GRANBURY

IMPLEMENTING A GIS IN THE PUBLIC SECTOR

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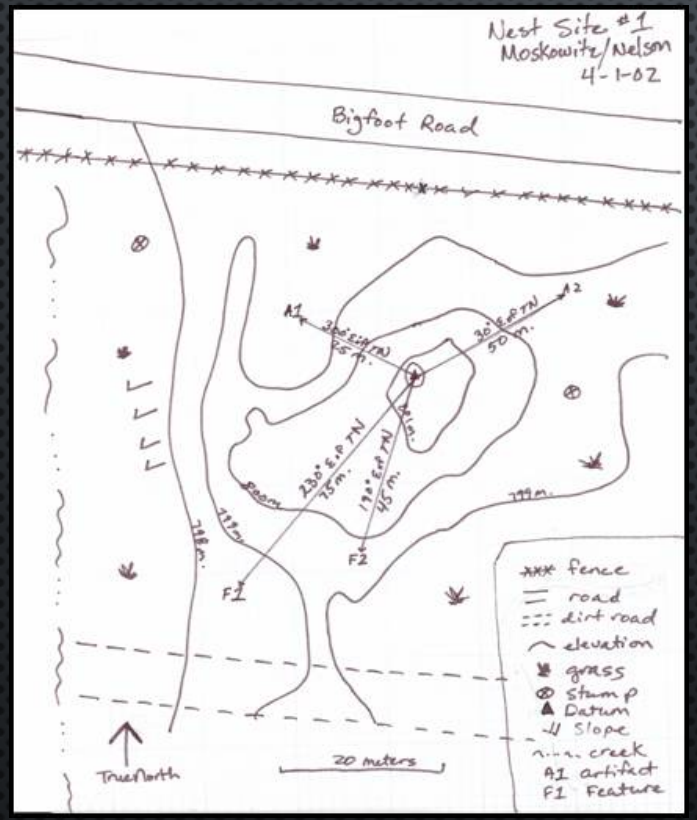
MY GIS EXPERIENCE

ARCHAEOLOGY

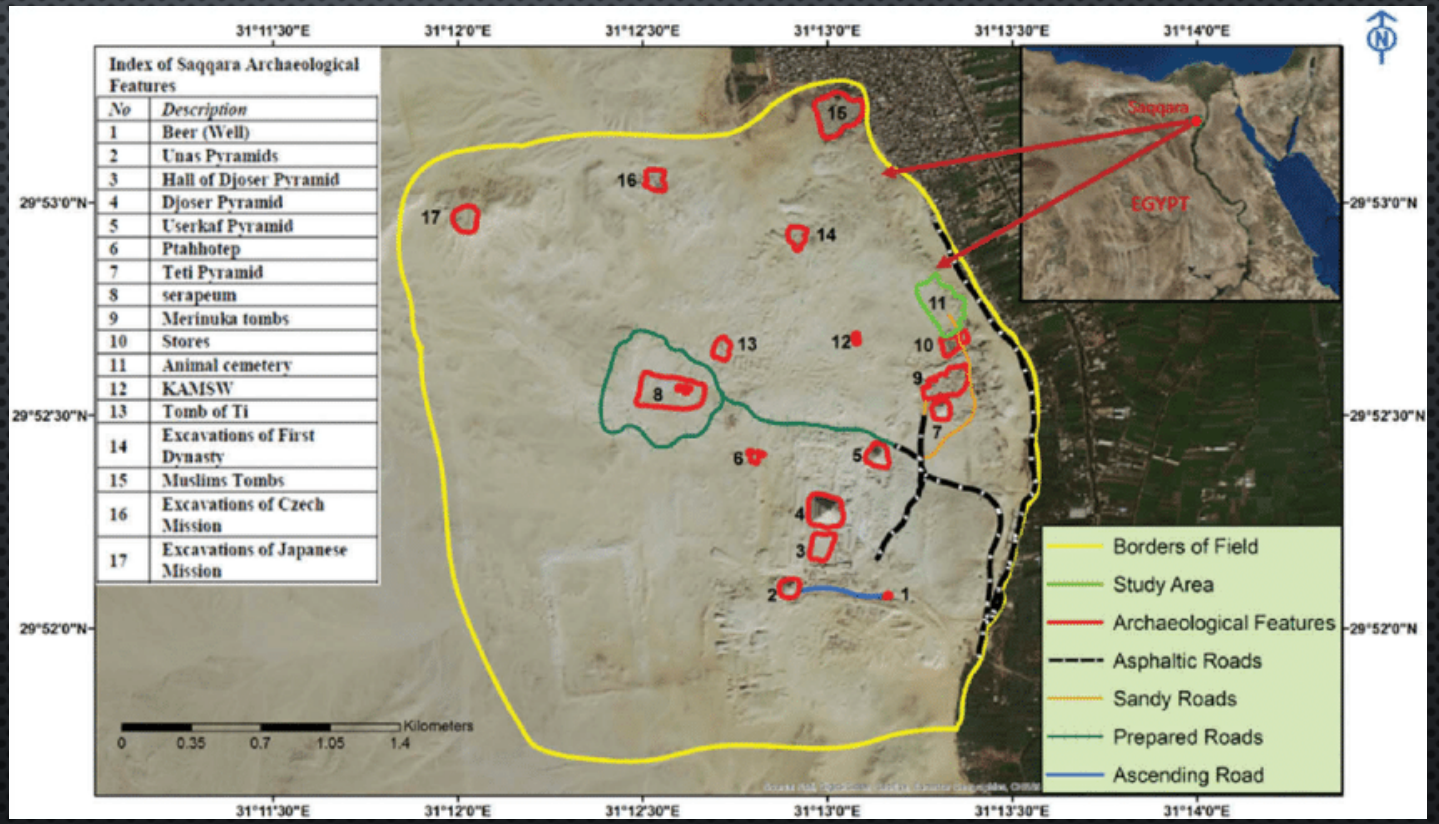
- Georeferencing
- Digitizing
- Historic Map and Aerial Imagery analysis
- Cartography
- Weighted site selection and suitability analysis
- Basic coding
- Data Standardizing

ARCHAEOLOGY

Basic Tasks include data acquisition, cartography, and data analysis

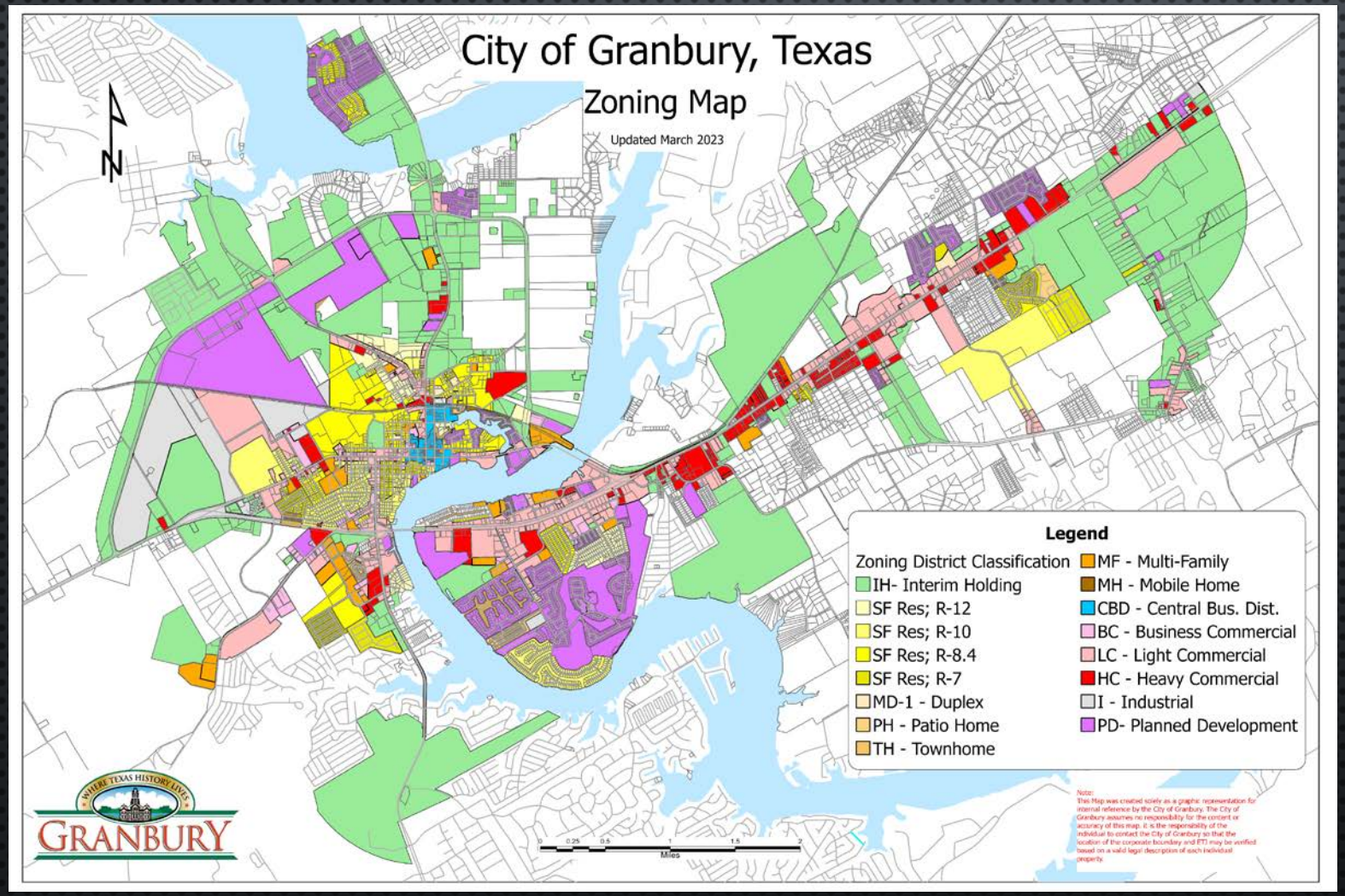


Link: archaeological sketch Map - Bing images



Link: archaeological site Map - Bing images

MY GIS EXPERIENCE

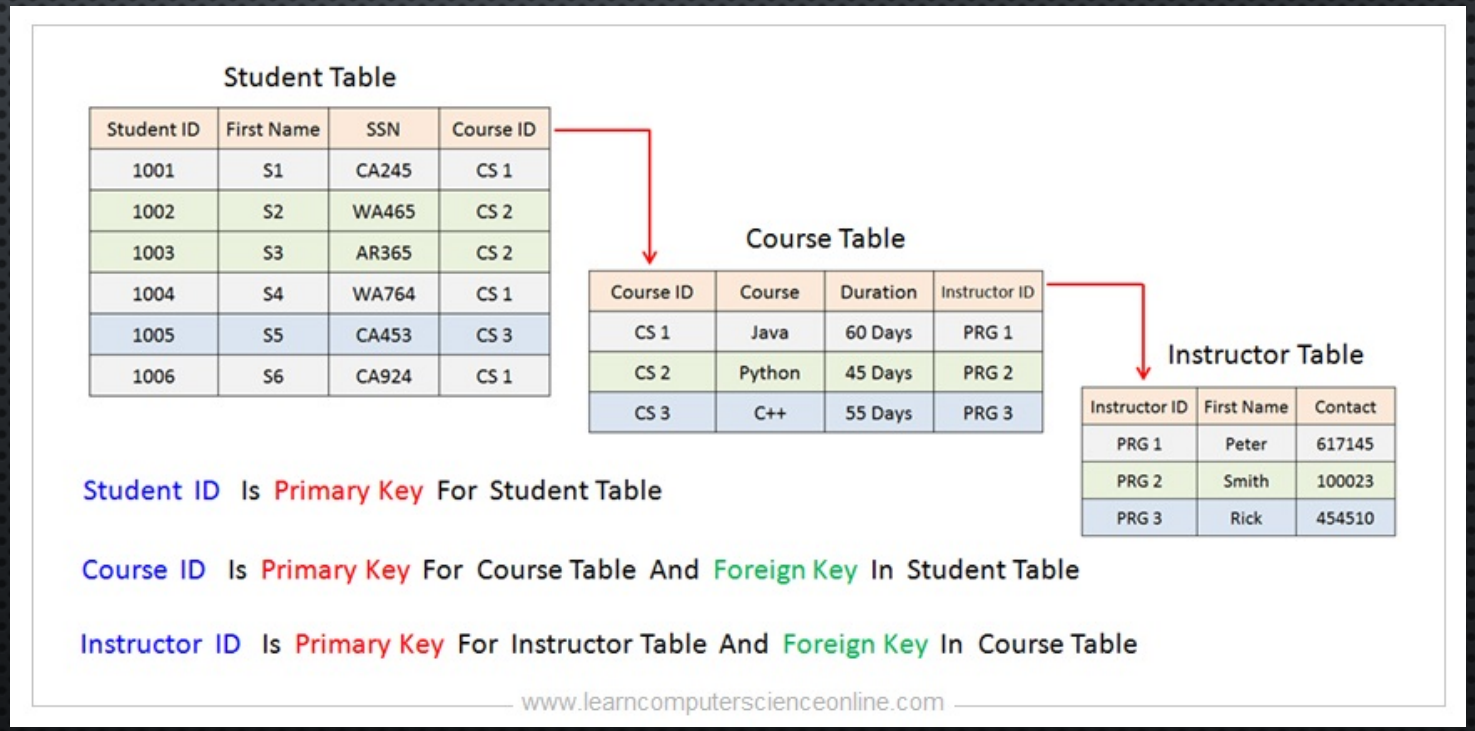


PUBLIC SECTOR

- GEOREFERENCING
- DIGITIZING
- CARTOGRAPHY
- BASIC CODING
- UPDATING DATA AS NEW ORDINANCES ARE PASSED

- Challenges
  - Non-GIS users created much of the data and there were no data standards other than using the same projected coordinate system
  - No metadata was created
  - Multiple departments have various levels of experience with GIS
  - Most users do not understand limitations or full capabilities of GIS

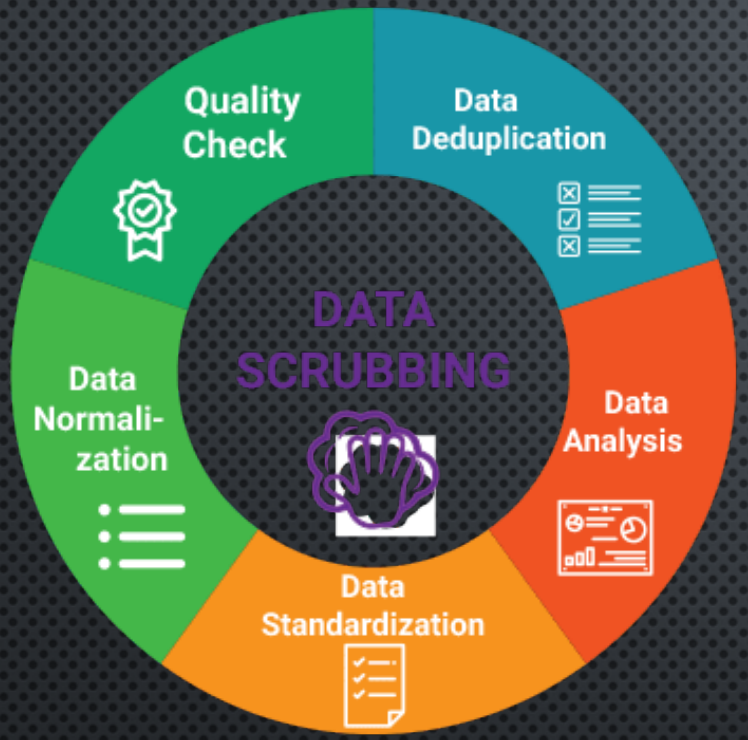
CITY OF GRANBURY



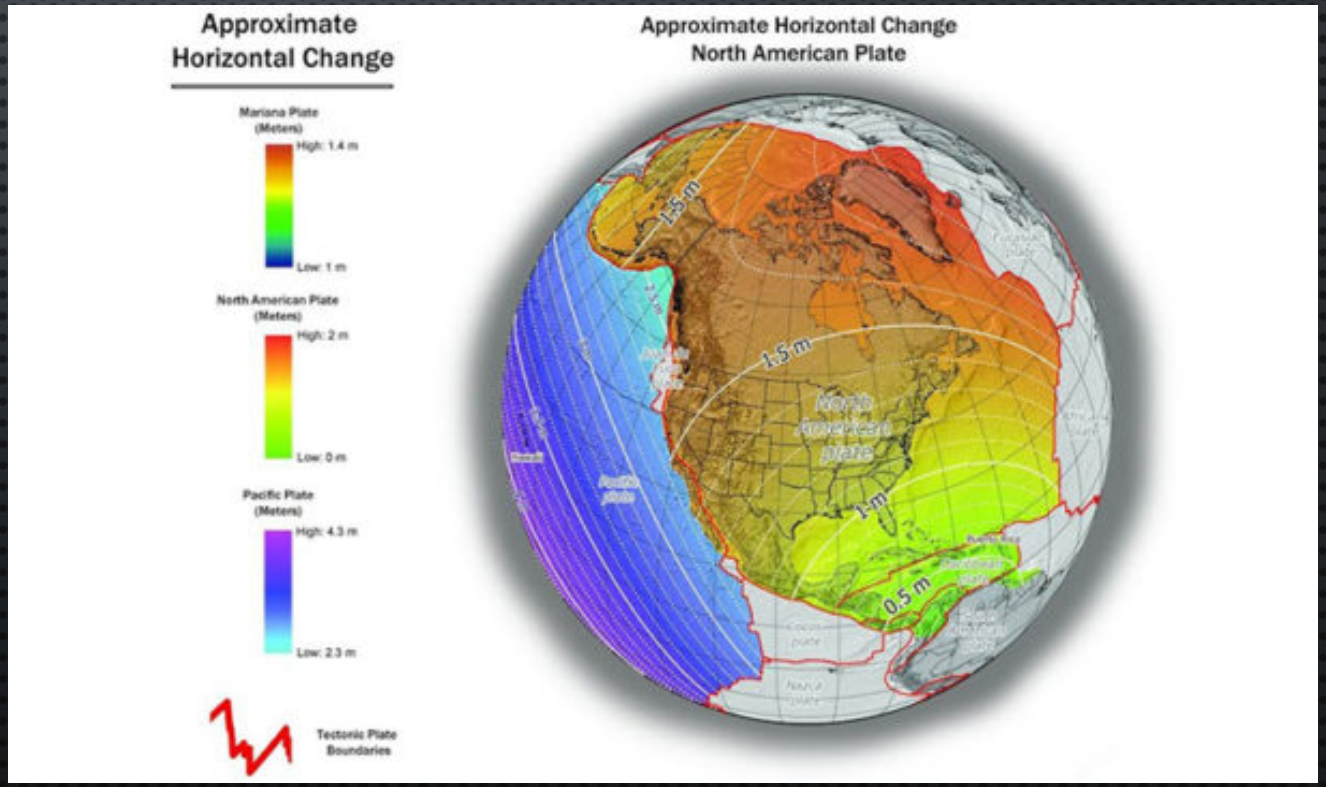
CHALLENGES

- GETTING STAKEHOLDER BUY IN

- HARDWARE LIMITATIONS



- Challenges
  - Data scrubbing (manual and automated)
  - Data creation (possibly utilizing North American Terrestrial Reference Frame of 2022 datum)



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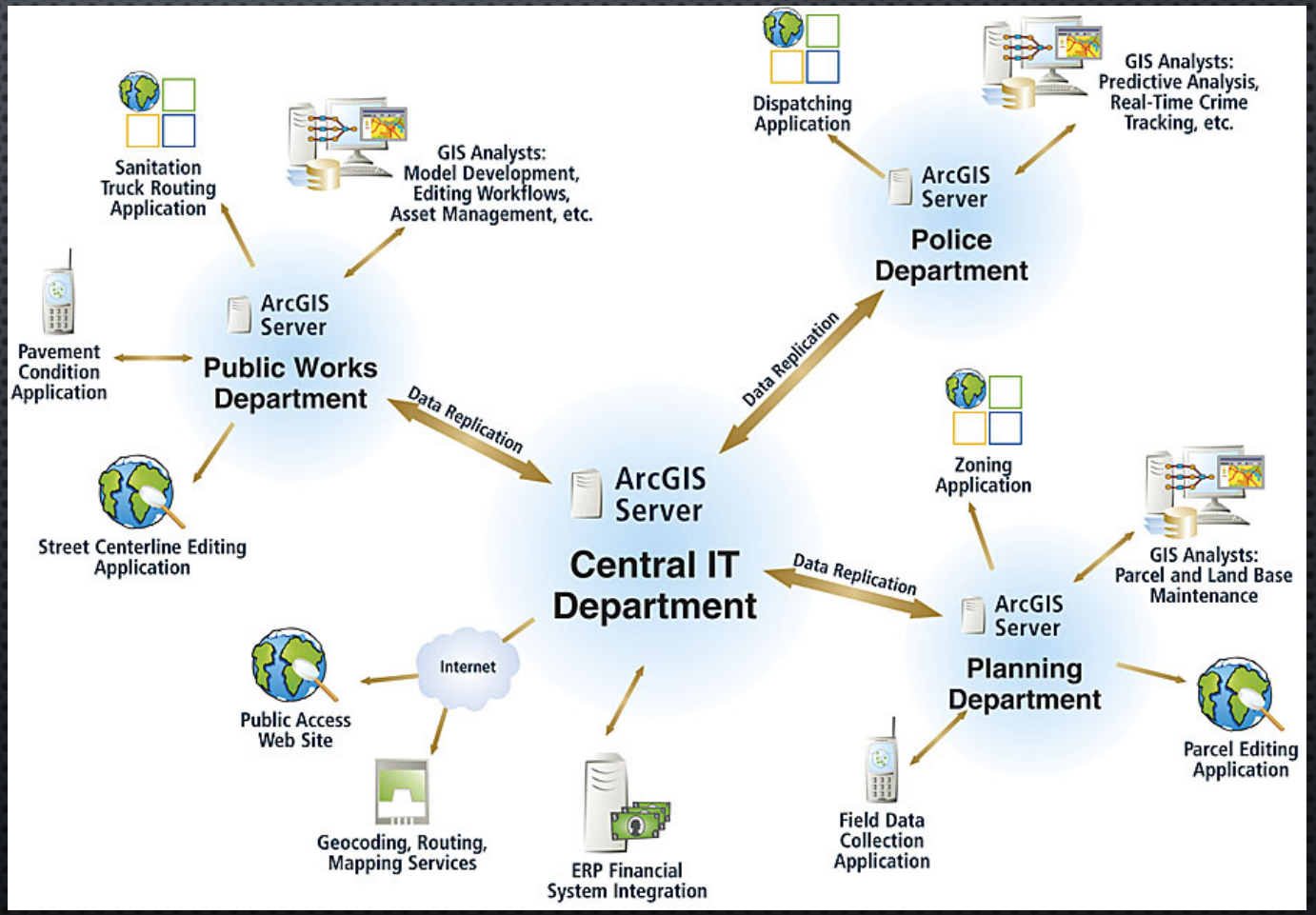
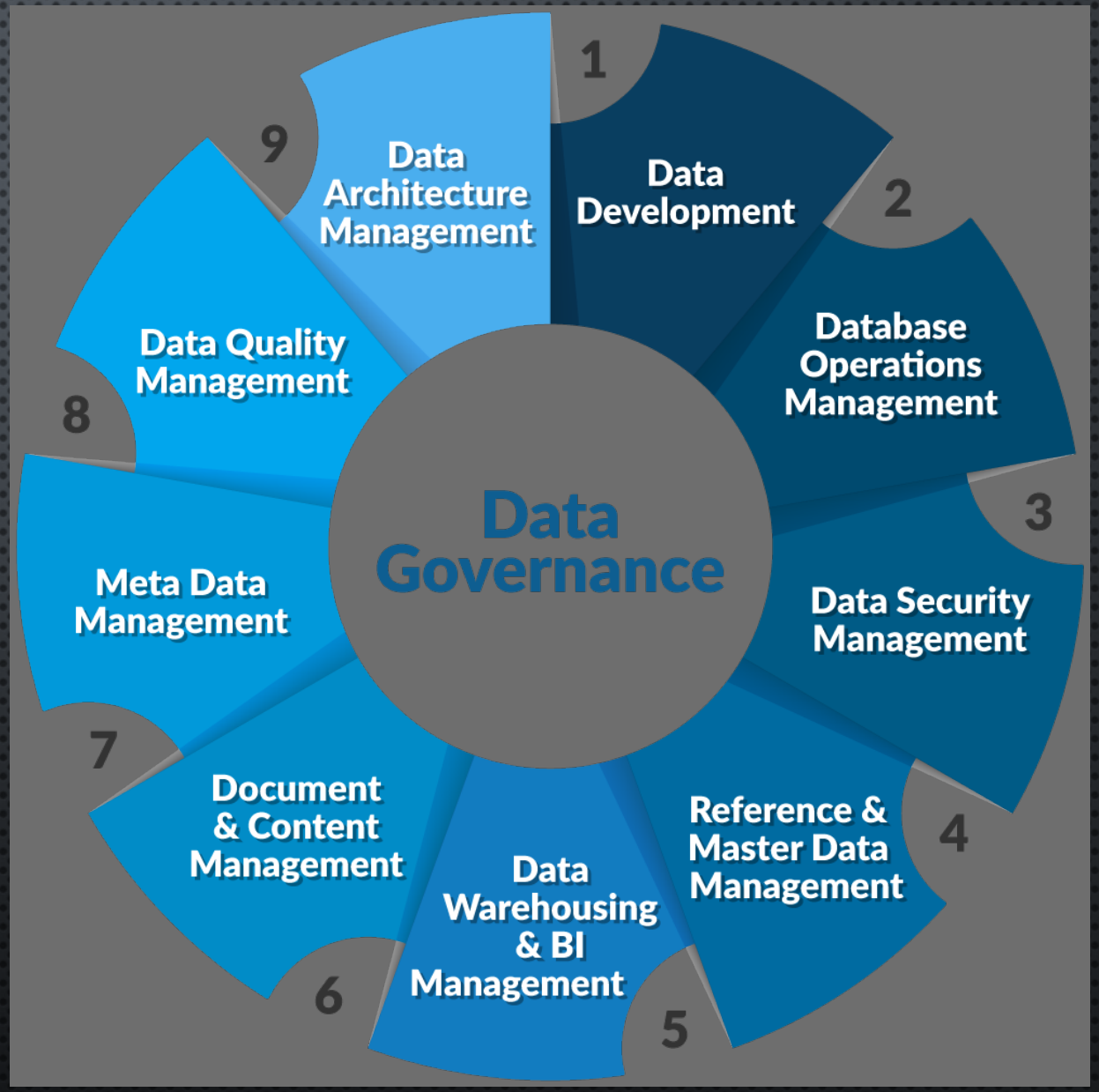
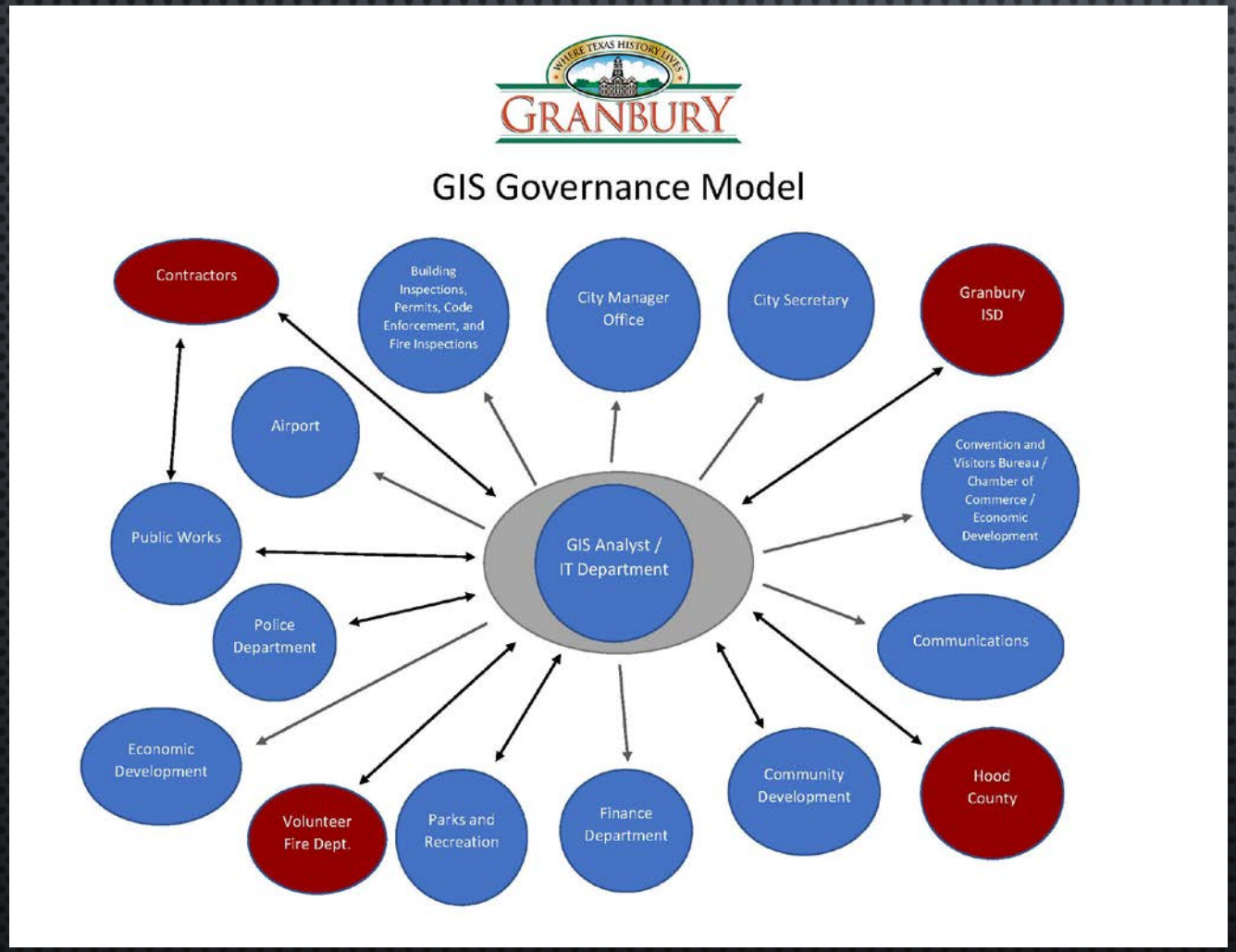
- CHALLENGES
  - IMPLEMENTING ENTERPRISE GIS UTILIZING THE ESRI SMALL GOVERNMENT ENTERPRISE AGREEMENT (SGEA)
  - MIGRATING FROM SEPARATE FILE GEODATABASES TO CENTRALIZED SQL DATABASE



A Master Data List and a Data Design plan are being created to ensure that all new data created is standardized and clean for use in future analysis



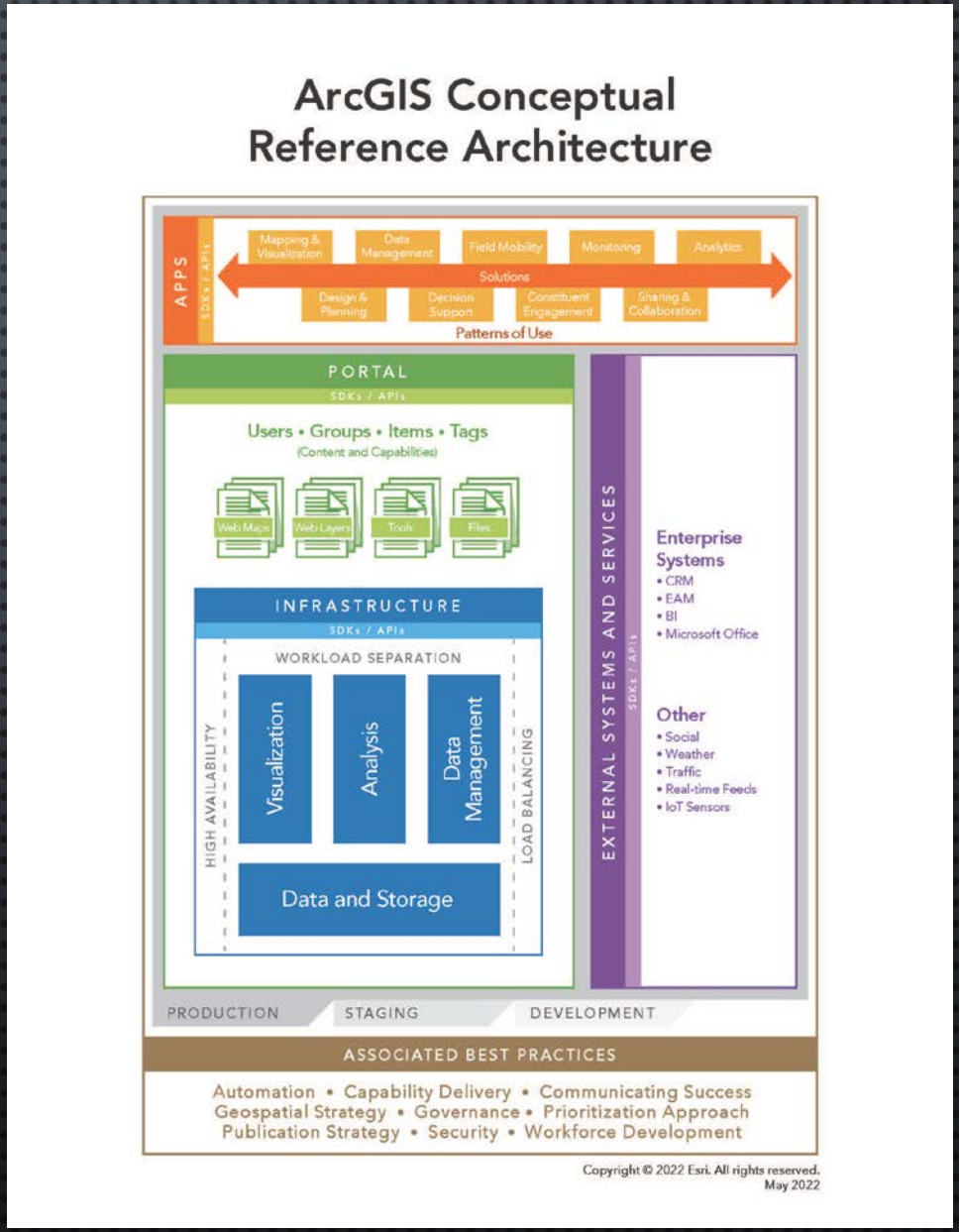
CITY OF GRANBURY



- MANY DEPARTMENTS WILL UTILIZE GIS, THEY JUST MAY NOT EVEN KNOW IT YET

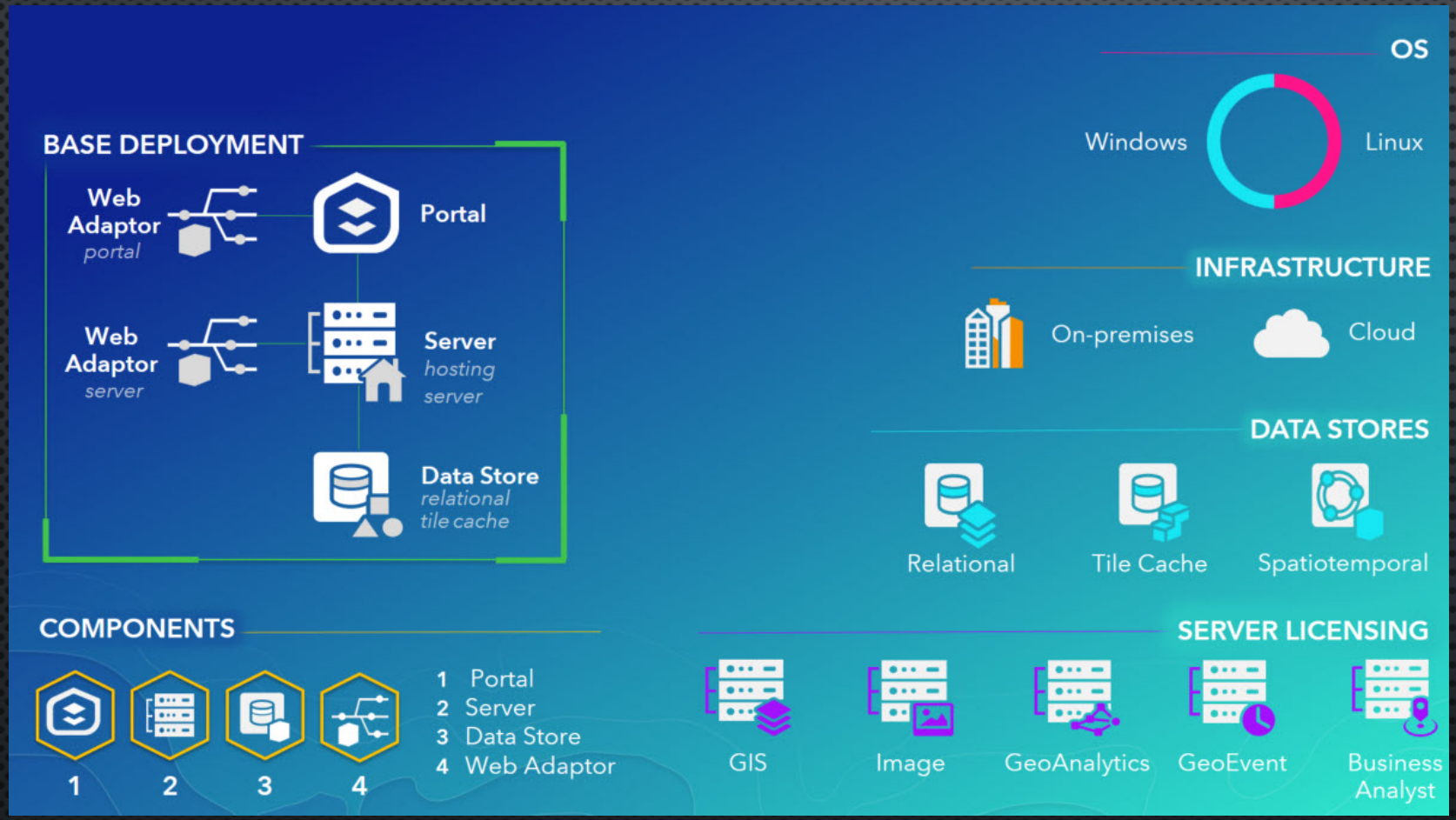
CITY OF GRANBURY

- SYSTEM ARCHITECTURE IS IMPORTANT TO CREATE CORRECTLY FROM THE BEGINNING



Link: Architecting the ArcGIS System: Best Practices | Esri Training Document

CITY OF GRANBURY



- An Enterprise System is being planned for the City of Granbury – redundancy would double all but adaptors
- The base deployment
  1. Server
  2. Portal
  3. Data Store
  4. Web Adaptor

Link: WhatsNew_1.jpg (1203×676) (esri.com)

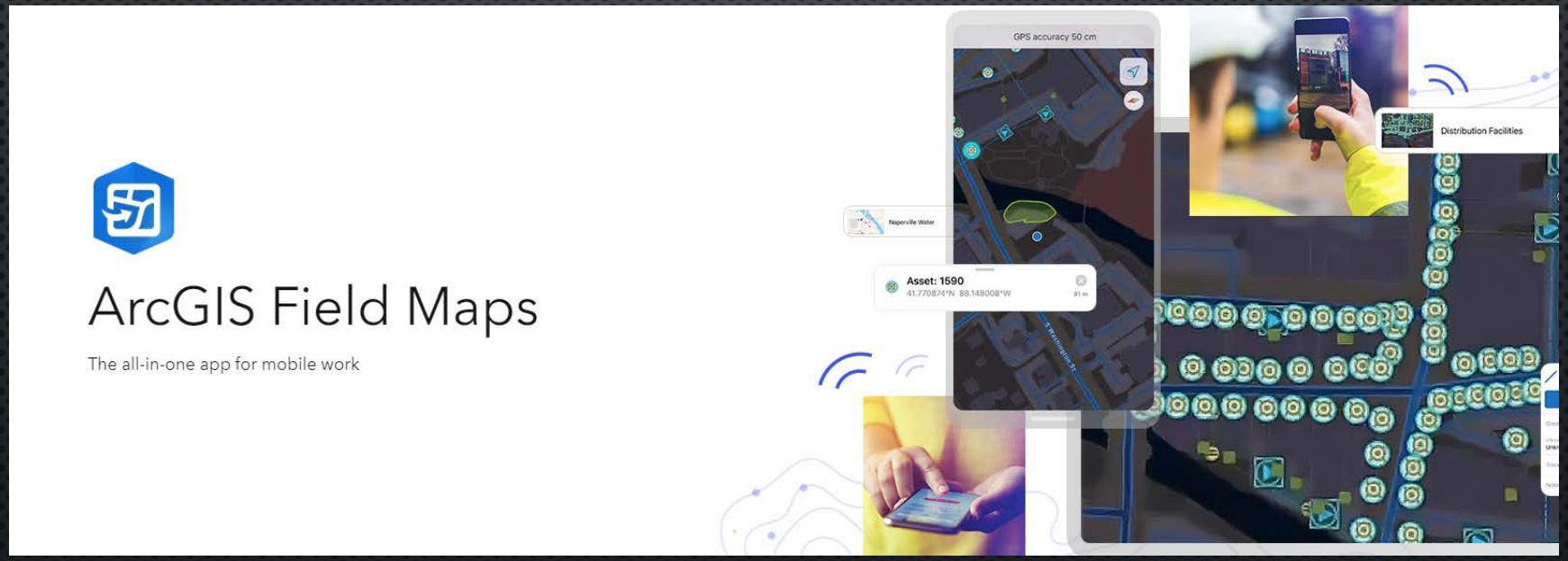
STORMWATER MAPPING

- As a city grows requirements for data change
- State law requires that after a city reaches a population over 10,000 that the stormwater system be mapped and managed
- To date very little data has been created and what is has no network
- The Stormwater Utility Network Foundation from ESRI may be utilized
- The Hydrology tool set in the Spatial Analyst extension will be a crucial component

stormwater - Bing images

STORMWATER MAPPING

- FIELD VERIFICATION WILL BE NECESSARY AFTER INITIAL IDENTIFICATION TO ENSURE THE ACCURACY OF THE REMOTE SENSING AND MODELING



Field Data Collection App for Mobile Workers | ArcGIS Field Maps (esri.com)

HYDROLOGY WORKFLOW

- HYDROLOGY TOOLSET
  - HYDROLOGIC ANALYSIS SAMPLE APPLICATIONS—ARCGIS PRO | DOCUMENTATION

Available with Spatial Analyst license.

The Hydrology tools are used to model the flow of water across a surface.

Information about the shape of the earth's surface is useful for many fields, such as regional planning, agriculture, and forestry. These fields require an understanding of how water flows across an area and how changes in that area may affect that flow.

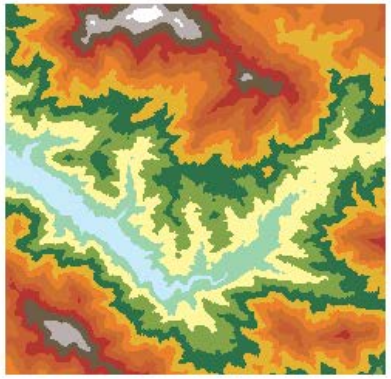
When modeling the flow of water, you may want to know where the water came from and where it is going. The following topics explain how to use the hydrologic analysis functions to help model the movement of water across a surface, the concepts and key terms regarding drainage systems and surface processes, how the tools can be used to extract hydrologic information from a digital elevation model (DEM), and sample hydrologic analysis applications.

- Understanding drainage systems
- Exploring digital elevation models (DEM)
- Deriving runoff characteristics
- Creating a depressionless DEM
- Creating watersheds
- Hydrological analysis sample applications

The Hydrology tools can be applied individually or used in sequence to create a stream network or delineate watersheds.

HYDROLOGY WORKFLOW

1. The DEM on which the hydrologic analysis will be performed.



Input DEM surface

2. Using the DEM as input to the Flow Direction tool, the direction in which water would flow out of each cell is determined.

Flow direction is determined.

Link: Hydrologic analysis sample applications—ArcGIS Pro | Documentation

HYDROLOGY WORKFLOW

3 With the Sink tool, any sinks in the original DEM are identified. A sink is usually an incorrect value lower than the values of its surroundings. The depressions shown in the graphic above (the scattered colored points) are problematic because any water that flows into them cannot flow out. To ensure proper drainage mapping, these depressions can be filled using the Fill tool.

Sinks are identified.

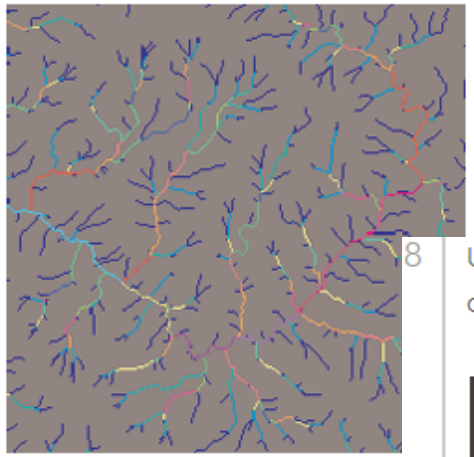
4 Using the Watershed tool, the watersheds are delineated for specified locations. However, if you want to calculate only the stream network, this step can be ignored.

Watersheds are delineated.

Link: Hydrologic analysis sample applications—ArcGIS Pro | Documentation

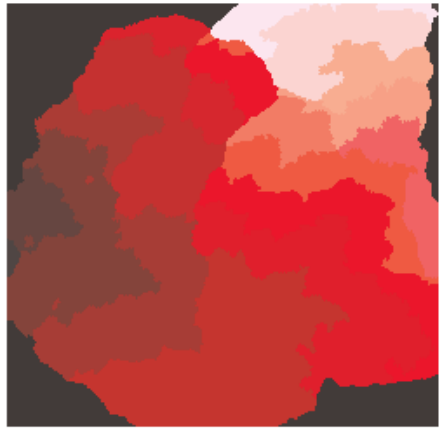
HYDROLOGY WORKFLOW

7 To represent the order of each of the segments in a network, apply the Stream Order tool. The available methods for ordering are the Shreve and Strahler techniques.



Output from stream ordering

8 Using the Flow Length tool, the length of the flow path, either upslope or downslope, from each cell within a given watershed can be determined. This is useful for calculating the travel time of water through a watershed.

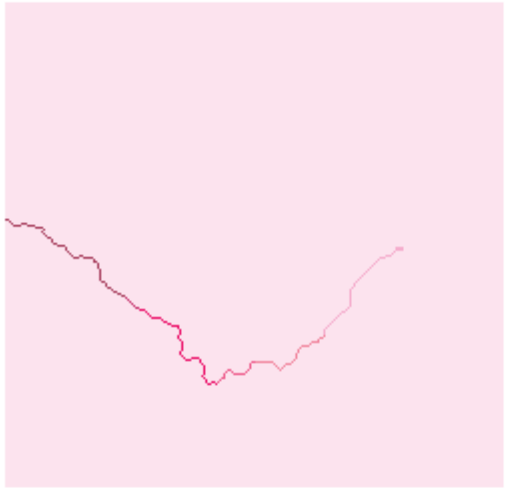


Flow length output

Link: Hydrologic analysis sample applications—ArcGIS Pro | Documentation

HYDROLOGY WORKFLOW

5 To create a stream network, use the Flow Accumulation tool to calculate the number of upslope cells flowing to a location. The output flow direction raster created in a previous step is used as input.



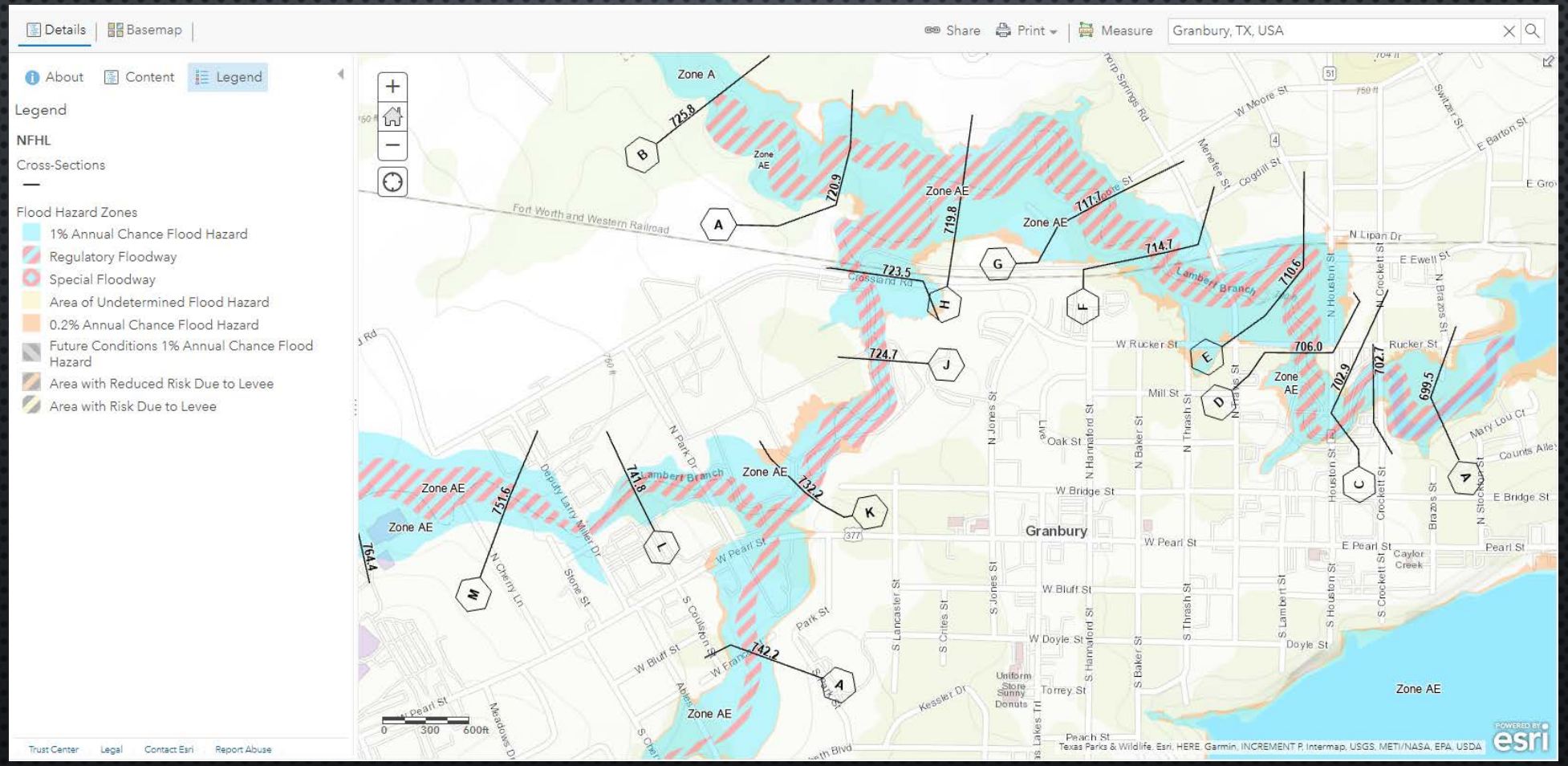
Flow accumulation output

6 A threshold can be specified on the raster derived from the Flow Accumulation tool; the initial stage is defining the stream network system. This task can be accomplished with the Con tool or using Map Algebra. An example of general syntax to use in Con is `newraster = con(accum > 100, 1)`. All cells with more than 100 cells flowing into them will be part of the stream network.

Link: Hydrologic analysis sample applications—ArcGIS Pro | Documentation

FLOODPLAIN MAPPING AND VERIFICATION

- FLOODPLAIN MAPPING: GIS WILL BE USED TO MAP OUT FLOOD-PRONE AREAS AND DEVELOP FLOOD MANAGEMENT PLANS. BELOW IS THE FEMA NATIONAL FLOOD HAZARD LAYER.



3D Aerial Imagery with AI Data Insights | Nearmap US

- Machine learning: May be able to be trained and utilized to identify stormwater system features that may have been missed by manual identification on aerials and in the field.

Conclusion

- GIS is utilized extensively in the modern world, adopting new technologies can be difficult in a smaller municipality
- Data Management and visualization is vital to government and business applications
- Questions or comments?
- Any tips or cautionary tales about an Enterprise implimentation contact me at - ipatrick@granbury.org