December 16, 2020

Mr. Tony Redman
Maryland Department of Natural Resources
Environmental Review Program
Tawes State Office Building C-3
580 Taylor Avenue
Annapolis, Maryland 21401

Contract Number:
Subject: **Druid Park Lake Drive (DPLD) Complete Streets Accessibility-Fisheries Information Request**

Dear Mr. Redman:

WSP USA, Inc., in coordination with the Baltimore City Department of Transportation (BCDOT) Planning Division, is evaluating and identifying streetscape improvements, traffic calming opportunities and multi-modal roadway enhancements for the Druid Park Lake Drive corridor from Mount Royal terrace ramp on the west side of I-83 to the Greenspring Avenue Intersection near the northwest portion of the park. The scope of this project includes existing conditions assessments including traffic and environmental resources, concept development (10% design), and community outreach. A project location map is included for your reference.

We request any information concerning resident fish and anadromous fish or additional water quality considerations within the study area. Please send your response and any comments you have on the project to Bridey Gallagher at bridey.gallagher@wsp.com. We have limited staff in the office due to the COVID-19 pandemic, but our mailing address is 1 E. Pratt Street Suite 330 Baltimore MD 21202 if you prefer to provide comments by mail. If you have questions regarding this request, please feel free to contact me at (410) 622-3614, at your convenience. Thank you for your consideration and review of the project.

Sincerely,

Bridey Gallagher

Bridey Gallagher
Environmental Planner, WSP

Enclosure
cc by email:
Pam.mcnicholas@wsp.com
korbyn.gehlbach@wsp.com

WSP USA
3rd Floor
1 East Pratt Street
Baltimore, MD 21202

Tel.: +1 410 727-5050
Fax: +1 410 727-4608
wsp.com

MARYLAND
DEPARTMENT OF
NATURAL RESOURCES

Larry Hogan, Governor
Boyd Rutherford, Lt. Governor
Jeannie Haddaway-Riccio, Secretary
Charles Glass, Deputy Secretary

January 26, 2021

Ms. Bridey Gallagher
WSP USA, Inc.
1 East Pratt Street
Suite 300
Baltimore, MD 21202

RE: Environmental Review for Druid Park Lake Drive (DPLD) Complete Streets Accessibility, Baltimore City, Maryland.

Dear Ms. Gallagher:

The Wildlife and Heritage Service has determined that there are no official State or Federal records for listed plant or animal species within the delineated area shown on the map provided. As a result, we have no specific concerns regarding potential impacts or recommendations for protection measures at this time. Please let us know however if the limits of proposed disturbance or overall site boundaries change and we will provide you with an updated evaluation.

Thank you for allowing us the opportunity to review this project. If you should have any further questions regarding this information, please contact me at (410) 260-8573.

Sincerely,

Lori A. Byrne

Lori A. Byrne,
Environmental Review Coordinator
Wildlife and Heritage Service
MD Dept. of Natural Resources

ER# 2020.2051.bc

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Wetlands

Project Summary

Consultation Code: 05E2CB00-2021-SLI-0440
Event Code: 05E2CB00-2021-E-01073
Project Name: Druid Park Lake Drive (DPLD) Complete Streets Accessibility
Project Type: TRANSPORTATION
Project Description: WSP USA has been requested by the Baltimore City Department of Transportation (BCDOT) Planning
Division to submit a scope of work to evaluate and identify streetscape improvements, traffic calming
opportunities and multi-modal roadway enhancements for the Druid Park Lake Drive corridor from Mount Royal Terrace ramp on the west side of I-83 to the Greenspring Avenue intersection near the NW portion of the park. The required activities within the scope of this project include the completion of the following
support services:
· Project Management
· Existing Conditions Assessments
· Concept Development (10% Design)
· Community Outreach

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@39.32194525,-76.65491684416268,14z

Counties: Baltimore County, Maryland

USFWS National Wildlife Refuge Lands And Fish Hatcheries

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

Project Limits

Jones Falls Trail

Parks

WSP USA Inc
1 EAST PRATT STREET SUITE 300
BALTIMORE, MD 21202
(410) 727-5050

Druid Park Lake Drive (DPLD) Complete Streets Accessibility

Park and Trails Map

January 2021

Cultural Resources Supplemetal Memo: Select Historic Images and Brief History

MEMO

TO: Wes Mitchell, WSP, et al.

FROM: WSP Cultural Resources Group

SUBJECT: **Druid Park Lake Drive and Surrounding Areas Cultural Resources**

DATE: **February 22, 2021**

Introduction and Purpose

This memo serves to augment the initial environmental screening information provided to the project team in 2020 and early 2021. While the initial task was to focus on roadways surrounding the park, the content of this memo developed in response to questions from the team. The intent of this memo is not to provide a comprehensive park or zoo history but to highlight areas of interest that the design team may want to explore for inspiration and to also consider historic preservation compliance requirements as the project progresses and more information on the design and funding sources are confirmed.

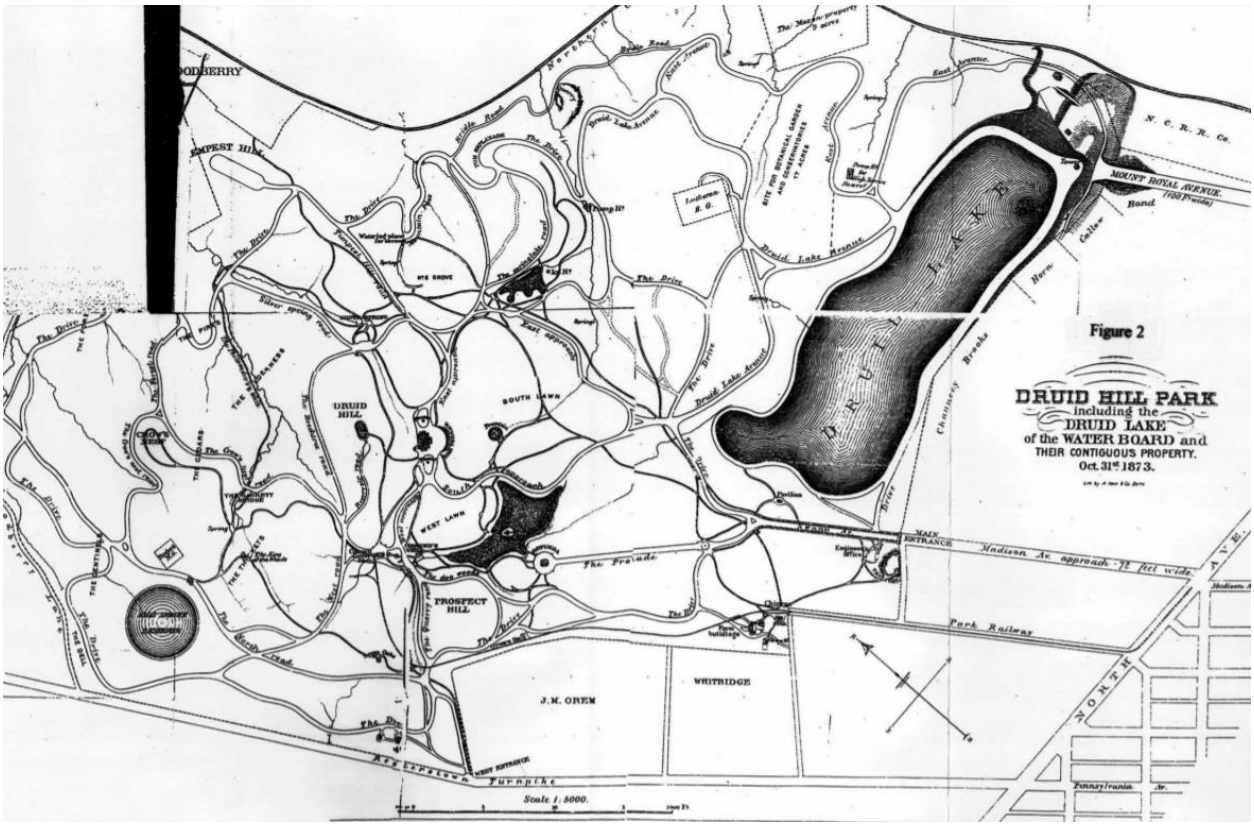
Historic Context Summary and Select Images

Early History of the Area and Establishment of Druid Hill Park

The area that now includes Druid Hill Park and the project area was initially occupied by Susquehannock Indians, who ceded land in 1652 to Lord Baltimore. The location was appealing to the Native American tribe because of its access to the Jones Falls stream and other springs in the area. Lord Baltimore subsequently began to parcel the land out.

Much of the park and project area was part of "Auchentorlie," the estate of George Buchanan, one of the seven commissioners who founded Baltimore City in 1729. A subsequent owner, Colonel Nicholas Rogers, renamed the area "Druid Hill," which was the name when the City of Baltimore purchased the property from his son Lloyd Rogers in 1860. Mayor Thomas Swann established Druid Hill Park later that year on October 19, 1860. A one-cent park tax on the nickel horse-car fares financed the purchase.

Druid Hill Park, which consists of 745 acres, was one of the first large public parks in America; Baltimore's first large municipal park; and the third oldest established park in the United States. At the time that it was established, the park was on the northern most edge of Baltimore's urban development.



1873 map of area (from the park's NRHP documentation; additional maps from later years exist)

Druid Hill Park Design

The park was designed by landscape designer and gardener Howard Daniels (1815-1863). Daniels also designed numerous park-like Victorian-era cemeteries and grounds for private residences and institutions. In the 1850s, his design for Central Park ranked fourth in the nationwide competition, losing to Frederick Law Olmsted and Calvert Vaux. Daniels toured English parks and Gardens from 1855-1856 and was influenced by the naturalistic landscapes. He opted to leave natural wooded habitats within the park, most notably in the northern areas of the park, which contains some of the oldest forest growth in Maryland.

Druid Hill Park, circa 1907
https://www.flickr.com/photos/enochprattlibrary/albums/72157625737220141

Daniels' designs for the curvilinear park drives contributed to the naturalistic appeal. Later, as automobiles became popular, car dealers would use these winding roads to teach new car buyers how to drive.

Druid Hill Park Reservoir, circa 1925
https://www.mdhs.org/digitalimage/street-scene-automobiles-along-druid-hill-park-reservoir-baltimore

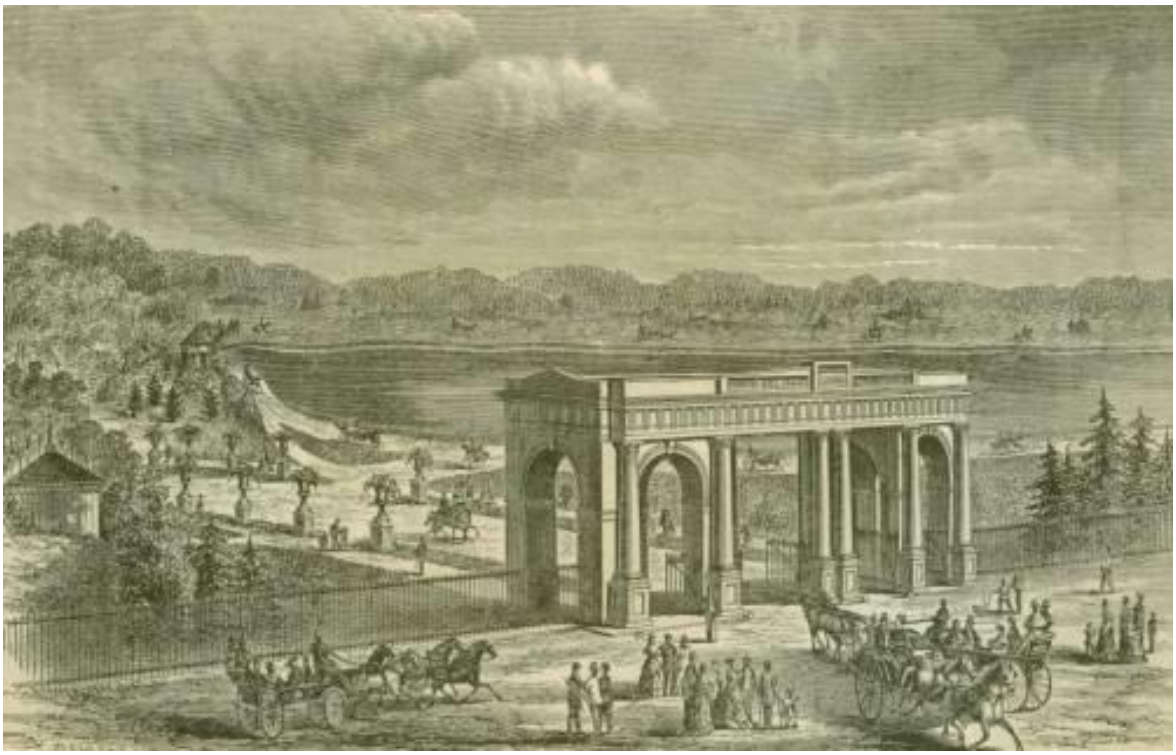
Park Entrances and Exits

John H.B. Latrobe, son of renowned architect of the U.S. Capitol Benjamin Henry Latrobe, designed the colossal entrance and notable exit gateways to Druid Hill Park. The Madison Street entrance was the most prominent and monumental entrance gate. The Mt. Royal Avenue gate, which was considered an exit, featured two slightly dissimilar piers with smooth, deeply incised blocks topped with cornices and elaborate lighting fixtures, while the Fulton Street exit incorporated with spherical finials smooth piers with cornices. These piers separated more elaborate segmentally arched cast-iron gates. These gates could serve as design inspiration for new or restored park features.

Unfortunately, Daniels only lived about three years after his win to design the park. Park engineer Augutus Faul and architect George Aloysius Frederick completed Daniels' general design wishes while adding their own design vocabulary to the final result. In the early twentieth century, the celebrated Olmsted Brothers firm consulted for the city, providing advice on the park design.

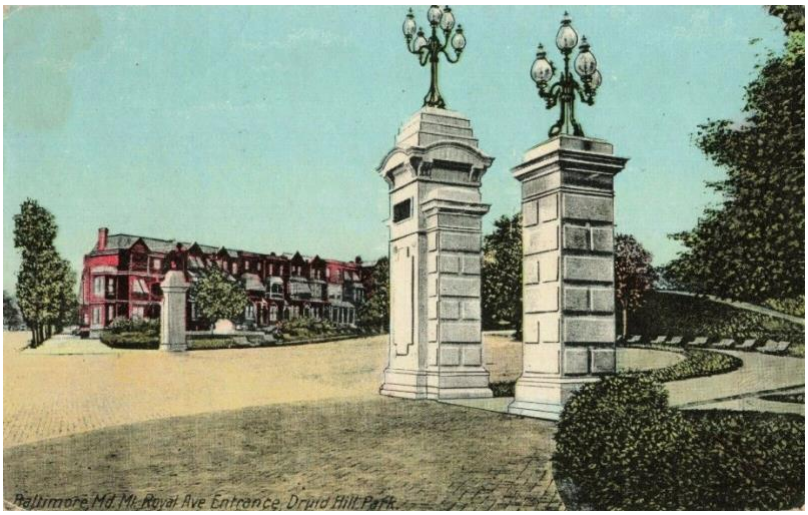
Druid Hill Park, Madison Street Entrance, date unknown
http://www.mdhs.org/digitalimage/druid-hill-park-gate-madison-avenue-entrance

Druid Hill Park, Madison Street Entrance, date unknown
https://www.kilduffs.com/Parks.html

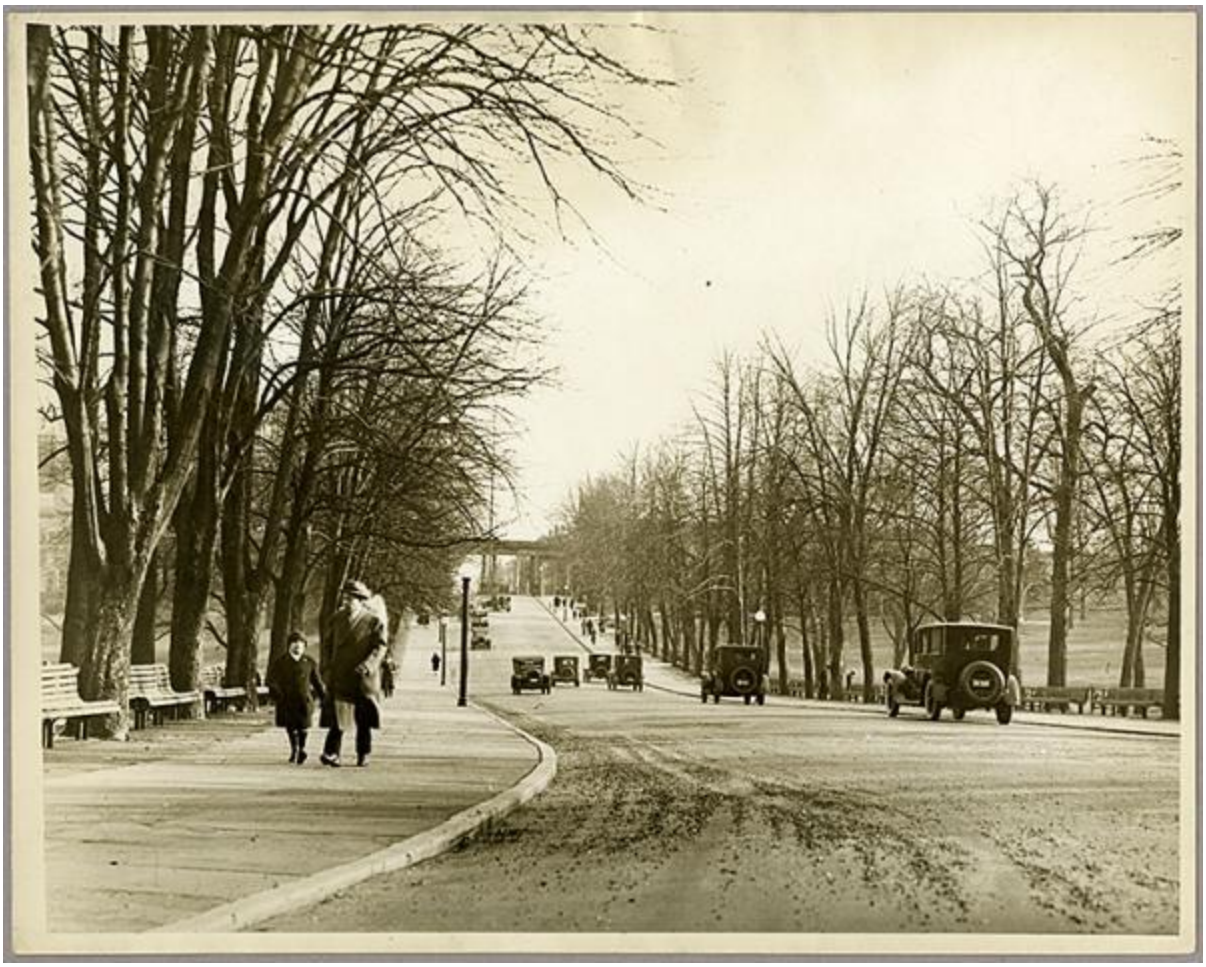


Druid Hill Park, Madison Street Entrance, date unknown
https://www.kilduffs.com/Parks.html

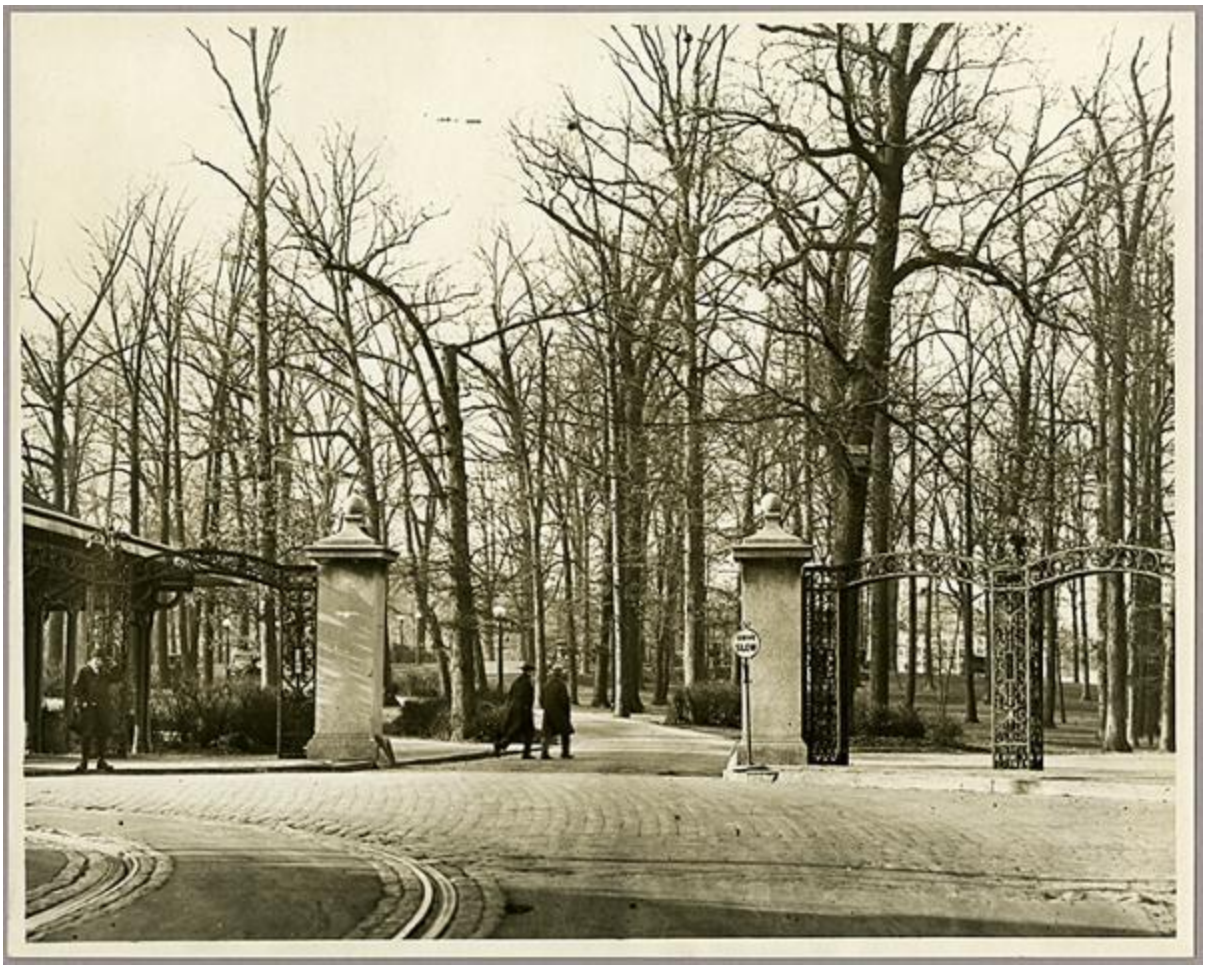
Mt. Royal Avenue from Druid Hill Park, date unknown. Note entrance piers on the right.
https://www.kilduffs.com/Parks.html



Close-up of Mt. Royal Ave. Entrance to Druid Hills Park
https://www.ebay.com/itm/Postcard-Entrance-Druid-Hill-Park-Baltimore-Maryland-/352998342245

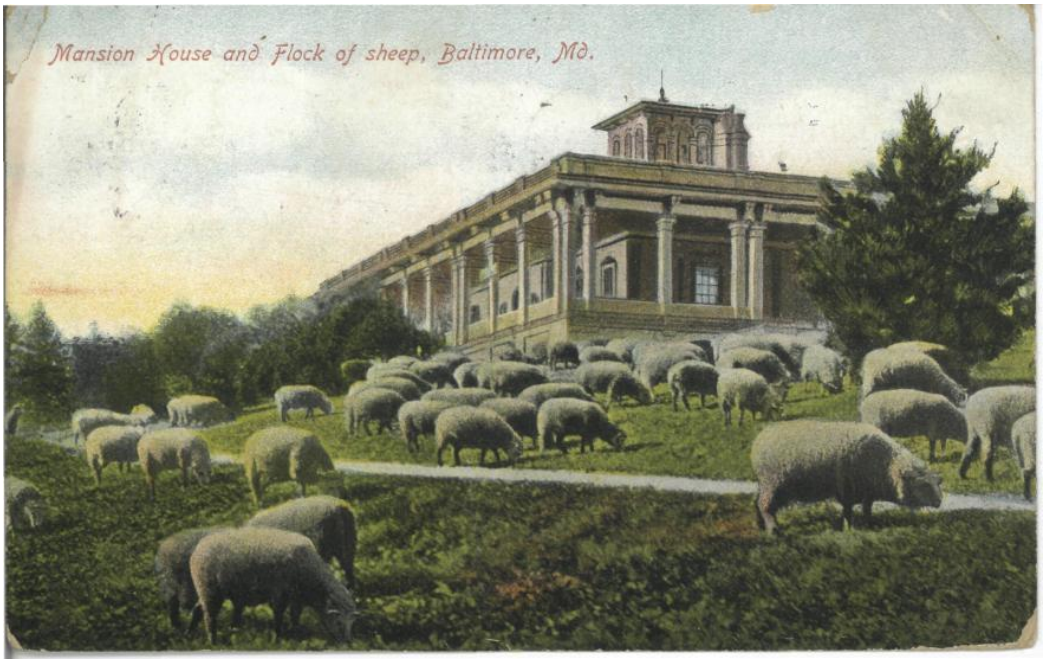


Druid Hill Park, looking south to Madison Street entrance
https://www.mdhs.org/digitalimage/street-scene-druid-hill-park-baltimore



Druid Hill Avenue at Fulton Street
https://www.mdhs.org/digitalimage/druid-hill-park-entrance-druid-hill-avenue-fulton-street-baltimore

At the time it was developed, the nationwide American Parks Movement was beginning to sweep the nation. The movement advocated for providing large parks for urban dwellers to allow for outdoor recreational and social opportunities, following earlier European traditions. Initially, the large grass expanses were “mowed” by a flock of Southdown sheep. The sheep were tended by a shepherd who was one of the park’s first employees.



Flock of sheep, Druid Hill Park grounds, circa 1900
https://baltimorecityhistory.net/online-exhibit-gallery/historic-baltimore-postcards/#jp-carousel-3430

Druid Hill Park Shepherd and Sheep, circa 1912
https://www.flickr.com/photos/enochprattlibrary/albums/72157625737220141

The park has several prominent features. The man-made Druid Hill Reservoir was constructed from 1863-1871 and is encircled by a popular trail for walking, running, and biking. The Maryland Zoo (previously known as the Baltimore Zoo) was established in 1876. The park also contains the Howard P. Rawlings Conservatory and Botanic Gardens (renamed in 2004), which includes the country's second oldest Victorian-era glass conservatory. Druid Hill Park also includes woodland areas, athletic fields, picnic areas, and hills for winter sledding. A portion of the Jones Falls Trail, used for hiking and biking, extends through a portion of the park. Historic monuments and statuary within the park include monuments to Scottish hero William Wallace, Christopher Columbus, and George Washington.

Historic post card of Druid Hill Park Conservatory, now the Rawlings Conservatory, circa 1930.

Other architectural follies in the park included boathouse, as well as several pavilions and pagodas with Moorish designs and numerous springs with unique designs were scattered throughout the park. Like the entrance and exit gates, these elements could serve as ongoing design inspiration.

Historic postcard image of the park's Moorish bandstand. The structure is no longer extant. Author's collection.

This historic image shows the park's Moorish tower that remains in place. Author's collection.

Racial Segregation as Part of the Park's History

When Druid Hill Park first opened, it facilities were racially segregated. This practice continued into the twentieth century. Although championship events and competitions for various sports with African-American players were held in the park, the segregationist policies were not abolished until 1948. At that time, twenty-four Black tennis players openly challenged this discrimination by playing on the "white-only" tennis courts. Although they were arrested, their brave actions ultimately dismantled the park's segregation and influenced changes throughout the City. The names of the protestors are commemorated on the Baltimore Tennis Club marker, which is located adjacent to the Rawlings Conservatory. Interestingly, this event was the subject of renowned Baltimore writer H.L. Mencken's final *Baltimore Sun* editorial, with Mencken condemning the City's divisive policies.

African-American men playing tennis, Druid Hill Park, circa 1948
http://www.mdhs.org/digitalimage/men-playing-tennis-druid-hill-park

Druid Hill Park, segregated swimming pool, circa 1948
http://www.mdhs.org/node?page=62

An interracial group called the Young Progressives of Maryland peacefully protest the segregated tennis courts in Druid Hill Park, 1948
https://www.theclio.com/web/entry?id=9536

Administrative Buildings

Although over time, they have become separated from the current park boundary (apparently due to changes in circulation and traffic patterns), modest administrative parks buildings that surround the present-day park are historic and contributing to the historic district. One was built in 1894 as the Engineer's Office, later used as an administrative office, and now is a Baltimore City Parks and Recreation building; it was altered in 1955 but is still considered contributing. The other appears to have originally served as a pumping station and was built in 1873. It was later altered for use as a bath and field house in 1924; It is also contributing to the park historic district and associated with the park's significant integration history in the 1956 when Black citizens were finally allowed to use the bath house and the pool in the park.

Some of the initial DPLD concepts called for the removal of historic buildings. While moving buildings is usually strongly discouraged because it removes the buildings from their original settings, it doesn't mean that the buildings could never be moved; it just means that the Section 106 and/or historic preservation review process will likely be more difficult and longer, and the team may not get the desired outcome or we may present risk to the client by spending project funds while potentially not being able execute the project as planned. A design that reintegrated these buildings within the park may be more successful.

Additional Ideas for Consideration

A cursory list of ideas to be explored may include ways for the parks original entrances to be safely reintegrated into the pedestrian experiences in the park, particularly for local residents who find safe access to be difficult despite living proximate to the park. Reintegrating these entrances, particularly the monumental Madison Street gate and the exits at Mount Royal Avenue and Fulton Street, perhaps in tandem with landscaping and paving materials to remind drivers that they are traversing a pedestrian area, could restore both historic setting and safety.

Another consideration could be reintegrating some of the unique fountain designs within the park or using the spring names to delineate historic segments of the park or in wayfinding signage. Numerous fountains existed in the park, many with distinguishing forms or sculptural features. Most were closed when surrounding development caused water contamination, depriving park users of a welcome source of refreshment during the hot summer months.

A stock photo of the Crises Fountain in Druid Hill Park, collection of New York Public Library.

Opportunities for highlighting Black history are also present and should not be overlooked. The story of integrating the park coupled with the desire to remove and/or rededicate statues of George Washington, Christopher Columbus, et al. open opportunities within the park to highlight other aspects of park history or African-American leaders. Transportation-related history of the park could also be interpreted and buildings such as the Mansion House, Conservatory, and unique zoo structures could also prove to be a draw. Community input is particularly important for these ideas to determine what park users and neighbors.

Current Designations and Historic Preservation Compliance Considerations

Built Historic Properties

Although an Area of Potential Effects (APE) has not been delineated, a general Preliminary Study Area has been developed. This area includes built historic properties, which are those that are listed in or eligible for the National Register of Historic Places (NRHP). Only historic properties are subject to compliance with federal historic preservation law and they are assessed for effects from the project's physical impacts as well as visual, auditory, atmospheric, or vibratory effects from the project. The APE will be established when the project's limits of disturbance are confirmed.

Many prominent built historic properties, including both historic districts and individual resources, are within the Preliminary Study Area. Some, such as the Reservoir Hill Historic District (B-1379) are listed in or determined eligible for the NRHP, while others have only been identified but not evaluated for NRHP eligibility. Properties more than fifty years of age within the APE are generally evaluated for NRHP eligibility. Some of these properties may not have been identified or evaluated previously.

NRHP-listed or eligible properties, including both built resources and archaeological sites, are subject to compliance with Section 106 of the National Historic Preservation Act and its enabling legislation found at 36 CFR Section 800. This is required if the project will receive federal funding or permitting. Compliance with Baltimore City's Commission of Historical and Architectural Preservation's (CHAP) regulations is required for Baltimore City's designated local historic districts and landmarks. As more project information is confirmed, qualified cultural resources staff will coordinate with city project management staff, CHAP, and State Historic Preservation Office staff, as appropriate, to make sure the project complies with applicable local, state, and federal historic preservation laws.

Although numerous historic properties are present within the Preliminary Study Area, the most prominent and relevant is Druid Hill Park (B-56), which was listed in the National Register of Historic Places in 1973. A substantial update of the original registration form was completed in 1997. This updated documentation identifies 22 contributing buildings; 4 contributing sites; 24 contributing structures; and 20 contributing objects.

Archaeological Sites and Related Considerations

Information on archaeological sites and survey efforts were obtained by a professional archaeologist meeting to Secretary of the Interior's Professional Qualifications Standards from on-line Maryland Historical Trust (MHT) records (accessed November 2020 – January 2021). Additional online digital data sources were used in the assessment of archaeological potential, including historic mapping, aerial photography, and soils and geology data as well as LiDAR imaging.

Based on current MHT records, there is only one previously identified archaeological site located within the current Preliminary Study Area for the Druid Park Lake Drive project. The Druid Hill Park Superintendent's House archaeological site (18BC176) is situated in the triangular parcel bound by Auchentoroly Terrace, Liberty Heights and Reisterstown Road. This site does not appear to have had a formal Determination of Eligibility (DOE) for the National Register of Historic Places (NRHP). However, given the documented nineteenth-century structural remains and archaeological deposits, as well as the potential remains from an earlier eighteenth-century plantation, the site should be considered potentially significant and will need to be formally evaluated. Site 18BC176 falls completely within the currently delineated Preliminary Study Area, and if eligibility is confirmed, planning would need to consider attempts to avoid, minimize or mitigate potential adverse effects. There is one additional archaeological resource recorded in the general vicinity of the current Preliminary Study Area: 18BC100, which is the remains of an earlier eighteenth-nineteenth century industrial mill dam, located east to the Johns Falls Expressway, 403 feet (122 meters) from the nearest point of the current Preliminary Study Area.

MHT records do not show any other previously completed archaeological survey efforts in the vicinity of the current project. Druid Hill Park (specifically the Maryland Zoo area) is reported to contain at least two cemeteries (one of which has African American associations) and these have been tentatively located based on historic mapping. The smaller cemetery is in the north-western portion of the park, 781 feet

(233 meters) from the closest point of the currently defined Preliminary Study Area. The larger cemetery is shown in the south-central part of the park, separated from the Preliminary Study Area by Druid Hill and approximately 1,657 feet (510 meters). Potential project effects to either cemetery or Site 18BC100 are not anticipated.

Archaeological Potential

In addition to effects to recorded archaeological sites, ongoing cultural resource studies will consider potential effects on previously unidentified archaeological resources. Within the Preliminary Study Area, areas of park property could be considered to have generally higher potential to preserve the integrity of historic landscapes and any archaeological sites they might contain. However, given the intensity of the landform modification required to create the park, pre-contact or early historic site preservation is likely to be low. The potential for historic archaeological sites and features associated with the 150+ year-old park and zoo also should be taken into consideration. For the portions of the Preliminary Study Area outside the park, mostly characterized by relatively dense rowhouse residential and light commercial development, an assessment of potential of urban archaeological resources will need to be conducted. In general terms, existing roadways and sidewalks of such urban neighborhoods have a relatively low potential for archaeological resources, compared to landscaped areas, backyards, open lots and alleys. There also are several churches within the Preliminary Study Area and the location of associated graveyards and the potential for unmarked burials may also need to be assessed.

Additional Research Potential

In addition to the initial environmental screening for built historic properties and archaeological sites presented to the project team, numerous Maryland Inventory of Historic Properties forms and survey forms for surrounding buildings as well as for the park itself provide information. These include but are not limited to those inventoried by the Maryland Historical Trust; CHAP; and the National Register of Historic Places. When an APE is developed and both funding and permitting sources are confirmed, those within the Area of Potential Effects will need to be assessed for historic significance if they have not previously been subject to evaluations and those that are significant for historic or architectural reasons, i.e., meeting established federal, state, and/or local criteria, will be assessed for effects from the project.

Additional Details and Future Research

Finally, the well-researched, erudite, delightfully written book *Druid Hill Park: The Heart of Historic Baltimore* by Eden Unger Bowditch and Ann Draddy provides images and text useful to understanding the park's history and importance of place within Baltimore and the entire state. It is a reliable source to add accurate details to the cursory information provided here.

Appendix D

Design Considerations

- Druid Park Lake Drive Analysis Segments
- Landscape and Urban Design Analysis

Druid Park Lake Drive Analysis Segments

The Project Team performed an initial analysis of issues along the corridor by segment. These segments were selected based on similar land use and roadway characteristics and allowed for detailed examination in the initial concept development process. The issues identified in these segments informed opportunities for design elements.

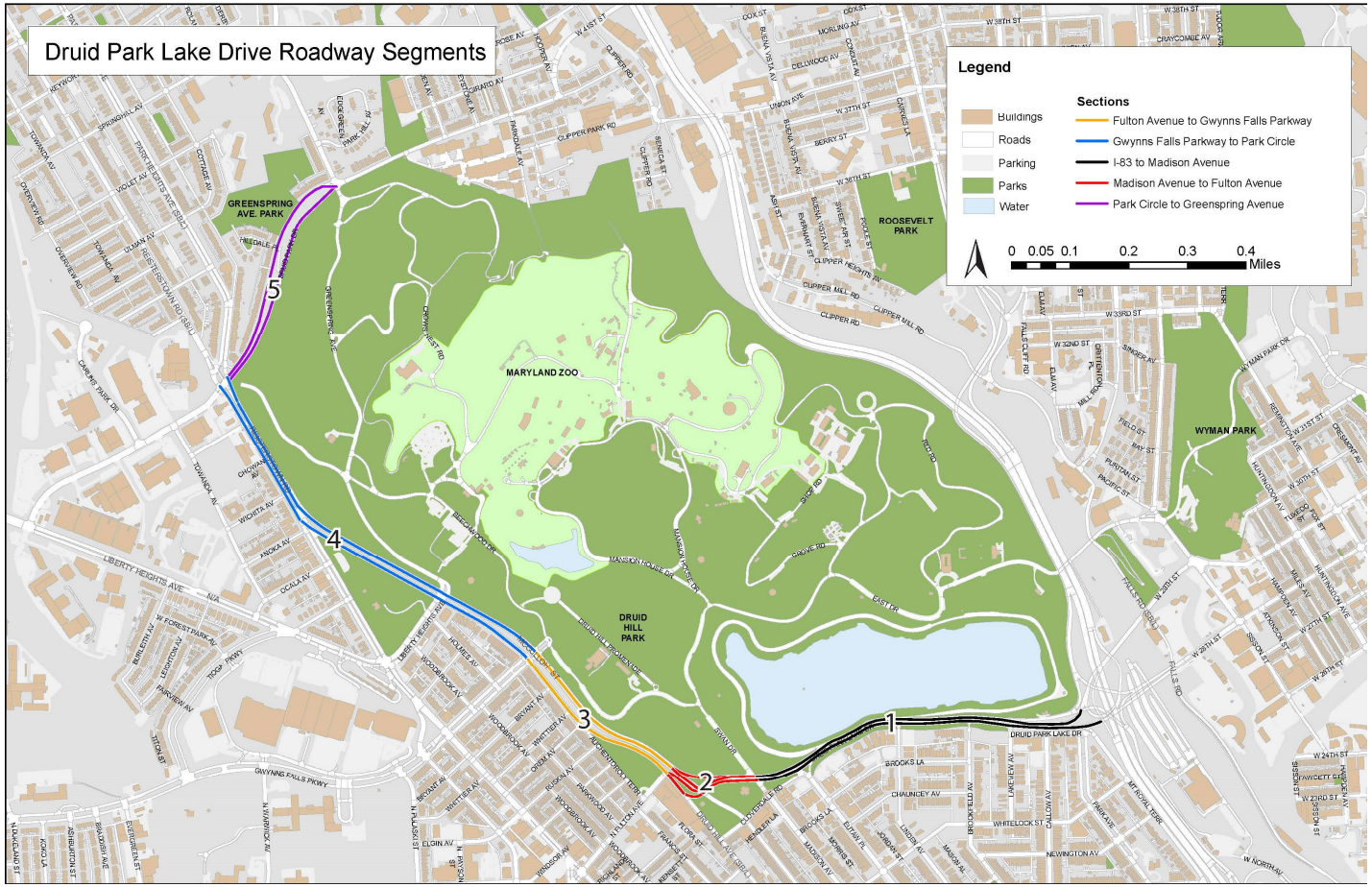


Table 1: Druid Park Lake Drive Existing Conditions Analysis - Roadway Segments

Druid Park Lake Drive Roadway Segments						
Segment Number (See map above)	Segment Boundaries	Segment Length	# of Intersections	# of EB Lanes	# of WB Lanes	Characteristics
1	I-83 to Madison Ave.	0.60 mi	7	2-3	1-2	The Big Jump temporary shared-use path is on the EB side of this segment. Ongoing construction on this segment related to Druid Lake water tank project. Large apartment buildings and 1-2 development sites to consider. Major entrance to Druid Hill Park at Madison Ave. Potential opportunity for new park entrance(s).
2	Madison Ave. to Fulton Ave.	0.15 mi	3	3-5	3-5	Complex and unsafe intersection. Transition from McCulloh St. to DPLD and from DPLD to Druid Hill Ave. Large green spaces in median and adjacent to roadway.
3	Fulton Ave. to Gwynns Falls Parkway	0.3 mi	5	3	3-5	Existing local access lane (Auchentoroly Terrace). Minor intersections with residential roads on EB side. Potential opportunity for new park entrance(s) and local access lane. Landscaped median. Major entrance to Druid Hill Park at Gwynns Falls.

4	Gwynns Falls Parkway to Park Circle	0.72 mi	6	2-3	2-4	Existing cycle track. Transition to Reisterstown Rd. Minor intersections with residential roads on EB side. Newly reconstructed intersection at Park Circle. Major entrance to Druid Hill Park at Greenspring.
5	Park Circle to Greenspring Ave.	0.38 mi	2	1-2	1-2	Residential scale. Limited ROW. Large green median with relatively steep slope.

DRUID PARK LAKE DRIVE COMPLETE STREET DESIGN

Landscape/Streetscape/Urban Design Analysis - Abbreviated Narrative

INTRODUCTION

DPLD possesses intrinsic qualities that make it a unique street unlike others. On one side, DPLD surrounds half of the Druid Hill Park's border, one of the most prestigious city parks in the Country, designed by the father of landscape architecture, Mr. Frederick Olmsted. On the other side of DPLD are historic landmarks, a city and national registered historic district, buildings with architectural significance, vacant lots, parklands, tree groves, hedge rows, low masonry walls, and vegetative slopes. For about half of the DPLD, there are tree planted medians in the middle of the street, which provide the boulevard feel and is a significant asset to preserve.

KEY ISSUES - Landscape/Streetscape/Urban Design

- Community's accesses and connections to the Park.
- Need to accommodate all users of DPLD safely and efficiently: motorists (commuters and residents), pedestrians (all ages and physical conditions, park visitors and residents), and bicyclists (park visitors and residents).
- The speed of traffic is too fast for the motorist to experience and appreciate the historic, architectural, landscape and ecological heritage of the corridor.
- Not well-maintained street trees and other vegetation displaying an unmanaged appearance
- Need to have a more cohesive image and a stronger identity.
- Change the perception of DPLD. – from single function roadway to a multi-modal complete street that also connects the neighborhood residents to the Park of national and historic significance, so that DPLD is no longer perceived a barrier between the Park and the neighborhood.

GOALS – Landscape/Streetscape/Urban Design, Preliminary

(*to be revised with the input and coordination with the project team and the community*)

1. Enhance the "park" feel along the corridor.
   (*Prefer installation of tree groves to evenly spaced street trees.)*
2. Provide a more relaxed, enjoyable and leisure driving experience.
   (*through various improvements*.)
3. Provide a permanent, continuous hiker/biker pathway along the corridor and multiple safe, easy, and pleasant connections from the neighborhood to the park.
   (*a complete street environment.*)
4. Reduce the sense of scale along vehicular travel lanes.
   (*Narrow street width to increase and consolidate bicyclist and pedestrian space. See #8.*)
5. Explore the possibilities of the separation of vehicular space and pedestrian/bicyclist space, which will increase the space to provide pedestrian/bicyclist amenities.
   (*See picture below.*)

Use Planting Median to Separate Vehicular Traffic and Pedestrian and Bicyclist Traffic and Provide Pedestrian and Bicyclist Amenities.

6. Provide the user with the opportunities to experience, explore and appreciate the historic, architectural, landscape and ecological heritage of the corridor and the area. In another word, reconnect communities to the Park's history, programs and activities and ecology.
   (*Reduce speed limit and calm the traffic via various means.*)
7. Establish a cohesive (not unified) image and a stronger sense of place/identity.
   (*Use existing and proposed features and selectively repeat them along the corridor: stone walls, tree groves, hedge rows, same style of streetlights and traffic signals, paving or street paint at intersections, etc.*)
8. Maintain/enhance the existing characteristics of DPLD: view to the lake, scattered tree groves, and boulevard feel of the western portion of DPLD.

STUDY SEGEMENTS

The entire project area is divided into six segments based on existing features on both sides of DPLD. Prototypical design strategies can then be developed for each segment.

a. **I 83 to Eutaw**
   South: mixed uses
   North: Park
b. **Eutaw to Ruskin**
   both sides: Parkland
c. **Ruskin to Liberty Height**-
   South: Residential
   North: Park
   Middle: Planting Medians
d. **Liberty to Reisterstown**
   both sides: Parkland
   Middle: Planting Medians
e. **Reisterstown to Park Circle**
   Northeast: Park
   Southwest: Mixed use
   Middle: Concrete Median
f. **Park Circle to Greenspring**

East: Park
West - Residential

Existing Edges of DPLD –

Hard Edge- building, walls, fence, curb
Soft Edge- tree grove, hedge rows, landscape planting, wilderness - woods

PURPOSES OF THE ANALYSIS

1. To get a sense of how the street space of DPLD is defined and how these defining elements/features or lack of these elements/features affect the user's experience, positive or negative.
2. To seek common features of each segment listed above that can be enhanced or improved.
3. To determine what landscape/street design ideas would be most appropriate for each segment.
4. To identify locations that place-making strategies can be implemented to strengthen the cohesiveness along the corridor and the identity of DPLD.

Visual analysis is a 2D graphic interpretation of the current user experience to be used as a basis for developing design concepts that will improve and enhance the user experience. **Corridor analysis** identifies the design issues and opportunities along the corridor and what can be done spatially to achieve project goals, that is to create a complete street environment. **Intersection Analysis** identifies the issues of connecting to the Park and the place-making strategies to increase the sense of place and to improve the pedestrian friendliness as well as universal accessibility.

PRELIMINARY OVERALL CORRIDOR DESIGN VISION

- Relocate curb toward the center of the street to define the street and consolidate the space for one or two existing travel lanes and existing sidewalk spaces into one much wider pedestrian/cyclist space. This will reduce the pedestrian crossing distance from the neighborhood to the Park as well as the perceived scale of the vehicular space. See the example below for reducing the excessively wide median width and travel lane width to make room for hiker-biker trails on both sides of the roadway within the existing right-of-way.

Narrowed Median and Travel Lanes

- Narrowed street space along with smaller turning radius at all street corners can calm the traffic.
- Consolidate space with existing sidewalk to provide the pedestrian/bicyclist amenities. Provide planting, possibly site furniture and wayfinding signage. See pictures below.


- Apply place-making strategies for all major pedestrian crossing intersections to provide sense of place at intersection and cohesiveness along the corridor. The common and repeating features such as ornamental traffic signal device and street light combination, pavers or street print at pedestrian crossing intersection will contribute to the cohesiveness of DPLD. (See Summary of Intersection Analysis.)
- Place **tree groves of a mixture of major and ornamental deciduous trees** in medians and roadsides (not evenly spaced street trees). New scattered tree groves are better fit to and enhance the image of DPLD as a "park drive", as there are many tree groves on both sides of the street.
- Explore the possibilities of introducing traffic circle(s) or roundabout at selected intersection(s) such as Fulton, Gwynns Falls, or Liberty Heights and eventually at I-83 to calm the traffic and simplify the traffic pattern.
- When necessary, due to the cut into existing slopes, use stone or cultured stones as the wall materials to be consistent with existing walls.
- Eliminate medians is Segment 1.
- Include and/or repeat some of the existing and future site features as part of the design vocabulary along the corridor, such as stone walls, tree groves, street paving, traffic signal pole and light pole, site furniture, etc. to achieve cohesiveness of the entire corridor streetscape.
- Include wayfinding signage at strategic locations will further enhance the user experience (pleasantness, ease, and welcoming) along DPLD corridor. Sign design should relate to current Park sign in colors, materials, and typeface. Minimize cluttering of various signage.

SUMMARY OF INTERSECTIONS ANALYSIS

In addition to the analysis of the six segments of the entire corridor, site analysis of selected seven intersections was also performed. These include the intersections of DPLD with Linden Avenue, Eutaw Place, Madison Avenue, Fulton Ave, Gwynns Falls Parkway, Liberty Heights, and Greenspring Avenue. The newly constructed Intersection at Park Circle is not included.

Goals

- Make each intersection a pedestrian "place".
- Enhancing/Establish safe and welcoming pedestrian connections to the Park.
- Ensure universal accessibilities.
- Improve the visual quality of each intersection, which has similar design character.

- Each imageable intersection will contribute to the cohesiveness of the entire corridor.

Preliminary Overall Intersection Improvement Approaches

- Use place-making strategies at each intersection to enhance the sense of place at each intersection.
- Use the enhanced pedestrian crossing as a traffic calming measure for the resident, the motorist, and the hiker/biker.
- Instead of striping or installing decorative paving only on crosswalks, special street surface treatments at the entire intersections, such as StreetBond, pavers or imprinted concrete, can be installed to calm the traffic, enhance sense of place for all users, and add rhythmic experience to the motorist. (See the example below.) Simple pedestrian-scale artwork that relates to the identity or the history of adjacent neighborhoods, can also be incorporated into the street surfacing design.

- ADA compliant sidewalk and street corners – Rebuild ped ramps, 2 at each corner. Widen adjacent sidewalk to be 5' wide min. Expand paving at street corners for pedestrian stopping and congregation.
- Landscape Enhancement – Plant street trees along sidewalks in the vicinity of the intersection.
- The median – Use it as a pedestrian refuse. Place wayfinding sign.
- Traffic Signals – Install period style traffic signal poles with mast arms and streetlights combination to minimizing the cluttering of various poles (See picture below.). Avoid poles and pedestrian flow conflicts as well.

Period Style

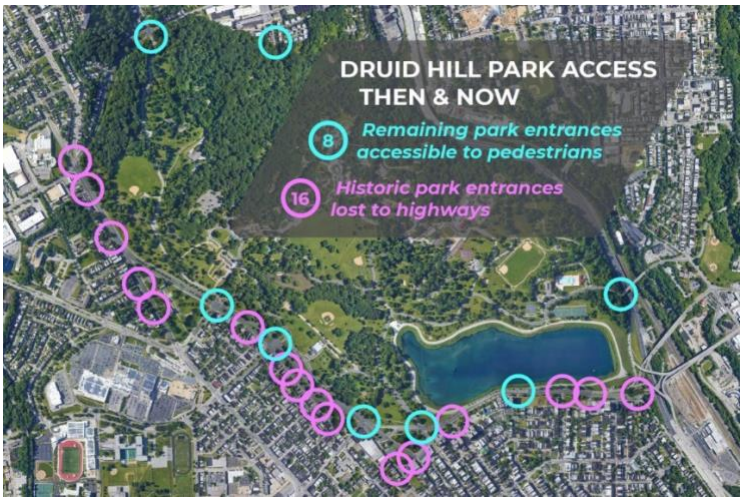
Contemporary Style

- Incorporate existing features nearby: wall, gateway, sign, pillar, etc., into the streetscape.

- Improve connections with nearby sidewalks/trails.
- Preserve the view to the Lake, important focal point, significant building, historic features, landmark, and other visible site features.
- Reduce the distance between curbs to minimize the pedestrian crossing distance. No bump-out is proposed on DPLD.

Historic DPLD Crossings

In addition to the above-mentioned intersections, there are 16 additional locations that were identified as "historic connections" to the Park by the community. (See the image below.) It will be up to the community and the project team to jointly explore the feasibility and decide which would be revived.



Appendix E

Traffic Analysis

- Traffic Synchro Analysis Results

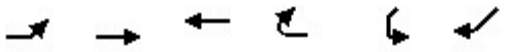
HCM Signalized Intersection Capacity Analysis
1: Linden Ave & Druid Lake Park Dr

12/20/2021

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	691	15	0	954	0	0
Future Volume (vph)	691	15	0	954	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0			4.0		
Lane Util. Factor	1.00			0.95		
Frt	1.00			1.00		
Flt Protected	1.00			1.00		
Satd. Flow (prot)	1857			3539		
Flt Permitted	1.00			1.00		
Satd. Flow (perm)	1857			3539		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	751	16	0	1037	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	767	0	0	1037	0	0
Turn Type	NA		Prot	NA		
Protected Phases	6		5	2		
Permitted Phases						
Actuated Green, G (s)	110.0			110.0		
Effective Green, g (s)	110.0			110.0		
Actuated g/C Ratio	1.00			1.00		
Clearance Time (s)	5.0			4.0		
Vehicle Extension (s)	3.0			3.0		
Lane Grp Cap (vph)	1857			3539		
v/s Ratio Prot	c0.41			0.29		
v/s Ratio Perm						
v/c Ratio	0.41			0.29		
Uniform Delay, d1	0.0			0.0		
Progression Factor	1.00			1.00		
Incremental Delay, d2	0.7			0.2		
Delay (s)	0.7			0.2		
Level of Service	A			A		
Approach Delay (s)	0.7			0.2	0.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	0.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	41.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	666	0	47	0	0	954
Future Volume (vph)	666	0	47	0	0	954
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.4		5.6			5.4
Lane Util. Factor	1.00		0.95			0.76
Frt	1.00		1.00			0.85
Flt Protected	0.95		1.00			1.00
Satd. Flow (prot)	1770		3539			3610
Flt Permitted	0.95		1.00			1.00
Satd. Flow (perm)	1770		3539			3610
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	724	0	51	0	0	1037
RTOR Reduction (vph)	0	0	0	0	0	204
Lane Group Flow (vph)	724	0	51	0	0	833
Turn Type	Prot		NA			Prot
Protected Phases	2		8			6
Permitted Phases						
Actuated Green, G (s)	144.6		24.4			144.6
Effective Green, g (s)	144.6		24.4			144.6
Actuated g/C Ratio	0.80		0.14			0.80
Clearance Time (s)	5.4		5.6			5.4
Vehicle Extension (s)	0.2		5.0			3.0
Lane Grp Cap (vph)	1421		479			2900
v/s Ratio Prot	c0.41		c0.01			0.23
v/s Ratio Perm						
v/c Ratio	0.51		0.11			0.29
Uniform Delay, d1	5.9		68.2			4.5
Progression Factor	1.00		1.00			1.00
Incremental Delay, d2	1.3		0.4			0.2
Delay (s)	7.2		68.7			4.8
Level of Service	A		E			A
Approach Delay (s)		7.2	68.7		4.8	
Approach LOS		A	E		A	

Intersection Summary			
HCM 2000 Control Delay	7.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	46.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL2	SBL	SBR	NWL	NWR
Lane Configurations											
Traffic Volume (vph)	8	660	13	88	860	53	6	13	5	0	0
Future Volume (vph)	8	660	13	88	860	53	6	13	5	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.6			6.6			5.6			
Lane Util. Factor	1.00	1.00			0.91			1.00			
Frt	1.00	1.00			0.99			0.97			
Flt Protected	0.95	1.00			1.00			0.96			
Satd. Flow (prot)	1770	1857			5023			1744			
Flt Permitted	0.95	1.00			0.77			0.96			
Satd. Flow (perm)	1770	1857			3889			1744			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	717	14	96	935	58	7	14	5	0	0
RTOR Reduction (vph)	0	0	0	0	4	0	0	23	0	0	0
Lane Group Flow (vph)	9	731	0	0	1085	0	0	3	0	0	0
Turn Type	Prot	NA		Prot	NA		Perm	Prot			
Protected Phases	1	6		5	2			4			
Permitted Phases							8				
Actuated Green, G (s)	1.6	119.8			112.2			19.0			
Effective Green, g (s)	1.6	119.8			112.2			19.0			
Actuated g/C Ratio	0.01	0.80			0.75			0.13			
Clearance Time (s)	5.0	5.6			6.6			5.6			
Vehicle Extension (s)	3.0	3.0			3.0			3.0			
Lane Grp Cap (vph)	18	1483			2908			220			
v/s Ratio Prot	0.01	c0.39									
v/s Ratio Perm					0.28			0.00			
v/c Ratio	0.50	0.49			6.86dl			0.01			
Uniform Delay, d1	73.8	5.0			6.6			57.3			
Progression Factor	1.00	1.00			1.00			1.00			
Incremental Delay, d2	20.2	1.2			0.1			0.0			
Delay (s)	94.0	6.2			6.7			57.3			
Level of Service	F	A			A			E			
Approach Delay (s)		7.3			6.7			57.3		0.0	
Approach LOS		A			A			E		A	

Intersection Summary			
HCM 2000 Control Delay	7.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	17.2
Intersection Capacity Utilization	78.3%	ICU Level of Service	D
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		↑↑			↑↑						↑↑↑	↱
Traffic Volume (vph)	0	653	0	0	254	0	0	0	0	0	144	28
Future Volume (vph)	0	653	0	0	254	0	0	0	0	0	144	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.6			5.6						6.6	6.6
Lane Util. Factor		0.95			0.95						0.91	1.00
Frt		1.00			1.00						1.00	0.85
Flt Protected		1.00			1.00						1.00	1.00
Satd. Flow (prot)		3539			3539						5085	1583
Flt Permitted		1.00			1.00						1.00	1.00
Satd. Flow (perm)		3539			3539						5085	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	710	0	0	276	0	0	0	0	0	157	30
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	27
Lane Group Flow (vph)	0	710	0	0	276	0	0	0	0	0	157	3
Turn Type		NA			NA						NA	Perm
Protected Phases		2			6						8	
Permitted Phases												8
Actuated Green, G (s)		147.5			147.5						20.3	20.3
Effective Green, g (s)		147.5			147.5						20.3	20.3
Actuated g/C Ratio		0.82			0.82						0.11	0.11
Clearance Time (s)		5.6			5.6						6.6	6.6
Vehicle Extension (s)		3.0			3.0						3.0	3.0
Lane Grp Cap (vph)		2900			2900						573	178
v/s Ratio Prot		c0.20			0.08						c0.03	
v/s Ratio Perm												0.00
v/c Ratio		0.24			0.10						0.27	0.02
Uniform Delay, d1		3.7			3.2						73.1	71.0
Progression Factor		0.57			1.00						1.00	1.00
Incremental Delay, d2		0.2			0.1						0.3	0.0
Delay (s)		2.3			3.2						73.4	71.0
Level of Service		A			A						E	E
Approach Delay (s)		2.3			3.2			0.0			73.0	
Approach LOS		A			A			A			E	

Intersection Summary			
HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	32.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Volume (vph)	717	0	254	0	0	254
Future Volume (vph)	717	0	254	0	0	254
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6		6.6			6.6
Lane Util. Factor	0.91		0.97			0.88
Frt	1.00		1.00			0.85
Flt Protected	1.00		0.95			1.00
Satd. Flow (prot)	5085		3433			2787
Flt Permitted	1.00		0.95			1.00
Satd. Flow (perm)	5085		3433			2787
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	779	0	276	0	0	276
RTOR Reduction (vph)	0	0	0	0	0	245
Lane Group Flow (vph)	779	0	276	0	0	31
Turn Type	NA		Prot			Over
Protected Phases	2		8			8
Permitted Phases						
Actuated Green, G (s)	147.5		20.3			20.3
Effective Green, g (s)	147.5		20.3			20.3
Actuated g/C Ratio	0.82		0.11			0.11
Clearance Time (s)	5.6		6.6			6.6
Vehicle Extension (s)	3.0		3.0			3.0
Lane Grp Cap (vph)	4166		387			314
v/s Ratio Prot	c0.15		c0.08			0.01
v/s Ratio Perm						
v/c Ratio	0.19		0.71			0.10
Uniform Delay, d1	3.5		77.0			71.6
Progression Factor	1.00		1.16			1.00
Incremental Delay, d2	0.1		6.1			0.1
Delay (s)	3.6		95.8			71.8
Level of Service	A		F			E
Approach Delay (s)	3.6			95.8	71.8	
Approach LOS	A			F	E	

Intersection Summary			
HCM 2000 Control Delay	36.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	34.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	13	427	17	277	476	2	33	41	300	0	11	8
Future Volume (vph)	13	427	17	277	476	2	33	41	300	0	11	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		5.0	6.0			6.0	6.0		6.0	
Lane Util. Factor		0.91		0.97	0.91			0.91	0.91		1.00	
Frt		0.99		1.00	1.00			0.90	0.85		0.94	
Flt Protected		1.00		0.95	1.00			0.99	1.00		1.00	
Satd. Flow (prot)		5050		3433	5082			3028	1441		1755	
Flt Permitted		0.92		0.95	1.00			0.90	1.00		1.00	
Satd. Flow (perm)		4650		3433	5082			2757	1441		1755	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	464	18	301	517	2	36	45	326	0	12	9
RTOR Reduction (vph)	0	3	0	0	0	0	0	0	0	0	8	0
Lane Group Flow (vph)	0	493	0	301	519	0	0	244	163	0	13	0
Turn Type	Perm	NA		Prot	NA		Perm	NA	Perm		NA	
Protected Phases		6		5	2			4			8	
Permitted Phases	6						4		4	8		
Actuated Green, G (s)		60.0		14.9	79.9			18.1	18.1		18.1	
Effective Green, g (s)		60.0		14.9	79.9			18.1	18.1		18.1	
Actuated g/C Ratio		0.55		0.14	0.73			0.16	0.16		0.16	
Clearance Time (s)		6.0		5.0	6.0			6.0	6.0		6.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		2536		465	3691			453	237		288	
v/s Ratio Prot				c0.09	0.10						0.01	
v/s Ratio Perm		c0.11						0.09	c0.11			
v/c Ratio		0.19		0.65	0.14			0.54	0.69		0.05	
Uniform Delay, d1		12.7		45.1	4.6			42.1	43.3		38.7	
Progression Factor		1.66		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		0.2		3.1	0.1			1.2	8.0		0.1	
Delay (s)		21.3		48.2	4.7			43.4	51.3		38.8	
Level of Service		C		D	A			D	D		D	
Approach Delay (s)		21.3			20.6			46.5			38.8	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	27.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	42.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	249	5	152	307	58	9	41	167	41	81	1
Future Volume (vph)	0	249	5	152	307	58	9	41	167	41	81	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		6.0	6.0			6.0	6.0		6.0	
Lane Util. Factor		0.95		0.97	0.95			0.91	0.91		0.95	
Frt		1.00		1.00	0.98			0.91	0.85		1.00	
Flt Protected		1.00		0.95	1.00			1.00	1.00		0.98	
Satd. Flow (prot)		3530		3433	3455			3063	1441		3477	
Flt Permitted		1.00		0.95	1.00			0.92	1.00		0.81	
Satd. Flow (perm)		3530		3433	3455			2838	1441		2850	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	271	5	165	334	63	10	45	182	45	88	1
RTOR Reduction (vph)	0	1	0	0	7	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	275	0	165	390	0	0	146	91	0	134	0
Turn Type		NA		Prot	NA		Perm	NA	pm+ov	custom	NA	
Protected Phases		6		1	2			4	1			
Permitted Phases							4		4	8	8	
Actuated Green, G (s)		70.4		10.6	87.0			11.0	21.6		11.0	
Effective Green, g (s)		70.4		10.6	87.0			11.0	21.6		11.0	
Actuated g/C Ratio		0.64		0.10	0.79			0.10	0.20		0.10	
Clearance Time (s)		6.0		6.0	6.0			6.0	6.0		6.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		2259		330	2732			283	361		285	
v/s Ratio Prot		0.08		c0.05	c0.11				0.02			
v/s Ratio Perm								c0.05	0.04		0.05	
v/c Ratio		0.12		0.50	0.14			0.52	0.25		0.47	
Uniform Delay, d1		7.7		47.2	2.7			47.0	37.4		46.7	
Progression Factor		0.38		0.98	0.93			0.55	0.71		1.00	
Incremental Delay, d2		0.1		1.2	0.1			1.6	0.4		1.2	
Delay (s)		3.0		47.3	2.6			27.5	26.8		48.0	
Level of Service		A		D	A			C	C		D	
Approach Delay (s)		3.0			15.8			27.2			48.0	
Approach LOS		A			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	18.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	36.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL2	SBL	SBR	NWL	NWR	NWR2
Lane Configurations												
Traffic Volume (vph)	0	175	257	52	184	2	10	189	15	118	169	12
Future Volume (vph)	0	175	257	52	184	2	10	189	15	118	169	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	4.0	5.0	5.0			4.0	4.0	4.0	4.0	
Lane Util. Factor		0.95	1.00	1.00	0.95			0.97	1.00	1.00	0.88	
Frt		1.00	0.85	1.00	1.00			1.00	0.85	1.00	0.85	
Flt Protected		1.00	1.00	0.95	1.00			0.95	1.00	0.95	1.00	
Satd. Flow (prot)		3539	1583	1770	3534			3433	1583	1770	2787	
Flt Permitted		1.00	1.00	0.59	1.00			0.94	1.00	1.00	1.00	
Satd. Flow (perm)		3539	1583	1101	3534			3399	1583	1863	2787	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	190	279	57	200	2	11	205	16	128	184	13
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	5	0	4	0
Lane Group Flow (vph)	0	190	279	57	201	0	0	216	11	128	193	0
Turn Type		NA	pm+ov	custom	NA		Perm	Prot	Perm	pm+pt	Prot	
Protected Phases		4	1					6		1	2	
Permitted Phases			4	8	8		6		6	2		
Actuated Green, G (s)		11.9	24.4	11.9	11.9			72.6	72.6	89.1	89.1	
Effective Green, g (s)		11.9	24.4	11.9	11.9			72.6	72.6	89.1	89.1	
Actuated g/C Ratio		0.11	0.22	0.11	0.11			0.66	0.66	0.81	0.81	
Clearance Time (s)		5.0	4.0	5.0	5.0			4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		382	351	119	382			2243	1044	1509	2257	
v/s Ratio Prot		0.05	c0.09							0.01	0.07	
v/s Ratio Perm			0.09	0.05	0.06			c0.06	0.01	0.06		
v/c Ratio		0.50	0.79	0.48	0.53			0.10	0.01	0.08	0.09	
Uniform Delay, d1		46.2	40.4	46.1	46.4			6.8	6.4	2.1	2.1	
Progression Factor		1.00	1.00	0.94	0.94			1.01	1.00	1.00	1.00	
Incremental Delay, d2		1.0	11.7	3.0	1.3			0.1	0.0	0.0	0.1	
Delay (s)		47.3	52.2	46.3	44.7			6.9	6.4	2.2	2.2	
Level of Service		D	D	D	D			A	A	A	A	
Approach Delay (s)		50.2			45.0			6.9		2.2		
Approach LOS		D			D			A		A		

Intersection Summary			
HCM 2000 Control Delay	29.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	37.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBR2	NBL	SEL	SER
Lane Configurations				
Traffic Volume (vph)	317	171	254	214
Future Volume (vph)	317	171	254	214
Ideal Flow (vphpl)	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0
Lane Util. Factor	0.88	0.97	0.97	0.88
Frt	0.85	1.00	1.00	0.85
Flt Protected	1.00	0.95	0.95	1.00
Satd. Flow (prot)	2787	3433	3433	2787
Flt Permitted	1.00	0.95	0.95	1.00
Satd. Flow (perm)	2787	3433	3433	2787
Peak-hour factor, PHF	0.92	0.92	0.92	0.92
Adj. Flow (vph)	345	186	276	233
RTOR Reduction (vph)	0	0	0	0
Lane Group Flow (vph)	345	186	276	233
Turn Type	custom	Prot	Prot	pt+ov
Protected Phases	2 3 4	2	4	2 4
Permitted Phases				
Actuated Green, G (s)	110.0	56.0	24.0	84.0
Effective Green, g (s)	103.0	56.0	24.0	84.0
Actuated g/C Ratio	0.94	0.51	0.22	0.76
Clearance Time (s)		4.0	4.0	
Vehicle Extension (s)		3.0	3.0	
Lane Grp Cap (vph)	2609	1747	749	2128
v/s Ratio Prot	c0.12	0.05	c0.08	0.08
v/s Ratio Perm				
v/c Ratio	0.13	0.11	0.37	0.11
Uniform Delay, d1	0.3	14.0	36.6	3.4
Progression Factor	1.00	0.96	1.00	1.00
Incremental Delay, d2	0.1	0.1	1.4	0.1
Delay (s)	0.4	13.6	38.0	3.5
Level of Service	A	B	D	A
Approach Delay (s)			22.2	
Approach LOS			C	

Intersection Summary			
HCM 2000 Control Delay	13.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.20		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	Err%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

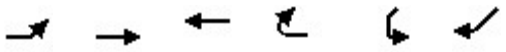
HCM Signalized Intersection Capacity Analysis
1: Linden Ave & Druid Lake Park Dr

12/20/2021

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	968	30	0	1482	0	0
Future Volume (vph)	968	30	0	1482	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0			4.0		
Lane Util. Factor	1.00			0.95		
Frt	1.00			1.00		
Flt Protected	1.00			1.00		
Satd. Flow (prot)	1855			3539		
Flt Permitted	1.00			1.00		
Satd. Flow (perm)	1855			3539		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1052	33	0	1611	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1085	0	0	1611	0	0
Turn Type	NA		Prot	NA		
Protected Phases	6		5	2		
Permitted Phases						
Actuated Green, G (s)	110.0			110.0		
Effective Green, g (s)	110.0			110.0		
Actuated g/C Ratio	1.00			1.00		
Clearance Time (s)	5.0			4.0		
Vehicle Extension (s)	3.0			3.0		
Lane Grp Cap (vph)	1855			3539		
v/s Ratio Prot	c0.58			0.46		
v/s Ratio Perm						
v/c Ratio	0.58			0.46		
Uniform Delay, d1	0.0			0.0		
Progression Factor	1.00			1.00		
Incremental Delay, d2	1.4			0.4		
Delay (s)	1.4			0.4		
Level of Service	A			A		
Approach Delay (s)	1.4			0.4	0.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	0.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	56.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	918	0	123	0	0	1482
Future Volume (vph)	918	0	123	0	0	1482
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.4		5.6			5.4
Lane Util. Factor	1.00		0.95			0.76
Frt	1.00		1.00			0.85
Flt Protected	0.95		1.00			1.00
Satd. Flow (prot)	1770		3539			3610
Flt Permitted	0.95		1.00			1.00
Satd. Flow (perm)	1770		3539			3610
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	998	0	134	0	0	1611
RTOR Reduction (vph)	0	0	0	0	0	355
Lane Group Flow (vph)	998	0	134	0	0	1256
Turn Type	Prot		NA			Prot
Protected Phases	2		8			6
Permitted Phases						
Actuated Green, G (s)	104.6		34.4			104.6
Effective Green, g (s)	104.6		34.4			104.6
Actuated g/C Ratio	0.70		0.23			0.70
Clearance Time (s)	5.4		5.6			5.4
Vehicle Extension (s)	0.2		5.0			3.0
Lane Grp Cap (vph)	1234		811			2517
v/s Ratio Prot	c0.56		c0.04			0.35
v/s Ratio Perm						
v/c Ratio	0.81		0.17			0.50
Uniform Delay, d1	15.8		46.3			10.5
Progression Factor	0.18		1.00			1.00
Incremental Delay, d2	4.3		0.4			0.7
Delay (s)	7.1		46.7			11.2
Level of Service	A		D			B
Approach Delay (s)		7.1	46.7		11.2	
Approach LOS		A	D		B	

Intersection Summary			
HCM 2000 Control Delay	11.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	71.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL2	SBL	SBR	NWL	NWR
Lane Configurations											
Traffic Volume (vph)	15	902	24	134	1434	37	16	30	15	0	0
Future Volume (vph)	15	902	24	134	1434	37	16	30	15	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.6			6.6			5.6			
Lane Util. Factor	1.00	1.00			0.91			1.00			
Frt	1.00	1.00			1.00			0.97			
Flt Protected	0.95	1.00			1.00			0.96			
Satd. Flow (prot)	1770	1856			5047			1736			
Flt Permitted	0.95	1.00			0.69			0.96			
Satd. Flow (perm)	1770	1856			3497			1736			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	980	26	146	1559	40	17	33	16	0	0
RTOR Reduction (vph)	0	0	0	0	2	0	0	55	0	0	0
Lane Group Flow (vph)	16	1006	0	0	1743	0	0	11	0	0	0
Turn Type	Prot	NA		Prot	NA		Perm	Prot			
Protected Phases	1	6		5	2			4			
Permitted Phases							8				
Actuated Green, G (s)	3.3	118.8			110.5			19.0			
Effective Green, g (s)	3.3	118.8			110.5			19.0			
Actuated g/C Ratio	0.02	0.79			0.74			0.13			
Clearance Time (s)	5.0	6.6			6.6			5.6			
Vehicle Extension (s)	3.0	3.0			3.0			3.0			
Lane Grp Cap (vph)	38	1469			2576			219			
v/s Ratio Prot	0.01	c0.54									
v/s Ratio Perm					0.50			0.01			
v/c Ratio	0.42	0.68			24.33dl			0.05			
Uniform Delay, d1	72.4	7.1			10.4			57.6			
Progression Factor	1.45	0.99			1.10			1.00			
Incremental Delay, d2	7.0	2.5			0.6			0.1			
Delay (s)	112.0	9.5			12.0			57.7			
Level of Service	F	A			B			E			
Approach Delay (s)		11.1			12.0			57.7		0.0	
Approach LOS		B			B			E		A	

Intersection Summary			
HCM 2000 Control Delay	12.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	17.2
Intersection Capacity Utilization	104.2%	ICU Level of Service	G
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		↑↑			↑↑						↑↑↑	↱
Traffic Volume (vph)	0	894	0	0	452	0	0	0	0	0	369	47
Future Volume (vph)	0	894	0	0	452	0	0	0	0	0	369	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.6			5.6						6.6	6.6
Lane Util. Factor		0.95			0.95						0.91	1.00
Frt		1.00			1.00						1.00	0.85
Flt Protected		1.00			1.00						1.00	1.00
Satd. Flow (prot)		3539			3539						5085	1583
Flt Permitted		1.00			1.00						1.00	1.00
Satd. Flow (perm)		3539			3539						5085	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	972	0	0	491	0	0	0	0	0	401	51
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	40
Lane Group Flow (vph)	0	972	0	0	491	0	0	0	0	0	401	11
Turn Type		NA			NA						NA	Perm
Protected Phases		2			6						8	
Permitted Phases												8
Actuated Green, G (s)		105.9			105.9						31.9	31.9
Effective Green, g (s)		105.9			105.9						31.9	31.9
Actuated g/C Ratio		0.71			0.71						0.21	0.21
Clearance Time (s)		5.6			5.6						6.6	6.6
Vehicle Extension (s)		3.0			3.0						3.0	3.0
Lane Grp Cap (vph)		2498			2498						1081	336
v/s Ratio Prot		c0.27			0.14						c0.08	
v/s Ratio Perm												0.01
v/c Ratio		0.39			0.20						0.37	0.03
Uniform Delay, d1		8.9			7.5						50.5	46.8
Progression Factor		0.73			0.91						1.00	1.00
Incremental Delay, d2		0.4			0.0						0.2	0.0
Delay (s)		7.0			6.9						50.7	46.9
Level of Service		A			A						D	D
Approach Delay (s)		7.0			6.9			0.0			50.3	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	42.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Volume (vph)	1041	0	452	0	0	382
Future Volume (vph)	1041	0	452	0	0	382
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6		6.6			6.6
Lane Util. Factor	0.91		0.97			0.88
Frt	1.00		1.00			0.85
Flt Protected	1.00		0.95			1.00
Satd. Flow (prot)	5085		3433			2787
Flt Permitted	1.00		0.95			1.00
Satd. Flow (perm)	5085		3433			2787
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1132	0	491	0	0	415
RTOR Reduction (vph)	0	0	0	0	0	169
Lane Group Flow (vph)	1132	0	491	0	0	246
Turn Type	NA		Prot			Over
Protected Phases	2		8			8
Permitted Phases						
Actuated Green, G (s)	105.9		31.9			31.9
Effective Green, g (s)	105.9		31.9			31.9
Actuated g/C Ratio	0.71		0.21			0.21
Clearance Time (s)	5.6		6.6			6.6
Vehicle Extension (s)	3.0		3.0			3.0
Lane Grp Cap (vph)	3590		730			592
v/s Ratio Prot	c0.22		c0.14			0.09
v/s Ratio Perm						
v/c Ratio	0.32		0.67			0.42
Uniform Delay, d1	8.3		54.3			51.0
Progression Factor	1.00		1.17			1.00
Incremental Delay, d2	0.2		2.4			0.5
Delay (s)	8.6		65.8			51.5
Level of Service	A		E			D
Approach Delay (s)	8.6			65.8	51.5	
Approach LOS	A			E	D	

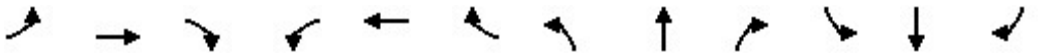
Intersection Summary			
HCM 2000 Control Delay	31.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	43.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	15	600	15	581	777	8	67	44	451	0	46	30
Future Volume (vph)	15	600	15	581	777	8	67	44	451	0	46	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		5.0	6.0			6.0	6.0		6.0	
Lane Util. Factor		0.91		0.97	0.91			0.91	0.91		1.00	
Frt		1.00		1.00	1.00			0.90	0.85		0.95	
Flt Protected		1.00		0.95	1.00			0.99	1.00		1.00	
Satd. Flow (prot)		5062		3433	5077			3020	1441		1763	
Flt Permitted		0.91		0.95	1.00			0.86	1.00		1.00	
Satd. Flow (perm)		4592		3433	5077			2637	1441		1763	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	652	16	632	845	9	73	48	490	0	50	33
RTOR Reduction (vph)	0	2	0	0	1	0	0	0	0	0	25	0
Lane Group Flow (vph)	0	682	0	632	853	0	0	366	245	0	58	0
Turn Type	Perm	NA		Prot	NA		Perm	NA	Perm		NA	
Protected Phases		6		5	2			4			8	
Permitted Phases	6						4		4	8		
Actuated Green, G (s)		42.4		25.5	72.9			25.1	25.1		25.1	
Effective Green, g (s)		42.4		25.5	72.9			25.1	25.1		25.1	
Actuated g/C Ratio		0.39		0.23	0.66			0.23	0.23		0.23	
Clearance Time (s)		6.0		5.0	6.0			6.0	6.0		6.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		1770		795	3364			601	328		402	
v/s Ratio Prot				c0.18	0.17						0.03	
v/s Ratio Perm		c0.15						0.14	c0.17			
v/c Ratio		0.39		0.79	0.25			0.61	0.75		0.15	
Uniform Delay, d1		24.4		39.8	7.5			38.1	39.5		33.9	
Progression Factor		1.72		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		0.6		5.5	0.2			1.8	9.0		0.2	
Delay (s)		42.5		45.3	7.7			39.8	48.4		34.1	
Level of Service		D		D	A			D	D		C	
Approach Delay (s)		42.5			23.7			43.3			34.1	
Approach LOS		D			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	32.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	55.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	306	10	357	395	122	24	65	263	61	131	1
Future Volume (vph)	0	306	10	357	395	122	24	65	263	61	131	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		6.0	6.0			6.0	6.0		6.0	
Lane Util. Factor		0.95		0.97	0.95			0.91	0.91		0.95	
Frt		1.00		1.00	0.96			0.91	0.85		1.00	
Flt Protected		1.00		0.95	1.00			0.99	1.00		0.98	
Satd. Flow (prot)		3522		3433	3414			3071	1441		3482	
Flt Permitted		1.00		0.95	1.00			0.89	1.00		0.74	
Satd. Flow (perm)		3522		3433	3414			2741	1441		2610	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	333	11	388	429	133	26	71	286	66	142	1
RTOR Reduction (vph)	0	1	0	0	12	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	343	0	388	550	0	0	240	143	0	209	0
Turn Type		NA		Prot	NA		Perm	NA	pm+ov	custom	NA	
Protected Phases		6		1	2			4	1			
Permitted Phases							4		4	8	8	
Actuated Green, G (s)		59.3		17.8	83.1			14.9	32.7		14.9	
Effective Green, g (s)		59.3		17.8	83.1			14.9	32.7		14.9	
Actuated g/C Ratio		0.54		0.16	0.76			0.14	0.30		0.14	
Clearance Time (s)		6.0		6.0	6.0			6.0	6.0		6.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		1898		555	2579			371	506		353	
v/s Ratio Prot		0.10		c0.11	c0.16				0.05			
v/s Ratio Perm								c0.09	0.05		0.08	
v/c Ratio		0.18		0.70	0.21			0.65	0.28		0.59	
Uniform Delay, d1		12.9		43.6	3.9			45.1	29.7		44.7	
Progression Factor		1.22		1.14	0.86			0.86	1.36		1.00	
Incremental Delay, d2		0.2		3.8	0.2			3.8	0.3		2.7	
Delay (s)		16.0		53.3	3.5			42.4	40.6		47.3	
Level of Service		B		D	A			D	D		D	
Approach Delay (s)		16.0			23.8			41.7			47.3	
Approach LOS		B			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	28.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	50.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL2	SBL	SBR	NWL	NWR	NWR2
Lane Configurations												
Traffic Volume (vph)	0	262	362	89	403	6	9	332	51	311	340	41
Future Volume (vph)	0	262	362	89	403	6	9	332	51	311	340	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	4.0	5.0	5.0			4.0	4.0	4.0	4.0	
Lane Util. Factor		0.95	1.00	1.00	0.95			0.97	1.00	1.00	0.88	
Frt		1.00	0.85	1.00	1.00			1.00	0.85	1.00	0.85	
Flt Protected		1.00	1.00	0.95	1.00			0.95	1.00	0.95	1.00	
Satd. Flow (prot)		3539	1583	1770	3531			3433	1583	1770	2787	
Flt Permitted		1.00	1.00	0.49	1.00			0.94	1.00	1.00	1.00	
Satd. Flow (perm)		3539	1583	907	3531			3405	1583	1863	2787	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	285	393	97	438	7	10	361	55	338	370	45
RTOR Reduction (vph)	0	0	0	0	2	0	0	0	23	0	5	0
Lane Group Flow (vph)	0	285	393	97	443	0	0	371	32	338	410	0
Turn Type		NA	pm+ov	custom	NA		Perm	Prot	Perm	pm+pt	Prot	
Protected Phases		4	1					6		1	2	
Permitted Phases			4	8	8		6		6	2		
Actuated Green, G (s)		20.2	33.8	20.2	20.2			63.2	63.2	80.8	80.8	
Effective Green, g (s)		20.2	33.8	20.2	20.2			63.2	63.2	80.8	80.8	
Actuated g/C Ratio		0.18	0.31	0.18	0.18			0.57	0.57	0.73	0.73	
Clearance Time (s)		5.0	4.0	5.0	5.0			4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		649	486	166	648			1956	909	1368	2047	
v/s Ratio Prot		0.08	c0.10							0.03	0.15	
v/s Ratio Perm			0.15	0.11	0.13			0.11	0.02	c0.15		
v/c Ratio		0.44	0.81	0.58	0.68			0.19	0.03	0.25	0.20	
Uniform Delay, d1		39.9	35.1	41.1	41.9			11.2	10.2	4.9	4.5	
Progression Factor		1.00	1.00	0.52	0.53			1.08	2.55	1.00	1.00	
Incremental Delay, d2		0.5	9.6	4.9	2.8			0.2	0.1	0.1	0.2	
Delay (s)		40.3	44.7	26.2	25.0			12.3	26.0	5.0	4.8	
Level of Service		D	D	C	C			B	C	A	A	
Approach Delay (s)		42.9			25.2			14.0		4.9		
Approach LOS		D			C			B		A		

Intersection Summary			
HCM 2000 Control Delay	21.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	54.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBR2	NBL	SEL	SER
Lane Configurations				
Traffic Volume (vph)	420	346	316	392
Future Volume (vph)	420	346	316	392
Ideal Flow (vphpl)	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0
Lane Util. Factor	0.88	0.97	0.97	0.88
Frt	0.85	1.00	1.00	0.85
Flt Protected	1.00	0.95	0.95	1.00
Satd. Flow (prot)	2787	3433	3433	2787
Flt Permitted	1.00	0.95	0.95	1.00
Satd. Flow (perm)	2787	3433	3433	2787
Peak-hour factor, PHF	0.92	0.92	0.92	0.92
Adj. Flow (vph)	457	376	343	426
RTOR Reduction (vph)	0	0	0	0
Lane Group Flow (vph)	457	376	343	426
Turn Type	custom	Prot	Prot	pt+ov
Protected Phases	2 3 4	2	4	2 4
Permitted Phases				
Actuated Green, G (s)	110.0	27.0	53.0	84.0
Effective Green, g (s)	103.0	27.0	53.0	84.0
Actuated g/C Ratio	0.94	0.25	0.48	0.76
Clearance Time (s)		4.0	4.0	
Vehicle Extension (s)		3.0	3.0	
Lane Grp Cap (vph)	2609	842	1654	2128
v/s Ratio Prot	c0.16	c0.11	0.10	c0.15
v/s Ratio Perm				
v/c Ratio	0.18	0.45	0.21	0.20
Uniform Delay, d1	0.3	35.2	16.4	3.6
Progression Factor	1.00	0.88	1.00	1.00
Incremental Delay, d2	0.1	1.7	0.3	0.2
Delay (s)	0.4	32.6	16.7	3.8
Level of Service	A	C	B	A
Approach Delay (s)			9.6	
Approach LOS			A	

Intersection Summary			
HCM 2000 Control Delay	12.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	Err%	ICU Level of Service	H
Analysis Period (min)	15		

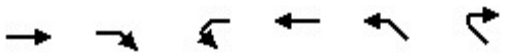
c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
1: Linden Ave & Druid Lake Park Dr

12/20/2021

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	691	15	44	910	0	0
Future Volume (vph)	691	15	44	910	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		4.5	5.0		
Lane Util. Factor	1.00		1.00	1.00		
Frt	1.00		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	1857		1770	1863		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	1857		1770	1863		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	751	16	48	989	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	767	0	48	989	0	0
Turn Type	NA		Prot	NA		
Protected Phases	6		5	2		
Permitted Phases						
Actuated Green, G (s)	55.0		5.5	90.0		
Effective Green, g (s)	55.0		5.5	90.0		
Actuated g/C Ratio	0.46		0.05	0.75		
Clearance Time (s)	5.0		4.5	5.0		
Lane Grp Cap (vph)	851		81	1397		
v/s Ratio Prot	c0.41		0.03	c0.53		
v/s Ratio Perm						
v/c Ratio	0.90		0.59	0.71		
Uniform Delay, d1	30.0		56.2	8.0		
Progression Factor	0.09		1.00	1.00		
Incremental Delay, d2	1.7		28.0	3.1		
Delay (s)	4.5		84.2	11.0		
Level of Service	A		F	B		
Approach Delay (s)	4.5			14.4	0.0	
Approach LOS	A			B	A	

Intersection Summary			
HCM 2000 Control Delay	10.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	52.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	652	117	44	866	119	54
Future Volume (vph)	652	117	44	866	119	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5		4.5	5.5	5.0	
Lane Util. Factor	1.00		1.00	1.00	1.00	
Frt	0.98		1.00	1.00	0.96	
Flt Protected	1.00		0.95	1.00	0.97	
Satd. Flow (prot)	1825		1770	1863	1725	
Flt Permitted	1.00		0.95	1.00	0.97	
Satd. Flow (perm)	1825		1770	1863	1725	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	709	127	48	941	129	59
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	836	0	48	941	188	0
Turn Type	NA		Prot	NA	Prot	
Protected Phases	2		1	6	8	
Permitted Phases						
Actuated Green, G (s)	52.5		5.5	87.5	22.0	
Effective Green, g (s)	52.5		5.5	87.5	22.0	
Actuated g/C Ratio	0.44		0.05	0.73	0.18	
Clearance Time (s)	5.5		4.5	5.5	5.0	
Lane Grp Cap (vph)	798		81	1358	316	
v/s Ratio Prot	c0.46		0.03	c0.51	c0.11	
v/s Ratio Perm						
v/c Ratio	1.05		0.59	0.69	0.59	
Uniform Delay, d1	33.8		56.2	8.9	44.9	
Progression Factor	1.00		0.85	1.13	1.00	
Incremental Delay, d2	45.0		20.2	2.0	8.0	
Delay (s)	78.8		67.7	12.1	52.9	
Level of Service	E		E	B	D	
Approach Delay (s)	78.8			14.8	52.9	
Approach LOS	E			B	D	

Intersection Summary			
HCM 2000 Control Delay	44.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.5
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL2	SBL	SBR	NWL	NWR	NWR2
Lane Configurations												
Traffic Volume (vph)	0	186	257	52	169	320	244	189	35	118	168	7
Future Volume (vph)	0	186	257	52	169	320	244	189	35	118	168	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0		5.0	4.0		4.0	4.0	4.0	4.0	4.0
Lane Util. Factor		1.00	1.00		0.95	1.00		1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85		1.00	0.85	1.00	0.85	0.85
Flt Protected		1.00	1.00		0.99	1.00		0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1863	1583		3498	1583		1770	1583	1770	1583	1583
Flt Permitted		1.00	1.00		0.77	1.00		0.56	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1863	1583		2735	1583		1047	1583	1770	1583	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	202	279	57	184	348	265	205	38	128	183	8
RTOR Reduction (vph)	0	0	213	0	0	149	0	0	19	0	0	6
Lane Group Flow (vph)	0	202	66	0	241	199	0	470	19	128	183	2
Turn Type		NA	Perm	Perm	NA	pm+ov	Prot	Prot	Perm	Prot	Prot	Prot
Protected Phases		4			8	1	1	6		5	2	2
Permitted Phases			4	8		8			6			
Actuated Green, G (s)		26.0	26.0		26.0	63.0		75.0	54.0	17.0	34.0	34.0
Effective Green, g (s)		26.0	26.0		26.0	63.0		75.0	54.0	17.0	34.0	34.0
Actuated g/C Ratio		0.24	0.24		0.24	0.57		0.68	0.49	0.15	0.31	0.31
Clearance Time (s)		5.0	5.0		5.0	4.0		4.0	4.0	4.0	4.0	4.0
Lane Grp Cap (vph)		440	374		646	906		957	777	273	489	489
v/s Ratio Prot		c0.11				0.07		c0.17		0.07	0.12	0.00
v/s Ratio Perm			0.04		0.09	0.05		c0.17	0.01			
v/c Ratio		0.46	0.18		0.37	0.22		0.49	0.02	0.47	0.37	0.01
Uniform Delay, d1		36.0	33.5		35.2	11.5		8.1	14.4	42.4	29.7	26.3
Progression Factor		1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		3.4	1.0		1.6	0.6		1.8	0.1	5.7	2.2	0.0
Delay (s)		39.4	34.5		36.8	12.0		9.9	14.5	48.1	31.9	26.3
Level of Service		D	C		D	B		A	B	D	C	C
Approach Delay (s)		36.6			22.2			10.2		38.2		
Approach LOS		D			C			B		D		

Intersection Summary			
HCM 2000 Control Delay	25.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	61.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	488	468	0
Future Volume (Veh/h)	0	0	0	488	468	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	530	509	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1039	509	509			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1039	509	509			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	255	564	1056			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	0	0	530	509	0
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	0
cSH	1700	1700	1700	1700	1700
Volume to Capacity	0.00	0.00	0.31	0.30	0.00
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS	A				
Approach Delay (s)	0.0	0.0		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	29.0%	ICU Level of Service	A
Analysis Period (min)	15		

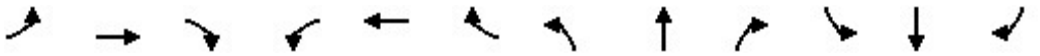
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	691	15	29	925	0	0
Future Volume (vph)	691	15	29	925	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0			4.0		
Lane Util. Factor	1.00			0.95		
Frt	1.00			1.00		
Flt Protected	1.00			1.00		
Satd. Flow (prot)	1857			3534		
Flt Permitted	1.00			0.86		
Satd. Flow (perm)	1857			3044		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	751	16	32	1005	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	767	0	0	1037	0	0
Turn Type	NA		Perm	NA		
Protected Phases	6			2		
Permitted Phases			2			
Actuated Green, G (s)	70.0			71.0		
Effective Green, g (s)	70.0			71.0		
Actuated g/C Ratio	0.58			0.59		
Clearance Time (s)	5.0			4.0		
Lane Grp Cap (vph)	1083			1801		
v/s Ratio Prot	c0.41					
v/s Ratio Perm				0.34		
v/c Ratio	0.71			0.58		
Uniform Delay, d1	17.7			15.2		
Progression Factor	0.72			1.00		
Incremental Delay, d2	2.1			1.3		
Delay (s)	15.0			16.5		
Level of Service	B			B		
Approach Delay (s)	15.0			16.5	0.0	
Approach LOS	B			B	A	

Intersection Summary			
HCM 2000 Control Delay	15.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	11.5
Intersection Capacity Utilization	49.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NWL	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	666	109	47	40	29	896
Future Volume (vph)	666	109	47	40	29	896
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.4		4.4	4.4	4.4	4.4
Lane Util. Factor	1.00		1.00	1.00	1.00	0.95
Frt	0.98		1.00	0.85	0.86	0.85
Flt Protected	0.96		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1752		1770	1583	1596	1504
Flt Permitted	0.96		0.95	1.00	1.00	1.00
Satd. Flow (perm)	1752		1770	1583	1596	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	724	118	51	43	32	974
RTOR Reduction (vph)	0	0	0	35	208	217
Lane Group Flow (vph)	842	0	51	8	301	280
Turn Type	Prot		Prot	Perm	Prot	Perm
Protected Phases	2!		8		6!	
Permitted Phases				8		6
Actuated Green, G (s)	66.6		23.6	23.6	67.6	67.6
Effective Green, g (s)	66.6		23.6	23.6	67.6	67.6
Actuated g/C Ratio	0.55		0.20	0.20	0.56	0.56
Clearance Time (s)	5.4		4.4	4.4	4.4	4.4
Lane Grp Cap (vph)	972		348	311	899	847
v/s Ratio Prot	c0.48		c0.03		0.19	
v/s Ratio Perm				0.01		0.19
v/c Ratio	0.87		0.15	0.03	0.33	0.33
Uniform Delay, d1	22.9		39.9	38.9	14.1	14.1
Progression Factor	1.00		1.00	1.00	0.40	0.52
Incremental Delay, d2	10.2		0.9	0.2	0.8	0.9
Delay (s)	33.1		40.8	39.1	6.5	8.2
Level of Service	C		D	D	A	A
Approach Delay (s)	33.1		40.0		7.3	
Approach LOS	C		D		A	

Intersection Summary			
HCM 2000 Control Delay	20.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.3
Intersection Capacity Utilization	81.3%	ICU Level of Service	D
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

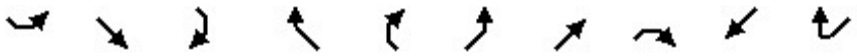


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	754	125	30	860	53	144	5	28	6	13	5
Future Volume (vph)	8	754	125	30	860	53	144	5	28	6	13	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6			5.6			5.6			5.6	
Lane Util. Factor	1.00	1.00			0.95			1.00			1.00	
Frt	1.00	0.98			0.99			0.98			0.97	
Flt Protected	0.95	1.00			1.00			0.96			0.99	
Satd. Flow (prot)	1770	1823			3504			1752			1790	
Flt Permitted	0.19	1.00			0.61			0.75			0.92	
Satd. Flow (perm)	359	1823			2136			1362			1676	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	820	136	33	935	58	157	5	30	7	14	5
RTOR Reduction (vph)	0	0	0	0	3	0	0	5	0	0	4	0
Lane Group Flow (vph)	9	956	0	0	1023	0	0	187	0	0	22	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	79.4	79.4			79.4			34.4			34.4	
Effective Green, g (s)	79.4	79.4			79.4			34.4			34.4	
Actuated g/C Ratio	0.53	0.53			0.53			0.23			0.23	
Clearance Time (s)	5.6	5.6			5.6			5.6			5.6	
Lane Grp Cap (vph)	190	964			1130			312			384	
v/s Ratio Prot		c0.52										
v/s Ratio Perm	0.03				0.48			c0.14			0.01	
v/c Ratio	0.05	0.99			0.91			0.60			0.06	
Uniform Delay, d1	17.0	35.0			31.9			51.7			45.1	
Progression Factor	0.18	0.29			1.00			1.00			1.00	
Incremental Delay, d2	0.2	16.1			11.9			8.3			0.3	
Delay (s)	3.3	26.2			43.8			60.0			45.4	
Level of Service	A	C			D			E			D	
Approach Delay (s)		26.0			43.8			60.0			45.4	
Approach LOS		C			D			E			D	

Intersection Summary			
HCM 2000 Control Delay	37.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	15.2
Intersection Capacity Utilization	73.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

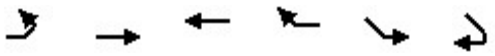
Movement	NBL	NBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Volume (vph)	0	170	717	0	254	755
Future Volume (vph)	0	170	717	0	254	755
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.6		4.5	5.6
Lane Util. Factor	1.00		1.00		1.00	0.95
Frt	0.86		1.00		1.00	1.00
Flt Protected	1.00		1.00		0.95	1.00
Satd. Flow (prot)	1611		1863		1770	3539
Flt Permitted	1.00		1.00		0.95	1.00
Satd. Flow (perm)	1611		1863		1770	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	185	779	0	276	821
RTOR Reduction (vph)	154	0	0	0	0	0
Lane Group Flow (vph)	31	0	779	0	276	821
Turn Type	Prot		NA		Prot	NA
Protected Phases	7		2		1	6
Permitted Phases						
Actuated Green, G (s)	25.0		58.4		31.5	114.4
Effective Green, g (s)	25.0		58.4		31.5	114.4
Actuated g/C Ratio	0.17		0.39		0.21	0.76
Clearance Time (s)	5.0		5.6		4.5	5.6
Lane Grp Cap (vph)	268		725		371	2699
v/s Ratio Prot	c0.02		c0.42		c0.16	c0.23
v/s Ratio Perm						
v/c Ratio	0.12		1.07		0.74	0.30
Uniform Delay, d1	53.1		45.8		55.5	5.5
Progression Factor	1.00		1.00		1.13	1.03
Incremental Delay, d2	0.9		55.2		6.5	0.1
Delay (s)	54.0		101.0		69.3	5.8
Level of Service	D		F		E	A
Approach Delay (s)	54.0		101.0			21.8
Approach LOS	D		F			C

Intersection Summary			
HCM 2000 Control Delay	54.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	20.7
Intersection Capacity Utilization	76.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	SEL	SET	SER	NWR	NWR2	NEL	NET	NER	SWT	SWR2
Lane Configurations										
Traffic Volume (vph)	13	427	294	753	2	33	41	300	11	8
Future Volume (vph)	13	427	294	753	2	33	41	300	11	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	5.0	6.0			6.0	5.0	6.0	6.0
Lane Util. Factor		1.00	1.00	0.88			1.00	1.00	1.00	1.00
Frt		1.00	0.85	0.85			1.00	0.85	1.00	0.85
Flt Protected		1.00	1.00	1.00			0.98	1.00	1.00	1.00
Satd. Flow (prot)		1860	1583	2787			1822	1583	1863	1583
Flt Permitted		1.00	1.00	1.00			0.86	1.00	1.00	1.00
Satd. Flow (perm)		1860	1583	2787			1605	1583	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	464	320	818	2	36	45	326	12	9
RTOR Reduction (vph)	0	0	0	8	0	0	0	0	0	8
Lane Group Flow (vph)	0	478	320	812	0	0	81	326	12	1
Turn Type	Perm	NA	custom	custom		Perm	NA	custom	NA	Perm
Protected Phases		6	5	2			4	5	8	
Permitted Phases	6		6	5		4		4		8
Actuated Green, G (s)		33.0	55.0	80.0			18.0	40.0	18.0	18.0
Effective Green, g (s)		33.0	55.0	80.0			18.0	40.0	18.0	18.0
Actuated g/C Ratio		0.30	0.50	0.73			0.16	0.36	0.16	0.16
Clearance Time (s)		6.0	5.0	6.0			6.0	5.0	6.0	6.0
Lane Grp Cap (vph)		558	863	2026			262	575	304	259
v/s Ratio Prot			0.07	c0.29				c0.11	0.01	
v/s Ratio Perm		0.26	0.13				0.05	0.09		0.00
v/c Ratio		0.86	0.37	0.40			0.31	0.57	0.04	0.01
Uniform Delay, d1		36.3	16.9	5.8			40.5	28.1	38.7	38.5
Progression Factor		0.61	0.52	1.00			1.00	1.00	1.00	1.00
Incremental Delay, d2		15.2	1.2	0.6			3.0	4.0	0.2	0.0
Delay (s)		37.4	10.0	6.4			43.6	32.1	39.0	38.5
Level of Service		D	A	A			D	C	D	D
Approach Delay (s)		26.4					34.4		38.8	
Approach LOS		C					C		D	

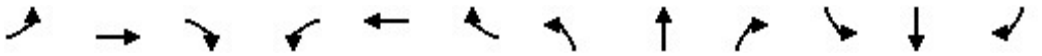
Intersection Summary			
HCM 2000 Control Delay	20.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	75.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations		↑			↰↰	
Traffic Volume (vph)	0	457	0	0	277	0
Future Volume (vph)	0	457	0	0	277	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	
Lane Util. Factor		1.00			0.97	
Frt		1.00			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		1863			3433	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		1863			3433	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	497	0	0	301	0
RTOR Reduction (vph)	0	0	0	0	282	0
Lane Group Flow (vph)	0	497	0	0	19	0
Turn Type		NA			Prot	
Protected Phases		2			3	
Permitted Phases						
Actuated Green, G (s)		91.0			7.0	
Effective Green, g (s)		91.0			7.0	
Actuated g/C Ratio		0.83			0.06	
Clearance Time (s)		6.0			6.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		1541			218	
v/s Ratio Prot		c0.27			c0.01	
v/s Ratio Perm						
v/c Ratio		0.32			0.09	
Uniform Delay, d1		2.2			48.5	
Progression Factor		4.13			1.00	
Incremental Delay, d2		0.5			0.2	
Delay (s)		9.7			48.7	
Level of Service		A			D	
Approach Delay (s)		9.7	0.0		48.7	
Approach LOS		A	A		D	

Intersection Summary			
HCM 2000 Control Delay	24.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	46.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	254	5	137	322	58	9	41	162	41	81	1
Future Volume (vph)	0	254	5	137	322	58	9	41	162	41	81	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		6.0	6.0			6.0	6.0		6.0	
Lane Util. Factor		1.00		1.00	1.00			1.00	1.00		0.95	
Frt		1.00		1.00	0.98			1.00	0.85		1.00	
Flt Protected		1.00		0.95	1.00			0.99	1.00		0.98	
Satd. Flow (prot)		1858		1770	1820			1846	1583		3477	
Flt Permitted		1.00		0.95	1.00			0.94	1.00		0.83	
Satd. Flow (perm)		1858		1770	1820			1744	1583		2951	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	276	5	149	350	63	10	45	176	45	88	1
RTOR Reduction (vph)	0	0	0	0	6	0	0	0	112	0	1	0
Lane Group Flow (vph)	0	281	0	149	407	0	0	55	64	0	133	0
Turn Type		NA		Prot	NA		Perm	NA	pm+ov	custom	NA	
Protected Phases		6		5	2			4	5			
Permitted Phases							4		4	8	8	
Actuated Green, G (s)		27.0		21.0	79.0			19.0	40.0		19.0	
Effective Green, g (s)		27.0		21.0	79.0			19.0	40.0		19.0	
Actuated g/C Ratio		0.25		0.19	0.72			0.17	0.36		0.17	
Clearance Time (s)		6.0		6.0	6.0			6.0	6.0		6.0	
Lane Grp Cap (vph)		456		337	1307			301	661		509	
v/s Ratio Prot		c0.15		c0.08	c0.22				0.02			
v/s Ratio Perm								0.03	0.02		c0.05	
v/c Ratio		0.62		0.44	0.31			0.18	0.10		0.26	
Uniform Delay, d1		36.9		39.3	5.6			38.9	23.1		39.4	
Progression Factor		0.94		0.91	0.95			1.84	0.64		1.00	
Incremental Delay, d2		6.0		3.9	0.6			1.3	0.3		1.2	
Delay (s)		40.6		39.7	5.9			72.9	15.0		40.7	
Level of Service		D		D	A			E	B		D	
Approach Delay (s)		40.6			14.9			28.8			40.7	
Approach LOS		D			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	26.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	45.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL2	SBL	SBR	NWL	NWR	NWR2
Lane Configurations												
Traffic Volume (vph)	0	175	257	37	184	2	5	204	15	118	169	12
Future Volume (vph)	0	175	257	37	184	2	5	204	15	118	169	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	4.0	5.0	5.0			4.0	4.0	4.0	4.0	4.0
Lane Util. Factor		0.95	1.00	1.00	0.95			1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00			1.00	0.85	1.00	0.85	0.85
Flt Protected		1.00	1.00	0.95	1.00			0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)		3539	1583	1770	3534			1770	1583	1770	1583	1583
Flt Permitted		1.00	1.00	0.59	1.00			1.00	1.00	1.00	1.00	1.00
Satd. Flow (perm)		3539	1583	1099	3534			1855	1583	1863	1583	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	190	279	40	200	2	5	222	16	128	184	13
RTOR Reduction (vph)	0	0	231	0	1	0	0	0	5	0	0	2
Lane Group Flow (vph)	0	190	48	40	201	0	0	227	11	128	184	11
Turn Type		NA	pm+ov	Perm	NA		Perm	Prot	Perm	pm+pt	Prot	Perm
Protected Phases		4	1		8			6		1	2	
Permitted Phases			4	8			6		6	2		2
Actuated Green, G (s)		11.7	18.9	11.7	11.7			78.1	78.1	89.3	89.3	89.3
Effective Green, g (s)		11.7	18.9	11.7	11.7			78.1	78.1	89.3	89.3	89.3
Actuated g/C Ratio		0.11	0.17	0.11	0.11			0.71	0.71	0.81	0.81	0.81
Clearance Time (s)		5.0	4.0	5.0	5.0			4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		376	271	116	375			1317	1123	1512	1285	1285
v/s Ratio Prot		0.05	c0.01		c0.06					0.01	0.12	
v/s Ratio Perm			0.02	0.04				c0.12	0.01	0.06		0.01
v/c Ratio		0.51	0.18	0.34	0.54			0.17	0.01	0.08	0.14	0.01
Uniform Delay, d1		46.4	38.9	45.6	46.6			5.3	4.7	2.2	2.2	2.0
Progression Factor		1.00	1.00	1.13	1.14			0.96	1.00	1.00	1.00	1.00
Incremental Delay, d2		1.1	0.3	1.7	1.4			0.3	0.0	0.0	0.2	0.0
Delay (s)		47.5	39.2	53.0	54.6			5.3	4.7	2.3	2.4	2.0
Level of Service		D	D	D	D			A	A	A	A	A
Approach Delay (s)		42.6			54.3			5.3		2.4		
Approach LOS		D			D			A		A		

Intersection Summary			
HCM 2000 Control Delay	27.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.22		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	43.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	488	468	0
Future Volume (Veh/h)	0	0	0	488	468	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	530	509	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				382		
pX, platoon unblocked	0.99					
vC, conflicting volume	1039	509	509			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1032	509	509			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	254	564	1056			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	0	0	530	509
Volume Left	0	0	0	0
Volume Right	0	0	0	0
cSH	1700	1700	1700	1700
Volume to Capacity	0.00	0.00	0.31	0.30
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0
Lane LOS	A			
Approach Delay (s)	0.0	0.0		0.0
Approach LOS	A			

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	29.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	691	15	44	910	0	0
Future Volume (vph)	691	15	44	910	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0			4.0		
Lane Util. Factor	1.00			0.95		
Frt	1.00			1.00		
Flt Protected	1.00			1.00		
Satd. Flow (prot)	1857			3531		
Flt Permitted	1.00			0.79		
Satd. Flow (perm)	1857			2780		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	751	16	48	989	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	767	0	0	1037	0	0
Turn Type	NA		Perm	NA		
Protected Phases	6			2		
Permitted Phases			2			
Actuated Green, G (s)	70.0			71.0		
Effective Green, g (s)	70.0			71.0		
Actuated g/C Ratio	0.58			0.59		
Clearance Time (s)	5.0			4.0		
Lane Grp Cap (vph)	1083			1644		
v/s Ratio Prot	c0.41					
v/s Ratio Perm				0.37		
v/c Ratio	0.71			0.63		
Uniform Delay, d1	17.7			16.0		
Progression Factor	1.00			1.00		
Incremental Delay, d2	3.9			1.8		
Delay (s)	21.7			17.8		
Level of Service	C			B		
Approach Delay (s)	21.7			17.8	0.0	
Approach LOS	C			B	A	

Intersection Summary			
HCM 2000 Control Delay	19.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	11.5
Intersection Capacity Utilization	61.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NWL	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	652	117	119	54	44	866
Future Volume (vph)	652	117	119	54	44	866
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6		5.6	5.6	5.6	5.6
Lane Util. Factor	1.00		1.00	1.00	1.00	0.95
Frt	0.98		1.00	0.85	0.87	0.85
Flt Protected	0.96		0.95	1.00	0.99	1.00
Satd. Flow (prot)	1750		1770	1583	1606	1504
Flt Permitted	0.96		0.95	1.00	0.57	1.00
Satd. Flow (perm)	1750		1770	1583	917	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	709	127	129	59	48	941
RTOR Reduction (vph)	0	0	0	49	151	236
Lane Group Flow (vph)	836	0	129	10	264	338
Turn Type	Prot		Prot	Prot	Perm	Prot
Protected Phases	2		8	8		6
Permitted Phases					6	
Actuated Green, G (s)	88.4		25.4	25.4	88.4	88.4
Effective Green, g (s)	88.4		25.4	25.4	88.4	88.4
Actuated g/C Ratio	0.59		0.17	0.17	0.59	0.59
Clearance Time (s)	5.6		5.6	5.6	5.6	5.6
Lane Grp Cap (vph)	1031		299	268	540	886
v/s Ratio Prot	c0.48		c0.07	0.01		0.22
v/s Ratio Perm					0.29	
v/c Ratio	0.81		0.43	0.04	0.49	0.38
Uniform Delay, d1	24.2		55.8	52.1	17.8	16.3
Progression Factor	0.10		1.00	1.00	1.00	1.00
Incremental Delay, d2	3.0		4.5	0.3	3.2	1.2
Delay (s)	5.5		60.3	52.3	20.9	17.6
Level of Service	A		E	D	C	B
Approach Delay (s)	5.5		57.8		19.0	
Approach LOS	A		E		B	

Intersection Summary			
HCM 2000 Control Delay	17.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	15.2
Intersection Capacity Utilization	90.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	8	749	130	127	805	53	6	13	5	72	0	14
Future Volume (vph)	8	749	130	127	805	53	6	13	5	72	0	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			4.6			5.6			5.6	
Lane Util. Factor		1.00			0.95			1.00			1.00	
Frt		0.98			0.99			0.97			0.98	
Flt Protected		1.00			0.99			0.99			0.96	
Satd. Flow (prot)		1825			3488			1790			1749	
Flt Permitted		0.99			0.60			0.93			0.74	
Satd. Flow (perm)		1803			2092			1696			1353	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	814	141	138	875	58	7	14	5	78	0	15
RTOR Reduction (vph)	0	0	0	0	3	0	0	4	0	0	36	0
Lane Group Flow (vph)	0	964	0	0	1068	0	0	22	0	0	57	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)		87.4			87.4			27.4			27.4	
Effective Green, g (s)		87.4			87.4			27.4			27.4	
Actuated g/C Ratio		0.58			0.58			0.18			0.18	
Clearance Time (s)		4.6			4.6			5.6			5.6	
Lane Grp Cap (vph)		1050			1218			309			247	
v/s Ratio Prot												
v/s Ratio Perm		c0.53			0.51			0.01			c0.04	
v/c Ratio		0.92			0.88			0.07			0.23	
Uniform Delay, d1		28.1			26.7			50.8			52.3	
Progression Factor		1.00			1.14			1.00			1.00	
Incremental Delay, d2		13.9			7.9			0.4			2.2	
Delay (s)		42.0			38.2			51.2			54.5	
Level of Service		D			D			D			D	
Approach Delay (s)		42.0			38.2			51.2			54.5	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	40.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	14.7
Intersection Capacity Utilization	99.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	NBL	NBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Volume (veh/h)	0	170	717	0	0	882
Future Volume (Veh/h)	0	170	717	0	0	882
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	185	779	0	0	959
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						812
pX, platoon unblocked	0.84					
vC, conflicting volume	1258	779			779	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	933	779			779	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	45			100	
cM capacity (veh/h)	223	339			834	

Direction, Lane #	NB 1	SE 1	SE 2	NW 1	NW 2
Volume Total	185	779	0	480	480
Volume Left	0	0	0	0	0
Volume Right	185	0	0	0	0
cSH	339	1700	1700	1700	1700
Volume to Capacity	0.55	0.46	0.00	0.28	0.28
Queue Length 95th (ft)	78	0	0	0	0
Control Delay (s)	27.7	0.0	0.0	0.0	0.0
Lane LOS	D				
Approach Delay (s)	27.7	0.0		0.0	
Approach LOS	D				

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	54.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SEL	SET	SER	SER2	NWL	NWT	NWR	NEL	NET	NER	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	13	417	10	17	404	476	2	33	41	300	11	8
Future Volume (vph)	13	417	10	17	404	476	2	33	41	300	11	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			5.0	6.0			6.0	5.0	6.0	
Lane Util. Factor		0.95			1.00	0.95			1.00	1.00	1.00	
Frt		0.99			1.00	1.00			1.00	0.85	0.94	
Flt Protected		1.00			0.95	1.00			0.98	1.00	1.00	
Satd. Flow (prot)		3503			1770	3537			1822	1583	1755	
Flt Permitted		0.93			0.34	1.00			0.86	1.00	1.00	
Satd. Flow (perm)		3258			625	3537			1597	1583	1755	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	453	11	18	439	517	2	36	45	326	12	9
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	8	0
Lane Group Flow (vph)	0	496	0	0	439	519	0	0	81	326	13	0
Turn Type	Perm	NA			pm+pt	NA		Perm	NA	pm+ov	NA	
Protected Phases		6			5	2			4	5	8	
Permitted Phases	6				2			4		4		
Actuated Green, G (s)		23.0			80.0	80.0			18.0	50.0	18.0	
Effective Green, g (s)		23.0			80.0	80.0			18.0	50.0	18.0	
Actuated g/C Ratio		0.21			0.73	0.73			0.16	0.45	0.16	
Clearance Time (s)		6.0			5.0	6.0			6.0	5.0	6.0	
Lane Grp Cap (vph)		681			787	2572			261	719	287	
v/s Ratio Prot					c0.16	0.15				c0.13	0.01	
v/s Ratio Perm		c0.15			c0.24				0.05	0.07		
v/c Ratio		0.73			0.56	0.20			0.31	0.45	0.05	
Uniform Delay, d1		40.6			7.2	4.8			40.5	20.6	38.8	
Progression Factor		1.00			1.00	1.00			1.00	1.00	1.00	
Incremental Delay, d2		6.7			2.8	0.2			3.1	2.1	0.3	
Delay (s)		47.3			10.0	5.0			43.6	22.7	39.1	
Level of Service		D			B	A			D	C	D	
Approach Delay (s)		47.3				7.3			26.8		39.1	
Approach LOS		D				A			C		D	

Intersection Summary			
HCM 2000 Control Delay	22.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	60.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL2	SBL	SBR	NWL	NWR	NWR2
Lane Configurations												
Traffic Volume (vph)	0	175	257	37	184	2	5	204	15	118	169	12
Future Volume (vph)	0	175	257	37	184	2	5	204	15	118	169	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	4.0	5.0	5.0			4.0	4.0	4.0	4.0	4.0
Lane Util. Factor		0.95	1.00	1.00	0.95			1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00			1.00	0.85	1.00	0.85	0.85
Flt Protected		1.00	1.00	0.95	1.00			0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)		3539	1583	1770	3534			1770	1583	1770	1583	1583
Flt Permitted		1.00	1.00	0.59	1.00			1.00	1.00	1.00	1.00	1.00
Satd. Flow (perm)		3539	1583	1099	3534			1855	1583	1863	1583	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	190	279	40	200	2	5	222	16	128	184	13
RTOR Reduction (vph)	0	0	231	0	1	0	0	0	5	0	0	2
Lane Group Flow (vph)	0	190	48	40	201	0	0	227	11	128	184	11
Turn Type		NA	pm+ov	Perm	NA		Perm	Prot	Perm	pm+pt	Prot	Perm
Protected Phases		4	1		8			6		1	2	
Permitted Phases			4	8			6		6	2		2
Actuated Green, G (s)		11.7	18.9	11.7	11.7			78.1	78.1	89.3	89.3	89.3
Effective Green, g (s)		11.7	18.9	11.7	11.7			78.1	78.1	89.3	89.3	89.3
Actuated g/C Ratio		0.11	0.17	0.11	0.11			0.71	0.71	0.81	0.81	0.81
Clearance Time (s)		5.0	4.0	5.0	5.0			4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		376	271	116	375			1317	1123	1512	1285	1285
v/s Ratio Prot		0.05	c0.01		c0.06					0.01	0.12	
v/s Ratio Perm			0.02	0.04				c0.12	0.01	0.06		0.01
v/c Ratio		0.51	0.18	0.34	0.54			0.17	0.01	0.08	0.14	0.01
Uniform Delay, d1		46.4	38.9	45.6	46.6			5.3	4.7	2.2	2.2	2.0
Progression Factor		1.00	1.00	1.00	1.00			0.99	1.00	1.00	1.00	1.00
Incremental Delay, d2		1.1	0.3	1.8	1.5			0.3	0.0	0.0	0.2	0.0
Delay (s)		47.5	39.2	47.4	48.1			5.5	4.7	2.3	2.4	2.0
Level of Service		D	D	D	D			A	A	A	A	A
Approach Delay (s)		42.6			47.9			5.5		2.4		
Approach LOS		D			D			A		A		

Intersection Summary			
HCM 2000 Control Delay	26.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.22		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	43.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	488	468	0
Future Volume (Veh/h)	0	0	0	488	468	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	530	509	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				382		
pX, platoon unblocked	0.98					
vC, conflicting volume	1039	254	509			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1031	254	509			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	225	745	1052			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	0	0	530	339	170
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	0
cSH	1700	1700	1700	1700	1700
Volume to Capacity	0.00	0.00	0.31	0.20	0.10
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS	A				
Approach Delay (s)	0.0	0.0		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	29.0%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
1: Linden Ave & Druid Lake Park Dr

12/20/2021

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	968	30	67	1415	0	0
Future Volume (vph)	968	30	67	1415	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		4.5	5.0		
Lane Util. Factor	1.00		1.00	1.00		
Frt	1.00		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	1855		1770	1863		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	1855		1770	1863		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1052	33	73	1538	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1085	0	73	1538	0	0
Turn Type	NA		Prot	NA		
Protected Phases	6		5	2		
Permitted Phases						
Actuated Green, G (s)	81.0		9.5	120.0		
Effective Green, g (s)	81.0		9.5	120.0		
Actuated g/C Ratio	0.54		0.06	0.80		
Clearance Time (s)	5.0		4.5	5.0		
Lane Grp Cap (vph)	1001		112	1490		
v/s Ratio Prot	0.58		0.04	c0.83		
v/s Ratio Perm						
v/c Ratio	1.08		0.65	1.03		
Uniform Delay, d1	34.5		68.6	15.0		
Progression Factor	0.24		1.00	1.00		
Incremental Delay, d2	39.7		25.8	32.0		
Delay (s)	48.1		94.5	47.0		
Level of Service	D		F	D		
Approach Delay (s)	48.1			49.2	0.0	
Approach LOS	D			D	A	

Intersection Summary			
HCM 2000 Control Delay	48.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	78.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			