ISSUES IN DIGITAL CARTOGRAPHIC DATA STANDARDS

Report #8

A Draft Proposed Standard for
Digital Cartographic Data

Harold Moellering, Editor

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PREFACE

This report is the eighth in the series which discusses the work of the National Committee for Digital Cartographic Data Standards. It contains the Draft Proposed Standard for cartography in the United States. The standard is divided into four major sections: Definitions and References, Spatial Data Exchange, Digital Cartographic Data Quality, and Cartographic Features.

The Committee has organized a special set of public hearings on this Draft Proposed Standard to be held at the AUTO-CARTO 8 meetings in conjunction with the Spring American Congress on Surveying and Mapping meetings in Baltimore on Thursday April 2, 1987 beginning at 8:30 A.M. All interested parties are invited to participate in these hearings.

This report represents the work of the Committee for the fifth year of operation. We now invite public comment on this standard as presented and discussed herein. Please note that there are five sheets in the back of this report where one can provide written comments and opinions for the consideration of the Committee. Please note that only written comments can be processed by the Committee due to limited staff and resources. Please send all written comments on this report to the DCDS headquarters at the following address:

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INTRODUCTION AND EXECUTIVE SUMMARY

1.0 BACKGROUND

For more than five years an effort has been going on in the United States to develop digital cartographic data standards. This report presents the Draft Proposed Standard in four parts that are the result of a tremendous amount of work by the Committees and individuals involved. This initial introduction and executive summary is intended to provide the reader with a brief overview of this effort and a summary of the standard being proposed.

The National Committee for Digital Cartographic Data Standards has been formed with the general goal of working with the cartographic profession to develop digital cartographic data standards which can be applied on a national basis. The mandate for this work has come from a Memorandum of Understanding that was negotiated between the National Bureau of Standards and the U.S. Geological Survey in 1980 that designated the Survey with lead responsibility for developing, defining, and maintaining data elements and standards for earth science information systems. It is clear that cartographic data standards are only one aspect of this broader mandate. In January 1982 the National Committee for Digital Cartographic Data Standards was founded and organized under the auspices of the American Congress on Surveying and Mapping, the parent organization of the American Cartographic Association. The Committee operates as an impartial and independent body to develop the necessary cartographic standards in a milieu which includes all segments of the cartographic profession. The standards being developed by the Committee will be submitted back to the U.S. Geological Survey with the ultimate goal of becoming Federal Information Processing Standards (FIPS). It is anticipated that the agency, after due consideration, will submit these standards to the National Bureau of Standards for consideration as FIPS standards. To this end the National Committee has organized itself into a Steering Committee and three Working Groups (WGs):

Working Group I	Data Organization
Working Group II	Data Set Quality
Working Group III	Cartographic Features.

As the organization of the Committee is now constituted, the Steering Committee serves as a policy review group which oversees the output of the Working Groups for clarity, consistency and coherence, and subsequently votes on that work. The Working Groups are where a large part of the real effort of the Committee takes place.

As a result of the establishment of the National Committee, its original primary goal has been defined as (Moellering, 1982):

> To provide a professional forum for all involved Federal, State, and local public agencies, private industry, and professional individuals to express their opinions, assessments, and proposals concerning digital cartographic data standards. After sufficient time for the formulation, circulation, discussion, reformulation, and comment, these proposed standards will be submitted to the U.S. Bureau of Standards to become national digital cartographic data standards.

In the ensuing years, this original statement has been slightly modified such that the proposed standards will be submitted back to the U.S. Geological Survey, and then the Survey will then carry the standards forward to the National Bureau of Standards.

The primary tasks of the Committee are as follows:

1) To examine and define the scope of these standards efforts in more detail;

2) To define the number, scope, and goals of the Working Groups and to appoint the membership of the Groups;

3) To define the general policy for the orderly examination, discussion, and adoption of the standards proposed by the Working Groups;

4) To establish liaison with all interested Government agencies, private companies, academic institutions, professional societies, and groups responsible for standards in the major neighboring technical areas;

5) To issue periodic reports from the Committee and the Working Groups; and

6) To submit the proposed standards to the U.S. Geological Survey.

A second committee cooperating in this effort is the Standards Working Group of the Federal Interagency Coordinating Committee on Digital Cartography (FICCDC). It was organized in 1983 with a mandate to coordinate activities between Federal agencies relating to digital cartography. Of the five Working Groups, one, the Standards Working Group, is of interest here. This Group has a mandate to work on the problems of content, format and accuracy in order to formulate efficient data exchange between Federal agencies.

1.1 Cycles of Work

In order to develop effective digital cartographic standards, the most efficient approach is to follow the same strategy one uses to solve scientific problems. Therefore one begins with the general considerations and progressively works down to the specific detailed problems and then back up to the general problem. As a result, the solution process has been conceptualized into five basic cycles of work:

1) Define the fundamental issues involved,

2) Define the alternatives to the problem,

3) Formulate an Interim Proposed Standard,

4) Test and evaluate the Interim Proposed Standard,

5) Generate the final Proposed Standard.

At the end of each cycle a report has been written by the Committee and circulated to the profession for thought, reflection and comment. Numerous presentation sessions have also been held at the Spring and Fall ACSM meetings for public comment and discussion. Comments received by the Committee from concerned professionals have been integrated into the process quickly. It should be fairly clear that this incremental process described here is designed to minimize contrasting opinions at the end by integrating comments and suggestions quickly into the process.

The process began with cycle 1 when the Committee was originally organized and the fundamental issues were defined during the 1982-83 year. The issues were presented and discussed in Committee Report No. 3 (Moellering(ed.), 1983). During the following year of cycle 2 the feasible alternatives were examined and evaluated in Committee Report No. 4 (Moellering(ed.), 1984) and discussed in public hearings. Cycle 3 during the 1984-85 year saw the formulation of the Interim Proposed Standard which was issued as Committee Report No. 6 (Moellering (ed.), 1985) with public hearings held at the AUTO-CARTO 7 meetings in Washington, D.C. During the 1986-87 years of cycle 4 the Committee conducted empirical field tests of the Interim Proposed Standard, issued Report No. 7 (Moellering (ed.), 1986) and reviewed and updated the standard. This work has been issued as the current report on the Draft Proposed Standard with public hearings to be held at the AUTO-CARTO 8 meetings in Baltimore in April, 1987. Future work on the standard will be discussed at the end of this introduction.

2.0 COMMITTEE MEMBERSHIP

The National Committee for Digital Cartographic Data Standards is composed of a Steering Committee , three Working Groups and an Executive Committee. The Steering Committee is the primary organizational structure for the effort and its members are the ones who created the Working Groups in 1982 and defined the scope of their activities. The Steering Committee is also the group that formally votes on the standards according to the American National Standards Institute rules being followed. The Executive Committee is composed of the Chairs and Vice Chairs of the Working Groups and the Committee itself. This group leads the work of the Committee on a day-to-day basis. The Working Groups focus on specific aspects of the standards problem and are composed of experts knowledgeable about those specific aspects of the problem.

The members of the Steering Committee are as follows:

Harold Moellering, Ohio State University, Chairman
Lawrence Fritz, National Ocean Service, Vice Chairman
Dennis Franklin, Defense Mapping Agency
Robert W. Marx, Bureau of the Census
Jerome E. Dobson, Oak Ridge National Laboratories
Dean Edson, E-Quad Associates
Jack Dangermond, Environmental Systems Research Institute
John Davis, Kansas Geological Survey
Paula Hagan, Private Consultant
A.R. Boyle, University of Saskatchewan
Timothy Nyerges, University of Washington
Dean Merchant, Ohio State University
Hugh Calkins, SUNY Buffalo

The members of Working Group I, Data Organization:

Timothy Nyerges, University of Washington, Chairman
Bill Liles, Xerox Special Information Services, Vice Chairman
A.R. Boyle, University of Saskatchewan
Hugh Calkins, SUNY Buffalo
Fred C. Billingsley, NASA Jet Propulsion Laboratory
Robin Fegeas, U.S. Geological Survey
David Pendleton, National Ocean Survey
Clif McVay, Defense Mapping Agency
Jan W. van Roessel, EROS Data Center
Alfred A. Brooks, Information Interchange

The members of Working Group II, Data Set Quality:

Nicholas Chrisman, University of Wisconsin, Chairman
Charles Poeppelmeier, Defense Mapping Agency, Vice Chairman
Dean Merchant, Ohio State University
John Davis, Kansas Geological Survey
George Rosenfield, U.S. Geological Survey
George Johnson, National Ocean Service
Wallace Crisco, Bureau of Land Management
Gunther Greulich, Survey Engineers of Boston
John L. Stout, Geological Consultant
David Meixler, Bureau of the Census
Frank Beck, U.S. Geological Survey

The members of Working Group III, Cartographic Features:

Warren Schmidt, Digital Mapping Unlimited, Chairman
Robert D. Rugg, Virginia Commonwealth University, Vice Chairman
Roger Payne, U.S. Geological Survey
Walter Winn, National Ocean Service
Beth Driver, Maxim Technologies Inc.
Frederick Tamm-Daniels, Tennessee Valley Authority
Mary Clawson, Naval Ocean R&D Activity
Benny Klock, Defense Mapping Agency
Erich Frey, National Ocean Service
Mark Monmonier, Syracuse University

The Standards Working Group of the Federal Interagency Coordinating Committee on Digital Cartography has cooperated in the formulating and testing of several parts of this Draft Proposed Standard. The membership for this Working Group of the Federal Committee is as follows:

Gale TeSelle, Soil Conservation Service, Chairman
Joe Knott, Bureau of the Census
Michael Roivas, Defense Mapping Agency
David Thompson, Federal Aviation Agency
Pat Martin, Federal Emergency Management Agency
Eric Anderson, U.S. Geological Survey
Jan van Roessel, U.S. Geological Survey
Robin Fegeas, U.S. Geological Survey
Henry Tom, National Bureau of Standards
James Upperman, National Bureau of Standards
Lawrence Fritz, National Oceanographic and Atmospheric Administration
Walter Winn, National Oceanographic and Atmospheric Administration
Fred Tamm-Daniels, Tennessee Valley Authority

In addition, there have been a large number of corresponding members involved in this effort. They fall into two broad groups: individual professionals, of whom there are about a thousand, and organizational liaison representatives, of whom there are about two hundred. The organizations represented are professional societies, private sector companies, academic groups, and state and local governments. The Federal agencies are represented by the Federal Committee.

3.0 GENERAL DESCRIPTION OF THE STANDARD

The general goal of this standard is to facilitate the wide use of digital cartographic data bases by providing capabilities that make it easier to use data bases that were developed by other organizations. The work has been divided into four major efforts: define cartographic objects, develop a spatial data exchange mechanism, develop data quality specifications, and develop a unified set of cartographic features. The work on the objects develops a unified set of primitive and simple objects that can be built up as digital representations of cartographic features. The work on spatial data exchange aims to facilitate the digital transfer of the major kinds of cartographic data between noncommunicating computer systems without loss of content or meaning. The work on data quality develops the specifications of a quality report based on the concept of "truth in labeling" and recommends a coordinate standard. The work on cartographic features aims to specify a unified set of definitions of cartographic entities that are real world realizations of a feature and associated attributes. The following is a more detailed summary of these four efforts.

4.0 OBJECT STANDARD (PART I)

The object standard is an attempt to produce a systematic and complete set of cartographic objects for 0, 1, and 2 dimensions. Three dimensional cartographic objects have not been specified. The objectives of this standard for cartographic objects are severalfold:

1) to specify a set of primitive and simple cartographic objects in 0,1, and 2 dimensions;
2) to specify the set of objects that will support the three major cartographic functions:
   a) geometry only operations,
   b) geometry and topology operations,
   c) topology only operations.
3) to specify these objects in a modular fashion such that more elaborate compound and complex objects can be constructed from them;
4) to specify objects that are valid in planar, Euclidean geometry as well as simple curved surfaces such as the sphere or ellipsoid.

Three classes of cartographic objects are defined. Two classes are defined explicitly: geometry only, and geometry and topology, while the third class, topology only, is defined implicitly by truncating the coordinates from the geometry and topology class of objects. The intended use of these three classes of objects is as follows:

1) geometry only - to be used for cartographic drawing only,
2) geometry and topology - to be used for work with modern cartographic data structures which use geometric drawing and utilize topological operations,
3) topology only - to be used for certain analytical operations.

The relationship between the classes of objects and the intended use is specified in Table 1.

Table 1. Intended Uses of Defined Cartographic Objects in Three Cartographic Settings.

	Geometry Only (G)	Geometry and Topology (GT)	Topology Only (T)
0-D	point *	node	(truncated node)
1-D	line segment string arc ring (string or arc)	link directed link chain * ring (link or chain)	link, directed link with truncated nodes ring (link with truncated nodes)
2-D	polygon (ring(s): string or arc) pixel grid cell	polygon (ring(s): link or chain)	polygon (ring(s): link with truncated nodes)

* Note: There are Special Implementation Objects in Part I, Section 1.4.4 that are based on the point and on the chain.

For the purposes of this standard, the following terms have the following defined meanings:

Feature - a defined entity that can be represented by an object.

Entity - a real world phenomenon that is not subdivided into phenomena of the same kind.

Object - a digital representation of a feature.

The relationship between a feature, an entity, and an object is represented in Figure 1.

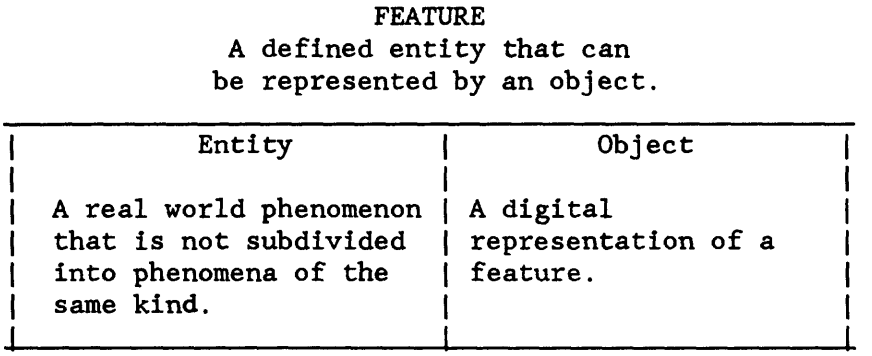

Figure 1. Relationship Between Cartographic Feature, Entity, and Object

5.0 SPATIAL DATA EXCHANGE STANDARD (PART II)

The Spatial Data Exchange Standard includes the primary capability to exchange cartographic object, relational, and raster/grid information as well as cartographic features and attributes, and information pertaining to the quality levels of this data. This standard has been produced in response to an identified need for a mechanism to allow spatial data to be easily moved from one computer system to another, independent of make. Because of this concern, this data exchange standard has been developed with the following objectives:

1) to provide a mechanism for the interchange of digital cartographic information between noncommunicating parties using dissimilar computer systems, preserving the meaning of the information, and reducing to a minimum the need for information external to this standard concerning the interchange;

2) to provide, for the purpose of interchange, a set of clearly specified cartographic objects and relationships that can represent real world cartographic entities, and to specify the ancillary information that may be necessary to accomplish the interchanges required by the cartographic community;

3) to provide an interchange model that will facilitate the conversion of user-oriented objects, relationships and information into the set of objects, relationships and information specified by this standard for the purposes of interchange such that their meaning will be preserved and can be discerned by the recipient of a conforming interchange;

4) to ensure that any implementation of this standard can have the following characteristics:

   a) the ability to transfer vector, raster, grid, and attribute data, and other ancillary information;

   b) the implementation methodology can be media independent and extendable to encompass new cartographic information as needed;

   c) an internally contained description of the data types, formats, and data structures such that the information items can be identified and processed into the user's native system;

   d) the data and media formats should be based where practical on existing FIPS, ANSI, ISO or other accepted standards.

This standard specifies a series of exchange modules. Each module contains a collection of data fields that have been grouped together because of the purpose and/or function of that information. Each module consists of a collection of module fields that contain the information to be transferred. Exchange modules are grouped into higher level abstractions called exchange forms which are the Object Form, the Relational Form, and the Raster-Grid Form which represent the three basic exchange forms for transferring spatial elements. Each exchange form would serve the purpose of a conventional exchange format and is preceded by information in the Global Information modules and Data Quality modules. Three encoding methods can be used to implement this standard:

A) International Standards Organization (ISO) 8211 data descriptive file coding,

B) Federal Interagency Coordinating Committee on Digital Cartography (FICCDC) Federal Geographic Exchange Format (FGEF) delimiter coding,

C) NASA General Data Interchange Language (GDIL), an extension of ISO 8211.

6.0 DATA QUALITY STANDARD (PART III)

The Data Quality Standard consists of a coordinate standard and the specifications of a Quality Report. The purpose of a Quality Report is to provide detailed information for a user to evaluate the fitness of the data for a particular use. This style of standard can be characterized as "truth in labeling", rather than fixing arbitrary numerical thresholds of quality. These specifications therefore provide no fixed levels of quality because such fixed levels are product dependent. In the places where testing is required, several options for different levels of testing are provided. In this environment the producer provides the quality information about the data and the user makes the decision of whether to use the data for a specific application. The five fundamental components of a quality report are:

1) Lineage,

2) Positional Accuracy, with testing levels of:
    a) deductive estimate,
    b) internal evidence,
    c) comparison to source,
    d) independent source of higher accuracy,

3) Attribute Accuracy, with testing levels of:
    a) deductive estimate,
    b) tests based on independent samples,
    c) tests based on polygon overlay,

4) Logical Consistency, including tests of:
    a) tests of valid values,
    b) general tests for graphic data,
    c) specific topological tests,

5) Completeness.

7.0 CARTOGRAPHIC FEATURES STANDARD (PART IV)

The cartographic features standard provides a model that consists of entities, attributes, and attribute values as well as standard terms and included terms. As such the standard contains about 200 entities, 300 attributes and 1100 included terms. As such the entity definitions are not hierarchically structured, are scale independent, and are universal in the sense that they are not product specific. This work has resulted in a smaller primary set of entities that are more broadly defined with more detailed and flexible attributes. The machine processing of such a nonhierarchical and simplified entity set with flexible attributes is more straightforward than with other approaches. The definitions of the entities and attributes are organized such that there is a mechanism to add entities and attributes not included in the standard.

Currently the standard only includes entities and attributes from topography and hydrography. In the future hydrological, cadastral, geological, geophysical and aeronautical entities and attributes will have to be defined and added to the standard to make it complete.

8.0 FUTURE WORK

This report is scheduled for distribution in January of 1987 so that members of the profession will be able to have ample time to read and digest the contents of the standard in time for the public hearings to be held at the AUTO-CARTO 8 meetings in Baltimore in March/April, 1987. During this intervening time written comments concerning the standard will be gladly accepted. At the hearings in Baltimore presentation and comment sessions will be held as part of the public hearings where the entire Committee will be present. These comments will be circulated and discussed in the Committee meetings.

During the time frame of October, 1986 to February, 1987, the Standards Working Group of the Federal Committee will be field testing the September, 1986 version of FGEF. The results of these tests are planned to be finished by March, 1987. As a result the findings of these tests will be integrated back into the standard after the April meetings.

After the AUTO-CARTO 8 meetings in Baltimore, the Draft Proposed Standard by the National Committee and the testing results of the SWG of the Federal Committee will be merged together. This work will be done by a TAsk Force headed by Joel Morrison of the U.S. Geological Survey. This Task Force will be composed primarily of members of the National Committee working Group I and the Federal Committee Standards Working Group. This group will do the final polishing of the standard in preparation for its submission as a Federal Information Processing Standard (FIPS). This polishing work is scheduled to be finished in the Summer of 1987. When the standard has been finally polished, finally reviewed by the National and Federal Committees, and ready for submission as a FIPS standard, it is planned that it will be published in the American Cartographer. After this the Survey will carry the standard through the formal FIPS process as defined by the U.S. National Bureau of Standards. When a standard is proposed and considered as a FIPS standard, a maintenance authority must be appointed because once a standard is developed it must be maintained to keep it current. Periodic updates will be required because specifying standards of this kind is not a one time activity. It is anticipated that some arm of the U.S. Geological Survey will be designated as the maintenance authority because it is the agency that received the original mandate to develop the standard at the outset.

9.0 REFERENCES

Moellering, H, 1982, "The Challenge of Developing a Set of National Digital Cartographic Data Standards for the United States", Proc. of the Spring ACSM Meetings, Denver, p. 210.

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THE STANDARD

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PART I

DEFINITIONS AND REFERENCES

January, 1987

National Committee for Digital Cartographic Data Standards

1 SCOPE, PURPOSE AND APPLICATION

The Spatial Data Exchange Standard (SDES) has been produced to meet a need for easy transfer of spatial data from one computer system to another, independent of make.

The concerns for common data formats and geocoding conventions cut across all topics of spatial data handling. Currently, it is difficult and inefficient for diverse users to use a given set of data, which hinders the interpretation of a data set from a variety of sources for general use.

At least five major forces are causing concern about incompatibility: (1) increasing amounts of spatial data are being generated and must be stored, cataloged, and retrieved, (2) there is rapid progress and expansion in the area of spatial data processing, (3) increasing amounts of related and useful data are being obtained in digital form, (4) increasing sophistication in the ability to register digital images with maps, as well as the analysis of multiple sets of data is resulting in a call for more digital data, and (5) much of the map automation effort may be duplicative and redundant.

The incompatibility of various archives, data base formats, and processing has been documented several times. The basic elements associated with cartographic and imagery data (points, lines, areas (polygons), grid cells and pixels,) are being used increasingly for geographic analysis as well as for making maps.

Because of this concern, this data exchange standard has been developed with the following objectives:

1. to provide a mechanism for the interchange of digital spatial information between noncommunicating parties using dissimilar computer systems, preserving the meaning of the information, and reducing to a minimum the need for information external to this standard concerning the interchange.

2. to provide, for the purpose of interchange, a set of clearly specified spatial objects and relationships that can represent real world spatial entities, and to specify the ancillary information that may be necessary to accomplish the interchanges required by the cartographic community.

3. to provide an interchange model that will facilitate the conversion of user-oriented objects, relationships and information into the set of objects, relationships and information specified by this standard for the purposes of interchange such that their meaning will be preserved and can be discerned by the recipient of a conforming

interchange.

4. to ensure that any implementation of this standard can have the following characteristics:

   a. the ability to transfer vector, raster, grid, and attribute data, and other ancillary information.

   b. the implementation methodology can be media-independent and extendable to encompass new spatial information as needed.

   c. an internally contained description of the data types, formats, and data structures such that the information items can be identified and processed into the user's native system.

   d. the data and media formats should be based where practical on existing FIPS, ANSI, ISO, or other accepted standards.

This standard has been written so as to be "implementation independent." Three alternative implementation methods that are not a part of the standard are described in appendices A, B, and C. The specifications of sections 4 and 5 describe the generic data content and data organization of the exchange, and are meant to be independent of the implementation method. The terminology used in sections 4 and 5 must be translated into corresponding terms for the implementation methods as provided in appendices A,B, and C.

Section 2 discusses conformance to this standard. Section 3 lists the references that apply to this standard and presents the terms and definitions as well. Section 4 contains general models and general specifications. Section 5 contains implementation-independent, detailed specifications for exchange modules. Appendices A, B, and C present the encoding methods for implementing this standard.

This standard specifies a series of exchange modules. Each module contains a collection of data fields that have been grouped together because of the purpose and/or function of that information. Each module consists of a collection of module fields that contain the information to be transferred.

Exchange modules are grouped into higher level abstractions called exchange forms. Each exchange form would serve the purpose of a conventional exchange format. Examples of these formats are the U.S. Geological Survey's Digital Line Graph and the Defense Mapping Agency's Standard Linear Format.

An exchange module implemented in the simplest of data organizations would represent a single logical file implemented as a single physical file. However, an exchange module can actually be made up of one or more logical files, and implemented as a single or multiple physical files.

Three encoding methods can be used to implement this standard. These are discussed in Appendices A, B and C, respectively, as:

(A) International Standards Organization (ISO) 8211 data descriptive file coding

(B) Federal Interagency Coordinating Committee on Digital Cartography (FICCDC) Federal Geographic Exchange Format (FGEF) delimiter coding

(C) NASA General Data Interchange Language (GDIL).

Table 1.1 provides a list of exchange modules grouped according to the following: Globals Information, Data Quality, Object Form, Relational Form, and Raster-Grid Form. The Object, Relational, and Raster-Grid Forms represent the three basic exchange forms for transferring spatial elements. With each of these basic exchange forms, all or part of the Global and Data Quality groups can be used to provide a complete transfer format. However, a complete transfer format can also be assembled from modules of any of the exchange forms as may be appropriate.

Table 1.1 Exchange Forms and Modules

GLOBAL INFORMATION

Catalog/Directory
Catalog/Cross-Reference
Catalog/Spatial-Domain
Identification
Security
Internal Spatial Reference
External Spatial Reference
Spatial Domain
Registration Points
Lineage
Positional Accuracy
Attribute Accuracy
Logical Consistency

DATA QUALITY

Lineage
Positional Accuracy

Attribute Accuracy
Logical Consistency
Completeness

OBJECT FORM

Point-Node
Line
Polygon-Ring
Arc
Composite
Attribute Description

RELATIONAL FORM

Schema
Feature/Element
Polygon/Ring
Polygon/Chain
Polygon/Point
Ring/Chain
Ring/Point
Chain/Point
Node/Chain
Node/Point
Polygon/Address
Ring/Address
Chain/Address
Node/Address
Point/Address
Chain-topology
Attribute-Primary
Attribute-Secondary

RASTER-GRID FORM

Grid-Definition
Grid-Cell
Raster-Definition
Raster-Cell

2 CONFORMANCE

This standard makes a clear distinction between data models, content, and structure on the one hand, and implementation on the other. Sections 4 and 5 address the former, while Appendices A, B, and C specify the latter.

A spatial data exchange shall be in conformance with this standard if all specifications in sections 4 and 5 are strictly adhered to.

Appendices A, B, and C are not a part of the spatial data exchange standard. They contain three strongly recommended implementation methods. Non-conformance with any of the specifications for these methods does not imply non-conformance with the standard.

3 MAINTENANCE

The U.S. Geological Survey is the designated maintenance organization for this standard. Queries may be sent to the Chief, National Mapping Division, U.S. Geological Survey, Reston, VA 22092.

4 GENERAL SPECIFICATION

This section contains general concepts and specifications that pertain to the exchange module specifications of Section 5. It also specifies the general elements of an implementation and the relationships of the logical constructs of the data models to the general elements of a detailed implementation as well as general constraints on implementations. This section consists of two main parts: the underlying models, and specific exchange module specification conventions used in Section 5. This section also contains specifications for the relationships of the logical constructs of the model to the general constructs of an implementation such as those described in the Appendices.

4.1 Spatial Data Exchange Models

Three data models form the basic foundation for the process of converting from a user representation of a cartographic feature to a corresponding digital object representation in a spatial data exchange.

1. The conceptual model of spatial data. This model describes the spatial objects and the logical and topological relationships between the spatial objects used to capture the spatial features. The conceptual data model is data structure independent.

2. The exchange forms. This data model relates to capturing the objects and their relationships, as expressed in the conceptual model, into appropriate data structures that are represented by the exchange forms, namely: vector-based object oriented, vector-based relational, or raster-grid. The exchange forms express a logical data model that is data structure dependent but implementation independent.

3. The exchange model. This model relates an implementation of these data structures to logical constructs of the standard and the general constructs of the implementation method and a selected exchange medium. The exchange model is therefore implementation dependent.

Each of these three underlying models will be discussed in turn in the following three sections (4.1.1-3).

4.1.1 The Conceptual Model Of Spatial Data

Implicit in this spatial data exchange specification is a conceptual model of spatial data that is sufficient to accommodate the wide range of different user-specific views of spatial data to be exchanged. This section briefly outlines this conceptual model and, together with the following two sections, provide a framework within which a user can map spatial data into the exchange modules of this standard.

At the most abstract level, this conceptual model of spatial data consists of features, attributes, and relationships. A feature is a defined real world phenomenon that is not subdivided into phenomena of the same kind. An attribute is a defined characteristic of a feature. An attribute may be assigned a specific quality or quantity termed an attribute value. A required attribute of a spatial data feature is location. Relationships exist between features and between attributes (as well as between attributes and features).

At the next level of abstraction, the conceptual model consists of spatial objects. An object is a digital representation of part or all of a feature. Likewise, attributes, attribute values, and relationships can have digital representations that are related to objects and one another just as they themselves are to features and one another at the higher level of abstraction.

The spatial objects that can be used to represent features are defined in terms of spatial attributes (i.e. geometry) and spatial relationships (i.e. topology). The definition of each object type is given in the Terms section of Part I, Section 3. For the present, the explicit spatial dimensionality of these objects is limited to zero, one, and two dimensions. This model can be seen therefore to consider the location attribute to be primarily defined in reference to a surface (usually the Earth's). Three or N-dimensional data, however, may be accommodated.

In addition to the basic spatial objects, a generic composite object and an attribute data object are also available. A composite object consists of two or more other objects (either basic or composite). An attribute data object can be used to represent attributes and attribute values independent of other objects. These two objects, the composite and the attribute data, allow non-spatial attributes and relationships as well as more complex spatial attributes and relationships to provide the basis for user-defined digital representations of features and attribute data.

Finally, this model provides for "global" features, attributes, and relationships to be described. The spatial data of a given exchange may be characterized by spatial domain, feature class, temporal extent, data quality, security requirements, spatial referencing system (for location), or whatever other global information may be pertinent. Further, a catalog construct may be used to specify global relationships between groupings of data as well as relationships between objects.

4.1.2 The Exchange Forms

Spatial data may conform to the one conceptual model and still be represented by more than one logical data model. This standard provides for three different logical data structure constructs to be used for exchange. These constructs, termed exchange forms, are (1) the Object form, (2) the Relational form, and (3) the Raster-Grid form. Various individual exchange modules may be grouped into one of these exchange forms (see Table 1.1).

The object form can be thought of as comprising the traditional "vector" spatial data representation. Each individual exchange module record is meant to carry all information or links to all information about one cartographic object. Locational data, other attribute data, and relationships to other objects are all included in one module record.

The relational form also expresses a vector representation, but in the form of a set of relational tables. Here each exchange module represents a relationship between objects or between objects and attributes or between attributes.

The raster form organizes the spatial data by location and can be considered the means for exchanging traditional raster or grid cell structured data. The Raster-Grid modules allow attribute data to be associated with image pixels or grid cells.

Note that the global modules are used with any of the three exchange forms.

4.1.3 The Exchange Model

This section defines the third model in terms of its constructs and logical relationships. It deals with three types of logical exchange constructs: 1) logical constructs solely pertaining to this standard; 2) constructs relating the implementation methods or media; and 3) constructs solely pertaining to the exchange media. The three types are summarized in table 4.1.3.1. Definitions as found in Section 3.2 define logical characteristics of constructs that have physical instances which are implementation and/or media dependent. Definitions for the corresponding physical constructs may be found in the implementation requirements in the Appendices where additional

constraints may exist.

Table 4.1.3.1

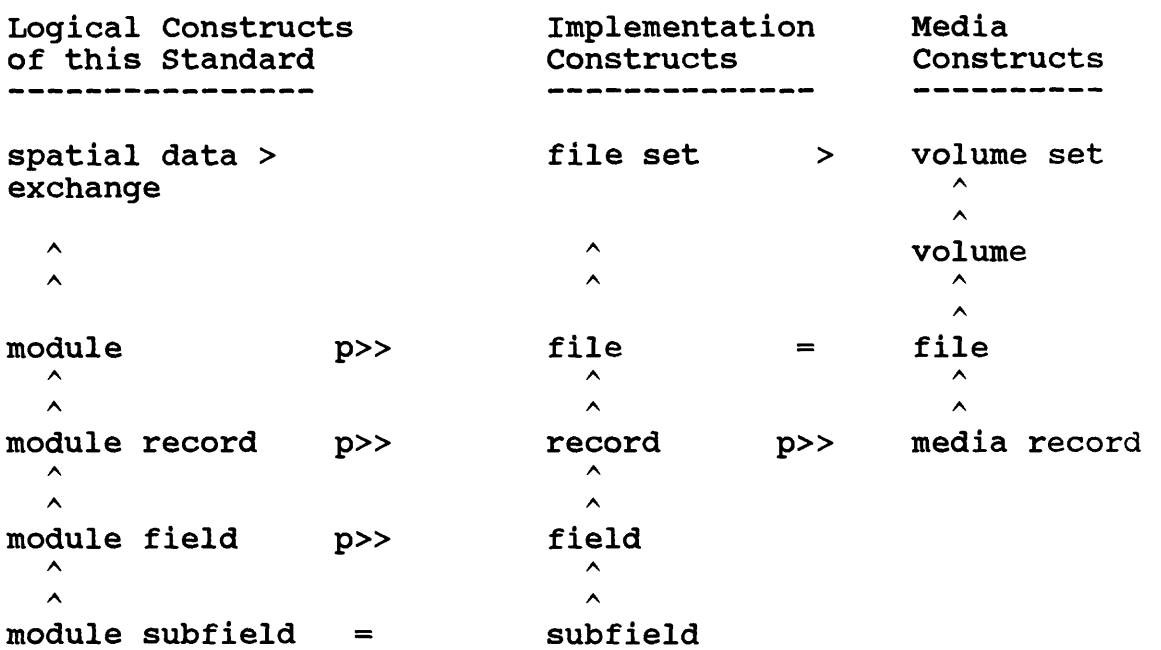
Exchange Constructs of this Standard

Construct	Logical	Implementation	Media
Module	X		
Module specification	X		
Module record	X		
Module field	X		
Module subfield	X		
Field group	X		
Subfield		X	
Field		X	
Record		X	
File		X	
File set		X	
Volume			X
Volume set			X
Media record			X

Table 4.1.3.2 depicts the relationships of the logical constructs specified in this standard to the typical constructs of an implementation and a medium. These relationships may vary due to the capabilities of the implementation and the medium chosen. An implementation may be media specific, in which case the implementation constructs and media constructs may appear merged into a single concept. For implementations that are media-independent, some of the constructs are logical constructs whose instances become specific only when the medium is specified. By separating the logical constructs from the physical constructs, this standard provides a set of logical specifications that can be supported by more than one implementation method for more than one medium.

Table 4.1.3.2

Relationships between the Exchange Constructs of this Standard and a Typical Implementation and Medium.



B = A implies functional equivalence of A and B
B > A implies A contains one of B
B >> A implies A contains one or more of B
B p>> A implies A contains part of, or one or more of B

The exchange model specifies relationships of the following basic types: (1) implicit construct ordering relationships, and (2) explicit cross-references between constructs.

Ordering relationships referred to in this standard carry the meaning that the constructs should be accessible to the receiver in the order indicated, without requiring any information about order not contained within the exchange or in this standard. It does not necessarily imply physical storage order on the media.

4.1.3.1 Backus-Naur Form

Backus-Naur Form will be used to concisely express structure, relationships, and layout of the exchange constructs in this specification where appropriate. BNF is a system of production rules, equivalent to that of syntax diagrams, that was first developed by Backus (1963).

Each production rule has a left side (identifier) and a right side (expression) connected by the symbol "::=", meaning that the left hand side is replaced by or produces the right hand side. Terms in the right hand side either match other identifiers or are terminal symbols. Making substitutions using matching symbols in the production rules therefore lead to explaining the highest level identifier in terms of the lowest level terminal symbols. Other identifiers are intermediate, explaining the organization of the lower level symbols, and it is this expressive power of BNF that is used to define the organization of the exchange constructs in this standard. Most often the terminal symbols will actually be absent, but the production rules are presented in an indented form, which indicates the levels of organization.

The BNF used here is an extension from normal usage, where the order of the terms in the right hand side of the production rule implies a physical ordering of these terms (as characters in a sentence for instance). However, for data exchange, order may not be important at times, and the terms may be considered a set. When order is not important, the convention of separating the terms with a "," will be used.

The symbols used in the production rules have the following meaning:

Symbol	Meaning
::=	is replaced by, produces, consists of
|	exclusive or
[]	term enclosed is optional (used zero or one times)
{}	term enclosed is used any number of times (zero, one, or several times)
<>	term enclosed is non-terminal
,	exists together with (no order implied)

An example of the usage of BNF is the following:

```
<module record A>::= <Pfield>, {<Sfield1>}, {<Sfield2>}, [<Sfield3>]
  <Pfield>::= <Modname> <Objrep> <Objid>
```

meaning that module record A is composed of a primary field and

three secondary fields, where these fields need not occur in the order shown. Sfield1 and Sfield2 may be repeated a variable number of times, and Sfield3 either occurs once or is absent. The primary field is further defined in terms of its subfields, whereas the secondary fields are not broken down any further, but are non-terminal, meaning that they represent intermediate concepts. As the subfields of Pfield are not separated by commas, they must occur in the order indicated.

4.1.3.2 Implicit Relationships Between Constructs

The ordering relationships between the logical constructs of this standard in the exchange are designated in Table 4.1.3.2. This table also designates the relationships between these constructs and other implementation and media constructs.

4.1.3.2.1 Modules Within A Spatial Data Exchange

In a spatial data exchange, modules should be organized (see Table 5.2.1) beginning with global modules, followed by cartographic object modules, followed by relational modules, followed by the raster modules. However, when catalog modules are included, this ordering is not required and need not be adhered to.

Module types may be included or omitted as required.

4.1.3.2.2 Module Records Within Modules

Module records should preferably occur in ascending sorted order, according to the module record identifier field. Module records representing spatial objects or relationships between components of spatial objects (relational exchange form) shall occur in the order dictated by the spatial data model.

4.1.3.2.3 Module Fields Within Module Records

It is recommended that module fields within module records occur according to the sequence specified in Section 5. Module fields may occur in a different order, given that each field is properly identified through the encoding method and that the relationships between fields is preserved where appropriate (field groups). Module fields within each module description are arranged such that within a given module record the primary module field will not repeat, whereas the secondary module fields may repeat a fixed or variable number of times.

The structure of a module with a primary field "Pfield", and secondary fields Sfield1, Sfield2,...,Sfieldn, can be expressed as:

<module record>::= <Pfield>, {<Sfield1>}, {<Sfield2>},
..., {<Sfieldn>}

where the "{}" brackets indicate occurrence of zero or more times. The rules for the case where the field is absent are given in section 4.1.3.2.6.

The above model generally applies, but there are also instances where the relationships between module fields are more complex, and the fields participate in a tree structure (see Section 4.1.3.2.5). Moreover, the order of repetition of a module field may not be significant, or it may be highly significant. Secondary fields therefore fall into four classes:

a) the order of repetition is not significant

b) the order of repetition is significant

c) the order of repetition is significant and is correlated with the repetition of another field

d) the field participates in a rooted tree structure

Modules of the Relational Exchange Form have only a single module field per module record, and therefore are simply constructed as:

<module record>::= <Pfield>

4.1.3.2.4 Subfields Within Fields

Module subfields within module fields shall occur according to the sequence specified in Section 5.

A module subfield with a given name can be repeated a variable number of times within a given spatial data exchange if this is so specified within this standard (see Section 4.2.3.6).

4.1.3.2.5 Field Groups

Certain groups of module fields have special ordering and/or relationships that deviate from the simple nesting model specified in Section 4.1.3.2.3. These are designated as special field groups. There are two types of field groups: (1) attributes, and (2) polygons (rings).

Attribute fields are related in the form of a tree; their organization is fully specified in Section 4.1.3.3.6.

Polygons (rings) occur in the Polygon-Ring module and consist of a set of spatial address fields or foreign identifier fields for a ring, and rings grouped into a polygon. The special relationship between the fields is the repetition of the spatial address or foreign identifier fields for a ring, and the repetitions of the multiple rings for a polygon within the module record. This field group is defined in the Polygon-Ring module specification (Section 5.4.3).

4.1.3.2.6 Optionality Of Module Fields

Module fields can be be omitted entirely provided that: (1) the sequence indicated in Section 5 is maintained, and (2) remaining fields can be properly identified in the decoding process without additional external information not contained in this standard. Alternatively, fields may be empty (null) module fields. The definition and the method for implementing null fields is implementation dependent, and may also be application specific.

4.1.3.2.7 Optionality Of Module Subfields

Module subfields can be be omitted entirely provided that: (1) the sequence indicated in Section 5 is maintained, and (2) remaining fields can be properly identified in the decoding process without additional external information not contained in this standard. Alternatively, subfields may be empty (null) module fields. The definition and the method for implementing null subfields is implementation dependent and may also be application specific.

4.1.3.2.8 Extra Module Fields And Module Subfields

Private agreements limit the scope of the interchange and are discouraged. Recurring needs for similar private agreements with a significant number of users should be referred to the maintenance organization of the standard.

Under private agreement, extra module fields and module subfields may be added, but the integrity of the standard should not be compromised. Additional field names and subfield names may be added provided that they do not conflict in meaning with similar controls specified in this standard. Full specifications for each implementation method are found in the appendices.

4.1.3.2.9 Preservation Of Order

For a repetitive list, an implementation shall preserve the order as received from the sender, and on output, preserve order as found on the media.

4.1.3.3 Explicit Relationships Between Constructs

Whereas the previous sections dealt with implied relationships between constructs, the following sections deal with relationships between constructs which are explicitly encoded in the spatial data exchange. The relationships discussed are not only restricted to relationships between exchange constructs, but also include other elements of the exchange such as spatial addresses and attributes.

4.1.3.3.1 Modules, Records, Files, And Volumes

As indicated in Table 4.1.3.2, a module may occur in a part of, in all of, or in more than one media record, file, or volume. The Catalog/Directory module may be used to specify which records, files and volumes are associated with a particular module. Each Catalog/Directory module record has a single field with subfields containing identifiers for module, record, file, and volume. More than one catalog module record may be used to express the relationships between a specific module and its associated media records, files, and volumes.

4.1.3.3.2 Module Cross References

Certain modules may reference, have bearing on, refer to, or relate to other modules. These relationships are specifically expressed in the Catalog/Cross-Reference module. Each module record in this module has one field consisting of four subfields, containing module names and types for two modules.

4.1.3.3.3 Modules And Spatial Domain

Relationships between modules and spatial domain, map and map layer are expressed through the Catalog/Spatial-Domain module. Each module record in this module has a field with four subfields, containing module name, spatial domain, map name, and layer name.

4.1.3.3.4 Module Record Cross References

Module Record Identifiers -

Explicit relationships between module records are established through module record identifiers and foreign identifiers. A module record identifier shall provide a unique identification for the record in the entire exchange. The identifier has three subfields: (1) module name, (2) object representation, and (3) object identifier. The module record identifier frequently exists as the first three subfields of the primary module field associated with the module record. The object identifier must be unique within the combination of module name and object representation.

Module record identifiers are used only for the modules in the Object exchange form. In the Relational exchange form module name and object representation are stored in the schema module preceding the spatial data module. Module records for the global modules do not have unique record identifiers, but carry only the module name in the first subfield of the primary module field.

Foreign Identifiers -

References to other records from a given record shall be made through foreign identifiers. Foreign identifiers must be identical in domain and structure to the module record identifiers across the entire interchange file set. Omitted subfields must be consistently omitted in both foreign and module record identifiers.

4.1.3.3.5 Spatial Addresses

The standard allows for a number of spatial addressing techniques other than the traditional method of Cartesian coordinates. For each method, and even within each method, a potentially different number of subfields may be required to form a complete spatial address. The method for specifying the type of address and for labelling the components of the address are further specified in Section 5.1.2.

4.1.3.3.6 Attributes

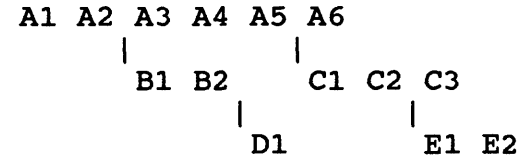
The attribute field group is a set of consecutive fields containing a nested tree structure of the generic form:

```
<subtree> ::= {<attribute> | <[> <subtree> <]>}
<attribute> ::= <attribute definition field>
                {<attribute value field>}
   <attribute definition field> ::= <attribute name>
                                    <attribute value format>
                                    <attribute value unit>
   <attribute value field> ::= {<attribute value subfield>}
```

where the "{}" brackets indicate indefinite repetition, and "|" has the meaning of exclusive OR. All terms in the productions are non-terminal and are enclosed in "<>" brackets. The sentences that can be produced by the above BNF are not to be taken literally; they are only symbolic of the attribute tree structure present in any kind of specific implementation of this standard. In the sentences that can be generated by the above representation the subtrees other than the root subtree are identified by opening "[" and closing "]" brackets.

Each attribute in the attribute tree consists of two consecutive field types: the attribute definition field and the attribute value field. For each attribute, the attribute value field may be repeated an arbitrary number of times, and each attribute value field may consist of an arbitrary number of attribute value subfields. The significance of an attribute followed by a subtree is that the subtree provides secondary data for the attribute. Any attribute subfield may be omitted according to the rules for missing subfields of Section 4.1.3.2.7.

Assuming the following tree structure for example:



where the attribute with name A2 has secondary attributes B1, B2 etc., and where the format, unit, and value are represented by FA1, UA1, VA1, etc., the structure may be expressed sequentially as:

```
A1 FA1 UA1 VA1
A2 FA2 UA2 VA2
   [B1 FB1 UB1 VB1
   B2 FB2 UB2 VB2
      [D1 FD1 UD1 VD1]]
A3 FA3 UA3 VA3
A4 FA4 UA4 VA4
A5 FA5 UA5 VA51 VA52 VA53
   [C1 FC1 UC1 VC1
   C2 FC2 UC2 VC2
      [E1 FE1 UE1 VE1
      E2 FE2 UE2 VE2]
   C3 FC3 UE3 VE31 VE32 VE33]
A6 FA6 UA6 VA6
```

In this generic example, the tree and subtrees are characterized through brackets and indentation. Each implementation method for this standard must have its own mechanism for transferring the logical relationships between the module fields of the attribute tree.

4.1.3.3.7 Attribute Description

To avoid unnecessary repetition of attributes that do not vary from spatial object to spatial object, attributes may be stored separately in the Attribute Description module. The association between the spatial object representation and the attribute record in the attribute description module shall be expressed through a special attribute coded to provide the linkage. For this special attribute the attribute value format subfield shall contain the character "^", and the attribute value field shall have three subfields containing the components of the foreign identifier.

In general, this convention may also be used to store foreign identifiers pointing to module records other than module records of the attribute description module.

4.1.3.3.8 Attributes In The Relational Exchange Form

Attributes for the relational exchange form are stored as module subfields in a single module field which is equivalent with the module record. For implementation methods which are not self-describing, format information must be provided in a Schema module. The pairing of attribute and schema modules shall be expressed in the Catalog/Cross-Reference module. The Attribute-Primary and Attribute-Secondary attribute modules may be used to relate secondary to primary attributes, and this may be done recursively, so that hierarchical relationships can be preserved. The first subfield(s) in an Attribute-Secondary module record should be a relational foreign key or be join items in an Attribute-Primary module record. Schema modules may be provided for non-attribute relational exchange forms as well, but this is not a requirement.

4.2 Exchange Module Specification Conventions

The following sections contain the conventions followed and notation used for the module specifications of Section 5.

4.2.1 Specification Layout

Each specification consists of two consecutive tables: (1) the module composition table, and (2) the domain description table. The module composition table has a number of columns describing the fields comprising the module record. They represent: (1) Field Name, (2) Subfield Name, and (3) Field/Subfield Name Description. Each module record is composed of a set of module fields. Each module field has a field name. The primary module field name for a module record is also the module type. Subfield names identify the data content of the module records.

The domain description table consists of four columns representing: (1) Subfield Name, (2) Subfield Type, (3) Domain, and (4) Domain Description. Each subfield name entry has a corresponding name entry in the module composition table. The Subfield Type indicates the manner in which the subfield must be encoded. Each of the codes has the following meaning:

A: graphic characters, alphanumeric characters, or alphabetic characters
I: implicit-point (integer)
R: explicit-point unscaled (real)
S: explicit-point scaled (real with exponent)
B: bitfield data (unsigned binary, as per agreement)
C: character mode bitfield (binary in zero and one characters)

In some instances, one may select from two of the above types, in which case the code letters will be separated by a vertical bar "|". The subfield type used should always be predictable.

The domain column specifies the set of values that may be encoded within the indicated subfield type. There are seven major domain specifications:

(a) Graphics characters (Gr-chars)
(b) Alphanumeric (Alphanum)
(c) Alphabetic (Alpha)
(d) Integer
(e) Real
(f) Binary
(g) Allowable values (domain enumeration)

In the first six cases (a,b,c,d,e,f), the domain column will indicate "Alphanumeric," "Integer," etc. In the last case, (g), the permitted values are listed, and each value is explained in the domain description column. For the first six cases, the domain description column may provide further restrictions. For instance, if an alphanumeric item must start with an alphabetic character this will be indicated.

Table 4.2.1.1 contains a complete enumeration of the graphics characters, alphabetic, numeric, and alphanumeric character sets to be used for the graphics characters, alphabetic, numeric, and alphanumeric domains.

Table 4.2.1.1

Character Sets Used to Express the Graphics Characters, Alphabetic, Numeric and Alphanumeric Domains

Graphics Characters									
Alphanumeric									
Alphabetic					Numeric				
A	N	a	n	blank	0	E	!	|	
B	O	b	o		1	.	"	/	{
C	P	c	p		2	+	#	:	}
D	Q	d	q		3	-	$	;	
E	R	e	r		4		%	<	
F	S	f	s		5		&	=	
G	T	g	t		6		'	>	
H	U	h	u		7		(	?	
I	V	i	v		8		)	@	
J	W	j	w		9		*	[	
K	X	k	x				~	]	
L	Y	l	y				,	\	
M	Z	m	z					^	

1/ The width of the underline below the character set name indicates which characters are included in the set

2/ The "E" in the Numeric set is used for expressing an exponent. Note that the characters ".","+", and "-" are not part of the Alphanumeric set.

4.2.2 Generic Versus Explicit Specification

Various specification elements, such as module names, field names and subfield names, can be specified generically, rather than explicitly. In this case the user must replace the generic names with names composed by the user, or selected by the user from a name substitution table, as indicated by the notation and naming conventions laid out in the following sections.

An explicit specification is one that shall appear verbatim as documented in this standard.

4.2.3 Notation And Naming Conventions

This section specifies notation conventions for the nature and character of field names and subfield names occurring in the module specification tables.

4.2.3.1 Explicit Specification

All field names are specified in alphabetic characters, with the first character in upper case, and the remainder in lower case. Subfield names are specified the same as field names.

4.2.3.2 Generic Specification

Field name and subfield names are specified in lower-case alphabetic characters, and the entire name shall be replaced by the user, often from specified authority tables.

After user substitution, all specifications will appear as though they were explicit specifications.

4.2.3.3 Classes Of Fields

Fields may be grouped into different classes. Some fields may have repeated instances in the exchange, while others are not allowed to repeat. For some fields ordering may be important, while for others it is not. To designate the class of a field therefore, each field may have one or more characters following its name. The meaning of these designations is as follows.

Primary fields will be indicated by a (P), secondary fields where order of repetition is not significant are marked by (R), and secondary fields where the order is significant are marked by (O). Secondary fields participating in a tree structure will be marked by (T). Secondary fields that should not be repeated are marked with (N).

Secondary fields where order of repetition is significant and is correlated with the repetition of one or more other fields is designated as follows. Each set of fields with a module record where ordering is correlated will be assigned a character. This character is then appended to the order symbol (O) for a field, symbolically expressed as follows: (O/x), where x is replaced by an upper case alphabetic character in the specifications. For example, if two fields named Internal address and External address, have an ordering relationship in which there is a one-to-one correspondence between the elements in the list of instances of these fields, then the pair of these fields is designated as set A and the fields are marked:

Internal address (O/A)

Flag	Used with	Meaning
(*)	field name	Part of field group
(+)	generic subfield name	User must substitute one or more explicit subfields with user assigned names for the generic subfield in the generic specification
(#)	subfield name	Subfield with given name and type may be repeated an indefinite number of times
(P)	field name	Primary module field
(O)	field name	Secondary module field where order of repetition is significant
(O/x)	field name	Secondary module field where order of repetition is significant, and where the order is correlated with the order of one or more other fields belonging to the set x (x to be replaced with an uppercase Alphabetic character)
(R)	field name	Secondary module field where order of repetition is not significant
(T)	field name	Secondary module fields participating in a rooted tree structure
(N)	field name	Non-repeating secondary module field
(-)	field name	Contents and structure of the field is tha of a spatial address
(^)	field name	Contents and structure of a field is th of a foreign identifier

5 EXCHANGE MODULE SPECIFICATION

This section contains field and subfield specifications for each exchange module record. Each exchange module may contain a number of module records. The general data models and specifications of Section 4, combined with the specific details of this section, form the implementation independent core of the standard.

An implementation of this standard shall preserve the meaning of the data including any logical associations required by this standard. The specifications may require:

- the preservation of or means for reconstruction of a logical order in which the recipient may retrieve data comprising module subfields, module fields, module records, and modules
- the preservation of or means for reconstruction of the logical structures such as ordered rooted trees
- the preservation of the identity of the interchange data elements

ecific requirements for the preservation of meaning and/or are set out in each module specification according to the summarized in section 4.2.3.8.

5.1 Universal Fields And Subfields

In the following sections, universal fields and subfields are specified for attributes, spatial address, and foreign identifier. Also, in order to facilitate the exchange of meaning, field and subfield coding conventions in the form of existing standards are specified.

5.1.1 Attributes

Attributes constitute a special field group that represents a tree structure (see Section 4.1.3.3.6). The two field types of this field group are specified as:

FIELD NAME	SUBFIELD NAME	FIELD/SUBFIELD DESCRIPTION
(*)Attribute Definition (T)		
	Attribnam	Attribute name
	Attrfmt	Attribute value(s) format
	Attrunit	Attribute value(s) measurement unit
(*)Attribute Value (T)		
	(#)Attrval	Attribute value

SUBFIELD NAME	SUBFIELD TYPE	DOMAIN	DOMAIN DESCRIPTION
Attribnam	A	Gr-chars	Any combination of graphics characters
Attrfmt	A	A	Graphics characters
		I	Implicit-point (integer)
		R	Explicit-point unscaled
		S	Explicit-point scaled
		B	Bitfield data
		C	Character mode bitfield
		^	Foreign identifier
Attrunit	A	Gr-chars	Any combination of graphics characters
Attrval	A|	Gr-chars	As indicated by Attrfmt. When
	I|	Integer	Attrfmt is set to "^", meaning
	R|	Real	foreign identifier, the three
	S|	Binary	Attrval subfields following the
	B|		Attrfmt subfield contain the
	C|		the three parts of a foreign identifier (see section 5.1.3)

5.1.2 Spatial Address

Spatial address fields occur in many modules and are fully defined as:

FIELD NAME	SUBFIELD NAME	FIELD/SUBFIELD DESCRIPTION
(-)spatial address (O)		
	(+)compi	Component i of the spatial address

SUBFIELD NAME	SUBFIELD TYPE	DOMAIN	DOMAIN DESCRIPTION
(+)compi	A|N	Gr-chars Numeric	As defined in the Spatial Address Information field of the Internal Spatial Reference Module

Note that the field name "spatial address" in the first table has all lower case characters, meaning that the field name is generic, so that a different name may be substituted in the module description tables.

5.1.3 Foreign Identifiers

Foreign identifiers are also part of a number of module specifications and are specified as:

FIELD NAME	SUBFIELD NAME	FIELD/SUBFIELD DESCRIPTION
(^)foreign id (O)		
	Modnam	Module name of module referenced
	Objrep	Representation code for object referenced
	Objid	Identifier of object referenced

SUBFIELD NAME	SUBFIELD TYPE	DOMAIN	DOMAIN DESCRIPTION
Modnam	A	Alphanum	Name must must begin with alphabetic character
Objrep	A	Alpha	Two characters as specified in Table 5.4.1. The domain is a subset of these characters for a particular module type as indicated in the module specification.
Objid	I	Integer	Unsigned integer. Modnam, Objid and Objrep form unique ID within the file set.

5.1.4 Field And Subfield Coding

The encoding of data content by the sender, based upon the following widely used code sets, will facilitate a more efficient exchange of meaning. It is not the intent of this standard to recommend the coding of all data content, but simply to employ existing code sets where applicable.

Each document in the list is preceded by a short subject for reference purposes only.

CODE SETS Catalog of Widely Used Code Sets, FIPSPUB 19-1, 7 Jan 85

COUNTIES Counties, and County Equivalents of the States of the United States and District of Columbia, FIPSPUB 6-3, 15 Dec 79

COUNTRIES Countries, Dependencies, Areas of Special Sovereignty and their Principal Administrative Divisions, FIPSPUB 10-3, 9 Feb 84

Guideline for Implementation of ANSI Codes for the Implementation of Names of Countries, Dependencies and Areas of Special Sovereignty, FIPSPUB 104, 19 Sep 83

CURRENCY Codes for Representation of Currencies and Funds, ISO 4217, 15 Jun 78

DATES Calendar Date, FIPSPUB 4, 1 Nov 68

HYDROLOGIC UNITS

Codes for the Identification of Hydrologic Units in the United States and Caribbean Outlying Areas, FIPSPUB 103, 15 Nov 83

LOCATIONS Representation of Geographic Position Location for Information Interchange, FIPSPUB 70, 24 Oct 80

ORGANIZATIONS

Codes for Identification of Federal and Federally Assisted Organization, FIPSPUB 95, 23 Dec 82

PLACES Metropolitan Statistical Areas, FIPSPUB 8-5, 31 Oct 1984

Guideline: Codes for Names of Populated Places, Primary County Divisions, Other Locational Entities in the United States, FIPSPUB 55-1, 30 Dec 83

Power Plant Identification: Recommended Practice, IEEE 803-1983 & IEEE 803A-1983

Standard Point Location Code (SPLC) Continental Directory, National Motor Freight 102-E, 1 May 1984

National Zip Code and Post Office Directory, U.S.#Postal Service Publication 65

STATES States and Outlying Areas of the United States, FIPSPUB 5-1, 15 Jun 70

TIME Representations of Local Time of the Day for Information Interchange, FIPSPUB 58

Representations of Universal Time, Local Time Differentials, and United States Time Zone References for Information Interchange, FIPSPUB 59, 1 Feb 79

5.2 Global Information

The global information modules define global parameters for interpreting the data exchange. Table 5.2.1 summarizes the global module types:

Table 5.2.1 Global Module Types

MODULE TYPE
Catalog/Directory
Catalog/Cross-Reference
Catalog/Spatial-Domain
Identification
Security
Internal Spatial Reference
External Spatial Reference
Spatial Domain
Registration Points

5.2.1 Catalog

The Catalog module specification describes three types of modules:

1. Catalog/Directory, containing information on the location of modules within the exchange

2. Catalog/Cross-Reference, indicating pairwise relationships between modules

3. Catalog/Spatial-Domain, specifying the relationships between modules, spatial domain, maps, map layers, and features

The catalog defines the contents of the exchange in terms of the included modules, specifies how to access individual modules, and specifies relationships between modules. It also relates modules to spatial domains. It therefore describes the physical, logical, and spatial organization of the interchange at the module level.

The three catalog modules are relational modules with one primary module field per module record. Many-to-one and one-to-many relationships are normally expressed with multiple module records, in which the single item is repeated from record to record. However, for the purpose of eliminating multiple records, the following wildcard rules may be applied also

1. An entire data element may be replaced with a "*" meaning "all"

2. Non-contiguous substrings of a data element can be replaced with a "*" meaning that the data element refers to those other data elements where the explicitly specified substrings are matched in their relative order

3. Non-contiguous characters of a data element may be replaced with a "?" meaning that the data element refers to those other data elements where the explicitly specified characters match in their relative order

5.2.1.1 Catalog/Directory

This module contains information on where to locate all modules within the exchange.

FIELD NAME	SUBFIELD NAME	FIELD/SUBFIELD DESCRIPTION
Catalog/Directory (P)		
	Modname	A unique identifier for this Catalog/Directory module
	Name	The unique value in the Modname subfield of the module referenced
	Type	The exchange module primary field name of "Name" above
	Volume	The volume on which a part or all of the module is to be found
	File	The file on which a part or all of the module is to be found
	Record	The record on which a part or all of the module is to be found (implementation record)
	Comment	Any other information

SUBFIELD NAME	SUBFIELD TYPE	DOMAIN	DOMAIN DESCRIPTION
Modname	A	Alphanum	Name must begin with alphabetic character
Name	A	Alphanum	Name must begin with alphabetic character
Type	A	Gr-chars	Must be a valid module primary module field name
Volume	A	Gr-chars	Valid volume descriptor, wild-card characters may be used
File	A	Gr-chars	Valid file name, wild-card characters may be used
Record	I|A	Integer Gr-chars	Unsigned integer, wild card characters may be used.
Comment	A	Gr-chars	Any combination of graphics characters

The following example demonstrates the use of the Catalog/Directory module (types have been abbreviated in order to fit the table):

Modname	Name	Type	Volume	File	Record	Comment
CD	CD	Cat/Dir	FloppyA	C.DAT	1	13/6/86
CD	CX	Cat/Cross	FloppyA	C.DAT	2	13/6/86
CD	CS	Cat/Spatial	FloppyA	C.DAT	3	13/6/86
CD	ID	Identificat.	FloppyA	I.DAT	1	More details
CD	IR	Internal Ref	FloppyA	IR.DAT		
CD	ER	External Ref	FloppyA	ER.DAT	*	
CD	P1	Point-Node	FloppyA	P1.DAT	*	Points
CD	P2	Point-Node	FloppyA	P2.Dat	*	Nodes
CD	L1	Line	FloppyA	L1.Dat	*	Lines
CD	L2	Line	FloppyA	L2.Dat	*	Chains
CD	PR	Polygon-Ring	FloppyA	PR.Dat	*	Polygons
CD	PR	Polygon-Ring	FloppyB	PR.Dat	*	

Notice that Modname is by definition the same throughout the entire module.

5.2.1.2 Catalog/Cross-Reference

This module contains the linkages for modules in the exchange. These linkages may be many-to-one, one-to-many or one-to-one. For example, for global modules, the linkage may be one-to-one or one-to-many. For the one-to-many and many-to-one linkages, multiple module records for a given module are required.

FIELD NAME	SUBFIELD NAME	FIELD/SUBFIELD DESCRIPTION
Catalog/Cross Reference (P)		
	Modname	A unique identifier for this Catalog/Cross-reference module
	Name1	The unique value in the Modname subfield of the module referenced
	Type1	The exchange module primary field name of "Name1" above
	Name2	The unique value in the Modname subfield of the module referenced
	Type2	The exchange module primary field name of "Name2" above
Comment		Any other information

SUBFIELD NAME	SUBFIELD TYPE	DOMAIN	DOMAIN DESCRIPTION
Modname	A	Alphanum	Name must begin with alphabetic character
Name1	A	Alphanum	Name must be name of a module in the exchange
Type1	A	Gr-chars	Must be a valid module primary module field name
Name2	A	Gr-chars	Name must be name of a module in the exchange, wildcard characters may be used
Type2	A	Gr-chars	Must be a valid module primary

			module field name, wildcard characters may be used
Comment	A	Gr-chars	Any combination of graphics characters

The following example demonstrates the use of this module:

Modname	Name1	Type1	Name2	Type2	Comment
CX	CD	Cat/Dir	*	*	All modules are cataloged
CX	ER	External Ref	P1	Point-Node	
CX	ER	External Ref	P2	Point-Node	
CX	ER	External Ref	L1	Line	
CX	ER	External Ref	L2	Line	
CX	ER	External Ref	PR	Polygon-Ring	
CX	PR	Polygon-Ring	L2	Line	PR pols consist of L2 chains

5.2.1.3 Catalog/Spatial-Domain

This module defines the relations between a particular module and a spatial domain, map, or feature.

FIELD NAME	SUBFIELD NAME	FIELD/SUBFIELD DESCRIPTION

Catalog/Spatial-Domain (P)

Modname	A unique identifier for this Catalog/Spatial-Domain module
Name	The unique name of a module referenced
Type	The exchange module field name of "Name" above
Domain	Area of geographic coverage referenced by this module, wildcard characters may be used
Map	Map coverage name of map coverage referenced by this module, wildcard characters may be used
Feature	Feature class or feature name referenced by this module, wildcard characters

may be used

Comment Any other information

SUBFIELD NAME	SUBFIELD TYPE	DOMAIN	DOMAIN DESCRIPTION
Modname	A	Alphanum	Name must begin with alphabetic character
Name	A	Alphanum	Name must begin with an alpha character
Type	A	Gr-chars	Must be a valid module primary module field name
Domain	A	Gr-chars	Any combination of graphics characters
Map	A	Gr-chars	Any combination of graphics characters
Feature	A	Gr-chars	Any combination of graphics characters
Comment	A	Gr-chars	Any combination of graphics characters

The use of this module is demonstrated with the following example (the comment field is not shown):

Modname	Name	Type	Domain	Map	Feature
CS	CD	Cat/Direct	*	*	*
CS	P1	Point-Node	Alaska	null	Mount Drum
CS	P2	Point-Node	Alaska	Gulkana	null
CS	L1	Line	Alaska	null	Copper River
CS	L2	Line	Alaska	Gulkana	null
CS	PR	Polygon-Ring	Alaska	Gulkana	null
CS	L3	Polygon-Ring	Alaska	Kenai	Soils

5.2.2 Identification

The identification module(s) provide identifying information about the content of other data modules in the exchange. All subfields of the Identification field, except Modname, are optional and the entire Attributes field is also optional. But in practice most subfields will be used and will carry alphanumeric data deemed useful or necessary by the user for identification purposes and for the specification of global attributes not specifically allowed for in other modules.

FIELD NAME	SUBFIELD NAME	FIELD/SUBFIELD DESCRIPTION
Identification (P)		
	Modname	A unique name for an identification module.
	Title	An overall title or name applied to all data content of the data transfer
	Dataid	A user-defined, usually unique to the user, data set identifier
	Domain Description	Geographic area of coverage (specified only in text form--more precise specification is made with the Spatial Domain module)
	Datastrc	a description of the internal data structure, organization, or other properties of the data relating only to the digital representation rather than, and independent of, the actual "analog" data represented. (Examples might be "topologically-structured vector data," "imagery," "polygon," "grid cell," "network," "graphic vector data," "point," "line," "TIN," or some coding such as "DLG-3," "WDB-I," or "SLF" with sender/receiver agreed upon meaning.)
	Comment	Additional Comments
Feature Description(R)		
	Name	A feature name
	Description	

A feature description (synonymous terms for "feature" as used here might be category, product type, applications area, theme, overlay, or layer)

Map Date (O)

Mapdat1 A date (or start of a range) specifying the temporal extent of the data.

Mapdat2 A date specifying the end of the temporal extent of the data (if null, only Mapdat1 specifies the temporal extent)

Scale (O) Scale limits for valid usage

Scale1 A scale denominator at which the data may be referenced in a "paper-map" sense

Scale2 A scale denominator which, when used in conjunction with Scale1 as the "start" scale, specifies the "end" scale at which the data may be referenced in a "paper map" sense.

(*)Attribute Definition (T)

(*)Attribute Value (T)

SUBFIELD NAME	SUBFIELD TYPE	DOMAIN	DOMAIN DESCRIPTION
Modname	A	Alphanum	Name must start with alphabetic character
Title	A	Gr-chars	Any combination of graphics characters
Dataid	A	Gr-chars	Any combination of graphics characters
Geoarea	A	Gr-chars	Any combination of graphics characters
Datastrc	A	Gr-chars	Any combination of graphics characters
Comment	A	Gr-chars	Any combination of graphics

			characters
Feaclas	A	Gr-chars	Any combination of graphics characters
Mapdat1	A	Gr-chars	FIPSPUB4 specified date (day or month-day may be omitted)
Mapdat2	A	Gr-chars	FIPSPUB4 specified date (day or month-day may be omitted)
Scale1	I	Numeric	A valid numeric scale denominator
Scale2	I	Numeric	A valid numeric scale denominator

5.2.3 Security

The security module provides information on the security of the data in a transmission. Since some organizations have more rigorous requirements for this data than do other organizations, each organization may customize this module to their own needs.

FIELD NAME	SUBFIELD NAME	FIELD/SUBFIELD DESCRIPTION
Security (P)		
	Modname	A unique name for a security module
	Secclass	Security classification level
	Control	Instructions for distribution and handling of the data
	ReviewDate	Reclassification date
	ReviewInst	Reclassification instructions
	Comment	Additional comments
(*)Attribute Definition (T)		
(*)Attribute Value (T)		

SUBFIELD NAME	SUBFIELD TYPE	DOMAIN	DOMAIN DESCRIPTION
Modname	A	Alphanum	Name must start with alphabetic character
Secclass	A	Gr-chars	Any combination of graphics characters
		Top Secret	
		Secret	
		Confidential	
		Restricted	
		Unclassified	
Control	A	Gr-chars	User-defined combination of graphics characters
ReviewDate	A	Gr-chars	FIPSPUB4 specified date
ReviewInst	A	Gr-chars	FIPSPUB4 specified date
Comment	A	Gr-chars	Any combination of graphics characters

5.2.4 Spatial Reference

The spatial reference in a spatial data exchange is defined through the use of the following module records:

Internal Spatial Reference
External Spatial Reference
Spatial Domain
Registration Points

Through the use of the internal and external spatial reference module records, any internal (to the exchange module) coordinate system may be mathematically defined and related to geographic coordinates. The internal spatial reference module record provides a mechanism for the sender to explicitly define the transformation of the internal coordinate system to a system defined in the external spatial reference module record. If the sender is unable to supply these parameters, the sender can supply, via the registration point module record, an adequate number of internal/external coordinate pairs to allow the receiver to compute the transformation parameters. If the sender supplies internal spatial addresses in exact correspondence with the system defined in the external spatial reference module record, the transformation parameters will resemble an identity matrix and the internal/external coordinate pairs in the

registration point module record, if provided, will be identical.

The external spatial reference module record makes explicit reference to the General Cartographic Transformation Package (GCTP) available from the National Ocean Service/NOAA, Rockville, Maryland (see References section, Part I).

5.2.4.1 Internal Spatial Reference

The transformation parameters described in the internal spatial reference module record provide for a four parameter transformation of the horizontal component and two parameter transformation of the vertical component. The transformation parameters can be used to define (an optional) rotation (about the Z axis), translation, and scaling. However, they do not permit an affine transformation which could absorb systematic errors. The following equations shall be used for this transformation:

$$X = A1x' + A2y' + A3$$

$$Y = A1y' - A2x' + A4$$

$$Z = A5z' + A6$$

Where:

A1...A6	represent the ordered subfields of the transformation parameter field
x', y', z'	represent the internal reference system coordinates
X, Y, Z	represent the external reference system coordinates

FIELD NAME	SUBFIELD NAME	FIELD/SUBFIELD DESCRIPTION
Internal Spatial Reference (P)		
	Modname	Unique name for this Internal Spatial Reference Module
	Comment	Free form comment subfield
Spatial Address Information (N)		
	Spatial Address Type	

Indicates whether horizontal component only or both horizontal and vertical component are present in the spatial address

Spatial Address Series Format

Specific format for the Series Format construction of a series of internal spatial addresses

Horizontal Component Format

Specific format of the horizontal components of the spatial address

Vertical Component Format

Specific format of the horizontal components of the spatial address

Transformation Parameters (N)

Parameter1

Horizontal scaling and rotation

Parameter2

Horizontal scaling and rotation

Parameter3

Horizontal origin

Parameter4

Horizontal origin

Parameter5

Vertical scale factor

Parameter6

Vertical origin

Estimate of Positional Accuracy (N)

See Part III, Positional Accuracy, section 5.2

Horizontal Accuracy Component

Horizontal spatial address component of positional accuracy estimate

Vertical Accuracy Component

Vertical spatial address component of positional accuracy estimate

Coordinate Resolution (N)

Least count of H/V coordinate

Horizontal Resolution Component

Horizontal component of coordinate resolution

Vertical Resoltuion Component

Vertical component of coordinate resolution

SUBFIELD NAME	SUBFIELD TYPE	DOMAIN	DOMAIN DESCRIPTION
Modname	A	Alphanum	Name must start with an alphabetic character
Comment	A	Gr-chars	Any combination of graphics characters
Spatial Address Type			
	A	2-TUPLE	Horizontal component only
		3-TUPLE	Horizontal component and a vertical component
Spatial Address Series Format			
	A	ABSOLUTE	All spatial addresses are alike and are referenced to the same origin
		RELATIVE	The first spatial address in the series is "absolute;" however each following address in the series is referenced to the preceding address
Horizontal Component Format			

A	Gr-chars	Graphic characters
	I	Implicit-point integer
	R	Explicit-point unscaled
	S	Explicit-point scaled
	B	Bitfield data
	C	Character mode bitfield data

Vertical Component Format

A	Gr-chars	Graphic characters
	I	Implicit-point integer
	R	Explicit-point unscaled
	S	Explicit-point scaled
	B	Bitfield data
	C	Character mode bitfield data

Parameter1

R	Real	Any real number

Parameter2
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.
.
Parameter6

Horizontal Component

A	Alphanum	As defined in terms of Horizontal Units of the Horizontal Reference field of the External Spatial Reference module

Vertical Component

A	Alphanum	As defined in terms of Vertical Units of the Vertical Reference field of the External Spatial Reference module

GCTP projection system code

Zone Number

GCTP UTM/State Plane zone number

Horizontal Units

GCTP units of measure code

Parameter1

Refer to GCTP documentation for definition of this and the following parameters (see References section of Part I)

Parameter2

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.
.

Parameter13

SUBFIELD NAME	SUBFIELD TYPE	DOMAIN	DOMAIN DESCRIPTION
Modname	A	Alphanum	Name must start with an alphabetic character
Reference Documentation			
	A	GCTP	General Cartographic Transformation Package
		Gr-chars	Any combination of graphics characters
Reference System Name			
	A	Gr-chars	Any combination of graphics characters
Vertical Units			
	A	Gr-chars	Any combination of graphics characters
Vertical Reference			
	A	MSL	Mean Sea Level; all elevations in the data set are referenced to the

5.2.4.2 External Spatial Reference

FIELD NAME	SUBFIELD NAME	FIELD/SUBFIELD DESCRIPTION
External Spatial Reference (P)		
	Modname	Specific name for this external spatial reference module
	Reference Documentation	Reference in which the external system used is documented.
	Reference System Name	Full descriptive name of the external system used
	Vertical Units	Units of measure of third component of the spatial addresses
	Vertical Reference	Reference surface for the third component of the internal spatial addresses
	Sounding Datum	Reference datum for the third component of the internal spatial addresses (for hydrographic depths only)
	Comment	Free form comment subfield
Horizontal Reference (N)		
	Horizontal Datum	Geodetic datum to which the internal spatial addresses have been referenced
	Projection Code	

			GEOID of the specified datum
		GEODETIC	All elevations are referenced to the ellipsoid of the specified datum
Sounding Datum			
	A	MHW	Mean High Water
		MHWN	Mean High Water Neaps
		MHWS	Mean High Water Springs
		MHHW	Mean Higher High Water
		MLW	Mean Low Water
		MLWN	Mean Low Water Neaps
		MLWS	Mean Low Water Springs
		MLLW	Mean Lower Low Water
Comment	A	Gr-chars	Any combination of graphics characters
Horizontal Datum			
	A	ADI	Adindan
		ARF	Arc 1950
		AUA	Australian Geodetic
		BUR	Bukit Rimpah
		CAZ	Camp Area Astro.
		CAI	Campo Inchauspe
		CHU	Chua Astro
		COA	Corrego Alegre
		BAT	Djakarta
		EUR	European 50
		GSE	G. Segara
		GSF	G. Serindung
		GEO	Geodetic 1949
		GHA	Ghana
		GUA	Guam 1963
		HEN	Herat North
		HJO	Hjorsey
		HTN	Hu-tzu-shan
		IND	Indian
		IRE	Ireland 1965
		KEA	Kertau
		LIB	Liberia 1964
		LOC	Local Astro.
		LUZ	Luzon
		MER	Merchich
		MOL	Montjong Lowe
		NIG	Nigeria
		NAS	North American 1927
		NAX	North American 1983
		OHA	Old Hawaiian
		OGB	Ordnance Survey of Great Britain

	PRP	Provisional South American 1956
	QUO	Qornoq
	SIB	Sierra Leone 1960
	TAN	Tananarive Obsv. 1925
	TIL	Timbalai
	TOK	Tokyo
	VOI	Voirol
	WGA	World Geodetic System 1960
	WGB	World Geodetic System 1966
	WGC	World Geodetic System 1972
	WGE	World Geodetic System 1984
	YAC	Yacare
	HER	Hermannskogel
	ENB	European 79
	GDA	German
	Gr-chars	Any other geodetic datum

Projection Code

I	Numeric	see GCTP documentation Appendix A (for complete reference see Part I: References)

Zone Number

I	Numeric	see GCTP documentation Appendix B

Units Code

I	Numeric	see GCTP documentation Appendix C

Parameter1

R	Real	see GCTP documentation Appendix D

Parameter2

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Parameter13

5.2.5 Spatial Domain

The Spatial Domain module specifies a geographic areal domain within which the spatial addresses of other modules are contained. Two basic methods of specifying this coverage are allowed for in this module:

(1) by specifying a spatial address with all minimum value components and a spatial address with all maximum value components (in most cases, the southwest (or lower left) and northeast (or upper right) corners of a coverage rectangle); and/or

(2) by a series of spatial addresses describing a ring delineating the area.

Further, two types of spatial addresses may be used:

(a) "internal" spatial addresses as fully defined by parameters of the Internal Spatial Reference module;

(b) "external" spatial addresses as fully defined by parameters of the External Spatial Reference module.

Note that any number of Spatial Domain modules may be used to specify spatial domain for the same set of data (if more than one way of specifying spatial domain is desired).

FIELD NAME	SUBFIELD NAME	FIELD/SUBFIELD DESCRIPTION
Spatial Domain (P)		
	Modname	Unique name for this Spatial Domain module
	Spatial Domain Type	Method of specifying the domain spatial addresses
	Domain Spatial Address Type	System employed to specify the domain spatial addresses
	Domain Spatial Address Series Format	Indicates how series of spatial addresses are constructed
	Comment	Free form comment subfield
(-) Domain Spatial Address		

SUBFIELD NAME	SUBFIELD TYPE	DOMAIN	DOMAIN DESCRIPTION
Modname	A	Alphanum	Name must start with an alphabetic character
Spatial Domain Type			
	A	MINMAX	Spatial domain is specified by two spatial addresses. The first containing the minimum value associated with each component; the second containing the maximum value associated with each component
		RING	Spatial domain is specified by a series of spatial addresses forming a ring boundary
Domain Spatial Address Type			
	A	INTERNAL	Internal spatial addresses are used
		EXTERNAL	Spatial addresses are in the form defined in the external spatial reference module
Domain Spatial Address Series Format			
	A	ABSOLUTE	All spatial series addresses are constructed alike
		RELATIVE	First spatial address is absolute, others are referenced to the preceding point
Comment	A	Gr-chars	Any combination of graphics characters

5.2.6 Registration Point

Registration points may be used as a method of relating the internal spatial referencing system to the external spatial referencing system.

FIELD NAME	SUBFIELD NAME	FIELD/SUBFIELD DESCRIPTION
Registration Point (P)		
	Modname	Unique name for this Registration Point module
	Comment	Free form comment subfield
(-) External Reference Spatial Address (O/A)		
(-) Internal Reference Spatial Address (O/A)		

SUBFIELD NAME	SUBFIELD TYPE	DOMAIN	DOMAIN DESCRIPTION
Modname	A	Alphanum	Name must start with an alphabetic character
Comment	A	Gr-chars	Any combination of graphic characters

5.3 Data Quality Modules

The Data Quality group is composed of the following modules: Lineage, Positional Accuracy, Attribute Accuracy, Logical Consistency, and Completeness. The contents for these modules are specified in Part III of this document.

Information on data quality can be carried at different levels of aggregation. Thus, information on quality can refer to a domain, map, coverage, or an individual cartographic object. The Catalog can be used to make reference to the level of specificity of the information on quality. This could be done through the use of Catalog/Directory data fields: Volume, File, Record; or the Catalog/Spatial-Domain module data fields: Domain, Layer, Map, and Feature. There is also the provision for a data quality overlay relationship where a separate data layer provides the geometric and attribute information which applies to another data layer.

At the present time, all data quality modules in a data exchange are required to include at least a statement to the effect that no data quality description is available at the time of data preparation if such a statement reflects the status of the data.

5.3.1 Lineage

The Lineage module transfers the information described in Part III, Section 5.1. This module may contain elaboration of the information also coded in Part II, Section 5.2.2: Identification. However, the transformation details must be transferred in the Spatial Reference Modules (see part II, Section 5.2.4).

FIELD NAME	SUBFIELD NAME	FIELD/SUBFIELD DESCRIPTION
Lineage (P)		
	Modname	A unique module name for a Lineage module
Comment (N)		Any comments
(*)Attribute Definition (T)		
(*)Attribute Value (T)		Attributes or comments as determined by the supplier organization in accordance with the Data Quality Standard in Part III
(^)Foreign ID (R)		Reference to a specific module record

SUBFIELD NAME	SUBFIELD TYPE	DOMAIN	DOMAIN DESCRIPTION
Modname	A	Alphanum	Name must start with alphabetic character
Comment	A	Gr-chars	Any combination of graphics characters

5.3.2 Positional Accuracy

The Positional Accuracy module transfers the description of testing procedures and related details specified in Part III, Section 5.2. The estimates of positional accuracy obtained from the tests must be transferred using the Spatial Reference Modules (see Part II, Section 5.2.4).

FIELD NAME	SUBFIELD NAME	FIELD/SUBFIELD DESCRIPTION
Positional Accuracy (P)		
	Modname	A unique module name for a Positional Accuracy module
Comment (N)		Any comments
(*)Attribute Definition (T)		
(*)Attribute Value (T)		Attributes or comments as determined by the supplier organization in accordance with the Data Quality Standard in Part III
(^)Foreign ID (O)		Reference to a specific module record

SUBFIELD NAME	SUBFIELD TYPE	DOMAIN	DOMAIN DESCRIPTION
Modname	A	Alphanum	Name must start with alphabetic character
Comment	A	Gr-chars	Any combination of graphics characters

5.3.3 Attribute Accuracy

The Attribute Accuracy module transfers all information required by Part III, Section 5.3

FIELD NAME	SUBFIELD NAME	FIELD/SUBFIELD DESCRIPTION
Attribute Accuracy (P)		
	Modname	A unique module name for an Attribute Accuracy module
Comment		Any comments
(*)Attribute Definition (T)		
(*)Attribute Value (T)		Attributes or comments as determined by the supplier organization in accordance with the Data Quality Standard in Part III
(^)Foreign ID (O)		Reference to a specific module record

SUBFIELD NAME	SUBFIELD TYPE	DOMAIN	DOMAIN DESCRIPTION
Modname	A	Alphanum	Name must start with alphabetic character
Comment	A		Any combination of graphics characters

5.3.4 Logical Consistency

The Logical Consistency Module transfers all information required by Part III, Section 5.4

FIELD NAME	SUBFIELD NAME	FIELD/SUBFIELD DESCRIPTION
Logical Consistency (P)		
	Modname	A unique module name for a Logical Consistency module
Comment		Any comments
(*)Attribute Definition (T)		
(*)Attribute Value (T)		Attributes or comments as determined by the supplier organization in accordance with the Data Quality Standard in Part III
(^)Foreign ID (O)		Reference to a specific module record

SUBFIELD NAME	SUBFIELD TYPE	DOMAIN	DOMAIN DESCRIPTION
Modname	A	Alphanum	Name must start with alphabetic character
Comment	A	Gr-chars	Any combination of graphics characters

5.3.5 Completeness

The Completeness Module transfers all information required by Part III, Section 5.5.

FIELD NAME	SUBFIELD NAME	FIELD/SUBFIELD DESCRIPTION
Completeness (P)		
	Modname	A unique module name for a Completeness module
Comment		Any comments
(*)Attribute Definition (T)		
(*)Attribute Value (T)		Attributes or comments as determined by the supplier organization in accordance with the Data Quality Standard in Part III
(^)Foreign ID (O)		Reference to a specific module record

SUBFIELD NAME	SUBFIELD TYPE	DOMAIN	DOMAIN DESCRIPTION
Modname	A	Alphanum	Name must start with alphabetic character
Comment	A	Gr-chars	Any combination of graphics characters

5.4 Object Form

The Object Form consists of modules defining global information, data quality and cartographic objects for vector-based objects.

The Global Information modules and the Data Quality modules have been specified in Sections 5.2 and 5.3, respectively. Required global modules are: Internal and External Spatial Reference, Lineage and Positional Accuracy. Recommended modules are: Catalog/Directory, Catalog/Cross- Reference, Catalog/Spatial-Domain, Identification, Internal Spatial Reference, External Spatial Reference, Spatial Domain, and Registration Points.

The objects have been grouped into their corresponding modules according to the similarity in data fields required to represent the object.

The modules that implement the vector-based cartographic objects are the following: Point-Node, Line, Polygon-Ring, Arc, Composite, and Attribute Description.

As more than one object can be stored in each type of module, the type of object represented is expressed through an object representation code. Table 5.4.1 summarizes the assignment of vector-based objects to modules, and lists the object representation code for each.

Table 5.4.1 Modules and Vector-Based Object Representations

Module Type	Object Representation	Representation Code
Point-Node	Point	PX
	Feature Point	PG
	Label Point	PT
	Area Point	PA
	Node	PN
Line	String	LS
	Link	LQ
	Directed Link	LB
	Chain	LU
	Point Chain	LE
	Area Chain	LL
	Network Chain	LW
	Composite Line	LC
Polygon-Ring	Polygon represented using line module(s)	RP
	Polygon represented using ring(s)	RR
	Polygon represented using spatial addresses	RC
	Ring represented using line module(s)	RD
	Ring represented using spatial addresses	RV
Arc		
	Circular arc	AC
	Elliptical arc	AE
	Parabolic arc	AP
	Hyperbolic arc	AH
	Linear	CL
	Quadratic	CQ
	Cubic	CU
	Wilson-Fowler	CW
	Modified Wilson-Fowler	CM
	B-Spline	CB
	Curve line	CI
	Curve circular arc	CC
	Curve elliptical arc	CE
	Curve parabolic arc	CP
	Curve hyperbolic arc	CH
Composite	Complex	FF
Attribute Description	Same as object to which attribute pertains	

5.4.1 Point-Node

The Point-Node module shall be used to exchange points of the following type: generic point, feature point, label point, area point, and node.

FIELD NAME	SUBFIELD NAME	FIELD/SUBFIELD DESCRIPTION
Point-Node (P)		
	Modname	A unique identifier for the module
	Objrep	Representation code for the object
	Objid	Object identifier
(-)Spatial Address (N)		Spatial address of point (single spatial address)
(*)Attribute Definition (T)		
(*)Attribute Value (T)		
(^)LineID (O)		Contains foreign ID of line associated with the node
(^)AreaID (O)		Contains foreign ID of area associated with the node

SUBFIELD NAME	SUBFIELD TYPE	DOMAIN	DOMAIN DESCRIPTION
Modname	A	Alphanum	Name must start with alphabetic character
Objrep	A	Alpha	Two characters as specified in Table 5.4.1 under Representation code
Objid	I	Integer	Unsigned integer. With Modnam and Objrep must form unique ID within the file set

5.4.2 Line

The Line module shall be used to interchange cartographic objects of the following type: string, link, directed link, chain, point chain, area chain, network chain, and complex line.

When the object type is that of a complex line (LC), the Foreign ID field is used instead of the Spatial Address field. The Foreign ID then refers to records in other Line or Arc modules. This allows for the exchange of a line entirely composed of arcs, or a line made up of a mixture of arcs and lines. The Foreign ID and Spatial Address fields are both listed in the module description table, but only one shall be used for a given unique module implementation according to the rules for optional fields of Section 4.1.3.2.6. This section states that fields can be omitted given that the remaining fields can be identified properly in the decoding process. This is certainly the case in this instance, because the type of field used can be determined from the Representation Code of Table 5.4.1 (Foreign ID is used for code LC; spatial addresses are used for all other objects used to represent arcs.)

FIELD NAME	SUBFIELD NAME	FIELD/SUBFIELD DESCRIPTION
Line (P)		
	Modname	A unique identifier for the module
	Objrep	Representation code for the object
	Objid	Object identifier
(*)Attribute Definition (T)		
(*)Attribute Value (T)		
(^)PolygonID Left (N)		Foreign ID of left Polygon-Ring module record
(^)PolygonID Right (N)		Foreign ID of right Polygon-Ring module record
(^)Startnode ID (N)		Foreign ID of start node Point module

record

(^)Endnode ID (N)

Foreign ID of end node Point module record

(^)Foreign ID (O)

Foreign ID of module record of other Arc or Line module

(-)Spatial Address (O)

Spatial address of line point

SUBFIELD NAME	SUBFIELD TYPE	DOMAIN	DOMAIN DESCRIPTION
Modname	A	Alphanum	Name must start with alphabetic character
Objrep	A	Alpha	Two characters as specified in Table 5.4.1 under Representation Code
Objid	I	Integer	Unsigned integer. With Modname and Objrep must form unique ID within the file set

5.4.3 Polygon-Ring

The Polygon-Ring module shall be used to exchange simple or complex polygons. A simple polygon consists of a single ring, whereas complex polygons consists of one outer ring and one or more inner rings.

The module can be used in two main modes relating to complex polygons. In the first mode, the rings are stored in one module and the complex polygons in another, where the polygons then refer to the rings through foreign identifiers. In the second mode, the complex polygons are stored in a single module, one polygon per module record. Rings can be stored directly in the module record in the form of lists of spatial addresses or the module record can store lists of foreign identifiers. The foreign identifiers can therefore refer to various types of line modules (through the line foreign ID) or refer to other polygon modules with single rings (through the ring foreign ID); hence, there is a capability to define polygons in terms of strings, links, chains, coordinate lists, or other rings (see Table 5.4.1).

The Polygon-Ring module contains two different field groups: attributes, with the Attribute Definition and Attribute Value fields, and polygons (or rings) with either the Spatial Address field or the Foreign ID field. Each polygon may consist of a number of rings , and each ring may contain a number of chains, and hence, each polygon with its rings and chains constitutes a field group. As both field groups are listed in sequence, and the fields are marked with asterisks, one must keep in mind that these are two different fields groups: attributes and polygons.

The module composition table lists the two fields of Spatial Address and Foreign ID, but only one shall be used for a given unique module implementation, according to the rules for optional fields of Section 4.1.3.2.6. This section states that fields can be omitted given that the remaining fields can be properly identified in the decoding process. This is certainly the case in this instance, because the type of field used can be determined from the Representation Code of Table 5.4.1 (spatial address for codes RC and RV, Foreign ID's for all other polygon-ring codes).

The structural composition of a polygon-ring module record can be expressed as follows (the following represents only an overview of the complete structure of the entire module record):

```
<polygon-ring module record> ::=
                    <polygon-ring primary field>
                    <attributes field group>
                    <polygon>|<ring>
   <polygon> ::= {<[> <ring> <]>}
     <ring>::= <ring foreign ID> |
               {<line foreign ID>} |
               {<spatial address>}
```

where the "{}"brackets indicate repetition, and "|" means exclusive or; the choice between <spatial address> and <line foreign ID> must be consistent throughout the entire module (no mixing allowed), and similarly the choice between defining polygons in terms of <ring foreign ID> referring to rings in other modules, or by defining the rings in the same record, shall be consistent throughout the entire module.

In the above BNF the nonterminal brackets <[> and <]> are entirely symbolic and have been inserted so that production substitution will produce a sentence that is symbolically representative of the tree structure being portrayed. In this sentence, the <[> <]> brackets delimit the rings. In practice, an implementation is reponsible for identifying the individual rings.

A tree structure is present when the rings of a polygon are expressed in either line foreign identifiers or spatial addresses. This tree structure is rooted in the Polygon-Ring primary field. An implementation is responsble for adequately representing this tree structure.

FIELD NAME	SUBFIELD NAME	FIELD/SUBFIELD DESCRIPTION
Polygon-Ring (P)		
	Modname	A unique identifier for the module
	Objrep	Representation code for the object
	Objid	Object identifier
(*)Attribute Definition (T)		
(*)Attribute Value (T)		
(*)(-)Spatial Address(T)		Spatial address of ring points
(*)(^)Line Foreign ID (T)		Foreign identifier of Line module record for line object as part of the ring
(^)Ring Foreign ID (O)		Foreign identifier of Polygon-Ring module record for ring as part of a complex polygon

SUBFIELD NAME	SUBFIELD TYPE	DOMAIN	DOMAIN DESCRIPTION
Modname	A	Alphanum	Name must start with alphabetic character
Objrep	A	Alpha	Two characters as specified in Table 5.4.1 under Representation Code
Objid	I	Integer	Unsigned integer; with Modname and Objrep must form unique ID within the file set

5.4.4 Arc

A considerable portion of this section is based on the respective ARC and CURVE discussion in the Initial Graphics Exchange Specification (IGES) version 3.0 (see the References section, Part I).

An Arc Module can be used to transfer lines that use an analytic or parametric specification for the radius of local curvature of the cartographic line object. An Arc module is used to transfer the geometry of the line. If topology is required, then a line module with a topological oriented object representation such as a chain must be used to reference the appropriate Arc module record.

An Arc module can be used to transfer:

Circular arc

Conic arc: ellipse, hyperbola, parabola

Parametric spline curve: linear, quadratic, cubic, Wilson-Fowler, Modified Wilson-Fowler, B-Spline

Rational b-spline: line, circular arc, elliptical arc, parabolic arc, hyperbolic arc

The difference between curves and arcs is in the number of parameters required to describe the objects. The curves require several more parameters than do the arcs; hence, more fields and subfields are required. The circular and conic arcs can be transferred as parametric spline curves if private parties do not agree on the analytic form of their respective equations.

The arcs can be transferred as rational B-spline curves when the analytical default equations are not appropriate. The analytical arcs have a predetermined number of parameters as given by a set of equations which make their description more succinct. The curves do not have a predetermined character and, thus, do not have a predetermined number of parameters, but are instead based on a number of points/segments for definition.

Spatial addresses shall be defined using orthogonal, planar coordinate systems only.

The "Attribute Field Group" can be used to specify additional parameters in addition to the basic set of parameters for each of the arcs and curves.

FIELD NAME	SUBFIELD NAME	FIELD/SUBFIELD DESCRIPTION
Arc (P)		
	Modname	A unique identifier for the module
	Objrep	Representation code for the object
	Objid	Object identifier
(-)Start Address		Spatial address of the start point of arc
(-)End Address		Spatial address of the end point of the arc
(-)Center Address		Spatial address of the center point of the arc
Direction (N)		Direction from Start Address to End Address
Curvegen (O/A)		Anchor point(s) for curve generation
	CG(i)	Integer ID's to correspond with the points in the sequence in which they appear in the curve as anchor points
(*)Attribute Definition (T)		
(*)Attribute Value (T)		
Conic arc (N)		
	A	Conic coefficient
	B	Conic coefficient
	C	Conic coefficient
	D	Conic coefficient
	E	Conic coefficient
	F	Conic coefficient
Curveparm (N)		
	Degree	Degree of continuity if parametric spline Degree of basis functions if rational B-spline
	Planar	Planar or non-planar property of the

curve/arc

Closure — The closure property of the curve/arc

Splinetyp — The type of spline indicating the type of weights on the coefficients. Rational has unequal weights. Polynomial has equal weights

Period — The periodic property with respect to the parametric variable

Numseg — The number of segments for defining the curve

Points — The number of points (upper index) in the numerator of the summation of the basis function. See Appendix D, page 472 of IGES version 3.0, April 1986, for more detail

Knot Sequence (O/B) — Knot sequence parameters are used for rational B-splines

T(i) — Knot sequence parameter of knot sequence. Instances of this field represent a parameter T(i) where i ranges from the value of "Degree" to the value of "Points-Degree+1"

Weight (O/B) — Weights are used for rational B-splines

W(i) — Weight of knot T(i). Field has as many instances as Knot Sequence defined above

Parameter (O) — Used for rational B-splines

V(i) — Parameter value. Field has as many instances as Knot Sequence defined above

(-)Normal spatial address

Used for rational B-splines
X coordinate of unit normal if curve is planar
Y coordinate of unit normal if curve is planar
Z coordinate of unit normal if curve is planar

Breakpoint (O) — Breakpoints are used for parametric splines

B(i) — Breakpoint of piecewise polynomial. Each

instance of this field represents a breakpoint B(i) where i ranges from 1 to Numseg, and Numseg represents the number of segments

(-)Spatial Address (O/A)

Spatial address for control points on curve. Used for rational B-splines and parametric splines

Coefficient matrix dimension (N)

Icoeff — The number of coefficients per x,y,and z component of the spatial address

Jxyz — The number of components in the spatial address

Kpoint — The number of points to be represented

Coefficient Matrix(O)

List containing the elements of an Icoeff x Jxyz x Kpoint coefficient matrix, stored as a one-dimensional vector with length Icoeff*Jxyz*Kpoint

C(i) — Coefficient in the above list. Coefficients are arranged such that each element of the list corresponds to an element of the three-dimensional matrix c(p,q,r) (where p, q, and r correspond to the Icoeff, Jxyz, and Kpoint dimensions) such that p ,q and r vary from most frequently to least frequently when traversing the list for increasing i

Derivative matrix dimension (N)

Kderiv — The number of derivatives per x,y, and z component of the spatial address

Jxyzval — The number of components in the spatial address plus one for the value of the address component

Isegments — The number of segments to be represented

Derivative matrix (O)

List containing the elements of an Kderiv x Jxyzval x Isegments matrix, stored

as a one-dimensional vector with length Kderiv*Jxyzval*Isegments. For each of Isegments contains an evaluation of the polynomial and their derivatives at the parameter value u = t(Numseg+1) at the terminant point (see page 134 of IGES version 3.0 for more details)

D(i) Coefficient in the above list. Coefficients are arranged such that each element of the list corresponds to an element of the three-dimensional matrix c(p,q,r) (where p, q, and r correspond to the Icoeff, Jxyz, and Kpoint dimensions) such that p ,q, and r vary from most frequently to least frequently when traversing the list for increasing i. c(1,1,r) contains X, c(1,2,r) contains Y, and c(1,3,r) contains Z for segment r. c(p,q,r) represents the p-1 th derivative with respect to qth component of the spatial address, divided by p-1 factorial

SUBFIELD NAME	SUBFIELD TYPE	DOMAIN	DOMAIN DESCRIPTION
Modname	A	Alphanum	Name must start with alphabetic character
Objrep	A	AC	circular arc
		AE	elliptical arc
		AP	parabolic arc
		AH	hyperbolic arc
		CL	linear
		CQ	quadratic
		CU	cubic
		CW	Wilson-Fowler
		CM	Modified Wilson-Fowler
		CB	B-Spline
		CI	curve line
		CC	curve circular arc
		CE	curve elliptical arc
		CP	curve parabolic arc
		CH	curve hyperbolic arc
Objid	I	Integer	Unsigned integer. With Modname and Objrep must form a unique ID within the file set
Direction	A	CC	Counter-clockwise as if clock is face up laying on a table

		CW	Clockwise
CG(i)	I	Integer	Positive integer
A	A|N	Alphanum	Any alphanumeric specification
B	A|N	Alphanum	Any alphanumeric specification
C	A|N	Alphanum	Any alphanumeric specification
D	A|N	Alphanum	Any alphanumeric specification
E	A|N	Alphanum	Any alphanumeric specification
F	A|N	Alphanum	Any alphanumeric specification
Degree	I	Integer	Values depend on interpretation using continuity or basis function
Planar	I	2 3	Planar non-planar
Closure	A	O C	open curve closed curve
Splinetyp	A	R P	rational polynomial
Period	A	P N	Periodic Non-periodic
Numseg	I	Integer	Positive integer
Points	I	Integer	Positive integer
T(i)	R|S	Real	Real number
W(i)	R|S	Real	Real number
V(i)	R|S	Real	Real number
B(i)	R|S	Real	Real number
Icoeff	I	Integer	Any number of coefficients
Jxyz	I	2 3	When xy is used When xyz is used
Kpoint	I	Integer	Any number of points

C(i)	R|S	Real	Real number
Isegments	I	Integer	Number of points - 1 when segments are used
Jxyzval	I	3 4	When coordinate pair xy used 2 + 1. When coordinate triple xyz used 3 + 1
Kderiv	I	Integer	Any number of derivatives
D(i)	R|S	Real	Real number

5.4.5 Composite

The Composite module is used to transfer compound and complex objects (see Part I, section 1.4). It serves to transfer user-defined composite data in ways that could not be accomplished with the Point-Node, Line, Polygon-Ring, and Arc Modules. Cartographic objects are grouped to make a more complex cartographic object; therefore, composite instances do not carry any coordinate data within the composite record. This capability also provides for the attribute data to be defined only once, by referencing several other objects that have coordinates but no attributes.

FIELD NAME	SUBFIELD NAME	FIELD/SUBFIELD DESCRIPTION
Composite (P)		
	Modname	A unique identifier for the module
	Objrep	Representation code for the grid
	Objid	Object identifier
(*)Attribute Definition (T)		
(*)Attribute Value (T)		
Foreign ID (O)		Foreign identifier of module record for object that is a part of this feature

SUBFIELD NAME	SUBFIELD TYPE	DOMAIN	DOMAIN DESCRIPTION
Modname	A	Alphanum	Name must start with alphabetic character
Objrep	A	Alpha	Two characters as specified in Table 5.4.1 under Representation Code
Objid	I	Integer	Unsigned integer; with Modname and Objrep must form unique ID within the file set

5.4.6 Attribute Description

This module is to be used in conjunction with the attributes that can be attached to each cartographic object. Its primary use is to describe secondary and other related attributes that do not vary from object to object. Linkages between attributes stored in these module records and attributes attached to the objects can be made as described in Section 4.1.3.3.7.

FIELD NAME	SUBFIELD NAME	FIELD/SUBFIELD DESCRIPTION
Attribute Description (P)		
	Modname	A unique name for the module
	Objrep	Object representation code
	Objid	Identifier for module record
(*)Attribute Definition (T)		
(*)Attribute Value (T)		
		Secondary and related attributes

SUBFIELD NAME	SUBFIELD TYPE	DOMAIN	DOMAIN DESCRIPTION
Modname	A	Alphanum	Name must start with alphabetic character
Objrep	A	Alpha	Two characters as specified in Table 5.4.1 for object to which these attributes refer (if applicable)
Objid	I	Integer	Unsigned integer. With Modname and Objrep must form unique ID within the file set

5.5 Relational Form

The Relational exchange form is based on the relational model, in which all data are expressed in the form of "flat files," or two-way tables. This exchange form is particularly well suited for exchange involving relational database management systems.

The modules in the relational form all have a single field consisting of multiple subfields. Each module record contains only this single field. The subfields of this field and the subfield names correspond to the attributes or columns of the relational tuples or rows.

5.5.1 General Specification For Relational Modules

The following sections contain general specifications pertaining to all relational modules and the way in which these modules shall be used.

5.5.1.1 Relational Schema

A schema module has been included that must be used when the encoding method does not have a data descriptive facility. However, the schema module can be used to good advantage even when such a facility is present. For instance, the schema module contains the object representation code of the objects encoded with relational modules. When the schema module is used, the schema and data modules must occur in pairs, and the association between the members of a pair can be expressed through the Catalog/Cross-Reference module.

5.5.1.2 Relational Elements

The relational modules are based on a topological model in which the basic elements are: the polygon, ring, chain, node, point, and spatial address. The relational modules specify the relationships between these basic elements, for instance, the rings forming a polygon, or the chains forming a ring.

5.5.1.3 Relational Modules

The following modules constitute the relational exchange form:

MODULE TYPE

Schema
Composite/Element
Polygon/Ring
Polygon/Chain
Polygon/Point
Polygon/address
Ring/Chain
Ring/Point
Ring/address
Chain Topology
Chain/Point
Chain/address
Node/Chain
Node/Point
Node/address
Point/address
Attribute-Primary
Attribute-Secondary

Subsets of the above modules can be used as needed. For instance to avoid redundant specification of coordinates, chains can be defined in terms of points, where points can be shared between chains. However, to produce an output map, a relational join between the Chain/Point and Point/address relations is needed, so that it may be easier to transfer a Chain/address module instead.

5.5.1.4 Spatial Object Representations

The relational exchange form can accommodate most of the object representations of Table 5.4.1, by designation of content and by omission of subfields as summarized in the following table. Arc, Grid and Raster modules are not handled in the relational exchange form.

Relational Modules and Object Representations

Object Representation	Code	Relational Module Combinations
Point	PX	Point/address, Primary-Attribute, Secondary Attribute
Feature Point	PG	Point/address, Primary-Attribute, Secondary Attribute
Label Point	PT	Point/address, Primary-Attribute, Secondary Attribute
Area Point	PA	Point/address, Polygon/Point, Primary-Attribute, Secondary Attribute
Node	PN	Node/point, Node/Chain or Node/address, Node/Chain Primary-Attribute, Secondary Attribute
String	LS	Chain/address or Chain/Point, Point/address or Point/address Primary-Attribute, Secondary Attribute
Link	LQ	Chain/address Chain/Point, Point/address or Point/address Primary-Attribute, Secondary Attribute
Directed Link	LB	Chain/address, Chain Topology or Chain/Point, Chain Topology, Point/address Primary-Attribute, Secondary Attribute
Chain	LU	Chain/address,(Chain Topology) or Chain/Point, Point/address, (Chain Topology) Primary-Attribute, Secondary Attribute
Point Chain	LE	Chain/address, Chain Topology (omit node subfields) or Chain/Point, Chain Topology, Point/address Primary-Attribute, Secondary Attribute
Area Chain	LL	Chain/address, Chain Topology or Chain/Point, Chain Topology, Point/address Primary-Attribute, Secondary Attribute
Network Chain	LW	Chain/address, Chain Topology (omit left and right subfields) or Chain/Point, Chain Topology, Point/address Primary-Attribute, Secondary Attribute
Polygons with line modules	RP	Polygon/Chain Primary-Attribute, Secondary Attribute
Polygons with rings	RR	Polygon/Ring Primary-Attribute, Secondary Attribute
Polygons with coordinate lists	RC	Polygon/address Primary-Attribute, Secondary Attribute
Ring with line modules	RD	Ring/Chain Primary-Attribute, Secondary Attribute
Ring with coordinate lists	RV	Ring/address Primary-Attribute, Secondary Attribute

Composite	FF	Feature/element Primary-Attribute, Secondary Attribute

5.5.1.5 Generic Module Specifications

The relational modules are for the most part of the form: type1/type2 or type/address, where type1 is a relational element type such as a polygon, chain or ring, and type2 is another element type, not the same as the first type. The address in type/address is a spatial address as specified by the Spatial Address Information field in the Internal Spatial Reference module. Relational modules of the above type are specified as generic modules, using a name substitution table to indicate the appropriate field names and subfield names for each combination.

Four relational modules do not fall in the above category: Schema, Chain Topology, Attribute-Primary, and Attributes-Secondary. These modules are specified directly.

5.5.1.6 Foreign Identifiers

In the relational form, cross-references between elements are also made through unique identifiers for each element. In contrast to the Object Form, these are all contained in one subfield in order to facilitate relational operations. The identifier may either be a unique integer in the entire file set or it may be unique within a module. If the identifier is not unique within a file set, then the Catalog/Cross-Reference module shall have appropriate cross-reference entries indicating the names of the modules where the referenced element is to be found.

In pure relational terminology a foreign identifier would be referred to as a foreign key, however to maintain consistent terminology between the Object and Relational exchange forms this term will not be used.

5.5.1.7 Module Names

In the relational form, the module name of a module is not encoded within the module record itself (with the exception of the schema module). Thus, unnecessary excessive repetitions of the module name are avoided. Module name and type are encoded instead in the schema module that must preceed the the data module.

5.5.2 Schema

This module provides information about the exact composition of the relational module. It defines the included subfields for each module as well as the following characteristics of each subfield: format, unit, object representation, and maximum length of the subfield.

FIELD NAME	SUBFIELD NAME	FIELD/SUBFIELD DESCRIPTION
Schema (P)		
	Modname	Schema module name
	Name	Relational module name
	Type	Relational module type
	Objrep	Object representation of relational module
	Subfield	Subfield name of relational module subfield
	Format	Format of subfield in relational module
	Unit	Measurement unit of subfield in relational module

SUBFIELD NAME	SUBFIELD TYPE	DOMAIN	DOMAIN DESCRIPTION
Modname	A	Alphanum	Name must start with alphabetic character
Name	A	Alphanum	Name must begin with alphabetic and be module name of relational module
Type	A	Gr-chars	Must be a valid module primary field name
Objrep	A	Alpha	Two characters as specified in Table 5.7.1
Subfield	A	Gr-chars	Subfield name as in the relational module attribute relations. In the latter case must be <= 8 characters, and begin with Alpha character
Format	A	I	Implicit-point (integer)

		R	Explicit-point unscaled
		S	Explicit-point scaled
		B	Bitfield data
		C	Character mode bitfield
		A	Graphics characters. The selected character must be one of the characters indicated as formats for the subfield in the relational module descriptions with the exception of user defined attribute modules
Unit	A	Gr-chars	Any combination of graphics characters. Any recognizable measurement unit or abbreviation for measurement unit

5.5.3 Type1/Type2

This is a generic module specification. The field name and subfield names in the module composition and subfield description tables are generic and shall be replaced by the names provided for each specific module name in the name substitution table, which is the third table in this section.

FIELD NAME	SUBFIELD NAME	FIELD/SUBFIELD DESCRIPTION
type1/type2 (P)		
	type1id	Identifier for Type1 element
	type2id	Identifier for Type2 element

SUBFIELD NAME	SUBFIELD TYPE	DOMAIN	DOMAIN DESCRIPTION
type1id	A|I	Alphanum Integer	Unique ID for element of type1 in the file set if no other relational data modules are cross-referenced in the Catalog/Cross-Reference module. Otherwise unique within the cross-referenced modules
type2id	A|I	Alphanum Integer	Unique ID for element of type2 in the file set if no other relational data modules are cross-referenced in the Catalog/Cross-Reference module.

Otherwise unique within the cross-referenced modules

Field and subfield name substitution table

Primary field name (type1/type2)	First subfield (type1id)	Second subfield (type2id)
Composite/Element	Cmpid	Elmid
Polygon/Ring	Polid	Rngid
Polygon/Chain	Polid	Chnid
Polygon/Point	Polid	Pntid
Ring/Chain	Rngid	Chnid
Ring/Point	Rngid	Pntid
Chain/Point	Chnid	Pntid
Node/Chain	Nodid	Chnid
Node/Point	Nodid	Pntid

5.5.4 Type/Address

This is the second generic module specification. The field name and subfield names in the module composition and subfield description tables are generic and are to be replaced by the names provided for each specific module name in the name substitution table, which is the third table in this section.

This generic type module relates a relational element to its spatial address as specified in the Spatial Address Information field of the Internal Spatial Reference module. Between types of spatial addresses, the number of subfields for the address will vary, and even within a type of address the number of subfields may be different, depending on the application (e.g, X and Y, or X, Y, and Z). The subfield names for a spatial address must therefore be specified by the user.

FIELD NAME	SUBFIELD NAME	FIELD/SUBFIELD DESCRIPTION
type/address (P)		
	typeid	Identifier for type element
	(+)compi	Component i of the spatial address

SUBFIELD NAME	SUBFIELD TYPE	DOMAIN	DOMAIN DESCRIPTION
typeid	A|I	Alphanum Integer	Unique ID for element of type2 in the file set if no other relational data modules are cross-referenced in the Catalog/Cross-Reference module. Otherwise unique within the cross-referenced modules
(+)compi	A|N	Alphanum Numeric	As defined in the Spatial Reference module/Horizontal address component field

Field and subfield name substitution table

Primary field name (type/address)	First subfield (typeid)	((i+1)th subfields) ((+)compi)
Polygon/Address	Polid	user defined
Ring/Address	Rngid	user defined
Chain/Address	Chnid	user defined
Node/Address	Nodid	user defined
Point/Address	Pntid	user defined

5.5.5 Chain Topology

This module defines the topological relations for a chain in terms of start and end node and left and right polygon identifiers.

FIELD NAME	SUBFIELD NAME	FIELD/SUBFIELD DESCRIPTION
Chain-topology (P)		
	Chnid	Chain ID
	Strnode	Start node ID
	Endnode	End node ID
	Lftpol	Left Polygon ID
	Rgtpol	Right Polygon ID

SUBFIELD NAME	SUBFIELD TYPE	DOMAIN	DOMAIN DESCRIPTION
Chnid	A|I	Alphanum Integer	Unique ID for chain in the file set if no other relational data modules are cross-referenced in the Catalog/Cross-Reference module. Otherwise unique within the cross-referenced modules
Strnode	A|I	Alphanum Integer	Unique ID for start node in the file set if no other relational data modules are cross-referenced in the Catalog/Cross-Reference module. Otherwise unique within the cross-referenced modules
Endnode	A|I	Alphanum Integer	Unique ID for end node in the file set if no other relational data modules are cross referenced in the Catalog/Cross-Reference module. Otherwise unique within the cross-referenced modules
Lftpol	A|I	Alphanum Integer	Unique ID for left polygon in the file set if no other relational data modules are cross referenced in the Catalog/Cross-Reference module. Otherwise unique within the cross-referenced modules
Rgtpol	A|I	Alphanum Integer	Unique ID for right polygon in the file set if no other relational data modules are cross referenced in the Catalog/Cross-Reference module. Otherwise unique within the cross-referenced modules

5.5.6 Attribute-Primary

The attribute-Primary module defines the primary attributes associated with a spatial element or object. The first subfield must contain an identifier of a relational element in the file set so that the attributes can be associated with this element.

FIELD NAME	SUBFIELD NAME	FIELD/SUBFIELD DESCRIPTION
Attribute-Primary (P)		
	Elmid	Identifier for relational element
	(+)attprim	Primary attribute of Elmid element

SUBFIELD NAME	SUBFIELD TYPE	DOMAIN	DOMAIN DESCRIPTION
Elmid	A|I	Alphanum Integer	Unique ID for element in the file set if no other relational data modules are cross referenced in the Catalog/Cross-Reference module. Otherwise unique within the cross-referenced modules
attprim	A|I|R S|B|C	Alphanum Numeric Bitfield	As indicated by Format in the Schema module

5.5.7 Attribute-Secondary

The attribute-secondary module defines the secondary attributes associated with values of primary attributes. The first attribute in the n-tuple for this module must be a primary attribute defined in a primary attribute relation.

FIELD NAME	SUBFIELD NAME	FIELD/SUBFIELD DESCRIPTION
Attribute-secondary (P)		
	attprim	Primary attribute of primary attribute module
	(+)attsec	Secondary attribute associated with primary attribute

SUBFIELD NAME	SUBFIELD TYPE	DOMAIN	DOMAIN DESCRIPTION
attprim	A|I|R S|B|C	Alphanum Numeric Bitfield	As indicated by Format in the Schema module or as indicated by the format controls of the encoding method
attsec	A|I|R S|B|C	Alphanum Numeric Bitfield	As indicated by Format in the Schema module or as indicated by the format controls of the encoding method

5.6 Raster-Grid Form

The Raster-Grid Form has two distinct sets of modules for encoding raster or gridded data. The first two modules (Grid-Definition and Grid-Cell) have been designed for the exchange of gridded data associated with geographic information systems. For example, these modules allow for the encoding of attribute data with each grid-cell identical to the attribute encoding that is possible for objects from the Object exchange form.

The second set of two modules (Raster Definition and Raster-Cell) has been designed for exchange of remote sensing oriented image data.

The two sets of modules are referred to as the grid and raster modules, respectively.

The fields and subfields of the raster modules have been defined to be as close as possible to those of the grid modules. Some differences are to be expected, as the geographic location of pixels in raster data is implicit (no pixel-by-pixel locations given), the data values are usually unsigned binary, and various layering patterns are employed. Field and subfield orders have been chosen to allow maximum opportunity for truncation of lesser-used parameters.

To distinguish between the different types of raster and gridded data and their encoding methods, the concept of an object representation code has been carried through in this exchange form . Table 5.7.1 summarizes the object representations for gridded data.

Table 5.7.1 Modules and Raster/Grid-Based Object Representations

Module Type	Object Representation	Representation Code
Grid-Definition	Straight encoding with cell values	GI
	Straight encoding with attributes	GJ
	Run encoding with cell values	GK
	Run encoding with attributes	GM
Grid-Cell	Same as for Grid-Definition	
Raster-Definition	Straight encoding with pixel values	RI
	Straight encoding with attributes	RJ
	Run encoding with pixel	RK

	values	
	Run encoding with attributes	RM
	Other	RX
Raster-Cell	Same as for Raster-Definition	
Grid-Definition	Straight encoding with cell values	GI
	Straight encoding with attributes	GJ
	Run encoding with cell values	GK
	Run encoding with attributes	GM
Grid-Cell	Same as for Grid-Definition	
Raster-Definition	Straight encoding with pixel values	RI
	Straight encoding with attributes	RJ
	Run encoding with pixel values	RK
	Run encoding with attributes	RM
	Other	RX
Raster-Cell	Same as for Raster-Definition	

5.6.1 Grid-Definition

Gridded data can be encoded using the Grid-Definition module and Grid-Cell module. These two modules can accommodate image data, digital terrain models, gridded GIS layers and other gridded data. A number of different data types is supported. However, for image data, the use of the Raster Exchange Form is recommended.

A multi-layered grid could be encoded using the attribute coding conventions of the format, and in fact, the grid section has been structured to reflect this coding philosophy. However, the emphasis is on a more rigid organization to specifically accommodate gridded data structures.

Instead of name, format, unit, and value as in the attribute definition and attribute value fields, the attribute definition occurs in the Grid-Definition module, and the values are encoded in the Grid-Cell module. Multiple layers can be accommodated either by a layer sequential format in which a Grid-Definition module and a Grid-Cell module are used for each layer, or they can be coded interleaved by cell. For the interleaved case, in the Grid-Cell module, a cell value for each type of layer

occupies a subfield, and the adjacent subfields with cell values for the number of layers constitute a field. In the Grid-Definition module, the field "Layer" containing the relevant parameters for each layer is then repeated once for each additional interleaved layer.

Grid cell attributes can be represented by a single value for each layer, but also as full attributes in the form of attribute fields, which may be attached to each grid cell as with any other spatial object.

The Grid-Definition and Grid-Cell modules shall be subject to overall spatial reference specifications as provided in the Internal and External Spatial Reference modules.

The grid data record can accommodate a number of different grid types and encoding methods as indicated in Table 5.7.1. The I, J, K, and M object representation codes of this table represent the encoding method. I and J represent straight encoding, cell by cell, while K and M represent run encoding, in which a number of identical cells is only represented once. The J straight encoding type has been included for consistency and completeness, but is not expected to be used frequently because run type M would be more efficient.

I - Straight encoding with cell values
J - Straight encoding with attributes
K - Run encoding with cell values
M - Run encoding with attributes

These different organizations can be supported because the grid data record is made up of three optional parts: (1) a point, (2) attributes, and (3) cell values. The point part contains row and column numbers and optional full coordinates for the point. The attributes part contains attributes structured the same as attributes in other modules. The values part represents a sequence of consecutive grid cells not necessarily restricted to a single row. The sequence may start in the middle of row i, proceed through rows i through n, and terminate in the middle of row n. In the straight encoding mode, the sequence always contains a complete row of value fields. In the run encoding mode, it contains only one value field or one group of attributes, because all the cells are assumed to be identical up to the next point. A further possibility occurs because for any cell a number of consecutive values may be coded, each associated with a different layer. This is the equivalent of a band-interleaved format.

The following expressions reflect more precisely the different types of organizations that can be used to exchange gridded data. The brackets "{}" have the meaning that an enclosed item can be repeated an indefinite number of times, and "<>" brackets have

the meaning that the enclosed item is a conceptual unit that can be broken down into smaller detailed components. Terms used are those defined in Section 3.2 or are field and subfield names defined in the tables of this section and the Grid-Cell Section (5.6.2).

The following expressions are only examples of legal configurations and are not meant to be all-inclusive; for instance, the location of a "point" is expressed by the Row and Column subfields of the Cell field of the Grid-Cell module record, and an optional spatial address with precise coordinates can be included for this point as well, but has been left out of the following examples.

(1) Layer interleaved (encoding type I, straight encoding with cell values).

```
<grid> ::= <Grid-Definition module>
           <Grid-Cell module>
   <Grid-Definition module> ::= <Grid-Definition module record>
   <Grid-Cell module> ::= {<Grid-Cell module record>}
   <Grid-Definition module record> ::= <Grid field>
                                       {<Layer field>}
   <Grid-Cell module record> ::= <Cell field> {<Cell Value field>
      <Cell Value field>::= <Layer1 subfield>
                            <Layer2 subfield>
                                    .
                                    .
                                    .
                            <LayerN subfield>
```

Notice how the Grid-Definition module only contains one module record, with repeated layer fields for each interleaved layer, while the Grid-Cell module contains multiple module records containing the layer interleaved cell data. In the above example layer1, layer2,..., layerN are user substitutions for the generic subfield name of (+)layer.

(2) Layer sequential.

```
<grid> ::= {<grid layer>}
  grid layer ::= <Grid-Definition module>
                 <Grid-Cell module>
```

(3) Encoding type J, straight encoding with attributes.

```
<grid> ::= <Grid-Definition module>
           <Grid-Cell module>
   <Grid-Definition module> ::= <Grid-Definition module record>
   <Grid-Cell module> ::= {<Grid-Cell module record>}
      <Grid-Definition module record> ::= <Grid field>
                                          <Layer field>
       <Grid-Cell module record> ::= <Cell field>
                                     <attribute field group>
```

Notice that in this case the distinction between layer sequential and layer-interleaved is not relevant, as all attributes for all layers are present in <attribute field group>, which is the special attribute field group, with the attributes arranged as a tree, made up of the Attribute Definition and Attribute Value fields (see Section 4.1.3.3.6).

(4) Encoding type K, run encoding with cell values (layer interleaved)

```
<grid> ::= <Grid-Definition module>
           <Grid-Cell module>
  <Grid-Definition module> ::= <Grid-Definition module record>
  <Grid-Cell module> ::= {<Grid-Cell module record>}
  <Grid-Definition module record> ::= <Grid field>
                                      {<Layer field>}
     <Grid-Cell module record> ::= <Cell field> <Cell Value field>
        <Cell field>::= <Modname subfield>
                        <Objrep subfield>
                        <Numcell subfield>
                        <Row subfield>
                        <Column subfield>
        <Cell Value field>::= <Layer1 subfield>
                              <Layer2 subfield>
                                    .
                                    .
                                    .
                              <LayerN subfield>
```

Notice that the difference between this example and the first is that there is only a single Cell Value field in each Grid-Cell module record. This Cell Value field has the information for all identical cells for a run, starting at the row and column indicated by the Row and Column subfields. The run may start anywhere in the image, and terminates one cell before the row and column of the next run in the next Grid-Cell module record. Note that the encoding method is not called "run-length" encoding, because it does not store a length of a run relative to the

starting point; rather the run occurs between two points with specified absolute positions.

(5) Encoding type M, run encoding with attributes

```
<grid> ::= <Grid-Definition module>
           <Grid-Cell module>
   <Grid-Definition module> ::= <Grid-Definition module record>
   <Grid-Cell module> ::= {<Grid-Cell module record>}
      <Grid-Definition module record> ::= <Grid field>
                                          <Layer field>
      <Grid-Cell module record> ::= <Cell field>
                                    <attribute field group>
         <Cell field>::= <Modname subfield>
                         <Objrep subfield>
                         <Numcell subfield>
                         <Row subfield>
                         <Column subfield>
         <Cell Value field>::= <layer1 subfield>
                               <layer2 subfield>
                                    .
                                    .
                                    .
                               <layerN subfield>
```

Again note that when attributes are used instead of Cell Value fields, the notion of distinct layers vanishes. Instead there is a single layer with multiple attributes. In this case, one instance of the attribute field group applies to the run represented by one Grid-Cell module record.

The usage of the various portions of the Grid-Cell Module record for each of the data types will be further explained in the full specification for this record.

FIELD NAME	SUBFIELD NAME	FIELD/SUBFIELD DESCRIPTION
Grid-Definition (P)		
	Modname	A unique identifier for the module
	Objrep	Representation code for the grid
	Objid	Object identifier
	Numrow	Number of rows
	Numcol	Number of columns

	Rowcol	Columns or rows are stored in the data records
	Rowdir	Row direction
	Coldir	Column direction
	Orangle	Orientation angle
	Numlayer	Number of layers in the grid
	Xres	X-resolution
	Yres	Y-resolution
	Originx	X of grid offset from file origin as specified in the Parameter3 subfield of the Internal Spatial Reference module
	Originy	Y of grid offset from file origin as specified in the Parameter4 subfield of the Internal Spatial Reference module
	Cell1x	X offset of first cell center to origin (Originx above)
	Cell1y	Y offset of first cell center to origin (Originy above)
Layer (O)		One layer field for each data layer
	Name	Layer name
	Cellcode	Cell encoding type
	Format	Layer value format
	Minval	Minimum cell value for layer
	Maxval	Maximum cell value for layer
	Zres	Z-resolution
	Numbits	Number of bits per entry

(*)Attribute Definition (T)

(*)Attribute Value (T)

Attributes pertaining to entire grid

SUBFIELD NAME	SUBFIELD TYPE	DOMAIN	DOMAIN DESCRIPTION
Modname	A	Alphanum	Name must start with alphabetic character
Objrep	A	Alpha	Two characters as specified in Table 5.7.1 under Representation Code.
Objid	I	Integer	Unsigned integer. With Modname and Objrep must form unique ID within the file set
Numrow	I	Integer	Unsigned integer >= 1
Numcol	I	Integer	Unsigned integer >= 1
Rowcol	A	ROW COLUMN	Rows are stored in the data records Columns are stored in the data records
Rowdir	A	TB BT	Rows are in top to bottom sequence Rows are in bottom to top sequence
Coldir	A	LR RL	Columns are in left to right sequence Columns are in right to left sequence
Orangle	R	Real	Counter clockwise angle from the primary axis of ground planimetric reference to the primary axis of the grid reference system. Degrees and decimal degrees
Numlayer	I	Integer	Unsigned Integer >= 1
Xres	R	Real	Between cell centers X increment in horizontal units specified in the External Spatial Reference module
Yres	R	Real	Between cell centers Y increment in horizontal units specified in the External Spatial Reference module
Originx	R	Real	In horizontal units specified in the External Spatial Reference module
Originy	R	Real	In horizontal units specified in the External Spatial Reference module

Cell1x	R	Real	In horizontal units specified in the External Spatial Reference module
Cell1y	R	Real	In horizontal units specified in the External Spatial Reference module
Name	A	Gr-chars	Any combination of graphics characters
Cellcode	A	L D F P C	Presence/absence of feature in cell Dominant type by area Dominant type by frequency Percent occurrence (two-class grid) Attribute value at cell center
Format	A	I R S B C A	Implicit-point (integer) Explicit-point unscaled Explicit-point scaled Bitfield data Character mode bitfield graphics characters
Minval	A|I| R|S	Alphanum Integer Real	Minimum cell value for layer. If Alphanum, then lexicographical minimum.
Maxval	A|I| R|S	Alphanum Integer Real	Maximum cell value for layer. If Alphanum, then lexicographical maximum.
Zres	I|R	Integer Real	Z increment in vertical units specified in the External Spatial Reference module. If Z represents class values, then class interval
Numbits	I	Integer	Unsigned integer

5.6.2 Grid-Cell

The Grid-Cell module record consists of three basic constructs: (1) a point, (2) attributes, and (3) cell values. The point can be used to encode precise coordinates at the beginning of the row or run. A run is a sequence of identical cells for which properties need to be recorded once. The coordinates for the point can be either Row and Column subfields of the Cell Primary module field or can be a spatial address through the Spatial Address field or can be both. Attributes can be associated with each cell or run. The cell value field records the cell value (or cell values if layer-interleaved by cell) for each cell. A

number of layer values for a run or cell is grouped into a field called the Cell Value field. The number of subfields in this field is variable and depends on the application. This subfield is therefore specified generically (see sections 4.2.2 and 4.2.3.2). For example, for a specific application with layers Vegetation, Soils and Slope, (+)layer of the Cell Value field is converted to the explicit classification of three subfields with names Vegetation, Soils, and Slope.

FIELD NAME	SUBFIELD NAME	FIELD/SUBFIELD DESCRIPTION
Grid-Cell (P)		
	Modname	A unique identifier for the module
	Objrep	Representation code for the grid
	Objid	Object identifier
	Numcell	Number of cell fields in the module record (since there is only one run per record this is also the number of cells per run)
	Row	Row number of point
	Column	Column number of point
(-)Spatial Address (N)		Spatial address of point
(*)Attribute Definition (T)		
(*)Attribute Value (T)		
Cell Value (O)		
	(+)layer	Cell data values for each interleaved layer

SUBFIELD NAME	SUBFIELD TYPE	DOMAIN	DOMAIN DESCRIPTION
Modname	A	Alphanum	Name must start with alphabetic character
Objrep	A	Alpha	Two characters as specified in Table 5.7.1 under Representation Code.
Objid	I	Integer	Unsigned integer. With Modname and Objrep must form unique ID within the file set
Numcell	I	Integer	Unsigned Integer >=1
Row	I	Integer	Unsigned Integer >=1
Column	I	Integer	Unsigned Integer >=1
(+)layer	A|I|R S|B|C	Alphanum Numeric Bitfield	As indicated by Format

5.6.3 Raster Definition

The reproduced image is a regular tesselation - all reproduction pixels are to be the same size and shape. No image rectification is to be done during the interchange. Multiple layers may be separated into separate modules or interleaved in one.

The fields and subfields of the Raster modules have been defined to be as close as possible to those of the Grid-definition module. Some differences are to be expected as the geographic location of pixels in Raster data is implicit (no pixel-by-pixel locations given), the data values are usually unsigned binary, and various layering patterns are employed. Field and subfield orders have been chosen to allow maximum opportunity for truncation of lesser-used parameters.

The layers of a set must have congruent, registered pixels. The pixels may contain coded attributes such as dominant cover (thematic map), or other, as well as a numerical value of a continuum image parameter such as radiance or altitude. Each of these variables would be expected to be in a separate logical layer, be they interleaved by pixel or line, or be in sequential modules. Individual layers will be described by a series of Layer fields. The Objectid will be the same in all related image modules, and is expected to be unique within the file set.

For single-layer images (no Sequence Field, or Numlayer = 1), the Layer Field is not needed for image playback. For multi-layer images (Numlayer >1), the layering pattern is given in the Sequence Field, the layering order is given in an ordered sequence of Layer Names in the Lname subfield of the sequence field. Parameters for the layers are given in a set of named Layer fields.

If the same pixel format is used in all layers or for single-layer images, the Pixels field will apply to all layers. If the pixel formats of the several layers are different in different layers, the Format and Bitmask subfields in the Layer fields shall be used instead of the Pixel field to indicate formats in each layer individually.

For Bitfield pixel data, the bits shall represent an unsigned positive binary number unless otherwise indicated in the Cellcode or Attribute fields.

This module describes the logical makeup of the image data plus image layout information. It also contains information which is ancillary to basic image reproduction: identification of the multiple layer parameters and certain geometric information peculiar to remotely sensed images. Layer coding is included to allow the various layers to have different coding.

FIELD NAME	SUBFIELD NAME	FIELD/SUBFIELD DESCRIPTION
Raster Definition (P)		
	Modname	A unique identifier for the module
	Objrep	Representation code
	Objectid	A unique raster identifier
Layout (N)		Contains layout and ancillary information pertaining to all layers
	Numrow	Number of rows
	Numcol	Number of pixels per row
	Rowdir	Row direction pattern
	Coldir	Column direction pattern
	Aspratio	Aspect ratio of pixels - line/pixel

	Pixcs	Pixel layout, columnar/staggered
	Scanpat	Scan pattern, Number of lines per alteration
	Numlayer	Number of pixel layers (e.g., spectral bands)
	Llist	Ordered list of Layer names corresponding to the Layer "Lname" subfield
	Patolay	Pattern of the overlay
	Orangle	Orientation angle, CW from reference grid
	Sunaz	Sun azimuth angle, CW from north
	Sunel	Sun elevation, up from horizon
	Centaz	Viewing azimuth angle at image center, CW from north
	Centel	Viewing elevation angle from nadir at image center
	Xfov	X angular field of view, edge to edge
	Yfov	Y angular field of view, top to bottom
	Xres	X-resolution (along-line pixel spacing, object space, at image center)
	Yres	Y-resolution (between-lines spacing, object space, at image center)
	Comment	Free-form comments as desired
Layer (O)		One Layer field for each data layer
	Lname	Layer name, description or code
	Cellcode	Cell encoding type
	Format	Pixel format
	Bitmask	Defines bitfield length and active pixels
	Minval	Data minimum value
	Maxval	Data maximum value

(*) Attribute Definition (T)

(*) Attribute Value (T)

These fields will describe any attributes pertaining to the entire raster.

Comments (N) Any desired comments

SUBFIELD NAME	SUBFIELD TYPE	DOMAIN	DOMAIN DESCRIPTION
Modname	A	Alphanum	Name must start with alphabetic character
Objrep	A	RI	Straight encoding with continuum values
		RJ	Straight encoding with attributes
		RL	Straight encoding with logical Presence (1) or absence (0)
		RM	Run encoding with attributes
		RX	Other
Objectid	A	Alphanum	A unique ID within the file set
Numrow	I	Integer	Unsigned integer >= 1
Numcol	I	Integer	Unsigned integer >= 1
Rowdir	A	TB	Rows are in top to bottom sequence
		BT	Rows are in bottom to top sequence
Coldir	A	LR	Columns are in left to right sequence
		RL	Columns are in right to left sequence
Aspratio	R	Real	Line spacing/Pixel spacing ratio
Pixcs	A	C|S	C=columnar, S=staggered
Scanpat	I	0 (Zero)	One-way scan
		Not Zero	Boustrophedonic scan, number of lines/alternation
Numlayer	I	Integer	Unsigned integer >= 1
Llist	A	Alphanum	Lname must start with alphabetic character
Patolay	A	BSQ	Sequential layers
		BIL	Interleaved by line

		BIP	Interleaved by pixel
Orangle	R	Real	Degrees stated as +-XXX.XXX
Sunaz	R	Real	Degrees stated as +-XXX.XXX
Sunel	R	Real	Degrees stated as +-XXX.XXX
Centaz	R	Real	Degrees stated as +-XXX.XXX
Centel	R	Real	Degrees stated as +-XXX.XXX
Xfov	R	Real	Degrees stated as +-XXX.XXX
Yfov	R	Real	Degrees stated as +-XXX.XXX
Xres	R	Real	Between pixel centers X increment in horizontal units specified in the External Spatial Reference module
Yres	R	Real	Between pixel centers Y increment in horizontal units specified in the External Spatial Reference module
Comment	A	Alphanum	Any combination of graphics characters
Lname	A	Alphanum	Lname must start with alphabetic character
Cellcode	A	L	presence/absence of feature in pixel
		D	Dominant type by area
		F	Dominant type by frequency
		V	Value of a continuum attribute variable
		X	Assigned Code, may be described in Attribute fields
Format	A	I	Implicit-point (integer) NR-1
		R	Explicit-point, unscaled (Real) NR-2
		S	Explicit-point, scaled (Exponen) NR-3
		B	Bitfield
		C	Character mode bitfield
		A	Alphanumeric
Bitmask	C	0,1	An ordered list corresponding to unused and active positions of

			bitfield bits
Minval	I|R|S|B	Int, Real, scaled, binary	Minimum legal value of continuum variable
Maxval	I|R|S|B	Int, real, scaled, binary	Maximum legal value of continuum variable

Note: Objrep coding applies to the referenced Raster Cell data.

5.6.4 Raster Cell Module

This module contains the actual data values for the raster. The order of the bits must be preserved.

FIELD NAME	SUBFIELD NAME	FIELD/SUBFIELD DESCRIPTION
Raster Id		
	Modname	A unique name for the module
	Objrep	Representation Code
	Objectid	Image identifier - same as related modules
Data		
		Octets (bytes) or binary fields. Binary pixel data bits will be concatenated into a continuous string, and the string broken into octets even if the pixels consist of other than 8 bits.

SUBFIELD NAME	SUBFIELD TYPE	DOMAIN	DOMAIN DESCRIPTION
Modname	A	Alphanum	Name must start with alphabetic character
Objrep	A	RI	Straight encoding with continuum values
		RJ	Straight encoding with attributes
		RL	Straight encoding with logical presence (1) or absence (0)
		RM	Run encoding with attributes
		RX	Other
Objectid	A	Gr-chars	A unique ID within the file set - same as in the related modules
Data	A|B	Alphanum or binary	Any alphanumeric representation as specified in the related modules

APPENDIX A

ISO 8211 IMPLEMENTATION SPECIFICATIONS 1/

A.1 OBJECTIVE AND SCOPE

The objective of this Appendix is to specify a method for the interchange of the data representing the objects specified in Section 5 between noncommunicating parties. The scope is limited to the use of ISO 8211 as an interchange method and to media for which support exists in the form of labelling standards. Specifications for complete sets of data modules are described as well as the manner by which incomplete sets of data modules may be interchanged.

ISO 8211 is a general purpose interchange standard and this Appendix specifies the allowable subset of tags, names, labels, formats, and other control information necessary for the interchange of spatial data. It specifies the limits allowed users for those ISO 8211 parameters which are permitted to vary such that interchange may be accomplished. Although private agreements are discouraged, this appendix specifies the methods by which private agreements can extend the standard within the general specifications of ISO 8211 in order that the user can interchange data not anticipated by this standard in a manner which does not conflict with the standard.

The methodology of this Appendix is to define ISO 8211 constructs which, for the purpose of interchange, accept the logical constructs of Section 5 and preserve their meaning. Where possible, a correspondence is maintained between the module subfields and fields of Section 5 and the ISO 8211 subfields and fields maintaining both identification and order when required. Where Section 5 has module field requirements not easily met by a single ISO 8211 field, a multiple field construction is used. The fields associated with a single module record are collected

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1/ ISO 8211 is also a Federal Information Processing Standard; see FIPSPUB 123, Specification for a Data Descriptive File for Information Interchange, 19 Sept 1986.

into a single ISO 8211 record.

The content and size of an interchange determine what fields are present and how they are collected into records and the records into files. Section 5 allows the user considerable freedom to structure records and files as needed and this Appendix does likewise.

ISO 8211 is a media-independent standard and its variable length records may be written on any medium which is able to accept them, including communications lines. In order to promote interchange, the user is advised to employ standardized media for which labels and file structures exist as well as widespread implementations. Unfortunately, not all levels of standardized media are equally well supported by all vendors. The requirements for standardized media are given in Section A9.

A.2 CONFORMANCE

A spatial interchange file set is in conformance with this Appendix of the standard when all files, records, and fields are in conformance with the applicable media standards, ISO 8211, the specifications of Part II, Sections 4 and 5 of this standard, the required specifications of Parts I, III, and IV of this standard, and the specifications of Sections A5 through A9 of this appendix.

A.3 REFERENCES FOR THIS APPENDIX

When any of the Standards cited in this Appendix are superseded by an approved revision, the revision shall apply.

ANSI X3.27-1986, American National Standard for File Structure

ANSI/ISO 4341-1978, American National Standard for Magnetic Tape Cassette and Cartridge Labelling and File Structure for Information Interchange

ANSI/ISO 8211-1986, American National Standard for Information Processing - Specification for a Data Descriptive file for Information Interchange

ISO 6093-1985, Information Processing - Specification for Representation of Numeric Values in Character Strings for Information Interchange

ISO 7665-1985, File Structure and Labelling for Flexible Disk Cartridges for Information Interchange

ISO/DIS 9293-198x, Volume and File Structure for Flexible Disk Cartridges for Information Interchange

Knuth, D. E.; "The Art of Computer Programming, Vol 1, Fundamental Algorithms", 2nd Ed.; Addison-Wesley, Reading, MA, 1973; p. 305 ff.

A.4 DEFINITIONS FOR THIS APPENDIX

The definitions are limited to those terms not in common usage and not found in the reference standards.

A.5 SPECIFICATIONS

Table A1 1/ specifies all the ISO 8211 tags, names, labels and control fields reserved by this standard for the interchange of a set of complete modules as single or multiple files. The constructs of Table A1 are related to the logical constructs of Section 5 by section references and by the following nomenclature:

	Section 5	ISO 8211/Table A1
a)	Module subfield Subfield Name	Subfield Label
b)	Module field Field Name	Field (1) Name
c)	Domain	Data type/format

Note: (1) In some fields, multiple ISO 8211 fields may be required to complete a module field or, when the repetition requirements permit, two or more module fields have been merged into one ISO 8211 field.

The identification nomenclature of Section 5 has been used for most of the corresponding constructions of this implementation. Table A1 specifies any exceptions to this practice. Specifications for the contents of user data subfields corresponding to the tags and labels are found in Section 5.

Note - Certain of the data elements of Section 5 are controls not

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1/ This table does not contain the recently added Coordinate Resolution field. Also the the field name "Estimate of Coordinate Precision" of the Internal Spatial Reference Module has been changed to "Estimate of Positional Accuracy."

applicable to an ISO 8211 interchange and are omitted from the ISO 8211 interchange file. A few module subfields contain more than one data item and these are resolved into proper ISO 8211 subfields.

A subset of the data descriptive information is subject to variation based on the data to be interchanged (see A5.1.2).

Table A1

Specification of Tags, Field Controls, Names, Labels, and Formats

---

Notation - The table entries are formatted as follows:

```
Tag         Field controls (six bytes),name&    (see 5.d..)
[n]|[m,n]   Label& - continued to next line as necessary
            Format;
```

where:

```
  Tag   is a four character ISO 8211 tag
Fldcon  are the ISO 8211 field controls
Name    is the ISO 8211 name
   []   signifies that no labels are specified
  [n]   signifies n subfield elements of an n-tuple
[m,n]   signifies the number of elements in a two-dimensional
        array; often an n-tuple, repeating m times.
[3;]    implies a three-dimensional array with explicitly stated
        dimension and extent controls. See ISO 8211 6.2.4.
Label   is an ISO 8211 vector label or Cartesian label
Format  is the ISO 8211 format control
{taga|tagb} implies "taga" or "tagb", but not both
"lowercase" implies a user determined name or label
"ATTG" implies any form of the ATTRIBUTE field group.
```

Dashed lines, "-----", group associated sets of tags and field descriptions which form a spatial data module (i.e., the associated fields lie between the dashed lines). The primary field of the set is listed first and the secondary fields, if any, are listed after the primary fields. Secondary fields are defined at their first occurrence and shall be included in a subsequent module when referenced by tag.

The following field descriptions occur frequently in several modules and shall be included in the modules when referenced by tag:

Universal Field Specifications (see 5.1)

```
0001  0100;&DDF RECORD IDENTIFIER&
```

```
[]    &
      ;
```

Note: This field is required by ISO 8211 in each record.

In the Attribute tags, the substitution of "digits" for "d" provides for the definition of multiple Attribute fields.

The following form of the Attribute field is used when labelling is required and repetitions of the same n-tuple occur associated with the same ATTRIBNAM and ATTRIBUNIT. Mulitple Attribute Value fields can also be associated with the same Attributes field.

```
ATdd  1600;&ATTRIBUTES&  (see 5.1.1)
[2]   ATTRIBNAM!ATTRUNIT&
      (2A);

AVdd  2600;&ATTRIBUTE VALUE&
[m,n] *user subfield value labels&
      (Z);
```

The attributes field group may form an ordered, rooted tree in which case, the tag, ATdd, is the parent of AVdd. (See A5.1.3)

The following form of the Attribute field is used when labelling is required and repetitions of different attributes of the same format and data types occur.

```
ARdd  2600;&ATTRIBUTES&  (see 5.1.1)
      *ATTRIBNAM!ATTRIBUNIT!user data subfield labels&
      (2A,Z); For data comprising n-tuples, Z is a composite term.
```

The following form of the Attribute field is used when labelling is not required and repetitions of the same n-tuple occur or when varying numbers of values of a single attribute occur. There are no labels used.

```
ASdd  1600;&ATTRIBUTES&  (see 5.1.1)
      &  Subfield order: Attribnam, Attribunit, Attribvalue(s).
      (2A,(Z)); For multiple data values, Z is a composite term.
```

The interpretation of the values is a user protocol based upon the value of Attribnam and Attribunit.

The Spatial Address field supplies a set of components from which the location of a point can be determined. The number, meaning and names of these components are given in the Spatial Address module.

The names of the components shall appear as labels in this field description in the order in which the components occur.

```
SADR  2600;&spatial address&  (see 5.1.2)
```

```
[m,n] *comp1!comp2!...!compi!...!compn&
      (Z);
```

The following special spatial address tags have the same subfields as SADR:

DMSA - Domain spatial address
RADS - Registration spatial addresses (external/internal).

The SADR tag may take the form, SAdd where "dd" is "digits", in order to define multiple spatial address types in one file.

```
FRID  2600;&foreign id&   (see 5.1.3)
[m,3] *MODNAM!OBJREP!OBJID&
      (2A,I);
```

The following special foreign identifier tags have the same subfields as FRID:

ARID - Area Identifier
LNID - Line Identifier
RNID - Ring Identifier.

The FRID tag may take the form, FRdd where "dd" is "digits", in order to define multiple foreign identifier types in one file.

```
COMM  0000;&COMMENT&
[1]   &
      (A);
```

Global Information (see 5.2)

```
CATD  2600;&CATALOG/DIRECTORY&     (see 5.2.1.1)
[m,7] *MODNAME!NAME!TYPE!VOLUME!FILE!RECORD!COMMENT&
      (5A,Z,A);
```

```
CATX  2600;&CATALOG/CROSS REFERENCE&       (see 5.2.1.2)
[m,6] *MODNAME!NAME1!TYPE1!NAME2!TYPE2!COMMENT&
      (6A);
```

```
CATS  2600;&CATALOG/SPATIAL DOMAIN&      (see 5.2.1.3)
[m,7] *MODNAME!NAME!TYPE!DOMAIN!MAP!FEATURE!COMMENT&
      (7A);
```

```
IDEN  1000;&IDENTIFICATION&  (see 5.2.2)
[6]   MODNAME!TITLE!DATAID!GEOAREA!DATASTRCT!COMMENT&
      (6A);

FEAC  2000;&FEATURE DESCRIPTION&
[n,2] *FEATURE NAME!DESCRIPTION&
      (A);
```

```
MAPD  2000;&MAP DATE&
[n,2] *MAPDAT1!MAPDAT2&
      (2A);

SCAL  2100;&MAP SCALE&
[n,2] *SCALE1!SCALE2&
      (2I);
-----------------------------------------------------------------
SCUR  0000;&SECURITY&          (see 5.2.3)
[6]   MODNAME!SECCLASS!CONTROL!REVIEWDATE!REVIEWINST!COMMENT&
      (6A)

ATTG
-----------------------------------------------------------------
IREF  1600;&INTERNAL SPATIAL REFERENCE& (see 5.2.4.1)
[6]   MODNAME!REFTYPE!SADDRTYPE!SASERFMT!HORIZCOMPFMT|VERTCOMPFMT&
      (8A);

COPR  2600;&ESTIMATE OF COORDINATE PRECISION&
[n,2] *HORIZCOMPPRECIS!VERTCOMPPRECIS&
      (2A);

ITRT  1600;&TRANSFORMATION PARAMETERS&
[6]   &
      (R);
-----------------------------------------------------------------
XREF  1600;&EXTERNAL SPATIAL REFERENCE& (see 5.2.4.2)
[7]  MODNAME!REFDOC!REFSYSNAM!VERTUNIT!VERTREFERENCE!SOUNDDATUM!
      COMMENT&
      (7A);

HZRF  1600;&HORIZONTAL REFERENCE&
[4]   HORIZDATUM!PROJCODE!ZONENUM!HORIZUNIT&
      (A,3I)

GCPA  2600;&GCTP PARAMETERS&
[]    &
      (R);
-----------------------------------------------------------------
SPDM  1600;&SPATIAL DOMAIN&          (see 5.2.5)
[5]   MODNAME!SPATDOMTYP!DOMSPATADDR!DOMSPATADDRSERFMT!COMMENT&
      (5A);

DMSA
-----------------------------------------------------------------
RGIS  2600;&REGISTRATION&  (see 5.2.6)
[2]   MODNAME!COMMENT&
      (2A);

RADS  2600;&EXTERNAL/INTERNAL SPATIAL ADDRESSES&
[n,m] *external spatial address labels!     Note: Combines two
      internal spatial address labels&      ordered module fields.
```

```
      (Z);
-----------------------------------------------------------------
Data Quality  (see 5.3)
-----------------------------------------------------------------
DQLG  0000;&LINEAGE&  (see 5.3.1)
[1]   MODNAME&
      (A);

COMM, FRID, ATTG
-----------------------------------------------------------------
DQPA  0000;&POSITIONAL ACCURACY&  (see 5.3.2)
[1]   MODNAME&
      (A);

COMM, FRID, ATTG
-----------------------------------------------------------------
DQAA  0000;&ATTRIBUTE ACCURACY&  (see 5.3.3)
[1]   MODNAME&
      (A);

COMM, FRID, ATTG
-----------------------------------------------------------------
DQLC  0000;&LOGICAL CONSISTENCY&  (see 5.3.4)
[1]   MODNAME&
      (A);

COMM, FRID, ATTG
-----------------------------------------------------------------
DQCG  0000;&COMPLETENESS&  (see 5.3.5)
[1]   MODNAME&
      (A);

COMM, FRID, ATTG
-----------------------------------------------------------------
Spatial Objects  (see 5.4)
-----------------------------------------------------------------
PNTS  1600;&POINT-NODE&  (see 5.4.1)
[3]   MODNAME!OBJREP!OBJID&
      (2A,I);

SADR, ARID, LNID, ATTG
-----------------------------------------------------------------
LINE  1600;&LINE&          (see 5.4.2)
[3]   MODNAME!OBJREP!OBJID&
      (2A,I);

NEIG  2600;&NEIGHBORS&
[4,3] POLYGONID LEFT!POLYGONID RIGHT!STARTNODE ID!ENDNODE ID
      *MODNAM!OBJREP!OBJID&
      (4(2A,I));

{FRID|SADR}, ATTG
```

1 CARTOGRAPHIC OBJECTS

1.1 Scope, Purpose and Application

In order to efficiently encode and store cartographic objects that are digital representations of cartographic features, a systematic and comprehensive set of such objects that support the various cartographic operations carried out by modern cartographic data systems must be provided. These objects are intended to serve the cartographic community specifically, and the spatial data handling community in general.

1.1.1 Background

This work was begun by the National Committee for Digital Cartographic Data Standards in 1982 to harmonize and systematize a comprehensive set of cartographic objects for the profession. In 1985, the Standards Working Group of the Federal Interagency Coordinating Committee on Digital Cartography also began working on cartographic object definitions. This resulting standard represents a joint and collaborative effort by both groups to scientifically define a set of objects that will support work with cartographic data systems and spatial data exchanges.

1.1.2 Objectives

This standard is an attempt to produce a systematic and complete set of cartographic objects for 0, 1, and 2 dimensions. Three dimensional cartographic objects have not been specified. The objectives of this standard for cartographic objects are severalfold:

1) to specify a set of primitive and simple cartographic objects in 0, 1, and 2 dimensions;
2) to specify the set of objects that will support the three major cartographic functions:
    a) geometry only operations,
    b) geometry and topology operations,
    c) topology only operations.
3) to specify these objects in a modular fashion such that more elaborate compound and complex objects can be constructed from them;
4) to specify objects that are valid in planar, Euclidean geometry as well as simple curved surfaces such as the sphere or ellipsoid.

1.1.3 Classification and Intended Use of Objects Defined Herein

Three classes of cartographic objects are defined. Two classes are defined explicitly: geometry only, and geometry and topology, while the third class, topology only, is defined implicitly by truncating the coordinates from the geometry and topology class of objects. The intended use of these three classes of objects is as follows:

1) geometry only - to be used for cartographic drawing only,
2) geometry and topology - to be used for work with modern cartographic data structures which use geometric drawing and utilize topological operations,
3) topology only - to be used for certain analytical operations.

The relationship between the classes of objects and the intended use is specified in Table 1.

Table 1. Intended Uses of Defined Cartographic Objects in Three Cartographic Settings.

	Geometry Only (G)	Geometry and Topology (GT)	Topology Only (T)
0-D	point *	node	(truncated node)
1-D	line segment string arc ring (string or arc)	link directed link chain * ring (link or chain)	link, directed link with truncated nodes ring (link with truncated nodes)
2-D	polygon (ring(s): string or arc) pixel grid cell	polygon (ring(s): link or chain)	polygon (ring(s): link with truncated nodes)

* Note: There are Special Implementation Objects in Section 1.4.4 that are based on the point and on the chain.

1.2 Conformance

A user is in conformance with this standard if the primitive and simple objects appearing in this document are used exclusively and referenced. All compound and complex objects must be constructed out of the primitive and simple objects defined herein.

1.3 Fundamental Feature Terms and Definitions

For the purposes of this standard, the following terms have the following defined meanings:

Feature - a defined entity that can be represented by an object.

Entity - a real world phenomenon that is not subdivided into phenomena of the same kind.

Object - a digital representation of a feature.

The relationship between a feature, an entity, and an object is represented in Figure 1.

FEATURE
A defined entity that can
be represented by an object.

Entity	Object
A real world phenomenon that is not subdivided into phenomena of the same kind.	A digital representation of a feature.

Figure 1. Relationship Between Cartographic Feature, Entity, and Object

1.4 Definition of Cartographic Objects

The cartographic objects specified in the following sections represent the primitive and simple objects required for digital cartographic processing which can be used to construct higher level objects that represent a more complex realization of the real world. All objects in the following list are simple objects. The objects that cannot be subdivided are primitive objects. The following definitions have been specified such that they are valid in planar Euclidean geometry as well as simple curved surfaces such as the sphere or ellipsoid.

Compound and complex objects can be constructed from the primitive and simple objects. In general, when constructing such higher level objects, it is advisable to construct such objects out of those from a single class of use (e.g. geometry and topology). Mixing those from different use classes to construct higher level objects may produce complications and is therefore not advised.

1.4.1 Definition of 0-Dimensional Cartographic Objects

1.4.1.1 (G only) — point - A 0-dimensional object that specifies geometric location. A set of coordinates specifies the location.

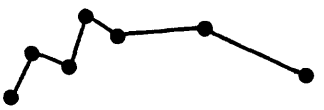
1.4.1.2 (GT/T) — node - A 0-dimensional object that is a topological junction or end point and that may specify geometric location. An optional set of coordinates specifies the location.

1.4.2 Definition of 1-Dimensional Cartographic Objects

1.4.2.0 (generic) — line - A 1-dimensional object.

1.4.2.1 (G only) — line segment - A 1-dimensional object that is a direct line between two points.

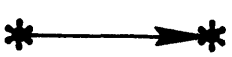
1.4.2.2 (G only) — string - A sequence of line segments.



1.4.2.3 (G only) — arc - A locus of points that forms a curve that is defined by a mathematical function.

1.4.2.4 (GT/T) link - A 1-dimensional object that is a connection between two nodes. Alias: edge.

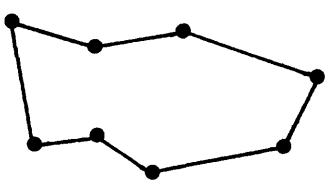
1.4.2.5 (GT/T) directed link - A link between two nodes with one direction specified.



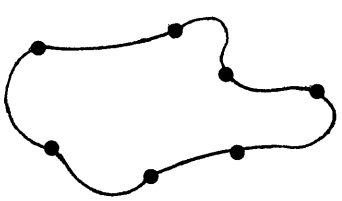
1.4.2.6 (GT/T) chain - A directed sequence of nonintersecting line segments and/or arcs with nodes at each end. References to left and right area identifiers are optional.

1.4.2.7 (generic) ring - A sequence of nonintersecting chains, strings, links, or arcs with closure. (It represents a closed boundary, but not the interior area inside the closed boundary).

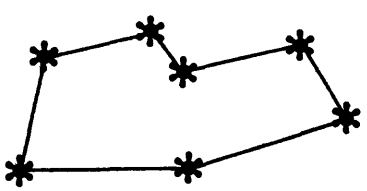
1.4.2.7.1 (G only) 1) ring created from string(s).



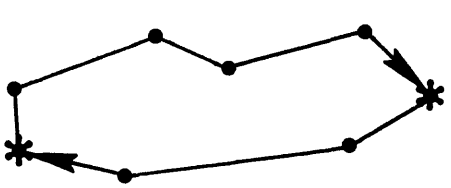
1.4.2.7.2 (G only) 2) ring created from arc(s).



1.4.2.7.3 (GT/T) 3) ring created from links.



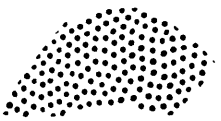
1.4.2.7.4 (GT/T) 4) ring created from chain(s).



1.4.3 Definition of 2-Dimensional Cartographic Objects

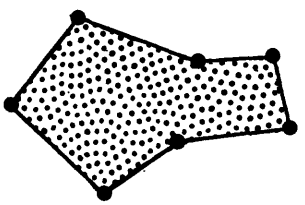
1.4.3.0 (generic) area - A bounded continuous two dimensional object which may or may not include its boundary.

1.4.3.1 (generic) interior area - An area not including its boundary.

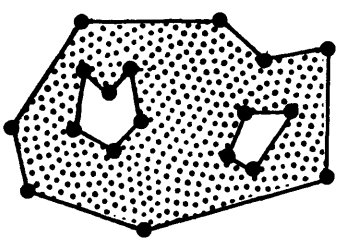


1.4.3.2 (generic) polygon - An area consisting of an interior area, one outer ring and zero or more nonintersecting, nonnested inner rings.

1.4.3.2.1 (generic) 1) simple polygon - A polygon without inner rings.

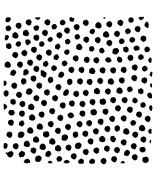


1.4.3.2.2 (generic) 2) complex polygon - A polygon with one or more inner rings.



1.4.3.3 (G only) pixel - A 2-dimensional picture element that is the smallest nondivisible element of an image.

1.4.3.4 (G only) grid cell - A 2-dimensional object that represents an element of a regular or nearly regular tessellation of a surface.



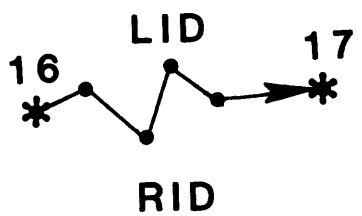
1.4.4 Special Implementation Objects

1.4.4.1 (special) — feature point - A point used principally for identifying the location of point features, such as towers, buoys, gauging stations, etc.

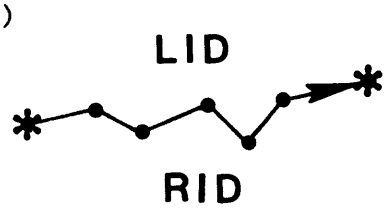
1.4.4.2 (special) — label point - A point used principally for displaying map and chart text (feature names) to assist in feature identification.

1.4.4.3 (special) — area point - A point within an area carrying attribute information about that area.

1.4.4.4 (GT/T) — complete chain - A chain that has node identifiers and left and right area identifiers.



1.4.4.5 (GT/T) — area chain - A chain with left and right area identifiers but without node identifiers.



1.4.4.6 (GT/T) — network chain - A chain that has node identifiers but without left and right area identifiers.

2 GENERAL TERMS AND DEFINITIONS

Accuracy - The closeness of results of observations, computations or estimates to the true values or the values accepted as being true.

Attribute - A defined characteristic of an entity (e.g. composition).

Attribute Class - A specified group of attributes (e.g. those describing measure, serviceability, structure, or composition).

Attribute Value - A specific quality or quantity assigned to an attribute (e.g. steel).

Check Plot - A graphic product produced from a digital system to verify the positional data by direct superimposition on the graphic original used to create the digital record. Typically the check plot is produced on stable base, transparent or translucent material. Procedures to register the check plots should be considered carefully.

Complex Object - An object constructed from a mix of different kinds of primitive and simple objects from the same class. (see Table 1 above.)

Compound Object - An object constructed from a set of the same kind of primitive or simple objects.

Control (mapping) - A system of points with established horizontal and vertical positions which are used as fixed references in positioning and relating map features.

Coordinates - Pairs of numbers expressing horizontal distances along orthogonal axes; alternatively, triplets of numbers measuring horizontal and vertical distances. Row and column numbers of pixels from raw imagery are not considered coordinates for the purposes of the quality standard.

Cycle - In the context of topological testing, a closed ring of adjacencies between graph duals (constructed according to Euler's Law).

Data Base - Related subject information stored as a volume set, volume, file set, or file.

Data Element - A logically primitive item of data.

Entity - A real world phenomenon that is not subdivided into phenomena of the same kind (e.g. a bridge).

Entity Class - A specified group of entities (e.g. land use, hydrographic, transportation).

Exchange Construct - A volume set, volume, file set, file, module, module record, module field, module subfield, field, subfield, record, or media record.

Exchange Form - A collection of related module specifications based on an underlying data model.

Feature - A defined entity that can be represented by an object.

Field - Consists of one or more related subfields. It may contain part or all of a module field. It does not contain parts of two or more module fields.

Field Group - A set of related module fields with special ordering and/or logical relationships between module fields in the group.

Field Name - A name associated with a field.

File - An identifiable collection of zero or more related records. It may contain part of, or all of one or many modules.

File Set - An identifiable collection of zero or more related files.

Foreign Identifier - A reference to a unique module record other than the record containing the foreign identifier; has the same domain and structure as the module record identifier to which it refers.

Geocodes - A system of abbreviation used to create an exhaustive list of a class of geographic features (usually applied to political units).

Implementation Method - A method of encoding data content and data structure to accomplish an interchange between dissimilar computer systems, without loss of content, meaning, or structure.

Included Term - Non-standard label of an entity or attribute that is cross-referenced to a standard term of an entity or attribute.

Media Record - An implementation-dependent, media-dependent construct containing part of or all of one or more module records. The fixed length records, variable length records and segmented records written in magnetic tape blocks or in diskette sectors are examples of media records as is a block or sector if no record structure is defined.

Misclassification Matrix - Results of an attribute accuracy test given in the form of a row by column (RxC) contingency table (crosstabulation) sometimes called a classification error matrix. Usually the rows represent the interpretation tested and the columns represent the verification assumed to be correct. The diagonal elements represent the correct classifications when the matrix is square and the rows and columns are strictly comparable. The remaining elements can be treated row-wise as errors of commission, and column-wise as errors of omission.

Module - A logical collection of module records.

Module Field - A collection of one or more module subfields and has an identifier specified by this standard. A Primary Module Field is the first field in a module record. A Secondary Module Field is any other field in a module record.

Module Record - A collection of one or more module fields. A Module Record contains a single instance of data conforming to a module specification.

Module Record Identifier - First three subfields of a primary module field of a module record containing a unique identification for that record in the volume set.

Module Specification - The meaning, identification, order requirements and data structure requirements for data belonging to the module.

Module Subfield - A single elementary data element having the identifier, data type, data domain, meaning and logical associations defined by the module specifications of this standard.

Object - A digital representation of a feature.

Quality - An essential or distinguishing characteristic necessary for cartographic data to be fit for use.

Quality Overlay - A collection of points, lines and areas organized to represent quality information for another set of map information. An overlay describing lineage can be termed a source data index; a positional accuracy overlay can be termed a reliability diagram; or a term describing the content.

Record - An implementation-dependent construct that consists of an identifiable collection of one or more related fields. It may contain part of, all of one, or many module records. It may be written as part of or all of one or more media records.

Scales Of Measurement - A system of classification of measurements depending on the mathematical operations permitted: the simplest scale is nominal scale which only permits a test of equivalence (same value), ordinal scale adds the property of order and the operations greater than and less than, interval scale defines addition and subtraction, and ratio scale subsumes the earlier ones with the inclusion of multiplication and division. Collectively, nominal and ordinal can be termed categorical, and interval and ratio can be termed continuous scale.

Spatial Data Exchange - A collection of related modules.

Standard Term - Primary label of an entity or attribute.

Subfield - A subdivision containing a single data element that corresponds to exactly one module subfield.

Subfield Name - A name associated with a subfield.

Transformation - A computational process of converting a position from one coordinate system to another.

Volume - A media-dependent construct consisting of an identifiable collection of part of or all of one or more files. A volume is a discrete interchange construct such as unit of dismountable media or a single online session.

Volume Set - A media-dependent construct consisting of an identifiable collection of one or more volumes containing a single file set.

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US National Ocean Service, 1985, Glossary on Mapping, Charting and Geodesy Terms, Draft Edition.

PART II

SPATIAL DATA EXCHANGE

January, 1987

National Committee for Digital Cartographic
Data Standards

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APPENDIX A ISO 8211 IMPLEMENTATION SPECIFICATIONS

APPENDIX B FICCDC IMPLEMENTATION SPECIFICATIONS

```
---------------------------------------------------------------
POLY  1600;&POLYGON&       (see 5.4.3)
[3]   MODNAME!OBJREP!OBJID&
      (2A,I);

{RNID,LNID|SADR}, ATTG

The Polygon-ring tree, when formed from the tags POLY and RNID;
or from POLY, RNID and LNID; or from POLY, RNID and SADR are not
recursive trees and can be formed in the normal ISO 8211 manner
(see ISO 8211 clauses 5.2.2 and 5.3.2).  It may be necessary to
retain the RNID tags to indicate the tree structure even if the
data
fields are null.
---------------------------------------------------------------
ARCS  1600;&ARC&  (see 5.4.4)
[4]   MODNAME!OBJREP!OBJID!DIRECTION&
      (2A,I,A);

ARAD  2600;&ARC ADDRESSES&
[3,n) START ADDRESS!END ADDRESS!CENTER ADDRESS
      *spatial address labels&
      (3(nZ));    Note: This field merges three module fields.

CNAR  1400;&CONIC ARC&
[6]   A!B!C!D!E!F&
      (6R);

CVPM  CURVEPARM&
[7]   DEGREE!PLANAR!CLOSURE!SPLINETYPE!PERIOD!NUMSEG!POINTS&
      (2I,3A,2I)

KTPR  2400;&KNOT SEQUENCE, WEIGHTS & PARAMETERS&
[n,3] *T!W|V& Note: This field merges three ordered module fields.
      (R)

CPTS  2400;&CURVE CONTROL POINTS&
[n,m] *CG!spatial address labels&  Note: This field combines the
      (I,nZ);                  Curvegen and Spatial Address fields.

NADR  1600;&NORMAL SPATIAL ADDRESS&
[n]   spatial address labels&
      (Z)

BKPT  1400;&BREAKPOINTS&
[n]   &
      (R)

COEF  1400;&COEFICIENT MATRIX&
[3;]  &     Note: Inline dimension and extent controls of the form;
      (R)         3&ICOEFF&JXYJ&KPOINTS&. See ISO 8211 6.2.4
```

```
DRIV  1400;&DERIVATIVE MATRIX&
[3;]  &     Note: Inline dimension and extent controls of the form;
      (R)         3&KDERIV&JXYZVAL&ISEGMEMTS&. See ISO 8211 6.2.4

ATTG
-----------------------------------------------------------------
COMP  1600;&COMPOSITE&    (see 5.4.5)
[3]   MODNAME!OBJREP!OBJID&
      (2A,I);

FRID, ATTG
-----------------------------------------------------------------
ATTD  1600;&ATTRIBUTE DESCRIPTION&  (see 5.4.6)
[3]   MODNAME!OBJREP!OBJID&
      (2A,I);

ATTG
-----------------------------------------------------------------
Relational   (see 5.5)
-----------------------------------------------------------------
SCMA  1000;&SCHEMA&    (see 5.5.2)
[7]   MODNAM!NAME!TYPE!OBJREP!SUBFIELD!FORMAT!UNIT&
      (7A);
-----------------------------------------------------------------
Generic specifications of Type1/Type2 fields  (see 5.5.2)

tagt  2600;&type1/type2&
[m,n] type1id!type2id&
      (2Z);

where "tagt", "type1/type2", "type1id" and "type2id" are selected
from the following table:

tagt  type1/type2        type1id   type2id
~~~~  ~~~~~~~~~~~        ~~~~~~~   ~~~~~~~
FTEL  FEATURE/ELEMENT    CMPID     ELMID
POLI  POLYGON/RING       POLID     RNGID
POCN  POLYGON/CHAIN      POLID     CHNID
POPT  POLYGON/POINT      POLID     PNTID
RNCH  RING/CHAIN         RNGID     CHNID
RNPT  RING/POINT         RNGID     PNTID
CNPT  CHAIN/POINT        CHNID     PNTID
NDCH  NODE/CHAIN         NODID     CHNID
NDPT  NODE/POINT         NODID     PNTID
-----------------------------------------------------------------
Generic specifications of Type/Address fields  (see 5.5.4)

tagt  2600;&type&
[m,n] typeid!address&
      (2Z);

where "tagt", "type" and "typeid" are selected
```

from the following table:

tagt	type	typeid
POAD	POLYGON/ADDRESS	POLID
RNAD	RING/ADDRESS	RNGID
CNAD	CHAIN/ADDRESS	CHNID
NDAD	NODE/ADDRESS	NODID
PTAD	POINT/ADDRESS	PNTDD

and "address" is the labelling of the SADR field for the module.

```
CHTO   2600;&CHAIN-TOPOLOGY&    (see 5.5.5)
[m,5]  *CHNID!STRNONE!ENDNODE!!LFTPOL!RGTPOL&
       (5Z)
-----------------------------------------------------------------
ATPR   2600;&ATTRIBUTE-PRIMARY&    (see 5.5.6)
[m,n]  *ELMID!attprim&
       (2Z);
-----------------------------------------------------------------
ATSC   2600;&ATTRIBUTE-SECONDARY&    (see 5.5.7)
[m,n]  *ELMID!attsec&
       (2Z);
-----------------------------------------------------------------
Grid-Raster Forms    (see 5.6)
-----------------------------------------------------------------
GRID   1600;&GRID DEFINITION&      (see 6.6.1)
[15]   MODNAME!OBJREP!OBJID!NUMROW!NUMCOL!ROWDIR!COLDIR!ORANGLE!
       NUMLAYERS!XRES!YRES!ORIGINX!ORIGINY!CELLLX!CELLLY&
       (2A,3I,2A,R,I,6R);

CLAY   2600;&CELL LAYER DESCRIPTION&
[m,7]  *NAME!CELLCODE!FORMAT!MINVAL!MAXVAL!ZRES!NUMBITS&
       (3A,3Z,I);

ATTG
-----------------------------------------------------------------
CELL   1600;&GRID CELL&   (see 5.6.2)
[6]    MODNAME!OBJREP!OBJID!NUMCELL!ROW!COLUMN&
       (2A,4I);

CVAL   2600;&CELL VALUE&
[m,n]  *layeri!layer2!...!layeri!...layern&
       (Z);

SADR, ATTG
-----------------------------------------------------------------
RDEF   1600;&RASTER DEFINITION&   (see 5.6.3)
[22]   MODNAME!OBJREP!OBJID!NUMROW!NUMCOL!ROWDIR!COLDIR!
       ASPRATIO!PIXCS!SCANPAT!NUMLAYER!PATOLAY!ORANGLE!SUNAZ!
       SUNEL!CENTAZ!CENTEL!XFOV!YFOV!XRES!YRES!COMMENT&
       (3A,2I,2A,R,A,2I,A,9R,A);
```

```
RLAY  2600;&RASTER LAYER DESCRIPTION&
[n,6] *LNAME!CELLCODE!FORMAT!BITMASK!MINVAL!MAXVAL&
      (2A,2Z,A,C,2Z);

COMM, ATTG
```

In order to reduce complexity, the Layout subfields which do not repeat have been merged into RDEF; and the Lname subfield (which is redundant) has been dropped.

```
-----------------------------------------------------------------
RCEL  0000;&RASTER CELL MODULE&   (see 5.6.5)
[3]   MODNAME!OBJREP!OBJID&
      (3A);

RDAT  1600;&RASTER DATA&
[]    &
      (Z);
-----------------------------------------------------------------
```

A.5.1 Conformance To ISO 8211

All files, records, controls, tags, data descriptive fields, and data fields shall conform to ISO 8211.

A.5.1.1 Tags, Names, And Labels

The tags, names, and labels shall conform to the meanings specified in Section 5 and to Table A1. The spelling of tags, names, and labels shall conform to the spellings of Table A1. Labels shall occur in the order specified in Table A1 (see A5.2 for missing data specifications). Where there is a requirement in Section 5 for the preservation of the order of module fields and/or subfields or for the associations between module fields or subfields, this ordering shall be preserved by the order of the ISO 8211 records, fields, and subfields.

Data descriptive fields which have no specified labels may be augmented by user-supplied labels for the identification of subfield data. An import system is not required to recognize user-supplied labels.

A.5.1.2 Permitted Variations In Field Controls And Formats

Field controls and formats shall conform to Table A1 in the following manner:

a) Data Structure (byte 1) - No variance.

b) Data Type (byte 2) - This control shall agree with the data type of the corresponding user data.

c) Reserved bytes (bytes 3 - 4) - No variation.

d) Printable Delimiters (bytes 5-6) - The printable graphics to be substituted on display for the field terminator and the unit terminator may be selected by the user to prevent conflict with the data.

   Note - The printable graphics, ";" and "" at other locations in Table A1 represent FT(1/14) and UT(1/15).

e) Format - The format shall agree with the user data in data type and field width or delimiter. The formats shown are typical.

A.5.1.3 Recursive Trees Or Subtrees

Note: ISO 8211 cannot distinguish between trees which have identical tag pair lists and preorder traversal sequences. This arises only when a tree has a tag as its own progeny and other tags can be attached to these nodes in an ambigious manner. Such a tree can be fully recursive. This occurs only for some instances of the Attribute field. If the required DDR tag redundancy is not prohibitive, this problem can be met by supplying a series of Attribute tags with the same data description. Otherwise, it is necessary to supply the right and left link information of the corresponding binary tree as described below (Knuth, 1973).

Recursive trees or subtrees shall be imbedded in an ISO 8211 tree. The root node of each imbedded subtree shall be a field named, LINKS, with the associated tag, TREE and all nodes of the subtree shall have the root node of the subtree as their parent node. The record identifier field shall be the parent node of the field, LINKS. In the absence of any other field structure, the record identifier field shall be the parent node for any field not participating in the subfield structures. The tags shall be in the preorder traversal sequence of the tree and subtrees.

The data description of the LINKS field shall be:

```
TREE    2100;&LINKS&*RIGHT LINK!LEFT LINK&(I);
```

The data subfields of LINKS shall contain the right-hand and left-hand links of each node of the binary tree corresponding to the ordered, rooted tree of the data. The links shall be expressed as the incremental indices of the subtree tags in the preorder traversal sequence and shall be relative to the tag, TREE, of the subtree root node. The nonexistence of a link shall be represented by zero value (see ISO 8211 Annex C.).

A.5.2 Missing Data

This section specifies the methods by which the implementation permits the representation of missing data.

A.5.2.1 Fields Missing From Entire Files

When a data field is missing from all the data records of a file, the corresponding tag and data descriptive field may be ommitted from the DDR of the file.

A.5.2.2 Fields Missing From Specific Data Records

Missing fields may be indicated by omitting the tag from the data record directory and the field from user data area of the data record.

A.5.2.3 Consistently Missing Data Subfields

When a labelled data subfield is consistently missing throughout a file in one of the tagged fields specified in Table A1, then the subfield label corresponding to that data subfield may be omitted from the list of labels. The remaining labels shall occur in the order specified in Table A1.

A.5.2.4 Intermittently Missing Data Subfields

When a data subfield is intermittently missing, a delimited data format shall be specified and a null data value comprising zero bytes shall be placed in the user data field followed by the appropriate delimiter.

A.5.3 Files Containing A Single Modnam Value Within The Same Tag.

When a file set comprises data with a single data value in the modnam subfield in a field associated with a tag which is unique throughout the file set, the user may opt to eliminate the module name subfield and place the value of this field in the DDR as the name of the field.

On import, the DDR name of a tag shall be substituted for a missing modnam subfield.

FOOTNOTE - The intent of this specification is to reduce overhead due to unnecessary redundancy. It is not applicable to fields which have multiple values in the modnam subfield. In these cases, the user is advised to use a set of brief numeric module names.

A.5.4 Foreign Identifiers

Foreign identifiers shall agree in data structure, data type and format with the fields containing the data describing the spatial objects which the foreign identifiers designate. The unique description of foreign identifiers shall prevail across the interchange file set.

The designated spatial element of each foreign identifier shall exist in the interchange file set.

The neighborhoods field shall conform to the specifications of a foreign identifier.

A.5.5 Repeating Fields

Where Section 5 permits or requires repeated fields containing n-tuples, this section provides an array structure allowing the repetition of the data in the same field. This allows the user to reduce overhead and keep similiar data in close proximity. The user also has the option to use additional fields and to place the data in a separate record.

A.6 RECORD STRUCTURE

A record may contain fields from more than one module. This section provides specifications for resolving and preventing conflicting associations of primary and secondary fields.

A.6.1 Level 3 Files

The records having two or more primary fields containing instances of a common associated secondary field shall be interchanged as a level 3 file. The DDF RECORD IDENTIFIER tag shall be designated as the parent of all other tags and the preorder traversal sequence of the DR shall define the proper association of primary and secondary tags. Each secondary tag shall be associated with the immediately preceding primary tag.

A.6.2 Level 2 Files

A record in a level 2 file shall not contain two or more primary fields having, in that record, a common secondary field or fields.

A.7 FILE SET STRUCTURE

Subject to the constraints of Section A.6.2, a file set may consist of one or more files.

A.8 DATA REPRESENTATION

The character set used to represent non-bit field data shall be the graphic character set enumerated in Part I, Section 4.2.1 of this standard encoded as specified in ANSI X3.4 extended to an 8-bit environment if required.

A.8.1 Numeric Data

Character representation of numeric data shall conform to ISO 6093 with the provision that "COMMA" shall not be used for the decimal mark. Numeric fields shall be right adjusted.

A.8.2 Dates

A date in a numeric field shall be entered in the format YYYYMMDD.

A.9 MEDIA REQUIREMENTS

The variable length records of ISO 8211 may be written on several media. This section specifies requirements for several standardized media.

A.9.1 Magnetic Tapes

The ISO 8211 records shall be blocked and spanned into fixed length records of 2048 bytes in a blocksize of 2048 bytes conforming to level 2 of ANSI X3.27 and other applicable standards.

Footnote: Unfortunately one large vendor does not support the level 4 ANSI X3.27 record structure needed for variable length records and level 2 is the highest common denominator. Further, this blocksize, set by X3.27, is wasteful of high density tapes and implementors should anticipate receiving blocksizes of at least 32,767 bytes.

A.9.2 Flexible Diskettes

The diskettes shall be written in conformance to ISO/DIS 9293. The ISO 8211 records shall be blocked and spanned into sectors without record delimiters or control fields other than the record length provided in ISO 8211.

Footnote: This widely used format is being standardized and quite probably will receive wide support whereas ISO 7665 will not.

A.9.3 Magnetic Tape Cartridges And Cassettes

The ISO 8211 records shall be blocked and spanned into fixed length records of 2048 bytes in a blocksize of 2048 bytes conforming to level 2 of ANSI/ISO 4341-1978 and other applicable standards.

A.10 PRIVATE AGREEMENTS

Private agreements limit the scope of interchange and are discouraged. Recurring needs for similar private agreements with a significant number of users should be referred to the maintenance organization of the standard.

The inclusion of ancillary data should be accomplished within the framework of ISO 8211 by defining private tags, names, and labels. Inasmuch as ISO 8211 permits the association of tags within records, there is no need to compromise the tags and labels of this standard and conforming software. The following guidelines insure that no compromise will exist:

a) Do not use the tags, names, and labels of this standard with any other meaning or with controls not specified for use with them.

b) Define private agreement tags, names, and labels as a completely separate set using lower case characters and in full compliance with ISO 8211.

c) Users anticipating the participation in private agreements should design software processing tags and fields within the context of ISO 8211 and subfields within the context of this standard.

APPENDIX B

FICCDC IMPLEMENTATION SPECIFICATIONS

B.1 OBJECTIVE AND SCOPE

The objective of this appendix is to specify a method for the exchange between non-communicating parties of the modules specified in Section 5.

The scope is limited to the use of printable ASCII characters as specified in ANSI X3.4 and the transfer of numeric forms as defined in ISO 6093 with transitions between exchange units specified by user defined delimiter characters, and the meaning of exchange constructs preserved through the use of collector symbols. This approach is based on the FICCDC delimiting method specified for the Federal Geographic Exchange Format, but has been modified to eliminate certain characteristics which would have been less than optimal for this standard.

B.2 CONFORMANCE

A spatial data exchange file set is in conformance with this appendix of the standard when all files, records and fields, are in conformance with the applicable media standards, ANSI X3.4, ISO 6093 and the specifications of Part II, sections 4 and 5 of the standard, the required specifications of Parts I, III and IV of this standard, and the specifications of sections B5-B11 of this appendix.

B.3 REFERENCES FOR THIS APPENDIX

American National Standard Code for Information Interchange, ANSI X3.4-1977

ISO 6093 Information Processing - Specification for Representation for Numeric Values in Character Strings for Information Interchange.

FIPSPUB79 Magnetic Tape Labels and File Structure for Information Interchange, 1980 October 17.

ISO Information Processing - Volume and File Structure of Flexible Disk Cartridges for Information Interchange, ISO/DIS 9293

ANSI/ISO 4341-1978 Magnetic Tape Cassette and Cartridge Labelling and File Structure for Information Interchange.

Federal Geographic Exchange Format, A Uniform Format for the Exchange of Spatial Data Among Federal Agencies, Prepared by the Standards Working Group, Federal Interagency Coordinating Committee on Digital Cartography, August 21, 1985.

B.4 DEFINITIONS FOR THIS APPENDIX

The following definitions are limited to those terms not found in Part I of this standard and are not in common usage, and are not found in the reference standards.

(a) delimiter symbol - unique one-character symbol separating exchange constructs.

(b) collector symbol - unique one character symbol that designates the opening or closing of a collection of exchange constructs with a special meaning, such as a number of repeated fields or subfields, or a leaf in a tree that constitutes a field group, or a string of characters with special status.

B.5 SPECIFICATIONS

The delimiter/collector implementation method has the following characteristics:

1. There is no data descriptive portion in the data exchange; fields and subfields must be identified through the order in which they are encoded. This is the main difference between the method of this appendix and the methods of appendices A and C. It constitutes a significant simplification in the effort to implement this implementation of the standard, but one must also beware of its disadvantages.

2. Exchange units are separated with one-character, user-defined delimiter symbols.

3. The meaning of higher level organizations of fields and subfields into repeating groups and levels of field groups is expressed through collector symbols that are matched begin and end symbols (in the FICCDC FGEF, counts are used for repeating groups. But this feature was judged undesirable for this implementation).

B.5.1 Delimiter/Collector Symbols

The following table lists the delimiter symbol designations as well as a set of example delimiters that will be used for examples in this Appendix:

Designation	Example
subfield delimiter	,
field delimiter	;
module record delimiter	!
module delimiter	/
begin set	{
end set	}
begin subtree	[
end subtree	]
include symbol	"

B.5.2 Rules For Use Of Delimiter Symbols

The following rules shall govern the use of the delimiting symbols associated with the exchange units of this standard:

(a) Each symbol shall terminate a unit with which it is associated (a subfield delimiter terminates a subfield, a field delimiter terminates a field, etc.).

(b) A module delimiter shall have precedence over a module record delimiter, which shall have precedence over a field delimiter, which shall have precedence over a subfield delimiter.

(c) Whenever the end of one type of unit also implies the end of one or more units with a higher precedence delimiter (for instance, when the termination of a subfield is also the termination of a field and a module record), the higher precedence delimiter shall be used (telescoping of delimiters).

(d) Whenever two delimiters are adjacent to each other, the presence of a null (empty) unit of a type indicated by the delimiter with the lower precedence shall be implied.

Using the example delimiting symbols, examples of delimiter usage and meaning are the following:

Usage	Meaning
GCTP,	end of sub-field containing "GCTP"
70526;	end of field
BAD DATA!	end of subfield, field and record, subfield containing the comment "BAD DATA"
40967/	end of field, record and module with field containing "40967"
,,	null subfield
;,	null subfield
,!	null subfield
!;	null field
!!	null record
!/	null record

Note that the type of non-null units to the left of the delimiter cannot strictly be determined from the delimiting symbol being encountered, but that the delimiter must be interpreted in the context of the data being read. For instance, "70526;" from the above table could also mean end of field and subfield, because a delimiter sequence of ",;" would be replaced by ";" under the delimiter telescoping rule.

B.5.3 Rules For The Use Of Collector Symbols

There are three types of collector symbols: (1) set symbols, (2) subtree symbols, and (3) the include symbol. The use of each type is explained in turn in the following three sections.

B.5.3.1 Set Symbols

For the spatial object exchange form instances of fields may each be repeated an indefinite number of times (see Section 4.1.3.2.3 of this standard). Also certain instances of subfields may be repeated a variable number of times (subfields marked with a "#" in the module composition table, see Section 4.2.3.6 of this standard). To detect the next type of field in these cases, the mere use of the delimiters of the previous section of this appendix will not suffice. In the FICCDC FGEF, field counts are employed. But for this implementation, set symbols are used.

A begin set symbol signals the beginning of a set of instances of fields or subfields of the same type, hereafter referred to as a set. The end set symbol signals the end of the set.

The following rules govern the use of the set symbols:

(a) Set symbols shall enclose the first, second, and additional instances of a repeated field or subfield.

(b) The begin set symbol shall occur immediately before the first item in the set.

(c) End set symbols shall immediately follow the last item in the set, and, hence, occur before any delimiters.

(d) Set symbols shall always occur in pairs.

(e) Delimiters shall not replace or preempt set symbols.

(f) A begin set symbol may be preceded by a field width expressed in terms of the number of bytes occupied by the field, in which case the delimiters in the field group may be omitted after the first field or subfield delimiter has occurred in the set.

For example, assuming the following fields A,B, and C, where B can be repeated a variable number of times, a sample of instances may be encoded as follows (instances appear in lower case):

```
a;{b1;b2;b3};c/
```

Or assume fields A, B, and C where both B and C may have repetitions:

```
a;{b1;b2;b3};{c1;c2;c3}/
```

Or assume fields A, B, and C where A has two subfields P and Q, of which P can variably repeat:

```
{p1,p2,p3,p4},q;b;c/
```

Or assume that Q repeats, and B has two subfield S and T of which S repeats:

```
p,{q1,q2,q3};{s1,s2,s3,s4},t/
```

To demonstrate nested subfields within nested fields, assume three fields A, B and C, where C repeats, and has two repeating subfields v and w:

```
a;{{v1,v2,v3},{w1,w2};{v1,v2,v3,v4},{w1,w2,w3}};
```

The last rule, stating that a field width may precede the opening symbol of a set, permits for the encoding of fixed length binary data, and can otherwise be used to save space for repetitive data of fixed length.

For example, assume fields A, B, and C, of which B repeats with fixed length. This case may then be encoded as:

```
a;2{b1;b2b3b4b5b6b7b8};c/
```

where the 2 preceding the left bracket indicates the field length in bytes of the field instances in the repeat group.

B.5.3.2 Subtree Symbols

The begin subtree and end subtree symbols are used for the encoding of hierarchical attribute structures (see Section 4.1.3.3.6 of the standard) and for conveying the structure of the polygon-ring field group (see Section 5.4.3 of the standard).

For hierarchical attribute data, subtrees of the attribute tree that constitutes the attribute field group must be marked by special symbols. The BNF found in Section 4.1.3.3.5 of the standard expresses the organization of the attribute field group. The symbolic brackets <[> and <]> in this organization enclosing <subtree> are the equivalent of the open end close subtree collector symbols and can be replaced by user selected symbols. Similarly, the <[> and <]> brackets in the BNF for the polygon-ring field group of Section 5.4.3 can be replaced by user selected open and close subtree collector symbols.

The following rules govern the use of the subtree symbols:

(a) The begin subtree symbol shall occur immediately before the first item in the subtree.

(b) End subtree symbols shall immediately follow the last item in the repeat group, and, hence, come before any delimiters.

(c) Subtree symbols shall always occur in pairs.

(d) Delimiters shall not replace or preempt subtree symbols.

The following is an encoding illustration in which the attribute tree of Section 4.1.3.3.6 has been encoded using the example delimiter/collector symbols:

```
a1,fa1,ua1;va1;
a2,fa2,ua2;va2;
   [b1,fb1,ub1;vb1;
   b2,fb2,ub2;vb2;
      [d1,fd1,ud1,vd1]];
a3,fa3,ua3;va3;
a4,fa4,ua4;va4;
a5,fa5,ua5;{va51,va52,va53};
   [c1,fc1,uc1;vc1;
   c2,fc2,uc2;vc2;
      [e1,fe1,ue1;ve1;
      e2,fe2,ue2;ve2];
   c3,fc3,ue3;{ve31,ve32,ve33}];
a6,fa6,ua6;va6/
```

B.5.3.3 Include Symbol

The function of the include symbol is to include delimiter and special symbols when used for other purposes. When an include symbol is encountered special symbols and delimiters are not to be intercepted. This status shall be reversed when the next include symbol is encountered. To include the include symbol one shall use two adjacent include symbols.

For example, when a double quote (") is used for the include symbol the string "AU SOLD @ $0.40/TON" requires the include symbols to prevent the slash (/) from being intercepted as a module delimiter.

B.5.4 Bootstrap Module

Delimiter symbols shall be specified by the encoder of the data in this standard. Before decoding can commence, the delimiting symbols must be known.

Therefore, the first module in the exchange shall be an implementation specific bootstrap module, that shall occur as the first media record in the exchange, or else shall be stored as the first media record in a file with the character string BOOTSTRAP included in the file name. The Bootstrap module is composed as follows:

FIELD NAME	SUBFIELD NAME	FIELD/SUBFIELD DESCRIPTION
Bootstrap		Indentifies record as bootstrap record
Delimiter/Collector		Symbols Contains the delimiter collector symbols

SUBFIELD NAME	SUBFIELD TYPE	DOMAIN	DOMAIN DESCRIPTION
Bootstrap	A	BOOTSTRAP	
Delimiter/collector		Symbols pqrstuvwx where the characters have the following meaning p subfield delimiter q field delimiter r module record delimiter s module delimiter t begin subtree u end subtree v begin set w end set x include symbol and the user can replace any character in the string pqrstuvwx with a unique graphics character to be used for no other purpose than a delimiter/collector collector symbol.	

The record of the bootstrap module encoded in the implementation method of this appendix, for the example symbol set, is as follows:

```
BOOTSTRAP;",;!/{}[]"""/
```

Note that sequence of three double quotes is necessary because the double quote is included as part of the field and must therefore be preceded by another double quote; the sequence is also needed to resume the special symbol scan suspended by the double quote before the comma.

The objective of the above arrangement is that the bootstrap module can be processed as any other module, given that the special symbols are known. If they are unknown however, they may be read because they occur in fixed locations in the first physical data record of the exchange or of the Bootstrap file as follows:

Designation	Character Position
subfield delimiter	12
field delimiter	13
module record delimiter	14
module delimiter	15
begin set	16
end set	17
begin subtree	18
end subtree	19
include symbol	20

B.6 MISSING DATA FIELDS

Missing data fields that can be clearly omitted in light of an object representation code may be entirely omitted, otherwise null fields shall be used.

B.7 RECORD STRUCTURE

There are no restrictions on the relations between media records and module records indicated in Table 4.1.3.2 of this standard.

B.8 FILE SET STRUCTURE

There are no restrictions on the relations between media and implementation constructs as indicated in Table 4.1.3.2 of this standard.

B.9 DATA REPRESENTATION

The character set used to represent non-bit field data shall be the graphic character set enumerated in Part I, Section 4.2.1 of this standard encoded as specified in ANSI X3.4 extended to an 8-bit environment if required.

B.9.1 Numeric Data

Character representation of numeric data shall conform to ISO 6093 with the provision that "COMMA" shall not be used for the decimal mark.

B.9.2 Dates

A date in a numeric field shall be entered in the format YYYYMMDD.

B.10 MEDIA REQUIREMENTS

The variable length records of this implementation may be written on several media. This section specifies requirements for several standardized media.

B.10.1 Magnetic Tapes

The records shall be blocked and spanned into fixed length records of 2048 bytes in a blocksize of 2048 bytes conforming to level 2 of FIPSPUB79 and other applicable standards.

B.10.2 Flexible Diskettes

The diskettes shall be written in conformance to ISO/DIS 9293. The ISO 8211 records shall be blocked and spanned into sectors without record delimiters or control fields other than the ones specified for this implementation

B.10.3 Magnetic Tape Cartridges And Cassettes

The ISO 8211 records shall be blocked and spanned into fixed length records of 2048 bytes in a blocksize of 2048 bytes conforming to level 2 of ANSI/ISO 4341-1978 and other applicable standards.

B.11 PRIVATE AGREEMENTS

Private agreements limit the scope of interchange and are discouraged. Recurring needs for similar private agreements with a significant number of users should be referred to the maintenance organization of the standard.

PART III

DIGITAL CARTOGRAPHIC DATA QUALITY

January 1987

National Committee for Digital Cartographic Data Standards

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1 SCOPE, PURPOSE AND APPLICATION

The purpose of the quality report is to provide detailed information for a user to evaluate the fitness for a particular use. This style of standard can be characterized as "truth in labelling", rather than fixing arbitrary numerical thresholds of quality. To implement the standard, a producer is urged to include the most rigorous and quantitative information available on the components of data quality described below.

2 MAINTENANCE

The quality standard refers to a number of other standards maintained by related professional bodies in the surveying and mapping disciplines. This standard should be considered to reference the currently accepted version of these standards, as revised and promulgated by their maintenance bodies.

3 CONFORMANCE

Digital cartographic data shall include a quality report. This standard describes the five sections required in the quality report: lineage, positional accuracy, attribute accuracy, logical consistency and completeness. Where the spatial variation in quality is known, a quality report must record that variation.

This standard also specifies a standard for coordinates. Conformance to the quality report standard is separable from the coordinate standard.

3.1 Form of a Quality Report

The quality report can be issued as a paper document or encoded on computer-compatible media in the form prescribed by Part II of this Standard. Since the quality report will function in the assessment of fitness for use, it shall be obtainable separately from the actual data. The digital data transmission may contain the quality report, in whole or in part, but, as a minimum, it must contain a reference to the quality report and how to obtain it.

3.2 Testing

In Sections 5.2, 5.3 and 5.4 below, there are options described for different categories of testing. Informed assessment of fitness for use is best served by the most rigorous types of tests.

3.3 Quality Overlays

For those components of quality displaying spatial variation, a quality overlay system may be used. The producer of the quality report may choose to produce a comprehensive quality overlay

describing all components of quality, or various components may be portrayed on separate overlays. When the quality report is issued on paper, the quality overlays appear as diagrams with text labels or thematic map depictions. In digital form, the overlays are encoded using the standards of Part II of this Standard.

4 COORDINATE STANDARD

All coordinates used for the transfer of digital cartographic data must have a known (and expressed) relationship to latitude and longitude. This standard is implemented by the use of currently recognized standard reference ellipsoids (for horizontal measurements) and standard geoids (for vertical measurements). These standards are set by the Federal Geodetic Coordinating Committee (1985).

5 SPECIFICATIONS FOR QUALITY REPORT

A quality report consists of five sections covering lineage, positional accuracy, attribute accuracy, logical consistency and completeness. Each section of the report will contain reference to temporal information and currency.

5.1 Lineage

The lineage section of a quality report shall include a description of the source material from which the data were derived, and the methods of derivation, including all transformations involved in producing the final digital files. The description shall include the dates of the source material and the dates of ancillary information used for update. The date assigned to a source shall reflect the date that the information corresponds to the ground, however, if this date is not known, then a date of publication can be used, if declared as such.

Any data base created by merging information obtained from distinct sources must be described at sufficient detail to identify the actual source for each element in the file. In these cases, either a lineage code on each element or a quality overlay (source data index, etc.) will be required.

The lineage section shall also include reference to the specific control information used. Control from the National Geodetic Reference System shall be identified according to identifiers in that system, while other points used for control shall be described with sufficient detail to allow recovery.

The lineage section shall describe the mathematical transformations of coordinates used in each step from the source material to the final product. The locations of any registration points for coordinate transformations shall be given. The methods used to make coordinate transformations must

be documented. To fulfill this standard, it is acceptable to make reference to separate documentation for the coordinate transformation algorithm used, but the specific parameters applied must be described for the particular case. Documentation of a transformation algorithm must include the nature of computational steps taken to avoid loss of digits through roundoff and must include a set of sample computations including numerical values of coefficients to confirm equivalence of transformations. The documentation of a transformation algorithm must be available on request by a user obtaining digital data even if that user is not licensed to use the particular software.

5.2 Positional Accuracy

The quality report section on positional accuracy must report the degree of compliance to the coordinate standard in Section 4. The relationship of the coordinates to latitude and longitude must be expressed in terms of reference ellipsoids, geoids, and other established standards. The dates of the geodetic standards and of the datum used must be referenced. Quality of control surveys must be reported using the procedures established in the geodetic standard. If a separate control survey has been used, it must be described in the standard form, even if results fall below the recognized classification thresholds.

Descriptions of positional accuracy must consider the quality of the final product after all transformations. The information on transformations forms a part of the lineage section of the quality report.

The report of any test of positional accuracy shall include the date of the test. Variations in positional accuracy shall be reported either as additional attributes of each feature, or through a quality overlay (reliability diagram).

Measures of positional accuracy can be obtained by one of the following optional methods:

5.2.1 Deductive Estimate

Any deductive statement based on knowledge of errors in each production step must include reference to complete calibration tests and must also describe assumptions concerning error propagation. Results from deductive estimates must be distinguished from results of other tests.

5.2.2 Internal Evidence

FGCC procedures will be used for tests based on repeated measurement and redundancy such as closure of traverse or residuals from an adjustment.

5.2.3 Comparison to Source

When using graphic inspection of results ("check plots") the geometric tolerances applied must be reported, and the method of registration must also be described. Use of check plots shall be included in the lineage section.

5.2.4 Independent Source of Higher Accuracy

The preferred test for positional accuracy is a comparison to an independent source of higher accuracy. The test must be conducted using the rules prescribed in the proposed Accuracy Specifications for Large-Scale Line Maps and later versions (American Society for Photogrammetry and Remote Sensing, 1986). When the dates of testing and source material differ, the report shall describe the procedures used to ensure that the results relate to positional error, not to temporal effects. The numerical results in ground units, as well as the number and location of the test points must be reported. A statement of compliance to a particular threshold is not adequate in itself. This test may only be applicable to well-defined points.

5.3 Attribute Accuracy

Accuracy assessment for measures on a continuous scale shall be performed using procedures similar to those used for positional accuracy (providing a numerical estimate of expected discrepencies).

The report of a test of attribute accuracy shall include the date of the test and the dates of the materials used. In the case of different dates, the report shall describe the rates of change in the phenomena classified. Spatial variations in attribute accuracy may be reported in a quality overlay.

Accuracy tests for categorical attributes can be performed by one of the following methods. All methods shall make reference to map scale in interpreting classifications.

5.3.1 Deductive Estimate

Any estimate, even a guess based on experience, is permitted. The basis for the deduction must be explained. Statements such as "good" or "poor" should be explained in as quantitative a manner as possible.

5.3.2 Tests Based on Independent Samples

A misclassification matrix must be reported as counts of sample units crosstabulated by the categories of the sample and of the tested material. The sampling procedure and the location of sample units must be described.

5.3.3 Tests Based on Polygon Overlay

A misclassification matrix must be reported as areas. The relationship between the two maps must be explained; as far as possible, the two sources should be independent and one should have higher accuracy.

5.4 Logical Consistency

A report on logical consistency shall describe the fidelity of relationships encoded in the data structure of the digital cartographic data. The report shall detail the tests performed and the results of the tests.

5.4.1 Tests of Valid Values

Tests for permissible values can be applied to any data structure. Such a test can detect gross blunders, but it does not ensure all aspects of logical consistency.

5.4.2 General Tests for Graphic Data

A data base containing cartographic lines can be subjected to the following general questions:

Do lines intersect only where intended?
Are any lines entered twice?
Are all areas completely described?
Are there any overshoots or undershoots?
Are any polygons too small, or any lines too close?

Different tests can be applied to address these questions, but the quality report shall contain a description of the tests applied or a reference to documentation of the software used. The report shall state whether all inconsistencies were corrected or it shall detail the remaining errors by case.

5.4.3 Specific Topological Tests

For exhaustive areal coverage data transmitted as chains, or derived from chains, it is permissible to report logical consistency as "Topologically Clean", under the condition that an automated procedure has verified the following conditions:

a. All chains intersect at nodes.
   (use of exact case or tolerance must be reported)
b. Cycles of chains and nodes are consistent around polygons.
   Or alternatively, cycles of chains and polygons
   are consistent around nodes.
c. Inner rings embed consistently in enclosing polygon.

Considering the definition of polygon adopted in Part I, conditions b and c require unique polygon identifiers. The quality report must identify the software (name and version) used to verify these conditions.

5.4.4 Date of test

The report must include the date on which the tests were applied. When corrections and modifications occur after the test for logical consistency, the quality report should indicate how the new information is checked for logical consistency.

5.5 Completeness

The quality report must include information about selection criteria, definitions used and other relevant mapping rules. For example, geometric thresholds such as minimum area or minimum width must be reported.

In encoding cartographic features, standard geocodes (such as the feature codes described in Part IV or in the FIPS codes for states, counties, municipalities and places) shall be employed as far as possible. Deviations from standard definitions and interpretations must be described.

The report on completeness shall describe the relationship between the objects represented and the abstract universe of all such objects. In particular, the report shall describe the exhaustiveness of a set of features. Exhaustiveness concerns spatial and taxonomic (attribute) properties, both of which can be tested. A test for spatial completeness can be obtained from topological tests for logical consistency described in Section 5.4.3. Tests for taxonomic completeness operate by comparison of a master list of geocodes to the codes actually appearing in the file. The procedures used for testing, and the results, shall be described in the quality report.

APPENDIX C

GDIL IMPLEMENTATION SPECIFICATION

C.1 OBJECTIVE AND SCOPE

The objective of this section is to enable the interchange of the data representing the cartographic objects specified in Part II between dissimilar computers with a minimum of manual intervention using the General Data Interchange Language (GDIL) being developed by NASA. This language is being developed as a generic capability to allow transfer of discipline-dependent data in a discipline-independent and media-independent manner.

The essence of the data transfer requirement is that the machine-readable logical description of each data field must be available to the recipient. This may be accomplished, in descreasing order of desirability, by including this description with the data, by including references to machine-readable descriptions, or by including references to paper documentation.

GDIL was developed as a media-independent, content-independent tool for the interchange of information between dissimilar computer systems. It is NOT a tool for the internal processing of information. It permits the sender to describe the interchanged information and to send this description as an integral part of the interchange file. It permits the description of both character and bitfield information in fixed- or variable-width (delimited) fields or subfields. It further permits the identification of fields and subfields by arbitrarily long names and labels which serve to give meaning to the data. In addition, it provides for the definition and labeling of complex structures and commutated data.

Although it does not inherently provide for application-oriented processing algorithms, it does permit them to be concisely indicated or described in accompanying text fields. The syntactic rules permit access to the data at any hierarchical level and at the same time to the associated description.

Being media independent, GDIL relies on a medium or communication standard to enable the physical interchange. Being content-independent, GDIL relies on applications protocols to specify how the data is to be used and what it means. This results in some data types (e.g., logical and complex) being expressed as more primitive forms.

C.2 CONFORMANCE

A spatial data interchange file set is in conformance with this section of the standard when all files, records, and fields are in conformance with the specifications of Part II of this standard and with the specifications of the GDIL.

C.3 REFERENCES FOR THIS APPENDIX

The General Data Interchange Language, JPL Document No. D-3606, Jet Propulsion Laboratory, Pasadena, California, 91109.

C.4 DEFINITIONS FOR THIS SECTION

The symbolism used in this document is:

< >	A logical entity; the actual value is to be substituted
( )	Indicates grouping
{ }	Possible multiple replications
[ ]	May be optionally present or absent
::=	Is defined as
=	Represents the IS3 (1/13) when a single-character printable symbol is desired
>	Represents the IS2 (1/14) when a single-character printable symbol is desired
?	Represents the IS1 (1/15) when a single-character printable symbol is desired
:	Represents the ASCII Line Feed (LF, 0/10) when a single-character printable symbol is desired
*	In the format controls, refers to a format control defined elsewhere

C.4.1 Overview Of The GDIL

Because the GDIL documentation is not yet widely available, a short overview follows.

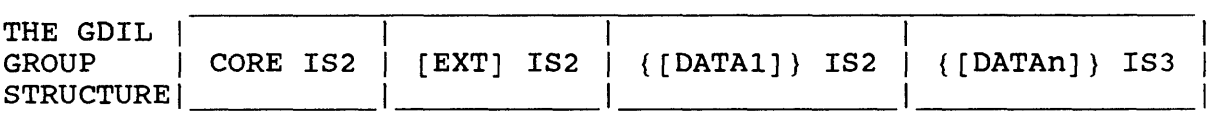
The GDIL defines the use and structure of the Core and Extension descriptive records. These descriptive records, in turn, describe the structure of the Data records. Fields in the Data Records may be separated with user-defined delimiters or their formats may be individually described. There is no need to alter the user-defined structure of the Data records, although some of the information may profitably be copied or moved to the GDIL records for subsequent operations.

C.4.1.1 GDIL Structure Definition

The GDIL Group consists of Core, Extension, and Data records:

<Group> ::= <Core> [<Extension>] [{<Data1>}] [{<Datan>}]

	Terminated with:
Core Record	IS2
[Extension Record]	IS2
[Data Record	IS2]
...	
[Last Data Record]	IS3.

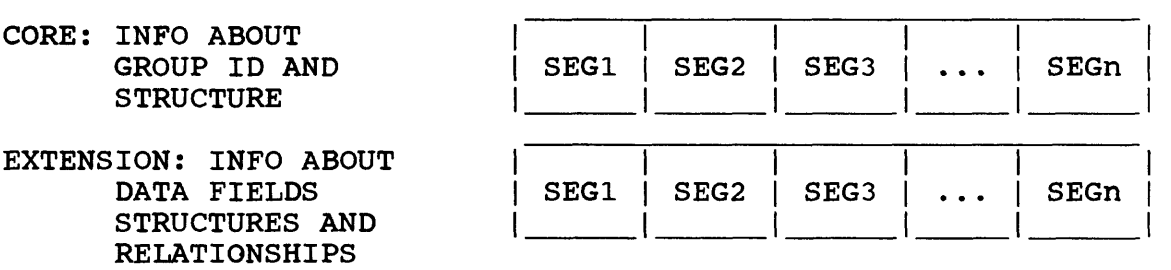


The ISs are definitive and must be included, even though the contents of the related Extension or Data are omitted.

The Core and Extension records each consist of a series of segments having a single BNF form:

<Core> ::= {}

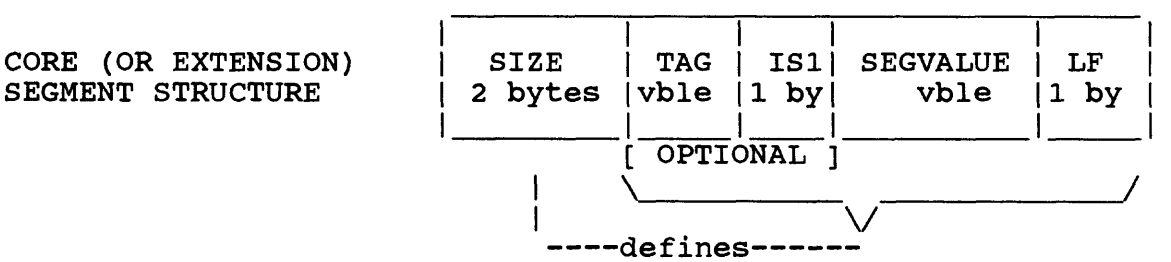
<Extension> ::= {}.



Each segment consists of a Length-Type-Value series of fields:

 ::= <Length> [<Tag> <IS1>] <SegValue> <LF> where

Tag is the segment Type
SegValue is the Segment data contents



The Length field (2 bytes) is the length of the Segment, from the [Tag] to the LF, inclusive.

C.4.1.2 GDIL Component Uses

The CORE contains information about the Group makeup and global information about the Group.

The EXTENSION contains information about the Data field structures and relationships.

DATA records are the user-defined records which make up the user Modules.

The GDIL may be described as Keyword-driven, where the GDIL keywords are the segment tags. This allows the building of a GDIL Group from a relatively small group of specification-defined Tags plus user-defined Tags. This approach allows a standard, recognizable group of segment tags to be specified in the GDIL, from which a given instance may be assembled. Similarly, the

user may define keywords (Labels) for the data fields of the user modules. These fields may be described and located by using the labels as keywords. Thus, only those Tags and Labels necessary for the instance need be included.

C.4.1.3 Data Field Structure Description

The data field structures are described in a series of entries called format controls which are related to the corresponding data fields through the labels as follows:

Format Control, Long and Short (FCL and FCS) segments are structured logically as:

FCL IS1 <Xref> , { <Label> <Length> <Position> <Format Control> }

FCS IS1 <Xref> , { [<Label>] <Format Control> }

Xref is the identifier of the data record being described. Labels are the user-defined field or other aggregate labels. Position is the position of the field in the data record. Format Control describes the Integer, Real, Character, or other form of the data field.

New variables, arrays and complex data field structures may be defined once in a structure segment and subsequently used:

STRUCT IS1 <Label> : {<Format Control>}

Format controls are recursive in that format control of previously defined structures or fields may be included by reference using a preceding asterisk in the format controls:

STRUCT IS1 <Label> : [{*<Label1>}] [{<Format Control>}]
or FCS IS1 <Xref> , { [*<Label1>] <Format Control> }

where Label1 is a previously defined Label.

The structures of externally defined fields may be obtained and labeled using the EXAF (External Authority and Format) segment:

EXAF IS1 {<Label> , <Authority> , <Format ID>} where

Label is the user-defined label for this instance, Authority is the external authority being referenced, and Format ID is its format reference.

C.4.1.4 Data Field Relationships

Sending of the relationships of data fields involves conversion of the logical structures into a linear form and then conversion of this linear form back into the structures. GDIL can describe and convey the resulting linear structure, but does not supply the mechanisms for the reconstruction.

C.4.1.4.1 Datatags

The DATATAGS segment contains an optionally parenthesized list of the user data field labels to whatever depth the user desires. For SDES applications, the allowable set of labels are those specified in the SDES Specification. The same labels are used in the FCL, FCS, STRUCT, EXAF, and the logical description segments.

C.4.1.4.2 Hierarchical And Network Structures

The parenthesized Datatags form will describe a hierarchical or field-subfield structure. An alternate method is by providing a list of node labels in a preorder traverse sequence from a single root representing the entire section of data, plus an ordered list of the last node of preorder traverse sequences beginning at each node (including leaf nodes). These two sequences are carried in the TRAV(erse) and LASTNODE segments.

Network structures may be described by cutting the structure into a hierarchical tree and sending this plus a list of the cut links using the LABELPAIR Segment.

C.4.1.4.3 Relational Structures

Relational structures may be be decomposed into a set of relational tables. The structure of the lines of these tables may be described using the Structure segment. The column headings may be given as labels in a Datatags segment.

```
STRUCT:       <TableLabel>:<FmtCtl1>,<FmtCtl2>, ... ,<FmtCtln>
DATATAGS:    ,<TableLabel>(<ColHdg1>,<ColHdg2>, ... ,<ColHdgn>)
FCS:         ,<TableLabel>,0(*<TableLabel>)                    where
```

the Datatags and FCS leading commas indicate the omission of the Xref field, and the 0( ) FCx form indicates an undetermined number of entries.

C.5 THE CARTOGRAPHIC IMPLEMENTATION

It is expected that the reader will be familiar with the GDIL specification in which the segments discussed here, and others, are defined. Discussion of the cartographic implementation primarily concerns the use of the DATATAGS, FCL, FCS, STRUCT, and EXAF segments. Other specified segment tags and uses, and more complete rules, may be found in the GDIL specifications.

Because the GDIL is generic, a discussion of only a few SDES modules will suffice to explain the GDIL useage. In most cases, the SDES modules, or portions of them, may be described in a delimiter type structure as well as by complete definition of each data field in detail. The GDIL parser, through use of the Datatags, FCS, and Struct segments, will provide the recipient the Label, location, and structure of each data field. The Trav, Lastnode, and Labelpair segments will provide necessary logical relationships.

C.5.1 The GDIL Group Structure

C.5.1.1 Module Makeup

The GDIL will allow several styles of implementation of the SDES. The GDIL does not require any modification of the user data, although copying some of the information, such as the field and sub-field names into the Extension will make them more available to a catalog. The general style proposed for the SDES implementation of each module is:

Generate the Core with the necessary global information.
    Include SDES Taglist, references, module length, module cross references, Data Definition Indicator (DDI)
Generate the Extension with the data field structure definitions
    Include Datatags, FCx, and logical constructions
Append the data records of a given SDES module.

Only those data fields needed for the particular file need be included in a module unless external considerations require otherwise. Only those Tags and Labels corresponding to included data fields and sub-fields need be designated in the Datatags segment. Their hierarchical relationships may be indicated by the parenthetical structure of the Datatags segment and/or by the use of the TRAV and LASTNODE segments.

C.5.1.2 Multiple SDES Modules In One File

Each SDES Module will normally occupy one GDIL Group. Multiple SDES modules may be encoded within one File by concatenating a following module immediately after the IS3 of a previous module.

C.5.1.3 Core Modules - Global Information

Structures of user-defined Core segments are not explicitly indicated, but may be found by reference to external documentation as referenced in EXAF. Lacking this, each may be read as a single character string.

C.5.2 Representations

Unqualified numerical forms are the integer, real, and floating of ISO 6093 (ASCII decimal number strings), and unsigned positive binary fields. Other forms may be used by taking EXCeptions to the default forms in an EXC segment. Uses and restrictions on these forms are given in the GDIL specification.

C.5.3 Permitted Variations

C.5.3.1 User-Specified Parameters

GDIL provides locations for the user to define the following:

Data field and subfield delimiters for delimited data

Null character

Physical blocksize

Nonstandard meanings of bitfield data

C.5.3.2 Missing Data Fields

C.5.3.2.1 Consistently Missing Fields

If fields or subfields specified in Part II are intentionally consistently omitted, the corresponding field or subfield labels shall be omitted from the Extension segments.

C.5.3.2.2 Intermittently Missing Data

Missing data fields which have been listed in the Datatags segment shall be replaced by null fields. A null field may consist of a string of null characters to fill a defined-length field, or may consist of zero characters in a delimited field, followed by the appropriate delimiter.

C.5.3.3 Repeated Data Fields

For many interchanges, such as the spatial object exchange form, fields or field groups may occur more than once. To produce a completely defined exchange form, the total number of occurrences must be indicated.

The GDIL provides a 0(<field>) entry indicating an undetermined number of occurances of the field (including zero). This should be replaced during construction of a specific instance with the actual number of occurences.

Because the positions of the multiple occurrences of a field or field group cannot be designated in the single location in the FCL allocated to this parameter, the FCL location entry pertaining to the multiple-occurrence data fields or field groups shall be indicated by a null field. Alternatively, the FCS format control may be used.

C.5.4 Foreign Data Structures

Structures referred to by EXAF must be available to the parsing software to allow the format controls to be substituted into the FCL or FCS segments or parsing of user-defined Core segments.

C.6 MEDIA REQUIREMENTS

The variable length records may be written on several media. ISO specifications for the appropriate medium shall be followed if available. Lacking these, FIPS or ANSII specifications, in order of preference, shall be followed. Any other medium specifications will require private agreements.

C.7 PRIVATE AGREEMENTS

Private agreements limit the scope of interchange and are discouraged. Recurring needs for similar private agreements with a significant number of users should be referred to the maintenance organization of the standard.

The inclusion of ancillary data should be accomplished within the framework of GDIL by defining private tags, names and labels for use in the Core and Extension. The GDIL parser will not be able to recognize these and can only pass them to the user applications software. The following guidelines will assure that no compromises will exist:

- Do not use the tags or labels defined within the GDIL specifications for private purposes.

- Use the GDIL-defined tags and labels as called out in the specification.

C.8 EXAMPLES

C.8.1 Identification Module

Consider an Identification module with the following data:

Identification		
	Modname	ID
	Title	Demonstration Image
	Geoarea	None
	Datastrc	Image
Map Date		
	Mapdat1	860731

The remainder of the fields and subfields in the specification of this module are not used.

C.8.1.1 Defined-field Coding

Note that the only module fields used are those actually required.

This could be coded (Spaces not significant):

```
16MCAF ? GDIL860901:            (GDIL Authority and release date)

09GLEN ? 215:                              (Group Length, using FCS)

75DATATAGS ? ,IDENTIFICATION(MODNAME,TITLE,GEOAREA,DATASTRC),
MAP_DATE(MAPDAT1):

70FCS ? ,(MODNAME,A2),(TITLE,A19),(GEOAREA,A4),(DATASTRC,A5),
(MAPDAT1,I6)>

The Data:   IDDemonstration ImageNoneImage860731=
```

Alternatively, FCL could be used:

```
00FCL ? ,(IDENTIFICATION,0,0,X30),(MODNAME,2,0,A2),(TITLE,19,2,A1
9),(GEOAREA,4,21,A4),(DATASTRC,5,25,A5):
44FCL ? 5),(MAP_DATE,0,30,X6),(MAPDAT1,6,30,I6)>
```

Note 1: Because the SDES allows only one structure of data record in each module, no Xref is required; the leading comma in the Datatags and FCx segments indicates this missing field.

Note 2: The fully labeled form of the Datatags and FCx segments is shown. Other constructions are defined in the GDIL specifications allowing omission of the FCx labels.

Note 3: In the FCL segments:

The inclusion of IDENTIFICATION and MAPDATE labels, although there is no corresponding physical data, allows access at those logical levels. The zero length and X format control are used.

The dual FCL structure illustrates the 00 length used to indicate a segment extension; the data portions of the two FCLs are concatenated to form a single logical FCL.

C.8.1.2 SDES Delimiter Coding

The defined-field coding requires that the sender indicate the exact field length for each of the data fields. If this cannot be determined ahead of time, delimiter coding may be used with the cost of having to insert (and later remove) the delimiters in the data records.

Thus, the above example could also be coded using a subfield delimiter specified in the FCS (for this example as @). Only the changed FCS and Data are now shown:

69FCS ? ,(MODNAME,A@),(TITLE,A@),(GEOAREA,A@),(DATASTRC,A@),
(MAPDAT1,I@)>

The Data: ID@Demonstration Image@None@Image@860731=

PART IV

CARTOGRAPHIC FEATURES

January, 1987

National Committee for Digital Cartographic Data Standards

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1 SCOPE, PURPOSE, AND APPLICATION

This portion of the Digital Cartographic Data Standard responds to the need for standardizing Cartographic Features. The conceptual model and defined terms are the foundation for a uniform approach to creating a cartographic feature file and exchanging between existing digital cartographic systems.

The purpose of this standard is to provide a classification scheme and definitions for cartographic features. Cartographic features are defined entities that can be represented by an object. Entities are real world phenomena that are not subdivided into phenomena of the same kind. The definitions provided are currently limited to those entities found on general nautical charts and topographic maps. A mechanism is given for adding entities unique to cadastral, demographic, hydrologic, soils, and other maps and aeronautical charts.

There are two intended applications of this standard for systems employing cartographic data in digital form: (1) new users will have a model and definitions needed for creating a features list; (2) exchange between existing systems will be facilitated. The principal beneficiaries will be the practitioners of those professions involved with the organizing and exchanging of spatial data. Most frequently, these will be cartographers, geographers, planners and resource managers, however, the principles of the conceptual model will apply to any application that requires classification and representation of spatial data.

2 CONFORMANCE

The entity and attribute content of an exchange file shall be in conformance with this standard if the usage strictly adheres to the standard entity and attribute terms and definitions as described in Part IV, Section 5. New entity and attribute terms that are identical or synonymous with existing terms may not be used. All permitted extensions of usage, as described in Part IV, Section 4.3, shall be documented as specified in that section and in the Completeness Section of the Exchange File Quality Report (see Part II, Section 5.3.5 and Part III, Section 3.5).

3 MAINTENANCE

The U.S. Geological Survey is the designated maintenance organization for the Cartographic Features part of this standard. Suggestions for the improvement of the standard and queries should be addressed to Chief, National Mapping Division, U.S. Geological Survey, Reston, VA 22092.

4 FEATURE MODEL CONCEPTS

4.1 Basic Concepts

Cartographic features shall be described by the following three concepts: Entity; Attribute; and Attribute Value; and the terms: Standard and Included. These are defined as follows:

ENTITY — a real world phenomenon that is not subdivided into phenomena of the same kind (e.g., a bridge);

ATTRIBUTE — a defined characteristic of an entity (e.g., composition);

ATTRIBUTE VALUE — a specific quality or quantity assigned to an attribute (e.g., steel);

STANDARD TERM — primary label of an entity or attribute;

INCLUDED TERM — non-standard label of an entity or attribute that is cross-referenced to a STANDARD TERM of an entity or attribute.

4.2 Optional Concepts

Two additional concepts, Entity Class and Attribute Class are provided as user options. These are defined as follows:

ENTITY CLASS — A specified group of entities (e.g., land use, hydrographic, transportation);

ATTRIBUTE CLASS — A specified group of attributes (e.g., those describing measure, composition, serviceability, or structure).

4.3 Addition of Entity and Attribute Terms and Definitions

Private agreements covering the creation and usage of non-standard entity and attribute terms limit the scope of the exchange and are discouraged. Recurring needs for similar private agreements with a significant number of users should be referred to the organization maintaining this standard. If additional terms are used in a specific exchange file, the terms must be documented according to the following minimum specifications:

(1) Documentation as specified within the Completeness Section (see Part II, 5.35 and Part III, 3.5) shall be provided;

(2) The candidate term usage shall be identified;

(3) The candidate term shall be defined;

(4) The source of the above definition shall be identified;

(5) If an entity term, the associated attributes shall be identified;

(6) If an attribute term, the value range shall be identified.

5 ENTITY AND ATTRIBUTE TERMS AND DEFINITIONS

The following lists contain those Entities and Attributes represented on general nautical charts and topographic maps. These are abbreviated lists that show only the standard definitions. The complete files containing other, non-standard, entity definitions and Included Term definitions are available from the maintaining organization. The Entity Definitions list appears first, followed by the Attribute Definitions list Attribute Values, with the exception of a small number appearing under Attributes, are not shown.

The following notes pertain:

(1) "INCLUDED TERM" of "INCLUD" refer to non-standard entity terms that are cross-referenced to standard entity terms;

(2) Single underlines connecting entity or attribute terms indicate a multiple-word label;

(3) Slashes (/) appearing in entity cross-references indicate that the Included Term has multiple definitions and is included under two or more Standard Entity terms (e.g., a HUMMOCK is an Included term under both MOUNT and ISLAND reflecting different regional usage;

(4) "SOURCE" notations refer to a document or agency. The exact references can be found in Part I, 3.

ACCESSWAY (INCLUDED TERM 1)
SEE: ROAD

ADMINISTRATIVE_BOUNDARY (INCLUDED TERM 2)
SEE: BOUNDARY

AERATION_BEDS (INCLUDED TERM 3)
SEE: FILTRATION_BEDS

AERIAL_CABLEWAY (INCLUDED TERM 4)
SEE: CABLEWAY

AERIAL_CABLEWAY_LINES (INCLUDED TERM 5)
SEE: CABLEWAY

AERIAL_CABLEWAY_PYLON (INCLUDED TERM 6)
SEE: TOWER

AERODROME (INCLUDED TERM 7)
SEE: AIRPORT

AERODROME_BEACON (INCLUDED TERM 8)
SEE: BEACON

AERODROME_CONTROL_TOWER (INCLUDED TERM 9)
SEE: TOWER

AERONAUTICAL_RADIOBEACON (INCLUDED TERM 10)
SEE: BEACON

AERONAUTICAL_BEACON (INCLUDED TERM 11)
SEE: BEACON

AERONAUTICAL_LIGHT (INCLUDED TERM 12)
SEE: BEACON

AERONAUTICAL_NAVIGATIONAL_RADIO_STATION (INCLUDED TERM 13)
SEE: BUILDING/BUILDING_COMPLEX

AIR_BEACON (INCLUDED TERM 14)
SEE: BEACON

AIRDROME (INCLUDED TERM 15)
SEE: AIRPORT

AIRFIELD (INCLUDED TERM 16)
SEE: RUNWAY

AIRFIELD_REVETMENT (INCLUDED TERM 17)
SEE: WALL

AIR_ROUTE (INCLUDED TERM 18)
SEE: LANE

STANDARD FEATURE TERM 1: AIRPORT
DEFN: A LEVELED TRACT OR WATER SURFACE WHERE AIRCRAFT CAN TAKE OFF AND LAND, USUALLY EQUIPPED WITH HARD-SURFACED LANDING STRIPS, A CONTROL TOWER, HANGARS, AND ACCOMMODATIONS FOR PASSENGERS AND CARGO.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY
ATTRIB: LOCATION NAME RUNWAYS_NUMBER_OF VEHICLE_SIZE_SERVED FACILITIES_PRESENT AIR_TRAFFIC_CONTROL_SERVICE AREA USER_TYPE CARGO_TRANSPORTATION PASSENGER_TRANSPORTATION
EXISTING/PROPOSED LIGHTED/UNLIGHTED RESTRICTIONS SERVICES_PROVIDED USER_TYPE AIR/LAND/WATER VEHICLE_ACCOMODATED FEATURE_PRESENT AIR/LAND/WATER CONTROLLED/UNCONTROLLED
INCLUD: AERODROME AIRDROME ALTERNATE_AERODROME AUXILIARY_AERODROME CONTROLLED_AERODROME HELIPORT SEADROME LANDING_AREA SEAPLANE_BASE SUPPLEMENTARY_AERODROME

AIRPORT_BEACON (INCLUDED TERM 19)
SEE: BEACON

AIRPORT_TRAFFIC_AREA (INCLUDED TERM 20)
SEE: APPROACHWAY

AIRPORT_TRAFFIC_CONTROL_TOWER (INCLUDED TERM 21)
SEE: TOWER

AIRSTRIP (INCLUDED TERM 22)
SEE: RUNWAY

ALLEY (INCLUDED TERM 23)
SEE: ROAD

ALLUVIAL_FAN (INCLUDED TERM 24)
SEE: DELTA

STANDARD FEATURE TERM 2: ALLUVIUM
DEFN: ALL UNCONSOLIDATED FRAGMENTAL MATERIAL LAID DOWN BY A STREAM.
SOURCE: MODIFIED FROM MONKHOUSE, A DICTIONARY OF GEOGRAPHY
ATTRIB: LOCATION COMPOSITION SHAPE VOLUME

ALTERNATE_AERODROME (INCLUDED TERM 25)
SEE: AIRPORT

ALTERNATING_LIGHT (INCLUDED TERM 26)
SEE: BEACON

STANDARD FEATURE TERM 3: AMMUNITION DUMP
DEFN: A MILITARY INSTALLATION USED FOR THE STORAGE OF EXPLOSIVES AND OTHER WARLIKE STORES.
SOURCE: MODIFIED FROM THE CANADIAN COUNCIL ON SURVEYING AND MAPPING

AMPHITHEATER (INCLUDED TERM 27)
SEE: OUTDOOR_THEATER

AMUSEMENT_PARK (INCLUDED TERM 28)
SEE: PARK

ANABRANCH (INCLUDED TERM 29)
SEE: WATERCOURSE

ANCHOR_BUOY (INCLUDED TERM 30)
SEE: BUOY

ANCHOR_LIGHT (INCLUDED TERM 31)
SEE: BEACON

ANCHORAGE (INCLUDED TERM 32)
SEE: HARBOR

ANCHORAGE_BUOY (INCLUDED TERM 33)
SEE: BUOY

ANIMAL_SANCTUARY (INCLUDED TERM 34)
SEE: PARK

ANIMAL_SANCTUARY_BOUNDARY (INCLUDED TERM 35)
SEE: BOUNDARY

ANSE (INCLUDED TERM 36)
SEE: INLET

STANDARD FEATURE TERM 4: ANTENNA
DEFN: A METALLIC APPARATUS FOR SENDING AND RECEIVING ELECTRO-MAGNETIC WAVES.
SOURCE: AMERICAN HERITAGE DICTIONARY
ATTRIB: LOCATION SIGNAL_TYPE HEIGHT NAME FEATURE_CONNECTED COMPOSITION MOUNTED SHAPE MOVABLE/STATIONARY
INCLUD: DIRECTIONAL_ANTENNA DISH DISK LOOP_ANTENNA

STANDARD FEATURE TERM 5: ANTENNA ARRAY
DEFN: A GROUP OF DIRECTIONAL ANTENNAS.
SOURCE: NAVIGATION DICTIONARY

APARTMENT_BUILDING (INCLUDED TERM 37)
SEE: BUILDING

APARTMENT_COMPLEX (INCLUDED TERM 38)
SEE: BUILDING_COMPLEX

APPROACH_AREA (INCLUDED TERM 39)
SEE: APPROACHWAY

APPROACH_LIGHTS (INCLUDED TERM 40)
SEE: BEACON

APPROACH_PATH (INCLUDED TERM 41)
SEE: APPROACHWAY

APPROACH_TO_HIGHWAY (INCLUDED TERM 42)
SEE: ROAD

STANDARD FEATURE TERM 6: APPROACHWAY

DEFN: THE AIRSPACE THROUGH WHICH AIRCRAFT APPROACH OR LEAVE A LANDING AREA.
SOURCE: NAVIGATION DICTIONARY
ATTRIB: LOCATION AREA HEIGHT RESTRICTIONS NAME USER_TYPE LIGHTED/UNLIGHTED
INCLUD: AIRPORT_TRAFFIC_AREA APPROACH_PATH APPROACH_AREA

APRON (INCLUDED TERM 43)
SEE: PARKING_AREA/PLAIN

AQUEDUCT (INCLUDED TERM 44)
SEE: WATERCOURSE/BRIDGE

STANDARD FEATURE TERM 7: ARCH
DEFN: A CURVED STRUCTURE THAT SUPPORTS THE WEIGHT OF MATERIAL OVER AN OPEN SPACE.
SOURCE: WEBSTER'S NEW COLLEGIATE DICTIONARY
ATTRIB: ARTIFICIALLY_IMPROVED/MANMADE/NATURAL LOCATION NAME

ARCHED_ICEBERG (INCLUDED TERM 45)
SEE: ICEBERG

ARCHIPELAGO (INCLUDED TERM 46)
SEE: SEA/ISLAND_CLUSTER

ARCHIPELAGO_APRON (INCLUDED TERM 47)
SEE: PLAIN

ARCTIC_PACK (INCLUDED TERM 48)
SEE: ICE_FIELD

ARENA (INCLUDED TERM 49)
SEE: BUILDING

ARETE (INCLUDED TERM 50)
SEE: RIDGE

ARM (INCLUDED TERM 51)
SEE: INLET

ARMISTICE_LINE (INCLUDED TERM 52)
SEE: BOUNDARY

ARMORY (INCLUDED TERM 53)
SEE: BUILDING/BUILDING_COMPLEX

ARMY_CAMP (INCLUDED TERM 54)
SEE: MILITARY_BASE

ARROYO (INCLUDED TERM 55)
SEE: WATERCOURSE

ART_GALLERY (INCLUDED TERM 56)
SEE: BUILDING

ARTIFICIAL_HARBOR (INCLUDED TERM 57)

SEE: HARBOR

ATHLETIC_CLUB (INCLUDED TERM 58)
SEE: BUILDING

ASTRONOMIC_POSITION (INCLUDED TERM 59)
SEE: CONTROL_POINT

ATHLETIC_FIELD (INCLUDED TERM 60)
SEE: SPORTS_FIELD

ATOLL (INCLUDED TERM 61)
SEE: REEF/ISLAND

ATOLL_REEF (INCLUDED TERM 62)
SEE: REEF

AUDITORIUM (INCLUDED TERM 63)
SEE: BUILDING

AUTOMOBILE_PLANT (INCLUDED TERM 64)
SEE: BUILDING_COMPLEX

AUXILIARY_AERODROME (INCLUDED TERM 65)
SEE: AIRPORT

AVENUE (INCLUDED TERM 66)
SEE: ROAD

AWASH_ROCK (INCLUDED TERM 67)
SEE: ROCK

AWAWA (INCLUDED TERM 68)
SEE: WATERCOURSE

BACK_MARSH (INCLUDED TERM 69)
SEE: WETLAND

BACKSWAMP (INCLUDED TERM 70)
SEE: WETLAND

STANDARD FEATURE TERM 8: BACKWATER
DEFN: AN AREA OF CALM WATER UNAFFECTED BY THE CURRENT OF A STREAM
SOURCE: ADAPTED FROM STAMP AND MONKHOUSE
ATTRIB: LOCATION WIDTH DEPTH

BALD (INCLUDED TERM 71)
SEE: CLEARING/MOUNT

BALL (INCLUDED TERM 72)
SEE: BAR

BALL_PARK (INCLUDED TERM 73)

SEE: PARK/SPORTS_FIELD

BAMBOO (INCLUDED TERM 74)
SEE: WOODLAND

BANDSTAND (INCLUDED TERM 75)
SEE: OUTDOOR_THEATER

BANK (INCLUDED TERM 76)
SEE: MOUNT/SHORE

BANK_REEF (INCLUDED TERM 77)
SEE: REEF

STANDARD FEATURE TERM 9: BAR
DEFN: A SUBMERGED OR EMERGED MOUND, RIDGE, OR SUCCESSION OF RIDGES OF SAND OR OTHER MATERIAL EXTENDING ACROSS THE BOTTOM AND WHICH MAY OBSTRUCT NAVIGATION.
SOURCE: HYDROGRAPHIC DICTIONARY
ATTRIB: COMPOSITION LOCATION LENGTH SHAPE AREA WIDTH HEIGHT SHORE_ORIENTATION ARTIFICIALLY_IMPROVED/MANMADE/NATURAL
INCLUD: BALL SANDBAR MARSH_BAR LONGSHORE_BAR SHOAL BAYMOUTH_BAR BARRIER_BEACH TRANSVERSE_BAR SAND_BANK BAY_BAR OFFSHORE_BAR LONGSHORE_BAR BARRIER_ISLAND BAY_BARRIER SHOAL_PATCHES BAY_HEAD_BAR CUSPATE_BAR TONGUE POINT HOOK SAND_HORN SAND_LOBE SPIT HOOKED_SPIT RECURVED_SPIT SAND_SPIT TOMBOLO CUSPATE_SPIT

BAR_BUOY (INCLUDED TERM 78)
SEE: BUOY

BAR_PORT (INCLUDED TERM 79)
SEE: PORT

BARE_ROCK (INCLUDED TERM 80)
SEE: ROCK

BARN (INCLUDED TERM 81)
SEE: BUILDING

BARRACKS (INCLUDED TERM 82)
SEE: BUILDING/BUILDING_COMPLEX

BARRAGE (INCLUDED TERM 83)
SEE: DAM

BARRANCA (INCLUDED TERM 84)
SEE: WATERCOURSE

BARRIER_BASIN (INCLUDED TERM 85)
SEE: BASIN

BARRIER_BEACH (INCLUDED TERM 86)
SEE: BAR

BARRIER_FLAT (INCLUDED TERM 87)
SEE: WETLAND/FLAT

BARRIER_ICEBERG (INCLUDED TERM 88)
SEE: ICEBERG

BARRIER_ISLAND (INCLUDED TERM 89)
SEE: BAR/ISLAND

BARRIER_LAGOON (INCLUDED TERM 90)
SEE: LAGOON

BARRIER_REEF (INCLUDED TERM 91)
SEE: REEF

BASCULE_BRIDGE (INCLUDED TERM 92)
SEE: BRIDGE

STANDARD FEATURE TERM 10: BASIN
DEFN: ANY BOWL-SHAPED DEPRESSION IN THE SURFACE OF THE LAND OR OCEAN FLOOR.
SOURCE: MODIFIED FROM AMERICAN HERITAGE DICTIONARY
ATTRIB: CIRCUMFERENCE LOCATION SHAPE DEPTH SLOPE_OF_SIDES NAME SIZE ARTIFICIALLY_IMPROVED/MANMADE/NATURAL AREA AIR/LAND/WATER
INCLUD: BARRIER_BASIN SINK KETTLE DEPRESSION CAULDRON NON_TIDAL_BASIN TIDAL_BASIN WAVE_BASIN PIT SABKHA SINKHOLE

BATTERY (INCLUDED TERM 93)
SEE: FORT

BAY (INCLUDED TERM 94)
SEE: INLET

BAY-HEAD_BAR (INCLUDED TERM 95)
SEE: BAR

BAY_BAR (INCLUDED TERM 96)
SEE: BAR

BAY_BARRIER (INCLUDED TERM 97)
SEE: BAR

BAY_DELTA (INCLUDED TERM 98)
SEE: DELTA

BAY_ICE (INCLUDED TERM 99)
SEE: ICE_FIELD

BAYMOUTH_BAR (INCLUDED TERM 100)
SEE: BAR

BAYOU (INCLUDED TERM 101)
SEE: LAKE/WATERCOURSE

STANDARD FEATURE TERM 11: BEACH
DEFN: THE AREA EXTENDING FROM THE SHORELINE INLAND TO A MARKED CHANGE IN PHYSIOGRAPHIC FORM OR MATERIAL,OR TO THE LINE OF PERMANENT VEGETATION. THE GENTLY SLOPING SHORE WHICH IS WASHED BY WAVES OR TIDES, ESPECIALLY THE PARTS COVERED BY SAND OR PEBBLES.
SOURCE: NAVIGATION DICTIONARY, U.S. NAVAL OCEANOGRAPHIC OFFICE

INCLUD: LAGOON_BEACH FORESHORE_FLATS RIVAGE BEACH_BERM

BEACH_BERM (INCLUDED TERM 102)
SEE: BEACH

BEACH_CUSPS (INCLUDED TERM 103)
SEE: RIDGE

BEACH_FACE (INCLUDED TERM 104)
SEE: SHORE

BEACH_RIDGE (INCLUDED TERM 105)
SEE: RIDGE

BEACH_SCARP (INCLUDED TERM 106)
SEE: CLIFF

STANDARD_FEATURE_TERM 12: BEACON
DEFN: A FIXED SIGNAL, MARK OR LIGHT AND ASSOCIATED FACILITIES ERECTED FOR THE GUIDANCE OF MARINERS OR AIRPLANE PILOTS.
SOURCE: MODIFIED FROM CANADIAN COUNCIL ON SURVEYING AND MAPPING
ATTRIB: LIGHTED/UNLIGHTED HEIGHT LOCATION SIGNAL_TYPE FIXED/FLASHING NAME STAFFED/UNSTAFFED WIDTH SIGNAL_DIRECTION COLOR LIGHT_DISPLAY SIGNAL_INTENSITY NAVAIDS
INCLUD: AERODROME_BEACON AERONAUTICAL_RADIOBEACON AERONAUTICAL_BEACON AIR_BEACON AIRPORT_BEACON CIRCULAR_BEACON CALIBRATION_RADIOBEACON CODE_BEACON CONTINUOUS_RADIOBEACON DAYBEACON DIRECTIONAL_BEACON FAN_MARKER_BEACON HOMING_BEACON IDENTIFICATION_BEACON LANDING_BEACON LANDMARK_BEACON LIGHTHOUSE LIGHTED_BEACON LIGHT_STATION MARKER_RADIOBEACON MARKER_BEACON MARINE_RADIOBEACON OBSTRUCTION_BEACON OFFSHORE_LIGHT_STATION OMNIDIRECTIONAL_BEACON PILE_LIGHTHOUSE PERCH PILE_BEACON RACON RADAR_BEACON RADIOBEACON RESPONDER_BEACON ROTATING_BEACON ROTATING_LOOP_RADIOBEACON SEA_BEACON TRANSPONDER_BEACON WARNING_BEACON WARNING_RADIOBEACON OBSTRUCTION_MARKER WINTER_MARKER TIDE_SIGNAL AERONAUTICAL_LIGHT ALTERNATING_LIGHT ANCHOR_LIGHT CHANNEL_LIGHT COLORED_LIGHT FIXED_LIGHT FIXED_AND_FLASHING_LIGHT INTERMITTENT_LIGHT FIXED_AND_GROUP_FLASHING_LIGHT FLASHING_LIGHT HORIZON_LIGHTS RANGING_MARKER OFFSHORE_TOWER LEADING_LIGHT LONG_FLASHING_LIGHT MAJOR_LIGHT MARINE_LIGHT MINOR_LIGHT NAVIGATION_LIGHT OBSTRUCTION_LIGHT OCCASIONAL_LIGHT OCCULTING_LIGHT PILE_DOLPHIN OCCULTING_QUICK_FLASHING_LIGHT QUICK_FLASHING_LIGHT RANGING_LIGHT REAR_LIGHT RED_SECTOR RUNWAY_LIGHTS ROTATING_LIGHT SECTORED_LIGHT SHORT_FLASHING_LIGHT SHORT_LONG_FLASHING_LIGHT TAXI_CHANNEL_LIGHT TAXIWAY_LIGHTS THRESHOLD_LIGHT TIDAL_LIGHT UNATTENDED_LIGHT UNDULATING_LIGH UNWATCHED_LIGHT WARNING_LIGHT WATCHED_LIGHT WEAK_LIGHT WINTER_LIGHT RED_SECTOR_LIGHT APPROACH_LIGHTS FOG_SIGNAL MAJOR_FOG_SIGNAL MINOR_FOG_SIGNAL OCCASIONAL_FOG_SIGNAL BOUNDARY_LIGHTS STAKES LIGHT CHANNEL_MARKER

BEAVER_DAM (INCLUDED TERM 107)
SEE: DAM

BECK (INCLUDED TERM 108)
SEE: WATERCOURSE

BELL_BUOY (INCLUDED TERM 109)
SEE: BUOY

BENCH (INCLUDED TERM 110)
SEE: TERRACE

BENCH_MARK (INCLUDED TERM 111)
SEE: CONTROL_POINT

BEND (INCLUDED TERM 112)

SEE: WATERCOURSE
DEFN: A CURVE IN THE COURSE OF A STREAM AND (OR) THE LAND WITHIN THE CURVE; A CURVE IN A LINEAR BODY OF WATER (BOTTOM, LOOP, MEANDER)

STANDARD FEATURE TERM 13: BERTH
DEFN: THE PLACE WHERE THE SHIP LIES WHEN AT ANCHOR SECURED TO A PIER OR WHARF.
SOURCE: DEFENSE MAPPING AGENCY
INCLUD: DOCK SLIP FERRY_SITE FERRY_SLIP WETDOCK

BERY (INCLUDED TERM 113)
SEE: MOUNT/ICEBERG

BICYCLE_PATH (INCLUDED TERM 114)
SEE: ROAD

BICYCLE_TRAIL (INCLUDED TERM 115)
SEE: ROAD

BIFURCATION_BUOY (INCLUDED TERM 116)
SEE: BUOY

BIGHT (INCLUDED TERM 117)
SEE: INLET

BILLBOARD (INCLUDED TERM 118)
SEE: SIGN

BIRD_SANCTUARY (INCLUDED TERM 119)
SEE: PARK

BLANKET_BOG (INCLUDED TERM 120)
SEE: WETLAND

BLAST_BARRIER (INCLUDED TERM 121)
SEE: WALL

BLUFF (INCLUDED TERM 122)
SEE: CLIFF/WOODLAND

BOARDWALK (INCLUDED TERM 123)
SEE: ROAD

BOAT_BASIN (INCLUDED TERM 124)
SEE: HARBOR

BOAT_HARBOR (INCLUDED TERM 125)
SEE: HARBOR

BOAT_LANDING (INCLUDED TERM 126)
SEE: WHARF/PIER/LANDING_PLACE

BOATHOUSE (INCLUDED TERM 127)
SEE: BUILDING

BOG (INCLUDED TERM 128)
SEE: WETLAND

BOLLARD (INCLUDED TERM 129)
SEE: MOORING

BOOM (INCLUDED TERM 130)
SEE: BREAKWATER

BOROUGH (INCLUDED TERM 131)
SEE: PLACE

BORROW_PIT (INCLUDED TERM 132)
SEE: MINE

BOTANICAL_GARDEN (INCLUDED TERM 133)
SEE: PARK

BOULEVARD (INCLUDED TERM 134)
SEE: ROAD

STANDARD FEATURE TERM 14: BOTTOM
DEFN: THE PORTION OF THE GROUND_SURFACE WHICH LIES BELOW WATER.
SOURCE: NEW DEFINITION

STANDARD FEATURE TERM 15: BOUNDARY
DEFN: A NON-PHYSICAL LINE INDICATING THE LIMIT OR EXTENT OF AN AREA OR TERRITORY.
SOURCE: MODIFIED FROM CANADIAN COUNCIL ON SURVEYING AND MAPPING.
ATTRIB: AIR/LAND/WATER FEATURE_BOUNDED AREA_DIVIDED NEGOTIATED/UNILATERAL RECOGNIZED/UNRECOGNIZED INTERNATIONAL_DATE_LINE RESTRICTIONS LOCATION LENGTH NAME LIGHTED/UNLIGHTED TIDAL
INCLUD: ADMINISTRATIVE_BOUNDARY ANIMAL_SANCTUARY_BOUNDARY ARMISTICE_LINE CEASE_FIRE_LINE CLAIM_LINE CONVENTION_MANDATE_LINE DEFACTO_BOUNDARY DEMILITARIZED_LINE FOREST/PARK_BOUNDARY INDIAN_TREATY_LINE INTERNATIONAL_DATE_LINE MINE_DANGER_AREA LAND_GRANT_LINE SECTION_LINE COLREGS_DEMARCATION_LINE CUSTOM_BOUNDARY HARBOR_LIMIT SOVEREIGNTY_LIMIT INTERNATIONAL_BOUNDARY INTERPROVINCIAL_BOUNDARY CITY_LIMITS TREE_LINE TIMBER_LINE HARBOR_LINE BOUNDARY_LINE BOUNDARY_LIGHTS TIDE_LIMIT TOWN_LIMITS CADASTRAL_BOUNDARY LIMITS COAST_GUARD_LINES TERRITORIAL_WATERS_LIMIT

BOUNDARY_LINE (INCLUDED TERM 135)
SEE: BOUNDARY

BOUNDARY_LIGHTS (INCLUDED TERM 136)
SEE: BOUNDARY/BEACON

BOUNDARY_MONUMENT (INCLUDED TERM 137)
SEE: CONTROL_POINT

BOUNDARY_SIGN (INCLUDED TERM 138)
SEE: SIGN

BRAIDED_RIVER (INCLUDED TERM 139)
SEE: WATERCOURSE

BRAIDED_STREAM (INCLUDED TERM 140)

SEE: WATERCOURSE

BRAKE (INCLUDED TERM 141)
SEE: WOODLAND

BRANCH (INCLUDED TERM 142)
SEE: WATERCOURSE

STANDARD FEATURE TERM 16: BREAKERS
DEFN: A ZONE OR REGION OF WAVES BREAKING INTO FOAM AS THEY ADVANCE TOWARD THE SHORE.
SOURCE: ADAPTED FROM A DICTIONARY OF GEOGRAPHY, MOORE
ATTRIB: DANGEROUS OFFSHORE/ONSHORE

STANDARD FEATURE TERM 17: BREAKWATER
DEFN: A STRUCTURE BUILT TO BREAK THE FORCE OF WAVES SO AS TO PROTECT A BEACH, HARBOR, OR OTHER WATERFRONT FACILITY.
SOURCE: MODIFIED FROM CANADIAN COUNCIL ON SURVEYING AND MAPPING
ATTRIB: LOCATION SHORE_ORIENTATION LENGTH COMPOSITION WIDTH PROTRUDING/SUBMERGED IMPERMEABLE/PERMEABLE NAME FLOATING
INCLUD: GROIN GROYNE JETTY MOLE SEAWALL BOOM FLOATING_BREAKWATER WAVE_TRAP TRAINING_WALL BULKHEAD WEIR_JETTY WAVE_BASIN SEA_GATE

STANDARD FEATURE TERM 18: BRIDGE
DEFN: A STRUCTURE ERECTED OVER A DEPRESSION OR OBSTACLE TO CARRY TRAFFIC OR SOME FACILITY SUCH AS A PIPELINE.
SOURCE: MODIFIED FROM CANADIAN COUNCIL ON SURVEYING AND MAPPING
ATTRIB: LOCATION NAME SPAN_LENGTH COMPOSITION WIDTH BEARING_CAPACITY MODE_TRANSPORTED FEATURE_SPANNED SUPPORT_TYPE
SPAN_MOVEMENT COVERED/UNCOVERED FEATURE_CONNECTED MATERIAL_TRANSPORTED CLEARANCE LIGHTED/UNLIGHTED FLOATING
CONDITION_OF_SURFACE_MATERIAL TOLL SPAN_MOVEMENT
INCLUD: AQUEDUCT COVERED_BRIDGE BASCULE_BRIDGE DRAW_BRIDGE FOOTBRIDGE LIFT_BRIDGE OVERPASS PEDESTRIAN-BICYCLE_OVERPASS
PONTOON_BRIDGE SUSPENSION_BRIDGE SWING_BRIDGE TRESTLE VIADUCT

STANDARD FEATURE TERM 19: BRIDGE SUPERSTRUCTURE
DEFN: THOSE ELEMENTS OF THE BRIDGE STRUCTURE WHICH ARE ABOVE THE UPPERMOST DECK.
SOURCE: DEFENSE MAPPING AGENCY

BRIGALOW (INCLUDED TERM 143)
SEE: WOODLAND

BRINE_WELL (INCLUDED TERM 144)
SEE: WELL

BROOK (INCLUDED TERM 145)
SEE: WATERCOURSE

BRUSH (INCLUDED TERM 146)
SEE: WOODLAND

STANDARD FEATURE TERM 20: BUILDING
DEFN: A PERMANENT WALLED AND ROOFED CONSTRUCTION.
SOURCE: MODIFIED FROM CANADIAN COUNCIL ON SURVEYING AND MAPPING
ATTRIB: NAME AGE COVERED/UNCOVERED ITEM(S)_STORED FUNCTION RADAR_TYPE HEIGHT SIZE OWNER_TYPE STORAGE USER_TYPE
NUMBER_OF_STRUCTURES_PRESENT PRODUCTS RELATIONSHIP_TO_GROUND_SURFACE EQUIPMENT_PRESENT SUBSTANCE_BEING_PROCESSED
INCLUD: AERONAUTICAL_NAVIGATIONAL_RADIO_STATION APARTMENT_BUILDING ARENA ARMORY ART_GALLERY ATHLETIC_CLUB AUDITORIUM BARN
BARRACKS BOATHOUSE CANNERY CATHEDRAL CHURCH CITY_HALL CLINIC COAST_GUARD_STATION COLLEGE CONVENT COURTHOUSE
CREMATORIUM DEPOT DRILL_HALL ELECTRIC_POWER_GENERATING_STATION ELECTRIC_SUBSTATION FILLING_STATION
FIRE_LOOKOUT_BUILDING FIRE_STATION FUNERAL_HOME GRAIN_ELEVATOR GRANARY GREENHOUSE HANGAR HOSPITAL HOSTEL HOTEL HOUSE JAI
LIBRARY LIFE_SAVING_STATION MILL MONASTERY MOSQUE MOTEL MUSEUM OFFICE_BUILDING PENITENTIARY PLANETARIUM PLANT
POLICE_STATION POST_OFFICE PRIMARY_TIDE_STATION PRISON PUMPING_STATION RADAR_STATION RADIO_BEACON_MONITOR_STATION
RADIO_DIRECTION_FINDER_STATION RADIO_STATION RANGER_STATION REFINERY ROCKET_STATION SANITARIUM SCHOOL SCIENCE_CENTER
SECONDARY_TIDE_STATION SIGNAL_STATION STABLE STATION STEEL_MILL STORE SYNAGOGUE TELEVISION_STATION TEMPLE
TERMINAL THEATER TIDE_STATION TOURIST_CABIN TOURIST_LODGE TOWN_HALL
TRANSFORMER_STATION SUBSTATION/TRANSFORMER_YARD ENGINE_TEST_CELL PARKING_GARAGE GARAGE NUCLEAR_ACCELERATOR
NUCLEAR_REACTOR SNOW_SHED TRANSMITTER_STATION

STANDARD FEATURE TERM 21: BUILDING COMPLEX

DEFN: A GROUP OF BUILDINGS AND ASSOCIATED FACILITIES FUNCTIONING TOGETHER AS A UNIT
SOURCE: NEW DEFINITION
ATTRIB: LOCATION ITEM(S)_STORED HEIGHT COVERED/UNCOVERED RADAR_TYPE NUMBER_OF_STRUCTURES_PRESENT FUNCTION AREA PRODUCTS WIDTH LENGTH EQUIPMENT_PRESENT OWNER_TYPE RELATIONSHIP_TO_GROUND_SURFACE SUBSTANCE_BEING_PROCESSED
INCLUD: APARTMENT_COMPLEX AERONAUTICAL_NAVIGATIONAL_RADIO_STATION APARTMENT_COMPLEX ARMORY AUTOMOBILE_PLANT BARRACKS CANNERY CEMENT_PLANT CHEMICAL_PLANT COAST_GUARD_STATION COLLEGE ELECTRIC_POWER_GENERATING_STATION ELECTRIC_SUBSTATION FACTORY FILLING_STATION FILTRATION_PLANT FIRE_STATION HOSPITAL_COMPLEX LIFE_SAVING_STATION MILL MONASTERY MOTEL PENITENTIARY PLANT POLICE_STATION POWER_PLANT PRIMARY_TIDE_STATION PRISON PUMPING_STATION RADAR_STATION RADIO_BEACON_MONITOR_STATION RADIO_DIRECTION_FINDER_STATION RADIO_STATION RANGER_STATION REFINERY RESEARCH_CENTER ROCKET_STATION SCHOOL SECONDARY_TIDE_STATION SEWAGE_TREATMENT_PLANT SHOPPING_CENTER SIGNAL_STATION STATION STEEL_MILL TELEVISION_STATION TIDE_STATION TRANSFORMER_STATION TRANSMITTER_STATION SUBSTATION_TRANSFORMER_YARD ENGINE_TEST_CELL NUCLEAR_REACTOR EARLY_WARNING_RADAR_SITE

BUILT_UP_AREA (INCLUDED TERM 147)
SEE: PLACE

BULKHEAD (INCLUDED TERM 148)
SEE: BREAKWATER/EMBANKMENT/WALL

STANDARD FEATURE TERM 22: BUOY

DEFN: A FLOAT MOORED OR ANCHORED IN WATER.
SOURCE: MODIFIED FROM NAVIGATION DICTIONARY
ATTRIB: LOCATION SHAPE COLOR SOUND_CHARACTERISTIC LIGHT_CHARACTERISTIC RADIO_SIGNAL_CHARACTERISTIC COLOR_PATTERN NAME HEIGHT WIDTH LIGHTED/UNLIGHTED SIGNAL_INTENSITY SIGNAL_TYPE LIGHT_DISPLAY NAVAIDS STAFFED/UNSTAFFED
INCLUD: BAR_BUOY BELL_BUOY CABLE_BUOY CAN_BUOY CASK_BUOY ANCHORAGE_BUOY BIFURCATION_BUOY ANCHOR_BUOY CHANNEL_MARKER CHECKERED_BUOY CHANNEL_BUOY COMBINATION_BUOY CONICAL_BUOY DAN_BUOY DANGER_BUOY DREDGING_BUOY FAIRWAY_BUOY FISH_NET_BUOY HORN_BUOY ICE_BUOY JUNCTION_BUOY KEG_BUOY LIGHTED_BUOY LIGHTED_SOUND_BUOY LIGHT_FLOAT LIGHTSHIP LIGHT_VESSEL LARGE_AUTOMATIC_NAVIGATIONAL_BUOY MID_CHANNEL_BUOY MOORING_BUOY NUN_BUOY OBSTRUCTION_BUOY PARTI_COLORED_BUOY PILLAR_BUOY QUARANTINE_BUOY RADAR_BUOY RADIOBEACON_BUOY SEA_BUOY RIVER_BUOY SONOBUOY SOUND_BUOY SPAR_BUOY SPECIAL_PURPOSE_BUOY SPOIL_GROUND_BUOY STATION_BUOY SUPER_BUOY SWINGING_BUOY TELEGRAPH_BUOY THERMOBUOY TOPMARK_BUOY TRANSOBUOY TRUMPET_BUOY TRUNK_BUOY TURNING_BUOY WARPING_BUOY WHISTLE_BUOY WINTER_BUOY WRECK_BUOY FLAME_FLOAT MARINE_AUTOMATIC_METEROLOGICAL_STATION MISSISSIPPI_RIVER-TYPE_BUOY

BURN (INCLUDED TERM 149)
SEE: CLEARING

BURNT_OVER_AREA (INCLUDED TERM 150)
SEE: CLEARING

BUSH (INCLUDED TERM 151)
SEE: WOODLAND

BUTTE (INCLUDED TERM 152)
SEE: PLATEAU

CAATINGA (INCLUDED TERM 153)
SEE: WOODLAND

CABLE (INCLUDED TERM 154)
SEE: UTILITY

CABLE_BUOY (INCLUDED TERM 155)

SEE: BUOY

STANDARD FEATURE TERM 23: CABLEWAY
DEFN: A CONVEYOR SYSTEM IN WHICH CARRIER UNITS RUN ON WIRE CABLES STRUNG BETWEEN SUPPORTS.
SOURCE: MODIFIED FROM AMERICAN HERITAGE DICTIONARY
ATTRIB: LOCATION HEIGHT LENGTH OPERATING_SEASON MODE_TRANSPORTED NAME COMPOSITION COVERED PASSENGER_TRANSPORTATION
INCLUD: AERIAL_CABLEWAY SKI_LIFT AERIAL_CABLEWAY_LINES TRAMWAY

CADASTRAL_BOUNDARY (INCLUDED TERM 156)
SEE: BOUNDARY

CADASTRAL_MONUMENT (INCLUDED TERM 157)
SEE: CONTROL_POINT

CAIRN (INCLUDED TERM 158)
SEE: CONTROL_POINT

CAISSON (INCLUDED TERM 159)
SEE: GATE

CALDERA (INCLUDED TERM 160)
SEE: CRATER

CALIBRATION_RADIOBEACON (INCLUDED TERM 161)
SEE: BEACON

CAMBER (INCLUDED TERM 162)
SEE: HARBOR/BASIN

STANDARD FEATURE TERM 24: CAMPGROUND
DEFN: THE GROUND OR AREA ON WHICH TENTS, HUTS, ETC. ARE ERECTED FOR TEMPORARY SHELTER.
SOURCE: MODIFIED FROM CANADIAN COUNCIL ON SURVEYING AND MAPPING
ATTRIB: NAME LOCATION NUMBER_OF_SITES VEHICLE_ACCOMMODATED
INCLUD: CAMPSITE LUMBER_CAMP RECREATIONAL_VEHICLE_AREA

CAMPSITE (INCLUDED TERM 163)
SEE: CAMPGROUND

CAN_BUOY (INCLUDED TERM 164)
SEE: BUOY

CANAL (INCLUDED TERM 165)
SEE: WATERCOURSE

CANAL_PORT (INCLUDED TERM 166)
SEE: PORT

CANNERY (INCLUDED TERM 167)
SEE: BUILDING/BUILDING_COMPLEX

CANYON (INCLUDED TERM 168)
SEE: VALLEY

CANYON_DELTA (INCLUDED TERM 169)
SEE: DELTA

STANDARD FEATURE TERM 25: CAPE
DEFN: A RELATIVELY EXTENSIVE LAND AREA JUTTING INTO A WATER BODY, WHICH PROMINENTLY MARKS A CHANGE IN OR INTERRUPTS NOTABLY THE COASTAL TREND OF THAT WATER BODY.
SOURCE: MODIFIED FROM NAVIGATION DICTIONARY
ATTRIB: NAME LOCATION SHAPE WIDTH LENGTH

CARLINE (INCLUDED TERM 170)
SEE: RAILWAY

CART_TRACK (INCLUDED TERM 171)
SEE: ROAD

CASCADE (INCLUDED TERM 172)
SEE: WATERFALL

CASK_BUOY (INCLUDED TERM 173)
SEE: BUOY

CATARACT (INCLUDED TERM 174)
SEE: RAPIDS

CATCH_BASIN (INCLUDED TERM 175)
SEE: LAKE/TANK
DEFN: A TANK OR RESERVOIR DESIGNED TO RECEIVE RAINWATER; IT IS NOT TO BE CONFUSED WITH CATCHMENT
SOURCE: CANADIAN COUNCIL ON SURVEYING AND MAPPING, DRAFT STANDARDS

STANDARD FEATURE TERM 26: CATCHMENT
DEFN: AN AREA DRAINED BY A SINGLE WATERCOURSE; A NATURAL DRAINAGE AREA WHICH MAY COINCIDE WITH A RIVER BASIN, IN WHICH THE DIVIDES DIRECT THE WATER FROM THE RAINFALL AND PERCOLATION INTO A RIVER. HOWEVER WHERE UNDERGROUND FLOW IS INVOLVED, THE C. MAY BE LARGER OR SMALLER THAN THAT THAT MAY BE APPARENT FROM THE SURFACE RELIEF.
SOURCE: A DICTIONARY OF GEOGRAPHY, MONKHOUSE
ATTRIB: LOCATION AREA FLOOD_CONTROL
INCLUD: DRAINAGE_BASIN

CATHEDRAL (INCLUDED TERM 176)
SEE: BUILDING

CATTLE_GATE (INCLUDED TERM 177)
SEE: GATE

CATTLE_UNDERPASS (INCLUDED TERM 178)
SEE: TUNNEL

CAULDRON (INCLUDED TERM 179)
SEE: BASIN

CAUSEWAY (INCLUDED TERM 180)
SEE: ROAD

STANDARD FEATURE TERM 27: CAVE

DEFN: NATURALLY FORMED, SUBTERRANEAN OPEN AREA OR CHAMBER.
SOURCE: MODIFIED FROM CANADIAN COUNCIL ON SURVEYING AND MAPPING
ATTRIB: AREA DEPTH WIDTH CHAMBERS_NUMBER_OF NAME LOCATION AIR/LAND/WATER
INCLUD: CAVERN GROTTO NOTCH

CAVERN (INCLUDED TERM 181)
SEE: CAVE

CAY (INCLUDED TERM 182)
SEE: ISLAND

CEASE_FIRE_LINE (INCLUDED TERM 183)
SEE: BOUNDARY

CEJA (INCLUDED TERM 184)
SEE: CLIFF

CEMENT_PLANT (INCLUDED TERM 185)
SEE: BUILDING_COMPLEX

STANDARD FEATURE TERM 28: CEMETERY
DEFN: A PLACE FOR BURYING THE DEAD
SOURCE: AMERICAN HERITAGE DICTIONARY
ATTRIB: LOCATION NAME
INCLUD: GRAVEYARD

CERRITO (INCLUDED TERM 186)
SEE: MOUNT

CERRO (INCLUDED TERM 187)
SEE: MOUNT/RIDGE

CHANARAL (INCLUDED TERM 188)
SEE: WOODLAND

CHANNEL (INCLUDED TERM 189)
SEE: WATERCOURSE/LANE

CHANNEL_BUOY (INCLUDED TERM 190)
SEE: BUOY

CHANNEL_LIGHT (INCLUDED TERM 191)
SEE: BEACON

CHANNEL_MARKER (INCLUDED TERM 192)
SEE: BEACON/BUOY

CHAPARRAL (INCLUDED TERM 193)
SEE: WOODLAND

CHAPEIRAO (INCLUDED TERM 194)
SEE: PINNACLE

CHASM (INCLUDED TERM 195)
SEE: VALLEY

CHECKERED_BUOY (INCLUDED TERM 196)
SEE: BUOY

CHEMICAL_PLANT (INCLUDED TERM 197)
SEE: BUILDING_COMPLEX

STANDARD FEATURE TERM 29: CHIMNEY
DEFN: A STRUCTURE CONTAINING A PASSAGE OR FLUE FOR DISCHARGING SMOKE AND GASSES FROM COMBUSTION.
SOURCE: DEFENSE MAPPING AGENCY
ATTRIB: GAS_EMITTED_TYPE SMOKE_EMISSION FEATURE_CONNECTED FEATURE_PRESENT HEIGHT SHAPE SMOKE_EMISSION
INCLUD: FLARE_PIPE SMOKE_STACK

CHURCH (INCLUDED TERM 198)
SEE: BUILDING

CINDER_CONE (INCLUDED TERM 199)
SEE: MOUNT

CIRCULAR_BEACON (INCLUDED TERM 200)
SEE: BEACON

STANDARD FEATURE TERM 30: CIRQUE
DEFN: A DEEP NATURAL HOLLOW NEAR THE CREST OF A MOUNTAIN.
SOURCE: NEW DEFINITION

CISTERN (INCLUDED TERM 201)
SEE: TANK

CITY (INCLUDED TERM 202)
SEE: PLACE

CITY_HALL (INCLUDED TERM 203)
SEE: BUILDING

CITY_LIMITS (INCLUDED TERM 204)
SEE: BOUNDARY

CITY_SQUARE (INCLUDED TERM 205)
SEE: PARK

CLAIM_LINE (INCLUDED TERM 206)
SEE: BOUNDARY

CLEARED_AREA (INCLUDED TERM 207)
SEE: CLEARING

STANDARD FEATURE TERM 31: CLEARING
DEFN: AN OPEN AREA IN A FOREST.
SOURCE: MODIFIED FROM CANADIAN COUNCIL ON SURVEYING AND MAPPING
ATTRIB: LOCATION AGE AREA ARTIFICIALLY_IMPROVED/MANMADE/NATURAL PREDOMINANT_SPECIES NAME FIRE_LINE SPECIES WIDTH

INCLUD: CLEARED_AREA BALD GLADE BURN BURNT_OVER_AREA FIREBREAK FIRE_LINE LOGGED_AREA CUT_LINE .

STANDARD FEATURE TERM 32: CLIFF
DEFN: A HIGH, STEEP, OR OVERHANGING FACE OF ROCK.
SOURCE: AMERICAN HERITAGE DICTIONARY
ATTRIB: SLOPE COMPOSITION DWELLING INHABITED LOCATION NAME HEIGHT LENGTH
INCLUD: BLUFF CEJA CRAG ICE_CLIFF ESCARPMENT BEACH_SCARP PRECIPICE SCAW PALISADE SCARP SCAR MARINE_CLIFF

CLINIC (INCLUDED TERM 208)
SEE: BUILDING

CLOSED_BAY (INCLUDED TERM 209)
SEE: INLET

CLOSED_SEA (INCLUDED TERM 210)
SEE: SEA

CLOVER_LEAF_INTERCHANGE (INCLUDED TERM 211)
SEE: INTERSECTION

STANDARD FEATURE TERM 33: COAST
DEFN: THE GENERAL REGION OF INDEFINITE WIDTH THAT EXTENDS FROM THE SEA INLAND TO THE FIRST MAJOR CHANGE IN TERRAIN FEATURES.
SOURCE: U.S. NAVAL OCEANOGRAPHIC OFFICE GLOSSARY OF OCEANOGRAPHIC TERMS
ATTRIB: NAME LOCATION
INCLUD: COASTAL_AREA SEA_COAST RIVAGE COASTAL_PLAIN

COASTAL_SHORELINE (INCLUDED TERM 212)
SEE: SHORELINE

COAST_GUARD_STATION (INCLUDED TERM 213)
SEE: BUILDING/BUILDING_COMPLEX

COAST_GUARD_LINES (INCLUDED TERM 214)
SEE: BOUNDARY

COASTAL_AREA (INCLUDED TERM 215)
SEE: COAST

COASTAL_PLAIN (INCLUDED TERM 216)
SEE: PLAIN/COAST

COASTLINE (INCLUDED TERM 217)
SEE: SHORELINE

CODE_BEACON (INCLUDED TERM 218)
SEE: BEACON

COL (INCLUDED TERM 219)
SEE: GAP

COLLEGE (INCLUDED TERM 220)
SEE: BUILDING/BUILDING_COMPLEX

COLORED_LIGHT (INCLUDED TERM 221)
SEE: BEACON

COLREGS_DEMARCATION_LINE (INCLUDED TERM 222)
SEE: BOUNDARY

COMBINATION_BUOY (INCLUDED TERM 223)
SEE: BUOY

COMMUNITY (INCLUDED TERM 224)
SEE: PLACE

CONICAL_BUOY (INCLUDED TERM 225)
SEE: BUOY

CONIFEROUS_FOREST (INCLUDED TERM 226)
SEE: WOODLAND

CONSERVATION_AREA (INCLUDED TERM 227)
SEE: RESERVE

STANDARD FEATURE TERM 34: CONTINENT
DEFN: ONE OF THE LARGE, UNBROKEN MASSES OF LAND INTO WHICH THE EARTH'S SURFACE IS DIVIDED.
SOURCE: A DICTIONARY OF GEOGRAPHY, W.G. MOORE

CONTINENTAL_GLACIER (INCLUDED TERM 228)
SEE: ICE_FIELD

CONTINENTAL_ICE (INCLUDED TERM 229)
SEE: ICE_FIELD

CONTINUOUS_RADIOBEACON (INCLUDED TERM 230)
SEE: BEACON

STANDARD FEATURE TERM 35: CONTROL POINT
DEFN: A POINT OF KNOWN LOCATION.
SOURCE: NEW DEFINITION
ATTRIB: LANDMARK LOCATION MEMORIAL PHYSICAL COMPOSITION HORIZONTAL/VERTICAL METHOD_OF_MEASUREMENT FEATURE_PRESENT DIAGNOSTIC
INCLUD: VERTICAL_CONTROL_POINT BENCH_MARK VERTICAL_CONTROL_MONUMENT HORIZONTAL_CONTROL_POINT HORIZONTAL_CONTROL_MONUMENT PHOTOGRAMMETRIC_HORIZONTAL_CONTROL_POINT CONTROL_SURVEY_MONUMENT CADASTRAL_MONUMENT BOUNDARY_MONUMENT SURVEY_MONUMENT MONUMENTED_CONTROL_POINT WAY_POINT STONE_MOUND_MONUMENT CAIRN REFERENCE_POINT_LOCATION ASTRONOMIC_POSITION DIAGNOSTIC_POINT ELEVATION_POINT TRIANGULATION_STATION

CONTROL_SURVEY_MONUMENT (INCLUDED TERM 231)
SEE: CONTROL_POINT

CONTROL_TOWER (INCLUDED TERM 232)
SEE: TOWER

CONTROLLED_ACCESS_ROAD (INCLUDED TERM 233)
SEE: ROAD

CONTROLLED_AERODROME (INCLUDED TERM 234)

SEE: AIRPORT

CONTROLLING_DEPTH (INCLUDED TERM 235)
SEE: SOUNDING

CONVENT (INCLUDED TERM 236)
SEE: BUILDING

COOLING_TOWER (INCLUDED TERM 237)
SEE: TOWER

COPSE (INCLUDED TERM 238)
SEE: WOODLAND

CONVENTION_MANDATE_LINE (INCLUDED TERM 239)
SEE: BOUNDARY

CORAL_HEAD (INCLUDED TERM 240)
SEE: PINNACLE

CORAL_REEF (INCLUDED TERM 241)
SEE: REEF

CORDUROY_ROAD (INCLUDED TERM 242)
SEE: ROAD

COULEE (INCLUDED TERM 243)
SEE: VALLEY/WATERCOURSE

COURSE (INCLUDED TERM 244)
SEE: LANE/WATERCOURSE
DEFN: THAT PART OF A BODY OF WATER DEEP ENOUGH FOR NAVIGATION THROUGH AN AREA OTHERWISE NOT SUITABLE.
SOURCE: DEFENSE MAPPING AGENCY

COURTHOUSE (INCLUDED TERM 245)
SEE: BUILDING

COVE (INCLUDED TERM 246)
SEE: INLET

COVERED_BRIDGE (INCLUDED TERM 247)
SEE: BRIDGE

CRAG (INCLUDED TERM 248)
SEE: CLIFF/PINNACLE

STANDARD FEATURE TERM 36: CRATER
DEFN: CIRCULAR-SHAPED DEPRESSION AT THE SUMMIT OF A VOLCANIC CONE OR ON THE SURFACE OF THE LAND.
SOURCE: MODIFIED FROM GNIS DOCUMENTATION, APPENDIX B, FEATURE CLASS DEFINITIONS
INCLUD: CALDERA

CREEK (INCLUDED TERM 249)
SEE: WATERCOURSE

CREMATORIUM (INCLUDED TERM 250)
SEE: BUILDING

CREST (INCLUDED TERM 251)
SEE: RIDGE

STANDARD FEATURE TERM 37: CREVASSE
DEFN: A DEEP FISSURE IN SNOW OR ICE
SOURCE: DEFENSE MAPPING AGENCY
INCLUD: CREVICE

CREVICE (INCLUDED TERM 252)
SEE: CREVASSE/VALLEY

STANDARD FEATURE TERM 38: CRIB
DEFN: A CRATELIKE CONSTRUCTION OF LOGS OR BEAMS, USUALLY FILLED WITH STONES, PLACED IN WATER AS A FREE STANDING MOORING DEVICE OR AS THE FOUNDATION OF A PIER OR WHARF.
SOURCE: CANADIAN COUNCIL ON SURVEYING AND MAPPING

STANDARD FEATURE TERM 39: CROP LAND
DEFN: LAND THAT HAS BEEN PLOWED OR OTHERWISE CULTIVATED.
SOURCE: MODIFIED FROM CANADIAN COUNCIL ON SURVEYING AND MAPPING
ATTRIB: LOCATION CROP_GROWN GROWING_PATTERNS AREA GROWING_SEASON IRRIGATED NAME ACIDITY ENCLOSED FALLOW GRAZING LATITUDINAL_ZONE MINERAL_CONTENT PREDOMINANT_SPECIES TREE_COVER
INCLUD: FIELD CULTIVATED_FIELD CULTIVATED_AREA ORCHARD VINEYARD GARDEN MARKET_GARDEN TRUCK_FARM TRUCK_GARDEN PADDY_FIELD PLANTATION_FIELD RANGE PASTURE

CROSS_LINES (INCLUDED TERM 253)
SEE: SOUNDING

CROSSING (INCLUDED TERM 254)
SEE: INTERSECTION

CROSSING_GATE (INCLUDED TERM 255)
SEE: GATE

CUESTA (INCLUDED TERM 256)
SEE: RIDGE/MOUNT

CUL_DE_SAC (INCLUDED TERM 257)
SEE: ROAD
DEFN: A DEAD END STREET; IMPASSE
SOURCE: THE AMERICAN HERITAGE DICTIONARY

CULTIVATED_FIELD (INCLUDED TERM 258)
SEE: CROP_LAND

CULTIVATED_AREA (INCLUDED TERM 259)
SEE: CROP_LAND

CULVERT (INCLUDED TERM 260)
SEE: WATERCOURSE

CUSPATE_BAR (INCLUDED TERM 261)
SEE: BAR

CUSPATE_SPIT (INCLUDED TERM 262)
SEE: BAR

CUSTOM_BOUNDARY (INCLUDED TERM 263)
SEE: BOUNDARY

STANDARD FEATURE TERM 40: CUT
DEFN: AN EXCAVATION OF THE EARTH'S SURFACE TO PROVIDE PASSAGE FOR A ROAD, RAILWAY, CANAL ETC.
SOURCE: DEFENSE MAPPING AGENCY

CUT_LINE (INCLUDED TERM 264)
SEE: CLEARING

CUT_OFF (INCLUDED TERM 265)
SEE: WATERCOURSE

DALE (INCLUDED TERM 266)
SEE: VALLEY

STANDARD FEATURE TERM 41: DAM
DEFN: A BARRIER CONSTRUCTED ACROSS A WATERCOURSE TO CONTROL THE FLOW OR RAISE THE LEVEL OF WATER.
SOURCE: AMERICAN HERITAGE DICTIONARY
ATTRIB: LOCATION NAME CONSTRUCTION MATERIAL DISCHARGE FLOOD_CONTROL HYDROELECTRIC_POWER IRRIGATION LIGHTED/UNLIGHTED
INCLUD: BARRAGE WEIR BEAVER_DAM

DAN_BUOY (INCLUDED TERM 267)
SEE: BUOY

DANGER_BUOY (INCLUDED TERM 268)
SEE: BUOY

DANGEROUS_WRECK (INCLUDED TERM 269)
SEE: WRECK

DANGEROUS_ROCK (INCLUDED TERM 270)
SEE: ROCK

DAYBEACON (INCLUDED TERM 271)
SEE: BEACON

DEAD_END_STREET (INCLUDED TERM 272)
SEE: ROAD

DECIDUOUS_FOREST (INCLUDED TERM 273)
SEE: WOODLAND

DEEP (INCLUDED TERM 274)
SEE: TROUGH

DEFACTO_BOUNDARY (INCLUDED TERM 275)

SEE: BOUNDARY

DEFILE (INCLUDED TERM 276)
SEE: GAP/VALLEY

DELL (INCLUDED TERM 277)
SEE: VALLEY

STANDARD FEATURE TERM 42: DELTA
DEFN: A TRACT OF ALLUVIUM FORMED AT THE MOUTH OF A RIVER WHERE THE DEPOSITION OF SOME OF ITS LOAD EXCEEDS ITS RATE OF REMOVAL, CROSSED BY THE DIVERGENT CHANNELS (DISTRIBUTARIES) OF THE RIVER.
SOURCE: A DICTIONARY OF GEOGRAPHY, MONKHOUSE
ATTRIB: LOCATION WIDTH DISCHARGE NAVIGABLE
INCLUD: ALLUVIAL_FAN BAY_DELTA CANYON_DELTA FAN_DELTA FAN OUTWASH_PLAIN

DELTA_MORAINE (INCLUDED TERM 278)
SEE: MORAINE

DEMILITARIZED_LINE (INCLUDED TERM 279)
SEE: BOUNDARY

STANDARD FEATURE TERM 43: DEMILITARIZED ZONE
DEFN: AN AREA IN WHICH MILITARY ACTIVITY IS PROHIBITED.
SOURCE: DEFENSE MAPPING AGENCY
INCLUD: NEUTRAL_ZONE

DEPOT (INCLUDED TERM 280)
SEE: BUILDING

DEPRESSION (INCLUDED TERM 281)
SEE: BASIN/VALLEY

STANDARD FEATURE TERM 44: DESERT
DEFN: A REGION RENDERED BARREN OR PARTIALLY BARREN BY ENVIRONMENTAL EXTREMES, ESPECIALLY BY LOW RAINFALL.
SOURCE: AMERICAN HERITAGE DICTIONARY
ATTRIB: NAME LOCATION LATITUDINAL_ZONE AREA

DIAGNOSTIC_POINT (INCLUDED TERM 282)
SEE: CONTROL_POINT

DIAMOND_INTERSECTION (INCLUDED TERM 283)
SEE: INTERSECTION

DIKE (INCLUDED TERM 284)
SEE: EMBANKMENT

DIRECTIONAL_BEACON (INCLUDED TERM 285)
SEE: BEACON

DIRECTIONAL_ANTENNA (INCLUDED TERM 286)
SEE: ANTENNA

DISH (INCLUDED TERM 287)

SEE: ANTENNA
DEFN: A CONCAVE OBJECT USED FOR TRANSMITTING OR RECEIVING ELECTRONIC SIGNALS
SOURCE: DEFENSE MAPPING AGENCY

DISK (INCLUDED TERM 288)
SEE: ANTENNA
DEFN: SYNONYM FOR DISH

DISMAL (INCLUDED TERM 289)
SEE: WETLAND

DISPLAY_SIGN (INCLUDED TERM 290)
SEE: SIGN

DISPOSAL_AREA (INCLUDED TERM 291)
SEE: DUMPING_GROUND

DISPOSAL_BED (INCLUDED TERM 292)
SEE: DUMPING_GROUND

DISTRIBUTARY (INCLUDED TERM 293)
SEE: WATERCOURSE

DITCH (INCLUDED TERM 294)
SEE: WATERCOURSE

DIVIDED_HIGHWAY (INCLUDED TERM 295)
SEE: ROAD

DOCK (INCLUDED TERM 296)
SEE: BERTH

DOCKYARD (INCLUDED TERM 297)
SEE: SHIPYARD

DOLPHIN (INCLUDED TERM 298)
SEE: MOORING

DOME (INCLUDED TERM 299)
SEE: MOUNT

DOUBLE_TRACK_RAILWAY (INCLUDED TERM 300)
SEE: RAILWAY

DOWN (INCLUDED TERM 301)
SEE: GRASSLAND

DOWNLAND (INCLUDED TERM 302)
SEE: GRASSLAND

DOWNS (INCLUDED TERM 303)
SEE: GRASSLAND

DRAIN (INCLUDED TERM 304)
SEE: WATERCOURSE

DRAINAGE_BASIN (INCLUDED TERM 305)
SEE: CATCHMENT

DRAW (INCLUDED TERM 306)
SEE: WATERCOURSE

DRAW_BRIDGE (INCLUDED TERM 307)
SEE: BRIDGE

DREDGED_CHANNEL (INCLUDED TERM 308)
SEE: LANE/WATERCOURSE

DREDGING_BUOY (INCLUDED TERM 309)
SEE: BUOY

DRILL_HALL (INCLUDED TERM 310)
SEE: BUILDING

DRIVE_IN_THEATER (INCLUDED TERM 311)
SEE: OUTDOOR_THEATER

DRIVEWAY (INCLUDED TERM 312)
SEE: ROAD

DROWNED_VALLEY (INCLUDED TERM 313)
SEE: VALLEY

DRUMLIN (INCLUDED TERM 314)
SEE: MOUNT/RIDGE

DRY_HARBOR (INCLUDED TERM 315)
SEE: HARBOR

STANDARD FEATURE TERM 45: DRYDOCK
DEFN: AN ARTIFICIAL BASIN FITTED WITH GATE OR CAISSON INTO WHICH A VESSEL MAY BE FLOATED AND FROM WHICH THE WATER MAY BE PUMPED OUT TO EXPOSE THE BOTTOM OF THE VESSEL.
SOURCE: NAUTICAL CHART MANUAL
INCLUD: FLOATING_DOCK GRAVING_DOCK

DUAL_HIGHWAY (INCLUDED TERM 316)
SEE: ROAD

DUMP (INCLUDED TERM 317)
SEE: DUMPING_GROUND

DUMP_SITE (INCLUDED TERM 318)
SEE: DUMPING_GROUND

STANDARD FEATURE TERM 46: DUMPING GROUND
DEFN: AREA DESIGNATED FOR DUMPING VARIOUS TYPES OF MATERIALS.

SOURCE: MODIFIED FROM NAUTICAL CHART MANUAL
ATTRIB: LOCATION AREA WASTE_MATERIAL WATER_DEPTH SALINITY NAME AIR/LAND/WATER MINERAL_CONTENT LANDFILL
INCLUD: SPOIL_GROUND SPOIL_AREA DISPOSAL_AREA DUMP_SITE SCRAP_YARD SPOIL_BANKS DISPOSAL_BED JUNK_YARD LIQUID_WASTE_DISPOSAL_AREA TAILING_PILE MINERAL_PILE TAILING_POND DUMP SLAG_HEAP WRECKING_YARD

DYKE (INCLUDED TERM 319)
SEE: EMBANKMENT
DEFN: ALTERNATE SPELLING OF DIKE

EARLY_WARNING_RADAR_SITE (INCLUDED TERM 320)
SEE: BUILDING/BUILDING_COMPLEX

STANDARD FEATURE TERM 47: EARTH SURFACE
DEFN: THE OUTERMOST SURFACE OF THE LAND AND WATERS OF THE PLANET.
SOURCE: NEW DEFINITION

ECOLOGICAL_AREA (INCLUDED TERM 321)
SEE: RESERVE

ELECTRIC_POWER_GENERATING_STATION (INCLUDED TERM 322)
SEE: BUILDING/BUILDING_COMPLEX

ELECTRICAL_TOWER (INCLUDED TERM 323)
SEE: TOWER

ELECTRIC_SUBSTATION (INCLUDED TERM 324)
SEE: BUILDING/BUILDING_COMPLEX

ELEVATED_HIGHWAY (INCLUDED TERM 325)
SEE: ROAD

ELEVATION_POINT (INCLUDED TERM 326)
SEE: CONTROL_POINT

STANDARD FEATURE TERM 48: EMBANKMENT
DEFN: A RAISED STRUCTURE OF EARTH, GROUND, ETC.
SOURCE: MODIFIED FROM CANADIAN COUNCIL ON SURVEYING AND MAPPING
ATTRIB: LOCATION LENGTH HEIGHT COMPOSITION WIDTH NATURAL ARTIFICIALLY_IMPROVED NAME
INCLUD: DIKE DYKE LEVEE BULKHEAD SEAWALL

END_MORAINE (INCLUDED TERM 327)
SEE: MORAINE

ENGINE_TEST_CELL (INCLUDED TERM 328)
SEE: BUILDING/BUILDING_COMPLEX

ENTRANCE_LOCK (INCLUDED TERM 329)
SEE: LOCK

ENTREPOT (INCLUDED TERM 330)
SEE: PORT

EQUATORIAL_FOREST (INCLUDED TERM 331)

SEE: WOODLAND

EQUATORIAL_RAIN_FOREST (INCLUDED TERM 332)
SEE: WOODLAND

ESCARPMENT (INCLUDED TERM 333)
SEE: CLIFF

ESKER (INCLUDED TERM 334)
SEE: RIDGE

ESTUARY (INCLUDED TERM 335)
SEE: INLET/MOUTH

EVERGLADE (INCLUDED TERM 336)
SEE: WETLAND

EXCAVATION (INCLUDED TERM 337)
SEE: MINE

STANDARD FEATURE TERM 49: EXHIBITION GROUND
DEFN: A PUBLIC AREA CONTAINING BUILDINGS, PADDOCKS ETC. FOR THE DISPLAY OF LIVESTOCK, AGRICULTURAL PRODUCE, MACHINERY, ETC.
SOURCE: CANADIAN COUNCIL ON SURVEYING AND MAPPING
ATTRIB: LOCATION NAME EVENTS_HELD
INCLUD: FAIRGROUND

EXPRESSWAY (INCLUDED TERM 338)
SEE: ROAD

FACTORY (INCLUDED TERM 339)
SEE: BUILDING/BUILDING_COMPLEX

FAIRGROUND (INCLUDED TERM 340)
SEE: EXHIBITION_GROUND

FAIRWAY (INCLUDED TERM 341)
SEE: LANE

FAIRWAY_BUOY (INCLUDED TERM 342)
SEE: BUOY

FALLS (INCLUDED TERM 343)
SEE: WATERFALL

FAN (INCLUDED TERM 344)
SEE: DELTA

FAN_DELTA (INCLUDED TERM 345)
SEE: DELTA

FAN_MARKER_BEACON (INCLUDED TERM 346)
SEE: BEACON

STANDARD FEATURE TERM 50: FARM
DEFN: A TRACT OF CROP OR GRAZING LAND, AS WELL AS THE GROUP OF BUILDINGS WITH AND OFTEN SURROUNDING A FARMHOUSE, INCLUDING BARNS, SHEDS, AND OTHER OUTBUILDINGS, USED FOR AGRICULTURAL PRODUCTION.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY
ATTRIB: CROP_GROWN CROP_USE
INCLUD: NURSERY RANCH

FARM_LANE (INCLUDED TERM 347)
SEE: ROAD

STANDARD FEATURE TERM 51: FAULT
DEFN: A FRACTURE IN THE EARTH'S CRUST WITH DISPLACEMENT ON ONE SIDE OF THE FRACTURE RELATIVE TO THE OTHER.
SOURCE: DEFENSE MAPPING AGENGY
ATTRIB: LENGTH

FEEDLOT (INCLUDED TERM 348)
SEE: STOCKYARD

FEN (INCLUDED TERM 349)
SEE: WETLAND

STANDARD FEATURE TERM 52: FENCE
DEFN: AN ENCLOSURE OR BARRIER MADE OF WIRE, RAILS, SLATS OR OTHER RELATIVELY LIGHT MATERIAL; AS OPPOSED TO A WALL WHICH IS OF STONE OR OTHER HEAVY MATERIAL.
SOURCE: CANADIAN COUNCIL ON SURVEYING AND MAPPING
ATTRIB: LENGTH HEIGHT COMPOSITION ARTIFICIALLY_IMPROVED/MANMADE/NATURAL BOUNDARY_MARKER BARRIER SOUND_BARRIER
INCLUD: SOUND_BARRIER

FERRY (INCLUDED TERM 350)
SEE: WHARF/PIER

FERRY_CROSSING (INCLUDED TERM 351)
SEE: LANE

FERRY_SITE (INCLUDED TERM 352)
SEE: BERTH/PIER/WHARF

FERRY_SLIP (INCLUDED TERM 353)
SEE: BERTH

FERRY_STATION (INCLUDED TERM 354)
SEE: BUILDING

FERRY_TERMINAL (INCLUDED TERM 355)
SEE: PIER/WHARF

FIELD (INCLUDED TERM 356)
SEE: CROP_LAND/GRASSLAND

FILLING_STATION (INCLUDED TERM 357)
SEE: BUILDING/BUILDING_COMPLEX

STANDARD FEATURE TERM 53: FILTRATION BEDS

DEFN: AN AREA CONTAINING LAYERS OF MATERIAL USED TO FILTER OR AERATE WATER.
SOURCE: DEFENSE MAPPING AGENCY
INCLUD: AERATION_BEDS

FILTRATION_PLANT (INCLUDED TERM 358)
SEE: BUILDING_COMPLEX

FIORD (INCLUDED TERM 359)
SEE: INLET

FIRE_LINE (INCLUDED TERM 360)
SEE: CLEARING

FIRE_LOOKOUT_TOWER (INCLUDED TERM 361)
SEE: TOWER

FIRE_LOOKOUT_BUILDING (INCLUDED TERM 362)
SEE: BUILDING

FIRE_ROAD (INCLUDED TERM 363)
SEE: ROAD

FIRE_STATION (INCLUDED TERM 364)
SEE: BUILDING/BUILDING_COMPLEX

FIRE_TOWER (INCLUDED TERM 365)
SEE: TOWER

FIREBREAK (INCLUDED TERM 366)
SEE: CLEARING

FIRTH (INCLUDED TERM 367)
SEE: INLET

STANDARD FEATURE TERM 54: FISH HATCHERY
DEFN: A FACILITY USED FOR THE SPAWNING OF FISH WHICH ARE SUBSEQUENTLY USED TO STOCK LAKES AND STREAMS.
SOURCE: CANADIAN COUNCIL ON SURVEYING AND MAPPING
ATTRIB: LOCATION NAME SPECIES CAPACITY
INCLUD: FISHERY

FISH_HAVEN (INCLUDED TERM 368)
SEE: FISHING_GROUND

STANDARD FEATURE TERM 55: FISH LADDER
DEFN: A FACILITY CONSISTING OF A SERIES OF SMALL POOLS EACH ONE SLIGHTLY HIGHER THAN THE PRECEDING, BUILD AROUND A DAM TO ENABLE FISH TO MAKE THEIR WAY UPSTREAM.
SOURCE: CANADIAN COUNCIL ON SURVEYING AND MAPPING
ATTRIB: LOCATION LENGTH SPECIES_SERVED SEASON_USED WIDTH NAME

FISH_NET_BUOY (INCLUDED TERM 369)
SEE: BUOY

FISH_POUND (INCLUDED TERM 370)

SEE: FISH_TRAP

STANDARD FEATURE TERM 56: FISH TRAP
DEFN: A DEVICE USED TO CATCH FISH.
SOURCE: NEW DEFINITION
ATTRIB: LOCATION NAME SEASON_USED PREDOMINANT_SPECIES SALINITY LENGTH WIDTH
INCLUD: FISH_POUND FISH_STAKES WEIR TUNNY_NETS STAKE_NET FISH_WEIR

FISH_TRAP_AREA (INCLUDED TERM 371)
SEE: FISHING_GROUND

FISH_WEIRS (INCLUDED TERM 372)
SEE: FISH_TRAP

FISHERY (INCLUDED TERM 373)
SEE: FISHING_GROUND/FISH_HATCHERY

STANDARD FEATURE TERM 57: FISHING GROUND
DEFN: A WATER AREA IN WHICH FISHING IS FREQUENTLY CARRIED ON.
SOURCE: MODIFIED FROM NAVIGATION DICTIONARY
ATTRIB: LOCATION SOVEREIGNTY PREDOMINANT_SPECIES SEASONAL_LIMITS AREA SALINITY ARTIFICIALLY_IMPROVED/MANMADE/NATURAL NAME
INCLUD: FISHERY FISH_TRAP_AREA OYSTER_BED FISH_HAVEN FISHING_ZONE

FISH_STAKES (INCLUDED TERM 374)
SEE: FISH_TRAP/POST

FISHING_ZONE (INCLUDED TERM 375)
SEE: FISHING_GROUND

FIXED_AND_FLASHING_LIGHT (INCLUDED TERM 376)
SEE: BEACON

FIXED_AND_GROUP_FLASHING_LIGHT (INCLUDED TERM 377)
SEE: BEACON

FIXED_LIGHT (INCLUDED TERM 378)
SEE: BEACON

FJORD (INCLUDED TERM 379)
SEE: INLET

FLAG_TOWER (INCLUDED TERM 380)
SEE: TOWER

FLAME_FLOAT (INCLUDED TERM 381)
SEE: BUOY

FLARE_PIPE (INCLUDED TERM 382)
SEE: CHIMNEY

FLASHING_LIGHT (INCLUDED TERM 383)
SEE: BEACON

STANDARD FEATURE TERM 58: FLAT
DEFN: A LEVEL TRACT LYING AT A SMALL DEPTH BELOW THE SURFACE OF WATER, OR ALTERNATELY COVERED AND LEFT BARE BY THE TIDE.
SOURCE: NAUTICAL CHART MANUAL, U.S. DEPT. OF COMMERCE, NATIONAL OCEAN SURVEY
INCLUD: TIDAL_FLAT BARRIER_FLAT

FLOATING_BREAKWATER (INCLUDED TERM 384)
SEE: BREAKWATER

FLOATING_DOCK (INCLUDED TERM 385)
SEE: DRYDOCK

FLOATING_MARSH (INCLUDED TERM 386)
SEE: WETLAND

FLOEBERG (INCLUDED TERM 387)
SEE: ICEBERG

STANDARD FEATURE TERM 59: FLOOD PLAIN
DEFN: AN AREA WHICH IS SUBJECT TO PERIODIC FLOODING.
SOURCE: MODIFIED FROM A DICTIONARY OF BASIC GEOGRAPHY, SCHMIEDER, GRIFFIN, CHATHAM, NATOLI
ATTRIB: WIDTH LENGTH FEATURE_PRESENT

FLOODGATE (INCLUDED TERM 388)
SEE: GATE

FLUME (INCLUDED TERM 389)
SEE: WATERCOURSE

FOG_SIGNAL (INCLUDED TERM 390)
SEE: BEACON

FOOTBRIDGE (INCLUDED TERM 391)
SEE: BRIDGE

FOOTHILL (INCLUDED TERM 392)
SEE: MOUNT

FOOTPATH (INCLUDED TERM 393)
SEE: ROAD

FORCES_BASE (INCLUDED TERM 394)
SEE: MILITARY_BASE

STANDARD FEATURE TERM 60: FORD
DEFN: THE SHALLOW PART OF A RIVER WHICH CAN BE EASILY CROSSED
SOURCE: A DICTIONARY OF GEOGRAPHY, MONKHOUSE

FOREDEEP (INCLUDED TERM 395)
SEE: TROUGH

FORELAND (INCLUDED TERM 396)
SEE: PENINSULA

FORESHORE (INCLUDED TERM 397)
SEE: SHORE

FORESHORE_FLATS (INCLUDED TERM 398)
SEE: BEACH

FOREST (INCLUDED TERM 399)
SEE: WOODLAND

FOREST/PARK_BOUNDARY (INCLUDED TERM 400)
SEE: BOUNDARY

FOREST_RESERVE (INCLUDED TERM 401)
SEE: RESERVE

FORK (INCLUDED TERM 402)
SEE: WATERCOURSE

STANDARD FEATURE TERM 61: FORT
DEFN: A FORTIFIED PLACE OR POSITION.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY
INCLUD: BATTERY

FREEWAY (INCLUDED TERM 403)
SEE: ROAD

FRINGING_REEF (INCLUDED TERM 404)
SEE: REEF

STANDARD FEATURE TERM 62: FUMAROLE
DEFN: A HOLE IN THE EARTH'S CRUST FROM WHICH STEAM AND GASES ARE EMITTED.
SOURCE: ADAPTED FROM MOORE, A DICTIONARY OF GEOGRAPHY
ATTRIB: LOCATION GAS_EMITTED_TYPE

FUNERAL_HOME (INCLUDED TERM 405)
SEE: BUILDING

STANDARD FEATURE TERM 63: GANTRY
DEFN: A FRAME STRUCTURE RAISED ON SIDE SUPPORTS SO AS TO SPAN OVER OR AROUND SOMETHING.
SOURCE: DEFENSE MAPPING AGENCY
ATTRIB: FEATURE_SPANNED
INCLUD: RAILROAD_GANTRY

STANDARD FEATURE TERM 64: GAP
DEFN: LOW POINT OR OPENING BETWEEN HILLS OR MOUNTAINS OR IN A RIDGE OR MOUNTAIN RANGE.
SOURCE: GNIS DOCUMENTATION, APPENDIX B
ATTRIB: LOCATION SHAPE SLOPE WIDTH
INCLUD: DEFILE MOUNTAIN_PASS NOTCH PASS SADDLE COL SILL

GARAGE (INCLUDED TERM 406)
SEE: BUILDING

GARDEN (INCLUDED TERM 407)

SEE: CROP_LAND

GARIGUE (INCLUDED TERM 408)
SEE: WOODLAND

GAS_FIELD (INCLUDED TERM 409)
SEE: OIL_FIELD

GASOMETER (INCLUDED TERM 410)
SEE: TANK

STANDARD FEATURE TERM 65: GATE
DEFN: A STRUCTURE THAT MAY BE SWUNG, DRAWN, OR LOWERED TO BLOCK AN ENTRANCE OR PASSAGEWAY.
SOURCE: AMERICAN HERITAGE DICTIONARY
ATTRIB: LOCATION RELATED_FEATURE NAME WIDTH LENGTH TOLL HEIGHT COMPOSITION TIDAL FEATURE_CONNECTED FUNCTION FEATURE_PRESENT
INCLUD: CROSSING_GATE CATTLE_GATE TOLL_GATE CAISSON TIDE_GATE FLOODGATE SLUICE SLUICE_GATE SEA_GATE

STANDARD FEATURE TERM 66: GEYSER
DEFN: AN INTERMITTENT FOUNTAIN OF HOT WATER EJECTED WITH FORCE FROM A HOLE IN THE EARTH'S CRUST
SOURCE: ADAPTED FROM MONKHOUSE

GLACIAL_GORGE (INCLUDED TERM 411)
SEE: VALLEY

GLACIAL_MORAINE (INCLUDED TERM 412)
SEE: MORAINE

GLACIAL_STREAM (INCLUDED TERM 413)
SEE: WATERCOURSE

GLACIAL_TROUGH (INCLUDED TERM 414)
SEE: VALLEY

GLACIER (INCLUDED TERM 415)
SEE: ICE_FIELD

GLACIER_BERG (INCLUDED TERM 416)
SEE: ICEBERG

GLACIER_ICEBERG (INCLUDED TERM 417)
SEE: ICEBERG

GLACIER_TONGUE (INCLUDED TERM 418)
SEE: ICE_FIELD

GLADE (INCLUDED TERM 419)
SEE: CLEARING/GRASSLAND

GLEN (INCLUDED TERM 420)
SEE: VALLEY

GOE (INCLUDED TERM 421)
SEE: VALLEY

STANDARD FEATURE TERM 67: GOLF COURSE
DEFN: AN AREA SET OUT FOR THE PLAYING OF GOLF.
SOURCE: CANADIAN COUNCIL ON SURVEYING AND MAPPING
ATTRIB: LOCATION NAME
INCLUD: GOLF_DRIVING_RANGE

GOLF_DRIVING_RANGE (INCLUDED TERM 422)
SEE: GOLF_COURSE

GORGE (INCLUDED TERM 423)
SEE: VALLEY

GRABEN (INCLUDED TERM 424)
SEE: VALLEY

GRADE_CROSSING (INCLUDED TERM 425)
SEE: INTERSECTION

GRADE_INTERSECTION (INCLUDED TERM 426)
SEE: INTERSECTION

GRAIN_ELEVATOR (INCLUDED TERM 427)
SEE: BUILDING

GRANARY (INCLUDED TERM 428)
SEE: BUILDING

STANDARD FEATURE TERM 68: GRANDSTAND
DEFN: A USUALLY ROOFED STRUCTURE FOR VIEWING EVENTS AND HAVING TIERS OF SEATS FOR SPECTATORS.
SOURCE: DEFENSE MAPPING AGENCY

STANDARD FEATURE TERM 69: GRASSLAND
DEFN: AN UNCULTIVATED AREA OF GRASS OR GRASSLIKE VEGETATION.
SOURCE: MODIFIED FROM AMERICAN HERITAGE DICTIONARY
ATTRIB: LOCATION SPECIES ANNUAL_PRECIPITATION ACIDITY AREA PREDOMINANT_SPECIES NAME GRAZING
INCLUD: MEADOW RANGE SAVANNA FIELD PRAIRIE PASTURE PAMPAS HAY_MEADOW STEPPE VELD PUSZTA
DOWNLAND DOWNS DOWN GLADE MOOR HERBACEOUS_AREA

STANDARD FEATURE TERM 70: GRAVE
DEFN: A PLACE WITHIN A GRAVEYARD USED FOR BURIAL.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

GRAVE_MARKER (INCLUDED TERM 429)
SEE: MONUMENT

GRAVEL_PIT (INCLUDED TERM 430)
SEE: MINE

GRAVEYARD (INCLUDED TERM 431)
SEE: CEMETERY

GRAVING_DOCK (INCLUDED TERM 432)
SEE: DRYDOCK

GREENHOUSE (INCLUDED TERM 433)
SEE: BUILDING

GROIN (INCLUDED TERM 434)
SEE: BREAKWATER

GROTTO (INCLUDED TERM 435)
SEE: CAVE

STANDARD FEATURE TERM 71: GROUND
DEFN: THE SOLID PORTION OF THE EARTH UP TO AND INCLUDING THE GROUND_SURFACE.
SOURCE: NEW DEFINITION

STANDARD FEATURE TERM 72: GROUND SURFACE
DEFN: THE LAND SURFACE OF THE EARTH, BOTH EXPOSED AND UNDERWATER.
SOURCE: NEW DEFINITION

GROVE (INCLUDED TERM 436)
SEE: WOODLAND

GROYNE (INCLUDED TERM 437)
SEE: BREAKWATER

STANDARD FEATURE TERM 73: GUARD RAIL
DEFN: A STRONG FENCE OR BARRIER TO PREVENT VEHICLES FROM LEAVING THE ROADWAY, OR FOR PEOPLE'S SAFETY.
SOURCE: MODIFIED FROM CANADIAN COUNCIL ON SURVEYING AND MAPPING
INCLUD: GUIDE_RAIL

GUIDE_RAIL (INCLUDED TERM 438)
SEE: GUARD_RAIL

GULCH (INCLUDED TERM 439)
SEE: VALLEY/WATERCOURSE

GULF (INCLUDED TERM 440)
SEE: INLET

GULLY (INCLUDED TERM 441)
SEE: VALLEY/WATERCOURSE

GUT (INCLUDED TERM 442)
SEE: WATERCOURSE

GUTTER (INCLUDED TERM 443)
SEE: WATERCOURSE

GUYOT (INCLUDED TERM 444)
SEE: PLATEAU

HALF_TIDE_BASIN (INCLUDED TERM 445)
SEE: LOCK

HAMLET (INCLUDED TERM 446)

SEE: PLACE

HANGAR (INCLUDED TERM 447)
SEE: BUILDING

STANDARD FEATURE TERM 74: HARBOR
DEFN: AN AREA OF WATER WHERE SHIPS, PLANES OR OTHER WATERCRAFT CAN ANCHOR OR DOCK. ALSO SPELLED HARBOUR.
SOURCE: MODIFIED FROM GEOGRAPHIC NAMES INFORMATION SYSTEM APPENDIX B
ATTRIB: LOCATION TIDAL ARTIFICIALLY_IMPROVED/MANMADE/NATURAL NAME VEHICLE_TYPE AREA SALINITY FACILITIES_PRESENT CONTROL_OVER_WATER_LEVEL EXPOSED/SHELTERED RESTRICTIONS LIGHTED/UNLIGHTED VEHICLE_SIZE_SERVED BUOYED CARGO_TRANSPORTATIO CHARTED_DEPTH COMMERCIAL_SHIPPING
INCLUD: DRY_HARBOR HARBOR_OF_REFUGE ARTIFICIAL_HARBOR BOAT_HARBOR INNER_HARBOR ISLAND_HARBOR NATURAL_HARBOR TIDAL_HARBOR HAVEN BOAT_BASIN ANCHORAGE OPEN_BERTH PROHIBITED_ANCHORAGE TEMPORARY_ANCHORAGE QUARANTINE_ANCHORAGE OPEN_HARBOR OPEN_ROADSTEAD ROADSTEAD STRANDING_HARBOR CAMBER

HARBOR_LIMIT (INCLUDED TERM 448)
SEE: BOUNDARY

HARBOR_LINE (INCLUDED TERM 449)
SEE: BOUNDARY

HARBOR_OF_REFUGE (INCLUDED TERM 450)
SEE: HARBOR

HAVEN (INCLUDED TERM 451)
SEE: HARBOR

HAY_MEADOW (INCLUDED TERM 452)
SEE: GRASSLAND

HEAD (INCLUDED TERM 453)
SEE: PENINSULA

HEADLAND (INCLUDED TERM 454)
SEE: PENINSULA

STANDARD FEATURE TERM 75: HEADWATERS
DEFN: THE UPPER PART OF A RIVER SYSTEM: DENOTING THE UPPER BASIN AND SOURCE STREAMS OF A RIVER.
SOURCE: MODIFIED FROM A DICTIONARY OF GEOGRAPHY, MONKHOUSE

HEATH (INCLUDED TERM 455)
SEE: WOODLAND/WETLAND

STANDARD FEATURE TERM 76: HEDGE
DEFN: A DENSE GROWTH OF SHRUBBERY PLANTED AS A FENCE OR BOUNDARY.
SOURCE: CANADIAN COUNCIL ON SURVEYING AND MAPPING
ATTRIB: HEIGHT LENGTH BOUNDARY_MARKER BARRIER
INCLUD: HEDGEROW SHELTERBELT

HEDGEROW (INCLUDED TERM 456)
SEE: HEDGE

HELICOPTER_LANDING_PAD (INCLUDED TERM 457)
SEE: HELIPAD

STANDARD FEATURE TERM 77: HELIPAD
DEFN: A TRANSPORTATION STRUCTURE USED FOR THE LANDING OF HELICOPTERS.
SOURCE: CANADIAN COUNCIL ON SURVEYING AND MAPPING
ATTRIB: SHAPE WIDTH LIGHTED/UNLIGHTED SURFACE_MATERIAL

HELIPORT (INCLUDED TERM 458)
SEE: AIRPORT

HERBACEOUS_AREA (INCLUDED TERM 459)
SEE: GRASSLAND

HIGHWAY (INCLUDED TERM 460)
SEE: ROAD

HIGHWAY_ROUTE_NUMBER (INCLUDED TERM 461)
SEE: SIGN

HILL (INCLUDED TERM 462)
SEE: MOUNT

HILLOCK (INCLUDED TERM 463)
SEE: MOUNT

HOCKEY_RINK (INCLUDED TERM 464)
SEE: ICE_RINK

HOLDING_PEN (INCLUDED TERM 465)
SEE: STOCKYARD

HOLLOW (INCLUDED TERM 466)
SEE: VALLEY

HOMING_BEACON (INCLUDED TERM 467)
SEE: BEACON

HOOK (INCLUDED TERM 468)
SEE: BAR/PENINSULA

HOOKED_SPIT (INCLUDED TERM 469)
SEE: BAR

STANDARD FEATURE TERM 78: HOPPER
DEFN: A TOP LOADING FUNNEL_SHAPED STRUCTURE FOR TEMPORARY STORAGE OF LOOSE MATERIALS WHICH WILL BE DISPENSED FROM ITS BOTTOM.
SOURCE: DEFENSE MAPPING AGENCY

HORIZON_LIGHTS (INCLUDED TERM 470)
SEE: BEACON

HORIZONTAL_CONTROL_POINT (INCLUDED TERM 471)
SEE: CONTROL_POINT

HORIZONTAL_CONTROL_MONUMENT (INCLUDED TERM 472)
SEE: CONTROL_POINT

HORN_BUOY (INCLUDED TERM 473)
SEE: BUOY

HOSPITAL (INCLUDED TERM 474)
SEE: BUILDING

HOSPITAL_COMPLEX (INCLUDED TERM 475)
SEE: BUILDING_COMPLEX
DEFN: GROUP OF STRUCTURES WHERE THE SICK OR INJURED MAY RECEIVE MEDICAL CARE
SOURCE: NEW DEFINITION

HOSTEL (INCLUDED TERM 476)
SEE: BUILDING

HOTEL (INCLUDED TERM 477)
SEE: BUILDING

HOTSPRING (INCLUDED TERM 478)
SEE: SPRING

HOUSE (INCLUDED TERM 479)
SEE: BUILDING

HOVERCRAFT_STATION (INCLUDED TERM 480)
SEE: BUILDING

HOVERCRAFT_TERMINAL (INCLUDED TERM 481)
SEE: PIER/WHARF

HULK (INCLUDED TERM 482)
SEE: WRECK

HUMMOCK (INCLUDED TERM 483)
SEE: MOUNT/ISLAND

HUT (INCLUDED TERM 484)
SEE: BUILDING

HYDRO_TOWER (INCLUDED TERM 485)
SEE: TOWER

HYDROFOIL_STATION (INCLUDED TERM 486)
SEE: BUILDING

HYDROFOIL_TERMINAL (INCLUDED TERM 487)
SEE: PIER/WHARF

ICE_BUOY (INCLUDED TERM 488)
SEE: BUOY

ICE_CAP (INCLUDED TERM 489)
SEE: ICE_FIELD

ICE_CLIFF (INCLUDED TERM 490)
SEE: CLIFF

STANDARD FEATURE TERM 79: ICE FIELD
DEFN: LARGE AREA OF PERMANENT SEA OR LAND ICE.
SOURCE: MODIFIED FROM STAMP, DICTIONARY OF GEOGRAPHY
ATTRIB: NAME LOCATION MOVING/STATIONARY ATTACHED_TO_LAND FLOATING LEVEL_SURFACE PERENNIAL/INTERMITTENT
INCLUD: ICE_SHEET ICE_CAP GLACIER ROCK_GLACIER POLAR_ICE_PACK PACK_ICE POLAR_ICE SHELF_ICE GLACIER_TONGUE ISLAND_ICE ARCTIC_PACK BAY_ICE CONTINENTAL_GLACIER CONTINENTAL_ICE

ICE_PEAK (INCLUDED TERM 491)
SEE: PEAK

STANDARD FEATURE TERM 80: ICE RINK
DEFN: A SURFACE OF ICE FOR ICE SKATING.
SOURCE: WEBSTER'S NEW COLLEGIATE DICTIONARY
ATTRIB: SPORTS_TYPE COVERED/UNCOVERED NAME LOCATION
INCLUD: HOCKEY_RINK RINK

ICE_SHEET (INCLUDED TERM 492)
SEE: ICE_FIELD

STANDARD FEATURE TERM 81: ICEBERG
DEFN: A LARGE MASS OF DETACHED LAND ICE IN THE SEA OR STRANDED IN SHALLOW WATER.
SOURCE: MODIFIED FROM NAVIGATION DICTIONARY
ATTRIB: LOCATION NAME
INCLUD: ARCHED_ICEBERG FLOEBERG GLACIER_BERG BARRIER_ICEBERG BERY GLACIER_ICEBERG

IDENTIFICATION_BEACON (INCLUDED TERM 493)
SEE: BEACON

IMPROVED_CHANNEL (INCLUDED TERM 494)
SEE: WATERCOURSE/LANE

INCLINE_RAILWAY (INCLUDED TERM 495)
SEE: RAILWAY

STANDARD FEATURE TERM 82: INDIAN RESERVATION
DEFN: AN AREA SET ASIDE FOR THE USE OF AN INDIAN TRIBE OR TRIBES.
SOURCE: MODIFIED FROM CANADIAN COUNCIL ON SURVEYING AND MAPPING
ATTRIB: LOCATION NAME
INCLUD: RESERVATION

INDIAN_TREATY_LINE (INCLUDED TERM 496)
SEE: BOUNDARY

INLAND_SEA (INCLUDED TERM 497)
SEE: LAKE

STANDARD FEATURE TERM 83: INLET

DEFN: AN OPENING OF THE SEA INTO THE LAND, OR OF A LAKE INTO ITS SHORES.
SOURCE: MODIFIED FROM A DICTIONARY OF GEOGRAPHY, MONKHOUSE
ATTRIB: NAME LOCATION SIZE SHAPE WIDTH DEPTH SALINITY BUOYED COMMERCIAL_SHIPPING NAVIGABLE
INCLUD: ANSE ARM BAY BIGHT COVE ESTUARY FIRTH GULF CLOSED_BAY RIA RINCON FIORD FJORD

INNER_HARBOR (INCLUDED TERM 498)
SEE: HARBOR

INNER_LEAD (INCLUDED TERM 499)
SEE: LANE

INSHORE (INCLUDED TERM 500)
SEE: SHORE

STANDARD FEATURE TERM 84: INSHORE TRAFFIC ZONE
DEFN: A DESIGNATED AREA BETWEEN THE LANDWARD BOUNDARY OF A TRAFFIC_SEPARATION_SCHEME AND THE ADJACENT COAST, INTENDED FOR LOCAL TRAFFIC.
SOURCE: MODIFIED FROM DMA

INTERCHANGE (INCLUDED TERM 501)
SEE: INTERSECTION

INTERMITTENT_LIGHT (INCLUDED TERM 502)
SEE: BEACON

INTERMONTANE_PLATEAU (INCLUDED TERM 503)
SEE: PLATEAU

INTERNATIONAL_BOUNDARY (INCLUDED TERM 504)
SEE: BOUNDARY

INTERNATIONAL_DATE_LINE (INCLUDED TERM 505)
SEE: BOUNDARY

INTERPROVINCIAL_BOUNDARY (INCLUDED TERM 506)
SEE: BOUNDARY

STANDARD FEATURE TERM 85: INTERSECTION
DEFN: THE JUNCTION OF ROADS OR TRACKS.
SOURCE: NEW DEFINITION
ATTRIB: LOCATION SHAPE GRADE_SEPARATION FEATURE_CONNECTED AREA FEATURE_PRESENT PASSENGER_TRANSPORTATION LIGHTED/UNLIGHTED
INCLUD: CLOVER_LEAF_INTERCHANGE CROSSING DIAMOND_INTERSECTION GRADE_INTERSECTION GRADE_CROSSING INTERCHANGE PEDESTRIAN_CROSSING TRAFFIC_CIRCLE RAILROAD_CROSSING

STANDARD FEATURE TERM 86: IRRIGATION SYSTEM
DEFN: A SYSTEM DESIGNED TO SUPPLY LAND WITH WATER.
SOURCE: MODIFIED FROM AMERICAN HERITAGE DICTIONARY
ATTRIB: DIAMETER SHAPE

STANDARD FEATURE TERM 87: ISLAND
DEFN: AREA OF DRY OR RELATIVELY DRY LAND SURROUNDED BY WATER OR LOW WETLAND.
SOURCE: GNIS DOCUMENTATION, APPENDIX B
ATTRIB: LOCATION NAME AREA SHAPE COMPOSITION

INCLUD: CAY KEY ISLET ATOLL STACK TOMBOLO HUMMOCK BARRIER_ISLAND

ISLAND_ARC (INCLUDED TERM 507)
SEE: ISLAND_CLUSTER

STANDARD FEATURE TERM 88: ISLAND CLUSTER
DEFN: A GROUP OF ISLANDS
SOURCE: NEW TERM NO EXISTING DEFINITION
INCLUD: ARCHIPELAGO ISLAND_ARC

ISLAND_HARBOR (INCLUDED TERM 508)
SEE: HARBOR

ISLAND_ICE (INCLUDED TERM 509)
SEE: ICE_FIELD

ISLET (INCLUDED TERM 510)
SEE: ISLAND

STANDARD FEATURE TERM 89: ISTHMUS
DEFN: NARROW SECTION OF LAND IN A BODY OF WATER CONNECTING TWO LARGER LAND AREAS.
SOURCE: GNIS DOCUMENTATION, APPENDIX B
ATTRIB: LOCATION COMPOSITION AREA WIDTH LENGTH NAME
INCLUD: NECK SUBMARINE_ISTHMUS

JAIL (INCLUDED TERM 511)
SEE: BUILDING

JETTY (INCLUDED TERM 512)
SEE: BREAKWATER

JUNCTION_BUOY (INCLUDED TERM 513)
SEE: BUOY

JUNGLE (INCLUDED TERM 514)
SEE: WOODLAND

JUNK_YARD (INCLUDED TERM 515)
SEE: DUMPING_GROUND

KAME (INCLUDED TERM 516)
SEE: MOUNT/RIDGE

KAME_TERRACE (INCLUDED TERM 517)
SEE: TERRACE

KEG_BUOY (INCLUDED TERM 518)
SEE: BUOY

KETTLE (INCLUDED TERM 519)
SEE: BASIN

KEY (INCLUDED TERM 520)

SEE: ISLAND

KILL (INCLUDED TERM 521)
SEE: WATERCOURSE

KILOMETER_POST (INCLUDED TERM 522)
SEE: SIGN

KNOB (INCLUDED TERM 523)
SEE: MOUNT

KNOLL (INCLUDED TERM 524)
SEE: MOUNT

STANDARD FEATURE TERM 90: LAGOON
DEFN: A SHEET OF SALT WATER SEPARATED FROM THE OPEN SEA BY SAND OR SHINGLE BANKS... THE SHEET OF WATER BETWEEN AN OFFSHORE REEF ESP. OF CORAL AND MAINLAND. THE SHEET OF WATER WITHIN A RING OR HORSESHOE SHAPED ATOLL.
SOURCE: A DICTIONARY OF GEOGRAPHY, MONKHOUSE
ATTRIB: LOCATION NAME AREA SALINITY BUOYED CHARTED_DEPTH DEPTH NAVIGABLE
INCLUD: BARRIER_LAGOON LAGUNA

LAGOON_BEACH (INCLUDED TERM 525)
SEE: BEACH

LAGUNA (INCLUDED TERM 526)
SEE: LAGOON

STANDARD FEATURE TERM 91: LAKE
DEFN: ANY STANDING BODY OF INLAND WATER.
SOURCE: MODIFIED FROM NAVIGATION DICTIONARY
ATTRIB: ARTIFICIALLY_IMPROVED/MANMADE/NATURAL LOCATION NAME ACIDITY CHARTED_DEPTH ENCLOSED RECREATIONAL SALINITY STORAGE TEMPERATURE WATER_SUPPLY ICE_PRESENT
INCLUD: BAYOU PASTEUER_LAKE PROGLACIAL_LAKE SALT_LAKE MORTLAKE OXBOW OPEN_WATER POOL INLAND_SEA MILLPOND PATERNOSTER_LAKE RESERVOIR POND SALINA SOUND SWIMMING_POOL CATCH_BASIN

LAND_GRANT_LINE (INCLUDED TERM 527)
SEE: BOUNDARY

LANDING (INCLUDED TERM 528)
SEE: LANDING_PLACE/PIER/WHARF

STANDARD FEATURE TERM 92: LANDING PLACE
DEFN: A PLACE FOR LOADING AND UNLOADING PASSENGERS OR CARGO TO AND FROM WATER VESSELS.
SOURCE: MODIFIED FROM DEFENSE MAPPING AGENCY
INCLUD: BOAT_LANDING LANDING

LANDING_AREA (INCLUDED TERM 529)
SEE: AIRPORT/RUNWAY

LANDING_BEACON (INCLUDED TERM 530)
SEE: BEACON

LANDING_FIELD (INCLUDED TERM 531)

SEE: RUNWAY

LANDING_LANE (INCLUDED TERM 532)
SEE: RUNWAY/LANE

LANDING_STRIP (INCLUDED TERM 533)
SEE: RUNWAY

LANDMARK_BEACON (INCLUDED TERM 534)
SEE: BEACON

STANDARD FEATURE TERM 93: LANE
DEFN: A PRESCRIBED COURSE FOR SHIPS OR AIRCRAFT, OR A STRIP DELINEATED ON A ROAD TO ACCOMODATE A SINGLE LINE OF AUTOMOBILES; NOT TO BE CONFUSED WITH THE ROAD ITSELF.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY
ATTRIB: WIDTH SAFE_PASSAGE DANGER_TYPE LENGTH CHARTED_DEPTH FEATURE_PRESENT AIR/LAND/WATER BLIND/OPEN LEAD_TYPE
INCLUD: AIR_ROUTE CHANNEL DREDGED_CHANNEL COURSE SHIPPING_LANE FAIRWAY WAY PASS PASSAGE SERVICE_LANE LANDING_LANE WATER_LANE FERRY_CROSSING SAFETY_FAIRWAY WATERWAY LEAD INNER_LEAD SEAWAY IMPROVED_CHANNEL RANGE

LARGE_AUTOMATIC_NAVIGATIONAL_BUOY (INCLUDED TERM 535)
SEE: BUOY

LATERAL_MORAINE (INCLUDED TERM 536)
SEE: MORAINE

LAUNCH_PAD (INCLUDED TERM 537)
SEE: MISSILE_SITE

STANDARD FEATURE TERM 94: LAUNCHING RAMP
DEFN: A TRANSPORTATION STRUCTURE USED FOR LAUNCHING BOATS.
SOURCE: CANADIAN COUNCIL ON SURVEYING AND MAPPING
ATTRIB: LOCATION LENGTH SLOPE WIDTH VEHICLE_SIZE_SERVED COMPOSITION NAME GRADIENT
INCLUD: RAMP SLIPWAY

LAVA_CONE (INCLUDED TERM 538)
SEE: MOUNT

LAWN_BOWLING_GREEN (INCLUDED TERM 539)
SEE: PARK

LEAD (INCLUDED TERM 540)
SEE: LANE
DEFN: A NAVIGABLE PASSAGE THROUGH ICE, BETWEEN ROCKS OR SHOALS, ETC. IT MAY BE COVERED BY THIN ICE. ONE NOT SO COVERED IS CALLED AN OPEN LEAD. ONE BETWEEN FLOATING ICE AND THE SHORE OR FAST ICE IS CALLED A SHORE LEAD OR SHORE CLEARING. A LEAD WITH ONLY ONE OUTLET IS CALLED A BLIND LEAD, POCKET, OR CUL-DE-SAC. ALSO CALLED A CHANNEL, LANE.
SOURCE: NAVIGATION DICTIONARY

LEADING LIGHT (INCLUDED TERM 541)
SEE: BEACON

LEDGE (INCLUDED TERM 542)
SEE: REEF

LEVEE (INCLUDED TERM 543)
SEE: EMBANKMENT

LIBRARY (INCLUDED TERM 544)
SEE: BUILDING

LIFE_SAVING_STATION (INCLUDED TERM 545)
SEE: BUILDING/BUILDING_COMPLEX
DEFN: A PLACE WHERE EQUIPMENT FOR SAVING LIFE AT SEA IS MAINTAINED.
SOURCE: NAVIGATION DICTIONARY
ATTRIB: EQUIPMENT_PRESENT

LIFT_BRIDGE (INCLUDED TERM 546)
SEE: BRIDGE

LIGHT (INCLUDED TERM 547)
SEE: BEACON

LIGHT_FLOAT (INCLUDED TERM 548)
SEE: BUOY

LIGHT_STANDARD (INCLUDED TERM 549)
SEE: POST

LIGHT_STATION (INCLUDED TERM 550)
SEE: BEACON

LIGHT_VESSEL (INCLUDED TERM 551)
SEE: BUOY

LIGHTED_BEACON (INCLUDED TERM 552)
SEE: BEACON

LIGHTED_BUOY (INCLUDED TERM 553)
SEE: BUOY

LIGHTED_SOUND_BUOY (INCLUDED TERM 554)
SEE: BUOY

LIGHTHOUSE (INCLUDED TERM 555)
SEE: BEACON

LIGHTSHIP (INCLUDED TERM 556)
SEE: BUOY

LIMITS (INCLUDED TERM 557)
SEE: BOUNDARY

LIQUID_WASTE_DISPOSAL_AREA (INCLUDED TERM 558)
SEE: DUMPING_GROUND

LOCALITY (INCLUDED TERM 559)
SEE: PLACE

STANDARD FEATURE TERM 95: LOCK
DEFN: AN ENCLOSURE IN A WATER BODY WITH GATES AT EACH END TO RAISE OR LOWER VESSELS AS THEY PASS FROM ONE LEVEL TO ANOTHER.
SOURCE: MODIFIED FROM CANADIAN COUNCIL ON SURVEYING AND MAPPING
ATTRIB: LOCATION TIDAL VEHICLE_SIZE_SERVED LENGTH WIDTH SALINITY NAME DISCHARGE FLOOD_CONTROL
INCLUD: HALF_TIDE_BASIN ENTRANCE_LOCK TIDE_LOCK

LODE (INCLUDED TERM 560)
SEE: WATERCOURSE

LOGGED_AREA (INCLUDED TERM 561)
SEE: CLEARING

LONG_FLASHING_LIGHT (INCLUDED TERM 562)
SEE: BEACON

LONGSHORE_BAR (INCLUDED TERM 563)
SEE: BAR

LOOKOUT_TOWER (INCLUDED TERM 564)
SEE: TOWER

LOOP_ANTENNA (INCLUDED TERM 565)
SEE: ANTENNA

LUMBER_CAMP (INCLUDED TERM 566)
SEE: CAMPGROUND

MAINTENANCE_ROAD (INCLUDED TERM 567)
SEE: ROAD

MAJOR_FOG_SIGNAL (INCLUDED TERM 568)
SEE: BEACON

MAJOR_LIGHT (INCLUDED TERM 569)
SEE: BEACON

MALLEE_SCRUB (INCLUDED TERM 570)
SEE: WOODLAND

MANGROVE_SWAMP (INCLUDED TERM 571)
SEE: WETLAND/WOODLAND

MAQUIS (INCLUDED TERM 572)
SEE: WOODLAND

MARGINAL_SEA (INCLUDED TERM 573)
SEE: SEA

STANDARD FEATURE TERM 96: MARINA
DEFN: A HARBOR FACILITY FOR RECREATIONAL CRAFT WHERE SUPPLIES, REPAIRS, AND VARIOUS SERVICES ARE AVAILABLE.
SOURCE: NAUTICAL CHART MANUAL, U.S. DEPT. OF COMMERCE, NATIONAL OCEAN SURVEY
ATTRIB: LOCATION NAME SERVICES_PROVIDED

MARINE_AUTOMATIC_METEROLOGICAL_STATION (INCLUDED TERM 574)
SEE: BUOY
DEFN: A BOAT-TYPE AUTOMATIC WEATHER STATION CONSTRUCTED OF NONMAGNETIC MATERIALS. IT IS MOORED IN DEEP WATER.
SOURCE: MODIFIED FROM NAVIGATION DICTIONARY
ATTRIB: LOCATION NAME

MARINE_BENCH (INCLUDED TERM 575)
SEE: TERRACE

MARINE_CLIFF (INCLUDED TERM 576)
SEE: CLIFF

MARINE_LIGHT (INCLUDED TERM 577)
SEE: BEACON

MARINE_RADIOBEACON (INCLUDED TERM 578)
SEE: BEACON

MARKER_BEACON (INCLUDED TERM 579)
SEE: BEACON

MARKER_RADIOBEACON (INCLUDED TERM 580)
SEE: BEACON

MARKET_GARDEN (INCLUDED TERM 581)
SEE: CROP_LAND

MARSH (INCLUDED TERM 582)
SEE: WETLAND

MARSH_BAR (INCLUDED TERM 583)
SEE: BAR

MATTRESS (INCLUDED TERM 584)
SEE: REVETMENT

MEADOW (INCLUDED TERM 585)
SEE: GRASSLAND

MEANDER (INCLUDED TERM 586)
SEE: WATERCOURSE

MEMORIAL_PARK (INCLUDED TERM 587)
SEE: PARK

MESA (INCLUDED TERM 588)
SEE: PLATEAU

MICROWAVE_TOWER (INCLUDED TERM 589)
SEE: TOWER

MID_CHANNEL_BUOY (INCLUDED TERM 590)
SEE: BUOY

MILE_POST (INCLUDED TERM 591)
SEE: SIGN

MILEAGE_POST (INCLUDED TERM 592)
SEE: SIGN

STANDARD FEATURE TERM 97: MILITARY BASE
DEFN: (MODIFIED)AN AREA OWNED AND OPERATED BY THE GOVERNMENT IN WHICH VARIOUS MILITARY ACTIVITIES TAKE PLACE.
SOURCE: CANADIAN COUNCIL ON SURVEYING AND MAPPING
INCLUD: ARMY_CAMP FORCES_BASE NAVAL_STATION

STANDARD FEATURE TERM 98: MILITARY BUNKER
DEFN: A MILITARY STRONGPOINT, USUALLY PART OF AN EXTENSIVE FORTIFICATION.
SOURCE: CANADIAN COUNCIL ON SURVEYING AND MAPPING

MILITARY_RESERVE (INCLUDED TERM 593)
SEE: RESERVE

MILL (INCLUDED TERM 594)
SEE: BUILDING/BUILDING_COMPLEX

MILLPOND (INCLUDED TERM 595)
SEE: LAKE

STANDARD FEATURE TERM 99: MINE
DEFN: AN EXCAVATION IN THE EARTH FOR THE PURPOSE OF EXTRACTING EARTH MATERIALS
SOURCE: MODIFIED FROM AMERICAN HERITAGE DICTIONARY
ATTRIB: ACTIVE/INACTIVE ABANDONED AREA COVERED/UNCOVERED DEPTH EQUIPMENT_PRESENT NAME NUMBER_OF_SHAFTS SHAPE SUBSTANCE_EXTRACTED SURFACE_MINING WIDTH
INCLUD: BORROW_PIT EXCAVATION GRAVEL_PIT OPEN_PIT_MINE PIT PLACER_MINE QUARRY SAND_PIT STRIP_MINE

MINE_DANGER_AREA (INCLUDED TERM 596)
SEE: BOUNDARY

STANDARD FEATURE TERM 100: MINEFIELD
DEFN: AN AREA WHERE EXPLOSIVE MINES HAVE BEEN ANCHORED OR SUNK IN WATER OR BURIED ON LAND.
SOURCE: THE AMERICAN HERITAGE DICTIONARY
ATTRIB: AIR/LAND/WATER

MINERAL_PILE (INCLUDED TERM 597)
SEE: DUMPING_GROUND

MINERAL_SPRING (INCLUDED TERM 598)
SEE: SPRING

MINOR_FOG_SIGNAL (INCLUDED TERM 599)
SEE: BEACON

MINOR_LIGHT (INCLUDED TERM 600)
SEE: BEACON

MIRE (INCLUDED TERM 601)
SEE: WETLAND

STANDARD FEATURE TERM 101: MISSILE SITE
DEFN: AN AREA FOR HOUSING AND LAUNCHING GUIDED MISSILES.
SOURCE: DEFENSE MAPPING AGENCY
INCLUD: LAUNCH_PAD

MISSISSIPPI_RIVER-TYPE_BUOY (INCLUDED TERM 602)
SEE: BUOY

MOAT (INCLUDED TERM 603)
SEE: WATERCOURSE/VALLEY

STANDARD FEATURE TERM 102: MOBILE HOME
DEFN: A TRAILER THAT IS A PERMANENT DWELLING AND IS DESIGNED WITHOUT A PERMANENT FOUNDATION.
SOURCE: DEFENSE MAPPING AGENCY
INCLUD: TRAILER

STANDARD FEATURE TERM 103: MOBILE HOME PARK
DEFN: AN AREA MAINTAINED FOR THE PARKING OF INHABITED MOBILE HOMES.
SOURCE: DEFENSE MAPPING AGENCY
INCLUD: TRAILER_PARK

MOLE (INCLUDED TERM 604)
SEE: BREAKWATER

MONADNOCK (INCLUDED TERM 605)
SEE: MOUNT

MONASTERY (INCLUDED TERM 606)
SEE: BUILDING/BUILDING_COMPLEX

MONORAIL (INCLUDED TERM 607)
SEE: RAILWAY

MONSOON_FOREST (INCLUDED TERM 608)
SEE: WOODLAND

STANDARD FEATURE TERM 104: MONUMENT
ATTRIB: HEIGHT WIDTH SHAPE
INCLUD: GRAVE_MARKER OBELISK SHRINE

MONUMENTED_CONTROL_POINT (INCLUDED TERM 609)
SEE: CONTROL_POINT

MOOR (INCLUDED TERM 610)
SEE: WOODLAND/WETLAND/GRASSLAND

STANDARD FEATURE TERM 105: MOORING
DEFN: THE PLACE WHERE A CRAFT MAY BE SECURED TO THE GROUND, WHARF, PIER, POST, OR BUOY.
SOURCE: MODIFIED FROM NAVIGATION DICTIONARY
ATTRIB: LOCATION FEATURE_CONNECTED LENGTH WIDTH COMPOSITION VEHICLE_SERVED RING DOLPHIN BOLLARD NAME
INCLUD: DOLPHIN BOLLARD MOORING_BUOY MOORING_MAST MOORING_RING

MOORING_BUOY (INCLUDED TERM 611)

SEE: BUOY/MOORING

MOORING_MAST (INCLUDED TERM 612)
SEE: MOORING/POST

MOORING_RING (INCLUDED TERM 613)
SEE: MOORING

STANDARD FEATURE TERM 106: MORAINE
DEFN: AN ACCUMULATION OF BOULDERS, STONES, OR OTHER DEBRIS CARRIED AND DEPOSITED BY A GLACIER.
SOURCE: AMERICAN HERITAGE DICTIONARY
INCLUD: GLACIAL_MORAINE DELTA_MORAINE TERMINAL_MORAINE END_MORAINE LATERAL_MORAINE

MORASS (INCLUDED TERM 614)
SEE: WETLAND

MORTLAKE (INCLUDED TERM 615)
SEE: LAKE

MOSQUE (INCLUDED TERM 616)
SEE: BUILDING

MOTEL (INCLUDED TERM 617)
SEE: BUILDING/BUILDING_COMPLEX

MOTTE (INCLUDED TERM 618)
SEE: WOODLAND

MOUND (INCLUDED TERM 619)
SEE: MOUNT

STANDARD FEATURE TERM 107: MOUNT
DEFN: A MOUNTAIN OR HILL.
SOURCE: MODIFIED FROM AMERICAN HERITAGE DICTIONARY
ATTRIB: ACTIVE/INACTIVE NAME VENT_PRESENT GAS_EMITTED_TYPE LOCATION PERMANENTLY_ICE_COVERED BARE SOIL_TEXTURE
INCLUD: MOUNTAIN CINDER_CONE SAND_DUNE HUMMOCK KNOLL PINGO VOLCANO BALD SEAMOUNT SHIELD_VOLCANO KNOB MOUND LAVA_CONE MONADNOCK SEAKNOLL DOME HILL HILLOCK DRUMLIN KAME BERY CERRITO CERRO FOOTHILL CUESTA RISE BANK

STANDARD FEATURE TERM 108: MOUNT RANGE
DEFN: A SERIES OF CONNECTED AND ALIGNED MOUNTAINS OR MOUNTAIN RIDGES.
SOURCE: NAVIGATION DICTIONARY
INCLUD: RANGE MOUNTAIN_RANGE SEAMOUNT_CHAIN SEAMOUNT_GROUP SEAMOUNT_RANGE SAND_HILLS

MOUNTAIN (INCLUDED TERM 620)
SEE: MOUNT

MOUNTAIN_PASS (INCLUDED TERM 621)
SEE: GAP

MOUNTAIN_RANGE (INCLUDED TERM 622)
SEE: MOUNT_RANGE

STANDARD FEATURE TERM 109: MOUTH

DEFN: THE EXIT OR POINT OF DISCHARGE OF A STREAM INTO ANOTHER STREAM, LAKE OR SEA.
SOURCE: U.S. NAVAL OCEANOGRAPHIC OFFICE, NAVIGATION DICTIONARY
INCLUD: ESTUARY OUTLET

MULGA (INCLUDED TERM 623)
SEE: WOODLAND

MULGA_SCRUB (INCLUDED TERM 624)
SEE: WOODLAND

MULTIPLE_TRACK_RAILWAY (INCLUDED TERM 625)
SEE: RAILWAY

MUNICIPAL_PARK (INCLUDED TERM 626)
SEE: PARK

MUNICIPALITY (INCLUDED TERM 627)
SEE: PLACE

MUSEUM (INCLUDED TERM 628)
SEE: BUILDING

MUSKEG (INCLUDED TERM 629)
SEE: WETLAND

NARROWS (INCLUDED TERM 630)
SEE: WATERCOURSE

NATIONAL_PARK (INCLUDED TERM 631)
SEE: PARK

NATURAL_HARBOR (INCLUDED TERM 632)
SEE: HARBOR

NAVAL_STATION (INCLUDED TERM 633)
SEE: MILITARY_BASE

NAVIGATION_LIGHT (INCLUDED TERM 634)
SEE: BEACON

NECK (INCLUDED TERM 635)
SEE: ISTHMUS/PENINSULA

NEUTRAL_ZONE (INCLUDED TERM 636)
SEE: DEMILITARIZED_ZONE

NON_TIDAL_BASIN (INCLUDED TERM 637)
SEE: BASIN

NOTCH (INCLUDED TERM 638)
SEE: GAP/CAVE

NUCLEAR_ACCELERATOR (INCLUDED TERM 639)

SEE: BUILDING

NUCLEAR_REACTOR (INCLUDED TERM 640)
SEE: BUILDING/BUILDING_COMPLEX

NULLAH (INCLUDED TERM 641)
SEE: WATERCOURSE

NUNATAK (INCLUDED TERM 642)
SEE: PEAK

NUN_BUOY (INCLUDED TERM 643)
SEE: BUOY

NURSERY (INCLUDED TERM 644)
SEE: FARM

STANDARD FEATURE TERM 110: OASIS
DEFN: A SMALL, ISOLATED, FERTILE OR GREEN AREA IN A DESERT REGION, USUALLY HAVING A SPRING OR WELL.
SOURCE: DEFENSE MAPPING AGENCY

OBSEQUENT_STREAM (INCLUDED TERM 645)
SEE: WATERCOURSE

OBELISK (INCLUDED TERM 646)
SEE: MONUMENT

OBSERVATION_TOWER (INCLUDED TERM 647)
SEE: TOWER

OBSTRUCTION_BEACON (INCLUDED TERM 648)
SEE: BEACON

OBSTRUCTION_MARKER (INCLUDED TERM 649)
SEE: BEACON

OBSTRUCTION_LIGHT (INCLUDED TERM 650)
SEE: BEACON

OBSTRUCTION_BUOY (INCLUDED TERM 651)
SEE: BUOY

OCCASIONAL_LIGHT (INCLUDED TERM 652)
SEE: BEACON

OCCASIONAL_FOG_SIGNAL (INCLUDED TERM 653)
SEE: BEACON

OCCULTING_LIGHT (INCLUDED TERM 654)
SEE: BEACON

OCCULTING_QUICK_FLASHING_LIGHT (INCLUDED TERM 655)
SEE: BEACON

OCEAN (INCLUDED TERM 656)
SEE: SEA

STANDARD FEATURE TERM 111: OFF ROAD VEHICULAR AREA
DEFN: AN AREA FOR THE TESTING OF, OR USE BY, VEHICLES THAT ARE DESIGNED TO TRAVEL ACROSS THE TERRAIN.
SOURCE: MODIFIED FROM CANADIAN COUNCIL ON SURVEYING AND MAPPING
ATTRIB: LOCATION NAME RECREATIONAL

OFFICE_BUILDING (INCLUDED TERM 657)
SEE: BUILDING

OFFSHORE_BAR (INCLUDED TERM 658)
SEE: BAR

OFFSHORE_LIGHT_STATION (INCLUDED TERM 659)
SEE: BEACON

OFFSHORE_LOADING_FACILITY (INCLUDED TERM 660)
SEE: PORT

STANDARD FEATURE TERM 112: OFFSHORE PLATFORM
DEFN: A RAISED SURFACE LOCATED IN A SEA.
SOURCE: NEW DEFINITION
ATTRIB: LOCATION LENGTH WIDTH HEIGHT FEATURE_PRESENT EQUIPMENT_PRESENT AIRCRAFT_LANDING

OFFSHORE_TOWER (INCLUDED TERM 661)
SEE: BEACON
DEFN: MANNED OR MONITORED LIGHT STATION BUILT ON EXPOSED MARINE SITE TO REPLACE LIGHT VESSEL.
SOURCE: NATIONAL OCEAN SERVICE

STANDARD FEATURE TERM 113: OIL FIELD
DEFN: AN AREA WHERE PETROLEUM IS OR WAS REMOVED FROM THE EARTH.
SOURCE: GNIS DOCUMENTATION, APPENDIX B
ATTRIB: NAME LOCATION SUBSTANCE_EXTRACTED
INCLUD: GAS_FIELD

OIL_WELL (INCLUDED TERM 662)
SEE: WELL

OMNIDIRECTIONAL_BEACON (INCLUDED TERM 663)
SEE: BEACON

OPEN-PIT_MINE (INCLUDED TERM 664)
SEE: MINE

OPEN_BERTH (INCLUDED TERM 665)
SEE: HARBOR

OPEN_HARBOR (INCLUDED TERM 666)
SEE: HARBOR

OPEN_ROADSTEAD (INCLUDED TERM 667)
SEE: HARBOR

OPEN_SEA (INCLUDED TERM 668)
SEE: SEA

OPEN_SOUND (INCLUDED TERM 669)
SEE: SEA

OPEN_WATER (INCLUDED TERM 670)
SEE: SEA/LAKE

ORCHARD (INCLUDED TERM 671)
SEE: CROP_LAND

STANDARD FEATURE TERM 114: OUTDOOR THEATER
DEFN: AN OUTDOOR AREA CONSISTING OF A STAGE OR OTHER FOCAL POINT, AND AN AREA WHERE THE AUDIENCE CAN BE SEATED TO VIEW THE PERFORMANCE OR EVENT.
SOURCE: CANADIAN COUNCIL ON SURVEYING AND MAPPING
ATTRIB: COVERED/UNCOVERED NAME LOCATION SCREEN_PRESENT BANDSTAND_PRESENT FEATURE_PRESENT
INCLUD: AMPHITHEATER BANDSTAND DRIVE_IN_THEATER

OUTLET (INCLUDED TERM 672)
SEE: MOUTH

OUTPORT (INCLUDED TERM 673)
SEE: PORT

OUTWASH (INCLUDED TERM 674)
SEE: DELTA

OUTWASH_PLAIN (INCLUDED TERM 675)
SEE: DELTA/PLAIN

STANDARD FEATURE TERM 115: OVERFALLS
DEFN: SHORT BREAKING WAVES OCCURRING WHEN A CURRENT PASSES OVER A SHOAL OR OTHER SUBMARINE OBSTRUCTION OR MEETS A CONTRARY CURRENT OR WIND.
SOURCE: DEFENSE MAPPING AGENCY
ATTRIB: TIDAL
INCLUD: TIDE_RIPS

OVERFLOW_CHANNEL (INCLUDED TERM 676)
SEE: WATERCOURSE

OVERPASS (INCLUDED TERM 677)
SEE: BRIDGE

STANDARD FEATURE TERM 116: OVERRUN/STOPWAY
DEFN: AN AREA BEYOND THE TAKE-OFF RUNWAY ABLE TO SUPPORT AN AIRPLANE DURING AN ABORTED TAKE-OFF.
SOURCE: DEFENSE MAPPING AGENCY

OXBOW (INCLUDED TERM 678)
SEE: LAKE

OYSTER_BED (INCLUDED TERM 679)
SEE: FISHING_GROUND

PACK_ICE (INCLUDED TERM 680)
SEE: ICE_FIELD

PADDY_FIELD (INCLUDED TERM 681)
SEE: CROP_LAND

PALISADE (INCLUDED TERM 682)
SEE: CLIFF

PALSA_BOG (INCLUDED TERM 683)
SEE: WETLAND

PAMPAS (INCLUDED TERM 684)
SEE: GRASSLAND

PARISH (INCLUDED TERM 685)
SEE: PLACE

STANDARD FEATURE TERM 117: PARK
DEFN: A PLACE OR AREA SET ASIDE FOR RECREATION OR PRESERVATION OF A CULTURAL OR NATURAL RESOURCE.
SOURCE: MODIFIED FROM GNIS DOCUMENTATION, APPENDIX B
ATTRIB: ADMINISTRATION OWNER_TYPE NAME LOCATION OWNER_TYPE PARK_ATTRACTION_PRESENT SEASONAL
INCLUD: AMUSEMENT_PARK BALL_PARK BIRD_SANCTUARY BOTANICAL_GARDEN CITY_SQUARE LAWN_BOWLING_GREEN PLAZA
NATIONAL_PARK MEMORIAL_PARK MUNICIPAL_PARK REGIONAL_PARK PICNIC_SITE PLAYGROUND REST_AREA SANCTUARY
SQUARE WAYSIDE_PARK ZOO ANIMAL_SANCTUARY

STANDARD FEATURE TERM 118: PARKING AREA
DEFN: AN AREA SET ASIDE FOR THE PARKING OF MOTOR VEHICLES.
SOURCE: NAVIGATION DICTIONARY
ATTRIB: LENGTH WIDTTH FEATURE_PRESENT VEHICLE_ACCOMODATED
INCLUD: APRON PARKING_LOT RECREATIONAL_VEHICLE_AREA

PARKING_GARAGE (INCLUDED TERM 686)
SEE: BUILDING

PARKING_LOT (INCLUDED TERM 687)
SEE: PARKING_AREA

PARKWAY (INCLUDED TERM 688)
SEE: ROAD

PARTI_COLORED_BUOY (INCLUDED TERM 689)
SEE: BUOY

PASS (INCLUDED TERM 690)
SEE: GAP/WATERCOURSE/LANE

PASSAGE (INCLUDED TERM 691)
SEE: WATERCOURSE/LANE

PASTEUER_LAKE (INCLUDED TERM 692)
SEE: LAKE

PASTURE (INCLUDED TERM 693)
SEE: CROPLAND/GRASSLAND

PATERNOSTER_LAKE (INCLUDED TERM 694)
SEE: LAKE

PATH (INCLUDED TERM 695)
SEE: ROAD

STANDARD FEATURE TERM 119: PEAK
DEFN: THE SUMMIT OF A MOUNTAIN.
SOURCE: NAVIGATION DICTIONARY
INCLUD: ICE_PEAK NUNATAK SUMMIT

PEAT_BOG (INCLUDED TERM 696)
SEE: WETLAND

PEAT_CUTTING (INCLUDED TERM 697)
SEE: WETLAND

PEDESTRIAN_CROSSING (INCLUDED TERM 698)
SEE: INTERSECTION

PEDESTRIAN-BICYCLE_OVERPASS (INCLUDED TERM 699)
SEE: BRIDGE

PEDESTRIAN_UNDERPASS (INCLUDED TERM 700)
SEE: TUNNEL

STANDARD FEATURE TERM 120: PENINSULA
DEFN: A BODY OF LAND JUTTING OUT INTO AND NEARLY SURROUNDED BY WATER.
SOURCE: MODIFIED FROM NAUTICAL CHART MANUAL
ATTRIB: NAME LOCATION
INCLUD: NECK FORELAND PROMONTORY WINGED_HEADLAND HEADLAND HEAD TONGUE POINT HOOK

PENITENTIARY (INCLUDED TERM 701)
SEE: BUILDING/BUILDING_COMPLEX

PENS (INCLUDED TERM 702)
SEE: WHARF

PENSTOCK (INCLUDED TERM 703)
SEE: UTILITY/WATERCOURSE

PERCH (INCLUDED TERM 704)
SEE: BEACON

PHOTOGRAMMETRIC_HORIZONTAL_CONTROL_POINT (INCLUDED TERM 705)
SEE: CONTROL_POINT

PICNIC_SITE (INCLUDED TERM 706)
SEE: PARK

STANDARD FEATURE TERM 121: PIER
DEFN: A STRUCTURE BUILT OUT INTO THE WATER, USUALLY WITH ITS GREATEST DIMENSION AT RIGHT ANGLES TO THE SHORE, FORMING A LANDING PLACE OR A PLACE ALONGSIDE WHICH VESSELS CAN LIE.
SOURCE: NAUTICAL CHART MANUAL
INCLUD: LANDING BOAT_LANDING FERRY FERRY_SITE FERRY_TERMINAL HYDROFOIL_TERMINAL HOVERCRAFT_TERMINAL

PILE (INCLUDED TERM 707)
SEE: POST

PILE_BEACON (INCLUDED TERM 708)
SEE: BEACON

PILE_DOLPHIN (INCLUDED TERM 709)
SEE: BEACON

PILE_LIGHTHOUSE (INCLUDED TERM 710)
SEE: BEACON

STANDARD FEATURE TERM 122: PILING
DEFN: A SET OF POSTS FORCED INTO THE EARTH TO SERVE AS A SUPPORT, AS FOR A PIER, OR TO RESIST LATERAL PRESSURE.
SOURCE: MODIFIED FROM DEFENSE MAPPING AGENCY

PILLAR (INCLUDED TERM 711)
SEE: PINNACLE

PILLAR_BUOY (INCLUDED TERM 712)
SEE: BUOY

PILOT_LIGHTSHIP (INCLUDED TERM 713)
SEE: BUOY

STANDARD FEATURE TERM 123: PILOT WATERS
DEFN: AREAS IN WHICH THE SERVICES OF A MARINE PILOT ARE ESSENTIAL.
SOURCE: MODIFIED FROM NAVIGATION DICTIONARY
ATTRIB: NAME LOCATION

PINGO (INCLUDED TERM 714)
SEE: MOUNT

STANDARD FEATURE TERM 124: PINNACLE
DEFN: A TALL, SLENDER, SPIRE-SHAPED ROCK PROJECTING FROM A LEVEL OR MORE GENTLY SLOPING SURFACE.
SOURCE: MODIFIED FROM NAUTICAL CHART MANUAL
ATTRIB: HEIGHT SHAPE CIRCUMFERENCE NAME LOCATION COMPOSITION
INCLUD: PILLAR SCAR CRAG CORAL_HEAD CHAPEIRAO PRECIPICE

PIPE (INCLUDED TERM 715)
SEE: UTILITY

PIPELINE (INCLUDED TERM 716)
SEE: UTILITY

PIT (INCLUDED TERM 717)
SEE: MINE/BASIN

STANDARD FEATURE TERM 125: PLACE
DEFN: AN AREA WITH DEFINITE OR INDEFINITE BOUNDARIES
SOURCE: THE AMERICAN HERITAGE DICTIONARY
ATTRIB: AGE PHYSICAL_CONDITION_OF_FEATURE LOCATION NAME POPULATION AREA INCORPORATED/UNINCORPORATED
INCLUD: POPULATED_PLACE CITY BOROUGH BUILT_UP_AREA TOWN VILLAGE PARISH HAMLET LOCALITY MUNICIPALITY SETTLEMENT COMMUNITY URBAN_AREA RUINS SEAPORT

PLACER_MINE (INCLUDED TERM 718)
SEE: MINE

STANDARD FEATURE TERM 126: PLAIN
DEFN: A REGION OF GENERAL UNIFORM SLOPE, COMPARATIVELY LEVEL AND OF CONSIDERABLE EXTENT.
SOURCE: GNIS DOCUMENTATION, APPENDIX B
INCLUD: ARCHIPELAGO_APRON COASTAL_PLAIN APRON OUTWASH_PLAIN

PLANETARIUM (INCLUDED TERM 719)
SEE: BUILDING

PLANT (INCLUDED TERM 720)
SEE: BUILDING/BUILDING_COMPLEX

PLANTATION (INCLUDED TERM 721)
SEE: CROPLAND

STANDARD FEATURE TERM 127: PLATEAU
DEFN: AN ELEVATED AND COMPARATIVLEY LEVEL EXPANSE OF LAND.
SOURCE: AMERICAN HERITAGE DICTIONARY
ATTRIB: LOCATION NAME
INCLUD: TABLELAND MESA BUTTE GUYOT TABLEMOUNT TABLEKNOLL INTERMONTANE_PLATEAU

PLATFORM (INCLUDED TERM 722)
SEE: OFFSHORE_PLATFORM

PLAYGROUND (INCLUDED TERM 723)
SEE: PARK

PLAZA (INCLUDED TERM 724)
SEE: PARK

STANDARD FEATURE TERM 128: PLUNGE POOL
DEFN: A HOLLOW ERODED BY THE FORCE OF THE FALLING WATER AT THE BASE OF A WATERFALL, PARTICULARILY BY THE EDDYING EFFECT.
SOURCE: A DICTIONARY OF GEOGRAPHY, MONKHOUSE

POCOSIN (INCLUDED TERM 725)
SEE: WETLAND

POINT (INCLUDED TERM 726)
SEE: BAR/PENINSULA

POLAR_ICE (INCLUDED TERM 727)
SEE: ICE_FIELD

POLAR_ICE_PACK (INCLUDED TERM 728)

SEE: ICE_FIELD

POLICE_STATION (INCLUDED TERM 729)
SEE: BUILDING/BUILDING_COMPLEX

STANDARD FEATURE TERM 129: POLYNA
DEFN: ANY ENCLOSED WATER AREA IN PACK ICE OTHER THAN A LEAD, NOT LARGE ENOUGH TO BE CALLED OPEN WATER. WHEN FROZEN OVER, A POLYNA BECOMES AN ICE SKYLIGHT FROM THE POINT OF VIEW OF THE SUBMARINER. ALSO CALLED BIG CLEARING, CLEARING, GLADE, ICE CLEARING, POOL, REGIONAL CLEARING.
SOURCE: NAVIGATION DICTIONARY

POND (INCLUDED TERM 730)
SEE: LAKE

PONTOON_BRIDGE (INCLUDED TERM 731)
SEE: BRIDGE
DEFN: A FLOATING BRIDGE.
SOURCE: NEW DEFINITION

POOL (INCLUDED TERM 732)
SEE: LAKE

POPULATED_PLACE (INCLUDED TERM 733)
SEE: PLACE

STANDARD FEATURE TERM 130: PORT
DEFN: A LANDING_PLACE PROVIDED WITH TERMINAL AND TRANSFER FACILITIES FOR LOADING AND DISCHARGING CARGO OR PASSENGERS, USUALLY LOCATED IN A HARBOR.
SOURCE: NAVIGATION DICTIONARY, U.S. NAVAL OCEANOGRAPHIC OFFICE
ATTRIB: LOCATION NAME AREA BUOYED CHARTED_DEPTH COMMERCIAL_SHIPPING FACILITIES_PRESENT FEATURE_PRESENT VEHICLE_SIZE_SERVED OFFSHORE/ONSHORE
INCLUD: CANAL_PORT OUTPORT OFFSHORE_LOADING_FACILITY SEAPORT

STANDARD FEATURE TERM 131: POST
DEFN: A LONG RELATIVELY SLENDER, AND GENERALLY ROUND PIECE OF WOOD OR OTHER MATERIAL.
SOURCE: NEW DEFINITION
ATTRIB: FEATURE_CONNECTED DIAMETER HEIGHT FEATURE_SUPPORTED COMPOSITION
INCLUD: FISH_STAKES LIGHT_STANDARD POWER_TRANSMISSION_POLE TELEPHONE_POLE TELEGRAPH_POLE MOORING_MAST PILE

POST_OFFICE (INCLUDED TERM 734)
SEE: BUILDING

POWDER_MAGAZINE (INCLUDED TERM 735)
SEE: BUILDING

POWER_LINE (INCLUDED TERM 736)
SEE: UTILITY

POWER_PLANT (INCLUDED TERM 737)
SEE: BUILDING_COMPLEX

POWER_TRANSMISSION_LINE (INCLUDED TERM 738)
SEE: UTILITY

POWER_TRANSMISSION_POLE (INCLUDED TERM 739)
SEE: POST

POWER_TRANSMISSION_PYLON (INCLUDED TERM 740)
SEE: TOWER

PRAIRIE (INCLUDED TERM 741)
SEE: GRASSLAND

PRECIPICE (INCLUDED TERM 742)
SEE: CLIFF/PINNACLE

PRIMARY_TIDE_STATION (INCLUDED TERM 743)
SEE: BUILDING/BUILDING_COMPLEX/TIDAL_GAUGE
DEFN: STATION WHERE CONTINUOUS TIDAL OBSERVATIONS ARE MADE OVER A NUMBER OF YEARS TO OBTAIN BASIC TIDAL DATA FOR THE LOCALITY.
SOURCE: MODIFIED FROM NAVIGATION DICTIONARY

PRISON (INCLUDED TERM 744)
SEE: BUILDING/BUILDING_COMPLEX

PRIVATE_ROAD (INCLUDED TERM 745)
SEE: ROAD

PROGLACIAL LAKE (INCLUDED TERM 746)
SEE: LAKE

PROHIBITED_ANCHORAGE (INCLUDED TERM 747)
SEE: HARBOR

PROHIBITED_AREA (INCLUDED TERM 748)
SEE: RESTRICTED_AREA

PROHIBITED_FLYING_AREA (INCLUDED TERM 749)
SEE: RESTRICTED_AREA

PROMONTORY (INCLUDED TERM 750)
SEE: PENINSULA

PUMPING_STATION (INCLUDED TERM 751)
SEE: BUILDING/BUILDING_COMPLEX

STANDARD FEATURE TERM 132: PUMP OUT FACILITY
DEFN: A HOLDING PLACE WHERE SHIP'S BILGES AND CARGO ARE PUMPED.
SOURCE: DEFENSE MAPPING AGENCY

PUP (INCLUDED TERM 752)
SEE: WATERCOURSE

PUSZTA (INCLUDED TERM 753)
SEE: GRASSLAND

PYLON (INCLUDED TERM 754)
SEE: TOWER

DEFN: (NEW)A BRIDGE SUPPORT.

STANDARD FEATURE TERM 133: PYRAMID
DEFN: AN ANCIENT STRUCTURE HAVING A BROAD BASE WITH SIDES NARROWING TOWARDS THE TOP.
SOURCE: MODIFIED FROM DEFENSE MAPPING AGENCY

QUAGMIRE (INCLUDED TERM 755)
SEE: WETLAND

QUAKING_BOG (INCLUDED TERM 756)
SEE: WETLAND

QUARANTINE_ANCHORAGE (INCLUDED TERM 757)
SEE: HARBOR

QUARANTINE_BUOY (INCLUDED TERM 758)
SEE: BUOY

QUARRY (INCLUDED TERM 759)
SEE: MINE

QUAY (INCLUDED TERM 760)
SEE: WHARF

QUICK_FLASHING_LIGHT (INCLUDED TERM 761)
SEE: BEACON

STANDARD FEATURE TERM 134: QUICKSAND
DEFN: A BED OF LOOSE SAND MIXED WITH WATER FORMING A SOFT, SHIFTING MASS THAT YIELDS EASILY TO PRESSURE.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY
ATTRIB: NAME LOCATION

RACE (INCLUDED TERM 762)
SEE: WATERCOURSE

STANDARD FEATURE TERM 135: RACETRACK
DEFN: A COURSE LAID OUT FOR RACING.
SOURCE: AMERICAN HERITAGE DICTIONARY
ATTRIB: NAME LOCATION
INCLUD: SPORTS_TRACK

RACON (INCLUDED TERM 763)
SEE: BEACON

RADAR_BEACON (INCLUDED TERM 764)
SEE: BEACON

RADAR_BUOY (INCLUDED TERM 765)
SEE: BUOY

STANDARD FEATURE TERM 136: RADAR DOME
DEFN: A DOME SHAPED STRUCTURE USED TO PROTECT THE ANTENNA OF A RADAR INSTALLATION.
SOURCE: CANADIAN COUNCIL ON SURVEYING AND MAPPING

ATTRIB: LOCATION NAME

STANDARD FEATURE TERM 137: RADAR REFLECTOR
DEFN: A DEVICE CAPABLE OF OR INTENDED FOR REFLECTING RADAR SIGNALS.
SOURCE: NAVIGATION DICTIONARY
ATTRIB: LOCATION NAME FEATURE_PRESENT
INCLUD: RUNWAY_RADAR_REFLECTOR

RADAR_RESPONDER_BEACON (INCLUDED TERM 766)
SEE: BEACON

RADAR_STATION (INCLUDED TERM 767)
SEE: BUILDING/BUILDING_COMPLEX

RADIO_BEACON_MONITOR_STATION (INCLUDED TERM 768)
SEE: BUILDING/BUILDING_COMPLEX
DEFN: A STATION WHICH MONITORS THE SIGNAL FROM ONE OR MORE REMOTELY LOCATED MARINE RADIOBEACONS.
SOURCE: NAVIGATION DICTIONARY

RADIO_DIRECTION_FINDER_STATION (INCLUDED TERM 769)
SEE: BUILDING/BUILDING_COMPLEX

RADIO_MAST (INCLUDED TERM 770)
SEE: TOWER

RADIO_STATION (INCLUDED TERM 771)
SEE: BUILDING/BUILDING_COMPLEX
DEFN: A PLACE EQUIPPED WITH ONE OR MORE TRANSMITTERS OR RECEIVERS INCLUDING THE ACCESSORY EQUIPMENT NECESSARY FOR CARRYING ON A RADIOCOMMUNICATION SERVICE.
SOURCE: MODIFIED FROM NATIONAL OCEAN SERVICE GLOSSARY

RADIO_TOWER (INCLUDED TERM 772)
SEE: TOWER

RADIOBEACON (INCLUDED TERM 773)
SEE: BEACON

RADIOBEACON_BUOY (INCLUDED TERM 774)
SEE: BUOY

RAILROAD (INCLUDED TERM 775)
SEE: RAILWAY

RAILROAD_CROSSING (INCLUDED TERM 776)
SEE: INTERSECTION

RAILROAD_GANTRY (INCLUDED TERM 777)
SEE: GANTRY
DEFN: A BRIDGELIKE SPANNING FRAME SUPPORTING A GROUP OF RAILWAY SIGNALS OVER SEVERAL TRACKS.
SOURCE: MODIFIED FROM AMERICAN HERITAGE DICTIONARY
ATTRIB: LOCATION NAME

RAILROAD_PASSING (INCLUDED TERM 778)

SEE: RAILWAY
DEFN: A SHORT SECTION OF RAILROAD TRACK CONNECTED BY SWITCHES WITH THE MAIN TRACK AND USED FOR THE PASSAGE OF TRAINS ON SINGLE LINE RAILROADS.
SOURCE: NEW DEFINITION

RAILROAD_REPAIR_BUILDING (INCLUDED TERM 779)
SEE: BUILDING
DEFN: A BUILDING USED TO RESTORE OR REPAIR RAILROAD EQUIPMENT.
SOURCE: NEW DEFINITION

RAILROAD_STORAGE_BUILDING (INCLUDED TERM 780)
SEE: BUILDING
DEFN: A BUILDING USED TO STORE RAILROAD EQUIPMENT.
SOURCE: NEW DEFINITION

RAILROAD_YARD (INCLUDED TERM 781)
SEE: RAILWAY_YARD

STANDARD FEATURE TERM 138: RAILWAY
DEFN: A PERMANENT WAY HAVING ONE OR MORE RAILS WHICH PROVIDES A TRACK FOR CARS.
SOURCE: MODIFIED FORM CANADIAN COUNCIL ON SURVEYING AND MAPPING
ATTRIB: LOCATION ACCESS NAME RAILS_NUMBER_OF GRADIENT LENGTH MOVABLE/STATIONARY CONNECTED_BY_SWITCHES/MAIN_TRACK CARGO_TRANSPORTATION PASSENGER_TRANSPORTATION COMPOSITION COVERED FEATURE_PRESENT RAIL_DIRECTION_CHANGES RAIL_CONNECTOR_ RAIL_GAUGE RAIL_GAUGE_ADAPTABILITY SLOPE TRAFFIC_LIGHTS_PRESENT LOADING/UNLOADING TREE_LINED EMBEDDED_IN_PAVEMENT DUAL_GAUGE COG ELECTRIFIED
INCLUD: CARLINE MONORAIL MULTIPLE_TRACK_RAILWAY RAILROAD_PASSING RAILROAD SIDING SPECIAL_TRACK_RAILWAY SPUR STREETCAR_LINE SUBWAY INCLINE_RAILWAY SINGLE_TRACK_RAILWAY DOUBLE_TRACK_RAILWAY TRACK

RAILWAY_TUNNEL (INCLUDED TERM 782)
SEE: TUNNEL

RAILWAY_TURNTABLE (INCLUDED TERM 783)
SEE: TURNTABLE

STANDARD FEATURE TERM 139: RAILWAY YARD
DEFN: AN AREA PROVIDED WITH A SYSTEM OF TRACKS WHERE RAILROAD TRAINS ARE MADE UP AND CARS ARE SWITCHED, STORED, OR SERVICED.
SOURCE: AMERICAN HERITAGE DICTIONARY
INCLUD: RAILROAD_YARD

RAISED_BEACH (INCLUDED TERM 784)
SEE: TERRACE

RAISED_BOG (INCLUDED TERM 785)
SEE: WETLAND

RAMP (INCLUDED TERM 786)
SEE: ROAD/LAUNCHING_RAMP

RANCH (INCLUDED TERM 787)
SEE: FARM

RANGE (INCLUDED TERM 788)
SEE: GRASSLAND/LANE/MOUNT_RANGE/RIDGE/CROPLAND

RANGER_STATION (INCLUDED TERM 789)
SEE: BUILDING/BUILDING_COMPLEX

RANGING_LIGHT (INCLUDED TERM 790)
SEE: BEACON

RANGING_MARKER (INCLUDED TERM 791)
SEE: BEACON

STANDARD FEATURE TERM 140: RAPIDS
DEFN: AN AREA OF BROKEN, FAST FLOWING WATER IN A STREAM, WHERE THE SLOPE OF THE BED INCREASES (BUT WITHOUT A PROMINENT BREAK OF SLOPE WHICH MIGHT RESULT IN A WATERFALL), OR WHERE A GENTLY DIPPING BAR OF HARDER ROCK OUTCROPS.
SOURCE: A DICTIONARY OF GEOGRAPHY, MONKHOUSE
ATTRIB: LOCATION WIDTH FEATURE_PRESENT DISCHARGE
INCLUD: CATARACT

RAVINE (INCLUDED TERM 792)
SEE: VALLEY/WATERCOURSE

RE-ENTRANT (INCLUDED TERM 793)
SEE: VALLEY

REACH (INCLUDED TERM 794)
SEE: WATERCOURSE

REAR_LIGHT (INCLUDED TERM 795)
SEE: BEACON

RECREATIONAL_VEHICLE_AREA (INCLUDED TERM 796)
SEE: CAMPGROUND/PARKING_AREA

RECURVED_SPIT (INCLUDED TERM 797)
SEE: BAR

RED_SECTOR (INCLUDED TERM 798)
SEE: BEACON

RED_SECTOR_LIGHT (INCLUDED TERM 799)
SEE: BEACON

STANDARD FEATURE TERM 141: REEF
DEFN: A RIDGE OF ROCKS, LYING NEAR THE SURFACE OF THE SEA, WHICH MAY BE VISIBLE AT LOW TIDE, BUT IS USUALLY COVERED BY WATER.
SOURCE: MOORE, A DICTIONARY OF GEOGRAPHY
ATTRIB: LENGTH WIDTH HEIGHT LOCATION COMPOSITION SHAPE NAME NAVIGABLE DANGEROUS
INCLUD: BARRIER_REEF CORAL_REEF REEF_FLAT BANK_REEF LEDGE SUBMERGED_REEF ATOLL ATOLL_REEF SHORE_REEF FRINGING_REEF

REEF_FLAT (INCLUDED TERM 800)
SEE: REEF

REFERENCE_POINT_LOCATION (INCLUDED TERM 801)
SEE: CONTROL_POINT

REFINERY (INCLUDED TERM 802)

SEE: BUILDING/BUILDING_COMPLEX

REFORESTED_AREA (INCLUDED TERM 803)
SEE: WOODLAND

STANDARD FEATURE TERM 142: REFUELING TRACK
DEFN: AIRSPACE DESIGNATED FOR CONDUCTING AERIAL REFUELING.
SOURCE: DEFENSE MAPPING AGENCY

REGIONAL_PARK (INCLUDED TERM 804)
SEE: PARK

RESEARCH_CENTER (INCLUDED TERM 805)
SEE: BUILDING_COMPLEX

RESERVATION (INCLUDED TERM 806)
SEE: INDIAN_RESERVATION/RESERVE

RESERVATION_BOUNDARY_LINE (INCLUDED TERM 807)
SEE: BOUNDARY

STANDARD FEATURE TERM 143: RESERVE
DEFN: A TRACT OF LAND SET ASIDE FOR A SPECIFIC USE.
SOURCE: MODIFIED FROM GNIS DOCUMENTATION APPENDIX B
ATTRIB: FOREST_RESERVE MILITARY_RESERVE RESERVATION CONSERVATION_AREA ECOLOGICAL_AREA

RESERVE_BOUNDARY_LINE (INCLUDED TERM 808)
SEE: BOUNDARY

RESERVOIR (INCLUDED TERM 809)
SEE: LAKE

RESPONDER_BEACON (INCLUDED TERM 810)
SEE: BEACON

REST_AREA (INCLUDED TERM 811)
SEE: PARK

STANDARD FEATURE TERM 144: RESTRICTED AREA
DEFN: AN AREA OF AIR, LAND, OR WATER IN WHICH TRAVEL OR OTHER ACTIVITIES ARE SUBJECT TO SPECIFIED CONDITIONS OR CONSTRAINTS.
SOURCE: NEW DEFINITION
ATTRIB: RESTRICTION_TYPE AIR/LAND/WATER
INCLUD: PROHIBITED_AREA PROHIBITED_FLYING_AREA RESTRICTED_WATERS

RESTRICTED_WATERS (INCLUDED TERM 812)
SEE: RESTRICTED_AREA

RETAINING_WALL (INCLUDED TERM 813)
SEE: WALL

STANDARD FEATURE TERM 145: REVETMENT
DEFN: A FACING, OTHER THAN A WALL, OF STONE, CONCRETE, WOOD ETC., BUILT TO SUSTAIN AN EMBANKMENT.
SOURCE: CANADIAN COUNCIL ON SURVEYING AND MAPPING

ATTRIB: LOCATION LENGTH COMPOSITION HEIGHT WIDTH NAME
INCLUD: RIPRAP MATTRESS RIPRAP_MOUNDS

RIA (INCLUDED TERM 814)
SEE: INLET

STANDARD FEATURE TERM 146: RIDGE
DEFN: A LONG AND NARROW UPLAND WITH STEEP SIDES.
SOURCE: MODIFIED FROM NAUTICAL CHART MANUAL
ATTRIB: LOCATION HEIGHT SLOPE COMPOSITION LENGTH WIDTH
INCLUD: SPUR ARETE ESKER SILL SAND_DUNE CERRO CUESTA BEACH_CUSPS BEACH_RIDGE CREST DRUMLIN KAME

STANDARD FEATURE TERM 147: RIDGE LINE
DEFN: THE LINE SEPARATING DRAINAGE BASINS
SOURCE: NEW DEFINITION
ATTRIB: CONTINENTAL_DIVIDE

RIFT_VALLEY (INCLUDED TERM 815)
SEE: VALLEY

STANDARD FEATURE TERM 148: RIG
DEFN: VERTICAL STRUCTURE FITTED FOR DRILLING OR LIFTING OPERATIONS
SOURCE: DEFENSE MAPPING AGENCY
ATTRIB: LOCATION HEIGHT WIDTH LENGTH OFFSHORE/ONSHORE EQUIPMENT_PRESENT SUBSTANCE_EXTRACTED

RILL (INCLUDED TERM 816)
SEE: WATERCOURSE

RINCON (INCLUDED TERM 817)
SEE: INLET

RINK (INCLUDED TERM 818)
SEE: ICE_RINK

RIO (INCLUDED TERM 819)
SEE: WATERCOURSE

RIPRAP (INCLUDED TERM 820)
SEE: REVETMENT

RIPRAP_MOUNDS (INCLUDED TERM 821)
SEE: REVETMENT

RISE (INCLUDED TERM 822)
SEE: MOUNT

RIVAGE (INCLUDED TERM 823)
SEE: BEACH/COAST/SHORE

RIVER (INCLUDED TERM 824)
SEE: WATERCOURSE

RIVER_BED (INCLUDED TERM 825)

SEE: WATERCOURSE
DEFN: THE WATERCOURSE COVERED OR ONCE COVERED BY WATER, BETWEEN THE BANKS OF A RIVER.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

RIVER_BUOY (INCLUDED TERM 826)
SEE: BUOY

RIVULET (INCLUDED TERM 827)
SEE: WATERCOURSE

STANDARD_FEATURE_TERM_149: ROAD
DEFN: AN OPEN WAY FOR THE PASSAGE OF VEHICLES, PERSONS, OR ANIMALS ON LAND.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY
ATTRIB: LOCATION ACCESS NAME MODE_TRANSPORTED WIDTH LENGTH LANES_NUMBER_OF COMPOSITION BEARING_CAPACITY ACCESS GRADIENT BLIND/OPEN RESTRICTIONS EXISTING/PROPOSED OWNER_TYPE USER_TYPE CARGO_TRANSPORTATION COVERED/UNCOVERED LIGHTED/UNLIGHTED PASSENGER_TRANSPORTATION MEDIAN_PRESENT FEATURE_PRESENT ONE_WAY/TWO_WAY SLOPE PEDESTRIAN_USE PHYSICAL_CONDITION_OF_SURFACE_MATERIAL ROAD_TYPE TOLL TRAFFIC_LIGHTS_PRESENT TREE_LINED
INCLUD: ACCESSWAY ALLEY APPROACH_TO_HIGHWAY AVENUE BICYCLE_PATH BICYCLE_TRAIL BOARDWALK BOULEVARD CART_TRACK CONTROLLED_ACCESS_ROAD CORDUROY_ROAD CAUSEWAY DEAD_END_STREET DIVIDED_HIGHWAY DRIVEWAY DUAL_HIGHWAY EXPRESSWAY ELEVATED_HIGHWAY FARM_LANE FIRE_ROAD FOOTPATH FREEWAY HIGHWAY MAINTENANCE_ROAD PARKWAY PRIVATE_ROAD RAMP RUNAWAY_PREVENTER SERVICE_LANE SERVICE_STREET SIDEWALK STREET TOLLROAD TRACK TRAIL TURNPIKE WALK WINTER_ROAD PATH SPUR CUL_DE_SAC WAY THOROFARE THOROUGHFARE THROUGHFARE THRUWAY

ROADSTEAD (INCLUDED TERM 828)
SEE: HARBOR

STANDARD_FEATURE_TERM_150: ROCK
DEFN: AN ISOLATED ROCKY FORMATION OR A SINGLE LARGE STONE, USUALLY ONE CONSTITUTING A DANGER TO NAVIGATION. IT MAY BE ALWAYS SUBMERGED, ALWAYS UNCOVERED, OR ALTERNATELY COVERED AND UNCOVERED BY THE TIDE.
SOURCE: MODIFIED FROM NAVIGATION DICTIONARY
ATTRIB: NAME LOCATION BARE RELATIONSHIP_TO_WATER_SURFACE DANGEROUS
INCLUD: BARE_ROCK AWASH_ROCK SUNKEN_ROCK DANGEROUS_ROCK

ROCK_GLACIER (INCLUDED TERM 829)
SEE: ICE_FIELD

ROCK_TERRACE (INCLUDED TERM 830)
SEE: TERRACE

ROCKET_STATION (INCLUDED TERM 831)
SEE: BUILDING/BUILDING_COMPLEX

ROTATING_BEACON (INCLUDED TERM 832)
SEE: BEACON

ROTATING_LOOP_RADIOBEACON (INCLUDED TERM 833)
SEE: BEACON

ROTATING_LIGHT (INCLUDED TERM 834)
SEE: BEACON

STANDARD_FEATURE_TERM_151: ROUNDABOUT
DEFN: AREA OF WATER SUBJECT TO A ROUTING MEASURE RESTRICTING SHIP MOVEME[redacted]COUNTER-CLOCKWISE DIRECTION.

SOURCE: MODIFIED FROM DMA

ROUNDHOUSE (INCLUDED TERM 835)
SEE: BUILDING

ROUTE_MARKER (INCLUDED TERM 836)
SEE: SIGN

RUINS (INCLUDED TERM 837)
SEE: PLACE

RUN (INCLUDED TERM 838)
SEE: WATERCOURSE

RUNAWAY_PREVENTER (INCLUDED TERM 839)
SEE: ROAD

RUNNEL (INCLUDED TERM 840)
SEE: TROUGH/WATERCOURSE

STANDARD FEATURE TERM 152: RUNWAY
DEFN: A STRAIGHT PATH USED FOR LANDING, TAXIING AND TAKE-OFF OF AIRCRAFT.
SOURCE: MODIFIED FROM NAVIGATION DICTIONARY
ATTRIB: LOCATION NAME TAKE-OFF/TAXIWAY SURFACE_MATERIAL LENGTH WIDTH AIR/LAND/WATER VEHICLE_ACCOMODATED VEHICLE_SIZE_SERVED LIGHTED/UNLIGHTED PHYSICAL_CONDITION_OF_SURFACE_MATERIAL RESTRICTIONS PASSENGER_TRANSPORTATION
INCLUD: LANDING_LANE LANDING_STRIP TAXIWAY WATER_LANE TAXI_CHANNEL LANDING_AREA LANDING_FIELD AIRSTRIP AIRFIELD SEADROME SEAPLANE_LANDING/TAKE-OFF_AREA

RUNWAY_LIGHTS (INCLUDED TERM 841)
SEE: BEACON

RUNWAY_RADAR_REFLECTOR (INCLUDED TERM 842)
SEE: RADAR_REFLECTOR

SABKHA (INCLUDED TERM 843)
SEE: BASIN

SADDLE (INCLUDED TERM 844)
SEE: GAP

SAFETY_FAIRWAY (INCLUDED TERM 845)
SEE: LANE

SAGEBRUSH (INCLUDED TERM 846)
SEE: WOODLAND

SALINA (INCLUDED TERM 847)
SEE: WETLAND/LAKE

SALT_LAKE (INCLUDED TERM 848)
SEE: LAKE

SALT_MARSH (INCLUDED TERM 849)

SEE: WETLAND

STANDARD FEATURE TERM 153: SALT PAN
DEFN: AN AREA OF SALT DEPOSITS.
SOURCE: DEFENSE MAPPING AGENCY

SALTING (INCLUDED TERM 850)
SEE: WETLAND

SANCTUARY (INCLUDED TERM 851)
SEE: PARK

SAND_BANK (INCLUDED TERM 852)
SEE: BAR

SAND_DUNE (INCLUDED TERM 853)
SEE: MOUNT/RIDGE

SAND_HILLS (INCLUDED TERM 854)
SEE: MOUNT_RANGE

SAND_HORN (INCLUDED TERM 855)
SEE: BAR

SAND_LOBE (INCLUDED TERM 856)
SEE: BAR

SAND_PIT (INCLUDED TERM 857)
SEE: MINE

SAND_SPIT (INCLUDED TERM 858)
SEE: BAR

SANDBAR (INCLUDED TERM 859)
SEE: BAR

SANITARIUM (INCLUDED TERM 860)
SEE: BUILDING

SAVANNA (INCLUDED TERM 861)
SEE: GRASSLAND

SCAR (INCLUDED TERM 862)
SEE: CLIFF/PINNACLE

SCARP (INCLUDED TERM 863)
SEE: CLIFF

SCAW (INCLUDED TERM 864)
SEE: CLIFF

SCHOOL (INCLUDED TERM 865)
SEE: BUILDING/BUILDING_COMPLEX

SCIENCE_CENTER (INCLUDED TERM 866)
SEE: BUILDING

SCRAP_YARD (INCLUDED TERM 867)
SEE: DUMPING_GROUND

SCRUB (INCLUDED TERM 868)
SEE: WOODLAND

STANDARD FEATURE TERM 154: SEA
DEFN: THE GREAT BODY OF SALT WATER OF THE OCEANS.
SOURCE: ADAPTED FROM STAMP
ATTRIB: LOCATION NAME ACIDITY SALINITY CHARTED_DEPTH COMMERCIAL_SHIPPING ICE_PRESENT MINERAL_CONTENT NAVIGABLE RECREATIONAL
INCLUD: ARCHIPELAGO MARGINAL_SEA CLOSED_SEA OPEN_SEA OPEN_WATER OCEAN

SEA_BEACON (INCLUDED TERM 869)
SEE: BEACON

SEA_BUOY (INCLUDED TERM 870)
SEE: BUOY

SEA_COAST (INCLUDED TERM 871)
SEE: COAST

SEA_GATE (INCLUDED TERM 872)
SEE: BREAKWATER/GATE

SEACHANNEL (INCLUDED TERM 873)
SEE: VALLEY/WATERCOURSE

SEADROME (INCLUDED TERM 874)
SEE: RUNWAY

SEAKNOLL (INCLUDED TERM 875)
SEE: MOUNT

SEAMOUNT (INCLUDED TERM 876)
SEE: MOUNT

SEAMOUNT_CHAIN (INCLUDED TERM 877)
SEE: MOUNT_RANGE

SEAMOUNT_GROUP (INCLUDED TERM 878)
SEE: MOUNT_RANGE

SEAMOUNT_RANGE (INCLUDED TERM 879)
SEE: MOUNT_RANGE

SEAPEAK (INCLUDED TERM 880)
SEE: PEAK

SEAPLANE_BASE (INCLUDED TERM 881)
SEE: AIRPORT

SEAPLANE_LANDING/TAKE-OFF_AREA (INCLUDED TERM 882)
SEE: RUNWAY

SEAPORT (INCLUDED TERM 883)
SEE: PORT/PLACE

SEASHORE (INCLUDED TERM 884)
SEE: SHORE

SEAWALL (INCLUDED TERM 885)
SEE: BREAKWATER/EMBANKMENT/WALL

SEAWAY (INCLUDED TERM 886)
SEE: WATERCOURSE/LANE

SECONDARY_TIDE_STATION (INCLUDED TERM 887)
SEE: BUILDING/BUILDING_COMPLEX/TIDAL_GAUGE
DEFN: A TIDE STATION OPERATED OVER A SHORT PERIOD OF TIME TO OBTAIN DATA FOR A SPECIFIC PURPOSE.
SOURCE: MODIFIED FROM NAVIGATION DICTIONARY

SECTION_LINE (INCLUDED TERM 888)
SEE: BOUNDARY

SECTORED_LIGHT (INCLUDED TERM 889)
SEE: BEACON

SEEP (INCLUDED TERM 890)
SEE: SPRING

SEND (INCLUDED TERM 891)
SEE: SWASH

SERVICE_LANE (INCLUDED TERM 892)
SEE: ROAD/LANE

SERVICE_STREET (INCLUDED TERM 893)
SEE: ROAD

SETTLEMENT (INCLUDED TERM 894)
SEE: PLACE

SEWAGE_TREATMENT_PLANT (INCLUDED TERM 895)
SEE: BUILDING_COMPLEX

STANDARD FEATURE TERM 155: SHAFT
DEFN: A LONG NARROW PASSAGE SUNK IN THE EARTH.
SOURCE: AMERICAN HERITAGE DICTIONARY
ATTRIB: ANGLE LOCATION, LENGTH, WIDTH, DEPTH, SLOPE, DIRECTION

SHELF_ICE (INCLUDED TERM 896)
SEE: ICE_FIELD

SHELTERBELT (INCLUDED TERM 897)

SEE: HEDGE

SHIELD_VOLCANO (INCLUDED TERM 898)
SEE: MOUNT

STANDARD FEATURE TERM 156: SHINGLE
DEFN: A COLLECTION OF LOOSE PEBBLES ON THE SHORE OF THE SEA OR A LAKE
SOURCE: ADAPTED FROM MOORE, A DICTIONARY OF GEOGRAPHY

SHIP_CANAL (INCLUDED TERM 899)
SEE: WATERCOURSE

SHIPPING_LANE (INCLUDED TERM 900)
SEE: LANE

STANDARD FEATURE TERM 157: SHIPYARD
DEFN: A YARD OR AREA WHERE SHIPS ARE BUILT OR REPAIRED.
SOURCE: AMERICAN HERITAGE DICTIONARY
INCLUD: DOCKYARD

SHOAL (INCLUDED TERM 901)
SEE: BAR

SHOAL_PATCHES (INCLUDED TERM 902)
SEE: BAR

SHOPPING_CENTER (INCLUDED TERM 903)
SEE: BUILDING_COMPLEX

STANDARD FEATURE TERM 158: SHORE
DEFN: THAT PART OF THE LAND IN IMMEDIATE CONTACT WITH A BODY OF WATER INCLUDING THE AREA BETWEEN HIGH AND LOW WATER LINES.
SOURCE: MODIFIED FROM NAVIGATION DICTIONARY
ATTRIB: SLOPE LOCATION AREA COMPOSITION EQUIPMENT_PRESENT LENGTH WIDTH NAME
INCLUD: INSHORE STRAND FORESHORE BEACH_FACE RIVAGE SHOREFACE SEASHORE BANK

SHORE_REEF (INCLUDED TERM 904)
SEE: REEF

SHOREFACE (INCLUDED TERM 905)
SEE: SHORE

STANDARD FEATURE TERM 159: SHORELINE
DEFN: THE LINE OF CONTACT BETWEEN A BODY OF WATER AND THE LAND
SOURCE: MODIFIED FROM NAVIGATION DICTIONARY
ATTRIB: MEAN_HIGH_WATER DATUM COASTLAL
INCLUD: COASTLINE COASTAL_SHORELINE

SHORT_FLASHING_LIGHT (INCLUDED TERM 906)
SEE: BEACON

SHORT_LONG_FLASHING_LIGHT (INCLUDED TERM 907)
SEE: BEACON

SHRINE (INCLUDED TERM 908)
SEE: MONUMENT

SHRUB (INCLUDED TERM 909)
SEE: WOODLAND

SIDEWALK (INCLUDED TERM 910)
SEE: ROAD

SIDING (INCLUDED TERM 911)
SEE: RAILWAY

STANDARD FEATURE TERM 160: SIGN
DEFN: A ROADWAY ASSOCIATED FEATURE WHICH PROVIDES INFORMATION TO PEOPLE PASSING.
SOURCE: CANADIAN COUNCIL ON SURVEYING AND MAPPING
ATTRIB: LOCATION INFORMATION_DISPLAYED COMPOSITION LIGHTED/UNLIGHTED
INCLUD: DISPLAY_SIGN HIGHWAY_ROUTE_NUMBER MILE_POST MILEAGE_POST ROUTE_MARKER TRAFFIC_SIGN SIGN_POST BILLBOARD BOUNDARY_SIGN KILOMETER_POST

SIGN_POST (INCLUDED TERM 912)
SEE: SIGN

SIGNAL_STATION (INCLUDED TERM 913)
SEE: BUILDING/BUILDING_COMPLEX

SILL (INCLUDED TERM 914)
SEE: RIDGE/GAP

SILO (INCLUDED TERM 915)
SEE: BUILDING

SILVA (INCLUDED TERM 916)
SEE: WOODLAND

SINGLE_TRACK_RAILWAY (INCLUDED TERM 917)
SEE: RAILWAY

SINK (INCLUDED TERM 918)
SEE: BASIN

SINKHOLE (INCLUDED TERM 919)
SEE: BASIN

STANDARD FEATURE TERM 161: SKI AREA
DEFN: AN AREA USED FOR SKIING.
SOURCE: CANADIAN COUNCIL ON SURVEYING AND MAPPING
ATTRIB: LOCATION NAME

STANDARD FEATURE TERM 162: SKI JUMP
DEFN: A RAMP USED FOR SKI JUMPING.
SOURCE: MODIFIED FROM DEFENSE MAPPING AGENCY

SKI_LIFT (INCLUDED TERM 920)

SEE: CABLEWAY

SKI_PYLON (INCLUDED TERM 921)
SEE: TOWER

SLAG_HEAP (INCLUDED TERM 922)
SEE: DUMPING_GROUND

SLASH (INCLUDED TERM 923)
SEE: WETLAND

SLIP (INCLUDED TERM 924)
SEE: BERTH

SLIPWAY (INCLUDED TERM 925)
SEE: LAUNCHING_RAMP

SLOUGH (INCLUDED TERM 926)
SEE: WETLAND

SLUE (INCLUDED TERM 927)
SEE: WETLAND

SLUICE (INCLUDED TERM 928)
SEE: WATERCOURSE/GATE

SLUICE_GATE (INCLUDED TERM 929)
SEE: GATE

SMOKE_STACK (INCLUDED TERM 930)
SEE: CHIMNEY

STANDARD FEATURE TERM 163: SNAG
DEFN: A STEM OR TRUNK OF A TREE ABOVE OR BELOW THE SURFACE OF THE WATER.
SOURCE: DEFENSE MAPPING AGENCY
INCLUD: STUMP

SNOW_SHED (INCLUDED TERM 931)
SEE: BUILDING
DEFN: A SHELTER BUILT TO PROTECT A SECTION OF RAILROAD FROM SNOW SLIDES.
SOURCE: DEFENSE MAPPING AGENCY

STANDARD FEATURE TERM 164: SNOWFIELD
DEFN: A REGION OF PERMANENT SNOW IN MOUNTAINOUS AREAS OR HIGH LATITUDES.
SOURCE: MODIFIED FROM CANADIAN COUNCIL ON SURVEYING AND MAPPING

STANDARD FEATURE TERM 165: SOLAR PANEL
DEFN: A UNIT OF SOLAR CELLS FOR CONVERTING SUNLIGHT INTO ELECTRICAL ENERGY OR HEAT.
SOURCE: DEFENSE MAPPING AGENCY

SONOBUOY (INCLUDED TERM 932)
SEE: BUOY

SOUND (INCLUDED TERM 933)
SEE: WATERCOURSE/LAKE/INLET

SOUND_BARRIER (INCLUDED TERM 934)
SEE: FENCE/WALL
DEFN: A FENCE OR WALL BUILT TO CONTAIN OR DEFLECT NOISE.
SOURCE: CANADIAN COUNCIL ON SURVEYING AND MAPPING

SOUND_BUOY (INCLUDED TERM 935)
SEE: BUOY

SOVEREIGNTY_LIMIT (INCLUDED TERM 936)
SEE: BOUNDARY

SPAR_BUOY (INCLUDED TERM 937)
SEE: BUOY

SPECIAL_PURPOSE_BUOY (INCLUDED TERM 938)
SEE: BUOY

SPECIAL_TRACK_RAILWAY (INCLUDED TERM 939)
SEE: RAILWAY

SPILLWAY (INCLUDED TERM 940)
SEE: WATERCOURSE

SPIT (INCLUDED TERM 941)
SEE: BAR

SPOIL_AREA (INCLUDED TERM 942)
SEE: DUMPING_GROUND

SPOIL_BANKS (INCLUDED TERM 943)
SEE: DUMPING_GROUND

SPOIL_GROUND (INCLUDED TERM 944)
SEE: DUMPING_GROUND

SPOIL_GROUND_BUOY (INCLUDED TERM 945)
SEE: BUOY

STANDARD FEATURE TERM 166: SPORTS_FIELD
DEFN: A FIELD ON WHICH SPORTING ACTIVITIES ARE CARRIED OUT.
SOURCE: CANADIAN COUNCIL ON SURVEYING AND MAPPING
ATTRIB: LOCATION NAME LIGHTED/UNLIGHTED SPORTS_TYPE
INCLUD: SPORTS_PLAYING_FIELD ATHLETIC_FIELD BALL_PARK

SPORTS_PLAYING_FIELD (INCLUDED TERM 946)
SEE: SPORTS_FIELD

SPORTS_TRACK (INCLUDED TERM 947)
SEE: RACETRACK

STANDARD FEATURE TERM 167: SPRING
DEFN: THE PLACE WHERE WATER ISSUES FROM THE GROUND NATURALLY.
SOURCE: MODIFIED FROM USGS
ATTRIB: LOCATION NAME FORCE_OF_FLOW INTERMITTENT/PERENNIAL TEMPERATURE RELATIONSHIP_TO_WATER_SURFACE SALINITY
INCLUD: SEEP MINERAL_SPRING HOTSPRING

SPUR (INCLUDED TERM 948)
SEE: RIDGE/RAILWAY/ROAD

SQUARE (INCLUDED TERM 949)
SEE: PARK

STABLE (INCLUDED TERM 950)
SEE: BUILDING

STACK (INCLUDED TERM 951)
SEE: ISLAND

STANDARD FEATURE TERM 168: STADIUM
DEFN: LARGE OFTEN UNROOFED STRUCTURE IN WHICH ATHLETIC EVENTS ARE HELD.
SOURCE: BRUDER, NAUTICAL CHART MANUAL
ATTRIB: COVERED/UNCOVERED SPORTS_TYPE

STAKE_NET (INCLUDED TERM 952)
SEE: FISH_TRAP

STAKES (INCLUDED TERM 953)
SEE: BEACON

STAND (INCLUDED TERM 954)
SEE: WOODLAND

STANDPIPE (INCLUDED TERM 955)
SEE: TANK
DEFN: (MODIFIED)A HIGH VERTICAL RESERVOIR USED FOR STORING WATER IN A MUNICIPAL WATER SYSTEM SO AS TO MAINTAIN A UNIFORM PRESSURE.
SOURCE: CANADIAN COUNCIL ON SURVEYING AND MAPPING

STATION (INCLUDED TERM 956)
SEE: BUILDING/BUILDING_COMPLEX
DEFN: THE PLACE, BUILDING OR ESTABLISHMENT FROM WHICH A SERVICE IS PROVIDED OR OPERATIONS ARE DIRECTED.

STATION_BUOY (INCLUDED TERM 957)
SEE: BUOY

STEEL_MILL (INCLUDED TERM 958)
SEE: BUILDING/BUILDING_COMPLEX

STEPPE (INCLUDED TERM 959)
SEE: GRASSLAND

STANDARD FEATURE TERM 169: STOCKYARD
DEFN: AN ENCLOSED AREA IN WHICH LIVESTOCK ARE TEMPORARILY KEPT.

SOURCE: DEFENSE MAPPING AGENCY
INCLUD: FEEDLOT HOLDING_PEN

STONE_MOUND_MONUMENT (INCLUDED TERM 960)
SEE: CONTROL_POINT

STORAGE_BUNKER (INCLUDED TERM 961)
SEE: BUILDING

STORAGE_TANK (INCLUDED TERM 962)
SEE: TANK

STORE (INCLUDED TERM 963)
SEE: BUILDING

STRAIT (INCLUDED TERM 964)
SEE: WATERCOURSE

STRAND (INCLUDED TERM 965)
SEE: SHORE

STRANDED_WRECK (INCLUDED TERM 966)
SEE: WRECK

STRANDING_HARBOR (INCLUDED TERM 967)
SEE: HARBOR

STRATH (INCLUDED TERM 968)
SEE: VALLEY

STREAM (INCLUDED TERM 969)
SEE: WATERCOURSE

STREAM_CHANNEL (INCLUDED TERM 970)
SEE: WATERCOURSE

STREET (INCLUDED TERM 971)
SEE: ROAD

STREETCAR_LINE (INCLUDED TERM 972)
SEE: RAILWAY

STRING_BOG (INCLUDED TERM 973)
SEE: WETLAND

STRIP_MINE (INCLUDED TERM 974)
SEE: MINE

STUMP (INCLUDED TERM 975)
SEE: SNAG
DEFN: A PORTION OF THE TRUNK OF A TREE ABOVE OR BELOW THE SURFACE OF THE WATER.
SOURCE: MODIFIED FROM DEFENSE MAPPING AGENCY

SUBMARINE_ISTHMUS (INCLUDED TERM 976)
SEE: ISTHMUS

SUBMARINE_CABLE (INCLUDED TERM 977)
SEE: UTILITY

SUBMERGED_REEF (INCLUDED TERM 978)
SEE: REEF

SUBSTATION/TRANSFORMER_YARD (INCLUDED TERM 979)
SEE: BUILDING/BUILDING_COMPLEX

SUBWAY (INCLUDED TERM 980)
SEE: RAILWAY/TUNNEL

SUMMIT (INCLUDED TERM 981)
SEE: PEAK

SUNKEN_ROCK (INCLUDED TERM 982)
SEE: ROCK

SUNKEN_WRECK (INCLUDED TERM 983)
SEE: WRECK

SUPER_BUOY (INCLUDED TERM 984)
SEE: BUOY

SUPPLEMENTARY_AERODROME (INCLUDED TERM 985)
SEE: AIRPORT

SURVEY_MONUMENT (INCLUDED TERM 986)
SEE: CONTROL_POINT

SUSPENSION_BRIDGE (INCLUDED TERM 987)
SEE: BRIDGE

SWALE (INCLUDED TERM 988)
SEE: TROUGH

SWAMP (INCLUDED TERM 989)
SEE: WETLAND

SWAMP_FOREST (INCLUDED TERM 990)
SEE: WETLAND

STANDARD FEATURE TERM 170: SWASH
DEFN: THE MASS OF BROKEN FOAMING WATER WHICH RUSHES BODILY UP A BEACH AS A WAVE BREAKS. SYN. WITH SEND.
SOURCE: A DICTIONARY OF GEOGRAPHY, MONKHOUSE
INCLUD: SEND

SWIMMING_POOL (INCLUDED TERM 991)
SEE: LAKE

SWING_BRIDGE (INCLUDED TERM 992)
SEE: BRIDGE

SWINGING_BUOY (INCLUDED TERM 993)
SEE: BUOY

SYNAGOGUE (INCLUDED TERM 994)
SEE: BUILDING

TABLEKNOLL (INCLUDED TERM 995)
SEE: PLATEAU

TABLELAND (INCLUDED TERM 996)
SEE: PLATEAU

TABLEMOUNT (INCLUDED TERM 997)
SEE: PLATEAU

TAIGA (INCLUDED TERM 998)
SEE: WOODLAND

TAILING_DUMP (INCLUDED TERM 999)
SEE: DUMPING_GROUND

TAILING_PILE (INCLUDED TERM 1000)
SEE: DUMPING_GROUND

TAILING_POND (INCLUDED TERM 1001)
SEE: DUMPING_GROUND

STANDARD FEATURE TERM 171: TALUS
DEFN: SLOPES OF BROKEN ROCK DEBRIS ON A MOUNTAINSIDE.
SOURCE: MODIFIED FROM CANADIAN COUNCIL ON SURVEYING AND MAPPING
ATTRIB: LOCATION NAME

STANDARD FEATURE TERM 172: TANK
DEFN: A STRUCTURE USED FOR THE STORAGE OF FLUIDS.
SOURCE: CANADIAN COUNCIL ON SURVEYING AND MAPPING
ATTRIB: LOCATION NAME SUBSTANCE_STORED RELATIONSHIP_TO_GROUND_SURFACE
INCLUD: CATCH_BASIN CISTERN GASOMETER STANDPIPE STORAGE_TANK

TAXI_CHANNEL (INCLUDED TERM 1002)
SEE: RUNWAY

TAXI_CHANNEL_LIGHT (INCLUDED TERM 1003)
SEE: BEACON

TAXIWAY (INCLUDED TERM 1004)
SEE: RUNWAY

TAXIWAY_LIGHTS (INCLUDED TERM 1005)
SEE: BEACON/RUNWAY

TELEGRAPH_BUOY (INCLUDED TERM 1006)
SEE: BUOY

TELEGRAPH_LINE (INCLUDED TERM 1007)
SEE: UTILITY

TELEGRAPH_POLE (INCLUDED TERM 1008)
SEE: POST

TELEGRAPH_PYLON (INCLUDED TERM 1009)
SEE: TOWER

TELEPHONE_LINE (INCLUDED TERM 1010)
SEE: UTILITY

TELEPHONE_POLE (INCLUDED TERM 1011)
SEE: POST

TELEPHONE_PYLON (INCLUDED TERM 1012)
SEE: TOWER

TELEVISION_STATION (INCLUDED TERM 1013)
SEE: BUILDING/BUILDING_COMPLEX

TELEVISION_TOWER (INCLUDED TERM 1014)
SEE: TOWER

TEMPLE (INCLUDED TERM 1015)
SEE: BUILDING

TEMPORARY_ANCHORAGE (INCLUDED TERM 1016)
SEE: HARBOR

STANDARD FEATURE TERM 173: TENNIS COURT
DEFN: A RECREATIONAL AREA USED FOR PLAYING TENNIS.
SOURCE: CANADIAN COUNCIL ON SURVEYING AND MAPPING
ATTRIB: LOCATION NAME

TERMINAL (INCLUDED TERM 1017)
SEE: BUILDING

TERMINAL_MORAINE (INCLUDED TERM 1018)
SEE: MORAINE

STANDARD FEATURE TERM 174: TERRACE
DEFN: A STEPLIKE FEATURE BETWEEN HIGHER AND LOWER GROUND: A RELATIVELY FLAT OR GENTLY INCLINED SHELF OF EARTH, BACKED AND FRONTED BY STEEP SLOPES OR MAN-MADE RETAINING WALLS.
SOURCE: MODIFIED FROM CANADIAN COUNCIL ON SURVEYING AND MAPPING
ATTRIB: NAME LOCATION
INCLUD: BENCH MARINE_BENCH KAME_TERRACE ROCK_TERRACE RAISED_BEACH

TERRITORIAL_WATERS_LIMIT (INCLUDED TERM 1019)
SEE: BOUNDARY

TEXAS_TOWER (INCLUDED TERM 1020)
SEE: TOWER

THEATER (INCLUDED TERM 1021)
SEE: BUILDING

THERMOBUOY (INCLUDED TERM 1022)
SEE: BUOY

THICKET (INCLUDED TERM 1023)
SEE: WOODLAND

THORN_FOREST (INCLUDED TERM 1024)
SEE: WOODLAND

THOROFARE (INCLUDED TERM 1025)
SEE: ROAD/WATERCOURSE

THOROUGHFARE (INCLUDED TERM 1026)
SEE: ROAD/WATERCOURSE

THRESHOLD_LIGHT (INCLUDED TERM 1027)
SEE: BEACON

THROUGHFARE (INCLUDED TERM 1028)
SEE: ROAD/WATERCOURSE

THRUWAY (INCLUDED TERM 1029)
SEE: ROAD

TIDAL_BASIN (INCLUDED TERM 1030)
SEE: BASIN

TIDAL_FLAT (INCLUDED TERM 1031)
SEE: FLAT

STANDARD FEATURE TERM 175: TIDAL GAUGE
DEFN: AN INSTRUMENT FOR MEASURING THE HEIGHT OF THE TIDE.
SOURCE: DEFENSE MAPPING AGENCY
ATTRIB: PRIMARY/SECONDARY
INCLUD: PRIMARY_TIDE_STATION SECONDARY_TIDE_STATION

TIDAL_HARBOR (INCLUDED TERM 1032)
SEE: HARBOR

TIDAL_LIGHT (INCLUDED TERM 1033)
SEE: BEACON

TIDAL_MARSH (INCLUDED TERM 1034)
SEE: WETLAND

TIDAL_QUAY (INCLUDED TERM 1035)
SEE: WHARF

TIDE_GATE (INCLUDED TERM 1036)
SEE: GATE

TIDE_LIMIT (INCLUDED TERM 1037)
SEE: BOUNDARY

TIDE_LOCK (INCLUDED TERM 1038)
SEE: LOCK

TIDE_SIGNAL (INCLUDED TERM 1039)
SEE: BEACON

TIDE_RIPS (INCLUDED TERM 1040)
SEE: OVERFALLS

TIDE_STATION (INCLUDED TERM 1041)
SEE: BUILDING/BUILDING_COMPLEX

TIDEWAY (INCLUDED TERM 1042)
SEE: WATERCOURSE

TIMBER_LINE (INCLUDED TERM 1043)
SEE: BOUNDARY

STANDARD FEATURE TERM 176: TIME ZONE
DEFN: A GEOGRAPHIC REGION WITHIN WHICH THE SAME STANDARD TIME IS USED.
SOURCE: DEFENSE MAPPING AGENCY
ATTRIB: NAME LOCATION

TOLL_GATE (INCLUDED TERM 1044)
SEE: GATE

TOLLROAD (INCLUDED TERM 1045)
SEE: ROAD

TOMBOLO (INCLUDED TERM 1046)
SEE: BAR/ISLAND

TONGUE (INCLUDED TERM 1047)
SEE: BAR/PENINSULA

TOPMARK_BUOY (INCLUDED TERM 1048)
SEE: BUOY

TORRENT (INCLUDED TERM 1049)
SEE: WATERCOURSE

TOURIST_CABIN (INCLUDED TERM 1050)
SEE: BUILDING

TOURIST_LODGE (INCLUDED TERM 1051)
SEE: BUILDING

STANDARD FEATURE TERM 177: TOWER
DEFN: A TALL FRAMEWORK OR STRUCTURE, THE ELEVATION OF WHICH IS FUNCTIONAL.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY
ATTRIB: LOCATION COMMUNICATION/NONCOMMUNICATION OBSERVATION HEIGHT DIAMETER FEATURE_SUPPORTED FUNCTION NAME FEATURE_PRESENT FEATURE_CONNECTED CONTROL LIGHTED/UNLIGHTED MOVABLE/STATIONARY RADIO_TRANSMISSION MICROWAVE_TRANSMISSION STORAGE TELEVISION_TRANSMISSION OFFSHORE/ONSHORE
INCLUD: CONTROL_TOWER AIRPORT_TRAFFIC_CONTROL_TOWER PYLON AERODROME_CONTROL_TOWER FLAG_TOWER TEXAS_TOWER LOOKOUT_TOWER OBSERVATION_TOWER POWER_TRANSMISSION_PYLON RADIO_MAST RADIO_TOWER WATER_TOWER FIRE_LOOKOUT_TOWER TELEGRAPH_PYLON TELEPHONE_PYLON TELEVISION_TOWER MICROWAVE_TOWER TRANSMISSION_TOWER FIRE_TOWER ELECTRICAL_TOWER HYDRO_TOWER AERIAL_CABLEWAY_PYLON SKI_PYLON WATER_INTAKE_TOWER COOLING_TOWER

TOWN (INCLUDED TERM 1052)
SEE: PLACE

TOWN_HALL (INCLUDED TERM 1053)
SEE: BUILDING

TOWN_LIMITS (INCLUDED TERM 1054)
SEE: BOUNDARY

TRACK (INCLUDED TERM 1055)
SEE: RAILWAY/ROAD

TRAFFIC_CIRCLE (INCLUDED TERM 1056)
SEE: INTERSECTION

STANDARD FEATURE TERM 178: TRAFFIC SEPARATION SCHEME
DEFN: AREA OF WATER WITH LANES DESIGNATED TO SEPARATE OPPOSING STREAMS OF VESSEL TRAFFIC.
SOURCE: MODIFIED FROM DMA

TRAFFIC_SIGN (INCLUDED TERM 1057)
SEE: SIGN

TRAIL (INCLUDED TERM 1058)
SEE: ROAD

TRAILER (INCLUDED TERM 1059)
SEE: MOBILE_HOME

TRAILER_PARK (INCLUDED TERM 1060)
SEE: MOBILE_HOME_PARK

TRAINING_WALL (INCLUDED TERM 1061)
SEE: BREAKWATER

TRAMWAY (INCLUDED TERM 1062)
SEE: CABLEWAY

TRANSFORMER_STATION (INCLUDED TERM 1063)
SEE: BUILDING/BUILDING_COMPLEX

TRANSMISSION_TOWER (INCLUDED TERM 1064)
SEE: TOWER

TRANSMISSION_LINE (INCLUDED TERM 1065)
SEE: UTILITY

TRANSMITTER_STATION (INCLUDED TERM 1066)
SEE: BUILDING/BUILDING_COMPLEX

TRANSOBUOY (INCLUDED TERM 1067)
SEE: BUOY

TRANSPONDER_BEACON (INCLUDED TERM 1068)
SEE: BEACON

TRANSVERSE_BAR (INCLUDED TERM 1069)
SEE: BAR

STANDARD FEATURE TERM 179: TREE
DEFN: A WOODY PERENNIAL PLANT, HAVING A SELF-SUPPORTING MAIN STEM OR TRUNK.
SOURCE: MODIFIED FROM THE DEFENSE MAPPING AGENCY
ATTRIB: HEIGHT

TREE_LINE (INCLUDED TERM 1070)
SEE: BOUNDARY

TRENCH (INCLUDED TERM 1071)
SEE: VALLEY/TROUGH

TRESTLE (INCLUDED TERM 1072)
SEE: BRIDGE

TRIANGULATION_STATION (INCLUDED TERM 1073)
SEE: CONTROL_POINT

TRIBUTARY (INCLUDED TERM 1074)
SEE: WATERCOURSE

TROPICAL_RAIN_FOREST (INCLUDED TERM 1075)
SEE: WOODLAND

STANDARD FEATURE TERM 180: TROUGH
DEFN: A LONG DEPRESSION OF THE SEA FLOOR
SOURCE: ADAPTED FROM NAUTICAL CHART MANUAL
INCLUD: DEEP SWALE TRENCH FOREDEEP RUNNEL

TRUCK_FARM (INCLUDED TERM 1076)
SEE: CROP_LAND

TRUCK_GARDEN (INCLUDED TERM 1077)
SEE: CROP_LAND

TRUMPET_BUOY (INCLUDED TERM 1078)
SEE: BUOY

TRUNK_BUOY (INCLUDED TERM 1079)

SEE: BUOY

TULELANDS (INCLUDED TERM 1080)
SEE: WETLAND

STANDARD FEATURE TERM 181: TUNDRA
DEFN: A TREELESS AREA POLEWARD OR UPWARD OF THE TREE LINE OF ARCTIC OR ALPINE REGIONS, HAVING A PERMANENTLY FROZEN SUBSOIL AND SUPPORTING LOW-GROWING VEGETATION SUCH AS LICHENS, MOSSES, AND STUNTED SHRUBS.
SOURCE: NEW DEFINITION
ATTRIB: LOCATION AREA PREDOMINANT_SPECIES NAME

STANDARD FEATURE TERM 182: TUNNEL
DEFN: AN UNDERGROUND OR UNDERWATER PASSAGE.
SOURCE: AMERICAN_HERITAGE_DICTIONARY
ATTRIB: LOCATION NAME MODE_TRANSPORTED CLEARANCE LENGTH WIDTH RESTRICTIONS FEATURE_PASSED_UNDER FEATURE_CONNECTED PASSENGER_TRANSPORTATION PHYSICAL_CONDITION_OF_SURFACE_MATERIAL TOLL RELATIONSHIP_TO_GROUND_SURFACE RELATIONSHIP_TO_WATER_SURFACE
INCLUD: CATTLE_UNDERPASS PEDESTRIAN_UNDERPASS RAILWAY_TUNNEL SUBWAY UNDERPASS

TUNNY_NETS (INCLUDED TERM 1081)
SEE: FISH_TRAP

STANDARD FEATURE TERM 183: TURNING BASIN
DEFN: A WATER AREA USED FOR TURNING VESSELS.
SOURCE: NAVIGATION DICTIONARY
ATTRIB: LOCATION WIDTH LENGTH CHARTED_DEPTH SALINITY

TURNING_BUOY (INCLUDED TERM 1082)
SEE: BUOY

TURNPIKE (INCLUDED TERM 1083)
SEE: ROAD

STANDARD FEATURE TERM 184: TURNTABLE
DEFN: A CIRCULAR HORIZONTAL ROTATING PLATFORM EQUIPPED WITH A RAILWAY TRACK, USED FOR TURNING LOCOMOTIVES, AS IN A ROUNDHOUSE.
SOURCE: AMERICAN HERITAGE DICTIONARY
ATTRIB: LOCATION NAME DIAMETER RAIL_GAUGE
INCLUD: RAILWAY_TURNTABLE

UNATTENDED_LIGHT (INCLUDED TERM 1084)
SEE: BEACON

UNDERPASS (INCLUDED TERM 1085)
SEE: TUNNEL

UNDULATING_LIGHT (INCLUDED TERM 1086)
SEE: BEACON

UNIVERSITY (INCLUDED TERM 1087)
SEE: BUILDING_COMPLEX

UNWATCHED_LIGHT (INCLUDED TERM 1088)
SEE: BEACON

URBAN_AREA (INCLUDED TERM 1089)
SEE: PLACE

UTILIDOR (INCLUDED TERM 1090)
SEE: UTILITY

STANDARD FEATURE TERM 185: UTILITY
DEFN: A LINEAR DISTRIBUTION SYSTEM CONSISTING OF PIPELINES, HIGH TENSION WIRES, CABLES ETC., PROVIDING A PUBLIC SERVICE AND USUALLY SUBJECT TO GOVERNMENT REGULATIONS.
SOURCE: CANADIAN COUNCIL ON SURVEYING AND MAPPING
ATTRIB: NAME LOCATION RELATIONSHIP_TO_GROUND_SURFACE RELATIONSHIP_TO_WATER_SURFACE SIGNAL_TYPE SINGLE_WIRE/MULTIPLE_WIRES SHAPE SUBSTANCE_TRANSPORTED
INCLUD: CABLE TRANSMISSION_LINE PENSTOCK POWER_LINE POWER_TRANSMISSION_LINE SUBMARINE_CABLE TELEPHONE_LINE TELEGRAPH_LINE UTILIDORE PIPE PIPELINE

STANDARD FEATURE TERM 186: VALLEY
DEFN: A LONG, NARROW DEPRESSION IN THE EARTH'S SURFACE, USUALLY WITH A FAIRLY REGULAR DOWNSLOPE.
SOURCE: MODIFIED FROM A DICTIONARY OF GEOGRAPHY, MOORE
ATTRIB: LENGTH DEPTH WIDTH SLOPE_OF_SIDES WATER NAME LOCATION AIR/LAND/WATER
INCLUD: TRENCH MOAT GLACIAL_TROUGH CANYON CHASM DALE DELL GLACIAL_GORGE GLEN COULEE RAVINE GORGE GRABEN HOLLOW RE-ENTRANT STRATH RIFT_VALLEY GULCH GULLY DROWNED_VALLEY GOE DEPRESSION DEFILE SEACHANNEL CREVICE WATER_GAP

VELD (INCLUDED TERM 1091)
SEE: GRASSLAND

VERTICAL_CONTROL_POINT (INCLUDED TERM 1092)
SEE: CONTROL_POINT

VERTICAL_CONTROL_MONUMENT (INCLUDED TERM 1093)
SEE: CONTROL_POINT

VIADUCT (INCLUDED TERM 1094)
SEE: BRIDGE

VILLAGE (INCLUDED TERM 1095)
SEE: PLACE

VINEYARD (INCLUDED TERM 1096)
SEE: CROP_LAND

VOLCANO (INCLUDED TERM 1097)
SEE: MOUNT

VOLCANIC_DIKE (INCLUDED TERM 1098)
SEE: RIDGE

WADI (INCLUDED TERM 1099)
SEE: WATERCOURSE

WALK (INCLUDED TERM 1100)
SEE: ROAD

STANDARD FEATURE TERM 187: WALL

DEFN: AN UPRIGHT STRUCTURE OF MASONRY, WOOD, PLASTER, OR OTHER BUILDING MATERIAL SERVING TO ENCLOSE, DIVIDE, OR PROTECT AN AREA.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY
ATTRIB: HEIGHT LENGTH COMPOSITION BOUNDARY_MARKER BARRIER EQUIPMENT_PRESENT FUNCTION SOUND_BARRIER
INCLUD: AIRFIELD_REVETMENT BLAST_BARRIER RETAINING_WALL SEAWALL BULKHEAD SOUND_BARRIER

WAREHOUSE (INCLUDED TERM 1101)
SEE: BUILDING

WARNING_BEACON (INCLUDED TERM 1102)
SEE: BEACON

WARNING_LIGHT (INCLUDED TERM 1103)
SEE: BEACON

WARNING_RADIOBEACON (INCLUDED TERM 1104)
SEE: BEACON

WARPING_BUOY (INCLUDED TERM 1105)
SEE: BUOY

WASH (INCLUDED TERM 1106)
SEE: WATERCOURSE

WATCHED_LIGHT (INCLUDED TERM 1107)
SEE: BEACON

WATER_GAP (INCLUDED TERM 1108)
SEE: VALLEY/WATERCOURSE

WATER_HOLE (INCLUDED TERM 1109)
SEE: WELL

WATER_INTAKE_TOWER (INCLUDED TERM 1110)
SEE: TOWER

WATER_LANE (INCLUDED TERM 1111)
SEE: RUNWAY/LANE

WATER_TOWER (INCLUDED TERM 1112)
SEE: TOWER

STANDARD FEATURE TERM 188: WATERCOURSE
DEFN: A WAY OR COURSE THROUGH WHICH WATER MAY OR DOES FLOW.
SOURCE: NEW DEFINITION
ATTRIB: LOCATION NAME WIDTH DEPTH VOLUME LENGTH RELATIONSHIP_TO_GROUND_SURFACE COMPOSITION CHARTED_DEPTH COVERED/UNCOVERED SLOPE SHAPE NAVIGABLE IRRIGATION DRAINAGE WATER_SUPPLY COMMERCIAL_SHIPPING PASSENGER_TRANSPORTATION ACCESS BUOYED LIGHTED/UNLIGHTED WATERAGE RECREATIONAL FLOOD_CONTROL HYDROELECTRIC_POWER GRADIENT_OF_SLOPE_OF_SIDES ARTIFICIALLY_IMPROVED/MANMADE/NATURAL BLIND/OPEN CARGO_TRANSPORTATION DISCHARGE EMBANKED FEATURE_PRESENT LIGHTED/UN INTERMITTENT/PERENNIAL SALINITY DIRECTION_OF_FLOW BRANCH/PARENT FORCE_OF_FLOW TIDAL GLACIAL HYDRAULIC_RADIUS FORM_RATIO CROSS_SECTIONAL_AREA WETTED_PERIMETER ACIDITY BRAIDED BUOYED DISCHARGE ICE_PRESENT MINERAL_CONTENT RECREATIONAL TEMPERATURE WATER_PRESENT NAVIGABLE FEATURE_CROSSED_UNDER WATER_BODY_CONNECTION
INCLUD: AQUEDUCT ANABRANCH ARROYO AWAWA BARRANCA BAYOU BECK BEND BRAIDED_RIVER BRAIDED_STREAM BRANCH BROOK CANAL CHANNEL COULEE COURSE CREEK CULVERT CUT_OFF DISTRIBUTARY DITCH DRAIN DRAW FLUME GLACIAL_STREAM GULCH DREDGED_CHANNEL GULLY GUT GUTTER IMPROVED_CHANNEL KILL LODE MEANDER NARROWS NULLAH OBSEQUENT_STREAM OVERFLOW_CHANNEL PASS PASSAGE PUP RACE RAVINE REACH RILL RIVER RIVER_BED RIVULET RUN RUNNEL SEAWAY SEACHANNEL SHIP_CANAL SLOUGH SLUICE SOUND SPILLWAY STRAIT STREAM STREAM_CHANNEL MOAT PENSTOCK THOROFARE THOROUGHFARE THROUGHFARE TIDEWAY TORRENT TRIBUTARY WADI WASH WATER_GAP

STANDARD FEATURE TERM 189: WATERFALL
DEFN: A SUDDEN DESCENT OF WATER OVER A STEP OR LEDGE IN THE BED OF A RIVER.
SOURCE: DICTIONARY OF GEOGRAPHY, STAMP
ATTRIB: LOCATION WIDTH DISCHARGE HYDROELECTRIC_POWER NAME LOCATION NAME
INCLUD: CASCADE FALLS

STANDARD FEATURE TERM 190: WATER SURFACE
DEFN: THE WATER PORTION OF THE EARTH'S SURFACE, INCLUDING THE SURFACE OF SEA AND INLAND WATERS.
SOURCE: NEW DEFINITION

STANDARD FEATURE TERM 191: WATERING PLACE
DEFN: A PLACE OTHER THAN A SPRING OR WELL WHERE VESSELS AND VEHICLES REPLENISH THEIR WATER SUPPLY.
SOURCE: MODIFIED FROM DEFENSE MAPPING AGENCY

WATERWAY (INCLUDED TERM 1113)
SEE: LANE

WAVE_BASIN (INCLUDED TERM 1114)
SEE: BREAKWATER/BASIN

WAVE_TRAP (INCLUDED TERM 1115)
SEE: BREAKWATER

WAY (INCLUDED TERM 1116)
SEE: LANE/ROAD

WAY_POINT (INCLUDED TERM 1117)
SEE: CONTROL_POINT

WAYSIDE_PARK (INCLUDED TERM 1118)
SEE: PARK

WEAK_LIGHT (INCLUDED TERM 1119)
SEE: BEACON

WEIR (INCLUDED TERM 1120)
SEE: FISH_TRAP/DAM

WEIR_JETTY (INCLUDED TERM 1121)
SEE: BREAKWATER

STANDARD FEATURE TERM 192: WELL
DEFN: A PIT OR HOLE DUG OR BORED INTO THE EARTH, FOR THE EXTRACTION OF OIL, WATER, OTHER FLUIDS OR GASES.
SOURCE: MODIFIED FROM CANADIAN COUNCIL ON SURVEYING AND MAPPING
ATTRIB: SUBSTANCE_EXTRACTED SALINITY COMPOSITION COVERED/UNCOVERED IRRIGATION
INCLUD: BRINE_WELL OIL_WELL WATER_HOLE

WETDOCK (INCLUDED TERM 1122)
SEE: BERTH

STANDARD FEATURE TERM 193: WETLAND
DEFN: A VEGETATED AREA THAT IS INUNDATED OR SATURATED BY SURFACE OR GROUNDWATER.
SOURCE: NEW DEFINITION

ATTRIB: LOCATION NAME AREA SALINITY PREDOMINANT_SPECIES TIDAL SEASONAL_DEPTH ACIDITY NAVIGABLE SOIL_TYPE DRAINAGE FLOOD_FREQUENCY
INCLUD: BOG PEAT_BOG STRING_BOG PALSA_BOG MARSH SLOUGH MUSKEG FEN SWAMP POCOSIN TIDAL_MARSH SALT_MARSH DISMAL MIRE MORASS QUAGMIRE SLASH SLUE TULELANDS EVERGLADE SWAMP-FOREST SALTING QUAKING_BOG MANGROVE_SWAMP RAISED_BOG BLANKET_BOG BACK_MARSH BACKSWAMP BARRIER_FLAT FLOATING_MARSH SALINA HEATH MOOR PEAT_CUTTING

STANDARD FEATURE TERM 194: WHARF
DEFN: A STRUCTURE EXTENDING PARALLEL TO THE SHORELINE SO THAT VESSELS MAY LIE CLOSE ALONGSIDE TO RECEIVE AND DISCHARGE CARGO.
SOURCE: NAUTICAL CHART MANUAL, US DEPT. OF COMMERCE, NATIONAL OCEAN SURVEY
ATTRIB: LOCATION LENGTH WIDTH SHORE_ORIENTATION CONSTRUCTION_TYPE TIDAL COMPOSITION CONTROL_OVER_WATER_LEVEL FACILITIES_PRESENT VEHICLE_SIZE_SERVED SLIPS_NUMBER_OF CARGO_TRANSPORTATION NAME
INCLUD: QUAY LANDING PENS HOVERCRAFT_TERMINAL HYDROFOIL_TERMINAL TIDAL_QUAY FERRY FERRY_TERMINAL FERRY_SITE BOAT_LANDING

WHISTLE_BUOY (INCLUDED TERM 1123)
SEE: BUOY

STANDARD FEATURE TERM 195: WIND INDICATOR
DEFN: A VISUAL DEVICE USED TO PROVIDE WIND INFORMATION.
SOURCE: DEFENSE MAPPING AGENCY

STANDARD FEATURE TERM 196: WINDBREAK
DEFN: A SHELTER, EITHER NATURAL (E.G. A LINE OF TREES OR A THICK HEDGE) OR ARTIFICIAL (A SCREEN), WHICH BREAKS OR INTERRUPTS THE FORCE OF THE WIND.
SOURCE: A DICTIONARY OF GEOGRAPHY, MONKHOUSE
ATTRIB: HEIGHT LENGTH COMPOSITION ARTIFICIALLY_IMPROVED/MANMADE/NATURAL FEATURE_PRESENT

STANDARD FEATURE TERM 197: WINDMILL
DEFN: A MILL OR OTHER MACHINE THAT RUNS ON THE ENERGY GENERATED BY A WHEEL OF ADUSTABLE BLADES OR FLATS ROTATED BY THE WIND.
SOURCE: AMERICAN HERITAGE DICTIONARY

WINGED_HEADLAND (INCLUDED TERM 1124)
SEE: PENINSULA

WINTER_BUOY (INCLUDED TERM 1125)
SEE: BUOY

WINTER_LIGHT (INCLUDED TERM 1126)
SEE: BEACON

WINTER_MARKER (INCLUDED TERM 1127)
SEE: BEACON

WINTER_ROAD (INCLUDED TERM 1128)
SEE: ROAD

WOOD (INCLUDED TERM 1129)
SEE: WOODLAND

WOODED_AREA (INCLUDED TERM 1130)
SEE: WOODLAND

STANDARD FEATURE TERM 198: WOODLAND
DEFN: LAND HAVING A COVER OF TREES, SHRUBS, OR BOTH.

SOURCE: MODIFIED FROM AMERICAN HERITAGE DICTIONARY
ATTRIB: LOCATION AREA PREDOMINATE_SPECIES AGE SPECIES EVERGREEN/DECIDUOUS COMMERCIAL NAME ANNUAL_PRECIPITATION HEIGHT ACIDITY ENCLOSED GROWING_PATTERN TREE_COVER UNDERGROWTH_PRESENT SPECIES_CULTIVATED
INCLUD: BAMBOO FOREST GROVE STAND WOODS TAIGA THICKET SILVA BRUSH JUNGLE COPSE WOODED_AREA MOTTE BRAKE BLUFF REFORESTED_AREA WOOD MULGA_SCRUB SAGEBRUSH MOOR HEATH BRIGALOW SHRUB MANGROVE_SWAMP CONIFEROUS_FOREST DECIDUOUS_FOREST EQUATORIAL_FOREST MONSOON_FOREST THORN_FOREST TROPICAL_RAIN_FOREST EQUATORIAL_RAIN_FOREST CAATINGA SCRUB BUSH CHANARAL CHAPARRAL GARIGUE MALLEE_SCRUB MAQUIS MULGA

WOODS (INCLUDED TERM 1131)
SEE: WOODLAND

STANDARD FEATURE TERM 199: WRECK
DEFN: A WRECKED VESSEL, EITHER SUBMERGED OR VISIBLE, WHICH IS ATTACHED TO OR FOUL OF THE BOTTOM OR CAST UP ON THE SHORE.
SOURCE: MODIFIED FROM NAVIGATION DICTIONARY
ATTRIB: LOCATION NAME
INCLUD: STRANDED_WRECK SUNKEN_WRECK HULK DANGEROUS_WRECK

WRECK_BUOY (INCLUDED TERM 1132)
SEE: BUOY

WRECKING_YARD (INCLUDED TERM 1133)
SEE: DUMPING_GROUND

STANDARD FEATURE TERM 200: ZONE OF OCCUPATION
DEFN: AN AREA, USUALLY TEMPORARY, HELD AND CONTROLLED BY A FOREIGN MILITARY FORCE.
SOURCE: DEFENSE MAPPING AGENCY

ZOO (INCLUDED TERM 1134)
SEE: PARK

ABANDONED (ATTRIBUTE TERM 1)
FEATURE: MINE
DEFN: DESERTED
SOURCE: NEW DEFINITION

ACCESS (ATTRIBUTE TERM 2)
FEATURE: INTERSECTION ROAD RAILWAY WATERCOURSE
DEFN: THE TYPE OF CONNECTION AVAILABLE TO A GIVEN TRANSPORTATION FEATURE
SOURCE: NEW DEFINITION
VALUES: FREE/LIMITED

ACIDITY (ATTRIBUTE TERM 3)
FEATURE: WATERCOURSE LAKE SEA WOODLAND CROP_LAND WETLAND GRASSLAND
DEFN: THE DEGREE TO WHICH HYDROGEN IONS ARE HELD BY SOIL COLLOIDS OR WATER
SOURCE: STRAHLER, PHYSICAL GEOGRAPHY

ACTIVE/INACTIVE (ATTRIBUTE TERM 4)
FEATURE: MINE MOUNT
DEFN: ENGAGED IN ACTIVITY VS. NO LONGER IN USE.
SOURCE: NEW DEFINITION

ADMINISTRATION (ATTRIBUTE TERM 5)
FEATURE: PARK
DEFN: THE ORGANIZATION THAT HAS CHARGE OF OR DIRECTS OR MANAGES THE OPERATION OF THE FEATURE.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY
INCLUD: MUNICIPAL

AERONAUTICAL_NAVIGATIONAL (ATTRIBUTE TERM 6)
FEATURE: BUILDING/BUILDING_COMPLEX
DEFN: INVOLVING TRANSMISSION OF SPECIAL RADIO SIGNALS INTENDED TO ASSIST IN THE DETERMINATION OF AIRCRAFT POSITION INCLUDING THAT RELATIVE TO COLLISION HAZARDS.
SOURCE: MODIFIED FROM U.S. NAVAL OCEANOGRAPHIC OFFICE, NAVIGATION DICTIONARY
INCLUD: ALKALINE
VALUES: ACID/ALKALINE PH

AGE (ATTRIBUTE TERM 7)
FEATURE: BUILDING CLEARING WOODLAND
DEFN: THE FIRST YEAR IN EXISTENCE.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY
VALUES: YEAR_CONSTRUCTED
YEAR_CLEARING_OCCURRED

AIRCRAFT_LANDING (ATTRIBUTE TERM 8)
FEATURE: OFFSHORE_PLATFORM
DEFN: SUITABLE FOR OR DESIGNED FOR AIRCRAFT TO DESCEND TOWARD AND SETTLE ON.
SOURCE: THE AMERICAN HERITAGE DICTIONARY

AIR/LAND/WATER (ATTRIBUTE TERM 9)
FEATURE: LANE MINEFIELD RUNWAY VALLEY CAVE DUMPING_GROUND
DEFN: EXISTING IN OR PART OF THE ATMOSPHERE, THE EARTH'S DRY SURFACE, OR A BODY OF WATER
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

INCLUD: LAND WATER

AIRPORT_LIGHTING (ATTRIBUTE TERM 10)
SEE: LIGHTED

ALKALINE (ATTRIBUTE TERM 11)
SEE: ACIDITY

ALTITUDE (ATTRIBUTE TERM 12)
FEATURE: SATELLITE
DEFN: THE HEIGHT OF A THING ABOVE A REFERENCE LEVEL, ESPECIALLY ABOVE THE EARTH'S SURFACE. SEE ALSO HEIGHT, ELEVATION.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

ANNUAL_PRECIPITATION (ATTRIBUTE TERM 13)
FEATURE: EARTH_SURFACE
DEFN: THE QUANTITY OF RAIN AND SNOW FALLING WITHIN THE PERIOD OF A YEAR
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

APPROACH_LIGHTING (ATTRIBUTE TERM 14)
SEE: LIGHTED

ARCHITECTURAL_PROPERTIES (ATTRIBUTE TERM 15)
FEATURE: BUILDING/BUILDING_COMPLEX
DEFN: THE STYLE OR METHOD OF DESIGN OR CONSTRUCTION
SOURCE: THE AMERICAN HERITAGE DICTIONARY

AREA (ATTRIBUTE TERM 16)
FEATURE: BAR SHORE ISLAND ISTHMUS CAVE GAP FISHING_GROUND HARBOR CROP_LAND WOODLAND CLEARING TUNDRA GRASSLAND WETLAND
INTERSECTION AIRPORT DANGER_AREA DUMPING_GROUND VEHICLE_STORAGE PLACE APPROACHWAY INLET BASIN
DEFN: THE MEASURE OF A PLANAR REGION OF THE EARTH'S SURFACE
SOURCE: THE AMERICAN HERITAGE DICTIONARY

AREA_DIVIDED (ATTRIBUTE TERM 17)
FEATURE: BOUNDARY
DEFN: THE PART OF THE EARTH'S SURFACE APPORTIONED.
VALUES: AREA_OF_POLITICAL_DISPUTE BATTLE_ZONE REGULATED_TERRITORY

ARTIFICIALLY_IMPROVED/MANMADE/NATURAL (ATTRIBUTE TERM 18)
FEATURE: WATERCOURSE LAKE TROUGH CLEFT LEAD MOUNTAIN SWASH SPRING TUNDDRA BACKWATER BREAKER CORAL_HEAD COULEE DANGER_AREA
FERRY_CROSSING FISH_HAVEN FISH_HATCHERY FISHING_GROUND FUMAROLE HEADWATERS ISTHMUS MOUTH POLYNA INLET BRIDGE
GAP SEA ISLAND_CLUSTER FLAT RIDGE HARBOR REEF ISLAND_CLUSTER WETLAND CLEARING SHORE PORT DAM BASIN BAR LAGOON DELTA
LAKE BEACH WOOODLAND BREAKWATER DEPRESSION VALLEY WATERFALL VALLEY RAPIDS CAVE CLIFF COAST CAPE
GRASSLAND SCHOOL ROAD CABLEWAY AIRPORT BEACON TOWER STATION APPROACHWAY ANTENNA CLEARING DAM WHARF SIGN MOORING
BREAKWATER PLACE WELL RAILWAY GATE TUNNEL CROP_LAND DUMPING_GROUND EMBANKMENT LOCK TERMINAL
TURN_TABLE UTILITY CATCHMENT CEMETERY DANGER_AREA EXTRACTIVE_INDUSTRY FISH_HATCHERY FISH_HAVEN LAUNCHING_RAMP PARK
DEFN: ARTIFICIALLY IMPROVED: NATURALLY EXISTING FEATURE WITH MAN MADE ALTERATIONS.
SOURCE: NEW DEFINITION
DEFN: MANMADE: MADE BY MAN, RATHER THAN OCCURRING IN NATURE.
NATURAL: PRESENT OR PRODUCED BY NATURE.
SOURCE: THE AMERICAN HERITAGE DICTIONARY
INCLUD: MANMADE NATURAL

ASTRONOMICALLY_DETERMINED (ATTRIBUTE TERM 19)

SEE: METHOD_OF_MEASUREMENT

ATTACHED_TO_LAND (ATTRIBUTE TERM 20)
FEATURE: ICE_FIELD
DEFN: CONNECTED TO A BODY OF LAND
SOURCE: NEW DEFINITION

BANDSTAND_PRESENT (ATTRIBUTE TERM 21)
FEATURE: OUTDOOR_THEATER

BARE (ATTRIBUTE TERM 22)
FEATURE: MOUNT PEAK MOUNT_RANGE
DEFN: EXPOSED, NOT COVERED WITH SUCH THINGS AS ICE, SNOW OR TREES.
SOURCE: NEW DEFINITION

BARRIER (ATTRIBUTE TERM 23)
FEATURE: FENCE WALL

BEARING_CAPACITY (ATTRIBUTE TERM 24)
FEATURE: ROAD BRIDGE
DEFN: THE ABILITY OF A SURFACE OR A STRUCTURE TO BEAR WEIGHT
SOURCE: MODIFIED FROM IDEAS
INCLUD: WEIGHT_BEARING_CAPACITY

BLIND/OPEN (ATTRIBUTE TERM 25)
FEATURE: WATERCOURSE ROAD LANE
DEFN: BLIND: NOT HAVING AN OUTLET
OPEN: ALLOWING CONTINUOUS PASSAGE
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY
INCLUD: OPEN DEAD_END CUL_DE_SAC THROUGH_ROAD

BOUNDARY_MARKER (ATTRIBUTE TERM 26)
FEATURE: FENCE HEDGE WALL
DEFN: SERVING TO PRESERVE AND IDENTIFY THE LOCATION OF THE BOUNDARY LINE
SOURCE: MODIFIED FROM COASTAL MAPPING HANDBOOK, U.S. GEOLOGICAL SURVEY

BRAIDED (ATTRIBUTE TERM 27)
FEATURE: WATERCOURSE
DEFN: SPLIT INTO MANY PARTS OR CHOKED WITH SANDBARS THAT DIVIDE IT INTO AN INTRICATE NETWORK OF INTERLACING CHANNELS.
SOURCE: NEW DEFINITION

BRANCH/PARENT (ATTRIBUTE TERM 28)
FEATURE: WATERCOURSE
DEFN: RELATIONSHIP BETWEEN A MAIN STREAM AND ONE OF ITS TRIBUTARIES
SOURCE: NEW DEFINITION
INCLUD: PARENT

BUILDINGS_NUMBER_OF (ATTRIBUTE TERM 29)
FEATURE: BUILDING_COMPLEX
DEFN: THE NUMBER OF PERMANENT WALLED CONSTRUCTIONS PRESENT
SOURCE: NEW DEFINITION

BUOYED (ATTRIBUTE TERM 30)

FEATURE: WATERCOURSE INLET PORT HARBOR LAGOON INLET
DEFN: MARKED WITH BUOYS USED AS NAVIGATION AIDS
SOURCE: NEW DEFINITION

CARGO_TRANSPORTATION (ATTRIBUTE TERM 31)
FEATURE: WHARF HARBOR AIRPORT WATERCOURSE ROAD RAILWAY
DEFN: USED FOR THE MOVING OF FREIGHT FROM ONE PLACE TO ANOTHER
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

CHAMBERS_NUMBER_OF (ATTRIBUTE TERM 32)
FEATURE: CAVE
DEFN: THE NUMBER OF ENCLOSED SPACES OR COMPARTMENTS
SOURCE: THE AMERICAN HERITAGE DICTIONARY

CHARTED_DEPTH (ATTRIBUTE TERM 33)
FEATURE: WATERCOURSE PORT LAGOON HARBOR SEA LAKE LANE
DEFN: THE VERTICAL DISTANCE FROM THE TIDAL DATUM TO THE BOTTOM
SOURCE: GLOSSARY OF OCEANOGRAPHIC TERMS
INCLUD: SOUNDING DEPTH

CIRCUMFERENCE (ATTRIBUTE TERM 34)
FEATURE: BASIN PINNACLE
DEFN: THE LENGTH OF THE BOUNDARY LINE OF ANY CLOSED CURVILINEAR FEATURE
SOURCE: THE AMERICAN HERITAGE DICTIONARY

CIVILIAN (ATTRIBUTE TERM 35)
SEE: OWNER_TYPE USER_TYPE

CLEARANCE (ATTRIBUTE TERM 36)
FEATURE: TUNNEL BRIDGE
DEFN: THE VERTICLE DISTANCE FROM A SURFACE TO THE NEAREST OVERHEAD OBSTRUCTION
SOURCE: MODIFIED FROM IDEAS

COASTAL (ATTRIBUTE TERM 37)
FEATURE: SHORELINE
DEFN: PERTAINING TO THE EDGE OF LAND NEXT TO THE SEA.

COG (ATTRIBUTE TERM 38)
FEATURE: RAILWAY
DEFN: EQUIPPED WITH TEETH TO TRANSMIT MOTIVE FORCE TO A CORRESPONDING WHEEL.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

COLOR (ATTRIBUTE TERM 39)
FEATURE: BEACON BUOY
DEFN: THAT ASPECT OF THINGS THAT IS CAUSED BY DIFFERING WAVE LENGTHS OF LIGHT REFLECTED OR EMITTED BY THEM
SOURCE: THE AMERICAN HERITAGE DICTIONARY

COLOR_PATTERN (ATTRIBUTE TERM 40)
FEATURE: BUOY
DEFN: THE COLOR OR COMBINATION OF COLORS IN THE GEOMETRICAL DESIGN OR PATTERN
SOURCE: IDEAS

COMMERCIAL (ATTRIBUTE TERM 41)

FEATURE: WOODLAND
DEFN: USED OR EXPLOITED FOR FINANCIAL GAIN
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

COMMERCIAL_SHIPPING (ATTRIBUTE TERM 42)
FEATURE: WATERCOURSE HARBOR PORT SEA INLET
DEFN: TRAVEL OR TRAFFIC BY WATER VESSELS CARRYING COMMERCIAL GOODS
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

COMMUNICATION/NONCOMMUNICATION (ATTRIBUTE TERM 43)
FEATURE: TOWER
DEFN: USED FOR TRANSMISSION OR RECEPTION OF COMMUNICATION SIGNALS VS. NOT USED FOR THE TRANSMISSION OR RECEPTION OF COMMUNICATION SIGNALS.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

COMPOSITION (ATTRIBUTE TERM 44)
FEATURE: WATERCOURSE ROAD RUNWAY CABLEWAY WELL RAILWAY BRIDGE ANTENNA DAM SIGN WHARF PIER BAR SHORE REEF ISLAND ISTHMUS CLIFF PEAK RIDGE BREAKWATER MOORING REVETMENT EMBANKMENT LAUNCHING_RAMP GATE CONTROL_POINT FENCE WALL
DEFN: THE SPECIFIED MIXTURE OR COMBINATION OF ONE OR MORE ELEMENTS OR INGREDIENTS
SOURCE: THE AMERICAN HERITAGE DICTIONARY
INCLUD: SURFACE_MATERIAL CONSTRUCTION_MATERIAL

CONNECTED_BY_SWITCHES/MAIN_TRACK (ATTRIBUTE TERM 45)
FEATURE: RAILWAY
DEFN: A RAILWAY SEGMENT SUCH AS A SIDING OR SPUR, REQUIRING PASSING THROUGH A SWITCH TO GAIN ACCESS TO THE MAIN TRACK
SOURCE: NEW DEFINITION
INCLUD: MAIN_TRACK

CONSTRUCTION_MATERIAL (ATTRIBUTE TERM 46)
SEE: COMPOSITION

CONSTRICTION (ATTRIBUTE TERM 47)
FEATURE: ROAD WATERCOURSE
DEFN: HAVING A NARROW PLACE IN THE FEATURE
SOURCE: DEFENSE MAPPING AGENCY

CONSTRUCTION_TYPE (ATTRIBUTE TERM 48)
FEATURE: WHARF
DEFN: THE STRUCTURAL CONFIGURATION OF A FEATURE
SOURCE: MODIFIED FROM IDEAS
INCLUD: SOLID_CONSTRUCTION PILLAR_CONSTRUCTION

CONTINENTAL_DIVIDE (ATTRIBUTE TERM 49)
FEATURE: RIDGE_LINE
DEFN: SEPARATES DRAINAGE BASINS THAT FLOW TO OPPOSITE SIDES OF THE CONTINENT.
SOURCE: NEW DEFINITION

CONTROL (ATTRIBUTE TERM 50)
FEATURE: TOWER
DEFN: TO EXERCISE AUTHORITY OR DOMINATING INFLUENCE OVER; DIRECT; REGULATE/VERIFY
SOURCE: THE AMERICAN HERITAGE DICTIONARY

CONTROL_OVER_WATER_LEVEL (ATTRIBUTE TERM 51)

FEATURE: HARBOR WHARF
DEFN: HAVING SOME MEANS OF REGULATING THE HEIGHT OF A SPECIFIC BODY OF WATER
SOURCE: NEW DEFINITION

CONTROLLED/UNCONTROLLED (ATTRIBUTE TERM 52)
FEATURE: AIRPORT
DEFN: AUTHORITY OR DOMINATING INFLUENCE EXERCISED OVER; DIRECTED; APPLIES TO AIR TRAFFIC NEAR AND AT AN AIRPORT.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

COVERED/UNCOVERED (ATTRIBUTE TERM 53)
FEATURE: WATERCOURSE ROAD CABLEWAY WELL RAILWAY CATCHMENT BRIDGE STADIUM ICE_RINK
DEFN: HAVING SOMETHING PLACED OVER THE FEATURE VS. NOT HAVING ANYTHING OVER IT
SOURCE: THE AMERICAN HERITAGE DICTIONARY

CROP_GROWN (ATTRIBUTE TERM 54)
SEE: SPECIES_CULTIVATED

CROP_USE (ATTRIBUTE TERM 55)
FEATURE: CROPLAND
DEFN: THE EMPLOYMENT OR PURPOSE OF AN AGRICULTURAL PRODUCT.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY
VALUES: GRAFTING SEEDING TRANSPLANTING

CROSS_SECTIONAL_AREA (ATTRIBUTE TERM 56)
FEATURE: WATERCOURSE LAKE
DEFN: A SECTION FORMED BY A PLANE CUTTING THROUGH AN OBJECT AT RIGHT ANGLES TO AN AXIS.
SOURCE: THE AMERICAN HERITAGE DICTIONARY

CUL_DE_SAC (ATTRIBUTE TERM 57)
SEE: BLIND/OPEN

CULTIVATED (ATTRIBUTE TERM 58)
FEATURE: CROP_LAND
DEFN: IMPROVED AND PREPARED LAND; PLOWED OR FERTILIZED OR TENDED FOR GROWING CROPS
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

DANGER_TYPE (ATTRIBUTE TERM 59)
FEATURE: LANE
DEFN: THE KIND OF OR SOURCE OF PERIL
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY
VALUES: GAS_FIELDS MINEFIELDS OIL_FIELDS

DANGEROUS (ATTRIBUTE TERM 60)
FEATURE: BREAKERS MINEFIELD REEF SNAG STUMP ROCK WRECK
DEFN: INVOLVING OR FRAUGHT WITH DANGER; PERILOUS. APT OR ABLE TO DO HARM.
SOURCE: AMERICAN HERITAGE DICTIONARY

DATUM (ATTRIBUTE TERM 61)
DEFN: A POINT OR LINE ON A SURFACE USED AS A REFERENCE AS IN SURVEYING, MAPPING OR GEOLOGY.
NOTE: AN INTEGRAL PART OF THE COORDINATE DESCRIPTION FOR LOCATION.
SOURCE: DEFENSE MAPPING AGENCY
SEE: LOCATION
VALUES: MEAN_SEA_LEVEL MEAN_HIGH_WATER NATIONAL_GEODETIC_VERTICAL_DATUM

VAL.DEF: MEAN_SEA_LEVEL: A STANDARD DATUM FOR HEIGHTS, LAST ADJUSTED IN 1929
MEAN_HIGH_WATER: THE TIDAL DATUM THAT IS THE ARITHMETIC AVERAGE OF THE HIGH WATER HEIGHTS OBSERVED OVER A SPECIFIC 19-YEAR METONIC CYCLE
NATIONAL_GEODETIC_VERTICAL_DATUM (NGVD) OF 1929: THE GEODETIC DATUM IS FIXED AND DOES NOT TAKE INTO ACCOUNT THE CHANGING STANDS OF SEA LEVEL.
SOURCE: USGS AND NOS, COASTAL MAPPING HANDBOOK

DEAD_END (ATTRIBUTE TERM 62)
SEE: BLIND/OPEN

DECIDUOUS/EVERGREEN (ATTRIBUTE TERM 63)
FEATURE: WOODLAND
DEFN: DECIDUOUS: CHARACTERIZED BY SHEDDING FOILAGE AT THE END OF ITS GROWING SEASON
EVERGREEN: CHARACTERIZED BY HAVING FOILAGE THAT PERSISTS AND REMAINS GREEN THROUGHOUT THE YEAR.
SOURCE: THE AMERICAN HERITAGE DICTIONARY
INCLUD: EVERGREEN

DENSITY_OF_GROWTH (ATTRIBUTE TERM 64)
FEATURE: WOODLAND
DEFN: THE DEGREE OR MEASURED DEGREE TO WHICH THE AREA IS FILLED OR OCCUPIED BY PLANT LIFE
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

DEPTH (ATTRIBUTE TERM 65)
SEE: CHARTED_DEPTH

DETERMINED_BY_TRIANGULATION (ATTRIBUTE TERM 66)
SEE: METHOD_OF_MEASUREMENT

DIAGNOSTIC (ATTRIBUTE TERM 67)
FEATURE: CONTROL_POINT
DEFN: USED TO CHECK SYSTEM ACCURACY

DIAMETER (ATTRIBUTE TERM 68)
FEATURE: IRRIGATION_SYSTEM
DEFN: THE LENGTH OF A LINE SEGMENT PASSING THROUGH THE CENTER OF A CIRCULAR SHAPED FEATURE.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

DIRECTION (ATTRIBUTE TERM 69)
FEATURE: SHAFT
DEFN: THE RELATIONSHIP BY WHICH THE ALIGNMENT OR ORIENTATION OF ANY POSITION WITH RESPECT TO ANY OTHER POSITION IS ESTABLISHED.
SOURCE: THE AMERICAN HERITAGE DICTIONARY

DIRECTION_OF_FLOW (ATTRIBUTE TERM 70)
FEATURE: WATERCOURSE
DEFN: THE LINE OR COURSE OF MOVEMENT OF WATER OR LAVA SHOWN BY THE POSITION OF ONE POINT RELATIVE TO ANOTHER WITHOUT REFERENCE TO THE DISTANCE BETWEEN THEM. THE DIRECTION IS USUALLY INDICATED IN TERMS OF ITS ANGULAR DISTANCE FROM A REFERENCE DIRECTION
SOURCE: MODIFIED FROM THE DEFENSE MAPPING AGENCY

DISCHARGE (ATTRIBUTE TERM 71)
FEATURE: WATERFALL DAM LOCK DELTA WATERCOURSE GEYSER RAPIDS
DEFN: CUBIC MEASURE OF WATER FLOWING PER UNIT OF TIME

SOURCE: NEW DEFINITION

DISCOLORED (ATTRIBUTE TERM 72)
FEATURE: SEA
DEFN: HAVING A CHANGED OR SPOILED COLOR
SOURCE: DEFENSE MAPPING AGENCY

DRAINED (ATTRIBUTE TERM 73)
FEATURE: WETLAND
DEFN: HOW EASILY WATER CAN BE DRAWN OFF THE LAND SURFACE OF THE FEATURE.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

DREDGED (ATTRIBUTE TERM 74)
FEATURE: LANE WATERCOURSE
DEFN: DEEPENED BY VARIOUS MACHINES EQUIPPED WITH SCOOPING OR SUCTION DEVICES USUALLY ATTACHED TO BARGES OR BOATS.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

DRILLING (ATTRIBUTE TERM 75)
SEE: EQUIPMENT_PRESENT
DEFN: HAVING EQUIPMENT DESIGNED TO BORE HOLES IN THE GROUND
SOURCE: THE AMERICAN HERITAGE DICTIONARY

DUAL_GAUGE (ATTRIBUTE TERM 76)
FEATURE: RAILWAY
DEFN: HAVING A THIRD RAIL TO PERMIT USE BY NON-STANDARD GAUGE ROLLING STOCK.
SOURCE: NEW DEFINITION

DWELLING (ATTRIBUTE TERM 77)
FEATURE: BUILDING BUILDING_COMPLEX CAVE CLIFF
DEFN: USED AS A RESIDENCE OR AN ABODE.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

EDDYS_PRESENT (ATTRIBUTE TERM 78)
FEATURE: SEA WATERCOURSE
DEFN: PRESENCE OF CURRENTS MOVING CONTRARY TO THE DIRECTION OF THE MAIN CURRENT ESPECIALLY IN A CIRCULAR MOTION.
SOURCE: MODIFIED FROM THEE AMERICAN HERITAGE DICTIONARY

ELECTRIFIED (ATTRIBUTE TERM 79)
FEATURE: RAILWAY
DEFN: EQUIPPED FOR USE BY ELECTRIC POWER DRIVEN ENGINES.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY
VALUES: OVERHEAD THIRD_RAIL

ELEVATION (ATTRIBUTE TERM 80)
DEFN: THE HEIGHT TO WHICH SOMETHING IS ABOVE A REFERENCE DATUM, ESPECIALLY ABOVE SEA LEVEL.
NOTE: ELEVATION IS CODED AS THE "Z" COORDINATE OF THE LOCATION OF THE FEATURE.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY
SEE: LOCATION

EMBANKED (ATTRIBUTE TERM 81)
FEATURE: WATERCOURSE
DEFN: CONFINED, SUPPORTED OR PROTECTED BY A PILED UP MASS
SOURCE: THE AMERICAN HERITAGE DICTIONARY

EMBEDDED_IN_PAVEMENT (ATTRIBUTE TERM 82)
FEATURE: RAILWAY
DEFN: PERMITS LAND VEHICLES TO TRAVEL ALONG A RAILWAY.
SOURCE: NEW DEFINITION

ENCLOSED (ATTRIBUTE TERM 83)
FEATURE: WOODLAND CROP_LAND LAKE GRASSLAND
DEFN: SURROUNDED ON ALL SIDES BY FOR EXAMPLE A FENCE.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

EQUIPMENT_PRESENT (ATTRIBUTE TERM 84)
FEATURE: AIRPORT BUILDING BUILDING_COMPLEX HARBOR MINE OFFSHORE_PLATFORM SHIPYARD WALL
DEFN: DEVICES OR MACHINERY OR TOOLS PRESENT.
SOURCE: NEW DEFINITION
INCLUD: DRILLING
VALUES: ARRESTING_GEAR ARTILLERY CONVEYOR CRANE DRAGLINE DREDGE DRILLING POWERSHOVEL PUMP

EVENT_HELD (ATTRIBUTE TERM 85)
FEATURE: EXHIBITION_GROUND
DEFN: THE ORGANIZED PROGRAM OR PARTS OF A PROGRAM TAKING PLACE AT THE SITE.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

EVERGREEN (ATTRIBUTE TERM 86)
SEE: DECIDUOUS/EVERGREEN

EXERCISE (ATTRIBUTE TERM 87)
FEATURE: SPORTS_FIELD
DEFN: USED FOR ACTIVITIES THAT REQUIRE PHYSICAL EXERTION ESPECIALLY WHEN PERFORMED TO DEVELOP OR MAINTAIN FITNESS.
SOURCE: THE AMERICAN HERITAGE DICTIONARY

EXISTING/PROPOSED (ATTRIBUTE TERM 88)
FEATURE: ROAD
DEFN: PREVIOUSLY CONSTRUCTED AND PRESENTLY EXISTING VS. IN THE PLANNING STAGE
SOURCE: NEW DEFINITION
INCLUD: PROPOSED

EXPOSED/SHELTERED (ATTRIBUTE TERM 89)
FEATURE: HARBOR
DEFN: NOT PROTECTED VS. PROTECTED AS FROM THE WEATHER
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY
INCLUD: SHELTERED

EXTERNAL_CONSTRUCTION_MATERIAL (ATTRIBUTE TERM 90)
FEATURE: BUILDING BUILDING_COMPLEX WALL
DEFN: THE SPECIFIED MIXTURE OR COMBINATION OF ELEMENTS USED TO CONSTRUCT THE OUTER LAYER OF THE FEATURE.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY
VALUES: CONCRETE MARBLE

FACILITIES_PRESENT (ATTRIBUTE TERM 91)
FEATURE: HARBOR PORT MOORING ROAD AIRPORT PARK
DEFN: THE STRUCTURES OR INSTALLATIONS AVAILABLE FOR THE ENHANCEMENT OF THE USE OF THE FEATURE BEING DESCRIBED
SOURCE: NEW DEFINITION
VALUES: REPAIR_FACILITIES ZOO_FACILITIES COMFORT NONE DRINKING_WATER PICNIC_TABLES

FALLOW (ATTRIBUTE TERM 92)
FEATURE: CROP_LAND
DEFN: CULTIVATED LAND THAT IS ALLOWED TO LIE IDLE DURING THE GROWING SEASON.
SOURCE: WEBSTER'S NEW COLLEGIATE DICTIONARY

FEATURE_BOUNDED (ATTRIBUTE TERM 93)
FEATURE: BOUNDARY
DEFN: THE FEATURE THAT HAS ITS BORDER IDENTIFIED OR MARKED
SOURCE: NEW DEFINITION
VALUES: RESERVE DEMILITARIZED_ZONE HARBOR INDIAN_RESERVATION LAND_GRANT PARK POLITICAL_AREA RESTRICTED_AREA SECTION TIME_ZONE WOODLAND

FEATURE_CONNECTED (ATTRIBUTE TERM 94)
FEATURE: BOUNDARY BUILDING CONTROL_POINT POST STEEPLE TOWER INTERSECTION BRIDGE TUNNEL GATE
DEFN: ANOTHER FEATURE WHICH IS JOINED TO THE FEATURE BEING DESCRIBED
SOURCE: NEW DEFINITION
VALUES: BOUNDARY BUILDING CONTROL_POINT POST STEEPLE TOWER INTERSECTION BRIDGE TUNNEL GATE

FEATURE_CROSSED_UNDER (ATTRIBUTE TERM 95)
FEATURE: RAILWAY ROAD TUNNEL WATERCOURSE
DEFN: THE FEATURE THAT IS PASSED UNDER BY THE FEATURE BEING DESCRIBED.
SOURCE: NEW DEFINITION
VALUES: BRIDGE RAILWAY ROAD WATERCOURSE

FEATURE_MARKED (ATTRIBUTE TERM 96)
FEATURE: MONUMENT
DEFN: THE FEATURE THAT IS DISTINGUISHED BY SOME PHYSICAL SIGN, SYMBOL OR VISIBLE IMPRESSION OR SOME PHYSICAL OBJECT
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY
VALUES: GRAVE

FEATURE_PRESENT (ATTRIBUTE TERM 97)
FEATURE: AIRPORT HARBOR LAKE MINE OUTDOOR_THEATER PLACE PLAIN ROAD SEA SKI_AREA WATERCOURSE
DEFN: PRESENCE OF ONE FEATURE WITHIN ANOTHER FEATURE, FOR EXAMPLE DAM IN WATERCOURSE, BREAKWATER IN HARBOR
SOURCE: NEW DEFINITION
VALUES: BREAKWATER BUILDING BUOY CABLEWAY GATE LANE PARKING_AREA ROAD RUNWAY SHAFT SNAG STUMP WALL WHARF DAM

FEATURE_SPANNED (ATTRIBUTE TERM 98)
FEATURE: BRIDGE GANTRY
DEFN: A FEATURE THAT THE FEATURE BEING DESCRIBED CROSSES ABOVE WITHOUT JOINING.
SOURCE: NEW DEFINITION
VALUES: RAILWAY ROAD WATERCOURSE

FEATURE_SUPPORTED (ATTRIBUTE TERM 99)
FEATURE: POST TOWER PILING
DEFN: THE FEATURE THAT HAS ITS WEIGHT BORN FROM BELOW BY THE FEATURE BEING DESCRIBED
SOURCE: NEW DEFINITION
VALUES: PIER UTILITY

FIRE_LINE (ATTRIBUTE TERM 100)
FEATURE: CLEARED_AREA
DEFN: CLEARED OR PLOWED STRIP OF LAND TO STOP THE SPREAD OF FIRE
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

FLOATING (ATTRIBUTE TERM 101)
FEATURE: ICE_FIELD SNOW_FIELD BRIDGE
DEFN: SUSPENDED WITHIN OR ON THE SURFACE OF WATER.
SOURCE: THE AMERICAN HERITAGE DICTIONARY

FLOOD_CONTROL (ATTRIBUTE TERM 102)
FEATURE: WATERCOURSE CATCHMENT DAM LOCK
DEFN: DESIGNED FOR THE CONTROL OR DRAINAGE OF A RISING AND OVERFLOWING BODY OF WATER
SOURCE: NEW DEFINITION

FLOOD_FREQUENCY (ATTRIBUTE TERM 103)
FEATURE: FLOOD_PLAIN WETLAND
DEFN: HOW OFTEN AN AREA IS SUBJECT TO INUNDATION
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY
VALUES: PERIODIC

FLOODED (ATTRIBUTE TERM 104)
FEATURE: EARTH
DEFN: INUNDATED WITH OR SUBMERGED UNDER AN EXCESS AMOUNT OF WATER
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

FORCE_OF_FLOW (ATTRIBUTE TERM 105)
FEATURE: GEYSER WATERCOURSE SPRING
DEFN: THE STRENGTH OF ENERGY EXERTED BY THE MOVEMENT OF WATER OR LAVA.
SOURCE: MODIFIED FROM WEBSTER'S NEW COLLEGIATE DICTIONARY
VALUES: FREE_FLOWING/SLUGGISH/STAGNANT
VAL.DEF: SLUGGISH: DISPLAYING LITTLE MOVEMENT OR ACTIVITY; SLOW; INACTIVE
STAGNANT: NOT MOVING OR FLOWING WITHOUT A CURRENT; MOTIONLESS.
SOURCE: THE AMERICAN HERITAGE DICTIONARY

FORM_RATIO (ATTRIBUTE TERM 106)
FEATURE: WATERCOURSE
DEFN: THE RELATIONSHIP BETWEEN THE DEPTH AND WIDTH OF A STREAM, EXPRESSED AS A RATIO
SOURCE: MONKHOUSE, A DICTIONARY OF GEOGRAPHY

FOUL_GROUND (ATTRIBUTE TERM 107)
FEATURE: BOTTOM
DEFN: HAVING HOLDING QUALITIES FOR ANCHORING THAT ARE POOR, OR WHERE DANGER OF STRIKING OR FOULING THE GROUND OR OTHER OBSTRUCTIONS EXISTS.
SOURCE: DEFENSE MAPPING AGENCY

FUNCTION (ATTRIBUTE TERM 108)
FEATURE: BUILDING BUILDING_COMPLEX CONTROL_POINT GATE HEDGE POST TOWER WATERCOURSE
DEFN: THE ACTIVITY OR NEED THAT THE FEATURE IS DESIGNED FOR OR ADAPTED TO
SOURCE: MODIFIED FROM AMERICAN HERITAGE DICTIONARY
VALUES: ANTI_TANK_BARRIER COOLING_LIQUIDS DEFENSE DRAINAGE EARLY_WARNING ELECTRIC_CURRENT_TRANSFORMATION ELECTRICITY_TRANSMISSION EROSION_PROTECTION FISHING_AREA_OUTLINE JET_PROPELLER_BLAST_PROTECTION NUCLEAR_POWER_GENERATION PARTICLE_ACCELERATION RAILWAY_SNOW_SHELTER SPORTS SWIMMING TESTING_ENGINES WAYPOINT WATER_FLOW_REGULATION WATER_INTAKE WINDBREAK SOUND_BARRIER FIRE_LOOKOUT

GAS_EMITTED_TYPE (ATTRIBUTE TERM 109)
FEATURE: CHIMNEY FUMAROLE MOUNT
DEFN: KIND OF GASEOUS SUBSTANCE RELEASED

SOURCE: NEW DEFINITION

GAUGE (ATTRIBUTE TERM 110)
SEE: RAIL_GAUGE

GLACIAL (ATTRIBUTE TERM 111)
FEATURE: WATERCOURSE
DEFN: OF, PERTAINING TO OR DERIVED FROM A GLACIER
SOURCE: THE AMERICAN HERITAGE DICTIONARY

GRADE_SEPARATION (ATTRIBUTE TERM 112)
FEATURE: INTERSECTION
DEFN: AN INTERSECTION USING AN OVERPASS OR UNDERPASS
SOURCE: WEBSTER'S NEW COLLEGIATE DICTIONARY

GRADIENT (ATTRIBUTE TERM 113)
SEE: SLOPE

GRADIENT_OF_SIDES (ATTRIBUTE TERM 114)
SEE: SLOPE_OF_SIDES

GRAZING (ATTRIBUTE TERM 115)
FEATURE: CROP_LAND GRASSLAND
DEFN: LAND WHICH SUPPLIES HERBIAGE FOR GRAZING ANIMALS
SOURCE: MODIFIED FROM WEBSTER'S NEW COLLEGIATE DICTIONARY

GROWING_PATTERN (ATTRIBUTE TERM 116)
FEATURE: CROP_LAND WOODLAND
DEFN: THE LAYOUT OR ARRANGEMENT OF GROWING PLANT LIFE
SOURCE: NEW DEFINITION

GROWING_SEASON (ATTRIBUTE TERM 117)
FEATURE: CROP_LAND
DEFN: THE PERIOD OF TIME DURING THE YEAR CHARACTERIZED BY ENVIRONMENTAL CONDITIONS SUITABLE FOR PLANTING AND GROWING CROPS
SOURCE: NEW DEFINITION

HEIGHT (ATTRIBUTE TERM 118)
FEATURE: BUILDING CROPLAND WOODLAND REVETMENT EMBANKMENT BAR REEF CLIFF PINNACLE RIDGE BEACON BUOY APPROACHWAY CABLEWAY GATE BARRIER TOWER ANTENNA
DEFN: THE VERTICAL DISTANCE FROM THE BASE TO THE TOP
SOURCE: THE AMERICAN HERITAGE DICTIONARY
VALUES: NUMBER OF STOREYS
PREDOMINANT HEIGHT OF VEGETATION

HORIZONTAL/VERTICAL (ATTRIBUTE TERM 119)
FEATURE: CONTROL_POINT
DEFN: PARALLEL TO OR IN THE PLANE OF THE HORIZON VS. PERPENDICULAR TO THE PLANE OF THE HORIZON
SOURCE: THE AMERICAN HERITAGE DICTIONARY

HYDRAULIC_RADIUS (ATTRIBUTE TERM 120)
FEATURE: WATERCOURSE
DEFN: THE RATIO BETWEEN THE CROSS-SECTIONAL AREA OF A STREAM AND ITS WETTED PERIMETER
SOURCE: MONKHOUSE, A DICTIONARY OF GEOGRAPHY

HYDROELECTRIC_POWER (ATTRIBUTE TERM 121)
FEATURE: WATERCOURSE WATERFALL DAM
DEFN: USED FOR THE PRODUCTION OF ELECTRICITY BY WATER POWER
SOURCE: NEW DEFINITION

ICE_PRESENT (ATTRIBUTE TERM 122)
FEATURE: WATERCOURSE LAKE SEA
DEFN: CONTAINING WATER WHICH IS EITHER PARTIALLY OR COMPLETELY FROZEN
SOURCE: NEW DEFINITION

INCORPORATED/UNINCORPORATED (ATTRIBUTE TERM 123)
FEATURE: PLACE
DEFN: UNITED OR COMBINED INTO AN ORGANIZED BODY WHICH IS MAINTAINED THROUGH A SERIES OF LAWS OR RULES
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY
INCLUD: UNINCORPORATED

INFORMATION_DISPLAYED (ATTRIBUTE TERM 124)
FEATURE: SIGN
DEFN: THE IDEA COMMUNICATED THROUGH EXHIBITION
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY
VALUES: MILEAGE KILOMETERS ROUTE_NUMBER

INTERMITTENT/PERENNIAL (ATTRIBUTE TERM 125)
FEATURE: WATERCOURSE SPRING
DEFN: OCCURRING OR APPEARING IN INTERRUPTED SEQUENCE VS. PRESENT AT ALL SEASONS OF THE YEAR
SOURCE: MODIFIED FROM WEBSTER'S NEW COLLEGIATE DICTIONARY
INCLUD: PERENNIAL

INTERNATIONAL_DATE_LINE (ATTRIBUTE TERM 126)
FEATURE: BOUNDARY
DEFN: THE IMAGINARY LINE THROUGH THE PACIFIC OCEAN ROUGHLY CORRESPONDING TO 180 DEGREES LONGITUDE, TO THE EAST OF WHICH, BY INTERNATIONAL AGREEMENT, THE CALENDAR DATE IS ONE DAY EARLIER THAN TO THE WEST.
SOURCE: DEFENSE MAPPING AGENCY

IRRIGATED (ATTRIBUTE TERM 127)
FEATURE: CROP_LAND
DEFN: SUPPLIED WITH WATER BY MEANS OF PIPES, DITCHES OR STREAMS FOR AGRICULTURAL PURPOSES.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

IRRIGATION (ATTRIBUTE TERM 128)
FEATURE: WATERCOURSE WELL LAKE DAM
DEFN: USED FOR THE SUPPLYING OF WATER BY ARTIFICIAL MEANS TO LAND FOR AGRICULTURAL PURPOSES.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

ITEM(S)_STORED (ATTRIBUTE TERM 129)
FEATURE: BUILDING BUILDING_COMPLEX DEPOT MISSILE_SITE TANK
DEFN: THE ARTICLES OR SUBSTANCES RESERVED OR PUT AWAY FOR FUTURE USE.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY
INCLUD: SUBSTANCE_STORED
VALUES: GRAIN MISSILES RAINWATER WATER

LAND (ATTRIBUTE TERM 130)
SEE: AIR/LAND/WATER

LAND_USE_CATEGORY (ATTRIBUTE TERM 131)
FEATURE: BUILDING BUILDING_COMPLEX
DEFN: BROAD CLASSIFICATION OF THE USE OF LAND FOR PLANNING AND ZONING PURPOSES.
SOURCE: NEW DEFINITION
INCLUD: USE_TYPE
VALUES: RESIDENTIAL COMMERCIAL INDUSTRIAL PUBLIC_AND_INSTITUTIONAL MILITARY AGRICULTURAL
VAL.DEF: RESIDENTIAL: HAVING A BUILDING OR BUILDINGS USED TO HOUSE PEOPLE; PRESENCE OF HOMES
COMMERCIAL: OF, PERTAINING TO OR ENGAGED IN THE BUYING AND SELLING OF GOODS OR SERVICES.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

LANDING/TAKE_OFF/TAXIING (ATTRIBUTE TERM 132)
FEATURE: LANE RUNWAY
DEFN: USED AS THE PLACE FOR AIRCRAFT TO DESCEND FROM FLIGHT OR TO RISE UP INTO FLIGHT VS. THE PLACE FOR AIRCRAFT TO ROLL TO AND FROM THE LANDING/TAKE-OFF PLACE
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

LANDMARK (ATTRIBUTE TERM 133)
FEATURE: CONTROL_POINT MONUMENT
DEFN: A PROMINENT AND IDENTIFYING FEATURE OF A LANDSCAPE
SOURCE: THE AMERICAN HERITAGE DICTIONARY

LANES_NUMBER_OF (ATTRIBUTE TERM 134)
FEATURE: ROAD RAILWAY WATERCOURSE
DEFN: THE NUMBER OF PATHS AVAILABLE SIDE BY SIDE FOR THE SIMULTANEOUS PASSAGE OF VEHICLES IN A ROAD, RAILWAY OR NAVIGATION ROUTE
SOURCE: NEW DEFINITION

LATITUDINAL_ZONE (ATTRIBUTE TERM 135)
FEATURE: WOODLAND GRASSLAND CROP_LAND DESERT
DEFN: ONE OF THE LARGE REGIONS DELIMITED BY DISTANCE FROM THE EQUATOR, USED AS A BASIS FOR CLASSIFYING CLIMATES
SOURCE: NEW DEFINITION
VALUES: TROPICAL SUBTROPICAL TEMPERATE SUBARCTIC ARCTIC

LEADING_LIGHTS (ATTRIBUTE TERM 136)
FEATURE: LANE
DEFN: PRESENCE OF TWO OR MORE LIGHTS FORMING A LEADING LINE OR COURSE TO BE FOLLOWED
SOURCE: DEFENSE MAPPING AGENCY

LEAD_TYPE (ATTRIBUTE TERM 137)
FEATURE: LANE
DEFN: CHARACTERISTICS OR CATEGORY OF LEAD
SOURCE: NEW DEFINITION
VALUES: SHORE_LEAD

LENGTH (ATTRIBUTE TERM 138)
FEATURE: WATERCOURSE PLATEAU ROAD FISH_LADDER FISH_TRAP LOCK TURNING_BASIN BREAKWATER WHARF MOORING REVETMENT EMBANKMENT BAR SHORE REEF VALLEY ISTHMUS CLIFF RIDGE LAUNCHING_RAMP RUNWAY RAILWAY TUNNEL CABLEWAY GATE BARRIER BOUNDARY
DEFN: THE LONGER OR LONGEST DIMENSION OF A FEATURE
SOURCE: WEBSTER'S NEW COLLEGIATE DICTIONARY

LEVEL_SURFACE (ATTRIBUTE TERM 139)
FEATURE: ICE_FIELD
DEFN: A TRACT WITH A RELATIVELY UNIFORM HORIZONTAL UPPERMOST LAYER.

SOURCE: NEW DEFINITION

LIGHT_CHARACTERISTIC (ATTRIBUTE TERM 140)
FEATURE: BUOY
DEFN: THE DISTINCTIVE CHARACTER OR QUALITY TYPICAL OF A SPECIFIC LIGHT EMITTED
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

LIGHT_DISPLAY (ATTRIBUTE TERM 141)
FEATURE: BEACON BUOY
DEFN: THE SEQUENCE AND APPROXIMATE LENGTH OF LIGHT AND DARK PERIODS OF A SPECIFIC LIGHT
SOURCE: MODIFIED FROM IDEAS
VALUES: FIXED/FLASHING

LIGHTED/UNLIGHTED (ATTRIBUTE TERM 142)
FEATURE: WATERCOUURSE BUOY BEACON HARBOR AIRPORT ROAD TOWER SIGN PLACE DAM BRIDGE TUNNEL INTERSECTION STATION RUNWAY
DEFN: MARKED WITH LIGHTS USED AS AIDS TO NAVIGATION, OR TO GENERAL NIGHT USE
SOURCE: NEW DEFINITION

LIGHTS_IN_A_LINE (ATTRIBUTE TERM 143)
FEATURE: BOUNDARY
DEFN: PRESENCE OF LIGHTS MARKING AREA LIMITS, CABLE ALIGNMENTS FOR ANCHORING, ETC., NOT MARKING DIRECTION OR COURSE.
SOURCE: DEFENSE MAPPING AGENCY

LOADING/UNLOADING (ATTRIBUTE TERM 144)
FEATURE: BUILDING RAILWAY
DEFN: USED AS A PLACE WHERE CARGO OR PASSENGERS CAN BE RECEIVED OR DISCHARGED
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

LOCATION (ATTRIBUTE TERM 145)
FEATURE: ALL
DEFN: THE PLACE, SITE OR SPACE OCCUPIED BY A SPECIFIED FEATURE
NOTE: CODED AS THE COORDINATES OF THE FEATURE BEING DESCRIBED
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY
INCLUD: ELEVATION DATUM

MAIN_TRACK (ATTRIBUTE TERM 146)
SEE: CONNECTED_BY_SWITCHES/MAIN_TRACK

MANMADE (ATTRIBUTE TERM 147)
SEE: ARTIFICIALLY_IMPROVED/MANMADE/NATURAL

MATERIAL_CONVEYED (ATTRIBUTE TERM 148)
FEATURE: UTILITY
DEFN: THE SUBSTANCE OR ITEM(S) BEING TRANSPORTED.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY
INCLUD: SUBSTANCE_TRANSPORTED
VALUES: GAS LIQUID

MATERIAL_PROCESSED (ATTRIBUTE TERM 149)
FEATURE: BUILDING BUILDING_COMPLEX
DEFN: THE MATERIALS BEING ALTERED THROUGH AN INDUSTRIAL PROCESS
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY
INCLUD: SUBSTANCE_BEING_PROCESSED

MEAN_HIGH_WATER (ATTRIBUTE TERM 150)
FEATURE: SHORELINE
DEFN: THE TIDAL DATUM THAT IS THE ARITHMETIC AVERAGE OF THE HIGH WATER HEIGHTS OBSERVED OVER A SPECIFIC 19-YEAR METONIC CYCLE. SEE ALSO DATUM.
SOURCE: USGS AND NOS, COASTAL MAPPING HANDBOOK

MEAN_SEA_LEVEL (ATTRIBUTE TERM 151)
FEATURE: SHORELINE
DEFN: A STANDARD DATUM FOR HEIGHTS AND ELEVATION IN COASTAL AREAS.
SOURCE: USGS AND NOS, COASTAL MAPPING HANDBOOK

MEDIAN_PRESENT (ATTRIBUTE TERM 152)
FEATURE: ROAD
DEFN: PRESENCE OF A DIVIDING AREA OFTEN PAVED OR LANDSCAPED, BETWEEN OPPOSING LANES
SOURCE: THE AMERICAN HERITAGE DICTIONARY

MEMORIAL (ATTRIBUTE TERM 153)
FEATURE: CONTROL_POINT MONUMENT
DEFN: DESIGNED OR ESTABLISHED TO SERVE AS A REMEMBRANCE TO A PERSON OR AN EVENT
SOURCE: AMERICAN HERITAGE DICTIONARY

METHOD_OF_MEASUREMENT (ATTRIBUTE TERM 154)
FEATURE: CONTROL_POINT
VALUES: ASTRONOMICALLY_DETERMINED DETERMINED_BY_TRIANGULATION

MICROWAVE_TRANSMISSION (ATTRIBUTE TERM 155)
FEATURE: TOWER ANTENNA BUILDING
DEFN: THE ACT OR PROCESS OF SENDING A SIGNAL OF ELECTROMAGNETIC RADIATION HAVING A WAVELENGTH IN THE APPROXIMATE RANGE FROM ONE CENTIMETER TO ONE METER.
SOURCE: MODIFIED FROM WEBSTER'S NEW COLLEGIATE DICTIONARY

MILITARY (ATTRIBUTE TERM 156)
SEE: OWNER_TYPE USER_TYPE

MINERAL_CONTENT (ATTRIBUTE TERM 157)
FEATURE: LAKE SEA CROP_LAND DUMPING_GROUND MINE
DEFN: PRESENCE OF ANY NATURALLY OCCURRING, HOMOGENEOUS INORGANIC SUBSTANCES.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

MODE_TRANSPORTED (ATTRIBUTE TERM 158)
SEE: TRANSPORTATION_MODE_ACCOMMODATED

MOUNTED (ATTRIBUTE TERM 159)
FEATURE: ANTENNA
DEFN: FITTED INTO OR SET IN A BACKING OR SUPPORT
SOURCE: THE AMERICAN HERITAGE DICTIONARY

MOVABLE/STATIONARY (ATTRIBUTE TERM 160)
FEATURE: RAILWAY TOWER ANTENNA BRIDGE ICE_FIELD
DEFN: ABILITY TO CHANGE POSITION VS. FIXED IN POSITION UNABLE TO MOVE
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY
INCLUD: STATIONARY

NAME (ATTRIBUTE TERM 161)
FEATURE: ALL
DEFN: A WORD OR PHRASE THAT CONSTITUTES THE DISTINCTIVE DESIGNATION OF AN OCCURRENCE OF A FEATURE
SOURCE: THE AMERICAN HERITAGE DICTIONARY

NATURAL (ATTRIBUTE TERM 162)
SEE: ARTIFICIALLY_IMPROVED/MANMADE/NATURAL

NAVAIDS (ATTRIBUTE TERM 163)
FEATURE: BEACON BUOY
DEFN: SERVING AS AIDS TO NAVIGATION
SOURCE: NEW DEFINITION

NAVIGABLE (ATTRIBUTE TERM 164)
FEATURE: WATERCOURSE INLET SEA LAKE HARBOR DELTA REEF LEAD LAGOON WETLAND
DEFN: HAVING WATER DEEP ENOUGH AND WIDE ENOUGH TO AFFORD PASSAGE TO SHIPS; CAPABLE OF BEING STEERED
SOURCE: THE AMERICAN HERITAGE DICTIONARY

NEGOTIATED/UNILATERAL (ATTRIBUTE TERM 165)
FEATURE: BOUNDARY
DEFN: ARRANGED OR SETTLED THROUGH CONSULTATION AND AGREEMENT WITH TWO OR MORE INTERESTED PARTIES VS. ARRANGED OR SETTLED BY ONE PARTY WITHOUT CONSULTATION OR AGREEMENT WITH ANY OTHER INTERESTED PARTY
SOURCE: DEFENSE MAPPING AGENCY

NUMBER_OF_SITES (ATTRIBUTE TERM 166)
FEATURE: CAMPGROUND
DEFN: THE NUMBER OF PLACES OR PLOTS OF LAND DESIGNATED FOR A SPECIFIC USE.
SOURCE: NEW DEFINITION

OBSERVATION (ATTRIBUTE TERM 167)
FEATURE: TOWER
DEFN: USED AS A PLACE TO WATCH OVER ATTENTIVELY.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

OBSTRUCTION (ATTRIBUTE TERM 168)
FEATURE: SNAG STUMP
DEFN: ACTING AS AN OBSTACLE IMPEDING PASSAGE
SOURCE: AMERICAN HERITAGE DICTIONARY

OFFSHORE/ONSHORE (ATTRIBUTE TERM 169)
FEATURE: BREAKERS PORT
DEFN: LOCATED OR OCCURRING AT A DISTANCE FROM SHORE VS. LOCATED OR OCCURRING ON SHORE
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

ONE_WAY/TWO_WAY (ATTRIBUTE TERM 170)
FEATURE: ROAD
DEFN: ACCOMMODATING A LANE OR LANES OF TRAFFIC MOVING IN ONE DIRECTION ONLY VS. TRAFFIC MOVING IN OPPOSING DIRECTIONS
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY
INCLUD: TWO_WAY

OPEN (ATTRIBUTE TERM 171)
SEE: BLIND/OPEN

OWNER_TYPE (ATTRIBUTE TERM 172)
FEATURE: AIRPORT ROAD BUILDING BUILDING_COMPLEX PARK
DEFN: CHARACTERISTICS OR CATEGORY OF OWNERS OF THE FEATURE
SOURCE: NEW DEFINITION
INCLUD: CIVILIAN MILITARY PRIVATE PUBLIC
VALUES: CIVILIAN MILITARY PRIVATE PUBLIC

PARENT (ATTRIBUTE TERM 173)
SEE: BRANCH/PARENT

PARK_ATTRACTION (ATTRIBUTE TERM 174)
FEATURE: PARK
DEFN: THE PRESENCE OF VARIOUS MECHANICAL CONTRAPTIONS OPERATED AS AMUSEMENT PARK ENTERTAINMENT
SOURCE: MODIFIED FROM THE AMERICAN HARITAGE DICTIONARY
VALUES: FERRIS_WHEEL ROLLER_COASTER

PASSENGER_TRANSPORTATION (ATTRIBUTE TERM 175)
FEATURE: WATERCOURSE ROAD AIRPORT RUNWAY CABLEWAY RAILWAY TUNNEL INTERSECTION
DEFN: USED FOR THE CONVEYANCE OF HUMAN PASSENGERS
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

PASSING (ATTRIBUTE TERM 176)
FEATURE: LANE RAILWAY
DEFN: USED FOR TRAVELING AT A FASTER SPEED OR FOR GOING AROUND OTHERS USING THE FEATURE
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

PEDESTRIAN_USE (ATTRIBUTE TERM 177)
FEATURE: ROAD
DEFN: USED BY PEOPLE TRAVELING ON FOOT
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

PERENNIAL (ATTRIBUTE TERM 178)
SEE: INTERMITTENT/PERENNIAL

PERMANENTLY_ICE_COVERED (ATTRIBUTE TERM 179)
FEATURE: MOUNT MOUNT_RANGE PEAK
DEFN: HAVING A FIXED OUTER LAYER OF ICE WHICH DOES NOT MELT.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTINARY

PERMEABILITY (ATTRIBUTE TERM 180)
FEATURE: BREAKWATER
DEFN: THE ABILITY OF SUBSTANCES TO PASS THROUGH THE OPENINGS OR INTERSTICES
SOURCE: THE AMERICAN HERITAGE DICTIONARY
VALUES: IMPERMEABLE/PERMEABLE

PHYSICAL (ATTRIBUTE TERM 181)
FEATURE: BOUNDARY CONTROL_POINT
DEFN: OF OR PERTAINING TO MATERIAL THINGS
SOURCE: THE AMERICAN HERITAGE DICTIONARY
VALUES: PHYSICAL/NOT_PHYSICAL

PHYSICAL_CONDITION_OF_FEATURE (ATTRIBUTE TERM 182)
FEATURE: PLACE

DEFN: THE STATE OF REPAIR OF A FEATURE OR THE EXTENT OF DETERIORATION.
SOURCE: NEW DEFINITION
VALUES: RUINS

PHYSICAL_CONDITION_OF_SURFACE_MATERIAL (ATTRIBUTE TERM 183)
FEATURE: ROAD RUNWAY BRIDGE TUNNEL
DEFN: THE PHYSICAL CONDITION OF A SPECIFIED TRANSPORTATION SURFACE WHICH ALLOWS FOR USE RANGING FROM SUSTAINED USE BY HEAVIEST VEHICLES TO NON-USE DUE TO DISREPAIR OR DETERIORATION
SOURCE: IDEAS

PILLAR_CONSTRUCTION (ATTRIBUTE TERM 184)
SEE: CONSTRUCTION_TYPE

POPULATION (ATTRIBUTE TERM 185)
FEATURE: PLACE
DEFN: THE NUMBER OF PEOPLE INHABITING A SPECIFIED AREA
SOURCE: THE AMERICAN HERITAGE DICTIONARY

PREDOMINANT_SPECIES (ATTRIBUTE TERM 186)
FEATURE: CROP_LAND FISHING_GROUND CLEARING TUNDRA GRASSLAND WETLAND FISH_TRAP WOODLAND
DEFN: THE MOST COMMON, CONSPICUOUS, OR PREVALENT ANIMAL OR PLANT LIFE BELONGING TO A DISTINCT BIOLOGICAL SPECIES
SOURCE: THE AMERICAN HERITAGE DICTIONARY

PRIMARY/SECONDARY/TERTIARY/QUATERNARY (ATTRIBUTE TERM 187)
FEATURE: TIDE_STATION
DEFN: ORDER OF IMPORTANCE, DEGREE OF PRIORITY OR DEGREE OF USE
SOURCE: NEW DEFINITION

PRIVATE (ATTRIBUTE TERM 188)
SEE: OWNER_TYPE USER_TYPE

PRODUCT (ATTRIBUTE TERM 189)
FEATURE: PLANT
DEFN: THE ITEM OR SUBSTANCE PRODUCED THROUGH AN INDUSTRIAL PROCESS.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

PROPOSED (ATTRIBUTE TERM 190)
SEE: EXISTING/PROPOSED

PUBLIC (ATTRIBUTE TERM 191)
SEE: OWNER_TYPE USER_TYPE

RADAR_GUIDED (ATTRIBUTE TERM 192)
FEATURE: LANE
DEFN: USERS DIRECTED OR STEERED BY SIGNALS OF REFLECTED HIGH FREQUENCY RADIO WAVES.
SOURCE: MODIFIED FROM DEFENSE MAPPING AGENCY

RADAR_TYPE (ATTRIBUTE TERM 193)
FEATURE: BUILDING TOWER
DEFN: THE KIND OF OR INTENSITY OF THE HIGH FREQUENCY RADIO WAVES USED FOR GUIDANCE OR DETECTION OF OBJECTS
SOURCE: MODIFIED FROM THE DEFENSE MAPPING AGENCY
VALUES: LONG_RANGE

RADIO_SIGNAL_CHARACTERISTIC (ATTRIBUTE TERM 194)
FEATURE: BUOY
DEFN: THE DISTINCTIVE CHARACTER OR QUALITY TYPICAL OF A SPECIFIC RADIO SIGNAL EMITTED
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

RADIC_TRANSMISSION (ATTRIBUTE TERM 195)
FEATURE: TOWER ANTENNA STATION BUILDING
DEFN: USED FOR OR CONTAINING THE EQUIPMENT USED TO TRANSMIT RADIO SIGNALS, ELECTROMAGNETIC WAVES IN APPROXIMATE FREQUENCY RANGE FROM 10 KILOCYCLES/SECOND TO 300,000 MEGACYCLES/SECOND. TO TRANSMIT OR TO RECEIVE ELECTRIC SIGNALS WITHOUT WIRES CONNECTING THE POINTS OF TRANSMISSION AND RECEPTION.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

RAIL_CONNECTOR_TYPE (ATTRIBUTE TERM 196)
FEATURE: RAILWAY
DEFN: THE METHOD USED TO JOIN OR CONNECT CONSECUTIVE RAILS OF A SPECIFIC RAIL LINE OR SEGMENT
SOURCE: IDEAS

RAIL_DIRECTION_CHANGES (ATTRIBUTE TERM 197)
FEATURE: RAILWAY
DEFN: TYPE OF FACILITY AVAILABLE AT A SPECIFIC LOCATION TO ACCOMPLISH CHANGING THE DIRECTION OF A LOCOMOTIVE
SOURCE: IDEAS

RAIL_GAUGE (ATTRIBUTE TERM 198)
FEATURE: RAILWAY TURNTABLE
DEFN: THE DISTANCE BEETWEEN TWO RAILS OF A RAILWAY TRACK
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

RAIL_GAUGE_ADAPTABILITY (ATTRIBUTE TERM 199)
FEATURE: RAILWAY
DEFN: METHOD USED TO CHANGE THE GAUGE ON A SPECIFIC PIECE OR CATEGORY OF RAILWAY EQUIPMENT
SOURCE: IDEAS

RAILS_NUMBER_OF (ATTRIBUTE TERM 200)
FEATURE: RAILWAY
DEFN: HAVING PARALLEL BARS FOR CONVEYANCE VS. A SINGLE BAR SYSTEM.
SEE ALSO LANES_NUMBER_OF.
SOURCE: NEW DEFINITION
VALUES: MONORAIL DOUBLE_RAIL
VAL.DEF: DOUBLE_RAIL: TWO PARALLEL RAILS MAKING A SINGLE RAIL LANE

RECOGNIZED/UNRECOGNIZED (ATTRIBUTE TERM 201)
FEATURE: BOUNDARY
DEFN: ACKNOWLEDGED AS BEING VALID VS. NOT ACKNOWLEDGED.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

RECREATIONAL (ATTRIBUTE TERM 202)
FEATURE: WATERCOURSE LAKE SEA
DEFN: USED FOR THE REFRESHMENT OF ONE'S MIND OR BODY AFTER LABOR THROUGH DIVERTING ACTIVITY; PLAY
SOURCE: MODIFIED FROM WEBSTER'S NEW COLLEGIATE DICTIONARY

REGULATED (ATTRIBUTE TERM 203)
SEE: RESTRICTIONS

RELATED_FEATURE (ATTRIBUTE TERM 204)
FEATURE: GATE
DEFN: THE LOGICAL OR NATURAL ASSOCIATION BETWEEN TWO OR MORE FEATURES; RELEVANCE OF ONE TO ANOTHER; CONNECTION
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

RELATIONSHIP_TO_GROUND_SURFACE (ATTRIBUTE TERM 205)
FEATURE: BUILDING WATERCOURSE ROAD UTILITY TANK TUNNEL
DEFN: THE OCCUPATION OF SPACE IN RELATION TO THE SOLID SURFACE OF THE EARTH.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY
VALUES: ABOVE_GROUND/AT_GROUND_LEVEL/BELOW_GROUND

RELATIONSHIP_TO_WATER_SURFACE (ATTRIBUTE TERM 206)
FEATURE: TUNNEL UTILITY
DEFN: THE POSITION OF THE FEATURE ABOVE OR BELOW THE SURFACE OF THE LOCAL WATER FEATURE
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY
VALUES: UNDERWATER

RELIEF (ATTRIBUTE TERM 207)
FEATURE: EARTH_SURFACE
DEFN: THE DIFFERENCE BETWEEN HIGH AND LOW PLACES IN A LOCALITY

RELIGIOUS (ATTRIBUTE TERM 208)
FEATURE: BUILDING

RESTRICTIONS (ATTRIBUTE TERM 209)
FEATURE: HARBOR ROAD APPROACHWAY TUNNEL LAKE SEA BRIDGE BOUNDARY RUNWAY RESTRICTED_AREA
DEFN: LIMITATIONS ON THE USE FOR LEGAL, SAFETY, SECURITY OR OTHER REASONS.
SOURCE: NEW DEFINITION
INCLUD: USE_RESTRICTIONS REGULATED SEASONAL_LIMITS SPECIAL_USE
VALUES: CUSTOMS ENTRY INTERNATIONAL_REGULATIONS_FOR_PREVENTING_COLLISIONS_AT_SEA
NAVIGATION_RULES_FOR_HARBORS_RIVERS_AND_INLAND_WATERS

ROAD_TYPE (ATTRIBUTE TERM 210)
FEATURE: ROAD
DEFN: CHARACTERISTICS OR CATEGORY OF ROAD
SOURCE: NEW DEFINITION
VALUES: INTERSTATE STATE_HIGHWAY COUNTY_ROAD LOCAL_ROAD

ROCKY (ATTRIBUTE TERM 211)
SEE: SOIL_TEXTURE

RUNWAYS_NUMBER_OF (ATTRIBUTE TERM 212)
FEATURE: AIRPORT
DEFN: THE NUMBER OF PREPARED SURFACES AVAILABLE TO ACCOMMODATE THE LANDING AND TAKE-OFF OF AIRCRAFT
SOURCE: NEW DEFINITION

SAFE_PASSAGE (ATTRIBUTE TERM 213)
FEATURE: LANE
DEFN: HAVING BEEN ESTABLISHED AS A ROUTE FREE FROM HAZARDS
SOURCE: MODIFIED FROM DEFENSE MAPPING AGENCY

SALINITY (ATTRIBUTE TERM 214)
FEATURE: WATERCOURSE LAKE SPRING INLET FISHING_GROUND FISH_TRAP LOCK HARBOR TURNING_BASIN WETLAND DUMPING_GROUND WELL

DEFN: THE PROPORTION OF DISSOLVED SALTS IN PURE WATER, STATED IN PARTS PER THOUSAND BY MASS
SOURCE: MONKHOUSE, A DICTIONARY OF GEOGRAPHY
VALUES: SALTY/BRACKISH/FRESH
VAL.DEF: BRACKISH IS SLIGHTLY SALTY, BETWEEN 15 AND 30 PARTS PER THOUSAND
VALUES: PARTS OF SALT PER THOUSAND PARTS OF WATER

SCREEN_PRESENT (ATTRIBUTE TERM 215)
FEATURE: OUTDOOR_THEATER
DEFN: THE PRESENCE OF A LARGE FLAT WHITE OR SILVER SURFACE UPON WHICH A PICTURE IS PROJECTED
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

SEA_ICE_PRESENT (ATTRIBUTE TERM 216)
FEATURE: SEA
DEFN: PRESENCE OF MORE THAN 10 PERCENT SEA ICE INHIBITING FREE NAVIGATION.
SOURCE: DEFENSE MAPPING AGENCY

SEA_LEVEL_RELATIONSHIP (ATTRIBUTE TERM 217)
SEE: ELEVATION

SEASON_USED (ATTRIBUTE TERM 218)
FEATURE: FISH_TRAP FISH_LADDER CABLEWAY
DEFN: THE SPECIFIED SEASON OR TIME OF YEAR THAT SOMETHING CAN BE USED, ESPECIALLY IN REFERENCE TO SOMETHING THAT IS DEPENDENT ON OR CONTROLLED BY SEASONAL CHANGES
SOURCE: NEW DEFINITION
INCLUD: SEASONAL_LIMITS

SEASONAL_DEPTH (ATTRIBUTE TERM 219)
FEATURE: WETLAND
DEFN: THE MEASUREMENT FROM THE WATER SURFACE TO THE BOTTOM OF THAT WATER BODY AT DIFFERENT SEASONS; USED IN RELATION TO WATER BODIES WHICH HAVE MARKED CHANGES DUE TO SEASON CHANGE
SOURCE: NEW DEFINITION

SEASONAL_LIMITS (ATTRIBUTE TERM 220)
SEE: RESTRICTIONS SEASON_USED

SEAWEED_PRESENT (ATTRIBUTE TERM 221)
FEATURE: SEA
DEFN: PRESENCE OF ANY OF NUMEROUS MARINE ALGAE, SUCH AS KELP, ROCKWEED, OR GULFWEED.
SOURCE: DEFENSE MAPPING AGENCY

SERVICES_PROVIDED (ATTRIBUTE TERM 222)
FEATURE: AIRPORT STATION MARINA
DEFN: KINDS OF SERVICES PROVIDED AT A GIVEN FACILITY. SEE ALSO FACILITIES_AVAILABLE.
SOURCE: NEW DEFINITION
VALUES: AIR_TRAFFIC_CONTROL_SERVICE BAGGAGE_SERVICE REPAIR_SERVICE FUEL

SHAFTS_NUMBER_OF (ATTRIBUTE TERM 223)
FEATURE: MINE
DEFN: THE NUMBER OF LONG NARROW PASSAGES SUNK IN THE EARTH.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

SHAPE (ATTRIBUTE TERM 224)
FEATURE: IRRIGATION_SYSTEM MONUMENT MOUNT WALL

DEFN: SPATIAL FORM
SOURCE: THE AMERICAN HERITAGE DICTIONARY
VALUES: CIRCULAR CONE CYLINDRICAL OBELISK TUBULAR WEDGED CLOVERLEAF DIAMOND PYRAMID CONCAVE

SHARP_CURVE (ATTRIBUTE TERM 225)
FEATURE: LANE ROAD WATERCOURSE
DEFN: PRESENCE OF AN ABRUPT ACUTE BEND IN THE FEATURE
SOURCE: MODIFIED FROM THE DEFENSE MAPPING AGENCY
VALUES: RADIUS < 30_METERS

SHELTERED (ATTRIBUTE TERM 226)
SEE: EXPOSED/SHELTERED

SHORE_ORIENTATION (ATTRIBUTE TERM 227)
FEATURE: BREAKWATER WHARF BAR
DEFN: THE POSITION OF SOMETHING RELATIVE TO THE SHORE: FOR EXAMPLE, PARALLEL
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

SIGNAL_DIRECTION (ATTRIBUTE TERM 228)
FEATURE: BEACON
DEFN: THE LINE OR COURSE ALONG WHICH THE SOUND, IMAGE, OR OTHER TRANSMITTED MESSAGE TRAVELS
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

SIGNAL_INTENSITY (ATTRIBUTE TERM 229)
FEATURE: BEACON BUOY
DEFN: THE CONCENTRATION OF POWER OR FORCE OF THE SIGNAL EMITTED
SOURCE: THE AMERICAN HERITAGE DICTIONARY

SIGNAL_TYPE (ATTRIBUTE TERM 230)
FEATURE: BEACON BUOY ANTENNA BUILDING TOWER UTILITY
DEFN: THE KIND OF ELECTRONIC IMPULSE USED FOR COMMUNICATION.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY
VALUES: RADIO TELEGRAPH TELEPHONE MICROWAVE TELEVISION

SINGLE_WIRE_/MULTIPLE_WIRES (ATTRIBUTE TERM 231)
FEATURE: UTILITY
DEFN: PRESENCE OF ONE STRAND OF WIRES VS. MORE THAN ONE STRAND TOGETHER
SOURCE: NEW DEFINITION

SIZE (ATTRIBUTE TERM 232)
FEATURE: BUILDING
DEFN: THE PHYSICAL DIMENSIONS, PROPORTIONS, MAGNITUDE, OR EXTENT OF SOMETHING
SOURCE: THE AMERICAN HERITAGE DICTIONARY
VALUES: LARGE SMALL

SLIPS_NUMBER_OF (ATTRIBUTE TERM 233)
FEATURE: WHARF
DEFN: THE NUMBER OF SPACES BETWEEN WHARFS OR PIERS DESIGNED TO ACCOMMODATE WATER VESSELS
SOURCE: NEW DEFINITION

SLOPE (ATTRIBUTE TERM 234)
FEATURE: WATERCOURSE SHAFT SHORE GAP CLIFF RIDGE ROAD LAUNCHING_RAMP RAILWAY
DEFN: THE SLANT OR DEVIATION FROM HORIZONTAL MEASURED IN DEGREES

SOURCE: AMERICAN HERITAGE DICTIONARY
INCLUD: GRADIENT

SLOPE_OF_SHAFT (ATTRIBUTE TERM 235)
FEATURE: MINE
DEFN: THE SLANT OR DEVIATION FROM HORIZONTAL MEASURED IN DEGREES OF THE SHAFT
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

SLOPE_OF_SIDES (ATTRIBUTE TERM 236)
FEATURE: BASIN VALLEY WATERCOURSE
DEFN: SAME AS FOR "SLOPE," BUT MEASURED BETWEEN THE UPPER AND LOWER SURFACES OF THE FEATURE, ALONG ITS SIDES.
SOURCE: NEW DEFINITION
INCLUD: GRADIENT_OF_SIDES

SMOKE_EMISSION (ATTRIBUTE TERM 237)
FEATURE: CHIMNEY
DEFN: THE VENTING OF VAPOR MADE UP OF SMALL PARTICLES OF CARBONACEOUS MATTER IN THE AIR, RESULTING MAINLY FROM INCOMPLETE COMBUSTION OF ORGANIC MATERIAL, SUCH AS WOOD OR COAL.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

SOIL_TEXTURE (ATTRIBUTE TERM 238)
FEATURE: GROUND
DEFN: THE KIND OF GROUND MATERIAL CHARACTERIZED BY THE RELATIVE PROPORTIONS OF THE VARIOUS SIZE GROUPS OF INDIVIDUAL SOIL GRAINS IN A MASS OF SOIL
SOURCE: MODIFIED FROM A DICTIONARY OF GEOGRAPHY MONKHOUSE
INCLUD: ROCKY
VALUES: CLAY SILT SAND ROCK

SOIL_TYPE (ATTRIBUTE TERM 239)
FEATURE: BASIN GROUND WETLAND
DEFN: THE PRINCIPAL UNIT USED IN SOIL MAPPINGS AS DEFINED BY THE SOIL CONSERVATION SERVICE.
SOURCE: NEW DEFINITION

SOLID_CONSTRUCTION (ATTRIBUTE TERM 240)
SEE: CONSTRUCTION_TYPE

SOUND_BARRIER (ATTRIBUTE TERM 241)
FEATURE: FENCE WALL

SOUND_CHARACTERISTIC (ATTRIBUTE TERM 242)
FEATURE: BUOY
DEFN: THE DISTINCTIVE CHARACTER OR QUALITY TYPICAL OF A SPECIFIC SOUND EMITTED
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

SOUNDING (ATTRIBUTE TERM 243)
SEE: CHARTED_DEPTH

SOVEREIGNTY (ATTRIBUTE TERM 244)
FEATURE: FISHING_GROUND
DEFN: THE SUPREME AUTHORITY OR CONTROL OVER THE FEATURE
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY
VALUES: NATIONAL INTERNATIONAL

SPAN_LENGTH (ATTRIBUTE TERM 245)
FEATURE: BRIDGE
DEFN: THE LENGTH OF THE SECTION BETWEEN INTERMEDIATE SUPPORTS OF A BRIDGE
SOURCE: THE AMERICAN HERITAGE DICTIONARY

SPAN_MOVEMENT (ATTRIBUTE TERM 246)
FEATURE: BRIDGE
DEFN: THE MANNER IN WHICH THE SECTION BETWEEN TWO INTERMEDIATE SUPPORTS OF A BRIDGE MOVES
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

SPECIAL_USE (ATTRIBUTE TERM 247)
SEE: RESTRICTIONS

SPECIES (ATTRIBUTE TERM 248)
FEATURE: CLEARING FISH_HATCHERY FISH_LADDER GRASSLAND WOODLAND
DEFN: A FUNDAMENTAL CATEGORY OF TAXONOMIC CLASSIFICATION, RANKING AFTER A GENUS, AND CONSISTING OF ORGANISMS CAPABLE INTERBREEDING
SOURCE: THE AMERICAN HERITAGE DICTIONARY

SPECIES_CULTIVATED (ATTRIBUTE TERM 249)
FEATURE: CROPLAND FISHING_GROUND FARM WOODLAND
DEFN: THE FORM OF LIFE GROWN AND NURTURED FOR HARVEST
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY
INCLUD: CROP_GROWN
VALUES: CORN WHEAT OYSTERS FLOWERS FRUIT GRAPES HOPS NUTS SHRUBS TREES

SPORTS_TYPE (ATTRIBUTE TERM 250)
FEATURE: SPORTS_FIELD ICE_RINK STADIUM
DEFN: THE TYPE OF ORGANIZED COMPETITIVE GAME(S) THAT THE FEATURE IS USED FOR
SOURCE: THE AMERICAN HERITAGE DICTIONARY
VALUES: BASEBALL FOOTBALL SOCCER ICE_HOCKEY

STAFFED/UNSTAFFED (ATTRIBUTE TERM 251)
FEATURE: BEACON BUOY

STATIONARY (ATTRIBUTE TERM 252)
SEE: MOVABLE/STATIONARY

STORAGE (ATTRIBUTE TERM 253)
FEATURE: LAKE TOWER BUILDING RAILWAY TANK
DEFN: USED FOR MAINTAINING A STOCK OR SUPPLY FOR FUTURE USE
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

STRUCTURE_TYPE (ATTRIBUTE TERM 254)
FEATURE: BUILDING BUILDING_COMPLEX
DEFN: THE CONFIGURATION OR ARRANGEMENT OF A FEATURE
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

SUBSTANCE_BEING_PROCESSED (ATTRIBUTE TERM 255)
SEE: MATERIAL_PROCESSED

SUBSTANCE_EXTRACTED (ATTRIBUTE TERM 256)
FEATURE: MINE WELL OILFIELD

DEFN: THE MATTER (LIQUID, SOLID OR GASEOUS) BEING DRAWN FORTH BY MECHANICAL OR CHEMICAL PROCESSES
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

SUBSTANCE_STORED (ATTRIBUTE TERM 257)
SEE: ITEM(S)_STORED

SUBSTANCE_TRANSPORTED (ATTRIBUTE TERM 258)
SEE: MATERIAL_CONVEYED

SUPPORT_TYPE (ATTRIBUTE TERM 259)
FEATURE: UTILITY ANTENNA
DEFN: THE KIND OF FEATURE USED TO BEAR THE WEIGHT OF THE FEATURE BEING DESCRIBED.
SOURCE: THE AMERICAN HERITAGE DICTIONARY
VALUES: POST TOWER BUILDING

SURFACE_MATERIAL (ATTRIBUTE TERM 260)
SEE: COMPOSITION

TELEVISION_TRANSMISSION (ATTRIBUTE TERM 261)
FEATURE: TOWER BUILDING ANTENNA
DEFN: THE TRANSMISSION OF VISUAL IMAGES OF MOVING AND STATIONARY OBJECTS, GENERALLY WITH ACCOMPANYING SOUND, AS ELECTROMAGNETIC WAVES, AND THE RECONVERSION OF RECEIVED WAVES INTO VISUAL IMAGES
SOURCE: THE AMERICAN HERITAGE DICTIONARY

TEMPERATURE (ATTRIBUTE TERM 262)
FEATURE: SPRING GEYSER GLACIER SEA LAKE FUMAROLE
DEFN: A SPECIFIC DEGREE OF HOTNESS OR COLDNESS AS INDICATED ON OR REFERED TO A STANDARD SCALE
SOURCE: THE AMERICAN HERITAGE DICTIONARY
VALUES: AVERAGE_ANNUAL
MINIMUM_RECORDED MAXIMUM_RECORDED

THROUGH_ROAD (ATTRIBUTE TERM 263)
SEE: BLIND/OPEN

TIDAL (ATTRIBUTE TERM 264)
FEATURE: OVERFALLS
DEFN: SUBJECT TO THE ALTERNATING RISE AND FALL OF WATER LEVEL CAUSED BY THE ASTRONOMIC TIDE-PRODUCING FORCES
SOURCE: THE AMERICAN HERITAGE DICTIONARY

TOLL (ATTRIBUTE TERM 265)
FEATURE: ROAD BRIDGE WATERCOURSE TUNNEL
DEFN: A FIXED CHARGE OR TAX FOR ACCESS, ESPECIALLY FOR PASSAGE ACROSS A BRIDGE OR ALONG A ROAD.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

TRACK_GAUGE (ATTRIBUTE TERM 266)
SEE: RAIL_GAUGE

TRAFFIC_LIGHTS_PRESENT (ATTRIBUTE TERM 267)
FEATURE: ROAD RAILWAY
DEFN: PRESENCE OF ROAD SIGNALS THAT BEAM A RED OR GREEN LIGHT OR AN AMBER WARNING LIGHT TO DIRECT TRAFFIC TO STOP OR PROCCEED
SOURCE: THE AMERICAN HERITAGE DICTIONARY

TRANSPORTATION_MODE_ACCOMMODATED (ATTRIBUTE TERM 268)

FEATURE: CUT GAP TUNNEL ROAD BRIDGE
DEFN: THE KIND OF TRANSPORTATION THAT A FEATURE IS ADAPTED TO OR SUITED FOR.
SOURCE: NEW DEFINITION
INCLUD: MODE_TRANSPORTED
VALUES: AUTOMOTIVE RAIL

TREE_COVER (ATTRIBUTE TERM 269)
FEATURE: WOODLAND CROP_LAND
DEFN: THE AMOUNT OR DENSITY OF TALL WOODY PLANTS OCCUPYING THE SURFACE OF A SPECIFIED AREA
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY
VALUES: PERCENT OF AREA COVERED BY TREES

TREE_LINED (ATTRIBUTE TERM 270)
FEATURE: ROAD RAILWAY
DEFN: HAVING A BORDER OF TREES ALONG ITS SIDES
SOURCE: THE AMERICAN HERITAGE DICTIONARY

TWO_WAY (ATTRIBUTE TERM 271)
SEE: ONE_WAY/TWO_WAY

UNDERGROWTH_PRESENT (ATTRIBUTE TERM 272)
FEATURE: WOODLAND
DEFN: PRESENCE OF LOW GROWING PLANTS, SAPLINGS, AND SHRUBS BENEATH THE TREES IN A FOREST.
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

UNINCORPORATED (ATTRIBUTE TERM 273)
SEE: INCORPORATED/UNINCORPORATED

USE_RESTRICTIONS (ATTRIBUTE TERM 274)
SEE: RESTRICTIONS

USE_TYPE (ATTRIBUTE TERM 275)
SEE: LAND_USE_CATEGORY FUNCTION

USER_TYPE (ATTRIBUTE TERM 276)
FEATURE: AIRPORT ROAD BUILDING BUILDING_COMPLEX PARK
DEFN: CHARACTERISTICS OR CATEGORY OF USERS OF THE FEATURE
SOURCE: NEW DEFINITION
VALUES: CIVILIAN MILITARY PRIVATE PUBLIC

VEHICLE_ACCOMMODATED (ATTRIBUTE TERM 277)
FEATURE: AIRPORT HELIPAD LANE PARKING_AREA MOORING HARBOR RUNWAY CAMPGROUND
DEFN: THE TYPE OF VEHICLE THAT THE FEATURE IS ADAPTED TO OR DESIGNED TO SERVE
SOURCE: NEW DEFINITION
INCLUD: VEHICLE_SERVED VEHICLE_TYPE VESSEL_SERVED VESSEL_TYPE
VALUES: AIRSHIP AIRCRAFT FERRY HELICOPTER SEAPLANE RECREATION_VEHICLE

VEHICLE_SERVED (ATTRIBUTE TERM 278)
SEE: VEHICLE_ACCOMMODATED

VEHICLE_SIZE_SERVED (ATTRIBUTE TERM 279)
FEATURE: AIRPORT RUNWAY LAUNCHING_RAMP LOCK WHARF PORT HARBOR MOORING
DEFN: THE PHYSICAL DIMENSION, PROPORTION, MAGNITUDE, OR EXTENT OF ANY DEVICE FOR CARYING PASSENGERS, GOODS, OR EQUIPMENT THAT THE SPECIFIED FEATURE HAS SPACE FOR STORAGE OR SERVICE FOR

SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

VEHICLE_TYPE (ATTRIBUTE TERM 280)
SEE: VEHICLE_ACCOMMODATED

VENT_PRESENT (ATTRIBUTE TERM 281)
FEATURE: MOUNT
DEFN: PRESENCE OF AN OPENING PERMITTING THE PASSAGE OR ESCAPE OF LIQUIDS, GAS
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

VERTICAL (ATTRIBUTE TERM 282)
SEE: HORIZONTAL/VERTICAL

VESSEL_ACCOMMODATED (ATTRIBUTE TERM 283)
SEE: VEHICLE_ACCOMMODATED

VESSEL_TYPE (ATTRIBUTE TERM 284)
SEE: VEHICLE_ACCOMMODATED

VOLCANIC (ATTRIBUTE TERM 285)
FEATURE: MOUNT ROCK
DEFN: PERTAINING TO OR PRODUCED BY VOLCANIC ERUPTIONS.
SOURCE: THE AMERICAN HERITAGE DICTIONARY

VOLUME (ATTRIBUTE TERM 286)
FEATURE: WATERCOURSE LAKE
DEFN: SPACE OCCUPIED OR CUBIC CAPACITY AS MEASURED IN CUBIC UNITS
SOURCE: WEBSTER'S NEW COLLEGIATE DICTIONARY

WASTE_MATERIAL (ATTRIBUTE TERM 287)
FEATURE: DUMPING_GROUND
DEFN: THE USELESS OR WORTHLESS BYPRODUCTS OF A PROCESS OR THE LIKE; REFUSE OR EXCESS MATERIAL
SOURCE: THE AMERICAN HERITAGE DICTIONARY

WATCHED (ATTRIBUTE TERM 288)
SEE: STAFFED/UNSTAFFED

WATER (ATTRIBUTE TERM 289)
SEE: AIR/LAND/WATER

WATER_BODY_CONNECTION (ATTRIBUTE TERM 290)
FEATURE: WATERCOURSE
DEFN: ACTING AS A LINK BETWEEN TWO LARGER BODIES OF WATER
SOURCE: NEW DEFINITION

WATER_PRESENT (ATTRIBUTE TERM 291)
FEATURE: WATERCOURSE
DEFN: PRESENCE OF WATER IN THE FEATURE.
SOURCE: NEW DEFINITION

WATER_SUPPLY (ATTRIBUTE TERM 292)
FEATURE: WATERCOURSE LAKE
DEFN: EQUIPPED OR USED TO FURNISH WATER

SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

WATER_TEMPERATURE (ATTRIBUTE TERM 293)
FEATURE: WATERCOURSE
DEFN: THE SPECIFIED DEGREE OF HOTNESS OR COLDNESS OF THE WATER AS INDICATED OR REFERRED TO A STANDARD SCALE
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

WATERAGE (ATTRIBUTE TERM 294)
FEATURE: WATERCOURSE
DEFN: THE MOVEMENT OF GOODS OR MERCHANDISE (SUCH AS LOGS) BY WATER
SOURCE: THE AMERICAN HERITAGE DICTIONARY

WEIGHT_BEARING_CAPACITY (ATTRIBUTE TERM 295)
SEE: BEARING_CAPACITY

WETTED_PERIMETER (ATTRIBUTE TERM 296)
FEATURE: WATERCOURSE
DEFN: LENGTH OF THE LINE OF CROSS-SECTIONAL CONTACT BETWEEN THE WATER IN A STREAM AND ITS WATERCOURSE
SOURCE: ADAPTED FROM MONKHOUSE, A DICTIONARY OF GEOGRAPHY

WIDTH (ATTRIBUTE TERM 297)
FEATURE: WATERCOURSE INLET FISH_LADDER FISH_TRAP LOCK TURNING_BASIN BREAKWATER WHARF MOORING REVETMENT EMBANKMENT BAR SHORE REEF VALLEY ISTHMUS CAVE GAP RIDGE BEACON BUOY ROAD LAUNCHING_RAMP BRIDGE RUNWAY TUNNEL GATE
DEFN: THE MAXIMUM HORIZONTAL MEASUREMENT TAKEN AT RIGHT ANGLES TO THE LENGTH; BREADTH; THE MAXIMUM HORIZONTAL MEASUREMENT OF THE EXTENT OF SOMETHING FROM SIDE TO SIDE
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

WINDBREAK (ATTRIBUTE TERM 298)
FEATURE: HEDGE FENCE
DEFN: A HEDGE, ROW OF TREES, OR FENCE SERVING TO LESSEN OR BREAK THE FORCE OF THE WIND
SOURCE: THE AMERICAN HERITAGE DICTIONARY

WIRE_DRAGGED (ATTRIBUTE TERM 299)
FEATURE: LANE LAKE SEA WATERCOURSE
DEFN: CLEARED OF HAZARDS THROUGH THE USE OF A WIRE DRAGGED THROUGH THE WATER
SOURCE: DEFENSE MAPPING AGENCY

WORK_IN_PROGRESS (ATTRIBUTE TERM 300)
FEATURE: SEA WATERCOURSE LAKE
DEFN: PRESENCE OF CONSTRUCTION OR OTHER WORK THAT IS INCOMPLETE AND THAT MAY LIMIT ACCESS OR POSE SOME HAZARD
SOURCE: DEFENSE MAPPING AGENCY

ZOO (ATTRIBUTE TERM 301)
FEATURE: PARK
DEFN: PRESENCE OF WILD ANIMALS FOR PUBLIC DISPLAY
SOURCE: MODIFIED FROM THE AMERICAN HERITAGE DICTIONARY

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