The Proposed Parliamentary Building Project
GROUP MEMBERS:

Kadian Brown
Kemoi Bryan
Jerome Clarke
Sasha-Gaye Forbes
Introduction

Foundation & Retaining Wall

Soil Exploration

Structural Details and Design

Water & Drainage

Traffic

EIA

Costing of Project

Conclusion

References
INTRODUCTION
INTRODUCTION

• Problems facing Existing Parliament building:
  × Lacks space
  × Not accessible to the disabled community
  × Posses safety and security problems
INTRODUCTION
• The George VI Memorial Park Act (1956) states that Heroes Circle should house Jamaica’s Parliament. (UDC, 2017).
PROPOSED LOCATION
PROPOSED LOCATION

Kadian Brown, 2017
• **Type of Foundation**: Mat Foundation

• **Reason(s)**: It is common to use mat foundations for deep basements and buildings that carry large loads.

• **Dimensions**:
  - \( D_f = 6.4\,\text{m} \)
  - Thickness, \( d = 0.65\,\text{m} \)
  - \( L = 54.4\,\text{m} \); \( B = 29.4\,\text{m} \)
TYPICAL CONSTRUCTION OF MAT FOUNDATION
RETAINING WALL

- **Retaining Wall**: Cantilever Retaining Wall
- **Reason**: It has much thinner stem and utilizes the weight of the backfill soil to provide most of the resistance to sliding and overturning.

**Design Parameters**

- **Unit Weight**: $\gamma = 14\text{kN/m}^3$
- **Angle of friction**: $\Theta = 20^\circ$
- **Cohesion**: $c = 0$
TYPICAL CONSTRUCTION OF RETAINING WALL

ACP Concrete, 2018
IMPORTANCE OF SOIL EXPLORATION

- It helped us to determine the bearing capacity of the soil, in order for us to design a suitable foundation.
- It helped us to determine the soil parameters in order for us to design a suitable retaining wall.
SOIL EXPLORATION

• Tests done:
  ✓ Vane Shear
  ✓ Unconfined Compression Test
  ✓ Sieve Analysis (ASTM D422, D1140)
  ✓ Atterberg Limits
SOIL EXPLORATION

• Results:
  • Type of soil: Silty-Clay (Atterberg Test); Alluvium (Mines and Geology Dept.) [ASTM D4318]
  • Unit Weight: $\gamma = 14 \text{ kN/m}^3$
  • Bearing Capacity: 345.69 kN/m$^2$
  • Well-graded Soil
BUILDING DESIGN
BUILDING DESIGN
BASEMENT DESIGN

Basement Parking

• Available Parking Spaces: 66 Spaces

• Required Disabled Spaces: 3 Spaces (based on IBC)
BASEMENT DESIGN

Plan View of Basement Parking

Geometric Details
- Parking Angle: 0°
- Stall Width: 3m
- Stall Depth: 6m
- Aisle Width: 7.62m
BASEMENT DESIGN

Basement Ventilation

Required Fan Thrust: 82.5N
Use 4 x 25 N fans = 100N

Required Exhaust Rate (Litre/s) = 30,000

Typical Arrangement of Basement Ventilation Fans
FLOOR PLANS

GROUND FLOOR PLAN

- Library
- MP Lobby
- MP Restroom
- Stereorama
- Kitchen
- Manager's Office
- Visitor's Restroom (Female)
- Visitor's Restroom (Male)
- Hall for Gatherings and Ceremonies
- Visitors Entrance and Lobby
- Employee Lounge
- Clerk's Office
MEZZANINE FLOOR PLAN
Design Loads Included

• Dead Load
• Live Load
• Dynamic Load
• Wind Load
• Earthquake Load
Concrete

• Design Strength: 20 Mpa
• Type of Cement: Type I Ordinary Portland Cement (ASTM C150)
• Tests to be performed:
  1. Slump Test
  2. Compressive Test
MATERIAL SPECIFICATIONS

Slump Test

• Used to test the workability and consistency of a fresh concrete mix
• Can also be used as an indicator of an improperly mixed batch
• Different types of construction will require different degrees of workability
• Slump tests should meet the standard as set out by ASTM C143
MATERIAL SPECIFICATIONS

Slump Test
## Typical Interpretation of slump Test Results

<table>
<thead>
<tr>
<th>Degree of workability</th>
<th>Slump</th>
<th>Compacting Factor</th>
<th>Use for which concrete is suitable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very low</td>
<td>0.25</td>
<td>0.1</td>
<td>Very dry mixes; used in road making. Roads vibrated by power operated machines.</td>
</tr>
<tr>
<td>Low</td>
<td>25-50</td>
<td>1.2</td>
<td>Low workability mixes; used for foundations with light reinforcement. Roads vibrated by hand operated Machines.</td>
</tr>
<tr>
<td>Medium</td>
<td>50-100</td>
<td>2.4</td>
<td>Medium workability mixes; manually compacted flat slabs using crushed aggregates. Normal reinforced concrete manually compacted and heavily reinforced sections with vibrations.</td>
</tr>
<tr>
<td>High</td>
<td>100-175</td>
<td>4.7</td>
<td>High workability concrete; for sections with congested reinforcement. Not normally suitable for vibration.</td>
</tr>
</tbody>
</table>
MATERIAL SPECIFICATIONS

Typical Types of Slump Results
Compressive Strength Test

• Determines if a batch of concrete meets the designed/required compressive strength.
• American Society for Testing Materials ASTM C39/C39M provides Standard Test
• Six cube samples are taken and left in a curing tank for 7 days, after which they are tested for compression
MATERIAL SPECIFICATIONS

Compressive Test Apparatus

Cube Mold  Curing Tank  Compressive Test Machine
## Typical Strength Characteristics of Various grades of Concrete

<table>
<thead>
<tr>
<th>Grade of Concrete</th>
<th>Minimum compressive strength N/mm² at 7 days</th>
<th>Specified characteristic compressive strength (N/mm²) at 28 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>M15</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>M20</td>
<td>13.5</td>
<td>20</td>
</tr>
<tr>
<td>M25</td>
<td>17</td>
<td>25</td>
</tr>
<tr>
<td>M30</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>M35</td>
<td>23.5</td>
<td>35</td>
</tr>
<tr>
<td>M40</td>
<td>27</td>
<td>40</td>
</tr>
<tr>
<td>M45</td>
<td>30</td>
<td>45</td>
</tr>
</tbody>
</table>
MATERIAL SPECIFICATIONS

Asphalt Pavement

- Should have adequate strength to distribute the wheel loads to the soil without undue deflection, compaction or consolidation.
- Should be water resistant and have sufficient surface friction to avoid skidding
- Should be compliant with AASHTO guidelines
- Thickness of approximately 6 inches
Typical Layers of Asphalt Road Pavement
• **Pressure in main pipe**: Approximately 60 psi

• **Tank info**: The National Water Commission encourages the use a tank storage of water for buildings two (2) storeys and more; to aid in supply for users and fire suppression.

  • **Specifications**: Cap. of 2000 gal, Height of 110 in., Diameter of 80.75 in., Outlet 1.5in

• **Water Table**: Rest water level– 135ft
WATER & DRAINAGE

FIRE PROTECTION WATER SUPPLIES

507.1 Required water supply. An approved water supply capable of supplying the required fire flow for fire protection shall be provided to premises upon which facilities, buildings or portions of buildings are hereafter constructed or moved into or within the jurisdiction.

507.2 Type of water supply. A water supply shall consist of reservoirs, pressure tanks, elevated tanks, water mains or other fixed systems capable of providing the required fire flow (IFC, 2015).
WATER & DRAINAGE
WATER & DRAINAGE
PROPOSED SITE PLAN
WATER & DRAINAGE
Section of Trap Gully
Section of Manhole

4' X 4'(100x100) R.C. TIE BEAM, REINF. WITH 3/8"(10) DIA. M.S.B. TIED TO BLOCK REINF.'T. (TYPICAL)

4'(100) THICK R.C. PAD
REINF. WITH 1/2"(12) DIA.
M.S. BARS @ 6'(150) O/C
BOTH WAYS
Section of Grease Trap
Section of Grease Trap

(Retrieved from http://www.cpda.co.uk/design/layouts/).
TRAFFIC MANAGEMENT PLAN
TRAFFIC MANAGEMENT PLAN

• A suitable transport system is an integral factor in the development of an effective Parliament Building.

• With the construction of the new Parliament Building as well as the complex to house other Government Agencies it is expected that the traffic volume of vehicles which use the area increases by no less than 100%.
ENVIRONMENTAL IMPACT

• With this increase in traffic it is assumed that the air quality in and around the region will be impacted.

• Contaminants such as concentrations of $PM_{10}$, $NO_2$ and $SO_2$

  (Cross Road, 2012) (NEPA)

• Increases in these concentrations can lead to respiratory and inflammatory illness with long-term exposure.
## COMPARISON OF AIR QUALITY

<table>
<thead>
<tr>
<th>Criteria Air Pollutants (CAPs)</th>
<th>Annual Reading from Air Monitoring Station ($\mu g/m^3$)</th>
<th>National Ambient Air Quality Standards (NEPA) ($\mu g/m^3$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Particulate Matter less than 10µm [$PM_{10}$]</td>
<td>46.07</td>
<td>50</td>
</tr>
<tr>
<td>Nitrogen Dioxide [$NO_2$]</td>
<td>24.32</td>
<td>100</td>
</tr>
<tr>
<td>Sulphur Dioxide [$SO_2$]</td>
<td>22.51</td>
<td>80</td>
</tr>
</tbody>
</table>
TRAFFIC COUNT OF EAST STREET
PICTURES OF CURRENT TRAFFIC SYSTEM
PROPOSED PLAN

• The workable traffic system proposed to improve the efficiency of traffic in the area would be achieved through the reduction of its opposing lane vehicular conflict.

• This would be done through the conversion of Heroes Circle into a one-way clockwise loop and the expansion of the circle to accommodate one additional lane of travel.

• The project would also entail the conversion of all the minor access roads adjoining Heroes Circle into an alternating pattern of one-way roads.
EXAMPLE OF PROPOSED PLAN AT INTERSECTIONS
Roads that will be significantly affected:

- Slipe Road
- Old Hope Road
INTERNAL DESIGN

• One special entrance to the north side of Heroes Circle from which dignitaries and Parliamentarians will enter and travel directly to underground parking beneath the Parliament Building.

• Two (two-way) entrances/exits to the East and West sides of Heroes Circle (opposite Tarrington Avenue (west) and Opposite Hitchen Street (east).

• Both would lead to a central roundabout which would be located just south of the parliament building.
## COSTING

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master Summary</td>
<td>$ 326,751,543</td>
</tr>
<tr>
<td>Structure</td>
<td>$ 728,425</td>
</tr>
<tr>
<td>Windows and Doors</td>
<td>$ 28,118,000</td>
</tr>
<tr>
<td>Equipment</td>
<td>$ 3,235,300</td>
</tr>
<tr>
<td>Wall &amp; Ceiling</td>
<td>$ 1,283,460</td>
</tr>
<tr>
<td>Professional Fees</td>
<td>$ 75,674,791</td>
</tr>
<tr>
<td>Plumbing</td>
<td>$ 30,000,000</td>
</tr>
<tr>
<td>Drainage</td>
<td></td>
</tr>
<tr>
<td>Road Works</td>
<td>$ 57,000,000</td>
</tr>
<tr>
<td>Maintenance</td>
<td>$ 2,274,800</td>
</tr>
<tr>
<td>Construction Overheads</td>
<td>$ 64,283,065</td>
</tr>
<tr>
<td>Total</td>
<td>$ 589,349,383</td>
</tr>
</tbody>
</table>
CONCLUSION

• **Project**: Proposed Parliament Building at Heroes Circle, Kingston.

• **Type of Structure**: Reinforced Concrete

• **Type of Foundation**: Mat Foundation

• **Proposed External Traffic**: One-way clockwise loop around the Heroes Circle.
REFERENCES


• ACI 18-95
• ASCE 7-10
• BS 8110
• IBC
• Water Resource Authority
• National Works Agency

Any Questions?