Northwest Bus Rapid Transit

Preliminary Design Report

December 9, 2020

The City of OKLAHOMA CITY

OKLAHOMA CITY EMBARK

HNTB

Table of Contents

Abbreviations and Acronyms iv

1. General 1-1
- 1.1 Purpose and Scope 1-1
- 1.2 History 1-1
- 1.3 System Description 1-2
- 1.4 Alignment and Stations 1-2
- 1.5 BRT Vehicles 1-4
- 1.6 Standards and Codes 1-4
- 1.7 Project Goals 1-4

2. Urban Design – NW BRT Stations 2-1
- 2.1 NW BRT Stations 2-1
- 2.2 NW BRT Station Stop Siting 2-1
- 2.3 Final Alignment 2-2
- 2.4 Downtown Transit Center Circulation 2-5
- 2.5 Station Types 2-6
  - 2.5.1 Standard Station 2-6
  - 2.5.2 High Ridership Station 2-7
  - 2.5.3 Station Considerations & Modifications 2-8
- 2.6 Station Design Aspects 2-9
  - 2.6.1 Accessible Boarding/Deboarding 2-10
  - 2.6.2 Detectable Warning Material 2-10
  - 2.6.3 Shelter 2-10
  - 2.6.4 Custom Pylon and Informational Signage 2-10
  - 2.6.5 Lighting and Power 2-11
  - 2.6.6 Amenities 2-12
  - 2.6.7 Bus Pads 2-12
  - 2.6.8 Bus Pull-Outs 2-12
- 2.7 Stakeholder & Public Involvement 2-13
- 2.8 Branding 2-13
- 2.9 Neighborhood/District Identity 2-13

3. Civil Work 3-1
- 3.1 Survey Control System 3-1
  - 3.1.1 Survey Control 3-1
  - 3.1.2 Centerline 3-1
- 3.2 Drainage 3-1
- 3.3 Right-Of-Way 3-1
  - 3.3.1 Right-of-Way Transaction Types 3-1
  - 3.3.2 NW BRT Right-of-Way Takings 3-2
  - 3.3.3 Pedestrian Grade-Separated Crossings 3-2
- 3.4 Roadways 3-2
  - 3.4.1 Applicable Standards 3-2
  - 3.4.2 Guideway Improvements 3-3
  - 3.4.3 Intersection Site Distance (ISD) 3-4
  - 3.4.4 Bus Route Clearance 3-4
  - 3.4.5 Grading 3-7

3.4.6 Bicycle Facilities 3-7
3.4.7 Pedestrian Improvements 3-8
4. Urban Design – Potential Right-of-Way and Alignment Improvements 4-1
4.1 Goals and Criteria for Integrating Related Improvements 4-1
4.1.1 Street Trees and Landscaped Areas 4-1
4.1.2 Integration of Bicycle Facilities 4-1
4.1.3 Civil/Roadway 4-1
4.1.4 Downtown Streetscape 4-1
4.1.5 Plan Review Coordination 4-1
5. Utilities 5-1
5.1 Utilities 5-2
5.2 Public Utilities (Water, Sewer, Storm Drain) 5-2
5.2.1 Water Utilities 5-2
5.2.2 Sewer Utilities 5-2
5.2.3 Storm Drainage Facilities 5-3
5.3 Private (Third-Party) Utilities 5-3
5.3.1 General Information 5-3
5.3.2 Gas Lines (Oklahoma Natural Gas) 5-4
5.3.3 Street Lights and Traffic Signals 5-4
5.3.4 Parking Meters and Pay and Display Kiosks 5-4
5.3.5 Vaults and Basement Encroachments 5-4
5.3.6 Utility Design Drawings 5-4
6. Traffic 6-1
7. Structural 7-1
7.1 Applicable Codes and Standards 7-1
7.2 Structural Footing Design 7-2
7.3 Retaining Walls 7-2
7.4 Soils 7-2
8. Vehicles 8-1
8.1 Preliminary Operating Plan 8-1
8.2 Vehicle Technologies 8-1
8.3 Vehicle Procurement 8-2
9. Signal and Route Control 9-1
9.1 BRT Running Times 9-1
9.2 Transit Signal Priority (TSP) 9-1
10. Communications 10-1
10.1 Real-Time Arrival (RTA) Displays 10-1
10.2 Wayfinding Information 10-1
10.3 Fare Collection 10-1
10.4 Communications & Electrical 10-1
11. Safety and Security 11-1
11.1 Safety Management Policy Goals 11-1
12. Schedule 12-1
13. Preliminary Cost Estimate 13-1
13.1 Basis/Assumptions of Costs 13-1
13.2 Funding 13-1

14. Appendices 14-1

TABLES

TABLE 1: NW BRT PRELIMINARY STATION NAMES 2-1
TABLE 2: PRELIMINARY DESIGN STATION CONSIDERATIONS & MODIFICATIONS 2-8
TABLE 3: PEDESTRIAN & INTERSECTION IMPROVEMENTS 3-9
TABLE 4: UTILITY COORDINATION 5-1
TABLE 5: BRT PRELIMINARY OPERATING PLAN 8-1
TABLE 6: BRT PRELIMINARY RUNNING TIMES 9-1
TABLE 7: TSP EVALUATED SIGNAL LOCATIONS 9-2
TABLE 8: NW BRT PROJECT COSTS AND FUNDING SOURCES 13-1

FIGURES

FIGURE 1: NW BRT ALIGNMENT & STATION LOCATIONS 1-3
FIGURE 2: EMBARK STANDARD BUS - JULY 18, 2019 1-4
FIGURE 3: NW BRT ALIGNMENT* 2-4
FIGURE 4: SOUTHBOUND DOWNTOWN TRANSIT CENTER BRT STATION STOP 2-5
FIGURE 5: NORTHBOUND DOWNTOWN TRANSIT CENTER BRT STATION STOP 2-6
FIGURE 6: STANDARD STATION RENDERING 2-7
FIGURE 7: HIGH RIDERSHIP STATION RENDERING 2-8
FIGURE 8: RUB RAIL SWIFT BRT SEATTLE, WASHINGTON 2-10
FIGURE 9: CUSTOM PYLON FOR THE OKC STREETCAR 2-11
FIGURE 10: STANDARD STATION NIGHT RENDERING 2-12
FIGURE 11: NEIGHBORHOOD & DISTRICT IDENTITY 2-14
FIGURE 12: MAIN STREET & ROBINSON AVENUE AUTOTURN 3-5
FIGURE 13: 56TH STREET & INDEPENDENCE AVENUE AUTOTURN 3-6
FIGURE 14: BROADWAY AVENUE AND MAIN STREET AUTOTURN 3-7
FIGURE 15: CLASSEN BIKE LANE OPERATION 3-8
FIGURE 16: BIKE LANE OPERATION WITH SHELTER 3-8
FIGURE 17: MERIDIAN AVENUE MID-BLOCK CROSSING 3-10
FIGURE 18: SPECIAL ZONING DISTRICTS 4-2
FIGURE 19: TSP ROUTE PRIORITIES 9-4
FIGURE 20: NW BRT PROJECT SCHEDULE 12-1

Abbreviations and Acronyms

AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
APC	Automatic Passenger Counters
AVL	Automatic Vehicle Location
BCA	Benefit/Cost Analysis
BRT	Bus Rapid Transit
BUILD	Better Utilizing Investments to Leverage Development
CBD	Central Business District
CNG	Compressed Natural Gas
Concept Plan	NW Multimodal Transportation Corridor Concept Plan
COPTA	Central Oklahoma Transportation and Parking Authority
DCE	Documented Categorical Exclusion
DCM	Design Criteria Manual
FGP	Fixed Guideway Plan
ft	Foot
FHWA	Federal Highway Administration
FTA	Federal Transit Authority
in	Inch
IQC	Institute for Quality Communities
ISD	Intersection Site Distance
lbs	Pounds
m	Meter
MAPS 3	Metropolitan Area Projects Plan 3
MAPS 4	Metropolitan Area Projects Plan 4
mm	Millimeter
NEPA	National Environmental Policy Act
NW	Northwest
OCWUT	Oklahoma City Water Utilities Trust
ODOT	Oklahoma Department of Transportation
OG&E	Oklahoma Gas and Electric
OKC	Oklahoma City
PTASP	Public Transportation Agency Safety Plan
RTA	Real Time Arrival
SSCP	Safety and Security Certification Plan
SSMP	Safety and Security Management Plan
TIGER	Transportation Investment Generating Economic Recovery
TSP	Transit Signal Priority
TVM	Ticket Vending Machine

USDOT	United States Department of Transportation
VPN	Virtual Private Network

1. General

1.1 Purpose and Scope

The purpose of the Preliminary Design Report is to document the decisions and design criteria for the Northwest (NW) Bus Rapid Transit (BRT) project. This report covers the preliminary design phase of the NW BRT project up to 30% completion. The report utilizes recommendations based on the design team's experience and design criteria established by other BRT projects like Oklahoma City (OKC).

1.2 History

The NW BRT project will be Central Oklahoma's first BRT line and will provide a premium transit line to OKC residents with fast and frequent service, enhanced vehicles, stations, and passenger amenities. With the $28.4 million Santa Fe Intermodal Hub completed in 2017, and the $135 million OKC Streetcar completed in 2018, the NW BRT will be OKC's third major transit capital investment in the last five years. For the past decade, local planning efforts for the NW BRT have focused on developing a practical, cost-effective, and innovative multimodal project that introduces an enhanced regional transit connection between the highly populated area of northwest OKC, regional medical, office and commercial centers, and downtown via the NW Expressway and Classen Boulevard. The project will expand local and regional mobility options, improve job access and support transit-oriented development (TOD) along the corridor.

In 2005, the NW BRT project was conceptualized in the 2030 Fixed Guideway Plan (FGP). The FGP identified transportation solutions to improve connections and mobility within the OKC metropolitan area. The resulting vision identified several transit opportunities as part of the regional systems plan, including BRT on the Classen Boulevard and NW Expressway corridor, thus laying the foundation for a multimodal corridor connecting the northwest area to downtown. Factors considered in selecting the NW corridor included cost effectiveness, land use compatibility, and potential connections with other local transit.

The NW BRT was selected by the U.S. Department of Transportation (USDOT) in 2015 as one of five locations to beta test a framework that integrates public health principles into transportation corridor planning projects. As part of the beta test, EMBARK established an Advisory Focus Group and engaged stakeholders to identify goals that incorporated public health initiatives and transportation needs. The goals that were developed as part of this process include increased physical activity, improved access to health resources, improved air quality, expanded access for transportation-disadvantaged populations, and increased safety of non-motorized users. A technical assistance report was developed by the University of Oklahoma Institute for Quality Communities (IQC) for EMBARK. After the conclusion of the health-in-planning beta test, EMBARK was one of nine agencies selected by the Federal Transit Authority (FTA) and Smart Growth America for a TOD study assessment. The assessment was completed along the NW BRT corridor and included recommendations to foster private investment, enhance the pedestrian and bicycle infrastructure, and improve connectivity to support a future transit investment.

The 2017 NW Multimodal Transportation Corridor Concept Plan (Concept Plan) incorporated the findings and recommendations from the previous planning efforts and documented the next steps for implementation of the project. Community workshops were held to seek input on the Concept Plan and a technical assistance report was developed by the IQC for EMBARK. The technical report evaluated three high-priority intersections along the proposed BRT corridor that could support TOD and developed typical intersection station concepts.

In 2018 the NW BRT project was awarded $14.4 million in federal funding through the USDOT Better Utilizing Investments to Leverage Development (BUILD) discretionary grant program. Federal BUILD grant funding will pay for approximately 50% of the total project cost. The BUILD grant agreement between EMBARK and USDOT was executed on February 27th, 2020.

EMBARK initiated further advanced planning in 2018 that culminated in the NW BRT Project Definition Report. This report summarized the technical evaluation, public engagement process and design assumptions for the NW BRT project and was prepared to provide additional detail including alignment, operating plan, vehicle type, station amenities, station location and platform footprints, park-and-ride locations, pedestrian and bicycle infrastructure, signal upgrades, transit signal priority (TSP) measures, and guideway improvements including queue jump lanes and bus pull-outs. These improvements were evaluated by the FTA for the purpose of environmental review under the provisions of the National Environmental Policy Act (NEPA). The project received a documented Categorical Exclusion (DCE) from FTA on July 9, 2019. With the approved DCE, EMBARK procured a consultant for preliminary (Task 1) and final design (Task 2) in August 2019. Task 1-A kicked off in July 2019, and included alignment confirmation, pedestrian improvement evaluation, and a traffic study to determine the guideway improvements that would be carried into preliminary design. Task 1-B started in April 2020 and concluded with this Preliminary Design Report, 30% design plans and preliminary capital cost estimates. Final design is scheduled to be complete in early 2022. Construction will begin in mid-2022 and be complete in mid-2023. After driver training and system testing, revenue service is anticipated to begin in late 2023.

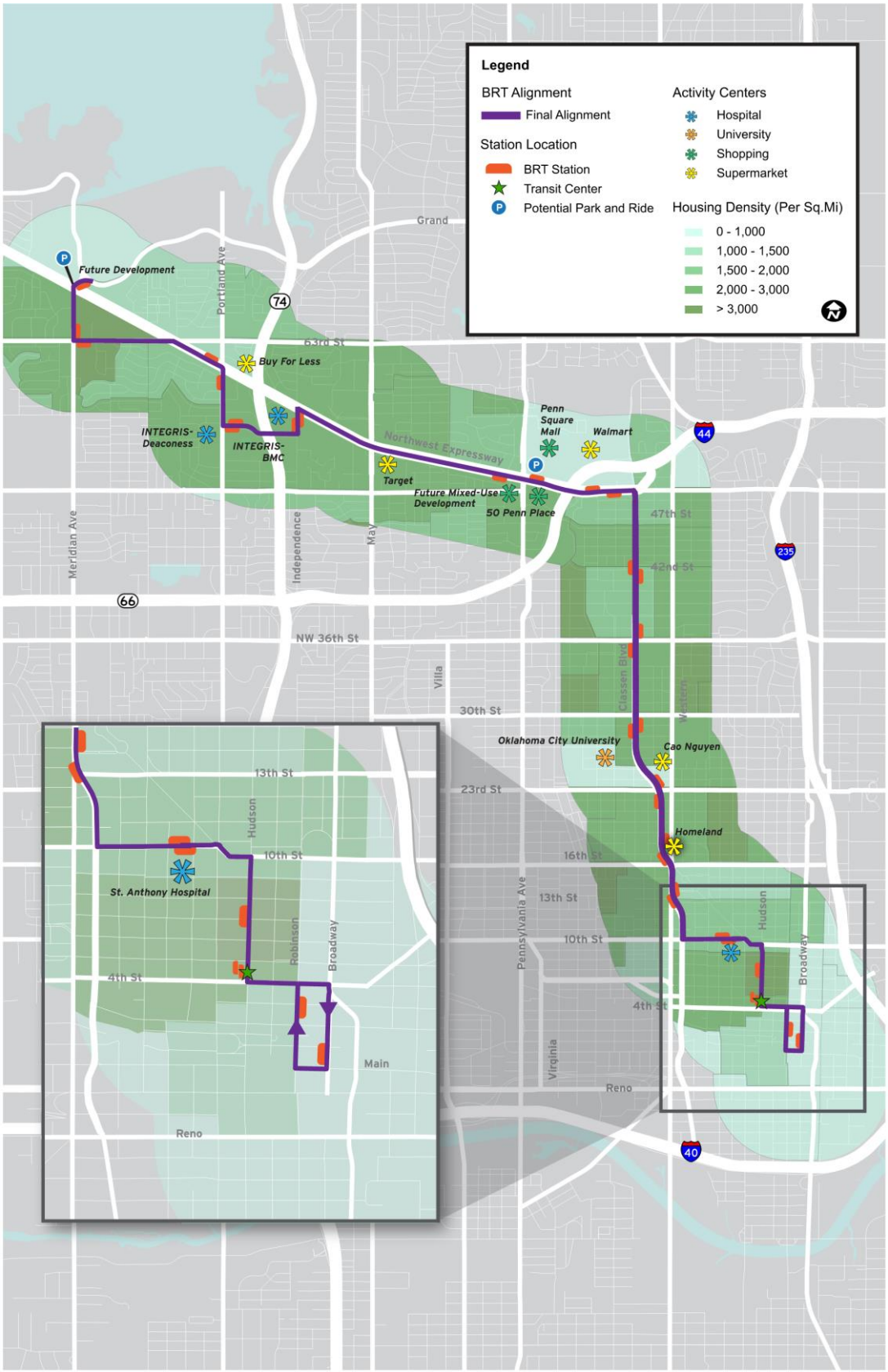
1.3 System Description

The NW BRT route is approximately eight miles in length (one-way) between downtown OKC and the Meridian Avenue/NW Expressway intersection just south of Lake Hefner. The route connects regional medical centers, commercial centers, the downtown central business district (CBD), and residents along Classen Boulevard and Northwest Expressway. The NW BRT system includes 32 branded stations each with a level-boarding platform, shelter, seating, pylon, real time arrival (RTA) display, ticket vending machine (TVM) for off-board fare collection, litter receptacle and at least one bike rack. All stations will be American Disabilities Act (ADA) accessible and have clear signage. The system will also include up to two park-and-ride facilities, traffic signal and infrastructure upgrades, and connected pedestrian and bicycle infrastructure. The NW BRT will include seven specialized BRT vehicles with two spares running in mixed traffic in all locations except along NW Expressway. All NW BRT stations along NW Expressway will have a bus pull-out for the safety of the bus, pedestrians, and transit customers.

1.4 Alignment and Stations

The NW BRT alignment, shown on the following page, will run mainly along the NW Expressway and Classen Boulevard. The NW BRT will come within a half-mile of more than 40,000 residents and approximately 91,000 jobs which is about 23% of OKC's employment base. The route serves three hospitals, major office complexes, emerging mixed-use centers, a regional mall, residential neighborhoods, and the downtown OKC regional employment center. Classen Boulevard will accommodate multiple modes including transit, vehicular, pedestrian, and bicycle connections.

Figure 1: NW BRT Alignment & Station Locations



1.5 BRT Vehicles

Most BRT systems use stylized vehicles that are distinct from the rest of the vehicles in the bus transit fleet. The NW BRT will feature 40' BRT vehicles that will be uniquely stylized and branded to convey its rapid service, stand apart from the rest of the EMBARK bus fleet, and provide vehicle and cabin amenities to improve the customer experience.

Figure 2: EMBARK standard bus - July 18, 2019

The NW BRT vehicles will use Compressed Natural Gas (CNG) to improve air quality. The nine vehicle BRT fleet accounts for seven vehicles operating during peak times with two spare vehicles providing a 20% spare ratio. The vehicles will have kneeling/leveling capabilities to support level boarding. They will also include on-vehicle technologies to support TSP including a TSP transceiver (installed after delivery).

1.6 Standards and Codes

The NW BRT will be designed using the latest design manuals and criteria. Specifications will be developed during final design to communicate requirements to the contractor for construction. The following criteria and guides were utilized for engineering design. In case of conflicts between the criteria, standards, codes, etc. the more stringent requirement will govern:

- American Association of State Highway and Transportation Officials (AASHTO), *Policy on Geometric Design of Highways and Streets* (2018)
- AASHTO, *Roadside Design Guide*, third edition (2011)
- AASHTO, *Roadway Lighting Design Guide*
- AASHTO, *Guide for Development of Bicycle Facilities* (2012)
- Federal Highway Administration (FHWA), *Manual on Uniform Traffic Control Devices* (2009)
- NW BRT *Design Criteria Document* (**Appendix B**)
- OKC Bike Standard Drawings (**Appendix I**)

1.7 Project Goals

The purpose of the NW BRT project is to provide a premium transit service to OKC residents through faster and more frequent service with enhanced vehicles, stations, and passenger amenities. The NW BRT will expand local and regional mobility options, improve job access, support TOD, and enhance livability along the NW corridor. This initial BRT line will set the stage for rapid bus service in OKC and help to lay the groundwork for future BRT routes throughout the region. The following project goals build on previous planning efforts including the 2005 FGP, 2017 Concept Plan, and 2018 BUILD Grant application:

- Provide a premium transit service with improved frequency, travel time and reliability.
- Increase ridership and mode share via a service that is comfortable, pleasant and easy to use.
- Improve access for users walking and bicycling to transit.
- Reduce or maintain traffic congestion levels.
- Support private investment as well as economic development, revitalization and land use redevelopment opportunities including TOD along the NW corridor.

- Coordinate BRT stations with other planned and programmed pedestrian and bicycle projects.
- Coordinate BRT improvements with other planned and programmed roadway projects.
- Minimize adverse impacts to existing businesses and industry.
- Support community vision for high capacity transit that connect the corridor's stops to districts and key developments.
- Enhance quality of life and livability.
- Improve the safety of all users of the system.
- Respect the character of the corridor, neighborhoods and adjacent land uses.

2. Urban Design – NW BRT Stations

2.1 NW BRT Stations

The NW BRT stations are identified by the nearest major cross street which will be clearly delineated on the station pylon. On average, individual stations or pairs are located one-half mile to one mile from the previous station or station pair. The northbound and southbound indication for each preliminary station name corresponds to the direction of bus travel on the NW BRT route. If a station has a southbound indication the bus is traveling towards the Central Business District and vise versus a northbound indication specifies that the bus is traveling towards the OKC Water Utilities Trust (OCWUT) Property on Meridian Avenue. Preliminary station names are shown in **Table 1**.

Table 1: NW BRT Preliminary Station Names

OCWUT Property Station
NW 63rd Street at North Meridian Avenue (NB & SB)
NW Expressway at North Portland Avenue (NB & SB)
NW 56th Street at North Portland Avenue (NB & SB)
NW 56th Street at North Independence Avenue (NB & SB)
NW Expressway at North Penn Avenue (NB & SB)
NW Expressway at North Blackwelder Avenue (NB & SB)
NW 42nd Street at North Classen Boulevard (NB & SB)
NW 36th Street at North Classen Boulevard (NB & SB)
NW 30th Street at North Classen Boulevard (NB & SB)
NW 23rd Street at North Classen Boulevard (NB & SB)
NW 18th Street at North Classen Boulevard (NB & SB)
NW 13th Street at North Classen Boulevard (NB & SB)
NW 10th Street at Dewey Avenue (NB & SB)
NW 8th Street at North Hudson Avenue (SB)
Downtown Transit Center Stations (NB & SB)
North Robinson Avenue at West Park Avenue (NB)
North Broadway Avenue at West Main Street (SB)

2.2 NW BRT Station Stop Siting

The NW BRT stations are spaced approximately every one-half mile to one mile along the route. The NW BRT will utilize curbside stations throughout the project. Median platforms were evaluated during early planning but were not recommended due to potential conflict points, adverse traffic impacts and construction costs. Documentation of that evaluation is included in **Appendix K**, the NW BRT Project Definition Report. Stations are generally located at major intersections. Where practical, NW BRT stations will be located on the far-side of signalized intersections in the direction of travel to achieve an overall shorter running time by reducing dwell time at traffic signals.

Locating stations on the far-side of intersections allows transit vehicles to clear intersections before stopping, supports transit signal priority (TSP) integration, improves overall travel time, and is considered safer for pedestrians crossing intersections behind transit vehicles. The benefits of TSP are reduced or eliminated when stations are placed near-side of signalized intersections as the priority achieved through

bus detection (green extension, red truncation, etc.) may be wasted when the bus dwells at the station for alighting and boarding passengers.

On NW Expressway, there are few gaps in traffic of adequate size for the bus to merge back into traffic safely from the bus pull-off due to the high volume of daily vehicles. While speeds are lower near congested intersections, gaps are tighter when congestion is present on the near-side of intersections. In some situations, the bus may be required to wait through an entire signal cycle to merge back with traffic. Near-side stations prevent effective use of a queue jump lane because the adjacent queue of through traffic would already be discharging from the stop bar by the time the bus was ready to depart from the near-side stop. Instead of receiving a "jump" on the queue of traffic in the adjacent through lanes, the bus would be required to merge with it.

Along the corridor, there are some NW BRT stations located at mid-block or further from an intersection to provide more convenient access to major activity or employment centers. These locations have been evaluated and determined to be ideal for increased ridership.

2.3 Final Alignment

The final alignment (shown in **Figure 3** on page 15) is generally consistent with the 2017 Concept Plan and 2018 NW BRT BUILD Grant application with a few minor modifications including an extended alignment to connect to the downtown core, more efficient routing through Midtown and a more direct connection to the INTEGRIS and Deaconess hospitals. These modifications were based on discussions with stakeholders, the public, and balance the potential to better serve customers with minimal impact on the overall route running time. The alignment was refined during the project definition phase and finalized early in preliminary design (Task 1-A). The alignment refinements for each segment are summarized below:

- **Downtown Routing and Terminus:** The initial downtown route terminus was located at the existing Downtown Transit Center at 4th Street and N Hudson Avenue. During the project definition phase, it was determined that the route needed to extend further south to provide direct access to the central business district in downtown Oklahoma City. The recommended downtown routing captures additional employment and entertainment in the center of downtown via a one-seat ride. This extended route adds ten additional minutes round trip or five minutes in each direction and additional operating costs. The Downtown Transit Center is nearly one-half mile from the downtown employment core which is beyond the acceptable walking distance for most transit users. The route extension to the downtown core is considered an acceptable tradeoff between market penetration and operating cost. The recommended downtown route will run clockwise from 4th Street to N Broadway Avenue to W Main Street to N Robinson Avenue and back to 4th Street. The clockwise routing was selected to reduce the number of left turns. The route includes a stop at the Downton Transit Center in both the inbound and outbound directions and will be the layover location for the route on the outbound trip. There is a future extension option south along W Reno Avenue and EK Gaylord Boulevard to connect the BRT to the Santa Fe Intermodal Hub Station. This future extension provides direct access to major activity centers including the new OKC Convention Center, Chesapeake Energy Arena, and Myriad Botanical Gardens as well as additional bus routes, the OKC Streetcar, Amtrak, and future commuter rail services.
- **Downtown to/from Classen Boulevard:** The recommended route accesses Classen Boulevard from the Downtown Transit Center using Hudson Avenue to NW 10th Street to Classen Boulevard. The recommended alignment provides a direct connection to St. Anthony Hospital's main entrance which is the largest employer in Midtown. Safe and convenient access from the BRT station to the main entrance was important to the hospital to serve workers and patients.
- **Classen Boulevard at NW Expressway:** An evaluation of the BRT alignment identified the left turn from Classen Boulevard to NW Expressway as the key bottleneck along the route. Several alternatives were considered and during the Project Prioritization Workshop on January 16, 2020 a dedicated bus-only left turn queue jump was selected to minimize disruption to the BRT running

times. The right turn lane along Classen Boulevard will drop for general purpose traffic and become a bus-only lane at the intersection. The traffic signal will be modified to include a phase for a bus-only left turn from the existing outside right lane along Classen Boulevard into the existing outside right lane on NW Expressway.

- **NW Expressway at Independence Avenue to Portland Avenue via NW 56th Street:** The recommended alignment includes a deviation from NW Expressway to N Independence Avenue, 56th Street and N Portland Avenue to provide stations at INTEGRIS and Deaconess Hospitals. Other alignment alternatives were considered during the process, including an initial north deviation along N May Avenue, United Founders Boulevard and Mosteller. The United Founders Boulevard alignment provides access to some employment and large multi-family developments, but the recommended alignment provides more direct access to INTEGRIS and Deaconess Hospitals, the largest employment and activity centers outside of downtown. INTEGRIS merged with Deaconess in 2018 which further increases the need to provide a connection to serve employees and patients. At the INTEGRIS stakeholder meeting, hospital officials noted the need for convenient transportation options between the hospitals and medical office buildings. They also noted that convenient BRT service would be attractive to hospital employees, patients and visitors. INTEGRIS/Deaconess is a regional draw and one of the benefits of the BRT is that it would also provide visitors convenient access to restaurants, entertainment and service destinations along the route. This deviation adds approximately three minutes in each direction but also avoids potential delays and schedule uncertainty at the SH 74 and NW Expressway interchange.

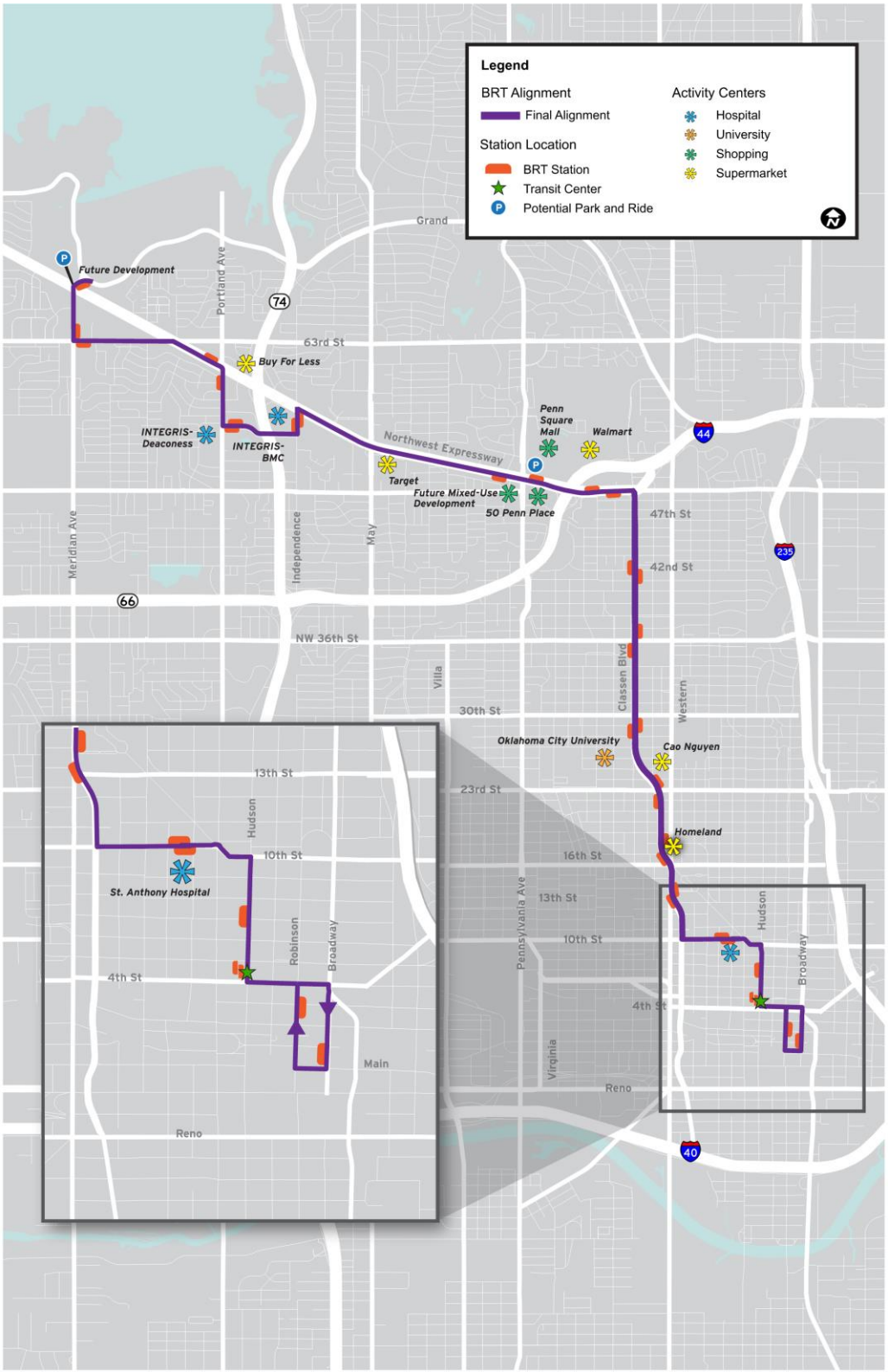
- **NW Expressway at 63rd Street and Terminus:** The recommended alignment includes a deviation from NW Expressway to NW 63rd Street to N Meridian Avenue and places the end of the line at the existing parking lot on the OCWUT Property. This alignment provides more direct and safer access for the apartments and higher-density residential area on NW 63rd Street. A direct route on NW Expressway in this segment would provide faster service, however, it does not provide convenient access to the transit market. Layovers will occur at the park-and-ride terminus at N Meridian Avenue and NW Expressway.

The downtown route extension and the two route deviations from NW Expressway add a total of ten minutes to the overall running time in each direction.

- Downtown extension from the Downtown Transit Center to Main and Broadway adds five minutes in each direction.
- The INTEGRIS/Deaconess loop from NW Expressway to Independence, 56th Street and Portland Avenue adds three minutes in each direction.
- The end of line alignment from NW Expressway to 63rd Street and Meridian Avenue adds two minutes in both directions.

The additional time required by the final recommended route alignment increases the BRT vehicle requirement by one, thus increasing operating costs. However, the recommended alignment provides better access to key transit markets, employment, and activity centers increasing ridership potential.

*Figure 3: NW BRT Alignment**

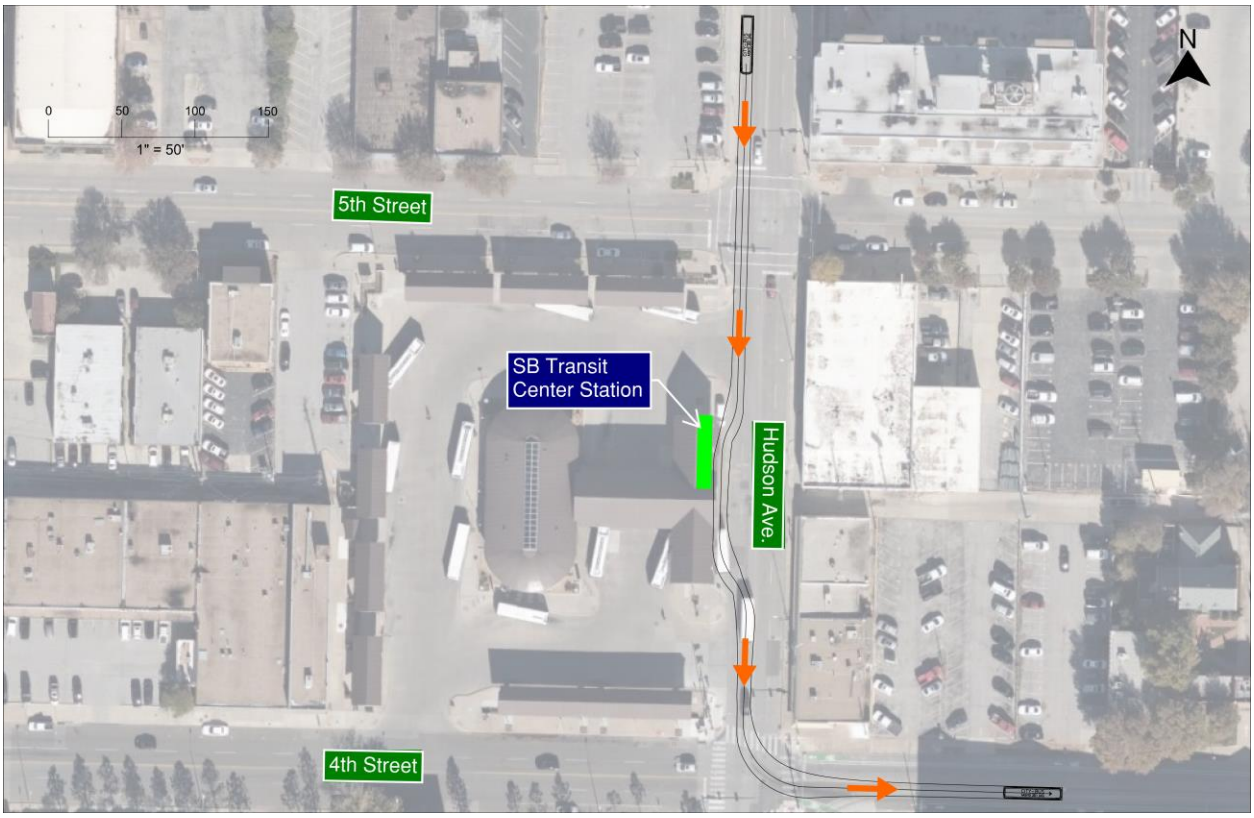


*See preliminary design plans in **Appendix L** for detailed station locations.

2.4 Downtown Transit Center Circulation

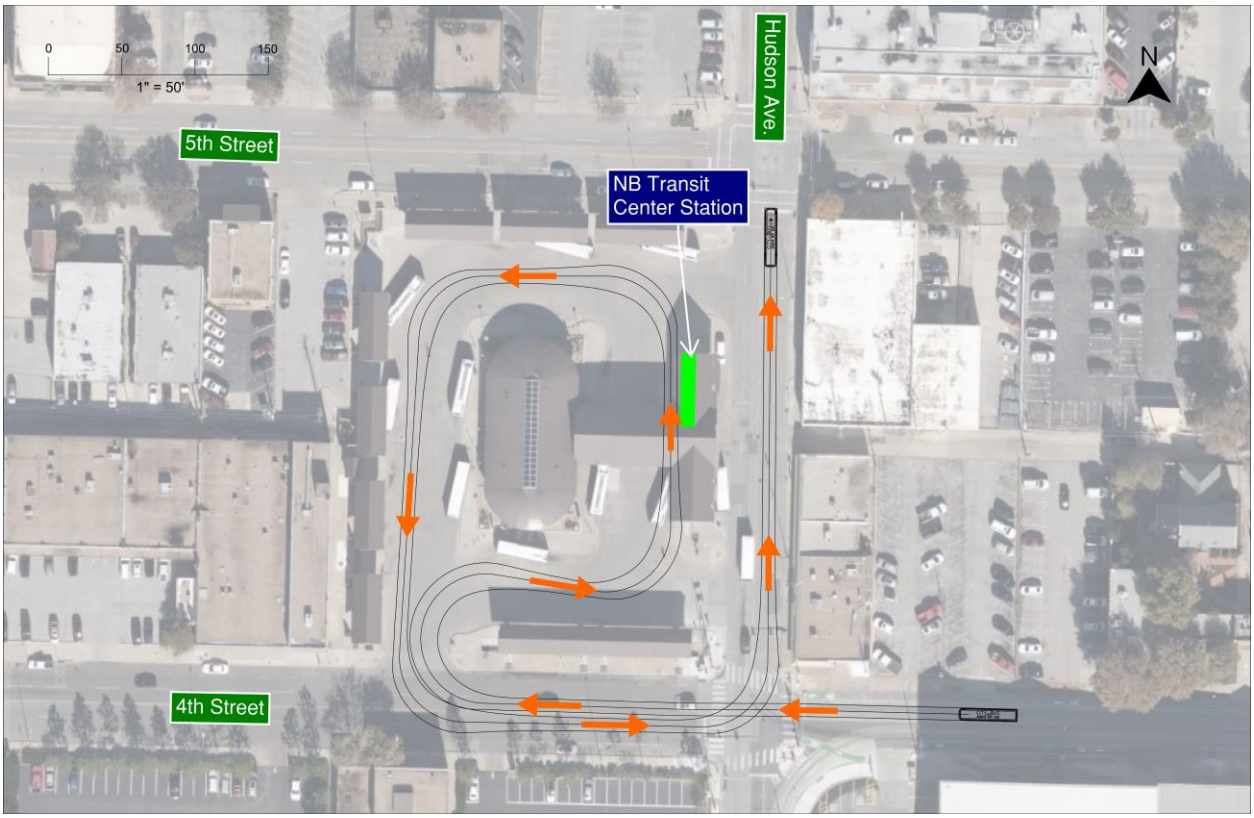
The NW BRT service will have two stops located at the Downtown Transit Center on 4th Street and Hudson Avenue in downtown OKC. The recommendation for the southbound station is to utilize the existing eastern bay along the west curb of Hudson. This will require a reassignment of bus bays but allows quick and easy access for the BRT vehicle to stop at the Downtown Transit Center without formally entering the complex. Upon exit, the bus will be required to cross one lane of traffic on Hudson to position for the left turn onto 4th Street. The distance from the northeastern bay to the stop bar on Hudson is approximately 160 feet. This BRT southbound stop would not require additional running time. The southbound recommendation and bus circulation are shown below in **Figure 4**.

Figure 4: Southbound Downtown Transit Center BRT Station Stop



The recommendation for the northbound BRT station is to utilize the adjoining bay next to the southbound BRT station. After EMBARK performed a field analysis with an existing bus, the final recommended route proceeds as follows. The bus will proceed straight along 4th street with a right turn into the southern entrance of the Downtown Transit Center. Upon entrance to the Transit Center, the bus will continue the right turn movement towards the Eastern bays. The bus will turn left to approach the Northern bay along the Eastern side of the Downtown Transit Center. To exit the bay the bus will proceed north and turn left twice to circulate within the Downtown Transit Center. At 4th Street the bus will turn left out of the Downtown Transit Center and continue straight to the 4th and Hudson intersection. The bus will then make a left onto Hudson Avenue to travel northbound along the BRT alignment. The northbound stop recommendation would increase running times by approximately one minute. The northbound BRT stop is displayed below in **Figure 5.**

Figure 5: Northbound Downtown Transit Center BRT Station Stop



2.5 Station Types

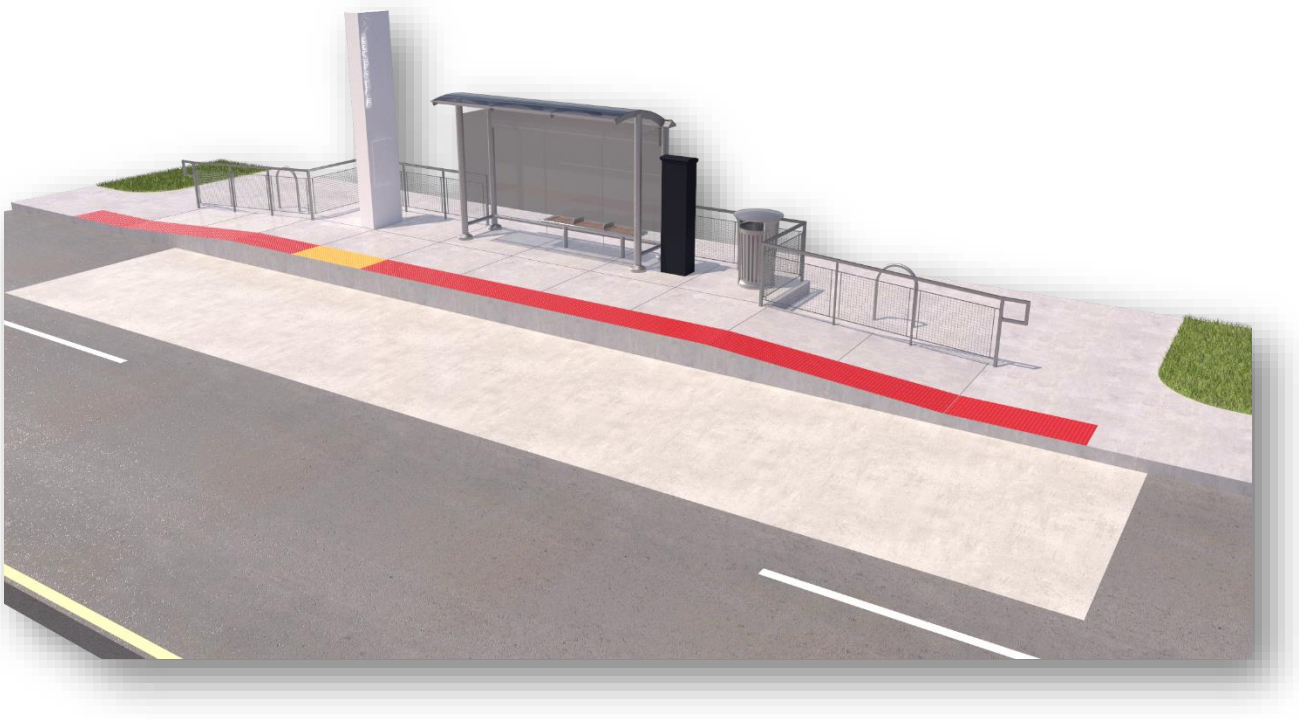
High amenity, modern stations will be constructed for the NW BRT. These high visibility, uniquely branded stations will include a shelter, level boarding platform, station pylon, RTA display, TVM for off-board fare collection, bicycle parking, seating, litter receptacle and ADA accommodations. The NW BRT project includes two types of station designs:

- **Standard Station:** Single shelter with a total station footprint of 10’ by 30’.
- **High Ridership Station:** Single large shelter with a total station footprint of 10’ by 42’.

2.5.1 Standard Station

The standard station will include level boarding with ADA access on each side of the raised platform. A standard shelter (approximately 11’ long) will be provided. The station platform, with a height of 13.75” above street level, will include ramps at each end that provide access to the level boarding area of the station. The platform will accommodate a 5’x8’ loading zone and a tactile warning strip, along the platform loading areas and down each ramp. The ADA loading area will be marked with a yellow truncated dome to provide a berthing location for the driver to know where to align the front door of the bus. There will be an additional 5’ truncated area located past the ramp to provide shared service to non-BRT fleet buses at a standard curb height. Passenger amenities include an RTA display, seating, TVM, litter receptacle and bike parking. A standard station rendering is shown in **Figure 6**.

Figure 6: Standard Station Rendering



2.5.2 High Ridership Station

The high ridership station will include level boarding with ADA access on each side of the raised platform. In addition, a larger shelter (approximately 22’ long) and more seating will be provided as well as the standard BRT passenger amenities including RTA display, TVM, litter receptacle, and bicycle parking. The platform will have a height of 13.75” above street level with ramps at each end to provide access to the level boarding area of the station. The platform will accommodate a 5’x8’ loading zone and a tactile warning strip, along the platform loading areas and down each ramp. The ADA loading zone will be marked with a yellow tactile warning strip to inform the bus driver where to align the front door of the bus. There will be an additional 5’ truncated area located past the ramp to provide shared service to non-BRT fleet buses at a standard curb height. The high ridership station rendering is shown in **Figure 7**.

Figure 7: High Ridership Station Rendering

2.5.3 Station Considerations & Modifications

During preliminary design, several considerations were factored in to design each station location. The key considerations included evaluation of existing ADA conditions, utility coordination, station type, and station modifications. Depending on the topography, impact to properties and other limiting factors, some station modifications were required along the route. These considerations and modifications are outlined in **Table 2** below.

Table 2: Preliminary Design Station Considerations & Modifications

Station Name	Direction	Station Type	Station Modification(s)
OCWUT Property Station	Turnaround	High Ridership	None
Meridian Avenue & 63rd Street	NB	Standard	1 Bike Rack
Meridian Avenue & 63rd Street	SB	Standard	1 Bike Rack
Portland & NW Expressway	NB	Standard	None
Portland & NW Expressway	SB	Standard	No Sidewalk Behind
56th Street & Portland Avenue	SB	Standard	None
56th Street & Portland Avenue	NB	Standard	None
Independence Avenue & NW Expressway	NB	Standard	None
Independence Avenue & NW Expressway	SB	Standard	None

NW Expressway & Penn Avenue	SB	Standard	None
NW Expressway & Penn Avenue	NB	Standard	None
NW Expressway & Blackwelder Avenue	SB	Standard	None
NW Expressway & Blackwelder Avenue	NB	Standard	None
Classen Boulevard & 42nd Street	NB	Standard	None
Classen Boulevard & 42nd Street	SB	Standard	1 Bike Rack
Classen Boulevard & 36th Street	NB	Standard	None
Classen Boulevard & 36th Street	SB	Standard	None
Classen Boulevard & 30th Street	NB	Standard	None
Classen Boulevard & 30th Street	SB	Standard	1 Bike Rack
Classen Boulevard & 23rd Street	NB	High Ridership	None
Classen Boulevard & 23rd Street	SB	High Ridership	None
Classen Boulevard & 18th Street	NB	Standard	1 Bike Rack
Classen Boulevard & 18th Street	SB	Standard	ADA Ramp on South Side of Station & No Bike Racks
Classen Boulevard & 13th Street	NB	Standard	None
Classen Boulevard & 13th Street	SB	Standard	None
10th Street & Dewey Ave.	SB	Standard	ADA Ramp on East Side of Station & 1 Bike Rack
10th Street & Dewey Ave.	NB	Standard	None
Hudson Avenue & 8th Street	SB	Standard	1 Bike Rack
Hudson **Ave. & 4th Street at the Downtown Transit** Center	NB	Transit Center	None
Hudson Ave. & 4th Street at the Downtown Transit Center	SB	Transit Center	None
Broadway Avenue & Main Street	SB	Standard	None
Robinson Avenue & Park Avenue	NB	Standard	None

2.6 Station Design Aspects

Civil infrastructure improvements are required to help the operational efficiency of the BRT service. These improvements provide the infrastructure needed for the bus to operate reliably and allow safe pedestrian connections from the station to the nearest intersection. The design criteria and assumptions can be found in **Appendix B**.

2.6.1 Accessible Boarding/Deboarding

To provide safe and efficient boarding, the station platform will be enhanced with level boarding. For the BRT to operate with ADA compliant level boarding there must be a maximum 3" horizontal gap and ½" vertical gap between the platform and the floor of the transit vehicle. To ensure precision of the bus docking at the station platform, a 2" guide strip (rub rail) will be provided at each NW BRT station through the full length of the level boarding curb. In addition, a gap filler will be attached to the front door of the bus to help minimize the gap between the bus and the platform. To ensure ADA boarding compliance bus operators will be trained on how to pull up correctly to the platform.

Figure 8: Rub Rail Swift BRT Seattle, Washington

2.6.2 Detectable Warning Material

The NW BRT stations will all include ADA-compliant detectable warning strips along the boarding platform, the ramps on either side of the platform, and an additional 5' for shared bus stop boarding. The warning strips will be 24" wide. The ADA warning strips will match the OKC Streetcar red color to keep all transit modes consistent. Additionally, a 5' yellow section of warning strip will be added as a berthing location to guide the bus drivers to the correct location for ADA boarding.

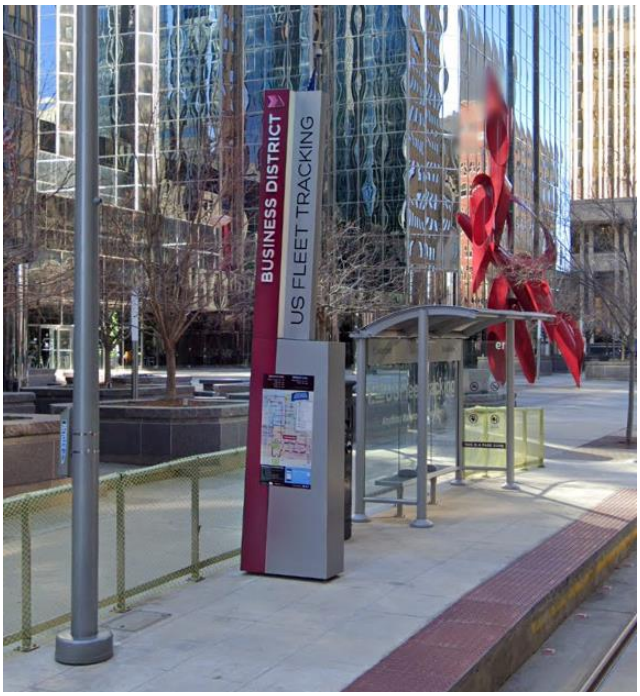
2.6.3 Shelter

Station platforms will include a standard shelter (approximately 11' long) for the standard station type and a larger shelter (approximately 22' long) for the high ridership station locations. The shelters will have glazed window screens on all three sides to keep the shelters consistent across EMBARK's network. These shelters will be approved by the City of OKC and EMBARK and be similar in nature to shelters used for the OKC Streetcar. Conceptual drawings and renderings of the typical stops are shown in **Appendix L.**

2.6.4 Custom Pylon and Informational Signage

Each platform will include a custom pylon with the station stop name and NW BRT branding. The pylon will be clearly visible and serve as a wayfinding tool for pedestrians. The pylon will be equipped with an RTA display to inform customers when the next bus will be arriving. The pylon will be a similar size and scale to the OKC Streetcar pylon shown in **Figure 9** but will include a custom design that reflects the NW BRT branding.

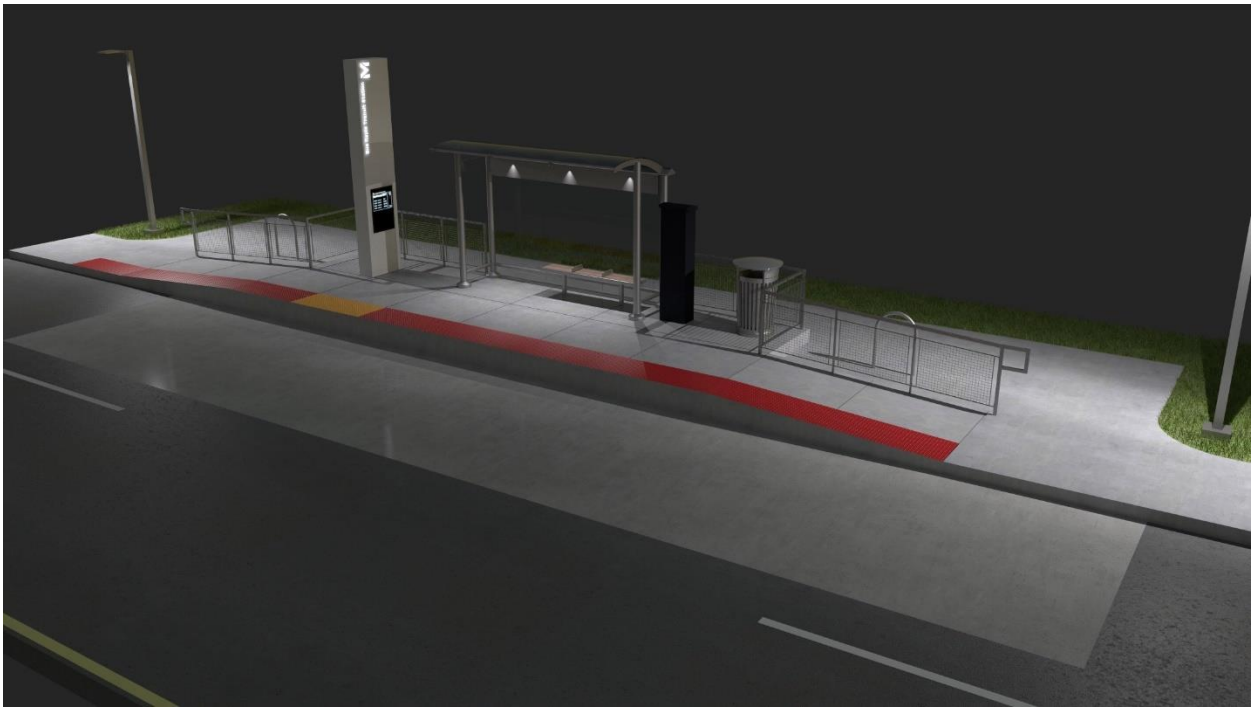
Figure 9: Custom Pylon for the OKC Streetcar



2.6.5 Lighting and Power

Lighting is an important aspect of BRT projects because providing a safe and well-lit station creates a safer space for users and encourages ridership. Adequate lighting for each station will be provided from the shelter, the pylon, and two nearby pedestrian light poles. Lighting will cover the platform ramps, shelter, and sidewalk behind the shelter. A nighttime rendering for the standard station is provided in **Figure 10**.

Figure 10: Standard Station Night Rendering



2.6.6 Amenities

Station amenities will be included at station locations for high ridership and standard station types. Due to constraints at certain station locations, amenities have been modified to limit right-of-way or utility impacts. These changes are included in the 30% plan sheets shown in **Appendix L**. The full list of amenities are as follows:

- Custom pylon with wayfinding information
- RTA display
- Shelter with seating
- ADA compliant slopes and boarding space
- Level boarding curb
- Handrail with safety mesh
- TVM
- Litter receptacle
- Bike racks (accommodates 2 bikes per rack)
- Station and pedestrian lighting
- Additional 5’ standard curb height boarding area for shared stations with non-BRT buses

2.6.7 Bus Pads

Bus pads will be constructed at each station to ensure a level and long-lasting pavement section for the bus to stop at each station. The proposed size of each bus pad is 52’ long by 9’ wide made from 10” concrete pavement with mesh fiber reinforcement. Below the concrete will be 12” of well-graded aggregate base. The bus pads will help maintain roadway quality due to the frequent deceleration, acceleration, and dwelling of the buses at each station.

2.6.8 Bus Pull-Outs

Bus pull-outs will be provided for stations located along NW Expressway. The pull-out is 12’ wide and of adequate length to allow the bus to safely pull over and stop at the station before accelerating and merging back into existing traffic. The bus pull-out will be 8” thick asphalt pavement to match the existing

pavement along NW Expressway. Striping will be added to each bus pull-out clearly delineating the pavement as use for buses and not general traffic.

2.7 Stakeholder & Public Involvement

The NW BRT project hosted a public meeting in February 2019 as a part of the project definition phase. Feedback received from the public meeting was incorporated into the alignment and station locations as appropriate. During the preliminary design phase, EMBARK met with property and business owners at each station location to begin the right-of-way process and gain buy-in for the project. The next public meeting will be held after the preliminary design report is adopted and approved in early 2021.

Ongoing stakeholder and public involvement will be an important aspect of this project particularly for the OCWUT property at the end of the line. There may be opportunities for an enhanced BRT station, additional amenities, and TOD with the development planned for that location. Additionally, Penn Central is an approved 17-acre mixed-use development on the southwest corner of Pennsylvania Avenue and NW Expressway. The development includes a hotel, theater, shops, offices and apartments. Both developments offer great opportunities for BRT customers and coordination through final design will be ongoing.

2.8 Branding

Unique branding of the BRT allows agencies to give the service a distinct identity as a premium service to customers. EMBARK will procure a consultant to develop a BRT brand. It is anticipated that the consultant will be selected by December 31, 2020. The brand development work and ensuing focused message strategy that will follow this selection will drive decisions related to the positioning and promotion of this new system and route. The brand will be critical to the development of the naming and logo that will represent this and future BRT routes.

AERO BRT, Tulsa, OK

The branding strategy will include developing the name of the service, messaging strategy, and vehicle branding. The new brand will be incorporated into the vehicles, stations, and marketing of the BRT route. The messaging and branding strategy are intended to generate awareness about the BRT and make it desirable for future customers. The focus of the branding is to retain existing transit customers and attract new ones. The AERO logo, shown to the right, is the brand for the Tulsa, OK BRT. The “AERO” name is a nod to Tulsa’s Art Deco architectural influences, the aerospace industry, and a direct reflection of the fast and efficient service BRT provides. The NW BRT brand will be incorporated in this BRT route and future routes throughout Oklahoma City.

2.9 Neighborhood/District Identity

Similar to the OKC Streetcar, station names may offer the opportunity for sponsorship or other distinguishing characteristics as part of the station name. This may include neighborhoods, district or sponsor names that could be reflected in the station architecture. The NW BRT route travels through several distinct districts and while it will be important to include universal branding, some districts may desire unique aesthetic to the station design that conforms with surrounding character. Districts along the NW BRT route include:

- City Center/Downtown
- Midtown
- Plaza District
- Uptown 23rd
- Asian District
- Western Avenue

Although neighborhood identity will be considered, individual aesthetics should not deter from the BRT brand nor require additional maintenance. Any logos, graphics, or special aesthetic will need to withstand the test of time and be widely recognizable to add to pedestrian wayfinding. As a part of the branding process, EMBARK and their consultant will utilize neighborhood identities, stakeholder outreach and a variety of public involvement or focus groups as appropriate to develop the brand. Images of district identities that could be incorporated into final design are shown in **Figure 11**. Coordination with each of these districts was discussed between HNTB and the project team and notes from this meeting can be found in **Appendix D**.

Figure 11: Neighborhood & District Identity

3. Civil Work

3.1 Survey Control System

3.1.1 Survey Control

Survey elevations will be referenced to the City of OKC survey monuments utilizing Oklahoma State Plane Coordinate System, North Zone, NAD 83, NAVD88. Topographic survey will be performed in accordance with the Instruction Manual for Topographic and Planimetric Mapping as adopted by the Oklahoma State Board of Licensure of Professional Engineers and Land Surveyors. Topographic survey will be collected utilizing mobile based LiDAR and conventional surveying methods.

3.1.2 Centerline

No centerline will be established for the project. Station locations will be set using northing and easting callouts and elevations based on the surveyed information.

3.2 Drainage

The additional impervious pavement added with the BRT stations and bus pull-outs is likely not going to significantly impact existing storm drainage systems. The existing systems will be evaluated and, if required, will be updated. In a few locations existing storm drain inlets will need to be relocated due to new bus pull-outs or station constraints. These new inlets will be designed to collect runoff from the 10-year frequency storm when on grade, and 50-year frequency in sag locations, while accommodating the 100-year storm overflow. Cross-drain structures will be designed to pass the requirements of the 50-year frequency storm.

3.3 Right-Of-Way

3.3.1 Right-of-Way Transaction Types

Property transactions should be directed by right-of-way specialists and/or city legal counsel. Right-of-way types and takings are described below.

Fee Ownership/Exclusive Right-of-Way

Fee ownership is a condition where ownership of property is purchased for project-related facilities and the right-of-way is used exclusively by NW BRT. For portions of new facilities that extend from public rights-of-way (for example, corner clips), fee purchase is desirable.

Joint Use of Public Right-of-Way

Joint use of public right-of-way is a condition in which the NW BRT facilities are constructed in the public right-of-way. Existing and future facilities such as sidewalks, gas lines, water lines, and sewers not necessarily related to the NW BRT Project could also be contained in a portion of the same public right-of-way. Joint use of public right-of-way will always be the first type of right-of-way considered for the NW BRT Project.

Permanent Easement

Permanent easement right-of-way is a condition in which ownership of the property is held in fee by others, and an easement or right to occupy a certain limited portion of the property, usually for a specified use, is acquired from the fee owner.

Construction Easement

Construction easement right-of-way is a condition in which a temporary easement or short-term lease is acquired from the fee owner. A construction easement provides enough space to allow for the use of the property by the contractor during construction. This easement usually terminates soon after the completion of construction.

Utility Easement

Utility easement right-of-way is a condition in which ownership of the property is held in fee by others and an easement or right to install and maintain utilities, either underground or overhead, on a certain limited portion of the property, is acquired from the fee owner.

3.3.2 NW BRT Right-of-Way Takings

Preliminary right-of-way acquisitions were evaluated throughout the preliminary design process. Station and guideway improvements were designed within right-of-way limits when possible. In order to evaluate right-of-way procurement, two categories were utilized, which classified the purchase as essential or for future use.

- Essential – right-of-way purchase required to build the station
- Future use – additional right-of-way required for future 12' multi-use path behind the station along northbound and southbound Classen Boulevard

In areas along the proposed multi-use path, an additional seven feet behind the 6' sidewalk, located at the back of each station platform, will be required. For the preliminary design, essential and future right-of-way costs are included in the cost estimate located in **Appendix A**. The 30% plan sheets show the proposed right-of-way takings for future use to demonstrate the maximum taking.

3.3.3 Pedestrian Grade-Separated Crossings

During the Task 1-A of preliminary design, grade separated crossings over NW Expressway were evaluated for feasibility and cost. At the project prioritization workshop, it was determined that the crossings would not be built with the NW BRT project, but right-of-way would be purchased so they could be constructed if desired in the future. The pedestrian grade-separated crossings locations are:

- Penn Square Mall & 50 Penn Place
- Independence Avenue & NW Expressway (INTEGRIS/Deaconess hospital)

Using preliminary layouts of these potential grade-separated crossings with adequate ADA accessibility, it was determined that no right-of-way acquisition would be required. Both locations have adequate existing right-of-way to construct the crossings.

3.4 Roadways

3.4.1 Applicable Standards

The bus pull-outs, stations, ADA ramps and all roadway design will follow the standards and codes set forth in this document. In cases where the City design standards conflict with other published standards, the City design standards will govern.

- AASHTO, *Policy on Geometric Design of Highways and Streets* (2018)
- AASHTO, *Roadside Design Guide*, third edition (2011)
- AASHTO, *Roadway Lighting Design Guide* (2018)
- AASHTO, *Guide for Development of Bicycle Facilitie*s (2012)
- AASHTO, *Guide for Pavement Des*ign (1993)

- FHWA, *Manual on Uniform Traffic Control Devices for Streets and Highways* (MUTCD) (2009)
- ODOT, *Design and Engineering Manual* (1992)
- ODOT, Standard Specifications for Highway and Structures (2019)
- ODOT, Standard Drawings (2019)
- NW BRT *Design Criteria Document* (**Appendix B**)
- Oklahoma City Bicycle Infrastructure Standard Drawings (**Appendix I**)
- Oklahoma City Paving Standard Drawings

3.4.2 Guideway Improvements

The NW BRT will connect the northwest area of Oklahoma City to downtown along the NW Expressway and Classen Boulevard. The NW BRT will be curb-running in mixed traffic along Classen Boulevard and will have bus pull-outs at stations along NW Expressway.

3.4.2.1 Bus Queue Jumps

There are three proposed bus queue jumps in the current operating plan. One dedicated left turn at the intersection of NW Expressway and Classen and two at the NW Expressway and Pennsylvania intersection.

The bus-only queue jump at NW Expressway & Classen will operate as a transit-only phase left turn. The BRT vehicle will stay in the righthand curb lane when headed on its outbound trip approaching NW Expressway. This lane will become a dedicated lane for the BRT. Once the bus is detected at the intersection it will trigger a dedicated transit only left turn phase where all other traffic is stopped, and the bus can proceed through the intersection into the righthand curb lane of the NW Expressway. There will be a checkout detector to end the transit only phase or it will time out after a predetermined clearance time. There are several conflicts which could occur with this dedicated phase including vehicles entering the dedicated bus lane, southbound vehicles making a right turn or other traffic blocking the intersection. Signing and striping will be used to limit traffic blocking the intersection and discourage the use of the dedicated bus lane. These conflicts also have a low likelihood and severity of collision associated with these errors. The southbound right turn is a potentially more serious conflict and to mitigate this a no right turn on red blank out sign will be installed for the movement.

The two queue jumps at NW Expressway and Pennsylvania have been added to the project due to the proposed nearside stops now being shifted an additional 12’ to allow for future lanes. During a safety test, EMBARK discovered an ideal length of 300’ to allow the bus to pull back into traffic along NW Expressway from a bus pull-out. Due to the existing constraints at NW Expressway and Pennsylvania, this length could not be accommodated so a bus queue jump was the safest solution to allow the BRT to rejoin traffic and stay on schedule.

The outbound bus will operate with the BRT vehicle exiting the bus pull-out and entering the existing right turn bay. Once in the turn bay they activate the signal for a right-turn and queue jump phase. This phase would trigger just before the through movement and allow the BRT vehicle to pass through the intersection and get into the righthand curb lane ahead of the remaining through traffic. A checkout detector would be utilized to ensure the BRT vehicle has cleared the intersection before through traffic is released. The conflicting right turn movements would have a no right turn on red blank out sign.

The inbound bus will operate with the BRT vehicle exiting the bus pull-out and entering the additional bus-only pavement, built to accommodate the future lanes. Once in the bus-only lane at the intersection they activate the signal for a queue jump phase. This phase would trigger just before the through movement and allow the BRT vehicle to pass through the intersection and get into the righthand curb lane ahead of the remaining through traffic. A checkout detector would be utilized to ensure the BRT vehicle has cleared the intersection before through traffic is released. To avoid a potential conflict with right turns from the adjacent lane, right turn movements would have a no right turn on red blank out sign.

3.4.2.2 Bus Pull-outs

Bus pull-outs reduce vehicular delay on NW Expressway by moving the BRT out of travel lanes and eliminating an impedance while the BRT dwells at each station. The pull-out will be designed as an additional 12' lane and provide approximately 300' length for the bus to accelerate back into traffic. The bus pull-out locations are as follows:

- NW Expressway at North Blackwelder Avenue (NB & SB)
- NW Expressway at North Penn Avenue (NB & SB)
- NW Expressway at North Portland Avenue (NB)
- OCWUT Property Station

To allow for safe movement from the bus pull-outs back into traffic along NW Expressway, the signal upstream of the station will trigger a detector which would call a special phase to change the signal to only allow the eastbound and westbound left turns to have a green. This will provide a gap for the BRT vehicle to exit the bus pull-out safely without conflicting traffic. A checkout detector would be utilized to turn off the phase or signal that the bus was able to exit without utilizing the phase and releasing the hold. Additionally, no right turn on red blank out signs would be used at the cross streets. Bus pull-out preliminary design layouts are shown in the preliminary design sheets in **Appendix L.**

3.4.3 Intersection Site Distance (ISD)

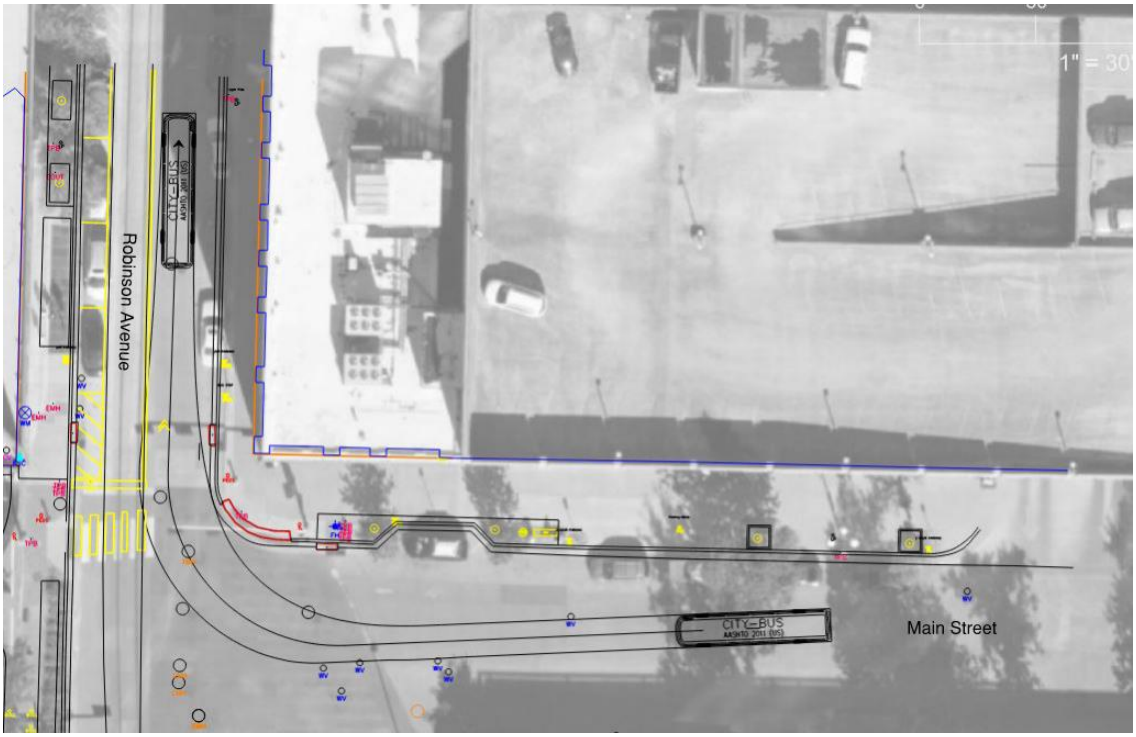
ISD is the unobstructed and continuous visual distance required for a driver to detect an unexpected or otherwise difficult-to-perceive hazard in a roadway allowing the driver to turn right or left safely. The City of OKC provided HNTB with ISD evaluation criteria to use for each location. The criteria are based on roadway speed and slopes which yield a specific site triangle length. The length is plotted on the roadway to determine if vehicles can safely make their turning movement without obstructions in the site line. Several station locations had pylon and shelter conflicts with the site line for drivers. Adjustments were made at all but one of these station locations to eliminate the conflict. A design exception was allowed at the southbound 23rd Street and Classen station because there is an existing bus stop within the site line and the conflict is with a minimally used one-way exit from a private business. ISD exhibits and meeting minutes made can be found in **Appendix G** of this report.

3.4.4 Bus Route Clearance

After the final alignment was confirmed and approved, the route was analyzed with AutoTURN software to determine if additional infrastructure improvements were needed along the route. This evaluation consisted of utilizing the standard 40' bus template in AutoTURN software and driving the final alignment in both directions. Through this analysis three intersections were identified as locations that needed minor striping adjustments for the bus to turn safely.

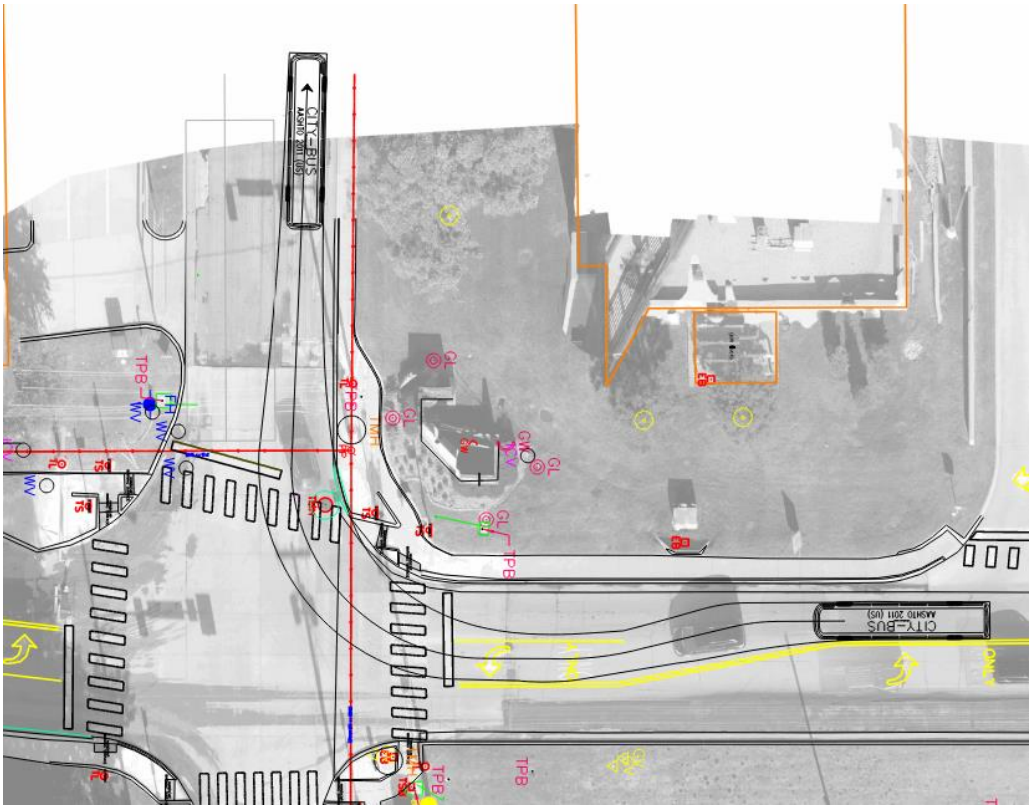
1. W Main St. and N Robinson Ave.
    a. The BRT bus route turns right from W Main St. to N Robinson Ave. In this location, for the bus to not encroach into oncoming traffic, the first parking space along N Robinson Ave. will need to be striped out.

Figure 12: Main Street & Robinson Avenue AutoTURN



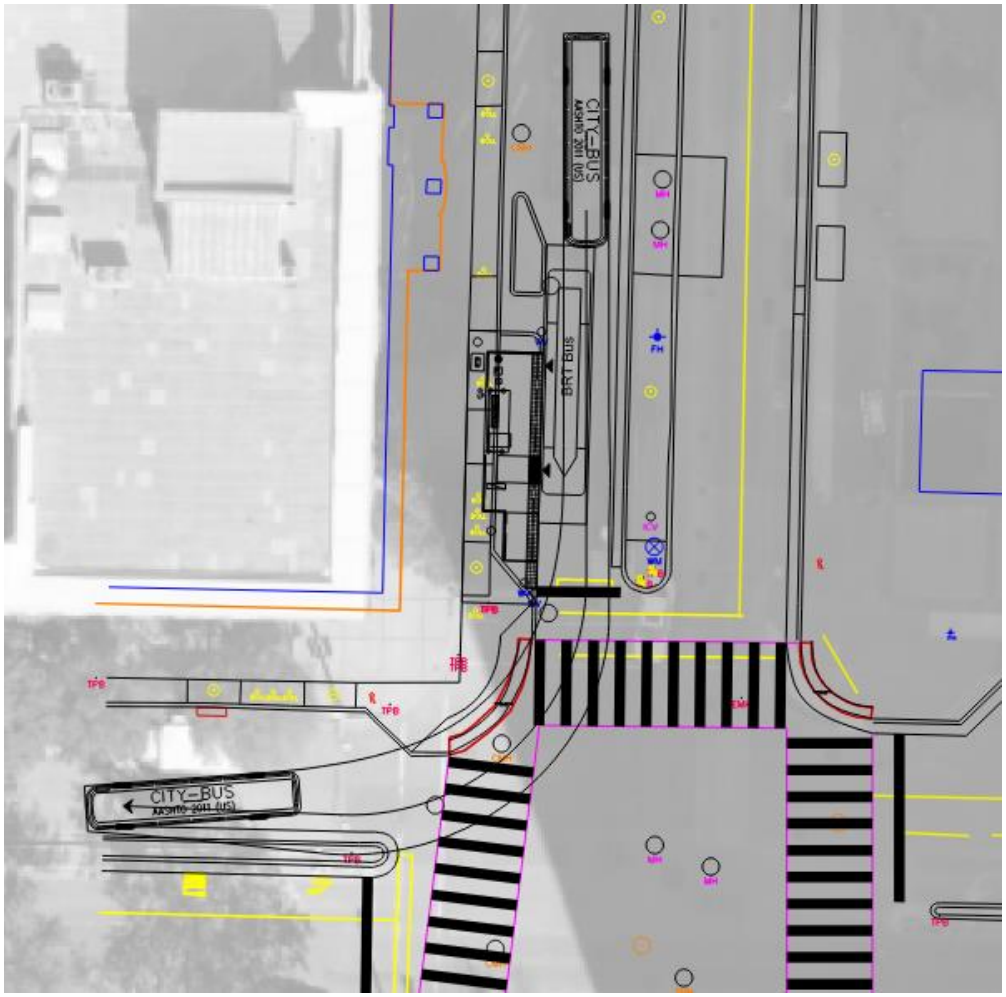
2. NW 56th St. and N Independence Ave.
    a. The BRT bus route turns right from N Independence Ave. to NW 56th St. This right turn currently presents challenges for the EMBARK bus system as is evident by tire marks on the existing curb. EMBARK performed a field analysis of this location and determined that a standard 40' bus cannot make this turn if there is a car in the left turn queue along NW 56th St. In order to mitigate this right turn conflict point, the NW BRT project will shift the westbound NW 56th St. stop bar approximately 25' to the west. This will allow all buses to make this turn safely and still keep the stop bar to the east of the business entrance along NW 56th St.

Figure 13: 56th Street & Independence Avenue AutoTURN



3. Broadway Avenue and Main Street
    a. Recent improvements have been completed at the Broadway Avenue and Main Street intersection including a new ADA ramp on the Northwest corner of the intersection. This new return now presents a conflict point with the BRT bus route. Solutions to this location will be determined with final design but there are two options for mitigating the conflict. First is to reconstruct the curb return and ADA ramp to closely match the bus turning path and update the P180 curb return to current standards while accommodating the bus turning movement. Oklahoma state law prohibits any parking within 20' from the pedestrian crossing. The second option is to shift the eastbound Main Street stop bar approximately 30' and remove a portion of the existing median allowing the bus to turn without encroaching into oncoming traffic.

Figure 14: Broadway Avenue and Main Street AutoTURN



3.4.5 Grading

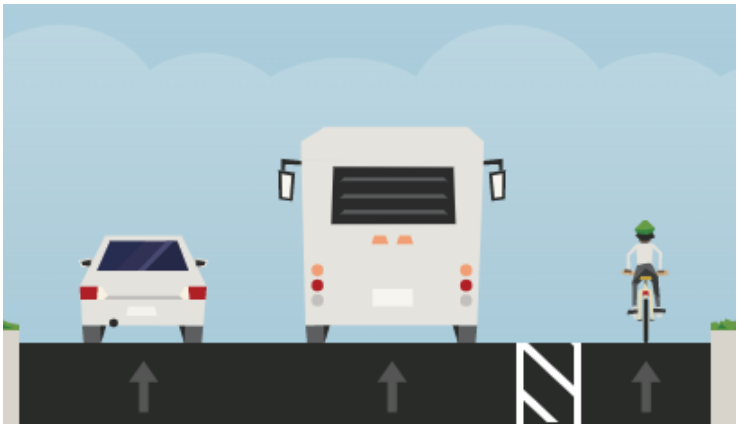
Grading for the bus pull-outs and stations will be detailed during final design. The areas will be cleared and grubbed, and unsuitable material shall be removed. An erosion and sediment control plan will be created and included in the final plans for contractor use to protect the areas under construction.

Along the roadway a maximum 3:1 slope will be utilized with this project. 4:1 slopes will be used as the standard grade and 3:1 utilized only if required to mitigate impacts to property or additional right-of-way acquisition.

3.4.6 Bicycle Facilities

A bike lane connection will be provided from 10th Street to 16th Street on Classen Boulevard in the existing outside lane in the northbound and southbound directions as shown in **Figure 15.**

Figure 15: Classen Bike Lane Operation



Source: Made with Streetmix

The station platforms will be placed in the existing outside lane with the bike lane routed behind. The bus will use the adjacent lane in mixed traffic to dwell and pick up passengers. This operation is shown in **Figure 16**.

Figure 16: Bike Lane Operation with Shelter

Source: Made with Streetmix

The bike lane will connect to a future bike lane between 4th Street and 10th Street on Classen being designed by others. The connection from 10th to 16th provided by the NW BRT project will help merge the gap between the 4th Street project and the existing bike lane that begins at 16th Street and Western Avenue on Classen. OKC *Bike Standards* used to design the bike lane for this stage of the project can be found in **Appendix I.**

In addition, it was requested that project team evaluate the need to purchase additional right-of-way behind stations for a potential future multi-use path on Classen Boulevard between 10th Street and NW Expressway. Right-of-way is included in the preliminary cost estimate shown in **Appendix A**. Bike parking will be provided for most standard and high ridership stations.

3.4.7 Pedestrian Improvements

Pedestrian and ADA improvements will be provided from the station to the nearest intersection. Intersections that are not currently meeting ADA standards will be updated with newly constructed ADA ramps, pedestrian push buttons, and striping.

3.4.7.1 Intersection Improvements

Several intersections along the NW BRT route require ADA ramp improvements and updated crosswalk striping. Updating ADA ramps in many locations also requires new pedestrian poles, audible push buttons, and pedestrian signal heads. These updates will provide safer and improved means for pedestrians to access and cross intersections nearest to the BRT stop locations. HNTB performed a preliminary ADA field evaluation to determine which locations along the route were not ADA compliant. Locations were deemed non-compliant if the intersection did not meet the latest ADA ramp slope requirements, did not have updated pedestrian audible push buttons, or lacked crosswalk striping. All planned pedestrian improvements to intersections are shown in the preliminary design plan sheets in **Appendix L**. A list of all the necessary pedestrian improvements is shown in **Table 3.**

City of OKC Public Works ADA Curb Ramp standard drawings will be utilized for the curb ramp design. In areas where the City's criteria cannot be met, Public Right-of-Way Accessibility Guidelines will be met. Detectable warning placement, type and color will be included per City standards.

Sidewalks will be designed at a 1.5% standard cross slope. Criteria requires sidewalks to not exceed 2% per ADA guidance. Designing the sidewalk at 1.5% allows some flexibility for the contractor to slightly exceed the design but still meet ADA accessibility requirements.

Table 3: Pedestrian & Intersection Improvements

Station Name	Direction	Existing ADA Evaluation	Pedestrian Poles	New Signal	Pedestrian Push Buttons	ADA Ramps
OCWUT Property Station	Turnaround	Compliant	-	-	-	-
Meridian Avenue & 63rd Street	NB	Compliant	-	-	-	-
Meridian Avenue & 63rd Street	SB	Compliant	-	-	-	-
Portland & NW Expressway	NB	Non-Compliant	-	-	-	6
Portland & NW Expressway	SB	Non-Compliant	7	-	8	4
56th Street & Portland Avenue	SB	Non-Compliant	1	1	3	3
56th Street & Portland Avenue	NB	Non-Compliant	-	-	-	3
Independence Avenue & NW Expressway	NB	Compliant	-	-	-	-
Independence Avenue & NW Expressway	SB	Compliant	-	-	-	-
NW Expressway & Penn Avenue	SB	Non-Compliant	-	-	-	2
NW Expressway & Penn Avenue	NB	Non-Compliant	3	-	4	3
NW Expressway & Blackwelder Avenue	SB	Non-Compliant	-	-	-	5
NW Expressway & Blackwelder Avenue	NB	Non-Compliant	6	-	8	5
Classen Boulevard & 42nd Street	NB	Non-Compliant	-	-	-	4
Classen Boulevard & 42nd Street	SB	Non-Compliant	-	-	2	4
Classen Boulevard & 36th Street	NB	Compliant	-	-	-	-
Classen Boulevard & 36th Street	SB	Compliant	-	-	-	-
Classen Boulevard & 30th Street	NB	Compliant	-	-	-	-
Classen Boulevard & 30th Street	SB	Compliant	-	-	-	1

Classen Boulevard & 23rd Street	NB	Non-Compliant	-	-	-	4
Classen Boulevard & 23rd Street	SB	Non-Compliant	-	-	-	6
Classen Boulevard & 18th Street	NB	Compliant	-	-	-	
Classen Boulevard & 18th Street	SB	Non-Compliant	-	-	-	2
Classen Boulevard & 13th Street	NB	Compliant	-	-	-	-
Classen Boulevard & 13th Street	SB	Compliant	-	-	-	2
10th Street & Dewey Ave.	SB	Compliant	-	-	-	-
10th Street & Dewey Ave.	NB	Compliant	-	-	-	-
Hudson Avenue & 8th Street	SB	Compliant	-	-	-	-
Hudson Ave. & 4th Street at the Downtown Transit Center	NB	Compliant	-	-	-	-
Hudson Ave. & 4th Street at the Downtown Transit Center	SB	Compliant	-	-	-	-
Broadway Avenue & Main Street	SB	Non-Compliant	-	-	8	1
Robinson Avenue & Park Avenue	NB	Compliant	-	-	-	-

3.4.7.2 Mid-Block Crossing

A new, mid-block pedestrian crossing along Classen Boulevard between 42nd Street and 43rd Street is proposed with this project. The proposed crossing would be like the signalized pedestrian crossing along Meridian Avenue between 52nd Street and 53rd Street shown in **Figure 17**.

Figure 17: Meridian Avenue Mid-Block Crossing

The proposed signal will be a 2-stage crossing with red, yellow, and green signal heads for vehicular traffic, audible pedestrian push buttons and signals on the outside and median of Classen, and updated pedestrian crosswalk striping. This pedestrian crossing is an important connection to the NewView facility on the northwest side of Classen Boulevard and 42nd Street. NewView is a non-profit organization focused on assisting those with blind and vision impairments to provide rehabilitation services, employment opportunities, and community engagement activities. With no existing signal to allow for safe access to cross Classen at the 42nd Street BRT stops, this mid-block crossing is critical for the safety of the customers.

4. Urban Design – Potential Right-of-Way and Alignment Improvements

4.1 Goals and Criteria for Integrating Related Improvements

This project will coordinate the alignment, infrastructure improvements, and station locations with other improvements or redevelopment projects along the route.

4.1.1 Street Trees and Landscaped Areas

There is a desire to limit the impact to existing trees and landscaping where possible. The final plans will include notes to 'Do Not Disturb' existing landscaping. In cases where trees need to be removed, additional trees will be added with the project. The tree types and species will be coordinated with the City's Planning and Parks and Recreation Departments. Stations located within the Project 180 footprint in downtown will follow the guidelines established for that project as it relates to landscaping.

4.1.2 Integration of Bicycle Facilities

This project will coordinate with any planned bicycle facility improvements as outlined in OKC's bikewalkOKC plan. Additionally, this project will include striping of a new bicycle facility along Classen Boulevard from 10th Street to 16th Street northbound and southbound. This new facility will flow behind the new BRT stations at 13th Street and Classen and create a multi-modal facility for the community. The latest Bicycle Standards from OKC will be utilized for design.

4.1.3 Civil/Roadway

The civil design work for this project will utilize the latest design guides, standards and codes outlined in Section 3.4.1. These documents will guide the design to develop a set of construction plans that meet the latest safety measures and create a transformational project for customers.

4.1.4 Downtown Streetscape

To the extent possible, the stations located within the limits of Project 180 will follow the guidelines established for that project. This includes but, is not limited to, landscaping, ADA improvements, district identity, and sidewalk connections. There is a desire to continue creating a downtown OKC that is beautiful, vibrant and safe for users and residents alike. Five essential goals that downtown streetscape must achieve have been identified as follows:

1. Enhance the identity of downtown and its districts
2. Provide for safe and efficient movement
3. Ensure people of all ages and abilities can access downtown streets
4. Create an attractive, comfortable, and inviting atmosphere
5. Promote sidewalk activity and economic vitality

4.1.5 Plan Review Coordination

The NW BRT alignment transects several OKC special zoning districts. HNTB and EMBARK staff will coordinate with the City of OKC on all required design reviews during the final design process. A map of the special zoning districts is shown in **Figure 18** with the NW BRT route shown in pink.

- Urban Design Overlay District
  - Asian
  - Requires Urban Design Commission review – mixed zoning
- Urban Conservation Zoning Overlay District [UCD]
  - Gatewood (Classen is eastern limit)

    - Special Zoning Regulations Required
- Historic Preservation Zoning District [HP]
    - Heritage Hills (Classen is western limit)
    - Requires Historic Preservation Commission review
- Downtown Transitional District [DTD-1/A2] (Classen is western limit)
    - Requires Downtown Design Committee review
- Cottage District [DTD-1]
    - Requires Urban Design Commission review
- Downtown Business District [DBD]
    - Requires Downtown Design Committee review

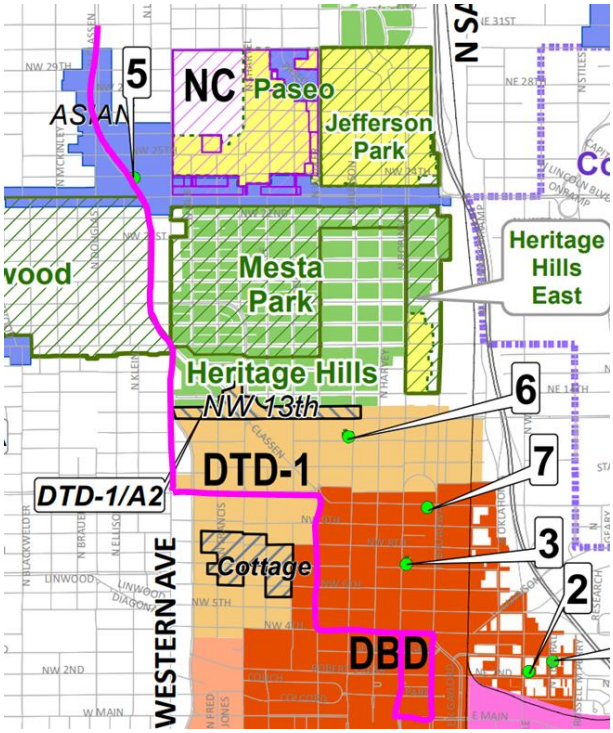


Figure 18: Special Zoning Districts

5. Utilities

The City of OKC is responsible for the utility coordination of this project. There was a preliminary kickoff meeting with representatives from the City of OKC, EMBARK, the Consultant, and local utility companies (AT&T, Cox Communications, Oklahoma Natural Gas and Oklahoma Gas & Electric) held on August 31, 2020 to discuss utilities located at each preliminary station location. The City will be performing pothole investigations to determine exact location depth of potential utility conflicts along the route. Potential utility conflicts that were noted in the coordination meeting are shown in **Table 4**.

Table 4: Utility Coordination

Station Name	Direction	Utility Coordination
OCWUT Property Station	Turnaround	Power Pole, Communication Line
Meridian Avenue & 63rd Street	NB	Overhead Powerlines, Gas Line
Meridian Avenue & 63rd Street	SB	Curb Inlet
Portland & NW Expressway	NB	High-Pressure Pipeline
Portland & NW Expressway	SB	Power Pole, High-Pressure Gas Main,
56th Street & Portland Avenue	SB	Communication Lines, Power Pole Transformer, Gas Line
56th Street & Portland Avenue	NB	Overhead Powerlines, Underground Fiber, Poly Distribution Main
Independence Avenue & NW Expressway	NB	Storm Sewer Line, Waterline, Gas Main, Fiber
Independence Avenue & NW Expressway	SB	Fiber, Underground Electrical Line, Gas Line
NW Expressway & Penn Avenue	SB	Light Pole, Inlets, Fiber, Manholes, Street Light Pole
NW Expressway & Penn Avenue	NB	Communication Line/Box, Light Poles, Pullbox Box
NW Expressway & Blackwelder Avenue	SB	Overhead Powerlines
NW Expressway & Blackwelder Avenue	NB	Drainage Ditch, Pullbox Box, Gas Main, Underground Electrical Line, Manholes
Classen Boulevard & 42nd Street	NB	Waterline, Fiber
Classen Boulevard & 42nd Street	SB	Waterline, Do Not Disturb Gas Line, Fiber
Classen Boulevard & 36th Street	NB	Waterline
Classen Boulevard & 36th Street	SB	Waterline, Do Not Disturb Gas Line
Classen Boulevard & 30th Street	NB	Pull box & Electrical Lines, Waterline, Water Meter
Classen Boulevard & 30th Street	SB	-
Classen Boulevard & 23rd Street	NB	-
Classen Boulevard & 23rd Street	SB	Waterline
Classen Boulevard & 18th Street	NB	-

Classen Boulevard & 18th Street	SB	-
Classen Boulevard & 13th Street	NB	Adjust Storm Sewer Manhole, Sanitary Sewer Line, Storm Sewer Line, Overhead Powerlines, Gas Utility Easement
Classen Boulevard & 13th Street	SB	Storm Sewer Line, Electrical Lines, Copper
10th Street & Dewey Ave.	SB	Light Pole, Pullbox, Communication Line, Storm Sewer Line, Do Not Disturb Manhole, Underground Electrical Lines, Copper Fiber, Gas Line
10th Street & Dewey Ave.	NB	Pull box, Electrical Line, Light Pole, Communication Line, Copper Fiber
Hudson Avenue & 8th Street	SB	Waterline, Gas Poly Main
Hudson Ave. & 4th Street at the Downtown Transit Center	NB	-
Hudson Ave. & 4th Street at the Downtown Transit Center	SB	-
Broadway Avenue & Main Street	SB	Communication Line, Electrical Lines, Duct Bank, AT&T Conduit, Gas Line
Robinson Avenue & Park Avenue	NB	Electrical Utilities, Water Utilities, Gas Line, Steel Distribution Main, Duct Bank, Underground Electrical Lines

5.1 Utilities

The objective of preconstruction activities is to ensure that pertinent utility information is obtained, properly incorporated into the design process, and shown on construction plans. Information will include owner, type, size, material (if available), location, and existing right-of-way of all existing and proposed utility facilities impacted by the NW BRT Project construction, and the disposition of existing and proposed facilities within any properties to be acquired. Age of facilities is a benefit if data is available.

5.2 Public Utilities (Water, Sewer, Storm Drain)

5.2.1 Water Utilities

Water line modifications will be coordinated with the OCWUT and will conform to City standards, codes, and standard details. Water line modifications will accommodate station construction as follows:

- Water mains under stations (perpendicular or parallel) will be evaluated if they need replacing or casing. The casing design should consider requirements of OCWUT or be designed specifically for the crossing configuration. The lines are to remain in service during construction to the greatest extent possible. This will require an offset alignment with two tapping sleeves, valves, and multiple fittings.
- Fire hydrants in conflict with stop locations will be relocated as part of the project. Relocations will be designed in consultation with OCWUT and OKC Fire Department, with consideration given to local standards for fire hydrant placement and pressure/flow requirements.
- Water valves in conflict with the station locations will be relocated or vertically adjusted to the finished grade.

5.2.2 Sewer Utilities

Sewer line modifications will be coordinated with the OCWUT and should conform to City standards, codes, and standard details. Sewer line modifications will be made to accommodate NW BRT station construction as follows:

- Sewer lines under stations (parallel or perpendicular) will not be considered in conflict and will be left in place subject to verification of vertical clearance of the pipe with the station slab and subgrade.
- Sewer lines found to be too shallow will be brought to the attention of OCWUT for further discussion of options. Replacement of these shallow lines is not included in the NW BRT Project or its budget.
- Manholes in conflict with the station will be modified as necessary or replaced with larger structures to allow placement of frame and cover to a location outside the station.
- Brick sewer lines crossing the stations will be evaluated for condition to determine whether rehabilitation or replacement is appropriate. In some cases, an underground reinforced concrete bridge can be designed over the brick sewer.

The condition of each sewer line in proximity to the stations should be inspected by City maintenance crews using video inspection techniques, if desired, during the design phase to assess the existing condition of the pipes. If there are older pipes that are in disrepair or determined to be at the end of their service life, then some pipe replacement or strengthening methods will be accommodated. Sewer lines found to be too shallow will be brought to the attention of OCWUT for further discussion of options.

5.2.3 Storm Drainage Facilities

Storm drainage system modifications will be coordinated with the City's DPW and should conform to City standards, codes, and standard details. Storm drainage system modifications will be made to NW BRT construction as follows:

- Storm sewer lines under stations (parallel or perpendicular) will not be considered in conflict and will be left in place subject to verification of vertical clearance of the pipe with the station and subgrade.
- Storm sewer lines found to be too shallow will be brought to the attention of DPW for further discussion of options.
- Manholes will be modified as necessary or replaced with larger structures to allow placement of frame and cover to a location outside the edge of the station.
- Storm sewer inlets in conflict with the stations will be relocated or modified to meet the finished grade.
- Brick storm sewer lines crossing the stations will be evaluated for condition to determine whether rehabilitation or replacement as part of the project is appropriate. In some cases, an underground reinforced concrete bridge can be designed over the brick sewer.

The condition of each storm sewer line in proximity to the stations should be inspected by City maintenance crews using video inspection techniques, if desired, during the design phase to assess the existing condition of the pipes. If there are older pipes that are in disrepair or determined to be at the end of their service life, then some pipe replacement or strengthening methods may be accommodated. Storm sewer lines found to be too shallow will be brought to the attention of DPW for further discussion of options.

5.3 Private (Third-Party) Utilities

5.3.1 General Information

OKC has prior rights to the use of public rights-of-way, including statutory rights-of-way, rights-of-way that were platted prior to a private utility installation, or dedicated to the City prior to a private utility installation. In these situations, the prior right of the City provides domain over the right-of-way, and private utilities can locate within these areas with the permission of the City. Therefore, private utilities must relocate or modify their facilities at the request of the City, at their own expense.

Some utility companies may have a prior right to the use of public right-of-way if they had obtained a private utility easement outside of the statutory right-of-way prior to the dedication or platting of additional

right-of-way covering the same area as the private utility easement. In these situations, the City is required to reimburse the utility company for any modifications or relocations of private utilities resulting from City improvement projects impacting that utility. In some cases, a franchise agreement between the City and a private utility company may provide alternative conditions to the previously stated prior rights of the City. These agreements should be reviewed and confirmed by the City attorney.

In general, the project will be located within rights-of-way that are either statutory or platted prior to the installation of private utilities and the City maintains the prior right. The project design will be coordinated with design and construction of impacted private utilities, and private utility work will be performed in accordance with a utility relocation agreement between the utility companies and the City, to be developed during the design phase. Relocation designs performed by the third-party utilities should be reviewed with the City's Project representatives prior to implementation, for approval of concept and level of detail, and for coordination with streetcar facility installation schedules.
The following general guidance will apply to all third-party utilities:

- Some utilities may be known to be too shallow, but also excessively expensive to modify or relocate. These will be considered on a case-by-case basis for possible solutions to reinforce the station above the utility to protect it.
- Modification of manhole or vault access risers, frames and covers will be at the expense of the utility company (subject to the franchise agreements).

5.3.2 Gas Lines (Oklahoma Natural Gas)

Gas valves in conflict with the station or Project improvements should be relocated and may be shifted to a location either outside the improvements. Valves within the station slab or construction limits will be vertically adjusted to grade. Adjustment or relocation of valves will be at the expense of the utility company.

5.3.3 Street Lights and Traffic Signals

All relocations, temporary or permanent, and maintenance of municipal streetlights and traffic signal equipment (including loop detectors and interconnect cables) will be in accordance with the requirements of DPW.

5.3.4 Parking Meters and Pay and Display Kiosks

EMBARK will remove meters in conflict areas as needed.

5.3.5 Vaults and Basement Encroachments

There are several buildings in the OKC downtown area with basements outside the visible building walls that protrude into the right-of-way below sidewalks. OKC also has a pedestrian tunnel system connecting various buildings in the downtown area below street level. One available source of information is Project 180, which identified the locations of these facilities and inventoried them for consideration as possible conflicts with the project. A summary of the basements and concourses included in the Project 180 inventory.

5.3.6 Utility Design Drawings

If required, water and sewer design plans will be shown on separate drawings in accordance with OCWUT requirements. Storm drain work will be shown on the NW BRT plans. Third-party utility drawings will be prepared by the private utility company and submitted to the Project team for review and approval.

6. Traffic

A traffic analysis was performed to analyze the need and feasibility of guideway improvements along Classen Boulevard and parts of NW Expressway. To assess the impacts of the proposed NW BRT, signalized traffic operations and travel times starting at 10th Street and N Classen Boulevard and along the BRT route to NW Expressway and Pennsylvania Avenue were evaluated in a VISSIM simulation model during the AM and PM peak hours.

Along the study corridor, the existing scenario simulations and results match the current travel behaviors along Classen Boulevard and NW Expressway. The saturation flow rates, travel times, and levels of service were calibrated to match existing conditions. The calibrated model was used to test the build BRT scenario with and without BAT lanes and the dedicated bus-only northbound left turn at Classen and NW Expressway. Travel times (general purpose vehicles and buses including dwell times), intersection delays, and LOS were calculated to quantify the impacts. The results show that the BAT lanes have very little impact on the travel times for both the general-purpose vehicles and for the buses, but they did negatively impact delays and level of service at intersections. Queues at some intersections exceeded 1,000 feet. Due to the negative impact to general purpose vehicles and the insignificant benefit to bus running times, BAT lanes will not be included as a part of this Project along Classen Boulevard.

The addition of TSP to the Classen corridor was also considered as part of this analysis to improve bus travel times and reliability. The results of the with and without BAT lane alternatives remained consistent with the previous findings recommended above even when TSP was added. The addition of TSP did provide a significant improvement to bus travel times while also giving slight improvement to the general-purpose travel times. Overall, the LOS remained fairly constant between the with TSP and without TSP alternatives with the exception of LOS F occurring at 23rd and Classen. Even with the slight increase in delay to some of the side streets, the addition of TSP will result in significant improvements to bus travel times and is recommended for the section of Classen Boulevard where the BRT will operate.

When focusing on the NW Expressway and Classen intersection, some benefits were realized with the dedicated bus-only northbound left turn lane. The bus was able to traverse the intersection an average of about 20 seconds faster than without the dedicated lane. This did come at an expense to general purpose traffic and required changes to signal phasing and timing at the intersection. The east/west split phasing was removed to improve the efficiency of the signal, but the level of service still dropped from a D today to an E in the build scenario with the dedicated bus-only turn lane, representing an increase of about ten seconds of delay per vehicle at the intersection. However, despite the impacts to general purpose vehicles and because of the benefits to the BRT bus running time as well as reliability for schedule adherence, it is recommended to move forward with the consideration of the bus-only northbound left turn lane.

7. Structural

7.1 Applicable Codes and Standards

The adopted building code applicable for the design of the foundations for the BRT Shelter and Marker is the 2015 International Building Code (IBC), effective as of September 17, 2018. The IBC references ASCE 7-10, Minimum Design Loads for Buildings and Other Structures and will be used to determine the loading criteria for design of the footing for the shelter and marker.

A. Building Occupancy / Construction Type
    1. Building Risk Category II IBC Table 1604.5
        a. Building and other structures except those listed in RISK Categories I, III and IV.
B. Dead Loads
    1. Self-weight of new BRT Marker and Shelter.
        a. Superimposed Dead Load 10 psf for miscellaneous
C. Live Loads – Per ASCE 7 Table 4-1
    1. Uniform Loads
        a. Roofs: 20 psf
    2. Handrails, guardrails, grab bars, and vehicle barriers per ASCE 7 Section 4.4.1-3
        a. Handrails and guards: 50 lb/ft or 200 lb applied in any direction at top
        b. Intermediate rails and fillers: 50 lb over an area not to exceed 1 sq. ft. (NOT in combination with handrail loads)
        c. Grab bars: 250 lb in any direction at any point
    3. Live Load Reduction – Not applicable.
D. Snow Loads – ASCE 7 Chapter 7
    1. Ground snow load Pg = 10 psf
    2. Flat roofs (slope≤ 5º): Pf = 0.7 CeCttPgg ≥ Pf = 20xIs psf min.
        a. Snow exposure coefficient (Ce): Partially Exposed, Category B: Ce = 1.0
        b. Temperature Factor (Ct):
        c. Unheaded and open air structures: Ct = 1.2
        d. Snow Importance Factor (Is): Category II, Is = 1.00
        e. Rain on Snow: for slopes less than ½ inch per foot add 5 psf
        f. Snow on Flat Roof (No Drift) = Pf = .7 x 1.0 x 1.2 x 10 x 1.0 + 5(rain on snow) = 13.4 psf. But not less than Pg x Is = 20 x 1.0 = 20 psf
        g. Drifting snow per ASCE 7 Chapter 7
E. Wind Load
    1. Since mean roof height < 60 feet.
    2. Exposure = C
    3. Basic wind speed (V) = 115 mph
    4. Importance factor (per IBC): Iw = 1.00
    5. Directionality factor (Kd) = 0.85
    6. Topographic factor (Kt) = 1.00
    7. Velocity Pressure Exposure Coefficients (Kz & Kh): varies with height, see Table 27.3-1
    8. Velocity pressure qz = .00256*Kz*Kzt*Kd*V2*I
    9. Gust factor (G) = 0.85
    10. Internal Pressure Coefficient (GCpi) = +/- 0.18 (enclosed).
    11. External Pressure Coefficient (Cp) per Figure 27.4-1
    12. Torsional effects will be included.
F. Seismic Load
    1. Site Class = D (assumed)
    2. Occupancy Category = II
    3. Importance factor (IE) = 1.00
    4. Ground Motion
        a. 0.2 sec. spectral response acceleration (Ss) = 0.314g

b. 1.0 sec. spectral response acceleration (S1) = 0.081g
c. 0.2 sec max. spectral response acceleration (SMS) = 0.487g
d. 1.0 sec max. spectral response acceleration (SM1) = 0.196g;
e. 5% damped design spectral response acceleration:
    1. SDS = 2/3*SMS = 2/3*0.487= 0.325g
    2. SD1 = 2/3*SM1 = 2/3*0.231= 0.130g

5. Seismic Design Category = “B”. Per ASCE 7 11.6.
6. Lateral force resisting systems
    a. Steel Systems Not Specifically Detailed for Seismic: R = 3, Omega = 3, Cd = 3

G. Thermal Load
1. Yearly Average Temperature = 61.5 ºF
2. Yearly Average High Temperature = 72 ºF
3. Yearly Average Low Temperature = 51 ºF
4. Average High Temperature in July = 94 ºF
5. Average Low Temperature in January = 29 ºF
6. Maximum Seasonal Climatic Temperature Change = 65 ºF
7. Annual Average Ambient Relative Humidity = 65%

7.2 Structural Footing Design

The foundation for the BRT Marker will utilize a shallow spread footing to resist overturning, sliding and bearing due to wind and/or seismic loading. The foundation for the BRT Shelter will utilize a thickened slab under the footprint of the shelter to minimize depth of footing and utility conflicts.

7.3 Retaining Walls

Each station location has undergone a preliminary evaluation for structural wall needs along the corridor. From this evaluation it was determined that the northbound Independence Avenue and NW Expressway station is the only location, at this time, that would require a Mechanically Stabilized Earth (MSE) wall. This determination is due to the steep slope from the station location down to the existing parking lot. Other station locations may require smaller integral sidewalk walls depending on the existing grading and other constraints to limit impacts to properties or utilities. Integral sidewalk walls utilize the station platform as the footing and are limited to 3’ of exposed wall height. A preliminary detail for the integral wall design is included in the preliminary plans in **Appendix L.**

7.4 Soils

HNTB’s subconsultant drilled borings in three locations across the project route to determine the characteristics of the soil. The geotechnical report is included in **Appendix H.** The boring and soil information will be used to design the station foundation and MSE walls during the final design of the project.

8. Vehicles

The NW BRT project will use stylized 40-foot BRT vehicles. The vehicles will have kneeling/leveling capabilities to support level boarding. These vehicles will be designed and branded to look different than the rest of the EMBARK fleet. These stylized BRT vehicles provide a premium service and a different look and feel from standard vehicles that is appealing to both current and potential customers. One of the primary advantages to using this type of bus is the easy assimilation into the maintenance program. The NW BRT vehicles will use a CNG fueling system which reduces harmful emissions and lower average fuel costs than traditional diesel systems.

8.1 Preliminary Operating Plan

The preliminary operating plan, shown below in **Table 5**, was developed to outline the service frequency and determine the number of required vehicles. Based on the preliminary operating plan, the NW BRT line will require seven operating vehicles during the peak period to achieve 12-minute headways with two spare vehicles. The total NW BRT fleet will be nine vehicles.

Table 5: BRT Preliminary Operating Plan

Time Period	Headway	Service Span		Vehicles
Weekday Operating Plan				
Early AM	20	5:00 AM	6:30 AM	4
AM Peak	12	6:30 AM	8:30 AM	7
Midday	12	8:30 AM	3:30 PM	7
PM Peak	12	3:30 PM	7:00 PM	7
Evening	30	7:00 PM	12:00 AM	3
Friday Extended Hours				
Evening	30	12:00 AM	2:00 AM	3
Saturday Operating Plan				
Daytime	20	6:00 AM	5:30 PM	4
Evening	30	5:30 PM	2:00 AM	3
Sunday Operating Plan				
Daytime	30	6:00 AM	5:30 PM	3
Evening	30	5:30 PM	8:30 PM	3

8.2 Vehicle Technologies

On-vehicle technologies will be procured and installed after vehicle delivery by EMBARK. These will include TSP transponders, radios, automatic vehicle location (AVL) systems, automatic passenger counters (APC) and other driver aids. The radio and AVL system between the vehicle operator and the EMBARK operations center will utilize existing systems to create a seamless integration of the BRT vehicles into the current transit operations. The AVL system will be based on GPS location information supplemented by dead reckoning. The vehicle's location will be provided to the EMBARK operations center via either cellular telephone or data radio communication, subject to the limitations of existing cellular infrastructure. The AVL equipment will be compatible with EMBARK's Trapeze software. All BRT vehicles will be equipped with APC to monitor passenger loading and ridership of the new BRT line. Also, a TSP transponder to communicate the buses speed, direction and other information needed for the operation of TSP at the signals will be installed on the bus.

8.3 Vehicle Procurement

The vehicles will be procured in early 2021 with delivery in mid-2023. This schedule allows for a three-month driver training and testing period with revenue operations scheduled to begin in late 2023.

9. Signal and Route Control

9.1 BRT Running Times

Based on the operating plan, preliminary running times were developed for the final alignment. The running time estimates by segment are shown in **Table 6** below. The estimation of running times for the various alignment options involved several steps. The base running time estimate was developed from a field test. On January 18th, 2019, EMBARK and City staff, along with the consultant team, participated in a field test using a 40' vehicle to drive the recommended alignment and options. This included an analysis of average runtime recorded under existing conditions and review of operational considerations including turning movements and key bottlenecks. Additional data was collected using Google's real time traffic data, accessed January 30, 2019 to February 4, 2019 and ran during the morning and afternoon peak periods and midday period. An average of 15 seconds per station was added for passenger boarding and alighting. Off board fare collection was assumed, significantly reducing station dwell times. All running time estimates were checked for reasonableness. It is recommended prior to ordering vehicles for the BRT that EMBARK perform simulated runs on the route with a 40' bus, including dwelling at stop locations.

Table 6: BRT Preliminary Running Times

Route Segment	Northbound	Southbound
Downtown Extension - EOL to Downtown Transit Center	5	5
Downtown Transit Center to 23rd & Classen	9.5	8
23rd/Classen to May/NW Expressway	10	9
May/NW Expressway to Independence/NW Expressway	1.5	1.5
INTEGRIS Loop to 63rd/NW Expressway	5.5	5.5
63rd/NW Expressway via 63rd & Meridian	3	3
Subtotal	34.5	32
Time for Passenger Boarding & Alighting	3.5	3.5
Total Running Time	**38**	**35.5**

9.2 Transit Signal Priority (TSP)

TSP uses technology to reduce dwell time at traffic signals for transit vehicles by extending green light time or reducing red time at a given signal. This helps to reduce delay, increase transit speed, and improve reliability of transit operations in the corridor. HNTB performed a preliminary field evaluation of 39 signalized intersections along the entirety of the BRT route. During this field visit, each signal cabinet was opened and evaluated based on its ability to implement TSP upgrades. Intersections along the corridor were categorized into four priority rankings for potential TSP improvements including:

- Priority 1 – Includes the bus-only left turn onto NW Expressway, queue jump upgrades to the Pennsylvania and NW Expressway intersection and all other signalized intersections that already have TSP implementations in the cabinet.
- Priority 2 – Signals along Classen Boulevard and 10th Street that would require a full upgrade.
- Priority 3 – Signals in downtown that do not have TSP capabilities and would require a full upgrade.
- Priority 4 – Signals along NW Expressway and associated deviations from the Expressway that would require a full upgrade.

Following prioritization, signals were also rated based on either a need for a full upgrade, TSP already implemented or TSP Compatible. A full upgrade would require all necessary TSP elements be added to

the signal cabinet while TSP implemented, or TSP Compatible would be a minor upgrade to the cabinet. All intersections and their corresponding upgrade evaluation are listed below in **Table 7**.

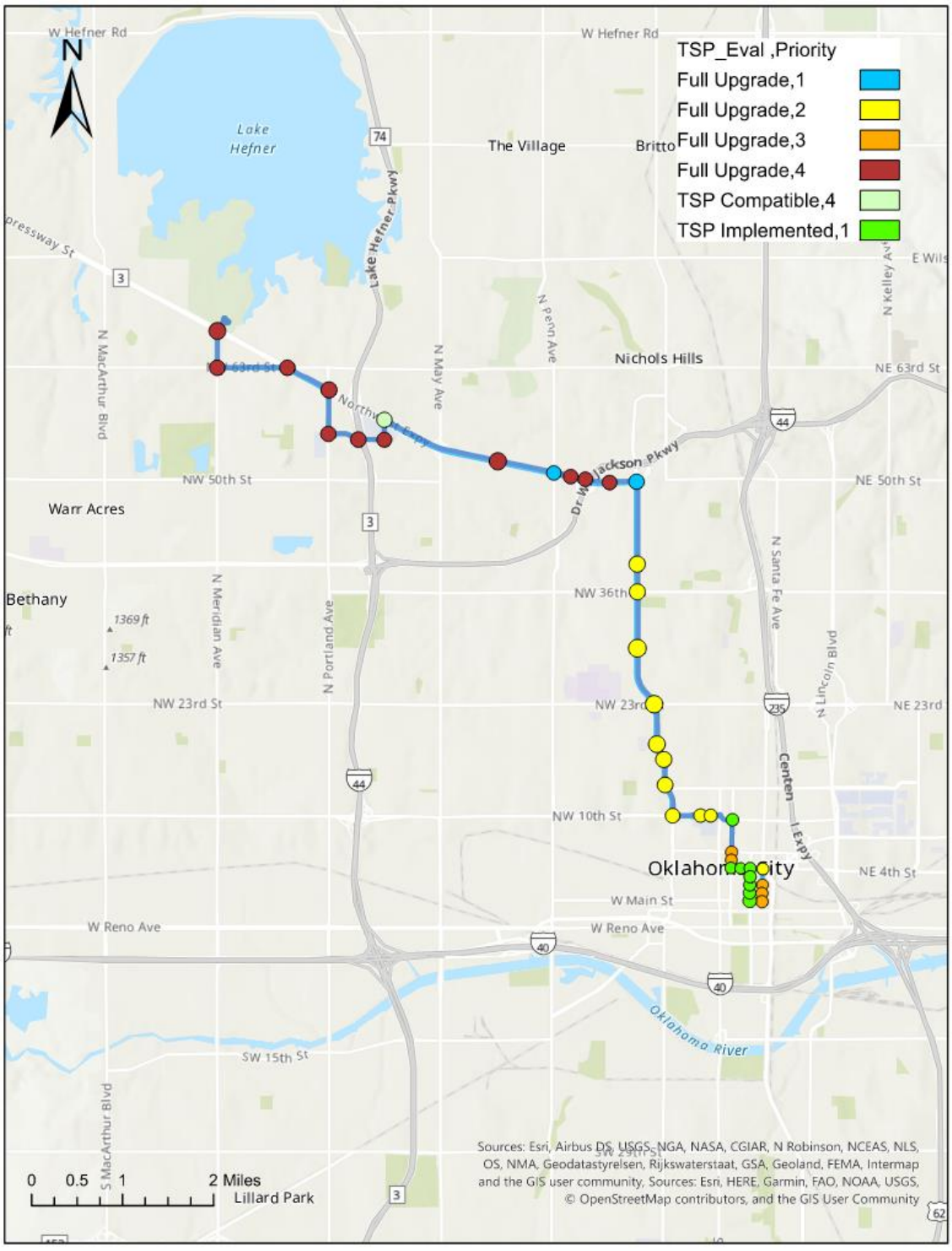
Table 7: TSP Evaluated Signal Locations

Location	Type	TSP Evaluation	Priority
NW Expressway & Pennsylvania Ave.	Intersection	Full Upgrade	1
NW Expressway & Classen Blvd.	Intersection	Full Upgrade	1
10th Street & Hudson	Intersection	TSP Implemented	1
4th Street & Hudson	Intersection	TSP Implemented	1
4th Street & Harvey	Intersection	TSP Implemented	1
Main & Robinson Ave.	Intersection	TSP Implemented	1
Robinson & Park Ave.	Intersection	TSP Implemented	1
Robinson & Robert S Kerr	Intersection	TSP Implemented	1
Robinson & Dean A McGee Ave.	Intersection	TSP Implemented	1
4th Street & Robinson	Intersection	TSP Implemented	1
39th Street & Classen Blvd.	Intersection	Full Upgrade	2
36th Street & Classen Blvd.	Intersection	Full Upgrade	2
30th Street & Classen Blvd.	Intersection	Full Upgrade	2
23rd Street & Classen Blvd.	Intersection	Full Upgrade	2
18th Street & Classen Blvd.	Intersection	Full Upgrade	2
16th Street & Classen Blvd.	Intersection	Full Upgrade	2
13th Street & Classen Blvd.	Intersection	Full Upgrade	2
10th Street & Classen Blvd.	Intersection	Full Upgrade	2
Lee Ave. & 10th Street	Intersection	Full Upgrade	2
Dewey Ave. & 10th Street	Intersection	Full Upgrade	2
4th Street & Broadway	Intersection	Full Upgrade	2
6th Street & Hudson	Intersection	Full Upgrade	3
5th Street & Hudson	Intersection	Full Upgrade	3
Broadway & Robert S Kerr	Intersection	Full Upgrade	3
Broadway & Park Ave.	Intersection	Full Upgrade	3
Broadway & Main Street	Intersection	Full Upgrade	3
NW Expressway & Meridian	Intersection	Full Upgrade	4
Meridian & 63rd Street	Intersection	Full Upgrade	4
NW Expressway & 63rd Street	Intersection	Full Upgrade	4
Portland & 56th Street	Intersection	Full Upgrade	4
56th Street and Grand Blvd	Intersection	Full Upgrade	4
56th Street & Independence Ave.	Intersection	Full Upgrade	4
NW Expressway & Independence Ave.	Intersection	TSP Compatible	4
NW Expressway & Villa Ave.	Intersection	Full Upgrade	4
NW Expressway & Portland Ave.	Intersection	Full Upgrade	4
NW Expressway & Penn Square Mall	Intersection	Full Upgrade	4
NW Expressway & Belle Isle	Intersection	Full Upgrade	4

NW Expressway & Blackwelder Ave.	Intersection	Full Upgrade	4

Figure 19 on the following page shows the existing traffic signals along the NW BRT corridor and their corresponding prioritization and upgrades. The TSP concept of operations memorandum is included in **Appendix J.**

Figure 19: TSP Route Priorities



10. Communications

The NW BRT will include various technologies at the stations to enhance customer experience and improve transit operations. The technologies outlined below will be deployed in a consistent manner throughout the BRT route and will be similar in nature to that of the OKC Streetcar. More detail about specific devices and requirements will be defined in final design.

10.1 Real-Time Arrival (RTA) Displays

RTA displays provide relevant transit information such as next bus arrival times and connecting routes and are essential to providing a premium and reliable transit experience. RTA displays can be LED or full-color screens. RTA displays will comply with ADA standards for text displays, graphic content, and audio annunciation. The NW BRT stations will include RTA displays that will be integrated into the pylon, similar to the OKC Streetcar.

10.2 Wayfinding Information

An ADA compliant wayfinding information sign will be included in the pylon at each station. The display will be positioned to provide the necessary information to customers to find where they are on a map of the City with information on the individual districts and key locations in the area.

10.3 Fare Collection

On-board fare collection is a primary source of delays due to extended dwell times on corridors with heavy ridership. The NW BRT will deploy off-board fare collection using mobile fare payment via phones as well as TVMs. TVMs will improve reliability and reduce dwell time at the station. TVMs will be installed on the level boarding platform of each BRT station, facilitating fare purchases with either cash or a debit/credit card. EMBARK will likely use a similar TVM as OKC Streetcar at the BRT stations.

10.4 Communications & Electrical

Each BRT station will require communications and power to operate their technology systems for the real-time arrival signs and fare collection. Communications will be provided through a cellular modem placed in the technology cabinet with a Virtual Private Network (VPN) connection. Each station will require electric service with a power meter to the technology cabinet which will have an electrical panel to distribute power to each light and device.

11. Safety and Security

The NW BRT design will address system elements according to the requirements of the applicable standards listed. Should any standard or requirement conflict, the most stringent standard will apply. The purpose of this section is to establish the standards and design policies for the design, construction, and commissioning of the system's safety elements on the NW BRT project. To ensure the safety of the system and to mitigate hazards on the project the designer and contractors will comply with the current version of the EMBARK's Safety and Security Management Plan (SSMP), Safety and Security Certification Plan (SSCP), and Public Transportation Agency Safety Plan (PTASP). Additionally, any deviations from the project's design criteria must be proposed, evaluated, approved, and documented.

11.1 Safety Management Policy Goals

This section identifies the goals for the design of a safe and secure BRT based upon the PTASP:

- **Goal 1**: Support the management of safety through the provision of appropriate resources that will result in an organizational culture that fosters safe practices, encourages effective employee safety reporting and communication, uses that reporting and communication as a fundamental source for safety concerns and hazard identification, and actively manages safety with the same attention to results as the attention to the results of the other management systems of the organization.
- **Goal 2**: Integrate the management of safety among the primary responsibilities of all managers and employees.
- **Goal 3**: Establish and operate hazard identification and analysis and safety risk evaluation activities to eliminate or mitigate the safety risks of the consequences of hazards resulting from our operations or activities to a point which is consistent with our acceptable level of safety performance.
- **Goal 4**: Ensure that sufficiently skilled and trained personnel are available to implement safety management process.
- **Goal 5**: Establish and measure our safety performance against realistic and data-driven safety performance indicators and safety performance targets.
- **Goal 6**: Continually improve our safety performance through management processes that ensure that appropriate safety management action is taken and is effective.

12. Schedule

The NW BRT Key Schedule Milestones are as follows:

- Completion of National Environmental Policy Act (NEPA) process: July 9, 2019
- Preliminary Design: 2020
- Final Design: 2020-2022
- Bus Procurement: 2021-2023
- ROW/Utility Coordination: 2020-2022
- Construction Contract Award: 2022
- Construction: 2022-2023
- Planned Revenue Service Begin: late 2023

The NW BRT Project Schedule is shown in **Figure 20**.

Figure 20: NW BRT Project Schedule

13. Preliminary Cost Estimate

A preliminary cost estimate for the NW BRT project is included in **Appendix A**. The preliminary cost estimate was developed for all the civil improvements as well as estimates for utility relocations and right-of-way acquisitions. No costs are included for engineering, vehicles, match projects or local matching funding. A 25% contingency was included on the civil, utility and right-of-way costs as well as 3.2% inflection for construction beginning in 2022.

Civil Construction Cost = $16,761,853.23
Right-of-Way & Utility Cost = $835,784.99

Civil, Right-of-Way, & Utility Subtotal = $17,597,638.23
Inflation (3.5%/year) = $1,253,391.78
Preliminary Total = $18,851,030.01

13.1 Basis/Assumptions of Costs

Unit prices of the station elements for the project are provided in **Appendix A.** These unit prices were established from historical bid tabs from the OKC Streetcar and similar recent BRT projects in Kansas City, Tulsa, and El Paso. Where appropriate, specialized item costs for elements such as the pylon and TSP components were supplemented by the design consultants experience on similar BRT projects. Unit prices were established with the following criteria:

- **Non-Local Unit prices:** Items not commonly constructed in OKC were based off unit prices established based on similar work being performed on other BRT projects.
- **Local Unit Prices:** For items of work commonly constructed in OKC (like utilities, traffic signals, bike lanes, etc.), unit prices were based on information available from provided local bid tabs.

13.2 Funding

In 2019, the project received a federal BUILD Grant for $14.4 Million in federal funding. The funding allocation included in the grant agreement for the NW BRT project is shown in **Table 8:**

Table 8: NW BRT Project Costs and Funding Sources

Activity	FY 2018 BUILD Transportation Discretionary Grant Funds	Other Federal Funds (5307)	Local Funds & 5307 Match	Project Cost
Preliminary and Final Design		$774,800	$700,000	$1,474,800
Stations and Park & Ride Facilities	$3,300,000		$2,500,000	$5,800,000
Street Improvements and Signal Upgrades	$3,650,000		$2,000,000	$5,650,000
Pedestrian and Bicycle Infrastructure	$4,250,000		$2,735,000	$6,985,000
Vehicles			$5,400,000	$5,400,000
Contingency[1]	$3,175,250		$400,000	$3,575,250
TOTALS	**$14,375,250**	**$774,800**	**$13,735,000**	**$28,885,050**

[1] To make sure BUILD funds are used for infrastructure investment, use of contingency funds is limited to the existing line items in the budget, Before using contingency funds, the Recipient shall comply with requirements for budget changes under section 7.3 and, if necessary, schedule changes under section 7.2 of the Paper Grant Agreement.

14. Appendices

APPENDIX A: PRELIMINARY ENGINEER'S ESTIMATE OF PROBABLE COST
APPENDIX B: DESIGN CRITERIA
APPENDIX C: MONTHLY COORDINATION MEETING MINUTES
APPENDIX D: SPECIAL DISTRICT COORDINATION MEETING
APPENDIX E: COMMENT RESOLUTION FORM
APPENDIX F: STATION LOCATION WORKSHOP MINUTES
APPENDIX G: INTERSECTION SITE DISTANCE (ISD) MEETING MINUTES AND ISD EXHIBITS
APPENDIX H: GEOTECHNICAL REPORT
APPENDIX I: OKLAHOMA CITY BIKE STANDARDS
APPENDIX J: TRANSIT SIGNAL PRIOIRTY (TSP) CONCEPT OF OPERATIONS
APPENDIX K: PROJECT DEFINITION REPORT
APPENDIX L: 30% PRELIMINARY PLANS

APPENDIX A: PRELIMINARY ENGINEER'S ESTIMATE OF PROBABLY COST

EMBARK/CITY OF OKLAHOMA CITY
Northwest Bus Rapid Transit (BRT) Project
Project No. MC-0619
Preliminary Engineer's Estimate of Probable Cost

ITEM DESCRIPTION	UNIT	UNIT PRICE	QUANTITY	TOTAL
GENERAL				
MOBILIZATION	LSUM	$ 2,000,000.00	1	$ 2,000,000.00
CONSTRUCTION STAKING	LSUM	$ 400,000.00	1	$ 400,000.00
CIVIL				
CURB AND GUTTER	LF	$ 35.00	4,116	$ 144,073.08
SIDEWALK	SY	$ 60.00	3,229	$ 193,730.25
ADA CURB RAMP (Intersection/Sidewalk Improvements)	EA	$ 2,000.00	55	$ 110,000.00
DRIVEWAY RECONSTRUCTION (6" CONCRETE)	SY	$ 65.00	137	$ 8,932.42
DRAINAGE	LSUM	$ 320,000.00	1	$ 320,000.00
REMOVE CURB AND GUTTER	LF	$ 10.00	5,658	$ 56,581.19
REMOVE PAVEMENT	S.Y.	$ 15.00	422	$ 6,330.09
TRAFFIC CONTROL	LSUM	$ 500,000.00	1	$ 500,000.00
CLEARING & GRUBBING	LSUM	$ 50,000.00	1	$ 50,000.00
TREE REPLACEMENT	LSUM	$ 20,000.00	1	$ 20,000.00
EARTHWORK	LSUM	$ 100,000.00	1	$ 100,000.00
SOD	SY	$ 6.00	13,300	$ 79,800.00
EROSION CONTROL	LSUM	$ 100,000.00	1	$ 100,000.00
SIGNALS				
SIGNALIZED MID BLOCK CROSSING (42ND STREET)	EA	$ 150,000.00	1	$ 150,000.00
AUDIBLE PEDESTRIAN PUSH BUTTONS AND SIGNS	EA	$ 1,500.00	33	$ 49,500.00
SIGNAL POLE RELOCATION (Main/Broadway & 56th/Portland)	EA	$ 45,000.00	2	$ 90,000.00
NEW PED POLE W/ FOUNDATION (10')	EA	$ 2,000.00	17	$ 34,000.00
PERMANENT SIGNING & PAVEMENT MARKING				
SHEET ALUMINUM SIGNS	SF	$ 25.00	21	$ 514.58
SQUARE STEEL SIGN POST	LF	$ 12.00	36	$ 432.00
SIGN REMOVAL	EA	$ 150.00	1	$ 150.00
TRAFFIC STRIPE (WORDS) (ONLY)	EA	$ 400.00	21	$ 8,400.00
TRAFFIC STRIPE (WORDS) (BUS)	EA	$ 400.00	20	$ 8,000.00
TRAFFIC STRIPE (Thermoplastic) (ARROW) (SINGLE)	EA	$ 250.00	2	$ 500.00
TRAFFIC STRIPE (4") (Multi-Polymer)	LF	$ 1.25	599	$ 748.60
TRAFFIC STRIPE (8") (Multi-Polymer)	LF	$ 2.00	2,388	$ 4,776.99
TRAFFIC STRIPE (24") (Thermoplastic)	LF	$ 15.00	4,241	$ 63,620.84
STATIONS (SHELTER/MARKER/SITE WORK/AMENITIES/STATION LIGHTING/TVM/RTAS)				
SB BROADWAY / MAIN ST. STATION (STANDARD)	LSUM	$ 189,600.00	1	$ 189,600.00
NB ROBINSON / PARK AVE. STATION (STANDARD)	LSUM	$ 193,900.00	1	$ 193,900.00
TRANSIT CENTER BRT STATION IMPROVEMENTS	LSUM	$ 200,000.00	1	$ 200,000.00
SB HUDSON / 8TH STREET STATION (STANDARD)	LSUM	$ 193,300.00	1	$ 193,300.00
SB 10TH STREET/DEWEY STATION (STANDARD)	LSUM	$ 188,700.00	1	$ 188,700.00
NB 10TH STREET/DEWEY STATION (STANDARD)	LSUM	$ 193,900.00	1	$ 193,900.00
SB CLASSEN / 13TH STREET STATION (STANDARD)	LSUM	$ 194,000.00	1	$ 194,000.00
NB CLASSEN / 13TH STREET STATION (STANDARD)	LSUM	$ 194,400.00	1	$ 194,400.00
SB CLASSEN / 18TH STREET STATION (STANDARD)	LSUM	$ 189,700.00	1	$ 189,700.00
NB CLASSEN / 18TH STREET STATION (STANDARD)	LSUM	$ 192,900.00	1	$ 192,900.00
SB CLASSEN / 23RD STREET STATION (HIGH RIDERSHIP)	LSUM	$ 244,200.00	1	$ 244,200.00
NB CLASSEN / 23RD STREET STATION (HIGH RIDERSHIP)	LSUM	$ 244,100.00	1	$ 244,100.00
SB CLASSEN / 30TH STREET STATION (STANDARD)	LSUM	$ 194,100.00	1	$ 194,100.00
NB CLASSEN / 30TH STREET STATION (STANDARD)	LSUM	$ 194,100.00	1	$ 194,100.00
SB CLASSEN / 36TH STREET STATION (STANDARD)	LSUM	$ 194,000.00	1	$ 194,000.00
NB CLASSEN / 36TH STREET STATION (STANDARD)	LSUM	$ 194,000.00	1	$ 194,000.00
SB CLASSEN / 42ND STREET STATION (STANDARD)	LSUM	$ 222,700.00	1	$ 222,700.00
NB CLASSEN / 42ND STREET STATION (STANDARD)	LSUM	$ 194,300.00	1	$ 194,300.00
SB NW EXPY / BLACKWELDER (STANDARD)	LSUM	$ 262,400.00	1	$ 262,400.00
NB NW EXPY / BLACKWELDER (STANDARD)	LSUM	$ 252,900.00	1	$ 252,900.00
SB NW EXPY / PENN STATION (STANDARD)	LSUM	$ 313,200.00	1	$ 313,200.00
NB NW EXPY / PENN STATION (STANDARD)	LSUM	$ 301,000.00	1	$ 301,000.00
SB INDEPENDENCE / 56TH STREET STATION (STANDARD)	LSUM	$ 193,900.00	1	$ 193,900.00
NB INDEPENDENCE / 56TH STREET STATION (STANDARD)	LSUM	$ 193,900.00	1	$ 193,900.00
NB 56TH STREET / N PORTLAND STATION (STANDARD)	LSUM	$ 194,300.00	1	$ 194,300.00
SB 56TH STREET / N PORTLAND STATION (STANDARD)	LSUM	$ 193,100.00	1	$ 193,100.00
SB NW EXPY / PORTLAND STATION (STANDARD)	LSUM	$ 192,600.00	1	$ 192,600.00
NB NW EXPY / PORTLAND STATION (STANDARD)	LSUM	$ 248,400.00	1	$ 248,400.00
NB 63RD STREET / MERIDIAN STATION (STANDARD)	LSUM	$ 189,200.00	1	$ 189,200.00
SB 63RD STREET / MERIDIAN STATION (STANDARD)	LSUM	$ 193,000.00	1	$ 193,000.00

WATER TRUST PROPERTY STATION (HIGH RIDERSHIP)	LSUM	$	316,500.00	1	$ 316,500.00
PARK & RIDE					
WATER TRUST PROPERTY (SIGNING & STRIPING)	LSUM	$	25,000.00	1	$ 25,000.00
PENN SQUARE MALL (SIGNING & STRIPING)	LSUM	$	25,000.00	1	$ 25,000.00
BIKE LANE					
TRAFFIC STRIPE (8") (MULTI-POLYMER)	LF	$	2.00	12,205	$ 24,410.20
DELINEATORS (PROVIDE/INSTALL)	EA	$	60.00	77	$ 4,620.00
GREEN PAINT (BIKE BOX)	SF	$	12.00	4,805	$ 57,660.75
REMOVE TRAFFIC STRIPE (4")	LF	$	1.00	4,383	$ 4,383.24
TRAFFIC STRIPE (MULTI-POLYMER) (BIKE LANE SYMBOL)	EA	$	400.00	17	$ 6,800.00
TRAFFIC STRIPE (MULTI-POLYMER) (SHARROW)	EA	$	400.00	1	$ 400.00
STRUCTURAL					
MSE WALL #1	SF	$	55.00	383	$ 21,037.50
INTEGRAL SIDEWALK RETAINING WALL	CY	$	1,750.00	37	$ 65,030.86
TRANSIT SIGNAL PRIORITY					
TSP PRIORITY 1	LSUM	$	182,500.00	1	$ 182,500.00
TSP PRIORITY 2	LSUM	$	715,000.00	1	$ 715,000.00
TSP PRIORITY 3	LSUM	$	325,000.00	1	$ 325,000.00
TSP PRIORITY 4	LSUM	$	796,250.00	1	$ 796,250.00
				SUBTOTAL	**$ 13,409,482.59**
				CONTINGENCY (25%)	**$ 3,352,370.65**
				CIVIL TOTAL	**$ 16,761,853.23**

UTILITIES					
2" GAS	LF	$	30.00	400	$ 12,000.00
4" GAS	LF	$	40.00	200	$ 8,000.00
6" GAS	LF	$	100.00	300	$ 30,000.00
8" GAS	LF	$	200.00	200	$ 40,000.00
16" TRANSMISSION GAS	EA	$	1,000.00	200	$ 200,000.00
Water Line	LS	$	200,000.00	1	$ 200,000.00
ROW TAKINGS					
ROW	SF	$	10.00	11,979	$ 119,792.18
DRIVEWAY CLOSURES	EA	$	10,000.00	4	$ 40,000.00
ROW FUTURE PATH	SF	$	10.00	1,884	$ 18,835.81
				SUBTOTAL	**$ 668,628.00**
				CONTINGENCY (25%)	**$ 167,157.00**
				ROW/UTILITY TOTAL	**$ 835,784.99**

PROJECT SUBTOTAL	$	17,597,638.23
INFLATION (2022) (3.5%/year)	$	1,253,391.78
PROJECT TOTAL	**$**	**18,851,030.01**

Note: All Unit Prices based on 2020 values. The costs shown on this estimate represent an estimate of probable costs prepared in good faith and with reasonable care. HNTB has no control over the costs of construction labor, materials, or equipment, nor over competitive bidding or negotiating methods and does not make any commitment or assume any duty to assure that bids or negotiated prices will not vary from this estimate. This estimate does not include costs for local MATCH Projects or Vehicle Costs associated with the improvements.

APPENDIX B: DESIGN CRITERIA

Design Criteria - Northwest Bus Rapid Transit (BRT)

Design Item	Downtown	Classen	NW Expressway
Location Description	**4th street to 10th & Classen**	**10th & Classen to Classen & NW Expressway**	**NW Expressway & Classen to NW Expressway & Meridian**
Roadway Classification	Urban Principal Arterial	Urban Principal Arterial	Urban Principal Arterial
Design Speed (mph)	25	40	45
Posted Speed (mph)	25	40	45
AADT*	8,200	33,500	59,800
Design Vehicle	40' Transit Bus	40' Transit Bus	40' Transit Bus
Typical Section			
Primary Pavement Material	Concrete Widening-252	Concrete Widening-252	Concrete Widening-252
Lane Width (ft)	10.5	10.5	12
Pavement Cross Slope (max)	2.00%	2.00%	2.00%
Parkway Cross Slope	1.50%	1.50%	1.50%
Parkway Width (ft)	Varies	Varies	Varies
Sidewalk/Trail Cross Slope Max. (%)	2	2	2
Sidewalk/Trail Cross Slope Min. (%)	1.5%	1.5%	1.5%
Sidewalk/Trail Width Min. (ft)	5	5	5
Station*			
Station Length (ft)	30	30	40
Station Width (ft)	10.5	10.5	10.5
Sidewalk Behind Station Min (ft)	5	5	5
Sidewalk to nearest intersection Min (ft)	5	5	5
Material	Concrete	Concrete	Concrete
BRT Bus Pad Length (ft)	52	52	52
BRT Bus Pad Width (ft)	9	9	9
BRT Bus Pad Concrete Depth (Inches)	10	10	10
Level Boarding Curb Height (inches)	13.75	13.75	13.75
Intersection Sight Distance	OKC ISD Criteria	OKC ISD Criteria	OKC ISD Criteria
Sight Distance Measurement from Back of Curb (ft)	10	10	10
Station Platform Slope	1%	1%	1%
Transit Curb Width (inches)	12	12	12
Rub Rail Width (inches)	2	2	2
Platform Gap Filler Width (inches)	2	2	2
Bus Pulloff Lane Min. Width (ft)	-	-	12
Bus Pulloff Bay Length (ft)	-	-	300 (ideal) / 200 (min)
Bike lane Criteria (as applicable)			

Bike lane Width (ft)	-	6	-
Multi-use Path (ft)	-	12	-
Min. Buffer Width (ft)	-	3 (w/ delineation)	-
Driveways			
Max. Driveway Width (ft)	30	30	30
Max. Curb Return Radii (ft)	25	25	25
Slope Max (%)	12	12	12
Sidewalk Max. Slope (%)	2	2	2
Sidewalk Min. Slope (%)	0.5	0.5	0.5
Apron Max. Slope (%)	10	10	10
Pavement Min. Thickness (inches)	4	4	4
Aggregate Base Min. Thickness (inches)	3	3	3
Curb			
Curb Type	Downtown	Barrier (> 32')	Barrier (> 32')
Curb Height (inches)	6	6	6
Curb & Gutter Width (Inches)	24	32	32
Gutter Thickness (Inches)	8	8	8
Loading Curb width (inches)	12		
Drainage Design			
Drainage Design Storm Frequency	10-year on grade, 50-year sag	10-year on grade, 50-year sag	10-year on grade, 50-year sag
Minimum Pipe Size (inches)	18-in	18-in	18-in
Allowable Spread (ft.)	Greater of Shoulder/gutter or outside lane	Greater of Shoulder/gutter or outside lane	Greater of Shoulder/gutter or outside lane
Ponding Depth at Low point (ft.)	Depth inundating outside driving lane	Depth inundating outside driving lane	Depth inundating outside driving lane
Miscellaneous			
Object Free Zone (ft)	6 (ideal)/ 3 (min)	6 (ideal)/ 3 (min)	6 (ideal)/ 3 (min)
Clear Zone (ft)	14	14	20

1. The NW BRT route has three different segments - Downtown, Classen, and NW Expressway.
2. The BRT stations along Classen north of 16th will be designed to allow for an additional 12' space behind the sidewalk to allow for future design of a bike lane or multi-use path.
3. Station dimensions listed for all three segments (Downtown, Classen, and NW Expressway) will all be designed on a case by case basis. Where adequate ROW exists, the station dimensions listed will be used for the ideal design circumstance.
4. Roadway drainage analysis will only be performed if station construction requires modification or movement of existing drainage structures. Increase in impervious area due to station slab is assumed to be negligible.
5. Drainage criteria and analysis methods will be based on ODOT Roadway Drainage Manual. City of Oklahoma City construction details will be utilized, and ODOT details utilized if required detail not available within City standards.
6. Fiber reinforcement will be utilized in the concrete bus pad to mitigate future cracking.

APPENDIX C: MONTHLY COORDINATION MEETING MINUTES

Project Name: Northwest BRT

Date of Meeting: 5/27/2020

HNTB Project #74876

Location: Microsoft Teams Meeting

Purpose of Meeting: Monthly Coordination

Time: 3:00 – 4:00pm

ATTENDEES:

EMBARK
Jason Ferbrache
Jesse Rush
Marilyn Dillon

Oklahoma City
Inger Peters
Sarah Ferguson
James Welch

HNTB
Brian Comer
Heidi Katz
Marcus Geist
Makenzie Allen

MEETING MINUTES:

1. Introductions/attendees

2. Public Involvement
    - Stakeholder advisory group update - Contact list is completed, and this list will be contacted soon to gain input from the committee.
    - Branding update
        i. HNTB is following up on SunMetro
        ii. Seeking a list of branding opportunities (trash cans, markers, etc.)
            1. Tulsa – logo on shelter, marker, seat bench
            2. VelociRFTA – concrete, marker, etc.
    - 1st public meeting – final alignment and station locations (July/August)
        i. Online versus In-Person
            1. In-person is preferred if possible (August)
            2. OKC has participated in some stakeholder meetings for street enhancement projects virtually.
            3. May need to expand opportunities – mailout, virtual meeting (some have seen more attendance because users can more easily tune in), can leave it up for public comment (longer than the in-person option), comments can be provided via survey tools during the meeting.

3. Station/Alignment
    - Confirm alignment
        i. HNTB will host meeting with EMBARK operations staff
    - Confirm station locations
    - Station layout considerations – confirm assumptions
        - streetcar shelter and bench
        - bike rack
        - handrail
        - TVM
        - marker
        - separate electrical box – previous lessons learned have shown this is a more secure approach and would provide more flexibility.
        - sidewalk on front & back if possible –
            - Bike path behind station – design for 12' (trim back if needed)

        - Assume 1' behind sidewalk/path for ROW
        - 5' minimum width for arterial streets
    - Additional room between shelter and roadway (4' min) – excludes 2' truncated dome distance
        - Streetcar – 10' deep (minimum)
        - Try to go above minimum ADA if possible
        - Some Streetcar stations were are difficult for ADA users
            - S side of Bricktown Ballpark (stormwater drain conflict)
            - 11th & Walker
    - trash receptacle

4. Stops
    - Traffic signal inventory –
        i. Existing as-built information
        ii. Future project discussion
        iii. HNTB will send checklist of what is needed for each cabinet –
            1. Traffic team with OKC can verify what is currently located in each.
            2. Determine the amount of space in the cabinets/if there is enough room for future needs.
    - Design criteria
    - Survey/Geotech – on schedule
    - Coordination
        i. 13th street / 16th street bike lanes (includes traffic signal design) preliminary draft has been turned in and will be influenced by NW BRT.
            1. There are stops located in this area, but this will be difficult to move forward without survey. A separate meeting can be setup to help talk more about next steps.
            2. HNTB (Heidi Katz) to contact Erica Myers – CEC
            3. Kimley Horn – Project 10th street to south

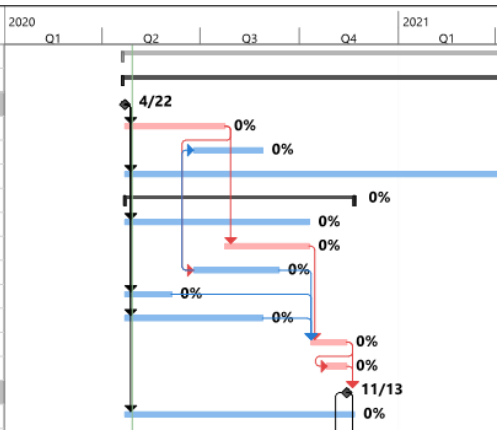
5. Operating Plan assumptions
    - Vehicle procurement timeline
    - Number of vehicles
        i. Schedule meeting with operations group prior to next monthly coordination meeting.

6. Technology
    - Station amenities

7. Cost Estimates
    - Station location constraints
    - Utilities/Right-of-Way

8. Review Schedule/Timelines

Task Name	Duration	Start	Finish
74876-DS-	**957 days**	**Mon 4/20/20**	**Wed 12/27/23**
NW BRT - OKC	**925 days**	**Mon 4/20/20**	**Mon 11/13/23**
[M] Notice to Proceed	0 days	Wed 4/22/20	Wed 4/22/20
Survey	65 days	Wed 4/22/20	Thu 7/23/20
Geotechnical Investigations	45 days	Thu 6/25/20	Thu 8/27/20
Printing/Plotting/Travel	45 mons	Wed 4/22/20	Wed 10/11/23
Preliminary Report - 30% Design	**150 days**	**Wed 4/22/20**	**Fri 11/20/20**
PI & Branding	120 days	Wed 4/22/20	Fri 10/9/20
Stations	55 days	Fri 7/24/20	Fri 10/9/20
Stop Locations	55 days	Thu 6/25/20	Fri 9/11/20
Ped Crossings, Guideway & Bike Lane	30 days	Wed 4/22/20	Wed 6/3/20
Technology, Operating Plan, & Vehicles	90 days	Wed 4/22/20	Thu 8/27/20
Cost Estimate & Report	25 days	Mon 10/12/20	Fri 11/13/20
QA/QC reviews	14 days	Tue 10/27/20	Fri 11/13/20
[M] Submit Preliminary Report	0 days	Fri 11/13/20	Fri 11/13/20
Project Management	150 days	Wed 4/22/20	Fri 11/20/20



9. Action Items:
    - HNTB (Heidi Katz) to provide list of branding opportunities and examples of branding.
    - HNTB (Brian Comer) to provide operating plan by mid-June for review to discuss at the following coordination meeting.
    - HNTB (Marcus Geist) to provide design criteria document by mid-June for review and approval.
    - HNTB (Eric Strack) to develop checklist of needs for each cabinet in the traffic signal inventory.
    - HNTB (Heidi Katz) to coordinate with CEC to discuss project overlap with the station locations at 13th / 16th street on Classen.
    - HNTB (Brian Comer) to schedule meeting with operations group prior to next monthly coordination meeting.
    - HNTB (Heidi Katz) to schedule meeting to discuss schedule (Marilyn, Jesse, Inger, Heidi)
        i. Add in review periods for the City
        ii. 30% approval and 100% - COTPA Board
        iii. FTA schedule milestones (from grant agreement, extensive schedule in appendix)
            1. Overall schedule for engineering
            2. Construction schedule – includes pricing
        iv. Use this meeting for Steering Committee updates

The HNTB Companies
Infrastructure Solutions

Project Name: Northwest BRT

Date of Meeting: 6/24/2020

HNTB Project #74876

Location: Microsoft Teams Meeting

Purpose of Meeting: Monthly Coordination

Time: 3:00 – 4:00pm

ATTENDEES:

EMBARK
Jason Ferbrache
Jesse Rush
Marilyn Dillon
Kristen Torkelson
Suzanne Wickenkamp
Michael Scroggins

Oklahoma City
Inger Peters
Sarah Ferguson
James Welch

HNTB
Brian Comer
Heidi Katz
Marcus Geist
Makenzie Allen
Eric Strack

MEETING AGENDA:

1. Introductions/attendees

2. Public Involvement
   - Stakeholder advisory group update – close to wrapping up so that we can host our first public meeting (August)
   - Branding update – depends on advisory group (kickoff with HNTB, timing of meeting TBD, hopefully end of July/early August)
   - 1st public meeting – final alignment and station locations (July/August)

3. Station/Alignment/Operating Plan
   - Confirm alignment/station locations
     i. HNTB has updated final memo per meeting
     ii. Still need to confirm transit center stop and circulation
     iii. HNTB is evaluating the final number of vehicles after transit center decision
        1. Need to figure out local match to make sure we know the projects and criteria are met – concern about Villa Stations
        2. City/EMBARK is going to determine if they want Villa stations
   - Station layout considerations – update per meeting 6/23

4. Stops
   - Traffic signal inventory –
     i. Schedule in July, HNTB to attend with OKC traffic
     ii. Inger to send spreadsheet to OKC Traffic – is there a database of information to prepopulate information? (Sarah)
   - Design criteria
     i. Bus Pull-off - EMBARK completed a field test, and the 200' taper is possible but extending to a 300' taper would be ideal.
   - Newflyer Buses:
     i. Curb height per bus design – 14" or 13.75" curb?
     ii. Can EMBARK or HNTB measure an existing bus?
        1. Jesse/Heidi to measure existing buses
     iii. 3" horizontal and 1/2" vertical criteria for ADA boarding
   - Station Shelter
     i. Do you want the exact shelters from streetcar?

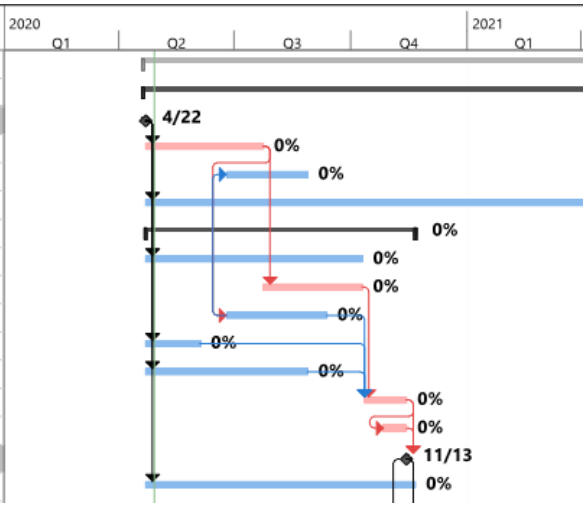
ii. If not, need to confirm EMBARK's preference
iii. If so, would need to sole source and get approval from FTA
    1. Maintenance is important, match streetcar if we can
    2. May not need to sole source – multiple manufacturers were able to bid on recent solicitation

- Survey/Geotech
    i. Identify wall locations

5. Utilities/Right-of-Way
    - Working through laying out stations, will know more in coming months

6. Review Schedule/Timelines

Task Name	Duration	Start	Finish
74876-DS-	**957 days**	**Mon 4/20/20**	**Wed 12/27/23**
NW BRT - OKC	**925 days**	**Mon 4/20/20**	**Mon 11/13/23**
[M] Notice to Proceed	0 days	Wed 4/22/20	Wed 4/22/20
Survey	65 days	Wed 4/22/20	Thu 7/23/20
Geotechnical Investigations	45 days	Thu 6/25/20	Thu 8/27/20
Printing/Plotting/Travel	45 mons	Wed 4/22/20	Wed 10/11/23
Preliminary Report - 30% Design	**150 days**	**Wed 4/22/20**	**Fri 11/20/20**
PI & Branding	120 days	Wed 4/22/20	Fri 10/9/20
Stations	55 days	Fri 7/24/20	Fri 10/9/20
Stop Locations	55 days	Thu 6/25/20	Fri 9/11/20
Ped Crossings, Guideway & Bike Lane	30 days	Wed 4/22/20	Wed 6/3/20
Technology, Operating Plan, & Vehicles	90 days	Wed 4/22/20	Thu 8/27/20
Cost Estimate & Report	25 days	Mon 10/12/20	Fri 11/13/20
QA/QC reviews	14 days	Tue 10/27/20	Fri 11/13/20
[M] Submit Preliminary Report	0 days	Fri 11/13/20	Fri 11/13/20
Project Management	150 days	Wed 4/22/20	Fri 11/20/20



7. Action Items
    - Inger to send spreadsheet to OKC Traffic – is there a database of information to prepopulate information? (Sarah)
    - Jesse/Heidi to schedule a day to measure existing buses at the transit center.
    - HNTB to deliver Design Criteria, updated Alignment Memo, Transit Center Memo, and updated station layout with comment resolution.

Project Name: Northwest BRT

Date of Meeting: 7/22/2020

HNTB Project #74876

Location: Microsoft Teams Meeting

Purpose of Meeting: Monthly Coordination

Time: 3:00 – 4:00pm

ATTENDEES:

EMBARK
Jason Ferbrache
Jesse Rush
Marilyn Dillon
Suzanne Wickenkamp
Michael Scroggins

Oklahoma City
Inger Peters
James Welch

HNTB
Heidi Katz
Marcus Geist
Makenzie Allen

MEETING AGENDA:

1. Introductions/attendees

2. Public Involvement
   - Stakeholder advisory group update – approval, adding a couple participants
   - Branding update – waiting to kick off branding
   - 1st public meeting – final alignment and station locations (late August)

3. Station/Alignment/Operating Plan
   - PW comments – 7/23 to HNTB
   - Alignment
     i. No comments
     ii. Villa stations – not being added to this project
     iii. Nearby projects to coordinate
   - Station layouts
     i. Comments being addressed - Review renderings
     ii. Near-side vs far-side discussion
     iii. Lighting requirements – working through design
        1. Full station, ADA beginning and end and lighting the sidewalk behind the station
     iv. High ridership station location (double shelter) options –
        1. Meridian
        2. 23rd Street and Classen
     v. NW Expressway station review workshop – July 28, 1-5pm
   - Operating Plan
     - Transit center circulation status

4. Define park and ride locations – use existing lots with updated striping/signing
   - Meridian – end of line
     i. Updated striping and signing
     ii. MOU with utilities department
   - Penn Square Mall or other location?

5. Stops
    - Design criteria
        i. Bus pad – may want to use concrete the whole bus pull-out
            1. Subgrade could help concrete
            2. PW uses 8" dowel reinforced concrete on 3" asphalt & 6" base
    - New Flyer bus analysis – 7/15
    - HNTB to call New Flyer to discuss standard BRT boarding height

6. Technology
    - Traffic meeting – 7/28
        i. Discuss plan for TSP
        ii. Traffic signal upgrade requirements
    - Traffic signal inventory – may not be required per 7/28 meeting
    - TSP discussion – mid-August
    - Need to do a field visit/inventory (with pictures)

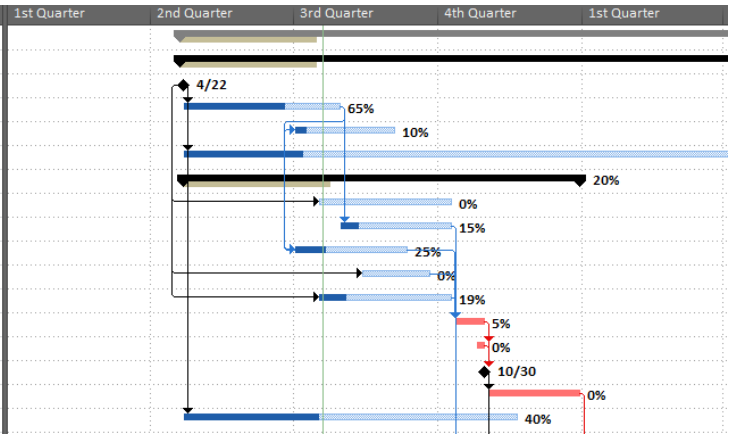
7. Subconsultants
    - Survey
        i. NW Expressway survey & utilities submitted
        ii. Classen/Downtown to be delivered on 8/1
    - Geotech
        i. Most walls will be small CIP – 3' or less
        ii. Up to 3 locations for MSE walls
        iii. Working with Geotech to begin drilling in the next couple weeks

8. Utilities/Right-of-Way
    - ROW needs will be discussed at workshop for NW Expressway on 7/28 & mid-August for Classen/downtown
    - Identifying utility conflicts as we lay out stations
    - Utility coordination meeting late August

9. Permits
    - What is required for this project?
        i. Electrical permits – through Development Services
        ii. Contractor permits

10. Review Schedule/Timelines

Task Name	Duration	%	Work
74876-DS-	**957 days?**	**3%**	**7,648 hrs**
NW BRT - OKC	**925 days?**	**3%**	**7,648 hrs**
[M] Notice to Proceed	0 days	0%	0 hrs
Survey	70 days	65%	0 hrs
Geotechnical Investigations	45 days	10%	0 hrs
Printing/Plotting/Travel	45 mons	6%	0 hrs
Preliminary Report - 30% Design	**175 days**	**20%**	**2,156 hrs**
PI & Branding	60 days	0%	274 hrs
Stations	50 days	15%	490 hrs
Stop Locations	50 days	25%	436 hrs
Ped Crossings, Guideway & Bike Lane	30 days	0%	174 hrs
Technology, Operating Plan, & Vehicles	60 days	19%	400 hrs
Cost Estimate & Report	15 days	5%	119 hrs
QA/QC reviews	5 days	0%	20 hrs
[M] Submit Preliminary Report	0 days	0%	0 hrs
City/EMBARK review	40 days	0%	0 hrs
Project Management	150 days	40%	243 hrs



11. Action Items
    - PW provide comments to HNTB
    - PW provide nearby projects to HNTB – (kmz)
    - HNTB to call New Flyer for standard bus height
    - HNTB to send recommendation for larger station locations – reach out to Chip
    - HNTB to create exhibit for Penn Sq Mall P&R
    - HNTB to determine number of spaces needed for P&R locations
        - End of line – 30 existing spaces
        - Penn sq mall
    - HNTB to provide schedule of deadlines for bus and platform technology needs
        - Specs
        - Schedule

The HNTB Companies
Infrastructure Solutions

Project Name: Northwest BRT

Date of Meeting: 8/26/2020

HNTB Project #74876

Location: Microsoft Teams Meeting

Purpose of Meeting: Monthly Coordination

Time: 3:00 – 4:00pm

*Meeting recording can be accessed via Microsoft Teams

ATTENDEES:

EMBARK
Jason Ferbrache
Jesse Rush

Oklahoma City
Inger Peters
James Welch
Sara Ferguson

HNTB
Heidi Katz
Marcus Geist
Makenzie Allen
Brian Comer
Eric Strack

MEETING MINUTES:

1. Introductions/attendees

2. Public Involvement/Stakeholders
   - Stakeholder advisory group update – approval, adding a couple participants
     i. Made progress – finalizing participants
     ii. Kickoff soon (early September, prior to public meeting)
   - Branding update – Deadline for branding – 12/31/2020
     i. Wanted steering committee input
     ii. Moving forward with branding
   - 1st public meeting –9/14 4:00-6:00pm – prep meeting 9/1 & 9/10
     i. Open House format – (available via teleconference?)
     ii. Follow-up planning meeting
   - Update on EMBARK stakeholder meetings -
     i. JZ Motors (NE corner of 63rd and Meridian) to close driveway – Jesse visited them, under new management, doing a remodel
     ii. Penn Square Mall to discuss P&R – Calls into Penn Sq, not called back
     iii. Oak Development to discuss moving Penn station – Moved station to W of Penn
     iv. Water Trust P&R/Development Update – Jesse met with them 8/25, need to discuss further to discuss scope

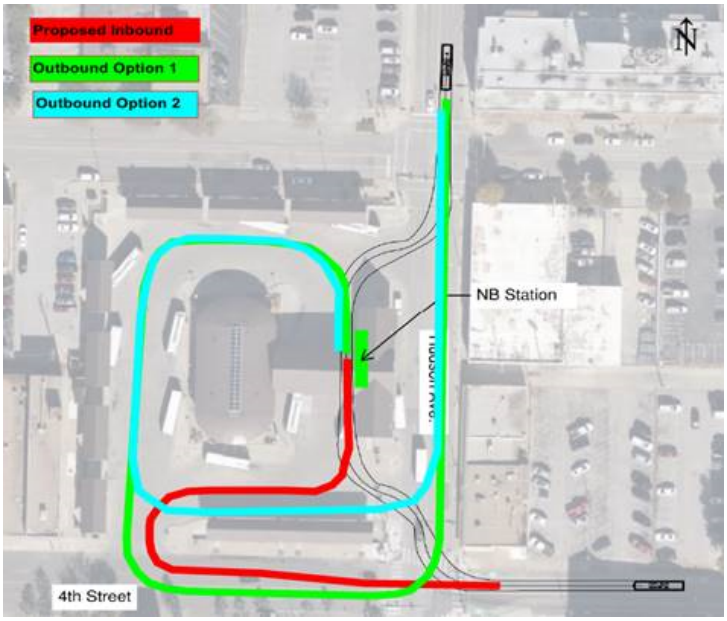
3. Local match projects
   - Is there a final list that can be sent to HNTB? MOU included the match project list
   - Was there a decision regarding the additional lanes at Penn – will that be added to HNTB's scope? – In the process of formally accepting the final traffic studies, not yet moved to council

4. Station/Alignment/Operating Plan
   - Alignment
     i. Downtown circulation – to remain as shown in alignment memo
   - Station layouts
     i. ADA inventory –

1. Can we send a list of intersections to the City to verify existing ADA compliance?
    a. The city does not require ADA upgrades for just signal box upgrades

ii. Lighting – being designed
iii. Foundation – preliminary footing layout
1. Marker: 6ft x 6ft x 14" deep spread footing (Assuming a 15 ft tall pylon and 2'-8" wide)
2. Shelter: 8" thick slab w/ 12" thick downturns 1'-0" outside of perimeter of shelter

- Classen station review workshop – August 31, 11:00am-5:00pm
- Operating Plan
    - HNTB to review and recommend movement



5. Park and ride locations –
    - Meridian – end of line (25 spaces – may expand with Water Trust development)
        i. Updated striping and signing
        ii. MOU with utilities department
        iii. Concern with number of spaces – likely to be increased with Water Trust development, planning to use existing parking lot to minimize costs in the interim
    - Penn Square Mall (25 spaces)
        i. Updated striping and signing
        ii. MOU with Penn Square Mall

6. Technology
    - TSP discussion – 8/13
        i. Follow-up meeting in mid-September

7. Subconsultants
    - Survey
        i. Classen/Downtown to be delivered on 8/1, full Classen 9/1

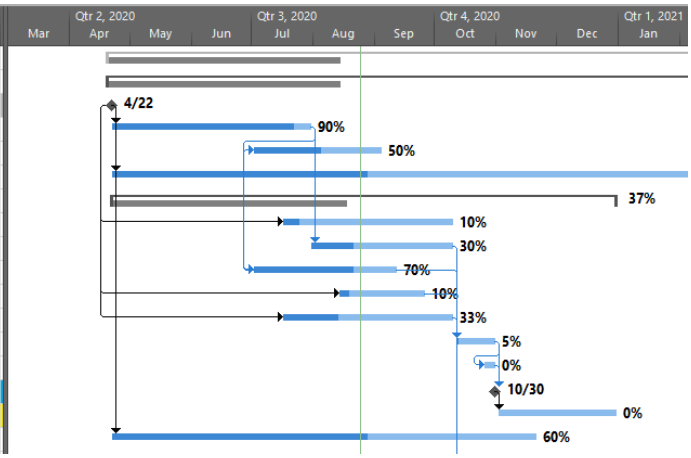
ii. Additional survey needs (so far):
    1. Portland and NW Expressway
    2. Meridian NB
    3. 56th and Portland
    4. Water trust triangle
    5. SW corner of Penn and NW Expressway

- Geotech
    i. 3 boring locations drilled
    ii. Terracon is working on the Geotech report

8. Utilities/Right-of-Way
    - ROW needs will be discussed at workshops
    - Utility coordination meeting – 8/31
        i. Can we show them preliminary exhibits for Classen as a discussion? yes
        ii. Exhibits to share:
            1. Full alignment with stations shown
            2. NW Expressway/Classen preliminary station layouts
            3. Preliminary station layout with dimensions

9. Review Schedule/Timelines

Task Name	Duration	Start	Finish
74876-DS-	**925 days?**	**Mon 4/20/20**	**Mon 11/13/23**
NW BRT - OKC	**925 days?**	**Mon 4/20/20**	**Mon 11/13/23**
[M] Notice to Proceed	0 days	Wed 4/22/20	Wed 4/22/20
Survey	70 days	Wed 4/22/20	Thu 7/30/20
Geotechnical Investigations	45 days	Thu 7/2/20	Thu 9/3/20
Printing/Plotting/Travel	45 mons	Wed 4/22/20	Wed 10/11/23
Preliminary Report - 30% Design	**175 days**	**Wed 4/22/20**	**Wed 12/30/20**
PI & Branding	60 days	Fri 7/17/20	Fri 10/9/20
Stations	50 days	Fri 7/31/20	Fri 10/9/20
Stop Locations	50 days	Thu 7/2/20	Fri 9/11/20
Ped Crossings, Guideway & Bike Lane	30 days	Fri 8/14/20	Fri 9/25/20
Technology, Operating Plan, & Vehicles	60 days	Fri 7/17/20	Fri 10/9/20
Cost Estimate & Report	15 days	Mon 10/12/20	Fri 10/30/20
QA/QC reviews	5 days	Mon 10/26/20	Fri 10/30/20
[M] Submit Preliminary Report	0 days	Fri 10/30/20	Fri 10/30/20
City/EMBARK review	40 days	Mon 11/2/20	Wed 12/30/20
Project Management	150 days	Wed 4/22/20	Fri 11/20/20



10. Stops
    - Curb height/bus door discussion
    - 14" bus floor height
    - New Flyer recommended 13" curb height
    - ADA level boarding requirements: 5/8" vertical and 2" horizontal
        - How far does the bridge plate extend to bridge the horizontal gap to platform?
            - The length of the ramp is 20".
        - What is the vertical leeway for the bridge plate?
            - The ramp can achieve an app. 5" vertical transition downward, BUT note that this would be at a +14 degree slope.
        - Does NF offer any recessed door options that had zero change of hanging on the platform.
            - We do have a front door slide glide door that when fully open does not extend outside of the bus body, HOWEVER, during its travel of opening it will extend beyond the bus body before retracting (this is on the front

door). Property should still design platforms that are below the floor height of the bus, that will ensure doors do hang up on platform and operationally allows for smoother boarding and de-boarding.

- Peoria BRT Example Notes:
  - City of Tulsa – 15" bus floor, toured Grand Rapids – they did a 15" curb height and it got caught
  - Tulsa built a 14.75" curb, not had problems with rubber getting caught
  - Got them within the 0.5" vertical, 1/4" tolerance
  - Recommend using a 13.75" curb height
  - Does the curb height limit EMBARK to only New Flyer?
  - Recently seen gap filler added to bus rather than curb, have not seen it included in bus procurement (retrofitted by agency)

11. Pedestrian crossings
    - Ped crossing at 42nd street not approved by traffic commission – last spring or fall (2019/2020)
    - Adding ped improvements to existing signal does not need to be approved by traffic commission
    - Need to request approval for new signal at 42nd

12. Action Items
    - HNTB to review and recommend movement for transit center.
    - Heidi (HNTB) to reschedule the 1st public meeting to 9/14 from 4:00 – 6:00 PM.
    - HNTB to do inventory of existing intersections for potential ADA upgrades – include a ped signal at 42nd street for New View.
    - HNTB to develop TSP exhibit for further discussions.
    - Jesse to follow up about how information will be presented at the Public meeting (open house vs. teleconference).
    - Jesse to reach out to JZ Motors again to talk with the new owner about the potential driveway closure.
    - Jesse to share preliminary plans of the Oak Development with HNTB to better inform design of the EB Penn Station.
    - Jesse to follow up with HNTB about the upcoming Water Trust Development to inform end of line station design and level of design/scope changes.
    - Inger to share MOU match project list with HNTB.
    - Inger to follow up with Eric Wenger after council approval of report about additional lane development at Penn and what projects will be pushed out first.

The HNTB Companies
Infrastructure Solutions

Project Name: Northwest BRT

Date of Meeting: 9/30/2020

HNTB Project #74876

Location: Microsoft Teams Meeting

Purpose of Meeting: Monthly Coordination

Time: 4:00 – 5:00pm

ATTENDEES:

EMBARK
Jason Ferbrache
Jesse Rush
Marilyn Dillon
Suzanne Wickenkamp
Michael Scroggins

Oklahoma City
Inger Peters
James Welch

HNTB
Heidi Katz
Marcus Geist
Makenzie Allen

MEETING MINUTES:

1. Introductions/attendees

2. Public Involvement/Stakeholders
    - Stakeholder advisory group update –
        i. Kristen is finalizing group
        ii. Waiting to hear back from INTEGRIS
        iii. Contact info for Penn Square needed
        iv. Working on diversifying the committee
    - Branding update – Deadline for branding – 12/31/2020
        i. Michael is putting together branding scope of work for RFP
    - 1st public meeting –
        i. Postponed until after 30% report is approved (Jan/Feb)
    - Update on EMBARK stakeholder meetings
        i. All station location meetings – inform HNTB of any changes to stations
    - 1% art criteria? – Confirmed that it is not a requirement for this project

3. Station/Alignment/Operating Plan
    - Alignment
        i. Transit center circulation – submitted 9/4
        ii. Any comments or approval?
        iii. Portland and NW Expressway ADA upgrade – HNTB to design a full ADA upgrade, consider widening an additional 'bus only' lane on the right side
            1. 4th street, left turn onto Broadway (example of left turn)
            2. ADT 53,000 on NW Expressway, 13,000 on S side of Portland
    - Classen station review workshop
        i. Submitted exhibits, minutes, actions
        ii. HNTB updated all geometric changes/ROW changes
        iii. OKC Planning confirmed 23rd street bricks are not historic and will be removed and replaced with striping for crosswalks
        iv. Outstanding question –
            1. Move 42nd ped signal to mid-block? yes
        v. OKC Planning comments

vi. Re-evaluation of stations that have shifted for FTA (submit to them as soon as we feel comfortable, one time is preferable – part of the 30% submittal, include drawings with documentation)
    1. Description of the purpose of the move
    2. Include considerations of the resources evaluated during the CE
    3. Keep consistent branding throughout the project
vii. Bike Lanes – should we include delineators? yes

BIKE TIER TABLE

TIER LEVELS	ROADWAY TREATMENT TYPE	SPEED RANGE *
TIER I (FLEXIBLE DELINEATORS REQUIRED)	10' OR 12' PAVED SURFACE BEHIND ROADWAY CURB	25 MPH +
	BIKE LANE	25 MPH +
	SEE SHEET ~~D805~~ D803 FOR DELINEATOR SPACING CRITERIA	
TIER II (FLEXIBLE DELINEATORS OPTIONAL)	BIKE LANE WITH NO BIKE BUFFER	25 MPH - 35 MPH
	BIKE LANE WITH BIKE BUFFER	25 MPH - 40 MPH
	~~BIKE LANE WITH BIKE BUFFER – BUFFER BETWEEN PARALLEL PARKING AND BIKE LANE – 3' MINIMUM BIKE BUFFER~~	25 MPH - 30 MPH
TIER III	SHARED BIKE LANE PAVEMENT MARKINGS	25 MPH - 35 MPH

*ALL ROADWAY SPEEDS ARE BASED UPON THE GREATER OF :
THE POSTED SPEED LIMIT OR THE 85TH PERCENTILE SPEED ROUNDED TO THE NEAREST 5MPH.

4. Park and ride locations – Keep this high-level, show Penn Sq mall access to corner parking lot, Meridian use cloud with note
    - Meridian – coordination with Water Trust property status
    - Penn Square Mall/Oak Development – status of discussions

5. Technology
    - Sent TSP exhibit for review 9/4
    - TSP discussion – 9/25

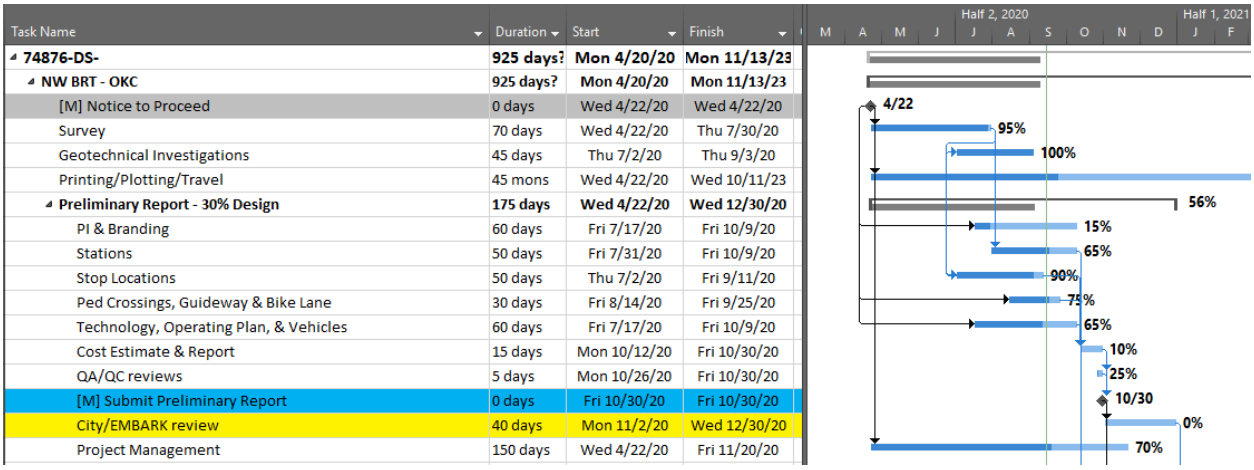
6. Subconsultants
    - Survey
        i. Received all survey
        ii. Additional survey needs identified:
            1. Portland and NW Expressway
            2. Meridian NB
            3. 56th and Portland
            4. Water trust triangle
            5. SW corner of Penn and NW Expressway
    - Geotech
        i. Geotech report received
        ii. HNTB beginning preliminary wall type analysis

7. Utilities
    - Utility coordination meeting 8/31
    - Chris Garrison managing utility coordination

- Finalize station locations by 30% design to help push utility coordination

8. Right-of-Way
   - Preliminary ROW needs identified and submitted with workshops
   - Per FTA agreement – ROW acquisition to begin October 15, 2020

9. Review Schedule/Timelines



Task Name	Duration	Start	Finish
74876-DS-	**925 days?**	**Mon 4/20/20**	**Mon 11/13/23**
NW BRT - OKC	**925 days?**	**Mon 4/20/20**	**Mon 11/13/23**
[M] Notice to Proceed	0 days	Wed 4/22/20	Wed 4/22/20
Survey	70 days	Wed 4/22/20	Thu 7/30/20
Geotechnical Investigations	45 days	Thu 7/2/20	Thu 9/3/20
Printing/Plotting/Travel	45 mons	Wed 4/22/20	Wed 10/11/23
Preliminary Report - 30% Design	**175 days**	**Wed 4/22/20**	**Wed 12/30/20**
PI & Branding	60 days	Fri 7/17/20	Fri 10/9/20
Stations	50 days	Fri 7/31/20	Fri 10/9/20
Stop Locations	50 days	Thu 7/2/20	Fri 9/11/20
Ped Crossings, Guideway & Bike Lane	30 days	Fri 8/14/20	Fri 9/25/20
Technology, Operating Plan, & Vehicles	60 days	Fri 7/17/20	Fri 10/9/20
Cost Estimate & Report	15 days	Mon 10/12/20	Fri 10/30/20
QA/QC reviews	5 days	Mon 10/26/20	Fri 10/30/20
[M] Submit Preliminary Report	0 days	Fri 10/30/20	Fri 10/30/20
City/EMBARK review	40 days	Mon 11/2/20	Wed 12/30/20
Project Management	150 days	Wed 4/22/20	Fri 11/20/20

10. Action Items
    Add local match update line item on regular agenda
    Any red flags or concerns, bring them up and lets talk
    - Match projects – sent project scope at end of July (PC-0730 bike lanes combining with MC 0669) – qualifications received, working on shortlists
      - Where are we on PC-0731 and the Independence sidewalk project?
      - Anticipate combining the other projects as one solicitation

11. Direct Action Items
    Jason:
    - To contact Mr. Ruiz

    EMBARK:
    - To reach out to individual stakeholders (property/business owners) at each station location
    - Perform field test of the 56th and Independence curb return with safety team and a bus
    - Perform a field test of the 'bus only left turn' option at Portland and NW Expressway

    Kristen:
    - To send Heidi spreadsheet with locations of Station Impacts

    Jesse:
    - To follow up with Oak Development and provide an update (have not heard since last meeting)
    - To follow up with meeting regarding the Water Trust update

    HNTB:
    - To Cloud the area of consideration for preliminary plan submittal, for the Water Trust update, and say 'To be coordinated with Water Trust'
    - To design a full ADA upgrade at Portland and NW Expressway
    - To develop a high-level cost estimate for adding a bus-only lane at Portland and NW Expressway

- To add "red flags" and "local match update" as a future line item to these meetings

OKC Public Works:

- To send out contract documents to EMBARK for A&E local match projects to make sure they follow federal processes

Marcus:

- To join EMBARK during the field verification of the 56th and Independence curb return with safety team and a bus

APPENDIX D: SPECIAL DISTRICT COORDINATION MEETING

The HNTB Companies
Infrastructure Solutions

Project Name: Northwest BRT

Date of Meeting: 6/25/2020

HNTB Project #74876

Location: Microsoft Teams Meeting

Purpose of Meeting: Monthly Coordination

Time: 3:00 – 4:00pm

ATTENDEES:

EMBARK
Jesse Rush
Marilyn Dillon

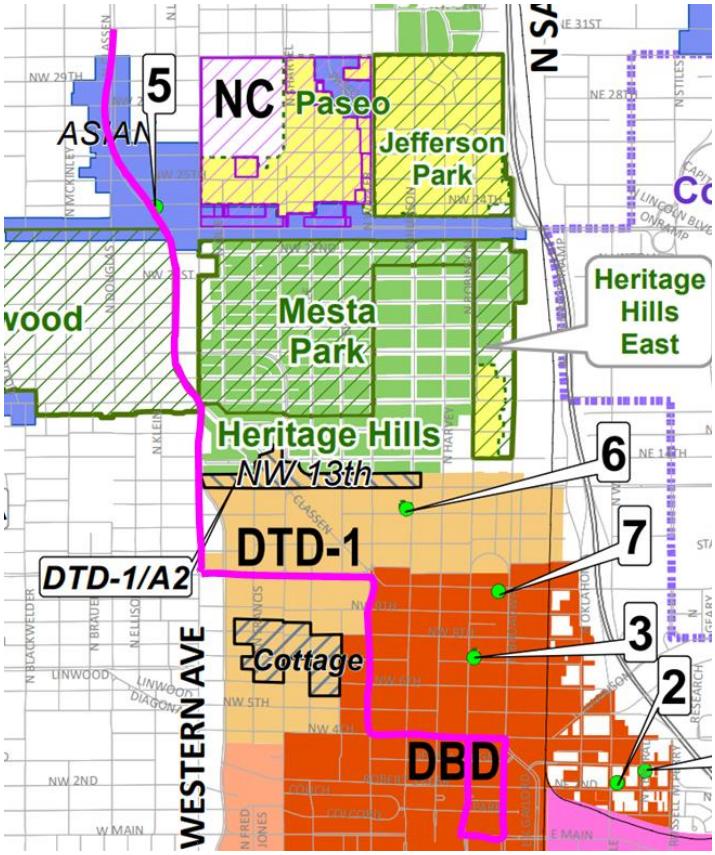
Oklahoma City
Inger Peters
Laura Griggs
Kathryn Friddle
Michael Philbrick

HNTB
Brian Comer
Heidi Katz
Marcus Geist
Makenzie Allen

MEETING AGENDA:

1. Introductions/attendees

2. Zoning Districts
   https://www.okc.gov/departments/planning/design-review-and-historic-preservation



North to South
- Urban Design Overlay District
  - Asian (BRT runs through)
  - Requires Urban Design Commission review – mixed zoning
  - Michael – Urban Design Commission (Commission meets fourth Wednesday of the Month)
    - The Asian District is not the only District in this segment. Uptown 23rd Street also exists in this area. The process for both districts would be the same. Coordination with the Urban Design Commission will depend on what is being proposed in this area.
    - Administrative approval may be the only necessary approach depending on what is proposed. This will be a smaller application fee and shorter turnaround time than going to commission. (Approvals completed each Monday)
    - Concern of disrupting pedestrian flow path and will be looked at as far as impacts to sidewalks. This will be looked at for all stops in each district.
  - Applications are required per district – the application fees are increasing (July 6th) to $200.
- Urban Conservation Zoning Overlay District [UCD]

        - Gatewood (Classen is eastern limit)
        - Special Zoning Regulations Required
        - Laura: Not aware of ordinance restrictions in this location.
            - HNTB to review Chapter 59: Zoning Code
    - Historic Preservation Zoning District [HP]
        - Heritage Hills (Classen is western limit)
        - Requires Historic Preservation Commission review
    - Downtown Transitional District [DTD-1/A2] (Classen is western limit)
        - Requires Downtown Design Committee review (Meets on the Third Wednesday of the Month)
        - HNTB to look over the DDF located on the cities website (Downtown Development Framework) that will guide stop location criteria.
        - A2 area will not impact the BRT
    - Cottage District [DTD-1] (BRT runs through)
        - Requires Urban Design Commission review
        - HNTB to update map – current map in the notes does not show how the BRT travels through this district.
    - Downtown Business District [DBD] (BRT runs through)
        - Requires Downtown Design Committee review

3. Submittal Requirements/Approvals Needed
    - Are they the same for each?
        - Applications are required per district.
    - At what point do we submit plans? 60%?
        - Preference is to submit at least with 60% plans, but if changes of any kind are made revisions would have to be submitted. Approvals are good for a year.
    - How long do they require for review periods?
        - Administrative approvals are completed weekly while commission approvals may take longer (monthly).
    - How are comments addressed?
        - EMBARK will complete review and then City staff.
    - What is the requirement for meetings/comment resolution?
        - City Staff to review prior to commission meetings.

4. Action Items
    - HNTB to include a DRAFT map of Stop locations & the amount of stops that are impacted by zoning.
    - HNTB to review the DDF (Downtown Development Framework) that located on the cities website that will guide stop location criteria.
    - HNTB to review Chapter 59: Zoning Code to determine ordinance restrictions for the UCD District (Gatewood).
    - HNTB to update map – current map in the notes does not show how the BRT travels through this district.

APPENDIX E: COMMENT RESOLUTION MATRIX

Form QF 04 Comment Resolution Form
Revision: 1
Revision Date: 09/04/2019

Project Name	Oklahoma City Northwest Bus Rapid Transit			Date	Initial
HNTB Contract #	74876				
Deliverable Type/Name	Report(s)	30% Design Report	Submitted for Review	10/25/20	MBA
Submittal/Phase	Preliminary Design		Review Complete	Varies	
Originator/Task Lead	Heidi Katz		Responses Provided		
Organization/Firm	HNTB		Responses Resolved		
Reviewer Name			Changes Made		
Organization/Disclnger Peterslir			All Changes Verified	10/26/20	HMK
Review Type	Owner/Client/Third Party Review				

ID	Sheet Name/ Sheet X of XX	Sheet No.	Comment Made by Initials	Comment (Limit to One Item Per Row)	Agree	Response	Resolved	Fixed/ Initials	Verified/ Initials
1	Email 6/15	NA	Jesse Rush	How much of a difference will it make if the connecting sidewalk is along the curb? Would the accessible path wind around behind the shelter? Would the station sit back farther behind the sidewalk? See bus stop guide PW uses (attached)	Yes	The station layouts will be updated to show connections to existing sidewalk at the front of each station. Sidewalk will still be shown behind the station, but each station platform is designed to have adequate sidewalk width on the station platform for pedestrians to access.	Yes	MBA	HMK
2	Email 6/15	NA	Jesse Rush	Is the marker going to contain a screen like on SC? It is our intent that it will.	Yes	Yes, the marker will contain a real time arrival (RTA) screen similar to that of the OKC streetcar.	Yes	MBA	HMK
3	Email 6/15	NA	Jesse Rush	If we wanted to expand these for 60' articulated buses 5 or 10 years from now is there anything we could do to make that easier when we're building them now?	No	The station platform could be widening in the future to accommodate 60' buses if required.	Yes	MBA	HMK
4	Email 6/15	NA	Jesse Rush	You have the TVM next to the marker in the middle drawing, but on the opposite side in the first drawing. Is this a space issue? Is there not enough room for the TVM and the accessible loading area to be next to each other in the first photo?	Yes	Updated.	Yes	MBA	HMK
5	Email 6/15	NA	Jesse Rush	Do you have a preference between two shelters or one big shelter?See attached	Yes	It is recommended to keep two separate shelters to keep future maintenance consistent.	Yes	MBA	HMK
6	Email 6/15	NA	Jesse Rush	I know it's constrained, but there isn't enough room for a small shelter? No TVM?	Yes	Constrained stations will be designed on a case-by-case basis. We have noted that EMBARK desires a shelter at every station if possible.	Yes	MBA	HMK
7	Email 6/15	NA	Jesse Rush	In the constrained picture, is the bench blocking the marker?	Yes	Yes, this will be updated to show the marker on the left side of the station instead of on the right.	Yes	MBA	HMK
8	Email 6/15	NA	Jesse Rush	Are there drainage concerns where the ITS and pull box are located? Seems like water would get trapped in the corner.	No	We will design and detail elevations to have positive drainage in corner. The ITS cabinet & pullbox have been moved to the top of the station platform (a high point) to mitigate drainage concerns.	Yes	MBA	HMK
9	Email 6/15	NA	Jesse Rush	What will be used as a birthing mark?	Yes	Yellow trucated domes will be used for the birthing mark.	Yes	MBA	HMK
10	Email 6/15	NA	Jesse Rush	The constrained layout must be the very very very last option.	Yes	Understood and will be discussed with EMBARK as needed.	Yes	MBA	HMK
11	Email 6/15	NA	Jesse Rush	The layout (TVM, Pylon, Trash etc) of the stops should be the same regardless of if it is a larger or smaller version.	Yes	Agree, station layouts will be updated to show conformity across.	Yes	MBA	HMK

12	Email 6/15	NA	Jesse Rush	We should be planning for a lighting requirement now. Where will a streetlight pole base go?	Yes	Lighting is provided underneath each shelter as well as by the marker. Additional ped poles have been added to the layouts.	Yes	MBA	HMK
13	PDF	1	James Welch	ITS cabinet looks really small. I suspect a larger cabinet would be desired. Single or double door? What size of pull box is being utilized.	Yes	Updated to include ODOT standard ITS cabinet and Pullbox.	Yes	MBA	HMK
14	PDF	1	James Welch	If future 12' path is intended, sidewalk needs to be 6' wide. Adding on a 7' section to a 5' existing is not visually appealing and I would expect negative public perception.	Yes	Updated sidewalk in station layouts to be 6'.	Yes	MBA	HMK
15	PDF	1	James Welch	Bike handle bars may stick out into 5' pathway. What is the distance from the bike rack to the edge of the 5' sidewalk?	Yes	The station layouts have been updated with improvements to the bike racks. The space from the bike rack to where the sidewalk starts is about 17". Standard bike widths are 24" and 68" in length. This would leave about 7" that the handlebars could interfere with the sidewalk. The sidewalk in this area has been widened to 6'.	Yes	MBA	HMK
16	PDF	2	James Welch	same comments from option 1.	Yes	Updated.	Yes	MBA	HMK
17	PDF	3	James Welch	Does this option not include a cabinet or pull box?	Yes	The layout has been updated to account for the Pullbox and ITS cabinet.	Yes	MBA	HMK
18	PDF	3	James Welch	6' minimum sidewalk from back of curb.	Yes	Updated.	Yes	MBA	HMK
19	Email 6/15	NA	Keith Wilkinson	Number 3 doesn't work from an ADA standpoint. A 30" wide x 48" deep area for a wheel chair is required for companion seating next to the bench.	Yes	Station layouts have been updated to inclde 2.5' x 4' Accessible waiting area pace.	Yes	MBA	HMK
20	Station Layout Meeting 06/23/2020	NA	Station Meeting 06/23/2020	Increase the space behind the marker to be a minimum of 4' to be ADA compliant. This will also create the ability to include double screens on the marker (front and back).	Yes	Updated area behind the marker to include a minimum of 4' to the handrail.	Yes	MBA	HMK
21	Station Layout Meeting 06/23/2020	NA	Station Meeting 06/23/2020	Per discussion with Keith Wilkinson it is reccomended to include truncated domes across the stations full length and down each ramp. The truncated domes indicate hazards for ADA users.	Yes	The layouts have been updated to include domes down each ramp and across the full stations length.	Yes	MBA	HMK
22	Station Layout Meeting 06/23/2020	NA	Station Meeting 06/23/2020	Move the TVM away from the ADA accessible loading area to the other side of the station to avoid a queue in the ADA accessible loading area.	Yes	Updated.	Yes	MBA	HMK
23	Station Layout Meeting 06/23/2020	NA	Station Meeting 06/23/2020	Add a curve where the existing sidewalk meets the station to direct users to travel behind the station if they do not plan to board the BRT.	Yes	Updated.	Yes	MBA	HMK
24	Station Layout Meeting 06/23/2020	NA	Station Meeting 06/23/2020	Widen each ramp to be as wide as the station similar to that of the OKC Streetcar.	No	Since we are providing sidewalk behind each station we would like to encourage users to travel around unless they plan to board the BRT to avoid heavy through traffic on the station platform.	Yes	MBA	HMK
25	Station Layout Meeting 06/23/2021	NA	Station Meeting 06/23/2020	Are there cleaning concerns with the high ridershInger Peters station shelters being close together?	No	Enough space will be provided between each shelter for a pressure washer to fit, but not enough room that a person can fit in between.	Yes	MBA	HMK
26	Station Layout Meeting 06/23/2022	NA	Station Meeting 06/23/2020	Can HNTB consider a wind screen for the high ridershInger Peters station as an option?	Yes	The shelters will be similar to the OKC Street car as these have glass panels that are provisions to help block the wind.	Yes	MBA	HMK
27	Station Layout Meeting 06/23/2023	NA	Station Meeting 06/23/2020	For the constrained option, it is priority to include a shelter over a bench.	Yes	Removed the constrained option, included a shelter and bench at every station	Yes	MBA	HMK
28	2020_06_29_Draft_Station Layout.pdf	1	Jesse Rush	Trash can is see through	Yes	Updated	Yes	JMW	HMK
29	2020_06_29_Draft_Station Layout.pdf	1	Jesse Rush	Please provide a foot candle layout for the lighting proposed	Yes	Included a write up and nightime rendering of the lighting, final lighting analysis and design will be completed during final design	Yes	MBA	HMK
30									
31									

Form QF 04 Comment Resolution Form

Revision: 1
Revision Date: 09/04/2019

Project Name	Oklahoma City Northwest Bus Rapid Transit		
HNTB Contract #	74876		
Deliverable Type/Name	Report(s)	30% Design Report	Submitted for Review
Submittal/Phase	Preliminary Design		Review Complete
Originator/Task Lead	Heidi Katz		Responses Provided
Organization/Firm	HNTB		Responses Resolved
Reviewer Name			Changes Made
Organization/Disclnger Pete			All Changes Verified
Review Type	Owner/Client/Third Party Review		

ID	Sheet Name/ Sheet X of XX	Sheet No.	Comment Made by Initials	Comment (Limit to One Item Per Row)	Agree	Response
1	Email 6/22	NA	Inger Peters	Sight distance: lets see where the conflicts are and mitigate if we can...at least each one won't be a "surprise" after construction.	Yes	Mitigated sight distance concerns at all locations except SB 23rd street station. SB 23rd street will remain as-is. Exising station is within sight distance triangle. Approved at 10/19/2020 ISD discussion with EMBARK and OKC.
2	Email 6/22	NA	Inger Peters	11' lane would be minimum.	Yes	Updated design criteria cell E15.
3	Email 6/22	NA	Inger Peters	Cross slope: yes call for 1.5% in standards (and hopefully achieve less than 2% in the field).	Yes	Updated design criteria cells C21,D21,E21
4	Email 6/24	NA	James Welch	Sight distance is measured in OKC 10' from the back of curb. I have attached OKC's official sight distance criteria. When developments are propose, OKC verifies that the Roadways within the development meet this criteria. I would recommend against assuming the stations will be see through for the following reasons. 1. The station platform will be raised with equInger Petersment: ticket vending, ITS cabinet, benches, trash, ect. I know that traffic management fields phone calls complaining about sights distance obstructions (traffic control boxes) that meet OKC sight distance criteria 2.IT would not surprise me if a poster or adds magically appeared at some point in time on the glass. 3.While those waiting to use the bus do are not technically considered an obstruction because they are not a fixed object, If the BRT is as successful as hoped for, the stations will have people waiting a fair amount of time.	Yes	Updated Sight Distance Criteria (back of curb distance) to 10' in Design Criteria.
5	Email 6/24	NA	James Welch	The existing lanes on NW Expressway are 12'. On all new roadway designs, the consultants are being directed to design for 12' lanes. – I recommend a minimum of 12' lane for the bus pullout. An 11' lane would meet the minimum requirements.	Yes	Updated bus pullot lane width to 12' in Design Criteria.
6	Email 6/24	NA	James Welch	I will leave the decision to build a full acceleration lane for the bus up to EMBARK. Keep in mind that 200' is approximately 4 bus lengths for the bus to fully merge. https://nacto.org/publication/transit-street-design-guide/stations-stops/stop-configurations/curbside-pull-stop/	Yes	Per conversation from the monthly coordination meeting it was decided by the group that a 300' distance is preferred over a 200' distance for the bus pulloffs. Updated in Design Criteria.
7	Email 6/24	NA	James Welch	1.5% is a good design slope. ADA and OKC standards allow for up to a 2% cross slope, I'm glad HNTB is designing to a lesser slope. The 3rd attachment are the standards which the paving sections builds ramps to. Hopefully Eric will sign off on these soon for city wide use.	Yes	Design criteria represents a 1.5% design slope for Sidewalks.

8	Email 6/24	NA	James Welch	Please see the second attachment – this a memo from Eric dated August 15, 2012. This should answer most of your questions. Also, please see the D-800 pdf dated 2/21/20.	Yes	Added information from these attachments for commercial driveway considerations in rows 46, 47 of the spreadsheet.
9	Email 6/24	NA	James Welch	OKC paving does not have an opinion on designing the concrete bus pad with fiber reinforcement to avoid cracking. When your pavement thickness is 8” or greater I would recommend adding some rebar.	Yes	To avoid cracking, HNTB recommends fiber-reinforced concrete for the bus pad
10	74876 NW BRT_Design Criteria_Review Comments.pdf	1	Jesse Rush	Why is the station length shorter than the bus pad length?	Yes	The Bus pad length is longer in length to encompass where the bus will be stopping and starting. The bus pad and station do not line up because the bus will be boarding passengers at the ADA loading zone located on each station platform.
11	74876 NW BRT_Design Criteria_Review Comments.pdf	1	Jesse Rush	Comment on the Bike Lane Criteria: "We are designing to a 12' multi use lane for bikes"	Yes	Updated by adding a row underneath bike lane criteria
12	74876 NW BRT_Design Criteria_Review Comments.pdf	2	Jesse Rush	Comment on assumption 6: Is the concrete bus pad really 10" thick?	Yes	Yes, with reinforcement to reduce cracking
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						
40						
41						
42						
43						
44						
45						
46						
47						

Form QF 04 Comment Resolution Form

Revision: 1

Revision Date: 09/04/2019

Project Name	Oklahoma City Northwest Bus Rapid Transit			Date	Initial
HNTB Contract #	74876				
Deliverable Type/Name	Report(s)	30% Design Report	Submitted for Review	10/25/20	MBA
Submittal/Phase	Preliminary Design		Review Complete	1/2/00	
Originator/Task Lead	Heidi Katz		Responses Provided		
Organization/Firm	HNTB		Responses Resolved		
Reviewer Name			Changes Made		
Organization/Disclnger Pete			All Changes Verified	10/26/20	HMK
Review Type	Owner/Client/Third Party Review				

ID	Sheet Name/ Sheet X of XX	Sheet No.	Comment Made by Initials	Comment (Limit to One Item Per Row)	Agree	Response	Resolved	Fixed/ Initials	Verified/ Initials
1	20200701_NW_BRT_ Transit_Center_Analys is. Pdf	2	Jason Ferbrache	Perform field test and hazard analysis	Yes	EMBARK performed field test	Yes	MBA	HMK
2	20200701_NW_BRT_ Transit_Center_Analys is. Pdf	2	Jason Ferbrache	Images should indicate direction of travel	Yes	Updated	Yes	MBA	HMK
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									

Form QF 04 Comment Resolution Form

Revision: 1
Revision Date: 09/04/2019

Project Name	Oklahoma City Northwest Bus Rapid Transit			Date	Initial
HNTB Contract #	74876				
Deliverable Type/Name	Report(s)	30% Design Report	Submitted for Review	10/25/20	MBA
Submittal/Phase	Preliminary Design		Review Complete	Varies	
Originator/Task Lead	Heidi Katz		Responses Provided		
Organization/Firm	HNTB		Responses Resolved		
Reviewer Name			Changes Made		
Organization/Disclnger Pete			All Changes Verified	10/26/20	HMK
Review Type	Owner/Client/Third Party Review				

ID	Sheet Name/ Sheet X of XX	Sheet No.	Comment Made by Initials	Comment (Limit to One Item Per Row)	Agree	Response	Resolved	Fixed/ Initials	Verified/ Initials
1	Paving - 2020.07.28_NW BRT NW Expressway Station Location Review Minutes	1	James Welch	Water Trust Property - From field meeting on 8/4/2020 - roundabout option is strongly encouraged. (Traffic Management specifically asked about this)		Coordination is ongoing			
2	Paving - 2020.07.28_NW BRT NW Expressway Station Location Review Minutes	1	James Welch	Water Trust Property - Will parking spaces be enough to facilitate all the riders expected at this park and ride location? 25 people doesn't even fill up 1 standard bus.		Coordination is ongoing			
3	Paving - 2020.07.28_NW BRT NW Expressway Station Location Review Minutes	1	James Welch	SB Meridian - From field meeting on 8/4/20 - would have to relocated a very large drainage structure (8 hoods)	Yes	Drainage will be designed with final design - preliminary analysis reveals an option to limit relocations needed	Yes	MBA	HMK
4	Paving - 2020.07.28_NW BRT NW Expressway Station Location Review Minutes	2	James Welch	NB Portland - From field meeting on 8/4/20 - observed in the field EB traffic que's longer than the right turn lane	Yes	Portland station was moved back to NW Expressway, that will eliminate this conflict	Yes	MBA	HMK
5	Paving - 2020.07.28_NW BRT NW Expressway Station Location Review Minutes	2	James Welch	NB Portland - This will set up the same situation as NB Classen at NW Expressway. This most likely would require relocation of the existing trail and adding another lane for NB Specifically for the bus.	Yes	Portland station was moved back to NW Expressway, that will eliminate this conflict	Yes	MBA	HMK
6	Paving - 2020.07.28_NW BRT NW Expressway Station Location Review Minutes	2	James Welch	SB Portland - Not recommended to have the trail crossing through the station. Trail and station need to remain separate.	Yes	SB Portland station has been updated and moved to be shown on Portland Avenue to avoid the interference with the Trail.	Yes	MBA	HMK
7	Paving - 2020.07.28_NW BRT NW Expressway Station Location Review Minutes	2	James Welch	NB Independence - Include cost for future maintenance in this location	No	Maintenance costs not included with cost estimate	Yes	MBA	HMK

8	Paving - 2020.07.28_NW BRT NW Expressway Station Location Review Minutes	3	James Welch	NB Independence - Matching funds sales tax project calls for sidewalk to be on both sides of N Independence Ave. This will most likely require retaining wall on the east side from NW 56th street past the planned station. Best to acquire ROW only once.	No	Not including design of wall or right-of-way outside the station limits	Yes	MBA	HMK
9	Paving - 2020.07.28_NW BRT NW Expressway Station Location Review Minutes	3	James Welch	WB Penn - From field meeting on 8/4/20 - Very large grade difference at NW Expressway and Penn Ave. (length of ADA ramp)	Yes	Designing a switch-back connection to meet ADA requirements	Yes	MBA	HMK
10	Paving - 2020.07.28_NW BRT NW Expressway Station Location Review Minutes	3	James Welch	EB Penn - No need for all red. Traffic signal upstream will provide break with phase 5 left turns. (SB left)	Yes	Will design TSP to allow lefts but still create a gap for the bus to pull out into traffic	Yes	MBA	HMK
11	Paving - 2020.07.28_NW BRT NW Expressway Station Location Review Minutes	3	James Welch	EB Penn - West? Referring to the car wash?	No	Moving EB Penn station to West side of Penn	Yes	MBA	HMK
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									
42									
43									
44									
45									
46									

Form QF 04 Comment Resolution Form

Revision: 1

Revision Date: 09/04/2019

Project Name	Oklahoma City Northwest Bus Rapid Transit			Date	Initial
HNTB Contract #	74876				
Deliverable Type/Name	Report(s)	30% Design Report	Submitted for Review	10/25/20	MBA
Submittal/Phase	Preliminary Design		Review Complete	Varies	
Originator/Task Lead	Heidi Katz		Responses Provided		
Organization/Firm	HNTB		Responses Resolved		
Reviewer Name			Changes Made		
Organization/Disclnger Pete			All Changes Verified	10/26/20	HMK
Review Type	Owner/Client/Third Party Review				

ID	Sheet Name/ Sheet X of XX	Sheet No.	Comment Made by Initials	Comment (Limit to One Item Per Row)	Agree	Response	Resolved	Fixed/ Initials	Verified/ Initials
1	Email Correspondance		Stuart Chai	A non-warranted signal appears to be proposed at Classen and NW 42nd Street. The TTC has already considered this location for a signal and did not approve it. If you do pursue a signal, you will need to include modifying the Classen median for N/S left turn lanes.	Yes	Response from Jesse Rush: Change it to the mid-block that you had talked about previously. That would avoid the need for turn lanes and you could have a more direct tie to new view	Yes	MBA	HMK
2	Email Correspondance		Stuart Chai	I don’t know if this was conveyed to you BUT the route around the south side of Integris Baptist Hospital is of minimal use BECAUSE of the hours the service may run. Due to how hospitals work shifts, the rout will ONLY serve 1 of 3 shifts, which makes running it around the hospital pretty much without purpose. I recommend that EMBARK seriously consider saving some money and transit time and cutting this part of the route out. It will be pretty worthless.	No	Reasons HNTB reccomends keeping the alignment: For the INTEGRIS hospital the route is intended to serve INTGRIS and Deaconess and all of the employment and medical services between. This change was also based on input from the Hospital who wanted more direct access to the service. We do realize the service will not cover all shifts but the hospital noted that they have a lot of visitors at their complex, many from out of town, who would like access to other parts of the City. Hospitals are typically important trInger Peters generators and have many employee classifications that represent good transit markets, such as administrative, housekeeping, etc. Although the service span only serves one complete shift, parts of the other shifts are served as well. This allows employees to use transit for one part and another mode for the other (e.g., ridesharing, pick up/drop off by another driver). Operation on 56th Street and N. Portland allows service to several commercial and residential areas that otherwise wouldn’t be served well, or at all.	Yes	MBA	HMK
3									
4									
5									
6									
7									
8									
9									
10									
11									

Form QF 04 Comment Resolution Form

Revision: 1
Revision Date: 09/04/2019

Project Name	Oklahoma City Northwest Bus Rapid Transit			Date	Initial
HNTB Contract #	74876				
Deliverable Type/Name	Report(s)	30% Design Report	Submitted for Review	10/25/20	MBA
Submittal/Phase	Preliminary Design		Review Complete	Varies	
Originator/Task Lead	Heidi Katz		Responses Provided		
Organization/Firm	HNTB		Responses Resolved		
Reviewer Name			Changes Made		
Organization/Disclnger Pete			All Changes Verified	10/26/20	HMK
Review Type	Owner/Client/Third Party Review				

ID	Sheet Name/ Sheet X of XX	Sheet No.	Comment Made by Initials	Comment (Limit to One Item Per Row)	Agree	Response	Resolved	Fixed/ Initials	Verified/ Initials
1	Email Correspondance		James Welch	For the BRT. Not sure if regular buses will use. Think that number was 5 minutes behind schedule.	No	Per discussion with EMBARK, the preference is for the TSP to be applied to both regular and BRT buses	Yes	MBA	HMK
2	Email Correspondance		James Welch	Shortens the max green time for other phases, thus reducing the red time for transit […]	Yes	This option can shorten the maximum green time, take a few seconds from other phases, or shorten the red time for the transit vehicle as it approaches.	Yes	MBA	HMK
3	Email Correspondance		James Welch	The westbound phase? Do you mean phase 8? To add clarity, call out west bound for those not familiar with traffic signal operations	Yes	Updated to say the westbound phase	Yes	MBA	HMK
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									

Form QF 04 Comment Resolution Form

Revision: 1
Revision Date: 09/04/2019

				Date	Initial
Project Name	Oklahoma City Northwest Bus Rapid Transit				
HNTB Contract #	74876				
Deliverable Type/Name	Report(s)	30% Design Report	Submitted for Review	10/25/20	MBA
Submittal/Phase	Preliminary Design		Review Complete		
Originator/Task Lead	Heidi Katz		Responses Provided		
Organization/Firm	HNTB		Responses Resolved		
Reviewer Name			Changes Made		
Organization/Disclnger Pete			All Changes Verified		
Review Type	Owner/Client/Third Party Review				

ID	Sheet Name/ Sheet X of XX	Sheet No.	Comment Made by Initials	Comment (Limit to One Item Per Row)	Agree	Response	Resolved	Fixed/ Initials	Verified/ Initials
1	ISD exhibit	1	James Welch	Appears that the new shelter would be closer to the road than the existing one. Move the shelter structure back as far as possible.	Yes	Widened station platform to get shelter and pylon out of site line	Yes	MBA	HMK
2	ISD exhibit	2	James Welch	Looks like retaining wall will be required. If possible, move physical location of shelter and marker 1' - 2' back. Expect not much more in construction costs for this.	Yes	Widened station platform to get shelter and pylon out of site line	Yes	MBA	HMK
3	ISD exhibit	2	James Welch	Appears to require a ROW take - Does the shown allow the land owner to keep 90 degree parking per OKC ordinance? If the physical location of the shelter can be moved back 1'-2' and obtain sight distance with no additional impacts to the parking compared to currently shown - recommend having the shelter location moved back as far as practical.	Yes	Widened station platform to get shelter and pylon out of site line, the aerial was off in this exhibit, no ROW is required	Yes	MBA	HMK
4	ISD exhibit	4	James Welch	Shift shelter and marking back by 1'-2'. Slightly wider landing at top.	Yes	Widened station platform to get shelter and pylon out of site line	Yes	MBA	HMK
5	ISD exhibit	5	James Welch	Further discussion with group. New shelter will be larger than existing.	Yes	Due to existing constraints, the station will remain as designed. The shelter and pylon are within the ISD sight triangle, but the existing shelter is also within the ISD sight triangle. Due to the low volume of vehicles exiting the vet clinic in that alley, a design exception to leave the station in this location was approved during the meeting.	Yes	MBA	HMK
6	ISD exhibit	5	James Welch	Exit for vet parking - angle parking makes this the exit	Yes	See ID #5 comment	Yes	MBA	HMK
7	ISD exhibit	6	James Welch	Sight distance line - Note, Bike lane is considered a lane and vehicles should not be entering it	Yes	Shifted station to NW corner of island at 13th and Classen	Yes	MG	HMK
8	ISD exhibit	6	James Welch	Note - Vehicles also need to view bikes. Used criteria for 25 MPH = 235'. Approximately drawn in to location.	Yes	Shifted station to NW corner of island at 13th and Classen	Yes	MG	HMK
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									

APPENDIX F: STATION LOCATION WORKSHOP MINUTES

Project Name: Northwest BRT

Date of Meeting: 7/28/2020

HNTB Project #74876

Location: 431 W Main – EMBARK Large Conf and Microsoft Teams Meeting

Purpose of Meeting: NW Expressway Station Location Review

Time: 1:00 – 5:00pm

ATTENDEES:

EMBARK
Jason Ferbrache
Jesse Rush
Marilyn Dillon
Kristen Torkelson
Suzanne Wickenkamp
Michael Scroggins
Chip Nolen

Oklahoma City
Inger Peters
Sarah Ferguson
James Welch

HNTB
Brian Comer
Heidi Katz
Marcus Geist
Makenzie Allen

MEETING MINUTES:

1. Introductions/attendees

2. Review Station Locations from Water Trust Property to Pennsylvania:
    - Water Trust – End of Line
        i. Constructability – Potential power pole relocation minimum of 3' needed from back of curb, adjust lane addition to avoid high voltage power pole
        ii. Coordination meeting about the Roundabout – Next week (8/3)
        iii. HNTB to verify that AutoTurns for a larger bus option (60' Articulated Bus) can make the turnaround
        iv. HNTB to verify that the stop bar in the NE corner of the triangle allows for car storage at the bus turnaround.

    - NB Meridian
        i. Update station to be a Standard platform
            1. OGE pole relocation
            2. EMBARK to talk with property owner about NW driveway closure.
        ii. EMBARK to look into the possibility of relocation near Academy Sports/ apartments.

    - SB Meridian
        i. Where applicable maintain station distance to be 100' from the intersection
        ii. Potential Hazard – car turning into 7-11 by routing around the bus could cause a collision.
            1. South 28th / May Example
        iii. EMBARK to verify collisions or incidents due to existing bus shelter obstruction.
        iv. HNTB to verify space behind station platform to add a bike rack if space allows.

    - NB Portland – Possible move to Portland
        i. Drainage concern – details to be determined in final design

ii. HNTB to evaluate Portland signal timing for 1-stage versus 2-stage pedestrian crossing
    1. Verify the effect on run times with each stage
iii. There are existing examples where the extra lane turns into a right turn lane. HNTB to look further into this for striping or special treatment to detour motorists from turning into the Bus pull-out.
iv. This is an all red signal location

- SB Portland – 3 options
    i. Option on NW Expressway
        1. ROW could be purchased so the trail could be routed behind the station platform.
        2. It is not recommended that the bus run with traffic due to high traffic volumes on NW Expressway.
    ii. Option on corner of NW Expressway/Portland
        1. Bus is too close to intersection. There is no room for cars to be stored while it dwells.
    iii. Option block south on Portland
        1. Gas line runs along SB Portland potential to pothole depending on the depth. Verify at utility coordination meeting.
        2. HNTB to develop a critical utility list to provide to the city for utility coordination meeting.
    iv. Can both NB/SB stations be shifted to Portland?
        1. HNTB to verify that these locations have been cleared.
        2. This would be cost effective because no bus pull-out would be needed.
        3. NB option could have a transit only left turn so that it does not have to cross three lanes of traffic to turn onto NW Expressway.
    v. Preference is for HNTB to design for SB Portland Option 3

- EB 56th / Portland
    i. It was noted that there are many utilities through ROW area – Trail Project
    ii. Include an additional bike rack if space allows.

- WB 56th / Portland
    i. EMBARK to talk with the bank about closing the driveway west of the station.
    ii. Keep the station how it is shown with the sidewalk interfering slightly with the existing parking lot.

- NB Independence
    i. EMBARK to obtain a rough idea of ROW cost.
    ii. Purchase additional ROW behind the wall for constructability/grading.
    iii. Improvements to the existing midblock crossing? Include costs for:
        1. LED Ped Sign
        2. New striping (field verify but was discussed recently replaced with mill/overlay project on Independence)
        3. Pedestrian Push Button
        4. Handrail for wall
        5. Possibility to add Artwork on Retaining Wall – Inger to confirm Art percent requirement

- SB Independence

i. Combine regular bus stop with BRT station
ii. EMBARK would like to reuse the existing shelter
iii. Expressway / Independence Bond Project – Sidewalk at the intersection
    1. The City will verify the length of sidewalk needed to connect to the station.
    2. Sidewalk will be constructed on both sides of Independence – Matching funds

- WB Pennsylvania – 2 options
    i. Bus Pull-out Only
        1. Drainage impact location to be determined later in design
        2. Penn Square Mall intersection signal improvements to allow time for the bus to merge
    ii. Additional Lane
        1. Traffic Impact Study results should be sent to council in the month of August. Inger to provide feedback on the best solution on how to approach BRT construction with the potential of an additional traffic lane.
        2. HNTB to design and account for future 12' additional lane at this time.
        3. Shortening the turn lane is not recommended – Provide solutions for the safety of the bus to merge in and out of traffic at this location.
            a. Signal improvements at Penn Square mall to allow for a safe bus merge.
        4. Evaluate feasibility of mall parking for park'n'ride
            a. Embark to discs with Penn Square Mall

- EB Pennsylvania – 2 options
    i. Additional Lane
        1. Provide an all red solution at Pennsylvania to allow the bus to merge back safely into traffic
        2. EMBARK to talk with property owner about the potential of closing the driveway east of the station location
        3. HNTB to design and account for future 12' additional lane at this time.

3. Action Items
    - HNTB to develop list of utility concerns – provide list to Inger. HNTB to participate in Utility coordination meeting.
    - EMBARK-Share invite with HNTB for the Water Trust Property Roundabout coordination meeting.
    - EMBARK -Provide rough idea for per sq. ft. ROW cost.
    - EMBARK to talk with Property owners about potential driveway closures at station locations:
        i. NB Meridian / 63rd Street
        ii. WB 56th / Portland
        iii. SB NW Expressway / Penn
    - Inger to obtain Art percentage requirement
    - EMBARK to verify collisions or incidents due to existing bus shelter obstruction at WB 63rd / Meridian.
    - Inger to report back to the group in late August about the results of the Traffic Impact Study near NW Expressway / Penn
    - HNTB to verify NB / SB Portland potential station relocation areas have been cleared.

The HNTB Companies
Infrastructure Solutions

Project Name: Northwest BRT

Date of Meeting: 8/31/2020

HNTB Project #74876

Location: 431 W Main – EMBARK Large Conf and Microsoft Teams Meeting

Purpose of Meeting: Classen and Downtown Station Location Review

Time: 11:00am – 5:00pm

ATTENDEES:

EMBARK
Jesse Rush
Marilyn Dillon
Suzanne Wickenkamp
Chip Nolen

Oklahoma City
Inger Peters
Sarah Ferguson
James Welch
Lakesha Dunbar

HNTB
Brian Comer
Heidi Katz
Marcus Geist
Makenzie Allen
Eric Strack

MEETING MINUTES:

1. Introductions/attendees

2. Review Station Locations for Classen and Downtown.
    - Broadway / Main
        i. Potential Parking Garage Entrance – verify the station does not disrupt entrance.
        ii. Add new trees / relocate? – typically, parks or Downtown OKC will trim trees to prevent them from scratching the bus - Include line item for tree removal and new trees.
        iii. Do Not Disturb inlet
    - Robinson / Park
        i. Pull out curb return (30' radius)
        ii. Is this location far enough in front of the intersection?
        iii. Determine if there are tunnels or basements that run under the station location (Downtown).
    - SB Hudson / 7th
        i. Safety considerations for visibility from the coffee shop driveway
            1. Dwell time – 15 second unless there is an ADA boarding (2 minutes)
        ii. High potential of ADA boarding in this location
        iii. Add station to preliminary hazard analysis
    - EB 10th Street Station
        i. Concrete box near the sidewalk connection from the driveway
        ii. Flooding concern in this area
        iii. Evaluate ADA compliance with the sidewalk connection behind the station
        iv. Agree with removal of additional ADA ramp and bike rack at station to avoid disturbance of the existing Manhole.
        v. Stretch the normal bus (5') boarding to the East to place pylon on the platform
    - WB 10th Street Station
        i. Steep grade of road in this location (station will be 1% cross slope)
        ii. Longitudinal slope will remain with street as much as possible for level boarding purposes.

- 13th and Classen (NB)
    i. Bike lane similar to 4th & Robinson (Streetcar)
    ii. High potential of ADA boarding in this location
    iii. The third lane will be a bike lane that runs from 10th to 16th (to meet the Kimley Horn design)
    iv. 12th and Classen (bus shelter)
        1. Potential to move bus stop to new BRT location
    v. 13th street
        1. Plans for a Scooter's Coffee (existing gas station on the west side)
        2. Plans for an OnCue on the West side
- 13th street and Classen (SB)
    i. ADA for 12th street or 13th street – preference is that pedestrians would travel to 13th
        1. ADA enunciator should specify the direction of travel (exit North to get to 13th street) because 12th is not signalized
    ii. Route 5 and BRT share routes (could reallocate stops to share with BRT)
- 18th and Classen (NB)
    i. Nearside stop due to parking
- 18th and Classen (SB)
    i. All comments included in Action Items
- 23rd and Classen (NB)
    i. Extend ROW shape to nearest intersection
    ii. Are the bricks a requirement of the area?
        1. Could stripe adjacent to the bricks (removal would require pavement)
        2. Unless the bricks are there for historical or beautification purposes, removal of the bricks is preferred.
    iii. Constructability would require patching of some sort – HNTB to evaluate the solution
- 23rd and Classen (SB)
    i. Survey request for exact location of the Walgreens sign
    ii. ADA domes are not required at commercial entrances
    iii. Leave as shown
- 30th and Classen (NB)
    i. Identifying the ROW that is potentially available for purchase is a benefit that will help with conversations.
- 30th and Classen (SB)
    i. Comments included in Action Items below.
- 36th and Classen (NB)
    i. In this location, 60' from the back of bus to the nearest intersection
    ii. 80 to 100' is preferred for the distance from the back of the bus to the intersection
- 36th and Classen SB - No comments
- 42nd and Classen NB
    i. Take into consideration – special ADA additions for visually impaired at the crossing
        1. Crosswalk – additional, approved tactile warning surface to facilitate crossing for the visually impaired
        2. Audible push buttons – ADA requirement
    ii. Move crossing to the right of the existing manhole to keep the crossing straight across – if possible

- 42nd and Classen SB
    i. Retaining Wall location - to be evaluated
- NW Expressway & Blackwelder NB
    i. 2-stage on the West side only or 1-stage with crossings on both sides of the intersection – to be discussed further
    ii. Drainage will ask for urbanized flow rate – model (calculations) replacement should be at capacity or better for a relocation
- NW Expressway & Blackwelder SB - No comments

3. Action Items:
    - Broadway Station –
        - Send HNTB plans for City Center parking garage – confirm there is not a conflict with the Broadway station
    - 7th Street Station
        - Discuss station location (in front of patio) with Elemental Coffee
        - Add Elemental Coffee exit to preliminary hazard analysis
    - 10th Street Stations
        - EMBARK to confirm if they want additional pedestrian crossing improvements – currently no special design, leaving existing condition
    - 18th Street and NB Classen
        - EMBARK to talk to Homeland about ROW purchase & adding cart corral
        - HNTB to extend ROW taking to intersection
    - 18th Street and SB Classen
        - EMBARK to talk to neighborhood association about 'plaza' idea
        - HNTB move crosswalk south next to 17th Street
    - 23rd Street and NB Classen
        - EMBARK to talk to CVS/owner of parking lot about ROW
        - HNTB to extend ROW taking to intersection
        - OKC Planning to verify if bricks are historical
        - OKC PW to share any as-builts or plans for 23rd street intersection
    - 23rd Street and NB Classen
        - EMBARK to talk to Walgreens/owner of parking lot about ROW & potential sidewalk easement around entrance
    - 30th Street and NB Classen
        - EMBARK to talk to Pho Cuong owner about ROW taking and entrance closure
        - HNTB to extend ROW taking to intersection
    - 30th Street and SB Classen
        - EMBARK to talk to owner about ROW taking and entrance closure
        - HNTB to add curb to the intersection to not allow access behind station
        - OKC Planning to see if the sidewalk is included in Classen sidewalk improvements project
    - 42nd and NB Classen
        - EMBARK to talk to owner about entrance closure
        - HNTB to straighten North Classen crossing, add extra improvements on ped signal for visually impaired
    - 42nd and NB Classen
        - HNTB to design ADA accessible path to New View – final design

APPENDIX G: INTERSECTION SIGHT DISTANCE (ISD) MEETING MINUTES AND ISD EXHIBITS

The HNTB Companies
Infrastructure Solutions

Project Name: Northwest BRT

Date of Meeting: 10/19/2020

HNTB Project #74876

Location: Microsoft Teams Meeting

Purpose of Meeting: NW BRT Intersection Site Distance

Time: 11:00 – 12:00 pm

ATTENDEES:

EMBARK
Jesse Rush

Oklahoma City
James Welch
Sara Ferguson
Inger Peters

HNTB
Heidi Katz
Marcus Geist
Makenzie Allen
Eric Strack
Brian Comer

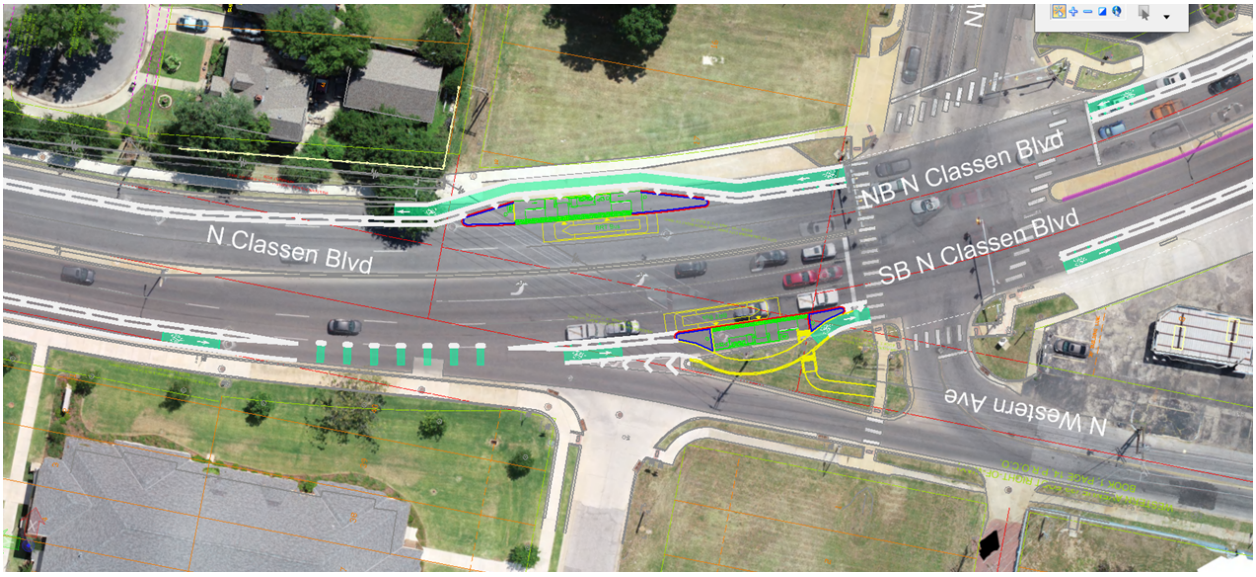
MEETING MINUTES:

1. Introductions/attendees

2. Intersection Site Distance Discussion
   - EB 63rd Street & Meridian
     - Widen station to move pylon and shelter out of ISD sight triangle.
   - 42nd Street SB
     - Widen station to move pylon and shelter out of ISD sight triangle.
   - 42nd Street NB
     - Widen station to move pylon and shelter out of ISD sight triangle.
   - 36th Street SB
     - Widen station to move pylon and shelter out of ISD sight triangle.
   - 23rd Street SB
     - Due to existing constraints, the station will remain as designed. The shelter and pylon are within the ISD sight triangle, but the existing shelter is also within the ISD sight triangle. Due to the low volume of vehicles exiting the vet clinic in that alley, a design exception to leave the station in this location was approved during the meeting.
   - 13th Street SB
     - Station just north of 12th and Classen was well within the ISD sight triangle
     - Suggestion to move the station to the island just north of the 13th and Classen intersection. Benefits include:
       - Across from NB 13th BRT station
       - Access to safe pedestrian crossing of Classen
       - Signalized intersection removes ISD concern

- Preliminary layout for new station was emailed on 10/19/20. Few items to note:
  - Bike lane transiting behind station utilizes 30' radii curves
  - ADA ramp to station only on S side
  - No bike rack space available
  - Leave existing signal pole and power pole (close)

- EMBARK to determine if this is the preferred station by 10/20/20 for 30% plans



N

MERIDIAN AVENUE

BRT Bus

63RD STREET

63RD STREET

ONLY

Add new Inlet

10'-0"

Discussed during meeting on October 10, 2020 the station was widened to move the pylon and shelter out of the ISD sight triangle.

0 30 60 90

1" = 30'

ISD TRIANGLE USING CURRENT STANDARDS

Discussed during meeting on October 10, 2020 the station was widened to move the pylon and shelter out of the ISD sight triangle.

10'-0"

BRT Bus

CLASSEN BLVD

42ND/CLASSEN
INTERSECTION

CLASSEN BLVD

BRT Bus

10'-0"

0 30 60 90

1" = 30'

ISD TRIANGLE USING CURRENT STANDARDS

42ND STREET

10'-0"

CLASSEN BLVD

BRT Bus

CLASSEN BLVD

42ND STREET

10'-0"

BRT Bus

Discussed during meeting on October 10, 2020 the station was widened to move the pylon and shelter out of the ISD sight triangle.

0 30 60 90

1" = 30'

ISD TRIANGLE USING CURRENT STANDARDS

Discussed during meeting on October 10, 2020 the station was widened to move the pylon and shelter out of the ISD sight triangle.

10'-0"

36TH STREET

CLASSEN BLVD

BRT Bus

CLASSEN BLVD

36TH STREET

0 30 60 90

1" = 30'

ISD TRIANGLE USING CURRENT STANDARDS

Discussed during meeting on October 10, 2020 the station is to remain as designed. Due to the low volume of vehicles exiting the vet clinic, a design exception to leave the station in this location was approved.

10'-0"

BRT Bus

23RD STREET

CLASSEN BLVD

CLASSEN BLVD

23RD STREET

0 30 60 90

1" = 30'

ISD TRIANGLE USING CURRENT STANDARDS

Discussed during meeting on October 10, 2020 the station was moved due to the ISD concern near 12th Street. It is recommended to enforce a "No Right Turn on Red" in this new location.

WESTERN AVENUE

CLASSEN BLVD

CLASSEN BLVD

10'-0"

BRT Bus

21.29 FT CLEARANCE

BRT Bus

13TH STREET

0 30 60 90

1" = 30'

ISD TRIANGLE USING CURRENT STANDARDS

APPENDIX H: GEOTECHNICAL REPORT

Terracon

4701 North Stiles Avenue, Oklahoma City, Oklahoma 73105
(405) 525-0453, Fax (405) 557-0549

LETTER OF TRANSMITTAL

TO: HNTB Corporation
Attn: Ms. Heidi Katz
100 N Broadway Suite 2420
Oklahoma City, Oklahoma 73102
Email: hkatz@hntb.com

DATE: August 28, 2020
JOB NO.: 03205054
JOB NAME: Proposed BRT MSE Retaining Walls in Oklahoma City, Oklahoma.
Re: Site Location, Exploration Plan, Boring Logs and Laboratory Test Results

WE ARE SENDING YOU: [X] Attached [ ] Under Separate Cover Via: Federal Express

THE FOLLOWING ITEMS:

[ ] Shop Drawings	[ ] Prints	[X] Site Location
[ ] Copy of Letter	[ ] Change Order	[X] Exploration Plans
[ ] Specifications	[ ] Plans	[X] Boring Logs
[ ] Contract Documents	[ ] Inspection Checklist	[X] Laboratory Test Results

Item	Copies	Date	Description
1	1	---	Site Location (Exhibit A-1)
2	1	---	Exploration Plan (Exhibit A-2)
3	1	---	Borings Logs B-1 to B-3 (Exhibits A-3 & A-8)
4	1	---	Grain Size Distribution Curves (Exhibit B-1)
5	1	---	General Notes (Exhibit C-1)
6	1	---	Unified Soil Classification System (Exhibit C-2)
7	1	---	Sedimentary Rock Classification (Exhibit C-3)

THESE ARE TRANSMITTED AS CHECKED BELOW:

[ ] For Approval	[ ] Approved as Submitted	[ ] Resubmit	_____	Copies for Approval
[ ] For Your Use	[ ] Approved as Noted	[ ] Submit	_____	Copies for Distribution
[X] As Requested	[ ] Returned for Corrections	[ ] Return	_____	Corrected Prints
[ ] For Review and Comment	[ ]	[ ]		
[ ] FOR BIDS DUE		[ ] PRINTS RETURNED AFTER LOAN TO US		

REMARKS:

If you have any questions about this submittal or if we can be of further service, please contact us.

We look forward to working with you on future projects.

PREPARED BY: Ogieaga Udomiaye - Staff Engineer REVIEWED BY: Norman Tan, P.E.–Department Manager

If enclosures are not as noted, kindly notify us at once.

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

Project Manager: OU	Project No. 03205054	Terracon 4701 N Stiles Ave Oklahoma City, OK 73105-3330	SITE LOCATION	Exhibit
Drawn by: OU	Scale: AS SHOWN		Proposed BRT Retaining Wall Oklahoma City, Oklahoma	A-1
Checked by: NKT	File Name: A1-A2			
Approved by: NKT	Date: AUG 2020			

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

Project Manager: OU	Project No. 03205054	Terracon 4701 N Stiles Ave Oklahoma City, OK 73105-3330	EXPLORATION PLAN Proposed BRT Retaining Wall Oklahoma City, Oklahoma	Exhibit A-2
Drawn by: OU	Scale: AS SHOWN			
Checked by: NKT	File Name: A1-A2			
Approved by: NKT	Date: AUG 2020			

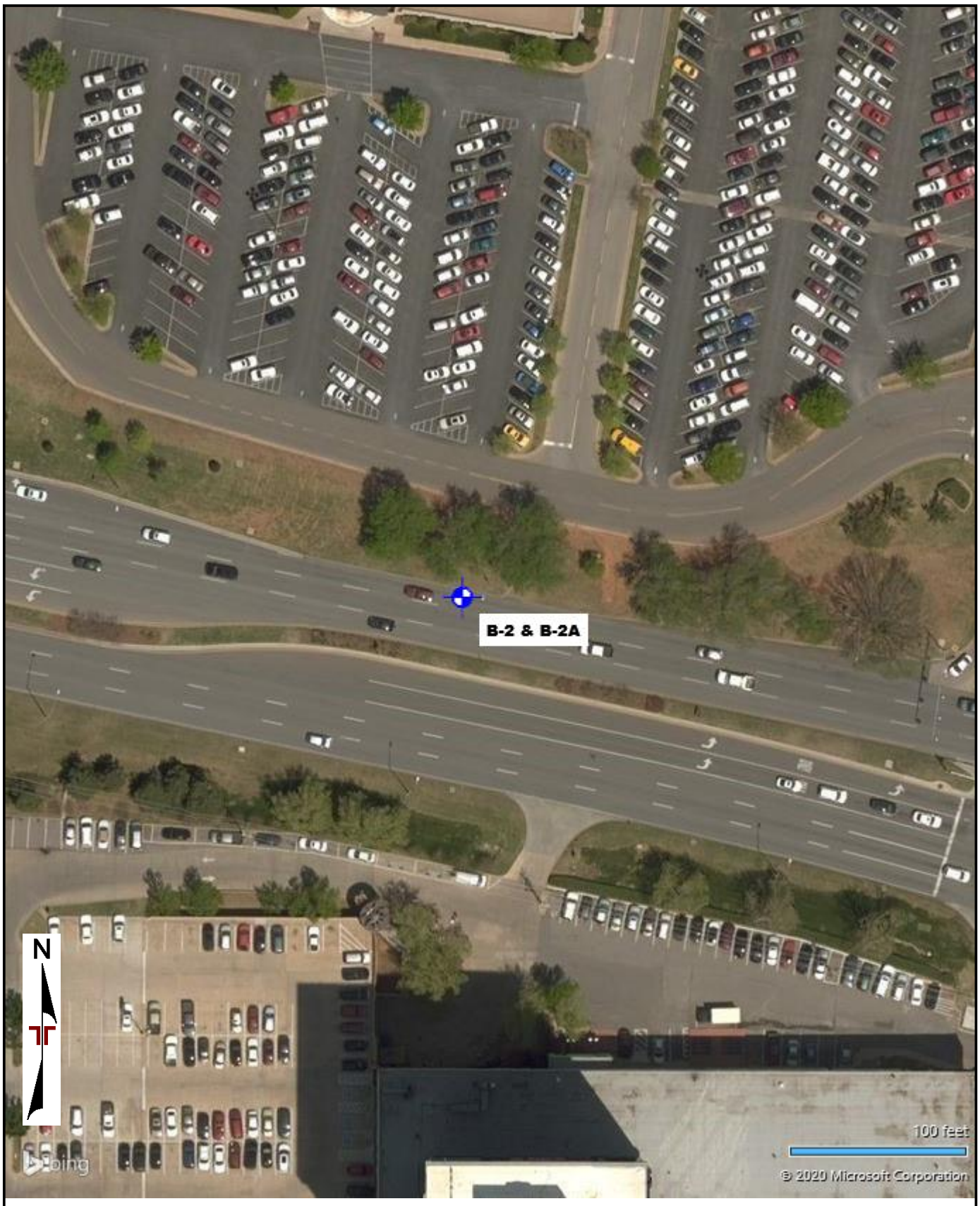


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

Project Manager:	OU
Drawn by:	OU
Checked by:	NKT
Approved by:	NKT

Project No.	03205054
Scale:	AS SHOWN
File Name:	A1-A2
Date:	AUG 2020

Terracon
4701 N Stiles Ave
Oklahoma City, OK 73105-3330

EXPLORATION PLAN

Proposed BRT Retaining Wall
Oklahoma City, Oklahoma

Exhibit

A-2

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

Project Manager:	OU
Drawn by:	OU
Checked by:	NKT
Approved by:	NKT

Project No.	03205054
Scale:	AS SHOWN
File Name:	A1-A2
Date:	AUG 2020

Terracon
4701 N Stiles Ave
Oklahoma City, OK 73105-3330

EXPLORATION PLAN

Proposed BRT Retaining Wall
Oklahoma City, Oklahoma

Exhibit

A-2

BORING LOG NO. B-1

PROJECT: Proposed BRT MSE Retaining Walls

CLIENT: HNTB Corporation
Oklahoma City, OK

SITE: Various Locations
Oklahoma City, OK

LOCATION See Exhibit A-2

Latitude: 35.5284° Longitude: -97.5745°

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	FILL - LEAN CLAY, dark brown and red							
			X	17	3-4-4 N=8	14		
3.5	+/-							
	SANDY LEAN CLAY (CL), red, stiff		X	13	3-5-5 N=10	14		58
6.0	+/-	5						
	LEAN CLAY WITH SILT (CL), red, stiff		X	15	3-5-7 N=12	16		
8.5	+/-							
	SANDY LEAN CLAY (CL), dark brown, stiff		X	18	4-4-5 N=9		24-15-9	
10.0	+/-	10						
	Boring Terminated at 10 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Power Auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:
Surface Cover: Approx. 3" Asphalt Concrete Pavement & Approx. 4" Portland Cement Concrete

WATER LEVEL OBSERVATIONS
No free water observed

Terracon
4701 N Stiles Ave
Oklahoma City, OK

Boring Started: 07-31-2020 | Boring Completed: 07-31-2020
Drill Rig: 747 | Driller: R. Peters
Project No.: 03205054 | Exhibit: A-3

BORING LOG NO. B-1A

PROJECT: Proposed BRT MSE Retaining Walls

CLIENT: HNTB Corporation
Oklahoma City, OK

SITE: Various Locations
Oklahoma City, OK

LOCATION See Exhibit A-2

Latitude: 35.5284° Longitude: -97.5745°

GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		FILL - LEAN CLAY, dark brown and red										
	3.0	+/-										
		SANDY LEAN CLAY (CL), red, stiff				17		3240	18	111		
	5.0	+/-	5									
		Boring Terminated at 5 Feet										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Power Auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
4701 N Stiles Ave
Oklahoma City, OK

Boring Started: 07-31-2020 | Boring Completed: 07-31-2020

Drill Rig: 747 | Driller: R. Peters

Project No.: 03205054 | Exhibit: A-4

BORING LOG NO. B-2

PROJECT: Proposed BRT MSE Retaining Walls

CLIENT: HNTB Corporation
Oklahoma City, OK

SITE: Various Locations
Oklahoma City, OK

LOCATION See Exhibit A-2

Latitude: 35.5231° Longitude: -97.546°

DEPTH	ELEVATION (Ft.)	GRAPHIC LOG	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		SANDY LEAN CLAY (CL), red, stiff									
					18	4-5-5 N=10		14			
					17	5-5-6 N=11		13		30-15-15	
					16	4-4-7 N=11					55
		-medium stiff below 8.5'			14	3-4-3 N=7		13			
10.0	+/-	***Boring Terminated at 10 Feet***									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Power Auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:
Surface Cover: Approx. 3" Asphalt Concrete Pavement & Approx. 8" Portland Cement Concrete

WATER LEVEL OBSERVATIONS
No free water observed

Terracon
4701 N Stiles Ave
Oklahoma City, OK

Boring Started: 07-31-2020 | Boring Completed: 07-31-2020
Drill Rig: 747 | Driller: R. Peters
Project No.: 03205054 | Exhibit: A-5

BORING LOG NO. B-2A

PROJECT: Proposed BRT MSE Retaining Walls

CLIENT: HNTB Corporation
Oklahoma City, OK

SITE: Various Locations
Oklahoma City, OK

LOCATION See Exhibit A-2

Latitude: 35.5231° Longitude: -97.546°

GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		SANDY LEAN CLAY (CL), red, stiff										
	7.0	+/-	5			20		3550	16	111		
		Boring Terminated at 7 Feet										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Power Auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
4701 N Stiles Ave
Oklahoma City, OK

Boring Started: 07-31-2020 | Boring Completed: 07-31-2020

Drill Rig: 747 | Driller: R. Peters

Project No.: 03205054 | Exhibit: A-6

BORING LOG NO. B-3

PROJECT: Proposed BRT MSE Retaining Walls

CLIENT: HNTB Corporation
Oklahoma City, OK

SITE: Various Locations
Oklahoma City, OK

LOCATION See Exhibit A-2

Latitude: 35.515° Longitude: -97.5345°

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SANDY LEAN CLAY (CL), brown, medium stiff										
					16	2-3-5 N=8		19		35-15-20	
3.5	+/-										
	LEAN CLAY WITH SAND (CL), red, soft				18	1-1-1 N=2		21			74
6.5	+/-	5									
	WEATHERED SILTSTONE, red, moderately hard		▽		17	23-50/4"					
			▽								
9.0	-soft below 8.5' +/-				6	50/6"		13			
	Boring Terminated at 9 Feet										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Power Auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:
Surface Cover: Approx. 3" Asphalt Concrete Pavement

WATER LEVEL OBSERVATIONS

▽ *6' While drilling*
▽ *8' After boring*

Terracon
4701 N Stiles Ave
Oklahoma City, OK

Boring Started: 07-31-2020 | Boring Completed: 07-31-2020
Drill Rig: 747 | Driller: R. Peters
Project No.: 03205054 | Exhibit: A-7

BORING LOG NO. B-3A

PROJECT: Proposed BRT MSE Retaining Walls

CLIENT: HNTB Corporation
Oklahoma City, OK

SITE: Various Locations
Oklahoma City, OK

LOCATION See Exhibit A-2

Latitude: 35.515° Longitude: -97.5345°

GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		SANDY LEAN CLAY (CL), brown and red										
	4.0	+/-				12						
		Boring Terminated at 4 Feet										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Power Auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
4701 N Stiles Ave
Oklahoma City, OK

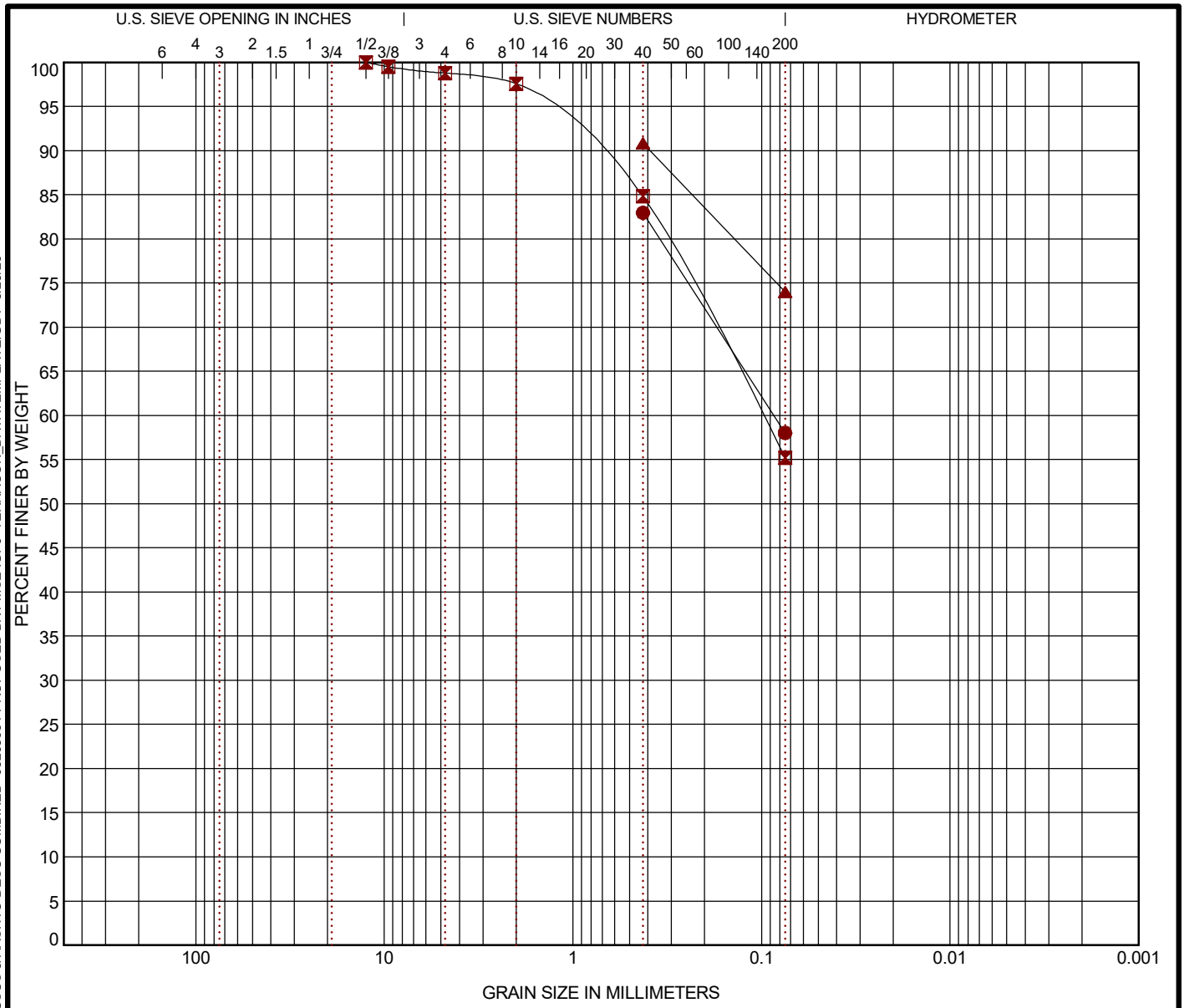
Boring Started: 07-31-2020 | Boring Completed: 07-31-2020

Drill Rig: 747 | Driller: R. Peters

Project No.: 03205054 | Exhibit: A-8

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID	Depth	USCS Classification	AASHTO Classification	WC (%)	LL	PL	PI	Cc	Cu
B-1	3.5 - 5			14.0					
B-2	6 - 7.5								
B-3	3.5 - 5			21.3					

Boring ID	Depth	D_{100}	D_{60}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Fines	%Clay
B-1	3.5 - 5	0.425	0.086				24.9		58.0	
B-2	6 - 7.5	12.5	0.099			1.2	43.6		55.2	
B-3	3.5 - 5	0.425					16.8		74.0	

PROJECT: Proposed BRT MSE Retaining Walls

SITE: Various Locations
Oklahoma City, OK

Terracon
4701 N Stiles Ave
Oklahoma City, OK

PROJECT NUMBER: 03205054

CLIENT: HNTB Corporation
Oklahoma City, OK

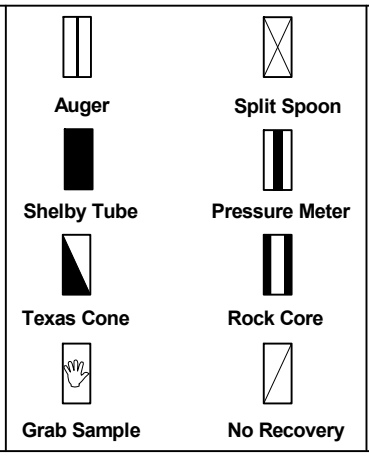
EXHIBIT: B-1

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS & AASHTO DESC COMBINED 03205054 PROPOSED BRT MSE .GPJ TERRACON_DATATEMPLATE.GDT 8/28/20

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING



WATER LEVEL

Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.

FIELD TESTS

(HP)	Hand Penetrometer
(T)	Torvane
(b/f)	Standard Penetration Test (blows per foot)
(PID)	Photo-Ionization Detector
(OVA)	Organic Vapor Analyzer
(TCP)	Texas Cone Penetrometer

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance Includes gravels, sands and silts.			CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance			
Descriptive Term (Density)	**Standard Penetration or N-Value Blows/Ft.**	**Ring Sampler Blows/Ft.**	**Descriptive Term (Consistency)**	**Unconfined Compressive Strength, Qu, psf**	**Standard Penetration or N-Value Blows/Ft.**	**Ring Sampler Blows/Ft.**
Very Loose	0 - 3	0 - 6	Very Soft	less than 500	0 - 1	< 3
Loose	4 - 9	7 - 18	Soft	500 to 1,000	2 - 4	3 - 4
Medium Dense	10 - 29	19 - 58	Medium-Stiff	1,000 to 2,000	4 - 8	5 - 9
Dense	30 - 50	59 - 98	Stiff	2,000 to 4,000	8 - 15	10 - 18
Very Dense	> 50	≥ 99	Very Stiff	4,000 to 8,000	15 - 30	19 - 42
			Hard	> 8,000	> 30	> 42

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 15
With	15 - 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Major Component of Sample	Particle Size
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm
Silt or Clay	Passing #200 sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 5
With	5 - 12
Modifier	> 12

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1 - 10
Medium	11 - 30
High	> 30

Terracon

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]					Soil Classification	
					Group Symbol	Group Name [B]
Coarse Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$ [E]		GW	Well-graded gravel [F]
			$Cu < 4$ and/or $1 > Cc > 3$ [E]		GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH		GM	Silty gravel [F,G,H]
			Fines classify as CL or CH		GC	Clayey gravel [F,G,H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$ [E]		SW	Well-graded sand [I]
			$Cu < 6$ and/or $1 > Cc > 3$ [E]		SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH		SM	Silty sand [G,H,I]
			Fines classify as CL or CH		SC	Clayey sand [G,H,I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots on or above "A" line [J]		CL	Lean clay [K,L,M]
			PI < 4 or plots below "A" line [J]		ML	Silt [K,L,M]
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay [K,L,M,N]
			Liquid limit - not dried			Organic silt [K,L,M,O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line		CH	Fat clay [K,L,M]
			PI plots below "A" line		MH	Elastic Silt [K,L,M]
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay [K,L,M,P]
			Liquid limit - not dried			Organic silt [K,L,M,Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

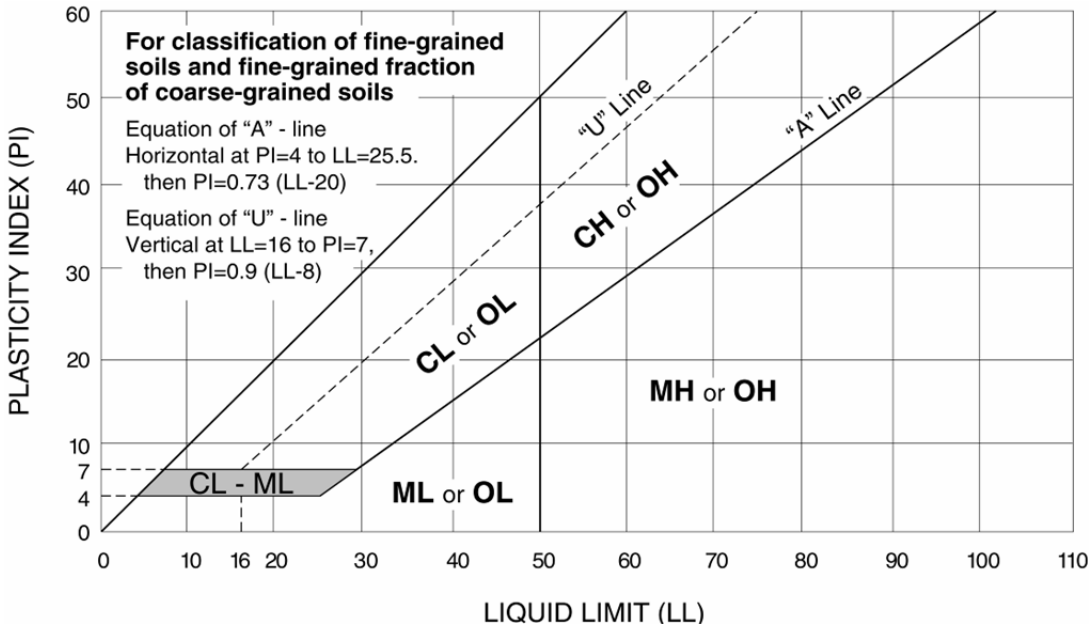
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.



Terracon

GENERAL NOTES

Sedimentary Rock Classification

DESCRIPTIVE ROCK CLASSIFICATION:

Sedimentary rocks are composed of cemented clay, silt and sand sized particles. The most common minerals are clay, quartz and calcite. Rock composed primarily of calcite is called limestone; rock of sand size grains is called sandstone, and rock of clay and silt size grains is called mudstone or claystone, siltstone, or shale. Modifiers such as shaly, sandy, dolomitic, calcareous, carbonaceous, etc. are used to describe various constituents. Examples: sandy shale; calcareous sandstone.

LIMESTONE	Light to dark colored, crystalline to fine-grained texture, composed of $CaCo_3$, reacts readily with HCl.
DOLOMITE	Light to dark colored, crystalline to fine-grained texture, composed of $CaMg(CO_3)_2$, harder than limestone, reacts with HCl when powdered.
CHERT	Light to dark colored, very fine-grained texture, composed of micro-crystalline quartz ($Si0_2$), brittle, breaks into angular fragments, will scratch glass.
SHALE	Very fine-grained texture, composed of consolidated silt or clay, bedded in thin layers. The unlaminated equivalent is frequently referred to as siltstone, claystone or mudstone.
SANDSTONE	Usually light colored, coarse to fine texture, composed of cemented sand size grains of quartz, feldspar, etc. Cement usually is silica but may be such minerals as calcite, iron-oxide, or some other carbonate.
CONGLOMERATE	Rounded rock fragments of variable mineralogy varying in size from near sand to boulder size but usually pebble to cobble size (½ inch to 6 inches). Cemented together with various cementing agents. Breccia is similar but composed of angular, fractured rock particles cemented together.

PHYSICAL PROPERTIES:

DEGREE OF WEATHERING

Slight	Slight decomposition of parent material on joints. May be color change.
Moderate	Some decomposition and color change throughout.
High	Rock highly decomposed, may be extremely broken.

HARDNESS AND DEGREE OF CEMENTATION

Limestone and Dolomite:

Hard	Difficult to scratch with knife.
Moderately Hard	Can be scratched easily with knife, cannot be scratched with fingernail.
Soft	Can be scratched with fingernail.

Shale, Siltstone and Claystone

Hard	Can be scratched easily with knife, cannot be scratched with fingernail.
Moderately Hard	Can be scratched with fingernail.
Soft	Can be easily dented but not molded with fingers.

Sandstone and Conglomerate

Well Cemented	Capable of scratching a knife blade.
Cemented	Can be scratched with knife.
Poorly Cemented	Can be broken apart easily with fingers.

BEDDING AND JOINT CHARACTERISTICS

Bed Thickness	Joint Spacing	Dimensions
Very Thick	Very Wide	> 10′
Thick	Wide	3′ - 10′
Medium	Moderately Close	1′ - 3′
Thin	Close	2″ - 1′
Very Thin	Very Close	.4″ - 2″
Laminated	—	.1″ - .4″

Bedding Plane	A plane dividing sedimentary rocks of the same or different lithology.
Joint	Fracture in rock, generally more or less vertical or transverse to bedding, along which no appreciable movement has occurred.
Seam	Generally applies to bedding plane with an unspecified degree of weathering.

SOLUTION AND VOID CONDITIONS

Solid	Contains no voids.
Vuggy (Pitted)	Rock having small solution pits or cavities up to ½ inch diameter, frequently with a mineral lining.
Porous	Containing numerous voids, pores, or other openings, which may or may not interconnect.
Cavernous	Containing cavities or caverns, sometimes quite large.

APPENDIX I: OKLAHOMA CITY BIKE STANDARDS

1. ALL PARKING SPACES MUST BE INDIVIDUAL MARKED AND HANDICAP ACCESSIBLE SPACE(S) MUST BE PROVIDED. IF HANDICAP ACCESSIBLE SPACE(S) WERE NOT PREVIOUSLY MARKED, A REQUEST MUST BE TAKEN TO TRAFFIC AND TRANSPORTATION COMMISSION. ONE HANDICAP PARKING ACCESSIBLE SPACE REQUIRED PER 25 PARKING SPACES. THE COUNT IS MEASURED AROUND THE INTERIOR OF EACH INDIVIDUAL BLOCK. IF REMOVAL OR ADDITIONAL OF ANGLED PARKING, METERED PARKING, TIME LIMITED OR NO PARKING IS PROPOSED, THE PROPOSED IS REQUIRED TO BE APPROVED BY THE TRAFFIC AND TRANSPORTATION COMMISSION.

2. IF THE RIGHT OF WAY WIDTH IS GREATER THAN 14' FROM THE FRONT FACE OF THE CURB, A 5' HATCHED AREA MUST BE PROVIDED NEXT TO THE PARALLEL HANDICAP ACCESSIBLE PARKING SPACE

3. A MINIMUM OF TWO PARKING SPACES ADJACENT TO EACH OTHER SHALL BE REQUIRED. PARKING SPACE MIN 20' FROM EDGE OF DRIVEWAY.

4. WHEN MEASURING THE BLOCK WIDTH THE NARROWEST EXISTING OR PLANNED WIDTH SHALL BE USED.

5. A MINIMUM OF 1,000' OF BICYCLE TREATMENT SHALL BE MAINTAINED BEFORE SWITCHING TO ANOTHER TREATMENT TO PROVIDED UNIFORMITY TO THE SYSTEM AND THE BICYCLE AND ROADWAY USERS.

6. MINIMUM BIKE BUFFER SHALL BE 3' IN WIDTH, AS SHOWN IN THE STANDARD DRAWINGS, THE BIKE BUFFER MAY BE INCREASED IN WIDTH.

7. WHEN USED, BIKE LANE AND SHARED BIKE LANE SYMBOLS SHALL BE AT EVERY INTERSECTION.

8. WHEN USED, SHARED BIKE LANE SYMBOLS SHOULD BE PLACED WITH A MAXIMUM OF 250' SPACING.

9. NO CROSSWALK PAVEMENT MARKINGS SHALL BE PLACED UNLESS RAMPS MEET THE CURRENT D700 STANDARDS OR ARE REPLACING PREVIOUSLY MARKED CROSSWALKS.

10. ALL CROSSWALK MAKINGS SHALL BE CONTINENTAL. IF THE CROSSWALK IS LOCATED WITH STOP CONTROL, A STOP BAR AND 50' OF DOUBLE YELLOW SHALL BE PROVIDED.

11. SHARED BIKE LANE SYMBOLS SHALL ONLY BE USED ON ROADWAYS OF 35 MPH OR LESS.

12. GREEN PAVEMENT MARKINGS ARE ONLY TO BE USED ON BIKE LANES, SHARED LANE PAVEMENT MARKINGS SHALL HAVE BLACK CONTRAST PAVEMENT MARKINGS BEHIND THE SYMBOL.

13. FOR OFFSET INTERSECTIONS WITH AN OFFSET OF 10' OR GREATER, PROVIDE CONFLICT GREEN MARKINGS AS SHOWN ON STANDARD DETAIL SHEET D803. BOTH THE APPROACH SIDE AND EXISTING SIDE OF THE INTERSECTION MUST HAVE BIKE LANES TO UTILIZE THE GREEN CONFLICT MARKINGS. CONFLICT STRIPE TO PROVIDE GUIDANCE FOR LANE SHIFTS THROUGH AN INTERSECTION SHALL BE 2' LINE WITH A 3' SPACE.

14. VERTICAL FLEXIBLE DELINEATORS TO BE INSTALLED ALL THE WAY TO THE STOP BAR OR PC A ROAD / DRIVEWAY.

15. WHEN CONVERTING FROM A 4 LANE SECTION, TO A 3 LANE SECTION, THE LEFT TURN LANE SHALL BE A MINIMUM OF 1OO' IN LENGTH AT A TRAFFIC SIGNAL OR OTHER STOP CONTROL.

16. VERTICAL FLEXIBLE DELINEATORS SPECIFIED NEED TO BE NCHRP 350 COMPLAINT AND BE RUGGED: WITHSTAND 50+ HITS AT 60 MPH.

17. DELINEATORS AND REFLECTORS MUST MATCH THE CONTROLLING PAVEMENT MARKING COLOR. WHITE ON WHITE LINES, YELLOW ON YELLOW LINES. GREEN DELINEATORS OR POST SHALL NOT BE PERMITTED. DELINEATORS TO HAVE A MINIMUM OF 2-3" REFLECTORS OR 1-6" REFLECTOR.

18. ALL VERTICAL FLEXIBLE DELINEATORS TO BE INSTALLED WITH EPOXY, BOLT ATTACHMENTS TO THE PAVEMENT OR BRIDGE DECKS SHALL NOT BE USED.

19. ALL ROADWAYS SHALL MAINTAIN THE MINIMUM CURB TO CURB WIDTH REQUIRED IN THE OKC SUBDIVISION REGULATIONS. THIS INCLUDES A MINIMUM WIDTH OF 20' FOR ONE-WAY ROADWAYS AND 26 FOOT FOR TWO-WAY ROADWAYS.

20. VEHICULAR TRAVEL LANE SHALL BE UNIFORM IN WIDTH THROUGH THE CORRIDOR. LANE WIDTHS SHALL BE:
    - A. PARKING - 8'
    - B. BIKE BUFFER - 3' MINIMUM - REQUIRED BETWEEN ALL PARALLEL PARKING AND BIKE LANES
      5' MINIMUM - REQUIRED BETWEEN ALL ANGLED PARKING AND BIKE LANES
    - C. BIKE LANE - 5' MINIMUM - 6' RECOMMENDED, 4' BIKE LANES MAY BE USED UPON CITY ENGINEER APPROVAL
    - D. RIGHT TURN LANE - 11' MINIMUM - 12' RECOMMENDED
    - E. THROUGH LANE - 11' MINIMUM - 13' (TWO LANE ONLY) OTHERWISE 12' RECOMMENDED
    - F. LEFT TURN LANE - 11' MINIMUM - 14' RECOMMENDED

21. HATCHED AND CHEVRON STRIPE SHALL BE 8" SOLID FOR ROADWAYS WITH SPEED LIMITS ≤ 40 MPH AND 12" SOLID FOR ROADWAYS WITH A SPEED LIMIT OF ≥ 45 MPH. THIS INCLUDES THE PAVEMENT MARKING DELINEATING THE OUTSIDE OF THE GORE.

22. CENTER TURN LANE ARROW CLUSTER SPACING IS A MAXIMUM OF 250 FEET OR AT LEAST ONE CLUSTER PER BLOCK. SEE SHEET D-802.

23. ALL EXCEPTIONS MUST BE APPROVED BY THE CITY ENGINEER.

24. GORE AREA AROUND PARKING STALL SHALL BE 8" WHITE STRIPE. LINE SEPARATING PARKING STALLS SHALL BE 4" WHITE STRIPE. HATCH MARKING TO BE ON 5' SPACING AND SHALL BE 8" WHITE STRIPE.

25. WHEN DEDICATED RIGHT TURN LANES CONFLICT WITH BIKE LANES THE FOLLOWING CONDITIONS APPLY TO DELINEATOR PLACEMENT:
    - A. PLACE DELINEATORS AT EVERY CHEVRON IN THE BUFFER ADJACENT T0 THE TURN LANE. DELINEATORS ALONG THE BIKE BOX SHALL BE SPACED AT 6.5' CENTERS.
    - B. PLACE DELINEATORS AT EVERY CHEVRON IN THE BUFFER, BEGINNING AT THE SECOND CHEVRON, WITHIN THE LIMITS OF THE TURN LANE. DELINEATORS ALONG THE BIKE BOX SHALL BE SPACED AT 6.5' CENTERS.

BIKE TIER TABLE

TIER LEVELS	ROADWAY TREATMENT TYPE	SPEED RANGE *
TIER I (FLEXIBLE DELINEATORS REQUIRED)	10' OR 12' PAVED SURFACE BEHIND ROADWAY CURB	25 MPH +
	BIKE LANE	25 MPH +
	SEE SHEET D803 FOR DELINEATOR SPACING CRITERIA	
TIER II (FLEXIBLE DELINEATORS OPTIONAL)	BIKE LANE WITH NO BIKE BUFFER	25 MPH - 35 MPH
	BIKE LANE WITH BIKE BUFFER	25 MPH - 40 MPH
	ON STREET PARKING WITH BIKE LANE - BIKE BUFFER BETWEEN PARKING AND BIKE LANE	25 MPH - 30 MPH
TIER III	SHARED BIKE LANE PAVEMENT MARKINGS	25 MPH - 35 MPH

*ALL ROADWAY SPEEDS ARE BASED UPON THE GREATER OF :
THE POSTED SPEED LIMIT OR THE 85TH PERCENTILE SPEED ROUNDED TO THE NEAREST 5MPH.

ROADWAY USERS' QUALITY OF SERVICE (QOS) AVERAGE DAILY TRAFFIC (ADT) VOLUME RANGES

EXISTING CONDITIONS AND REQUIRED NUMBER OF TRAVEL LANES		
ROADWAY SECTION	ADT RANGE UNDIVIDED ROADWAY	ADT RANGE DIVIDED ROADWAY*
2 LANE	UP TO 10,000	UP TO 14,000
2 LANE, 1 CONTINUOUS TURN LANE	4,000 - 12,000	N/A
4 LANE	7,000 - 22,000	9,000 - 24,000
4 LANE, 1 CONTINUOUS TURN LANE	10,000 - 24,000	N/A
6 LANE	14,000 - 28,000	15,000 - 36,000
6 LANE, 1 CONTINUOUS TURN LANE	15,000 - 32,000	N/A

*ALL DRIVES MUST HAVE TURN LANE OR 30' OF MEDIAN BETWEEN OPPOSING TRAVEL LANES

DELINEATOR DETAILS		
BUFFER CONDITION	**DELINEATOR SPACING (FEET)**	**DELINEATOR LOCATION**
8 INCH LINE UP TO 3 FOOT BUFFER	20	ON THE LINE
3 FOOT BUFFER UP TO 5 FOOT BUFFER	30	INTERIOR ANGLE OF THE CHEVRON
5 FOOT BUFFER AND GREATER	45	INTERIOR ANGLE OF THE CHEVRON
BIKE BOX	6'-6" CENTER TO CENTER	

The City of Oklahoma City
Public Works Department
Engineering Division

APPROVED BY: ERIC J. WENGER, P.E. CITY ENGINEER DATE:

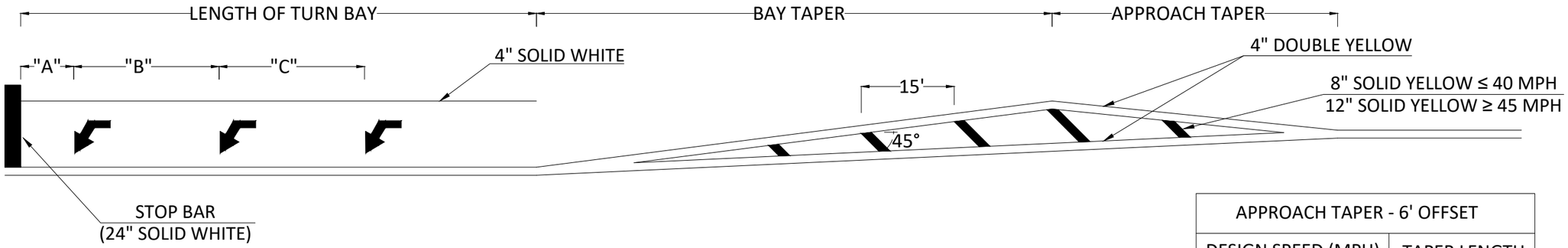
VSC

DRAWN: DATE:

NOTES AND BIKE TIER TABLE

DESIGN STANDARDS FOR ROADS

Drawing Number
D801



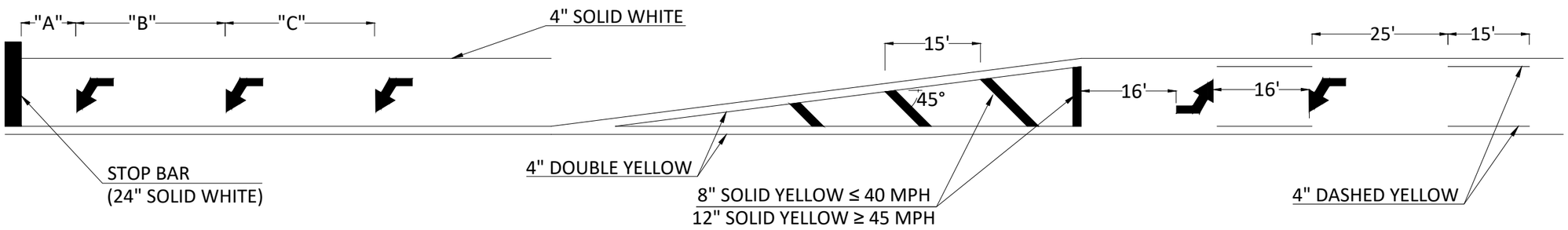
TURN BAY TABLE			
LENGTH OF TURN BAY FT.	"A" FT.	"B" FT.	"C" FT.
75' - 99'	20'	35'	--
100' - 149'	20'	35'	35'
* 35' SPACING UNTIL END OF TURN BAY LENGTH			

TURN BAY TAPER RATES	
DESIGN SPEED (MPH)	TAPER RATE
SPEED < 30	8:1
30 ≤ SPEED ≤ 50	10:1
50 SPEED ≥ V	15:1

APPROACH TAPER	
DESIGN SPEED (MPH)	TAPER RATE
SPEED ≤ 40	$WS^2/60$
SPEED ≥ 45	WS

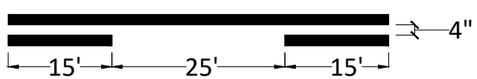
W = OFFSET (FT)
S = SPEED (MPH)

APPROACH TAPER - 6' OFFSET	
DESIGN SPEED (MPH)	TAPER LENGTH
25 MPH	65
30 MPH	90
35 MPH	125
40 MPH	160
45 MPH	270
50 MPH	300
55 MPH	330

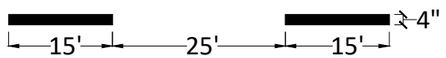


DOUBLE YELLOW
(4 INCH STRIPE)

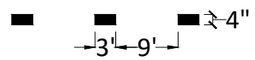
TURN LANE YELLOW PAVEMENT MARKING DETAIL
(4 INCH STRIPE)



DASHED LANE LINE
(4 INCH STRIPE)



DOTTED LANE LINE
(4 INCH STRIPE)



The City of Oklahoma City
Public Works Department
Engineering Division

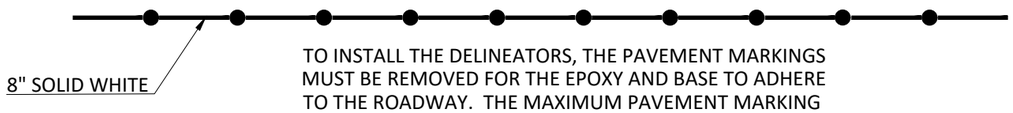
APPROVED BY: ERIC J. WENGER, P.E. CITY ENGINEER
DATE:
DRAWN: VSC
DATE:

BIKE LANE TREATMENTS
NUMBER OF LANES REQUIRED
DESIGN STANDARDS FOR ROADS

Drawing Number
D802

BIKE BUFFER (STRIPE ONLY)

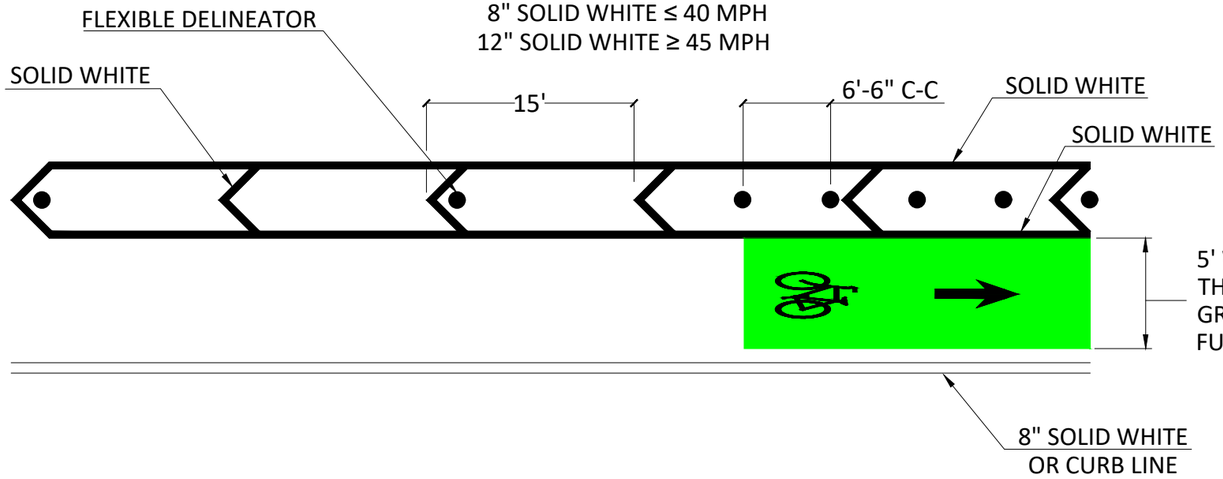
8" SOLID WHITE ≤ 40 MPH



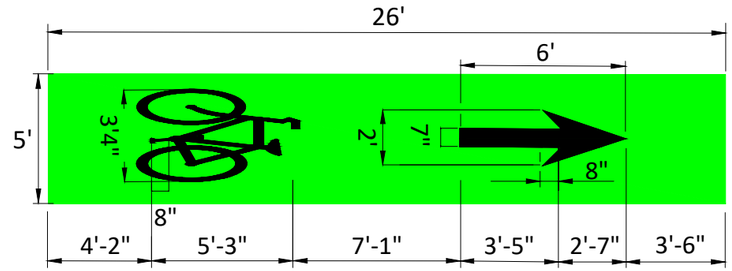
TO INSTALL THE DELINEATORS, THE PAVEMENT MARKINGS MUST BE REMOVED FOR THE EPOXY AND BASE TO ADHERE TO THE ROADWAY. THE MAXIMUM PAVEMENT MARKING REMOVAL FOR EACH DELINEATOR SHALL BE 12 INCHES.

BIKE BUFFER

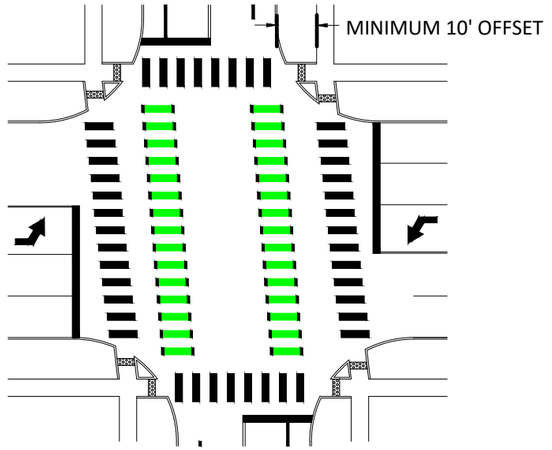
8" SOLID WHITE ≤ 40 MPH
12" SOLID WHITE ≥ 45 MPH



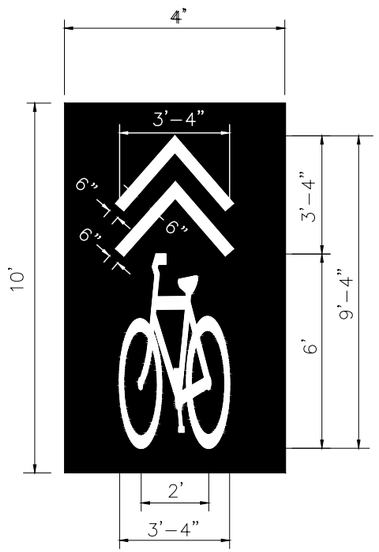
TYPICAL BIKE LANE BOX AND SYMBOL



CONFLICT PAVEMENT MARKINGS
OFFSET BIKE LANE ACROSS INTERSECTION

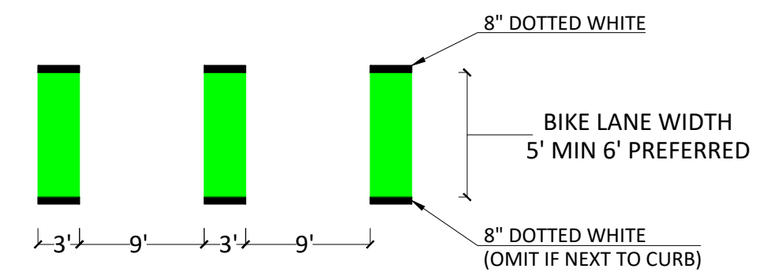


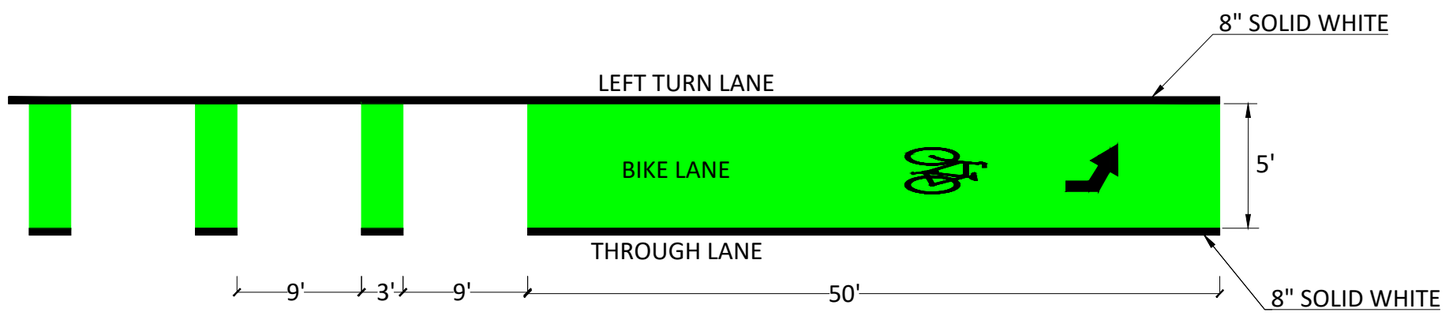
SHARROW PAVEMENT MARKER



NOT TO SCALE

BIKE LANE CONFLICT AREA





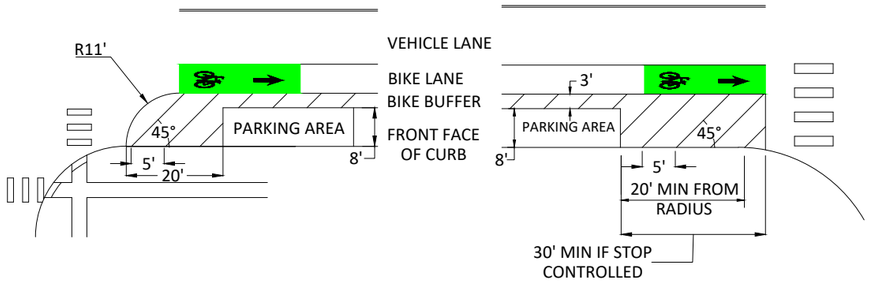
The City of Oklahoma City
Public Works Department
Engineering Division

APPROVED BY: ERIC J. WENGER, P.E., CITY ENGINEER
DRAWN: VSC
DATE:

BIKE LANE TREATMENTS
NUMBER OF LANES REQUIRED
DESIGN STANDARDS FOR ROADS

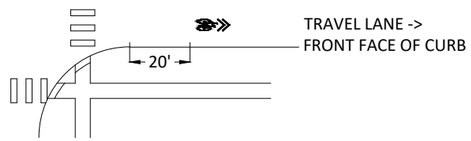
Drawing Number
D803

BIKE BUFFER WITH PARKING DETAILS

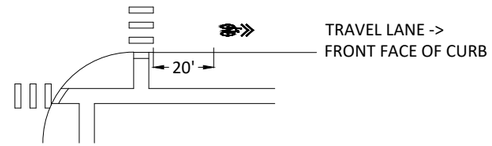


SHARED LANE INTERSECTION DETAILS

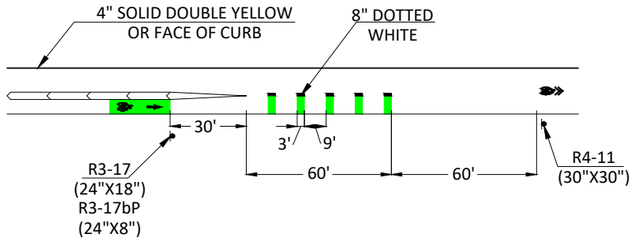
SIDEWALK OUTSIDE CURB RETURN



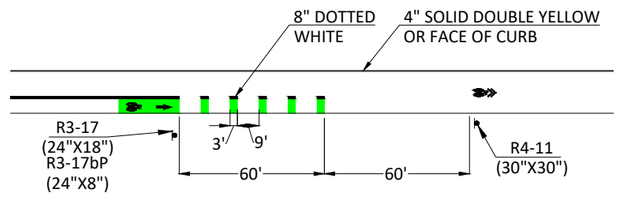
SIDEWALK INSIDE CURB RETURN



BIKE LANE WITH GORE TO SHARED BIKE LANE DETAIL



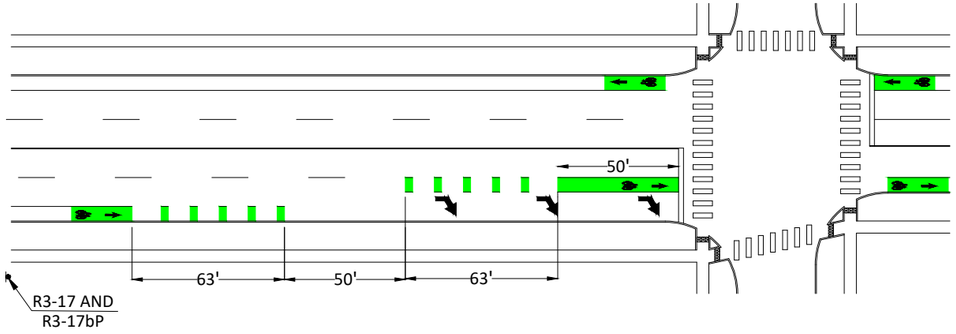
BIKE LANE TO SHARED BIKE LANE DETAIL

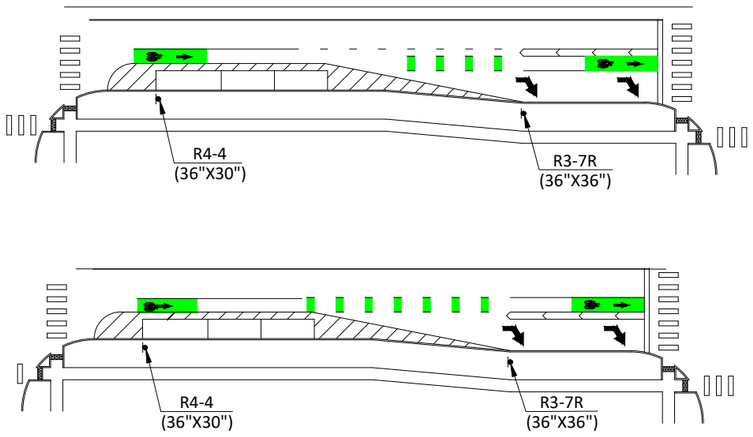


BIKE LANE WITH DEDICATED VEHICULAR RIGHT TURN LANE

BIKE LANE WITH BIKE BUFFER - MARKED PARKING - ADDITIONAL RIGHT TURN LANE AT INTERSECTION

BIKE LANE WITH OUTSIDE VEHICLE LANE BECOMING RIGHT TURN ONLY





The City of Oklahoma City
Public Works Department
Engineering Division

APPROVED BY:
ERIC J. WENGER, P.E.
CITY ENGINEER

DRAWN:

DATE:

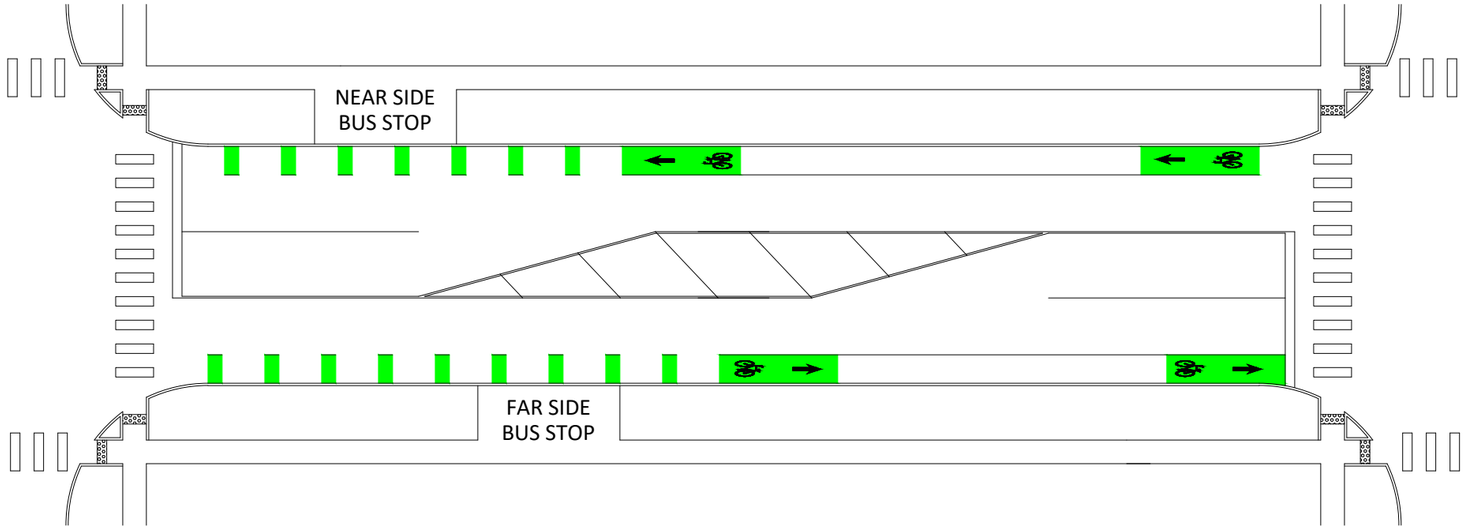
VSC

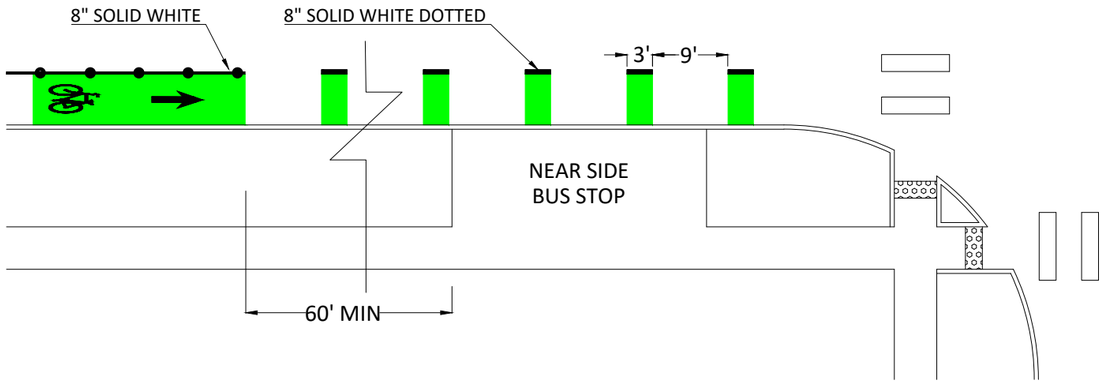
DATE:

BIKE LANE TREATMENTS
NUMBER OF LANES REQUIRED
DESIGN STANDARDS FOR ROADS

Drawing Number
D804

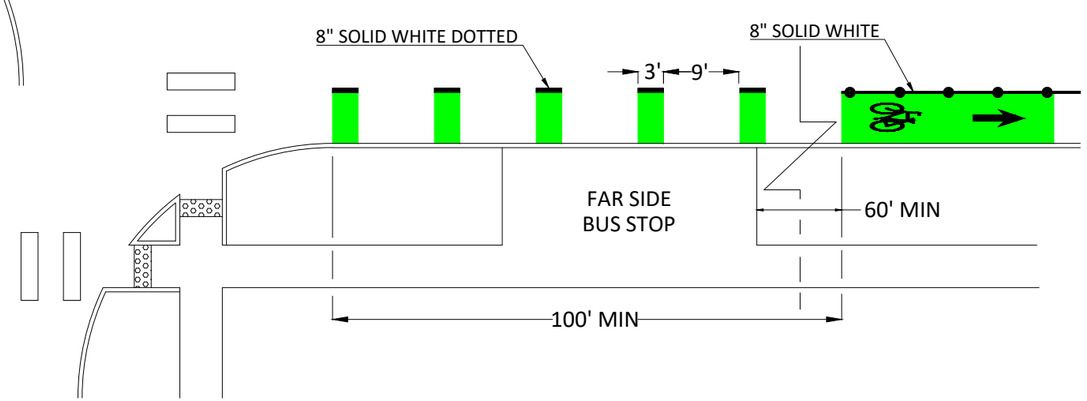
BUS STOP NEAR AND FAR SIDE





NOTES

1. IF BUS STOP DOES NOT FALL WITHIN 150' OF THE PC OF THE INTERSECTION, ROUGHLY 2/3 OF LENGTH TO BE BEFORE BUS STOP AND 1/3 TO BE AFTER BUS STOP. RECOMMENDED LENGTH IN THIS CASE APPROXIMATELY 150'
2. APPROXIMATELY 150' MAX. NOTE BUS STOP LOCATION CAN FALL ANYWHERE WITHIN THIS 100'-150'.
3. RESTART DELINEATORS NO LESS THAN 60 FEET FROM BUS STOP



The City of Oklahoma City
Public Works Department
Engineering Division

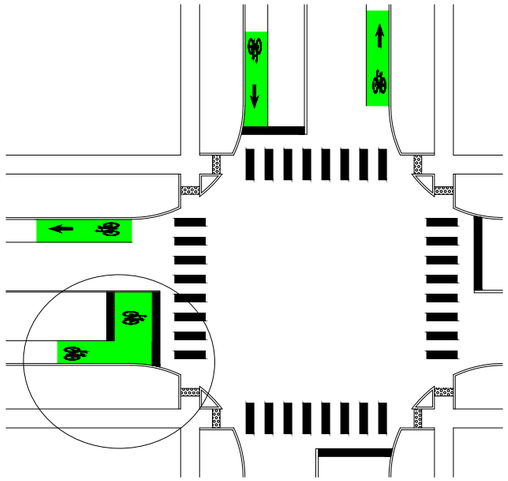
APPROVED BY:
ERIC J. WENGER, P.E.
CITY ENGINEER
DATE:

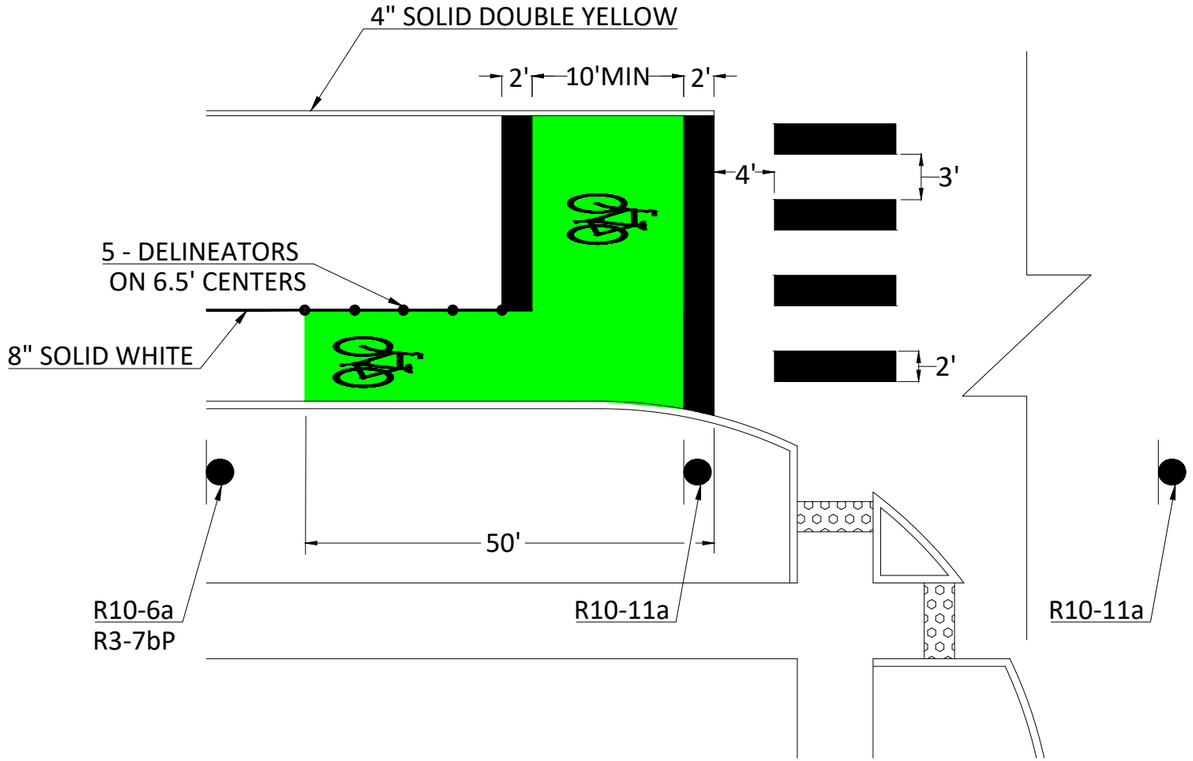
DRAWN: VSC
DATE:

BIKE LANE STANDARDS
DESIGN STANDARDS FOR ROADS

Drawing Number
D805

BIKE LANE WITHOUT BIKE BUFFER, NO MARKED ON STREET PARKING

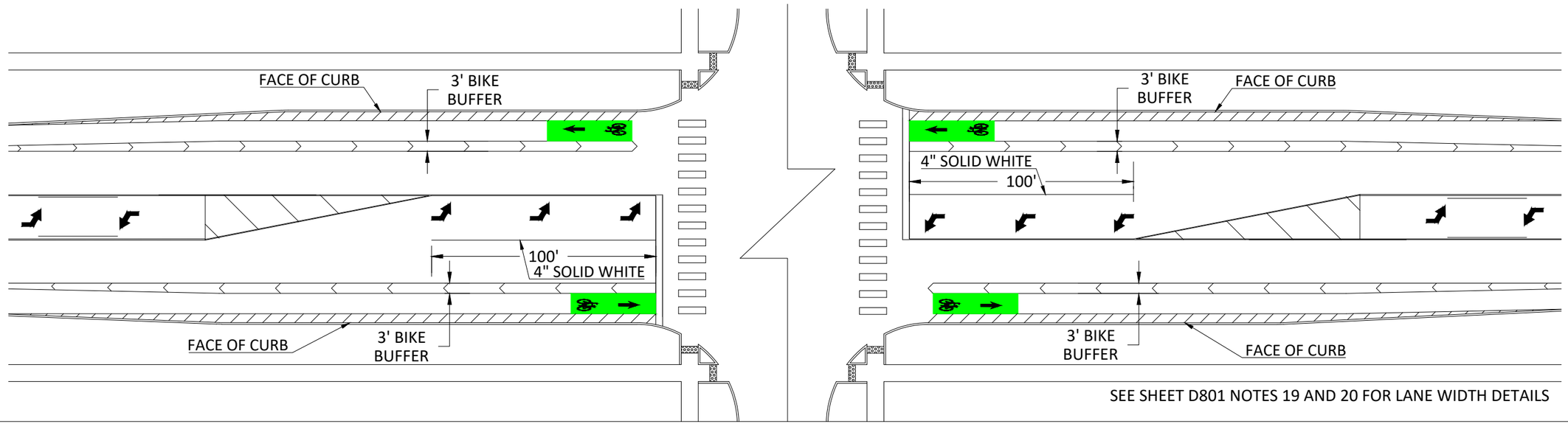




NOTES

1. A NO TURN ON RED (R10-11a) RESTRICTION IS REQUIRED BY THE FHWA'S INTERIM APPROVAL. ALL TURN RESTRICTIONS MUST BE APPROVED BY OKLAHOMA CITIES TRAFFIC AND TRANSPORTATION COMMISSION.
2. SIGN R-10-11a REQUIRED ON THE FAR SIDE OF THE INTERSECTION.

BIKE LANE - BIKE BUFFER - THREE LANE SECTION WITH CENTER TURN LANE AT EXISTING FIVE LANE SECTION WITH VARYING OUTSIDE GORE



SEE SHEET D801 NOTES 19 AND 20 FOR LANE WIDTH DETAILS

The City of Oklahoma City
Public Works Department
Engineering Division

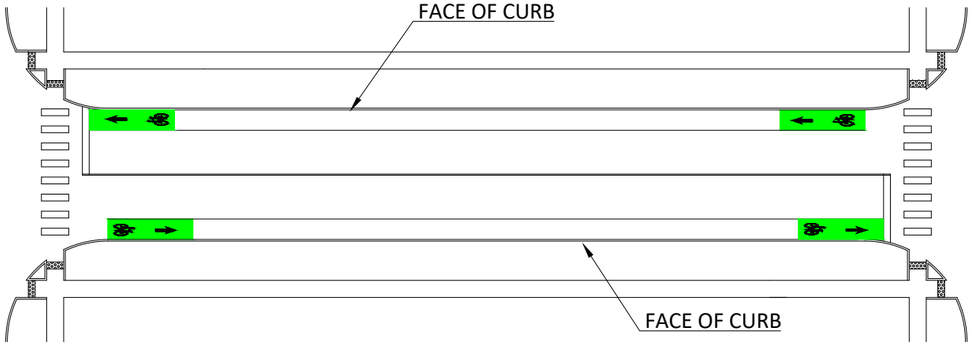
APPROVED BY:
ERIC J. WENGER, P.E.
CITY ENGINEER
DATE:

DRAWN: VSC
DATE:

BIKE LANE STANDARDS
DESIGN STANDARDS FOR ROADS

Drawing Number
D806

BIKE LANE - NO MARKED ON STREET PARKING - NO BIKE BUFFER

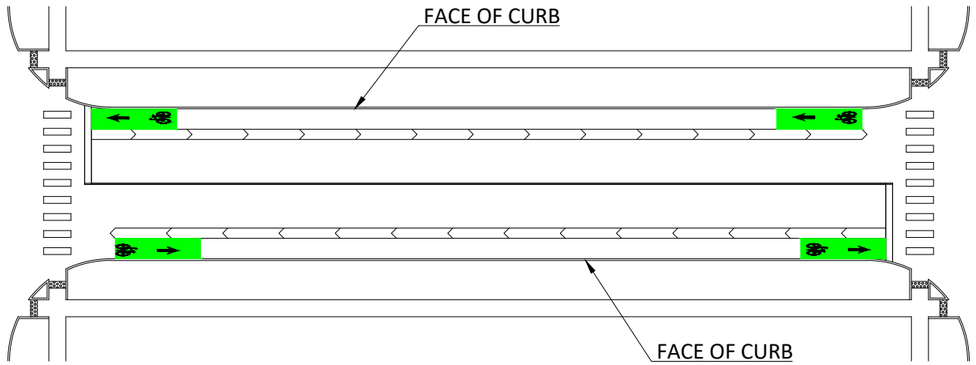


NUMBER OF LANES	CURB TO CURB WIDTH	
	RECOMMENDED (FEET)	MINIMUM (FEET)
2	38	32
3	50	43
4	60	54
5	74	65
6	84	76

NOTE

1. SEE SHEET D801 NOTES 19 AND 20 FOR LANE WIDTH DETAILS

BIKE LANE - NO MARKED ON STREET PARKING - BIKE BUFFER

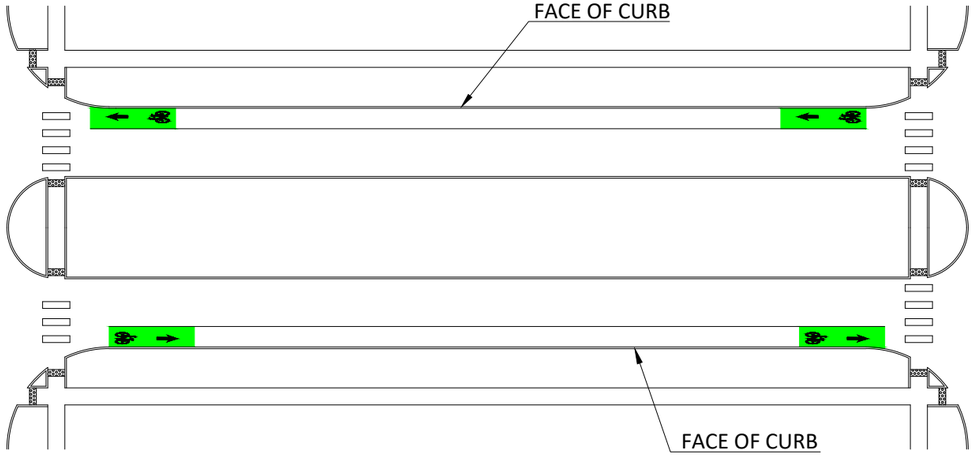


NUMBER OF LANES	CURB TO CURB WIDTH W /3' BIKE BUFFER	
	RECOMMENDED (FEET)	MINIMUM (FEET)
2	44	38
3	56	49
4	66	60
5	80	71
6	90	82

NOTE

1. SEE SHEET D801 NOTES 19 AND 20 FOR LANE WIDTH DETAILS

BIKE LANE - NO MARKED ON STREET PARKING - NO BIKE BUFFER



NUMBER OF LANES	CURB TO CURB WIDTH (DIRECTIONAL)	
	RECOMMENDED (FEET)	MINIMUM (FEET)
2	20	20
3	N/A	N/A
4	30	27
5	N/A	N/A
6	42	38

NOTES

1. SEE SHEET D801 NOTES 19 AND 20 FOR LANE WIDTH DETAILS.
2. LANE WIDTHS IN TABLE ARE FOR DIRECTION OF TRAVEL ONLY AND NOT THE FULL ROADWAY WIDTH.

The City of Oklahoma City
Public Works Department
Engineering Division

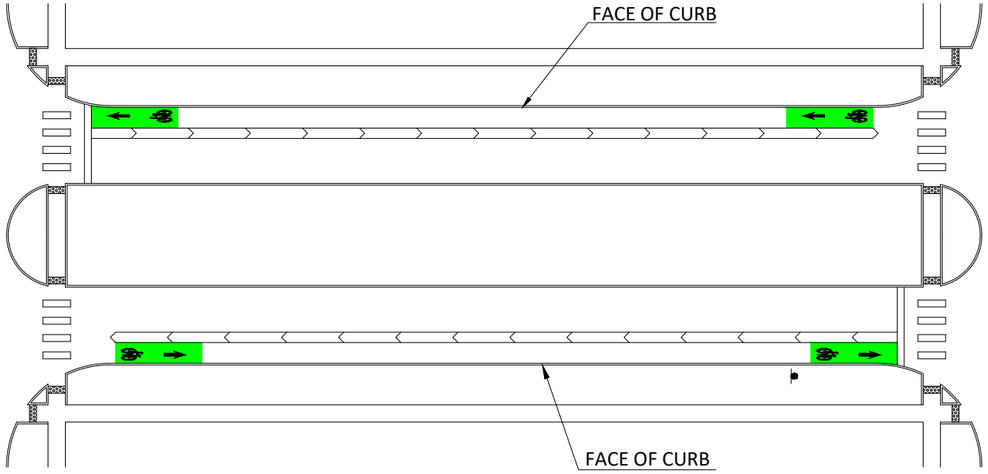
APPROVED BY:
ERIC J. WENGER, P.E.
CITY ENGINEER
DATE:

DRAWN: VSC
DATE:

BIKE LANE STANDARDS
DESIGN STANDARDS FOR ROADS

Drawing Number
D807

BIKE LANE - NO MARKED ON STREET PARKING - BIKE BUFFER

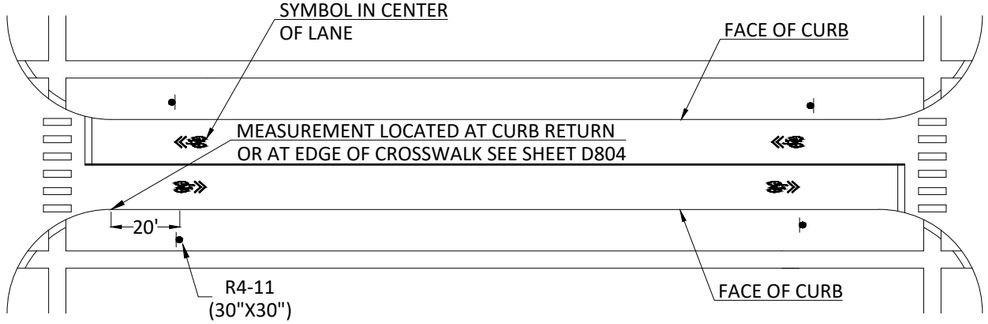


NUMBER OF LANES	CURB TO CURB WIDTH (DIRECTIONAL) WITH 3' BIKE BUFFER	
	RECOMMENDED (FEET)	MINIMUM (FEET)
2	22	20
3	N/A	N/A
4	33	30
5	N/A	N/A
6	45	41

NOTES

1. SEE SHEET D801 NOTES 19 AND 20 FOR LANE WIDTH DETAILS.
2. LANE WIDTHS IN TABLE ARE FOR DIRECTION OF TRAVEL ONLY AND NOT THE FULL ROADWAY WIDTH.

SHARED BIKE LANE - NO MARKED ON STREET PARKING

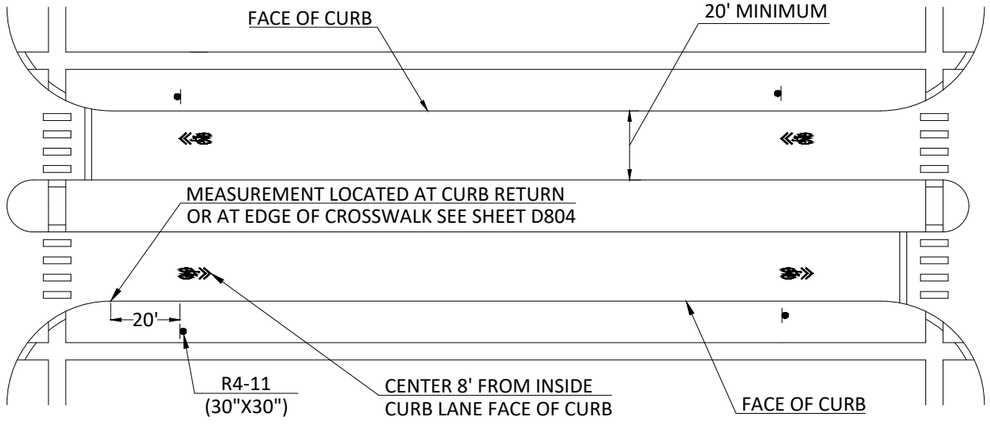


NUMBER OF LANES	CURB TO CURB WIDTH	
	RECOMMENDED (FEET)	MINIMUM (FEET)
2	26	26
3	38	33
4	48	44
5	62	55
6	72	66

NOTE

1. SEE SHEET D801 NOTES 19 AND 20 FOR LANE WIDTH DETAILS

SHARED BIKE LANE



NUMBER OF LANES	CURB TO CURB WIDTH (DIRECTIONAL)	
	RECOMMENDED (FEET)	MINIMUM (FEET)
2	20	20
3	N/A	N/A
4	24	22
5	N/A	N/A
6	36	33

NOTES

1. SEE SHEET D801 NOTES 19 AND 20 FOR LANE WIDTH DETAILS.
2. LANE WIDTHS IN TABLE ARE FOR DIRECTION OF TRAVEL ONLY AND NOT THE FULL ROADWAY WIDTH.

The City of Oklahoma City
Public Works Department
Engineering Division

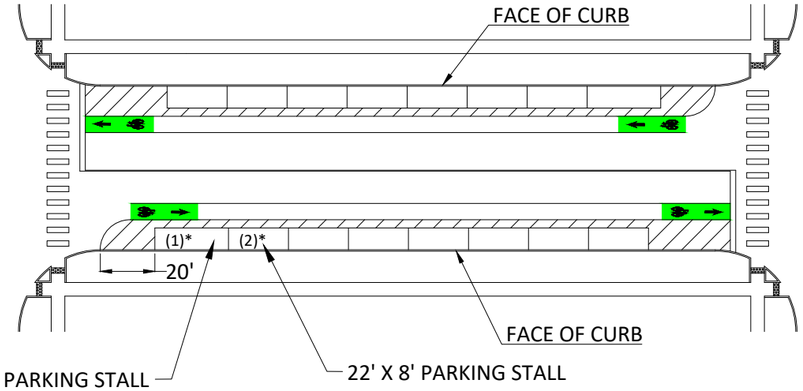
APPROVED BY:
ERIC J. WENGER, P.E.
CITY ENGINEER
DATE:

DRAWN:
VSC
DATE:

BIKE LANE STANDARDS
DESIGN STANDARDS FOR ROADS

Drawing Number
D808

BIKE LANE - MARKED ON STREET PARKING - BIKE BUFFER

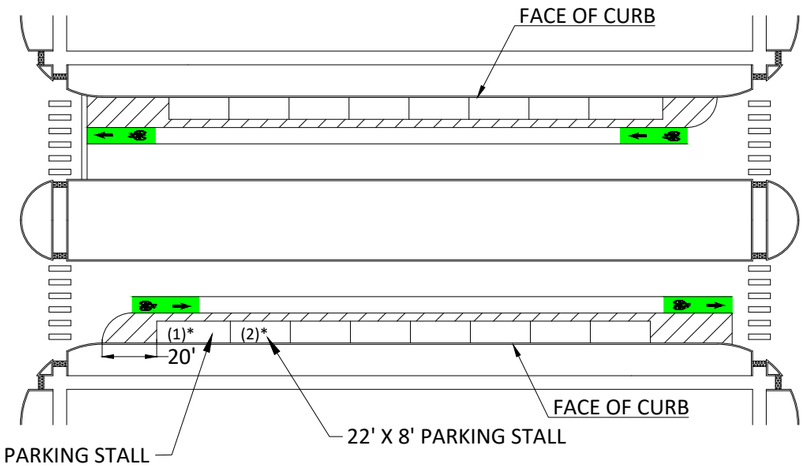


NUMBER OF LANES	CURB TO CURB WIDTH W/3' BUFFER AND PARKING	
	RECOMMENDED (FEET)	MINIMUM (FEET)
2	60	58
3	72	65
4	82	76
5	96	87
6	106	98

NOTE

1. SEE SHEET D801 NOTES 19 AND 20 FOR LANE WIDTH DETAILS

BIKE LANE - MARKED ON STREET PARKING - BIKE BUFFER

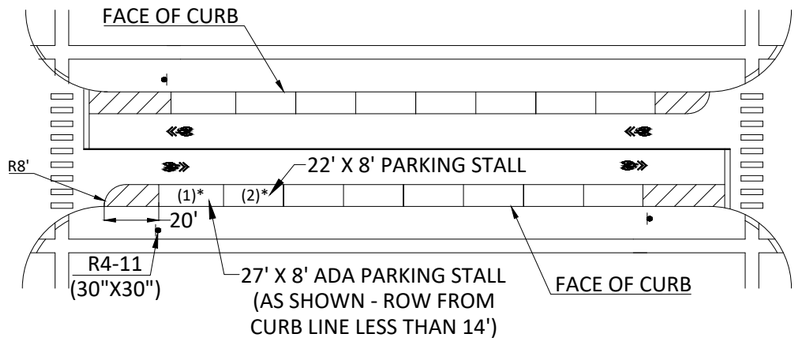


NUMBER OF LANES	CURB TO CURB WIDTH (DIRECTIONAL) WITH 3' BIKE BUFFER	
	RECOMMENDED (FEET)	MINIMUM (FEET)
2	30	27
3	N/A	N/A
4	41	38
5	N/A	N/A
6	53	49

NOTES

1. SEE SHEET D801 NOTES 19 AND 20 FOR LANE WIDTH DETAILS.
2. LANE WIDTHS IN TABLE ARE FOR DIRECTION OF TRAVEL ONLY AND NOT THE FULL ROADWAY WIDTH.

SHARED BIKE LANE - MARKED ON STREET PARKING



NUMBER OF LANES	CURB TO CURB WIDTH	
	RECOMMENDED (FEET)	MINIMUM (FEET)
2	42	42
3	54	49
4	64	60
5	78	71
6	88	82

NOTE

1. SEE SHEET D801 NOTES 19 AND 20 FOR LANE WIDTH DETAILS

(1)* IF INDIVIDUAL PARKING SPACES MARKED, HANDICAP ACCESSIBLE SPACE(S) MUST BE PROVIDED. IF NOT PREVIOUSLY MARKED, A REQUEST MUST BE TAKEN TO TRAFFIC COMMISSION. 1 HANDICAP PARKING ACCESSIBLE SPACE REQUIRED PER 25 PARKING SPACES MEASURE AROUND INTERIOR BLOCK. PARALLEL PARKING: HANDICAP PARKING SPACE 27' LONG - STANDARD PARKING 22' LONG IF RIGHT OF WAY TO BACK OF CURB IS 14' OR GREATER, THE HANDICAP PARKING SPACE MUST HAVE A 5' ACCESSIBLE ISLE BETWEEN THE CURB AND PARKING SPACE

(2)* A MINIMUM OF 2 PARKING SPACES NEXT TO EACH OTHER REQUIRED

The City of Oklahoma City
Public Works Department
Engineering Division

APPROVED BY:
ERIC J. WENGER, P.E.
CITY ENGINEER
DATE:

VSC
DRAWN:
DATE:

BIKE LANE STANDARDS
DESIGN STANDARDS FOR ROADS

Drawing Number
D809

APPENDIX J: TRANSIT SIGNAL PRIORITY (TSP) CONCEPT OF OPERATIONS




Northwest Bus Rapid Transit

Transit Signal Priority (TSP)

Concept of Operations

The City of OKLAHOMA CITY

OKLAHOMA CITY EMBARK

HNTB

Table of Contents

1.0 Scope of the Project 1
1.2 System Overview 1
1.3 Document Overview 3
1.4 Goals and Objectives 3
2.0 Referenced Documents 4
3.0 Existing and Planned Signal System Infrastructure 4
4.0 User-Oriented Operational Description 7
4.1 EMBARK Perspective 8
4.2 Oklahoma City Traffic Engineering Perspective 8
4.3 EMBARK User's Perspective 9
5.0 Operational Needs 9
6.0 System description 12
6.1 System Architecture 12
6.1.1 Logical Architecture 12
6.1.2 System Components 14
6.1.3 Physical Architecture 15
6.2 TSP Strategies 19
6.3 Communication Interfaces 19
7.0 Operational Environment 20
8.0 Support Environment 21
9.0 Operational Scenarios 21
9.1 Scenario 1: Transit Bus Running Behind Schedule 22
9.2 Scenario 2: Transit Bus Running Without Maintaining Headway 23
9.3 Scenario 3: Transit Signal Priority During Special Event 24
10.0 Summary Of Impacts 24
10.1 Operational Impacts 24
10.2 Organizational Impacts 25
11.0 Next Steps 25

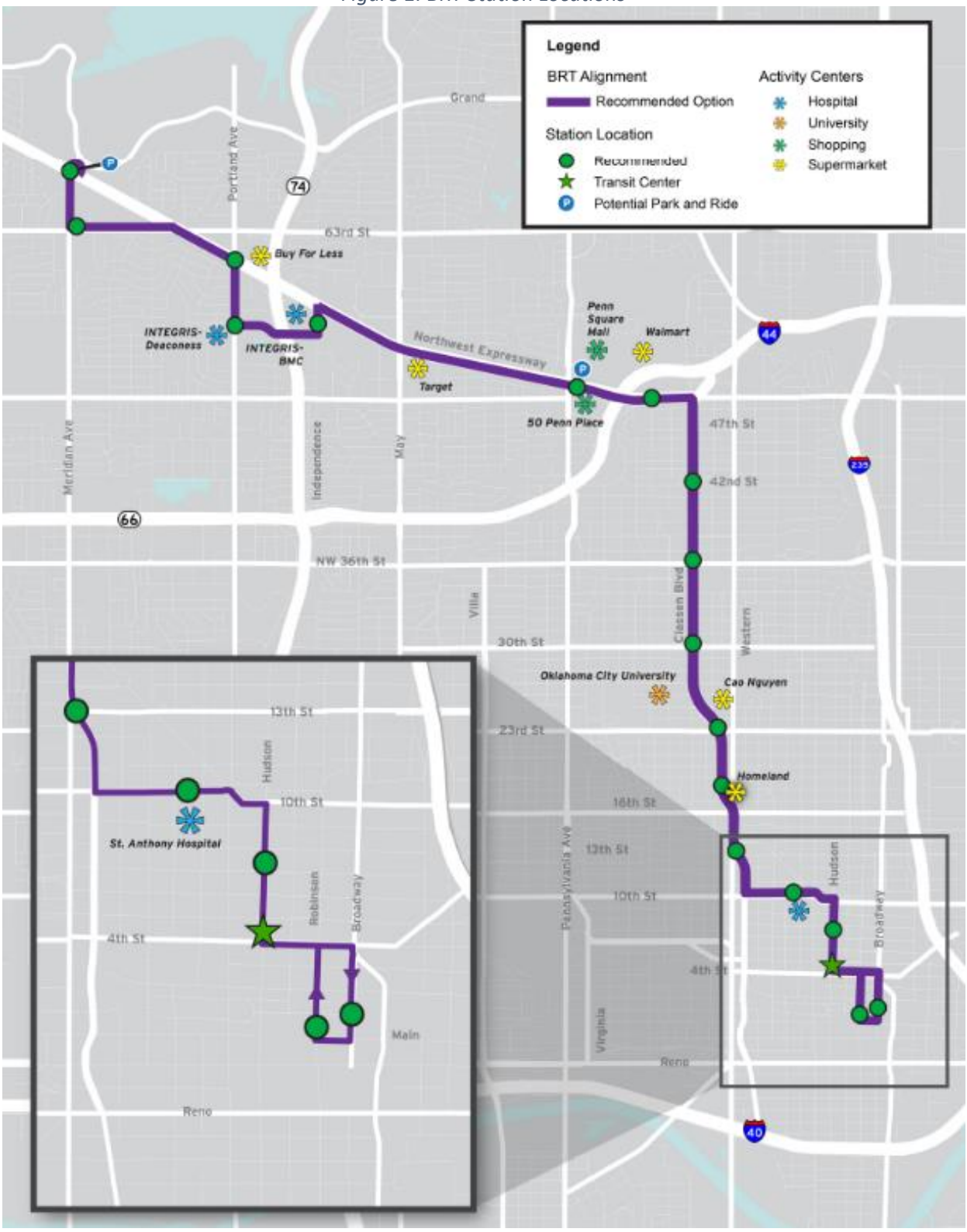
1.0 Scope of the Project

1.2 System Overview

The purpose of this project is to upgrade existing infrastructure to support the development of the high-level functional requirements for the deployment of Transit Signal Priority (TSP) for Oklahoma City, Oklahoma. This project will form the foundation for design and deployment of a TSP system. The TSP system will initially be utilized on the EMBARK Northwest Bus Rapid Transit (BRT) project, as well as the 3 additional BRT projects that are a part of the Oklahoma City Transit Plan, and potentially throughout the EMBARK transit network. TSP is currently utilized along the Oklahoma City Streetcar route in downtown Oklahoma City and will be integrated into the new fixed bus route service.

TSP is a key element of the future of the EMBARK Northwest BRT system intended to enhance the effectiveness and time efficiency of the service. The future BRT system will travel primarily along Classen Boulevard between downtown Oklahoma City and Northwest Expressway and along Northwest Expressway to Meridian Avenue. The locations of the proposed BRT stations from downtown Oklahoma City to Meridian Ave are shown in the **Figure 1** below.

Figure 1: BRT Station Locations



Source: NW BRT Corridor Study

This Concept of Operations (ConOps) includes evaluation of TSP requirements which include:

- GPS based TSP System
- Communication infrastructure
- Automated Vehicle Location/Computer Aided Dispatch (AVL/CAD) system

1.3 Document Overview

The Concept of Operations (ConOps) is a document that describes the expected operations of the TSP system from the user's viewpoint and provides documentation in compliance with the FTA Final Policy on Architecture and Standards Conformity and the Federal Highway Administration (FHWA) Rule 23 CFR 940.11 and applicable Systems Engineering Guidelines. The ConOps consists of:

- Scope of the Project
- Referenced Documents
- User-Oriented Operational Description
- Operational Needs
- System Overview
- Operational Environment
- Support Environment
- Operational Scenarios
- Summary of Impacts

The purpose of the ConOps document is to communicate overall qualitative system characteristics to EMBARK, Oklahoma City and other involved stakeholders. This document will define the user needs that will drive the requirements for the TSP system.

1.4 Goals and Objectives

The goal of the project is to develop, plan, design, and implement a GPS based TSP system that supports the travel time reliability of transit travel in Oklahoma City. The intent of implementing TSP along the corridor is to improve travel time reliability and running times for the Northwest BRT, a new fixed route bus service in Oklahoma City. Some system components such as traffic signal controllers, central traffic

management, local controller software and communication infrastructure necessary to support the proposed GPS based TSP system were implemented as part of the previous signal system upgrade project.

Specific objectives include:

- Reduce transit travel time along the Classen Boulevard and NW Expressway corridor
- Reduce excessive transit delay at congested intersections
- Reduce excessive transit delay at the left turn from Classen Boulevard onto NW Expressway
- Improve transit reliability (schedule adherence and headway management)
- Collect performance measures to evaluate system operations
- Improve the overall safety and operations of the future Northwest BRT at the designated intersections
- Add to the operational reliability of the BRT service

2.0 Referenced Documents

The following documents have been resourced in the preparation of this ConOps. Some of these documents provide policy guidance for the TSP system, some are standards with which the TSP system must comply, while others report the conclusions of discussions, workshops and other research used to define the needs of the project and subsequently identify project requirements.

- National Cooperative Highway Research Program (NCHRP) Report 812: Signal Timing Manual - Second Edition
- Transit Signal Priority (TSP): A Planning and Implementation Handbook - 2005
- Large-Scale Transit Signal Priority Implementation: District of Columbia's Path to Success – 2018
- NTCIP 1211: National Transportation Communications for ITS Protocol – Object Definitions for Signal Control and Prioritization

3.0 Existing and Planned Signal System Infrastructure

A thorough assessment of Oklahoma City's existing traffic signal system along the corridor was conducted by a field team in August of 2020. The current traffic signal controllers are Series 900 Controllers provided by Trafficware. For ease of continuity along the corridor all signal controllers upgraded to use TSP will use Trafficware's COMMANDER ATC Traffic Controllers. The advanced planning, NEPA and Preliminary Engineering Task of the BRT is completed and identified TSP as a key component of the Northwest BRT

program. This document provides a detailed description of the existing traffic signals on the BRT corridor and documented cabinet type, controller, firmware, mode of operation, detection and communications of each signal. The inventories of the existing signals along the BRT corridor are shown on **Figure 2** with details presented in **Table 1**. In order to fully provide TSP capabilities at all of the identified signals along the BRT corridor upgrading some of the equipment in the signal cabinets is necessary. Each cabinet will need to be upgraded to a commander type controller to incorporate the GPS based TSP. The upgrade will require a new cabinet, battery backup, and new communication equipment for each TSP location.

Figure 2: Exiting Signal Inventory

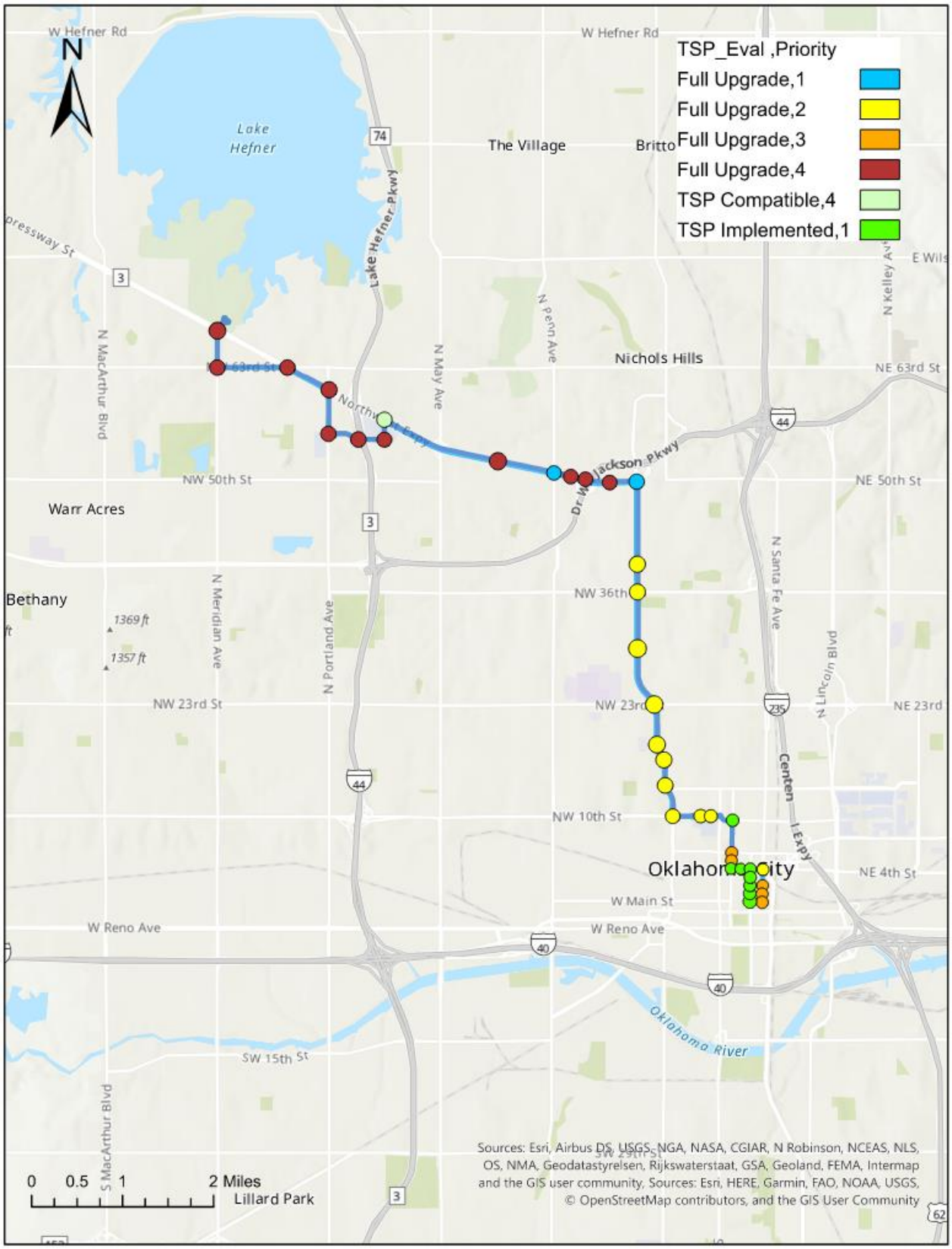


TABLE 1: EXISTING TRAFFIC SIGNAL DETAILS

Signal	Intersection Priority Level	Controller Type	Detection	Transit Signal Priority
NW Expressway & Meridian	4	NAZTEC NEMA 900	Radar/IR	No
Meridian & 63rd Street	4	NAZTEC 900	Loops	No
NW Expressway & 63rd	4	NAZTEC 900	Loops/IR	No
NW Expressway & Portland Ave.	4	NAZTEC 900	Radar	No
Portland Ave & 56th Street	4	NAZTEC 900	Radar	No
56th Street & Grand Blvd.	4	NAZTEC 900	Radar	No
56th Street & Independence Ave.	4	NAZTEC 900	Loops	No
NW Expressway & Independence Ave.	4	TW Commander	IR	No
NW Expressway & Villa Ave.	4	NAZTEC 900	IR/Loops	No
NW Expressway & Pennsylvania Ave.	1	NAZTEC 900	IR/Loops	No
NW Expressway & Penn Square Mall	4	NAZTEC 900	IR/Loops	No
NW Expressway & Belle Isle	4	NAZTEC 900 T52	IR/Loops	No
NW Expressway & Blackwelder Ave.	4	NAZTEX 900 TS2	Loops	No
NW Expressway & Classen Blvd.	1	NAZTEX 900 ATC 76	IR	No
39th Street & Classen Blvd.	2	NAZTEC 900 TS2	Loops	No
36th Street & Classen Blvd.	2	NAZTEC 900 TS2	Loops	No
30th Street & Classen Blvd.	2	NAZTEC 900 TS2	Loops	No
23rd Street & Classen Blvd.	2	NAZTEC 900 TS2	Loops	No
18th Street & Classen Blvd.	2	NAZTEC 900 TS2	Loops	No
16th Street & Classen Blvd.	2	NAZTEC 900 TS2	FLIR	No
13th Street & Classen Blvd.	2	NAZTEC 900 TS2	FLIR/Loops	No
10th Street & Classen Blvd.	2	NAZTEC 900 TS2	FLIR	No
Lee Ave. & 10th Street	2	NAZTEC 900 TS2	FLIR	No
Dewey Ave. & 10th Street	2	90-900 ATC	FLIR	Yes
10th Street & Hudson	1	Commander	Radar	Yes
6th Street & Hudson	3	NAZTEC 900 TS2	Loops	No
5th Street & Hudson	3	NAZTEC 900 TS2	Radar/Loops	No
4th Street & Hudson	1	NAZTEC 900 ATC 80	Radar/Loops	Yes
4th Street & Harvey	1	NAZTEC 900 ATC 80	Loops	Yes
4th Street & Robinson	1	NAZTEC 900 ATC 80	Radar	No
4th Street & Broadway	2	NAZTEC 900 ATC 80	Radar	No
Broadway & Robert S Kerr	3	NAZTEC 900 TS2	Loops	No
Broadway & Main Street	3	NAZTEC 900 TS2	FLIR/Loops	No
Broadway & Park Ave.	3			
Main & Robinson Ave.	1	NAZTEC 900 ATC 80	Loops	Yes
Robinson & Park Ave.	1	Commander	Loops	Yes
Robinson & Robert S Kerr	1	NAZTEC 900 ATC 80	Loops	Yes
Robinson & Dean A McGee Ave.	1	NAZTEC 900 ATC 80	Loops	Yes

4.0 User-Oriented Operational Description

The primary users of the proposed TSP systems are EMBARK, Oklahoma City Traffic Engineering and the traveling public utilizing EMBARK transit buses. While Oklahoma City and the travelers using EMBARK buses want a system with reliable and efficient service, the Oklahoma City Traffic Engineering and the

driving public desire a predictable and efficient signal system which minimizes disruption. The needs and desires of these user groups are different, and they view the TSP system from different perspectives as described in the following sections.

4.1 EMBARK Perspective

At present, EMBARK operates fixed route, commuter, and ADA Complementary Paratransit Services within Oklahoma City. Currently, Oklahoma City does have signal priority operating on their streetcar signal system. Embark wants to use TSP to provide high level priority to the fixed route bus system to help create a virtual dedicated guideway. The transit system will incorporate TSP, queue jumps, and holds for existing bus bays.

TSP operating at as many signals as possible on the corridor will help the buses arrive at their destinations in a reliable manner. In particular, EMBARK desires to achieve the following enhancements of its operation in the corridor by implementing TSP in addition to other strategies:

- Reduction of round-trip travel time to reduce operations cost
- Reduce excessive transit delay at congested intersections
- Improve travel time reliability (schedule adherence and headway management)

To achieve these goals, EMBARK is interested in schedule adherence-based TSP service at all signalized intersections in the corridor and throughout Oklahoma City. It is anticipated that green extension and early green TSP strategies will be implemented through a GPS based TSP System. An implementation of this type can reduce the operational costs associated with BRT service.

The TSP system will upgrade the existing system to use a vendor provided GPS transponder which will communicate directly with the signal receiver on the mast armor signal cabinet to determine bus location and status.

4.2 Oklahoma City Traffic Engineering Perspective

The Oklahoma City Traffic Engineering, a division of the Transportation Department, operates and maintains the signals at the intersections on the Northwest BRT corridor. Oklahoma City does currently

have a TSP system in place for streetcar service downtown. Even without TSP service, maintaining satisfactory level of service at some intersections is difficult.

Since traffic operations are already difficult in the Classen Boulevard and NW Expressway corridors, Traffic Engineering would prefer that an operational strategy be chosen which limits the impact of TSP to the traffic signal system. This may mean limiting the number or frequency of TSP calls or placing some other conditions on the TSP. The largest concern is the recovery time needed for the signal to return to its coordinated state. In addition, the TSP needs to be flexible enough to be implemented differently at different intersections based upon its timing plan and the needs of other users.

4.3 EMBARK User's Perspective

The riders of EMBARK transit want to have a reliable service around which they can plan their day and commute. If their transit trip has a large range of travel times, they must plan for the trip to take the longest amount of time every time to be sure they are at work or an appointment on time. The second important factor is trip speed. The bus needs to be close to the travel time by auto vehicle to earn the business of the choice rider (those who could drive). The riders are agnostic about how the travel time reliability or overall travel time reduction is accomplished but it is important to them and affects their daily life.

5.0 Operational Needs

Implementation of TSP service at the signalized intersections along the NW BRT route will serve all buses along the corridor. The focus of this section is to document those high-level needs and to add details to create operational needs that can be used to build an action plan and more detailed requirements. Once the needs were described, a preliminary list of performance measures were identified to support the evaluation of the goals and objectives.

The needs identified in this section were gathered through a series of meetings with the Oklahoma City and EMBARK staff.

Four categories were created to identify high-level needs and include:

1. Transit Operations
    - Reduce travel time delay
    - Improve transit service reliability by improving schedule adherence

- Decrease headway
- Decrease transit system operating cost
- Reduce round trip travel time of buses
- Improve operations of transit vehicles at traffic signals
- Implement conditional TSP which:
    - could always be in operation
    - have conditional priority based on schedule adherence
    - will minimize disruption to signal operation
    - will improve operations for transit vehicle and transit users
- Provide special signal phasing to support queue jumps

2. TSP Operations
    - Capable of generating conditional priority request without operator intervention
    - Capable of operating under free and coordinated signal operation modes along the NW BRT route
    - Flexible in adjusting priority condition parameters
    - Conditional parameters should be adjustable at each intersection
    - Configurable based on the day of the week
    - Configurable based on the time of day
    - Capable of generating priority requests based on schedule adherence and direction of travel
    - Capable of issuing priority based upon route
    - Capable of handling future vehicle growth
    - Free of issuing false priority request
    - Capable of tracking the conditions under which the TSP is granted
3. Communications Systems and Integration
    - Maintain cellular communication to the Traffic Operations Center (TOC)
4. System Monitoring and Reporting
    - System should be capable of storing data necessary for monitoring the deployed TSP performance

Through continued small group discussions, more detailed needs were identified based on various operational scenarios that are further described in the next section. These needs and associated requirements are further documented in the requirements and verification plan. **Table 2** summarizes the Operational Needs developed:

Table 2: Operational Needs

NO.	Needs Identified in Discussions with Stakeholders
1.0	**TRANSIT OPERATIONS**
1.01	Need to reduce travel time by reducing running time delay
1.02	Need to improve schedule adherence
1.03	Need to maintain headway
1.04	Need to improve travel time reliability
1.05	Need to reduce round trip travel time
1.06	Need to reduce travel time in peak periods
1.07	Need to have conditional priority based on schedule adherence
1.08	Need to provide real time GPS data
1.09	Need to reduce system operational cost
1.10	Need to implement conditional TSP capable of operating everyday
1.11	Need to provide special signal phasing to support queue jumps
2.0	**TSP OPERATIONS**
2.01	Need to provide real-time (live) data from buses
2.02	Need to provide a GPS based TSP system
2.03	Need to implement TSP with minimum disruption to signal operation
2.04	Need to capture the vehicle locations in real time
2.05	Need to estimate the time of arrival and departure at the signals along the corridor
2.06	Need to coordinate with bus location and system map
2.07	Need to exchange the vehicle status information with the Transit Operation Center
2.08	Need to transfer the operational and conditional priority characteristics to the GPS based TSP system
2.09	Need to communicate priority needed and when to the TCC from the GPS based TSP system
2.10	Need to communicate priority needed and when to the signal from the TCC
2.11	Need bus to acknowledge that it moved through signal and how long it took
2.12	The traffic signal controller needs to receive the priority parameters from the Traffic Control Center (TCC)
2.13	The traffic signal controller needs to send the status of the priority requests received back to the TCC
3.0	**COMMUNICATIONS SYSTEMS & INTEGRATION**
3.01	Need to maintain cellular communication to the TOC
3.02	Need to provide communication line between the bus and the TSP signal
3.03	Need to provide adequate speed, bandwidth, and reliability of GPS based system to TCC
3.04	Need to provide adequate speed, bandwidth, and reliability of TCC to signal controllers
3.05	Need to develop interagency agreements between EMBARK and Oklahoma Traffic Engineering
3.06	Need access to signal communications network
4.0	**SYSTEM MONITORING & REPORTING**
4.01	Need the Traffic Control Center to monitor the TSP system
4.02	Need the Oklahoma City Traffic Control Center to monitor the signal, communication network and the TSP devices to perform system diagnostics and to know device status
4.03	Need the TSP central system to log all priority requests
4.04	Need Automated Traffic Management System (ATMS) to report what type of priority was provided to each vehicle
4.05	Need reporting that is easily understandable, graphical and meaningful by all users
4.06	Need the TSP system report to provide reports summarizing the TSP activity
4.07	Need the Traffic Control Center to report the impact of TSP to signal operations

6.0 System description

To support the goal of improving bus operations, TSP is proposed to be implemented as a GPS based system. The concept for the TSP system has been established through coordination with stakeholders to address the needs identified in Section 5.0. This section describes the conceptual architecture of the proposed TSP system.

The system architecture described in this section is based on the National Transportation Communications for ITS Protocol (NTCIP) and Transit Communications Interface Profiles (TCIP) for the TSP system planning and design to the extent possible.

The proposed TSP system is described from three different perspectives: system architecture, TSP strategies and communication interfaces which are elaborated on in the following sections.

6.1 System Architecture

The system architecture defines the system logically without mentioning specific technology. It identifies the logical entities, their locations and the interfaces between them in the overall TSP system. The naming convention of the logical components is adopted from the NTCIP 1211 – Object Definitions for Signal Control and Prioritization and from the TCIP – Transit Communications Interface Profiles.

6.1.1 Logical Architecture

The TSP system will consist of two primary components: a Priority Request Generator (PRG) and a Priority Request Server (PRS) defined in the NTCIP 1211 – Object Definitions for Signal Control and Prioritization standards. The PRG is a logical entity that generates a priority request on behalf of a transit vehicle. PRS is a logical entity in the TSP enabled intersection that determines the disposition of a TSP priority request from the PRG. The logical view of the system is shown in the **Figure 3** below:

Figure 3: TSP System Logical Architecture

EMBARK's transit fleet vehicle carries a PRG. Priority requests are sent to the PRS in the field over the wireless communication medium as shown in **Figure 6** for processing.

Primary functions of the PRG are:

- To determine whether a vehicle is in need of transit signal priority at a signalized intersection based on the pre-defined priority request triggering criteria.
- To send the vehicle's request for priority, its time of arrival, and its time of service desired at the signalized intersection to the PRS.
- Keeping a log of all priority requests. These requests will be processed by the EMBARK Transit Management Center for reporting and tracking performance measures.

Primary functions of the PRS are:

- To receive multiple priority requests from different PRGs.
- To produce an estimate of the vehicles' calculated time for service desired at the signalized intersections.

- The PRS generates a priority service request to the traffic signal controller. The PRS prioritizes different priority requests coming from different PRGs based on vehicle's classification (Emergency Vehicle vs. Transit), vehicle level and time of service desired.
- To produce a log of all the received priority requests and granted service requests by the PRS for review by EMBARK and the Oklahoma City traffic engineering division.

6.1.2 System Components

The TSP system will consist of five (5) primary components: EMBARK Transit Operation Center, EMBARK BRT buses, Communication Devices (emitter on a transit vehicle), Priority Request Receiver at TSP enabled intersections, and the Oklahoma City Traffic Operation Center. The overall physical views of the TSP system from different perspectives are shown in **Figure 4, Figure 5 and Figure 6.**

Figure 4: TSP System Components in Plan View

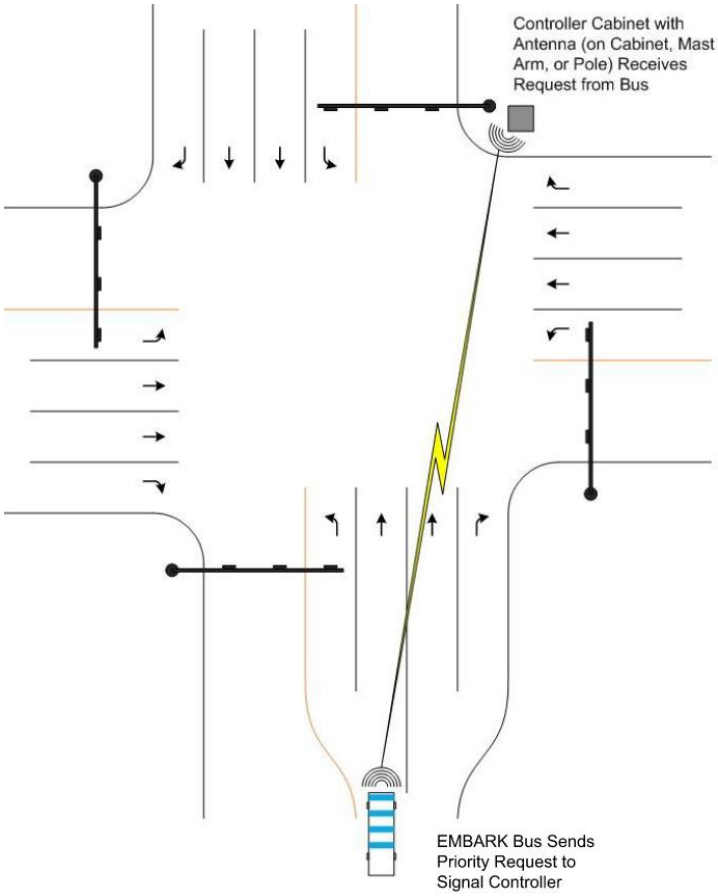


Figure 5: TSP System Components in Profile View

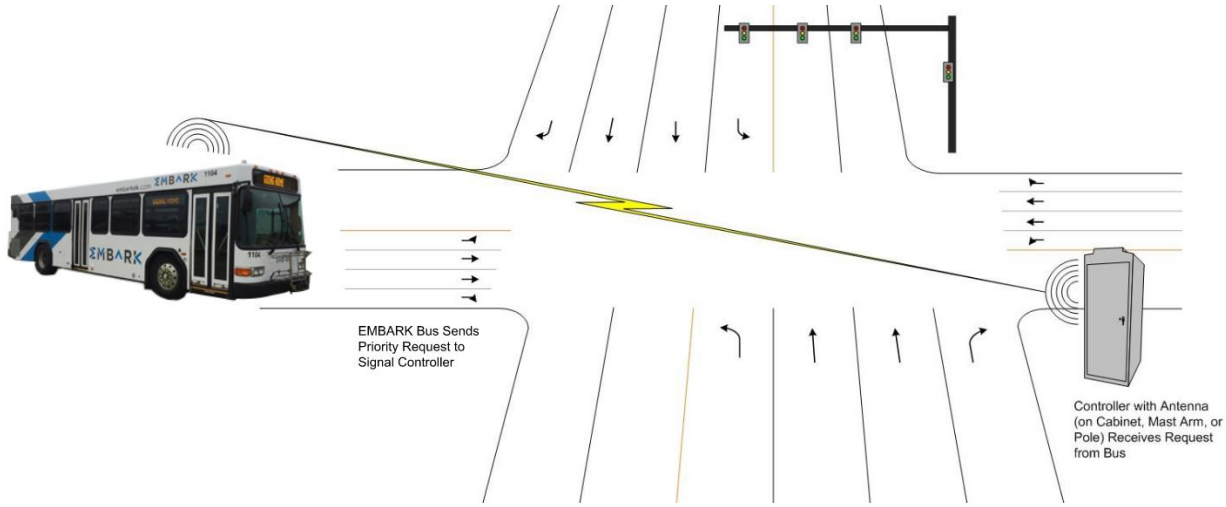
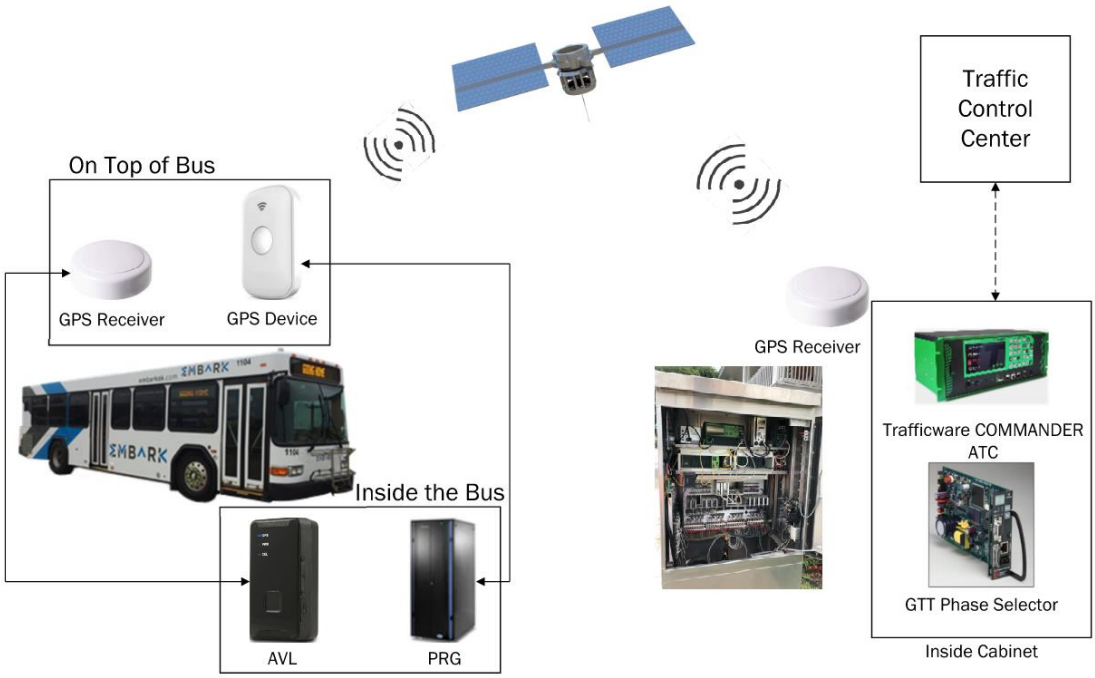


Figure 6: TSP System Schematic

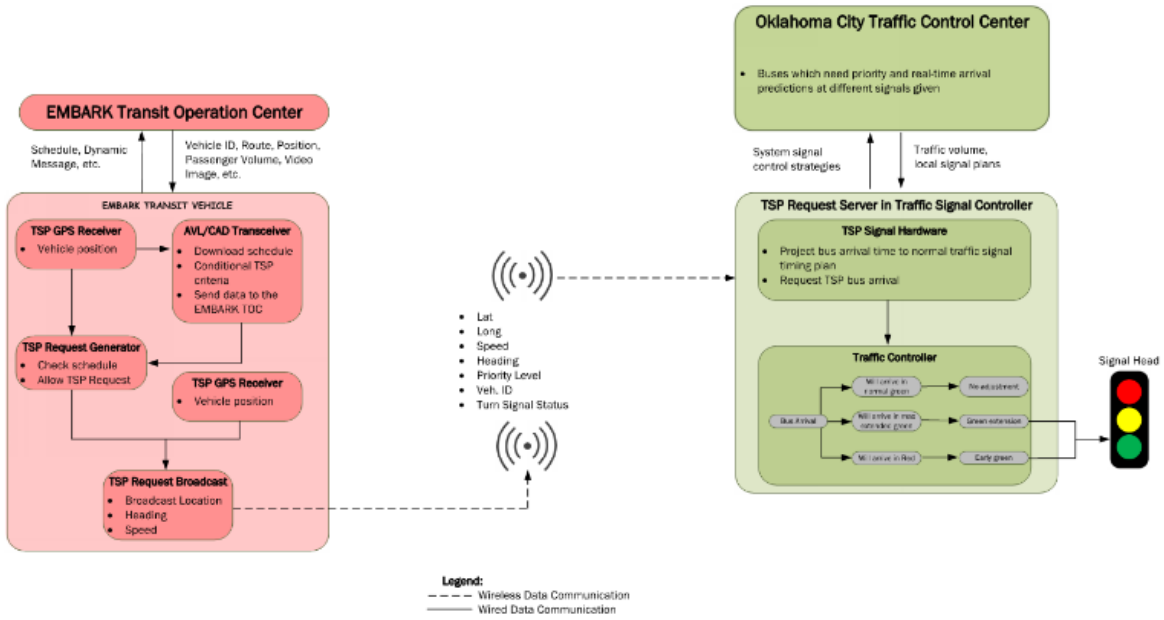


6.1.3 Physical Architecture

The physical architecture of the TSP system is illustrated in **Figure 7.** The TSP service request will begin with the EMBARK Automatic Vehicle Location (AVL) system collecting and monitoring bus position and referencing bus schedule time points. Based on bus schedule and bus position data, the current schedule

adherence condition will be calculated and checked against the predefined TSP criteria (e.g., number of minutes behind schedule). If the bus meets the criteria, the AVL system will send a message to the on-board PRG allowing TSP requests to be generated. The PRG will generate a TSP request and information such as latitude, longitude, speed, heading, vehicle ID, and priority level (e.g., low for TSP) will be included in the request. This information will be transmitted from the bus wirelessly to the receiver installed at the individual intersection as a priority request.

Figure 7: TSP Physical Architecture



After the receiver receives the TSP request and related information from the approaching bus, it will send the request to the PRS which could be either a separate component or integrated with the controller. The PRS would resolve the request against any other priority requests (e.g., emergency vehicle, other TSP calls). When the estimated bus arrival time (ETA) to the stop bar is calculated (from continuously updated bus position data sent from the on-board GPS vehicle equipment), the PRS will output a pulsating signal corresponding to the phase to be served to the traffic signal controller. The traffic signal controller will interpret the pulsating input as a TSP call on the appropriate priority input.

As soon as the TSP call is forwarded to the controller, the controller compares the time when the call is received to the programmed time of service desired (TSD) and the time of estimated departure (TED) values which should be already programmed into the controller. The ETA in the PRS is calculated time which estimates when the bus arrives at the intersection. The TSD is the predicted bus arrival time and

will be projected into the normal traffic signal timing plan by the controller to determine the bus arrival time relative to the timing plan.

Depending on the bus arrival time in the traffic signal timing plan, one of the following TSP strategies will be executed:

- If the bus arrival time is projected to fall in the normal green time of the bus phase, the normal signal timing plan will not be adjusted.
- If the bus arrival time is projected to fall in the maximum extended green time and TSP is granted, the green signal will be extended until the bus checks out or maximum extended green time is reached.
- If the bus arrival time is projected to fall in the red time of the bus phase and TSP is granted, the green signal will return early to the bus phase. The green times for non-bus phases will be shortened to provide an early return to the green signal for the bus phase with the minimum green time for those non-bus phases being maintained.

During the servicing of either green extensions or early green/red truncations, the traffic signal will maintain all vehicle and pedestrian minimum times, yellow and all-red change intervals, and should remain in coordination.

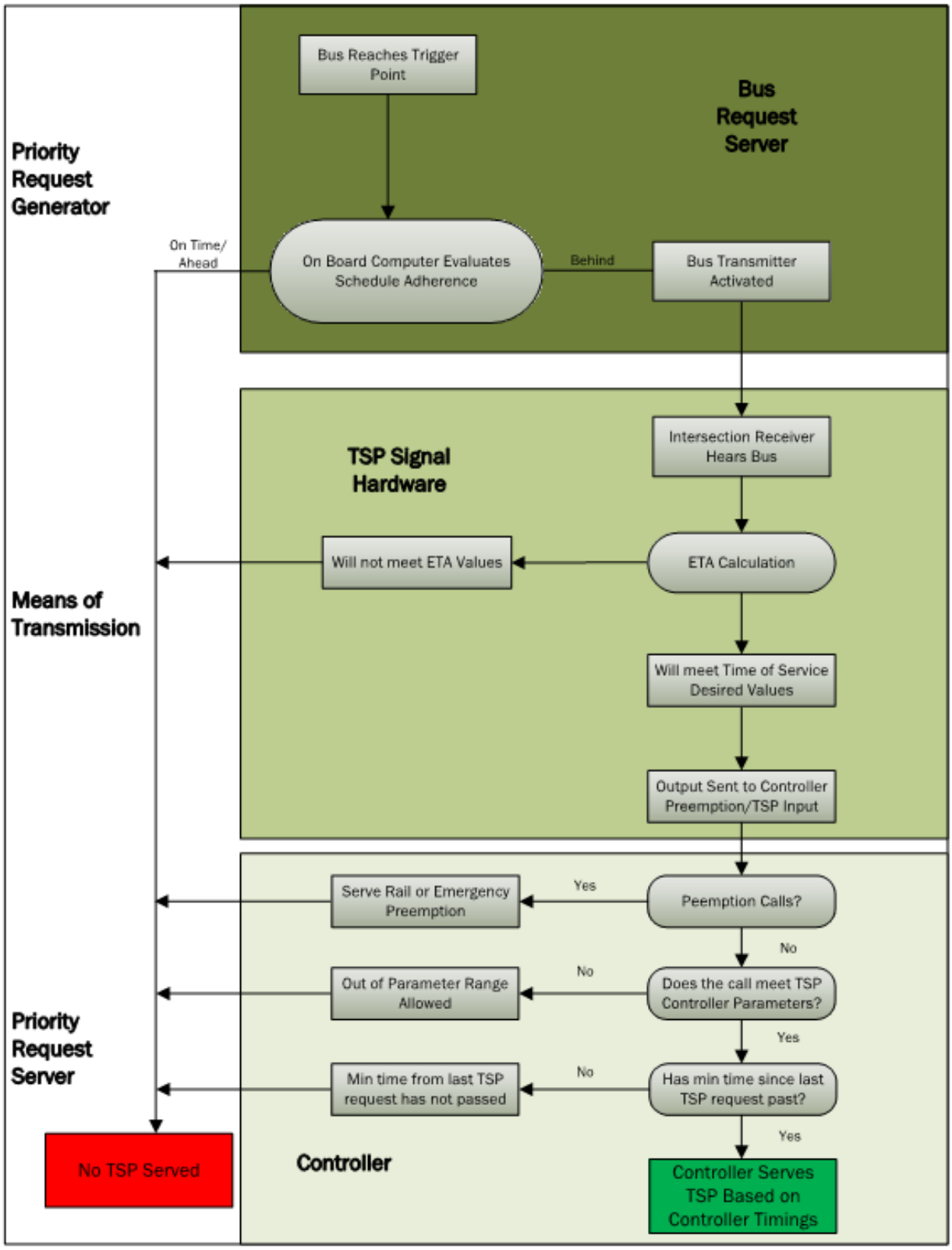
In the case of more than one TSP request at the same intersection, the PRS will address this event on a first come-first serve basis. The PRS will also address the servicing of high priority preemption calls for Fire & Rescue vehicles by immediately overriding all low priority calls (e.g., TSP).

The servicing of repeated TSP service requests will be controlled through a pre-defined value (e.g., re-arm or reservice value). This value will define the minimum number of cycle lengths required between successive TSP service requests. After servicing of the TSP request, the local traffic signal controller will return to normal operations.

The TSP service request process described above is illustrated graphically in **Figure 8.** This process will be automatic for EMBARK buses in service and will not require driver activation or active management by signal operators other than the retrieval of system component logs for monitoring purposes.

The controllers of the intersections in the BRT corridor will be upgraded as part of the Oklahoma City Traffic Signal BRT System upgrade project and will have the TSP functionality.

Figure 8: TSP Service Request Decision Diagram



6.2 TSP Strategies

While the system architecture gives a system overview including descriptions of the TSP system components and the interfaces between them, the TSP strategies describe the system from operational perspective. This view of the system describes what TSP strategies including green extension, early green and insertion of new phase at queue jumps will be implemented and the conditions required to grant a TSP request.

The conditional priority requires that certain criteria be met before a transit priority request can be generated. The intent of conditional priority is to be selective with regard to which buses are allowed to make a priority request. BRT buses that are one minute behind schedule will be granted the ability to make a TSP request along the BRT route. Regular buses that are two minutes behind schedule.

The following TSP strategies will be implemented:

- **Green extension** - extends the green time for the TSP movement when a bus is approaching. The green is extended up to a maximum permitted time or until the bus is no longer detected. This strategy only applies when the signal is green for the approaching bus. Early recommendation is 15 seconds of maximum green extension.
- **Early green** - shortens the green time of preceding phases to the minimum permitted time to expedite the return to green for the movement where a bus has been detected. This strategy only applies when the signal is red. The maximum early green should initially be set to 20 seconds.
- **Phase insertion** - a special priority phase is inserted within the normal signal sequence. The phase can only be inserted when a transit vehicle is detected and requests priority for this phase. An example would be the insertion of a bus queue jump phase at Pennsylvania and NW Expressway before phase 4. The queue jump phase can be very short, 4 to 6 seconds is normal, if there is a dedicated transit lane. This is only recommended at queue jump and dedicated lane segments where it is important for the bus to move ahead of other traffic.

Most intersections will use only the green extension and early green strategies. There are intersections that will have queue jumps and may require phase insertion to allow an early green phase for buses exiting the queue jump. This determination will be made during the preliminary design of the queue jumps. Special transit-only signal heads will be required for this application.

6.3 Communication Interfaces

This view of the TSP system identifies and provides general descriptions of the interfaces among the various entities comprising the TSP system.

EMBARK's existing Operations Management System (AVL/CAD) will include an interface with the TSP system. The AVL/CAD will be capable of providing data to the TSP system such as schedule, adherence data, and agency-defined thresholds to determine when a vehicle is off schedule as a means of triggering a TSP request. Other data, such as door opening, and closing can also be transmitted for use by TSP.

An emitter device will be installed on BRT vehicles to provide the communications link between the two systems that will automatically send the necessary data to receivers at designated intersections. This receiver will send information to the PRS which will determine, based on predefined conditions, if the priority request will be sent to the traffic controller or not.

Several communications technologies such as light-based, sound-based, radio frequency (RF)-based, satellite and radio-based are currently available. The communication technology will be finalized as part of the preliminary and final design.

The intersection to intersection communication necessary to relay data between the Oklahoma City Traffic Operation Center and each signalized intersection location in the corridor will be implemented as part of the Oklahoma City Signal System Upgrade project.

7.0 Operational Environment

Realizing the intended performance enhancement desired of the bus system by deploying the TSP service will require an operational agreement and sharing of responsibilities between EMBARK and Oklahoma City Traffic Engineering. From BRT team meetings the following agreements were identified:

EMBARK will design, deploy and maintain all of the elements of the bus service along the corridor. They will also operate and maintain the Transit Operation Center. Also, EMBARK is responsible for operating and maintaining all of the equipment on the bus. Defining routes, schedules and monitoring the schedule adherence through their AVL system is also under EMBARK's day-to-day transit operational responsibility. Oklahoma City Traffic Engineering will maintain any TSP equipment or firmware installed at the intersection or Oklahoma City Traffic Control Center.

In addition to those distinct responsibilities of EMBARK and the Oklahoma City Traffic Engineering, they have some shared responsibilities including assessment of the deployed TSP service, EMBARK generating performance measurement reports and the Oklahoma City Traffic Engineering reporting the number of times TSP was requested, granted, and determine its effectiveness at conveying the bus through the intersection. Alternatively, a reporting program can be purchased to provide these reports to traffic operations and Embark Transit operations. Reports should include any single component failures, check-in and check-out detections and all reports should have exact time stamps of the event.

8.0 Support Environment

The TSP system will utilize the traffic signal communication infrastructure to communicate with the TSP request server. The Oklahoma City Traffic Engineering will provide access or pass the TSP communications through its Traffic Control Center to the appropriate intersection. The Oklahoma City Traffic Engineering uses a third-party cellular network with a VPN connection that will connect the intersections and the Traffic Control Center. Oklahoma City and EMBARK need use of the cellular network VPN to support the implementation of TSP.

9.0 Operational Scenarios

This section presents a number of hypothetical operational scenarios that are intended to capture activities associated with operation of the system. The objective of developing operational scenarios is to capture system needs from the perspective of the users.

The operational scenarios capture the activities to be performed which are both routine and non-routine, in order to identify user requirements. It is important that the operational scenarios are realistic and reasonable.

Before going into the detailed description of the scenarios, the overall description of the normal initiation (start of the TSP service) and termination (end of the TSP service) is necessary to understand the sequence of events that generally occur in any TSP request.

At login each morning, each EMBARK transit vehicle will download and store in the on board AVL/CAD system and PRG: 1) Updated schedule information for the routes and trips assigned to the vehicle for the day and 2) Conditional priority factors by trip that accounts for type of service, direction, time of day, and historic passenger loading. Higher order factors will be granted TSP first when simultaneous priority requests are received at an intersection. As the transit vehicle is leaving the yard, the mobile AVL/GPS and the vehicle detection/location and communications will be tested, along with requests for priority. At the end of each day (or run), the transit vehicle will upload to the EMBARK Transit Operation Center using operation center to vehicle communications the service performance log data including the automatic passenger information, the schedule adherence of each trip, and the requests for transit signal priority.

The EMBARK Transit Operations Management System will archive the logged data. The EMBARK Transit Operation Center will also request the Oklahoma City Traffic Operation Center the logged wayside PRS data, and signal control data. These will be archived, and a fused performance database for the day will be analyzed to track the performance measures of the TSP system.

The operational scenarios include the following:

- Scenario 1: Transit Bus Running Behind Schedule
- Scenario 2: Transit Bus Running Without Maintaining Headway
- Scenario 3: Transit Signal Priority During Special Event

These scenarios are detailed below for the proposed TSP system.

9.1 Scenario 1: Transit Bus Running Behind Schedule

An EMBARK transit vehicle is travelling southbound on Classen Boulevard approaching the 18th Street signal at 7:00 am on Tuesday. For the BRT bus to receive TSP, it must be running 1 minute or more behind schedule. Since the vehicle is running 1 minute or more behind the established transit schedule in the AM peak period, the vehicle meets the priority request generating criteria.

The PRG transmits a message to the PRS at the intersection to request priority on the southbound approach. The message contains the vehicle ID, position, speed, priority level (accounting for type of service, direction, time of day, and historic ridership), schedule adherence and headway.

The PRS at the intersection receives the request from the approaching vehicle and compares the current position of the vehicle to its list of detection zones, determines that it has just entered the southbound detection zone for the intersection and estimates when it will reach the intersection. It then logs the vehicle ID, date and time, priority level, the schedule and gap, and intersection approach. The PRS activates the input in the detector rack that corresponds to the southbound through phase and checks the vehicle in. The arrival time for the vehicle is calculated to be 30 seconds from check in. The traffic signal controller senses that this input is active. At that time, the through phases for Classen Boulevard are green, with 24 seconds remaining until their force-off point. An extended green TSP is provided for 6 seconds to allow the southbound transit vehicle to pass through the intersection. The transit vehicle proceeds, leaving the detection zone and clearing the intersection, and is checked out. The extended green is terminated, and the signal reverts to its normal cycle.

9.2 Scenario 2: Transit Bus Running Without Maintaining Headway

An EMBARK transit vehicle is travelling northbound on Classen Boulevard approaching the 39th Street signal at 4:30 pm on Wednesday. It is approaching the intersection 3 minutes behind schedule. It has been receiving the location and speed data of all the transit vehicles in service along the corridor at 1-minute intervals and has calculated that it has been 11 minutes since the prior transit vehicle passed the intersection. The priority request triggering criteria under the headway control is satisfied with this headway and the transmitter on the vehicle is turned on to transmit a message to the PRS at the intersection to request priority on the westbound approach. The message contains the vehicle ID, position, speed, priority level, schedule adherence and headway.

The PRS at the intersection receives the request from the approaching vehicle and compares the current position of the vehicle to its list of detection zones, determines that it has just entered the northbound detection zone for the intersection and estimates when it will reach the intersection. It then logs the vehicle ID, date and time, the priority level, passenger count, schedule and gap, and intersection approach. The PRS activates the input in the detector rack that corresponds to the northbound through phase and checks the vehicle in. The arrival time for the vehicle is calculated to be 20 seconds from check in. The traffic signal controller senses that this input is active. At that time, the through phase for 39th street is green, with 30 seconds remaining for the phase. Also, the controller finds that if the existing green phase is served another 20 seconds it will meet the minimum green time requirement for the phase.

Meeting the minimum green time allows the controller to provide an early green TSP to allow the northbound transit vehicle to pass through the intersection. The transit vehicle passes through the intersection and is checked out. The early green is terminated, and the signal reverts to its normal cycle.

9.3 Scenario 3: Transit Signal Priority During Special Event

A number of "special events" are likely to occur annually along the Plaza District in the downtown corridor. Examples include live music events, food trucks, etc. The TSP treatment will depend on the event and service plan agreed between the Oklahoma City Traffic Engineering Division and EMBARK during special events. For this example, let's assume that a live music event is taking place one Saturday afternoon on or near the corridor. The steps to plan and respond to this event are:

- Oklahoma City Traffic Engineering and EMBARK receive notification 3 months in advance of the event schedule including anticipated attendance and other details.
- EMBARK proposes staging transit vehicles for people leaving the event at the end of the night. EMBARK vehicles would be inserted into the regularly scheduled service for 5-minute headways to the downtown street intersections.
- Operating mode will be set to "Special Event Service" and parameters sent to PRG and PRS devices impacted.
- Within ½ mile of the event locations, signals will be under manual police direction. In this area all TSP will be suspended for safety reasons.
- Outside of this radius, all conditional priority will be turned off, and the vehicles will operate under unconditional active priority (always issuing a priority request) in the outbound direction from the event location.
- The lockout period (the period when no TSP will be served) will also be set to zero.
- These parameters will remain in effect for 1 hour after the event ends.
- The operating mode will be set to "Recovery" until normal service patterns, schedules, and headways can resume.

10.0 Summary Of Impacts

10.1 Operational Impacts

The implementation of the elements identified in the TSP system concept will allow for significant operational improvements in EMBARK service. The TSP system will reduce transit delay, reduce roundtrip travel time, increase transit reliability (schedule adherence), increase efficiency of the future BRT system.

The following summarizes the expected operational impacts on the traffic in the BRT corridor due to the implementation of the TSP system.

1. Reduced average and the maximum round trip bus run times due to reduced delay at traffic signals.
2. Improved on-time performance and consistent headways by reducing travel time variability due to reduced traffic signal delay.
3. Reduced number of vehicles and operators required to provide the specified service in each time period. This will reduce the total system operation cost.
4. Reduced parallel traffic delay and LOS due to increased green time from TSP.
5. Potential increased crossing traffic delay and LOS due to decreased green time from TSP.

10.2 Organizational Impacts

TSP also has organizational impacts. In order to implement and operate TSP, the operating agreements and memorandum of understanding between the Oklahoma City Traffic Engineering and EMBARK is necessary to formally establish the initial TSP service, locations, roles and responsibilities, and a process for managing change. Because of the need to merge and integrate data from multiple sources (the Oklahoma City Traffic Control Center with their signal controllers, PRS and the EMBARK Transit Operation Center with their AVL/CAD system, PRG, etc.), there will be a need to have Oklahoma City Traffic Engineering process, store and analyze the TSP performance data.

11.0 Next Steps

The project team will develop high-level system requirements and a preliminary verification plan consistent with this Concept of Operations to support the TSP deployment. This final section of the Concept of Operations summarizes the need to manage and document the system engineering design and installation process to meet stakeholder needs.

EMBARK and the Oklahoma City Traffic Engineering or their representatives will track and amend the verification plan, project plans, specifications and requirements. The responsibility to manage the project changes will be the responsibility of Oklahoma City Project Manager. These changes will be documented in the acceptance testing and tracked through the mapped requirements back to the Concept of Operations. EMBARK and the Oklahoma City will review the mapped changes and determine the timeframe to amend the Concept of Operations.

APPENDIX K: PROJECT DEFINITION REPORT



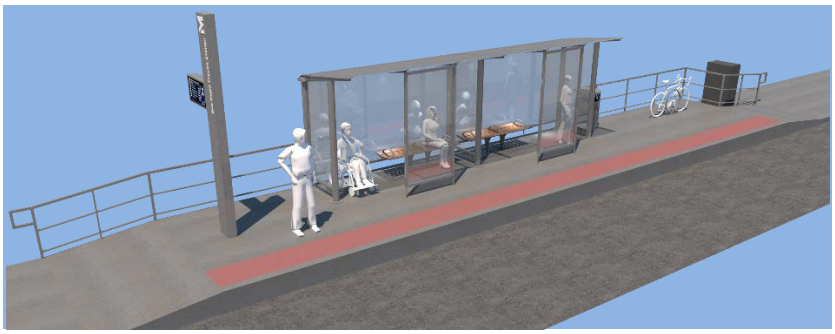

Northwest Bus Rapid Transit

Project Definition Report

March 27, 2019

The City of OKLAHOMA CITY

OKLAHOMA CITY EMBARK



HNTB HALFF COX | McLAIN Environmental Consulting

Table of Contents

Introduction 1
Service Characteristics 1
Project Costs 2
Funding 2
Schedule 3
Plan Coordination 3
COTPA 2030 Fixed Guideway Plan (FGP) (2005) 3
Public Health and Transportation Corridor Planning Framework (2015) 4
Smart Growth America TOD Assessment (2016) 4
Northwest Multimodal Transportation Corridor Concept Plan (2017) 4
planokc (2016) 4
2017 BCA 5
bikewalkokc (2018) 5
BUILD Grant and Planning Effort (2018) 5
Preliminary Alignment and Station Considerations 5
Guideway and Alignment Considerations 5
Station Considerations 6
Recommended and Alternate Alignment and Station Locations 6
Recommended Northwest BRT Alignment and Routing Considerations 7
Recommended and Alternate Station Locations 11
Ridership 13
Vehicles 13
Technology 13
Real-Time Signs 14
Fare Collection 14
On-Board Wi-Fi 14
Transit Signal Priority 14
Stations 14
Guideway Improvements 16
Pedestrian Improvements 16

List of Figures

Figure 1: Northwest BRT Project Schedule 3
Figure 2: Preliminary Northwest BRT Alignment and Station Locations 7
Figure 3: Recommended Northwest BRT Alignment and Station Locations 8
Figure 4: Expressway Station Design 14
Figure 5: Standard Station Design 14

List of Tables

Table 1: Northwest BRT Capital Costs 2
Table 2: Northwest BRT Capital Funding Sources 2
Table 3: Recommended and Alternate Station Locations 10

Introduction

The Northwest Bus Rapid Transit (BRT) project will be Central Oklahoma's first BRT line and will provide a premium transit service to Oklahoma City (OKC) residents through faster and more frequent service with enhanced vehicles, stations and passenger amenities. The Northwest BRT route is approximately eight miles in length (one-way) between downtown Oklahoma City and Meridian/NW Expressway just south of Lake Hefner, connecting regional medical centers, commercial centers, the downtown central business district (CBD), and residents along the Classen Boulevard and Northwest Expressway urban arterials. The corridor is ideal for BRT.

The Northwest BRT will expand local and regional mobility options, improve job access, support transit-oriented development (TOD), helps improve community health, and enhance livability along the corridor. Support for the project is evidenced by the recently approved bond and sales tax measures to provide local funding. The project was recently awarded $14.4 million in federal funding through the USDOT Better Utilizing Investments to Leverage Development (BUILD) discretionary grant program and is anticipated to start service in 2023. The total project cost is estimated to be $28.9 million. The service will be operated by the Central Oklahoma Transportation and Parking Authority (COTPA dba EMBARK), the region's transit provider. The project won a 2017 national USDOT Transportation Planning Excellence Award (TPEA) award.

The design effort for the Northwest BRT relies heavily upon previous planning efforts including the 2030 Central Oklahoma Transportation and Parking Authority (COTPA) Fixed Guideway Plan (FGP) (2005), Public Health and Transportation Corridor Planning Framework (2015), Smart Growth America TOD Assessment (2016), Northwest Multimodal Transportation Corridor Concept Plan (2017), Transportation Investment Generating Economic Recovery (TIGER) application preparation (2017), TIGER benefit/cost analysis (BCA) (2017), and the BUILD discretionary grant program application process (2018).

This document summarizes the project status, technical evaluation, public engagement process and design assumptions as of March 2019. This report was prepared as part of the refinement of the NW BRT planning to be a more specific project to be submitted to the Federal Transit Administration (FTA) for the purpose of environmental approval by the FTA under the provisions of the National Environmental Policy Act (NEPA). The Project Definition Report and project description may be updated periodically throughout the BRT project as the project develops.

Service Characteristics

According to the 2017 Benefit Cost Analysis (BCA), the Northwest BRT is anticipated to operate at 12-to-15-minute headways from 5:30 am to midnight on weekdays and every 20 minutes on Saturdays. The BCA estimated a total of 34,600 revenue service hours for Monday – Saturday service. This schedule will

be reviewed and refined as the project advances into preliminary design (engineering); it is anticipated that Sunday service will be added to the service plan.

The project includes uniquely branded BRT stations and several park-and-ride (PNR) locations that may include Northwest Expressway and Meridian, at/near Penn Square Mall, near INTEGRIS Hospital (Northwest Expressway and N Independence Avenue), and in the Classen Uptown area (near 23rd Street). BRT stations will be strategically spaced approximately ½ mile to 1 ½ miles apart along the 8-mile route. The recommended concept to date includes 13 station pairs and six stand-alone stations; equating a total of 32 recommended station locations. Many stations necessitate the addition of signalized at-grade crossings for pedestrians and cyclists and two are recommended for grade-separated crossings.

Project Costs

Per estimates in the BUILD grant, the Northwest BRT is estimated to cost $28.9 million including vehicles, stations, PNR facilities, street improvements, signal upgrades, and pedestrian improvements. **Table 1** shows capital cost estimates. In addition to capital costs, the Northwest BRT is estimated to have operating costs in the range of $3,200,000 to $3,800,000 annually according to the 2017 BCA.

Table 1: Northwest BRT Capital Costs

Project Components	Costs
Vehicles	$5,400,000
Stations and PNR Facilities	$5,800,000
Street Improvements and Signal Upgrades	$5,650,000
Pedestrian and Bicycle Infrastructure	$6,985,000
Design Services	$1,474,800
Contingency (15%)	$3,575,250
Total	$28,885,050

Source: 2018 BUILD Application

Funding

The Northwest BRT will be funded through a mix of local (47.6 percent) and federal (52.4 percent) sources. **Table 2** below shows a breakdown of project funding.

Table 2: Northwest BRT Capital Funding Sources

Source	Amount	% of Total Cost	Local/Federal
GO Bond Funds	$10,835,000	37.5%	Local
"Better Streets, Safer City" Funds	$2,200,000	7.6%	Local
COTPA Capital and Operating Reserves	$700,000	2.5%	Local
FTA Section 5307	$774,800	2.6%	Federal
USDOT BUILD Grant	$14,375,250	49.8%	Federal
Total	$28,885,050	100%	

Source: 2018 BUILD Application

The BRT's operating costs will be funded through EMBARK's annual operating budget and fares.

Schedule

Figure 1 below depicts the current project schedule. Key milestones are identified following the figure.

Figure 1: Northwest BRT Project Schedule

Year	2018		2019				2020				2021				2022				2023			
Quarter	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Detailed Planning																						
Environmental																						
Preliminary Engineering																						
Approvals & Permitting																						
Final Design																						
Construction																						
Safety Certification																						
Vehicle Procurement																						

Source: 2018 BUILD Application

Key Milestones:

- BUILD Award (December 2018)
- NEPA Clearance (2019 Q2)
- Design Begins (2020 Q2)
- BUILD Obligated (2020 Q3)
- Vehicle Delivery (2022 Q4)
- Construction Complete (2023 Q1)
- Revenue Operations Begin (Q2 2023)
- BUILD Funds Expended (Q4 2023)
- BUILD Funds Required Date of Expenditure (Q4 2025)

Plan Coordination

Each planning phase for the Northwest BRT was based on and coordinated with prior studies and existing regional plans. This sub-section provides an overview of these existing plans and their relationship to the Northwest BRT project. Community involvement has been part of the past planning and was renewed in 2018 and 2019 with various property owner meetings and stakeholder meetings as well as a February 28, 2019 Open House meeting in the corridor.

COTPA 2030 Fixed Guideway Plan (FGP) (2005)

The FGP identified transportation solutions to improve connections and mobility within the OKC metropolitan area. The resulting vision identified several transit opportunities, including BRT. A BRT corridor on Classen Boulevard and Northwest Expressway was included in the regional systems plan, thus laying the foundation for a multimodal corridor along the two arterials. Factors considered in selecting the corridor for the plan included cost effectiveness, land use compatibility and potential connections with other local transit.

Public Health and Transportation Corridor Planning Framework (2015)

The Northwest BRT was selected by the USDOT as one of five U.S. locations to beta test a framework that integrates public health principles into transportation corridor planning projects. As part of the beta test, EMBARK established an Advisory Focus Group and engaged stakeholders to identify goals that incorporated public health initiatives and transportation needs. The goals that were developed as part of this process can be summarized as increased physical activity, improved access to health resources, improved air quality, expanded access for transportation-disadvantaged populations, and increased safety of non-motorized users. Additionally, a technical assistance report was developed by the University of Oklahoma Institute for Quality Communities (IQC) under contract with EMBARK for the beta test. The IQC renderings and study report included three high-priority intersections along the proposed BRT corridor that could support TOD and developed typical intersection station concepts.

Smart Growth America TOD Assessment (2016)

After the conclusion of the health-in-planning beta test, EMBARK was one of nine agencies selected by FTA and Smart Growth America for a transit oriented development (TOD) study assessment. The assessment was completed along the Northwest BRT corridor and included recommendations to foster private investment and improve the pedestrian and bicycle infrastructure and connectivity to support a future transit investment.

Northwest Multimodal Transportation Corridor Concept Plan (2017)

The 2017 concept plan documents prior planning efforts and identifies next steps to implement the Northwest BRT project. Community workshops were held to seek input on the concept plan. Next steps included interim implementation projects like improvements to traffic signals and existing bus stops, planning and design, NEPA, and finalizing funding sources. The plan received national recognition through the 2017 USDOT Transportation Planning Excellence Award.

planokc (2016)

Oklahoma City's comprehensive plan focuses on seven 'big ideas' for Oklahoma City which includes "developing a transportation system that works for everyone." The plan supports mode choice and improved public health by providing better facilities for active transportation. Another focus is "building an urban environment that facilitates health and wellness." This involves creating infrastructure and land use patterns that encourage active lifestyles. Several goals, strategies, and initiatives found in the plan are directly related to goals of the Northwest BRT – TOD (on Northwest Expressway and at 23rd and Classen Boulevard), multimodal connectivity, accessibility, and public health. Adopted in 2016, the plan was developed over the course of five years and the recipient of American Planning Association's 2018 Daniel Burnham National Planning Achievement Award for a comprehensive plan.

2017 BCA

Smart Growth America completed the 2017 BCA for the Northwest BRT which showed substantial project benefits due to travel time savings, mode shift savings, automobile operations and maintenance cost savings, fuel savings, emissions reductions, and realized safety improvements. The BCA calculated expected life-cycle costs and benefits over a 30-year period and showed and overall project benefit through a benefit-cost ratio of 1.5 using a seven percent discount rate. This analysis helped make the case that the Northwest BRT would have real quantifiable benefits to OKC.

bikewalkokc (2018)

This plan was OKC's first master plan for pedestrians and cyclists and a component of the 'planokc' comprehensive plan with strategies and priorities focused on improving the safety, infrastructure, and connectivity of multimodal transportation in OKC. The plan specifically calls for targeted pedestrian and bicycle improvements along Classen Boulevard and in the Northwest Expressway and May Avenue area to improve mobility and safe access to and from transit services.

BUILD Grant and Planning Effort (2018)

In 2018, COTPA dba EMBARK and the City partnered to submit a BUILD grant application. The grant application again furthered the level of planning detail. The project was selected and awarded $14.4 million in capital funding.

Preliminary Alignment and Station Considerations

Guideway and Alignment Considerations

The Northwest BRT project was designed to serve major corridors with areas of relatively high density residential and employment, plus key travel generators. The route will come within a half mile of more than 40,000 residents and approximately 91,000 jobs which is about 23% of Oklahoma City's employment base. The route serves three hospitals, several residential neighborhoods and downtown as the region's employment center. Guideway options were evaluated for the Northwest BRT including curb versus median running alignments. Both alignment options were considered and evaluated against the goals determined for the guideway of the project: safety for passengers, minimize traffic impacts, reduce travel time, avoid right-of-way (ROW) impacts, and improve multimodal connections. Analysis has determined that a curb-running alignment best fits the guideway goals as curb-running BRT does not impact left turns, allows standard vehicles and local routes, passenger waiting areas are on the curb in the streetscape, and the alignment alternative has a lower overall capital cost.

In general, the Northwest BRT will run in mixed-traffic. However, select sections of the route may include additional guideway provisions. The Northwest BRT will employ bus pull-outs, queue jump lanes, and business access and transit (BAT) lanes. The BRT may also use transit only lanes on select segments

of the alignment. These guideway elements are currently being evaluated. In addition, several routing alternatives are also being evaluated.

Station and Park-and-Ride (PNR) Considerations

General station location guidelines and considerations were evaluated early in the planning process and continuously refined to achieve project goals. When possible, all stations will be located at the "far side" of signalized intersections in the direction of travel to achieve an overall shorter running time by reducing dwell time at traffic signals. Locating stations far side of intersections allows transit vehicles to clear intersections before stopping, supports transit signal priority (TSP) signal integration, improves overall travel time, and is considered safer as pedestrians cross at intersections behind transit vehicles rather than in front of dwelling transit vehicles. Far side station locations are preferred over both near side and mid-block stations for the Northwest BRT. The project will also address pedestrian and bicycle access to and from the stations and PNR facilities including improved at-grade crossings and at least two grade separated crossings on the Northwest Expressway.

All station locations are being evaluated with a goal of minimizing ROW and other environmental impacts. Each station will include a level-boarding passenger platform, a shelter to provide shade and protect passengers from inclement weather, a marker/vertical element to identify the station, real time arrival (RTA) signs, and additional passenger amenities such as bicycle racks, benches, etc.

Two station options were also developed to meet the needs of different station locations. The standard station has a smaller footprint (approximately 10 ft x 44 ft) and the expressway station has a larger footprint (approximately 10 ft x 62 ft). Both options can accommodate the standard length bus and articulated bus vehicles. Station types are described in further detail later in this report.

The project will include up to six PNR facilities along the route. The facilities will be within existing rights-of-way or through shared parking agreements with existing businesses and entities along the route.

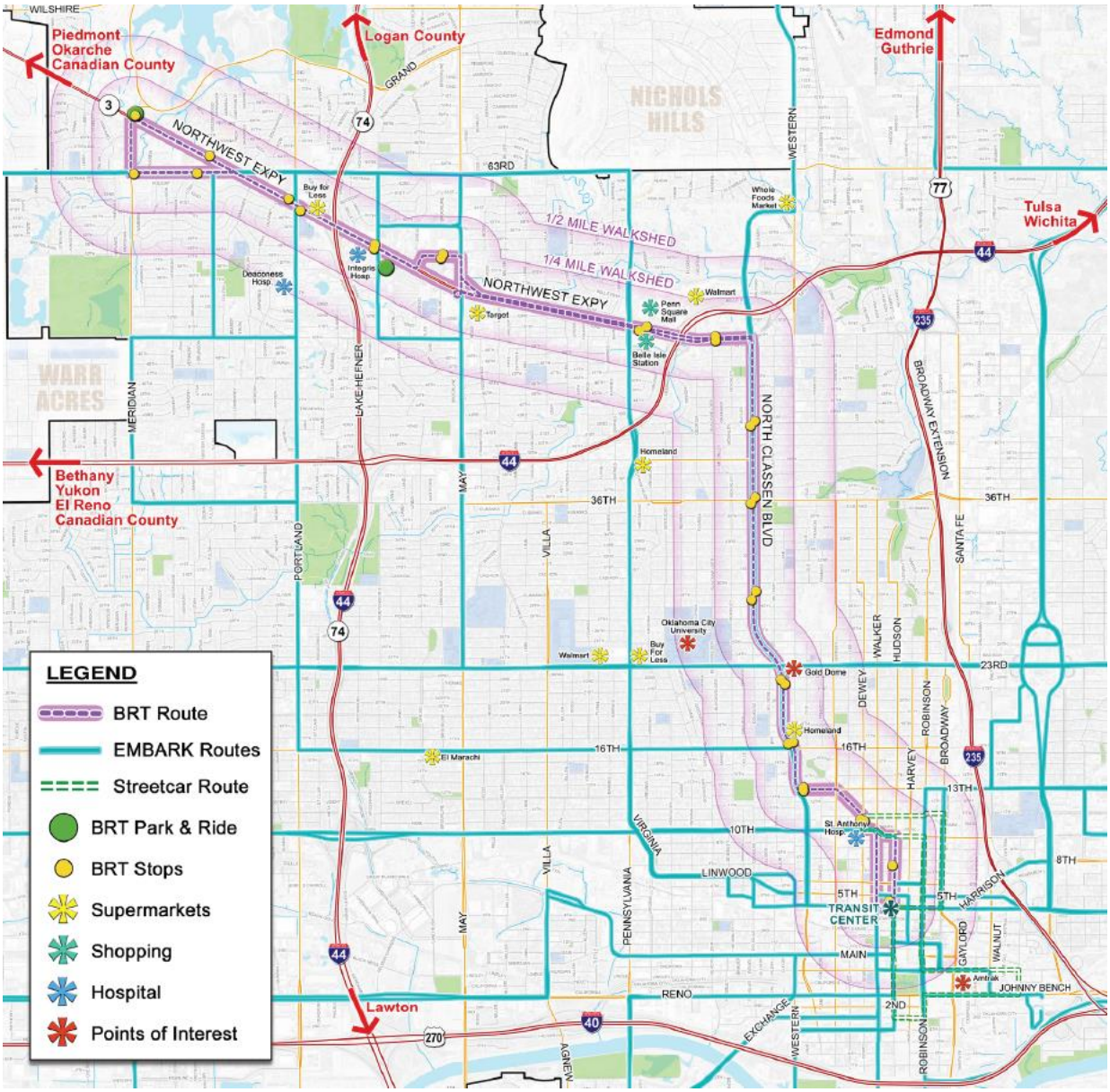
Recommended and Alternate Alignment and Station Locations

Previous planning studies and recent planning activities have identified several alternatives for alignment and station locations of the Northwest BRT. The preliminary alignment (**Figure 2**), as included in the 2017 Concept Plan and 2018 BUILD Grant request, has been slightly modified in the recommended alternative as illustrated in **Figure 3**. On January 18th, 2019 consultants and COTPA staff participated in a field test using a 40-foot vehicle to drive the recommended alignment and options. This included an analysis of average runtime recorded under existing conditions and review of operational considerations including turning movements and key bottlenecks. The following sections outline the recommended alignment and station alternatives at present. However, the alternatives will continue to be evaluated throughout the environmental and preliminary design processes.

Recommended Northwest BRT Alignment and Routing Considerations

The preliminary alignment, as included in the 2017 Concept Plan and 2018 BUILD Grant application, is shown in **Figure 2**.

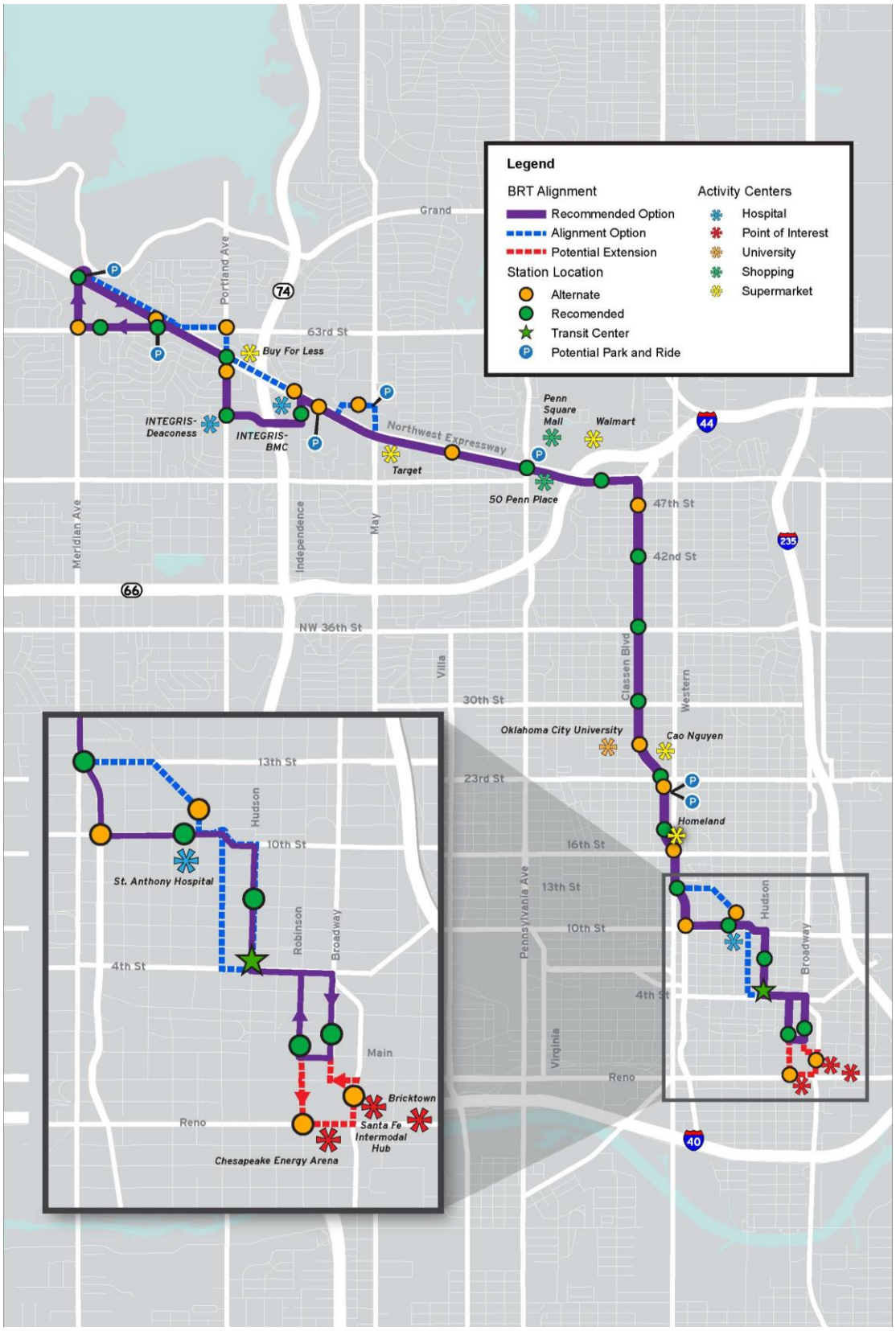
Figure 2: Preliminary Alignment and Station Locations



Source: 2018 BUILD Application

Since the planning in 2017 and 2018, the project has progressed, and a recommended alignment is under consideration. The current emerging recommended alignment is shown in **Figure 3**.

Figure 3: Recommended Northwest BRT Alignment and Station Locations



Source: HNTB Project Team

The descriptions below summarize the various alignment alternatives and considerations, specifically proposed changes between the current recommended alignment and the previous 2017 Concept Plan alignment.

- **Downtown Terminus:** The preliminary terminus downtown from the 2017 Concept Plan was located at the existing transit center at 4th and 5th Streets and N Hudson Avenue. The need for a downtown loop was a low priority because of the existence of a downtown bus circulator route and the planned 2018 streetcar circulator. This terminus was reconsidered to allow for a new terminus in the heart of downtown (W Main Street and N Robinson Avenue and N Broadway Avenue). The recommended alternative captures additional employment and entertainment in the center of downtown OKC via a one-seat ride.

- **Downtown Routing:** The recommended routing downtown ends at W Main Street and Broadway and provides direct access to thousands of downtown jobs. There is a potential future extension south to turn around at W Reno Avenue and E K Gaylord Boulevard to link the BRT to the Santa Fe Station which is owned by the City and is planned to eventually service as a regional rail transit intermodal hub. This potential routing also provides direct access to major activity generators including the Cox Convention Center, Chesapeake Energy Arena, and Myriad Botanical Gardens.

- **Downtown Routing to/from Classen Boulevard:** The recommended routing accesses Classen Boulevard from NW 10th Street instead of NW 13th Street in the 2017 Concept Plan due to fewer traffic signals and recent higher density residential development.

- **Northwest Expressway at May Avenue:** The 2017 Concept Plan assumed a deviation from Northwest Expressway on N May Avenue to provide access to commercial development. This routing option has been maintained as an alternative alignment. However, the recommended alignment now remains on Northwest Expressway to N Independence Avenue.

- **Service to INTEGRIS:** Another change to the 2017 Concept Plan alignment is a route deviation to better serve the INTEGRIS Hospital, public housing for older adults, office buildings, a YMCA, and various nearby medical facilities. The recommended alignment includes a deviation via N Independence and N Portland Avenues to access NW 56th Street. The prior alignment (staying on Northwest Expressway) through this area is maintained as an alternative alignment. Both alignment alternatives will continue to be evaluated operationally.

- **Northwest Expressway Routing, Portland to NW 63rd Street:** The recommended alignment between N Portland Avenue and NW 63rd Street is to operate on Northwest Expressway. However, an alignment alternative has been added to the project that may deviate on N Portland Avenue and NW 63rd Street to better serve commercial uses north of the corridor.

- **Northwest Terminus:** The northwestern terminus as defined in the 2017 Concept Plan was a PNR facility at N Meridian Avenue, just north of Northwest Expressway. Discussions with staff of the Oklahoma City Water Utility Trusts (OCWUT) show promise for a PNR facility there. The recommended alignment to access the end of the line (EOL) operates on NW 63rd Street to North Meridian Avenue on outbound trips to better serve the apartments and higher-density residential area on NW 63rd Street. The recommended alignment for inbound trips remains on Northwest Expressway traveling to the southeast. Northwest Expressway west of SH 74 (Hefner Parkway) is SH 73 and is controlled by the Oklahoma Department of Transportation (ODOT) as of winter 2019, and transferal of this to the City is anticipated to occur in the future.

Recommended and Alternate Station Locations

The Northwest BRT is planned to have approximately 32 station locations (approximately 13 station pairs and six stand-alone stations) and several PNR facilities. PNR facilities may include locations at Northwest Expressway and Meridian, Penn Square Mall, INTEGRIS Hospital (Northwest Expressway and N Independence Avenue), Northwest Expressway and N May Avenue, and in the Classen Uptown area (near 23rd Street). Some station pair locations have been added or changed since the 2017 Concept Plan due to the preferred shift to having an alignment on Northwest and 10th Street and Northwest and 56th Street. **Table 3** is a complete list of potential station locations. Stations are grouped by station area and each row in the table indicates whether the location is the "recommended" or an "alternate" station location. The northbound (NB) or southbound (SB) label indicates the overall route direction; northbound being from downtown to Northwest Expressway and Meridian and southbound being from Northwest Expressway and Meridian into downtown OKC.

Table 3: Recommended and Alternate Station Locations

	Station	Location	Type	Route Direction	Alternative
1a	**Broadway Ave**	On Broadway Ave SB far-side of Park Ave	Standard	SB	**Recommended**
1b	**Broadway Ave**	On Broadway Ave NB far-side of Park Ave	Standard	NB	Alternate
2a	**Robinson Ave**	On Robinson Ave NB far-side of Park Ave	Standard	NB	**Recommended**
2b	**Robinson Ave**	On Robinson Ave NB near-side of Park Ave	Standard	NB	Alternate
2c	**Robinson Ave**	On Robinson Ave SB near-side of Main St	Standard	SB	Alternate
3	**Gaylord Blvd (Santa Fe Station)**	On Gaylord Blvd NB mid-block btw Reno Ave & Sheridan Ave	Standard	NB	Alternate
4	**Reno Ave**	On Reno Ave EB mid-block btw Robinson Ave & Gaylord Blvd	Standard	NB	Alternate
5a	**Downtown Transit Center**	Hudson Ave & 4th St station parallel to Hudson Ave	N/A	NB/SB	**Recommended**
5b	**Downtown Transit Center**	Hudson Ave & 4th St station parallel to 4th St	N/A	NB/SB	**Recommended**
6a	**Hudson Ave between 7th St & 8th St**	On Hudson Ave NB mid-block between 7th St & 8th St	Standard	NB	Alternate
6b	**Hudson Ave between 7th St & 8th St**	On Hudson Ave SB mid-block between 7th St & 8th St	Standard	SB	**Recommended**
7a	**10th St btw Lee Ave & Dewey Ave**	On 10th St WB mid-block between Lee Ave & Dewey Ave	Standard	NB	**Recommended**
7b	**10th St btw Lee Ave & Dewey Ave**	On 10th St EB mid-block between Lee Ave & Dewey Ave	Standard	SB	**Recommended**
8a	**Dewey Ave & 11th St**	On Dewey Ave NB near-side of Classen Dr	Standard	NB	Alternate
8b	**Dewey Ave & 11th St**	On Dewey Ave SB far-side of Classen Dr	Standard	SB	Alternate
9a	**Classen Blvd & 10th St**	On Classen Blvd NB (far-side)	Standard	NB	Alternate
9b	**Classen Blvd & 10th St**	On 10th Street EB (far-side)	Standard	SB	Alternate
10a	**Classen Blvd & 13th St**	On Classen Blvd NB far-side of 13th St	Standard	NB	**Recommended**
10b	**Classen Blvd & 13th St**	On Classen Blvd SB far-side of 13th St	Standard	SB	**Recommended**
10c	**Classen Blvd & 12th St**	On Classen Blvd NB far-side of 12th St	Standard	NB	Alternate
10d	**Classen Blvd & 13th St**	On 13th WB (near-side)	Standard	NB	Alternate
10e	**Classen Blvd & 13th St**	On 13th EB (far-side)	Standard	SB	Alternate
11a	**Classen Blvd & 18th St**	On Classen Blvd SB (far-side) of 18th St	Standard	SB	**Recommended**
11b	**Classen Blvd & 18th St**	On Classen Blvd NB (near-side) of 18th St	Standard	NB	**Recommended**
11c	**Classen Blvd & 16th St**	On Classen Blvd NB far-side of Western Ave	Standard	NB	Alternate
11d	**Classen Blvd & 16th St**	On Classen Blvd SB near-side of 16th St	Standard	SB	Alternate
12a	**Classen Blvd & 23rd St**	On Classen Blvd NB far-side of 23rd St	Standard	NB	**Recommended**
12b	**Classen Blvd & 23rd St**	On Classen Blvd SB mid-block between 22nd St & 23rd St	Standard	SB	**Recommended**
12c	**Classen Blvd & 22nd St**	On Classen Blvd NB (far-side) of 22nd St	Standard	NB	Alternate
13a	**Classen Blvd & 26th St**	On Classen Blvd NB near-side of 26th St	Standard	NB	Alternate
13b	**Classen Blvd & 26th St**	On Classen Blvd SB far-side of 26th St	Standard	SB	Alternate

Table 3: Recommended and Alternate Station Locations – Continued

	Station	Location	Type	Route Direction	Alternative
14a	**Classen Blvd & 30th St**	On Classen Blvd NB near-side of 30th St	Standard	NB	**Recommended**
14b	**Classen Blvd & 30th St**	On Classen Blvd SB far-side of 30th St	Standard	SB	**Recommended**
14c	**Classen Blvd & 30th St**	On Classen Blvd NB far-side of 30th St	Standard	NB	Alternate
14d	**Classen Blvd & 28th St/29th St**	On Classen Blvd NB mid-block between 28th St & 29th St	Standard	NB	Alternate
14e	**Classen Blvd & 28th St/29th St**	On Classen Blvd SB mid-block between 28th St & 29th St	Standard	SB	Alternate
15a	**Classen Blvd & 36th St**	On Classen Blvd NB far-side of 36th St	Standard	NB	**Recommended**
15b	**Classen Blvd & 36th St**	On Classen Blvd SB far-side of 36th St	Standard	SB	**Recommended**
16a	**Classen Blvd & 42nd St**	On Classen Blvd NB far-side of 42nd St	Standard	NB	**Recommended**
16b	**Classen Blvd & 42nd St**	On Classen Blvd SB far-side of 42nd St	Standard	SB	**Recommended**
16c	**Classen Blvd & 42nd St**	On Classen Blvd SB near-side of 42nd St	Standard	SB	Alternate
17a	**Classen Blvd & 46th St**	On Classen Blvd NB mid-block between 46th & 47th St	Standard	NB	Alternate
17b	**Classen Blvd & 47th St**	On Classen Blvd SB far-side of 47th St	Standard	SB	Alternate
18a	**Northwest Expy & Blackwelder Ave**	On Northwest Expy WB near-side of Blackwelder Ave	Expressway	NB	**Recommended**
18b	**Northwest Expy & Blackwelder Ave**	On Northwest Expy EB far-side of Blackwelder Ave	Expressway	SB	**Recommended**
18c	**Northwest Expy & Blackwelder Ave**	On Northwest Expy WB far-side of Blackwelder Ave	Expressway	NB	Alternate
19a	**Northwest Expy & Pennsylvania Ave**	On Northwest Expy WB mid-block btw entrance to Penn Square Mall & Pennsylvania Ave	Expressway	NB	**Recommended**
19b	**Northwest Expy & Pennsylvania Ave**	On Northwest Expy EB far-side of Pennsylvania Ave	Expressway	SB	**Recommended**
19c	**Northwest Expy & Pennsylvania Ave**	On Northwest Expy WB far-side of entrance to Penn Square Mall	Expressway	NB	Alternate
19d	**Northwest Expy & Pennsylvania Ave**	On Northwest Expy EB mid-block btw entrance to Penn Square Mall & Pennsylvania Ave	Expressway	SB	Alternate
20a	**Northwest Expressway & Villa Ave**	On Northwest Expy WB far-side of Villa Ave	Expressway	NB	Alternate
20b	**Northwest Expressway & Villa Ave**	On Northwest Expy EB near-side of Villa Ave	Expressway	SB	Alternate
20c	**Northwest Expressway & Villa Ave**	On Northwest Expy EB far-side of Villa Ave	Expressway	SB	Alternate
21a	**United Founder Blvd**	On United Founders Blvd WB mid-block between May Ave & Mosteller Dr	Expressway	NB	Alternate
21b	**United Founder Blvd**	On United Founders Blvd EB mid-block between May Ave & Mosteller Dr	Expressway	SB	Alternate
22a	**Northwest Expy Service Rd between Independence Ave & Mosteller Dr**	On Northwest Expy Service Rd WB btw Independence Ave & Mosteller Dr	Expressway	NB	Alternate
22b	**Northwest Expy Service Rd between Independence Ave & Mosteller Dr**	On Northwest Expy Service Rd EB btw Independence Ave & Mosteller Dr	Expressway	SB	Alternate
22c	**Northwest Expy between Independence Ave & Mosteller Dr**	On Northwest Expy WB btw Independence Ave & Mosteller Dr	Expressway	NB	Alternate
23a	**Northwest Expy & Independence Ave**	On Northwest Expy WB far-side of Independence Ave	Expressway	NB	Alternate
23b	**Northwest Expy & Independence Ave**	On Northwest Expy EB near-side of Independence Ave	Expressway	SB	Alternate
24a	**Independence Ave & Northwest Expy**	On Independence Ave NB between Northwest Expy & 56th St	Expressway	SB	**Recommended**
24b	**Independence Ave & Northwest Expy**	On Independence Ave SB between Northwest Expy & 56th St	Expressway	NB	**Recommended**
25a	**Portland Ave & 56th St**	On 56th St WB near-side of Portland Ave	Expressway	NB	**Recommended**
25b	**Portland Ave & 56th St**	On 56th St EB far-side of Portland Ave	Expressway	SB	**Recommended**
26a	**Northwest Expy & Portland Ave**	On Northwest Expy NB far-side of Portland Ave	Expressway	NB	**Recommended**
26b	**Northwest Expy & Portland Ave**	On Northwest Expy SB near-side of Portland Ave	Expressway	SB	**Recommended**
26c	**Portland Ave & Northwest Expy**	On Portland Ave NB near-side of Northwest Expy	Expressway	NB	Alternate
26d	**Portland Ave & Northwest Expy**	On Portland Ave SB far-side of Northwest Expy	Expressway	SB	Alternate
26e	**Northwest Expy & Portland Ave**	On Northwest Expy SB far-side of Portland Ave	Expressway	SB	Alternate
27a	**63rd St & Portland Ave**	On 63rd Ave WB far-side of Portland Ave intersection	Expressway	NB	Alternate
27b	**63rd St & Portland Ave**	On Portland Ave far-side of 63rd St intersection	Expressway	SB	Alternate

Table 3: Recommended and Alternate Station Locations – Continued

	Station	Location	Type	Route Direction	Alternative
28a	**63rd St & Tulsa Ave**	On 63rd St WB near-side of Tulsa Ave	Expressway	NB	**Recommended**
28b	**63rd St & Tulsa Ave**	On 63rd St EB far-side of Tulsa Ave	Expressway	SB	Alternate
28d	**63rd St & Tulsa Ave**	On 63rd St WB far-side of Tulsa Ave	Expressway	NB	Alternate
28d	**63rd St & Utah Ave**	On 63rd St EB far-side of Utah Ave	Expressway	SB	Alternate
29a	**63rd St & Warren Ave**	On 63rd St WB far-side of Warren Ave	Expressway	NB	**Recommended**
29b	**63rd St & Meridian Ave**	On Meridian Ave NB far-side of 63rd St intersection	Expressway	NB	Alternate
29c	**63rd St & Meridian Ave**	On 63rd St EB far-side of Meridian Ave intersection	Expressway	SB	Alternate
30a	**Northwest Expy & Wedgewood Dr**	On Northwest Expy NB far-side of Wedgewood Cir	Expressway	NB	Alternate
30b	**Northwest Expy & Wedgewood Dr**	On Northwest Expy SB near-side of Wedgewood Cir	Expressway	SB	Alternate
31a	**Northwest Expy & Meridian Ave**	In future development property on Meridian Ave	Expressway	NB/SB	**Recommended**

Source: HNTB Project Team

Ridership

Per estimates conducted with the BCA for the BUILD grant submittal, forecasted ridership for the Northwest BRT is approximately 2,250 riders per day. This would place the Northwest BRT as EMBARK's highest ridership route.

Vehicles

All BRT systems in the United States utilize stylized vehicles that are distinct from the rest of the vehicles in the transit fleet. The Northwest BRT will also feature a fleet of specifically-designed BRT vehicles that will be uniquely stylized and branded to community rapid service. Articulated buses are being evaluated to provide expanded carrying capacity and to serve the market most efficiently. As part of this decision-making process, a capacity analysis will be completed to ensure that potential ridership in the corridor will be accommodated.

Various propulsion systems are also being evaluated for the BRT fleet. The BRT fleet will feature CNG, electric, or other low/no emission propulsion technologies to enhance air quality and support alternative fuel industries in rural Oklahoma.

Technology

The Northwest BRT will include various technologies to enhance customer experience and improve transit operations. Consistency and adaptability are important when evaluating potential technologies. It is the assumption that the Northwest BRT will deploy similar fare payment, transit signal priority (TSP), real-time arrival (RTA), and other technology to the newly opened OKC Streetcar.

Real-Time Signs

RTA information provides a means to provide real-time bus locations and schedule information directly to customers, therefore improving customer experience. RTA information improves perceived reliability and makes transit service more attractive and accessible. RTA information will be provided at every BRT station.

Fare Collection

On-board fare collection is a primary source of delays due to extended dwell times on corridors with heavy ridership. The Northwest BRT will deploy off-board fare collection using mobile fare payment via phones as well as ticket vending machines (TVMs) to improve reliability and reduce dwell times. Such "proof of payment" systems are commonly used on streetcar lines and on light rail corridors and have gained popularity on BRT lines.

On-Board Wi-Fi

Free on-board Wi-Fi will be available to Northwest BRT passengers as it currently is on all EMBARK buses. Public Wi-Fi on-board transit vehicles helps to improve the commuters' travel experience, optimize public transport trip planning, and increase ridership through a more convenient and desirable environment on-board.

Transit Signal Priority

Targeted street improvements and signal upgrades along the route are being evaluated to enhance safety in the corridor and efficiently operate the Northwest BRT in mixed traffic. TSP in the corridor can help the route achieve rapid travel and reliability, as TSP will assist vehicles in staying on schedule and can help vehicles as they leave a station. Upgrades in signal technology paired with street treatments and corridor design efforts can create a virtual transit lane instead of implementing a dedicated transit-only lane throughout the corridor.

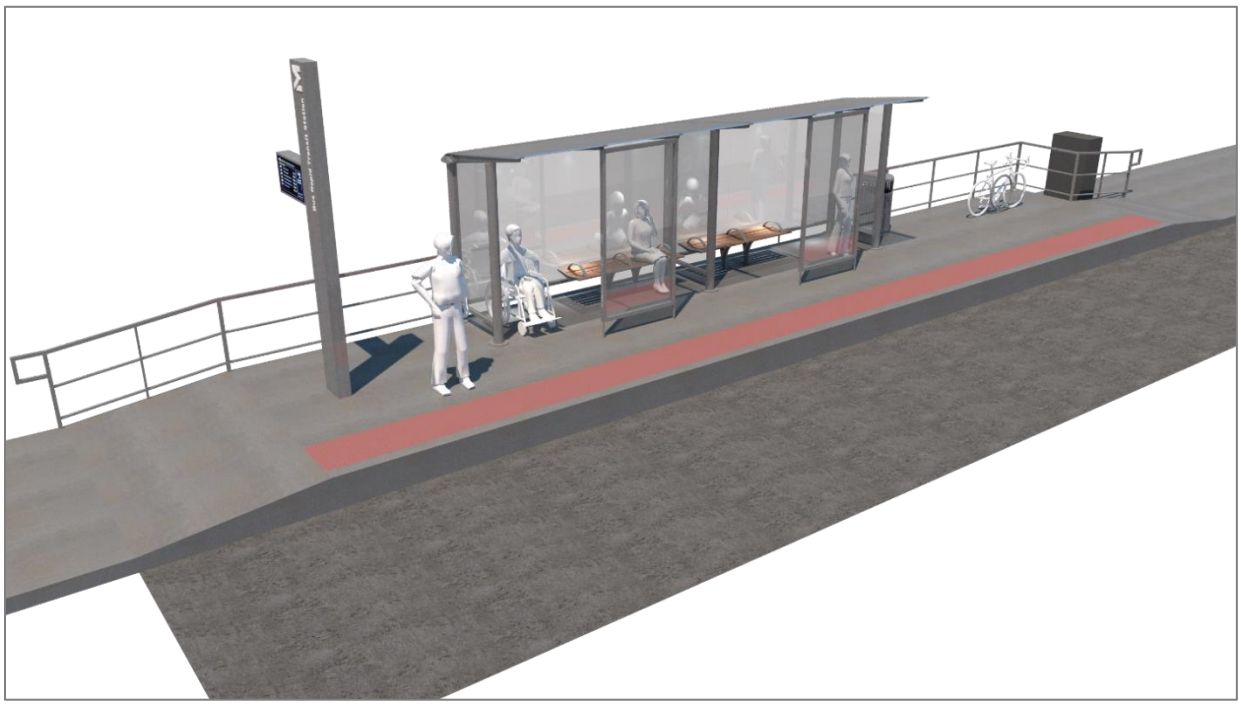
Stations

High amenity, modern stations will be constructed for the Northwest BRT. These high visibility and uniquely branded stations will each include a shelter, level boarding platform, station marker, RTA displays, TVMs for off-board fare collection, bicycle facilities, benches, trash receptacles and ADA accommodations. High-boarding locations may require larger stations and some locations may require a smaller design due to environmental or space constraints. As such, two station designs were developed to accommodate different station area needs:

- **Expressway Station**: Larger shelter with total footprint of 10 feet by 62 feet
- **Standard Station:** Smaller shelter with a total footprint of 10 feet by 44 feet

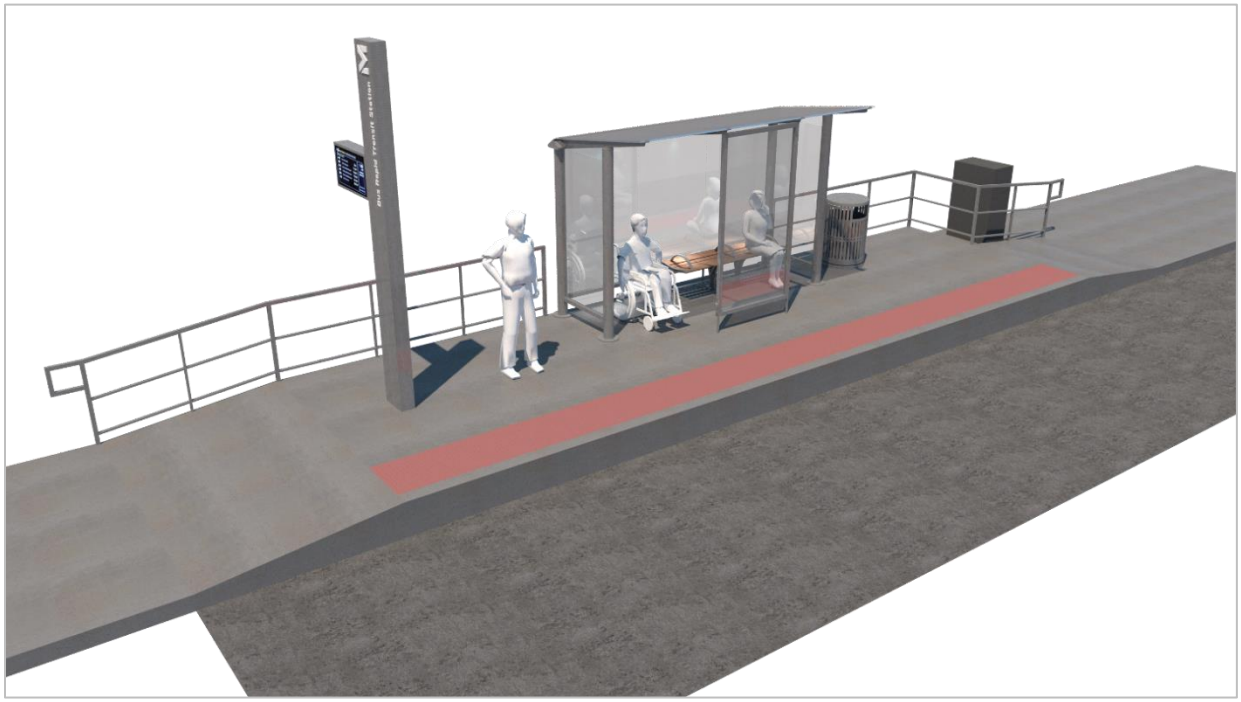
Preliminary renderings are shown in **Figure 4** and **Figure 5**.

Figure 4: Expressway Station Design



Source: HNTB Project Team

Figure 5: Standard Station Design



Source: HNTB Project Team

Guideway Improvements

The Northwest BRT implementation will include various techniques to ensure a rapid corridor that prioritizes transit and streamlines operations. The corridor will include TSP and street treatments such as business access and transit (BAT) lanes, queue jumps, left turn lanes, and bus pull-outs.

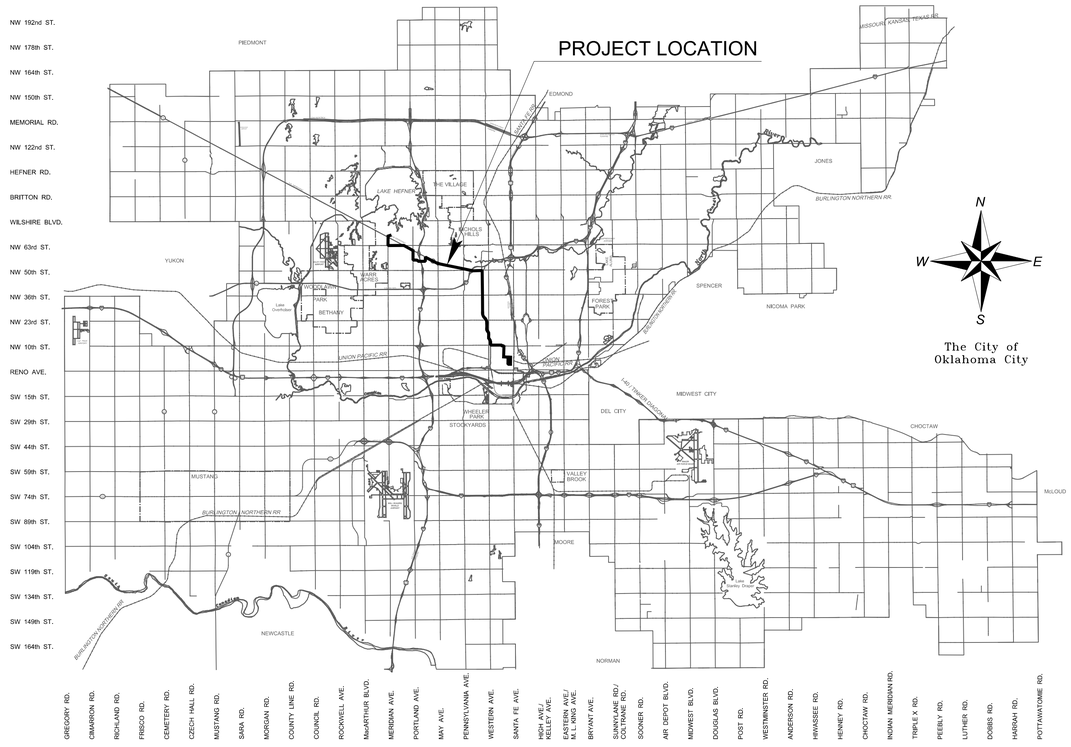
A combination of BAT lanes and queue jumps are likely to be used on Classen Boulevard. BAT lanes are located on the curb lane and reserve the lane for transit vehicles and right-turning vehicles. BAT lanes provide priority for buses while maintaining access to businesses. Queue jumps are located at intersections and provide preferences to buses at intersections by designing an additional travel lane at the intersection approach to a signalized intersection.

Due to the higher traffic demand and higher speeds on Northwest Expressway, buses have not been able to stop along the curb running lane on Northwest Expressway. Therefore, bus pull-outs will be used along Northwest Expressway to move the BRT vehicles out of traffic while dwelling at stations. Bus pull-outs, also described as bus pull-off lanes, bus bays or bus turnouts, allow vehicles to pull out of traffic at stations to pick up or drop off passengers and then re-enter traffic in conjunction with TSP. The project may also include sections of transit only lanes and queue jump lanes.

Pedestrian Improvements

Pedestrian improvements will be a key piece of the Northwest BRT project as all transit corridors require an enhanced and safer pedestrian and bicycle environment. There are several gaps in the sidewalk network along the Classen corridor and a pedestrian network and signalized pedestrian crossings are largely absent along the Northwest Expressway. Pedestrian crossings at intersections will be improved for safety and connectivity and two-stage crossings will be implemented where needed to ensure ADA accessibility. At some mid-block locations with lower traffic, such as near St. Anthony Hospital, flashing pedestrian crossing beacons may be employed. In addition to filling gaps and improving the network, two key pedestrian grade-separated crossings are recommended for the project: one near INTEGRIS Hospital and another near Penn Square Mall.

APPENDIX L: 30% PRELIMINARY PLANS



THE CITY OF OKLAHOMA CITY & EMBARK

OKC PROJECT NO. MC-0619
NORTHWEST BUS RAPID TRANSIT (BRT) STATIONS

IN THE VICINITY OF:

NORTH BROADWAY AVENUE AT WEST MAIN STREET
TO
NORTH MERIDIAN AVENUE AT NW EXPRESSWAY

PREPARED BY:

HNTB

101 N. ROBINSON AVENUE, SUITE 1130
OKLAHOMA CITY, OKLAHOMA 73102
www.hntb.com

The City of
OKLAHOMA CITY
Public Works Department

DAVID HOLT — Mayor

COUNCIL MEMBERS

JAMES GREINER	Ward 1
JAMES COOPER	Ward 2
LARRY McATEE	Ward 3
TODD STONE	Ward 4
DAVID GREENWELL	Ward 5
JOBETH HAMON	Ward 6
NIKKI NICE	Ward 7
MARK K. STONECIPHER	Ward 8

CRAIG FREEMAN — City Manager

ERIC J. WENGER, P.E. — City Engineer

CENTRAL OKLAHOMA TRANSPORTATION AND PARKING AUTHORITY (COTPA)

EMBARK

Chris Kauffman, Chairman
Bernard L. Semtner, III, Vice Chairman
Brent Bryant, Trustee
James Cooper, Trustee
Robert Ruiz, Trustee
David Holt, Trustee
Steve Hill, Surrogate Trustee
Craig Freeman, City Manager
Laura Johnson, Surrogate Trustee
Jason Ferbrache, COTPA Administrator

SHEET INDEX

1	TITLE SHEET
2	STATION LOCATION MAP
3	QUANTITIES AND GENERAL NOTES
4-5	TYPICAL STATION LAYOUT
6	NORTH BROADWAY AVENUE AT WEST MAIN AVENUE (SB)
7	NORTH ROBINSON AVENUE AT WEST PARK AVENUE (NB)
8	TRANSIT CENTER STATIONS (NB & SB)
9	NW 8TH STREET AT NORTH HUDSON AVENUE (SB)
10	NW 10TH STREET AND DEWEY AVENUE (NB & SB)
11	NW 13TH STREET AT NORTH CLASSEN BLVD (NB & SB)
12-13	NW 18TH STREET AT NORTH CLASSEN BLVD (NB & SB)
14-15	NW 23RD STREET AT NORTH CLASSEN BLVD (NB & SB)
16	NW 30TH STREET AT NORTH CLASSEN BLVD (NB & SB)
17	NW 36TH STREET AT NORTH CLASSEN BLVD (NB & SB)
18	NW 42ND STREET AT NORTH CLASSEN BLVD (NB & SB)
19-21	NORTH CLASSEN LANE DROP
22-26	NW EXPRESSWAY AT NORTH BLACKWELDER AVENUE (NB & SB)
27-32	NW EXPRESSWAY AT NORTH PENN AVENUE (NB & SB)
33	NW 56TH STREET AT NORTH INDEPENDENCE AVENUE (NB & SB)
34-35	NW 56TH STREET AT NORTH PORTLAND AVENUE (NB & SB)
36-39	NW EXPRESSWAY AT NORTH PORTLAND AVENUE (NB & SB)
40-41	NW 63RD STREET AT NORTH MERIDIAN AVENUE (NB & SB)
42	WATER TRUST PROPERTY STATION (NB)
43	PARK AND RIDE - NORTH PENN
44	PARK AND RIDE - NORTH MERIDIAN
45-54	BIKE LANE PLAN SHEETS
55-56	SITE DETAILS
57-58	TECHNOLOGY DETAILS
59	FOUNDATION DETAILS

ONE CALL UTILITY LOCATION NUMBER

840-5032
1-800-522-6543

This number is to be used for information on the location of all underground utilities. Contact this number and other numbers specified in the plans prior to any excavation.

PREPARED BY

CONSULTING ENGINEER

REGISTERED PROFESSIONAL ENGINEER

NO.

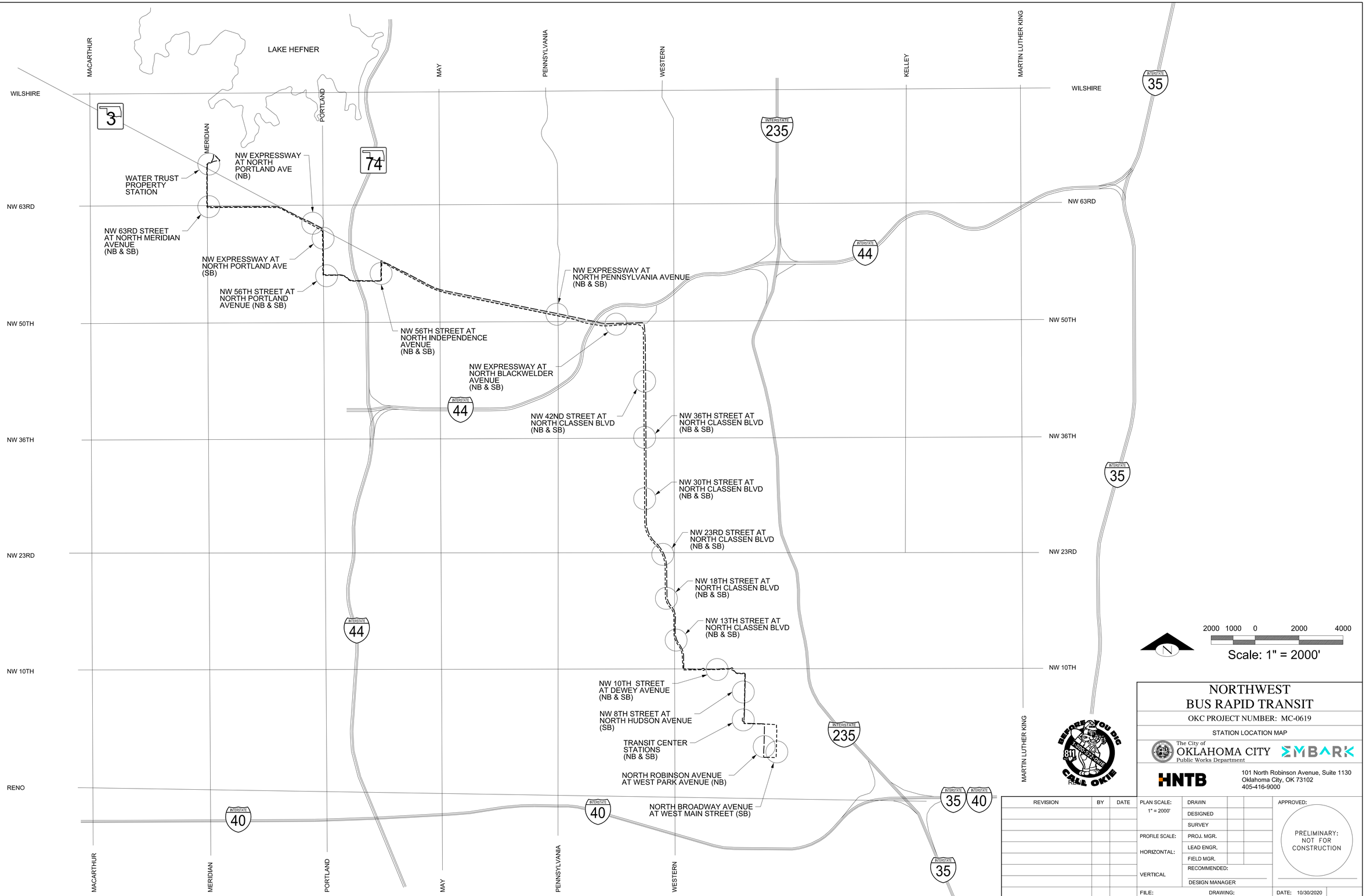
RECOMMENDED FOR APPROVAL

ERIC J. WENGER, P.E.
CITY ENGINEER

DATE

OKC PROJECT NO. MC-0619

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 01:36 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - Cover Sheet.dgn



2000 1000 0 2000 4000

Scale: 1" = 2000'

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

STATION LOCATION MAP

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB
101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

REVISION	BY	DATE

PLAN SCALE: 1" = 2000'
PROFILE SCALE:
HORIZONTAL:
VERTICAL

DRAWN
DESIGNED
SURVEY
PROJ. MGR.
LEAD ENGR.
FIELD MGR.
RECOMMENDED:
DESIGN MANAGER

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING: DATE: 10/30/2020

ATLAS PAGE NO: SHEET 2 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$DATE$$$ 12:15 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - Overall Station Layout Plan.dgn

SUMMARY OF QUANTITIES

ITEM #	ITEM	UNIT	QUANTITY	AS-BUILT
	NOTE: QUANTITIES TO BE INCLUDED IN FINAL DESIGN - SEE 30% PRELIMINARY DESIGN REPORT FOR PRELIMINARY COST ESTIMATE.			

GENERAL CONSTRUCTION NOTES:

1. UNLESS OTHERWISE NOTED, ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE 2009 OKLAHOMA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION AND THE CURRENT CITY OF OKLAHOMA CITY ENGINEERING SERVICES DEPARTMENT'S STANDARD SPECIFICATIONS AND STANDARD DETAILS AND STANDARD DRAWINGS AND CITY OF OKLAHOMA CITY SPECIAL PROVISIONS.
2. THE CONTRACTOR SHALL COMPLY WITH ALL FEDERAL, STATE AND LOCAL LAWS GOVERNING SAFETY, HEALTH AND SANITATION. THE CONTRACTOR SHALL PROVIDE ALL SAFEGUARDS, SAFETY DEVICES AND PROTECTIVE EQUIPMENT, AND TAKE ANY OTHER NEEDED ACTION ON AS HIS OWN RESPONSIBILITY OR AS THE ENGINEER MAY DETERMINE REASONABLY NECESSARY TO PROTECT PROPERTY IN CONNECTION WITH THE PERFORMANCE OF WORK COVERED BY THE CONTRACT.
3. PAY ITEMS SHALL BE AS SPECIFIED ON THE CITY OF OKLAHOMA CITY OR ON THE ODOT STANDARD DRAWINGS EXCEPT AS MODIFIED BY THE CONTRACT.
4. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK IN EACH AREA. THE CONTRACTOR IS FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT RESULT FROM HIS FAILURE TO LOCATE AND PRESERVE ANY AND ALL UTILITIES.
5. THE LOCATIONS OF THE UTILITIES ARE SHOWN ACCORDING TO ALL AVAILABLE INFORMATION. THE CONTRACTOR SHALL NOTIFY EACH UTILITY OWNER PRIOR TO COMMENCEMENT OF WORK TO VERIFY BOTH HORIZONTAL AND VERTICAL LOCATIONS. THE FOLLOWING IS A LIST OF UTILITY OWNERS; AT&T, PUBLIC SERVICE COMPANY OF OKLAHOMA (AEP), OKLAHOMA NATURAL GAS (ONG), COX COMMUNICATIONS, MCI/VERIZON, EASYTEL COMMUNICATIONS, WELLSCO VALLOR TELECOM, CITY OF OKLAHOMA CITY-WATER AND SEWER, CITY OF OKLAHOMA CITY-TRAFFIC OPERATIONS. SEE SHEET X FOR CONTACT INFORMATION.
6. THE CONTRACTOR SHALL GIVE THE NOTIFICATION CENTER OF OKLAHOMA ONE-CALL SYSTEM, INC. NOTICE OF ANY EXCAVATION NO SOONER THAN TEN DAYS NOR LATER THAN 48 HOURS , EXCLUDING SATURDAYS, SUNDAYS AND LEGAL HOLIDAYS, PRIOR TO THE COMMENCEMENT OF WORK. PHONE 1-800-522-6543.
7. THE CONTRACTOR SHALL TAKE REASONABLE PRECAUTIONS TO PREVENT EXCESS MOISTURE FROM INCLEMENT WEATHER OR OTHER SOURCES FROM ENTERING ANY STREET EXCAVATION. IF EXCESS MOISTURE DOES ENTER THE EXCAVATION THROUGH THE NEGLIGENCE OF THE CONTRACTOR AND THE ADJOINING PAVEMENT IS ADVERSELY AFFECTED BY THE EXCESS MOISTURE, THE CONTRACTOR SHALL REPLACE THE ADJOINING PAVEMENT AND SUBBASE AT HIS SOLE EXPENSE.
8. THE CONTRACTOR SHALL PRESERVE THE INTEGRITY OF THE SANITARY SEWER STRUCTURES AND ALL OTHER UTILITY STRUCTURES WITHIN THE PROJECT EXTENTS.
9. THE CONTRACTOR SHALL WORK IN COOPERATION WITH THE CITY OF OKLAHOMA CITY TO ESTABLISH, INSTALL, MAINTAIN, AND OPERATE COMPLETE, ADEQUATE, AND SAFE TRAFFIC CONTROLS DURING THE ENTIRE CONSTRUCTION PERIOD. ALL FLAGMEN, BARRICADES, AND TRAFFIC CONTROL DEVICES SHALL BE APPROVED BY THE FIELD ENGINEERING REPRESENTATIVE.
10. CONSTRUCTION SIGNAGE WILL BE INSTALLED IN A MANNER APPROVED BY THE ENGINEER, IN ACCORDANCE WITH CHAPTER VI OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, CURRENT ADDITION, AND APPLICABLE ODOT STANDARD DRAWINGS. THE CONTRACTOR SHALL PROVIDE A PROPOSED TRAFFIC CONTROL PLAN FOR APPROVAL BY THE ENGINEER PRIOR TO BEGINNING WORK.
11. THE CONTRACTOR SHALL NOTIFY THE CITY OF OKLAHOMA CITY FIELD ENGINEERING, 405-297-2581, A MINIMUM OF 48 HOURS PRIOR TO COMMENCING WORK OR PRIOR TO REMOVING TRAFFIC SIGNS.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REPLACEMENT OF ALL EXISTING TRAFFIC SIGNS AND MARKINGS REMOVED OR DAMAGED AS LISTED IN THE SIGNAGE SCHEDULE FOR THE PROJECT. ALL SIGNS AND POLES PROVIDED SHALL BE NEW AND UNDAMAGED AND SHALL MEET THE REQUIREMENTS OF CITY OF OKLAHOMA CITY SPECIFICATIONS SECTION 729 TRAFFIC SIGNS. ALL TRAFFIC MATERIALS REMOVED SHALL BE HANDLED PER CITY OF OKLAHOMA CITY SPECIFICATIONS SECTION 802, CONSTRUCTION SIGNING AND TRAFFIC CONTROL.
13. THE CONTRACTOR WILL BE RESPONSIBLE FOR PREPARATION AND DISTRIBUTION OF A WRITTEN NOTICE TO RESIDENTS 48 HOURS PRIOR TO BEGINNING PAVEMENT REMOVAL AND MILLING AND OVERLAY OPERATIONS.
14. LOCAL AND THROUGH TRAFFIC SHALL BE MAINTAINED THROUGH PROJECT AT ALL TIMES. OPEN CUT STREET CROSSINGS REQUIRE AN APPROVED TRAFFIC CONTROL PLAN WITH TRAFFIC CONTROL DEVICES IN ACCORDANCE WITH CURRENT MUTCD REQUIREMENTS.
15. ALL PUBLIC AND PRIVATE STREETS AND DRIVES SHALL BE ACCESSIBLE AT ALL TIMES.
16. ALL BROKEN CONCRETE, WASTE MATERIAL, AND OTHER DEBRIS SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED FROM THE LIMITS OF THE PROJECT AND DISPOSED OF IN A MANNER APPROVED BY THE ENGINEER. NO ADDITIONAL PAYMENT WILL BE MADE FOR THE DISPOSAL OF THIS MATERIAL.
17. ALL EXCAVATED MATERIAL NOT REQUIRED IN THE PROJECT SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE DISPOSED OF BY THE CONTRACTOR IN A MANNER ACCEPTABLE TO THE ENGINEER WITHOUT COST TO THE CITY. THE CONTRACTOR WILL BE REQUIRED TO OBTAIN AN EARTH CHANGE PERMIT IF ANY MATERIAL IS STORED ON THE PROJECT SITE AND/OR DISPOSED OF WITHIN THE CITY LIMITS.
18. ALL TREES, BRUSH AND OTHER DEBRIS THAT MIGHT INTERFERE WITH THE FLOW OF WATER IS TO BE CLEANED OUT TO THE RIGHT-OF-WAY LINE IN A MANNER APPROVED BY THE ENGINEER. ALL COST TO BE INCLUDED IN THE PRICE BID FOR OTHER ITEMS OF WORK, TREES OUTSIDE THE FILL SLOPES AND THE TOP OF CUT SLOPES SHALL NOT BE DISTURBED EXCEPT WITH THE WRITTEN APPROVAL OF THE ENGINEER.
19. WHERE MATERIALS ARE TRANSPORTED IN THE PROSECUTION OF WORK, VEHICLES SHALL NOT BE LOADED BEYOND THE CAPACITY RECOMMENDED BY THE VEHICLE MANUFACTURER OR AS PRESCRIBED BY ANY FEDERAL, STATE OR LOCAL LAW OR REGULATION.
20. ANY DAMAGE TO THE ROADWAY PAVEMENT, CURB, DRIVEWAYS OR SIDEWALK CAUSED BY THE CONTRACTOR'S OPERATION SHALL BE REPAIRED TO THE ENGINEER'S SATISFACTION AND SHALL BE ACCOMPLISHED AT THE CONTRACTOR'S SOLE EXPENSE. ALL DISTURBED ITEMS SHALL BE REPAIRED TO MATCH EXISTING MATERIALS AND PATTERNING.
21. IF THE CONTRACTOR ENCOUNTERS VOIDS WHEN PATCHING STREETS, THE CONTRACTOR SHALL CALL FIELD ENGINEERING AT 405-297-2581 FOR AN INSPECTION BEFORE PROCEEDING WITH WORK.
22. THE PROJECT SHALL BE CONSTRUCTED WITH CONTINUOUS FLOW OF MATERIAL SUPPLIED TO THE PROJECT SUCH THAT THE LAYDOWN MACHINE WILL REMAIN IN MOTION. ANY DELAY IN FORWARD PROGRESSION OF THE LAYDOWN MACHINE MAY REQUIRE A TRANSVERSE JOINT AS DIRECTED BY THE ENGINEER.
23. NO FLY ASH IS ALLOWED TO BE USED ON THIS PROJECT.
24. PHYSICAL TESTING FOR QUALITY ASSURANCE SHALL BE FURNISHED BY THE CITY.
25. CONTRACTOR IS RESPONSIBLE FOR ALL NECESSARY QUALITY CONTROL TESTING TO ENSURE THAT PROJECT REQUIREMENTS ARE MET.
26. MASONRY STRUCTURES SHALL NOT BE CONSTRUCTED WITHIN THE STREET RIGHT-OF-WAY.
27. ~~ALL CONCRETE CURB AND GUTTERS SHALL BE MONOLITHIC POURS. DOWELED ON CURBS WILL NOT BE ALLOWED.~~
28. NO LIFTING HOLES WILL BE ALLOWED ON ANY REINFORCED CONCRETE PIPES OR REINFORCED CONCRETE BOXES.
29. CURB RAMP CONSTRUCTION SHALL COMPLY WITH THE CURRENT AMERICANS WITH DISABILITIES ACT STANDARDS.
30. REFLECTORIZED SHEETING ON SIGNS AND BARRICADES SHALL BE OF A CUBIC PRISMATIC TYPE AND SHALL MEET THE SPECIFICATIONS ESTABLISHED FOR ASTM D 4956-01 TYPE IX RETROREFLECTIVE SHEETING. REFLECTORIZED SHEETING ON DRUMS AND TUBE CHANNELIZERS SHALL BE OF A HIGH-INTENSITY TYPE AND SHALL MEET THE SPECIFICATIONS ESTABLISHED FOR ASTM D 4956-01 TYPE III RETROREFLECTIVE SHEETING.
31. ALL SANITARY AND STORM SEWER MANHOLE CASTINGS AND LIDS THAT ARE LOCATED IN THE STREET AND ARE DISTURBED BY THE CONTRACTOR SHALL BE REPLACED WITH NEW LIDS AND CASTINGS AND THE OLD ONES SHALL BE SALVAGED AND DELIVERED TO A LOCATION SPECIFIED BY THE ENGINEER.
32. THE SIGN PLACEMENT STATIONING AND LOCATIONS SHOWN ON THE PLAN SHEETS AND SUMMARY SHEETS ARE APPROXIMATE. EXACT STATIONING AND LOCATIONS SHALL BE VERIFIED BY THE CONTRACTOR SO THAT THE SIGN IS INSTALLED IN ACCORDANCE WITH CITY OF OKLAHOMA CITY STANDARDS, CURRENT AMERICANS WITH DISABILITIES ACT STANDARDS, AND THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES IN ORDER TO PROVIDE OPTIMUM VISIBILITY TO THE ONCOMING/APPROACHING MOTORIST. IF A PROPOSED LOCATION CONFLICTS WITH OTHER SIGNS, UTILITIES, OR OTHER ROADWAY FEATURES, THE ENGINEER SHALL BE NOTIFIED.
33. POST LENGTHS SHOWN ON SIGN SUMMARY ARE APPROXIMATE. EXACT LENGTHS SHALL BE DETERMINED BY A FIELD SURVEY CONDUCTED BY THE CONTRACTOR.
34. ALL ASPHALT STREETS THAT ARE TO BE RECONSTRUCTED SHALL BE LEFT WITH A DRIVABLE SURFACE AT ALL TIMES. THE CONTRACTOR WILL NOT BE ALLOWED TO MILL OFF ALL THE ASPHALT BEFORE EXCAVATION BEGINS.
35. THE CONTRACTOR SHALL REPLACE ANY SECTION CORNERS OR OTHER PERMANENT RIGHT OF WAY MARKERS REMOVED OR DISTURBED AS A RESULT OF THE CONSTRUCTION OF THIS PROJECT. REPLACEMENT OF SECTION CORNERS OR ANY OTHER MONUMENTS SHALL BE PERFORMED BY A LICENSED LAND SURVEYOR AUTHORIZED TO PERFORM WORK IN THE STATE OF OKLAHOMA.
36. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CONTROL AND MAINTENANCE OF THE STORMWATER DRAINAGE. STORMWATER PONDING ON THE CONSTRUCTION SITE THAT IS THE RESULT OF CONSTRUCTION WILL NOT BE ALLOWED.
37. STRAW OR HAY BALES AS STORMWATER BEST MANAGEMENT PRACTICES ARE NO LONGER ALLOWED ON CONSTRUCTION PROJECTS.
38. THE CONTRACTOR MUST CALL 1-800-458-4251 IMMEDIATELY IF A NATURAL GAS PIPELINE IS CUT, DAMAGED, OR OTHERWISE DISTURBED.
39. PRIOR TO FINAL ACCEPTANCE, ALL EXPOSED CURB SURFACES SHALL BE CLEANED OF ALL DISCOLORATION SUCH AS ASPHALT STAIN, TIRE MARKS, OR OTHER DISFIGUREMENT.
40. ALL FEATURES OF THIS PROJECT INCLUDING, BUT NOT LIMITED TO, SIDEWALKS, CURB RAMPS, AND CROSSWALKS SHALL COMPLY WITH THE AMERICANS WITH DISABILITIES ACT, ACCESSIBILITY GUIDELINES, AND THE PROPOSED ACCESSIBILITY GUIDELINES FOR PEDESTRIAN FACILITIES IN THE PUBLIC RIGHT-OF-WAY, PUBLISHED ON JULY 26, 2011 BY THE U.S. ACCESS BOARD. WHERE SPATIAL LIMITATIONS OR EXISTING FEATURES WITHIN THE LIMITS OF THE PROJECT PREVENT FULL COMPLIANCE WITH THIS ACT, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER UPON DISCOVERY OF SUCH FEATURES. THE CONTRACTOR SHALL NOT PROCEED WITH ANY ASPECT OF THE WORK, WHICH IS NOT IN FULL COMPLIANCE WITH THE ADA WITHOUT PRIOR WRITTEN APPROVAL FROM THE ENGINEER. ANY WORK, WHICH IS NOT PERFORMED WITHIN THE GUIDELINES OF THE ADA, FOR WHICH THE CONTRACTOR DOES NOT HAVE WRITTEN APPROVAL, SHALL BE CORRECTED AT THE CONTRACTOR'S EXPENSE.
41. ALL TRENCH WIDTHS & BEDDING MATERIAL SHALL BE AS SHOWN ON CITY OF OKLAHOMA CITY STANDARD PIPE BEDDING DETAIL, STANDARD NO. S-09. SPECIFIED TRENCH WIDTHS SHALL BE MAINTAINED FULL DEPTH FROM THE FLOWLINE TO THE GRADING TEMPLATE. THE CONTRACTOR SHALL KEEP THE OPEN TRENCH DRAINED.
42. THE CONTRACTOR SHALL NOTIFY OKLAHOMA CITY TRAFFIC MANAGEMENT AT 405-297-2531, A MINIMUM OF 48 HOURS PRIOR TO COMMENCING WORK, LANE CLOSURES OR PRIOR TO DETOURING TRAFFIC.
43. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REPLACEMENT OF ALL EXISTING NEIGHBORHOOD, TRAFFIC SIGNS AND MARKINGS REMOVED OR DAMAGED AS PART OF THIS PROJECT.
44. CONTRACTOR SHALL NOT STORE EQUIPMENT OR MATERIALS IN THE FLOODPLAIN.

TRAFFIC ENGINEERING GENERAL CONSTRUCTION NOTES:

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE TRAFFIC SIGNAL IN A PROPER WORKING CONDITION DURING CONSTRUCTION AS DIRECTED BY THE TRAFFIC ENGINEER AND FOR FOLLOWING THE REQUIREMENTS OF CITY OF OKLAHOMA CITY STANDARD SPECIFICATIONS SECTION 700, TRAFFIC CONTROL. ALL TRAFFIC MATERIALS SHALL MEET THE REQUIREMENTS OF CITY OF OKLAHOMA CITY STANDARD SPECIFICATIONS SECTION 702, MATERIALS OR AS DIRECTED BY THE TRAFFIC ENGINEER. CONTRACTORS SHALL MEET THE REQUIREMENTS OF CITY OF OKLAHOMA CITY SPECIFICATIONS SECTION 103, BID REQUIREMENTS AND CONDITIONS.
2. THE CONTRACTOR SHALL OBTAIN THE NECESSARY PERMITS FOR ELECTRICAL INSPECTION ON ALL SIGNAL AND LIGHTING WORK PER CITY OF OKLAHOMA CITY STANDARD SPECIFICATIONS SECTION 700, TRAFFIC CONTROL. USE THE FOLLOWING ADDRESS(ES) FOR THE ELECTRICAL PERMIT:
   _____.

***NOTE: CONTACT TRAFFIC MANAGEMENT DIVISION FOR THE ADDRESS TO USE IN THE PLANS FOR THIS NOTE. PLEASE PROVIDE A LOCATION MAP SHOWING THE LOCATION OF THE SIGNAL OR LIGHTING CONTROLLERS FOR WHICH ADDRESSING IS BEING REQUESTED (CAD FILES ARE VERY HELPFUL). PLEASE ALLOW FOR A MINIMUM OF TWO WEEKS FOR THIS INFORMATION TO BE PROVIDED.

3. THIS PROJECT HAS BEEN DESIGNED AND IS TO BE CONSTRUCTED ACCORDING TO THE REQUIREMENTS OF THE 2013 VERSION OF THE CITY OF OKLAHOMA CITY TRAFFIC OPERATIONS STANDARDS AND SPECIFICATIONS.

WATERLINE CONSTRUCTION NOTES:

1. EXISTING SERVICE CONNECTIONS ARE TO BE KEPT IN SERVICE UNTIL CONNECTIONS TO NEW MAIN ARE MADE. ALL SERVICE LINE RECONNECTIONS SHALL BE MADE BY THE CONTRACTOR. SERVICE RECONNECTIONS SHALL BE INSTALLED AS PER CITY OF OKLAHOMA CITY STANDARD SPECIFICATIONS AND STANDARD DETAILS.
2. MINIMUM COVER OVER WATER LINES SHALL BE AS NOTED ON PLANS.
3. CONTRACTOR SHALL REPLACE EXISTING GRASS WITH SOD OF SAME TYPE AND VARIETY OR AS NOTED ON PLANS.
4. CONTRACTOR SHALL BORE UNDER EXISTING TREES DRIP LINE, UNLESS DIRECTED OTHERWISE BY ENGINEER.
5. CONTRACTOR SHALL BORE UNDER EXISTING DRIVEWAYS, UNLESS DIRECTED OTHERWISE BY ENGINEER.
6. CONTRACTOR SHALL PROVIDE AT LEAST 48 HOUR NOTICE TO ALL RESIDENTS OR BUSINESSES AFFECTED BEFORE TURNING OFF ANY WATER. CONTRACTOR SHALL BE RESPONSIBLE FOR PLACING DOOR HANGERS ON AFFECTED HOMES AND BUSINESSES.
7. ANY DAMAGE CAUSED BY CONTRACTOR TO ADJACENT TRAFFIC SIGNAL INFRASTRUCTURE SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE TO THE SATISFACTION OF THE TRAFFIC ENGINEER.
8. PRIOR TO PAVEMENT SAWING AND EXCAVATION NEAR SIGNALIZED INTERSECTION, CONTRACTOR SHALL CONTACT ENGINEERING SERVICES, TRAFFIC OPERATIONS, 918-596-9766, FOR SITE SPECIFIC, UNDERGROUND TRAFFIC UTILITY LOCATES.
9. CONSTRUCTION FOR ALL ENGINEERING SERVICES FACILITIES SHALL BE IN COMPLIANCE WITH THE LATEST EDITION OF TITLE 252, DEPARTMENT OF ENVIRONMENTAL QUALITY, CHAPTER 626, PUBLIC WATER SUPPLY CONSTRUCTION STANDARDS, OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY (ODEQ).
10. ANY CHANGES FROM APPROVED PLANS SHALL BE SUBMITTED TO THE CITY OF OKLAHOMA CITY FOR WRITTEN APPROVAL PRIOR TO INSTALLATION.

BEFORE YOU DIG 811 OKIE ONE-CALL SYSTEM, INC. CALL OKIE

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

QUANTITIES AND GENERAL NOTES

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB
101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

REVISION	BY	DATE

PLAN SCALE: 1" = 10'
PROFILE SCALE:
HORIZONTAL:
VERTICAL

DRAWN			
DESIGNED			
SURVEY			
PROJ. MGR.			
LEAD ENGR.			
FIELD MGR.			

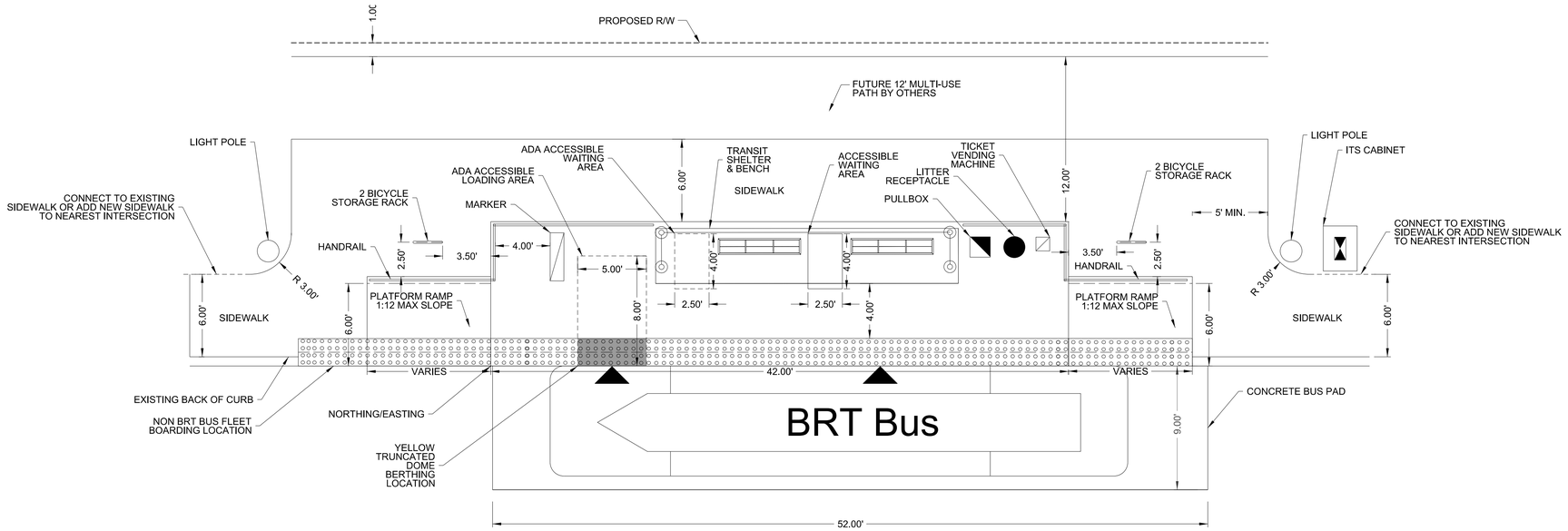
RECOMMENDED:
DESIGN MANAGER

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

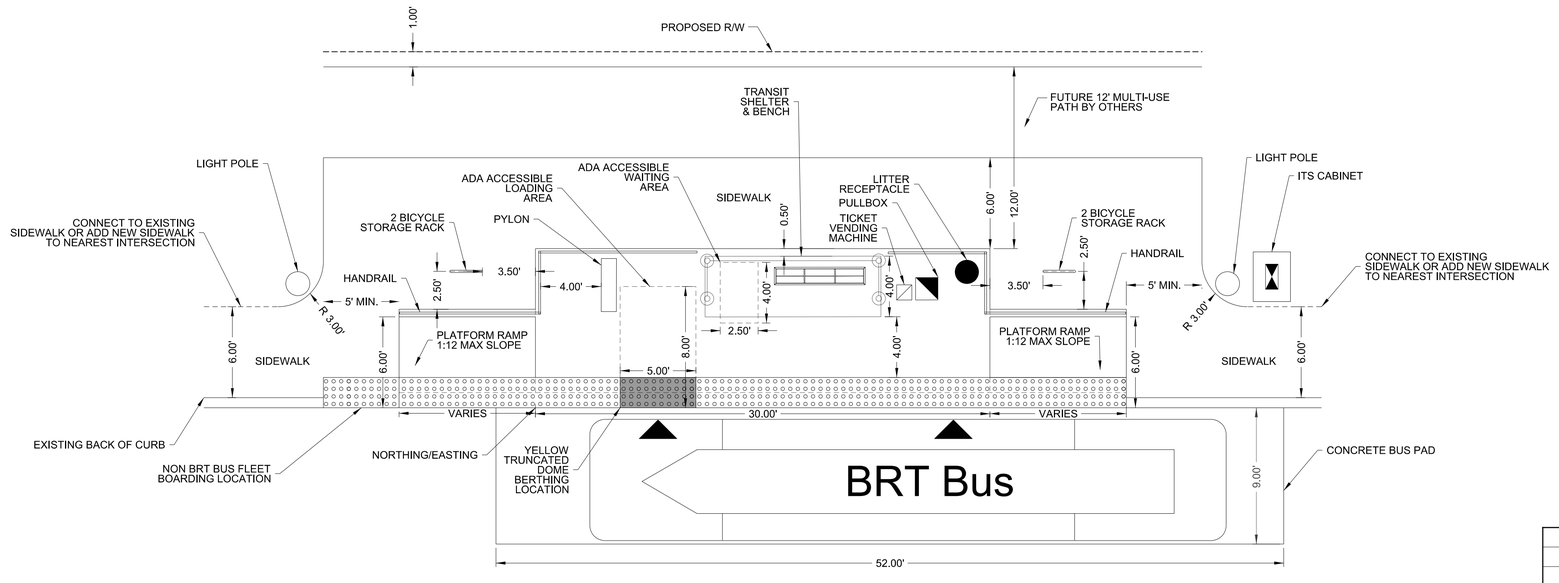
FILE: DRAWING:
DATE: 10/30/2020
ATLAS PAGE NO:
SHEET 3 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$DATE$$$ 12:15 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - Quantities and Notes.dgn



1 HIGH RIDERSHIP STATION LAYOUT

NOT TO SCALE



2 STANDARD STATION LAYOUT

NOT TO SCALE

PLOTTED BY: $USER$
PLOT DATE: $$$DATE$$$ 02:22 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - typical sections.dgn

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

TYPICAL STATION LAYOUT

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB

101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG 811 CALL OKIE

REVISION	BY	DATE

PLAN SCALE:
PROFILE SCALE:
HORIZONTAL:
VERTICAL

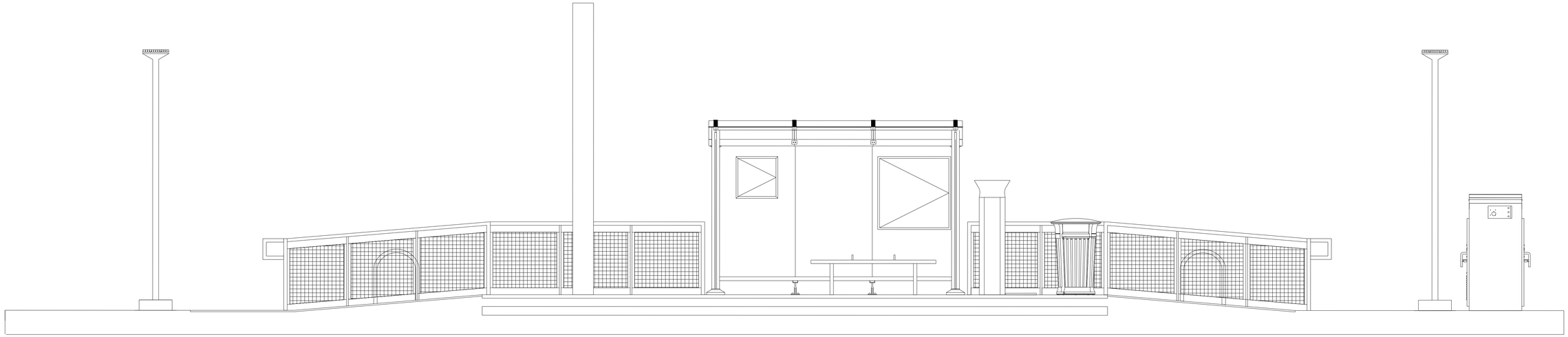
DRAWN			
DESIGNED			
SURVEY			
PROJ. MGR.			
LEAD ENGR.			
FIELD MGR.			

RECOMMENDED:
DESIGN MANAGER

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING:
DATE: 10/30/2020
ATLAS PAGE NO:
SHEET 4 OF 59 SHEETS



1 TYPICAL PLATFORM- ELEVATION VIEW OF STANDARD STATION

NOT TO SCALE - (SEE PLATFORM DRAWINGS FOR DIMENSIONS)

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 12:15 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - typical sections 2.dgn

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

NORTHWEST CORRIDOR BUS RAPID TRANSIT STATIONS

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB
101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG 811 CALL OKIE

REVISION	BY	DATE

PLAN SCALE:
PROFILE SCALE:
HORIZONTAL:
VERTICAL

DRAWN		
DESIGNED		
SURVEY		
PROJ. MGR.		
LEAD ENGR.		
FIELD MGR.		

RECOMMENDED:

DESIGN MANAGER

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING:

DATE: 10/30/2020

ATLAS PAGE NO:

SHEET 5 OF 59 SHEETS

EXISTING R/W

EXISTING R/W

MAIN STREET

EXISTING R/W

EXISTING R/W

NEW AUDIBLE ADA PUSH BUTTONS ADDED TO EXISTING SIGNAL. DO NOT DISTURB EXISTING SIGNAL.

STANDARD STATION
(NO BIKE RACKS AND SINGLE ADA RAMP ON SOUTH SIDE)

RELOCATE EXISTING SIGNAL WITH AUDIBLE NEW ADA PUSH BUTTONS.

BRT Bus

N: 170667.91
E: 2113063.32

BROADWAY AVENUE

BROADWAY AVENUE

NEW AUDIBLE ADA PUSH BUTTONS ADDED TO EXISTING SIGNAL. DO NOT DISTURB EXISTING SIGNAL.

EXISTING R/W

EXISTING R/W

NEW AUDIBLE ADA PUSH BUTTONS ADDED TO EXISTING SIGNAL. DO NOT DISTURB EXISTING SIGNAL.

MAIN STREET

EXISTING R/W

EXISTING R/W

10 5 0 10 20

Scale: 1" = 10'

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

NORTH BROADWAY AVENUE AND MAIN AVENUE STATION (SB)

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB
101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG CALL OKIE 811

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

PLAN SCALE: 1" = 10'
PROFILE SCALE:
HORIZONTAL:
VERTICAL

DRAWN			
DESIGNED			
SURVEY			
PROJ. MGR.			
LEAD ENGR.			
FIELD MGR.			
RECOMMENDED: DESIGN MANAGER			

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING: DATE: 10/30/2020

ATLAS PAGE NO: SHEET 6 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 12:22 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - Broadway_Main.dgn

PARK AVENUE

EXISTING R/W

EXISTING R/W

EXISTING R/W

ROBINSON AVENUE

Ex UGE

BRT Bus

N: 171113.64
E: 2112515.77

ROBINSON AVENUE

EXISTING R/W

BUS ONLY STRIPING

STANDARD STATION

DO NOT DISTURB
EXISTING SIGNAL

EXISTING R/W

EXISTING R/W

EXISTING R/W

PARK AVENUE

10 5 0 10 20

Scale: 1" = 10'

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

ROBINSON AVENUE AND PARK AVENUE STATION (NB)

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB

101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG CALL OKIE 811

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

PLAN SCALE: 1" = 10'
PROFILE SCALE:
HORIZONTAL:
VERTICAL

DRAWN			
DESIGNED			
SURVEY			
PROJ. MGR.			
LEAD ENGR.			
FIELD MGR.			

RECOMMENDED:
DESIGN MANAGER

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING:

DATE: 10/30/2020

ATLAS PAGE NO:

SHEET 7 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 12:23 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - Robinson_Park.dgn

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

TRANSIT CENTER STATION (NB & SB)

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB
101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG CALL OKIE 811

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

PLAN SCALE: 1" = 10'
PROFILE SCALE:
HORIZONTAL:
VERTICAL

DRAWN			
DESIGNED			
SURVEY			
PROJ. MGR.			
LEAD ENGR.			
FIELD MGR.			
RECOMMENDED: DESIGN MANAGER			

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING:

DATE: 10/30/2020

ATLAS PAGE NO:

SHEET 8 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 12:16 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - Transit Center.dgn

EXISTING R/W

EXISTING R/W

EXISTING R/W

STANDARD STATION
(1 BIKE RACK)

EXISTING R/W

N: 173539.99
E: 2111630.45

BRT Bus

NW 8TH STREET

EXISTING R/W

EXISTING R/W

HUDSON AVENUE

EXISTING R/W

EXISTING R/W

10 5 0 10 20

Scale: 1" = 10'

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

HUDSON AVENUE AND 8TH STREET STATION (SB)

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB

101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG CALL OKIE 811

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

PLAN SCALE: 1" = 10'
PROFILE SCALE:
HORIZONTAL:
VERTICAL

DRAWN			
DESIGNED			
SURVEY			
PROJ. MGR.			
LEAD ENGR.			
FIELD MGR.			

RECOMMENDED:
DESIGN MANAGER

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING:

DATE: 10/30/2020

ATLAS PAGE NO:

SHEET 9 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$DATE$$$ 12:16 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - Hudson_8th.dgn

10 5 0 10 20

Scale: 1" = 10'

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

10TH STREET AND DEWEY AVENUE STATION (NB & SB)

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB

101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG 811 CALL OKIE

1. PROPOSED R/W (N: 174595.07, E: 2110357.62)
2. PROPOSED R/W (N: 174590.75, E: 2110357.79)
3. PROPOSED R/W (N: 174590.74, E: 2110363.24)
4. PROPOSED R/W (N: 174595.10, E: 2110363.23)

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

PLAN SCALE: 1" = 10'
PROFILE SCALE:
HORIZONTAL:
VERTICAL

DRAWN
DESIGNED
SURVEY
PROJ. MGR.
LEAD ENGR.
FIELD MGR.
RECOMMENDED:
DESIGN MANAGER

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING:

DATE: 10/30/2020

ATLAS PAGE NO:

SHEET 10 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 12:16 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - WB10th_Dewey.dgn

10 5 0 10 20

Scale: 1" = 10'

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

CLASSEN BOULEVARD AND 13TH STREET STATION (NB & SB)

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB

101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG 811 CALL OKIE

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

PLAN SCALE: 1" = 10'

PROFILE SCALE:

HORIZONTAL:

VERTICAL

DRAWN | DESIGNED | SURVEY | PROJ. MGR. | LEAD ENGR. | FIELD MGR. | RECOMMENDED: | DESIGN MANAGER

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING:

DATE: 10/30/2020

ATLAS PAGE NO:

SHEET 11 OF 59 SHEETS

PLOTTED BY: $USERS
PLOT DATE: $$$$DATE$$$ 12:16 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - NBClassen_13th.dgn

CLASSEN BOULEVARD

EXISTING R/W

EXISTING R/W

EXISTING R/W

EXISTING R/W

EXISTING R/W

EXISTING R/W

BRT Bus

N: 177926.20
E: 2108112.16

1

2

3

PROPOSED R/W

STANDARD STATION
(1 BIKE RACK)

DO NOT DISTURB
EXISTING SIGNAL

19.52 FT CLEARANCE

18TH STREET

CLASSEN BOULEVARD

1. PROPOSED R/W (N: 177880.90, E: 2108125.97)
2. PROPOSED R/W (N: 177882.60, E: 2108140.79)
3. PROPOSED R/W (N: 177957.76, E: 2108132.21)

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

10 5 0 10 20

Scale: 1" = 10'

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

CLASSEN BOULEVARD AND 18TH STREET STATION (NB)

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB
101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

REVISION	BY	DATE

PLAN SCALE: 1" = 10'	DRAWN	
	DESIGNED	
	SURVEY	
PROFILE SCALE:	PROJ. MGR.	
HORIZONTAL:	LEAD ENGR.	
	FIELD MGR.	
VERTICAL	RECOMMENDED: DESIGN MANAGER	
FILE:	DRAWING:	
ATLAS PAGE NO:		

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

DATE: 10/30/2020

SHEET 12 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 12:16 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - NBClassen_18th.dgn

PLOTTED BY: $USER$
PLOT DATE: $$$DATE$$$ 12:16 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - SBClassen_18th.dgn

1. PROPOSED R/W (N: 177670.05, E: 2108010.23)
2. PROPOSED R/W (N: 177670.02, E: 2108001.01)
3. PROPOSED R/W (N: 177657.28, E: 2108001.05)

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

CLASSEN BOULEVARD AND 18TH STREET STATION (SB)

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB

101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG CALL OKIE 811

REVISION	BY	DATE

PLAN SCALE: 1" = 10'
PROFILE SCALE:
HORIZONTAL:
VERTICAL

DRAWN		
DESIGNED		
SURVEY		
PROJ. MGR.		
LEAD ENGR.		
FIELD MGR.		

RECOMMENDED:
DESIGN MANAGER

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING: DATE: 10/30/2020

ATLAS PAGE NO: SHEET 13 OF 59 SHEETS

10 5 0 10 20

Scale: 1" = 10'

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

CLASSEN BOULEVARD AND 23RD STREET STATION (NB)

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB
101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

1. PROPOSED R/W (N: 179843.15, E: 2108017.88)
2. PROPOSED R/W (N: 179857.73, E: 2108046.97)
3. PROPOSED R/W (N: 179858.92, E: 2108046.95)
4. PROPOSED R/W (N: 179924.60, E: 2107998.88)
5. PROPOSED R/W (N: 179928.52, E: 2107998.89)
6. PROPOSED R/W (N: 179934.34, E: 2107978.64)
7. PROPOSED R/W (N: 179950.61, E: 2107957.00)
8. PROPOSED R/W (N: 179949.02, E: 2107954.31)
9. PROPOSED R/W (N: 179957.12, E: 2107950.26)
10. PROPOSED R/W (N: 179964.02, E: 2107962.86)
11. PROPOSED R/W (N: 180039.53, E: 2107921.81)
12. PROPOSED R/W (N: 180032.73, E: 2107909.39)
13. PROPOSED R/W (N: 179793.33, E: 2107888.54)
14. PROPOSED R/W (N: 179796.98, E: 2107894.70)
15. PROPOSED R/W (N: 179835.21, E: 2107878.90)
16. PROPOSED R/W (N: 179847.68, E: 2107861.63)

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

PLAN SCALE: 1" = 10'
PROFILE SCALE:
HORIZONTAL:
VERTICAL

DRAWN			
DESIGNED			
SURVEY			
PROJ. MGR.			
LEAD ENGR.			
FIELD MGR.			
RECOMMENDED: DESIGN MANAGER			

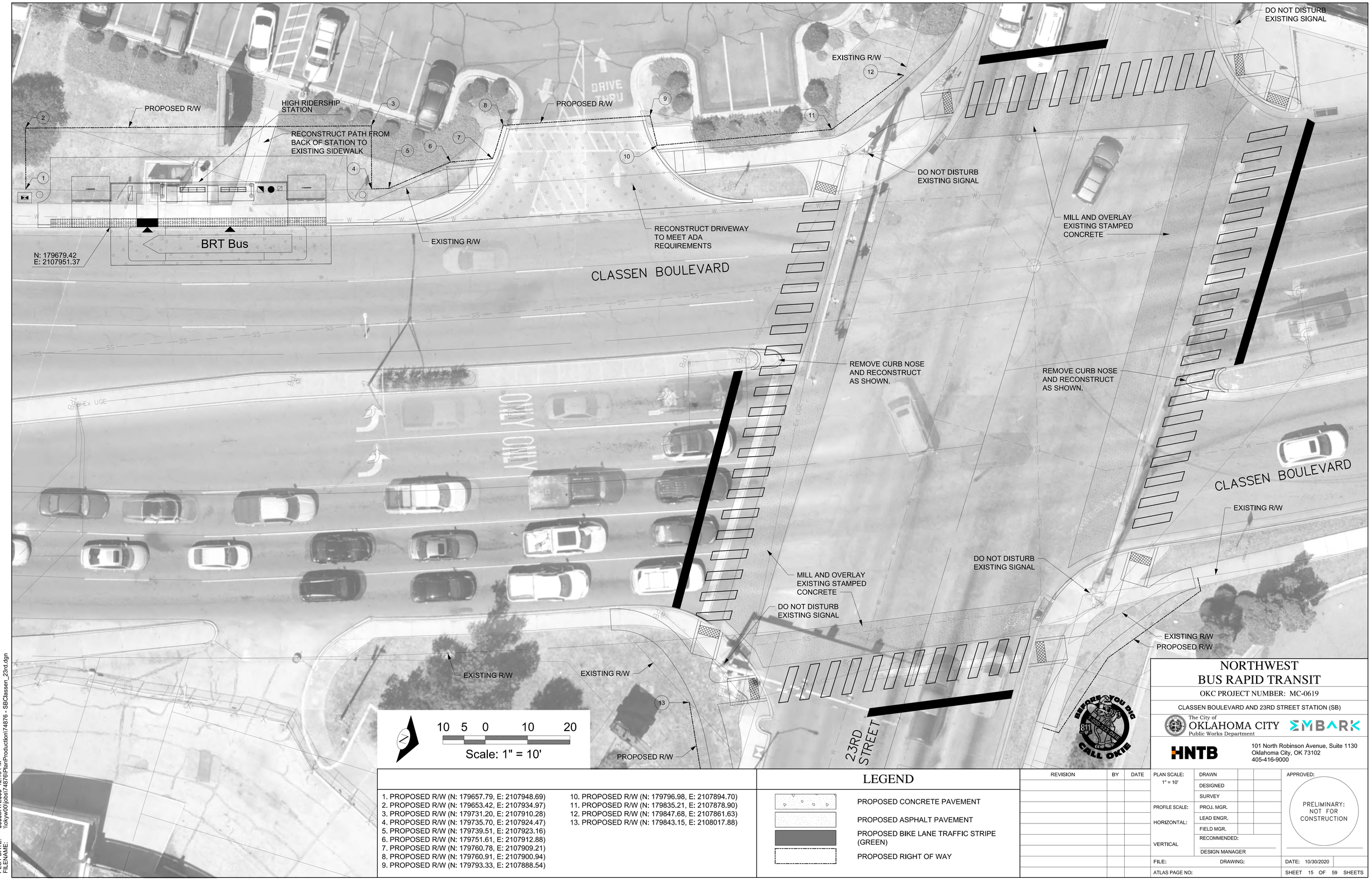
APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING: DATE: 10/30/2020

ATLAS PAGE NO: SHEET 14 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 12:16 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - NBClassen_23rd.dgn



1. PROPOSED R/W (N: 179657.79, E: 2107948.69)
2. PROPOSED R/W (N: 179653.42, E: 2107934.97)
3. PROPOSED R/W (N: 179731.20, E: 2107910.28)
4. PROPOSED R/W (N: 179735.70, E: 2107924.47)
5. PROPOSED R/W (N: 179739.51, E: 2107923.16)
6. PROPOSED R/W (N: 179751.61, E: 2107912.88)
7. PROPOSED R/W (N: 179760.78, E: 2107909.21)
8. PROPOSED R/W (N: 179760.91, E: 2107900.94)
9. PROPOSED R/W (N: 179793.33, E: 2107888.54)
10. PROPOSED R/W (N: 179796.98, E: 2107894.70)
11. PROPOSED R/W (N: 179835.21, E: 2107878.90)
12. PROPOSED R/W (N: 179847.68, E: 2107861.63)
13. PROPOSED R/W (N: 179843.15, E: 2108017.88)

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

CLASSEN BOULEVARD AND 23RD STREET STATION (SB)

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB

101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG CALL OKIE 811

PLAN SCALE: 1" = 10'	DRAWN		
	DESIGNED		
	SURVEY		
PROFILE SCALE:	PROJ. MGR.		
HORIZONTAL:	LEAD ENGR.		
	FIELD MGR.		
VERTICAL	RECOMMENDED: DESIGN MANAGER		
FILE:	DRAWING:	DATE: 10/30/2020	
ATLAS PAGE NO:		SHEET 15 OF 59 SHEETS	

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 12:16 PM
FILENAME: \\okyw00\jobs\74876\Plan\Production\74876 - SBClassen_23rd.dgn

EXISTING R/W

PROPOSED R/W

EXISTING R/W

EXISTING R/W

DO NOT DISTURB
EXISTING SIGNAL

N: 182384.51
E: 2107079.64

BRT Bus

STANDARD STATION
(1 BIKE RACK)

CLOSE EXISTING
DRIVEWAY

CLASSEN BOULEVARD

CLASSEN BOULEVARD

N: 182446.26
E: 2107166.98

BRT Bus

CLOSE EXISTING
DRIVEWAY

DO NOT DISTURB
EXISTING SIGNAL

EXISTING R/W

EXISTING R/W

PROPOSED R/W

EXISTING R/W

EXISTING R/W

30TH STREET

EXISTING R/W

30' BUILDING LINE

10 5 0 10 20

Scale: 1" = 10'

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

CLASSEN BOULEVARD AND 30TH STREET STATION (NB & SB)

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB
101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG CALL OKIE 811

1. PROPOSED R/W (N: 182355.44, E: 2107058.35)
2. PROPOSED R/W (N: 182355.43, E: 2107056.25)
3. PROPOSED R/W (N: 182443.43, E: 2107055.93)
4. PROPOSED R/W (N: 182443.43, E: 2107057.78)
5. PROPOSED R/W (N: 182387.33, E: 2107188.14)
6. PROPOSED R/W (N: 182387.34, E: 2107190.69)
7. PROPOSED R/W (N: 182480.34, E: 2107190.34)
8. PROPOSED R/W (N: 182480.33, E: 2107187.54)

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

PLAN SCALE: 1" = 10'
PROFILE SCALE:
HORIZONTAL:
VERTICAL

DRAWN
DESIGNED
SURVEY
PROJ. MGR.
LEAD ENGR.
FIELD MGR.
RECOMMENDED:
DESIGN MANAGER

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING: DATE: 10/30/2020

ATLAS PAGE NO: SHEET 16 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$DATE$$$ 12:17 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - SBClassen_30th.dgn

STANDARD STATION

N: 185046.58
E: 2107062.30

BRT Bus

CLASSEN BOULEVARD

ONLY ONLY

CLASSEN BOULEVARD

EXISTING R/W

EXISTING R/W

36TH STREET

BRT Bus

N: 185302.14
E: 2107152.58

STANDARD STATION

EXISTING R/W

EXISTING R/W

10 5 0 10 20

Scale: 1" = 10'

BEFORE YOU DIG
811
CALL OKIE

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

CLASSEN BOULEVARD AND 36TH STREET STATION (NB & SB)

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB

101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

REVISION	BY	DATE

PLAN SCALE: 1" = 10'	DRAWN	
	DESIGNED	
	SURVEY	
PROFILE SCALE:	PROJ. MGR.	
HORIZONTAL:	LEAD ENGR.	
	FIELD MGR.	
VERTICAL	RECOMMENDED: DESIGN MANAGER	

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING: DATE: 10/30/2020

ATLAS PAGE NO: SHEET 17 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 12:17 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - Classen_36th.dgn

42ND STREET

EXISTING R/W

INTEGRAL SIDEWALK RETAINING WALL

STANDARD STATION (1 BIKE RACK)

EXISTING R/W

EXISTING R/W

30' BUILDING LINE

NOTE:
1. ADDITIONAL SURVEY NEEDED TO COMPLETE SIDEWALK CONNECTION TO NEWVIEW
2. COORDINATE WITH NEWVIEW ON R/W NEEDS FOR SIDEWALK CONSTRUCTION
3. DISCUSS 2-STAGE OR SINGLE STAGE MID-BLOCK CROSSING

N: 187799.39
E: 2107041.08

BRT Bus

RECONSTRUCT ENTRANCE TO MEET ADA REQUIREMENTS

NEW SIGNAL WITH AUDIBLE ADA PUSH BUTTON

CLASSEN BOULEVARD

CLASSEN BOULEVARD AND 42ND STREET INTERSECTION

MIDBLOCK CROSSING

CLASSEN BOULEVARD

CLOSE EXISTING DRIVEWAY

N: 187749.16
E: 2107137.01

BRT Bus

NEW SIGNAL WITH AUDIBLE ADA PUSH BUTTON

42ND STREET

STANDARD STATION

EXISTING R/W

EXISTING R/W

EXISTING R/W

EXISTING R/W

1. PROPOSED R/W (N: 187886.85, E: 2107023.53)
2. PROPOSED R/W (N: 187886.85, E: 2106998.29)
3. PROPOSED R/W (N: 187936.53, E: 2106997.60)
4. PROPOSED R/W (N:187936.89 , E: 2107023.20)

10 5 0 10 20

Scale: 1" = 10'

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

PLOTTED BY: $USER$
PLOT DATE: $$$DATE$$ 12:17 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - NBClassen_42nd.dgn

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

CLASSEN BOULEVARD AND 42ND STREET STATION (NB & SB)

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB

101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG OKLAHOMA ONE CALL 811 CALL OKIE

REVISION	BY	DATE

PLAN SCALE: 1" = 10'

PROFILE SCALE:

HORIZONTAL:

VERTICAL

DRAWN | DESIGNED | SURVEY | PROJ. MGR. | LEAD ENGR. | FIELD MGR. | RECOMMENDED: DESIGN MANAGER

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING:

DATE: 10/30/2020

ATLAS PAGE NO:

SHEET 18 OF 59 SHEETS

EXISTING R/W

EXISTING R/W

EXISTING R/W

CLASSEN BOULEVARD

CLASSEN BOULEVARD

CLASSEN BOULEVARD AND NW EXPRESSWAY INTERSECTION

PAVEMENT MARKING SYMBOL (ARROW)(WHITE)

EXISTING R/W

EXISTING R/W

EXISTING R/W

48TH STREET

RIGHT LANE MUST TURN RIGHT

R3-7 (36"X36")

10 5 0 10 20

Scale: 1" = 10'

MATCH LINE - SEE SHEET 20

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

CLASSEN BOULEVARD AND NW EXPRESSWAY LANE DROP

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB
101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

REVISION	BY	DATE

PLAN SCALE: 1" = 10'

PROFILE SCALE: HORIZONTAL:

VERTICAL

DRAWN	
DESIGNED	
SURVEY	
PROJ. MGR.	
LEAD ENGR.	
FIELD MGR.	
RECOMMENDED: DESIGN MANAGER	

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING:

DATE: 10/30/2020

ATLAS PAGE NO:

SHEET 19 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 12:17 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - ClassenLaneDrop(3).dgn

MATCH LINE - SEE SHEET 19

MATCH LINE - SEE SHEET 21

EXISTING R/W

CLASSEN BOULEVARD

REMOVE EXISTING R3-8 SIGN

TO 1ST SIGNSIGN

BEGIN SIGNAGE

CLASSEN BOULEVARD AND NW EXPRESSWAY INTERSECTION

25 FT CLEARANCE

CLASSEN BOULEVARD

BUS ONLY LANE

RIGHT TURN ONLY LANE

PAVEMENT MARKING WORDS (BUS ONLY)(WHITE)(TYP.)

PAVEMENT MARKING WORDS (ONLY)(WHITE)(TYP.)

PAVEMENT MARKING (ARROW)(WHITE)(TYP.)

ONLY

BUS ONLY

TO 1ST SIGNSIGN

REMOVE EXISTING R3-8 SIGN

EXISTING R/W

ONLY ONLY ONLY

R3-8 (48" X 30")

10 5 0 10 20

Scale: 1" = 10'

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

CLASSEN BOULEVARD AND NW EXPRESSWAY LANE DROP

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB

101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG CALL OKIE 811

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

PLAN SCALE: 1" = 10'

PROFILE SCALE:

HORIZONTAL:

VERTICAL

DRAWN			
DESIGNED			
SURVEY			
PROJ. MGR.			
LEAD ENGR.			
FIELD MGR.			
RECOMMENDED:			
DESIGN MANAGER			

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING:

DATE: 10/30/2020

ATLAS PAGE NO:

SHEET 20 OF 59 SHEETS

PLOTTED BY: $USERS
PLOT DATE: $$$$DATE$$$ 12:17 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - ClassenLaneDrop(2).dgn

MATCH LINE - SEE SHEET 20

CLASSEN BOULEVARD

CLASSEN BOULEVARD

ONLY

ONLY BUS

ONLY BUS

ONLY BUS

PAVEMENT MARKING WORDS (BUS ONLY) (WHITE) (TYP.)

BUS ONLY LANE

CLASSEN CIRCLE

EXISTING R/W

NW EXPRESSWAY

10 5 0 10 20

Scale: 1" = 10'

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

CLASSEN BOULEVARD AND NW EXPRESSWAY LANE DROP

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB

101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG OKLAHOMA ONE CALL 811 CALL OKIE

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

PLAN SCALE: 1" = 10'

PROFILE SCALE:

HORIZONTAL:

VERTICAL

DRAWN | DESIGNED | SURVEY | PROJ. MGR. | LEAD ENGR. | FIELD MGR.

RECOMMENDED: DESIGN MANAGER

APPROVED:

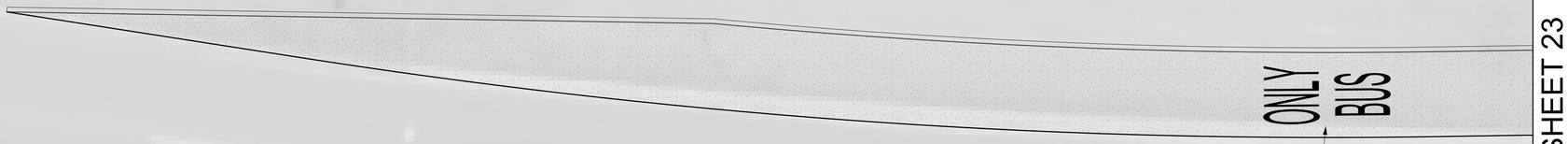
PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING: DATE: 10/30/2020

ATLAS PAGE NO: SHEET 21 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 12:18 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - ClassenLaneDrop.dgn

NOTE:
ADDITIONAL SURVEY NEEDED
FOR THIS STATION.



PAVEMENT MARKING
WORDS (BUS ONLY)
(WHITE) (TYP.)

MATCH LINE - SEE SHEET 23

10 5 0 10 20

Scale: 1" = 10'

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

BLACKWELDER AND NW EXPRESSWAY STATION (NB)

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB

101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG 811 CALL OKIE

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

PLAN SCALE: 1" = 10'
PROFILE SCALE:
HORIZONTAL:
VERTICAL

DRAWN			
DESIGNED			
SURVEY			
PROJ. MGR.			
LEAD ENGR.			
FIELD MGR.			

RECOMMENDED:
DESIGN MANAGER

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING: DATE: 10/30/2020

ATLAS PAGE NO: SHEET 22 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$DATE$$$ 12:18 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - NBBlackwelder(3).dgn

MATCH LINE - SEE SHEET 22

NOTE:
ADDITIONAL SURVEY NEEDED
FOR THIS STATION.

STANDARD STATION

ONLY BUS

BRT Bus

ONLY BUS

N: 190381.38
E: 2105471.39

PAVEMENT MARKING
WORDS (BUS ONLY)
(WHITE) (TYP.)

BLACKWELDER AVENUE AND NW EXPRESSWAY INTERSECTION

NW EXPRESSWAY

MATCH LINE - SEE SHEET 24

10 5 0 10 20

Scale: 1" = 10'

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

BLACKWELDER AND NW EXPRESSWAY STATION (NB)

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB
101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG 811 OKIE ONE CALL CALL OKIE

REVISION	BY	DATE

PLAN SCALE: 1" = 10'
PROFILE SCALE:
HORIZONTAL:
VERTICAL

DRAWN		
DESIGNED		
SURVEY		
PROJ. MGR.		
LEAD ENGR.		
FIELD MGR.		
RECOMMENDED: DESIGN MANAGER		

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING: DATE: 10/30/2020

ATLAS PAGE NO: SHEET 23 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$DATE$$ 12:18 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - NBBlackwelder(2).dgn

MATCH LINE - SEE SHEET 23

MATCH LINE - SEE SHEET 25

BLACKWELDER AVENUE

NW EXPRESSWAY

EXISTING R/W

REMOVE CURB NOSE AND RECONSTRUCT AS SHOWN

NEW PEDESTRIAN POLE WITH AUDIBLE ADA PUSH BUTTON

DO NOT DISTURB EXISTING SIGNAL

NEW PEDESTRIAN POLE WITH AUDIBLE ADA PUSH BUTTONS

REMOVE CURB NOSE AND RECONSTRUCT AS SHOWN

NEW PEDESTRIAN POLE WITH AUDIBLE ADA PUSH BUTTON

DO NOT DISTURB EXISTING SIGNAL

REMOVE CURB NOSE AND RECONSTRUCT AS SHOWN

NEW PEDESTRIAN POLE WITH AUDIBLE ADA PUSH BUTTONS

NEW PEDESTRIAN POLE WITH AUDIBLE ADA PUSH BUTTON

DO NOT DISTURB EXISTING SIGNAL

EXISTING R/W

PROPOSED R/W

1. PROPOSED R/W (N: 190263.91, E: 2105797.91)
2. PROPOSED R/W (N: 190265.56, E: 2105814.05)

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

10 5 0 10 20

Scale: 1" = 10'

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

INTERSECTION OF NORTH BLACKWELDER AND NW EXPRESSWAY

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB
101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG CALL OKIE 811

REVISION	BY	DATE

PLAN SCALE: 1" = 10'	DRAWN		
	DESIGNED		
	SURVEY		
PROFILE SCALE:	PROJ. MGR.		
HORIZONTAL:	LEAD ENGR.		
	FIELD MGR.		
VERTICAL	RECOMMENDED: DESIGN MANAGER		

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING: DATE: 10/30/2020

ATLAS PAGE NO: SHEET 24 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$DATE$$$ 12:18 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - NBBlackwelder.dgn

MATCH LINE - SEE SHEET 24

MATCH LINE - SEE SHEET 26

NW EXPRESSWAY

BLACKWELDER AVENUE AND NW EXPRESSWAY INTERSECTION

NW EXPRESSWAY

N: 190287.38
E: 2106134.36

PAVEMENT MARKING WORDS (BUS ONLY) (WHITE) (TYP.)

ONLY BUS

BRT Bus

ONLY BUS

EXISTING R/W

STANDARD STATION

32

N

10 5 0 10 20

Scale: 1" = 10'

BLOCK THIRTY-TWO (32)

LEGEND

PROPOSED CONCRETE PAVEMENT

PROPOSED ASPHALT PAVEMENT

PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)

PROPOSED RIGHT OF WAY

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

NORTH BLACKWELDER AND NW EXPRESSWAY STATION (SB)

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB
101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG 811 CALL OKIE

REVISION	BY	DATE

PLAN SCALE: 1" = 10'

DRAWN | DESIGNED | SURVEY

PROFILE SCALE: HORIZONTAL: VERTICAL

PROJ. MGR. | LEAD ENGR. | FIELD MGR.

RECOMMENDED: DESIGN MANAGER

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING:

DATE: 10/30/2020

ATLAS PAGE NO:

SHEET 25 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 12:18 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - SBBlackwelder.dgn

PLOTTED BY: $USER$
PLOT DATE: $$$SDATE$$$ 12:18 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - SBBlackwelder(2).dgn

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

BLACKWELDER AND NW EXPRESSWAY STATION (SB)

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB
101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG OKLAHOMA ONE CALL 811 CALL OKIE

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

PLAN SCALE: 1" = 10'
PROFILE SCALE:
HORIZONTAL:
VERTICAL

DRAWN			
DESIGNED			
SURVEY			
PROJ. MGR.			
LEAD ENGR.			
FIELD MGR.			

RECOMMENDED:
DESIGN MANAGER

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING:
DATE: 10/30/2020
ATLAS PAGE NO:
SHEET 26 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 12:18 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - SBPenn(3).dgn

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

PENNSYLVANIA AVENUE AND NW EXPRESSWAY STATION (SB)

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB
101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG 811 CALL OKIE

PLAN SCALE: 1" = 10'	DRAWN		
	DESIGNED		
	SURVEY		
PROFILE SCALE:	PROJ. MGR.		
HORIZONTAL:	LEAD ENGR.		
	FIELD MGR.		
VERTICAL	RECOMMENDED:		
	DESIGN MANAGER		
FILE:	DRAWING:	DATE: 10/30/2020	
ATLAS PAGE NO:		SHEET 27 OF 59 SHEETS	

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

MATCH LINE - SEE SHEET 27

MATCH LINE - SEE SHEET 29

NW EXPRESSWAY

PENNSYLVANIA AVENUE
AND NW EXPRESSWAY
INTERSECTION

PAVEMENT MARKING
WORDS (BUS ONLY)
(WHITE) (TYP.)

BUS ONLY

BUS ONLY

BUS ONLY

BRT Bus

N: 190734.20
E: 2102850.81

STANDARD STATION

EXISTING R/W

EXISTING R/W

NOTE:
ADDITIONAL SURVEY NEEDED
FOR THIS STATION.

10 5 0 10 20

Scale: 1" = 10'

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

PENNSYLVANIA AVENUE AND NW EXPRESSWAY STATION (SB)

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB

101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG 811 CALL OKIE

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

PLAN SCALE: 1" = 10'
PROFILE SCALE:
HORIZONTAL:
VERTICAL

DRAWN
DESIGNED
SURVEY
PROJ. MGR.
LEAD ENGR.
FIELD MGR.
RECOMMENDED:
DESIGN MANAGER

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING:

DATE: 10/30/2020

ATLAS PAGE NO:

SHEET 28 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 12:18 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - SBPenn.dgn

MATCH LINE - SEE SHEET 28

NW EXPRESSWAY

ONLY

ONLY

PAVEMENT MARKING WORDS (BUS ONLY) (WHITE) (TYP.)

ONLY BUS

NEW PEDESTRIAN POLE WITH AUDIBLE ADA PUSH BUTTON

DO NOT DISTURB EXISTING SIGNAL

NEW PEDESTRIAN POLE WITH AUDIBLE ADA PUSH BUTTON

REMOVE CURB NOSE AND RECONSTRUCT AS SHOWN

18.45 FT CLERANCE

REMOVE CURB NOSE AND RECONSTRUCT AS SHOWN

DO NOT DISTURB EXISTING SIGNAL

NW EXPRESSWAY

19.95 FT CLERANCE

19.37 FT CLERANCE

PENNSYLVANIA AVENUE

EXISTING R/W

10 5 0 10 20

Scale: 1" = 10'

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

NORTH PENNSYLVANIA AVENUE AND NW EXPRESSWAY STATION (SB)

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB
101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG 811 CALL OKIE

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

PLAN SCALE: 1" = 10'

HORIZONTAL:

VERTICAL

PROFILE SCALE:

DRAWN			
DESIGNED			
SURVEY			
PROJ. MGR.			
LEAD ENGR.			
FIELD MGR.			

RECOMMENDED:

DESIGN MANAGER

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING: DATE: 10/30/2020

ATLAS PAGE NO: SHEET 29 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$DATE$$$ 12:18 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - SBPenn(2).dgn

AUDIBLE ADA PUSH BUTTON ON EXISTING SIGNAL POLE. DO NOT DISTURB EXISTING SIGNAL.

NOTE:
FOR PARK AND RIDE INFORMATION,
SEE SHEET 43.

NEW PEDESTRIAN POLE WITH AUDIBLE ADA PUSH BUTTON

DO NOT DISTURB EXISTING SIGNAL OR PED POLES

PENNSYLVANIA AVENUE

NW EXPRESSWAY

REMOVE CURB NOSE AND RECONSTRUCT AS SHOWN

DO NOT DISTURB EXISTING SIGNAL

NEW PEDESTRIAN POLES WITH AUDIBLE ADA PUSH BUTTONS

DO NOT DISTURB EXISTING SIGNAL

MATCH LINE - SEE SHEET 31

10 5 0 10 20

Scale: 1" = 10'

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

NORTH PENNSYLVANIA AVENUE AND NW EXPRESSWAY STATION (NB)

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB
101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG 811 OKIE DIGLINE CALL OKIE

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

PLAN SCALE: 1" = 10'
PROFILE SCALE:
HORIZONTAL:
VERTICAL

DRAWN			
DESIGNED			
SURVEY			
PROJ. MGR.			
LEAD ENGR.			
FIELD MGR.			

RECOMMENDED:
DESIGN MANAGER

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING:
DATE: 10/30/2020
ATLAS PAGE NO:
SHEET 30 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 12:18 PM
FILENAME: \\okyw0\jobs\74876\PlanProduction\74876 - NBPenn.dgn

MATCH LINE - SEE SHEET 30

MATCH LINE - SEE SHEET 32

10 5 0 10 20

Scale: 1" = 10'

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

NORTH PENNSYLVANIA AVENUE AND NW EXPRESSWAY STATION (NB)

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB
101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG OKLAHOMA ONE CALL 811 CALL OKIE

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

PLAN SCALE: 1" = 10'
PROFILE SCALE:
HORIZONTAL:
VERTICAL

DRAWN			
DESIGNED			
SURVEY			
PROJ. MGR.			
LEAD ENGR.			
FIELD MGR.			

RECOMMENDED:
DESIGN MANAGER

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING: DATE: 10/30/2020

ATLAS PAGE NO: SHEET 31 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 12:18 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - NBPenn(2).dgn

MATCH LINE - SEE SHEET 31

EXISTING R/W

BUS

PAVEMENT MARKING WORDS (BUS ONLY) (WHITE) (TYP.)

NW EXPRESSWAY

PENN SQUARE MALL (EXIT)

ONLY

ONLY

NW EXPRESSWAY

10 5 0 10 20

Scale: 1" = 10'

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

NORTH PENNSYLVANIA AVENUE AND NW EXPRESSWAY STATION (NB)

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB
101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG 811 OKIE ONE CALL OKIE

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

PLAN SCALE: 1" = 10'
PROFILE SCALE:
HORIZONTAL:
VERTICAL

	DRAWN	DESIGNED	SURVEY	PROJ. MGR.	LEAD ENGR.	FIELD MGR.	RECOMMENDED: DESIGN MANAGER

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING: DATE: 10/30/2020

ATLAS PAGE NO: SHEET 32 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 12:18 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - NBPenn(3).dgn

HOSPITAL ROAD

INDEPENDENCE AVENUE

STANDARD STATION

PROPOSED R/W

EXISTING R/W

EXISTING R/W

BRT Bus

N: 192576.36
E: 2095082.24

BRT Bus

N: 192649.08
E: 2095117.95

EXISTING R/W

EXISTING R/W

CONFIRM - EXISTING MIDBLOCK CROSSING CONTAINS FLASHING PUSH BUTTON PEDESTRIAN BEACON.
NO IMPROVEMENTS REQUIRED AT THIS MIDBLOCK CROSSING.

PROPOSED MSE WALL

STANDARD STATION

PROPOSED R/W

10 5 0 10 20

Scale: 1" = 10'

1. PROPOSED R/W (N: 192586.09, E: 2095128.16)
2. PROPOSED R/W (N: 192586.12, E: 2095137.09)
3. PROPOSED R/W (N: 192669.83, E: 2095136.90)
4. PROPOSED R/W (N: 192675.08, E: 2095127.54)
5. PROPOSED R/W (N: 192557.25, E: 2095068.36)
6. PROPOSED R/W (N: 192557.22, E: 2095064.90)
7. PROPOSED R/W (N: 192625.22, E: 2095064.34)
8. PROPOSED R/W (N: 192625.25, E: 2095067.89)

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

NORTH INDEPENDENCE STATION (NB & SB)

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB
101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG 811 OKIE ONE CALL CALL OKIE

REVISION	BY	DATE

PLAN SCALE: 1" = 10'
PROFILE SCALE:
HORIZONTAL:
VERTICAL

DRAWN			
DESIGNED			
SURVEY			
PROJ. MGR.			
LEAD ENGR.			
FIELD MGR.			
RECOMMENDED: DESIGN MANAGER			

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING: DATE: 10/30/2020

ATLAS PAGE NO: SHEET 33 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$DATE$$ 12:19 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - SBIndependence.dgn

PORTLAND AVENUE

EXISTING R/W

EXISTING R/W

5

6

PROPOSED R/W

PROPOSED R/W

4

3

EXISTING R/W

STANDARD STATION

NEW AUDIBLE ADA PUSH BUTTONS ADDED TO EXISTING SIGNAL. DO NOT DISTURB EXISTING SIGNAL.

NEW AUDIBLE ADA PUSH BUTTON ADDED TO EXISTING SIGNAL. DO NOT DISTURB EXISTING SIGNAL.

CLOSE EXISTING DRIVEWAY

N: 192585.48
E: 2092621.44

BRT Bus

NOTE:
ADDITIONAL SURVEY NEED FOR THESE STATIONS.

56TH STREET

MATCH LINE - SEE SHEET 35

N: 192545.89
E: 2092596.98

BRT Bus

STANDARD STATION
(1 BIKE RACK)

2

1

NEW PEDESTRIAN POLE WITH AUDIBLE ADA PUSH BUTTONS

RELOCATE EXISTING SIGNAL POLE WITH ADA PUSH BUTTON

9

NEW AUDIBLE ADA PUSH BUTTON ADDED TO EXISTING SIGNAL. DO NOT DISTURB EXISTING SIGNAL.

EXISTING R/W

10' UTILITY EASEMENT

15' PRIVATE EASEMENT

EXISTING R/W

25' BUILDING LINE

PORTLAND AVENUE

EXISTING R/W

10 5 0 10 20

Scale: 1" = 10'

1. PROPOSED R/W (N: 192524.90, E: 2092407.65)
2. PROPOSED R/W (N: 192524.90, E: 2092391.86)
3. PROPOSED R/W (N: 192599.64, E: 2092391.86)
4. PROPOSED R/W (N: 192602.16, E: 2092407.28)
5. PROPOSED R/W (N: 192624.17, E: 2092507.17)
6. PROPOSED R/W (N: 192613.55, E: 2092526.67)

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

56TH STREET AND PORTLAND AVENUE STATION (NB & SB)

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB

101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG CALL OKIE 811

PLAN SCALE: 1" = 10'	DRAWN		
	DESIGNED		
	SURVEY		
PROFILE SCALE:	PROJ. MGR.		
HORIZONTAL:	LEAD ENGR.		
	FIELD MGR.		
VERTICAL	RECOMMENDED:		
	DESIGN MANAGER		

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING:

DATE: 10/30/2020

ATLAS PAGE NO:

SHEET 34 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 12:19 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - EB56th_Portland.dgn

MATCH LINE - SEE SHEET 34

PROPOSED R/W

1

2

EXISTING R/W

NOTE:
ADDITIONAL SURVEY NEED
FOR THESE STATIONS.

56TH STREET

EXISTING R/W

10 5 0 10 20

Scale: 1" = 10'

1. PROPOSED R/W (N: 192610.32, E: 2092709.43)
2. PROPOSED R/W (N: 192591.68, E: 2092711.41)

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

56TH STREET AND PORTLAND AVENUE STATION (NB & SB)

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB

101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

PLAN SCALE: 1" = 10'	DRAWN			APPROVED:
	DESIGNED			PRELIMINARY: NOT FOR CONSTRUCTION
	SURVEY			
PROFILE SCALE:	PROJ. MGR.			
HORIZONTAL:	LEAD ENGR.			
	FIELD MGR.			
VERTICAL	RECOMMENDED: DESIGN MANAGER			
FILE:	DRAWING:			DATE: 10/30/2020
ATLAS PAGE NO:				SHEET 35 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 12:19 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - EB56th_Portland(2).dgn

EXISTING R/W

ONLY
BUS

NW EXPRESSWAY

EXISTING R/W

ONLY
BUS

PAVEMENT MARKING
WORDS (BUS ONLY)
(WHITE) (TYP.)

MATCH LINE - SEE SHEET 37

NW EXPRESSWAY

PORTLAND AVENUE AND NW
EXPRESSWAY INTERSECTION

EXISTING R/W

UTILITY EASEMENT

10 5 0 10 20

Scale: 1" = 10'

NORTHWEST
BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

PORTLAND AVENUE AND NW EXPRESSWAY STATION (NB)

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB

101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG
811
OKIE811.COM
CALL OKIE

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

PLAN SCALE: 1" = 10'	DRAWN	
	DESIGNED	
	SURVEY	
PROFILE SCALE:	PROJ. MGR.	
HORIZONTAL:	LEAD ENGR.	
	FIELD MGR.	
VERTICAL	RECOMMENDED: DESIGN MANAGER	
FILE:	DRAWING:	
ATLAS PAGE NO:		

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

DATE: 10/30/2020

SHEET 36 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 12:19 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - NBPortland(4).dgn

MATCH LINE - SEE SHEET 36

MATCH LINE - SEE SHEET 38

EXISTING R/W

PROPOSED R/W

STANDARD STATION

1

2

3

4

LP

ONLY BUS

BRT Bus

ONLY BUS

N: 194839.33
E: 2092170.29

PAVEMENT MARKING WORDS (BUS ONLY) (WHITE) (TYP.)

EXISTING R/W

SIGN

TCS

TPB

NW EXPRESSWAY

NW EXPRESSWAY

PORTLAND AVENUE AND NW EXPRESSWAY INTERSECTION

FP

TPB

EXISTING R/W

1. PROPOSED R/W (N: 194862.93, E: 2092161.29)
2. PROPOSED R/W (N: 194863.75, E: 2092161.72)
3. PROPOSED R/W (N: 194831.95, E: 2092221.83)
4. PROPOSED R/W (N: 194831.06, E: 2092221.35)

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

10 5 0 10 20

Scale: 1" = 10'

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

PORTLAND AVENUE AND NW EXPRESSWAY STATION (NB)

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB

101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG OKLAHOMA ONE CALL 811 CALL OKIE

REVISION	BY	DATE

PLAN SCALE: 1" = 10'

HORIZONTAL:

VERTICAL

DRAWN			
DESIGNED			
SURVEY			
PROJ. MGR.			
LEAD ENGR.			
FIELD MGR.			

RECOMMENDED:

DESIGN MANAGER

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING:

DATE: 10/30/2020

ATLAS PAGE NO:

SHEET 37 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$DATE$$ 12:19 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - NBPortland(3).dgn

EXISTING R/W

NEW PEDESTRIAN POLE WITH AUDIBLE ADA PUSH BUTTON

DO NOT DISTURB EXISTING SIGNAL

EXISTING R/W

NEW PEDESTRIAN POLE WITH AUDIBLE ADA PUSH BUTTON

NW EXPRESSWAY

NEW AUDIBLE ADA PUSH BUTTON ADDED TO EXISTING SIGNAL. DO NOT DISTURB EXISTING SIGNAL.

EXISTING R/W

EXISTING R/W

PORTLAND AVENUE

PORTLAND AVENUE

DO NOT DISTURB EXISTING SIGNAL

EXISTING R/W

NEW PEDESTRIAN POLE WITH AUDIBLE ADA PUSH BUTTON

NEW PEDESTRIAN POLE WITH AUDIBLE ADA PUSH BUTTON

DO NOT DISTURB EXISTING SIGNAL

NEW PEDESTRIAN POLE WITH AUDIBLE ADA PUSH BUTTON

NEW PEDESTRIAN POLE WITH AUDIBLE ADA PUSH BUTTON

MATCH LINE SEE SHEET 37

NW EXPRESSWAY

10 5 0 10 20

Scale: 1" = 10'

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

PORTLAND AVENUE AND NW EXPRESSWAY INTERSECTION

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB

101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG CALL OKIE 811

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

PLAN SCALE: 1" = 10'
PROFILE SCALE:
HORIZONTAL:
VERTICAL

DRAWN
DESIGNED
SURVEY
PROJ. MGR.
LEAD ENGR.
FIELD MGR.
RECOMMENDED: DESIGN MANAGER

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING:

DATE: 10/30/2020

ATLAS PAGE NO:

SHEET 38 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 12:19 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - NBPortland.dgn

PORTLAND AVENUE

EXISTING R/W

EXISTING R/W

TMH

TPB

HOSPITAL

SS

W1

WV

PORTLAND AVENUE
AND NW EXPRESSWAY
INTERSECTION

BRT Bus

N: 194366.28
E: 2092418.47

STANDARD STATION
(NO SIDEWALK BEHIND
STATION OR BIKE RACKS)

NOTE:
ADDITIONAL SURVEY
REQUIRED FOR THIS STATION

60TH STREET

62ND STREET

GWGPIS

GPIS

PP

PP/SRVC

WM

15' BUILDING LINE

EXISTING R/W

EXISTING R/W

EXISTING R/W

10 5 0 10 20

Scale: 1" = 10'

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

PORTLAND AVENUE AND NW EXPRESSWAY STATION (SB)

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB
101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG CALL OKIE 811

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

PLAN SCALE: 1" = 10'	DRAWN		
	DESIGNED		
	SURVEY		
PROFILE SCALE:	PROJ. MGR.		
HORIZONTAL:	LEAD ENGR.		
	FIELD MGR.		
VERTICAL	RECOMMENDED:		
	DESIGN MANAGER		

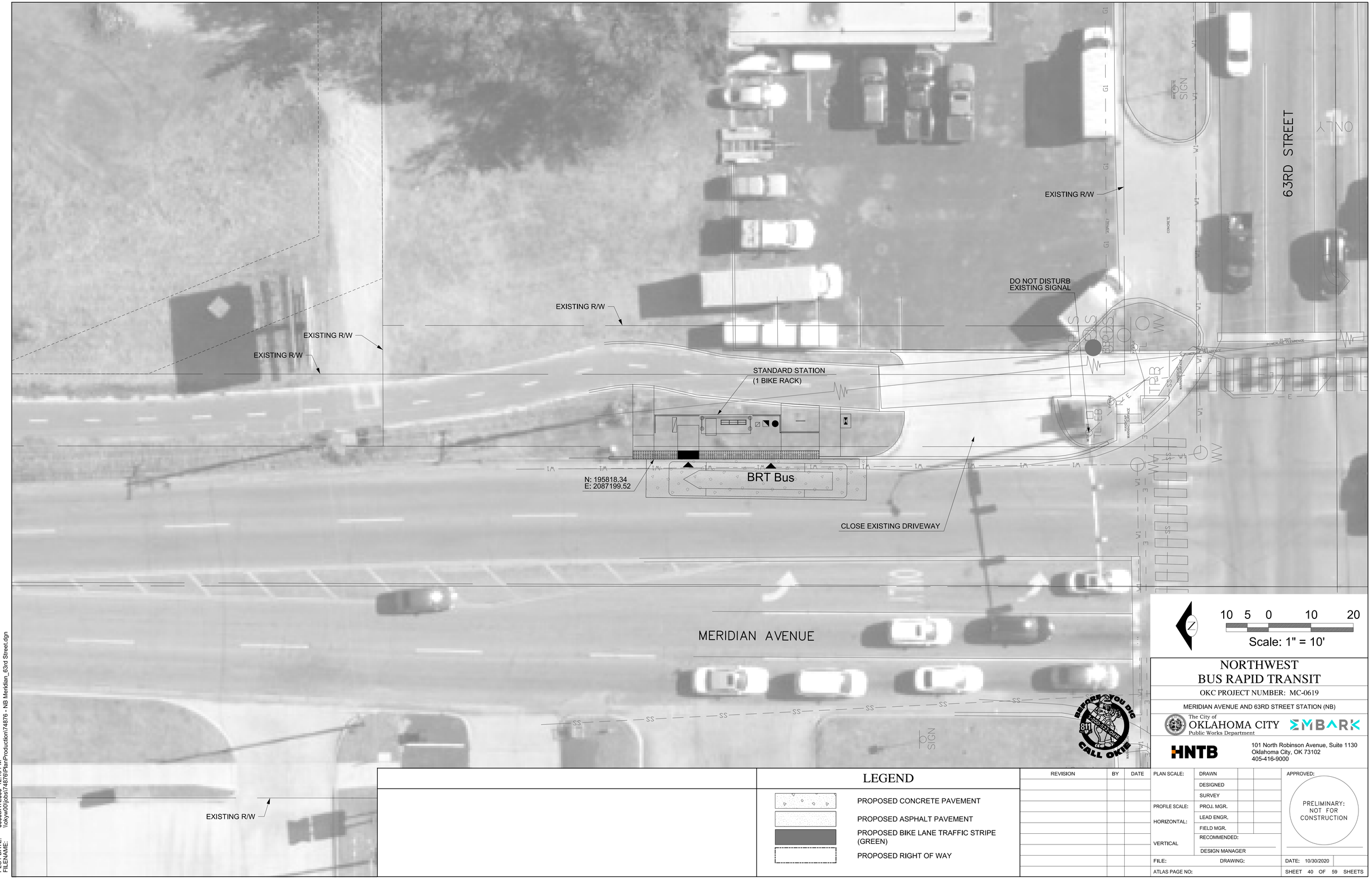
APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING: DATE: 10/30/2020

ATLAS PAGE NO: SHEET 39 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 12:19 PM
FILENAME: \\okyw00\jobs\74876\Plan\Production\74876 - NBPortland(2).dgn



10 5 0 10 20

Scale: 1" = 10'

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

MERIDIAN AVENUE AND 63RD STREET STATION (NB)

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB

101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG OKLAHOMA ONE CALL SYSTEM 811 CALL OKIE

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

PLAN SCALE:	DRAWN		APPROVED:
	DESIGNED		PRELIMINARY: NOT FOR CONSTRUCTION
	SURVEY		
PROFILE SCALE:	PROJ. MGR.		
HORIZONTAL:	LEAD ENGR.		
	FIELD MGR.		
VERTICAL	RECOMMENDED: DESIGN MANAGER		
FILE:	DRAWING:		DATE: 10/30/2020
ATLAS PAGE NO:			SHEET 40 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$DATE$$ 12:19 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - NB Meridian_63rd Street.dgn

MERIDIAN AVENUE

DO NOT DISTURB EXISTING SIGNAL

EXISTING R/W

63RD STREET

DO NOT DISTURB EXISTING SIGNAL

BRT Bus

N: 195627.37
E: 2087310.63

STANDARD STATION
(1 BIKE RACK)

EXISTING R/W

25' BUILDING LINE

EXISTING R/W

MERIDIAN AVENUE

10 5 0 10 20

Scale: 1" = 10'

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

63RD STREET AND MERIDIAN AVENUE STATION (SB)

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB
101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG CALL OKIE 811

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

PLAN SCALE: DRAWN | DESIGNED | SURVEY
PROFILE SCALE: PROJ. MGR.
HORIZONTAL: LEAD ENGR. | FIELD MGR.
VERTICAL: RECOMMENDED: DESIGN MANAGER

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING:
DATE: 10/30/2020
ATLAS PAGE NO:
SHEET 41 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$DATE$$$ 12:19 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - EB63rd Street_Meridian.dgn

10 5 0 10 20

Scale: 1" = 10'

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

WATER TRUST PROPERTY STATION (NB)

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB
101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG 811 CALL OKIE

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

PLAN SCALE: 1" = 20'
PROFILE SCALE: HORIZONTAL:
VERTICAL

DRAWN			
DESIGNED			
SURVEY			
PROJ. MGR.			
LEAD ENGR.			
FIELD MGR.			

RECOMMENDED:
DESIGN MANAGER

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING: DATE: 10/30/2020

ATLAS PAGE NO: SHEET 42 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 12:19 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - Water Trust Property Station.dgn

EXISTING R/W

PENNSYLVANIA AVENUE

POTENTIAL PARK AND RIDE SITE

PROPOSED R/W

EXISTING R/W

AUDIBLE ADA PUSH BUTTON ON EXISTING SIGNAL POLE. DO NOT DISTURB EXISTING SIGNAL.

INTERSECTION OF PENNSYLVANIA AVENUE AT NW EXPRESSWAY

NEW PEDESTRIAN POLE WITH AUDIBLE ADA PUSH BUTTON

DO NOT DISTURB EXISTING SIGNAL OR PED POLES

1. PROPOSED R/W (N: 190886.22, E: 2103211.19)
2. PROPOSED R/W (N: 190891.58, E: 2103215.93)
3. PROPOSED R/W (N: 190886.63, E: 2103222.43)
4. PROPOSED R/W (N: 190870.27, E: 2103323.78)
5. PROPOSED R/W (N: 190847.36, E: 2103320.08)

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

10 5 0 10 20

Scale: 1" = 10'

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

PARK AND RIDE - NORTH PENNSYLVANIA AVENUE

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB
101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG OKLAHOMA 811 CALL OKIE

REVISION	BY	DATE

PLAN SCALE: 1" = 10'
PROFILE SCALE:
HORIZONTAL:
VERTICAL

DRAWN
DESIGNED
SURVEY
PROJ. MGR.
LEAD ENGR.
FIELD MGR.
RECOMMENDED:
DESIGN MANAGER

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING: DATE: 10/30/2020

ATLAS PAGE NO: SHEET 43 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 12:19 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - Park and Ride_NPenn.dgn

20 10 0 20 40

Scale: 1" = 20'

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

PARK AND RIDE - WATER TRUST PROPERTY

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB
101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG OKLAHOMA ONE CALL 811 CALL OKIE

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

PLAN SCALE: 1" = 10'
PROFILE SCALE:
HORIZONTAL:
VERTICAL

DRAWN
DESIGNED
SURVEY
PROJ. MGR.
LEAD ENGR.
FIELD MGR.
RECOMMENDED:
DESIGN MANAGER

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING: DATE: 10/30/2020

ATLAS PAGE NO: SHEET 44 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 12:19 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - Park and Ride_NMeridian.dgn

10TH STREET

26'-0"

BIKE LANE DELINEATORS (TYP.)

BIKE LANE SYMBOL (WHITE ON GREEN) (TYP.)

6'-0" 3'-0" 10'-5" 10'-8" 10'-6" 6'-2" 10'-6" 10'-3" 3'-0" 6'-0"

NOTE: BIKE LANE SOUTH OF 10TH STREET BY OTHERS

CLASSEN BOULEVARD

17.37ft POWERLINE CLEARANCE

18.89ft POWERLINE CLEARANCE

Ex UGE

10TH STREET

MATCH LINE - SEE SHEET 46

10 5 0 10 20

Scale: 1" = 10'

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

CLASSEN BOULEVARD BIKE LANE

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB
101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG 811 CALL OKIE

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

PLAN SCALE: 1" = 10'
PROFILE SCALE:
HORIZONTAL:
VERTICAL

DRAWN			
DESIGNED			
SURVEY			
PROJ. MGR.			
LEAD ENGR.			
FIELD MGR.			

RECOMMENDED:
DESIGN MANAGER

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING:
DATE: 10/30/2020
ATLAS PAGE NO:
SHEET 45 OF 59 SHEETS

PLOTTED BY: $USERS
PLOT DATE: $$$$DATE$$$ 12:19 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - BikeLane10.dgn

MATCH LINE - SEE SHEET 45

MATCH LINE - SEE SHEET 47

PARK PLACE

CLASSEN BOULEVARD

26'-0"

6'-0"
3'-0"
10'-7"
11'-3"
9'-10"
10'-7"
10'-3"
3'-0"
6'-0"

BIKE LANE DELINEATORS (TYP.)

BIKE LANE SYMBOL (WHITE ON GREEN) (TYP.)

6'-0"
3'-0"
10'-6"
11'-1"
6'-2"
10'-7"
10'-5"
3'-0"
6'-0"

20.37ft POWERLINE CLEARENCE

PARK PLACE

CLASSEN BOULEVARD

10 5 0 10 20

Scale: 1" = 10'

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

CLASSEN BOULEVARD BIKE LANE

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB
101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

REVISION	BY	DATE

PLAN SCALE: 1" = 10'
PROFILE SCALE:
HORIZONTAL:
VERTICAL

DRAWN
DESIGNED
SURVEY
PROJ. MGR.
LEAD ENGR.
FIELD MGR.
RECOMMENDED:
DESIGN MANAGER

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING:

DATE: 10/30/2020

ATLAS PAGE NO:

SHEET 46 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$DATE$$$ 12:20 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - BikeLane9.dgn

10 5 0 10 20

Scale: 1" = 10'

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

CLASSEN BOULEVARD BIKE LANE

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB
101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG 811 CALL OKIE

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

PLAN SCALE: 1" = 10'	DRAWN		
	DESIGNED		
	SURVEY		
PROFILE SCALE:	PROJ. MGR.		
HORIZONTAL:	LEAD ENGR.		
	FIELD MGR.		
VERTICAL	RECOMMENDED: DESIGN MANAGER		

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING: DATE: 10/30/2020

ATLAS PAGE NO: SHEET 47 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 12:20 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - BikeLane8.dgn

MATCH LINE - SEE SHEET 47

MATCH LINE - SEE SHEET 49

NW 12TH STREET

CLASSEN BOULEVARD

NW 12TH STREET

26'-0"
6'-0"
3'-0"
10'-11"
11'-3"
5'-10"
10'-8"
10'-5"
3'-0"
6'-0"
26'-0"

27.26 FT CLEARANCE

BIKE LANE
DELINEATORS (TYP.)

BIKE LANE SYMBOL
(WHITE ON GREEN) (TYP.)

26'-0"
6'-0"
3'-0"
10'-11"
10'-5"
3'-0"
6'-0"
26'-0"
6'-0"
3'-0"
10'-3"

15' RESERVED FOR TRACKS AND SIDEWALK

10 5 0 10 20

Scale: 1" = 10'

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

CLASSEN BOULEVARD BIKE LANE

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB

101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG CALL OKIE 811

REVISION	BY	DATE

PLAN SCALE: 1" = 10'

PROFILE SCALE:

HORIZONTAL:

VERTICAL

DRAWN			
DESIGNED			
SURVEY			
PROJ. MGR.			
LEAD ENGR.			
FIELD MGR.			

RECOMMENDED:

DESIGN MANAGER

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING:

DATE: 10/30/2020

ATLAS PAGE NO:

SHEET 48 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 12:20 PM
FILENAME: \\okyw00\jobs\74876\Plan\Production\74876 - BikeLane7.dgn

MATCH LINE - SEE SHEET 48

MATCH LINE - SEE SHEET 50

CLASSEN BOULEVARD

13TH STREET

BIKE LANE SYMBOL (WHITE ON GREEN)(TYP.)

BIKE LANE DELINEATORS (TYP.)

26'-0"

6'-0"

3'-0"

10'-3"

11'-7"

9'-8"

10'-8"

10'-5"

3'-0"

6'-0"

26'-0"

NOTE:
BIKE LANE THROUGH INTERSECTION BY OTHERS

10 5 0 10 20

Scale: 1" = 10'

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

CLASSEN BOULEVARD BIKE LANE

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB
101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG CALL OKIE 811

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

PLAN SCALE: 1" = 10'
PROFILE SCALE:
HORIZONTAL:
VERTICAL

DRAWN			
DESIGNED			
SURVEY			
PROJ. MGR.			
LEAD ENGR.			
FIELD MGR.			

RECOMMENDED:
DESIGN MANAGER

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING: DATE: 10/30/2020

ATLAS PAGE NO: SHEET 49 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 12:20 PM
FILENAME: \\okyw00\jobs\74876\Plan\Production\74876 - BikeLane6.dgn

WESTERN AVENUE

BIKE LANE (GREEN)

BIKE LANE SYMBOL (WHITE ON GREEN)(TYP.)

BIKE LANE DELINEATORS (TYP.)

BRT Bus

BIKE LANE DELINEATORS (TYP.)

CLASSEN BOULEVARD

BRT Bus

BIKE LANE (GREEN)

6'-0" 3'-0" 10'-6" 10'-4" 10'-3" 2'-4" 9'-11" 10'-0" 3'-0" 6'-0"

MATCH LINE - SEE SHEET 49

MATCH LINE - SEE SHEET 51

10 5 0 10 20

Scale: 1" = 10'

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

CLASSEN BOULEVARD BIKE LANE

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB
101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG 811 OKIE ONE-CALL CALL OKIE

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

PLAN SCALE: 1" = 10'
PROFILE SCALE:
HORIZONTAL:
VERTICAL

DRAWN			
DESIGNED			
SURVEY			
PROJ. MGR.			
LEAD ENGR.			
FIELD MGR.			

RECOMMENDED:
DESIGN MANAGER

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING:
ATLAS PAGE NO:
DATE: 10/30/2020
SHEET 50 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 12:20 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - BikeLane5.dgn

10 5 0 10 20

Scale: 1" = 10'

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

CLASSEN BOULEVARD BIKE LANE

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB
101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG 811 OKLAHOMA ONE CALL CALL OKIE

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

PLAN SCALE: 1" = 10'
PROFILE SCALE:
HORIZONTAL:
VERTICAL

	DRAWN	DESIGNED	SURVEY	PROJ. MGR.	LEAD ENGR.	FIELD MGR.	RECOMMENDED: DESIGN MANAGER

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING:

DATE: 10/30/2020

ATLAS PAGE NO:

SHEET 51 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 12:49 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - BikeLane4.dgn

MATCH LINE - SEE SHEET 51

CLASSEN BOULEVARD (22-FOOT RIGHT-OF-WAY)
APPARENT ROW

7 TEEN VISITOR

7 TEEN VISITOR

CLASSEN BOULEVARD

WESTERN AVENUE (33-FOOT RIGHT-OF-WAY)
BOOK 17, PAGE 41, P.R.O.C.O.

6'-0"
3'-0"
10'-5"
10'-5"
5'-10"
10'-8"
10'-9"
3'-0"
6'-0"

CLASSEN BOULEVARD

28.92 FT CLEARANCE

WESTERN AVENUE (33-FOOT RIGHT-OF-WAY)
BOOK 17, PAGE 41, P.R.O.C.O.

WESTERN AVENUE (22-FOOT RIGHT-OF-WAY)
APPARENT ROW

MATCH LINE - SEE SHEET 53

10 5 0 10 20

Scale: 1" = 10'

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

CLASSEN BOULEVARD BIKE LANE

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB

101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG CALL OKIE 811

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

PLAN SCALE: 1" = 10'
PROFILE SCALE:
HORIZONTAL:
VERTICAL

DRAWN
DESIGNED
SURVEY
PROJ. MGR.
LEAD ENGR.
FIELD MGR.
RECOMMENDED:
DESIGN MANAGER

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING:
DATE: 10/30/2020
ATLAS PAGE NO:
SHEET 52 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 12:20 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - BikeLane3.dgn

MATCH LINE - SEE SHEET 52

MATCH LINE - SEE SHEET 54

15TH STREET

CLASSEN BOULEVARD

CLASSEN BOULEVARD (22-FOOT RIGHT-OF-WAY)
APPARENT ROW

CLASSEN BOULEVARD

26'-0"
BIKE LANE SYMBOL
(WHITE ON GREEN) (TYP.)

BIKE LANE
DELINEATORS (TYP.)

6'-0"
3'-0"
10'-0"
10'-11"
10'-4"
10'-5"
10'-6"
10'-6"
10'-0"
6'-0"

28.55 FT CLEARANCE

26'-0"
BIKE LANE SYMBOL
(WHITE ON GREEN) (TYP.)

SHARROW SYMBOL
(WHITE ON BLACK) (TYP.)

R4-11 (30"X36")
MAY USE
FULL LANE

R3-17 (24"x18")
BIKE LANE

R3-17bP (24"x8")
ENDS

10 5 0 10 20

Scale: 1" = 10'

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

CLASSEN BOULEVARD BIKE LANE

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB

101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG
811
CALL OKIE

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

PLAN SCALE: 1" = 10'
PROFILE SCALE:
HORIZONTAL:
VERTICAL

DRAWN			
DESIGNED			
SURVEY			
PROJ. MGR.			
LEAD ENGR.			
FIELD MGR.			

RECOMMENDED:
DESIGN MANAGER

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING:
DATE: 10/30/2020
ATLAS PAGE NO:
SHEET 53 OF 59 SHEETS

PLOTTED BY: $USER$
PLOT DATE: $$$DATE$$$ 12:20 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - BikeLane2.dgn

MATCH LINE - SEE SHEET 53

CLASSEN BOULEVARD

16TH STREET

CLASSEN BOULEVARD

WESTERN AVENUE

26'-0"

BIKE LANE SYMBOL
(WHITE ON GREEN) (TYP.)

BIKE LANE
DELINEATORS (TYP.)

6'-0"
3'-0"
10'-6"
10'-6"
4'-0"
11'-4"
10'-6"
10'-10"

NOTE: BIKE LANE THROUGH INTERSECTION BY OTHERS

10 5 0 10 20

Scale: 1" = 10'

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

CLASSEN BOULEVARD BIKE LANE

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB
101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG 811 CALL OKIE

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED BIKE LANE TRAFFIC STRIPE (GREEN)
- PROPOSED RIGHT OF WAY

REVISION	BY	DATE

PLAN SCALE: 1" = 10'
PROFILE SCALE:
HORIZONTAL:
VERTICAL

DRAWN
DESIGNED
SURVEY
PROJ. MGR.
LEAD ENGR.
FIELD MGR.
RECOMMENDED:
DESIGN MANAGER

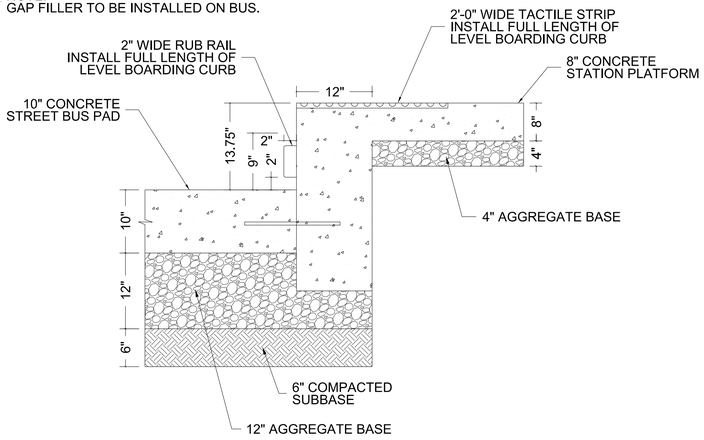
APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING:
DATE: 10/30/2020
ATLAS PAGE NO:
SHEET 54 OF 59 SHEETS

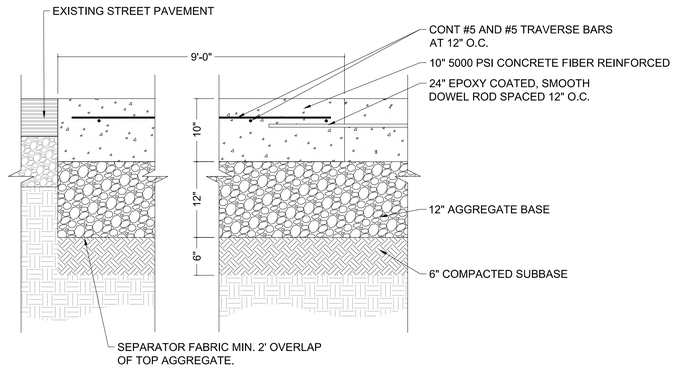
PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 12:20 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - BikeLane1.dgn

NOTE:
GAP FILLER TO BE INSTALLED ON BUS.



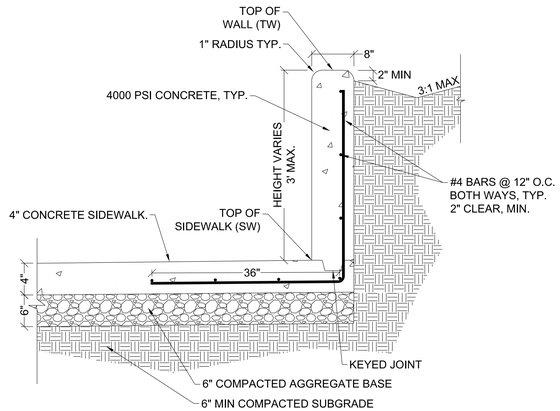
1 LEVEL BOARDING CURB

NOT TO SCALE



2 TYP. CONCRETE BUS PAD

NOT TO SCALE



ISRW NOTES:

1. ALL EARTHWORK, ROCK BASE, ROCK BEDDING, UNDERDRAIN PIPE INSTALLATION, BACKFILL AND TOPSOIL PLACEMENT SHALL BE CONSIDERED SUBSIDIARY TO INSTALLATION.
2. ALL CONCRETE MATERIAL SHALL BE 4000 PSI.
3. ALL EXPOSED WALL FACES SHALL BE SMOOTH FINISHED WITH NO VISIBLE FORM MARKS.
4. REINFORCING STEEL SHALL BE NEW MINIMUM GRADE 60 AS PER ASTM A615, AND SHALL BE BENT COLD.
5. MINIMUM 2" CLEARANCE SHALL BE PROVIDED FOR ALL REINFORCING.
6. ALL LAP SPLICES SHALL BE A MINIMUM OF 40 BAR DIAMETERS IN LENGTH.

3 TYP. INTEGRAL SIDEWALK RETAINING WALL (ISRW)

NOT TO SCALE

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 01:43 PM
FILENAME: J:\74876\PlanProduction\74876 - Roadway Details.dgn

BEFORE YOU DIG 811 OKIE LOCATE ONE CALL OKIE

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

SITE DETAILS

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB
101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

REVISION	BY	DATE

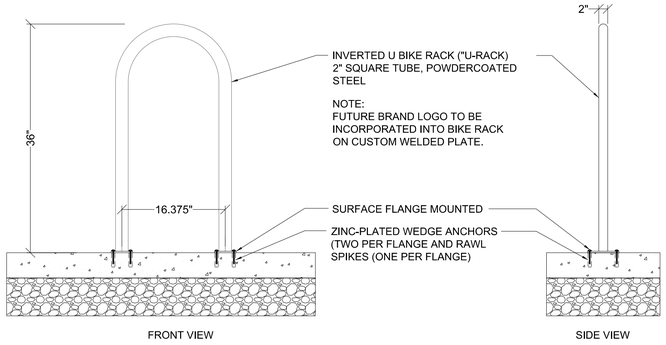
PLAN SCALE:
PROFILE SCALE:
HORIZONTAL:
VERTICAL

DRAWN
DESIGNED
SURVEY
PROJ. MGR.
LEAD ENGR.
FIELD MGR.
RECOMMENDED:
DESIGN MANAGER

APPROVED:

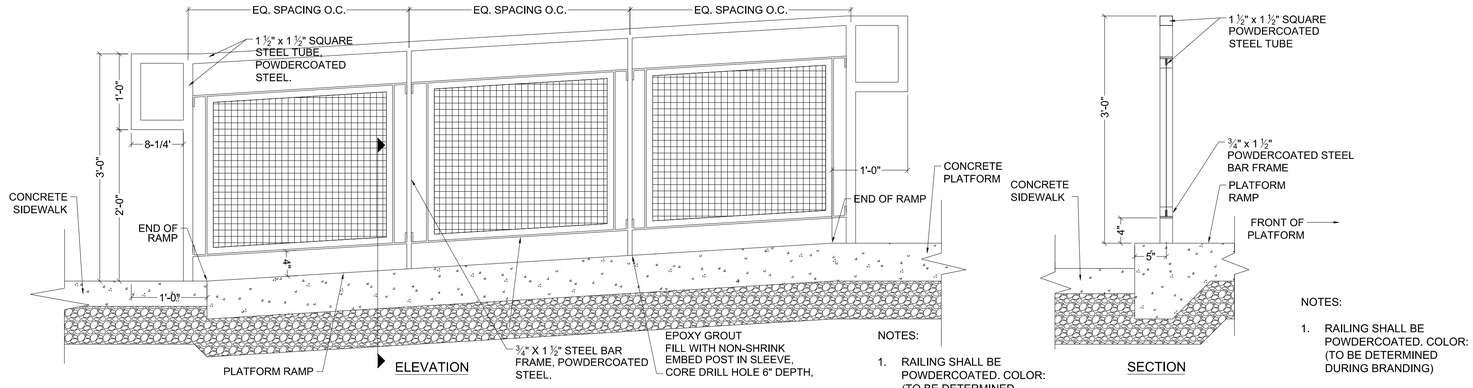
PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING:
DATE: 10/30/2020
ATLAS PAGE NO:
SHEET 55 OF 59 SHEETS



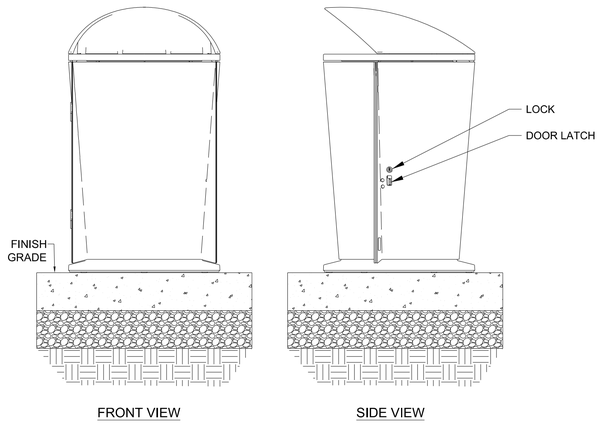
1 TYP. BICYCLE RACK

NOT TO SCALE



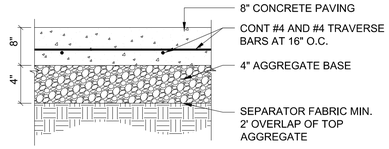
2 TYP. PLATFORM RAMP RAILING

NOT TO SCALE



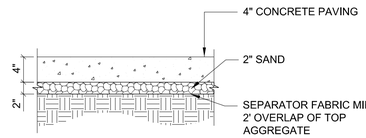
3 TYP. LITTER RECEPTACLE

NOT TO SCALE



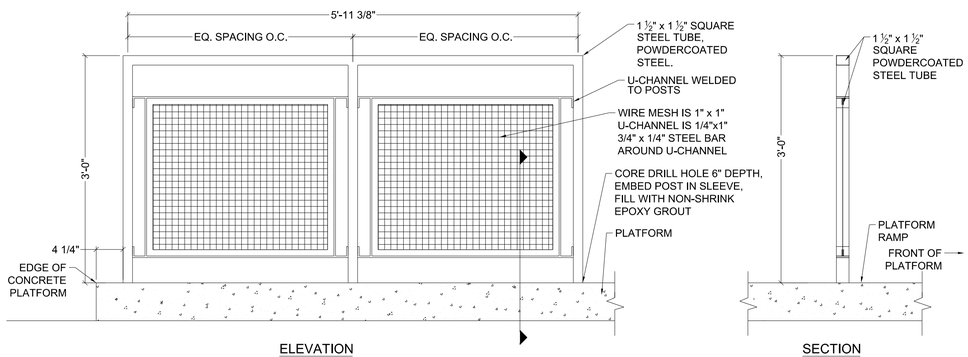
4 TYP. PLATFORM PAVING

NOT TO SCALE



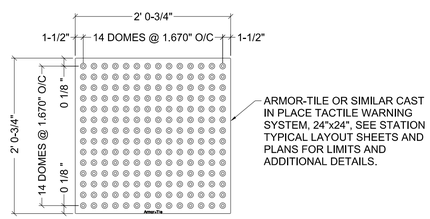
5 TYP. SIDEWALK PAVING

NOT TO SCALE



6 TYP. RAILING

NOT TO SCALE



NOTES:
SAFETY RED #31350 FOR STATION PLATFORMS AND ADA SIDEWALK RAMPS. FEDERAL YELLOW COLOR #33538 FOR BERTHING LOCATION.

7 TACTILE STRIPS

NOT TO SCALE

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 12:21 PM
FILENAME: J:\74876\PlanProduction\74876 - Site Details.dgn

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

SITE DETAILS

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB

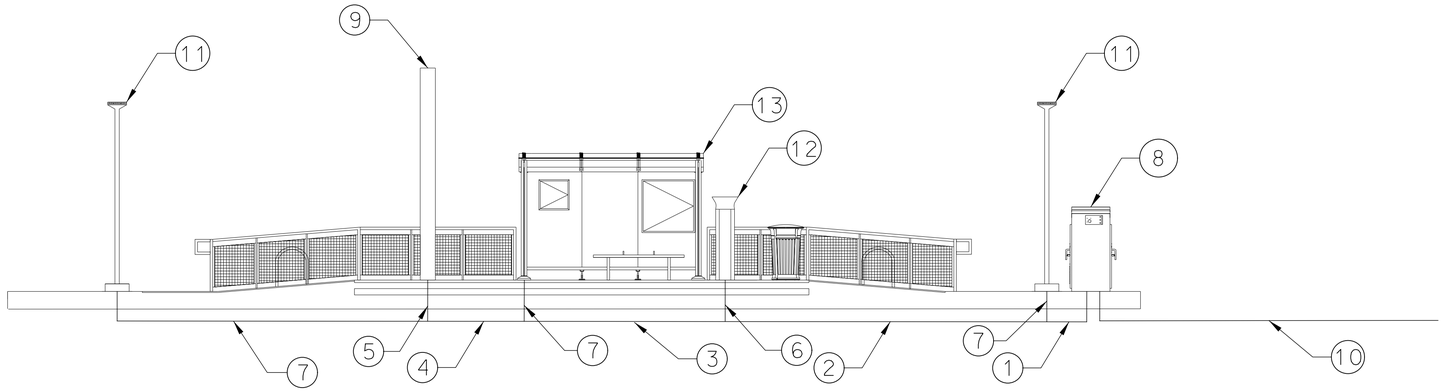
101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

REVISION	BY	DATE

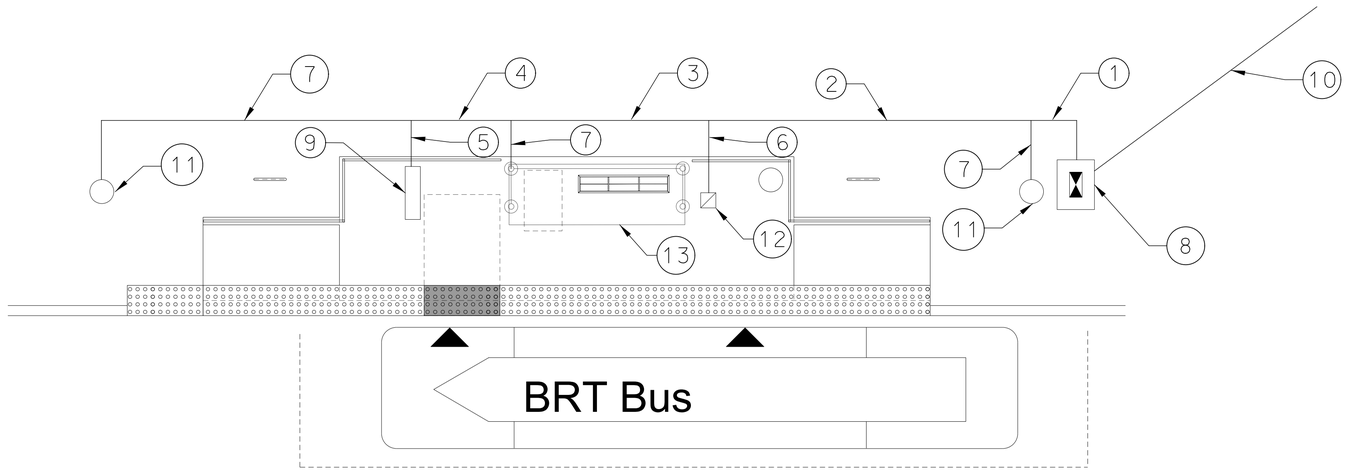
PLAN SCALE:	DRAWN		
	DESIGNED		
	SURVEY		
PROFILE SCALE:	PROJ. MGR.		
HORIZONTAL:	LEAD ENGR.		
	FIELD MGR.		
VERTICAL	RECOMMENDED: DESIGN MANAGER		
FILE:	DRAWING:	DATE: 10/30/2020	
ATLAS PAGE NO:		SHEET 56 OF 59 SHEETS	

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION



1 TYPICAL PLATFORM WIRING - ELEVATION VIEW
(SEE PLATFORM DRAWINGS FOR DIMENSIONS)



2 TYPICAL PLATFORM WIRING - PLAN VIEW
(SEE PLATFORM DRAWINGS FOR DIMENSIONS)

KEYNOTES

1. 1 - 2" CONDUIT (POWER/LIGHTING POWER)
   3 - 2" CONDUIT (LIGHTING POWER)
   1 - 2" CONDUIT (POWER)
   2 - 2" CONDUIT (CAT 6)
2. 1 - 2" CONDUIT (POWER/LIGHTING POWER)
   2 - 2" CONDUIT (LIGHTING POWER)
   1 - 2" CONDUIT (POWER)
   2 - 2" CONDUIT (CAT 6)
3. 1 - 2" CONDUIT (POWER/LIGHTING POWER)
   2 - 2" CONDUIT (LIGHTING POWER)
   1 - 2" CONDUIT (CAT 6)
4. 1 - 2" CONDUIT (POWER/LIGHTING POWER)
   1 - 2" CONDUIT (LIGHTING POWER)
   1 - 2" CONDUIT (CAT 6)
5. 1 - 2" CONDUIT (LIGHTING POWER)
   1 - 2" CONDUIT (CAT 6)
6. 1 - 2" CONDUIT (POWER)
   1 - 2" CONDUIT (CAT6)
7. 1 - 2" CONDUIT (LIGHTING POWER)
8. ITS CABINET AND METER
9. PYLON AND RTA SIGN
10. EVERGY SERVICE CONNECTION - CONTRACTOR TO SET METER CAN. EVERGY TO BUILD SERVICE CONNECTION AND INSTALL METER.
11. PEDESTRIAN LIGHT POLE
12. TICKET VENDING MACHINE
13. SHELTER

BEFORE YOU DIG OKIE811 CALL OKIE

NORTHWEST BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

PLATFORM CONDUIT DETAILS

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB
101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

REVISION	BY	DATE

PLAN SCALE: AS SHOWN
PROFILE SCALE:
HORIZONTAL:
VERTICAL

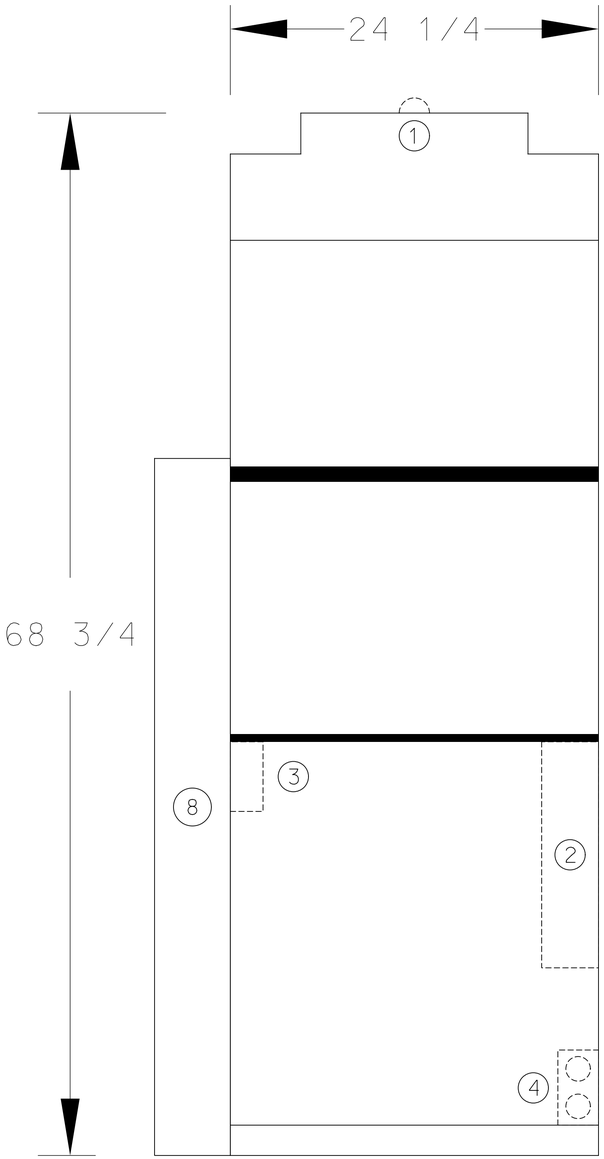
DRAWN
DESIGNED
SURVEY
PROJ. MGR.
LEAD ENGR.
FIELD MGR.
RECOMMENDED:
DESIGN MANAGER

APPROVED:

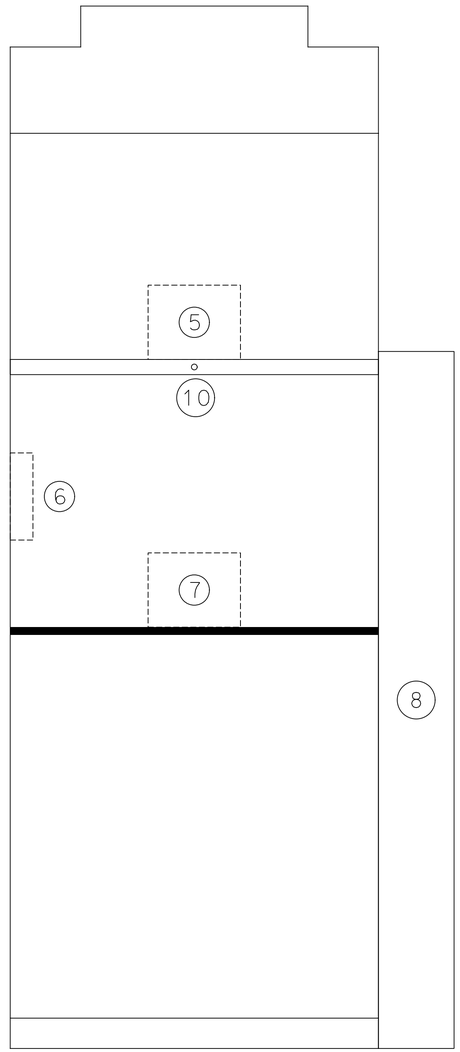
PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING:
DATE: 10/30/2020
ATLAS PAGE NO:
SHEET 57 OF 59 SHEETS

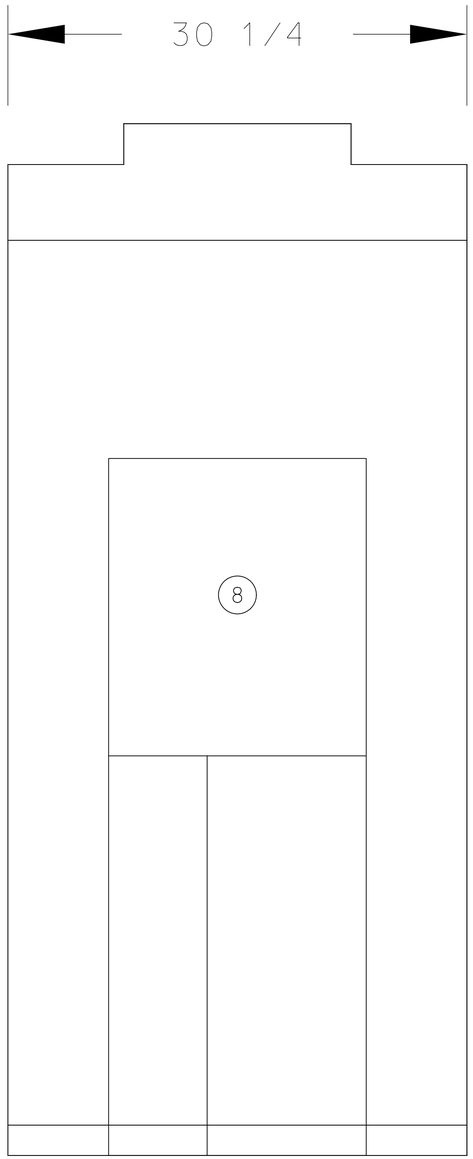
PLOTTED BY: $USERS
PLOT DATE: $$$SDATE$$$ 12:21 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - Technology1.dgn



9 332 ITS Cabinet Back View
Power Equipment



9 332 ITS Cabinet Front View
Communication Equipment



9 332 ITS Cabinet Side View

EQUIPMENT LIST

1. Intermatic Photocontrol #K4023C
2. Schneider Electric Load Center, 12 Space Circuit Breaker #QO112M100
3. ASCO Power Technologies Surge Protector Device Model 331
4. GFCI Service Outlet
5. Sign Controller
6. Web Power Switch WLCD Screen 10 Outlets
7. Sierra Wireless MP780
8. Myers Power Products, Inc. USP2
9. 332 ITS Cabinet
10. Shelf with pull out drawer

Note: Equipment list is for review. Contractor must use listed equipment or approved alternative.

PLOTTED BY: $USER$
PLOT DATE: $$$$DATE$$$ 12:21 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - Technology2.dgn

NORTHWEST
BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

PLATFORM ITS CABINET DIAGRAM

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB

101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG 811 OKIE ONE CALL OKIE

REVISION	BY	DATE

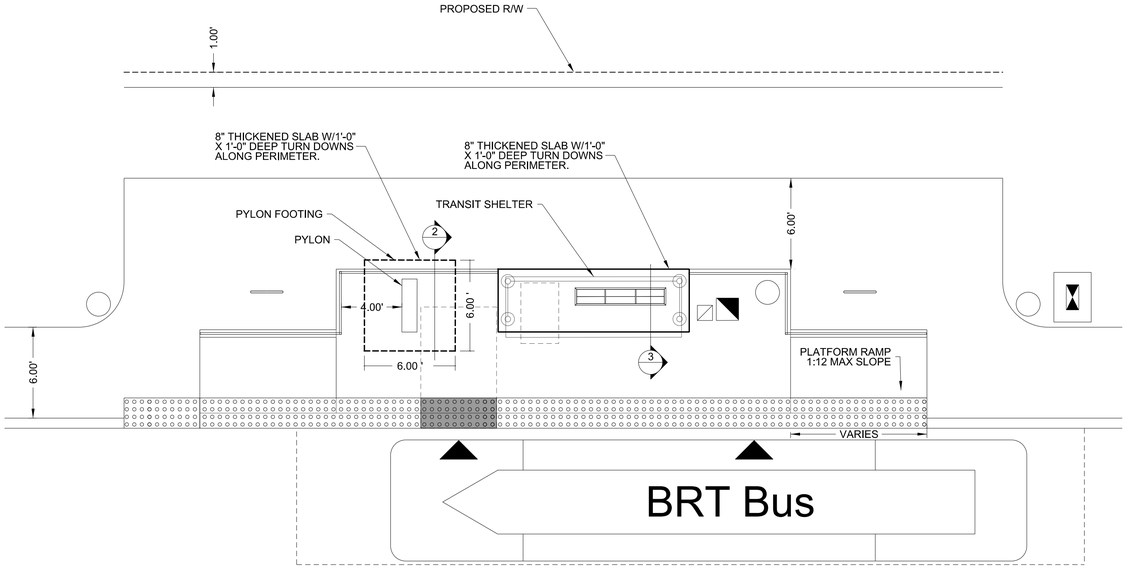
PLAN SCALE: 1" = 10'
PROFILE SCALE:
HORIZONTAL:
VERTICAL

DRAWN
DESIGNED
SURVEY
PROJ. MGR.
LEAD ENGR.
FIELD MGR.
RECOMMENDED:
DESIGN MANAGER

APPROVED:

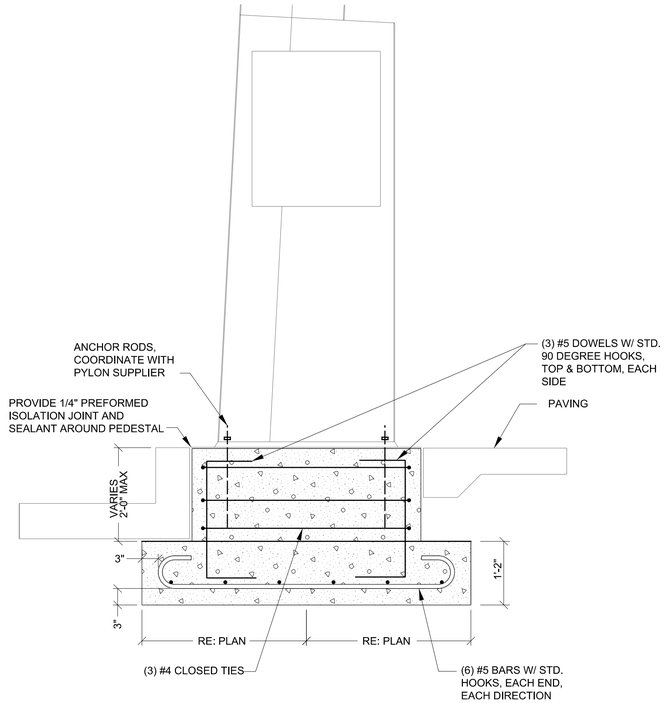
PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING:
DATE: 10/30/2020
ATLAS PAGE NO:
SHEET 58 OF 59 SHEETS



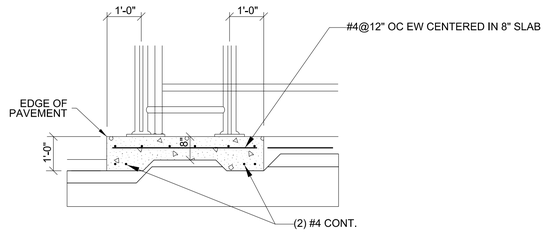
1 STANDARD STATION LAYOUT

NOT TO SCALE (APPLIES TO BOTH STATION TYPICALS)



2 SECTION AT PYLON FOOTING

NOT TO SCALE



3 SECTION AT SHELTER THRU THICKENED SLAB

NOT TO SCALE

NORTHWEST
BUS RAPID TRANSIT

OKC PROJECT NUMBER: MC-0619

FOUNDATION DETAILS

The City of OKLAHOMA CITY Public Works Department

EMBARK

HNTB

101 North Robinson Avenue, Suite 1130
Oklahoma City, OK 73102
405-416-9000

BEFORE YOU DIG 811 KNOW WHAT'S BELOW CALL OKIE

REVISION	BY	DATE

PLAN SCALE:
PROFILE SCALE:
HORIZONTAL:
VERTICAL

DRAWN			
DESIGNED			
SURVEY			
PROJ. MGR.			
LEAD ENGR.			
FIELD MGR.			

RECOMMENDED:

DESIGN MANAGER

APPROVED:

PRELIMINARY: NOT FOR CONSTRUCTION

FILE: DRAWING:

DATE: 10/30/2020

ATLAS PAGE NO:

SHEET 59 OF 59 SHEETS

PLOTTED BY: $USERS
PLOT DATE: $$$$DATE$$$ 12:21 PM
FILENAME: \\okyw00\jobs\74876\PlanProduction\74876 - Foundation Details.dgn