



# **PLTS GIS Data ReViewer 4.1**

*An ESRI® White Paper • December 2002*

Copyright © 2002 ESRI  
All rights reserved.  
Printed in the United States of America.

The information contained in this document is the exclusive property of ESRI. This work is protected under United States copyright law and other international copyright treaties and conventions. No part of this work may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or by any information storage or retrieval system, except as expressly permitted in writing by ESRI. All requests should be sent to Attention: Contracts Manager, ESRI, 380 New York Street, Redlands, CA 92373-8100, USA.

The information contained in this document is subject to change without notice.

#### **U.S. GOVERNMENT RESTRICTED/LIMITED RIGHTS**

Any software, documentation, and/or data delivered hereunder is subject to the terms of the License Agreement. In no event shall the U.S. Government acquire greater than RESTRICTED/LIMITED RIGHTS. At a minimum, use, duplication, or disclosure by the U.S. Government is subject to restrictions as set forth in FAR §52.227-14 Alternates I, II, and III (JUN 1987); FAR §52.227-19 (JUN 1987) and/or FAR §12.211/12.212 (Commercial Technical Data/Computer Software); and DFARS §252.227-7015 (NOV 1995) (Technical Data) and/or DFARS §227.7202 (Computer Software), as applicable. Contractor/Manufacturer is ESRI, 380 New York Street, Redlands, CA 92373-8100, USA.

@esri.com, 3D Analyst, ADF, AML, ARC/INFO, ArcAtlas, ArcCAD, ArcCatalog, ArcCOGO, ArcData, ArcDoc, ArcEdit, ArcEditor, ArcEurope, ArcExplorer, ArcExpress, ArcFM, ArcGIS, ArcGrid, ArcIMS, ArcInfo Librarian, ArcInfo, ArcInfo—Professional GIS, ArcInfo—The World's GIS, ArcLocation, ArcLogistics, ArcMap, ArcNetwork, *ArcNews*, ArcObjects, ArcOpen, ArcPad, ArcPlot, ArcPress, ArcQuest, ArcReader, ArcScan, ArcScene, ArcSchool, ArcSDE, ArcSdl, ArcStorm, ArcSurvey, ArcTIN, ArcToolbox, ArcTools, ArcUSA, *ArcUser*, ArcView, ArcVoyager, *ArcWatch*, ArcWeb, ArcWorld, Atlas GIS, AtlasWare, Avenue, BusinessMAP, Database Integrator, DBI Kit, ESRI, ESRI—Team GIS, ESRI—The GIS People, FormEdit, Geographic Design System, Geography Matters, Geography Network, GIS by ESRI, GIS Day, GIS for Everyone, GISData Server, *InsiteMAP*, MapBeans, MapCafé, MapObjects, ModelBuilder, MOLE, NetEngine, PC ARC/INFO, PC ARCPLOT, PC ARCSHELL, PC DATA CONVERSION, PC STARTER KIT, PC TABLES, PC ARCCREDIT, PC NETWORK, PC OVERLAY, Rent-a-Tech, RouteMAP, SDE, SML, Spatial Database Engine, StreetEditor, StreetMap, TABLES, the ARC/INFO logo, the ArcAtlas logo, the ArcCAD logo, the ArcCAD WorkBench logo, the ArcCOGO logo, the ArcData logo, the ArcData Online logo, the ArcEdit logo, the ArcEurope logo, the ArcExplorer logo, the ArcExpress logo, the ArcFM logo, the ArcFM Viewer logo, the ArcGIS logo, the ArcGrid logo, the ArcIMS logo, the ArcInfo logo, the ArcLogistics Route logo, the ArcNetwork logo, the ArcPad logo, the ArcPlot logo, the ArcPress for ArcView logo, the ArcPress logo, the ArcScan logo, the ArcScene logo, the ArcSDE CAD Client logo, the ArcSDE logo, the ArcStorm logo, the ArcTIN logo, the ArcTools logo, the ArcUSA logo, the ArcView 3D Analyst logo, the ArcView Business Analyst logo, the ArcView Data Publisher logo, the ArcView GIS logo, the ArcView Image Analysis logo, the ArcView Internet Map Server logo, the ArcView logo, the ArcView Network Analyst logo, the ArcView Spatial Analyst logo, the ArcView StreetMap 2000 logo, the ArcView StreetMap logo, the ArcView Tracking Analyst logo, the ArcWorld logo, the Atlas GIS logo, the Avenue logo, the BusinessMAP logo, the Data Automation Kit logo, the Digital Chart of the World logo, the ESRI Data logo, the ESRI globe logo, the ESRI Press logo, the Geography Network logo, the MapCafé logo, the MapObjects Internet Map Server logo, the MapObjects logo, the MOLE logo, the NetEngine logo, the PC ARC/INFO logo, the Production Line Tool Set logo, the RouteMAP IMS logo, the RouteMAP logo, the SDE logo, The World's Leading Desktop GIS, *Water Writes*, www.esri.com, www.geographynetwork.com, www.gisday.com, and Your Personal Geographic Information System are trademarks, registered trademarks, or service marks of ESRI in the United States, the European Community, or certain other jurisdictions.

Other companies and products mentioned herein are trademarks or registered trademarks of their respective trademark owners.

---

# PLTS GIS Data ReViewer 4.1

## An ESRI White Paper

<b>Contents</b>	<b>Page</b>
Introduction.....	1
GIS Data ReViewer 4.1 .....	2
Assessing Data.....	2
GIS Data ReViewer .....	2
Error Table.....	3
Logging Errors Into the Error Table .....	4
Automated Checks .....	5
Batch Validation for Attribution Rules.....	5
Topology Checks .....	5
Spatial Analysis Checks.....	6
Visual Quality Control.....	6
Results Analysis.....	7
Error Table Workflow and History.....	7
Review Data.....	8
Correct Data .....	8
Verify Corrections .....	8
Summary.....	9
Future Development.....	9



---

# PLTS GIS Data ReViewer 4.1

**Introduction** Large and small, data acquisition, manipulation, and creation projects have a vital need to review, validate, and maintain data quality throughout the project. Being able to monitor and carry out these efforts in a way that does not encumber the production process and that is tightly integrated with the software has traditionally been the challenge to data quality control.

GIS Data ReViewer is a custom product developed for the ArcMap™ application by ESRI's Production Line Tool Sets (PLTS) Group to support visual review and batch validation of data. ArcMap is an application within the ArcGIS™ Desktop products (ArcView®, ArcEditor™, and ArcInfo™). Composed of a series of buttons, tools, and context menus, GIS Data ReViewer is used to identify where corrections, additions, and deletions must be made to the spatial data and its attributes. Errors are logged into a table that stores all the necessary information for historical tracking.

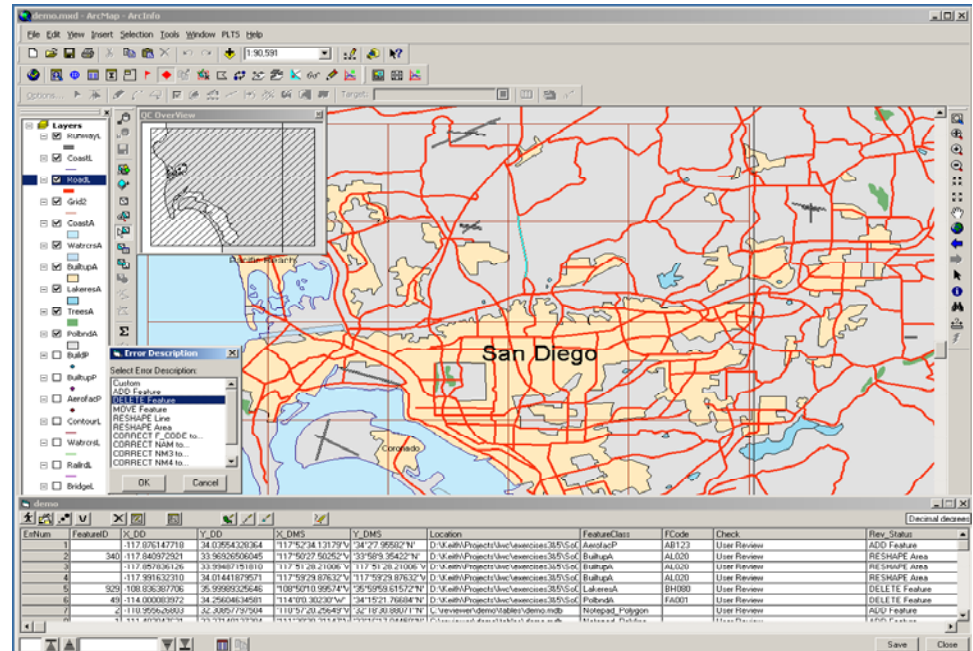
GIS Data ReViewer is a data quality control management application that provides an integration framework for ArcGIS multiuser geodatabase environments. It simplifies many aspects of automated and visual spatial data quality control (QC) tasks, resulting in significant error reduction, consolidation, and elimination—all done using a graphical user interface (GUI), thus reducing the need for checkplots. It also eliminates the paper trail associated with error files by storing data error information in an electronic file, thus improving and organizing the data review effort.

GIS Data ReViewer provides tools for selecting and editing, performing spatial analysis, creating QC Grids, finding overlapping features, creating error tables, capturing and digitizing missing features, and making topology checks as well as many other QC processes. A detailed error log is automatically recorded after each data integrity check to verify that all discrepancies are resolved. This information can be supplemented with comments and notes to provide even richer error log documentation. You can use GIS Data ReViewer integration points within the ArcMap application to leverage existing off-the-shelf solutions or to embed GIS Data ReViewer functionality in new applications.

This paper introduces the key features and discusses the intricacies and the framework of GIS Data ReViewer. It also explores the key integration points with ArcMap as well as topics of configuration and customization. For a complete discussion of how to configure and use GIS Data ReViewer, refer to the documentation and help system provided with GIS Data ReViewer.



GIS Data ReViewer can be used to review data that is in either a personal or an ArcSDE® geodatabase. Coverages or shapefile data can be reviewed using the visual review functionality of GIS Data ReViewer.



**Error Table**

Errors identified either by the automated or visual QC process are stored in the GIS Data ReViewer error table. GIS Data ReViewer records error information associated with each erroneous feature. Click on a record in the error table, and the display zooms to the feature in question.

The error table includes the following information.

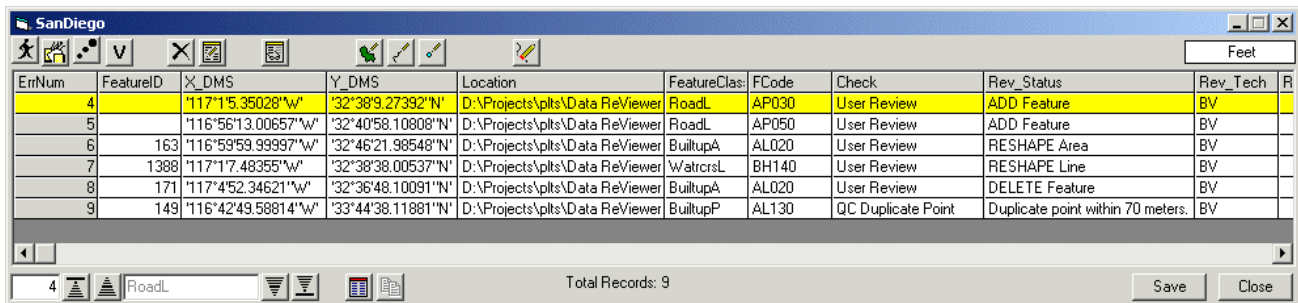
Error Table Field	Description
ErrNum	Sequential error number
FeatureID	Feature ID of record that contains the error
Y_DD	Y-coordinate in decimal degrees
X_DD	X-coordinate in decimal degrees
Y_DMS	Y-coordinate in degrees, minutes, and seconds
X_DMS	X-coordinate in degrees, minutes, and seconds
X	Y-coordinate in native coordinate system
Y	X-coordinate in native coordinate system
Location	Location of the data on the system
Feature Class	Feature class name that contains the error
FCode	Feature code of the record
Check	Name of the tool that created the error entry

Error Table Field	Description
Rev_status	Error description
Rev_tech	Reviewer's name or initials
Rev_date	Date the error was entered into the table
Cor_status	Correction status for the error
Cor_tech	Correction technician's name or initials
Cor_date	Date the error was corrected
Ver_status	Verification status for the error
Ver_tech	Verification of technician's name or initials
Ver_date	Date the correction was verified

A GIS Data ReViewer session can have more than one error table. A backup table is a copy of the error table. Although you cannot edit the backup table, you can copy from it.

If multiple technicians are reviewing the data, errors can be consolidated into one database using the import functionality available in GIS Data ReViewer.

Errors in the error table can be visited by simply clicking the error record.

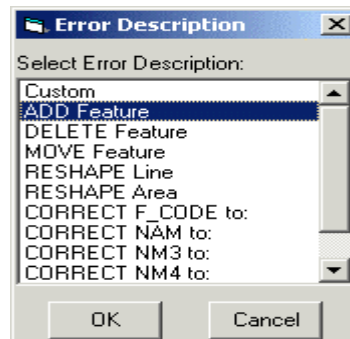


### Logging Errors Into the Error Table

Errors in the data can be logged into the error table through a variety of ways. The error table stores information about the data record and the associated error. Automated checks log error information directly into the error table while visual checks require user input of error information.

- By selecting the feature and clicking the **Commit Error** button, you can choose an error message from the error description table or enter your own error description. You can also add customized project-specific error description messages to the Error Description table.





- Missing features can be added to the error table by using the **Flag Missing Feature** button.
- You can duplicate error calls by clicking the **Duplicate Error** button, then clicking in the data to view the location where the error exists.
- Multiple features can be added as errors to the error table using the **User Review** button.

### Automated Checks

Automated QC checks can reduce the amount of labor required in evaluating data. Automated QC checks are consistent tests run against the data to ensure conformance to specifications. GIS Data ReViewer provides automated checks for feature attribution, topology, and spatial analysis.

### *Batch Validation for Attribution Rules*

Using GIS Data ReViewer, data attributes can be checked against coded value and range domains, connectivity rules defined in the geodatabase, and the PLTS knowledge base. The PLTS knowledge base is a database of additional rules to which the data must adhere. The rules can be configured through valid value tables (VVTs) or condition tables (CNTs). VVTs extend the capabilities of domains because they are lists of multiple attributes specifying valid code combinations for features. CNTs check attributes that are SQL queries. One VVT and CNT may be configured for each feature class. Once the PLTS knowledge base is configured, VVTs and CNTs are stored in the geodatabase where the data resides.

The batch validation can check a selected set of features or all features that are loaded in the ArcMap table of contents. Errors in the data that are identified by the batch validation are automatically logged into the error table.

### *Topology Checks*

In the process of digitizing features, geometric anomalies that compromise the topological fabric of a feature class may be introduced into the data. GIS Data ReViewer has topological checks to validate simple geometry. Topological checks include overlapping polygons within the same feature class, overlapping lines within the same feature class, duplicate polygon vertices, duplicate line vertices, self-crossing nonintersecting lines, nonintersecting lines within a feature class, and minimum length lines and area polygons.

The topology checks can be run against a selected set of features or all features that are loaded in the ArcMap table of contents. Errors in the data that are identified by the topology validation are automatically logged into the error table.

### *Spatial Analysis Checks*

Spatial analysis checks available in GIS Data ReViewer include

- Minimum area checks to identify polygons smaller than a specified size criteria
- Duplicate point checks to identify points within the same feature class that are located within a specified tolerance of one another
- Point on Poly checks to identify point features that fall within polygon features
- Poly on Poly checks to identify overlapping polygons

To input the appropriate feature classes and tolerances for the spatial analysis checks, you must know the database specifications. Any records that meet the criteria for the spatial checks can either be automatically logged into the error table or visited and logged manually.

### *Visual Quality Control*

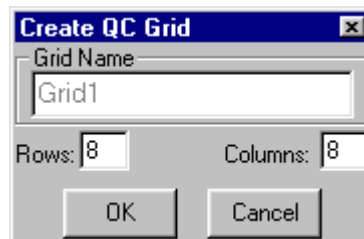
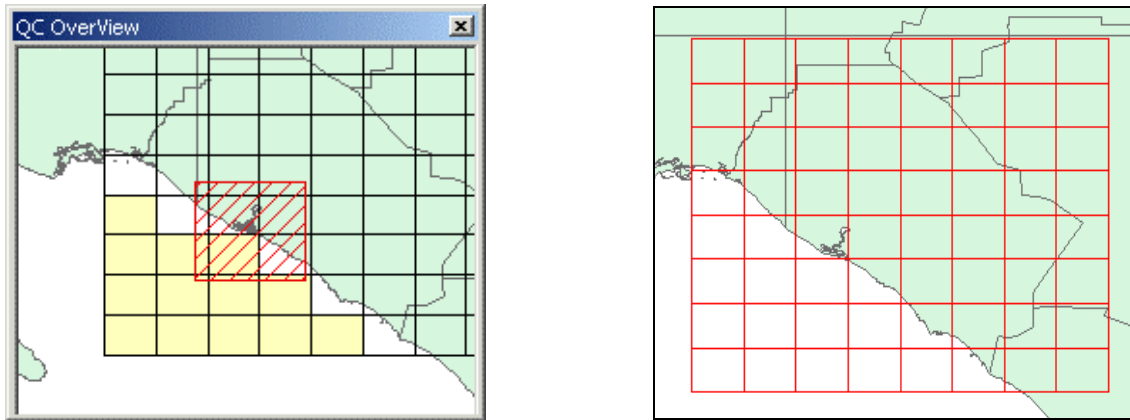
Visual QC refers to manually reviewing the data for anomalies. This process can be used to evaluate data for

- Completeness (no missing features)
- Positional accuracy to source data
- Correct attribution
- Annotation placement, rotation, and spelling
- Edgematching between map sheets/units

Traditionally, the visual QC process has been done using checkplots. GIS Data ReViewer offers an on-screen review of the data. Rendering data features with specific symbols can differentiate features and help detect miscoded features. Problems that are discovered by comparing source material to finished product can be logged into the GIS Data ReViewer error table, then tracked for correction and verification.

To systematically track the visual review process, GIS Data ReViewer allows you to create a QC Grid over the data. Each grid cell can be updated for status indicating that the cell has been reviewed. The QC OverView window is available for use as a frame of reference.

J-9007



Results Analysis Basic reporting capabilities in GIS Data ReViewer include

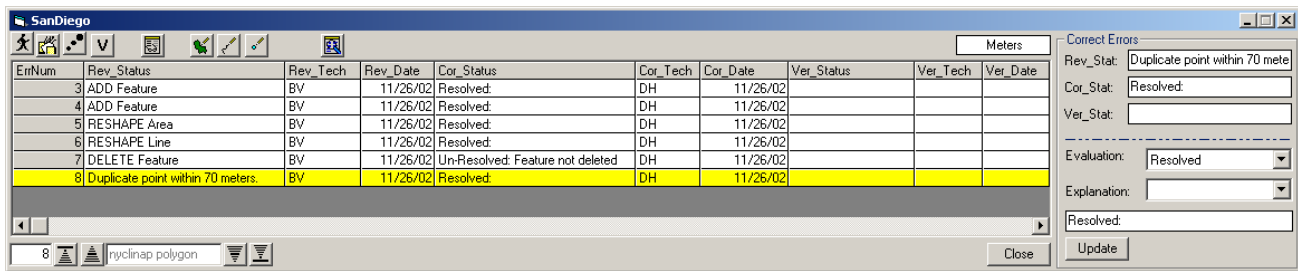
- Feature counts summarizing the number of records for each feature class loaded in the ArcMap table of contents
- A point feature class that can be generated from the errors logged into the error table, providing visual reference for the analysis of error location or concentration
- A summary that reports the number of errors for each feature class sorted by the type of check and the revision status

### ***Error Table Workflow and History***

Tracking historical information in the review and correction process is an important element offered by GIS Data ReViewer. Whether the scenario of data review is your internal QC, a review between you and your customer, or a review between you and your subcontractors, the GIS Data ReViewer workflow can be applied. The detection, correction, and verification of errors are recorded in the GIS Data ReViewer error table, thereby facilitating communication between users.

**Review Data** The data is inspected using the GIS Data ReViewer automated and visual functionality. The revision status (**Rev\_Status**), the QC technician's name (**Rev\_Tech**), and the review date (**Rev\_Date**) are logged into the error table. If multiple people are reviewing the data, error information can be consolidated into one database using the import functionality. The error information is provided to the person or organization responsible for making corrections to the data.

**Correct Data** The error information is imported into a GIS Data ReViewer session for corrections. You can step through each record in the error table and make the appropriate correction. The correction status (**Cor\_Status**) is updated indicating the corrective action taken. The correction technician's name (**Cor\_Tech**) and date of the correction (**Cor\_Date**) are automatically stored in the error table.

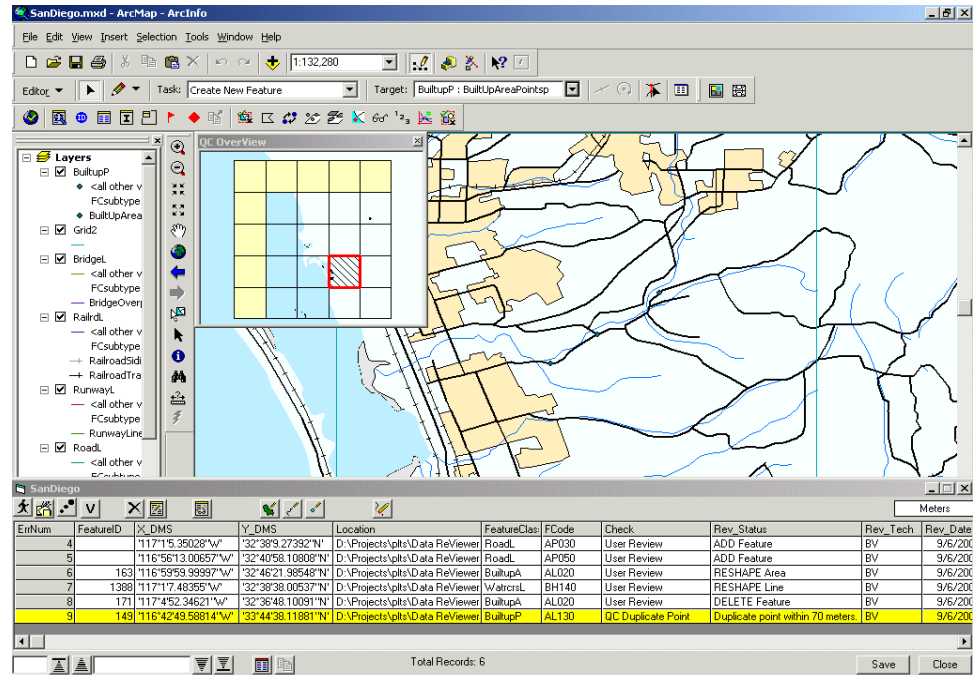


**Verify Corrections** Corrected data and the updated error table are returned to the group or individual who conducted the original review. Each error call can be revisited to verify that the appropriate corrective actions were applied. The verification status (**Ver\_Status**) can be updated to reflect this information. Again, the name of the technician (**Ver\_Tech**) and date of verification (**Ver\_Date**) are automatically populated.

J-9007

## Summary

GIS Data ReViewer is an integral part of the quality assurance process, serving as a quality control tool for both automated and visual database validation.



GIS Data ReViewer enables you to do the following:

- Perform batch validation of a geodatabase.
- Locate errors in data capture/attribution with a variety of tools.
- Log error information easily and accurately.
- Eliminate the paper trail associated with error files by storing data error information in one database.
- Make and log corrections to the data.
- Verify corrections made to the data.

## Future Development

Several new features will be included in future releases of the PLTS GIS Data ReViewer. These include the ability to generate a random sample and calculate the frequency on an attribute along with enhancements to some existing functionality.

The sampling functionality is based on your specifying either a percentage or a number of features to select from a coverage, shapefile, or feature class. The random sample is generated and saved to a sample table in the GIS Data ReViewer session. You are then presented with a sample table browser, allowing the features to be visited one at a time. When an error is identified, it can be committed directly to the current error table, and the

record is marked in the sample table. This feature will allow you to have a permanent record of the sample taken and will provide you with an efficient method to review the sampled features.

Summarizing a particular attribute field for a data delivery is a useful indicator of possible data issues. The new frequency tool in GIS Data ReViewer will provide the ability to create a summary of values for an attribute in the data. In addition, spatial checks will be able to be run on a selected set of features. Duplicate point checking can be conducted between two data layers, and column visibility in the error table as well as the working extent will be preserved between sessions. A tool for zooming to an  $x,y$  location will also be added.



For more than 30 years ESRI has been helping people manage and analyze geographic information. ESRI offers a framework for implementing GIS technology in any organization with a seamless link from personal GIS on the desktop to enterprisewide GIS client/server and data management systems. ESRI GIS solutions are flexible and can be customized to meet the needs of our users. ESRI is a full-service GIS company, ready to help you begin, grow, and build success with GIS.

## Corporate

ESRI  
380 New York Street  
Redlands, California  
92373-8100, USA  
Telephone: 909-793-2853  
Fax: 909-793-5953

For more information  
on ESRI, call

**1-800-447-9778**

(1-800-GIS-XPRT)

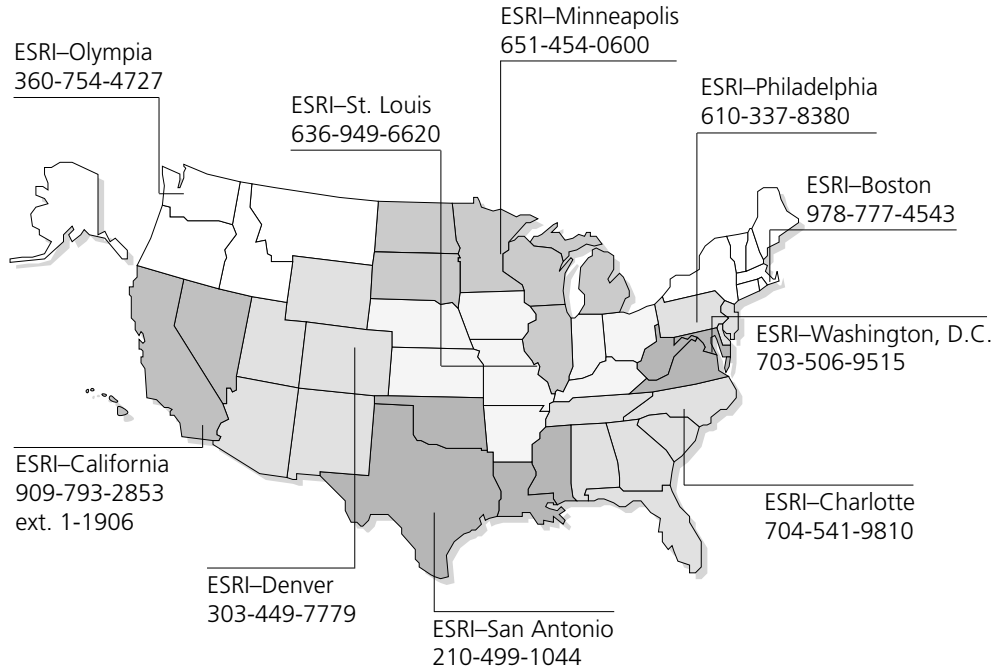
or contact an ESRI reseller near you.

Send e-mail inquiries to  
**info@esri.com**

Visit ESRI's Web page at  
**www.esri.com**

Outside the United States,  
contact your local ESRI distributor.  
For the number of your distributor,  
call ESRI at 909-793-2853,  
ext. 1235,  
or visit our Web site at  
**www.esri.com/international**

## Regional Offices



## International Offices

Australia 613-9867-0447	Germany/Switzerland 49-8166-677-0 41-1-360-2460	Japan 81-3-3794-6681	Singapore 65-742-8622
Belgium/Luxembourg 32-2-460-7480	Hong Kong 852-2730-6883	Korea 82-2-571-3161	Spain 34-91-559-4375
Bulgaria 359-2-964-0850	Hungary 361-428-8040	Netherlands 31-10-217-0700	Sweden 46-23-755-400
Canada 416-441-6035	India 91-11-620-3802	Poland 48-22-825-9836	Thailand 66-2-678-0707
France 33-1-46-23-6060	Indonesia/Malaysia 62-21-570-7685 603-7874-9930	Portugal 351-2-1-781-6640	United Kingdom 44-1296-745-500
	Italy 39-06-406-96-1	Romania 40-1-231-13-81	Venezuela 58-212-285-9394



Place ESRI business partner or distributor address here.



No. GS-35F-5086H