TOOLE DESIGN

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BASIS OF DESIGN MEMORANDUM

June 29, 2021

To: Rosalind Grigsby, Community Development Manager
Organization: City of Takoma Park
From: Ryan Parks, PE
Project: Maple Avenue Complete Streets

Introduction

The purpose of this Basis of Design memorandum is to identify relevant design criteria and standards that were and will continue to be referenced during the design phases of Maple Avenue between Carroll Avenue and Sligo Creek Trail. Toole Design reviewed the following documents while developing the preliminary design:

- Maryland Department of Transportation State Highway Administration (MDOT SHA) Bicycle Policy & Design Guidelines, 2015
- MDOT SHA Context Driven Guide, 2020
- Maryland Manual on Uniform Traffic Control Devices (MdMUTCD), 2011
- FHWA Manual on Uniform Traffic Control Devices, 2009
- Association of American State Highway Transportation Official's (AASHTO) Guide for the Development of Bicycle Facilities (Bike Guide)*
- Montgomery County Complete Streets Design Guide

**As the primary authors for the forthcoming 5th Edition of AASHTO's Bike Guide, Toole Design has also included draft design guidance from this unpublished document, where appropriate.*

The City of Takoma Park was awarded a grant from the Metropolitan Washington Council of Governments to develop a conceptual bikeway design for Maple Avenue. As noted in the grant application, Maple Avenue is a well-traveled neighborhood street which connects residents and visitors to schools, places of employment, dense housing, and recreational opportunities while providing important transportation linkages to the Takoma Metro and the Sligo Creek Trail. To strengthen these transportation connections, the City received funding to redesign Maple Avenue as a complete street which prioritizes pedestrians, bicyclists, and transit users to provide safer, more convenient, and more comfortable travel for all users.

Roadway Design

The project has two segments with different land uses and roadway widths: the northern and southern segments. Northern Maple Avenue is wider: 40'-44' curb to curb, with on-street parking on both sides, Montgomery County Transit bus stops, multi-unit residential, and institutional land uses. Southern Maple Avenue is narrower: typically 26' curb to curb, with on-street parking, bus stops, and single-family residences. The posted speed limit on Maple

Avenue is 25 miles per hour throughout the project limits, with a 15 mile per hour school zone adjacent to Piney Branch Elementary. Maple Avenue is classified as a local road.

Prior to the development of the construction documents, a sign inventory should be completed to document the location and condition of all roadway signs, especially the pedestrian crossing and school related signs. Additional roadway signs shall be installed in accordance with Maryland MUTCD requirements, including R3-17 “Bike Lane” signs and R4-11 “Bikes May Use Full Lane” signs.

Northern Maple – Philadelphia Avenue to Sligo Creek Trail

On the northern segment, multiple alternatives were developed for public engagement including:

- Separated bikeway priority, with a two-way cycle track
- Traffic calming priority, which had pedestrian refuge islands and painted buffer medians,
- Pedestrian priority concept which removed on-street parking to expand the sidewalks and parkways.

Ultimately, the community feedback indicated that parking is a priority for the residents of this segment. Additionally, the cost of relocating the curb and gutter on Northern Maple Avenue is relatively expensive, compared to southern Maple Avenue, due to the large drainage structures that are present along this segment. The public also indicated that Maple Avenue is an important route for bicyclists and an on-street facility should be included in the design.

Taking the results of public engagement into account, Toole Design produced a preferred typical section that combines elements of the traffic calming and bicycle priority concepts. The existing roadway is not wide enough for bike lanes in each direction; the plans include one 6-foot wide bike lane in the southwest (uphill) direction and a shared lane in the northeast (downhill) direction. The shared lane varies in width between 10-feet and 13-feet in width. The shared lane markings shall be placed in accordance with the MdMUTCD and MDOT SHA Bicycle Policy & Design Guidelines, centered in lanes less than 13-feet wide and 4-feet from the parking lane in 13-foot wide lanes. Seven-foot wide parking lanes are preferable in urban and suburban areas to encourage motorists in passenger vehicles to park close to the curb, providing additional roadway space for bicyclists. However, any minor variability in the roadway width is allocated to the parking lanes to provide consistent lane widths.

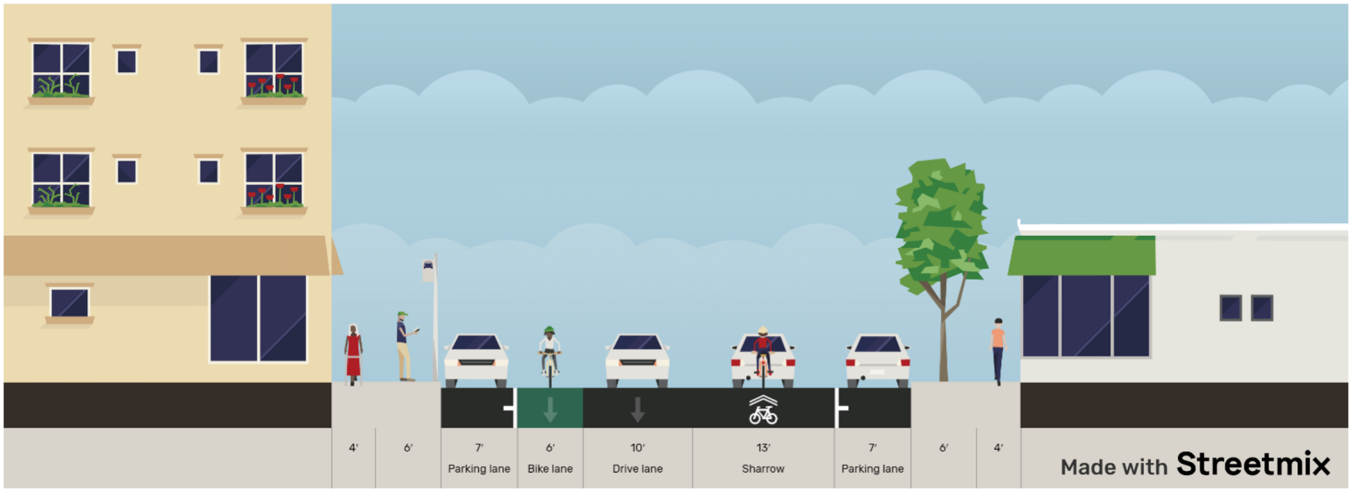

Figure 1. Proposed Typical Section for Northern Maple Avenue

The southbound approach to the intersection of Maple Avenue and Philadelphia Avenue, adjacent to the Takoma Park Community Center, lacks lane delineation and a large corner radius allows vehicles to turn at high rates of speed. This condition can be a threat to pedestrians and bicyclists on Maple Avenue and Philadelphia Avenue. To manage speeds, provide a dedicated bike lane to the intersection, and expand pedestrian space, a protected style intersection is recommended. The proposed condition would convert Maple Avenue to one left/through/right lane. This configuration would require the removal of the existing protected Maple Avenue to Philadelphia Avenue right turn signal phase. The design vehicle for this intersection is a City Bus, as the Montgomery County Transit bus route completes this turn. The concrete median design accommodates this turn without encroachment.

Philadelphia Avenue is classified as a Minor Arterial and is under the jurisdiction of MDOT SHA. Therefore, any geometric and signal changes at this intersection require coordination with MDOT SHA in future design stages. An alternate configuration would consist of one through/left lane, one right turn lane, and one bike lane. A bike lane to the right of a dedicated right turn lane requires bicycle signal installation and signal phase separation for the conflicting movements.

At the northeast corner of the intersection with Sherman Avenue, the roadway can be narrowed to better delineate the space, encourage lower speeds, and provide additional landscaping while maintaining access and parking for the businesses.

Throughout this segment, landscaped curb extensions are proposed to daylight the pedestrian crosswalks and decrease pedestrian exposure. The plans propose both detached and attached curb extensions for graphical purposes to maintain existing drainage patterns. If stormwater can be infiltrated and/or conveyed through, the detached curb extensions could be integrated into the existing parkway. For the turns from and onto local streets, the design vehicle, with no encroachment, is a passenger vehicle and the control vehicle is a 47-ft fire truck in accordance with the Montgomery County Complete Streets Design Guide.

Southern Maple – Carroll Avenue to Philadelphia Avenue

The Southern Maple Avenue segment concept includes traffic calming elements to supplement the shared lane markings and yield street configuration. One benefit of the existing parking configurations is that it narrows the street, causing vehicles traveling in opposite directions to yield and share the roadway. Promoting low vehicle speeds is one of the most important aspects of bicycle safety. Ideally, people biking and people driving would be moving at the same speed down a street, around 15 MPH.

While a dedicated bike lane alternative was considered, removal of parking would likely have the adverse effect of increasing motorists' speed, which would be detrimental to both pedestrian and bicyclist safety. To get this traffic calming effect regardless of the number of vehicles parked on the street, the concept plans propose landscaped curb extensions along Maple Avenue. These will be no wider than the width of a parked car and placed to maintain access to all residential driveways. These elements will mimic a parked car and reinforce the yield street condition. Shared lane markings shall be placed in accordance with the MdMUTCD.

South of Tulip Avenue, the roadway should be narrowed to create a landscape buffer between the west sidewalk and the roadway. Parking is currently restricted on the southbound side of the street. The roadway width of 21-feet was selected as the minimum width to allow for two passenger vehicles, approximately 7-feet wide, to pass in opposite directions very slowly when adjacent to a parked car or curb extension. The 14-foot available width also allows bicyclists and buses to cautiously pass in opposite directions, when necessary. On the southernmost section, 23-feet of roadway width is provided after installing a 5-foot wide landscaped parkway. There are no drainage structures on this section that will be impacted by moving the curb.

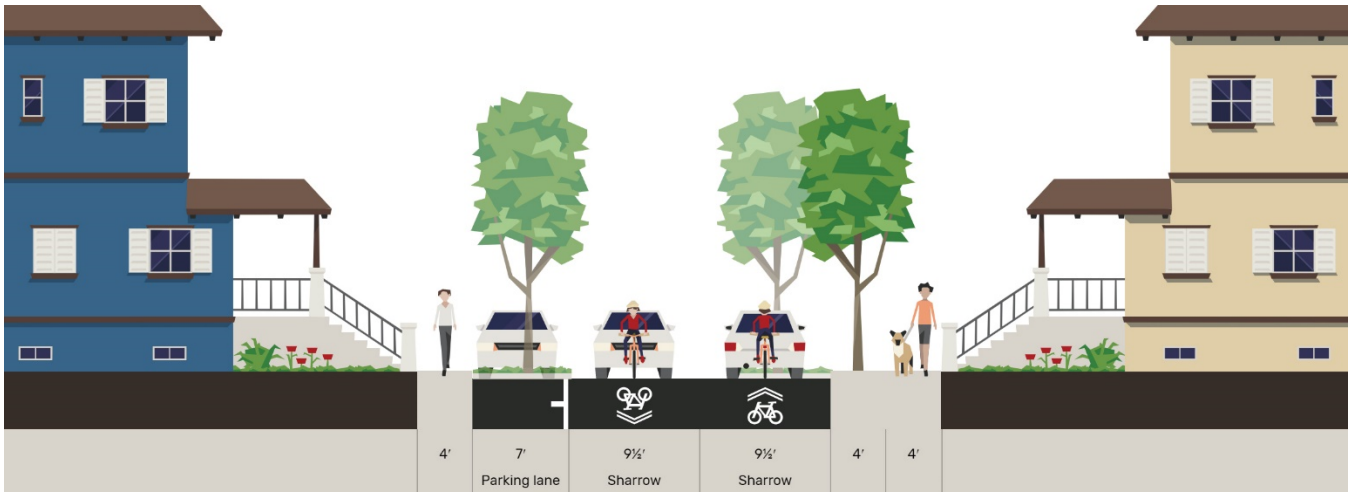

Figure 2. Proposed Typical Section for Southern Maple

The corridor will also maintain the number and location of speed humps. The speed humps on Maple Avenue should be installed to match the City's standard. Public feedback indicated that the speed humps on Maple are not comfortable for people biking or people driving.

A pedestrian refuge island is proposed across the north leg at the intersection with Old Philadelphia. This will serve as a gateway into the narrower segment and calm traffic that is proceeding for the large Philadelphia intersection. The pedestrian crosswalk is angled across Maple Avenue due to the utility pole on the east side of the street. If the utility pole can be relocated within this constrained site, the crosswalk should be perpendicular to the roadway.

On-street parking will largely remain as is. The only parking loss will be at the areas where the landscaped curb extensions are present, to promote pedestrian visibility at the Valley View Avenue crosswalk, and at the southwest corner of Old Philadelphia to accommodate the installation of the pedestrian refuge island.

Landscaping Design & Stormwater Management

The draft design recommends the installation of landscaped curb extensions and parkways for traffic calming, placemaking, and roadway beautification. While geotechnical, utility, and permitting coordination is required, the next phase of the design should investigate the integration of stormwater infiltration, bioretention, and other best management practices into the landscaped areas.

Street Trees

The City of Takoma Park requires a permit when work is proposed to remove or impact existing trees, including limb pruning of more than 10% of live branches. A tree protection plan may also be required to mitigate impacts to existing trees. According to the Takoma Park municipal Code 12.12.020:

An urban forest tree is a tree in the City which:

- Measures 24 inches or more in circumference at four and one-half feet above ground level, also known as diameter at breast height (DBH), measures seven and five-eighths inches or more at DBH*; or
- Is required to be planted or maintained, pursuant to governmental order, agreement, stipulation, covenant, easement, or a tree protection plan, or as a condition of issuance of a tree permit; or
- Is planted with government funding or under a government program. (Ord. 2003-40 (part), 2004)

When proposed trees are considered, reference the Takoma Park Approved Tree Species List, newest update January 22, 2021, as well as consider native plants to the region. Refer to the Maryland State Highway Administration Design Guide LDG and the Montgomery County Design Standards for spacing requirements from utilities both overhead and underground as well as clear zones from sightlines and offsets from signs and edges of travel lanes.

Trees must be installed to have the lowest tree branch a minimum of 8 feet above the sidewalk. Best practice is to provide 1.25 to 2 cubic feet of soil for every 1 square foot of mature canopy cover to allow trees to grow. Some best practices to encourage growth include engineered or structural soils, permeable paving, enhanced soil preparation and amendments, or stormwater infiltration practices. Existing subsurface conditions should be evaluated prior to installing street trees or bioinfiltration systems.

Stormwater Management

The City of Takoma Park will require a Stormwater Management permit for approval including a Concept or Site Development Plan and Final Construction Plans for review and approval. The requirements are outlined in the City Code Section 16.04.140, as well as the Maryland Department of the Environmental Stormwater Management Design Manual (MDE Manual). The primary objective is to manage runoff as close to its source as possible, then to design these Environmental Site Design (ESD) practices according to sizing requirements in the MDE Manual.

The proposed landscape areas shown in the 30% plans should consider infiltration practices as well as filtering practices such as bioretention facilities, and micro-scale practices such as landscape infiltration, micro-bioretention, and rain gardens. Planting for these facilities should consider native, low maintenance vegetation and reference the MDE Vegetation in Stormwater Best Management Practices latest edition.

Attachments

Appendix A – 30% Concept Plans

Appendix B – Opinion of Probable Cost

The information contained in this document is based on general conditions throughout the project area and may not be applicable in all locations. This is a preliminary report, and all results, recommendations, preliminary concepts, cost opinions, and commentary contained herein are based on limited data available at the time of preparation. Further engineering analysis and design are necessary prior to implementing any of the recommendations contained herein.

Sincerely,

Ryan Parks, PE | Project Engineer

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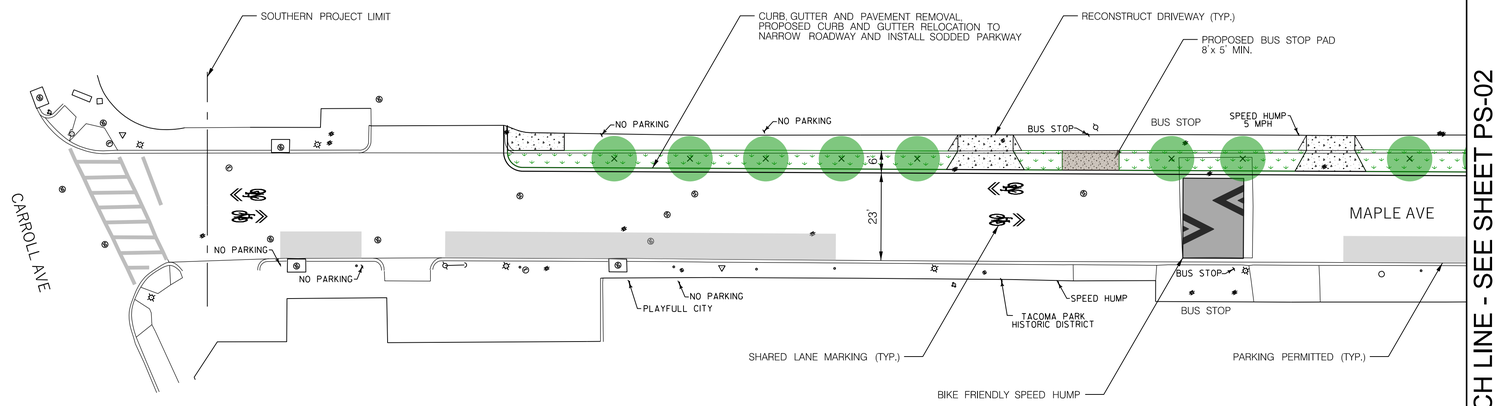
rparks@tooledesign.com | 510.298.0740 x614

Appendix A – 30% Concept Plans

Preliminary – Not for Construction



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City of Takoma Park

MAPLE STREET
TAKOMA PARK
30% PLANS

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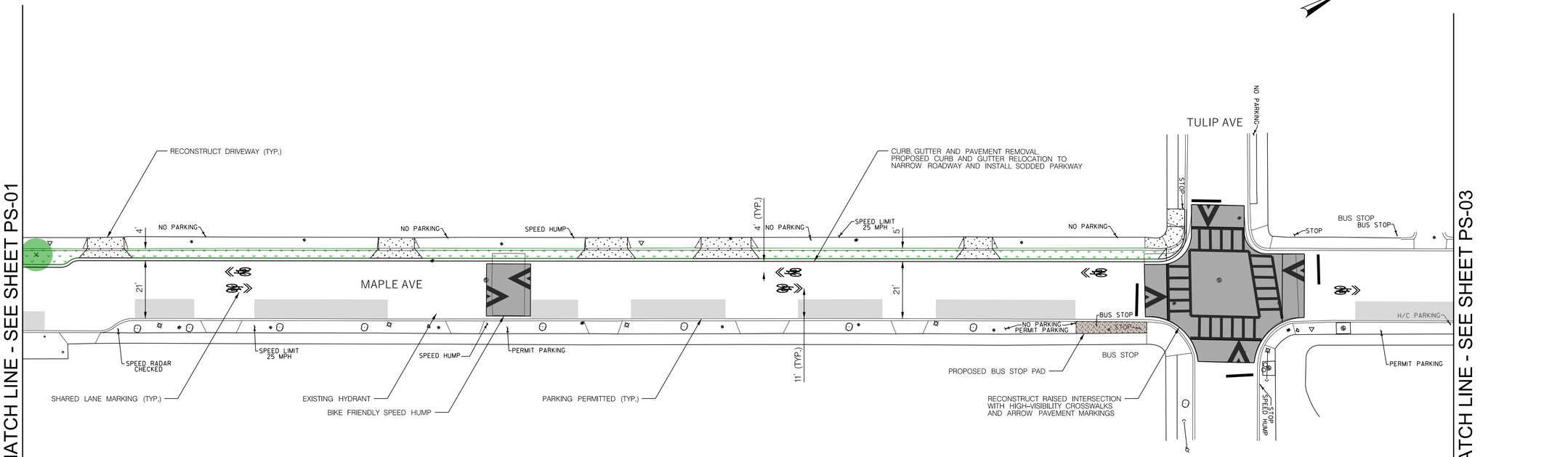

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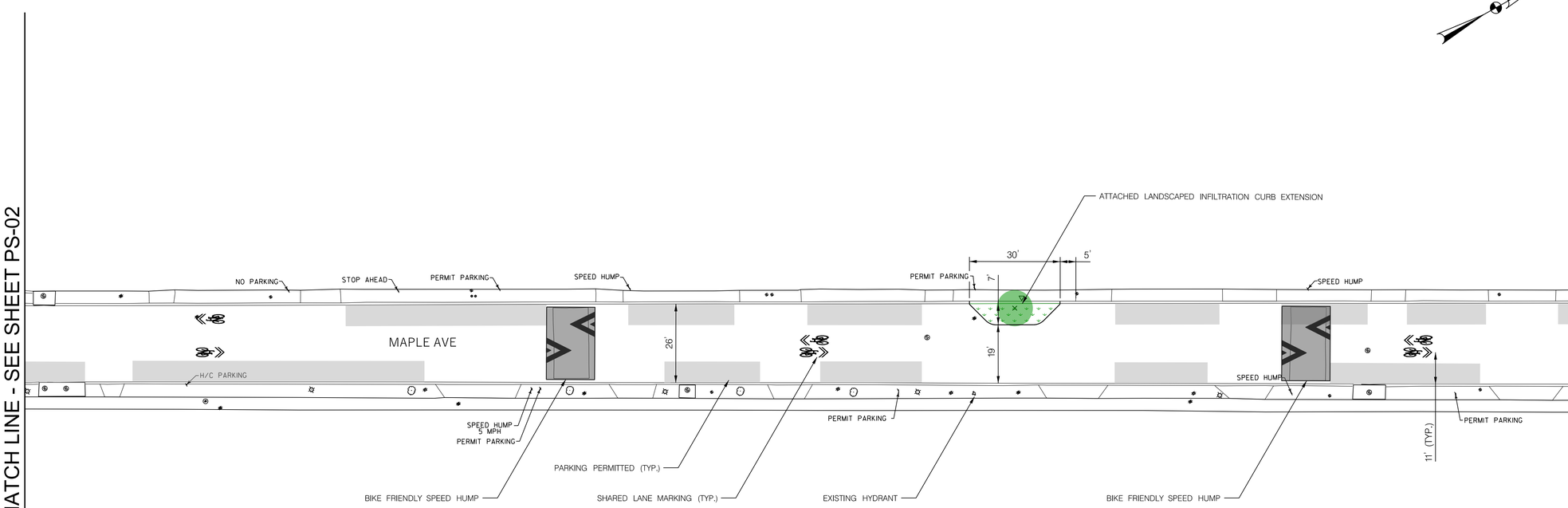

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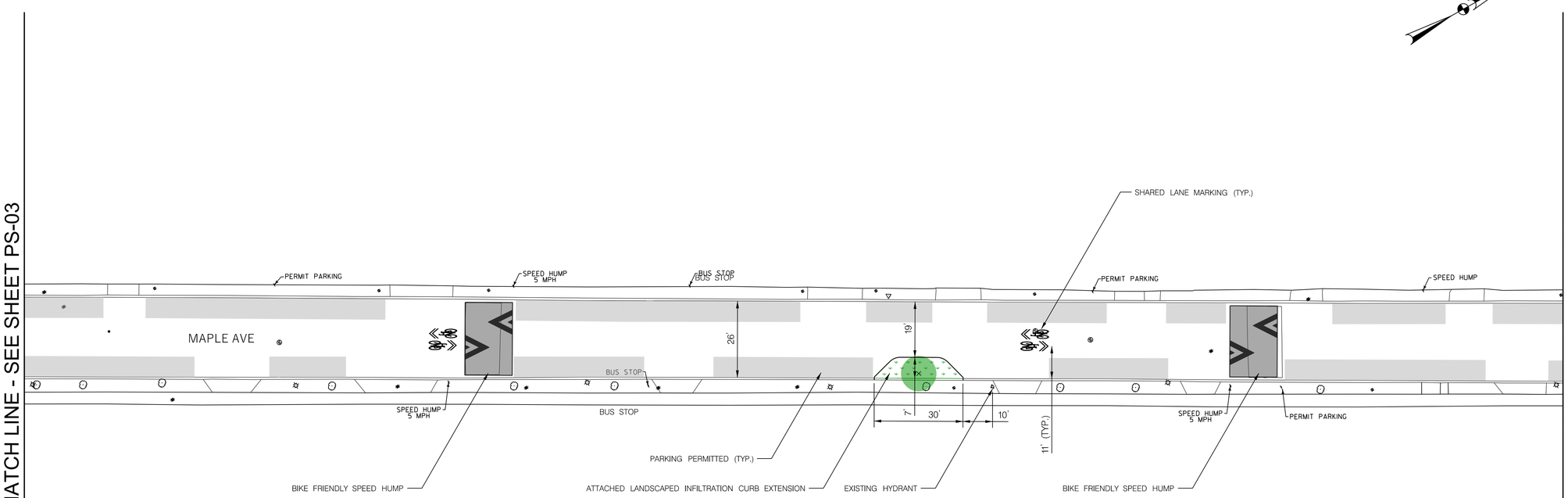

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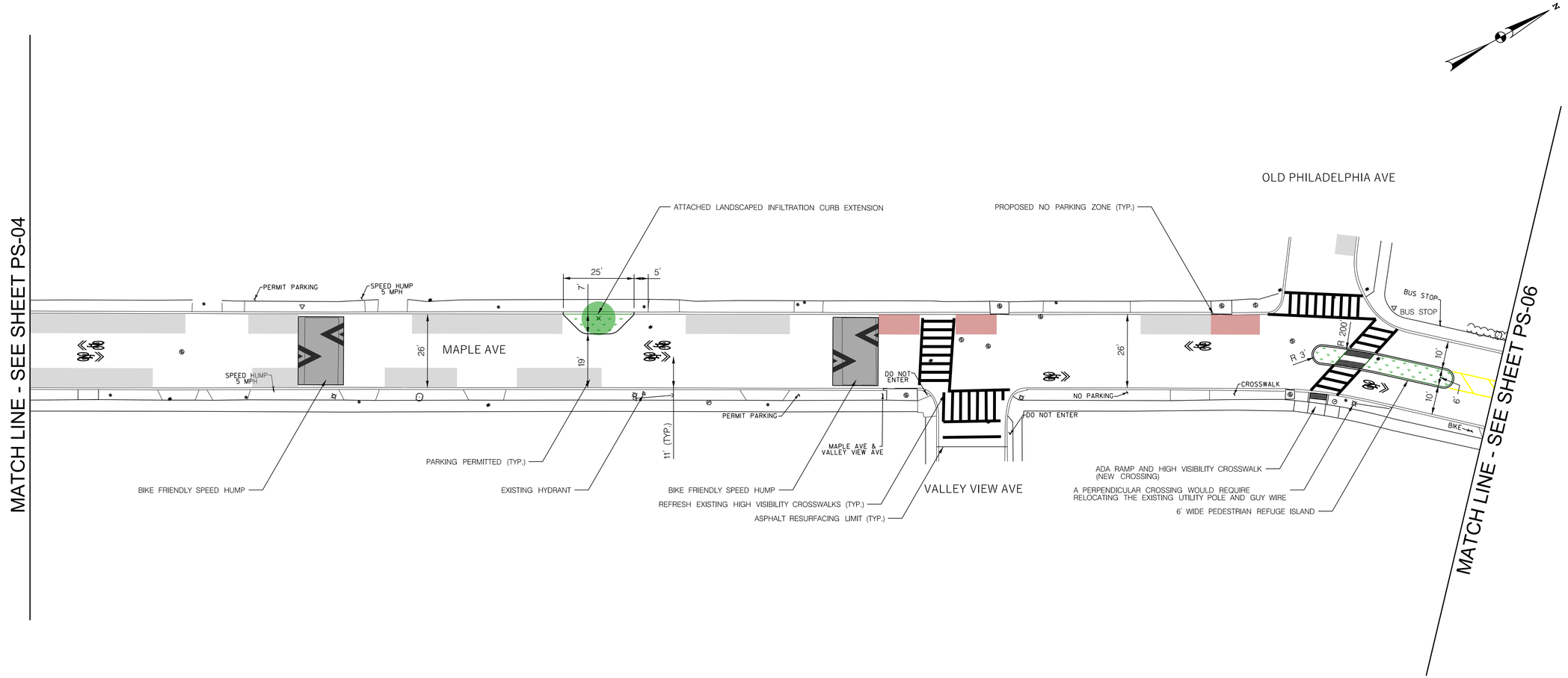

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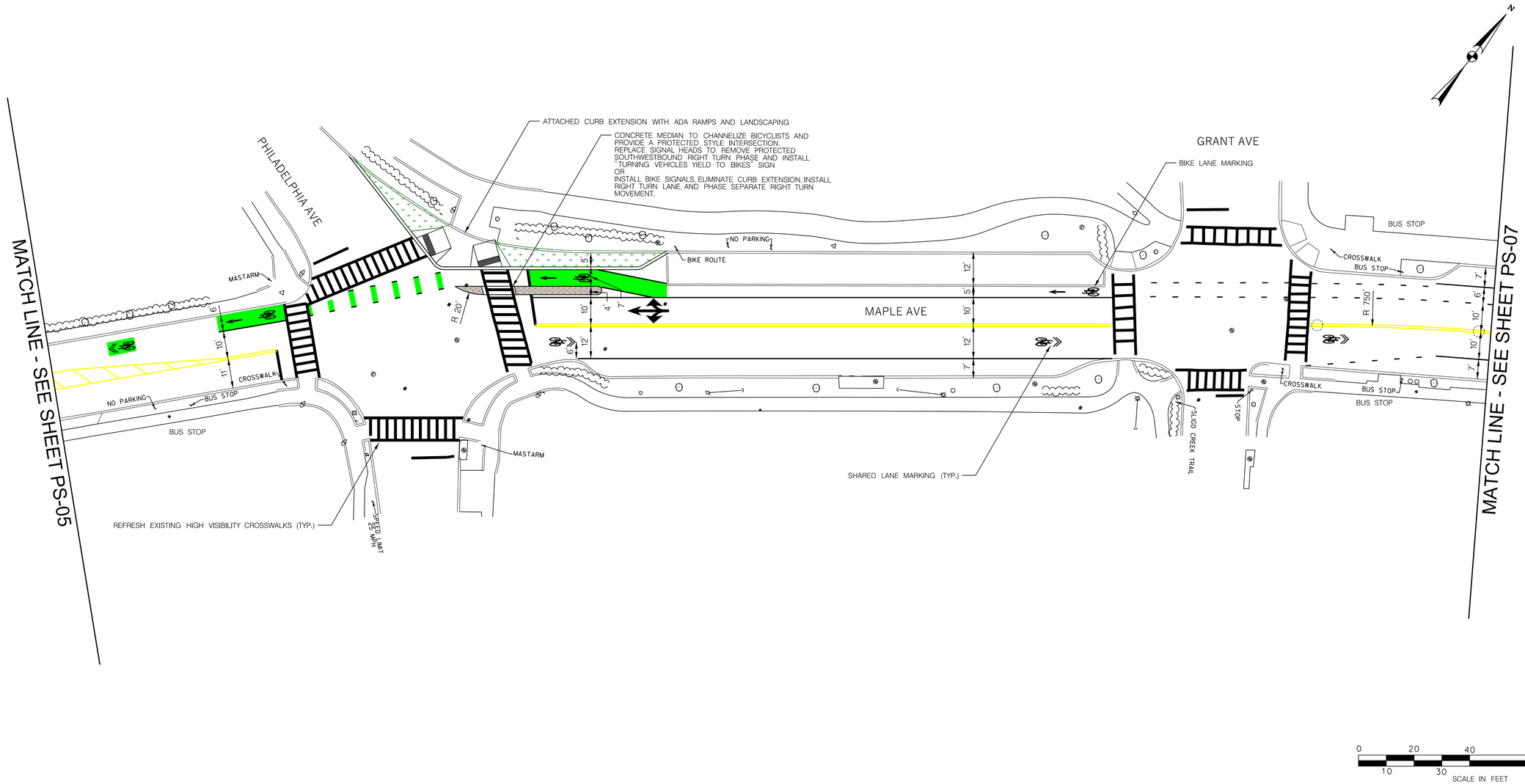

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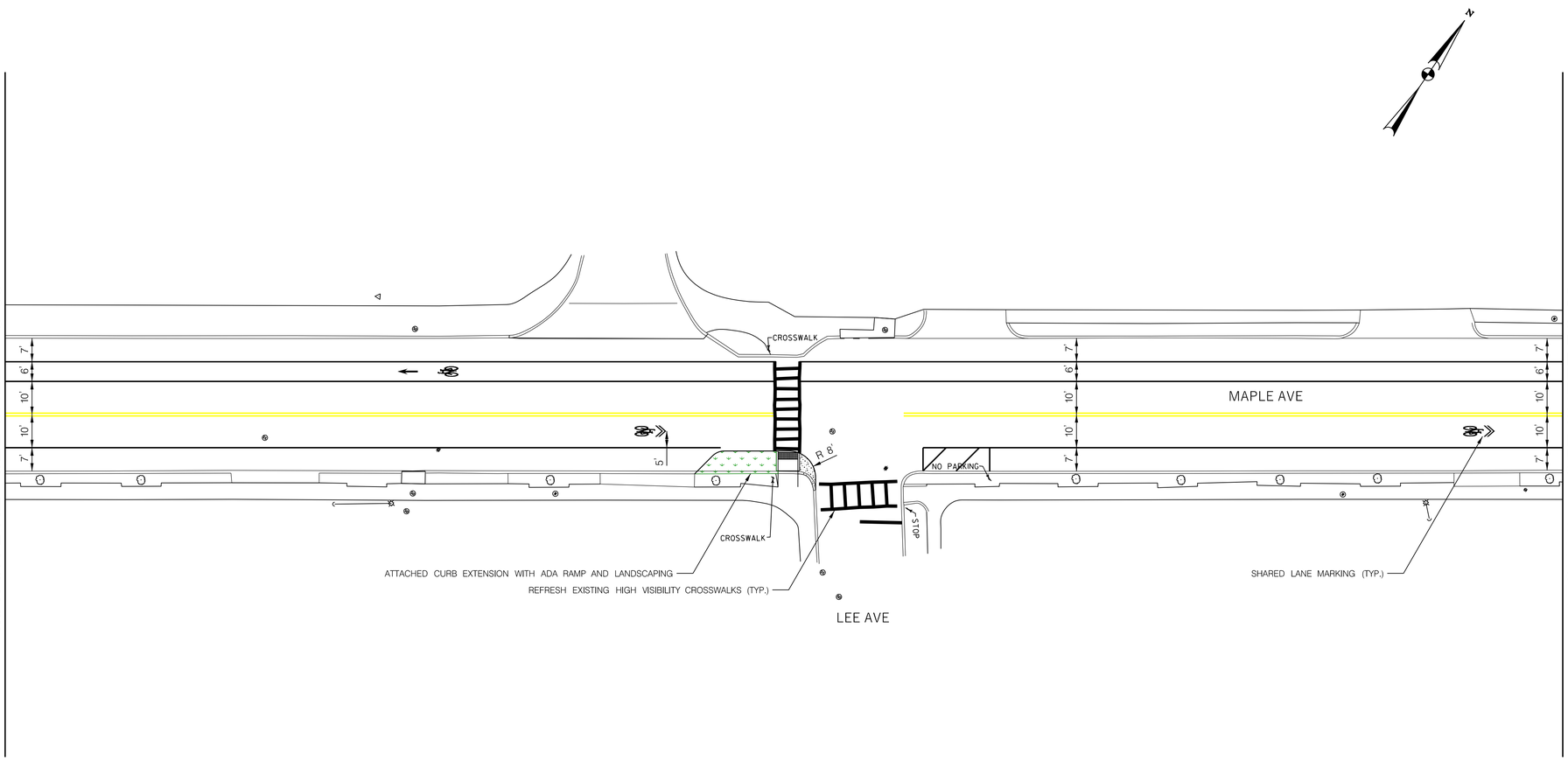

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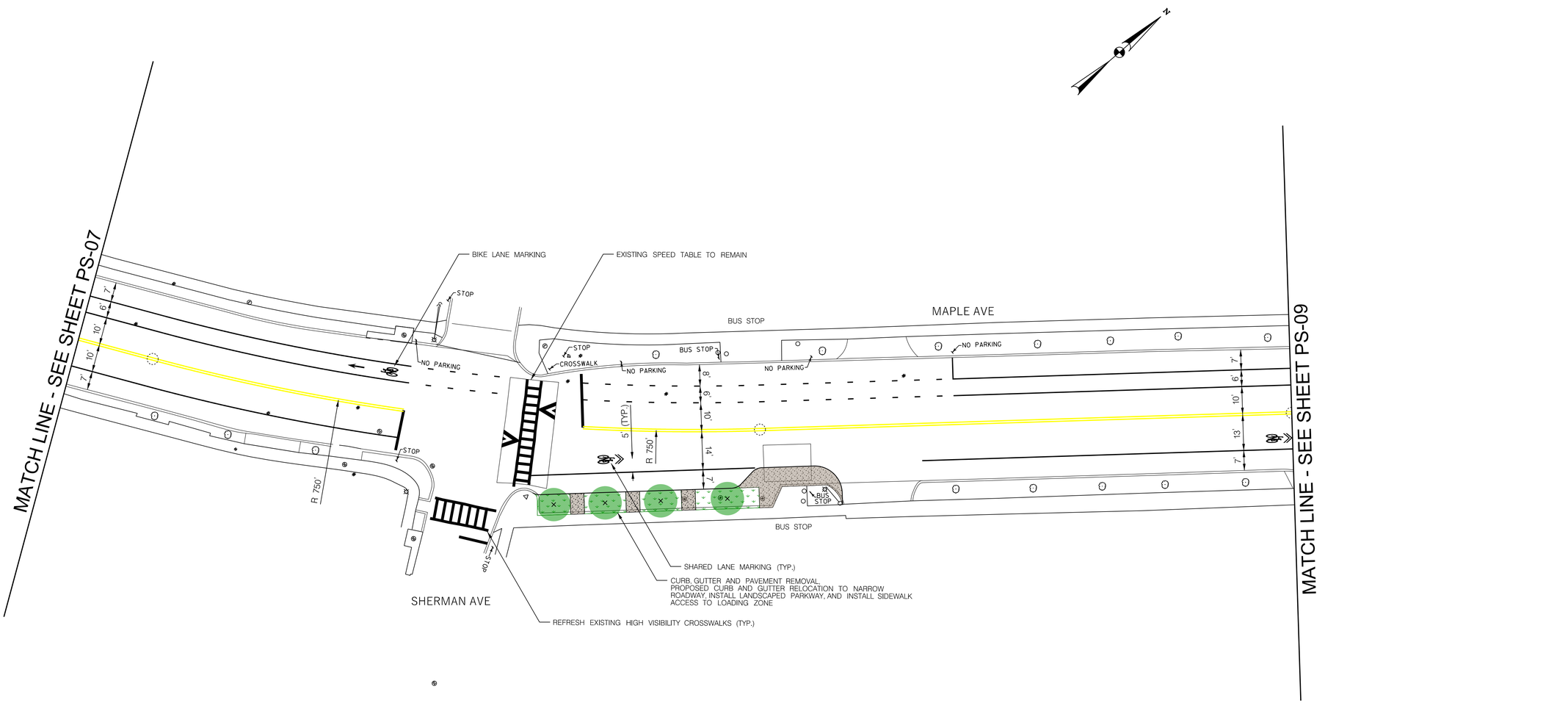

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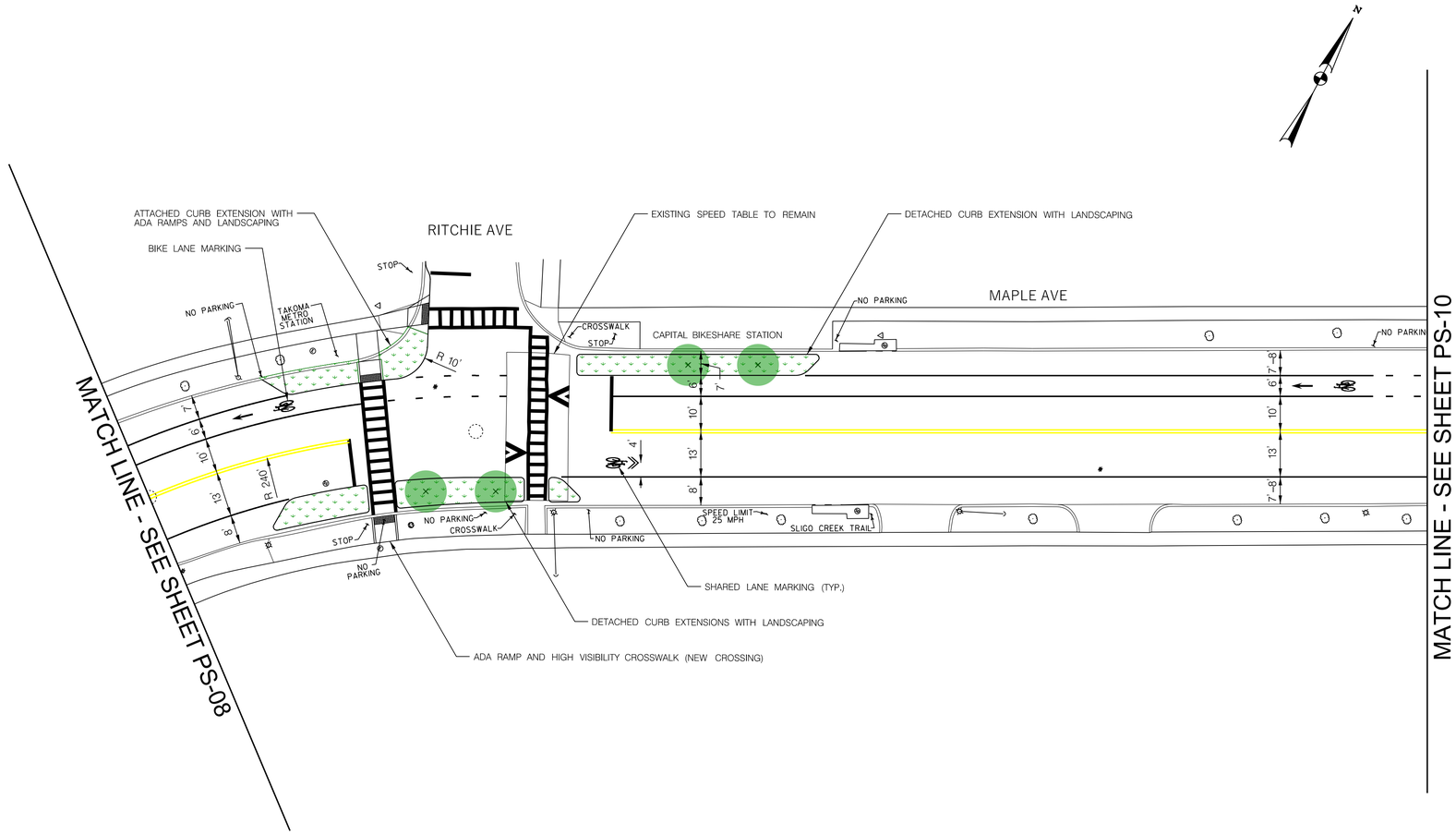

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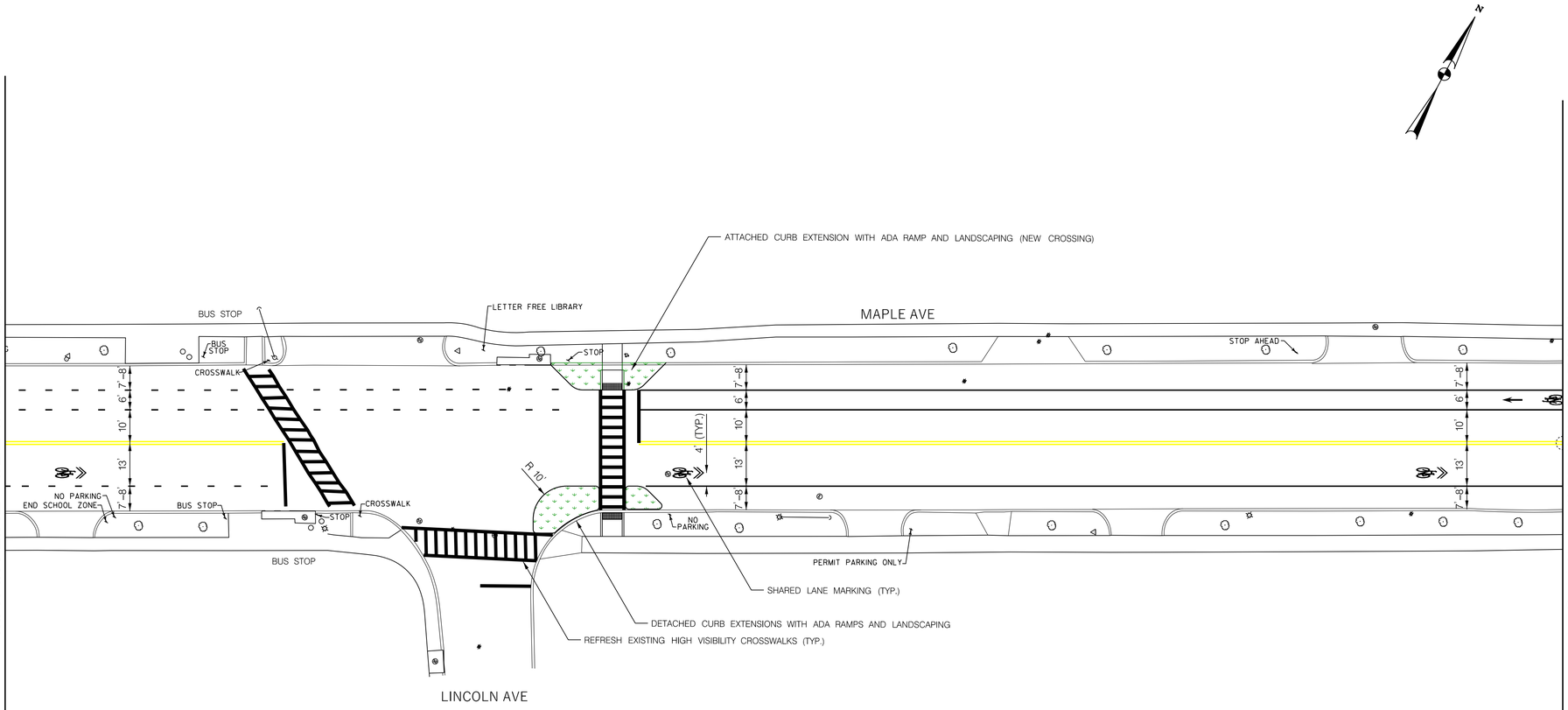

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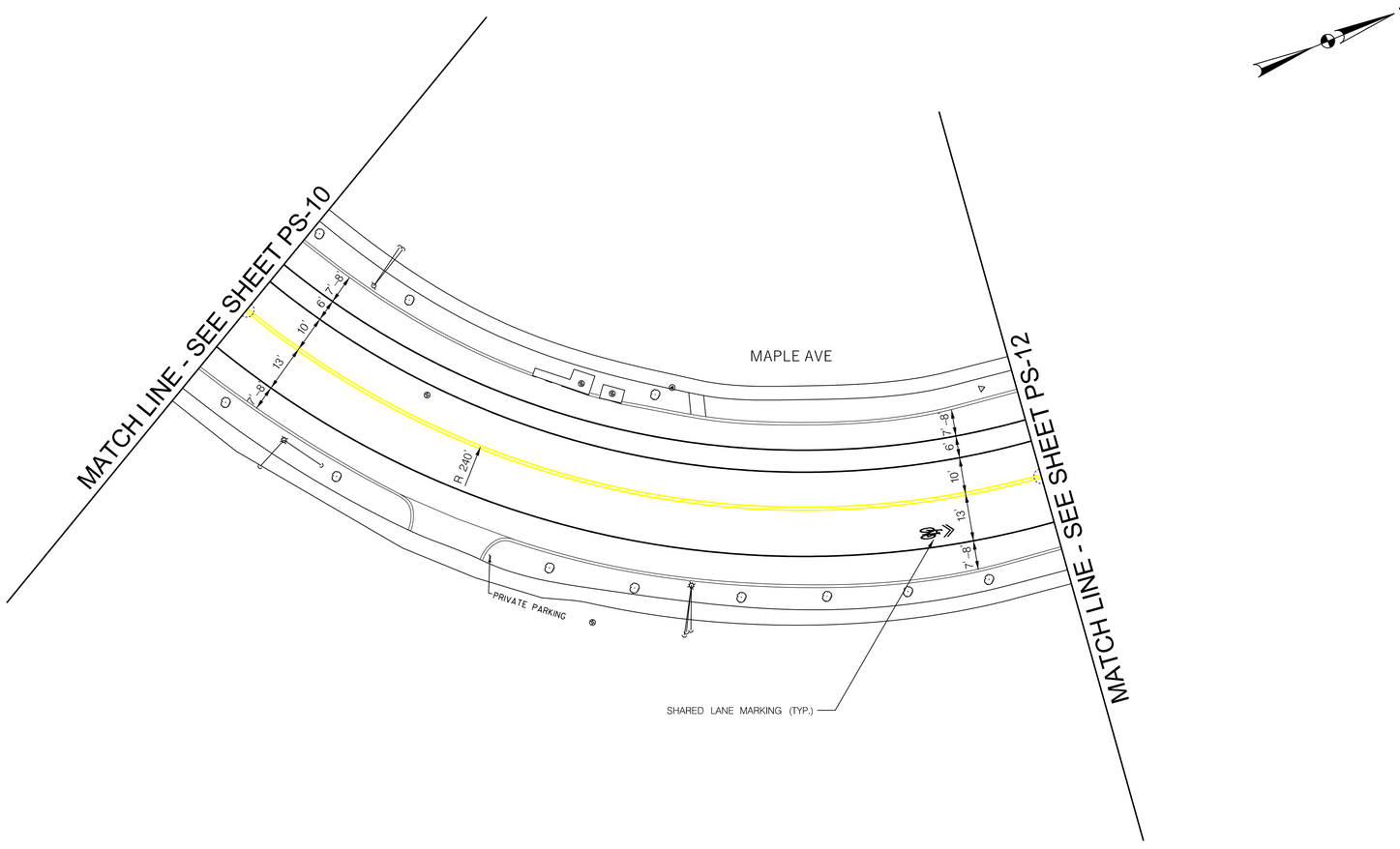

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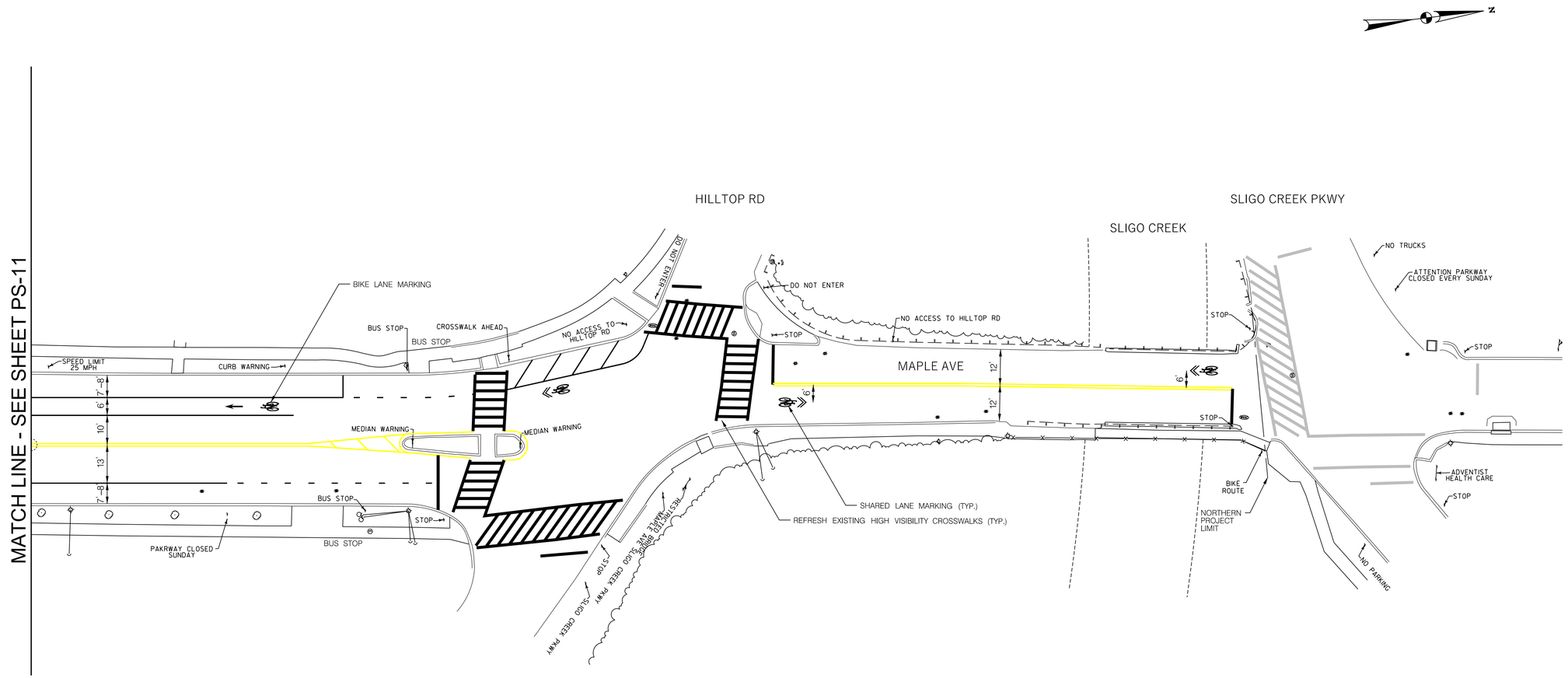

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Appendix B – Opinion of Probable Cost

This opinion of probable construction cost was developed by identifying pay items and establishing quantities based on the current 30% construction documents. Additional pay items have been assigned approximate lump sum prices based on a percentage of the anticipated construction cost. Preliminary cost opinions include a 30% contingency to cover items that are undefined or are typically unknown prior to final design. Unit costs are based on 2020 dollars and were assigned based on historical cost data from MDOT SHA Price Index. This cost opinion does not include permitting, inspection, or construction management; escalation; or the cost for ongoing maintenance. This cost opinion is provided for the Client's information, and is based on the design professional's recent experience, adjusted for factors known at the time of preparation. Toole Design Group, LLC has no control over the cost of labor and material, competitive bidding, or market conditions; and makes no warranties, expressed or implied, concerning the accuracy of the opinion as compared to actual bids or cost to the Client.

Maple Avenue 30% Design Plans - Opinion of Probable Cost

Carroll Ave to Sligo Creek Trail

Work Item	Unit	Quantity	Unit Cost	Total Cost
CONSTRUCTION				
Clearing/Grading/Demo				
Removal of Existing Curb	LF	1,185	$15.00	$17,775
Removal of Existing Driveways	CY	11	$200.00	$2,222
			Subtotal	**$19,997**
Paving & Pavement Markings				
Driveways	SF	111	$125.00	$13,889
Concrete Sidewalk & Bus Stop Pads	SF	650	$10.00	$6,500
Speed Humps	EA	8	$2,000.00	$16,000
Removal of Pavement Marking Lines	LF	4,120	$1.00	$4,120
5 Inch Yellow Thermoplastic Pavement Markings	LF	4,828	$3.50	$16,898
5 Inch White Thermoplastic Pavement Markings	LF	5,692	$3.50	$19,923
12 Inch White Thermoplastic Pavement Markings	LF	4,920	$7.00	$34,440
Bicycle Shared Lane Markings	EA	43	$250.00	$10,750
Bicycle Lane Markings	EA	9	$250.00	$2,250
Green Pavement Markings	SF	548	$15.00	$8,220
Standard Type A Combination Curb and Gutter	LF	1,974	$25.00	$49,350
Detectable Warning Surface for Curb Ramps	SF	156	$50.00	$7,800
			Subtotal	**$190,140**
Signs/Signals				
Signal Modifications	LS	1	$50,000	$50,000
Signs and Sign Posts	EA	15	$200	$3,000
			Subtotal	**$53,000**
Landscaping & Infiltration				
Trees	EA	20	$150.00	$3,000
Parkway Sodding	SF	2,278	$1.00	$2,278
Landscaping with infiltration components	SF	3,496	$50.00	$174,800
			Subtotal	**$180,078**
		Subtotal above categories		**$443,215**
Lump Sum Items				
Sediment & Erosion Control (2%)	LS	1	$8,864	$8,864
Utility Adjustments (1%)	LS	1	$4,432	$4,432
Mobilization and Startup Costs (7%)	LS	1	$31,025	$31,025
Survey Stakeout (2%)	LS	1	$8,864	$8,864
			Lump Sum Subtotal	**$53,185**
			Subtotal	**$496,400**
			30% Contingency	$148,920
			Total Estimated Construction Cost	**$645,400**

DESIGN ENGINEERING				
60% Design & 100% Design (Construction Documents)	LS	1	$150,000	$150,000
Geotechnical Investigations	LS	1	$30,000	$30,000
			Subtotal	**$180,000**
			Total Project Cost	**$825,400**