Introduction to GIS Data Management

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> ⓘ *This guide was created by the staff of the GIS/Data Center at Rice University and is to be used for individual educational purposes only. The steps outlined in this guide require access to ArcGIS Pro software and data that is available both online and at Fondren Library.*
>
> The following text styles are used throughout the guide:
>
> Explanatory text appears in a regular font.
>
> 1. Instruction text is numbered.
> 2. Required actions are underlined.
> 3. **Objects of the actions are in bold.**
>
> *Folder and file names are in italics.*
>
> Names of Programs, Windows, Panes, Views, or Buttons are Capitalized.
>
> 'Names of windows or entry fields are in single quotation marks.'
>
> "Text to be typed appears in double quotation marks."

> ⓘ The following step-by-step instructions and screenshots are based on the Windows 10 operating system and ArcGIS Pro 2.5.0 software with an Advanced license. If your personal system configuration varies, you may experience minor differences from the instructions and screenshots.

This course will teach you how to download, evaluate, and prepare GIS data from public online sources and set up a project in ArcGIS Pro.

Obtaining Tutorial Data

There are three ways of obtaining the tutorial data. The best option for getting the full GIS project experience is to follow Option 1 and learn how to download data from online GIS data portals. You will also gain exposure to the best GIS data websites for the Houston region. If you have limited time or if any of the data provider websites are not functional, you may download an identical version directly from the computers in the GIS/Data Center (Option 2) or online from this wiki (Option 3). Follow the applicable set of instructions below depending on the particular computer you are using.

OPTION 1: Obtaining tutorial data from source websites

If you choose to download the tutorial data from the source websites to practice finding and obtaining data from online sources, follow the instructions below.

H-GAC GIS Census Data

The Houston-Galveston Area Council (H-GAC) is the 13-county Metropolitan Planning Organization (MPO) for the Houston region. Federal legislation requires that an MPO be designated for each urbanized area with a population greater than 50,000 people (as established by the U.S. Census Bureau) in order to conduct long-range metropolitan transportation planning and be eligible for Federal funding for transportation projects. Their mission to carry out metropolitan transportation planning means that MPOs are a great source of data on topics such as demographics, employment, land use, transportation, and environmental conditions and most of these topics are well-suited towards GIS analysis.

Most of the data provided on the H-GAC portal is not originally created by the H-GAC. Instead, the data is either aggregated from multiple municipalities up to the 13-country region, or clipped from the entire country or state down to the 13-county region. For this tutorial, we will download population and housing data from the 2010 census, which has been aggregated to census tract boundaries.

1. Using a web browser, <u>search</u> for "**hgac census**" and select the result as shown below or or go directly to: https://www.h-gac.com/census-data.

www.h-gac.com › census-data

Census Data | Houston-Galveston Area Council (H-GAC)

Download **Census** Data at geography levels of Counties, **Census** Places, **Census** Tracts, Zip Codes and School Districts.

2. Under the '2010 Decennial Census Data' section, in the 'Ethnicity' column, click **Download Boundary files**.

2010 Decennial Census Data

Population	Housing Units	Ethnicity
Download PDF	Download PDF	Download PDF
Download XLS	Download XLS	Download XLS
Demographic Profile (XLS)		Download Boundary files

3. <u>Click</u> the blue **Download** button.

Census2010_Redistricting_Data_Shapefiles.zip   Download
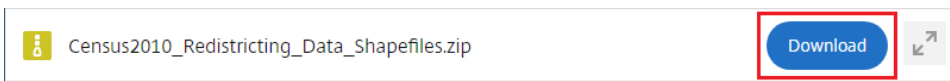
4. At the bottom of your browser window, you should see the *Census2010_Redistricting_Data_Shapefiles.zip* compressed folder being downloaded.

Census2010_Redist....zip
41.6/71.3 MB, 4 secs left
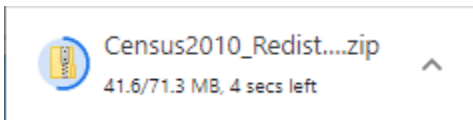
H-GAC GIS Datasets

1. Using a web browser, <u>search</u> for "**hgac gis**" and select the result as shown below or go directly to: https://gishub-h-gac.hub.arcgis.com/.

gishub-h-gac.hub.arcgis.com

H-GAC Regional Data Hub

H-GAC does not provide any services for converting the data provided here into ... Open **GIS** Datasets ... **H-GAC** Aerial Imagery Comparison: 2008 and 2018.

2. In order to see all of the data available in the catalog, click in the '**Search data**' box and, without typing anything, <u>press</u> **Enter**.

Search data

Feel free to browse through the available data and filter by categories on the left. When you are finished exploring, you will download major roads data.

1. At the top of the website, in the 'Search' box, <u>type</u> "**roads**" and <u>click</u> the **HGAC Major Roads** result directly beneath the search box.

roads

HGAC Major **Roads**
Data

Search: near for location
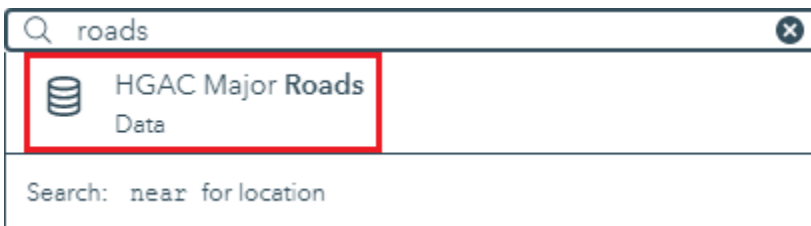
2. <u>Click</u> **Download** > Full Dataset **Shapefile**.
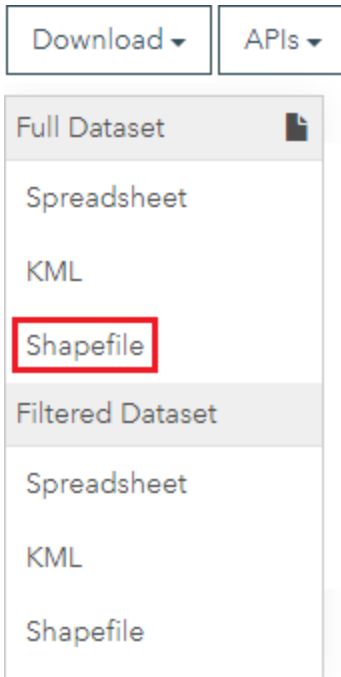
3. At the bottom of your browser window, you should see the *HGAC_Major_Roads-shp.zip* compressed folder downloaded.

Houston METRO Downloads

The Houston METRO website provides GIS data for the public transit system in Houston provided by METRO. While the same data is also available on the H-GAC Regional Data Hub, it is often For this tutorial, you will need the bus stops and bus routes data, which is included in the downloadable zip-file containing all of the GIS data available on the site. To obtain this data:

1. Using a web browser, search for "**houston metro gis**" and select the result as shown below or go directly to: https://www.ridemetro.org/Pages /DigitalAssets.aspx.

www.ridemetro.org › Pages › DigitalAssets ⋮

METRO Photos, Logos and Transit Data | Houston, TX

Trademark License Agreement – Media/News Use. The Metropolitan Transit Authority of Harris County, Texas ("**METRO**") is the sole and exclusive owner of its ...

2. Scroll down to the bottom of the webpage and select **Get Started**.

Get started >>

3. From the left **"Featured collections"** dropdown select **Transit Data Files**.
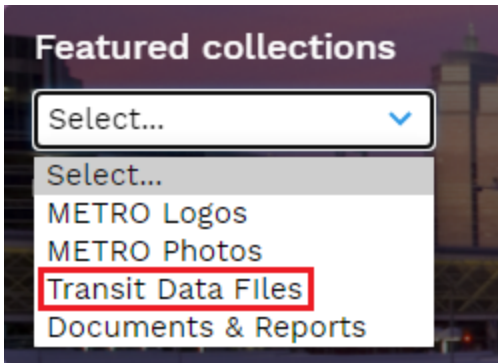
4. <u>Select</u> **Shape files**.
5. <u>Click</u> **Bus Routes - shape file** (do not check the box) and <u>click</u> the blue **Download button.**
6. Click outside of the download pop-up window to close it.
7. <u>Click</u> **Bus Stops - shape file** (do not check the box) and <u>click</u> the blue **Download button.**
8. At the bottom of your browser window, you should see both the *RS2688_Bus Stops - shape file.zip* and *RS2689_Bus Routes - shape file.zip* comp ressed folders downloaded.
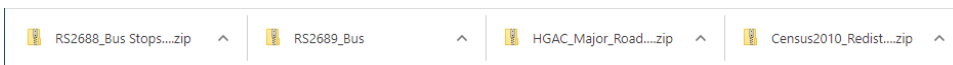
COHGIS

Though it is not used in this course, the COHGIS (City of Houston GIS) Data Hub provides over 200 data sets including administrative boundaries, amenity locations, transportation routes, crime, and flooding and is available at: https://cohgis-mycity.opendata.arcgis.com/. (Whenever you see a URL that ends in opendata.arcgis.com, you will know that you are visiting a standard ArcGIS Hub, which are commonly used by government entities for sharing GIS data.)

HCAD

The Harris County Appraisal District (HCAD) Public Data website is another great source of Houston data related to land parcels and other boundaries and is available at: https://hcad.org/hcad-online-services/pdata/.

OPTION 2: Accessing tutorial data from Fondren Library using the gistrain profile

If you are completing this tutorial from a computer in Fondren Library and are logged in using the gistrain profile, follow the instructions below:

1. In the taskbar at the bottom of the screen, <u>click</u> the **File Explorer** Application.

2. In the Navigation pane on the left side of File Explorer, double-click *GISData (\\smb.rdf.rice.edu\research\FondrenGDC) (O:)* > *GDCTraining* > *1_Short_Courses* > *Introduction_to_GIS_Data_Management* > *Downloads*.
3. To create a personal copy of the tutorial data, <u>select</u> all **four zip folders** and <u>drag</u> them into the **Downloads** folder in the Navigation pane.
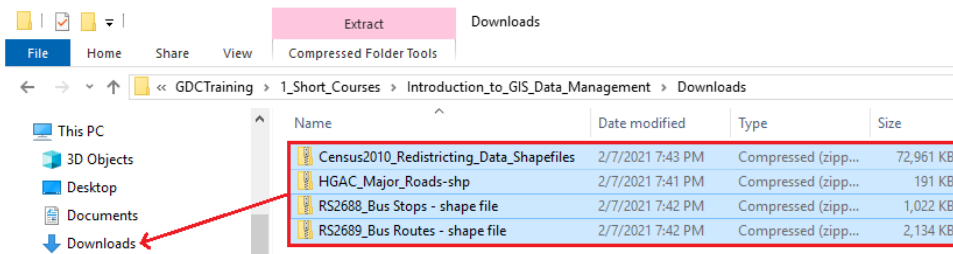
4. <u>Close</u> all windows.

OPTION 3: Accessing tutorial data online using a personal computer

If you are completing this tutorial from a personal computer, you will need to download the tutorial data online by following the instructions below:
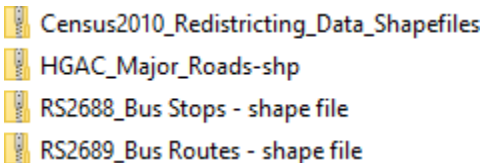
ⓘ **Tutorial Data Download**

Downloads.zip

ⓘ

1. Click *Downloads.zip* above to download the tutorial data.
2. Open your *Downloads* folder.
3. Right-click the compressed *Downloads* folder and select **Extract All...**.
4. In the 'Extract Compressed (Zipped) Folders' window, click the **Browse...** button.
5. On the left side of File Explorer in the Navigation pane, single-click the *Downloads* folder and click the **Select Folder** button.
6. Uncheck **Show extracted files when complete**.
7. Click **Extract**.
8. Right-click the original compressed *Downloads* folder and select **Delete**.

Preparing the Downloaded Data for ArcGIS Pro

Once you have downloaded the *Census* and *Major Roads* data from H-GAC and the *Bus Stops* and *Bus Routes* data from Houston METRO, you should be able to locate the data files in your *Downloads* folder.

1. Open the *Downloads* folder.
2. Ensure that you see the four folders shown below.

   📁 Census2010_Redistricting_Data_Shapefiles

   📁 HGAC_Major_Roads-shp

   📁 RS2688_Bus Stops - shape file

   📁 RS2689_Bus Routes - shape file

Notice that all the folders are compressed, or zipped, which allows you to download a single ZIP file, instead of numerous individual files. You can tell a folder is zipped when the 'Type' column reads 'Compressed (zipped) Folder' and the folder icon has a zipper on it. In order to view and utilize the data within ArcGIS software, you will first need to extract, or unzip, the folders.

If you have 7-Zip installed or would like to install it for free:

1. Select **all four folders**.
2. Right-click **any of the selected folders** and select **7-Zip > Extract Here**.

If you do not have 7-Zip installed:

1. Right-click each zipped folder individually and select **Extract All...** and then click **Extract**.

Your data is now in an uncompressed format and ready to be brought into ArcGIS Pro.

Creating a New Project in ArcGIS Pro

1. From the Start menu, launch **ArcGIS Pro**.
2. When ArcGIS Pro opens, under the 'New' section, click the **Map** template.
3. In the 'Create a New Project' window, for Name, type "**Intro**".
4. For Location, click the **Browse...** button to the right.
5. In the 'New Project Location' window, click **Computer** in the left column and click **Desktop** in the right column and click **OK**.
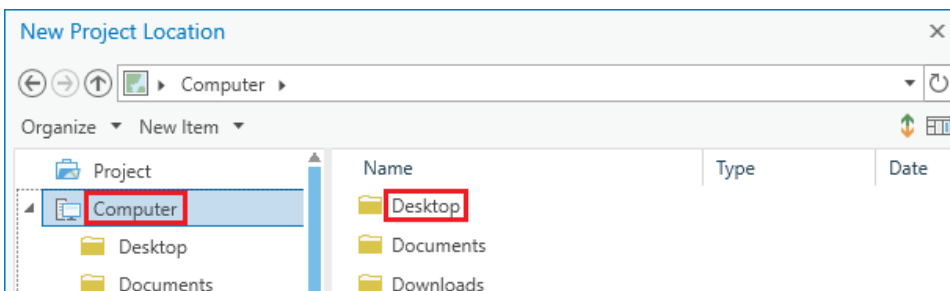
6. In the 'Create a New Project' Window, click **OK**.
7. Maximize the **ArcGIS Pro** application window

Managing GIS Data

The full layout of the software will be covered in the Introduction to ArcGIS Pro tutoril. For now, all you will be using is the Catalog pane along the far right side of the application window.

1. In the Catalog pane, click the arrow to expand **Folders > Intro > Intro.gdb.**

You will notice there is currently no data in the *Intro* project geodatabase that was automatically created when you created the *Intro* project. Over the next few steps, you will import the data you downloaded online from the *Downloads* folder to your project geodatabase.

Connecting to a folder

1. In the Catalog pane, right-click **Folders** and select **Add Folder Connection**.
2. In the 'Add Folder Connection' window, click **Computer** in the left column and single-click ***Downloads*** in the right column. Click **OK**.
3. In the Catalog pane, expand ***Downloads*** and ensure it looks as shown below. (If you followed Option 3 for obtaining the tutorial data and downloaded the data from this wiki page, you will only see four shapefiles listed.)
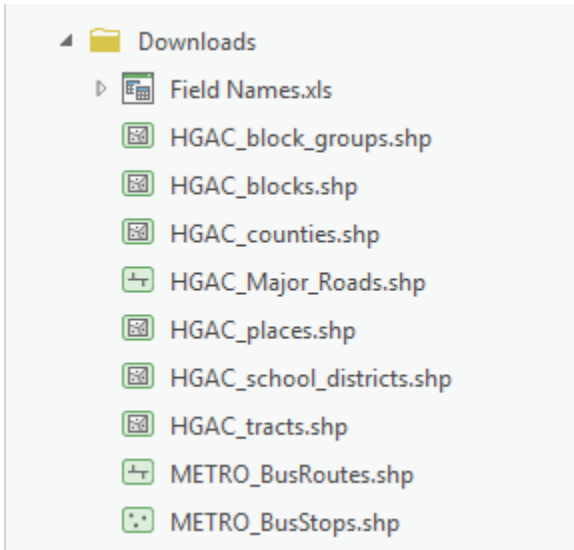

## Importing and exporting data in the project geodatabase

For this tutorial, we are working with vector data, which is a spatial data format that uses points, lines, and polygons to represent real features on the Earth's surface. Vector data is ideal for discrete themes with definite boundaries. A Feature Class is a vector storage format that represents a homogeneous collection of common features. There are two types of Feature Classes: a Shapefile feature class and a Geodatabase feature class. A Shapefile feature class is an open source format. Its file extension is .shp and its icon is green. A Geodatabase feature class is an Esri proprietary format. A Geodatabase feature class must be stored inside a Geodatabase (.gdb) and its icon is white. To better organize our project, we will import data into our Project Geodatabase.

All of the data you have downloaded is in the shapefile format. Since shapefiles and geodatabases are different file formats, you must convert the data.

1. In the Catalog pane, hold down the **Ctrl** key and click***HGAC_Major_Roads.shp***, ***HGAC_tracts.shp***, ***METRO_BusRoutes.shp***, and ***METRO_BusStops.shp*** to select all four shapefiles, as shown below.
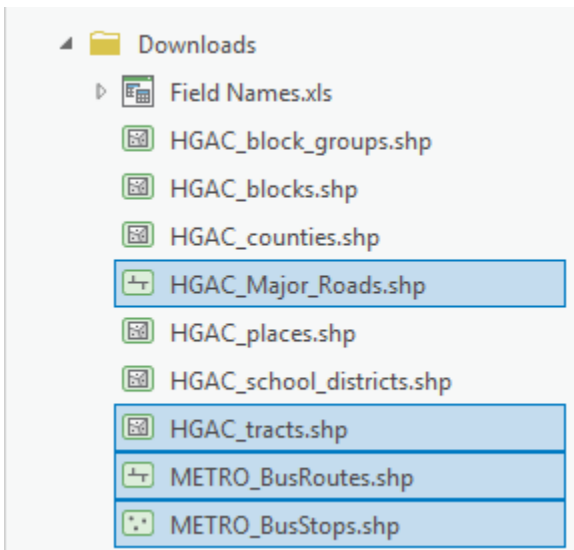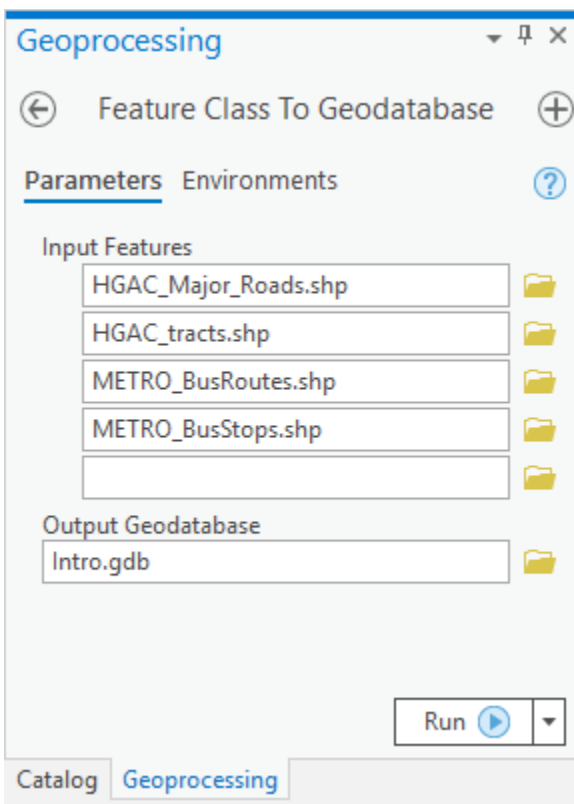

2. Right-click***HGAC_Major_Roads.shp*** and select **Export > Feature Class(es) To Geodatabase...**.
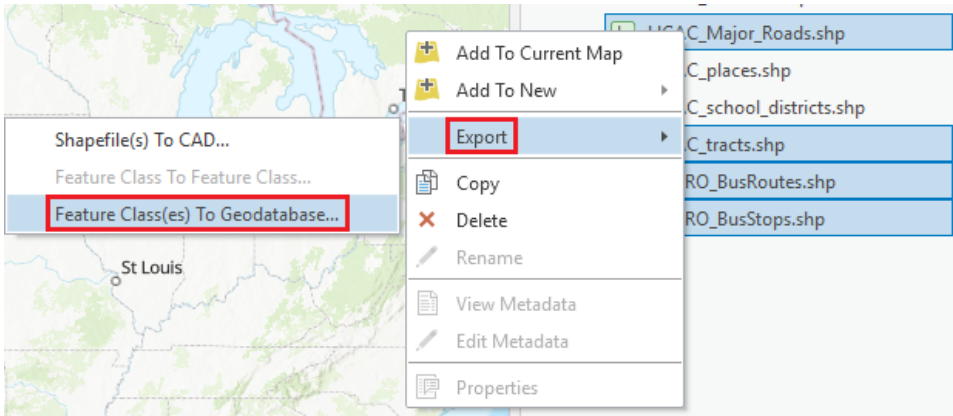
Note that the Geoprocessing pane opens on top of the Catalog pane. To toggle between the panes, you can use the tabs at the bottom of the pane.

1. Ensure your 'Feature Class To Geodatabase' tool parameters appear as shown below and click **Run**.

2. At the bottom of the Geoprocessing pane, click the **Catalog** tab.
3. In the Catalog pane, right-click the **Intro.gdb** geodatabase and select **Refresh**.
4. If necessary, expand the **Intro.gdb** geodatabase. Your project geodatabase should now contain four geodatabase feature classes: *HGAC_Major_Roads, HGAC_tracts, METRO_BusRoutes, and METRO_BusStops*, as shown below.
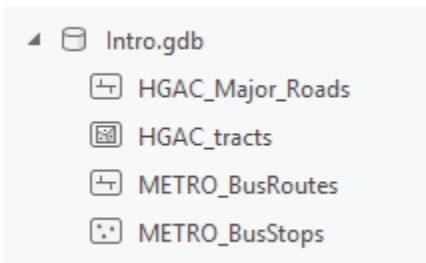
5. In the Catalog pane, in the Folders section, right-click the **Downloads** folder connection and select **Remove**.

6. In the Quick Access toolbar at the top of the application window, <u>click</u> the **Save** button.

7. <u>Close</u> **ArcGIS Pro**.