Environmental Impact Assessment:

The Central Bank of The Bahamas New Premises – REVISION 1

Submitted to:

Department of Environmental Planning and Protection

Charlotte House, Charlotte & Shirley Streets, Nassau, The Bahamas

Submitted by:

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On behalf of:
The Central Bank of The Bahamas

Fredrick Street, Nassau, The Bahamas

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1. EXECUTIVE SUMMARY

The proposed project site is situated near the Downtown Nassau area, which is located within the northern district of island of New Providence. The site is positioned between four (4) major roadways within the city of Nassau known as Parliament Street, East Street, Shirley Street and East Hill Street; and is an estimated 0.08 miles south of Parliament Square.

The seven (7) level building will contain a 250 seat-multipurpose theatre, art gallery, staff cafeteria, visitor center, security operations, service entry, central utilities plant, support, and storage facilities, developed office spaces, conference rooms, restrooms, staff gym, 2-level (basement level) 215 automobile underground parking lot, back of house facility (BOH), loading and unloading yard, and public park. The development of the project intends to strive for LEED Silver rating during the construction of the new CBOB premises. This program encourages sustainable development designs and materials which reduce demand on municipal utility resources.

As this is a previously impacted site, special care and consideration must be taken upon the commencement of the construction phase to ensure that minimal or no damage is done to the root system of the Silk Cotton trees on site. If damaged, this may compromise the integrity of the aged trees and other native trees on property which are part of the design.

Due to the site elevations, it is possible that construction may increase flood risk to the immediate Shirley Street area and community because of its location within the middle of a high traffic / commercial area. To avoid extensive run off and flooding to Shirley Street, Parliament Street, East Street, and East Hill Street, wastewater management will be in place. A trench should be installed to collect water as it follows the natural slope of the land at the site. The site will be graded to avoid pooling areas where standing water can accumulate. Appropriate drainage will be installed during construction to help prevent flooding on site during operation. During the hurricane seasons the drainage system will be cleared regularly.

It is likely that positive socio-economic impacts would stem from the development of the new CBOB premises. As this generates jobs for local residents and has the potential to decrease the unemployment rate within in New Providence. Subsequently, additional economic growth is expected to accompany the new premises as it provides construction jobs and a space for artists. The proposed art gallery/museum and performance theater provides a hub for local artists to showcase their talents to Bahamians and tourists. This gives stakeholders and opportunity to invest in Bahamian culture, thus preserving the Bahamian way of life through self-expression and storytelling.

2. INTRODUCTION AND OBJECTIVES

2.1 Introduction

Caribbean Coastal Services Limited (CCS) was engaged by The Central Bank of The Bahamas (CBOB) to provide an Environmental Impact Assessment (EIA) for the proposed development for its new premises on the island of New Providence, in the Commonwealth of The Bahamas. Baseline studies were conducted by CCS to support the preparation of the EIA in accordance with standards set by the Department of Environmental Planning and Protection (DEPP).

2.2 Objective of the Environmental Impact Assessment (EIA)

The objective of this EIA is to provide an accurate assessment of the potential environmental impacts of the proposed development of the new premises of CBOB in New Providence (hereinafter referred to as the "Project"). For the purposes of this EIA, the assessment of the previously occupied Royal Victoria Hotel and The Commission of Inquiry grounds/environment are inclusive of biological, physical, and socio-economic resources, as well as the processes that have the potential to be directly and/or indirectly impacted by the proposed project. Mitigation measures for potentially adverse environmental impacts during the construction and operations phases of the project will be discussed to ensure that the development adheres to the best environmental practices. The evaluation of potential impacts on environmental resources is a critical step in the environmental compliance process in The Bahamas, as well as successful project planning and execution. An Environmental Management Plan (EMP) will be produced upon the approval of the EIA, to outline mitigation measures for the prevention and/or minimization of environmental impacts during the developmental and operational phases of the Project.

2.3 Scope of the EIA

The scope of this EIA covers the socio-economic, biological, and physical footprint of the project's site at the previously occupied Royal Victoria Hotel and The Commission of Inquiry grounds, and its immediate terrestrial and social environments. Possible impacts associated with the proposed development and mitigation strategies to avoid or lessen such influences within and surrounding the project area will be evaluated and discussed. The project aims to provide quality services with emphasis on reducing negative environmental impacts to the surrounding businesses and infrastructure within the immediate vicinity of the proposed development. Furthermore, identifying and adapting LEED certification criterion to support sustainable development practices where possible.

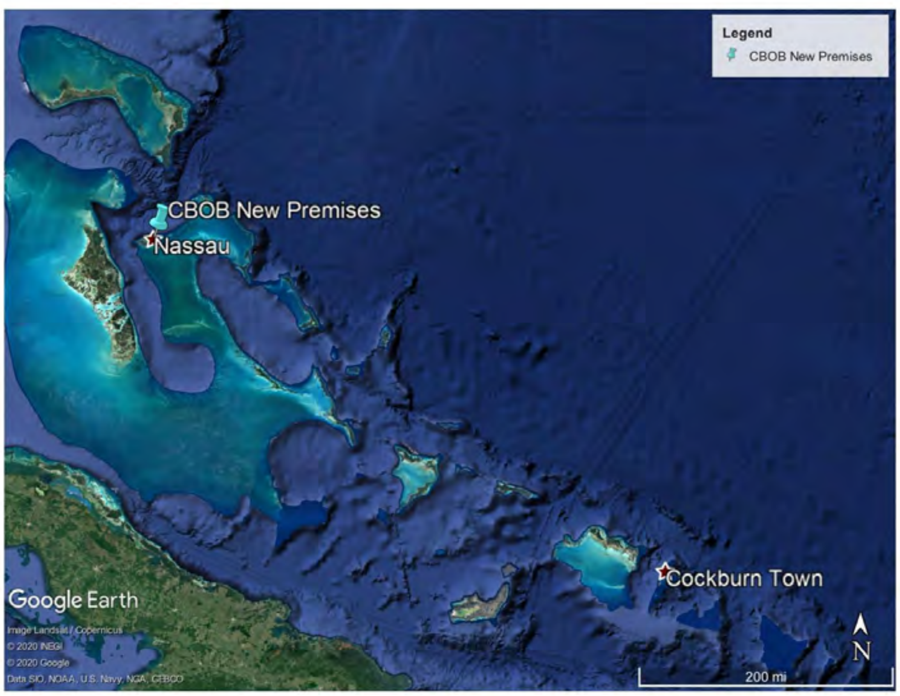
3. GEOGRAPHIC SETTING

3.1 Location of Site

The Commonwealth of The Bahamas is known as a popular tourist destination due to its warm climate, astonishing waters, and world class beaches. The archipelago is comprised of over 700 islands and cays, which lies within the North Atlantic Ocean and is surrounded by shallow turquoise waters. Nassau, the capital city of The Commonwealth of The Bahamas, is located on the island of New Providence. This is due to the establishment of the Bahamian government and Parliament within the city of Nassau. With a population of 246,329[1], New Providence is considered the most populated island within the archipelago. Although the population of the island is vast in comparison to the other islands within The Commonwealth of The Bahamas, the island's size is considerably small, measuring at approximately 207 km^2.

The proposed project site is situated near the Downtown Nassau area, which is located within the northern district of island of New Providence. The site is positioned between four (4) major roadways within the city of Nassau known as Parliament Street, East Street, Shirley Street and East Hill Street; and is an estimated 0.08 miles south of Parliament Square. Figures 1-3 below show Google Earth images of the site location relative to other features in the surrounding area.

Figure 1. Site location in The Bahamas (Google Earth).



[1] The Government of The Bahamas Department of Statistics. (2010). The Commonwealth of The Bahamas census of population and housing 2010: 1st release.

Figure 2. Site Location in New Providence (Google Earth).

Figure 3. Site location's proximity to Downtown Nassau (Google Earth).

3.2 Site Description

Main features of this 3.05-acre site includes few historical trees, overgrown vegetation, the dilapidated Commission of Inquiry building, an extensive parking lot, Ministry of Health HIV-AIDS Centre, The Bahamas National Reference Laboratory, National Drug Counsel, and a relatively smaller derelict building near the parking lot entrance (Figure 4). The smaller derelict building is the concrete building south of the National Drug Council in Figure 4.

The site is walled in on all sides and is located south of Shirley Street, east of Parliament Street, north of East Hill Street, and west of East Street (North). Which essentially positions the site within four major roadways in the congested city of Nassau. Maximum lengths and widths across the property are approximately 418.39 ft. and 340.59 ft., respectively with a total area of 3.05 acres (Figure 5).

The southern extent of the property features a steep upward slope which begins south of Shirley Street inclining along Parliament Street and headed south toward East Hill Street. This steep slope is mirrored on the adjacent side of the property near East Street. The maximum elevation of the site is an estimated 3/5-4.57ft. above sea level.

Prior to the completion of this EIA document, the aforementioned buildings (excluding the National Drug Council Building) were demolished during Quarter Four (4) of 2020 and Quarter One (1) of 2021 in unison with the demolition of the General Post Office located on East Hill Street. The demolition procedure was conducted by Woslee Construction in association with the document 'Environmental Management Plan for Central Bank of The Bahamas Demolition Project'[2]. Demolition activities are not covered under the scope of this EIA.

[2] SEV Consulting Group. (August 2020). Environmental management plan for Central Bank of The Bahamas demolition project. https://www.best.gov.bs/wp-content/uploads/2020/10/Central-Bank-Demolition-EMP-17Aug20.pdf

Figure 4. CBOB New Premises Survey Plan.

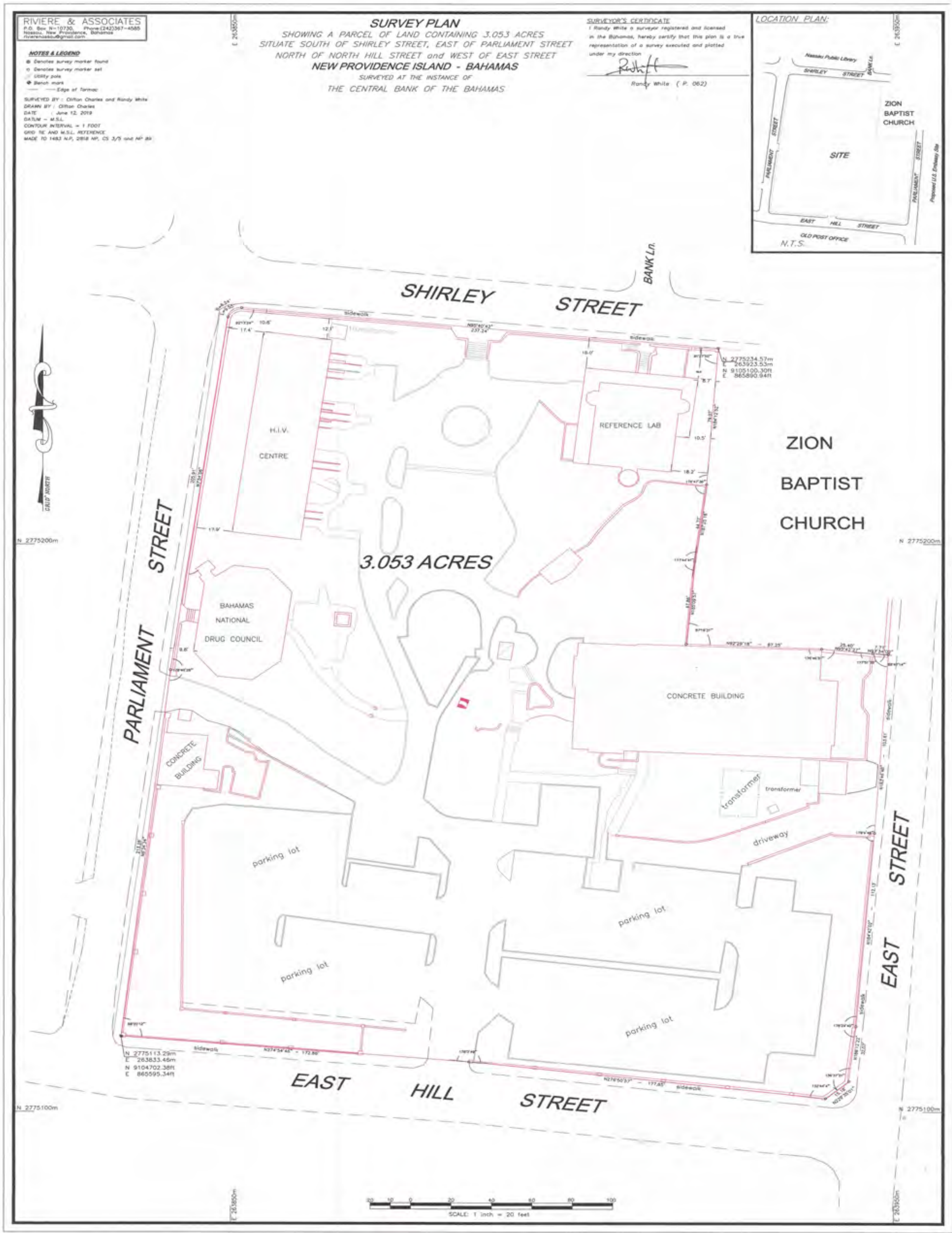


Figure 5. CBOB New Premises site boundaries.

3.3 Areas of Influence

Areas of influence associated with the project include direct and indirect economic and aesthetic impacts within the city of Nassau. The design and features of the new CBOB premises would influence the modernization of the Downtown area, as well as the surroundings businesses and attractions.

The surrounding terrestrial habitats, inclusive of the existing landscape and trees within the Royal Victoria Hotel grounds, are also under the influence of impacts stemming from the proposed development.

4. EXISTING LAND USE AND OWNERSHIP

Currently, the site is owned by the applicant (CBOB) and at present occupied by the Ministry of Health's National Reference Laboratory, The Bahamas HIV/AIDS Centre, The Bahamas National Drug Council, and the derelict Commission of Inquiry building; all of which exists within the once popular Royal Victoria Hotel grounds. The proposed site also hosts a free parking lot for patrons of the Downtown, Shirley Street and East Hill Street area. This parking lot provides job opportunities for car wash vendors as well as a resting place for vagrants.

According to Dr. Duane Sands, "The National Reference Laboratory is internationally accredited by the College of American Pathologists and is the only laboratory in The Bahamas certified by the Pan American Health Organization/World Health Organization to perform COVID-19 testing"[3]. The National Reference Laboratory also provides HIV/AIDS as well as other clinical testing, including COVID-19 testing.

The Bahamas HIV/AIDS Centre is presently located within the proposed site grounds. In 2002, the National AIDS Programme was established, which is currently known as The Bahamas HIV/AIDS Centre. This Programme was created as the government of The Bahamas' response to combating HIV/AIDS and serves as members of international efforts such as The Joint United Nations Programme on HIV/AIDS (UNAIDS) and Pan Caribbean Partnership Against HIV/AIDS (PANCAP). The HIV/AIDS Centre is responsible for the complete oversight of public and private medical treatment with regards to HIV/AIDS. This responsibility includes the coordination and training for anything related to HIV/AIDS throughout The Bahamas. Furthermore, this establishment currently provides free HIV/AIDS testing, relevant blood work, care provisions, medication, and doctor visits for the general public. It also provides accessible information and tools on the prevention and treatment for HIV/AIDS for tourists and the general public.

The Bahamas National Drug Council was established under the Ministry of Health as an effort to control illegal and prescription drug abuse within The Bahamas. Its initiatives include public outreach, youth education through school programs, exhibitions, and competitions. Furthermore, this agency works closely with the Royal Bahamas Defense Force, the Royal Bahamas Police Force and in some cases the US Embassy to combat the use of illicit drug use.

The Royal Commission of Inquiry also known as "The Commission of Inquiry" is an independent agency of the government of The Bahamas. Its main goal is to inquire into various issues that may accuse the government of illegal or heinous acts. The Commission of Inquiry Act states that is "An Act to enable the Governor-General to appoint Commissioners to inquire into and report on matters referred to them."[4] Currently, The Commission of Inquiry building located on the project site is unoccupied and in a derelict state.

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[3] Minister of Health Dr. the Hon. Duane Sands. (April 2020). The ministry of health COVID-19 update press conference.

[4] http://laws.bahamas.gov.bs/cms/images/LEGISLATION/PRINCIPAL/1911/1911-0013/CommissionsofInquiryAct_1.pdf

The Royal Victoria Hotel[5] opened as a luxury hotel in August 1861 during the United States Civil War. An increase in blockade running during the war and an increase in affluent southerners seeking trade opportunities travelling to The Bahamas led to an increased demand for accommodations. As a result, the government invested £25,000 in its construction. Landscaping surrounding the hotel became popular in its own right and is still referred to as the Royal Victoria Gardens. The trees currently on site were a part of the initial Garden.

As mentioned in Section 3.2, the aforementioned buildings have been demolished prior to the completion of this EIA document.

Figure 6. Signage of The Ministry of Health Reference Laboratory and The Bahamas HIV/AIDS Centre

Figure 7. Illustrations of The Royal Victoria Hotel.

[5] https://bahamaschronicle.com/the-royal-victoria-hotel-was-built-during-the-american-civil-war/

Figure 8. The current site of the Royal Victoria grounds.

Figure 9. The signage of the Bahamas National Drug Council.

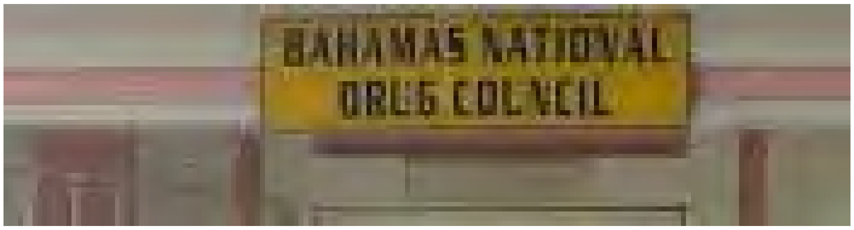


Figure 10. Signage of the derelict Commission of Inquiry Building located on the Royal Victoria Hotel grounds.

5. PROJECT DESCRIPTION

5.1 Project Details

The new Central Bank of The Bahamas headquarters (the "Project") consists of a seven (7) level building inclusive of developed office spaces, raised above a plaza level with two (2) sub-levels below containing both parking and function/support space for the new development, making a total of seven floors.

The site for this project is the grounds of the former historic Royal Victoria Hotel and Gardens in downtown Nassau, Bahamas. The site is approximately 3.05 acres and bounded by Shirley Street to the North, Parliament and East Streets to the west and east, and East Hill Street to the south (note: the Zion Baptist Church located at the northeast corner of this block is not part of the project site). The northern portion of the site will be a landscaped public park retaining as much of the existing vegetation as possible and maintained by the Central Bank of The Bahamas.

The office building above the plaza consists of three floor plates of +/- 17,000 gsf each and one floor plate of +/- 10,500 gsf with the plaza level consisting of the main entry/lobby, art gallery, and pre-function space at +/- 10,600 gsf which connects to a multipurpose performing Arts Theater of +/-10,000 gsf including restrooms and back of house services. The performing arts theater will have tiered seating for 250 people which is connected to the main office building via a pre-function space and is capable of hosting lectures/speaking events and has a small proscenium stage that will allow for a variety of performance types. The overall area of the building including the 4 storey office building, plaza level entry/lobby, art gallery, pre-function space and multipurpose performing arts theater is +/-82,000 gross square feet (gsf) measured with Building Owners and Managers Association (BOMA) standards. The roof area of all B1 spaces will create the plaza of +/- 46,000 gsf above which the office building is raised.

The two underground levels of the project accommodate parking for 215 automobiles, a secure +Visitors Centre and Staff Entry where screening of all persons entering the facility will happen at the B1 Level will happen, security operations, conference Rooms, staff gym and support facilities, staff cafeteria, services entry, and screening, loading dock, central utilities plant and support and storage facilities. The overall enclosed area for B1 is +/- 71,000 gsf with +/- 40,000 gsf dedicated to parking garage the remainder being used for the services mentioned. Level B2 consists of +/- 64,000 gsf with +/- 38,000 gsf dedicated to parking garage and the balance for the accommodation of services, utilities, storage, and support infrastructure.

<u>Project Details Summarized:</u>

1. **Plaza Level**
   - Main entrance/lobby - Art gallery
   - Pre-function space - Multi-purpose performing arts theater
   - Restrooms - BOH service
2. **Level 2,3,4 and 5 (4-stories situated above the plaza level)**

- Office spaces

3. **Basement Level 1 (B1)**
   - Visitor center - Security operations
   - Staff entry - Conference rooms
   - Staff gym - Support facilities
   - Staff Cafeteria - Service Entry
   - Loading Dock - Support and storage facilities
   - Central Utilities - Plant
4. **Basement Level 2 (B2)**
   - Parking garage - Utilities
   - Storage - Support infrastructure

5.2 Master Plan

Figure 11. CBOB Site Plan

Key Campus Metrics

LOT SIZE:

132,998.00 SF

CAMPUS ZONES:

New Public Realm (Royal Victoria Gardens, Widened Sidewalks, Sidewalk Landscaping):

24,350.00 SF (18% OF TOTAL)

Building Footprint at B1 including Curry House (Maximum extent of footprint):

79,350.00 SF (60% OF TOTAL)

CBOB Campus Exterior Areas (Gardens, Entrances, Utilities Yard):

29,298.00 SF (22% OF TOTAL)

ACCOMMODATION:

Offices, Campus Amenity Spaces, Ancillary Spaces & Parking for 214 vehicles, all over 8 levels (2 levels below grade, 5 levels above grade, plus roof level):

LEVEL B2

FIT OUT: 13,428 SF
PARKING: 49,031 SF
ALL: 62,459 SF

LEVEL B1

FIT OUT: 33,553 SF
PARKING: 38,625 SF
YARD: 7,349 SF
ALL: 79,527 SF

LEVEL 1

FIT OUT: 24,571 SF
PLAZA/ROOF: 47,140 SF
ALL: 71,711 SF

LEVEL 2

INTERIOR: 17,496 SF
EXTERIOR: 360 SF
ALL: 17,856 SF

LEVEL 3

INTERIOR: 16,734 SF
EXTERIOR: 663 SF
ALL: 17,397 SF

LEVEL 4

INTERIOR: 14,736 SF
EXTERIOR: 3,352 SF
ALL: 18,397 SF

LEVEL 5

INTERIOR: 12,350 SF
EXTERIOR: 3,331 SF
ALL: 15,681 SF

ROOF LEVEL

INTERIOR: 532 SF
EXTERIOR: 10,931 SF
ALL: 11,463 SF

Figure 11. CBOB site plan illustration.

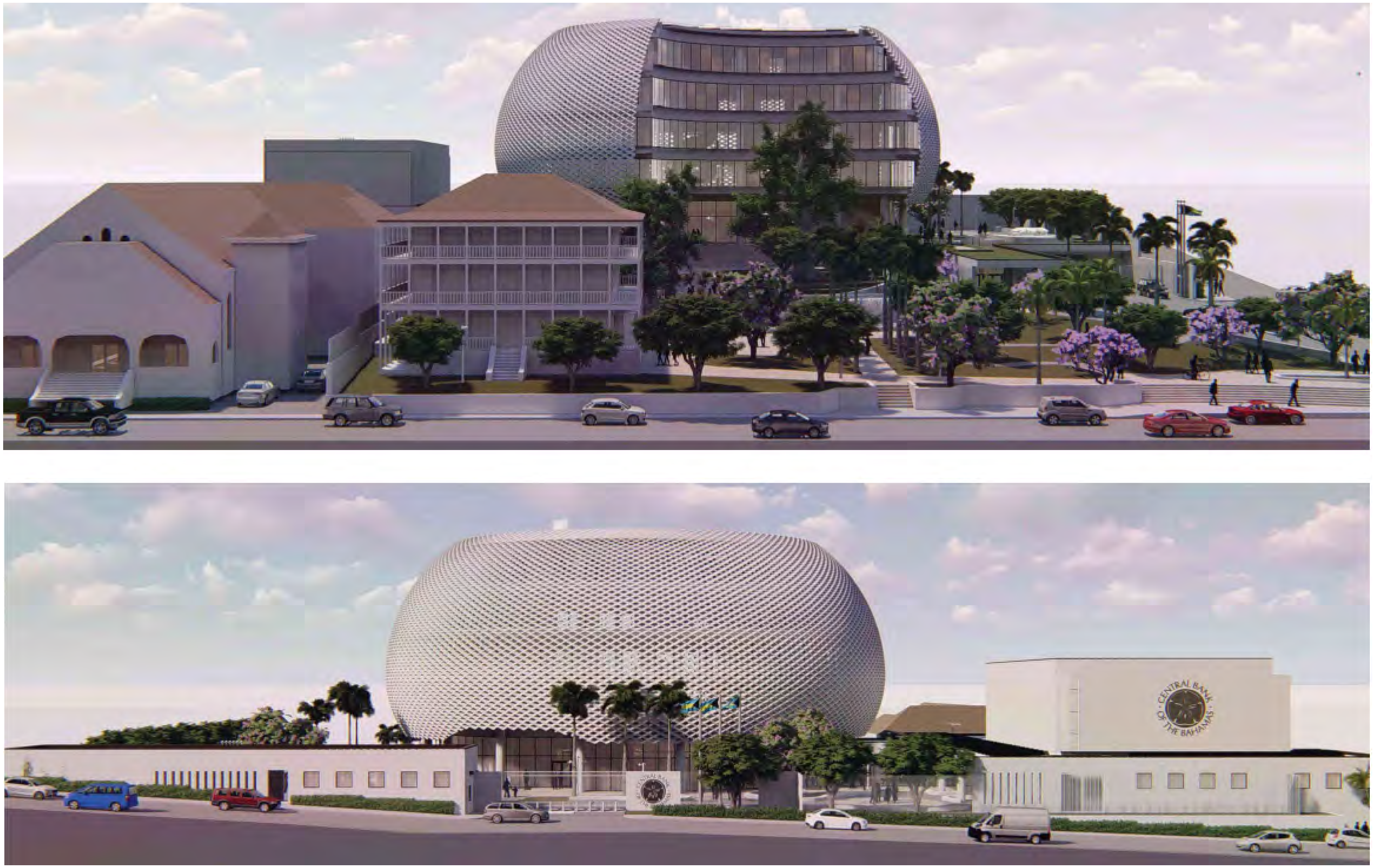


Figure 12. Site key points.

Additional Master Plan documents are included in Appendix A.

6. ALTERNATIVES

6.1 Other Considerations

Considerations for the new premises were made based on the proximity of the existing CBOB building and its location within the commercial district of the city of Nassau. The new premises at the Royal Victoria Hotel grounds would exist within approximately 0.17 miles east of CBOB's current location. Also, the elevations of Parliament and East Streets contribute to the modern designs of the new premises. Furthermore, the ultra-modern design of the CBOB new premises would complement the Government of the Bahamas' plan to modernize the Downtown community and appeal to citizens and tourists that frequent the area.

6.2 Specify "No Action" Alternative

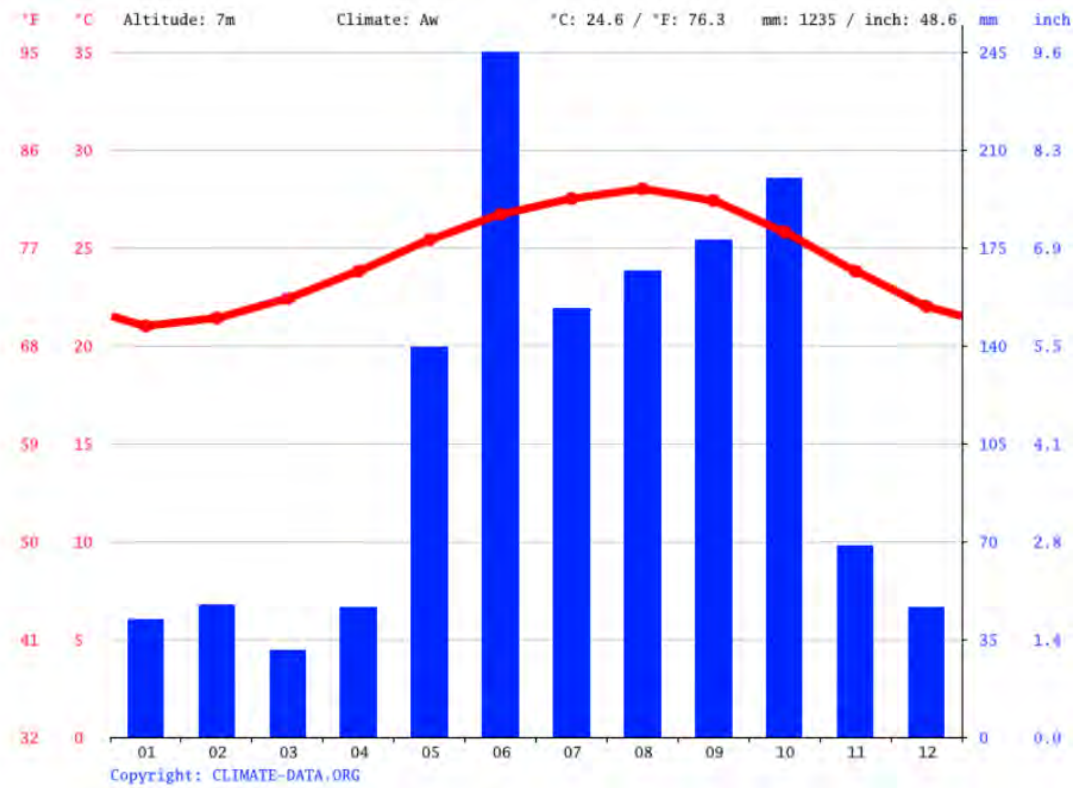
No development at the project site will retain the current environment in and around the former Royal Victoria Hotel grounds. Leaving the prime location to continue to be overcome by vegetation and remain a public eyesore. Furthermore, the proposed development could possibly become the catalyst to encourage modern development within the downtown area and continue to contribute to the aesthetic of Nassau. The design of the proposed development also stimulates economic growth within the area. Therefore, no development may result in lack of job opportunities for Bahamian citizens.

7. PHYSICAL AND BIOLOGICAL BASELINE

7.1 Climate

The general climate of The Bahamas is classified as Aw – tropical on the Köppen and Geiger classification scale. Figure 14 from Climate-data.org[6], summarizes general conditions on New Providence over a one-year period. The red line shows the air temperature, and the blue bars show precipitation.

Figure 13. New Providence Climate Temperature and Rainfall data from Climate-Data.org.



On July 6, 2020, climate data was collected at the CBOB site using a Kestrel 2 Model 5200L to help establish a baseline dataset for the site that will be used to guide environmental monitoring of the site. The table below shows the data collected (Table 1). Table 2 shows historical climate data collected in the month of July in 2018 and 2019. The Barometric Pressure Conversion Table[7] was used to convert the atmospheric pressure and The Old Farmer's Almanac[8] was used to convert the Dew Point collected on site for comparison with the historical data. Data collected on site for each parameter appears to fall within the ranges observed in 2018 and 2019.

[6] https://en.climate-data.org/north-america/the-bahamas/nassau/nassau-1307/#climate-graph
[7] https://novalynx.com/manuals/barometric-pressure-table.pdf
[8] https://www.almanac.com/content/temperature-conversion#

Table 1. Climate Data collected on July 6, 2020, at CBOB site.

Time Collected	8:50 AM	9:07 AM
Baro. (mb)	1016.7mb	1017.2mb
Altitude (Meters)	-31m	-35m
Heat Index (Celsius)	38.1°C	45.3°C
Rel. Air Dens. (%)	93.9%	93.1%
Air Flow (m^3/sec)	0.1 m^3/sec	0.1 m^3/sec
Dew Point (Celsius)	24.5°C	27.1°C
Air Speed (m/s)	1 m/s	0.8 m/s
Evap. Rate (kg/m^2/hr)	0 kg/m^2/hr	0 kg/m^2/hr
Wind Chill (Celsius)	31.1°C	33.3°C
Air Density (kg/m^3)	1.15kg/m^3	1.14kg/m^3

Table 2. Historical Climate Data for the month of July in New Providence in 2018 and 2019 [9].

Years: 2019	Temp (°F)	Dew Point (°F)	Wind Speed (mph)	Pressure (Hg)	Year: 2018	Temp (°F)	Dew Point (°F)	Wind Speed (mph)	Pressure (Hg)
1	79	71.7	4.8	28.7	1	83	74	7	30.1
2	81.9	75.6	4.7	30	2	72.4	64.8	4.8	27.7
3	83.5	75	5.2	30	3	80.2	72.7	5.8	30
4	81.8	75.2	5.2	30	4	83.2	74.2	6	30
5	83.1	74.7	9.6	30.1	5	83.8	74	9.1	28.9
6	85.1	73.5	12.6	30.1	6	84.1	72.7	6.7	30.1
7	79.1	74.2	8.7	30.1	7	83.3	73.4	5.7	30.1
8	70.5	65.3	9	30	8	84.9	74.1	8.4	30.1
9	84.4	74.6	10.3	30	9	84.7	73.4	5.8	30.1
10	84.6	75.4	7.8	28.8	10	83.7	73	4.7	30.1
11	82.3	75.7	6.7	30	11	78.5	74	5.9	30
12	81.9	75.8	5.6	30	12	82	74	4.5	30.1
13	85.3	74.8	10.7	30.1	13	83.6	75.2	4.7	30.1
14	83.8	74.4	8.7	30.1	14	81.7	74.2	3.6	30.1
15	84.8	74.8	9	30.1	15	83.1	74	5.1	30.1
16	85	73.9	8.7	30.1	16	83.9	74.3	6.4	28.8
17	85.5	74.6	8.6	30.1	17	84.4	74.6	8.8	30.1
18	84.6	74	9.6	30.1	18	84.4	75.2	8.2	30.1
19	81.6	71	10.1	30.1	19	84.4	75.5	9.4	30
20	84.8	73.8	10.8	30.1	20	83.6	74.6	9.6	30
21	84.5	74.1	8	30.1	21	85	75.8	7	30
22	80.2	75.7	10.4	29	22	79.4	72	5.9	28.6
23	80	72.5	10.3	30	23	82.2	74.5	6.5	28.7
24	83.3	75.3	8.4	30	24	83.3	75.7	10	30
25	83	74.5	5.5	30.1	25	84.2	76.3	9.3	30
26	85.2	74.6	6.4	30.1	26	83.9	76.3	8.5	30
27	85.1	76	7.7	30.1	27	84.8	75.2	11	30.1
28	84.5	76	5.4	30.1	28	82.4	74.8	8.2	30.1
29	83.3	76	6.4	30	29	82	73.8	9.7	30.1
30	80.2	72.7	6.3	30	30	82.9	74.8	9.5	28.8
31	80.6	70.4	9.4	30	31	84.5	74.7	12.4	30.1

[9] https://www.wunderground.com/history/monthly/bs/nassau/MYNN/date/2018-7

7.2 Topography

Riviere & Associates, Ltd. carried out a topographical survey and cadastral survey at the request of the Central Bank of The Bahamas. A survey plan of the project site was completed with a survey report. The survey report is shown in Appendix B. An excerpt from the report is as follows.

> "The site was walled in on all sides and in some areas along adjacent buildings. Survey monuments were set at breaks in the wall as per a boundary survey plan previously done by Donald E. Thompson & Associates. Distances shown are true and all bearings are grid north derived from existing surveys recorded in the department of lands and surveys. Datum is referenced to mean sea level and referenced from existing government control points. Reference was made to D.L.S. Plans 1483 N.P, 818 NP and CS 3/5 – 4.57ft above sea level,
>
> Survey information and datum was observed using
>
> 1. A Topcon total station GM-50 Series and Carlson Data Collector
> 2. Spectra Precision SP80 GPS Receivers
>
> The collected information was then computed and drawn in Autodesk Civil 3D 2018".

7.3 Hurricane History

The months of June-November are considered active hurricane months and are known as 'Hurricane Season' in The Bahamas. During hurricane season in The Bahamas a tropical storm and/or hurricane is expected to occur an average of every two years. This is due to the country's location within the warmer waters of the Atlantic Ocean, which causes an area of low pressure, an active ingredient for the creation of a hurricane. Hurricane Isaias was the most recent hurricane to impact New Providence in 2020. The storm was a Category 1. In 2016, Hurricane Matthew made landfall on the island of New Providence, causing major flooding and destruction as a Category 4 hurricane. A summary of the hurricanes from 1992 to 2019 to impact the island of New Providence is presented in the table below (Table 3).

Table 3. Summary of hurricane history to impact New Providence.

Hurricane Name	Date of Impact	Observed Impacts[10]
Matthew	October 6, 2016	130 mph (209.21 km/h) winds; Storm surge up to 8 ft (2.44 m)
Noel	Nov 1, 2007[11]	30 mph (48.28 km/h); 4.67 inches (11.86 cm) of rainfall [Tropical Storm]
Frances	Sept 4, 2004	115 mph (185.07 km/h) winds; "Frances also produced significant storm surge on several of the Bahama Islands, which the inundated the airports at Freeport, Grand Bahama, and Marsh Harbor, Abaco. However, exact surge values are not available.[12]"

[10] http://www.hurricanecity.com/city/nassau.htm

[11] https://www.nhc.noaa.gov/data/tcr/AL162007_Noel.pdf

[12] https://www.nhc.noaa.gov/data/tcr/AL062004_Frances.pdf

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Michelle	Nov 5, 2001	85mph (136.79 km/h); 12.64 inches (32.11 cm) of rainfall[13]
Floyd	Sept 14, 1999	145 mph (233.35 km/h) winds; storm surge and rainfall data not available
Andrew	Aug 23, 1992	155 mph (249.45 km/h) winds; storm surge and rainfall data not available

7.4 Air and Noise Quality

7.4.1 Air Quality

Air pollution levels were measured with an Igeress Formaldehyde Detector model # WP6930S on July 6, 2020, at four locations on the property to help establish baseline conditions at the site. The general air quality conditions on site were classified as "Fresh" based on the summary conditions of the following parameters described below. Table 4 summarizes the measurements collected and locations of each measurement.

Formaldehyde (HCHO)[14] – Formaldehyde is a flammable colorless gas that is typically considered a specific indoor air pollutant, however, according to the World Health Organization (WHO), "Formaldehyde is ubiquitously found in the environment, because it is formed primarily by numerous natural sources and anthropogenic activities. In the environment, it is released through biomass combustion (forest and bush fires)…Anthropogenic sources include direct ones such as on-site industrial emissions and fuel combustion from traffic." Exposure to elevated HCHO levels include but is not limited to cancer, eye and respiratory irritation and decreased lung function. Mean ambient air background concentrations remain low compared to those indoors, typically around 1–4 μg/m3. The HCHO measurements collected on site are lower than the mean ambient air concentration stated by WHO.

Total Volatile Organic Compound (TVOC) [15] – Volatile organic compounds are organic chemicals that become a gas at room temperature and are the main origin of air pollution at ground level. TVOC is the total concentration of all VOCs in the atmosphere, including Formaldehyde. "Exposure to VOCs can cause eye, nose and throat irritation, as well as upper respiratory infections, nausea, allergic reactions and headaches, etc. It can also aggravate existing respiratory diseases such as bronchitis and pneumonia." According to the TECAM website the TVOC levels observed on site is of low concern, the lowest ranking of concern for TVOC.

Particulate Matter (PM) – The EPA describes particulate matter as a general term that considers any combination of dust, dirt, smoke of various sizes that is airborne. It is often a mixture of solid particles and liquid droplets that occur in air that are divided into different groups based on their diameter. The size of the particle is linked to the potential cause for health problems. Smaller

[13] https://www.nhc.noaa.gov/data/tcr/AL152001_Michelle.pdf
[14] https://www.ncbi.nlm.nih.gov/books/NBK138711/
[15] https://www.tecamgroup.com/acceptable-voc-levels/#:~:text=Low%20TVOC%20concentration%20levels%20is,to%20be%20considerable%20or%20high.

particles, for example, can travel deep in the lungs or enter the bloodstream[16]. Fine particles also contribute to lower visibility. "PM10 represents the particle mass that enters the respiratory tract and, moreover, it includes both the coarse (particle size between 2.5 and 10 µm) and fine particles (measuring less than 2.5 µm, PM2.5) that are considered to contribute to the health effects observed in urban environments."[17] Based on this information the PM levels on site are low.

Humidity – Atmospheric humidity is the measure of the amount of water vapor in the air and is usually measured as a percentage. Once the humidity is recorded at 100% the air is totally saturated with water vapor. "It is important to human health because it affects thermal comfort; higher humidity levels can trigger heat stress, problems with breathing, and heart attacks"[18]. The average humidity range in July 2019 in The Bahamas was 90.5% to 49.1% and 90.9% to 57.3% in 2018[19]. The humidity on site fell within the expected range for the site.

Temperature –Temperature is the measure of the amount of heat or thermal energy in the atmosphere. "Prolonged exposure to extreme heat can cause heat exhaustion, heat cramps, heat stroke, and death, as well as exacerbate preexisting chronic conditions, such as various respiratory, cerebral, and cardiovascular diseases.20" The average temperature range in July 2019 in The Bahamas was 88.8°F to 62.8°F and 88.8°F to 73°F in 2018[6]. The temperature measured on site was generally higher than the average temperature in July in 2018 and 2019.

Table 4. Summary of Air Quality measurements at CBOB on July 6, 2020, where PM refers to Particulate Matter smaller than the respective values of 2.5µm, 1.0 and 10.

Air Quality Parameter	Southwestern Corner *9:05:39 AM*	Northwestern Corner *9:16:19 AM*	Northeastern Corner *9:20:53*	Southeastern Corner *9:24:53 AM*
Air Pollution Level	001 [Fresh]	001 [Fresh]	002 [Fresh]	003 [Fresh]
Formaldehyde (mg/m^3)	0.000	0.012	0.023	0.014
Total Volatile Organic Conditions (mg/m^3)	0.000	0.050	0.097	0.058
PM 2.5 ($\mu g/m^3$)	004	004	006	009
PM 1.0	003	003	004	006
PM 10	004	004	006	010
Humidity (%)	80	69	63	61
Temperature (°F)	84	91.4	93.2	93.2

[16] https://www.epa.gov/pm-pollution/health-and-environmental-effects-particulate-matter-pm
[17] https://apps.who.int/iris/bitstream/handle/10665/69477/WHO_SDE_PHE_OEH_06.02_eng.pdf?sequence=1
[18] https://www.metoffice.gov.uk/weather/learn-about/weather/types-of-weather/humidity/effects#:~:text=Humidity%20can%20affect%20human%20health,of%20sweat%20into%20the%20air..
[19] https://www.wunderground.com/history/monthly/bs/nassau/MYNN
[20] https://www.niehs.nih.gov/research/programs/geh/climatechange/health_impacts/heat/index.cfm

7.4.1.1 Asbestos and Lead Analysis

Deconstruction and relocation of the historic Little House on the project site has been proposed by the project owners. Laboratory analysis for asbestos containing materials and lead in paint was conducted to determine the presence or absence of these hazardous materials in the Little House structure. For the asbestos analysis, samples were taken from duct insulation, drywall, floor tiles and ceiling tiles found inside the structure. No asbestos containing materials were detected from seven (7) bulk material samples analyzed using polarized light microscopy. For the lead in paint analysis, samples were taken from paint on the interior surface of door frames and ceilings of the original Little House structure, and from the painted surface of concrete beneath the structure on the original building foundation. Five (5) paint chip samples were analyzed for lead by Flame in Atomic Absorption Spectroscopy (AAS), and two (2) samples were found to contain lead above the 0.5% weight threshold set by the US EPA. The Asbestos and Lead Analysis is located in Appendix C.

Figure 14. Asbestos Analysis

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
6 *042101363-0001*	Duct Insulation	Yellow Fibrous Homogeneous	95% Glass	5.0% Non-fibrous (Other)	**None Detected**
7 *042101363-0002*	Drywall	Gray/White Fibrous Homogeneous	50% Cellulose 30% MinWool	10% Perlite 10.0% Non-fibrous (Other)	**None Detected**
8-Floor Tile *042101363-0003*	Tile under Carpet	White Non-Fibrous Homogeneous		100.0% Non-fibrous (Other)	**None Detected**
8-Mastic *042101363-0003A*	Tile under Carpet	Yellow Non-Fibrous Homogeneous		100.0% Non-fibrous (Other)	**None Detected**
9 *042101363-0004*	Drywall	Brown/White Fibrous Homogeneous	20% Cellulose	80.0% Non-fibrous (Other)	**None Detected**
10-Ceiling Tile *042101363-0005*	Ceiling Tile	Brown/White Fibrous Homogeneous	15% Cellulose 5% Glass	80.0% Non-fibrous (Other)	**None Detected**
10-Joint Compound *042101363-0005A*	Ceiling Tile	White Non-Fibrous Homogeneous		100.0% Non-fibrous (Other)	**None Detected**

Figure 15. Lead Analysis

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Weight*	*Lead Concentration*
	202100535-0001		1/26/2021	0.2663 g	0.20 % wt
	Site: Little House, Lead Sample #1				
	202100535-0002		1/26/2021	0.2509 g	0.036 % wt
	Site: Little House, Sample (Interior) #2				
	202100535-0003		1/26/2021	0.2527 g	0.024 % wt
	Site: Light House, Sample #4				
	202100535-0004		1/26/2021	0.2732 g	6.8 % wt
	Site: Little House, Lead Interior Sample #2				
	202100535-0005		1/26/2021	0.2808 g	1.2 % wt
	Site: Little House Interior Sample #3				

7.4.2 Noise Quality

Ambient sound level was collected on July 7, 2020, using a Sound Level Meter model BAFX3608. The highest level measured, and the lowest measured levels are shown in Table 5 below. Figure 17 shows sound level chart for all readings. The highest observed measurements were equivalent to the sound level of a washing machine, dishwasher, or city traffic. The lowest level observed was equivalent to the range for normal conversation and air condition. Table 6 from the Center for Disease Control and Prevention (CDC) shows the expected sound level ranges for general conditions[21].

Table 5. Baseline sound recordings at the hour corners of the project site.

Location	Sound Level Range (dB)	Observations
Southwestern Corner	68.3-76.9	
Northwestern Corner	55.9-77.4	*Lowest Level observed*
Northeastern Corner	61.4-92.3	*Highest Level observed (This isolated reading of 92.3dB was recorded as a vehicle passed demonstrating its horn capabilities)*
Southeastern Corner	66.6-69.7	

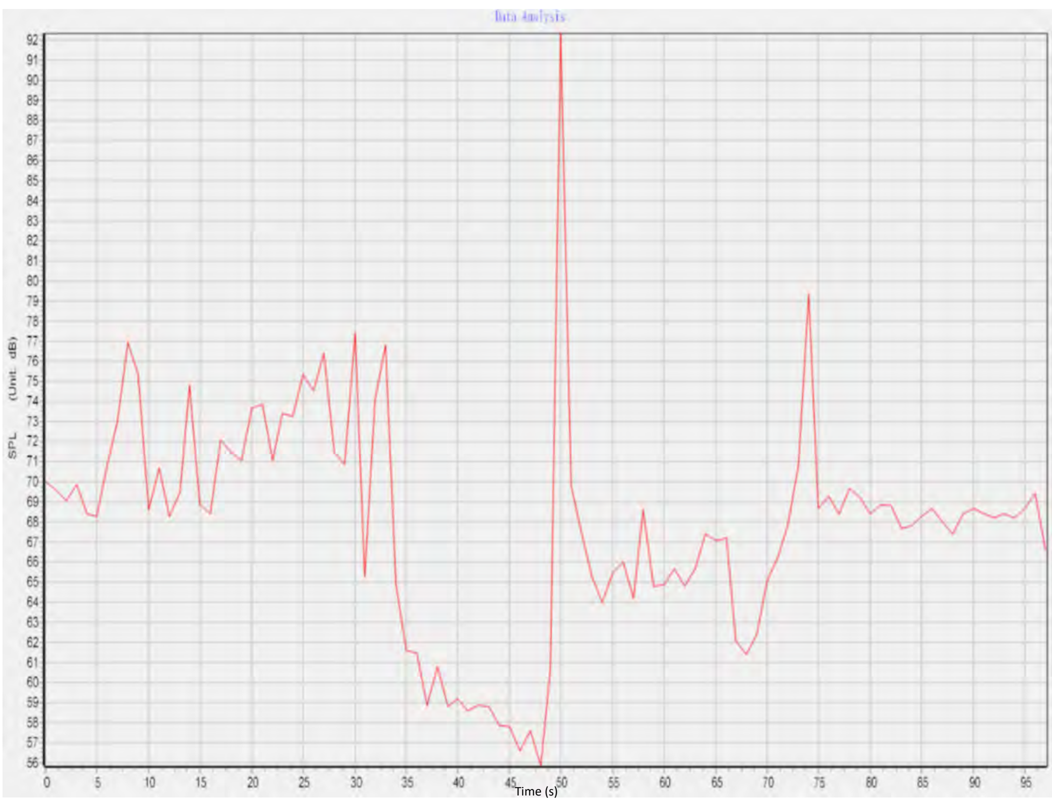
Table 6. CDC expected sound level ranges for general conditions.

Everyday Sounds and Noises	Average Sound Level (dB)	Typical Response (after routine or repeated exposure)
Softest sound that can be heard	0	Sounds at these dB levels typically do not cause any hearing damage.
Normal breathing	10	
Ticking watch	20	
Soft whisper	30	
Refrigerator hum	40	
Normal conversation, air conditioner	60	
Washing machine, dishwasher	70	You may feel annoyed by the noise
City traffic (inside the car)	80–85	You may feel very annoyed
Gas-powered lawnmowers and leaf blowers	80-85	Damage to hearing possible after 2 hours of exposure
Motorcycle	95	Damage to hearing possible after about 50 minutes of exposure

[21] https://www.cdc.gov/nceh/hearing_loss/what_noises_cause_hearing_loss.html#:~:text=Sound%20is%20measured%20in%20decibels,immediate%20harm%20to%20your%20ears.

Approaching subway train, car horn at 16 feet (5 meters), and sporting events (such as hockey playoffs and football games)	100	Hearing loss possible after 15 minutes
The maximum volume level for personal listening devices; a very loud radio, stereo, or television; and loud entertainment venues (such as nightclubs, bars, and rock concerts)	105–110	Hearing loss possible in less than 5 minutes
Shouting or barking in the ear	110	Hearing loss possible in less than 2 minutes
Standing beside or near sirens	120	Pain and ear injury
Firecrackers	140–150	Pain and ear injury

Figure 16. Sound level chart of the collective readings.



7.5 Terrestrial Resource Survey

7.5.1 Methodology

The newly proposed Central Bank location, formerly the Royal Victoria Gardens, is an urbanized landscape with several dilapidated, vacant infrastructures and remnants of what were once well-kept garden spaces. Small herbaceous plants, grasses, woody shrubs and large Silk Cotton and Dilly trees still exist on the fragmented greenscape. Botanical surveys were conducted at the proposed site to determine vegetation types, structure and diversity on July 7, 2019, October 23-24, 2019, and October 7, 2020. Walking releve surveys were performed to generate comprehensive botanical lists for the site. GPS points and measurements (recorded via distance finder and meter tape) of the existing site vegetation was observed and recorded during this survey (Table 7).

There are no Caribbean Pine or Blackland Coppice forest areas present on the site to support any significant population of migratory songbirds. Due to the site's distance from the nearest coastline and wetlands, there are no habitats to support shorebirds, seabirds, or waterfowls. The property includes anthropogenic changes to the natural environment which facilitates a small selection of Avian species that have been acclimatized to urban habitats. A Transect Survey was completed on the morning of July 1st, 2020, along random stratified sub-areas of the site to record a representative sample of Avian species presence. This Transect started in the south-eastern corner of the main parking lot area, continued along the central pathway to the main buildings and access way to Shirley Street, and ended at the parking lot behind Zion Baptist Church. Six species of birds were observed during the 1-mile-long running transect (Table 8). Notable species recorded were the White-Crowned Pigeon (Native breeding resident) and the Grey Kingbird (summer breeding migrant). Two White Crown Pigeon nests were discovered on the oldest, centrally located Silk Cotton tree along with an Immature individual of this species. An unidentified bird nest was also located in the Silk Cotton tree at the Northeast corner of the main parking lot. Though birds were not visible, vocalization of single-note alarm calls coming from this nest suggests this was an active Northern Mockingbird nest. Three Grey Kingbirds were found perched on a power line by the centrally located Silk Cotton tree and were suspected of foraging in the area for insects.

7.5.2 Vegetation Types / Habitat Types

The Gardens of the Royal Victoria Hotel were once famous for its beautiful landscapes and historical significance in the Downtown Nassau area. Regular tours and functions were carried out on the property for tourists visiting the downtown area. The Gardens have since fallen into a state of disrepair and utilized mainly as a parking lot for the nearby government and corporate office s of downtown Nassau. The remaining landscape was most recently managed by the Public Parks and Beaches Authority.

No natural habitats exist on the site, as the property has been altered to create the Garden landscape for the former Hotel grounds. Vegetation is restricted to planting beds surrounding the perimeter of the property, and beds scattered along pathways and parking areas within the property grounds. The CBOB Arborist Report is located in Appendix D.

7.5.3 Human Altered Habitat

Within the property boundaries at the Royal Victoria gardens are predominantly paved surfaces utilized as sidewalks/walkways, parking areas, and building infrastructure. The grounds house the offices of the HIV Centre, The National Reference Laboratory, the former National Drug Council, and the Commission of Inquiry.

Remnants of the former Royal Victoria Hotel grounds are the Curry House, serving as the location for the Reference Laboratory, The Little House serving as The Drug Council Building, the former pool area, the guard house, and walls/planters around the perimeter of the property.

7.5.4 Vegetation Map/ Habitat Map

Figure 17 CBOB New Premises habitat map.

Figure 18 Site map depicting tree inventory

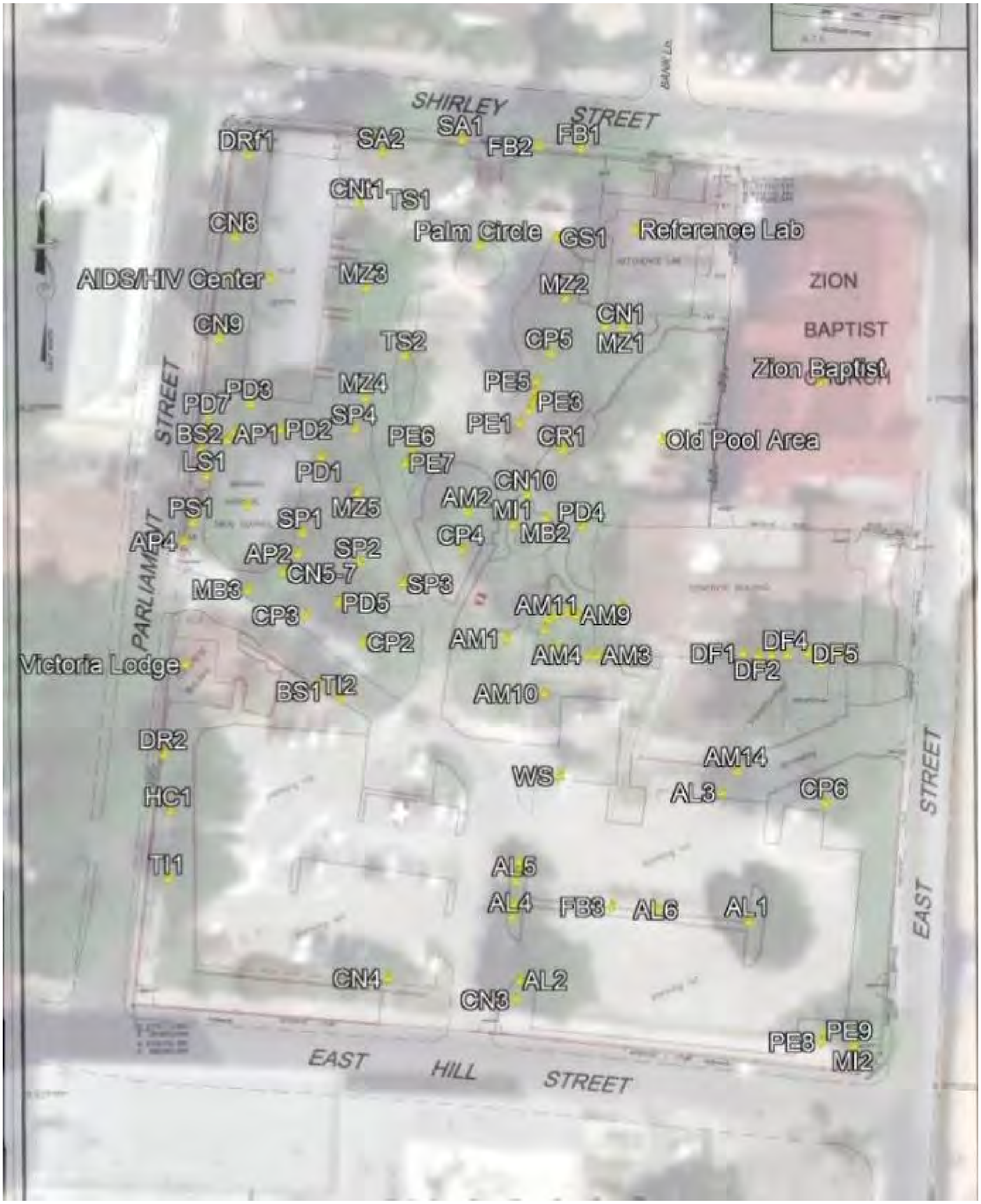


Table 7. Tree inventory for Royal Victoria Gardens

Tree Code	Species	Lat	Long	Notes
AL1	*Albizzia lebbeck*	25° 4'30.68"N	77°20'24.42"W	Invasive; within building footprint
AL2	*Albizzia lebbeck*	25° 4'30.40"N	77°20'25.62"W	Invasive; within building footprint
AL3	*Albizzia lebbeck*	25° 4'31.29"N	77°20'24.56"W	Invasive; within building footprint
AL4	*Albizzia lebbeck*	25° 4'30.70"N	77°20'25.66"W	Invasive; within building footprint
AL5	*Albizzia lebbeck*	25° 4'30.87"N	77°20'25.64"W	Invasive; within building footprint
AL6	*Albizzia lebbeck*	25° 4'30.74"N	77°20'24.90"W	Invasive; within building footprint
AL7	*Albizzia lebbeck*	25° 4'30.96"N	77°20'25.62"W	Invasive; within building footprint
AM1	*Adoninia merrillii*	25° 4'32.02"N	77°20'25.69"W	in planter under CP4
AM10	*Adoninia merrillii*	25° 4'31.76"N	77°20'25.49"W	in clumps in planter adjacent to COI
AM11	*Adoninia merrillii*	25° 4'32.11"N	77°20'25.47"W	in clumps in planter adjacent to COI
AM12	*Adoninia merrillii*	25° 4'31.98"N	77°20'25.45"W	in clumps in planter adjacent to COI
AM13	*Adoninia merrillii*	25° 4'32.06"N	77°20'25.49"W	in clumps in planter adjacent to COI
AM14	*Adoninia merrillii*	25° 4'31.39"N	77°20'24.48"W	in clumps in planter adjacent to COI
AM2	*Adoninia merrillii*	25° 4'32.62"N	77°20'25.89"W	in clumps in planter adjacent to COI
AM3	*Adoninia merrillii*	25° 4'31.94"N	77°20'25.21"W	in clumps in planter adjacent to COI
AM4	*Adoninia merrillii*	25° 4'31.94"N	77°20'25.26"W	in clumps in planter adjacent to COI
AM5	*Adoninia merrillii*	25° 4'31.95"N	77°20'25.33"W	in clumps in planter adjacent to COI
AM6	*Adoninia merrillii*	25° 4'31.97"N	77°20'25.40"W	in clumps in planter adjacent to COI
AM7	*Adoninia merrillii*	25° 4'32.13"N	77°20'25.43"W	in clumps in planter adjacent to COI
AM8	*Adoninia merrillii*	25° 4'32.14"N	77°20'25.37"W	in clumps in planter adjacent to COI
AM9	*Adoninia merrillii*	25° 4'32.13"N	77°20'25.32"W	in clumps in planter adjacent to COI

AP1	*Adenanthera pavonia*	25° 4'32.99"N	77°20'26.84"W	Invasive; adjacent to drug council and HIV centre
AP2	*Adenanthera pavonia*	25° 4'32.42"N	77°20'26.78"W	Invasive; adjacent to drug council and HIV centre
AP3	*Adenanthera pavonia*	25° 4'32.94"N	77°20'27.07"W	Invasive; adjacent to drug council and HIV centre
AP4	*Adenanthera pavonia*	25° 4'32.48"N	77°20'27.38"W	Invasive; adjacent to drug council and HIV centre
BS1	*Bursera simaruba*	25° 4'31.77"N	77°20'26.62"W	small specimen along western entrance driveway
BS2	*Bursera simaruba*	25° 4'32.92"N	77°20'27.29"W	large specimen in planter at western entrance of drug council building
CN1	*Cocos nucifera*	25° 4'33.49"N	77°20'25.08"W	adjacent to Reference laboratory; edible
CN10	*Cocos nucifera*	25° 4'32.70"N	77°20'25.58"W	in planter west of COI
CN2	*Cocos nucifera*	25° 4'32.70"N	77°20'25.58"W	adjacent to Reference laboratory; edible
CN3	*Cocos nucifera*	25° 4'30.31"N	77°20'25.64"W	in planter at southern entrance
CN4	*Cocos nucifera*	25° 4'30.41"N	77°20'26.31"W	in planter at southern entrance
CN5-7	*Cocos nucifera*	25° 4'32.33"N	77°20'26.86"W	east of drug council building
CN8	*Cocos nucifera*	25° 4'33.92"N	77°20'27.11"W	west of HIV in planter along Parliament street
CN9	*Cocos nucifera*	25° 4'33.44"N	77°20'27.19"W	west of HIV in planter along Parliament street
CNt1	*Caryota nitis*	25° 4'34.08"N	77°20'26.46"W	adjacent to HIV centre
CP1	*Ceiba pentandra*	25° 4'31.90"N	77°20'24.04"W	Protected species on southern side of COI building; adjacent to BPL transfer switch
CP2	*Ceiba pentandra*	25° 4'32.00"N	77°20'26.44"W	Protected species along western entrance driveway
CP3	*Ceiba pentandra*	25° 4'32.13"N	77°20'26.74"W	Protected species along western entrance driveway
CP4	*Ceiba pentandra*	25° 4'32.44"N	77°20'25.92"W	Protected species in central planter on property; historic specimen*
CP5	*Ceiba pentandra*	25° 4'33.37"N	77°20'25.46"W	Protected species south of Reference Laboratory
CP6	*Ceiba pentandra*	25° 4'31.24"N	77°20'24.02"W	Protected species south of eastern entrance; young specimen
CR1	*Clusia rosea*	25° 4'32.91"N	77°20'25.39"W	healthy specimen

DF1	*Dracena fragrans*	25° 4'31.95"N	77°20'24.45"W	specimen along southern face of COI
DF2	*Dracena fragrans*	25° 4'31.94"N	77°20'24.37"W	specimen along southern face of COI
DF3	*Dracena fragrans*	25° 4'31.94"N	77°20'24.30"W	specimen along southern face of COI
DF4	*Dracena fragrans*	25° 4'31.94"N	77°20'24.22"W	specimen along southern face of COI
DF5	*Dracena fragrans*	25° 4'31.95"N	77°20'24.11"W	specimen along southern face of COI
DF6	*Dracena fragrans*	25° 4'31.95"N	77°20'23.97"W	specimen along southern face of COI
DF7	*Dracena fragrans*	25° 4'31.94"N	77°20'23.91"W	specimen along southern face of COI
DR1	*Delonix regia*	25° 4'33.13"N	77°20'27.03"W	showy roadside tree on Parliament street, red flowers
DR2	*Delonix regia*	25° 4'31.47"N	77°20'27.48"W	showy roadside tree on Parliament street, red flowers
DR3	*Delonix regia*	25° 4'33.73"N	77°20'27.13"W	showy roadside tree on Parliament street, red flowers
DRf1	*Dracena reflexa*	25° 4'34.31"N	77°20'27.04"W	specimen along southern face of COI
FB1	*Ficus benjamina*	25° 4'34.34"N	77°20'25.30"W	large specimen tree along Northern boundary of Shirley Street
FB2	*Ficus benjamina*	25° 4'34.35"N	77°20'25.52"W	large specimen tree along Northern boundary of Shirley Street
FB3	*Ficus benjamina*	25° 4'30.75"N	77°20'25.14"W	small specimen in parking lot planter, within building footprint
GS1	*Guaiacum sanctum*	25° 4'33.92"N	77°20'25.43"W	small specimen planted in front of Reference Laboratory; protected tree
HC1	*Haematoxylum campechianum*	25° 4'31.20"N	77°20'27.45"W	large specimen in planter along Parliament street; invasive species
HC2	*Haematoxylum campechianum*	25° 4'31.80"N	77°20'26.68"W	small specimen in along western driveway
LC1	*Lantana camara*	25° 4'33.92"N	77°20'25.43"W	small specimen planted in front of Reference Laboratory
LS1	*Lysiloma sabicu*	25° 4'32.79"N	77°20'27.26"W	large specimen at western entrance of Drug Council Bldg; protected
MB1	*Melicoccus bijugatus*	25° 4'34.40"N	77°20'26.40"W	large specimen tree, near to Shirley Street boundary and BPL transfer switch; edible
MB2	*Melicoccus bijugatus*	25° 4'32.59"N	77°20'25.48"W	large specimen tree in planter west of COI; edible
MB3	*Melicoccus bijugatus*	25° 4'32.25"N	77°20'27.04"W	large specimen tree near to western entrance; edible

MI1	*Magnifera indica*	25° 4'32.56"N	77°20'25.65"W	specimen in planter east of CP4; edible
MI2	*Magnifera indica*	25° 4'30.09"N	77°20'23.87"W	mature tree in south-eastern corner of property; edible
MZ1	*Manzanilla zapote*	25° 4'33.49"N	77°20'25.08"W	adjacent to Reference laboratory; edible, bird food source
MZ2	*Manzanilla zapote*	25° 4'33.63"N	77°20'25.38"W	adjacent to Reference laboratory; edible, bird food source
MZ3	*Manzanilla zapote*	25° 4'33.68"N	77°20'26.43"W	large specimen in front of HIV center; edible, bird food source
MZ4	*Manzanilla zapote*	25° 4'33.16"N	77°20'26.43"W	large specimen in front of HIV center; edible, bird food source
MZ5	*Manzanilla zapote*	25° 4'32.71"N	77°20'26.47"W	large specimen in front of drug council in planter; edible, bird food source
PD1	*Pimenta dioica*	25° 4'32.88"N	77°20'26.66"W	specimen east of drug council building
PD2	*Pimenta dioica*	25° 4'33.01"N	77°20'26.87"W	abuts drug council building
PD3	*Pimenta dioica*	25° 4'33.13"N	77°20'27.03"W	abuts drug council building
PD4	*Pimenta dioica*	25° 4'32.55"N	77°20'25.29"W	in planter abutting east side of COI
PD5	*Pimenta dioica*	25° 4'32.19"N	77°20'26.57"W	in planter east of drug council building
PD6	*Pimenta dioica*	25° 4'33.02"N	77°20'27.26"W	abuts drug council building
PD7	*Pimenta dioica*	25° 4'33.08"N	77°20'27.25"W	abuts drug council building
PD8	*Pimenta dioica*	25° 4'32.96"N	77°20'27.15"W	abuts drug council building
PE1	*Ptychosperma elegans*	25° 4'33.04"N	77°20'25.62"W	in planter west of old pool area
PE2	*Ptychosperma elegans*	25° 4'33.10"N	77°20'25.57"W	in planter west of old pool area
PE3	*Ptychosperma elegans*	25° 4'33.14"N	77°20'25.55"W	in planter west of old pool area
PE4	*Ptychosperma elegans*	25° 4'33.19"N	77°20'25.54"W	in planter west of old pool area
PE5	*Ptychosperma elegans*	25° 4'33.24"N	77°20'25.53"W	in planter west of old pool area
PE6	*Ptychosperma elegans*	25° 4'32.91"N	77°20'26.18"W	in planter east of drug council building
PE7	*Ptychosperma elegans*	25° 4'32.85"N	77°20'26.22"W	in planter east of drug council building

PE8	*Ptychosperma elegans*	25° 4'30.11"N	77°20'24.04"W	within footprint of new building
PE9	*Ptychosperma elegans*	25° 4'30.16"N	77°20'24.03"W	within footprint of new building
PR1	*Phoenix roebelenii*	25° 4'30.91"N	77°20'25.63"W	within footprint of new building
PR2	*Phoenix roebelenii*	25° 4'30.76"N	77°20'25.65"W	within footprint of new building
PS1	*Pouteria sapota*	25° 4'32.57"N	77°20'27.33"W	in planter along west of drug council along Parliament street
RR1	*Roystonia regia*	25° 4'32.94"N	77°20'25.42"W	trunk damage near base
SA1	*Schefflera actinophylla*	25° 4'34.38"N	77°20'25.92"W	invasive
SA2	*Schefflera actinophylla*	25° 4'34.32"N	77°20'26.34"W	invasive
SP1	*Sabal palmetto*	25° 4'32.52"N	77°20'26.76"W	abuts drug council building
SP2	*Sabal palmetto*	25° 4'32.38"N	77°20'26.46"W	in planter east of drug council building
SP3	*Sabal palmetto*	25° 4'32.28"N	77°20'26.23"W	in planter east of drug council building
SP4	*Sabal palmetto*	25° 4'33.01"N	77°20'26.48"W	in planter east of drug council building
TI1	*Tamarindus indica*	25° 4'34.10"N	77°20'26.19"W	large specimen in planter along Parliament Street; edible
TI2	*Tamarindus indica*	25° 4'31.73"N	77°20'26.56"W	small specimen along western entrance driveway
TS1	*Tecoma stans*	25° 4'34.13"N	77°20'26.09"W	showy specimen east of HIV centre; national flower
TS2	*Tecoma stans*	25° 4'33.36"N	77°20'26.22"W	small specimen in planter east of drug council building; national flower
WS1	*Washingtonia sp.*	25° 4'31.37"N	77°20'25.41"W	within footprint of new building

7.5.5 Avian Species

Table 8 List of Species found during Rapid Assessment of Avifauna present on site.

No. of Individuals	Species Name	Scientific Name	Population Status	IUCN Red-List Status
6	Eurasian Collared Dove	*Streptopelia decaocto*	Extant & Introduced	Least Concern
3	Grey Kingbird	*Tyrannus dominicensis*	Breeding Summer Migrant	Least Concern
6	Northern Mockingbird	*Mimus polyglottos*	Extant Resident	Least Concern
3	Red-legged Thrush	*Turdus plumbeus*	Extant Resident	Least Concern
3	Rock Dove	*Columba livia*	Extant & Introduced Resident	Least Concern
13	White Crown Pigeon	*Patagioenas leucocephala*	Breeding Extant Resident	Near Threatened

The remaining bird species consists of introduced birds and the native Red-Legged Thrush which are all considered to be Least Concern, stable or growing populations according to the International Union for the Conservation of Nature (IUCN) Red-list database. Neither of these species listed are endemic or endangered and are widespread island-wide and across the country. While the White-Crown Pigeon is considered as Near-Threatened, populations in The Bahamas are becoming more stabilized and are increasing at a healthy rate. Utilizing information from important platforms such as the IUCN Red-List and Audubon on national and international conservation status of avian wildlife helps to identify developmental and long-term threats to important indicator species. The White-Crowned Pigeon population, for example, is vulnerable to overhunting and loss of habitat. That is, however, not an issue for this project due to it being located in a cooperation and tourist-rich area where hunting activities are non-existent, and also that this species has only been spotted on the Silk Cotton trees which will be conserved during the construction and operation phases. Negative impacts to the Avifauna would include transformation of land composition and use, and loss of natural resources. Nonetheless, this site has already been significantly developed and transformed through usage and design. Factors of concern deriving from the construction phase include the increase of air pollution, artificial light at night, increased noise levels and disturbances and introduction of invasive species.

The timing of this survey marked an important peak period during the Summer breeding season for resident breeders and summer migrants. Migratory birds account for nearly 50% of the total number of bird species found in The Bahamas and many begin to make their way to The Bahamas for the winter season at the beginning of October and leave between late April and early June. A thorough Avian Survey conducted on a monthly or quarterly basis is necessary to have a more accurate inventory of all bird species on site and to account for any seasonal variance of population distribution and abundance. Another source of error to quantifying species richness using this methodology is that standard morning surveys do not account for nocturnal species such as the Yellow Crown Night Heron or the Antillean Nighthawk, for example. With obstruction to visibility due to the presence of large buildings and other infrastructures, and difficulty hearing due to noises deriving from high-density traffic and construction around the perimeter of the property, it is possible the detection of avian species and population numbers on site were underestimated. This baseline assessment, however, shows that this site has a low biodiversity of Avian wildlife.

7.5.6 Protected Species

Four protected species were observed on site. A single Lignum Vitae, one Horseflesh, six Silk Cotton trees, and several white crowned pigeons. Table 9 summarizes the status of each of the protected species.

Table 9. List of Protected Species observed on site

Species Common Name	Scientific Name	Protection Status	Status
Lignum Vitae	*Guaiacum sanctum*	Protected	'Endangered' by the IUCN
Horseflesh	*Lysiloma sabicu*	Protected	Not listed
Silk Cotton Tree	*Ceiba pentandra*	Protected	'Least Concern' by the IUCN
White Crowned Pigeon	*Patagioenas leucocephala*		Decreasing population trend worldwide. It is the premier game bird of The Bahamas, Breeds in Coastal Red mangroves, but forages on berries and fruits in mature coppice Habitat.

7.5.7 Invasive Species

The neighboring community described an abundance of rodents on site. This was validated during terrestrial resource surveys as a rat nest was observed on site and rodents were observed in the debris on the proposed site.

Invasive flora on the property includes the Woman's Tongue Tree (*Albizzia lebbeck*) and the Umbrella Tree (*Schefflera arboricola*).

7.5.8 Habitat Utilization and Food Sources for Native Fauna

Habitat types on the property are restricted to constructed planters with specimen trees and lawn areas. Several fruit bearing trees occur on the property, which may serve as food sources for resident and migratory birds utilizing the site. These fruit bearing species include the Lantana (exotic), Landscape Palms (Alexander, Roystonia, Sabal, Christmas), Sapodilly, Guinep, Mango and Tamarind.

During multiple site visits White Crown Pigeons have been observed utilizing the branches of the large Silk Cotton Trees for next buildings and roosting. The other large specimen trees onsite may also serve as roosting and/or nesting sites for species in the area.

7.5.9 Endangered and Species of Economic Importance

The White Crown Pigeon is a culturally important game bird species, which is a common target for subsistence and recreational hunters during the regulated hunting seasons. The proposed work for the site may have temporary, localized and site specific impact on this species, however it is not foreseen to have long term impacts to island wide populations of this species.

Apart from the Silk Cotton and Lignum Vitae, the specimen trees on the property are not formally protected or listed as endangered or rare. With regards to the specific context of this project, large trees within the expanding urban environment of the Downtown Nassau area may be considered threatened.

7.5.10 Human Influence

The Royal Victoria Gardens site is usually active with persons and vehicles traversing the space to visit or work at the Reference Laboratory, HIV Center, or the nearby Downtown Area. The parking lot serves as critical space for persons in the area. The gardens were previously maintained by the staff of the Public Parks and Beaches Authority.

7.5.11 Human Uses of Biodiversity

Edible fruit from the Sapodilly, Guinep, Mango and Tamarind trees serve as a potential food source for persons in the Gardens. The Garden is frequented by tourists on self or guided tours of historic downtown Nassau, in which the site is an attraction as the former site of The Royal Victoria Hotel. The Gardens also represent valuable greenspace within the urbanized downtown Nassau area, which may provide an outdoor, green space for persons working in the city to enjoy.

7.6 Aesthetics

The current aesthetic the proposed development depicts one of dilapidated buildings and overgrown vegetation. Noticeable amounts of debris were observed amongst the overgrown vegetation throughout the site, creating an eyesore for the Downtown and Shirley Street community. The conditions of the existing buildings represent an unkempt compound which suggests that all of the buildings are abandoned. Which is portrays a false presentation of the active site.

The project intends to enhance the aesthetic of this immediate area by providing a green space/park for public use. The overall design of the new premises provides ultra-modern designs which should improve the dull and dilapidated area of the Royal Victoria Hotel grounds.

7.7 National Parks

There are currently no national parks or protected areas within the immediate vicinity of the proposed development site. The nearest national park known as Perpall Tract, is located within the Chippingham community. It is approximately 1.55 miles west of the site. Due to its vast coppice forest and location within the city, authorities recognized the potential for preservation.

The Bahamas National Trust Retreat Garden is approximately 2.50 miles east of the proposed development. This 11-acre protected area was established in 1989 and is managed by the Bahamas National Trust. Its presence provides home to various migratory and resident bird species and houses a large collection of international palm species.

7.8 Socio-economics

Economic stimulus due to the two (2) year duration of the project's construction phase is expected to positively affect Bahamians that are temporarily employed. The provision of the park or "green space" provides a public resting space away from direct sunlight within the Downtown area. This provides aesthetic scenery and social gathering for locals and tourists.

7.9 Cultural Resources

The original Royal Victoria Hotel would have played a significant part in the history of The Bahamas and the Town of Nassau in particular. It is necessary to liaise with the AMMC, as the authority with responsibility to the Government of the Commonwealth of The Bahamas for heritage resources, with regard to the any findings located during the preliminary boring and/or excavation exercises at the site.

7.9.1 Historical Overview

The Royal Victoria Hotel opened in August 1861. It was a government-built hotel and the first hotel built on New Providence at the time. The purpose of the hotel was to provide accommodations for those seeking a warmer climate for health and wellness, and also for the island to be able to benefit from the increase in travel and trade ushered by improved transportation by ship. The hotel was a limestone building, four stories high. Three of the stories were surrounded by a piazza ten feet wide, forming a covered promenade 900 feet long. It contained 121 double and single bedrooms, with lofty ceilings and could accommodate 200 guests. The hotel had views of the city of Nassau and a large portion of the island, and the harbor.

The buildings on the property included the main hotel building, and an unidentified building that contained a hair-dressing saloon, a billiard room and a bar, colloquially known as "The Tank". The Royal Victoria property contained a garden that was well known for its wide variety of tropical plants. In later years, a swimming pool, outdoor bar, and luxury apartments were added, with private lanais. A stockbroker's office was also added in the nearby garden. The hotel ceased operation in 1971. A portion of the building was damaged in the 1990s by fire and later demolished. The Bahamas Ministry of Health now occupies a section of the hotel that survived. Today, most of the grounds serve as a parking lot.

Further to the destruction by fire and the subsequent demolition of the old hotel, there are a number of other buildings that occupied the site. Note that the Zion Baptist Church at the corner of East and Shirley Streets is a privately owned building. Further details of the Royal Victoria site are provide in Appendix E 'Historical Overview of the Royal Victoria Site, new Providence, The Bahamas'.[22]

Historic objects of interest include:

- The Silk Cotton trees
- Other flora that were identified to be rare in The Bahamas
- Other objects on the site seen and unseen. Known and unknown at this time

7.9.2 Historical, Archaeological and Paleontological Resources

The developer plans to demolish, relocate, and rebuild the Little House (Bahamas Drug Council). A subcontracted historic preservation team will document this existing structure using photography and 3D Modeling and will conduct a detailed survey and measurements of the building. This team plans to preserve any limestone blocks, rails, tiles, and other historic elements that we encounter for reuse. Furthermore, the developers intend to preserve Curry House for adaptive reuse. The supplemental cultural resources associated with this document are located in Appendix E.

7.10 Tourist and Recreational Areas

The Downtown area also known as Bay Street is approximately 0.12 miles north of the proposes site and known as one of the island's oldest street. This street is lined with luxury and affordable retail stores, restaurants, bars, hotels, cafes, souvenirs, and liquor stores that are mostly represented by colonial architecture. Nassau Cruise Ports is located within walking distance of Bay Street, making it easy for tourists to access this busy tourism mecca. Horses are stationed within the Nassau Cruise Ports compounds. Vendors offer horse and carriage rides to tourist disembarking from various cruise lines to explore this area. Other offers include Segway or scooter tours.

Other recreational activities within the area include historical tours such as the Pompey Museum of Slavery and Emancipation, Pirates of Nassau, The Nassau Public Library, Parliament/Rawson Square, and the Straw Market. The Pompey Museum documents the slavery journey in The Bahamas and was names after a slave 'Pompey' who raised a revolt against inhumane conditions at the Rolle Plantation in Exuma. This museum details stories from slave arrival within The

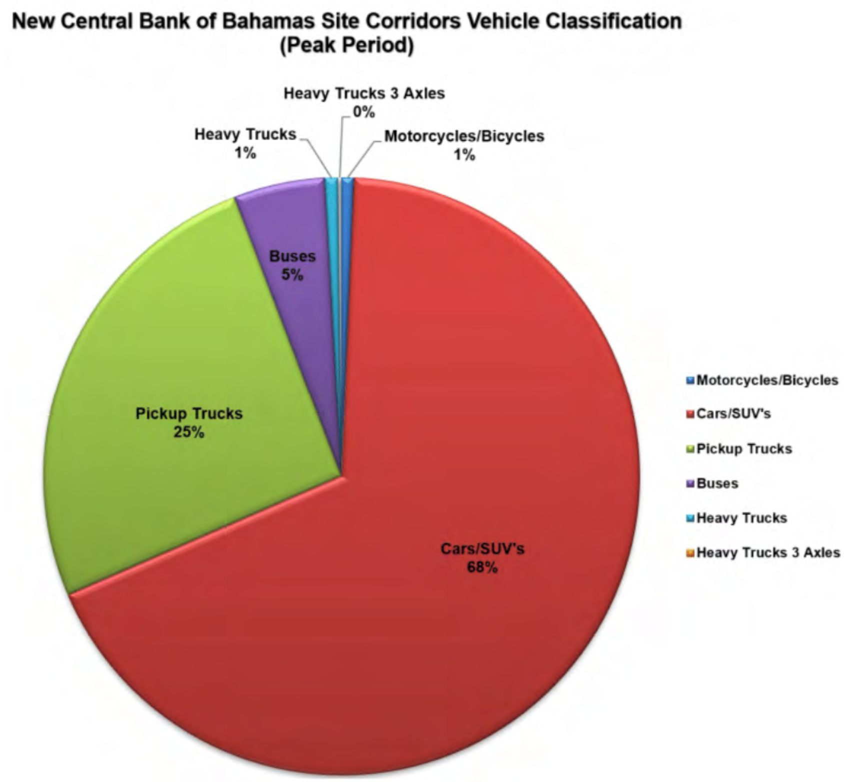
[22] Delancy-Fowler, K. (September 2020). Historical overview of the royal victoria site, New Providence, The Bahamas.

Bahamas to emancipation. Pirates of Nassau is an interactive museum which illustrates the lifestyle of Nassau during the piracy era until its eradication. The Nassau Public Library is located south of Parliament Square and directly across the street from the proposed site facing Shirley Street. This octagonal shaped library was established in 1873 and also serves as a museum housing artifacts and displaying its structure which was once a prison. Parliament Square or Rawson Square is located directly on Bay Street. This area is distinguished by its brick pavement which forms a square within Bay Street that only encompasses the country’s law makers within the parliament building and the Churchill building. The center of the square houses various statues which includes the bust of Sir Milo Butler, the first Bahamian Governor General and Queen Victoria. Within walking distance of Nassau Cruise Ports, the Nassau Straw Market is a popular stop for tourists to explore and purchase Bahamian hand crafted items such as carvings and straw accessories. This popular Bahamian craftsmanship includes the braiding ‘plaiting’ of dried palm and is a skill used to create baskets or bags used to harvest fruit or carry fish. Although, this skill was passed on from generations of Bahamians the Straw Market was established in the 1940’s where the skill was displayed for tourists to experience and purchase items. Such as bags, dolls, fans, etc. Its present structure was developed in 2011 after an unfortunate fire in 2001.

7.11 Transportation

Four (4) major thoroughfares surround the proposed development site, inclusive of Shirley Street, East Street, East Hill Street and Parliament Street. The busiest of these streets in terms of public transportation would include Shirley Street (20 bus routes), East Hill Street (25 bus routes) and East Street (23 bus routes). Parliament Street is also included in the bus routes; however its routes are minimal in total compared to the three others (8 bus routes). Various bus routes (identifiable by route number) frequent all four streets in passing and to arrive at the bus depot Downtown. Shirley Street acts as a service street for Bay and Parliament Streets. East Street runs from north to south on the island of New Providence. Its location near the proposed site is known as East Street (north) and is a major road to connect to Bay and Shirley Street. East Hill Street connects traffic to the one way Market Street to escape the immediate downtown area. Besides the major public transportation system, these roads are used by motor vehicles quite often. The pie chart in Figure 20 illustrates the classification of vehicles that frequent the streets near the proposed development.

Figure 19. Vehicle classification adjacent to CBOB site



[23]

7.12 Utilities Description

7.12.1 Roads

As mentioned in Section 7.11 the proposed area is considered high traffic. A Traffic Impact Study (TIA) report was produced to avoid interruption of traffic flow within the four major thoroughfares enclosing the project site (Appendix F). The (TIA) report identifies potential traffic and road safety impacts, and mitigation within the proposed area of the project associated with road development. Impacts associated with the development include localized impacts to traffic flow on East Street and Parliament Street (between East Hill Street and Shirley Street). To mitigate this impact, CBOB proposes to change traffic flow within the immediate vicinity of the development in order to accommodate the associated flow of traffic. These traffic changes include the conversion of East Street north to one-way heading north onto Shirley Street beginning at the intersection of East Hill Street and East Street. Also, the two-way direction of Parliament Street off Shirley Street heading south onto East Hill Street is intended to be converted into a one-way street continuing south onto East Hill Street. Shirley and East Hill Streets will retain its current traffic flow. Since the area is expected to encourage modern

[23]Caribbean Civil Group Limited. (October 2019). Proposed new central bank of The Bahamas, New Providence : Traffic impact assessment.

development within the area, these changes allow the CBOB access points to perform at optimum service.

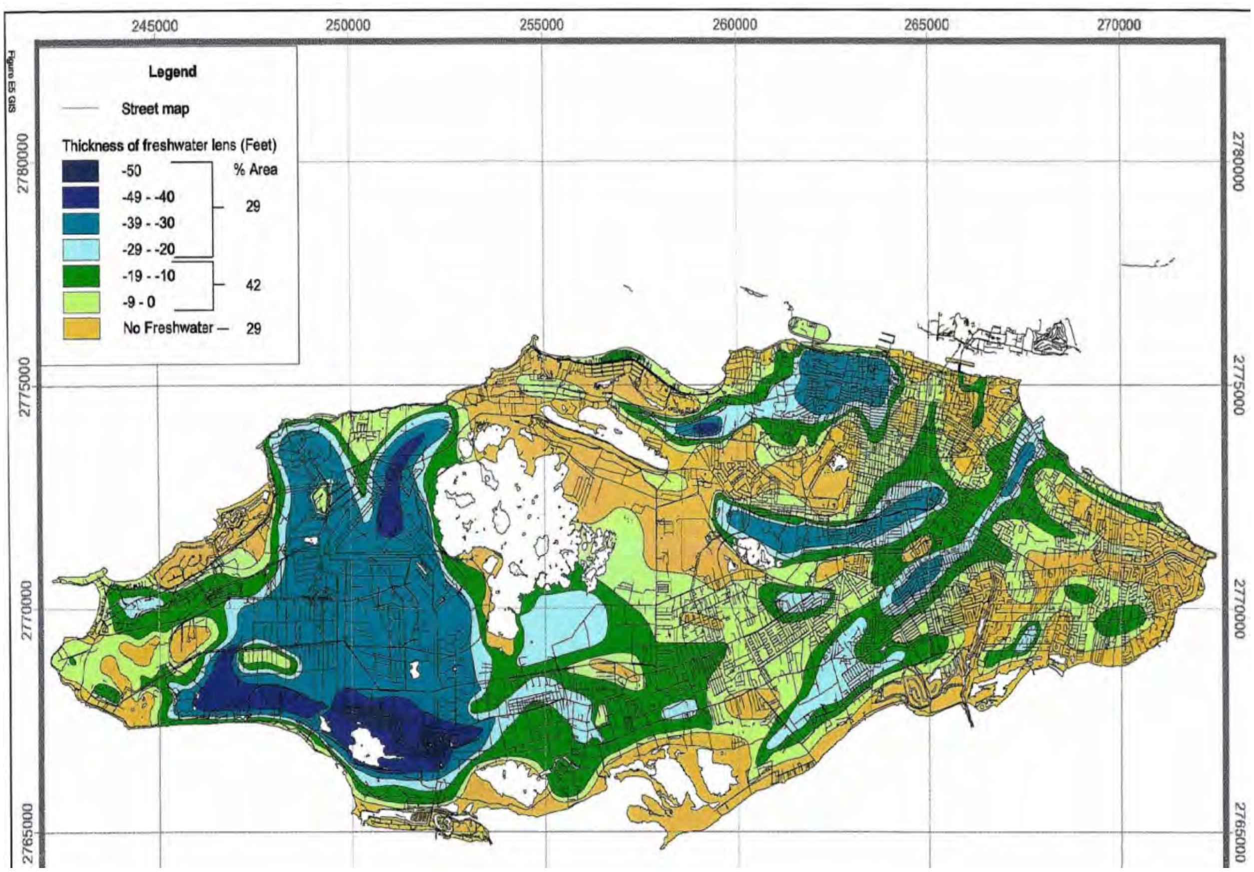
**Please note that Figure 1 (Page 5) of the TIA is to be represented as Figure 11 in [Section 5.2](#) of this EIA document and the dates stated on Page 19 of the TIA are to be omitted.*

7.12.2 Potable Water

Based on the image below (Figure 21), the historical fresh water lens for New Providence island in 1976 -1984 was approximately 30-39 ft. and 29% of the area. However, due to current and past developments it is possible the lens was impacted negatively and decreased over time. Potable water in adjacent areas is provided by the Water and Sewerage Corporation.

CBOB will purchase water from the Water and Sewerage Corporation to supply the development with potable water. The development's estimated potable water demand is 260gpd. Furthermore, the development intends to achieve a minimum of 50% potable water use reduction from fixtures and toilet following LEED Silver Rated materials.

Figure 20. Historical Fresh Water Lens on New Providence Island from UNDP/Bahamas Government Groundwater Studies in New Providence, 1976-1984[24].



[24]https://www.sam.usace.army.mil/Portals/46/docs/military/engineering/docs/WRA/Bahamas/BAHAMAS1WRA.pdf

7.12.3 Energy

Existing energy at the Royal Victoria Hotel grounds is supplied by Bahamas Power and Light Corporation Limited (BPL Co. LTD.). Streetlights focused on the surrounding streets are powered by BPL as well. CBOB intends to purchase energy from BPL to supply its new premises with electricity. The current calculated demand of the electrical load associated with this project is an estimated 1,850 kVA. The development intends to reduce 30-50% of its energy use by striving for LEED Silver rating materials, such as solar, by setting a goal of installing 30% renewable energy to the compound. Not only will the modernization of the new premises consist of a new building but it intends to display modern energy efficient technology which includes high-efficiency HVAC systems (ASHRAE 90.1[25].and ASHRAE 189[26] shall be followed), efficient lamps, lighting control, daylight harvesting, roof insulation, low emissivity (low "e") glazing, external vegetation for shading, and other energy efficiency options as associated with LEED Silver rating (See Section 11.2).

Temperature, CO_2, and airflow monitoring devices will be calibrated, and factory tested before installation to ensure energy saving accuracy and fresh indoor quality monitoring.

7.12.4 Solid Waste

Currently, solid waste within the proposed site is managed by the current occupants. However, debris can be found at various areas of the property and amongst overgrown vegetation.

Generated solid waste from construction and operation phases of the project intends to reduce contribution to the local landfill by recycling building materials where possible and as well as other solid waste items. This would be done by following LEED Silver criteria and complying with Department of Environmental Health Services.

7.12.5 Wastewater

Wastewater within the existing property is managed by the Water and Sewerage Corporation. The preliminary sewer flow for this project is an estimated 375gpm. The development intends to continue with this management of sewage and wastewater treatment. LEED certified materials will be used to catch and re-use rainwater for landscaping needs. Also, the estimated irrigation demand for this project is approximately 70gpm.

[25] https://www.ashrae.org/technical-resources/standards-and-guidelines/read-only-versions-of-ashrae-standards
[26] https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-26917.pdf

7.13 Summary of Physical and Biological Baseline Conditions

Healthy – A site ranked "Healthy" features intact natural habitat and ecosystems. These areas are generally undeveloped, pristine environments with good native biodiversity and minimal anthropogenic influences.

Moderate – A "Moderate" ranked site features some anthropogenic influences, including development, but the natural habitat can be observed with native species present.

Poor – Sites ranked as "Poor" are significantly developed, and feature little to no natural habitat or ecosystems can be observed on site. Usually invasive and or non-native species dominate the landscape, and the site is heavily anthropogenic influence.

Table 10. Summary Table of Baseline Conditions on Site

Environmental Aspects	Parameters Assessed	Relevant EIA Section
Physical	Hydrology & Hydrogeology	7.2 Topography and 7.12.2 Potable Water
	Air Quality	7.4.1 Air Quality
	Noise	7.4.2 Noise Quality
Biological	Terrestrial Habitats	7.5 Terrestrial Resource Survey
	Birds	7.5.5 Avian Species
	Flora	7.5.2 Vegetation Types
Socio-Economics	Neighboring Communities	7.8 Socio-economics
	Relocation	N/A
	Traffic	7.11 Transportation
	Economic	7.8 Socio-economics
	Utilities	7.12 Utilities Description
Cultural	Archaeological, Historic & Paleontological Resources	7.9 Cultural Resources

Physical & Biological Baseline Conditions KEY	Healthy	Moderate	Poor

8. Environmental Regulatory Bodies and Laws

8.1 Relevant Regulatory Bodies

Office of the Prime Minister - Office of the Prime Minister coordinates ministries, government, and parliamentary business. Specific related departments and agencies are listed below.

Department of Lands and Surveys - This department is responsible for planning, mapping, and monitoring of crown land (i.e. where beaches begin and end, high water marks, etc.).

National Emergency Management Agency (NEMA) - NEMA aims to reduce life and property loss in the event of a natural disaster.

Antiquities Monuments and Museum Corporation (AMMC) - The mission of AMMC is "to protect, preserve, and promote the Historic Cultural Resources of The Bahamas, and to be the number one conservation Agency in the world. We will do this while protecting our environment, encouraging research and archaeology, and by protecting, preserving, and promoting our Historical Sites."

Ministry of Agriculture, Marine Resources and Local Government - The Ministry of Agriculture Marine Resources and Local Government is responsible for the implementation, monitoring and evaluation of policies related to agricultural lands and marine resources. The Ministry serves as the Management and Scientific Authority for the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in The Bahamas.

Department of Marine Resources (DMR) - DMR is primarily responsible for the administration, management, and development of fisheries in The Bahamas. The department was created to administer, manage, and develop the fisheries sector as stipulated by the Fisheries Resources (Jurisdiction and Conservation) Act. The department is also tasked with enforcement of Fisheries Regulations, Marine Mammal Regulations and the Seafood Processing and Inspection Regulations.

Ministry of Public Works - The Ministry of Public Works maintains the physical infrastructure and natural environment of The Bahamas by providing quality services to its client agencies.

Department of Public Works - The Department of Public Works maintains public infrastructure inclusive of government buildings, roads, docks, bridges, and cemeteries.

Department of Physical Planning - The Department of Physical Planning manages town, physical, country and land use planning, zoning, private roads and subdivisions for New Providence and the Family Islands.

Water and Sewerage Corporation - The Water and Sewerage Corporation is entrusted with managing, maintaining, distributing, and developing the water resources of The Bahamas.

Ministry of Environment & Housing – The Ministry of Environment and Housing serves to protect, conserve, and manage the environment of The Bahamas. This ministry focuses on environmental control, solid waste management, public sanitation, and the beautification of public areas such as parks and beaches.

Department of Environmental Planning & Protection (DEPP) – The functions of the Department are to provide for and ensure the integrated protection of the environment of The Bahamas and ensure the sustainable management of its natural resources". DEPP is responsible for the evaluation of Environmental Impact Assessments (EIAs) and Environmental Management Plans (EMPs) and managing international environmental conventions.

Department of Environmental Health Services (DEHS) - DEHS manages the disposal of all wastes and management of environmental pollution (on land or in water). This department also promotes planning and approves various measures designed to ensure wise use of the environment.

Forestry Unit - The Forestry Unit's mandate is "to develop the forest resources of The Bahamas to their maximum potential by applying sound, scientific and sustained yield forest management principles and concepts."

Bahamas National Trust (BNT) - The mission of the BNT is "Conserving and protecting the natural resources of The Bahamas, through stewardship and education, for present and future generations."

Ministry of Labour - The Ministry of Labour oversees and regulates labour relations within The Bahamas.

Department of Labour – The Mission of the Department of Labour promotes good industrial relations between employer and employee, while promoting a high level of employment.

8.2 National Laws and Regulations

Conservation and Protection of the Physical Landscape of The Bahamas Act, 1997 (Ch. 260) - An Act to make provision for the conservation and protection of the physical landscape of The Bahamas,

- Where, section 3 speaks to excavation and harvesting of protected trees.

Town Planning Act, 1961 (Ch. 255) - An Act relating to town planning,

- Where, section 5 speaks to prescribed restricted areas and forbidding building activities.
- Where, section 7 speaks to committee sanctioned development activities.

Planning and Subdivision Act, 2010 - An Act to combine, consolidate and revise the law related to town planning and law relating to the development of subdivisions and to provide for matters connected thereto,

- where, section 3 speaks to the purpose of this Act which includes:
  - to provide planning for a controlled development system led by policy, land use designations and zoning.
  - the prevention of indiscriminate division and development of land.

- to ensure the efficient and orderly provision of infrastructure and services to the built environment.
- promoting sustainable development in a healthy natural environment.
- to maintain and improve the quality of the physical and natural environment.
- to protect and conserve the natural and cultural heritage of The Bahamas.
- provide for planning processes that are fair by making them open, accessible, timely and efficient.
- to recognize the decision-making authority and accountability of the Government in land use planning; and
- to plan for the development and maintenance of safe and viable communities.

Water and Sewerage Corporation Act, 1976 (Ch. 196) - An Act to establish a Water and Sewerage Corporation for the grant and control of water rights, the protection of water resources, regulating the extraction, use and supply of water, the disposal of sewage and for connected purposes,

- Where, section 3 speaks to government control of the production, extraction and use of water in the public interest.

Environmental Health Service Act, 1987 (Ch. 232) - An Act to promote the conservation and maintenance of the environment in the interest of health, for proper sanitation in matters of food and drinks and generally, for the provision and control of services, activities and other matters connected therewith or incidental thereto,

- Where, section 12 speaks to solid and liquid waste treatment in accordance with government regulations.
- Where, section 14 speaks to government notification of emissions or discharge, etc. of contaminant pollutants.

Environmental Health Services (Collection and Disposal of Waste) Regulations, 2004 (Ch. 232) - These Regulations may be cited as the Environmental Health Services (Collection and Disposal of Waste) Regulations, 2004,

- Where, section 3 speaks to the provision of waste collection service.
- Where, section 5 speaks to commercial waste.

Wild Bird Protection Act, 1952 (Ch. 249) - An Act to make provision for the protection of wild birds,

- Where, section 4 speaks to the killing or capture of wild birds during closed season.

Wild Animals Protection Act, 1968 (Ch. 248) - An Act to make provision for the control of the taking and export of wild animals",

- Where, section 3 speaks to taking of capture of wild animals.

Environmental Planning and Protection, 2019 - An Act to establish the department of environmental planning and protection; to provide for the prevention or control of pollution, the regulation of activities, and the administration, conservation, and sustainable use of the environment; and for connected purposes.

Environmental Impact Assessment Regulations, 2020 – An extension of the Environmental Planning and Protection Act that outlines the Environmental Impact Assessment Regulations which apply throughout the territory of The Bahamas including every island and cay; “The Minister, in exercise of the powers conferred by section 12 of the Environmental Planning and Protection Act, 2019 (No. 40 of 2019).

Disaster Preparedness and Response Act, 2006 - An Act to provide for a more effective organization of the mitigation of, preparedness for, response to and recovery from emergencies and disasters.

- Where, section 3 (1) states, there shall be a Department of Government referred to as NEMA which shall be the agency responsible for disaster relief management
- Where section 4 (2) (a) states, NEMA shall review and assess the various programmes and activities of the Government of The Bahamas which have an impact on the mitigation of, preparedness for, response to and recovery from emergencies and disasters in The Bahamas, and make recommendation to the Prime Minister on the likely activities and programmes on disaster preparedness and coordination
- Where, section 4 (2)(f) states NEMA shall prepare and review disaster risk assessment maps of The Bahamas
- Where, section 34 speaks to NEMA carrying out of the objective and purposes of an approved National Preparedness Plan as regards for, the mitigation of and the recovery from emergencies

Disaster Preparedness and Response (Amendment) Act, 2011 - An Act to Amend the Act Disaster Preparedness and Response Act by amending the First Schedule to Ch 34A. The First Schedule to the principal Act is amended by the deletion of the headings "Alert plus Watch (36 Hours Away) and Alert plus Warning (24 Hours Away)" set out under Column two along with the respective subsequent immediate entries and the substitution therefor of the following:

Column 1: "Tropical Cyclones	**Column2:** Alert plus Watch (48 Hours Away) When a Tropical Cyclone will possibly give storm or hurricane conditions within 48 hours in some parts of The Bahamas, a Storm or Hurricane Alert is issued. A storm or Hurricane Watch is announced at the beginning of this Alert. Alert plus Warning (36 Hours Away) When a tropical cyclone is likely to give storm or hurricane conditions within 36 hours in some parts of The Bahamas, a Tropical Stom1 or Hurricane Alert is issued, and includes a Tropical Storm or Hurricane Warning which is announced at the beginning of the Alert.

Bahamas Public Parks and Public Beaches Authority Act, 2014 – An Act to establish the public parks and public beaches authority, to provide for the property rights and liabilities of the public parks and public beaches authority and to identify, regulate, maintain, develop and conserve public parks and public beaches and for connected purposes." Where section 5 speaks to functions of the Authority.

Antiquities, Monuments and Museum Act, 1998 (Ch. 51) - "An Act to provide for the preservation, conservation, restoration, documentation, study and presentation of sites and objects of historical, anthropological, archaeological and paleontological interest, to establish a National Museum, and for matters ancillary thereto or connected therewith", where, section 3 speaks to the declaration of a monument by reason of its historical, anthropological, archaeological or paleontological significance.

Buildings Regulation, 1971 (Ch. 200) - "An Act to regulate the construction, alteration and repair of buildings, to provide for the re-instatement or removal of dangerous or dilapidated buildings, to authorize the publication of a building code and for purposes connected therewith." Where, Section 2. (c) speaks to the interpretation of 'building' including "any dock, bulkhead, pier and any works for the protection of land against encroachment by, or for the recovery of land from, fresh or salt water;" and Section 17 speaks to the Building Code.

Buildings Regulation (General) Rules, 1971 - (further to Section 19 of Ch. 200) and Section 9 speaks to the execution of permitted works.

Coast Protection Act, 1968 (Ch. 204) - "An Act to make provision for the protection of the coast against erosion and encroachment by the sea and for purposes connected therewith", where, section 8 speaks to approval for coastal protection work and section 9 speaks to the excavation of materials that compose of the seashore.

Conservation and Protection of the Physical Landscape of The Bahamas Act, 1997 (Ch. 260) - An Act to make provision for the conservation and protection of the physical landscape of The Bahamas. The Act contains parts regarding administration, regulation of excavation and landfill operations, provisions governing dangerous excavations, landfill operations, quarries or mines, zoning of The Bahamas for the purposes of quarrying and mining operations, protected trees, and general entries.

Conservation and Protection of the Physical Landscape of The Bahamas Regulations, 1997 - (further to Section 27 of Ch. 260). The Act contains parts regarding applications, permits and licenses, appeals, fees, offences, and penalties.

Forestry Act, 2010 and Forestry (Amendment) Act, 2010 & 2014 – An Act to provide the conservation and control of forests and for matter related thereto.

Forestry Regulations, 2014 and Forestry (Amendment) Regulations, 2021 – "5. Application for Permit to harvest protected tree. An application for the grant of a permit under section 12 of the

Act to harvest a protected tree, shall be made to the Director and shall contain all the relevant particulars set out in Form No. 3 (A) in the First Schedule including the payment of the prescribed fee as set out in the Second Schedule." And

"6. Permit to harvest protected tree. A permit granted under section 11 of the Act to harvest a protected tree shall be made in the manner set out in Form No. 3 (B) in the First Schedule, shall be accompanied by the payment of the prescribed fee as specified in the Second Schedule and shall be valid for six months from the date of the grant unless otherwise prescribed in the permit." And

"Construction or modification of road in a forest estate. A person shall not construct or modify a road or trail in a forest estate unless the construction or modification has been authorized by the Director of Forestry in writing, and the road, - a) or trail has been identified in an approved forest management plan; and b) layout has been approved by the Director of Forestry."

The Bahamas National Trust Act, 1959 - An Act to incorporate and confer powers upon The Bahamas National Trust for Places of Historic Interest or Natural Beauty.

The Bahamas National Trust (amendment) Act, 2010 – An act to amend section of the principal Act. "The Bahamas National Trust shall be at liberty from time to time to advise both the Government of The Bahamas and the private sector generally on development issues and policies relating to conservation, the environment, biodiversity, natural and cultural heritage and resource management."

Health and Safety Work Act, 2002 (Ch. 321C) - An Act to make provisions relating to health and safety at work and for connected purposes. Where, Section 4 speaks to general duties of employers to their employees and where, Section 7 speaks to general duties of employees at work.

Health and Safety at Work (Amendment) Act, 2015 - (repeal and replacement of Section 17 of Ch. 321C) Contains parts regarding applications, permits and licenses, appeals, fees, offences, and penalties.

8.3 International Conventions and Agreements

Stockholm Convention on Persistent Organic Pollutants – This is a global treaty to protect human health and the environment from chemicals that remain intact in the environment for long periods, become widely distributed geographically, accumulate in the fatty tissue of humans and wildlife, and have harmful impacts on human health or on the environment. "As set out in Article 1, the objective of the Stockholm Convention is to protect human health and the environment from persistent organic pollutants.

Rotterdam Convention (Prior Informed Consent) - The Convention was adopted on September 10, 1998, in Rotterdam and was entered into force on February 24, 2004. "The objective of this

Convention is to promote shared responsibility and cooperative efforts among Parties in the international trade of certain hazardous chemicals in order to protect human health and the environment from potential harm and to contribute to their environmentally sound use, by facilitating information exchange about their characteristics, by providing for a national decision-making process on their import and export and by disseminating these decisions to Parties” .

Commission on Sustainable Development – “The United Nations Commission on Sustainable Development (CSD) was established by the UN General Assembly in December 1992 to ensure effective follow-up of United Nations Conference on Environment and Development (UNCED), also known as the Earth Summit .”

Kyoto Protocol – “The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change (UNFCC), which commits its Parties by setting internationally binding emission reduction targets. The Kyoto Protocol was adopted in Kyoto, Japan on December 11, 1997, and entered into force on February 16, 2005. The Protocol commits industrialized countries and economies in transition to limit and reduce greenhouse gases (GHG) emissions in accordance with agreed individual targets. Signatories are obligated to adopt policies and measures on mitigation and to report periodically.”

Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and their Disposal – The Basel Convention was originally signed March 22, 1989, in Basel, Switzerland. And was entered into force on May 5, 1992. Since then, several iterations were entered into force. The 1995 “Ban Amendment” was entered into force in 2019. This Amendment provides for the prohibition of exports of all hazardous wastes covered by the Convention that are intended for final disposal, reuse, recycling, and recovery from countries listed in annex VII to the Convention (Parties and other States which are members of the OECD, EC, Liechtenstein) to all other countries. In 1998 Annexes VIII and IX were added to the convention. In 2019, provision for plastic waste was incorporated in the Convention. The Plastic Waste Amendments were entered into force as of January 1, 2021. “The Basel Convention is a global agreement between countries to protect human health and the environment against the adverse effects of hazardous wastes.”

Minamata Convention - “The Minamata Convention on Mercury is a global treaty to protect human health and the environment from the adverse effects of mercury. The Convention draws attention to a global and ubiquitous metal that, while naturally occurring, has broad uses in everyday objects and is released to the atmosphere, soil, and water from a variety of sources. Major highlights of the Minamata Convention include a ban on new mercury mines, the phase-out of existing ones, the phase out and phase down of mercury use in a number of products and processes, control measures on emissions to air and on releases to land and water, and the regulation of the informal sector of artisanal and small-scale gold mining. The Convention also addresses interim storage of mercury and its disposal once it becomes waste, sites contaminated by mercury as well as health issues.” http://www.mercuryconvention.org/

The Mauritius Strategy – The Mauritius Strategy is the 2005 commitment made in Port Louis, Mauritius to continue with the implementation of the 'Barbados Programme of Action for the Sustainable Development of Small Island Developing States' (BPOA) and add five additional priority areas to the BPOA. These additions include but are not limited to themes aligned with culture and sustainable production and consumption. The original BPOA addresses 14 priority areas which include climate change and sea- level rise, natural and environmental disasters, management of wastes, coastal and marine resources, freshwater resources, resources, energy resources, tourism resources, biodiversity resources, national institutions and administrative capacity, regional institutions and technical cooperation, transport and communication, science and technology, and human resource development.

9. ENVIRONMENTAL IMPACT ANALYSIS

9.1 Methodology for the Environmental Impact Assessment

The impact analysis is a critical component of the EIA process as it evaluates the potential impacts resulting from the interaction between project related activities and the surrounding environment during construction and operations phases of the project. Impacts are described as changes brought about to the surrounding environment as a result of project related activities. The surrounding environment for this EIA is inclusive of the physical, biological, and socio-economic environment within the project's area of influence. Environmental aspects considered in this analysis are listed below.

Table 11. Environmental aspects under consideration for Impact Analysis.

Environmental Aspects	
Physical	Hydrology & Hydrogeology
	Air Quality
	Noise
Biological	Terrestrial Habitats
	Birds
	Terrestrial Flora
Socio-Economics	Neighboring Communities
	Relocation
	Traffic
	Economic
	Utilities
Cultural	Archaeological, Historic & Paleontological Resources

Project related activities during construction and operations have the potential to impact the surrounding environment, and the nature of these impacts can be negative or positive and direct or indirect. Negative impacts are activities which result in an adverse change or degradation from the environmental baseline, while positive impacts result in a beneficial change or improvement to the environmental aspect under consideration. Direct impacts result from the direct interaction between project related activities and the surrounding environment, while indirect impacts consequences of the project implementation on the surrounding environment on a larger time and distance scale. Additionally, other parameters such as significance, duration and intensity are used in determining the scale of environmental impact.

Significance in this assessment is a determination of the degree of importance assigned to an environmental impact resulting from project related activities. An impact's significance is evaluated in terms of its magnitude and likelihood. Magnitude is a function of the impact's extent, whether restricted on site to the immediate project area, locally within a 10-mile radius, regionally to include the island of New Providence and the Central Bahamas and nationally to include the extent of The Bahama Archipelago. The likelihood of an impact is a rating which evaluates the likely potential for an impact to occur, with typical rating categories being unlikely to occur, likely to occur under most conditions, and definitely will occur.

The duration of the impact relates to the temporal scale which is required for changes in the host environment to return to baseline conditions or undetectable levels. Temporary impacts persist for a short duration and occur occasionally and/or intermittently. Short Term Impacts are expected to persist for the duration of the project activities related to the construction phase of the project. Long Term impacts extend beyond the duration of the construction period and exist throughout the life of the project. Permanent impacts persist far beyond the life of the project and are irreversible changes to the host environment due to project related activities.

The intensity of an impact can be considered as negligible, low, medium, or high. A Negligible impact is one which has no detectable change on the host environment. A low intensity impact does not affect the host environment in such a manner to alter natural flows and processes. Medium intensity impacts alter the natural flows and process of the host environment while allowing the flows and process to retain their natural functions. High intensity impacts alter natural flows and processes to the extent where natural functions are totally inhibited for a temporary or permanent period of time.

Cumulative impacts are the compounding effects of project related activities when combined with past, current, or future actions related to this or another project in the nearby environment. Cumulative impacts represent the interaction of impacting factors originating from different sources with the same host environment. The result is typically an exacerbation of the impact on the environmental aspect and is considered in this assessment.

9.2 Land Use Impact

The Royal Victoria Hotel grounds are a previously impacted site. Demolition of derelict buildings and infrastructure are likely to have long term beneficial impacts on the site by improving the local aesthetic of the area.

9.3 Aesthetic Impact

The demolition of aged buildings, removal of large amounts of debris and unsightly vegetation from the project sight eradicates the issue of the unpleasant sight within the Royal Victoria grounds. Its current aesthetic is deplorable and unacceptable for the capital city of Nassau and the Downtown area. Aesthetic impacts stemming from the development of this project would enhance the current area with modern infrastructure, lighting, and green spaces. These green spaces not only improve the Downtown area by providing a place of serenity via nature, but it is likely to encourage a trend of nature/ecological modernization within the Downtown area.

9.4 Impacts to the Physical Environment

Impacts to the physical environment relate to the demolition, excavation, land grading and vegetation clearing activities associated with the development of the project.

9.4.1 Air Quality Impacts

Negative impacts on air quality are likely to occur due to dust and particulate matter generated by on site construction activities. These activities include land clearing, removal of solid waste material, land grading, excavation, limestone rock import, stock piling and general construction activities on site. Potentially negative air quality impacts should cease once the development is complete due to the short term extent of these activities.

Deconstruction and relocation of the Historic Little House is proposed by the project owner. Results of laboratory analysis of paint chip samples indicates lead levels above 0.5% wt (Section 7.4.1.1 Asbestos and Lead Analysis). The presence of Lead in paint chips can pose serious health risks if proper protective equipment and disposal methods are utilized during deconstruction and relocation of the structure. To prevent possible health risk associated with this substance, it is recommended that staff wear personal protective equipment (PPE) prior to the commencement of work.

9.4.2 Noise Impacts

Noise generated from demolition and construction activities during the development are likely to have a negative impact on ambient sound levels by increasing the noise levels in the local areas surrounding the project site. Although, the area is known for its increased traffic and existing construction activities, the development of the project is likely to add to the existing noise level which may impact the local communities. However, these negative impacts are not expected to last due to the short term of construction and demolition activity.

9.5 Biological Impacts

Since, the Royal Victoria Hotel grounds are an impacted area; the biological impacts on site are focused primarily on the protected, White-Crowned Pigeon. This includes its habitat, nesting areas within the site, mating and feeding capabilities on site during and after construction.

9.5.1 Habitat Loss and Degradation Impact

The proposed site lacks the existence of abundant terrestrial habitat throughout the property. Its concrete pavement is devoid of a complete native Bahamian terrestrial habitat. However, the existence of the Lignum Vitae, Sapodilla and Silk Cotton trees provides the suitable habitat to support native and protected avian species such as the White-Crowned Pigeon. Since the development intends to leave the standing aged trees on property, this prevents loss of the existing bird habitat. Furthermore, the establishment of a public park would provide terrestrial habitat to a once vacant location which positively impacts this site and the immediate stakeholder community.

9.5.2 Impacts on Special Ecological Features and Biodiversity

Although, the developer intends to leave the existing standing trees on property there may be possible impacts to the root system of the aged Silk Cotton trees. Due to their girth, height, and age it is possible that there may be an extensive root system below the concrete surface of the existing Royal Victoria Hotel grounds. Special care and consideration must be taken upon the commencement of the construction phase to ensure that minimal or no damage is done to the root system. If damaged, this may compromise the integrity of the aged trees and other native trees on property which are part of the design.

9.5.3 Wildlife Impact

Protected avian species described in section 7.5.5 will benefit from the creation of terrestrial habitat and the preservation of standing native trees on property by providing habitat and a food source for these species. Invasive wildlife such as various rat species will be eradicated by pest control measures that follow best environmental management guidelines. Negative impacts to avian species may occur during construction phases as activity increases. However, the short term construction works should cease prompting avian species to return to the closest suitable habitat within the Downtown area.

9.6 Fire, Flood and Hurricane Risk

Due to the site elevations, it is possible that construction may increase flood risk to the immediate Shirley Street area and community because of its location within the middle of a high traffic / commercial area. Also, risk for fire damages may be moderate due to this location. If flood and fire measures are not avoided or easily mitigated this will affect the immediate area of Downtown Nassau and impact the communities outside of a 10 miles radius of the property. This may cause possible traffic congestion and smoke cover affecting stakeholders.

9.7 Solid, Liquid & Hazardous Waste Impact

Improper disposal of solid, liquid, and hazardous waste can have minimal negative impacts on the immediate and surrounding area, inclusive of air quality, the existing bird habitat (Silk Cotton trees). These impacts are considered minimal as the site has been previously developed and there is minimal threat to a pristine environment. Furthermore, modern civil infrastructure can be easily identified and avoided to prevent contamination of any kind during construction. As a result of construction activities, it is possible solid, liquid, and accidental hazardous waste to be accumulated on site. However, proper protocol and best environmental practices outlined the EMP will address such steps and procedures to avoid adverse impacts to the immediate and surrounding environments.

9.8 Energy Impact

The use of BPL energy will impact the surrounding community due to increased power usage. However, this development intends to reduce its energy use and dependency on BPL by installing energy efficient materials. Once registered LEED, appropriate materials will be recommended for use to aid in energy sustainability.

9.9 Water and Wastewater Impact

Potable water and wastewater demands will increase due to the developments' dependency on the Water and Sewerage Corporation. However, LEED certified materials and or processes will assist in the reduction of water and wastewater treatment demands.

9.10 Socio-Economic Impact

It is likely that positive socio-economic impacts would stem from the development of the new CBOB premises. As this generates jobs for local residents and has the potential to decrease the unemployment rate within in New Providence. Subsequently, additional economic growth is expected to accompany the new premises as it provides construction jobs and a space for artists.

9.11 Cultural Impact

The proposed art gallery/museum and performance theater provides a hub for local artists to showcase their talents to Bahamians and tourist. This gives stakeholders and opportunity to invest in Bahamian culture, thus preserving the Bahamian way of life through self-expression and storytelling.

9.11.1 Losses of Archaeological, Historic and Paleontological Resources

During construction it is possible that any archaeological, historic, or paleontological resource may be discovered given the known history of the site. If any artifacts of this nature may be discovered, it is imperative that AMMC of other relevant authorities be notified immediately. The derelict buildings should be examined prior to demolition by the competent authorizes to prevent loss of valuable artifacts, if any.

9.11.2 Community Service Impact

There are few negative impacts that are associated with this project as it relates to the surrounding community and its stakeholders. These include the public's acceptance of road direction changes, relocation, construction, and permanent loss of free parking. The four (4) major thoroughfares are well known and traveled among the community. Limiting road direction/traffic flow may incite anger or frustration in some stakeholders. Although, most of the establishments within the Royal Victoria Hotel grounds have vacated, the National Reference Laboratory is presently occupying a space within the premises. As the Covid-19 pandemic is currently ongoing, this proposes a task in due to the laboratory's ability to test for the virus. Its relocation must be swift, functional, and effective in order to provide an essential service to the Bahamian population. Construction works may increase the intensity of traffic flow due to various construction vehicles constantly entering and exiting the site daily which may temporarily cause a disruption. Furthermore, construction activities will prohibit the vacancy of free parking space for patrons within the immediate area.

A virtual town hall meeting be held to engage key stakeholders who will be directly and indirectly impacted by the construction of the CBOB New Premises. Persons will register for the meeting and can stream live over the internet. The Meeting Facilitator will pose questions and address concerns, while the Meeting Administrator will keep time, facilitate questions in the meeting chat room, record the session and transcribe notes. It is also proposed that a formal presentation of the final design of the CBOB New Premises be presented during this meeting. A formal date for the virtual meeting has not been set.

Although, the initial phases of the construction may be daunting to stakeholders the project should allow for more parking availability, Public Park for leisure and modernization of the Downtown area.

9.11.3 Recreational Impact

The development of the project will increase the volume of recreational and tourist activities within the local community. Added features of the new CBOB development including the park, art gallery and performance art theater positively impact the Downtown area due to its existence and modern designs.

9.11.4 Transportation Impacts

Changes to the existing roadways will impact traffic flow for stakeholders. Advanced notice is encouraged before the beginning of road works for the general public. Early indication of traffic direction changed should alleviate some frustration and surprise of the major changes to a well-known route. Construction vehicles entering and exiting the compound will impact existing traffic on Parliament and East Streets. However, this impact will be lessened if construction activity is localized and conducted only within hours of operation.

10. SUMMARY TABLE OF POTENTIAL ENVIRONMENTAL IMPACTS

Table 12 CBOB New Premises - Impact Significance Matrix - Extent, Duration, Intensity, Likelihood Aspect

Project Component	Impacting Factor	Physical			Biological			Socio-Economics					Cultural
		Hydrology & Hydrogeology	Air Quality	Noise	Terrestrial Habitats	Birds	Flora	Neighboring Communities	Relocation	Traffic	Economic	Utilities	Archaeological, Historic & Paleontological Resources
CONSTRUCTION													
Aboveground Infrastructure													
The proposed development of the new CBOB building contains a 250 seat-multipurpose theatre, pre-function space, art gallery, staff cafeteria, developed office spaces, public park, security operations, visitor center, conference rooms, staff gym, loading dock, restrooms.													
Public Park	Land Clearing												
	Excavation												
	Spoil Stockpiling												
	Solid, Liquid & Hazardous Waste												
	Noise												
	Emissions												
Road Improvements	Land Grading &Paving												
	Utility Installation												
Buildings	Land Clearing												
	Excavation												
	Spoil Stockpiling												
	Solid, Liquid & Hazardous Waste												
	Noise												
	Emissions												
Underground Infrastructure													
Underground parking lot, BOH facilities (storage, support facilities and utilities), and Mechanical Electrical & Plumbing (MEP) Infrastructure.													
Underground Parking Lot & MEP Infrastructure	Solid, Liquid, Hazardous Waste												
	Noise												
	Emissions												
	Drainage												
	Excavation												
OPERATION													
Aboveground Infrastructure													
Public Park	Solid, Liquid & Hazardous Waste												
	Noise												
	Emissions												
Road Improvements	Traffic Flow												
Buildings	Solid, Liquid & Hazardous Waste												
	Noise												
	Emissions												
Underground Infrastructure													
Underground Parking & MEP	Solid, Liquid & Hazardous Waste												
	Emissions												
	Drainage												

Impact Significance Key	Negligible/ No Impact	Minor Impact	Moderate Impact	Severe Impact	Beneficial Impact

11. ENVIRONMENTAL MANAGEMENT

The structure of the Environmental Management Plan (EMP) for the CBOB New Premises will be guided by the Department of Environmental Planning and Protection (DEPP). It should detail the best safety and environmental practices for construction and operation phases of the project. These guidelines explained in the EMP should assist in alleviating adverse impacts.

11.1 Draft Environmental Management Plan (EMP)

The EMP Terms of Reference (ToR) for the CBOB New Premises would outline the mitigation strategies related to the moderate to adverse environmental impacts associated with the project, as well as the necessary health and safety procedures and emergency response plans for construction and operational staff. The CBOB New Premises EMP ToR will follow the comprehensive framework set by the Department of Environmental Planning and Protection to ensure environmental compliance. Its contents will include:

- **Purpose, Scope and Content:** This section should summarize the purpose of the EMP and Emergency Response Plan (ERP); identify the project stages, components, and activities to which the plans will apply; and provide an outline of their content.
- **Summary of Impacts, Accidents/Malfunctions:** This section should summarize the predicted ongoing environmental (including socio-economic) impacts from activities during the various stages of the project that must be mitigated and the types of accidents (fires, explosions, natural events) and malfunctions (including acts of sabotage) that can be expected and the nature and scope of the impacts these would pose to the environment and the public. Information in the section will align with Section 10. Summary Table of Environmental Impacts in the EIA.
- **Summary of Environmental Regulatory Bodies and Standards:** This section should identify the relevant regulatory bodies having jurisdiction relating to environmental protection in The Bahamas and summarize their mandate, laws, regulations and policies and the relevant international Treaties, Conventions and Agreements to which The Bahamas is a signatory and their competent authorities. It should also include the laws, regulations, standards, codes and policies of other countries, international organizations as well as corporate policies that have been identified as applicable to the implementation of each stage of the project. The section should summarize the proposed environmental standards for each affected resource impacted by activities associated with each stage of the project that the proponent intends to comply with. Information in this section will align with section 8. National Environmental Laws, Policies, and International Conventions in the EIA.
- **Description of Planned Mitigation Measures:** This section should expand upon the planned mitigation measures mentioned in the EIA and further identify additional mitigation activities / plans that will be applied to meet the environmental standards established for the project. Each mitigation measure should be briefly described in relation to the impacts associated with each stage of the project. This should also reference any specific mitigation plans that may be applied during project implementation.

- **Description of Measures for Responding to Potential Accidents and Malfunctions:** This section should describe the measures to respond to fires, explosions or major spills that could occur during each stage of project implementation as a result of accidents, natural events or acts of sabotage or malfunctions. This should refer to any specific plans to deal with accidents, malfunctions, natural events or acts of sabotage.
- **Description of Planned Environmental Monitoring:** This section should describe the monitoring program, as guided by DEPP, including the protocols that will be used. This should specify the type of monitoring required, the parameters to be measured, methods to be used, sampling location; frequencies, detection limits and thresholds to signal the need for corrective actions.
- **Description of the Responsibilities and Accountabilities for Mitigation, Responses to Accidents and Malfunctions and Monitoring:** This section should identify the institutional arrangements (processes, procedures, and mechanisms) for implementation of the mitigation and monitoring and for responding to emergencies. This should include responsibilities for mitigation, accidents and malfunctions and monitoring together with information flow, and coordination between and among agencies responsible for mitigation, monitoring and emergency response.
- **Training:** This section should briefly describe the type of training, participants, course, content, and schedule that will be implemented to ensure that those responsible are knowledgeable about applying mitigation, responding to emergencies, and monitoring and reporting.
- **Description of the Responsibilities and Accountabilities for Reporting:** This section should specify institutional responsibilities for preparing, submitting, receiving, reviewing, and approving the reports associated with the EMP. An implementation schedule detailing the timing and schedule for reporting on progress should be prepared for each stage of the project. The format, content and timing of reporting should be phased and coordinated to facilitate audits, reviews, and approvals.
- **Mechanisms for Feedback and Adjustment:** This section should outline the review and audit processes and procedures and feedback mechanisms with proposed timing that will be put in place to modify the project in light of results of monitoring.
- **Public Consultation:** This section should provide a plan for public consultation activities during the finalization and implementation of the EMP. This could include: (i) notification of local communities when project implementation related activities are going to take place; and (ii) disclosure and review of the results of monitoring programs to local communities and stakeholders.

11.2 LEED Certification

The development of the project intends to strive for LEED Silver rating[27] during the construction of the new CBOB premises. This program encourages sustainable development designs and materials which reduce demand on municipal utility resources. Furthermore, each design effort or material is credited to achieve a standard rating which assists in the developer's attempts at achieving their sustainability goals[28]. The EMP will ensure that all of the LEED minimum program requirements are completed prior to construction. These are listed below.[29]

1. Register
    - Comply with environmental laws as regulated by DEPP,
    - Be a complete, permanent building,
    - Use a reasonable site boundary,
    - Comply with minimum floor area requirements,
    - Comply with minimum occupancy requirements,
    - Commit to sharing whole-building energy and water usage data,
    - Comply with a minimum building area to site area ratio,
    - Be in a permanent location on existing land,
    - Use reasonable LEED boundaries,
    - Comply with project size requirements.
2. Apply online.
3. Review
    - 3 –part review process (primary, final and appeal, if necessary)
4. Certify
5. Fees
    - Integration and access to the new Arc platform: All projects in LEED Online have automatic access to Arc at no additional cost; simply log into Arc and link to your project. [30]
    - A dedicated LEED Coach: Newly registered projects are given a dedicated LEED Coach. LEED Coaches have more than a decade of green building and LEED expertise and can assist with questions during your LEED certification process.
    - Award-winning customer service: Our customer service team has received 13 awards since 2013, including "Customer Service Team of the Year" from the American Business Awards and the International Business Awards.
6. Tools & Resources

[27] https://www.usgbc.org/leed
[28] https://www.usgbc.org/credits?Version=%22v4.1%22&Rating+System=%22New+Construction%22
[29] https://www.usgbc.org/tools/leed-certification/commercial
[30] https://www.usgbc.org/tools/leed-certification/fees

12. PUBLIC CONSULTATION

No public consultations have been held to date, with regards to the development of the project. However, public consultation will be coordinated with the relevant government agencies upon completion of the EIA. The developer plans to follow the public consultation process as guided by DEPP. The completed EIA document will be made available for public viewing, after which a public meeting will be held to discuss any questions or concerns raised by the public. At the conclusion of the public meeting, a public consultation report will be produced outlining the main proceedings of the meeting, and responses/solutions provided by the project owner.

12.1 Public Grievances

Public grievances are complaints or concerns expressed by stakeholders related to the development of the project. A website will be made available to the general public to express grievances related to the project. The general public may also email grievances to a designated email address provided by the developer. Complainants will have the option to remain anonymous if grievances are submitted through the website. Signage will be installed near the boundary of the project site informing the general public of the option to express grievances via the website or by email.

Grievances will be addressed within a two-week time period after they are recorded. Once a complaint is registered, an email acknowledgement will be sent to the complainant. The complaint will be sorted and directed to the appropriate department for resolution. If the resolution is straightforward, it will be communicated to the complainant. If the resolution is more involved, the proposed resolution will be communicated to the complainant and the appropriate steps taken to begin to address the grievance. In the event the complainant is satisfied with the resolution, CBOB will request an email or written confirmation that the complaint is resolved. In the event that complainant is not satisfied with the solution offered, CBOB representatives will meet with the complainant to help resolve the concern. Both grievances expressed by stakeholders and the response plan will be shared with the Department of Environmental Planning and Protection on a monthly basis. If there are no grievances to report, a response plan will not be submitted to DEPP. However, DEPP will be notified.

The form below will be used to record Public Grievances. The same information will be collected on the website.

Reference Number: (Unique number)

Date submitted: (Date the form is submitted)

Full Name: __*First and Last name*________________________________

Contact Information: ____*Phone or Email*____

Description of Grievance: ____

____

____

Proposed Resolution: Describe what you think would resolve the issue.

This will not be a required field in the form.

Would you like to be contacted to discuss the resolution to your grievance? __Yes __No

Please email completed form to [Designated e-mail address]

13. RECOMMENDATIONS AND MITIGATION STRATEGIES

Methodology

The following recommendations and mitigation strategies are a combination of best management practices used in previous experiences on similar developments. In accordance with these practices, a full- time environmental monitor will be on site during construction to ensure mitigation measures outlined in the Environmental Management Plan are always adhered to during development. Following construction, these practices should be taken on by a resident Environmental Manager. These practices include capitalizing on environmental windows (opportune times outside of migrating and/or nesting seasons) for valued ecosystem components (White-Crowned Pigeon), as much as reasonably practicable, in an effort to limit disturbances to the natural environment during construction and operational activities.

13.1 Air Quality Management Recommendations

During Construction – Air quality should be monitored with an air quality meter on site to ensure conditions during construction do not change significantly from the baseline conditions measured on site. The current air quality condition was good. Should the air quality show a sign of decline, then it is recommended that the site is watered at regular intervals and vehicles do not exceed 15 mph on site to avoid dust plumes. A dust barrier, a green mesh fence, should be installed at the perimeter of the site to reduce sound attenuation beyond the site boundary. Further dust mitigation activities will be described in the EMP.

Due to the presence of lead paint detected within Little House building. It is imperative that construction staff and other relevant staff associated with the construction/restoration activities wear PPE to prevent lead exposure. The purpose of wearing the PPE is to limit the body's exposure to lead and to prevent possible lead poisoning. These PPE include cover all body suit (chemical safe), filter mask, gloves, shoe covering, eye goggles and head covering. Disposal of lead materials should follow DEHS and DEPP guidelines.

Figure 21, Example of PPE during lead removal[31].

During Operation – Good air quality will be maintained on site during operation through strategic landscaping on site. Vegetation on the Park will include native species and those that have been shown to improve air quality. Smoking will be strongly discouraged on site. Fumes / exhaust from the generator will be reduced by constructing a suitable containment barrier and the location of the generator will be as removed from areas frequented by the general public as much as possible.

13.2 Noise Quality Management Recommendations

During Construction – The main source of sound during construction is the heavy equipment required for excavation, transporting aggregate, and removing waste from the site. These activities will be confined to the 7 am to 3 pm to reduce the sound impact to neighboring

[31] https://int-enviroguard.com/disposable-protective-clothing/chemsplashr/chemsplash-7019ys.html

communities. The green mesh fence used as a dust barrier also functions as noise barrier to a degree.

During Operation – The generator may produce noise during operation, but it can be mitigated by constructing a suitable containment barrier to reduce sound to neighboring communities. An energy efficient model will be sources to help reduce the amount of noise produced by the generator. The building for the theatre and art gallery will be insulated to reduce the amount of sound during events.

13.3 Potential Flood Management Recommendations

During Construction –To avoid extensive run off and flooding to Shirley Street, Parliament Street, East Street, and East Hill Street, wastewater management will be in place. A trench should be installed to collect water as it follows the natural slope of the land at the site. The water collected within the trench would be removed by the process of evaporation or redirected to disposal within nearby public drainage systems. The site will be graded to avoid pooling areas where standing water can accumulate.

During Operation – Appropriate drainage will be installed during construction to help prevent flooding on site during operation. During the hurricane seasons the drainage system will be cleared regularly.

13.4 Potential Fire Management Recommendations

Measures will be executed to prevent accidental fires on property during construction and operation activities. These include appropriate signage which indicates 'No Smoking' and no possession of smoking paraphernalia. Furthermore, vehicles will be maintained to avoid spontaneous combustion due to malfunction. Fire extinguishers and flame retardant material would be easily available for construction and CBOB staff for quick response if needed.

A Fire Prevention Plan should be developed to identify potential fire hazards or sources of ignition, to establish procedures which minimize the risk of fire in the workplace, and to describe construction site fire suppression system requirements. The plan should be written in compliance with MoW/OSHA requirements. The overall goal of this plan is to minimize personal injury and property damage.

13.5 Preservation and Education of Natural Resources

Landscaping will include native species as much as possible. Signage will be installed in the Park near species of importance on site. For example, the Silk Cotton Trees, the Lignum Vitae and the white crowned pigeons, as described in section 7.5.6 will be preserved on site.

13.6 Removal of Invasive Species

Invasive rodents will be removed during construction and through maintenance should not return to the site during operation. Debris will be removed from the site at regular intervals to avoid harboring rodents. Additionally, it is recommended that flora is sourced locally as much as possible to avoid the introduction of invasive species to the site.

14. CONCLUSION

The project site is impacted, which leaves little change to the existing environment. The overgrown invasive species on site will be removed and replaced with native landscaping which will attract native and protected avian species to the area. Also, the eradication of rodents due to onsite development would enhance the community's cleanliness and aesthetic. Development on this site would not only improve the aesthetic of the Shirley Street and Downtown area but allow for economic stimulation within this community by creating job opportunities.

Impacts which pose great concern to this site include flooding and the care of the aged Silk Cotton trees on property. However, mitigation recommendations provided such as proper drainage and best environmental practices during construction activities would lessen these impacts.

15. APPENDICIES

Appendix A – Master Plan

Key Campus Metrics

LOT SIZE:

132,998.00 SF

CAMPUS ZONES:

New Public Realm (Royal Victoria Gardens, Widened Sidewalks, Sidewalk Landscaping):

24,350.00 SF (18% OF TOTAL)

Building Footprint at B1 including Curry House (Maximum extent of footprint):

79,350.00 SF (60% OF TOTAL)

CBOB Campus Exterior Areas (Gardens, Entrances, Utilities Yard):

29,298.00 SF (22% OF TOTAL)

ACCOMMODATION:

Offices, Campus Amenity Spaces, Ancillary Spaces & Parking for 214 vehicles, all over 8 levels (2 levels below grade, 5 levels above grade, plus roof level):

LEVEL B2

FIT OUT: 13,428 SF
PARKING: 49,031 SF
ALL: 62,459 SF

LEVEL B1

FIT OUT: 33,553 SF
PARKING: 38,625 SF
YARD: 7,349 SF
ALL: 79,527 SF

LEVEL 1

FIT OUT: 24,571 SF
PLAZA/ROOF: 47,140 SF
ALL: 71,711 SF

LEVEL 2

INTERIOR: 17,496 SF
EXTERIOR: 360 SF
ALL: 17,856 SF

LEVEL 3

INTERIOR: 16,734 SF
EXTERIOR: 663 SF
ALL: 17,397 SF

LEVEL 4

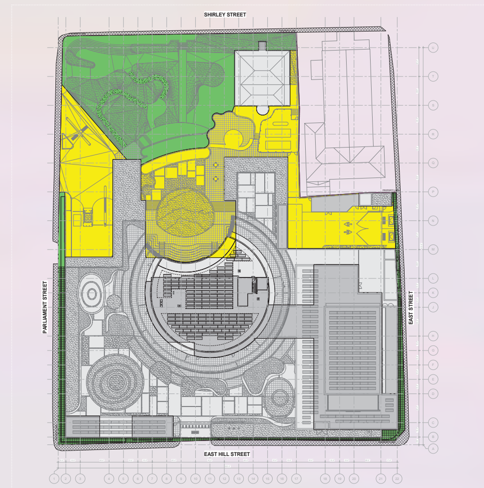
INTERIOR: 14,736 SF
EXTERIOR: 3,352 SF
ALL: 18,397 SF

LEVEL 5

INTERIOR: 12,350 SF
EXTERIOR: 3,331 SF
ALL: 15,681 SF

ROOF LEVEL

INTERIOR: 532 SF
EXTERIOR: 10,931 SF
ALL: 11,463 SF



1. *Visitor Center*
2. *Multipurpose Performance Space*
3. *Plaza*
4. *Cafeteria*


1 Visitor Center
2 Multipurpose Performance Space
3 Plaza
4 Cafeteria
SHIRLEY STREET
PARLIAMENT STREET
EAST STREET
EAST HILL STREET
1
2
3
4

Appendix B – Riviere & Associates, Ltd. Survey Report & Plan

Riviere & Associates, Ltd.
Land Surveyors
P.O. Box F-44658 • Tel: 242-351-5222 • Fax: 242-351-5219
Freeport, Grand Bahama, Bahamas

July 7th, 2019

The Central Bank of The Bahamas
Frederick and Market Streets
Nassau, The Bahamas
In C/o Graphite Engineering LTD

Re: Royal Victoria Gardens - Situate South of Shirley Street, West of east Street, North of East Hill Street and East of Parliament Street.

SURVEY REPORT

Riviere & Associates received instructions from the Central Bank of The Bahamas to carry out a topographical and cadastral survey of the above mentioned property and to prepare a survey plan of the same.

The site was walled in on all sides and in some areas along adjacent buildings. Survey monuments were set at breaks in the wall as per a boundary survey plan previously done by Donald E. Thompson & Associates. Distances shown are true and all bearings are grid north derived from existing surveys recorded in the department of lands and surveys. Datum is referenced to mean sea level and referenced from existing government control points. Reference was made to D.L.S. Plans 1483 N.P, 2818 NP and CS 3/5 - 4.57ft above sea level,

Survey information and datum was observed by using

1. A Topcon total station GM-50 Series and Carlson Data Collector
2. Spectra Precision SP80 GPS Receivers

The collected information was then computed and drawn in Autodesk Autocad Civil 3d 2018.

Legal Description

All that piece parcel or tract of land containing three and fifty-three thousandths (3.053) Acres situate South of Shirley Street, West of east Street, North of East Hill Street and East of Parliament Street and the boundaries of which begin at a point whose Northing is 9104860.445 Feet and whose

Easting is 867377.430 Feet; thence run on a North Azimuth of 184°42'02" for a distance of 112.13 feet to a point; thence run a North Azimuth of 186°12'22" for a distance of 32.07 feet to a point; thence run a North Azimuth of 229°35'01" for a distance of 15.18 feet to a point; thence run a North Azimuth of 276°50'57" for a distance of 177.85 feet to a point; thence run a North Azimuth of 274°54'46" for a distance of 172.86 feet to a point; thence run a North Azimuth of 06°34'34" for a distance of 213.26 feet to a point ; thence run a North Azimuth of 07°54'06" for a distance of 205.91 feet to a point; "thence along a curve to the RIGHT, having a radius of 6.240 feet for a distance of 8.644 feet ;thence run on a North Azimuth of 95°40'42" for a distance of 237.24 feet to a point; thence run a North Azimuth of 184°12'52" for a distance of 79.07 feet to a pint; thence run a North Azimuth of 187°25'16" for a distance of 44.77 feet to a point; thence run a North Azimuth of 185°09'57" for a distance of 47.86 feet to a point; thence run a North Azimuth of 92°29'18" for a distance of 67.25 feet to a point; thence run a North Azimuth of 95°42'27" for a distance of 25.40 feet to a point; thence run a North Azimuth of 93°34'02" for a distance of 7.71 feet to a point; thence run a North Azimuth of 183°46'48" for a distance of 103.61 feet to the point of beginning.

Sincerely

RWhite

Randy White

Registration No. 62

RIVIERE & ASSOCIATES
P.O. Box N-10730, Phone:(242)367-4585
Nassau, New Providence, Bahamas
rivierenassau@gmail.com

SURVEY PLAN

SHOWING A PARCEL OF LAND CONTAINING 3.053 ACRES
SITUATE SOUTH OF SHIRLEY STREET, EAST OF PARLIAMENT STREET
NORTH OF NORTH HILL STREET and WEST OF EAST STREET

NEW PROVIDENCE ISLAND - BAHAMAS

SURVEYED AT THE INSTANCE OF
THE CENTRAL BANK OF THE BAHAMAS

SURVEYOR'S CERTIFICATE

I Randy White a surveyor registered and licensed in the Bahamas, hereby certify that this plan is a true representation of a survey executed and plotted under my direction

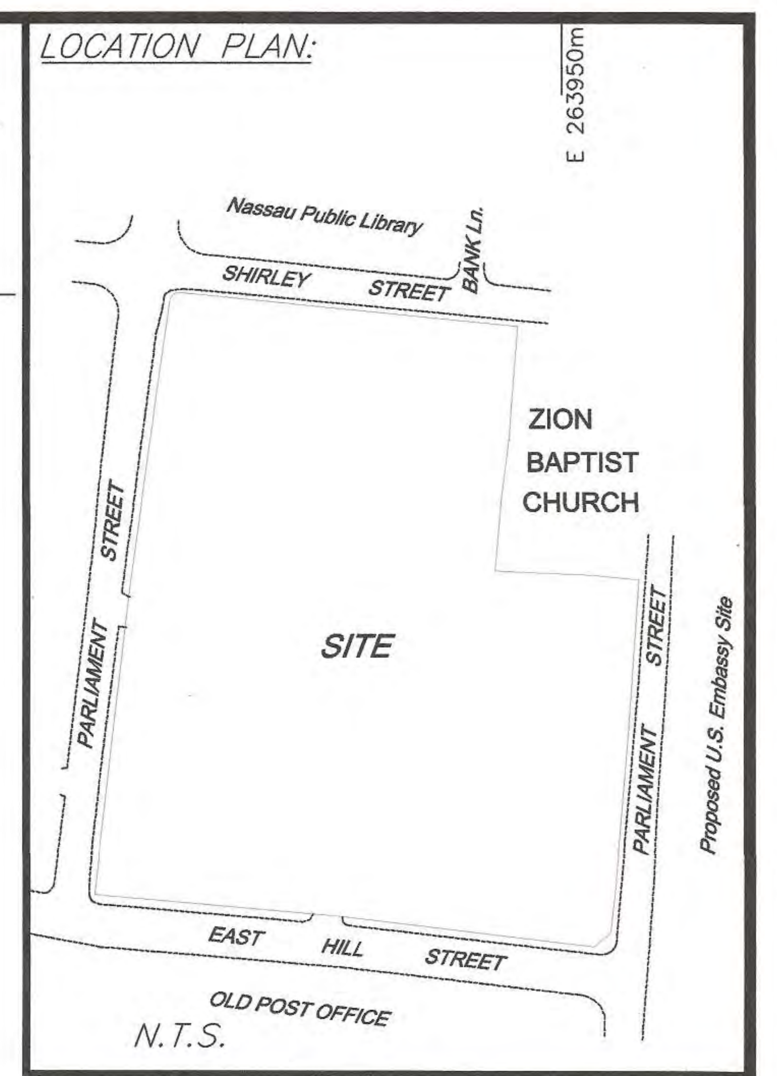
Randy White (P. 062)

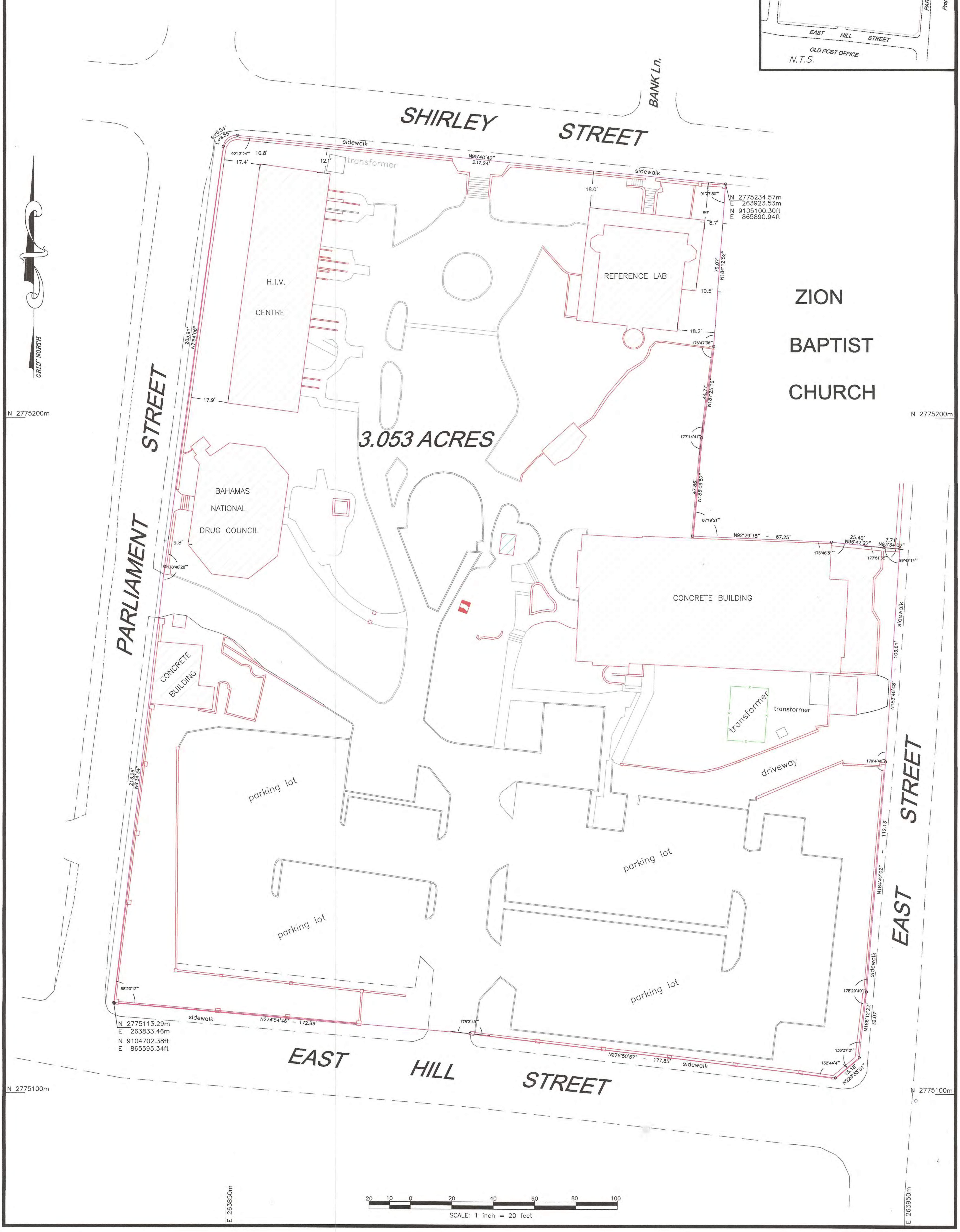
NOTES & LEGEND

- Denotes survey marker found
- Denotes survey marker set
- Utility pole
- Bench mark
- Edge of Tarmac

SURVEYED BY : Clifton Charles and Randy White
DRAWN BY : Clifton Charles
DATE : June 12, 2019
DATUM – M.S.L.
CONTOUR INTERVAL = 1 FOOT
GRID TIE AND M.S.L. REFERENCE MADE TO 1483 N.P, 2818 NP, CS 3/5 and NP 89

LOCATION PLAN:





SCALE: 1 inch = 20 feet

RIVIERE & ASSOCIATES
P.O. Box N–10730, Phone:(242)367–4585
Nassau, New Providence, Bahamas
rivierenassau@gmail.com

TOPOGRAPHICAL PLAN

SHOWING A PARCEL OF LAND CONTAINING 3.053 ACRES
SITUATE SOUTH OF SHIRLEY STREET, EAST OF PARLIAMENT STREET
NORTH OF NORTH HILL STREET and WEST OF EAST STREET

NEW PROVIDENCE ISLAND - BAHAMAS

SURVEYED AT THE INSTANCE OF
THE CENTRAL BANK OF THE BAHAMAS

NOTES & LEGEND

- Denotes survey marker found
- Denotes survey marker set
- Utility pole
- Bench mark
- Edge of Tarmac
- Utility manhole
- Light pole
- Water valve
- Sewer manhole
- Fire hydrant
- Buried Low Voltage Line

SURVEYED BY : Clifton Charles and Randy White
DRAWN BY : Clifton Charles
DATE : June 12, 2019
Job No. : 2019115
Plan No. : 2019115–1
DATUM – M.S.L.
CONTOUR INTERVAL = 1 FOOT
GRID TIE AND M.S.L. REFERENCE
MADE TO 1483 N.P, 2818 NP, CS 3/5 and NP 89

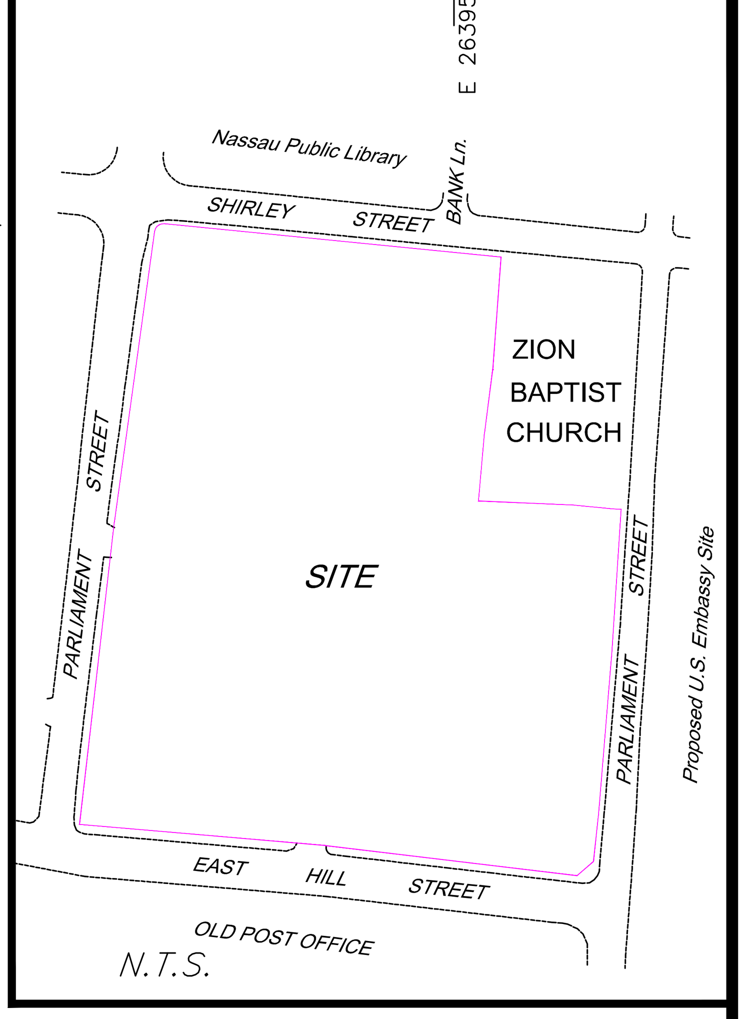
SURVEYOR'S CERTIFICATE

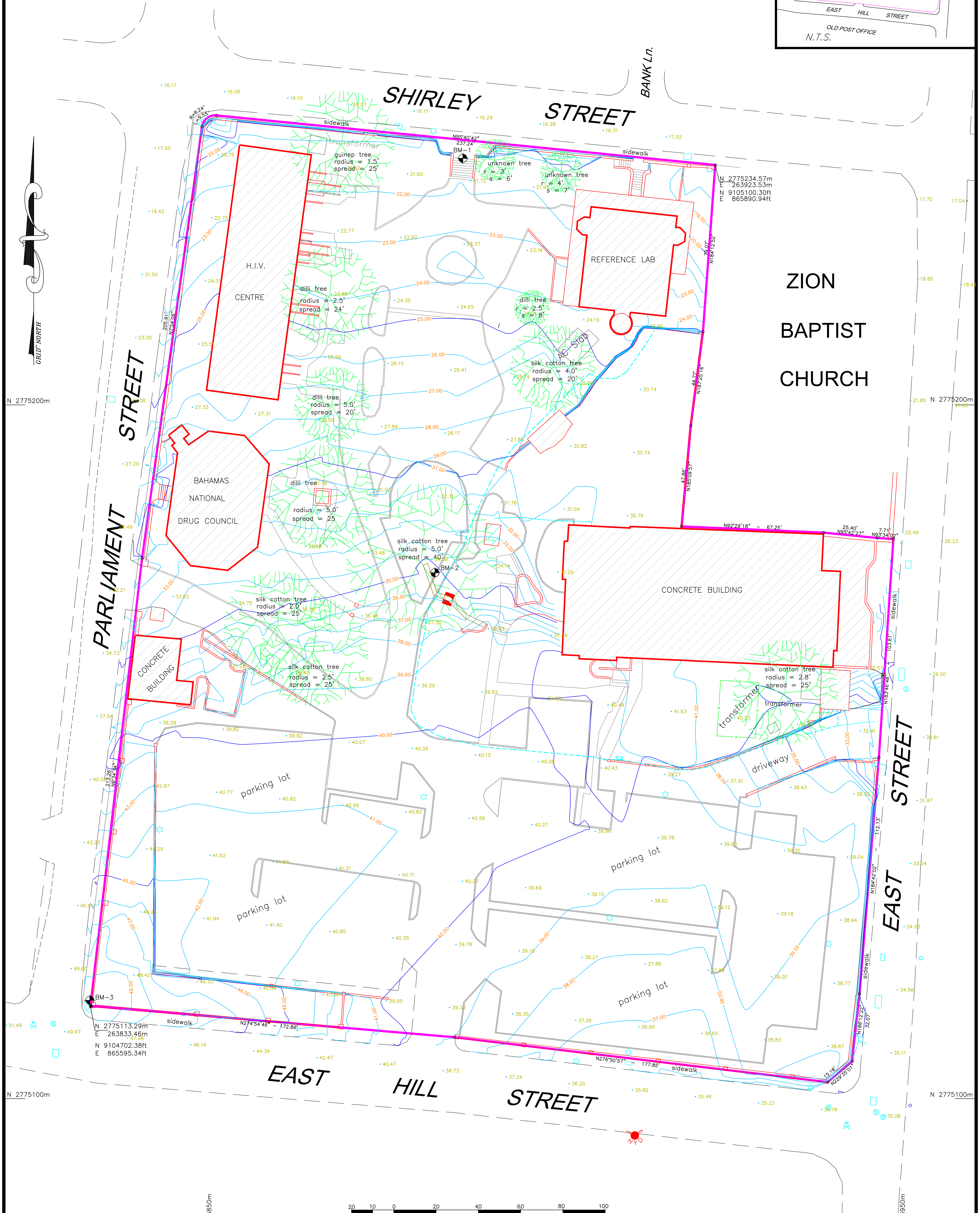
I Randy White a surveyor registered and licensed in the Bahamas, hereby certify that this plan is a true representation of a survey executed and platted under my direction

Randy White (P. 062)

BENCH MARK	ELEVATION
BM–1	17.14'
BM–2	35.92'
BM–3	49.78'

LOCATION PLAN:





SCALE: 1 inch = 20 feet

Appendix C – Asbestos and Lead Analysis

EMSL Analytical, Inc.
200 Route 130 North Cinnaminson, NJ 08077
Phone/Fax: (800) 220-3675/(856) 786-5974
http://www.EMSL.com / cinnasblab@EMSL.com

EMSL Order: 042101363
Customer ID: MISC-ACCT
Customer PO:
Project ID: EMSL-PJF

Attention: Raven Roberts
Airport Industrial Providence
Nassau,

Phone: (242) 327-5348
Fax:
Received Date: 01/19/2021 9:40 AM
Analysis Date: 01/25/2021
Collected Date: 01/04/2021

Project: Raven Roberts (EMSL-PJF)

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos: % Fibrous	Non-Asbestos: % Non-Fibrous	Asbestos: % Type
6 *042101363-0001*	Duct Insulation	Yellow Fibrous Homogeneous	95% Glass	5.0% Non-fibrous (Other)	**None Detected**
7 *042101363-0002*	Drywall	Gray/White Fibrous Homogeneous	50% Cellulose 30% MinWool	10% Perlite 10.0% Non-fibrous (Other)	**None Detected**
8-Floor Tile *042101363-0003*	Tile under Carpet	White Non-Fibrous Homogeneous		100.0% Non-fibrous (Other)	**None Detected**
8-Mastic *042101363-0003A*	Tile under Carpet	Yellow Non-Fibrous Homogeneous		100.0% Non-fibrous (Other)	**None Detected**
9 *042101363-0004*	Drywall	Brown/White Fibrous Homogeneous	20% Cellulose	80.0% Non-fibrous (Other)	**None Detected**
10-Ceiling Tile *042101363-0005*	Ceiling Tile	Brown/White Fibrous Homogeneous	15% Cellulose 5% Glass	80.0% Non-fibrous (Other)	**None Detected**
10-Joint Compound *042101363-0005A*	Ceiling Tile	White Non-Fibrous Homogeneous		100.0% Non-fibrous (Other)	**None Detected**

Initial report from: 01/25/2021 15:07:41

EMSL Analytical, Inc.
200 Route 130 North Cinnaminson, NJ 08077
Phone/Fax: (800) 220-3675/(856) 786-5974
http://www.EMSL.com / cinnasblab@EMSL.com

EMSL Order: 042101363
Customer ID: MISC-ACCT
Customer PO:
Project ID: EMSL-PJF

Attention: Raven Roberts
Airport Industrial Providence
Nassau,

Phone: (242) 327-5348
Fax:
Received Date: 01/19/2021 9:40 AM
Analysis Date: 01/25/2021
Collected Date: 01/04/2021

Project: Raven Roberts (EMSL-PJF)

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**

No Asbestos Detected — Between Expected Limit of Detection and Federal EPA Recommended Limit — Above Federal EPA Recommended Limit

These guidance limits are typically used in most scenarios. More stringent local or project specific guidelines may apply.

Analyst(s)

Quynh Vu (1) *Rachel Irwin (6)*

Samantha Rundstrom, Laboratory Manager
or other approved signatory

Initial report from: 01/25/2021 15:07:41

EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone/Fax: (856) 303-2500 / (856) 786-5974
http://www.EMSL.com cinnaminsonleadlab@emsl.com

EMSL Order:	202100535
CustomerID:	MISC-ACCT
CustomerPO:	
ProjectID:	EMSL-PJF

Attn: **Raven Roberts**

Airport Industrial Providence
Nassau,

Phone:	(242) 327-5348
Fax:	
Received:	1/19/2021 10:30 AM
Collected:	

Project: **Raven Roberts**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client Sample Description	*Lab ID*	*Collected*	***Analyzed***	*Weight*	***Lead Concentration***
	202100535-0001		1/26/2021	0.2663 g	0.20 % wt
Site: Little House, Lead Sample #1					
	202100535-0002		1/26/2021	0.2509 g	0.036 % wt
Site: Little House, Sample (Interior) #2					
	202100535-0003		1/26/2021	0.2527 g	0.024 % wt
Site: Light House, Sample #4					
	202100535-0004		1/26/2021	0.2732 g	6.8 % wt
Site: Little House, Lead Interior Sample #2					
	202100535-0005		1/26/2021	0.2808 g	1.2 % wt
Site: Little House Interior Sample #3					

Phillip Worby, Lead Laboratory Manager
or other approved signatory

Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.008% wt based on the minimum sample weight per our SOP. "<" (less than) result signifies the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. Definitions of modifications are available upon request.
Samples analyzed by EMSL Analytical, Inc. Cinnaminson, NJ NELAP Certifications: NJ 03036, NY 10872, PA 68-00367, AIHA-LAP, LLC ELLAP 100194, A2LA 2845.01

Initial report from 01/26/2021 15:56:26

Appendix D – Arborist Report

Arborist Report:

The Central Bank of The Bahamas New Premises

Submitted to:

The Central Bank of The Bahamas

Fredrick Street, Nassau, The Bahamas

Submitted by:

Caribbean Coastal Services Ltd.

Lot 57, Raphia Close East | Airport Industrial Park

P. O. Box CB-11524 Nassau, The Bahamas.

24 March 2021

Contents

Introduction

The Central Bank of The Bahamas is developing a new campus at the former location of The Royal Victoria Hotel. The site is in Downtown Nassau, and is bordered to its east by East Street, the south by East Hill Street, west by Parliament Street and north by Shirley Street. The approximately 3-acre property is the site of the Bahamas Drug Council (formerly the Little House), the HIV Centre, the National Reference Laboratory (formerly The Curry House) and the Commission of Inquiry Building. The site also serves as a major parking hub for workers in the surrounding areas.

Remnants of the former glory of the Royal Victoria Gardens remain, namely the large ionic Silk Cotton Trees and other tropical flora such as Sapodillys, Guineps, Poinciana and a variety of Palm species. The Garden serves as a valuable green space in the urbanized Downtown Nassau, and pedestrians regularly traverse the pathways as they commute to and from Downtown.

Certain project activities during the development of the CBOB New Premises may pose a risk towards the health of the resident vegetation on site at The Royal Victoria Gardens. It is the Project Owner's objective to retain and preserve as much of the Garden's vegetation as possible, as it is recognized the site is historical not only for the buildings which were once part of the Royal Victoria Hotel, but the trees and vegetation which made the space world renown and a beautiful site for visitors and residents. The redevelopment of the Garden should enhance the existing vegetation and celebrate the legacy of the historical site and its historical trees.

The objective of the Arborist Study is to identify nationally protected trees requiring preservation, to determine potential impacts to trees and landscape and tree preservation recommendations and protection solutions. The study is inclusive of the development of a monitoring plan for tree protection during construction and operation.

A tree inventory of all live trees (i.e >4m BH), and a floral inventory of all species is included. Recommendations on tree preservation option are based on their national protection status, intrinsic value, health and alignment with the proposed site plan for the project. Final decisions on trees to be preserved will be determined by the Project Owner and the Landscape Design Team. Where removal of nationally protected trees are unavoidable, appropriate mitigation strategies should be developed in conjunction with the Department of Forestry and the Department of Environmental Protection and Planning. The salvaging, removal of preservation of shrubby and herbaceous species on site is also at the discretion of the Project Owner and Landscape Design Team.

Where there is any tree, shrub or herbaceous species that is not wanted to be retained in its current location on site, the options exist to transplant elsewhere on site, to plant elsewhere offsite in a similar public Garden setting, or to discard.. Partnerships between the Project Owner, the Landscape Design Team and the Public Parks and Beaches Authority can assist with facilitating the replanting of trees from the Project site to other suitable public parks areas.

Figure 1. Satellite image depicting proximity of CBOB project site to Downtown Nassau

Figure 2. CBOB new premises project site

Floral Species List for the Project Site

Table 1. Comprehensive list of flora on site, inclusive of trees (>4in DBH, >2m tall), shrubs (<4in DBH, <2m tall), and herbaceous species of plants.

	Common Name	Species	Habit (Tree=T; Shrub=S; Herb=H)
1	Coral Pea	Adenanthera pavonia	T
2	Christmas Palm	Adonidia merrillii	T
3	Aechmea	Aechmea sp.	H
4	Agave	Agave americana	S
5	Woman's Tongue	Albizzia lebbeck	T
6	Asparagus Fern	Asparagus setaceus	H
7	Carpet Grass	Axonopus compressus	H
8	Poor Man's Orchid	Bauhinia variegata	T
9	Shepherd's Needle	Bidens alba	H
10	Bougainvillea	Bougainvillea sp	S
11	Casuarina	Casuarina equisetifolia	S
12	Silk Cotton	Ceiba pentandra	T
13	Fringed Chloris	Chloris ciliata	H
14	Autograph Tree	Clusia rosea	T
15	Coconut	Cocos nuciferus	T
16	Croton	Codiaecum variegatum	S
17	Wolly Buggar	Corchorus hirsutus	S
18	Crinum lily	Crinum asiaticum	H
19	Firebush	Croton lucidus	S
20	Bermuda Grass	Cynodon dactylon	H
21	Poincianna	Delonix regia	T
22	Spanish Clover	Desmodium incanum	H
23	Corn Plant	Dracena fragrans	T
24	Surinam Cherry	Eugenia uniflora	S
25	Ficus	Ficus benjamina	T
26	Lignum vitae	Guaiacum sanctum	S
27	Logwood	Haematoxylum campechianum	T
28	Rooster Comb	Heliotropium angiospermum	H
29	Sagisi Palm	Heterospathe elata	T
30	West Indian Jasmine	Ixora coccinea	S
31	Jasmine Vine	Jasminum fluminense	H
32	Sage	Lantana camara	S
33	Jumbey	Leucaena leucocephala	S

34	Lily Turf	Liriope muscari	H
35	Mango	Magnifera indica	T
36	Sapodilly	Manzanilla zapota	T
37	Guinep	Melicoccus bijugatus	T
38	Boston Fern	Nephrolepsis exaltata	H
39	Pink Oleander	Nerium oleander	S
40	Variegated Screwpine	Pandanus veitchii	S
41	Small Passion Flower	Passiflora suberosa	H
42	Dwarf Phoenix Palm	Phoenix roebelenii	T
43	Allspice	Pimenta diocia	T
44	Blue plumbago	Plumbago auriculata	S
45	Mamey Sapote	Pouteria sapota	T
46	Alexander Palm	Ptychosperma elegans	T
47	Royal Palm	Roystonia regia	T
48	Sabal Palm	Sabal palmetto	T
49	Snake Plant	Sanseviera trifasciata	H
50	Hawaiian Lettuce	Scaevola taccada	S
51	Umbrella Tree	Schefflera arboricola	T
52	Paradise Tree	Simarouba glauca	S
53	Tamarind	Tamarindus indica	T
54	Yellow Elder	Tecoma stans	S
55	Yucca	Yucca aloifolia	S
56	Snow Bush	Breynia disticha	S
57	Variegated Shell Ginger	Alpinia zerumbet	H
58	Prickly Pear	Opuntia cochenillifera	H
59	Carissa Plum	Carissa macrocarpa	S
60	Pentas	Pentas lanceolata	S
61	Fishtail Palm	Caryota nitis	S
62	Desert Rose	Adenium obesum	S
63	Geranium aralia	Polyscias guilfoylei	S
64	Song of India	Dracena reflexa	T

Figure 3. Site map depicting tree inventory

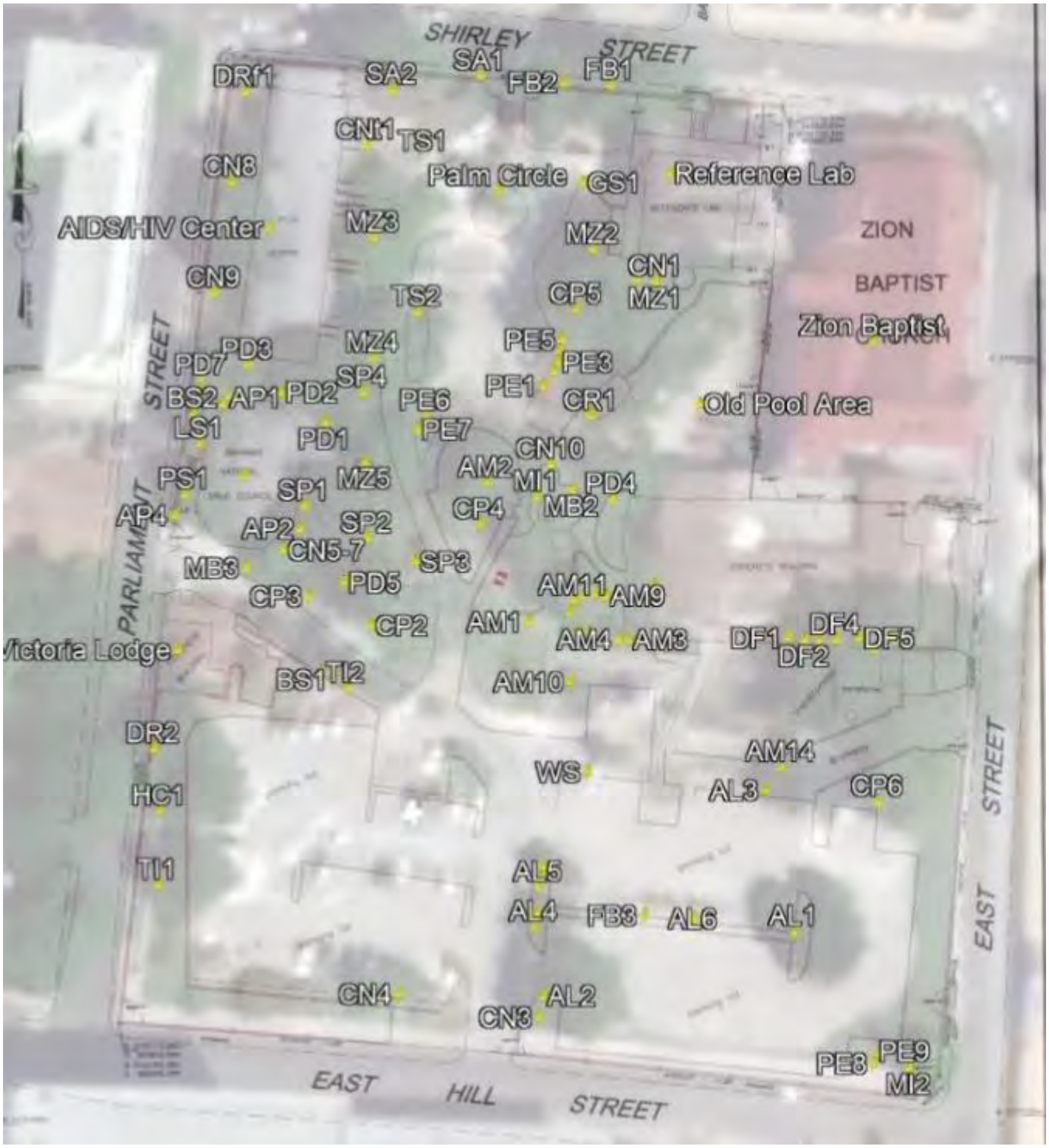


Figure 4. Site Map depicting tree inventory (southern portion of property)

Figure 5. Site map depicting tree inventory

Site Photo Log

Figure 6. Silk Cotton Tree (CP1)

Figure 7. Silk Cotton Trees (CP2, right; CP3, left)

Figure 8. Silk Cotton Tree (CP 5)

Figure 9. Lignum vitae (GS1) and Lantana (LC1)

Figure 10. Ficus benjamina (FB2)

Figure 11. Ficus benjamina (FB1)

Figure 12.Ptychosperma elegans (PE 1-4)

Figure 13. Allspice (PD1)

Figure 14. Allspice (PD2, front) and Adenanthera pavonia (AP1, rear)

Figure 15. Allspice trees (PD6-8)

Figure 16. Christmas Palm (AM2)

Figure 17. Royal Palm (RR1) left, and damaged trunk (right)

Figure 18. Pitch Apple Tree (CR1, left) and fruit (right)

Figure 19. Allspice Tree adjacent to COI (PD4)

Figure 20. Coconut (CN2)

Figure 21. Guinep (MB2)

Figure 22. Mango (MI1)

Figure 23. Sapodilly east of HIV Centre (MZ3)

Figure 24. Silk Cotton Tree (CB6)

Figure 25. Mango (MI2)

Figure 26. Ptychosperma palm (PE8)

Figure 27.Ptychosperma palm (PE9)

Figure 28. Albizzia lebbeck (AL1)

Figure 29. Albizzia lebbeck (AL6)

Figure 30. Albizzia lebbeck (AL5)

Figure 31. Albizzia lebbeck (AL2)

Figure 32. Albizzia lebbeck (AL4)

Figure 33. Pygmy Phoenix Palm (PR1)

Figure 34. Coconut (CN4)

Figure 35. Tamarind Tree (TI1)

Figure 36. Logwood Tree (HC1)

Figure 37. Poincianna Tree along Parliament Street (DR2)

Figure 38. Mamey sapote (PS1)

Figure 39. Guinep (MB3)

Figure 40. Coconuts (CN5-7)

Figure 41. Allspice Tree (PD5)

Figure 42. Silk Cotton Tree (CB4)

Figure 43. Christmas Palms near COI building

Figure 44. Snow bush (Breynia disticha)

Figure 45. Pink Oleander (Nerium oleander)

Figure 46. North eastern area of Garden, CP5 and Reference Laboratory in background.

Figure 47. West side of HIV Centre, facing south along Parliament Street .

Figure 48. Eastern end of parking lot, facing north toward COI building.

Figure 49. Eastern end of parking lot, facing east along southern wall.

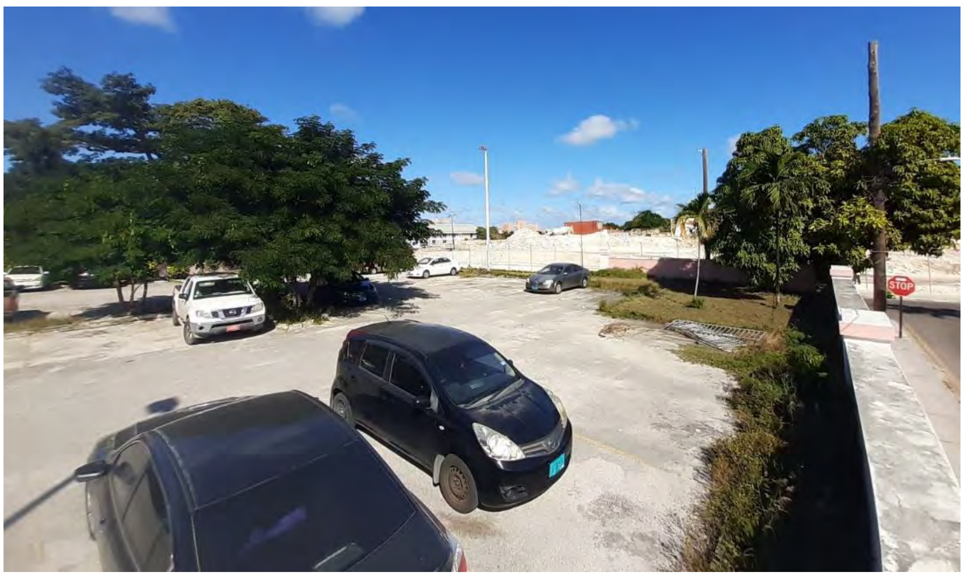


Figure 50. Eastern end of parking lot, facing west along south wall.

Figure 51. Western side of parking lot, facing north along south wall.

Figure 52. Western side of parking lot, facing east along western wall.

Figure 53. East side of Drug Council house

Figure 54. East side of Drug Council and HIV Centre

Figure 55. Iconic Silk Cotton Tree in center planter of property

Figure 56. Pink Oleander and Christmas Palm in planters on south side of COI building.

Figure 57. Eastern entrance to Royal Victoria Gardens, south of COI building

Figure 58. Silk Cotton (CP1) on southern side of COI buildings

Figure 59. Silk Cotton trees (CP2 & CP3) along western entrance of site.

Figure 60. Garden interior facing north

Figure 61. Garden interior facing east

Figure 62. East side of Drug Council and HIV Centre

Figure 63. Northwestern corner of property, facing east on Parliament Street.

Figure 64. Northern boundary of property, facing south along Shirley Street.

Tree Inventory Matrix

Table 2. Specified Tree matrix depicting tree designations, general conditions, location, risks, and recommendations.

Tree Code	Species	Lat	Long	Notes	Threats	Recommendations	Preservation Color Code
AL1	Albizzia lebbeck	25° 4'30.68"N	77°20'24.42"W	Invasive; within building footprint	construction of new building; excavation of parking lot	Removal/eradication from property	
AL2	Albizzia lebbeck	25° 4'30.40"N	77°20'25.62"W	Invasive; within building footprint	construction of new building; excavation of parking lot	Removal/eradication from property	
AL3	Albizzia lebbeck	25° 4'31.29"N	77°20'24.56"W	Invasive; within building footprint	construction of new building; excavation of parking lot	Removal/eradication from property	
AL4	Albizzia lebbeck	25° 4'30.70"N	77°20'25.66"W	Invasive; within building footprint	construction of new building; excavation of parking lot	Removal/eradication from property	
AL5	Albizzia lebbeck	25° 4'30.87"N	77°20'25.64"W	Invasive; within building footprint	construction of new building; excavation of parking lot	Removal/eradication from property	
AL6	Albizzia lebbeck	25° 4'30.74"N	77°20'24.90"W	Invasive; within building footprint	construction of new building; excavation of parking lot	Removal/eradication from property	
AL7	Albizzia lebbeck	25° 4'30.96"N	77°20'25.62"W	Invasive; within building footprint	construction of new building; excavation of parking lot	Removal/eradication from property	
AM1	Adoninia merrillii	25° 4'32.02"N	77°20'25.69"W	in planter under CP4		transplant for reuse	
AM10	Adoninia merrillii	25° 4'31.76"N	77°20'25.49"W	in clumps in planter adjacent to COI	demo of COI building; construction of new building	transplant for reuse	
AM11	Adoninia merrillii	25° 4'32.11"N	77°20'25.47"W	in clumps in planter adjacent to COI	demo of COI building; construction of new building	transplant for reuse	
AM12	Adoninia merrillii	25° 4'31.98"N	77°20'25.45"W	in clumps in planter adjacent to COI	demo of COI building; construction of new building	transplant for reuse	
AM13	Adoninia merrillii	25° 4'32.06"N	77°20'25.49"W	in clumps in planter adjacent to COI	demo of COI building; construction of new building	transplant for reuse	
AM14	Adoninia merrillii	25° 4'31.39"N	77°20'24.48"W	in clumps in planter adjacent to COI	demo of COI building; construction of new building	transplant for reuse	
AM2	Adoninia merrillii	25° 4'32.62"N	77°20'25.89"W	in clumps in planter adjacent to COI	demo of COI building; construction of new building	transplant for reuse	
AM3	Adoninia merrillii	25° 4'31.94"N	77°20'25.21"W	in clumps in planter adjacent to COI	demo of COI building; construction of new building	transplant for reuse	
AM4	Adoninia merrillii	25° 4'31.94"N	77°20'25.26"W	in clumps in planter adjacent to COI	demo of COI building; construction of new building	root prune, transplant for reuse	

AM5	Adoninia merrillii	25° 4'31.95"N	77°20'25.33"W	in clumps in planter adjacent to COI	demo of COI building; construction of new building	root prune, transplant for reuse	
AM6	Adoninia merrillii	25° 4'31.97"N	77°20'25.40"W	in clumps in planter adjacent to COI	demo of COI building; construction of new building	root prune, transplant for reuse	
AM7	Adoninia merrillii	25° 4'32.13"N	77°20'25.43"W	in clumps in planter adjacent to COI	demo of COI building; construction of new building	root prune, transplant for reuse	
AM8	Adoninia merrillii	25° 4'32.14"N	77°20'25.37"W	in clumps in planter adjacent to COI	demo of COI building; construction of new building	root prune, transplant for reuse	
AM9	Adoninia merrillii	25° 4'32.13"N	77°20'25.32"W	in clumps in planter adjacent to COI	demo of COI building; construction of new building	root prune, transplant for reuse	
AP1	Adenanthera pavonia	25° 4'32.99"N	77°20'26.84"W	Invasive; adjacent to drug council and HIV centre	deconstruction of drug council building; construction of entrance	removal	
AP2	Adenanthera pavonia	25° 4'32.42"N	77°20'26.78"W	Invasive; adjacent to drug council and HIV centre	deconstruction of drug council building; construction of entrance	removal	
AP3	Adenanthera pavonia	25° 4'32.94"N	77°20'27.07"W	Invasive; adjacent to drug council and HIV centre	deconstruction of drug council building; construction of entrance	removal	
AP4	Adenanthera pavonia	25° 4'32.48"N	77°20'27.38"W	Invasive; adjacent to drug council and HIV centre	deconstruction of drug council building; construction of entrance	removal	
BS1	Bursera simaruba	25° 4'31.77"N	77°20'26.62"W	small specimen along western entrance driveway	construction of new building; excavation of parking lot	removal	
BS2	Bursera simaruba	25° 4'32.92"N	77°20'27.29"W	large specimen in planter at western entrance of drug council building	deconstruction of drug council building; construction of entrance	retain for landscape?	
CN1	Cocos nucifera	25° 4'33.49"N	77°20'25.08"W	adjacent to Reference laboratory; edible	demo of old pool area	retain for landscape?	
CN10	Cocos nucifera	25° 4'32.70"N	77°20'25.58"W	in planter west of COI	demo of COI building	remove	
CN2	Cocos nucifera	25° 4'32.70"N	77°20'25.58"W	adjacent to Reference laboratory; edible	demo of old pool area	retain for landscape?	
CN3	Cocos nucifera	25° 4'30.31"N	77°20'25.64"W	in planter at southern entrance	construction of new building; excavation of parking lot	remove	
CN4	Cocos nucifera	25° 4'30.41"N	77°20'26.31"W	in planter at southern entrance	construction of new building; excavation of parking lot	remove	

CN5-7	Cocos nucifera	25° 4'32.33"N	77°20'26.86"W	east of drug council building	deconstruction of drug council building; construction of entrance	remove	
CN8	Cocos nucifera	25° 4'33.92"N	77°20'27.11"W	west of HIV in planter along Parliament street	demo of HIV center; roadworks and promenade construction	retain for landscape?	
CN9	Cocos nucifera	25° 4'33.44"N	77°20'27.19"W	west of HIV in planter along Parliament street	demo of HIV center; roadworks and promenade construction	retain for landscape?	
CNt1	Caryota nitis	25° 4'34.08"N	77°20'26.46"W	adjacent to HIV center	demo of HIV center	remove	
CP1	Ceiba pentandra	25° 4'31.90"N	77°20'24.04"W	Protected species on southern side of COI building; adjacent to BPL transfer switch	demo of COI; removal of BPL infrastructure; demo of retaining walls; construction of new BOH area	preserve	
CP2	Ceiba pentandra	25° 4'32.00"N	77°20'26.44"W	Protected species along western entrance driveway	Excavation of parking lot; construction of new building (within footprint)	remove	
CP3	Ceiba pentandra	25° 4'32.13"N	77°20'26.74"W	Protected species along western entrance driveway	Excavation of parking lot; construction of new building (within footprint)	remove	
CP4	Ceiba pentandra	25° 4'32.44"N	77°20'25.92"W	Protected species in central planter on property; historic specimen*	Excavation of parking lot; construction of new building (near to building footprint); construction of entrance driveway; demo of COI	retain for landscape; implement protectionary measures for demo, construction and operations phases	
CP5	Ceiba pentandra	25° 4'33.37"N	77°20'25.46"W	Protected species south of Reference Laboratory	demo of old pool area	retain for landscape; implement protectionary measures for demo, construction and operations phases	
CP6	Ceiba pentandra	25° 4'31.24"N	77°20'24.02"W	Protected species south of eastern entrance; young specimen	construction of new building (within building footprint); excavation of parking lot	removal	
CR1	Clusia rosea	25° 4'32.91"N	77°20'25.39"W	healthy specimen	demo of old pool area; demo of shed	retain for landscape; implement protectionary measures for demo, construction and operations phases	
DF1	Dracena fragrans	25° 4'31.95"N	77°20'24.45"W	specimen along southern face of COI	demo of COI	remove	
DF2	Dracena fragrans	25° 4'31.94"N	77°20'24.37"W	specimen along southern face of COI	demo of COI	remove	

DF3	Dracena fragrans	25° 4'31.94"N	77°20'24.30"W	specimen along southern face of COI	demo of COI	remove	
DF4	Dracena fragrans	25° 4'31.94"N	77°20'24.22"W	specimen along southern face of COI	demo of COI	remove	
DF5	Dracena fragrans	25° 4'31.95"N	77°20'24.11"W	specimen along southern face of COI	demo of COI	remove	
DF6	Dracena fragrans	25° 4'31.95"N	77°20'23.97"W	specimen along southern face of COI	demo of COI	remove	
DF7	Dracena fragrans	25° 4'31.94"N	77°20'23.91"W	specimen along southern face of COI	demo of COI	remove	
DR1	Delonix regia	25° 4'33.13"N	77°20'27.03"W	showy roadside tree on Parliament street, red flowers	promenade construction	remove	
DR2	Delonix regia	25° 4'31.47"N	77°20'27.48"W	showy roadside tree on Parliament street, red flowers	demo of HIV center	retain in landscape?	
DR3	Delonix regia	25° 4'33.73"N	77°20'27.13"W	showy roadside tree on Parliament street, red flowers	demo of HIV center; roadworks and promenade construction	retain in landscape?	
DRf1	Dracena reflexa	25° 4'34.31"N	77°20'27.04"W	specimen along southern face of COI	demo of COI	remove	
FB1	Ficus benjamina	25° 4'34.34"N	77°20'25.30"W	large specimen tree along Northern boundary of Shirley Street	demo of old property walls; final site grading	retain in landscape?	
FB2	Ficus benjamina	25° 4'34.35"N	77°20'25.52"W	large specimen tree along Northern boundary of Shirley Street	demo of old property walls; final site grading	retain in landscape?	
FB3	Ficus benjamina	25° 4'30.75"N	77°20'25.14"W	small specimen in parking lot planter, within building footprint	construction of new building; excavation of parking lot	remove	
GS1	Guaiacum sanctum	25° 4'33.92"N	77°20'25.43"W	small specimen planted in front of Reference Laboratory; protected tree	landscape design?	Transplant for reuse/ replace with larger specimen and maintenance program	
HC1	Haematoxylum campechianum	25° 4'31.20"N	77°20'27.45"W	large specimen in planter along Parliament street; invasive species	promenade construction	remove	

HC2	Haematoxylum campechianum	25° 4'31.80"N	77°20'26.68"W	small specimen in along western driveway	construction of new building; excavation of parking lot	remove	
LC1	Lantana camara	25° 4'33.92"N	77°20'25.43"W	small specimen planted in front of Reference Laboratory	landscape design?	remove and replace with native Lantana species	
LS1	Lysiloma sabicu	25° 4'32.79"N	77°20'27.26"W	large specimen at western entrance of Drug Council Bldg; protected	deconstruction of drug council building; construction of entrance	retain for landscape; implement protectionary measures for demo, construction and operations phases	
MB1	Melicoccus bijugatus	25° 4'34.40"N	77°20'26.40"W	large specimen tree, near to Shirley Street boundary and BPL transfer switch; edible	demo of HIV center; removal of BPL infrastructure; demo of old property walls; final site grading	remove and replace	
MB2	Melicoccus bijugatus	25° 4'32.59"N	77°20'25.48"W	large specimen tree in planter west of COI; edible	demo of COI	retain in landscape?	
MB3	Melicoccus bijugatus	25° 4'32.25"N	77°20'27.04"W	large specimen tree near to western entrance; edible	construction of new building; excavation of parking lot	remove and replace	
MI1	Magnifera indica	25° 4'32.56"N	77°20'25.65"W	specimen in planter east of CP4; edible	demo of old utility room	retain in landscape?	
MI2	Magnifera indica	25° 4'30.09"N	77°20'23.87"W	mature tree in south-eastern corner of property; edible	construction of new building; excavation of parking lot	remove and replace	
MZ1	Manzanilla zapote	25° 4'33.49"N	77°20'25.08"W	adjacent to Reference laboratory; edible, bird food source	demo of old pool area	retain in landscape?	
MZ2	Manzanilla zapote	25° 4'33.63"N	77°20'25.38"W	adjacent to Reference laboratory; edible, bird food source	landscape design?	retain in landscape?	
MZ3	Manzanilla zapote	25° 4'33.68"N	77°20'26.43"W	large specimen in front of HIV center; edible, bird food source	demo of HIV center	retain for landscape; implement protectionary measures for demo, construction and operations phases	
MZ4	Manzanilla zapote	25° 4'33.16"N	77°20'26.43"W	large specimen in front of HIV center; edible, bird food source	demo of HIV center	retain for landscape; implement protectionary measures for demo, construction and operations phases	
MZ5	Manzanilla zapote	25° 4'32.71"N	77°20'26.47"W	large specimen in front of drug council	deconstruction of drug council building; construction of entrance	retain in landscape?	

				in planter; edible, bird food source			
PD1	Pimenta dioica	25° 4'32.88"N	77°20'26.66"W	specimen east of drug council building	deconstruction of drug council building; construction of entrance	retain in landscape?	
PD2	Pimenta dioica	25° 4'33.01"N	77°20'26.87"W	abuts drug council building	deconstruction of drug council building; demo of HIV center; construction of entrance	remove	
PD3	Pimenta dioica	25° 4'33.13"N	77°20'27.03"W	abuts drug council building	deconstruction of drug council building; demo of HIV center; construction of entrance	remove	
PD4	Pimenta dioica	25° 4'32.55"N	77°20'25.29"W	in planter abutting east side of COI	demo of COI	retain in landscape?	
PD5	Pimenta dioica	25° 4'32.19"N	77°20'26.57"W	in planter east of drug council building	deconstruction of drug council building	retain in landscape?	
PD6	Pimenta dioica	25° 4'33.02"N	77°20'27.26"W	abuts drug council building	deconstruction of drug council building; demo of HIV center; construction of entrance	retain in landscape?	
PD7	Pimenta dioica	25° 4'33.08"N	77°20'27.25"W	abuts drug council building	deconstruction of drug council building; demo of HIV center; construction of entrance	retain in landscape?	
PD8	Pimenta dioica	25° 4'32.96"N	77°20'27.15"W	abuts drug council building	deconstruction of drug council building; demo of HIV center; construction of entrance	remove	
PE1	Ptychosperma elegans	25° 4'33.04"N	77°20'25.62"W	in planter west of old pool area	demo of pool area; landscape design?	retain in landscape?	
PE2	Ptychosperma elegans	25° 4'33.10"N	77°20'25.57"W	in planter west of old pool area	demo of pool area; landscape design?	retain in landscape?	
PE3	Ptychosperma elegans	25° 4'33.14"N	77°20'25.55"W	in planter west of old pool area	demo of pool area; landscape design?	retain in landscape?	
PE4	Ptychosperma elegans	25° 4'33.19"N	77°20'25.54"W	in planter west of old pool area	demo of o pool area; landscape design?	retain in landscape?	
PE5	Ptychosperma elegans	25° 4'33.24"N	77°20'25.53"W	in planter west of old pool area	demo of pool area; landscape design?	retain in landscape?	
PE6	Ptychosperma elegans	25° 4'32.91"N	77°20'26.18"W	in planter east of drug council building	landscape design?	retain in landscape?	
PE7	Ptychosperma elegans	25° 4'32.85"N	77°20'26.22"W	in planter east of drug council building	landscape design?	retain in landscape?	
PE8	Ptychosperma elegans	25° 4'30.11"N	77°20'24.04"W	within footprint of new building	excavation of new parking lot; construction of new building	remove	

PE9	Ptychosperma elegans	25° 4'30.16"N	77°20'24.03"W	within footprint of new building	excavation of new parking lot; construction of new building	remove	
PR1	Phoenix roebelenii	25° 4'30.91"N	77°20'25.63"W	within footprint of new building	excavation of new parking lot; construction of new building	remove	
PR2	Phoenix roebelenii	25° 4'30.76"N	77°20'25.65"W	within footprint of new building	excavation of new parking lot; construction of new building	remove	
PS1	Pouteria sapota	25° 4'32.57"N	77°20'27.33"W	in planter along west of drug council along Parliament street	deconstruction of drug council building	remove and replace	
RR1	Roystonia regia	25° 4'32.94"N	77°20'25.42"W	trunk damage near base	demo of old shed; demo of old pool area	retain in landscape	
SA1	Schefflera actinophylla	25° 4'34.38"N	77°20'25.92"W	invasive		remove	
SA2	Schefflera actinophylla	25° 4'34.32"N	77°20'26.34"W	invasive		remove	
SP1	Sabal palmetto	25° 4'32.52"N	77°20'26.76"W	abuts drug council building	deconstruction of drug council building	remove and replace	
SP2	Sabal palmetto	25° 4'32.38"N	77°20'26.46"W	in planter east of drug council building	new entrance	retain in landscape?	
SP3	Sabal palmetto	25° 4'32.28"N	77°20'26.23"W	in planter east of drug council building	new entrance	retain in landscape?	
SP4	Sabal palmetto	25° 4'33.01"N	77°20'26.48"W	in planter east of drug council building	new entrance	retain in landscape?	
TI1	Tamarindus indica	25° 4'34.10"N	77°20'26.19"W	large specimen in planter along Parliament Street; edible	demo of old property walls; final site grading; promenade construction; roadworks	retain in landscape?	
TI2	Tamarindus indica	25° 4'31.73"N	77°20'26.56"W	small specimen along western entrance driveway	excavation of new parking lot; construction of new building	remove	
TS1	Tecoma stans	25° 4'34.13"N	77°20'26.09"W	showy specimen east of HIV centre; national flower	demo of HIV center; landscape design?	retain in landscape?	
TS2	Tecoma stans	25° 4'33.36"N	77°20'26.22"W	small specimen in planter east of drug council building; national flower	landscape design; new entrance	retain in landscape?	
WS1	Washingtonia sp.	25° 4'31.37"N	77°20'25.41"W	within footprint of new building	excavation of new parking lot; construction of new building	remove and replace	

Figure 65. Site map with tree preservation/removal color codes

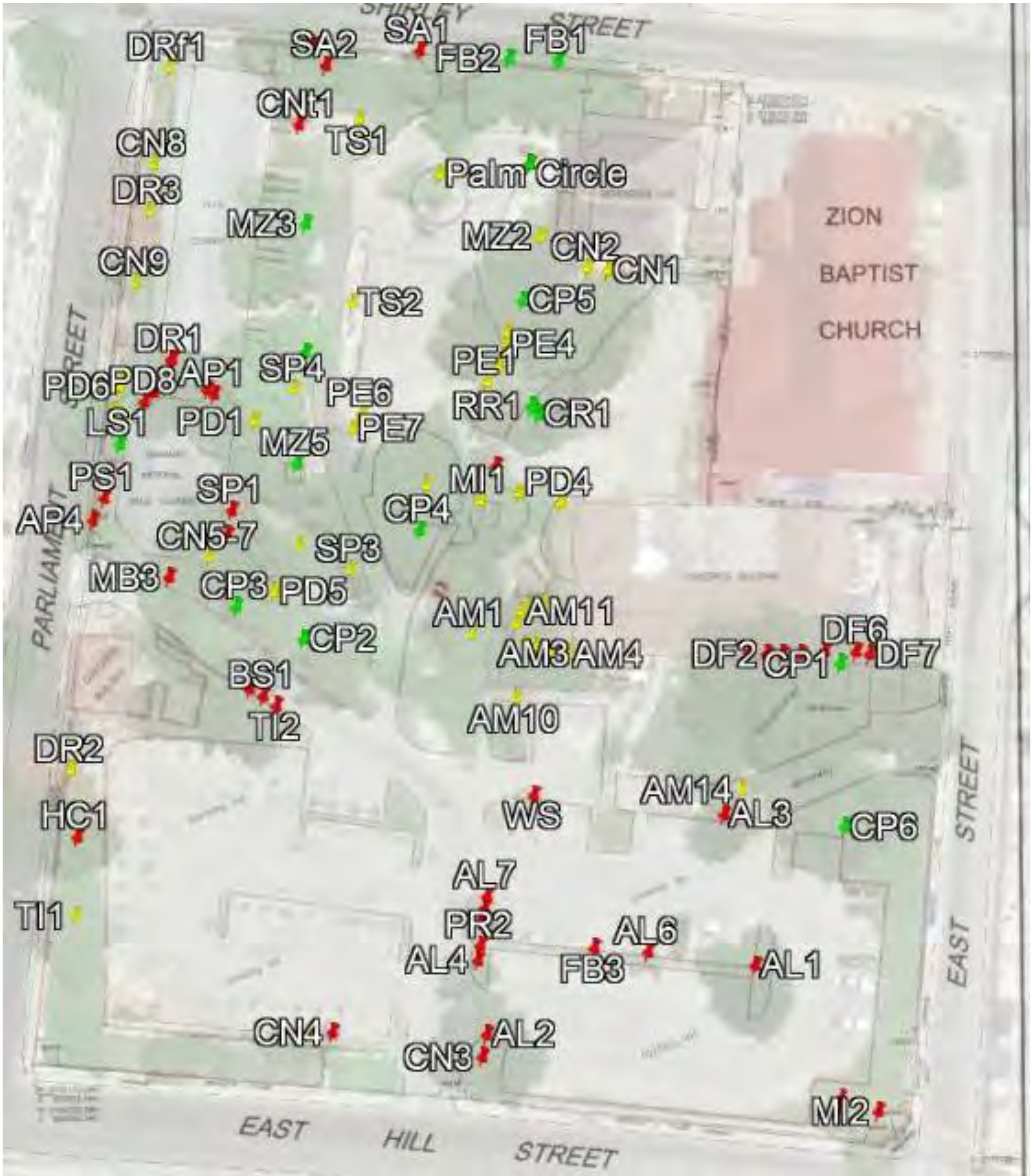
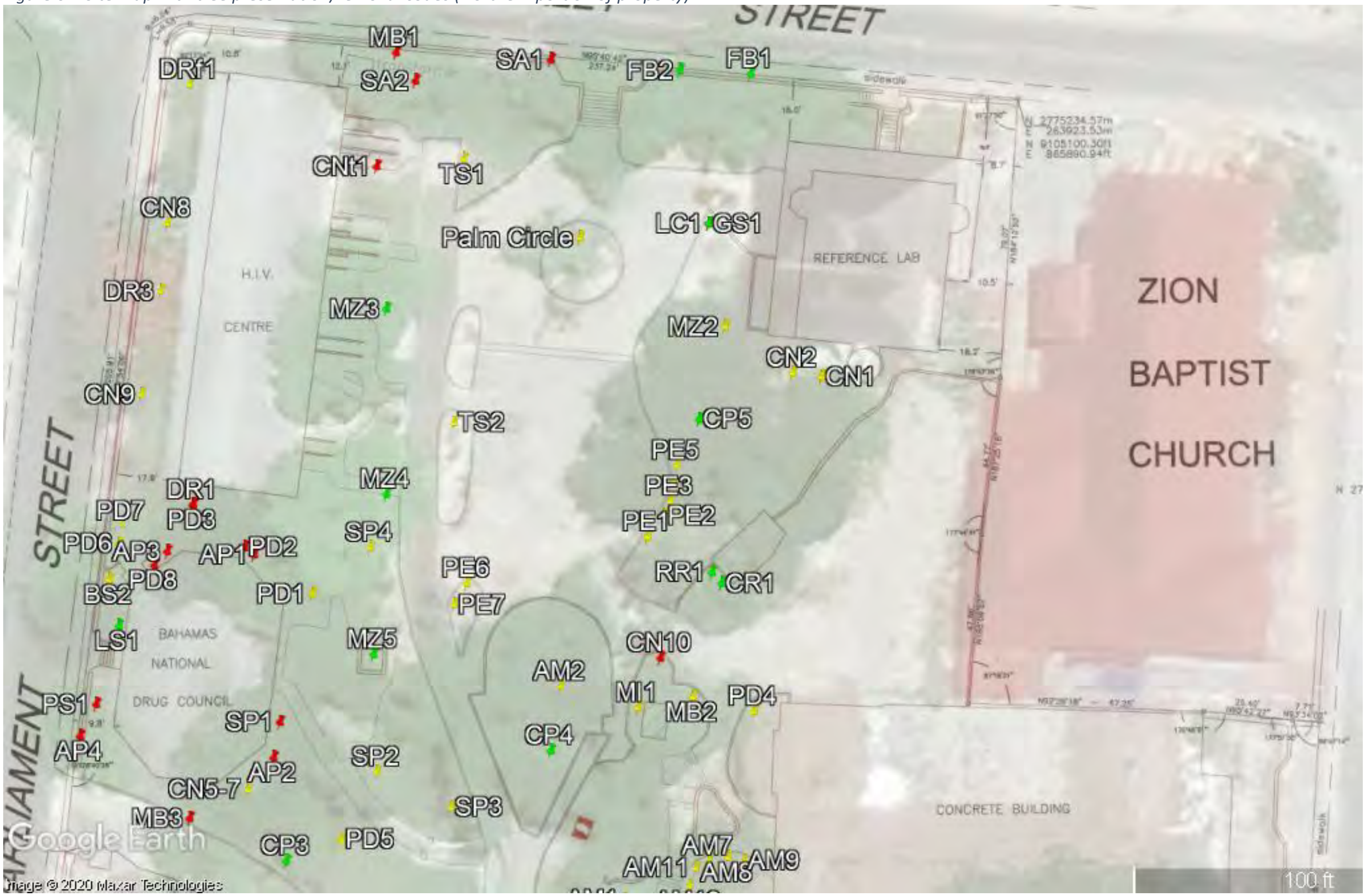


Figure 66. Site map with tree preservation/removal codes (Southern portion of property)

Figure 67. Site map with tree preservation/removal codes (Northern portion of property)

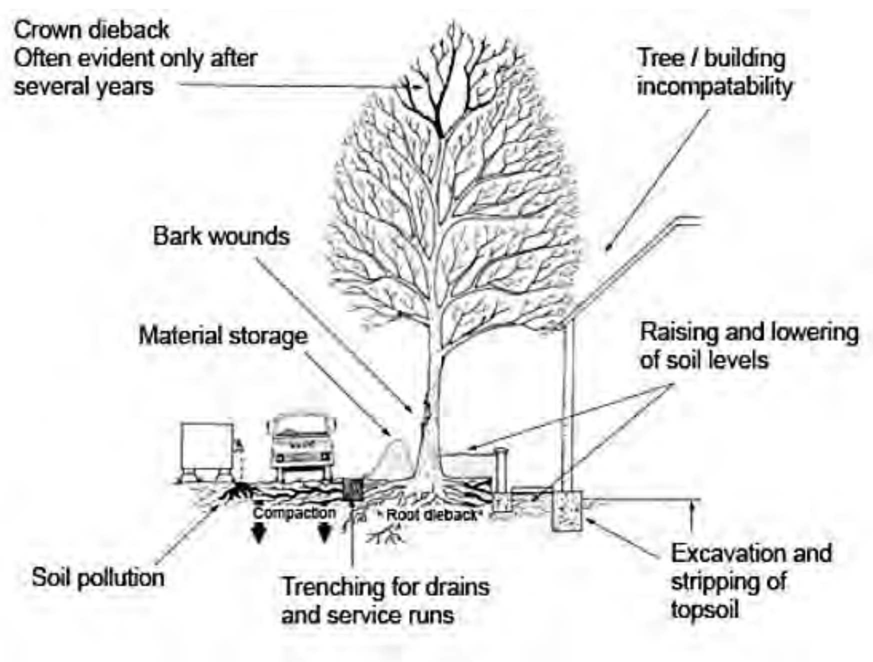


Tree Protection Measures During Demolition and Construction

Effective tree protection on a construction site requires an agreed upon system or set of rules which will govern the activities of the site during the development process. The responsibility is on all stakeholders, inclusive of the property owner, designers, contractors and other related personnel. The system for tree protection is considered inclusive of protective interventions to avoid impacts, rehabilitative measures to respond to impacts and monitoring measures to evaluate ongoing health of the specimens and practices of the construction site personnel. As part of the program, all site personnel should be educated on the measures in place to protect specified trees on the property.

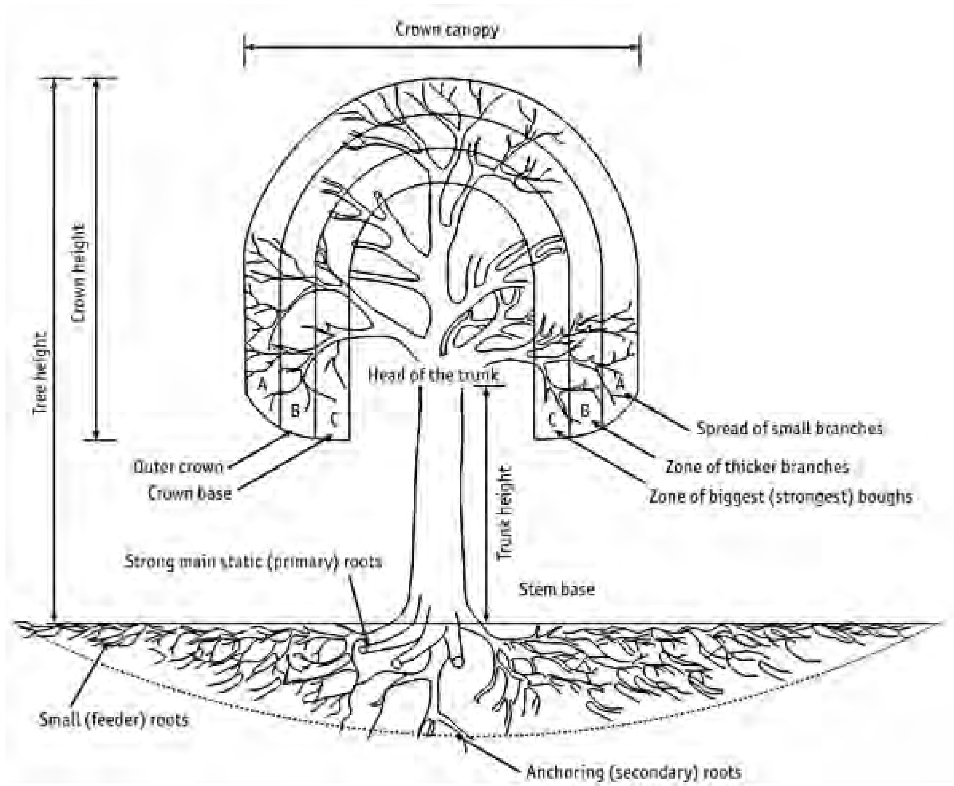
Protective measures are employed to preserve the health of designated specimen trees onsite. Specific methods include deploying highly visible and durable barriers around protected areas, restriction of vehicular access to these areas, prohibiting storage of stockpiled materials, chemicals or waste within protected areas, and limitation of grading and trenching activities. Release of liquid or chemical waste near of within the protective tree zone should always be avoided. Chemical contamination of the root zone can be quickly lethal to specimen trees.

Figure 68. Illustration of common injuries to protected trees on a construction site.



The most common mechanical injuries to specimen trees on a construction site include surface grading, trenching injury, bark removal and branch breakage. It is important to prevent occurrences of mechanical injury to protected trees on site, as overall tree health can be compromised by the introduction of pathogens post injury. Severing too many of a trees' roots can cause structural imbalance and can lead to toppling. Roots above 4 inches in diameter are as a general rule are not to be cut. If cutting of roots outside of the critical root zone is unavoidable, it should be done with sharp and clean hand tools, not using a backhoe or heavy equipment. A clean cut will encourage proper wound healing and prevent introduction of pathogens into the wound. Cutting of roots should never occur within the critical root zone, instead mechanical boring or moling should be used to create tunnels beneath the trees' roots, at a minimum depth of 24 inches.

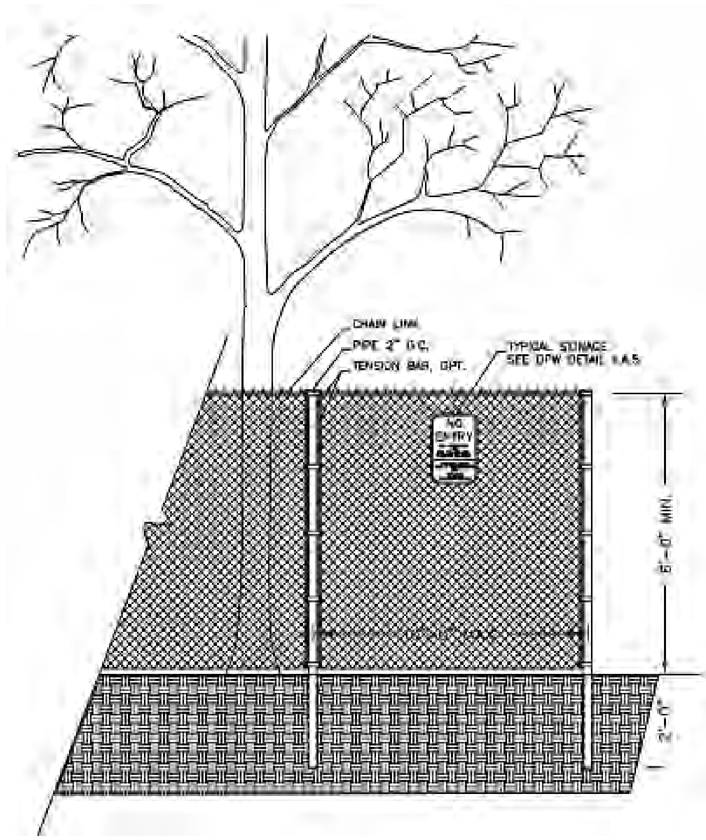
Figure 69. Diagram of tree elements



Soil compaction due to vehicular or foot traffic compresses the soil particles, interfering with gaseous exchange in the sensitive root zone within the upper 24inches of topsoil. Soil compaction also interferes with soil permeability, altering water flow to tree roots. Severe cases of soil compaction be lethal to specimen trees if not mitigated against or remedied.

Protective fencing and physical barriers should be constructed beneath the canopy of trees designated for protection or located in protective zones on the property. These barriers are constructed to prevent physical interaction of the tree with construction equipment and personnel. Avoidance of these protective zones will also prevent soil compaction within the specimen's root zone.

Figure 70. Illustration of protective above ground barriers to be constructed around CRZ or protected tree zones



The International Society of Arboriculture (ISA) describes the critical root zone as an area equal to 1ft radius from the base of the trunk for every 1 inch of the tree's diameter at DBH. Physical and chemical barriers around the specified tree may hinder or alter the CRZ. A thorough examination of for evidence and extent of surface roots, and potential subterranean barriers will assist in determining a specimen's actual critical root zone.

Figure 71. Calculating the CRZ from a tree using its DBH

Critical root zone radius distances calculated by tree diameter at breast height.

Tree diameter	Critical root zone radius	Total protection zone diameter, including trunk
2 inches	2 feet	4+ feet
6 inches	6 feet	13.5 feet
20 inches	20 feet	42 feet
46 inches	46 feet	96 feet

Figure 72. Illustration of roots structure within the CRZ of a tree

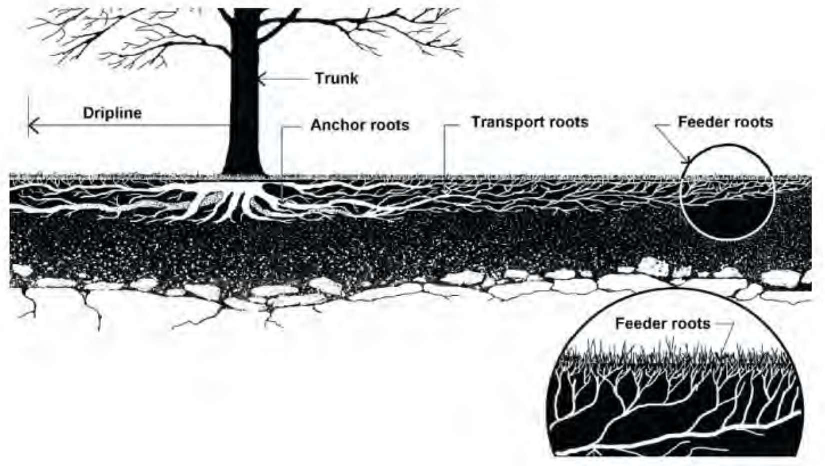
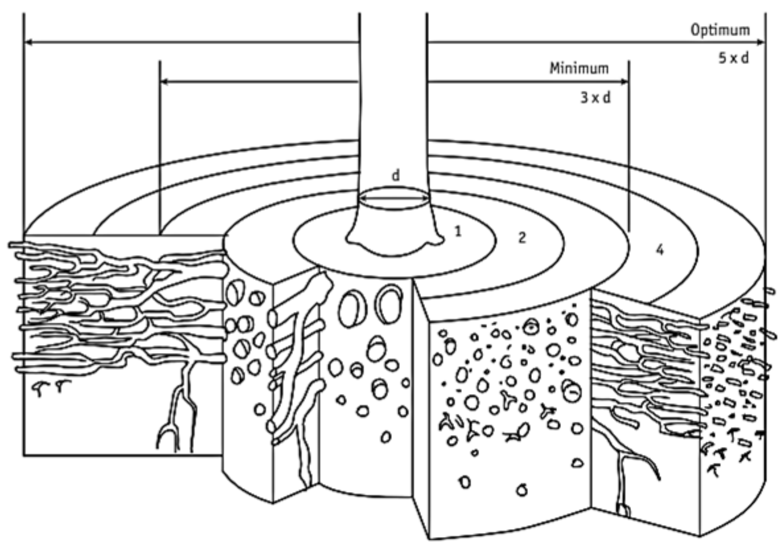


Figure 73. Illustration of change in root morphology within the CRZ of a tree



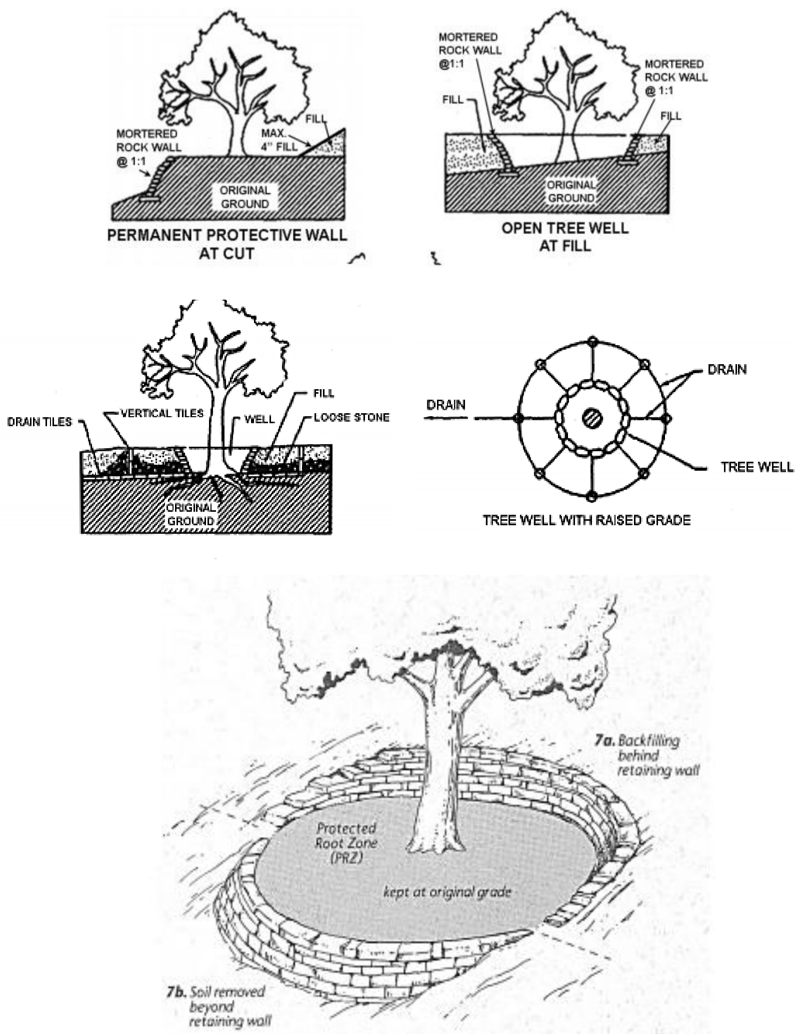
Grade changes to the surface within the critical root zone have severe implications on the health of the tree and are generally prohibited. Any grading to occur within the critical root zone should be done by hand or small equipment to minimize potential damage to roots. Grade cuts outside the critical root zone which are greater than 6 inches shall incorporate a retain wall or other appropriate transitional structure. Additionally, the installation of impervious surfaces within the critical root zone is prohibited unless accompanied by appropriate irrigation, aeration and fertilization. To avoid stress and damage due to grade changes, the following rules should be followed:

- Never place fill or organic material within the CRZ
- Never compact the soil within the CRZ
- If fill or soil is to be placed, it must not exceed 2-4 inches and must be of a coarser grade than the existing material beneath
- Remove no more than 2 inches of topsoil within the CRZ

- Retaining walls or terraces should be used to avoid excessive soil loos where areas greater than 6 inches are excavated outside of the CRZ
- Spread 4-6 inches of mulch over exposed roots to prevent moisture loss, reduce exposure to sun, lower soil temperatures and prevent soil erosion.
- Ensure supplementary irrigation is provided when rainfall levels are less than 1inch per week
- Proper root pruning should be conducted in areas where grade lowering is unavoidable

Prior to construction activities, protected trees on site should be well irrigated, fertilized and a 4-6 inch layer of mulch spread at its base within the critical root zone. Any necessary pruning should be performed to remove dead or dying limbs, as well as branches which may potentially be in the way of construction activities. Construction damage to tree roots may not show sign in the canopy until years after, slowly showing signs of decline and eventually resulting in tree death.

Figure 74. Protective strategies to prevent negative impacts to protected trees from changes in grade near or around the CRZ



Tree Protection and Monitoring General Guidelines

Prior to commencement of site prep, demo and construction activities, formal training and introduction to the tree protection program to all site staff should be constructed.

All specimens to be protected should have a highly visible and durable barrier around its critical root zone, and around larger areas of groups of trees called the Tree Protection Zone.

Protected trees which are highly sensitive or in high risk areas on site could be protected with additional padding around trunk, stem and branches.

Clearly visible signage should be placed on physical barriers around trees' CRZ.

No vehicles driving or parking and no storage of equipment or materials should occur within protected tree zones and critical root zones.

Disease, damaged or pest-ridden specimens should be removed and disposed of offsite.

Evaluate tree health regularly during construction and post construction, and apply necessary amendments as needed (water, fertilizer, aeration, pest management, mulch).

Do not store or deposit any hazardous material or chemicals (gas, oil, paint, thinner etc)

Avoid attaching wires, cables, cords or other restrictive materials around tree trunks or branches

No hard or paved surfaces should be constructed with protected tree zones and the critical root zone or protected trees.

Trenches lined with an impermeable membrane, should be installed in areas around the CRZ of protected trees which may be impacted by surface runoff from the project site.

Tree Removal vs Tree Preservation

The decision of whether or not to preserve a tree in its current location, transplant to a new location or remove completely from the project site is mainly a factor of:

1. Tree Protection Status/Value of specimen
2. Overall Tree Health
3. Final Site Design and related Project Activities

Table 3. Tree Removal vs Tree Preservation Rubric

Group	Tree characteristics within group	Recommended actions	Recommendations for preservation or removal
1.	Particularly valuable trees with the circumference of a natural monument, in good health, of natural value, described as being grand	Protect; make even significant changes to construction designs; adjust designs to trees; relocate infrastructure further away (distance threats as much as possible)	Preserve unconditionally
2.	Trees in good health, relatively young (initial phase of maturity), holding promise of surviving the investment due to their age; viable and of natural value	Protect; secure; modify designs; relocate infrastructure (distance threats as much as possible)	Preserve
3.	Trees growing very close to the planned development, exposed to very severe damage, whose chances of surviving the investment are additionally decreased by the trees' weak condition (this is the highest risk group)	It is essential to predict the risk of damage (critical injuries, assessment of the impact of habitat change) and make responsible decisions concerning tree removal. A compromise must be made to consider the well-being of the natural environment	If preservation is impossible, REMOVE with appropriate natural compensation, e.g. replacement planting in accordance with the regulations in force
4.	Trees that collide with the outline of planned buildings, roads, underground parking garages: if the trees are not cut down the investment cannot be carried out in its basic form. Dead or dying trees, trees of low natural value (invasive species), trees growing very densely, trees up to 10 years old which are the result of succession	None	REMOVE with appropriate natural compensation, e.g. replacement planting in accordance with the regulations in force

Protected Trees on the Project Site

The Conservation and Protection of The Physical Landscape of The Bahamas Act (2001) affords protection to the following species:

- Lignum vitae (*Guiacum sanctum*)
- Horseflesh (*Lysiloma sabicu*)
- Mahogany (*Swietenia mahagoni*)
- Caribbean Pine (*Pinus caribaea var bahamensis)*
- Red Cedar (*Juniperus bermudiana)*
- Brasiletto (*Caesalpinia vesicaria*)
- Candlewood (*Gochnatia ilicifolia*)
- Rauwolfia (*Rawolfia nitida*)
- Beefwood (*Guapira discolor*)
- Bullwood (*Pera bumelifolia*)
- Silk Cotton (*Ceiba pentandra*)

Permission to remove protected species of trees must be granted from the Department of Environmental Protection and Planning and/or the Forestry Department. Mitigation strategies for removal of protected species include the replacement of the species on site or another suitable location in the ratio of 3:1.

The Silk Cotton tree

A fully grown Silk Cotton tree, or *Ceiba pentandra*, like those found on the property, is a remarkable spectacle of Bahamian cultural landscape that communicates through visual and historical significance. This massive, buttress-trunk tree is one of the largest growing trees in the tropical forests of the western hemisphere and in African Savannas. It is native to North and South America and Africa and carries great symbolic importance to Ancient Mayan Civilization in Central America. It has been associated by many indigenous tribes across the Americas and Africa as the “World Tree” or “The Tree of Life” that connects the physical world to the heavens and the underworld and is signified as a route of communication to the spirit world.

While the Silk Cotton is not native to The Bahamas, being introduced to the landscape in the 1700’s by South Carolina farmer John Miller, it is closely associated with slavery and the sugar boom between 1790 and 1870. Early Spanish settlers in other parts of the Caribbean, according to a study conducted by the University of North Texas, learned of the cultural significance of this tree interpreted by the Natives, and use it to mark colonial urban centers to receive positive reverence from those that viewed the tree as blessed and holy. There has been much scrutiny and fear evoked when an individual cut down or defiles the Silk Cotton tree. Bahamians have even nicknamed it as the “Hurricane Tree” due to its ability to withstand the strong storm-forced winds typical of large hurricanes and seem relatively untouched at the aftermath of storms and lightning.

An individual of this species, located in the capital of The Bahamas, was at one point recognized as the largest tree in the world at its base. It was speculated as being the mother tree of all Silk Cottons found in the country. Before its demise from a disease, this 250-year old (or more) tree attracted lots of attention not only from the birds, bats and insects that feed from and pollinate it, but also from persons travelling from across the world to photograph this marvel of a tree.

The Silk Cotton tree is so called because of the pods it grows which are full of kapok fibers or "silk" which entangle the small seeds and transport them via wind and water. These fibers have been used to stuff mattresses, pillows, and life savers. During its flowering period it can produce up to 10L of more in nectar attracting a plethora of wildlife. It grows rapidly as a young plant (approximately 2 – 4 meters each year) with large, protruding conical spines on the trunk and branches of the tree that become reduced in prominence as the tree matures. It may live for several hundred years and reach 70 meters or more in canopy height and 3 meters in trunk width. The umbrella-like branching at the top of the tree allows for a very large canopy cover. The root system varies by depth and stretch and is influenced by age, soil type and surrounding trees and structures. The limestone substrate of young Bahamian geology has only a thin layer of topsoil in most areas and is thus prevents the tree roots from achieving any significant depth underground. The roots of this colossal tree therefore grow horizontally as tall buttresses extending just below or along the surface of the ground. According to the University of California you can determine the Critical Root Zone by measuring the diameter in inches of the tree at breast height and multiplying the result by 12. This will help to establish a protected area that will help to minimize potential damage to the trees. It is important to note that construction activities such as trenching, paving, or making major alterations to the drainage patterns near the tree can have negative impacts to its Critical Root Zone.

Historical Photos of Silk Cotton Trees on Site

Figure 75. Historical photo of CP2 and CP3

Figure 76. Historical photo of CP2 and CP3 (left), CP4 (right) and another individual of Silk Cotton (center) on the eastern side of the Little House.

Figure 77. Historical photo of CP2 with the Royal Victoria Hotel in the background.

Figure 78. Historical photo of CP4 with wooden deck.

Figure 79. Historical photo of CP2 (right), CP3 (center) and CP4 (left).

On the project site, there are three (3) protected species of trees as designated by the Conservation and Protection of the Physical Landscape of The Bahamas Act 2001, namely the Silk Cotton Tree (Ceiba pentandra), Lignum vitae (Guaiacum sanctum) and Horseflesh (Lysiloma sabicu).

Six Silk Cotton trees exist on the site (CP1-6 & a seedling in COI Building), adding historical value to the property as 5 of the large trees are estimated to be over 100 years old (CP1-5), with the oldest specimen approaching 200+ years old (CP4). Two of the large Silk Cotton trees are showing signs of rot and stress (CP3, CP5), one is a juvenile (CP6; > 20 years old). Site design considerations are important to retaining all, most or some of specimens of this protected species include:

Design Consideration	At risk specimen(s)
Western entrance design and building size/orientation	CP2, CP3
Eastern entrance design and BOH layout	CP1
Building size/orientation and site layout/landscaping	CP4, CP6
Site layout/landscaping	CP5

Certain project activities will pose a risk toward Silk Cotton protection goals on the CBOB New Premises construction site. Project activities related to the preparation of the site and during construction which pose the most risk to tree protection include the demolition of the Commission of Inquiry Building and demo of existing walls, planters, roadways within the critical root zone of the species:

Project Activity	At risk specimen(s)
Demolition of COI building and BPL infrastructure	CP1
Land clearing and excavation for new building	CP6
Demolition of COI building, existing roadways, pathways and display beds; land clearing and excavation for new building; construction of new building and nearby site infrastructure	CP2, CP3, CP4
Demolition of existing pathways and infrastructure	CP5
Site Grading	CP1-6

CP1 is most at risk from the demolition of the COI Building and other existing infrastructure within its CRZ, including the retaining wall and BPL infrastructure along the existing eastern entrance driveway. Tree protection for this species would include avoiding the use of heavy equipment and machinery within the CRZ, retaining the existing grade within the CRZ, use of hand power tools for demo of concrete structure within the CRZ and general care/awareness to avoid physical damage to the individuals via direct contact with machinery or falling debris during demo. The walls and COI infrastructure are considered to have restricted the trees roots from extending completely within the CRZ or having its surface roots extend beneath the concrete foundations. Most of the surface roots, critical for air exchange and tree stability, are located west of the tree in the lawned spaces south of the

COI building. Preservation of the upper 10-12 inches of soil is critical for the survival of these surface roots. Removal of existing vegetation or pavement/concrete within the CRZ should be immediately followed by an application of a mulch layer 4-6 inches deep, and supplemental irrigation to decrease the chances of water stress on this individual.

Figure 80. Location of CP1 on project site (left), CP1 position relative to COI Building (right) & CP1 position relative to BPL infrastructure (bottom).

Figure 81. Position of CP1 relative to BPL infrastructure

The two specimens CP2 and CP3 are located along the western entrance of the property and are adjacent to one another and the proposed footprint of the new building. CP3 is showing sign of rot at its apex, where its main trunk has been broken/severed, and could be retained in the landscape if desired. However this particular specimen appears to be the least healthy of all, and could be a candidate for removal. If CP2 can be integrated into the landscape design, due to its proximity to CP3, it would need to be carefully preserved during removal of CP3, with special care not to disturb the surface roots within the CRZ. Demolition of the existing entrance road and nearby pathway should occur by hand powered tools. Excavation and construction activities on the new building can potentially impact CP2 through collisions with heavy equipment, change of site grading, compression of roots and soil within its CRZ, among other threats. Its proximity to the proposed building footprint puts it at high risk for negative impacts, and its preservation may require adjustment to the design/layout of the current site plan. If site changes are not feasible, this specimen may be removed in conjunction with CP3.

Figure 82. Location of CP2 on project site

Figure 83. Position of CP2 relative to western entrance of site

Figure 84. CP3 location on the project site, and position relative to the western entrance driveway.

The featured specimen on the site CP4 is highly valued due to its large stature, unique architecture and historical significance to the Royal Victoria Gardens. Preserving this individual in place should be a desired goal of the Project Owner, as this specimen embodies the character of the Garden’s illustrious past. The protection of this specimen will require strict enforcement of the CRZ, especially in areas where surface roots are visible (in soil/lawn areas and display beds surrounding the specimen). The unique south-eastern facing horizontal branch extends within close proximity to the COI building, and extreme caution should be taken to avoid damage to this branch during demolition activities. Excavation and construction activities on the new building can potentially impact CP2 through collisions with heavy equipment, change of site grading, compression of roots and soil within its CRZ, among other threats. Its close proximity to the proposed building footprint puts it at high risk for negative impacts, and its preservation may require adjustment to the design/layout of the current site plan. A paved driveway passes alongside the specimen on its western side, and along with the planter’s low retaining walls, have effectively covered and cut off surface roots to the west of the tree. Despite no visible surface roots on this side of the tree, no excavation or trenching activity is proposed for the areas within its CRZ. Removal of pavement/concrete surfaces within the CRZ should be done with hand powered tools, with care taken not to damage the underlying roots.

Figure 85. Location of CP4 on the project site, and position relative to central driveway

Figure 86. Images of CP4 illustrating overall structure (top), main trunk (center) and concrete support under large horizontal branch

Figure 87. Images of CP4 showing steel cable support on horizontal branch (top) and visible surface roots near to trunk of tree (center, bottom).

CP5 is located in the northern area of the property, just south of the National Reference Laboratory. Nearby infrastructure also include the AC and generator units for the Reference Laboratory, as well as the old pool area for the former Royal Victoria Hotel. Despite this specimen exhibiting signs of rot and damage at its base, the tree remains healthy with a broad canopy, showing no signs of stress. The opportunity exists to preserve this tree in place with minimal risk to the CRZ once no major construction and demolition activities occur near to the specimen.

Figure 88. Position of CP5 on project site (top) and images showing main trunk and buttress roots (bottom).

Figure 89. Images of CP5 illustrating root structure and showing proximity to Reference Laboratory generator and AC unit

CP6 is a juvenile specimen located south of CP1 in the lawn area bordering the parking lot. This tree is a healthy juvenile, with no signs of stress or disease. Threats to this specimen are related to the construction activities, as it is located within the proposed footprint of the new building. Land clearing and excavation activities in preparation for construction would require removal of this specimen if adjusting the site design and/or layout is not feasible.

Figure 90. Location of CP6 on project site and location relative to parking lot and east entrance driveway

One specimen of Lignum vitae is planted near the entrance of the National Reference Laboratory. The specimen is a juvenile specimen, approximately 1m in height, and planted adjacent to a Lantana camara which partially obscures it from view and sunlight. This small individual can be transplanted and relocated elsewhere on the property, and/or replaced by a larger, healthier specimen. Removal of a protected tree will require a 3:1 replacement ratio on the project site.

Figure 91. Image of GS1 growing with Lantana in front of the National Reference Laboratory building

The only Horseflesh on the property is one large individual at the western entrance to the Drug Council Building on Parliament Street. This impressive specimen is planted within a small planter forming the wall along the sidewalk and a part of the entranceway to the building. The plan to deconstruct the historical Little House (Drug Council Building), will directly impact this tree unless proper tree protection measures are employed during the demolition process and future construction activities. Key considerations will include retaining the depth and grade of the planter in which the tree is planted, prevention of tree/root damage and prevention of soil compaction in the critical root zone of the specimen. Where tree protection measures are unfeasible or the specimen is deemed to have low survival percentage, consideration for tree removal and appropriate mitigation are necessary. Removal of a protected tree will require a 3:1 replacement ratio on the project site.

Figure 92. Images of LS1 located at the western entrance of The Little House

Protected Silk Cotton Tree Matrix

Table 4. Protected Silk Cotton Tree Matrix

Specimen	Location/Site Notes	Description/Size	Health	Threats	Recommendations for Protection of CRZ
CP1	Specimen located along East Street, adjacent to COI building on north side, BPL transformer box to the east, retaining wall and Victoria Gardens driveway to the South and weedy understory vegetation and building infrastructure to the west.	DBH of main trunk 3m. 6 main branches approx. 1.5m DBH each Canopy spread: SW 68ft W58.5ft SE 65ft East 62.5ft CRZ 35ft radius	Natural architecture maintained. Overall health is good. Specimen in flower April/May 2020 and in fruit in June 2020. No visible signs of rots or disease on trunk or main branches.	Threats: damage to above and below ground portions of tree during demolition of COI, removal of BPL infrastructure, demolition of retaining wall and nearby infrastructure. Eastern branches extend above East Street roadway	Bolster retaining wall to prevent collapse, remove topsoil and amend, removal of transformer pad using hand powered tools without the use of large heavy equipment within the CRZ. Invasive Albizzias and specimen landscape plants to be removed. Application of 4-6 inches of mulch and supplemental watering. Pruning of branches overhanging COI building may be required.
CP2	One of two specimens near to the western entrance.	DBH of main trunk 2m Canopy spread: North 51ft East 58ft South 50ft West 28.5 ft CRZ 30ft radius	Overall a healthy specimen which has had previous pruning exercises or broken branches. No readily apparent sign of disease on main trunk or branches. Signs of predation from sap sucking birds and insects. Leaves showing tip burn and some stress.	Specimen potentially within direct area of impact of new building. Located alongside the entrance driveway, the specimen risk physical damage through collision and root compaction by heavy vehicles operating onsite.	Remove if design changes and protection measures are not feasible.
CP 3	Second specimen located near to western	Main trunk DBH 1.7m Canopy spread: 30ft	Overall health of the specimen is stressed. The primary axis has been damaged	Specimen potentially within direct area of impact of new building and associated infrastructure. Located	Remove specimen if protection measures and site design modification unfeasible.

	entrance of property.	CRZ 30ft radius	and/or cut and lateral branches broken or severed. Visible signs of rot at the top of main trunk where primary axis was severed.	alongside the entrance driveway, the specimen risks physical damage through collision and root compaction by heavy vehicles operating onsite. Already stressed and damaged, any negative impacts from construction activities will promote continued deterioration of the specimen.	
CP4	Iconic tree to the former Hotel and Garden site. Formerly utilized as a bar and leisure spot by hotel and garden's guests. Photographic evidence confirms age of specimen to be 200+ years old.	Canopy Spread: South 66ft SE 76ft East 60ft North 52ft NW 34ft West 32 ft DBH ~4m CRZ 45ft radius Large central mother tree with 4 main branches beginning at 2m above the ground. Two of the main branches grow vertically and two horizontally. The horizontal branch on the eastern side of specimen is currently supported by a steel cable from distal end of branch to main trunk and by concrete support at the proximal end of the branch. Majority of tree weight is distributed on the southern and south-eastern sides of specimen. Surface roots visible	Steel cable has collared branch and has been subsumed into branch tissue. Beyond collared area of branch there are no obvious signs of stress. Lateral roots have grown through the concrete support into the ground, providing additional support for the branch's weight. Tree has nails, wood, metal pieces, wires inserted at various parts of main trunk and branches. Has suffered branch damage in past due to rough weather.	Physical damage of above and below ground plant parts by heavy equipment or trenching activities near to the exclusion zone. Alteration of ground chemistry due to construction activities. Age and resistance to sever weather/hurricanes. Susceptible to pests and disease under stressed conditions. Damage to eastern branch during demolition of COI building. Collapse of concrete support or steel cable support. Deposition of dust on leaves of specimen may reduce photosynthesis in specimen. Toxic or caustic dust particles can induce physical and chemical damage to specimen.	Prior to any demolition works in these areas, all surface roots are to be properly flagged and marked. Additional interventions to preserve main lateral branch by bolstering support beneath and replacing steel cable support with less damaging means. Establishment of protective buffer around the root exclusion zoon, to coincide with the drip line of the specimen. Subterranean barrier to prevent ground contamination from nearby construction activities. Supplemental drip irrigation and fertigation to be installed and supplied prior to trenching activities outside of root exclusion zone. Regular soil testing to ensure pH, soil moisture and nutrient content do not adversely impact the

		in lawn beneath specimen, and on eastern side of tree. Special note should be made to preserve as many of the surface roots on the eastern side of this specimen. Current infrastructure in these areas include walkways and display beds with other tree specimens. Unlike the western side of this tree, which serves as a driveway and experiences regular vehicular and foot traffic, the eastern side of the tree does not experience vehicular traffic and has minimal foot traffic.			specimen during construction.
CP5	Located South of the National Reference laboratory.	DBH 2.1m Canopy spread SW 45ft West 41ft North 40.5ft East 43ft CRZ 40ft radius	Large healthy tree, showing some signs of rot and decay near base of trunk. Main trunk hollowed out in this area, exhibiting some fungal growth and showing signs of fire damage.	Demolition and construction activities may impact health of this specimen without the appropriate controls. Continued rot at the base of the trunk may weaken structural integrity of tree overtime, increasing risk of main stem snapping/toppling during severe storms and/or hurricanes.	Retain in place if conducive to the landscape design of the Garden area
CP6	located in lawn within planter along East St.	DBH 1.26m; Canopy 20ft across; tree height is 28ft tall. Juvenile specimen, 5-10yrs old CRZ 20ft radius	Healthy condition, no visible signs of disease or pests.	Specimen located within main footprint of new building.	Remove and/or replant elsewhere on the property if tree protection measures or site design modification is not feasible.
GS1	Located in planter west of National	Approx. 1m tall., Young sapling, 3-5 years old	Requires soil amending, fertilization,		Remove and replant elsewhere in full sun with amended soil, or

	Reference Laboratory entrance	CRZ >1m radius	irrigation, and removal of competing Lantana camara		replace with larger specimens in 3:1 ratio
LS1	Located in elevated planter on western side of Little House along Parliament Street.	0.6m DBH, 21ft tall Mature specimen CRZ 18ft radius	Healthy specimen, surface roots confined to planter wall and Little House Infrastructure	Demolition of the Little House; construction of promenade	retain existing depth and grade of the planter, prevent trunk/branch/root damage and prevent soil compaction in critical root zone during demolition

Site Maps

Figure 93. Site map depicting location of nationally protected species of trees on the Project Site

Figure 94. Site map depicting nationally protected species with CRZ identified.

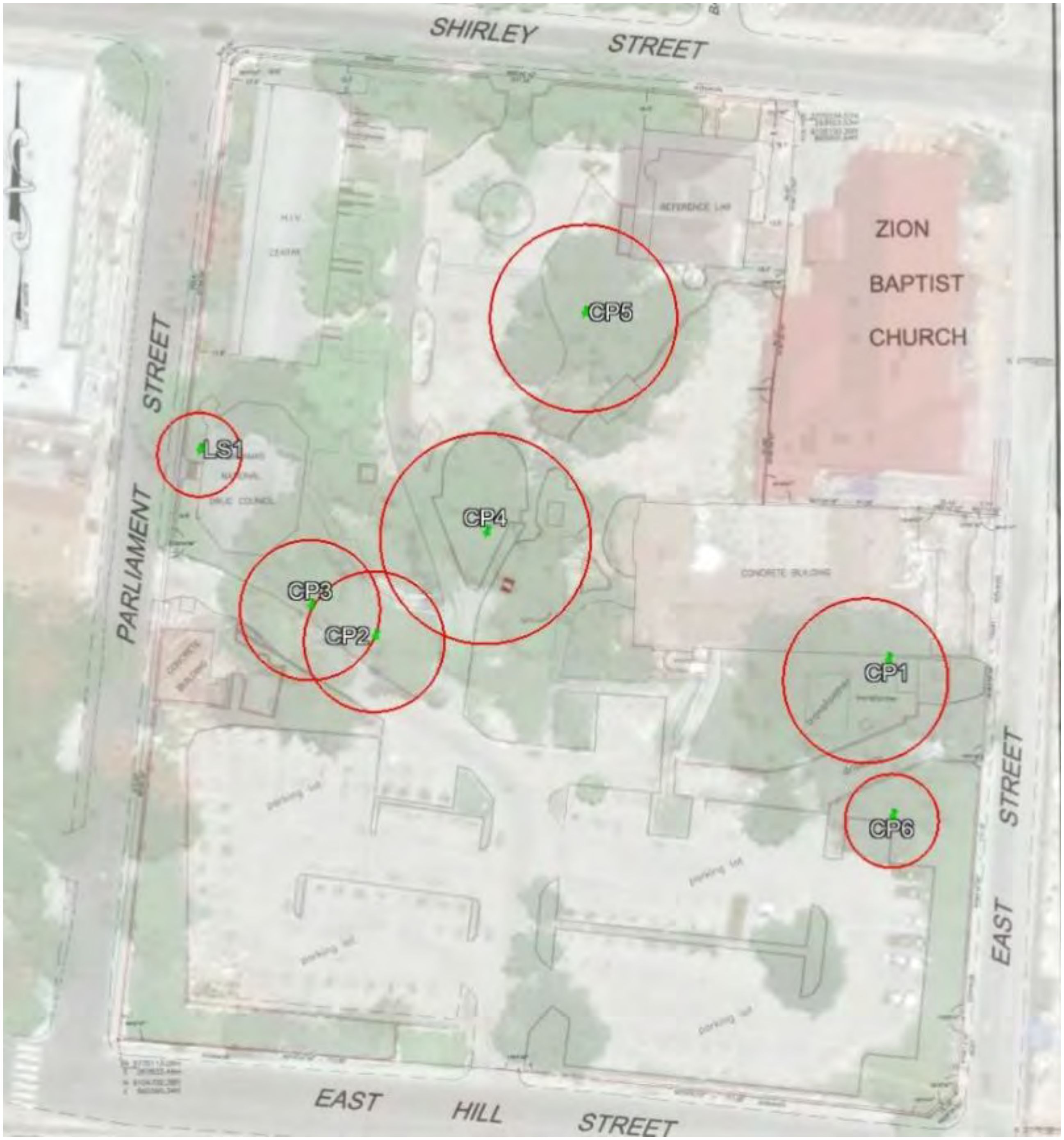


Figure 95. Site map with protected tree species, their respective CRZ, and color code for surface type (soil/lawn vs pavement/concrete)

Figure 96. Site route map for vehicular traffic, with CP1-6; LS1 (nationally protected trees) retained in place

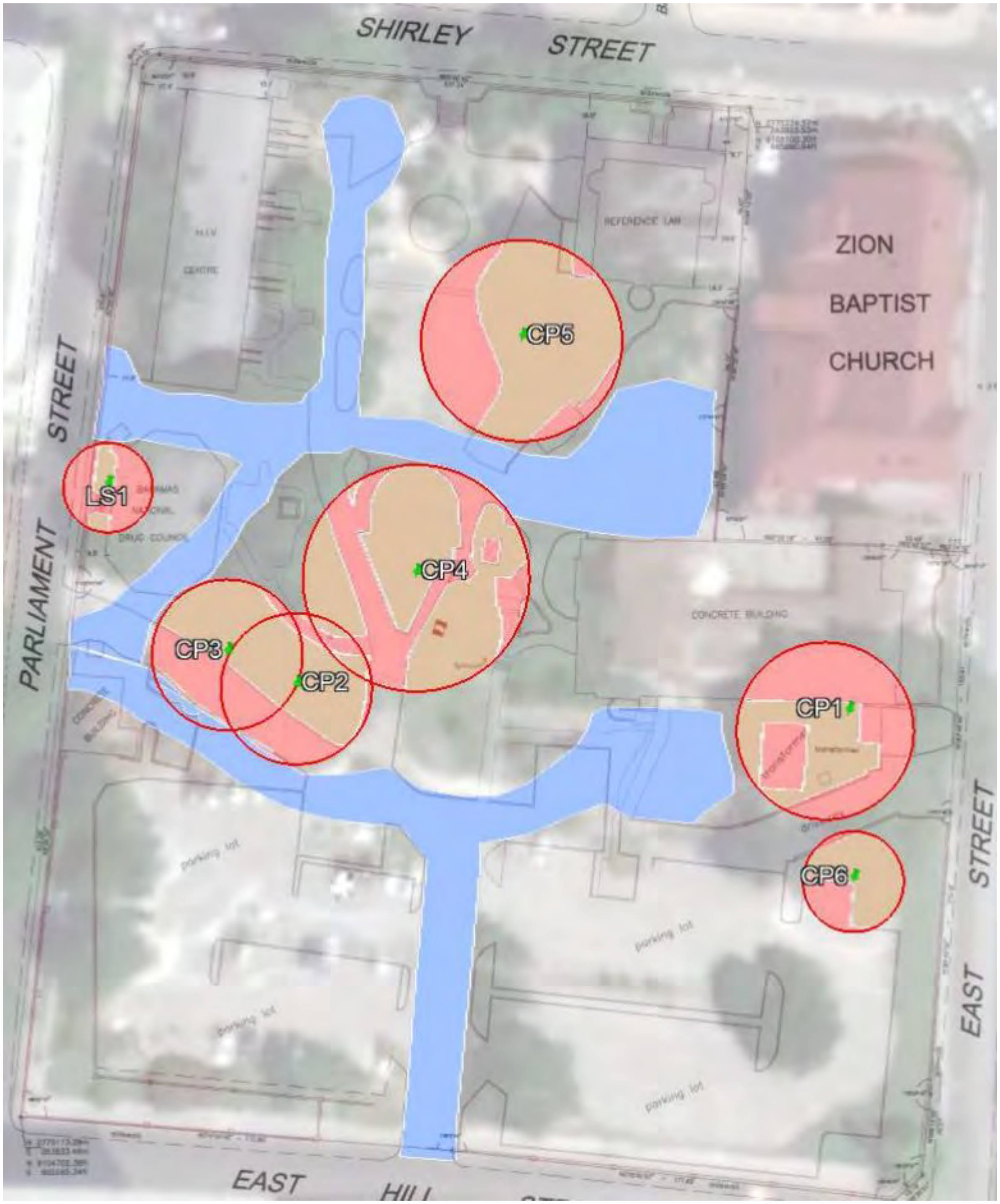


Figure 97. Site route map for vehicular traffic, with CP1,4,5,6;LS1 (nationally protected trees) retained in place, CP2-3 removed.

Figure 98. Site route map for vehicular traffic, with CP1,4,5; LS1 (nationally protected trees) retained in place, CP2,3,6 removed.

Figure 99. Site route map for vehicular traffic, with CP4,5; LS1 (nationally protected trees) retained in place, CP1,2,3,6 removed.

Figure 100. Site map depicting all nationally protected trees, and other specimens recommended for preservation.

Figure 101. Site map depicting CRZs of all nationally protected trees, and other specimens recommended for preservation

Figure 102. Site map depicting all trees recommended for preservation (Green), and other trees which can be preserved as the final site design allows (yellow).

Figure 103. Site map depicting trees recommended for removal.

Appendix E – The Royal Victoria Cultural Resources Report

Historical Overview of the Royal Victoria Site, New Providence, The Bahamas

Prepared by (PARENTHESES)

Table of Contents

Summary

The Royal Victoria Hotel opened in August 1861. It was a government-built hotel and the first hotel built on New Providence at the time. The purpose of the hotel was to provide accommodations for those seeking a warmer climate for health and wellness, and also for the island to be able to benefit from the increase in travel and trade ushered by improved transportation by ship.

The Royal Victoria Hotel was situated on an elevated lot, bounded by present-day Shirley Street, East Hill Street, Parliament Street and East Street. The hotel was a limestone building, four stories high. Three of the stories were surrounded by a piazza ten feet wide, forming a covered promenade 900 feet long. It contained 121 double and single bedrooms, with lofty ceilings and could accommodate 200 guests. The hotel had views of the city of Nassau and a large portion of the island, and the harbor.

The buildings on the property included the main hotel building, and an unidentified building that contained a hair-dressing saloon, a billiard room and a bar, colloquially known as “The Tank”. The Royal Victoria property contained a garden that was well known for its wide variety of tropical plants. In later years, a swimming pool, outdoor bar and luxury apartments were added, with private lanais. A stockbroker’s office was also added in the nearby garden.

The hotel ceased operation in 1971. A portion of the building was damaged in the 1990s by fire and later demolished. The Bahamas Ministry of Health now occupies a section of the hotel that survived. Today, most of the grounds serve as a parking lot.

Earlier Buildings

Prior to the Royal Victoria Hotel, King’s College School occupied the location on Parliament Street. It was also the residence of Mr. Timothy Darling.[1] In 1835, Governor William Colebrooke recommended the establishment of King’s College School in Nassau in connection with King’s College located in London. He emphasised its importance in numerous correspondences to England, writing that “any delay in the measures for establishing a school at Nassau under the King’s College in London would be attended with great disappointment to the community.”[2] The King’s College School was officially established in Nassau in 1837 and provided advanced instruction for both whites and blacks who were able to afford it. The school emphasised liberal arts and sciences.

Royal Victoria Construction

The Royal Victoria Hotel was built between 1859 and 1861. It was prominently situated on a ridge approximately 90 feet above sea level on the island of New Providence. The hotel was bordered to the north by Shirley Street, south by East Hill Street, west by Parliament Street and east by East Street. It faced north, overlooking public buildings, including the Nassau Pubic Library and the

[1] Mosley, M. “Nassau’s Oldest Hotel”. *Nassau Magazine*, Mid-Season 1960, Vol. XII, No.3, p.49. Originally published in 1954.

[2] Letter from Governor Colebrooke to Baron Glenelg, December 14, 1835 (CO 23/94:442).

Nassau harbour. The Royal Victoria Hotel, also known as the Royal Vic., was opened in August 1861.[3] It was the island's first and only hotel at the time of its opening.

Edwin Charles Mosely, originally from London, England and founder of the Nassau Guardian, advocated for the creation of a hotel to accommodate invalids and other tourists traveling by steamship from New York. He encouraged this as he felt this would increase trade and commerce and boost the island's economy. He wrote that "at least five hundred invalids would spend the summer here and the pecuniary advantages would benefit the whole community".[4] By 1845, he had called a public meeting to advocate and generate more interest.[5]

A precursor to the construction of the hotel was the establishment of Nassau on a reliable transportation route. In 1851, the House of Assembly passed an Act offering £1000 to any person or company able to provide a steamship service between the United States, Cuba and Nassau.[6] It was not until 1859 that Samuel Cunard began a monthly mail connection between Nassau and New York. The paddle steamer, S.S. Corsica, began the service in November 1859 and was later replaced by the Karnak.[7]

An Act for Securing the Creation of an Hotel on the Island of New Providence was passed on May 11, 1859. The property was purchased from Timothy Darling.[8] The tender by Timothy Darling, a Canadian businessman and American Consul, was accepted at £2,500. The final cost of constructing the hotel would come to approximately £25,000. The construction of the hotel was managed by a board of commissioners, which included the Governor, the Bishop, Mr. E. C. Moseley, Mr. H.E. Kemp, Mr. G.D. Harris and Mr. R.E. Rigby. The hotel would be open seasonally from November to May.[9]

The Building

The Royal Victoria Hotel was accessible from three sides – Shirley Street, Parliament Street and East Hill Street. The elevation afforded exposure to the prevailing winds. The structure was built of limestone and the original frontage was 200 feet and four stories. The east end was rounded off resembling the stern of a paddle-wheeler. Verandas were ten feet wide and wrapped around upper floors providing 900 feet of walking space (this would later be enlarged). There was a projecting story from the centre of the building, opposite the main parlour. The story was topped by a large, open piazza. An octagonal cupola glazed all around provided a view of housetops and the sea. There was a porte-cochere in the front of the building. Above it was the Gentlemen's Parlour, while the Ladies Parlour was at the eastern end.

The original King's College School, which was three-stories, was incorporated in the hotel as a western wing connected to the main building by a covered bridge.[10]

3 Villard, Henry S. 1976. *Royal Victoria Hotel.*
4 Villard, 1976, p. 11.
5 Russell, C. Seighbert. *Nassau's Historic Buildings*, p. 24.
6 Act of House of Assembly 1851.
7 Villard, 1976, p. 11. The first Bahamian postage stamps were also issued this year.
8 Russell, p. 24.
9 "Royal Victoria Hotel (Nassau, Bahamas), and Nassau and Savannah Mail Steamship Line." *Nassau, N.P. Bahamas: with illustrations from Photographs*. 1876, p. 7.
10 Mosley, 1960, p. 2.

The hotel contained 121 double and single bedrooms, with lofty ceilings and could accommodate 200 guests.[11] Bedrooms were large and well ventilated. They had high ceilings with windows reaching the floor. Rooms on the first, second and third stories had French casements that opened to the piazza.[12]

The dining room was located on the ground floor. It faced a porch on the east end and was able to seat 150 people.[13] There was also a restaurant on the ground floor. In a building described as "off to one side" was a hair-dressing salon, a billiard room and a bar, colloquially known as "The Tank".[14] Rainwater tanks were installed with a capacity of 300,000 gallons. Limited freshwater bathrooms were situated at the end of a long bridge that stretched to East Hill Street on the southern side.

A large airy court under the building's central projection had eight large, high archways and formed the hotel's main entrance. In this area, a bazaar was held every morning.

The Gardens

The Royal Victoria's "world famous" tropical garden featured 200 varieties of exotic plants, shrubs and trees. They included bougainvillea, Cereus, Malaya's fish tail palm, Spanish bayonet, South Sea Island's breadfruit tree, sapodilla of Yucatan, royal and coconut palms. The focal point was a huge silk cotton tree. A bandstand was constructed in the branches of the tree with steps leading up its trunk.[15]

The Guests

The Royal Victoria Hotel hosted a wide variety of individuals over the course of its life. Its guests included those involved in the American Civil War, persons seeking to recover health and strength from illness, rumrunners during the American prohibition period and general travellers seeking exotic experiences.

During the American Civil War (1861-1865), the hotel welcomed sea captains, those buying and selling cotton, dealers of munitions, Confederate agents, soldiers, diplomats, war correspondents among others.[16]

In response to those seeking health, it served as a sanatorium. In a report to the British Government on the Colonial Section at the Vienna Exhibition in 1873, Governor William Robinson wrote:

> Nassau however, has become, for many years past, a winter's resort for those seeking to escape from the rigors of a Northern to a milder Southern clime. Many eminent American Physicians strongly recommend such of their patients as may

[11] Taylor, E.B.A. "FOR SALE." New York Daily Herald. 19 Dec. 1877. Auction Advertisement authored 25 Sept. 1877.
[12] "Royal Victoria Hotel (Nassau, Bahamas), and Nassau and Savannah Mail Steamship Line," 1876, p. 3.
[13] Turtle, fish and fruit were typical breakfast items.
[14] Villard, 1976.
[15] Villard, 1976, p. 14.
[16] Ibid., p. 6.

be suffering from or threatened with pulmonary disease to proceed to Nassau for the winter, in consequence of the mildness and equability of the temperature. With a view to attract such a class of visitors, a very commodious hotel, built on the American plan, was erected at the expense of the Government. The lessees of the hotel, Americans, are bound to conduct it like a first-class New York hotel. Ample and good accommodation has therefore been provided.[17]

During the American prohibition (1920-1933), the hotel welcomed those in search of the forbidden beverages. During World War II, the Royal Victoria Hotel accommodated Allied survivors. The Royal Victoria Hotel Annex was commandeered by Wallis Simpson, Duchess of Windsor, for this purpose and referred to as a 1st Aid Station and Emergency Quarters.[18]

During the 1890s, the Royal Victoria entertained prominent guests including Austen and Neville Chamberlain, sons of the Right Honourable Joseph Chaimberlain. Neville went on to become Prime Minister of the United Kingdom.

The hotel was a popular accommodation for winter visitors from the United States, British North America and Europe. Many of the travellers would make use of the library, which was a short walking distance from the Royal Victoria Hotel.[19]

Entertainment/Culture

The Royal Victoria Hotel was a hub for cultural exchange and entertainment. At the entrance of the hotel, a bazaar was held every morning. At the bazaar, local vendors sold baskets, seashells, sponges, flowers, fruits and other native produce. Boatmen and carriage drivers offered their services of sailing, fishing and tours to guests, and young boys scrambled for pennies and ten and twenty-dollar gold pieces, also known as eagle coins. Donkey races also amused guests in the afternoons.[20]

Entertainment was free and included Blind Blake (Blake Higgs). Musicians would walk the streets and gardens with their instruments, guitar, violin, mouth organ, bass viol, playing and singing for coins.

Memorable social gatherings at the Royal Victoria include Washington's Birthday Ball which would take place annually on the 22nd of February and banquets of the St. Andrew's Society. Other memorable functions included dinners in honour of the late Viscount Burnham, Sir Winston Churchill and other visiting members of parliament.

17 "Royal Victoria Hotel (Nassau, Bahamas), and Nassau and Savannah Mail Steamship Line". *Nassau, N.P. Bahamas: with illustrations from Photographs*. 1876.
18 Wiberg, E. 2016. *U-Boats in The Bahamas*.
19 Ballance, V. C. F. 2013. "A new look at old books: The collection of Nassau Public Library in the mid-19th century", The International Journal of Bahamian Studies, 19, p. 4.
20 Mosley, 1960, p.49.

Management

The Royal Victoria Hotel was first leased by the Government to Mr. John S. Howell of New York. It was subsequently managed by Mr. G. O. Johnson under a board of commissioners.

In 1865, wartime profiteers departed, and the hotel was offered for sale. The management changed hands several times. In 1873, the Royal Victoria saw 500 winter visitors.

A 20-year lease was granted in 1871 to two Americans, Mr. Lewis Cleveland and another. However, Cleveland died in the fire and wreck of the Missouri ship the following year. Between 1874 and 1876, Mr. T.J. Porter became the proprietor.

In 1877, the Royal Victoria Hotel was put up for auction by the government. The advertisement for sale by public auction dated September 25, 1877 read:

> FOR SALE —- AT NASSAU, NEW PROVIDENCE, BAHAMAS,
>
> by public auction (unless and advantageous offer is in the meantime made), on Monday, February 11, 1878, at noon, on the premises, in accordance with an act of the Bahamas Legislature, all the Lands, Buildings and Appurtenances known as the ROYAL VICTORIA HOTEL, erected in 1861 by the Bahamas government at a cost of £20,000. The building is unequaled by any structure of the kind in the West Indies and will be sold subject to an existing lease which expires in 1880 and on condition that the premises shall be used by the purchaser for the keeping and maintaining a hotel from the 1st day of November in and every year until 31st May in each succeeding year at least, and for no other purpose during any other period aforesaid or during any other period of the year.[21]

The lease was acquired by J.M. Morton of Sinclair House in New York in 1879.

Curry House

Curry House located on Shirley Street, is a three-storey building opened in 1890 as a private hotel by Mr. R. H. Curry of the firm R. H. Curry & Company Limited. It was subsequently acquired by operators of the Royal Victoria.[22] Presently, Curry House houses the Ministry of Health's National Reference Laboratory.

J.M. Morton managed the Royal Victoria Hotel with his son, S.S. Morton, until it was sold to Henry M. Flagler in 1898. The 1898 Hotel and Steam Ship Service Act provided government support for hotel construction and a subsidized steamship service. In the same year, Henry M. Flagler, developer of South Florida and owner of East Coast Railway, purchased the Royal Victoria for £10,000. He agreed to integrate Nassau into his extensive system of hotels and railways in Florida. Flagler

21 Taylor, E.B.A. "FOR SALE." New York Daily Herald. 19 Dec. 1877. Auction Advertisement authored 25 Sept. 1877.
22 Russell, p. 26.

enlarged and renovated the Royal Victoria Hotel with electricity. It was lighted with electricity for the first time on January 18, 1899. It is believed that he added the fourth floor above the former King's College School section, making the appearance of the roof continuous from east to west.[23]

After Flagler, Frank C. Munson, President of Munson Steamship Lines,[24] took possession of house and garden and improved both. After Mr. Munson's death, his widow, Cora Mallory Munson, sold the property in 1949 to Royal Little, an American businessman and investor. The property underwent a million-dollar refurbishment. A swimming pool and outdoor bar was built. Air conditioning was implemented, a series of luxury apartments added, with private lanais overlooking the pool and terrace, a Cafe Royale, where one could dine indoor or outdoor and a Blockade Runner's Bar. A stockbroker's office was added in the nearby garden.

Decline of the Royal Victoria Hotel

The Royal Victoria Hotel declined as a result of competition from the Hotel Colonial, the end of the World War II, changes in the tourism industry and traveller values, and operational challenges. The Hotel Colonial began in 1900. In the beginning, it was no competition as the Royal Victoria attracted higher-end clientele and events such as elite private functions and government parties, such as fetes in honour of Queen Victoria's consort, Prince Albert; dinners of the select St. Andrews Society; and dinners to honour visiting members of Parliament, including Winston Churchill. Not until the Hotel Colonial burned in 1922 and was replaced, did it pose competition.

In 1950, Nassau was declared a year-round resort by Chairman of the Development Board and first Minister of Tourism, Sir Stafford Sands. His goal was to attract one million visitors a year. Some believe that the campaign attracted tourists of different values from the past, and that the traditional travellers' values changed from families seeking a winter retreat to the budget-conscious tourist.

On March 3, 1958, unidentified individuals threw sticks of dynamite from a moving car onto the Royal Victoria premises, blowing a hole in the dining room.[25] This attack was one of many incidents on New Providence directed at the government and hotel owners in protest of racial and political injustice leading up to Majority Rule in The Bahamas. The Royal Victoria Hotel had accommodated approximately 100 British troops from Jamaica who had been called in by the governor to reinforce the police in quelling the General Strike that took place on January 13 of the same year.

The hotel ceased operation in 1971. In 1972, the hotel was re-purchased by the Bahamas Government. A portion of the building was damaged in 1991 by fire and later demolished. The Bahamas Ministry of Health now occupies a section of the hotel that was saved. Today, most of the grounds serve as a parking lot.

23 Lightbourn, Ronald G. 2005. *Reminiscing II*, p. 55.
24 The line operated between 1899 and 1937. It operated from New York to Latin American and The Bahamas.
25 Fort Lauderdale News, 3 March 1958.

Environs

Nassau Public Library/Old Gaol

The Nassau Public Library and Museum is a three-story, stone octagonal building, painted pink, located on Shirley Street directly opposite the site of the Royal Victoria Hotel. The building was previously a prison constructed between 1797 and 1799 by Loyalist Joseph Eve. The octagonal design was believed to better withstand harsh weather and promote air flow. The first and second floors open into vaulted areas. The vaulted spaces, originally prison cells, now house books and serve as reading nooks. The third floor is encompassed by an open gallery. From the third-floor gallery, a bell was rung to call members of the House of Assembly to meetings.

The library was previously located in a reading room on the second floor of the Eastern Public Buildings on Rawson Square, in what is known today as the House of Assembly.[26] In 1847, the Nassau Library Act was passed, establishing the Bahama Public Library and Museum.[27] The library outgrew the reading room in the Eastern Public Buildings and was relocated across the square to the renovated old gaol in 1873.[28] An 1874 amendment to the Nassau Library Act changed the name to the Nassau Public Library, Reading Room and Museum.[29]

Jacaranda House

Jacaranda is the name of the house located at the northwest corner of Parliament and East Hill Streets. It is bounded by Charlotte Street to the west. The home was constructed in the 1840s as Anderson House. It was home to Chief Justice Sir George Anderson. Anderson purchased ballast stones from the Nassau docks for its construction. The house has since been enlarged and remodeled.

Ownership of the house was passed from the Anderson family to the Williams family, to the Miller family around 1900. Ownership returned to the Anderson family in 1944 when it was purchased by Sidney Farrington, who was the great nephew of George Anderson. Captain Vyvian Drury, who came to The Bahamas as an aid-de-camp to the Duke of Windsor during World War II, purchased the house and began renovations. The renovations included replacing the old kitchens with a dining room and new wing.[30]

In 1949, the house was purchased by Lady Eunice Oakes, widow of the late Sir Harry Oakes. Ownership then passed to her daughter, Shirley Oakes Butler in the 1960s, then in 1986 to Nancy Oakes von Hoyningen Huene, Shirley's elder sister. At this time the house was maintained by a housekeeper, Mme Legros, as Nancy never lived at the residence. After the death of Nancy in 2005, the property was passed to her daughter Patricia Oakes Leigh-Wood and niece Virginia Oakes McKinney. It is held by their holding company, Greshanda Properties Limited.

26 Balance, 2013, p. 32.
27 The Statute Law of the Bahamas, 1901, p. 73.
28 Balance, 2013, p. 34.
29 The Statute Law of the Bahamas, 1901, p. 75.
30 Moseley Moss, Valeria. *Reminiscing: Memories of Old Nassau*, 1999, 11.

In 1965, the guest house and pool were added. The guest house was built to resemble the old kitchen and modelled after the kitchen house at the East Hill Club.

Names of the house have included Anderson House, Everton House, Jacaranda and "the old Miller place."

Rodney E. Bain Building

The Rodney E. Bain building is four-story building located at the corner of Shirley Street and Parliament street, at the southwestern quadrant. The structure was built in 1990 and named after Rodney E. Bain, a prominent Bahamian educator originally from Mastic Point, Andros, who died in October 1980.

The building housed the Registrar General's Office until December 2005 when staff were evacuated due to water and sewage leaking from ceiling pipes. The Rodney E. Bain building was officially closed in January 2006[31].

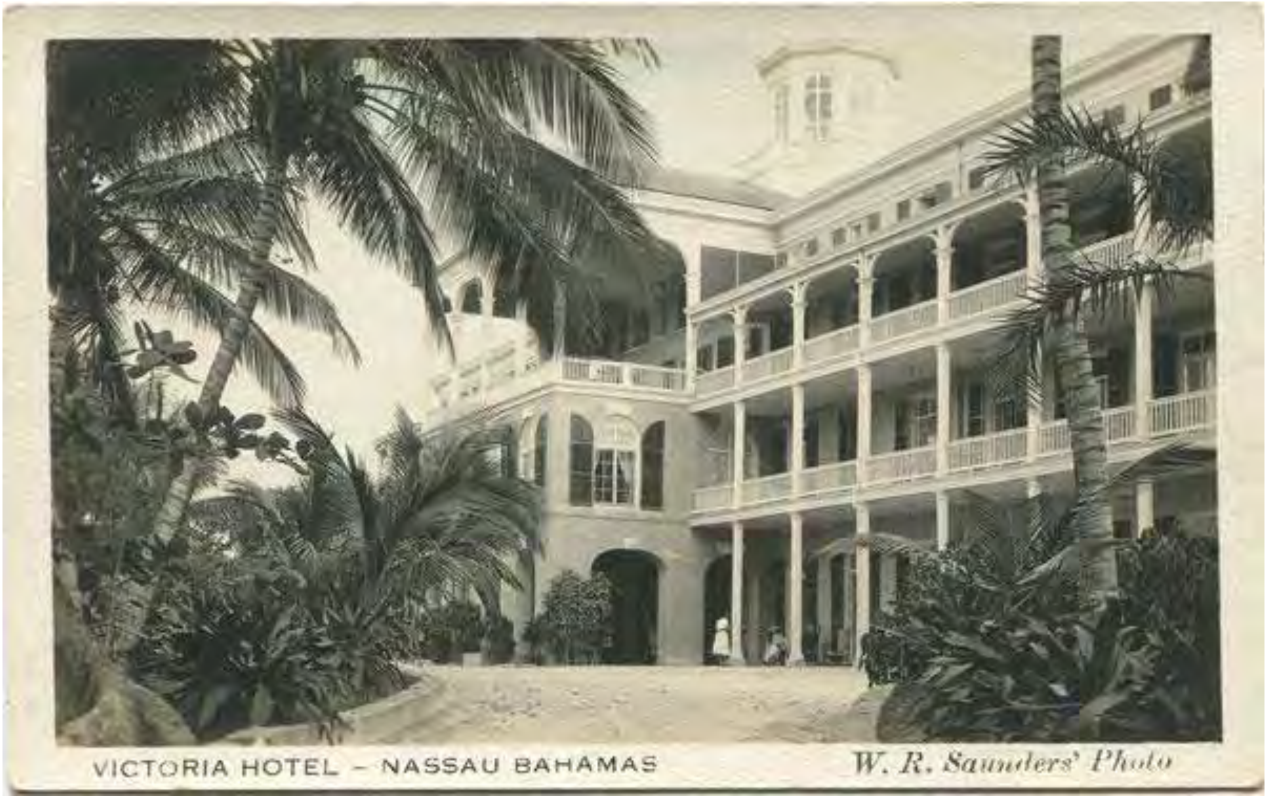
[31] Cadet, Alesha. "Rodney Bain building set for renovations." *Tribune.* March 13, 2010, p. 5.

Images

THE ROYAL VICTORIA HOTEL, NASSAU, NEW PROVIDENCE.—Nassau, upon the island of New Providence, is the capital of the Bahama group. It is a colony of Great Britain. The home Government built many years ago the substantial Royal Victoria Hotel as a santarium. It is beautifully located upon the rising ground behind the white and red houses of the town, which are embowered in a wealth of tropical foliage. From its piazzas a far-reaching view embraces the harbor, Hog Island opposite, and the surf which beats upon the coral reefs beyond. Fort Fincastle and Fort Charlotte are near by, and the fine roads, excursions by water to the sea- gardens and coral reefs, are greatly enjoyed by the large number of Americans who resort to this lovely " Isle of Summer " each winter.

Royal Victoria Hotel, 1892. Print of photo by Charles H. Adams.

Grounds of the Royal Victoria Hotel, 1895. Photo by William Henry Jackson.



Royal Victoria circa 1920. Photo by W.R. Saunders.

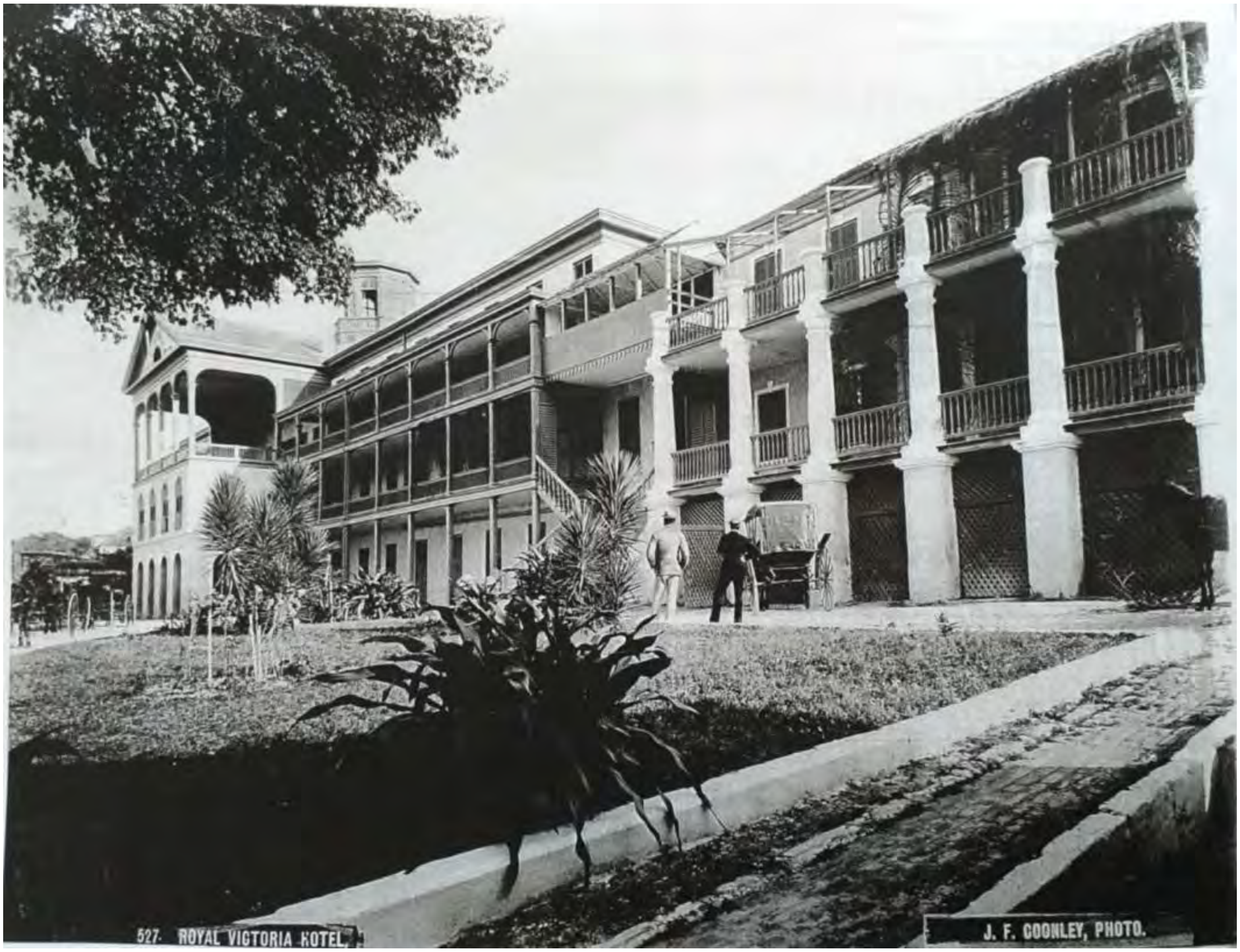


Photo showing the old King's College School building at the right, which was incorporated into the Royal Victoria Hotel. It is joined to the main building by a covered bridge.

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M. Sc. (Arch), B. Arch. (Hons)

Historic Preservation Architect ***Registered Architect (The Bahamas #038)***

RF1#11: LITTLE HOUSE DEMOLITION AND RELOCATION

INTRODUCTION: With reference to the aforementioned subject, a meeting was held at 10 a.m. on Tuesday October 20, 2020 to determine the process for the deconstruction of the existing structure and its reintegration into the Master Plan for the New Premises of the Central Bank of The Bahamas.

ATTENDEES: Mr. Basil McIntosh, (Structural Engineer), Mr. Don Wilmott – representative/Woslee Construction and Ms. Alicia Oxley (Parentheses) Ltd.

INITIAL OBSERVATIONS: With the assistance of the recent survey drawings the original and intrusive elements – walls, floors, ceilings and other building components were preliminarily identified for removal and/or retention.

PROPOSED/RECOMMENDED PHASES FOR DECONSTRUCTION: It was determined that the deconstruction be carried out in 2 phases:

Phase 1: The gutting and carting away of the identified intrusions to include the drywall partitions, drop ceilings, intrusive floor finishes (tiles and plywood), non-original fixtures etc. I wish to note at this juncture that there is still evidence of office equipment etc. that would need to be removed by the former building tenants.

.

Phase 2: The meticulous removal/stripping out of the components that make up the remaining/original structure, to include but not limited to, the doors and door frames to include the transoms; any other original components such as the sound timber flooring & roof framing (Abaco pine); quoins, timber balustrades and metal railings in the interior and exterior, the tiled letters :"The Little House" on the wall at the main entrance. It was also determined that in order to save the limestone blocks and other historic components that make up the structure that the deconstruction will be labour intensive.

IN ADDITION: It is recommended that following historic artifacts be also included for careful removal and storage at this time:

- the valuable historic tiles situated on the columned entrance at Parliament Street and at the Shirley Street entrance before they are stolen/removed by others

- the 2# columns and gate at the rear entrance to The Little House – that the columns be removed as units and not dismantled

CATALOGUING: In carrying out the deconstruction a cataloguing system must be put in place for the recording of the components as they are being removed, so that upon reconstruction they can be relocated similarly – to be identified on blueprints.

STORAGE: A dry storage will need to be identified for the components. It is suggested that secure storage containers be acquired and located on site for the storage of these parts

***Photos to show some of the historic exterior elements that must also be included in the cataloguing during the deconstruction process*.**

IN CONCLUSION: It is hoped therefore that this process is accepted and approved for action.

Submitted: Thursday, October 22, 2020

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Historic Preservation Architect ***Registered Architect (The Bahamas #038)***

ADDENDUM: RF1#11: LITTLE HOUSE DEMOLITION AND RELOCATION

NEED FOR ENVIRONMENTAL TESTING PRIOR TO DECONSTRUCTION WORKS

To date we have no accurate documentation with regard to the construction of The Little House. However. it has been determined that is may have been constructed circa end of the 19th century/beginning of the 20th century.

Considering this timeline, it may be possible that during the life of the structure that lead paint may have been used during the course of its existence, as well as the fire-retardant – asbestos, not to discount the presence of mold or any other substances.

It is therefore recommended that environmental tests for these and any other toxic substances be carried out prior to the dismantling of the structure.

Submitted: Thursday, October 22, 2020

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Appendix F – New Providence Traffic Impact Assessment

PROPOSED NEW CENTRAL BANK OF THE BAHAMAS, NEW PROVIDENCE
Traffic Impact Assessment

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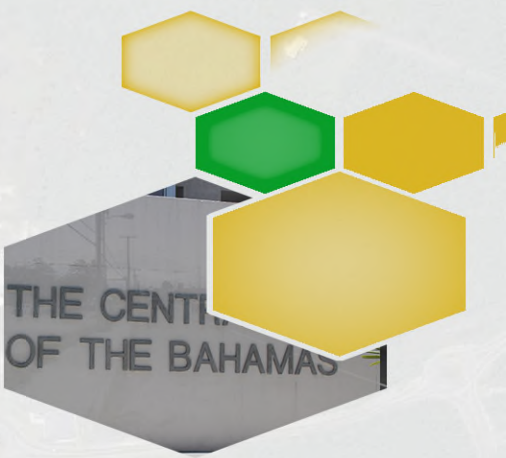

Prepared For:
THE CENTRAL BANK Of THE BAHAMAS

THE CENTRAL BANK OF THE BAHAMAS

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The New Central Bank of The Bahamas Building/ Traffic Impact Assessment Final Report

Project ID:

NP2119-820

Prepared by: **Ray R. McKenzie**	**Reviewed by:** **Ricardo L. Bonaby**	**Reviewed by:** **D'Kwon Q. Sulllivan**	**Approved by:** **Ray R. McKenzie**

Prepared For: Central Bank of The Bahamas

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REGISTERED PROFESSIONAL ENGINEER
RAY R. MCKENZIE
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COMMONWEALTH OF THE BAHAMAS

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ACKNOWLEDGEMENTS

The information presented for use in The Central Bank of the Bahamas report was due to the efforts of the Staff of the Central Bank and Mrs. Sonia Brown, P.E., Principal at Graphite Engineering as well as the statistics and road traffic data received from the Department of Statistics and the Road Traffic Department was very much appreciated and hereby gratefully acknowledged.

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LIST OF ACRONYMS/ABBREVIATIONS

ADT	Average Daily Traffic
CBD	Central Business District
CBOB	Central Bank of The Bahamas
CCG	Caribbean Civil Group
DPP	Department of Physical Planning
E	East
EB	Eastbound
HCM	Highway Capacity Manual
LOS	Level of Service
LT	Left-turn
MOE	Measures of Effectiveness
MPH	Miles Per Hour
N	North
N/A	Not Any
NB	Northbound
PMH	Princess Margaret Hospital
RAB	Roundabout
ROW	Right-of-Way
RT	Right-turn
S	South
SB	Southbound
Sec	Seconds
TIA	Traffic Impact Assessment
TMC	Turning Movement Counts
Veh	Vehicles
V/C	Volume to Capacity Ratio
W	West
WB	Westbound

Executive Summary

Introduction

The Traffic Impact Assessment (TIA) was commissioned by the Central Bank of the Bahamas (CBOB).

The Central Bank of the Bahamas plans to construct its new premises on the existing Royal Victoria Gardens site bounded by East Street to the east, Parliament Street to the west, Shirley Street to the north and East Hill Street to the south in the city of Nassau in the north central region of New Providence as indicated in **Figure 1** on Page 5. The objective of the new facility is to provide a modern space for the CBOB to undertake its business and act as a landmark structure that will not only serve as the new location of the Bank, but also as a catalyst for the revitalization of the Central Business District (CBD) area of the city of Nassau.

Impacts

The study area is a built-out revitalization zone interspersed with historic properties operating in saturated traffic conditions consisting of two major east-west arterial roadways namely Bay and Shirley Streets. The other north-south major roadways are Blue Hill Road, Market Street and East Streets respectively. The trips generated by the CBOB over the peak hour will be consistent with the existing trips generated by the Bank, just reassigned throughout the study area. The cultural components of the CBOB will attract new trips, however, this will be in the evening periods which are well off the peak traffic flows. Given the commercial nature of the bank the pass-by trips will be nonexistent to negligible. The CBOB TIA addresses the impacts in **Section 6.0**, Page 34.

Mitigation

The mitigation for the impacts identified are listed in Section 6.0 of this TIA along with recommendations for capital improvements in study area, intersection improvements, site specific access and policy recommendations to manage the traffic volumes and improve the level of service (LOS) and capacity in the study area.

Recommendations

The general recommendations center around providing strategic upgrades at various intersections in the study area and recommendations for capital improvements throughout the study area currently operates in a saturated condition **Table 5**, Page 17. The recommendations are outlined in Section 6.0.

Section 1

1.0 Background Information

The Traffic Impact Assessment (TIA) was commissioned by the Central Bank of the Bahamas (CBOB).

The Central Bank of the Bahamas plans to construct its new premises on the existing Royal Victoria Gardens site bounded by East Street to the east, Parliament Street to the west, Shirley Street to the north and East Hill Street to the south in the city of Nassau in the north central region of New Providence as indicated in **Figure 1** on Page 5. The objective of the new facility is to provide a modern space for the CBOB to undertake its business and act as a landmark structure that will not only serve as the new location of the Bank, but also as a catalyst for the revitalization of the Central Business District (CBD) area of the city of Nassau.

The portion of the site available for development is the southern 2.11 acres, however, the overall site is 3.056 acres.

The proposed building is planned to include a performing arts theatre, an art gallery, and a food court in conjunction with the developed office space. The building is currently intended to have four above ground levels and two floors of underground parking. The project is scheduled to break ground this year and be completed in June 2022.

The objective of this study is to analyze traffic conditions within the study area (bounded by Blue Hill Road to west, Elizabeth Avenue to east, Bay Street to North and Sands Road to South) indicated in **Figure 2** on Page 6 during peak hour period for the baseline and the 20 year horizon periods. This TIA report will indicate any resultant potential traffic operational and road safety impacts within the study area.

1.1 Methodology

The methodology used for the CBOB TIA is as follows:

(a) Average Daily Traffic Counts (ADT):

ADT data was collected using the JAMAR Trax I Plus, Trax Apollyon and the JAMAR Radar counters on Parliament Street, East Street, Shirley Street and East Hill Street adjacent to the site. The ADT data was collected for a 24-hour period over duration of seven (7) consecutive days. A seasonal adjustment factor of 1.09 was utilized on the ADT data given that school was on break based on historical counts collected island-wide.

(b) Intersection Turning Movement Counts (TMC):

Turning Movement Counts (TMC) was collected using the JAMAR TDC Ultra hand held counters at the Following intersections during the period as follows: 6:00AM – 9:00AM, 11:00AM – 1:00PM and 3:00PM – 6:00PM. Additional traffic data was extrapolated for Bay & Market and Bay & Frederick and additional data on record from late 2017 for Bay & East Street was utilized for the expansion of the traffic modell. A seasonal adjustment factor of 1.09 was utilized on the TMC data given that school was on break based on historical counts collected island-wide.

1. East Street & Sands Road
2. East Street & East Hill Street
3. East Street & Shirley Street
4. Shirley Street & Parliament Street
5. East Hill Street & Parliament Street
6. Duke Street & Frederick Street
7. Market Street & Duke Street
8. Blue Hill & Duke Street
9. East Street & Bay Street
10. Bay Street & Elizabeth Avenue
11. Shirley Street & Elizabeth Avenue
12. Bay & Market
13. Bay & Frederick
14. Bay & East Street

(c) Trip Generation Analysis:

Utilized existing trip generation for the CBOB office operations. Additionally, trip generation based on the Dundas Centre of the Performing Arts, Antonius Roberts Studio and Art Gallery and the National Art Gallery Bahamas in lieu of the ITE Trip Generation Manual 10th Edition was used to determine the overall trip generation that would be similar to the CBOB site.

Given that the new CBOB will include a Performing Arts Theatre and an Art Gallery which will attract trips after hours during the week, the trips generated during a typical workday peak hour and the afterhours (8:00pm – 9:00pm generated utilizing a reduction factor of 0.46 derived from the traffic data collected during the evening period) cultural events were evaluated and the worst-case scenario utilized for the TIA capacity analysis.

(d) Traffic Forecast:

The 5 year and 20 year horizon forecasts of traffic volumes took into consideration increased traffic volumes due to a determined growth rate of 3% which was used to establish the growth factors using the equation $(1 + r)^n$.

(e) Roadway Safety Analysis:

Safety in the study area corridors was evaluated to determine the expected safety performance and to identify modifications that will maintain or improve existing safety conditions before the opening of the new CBOB or other future development projects in the study area[1].

(f) Roadway Capacity Analysis:

The software PTV Vistro/PTV Vissim utilized to determine the baseline, 5-year, 10-year and 20-year horizon roadway capacity measures of effectiveness (MOE) and to modell the study area. The modell was calibrated and validated as indicated in the TIA **Table 13** Page 33.

(g) Traffic Impact Assessment:

This report prepared Traffic Impact Assessment for the typical weekday peak period conditions including recommendations for intersection improvements and road safety measures to mitigate safety issues over a 5-year horizon given the projected buildout for the site is year 2022 and over a 20-year horizon to improve traffic flow and safety within the study area based on the following categories:

- Capital improvements within study area
- Intersection improvements throughout study area
- Site specific access improvements
- Policy recommendations

1.2 Site Description

The proposed CBOB bounded by East Street to the east, Parliament Street to the west, Shirley Street to the north and East Hill Street to the south in the city of Nassau in the north central region of New Providence as indicated in **Figure 2** on Page 6. The proposed site will be mixed use with site particulars as follows:

1. Total site area – 3.056 acres

2. Developed site area – 2.11 acres

3. CBOB Staffing Plus Customers - 337

4. Performing Arts Theatre - 10,000 SF

5. Small Museum/Art Gallery - 4,000 SF

1 CH2MHILL, Best Practices for Traffic Impact Studies (Final Report SPR 614 For ODOT and FHWA 2006) 31.

6. Cafeteria/Food Court – 3,000 SF
7. CBOB – Occupiable Area ≈ 60,000 SF
8. Total Parking Stalls - 320

1.3 Study Area Location

The CBOB study area is bounded by Blue Hill Road to the west, Elizabeth Avenue to the East, Bay Street to the north and Sands Road to the south as indicated in **Figure 2** on Page 6.

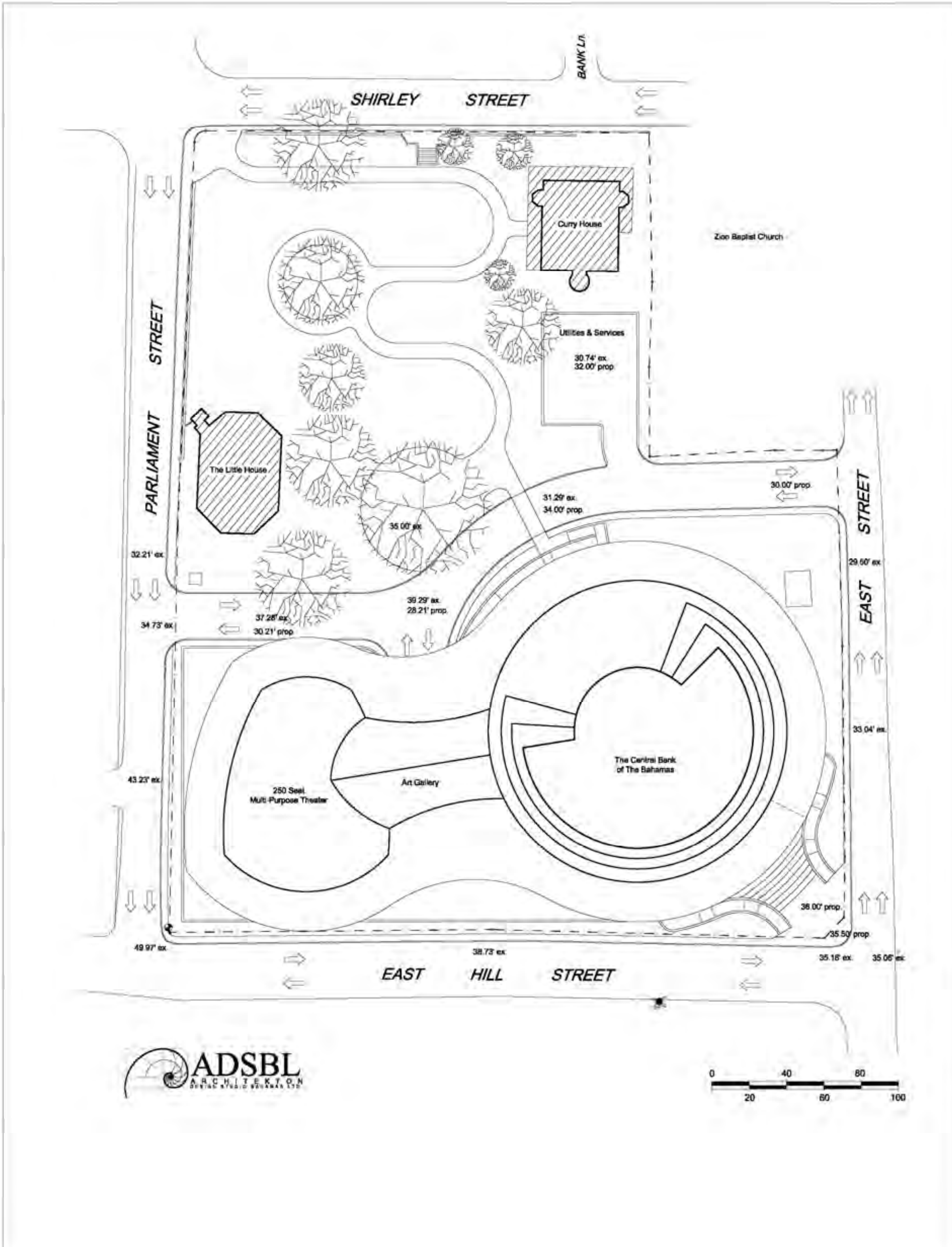


Figure 1 (The New Central Bank of the Bahamas Proposed Site)

Figure 2 (CBOB Study Area)

Section 2

2.0 Existing Conditions

The new CBOB will be situated on the existing Royal Victoria Gardens site bounded by Parliament Street, East Street, Shirley Street and East Hill Street in the city of Nassau Central Business District (CBD) as shown in **Figure 1** Page 5 and **Figures 3** through **Figures 6** below respectively.

Figure 3 (Parliament Street Looking South)

Figure 4 (East Street Looking North)

Figure 5 (Shirley Street Looking East)

Figure 6 (East Hill Street Looking East)

2.1 Study Area

The proposed CBOB study area is indicated in **Figure 2** Page 6.

2.2 Roadway Typical Cross Section Fronting Site

The existing typical roadway cross section dimensions (roadway paved width) for the corridors fronting the proposed site is outlined in **Table 1** as follows:

Table 1 (Typical Roadway Cross Section Width Fronting Site)

Roadway Name	Direction of Traffic Flow	Typical Cross Section Width
Parliament Street	Two-way Between Shirley & East Hill	29 Feet
East Street	Two-way	22 Feet
Shirley Street	One-way Westbound	24 Feet
East Hill Street	Two-way	29 Feet

2.3 Study Area Land Use

The CBOB site is located within the City of Nassau Revitalization (C3) zoning interspersed with commercial-tourist (C2) and high density residential (R5) in the areas adjacent to C3.

2.4 Safety

The overall road safety within the study area in addition to the proposed site to be developed will be a very important consideration for this traffic impact assessment, in particular any significant vehicular volumes interacting with pedestrian or bicycle traffic. An evaluation of safety in the study area is outlined in **Section 3.0** Page 19 of this TIA.

2.5 Existing Traffic Flow

The study area existing traffic flow pattern consists of one-way pairs and two-way traffic flows as outlined in **Figure 2** Page 6 and in **Table 2** as follows:

Table 2 (Existing Traffic Directional Flow)

Roadway Name	Direction of Traffic Flow
Blue Hill Road	One-way Northbound
Bay Street	One-way Eastbound
Parliament Street	One-way Between Bay & Shirley Two-way Between Shirley & East Hill
East Street North	One-way Northbound Between Woodes Rodgers Walk & Shirley Street
East Street	Two-way
Elizabeth Avenue/Sands Road	Two-way
Shirley Street	One-way Westbound
East Hill Street	Two-way

2.6 Site Accessibility

Public access to the existing site is via Parliament, East Street and East Hill Street with the East Hill Street access being the primary ingress/egress for the existing site.

2.7 Sidewalks

The sidewalk in the study area is of varying width and located predominately on both sides of the roadways. However, East Street (west side) and Sands Road (east side) fronting the Princess Margaret Hospital (PMH) have sidewalks on solely one side of those respective roadways.

2.8 Existing Parking

The proposed site has areas designated for parking within the confines of the property with on-street parking prohibited fronting the property on East Hill Street. However, on-street parking is permitted on Parliament Street fronting the site between Shirley and East Hill Streets on the west side of that roadway.

2.9 Omni (Jitney) Bus Transit System

There are public bus routes on all main corridors in the study areas as below with a designated layby area in the southwest quadrant of East and East Hill Streets:

1. East Street Corridor- Bus 1, 1a, 7, 7a, 21, 21a
2. Shirley Street – Bus 5a, 8, 9, 9a, 11, 16a, 16b
3. Bay Street /Market– Bus 1, 1a, 7, 7a, 8, 8a, 9, 9a, 10, 10a, 11, 14a, 15a, 16a, 19, 21, 21a

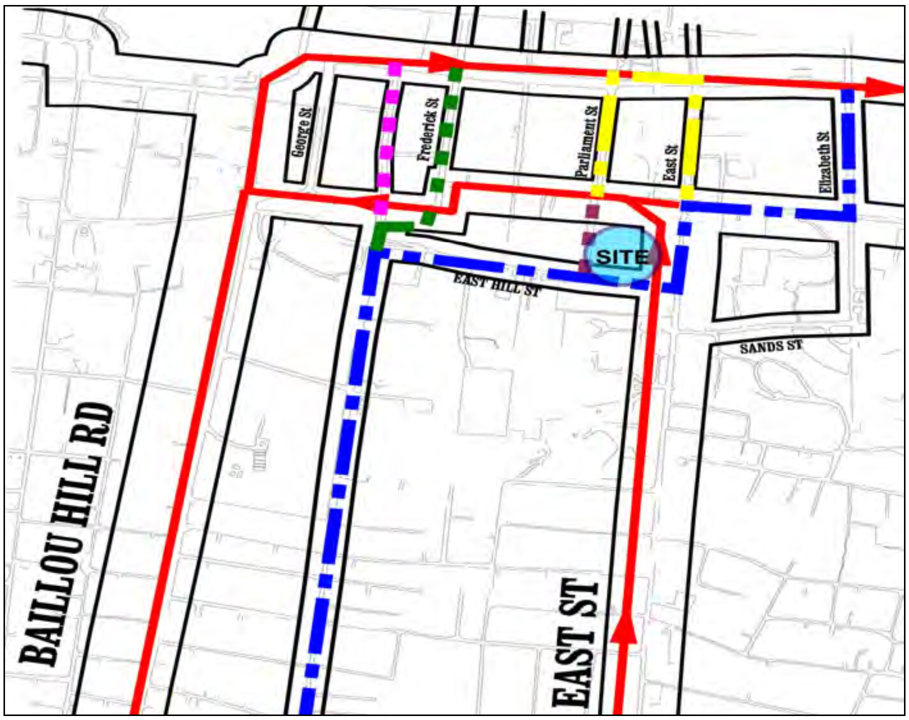


Figure 7 (City of Nassau Downtown CBD Bus Routes)

2.10 Traffic Volumes - Average Daily Traffic (ADT)

The existing ADT on corridors fronting the proposed CBOB site are outlined below in **Figure 8** through **Figures 13** respectively. The ADT on the minor roadways fronting the property are relatively low volume roadways including East Street between East Hill and Shirley Street.

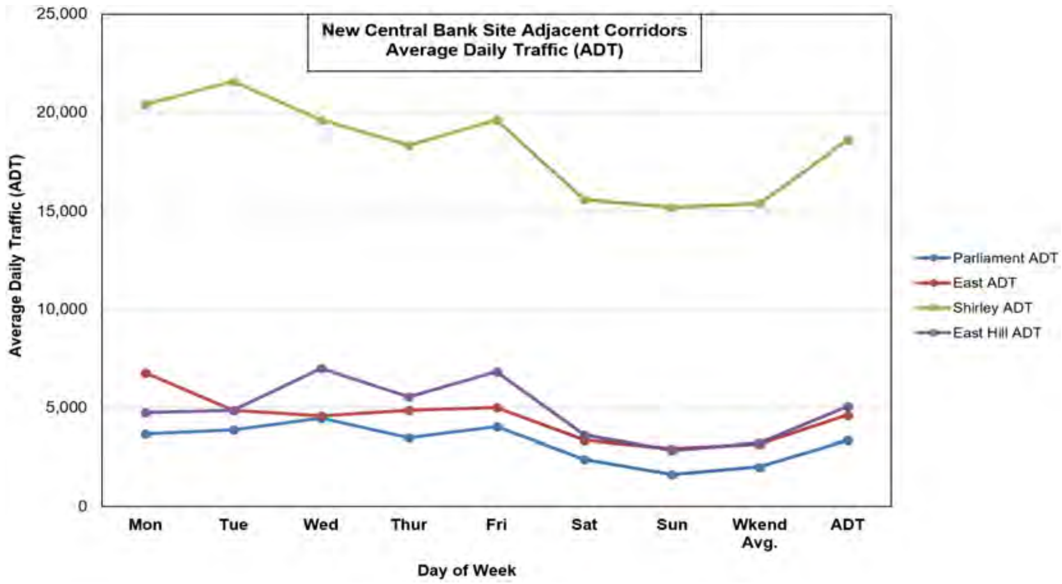


Figure 8 (Existing ADT On Corridors Adjacent to Site)

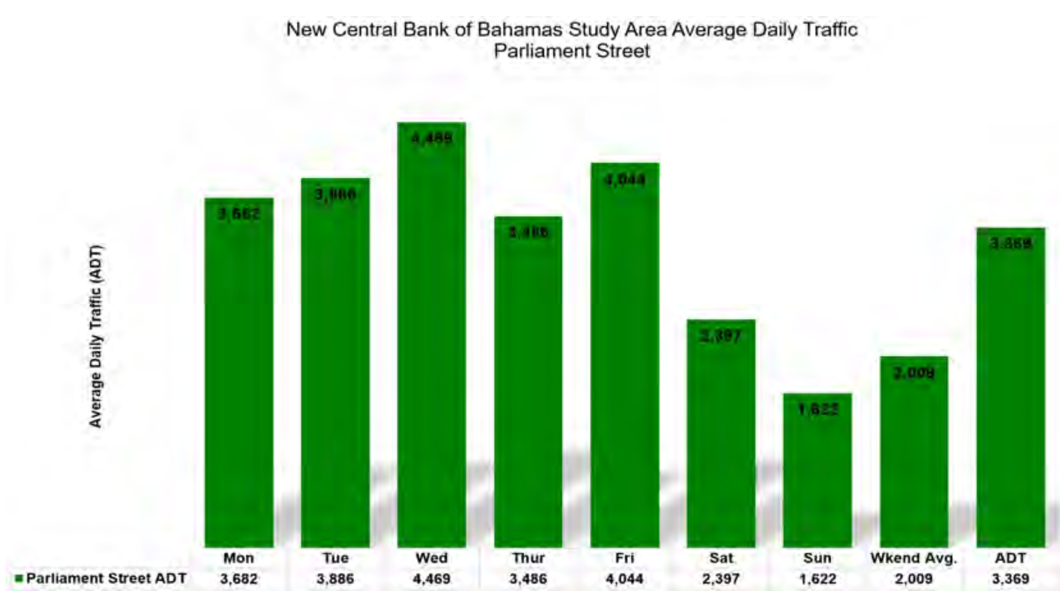


Figure 9 (Existing ADT Parliament Street Fronting Site)

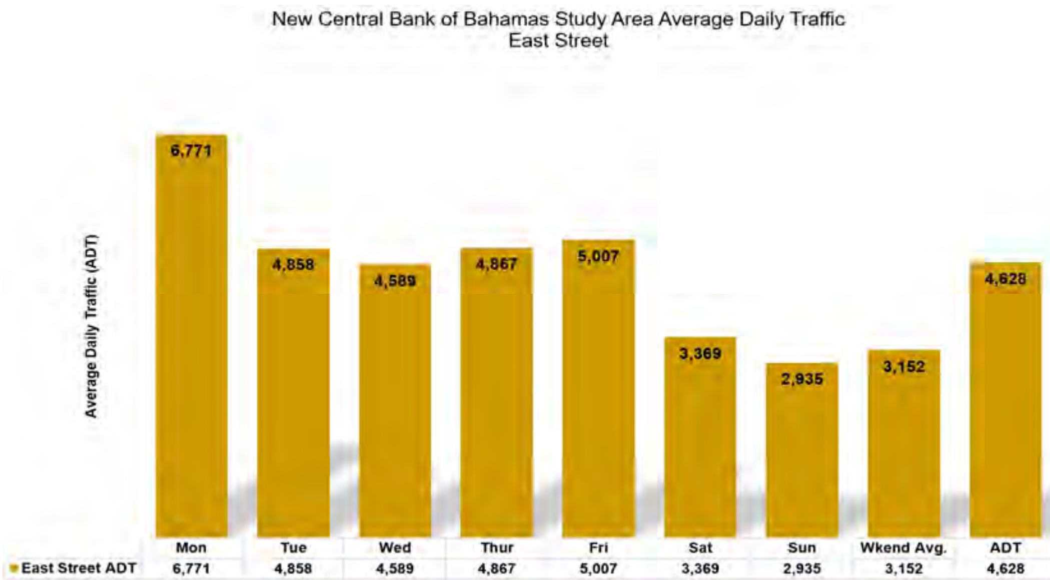


Figure 10 (Existing ADT East Street Fronting Site)

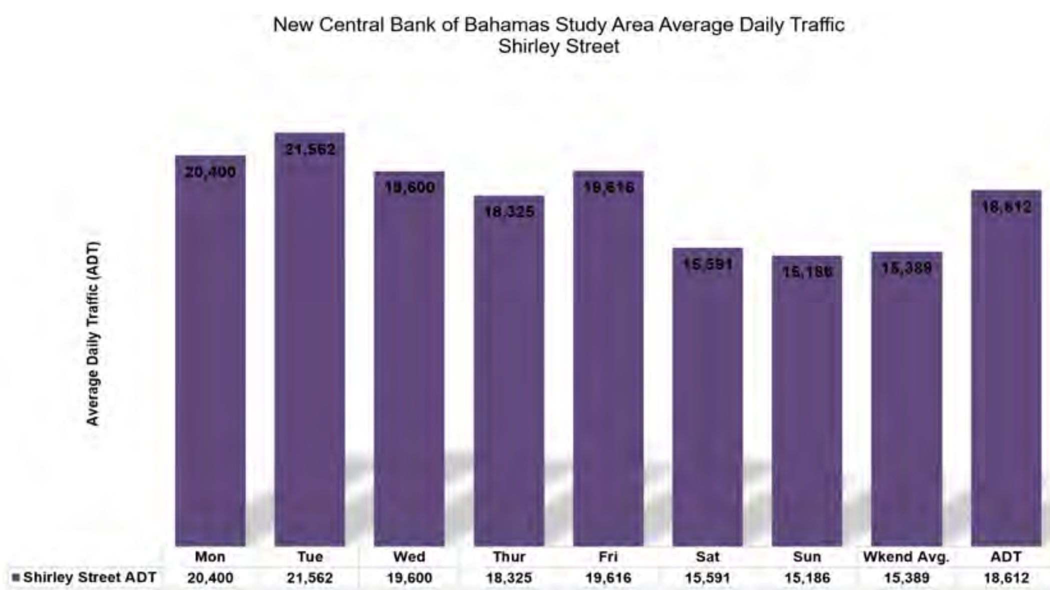


Figure 11 (Existing ADT Shirley Street Fronting Site)

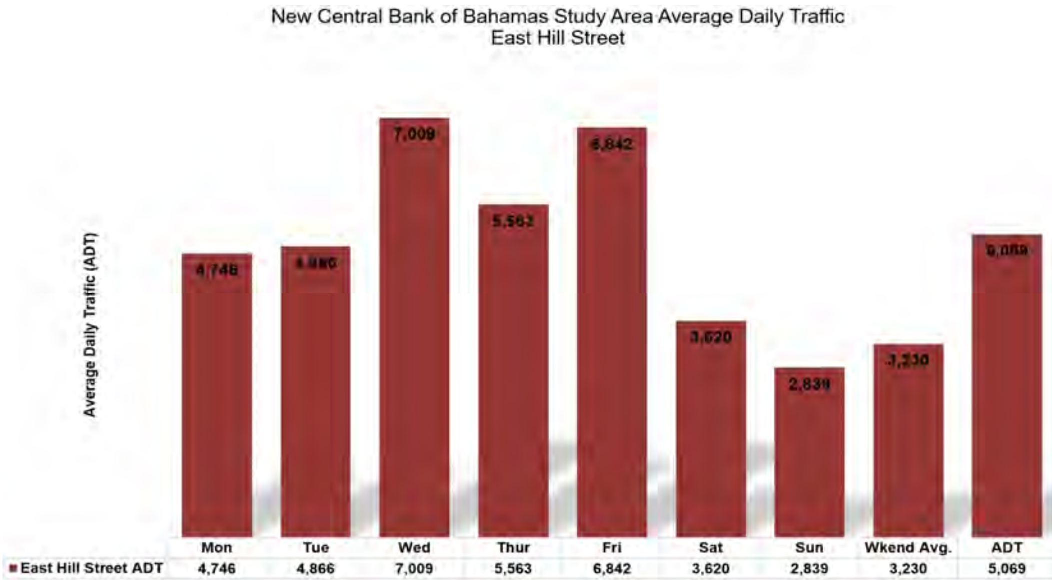


Figure 12 (Existing ADT East Hill Street Fronting Site)

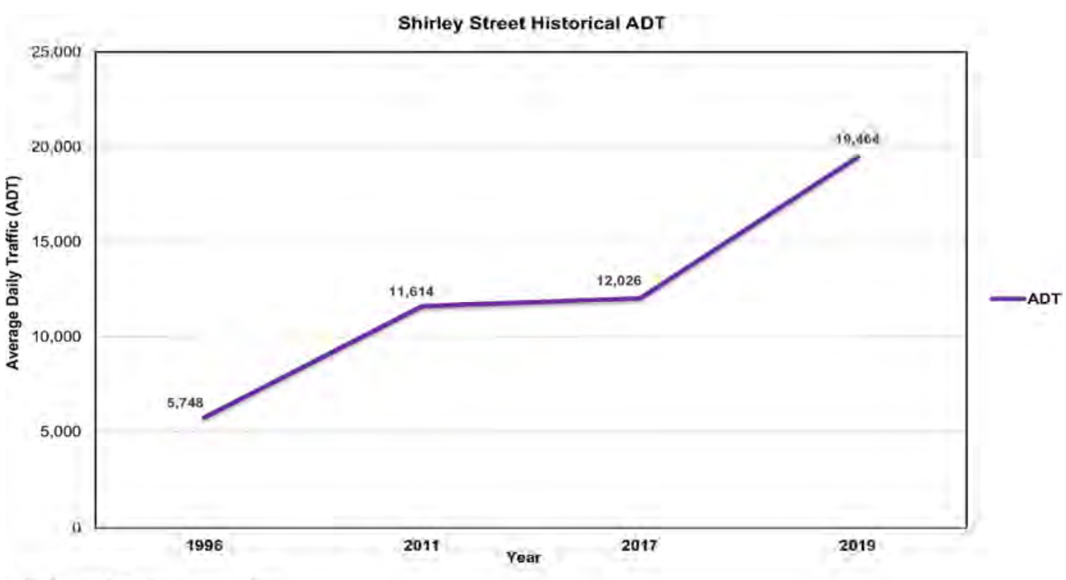


Figure 13 (Shirley Street Historical ADT)

2.11 Vehicle Classification

Vehicle classification counts were taken on the roadway segments Parliament, East Street, Shirley and East Hill Streets, which bounds the proposed site. The existing vehicle classifications are outlined in **Figure 14** below.

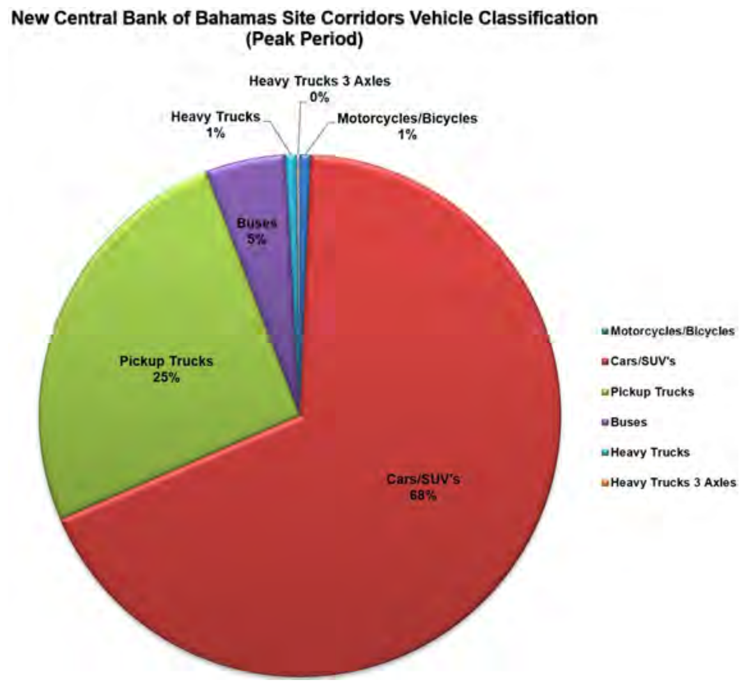


Figure 14 (Vehicle Classification Adjacent to CBOB Site)

2.12 Traffic Volumes - Turning Movement Counts (TMC)

In **Figure 15** are the baseline peak hour TMC counts which were collected at the following intersections during the following peak hours: 6:00AM – 9:00AM, 11:00AM – 1:00PM and 3:00PM – 6:00PM:

1	East & Sands	7	Duke & Market
2	East & East Hill	8	Duke & Blue Hill & Cumberland
3	Shirley & East	9	Bay & Parliament
4	Shirley & Parliament	10	Bay & Elizabeth
5	Parliament & East Hill	11	Shirley & Elizabeth
6	Shirley & Frederick		

2.13 Existing Condition Intersection Capacity Analysis

The capacity analysis was performed using PTV Vistro 7.0 software and PTV Vissim 11 for modelling purposes. Level of Service (LOS) is a quality measure describing conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience.

The HCM Version 6.0 LOS criteria for a signalized and unsignalized intersection designations are A - F[2] (A being best and F worst) as outlined in **Table 3** and **Table 4** respectively. The LOS determined for the study is the HCM. The baseline study area intersections analyzed are shown in **Figure 16** along with the LOS for that location. The TIA analysis LOS criteria are indicated in **Table 3** below.

Table 3 (Signalized Intersection LOS Criteria (HCM))

Signalized Intersection Level of Service Criteria (HCM)		
Control Delay (sec/veh)	LOS by Volume-to-Capacity Ratio[1]	
	v/c ≤ 1.0	v/c >1.0
≤ 10	A	F
>10-20	B	F
>20-35	C	F
>35-55	D	F
>55-80	E	F
>80	F	F

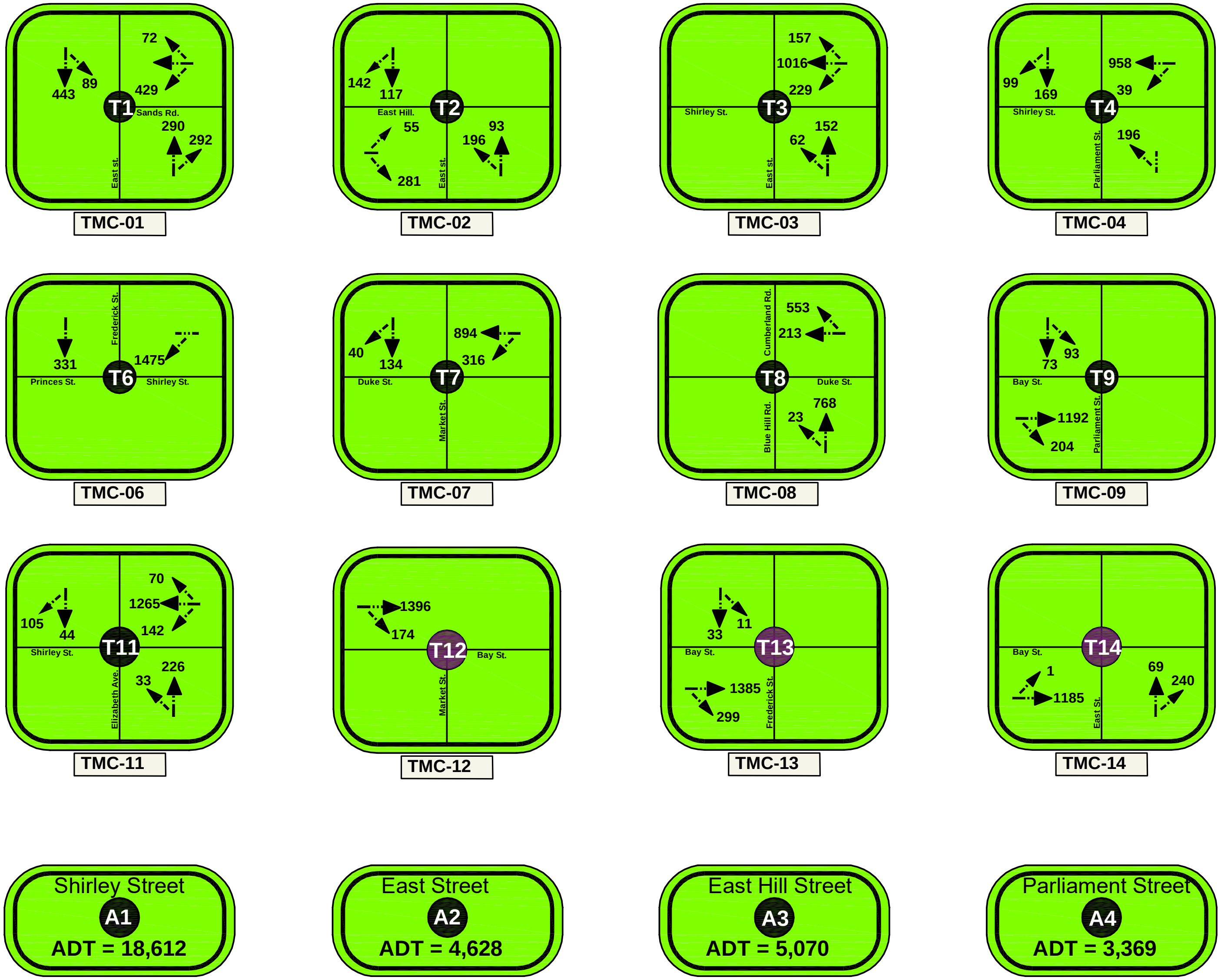
Note:[1] For approach-based and intersection wide assessments, LOS is defined solely by control delay

Table 4 (Unsignalized Intersection LOS Criteria (HCM))

Unsignalized Intersection Level of Service Criteria (HCM)		
Control Delay (sec/veh)	LOS by Volume-to-Capacity Ratio[3]	
	v/c ≤ 1.0	v/c >1.0
0-10	A	F
>10-15	B	F
>15-25	C	F
>25-35	D	F
>35-50	E	F
>50	F	F

Note: The LOS criteria apply to each lane on a given approach for minor street. LOS is not calculated for major-street approaches or for the intersection as a whole.

2 Highway Capacity Manual HCM Version 6.0 Volume 3 Exhibit 19-8 Page 19-16.
3 Highway Capacity Manual HCM Version 6.0 Volume 3 Exhibit 20-2 Page 20-6.



LEGEND:

- T — Turning Movement Count Location
- T — (TMC) Counts Extrapolated
- A — Average Daily Traffic Count Location

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FIGURE 15: Baseline Peak Hour Traffic In Study Area

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FIGURE 16: Study Area LOS

2.13.1 Existing Weekday[4] Study Area Level of Service (LOS)

The existing weekday study area intersections measures of effectiveness (MOE) LOS, v/c and delay break down by approach are outlined below in **Table 5** and Page 1 of Weekday Baseline Conditions Report in Appendix A.

Table 5 (Existing Weekday Study Area Intersection Analysis Summary)

Existing Weekday Study Area HCM LOS (Weekday Baseline Report Appendix A)						
No.	**Location**	**Control**	**Worst Leg**	**V/C**	**Delay (s/veh)**	**LOS**
1	East Street & Sands Road	Unsignalized	WB Right	0.833	373.7	F
2	East Street & East Hill	Unsignalized	EB Right	1.194	193.1	F
3	East Street & Shirley	Signalized	NB Thru	0.698	32.1	C
4	Shirley Street & Parliament	Signalized	NB Left	0.683	189.2	F
5	Parliament Street & East Hill	Signalized	SB Right	1.038	182.8	F
6	Shirley Street & Frederick	Signalized	SB Thru	0.751	23.8	C
7	Market Street & Duke	Signalized	SB Thru	0.541	13.2	B
8	Blue Hill Road & Duke/Cumberland	Signalized	WB Right	0.796	84.2	F
9	Bay Street & Parliament	Unsignalized	SB Thru	1.836	838.4	F
10	Bay Street & Elizabeth	Unsignalized	NB Right	10.893	4,836.8	F
11	Shirley Street & Elizabeth	Signalized	SB Right	28.513	181.8	F
12	Bay & Market	Unsignalized	EB Thru	0.016	0.00	A
13	Bay & Frederick	Signalized (Not Operational)	SB Thru	1.934	785.6	F
14	Bay & East	Signalized	EB Left	0.695	107.3	F

4 Typical week workday hours.

2.13.2 Existing Evening[5] Study Area Level of Service (LOS)

The existing evening study area intersections MOE's break down by approach are outlined below in **Table 6** and Page 1 of Evening Baseline Conditions Report in Appendix A. The evening counts were generated from the ADT counts and the weekday counts by deriving a traffic reduction factor for the study area of 0.46 over the time period 8:00pm – 9:00pm which is the anticipated time period for the scheduling of the CBOB cultural events. Given the weekday typical work day peak period is the worst case scenario, the weekday analysis will undertaken.

Table 6 (Existing Evening Study Area Intersection Analysis Summary)

Existing Evening Study Area HCM LOS (Evening Baseline Report Appendix B)						
No.	**Location**	**Control**	**Worst Leg**	**V/C**	**Delay (s/veh)**	**LOS**
1	East Street & Sands Road	Unsignalized	WB Right	0.368	46.4	E
2	East Street & East Hill	Unsignalized	EB Right	0.268	13.6	B
3	East Street & Shirley	Signalized	NB Thru	0.319	29.7	C
4	Shirley Street & Parliament	Signalized	NB Left	0.314	58.3	E
5	Parliament Street & East Hill	Signalized	SB Right	0.181	14.3	B
6	Shirley Street & Frederick	Signalized	SB Thur	0.345	31.7	C
7	Market Street & Duke	Signalized	SB Thru	0.248	27.4	C
8	Blue Hill Road & Duke/Cumberland	Signalized	WB Right	0.366	22.5	C
9	Bay Street & Parliament	Unsignalized	SB Thru	0.178	22.4	C
10	Bay Street & Elizabeth	Unsignalized	NB Right	0.649	46.4	E
11	Shirley Street & Elizabeth	Signalized	SB Right	1.154	75.2	E
12	Bay & Market	Unsignalized	EB Thru	0.007	0.00	A
13	Bay & Frederick	Signalized (Not Operational)	SB Thru	0.127	26.0	D
14	Bay & East	Signalized	EB Thru	0.320	17.2	B

5 Evening hours between 8:00pm – 9:00pm.

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FIGURE 18: Trips Generated Distribution Split

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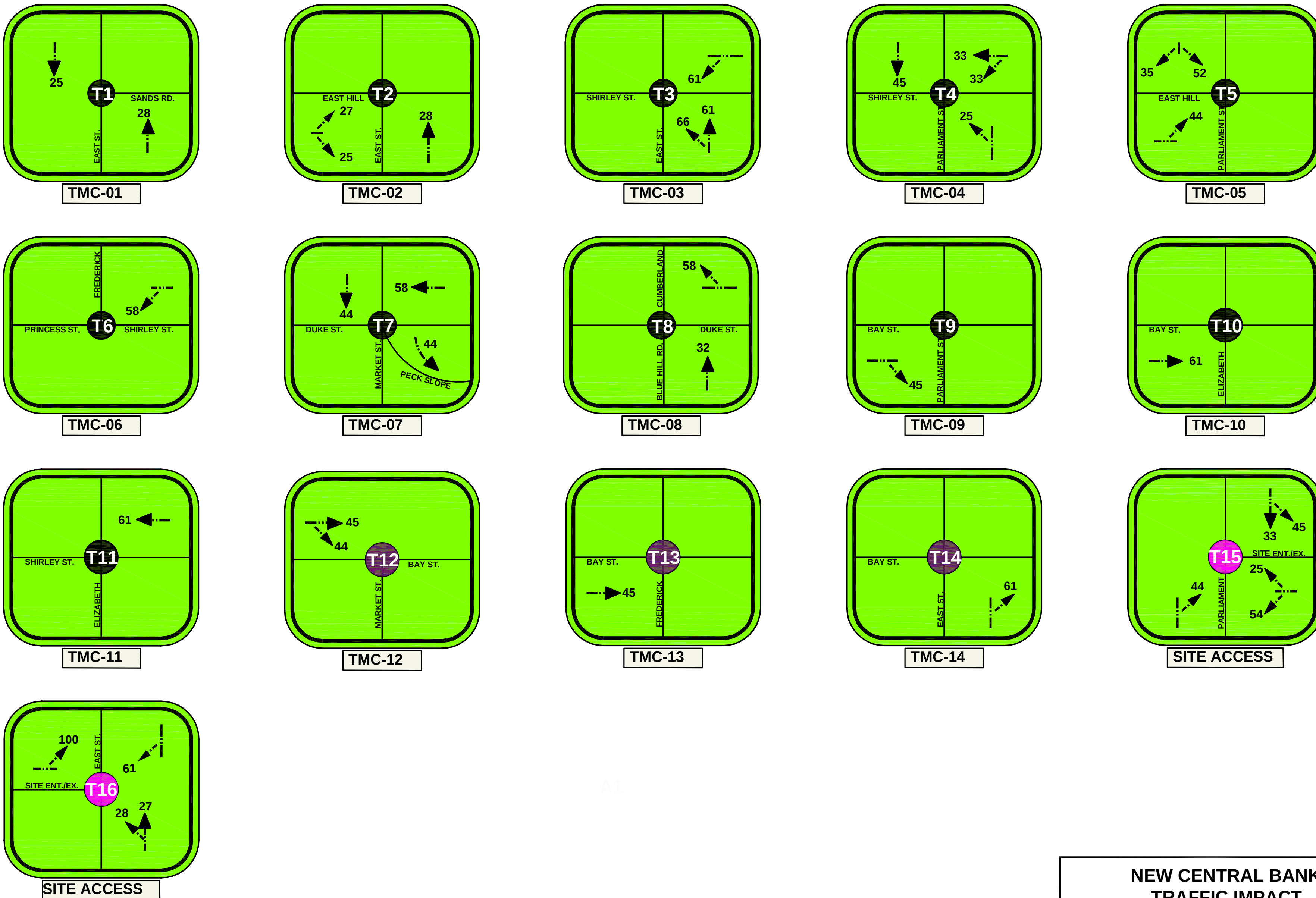

LEGEND:

T Turning Movement Count Location

T (TMC) Counts Extrapolated

T (TMC) Trips Generated by Site

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FIGURE 19: Site Trips Generated

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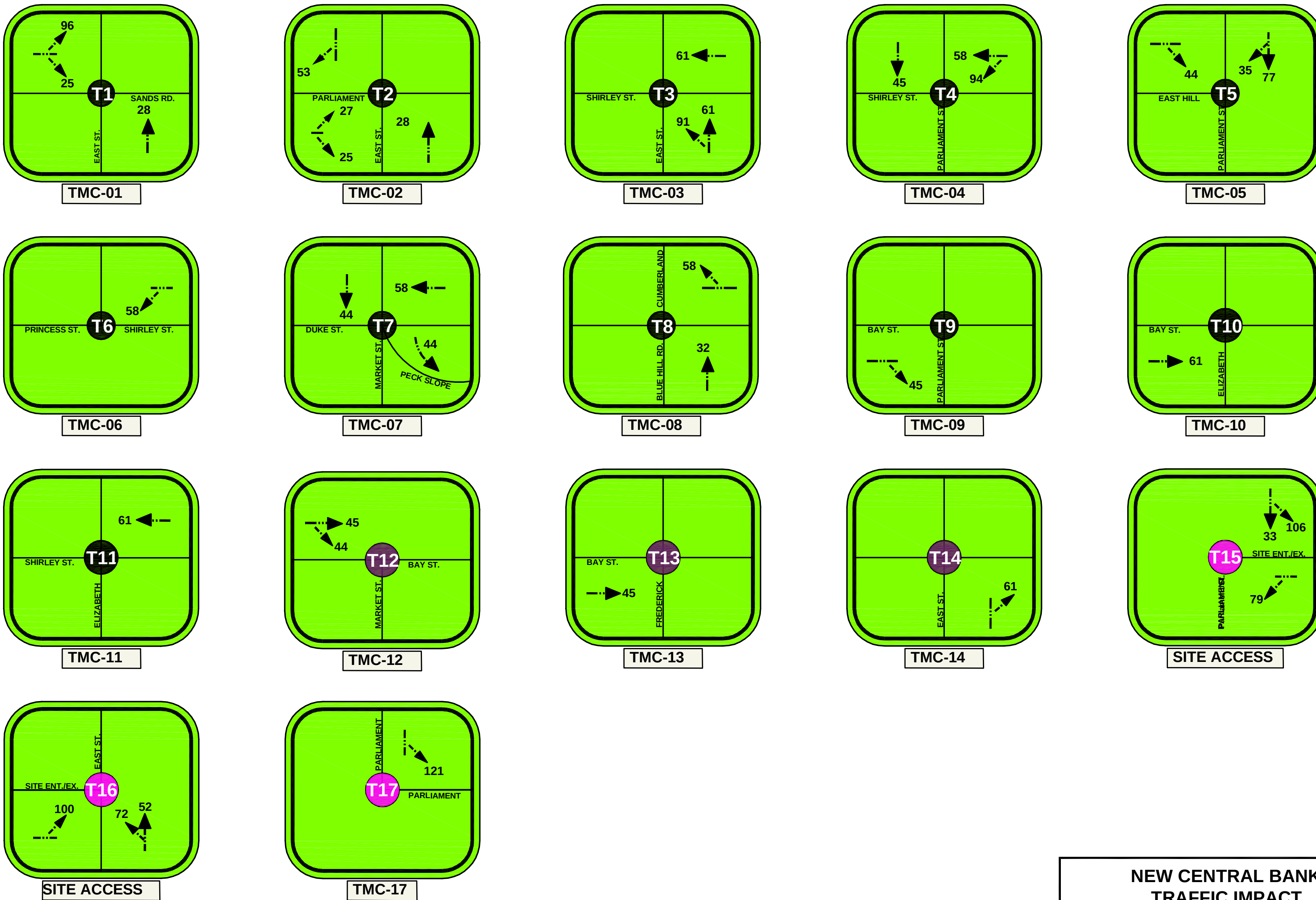

LEGEND:

- T Turning Movement Count Location
- T (TMC) Counts Extrapolated
- T (TMC) Trips Generated by Site

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FIGURE 20: Trips Reassigned By Realigned East Hill

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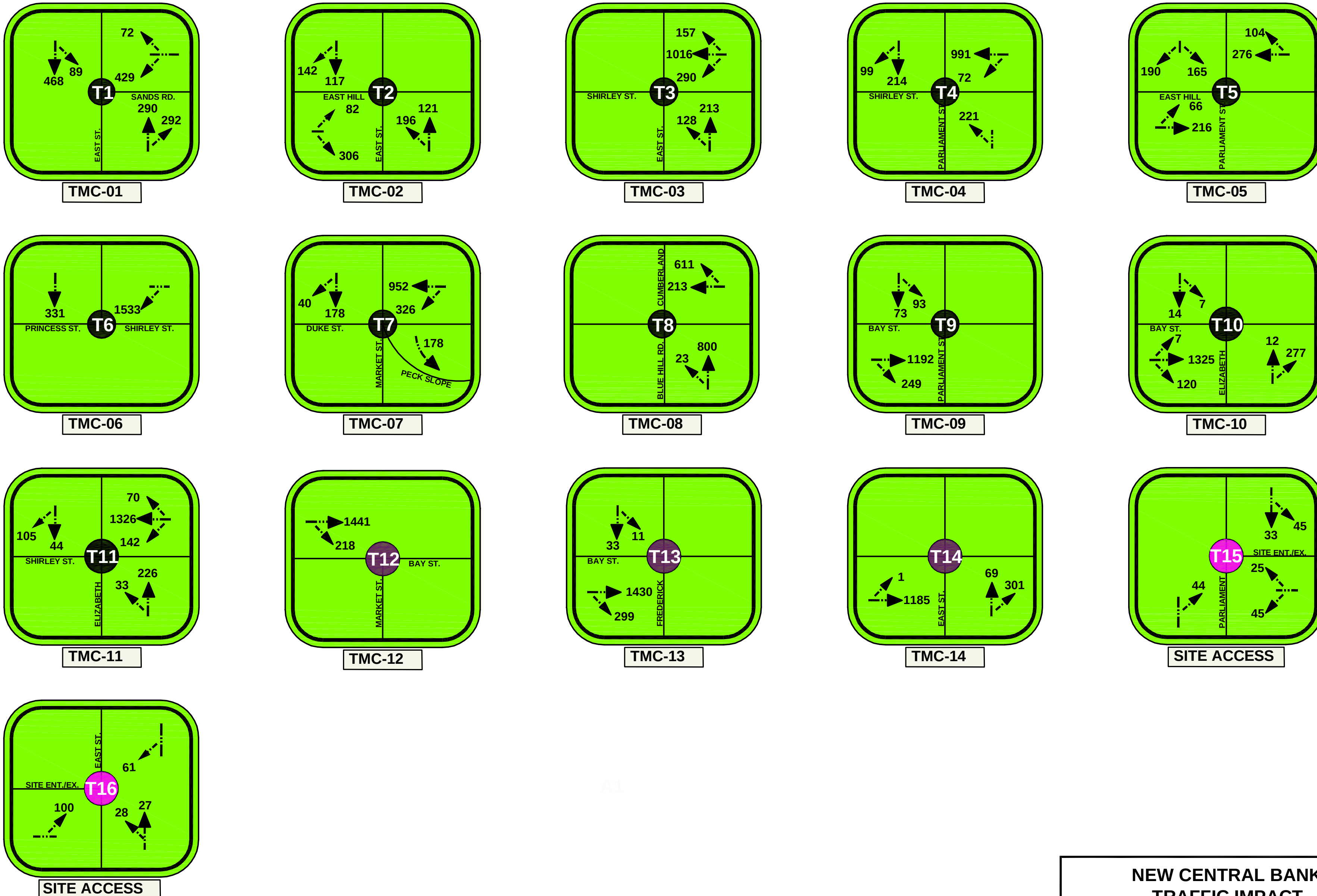

LEGEND:

T Turning Movement Count Location

T (TMC) Counts Extrapolated

T (TMC) Trips Generated by Site

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FIGURE 21: Trips Generated + Base Peak Traffic

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Section 3

3.0 Proposed Conditions

The new CBOB project is proposed to break ground in 2019 with a completion timeframe of June 2022 at the location as indicated in **Figure 1** Page 5 with a development area of 2.11 acres and a total site area of 3.056 acres. The proposed conditions are outlined in this section as follows:

3.1 Development Land Use

No material rezoning of land use is anticipated in the study area.

3.2 Future Development

There are a number of anticipated future developments in the study area that will have a proximate and direct impact on the new CBOB site in the immediate future and otherwise. The proposed Nassau Cruise Port development and the City of Nassau CBD area revitalization will impact the study area in particular from a pedestrian volume perspective. Likewise, the US Embassy with build-out programmed for 2022 as well as the development of the vacated Post Office Building on the south side of East Hill Street adjacent to the new CBOB (potential site for the relocation of House of Parliament and Courts) will likewise have a direct impact on the new CBOB access. Furthermore, the Public Hospital Authority has discussed expansion of the Princes Margaret Hospital on that property which will have certainly a secondary impact on the CBOB site.

3.3 Site Accessibility

The proposed primary ingress and egress to the site will be via Parliament and East Streets respectively as indicated in **Figure 1** Page 5.

3.4 Sidewalks

There is a continuous sidewalk infrastructure throughout the study area predominately along both sides of most of the roadways. However, it is anticipated that all trips generated by the CBOB for commercial purposes will be via automobiles. Trips generated for cultural purposes during the work day will be predominately pedestrian foot traffic utilizing the sidewalk infrastructure. Should the Cafeteria/Food Court be available to the general public, it is also anticipated that the trips generated by the food court will be predominately pedestrian foot traffic.

3.5 Omni (Jitney) Bus Transit System

The jitney buses that service the study area are indicated below. There is a proposed park and ride jitney busing system being considered by the Downtown Nassau Partnership (DNP) for trips generated by the downtown CBD. A parking site is proposed to be located in the east, west and south areas of the island to provide easily accessible pickup locations by a shuttle running at a specific headway. Furthermore, the Government of the Bahamas has also discussed the possibility of unifying the current busing system or establishing a state operated public busing system. Nevertheless, for the purpose of this study, it is envisaged that the servicing of the trips generated by the new CBOB site via jitney buses will be negligible. Therefore, this study focused solely on the vehicular trips generated. Notwithstanding, the jitney bus routes in the study areas are as outlined below. However, given the proximity of the existing layby in the southwest quadrant of East & East Hill Streets to the proposed Central Bank and US Embassy, for safety purposes it is highly recommended that layby be relocated to an area agreed with the Omni Bus (Jitney) Association.

1. East Street Corridor- Bus 1, 1a, 7, 7a, 21, 21a
2. Shirley Street – Bus 5a, 8, 9, 9a, 11, 16a, 16b
3. Bay Street/Market – Bus 1, 1a, 7, 7a, 8, 8a, 9, 9a, 10, 10a, 11, 14a, 15a, 16a, 19, 21, 21a

3.6 Proposed Parking

The parking stalls evaluation for the proposed new CBOB site parking demand is outlined as follows:

Parking Demand Required

- Total Minimum Stalls Required DPP – 200[6]
- Minimum Handicapped Stalls Required (1 for every 25 spaces) – 13[7]

Table 7 (Parking Demand Evaluation)

Site	Total Square Footage	Proposed Parking	Parking Required	Minimum Criteria Met?	Handicap Stalls Required
New Central Bank of the Bahamas	≈ 60,000	320	200	YES	13

The calculated minimum parking demand indicated is based on the DPP minimum standard as referenced by footnote No. 6 below. The proposed parking stalls allotted to the new CBOB is adequate per the occupiable building square footage. The minimum designated handicapped stalls are to be signed and marked as indicated above in

6 Department of Physical Planning Minimum Standard (1 Stall per 300/SF Building).
7 The Parking Handbook for Small Communities.

accordance with the Persons with Disabilities (Equal Opportunity) Act, 2014[8]. It is also recommended that the CBOB consider providing a bicycle parking area along with showers for staff that may desire to cycle to work as an alternative mode of transportation.

3.7 Safety

A safety analysis of the study area is outlined in this section.

3.7.1 Number of Access Points Serving The Site

The total number of access points servicing the proposed CBOB site consists of the primary access on Parliament Street which is an ingress/egress and additional access (ingress/egress) on East Street. As a result of heavy service vehicles needing to access the site from East Street, it is highly recommended that East Street between East Hill and Shirley Street be one-way northbound and that Parliament Street between the same limits be one-way southbound creating a one-way pair to better service the access of the new CBOB and other future developments for that area. The adequacy of the one-way pairs along with both access will be evaluated and the findings outlined in Section 6.0 **"Impact Assessment and Mitigation Measures"**.

3.7.2 Proposed Access Point(s) Adequately Setback From Intersections

The proposed CBOB ingress/egress via Parliament is setback approximately 200 feet upstream from Shirley Street and 200 feet downstream from East Hill Street, which is adequately setback from both intersections. The proposed access via East Street is setback approximately 190 feet (adequate for a 3 car queue storage length) [9] downstream from Shirley Street and 230 feet upstream from East Hill Street, both distances being setback adequately from the intersections.

3.7.3 Should Right-Turns Be Restricted Into The Site

It would be both practicable and prudent to restrict right-turning movements into the site based on the proximity to major intersections. Therefore, as mentioned in Section 3.7.1 a one-way pair is recommended for East and Parliament Streets with East Street flowing northbound and Parliament southbound. This one-way pair will be evaluated and recommendations outlined in Section 6.0 ***"Impact Assessment and Mitigation Measures"***.

3.7.4 Sensitivity to Pedestrian Needs

There is adequate sidewalk coverage in the study area. However, so that pedestrians could safely traverse Shirley Street at Parliament and East Streets, it

8 Subsections 20 and 21.
9 Mason, Elizer, Hooper, Urban Street Geometric Design Handbook (ITE 2008) Table 3-3, 145.

will be important that the study area traffic signals in close proximity to the site be upgraded and outfitted with pedestrian heads to accommodate pedestrian movements accessing the new CBOB site. Additionally, it is highly recommended that pedestrian fences (barriers) be utilized to better manager indiscriminate traversing of Shirley and Bay Streets (jay walking) channeling pedestrians to a signalized intersection where the demand could be serviced safely.

3.7.5 Parking Adequacy to Accommodate Oversized Vehicles

The area designated for on-site parking at the new CBOB site appears adequate and should be designed to accommodate a few oversized vehicles on property. Consistent with the existing parking prohibition it will be important to consider the prohibition of on-street parking on the west side of Parliament Street between Shirley and East Hill Streets for safety reasons.

3.7.6 Study Area Conflict Analysis

The predominate conflict issue in the study area is the Bay & Parliament Streets and Bay Street & Elizabeth Avenue intersections. With a do nothing alternative the intersection of Bay & Parliament will be exposed to a minimum of 6 vehicular conflict points as indicated in the **Figure 17** sketch below. To mitigate this situation a traffic signal warrant analysis (Section 4.2 Page 29) at this location will be evaluated along with Bay & Elizabeth, the latter having very restricted sight distance.

Figure 17 (Bay & Parliament Conflict Zone)

3.7.7 Study Area Intersection Sight Distances (ISD)

The intersection sight distance in study area is referenced to the desired requirements 1.47Vt (V= vehicle speed and t = time for a minor road vehicle to enter a major roadway)[10] and is controlled by approach and departure sight distances. However, inasmuch as the intersections in the study area are stop controlled or signalized the departure sight distance will govern. The ideal ISD is 330 feet, however, because the study area is an urban build out CBD, there are obstructions within the sight distance triangle in particular at Bay Street & Elizabeth Avenue; East Hill & East Streets and Parliament & East Hill Streets which are stop controlled. The stop bars must be located close to the intersecting roadways at those locations (or repainted as necessary), the vehicle at the stop will then have sufficient sight distance to maneuver safely through the intersection.

3.7.8 Study Area Safe Stopping Sight Distance (SSD)

Stopping sight distance is the sum of the distance the vehicle travels from the driver's first possible sighting of the hazard to the instant the brakes are touched, plus the distance required to stop after initial brake activation[11]. The SSD required for a level roadway with speeds of 30MPH is 200 feet[12], the study area corridors all have adequate SSD.

3.7.9 Study Area Vehicle-Pedestrian Conflicts

Given the new CBOB site is in the downtown CBD revitalization zone and in proximity to the cruise port, there will be pedestrian movements throughout the area. It will be important that pedestrian crossings are painted particularly at the signalized and non-signalized intersections as follows: Shirley & Parliament, East & Shirley, Parliament & East Hill and East & East Hill) and the Shirley & Parliament and East & Shirley traffic signals be upgraded and outfitted with pedestrian heads to accommodate pedestrian demands accessing the new CBOB site. Furthermore, it is highly recommended that to better manage pedestrian flows and reduce conflicts in the CBD area, pedestrian fences (barriers) be placed along Shirley Street and Bay Street routing pedestrian traffic to a traffic signal or to a designated mid-block crossing to minimize disruptive "jay walking" and to mitigate pedestrian/vehicular conflicts.

3.7.10 Site Access Throat Storage Depth

Providing adequate site access throat depth will be very important for safe and efficient traffic operations on the adjacent roadway and for the internal circulation

10 AASHTO, A Policy on Geometrid Design of Highways and Streets (7th Edition 2018) 9-45.
11 ITE, Traffic Engineering Handbook (5th Edition 1999) 13.
12 AASHTO, A Policy on Geometrid Design of Highways and Streets (7th Edition 2018) Table 3-1, 3-4.

of the site. It is necessary that CBOB site access throat depth enable motorists to ingress without impacting the adjacent roadway. A minimum throat depth of 50 feet[13] is desired, which would allow storage of two vehicles, the design of the site access and parking arrangement should incorporate this minimum standard.

3.7.11 Use of Auxiliary Lanes

So that traffic flow and operations throughout the study area can be realized at the optimal levels of safety and efficiency, where ever practicable and possible without significant land acquisition, the use of auxiliary lanes will be highly recommended.

3.7.12 Study Area Queuing and Storage

The study area is a built-out urban CBD area that was poorly planned from conception. Therefore, the existing queuing and storage areas are essentially established. Notwithstanding, where ever it is practicable and cost effective to do so, recommendations will be made in Section 6.0 for capacity enhancements throughout the study area.

3.7.13 Study Area Horizontal and Vertical Geometry

The study area is relatively flat with the exception of a circa 5% grade at the top of Parliament & East Hill intersection extending downhill toward East Hill Street. However, given that the existing main post office building is scheduled for demolition it is highly recommended that Parliament Street be extended southward and East Hill Street be relocated to align with Sands Road creating a four-leg intersection at that location as indicated in **Figure 26** Appendix H. This geometric realignment along with the one-way pairs will provide optimal traffic flow and capacity enhancement for the study area, more particularly, given the existing short storage area between East Hill and Sands Road will prohibit adequate queuing. Realignment of the roadway will also allow for the design of roundabouts at Parliament & East Hill, East & Sands Road and at the intersection of the realigned Parliament and East Hill Streets allowing access to the parking lot area in the rear of the existing post office and the property of the police headquarters. The evaluation of this recommended geometric alignment is presented in Section 6.0.

3.7.14 Study Area Heavy Vehicle Movements

The volume of heavy truck traffic in the study area is very low given the relocation of the major shippers to the Nassau Container Port on Arawak Cay in 2011/2012. Traffic classification indicates that 1% of the vehicles traveling on the roadways in proximity to the CBOB site are heavy truck traffic.

13 Mason, Elizer, Hooper, Urban Street Geometric Design Handbook (ITE 2008) Figure 3-28, 164.

3.8 Projected Traffic Growth Rate

Based on historical traffic data a growth rate of 3% will be utilized. The resulting traffic growth factor utilized for the study area over a 5, 10 and 20 year horizon will be 1.2, 1.35 and 1.8 respectively.

3.9 Trip Generation

The trip generation outlined in this section was based on local trip generation research for the existing Central Bank, Antonius Roberts Art Gallery, the National Art Gallery Bahamas and the Dundas Centre for the Performing Arts. The site will generate trips during a typical work day for the new Central Bank commercial activities and for the cultural components (Performing Arts Theatre and Museum and Art Gallery) in the evening hours, the trips generated evaluation encompassed both conditions and the worst case scenario utilized (weekday). The trip generation analysis for both conditions are outlined in this section and in Appendix C.

3.9.1 Percentage Distribution Assignment

The estimated trips generated percentage distributional splits are shown in **Figure 18**.

3.9.2 Trips Generated by Site

The estimated trips generated by the new CBOB Site for a weekday period and assignments are shown in **Figure 19** for the study area without realignment of Parliament and East Hill Streets respectively. Whereas **Figure 20** show the trips reassigned by realignment of the roadways Parliament and East Hill. The estimated trips were calculated as indicated in Exhibit 3 from actual local research data of similar generators is outlined in Appendix C. There were no pass-by trips estimated given the nature of the CBOB services. The cafeteria/food court trips generated is anticipated to be via foot traffic. The total trips generated over both analysis periods are highlighted in Exhibit 3 calculations.

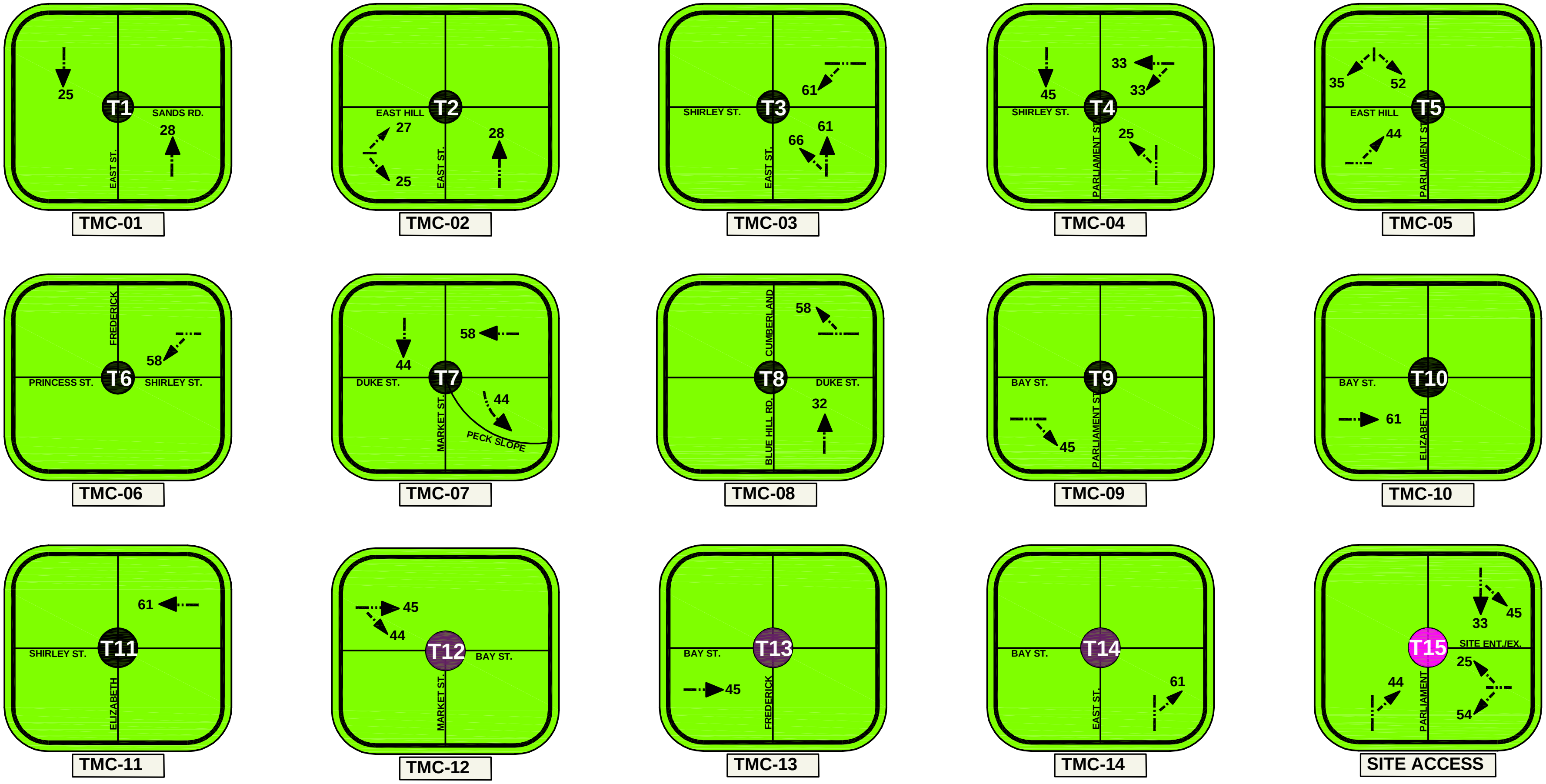
3.9.3 Trips Generated + Baseline Peak Traffic

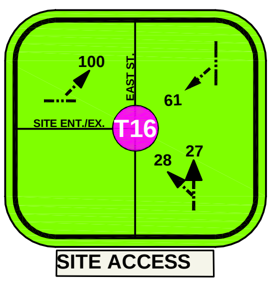
The estimated weekday trips generated by the CBOB site plus the existing baseline peak traffic are indicated in **Figure 21**.

3.10 Proposed Site Condition Capacity Analysis

Capacity analysis is a means of determining the ability of a roadway to accommodate the traffic accessing that roadway. Level of Service (LOS) is a measure of the quality of service on transportation infrastructure generally linked to travel time and delays and denoted by a grade from A to F (A being best and F worst) see **Table 3** and **4** Page 16.

FIGURE 18: Trips Generated Distribution Split





LEGEND:

- T Turning Movement Count Location
- T (TMC) Counts Extrapolated
- T (TMC) Trips Generated by Site

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FIGURE 19: Site Trips Generated

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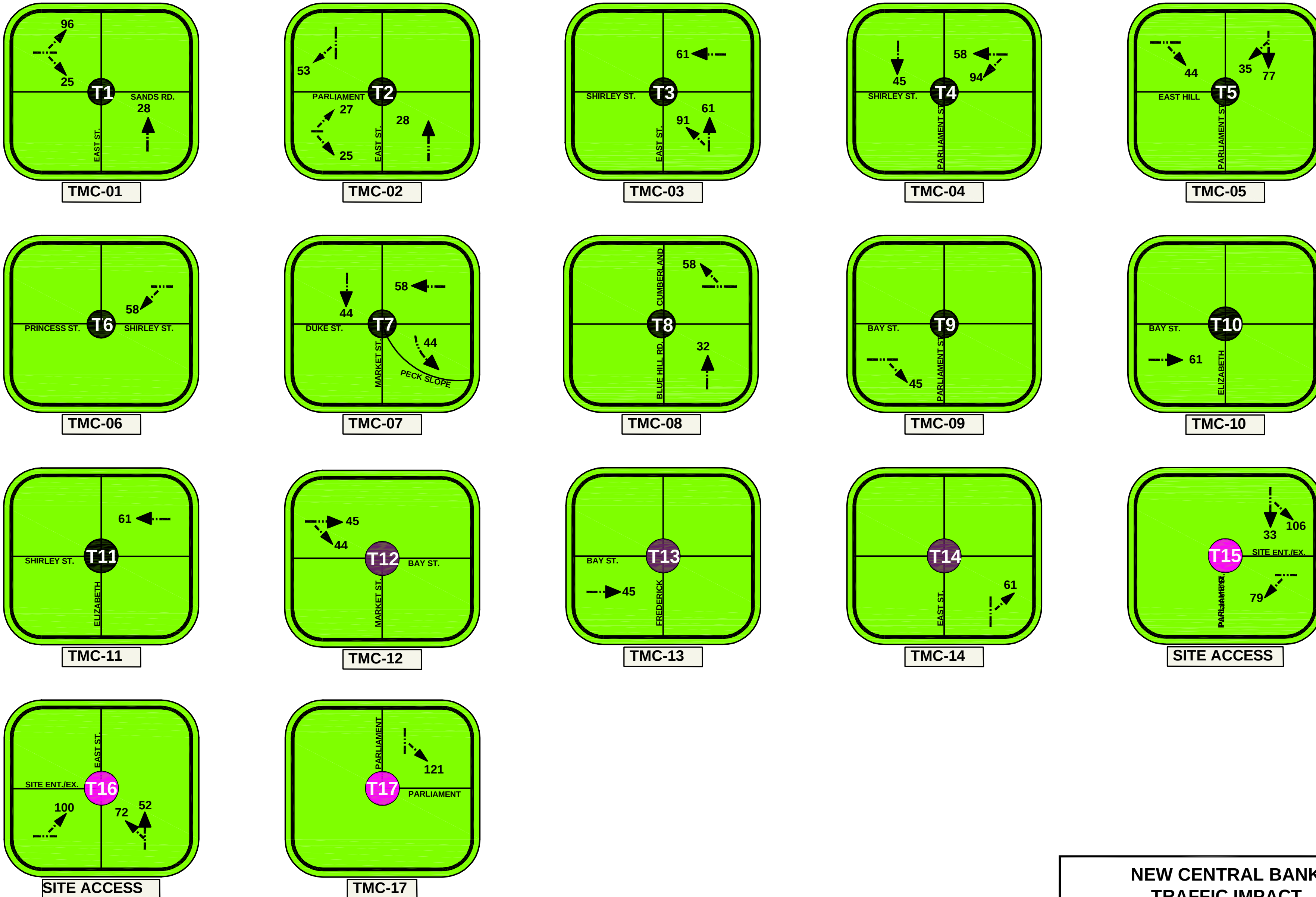

LEGEND:

T Turning Movement Count Location

T (TMC) Counts Extrapolated

T (TMC) Trips Generated by Site

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FIGURE 20: Trips Reassigned By Realigned East Hill

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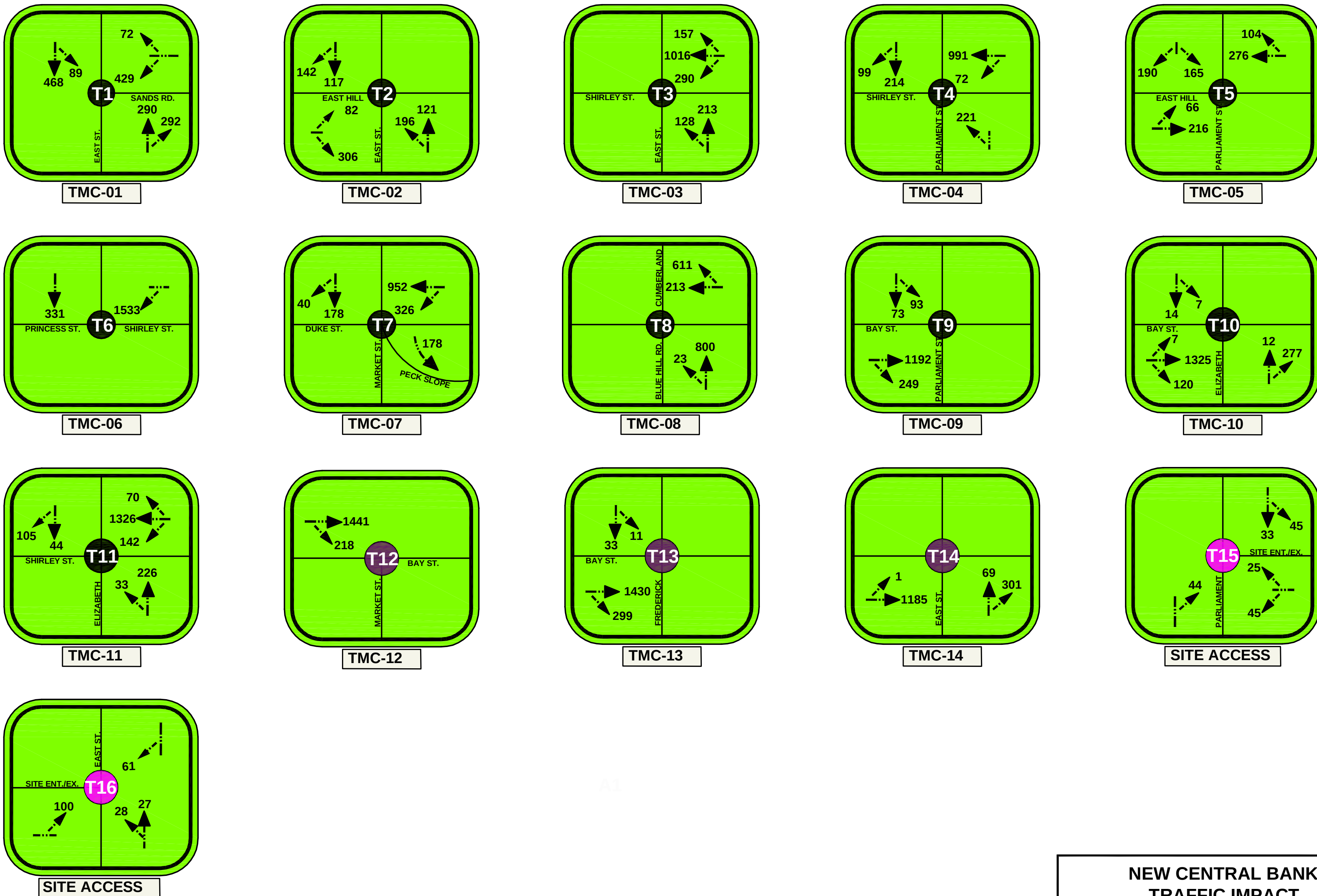

LEGEND:

- T Turning Movement Count Location
- T (TMC) Counts Extrapolated
- T (TMC) Trips Generated by Site

NEW CENTRAL BANK TRAFFIC IMPACT ASSESSMENT

FIGURE 21: Trips Generated + Base Peak Traffic

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3.10.1 Proposed Study Area Weekday Baseline Peak + Trips Generated Level of Service (LOS)

The study area weekday trips plus baseline peak generated MOE's break down by approach and intersection including the site access conditions are outlined below in **Table 8** and Exhibit 4 in Appendix D. Table 8 does not include any the geometric or capacity enhancements to the study area, the intent is to show how the trips generated by the site impacts the study area over and above the baseline condition.

Table 8 (Study Area Weekday Proposed Trips + Baseline Peak Generated MOE's)

Study Area Weekday Baseline + Proposed Trips Generated HCM LOS (Exhibit 4 Appendix D)						
No.	**Location**	**Control**	**Worst Leg**	**V/C**	**Delay (s/veh)**	**LOS**
1	East Street & Sands Road	Unsignalized	WB Right	0.715	315.3	F
2	East Street & East Hill	Unsignalized	EB Right	1.596	389.0	F
3	East Street & Shirley	Signalized	NB Thru	0.770	115.2	F
4	Shirley Street & Parliament	Signalized	NB Left	0.776	253.8	F
5	Parliament Street & East Hill	Signalized	SB Right	1.732	504.4	F
6	Shirley Street & Frederick	Signalized	SB Thur	0.776	24.2	C
7	Market Street & Duke	Signalized	SB Thru	0.504	11.1	B
8	Blue Hill Road & Duke/Cumberland	Signalized	WB Right	0.734	63.5	E
9	Bay Street & Parliament	Unsignalized	SB Thru	1.946	892.4	F
10	Bay Street & Elizabeth	Unsignalized	NB Right	9.241	4,044.6	F
11	Shirley Street & Elizabeth	Signalized	SB Right	28.491	179.9	F
12	Bay & Market	Unsignalized	EB Thru	0.016	0.00	A
13	Bay & Frederick	Signalized (Not Operational)	SB Thru	2.099	883.2	F
14	Bay & East	Signalized	EB Left	0.695	107.3	F
15	CBOB Parliament Street Access	Unsignalized	EB Left	0.067	15.7	C
16	CBOB East Street Access	Unsignalized	SB Right	0.171	10.9	B

Section 4

4.0 5 and 20 Year Horizon Analysis

4.1 Study Area 5 Year Horizon MOE's

5 Year Horizon Traffic

The 5 year horizon traffic is shown in **Figure 22**. The MOE's for the do nothing geometric alignment of Parliament and East Hill Streets including the one-way pairs along with the respective intersection improvements at the 5 year horizon are indicated in **Table 9** below.

The MOE's for the recommended geometric realignment and one-way pairs along with the respective intersection improvements at the 5 year horizon are indicated in **Table 10** Page 28.

<u>Do Nothing Geometric Alignment</u>

Table 9 (Study Area 5 Year Horizon MOE's For Do Nothing Geometric Alignment)

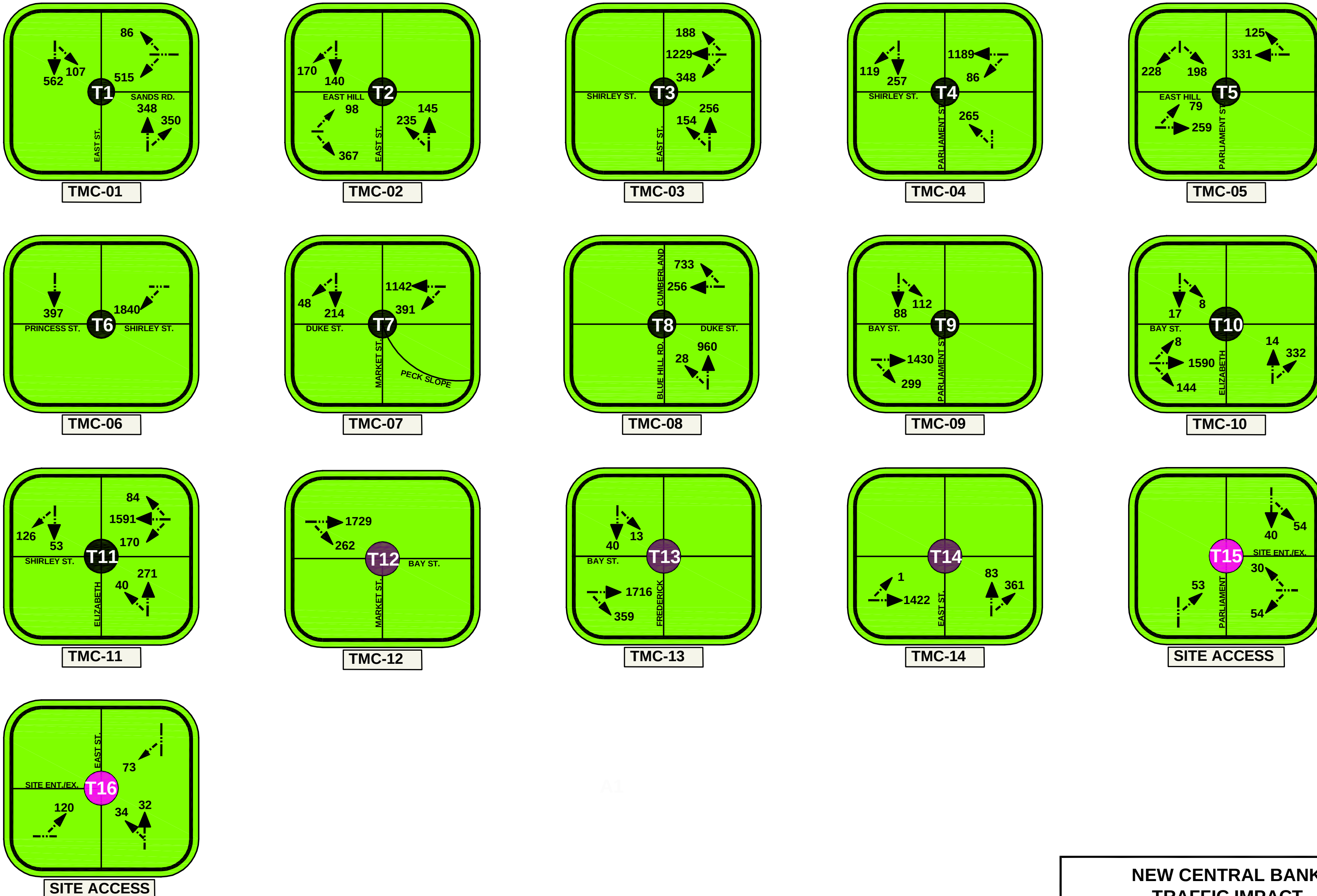
Study Area 5 Year Horizon HCM LOS (Exhibit 6 Appendix E)						
No.	**Location**	**Control**	**Worst Leg**	**V/C**	**Delay (s/veh)**	**LOS**
1	East Street & Sands Road	Unsignalized	WB Left	1.410	335.8	F
2	East Street & East Hill	Roundabout	SEB Right	--	8.6	A
3	East Street & Shirley	Signalized	NB Thru	0.655	148.5	F
4	Shirley Street & Parliament	Signalized	SB Thru	0.684	82.4	F
5	Parliament Street & East Hill	Signalized	SB Right	1.321	218.0	F
6	Shirley Street & Frederick	Signalized	SB Thru	0.925	46.7	D
7	Market Street & Duke	Signalized	SB Right	0.612	15.2	B
8	Blue Hill Road & Duke/Cumberland	Signalized	NB Left	0.894	94.8	F
9	Bay Street & Parliament	Signalized	SB Left	0.870	30.5	C
10	Bay Street & Elizabeth	Unsignalized	NB Right	0.834	114.0	F

11	Shirley Street & Elizabeth	Signalized	SB Right	10,237.011	291.4	F
12	Bay & Market	Unsignalized	EB Thru	0.018	0.00	A
13	Bay & Frederick	Signalized	EB Right	1.081	184.5	F
14	Bay & East	Signalized	NB Right	0.786	40.0	D
15	CBOB Parliament Access	Unsignalized	WB Left	0.126	11.5	B
16	CBOB East Street Access	Unsignalized	EB Left	0.142	11.0	B

Geometric Realignment

Table 10 (Study Area 5 Year Horizon MOE's for the Geometric Realignment)

Study Area 5 Year Horizon HCM LOS (Exhibit 7 Appendix E)						
No.	**Location**	**Control**	**Worst Leg**	**V/C**	**Delay (s/veh)**	**LOS**
1	East Street & Sands Road	Roundabout	WB Left	--	12.0	B
2	East Street & East Hill (Realigned)	--	--	--	--	--
3	East Street & Shirley	Signalized	NB Thru	0.655	148.5	F
4	Shirley Street & Parliament	Signalized	SB Thru	0.684	82.4	F
5	Parliament Street & East Hill (Realigned)	Roundabout	SB Right	--	5.3	A
6	Shirley Street & Frederick	Signalized	SB Thru	0.925	46.7	D
7	Market Street & Duke	Signalized	SB Right	0.612	15.2	B
8	Blue Hill Road & Duke/Cumberland	Signalized	NB Left	0.894	94.8	F
9	Bay Street & Parliament	Signalized	SB Left	0.870	30.5	C
10	Bay Street & Elizabeth	Unsignalized	NB Right	0.834	114.0	F
11	Shirley Street & Elizabeth	Signalized	NB Thru	1.132	136.0	F
12	Bay & Market	Unsignalized	EB Thru	0.018	0.00	A
13	Bay & Frederick	Signalized	EB Right	1.081	184.5	F
14	Bay & East	Signalized	NB Right	0.786	40.0	D
15	CBOB Parliament Access	Unsignalized	WB Left	0.132	11.9	B
16	CBOB East Street Access	Unsignalized	EB Left	0.142	11.0	B



LEGEND:

- T Turning Movement Count Location
- T (TMC) Counts Extrapolated
- T (TMC) Trips Generated by Site

NEW CENTRAL BANK TRAFFIC IMPACT ASSESSMENT

FIGURE 22: 5 Year Horizon Traffic

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4.2 Proposed Site Condition Traffic Signal Warrant Analysis

A warrant analysis for the study area was undertaken as outlined below in **Table 11** and indicated in Appendix E.

Table 11 (Study Area Warrant Analysis)

Location	Warrant Criteria Met?	Signal Installation Recommended
East & Sands	Yes	No (Roundabout)
East Street & East Hill (Realigned) (East Hill Recommended to be Realigned to Intersect with Sands)	Yes	No (Roundabout)
Bay & Elizabeth	Yes	Yes
Bay & Parliament	Yes	Yes
Parliament & East Hill (East Hill Recommended to be Vacated Between Parliament & East Street)	Yes	No (Roundabout)

4.3 Study Area 20 Year Horizon MOE's

The 20 year horizon traffic MOE's which includes the highly recommended geometric realignment of East Hill to intersect with Sands Hill Road and the one-way pairing of East (NB) and Parliament (SB) Streets is shown in **Figure 23** after Page 30. The respective intersection improvements MOE's are likewise indicated in **Table 12** below.

Table 12 (Study Area 20 Year Horizon MOE's for Geometric Realignment and One-way Pairs)

Study Area 20 Year Horizon HCM LOS (Exhibit 8 Appendix E)						
No.	**Location**	**Control**	**Worst Leg**	**V/C**	**Delay (s/veh)**	**LOS**
1	East Street & Sands Road (Realigned)	Roundabout	EB Right	--	75.4	F
2	East Street & East Hill (Vacated)	--	--	--	--	--
3	East Street & Shirley	Signalized	NB Thru	0.976	207.9	F
4	Shirley Street & Parliament	Signalized	SB Thru	0.972	150.7	F

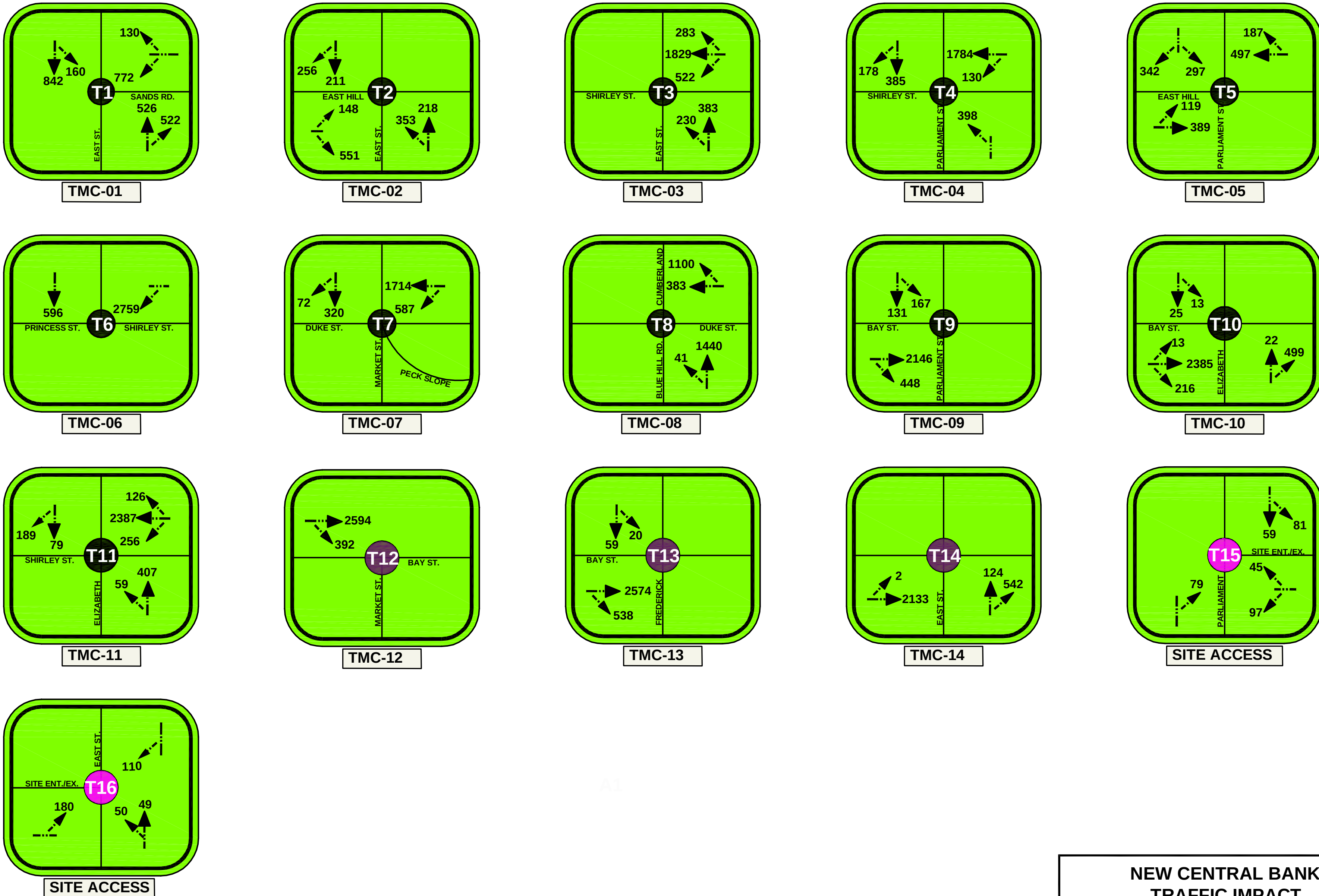
5	Parliament Street & East Hill (Realigned)	Roundabout	SB Right	--	6.1	A
6	Shirley Street & Frederick	Signalized	SB Thur	1.375	239.3	F
7	Market Street & Duke	Signalized	SB Right	0.935	43.4	D
8	Blue Hill Road & Duke/Cumberland	Signalized	NB Left	1.370	272.8	F
9	Bay Street & Parliament	Signalized	SB Left	1.299	206.4	F
10	Bay Street & Elizabeth	Signalized	NB Right	1.334	367.4	F
11	Shirley Street & Elizabeth	Signalized	NB Thru	1.640	364.6	F
12	Bay & Market	Unsignalized	EB Thru	0.028	0.00	A
13	Bay & Frederick	Signalized	EB Right	1.610	476.4	F
14	Bay & East	Signalized	NB Right	1.202	158.1	F
15	CBOB Parliament Access	Unsignalized	WB Left	0.148	12.9	B
16	CBOB East Street Access	Unsignalized	EB Left	0.168	12.3	B

4.4 Study Area 20 Year Horizon Capital Improvements

Given the study area is a built-out CBD area with areas designated as historic, this TIA identifies areas where capacity could be enhanced and traffic flows improved with minimal or calculated intrusion on existing building footprints or properties. The capital upgrades/improvements in the study area at the locations highlighted below would entail land acquisition at the respective intersections for realignment to install a roundabout as elaborated in Section 6.0. The upgrade will also entail the installation of traffic signals at the intersections outlined below as warranted. The installation of a roundabouts in lieu of a traffic signal where possible and practicable is highly recommended for the reduction of routine maintenance or replacement costs along with the enhancement of safety by reducing vehicle to vehicle conflicts (9 for a T-Intersection to 6 and from 32 to 8 for a four-leg intersection) as indicated in **Figure 24** Page 31.

The below upgrades highlighted would allow for strategic capacity enhancements and improvement in safety, pedestrianization and traffic flow for the study area to optimally accommodate the future developments planned for the area.

	Capital Improvements	Comments
1	East Hill Street	Realign East Hill to Intersect with Sands (See Figure 25 Appendix H)
2	Parliament Street	Realign Along with East Hill to Intersect with Sands (See Figure 25 Appendix H)
3	Bay & Parliament Streets	Install Fully Actuated or Adaptive Traffic Signal
4	Bay Street & Elizabeth Avenue	Install Fully Actuated or Adaptive Traffic Signal



LEGEND:

- T Turning Movement Count Location
- T (TMC) Counts Extrapolated
- T (TMC) Trips Generated by Site

NEW CENTRAL BANK
TRAFFIC IMPACT
ASSESSMENT

FIGURE 23: 20 Year Horizon Traffic

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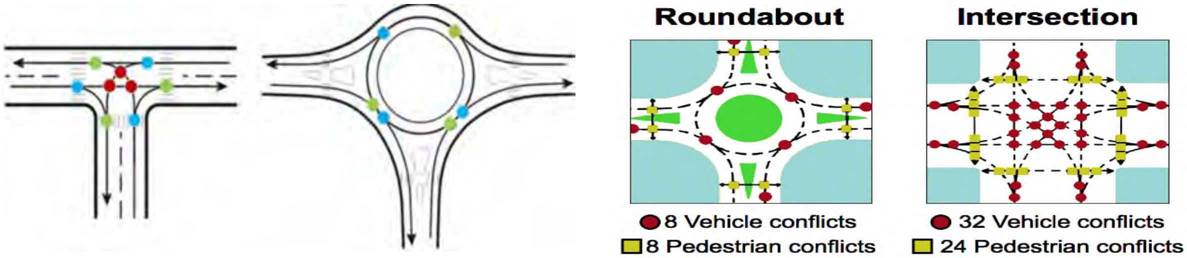
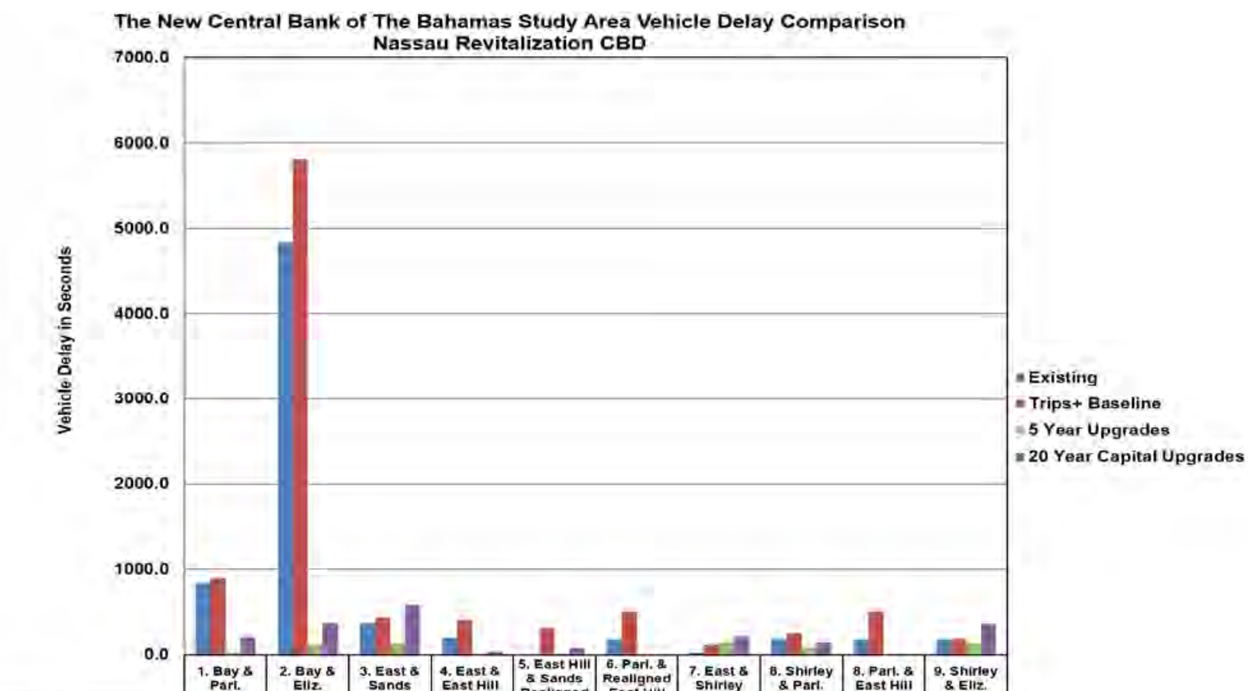


Figure 24 (Roundabout Reduction in Conflicts)

Section 5

5.0 Traffic Capacity Analysis Comparison

A comparison between the delays for the existing traffic, trips generated plus baseline condition, 5 and 20 year horizon traffic respectively including the capital upgrades recommended are indicated below in **Figure 25**. The capital upgrade over the 20 year horizon indicates a significant improvement in delays compared to a do nothing alternative. The recommended improvements will result in reduced delays and added capacity in the study area at the intersections indicated in Figure 25 below over the 20 year horizon.



	1. Bay & Parl.	2. Bay & Eliz.	3. East & Sands	4. East & East Hill	5. East Hill & Sands Realigned	6. Parl. & Realigned East Hill	7. East & Shirley	8. Shirley & Parl.	8. Parl. & East Hill	9. Shirley & Eliz.
Existing	838.4	4836.8	373.7	193.1	0.0	182.8	32.1	189.2	182.8	181.8
Trips+ Baseline	892.4	5810.0	441.9	408.1	315.3	504.4	115.2	253.8	504.4	185.5
5 Year Upgrades	30.5	114.0	135.2	9.9	12.0	5.3	148.5	82.4	5.3	136.0
20 Year Capital Upgrades	206.4	367.4	586.1	36.9	75.4	6.1	207.9	150.7	6.1	364.6

Figure 25 (Study Area Delay Comparison)

5.1 Traffic Modell Calibration and Validation

The modell was calibrated using turning movement count data input and average travel time speeds as documented in the field. Travel times were generated by the modell for the primary routes in the study area and validated by travel time data collection in the field on those exact routes. The calibration threshold and acceptance targets are listed below.

Table 13 (Calibration and Validation of Traffic Modell)

Calibration and Validation of Modell[14]						
No.	**Location**	**Field Travel Time**	**Modell Travel Time**	**Absolute Divergence (Time)**	**Absolute Divergence (%)**	**Validation**
1	**Bay Street** (Navy Lyon - Elizabeth)	3.167	2.8	22s	13%	OK
2	**Elizabeth-Shirley** (Elizabeth & Bay - Cumberland)	4.13	3.96	10.4s	4%	OK
3	**Shirley Street** (Armstrong - Cumberland)	4.08	4.18	6s	2%	OK
4	**East Hill Street** (East - Market Slip Lane)	1.25	0.99	15.6s	26%	OK
5	**East Street** (Ross - Shirley)	4	4.07	4.5s	2%	OK
6	**Blue Hill** (Meeting - Duke)	0.58	0.75	10.2s	23%	OK

14 Travel Times (Modell versus Field) – Travel Times of Modell within 15% (or 1 min, if higher).

Section 6

6.0 Impact Assessment and Mitigation Measures

The proposed New Central Bank of the Bahamas site is bounded by Parliament Street, East Street, Shirley Street and East Hill Street as indicted in **Figure 1** Page 5. The salient impacts anticipated are addressed below.

Table 14 (Proposed New Central Bank Site Impact Assessment)

The New Central Bank of The Bahamas Study Area Impact Assessment						
Item #	**Impact Description**	**Extent**	**Probability**	**Significance**	**Solutions Considered/Evaluated**	**Recommendations to Mitigate**
Capital Improvements/Strategies						
1.0	Systemic Transportation Management to Reduce Vehicular Traffic and Increase Usage of Different Modes of Transportation	Regional	May Likely Occur	High	Decreasing the demand for automobile usage and improving the different modes of transportation usage.	There has been minimal comprehensive land-use planning for New Providence along with a systemic approach to reduce automobile usage Island-wide. An initial land-use plan was created in 1966 led by Columbia University, however this plan was never adopted. The Columbia report forecasted a population of 200,000 for New Providence by 1997[15]. The 2000 census reported the population in New Providence at 212,000. In 1997 there was more than 85,000 (in 1999 86,000) registered vehicles in New Providence and in 2011 there was a total of 133,662 registered vehicles[16]. Mott MacDonald in 1999 indicated that in

15 Proctor & Redfern International Limited, Zoning Order Review – Scoping Study Interim Report (January 1997) vi.
16 Road Traffic Department.

The New Central Bank of The Bahamas Study Area Impact Assessment						
Item #	**Impact Description**	**Extent**	**Probability**	**Significance**	**Solutions Considered/Evaluated**	**Recommendations to Mitigate**
						2020 average peak hour journeys would take circa 4 hours to complete and about 40% of peak hour travel time spent in queues (circa 9,000 hours/day)[17] without intervention. Insofar as the projected population for New Providence is 332,900 by 2040[18] and the fact that vehicle ownership on the island of New Providence is approximately 0.6 per person the total registered vehicles in 2040 will be circa 200,000. The saturation and congestion due to that many vehicles on an island 80 square miles will be tremendous. Notwithstanding that the Government of the Bahamas has added significant capacity to the transportation infrastructure over the past 12 years, this is a solution that is hardly sustainable. Difficult decisions must be made to address the transportation system holistically. Adopting pragmatic transportation demand measures that require little or no legislation such as staggered work times, reducing the parking supply to reduce vehicular demand, introducing enforced paid parking in the study CBD area and ensuring that bicycle lanes are added to any major roadway works along with providing a busing system for students must be given serious consideration.

17 Mott MacDonald, New Providence Road Improvement Project “Transport Strategies for New Providence Island” (December 1997) 17.
18 The Census Section, Department of Statistics

The New Central Bank of The Bahamas Study Area Impact Assessment						
Item #	**Impact Description**	**Extent**	**Probability**	**Significance**	**Solutions Considered/Evaluated**	**Recommendations to Mitigate**
						Perhaps even more bold initiatives ought to be given due consideration given the urgency such as tolling select roadways and developing a state operated busing system that does not relegate the jitney bus system out of existence but merely competes in a free market providing users with a choice. The Downtown Nassau Partnership conceptual park and ride programme should likewise be given due consideration with the view for implementation as soon as possible. A recommendation for further exploration via a feasibility study would be converting one of the lanes of Shirley (Village Road to Cumberland) and Bay Streets (Navy Lyon to Village Road) to a bus lane only to incentivize the omni bus (jitney) bus ridership. Given the potential for traffic conditions to be exacerbated over the next 10-20 years coupled with constrained budgets requires alternatives that does not entail increasing roadway capacity as the number one option but rather an intentional focus on providing other viable modal choices other than the automobile. A practical example that would require political will would be the Bermuda model, where vehicular ownership per household is restricted, however, the ownership of motorcycles and bicycles are not. Furthermore, the downtown east-west arterials Shirley Street and Bay Street will

The New Central Bank of The Bahamas Study Area Impact Assessment						
Item #	**Impact Description**	**Extent**	**Probability**	**Significance**	**Solutions Considered/Evaluated**	**Recommendations to Mitigate**
						be operating at over saturated conditions over the 20 year horizon, adding additional capacity to both roadways in earnest will be impractical, as a result transportation demand management measures will become increasingly critical for planning and implementation in the short and long term.
2.0	East Street and Parliament Streets Traffic Increase (Between East Hill and Shirley Streets)	Local	Will Definitely Occur	High	Creating one-way pairs with East Street (northbound) and Parliament Street (southbound) between East Hill and Shirley Streets.	Given CBOB access locations will be via Parliament and East Streets and the fact that service vehicles will enter via the East Street access it is highly recommended to convert both roadways to a one way pair between East Hill and Shirley Streets. Furthermore, given the anticipated future developments in the study area, the one-way roadways will increase throughput capacity of those roadways and allow the access point to operate as a left-in and left-out only. This directional traffic flow permits the CBOB access points to perform at a high level of service (LOS) B over the 20 year horizon **Table 12** Item #15/16 Page 29.
3.0	Short Queue/storage between the off-set intersections of East Hill Street and Sands Road	Regional	Will Definitely Occur	High	Realign East Hill to intersect with Sands Road consistent with options in **Figure 25** in Appendix H.	Given the increase in traffic due to the trips generated by the CBOB and the future developments namely the US Embassy, House of Parliament/Courts and the PMH Expansion it is highly recommended to realign the East Hill Intersection with Sands Road with a geometric alignment that both minimizes land acquisition and impact to any historic structures. Due to the anticipated future

The New Central Bank of The Bahamas Study Area Impact Assessment						
Item #	**Impact Description**	**Extent**	**Probability**	**Significance**	**Solutions Considered/Evaluated**	**Recommendations to Mitigate**
						developments in the study area, the realignment would permit the installation of a roundabout at this intersection with a minimum ICD of 180 in lieu of a warranted traffic signal as indicated in **Table 11** Page 29. A roundabout control would perform at an acceptable LOS F over the 20 year horizon **Table 12** Item #1 Page 29.
Intersection Improvements Throughout Study Area						
4.0	East & Sands Road Intersection Traffic Increase	Localized	Will Definitely Occur	High	Make this location a roundabout controlled intersection.	This intersection is currently operating at a LOS F with a v/c of 0.833 and delays of 373.7 seconds for its worst leg as indicated in **Table 5** Page 17. Given the existing state at which this intersection currently operates, the fact that the US Embassy will have access off Sands Road adjacent to the intersection inasmuch as the existing post office building is scheduled for demolition it is highly recommended to realign the East Hill roadway to intersect with Sands Road creating a roundabout with a minimum ICD of 180 feet. The roundabout will operate at an acceptable LOS F over the 20 year horizon **Table 12** Item #1 Page 29. A roundabout would also allow speed management and for the creation of green vistas in the revitalization zone with appropriate center diameter treatments for the area.

The New Central Bank of The Bahamas Study Area Impact Assessment						
Item #	**Impact Description**	**Extent**	**Probability**	**Significance**	**Solutions Considered/Evaluated**	**Recommendations to Mitigate**
5.0	East & East Hill Street Traffic Increase and Short Queue Storage from Sands Road	Localized	Will Definitely Occur	High	Realign East Hill to intersect with Sands Road.	See recommendations made in Item 3.0. Additionally, it is recommended to relocate the bus layby from the southwest quadrant at East & East Hill Intersection to an area agreed with the Omni Bus (Jitney) Association due to safety reasons associated with the CBOB and US Embassy and utilize that area for the possible realignment of East Hill to intersect with Sands Road as indicated in Option 2 **Figure 25** Appendix H.

The New Central Bank of The Bahamas Study Area Impact Assessment						
Item #	**Impact Description**	**Extent**	**Probability**	**Significance**	**Solutions Considered/Evaluated**	**Recommendations to Mitigate**
6.0	Bay & Parliament Intersection Traffic Increase	Localized	Will Definitely Occur	Medium	Evaluated the installation of a traffic signal at this location.	This intersection is currently operating at a LOS F with a v/c of 1.836 and delays of 838.4 seconds on its worst leg in **Table 5** Page 17. Given the state at which this intersection operates, the fact that the new CBOB will attract trips directly on this route and the fact that there is existing conflicts at this intersection for southbound movements having to traverse two lanes of traffic and based on the improvements in operations as highlighted in **Table 12** (Item #9) Page 29 showing a v/c of 1.299 with delays of 206.4 seconds (LOS F) over the 20 year horizon a traffic signal is highly recommended and warranted as stated in **Table 11** Page 29. It is recommended that this location be programmed for a traffic signal installation. The signal should be a fully adaptive or fully actuated complete with pedestrian heads and connected to a single cabinet for master/slave operations as much as practicable to improve coordination through the study area to manage speed and flow of traffic in the downtown CBD.

The New Central Bank of The Bahamas Study Area Impact Assessment						
Item #	**Impact Description**	**Extent**	**Probability**	**Significance**	**Solutions Considered/Evaluated**	**Recommendations to Mitigate**
7.0	Bay & Elizabeth Intersection Traffic Increase	Localized	Will Likely Occur	High	Installation of a traffic signal if warranted for safety and better coordination along Bay Street Corridor in study area.	This intersection is currently operating at a LOS F with a v/c of 10.893 and delays of 4,836.8 seconds on its worst leg in **Table 5** (Item #10) Page 17. It is highly recommended that consideration be given for the installation of a traffic signal at this location in the study area due to the fact that this location has poor sight distance and that the signal warrants are met as indicated in **Table 11** Page 29. Consistent with the modell output the queue on northbound Elizabeth extends back to Shirley Street periodically which prompts the deployment of a police officer to this location to manually direct traffic during peak travel times. This signal and the others along Bay Street should be fully pedestrianized utilizing a single cabinet for master/slave operations to better maximize coordinated traffic movements and manage speeds along the Bay Street corridor where practicable. Similarly, where ever practicable the use of pedestrian fencing/barriers are recommended to mitigate jay walking along the Bay and Shirley Street corridors respectively.
Site Specific Access Improvements						
8.0	CBOB Parliament Access Ingress and Egress Traffic	Localized	Will Definitely Occur	Medium	Creating a one-way southbound	See recommendations made in Item 2.0.

The New Central Bank of The Bahamas Study Area Impact Assessment						
Item #	**Impact Description**	**Extent**	**Probability**	**Significance**	**Solutions Considered/Evaluated**	**Recommendations to Mitigate**
					corridor between Shirley and East Hill to make this location a left-in and left-out only.	
9.0	Traffic Flow Through All Other Signalized Intersections	Localized	Will likely Occur	High	Consideration should be given to connection of as many signals to a single cabinet to create a master cabinet for enhanced coordination purposes. The use of pedestrian fences/barriers along the Bay/Shirley Street corridor to better manage pedestrian flows to traffic signals or designated mid-block crossings is highly recommended. Increasing the capacity at all other intersections with exclusive right or left-turn lanes where practicable.	It is recommended that all signalized intersections in the study area be upgraded to a fully adaptive or fully actuated traffic signal complete with pedestrian heads and connected to a single cabinet as much as practicable to move platoons of traffic along the corridor by coordination. Additionally, the speeds on Bay and Shirley Streets could be better managed with a coordinated traffic signal system. It is also recommended that crosswalks be painted at each signalized location and pedestrian fencing/barrier be utilized to minimize jay walking and maintain a safe operating environment for the pronounced mix of vehicular and pedestrian traffic throughout the study area in the downtown CBD. Where ever practicable add exclusive right-turn lanes to enhance capacity and improve the LOS in particular at the north-leg of the intersection of Shirley & Elizabeth on the north leg as evidenced in **Table 9** Item#11 where "Do Nothing" alternative v/c is 10,237.011, Delay 291.4 seconds and LOS F versus adding the right-turn exclusive lane and lead-lag signal timing **Table 10** Item#11 the v/c is 1.132, delays 136 seconds and LOS F. Page 29.
Policy Recommendations						

The New Central Bank of The Bahamas Study Area Impact Assessment						
Item #	**Impact Description**	**Extent**	**Probability**	**Significance**	**Solutions Considered/Evaluated**	**Recommendations to Mitigate**
10.0	Practical Policies Enactment	Regional	Can Likely Occur	High	Transportation Demand Management Policies.	Due to the fact that adding additional capacity to the roadway infrastructure is not sustainable it would be prudent and timely for due consideration be given to planning and implementation of straight forward and practical policies with a view to reducing the demand for the use of vehicles on the roadway or flattening out the peak travel periods spike on the roadways by allowing flexible times for employees to report to work. Going forward over the 20 year horizon strategies/policies that addresses sustainable solutions must be cultivated. To this end, The Transport Policy and Planning Unit (TPPU) should be resourced adequately and provided with the necessary budget to lead the effort in this regard.

Section 7

7.0 Conclusion

The proposed new Central Bank of the Bahamas site location coupled with the imminent other developments such as the US Embassy, relocation of the House of Parliament/Courts, Nassau Cruise Port and the PMH Expansion will have a definite impact on the study area corridors. The solutions or the study area should be treated as immediate, short term and long term. In addition to adding capacity at intersections in the immediate, short term solutions should entail realigning roadways in the study area to enhance traffic flow and levels of service where possible and practicable as presented in this TIA. The long term solutions should trigger earnest and timely thought and action to implement strategies and policies for least cost remedies that can be implemented without political fallout or hardship to reduce the demand for vehicle usage as informed by feasibility/traffic engineering data collection and studies over the entire revitalization zone. Furthermore, the main corridors in the CBD study area are all presently operating at a near saturation or over saturated state. Therefore, the existing conditions over a 20 year horizon will likely deteriorate, accordingly, it is highly recommended that the strategic policy solutions be brought to bear as viable solutions to mitigate the growth of traffic due to the population growth with urgency. The population growth has already exceeded the critical population number from a traffic management perspective for an island the size of New Providence and so it is vitally important that consistent and sustained holistic planning for existing and future transportation issues and programming of solutions be undertaken as a priority.

Appendix A

Existing Weekday Baseline Report

CBOB Existing Weekday Baseline Report

Vistro File: Y:\...\01-CBOB Weekday Existing Baseline Analysis 6Aug19.vistro

Scenario: Base Scenario

Report File: Y:\...\00-CBOB Existing Weekday Baseline Report 7Aug19.pdf

07/08/2019

Intersection Analysis Summary

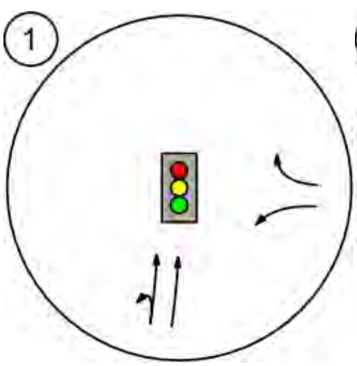
ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Blue Hill Road/Cumberland & Duke	Signalized	HCM 6th Edition	WB Right	0.796	84.2	F
6	Market Street & Duke Street	Signalized	HCM 6th Edition	SB Thru	0.541	13.2	B
11	Shirley Street & Frederick Street	Signalized	HCM 6th Edition	SB Thru	0.751	23.8	C
16	Bay Street & Parliament Street	Two-way stop	HCM 6th Edition	SB Thru	1.836	838.4	F
21	Bay Street & Elizabeth Avenue	Two-way stop	HCM 6th Edition	NB Right	10.893	4,836.8	F
26	Shirley Street & Elizabeth Avenue	Signalized	HCM 6th Edition	SB Right	28.513	181.8	F
31	East Street & Sands Road	Two-way stop	HCM 6th Edition	WB Right	0.833	373.7	F
36	East Street & East Hill Street	Two-way stop	HCM 6th Edition	EB Right	1.194	193.1	F
41	Parliament Street & East Hill Street	Two-way stop	HCM 6th Edition	SB Right	1.038	182.8	F
46	Shirley Street & Parliament Street	Signalized	HCM 6th Edition	NB Left	0.683	189.2	F
56	East Street & Shirley Street	Signalized	HCM 6th Edition	NB Thru	0.698	32.1	C
61	East Hill Street Slip Roads	Unknown	?		?	?	?
62	East Hill Street & RBC Parking	Two-way stop	HCM 6th Edition	NB Right	0.510	19.9	C
63	Bay Street & Frederick Street	Two-way stop	HCM 6th Edition	SB Thru	1.934	785.6	F
64	Bay Street & East Street	Signalized	HCM 6th Edition	EB Left	0.695	107.3	F
65	Bay Street & Market Street	Two-way stop	HCM 6th Edition	EB Thru	0.016	0.0	A
67	Market Street & Peck Slope Slip Lane	Unknown	?		?	?	?

68	Market Street & East Hill Slip Lanes	Unknown	?		?	?	?

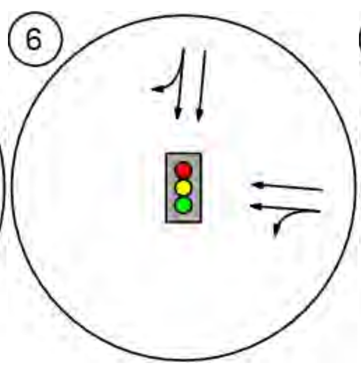
V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Report Figure 1: Lane Configuration and Traffic Control

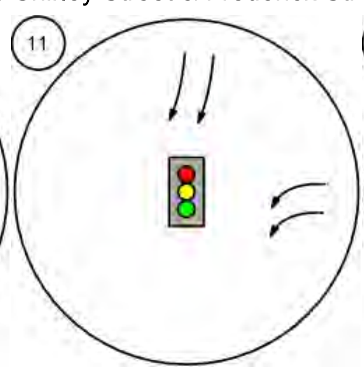
Blue Hill Road/Cumberland &



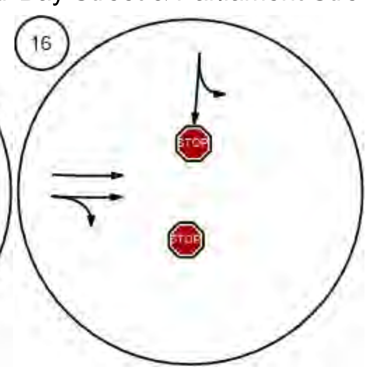
Market Street & Duke Street



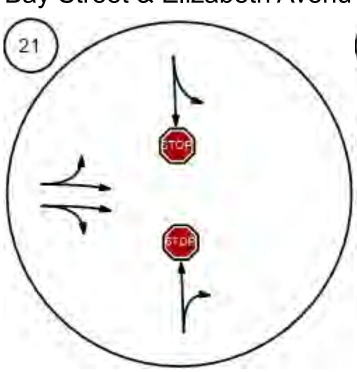
Shirley Street & Frederick Str



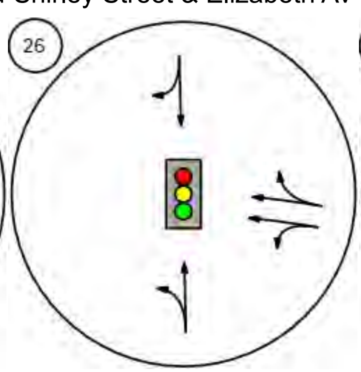
Bay Street & Parliament Stre



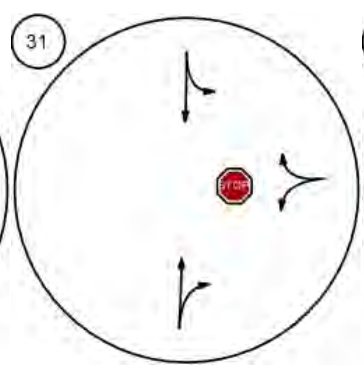
Bay Street & Elizabeth Avenu



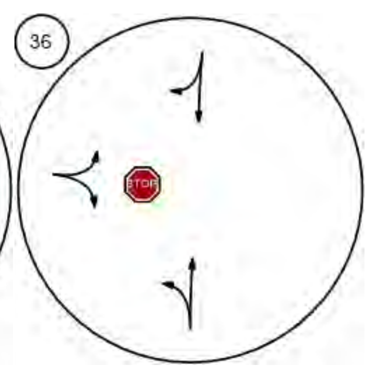
Shirley Street & Elizabeth Av



East Street & Sands Road

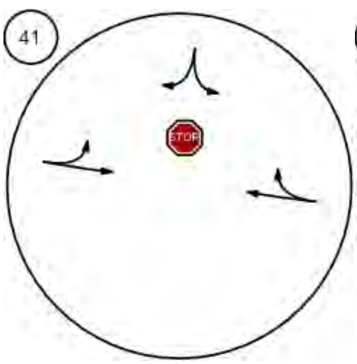


East Street & East Hill Street

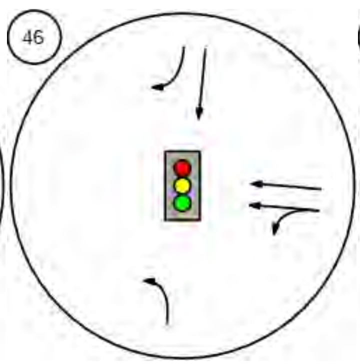


Report Figure 1: Lane Configuration and Traffic Control

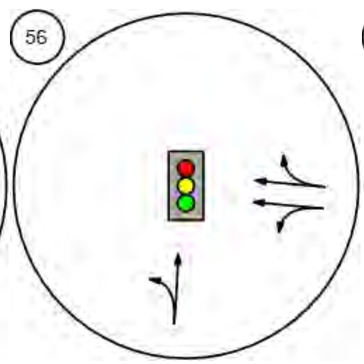
Parliament Street & East Hill



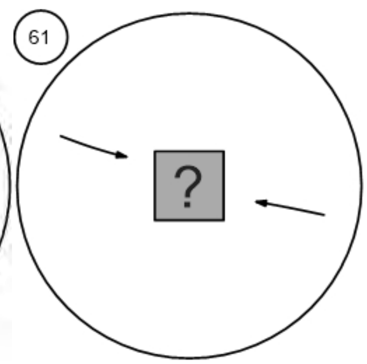
Shirley Street & Parliament S



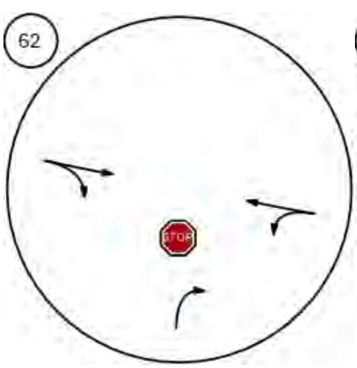
East Street & Shirley Street



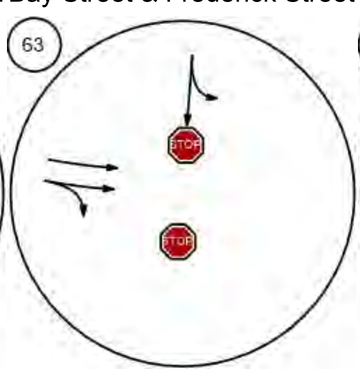
East Hill Street Slip Roads



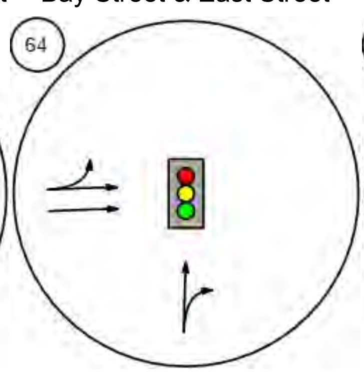
East Hill Street & RBC Parkin



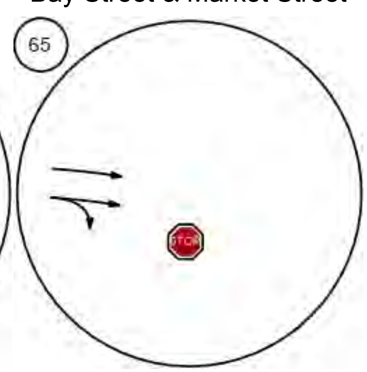
Bay Street & Frederick Street



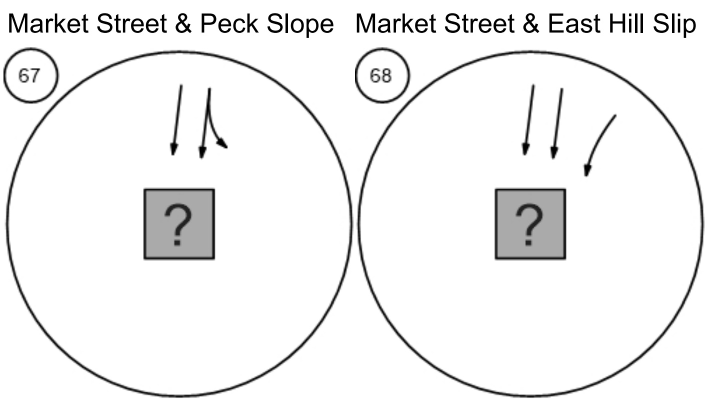
Bay Street & East Street



Bay Street & Market Street

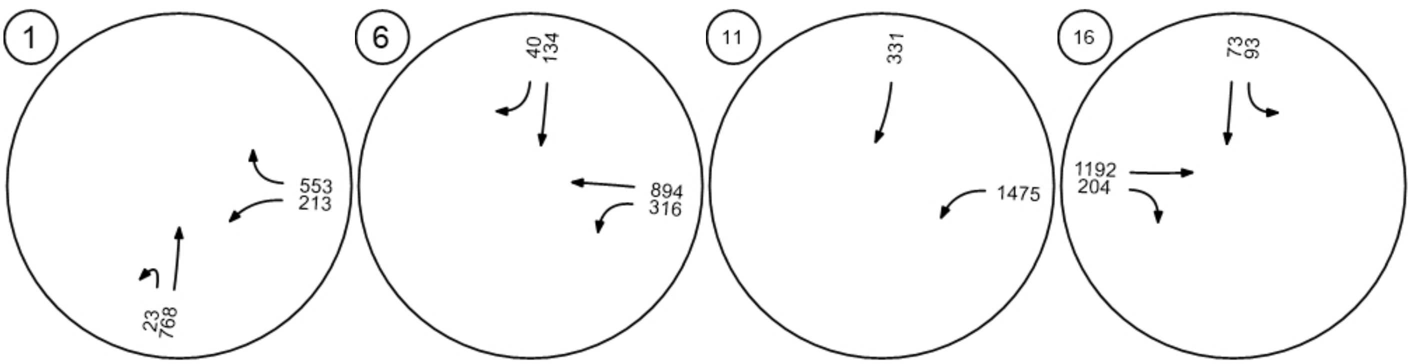


Report Figure 1: Lane Configuration and Traffic Control

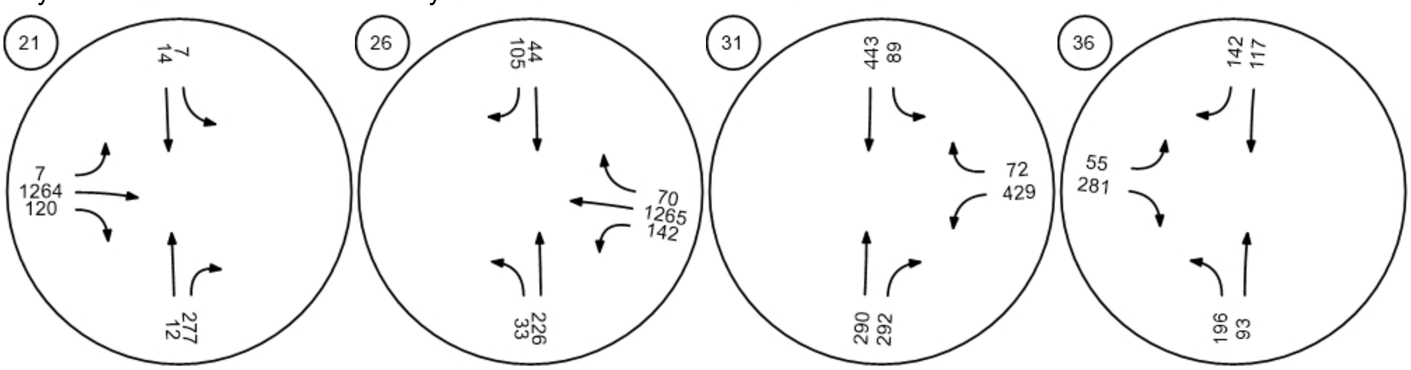


Report Figure 2a: Traffic Volume - Base Volume

Blue Hill Road/Cumberland & Market Street & Duke Street Shirley Street & Frederick Str Bay Street & Parliament Stre

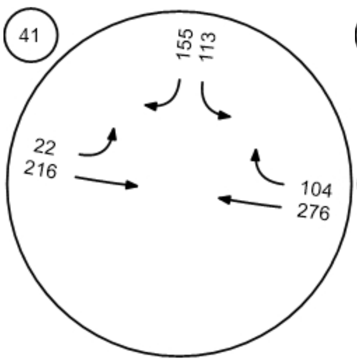


Bay Street & Elizabeth Avenu Shirley Street & Elizabeth Av East Street & Sands Road East Street & East Hill Street

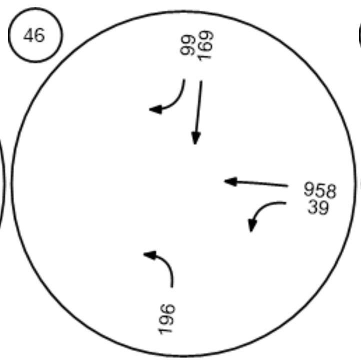


Report Figure 2a: Traffic Volume - Base Volume

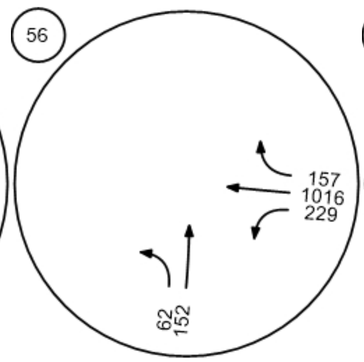
Parliament Street & East Hill



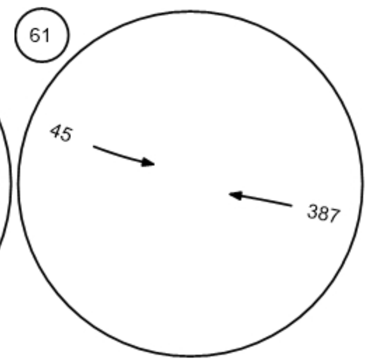
Shirley Street & Parliament S



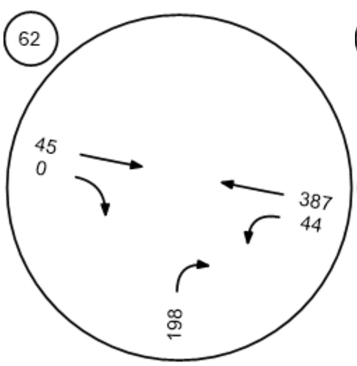
East Street & Shirley Street



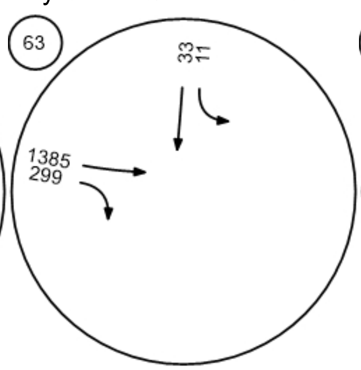
East Hill Street Slip Roads



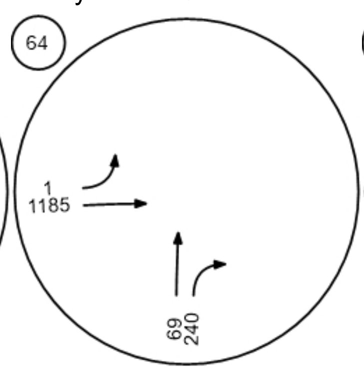
East Hill Street & RBC Parkin



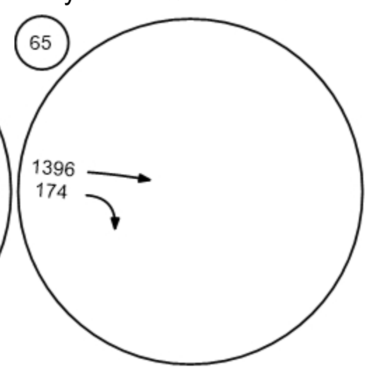
Bay Street & Frederick Street



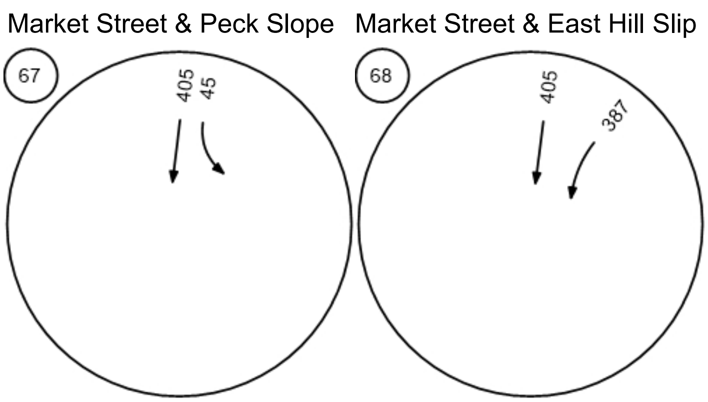
Bay Street & East Street



Bay Street & Market Street



Report Figure 2a: Traffic Volume - Base Volume



Appendix B

Existing Evening Baseline Report

CBOB Existing Evening Baseline Report

Vistro File: Y:\...\01-CBOB Existing Evening Baseline Analysis 6Aug19.vistro

Scenario: Base Scenario

Report File: Y:\...\00-CBOB Existing Evening Baseline Report 6Aug19.pdf

06/08/2019

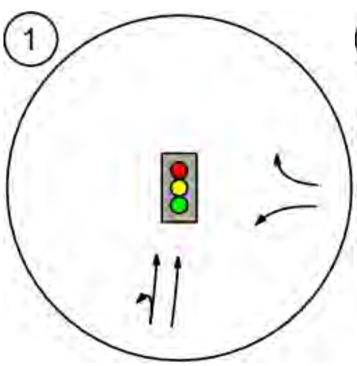
Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Blue Hill Road/Cumberland & Duke	Signalized	HCM 6th Edition	WB Right	0.366	30.6	C
6	Market Street & Duke Street	Signalized	HCM 6th Edition	SB Thru	0.248	9.7	A
11	Shirley Street & Frederick Street	Signalized	HCM 6th Edition	SB Thru	0.345	13.0	B
16	Bay Street & Parliament Street	Two-way stop	HCM 6th Edition	SB Thru	0.178	22.4	C
21	Bay Street & Elizabeth Avenue	Two-way stop	HCM 6th Edition	NB Right	0.649	46.4	E
26	Shirley Street & Elizabeth Avenue	Signalized	HCM 6th Edition	SB Right	0.403	26.8	C
31	East Street & Sands Road	Two-way stop	HCM 6th Edition	WB Right	0.089	17.6	C
36	East Street & East Hill Street	Two-way stop	HCM 6th Edition	EB Right	0.268	13.6	B
41	Parliament Street & East Hill Street	Two-way stop	HCM 6th Edition	SB Right	0.181	14.3	B
46	Shirley Street & Parliament Street	Signalized	HCM 6th Edition	NB Left	0.314	50.3	D
56	East Street & Shirley Street	Signalized	HCM 6th Edition	NB Thru	0.319	11.5	B
61	East Hill Street Slip Roads	Unknown	?		?	?	?
62	East Hill Street & RBC Parking	Two-way stop	HCM 6th Edition	NB Right	0.156	10.8	B
63	Bay Street & Frederick Street	Two-way stop	HCM 6th Edition	SB Thru	0.127	26.0	D
64	Bay Street & East Street	Signalized	HCM 6th Edition	EB Thru	0.320	17.2	B
65	Bay Street & Market Street	Two-way stop	HCM 6th Edition	EB Thru	0.007	0.0	A
67	New Intersection	Unknown	?		?	?	?
68	New Intersection	Unknown	?		?	?	?

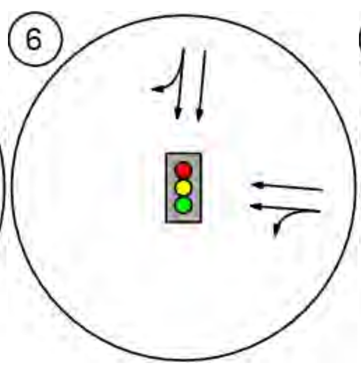
V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Report Figure 1: Lane Configuration and Traffic Control

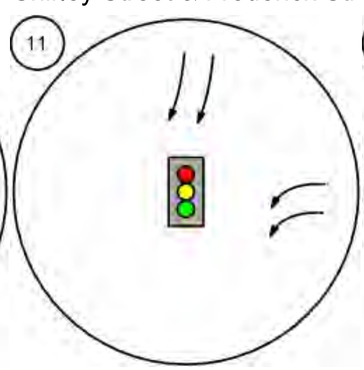
Blue Hill Road/Cumberland &



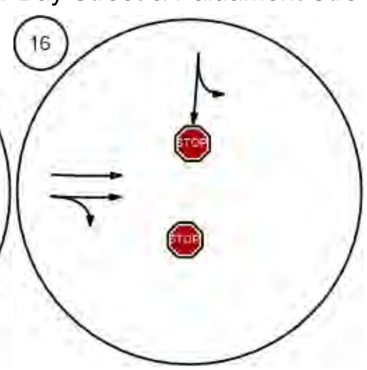
Market Street & Duke Street



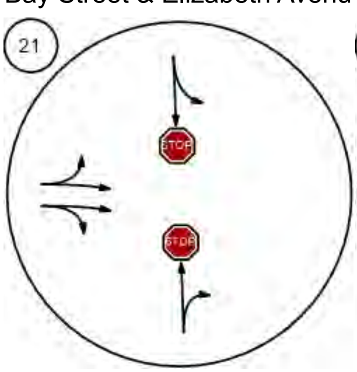
Shirley Street & Frederick Str



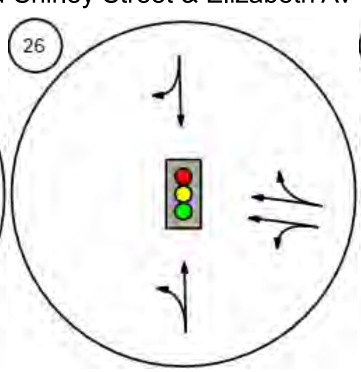
Bay Street & Parliament Stre



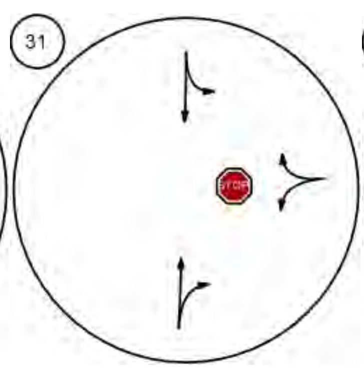
Bay Street & Elizabeth Avenu



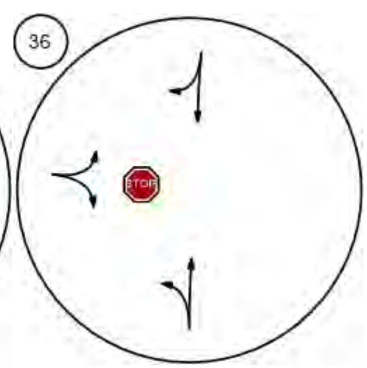
Shirley Street & Elizabeth Av



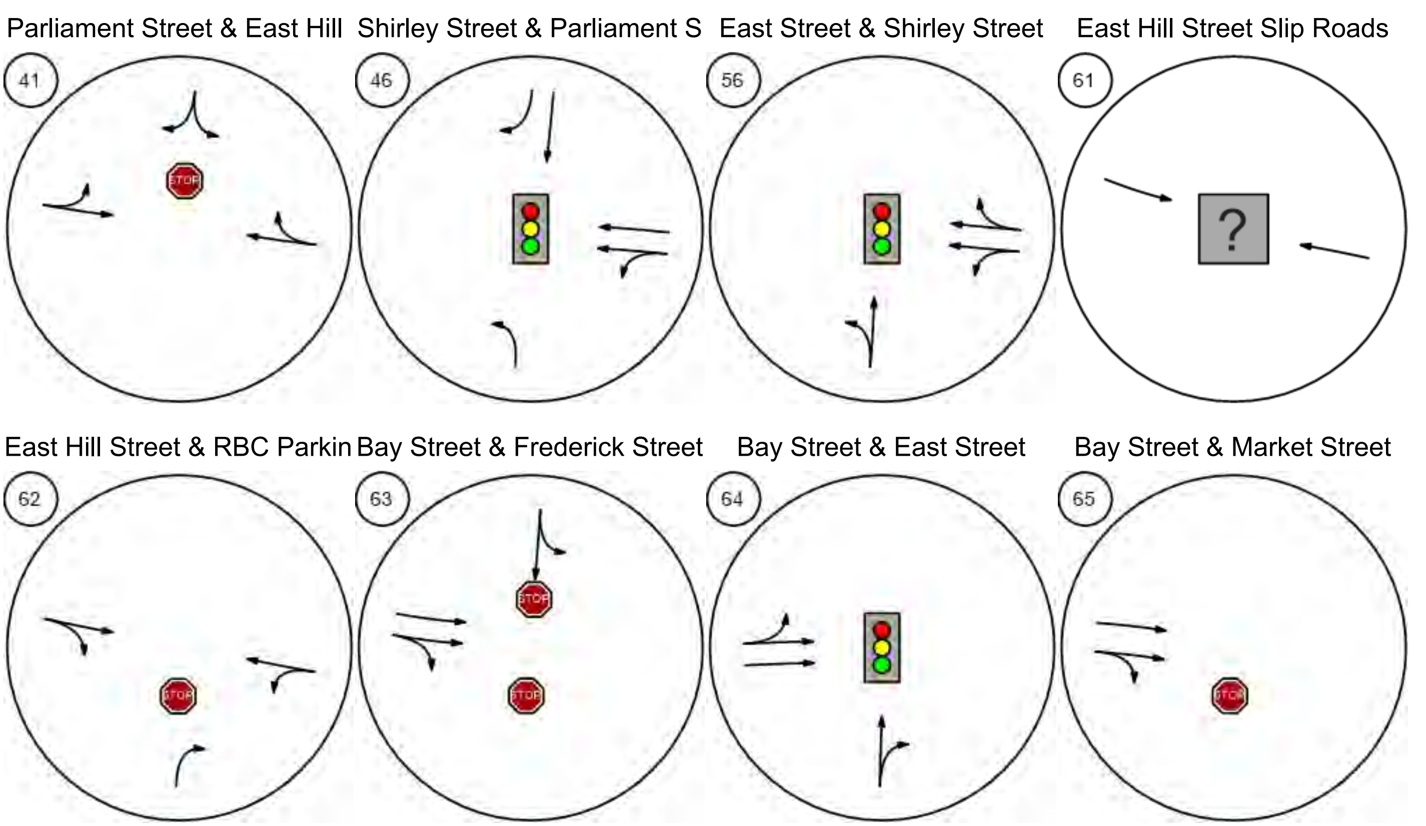
East Street & Sands Road



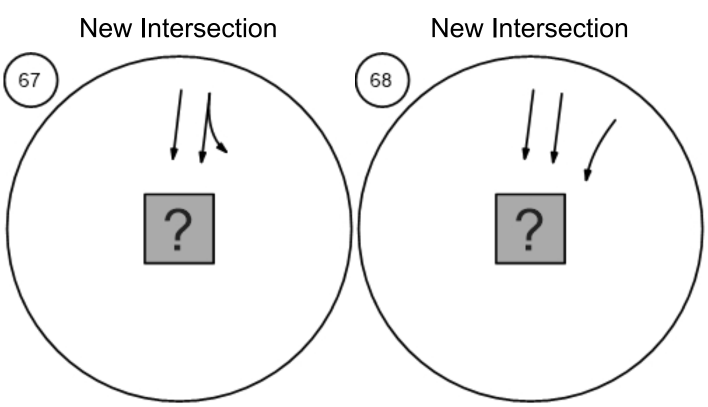
East Street & East Hill Street



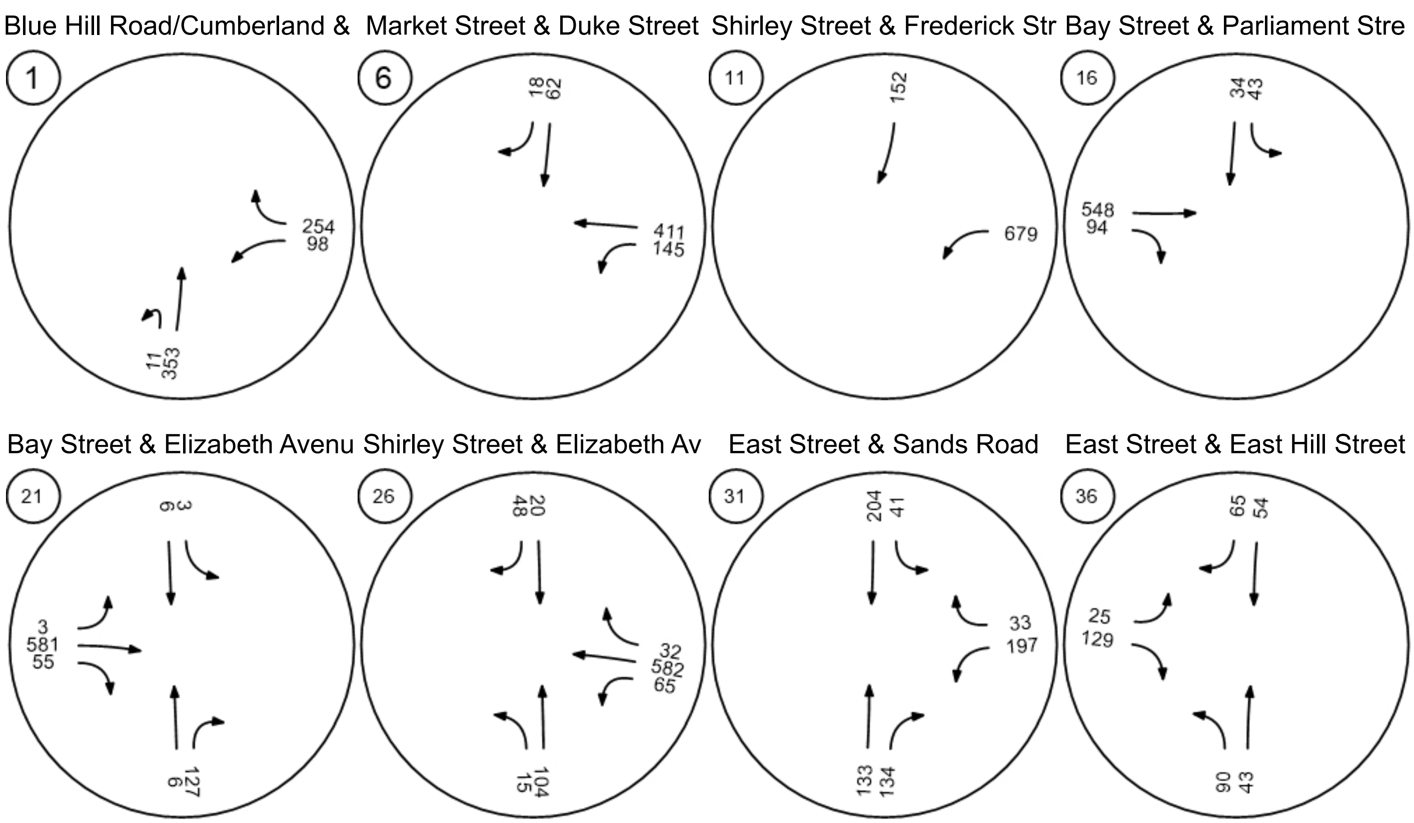
Report Figure 1: Lane Configuration and Traffic Control



Report Figure 1: Lane Configuration and Traffic Control

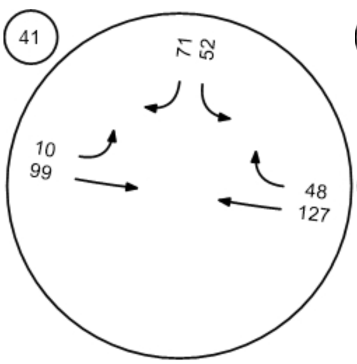


Report Figure 2f: Traffic Volume - Future Total Volume

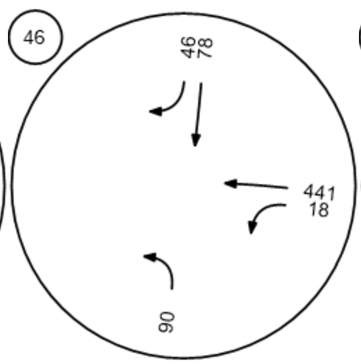


Report Figure 2f: Traffic Volume - Future Total Volume

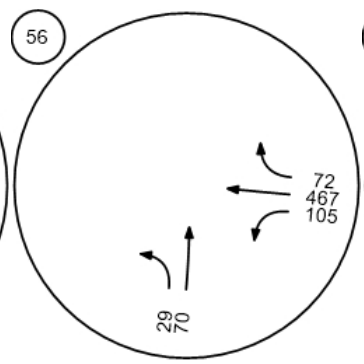
Parliament Street & East Hill



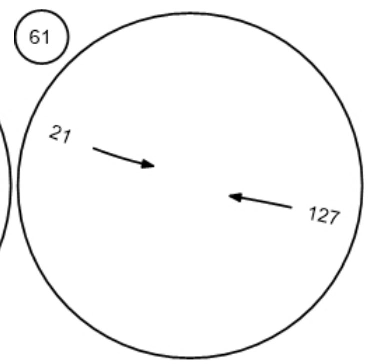
Shirley Street & Parliament S



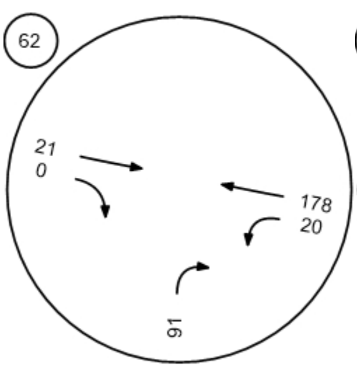
East Street & Shirley Street



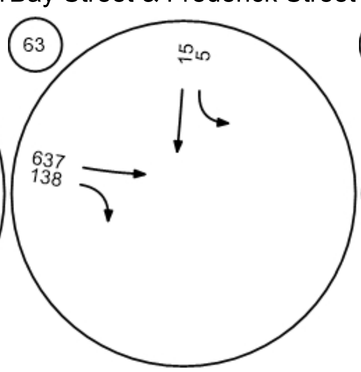
East Hill Street Slip Roads



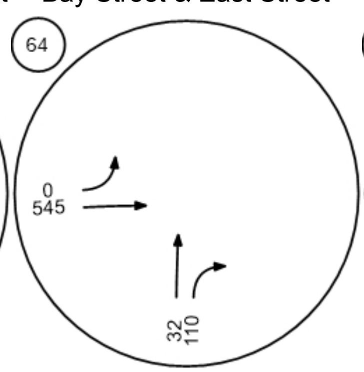
East Hill Street & RBC Parkin



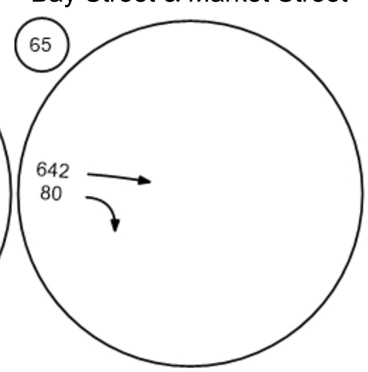
Bay Street & Frederick Street



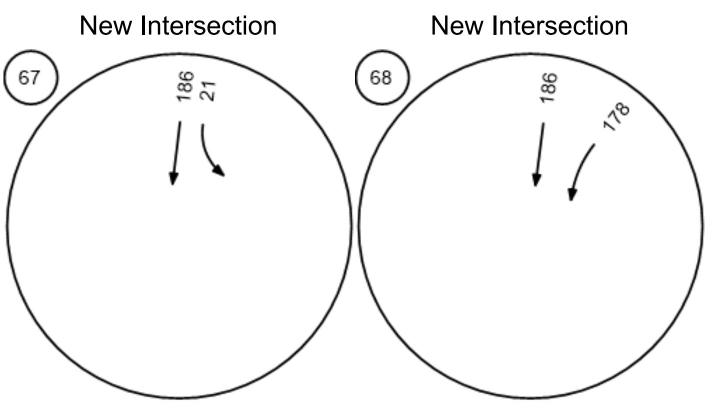
Bay Street & East Street



Bay Street & Market Street



Report Figure 2f: Traffic Volume - Future Total Volume



Appendix C

Trips Generated Analysis

PROPOSED CENTRAL BANK OF BAHAMAS DEVELOPMENT

1. CENTRAL BANK WEEK DAY OPERATIONS TRIP GENERATION BASED ON SURVEY

- Staffing – 337
- Clients – 20/Peak Hour

WEEKDAY PEAK PERIOD OF OPERATIONS

Directional Split:	50% Ingress	50% Egress
Ingress Volume:	178	
Egress Volume:	179	

2. CENTRAL BANK PERFORMANCE THEATRE TRIP GENERATION BASED ON SURVEY

- Total CBOB Theatre Seating Capacity – 300
- Based on Survey Dundas Centre For Performing Arts – 40 to 60% capacity documented for a seating capacity of 330
- Therefore utilize 50% of theatre capacity

EVENING PERIOD OF OPERATIONS

Directional Split:	50% INGRESS	50% EGRESS
INGRESS VOLUME:	75	
EGRESS VOLUME:	75	

3. CENTRAL BANK ART GALLERY TRIP GENERATION BASED ON SURVEY

- Based on Survey Antonius Roberts Art Gallery - 20 Persons/Hour
- Based on Survey National Art Gallery - 94 Persons/Hour for Exhibit Openings
- Utilize 94

EVENING PERIOD OF OPERATIONS

Directional Split: 50% Ingress 50% Egress

Ingress Volume: 47
Egress Volume: 47

4. CENTRAL BANK CAFETERIA/FOOD COURT

It is estimated that zero trips will be generated by the food court, it is anticipated that the trips generated will be internal to the site and external via pedestrian foot traffic.

5. ESTIMATED PASS-BY TRIPS

It is estimated that zero trips will be pass-by related trips given the specific services of the CBOB.

6. TOTAL PROJECTED PEAK HOUR TRIPS FOR CENTRAL BANK

Directional Split Averaged: 50% Ingress 50% Egress

Weekday Volume: 178 (Ingress) / 179 (Egress)

Evening Volume: Theatre 150
Museum/Art Gallery 94

Since Weekday Work Operations Volume > Evening Volumes use Weekday Work Volume for Trip Generation

Appendix D

Weekday Trips Generated+ Baseline Analysis

CBOB Weekday Trips+ Baseline Report

Vistro File: Y:\...\01-CBOB Weekday Trips+Baseline Analysis 23Sep19.vistro

Scenario: Base Scenario

Report File: Y:\...\00-CBOB Weekday Trips+Baseline Rpt E4 24Sep19.pdf

25/09/2019

Intersection Analysis Summary

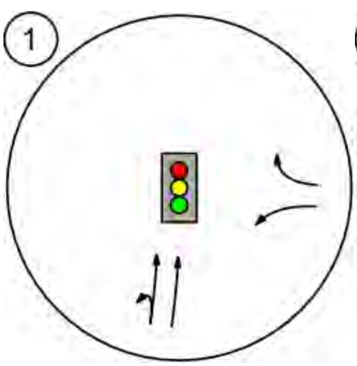
ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Blue Hill Road/Cumberland & Duke	Signalized	HCM 6th Edition	WB Right	0.734	63.5	E
6	Market Street & Duke Street	Signalized	HCM 6th Edition	SB Thru	0.504	11.1	B
11	Shirley Street & Frederick Street	Signalized	HCM 6th Edition	SB Thru	0.776	24.2	C
16	Bay Street & Parliament Street	Two-way stop	HCM 6th Edition	SB Thru	1.946	892.4	F
21	Bay Street & Elizabeth Avenue	Two-way stop	HCM 6th Edition	NB Right	12.927	5,810.0	F
26	Shirley Street & Elizabeth Avenue	Signalized	HCM 6th Edition	SB Right	28.536	185.5	F
31	East Street & Sands Road	Two-way stop	HCM 6th Edition	WB Right	0.971	441.9	F
36	East Street & East Hill Street	Two-way stop	HCM 6th Edition	EB Right	1.596	389.0	F
41	Parliament Street & East Hill Street	Two-way stop	HCM 6th Edition	SB Right	1.732	504.4	F
46	Shirley Street & Parliament Street	Signalized	HCM 6th Edition	NB Left	0.776	253.8	F
56	East Street & Shirley Street	Signalized	HCM 6th Edition	NB Thru	0.770	115.2	F
61	East Hill Street Slip Roads	Unknown	?		?	?	?
62	East Hill Street & RBC Parking	Two-way stop	HCM 6th Edition	NB Right	0.582	24.6	C
63	Bay Street & Frederick Street	Two-way stop	HCM 6th Edition	SB Thru	2.099	883.2	F
64	Bay Street & East Street	Signalized	HCM 6th Edition	EB Left	0.695	107.3	F
65	Bay Street & Market Street	Two-way stop	HCM 6th Edition	EB Thru	0.016	0.0	A
67	Market St. & Peck Slope Slipe Lane	Two-way stop	HCM 6th Edition	SB Thru	0.004	0.0	A

68	Market St. & East Hill Slip Lane	Unknown	?		?	?	?
69	CBOB Parliament Entrance	Two-way stop	HCM 6th Edition	WB Right	0.067	15.7	C
70	CBOB East Street Access	Two-way stop	HCM 6th Edition	EB Left	0.171	10.9	B

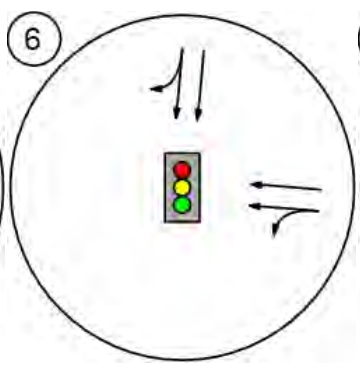
V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Report Figure 1: Lane Configuration and Traffic Control

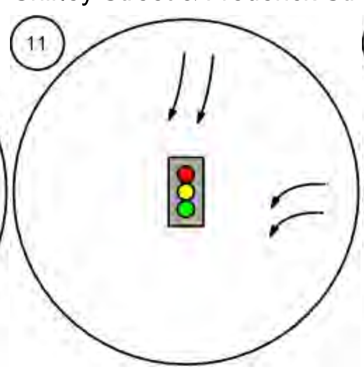
Blue Hill Road/Cumberland &



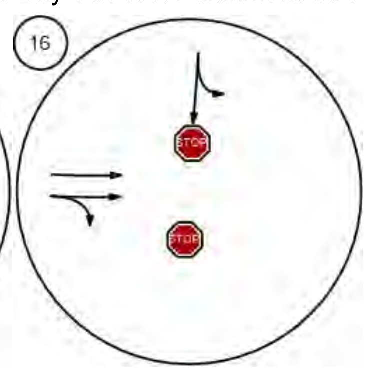
Market Street & Duke Street



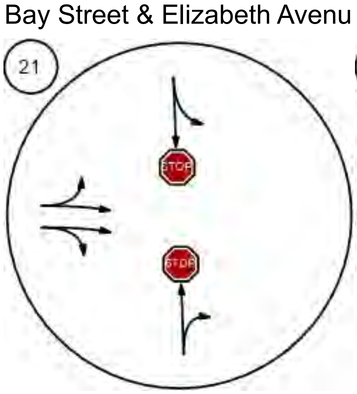
Shirley Street & Frederick Str



Bay Street & Parliament Stre

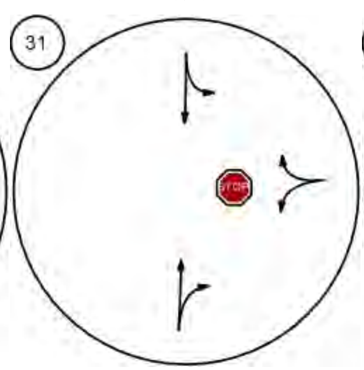


Bay Street & Elizabeth Avenu

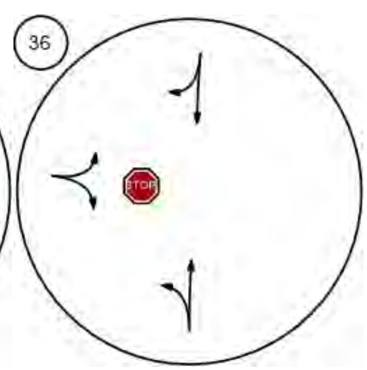


Shirley Street & Elizabeth Av

East Street & Sands Road

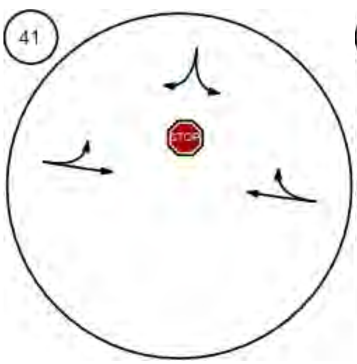


East Street & East Hill Street

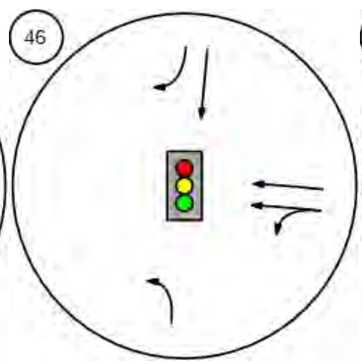


Report Figure 1: Lane Configuration and Traffic Control

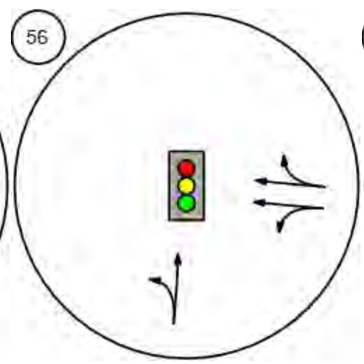
Parliament Street & East Hill



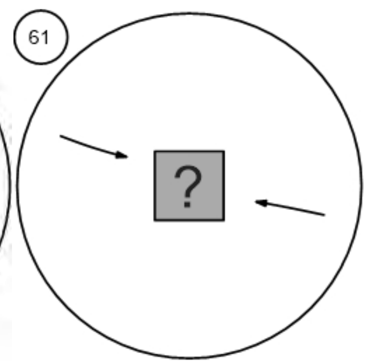
Shirley Street & Parliament S



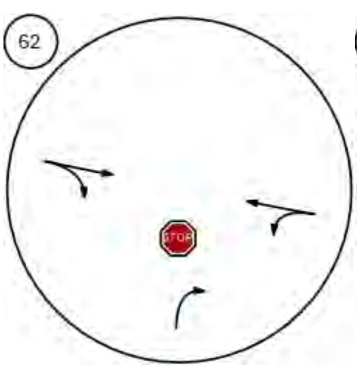
East Street & Shirley Street



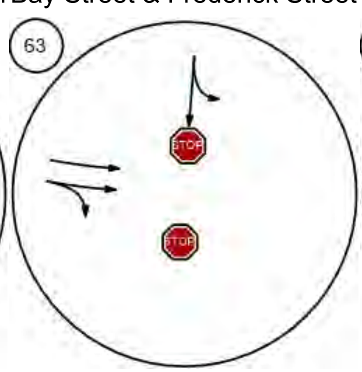
East Hill Street Slip Roads



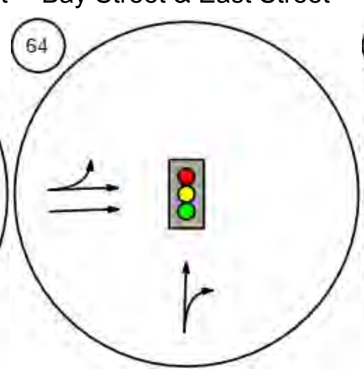
East Hill Street & RBC Parkin



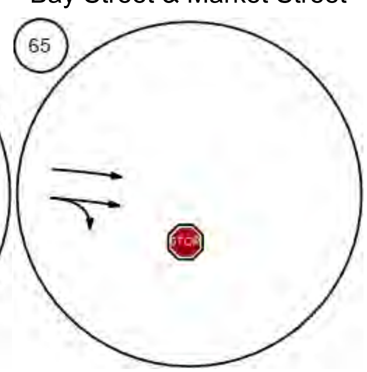
Bay Street & Frederick Street



Bay Street & East Street

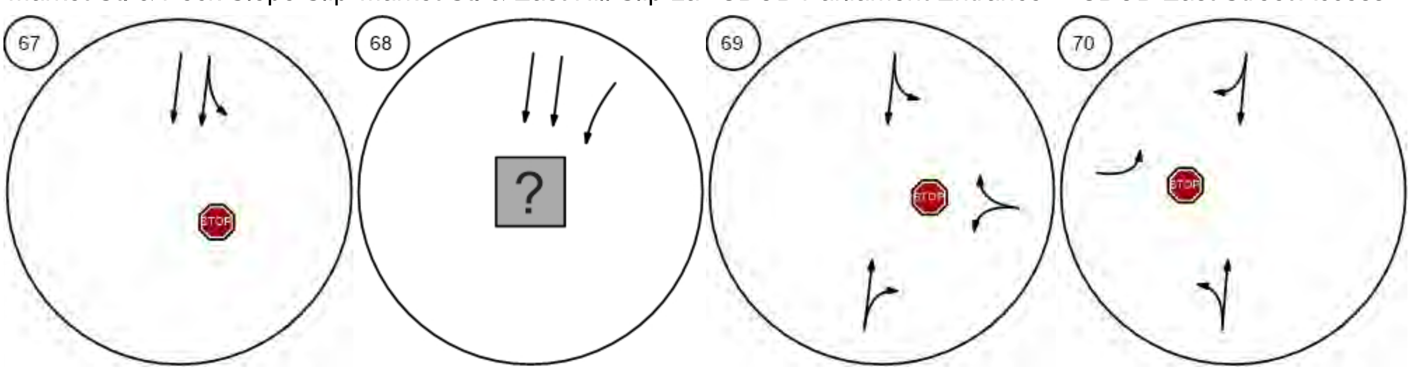


Bay Street & Market Street



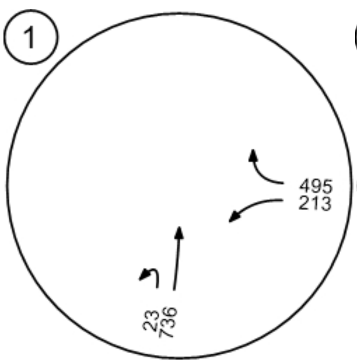
Report Figure 1: Lane Configuration and Traffic Control

Market St. & Peck Slope Slip | Market St. & East Hill Slip La | CBOB Parliament Entrance | CBOB East Street Access

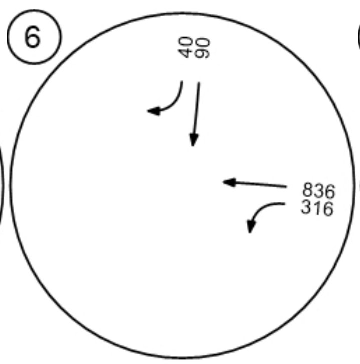


Report Figure 2f: Traffic Volume - Future Total Volume

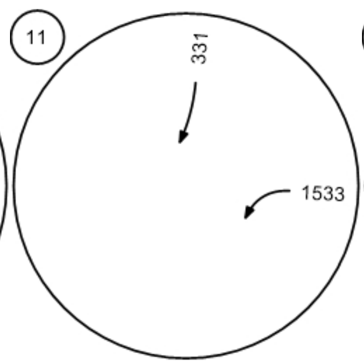
Blue Hill Road/Cumberland &



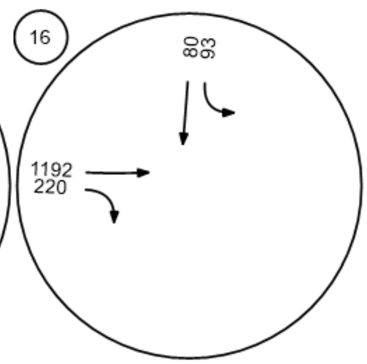
Market Street & Duke Street



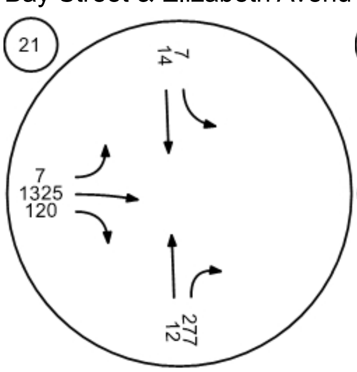
Shirley Street & Frederick Str



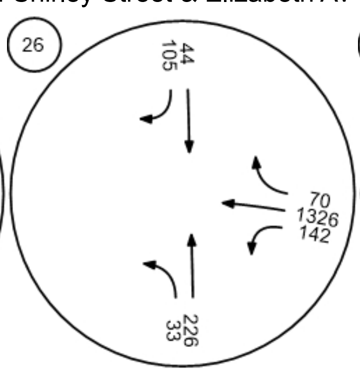
Bay Street & Parliament Stre



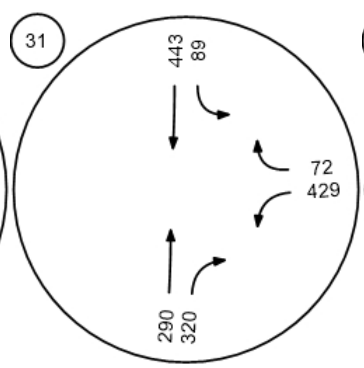
Bay Street & Elizabeth Avenu



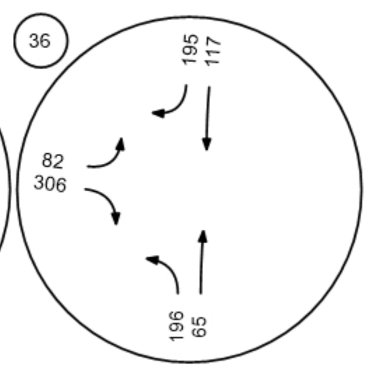
Shirley Street & Elizabeth Av



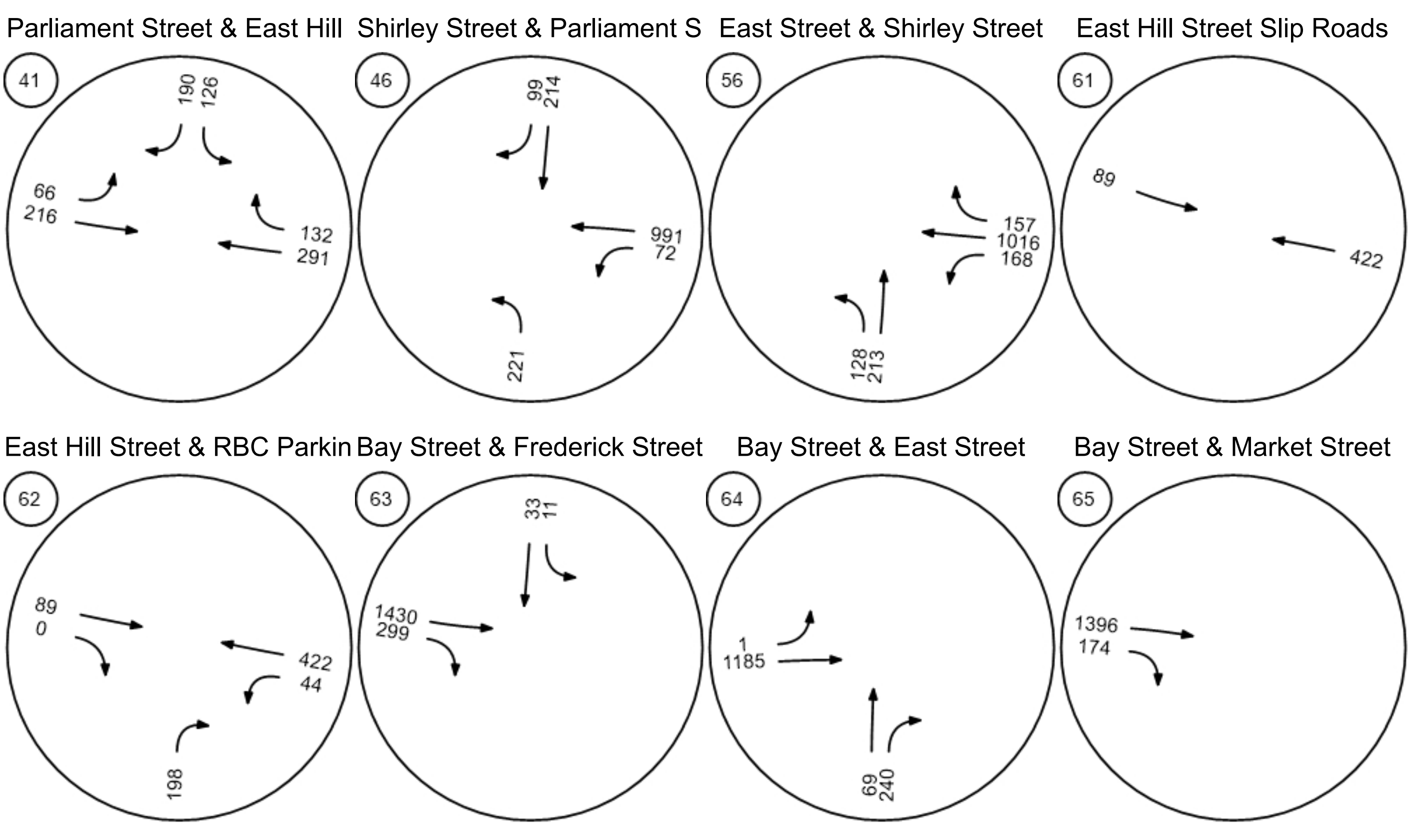
East Street & Sands Road



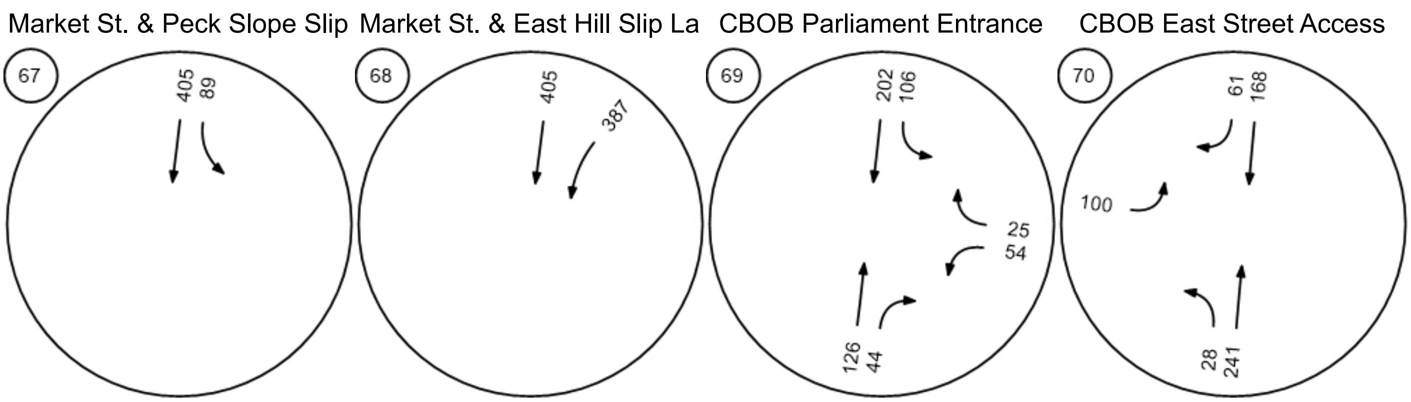
East Street & East Hill Street



Report Figure 2f: Traffic Volume - Future Total Volume



Report Figure 2f: Traffic Volume - Future Total Volume



Appendix E

Traffic Signal Warrant Analysis

Signal Warrants Report For Intersection 16: Bay Street & Parliament Street

Warrants Summary

Warrant	Name	Met?
#1	Eight Hour Vehicular Volume	No
#2	Four Hour Vehicular Volume	Yes
#3	Peak Hour	Yes

Intersection Warrants Parameters

Major Approaches	W
Minor Approaches	N
Speed > 40mph	No
Population < 10,000	No
Warrant Factor	100%

Warrant Analysis Traffic Volumes

Hour	Major Streets	Minor Streets
	W	N
1	1412	173
2	1356	166
3	1327	163
4	1130	138
5	1073	131
6	960	118
7	890	109
8	847	104
9	678	83
10	635	78
11	635	78
12	607	74
13	551	67
14	508	62
15	508	62
16	494	61
17	282	35
18	155	19
19	141	17
20	56	7
21	42	5
22	42	5
23	28	3
24	28	3

Warrant Analysis by Hour

Hour	Major Lanes		Minor Lanes		Warrant 1 Condition A				Warrant 1 Condition B				Warrant 2	Warrant 3
	Number	Volume	Number	Volume	100%	80%	70%	56%	100%	80%	70%	56%		Condition B
1	2	1412	1	173	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2	2	1356	1	166	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
3	2	1327	1	163	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
4	2	1130	1	138	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
5	2	1073	1	131	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
6	2	960	1	118	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No
7	2	890	1	109	No	No	Yes	Yes	No	Yes	Yes	Yes	No	No
8	2	847	1	104	No	No	No	Yes	No	Yes	Yes	Yes	No	No
9	2	678	1	83	No	No	No	No	No	No	Yes	Yes	No	No
10	2	635	1	78	No	No	No	No	No	No	Yes	Yes	No	No
11	2	635	1	78	No	No	No	No	No	No	Yes	Yes	No	No
12	2	607	1	74	No	No	No	No	No	No	No	Yes	No	No
13	2	551	1	67	No	No	No	No	No	No	No	Yes	No	No
14	2	508	1	62	No	No	No	No	No	No	No	Yes	No	No
15	2	508	1	62	No	No	No	No	No	No	No	Yes	No	No
16	2	494	1	61	No	No	No	No	No	No	No	No	No	No
17	2	282	1	35	No	No	No	No	No	No	No	No	No	No
18	2	155	1	19	No	No	No	No	No	No	No	No	No	No
19	2	141	1	17	No	No	No	No	No	No	No	No	No	No
20	2	56	1	7	No	No	No	No	No	No	No	No	No	No
21	2	42	1	5	No	No	No	No	No	No	No	No	No	No
22	2	42	1	5	No	No	No	No	No	No	No	No	No	No
23	2	28	1	3	No	No	No	No	No	No	No	No	No	No
24	2	28	1	3	No	No	No	No	No	No	No	No	No	No
Hours Met					3	5	7	8	6	8	11	15	5	1

Warrant 3 Condition A

Orientation	N
Total Stopped Delay Per Vehicle on Minor Approach (s)	872.9
Number of Lanes on Minor Street Approach	1
VehicleHours of Stopped Delay on Minor Approach ([h]h:mm)	41:56
Delay Condition Met	Yes
Volume on Minor Street Approach During Same Hour	173
High Minor Volume Condition Met	Yes
Total Entering Volume on All Approaches During Same Hour	1585
Number of Approaches on Intersection	2
Total Volume Condition Met	Yes
Warrant Met for Approach	Yes
Warrant Met for Intersection	**Yes**

Signal Warrants Report For Intersection 21: Bay Street & Elizabeth Avenue

Warrants Summary

Warrant	Name	Met?
#1	Eight Hour Vehicular Volume	Yes
#2	Four Hour Vehicular Volume	Yes
#3	Peak Hour	Yes

Intersection Warrants Parameters

Major Approaches	W
Minor Approaches	S, N
Speed > 40mph	No
Population < 10,000	No
Warrant Factor	100%

Warrant Analysis Traffic Volumes

Hour	Major Streets	Minor Streets	
	W	S	N
1	1330	289	21
2	1277	277	20
3	1250	272	20
4	1064	231	17
5	1011	220	16
6	904	197	14
7	838	182	13
8	798	173	13
9	638	139	10
10	599	130	9
11	599	130	9
12	572	124	9
13	519	113	8
14	479	104	8
15	479	104	8
16	465	101	7
17	266	58	4
18	146	32	2
19	133	29	2
20	53	12	1
21	40	9	1
22	40	9	1
23	27	6	0
24	27	6	0

Warrant Analysis by Hour

Hour	Major Lanes		Minor Lanes		Warrant 1 Condition A				Warrant 1 Condition B				Warrant 2	Warrant 3
	Number	Volume	Number	Volume	100%	80%	70%	56%	100%	80%	70%	56%		Condition B
1	2	1330	2	310	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2	2	1277	2	297	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3	2	1250	2	292	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4	2	1064	2	248	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
5	2	1011	2	236	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
6	2	904	2	211	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
7	2	838	2	195	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	No
8	2	798	2	186	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	No
9	2	638	2	149	No	Yes	Yes	Yes	No	No	Yes	Yes	No	No
10	2	599	2	139	No	Yes	Yes	Yes	No	No	No	Yes	No	No
11	2	599	2	139	No	Yes	Yes	Yes	No	No	No	Yes	No	No
12	2	572	2	133	No	Yes	Yes	Yes	No	No	No	Yes	No	No
13	2	519	2	121	No	No	Yes	Yes	No	No	No	Yes	No	No
14	2	479	2	112	No	No	No	Yes	No	No	No	No	No	No
15	2	479	2	112	No	No	No	Yes	No	No	No	No	No	No
16	2	465	2	108	No	No	No	Yes	No	No	No	No	No	No
17	2	266	2	62	No	No	No	No	No	No	No	No	No	No
18	2	146	2	34	No	No	No	No	No	No	No	No	No	No
19	2	133	2	31	No	No	No	No	No	No	No	No	No	No
20	2	53	2	13	No	No	No	No	No	No	No	No	No	No
21	2	40	2	10	No	No	No	No	No	No	No	No	No	No
22	2	40	2	10	No	No	No	No	No	No	No	No	No	No
23	2	27	2	6	No	No	No	No	No	No	No	No	No	No
24	2	27	2	6	No	No	No	No	No	No	No	No	No	No
Hours Met					8	12	13	16	6	8	9	13	6	3

Warrant 3 Condition A

Orientation	S	N
Total Stopped Delay Per Vehicle on Minor Approach (s)	4042.2	66.6
Number of Lanes on Minor Street Approach	1	1
VehicleHours of Stopped Delay on Minor Approach ([h]h:mm)	324:30	0:23
Delay Condition Met	Yes	No
Volume on Minor Street Approach During Same Hour	289	21
High Minor Volume Condition Met	Yes	No
Total Entering Volume on All Approaches During Same Hour	1640	1640
Number of Approaches on Intersection	3	3
Total Volume Condition Met	Yes	Yes
Warrant Met for Approach	Yes	No
Warrant Met for Intersection	**Yes**	

Signal Warrants Report For Intersection 31: East Street & Sands Road

Warrants Summary

Warrant	Name	Met?
#1	Eight Hour Vehicular Volume	Yes
#2	Four Hour Vehicular Volume	Yes
#3	Peak Hour	Yes

Intersection Warrants Parameters

Major Approaches	N, S
Minor Approaches	E
Speed > 40mph	No
Population < 10,000	No
Warrant Factor	100%

Warrant Analysis Traffic Volumes

Hour	Major Streets		Minor Streets
	N	S	E
1	532	554	501
2	511	532	481
3	500	521	471
4	426	443	401
5	404	421	381
6	362	377	341
7	335	349	316
8	319	332	301
9	255	266	240
10	239	249	225
11	239	249	225
12	229	238	215
13	207	216	195
14	192	199	180
15	192	199	180
16	186	194	175
17	106	111	100
18	59	61	55
19	53	55	50
20	21	22	20
21	16	17	15
22	16	17	15
23	11	11	10
24	11	11	10

Warrant Analysis by Hour

Hour	Major Lanes		Minor Lanes		Warrant 1 Condition A				Warrant 1 Condition B				Warrant 2	Warrant 3
	Number	Volume	Number	Volume	100%	80%	70%	56%	100%	80%	70%	56%		Condition B
1	2	1086	1	501	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2	2	1043	1	481	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3	2	1021	1	471	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4	2	869	1	401	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
5	2	825	1	381	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
6	2	739	1	341	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No
7	2	684	1	316	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No
8	2	651	1	301	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No
9	2	521	1	240	No	Yes	Yes	Yes	No	No	No	Yes	No	No
10	2	488	1	225	No	Yes	Yes	Yes	No	No	No	No	No	No
11	2	488	1	225	No	Yes	Yes	Yes	No	No	No	No	No	No
12	2	467	1	215	No	No	Yes	Yes	No	No	No	No	No	No
13	2	423	1	195	No	No	Yes	Yes	No	No	No	No	No	No
14	2	391	1	180	No	No	No	Yes	No	No	No	No	No	No
15	2	391	1	180	No	No	No	Yes	No	No	No	No	No	No
16	2	380	1	175	No	No	No	Yes	No	No	No	No	No	No
17	2	217	1	100	No	No	No	No	No	No	No	No	No	No
18	2	120	1	55	No	No	No	No	No	No	No	No	No	No
19	2	108	1	50	No	No	No	No	No	No	No	No	No	No
20	2	43	1	20	No	No	No	No	No	No	No	No	No	No
21	2	33	1	15	No	No	No	No	No	No	No	No	No	No
22	2	33	1	15	No	No	No	No	No	No	No	No	No	No
23	2	22	1	10	No	No	No	No	No	No	No	No	No	No
24	2	22	1	10	No	No	No	No	No	No	No	No	No	No
Hours Met					8	11	13	16	3	6	8	9	8	5

Warrant 3 Condition A

Orientation	E
Total Stopped Delay Per Vehicle on Minor Approach (s)	289.5
Number of Lanes on Minor Street Approach	1
VehicleHours of Stopped Delay on Minor Approach ([h]h:mm)	40:17
Delay Condition Met	Yes
Volume on Minor Street Approach During Same Hour	501
High Minor Volume Condition Met	Yes
Total Entering Volume on All Approaches During Same Hour	1587
Number of Approaches on Intersection	3
Total Volume Condition Met	Yes
Warrant Met for Approach	Yes
Warrant Met for Intersection	**Yes**

Signal Warrants Report For Intersection 36: East Street & East Hill Street

Warrants Summary

Warrant	Name	Met?
#1	Eight Hour Vehicular Volume	No
#2	Four Hour Vehicular Volume	No
#3	Peak Hour	Yes

Intersection Warrants Parameters

Major Approaches	S, N
Minor Approaches	W
Speed > 40mph	No
Population < 10,000	No
Warrant Factor	100%

Warrant Analysis Traffic Volumes

Hour	Major Streets		Minor Streets
	S	N	W
1	261	312	388
2	251	300	372
3	245	293	365
4	209	250	310
5	198	237	295
6	177	212	264
7	164	197	244
8	157	187	233
9	125	150	186
10	117	140	175
11	117	140	175
12	112	134	167
13	102	122	151
14	94	112	140
15	94	112	140
16	91	109	136
17	52	62	78
18	29	34	43
19	26	31	39
20	10	12	16
21	8	9	12
22	8	9	12
23	5	6	8
24	5	6	8

Warrant Analysis by Hour

Hour	Major Lanes		Minor Lanes		Warrant 1 Condition A				Warrant 1 Condition B				Warrant 2	Warrant 3
	Number	Volume	Number	Volume	100%	80%	70%	56%	100%	80%	70%	56%		Condition B
1	2	573	1	388	No	Yes	Yes	Yes	No	No	No	Yes	Yes	No
2	2	551	1	372	No	Yes	Yes	Yes	No	No	No	Yes	Yes	No
3	2	538	1	365	No	Yes	Yes	Yes	No	No	No	Yes	Yes	No
4	2	459	1	310	No	No	Yes	Yes	No	No	No	No	No	No
5	2	435	1	295	No	No	Yes	Yes	No	No	No	No	No	No
6	2	389	1	264	No	No	No	Yes	No	No	No	No	No	No
7	2	361	1	244	No	No	No	Yes	No	No	No	No	No	No
8	2	344	1	233	No	No	No	Yes	No	No	No	No	No	No
9	2	275	1	186	No	No	No	No	No	No	No	No	No	No
10	2	257	1	175	No	No	No	No	No	No	No	No	No	No
11	2	257	1	175	No	No	No	No	No	No	No	No	No	No
12	2	246	1	167	No	No	No	No	No	No	No	No	No	No
13	2	224	1	151	No	No	No	No	No	No	No	No	No	No
14	2	206	1	140	No	No	No	No	No	No	No	No	No	No
15	2	206	1	140	No	No	No	No	No	No	No	No	No	No
16	2	200	1	136	No	No	No	No	No	No	No	No	No	No
17	2	114	1	78	No	No	No	No	No	No	No	No	No	No
18	2	63	1	43	No	No	No	No	No	No	No	No	No	No
19	2	57	1	39	No	No	No	No	No	No	No	No	No	No
20	2	22	1	16	No	No	No	No	No	No	No	No	No	No
21	2	17	1	12	No	No	No	No	No	No	No	No	No	No
22	2	17	1	12	No	No	No	No	No	No	No	No	No	No
23	2	11	1	8	No	No	No	No	No	No	No	No	No	No
24	2	11	1	8	No	No	No	No	No	No	No	No	No	No
Hours Met					0	3	5	8	0	0	0	3	3	0

Warrant 3 Condition A

Orientation	W
Total Stopped Delay Per Vehicle on Minor Approach (s)	386.1
Number of Lanes on Minor Street Approach	1
VehicleHours of Stopped Delay on Minor Approach ([h]h:mm)	41:36
Delay Condition Met	Yes
Volume on Minor Street Approach During Same Hour	388
High Minor Volume Condition Met	Yes
Total Entering Volume on All Approaches During Same Hour	961
Number of Approaches on Intersection	3
Total Volume Condition Met	Yes
Warrant Met for Approach	Yes
Warrant Met for Intersection	**Yes**

Signal Warrants Report For Intersection 41: Parliament Street & East Hill Street

Warrants Summary

Warrant	Name	Met?
#1	Eight Hour Vehicular Volume	No
#2	Four Hour Vehicular Volume	No
#3	Peak Hour	Yes

Intersection Warrants Parameters

Major Approaches	E, W
Minor Approaches	N
Speed > 40mph	No
Population < 10,000	No
Warrant Factor	100%

Warrant Analysis Traffic Volumes

Hour	Major Streets		Minor Streets
	E	W	N
1	423	282	316
2	406	271	303
3	398	265	297
4	338	226	253
5	321	214	240
6	288	192	215
7	266	178	199
8	254	169	190
9	203	135	152
10	190	127	142
11	190	127	142
12	182	121	136
13	165	110	123
14	152	102	114
15	152	102	114
16	148	99	111
17	85	56	63
18	47	31	35
19	42	28	32
20	17	11	13
21	13	8	9
22	13	8	9
23	8	6	6
24	8	6	6

Warrant Analysis by Hour

Hour	Major Lanes		Minor Lanes		Warrant 1 Condition A				Warrant 1 Condition B				Warrant 2	Warrant 3
	Number	Volume	Number	Volume	100%	80%	70%	56%	100%	80%	70%	56%		Condition B
1	2	705	1	316	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No
2	2	677	1	303	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No
3	2	663	1	297	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No
4	2	564	1	253	No	Yes	Yes	Yes	No	No	No	Yes	No	No
5	2	535	1	240	No	Yes	Yes	Yes	No	No	No	Yes	No	No
6	2	480	1	215	No	Yes	Yes	Yes	No	No	No	No	No	No
7	2	444	1	199	No	No	Yes	Yes	No	No	No	No	No	No
8	2	423	1	190	No	No	Yes	Yes	No	No	No	No	No	No
9	2	338	1	152	No	No	No	Yes	No	No	No	No	No	No
10	2	317	1	142	No	No	No	No	No	No	No	No	No	No
11	2	317	1	142	No	No	No	No	No	No	No	No	No	No
12	2	303	1	136	No	No	No	No	No	No	No	No	No	No
13	2	275	1	123	No	No	No	No	No	No	No	No	No	No
14	2	254	1	114	No	No	No	No	No	No	No	No	No	No
15	2	254	1	114	No	No	No	No	No	No	No	No	No	No
16	2	247	1	111	No	No	No	No	No	No	No	No	No	No
17	2	141	1	63	No	No	No	No	No	No	No	No	No	No
18	2	78	1	35	No	No	No	No	No	No	No	No	No	No
19	2	70	1	32	No	No	No	No	No	No	No	No	No	No
20	2	28	1	13	No	No	No	No	No	No	No	No	No	No
21	2	21	1	9	No	No	No	No	No	No	No	No	No	No
22	2	21	1	9	No	No	No	No	No	No	No	No	No	No
23	2	14	1	6	No	No	No	No	No	No	No	No	No	No
24	2	14	1	6	No	No	No	No	No	No	No	No	No	No
Hours Met					3	6	8	9	0	0	3	5	3	0

Warrant 3 Condition A

Orientation	N
Total Stopped Delay Per Vehicle on Minor Approach (s)	496.1
Number of Lanes on Minor Street Approach	1
VehicleHours of Stopped Delay on Minor Approach ([h]h:mm)	43:32
Delay Condition Met	Yes
Volume on Minor Street Approach During Same Hour	316
High Minor Volume Condition Met	Yes
Total Entering Volume on All Approaches During Same Hour	1021
Number of Approaches on Intersection	3
Total Volume Condition Met	Yes
Warrant Met for Approach	Yes
Warrant Met for Intersection	**Yes**

Signal Warrants Report For Intersection 62: East Hill Street & RBC Parking

Warrants Summary

Warrant	Name	Met?
#1	Eight Hour Vehicular Volume	No
#2	Four Hour Vehicular Volume	No
#3	Peak Hour	No

Intersection Warrants Parameters

Major Approaches	E, W
Minor Approaches	S
Speed > 40mph	No
Population < 10,000	No
Warrant Factor	100%

Warrant Analysis Traffic Volumes

Hour	**Major Streets**		**Minor Streets**
	E	W	S
1	466	89	198
2	447	85	190
3	438	84	186
4	373	71	158
5	354	68	150
6	317	61	135
7	294	56	125
8	280	53	119
9	224	43	95
10	210	40	89
11	210	40	89
12	200	38	85
13	182	35	77
14	168	32	71
15	168	32	71
16	163	31	69
17	93	18	40
18	51	10	22
19	47	9	20
20	19	4	8
21	14	3	6
22	14	3	6
23	9	2	4
24	9	2	4

Warrant Analysis by Hour

Hour	Major Lanes		Minor Lanes		Warrant 1 Condition A				Warrant 1 Condition B				Warrant 2	Warrant 3
	Number	Volume	Number	Volume	100%	80%	70%	56%	100%	80%	70%	56%		Condition B
1	2	555	1	198	No	Yes	Yes	Yes	No	No	No	Yes	No	No
2	2	532	1	190	No	Yes	Yes	Yes	No	No	No	Yes	No	No
3	2	522	1	186	No	Yes	Yes	Yes	No	No	No	Yes	No	No
4	2	444	1	158	No	No	Yes	Yes	No	No	No	No	No	No
5	2	422	1	150	No	No	Yes	Yes	No	No	No	No	No	No
6	2	378	1	135	No	No	No	Yes	No	No	No	No	No	No
7	2	350	1	125	No	No	No	Yes	No	No	No	No	No	No
8	2	333	1	119	No	No	No	No	No	No	No	No	No	No
9	2	267	1	95	No	No	No	No	No	No	No	No	No	No
10	2	250	1	89	No	No	No	No	No	No	No	No	No	No
11	2	250	1	89	No	No	No	No	No	No	No	No	No	No
12	2	238	1	85	No	No	No	No	No	No	No	No	No	No
13	2	217	1	77	No	No	No	No	No	No	No	No	No	No
14	2	200	1	71	No	No	No	No	No	No	No	No	No	No
15	2	200	1	71	No	No	No	No	No	No	No	No	No	No
16	2	194	1	69	No	No	No	No	No	No	No	No	No	No
17	2	111	1	40	No	No	No	No	No	No	No	No	No	No
18	2	61	1	22	No	No	No	No	No	No	No	No	No	No
19	2	56	1	20	No	No	No	No	No	No	No	No	No	No
20	2	23	1	8	No	No	No	No	No	No	No	No	No	No
21	2	17	1	6	No	No	No	No	No	No	No	No	No	No
22	2	17	1	6	No	No	No	No	No	No	No	No	No	No
23	2	11	1	4	No	No	No	No	No	No	No	No	No	No
24	2	11	1	4	No	No	No	No	No	No	No	No	No	No
Hours Met					0	3	5	7	0	0	0	3	0	0

Warrant 3 Condition A

Orientation	S
Total Stopped Delay Per Vehicle on Minor Approach (s)	24.6
Number of Lanes on Minor Street Approach	1
VehicleHours of Stopped Delay on Minor Approach ([h]h:mm)	1:21
Delay Condition Met	No
Volume on Minor Street Approach During Same Hour	198
High Minor Volume Condition Met	Yes
Total Entering Volume on All Approaches During Same Hour	753
Number of Approaches on Intersection	3
Total Volume Condition Met	Yes
Warrant Met for Approach	No
Warrant Met for Intersection	**No**

Signal Warrants Report For Intersection 63: Bay Street & Frederick Street

Warrants Summary

Warrant	Name	Met?
#1	Eight Hour Vehicular Volume	No
#2	Four Hour Vehicular Volume	No
#3	Peak Hour	No

Intersection Warrants Parameters

Major Approaches	W
Minor Approaches	N
Speed > 40mph	No
Population < 10,000	No
Warrant Factor	100%

Warrant Analysis Traffic Volumes

Hour	Major Streets	Minor Streets
	W	N
1	1729	44
2	1660	42
3	1625	41
4	1383	35
5	1314	33
6	1176	30
7	1089	28
8	1037	26
9	830	21
10	778	20
11	778	20
12	743	19
13	674	17
14	622	16
15	622	16
16	605	15
17	346	9
18	190	5
19	173	4
20	69	2
21	52	1
22	52	1
23	35	1
24	35	1

Warrant Analysis by Hour

Hour	Major Lanes		Minor Lanes		Warrant 1 Condition A				Warrant 1 Condition B				Warrant 2	Warrant 3
	Number	Volume	Number	Volume	100%	80%	70%	56%	100%	80%	70%	56%		Condition B
1	2	1729	1	44	No	No	No	No	No	No	No	Yes	No	No
2	2	1660	1	42	No	No	No	No	No	No	No	Yes	No	No
3	2	1625	1	41	No	No	No	No	No	No	No	No	No	No
4	2	1383	1	35	No	No	No	No	No	No	No	No	No	No
5	2	1314	1	33	No	No	No	No	No	No	No	No	No	No
6	2	1176	1	30	No	No	No	No	No	No	No	No	No	No
7	2	1089	1	28	No	No	No	No	No	No	No	No	No	No
8	2	1037	1	26	No	No	No	No	No	No	No	No	No	No
9	2	830	1	21	No	No	No	No	No	No	No	No	No	No
10	2	778	1	20	No	No	No	No	No	No	No	No	No	No
11	2	778	1	20	No	No	No	No	No	No	No	No	No	No
12	2	743	1	19	No	No	No	No	No	No	No	No	No	No
13	2	674	1	17	No	No	No	No	No	No	No	No	No	No
14	2	622	1	16	No	No	No	No	No	No	No	No	No	No
15	2	622	1	16	No	No	No	No	No	No	No	No	No	No
16	2	605	1	15	No	No	No	No	No	No	No	No	No	No
17	2	346	1	9	No	No	No	No	No	No	No	No	No	No
18	2	190	1	5	No	No	No	No	No	No	No	No	No	No
19	2	173	1	4	No	No	No	No	No	No	No	No	No	No
20	2	69	1	2	No	No	No	No	No	No	No	No	No	No
21	2	52	1	1	No	No	No	No	No	No	No	No	No	No
22	2	52	1	1	No	No	No	No	No	No	No	No	No	No
23	2	35	1	1	No	No	No	No	No	No	No	No	No	No
24	2	35	1	1	No	No	No	No	No	No	No	No	No	No
Hours Met					0	0	0	0	0	0	0	2	0	0

Warrant 3 Condition A

Orientation	N
Total Stopped Delay Per Vehicle on Minor Approach (s)	853.8
Number of Lanes on Minor Street Approach	1
VehicleHours of Stopped Delay on Minor Approach ([h]h:mm)	10:26
Delay Condition Met	Yes
Volume on Minor Street Approach During Same Hour	44
High Minor Volume Condition Met	No
Total Entering Volume on All Approaches During Same Hour	1773
Number of Approaches on Intersection	2
Total Volume Condition Met	Yes
Warrant Met for Approach	No
Warrant Met for Intersection	**No**

Signal Warrants Report For Intersection 69: CBOB Parliament Entrance

Warrants Summary

Warrant	Name	Met?
#1	Eight Hour Vehicular Volume	No
#2	Four Hour Vehicular Volume	No
#3	Peak Hour	No

Intersection Warrants Parameters

Major Approaches	N, S
Minor Approaches	E
Speed > 40mph	No
Population < 10,000	No
Warrant Factor	100%

Warrant Analysis Traffic Volumes

Hour	Major Streets		Minor Streets
	N	S	E
1	308	170	79
2	296	163	76
3	290	160	74
4	246	136	63
5	234	129	60
6	209	116	54
7	194	107	50
8	185	102	47
9	148	82	38
10	139	77	36
11	139	77	36
12	132	73	34
13	120	66	31
14	111	61	28
15	111	61	28
16	108	59	28
17	62	34	16
18	34	19	9
19	31	17	8
20	12	7	3
21	9	5	2
22	9	5	2
23	6	3	2
24	6	3	2

Warrant Analysis by Hour

Hour	Major Lanes		Minor Lanes		Warrant 1 Condition A				Warrant 1 Condition B				Warrant 2	Warrant 3
	Number	Volume	Number	Volume	100%	80%	70%	56%	100%	80%	70%	56%		Condition B
1	2	478	1	79	No	No	No	No	No	No	No	No	No	No
2	2	459	1	76	No	No	No	No	No	No	No	No	No	No
3	2	450	1	74	No	No	No	No	No	No	No	No	No	No
4	2	382	1	63	No	No	No	No	No	No	No	No	No	No
5	2	363	1	60	No	No	No	No	No	No	No	No	No	No
6	2	325	1	54	No	No	No	No	No	No	No	No	No	No
7	2	301	1	50	No	No	No	No	No	No	No	No	No	No
8	2	287	1	47	No	No	No	No	No	No	No	No	No	No
9	2	230	1	38	No	No	No	No	No	No	No	No	No	No
10	2	216	1	36	No	No	No	No	No	No	No	No	No	No
11	2	216	1	36	No	No	No	No	No	No	No	No	No	No
12	2	205	1	34	No	No	No	No	No	No	No	No	No	No
13	2	186	1	31	No	No	No	No	No	No	No	No	No	No
14	2	172	1	28	No	No	No	No	No	No	No	No	No	No
15	2	172	1	28	No	No	No	No	No	No	No	No	No	No
16	2	167	1	28	No	No	No	No	No	No	No	No	No	No
17	2	96	1	16	No	No	No	No	No	No	No	No	No	No
18	2	53	1	9	No	No	No	No	No	No	No	No	No	No
19	2	48	1	8	No	No	No	No	No	No	No	No	No	No
20	2	19	1	3	No	No	No	No	No	No	No	No	No	No
21	2	14	1	2	No	No	No	No	No	No	No	No	No	No
22	2	14	1	2	No	No	No	No	No	No	No	No	No	No
23	2	9	1	2	No	No	No	No	No	No	No	No	No	No
24	2	9	1	2	No	No	No	No	No	No	No	No	No	No
Hours Met					0	0	0	0	0	0	0	0	0	0

Warrant 3 Condition A

Orientation	E
Total Stopped Delay Per Vehicle on Minor Approach (s)	12.7
Number of Lanes on Minor Street Approach	1
VehicleHours of Stopped Delay on Minor Approach ([h]h:mm)	0:16
Delay Condition Met	No
Volume on Minor Street Approach During Same Hour	79
High Minor Volume Condition Met	No
Total Entering Volume on All Approaches During Same Hour	557
Number of Approaches on Intersection	3
Total Volume Condition Met	No
Warrant Met for Approach	No
Warrant Met for Intersection	**No**

Signal Warrants Report For Intersection 70: CBOB East Street Access

Warrants Summary

Warrant	Name	Met?
#1	Eight Hour Vehicular Volume	No
#2	Four Hour Vehicular Volume	No
#3	Peak Hour	No

Intersection Warrants Parameters

Major Approaches	N, S
Minor Approaches	W
Speed > 40mph	No
Population < 10,000	No
Warrant Factor	100%

Warrant Analysis Traffic Volumes

Hour	Major Streets		Minor Streets
	N	S	W
1	229	269	100
2	220	258	96
3	215	253	94
4	183	215	80
5	174	204	76
6	156	183	68
7	144	169	63
8	137	161	60
9	110	129	48
10	103	121	45
11	103	121	45
12	98	116	43
13	89	105	39
14	82	97	36
15	82	97	36
16	80	94	35
17	46	54	20
18	25	30	11
19	23	27	10
20	9	11	4
21	7	8	3
22	7	8	3
23	5	5	2
24	5	5	2

Warrant Analysis by Hour

Hour	Major Lanes		Minor Lanes		Warrant 1 Condition A				Warrant 1 Condition B				Warrant 2	Warrant 3
	Number	Volume	Number	Volume	100%	80%	70%	56%	100%	80%	70%	56%		Condition B
1	2	498	1	100	No	No	No	Yes	No	No	No	No	No	No
2	2	478	1	96	No	No	No	Yes	No	No	No	No	No	No
3	2	468	1	94	No	No	No	Yes	No	No	No	No	No	No
4	2	398	1	80	No	No	No	No	No	No	No	No	No	No
5	2	378	1	76	No	No	No	No	No	No	No	No	No	No
6	2	339	1	68	No	No	No	No	No	No	No	No	No	No
7	2	313	1	63	No	No	No	No	No	No	No	No	No	No
8	2	298	1	60	No	No	No	No	No	No	No	No	No	No
9	2	239	1	48	No	No	No	No	No	No	No	No	No	No
10	2	224	1	45	No	No	No	No	No	No	No	No	No	No
11	2	224	1	45	No	No	No	No	No	No	No	No	No	No
12	2	214	1	43	No	No	No	No	No	No	No	No	No	No
13	2	194	1	39	No	No	No	No	No	No	No	No	No	No
14	2	179	1	36	No	No	No	No	No	No	No	No	No	No
15	2	179	1	36	No	No	No	No	No	No	No	No	No	No
16	2	174	1	35	No	No	No	No	No	No	No	No	No	No
17	2	100	1	20	No	No	No	No	No	No	No	No	No	No
18	2	55	1	11	No	No	No	No	No	No	No	No	No	No
19	2	50	1	10	No	No	No	No	No	No	No	No	No	No
20	2	20	1	4	No	No	No	No	No	No	No	No	No	No
21	2	15	1	3	No	No	No	No	No	No	No	No	No	No
22	2	15	1	3	No	No	No	No	No	No	No	No	No	No
23	2	10	1	2	No	No	No	No	No	No	No	No	No	No
24	2	10	1	2	No	No	No	No	No	No	No	No	No	No
Hours Met					0	0	0	3	0	0	0	0	0	0

Warrant 3 Condition A

Orientation	W
Total Stopped Delay Per Vehicle on Minor Approach (s)	10.9
Number of Lanes on Minor Street Approach	1
VehicleHours of Stopped Delay on Minor Approach ([h]h:mm)	0:18
Delay Condition Met	No
Volume on Minor Street Approach During Same Hour	100
High Minor Volume Condition Met	Yes
Total Entering Volume on All Approaches During Same Hour	598
Number of Approaches on Intersection	3
Total Volume Condition Met	No
Warrant Met for Approach	No
Warrant Met for Intersection	**No**

Appendix F

5 Year Horizon Capacity Analysis

CB 5-Yr No Realignment Traffic Report

Vistro File: Y:\...\01-CBOB Wkday 5-Year No Realignment 25Sep19.vistro

Scenario: Base Scenario

Report File: Y:\...\00-CBOB Wkday 5-Year No Realignment E6 25Sep19.pdf

25/09/2019

Intersection Analysis Summary

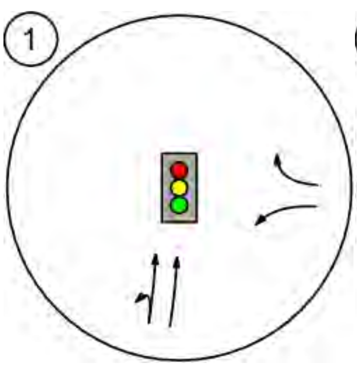
ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Blue Hill Road/Cumberland & Duke	Signalized	HCM 6th Edition	NB Left	0.894	94.8	F
6	Market Street & Duke Street	Signalized	HCM 6th Edition	SB Right	0.612	15.2	B
11	Shirley Street & Frederick Street	Signalized	HCM 6th Edition	SB Thru	0.925	46.7	D
16	Bay Street & Parliament Street	Signalized	HCM 6th Edition	SB Left	0.870	30.5	C
21	Bay Street & Elizabeth Avenue	Signalized	HCM 6th Edition	NB Right	0.834	114.0	F
26	Shirley Street & Elizabeth Avenue	Signalized	HCM 6th Edition	SB Right	10,237.011	291.4	F
31	East Street & Sands Road	Signalized	HCM 6th Edition	WB Left	1.410	335.8	F
36	East Street & East Hill Street	Roundabout	HCM 6th Edition	SEB Right		8.6	A
41	Parliament Street & East Hill Street	Two-way stop	HCM 6th Edition	SB Right	1.321	218.0	F
46	Shirley Street & Parliament Street	Signalized	HCM 6th Edition	SB Thru	0.684	82.4	F
56	East Street & Shirley Street	Signalized	HCM 6th Edition	NB Thru	0.655	148.5	F
61	East Hill Street Slip Roads	Unknown	?		?	?	?
62	East Hill Street & RBC Parking	Two-way stop	HCM 6th Edition	NB Right	1.067	113.0	F
63	Bay Street & Frederick Street	Signalized	HCM 6th Edition	EB Right	1.081	184.5	F
64	Bay Street & East Street	Signalized	HCM 6th Edition	NB Right	0.786	40.0	D
65	Bay Street & Market Street	Two-way stop	HCM 6th Edition	EB Thru	0.018	0.0	A
67	CBOB Parliament Access	Two-way stop	HCM 6th Edition	WB Left	0.126	11.5	B

69	CBOB East Street Access	Two-way stop	HCM 6th Edition	EB Left	0.142	11.0	B
72	Market St. & Peck Slope Slip Lane	Unknown	?		?	?	?
73	Mackey St. & East Hill Slip Road	Unknown	?		?	?	?

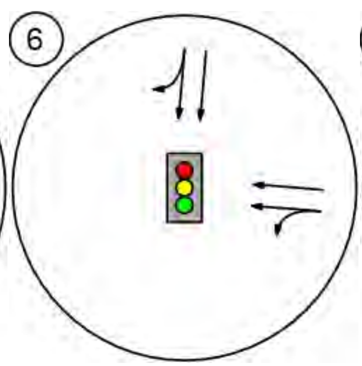
V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Report Figure 1: Lane Configuration and Traffic Control

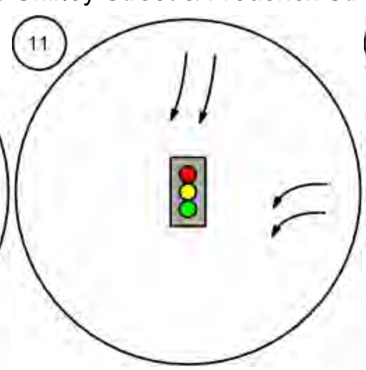
Blue Hill Road/Cumberland &



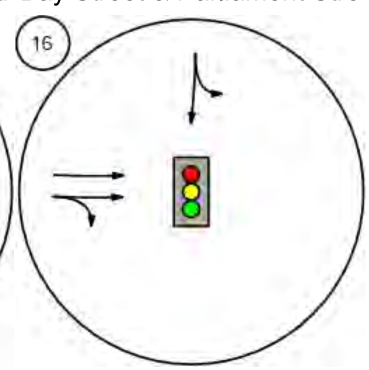
Market Street & Duke Street



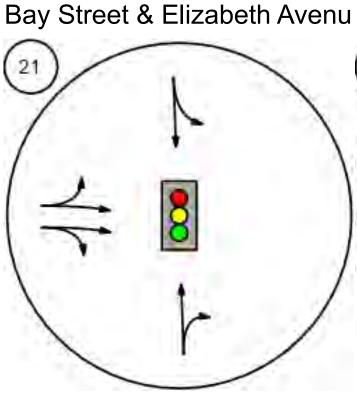
Shirley Street & Frederick Str



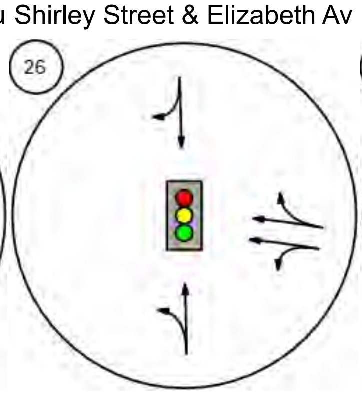
Bay Street & Parliament Stre



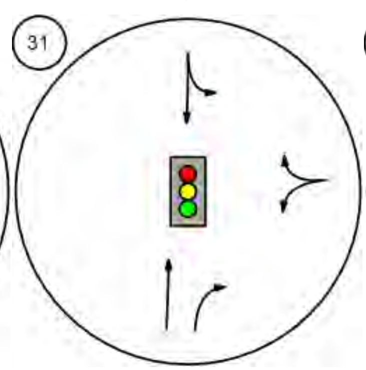
Bay Street & Elizabeth Avenu



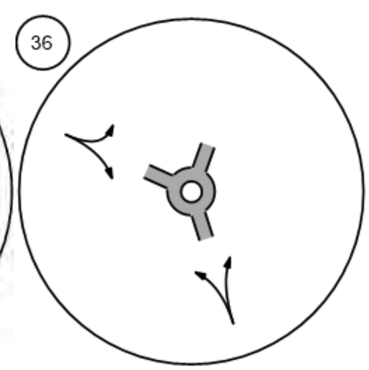
Shirley Street & Elizabeth Av



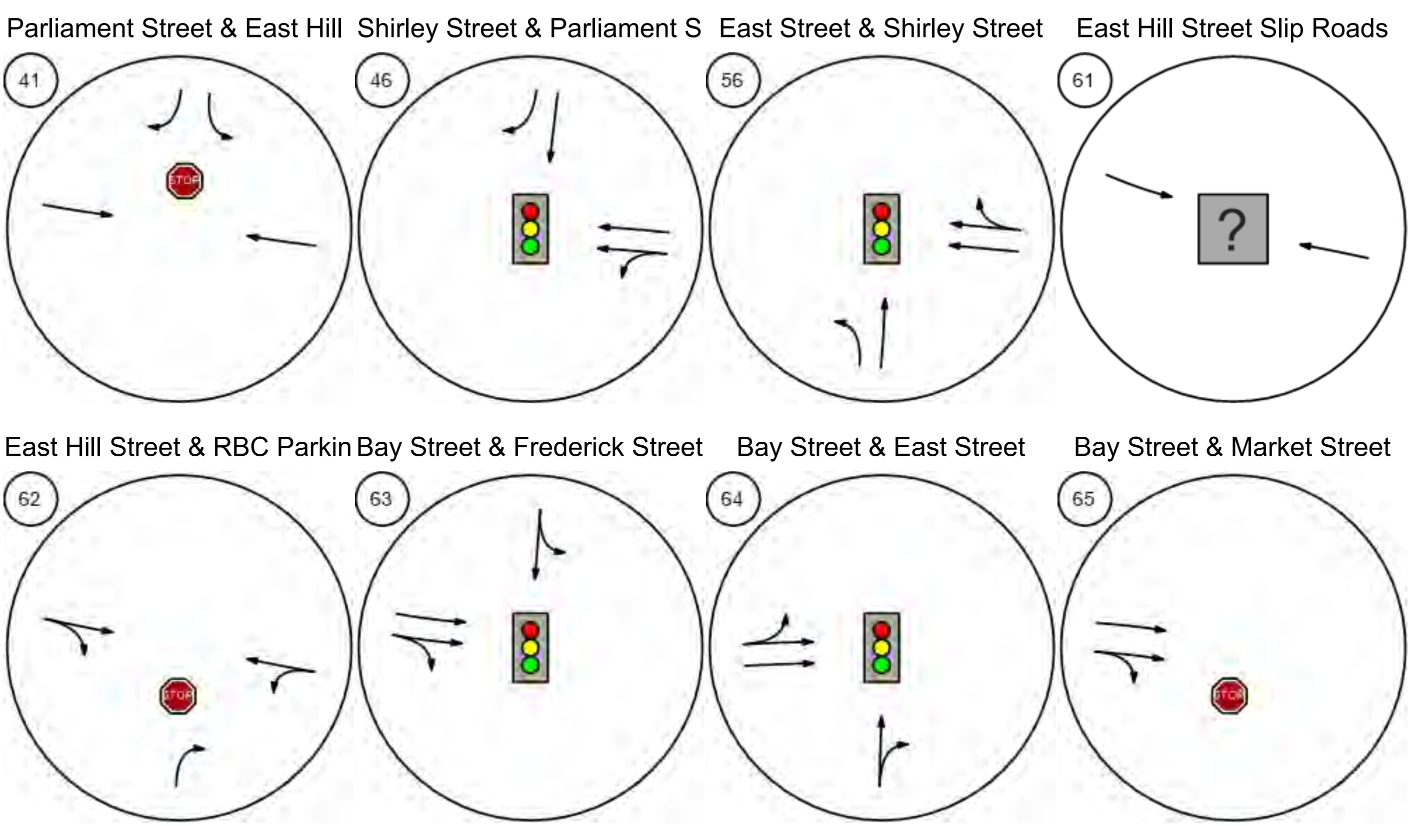
East Street & Sands Road



East Street & East Hill Street

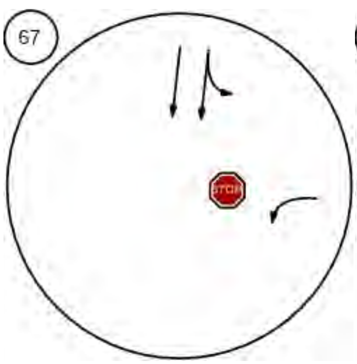


Report Figure 1: Lane Configuration and Traffic Control

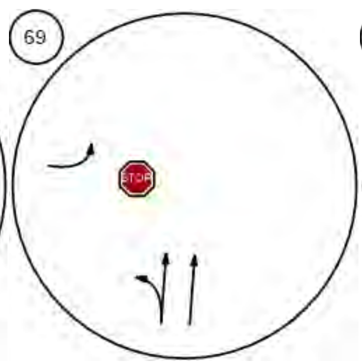


Report Figure 1: Lane Configuration and Traffic Control

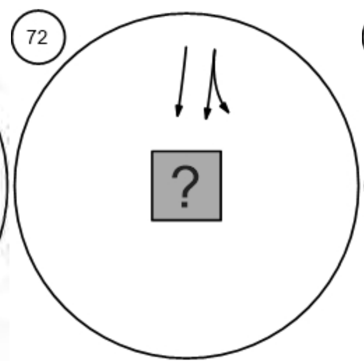
CBOB Parliament Access



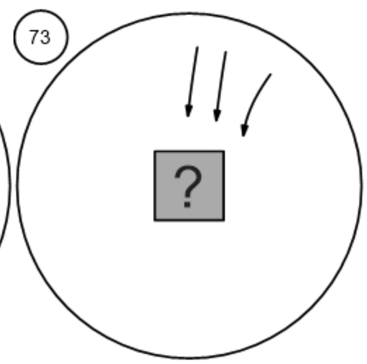
CBOB East Street Access



Market St. & Peck Slope Slip



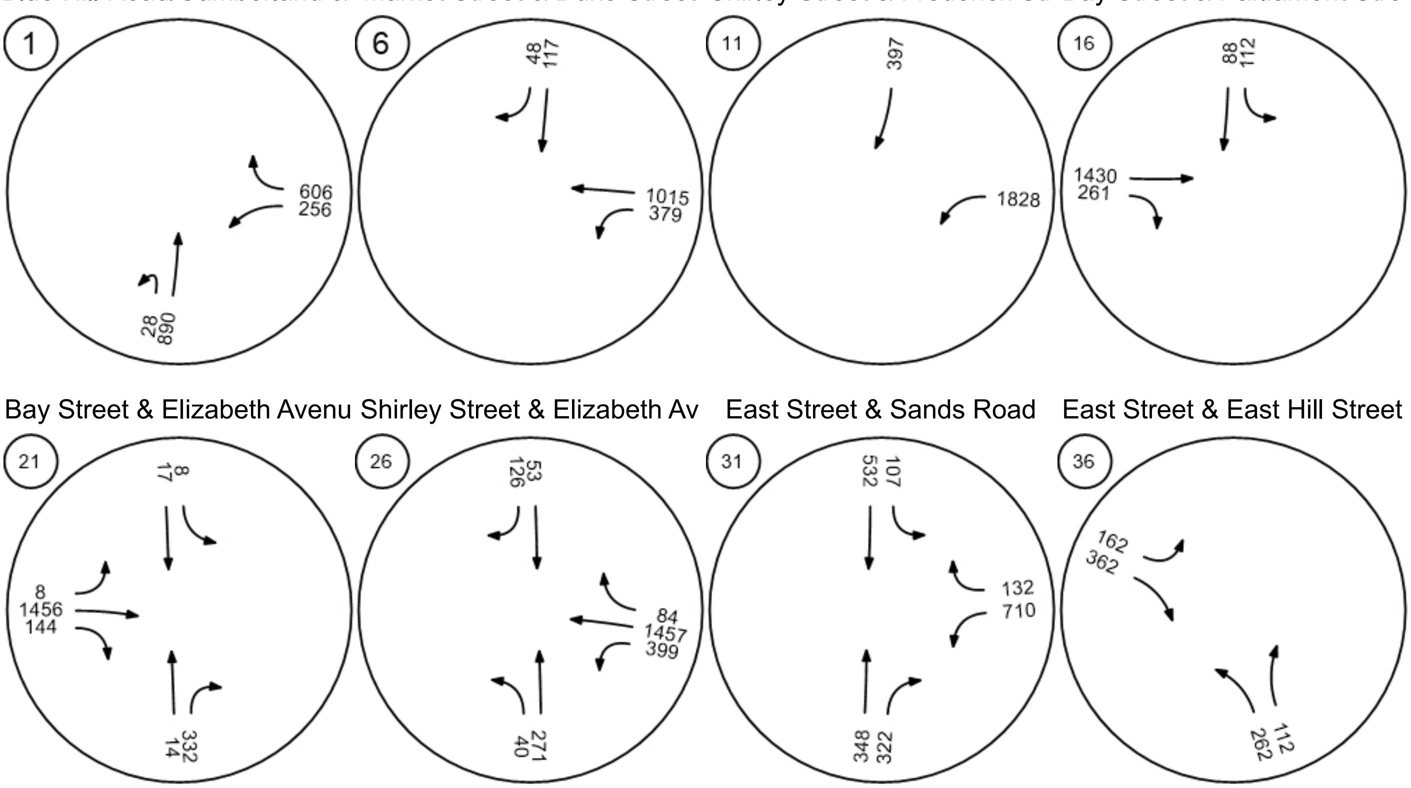
Mackey St. & East Hill Slip R



Report Figure 2f: Traffic Volume - Future Total Volume

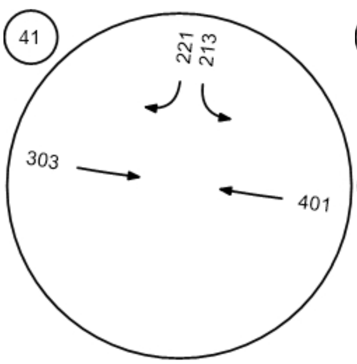
Blue Hill Road/Cumberland & | Market Street & Duke Street | Shirley Street & Frederick Str | Bay Street & Parliament Stre

Bay Street & Elizabeth Avenu | Shirley Street & Elizabeth Av | East Street & Sands Road | East Street & East Hill Street

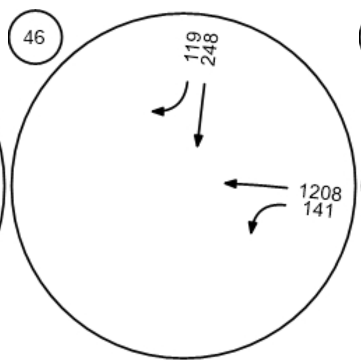


Report Figure 2f: Traffic Volume - Future Total Volume

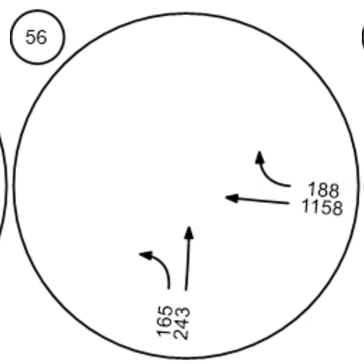
Parliament Street & East Hill



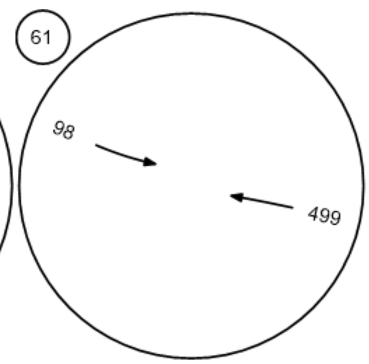
Shirley Street & Parliament S



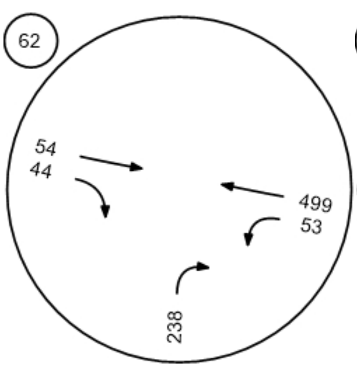
East Street & Shirley Street



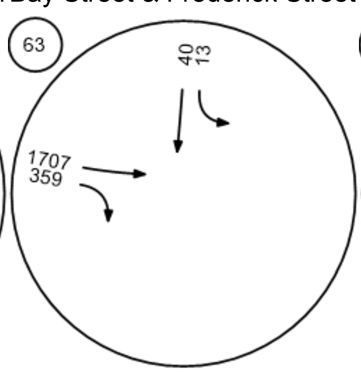
East Hill Street Slip Roads



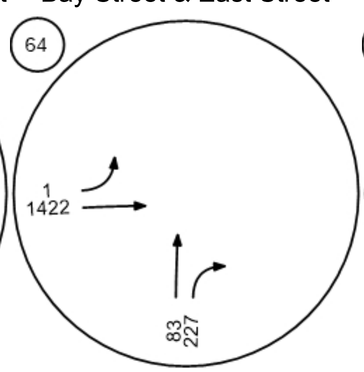
East Hill Street & RBC Parkin



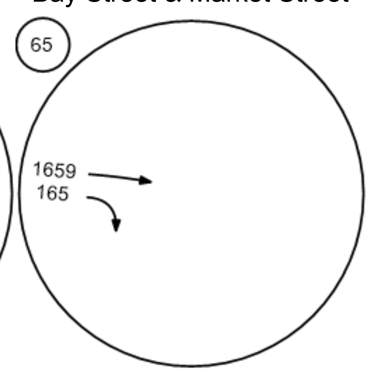
Bay Street & Frederick Street



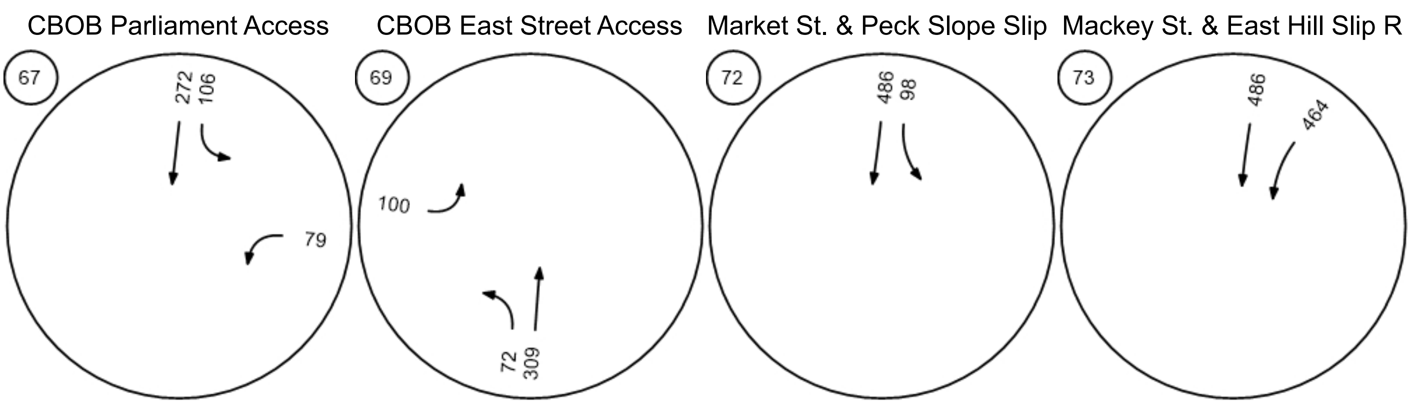
Bay Street & East Street



Bay Street & Market Street



Report Figure 2f: Traffic Volume - Future Total Volume



CBOB 5-Yr Realignment Traffic Report

Vistro File: Y:\...\01-CB Wkday Realigned 5-Year Hor 23Sep19.vistro

Scenario: Base Scenario

Report File: Y:\...\00-CB Wkday 5-Yr Hor Realignment E7 23Sep19.pdf

23/09/2019

Intersection Analysis Summary

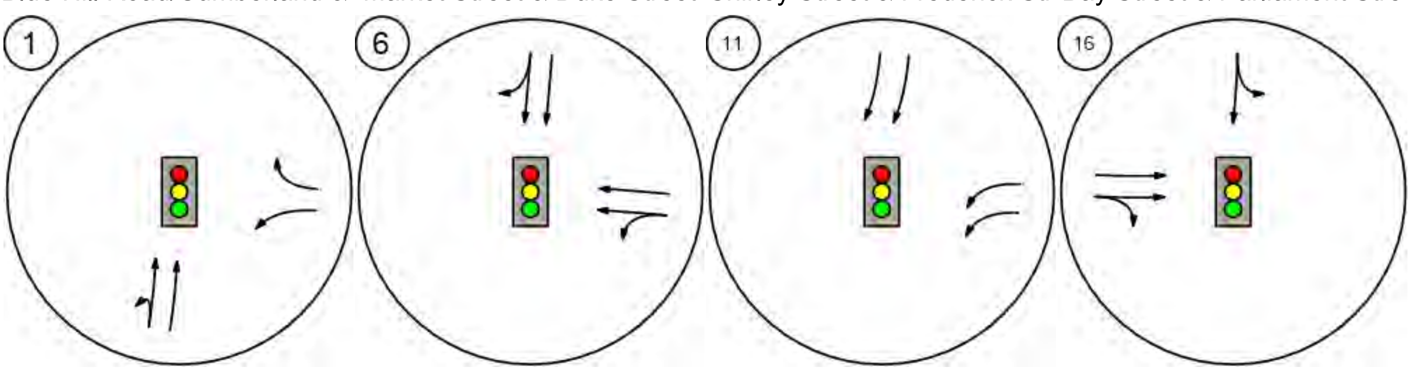
ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Blue Hill Road/Cumberland & Duke	Signalized	HCM 6th Edition	NB Left	0.894	94.8	F
6	Market Street & Duke Street	Signalized	HCM 6th Edition	SB Right	0.612	15.2	B
11	Shirley Street & Frederick Street	Signalized	HCM 6th Edition	SB Thru	0.925	46.7	D
16	Bay Street & Parliament Street	Signalized	HCM 6th Edition	SB Left	0.870	30.5	C
21	Bay Street & Elizabeth Avenue	Signalized	HCM 6th Edition	NB Right	0.834	114.0	F
26	Shirley Street & Elizabeth Avenue	Signalized	HCM 6th Edition	NB Thru	1.132	136.0	F
31	East Street & Sands Road (Realigned)	Roundabout	HCM 6th Edition	WB Left		12.0	B
41	Parliament Street & East Hill Street (Realigned)	Roundabout	HCM 6th Edition	SB Right		5.3	A
46	Shirley Street & Parliament Street	Signalized	HCM 6th Edition	SB Thru	0.684	82.4	F
56	East Street & Shirley Street	Signalized	HCM 6th Edition	NB Thru	0.655	148.5	F
61	East Hill Street Slip Roads	Unknown	?		?	?	?
62	East Hill Street & RBC Parking	Two-way stop	HCM 6th Edition	NB Right	1.067	113.0	F
63	Bay Street & Frederick Street	Signalized	HCM 6th Edition	EB Right	1.081	184.5	F
64	Bay Street & East Street	Signalized	HCM 6th Edition	NB Right	0.786	40.0	D
65	Bay Street & Market Street	Two-way stop	HCM 6th Edition	EB Thru	0.018	0.0	A
67	CBOB Parliament Access	Two-way stop	HCM 6th Edition	WB Left	0.131	11.9	B
69	CBOB East Street Access	Two-way stop	HCM 6th Edition	EB Left	0.142	11.0	B

70	CBOB Parking Ramp Exit	Two-way stop	HCM 6th Edition	EB Thru	0.000	0.0	A
72	Market St. & Peck Slope Slip Lane	Unknown	?		?	?	?
73	Mackey St. & East Hill Slip Road	Unknown	?		?	?	?
74	Parliament & East Hill (Realigned)	Roundabout	HCM 6th Edition	SB Left		5.0	A

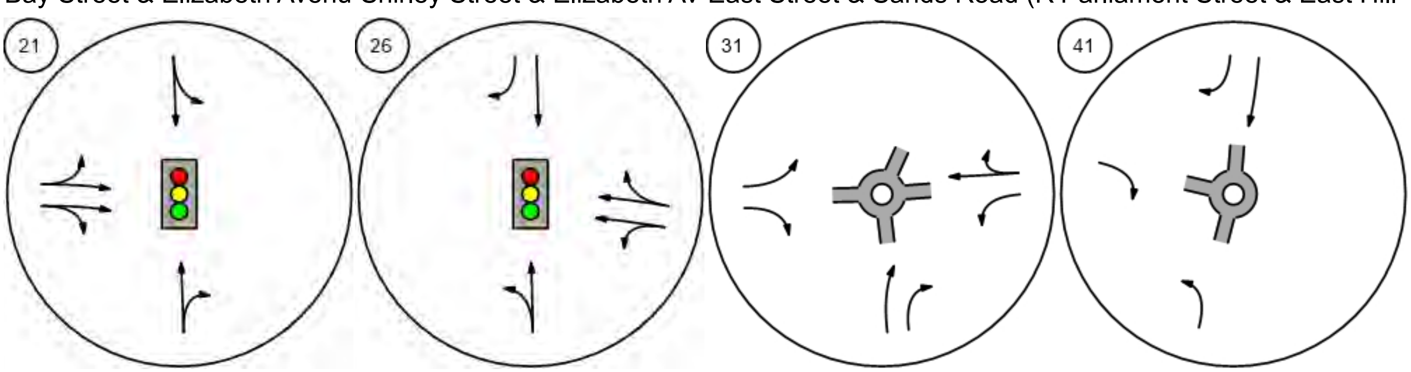
V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Report Figure 1: Lane Configuration and Traffic Control

Blue Hill Road/Cumberland & Market Street & Duke Street Shirley Street & Frederick Str Bay Street & Parliament Stre

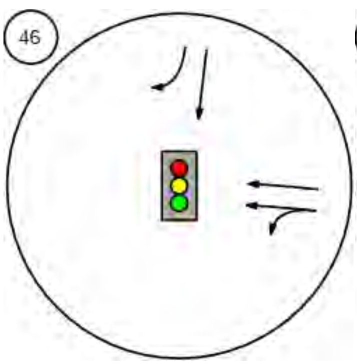


Bay Street & Elizabeth Avenu Shirley Street & Elizabeth Av East Street & Sands Road (R Parliament Street & East Hill

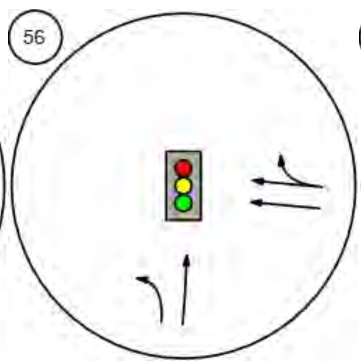


Report Figure 1: Lane Configuration and Traffic Control

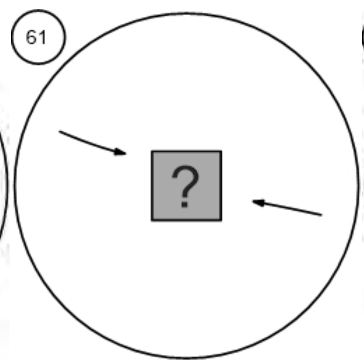
Shirley Street & Parliament S



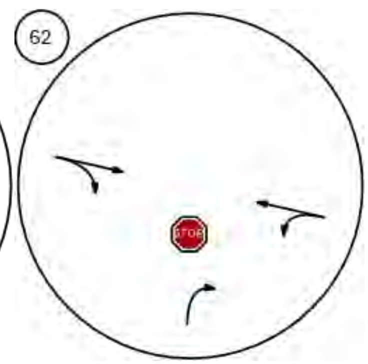
East Street & Shirley Street



East Hill Street Slip Roads



East Hill Street & RBC Parkin



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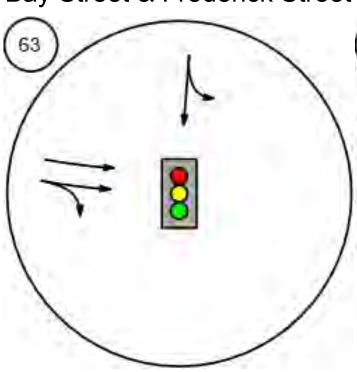

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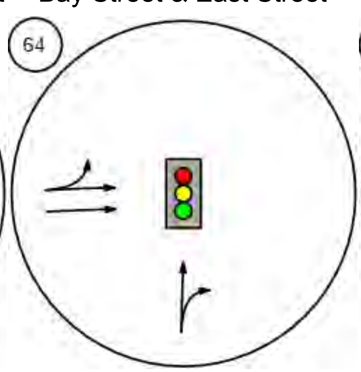
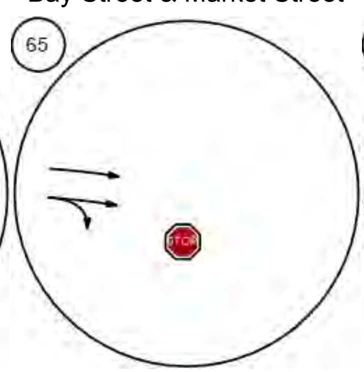
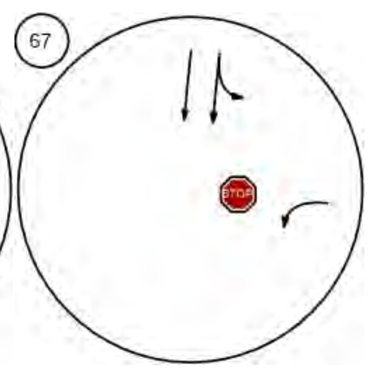


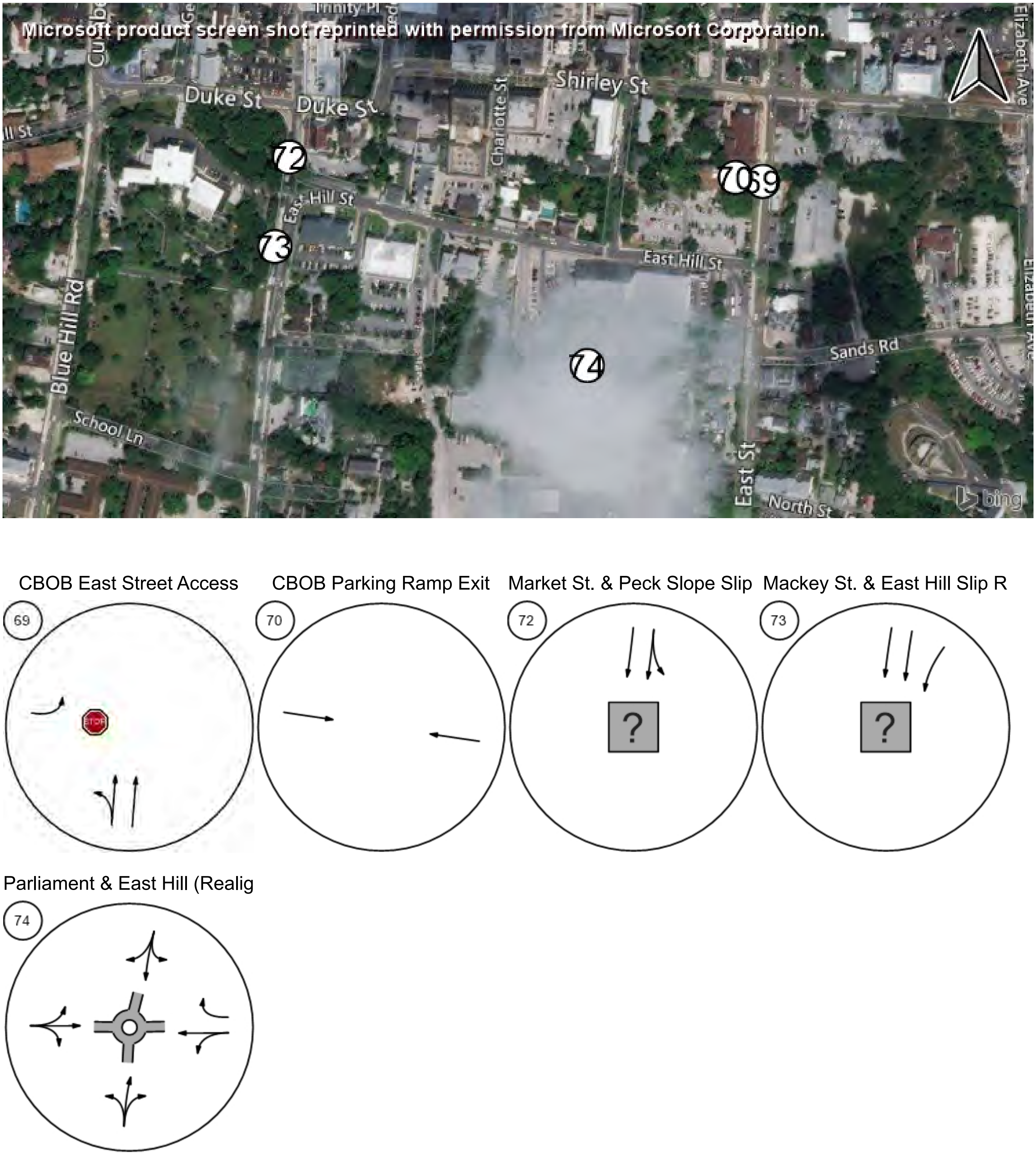
Bay Street & Market Street



CBOB Parliament Access

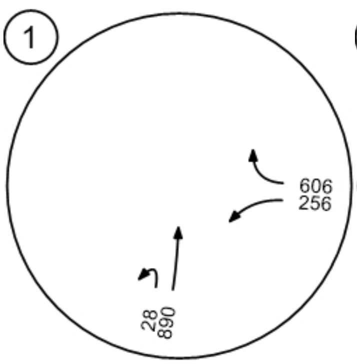


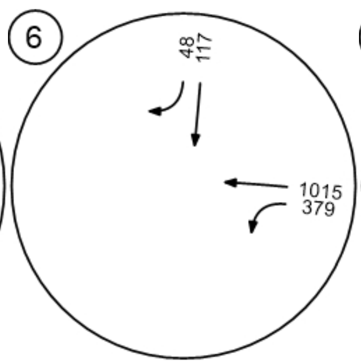
Report Figure 1: Lane Configuration and Traffic Control

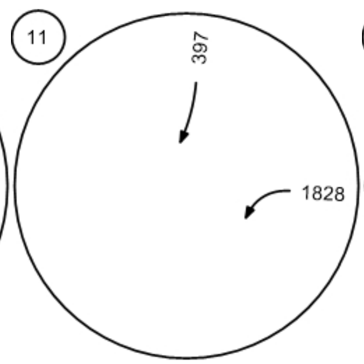


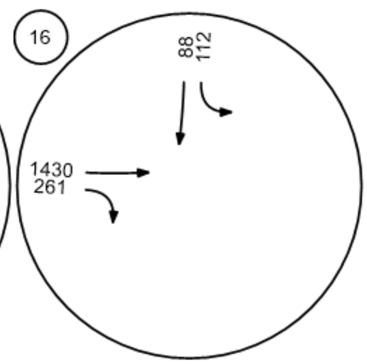
Report Figure 2f: Traffic Volume - Future Total Volume

Blue Hill Road/Cumberland & Market Street & Duke Street Shirley Street & Frederick Str Bay Street & Parliament Stre

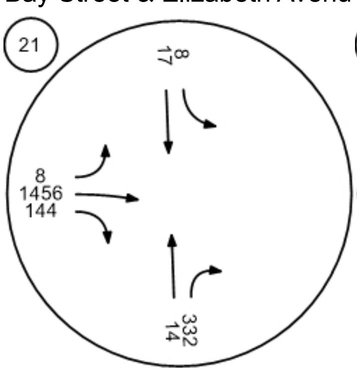


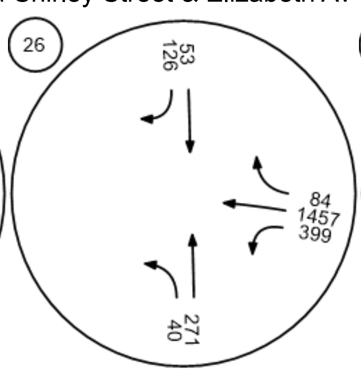


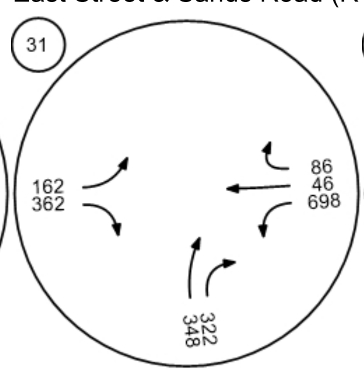


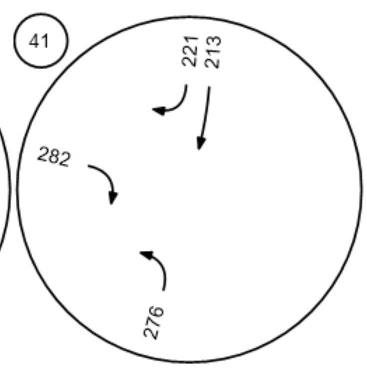


Bay Street & Elizabeth Avenu Shirley Street & Elizabeth Av East Street & Sands Road (R Parliament Street & East Hill



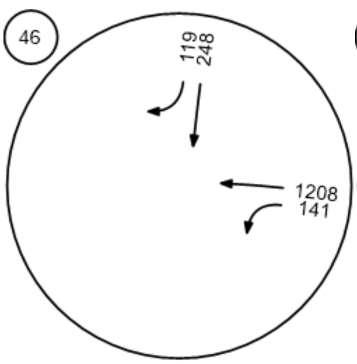




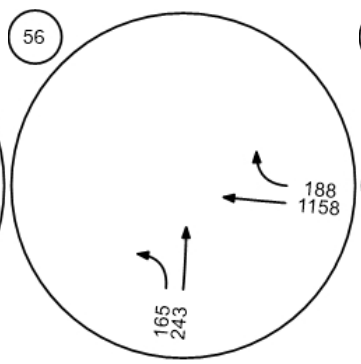


Report Figure 2f: Traffic Volume - Future Total Volume

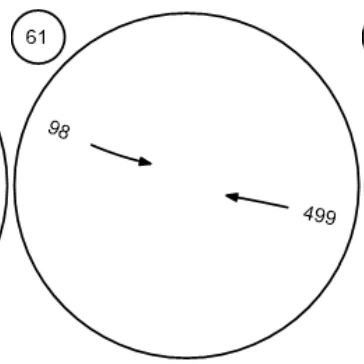
Shirley Street & Parliament S



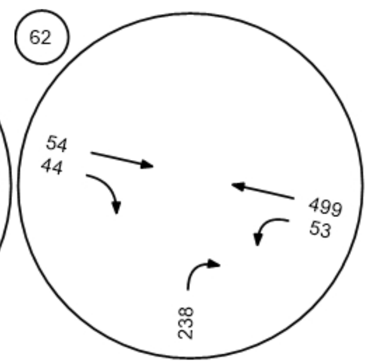
East Street & Shirley Street



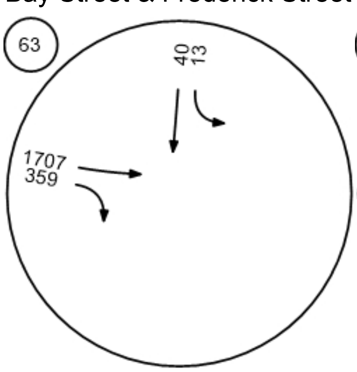
East Hill Street Slip Roads



East Hill Street & RBC Parkin



Bay Street & Frederick Street



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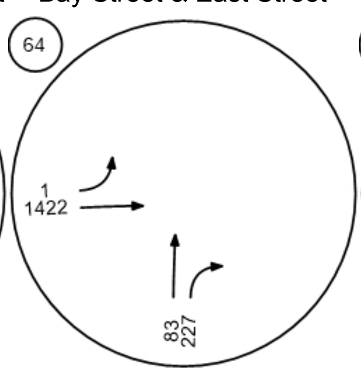
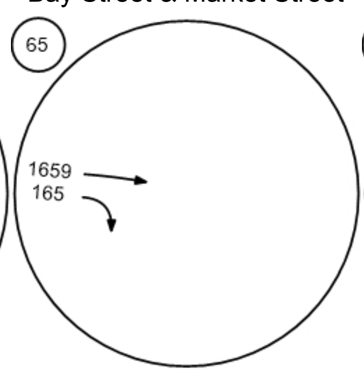
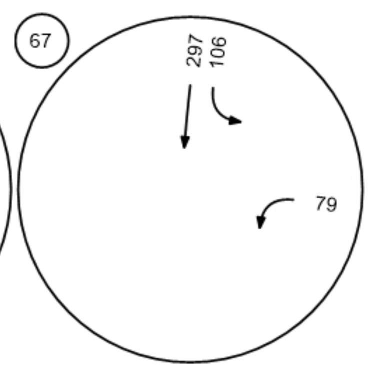


Bay Street & Market Street

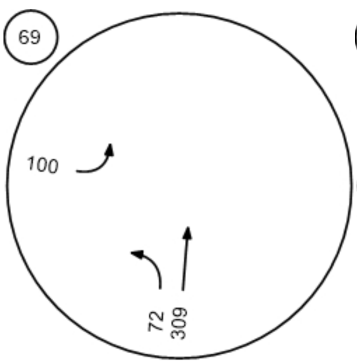


CBOB Parliament Access

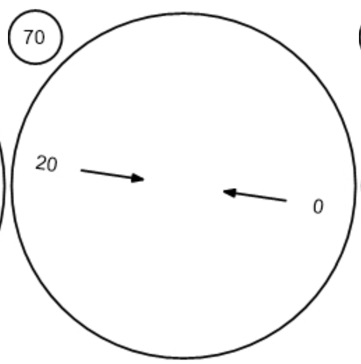


Report Figure 2f: Traffic Volume - Future Total Volume

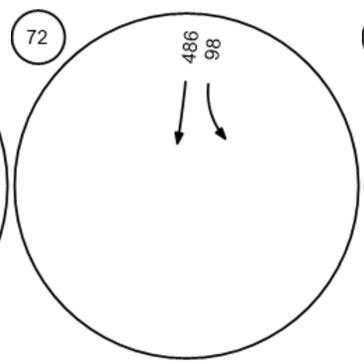
CBOB East Street Access



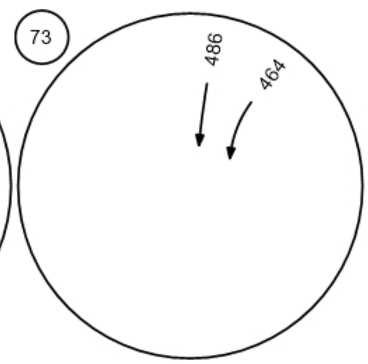
CBOB Parking Ramp Exit



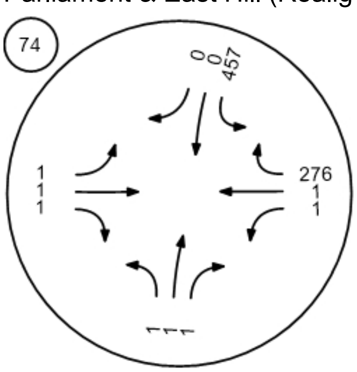
Market St. & Peck Slope Slip



Mackey St. & East Hill Slip R



Parliament & East Hill (Realig



Appendix G

20 Year Horizon Capacity Analysis

CBOB 20-Yr Ex Realignment Traffic Report

Vistro File: Y:\...\01-CB Wkday Realigned 20-Year Hor 23Sep19.vistro

Scenario: Base Scenario

Report File: Y:\...\01-CB Wkday Realign 20-Year Hor 24Sep19.pdf

24/09/2019

Intersection Analysis Summary

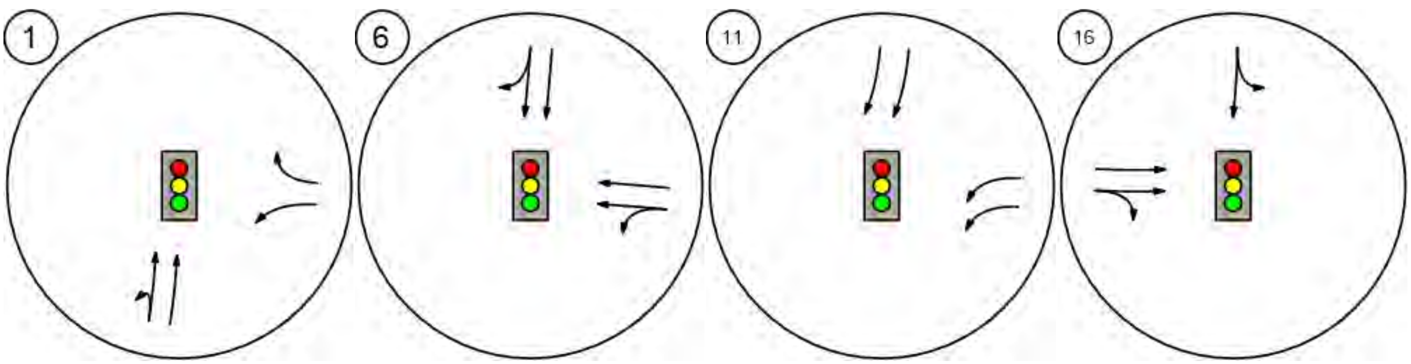
ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Blue Hill Road/Cumberland & Duke	Signalized	HCM 6th Edition	NB Left	1.370	272.8	F
6	Market Street & Duke Street	Signalized	HCM 6th Edition	SB Right	0.936	43.4	D
11	Shirley Street & Frederick Street	Signalized	HCM 6th Edition	SB Thru	1.375	239.3	F
16	Bay Street & Parliament Street	Signalized	HCM 6th Edition	SB Left	1.299	206.4	F
21	Bay Street & Elizabeth Avenue	Signalized	HCM 6th Edition	NB Right	1.334	367.4	F
26	Shirley Street & Elizabeth Avenue	Signalized	HCM 6th Edition	NB Thru	1.640	364.6	F
31	East Street & Sands Road (Realigned)	Roundabout	HCM 6th Edition	EB Right		75.4	F
41	Parliament Street & East Hill Street (Realigned)	Roundabout	HCM 6th Edition	SB Right		6.1	A
46	Shirley Street & Parliament Street	Signalized	HCM 6th Edition	SB Thru	0.972	150.7	F
56	East Street & Shirley Street	Signalized	HCM 6th Edition	NB Thru	0.976	207.9	F
61	East Hill Street Slip Roads	Unknown	?		?	?	?
62	East Hill Street & RBC Parking	Two-way stop	HCM 6th Edition	NB Right	3.269	1,089.4	F
63	Bay Street & Frederick Street	Signalized	HCM 6th Edition	EB Right	1.610	476.4	F
64	Bay Street & East Street	Signalized	HCM 6th Edition	NB Right	1.202	158.1	F
65	Bay Street & Market Street	Two-way stop	HCM 6th Edition	EB Thru	0.028	0.0	A
67	CBOB Parliament Access	Two-way stop	HCM 6th Edition	WB Left	0.148	12.9	B
69	CBOB East Street Access	Two-way stop	HCM 6th Edition	EB Left	0.168	12.3	B

72	Market St. & Peck Slope Slip Lane	Unknown	?		?	?	?
73	Mackey St. & East Hill Slip Road	Unknown	?		?	?	?
74	Parliament & East Hill (Realigned)	Roundabout	HCM 6th Edition	SB Left		5.0	A

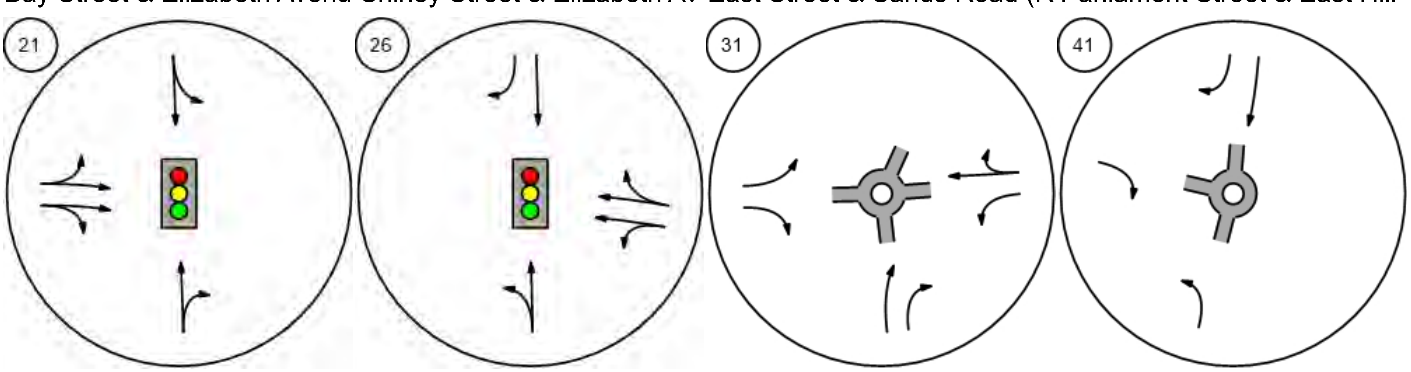
V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Report Figure 1: Lane Configuration and Traffic Control

Blue Hill Road/Cumberland & Market Street & Duke Street Shirley Street & Frederick Str Bay Street & Parliament Stre

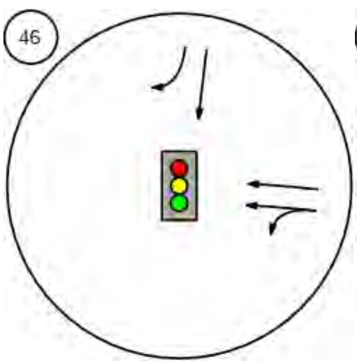


Bay Street & Elizabeth Avenu Shirley Street & Elizabeth Av East Street & Sands Road (R Parliament Street & East Hill

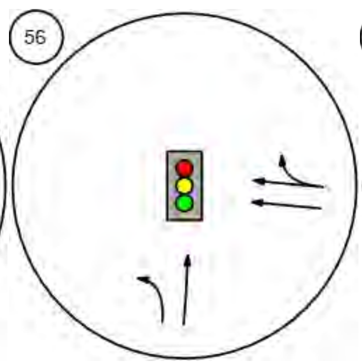


Report Figure 1: Lane Configuration and Traffic Control

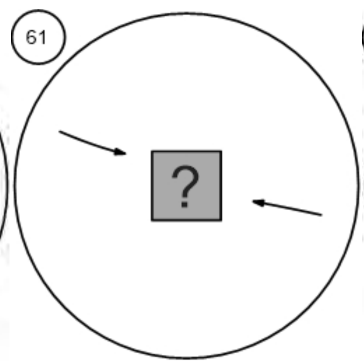
Shirley Street & Parliament S



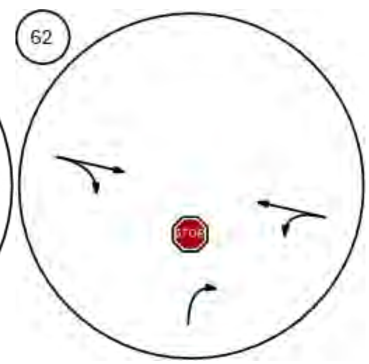
East Street & Shirley Street



East Hill Street Slip Roads



East Hill Street & RBC Parkin



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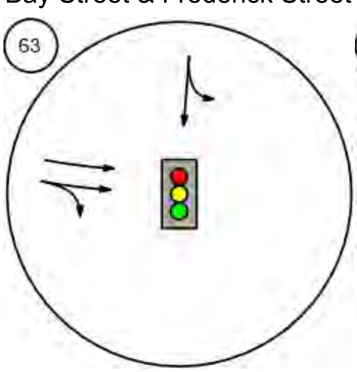

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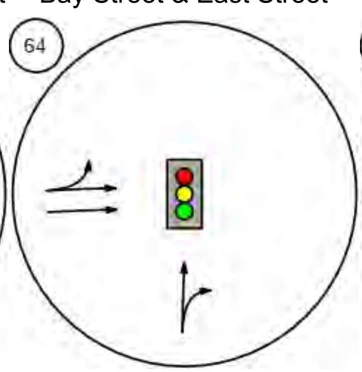

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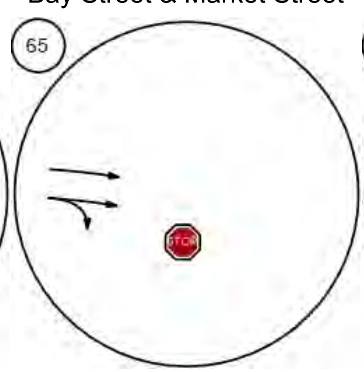
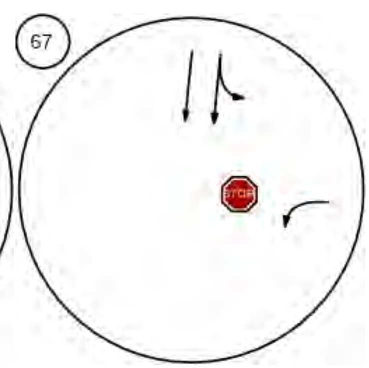
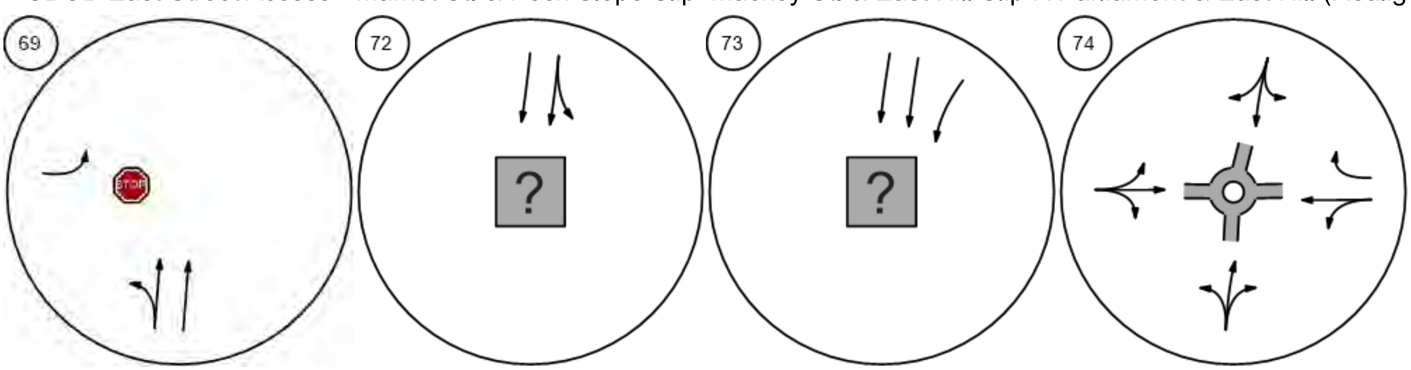


CBOB Parliament Access



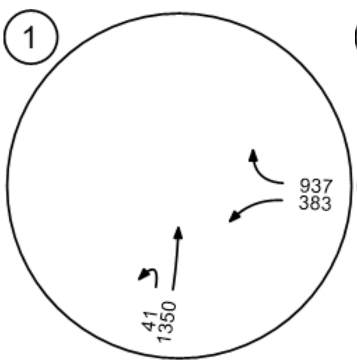
Report Figure 1: Lane Configuration and Traffic Control

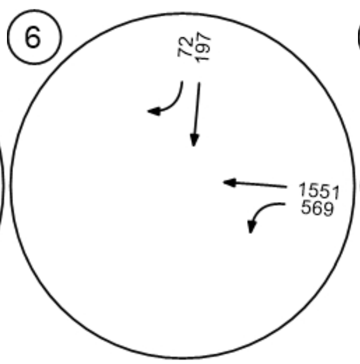
CBOB East Street Access | Market St. & Peck Slope Slip | Mackey St. & East Hill Slip R | Parliament & East Hill (Realig

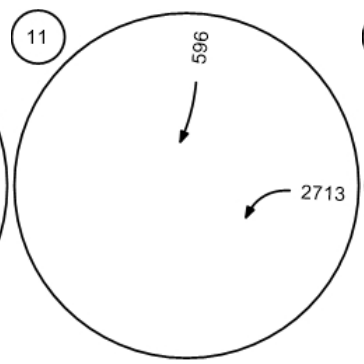


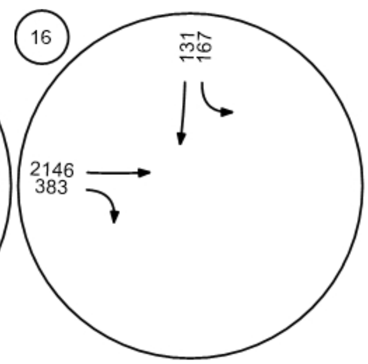
Report Figure 2f: Traffic Volume - Future Total Volume

Blue Hill Road/Cumberland & Market Street & Duke Street Shirley Street & Frederick Str Bay Street & Parliament Stre

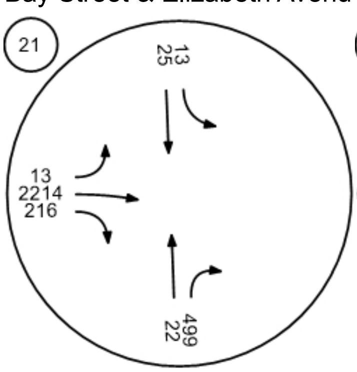


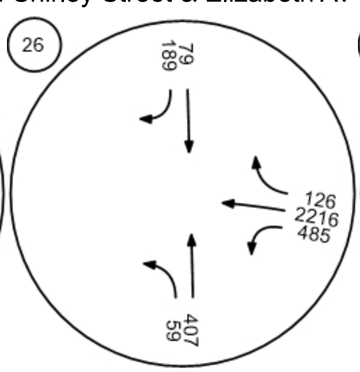


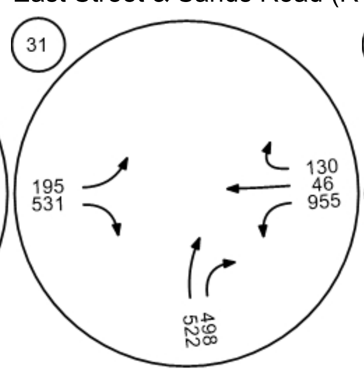


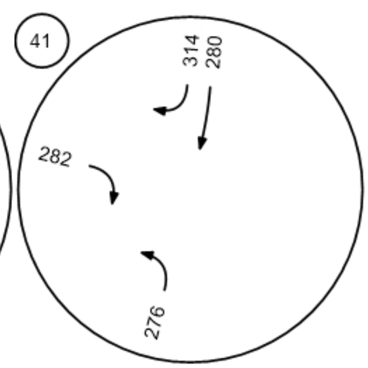


Bay Street & Elizabeth Avenu Shirley Street & Elizabeth Av East Street & Sands Road (R Parliament Street & East Hill



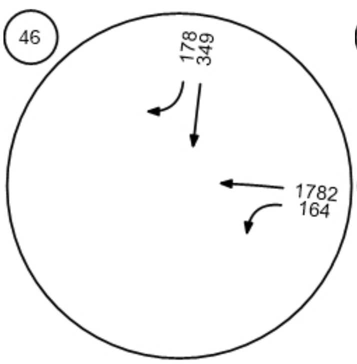






Report Figure 2f: Traffic Volume - Future Total Volume

Shirley Street & Parliament S



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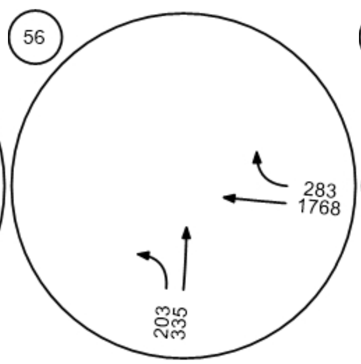
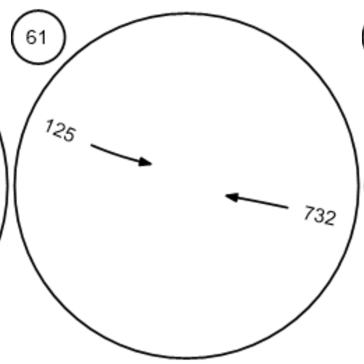
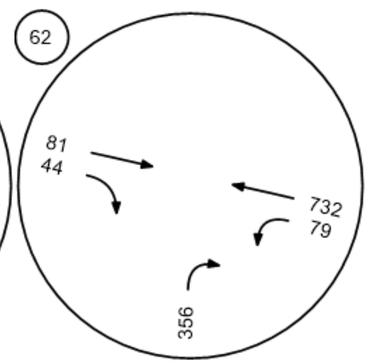


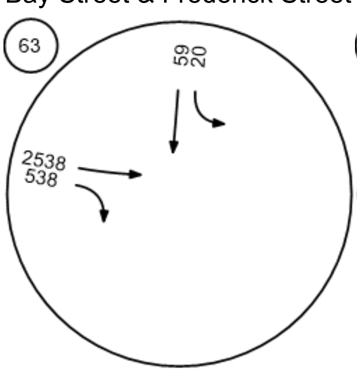
East Hill Street Slip Roads



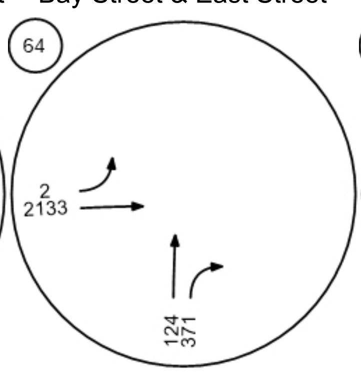
East Hill Street & RBC Parkin



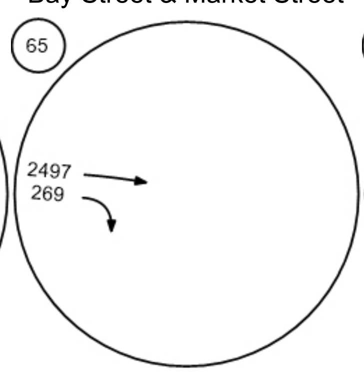
Bay Street & Frederick Street



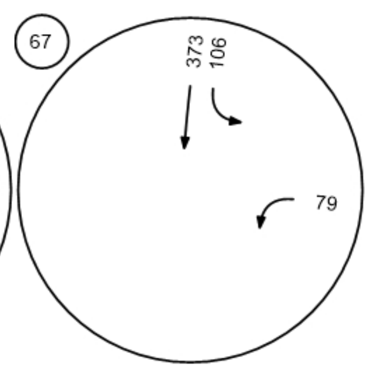
Bay Street & East Street



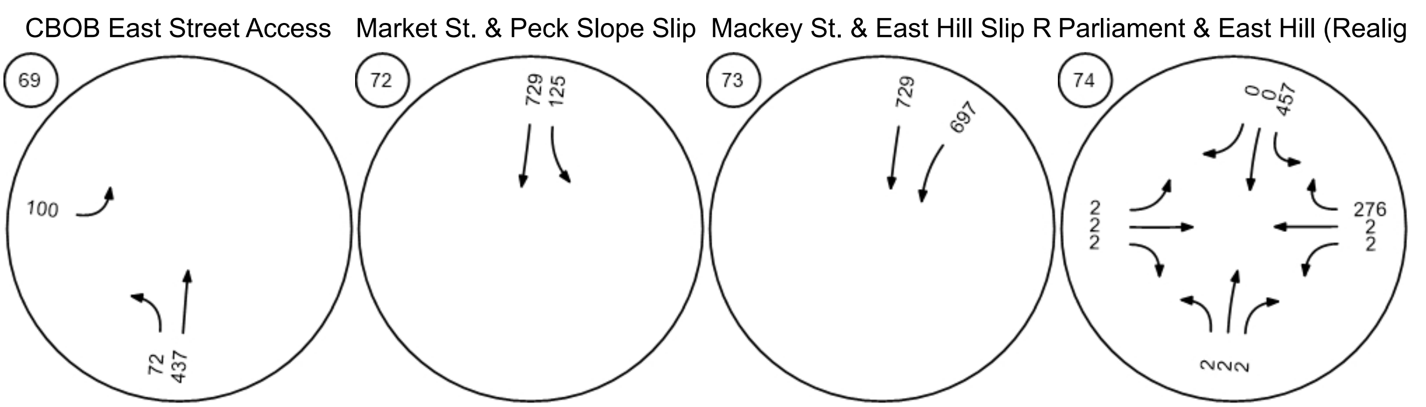
Bay Street & Market Street



CBOB Parliament Access

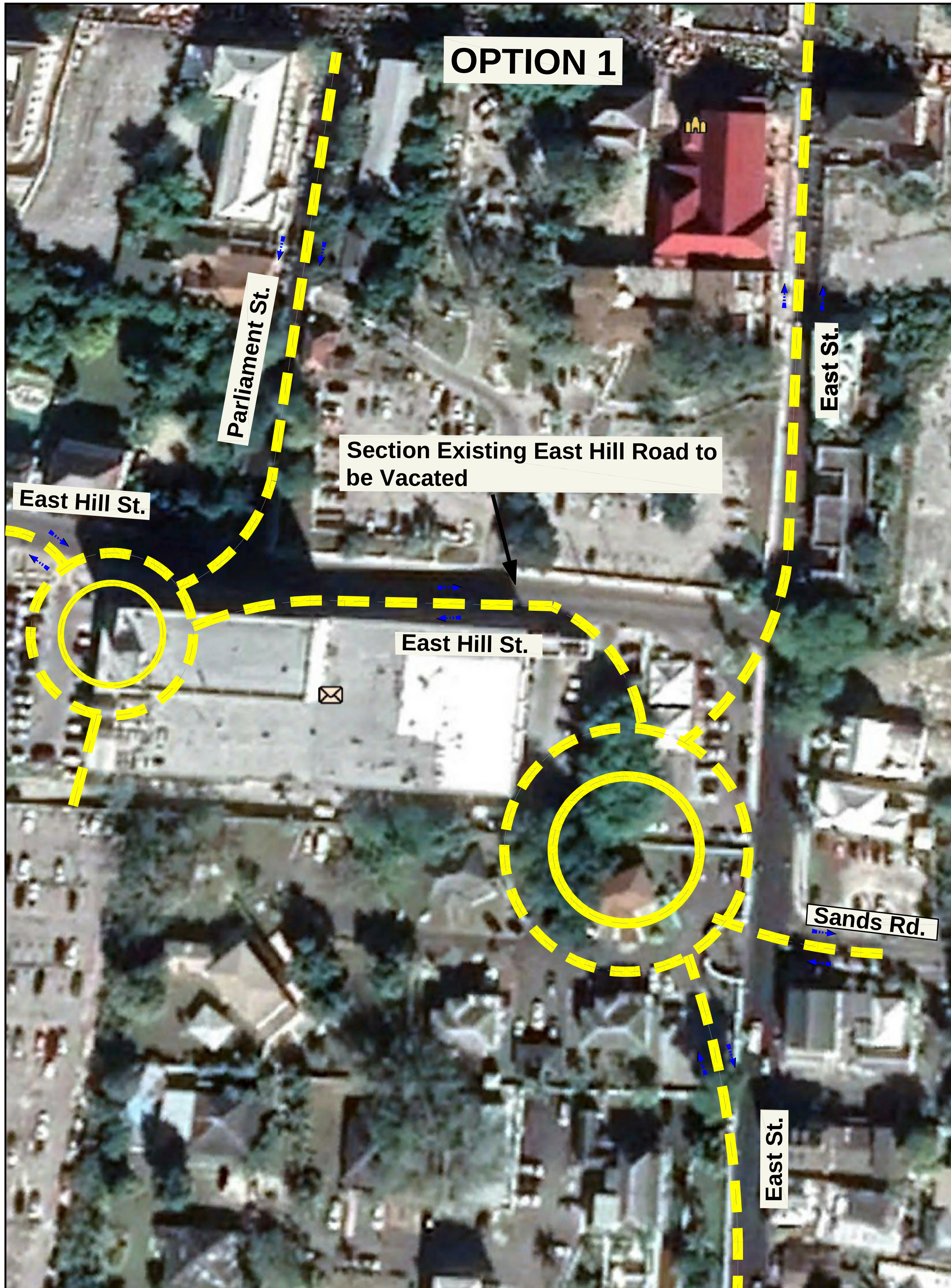


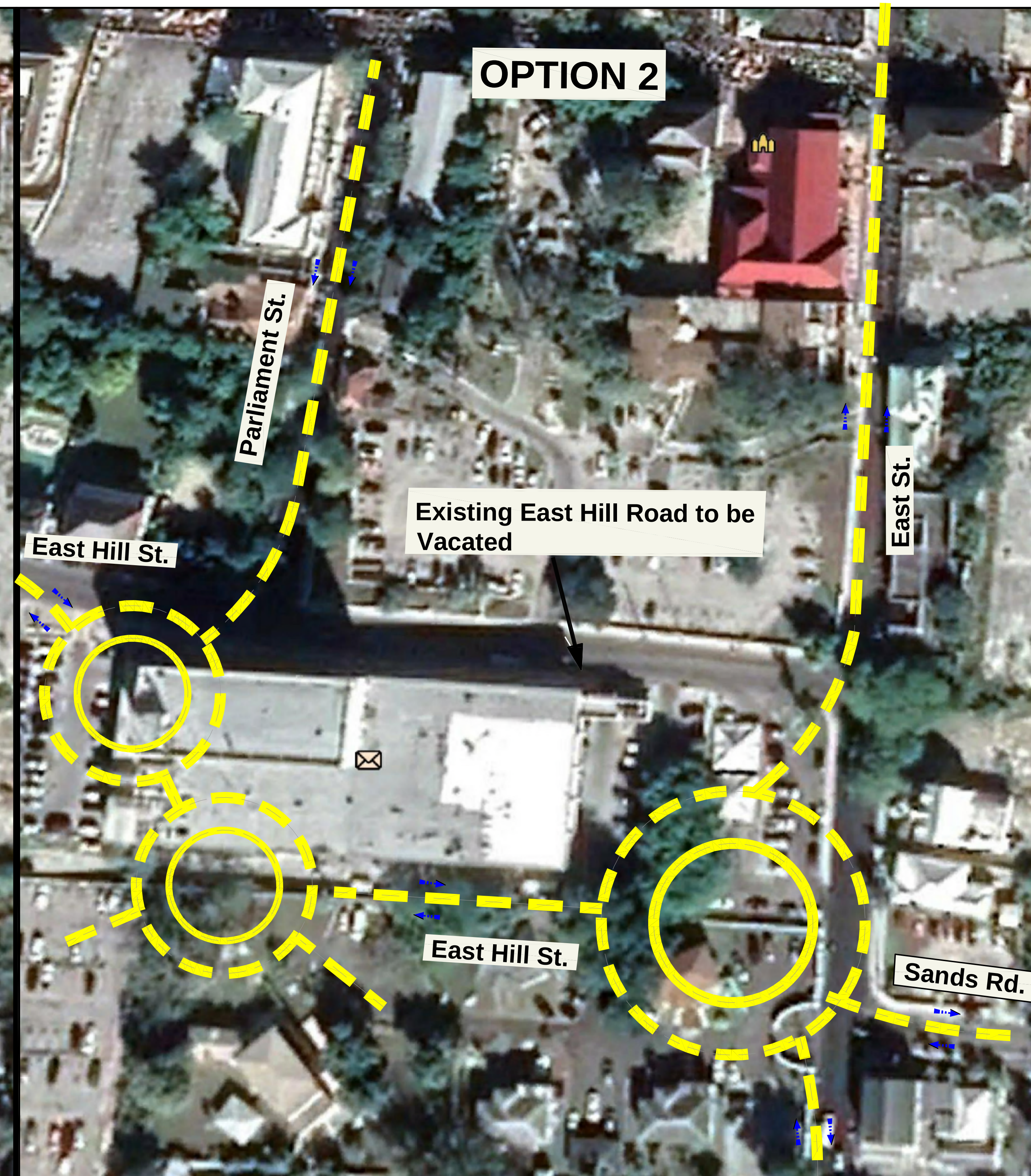
Report Figure 2f: Traffic Volume - Future Total Volume



Appendix H

Recommended Realignment of East Street





NEW CENTRAL BANK
TRAFFIC IMPACT
ASSESSMENT

FIGURE 26: Recommended Realignment of East Hill Street

CARIBBEAN CIVIL GROUP LIMITED

OUR SERVICES

Project Coordination

Transportation Engineering

Traffic Engineering

Civil Engineering

Drainage Engineering

Environmental Engineering

Topographical & Site Surveying

Construction Supervision & Contract Administration

CARIBBEAN CIVIL GROUP LIMITED

Professional Consulting Engineers

ISO 9001:2015 Certified Company

Certified B Corporation

CWWA CARIBBEAN WATER AND WASTEWATER ASSOCIATION

U.S. GREEN BUILDING COUNCIL