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# GIS Standard Manual

Engineering Department

Facilities Engineering Services Section  
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**Fermi National Accelerator Laboratory**

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The primary objective at Fermilab is that operations be conducted in a safe, deliberate and controlled manner. The role of the FESS/Engineering (FESS/E) procedures is to provide the best knowledge available in order to accomplish the task.

This GIS Standard Manual provides a compilation of the FESS/Engineering policies and procedures specific to the utilization of in-house projects and projects developed by outside A/E Consultants.

This GIS Standard Manual provides guidance for the A/E Consultant services and is intended as a supplement to the A/E subcontract. In all cases the A/E subcontract shall take precedence over the procedures in this standard.

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**I. INTRODUCTION****1.1 Purpose:**

Compliance to these standards will facilitate data sharing, integration and compatibility within the Fermilab's GIS system. The objective of this standard is to provide guidelines for database development and editing existing databases and shapefiles within Fermilab and it's A/E subcontractors. All GIS related features, entities, etc. shall be generated in Environmental Systems Research Institute (ESRI) ArcGIS software, unless directed otherwise by the Fermilab's GIS Coordinator.

**1.2 Contact Information:**

Inquiries should be directed to:

Mr. Jim Niehoff  
Fermi National Accelerator Laboratory  
P.O. Box 500, MS-214  
Batavia, IL 60510-0500

Alt. Joe Pygott

630.840.3856  
[niehoff@fnal.gov](mailto:niehoff@fnal.gov)

630.840.3305  
[pygott@fnal.gov](mailto:pygott@fnal.gov)

**1.3 Reference:**

The following policies/procedures complement the GIS Standards and should be utilized.

A/E Consultant Handbook  
Design Document Guide  
Fermilab Engineering Standards  
CAD Standards Manual



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## GIS STANDARDS

## COORDINATE SYSTEM

### Section II

### **II. COORDINATE SYSTEM**

All data layers developed by the consultant and used on a project at Fermilab site must include the following:

#### **2.1 Projected Coordinate System:**

Name: Fermi Coordinate  
Projected: Local  
Units: Feet  
Easting: 100,000  
Northing: 100,000  
Azimuth: 38.2800039694444370  
Datum: WGS 1984

#### **2.2 State Coordinate System:**

State plane: Illinois Zone East  
FIPS Zone: 1209  
Units: US Survey Feet  
Datum: North American 1983



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## GIS STANDARDS

## METADATA

### III METADATA

#### 3.1 Metadata Format:

All data layers must have metadata that conforms to the Federal Geographic Data Committee Standards (FGDC)

Further information can be obtained at: <http://www.fgdc.gov>

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#### **IV DATABASE FORMATS**

##### **4.1 General:**

There are two primary components of data, geographic (geometry) and informational (attribute) data.

##### **4.2 Database:**

Fermilab utilizes Oracle with ESRI's ArcSDE serving as the gateway for managing the geographic data in the relational database management system. The database used should be ESRI's Shape files and/or ESRI's geopersonal database.

It is highly recommended that initial plans are reviewed with Fermilab's GIS Coordinator before investing significant planning for a particular database. This includes databases that seem very simple to implement (example: Access databases or Excel spreadsheets).

##### **4.3 Format:**

ESRI's ArcGIS (ArcEditor) format with no compression or AutoCAD dxf files. Format should include ESRI's shape file format and/or geopersonal database.



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## GIS STANDARDS

## DELIVERABLES

### V DELIEVERABLES

#### 5.1 Acceptable Files:

Final deliverable files should include MXD (Map files), ESRI's shape files and/or ESRI's geo-personal-database. No ArcINFO coverage files will be accepted.

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V
















## GIS STANDARDS

## CURRENT LAYERS

### VI CURRENT LAYERS

### Section VI












<u>UTILITIES</u> <u>Feature Class Name &amp; Color Code</u>	<u>Description</u>
Feeder (High Voltage) -Red- 	The components of an electrical distribution system, including ductbank, cable, switches, manholes and transformers over 480v.
Elec (Low Voltage) -Red- 	The components of electrical exterior, typically from a building facility or step-down transformer/supply power to exterior lights, pumps/motors, control equipment, etc. under 480v.
Comm (Data) -Orange- 	The components of telephone close circuit TV, FIRUS, beam control/timing links, computing data, including manholes and hand holes. Typical material consists of fiber optic, copper cable, and coax cabling.
Gas -Yellow- 	The components of a natural gas distribution system consisting of pipes, valves, manholes, meters, pressure regulatory devices, etc.
ICW -Cyan- 	The components of an industrial cooling water system consisting of pipes, fire hydrants, post indicating valves, etc.
DWS -Blue- 	The components of a domestic potable water system containing pipes, buffalo valve boxes, flushing hydrants (fire hydrants in village area), etc.
Sewer -Green- 	The components of a waste water (sanitary sewer) collection system including pipes, valves, catch basins, lift stations, etc.
Storm and Pond Transfer Lines 	The components of a storm drainage collection system including pipes, catch basin, etc.
Overhead Conductors 	The components of the overhead power distribution system including switches, fuses, cutouts, and pole transformers. Typical 480v in village and along Eola Rd. 345kv to master sub-station and Kautz Rd. sub-station.
Power Poles 	The components of poles to support the overhead power distribution system and various communications systems.
Cathodic 	The components of the cathodic anodes, wire, and power are associated with the corrosion protection for the fix target beam (buried) pipes.



**GIS STANDARDS**

**CURRENT LAYERS**

**Section VI**

<p><b>Other</b> <b>Feature Class Name &amp; Color Code</b></p>	<p><b>Description</b></p>
<p>FIMS &amp; Trailers (Building Identification Number) </p>	<p>The components of the DOE facilities infrastructure management system database, tracking specific laboratory site and building/trailer identification number and associated attribute data.</p>
<p>Enclosures (Antiproton, Main Injector, NuMI, Main Ring ,Fix Target) </p>	<p>The components of the underground tunnel/enclosures housing the programmatic magnet beam components to conduct collision and fix target experiments.</p>
<p>Roads </p>	<p>The components of the Fermilab site providing linear feet of road, type of road, primary, etc..</p>
<p>Parking Lots </p>	<p>The components of parking area and type of pavement</p>
<p>ELM </p>	<p>The components of Environmental Land Use Management for the Fermilab site.</p>
<p>Agriculture </p>	<p>The components of leased areas for agriculture</p>
<p>Survey Monuments </p>	<p>The components of permanent monuments for the Fermilab alignment department</p>
<p>Soil Borings </p>	<p>The components of the soil boring records of the Fermilab site</p>
<p>Easement</p>	<p>The components of easements, example City of Batavia power and substations, AboveNET fiber Optic, etc.</p>
<p>Ponds &amp; Streams </p>	<p>The components of the surface water, streams, drainage ditches, etc.</p>
<p>Street Lights </p>	<p>The components of street lights</p>
<p>Site Boundary </p>	<p>The components of the site boundary for the Fermilab site.</p>



**VII SAMPLE GIS DATA REQUEST FORM**

**GIS Digital Data Request Form (SAMPLE)**

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Department/Organization: Phone: \_\_\_\_\_

**Available Layers**

- |                              |                     |
|------------------------------|---------------------|
| Agriculture                  | Land use (ELM)      |
| Buildings (FIMS)             | Overhead Conductors |
| Cathodic Protection          | Parking Lots        |
| Communication                | Power Poles         |
| Contours                     | Railroad            |
| County boundary              | Site Boundary       |
| Division/Sections properties | Sewer               |
| Domestic Water Service       | Streets/Roads       |
| Easements                    | Street lighting     |
| Enclosures (Tunnels)         | Soil Borings        |
| Feeder (Power)               | Survey Monuments    |
| Natural Gas Service          | Storm/Pond Transfer |
| Hydrology (creeks/streams)   | Aerial Photo        |
| Hydrology (ponds)            | Other _____         |
| Industrial Cooling Water     | _____               |

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**Additional Comments:**