2013 KSP-IDB Joint Consulting for Designing the Integrated Operation and Control Center in Montego Bay - Jamaica
1. Introduction of Project
2. What is Smart City
3. Status of the Montego Bay City
4. Comprehensive Design and Implementation Plan
1 Introduction of Project
2 What is Smart City
3 Status of the Montego Bay City
4 Comprehensive Design
Introduction of Project

**Sustainable Emerging Cities Platform by IDB**

1. Environmental Sustainability/Climate Change
   - Control Air/Water Pollution
   - Reduce, Reuse, and Recycle
   - Increase Energy Efficiency
   - Prevent/Respond to Disasters

2. Comprehensive And Sustainable Urban Development
   - Reduce Traffic
   - Improve Public Safety
   - Promote Competitiveness/Economic Development
   - Improve Connectivity

3. Fiscal Sustainability And Governance
   - Modernize Fiscal and Financial Management
   - Organize Public Utilities and Services
   - Incentivize Management by Results
   - Promote Participation

---

**Integrated Operation and Control Center**

---

2013 KSP-IDB Joint Project for Designing the Integrated Operation and Control Center in Montego Bay
In 2004, the Ministry of Strategy and Finance of Korea launched the Knowledge Sharing Program (KSP), a demand-driven bilateral policy consultation program to share Korea’s development experience with developing countries. From 2004 to 2011, KSP provided tailored solutions to 34 developing countries for over 300 projects.

- Launched in 2011
- Supports TA/TC projects of MDBs
- Formed a partnership with five major MDBs
The MoSF agreed to support the 2013 KSP consultancy for Montego Bay, Jamaica with detailed Technical Project Design and Implementation Plan for the IOCC.
Introduction of Project

Objectives

Comprehensive design for Montego Bay IOCC

- Support the Montego Bay municipality to make more informed planning decision and take immediate actions towards smart and sustainable urban development
- Impart IOCC solution to relieve Traffic Congestion, curb incident of Crime and Natural Disaster
**Introduction of Project**

**Project Flow Chart**

- **Establishment of Work Plan**: July, 2013
- **Online Research**
- **Preliminary Research**
- **Case studies**: September, 2013
- **On-site Meetings and Site Survey**
- **Field Survey (by local consultants)**
- **Training Course And Interim Report**: November 1st, 2013
- **Technical Solution**
- **Implementation Plan**

**We are Here!**

- **Final Workshop**: January 24, 2014
- **Final Report**: February 15, 2014
On-site Meetings and Site Survey

Jamaica Constabulary Force

Meeting at SJPC

National Works Agency

Meeting with Minister Noel Arscott
1.7

Introduction of Project

Training Course

Songdo IOCC

KBS Disaster Broadcasting Center

Anyang City Hall U-Center

Korea Internet Security Agency

2013 KSPIDB Joint Project for Designing the Integrated Operation and Control Center in Montego Bay
1.8

Expected Results

Introduction of Project

<table>
<thead>
<tr>
<th>Issues</th>
<th>Solutions</th>
<th>Expected Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic Congestion</td>
<td>Advanced Traffic Signal Control</td>
<td>Improve Traffic Condition</td>
</tr>
<tr>
<td>Lack of Information for Drivers</td>
<td>Supply Traveller Information</td>
<td>Supply Information for Driver</td>
</tr>
<tr>
<td>Route Taxi Issues</td>
<td>Automated Enforcement</td>
<td>Reduce Illegal Violation</td>
</tr>
<tr>
<td>Speed &amp; Signal Violation</td>
<td>Monitoring Illegal Parking &amp; Stopping</td>
<td>Crime Prevention</td>
</tr>
<tr>
<td>High Incidence Rate of Crime</td>
<td>Crime Prevention (CCTV Monitoring)</td>
<td></td>
</tr>
<tr>
<td>Natural Hazards Vulnerability</td>
<td>Disaster Prevention (CCTV Monitoring &amp; Emergency Warning)</td>
<td>Disaster Prevention</td>
</tr>
</tbody>
</table>
1. Introduction of Project
2. What is Smart City
3. Status of the Montego Bay City
4. Comprehensive Design and Implementation Plan
TOWARD SMART CITY

Smart City contains information and communication technology in every city element that enables citizens to access and utilize them at anytime, anywhere and from any devices.
# What is Smart City

## How ICT can impact on Smart City Development

<table>
<thead>
<tr>
<th>Function</th>
<th>Target</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>24-hour Monitoring</td>
<td>Environment: Air, Energy, Water, Disaster ...</td>
<td>Increasing: Efficiency, Productivity, Transparency, Competitiveness, Monitoring, Land Management</td>
</tr>
<tr>
<td>Sharing Real-Time Information</td>
<td>City: Transportation, Security, Waste ...</td>
<td></td>
</tr>
<tr>
<td>Sharing with Citizen &amp; other</td>
<td>Governance: Tax, Procurement, Custom ..</td>
<td>Decreasing: Crime, Pollution, Accident, Vulnerability</td>
</tr>
<tr>
<td>agencies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analysis Based upon Real-time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field Data</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ubiquitous Controlling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prompt Feedback and Improvement</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
What is Smart City

Integrated Monitoring System - Anyang City in Korea.

Equipment room and other facilities

The situation room is equipped with 45 units of 50-inch situation board

Response to any situation
1. Introduction of Project
2. What is Smart City
3. Status of the Montego Bay City
4. Comprehensive Design and Implementation Plan
3.1 Status of the City

City Status

<table>
<thead>
<tr>
<th>Area</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jamaica</td>
<td>10,991km²</td>
</tr>
<tr>
<td>Kingston</td>
<td>480km²</td>
</tr>
<tr>
<td>St. James Parish</td>
<td>595km²</td>
</tr>
<tr>
<td>Montego Bay</td>
<td>56km²</td>
</tr>
</tbody>
</table>

Kingston is 480km² and has a population of 579,100.
St. James Parish is 595km² and has a population of 200,000.
Montego Bay is 56km² and has a population of 110,000.
Status of the City

3.2 Road Status

Related Main Arterials

Montego Bay High-Density Area

Watson Taylor Park

Falmouth, Rio Bueno

Mandeville

St. John Rd.

Tucker Main Rd.

Bogue Rd.

B8

Saints

Falmouth, Rio Bueno

High-Density Area

Road Status

A1

Montego Bay

A1
### Status of the City

#### Road Status

**Downtown**

- **One-Way in operation**
  - St James St, Union St, Creek St, Church St, etc

- **Concentrated Traffic**
  - Significant portion of traffic from Bogue Rd and Rose hall is destined for the Downtown Montego Bay

- **Montego Bay High-Density Area**

---

2013 KSPIDB Joint Project for Designing the Integrated Operation and Control Center in Montego Bay
Montego Bay’s Redevelopment Challenges *

**ISSUES**

- Traffic Congestion
- Transportation crisis
- Crime
- Flood, Landslide, Hurricane
- Inadequate Parking
- Illegal Vending in non-designated area
- Drainage – Blocked and unable to carry required capacity
- Lack of green & recreational spaces
- Negative Image
- Squatter settlements
- Roads & sidewalks in poor conditions
- Unsightly small business commercial areas
- Garbage Disposal
- Shortage of eating & seating areas
- Poor architecture
- Declining interest in Downtown

**Resulting In**
Alternate commercial developments on the outskirts of downtown

* Source: Montego Bay Redevelopment Plan
To comprehend the basic demand and preference for IOCC

Overall Evaluation

The most urgent issue in Montego Bay

- Crime Prevention: 49%
- Transportation: 30%
- Disaster Prevention: 21%
To comprehend the basic demand and preference for IOCC

Transportation

Travel Mode

- Route Taxi: 97 (41%)
- Passenger Car: 61 (25%)
- Mini Bus & Coasters: 39 (16%)
- Tourist Taxi: 16
- Municipal Bus: 15
- Motorbike: 8
- Bicycle: 6

- 2013 KSPIDB Joint Project for Designing the Integrated Operation and Control Center in Montego Bay
To comprehend the basic demand and preference for IOCC

General Transportation Problems

- Congestion
- Signal Control
- Traffic Information
- Accident
- Over Speeding
- Signal Violation
- Over Loaded Trucks
- Parking Space

Very Severe  Severe  Little Problem  Not a Problem
To comprehend the basic demand and preference for IOCC

Transportation

Public Transportation Problems

Status of the City

Current Issues of Montego Bay: Needs Survey Result

- Lengthy bus waiting time
- Lack of bus arrival information
- Illegal parking & stopping of route taxis
- Overwhelming number of route taxis

Very Severe  Severe  Little Problem  Not a Problem
Status of the City

Current Issues of Montego Bay: Needs Survey Result

- To comprehend the basic demand and preference for IOCC

**Crime**

![Crime Problems Graph]

- Assault / Harrassment
- Theft / Robbery (Domestic)
- Theft / Robbery (Commercial)
- Pickpocketing (Street)
- Pickpocketing (Public Transportation)
- Vandalism
- Juvenile Crime
- Drug Use
- Gun shot

Legend:
- Very Severe
- Severe
- Little Problem
- Not a Problem
To comprehend the basic demand and preference for IOCC

Disaster Issues

- Earthquake
- Fire & the lack of fire department’s prompt response
- Flood/heavy rain and the lack of drainage system
- Drought
- Storm/hurricane and the resulting blackout

Very Severe  Severe  Little Problem  Not a Problem
Status of the City

Selection of Sub System

- Traffic Signal Control System
- Traveler Information System
- Traffic Violation Enforcement System
- Route Taxi & Metro Bus Management System
- IOCC
- Crime Prevention System
- Disaster Prevention System
- Parking Information System
Modeling of IOCC Subsystems

1. Advanced Traffic Signal Control
2. Advanced Traveller Information
3. Automated Enforcement
4. Crime Prevention
5. Disaster Prevention
6. Route Taxi & Metro Bus Management
7. Parking Information System

Integrated Operation and Control Center (IOCC)

Other organization
- NWA
- JCF
- ODPEM
- Others

Other Centers
- KINGSTON IOCC
- Other city IOCC

Data Collection
Analysis
Information Supply

Fiber Optic Cable

CCTV
VMS
Internet/Mobile
Parking Info

Route Taxi & Metro Bus

2013 KSPIDB Joint Project for Designing the Integrated Operation and Control Center in Montego Bay
3.13 Status of the City

Fundamental Design Concept

Goal

- System Optimization
- Operator-centric
- Standard architecture
- Expandable infrastructure
- Risk Analysis

Core elements

- System
  System considering the step-by-step scalability
- Operator-centric
  Operator-centric system to reflect the requirements
- organic structure
  Physical Integration organic integration
- KNOW-HOW
  Minimize the risk by applying a prior business experience

Proposed strategy and planning

**Strategy 1 | IOCC systems optimize the expected effects**

Take 1. Protective effect against incident, accident, disaster
Take 2. Establishment of policy alternatives according to the FEED-BACK

**Strategy 2 | Maximize linkage of operating system Strategy to establish**

Take 1. IOCC for conjunction the design, analysis, and understanding
Take 2. Secure infrastructure to build Private Network Infinite

**Strategy 3 | Optimal system architecture for improving the configuration**

Take 1. Measures proposed for Unprecedented control
Take 2. Establish a plan for system expansion

**Strategy 4 | Know-how applying equipment qualified**

Take 1. Take advantage of the prior business experience and business management
Take 2. Perform management professional process applies
**Expected Results of IOCC Operation**

- **Traffic Congestion**
  - Significant Traffic Jam

- **Signal Control System**
  - Needs for Intelligent Control

- **Lack of Information for Citizen**
  - No Traffic Information

- **Speed & Signal Violation**
  - * Many Violation at Arterials
  - * About 200 Car Accidents per year (during 2011–2013) (*1)

- **Route Taxi & Metro Bus Management**
  - Congestion by Route Taxi’s Illegal Parking

- **Crime**
  - about 1,000 Crimes per year (during 2008–2012) (*2)

- **Disaster**
  - Flooding, Land Slide and etc.

---

**Sub System and Service**

- **Advanced Traffic Signal Control**
- **Supply Traveler Information**
- **Automated Enforcement**
- **Route Taxi & Metro Bus Management**
- **Parking Information**
- **Crime Prevention**
  - CCTV Monitoring at Vulnerable Area & Infirmary, Illegal Settlement
- **Disaster Prevention**
  - Emergency Warning
  - CCTV Monitoring at Disaster Area

---

**Improve Traffic Condition**

- * Improve Traffic Flow by Optimization
- * Disperse the Traffic Jam
- * Reduce Car Accidents by 25%
- * Improve Mental Compliance

**Supply Information for Driver**

- * Supply the Traffic Information for Driver
- * Detour the Traffic Jam

**Reduce illegal Activities**

- * Improve mental Compliance
- * Reduce the Violation
- * Effective Use of Parking Area

**Crimes Prevention**

- * Monitoring Crime Activity
- * Preventive Measure
- * Reduce Crime Case by 25%

**Disaster Prevention**

- * Monitoring Flooding, Land Sliding
- * Wide Announcement
- * Preventive Measure

---

(*1) source: Montego Bay Municipality
(*2) source: JCF, Statistic and Information Management Unit
Downtown Redevelopment

- Green Space
- Pedestrian Movement
- Transportation
- Multimodal Transportation
- Economic Opportunities
- Market Revolution

To reposition **Montego Bay** as being the “**Friendly City**”

* from Montego Bay Redevelopment Plan

**Downtown & Urban Study Area**

**Status of the City**

- Downtown Redevelopment
- Smart City

**EXISTING INFORMAL SETTLEMENT**
- JARRETT PARK
- MIXED USE
- INDUSTRIAL

**Proposed Green Space**
- Recreational & Commercial
- Industrial

**Proposed BYPASS ROUTE**
- Existing roadway

**EXISTING PRIVATE GREEN SPACE**
- Existing residential areas

**EXISTING COMMERCIAL AREAS**
- Proposed new business district

**PEDESTRIAN ZONE**
- Alternate bypass route

**EXISTING INFORMAL SETTLEMENT**
- Jarrett Park
- Mixed use
- Industrial
Introduction of Project

What is Smart City

Status of the Montego Bay City

Comprehensive Design and Implementation Plan
**Comprehensive Design**

**Implementation Plan per Phase**

**ST. James Parish**

**The Greater Montego Bay**

- **Phase 1**: Downtown Area
- **Phase 2**: Greater Montego Bay City
- **Expansion**: St. James Parish / Other Cities

*Montego Bay Redevelopment Plan*
### Design Directions

- Downtown: Centered group control & Traffic flow coordination optimization
- Major arterial & connecting road: Real-time control with detectors & Traffic coordination optimization

### Design Principles

- Selection of signal group in consideration of road level, passage pattern and intersection intervals
- Installation of control system in consideration with geometric & passage characteristics
- Establishment of the signal control strategy for improvements

### Installation Plan per Phase

#### Phase 1
- Introduction of group and independent control on major intersections
- Improvement of roads thru pilot sector selection

#### Phase 2
- System expansion on major roads at downtown
- Traffic axis based control with the linkage to Phase 1 system
- Installation for entire city

#### Expansion
- National Level Standard establish
- Expansion of system to other cities
4.3

Comprehensive Design

Traffic Signal Control System

- **IOCC**
- **Loop Coil**
  - Inductance variance signal by vehicle
- **Traffic Signal Controller**
  - Signal Control parameter
  - Signal Control Plan etc.
- **Vehicle Detection System (VDS)**
  - Vehicle volume, spot speed, occupancy etc.

- Vehicle volume, spot speed, occupancy etc.
4.4 Comprehensive Design

Traffic Signal Control System – Example

Vehicle Detection System (VDS)

Vehicle Detection Information

IOCC

Data Processing

Traffic Signal Optimization

Data Management

Real-time Based Control

Traffic Signal Controller

Vehicle Detection Signal

Loop Coil
System Location Plan

**Phase 1**

- **33 Systems at One Way Roads**
  - Recommend the replacement of old systems
  - Center monitors the on-line traffic flow
  - Downtown, Bogue Rd. & Barnett St.
  - Traffic Flow Coordination Optimization

**Phase 2**

- **41 Systems at One Way Roads**
  - A1, Queens Dr., Howard Cook Hwy., etc.
  - Actuated Control by Detectors
  - Traffic Flow Coordination Optimization
  - System Expansion to other Intersections
4.6 Comprehensive Design

Advanced Traveler Information System

Design Directions
- Collects & processes traffic information from related bodies, incident management system, signal control system and traffic info system
- A system that provides users by drawing linkage information with other systems with a purpose of traffic control

Design Principles
- Real-time traffic flow control by providing traffic information
- Promotion of safety and efficient road traffic operation
- Enhancement of convenience to citizens and users
- Alternate junctions and points expected of traffic dispersions

Installation Plan per Phase

Phase 1
- AVI, VDS installation for real-time collecting traffic information
- VMS installation on major arterial roads

Phase 2
- Expansion to surrounding areas of downtown in a linkage with Ph1

Expansion
- National Level Standard establish
- Expansion of system to other cities
Comprehensive Design
Advanced Traveler Information System

AVI
(Automated Vehicle Identifier)

VDS
(Vehicle Detection System)

Signal control detector
(Loop detector at Stop Line)

AVI
(Automated Vehicle Identifier)

Web

Mobile Service

Traffic Information

Traffic Information

Collection
Process
Provision

IOCC

VMS

2013 KSPIDB Joint Project for Designing the Integrated Operation and Control Center in Montego Bay
4.8

Comprehensive Design

Advanced Traveler Information System - Example

AVI – “A”

AVI – “B”

License Plate Number Identification

Plate Number Comparison

Travel Time from A to B

Howard Cooke Hwy Congested 45min

W Green Ave 12min

Long Hill

Barnett St
Advanced Traveler System

Top 10 Locations for VMS

- Rose Hall / Greenwood Ave intersection
- Rose Hall / Lilliput intersection
- Barret Town / Rose Hall intersection
- Queens Dr / Airport – Bus stop
- City Centre / St James Street
- Sam sharpe Square
- Transportation Centre
- St Clavers Ave Satellite Transportation Centre
- Fustic Rd and Barnett Street intersection
- Howard Cooke / West Green Ave Intersection
- Bogue Road / Ramble Hill intersection
4.10 Advanced Traveler System

System Location Plan

Supply Information for Traffic Monitoring and Disaster Prevention

**Phase 1**

**Traffic Information Collection**
- 4 sets of AVI (Automated Vehicle Identification)
- 4 sets of VDS (Vehicle Detection System)
- Center monitors the on-line traffic flow

**Traffic Information Provision**
- 3 sets of Graphic VMS
- Internet & Mobile

**Phase 2**

- 4 sets of AVI (Automated Vehicle Identification)
- 6 sets of VDS (Vehicle Detection System)
- 4 sets of Text VMS (Variable Message Sign)
- More VMS & Information Service
### Comprehensive Design

**Automated Traffic Enforcement System**

#### Design Directions
- Automatic enforcement for the vehicles which violate the signal, speed, parking regulation
- After capturing the vehicle’s license plate, sends/processes/analyzes in the center and then, issues tickets

#### Design Principles
- Secures road safety by reducing accident risks by enforcing vehicles
- Guidance of safe speed and signal observation to the vehicles
- Maximization of effects on enforcement and reduction of operation costs through automatic enforcement

#### Installation Plan per Phase

<table>
<thead>
<tr>
<th>Phase</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phase 1</strong></td>
<td>- Priority installation on frequently violation occurring areas&lt;br&gt;- Installations other than the existing installation points</td>
</tr>
<tr>
<td><strong>Phase 2</strong></td>
<td>- Congested intersections &amp; other areas in need after Phase 1</td>
</tr>
<tr>
<td><strong>Expansion</strong></td>
<td>- Points needed for the enforcement to the entire city in linkage with Phase 2</td>
</tr>
</tbody>
</table>
### Automated Enforcement System

**System Location Plan**

**Phase 1**

- **Enforcement Camera Only**
  - **Speed Violation Enforcement**: 2 sets
  - **Speed & Signal Violation Enforcement**: 3 sets
    - Main Arterials of Montego Bay

- **Speed Violation Enforcement**: 3 sets
  - Arterials of Intersections that has frequently happens accidents or violation activities
4.13 Automated Traffic Enforcement System

System Location Plan

Multi-purpose for Enforcement, Traffic monitoring and Crime Prevention Camera

Phase 1
- Illegal Parking Enforcement
  - 13 sets
  - Downtown of Montego Bay City

Phase 2
- Illegal Parking Enforcement
  - 11 sets
  - Other roads or Intersections that has frequently happens parking violation activities
Crime Prevention System

Design Principles
- Installation of integrated control and crime surveillance system
- When a crime breaks out, CCTV camera controls the site and flexibly responds to accidents/incidents
- When an accident breaks out, possible to judge and respond rapidly with a small number of police forces

Design Directions
- CCTV is installed for multi-purpose for the crime prevention and for the traffic monitoring.
- The pole type system is installed with IP CCTV camera capable of 360° rotation
- Harmonization with surrounding environments

Installation Plan per Phase

Phase 1
- Reflects downtown & major arterial roads as priority
- Reflects vulnerable areas such as illegal settlement & infirmary facilities

Phase 2
- Expansions to the points such as accident prone areas/intersections
- Additional expansion on area that crimes are frequently happen

Expansion
- Installed at major management points of the city outskirts & crime prone areas
Crime Prevention System

Multi-Purpose Camera

For Traffic

For Crime Prevention

Congestion & Accident Monitoring

IOCC

Collection

Storage

Video

Monitoring Wall

Monitoring & Action

System Control

Action for Situation Clearance

Police Department

Medical Service
System Location Plan

Crime Prevention System

Phase 1
- Current CCTV Integration to IOCC
  - Exiting 19 sets of CCTV
- Crime + Traffic Information Provision
  - 3 sets of CCTV
- CCTV for Vulnerable Areas
  - 2 sets of CCTV
  - St. James Infirmary & Illegal Settlement

Phase 2
- New CCTV
  - 8 sets of CCTV
  - Expansions to the needed points
Design Principles

- Focal installation on accident prone points
- Priority installations on disaster happened frequently
- Focal management on troubled areas considering traffic environment
- Geometrically vulnerable points & points with frequent climate change

Installation Plan per Phase

**Phase 1**
- Installed with utmost priority towards risk areas centered on Pilot sectors

**Phase 2**
- Major management points
- Whole City

**Expansion**
- System Expansion & Upgrade to intelligent System

Disaster Prevention System

- Monitoring all events occurring in Montego Bay and carry out measure with situation room
- Using fixed megapixel camera and speed dome camera, could monitor flood at urban gully and tidal wave at seaside, landslide for 24 hours
- Displays & Warning information through VMS and alerts through speakers
Disaster Prevention System - Dataflow

**Related Disaster with Montego Bay**

- Flood in Urban Area
- Tidal wave at harbour
- Landslide
- Hurricane
- Earthquake

**Emergency Warning**

- Siren & Voice
- VMS
- Internet & Mobile
- Mass Media

**Data sharing with related agencies**

- OPDEM
- St. James Parish Headquarters
- Police Command Officers
- Emergency Medical Service
- Fire Bridge
- NWA

**Disaster situation monitoring, detection & prediction**

**Broadcasting, Data transmission**

**Data transmission or hot-Line**

**IOCC**
Disaster Prevention System - Example

Real-time Monitoring
Emergency Warning
Situation Management
Comprehensive Design
Disaster Prevention System

System Location Plan

Multi-Purpose for Disaster, Traffic Monitoring Camera

**Phase 1**
- Tidal Wave Observation
  - 1 sets
- Urban Flood Observation
  - 5 sets
- Landslide Observation
  - 2 sets

**Phase 2**
- Tidal Wave Observation
  - 2 sets
- Urban Flood Observation
  - 9 sets
- Landslide Observation
  - 6 sets
**Comprehensive Design**

**Route Taxi & Metro Bus Management System**

### Design Directions

- Real-time Tracking of Route Taxies & Metro Buses for schedule management, illegal operation or activity warning etc.
- Installation On Board Equipment (OBE) based on GPS & wireless communication with Display

### Design Principles

- Public Transportation management by Monitoring real-time locations for selected vehicles at IOCC
- Prevent illegal activities thru Drivers Warning Message
- Expand to Public Transportation Information System

### Installation Plan per Phase

**Phase 1**
- Priority installation of OBE on selected Route Taxi & Metro Bus

**Phase 2**
- Whole Route Taxi & Metro Bus installation of OBE

**Expansion**
- Expand to Information System
- Information Device installation at Bus Stops & Route Taxi Stops
Route Taxi & Metro Bus Management System

**Comprehensive Design**

- **H/W**: comm. Server, DB Server, Backup Server, Backup Disk
- **S/W**: GIS Based Operation Software, Statistic Data monitoring, Data Editing etc.

**IOCC**
- Monitoring Wall
- GIIS Based Operation Software
- Statistic Data monitoring, Data Editing etc.

**Location Monitoring**
- IOCC Message, Violation warning message, Predicted arrival information, IOCC Message etc.

**Statistics by Graph**
- Driver Assistance Display
- IOCC message
- real-time location data processing & Sending

**Data Management**
On a Route Taxi

DC 12V from Cigar jack or FuseBox

Flexible bracket

OBE
On a Metro Bus
Comprehensive Design

Route Taxi & Metro Bus Management System

Improvement to...

Information Service

At Route Taxi & Metro Bus Stops

On Hands
Comprehensive Design

Parking Information System

**Design Directions**
- Supply information of public parking area and public parking facilities

**Design Principles**
- Real-time parking space information to drivers through VMS, Internet, etc.
- Promote drivers to use public parking lot nearby
- Effect to prevent illegal parking activities and help to ensure maximum road capacity

**Installation Plan per Phase**

**Phase 1**
- Priority installation on Downtown Parking lots

**Phase 2**
- Whole installation on Montego Bay City Public Parking Lots

**Expansion**
- System Upgrade to intelligent Parking Information System
- Each parking space vacancy detection & lead each vehicle to parking space
Parking Information System
Comprehensive Design

Parking Information System - Example

Vehicle Detection for Space count

Information Service
Parking Lots in Montego Bay

- Rhyne Parkspot
- Valley Taxi Stand
- Montego Civic Center
- Harbour Street Craft Market
- St. James Parish Church
- Phase 1
- Catherine Sport Complex

Stand Alone System

**Phase 1**

- 1 set
- Pilot Case of Montego Bay City
- Recommend the Stand Alone Operation

**Phase 2**

- 4 sets
- Downtown of Montego Bay City

Comprehensive Design

Parking Information System
IOCC – Integration between IOCC and related agencies

New Equipment
- Existing (19) CCTV
- Surveillance CCTV
- Security
- VES/PES
- VDS
- Local Signal Controller
- BUS/Route Taxi

IOCC
- Traffic Management Server
- Disaster Management Server
- Video Storage/Distributor Server
- WEB/Mobile
- BMS/Route taxi
- VES/PES
- Traffic Signal Controller

(Integration Agencies)
- NWA
- JCF
- NSDMD
- Fire Station
- Metro Bus
- Broad Casting station
4.32 Comprehensive Design

**IOCC – Situation Board System Design**

<table>
<thead>
<tr>
<th>Structure</th>
<th>Width</th>
<th>Height</th>
<th>Depth</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1,016mm</td>
<td>762mm</td>
<td>788mm</td>
<td>60kg</td>
</tr>
</tbody>
</table>

- **Width size (6 row)**
  1. LED cube : 1,016mm X 6ea = 6,096mm
  2. vessel(edge) Gap : 5mm X 5ea = 25mm
  3. Total Sum : 6,096mm + 25mm = 6,121mm

- **Height size (2 row)**
  1. LED cube : 762mm X 2ea = 1,524mm
  2. vessel(edge) Gap : 5mm X 1ea = 5mm
  3. Base Flate : 1,000mm X 1ea = 1,000mm
  4. Total Sum : 1,524mm + 5mm + 1,000mm = 2,529mm
IOCC Interior – allocated IOCC Site

Default area: 30ft x 52 ft
(9.14m x 7.62m)

Additional area: 11ft x 14ft
(3.35m x 4.27m)
Assigned area: 30ft x 25
Comprehensive Design
IOCC – Interior design

Meeting room

Display monitoring

Situation monitoring room
Total fundamental area: 210m²
IOCC – Project Execution Organization

Kingston
- NWA/ODPEM/NSDMD/ICT/JCF.

Consulting Company
- PM
- Consultants

Montego Bay
- Mayor
- PMU(Project Management Unit)

Construction Company

Center Team
Field Team
Network Team
IOCC Manager (1)  • Required manpower: 21

Operation Team (total: 9)

Team Manager (1)
• Traffic Control Expert (1)
• Signal Control (2)
• Enforcement System (2)
• Public Security System (2)
• Disaster Management System (1)

Facilities Management Team (total: 11)

Team Manager (1)
• Center Equipment (1)
• Operating S/W (1)
• Field Equipment (5)
• Network Management (2)
• Electrical Management (1)
## Solutions for Cyber Security

### 4.40 Comprehensive Design

#### 5. Network Equipment

<table>
<thead>
<tr>
<th>Objects</th>
<th>Solutions</th>
</tr>
</thead>
</table>
| **1. Database**       | • **Blocking unauthorized data access**  
• Access control by user account  
• DBMS Installation to use a unique DBMS’s security method and logging monitoring |
| **2. Server and OS**  | • **Define on user account and password**  
• Access control and separation enhanced security on the file system  
• System logging monitoring  
• Install security software |
| **3. PC**             | • Install CMOS’s password  
• sunning screen saver and set password  
• Install *vaccine software/running* |
| **4. Application Software** | • **authority control depending on the level of user**  
• tracing a log of the application software access |

---

**Diagram:**

- **Internet**
- **Router+VPN**
- **L4 Switch**
- **Firewall/IPS**
- **DDOS**
- **Hazardous Traffic?**
- **EXIT**
- **1ST Unauthorised IP Blocking**
- **DMZ**
- **Server Farm**
- **External link**
- **L4**
### Comprehensive Design

**Site Equipment Installation Plan per Phase**

#### CCTV Cameras are recommended as multi-purpose for efficiency

<table>
<thead>
<tr>
<th>Sub System</th>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Traffic Signal Control System</td>
<td>33</td>
<td>41</td>
<td>72</td>
</tr>
<tr>
<td>VMS – Text</td>
<td>-</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>VMS - Graphic</td>
<td>3</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>AVI</td>
<td>4</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>VDS</td>
<td>4</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td><strong>Advanced Traveler Information System</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed Violation Enforcement</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Speed + Signal Violation Enforcement</td>
<td>3</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td><strong>Illegal Parking Enforcement + Traffic Monitoring + Crime Prevention</strong></td>
<td>13</td>
<td>11</td>
<td>24</td>
</tr>
<tr>
<td><strong>Crime Prevention + Traffic Monitoring</strong></td>
<td>5</td>
<td>8</td>
<td>13</td>
</tr>
<tr>
<td><strong>Disaster Prevention + Traffic Monitoring</strong></td>
<td>8</td>
<td>9</td>
<td>17</td>
</tr>
<tr>
<td><strong>Disaster</strong></td>
<td>-</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td><strong>CCTV Camera Sub Total</strong></td>
<td>31</td>
<td>41</td>
<td>72</td>
</tr>
<tr>
<td>Route Taxi &amp; Metro Bus Management System</td>
<td>-</td>
<td>2000</td>
<td>2000</td>
</tr>
<tr>
<td>Parking Information System</td>
<td>1</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Gunshot Alert System</td>
<td>-</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>IOCC</td>
<td>Basic Parts</td>
<td>Full Parts(duplex and back up)</td>
<td>1</td>
</tr>
<tr>
<td>Network Infrastructure</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
Comprehensive Design

Multi-Purpose Location of Site Equipment (1)

Legend & Comment

- Montego Bay Municipality (IOCQ Center)
- roads that need to install CCTV (traffic monitoring)
- roads that have severe congestion by illegal parking
- CCTV (Existing) - to be integrated - 1 sets
- Signal Controller (Existing) - to be replaced - 2 sets
- Signal Controller (New) - 4 sets
- VMS-T (Variable Message Sign with Text) - 4 sets
- VMS-G (Variable Message Sign with Graph) - 2 sets
- Speed Violation enforcement System - 4 sets
- Speed & Traffic Signal Violation enforcement System - 6 sets
- Illegal parking enforcement system - 2 sets
- Crime Prevention and Traffic Monitoring CCTV (New) - 11 sets
- Crime Prevention and Traffic Monitoring/Illegal Settlement - 1 set
- Crime Prevention and Traffic Monitoring/St. James Infirmary - 1 set
- Disaster Prevention Camera - 25 sets
- Landslide (1), Tidal (5), Flood (10)

Parking Information System

Information Terminal for Metro Bus & Route Taxi

<table>
<thead>
<tr>
<th>Camera Use Type</th>
<th>Contents</th>
<th>Sets</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Speed Violation Enforcement</td>
<td>10</td>
</tr>
<tr>
<td>G</td>
<td>Illegal Parking - Traffic Monitoring - Crime Prevention</td>
<td>24</td>
</tr>
<tr>
<td>C</td>
<td>Crime Prevention - Traffic Monitoring</td>
<td>18</td>
</tr>
<tr>
<td>D</td>
<td>Disaster Prevention - Traffic Monitoring</td>
<td>17</td>
</tr>
<tr>
<td>E</td>
<td>Disaster Monitoring</td>
<td>5</td>
</tr>
</tbody>
</table>
### Comprehensive Design

#### Multi-Purpose Location of Site Equipment (2)

<table>
<thead>
<tr>
<th>Camera Usage Type</th>
<th>Contents</th>
<th>Q’ty</th>
</tr>
</thead>
</table>
| A                 | • Speed Violation Enforcement  
• Speed & Signal Violation Enforcement | 10   |
| B                 | • Illegal Parking + Traffic Monitoring +  
Crime Prevention                  | 24   |
| C                 | • Crime Prevention + Traffic Monitoring      | 13   |
| D                 | • Disaster Prevention + Traffic Monitoring  | 17   |
| E                 | • Disaster Monitoring                       | 8    |

*Map showing locations labeled A to E.*
### The Necessity of IOCC in Montego Bay
- MB is the gateway of Jamaica for the world tourist
- Criminal rate of Anyang has been decreased 18% after IOCC implementation
- The main goals of SECI can be achieved by IOCC partially

### Concrete Action Plan
- Detailed implementation plan phase by phase
- Role assignment for the implementation among stakeholders
- Technical Assistance needs to be followed

### Administrative Support
- Consensus building among stakeholders; Ministries & institutes etc.
- Willingness to IOCC implementation & Dedicated staff & comm. for the project
- Legal and policy support for the IOCC implementation

### Funding Resources
- Max. Utilization of existing facility and plan (ex. Public Safety Backbone network)
- Minimize trial and error based on the prior implementation experiences
- Matching fund from IDB, Central & local government etc.
Thank you very much !!!