

## **New Legislation on NSDI in Japan: “Basic Act on the Advancement of Utilizing Geospatial Information”**

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### **Abstract**

*A new law, “Basic Act on the Advancement of Utilizing Geospatial Information,” was enacted by the National Diet in May 2007. This Act provides an overarching legal framework for the development, distribution and application of geospatial information so that people will be able to obtain maximum benefit out of this untapped domain of information, which is becoming increasingly available in digital form, by employing two key technologies, Geographic Information System and Space-based Positioning, Navigation and Timing. This paper summarizes the background and outline of this new legislation, and provides the author’s views on the challenges for the successful implementation of its vision, in which the Geographical Survey Institute is expected to play a key role.*

### **1. Introduction**

May 2007 saw remarkable progress in the development of National Spatial Data Infrastructure (NSDI) in Japan as a new bill on NSDI was enacted at the National Diet. The new legislation, “Basic act on the advancement of utilizing geospatial information” (a provisional translation of the Japanese title of the Act, hereafter referred to as the “NSDI Act”), is considered to provide an overarching legal framework on how geospatial information should be developed, distributed and used in the nation by taking advantage of two base technologies, Geographic Information System (GIS) and Space-Based Positioning, Navigation and Timing (PNT). This paper summarizes the background and outline of this new law, which was put into effect on 29 August 2007, together with the promulgation of the ordinance and technical standards of the Ministry of Land, Infrastructure and Transport (MLIT) on Fundamental Geospatial Data (FGD), whose development and timely update are considered a key ingredient for the successful implementation of the vision of the NSDI Act.

### **2. Background of the New Legislation**

#### **2.1 GIS Development**

The Government of Japan began promoting the use of GIS in an organized manner by setting up a liaison committee of Ministries and Agencies on GIS in 1995,

soon after the Kobe earthquake claimed more than 6,000 lives. Having learned the potential of using GIS for prompt emergency responses and quick recovery from such devastation, and having being informed of the US initiative of developing an NSDI in 1994, it was a natural consequence for the Government to take necessary measures to develop a new information infrastructure for GIS.

During the first ten years after the establishment of the liaison committee, much progress was made on the development of nationwide base geospatial data by digitizing 1:25,000-scale topographic maps, as well as of more detailed data by digitizing the 1:2,500-scale maps that have been prepared by local governments for designated areas of urban planning. The Government also introduced data standards, Japan Profile for Geographic Information Standards (JPGIS), based on the ISO19100 series standards, some of which have been translated into Japanese and adopted as the X7100 series of Japanese Industrial Standards (JIS). The Geographical Survey Institute (GSI), the national mapping organization of the Government, has been playing a key role in these government initiatives.

These government efforts have drawn demand for more detailed (e.g., including individual residential houses and buildings) and more frequently updated geospatial data (e.g., updated with new roads within a

few months of their construction) because of the rapidly growing geospatial business market. Such demand would most likely be fulfilled by active participation of local governments in the development of NSDI as they prepare detailed maps for their mandated work including urban planning and facilities management.

However, most local governments are still relying on paper maps for such mandated work, and these paper maps are usually prepared independently by different offices even within the same organization which may not be necessarily interested in sharing information between themselves.

In addition, GIS installation is still seen as an expensive procurement, which requires costly data development and computer/network system installation as well as capacity building for aging officials in most local governments that are struggling with financial deficits. As a result, only a small number of local governments have been considered successful in developing and maintaining an organization-wide GIS.

In the meantime, some private companies have digitized existing base maps prepared by local governments, and provide services for a variety of applications including car navigation, web mapping and residence maps that depict individual houses and apartments with household names that are posted on their entrance gates or mail boxes.

Since these different base map data of private mapping companies are independently updated, sometimes without accurate surveying and mapping, they do not spatially align with each other. Consequently, the geospatial contents companies have been facing the daunting task of preparing and maintaining different versions of their data geospatially tailored for each of these different base map data.

These circumstances called for the development of a nationwide FGD to be commonly used by the public and private sectors as the source of geospatial reference information.

## 2.2 PNT Development

Another vital driving force for the new legislation has been the widespread use of GPS, which is now

considered part of the social infrastructure in Japan. The applications of GPS range from precision surveying to personal navigation with GPS-enabled cell phones, and some of them are now an essential part of people's lives and businesses. However, GPS services depend entirely on US operations, and Japan has little control over their stability and sustainability. In addition, signal blockage by tall buildings and mountains provides limited coverage of positioning capability with GPS in crowded urban and rugged terrain areas, where some private companies see emerging businesses using geospatial information.

Consequently, the ruling political parties saw an urgent need to develop an augmentation and supplementary system for GPS to enhance the capability and availability of PNT services in Japan, which would support existing and emerging PNT applications as well as establish much closer liaison with PNT service providers, particularly the US.

Given that the synergetic integration of Government policies on these two technologies, i.e., GIS and PNT, could enhance efficiency in state and local government administrations as well as create new businesses and industries with advanced geospatial services, some members of the National Diet took the initiative of submitting a bill on geospatial information in June 2006. The bill was enacted in May 2007 during the regular Diet session.

## 3. Outline of New Legislation

The NSDI Act prescribes the basic principles that the nation should observe as new policies on the utilization of geospatial information, and requires the Government to develop a Basic Plan with specific measures to implement appropriate policies provided in the basic principles.

Some of these basic principles are listed below:

- Policies including development and distribution of digital geospatial information, promotion of GIS and PNT technologies, and capacity building shall be implemented in a comprehensive and systematic manner;
- Synergy between GIS and PNT shall be enhanced to

develop an environment that enables sophisticated use of geospatial information.;

- Stable and reliable PNT services shall be ensured;
- Geospatial information shall be utilized to improve efficiency and enhance functionality of government administration; and
- Consideration shall be given to the distribution of geospatial information, lest national security or individual rights be compromised.

Based on these principles, the NSDI Act specifies the following policies for the Government to implement through a Basic Plan:

- The Government shall work on capacity building on and enhanced use of GIS;
- State and local government offices shall develop and update FGD in a timely manner;
- The Government shall provide its FGD, in principle, free of charge to the public via the Internet;
- State and local government offices shall make efforts to use FGD in preparing maps mandated to them; and
- The Government shall liaise and coordinate with organizations that operate global PNT systems.

The NSDI Act also requires the Government to define the information items and quality requirements of the FGD as an ordinance of MLIT as well as to develop technical standards for its development in such a way to enhance its interoperability. GSI developed drafts for these orders, and finalized them after inviting comments from the public. They were promulgated when the law was put into effect on 29 August 2007. The contents of these orders are summarized below:

#### [Ordinance of MLIT for the Definition of FGD]

- (1) Information items: Geodetic Control Point, Coastline, Boundary of Public Facilities (Road Management Boundary), Boundary of Public Facilities (River Management Boundary), Administrative Boundary (town level; with a point in each polygon), Road Edge, Riverside Edge of Levee Crown, Railroad Track Centerline, Elevation (ground surface point where the elevation is known), Shoreline, Building Outline, Community Boundary (with a point in each polygon), and Street Block Boundary (with a point in each polygon).

(See Fig. 1 for an example of graphic representation of FGD.)

- (2) Quality requirements: FGD must be prepared either by GSI, by public surveying and mapping or by maritime surveying with positional accuracies (standard deviation) better than or equal to 2.5 m (horizontal) and 1.0 m (vertical) in the designated areas for urban planning, or 25 m (horizontal) and 5.0 m (vertical) outside the areas.

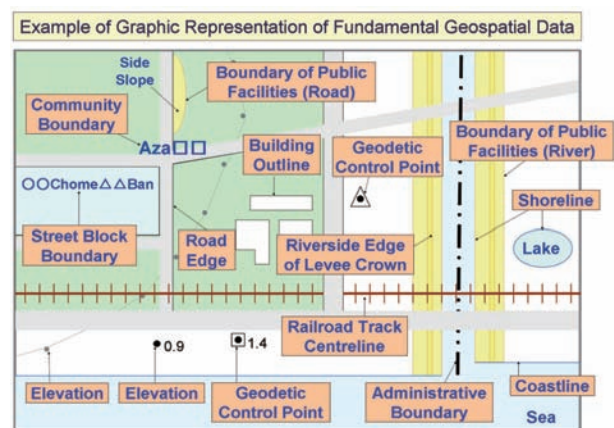


Fig. 1 An example of graphic representation of FGD.

#### [Public Notice of MLIT on the Technical Standards for the Development of FGD]

- (1) Existing datasets of FGD shall be used, where appropriate, when developing or updating another in the same area, and FGD shall be seamlessly connected to those existing in the surrounding areas.
- (2) ISO-19100 and JIS-X7100 series standards that are essential for data sharing shall be employed when FGD is to be distributed.

#### 4. Challenges in the Implementation of NSDI Act

The NSDI Act has provided the geospatial community with a high-level legal framework to develop an infrastructure for enhanced use of geospatial information. The NSDI Act leaves the details of its implementation to a Basic Plan that the Government is mandated to develop on specific measures in accordance with the basic principles and policies prescribed in the NSDI Act.

Preliminary discussions have already started on

the outline of the Plan, and they mostly focused on how FGD is to be developed and updated. It is commonly understood that FGD should be developed by making full use of existing digital data of the maps that are mandated for local governments to prepare, including urban planning maps (See Fig. 2 for the basic concept of FGD development.).

A project fund of about 1.8 billion yen a year has been made available to GSI for fiscal 2007. The fund is to be used to collect FGD from local governments for designated urban areas of about 51,000 km<sup>2</sup>, connect them seamlessly at the data boundaries and make them freely downloadable to the public via the Internet. The fund will also allow GSI to take aerial photographs and develop digital orthoimages as well as digital elevation model data of five meter posting for the same areas. GSI plans to coordinate with local governments in this FGD development project by providing these aerial photographs and other relevant information, and hence meeting their mapping needs.

However, the FGD development should not be concluded without ensuring that the data is used in and timely updated through the mandated businesses of local governments. Otherwise the data will quickly become outdated and less used, resulting in the continuation of duplicated efforts by private companies to create and maintain their own base map data. In this connection, the new legislation is expected to encourage local governments to start using digital map data with GIS and cooperatively work with GSI to develop and maintain FGD.

In this connection, strong leadership of GSI in the development of FGD through close cooperation with local governments will be a key to the successful implementation of the NSDI Act.

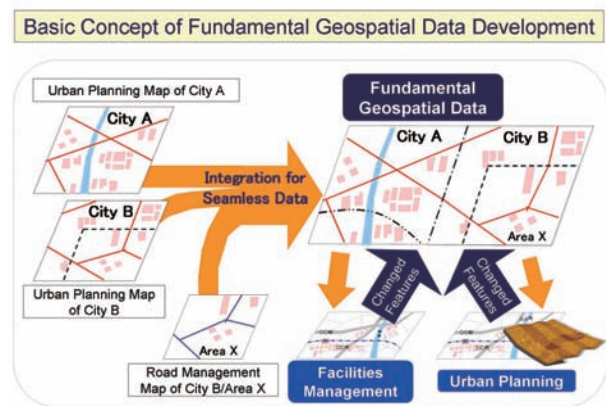


Fig. 2 Basic concept of FGD development.

## Appendix

The following three documents are unofficial translations of the NSDI Act, the Ordinance of MLIT and the Public Notice of MLIT for Technical Standards, respectively, which are referred to in this paper. Only the original Japanese text of these legal documents has legal effect, and the following translation is to be used solely as a reference material for the original text.

### 1. Basic Act on the Advancement of Utilizing Geospatial Information

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Chapter 1: General Provisions (Articles 1-8)

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Section 2: Policies concerning GIS (Articles 16-19)

Section 3: Policies concerning PNT (Articles 20 and 21)

#### Supplementary Provisions

#### Chapter 1: General Provisions

##### (Purpose)

Article 1: The purpose of this Act is to advance policies concerning the advancement of utilizing geospatial information (hereinafter, "AUGI") in a comprehensive and well-planned manner by establishing basic principles and clarifying the responsibilities of state and local governments as well as defining basic elements for policies on AUGI, in view of the fact that

AUGI is essential in establishing an economy and society in which the people can live their lives securely and prosperously at present and in the future.

#### (Definitions)

Article 2: In this Act, “geospatial information” refers to information consisting of either item (i) or a combination of items (i) and (ii).

- (i) Information that represents the position of a specific point or extent in geospace including its temporal information (hereinafter, “positional information”).
- (ii) Any information associated with the information in the previous item of this Article

(2) In this Act, “Geographic Information System (GIS)” refers to an information system that processes geospatial information, recorded in digital form, on a digital / electronic map (a map recorded by an electromagnetic method) with computers to enable geographic understanding and analyses of geospatial information.

(3) In this Act, “Fundamental Geospatial Data (FGD)” refers to positional information, in digital form, that belongs to features, which provides positional reference to geospatial information on a digital/electronic map, including geodetic control points, coastlines, boundaries of public facilities, administrative boundaries and others listed in an ordinance of the Ministry of Land, Infrastructure and Transport (hereinafter, “MLIT”), and that also meets the criteria defined by the ordinance of MLIT.

(4) In this Act, “Space-Based Positioning, Navigation and Timing (PNT)” refers to determination of position, acquisition of clock time concerning the said position based on signals emitted from satellites, and acquisition of tracking information associated with the said position and clock time.

#### (Basic Principles)

Article 3: Given that geospatial information, including FGD, statistical information and geo-imagery, provides essential infrastructure for the improvement of people’s lives and the sound development of the

national economy, AUGI shall be conducted based on the comprehensive and systematic implementation of policies including accurate and proper development and distribution of digital geospatial information, promotion of technologies like GIS and PNT, capacity building, enhancement of coordination among state and local governments and related institutions.

(2) In light of the fact that GIS and PNT benefit from each other such that GIS provides PNT with basic maps for the utilization of geospatial information acquired by PNT while PNT makes useful geospatial information constantly available for GIS, policies concerning AUGI shall be carried out to develop the environment that enables advanced use of geospatial information by enhancing the synergy between the policies for GIS and PNT.

(3) In view of the current situations that PNT has become the infrastructure for the improvement of people’s lives and the sound development of national economy by providing information including accurate position, clock time and tracking, policies concerning AUGI shall be carried out to ensure the environment that provides highly reliable PNT services without interruption.

(4) Policies concerning AUGI shall contribute to the promotion of effective use, development and conservation of the national land and to the protection of people’s lives, bodies and property by making progress in effective and efficient management of public facilities and the implementation of measures that prevent disasters through the active engagement of the state and local governments in applying the policies to their administrative work and projects.

(5) Policies concerning AUGI shall contribute to the improvement of efficiency of administrative management of governments as well as to their functional enhancement through the prevention of unnecessary duplication of map preparation and the improvement of integration, flexibility and transparency of policies by sharing geospatial information that is essential to each section in the government administration.

(6) Policies concerning AUGI shall contribute to the



enhancement of people's convenience through the provision of a variety of services that take advantage of geospatial information.

- (7) Policies concerning AUGI shall contribute to the vitalization and sustainable development of the economy and society through the creation and sound development of a variety of businesses, the enhancement of efficiency and quality of business activities, and the harmonization with the environment by taking advantage of geospatial information.
- (8) At the implementation of policies concerning AUGI, it shall be considered that the potential capabilities of private business organizations shall be appropriately employed by taking advantage of their originality and ingenuity as well as their proposals on technologies of utilizing geospatial information.
- (9) At the implementation of policies concerning AUGI, consideration shall be given, lest national security or individual rights and interests of the people be compromised in the process of expanding the distribution of geospatial information.

#### (The Responsibility of State Government)

Article 4: The state government is responsible for developing and carrying out comprehensive policies concerning AUGI, based on the basic principles in the previous Article (hereinafter, "Basic Principles").

#### (The Responsibility of Local Governments)

Article 5: The local governments are responsible for developing and carrying out policies concerning AUGI in harmony with the circumstances of their regions, based on the Basic Principles and appropriate division of responsibilities with the state government.

#### (Business Organizations' Effort)

Article 6: Business organizations, including those that practice businesses such as surveying, mapping and providing services with GIS and/or PNT, shall make efforts in their businesses, based on the Basic Principles, to provide high quality geospatial information, and to cooperate with the state and/or local governments in their policies concerning AUGI.

#### (Enhancement of Liaison among Related Organizations)

Article 7: Given that AUGI is effectively carried out when mutual liaison and cooperation are facilitated among the state/local governments, related business organizations and research institutions including universities, the state government shall take necessary measures that are vital to enhance the liaison among these organizations.

#### (Legal and other Measures)

Article 8: The Administration of the state government shall take legal, financial, and other measures that are essential to accomplish the policies concerning AUGI.

#### Chapter 2: Basic Plan for AUGI

##### (Development of Basic Plan for AUGI)

Article 9: In order to carry out policies concerning AUGI in a comprehensive and well-planned manner, the Administration of the state government shall develop a Basic Plan concerning AUGI (hereinafter "Basic Plan for AUGI").

(2) The Basic Plan for AUGI shall address the following subjects:

- (i) Basic strategies for the policies concerning AUGI.
- (ii) Policies concerning GIS.
- (iii) Policies concerning PNT.
- (iv) Other measures, in addition to those in the previous three items, required to accomplish policies concerning AUGI in a comprehensive and well-planned manner.

(3) Each policy addressed in the Basic Plan for AUGI shall, in principle, be accompanied with its specific goals and duration that is required to achieve them.

(4) The Administration of the state government shall provide the Basic Plan for AUGI to the public without delay through the Internet and other appropriate methods when it is developed in accordance with Paragraph 1 of this Article.

(5) The Administration of the state government shall, at appropriate occasions, review the achievements of the goals stipulated in Paragraph 3 of this Article, and provide the result to the public through the Internet

and other appropriate methods.

- (6) The provision in Paragraph 4 of this Article applies to amendments made to the Basic Plan for AUGI.

(Institutional Arrangement for Cooperation among Related Administrative Organizations)

Article 10: The Administration of the state government shall make institutional arrangements for the cooperation among related administrative organizations and take other appropriate measures for the development of the Basic Plan for AUGI and the implementation of policies based on the Plan.

Chapter 3: Basic Policies

Section 1: General Provisions

(Research Activities)

Article 11: The state government shall carry out research and studies that are necessary for the development and proper implementation of policies concerning AUGI.

(Dissemination of Knowledge)

Article 12: The state government shall carry out necessary policies including the enlightenment and dissemination of knowledge on utilizing geospatial information in order to foster the people’s understanding of and interest in the importance of utilizing geospatial information.

(Development of Human Resources)

Article 13: The state government shall take necessary measures in order to develop human resources who are equipped with expertise and technologies for AUGI.

(Utilization of Geospatial Information in Government Administration)

Article 14: The state and local governments shall take necessary measures including the broader use of GIS in their administrative work and projects, and the diversification and quality improvement of public services thereof, in order to enhance the people’s convenience as well as the efficiency and functionality of administrative management.

(Protection of Personal Information)

Article 15: The state and local governments shall carry out necessary measures including the proper protection of personal information and the labeling of FGD with quality information for the assurance of its reliability, in order to enable the people to appropriately and confidently use geospatial information.

Section 2: Policies concerning GIS

(Development of FGD)

Article 16: The state government shall issue technical standards with regard to the development of FGD, in order to disseminate the use of GIS by promoting the sharing of FGD.

- (2) The state and local governments shall take necessary measures including the development of FGD and its timely revision based on the said technical standards, in order to achieve the purpose provided in the previous Paragraph of this Article.

(Interoperability of FGD in Geospatial Services)

Article 17: The state and local governments shall make efforts to maximize the interoperable use of existing FGD when they prepare maps in those regions where they carry out their work and projects in such administrative functions that require using maps as city planning, maintenance of public facilities, management of agricultural areas including agricultural fields and forests, cadastral surveys, real estate property registration, taxation and statistics.

(Flawless Distribution of FGD)

Article 18: The state and local governments shall take necessary measures to achieve flawless distribution of geospatial information, including the willing distribution of FGD, and the development and distribution of statistical information and geo-imagery in digital form, given that sharing of FGD and other geospatial information throughout society is vital to the advanced utilization of geospatial information.

- (2) The state government shall, in principle, provide the FGD and other geospatial information that it possesses

free of charge through the Internet.

- (3) In addition to the measures listed in the previous two Paragraphs of this Article, the state government shall take necessary measures, including the provision of technical advice and information, in order to promote the utilization of geospatial information by the people and business organizations.

(Promotion of Research and Development concerning GIS)

Article 19: The state government shall take necessary measures, including the promotion of research and development, the timely evaluation of their results, and the dissemination of the achievements, in order to promote the development of GIS.

Section 3: Policies concerning PNT

(Liaison and Coordination concerning PNT)

Article 20: The state government shall take necessary measures, including the necessary liaison and coordination with organizations that operate global PNT systems, in order to advance the utilization of geospatial information by effectively establishing an environment that enables the people to receive stable and highly reliable PNT services.

(Promotion of Research and Development concerning PNT)

Article 21: The state government shall take necessary measures to promote research and development as well as studies that demonstrate the technology and feasibility concerning PNT, and to promote the use of PNT based on these results, in order to advance the utilization of geospatial information acquired by PNT.

Supplementary Provisions:

This Act shall become effective on the day specified by the Cabinet Order within three months from the day of promulgation.

Statement of Reason:

In view of the fact that AUGI is essential in realizing an economy and society in which the people

can live their lives securely and prosperously at present and in the future, it is critical to develop comprehensive and well-planned promotion of AUGI by establishing basic principles, clarifying the responsibilities of state and local governments for AUGI as well as specifying basic elements for policies concerning AUGI. This is the purpose of submitting this bill.

## 2. Ordinance of the Ministry of Land, Infrastructure and Transport No. 78

Ordinance on the Information Items of and the Requirements for Fundamental Geospatial Data that is referred to in Article 2, Paragraph 3 of the Basic Act on the Advancement of Utilizing Geospatial Information.

Article 1: The information items and their meaning\* of Fundamental Geospatial Data (hereinafter, “FGD”) that is referred to in Article 2, Paragraph 3 of the Basic Act on the Advancement of Utilizing Geospatial Information (hereinafter “Basic Act”) shall be those listed in the following table:

(\*: The meaning of each item of information is not translated into English in the following table. The original Japanese text explains the meaning by referring to, in most cases, those laws that specifically define or refer to the items of information.)

Information Items of FGD
Geodetic Control Point
Coastline
Boundary of Public Facilities (Road Management Boundary)
Boundary of Public Facilities (River Management Boundary)
Administrative Boundary (town level; with a point in each polygon)
Road Edge
Riverside Edge of Levee Crown
Railroad Track Centerline
Elevation (ground surface point where the elevation is known)
Shoreline
Building Outline
Community Boundary (with a point in each polygon)
Street Block Boundary (with a point in each polygon)



Article 2: The requirements that are referred to in Article 2, Paragraph 3 of the Basic Act are that the positional information of FGD shall satisfy all the following criteria.

(1) The positional information shall be a result of either of the following surveys:

- (i) Basic surveys conducted pursuant to Article 4 of the Survey Act;
- (ii) Public surveys, conducted pursuant to Article 5 of the Survey Act or those designated as public surveys in accordance with the provision of Article 47 of the Survey Act, whose results have been acknowledged to have adequate positional accuracies by the Director-General of the Geographical Survey Institute; and
- (iii) Hydrographic surveys conducted in accordance with the Cabinet Order provided in Article 9, Paragraph 1 of the Law for Hydrographic Activities.

(2) The positional information shall be a survey result that satisfies the following positional accuracy requirements:

- (i) Horizontal Accuracy: better than 2.5 m (SD) in areas designated for urban planning or better than 25 m (SD) outside the designated areas; and
- (ii) Vertical Accuracy: better than 1.0 m (SD) in areas designated for urban planning or better than 5.0 m (SD) outside the designated areas.

### **3. Public Notice of the Ministry of Land, Infrastructure and Transport No. 1144**

Public Notice on the Technical Standards for the Development of Fundamental Geospatial Data that are referred to in Article 16, Paragraph 1 of the Basic Act on the Advancement of Utilizing Geospatial Information

(Purpose)

Article 1: Technical standards, provided in Article 16, Paragraph 1 of the Basic Act on the Advancement of Utilizing Geospatial Information (hereinafter, “Basic Act”), for the development of Fundamental Geospatial Data (FGD), which is defined in Article 2, Paragraph 3 of the Basic Act, (hereinafter, “Technical Standards”)

shall be prepared for the purpose of promoting Geographic Information System through the improvement of the sharing of FGD by providing guidelines for the maximum use of FGD and for the development of seamless FGD as well as by setting standards for data interoperability.

(Scope)

Article 2: The Technical Standards shall be applied to the development or revision of FGD by conducting those surveys referred to in Article 2, Paragraph 1 of the Ordinance of the Ministry of Land, Infrastructure and Transport No. 78.

(2) The state and local governments that conduct surveys provided in the previous paragraph shall employ these Technical Standards pursuant to Article 16, Paragraph 2 of the Basic Act.

(Criteria for the Use of Existing FGD)

Article 3: When a dataset of FGD is to be developed or revised, if there are already existing datasets of FGD in the targeted area, which are better in positional accuracy and better represent the latest real world situations, the existing datasets of FGD are to be employed for the development or revision of the dataset of FGD.

(2) If the provision in the previous paragraph causes degradation of overall positional accuracies of the developed or revised dataset of FGD or some other unfavorable results, and hence hinders the advancement of sharing the dataset of FGD, necessary adjustment shall be made on the data.

(Criteria for the Development of Seamless FGD)

Article 4: When a dataset of FGD is to be developed or revised, if there are existing datasets of FGD (hereinafter, “neighboring datasets of FGD”) in areas adjacent to the targeted area (hereinafter, “neighboring areas”) that have better positional accuracies for the same information items, and if the neighboring datasets of FGD properly represent the latest real world situations, the dataset of FGD shall be connected to the neighboring datasets of FGD at the

boundaries between the targeted area and the neighboring areas.

- (2) If the provision in the previous paragraph causes degradation of overall positional accuracies of the developed or revised dataset of FGD or some other unfavorable results, and hence hinders the advancement of sharing the dataset of FGD, necessary adjustment shall be made on the data.
- (3) If, pursuant to Paragraph 1 of this Article, the positional adjustment to the dataset of FGD becomes larger than its positional accuracies when it is connected to the neighboring datasets of FGD, the connection shall not be performed. The information on the unconnected dataset of FGD shall be reported to the organizations that have developed the neighboring datasets of FGD.

(Criteria for the Development of Seamless FGD for Large Areas)

Article 5: When a dataset of FGD is to be developed by connecting multiple adjacent datasets of FGD of the same information items at their boundaries, either of the following methods shall be employed:

- (i) When the location of positional information of the dataset of FGD at the boundaries can be determined by employing ground or aerial surveys with positional accuracies no lower than those of the existing datasets of FGD, the coordinates of that location shall be used to connect the relevant existing datasets of FGD.
- (ii) When the positional accuracies of the datasets of FGD that shall be connected are the same, the coordinates of the mid point between the relevant datasets of FGD at the boundaries shall be used to connect them.
- (iii) When the positional accuracies of the datasets of FGD that shall be connected are different, the coordinates from the dataset of FGD of the highest positional accuracies shall be used to connect the relevant datasets of FGD at the boundaries.

- (2) If the provision in the previous paragraph causes degradation of overall positional accuracies of the developed seamless dataset of FGD or some other unfavorable results, and hence hinders the advancement of sharing the dataset of FGD, necessary adjustment shall be made on the data.
- (3) If, pursuant to Paragraph 1 of this Article, the positional adjustment to the datasets of FGD becomes larger than their positional accuracies when they are connected with each other, the connection shall not be performed. The information on the unconnected datasets of FGD shall be reported to the organizations that have developed the datasets.

(Standards that shall be adopted for FGD Distribution)

Article 6: When a dataset of FGD is to be distributed, the following standards shall be adopted.

- (i) Japanese Industrial Standards (hereinafter, "JIS")
    - X7107 (Spatial schema)
  - (ii) JIS X7108 (Temporal schema)
  - (iii) JIS X7111 (Spatial referencing by coordinates)
  - (iv) JIS X7112 (Spatial referencing by geographic identifiers)
  - (v) JIS X7113 (Quality principles)
  - (vi) JIS X7115 (Metadata)
  - (vii) ISO/TS 19103 (Conceptual schema language)
  - (viii) ISO 19109 (Rules for application schema)
  - (ix) ISO 19110 (Methodology for feature cataloguing)
  - (x) ISO 19118 (Encoding)
  - (xi) ISO 19123 (Schema for coverage geometry and functions)
  - (xii) ISO 19131 (Data product specifications)
- (2) Metadata of FGD shall be prepared in accordance with the provision in Item (vi) of the previous paragraph with the positional accuracies and other quality information based on the result of data inspection.
  - (3) ISO 19136 (Geography Markup Language) may be employed for data encoding instead of ISO 19118 Annex A.