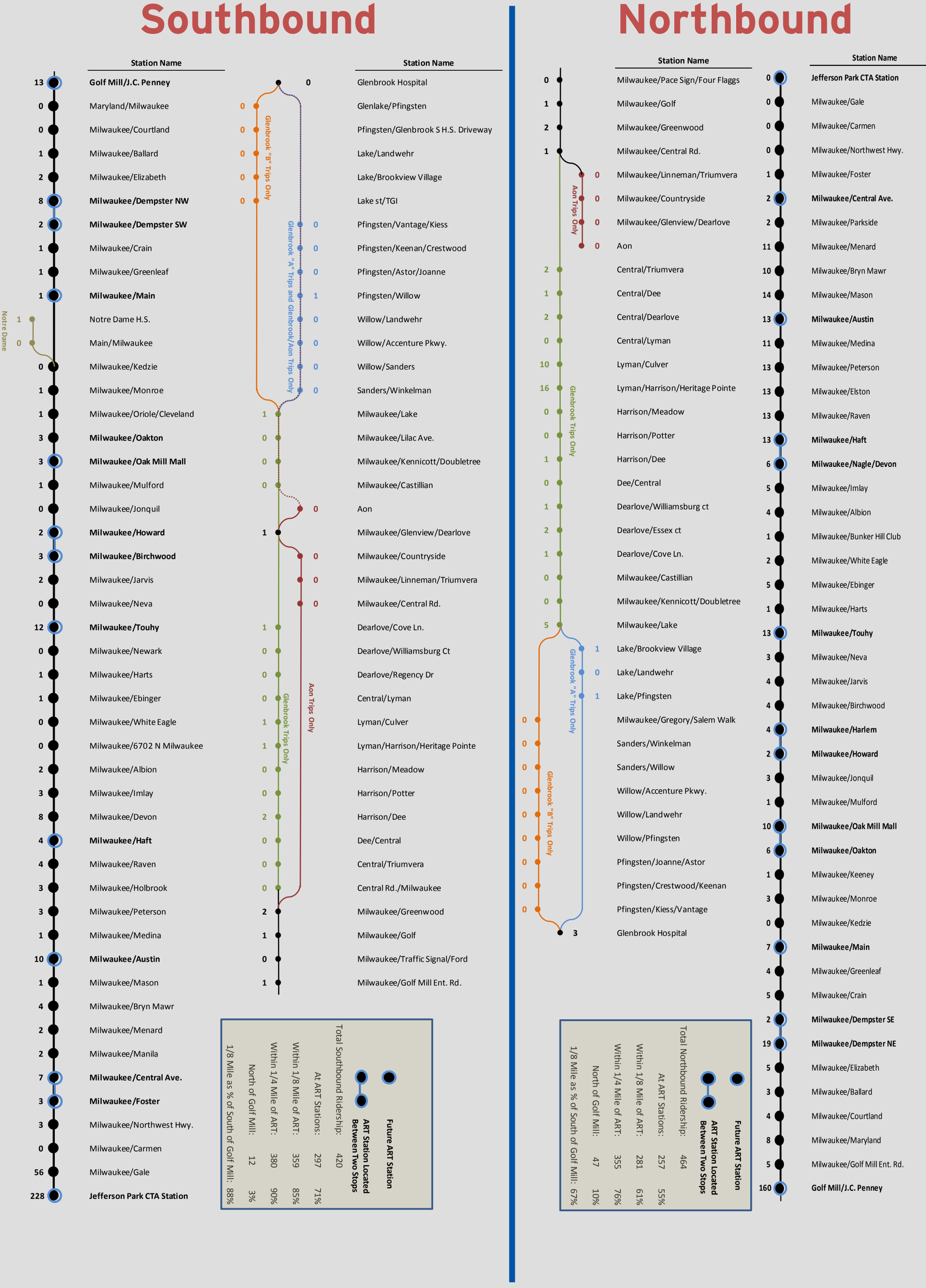
Future ART Station	
ART Station Located Between Two Stops	
Total Southbound Ridership:	422
At ART Stations:	255 60%
Within 1/8 Mile of ART:	261 62%
Within 1/4 Mile of ART:	299 71%
North of Golf Mill:	61 14%
1/8 Mile as % of South of Golf Mill:	72%

Northbound

Future ART Station	
ART Station Located Between Two Stops	
Total Northbound Ridership:	471
At ART Stations:	421 89%
Within 1/8 Mile of ART:	430 91%
Within 1/4 Mile of ART:	450 96%
North of Golf Mill:	31 7%
1/8 Mile as % of South of Golf Mill:	98%

Total PM Peak Alightings

Average Weekday



Passenger Loads by Stop

Peak Loading by Direction

Southbound 7:00 pm

Station Name	
Golf Mill/J.C. Penney	**17.9**
Maryland/Milwaukee	17.9
Milwaukee/Courtland	18.0
Milwaukee/Ballard	18.2
Milwaukee/Elizabeth	19.2
Milwaukee/Dempster NW	**20.2**
Milwaukee/Dempster SW	**20.4**
Milwaukee/Crain	20.5
Milwaukee/Greenleaf	20.6
Milwaukee/Main	**20.4**
Notre Dame H.S.	
Main/Milwaukee	
Milwaukee/Kedzie	20.4
Milwaukee/Monroe	20.4
Milwaukee/Oriole/Cleveland	20.4
Milwaukee/Oakton	**20.8**
Milwaukee/Oak Mill Mall	**21.5**
Milwaukee/Mulford	21.8
Milwaukee/Jonquil	21.9
Milwaukee/Howard	**21.9**
Milwaukee/Birchwood	**22.2**
Milwaukee/Jarvis	22.4
Milwaukee/Neva	22.5
Milwaukee/Touhy	**22.7**
Milwaukee/Newark	22.7
Milwaukee/Harts	22.7
Milwaukee/Ebinger	22.7
Milwaukee/White Eagle	22.7
Milwaukee/6702 N Milwaukee	22.7
Milwaukee/Albion	23.0
Milwaukee/Imlay	23.0
Milwaukee/Devon	22.8
Milwaukee/Haft	**22.6**
Milwaukee/Raven	22.6
Milwaukee/Holbrook	23.2
Milwaukee/Peterson	23.2
Milwaukee/Medina	23.2
Milwaukee/Austin	**23.2**
Milwaukee/Mason	23.3
Milwaukee/Bryn Mawr	23.0
Milwaukee/Menard	23.0
Milwaukee/Manila	23.1
Milwaukee/Central Ave.	**22.6**
Milwaukee/Foster	**22.5**
Milwaukee/Northwest Hwy.	22.4
Milwaukee/Carmen	22.3
Milwaukee/Gale	18.3
Jefferson Park CTA Station	**-2.2**

Northbound 9:00 am

Station Name	
Jefferson Park CTA Station	**25.3**
Milwaukee/Gale	26.1
Milwaukee/Carmen	26.2
Milwaukee/Northwest Hwy.	26.6
Milwaukee/Foster	26.7
Milwaukee/Central Ave.	**27.1**
Milwaukee/Parkside	27.1
Milwaukee/Menard	27.1
Milwaukee/Bryn Mawr	27.1
Milwaukee/Mason	26.5
Milwaukee/Austin	**26.1**
Milwaukee/Medina	25.9
Milwaukee/Peterson	25.0
Milwaukee/Elston	24.3
Milwaukee/Raven	24.2
Milwaukee/Haft	**23.5**
Milwaukee/Nagle/Devon	**23.0**
Milwaukee/Imlay	23.2
Milwaukee/Albion	23.1
Milwaukee/Bunker Hill Club	23.0
Milwaukee/White Eagle	22.9
Milwaukee/Ebinger	22.9
Milwaukee/Harts	22.8
Milwaukee/Touhy	**22.8**
Milwaukee/Neva	22.6
Milwaukee/Jarvis	22.4
Milwaukee/Birchwood	22.4
Milwaukee/Harlem	**22.3**
Milwaukee/Howard	**22.1**
Milwaukee/Jonquil	21.8
Milwaukee/Mulford	21.8
Milwaukee/Oak Mill Mall	**20.4**
Milwaukee/Oakton	**19.9**
Milwaukee/Keeney	19.9
Milwaukee/Monroe	19.9
Milwaukee/Kedzie	19.9
Milwaukee/Main	**19.9**
Milwaukee/Greenleaf	19.6
Milwaukee/Crain	19.4
Milwaukee/Dempster SE	**19.3**
Milwaukee/Dempster NE	**17.4**
Milwaukee/Elizabeth	16.9
Milwaukee/Ballard	16.8
Milwaukee/Courtland	16.5
Milwaukee/Maryland	14.8
Milwaukee/Golf Mill Ent. Rd.	13.7
Golf Mill/J.C. Penney	**2.1**

Average Weekday

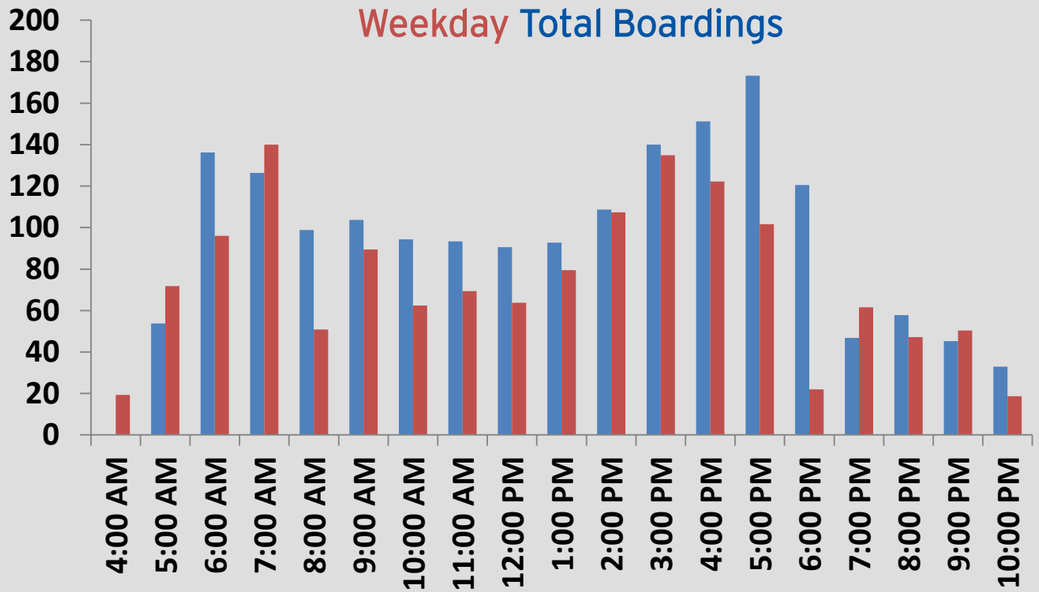
Southbound

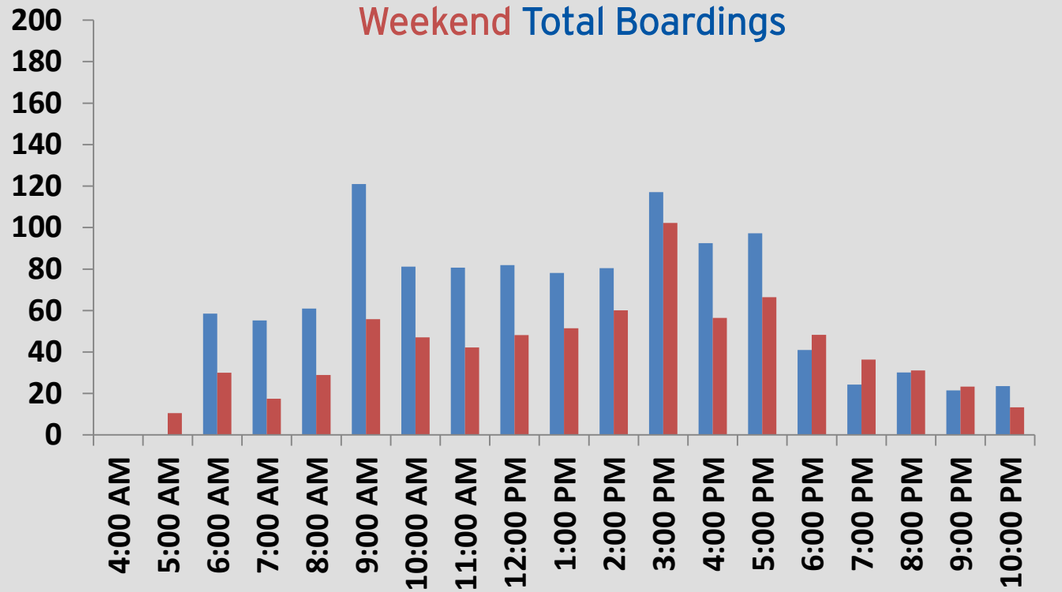
Station Name	
Golf Mill/J.C. Penney	**7.9**
Maryland/Milwaukee	8.0
Milwaukee/Courtland	8.1
Milwaukee/Ballard	8.3
Milwaukee/Elizabeth	8.6
Milwaukee/Dempster NW	**9.4**
Milwaukee/Dempster SW	**9.4**
Milwaukee/Crain	9.9
Milwaukee/Greenleaf	10.0
Milwaukee/Main	**10.2**
Notre Dame H.S.	
Main/Milwaukee	
Milwaukee/Kedzie	10.2
Milwaukee/Monroe	10.2
Milwaukee/Oriole/Cleveland	10.1
Milwaukee/Oakton	**10.3**
Milwaukee/Oak Mill Mall	**10.9**
Milwaukee/Mulford	10.9
Milwaukee/Jonquil	11.0
Milwaukee/Howard	**11.1**
Milwaukee/Birchwood	**11.4**
Milwaukee/Jarvis	11.5
Milwaukee/Neva	11.6
Milwaukee/Touhy	**11.7**
Milwaukee/Newark	11.7
Milwaukee/Harts	11.7
Milwaukee/Ebinger	11.9
Milwaukee/White Eagle	11.9
Milwaukee/6702 N Milwaukee	12.0
Milwaukee/Albion	12.1
Milwaukee/Imlay	12.3
Milwaukee/Devon	12.4
Milwaukee/Haft	**12.9**
Milwaukee/Raven	13.2
Milwaukee/Holbrook	13.6
Milwaukee/Peterson	14.1
Milwaukee/Medina	14.4
Milwaukee/Austin	**15.0**
Milwaukee/Mason	15.1
Milwaukee/Bryn Mawr	15.5
Milwaukee/Menard	15.6
Milwaukee/Manila	15.7
Milwaukee/Central Ave.	**15.5**
Milwaukee/Foster	**15.6**
Milwaukee/Northwest Hwy.	15.4
Milwaukee/Carmen	15.4
Milwaukee/Gale	13.0
Jefferson Park CTA Station	**-2.5**

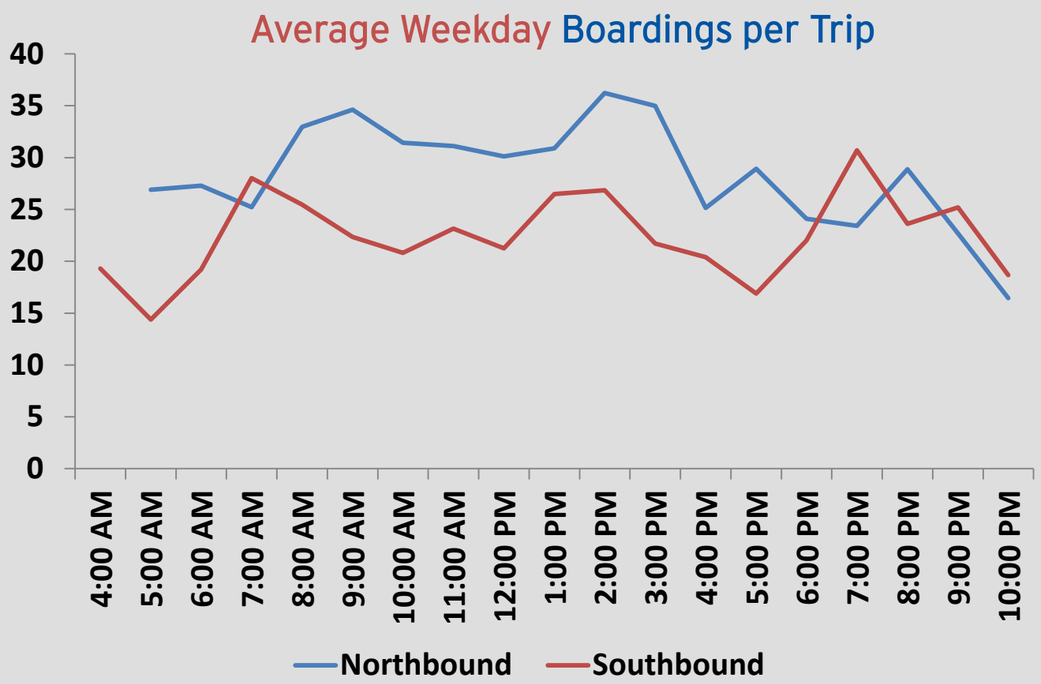
Northbound

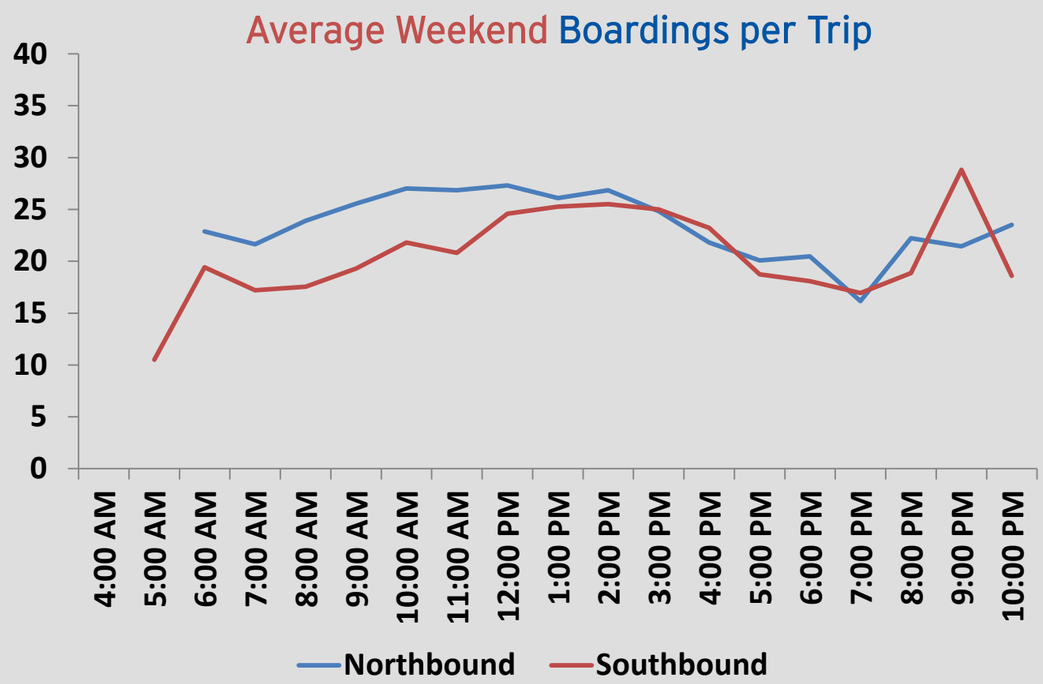
Station Name	
Jefferson Park CTA Station	**21.0**
Milwaukee/Gale	21.4
Milwaukee/Carmen	21.4
Milwaukee/Northwest Hwy.	21.8
Milwaukee/Foster	21.9
Milwaukee/Central Ave.	**22.1**
Milwaukee/Parkside	22.1
Milwaukee/Menard	21.8
Milwaukee/Bryn Mawr	21.7
Milwaukee/Mason	21.3
Milwaukee/Austin	**21.0**
Milwaukee/Medina	20.7
Milwaukee/Peterson	20.2
Milwaukee/Elston	19.7
Milwaukee/Raven	19.3
Milwaukee/Haft	**18.8**
Milwaukee/Nagle/Devon	**18.6**
Milwaukee/Imlay	18.5
Milwaukee/Albion	18.1
Milwaukee/Bunker Hill Club	18.0
Milwaukee/White Eagle	17.9
Milwaukee/Ebinger	17.8
Milwaukee/Harts	17.7
Milwaukee/Touhy	**17.6**
Milwaukee/Neva	17.5
Milwaukee/Jarvis	17.4
Milwaukee/Birchwood	17.2
Milwaukee/Harlem	**17.1**
Milwaukee/Howard	**17.1**
Milwaukee/Jonquil	16.9
Milwaukee/Mulford	16.8
Milwaukee/Oak Mill Mall	**16.0**
Milwaukee/Oakton	**15.8**
Milwaukee/Keeney	15.8
Milwaukee/Monroe	15.8
Milwaukee/Kedzie	15.8
Milwaukee/Main	**15.7**
Milwaukee/Greenleaf	15.5
Milwaukee/Crain	15.1
Milwaukee/Dempster SE	**15.0**
Milwaukee/Dempster NE	**13.9**
Milwaukee/Elizabeth	13.7
Milwaukee/Ballard	13.5
Milwaukee/Courtland	13.3
Milwaukee/Maryland	12.4
Milwaukee/Golf Mill Ent. Rd.	12.0
Golf Mill/J.C. Penney	**3.3**

Ridership by Hour









Android App Running Time Results

General Weekday

Northbound

Travel conditions

	Percentage	Avg Duration
Moving	69%	0:19:13
Bus Stop	13%	0:03:35
Traffic Light	18%	0:04:59
Congestion - Slowed	0%	0:00:06
Congestion - Stopped	0%	0:00:01
Total		*0:27:55*

Avg stops per run	13.96
Avg stop time	00:15
Avg stops > 60 secs per run	0.20

Southbound

Travel conditions

	Percentage	Avg Duration
Moving	69%	0:19:51
Bus Stop	13%	0:03:38
Traffic Light	17%	0:04:52
Congestion - Slowed	1%	0:00:17
Congestion - Stopped	1%	0:00:16
Total		*0:28:54*

Avg stops per run	14.56
Avg stop time	00:15
Avg stops > 60 secs per run	0.19

Android App Running Time Results

PM Peak

Northbound

Travel conditions

	Percentage	Avg Duration
Moving	75%	0:21:06
Bus Stop	9%	0:02:29
Traffic Light	16%	0:04:26
Congestion - Slowed	0%	0:00:00
Congestion - Stopped	0%	0:00:06
Total		*0:28:07*

Avg stops per run	14.00
Avg stop time	00:11
Avg stops > 60 secs per run	0.00

Southbound

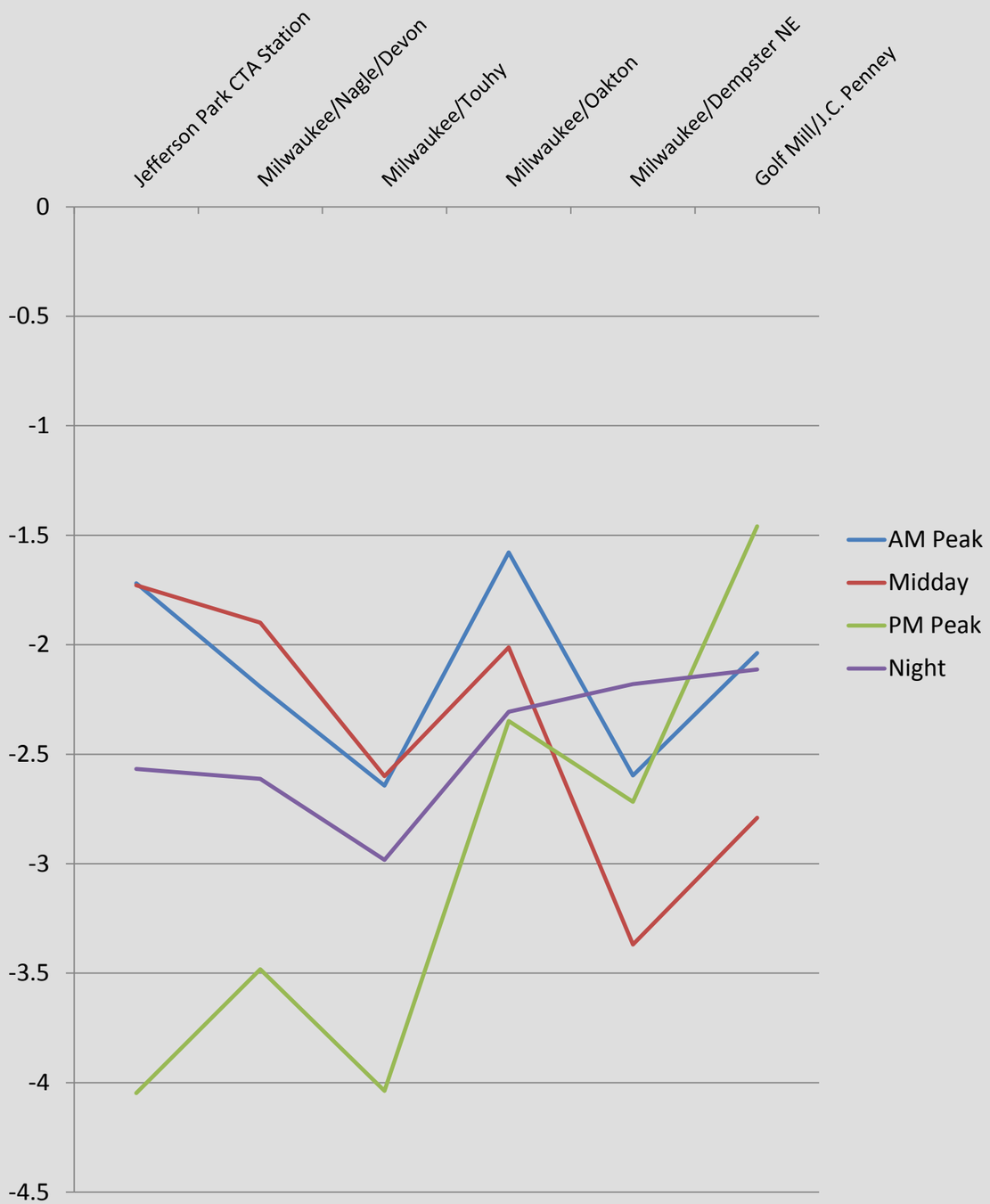
Travel conditions

	Percentage	Avg Duration
Moving	63%	0:19:16
Bus Stop	13%	0:03:56
Traffic Light	23%	0:07:13
Congestion - Slowed	1%	0:00:20
Congestion - Stopped	0%	0:00:03
Total		*0:30:49*

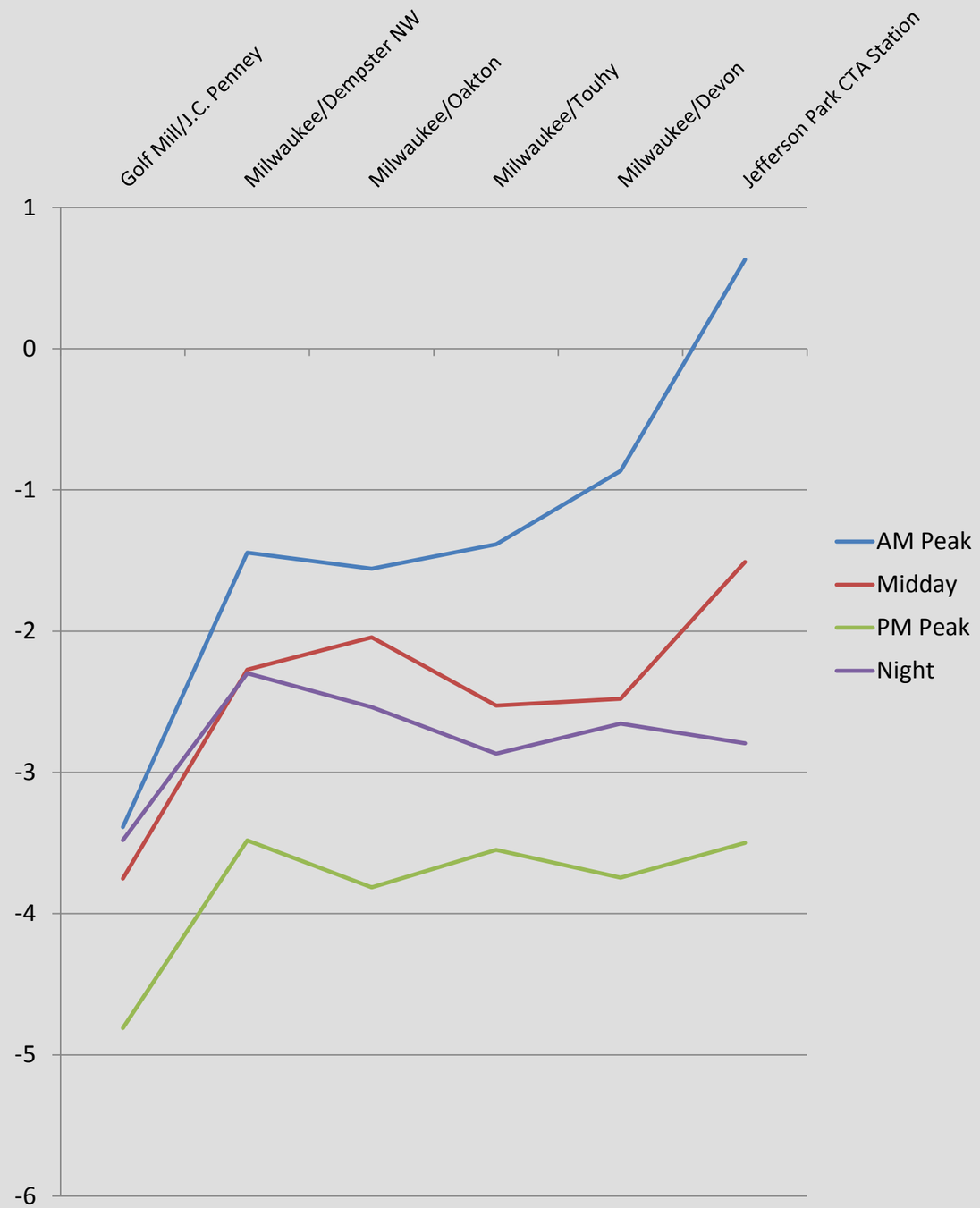
Avg stops per run	16.50
Avg stop time	00:14
Avg stops > 60 secs per run	0.00

Average Schedule Adherence (minutes)

Weekday Northbound



Weekday Southbound



Appendix D – Proposed Bus Schedules

Milwaukee Avenue ART Schedule – Annual Statistics

Annual Revenue Hours	25,267.25
Annual Revenue Miles	393,933
Required Peak Vehicles	6
Fleet Size at 20% Spares	8

Milwaukee Avenue ART Schedule – Weekday

Weekday Revenue Hours	72.9
Weekday Revenue Miles	1,139
Required Peak Vehicles	6

Leave Jefferson Pk	Arrive Golf Mill	Recovery time	Leave Golf Mill	Arrive Jefferson Pk	Recovery time	Leave next trip
			5:00 AM	5:22 AM	0:08:00	5:30 AM
5:00 AM	5:23 AM	0:06:00	5:29 AM	5:52 AM	0:08:00	6:00 AM
5:15 AM	5:38 AM	0:06:00	5:44 AM	6:07 AM	0:03:00	6:10 AM
5:30 AM	5:53 AM	0:06:00	5:59 AM	6:24 AM	0:06:00	6:30 AM
			6:10 AM	6:36 AM	0:04:00	6:40 AM
5:45 AM	6:09 AM	0:10:00	6:19 AM	6:46 AM	0:04:00	6:50 AM
6:00 AM	6:24 AM	0:05:00	6:29 AM	6:56 AM	0:04:00	7:00 AM
6:10 AM	6:34 AM	0:05:00	6:39 AM	7:06 AM	0:04:00	7:10 AM
6:20 AM	6:44 AM	0:05:00	6:49 AM	7:16 AM	0:04:00	7:20 AM
6:30 AM	6:54 AM	0:05:00	6:59 AM	7:26 AM	0:04:00	7:30 AM
6:40 AM	7:04 AM	0:05:00	7:09 AM	7:36 AM	0:04:00	7:40 AM
6:50 AM	7:14 AM	0:05:00	7:19 AM	7:46 AM	0:04:00	7:50 AM
7:00 AM	7:24 AM	0:05:00	7:29 AM	7:56 AM	0:04:00	8:00 AM
7:10 AM	7:34 AM	0:05:00	7:39 AM	8:06 AM	0:04:00	8:10 AM
7:20 AM	7:44 AM	0:05:00	7:49 AM	8:16 AM	0:04:00	8:20 AM
7:30 AM	7:54 AM	0:05:00	7:59 AM	8:26 AM	0:04:00	8:30 AM
7:40 AM	8:04 AM	0:05:00	8:09 AM	8:36 AM	0:04:00	8:40 AM
7:50 AM	8:14 AM	0:05:00	8:19 AM	8:46 AM	0:04:00	8:50 AM
8:00 AM	8:24 AM	0:05:00	8:29 AM	8:56 AM	0:04:00	9:00 AM
8:10 AM	8:34 AM	0:05:00	8:39 AM	9:06 AM		
8:20 AM	8:44 AM	0:02:00	8:46 AM	9:13 AM	0:02:00	9:15 AM
8:30 AM	8:54 AM	0:05:00	8:59 AM	9:26 AM	0:04:00	9:30 AM
8:40 AM	9:04 AM	0:05:00	9:09 AM	9:36 AM	0:09:00	9:45 AM
8:50 AM	9:14 AM	0:05:00	9:19 AM	9:46 AM		
9:00 AM	9:25 AM	0:04:00	9:29 AM	9:56 AM	0:04:00	10:00 AM
9:15 AM	9:40 AM	0:04:00	9:44 AM	10:11 AM	0:04:00	10:15 AM
9:30 AM	9:55 AM	0:04:00	9:59 AM	10:26 AM	0:04:00	10:30 AM
9:45 AM	10:10 AM	0:04:00	10:14 AM	10:41 AM	0:04:00	10:45 AM
10:00 AM	10:25 AM	0:04:00	10:29 AM	10:56 AM	0:04:00	11:00 AM

10:15 AM	10:40 AM	0:04:00	10:44 AM	11:11 AM	0:04:00	11:15 AM
10:30 AM	10:55 AM	0:04:00	10:59 AM	11:26 AM	0:04:00	11:30 AM
10:45 AM	11:10 AM	0:04:00	11:14 AM	11:41 AM	0:04:00	11:45 AM
11:00 AM	11:25 AM	0:04:00	11:29 AM	11:56 AM	0:04:00	12:00 PM
11:15 AM	11:40 AM	0:04:00	11:44 AM	12:11 PM	0:04:00	12:15 PM
11:30 AM	11:55 AM	0:04:00	11:59 AM	12:26 PM	0:04:00	12:30 PM
11:45 AM	12:10 PM	0:04:00	12:14 PM	12:41 PM	0:04:00	12:45 PM
12:00 PM	12:25 PM	0:04:00	12:29 PM	12:56 PM	0:04:00	1:00 PM
12:15 PM	12:40 PM	0:04:00	12:44 PM	1:11 PM	0:04:00	1:15 PM
12:30 PM	12:55 PM	0:04:00	12:59 PM	1:26 PM	0:04:00	1:30 PM
12:45 PM	1:10 PM	0:04:00	1:14 PM	1:41 PM	0:04:00	1:45 PM
1:00 PM	1:25 PM	0:04:00	1:29 PM	1:56 PM	0:04:00	2:00 PM
1:15 PM	1:40 PM	0:04:00	1:44 PM	2:11 PM	0:04:00	2:15 PM
1:30 PM	1:55 PM	0:04:00	1:59 PM	2:26 PM	0:04:00	2:30 PM
1:45 PM	2:10 PM	0:04:00	2:14 PM	2:41 PM	0:04:00	2:45 PM
2:00 PM	2:25 PM	0:04:00	2:29 PM	2:56 PM	0:04:00	3:00 PM
2:15 PM	2:40 PM	0:04:00	2:44 PM	3:11 PM		
2:30 PM	2:55 PM	0:04:00	2:59 PM	3:26 PM	0:04:00	3:30 PM
2:45 PM	3:10 PM	0:04:00	3:14 PM	3:41 PM	0:09:00	3:50 PM
3:00 PM	3:26 PM	0:04:00	3:30 PM	3:57 PM	0:03:00	4:00 PM
3:10 PM	3:38 PM	0:03:00	3:41 PM	4:08 PM	0:02:00	4:10 PM
3:20 PM	3:48 PM	0:03:00	3:51 PM	4:18 PM	0:02:00	4:20 PM
3:30 PM	3:58 PM	0:03:00	4:01 PM	4:30 PM	0:10:00	4:40 PM
3:40 PM	4:08 PM	0:03:00	4:11 PM	4:40 PM	0:10:00	4:50 PM
3:50 PM	4:18 PM	0:03:00	4:21 PM	4:50 PM	0:10:00	5:00 PM
4:00 PM	4:28 PM	0:03:00	4:31 PM	5:00 PM	0:10:00	5:10 PM
4:10 PM	4:38 PM	0:03:00	4:41 PM	5:10 PM	0:10:00	5:20 PM
4:20 PM	4:48 PM	0:03:00	4:51 PM	5:20 PM	0:10:00	5:30 PM
4:30 PM	4:58 PM	0:03:00	5:01 PM	5:30 PM	0:10:00	5:40 PM
4:40 PM	5:08 PM	0:03:00	5:11 PM	5:40 PM	0:10:00	5:50 PM
4:50 PM	5:18 PM	0:03:00	5:21 PM	5:50 PM	0:10:00	6:00 PM
5:00 PM	5:28 PM	0:03:00	5:31 PM	6:00 PM		
5:10 PM	5:38 PM	0:03:00	5:41 PM	6:10 PM	0:05:00	6:15 PM
5:20 PM	5:48 PM	0:04:00	5:52 PM	6:21 PM	0:09:00	6:30 PM
5:30 PM	5:58 PM	0:04:00	6:02 PM	6:31 PM		
5:40 PM	6:08 PM	0:06:00	6:14 PM	6:43 PM	0:02:00	6:45 PM
5:50 PM	6:18 PM	0:06:00	6:24 PM	6:53 PM	0:07:00	7:00 PM
6:00 PM	6:28 PM	0:06:00	6:34 PM	6:59 PM		
6:15 PM	6:43 PM	0:04:00	6:47 PM	7:12 PM	0:03:00	7:15 PM
6:30 PM	6:54 PM	0:05:00	6:59 PM	7:24 PM	0:06:00	7:30 PM
6:45 PM	7:09 PM	0:05:00	7:14 PM	7:39 PM	0:06:00	7:45 PM
7:00 PM	7:24 PM	0:05:00	7:29 PM	7:54 PM	0:06:00	8:00 PM
7:15 PM	7:39 PM	0:05:00	7:44 PM	8:09 PM	0:06:00	8:15 PM
7:30 PM	7:54 PM	0:05:00	7:59 PM	8:24 PM	0:06:00	8:30 PM
7:45 PM	8:09 PM	0:05:00	8:14 PM	8:39 PM	0:06:00	8:45 PM
8:00 PM	8:24 PM	0:05:00	8:29 PM	8:54 PM	0:06:00	9:00 PM
8:15 PM	8:39 PM	0:07:00	8:46 PM	9:09 PM	0:06:00	9:15 PM
8:30 PM	8:54 PM	0:07:00	9:01 PM	9:24 PM	0:06:00	9:30 PM
8:45 PM	9:09 PM	0:07:00	9:16 PM	9:39 PM	0:06:00	9:45 PM

9:00 PM	9:22 PM	0:07:00	9:29 PM	9:52 PM	0:08:00	10:00 PM
9:15 PM	9:37 PM	0:07:00	9:44 PM	10:07 PM		
9:30 PM	9:52 PM	0:07:00	9:59 PM	10:22 PM	0:08:00	10:30 PM
9:45 PM	10:07 PM					
10:00 PM	10:22 PM	0:07:00	10:29 PM	10:52 PM	0:08:00	11:00 PM
10:30 PM	10:52 PM	0:07:00	10:59 PM	11:22 PM	0:08:00	11:30 PM
11:00 PM	11:22 PM	0:07:00	11:29 PM	11:52 PM	0:08:00	12:00 AM
11:30 PM	11:52 PM	0:07:00	11:59 PM	12:22 AM		
12:00 AM	12:22 AM					

Milwaukee Avenue ART Schedule – Saturday

Saturday Revenue Hours	64.2
Saturday Revenue Miles	951.4

Leave Jefferson Pk	Arrive Golf Mill	Recovery time	Leave Golf Mill	Arrive Jefferson Pk	Recovery time	Leave next trip
			5:30 AM	5:54 AM	0:06:00	6:00 AM
5:30 AM	5:57 AM	0:03:00	6:00 AM	6:25 AM	0:05:00	6:30 AM
5:45 AM	6:12 AM	0:03:00	6:15 AM	6:40 AM	0:05:00	6:45 AM
6:00 AM	6:27 AM	0:03:00	6:30 AM	6:55 AM	0:05:00	7:00 AM
6:15 AM	6:42 AM	0:03:00	6:45 AM	7:10 AM	0:05:00	7:15 AM
6:30 AM	6:57 AM	0:03:00	7:00 AM	7:25 AM	0:05:00	7:30 AM
6:45 AM	7:12 AM	0:03:00	7:15 AM	7:40 AM	0:05:00	7:45 AM
7:00 AM	7:27 AM	0:03:00	7:30 AM	7:55 AM	0:05:00	8:00 AM
7:15 AM	7:42 AM	0:03:00	7:45 AM	8:10 AM	0:05:00	8:15 AM
7:30 AM	7:57 AM	0:03:00	8:00 AM	8:25 AM	0:05:00	8:30 AM
7:45 AM	8:12 AM	0:03:00	8:15 AM	8:42 AM	0:03:00	8:45 AM
8:00 AM	8:27 AM	0:03:00	8:30 AM	8:57 AM	0:03:00	9:00 AM
8:15 AM	8:42 AM	0:03:00	8:45 AM	9:12 AM	0:03:00	9:15 AM
8:30 AM	8:57 AM	0:03:00	9:00 AM	9:27 AM	0:03:00	9:30 AM
8:45 AM	9:12 AM	0:03:00	9:15 AM	9:42 AM	0:03:00	9:45 AM
9:00 AM	9:26 AM	0:03:00	9:29 AM	10:00 AM		
9:15 AM	9:41 AM	0:05:00	9:46 AM	10:17 AM	0:03:00	10:20 AM
9:30 AM	9:56 AM	0:05:00	10:01 AM	10:32 AM	0:03:00	10:35 AM
9:45 AM	10:11 AM	0:05:00	10:16 AM	10:47 AM	0:03:00	10:50 AM
10:00 AM	10:26 AM	0:05:00	10:31 AM	11:02 AM	0:13:00	11:15 AM
10:15 AM	10:41 AM	0:05:00	10:46 AM	11:17 AM	0:13:00	11:30 AM
10:30 AM	10:56 AM	0:05:00	11:01 AM	11:32 AM	0:13:00	11:45 AM
10:45 AM	11:11 AM	0:05:00	11:16 AM	11:47 AM	0:13:00	12:00 PM
11:00 AM	11:26 AM	0:05:00	11:31 AM	12:02 PM	0:13:00	12:15 PM
11:15 AM	11:41 AM	0:05:00	11:46 AM	12:17 PM	0:13:00	12:30 PM
11:30 AM	11:56 AM	0:05:00	12:01 PM	12:32 PM	0:13:00	12:45 PM

11:45 AM	12:11 PM	0:05:00	12:16 PM	12:47 PM	0:13:00	1:00 PM
12:00 PM	12:26 PM	0:05:00	12:31 PM	1:02 PM	0:13:00	1:15 PM
12:15 PM	12:41 PM	0:05:00	12:46 PM	1:17 PM	0:13:00	1:30 PM
12:30 PM	12:56 PM	0:05:00	1:01 PM	1:32 PM	0:13:00	1:45 PM
12:45 PM	1:11 PM	0:05:00	1:16 PM	1:47 PM	0:13:00	2:00 PM
1:00 PM	1:26 PM	0:05:00	1:31 PM	2:02 PM	0:13:00	2:15 PM
1:15 PM	1:41 PM	0:05:00	1:46 PM	2:17 PM	0:13:00	2:30 PM
1:30 PM	1:56 PM	0:05:00	2:01 PM	2:32 PM	0:13:00	2:45 PM
1:45 PM	2:11 PM	0:05:00	2:16 PM	2:47 PM	0:13:00	3:00 PM
2:00 PM	2:26 PM	0:05:00	2:31 PM	3:02 PM	0:13:00	3:15 PM
2:15 PM	2:41 PM	0:05:00	2:46 PM	3:17 PM	0:13:00	3:30 PM
2:30 PM	2:56 PM	0:05:00	3:01 PM	3:32 PM	0:13:00	3:45 PM
2:45 PM	3:11 PM	0:05:00	3:16 PM	3:47 PM	0:13:00	4:00 PM
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3:45 PM	4:11 PM	0:05:00	4:16 PM	4:47 PM	0:13:00	5:00 PM
4:00 PM	4:26 PM	0:05:00	4:31 PM	5:02 PM	0:13:00	5:15 PM
4:15 PM	4:41 PM	0:05:00	4:46 PM	5:17 PM	0:13:00	5:30 PM
4:30 PM	4:56 PM	0:05:00	5:01 PM	5:32 PM	0:13:00	5:45 PM
4:45 PM	5:11 PM	0:05:00	5:16 PM	5:47 PM	0:13:00	6:00 PM
5:00 PM	5:26 PM	0:05:00	5:31 PM	6:02 PM	0:13:00	6:15 PM
5:15 PM	5:41 PM	0:05:00	5:46 PM	6:17 PM	0:13:00	6:30 PM
5:30 PM	5:56 PM	0:05:00	6:01 PM	6:32 PM	0:13:00	6:45 PM
5:45 PM	6:11 PM	0:04:00	6:15 PM	6:44 PM		
6:00 PM	6:26 PM	0:03:00	6:29 PM	6:58 PM	0:02:00	7:00 PM
6:15 PM	6:41 PM	0:03:00	6:44 PM	7:13 PM	0:02:00	7:15 PM
6:30 PM	6:53 PM	0:03:00	6:56 PM	7:25 PM	0:05:00	7:30 PM
6:45 PM	7:08 PM	0:03:00	7:11 PM	7:40 PM	0:05:00	7:45 PM
7:00 PM	7:23 PM	0:03:00	7:26 PM	7:55 PM	0:05:00	8:00 PM
7:15 PM	7:38 PM	0:03:00	7:41 PM	8:08 PM	0:07:00	8:15 PM
7:30 PM	7:53 PM	0:03:00	7:56 PM	8:23 PM	0:07:00	8:30 PM
7:45 PM	8:08 PM	0:03:00	8:11 PM	8:38 PM	0:07:00	8:45 PM
8:00 PM	8:23 PM	0:03:00	8:26 PM	8:53 PM	0:07:00	9:00 PM
8:15 PM	8:38 PM	0:03:00	8:41 PM	9:08 PM	0:07:00	9:15 PM
8:30 PM	8:53 PM	0:03:00	8:56 PM	9:23 PM	0:07:00	9:30 PM
8:45 PM	9:08 PM	0:03:00	9:11 PM	9:38 PM	0:07:00	9:45 PM
9:00 PM	9:23 PM	0:03:00	9:26 PM	9:53 PM	0:07:00	10:00 PM
9:15 PM	9:38 PM	0:03:00	9:41 PM	10:08 PM		
9:30 PM	9:53 PM	0:03:00	9:56 PM	10:23 PM	0:07:00	10:30 PM
9:45 PM	10:08 PM	0:03:00	10:11 PM	10:38 PM		
10:00 PM	10:23 PM	0:03:00	10:26 PM	10:53 PM	0:07:00	11:00 PM
10:30 PM	10:53 PM	0:03:00	10:56 PM	11:23 PM		
11:00 PM	11:23 PM	0:03:00	11:26 PM	11:53 PM	0:07:00	12:00 AM
11:30 PM	11:53 PM	0:03:00	11:56 PM	12:23 AM		
12:00 AM	12:23 AM					

Milwaukee Avenue ART Schedule – Sunday

Sunday Revenue Hours	57.575
Sunday Revenue Miles	931.3

Leave Jefferson Pk	Arrive Golf Mill	Recovery time	Leave Golf Mill	Arrive Jefferson Pk	Recovery time	Leave next trip
			6:05 AM	6:28 AM	0:02:00	6:30 AM
6:00 AM	6:22 AM	0:03:00	6:25 AM	6:49 AM	0:11:00	7:00 AM
6:15 AM	6:37 AM	0:03:00	6:40 AM	7:04 AM	0:11:00	7:15 AM
6:30 AM	6:52 AM	0:03:00	6:55 AM	7:19 AM	0:11:00	7:30 AM
6:45 AM	7:07 AM	0:03:00	7:10 AM	7:34 AM	0:11:00	7:45 AM
7:00 AM	7:22 AM	0:03:00	7:25 AM	7:49 AM	0:11:00	8:00 AM
7:15 AM	7:37 AM	0:03:00	7:40 AM	8:04 AM	0:11:00	8:15 AM
7:30 AM	7:52 AM	0:03:00	7:55 AM	8:19 AM	0:11:00	8:30 AM
7:45 AM	8:07 AM	0:03:00	8:10 AM	8:34 AM	0:11:00	8:45 AM
8:00 AM	8:22 AM	0:03:00	8:25 AM	8:49 AM	0:11:00	9:00 AM
8:15 AM	8:37 AM	0:03:00	8:40 AM	9:04 AM	0:11:00	9:15 AM
8:30 AM	8:52 AM	0:03:00	8:55 AM	9:19 AM	0:11:00	9:30 AM
8:45 AM	9:07 AM	0:03:00	9:10 AM	9:34 AM	0:11:00	9:45 AM
9:00 AM	9:22 AM	0:03:00	9:25 AM	9:49 AM	0:11:00	10:00 AM
9:15 AM	9:37 AM	0:03:00	9:40 AM	10:04 AM	0:11:00	10:15 AM
9:30 AM	9:52 AM	0:03:00	9:55 AM	10:19 AM	0:11:00	10:30 AM
9:45 AM	10:07 AM	0:03:00	10:10 AM	10:34 AM	0:11:00	10:45 AM
			10:25 AM	10:48 AM	0:12:00	11:00 AM
10:00 AM	10:27 AM	0:08:00	10:35 AM	11:01 AM		
10:15 AM	10:42 AM	0:03:00	10:45 AM	11:11 AM	0:04:00	11:15 AM
10:30 AM	10:57 AM	0:03:00	11:00 AM	11:26 AM	0:04:00	11:30 AM
10:45 AM	11:12 AM	0:03:00	11:15 AM	11:41 AM	0:04:00	11:45 AM
11:00 AM	11:27 AM	0:03:00	11:30 AM	11:56 AM	0:04:00	12:00 PM
11:15 AM	11:42 AM	0:03:00	11:45 AM	12:11 PM	0:04:00	12:15 PM
11:30 AM	11:57 AM	0:03:00	12:00 PM	12:26 PM	0:04:00	12:30 PM
11:45 AM	12:12 PM	0:03:00	12:15 PM	12:43 PM	0:02:00	12:45 PM
12:00 PM	12:27 PM	0:03:00	12:30 PM	12:58 PM	0:02:00	1:00 PM
12:15 PM	12:42 PM	0:02:00	12:44 PM	1:13 PM	0:02:00	1:15 PM
12:30 PM	12:57 PM	0:02:00	12:59 PM	1:28 PM	0:02:00	1:30 PM
12:45 PM	1:12 PM	0:02:00	1:14 PM	1:43 PM	0:02:00	1:45 PM
1:00 PM	1:27 PM	0:02:00	1:29 PM	1:58 PM	0:02:00	2:00 PM
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1:30 PM	1:57 PM	0:02:00	1:59 PM	2:28 PM	0:02:00	2:30 PM
1:45 PM	2:12 PM	0:02:00	2:14 PM	2:43 PM	0:02:00	2:45 PM
2:00 PM	2:27 PM	0:02:00	2:29 PM	2:58 PM	0:02:00	3:00 PM
2:15 PM	2:42 PM	0:02:00	2:44 PM	3:13 PM	0:02:00	3:15 PM
2:30 PM	2:57 PM	0:02:00	2:59 PM	3:28 PM	0:02:00	3:30 PM
2:45 PM	3:12 PM	0:02:00	3:14 PM	3:43 PM	0:02:00	3:45 PM
3:00 PM	3:27 PM	0:02:00	3:29 PM	3:58 PM	0:02:00	4:00 PM

3:15 PM	3:42 PM	0:02:00	3:44 PM	4:13 PM	0:02:00	4:15 PM
3:30 PM	3:57 PM	0:02:00	3:59 PM	4:28 PM	0:02:00	4:30 PM
3:45 PM	4:12 PM	0:02:00	4:14 PM	4:43 PM	0:02:00	4:45 PM
4:00 PM	4:26 PM	0:03:00	4:29 PM	4:58 PM	0:02:00	5:00 PM
4:15 PM	4:38 PM	0:05:00	4:43 PM	5:12 PM	0:03:00	5:15 PM
4:30 PM	4:53 PM	0:05:00	4:58 PM	5:27 PM	0:03:00	5:30 PM
4:45 PM	5:08 PM	0:05:00	5:13 PM	5:42 PM	0:03:00	5:45 PM
5:00 PM	5:23 PM	0:05:00	5:28 PM	5:57 PM	0:03:00	6:00 PM
5:15 PM	5:38 PM	0:05:00	5:43 PM	6:12 PM	0:03:00	6:15 PM
5:30 PM	5:53 PM	0:05:00	5:58 PM	6:21 PM	0:04:00	6:25 PM
5:45 PM	6:08 PM	0:05:00	6:13 PM	6:36 PM	0:04:00	6:40 PM
6:00 PM	6:23 PM	0:05:00	6:28 PM	6:51 PM	0:04:00	6:55 PM
6:15 PM	6:38 PM	0:05:00	6:43 PM	7:06 PM	0:04:00	7:10 PM
6:25 PM	6:48 PM	0:07:00	6:55 PM	7:18 PM	0:07:00	7:25 PM
6:40 PM	7:03 PM	0:05:00	7:08 PM	7:31 PM	0:04:00	7:35 PM
6:55 PM	7:18 PM	0:05:00	7:23 PM	7:46 PM	0:04:00	7:50 PM
7:10 PM	7:33 PM	0:05:00	7:38 PM	8:01 PM	0:04:00	8:05 PM
7:25 PM	7:48 PM	0:05:00	7:53 PM	8:16 PM	0:04:00	8:20 PM
7:35 PM	7:58 PM	0:05:00	8:03 PM	8:26 PM	0:04:00	8:30 PM
7:50 PM	8:13 PM	0:04:00	8:17 PM	8:40 PM	0:05:00	8:45 PM
8:05 PM	8:28 PM	0:04:00	8:32 PM	8:55 PM	0:05:00	9:00 PM
8:20 PM	8:43 PM	0:04:00	8:47 PM	9:10 PM	0:05:00	9:15 PM
8:30 PM	8:53 PM	0:04:00	8:57 PM	9:20 PM	0:05:00	9:25 PM
8:45 PM	9:08 PM	0:04:00	9:12 PM	9:35 PM	0:05:00	9:40 PM
9:00 PM	9:23 PM	0:04:00	9:27 PM	9:50 PM		
9:15 PM	9:38 PM	0:04:00	9:42 PM	10:05 PM	0:05:00	10:10 PM
9:25 PM	9:48 PM	0:03:00	9:51 PM	10:14 PM		
9:40 PM	10:03 PM	0:03:00	10:06 PM	10:29 PM	0:11:00	10:40 PM
10:10 PM	10:33 PM	0:03:00	10:36 PM	10:59 PM	0:11:00	11:10 PM
10:40 PM	11:03 PM	0:03:00	11:06 PM	11:29 PM	0:11:00	11:40 PM
11:10 PM	11:33 PM	0:03:00	11:36 PM	11:59 PM		
11:40 PM	12:03 AM					

Route 270 with ART Schedule Baseline – Annual Statistics

Annual Revenue Hours	15,197.2
Annual Revenue Miles	260,402.2
Required Peak Vehicles	4
Fleet Size at 20% Spares	5

Route 270 with ART Schedule Baseline - Weekday

Weekday Revenue Hours	50.48
Weekday Revenue Miles	872.8
Required Peak Vehicles	4

Leave Glenbrk Hosp	Crestwd Apts	Golf Mill	Arrive Jeff Pk	Rec time	Leave Jeff Park	Arrive Golf Mill	Rec time	Leave Golf Mill	Crestwd Apts	Leave Glenbrk Hosp	Rec time	Leave Next Trip
		5:00 AM	5:23 AM	0:05:00	5:28 AM	5:54 AM	0:04:00	5:58 AM	6:06 AM	6:28 AM	0:11:00	6:39 AM
5:09 AM	5:21 AM	5:30 AM	5:55 AM	0:05:00	6:00 AM	6:26 AM	0:03:00	6:29 AM	6:38 AM	7:02 AM	0:04:00	7:06 AM
5:39 AM	5:51 AM	6:00 AM	6:25 AM	0:03:00	6:28 AM	6:54 AM	0:03:00	6:57 AM	7:06 AM	7:30 AM	0:02:00	7:32 AM
6:09 AM	6:21 AM	6:30 AM	6:57 AM	0:03:00	7:00 AM	7:26 AM	0:02:00	7:28 AM	7:37 AM	8:01 AM	0:01:00	8:02 AM
6:39 AM	6:51 AM	7:00 AM	7:27 AM	0:05:00	7:32 AM	7:58 AM	0:03:00	8:01 AM	8:10 AM	8:34 AM	0:04:00	8:38 AM
7:06 AM	7:18 AM	7:30 AM	7:57 AM	0:05:00	8:02 AM	8:28 AM	0:03:00	8:31 AM	8:40 AM	9:04 AM	0:04:00	9:08 AM
7:32 AM	7:44 AM	8:00 AM	8:27 AM	0:05:00	8:32 AM	8:59 AM	0:05:00	9:04 AM	9:13 AM	9:29 AM	0:04:00	9:33 AM
8:02 AM	8:14 AM	8:30 AM	8:57 AM	0:05:00	9:02 AM	9:29 AM	0:05:00	9:34 AM	9:43 AM	9:57 AM		
8:38 AM	8:51 AM	9:00 AM	9:27 AM	0:05:00	9:32 AM	9:59 AM	0:03:00	10:02 AM	10:11 AM	10:25 AM	0:08:00	10:33 AM
9:08 AM	9:21 AM	9:30 AM	9:57 AM	0:03:00	10:00 AM	10:27 AM	0:03:00	10:30 AM				10:30 AM
9:33 AM	9:46 AM	10:00 AM	10:27 AM	0:05:00	10:32 AM	10:59 AM	0:03:00	11:02 AM	11:11 AM	11:25 AM	0:08:00	11:33 AM
		10:30 AM	10:57 AM	0:03:00	11:00 AM	11:27 AM	0:03:00	11:30 AM				11:30 AM
10:33 AM	10:46 AM	11:00 AM	11:27 AM	0:05:00	11:32 AM	11:59 AM	0:03:00	12:02 PM	12:11 PM	12:25 PM	0:08:00	12:33 PM
		11:30 AM	11:57 AM	0:03:00	12:00 PM	12:27 PM	0:03:00	12:30 PM				12:30 PM
11:33 AM	11:46 AM	12:00 PM	12:27 PM	0:05:00	12:32 PM	12:59 PM	0:03:00	1:02 PM	1:11 PM	1:25 PM	0:08:00	1:33 PM
		12:30 PM	12:57 PM	0:03:00	1:00 PM	1:27 PM	0:03:00	1:30 PM				1:30 PM
12:33 PM	12:46 PM	1:00 PM	1:27 PM	0:05:00	1:32 PM	1:59 PM	0:04:00	2:03 PM	2:12 PM	2:26 PM	0:07:00	2:33 PM
		1:30 PM	1:57 PM	0:03:00	2:00 PM	2:27 PM	0:03:00	2:30 PM				2:30 PM
1:33 PM	1:46 PM	2:00 PM	2:27 PM	0:04:00	2:31 PM	2:58 PM	0:02:00	3:00 PM	3:09 PM	3:23 PM	0:10:00	3:33 PM
		2:30 PM	2:57 PM	0:04:00	3:01 PM	3:28 PM	0:02:00	3:30 PM				3:30 PM
2:33 PM	2:46 PM	3:00 PM	3:27 PM	0:04:00	3:31 PM	4:01 PM	0:03:00	4:04 PM	4:14 PM	4:30 PM	0:03:00	4:33 PM
		3:30 PM	3:59 PM	0:04:00	4:03 PM	4:33 PM		4:33 PM				
3:33 PM	3:46 PM	4:00 PM	4:29 PM	0:05:00	4:34 PM	5:04 PM	0:05:00	5:09 PM	5:19 PM	5:35 PM		5:35 PM
4:04 PM	4:17 PM	4:30 PM	4:59 PM	0:05:00	5:04 PM	5:34 PM	0:03:00	5:37 PM	5:47 PM	6:03 PM	0:03:00	6:06 PM
4:33 PM	4:46 PM	5:00 PM	5:29 PM	0:05:00	5:34 PM	6:04 PM	0:03:00	6:07 PM	6:17 PM	6:33 PM	0:03:00	6:36 PM
4:55 PM	5:17 PM	5:30 PM	5:59 PM	0:04:00	6:03 PM	6:33 PM	0:04:00	6:37 PM	6:47 PM	7:03 PM	0:03:00	7:06 PM
5:30 PM	5:50 PM	6:00 PM	6:29 PM	0:04:00	6:33 PM	7:03 PM	0:04:00	7:07 PM	7:16 PM	7:30 PM	0:04:00	7:34 PM
6:06 PM	6:26 PM	6:36 PM	7:01 PM	0:04:00	7:05 PM	7:31 PM		7:31 PM				
6:36 PM	6:56 PM	7:06 PM	7:31 PM	0:04:00	7:35 PM	8:01 PM		8:01 PM				
7:04 PM	7:24 PM	7:34 PM	7:59 PM	0:04:00	8:03 PM	8:29 PM	0:05:00	8:34 PM				8:34 PM
7:34 PM	7:54 PM	8:04 PM	8:29 PM	0:04:00	8:33 PM	8:59 PM	0:05:00	9:04 PM				9:04 PM
		8:34 PM	8:59 PM	0:04:00	9:03 PM	9:29 PM	0:05:00	9:34 PM				9:34 PM

9:04 PM	9:29 PM	0:04:00	9:33 PM	9:57 PM		9:57 PM		
9:34 PM	9:59 PM	0:02:00	10:01 PM	10:25 PM	0:02:00	10:27 PM		10:27 PM
10:27 PM	10:50 PM	0:04:00	10:54 PM	11:18 PM		11:18 PM		

Trip operates via Sanders-Willow

Route 270 with ART Schedule Baseline – Saturday

Saturday Revenue Hours 27.78
Saturday Revenue Miles 466.1

Leave Glenbrk Hosp	Crestwd Apts	Golf Mill	Arrive Jeff Pk	Rec time	Leave Jeff Park	Arrive Golf Mill	Rec time	Leave Golf Mill	Crestwd Apts	Leave Glenbrk Hosp	Rec time	Leave Next Trip
		5:25 AM	5:50 AM	0:09:00	5:59 AM	6:28 AM	0:05:00	6:33 AM	6:42 AM	6:55 AM	0:01:00	6:56 AM
		6:25 AM	6:50 AM	0:09:00	6:59 AM	7:28 AM	0:03:00	7:31 AM	7:40 AM	7:53 AM	0:03:00	7:56 AM
6:56 AM	7:09 AM	7:25 AM	7:50 AM	0:09:00	7:59 AM	8:28 AM	0:05:00	8:33 AM	8:42 AM	8:55 AM	0:01:00	8:56 AM
7:56 AM	8:09 AM	8:25 AM	8:56 AM	0:04:00	9:00 AM	9:28 AM	0:05:00	9:33 AM	9:42 AM	9:55 AM	0:01:00	9:56 AM
8:56 AM	9:09 AM	9:25 AM	9:56 AM	0:04:00	10:00 AM	10:28 AM	0:05:00	10:33 AM	10:42 AM	10:55 AM	0:01:00	10:56 AM
9:56 AM	10:09 AM	10:25 AM	10:56 AM	0:04:00	11:00 AM	11:28 AM	0:05:00	11:33 AM	11:42 AM	11:55 AM	0:01:00	11:56 AM
10:56 AM	11:09 AM	11:25 AM	11:56 AM	0:04:00	12:00 PM	12:28 PM	0:05:00	12:33 PM	12:42 PM	12:55 PM	0:01:00	12:56 PM
11:56 AM	12:09 PM	12:25 PM	12:56 PM	0:04:00	1:00 PM	1:28 PM	0:05:00	1:33 PM	1:42 PM	1:55 PM	0:01:00	1:56 PM
12:56 PM	1:09 PM	1:25 PM	1:56 PM	0:04:00	2:00 PM	2:28 PM	0:05:00	2:33 PM	2:42 PM	2:55 PM	0:01:00	2:56 PM
1:56 PM	2:09 PM	2:25 PM	2:56 PM	0:04:00	3:00 PM	3:28 PM	0:05:00	3:33 PM	3:42 PM	3:55 PM	0:01:00	3:56 PM
2:56 PM	3:09 PM	3:25 PM	3:56 PM	0:04:00	4:00 PM	4:28 PM	0:05:00	4:33 PM	4:42 PM	4:55 PM	0:01:00	4:56 PM
3:56 PM	4:09 PM	4:25 PM	4:56 PM	0:04:00	5:00 PM	5:28 PM	0:05:00	5:33 PM	5:42 PM	5:55 PM	0:01:00	5:56 PM
4:56 PM	5:09 PM	5:25 PM	5:54 PM	0:06:00	6:00 PM	6:25 PM	0:08:00	6:33 PM	6:42 PM	6:55 PM	0:01:00	6:56 PM
5:56 PM	6:09 PM	6:25 PM	6:54 PM	0:04:00	6:58 PM	7:26 PM						
6:56 PM	7:09 PM	7:25 PM	7:52 PM	0:04:00	7:56 PM	8:19 PM	0:06:00	8:25 PM				
		8:25 PM	8:52 PM	0:04:00	8:56 PM	9:19 PM	0:06:00	9:25 PM				
		9:25 PM	9:52 PM	0:04:00	9:56 PM	10:19 PM	0:02:00	10:21 PM				
		10:21 PM	10:46 PM	0:04:00	10:50 PM	11:13 PM						

Route 270 with ART Schedule Baseline - Sunday

Sunday Revenue Hours 15.15
Sunday Revenue Miles 234.5

Golf Mill	Arrive Jeff Pk	Rec time	Leave Jeff Park	Arrive Golf Mill	Rec time	Leave Next Trip
			5:41 AM	6:04 AM	0:06:00	6:10 AM
6:10 AM	6:34 AM	0:06:00	6:40 AM	7:04 AM	0:06:00	7:10 AM
7:10 AM	7:34 AM	0:06:00	7:40 AM	8:04 AM	0:06:00	8:10 AM
8:10 AM	8:34 AM	0:06:00	8:40 AM	9:04 AM	0:06:00	9:10 AM
9:10 AM	9:34 AM	0:05:00	9:39 AM	10:07 AM	0:03:00	10:10 AM
10:10 AM	10:36 AM	0:03:00	10:39 AM	11:07 AM	0:03:00	11:10 AM

11:10 AM	11:36 AM	0:03:00	11:39 AM	12:07 PM	0:03:00	12:10 PM
12:10 PM	12:38 PM	0:03:00	12:41 PM	1:09 PM	0:03:00	1:12 PM
1:10 PM	1:39 PM	0:03:00	1:42 PM	2:11 PM	0:02:00	2:13 PM
2:10 PM	2:39 PM	0:03:00	2:42 PM	3:11 PM	0:02:00	3:13 PM
3:10 PM	3:39 PM	0:03:00	3:42 PM	4:10 PM	0:02:00	4:12 PM
4:10 PM	4:39 PM	0:03:00	4:42 PM	5:07 PM	0:03:00	5:10 PM
5:10 PM	5:39 PM	0:04:00	5:43 PM	6:08 PM	0:02:00	6:10 PM
6:10 PM	6:34 PM	0:08:00	6:42 PM	7:07 PM	0:03:00	7:10 PM
7:10 PM	7:34 PM	0:08:00	7:42 PM	8:07 PM	0:03:00	8:10 PM
8:10 PM	8:34 PM	0:08:00	8:42 PM	9:07 PM	0:03:00	9:10 PM
9:10 PM	9:34 PM	0:08:00	9:42 PM	10:07 PM	0:03:00	10:10 PM
10:10 PM	10:34 PM	0:08:00	10:42 PM	11:07 PM		

Route 270 with ART Schedule Alternative Scenario – Annual Statistics

Annual Revenue Hours	12,258.88
Annual Revenue Miles	195,244.2
Required Peak Vehicles	3
Fleet Size at 20% Spares	4

Route 270 with ART Schedule Alternative Scenario - Weekday

Weekday Revenue Hours	39.58
Weekday Revenue Miles	632.2
Required Peak Vehicles	3

Leave Golf Mill	Arrive Jefferson Park	Recovery time	Leave Jefferson Park	Arrive Golf Mill	Crestwood Apts	Arrive Golf Mill	Recovery time	Leave Next Trip
4:56 AM	5:19 AM	0:10:00	5:29 AM	5:55 AM	6:03 AM	6:11 AM	0:15:00	6:26 AM
5:26 AM	5:51 AM	0:10:00	6:01 AM	6:27 AM	6:36 AM	6:45 AM	0:11:00	6:56 AM
5:56 AM	6:21 AM	0:10:00	6:31 AM	6:57 AM	7:06 AM	7:15 AM	0:11:00	7:26 AM
6:26 AM	6:53 AM	0:10:00	7:03 AM	7:29 AM	7:38 AM	7:47 AM	0:09:00	7:56 AM
6:56 AM	7:23 AM	0:10:00	7:33 AM	7:59 AM	8:08 AM	8:17 AM	0:09:00	8:26 AM
7:26 AM	7:53 AM	0:10:00	8:03 AM	8:29 AM	8:38 AM	8:47 AM	0:09:00	8:56 AM
7:56 AM	8:23 AM	0:10:00	8:33 AM	9:00 AM	9:09 AM	9:18 AM	0:08:00	9:26 AM
8:26 AM	8:53 AM	0:10:00	9:03 AM	9:30 AM	9:39 AM	9:48 AM	0:08:00	9:56 AM
8:56 AM	9:23 AM	0:10:00	9:33 AM	10:00 AM	10:09 AM	10:18 AM	0:08:00	10:26 AM
9:26 AM	9:53 AM	0:10:00	10:03 AM	10:30 AM	10:39 AM	10:48 AM	0:08:00	10:56 AM
9:56 AM	10:23 AM	0:10:00	10:33 AM	11:00 AM	11:09 AM	11:18 AM	0:08:00	11:26 AM
10:26 AM	10:53 AM	0:10:00	11:03 AM	11:30 AM	11:39 AM	11:48 AM	0:08:00	11:56 AM
10:56 AM	11:23 AM	0:10:00	11:33 AM	12:00 PM	12:09 PM	12:18 PM	0:08:00	12:26 PM
11:26 AM	11:53 AM	0:10:00	12:03 PM	12:30 PM	12:39 PM	12:48 PM	0:08:00	12:56 PM
11:56 AM	12:23 PM	0:10:00	12:33 PM	1:00 PM	1:09 PM	1:18 PM	0:08:00	1:26 PM
12:26 PM	12:53 PM	0:10:00	1:03 PM	1:30 PM	1:39 PM	1:48 PM	0:08:00	1:56 PM
12:56 PM	1:23 PM	0:10:00	1:33 PM	2:00 PM	2:09 PM	2:18 PM	0:08:00	2:26 PM
1:26 PM	1:53 PM	0:10:00	2:03 PM	2:30 PM	2:39 PM	2:48 PM	0:08:00	2:56 PM
1:56 PM	2:23 PM	0:10:00	2:33 PM	3:00 PM	3:09 PM	3:18 PM	0:08:00	3:26 PM
2:26 PM	2:53 PM	0:09:00	3:02 PM	3:29 PM	3:39 PM	3:49 PM	0:07:00	3:56 PM
2:56 PM	3:23 PM	0:07:00	3:30 PM	4:00 PM	4:10 PM	4:20 PM	0:06:00	4:26 PM
3:26 PM	3:55 PM	0:06:00	4:01 PM	4:31 PM	4:41 PM	4:51 PM	0:05:00	4:56 PM
3:56 PM	4:25 PM	0:06:00	4:31 PM	5:01 PM	5:11 PM	5:21 PM	0:05:00	5:26 PM
4:26 PM	4:55 PM	0:06:00	5:01 PM	5:31 PM	5:41 PM	5:51 PM	0:05:00	5:56 PM
4:56 PM	5:25 PM	0:06:00	5:31 PM	6:01 PM	6:11 PM	6:21 PM	0:05:00	6:26 PM
5:26 PM	5:55 PM	0:06:00	6:01 PM	6:31 PM	6:41 PM	6:51 PM	0:05:00	6:56 PM
5:56 PM	6:25 PM	0:07:00	6:32 PM	7:02 PM	7:11 PM	7:20 PM	0:06:00	7:26 PM
6:26 PM	6:51 PM	0:09:00	7:00 PM	7:26 PM				
6:56 PM	7:21 PM	0:05:00	7:26 PM	7:52 PM			0:04:00	7:56 PM
7:26 PM	7:51 PM	0:05:00	7:56 PM	8:22 PM			0:04:00	8:26 PM

7:56 PM	8:21 PM	0:05:00	8:26 PM	8:52 PM		0:04:00	8:56 PM
8:26 PM	8:51 PM	0:05:00	8:56 PM	9:22 PM		0:04:00	9:26 PM
8:56 PM	9:21 PM	0:05:00	9:26 PM	9:50 PM		0:06:00	9:56 PM
9:26 PM	9:51 PM	0:05:00	9:56 PM	10:20 PM			
9:56 PM	10:19 PM	0:05:00	10:24 PM	10:48 PM			

Route 270 with ART Schedule Alternative Scenario - Saturday

Saturday Revenue Hours	25.16
Saturday Revenue Miles	400.4

Leave Golf Mill	Arrive Jefferson Park	Recovery time	Leave Jefferson Park	Arrive Golf Mill	Crestwood Apts	Arrive Golf Mill	Recovery time	Leave Next Trip
5:35 AM	6:00 AM	0:07:00	6:07 AM	6:36 AM	6:45 AM	6:54 AM	0:11:00	7:05 AM
6:20 AM	6:45 AM	0:07:00	6:52 AM	7:21 AM	7:30 AM	7:39 AM	0:11:00	7:50 AM
7:05 AM	7:30 AM	0:07:00	7:37 AM	8:06 AM	8:15 AM	8:24 AM	0:11:00	8:35 AM
7:50 AM	8:21 AM	0:06:00	8:27 AM	8:55 AM	9:04 AM	9:13 AM	0:07:00	9:20 AM
8:35 AM	9:06 AM	0:06:00	9:12 AM	9:40 AM	9:49 AM	9:58 AM	0:07:00	10:05 AM
9:20 AM	9:51 AM	0:06:00	9:57 AM	10:25 AM	10:34 AM	10:43 AM	0:07:00	10:50 AM
10:05 AM	10:36 AM	0:06:00	10:42 AM	11:10 AM	11:19 AM	11:28 AM	0:07:00	11:35 AM
10:50 AM	11:21 AM	0:06:00	11:27 AM	11:55 AM	12:04 PM	12:13 PM	0:07:00	12:20 PM
11:35 AM	12:06 PM	0:06:00	12:12 PM	12:40 PM	12:49 PM	12:58 PM	0:07:00	1:05 PM
12:20 PM	12:51 PM	0:06:00	12:57 PM	1:25 PM	1:34 PM	1:43 PM	0:07:00	1:50 PM
1:05 PM	1:36 PM	0:06:00	1:42 PM	2:10 PM	2:19 PM	2:28 PM	0:07:00	2:35 PM
1:50 PM	2:21 PM	0:06:00	2:27 PM	2:55 PM	3:04 PM	3:13 PM	0:07:00	3:20 PM
2:35 PM	3:04 PM	0:07:00	3:11 PM	3:36 PM	3:45 PM	3:54 PM	0:11:00	4:05 PM
3:20 PM	3:49 PM	0:07:00	3:56 PM	4:24 PM	4:33 PM	4:42 PM	0:08:00	4:50 PM
4:05 PM	4:32 PM	0:11:00	4:43 PM	5:06 PM	5:15 PM	5:24 PM	0:11:00	5:35 PM
4:50 PM	5:17 PM	0:11:00	5:28 PM	5:51 PM	6:00 PM	6:09 PM	0:11:00	6:20 PM
5:35 PM	6:02 PM	0:11:00	6:13 PM	6:36 PM	6:45 PM	6:54 PM	0:11:00	7:05 PM
6:20 PM	6:47 PM	0:11:00	6:58 PM	7:21 PM				
7:05 PM	7:32 PM	0:05:00	7:37 PM	8:00 PM			0:05:00	8:05 PM
8:05 PM	8:32 PM	0:05:00	8:37 PM	9:00 PM			0:05:00	9:05 PM
9:05 PM	9:32 PM	0:05:00	9:37 PM	10:00 PM			0:05:00	10:05 PM
10:05 PM	10:32 PM	0:05:00	10:37 PM	11:00 PM				

Route 270 with ART Schedule Alternative Scenario - Sunday

Sunday Revenue Hours	14.76
Sunday Revenue Miles	227.8

Leave Golf Mill	Arrive Jefferson Park	Recovery time	Leave Jefferson Park	Arrive Golf Mill	Recovery time	Leave Next Trip
6:00 AM	6:24 AM	0:07:00	6:31 AM	6:55 AM	0:05:00	7:00 AM
7:00 AM	7:24 AM	0:07:00	7:31 AM	7:55 AM	0:05:00	8:00 AM
8:00 AM	8:24 AM	0:07:00	8:31 AM	8:55 AM	0:05:00	9:00 AM
9:00 AM	9:24 AM	0:05:00	9:29 AM	9:57 AM	0:03:00	10:00 AM
10:00 AM	10:26 AM	0:03:00	10:29 AM	10:57 AM	0:03:00	11:00 AM
11:00 AM	11:26 AM	0:03:00	11:29 AM	11:57 AM	0:03:00	12:00 PM
12:00 PM	12:28 PM	0:05:00	12:33 PM	1:01 PM	0:03:00	1:04 PM
1:04 PM	1:33 PM	0:03:00	1:36 PM	2:05 PM		
2:00 PM	2:29 PM	0:03:00	2:32 PM	3:01 PM	0:03:00	3:04 PM
3:04 PM	3:33 PM	0:03:00	3:36 PM	4:04 PM		
4:04 PM	4:33 PM	0:03:00	4:36 PM	5:01 PM	0:03:00	5:04 PM
5:04 PM	5:33 PM	0:03:00	5:36 PM	6:01 PM	0:03:00	6:04 PM
6:04 PM	6:28 PM	0:05:00	6:33 PM	6:58 PM	0:06:00	7:04 PM
7:04 PM	7:28 PM	0:06:00	7:34 PM	7:59 PM	0:05:00	8:04 PM
8:04 PM	8:28 PM	0:06:00	8:34 PM	8:59 PM	0:05:00	9:04 PM
9:04 PM	9:28 PM	0:06:00	9:34 PM	9:59 PM	0:05:00	10:04 PM
10:04 PM	10:28 PM	0:06:00	10:34 PM	10:59 PM	0:05:00	11:04 PM

Route 272 with ART Schedule Alternative Scenario – Annual Statistics

Annual Revenue Hours	13,174.2
Annual Revenue Miles	282,239.58
Required Peak Vehicles	5
Fleet Size at 20% Spares	6

Route 272 with ART Schedule Alternative Scenario - Weekday

Weekday Revenue Hours	47.66
Weekday Revenue Miles	1,005.22
Required Peak Vehicles	5

Leave Golf Mill	Arrive Hawthorn Shop Ctr	Recovery time	Leave Hawthorn Shop Ctr	Arrive Golf Mill	Recovery time	Leave Golf Mill
			5:30 AM	6:30 AM	0:10:00	6:40 AM
5:25 AM	6:23 AM	0:07:00	6:30 AM	7:33 AM	0:07:00	7:40 AM
			7:00 AM	8:03 AM	0:07:00	8:10 AM
6:10 AM	7:08 AM	0:12:00	7:20 AM	8:24 AM	0:16:00	8:40 AM
6:40 AM	7:43 AM	0:07:00	7:50 AM	8:54 AM	0:16:00	9:10 AM
7:10 AM	8:13 AM	0:07:00	8:20 AM	9:23 AM		
7:40 AM	8:43 AM	0:07:00	8:50 AM	9:50 AM	0:20:00	10:10 AM
8:10 AM	9:13 AM					
8:40 AM	9:40 AM	0:10:00	9:50 AM	10:53 AM	0:17:00	11:10 AM
9:10 AM	10:06 AM	0:14:00	10:20 AM	11:13 AM		
10:10 AM	11:06 AM	0:09:00	11:15 AM	12:08 PM	0:02:00	12:10 PM
11:10 AM	12:06 PM	0:09:00	12:15 PM	1:08 PM	0:02:00	1:10 PM
12:10 PM	1:06 PM	0:09:00	1:15 PM	2:08 PM	0:02:00	2:10 PM
1:10 PM	2:06 PM	0:09:00	2:15 PM	3:08 PM	0:02:00	3:10 PM
2:10 PM	3:06 PM	0:09:00	3:15 PM	4:19 PM		
			3:45 PM	4:49 PM	0:21:00	5:10 PM
3:10 PM	4:14 PM	0:06:00	4:20 PM	5:24 PM	0:16:00	5:40 PM
3:40 PM	4:44 PM	0:06:00	4:50 PM	5:59 PM	0:11:00	6:10 PM
4:10 PM	5:14 PM	0:06:00	5:20 PM	6:29 PM		
4:40 PM	5:44 PM	0:06:00	5:50 PM	6:59 PM	0:11:00	7:10 PM
5:10 PM	6:14 PM	0:06:00	6:20 PM	7:20 PM		
5:40 PM	6:44 PM					
6:10 PM	7:14 PM	0:06:00	7:20 PM	8:12 PM	0:08:00	8:20 PM
7:10 PM	8:10 PM	0:10:00	8:20 PM	9:12 PM	0:08:00	9:20 PM
8:20 PM	9:12 PM	0:08:00	9:20 PM	10:12 PM	0:08:00	10:20 PM
9:20 PM	10:12 PM	0:08:00	10:20 PM	11:12 PM		
10:20 PM	11:12 PM					

Via Buffalo Grove parking lot

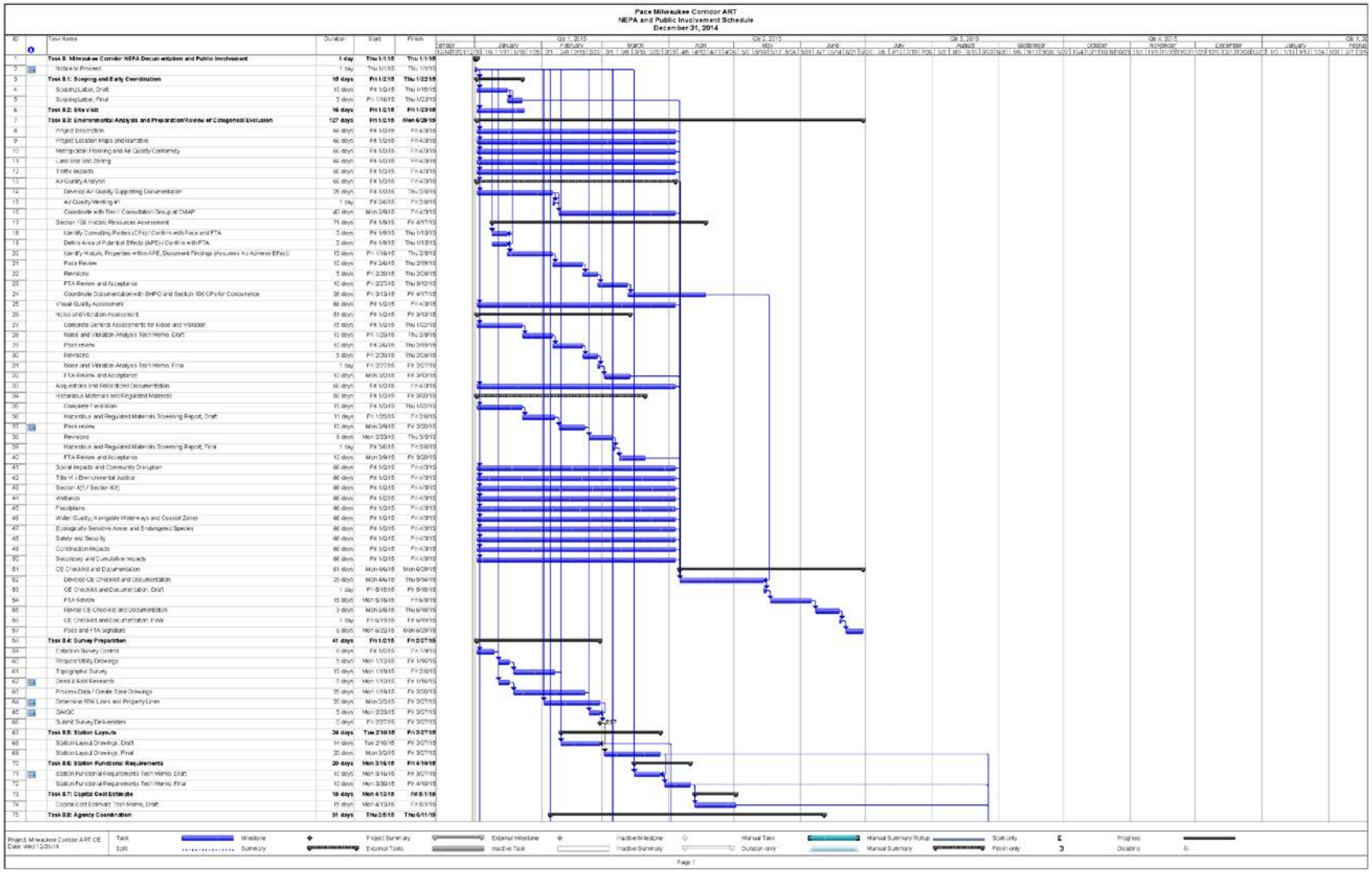
Route 272 with ART Schedule Alternative Scenario - Saturday

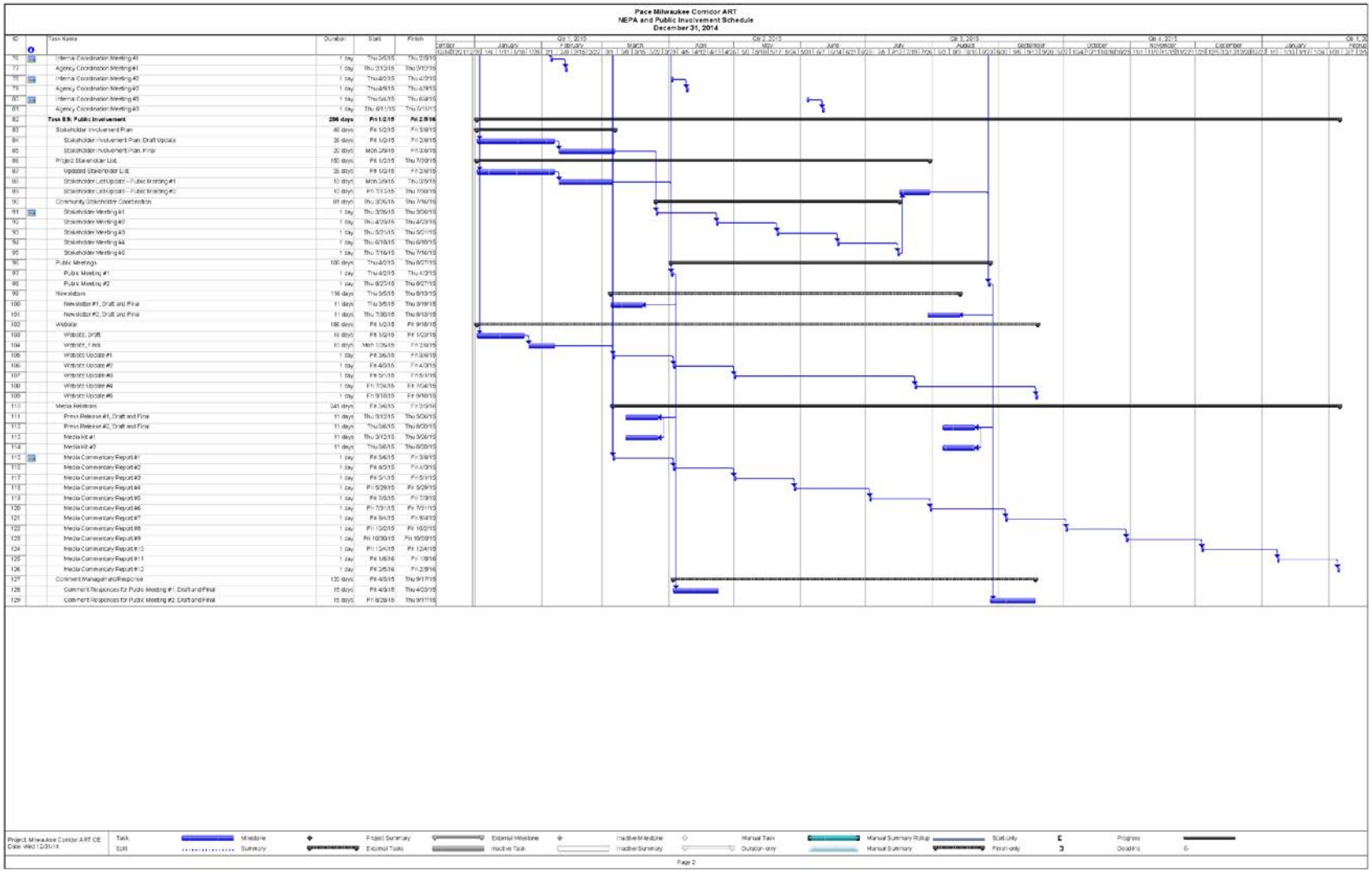
Saturday Revenue Hours	19.6
Saturday Revenue Miles	498.24

Leave Golf Mill	Arrive Hawthorn Shop Ctr	Recovery time	Leave Hawthorn Shop Ctr	Arrive Golf Mill	Recovery time	Leave Golf Mill
			8:10 AM	8:59 AM	0:16:00	9:15 AM
8:15 AM	9:04 AM	0:06:00	9:10 AM	9:59 AM	0:16:00	10:15 AM
9:15 AM	10:04 AM	0:06:00	10:10 AM	10:59 AM	0:16:00	11:15 AM
10:15 AM	11:04 AM	0:06:00	11:10 AM	11:59 AM	0:16:00	12:15 PM
11:15 AM	12:04 PM	0:06:00	12:10 PM	12:59 PM	0:16:00	1:15 PM
12:15 PM	1:04 PM	0:06:00	1:10 PM	1:59 PM	0:16:00	2:15 PM
1:15 PM	2:04 PM	0:06:00	2:10 PM	2:59 PM	0:16:00	3:15 PM
2:15 PM	3:04 PM	0:06:00	3:10 PM	3:59 PM	0:16:00	4:15 PM
3:15 PM	4:04 PM	0:06:00	4:10 PM	4:59 PM	0:16:00	5:15 PM
4:15 PM	5:04 PM	0:06:00	5:10 PM	5:59 PM	0:16:00	6:15 PM
5:15 PM	6:04 PM	0:06:00	6:10 PM	6:59 PM	0:16:00	7:15 PM
6:15 PM	7:04 PM	0:06:00	7:10 PM	7:59 PM	0:05:00	8:04 PM
7:15 PM	8:04 PM					

Terminates at Milwaukee/Deerfield

Appendix E – NEPA Categorical Exclusion Documentation Schedule




Pace Milwaukee Corridor ART
NEPA and Public Involvement Schedule
December 31, 2014

Appendix F – Capital Cost Estimate, FTA Standard Cost Category Format

MAIN WORKSHEET - BUILD ALTERNATIVE

(Rev.16, June, 2014)

PACE Connecting Communities — Today's Date **12/31/2014**

PACE Arterial Rapid Transit - Milwaukee Avenue Corridor — Yr of Base Year $ 2014

Milwaukee Corridor ART Project — Yr of Revenue Ops 2017

	Quantity	Base Year Dollars w/o Contingency (X000)	Base Year Dollars Allocated Contingency (X000)	Base Year Dollars TOTAL (X000)	Base Year Dollars Unit Cost (X000)	Base Year Dollars Percentage of Construction Cost	Base Year Dollars Percentage of Total Project Cost	YOE Dollars Total (X000)
10 GUIDEWAY & TRACK ELEMENTS (route miles)	**0.00**	0	0	**0**		**0%**	**0%**	**0**
10.01 Guideway: At-grade exclusive right-of-way				0				#DIV/0!
10.02 Guideway: At-grade semi-exclusive (allows cross-traffic)				0				#DIV/0!
10.03 Guideway: At-grade in mixed traffic				0				#DIV/0!
10.04 Guideway: Aerial structure				0				#DIV/0!
10.05 Guideway: Built-up fill				0				#DIV/0!
10.06 Guideway: Underground cut & cover				0				#DIV/0!
10.07 Guideway: Underground tunnel				0				#DIV/0!
10.08 Guideway: Retained cut or fill				0				#DIV/0!
10.09 Track: Direct fixation				0				#DIV/0!
10.10 Track: Embedded				0				#DIV/0!
10.11 Track: Ballasted				0				#DIV/0!
10.12 Track: Special (switches, turnouts)				0				#DIV/0!
10.13 Track: Vibration and noise dampening				0				#DIV/0!
20 STATIONS, STOPS, TERMINALS, INTERMODAL (number)	**18**	1,795	449	**2,244**	**$125**	**28%**	**16%**	**2,452**
20.01 At-grade station, stop, shelter, mall, terminal, platform	18	1,795	449	2,244	$125			2,452
20.02 Aerial station, stop, shelter, mall, terminal, platform				0				0
20.03 Underground station, stop, shelter, mall, terminal, platform				0				0
20.04 Other stations, landings, terminals: Intermodal, ferry, trolley, etc.				0				0
20.05 Joint development				0				0
20.06 Automobile parking multi-story structure				0				0
20.07 Elevators, escalators				0				0
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS	0.00	0	0	**0**		**0%**	**0%**	**0**
30.01 Administration Building: Office, sales, storage, revenue counting				0				#DIV/0!
30.02 Light Maintenance Facility				0				#DIV/0!
30.03 Heavy Maintenance Facility				0				#DIV/0!
30.04 Storage or Maintenance of Way Building				0				#DIV/0!
30.05 Yard and Yard Track				0				#DIV/0!
40 SITEWORK & SPECIAL CONDITIONS	0.00	3,122	508	**3,630**		**46%**	**25%**	**3,967**
40.01 Demolition, Clearing, Earthwork		180	45	225				245
40.02 Site Utilities, Utility Relocation		849	212	1,061				1,159
40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments				0				0
40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks				0				0
40.05 Site structures including retaining walls, sound walls				0				0
40.06 Pedestrian / bike access and accommodation, landscaping		327	82	409				447
40.07 Automobile, bus, van accessways including roads, parking lots		186	46	232				254
40.08 Temporary Facilities and other indirect costs during construction		1,581	123	1,704				1,862
50 SYSTEMS	0.00	1,680	420	**2,100**		**26%**	**15%**	**2,295**
50.01 Train control and signals				0				0
50.02 Traffic signals and crossing protection				0				0
50.03 Traction power supply: substations				0				0
50.04 Traction power distribution: catenary and third rail				0				0
50.05 Communications		1,680	420	2,100				2,295
50.06 Fare collection system and equipment				0				0
50.07 Central Control				0				0
Construction Subtotal (10 - 50)	0.00	6,597	1,377	**7,974**		**100%**	**55%**	**8,713**
60 ROW, LAND, EXISTING IMPROVEMENTS	0.00	10	2	**12**			**0%**	**13**
60.01 Purchase or lease of real estate		10	2	12				13
60.02 Relocation of existing households and businesses				0				0
70 VEHICLES (number)	**8**	4,241	212	**4,453**	**$557**		**31%**	**4,866**
70.01 Light Rail				0				0
70.02 Heavy Rail				0				0
70.03 Commuter Rail				0				0
70.04 Bus	8	4,241	212	4,453	$557			4,866
70.05 Other				0				0
70.06 Non-revenue vehicles				0				0
70.07 Spare parts				0				0
80 PROFESSIONAL SERVICES (applies to Cats. 10-50)	0.00	1,997	0	**1,997**		**25%**	**14%**	**2,182**
80.01 Project Development		799		799				873
80.02 Engineering (not applicable to Small Starts)								
80.03 Project Management for Design and Construction		399		399				436
80.04 Construction Administration & Management		479		479				524
80.05 Professional Liability and other Non-Construction Insurance		40		40				44
80.06 Legal; Permits; Review Fees by other agencies, cities, etc.		200		200				219
80.07 Surveys, Testing, Investigation, Inspection		80		80				87
80.08 Start up				0				0
Subtotal (10 - 80)	0.00	12,844	1,592	**14,436**			**100%**	**15,774**
90 UNALLOCATED CONTINGENCY				**0**			**0%**	**0**
Subtotal (10 - 90)	0.00			**14,436**			**100%**	**15,774**
100 FINANCE CHARGES				**0**			**0%**	**0**
Total Project Cost (10 - 100)	0.00			**14,436**			**100%**	**15,774**
Allocated Contingency as % of Base Yr Dollars w/o Contingency				12.39%				
Unallocated Contingency as % of Base Yr Dollars w/o Contingency				0.00%				
Total Contingency as % of Base Yr Dollars w/o Contingency				12.39%				
Unallocated Contingency as % of Subtotal (10 - 80)				0.00%				
YOE Construction Cost per Mile (X000)								#DIV/0!
YOE Total Project Cost per Mile Not Including Vehicles (X000)								#DIV/0!
YOE Total Project Cost per Mile (X000)								#DIV/0!

Appendix G – Product Information Sheets

TAPCO®
TRAFFIC & PARKING CONTROL CO., INC.

Blinker® LED Products

Rectangular Rapid Flash Beacon: RRFB-XL™

Extra-large beacons provide greater visibility, ideal for high-speed and multi-lane pedestrian & school crossings

- Driver yielding rates of 80-90%
- Large LEDs exceed FHWA standards
- Wireless, synchronized LEDs
- Solar powered, eco-friendly
- Web-based monitoring/alert option
- Easy installation, maintenance free
- Up to 30 days autonomy

TAPCO's pedestrian-activated RRFB-XL™ systems feature large, 7" x 3" LED arrays that exceed FHWA standards. They provide greater visiblity, ideal for high speed and multi-lane pedestrian and school crossings. When activated, the SAE J595 certified LED arrays flash an FHWA specified, alternating 'wig-wag' pattern. Side-mounted LED arrays flash concurrently to advise pedestrians that the units are flashing.

RRFBs have produced 80% to 90% driver compliance in yielding to pedestrians at high-risk uncontrolled crossings. This is the highest yielding rate of all devices not featuring a red display, and up to 4 times greater than standard round beacons. RRFBs cost less than other devices with similar vehicular yield rates.

RRFB options include:

- Advance RRFB, wirelessly linked to Crossing RRFB
- Self-powered remote bollard-mounted pushbutton
- Passively activated systems: microwave or infrared

PATENT NUMBERS 6,943,698 AND 6,693,556. OTHER PATENTS PENDING.

Applications

- High-speed and multi-lane crossings
- School crossings
- Pedestrian crossings
- Roundabout crossings

Benefits

- Larger 7"x 3" LED arrays provide increased visibility
- Significantly higher driver awareness and compliance
- High-intensity leds command attention, day and night

Features

- Multiple units are wirelessly synchronized, flash in unison
- Installation onto new or existing sign poles: single bar or back-to-back available
- Stand-alone, self-powered remote pushbutton bollard available
- 3-Year warranty

Visit **Traffic and Parking** on YouTube for videos on these products and more.

Pedestrian activated (active or passive)

Standard specifications (subject to change without notice)

Extra Large Rectangular Rapid Flash Beacon RRFB-XL	
MUTCD Approval	Interim FHWA Approval Memorandum (1A-11)
Housing	Powder coated aluminum
LED modules: 7¼" x 3"	2 arrays of 8 amber LEDs, SAE J595 certified
Pedestrian LED module : 11/²" x 3⁵/⁸"	Side-mounted, flash concurrent with Vehicle LEDs
Flash pattern	MUTCD specified 'wig-wag' flash pattern
Mounting hardware	Stainless steel u-bolts for 4" to 41/²" O.D. pole
Solar-assisted Battery-powered System	
Housing	NEMA 4X rated fiberglass or aluminum cabinet with lockable clasps
Solar panel: 55 watt	25¼"H x 25¾"W x 1½"D. Adjustable 40˚ to 60˚. Articulating mount rotates and pivots. Conforms to IP-67
Mounting	Aluminum mounting bracket (fits 4"– 4½" O.D. pole)
Battery (one per assembly)	12V, 40AH sealed gel battery requires no periodic watering. Sealed construction eliminates corrosive acid fumes and spills.
Battery lifespan	Up to 5 years
Control Circuit	IP-67 NEMA rated enclosure: dust proof and waterproof (up to 30 minutes in 3 feet of water)
BlinkerBeam™ Wireless Communication System	
Frequency	900 MHz FHSS
Range	3 miles with optional external antennas. For system separation over 900', a site survey is recommended
Radio	Operates on 900 MHz frequency hopping spread spectrum network. Operating range from 3.6vdc to 15vdc
Connectivity	Crosswalk and optional Advance LEDs flash concurrently
BlinkSync™ Wireless Synchronized Activation	Individual units in one system flash in synchronized patterns (avoids light noise of system operation). Ideal for multiple assemblies flashing in the same direction.
Push-button activation*	ADA pushbutton, typical (<120 millisecond)
*Optional remote, stand-alone pushbutton available (includes self-contained, replaceable battery with typical two-year life)	
Programming	
Windows TAPCO configuration software	
Optional web -based cellular communication for monitoring and control available	
Optional time clock system available for school zone signs	
Warranty	
3 year standard warranty	

Optional Push Button Activation

Activated with less than 2 lbs. of force. Provides two-tone audible confirmation as well as visual confirmation. Meets ADA, MUTCD and TAC requirements, and housing meets NEMA specifications. Remote mounting available. Audible navigation units are available.

Optional Pedestrian Motion Detector

Active infrared and microwave technologies work together to provide precise presence and accurate motion detection. Mountable between8' and 16'. Impervious to light, sun rain and snow. Housing is rated NEMA-4.

Optional Wireless Bollard Activation

Pedestrians and bicyclists can passively trigger flashing BlinkerSign® LED signs, RRFB, BlinkerBeacon™ LED Beacons, in-pavement LEDs and other ITS devices. Actuators are housed in anodized aluminum cabinets that can be secured to concrete or asphalt. Battery operated: no grid wiring required.

TAPCO® 1-800-236-0112 • www.tapconet.com • blinkersales@tapconet.com

Traffic & Parking Control Co, Inc. 5100 West Brown Deer Road, Brown Deer WI 53223 U.S.A. Phone 800-236-0112 FAX 800-444-0331
www.tapconet.com

MADE IN THE USA

GSA Contract Holder GS-07F-5924R GS-07F-0234U

US.COMMUNITIES Contract Holder 2013-100

1005-00001 02/20/14

TAPCO®
TRAFFIC & PARKING CONTROL COMPANY

Blinker™ LED Products

Push Button Activation

Push buttons allow pedestrians to manually activate BlinkerSign® LED Signs, Rectangular Rapid-Flash Beacons (RRFB), BlinkerBeacon™ LED Beacons, in-pavement LEDs and other ITS devices.

TAPCO offers mechanical and solid state push buttons, including simple push buttons, as well as push buttons with visual (red LED) & audio confirmation or an audible voice message. All TAPCO push buttons meet ADA and MUTCD requirements and provide dependable, precise control with minimal maintenance. All push buttons can be mounted on traffic poles or on remote pedestal poles near the devices you wish to activate.

Visual confirmation, voice message push button station

PUSH BUTTON WIRELESS PEDESTAL POLE OPTION

Push buttons mounted on stand-alone pedestal poles provide wireless communication between the push button and the device or devices you wish to activate synchronously. TAPCO's BlinkerBeam® transceiver radios (see reverse side of this page), controller and battery are all housed in each pedestal base (shown in photo at right). BlinkerBeam® wireless radios reduce your labor and installation costs significantly by eliminating the need for digging, trenching and electrical service.

Pedestal pole with push button and base housing wireless communication system

PUSH BUTTON SYSTEM OPTIONS

TAPCO BlinkLink™ is a cloud-based app that allows you to monitor and control your ITS devices device status from any web-enabled computer. It provides comprehensive management of ITS device settings and schedules, and can send user-defined email and text message device alerts. Up-to-date information allows you to respond immediately to changing situations.

Visual /audio confirmation push button

Standard push button

Typical Movement Push Button

Bulldog III Push Button

XAV2-LED Push Button

Standard push button	Visual/audio confirmation push button	Visual confirmation, voice message push button station
MECHANICAL PROPERTIES: Bezel: Aluminum Actuator: Stainless Steel Hardware: Stainless Steel Finish: Powder Coat **ELECTRICAL SPECIFICATIONS** Operating Voltage: TS1 & TS2 (12–24V AC/DC) Line Voltage: 50 V Switch Current: Max 200--500A On Resistance: <20 ohms Operating Mode: NO Closure Dwell: 150ms Switch: Piezo Solid State **OPERATING DATA** Operating Force: < 3 lbf Operating Temperature: -40˚C to 80˚C (-40˚F to 176˚F) Operating Life: $100x10^6$ IP Rating: 68	**MECHANICAL PROPERTIES:** Body Material: Aluminum, Powder Coated Button Material: 316 Stainless Steel Arrow Button: Anodized 6061 Aluminum, Nickel Plated Black Powder Coat on area surrounding arrow **ELECTRICAL SPECIFICATIONS:** Operating Force: 2.0 lbs. Maximum Operating Temperature: -34˚C to 74˚C (-30˚F to 165˚F) Operating Voltage: 12-36 VDC, 9-25 VAC RMA (18 VDC Typ.) MTBF: 8,800,000 hours Typ. Switch Operating Life: Greater than 300 million operations. "Off" Current: 15µA Typ. "On" Resistance: 85Ω Typ. (Momentary) Maximum "On" Current: 250 mA (over-current protection) Typ. Maximum "On" Time: 11 sec. Typ. Debouce Time: 85 ms. Typ. **LED OPERATING MODES:** Momentary: Approx 0.025 sec. LED flash each time button is pressed. Latching: LED activates only during non-walk phases and stays on until the beginning of the walk phase. **LED SPECIFICATIONS:** Luminous Intensity: 0.3 Lux @ 1 meter Minimum (Red) Viewing Angle: 155° Typical **BEEPER:** Volume: 68dB @ 1 meter Typ. Beep on Press: 2.6kHz Beep on Release: 2.3kHz Beep Length: 50ms Typ.	**MECHANICAL PROPERTIES:** Physical Enclosure Type: Cast aluminum housing with yellow powder coat finish, watertight O-ring seals. Installation: 2 holes on 6.0" centers, tapped ¼-20 plus ½" or larger hole for wire access. Dimensions: Width 5.50" Length 14.10" Maximum Height 2.60" Operating Temperature -34˚C to 60˚C (-30˚F to 140˚F) **POWER REQUIREMENTS:** DC In 10-24 VDC (from XAVCU2). Idle Current Draw: ~1.2mA. Peak Current Draw (15VDC input power): ~500mA with voice message at maximum. LED Current: 22mA typical. Outputs: BTN: Driven low to ground when the push button is pressed MIC (Microphone):0-1.5 Volts (ambient noise feedback). **INPUTS:** PWR+: 10-24 VDC referenced to PWR-. PWR-: DC Ground. LED: Connect to ground to drive LEDs (typically 22mA) MUTE: Connect to ground to enable audio amplifier. AUD1: One half of balanced audio input. AUD2: Other half of balanced audio input.

Optional BlinkerBeam® Wireless Communication

Push buttons can activate BlinkerBeam® solar/battery-powered transceiver radios. These compact controllers activate one or more BlinkerSign® LED Signs, BlinkerBeacon® LED Beacons, RRFB and other ITS devices wirelessly within a 1000 ft. range, up to one mile with an external antenna.

TAPCO® 1-800-236-0112 www.tapconet.com

Traffic & Parking Company, Inc. 5100 West Brown Deer Road, Brown Deer WI 53223 U.S.A. Phone 800-236-0112 FAX 800-444-0331
www.tapconet.com

MADE IN THE USA

GSA Contract Holder GS-07F-5924R GS-07F-0234U

WARMZONE
Premier Radiant Heating

CZ SNOW MELT CONTROLLER AND ACCESSORIES

CZ-OUTDOOR TEMPERATURE SENSOR

CZ-GROUND SENSOR

CZ-SNOW MELT CONTROLLER

CZ-ROOF SENSOR

CZ-SNOW MELT CONTROLLER ENCLOSURE

CLEARZONE
Snow Melting Systems

ADVANCED SNOW MELT CONTROL

Intelligent control of ice and snow melting

An all-in-one solution for ice- and snow melting usable for all applications within hydronic as well as electrical heating. Optimal operation is ensured due to output control which makes the system both effective and economical.

- Electronic on/off control up to 11 KW
- 2 zone control, individually controlled at the same time
- Economical control
- Detection of temperature and moisture
- Display and "knob wheel" for easy programming
- Control of electrical or waterbased ice and snow melting systems
- Alarm relay for external signal
- Language options

WE CANNOT CHANGE THE WEATHER
- BUT WE DO CONTROL THE CONSEQUENCES

Using readings from temperature and moisture sensors, the controller ensures economical control of power consumptions when keeping outdoor areas and roofs free of ice and snow. The moisture sensor is installed in the surface of the outdoor area or placed in the gutter. As soon as moisture is detected, The snow controller activates the snow melting system. Once the sensor has dried out, the snow control goes into an adjustable after run delay and then immediately turns off.

CZ- Snow Melt Control Options

For Roofs and Gutters:
Using the CZ snow melt controller, CZ-gutter sensor and the CZ-outdoor temperature sensor allows the Clearzone system to sense moisture in gutters and downspouts and the outside temperature. This allows the CZ-snow melt control to be used on roofs and gutters

For Snow melt Areas:
Using the CZ snow melt controller, The CZ-ground sensor allows the Clearzone system to sense moisture and temperature of concrete, asphalt and paver embedment's. . This allows the CZ-snow melt control system more flexible then most controls systems.

PRODUCT PROGRAM

TYPE	PRODUCT
CZ- CONTROL	Snow Control Includes the CZ-ENCLOSURE
ACCESORIES	
CZ- GROUND	Ground sensor for detection of moisture and temperature, 33' cable.
CZ-GUTTER	Gutter sensor for moisture. 33' cable
CZ- OUTDOOR	Outdoor sensor for temperature.
CZ- ENCLOSURE	The CZ Enclosure is required for UL in USA

WARMZONE
Premier Radiant Heating

WARMZONE:
12637 S 265 W
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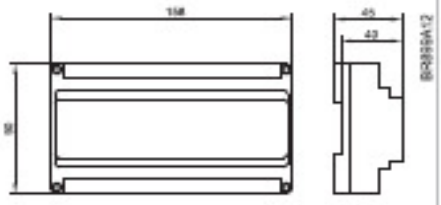
Draper, UT. 84020

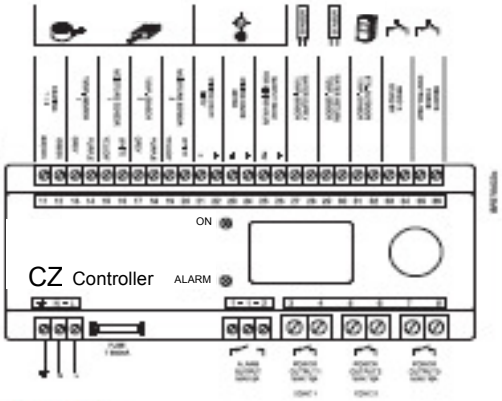
888-488-9276 Toll free
801-948-7598 Fax

www.warmzone.com

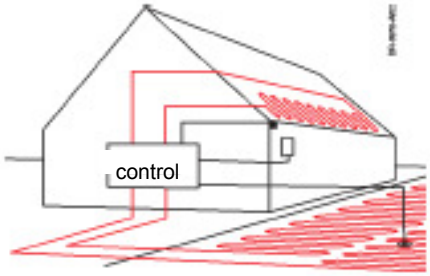
CLEARZONE
CLEARZONE SNOW MELTING SYSTEMS



Dimensions (mm)



Connections



Ground and roof application

Remote control:

It is possible to control the CZ Controller from an external signal. Timer, GSM Module, or a Touch tone phone interface.
The CZ- Controller can be switched on, placed in standby or the heating system can be forced on.

SENSORS

Ground sensor type
Designed for embedding into the surface of the outdoor area. Detects temperature and moisture.
Up to two Ground sensors may be installed.

Gutter sensor type
Designed for mounting in gutters and down pipes etc. Detects moisture only. Is mounted in combination with outdoor sensor
Up to two Gutter sensors may be installed.

Outdoor sensor type
Detects temperature. Is used in combination with gutter sensor
The outdoor sensor may also be used with the Ground sensor, when used in this way the outdoor sensor will detect rapidly decreasing air temperatures avoiding icy areas.

MOUNTING

Mounting of thermostat
DIN-rail mounting in switchboard, OJ-mounting box or on wall surface.

Mounting of ground sensor
Is mounted where the worst snow and ice problems normally occur. The sensor is mounted on a hard foundation, in a concrete base, with the top of the sensor flush with the surface. Where an asphalt surface is used, it should be placed in a concrete recess.

Mounting of gutter sensor
Is mounted in the gutter or down pipe on the sunny side of the building. The contact point of the sensor must be placed in the direction of flow of the melting water. Where necessary, it is possible to connect two sensors in parallel.

Mounting of outdoor sensor
Is mounted under the roof eaves on the north side of the building.

TECHNICAL DATA

Supply voltage	120/230V ±10%, 50-60 Hz
Temperature range	0/+5°C
Working range	-20/+5°C
Built-in timer for manual snow melting / afterrun	1-6 hours
Output relay	3 x 16A potential free relay
2 zone application	Output is 2 x 16A potential free relay
Water based system	Controlling a 3 or 4 way valve, primary pump, secondary pump.
Display	Graphic and with backlight
Ambient temperature	0/+50°C
Housing / incl. cover	IP20
Weight	495 g
Dimensions excl. cover (H/W/D)	90/156/45 mm
Dimensions incl. cover (H/W/D)	170/162/45 mm
LED's indicate the functions:	
ON/Green	Supply voltage to the thermostat
Error/Red	Fault indication
Ground sensor	
Detecting	Moisture and temperature
Mounting	Outdoor area
Housing	IP68
Ambient temperature	-20/+70°C
Dimensions	H32, Ø60 mm
Gutter sensor	
Detecting	Moisture
Mounting	Gutter and down pipe
Housing	IP68
Ambient temperature	-20/+70°C
Dimensions (H/W/D)	105/30/13 mm
Outdoor sensor	
Detecting	Temperature
Mounting	Wall surface
Housing	IP54
Ambient temperature	-20/+70°C
Dimensions (H/W/D)	86/45/35 mm

C US

For Residential and Commercial Applications

Job Name _____ Contractor _____

Job Location _____ Approval _____

Engineer _____ Contractor's PO No _____

Approval _____ Representative _____

General Information

ClearZone Mats **Electric Snow Melting**

Installing a Warmzone snow melting system provides a permanent solution to the problems caused by cold weather. Improve safety by providing instantaneous relief from snow and ice and increase your bottom line by reducing the costs associated with applying chemicals, owning snow clearing machinery or hiring outside services.

- Twin-conductor cable
- Single-point connection
- Easy and flexible installation
- Durable construction
- Silent, efficient and safe
- For use in concrete, asphalt and under pavers
- Zero EMF's (Electromagnetic fields)
- Genuine 10-year non-prorated warranty

Specifications

Cable Construction	Twin Conductor
Rated Voltage	208, 240, 277, 347, 480, 600V
Output (Mats)	37W/square feet (400W/m), 50W/square feet (540W/m)
Output (Cables)	9W/ft (35Wm),12W/ft (40W/m)
Cold Lead	20 feet, (6.0m)
Bending Radius	Minimum 1½ inches, (38mm)
Cable Diameter	¼ inches (6mm)
Conductor Insulation	Teflon™ FEP
Filler Sheath	PEX
Outer Insulation	PVC
Max. Temperature	220°F (105°C)
Min. Installation Temp.	40°F (5°C)

WARMZONE
Premier Radiant Heating

CZ Mats - 208V

- All mats are 2 feet wide.
- Power leads are 20 feet in length.

Item # 208V Mat	Length (feet)	Coverage (sq. ft.)	Watts (50W/sq. ft.)	Amps	Ohms
CZM-208-15-1	6.5	15	640	3.1	67.0
CZM-208-20-1	10.0	20	1,100	5.3	39.2
CZM-208-25-1	12.5	25	1,280	6.2	33.5
CZM-208-30-1	15.0	30	1,550	7.4	28.0
CZM-208-35-1	17.5	35	1,730	8.3	25.0
CZM-208-40-1	20.0	40	1,900	9.2	22.6
CZM-208-45-1	22.5	45	2,100	10.1	20.6
CZM-208-50-1	25.0	50	2,400	11.5	18.0
CZM-208-60-1	30.0	60	3,050	14.7	14.1
CZM-208-70-1	35.0	70	3,400	16.4	12.7
CZM-208-80-1	40.0	80	3,800	18.3	11.4
CZM-208-90-1	45.0	90	4,230	20.3	10.2
CZM-208-100-1	50.0	100	5,000	24.1	8.6

CZ Mats - 240V

- All mats are 2 feet wide.
- Power leads are 20 feet in length.
- Watt output of the 240V mat is reduced by 25% when operated at 208V (approximately 37.5W/sq.ft).

Item # 240V Mat	Length (feet)	Coverage (sq. ft.)	Watts (50W/sq. ft.)	Amps	Ohms
CZM-240-15-1	7.5	15	750	3.1	77.4
CZM-240-20-1	10.0	20	1,000	4.2	57.1
CZM-240-25-1	12.5	25	1,250	5.2	46.1
CZM-240-30-1	15.0	30	1,500	6.3	38.1
CZM-240-35-1	17.5	35	1,750	7.3	32.9
CZM-240-40-1	20.0	40	2,000	8.3	28.9
CZM-240-45-1	22.5	45	2,250	10.4	23.0
CZM-240-50-1	25.0	50	2,500	10.4	23.0
CZM-240-60-1	30.0	60	3,000	12.5	19.2
CZM-240-70-1	35.0	70	3,500	14.6	16.4
CZM-240-80-1	40.0	80	4,000	16.7	14.4
CZM-240-90-1	45.0	90	4,500	18.8	12.8
CZM-240-100-1	50.0	100	5,000	20.8	11.5
CZM-240-115-1	57.5	115	5,570	24.0	10.0
CZM-240-130-1	65.0	130	6,500	27.1	8.9

WARMZONE
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CZ Mats - 240V (37W/sq.ft.)

- All mats are 2 feet wide.
- Power leads are 20 feet in length.

Item # 240V Mat	Length (feet)	Coverage sq. ft.	Watts 37W/sq. ft.	Amps	Ohms
CZM-240-35-2	16.5	35	1235	5.1	46.6
CZM-240-40-2	20.0	40	1480	6.2	38.9
CZM-240-90-2	45.0	90	3495	14.6	16.5
CZM-240-120-2	60.0	120	4505	18.8	12.8
CZM-240-155-2	77.5	155	5715	23.8	10.1

CZ Mats - 277V

- All mats are 2 feet wide.
- Power leads are 20 feet in length.
- Watt output of the 277V matt is reduced by 25% when operated at 240V (approximately 37.5SW/sq.ft.

Item # 277V Mat	Length (feet)	Coverage (sq. ft.)	Watts (50W/sq. ft.)	Amps	Ohms
CZM-277-30-1	15.0	30	1,370	4.9	56.5
CZM-277-35-1	17.5	35	1,690	6.1	45.4
CZM-277-40-1	20.0	40	2,080	7.5	36.9
CZM-277-45-1	22.5	45	2,350	8.5	32.6
CZM-277-50-1	25.0	50	2,675	9.7	28.6
CZM-277-60-1	30.0	60	2,800	10.1	27.4
CZM-277-70-1	35.0	70	3,440	12.4	22.3
CZM-277-80-1	40.0	80	4,080	14.7	18.8
CZM-277-90-1	45.0	90	4,680	16.9	16.4
CZM-277-105-1	52.5	105	5,100	18.4	15.1
CZM-277-115-1	57.5	115	5,850	21.1	13.1

CZ Mats - 347V

- All mats are 2 feet wide.
- Power leads are 20 feet in length.

Item # 347V Mat	Length (feet)	Coverage (sq. ft.)	Watts (50W/sq. ft.)	Amps	Ohms
CZM-347-20-1	10	20	1,060	3.1	113.6
CZM-347-30-1	15	30	1,425	4.1	84.5
CZM-347-35-1	17.5	35	1,795	5.2	67.1
CZM-347-45-1	22	44	2,115	6.1	59.9
CZM-347-50-1	25	50	2,525	7.3	49.7
CZM-347-60-1	30	60	2,945	8.5	40.9
CZM-347-65-1	32	64	3,260	9.4	36.9
CZM-347-75-1	37	74	3,630	10.5	33.2
CZM-347-85-1	42	84	4,360	12.6	27.6

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CZ Mats - 480V

- All mats are 2 feet wide.
- Power leads are 20 feet in length.

Item # 480V Mat	Length (feet)	Area (sq. ft.)	Watts (50W/sq. ft.)	Amps	Ohms
CZM-480-20-1	10	20	1,000	2.1	228.6
CZM-480-30-1	15	30	1,500	3.1	154.8
CZM-480-40-1	20	40	2,000	4.2	1143
CZM-480-50-1	25	50	2,500	5.2	92.3
CZM-480-60-1	30	60	3,000	6.3	76.2
CZM-480-70-1	35	70	3,500	7.3	65.8
CZM-480-80-1	40	80	4,000	8.3	57.8
CZM-480-90-1	45	90	4,500	9.4	51.1
CZM-480-100-1	50	100	5,000	10.4	46.2
CZM-480-120-1	60	120	6,000	12.5	38.4
CZM-480-140-1	70	140	7,000	14.6	28.7
CZM-480-160-1	80	160	8,000	16.7	

CZ Mats - 600V

- All mats are 2 feet wide.
- Power leads are 20 feet in length.
- Watt output of the 600V mat is reduced by 35% when operated at 480V (approximately 32.5W/sq.ft.).

Item # 600V Mat	Length (feet)	Area (sq. ft.)	Watts (50W/sq. ft.)	Amps	Ohms
CZM-600-25-1	12.5	25	1,250	2.1	288.0
CZM-600-35-1	18.5	37	1,845	3.1	195.1
CZM-600-50-1	24.5	49	2.485	4.1	144.9
CZM-600-60-1	31.0	62	3,075	5.1	117.1
CZM-600-75-1	37.0	74	3,715	6.2	96.9
CZM-600-90-1	44.5	89	4,455	7.4	80.8
CZM-600-100-1	51.0	102	5,050	8.4	71.3
CZM-600-115-1	56.5	113	5,685	9.5	63.3
CZM-600-125-1	63.0	126	6,280	10.5	57.53

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Controls

	Description	Voltage
	DS-28 Snow Melt Controller (30A)	120V, 240V
	DS-5 Snow Melt Controller (60A)	120V, 240V
	Dual Zone Automatic Control Panel (ACP)*	208V-600V

Timer/Contactor Panels

	Description	Max. Amps	Coil Voltage	No. of Contractors
	Single Contactor, 600V	40	120	1
	Single Contactor, 600V	40	208-240	1
	Single Contactor, 600V	60	120	1
	Single Contactor, 600V	60	208-240	1
	CZ Timer Panel w/4hr timer, 600V	100	120	2
	CZ Contactor Panel w/o timer, 600V	100	120	2
	CZ Timer Panel w/4hr timer, 600V	200	120	4

Accessories

	Description
	Cable Strapping (15ft.)
	Cable Strapping (75ft.)
	Ground Sensors (two per package, includes 50ft. lead wire)
	Roof Sensor (Includes 50ft. lead wire)
	Nameplate (per NEC 426-13)
	CZ Repair Kit (Includes: crimp connectors, heat shrink tubes, repair wire)
	CDP-2 Remote Control & Display for Snow Sensors*
	CS-1 Remote Control/Monitor Pigtail for CDP-2

Warranty

Cable/Mat: Genuine 10-year comprehensive extended warranty against defects in material, design, and workmanship.

Technical Support

For technical questions, please contact Warmzone at
1-888-488-WARM (9276)
or via the web - www.warmzone.com

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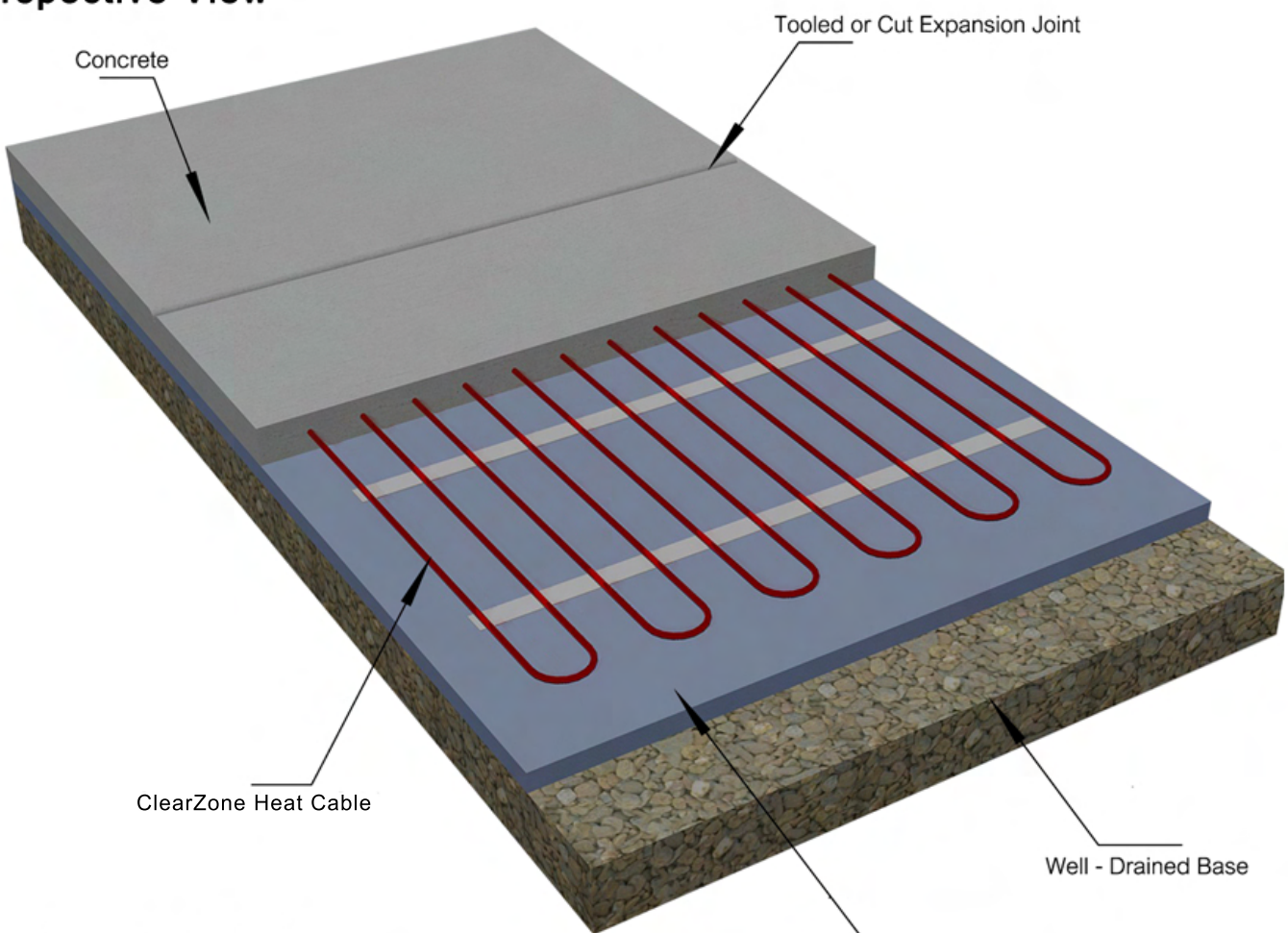
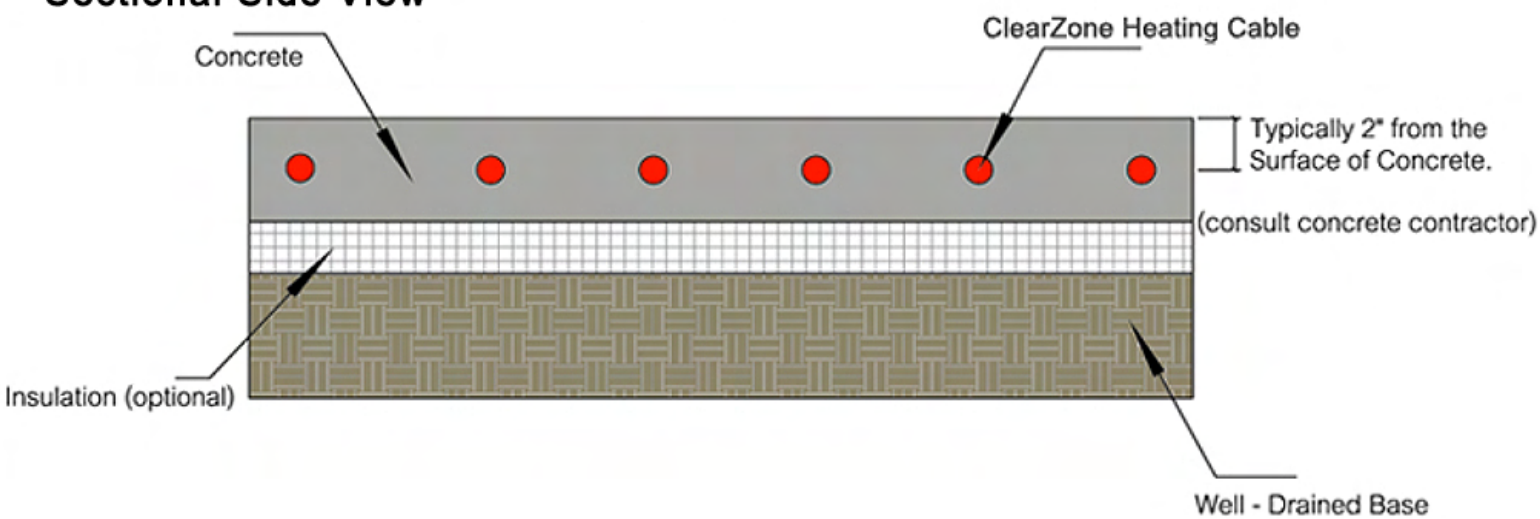
ClearZone Heat Cable in Concrete

Perspective View



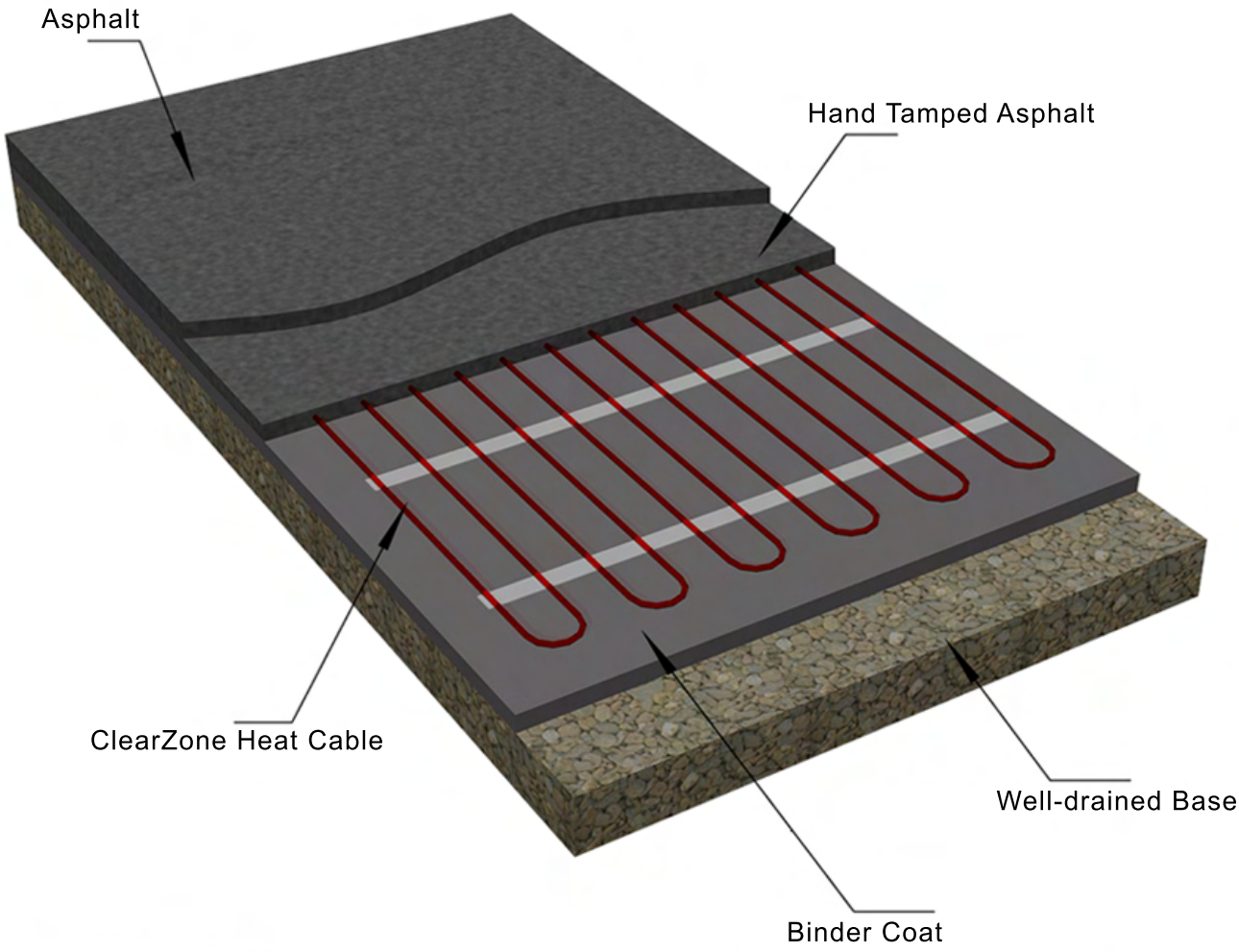
Perspective View

Sectional Side View

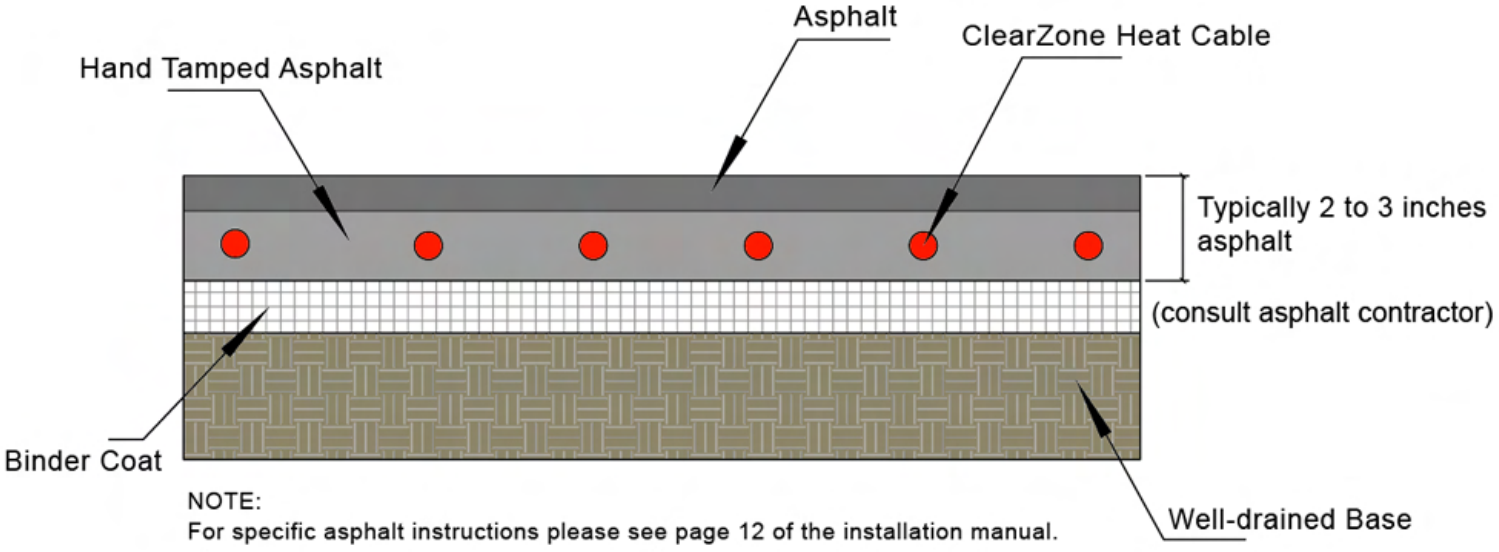


ClearZone Heat Cable Under Asphalt

Perspective View



Sectional Side View



NOTE:
For specific asphalt instructions please see page 12 of the installation manual.

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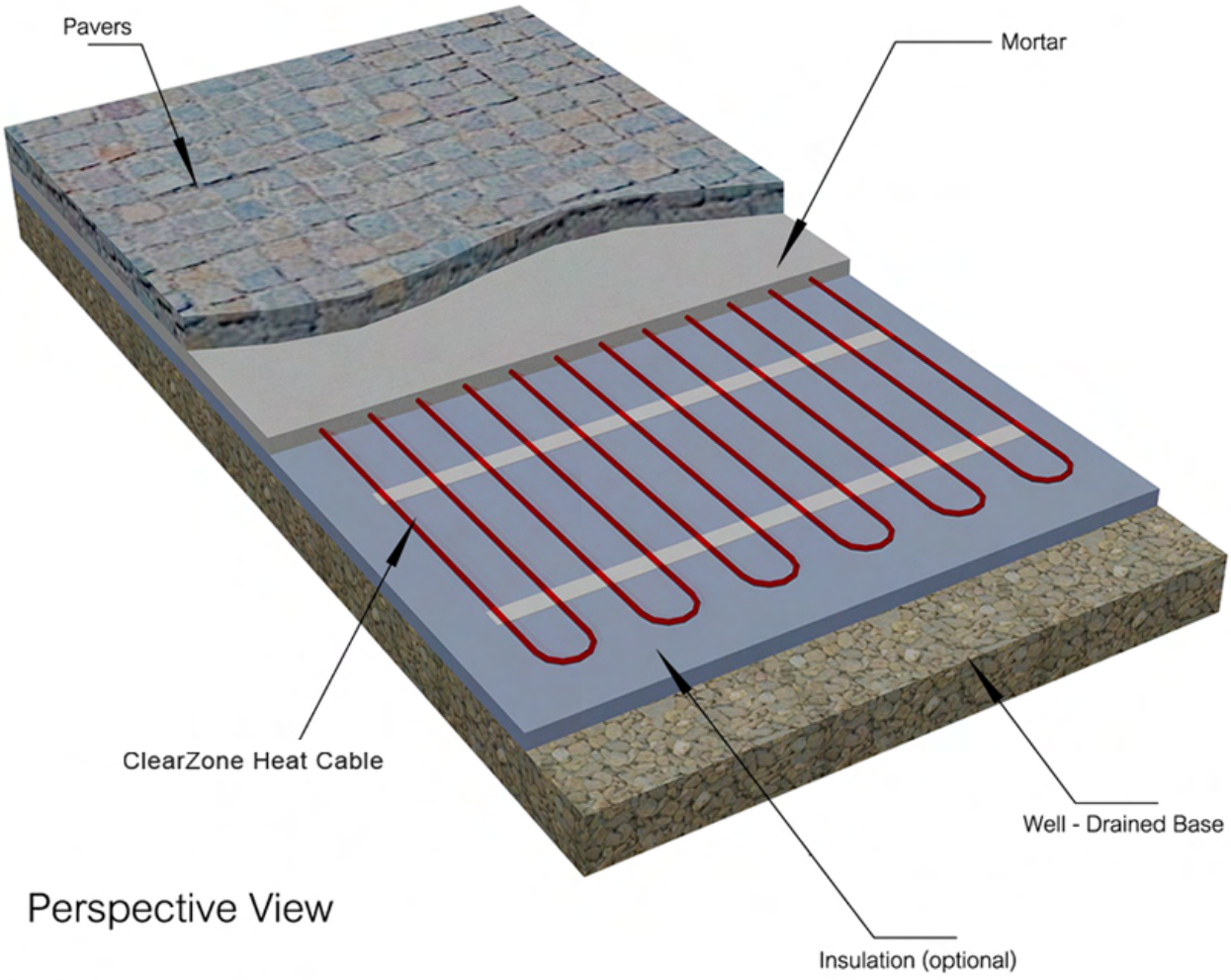
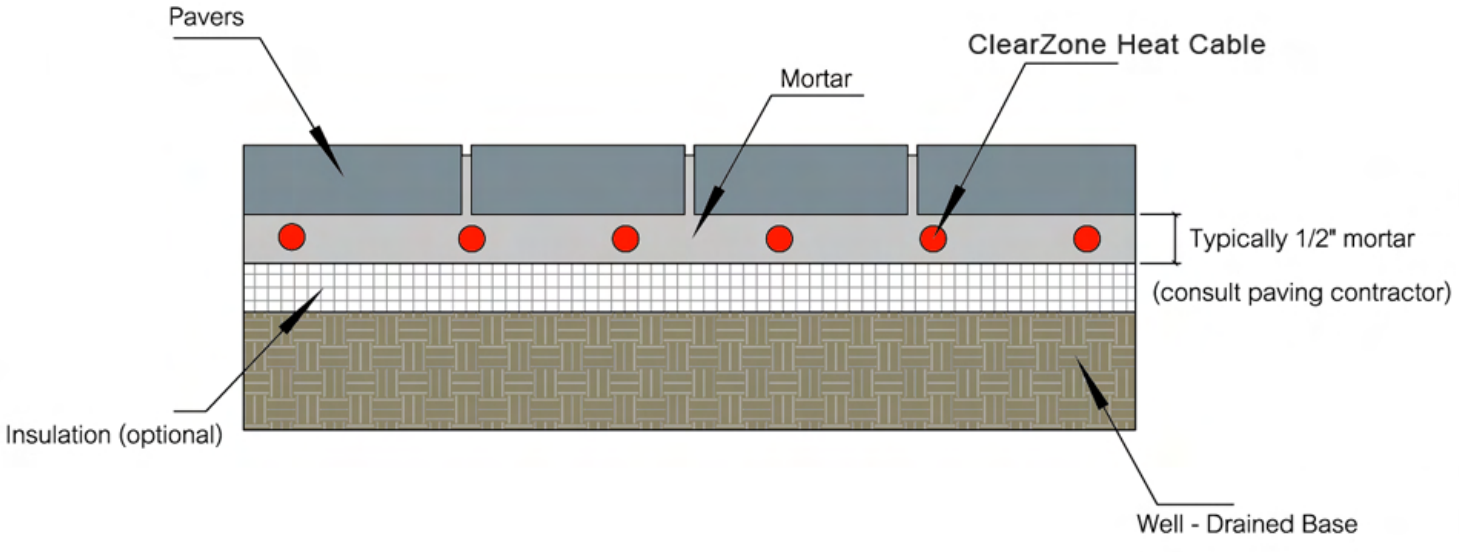
ClearZone Heat Cable Under Stone Pavers

Perspective View



Perspective View

Sectional Side View



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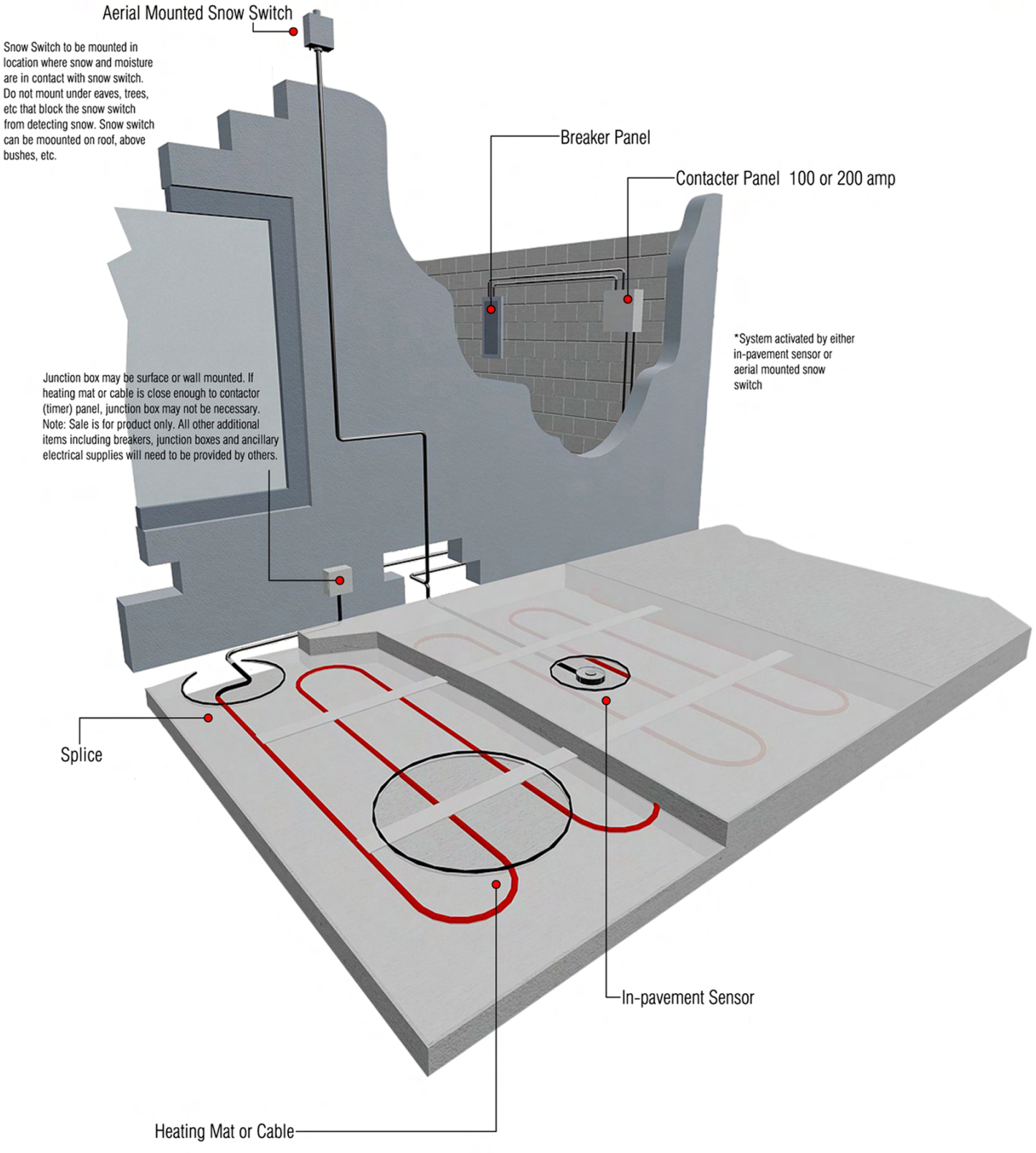
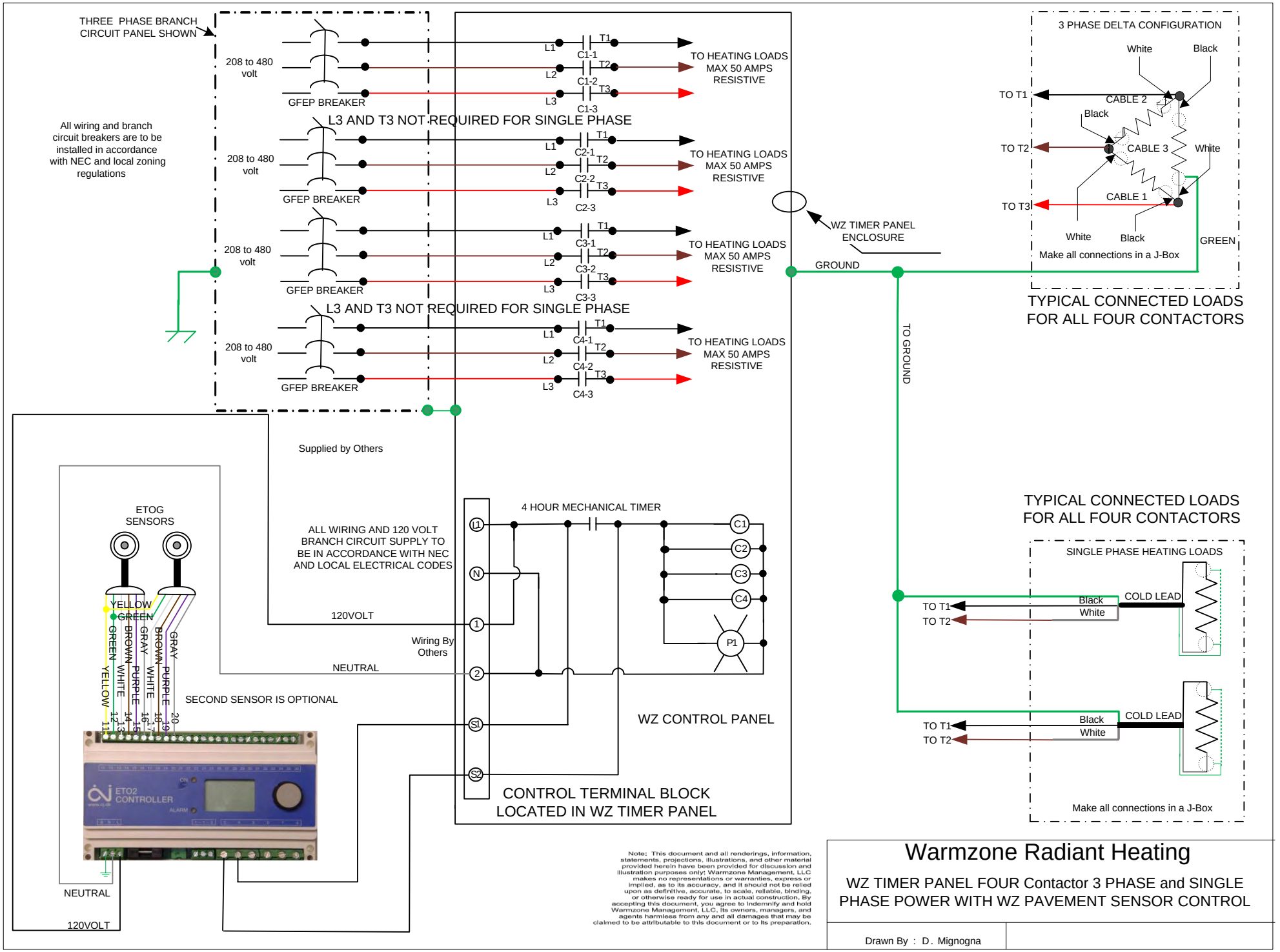
SYSTEM COMPONENTS

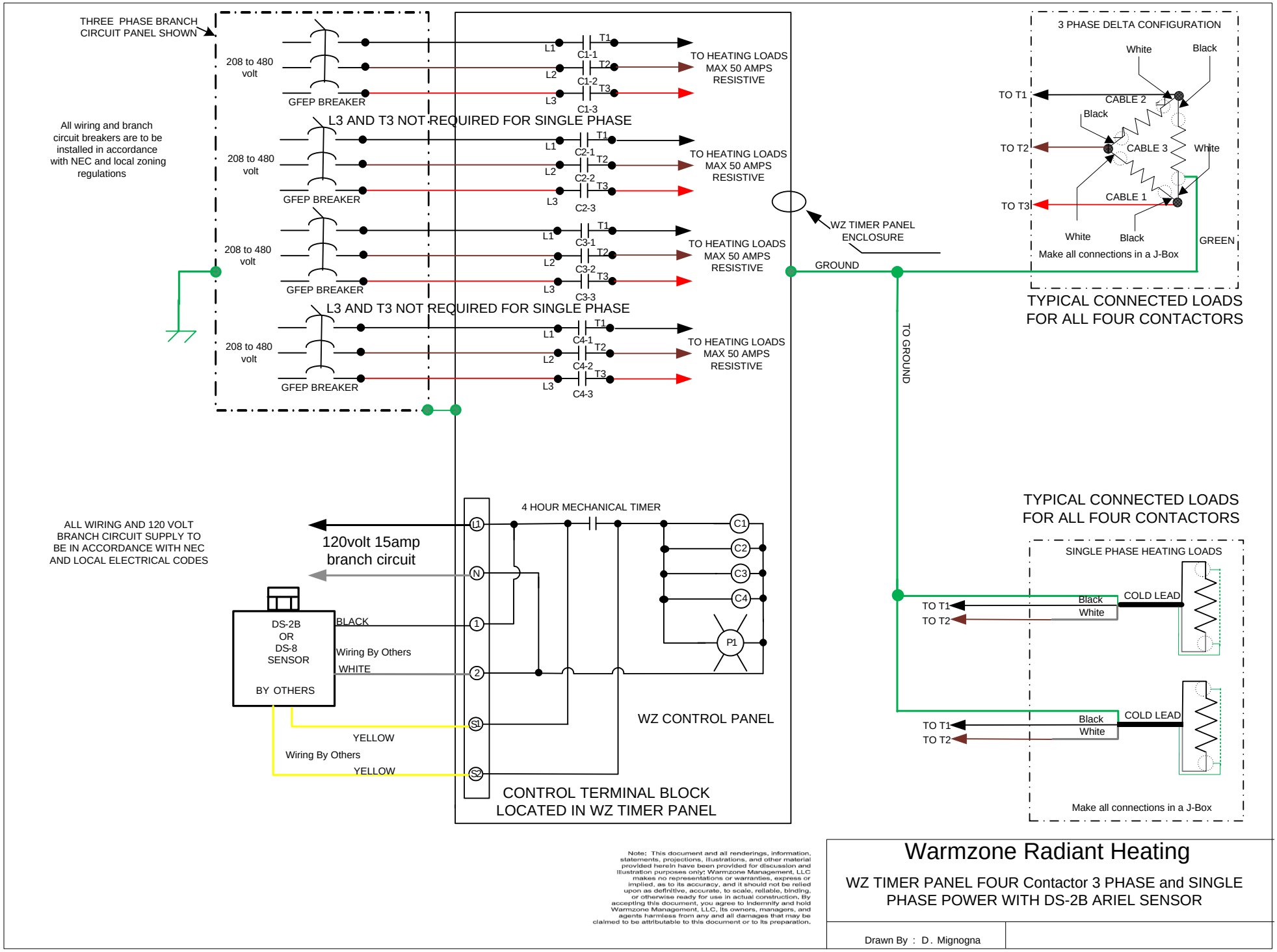




Warmzone Radiant Heating

WZ TIMER PANEL FOUR Contactor 3 PHASE and SINGLE PHASE POWER WITH WZ PAVEMENT SENSOR CONTROL

Drawn By : D. Mignogna



Warmzone Radiant Heating

WZ TIMER PANEL FOUR Contactor 3 PHASE and SINGLE PHASE POWER WITH DS-2B ARIEL SENSOR

Drawn By : D. Mignogna

CSA INTERNATIONAL

CERTIFICATION RECORD

The company named below has been authorized by CSA International to represent the products listed in this record as “CSA Certified” and to affix the CSA Mark to these products according to the terms and conditions of the CSA Service Agreement and applicable CSA program requirements (including additional Markings).

Alternate File: 253796

Class No: 2872 01 HEATERS Cable and Cable Sets

LISTEE

4802351

WARMZONE
2056 South 1100 East
Salt Lake City, UT 84106
USA

August 16, 2011

- Series Heating Cable Set, Cat No "WZ", 2-conductor construction with FEP insulation with XLPE insulation covering, shielding, and PVC or Polyolefin (PO) jacket, in 'MAT' assembly, usages "G", "S", "W", "WS", embedded applications, maximum temperature rating 105°C, maximum voltage 480V ac, up to 12W/ft (40W/m), maximum 30A/cct.

Note: Installation in accordance with the Canadian Electrical Code (CEC Part I).

/jj

CSA INTERNATIONAL

CERTIFICATION RECORD

The company named below has been authorized by CSA International to represent the products listed in this record as “CSA Certified” and to affix the CSA Mark to these products according to the terms and conditions of the CSA Service Agreement and applicable CSA program requirements (including additional Markings).

Alternate File: 253796

Class No: 2872 81 HEATERS Cable and Cable Sets - Certified to US Standards

LISTEE

4802351

WARMZONE
2056 South 1100 East
Salt Lake City, UT 84106
USA

August 16, 2011

- Series Heating Cable Set, Cat No "WZ", 2-conductor construction with FEP insulation with XLPE insulation covering, shielding, and PVC or Polyolefin (PO) jacket, in 'MAT' assembly, usages "G", "S", "W", "WS", Type C (embedded installation) and Embedded in Concrete Floor Warming within enclosed structures, maximum temperature rating 105°C, maximum voltage 480V ac, up to 12W/ft (40W/m) , maximum 30A/cct.

Note: Installation in accordance with the National Electrical Code (NEC).

/jj

CSA INTERNATIONAL

Certificate of Compliance

Certificate: 2447666 **Master Contract:** 253796

Project: 2447666 **Date Issued:** **August 16, 2011**

Issued to: WARMZONE
2056 South 1100 East
Salt Lake City, UT 84106
USA

Attention: **Kevin Wilson**

The products listed below are eligible to bear the CSA Mark shown

C US

Issued by: Jean Jones

PRODUCTS

CLASS – 2872 01 – HEATERS Cable and Cable Sets

- Series Heating Cable Set, Cat No "WZ", 2-conductor construction with FEP insulation with XLPE insulation covering, shielding, and PVC or Polyolefin (PO) jacket, in 'MAT' assembly, usages "G", "S", "W", "WS", embedded applications, maximum temperature rating 105°C, maximum voltage 480V ac, up to 12W/ft (40W/m), maximum 30A/cct.

Note: Installation in accordance with the Canadian Electrical Code (CEC Part I).

CLASS 2872 81 - Cable and Cable Sets – Certified to US Standards

- Series Heating Cable Set, Cat No "WZ", 2-conductor construction with FEP insulation with XLPE insulation covering, shielding, and PVC or Polyolefin (PO) jacket, in 'MAT' assembly, usages "G", "S", "W", "WS", Type C (embedded installation) and Embedded in Concrete Floor Warming within enclosed structures, maximum temperature rating 105°C, maximum voltage 480V ac, up to 12W/ft (40W/m) , maximum 30A/cct.

Note: Installation in accordance with the National Electrical Code (NEC).

APPLICABLE REQUIREMENTS

CSA C22.2 No. 130-03	Requirements for Electrical Resistance Heating Cables and Heating Device Sets
UL Standard 1673	Electric Space Heating Cables

MARKINGS

The CSA Mark, the company name, and/or tradename/ or identification/ or file number 253796, model designation, and any 'Cautions' or other information as specified in the Certification Report.

CSA INTERNATIONAL

Supplement to Certificate of Compliance

Certificate: 2447666 **Master Contract: 253796**

The products listed, including the latest revision described below, are eligible to be marked in accordance with the referenced Certificate.

Product Certification History

Project	Date	Description	
2447666	August 16, 2011	Submittor – Danfoss A/S	Listee - Warmzone
		M/C 221477	
		GX	WZ

SECTION 15773

SNOW AND ICE MELTING EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Snow melting equipment and controls.

B. Ice melting equipment and controls for roof and gutters.

1.2 RELATED SECTIONS

A. Section 02775 - Sidewalks.

B. Section 02780 - Unit Pavers.

C. Section 03300 - Cast-In-Place Concrete.

D. Section 15778 - Electric Snow-Melting Equipment.

E. Section 16050 – Basic Methods and Materials: Power and controls wiring.

1.3 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Shop Drawings:
1. Provide dimensioned layout of heater cable calculated to provide heat energy concentrations as required by application.
2. Provide schematic layout of controls and sensors.

D. Project Record Drawings:
1. Locations of cables.
2. Sensors.
3. Controls.
4. Branch circuit connections.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer shall have not less than 35 years experience manufacturing the heating cables specified in this Section.

B. Installer Qualifications: Installer shall demonstrate experience on projects of similar size and complexity. All wiring connections shall be done by a Qualified/Bonded electrician.

C. Self-regulating cable is not acceptable.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging maintaining environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer until ready for installation.

1.6 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.7 WARRANTY

A. The Electrical Contractor shall verify and record heating element resistance and insulation-to-ground resistance readings of the system upon delivery and again before during and after install.

B. If readings show electrical faults upon delivery testing, then manufacturer shall replace the cable at no cost to the Owner, prior to install of the equipment.

C. If readings show electrical faults following receipt testing, then Contractor shall replace the cable at no cost to the Owner or the manufacturer.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Acceptable Manufacturer/Distributor: Warmzone; 2056 S 1100 E, Salt Lake City, UT 84106 Toll Free Tel: (888)-488-9276. ASD. Tel: (801) 326-5100. Fax: (801) 326-5199. Email: sales@warmzone.com Web: http://www.warmzone.com.

B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 COMMERCIAL ROOF AND GUTTER ICE MELTING

A. Provide a complete, integrated system, comprised of heating cables, sensors and control panels as applicable.
   1. Provide heating cables with factory-installed cold junctions as described in this section and shown on the Drawings.
   2. Provide one Control System as described in this section, to operate with a power source of:
      a. 208-240 volt 3 wire.
      b. 277 volt 3 wire.
      c. 208-240 volt 4 wire.

d. 277 volt 4 wire.
e. Single phase.
f. 3 Phase.

3. Provide remote moisture and temperature sensors as described in this section.
4. The installation contractor shall provide required ground fault interrupt for the heating cables.
5. The manufacturer shall provide required ground fault interrupt for the heating cables as an integral part of the control system on custom systems only.

B. Heating Cables:
1. Cable shall be Warmzone Clearzone Constant Wattage Heating Cable.
2. Provide heating cable with the following properties:
a. Series Heating Cable Set, Cat no. “GX”, 2-conductor construction with FEP/XLPE insulation, shielding, and PVC or Polyolefin (PO) jacket, in ‘MAT’ assembly, usages “G”, “S”, “W”, “WS” embedded application (in Canada) and Type C embedded installation (in U.S.A.), maximum temperature rating 220 degree F (105 degrees C), maximum voltage 277V ac, up to 12W/ft (40W/m), maximum 16A/cct.
b. Lead free 1/4 inch (6 mm) round heating cable shall be both flexible and UV protected.
c. Cable shall include 20 feet (6 m) cold lead, single point connection.
d. Power connection, end seal, splice, and tee connection shall be applied in field.

C. Control System:
1. The control system shall be able to control electric radiant heating system for maximum efficiency and minimum power consumption.
2. The system temperature shall be controlled by either a Warmzone Clearzone850 controller with external digital temperature and moisture sensors and appropriate contactor or a Warmzone timer, contactor and/or snow controller with external temperature and moisture sensors.
3. Enclosures shall be NEMA 1X-4 rated.

D. Sensors: Control of the system shall be achieved by the use of one or more remote mounted sensors which will collectively sense the outdoor temperature and the presence of falling or drifting snow.
1. The system shall be capable of responding to the inputs from more that one sensor.
2. The controller will remain energized for an adjustable duration following the end of snowfall, so that slush and ice formation are prevented or evaporated.
3. The controller shall feature a device to permit Manual Over-ride to deal with unusual situations. The manual feature shall self disconnect after approximately 4 hours to prevent system run-away.
4. The control device shall be UL listed/approved.

2.3 COMMERCIAL SNOW MELTING

A. Provide a complete, integrated system, comprised of heating cables, sensors and control panels as applicable.
1. Provide heating cables with factory-installed cold junctions as described in this section and shown on the Drawings.
a. Designed Watts/SF: _____.
2. Provide one Control System as described in this section, to operate with a power source of:
a. 208-240 volt 3 wire.
b. 277 volt 3 wire.

c. 208-240 volt 4 wire.
d. 277 volt 4 wire.
e. Single phase.
f. 3 Phase.

3. Provide remote moisture and temperature sensors as described in this section.
4. The installation contractor shall provide required ground fault interrupt for the heating cables
5. The manufacturer shall provide required ground fault interrupt for the heating cables as an integral part of the control system on custom systems only.

B. Heating Cables:
1. Cable shall be Warmzone Clearzone Constant Wattage Heating Cable.
2. Provide heating cable with the following properties:
a. Series Heating Cable Set, Cat no. “GX”, 2-conductor construction with FEP/XLPE insulation, shielding, and PVC or Polyolefin (PO) jacket, in ‘MAT’ assembly, usages “G”, “S”, “W”, “WS” embedded application (in Canada) and Type C embedded installation (in U.S.A.), maximum temperature rating 220 degree F (105 degrees C), maximum voltage 277V ac, up to 12W/ft (40W/m), maximum 16A/cct.
b. Lead free 1/4 inch (6 mm) round heating cable shall be both flexible and UV protected.
c. Cable shall include 20 feet (6 m) cold lead, single point connection.
d. Power connection, end seal, splice, and tee connection shall be applied in field.

C. Control System:
D. Control System:
1. The control system shall be able to control electric radiant heating system for maximum efficiency and minimum power consumption.
2. The system temperature shall be controlled by either a Warmzone Clearzone850 controller with external digital temperature and moisture sensors and appropriate contactor or Warmzone timer, contactor and/or snow controller with external temperature and moisture sensors.
3. Enclosures shall be NEMA 1X-4 rated.
4.

E. Sensors: Control of the system shall be achieved by the use of one or more remote mounted sensors which will collectively sense the outdoor temperature and the presence of falling or drifting snow.
1. The system shall be capable of responding to the inputs from more that one sensor.
2. The controller will remain energized for an adjustable duration following the end of snowfall, so that slush and ice formation are prevented or evaporated.
3. The controller shall feature a device to permit Manual Over-ride to deal with unusual situations. The manual feature shall self disconnect after approximately 4 hours to prevent system run-away.
4. The control device shall be UL listed/approved.

F. Marker Plates (Aluminum Embedded Buried Heating System Identifiers):
1. NEC requirement per National Electric Code Section 426-13.
2. One Marker Plate per 400 square feet.
3. Provided by heating cable manufacturer.

2.4 RESIDENTIAL ROOF AND GUTTER ICE MELTING

1. Provide one Control System as described in this section, to operate with a power source of:
    a. 208-240 volt 3 wire.
    b. 277 volt 3 wire.
    c. 208-240 volt 4 wire.
    d. 277 volt 4 wire.
    e. Single phase.
    f. 3 Phase.
2. Provide remote moisture and temperature sensors as described in this section.
3. The installation contractor shall provide required ground fault interrupt for the heating cables
4. The manufacturer shall provide required ground fault interrupt for the heating cables as an integral part of the control system on custom systems only.

B. Heating Cables:
1. Cable shall be Warmzone Clearzone Constant Wattage Heating Cable.
2. Provide heating cable with the following properties:
    a. Series Heating Cable Set, Cat no. “GX”, 2-conductor construction with FEP/XLPE insulation, shielding, and PVC or Polyolefin (PO) jacket, in ‘MAT’ assembly, usages “G”, “S”, “W”, “WS” embedded application (in Canada) and Type C embedded installation (in U.S.A.), maximum temperature rating 220 degree F (105 degrees C), maximum voltage 277V ac, up to 12W/ft (40W/m), maximum 16A/cct.
    b. Lead free 1/4 inch (6 mm) round heating cable shall be both flexible and UV protected.
    c. Cable shall include 20 feet (6 m) cold lead, single point connection.
    d. Power connection, end seal, splice, and tee connection shall be applied in field.

C. Control System:
1. The control system shall be able to control electric radiant heating system for maximum efficiency and minimum power consumption.
2. The system temperature shall be controlled by either a Warmzone Clearzone850 controller with external digital temperature and moisture sensors and appropriate contactor or Warmzone timer, contactor and/or snow controller with external temperature and moisture sensors.
3. Enclosures shall be NEMA 1X-4 rated.
4. Sensors: Control of the system shall be achieved by the use of one or more remote mounted sensors which will collectively sense the outdoor temperature and the presence of falling or drifting snow.
5. The system shall be capable of responding to the inputs from more that one sensor.
6. The controller will remain energized for an adjustable duration following the end of snowfall, so that slush and ice formation are prevented or evaporated.
7. The controller shall feature a device to permit Manual Over-ride to deal with unusual situations. The manual feature shall self disconnect after approximately 4 hours to prevent system run-away.
8. The control device shall be UL listed/approved.

2.5 RESIDENTIAL SNOW MELTING

A. Provide a complete, integrated system, comprised of heating cables, sensors and control panels as applicable.
1. Provide heating cables with factory-installed cold junctions as described in this section and shown on the Drawings.
    a. Designed Watts/SF: _____.

2. Provide one Control System as described in this section, to operate with a power source of:
    a. 208-240 volt 3 wire.
    b. 277 volt 3 wire.
    c. 208-240 volt 4 wire.
    d. 277 volt 4 wire.
    e. Single phase.
    f. 3 Phase.
3. Provide remote moisture and temperature sensors as described in this section.
4. The installation contractor shall provide required ground fault interrupt for the heating cables
5. The manufacturer shall provide required ground fault interrupt for the heating cables as an integral part of the control system on custom systems only.

B. Heating Cables:
1. Cable shall be Warmzone Clearzone Constant Wattage Heating Cable.
2. Provide heating cable with the following properties:
    a. Series Heating Cable Set, Cat no. “GX”, 2-conductor construction with FEP/XLPE insulation, shielding, and PVC or Polyolefin (PO) jacket, in ‘MAT’ assembly, usages “G”, “S”, “W”, “WS” embedded application (in Canada) and Type C embedded installation (in U.S.A.), maximum temperature rating 220 degree F (105 degrees C), maximum voltage 277V ac, up to 12W/ft (40W/m), maximum 16A/cct.
    b. Lead free 1/4 inch (6 mm) round heating cable shall be both flexible and UV protected.
    c. Cable shall include 20 feet (6 m) cold lead, single point connection.
    d. Power connection, end seal, splice, and tee connection shall be applied in field.

C. Control System:
1. The control system shall be able to control electric radiant heating system for maximum efficiency and minimum power consumption.
2. The system temperature shall be controlled by either a Warmzone Clearzone850 controller with external digital temperature and moisture sensors and appropriate contactor or Warmzone timer, contactor and/or snow controller with external temperature and moisture sensors.
3. Enclosures shall be NEMA 1X-4 rated.
4.

D. Sensors: Control of the system shall be achieved by the use of one or more remote mounted sensors which will collectively sense the outdoor temperature and the presence of falling or drifting snow.
1. The system shall be capable of responding to the inputs from more that one sensor.
2. The controller will remain energized for an adjustable duration following the end of snowfall, so that slush and ice formation are prevented or evaporated.
3. The controller shall feature a device to permit Manual Over-ride to deal with unusual situations. The manual feature shall self disconnect after approximately 4 hours to prevent system run-away.
4. The control device shall be UL listed/approved.

E. Marker Plates (Aluminum Embedded Buried Heating System Identifiers):
1. NEC requirement per National Electric Code Section 426-13.
2. One Marker Plate per 400 square feet.
3. Provided by heating cable manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Coordinate preparation and installation requirements and schedule with the general contractor, electrical subcontractor, paving subcontractor, roofing/gutter subcontractor before beginning work.

3.2 PREPARATION

A. Inspect the cable and controls upon receipt of shipment, noting any damage and ensuring that the materials received match the order and shipping documents. Compare the labels and the electrical resistance of the heating cables with the shipping documents.

B. Ensure that electrical terminations in the control panel(s) have not been loosened by vibration during shipment.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.4 INSPECTION AND TESTING

A. Refer to manufacturer’s literature for requirements for testing, recording, and documenting resistance and insulation-to-ground readings.

B. Take test readings before, during, and after installation.

C. If problems are found, consult the manufacturer.

D. If problems cannot be corrected, notify Architect before proceeding with any overlayment construction.

E. Keep testing records for inspection by the Architect, and for subsequent submittal to the manufacturer to ensure validation of the warranty.

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Optionally repair or preferably replace damaged products before Substantial Completion.

3.6 DOCUMENTATION AND TRAINING

A. Manufacturer shall present the Owner with equipment start-up and operational documentation to assist in proper operation and to maintain specified design performance.

END OF SECTION

WARMZONE
Premier Radiant Heating

Timer Panel (088L3440)

TIMER PANEL - is primarily designed for snow and ice melting applications. All timer panels include a pre-wired UL listed NEMA 1 control, wiring diagram, terminal connection block, and two to four 3P contactors. Timer panels can be used stand alone or in conjunction with an automatic controller.

- Low cost
- Simple installation
- NEMA 1, UL listed panel box
- Heat on- indicator light
- Pre-wired terminal connections

ClearZone Controls

Max. Load Voltage:	600V.
Max. Heating Load:	100/200A
Control wiring:	120V
Enclosure Type:	NEMA 1
Mounting:	Wall mounted
Dimensions (HxWxD):	10½" x 10½" x 6½" / 16½" x 16½" x 6½"
Timer Override:	4 hours
Warranty:	2 years

Contactor Panel (088L3441)

CONTACTOR PANEL - is primarily designed for snow and ice melting applications. All panels include a pre-wired UL listed NEMA 1 control, wiring diagram, terminal connection block, and two to four 3P pole contactors. Contactor panels must be used in conjunction with an automatic controller or thermostat.

- Low cost
- Simple installation
- NEMA 1, UL listed panel box
- Heat on- indicator light
- Pre-wired terminal connections

Max. Load Voltage:	600V
Max. Heating Load:	100/200A
Control wiring:	120V
Enclosure Type:	NEMA 1
Mounting:	Wall mounted, indoors
Dimensions (HxWxD):	10½" x 10½" x 6½" / 16½" x 16½" x 6½"
Warranty:	2 years

Ordering Information

Part No.	Description	Max. Load	Timer	No. of Contactors
088L3440	GX Timer Panel	100A	Yes	2
088L3441	GX Contactor Panel	100A	No	2
088L3442	GX Timer Panel	200A	Yes	4
088L3443	GX Contactor Panel	200A	No	4

*Contact factory for custom designed panels for larger residential and commercial applications.

WARMZONE
Premier Radiant Heating

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Draper, UT 84020
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Appendix H – Milwaukee Corridor Implementation Schedule

Activity	2015				2016				2017			
	1st QTR	2nd QTR	3rd QTR	4th QTR	1st QTR	2nd QTR	3rd QTR	4th QTR	1st QTR	2nd QTR	3rd QTR	4th QTR
Preliminary Survey	■											
Advanced Conceptual Design		■										
NEPA Clearance	■	■										
File Grant with FTA			■									
Bid A/E Services	■											
Award A/E Services	■	■										
A/E Conduct Survey			■									
Acquire Property/Easements			■	■	■							
A/E Complete Engineering			■	■	■							
Secure Construction Permits						■						
Bid Construction						■						
Award Construction							■					
Complete Construction and Testing								■	■	■		