
INSTRUCTIONS FOR GIS ASSET NAMING USING THE U.S. NATIONAL GRID (USNG)

A Step-by-Step Guide for GIS Specialists to
Uniquely and Strategically Name any Type of
Asset using the U.S. National Grid



Prepared in Cooperation with:

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GROUP

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While every precaution has been taken in preparing this manual, including research, development, and testing, the Publisher and Authors assume no responsibility for errors or omissions. No liability is assumed by the Publisher or Authors for damages resulting in the use of this information.

Acknowledgments

The foundation of U.S. National Grid (USNG) naming strategies is based upon past work by Tom Terry of the U.S. Marine Corps, Talbot Brooks of Delta State University, and Al Studt of the Kennedy Space Center. These pioneers demonstrated that USNG coordinates can effectively be used in asset naming conventions to guarantee uniqueness, while reducing ambiguity and redundancy through implicit and highly precise location information.

The steps described in this guidebook are the continued work of Elisabetta DeGironimo of the Mohawk Valley Water Authority, Utica, New York. Ms. DeGironimo attended the New York State Geographic Information Systems Conference keynote speech by Talbot Brooks in 2006 on the topic of Hurricane Katrina response where the benefits of the USNG coordinate system were introduced to her. She realized that the USNG could be a viable solution for her water infrastructure asset naming challenge and developed a customized strategy for her institution. Ms. DeGironimo has furthered USNG naming strategies by developing computer code to automate the process. The automated code for asset naming was redesigned by Philip Griffith of the Florida Resources and Environmental Analysis Center (FREAC). Mr. Griffith has expanded the code to cover larger geographic areas, to accept multiple input and output formats, and to use open source methods. At the onset of the project, FREAC intern Neha Deepak Bhalerao assisted Mr. Griffith.

This guidebook seeks to expand the accessibility and reproducibility of Ms. DeGironimo's and Mr. Griffith's research to the general public by providing decision-making strategies and downloadable computer code.

This publication is prepared in cooperation with the USNG Implementation Work Group (<https://sites.google.com/a/sharedgeo.org/usng-iwg/>) for the purpose of promoting awareness and use of the U.S. National Grid.

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1 Welcome

The purpose of this manual is to guide GIS practitioners through the process of naming assets using the U.S. National Grid (USNG). Practitioners will learn the value of asset naming and the unique locational characteristics of the USNG, as well as acquire the technical expertise to accomplish asset naming tasks. These guidelines have been written to serve as stand-alone instructions. Computer code and a sample dataset are downloadable for use in the training exercise.

1.1 Prerequisite Skills

This manual is written for an audience with basic GIS skills, including working with shapefiles, and understanding attribute tables, formulae, and geographic projections. Users should have a basic knowledge of installing and using third-party Python libraries. No prior knowledge of the U.S. National Grid is required.

1.2 Materials Needed

- Python
 - For installation instructions, visit <https://www.python.org>
- pyUTM Python Library
 - For installation instructions, visit <https://github.com/FREAC/PYUTM>
- Your own asset data in shapefile or Comma Separated Values (CSV) format (*optional*)
- GIS mapping software (*optional*)

2 The Need for Strategic Asset Naming

An asset is something of value. Assets may need to be inventoried, and assets may need to be found, in tall grass, large fields, forests, or in a parking lot with hundreds of like items, such as light poles. Maintenance crews can spend critical time locating specific assets. What if we could make the job easier?

Assigning assets a unique identifier is a common method for identifying and referencing particular assets. The main requirement of an identifier is that it be unique. Asset numbers may be auto-generated or they may be strategically created. Auto-generated numbers can identify specific assets, but miss an opportunity to include important information concerning the asset. A strategically assigned asset identifier can include location information, thereby assuring both that the name is unique and that the location of the asset is always known (USNG Florida 2014b).

The USNG uniquely offers a method to locate any place or any object in the world with a short alphanumeric code (USNG Florida 2014a). The USNG is easy to use and can be taught at the eighth grade level in fifteen minutes. The USNG is a language of location that can pinpoint an asset anywhere in the world.

Figure 1 shows a smartphone displaying USNG coordinates atop a fire hydrant to demonstrate the simplicity of including the geospatial location in the asset name. Figure 2 shows a sample Emergency Location Marker (ELM) referencing USNG coordinates. These markers are used in nine states for Search-and-Rescue (SAR) operations as GPS services and cell phones using street addressing with common 911 systems have proven unreliable in a variety of settings.



Figure 1: Hydrant and smartphone showing full USNG coordinate associated with an asset near Titusville, Florida. Photo courtesy of Al Studt.



Figure 2: Emergency location marker (ELM) in Volusia County, Florida, using a smart phone app Theodolite that shows present position via USNG that matches the ELM. Photo courtesy of Al Studt.

2.1 User Stories

Question: In Central Florida, at a major theme park, a light pole falls on a customer's vehicle. A company is hired to inspect light pole bases. How do they easily differentiate any one light pole in a parking lot from any other?

Answer: The U.S. National Grid.

Al Studt
Fire Systems Engineer at Kennedy Space Center
Member of Florida Task Force 4 Urban Search & Rescue Team
Owner of <http://www.USNGFlorida.org>

The Mohawk Valley Water Authority serves 40,000 customers in the Greater Utica Area in Central New York. We have 700+ miles of pipe, 28 storage tanks, 21 pump stations, and numerous fire hydrants. We communicate hydrant status information internally and with many fire departments. We need to name these items meaningfully. We have tried several naming conventions—both sequential and hierarchical—with confusing and disappointing results. We converted to USNG asset naming and have used this successfully for over 4 years!

Elisabetta T. DeGeronimo
Watershed/GIS Coordinator at Mohawk Valley Water Authority
Utica, New York

Hundreds of thousands of roadside assets—culverts, drains, signs on ground mounts, signs on overhead support structures, signs on span wires, and guide rails—are found along the routes maintained by the New York State Department of Transportation. In the past, the existence of these assets was

only recorded in construction plans and the minds and memories of dedicated career staff. Our new asset naming convention, based upon the U.S. National Grid, benefits the entire department and particularly the field forces.

Mary Susan Knauss
Senior Transportation Analyst, Office of Transportation Management
New York State Department of Transportation, Albany, New York

2.2 Sample of Asset Naming Results

The specific parts of the asset name will be covered in detail in the next section. Figure 3 shows light poles along a highway in New York. The “LP” prefix indicates the asset is a Light Pole. The asset is located to a precision of 1 meter, as evidenced by the 10 numeric characters representing the USNG coordinates. Figure 4 shows an alternate view of asset naming using overlaid grid lines.



Figure 3: Sample of asset naming: light poles along a highway in New York. Photo courtesy of Mary Susan Knauss.

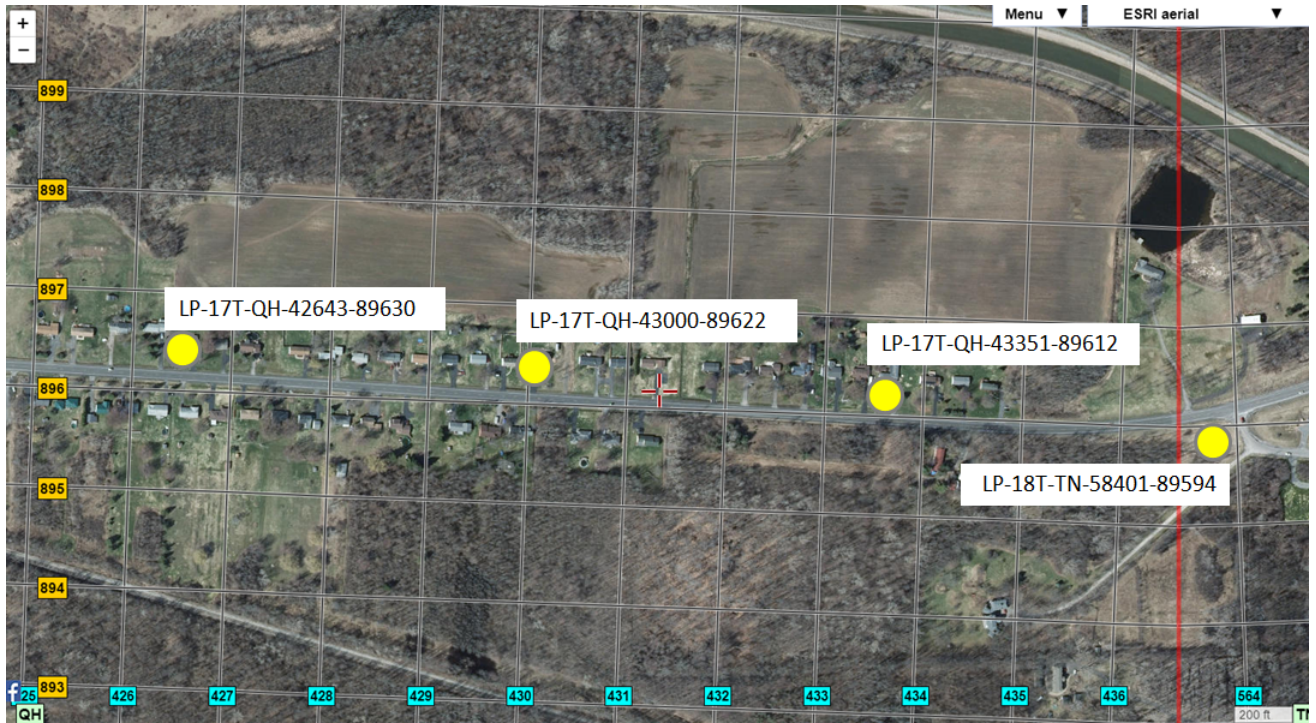


Figure 4: Sample of asset naming with overlaid grid: light poles along a highway in New York. Light pole data courtesy Mary Susan Knauss. Background map courtesy of Joseph Elfelt through GISsurfer (<https://GISsurfer.com>).

2.3 Previous Naming Strategies that Did Not Work Well

There are undoubtedly an unlimited number of creative methods to name assets. The only mandatory characteristic is that the names be unique. However, there are other characteristics that would be desirable and helpful, such as the names being meaningful, parsable, and of the same length. Below are some methods that have been tried with lackluster success.

1. Hierarchical

- Formula: city abbreviation + street abbreviation + nearest street address number
- Example: UTGEN00258 or MACAV15824
- Results: This strategy worked satisfactorily for assets located near standard house addresses but was far from ideal (DeGironimo 2014).

2. Customized Linear Reference

- Formula: Route(4) + Region, County and Municipal boundary codes(5) + mileage in 10ths(3)
- Example: 22A18011052 or 987G82031175
- Results: This strategy worked satisfactorily for locating transportation assets using the reference marker, a +/- distance from the nearest marker and an offset from the centerline. This approach does not work well at complicated interchanges, multiline intersections, or for assets located off the highway. The name is not meaningful to first responders or anyone outside of the DOT without code documentation and training. Figure 5 shows an example of this method (Knauss 2019).



Figure 5: Sample of the customized linear reference method. Photo courtesy of Mary Susan Knauss.

3. Sequential

- Formula: increment number count for each asset
- Example: 49735
- Results: The names are not meaningful, may not be the same length, and are not parsable (DeGironimo 2014).

4. Random

- Formula: assign random characters to each asset
- Example: 6eg28HW1
- Results: The names are not meaningful, may not be the same length, and are not parsable (DeGironimo 2014).

3 The Value of the U.S. National Grid

The U.S. National Grid has uses beyond wide-area emergency operations. It can be used by industry, municipalities, and any other entity to mark, or geolocate, assets. The USNG offers a simple, easy, reliable method for uniquely naming any natural or man-made GIS feature—fire hydrant, geologic outcrop, light pole, guardrail, transformer, and many more. The Kennedy Space Center has been associating USNG coordinates for asset geolocation since 2007 (USNG Florida 2014a).

The USNG is a modernized version of the Military Grid Reference System (MGRS) developed after World War II, giving it over 70 years of military usage and over a decade of proven reliability in emergency management. Unlike other grid systems, the USNG considers the curvature of the earth. The USNG is a language of location, considered to be the most reliable method of locating any place or object anywhere on earth at multiple scales. The USNG may be the only unambiguous way to describe locations in areas without an established road network or where destruction of signage has occurred. USNG coordinates convey a geographic location as well as a geographic scale measured in meters at multiples of ten from less than 1 meter to 100,000 meters (USNG Center 2018; USNG Florida 2014a).

The USNG is approved by Federal Geographic Data Committee (FGDC) as a standard for geolocating and location reporting across the United States. Based on Universal Transverse Mercator (UTM) projection, the USNG is measured in meters. The USNG is a national standard, recognized by the Federal Geographic Data Committee (FGDC), all branches of the U.S. military, the U.S. Park Service, the U.S. Geological Survey (USGS), the Federal Emergency Management Agency (FEMA), the Florida Division of Emergency Management (FDEM), the Florida Fire Chiefs' Association (FFCA), and many local emergency responders, including Search-and-Rescue (SAR) personnel. Each cell of the USNG has a unique identifier that conveys spatial location and size and is understandable by anyone familiar with this system (USNG Center 2018; USNG Florida 2014a; Studt 2014).

3.1 Deciphering the USNG Identifier

Figure 6 shows the U.S. is divided into 6-degree longitudinal zones designated by a number corresponding to the UTM zone. The 8-degree latitudinal bands are designated by a letter. This 6-degree longitude, 8-degree latitude band is known as the Grid Zone Designation (GZD). Examples of GZDs are 16R, 18T, and 11S. Because of the curvature of the earth, GZDs vary in size.

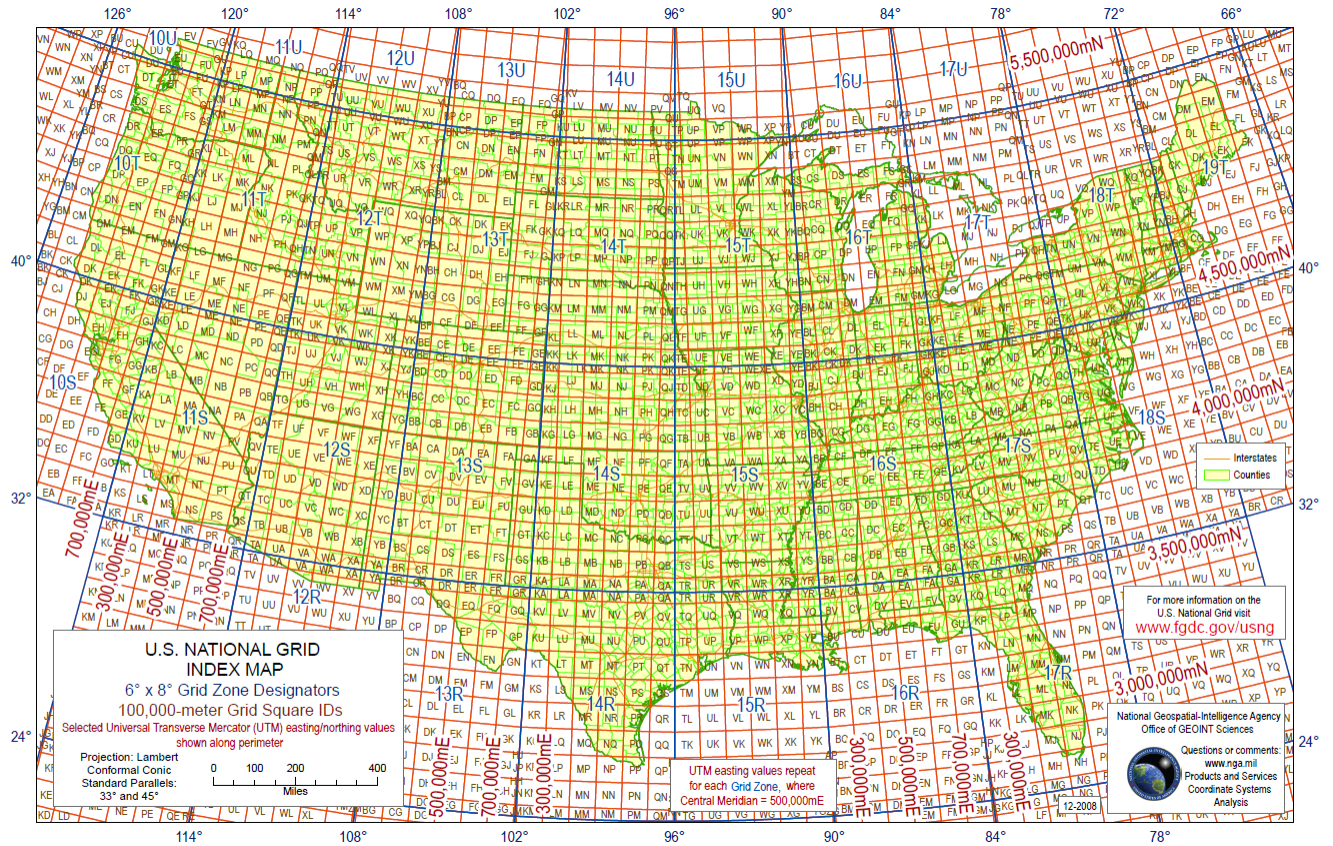


Figure 6: The division of the U.S. into Grid Zone Designations (GZDs) that considers the curvature of the earth. Map courtesy of the National Geospatial Intelligence Agency.

GZDs are further divided into 100,000-meter cells represented by unique 2-letter designations. Figure 7 shows the GZD and 100,000-meter grid cells, represented by 2 letters, for the state of Florida. Within each 100,000-meter cell, any point can be further divided down to 0.1 meter. Point positions within the 100,000-meter square are given UTM grid coordinates (Easting and then Northing). An equal number of digits is used for each position. The number of digits is determined by the desired precision. Table 1 shows the relationship between USNG scale and number of digits required to represent the scale. More digits give a finer precision. To demonstrate scale, Figure 8 shows a 10-meter grid superimposed on a 6-car portion of a parking lot.

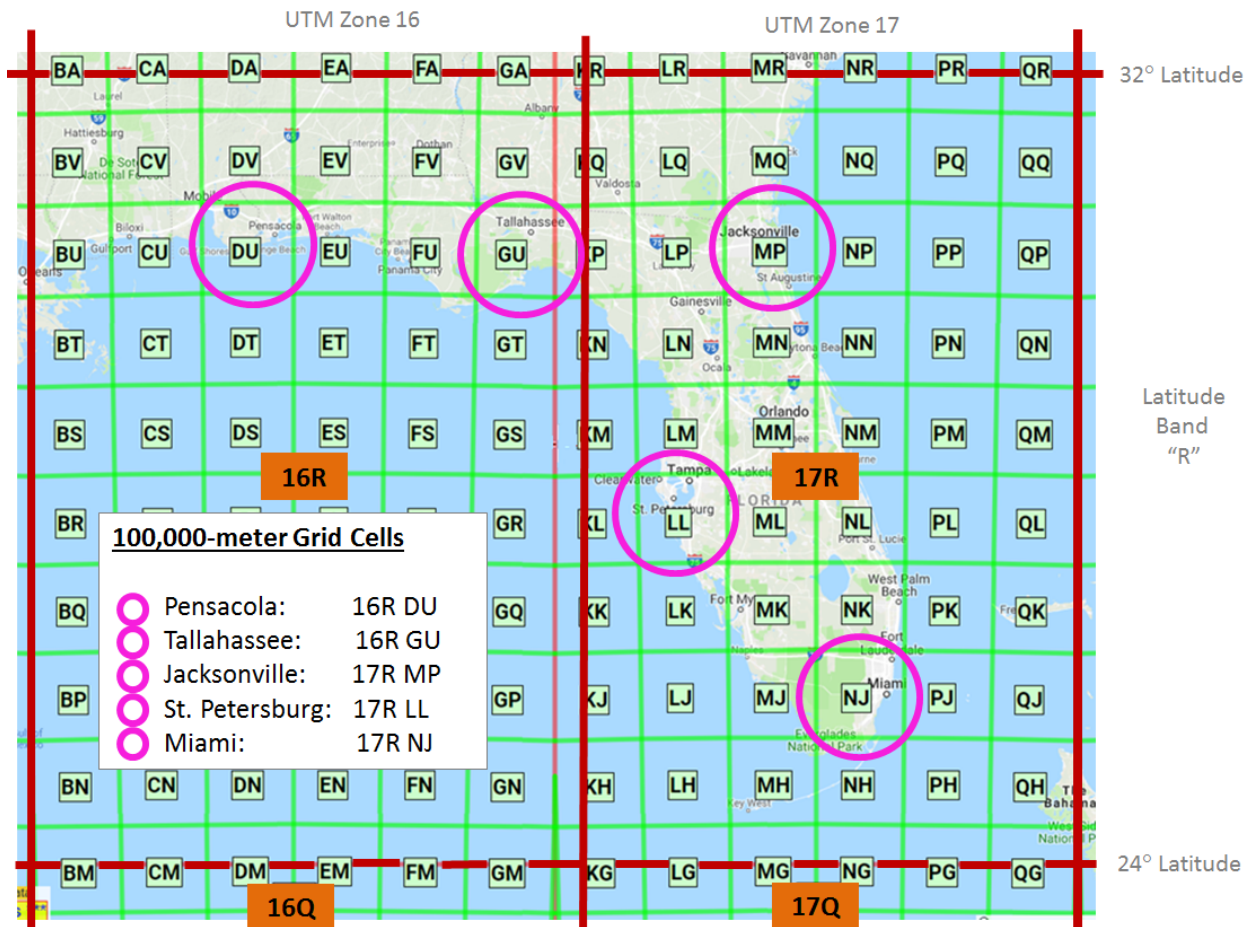


Figure 7: Florida divided into 100,000-meter grids. Background map courtesy of Joseph Elfelt through GISsurfer (<https://GISsurfer.com>)

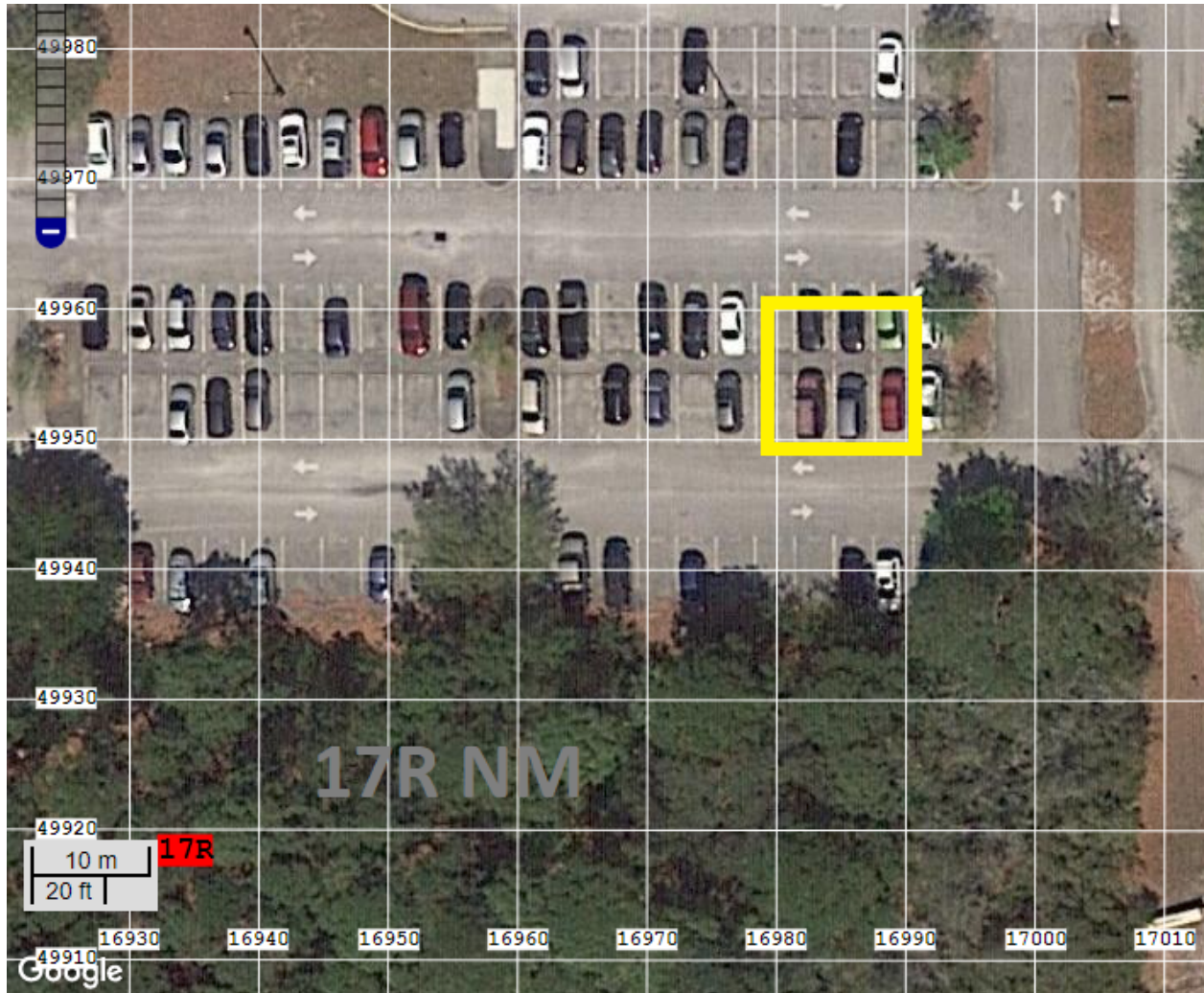


Figure 8: A 10-meter grid superimposed on a 6-car portion of a parking lot. Map courtesy of Al Studt.

USNG Scale in Meters	Human Scale	Number of Digits in the USNG Coordinate
100,000	Regional Area	0
10,000	Local Area	2
1,000	Neighborhood	4
100	Soccer Field	6
10	6-Car Parking Area	8
1	Manhole Cover	10
0.1	Patio Tile	12

Table 1: USNG scale and the number of digits needed to convey the scale.

3.2 Components of the USNG Identifier

Figure 9 shows a breakdown of the three parts of a USNG identifier.

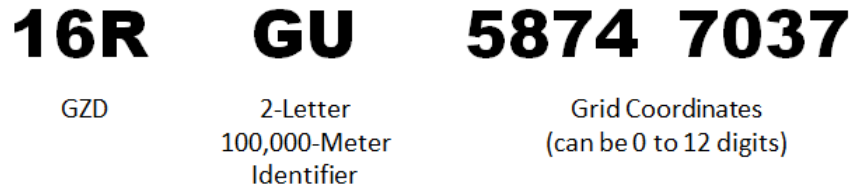


Figure 9: A USNG identifier separated into its three components.

The USNG identifier is comprised of three parts:

1. GZD – Grid Zone Designation
 - The U.S. is divided into 6-degree longitudinal zones designated by a number and 8-degree latitudinal bands designated by a letter.
2. 2-Letter 100,000 Meter Grid Identifier
 - Each GZD contains 100,000-meter grids with 2-letter designations. These grid identifiers are unique within each GZD, but are also unique in contiguous GZDs as they were specifically designated not to repeat within 800 miles.
3. Grid Coordinates
 - Point positions within the 100,000-meter square are given UTM grid coordinates (Easting then Northing).
 - An equal number of digits is used for each position.
 - The number of digits is determined by the desired precision or scale (0 to 12).

3.3 Geographic Extent and Truncating the Identifier

A GZD is to the USNG what an area code is to a telephone number. Telephone numbers intended to be used over a large region include the area code while phone numbers used locally omit it. The USNG works in a similar manner.

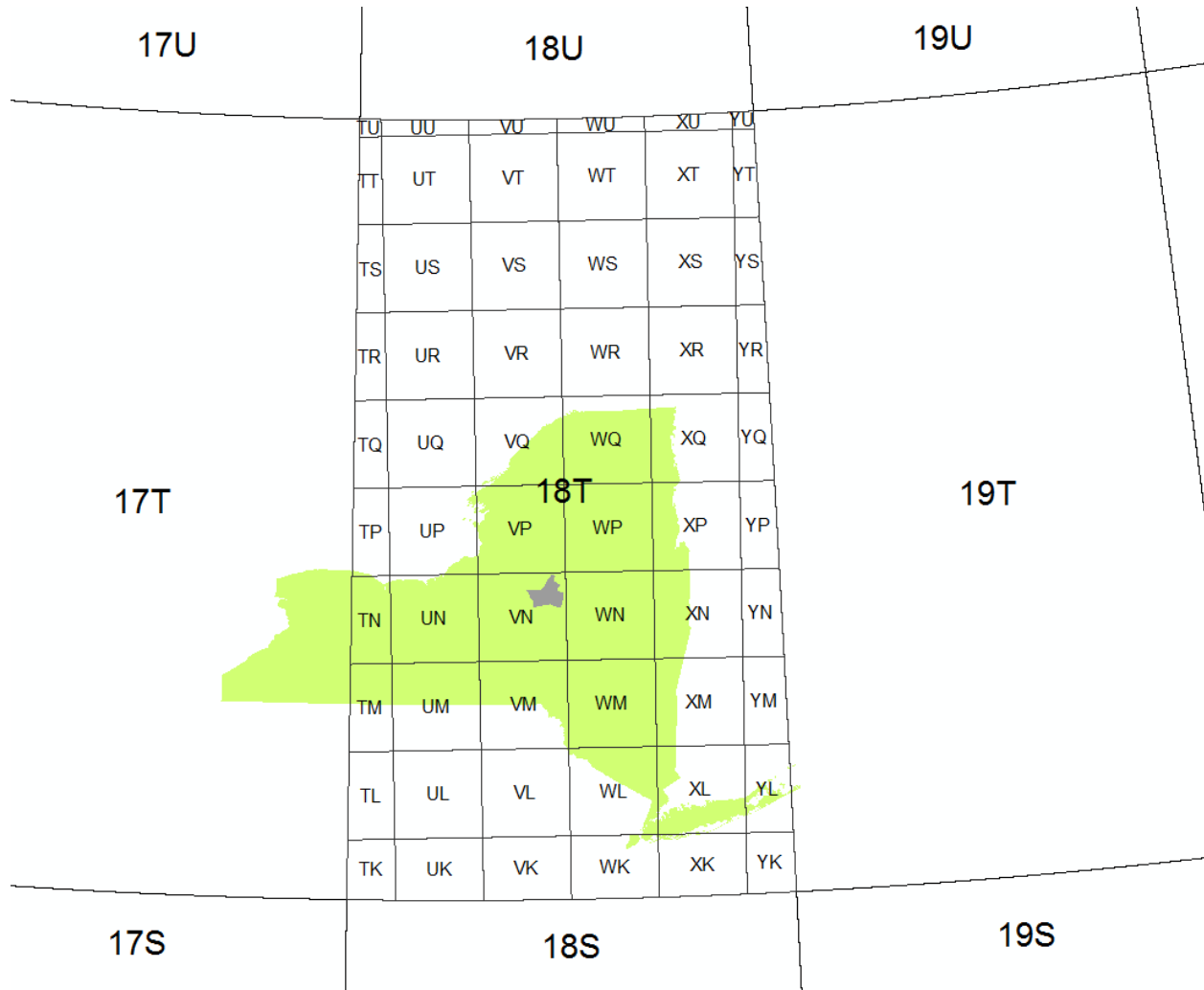


Figure 10: Mohawk Valley Water Authority (gray) located within the state of New York (green) with USNG overlay. Map courtesy of Elisabetta DeGironimo.

Figure 10 shows the Mohawk Valley Water Authority, shown in gray, located in central New York. The area is completely contained within the 2-letter, 100,000-meter grid cell named VN. Therefore, it is possible to remove the 18T GZD as well as the 2-letter identifier, for a total of 5 alphanumeric characters removed. All attributes within VN can be uniquely identified by the grid coordinates regardless of the scale (DeGironimo 2014).

By contrast, Figure 11 shows the state of Florida occupying two GZDs. Visual inspection shows that the 2-letter 100,000-meter grid identifiers do not repeat within these GZDs as this was a design feature of the USNG. Therefore, it is possible to omit the GZD (3 characters). All features within

Florida can be uniquely identified by the 2-letter identifier and grid coordinates, regardless of scale.

The state of New York is located within three GZDs. As in Florida, in New York the 100,000-meter grid identifiers are unique across the state and the 3-character GZDs may be omitted. Large areas where the 2-letter identifiers repeat will require the full USNG name as no alphanumeric characters can be removed without compromising uniqueness. Table 2 contains rules for determining the number of alphanumeric characters that can be omitted. Even if characters can be truncated, it is an organization's decision on whether to implement truncation.

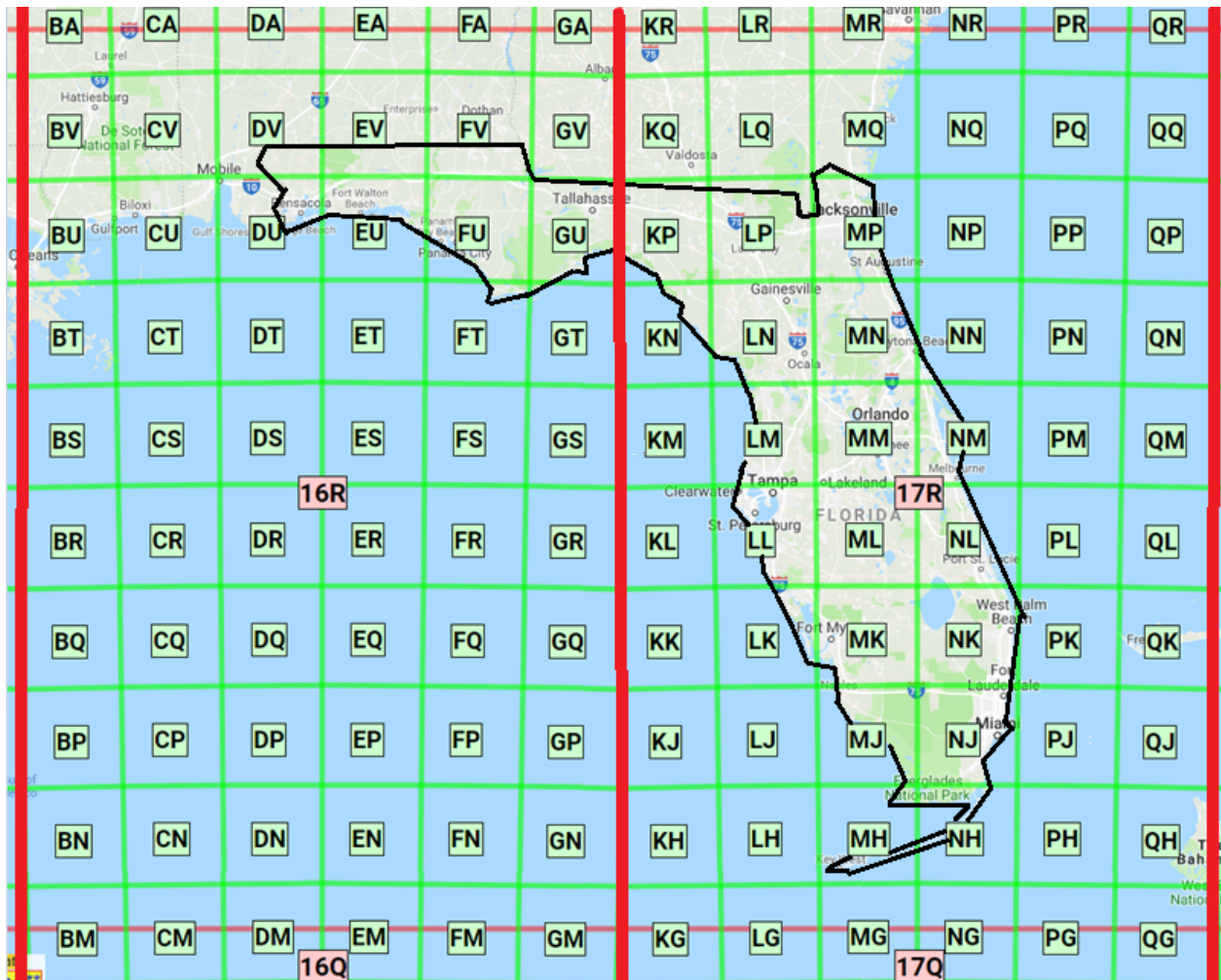


Figure 11: The state of Florida located within two GZDs–16R and 17R. The 2-letter 100,000-meter identifiers do not repeat within the GZDs. Background map courtesy of Joseph Elfelt through GISsurfer (<https://GISsurfer.com>)

Number of Alphanumeric Characters that can be Truncated	Condition for Truncation
5	If the geographic region is completely contained within one 100,000-meter grid cell
3	If the geographic region is not contained within one 100,000-meter grid cell, but there are no 2-letter identifiers that repeat within the region
0	If the geographic region is very large and there are repeating 2-letter identifiers

Table 2: Guidelines for determining how many alphanumeric characters can be removed from the full USNG identifier.

Naming Structure	Number of truncated USNG characters
Prefix-EEEE-NNNN-Suffix	5
Prefix-CC-EEEE-NNNN-Suffix	3
Prefix-GZD-CC-EEEE-NNNN-Suffix	0

Table 3: Structure and format of final asset names.

4 Asset Naming Considerations

4.1 Asset Naming Format

A structured naming format will increase readability and parsability. Abbreviating the asset name saves space and decreases chances for misspellings. If multiple features are found in the same grid cell, a counter is appended to the asset name to ensure uniqueness. All items are separated by a dash (-) for legibility by default, but the delimiter can be user-defined. Table 3 summarizes the three possible formats.

Feature Name	Prefix	USNG Scale	Number of Coordinate Digits Necessary to Convey Scale	Number of Alphanumeric Characters in Final Asset Name
Main Line Valve	MV	1 m	10	16
Pump	P	1 m	10	15
Curb Box	C	1 m	10	15
Fitting	F	1 m	10	15
Service Line Valve	SV	10 m	8	14
System Control Valve	CV	10 m	8	14
Pressure Regulating Valve	PV	10 m	8	14
Hydrant	H	100 m	6	11
System Meter	SM	100 m	6	12
Storage	T	1000 m	4	10
Sampling Station	SS	1000 m	4	10

Table 4: Naming strategy table for Mohawk Valley Water Authority.

The parts of the asset naming format are:

- GZD – Grid Zone Designation (*omit if geographic region is completely within one GZD*)
- CC – 2-letter 100,000-meter identifier (*omit if there are no 2-letter identifiers that repeat within the region*)
- Prefix – abbreviation of the asset name
- N – grid coordinate, northing (*contains 0-6 digits*)
- E – grid coordinate, easting (*contains 0-6 digits*)
- Suffix – number to denote multiple assets within the same grid cell to ensure uniqueness

4.2 Naming Strategy Table Examples

Tables 4 and 5 show real-world asset examples from the Mohawk Valley Water Authority and the New York State Department of Transportation. These tables demonstrate that organizations choose the asset scales best for their work flows.

4.3 Asset Scale

To devise a Naming Strategy Table such as those shown in Tables 4 and 5, careful thought should be given to asset scale. Should the scale reflect the size of the individual asset or the spatial proximity of the collective assets? Each organization must decide appropriate scales for each asset type that

Feature Name	Prefix	USNG Scale	Number of Coordinate Digits Necessary to Convey Scale	Number of Alphanumeric Characters in Final Asset Name
ADA Ramp	AR	1 m	10	16
ADA Sidewalk	AS	1 m	10	16
Linear Ditches	LD	1 m	10	16
Point Drains	PD	1 m	10	16
Guide Rail	GR	1 m	10	16
Retaining Walls	RW	1 m	10	16
Sign Assembly	SA	1 m	10	16
Light Pole	LP	1 m	10	16
Light Cabinets	LC	1 m	10	16
Pull Box	PB	1 m	10	16
Utilities	U	1 m	10	16

Table 5: Naming strategy table for the New York State Department of Transportation.

works for their group. It is important to consider not only the current scale of an asset but possible increased density in the future. The Mohawk Valley Water Authority (MVWA) discussed scale internally and their ideas are included here for guidance.

Originally, the MVWA planned to scale hydrants at 1 meter and various types of valves and pumps at 0.1 meter. The logic behind these choices is that these scales approximate the physical size of the asset. However, this strategy produced situations where the names were not unique, such as when multiple features physically touched. The MVWA realized that multiple features could occupy the same grid cell and names could be unique if an incremental counter were added as a suffix to the name. For example, the first asset found in a grid cell would receive a suffix of 0, and subsequent assets would receive incremental suffixes of 1, 2, and so forth. This strategy produced unique names even if multiple assets occupied a grid cell (DeGironimo 2014).

With uniqueness guaranteed, the MVWA considered other methods to improve the asset name. Since over 92% of MVWA fire hydrants are not located closer than 100 meters, questions arose over whether a hydrants scale should be 1 meter or if it could be increased to 10 or 100 meters. All scales would produce uniqueness through the incremental suffix. The decision was made to scale hydrants at 100 meters as this produced a shorter asset name that saved 4 digits and is more legible to humans. Table 6 shows hydrants and valves at various scales. In conclusion, a larger scale reduces the length of the asset name (DeGironimo 2014). The New York State Department of Transportation chose to scale all assets to 1 meter for statewide uniformity (Knauss 2019). (Note that the Python package pyUTM described below uses a slightly different strategy than described here for suffixes.)

Asset Type	Asset Scale	Asset Name
Hydrant	1 m	H-16721-02834-0
Hydrant	10 m	H-1673-0282-0
Hydrant	100 m	H-167-028-0
Main Line Valve	0.1 m	MV-334521-149032-0
Main Line Valve	1 m	MV-33452-14903-0

Table 6: Hydrant and valve assets at various scales and the resulting name differences for the Mohawk Valley Water Authority.

5 pyUTM

The most up-to-date version of the Python package pyUTM, as well as detailed instructions for its installation and use, can be found at <https://github.com/FREAC/pyutm> or installed from the Python Package Index using pip.

The following steps demonstrate pyUTM usage with shapefile data. pyUTM also supports CSV files and a Python list of points, but these are not used in the sample exercise.

a Download sample data from the Github page. The sample data is a of fire hydrant data for Leon County, Florida.

b Start a Python session, then type:

```
>>> import pyutm
```

This command will load pyUTM into your current Python session.

c Load the data into a Grid object. This step initializes the data. Data problems should be detected at this stage.

```
>>> grid_from_shp = pyutm.Grid('hydrants.shp', epsg=4326)
```

Replace the pathname with the actual directory path to the sample data. The EPSG of the input data is technically not required here, as pyUTM assumes data are in the WGS84 coordinate system if none is given.

d To write a USNG identifier, use the `write_refs()` function:

```
>>> grid_from_shp.write_refs('hydrants_2.shp', precision=1000)
```

This command writes a new named 'hydrants_2' into the directory used in the previous command. The precision of the identifier will be 1000 meters. Viewing this new should look similar to Figure 12.

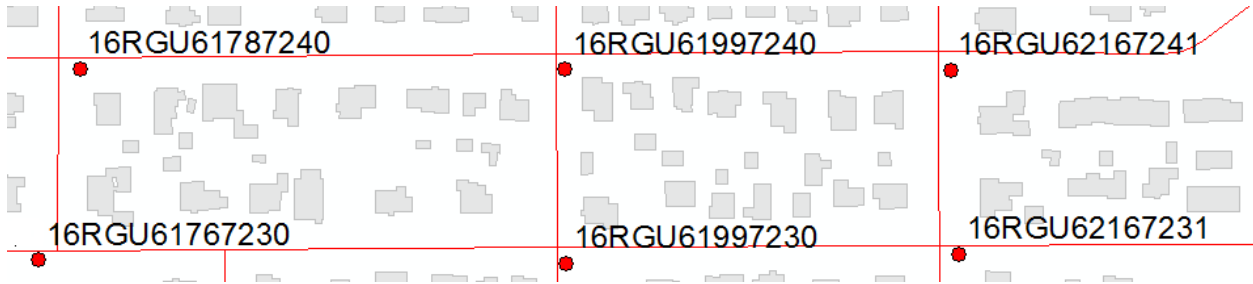


Figure 12: Hydrants showing USNG labels.

e To write a unique identifier based on the USNG, simply use the `write_uid()` function:

```
>>> grid_from_shp.write_refs('hydrants_3.shp', prefix='H',
    precision=1000)
```

This option displays both the GZD and 100-km grid identifier, as shown in Figure 13.



Figure 13: Hydrants showing full grid identifiers.

To remove the GZD, include the `gzd=False` option:

```
>>> grid_from_shp.write_refs('hydrants_4.shp', prefix='H',
    precision=1000, gzd=False)
```

To remove the 100-km grid identifier, include the `k100=False` option:

```
>>> grid_from_shp.write_refs('hydrants_5.shp', prefix='H',
    precision=1000, gzd=False, k100=False)
```

Figures 14 and 15 show the results of truncating alphanumeric characters from the asset name.



Figure 14: Hydrants with GZD grid identifier truncated.



Figure 15: Hydrants with GZD and 100-km grid identifiers truncated.

To change the precision of the identifier to 100 meters and the delimiter to `.`:

```
>>> grid_from_shp.write_refs('hydrants_6.shp', prefix='H',
    precision=100, gzd=False, k100=False, delimiter='.')
```

Figure 16 shows variations of precision and choice of delimiter.



Figure 16: Hydrants showing variations of precision and delimiter in the asset name.

There are many other options documented at the Github page. This sample exercise demonstrates basic functionality using shapefiles only.

6 Considerations for Asset Naming Using Your Own Data

Step 1. Determine extent of your geographic data.

Consult Table 2 to determine the number of characters that can be truncated for your geographic area, if any.

Step 2. Inventory the assets.

- Determine which assets will be included.
- Assign a short prefix (or abbreviation) to each asset type. (*optional*)
- Determine the scale (precision) to locate the asset. Consider the possibility that an asset could have increased density in the future.

Step 3. Complete the Naming Strategy Table.

Use Table 7 as a template for a Naming Strategy. This table is useful for planning purposes as well as project documentation.

Feature Name	Prefix	USNG Scale	Number of Coordinate Digits Necessary to Convey Scale	Number of Alphanumeric Characters in Final Asset Name
		1 m	10	
		10 m	8	
		100 m	6	
		1000 m	4	

Table 7: Template for developing a naming strategy table.

Step 4. Convert line or polygon data to point data.

Skip this step if your data is already in point format.

Since USNG is a point-based referencing system, points are needed.

Line Features Find midpoint (use Feature to Point (inside option))

Polygon Features Find centroid (use Feature to Point (inside option))

Line and polygon feature classes must have a unique temporary ID before running Feature to Point so that USNG IDs can be rejoined to the original feature.

Step 5. Run the steps shown in the sample exercise.

<https://github.com/FREAC/PyUTM> has the most recent code updates and instructions.

Step 6. Rejoin data if needed.

For line or polygon data, join the USNG ID with the original feature using the temporary ID created in step 4.

7 Conclusion

We hope that this instruction guide is helpful to organizations for USNG GIS asset naming. The USNG has over 70 years of proven use in many types of military operations, and its precision in pinpointing any place on earth makes it a reliable choice for Search-and-Rescue operations and unambiguous asset naming.

8 References

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9 Additional Resources

PyUTM *The Python package that accompanies this document. PyUTM creates standardized grid references for point data to create spatially meaningful unique identifiers for tasks such as asset naming. Output formats are USNG, MGRS, and UTM.*

Github: <https://github.com/FREAC/PyUTM>

USNG Center *Official Website for the USNG*

Website: <https://usngcenter.org>

General Information: <https://usngcenter.org/portfolio-item/usng-articles/>

Link to Directives: <https://usngcenter.org/portfolio-item/directives/>

Wikipedia

Website: https://en.wikipedia.org/wiki/United_States_National_Grid

GISsurfer *Map viewing tool with support for USNG, MGRS, UTM, and latitude longitude coordinates*

Website: <https://GISsurfer.com>

Map Viewer: <https://mappingsupport.com/p2/gissurfer.php>

USNG Florida *Promoting the U.S. National Grid in Florida and nationwide*

List of Resources: <http://bit.ly/USNG-resources>

Website: <http://usngflorida.org/>

Twitter: <https://twitter.com/usngflorida>

Articles: <https://medium.com/@USNGFlorida>

Facebook: <https://www.facebook.com/USNG-Florida-107618149257256/timeline/>

YouTube: https://www.youtube.com/channel/UCi1qd3IYvj--vPf0Kd_K8jw

Florida Fire Chiefs' Association *Statement to add USNG to all map products*

Website: <http://bit.ly/2015-FFCA-USNG>

USNG GIS Data Model *Benefits of using the USNG as a GIS database*

Website: <https://usng-gis.org>