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Feasibility Study on the Establishment of the Integrated Operation and Control Center in Two Latin American Cities

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Background and purpose of the project

There are about 550 small and medium sized cities with population sizes between 100,000 to 2,000,000 in Latin America. More than 140 of these cities have been growing faster than the average speed of national growth. This rapid urbanization offers some positive effects; chief among them is that more jobs are being provided to urban citizens. At the same time, these cities face various other issues: people's quality of life, stable employment and environmental protection. To solve these problems, the Inter-American Development Bank (IDB) started creating new sustainable city platform projects in 2011. In particular, these projects focused on the prevention of problems, namely slums, traffic congestion, environmental pollution, natural disasters and crime. Sadly, these problems have typically developed in large cities as small and medium sized cities have grown into mega cities. In relation to these projects, the IDB and the Korean government agreed to carry out a Knowledge Sharing Program (KSP).

This program was agreed upon in principle with the understanding that the information and communication sector would be shared, and that Korea's experience and knowledge would be transferred into sustainable development projects for new cities in Latin America. Throughout the first round of projects in 2011, the Integrated Operation and Control Center (IOCC) project was regarded as a feasible project and was subsequently given a high priority. When the second round of the project was implemented, it established the master plan for Goiania in Brazil and Montevideo in Uruguay in 2012.

The purpose of this study is to set up the basic design and implementation plan necessary for the establishment of the IOCC in hopes of improving the public transportation system as well as trying to prevent future disasters in Goiania and Montevideo.

Basic concept and establishment plan for the Integrated Operation and Control Center in Goiania

Traffic congestion problems have become aggravated in Goiania as the number of vehicles has continued to increase over the past 10 years. During this same period, the speed of bus traffic has decreased from 19.6km/h in 2008 to 14.1km/h at present. Accordingly, there is a need to improve the efficiency of the overall transportation network by improving mobility on the main road networks. This can be achieved through the development of an efficient urban traffic signal system and by establishing a real-time traffic information collection and supply system. It is also urgent that information be provided to those who use public transportation in this wide region as traffic congestion between Goiania and the nearest 17 satellite cities has increased. In addition, it is necessary to establish the IOCC for the integrated management of the South-North BRT Project, Metro Leve de Goiania (VPL) and Corredores Preferenciais Projects, which are all currently being pursued by Goiania City. The establishment of an urban integrated operation and control center is another urgent project that needs to be undertaken. It will minimize the impact of frequent traffic accidents and crack down on the violation of traffic rules including traffic signals, parking and speed. This operation and control center will also reduce crime rates, which are a very serious problem in Brazil, and prevent urban disasters including floods and landslides, which frequently occur.

The basic design plan for the Goiania IOCC features an optimal system based on efficiency, stability and expandability. The system utilizes Korea's ICT and Smart City establishment technology and experience. The basic design plan sets objectives of each sub-system to solve various problems in overall areas of the society, including transportation infrastructure, city and environmental conditions. Also these design unit systems can be practically applied to realize objectives. In short, the design plan for the IOCC system and its 7 sub-systems such as adaptive traffic control system, advanced traveler information system, automatic enforcement system, bus information system, incident management system, criminal prevention system and disaster prevention system as well as the design of information and how the communication network links to those sub-systems were presented. The IOCC plays the role of

Figure 1: Conceptual Map of IOCC Establishment in Goiania

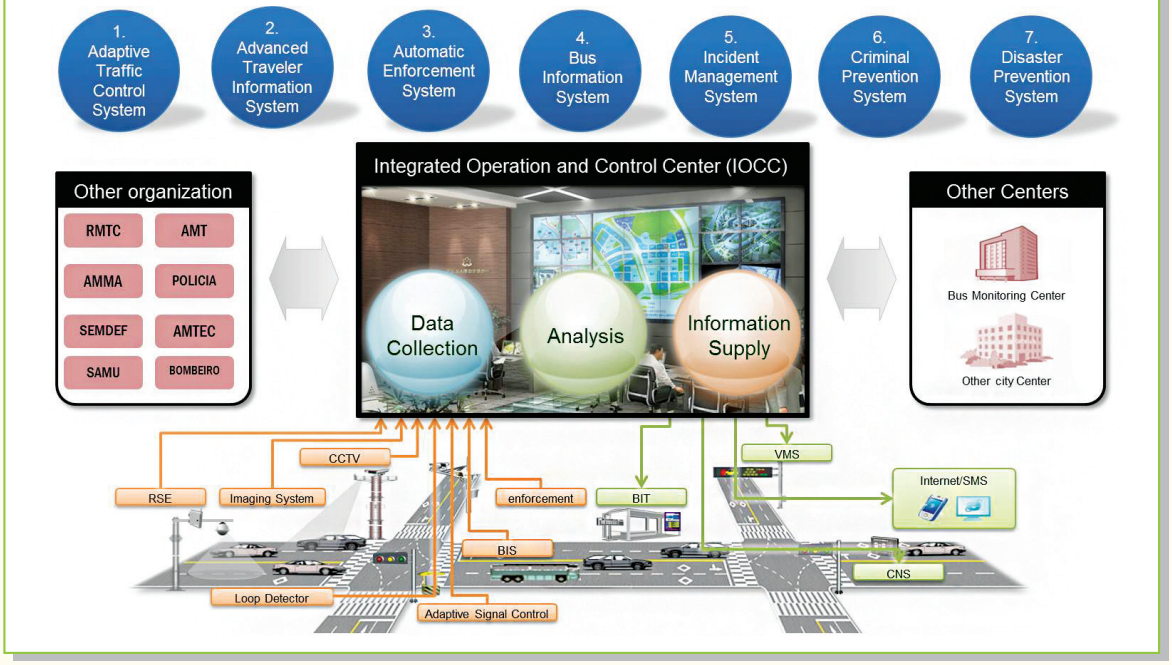


Figure 2 : IOCC Spatial Design

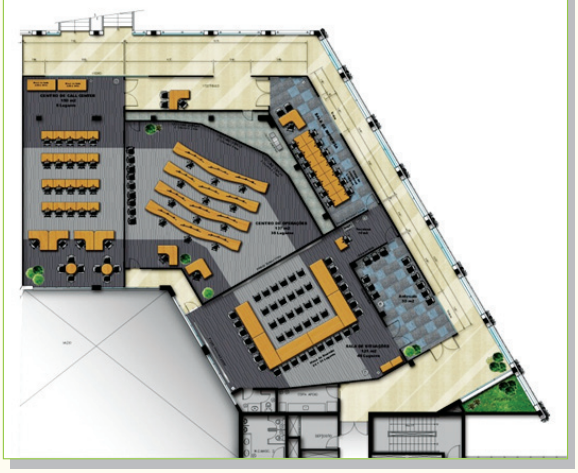
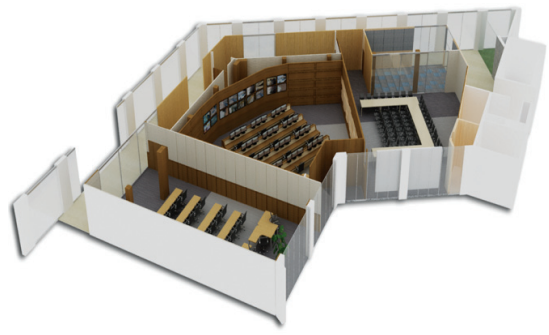


Figure 3 : IOCC 3D Bird's-eye View



transmitting necessary information among systems by controlling sub-systems and processing information collected at the system level. Its six major functions include information collecting, information processing, information integrating, provision of information, system control, information linking and system management.

The IOCC system design is divided into both a hardware and software system. The design focuses on optimization and expandability for each stage, operator-centric design that meets the requirement of the system operator, standard designs that secure compatibility and operability among systems and duplexing designs that pursue the stability of the system. To this end, various activities were conducted between Korea and Brazil. They included site surveys, information collection through documents and Internet searches and workshops for government officials in Goiania.

This study proposes a five-year project implementation plan by dividing the Goiania IOCC establishment project into three stages: the pilot stage, expansion stage and acceleration stage. The IOCC is composed of the situation room, the security control room, the meeting room, the equipment room, the press room and the reception room. The spatial design and aerial view are demonstrated in Figure 2 and 3.

The quantity and location of installation for each system were identified through an on-site survey to establish a plan for sub-systems. The installation in the first stage is concentrated on the center of the city and expands to the outskirts in the second and third stages. The installation quantity of sub systems and the equipment installation location by sub-system are shown in Figure 4 and 5.

For the successful implementation of the project, the willingness of Goiania City to relentlessly pursue the project is strongly needed. Korea also needs to make more efforts for the successful completion of the project by actively participating in technological cooperation programs. In addition, the foundation for stable financial support from various financial organizations including the IDB should be established, and efforts should be made to make sure that the feasibility of the project is well communicated to the public and supported by stakeholders. The KSP-IDB Joint Consulting Project is expected to solidify Goiania's status as one of the most advanced smart cities in Latin America.

Basic concept and establishment plan for Integrated Operation and Control Center in Montevideo

Currently, Montevideo faces issues: traffic congestion during rush hour, the increasing demand for public transportation, in particular buses and the modernization of traffic facilities. Specifically, it is hard to identify traffic signal conditions in real time even though some traffic signal equipment is controlled remotely. In addition, appropriate measures have not yet been taken, as there is no equipment to monitor traffic accidents and various activities that occur in every corner of a city. This study presents the design plan

Figure 4 : Adaptive Traffic Signal Control System in Goiania

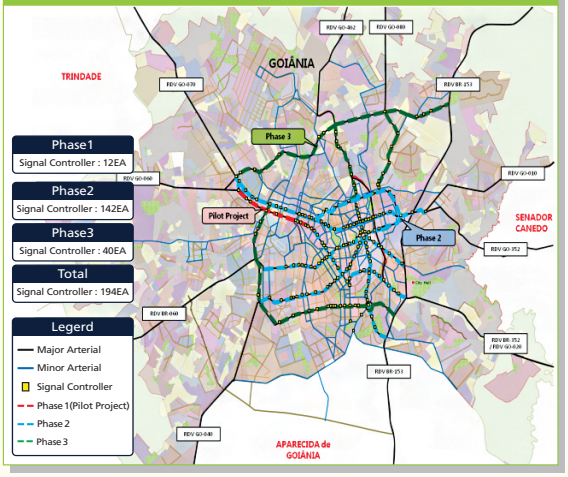


Figure 5 : Advanced Traveler Information System in Goiania

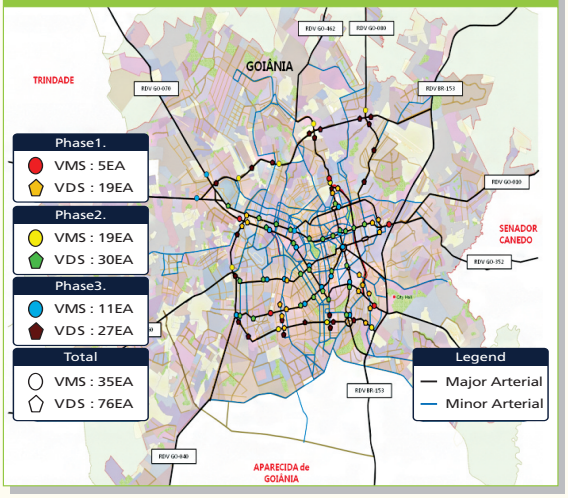


Figure 6 : Advanced Traveler Information System in Montevideo

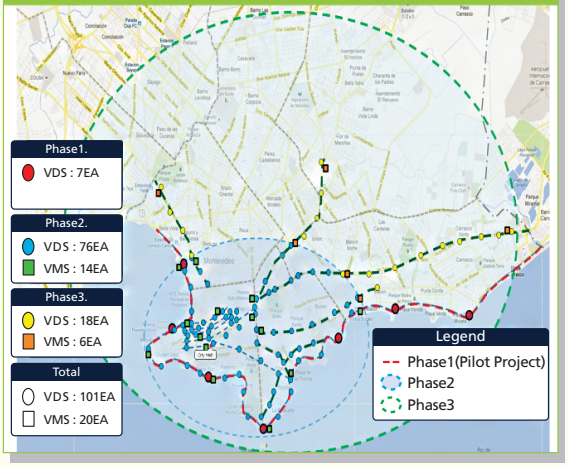


Figure 7 : Automatic Enforcement System in Montevideo

for a traffic signal control system that would consist of 5 sub-systems: an adaptive traffic control system, an advanced traveler information system, an automatic enforcement system, an incident management system and a bus information system as well as the design and information for a communication network that would link those sub-systems (excluding the criminal prevention system and disaster prevention system shown in Figure 1). As mentioned above, the IOCC will ensure that the necessary information is transmitted among systems by controlling the sub-systems and processing all the information collected at the system level. The system configuration mentioned here is the same as the basic concept of the Goiania IOCC. The implementation plan for the IOCC establishment includes the schedules for the pilot project (design-establishment-pilot operation), center system and sub-systems of the second stage.

Conclusion

The design plan proposed in this study can be used as a reference when Goiania or Montevideo City establishes the IOCC in the future. It is expected that the establishment of the IOCC will be highlighted as a key to sustainable development of major cities in Latin America.

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