



**HOMELAND SECURITY GEOSPATIAL ENTERPRISE  
ARCHITECTURE**

**ATTACHMENT G DATA 2  
GEOSPATIAL PROPERTIES-ELEMENTS**

**GEOSPATIAL MANAGEMENT OFFICE**

**DRAFT VERSION 0.6.1**

April 13, 2004

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## 1.0 INTRODUCTION

The geospatial context of the Department of Homeland Security (DHS) business data can be used to provide insight into how and where resources are being deployed, the location and impact of past events, the predicted implications of forecast scenarios, and much more. A number of common geospatial data elements and properties have been defined for the Homeland Security (HLS) Geospatial Enterprise Architecture (GEA) to support the efficient and widespread exploitation of this data. Exhibit 1 lists data elements-properties that can be utilized by all data objects within the HLS EA, including geospatial and predominantly non-geospatial objects, thus providing a normalized geospatial context for all objects.

Consistent use of these elements-properties throughout the HLS EA will enhance interoperability and the use of standard Geospatial Enterprise Services that exploit these elements-properties. For example, by using a common definition for the specification of an address, any HLS business data that includes the address can be more easily exploited and shared between systems and jurisdictions.

Many of the elements-properties listed in Exhibit 1 can be found as location reference data in non-geospatial datasets. It may not be feasible or practical to transform non-geospatial data into geospatial data in order to exploit the geospatial elements-properties of non-geospatial data. It is better to exploit this data in place through the consistent use of standard properties/elements and standard Geospatial Enterprise Services.

## 2.0 HLS GEOSPATIAL DATA PROPERTIES AND ELEMENTS

The first column in Exhibit 1 is for informational purposes only and is used to identify the row for editorial purposes. The “**Name**” is the identifier for the element/property. The column headed “**Subtype of**” indicates that the element is a subtype of the named element. The “**property**” column contains an “**X**” if the element may also be used as a property of other objects within the EA. Neither elements nor properties are limited to scalar representations. The column “**Component of**” is used to indicate that the item is a property of the named element. The “**Instance of**” column is for elements or properties that are instantiations of element or property types and indicates the item type that it instantiates. The “**Definition**” is taken from the *Key Terms* artifact. In the case of an inconsistency, the *Key Terms* artifact should be considered authoritative. The “**Reference**” column indicates the organization (or, in some cases the standard) that has defined a content model for the element. This referenced information will be used to develop the HLS Data Model for the Geospatial Elements.

### Exhibit 1: HLS Geospatial Properties and Elements

	Name	Subtype of	Property	Component of	Instance of	Definition	Reference
1	Absolute Location	Location				Specifies an absolute location on the earth. Defined by an address, position, feature geometry (e.g., point), or Place of Interest. A subclass of Location.	
2	Address	Absolute Location	X			Specifies street address or street intersection as used in navigation and locating parties and facilities. A subtype of Absolute Location under Location. As defined by Open GIS Consortium (OGC), address consists of a street address (or intersection), place name (e.g., country, municipality, etc.), postal code, street locator, building locator, and supplemental address information. Addresses are the means of referencing primarily residences and buildings (of all types).	OGC, USPS
3	Aerial Navigation					Identifies areas within the US National Airspace System. Includes Special Use Airspace, Airways, Waypoints, and navigation aids.	NGA, FAA
4	Area		X			Measure of the approximate surface area of an area of interest.	
5	Area of Interest	Absolute Location	X			A named area (defined by circle, bounding box, or polygon). Used as a search parameter or can be displayed. A designated area of interest in an application. May be represented as a Feature or Coverage. A subtype of Absolute Location, which is under Location.	

	Name	Subtype of	Property	Component of	Instance of	Definition	Reference
6	Base Data				Feature Collection	The foundational data required for generating multi-purpose maps and other geospatial products. The data that comprise a Base Map. May consist of one or more features and/or coverages. All Base data should be registered to a common coordinate reference system. An HLS Framework category.	
7	Base Map				Feature Collection	A multi-purpose map that conveys general geospatial context, as depicted by predominant earth features.	
8	Border Areas		X		Area of Interest	Administrative areas along US National borders.	Border Patrol
9	Bounding Box	Geospatial Extent	X			Geographic area of interest expressed as a rectangle.	
10	Bounding Circle	Geospatial Extent	X			Geographic area of interest expressed as a circle.	
11	Bounding Ellipse	Geospatial Extent	X			Geographic area of interest expressed as an ellipse.	
12	Building Locator		X	Street Address		Street number and other identifier for a building, either alone or in the context of a campus or collection of buildings.	OGC
13	Census District		X		Area of Interest	District defined by the Census Bureau for statistical calculations.	Census
14	Census Tract		X		Area of Interest	Sub-division of Census District defined by the Census Bureau for statistical calculations.	Census
15	Citizenship		X		Country	A person's country of origin or home country, as established through naturalization.	
16	Containment Area		X		Area of Interest	Bounded area delineating geographic extent for an incident or event that requires proactive measures to prevent expansion of the extent.	

	Name	Subtype of	Property	Component of	Instance of	Definition	Reference
17	Coordinate Reference System	Spatial Reference System	X	Geometry		A function that associates locations in space to geometries of coordinate tuples in a mathematical space, usually a real valued coordinate vector space, and conversely associates coordinate values and geometries to locations in the real world, e.g., geographic coordinates (latitude, longitude) and projected coordinates (UTM).	
18	Country		X			Identifier for a nation. Implemented as a name, abbreviation, or code.	
19	Country Abbreviation		X		Country	Standard (e.g., ISO 3166) abbreviation for a country.	ISO
20	Country Code		X	Address	Country	Registered code value for a country.	
21	Country Name		X		Country	Full name of a country.	
22	County		X	Address		Municipal subdivision of a state.	
23	County Code		X		County	Standard identifier for a specific county or other subdivision within a US state.	FIPS 55
24	Coverage	Geospatial Entity				A two- (and sometimes three or higher) dimensional geographic representation of earth phenomena. Common examples include imagery and digital terrain models. An HLS geospatial entity type.	
25	DHS Region		X		Area of Interest	Administrative region defined by DHS.	DHS
26	DHS Sector		X		Area of Interest	Sub-division of administrative region defined by DHS.	DHS
27	Direction	Linear Measure	X			The relationship by which the alignment or orientation of any position with respect to any other position is established.	
28	Distance	Linear Measure	X			A linear extent of space between two points. The travel distance between two places.	

	Name	Subtype of	Property	Component of	Instance of	Definition	Reference
29	Facility				Feature Collection, Structure	Geospatial representations of surface, above surface and sub-surface structures, and installed heating, ventilation and air conditioning (HVAC), plumbing, electrical, security systems, and other installed infrastructure for any facility identified as a critical or key asset. Also, associated real property (e.g., rights of way, easements, etc) A category of HLS Framework Data.	
30	Feature	Geospatial Entity				An abstraction of a real world phenomenon. A geographic feature with a location relative to the earth. Usually represented by vector data (points, lines and polygons) with geometry, topology and descriptive properties (attributes). An HLS geospatial entity type.	
31	Geodetic Control				Feature	Points of known precise location on the earth (latitude, longitude, elevation) as established through surveying or photogrammetric methods. Control points that are expressed in a common coordinate reference system (e.g., WGS - 1984). Geodetic control is required to accurately register spatial data. The National Spatial Reference System (NSRS) is the fundamental geodetic control for the United States. A subcategory of HLS Framework Data under the Base category.	
32	Geolink		X			A geo-enabled hyperlink (URI). This link may reference any geospatial-temporal resource (data/service). e.g., A geolink may reference a Location or a particular Feature. Geolinks provide the means to link between digital text/voice terms and the geospatial realm.	



	<b>Name</b>	<b>Subtype of</b>	<b>Property</b>	<b>Component of</b>	<b>Instance of</b>	<b>Definition</b>	<b>Reference</b>
33	Geometry		X	Geospatial Entity		The geometric properties of geospatial data.	
34	Geoname		X			The name associated with a specific geographic location/place. A place name. e.g., Trafalgar Square, White House, Washington, D.C. Typically available through a Gazetteer or Location-based Directory.	
35	Geospatial Annotation		X		Geolink	Link appended or otherwise associated with a document, message, or other communication providing a link to a geospatially-normalized description of a geospatial element referenced in the text.	
36	Geospatial Coordinate	Geometry Primitive	X		Point	The coordinates of a geospatial position expressed in a geospatial coordinate reference system, e.g., geographic – latitude, longitude, and elevation.	ISO, OGC
37	Geospatial Entity		X			The basic data types for HLS geospatial data that are used in geospatial services. Includes: Location, Feature, Coverage, Observation, Route, Mobile Object and Structure.	
38	Geospatial Extent		X			The extent of a geospatial entity type, as defined by a minimum bounding rectangle or polygon.	
39	Height		X		Distance	Value and unit of measure for the size of an object in the z-axis.	

	Name	Subtype of	Property	Component of	Instance of	Definition	Reference
40	Imagery	Coverage				A graphic representation of an object or scene, typically produced by an optical or digital electronic device. Common examples include remotely sensed data (e.g., satellite data), scanned data, and photographs. An image is normally stored as a raster data set of binary or integer values that represent the intensity of reflected light, heat, or other range of values on the electromagnetic spectrum. An HLS Framework Data category. A subtype of coverage.	
41	Jurisdiction		X		Area of Interest	Area of public safety responsibility.	
42	Length		X		Distance	Value and unit of measure for the size of an object in the x or y-axis.	
43	Linear Measure					Root class for defining classes used to expressed values measured based on a linear scale.	
44	Location Reference		X			General purpose, unique identification of a geospatial entity.	

	Name	Subtype of	Property	Component of	Instance of	Definition	Reference
45	Location Object	Geospatial Entity				Any place or site on the earth of interest in the HLS mission. A position with geospatial coordinates. Generally, as used in HLS business, a place, area or point of interest. Also, the location of a person, thing or phenomenon referenced to the earth. Includes Absolute Location and Relative Location. An HLS geospatial entity type. As defined by OGC, the extensible, abstract data type for all expressions of location that can be used by geospatial applications and services to specify the location of a target, asset, conveyance, person, etc. As used in location based service (LBS), a location is the root of a semantic tree that includes a Point, Position, Address, and Point of Interest as its subtypes.	
46	Map (and Chart)				Feature Collection	Generally, an annotated, symbolized graphical representation of select geospatial-temporal data for an intended purpose. Also, a map created by an orthorectified image. May contain annotations and marginalia. May be in hardcopy or softcopy form. May reference a Report or Plan. May be referenced by or embedded in a Report or Plan. A subcategory of HLS Framework Data under the Geospatial Product category.	
47	Mile Marker		X		Relative Location	Distance along a US limited access highway or railroad from a well-defined reference point. Mile marker signs are typically located along the side of each direction of the highway at least every mile; in some cases, every tenth of a mile.	

	Name	Subtype of	Property	Component of	Instance of	Definition	Reference
48	Mission Feature		X		Location Object	Dynamic or ad hoc location or area of interest pertinent to an organizational mission or event.	
49	Mobile Object	Geospatial Entity	X			Any object of interest that moves, or is otherwise dynamic, and is monitored and/or tracked. A person, good, conveyance or asset. Mobile objects have location, time, identity, activity, status, and optionally speed and direction of motion. Historical records of location/time/identity/activity/status/speed/direction may be recorded for tracking purposes. An HLS geospatial entity type.	
50	Municipal Subdivision		X	Address		Borough or other sub-division within a municipality.	
51	National Affiliation		X		Country	Relates a person, good or asset to a nation. A property of HLS Framework Data under Person, Goods or Asset data.	
52	National Map, The				Feature Collection	A seamless, continuously maintained set of Base data for the U.S., consisting of both feature and coverage data that meet consistent National standards. The National Map (TNM) will serve as the central portal for the sharing and dissemination of critical geospatial information. The 'Base Map' for HLS operations.	
53	Nautical Navigation				Feature Collection	Data which pertains to nautical navigation, like waterways, ports, harbors, bridges, navigation aids, traffic, traffic control, (electronic) navigation guidance, fixed hazards and dynamic hazards. A subcategory of HLS Framework Data under the Base category.	NOAA

	Name	Subtype of	Property	Component of	Instance of	Definition	Reference
54	Network					Includes the following type of networks: terrorist, hostile interest affiliation, road transportation (road, air, rail, and sea), logistical, energy distribution, communications, water supply, food distribution, emergency response, financial, sociological, etc.	
55	Observation	Geospatial Entity				Data derived from sensor measurement, human observation, and other observation and measurement techniques. An HLS geospatial entity type.	
56	Place Name		X	Address		Named location such as a country, municipality, or other well-defined, well-known area.	OGC
57	Place of Birth		X		Location	Location associated with a person's birth. An instance of Location.	
58	Place of Destination		X		Location	Shipping or travel destination. An instance of Location.	
59	Place of Interest	Absolute Location				May be represented as a point (i.e., point of interest) or an area (i.e., area of interest). A subtype of Absolute Location.	
60	Place of Manufacture		X		Location	Place where a good is manufactured. An instance of Location.	
61	Place of Origin		X		Location	Shipping or travel origin. An instance of Location.	
62	Point	Geometry Primitive	X			A location expressed as a set of coordinates within a defined coordinate reference system.	

	Name	Subtype of	Property	Component of	Instance of	Definition	Reference
63	Point of Interest	Place of Interest				A place or entity with a fixed position that may be used as a reference point or a target. A location of interest, represented as a point in a known coordinate reference system, with metadata describing the location. May also contain name, type, category, address, phone number and other information about a place. A subtype of Place of Interest. (Also see Place of Interest)	
64	Position		X			Any observed or calculated position, in the broad semantic context of the use of the term. Primarily contains a geographic position and quality of position. The geospatial coordinates, accuracy and precision of a point or vertices of a line or polygon.	
65	Postal Address	Address	X			Mailing address (may be specified as a street address, rural route, or post office box).	USPS
66	Postal Code		X	Address		National numbering system used to deliver mail. Can be used to identify a geographic area.	
67	Raster				Coverage	An abstraction of the real world where spatial data is expressed as a matrix of cells or pixels, with spatial position implicit in the ordering of the pixels. Unlike vector data, there are no implicit topological relationships. Coverages are often represented in raster form. e.g., imagery.	
68	Relative Location	Location				A location stated as a relative position with respect to an Absolute Location (i.e., address, position, feature geometry, e.g., point, or Place of Interest). A subtype of HLS geospatial entity type Location.	
69	Relative Locator	Relative Location	X			Range and bearing from a fixed, well-known point to the target location.	

	Name	Subtype of	Property	Component of	Instance of	Definition	Reference
70	Route	Geospatial Entity				The representation of a route for navigation purposes. The route's overall characteristics, such as its start point, waypoints, end point, transportation type, total distance, travel time and bounding box. Route geometry is defined as a list of geographic positions along the route, ordered in the sequence of planned travel, starting with the position of the route's origin and ending with the position of the route's destination, including waypoints. Also, a list of travel instructions consisting of turn-by-turn directions and advisories along the route, ordered in sequence of their occurrence. Routes are derived from navigable transportation networks. An HLS geospatial entity type.	
71	Secondary Address		X	Address		Information regarding a location within a building or structure (i.e. Suite 410).	
72	Spatial Reference System		X			A function that associates locations in space to geometries of coordinate tuples in a mathematical space, usually a real valued coordinate vector space, and conversely associates coordinate values and geometries to locations in the real world, e.g., coordinate reference systems, linear reference systems.	
73	Spatial Relationship		X			The relationship between two objects as described in geospatial terms (distance, coordinates, etc). Also topological relationships, e.g., adjacent, connected, surrounded by, etc.	

	Name	Subtype of	Property	Component of	Instance of	Definition	Reference
74	Speed		X	Velocity		The rate of motion or a measure of the rate of motion. Distance traveled over an interval of time.	
75	State		X	Address		Identifier for a state, province, or other national subdivision. Implemented as a name, abbreviation, or code.	
76	State Abbreviation		X		State	Standard (e.g., USPS Publication 28) abbreviation for a state.	USPS
77	State Code		X		State	Registered code value for a state (e.g., FIPS 55).	FIPS
78	State Name		X		State	Full name of a state.	
79	Street Address		X	Address		Structured street address. Example properties include building number, fractional number, prefix, street name, postfix, and direction.	FGDC, USPS, OGC, ISO
80	Street Intersection		X	Address		Intersection of one or more streets identified by name.	FGDC, USPS, OGC, ISO
81	Structure	Geospatial Entity				The geospatial representation of a man-made structure, e.g., building or bridge. An HLS geospatial entity type.	
82	Telecom Equipment Locator		X		Address	Information regarding the location of a piece of telecom equipment; may be a partial address.	TIA
83	Temporal Reference System		X			A function that associates time to a coordinate (usually one dimensional points and intervals) and conversely associates coordinate geometries to real world time.	
84	Temporal Relationship		X			The relationship between two events with respect to time; or pertaining to a specified period of time.	



	Name	Subtype of	Property	Component of	Instance of	Definition	Reference
85	Track			Mobile Object		A sequence of observations and/or predictions concerning the location/time/identity/activity/status for persons, goods, assets, conveyances or any other mobile objects for a given period of time (current, historical and planned/projected). Optionally, to also represent speed and direction of motion. A subcategory of HLS Framework Data under Person, Goods, Conveyance or Asset.	
86	Transshipment Point				Point of Interest	An intermediate location (waypoint) in a shipping route for goods and cargo where the means of conveyance changes.	
87	Velocity		X			Distance traveled in a unit of time and the direction of travel.	
88	Weather				Coverage, Feature Collection	Weather conditions at specified locations e.g., hindcasts, nowcasts, forecasts and climate data. A category of HLS framework data. Also might enter the HLS environment as Auxiliary data.	
89	Width	Linear Measure	X			Value and unit of measure for the size of an object in the x or y-axis.	
90	Zip Code		X		Postal Code	US Postal Service postal code.	USPS

### 3.0 ACRONYMS

Acronym	Definition
DHS	Department of Homeland Security
EA	Enterprise Architecture
FAA	Federal Aviation Administration
FGDC	Federal Geographic Data Committee
FIPS	Federal Information Processing Standards
HLS	Homeland Security
HVAC	Heating, Ventilation & Air Conditioning
ISO	International Standardization for Organization
LBS	Location Based Service
NGA	National Geospatial-Intelligence Agency
NSRS	National Spatial Reference System
NOAA	National Oceanic and Atmospheric Administration
OGC	Open GIS Consortium
TIA	Telecommunications Industry Association
TNM	The National Map
URI	Uniform Resource Identifier
USPS	United States Postal Service
UTM	Universal Transverse Mercator
WGS-84	World Geodetic Survey 1984