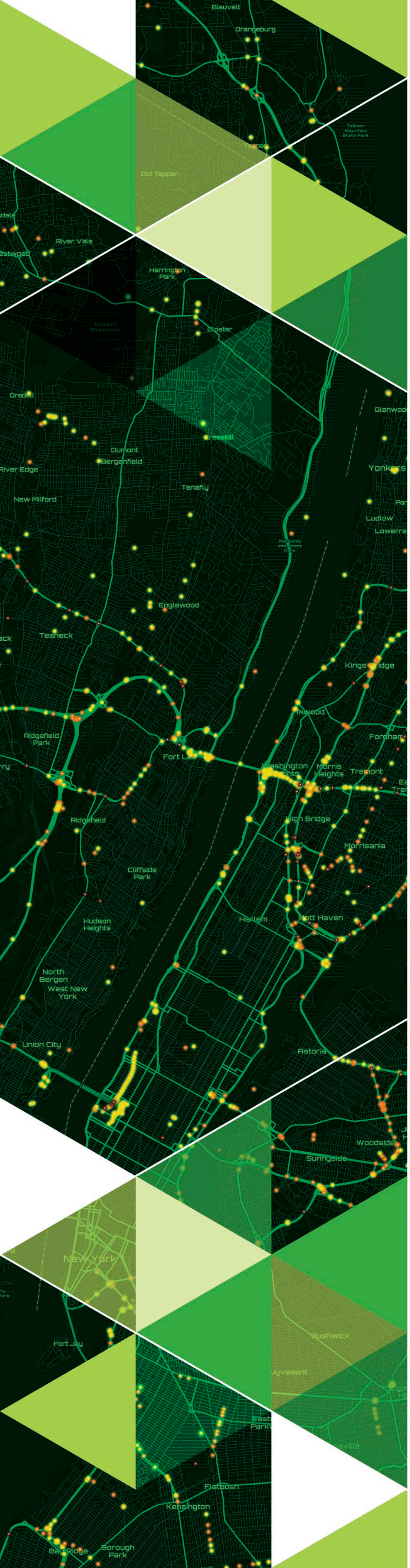


AN ESRI
TECHNICAL PAPER

August 2025

Modernizing Cadastral Systems with ArcGIS Parcel Fabric

380 New York Street
Redlands, California 92373-8100 USA
909 793 2853
info@esri.com
esri.com

esri | THE SCIENCE OF WHERE®

Table of Contents

Modernizing Cadastral Systems with ArcGIS Parcel Fabric

Executive Summary

The technological innovations of the past two decades have had a major impact on the speed, quantity, quality, and overall characteristics of cadastral measurement data. Simple web maps on mobile devices can be used to capture high-accuracy coordinate information in the field, either in real-time or disconnected and synchronized later. Such innovations have spawned exciting new approaches to the cadastral information systems of developing nations around the world and have also sparked a resurgence in the modernization of cadastral systems in the developed world. As a result, there is now an ever-growing body of cadastral data coming from diverse sources ranging from recorded paper documents to electronically submitted records to a variety of measurement sensors.

This paper describes ArcGIS Parcel Fabric technology, introducing parcel concepts, the information model, and key technical information for a foundational understanding of the software. Readers will get a broad vision as well as a deep dive into the important elements that underpin the technology and its role within the broader ArcGIS ecosystem.

ArcGIS Parcel Fabric is a modern cadastral software system that is a proven, practical solution for maintaining and using measurement-based information for land parcels. It allows cadastral organizations to support fit-for-purpose requirements by storing the information necessary for establishing appropriate use. Metadata such as method of capture, date, spatial accuracy, and historical lineage can be stored, used, and published as needed. The built-in data quality management of the software assesses other key criteria, such as topology and attribute accuracy.

Motivation

Representing land parcel information in a transparent public system is key to securing title and property ownership rights; a nation's economy is greatly influenced by the ability of its citizens to leverage the value of their land to gain access to credit.

Cadastral authorities serving as the authoritative source for land information are required to maintain a seamless digital map for use as a spatial index to cadastral registration, taxation, and titling systems. Contemporary systems often publish property information online as web services for use by the public and throughout the government. The parcel basemap layer commonly serves as spatial control in the maintenance of other geographic information system (GIS) datasets such as utilities, transportation, planning, and zoning. The continued growth in technologies that spatially enable traditionally nonspatial datasets presents many potential new benefits. These benefits run the risk of not being fully realized if fit-for-purpose metrics are not defined and published with the data.

Historical and Regional Context

Securing title to land includes capturing location evidence, usually by a partial or complete delineation of boundaries with an accompanying description of physical features and/or reference to abutting properties. The type and method of capture for boundary delineation evidence varies around the globe. From an information management perspective, as older titling systems adapt to newer technologies, they carry forward the approaches from the past in their natural evolution. Consequently, the capture and management of boundary evidence have evolved into different models, albeit with the underlying measurement types (distances, angles, etc.) having the same meaning in all models. Boundary evidence may directly reference physical features that depict the boundary itself, such as stone walls, hedgerows, etc., as in the general boundaries model; or may include distance measurements offset from existing structures near to the boundary, as seen in western European countries; or may be defined by physical monuments placed in the ground to define each bend in a boundary line, along with the distances, angles, and directions between, and the descriptions of the marks placed. Devices used have varied in sophistication through time, ranging from chain to tape measure to total station, to real-time kinematic Global Navigation Satellite System (GNSS) receivers. Of course, the recording medium for these measurements has also changed through time. For example, although a specific measurement type may be a “simple horizontal distance,” the resulting digital representations in modern systems range from scanned file images of the original handwritten field sketches to electronic field books to a record stored in a geodatabase table.

The old measurements recorded are reused to locate original boundaries, and new surveys attempt to find and capture the same physical objects that were placed or referenced in older surveys. The result is a measurement network of mixed measurement types, ages, and accuracy.

This paper reviews the general measurement concepts for building a cadastral map and describes ArcGIS Parcel Fabric technology in the context of these ideas, principles, and concepts.

Naming Convention for Technical Terms

In this paper, technical concepts are introduced using terminology that may be unfamiliar to the reader. Upon first occurrence, these terms are presented in lowercase italics to improve clarity and enhance readability and are thereafter treated as common nouns. Here is an example of using this convention: a *feature class* is a geodatabase table in which each row stores geometry representing a spatial feature. The geometry is contained in a dedicated shape field, while all other attributes are stored in the remaining fields.

A System for Parcel Intelligence

The architects of land information systems require the ability to build technology solutions that are easily configured without the need to create customized tools, yet flexible enough to accommodate the business needs of their clients. Preconfigured solutions available with off-the-shelf software products are easily adapted to the varying business needs of different land recording systems.

Maintaining data quality in information systems requires avoiding deterioration or loss of data during regular maintenance workflows, or when migrating data from old to new systems.

Geographic information systems also have additional considerations for spatial quality.

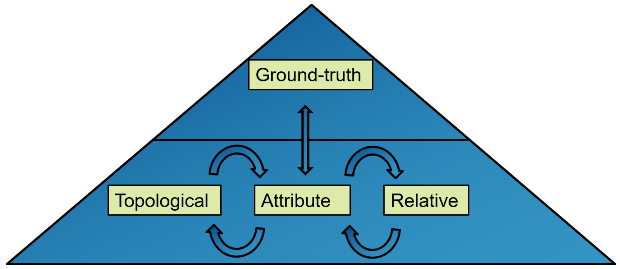
Defining data quality

Evaluating the spatial and non-spatial quality characteristics of land information systems is essential for their reliability and usability. These characteristics can be classified into four primary categories: attribute accuracy, topological accuracy, relative accuracy, and ground-truth accuracy. Understanding and assessing these categories ensures that the land information system supports sound decision-making, minimizes mistakes, and maintains the integrity of the system of record.

Ground-truth accuracy has two elements: the first is the absolute coordinate accuracy, relating to how well the coordinate stored in the mapping system matches the “absolute” survey-measured coordinate returned from the field. The other element of ground-truth accuracy is related to the identification of the correct object in the field and confirming the right description is stored in the system for the represented feature. This may be characterized as ensuring that you did not make a mistake by “accurately measuring the wrong feature.”

Relative accuracy describes the local spatial relationship between geographic features. For example, a road right-of-way may be described as 60 feet wide, such that two parcels on either side of the road are mapped with a 60-foot separation. If the digital representation of these two parcels is repositioned or given an identical X and Y offset, their relative accuracy is unchanged, whereas the absolute positional ground truth is altered.

The accuracy types are codependent and build on each other. For example, the stored attribute for a horizontal distance can be compared with the mapped shape length to detect and assess if any large difference is caused by a distorted geometry or by a mistake in the distance attribute. The legal date attribute may be used to understand the likely method of capture, which in turn influences how the measurement is used in adjustment techniques. The date also has added significance when considered in the context of dynamic datums.



The inter-related categories of accuracy, when combined into a cohesive information system make it possible to achieve continuous ground-truth improvement of the whole system over time, including enhanced positional quality information about the features.

Coordinate Accuracy

Coordinate accuracy is a metric of how well a published coordinate matches the ground truth position of the feature that the coordinate represents. In many respects a published coordinate is secondary to knowledge about its accuracy. This understanding of ground-truth accuracy makes spatial data considerably more useful to all consumers. Given the coordinate of a physical feature, information about its source and accuracy is required to make an informed decision about its potential use.

Configurable quality assurance frameworks

In ArcGIS Pro, a configurable set of frameworks is available to apply these different types of quality assurance checks. They are broadly available as part of the overall system of record in the ArcGIS ecosystem and are built in as part of ArcGIS Parcel Fabric. These are described in more detail in the next section.

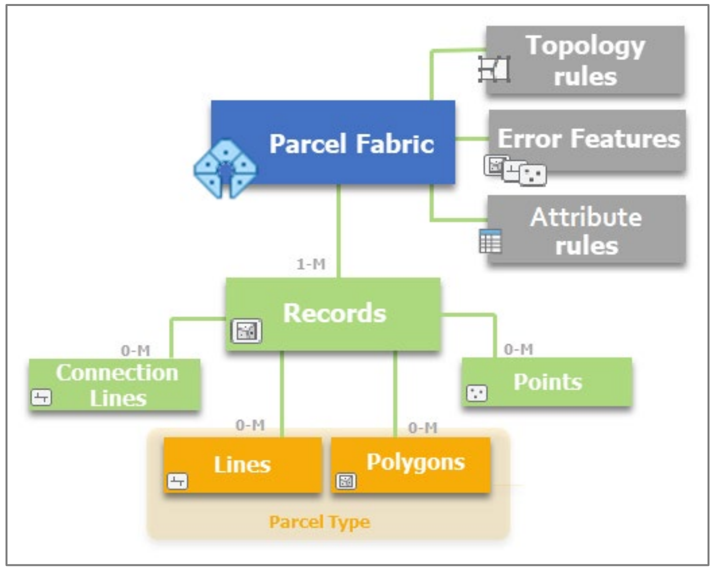
The Parcel Fabric Data Model

ArcGIS Parcel Fabric technology is built around a controller dataset, known as the *parcel fabric dataset*. The fabric also uses a *geodatabase topology* and *attribute rules*, as described in the following sections.

Geodatabase tables that store vector geometry, known as *feature classes*, are presented on the map as *feature layers*, and the individual table rows are called *features*. The parcel fabric dataset controls a group of feature classes that work together as a single cohesive system. The *records* feature class stores the representation of each recording document that brings new parcels into the fabric. Each record feature is stored with a polygon geometry that is the overall footprint for all the parcels that it represents. Each recording document may represent one or multiple parcels and the associated transactions in the parcel fabric do not remove the original parent parcels. The parent parcels are kept and managed by the system and are used to maintain parcel lineage.

Learn more about parcel fabric records.

Multiple *parcel types* can be added to a fabric. Parcel types are used to define specific roles for the parcels maintained by an organization. A few examples of parcel types are *lot*, *easement*, *tax*, and *ownership*. Each parcel type is represented by a pair of feature classes, one to store polygon features, and the other to store line features. These feature classes have a predefined set of attribute fields, and they can be extended with additional fields, domains, and subtypes. The parcel type can be created with *administrative boundaries*. These are used for very large parcels like administrative districts and allow a streamlined editing experience with certain operations deferred to avoid system performance problems when editing large shapes that have many vertices.



The ArcGIS Parcel Fabric Model

Parcel boundary features are stored in the lines feature class and are used to store the dimensions represented on the recording document.

Since parcels are usually defined by a closed loop of two-point lines that store dimension information, a mathematical misclosure can be computed and stored on the polygon feature representing the parcel and provides a quality check on the line dimensions.

The *connection lines* feature class is used to store any type of line that is not used as part of a parcel boundary. It stores recorded dimensions for lines that connect between parcels or that connect to control points. A couple of examples are street centerlines and tie lines.

The *points* feature class is used to build a network topology by storing a point feature at the common location between connected line ends. Points have a mapped geometry location stored in the shape field. The attribute fields include *Name*, *X*, *Y*, and *Z.* Coordinate attributes are optional, and are stored separately from the mapped geometry. Values in the *XY Accuracy* and *Z Accuracy* fields are used in the least-squares analysis. Points can be set as fixed and are used as constraints in a least-squares adjustment. Each parcel corner is represented by a single point feature in the points feature class and connects multiple measured lines in the network. These lines may come from different cadastral record documents with different recording dates.

[Learn more about the parcel fabric data model.]

COGO-enabled lines

The line feature classes in the fabric are automatically *COGO-enabled* for all parcel types. When a line feature class is COGO-enabled it means that it has additional attribute fields to store values such as the directions, distances for straight-line boundaries, or radius and arclengths for circular arc boundaries. Most COGO-lines are expected to be two-point, single-segment lines, though there are exceptions such as natural boundaries like rivers and shorelines. The section “A Deep Dive into COGO Concepts” explores this topic in greater detail.

Topology rules and Attribute rules

In ArcGIS Pro, a configurable set of frameworks is available to apply the different types of quality assurance checks described in “Defining data accuracy”. They are broadly available as part of the overall system of record in the ArcGIS ecosystem and are built into the parcel fabric dataset technology. There is a framework for Attribute Rules and for Topology Rules. The topology and attribute rules are preconfigured for the fabric dataset and additional rules can be added by land information system architects.

This attribute rules environment provides the ability to do immediate quality checks at the time of data edits and either prevent an edit (*constraint rule*) or write new metadata information (*calculate rule*) based on the criteria configured for the rule. There are also *validation rules*; these are evaluated directly by the user on demand, and any attribute criteria that are not valid are reported as *error features* that are inspected by the user so that further action can be taken to reassess the attribute quality. The attributes are corrected by the user and the rules are rerun to confirm the error features are removed. The parcel fabric dataset comes with preconfigured attribute rules. For example, there is an attribute rule that requires parcel features to be assigned to a record.

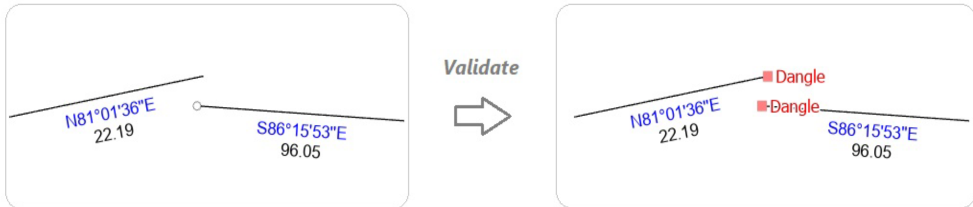
The framework for topology rules works in a similar way to attribute rules. The topology in a geodatabase is a set of rules that define how features are spatially

Feature Class 1	Subtype 1	Rule	Feature Class 2
Fabric_Connections		Endpoint Must Be Covered By (Line-Point)	Fabric_Points
Lot_Lines		Endpoint Must Be Covered By (Line-Point)	Fabric_Points
Lot_Lines		Must Not Have Dangles (Line)	
Lot_Lines		Must Not Self Overlap (Line)	
Lot_Lines		Must Not Self Intersect (Line)	
Lot_Lines		Must Be Covered By Boundary Of (Line-Area)	Lot
Lot		Boundary Must Be Covered By (Area-Line)	Lot_Lines

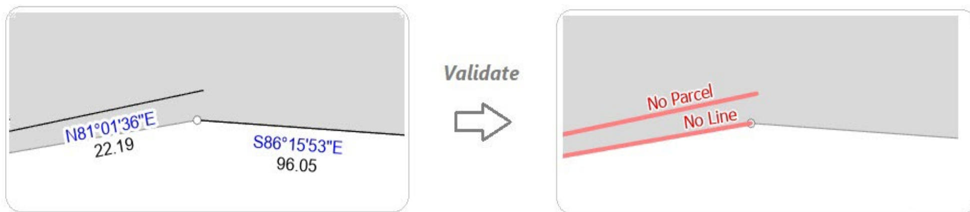
Topology rules for a parcel type called “Lot”

related. In the parcel fabric, these rules are used to define the connectivity in the network of parcel boundaries and to define the divisions between adjacent parcel polygons without gaps or overlaps along parcel boundaries. For example, there is a topology rule to specify that parcel polygon edges must be covered by a parcel line feature. There is another rule that requires a point feature to be located at the ends of lines.

The locations of edits made by users are tracked by the system, and when the user is ready, they use the validate command to make sure that none of these topology rules have been broken. If a rule is broken, then *error features* are created and displayed on the map. These are used to draw attention to data errors so that they can be fixed.



Parcel lines not connected at a point or another parcel line's end results in point error features called Dangles

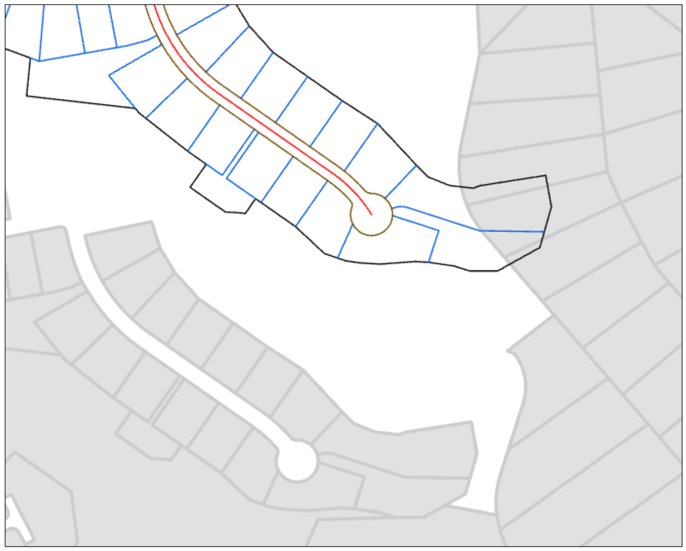


For a parcel type, polygon edges with no line and lines not on a polygon edge produce line error features

[Learn more about data quality management capabilities.]

Measurements: Coordinates, Angles, Distances, and Directions

Coordinates are traditionally not considered to be measurements per se, because in coordinate geometry (COGO) systems, distances, angles, and directions are used to calculate new coordinates rather than the coordinates being used to generate measurements. However, it is typical for surveyors in the US to produce and submit digital representations of parcel (and other) data in a ground coordinate system, where the intent is for the computed distance between any two points in their CAD drawing to represent the horizontal ground distance as would be measured between the same two physical locations in the field. In GIS datasets, the map projection is referenced to the ellipsoid and projected to "grid." When these CAD files are brought to the GIS, they are offset because of the scale factor applied to the coordinates. This CAD representation in a ground system is called a *modified projection*, and as described in the next section.



Ground Coordinates versus Grid Coordinates

Modified Projections

The term modified projection is also known by other terms: local datum plane, engineering coordinate system, ground coordinate system, or simply surface or ground.

When receiving a CAD file from a surveyor or engineer, it is common to find that it does not spatially align with the rest of the GIS data. It may be offset a few thousand feet to the northeast, or it may be miles away to the southwest, and may seem to be in an arbitrary local coordinate system. However, if the surveyor is using a modified projection, this information is usually provided as transformation parameters that indicate how the projection is modified, making it possible to use these parameters to place the CAD drawing in its projected grid location without the need for manually picking out georeferencing links.

Here's an example of a simple modification in the notes of a subdivision plat from Houston, Texas:

12. The coordinates shown hereon are Texas South Central Zone No. 4204 State Plane Surface Coordinates (NAD83) and may be brought to grid by dividing by the following combined scale 1.00013.

In this note, all the criteria are present for converting between ground coordinates and grid coordinates. There is the reference to the projection that is being modified and information that the coordinates are "Surface" coordinates. The combined scale factor is provided, and there is no rotation mentioned, and no origin specified.

Since the note does not explicitly provide the origin, the 0,0 origin of the state plane coordinate system is implied. For the description above, the corresponding CAD file location in its original ground coordinates is located to the northeast of the projected grid coordinate location.

The Purpose of Modified Projections

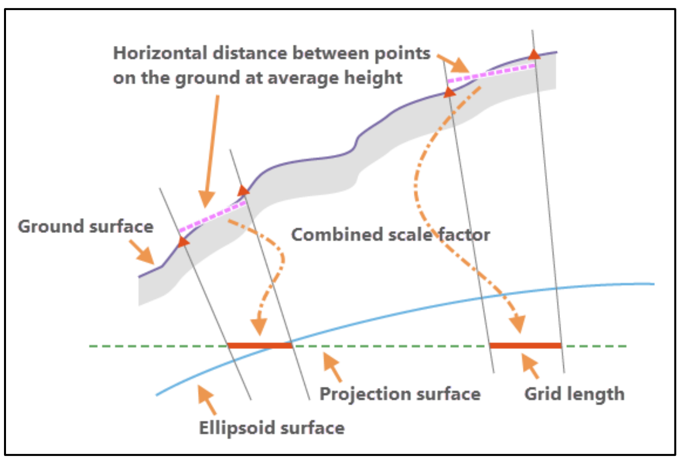
Modified projections like these are used as primitive, low-distortion projections for large scale mapping. Distances measured on the ground match the distances in the digital coordinate space of the mapping software environment without having to apply a scale factor and rotation.

The reason they are successful is that they cover a comparatively much smaller surface area of the earth compared to the projection they are derived from, and so using a flat plane for modeling a ground-based coordinate system is useful and practical for small site locations such as an engineering site or a parcel subdivision.

While there is a subtle distinction between coordinates resulting from measurements versus coordinates as measurements, ground coordinate systems allow for computed line lengths between coordinates to derive ground distance measurements.

The documents recorded by surveyors may include statements that allow the plan to be "calibrated" to a specified projection; this metadata is called *the ground to grid correction*, and has two parts: the combined scale factor, and the basis of bearing. The combined scale factor relates the projection on the ellipsoid back to the ground. It is applied to distance measurements and combines the scale factor caused by height above sea level with the scale factor resulting from the projection's distortion at the location of the plan.

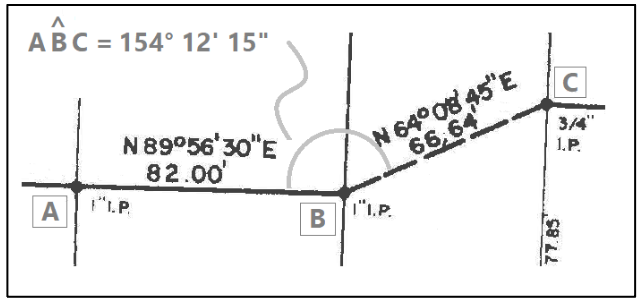
The basis of bearing references a known, physically marked ground line, and states the bearing adopted for that line. This is the baseline for all bearings on the plan and allows a rotation-to-grid to be computed for any projection. Regardless of the stated basis of bearing, the difference between any two bearings on the same plan gives us an angle measurement with good relative accuracy on the ground.



Combined scale factor

The angles derived from these sets of directions are used in least-squares adjustment as measurements in the measurement network.

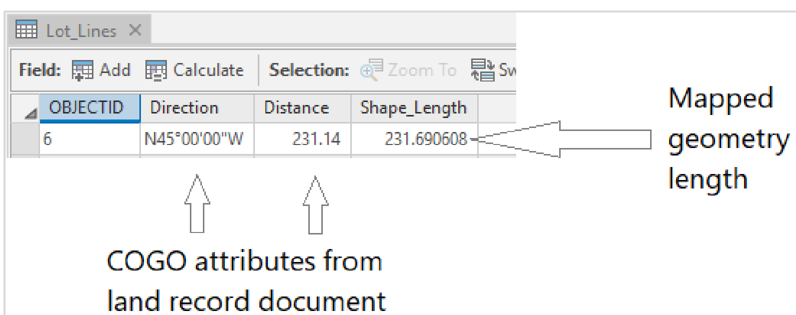
Together these angles, directions, and ground distance measurements provide independence from a specific projection. This means that the same ground values can be recorded in a database table as static numbers that are not tied to any projection. The distances recorded on plans and in deed descriptions in the US, as well as some other countries, are universally accepted to represent horizontal ground distances. These recorded dimensions are part of the land surveyor's instructions for finding the original physical marks that define property boundaries.



Angle from two directions

Mapped lines, representing parcel boundaries, are stored as line features in the line feature classes. The dimension values for a specific boundary line, as found on the recording document, is stored as attributes on the line feature. The geometry *shape length* is also stored as a separate property of the line feature. This shape length property is dynamic and is updated by the system automatically whenever editing workflows result in feature geometry changes. By comparison, the stored dimension values may only be changed directly by the user and are never automatically changed by the system. These are changed by a user if, for example, a mistake is found, and a value needs to be explicitly updated to match the value on the original document.

Changes to the mapped shape length of these lines occur as the result of editing workflows such as integrating new data into a preexisting parcel base or recomputing the measurement network through least-squares adjustment.



Entered land record versus dynamic mapped geometry

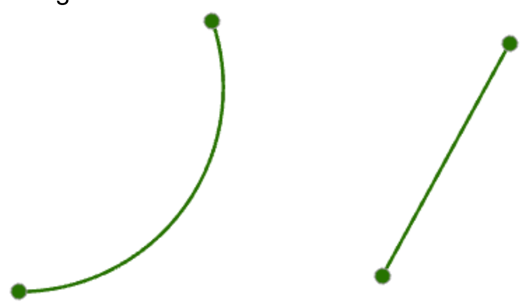
A Deep Dive into COGO Concepts

Coordinate Geometry (COGO) is a feature editing technique used primarily in the land records industry. It is characterized by the capturing of the dimensions depicted on land record documents as attributes on line features. These depictions can include the boundaries of land parcels, the centerlines of streets or railroads and the dimensions across road rights of way.

Attributes and line geometry

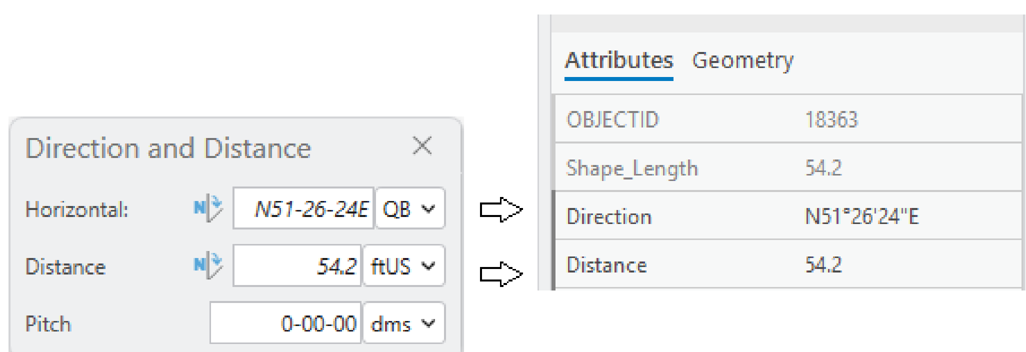
Any line feature class may be enhanced to support COGO attributes by making it COGO-enabled.

A COGO-enabled line feature class adds five system fields that store numeric values. These fields are called *Direction*, *Distance*, *Radius*, *Arclength*, and *Radius2*. These fields are of type double. In most cases, a COGO line feature is constructed as a straight line or a circular arc.



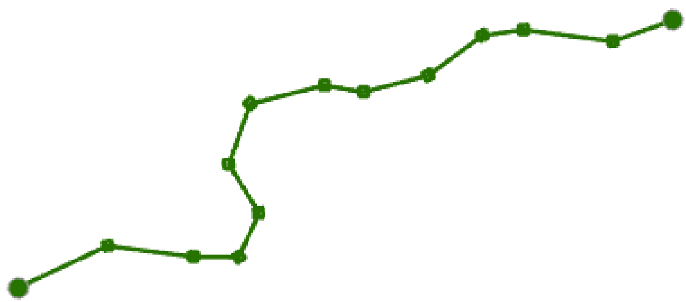
[Learn more about COGO Enabled lines.](#)

Editing tools are COGO-aware, and so dimensions entered with tool dialog boxes are stored in each feature's COGO attribute fields.



If a straight line or circular arc feature is created by drawing directly on the map, often referred to as heads-up digitizing, then the COGO attribute fields are left empty.

Since most COGO line features are single-segment constructions, the default tool on the feature template of a COGO-enabled feature layer is the two-point line tool. However, the regular line tool can also be used to create a natural boundary such as a river or lakeshore. The resulting feature is a multi-segment polyline, and the COGO attribute fields are left empty.



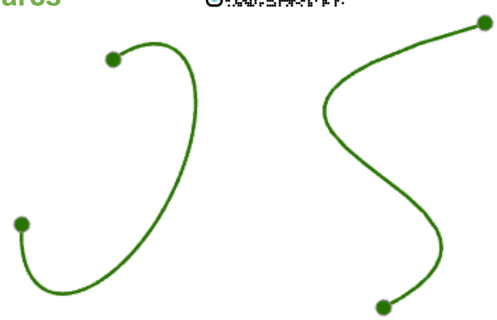
Some construction tools can result in partial COGO. For example, the distance intersection tool will result in two COGO line features with a distance value in each of the resulting lines to capture the two distance values entered, but the direction field values are left empty.

Ground to grid correction

When entering COGO values into construction tools, the geometry of the resulting feature may be scaled and rotated to correct for the map projection. The combined scale factor and the direction offset can be set and enabled for the active map.

Learn more about ground to grid corrections.

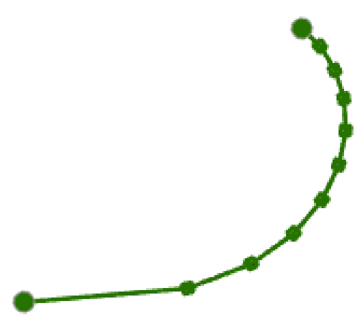
Bézier curves and elliptical arcs



In general, feature geometry can include four different types of segments: straight lines, circular arcs, elliptical arcs, and Bézier curves. Though COGO features are typically constructed as single-segment circular arcs or straight lines, there is nothing to prevent the creation of features in a COGO-enabled feature class that include elliptical arcs or Bézier curve segments. These features do not capture any dimensions onto the COGO attribute fields during their construction.

Spiral curves

Spiral curves are in a category of their own, since they are constructed as a COGO feature with multiple straight-line segments. COGO attributes are captured for chord direction, arclength, radius at the start of the spiral, and radius2 at the end of the spiral. Either radius can be set as infinity. See more details in the next section about the rules for COGO attribute values.



Rules for COGO Attribute Values

Units

The values stored in the Distance, Radius, Arclength, and Radius2 fields are in the linear units of the projection defined for the feature class of the COGO-enabled line. When the feature class does not have a projection but is in a geographic coordinate system, the values are in meters. Values stored in the Direction field are in decimal degrees, from 0° to 360°. The direction format is north azimuth, meaning 0° points north, and angles increase clockwise. For example, northeast is 45°, south is 180°, and northwest is 315°.
ArcGIS Pro presents these directions in the user interface in the format that has been configured for the Direction field. The formatting is achieved through Arcade expressions, which generate the user-facing output shown for labeling, in pop-ups, and in other related elements.

Learn more about Arcade scripting language.

This means that a direction may, for example, be displayed and entered in a quadrant-bearing format using degrees, minutes, and seconds, even though it's stored as a double in the Direction field.

The following table describes the fields used to store the parameters for each COGO line type:

COGO line type	Direction	Distance	Radius	Arclength	Radius2
Straight line	☑	☑	null	null	null
Circular arc	☑	null	☑	☑	null
Spiral arc	☑	null	☑	☑	☑
Polyline	☑	☑	null	null	null

- A straight line may only have its Direction and Distance COGO fields populated, and the others must be left unused.
- A circular arc may only have its Direction, Radius, and Arclength COGO fields populated, and the others must be left unused.
- A spiral may only have its Direction, Radius, Arclength, and Radius2 COGO fields populated, and the Distance field must be left unused. Since there is no parametric representation for clothoid spirals in ArcGIS Pro, the Radius, Arclength, and Radius2 COGO fields must be populated for the feature to be recognized as a spiral.
- A polyline that represents a natural boundary may only have its Direction and Distance COGO fields populated. It is common for all fields to be left unused for these COGO line types. (Natural boundaries are typically presented in bounds descriptions with wording such as "…bounded on the north by Rose Creek…" without any dimension information.)

Any of the values represented by the checkboxes in the table may be left as null. For example, you may have a straight line with the Distance field containing a value, but with the Direction field left unused. If a COGO feature has been over-specified where, for example, a circular arc has its Distance field populated, elements of the software will notify the operator. For example, the label expression will not show the radius and arclength and instead will show a message “COGO Error.”

Direction

The Direction attribute value on straight lines, circular arcs, and spirals always represents the north azimuth direction along the straight line or chord from start point to end point of the feature.

Distance

The Distance attribute value is never used for a circular arc or a spiral. It is used only for straight lines and multisegmented polyline features such as natural boundaries.

Arclength

Circular arcs and spirals use an arclength value as one of the parameters to define their shapes. The arclength is always greater than the chord length.

Radius

Circular arcs and spirals are defined as turning to the left (counterclockwise) or turning to the right (clockwise). For defining a circular arc that is proceeding counterclockwise, the value stored in the Radius field must be negative, and conversely, circular arcs to the right must store positive radius values.

Radius2

The second radius parameter is used exclusively for spirals. It is used in combination with the first radius value and arclength to define its mathematical shape.

Since the geometry engine does not have a true parametric representation for spirals, the geometry can only be approximated by a polyline with a series of short straight-line segments.

Another important property of a spiral is that either the start or the end of the curve can have a radius that’s defined as infinity. The rule for defining an infinite radius on a spiral is to use a zero value as follows:

- Starting radius of infinity; store 0 for Radius field
- Ending radius of infinity; store 0 for Radius2 field
- A zero value in both radius parameter fields for the same feature is not valid

As noted previously, the sign of the radius value for a circular arc defines whether the curve is turning to the left (counterclockwise) or turning to the right (clockwise). For spirals, since there are two radius values and since one or the other may be a zero value, the left-turning spiral is defined if either radius value is negative, or if both values are negative. For example, if one of the values is greater than zero and the other is less than zero, then the spiral is turning to the left (counterclockwise). Similarly, if both radii are negative, then that spiral is also turning left.

Parcel Editing Concepts

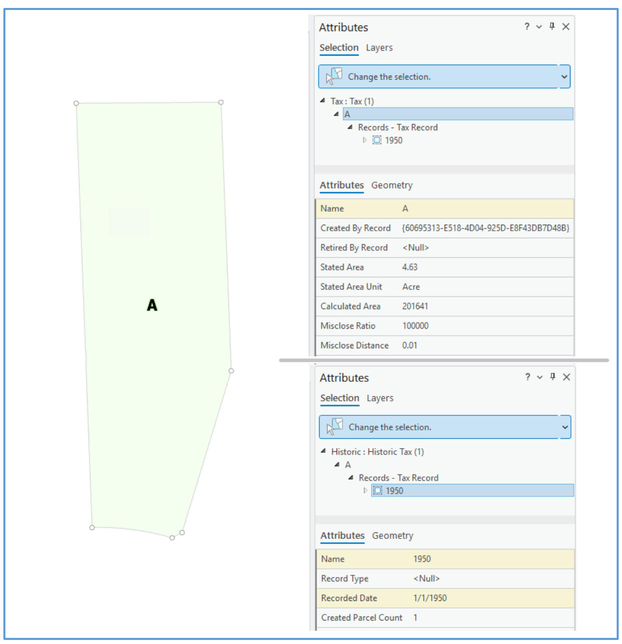
Editing data in the parcel fabric includes two types of workflows: *record-driven* workflows, and *quality-driven* workflows.

Record-driven workflows and the active record

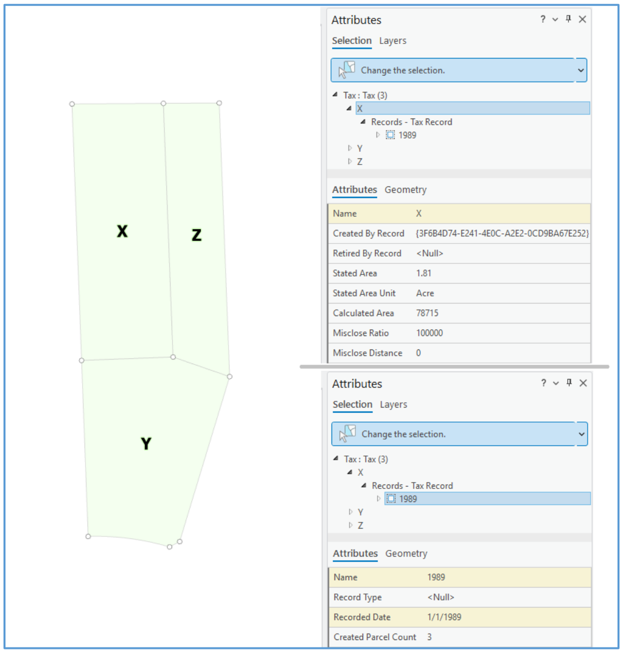
A record-driven workflow refers to the process of capturing the information recorded on cadastral documents such as a deed, subdivision plan, or record of survey and, in that process, creating the new parcels that these documents represent. Record-driven workflows add new parcels and update the parcel lineage; the parent parcel is retired when its child parcels are created. For example, when an existing parcel gets subdivided into portions, the division occurs because of a recording document. The original parent parcel is retired and the new parcels are created by that document.

From the user workflow perspective, the first step is to create the record in the fabric and then to set it as active.

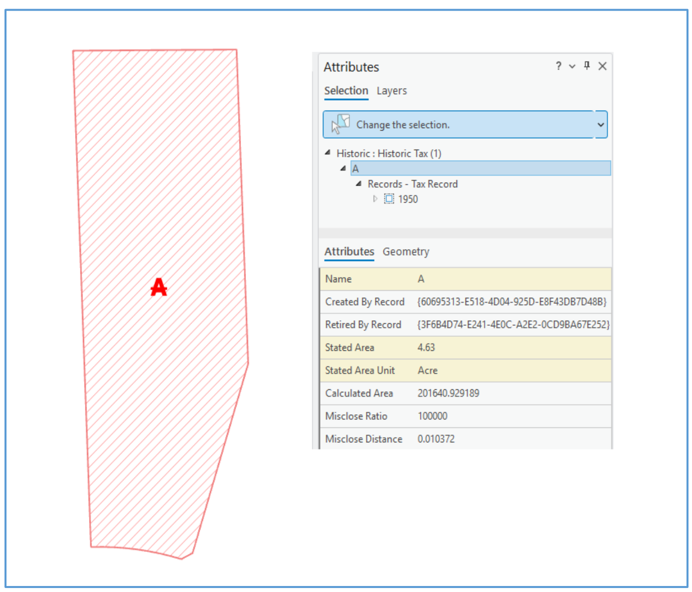
In this illustrated example, the parcel called A was created in 1950:

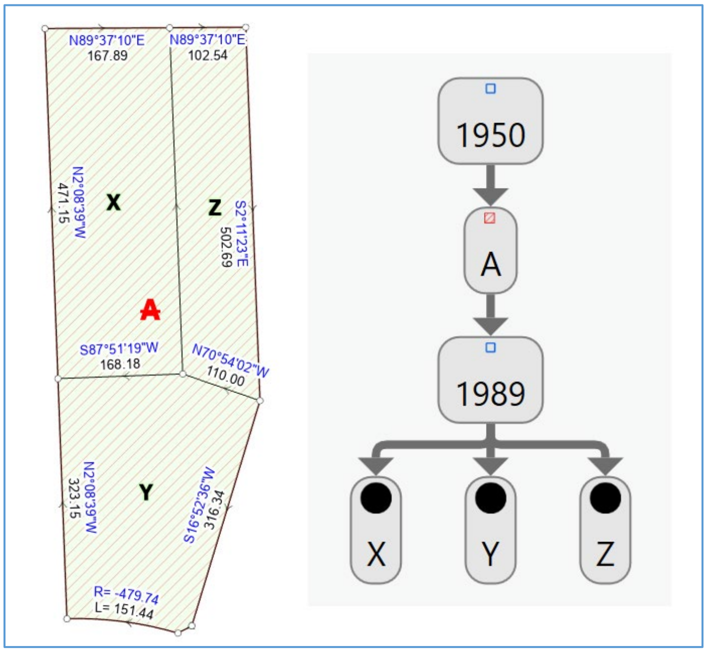


This parcel was then divided into child parcels X, Y, and Z in 1989:



The parcel type feature classes, the points feature class and connection lines feature class all have attribute fields to reference a globally unique identifier (GUID). The active record's GUID is used to populate the fields called *Retired By Record* and *Created By Record*. These fields are populated when new parcel features are created, or when existing parcels are retired and are being replaced by new parcels. When the active record is set, the edits that create new parcel features are tagged with this active record's GUID, and the parcel lineage is captured. In this subdivide example, parcel A has been retired by the globally unique identifier for the record that created X, Y, and Z:





[Learn more about the parcel fabric records.]

Quality-driven workflows

Quality-driven workflows are used for making ad-hoc edits or for making edits to fix reported data problems found via topology or parcel rules. This may include attribute edits, such as correcting a parcel name, stated area, or the attributed distance on a parcel's boundary line. These quality-driven workflows can also be geometry based, such as realigning parcel boundaries. In general, quality-driven workflows do not require an active record to be set, and if an active record is set for the map, the active record will have no impact on the quality-driven workflows, since they are edits to existing features and are not creating new features.

Editing via Published Feature Services

Though system architects are concerned with configuring the land information geodatabase, the ArcGIS Pro system is designed to easily and seamlessly work in a multiuser environment that is abstracted from the underlying data structures. This allows the users to focus on the features and interact with the feature layers in the map without needing to know how and where the data is hosted. The land records professionals who manage the parcel fabric data through ArcGIS Pro sign in to a portal connection and then connect to the feature service that is managed in a service-oriented architecture (SOA). The user creates a version, performs their edits, and then reconciles and posts their changes to make the updates through these services.

Although ArcGIS Pro is the primary client of these services, they are also available to thin clients, allowing immediate access to the system through mobile devices in the field. New measurements and other relevant cadastral data can be captured by field crews and assessed in real time in the office, saving repeated return trips to the site. Where the infrastructure does not support a real-time environment or business requirements preclude it, the data can be captured in the field and synchronized later.

The branch versioning model used in this feature service editing model allows the dynamic changes to the fabric coordinate positions to be recovered from any previous moment in time. This means that the previous and current positions of fabric points can be used to maintain spatial relationships with features in other non-parcel layers, such as a utility layer with features offset from parcel boundary lines.

Learn about using branch version moments to generate parcel fabric links.

Dynamic Datums

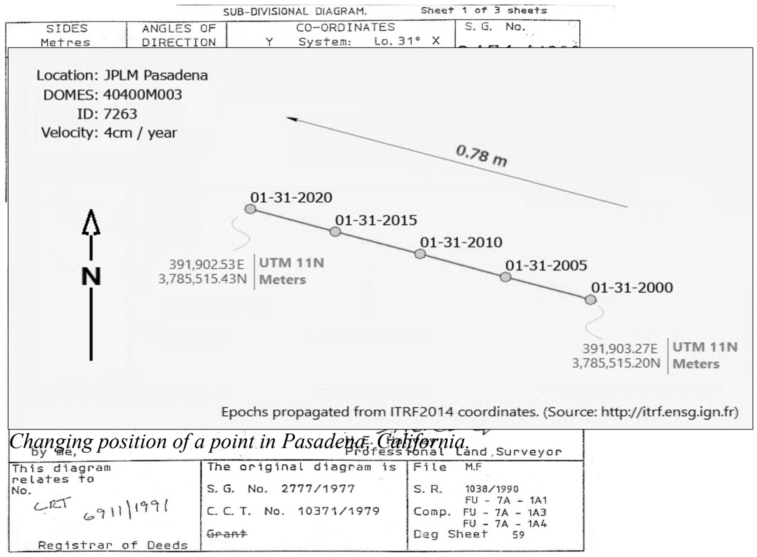
Unlike ground distance measurements, coordinates are dependent on specific spatial reference information, with a datum, epoch, and projection. Due to tectonic changes, coordinates change with time, and dynamic datums such as ITRF2014 and ITRF2020 model these tectonic changes. These models allow representing points with a velocity, and this allows the capture of their positions at specific dates.

When considering evidence of location for cadastral boundaries, there is an evidentiary hierarchy with certain forms of evidence holding precedence over others.

For example, if a physical monument is found undisturbed and with the same physical characteristics as described in the legal record, then it holds precedence over the recorded measurements that were used to locate the mark. If no physical mark is found, or if it has been significantly disturbed, then the next strongest piece of evidence may be bearings and distances. These rules of evidence vary by country and jurisdiction.

In some countries, all the coordinates are recorded on the titling document. In the case of southern African countries, this system of recorded coordinates predates GNSS and dynamic datums and so references a static datum.

Some studies have explored the idea that since dynamic datums are now able to represent four-dimensional coordinate representations, they may be used as absolutes in the cadastral framework. In such a coordinate-based cadastre, the coordinates would be promoted to the same level of evidence as the physical feature itself.



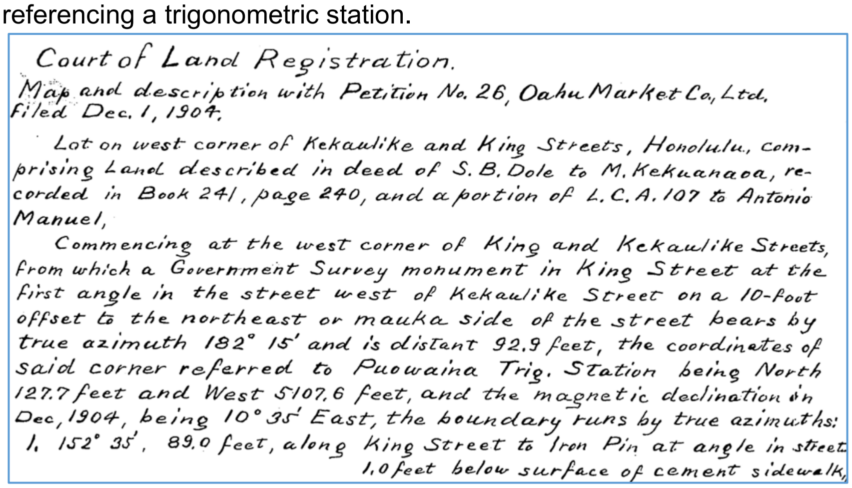
Changing position of a point in Pasadena, California.

Portion of sub-divisional diagram depicting coordinates in a static datum.

At the individual parcel document level, the typical tectonic shifts do not alter the relative location between the physical ground locations of the boundaries; hence, recorded coordinates like those in the figure above continue to have the same value as evidence of boundary location, despite tectonic changes.

Hawaiian land records

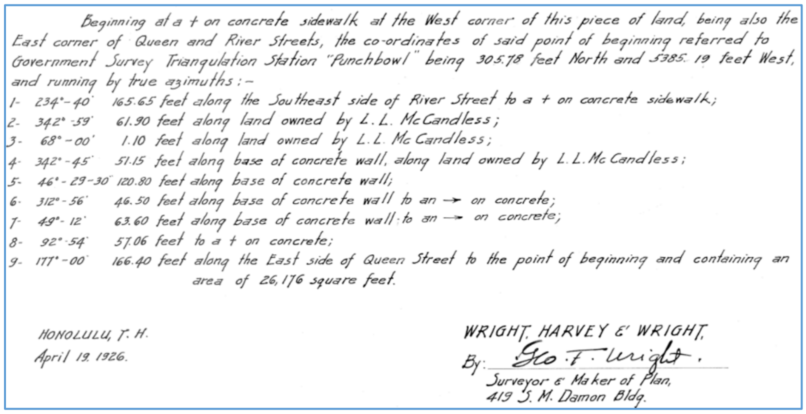
Another example of this is in the state of Hawaii, where most parcel record documents reference and use trigonometric stations with distances along true azimuth lines, a north-south line, and an east-west line. In the following document, recorded in 1904, the commencement point location is defined by referencing a trigonometric station.


Court of Land Registration.
Map and description with Petition No. 26, Oahu Market Co., Ltd. Filed Dec. 1, 1904.

Lot on west corner of Kekaulike and King Streets, Honolulu, comprising Land described in deed of S. B. Dole to M. Kekuanaoa, recorded in Book 241, page 240, and a portion of L. C. A. 107 to Antonio Manuel,

Commencing at the west corner of King and Kekaulike Streets, from which a Government Survey monument in King Street at the first angle in the street west of Kekaulike Street on a 10-foot offset to the northeast or mauka side of the street bears by true azimuth 182° 15' and is distant 92.9 feet, the coordinates of said corner referred to Puowaina Trig. Station being North 127.7 feet and West 5107.6 feet, and the magnetic declination in Dec, 1904, being 10° 35' East, the boundary runs by true azimuths:
1. 152° 35', 89.0 feet, along King Street to Iron Pin at angle in street 1.0 feet below surface of cement sidewalk,

Many of these stations are maintained by US National Geodetic Survey (NGS) and still exist today, as in this example from 1926:

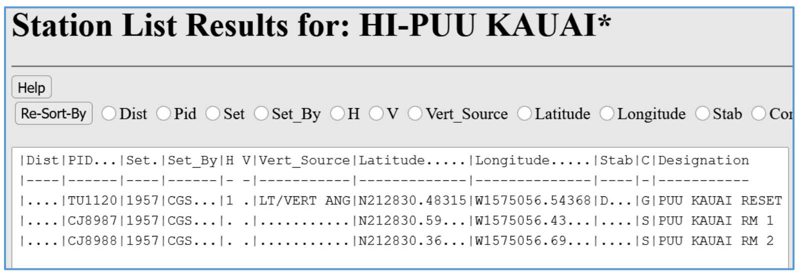


Beginning at a + on concrete sidewalk at the West corner of this piece of land, being also the East corner of Queen and River Streets, the co-ordinates of said point of beginning referred to Government Survey Triangulation Station "Punchbowl" being 305.78 feet North and 5385.19 feet West, and running by true azimuths:–

1- 234°-40' 165.65 feet along the Southeast side of River Street to a + on concrete sidewalk;
2- 342°-59' 61.90 feet along land owned by L. L. McCandless;
3- 68°-00' 1.10 feet along land owned by L. L. McCandless;
4- 342°-45' 51.15 feet along base of concrete wall, along land owned by L. L. McCandless;
5- 46°-29-30" 120.80 feet along base of concrete wall;
6- 312°-56' 46.50 feet along base of concrete wall to an → on concrete;
7- 49°-12' 63.60 feet along base of concrete wall to an → on concrete;
8- 92°-54' 57.06 feet to a + on concrete;
9- 177°-00' 166.40 feet along the East side of Queen Street to the point of beginning and containing an area of 26,176 square feet.

HONOLULU, T. H.
April 19. 1926.

WRIGHT, HARVEY & WRIGHT,
By: Geo. F. Wright.
Surveyor & Maker of Plan,
419 S. M. Damon Bldg.



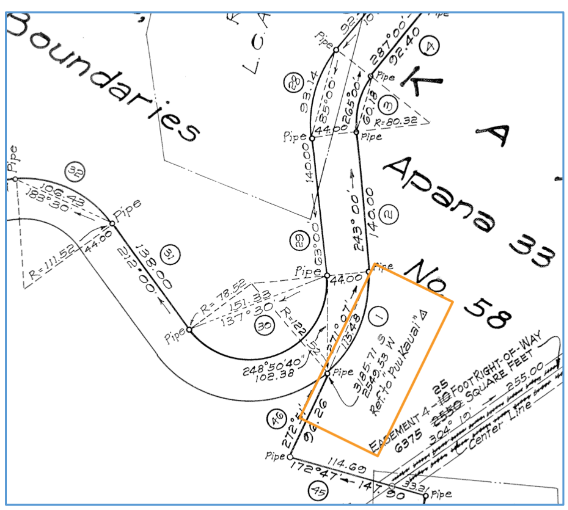
Station List Results for: HI-PUU KAUAI*

Help

Re-Sort-By ○ Dist ○ Pid ○ Set ○ Set_By ○ H ○ V ○ Vert_Source ○ Latitude ○ Longitude ○ Stab ○ Co

```
|Dist|PID...|Set.|Set_By|H V|Vert_Source|Latitude.....|Longitude.....|Stab|C|Designation
|----|------|----|------|- -|-----------|-------------|--------------|----|-|-----------
|....|TU1120|1957|CGS...|1 .|LT/VERT ANG|N212830.48315|W1575056.54368|D...|G|PUU KAUAI RESET
|....|CJ8987|1957|CGS...|. .|...........|N212830.59...|W1575056.43...|....|S|PUU KAUAI RM 1
|....|CJ8988|1957|CGS...|. .|...........|N212830.36...|W1575056.69...|....|S|PUU KAUAI RM 2
```

These true azimuths are geodetic directions, represented in south azimuth, and are based on the Clarke 1880 ellipsoid that was used in the early 1900s in Hawaii. From this information you can get surprisingly accurate georeferenced locations even from these old documents, despite the measurements being on the Clarke 1880 ellipsoid, and despite the tectonic movement of the earth since those documents were recorded. As with the previous example, typical tectonic changes do not alter the relative location between the physical ground locations of the boundaries.



While this system does not replace a modern field survey, by combining these older documented references and measurements with the present-day positions of the trigonometric stations, the coordinates calculated for today's positions can be used as good preliminary field search locations for parcel boundary monuments. ArcGIS Pro supports entering COGO for different types of geodetic lines, and so these techniques are possible using ArcGIS Parcel Fabric.

Learn more about configuring the use of geodetic lines.

The technique also requires the installation of the *ArcGIS Coordinate Systems Data* to provide the best possible datum transformation calculations when converting from the Clarke 1880 ellipsoid to the datum used for the NGS published coordinates.

Learn more about ArcGIS Coordinate System Data.

Modernized National Spatial Reference System (NSRS)

US National Geodetic Survey (NGS) is developing a dynamic datum to replace the static datums used in the past (like NAD 83). The modernized NSRS will be aligned with the latest ITRF (International Terrestrial Reference Frame). Coordinates will be tied to a reference epoch (e.g., 2020.00) and can be propagated forward or backward in time using velocity models. NGS will provide tools to transform coordinates between epochs.

Learn more about the modernized NSRS.

Parcel Lines and Topology

Topological editing overview

When editing features, you can choose to maintain feature topology through topological editing. While you have this environment set as active in your edit session, the geometry edits of a feature will propagate to the connected features, changing the geometry of multiple features all at once. You can choose a map topology that applies to the visible feature layers, or you can use a geodatabase topology that applies to feature classes controlled by the topology controller dataset. The difference between map topology and geodatabase topology is that for the latter, the topological edits apply irrespective of feature layer visibility, whereas map topology uses feature visibility. Topology nodes and topology edges define the shared elements of the features. Topological editing includes the capability to edit these nodes and edges directly.

Learn more about editing topology.

Parcel edge topology

Standard topology edits, when applied to parcel features, hold many of the characteristics of parcels intact. For example, the fabric points stay connected to the ends of parcel lines, and the parcel lines that are on a parcel polygon's edge will stay aligned to that edge.

However, there are other characteristics of parcel features that are not maintained in standard topological edits, and so these additional characteristics require additional topological editing behavior specific to parcels.

This extended behavior is called parcel edge topology, and it recognizes two additional characteristics when a parcel point is moved. These characteristics are described further in the sections below.

When the segments of different features intersect, vertices are introduced into the geometry when validating topology. These extra vertices do not immediately change the shape of the feature; however, they may impact the result of subsequent edits by altering the expected characteristics of the parcel boundary.

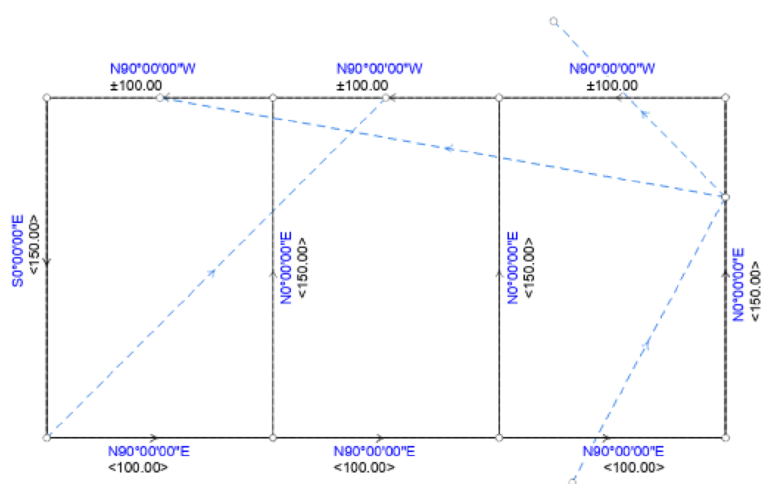
[Learn more about validating topology.]

Topological Editing Overview

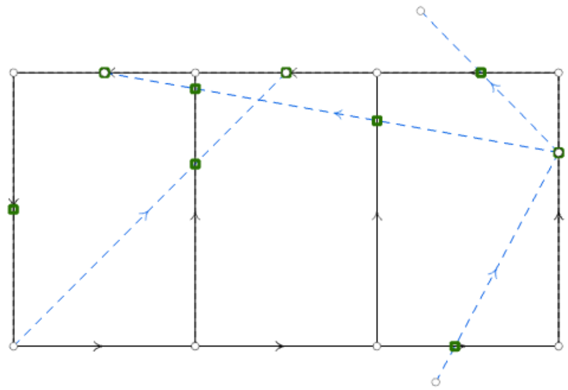
In the context of changing the location of a parcel fabric point, there are two characteristics of parcel line geometry that apply, as follows:

Two-point lines

Parcel line boundaries and connection lines are commonly two-point lines. While a two-point line means a straight-line feature between two points, it also includes a circular arc feature between two points. There are exceptions to this, such as natural boundaries that form part of the boundary of a waterfront property or similar. From a parcel geometry point of view, the start vertex and end vertex are of primary importance, as they are attached to the parcel points. The extra vertices are placed along the two-point line, between the end points. At these locations, the parcel data model does not require a parcel point feature unless the location is also the end of another parcel line or connection line.
Consider this set of parcel lines, connection lines, and fabric points:

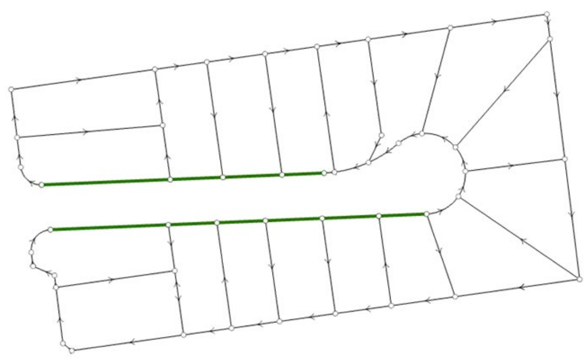


After a topology validation, vertices are added onto the geometry as shown here by the green squares:

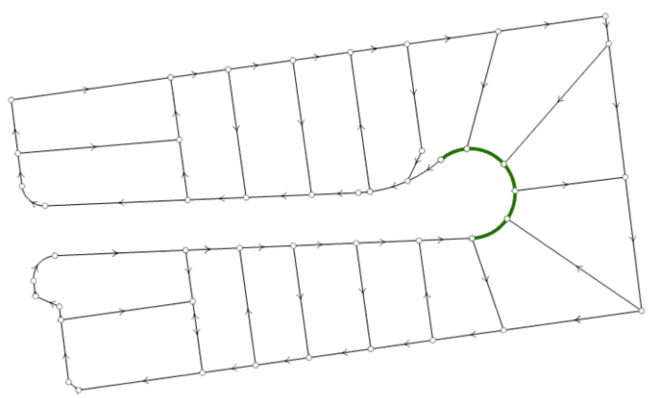


Tangent boundary lines

Parcel boundary lines are commonly tangent to other parcel lines where they connect at a common end. For example, most road-frontage boundaries along a road right-of-way are tangent to one another, as depicted by the green lines here:



The tangency between the circular arc boundary line components of a cul-de-sac is shown by the green lines here:



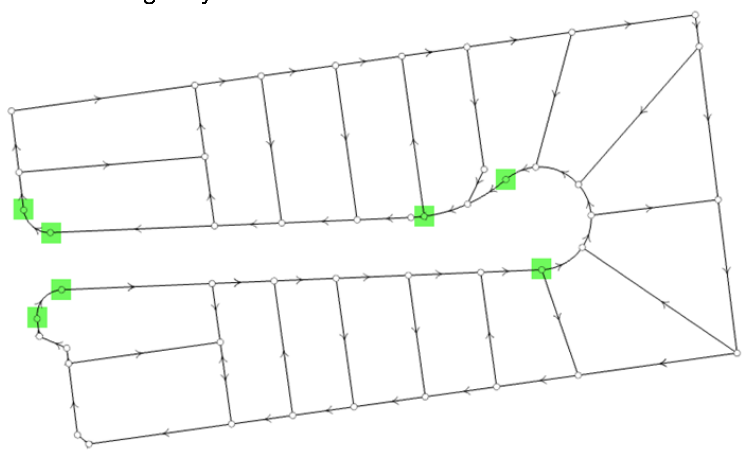
Updating Parcel Fabric Point Locations

Lines in the parcel fabric data model are expected to have fabric points at each end. These points are common points shared with the ends of other lines. When moving a parcel fabric point, the parcel line characteristics are maintained, and the move point edit recognizes the parcel edge topology.

Effect on parcel lines

When the point is moved, the sequences of straight lines that are collinear will be kept collinear. Similarly, sequences of circular arcs that are tangent and have the same center point will continue to keep these properties.
While these tangency properties also occur between the straight lines before and after sequences of circular arc line features, the parcel edge topology behavior does not attempt to maintain the tangency between these segments. This is because there are often competing tangency constraints.

As an example, the line features attached to these highlighted points will not have their tangency enforced:



[Learn more about fabric point location change.]

Least-Squares Analysis and Adjustment

ArcGIS Parcel Fabric includes a least-squares analysis engine called DynAdjust, from Geoscience Australia. This engine is used by Australia's governmental geodesy departments to maintain their authoritative geodetic network. This least-squares engine became available as an open-source product in August 2018, and Esri has integrated this technology for use with the parcel fabric dataset.

[Learn more about DynAdjust.]

[Learn more about how DynAdjust is Integrated into ArcGIS Parcel Fabric.]

The parcel fabric dataset models property boundary networks; these have characteristics that are outside the norm of typical survey measurement networks, as described in the next section.

Parcel boundary lines as a measurement network

Although there are some exceptions for cadastral documents from the 1800s and early 1900s, the dimensions on a plan are not directly observed in the field and are instead derived by calculation from field measurements. It is also common for the boundaries on a plan to be predefined prior to physical marks being placed in the field. Since these dimensions are somewhat removed from the true field measurements, there is some nonconformity in using a least-squares analysis for parcel boundaries and in treating them as a measurement network. It is more conventional and would be preferred if a network of GNSS baselines combined with total station measurements and other direct terrestrial measurements were used, but this information is typically not available in the land information systems of most countries.

When to use least squares analysis

While using a least squares analysis is not required to work effectively with ArcGIS Parcel Fabric, it can significantly enhance your understanding of your parcel data and its overall quality. Successfully running an adjustment is a strong indicator that the accuracy and quality requirements of your data have been met. It is also important to note that this analysis is not typically performed on the entire parcel fabric dataset at the outset. Instead, there is a recommended methodology for applying the analysis incrementally—evaluating the parcel fabric piece by piece—this is described in more detail in the software documentation.

Learn more about when to use a least squares analysis and adjustment.

Adjustment analysis for parcel boundary networks

Applying a least-squares analysis on large parcel boundary networks with data of varying accuracy has been a technique employed by municipalities in Canada and Australia, and by the Bureau of Land Management in the US.
While the DynAdjust engine has support for 20 different measurement types, for the purposes of adjusting parcel boundaries, Esri uses the following measurement types: direction sets, distances, geodetic azimuths, ellipsoid arc distances, and geodetic latitudes and longitudes. These are detailed in the sections that follow. The DynAdjust engine also supports the following types of point coordinate input:

- Free—These are regular parcel points. The point shape geometry is updated when the results of the least-squares adjustment are applied to the parcel fabric.
- Constrained—The spatial location of the point coordinate is fixed and does not move when the results of the least-squares analysis are applied.
- Weighted—The point is weighted by its associated accuracy in the XY Accuracy field. The higher the accuracy, the less movement allowed in the point shape geometry. This point type has a different treatment within the engine compared to the free and constrained points; this is described further in the section headed “Geodetic latitude and longitude.”

Consistency check

It is possible to run a least squares analysis without using constrained points. This approach allows the least squares analysis to run without the influence of the constrained points, providing a technique to more easily isolate and detect possible mistakes in direction and distance values

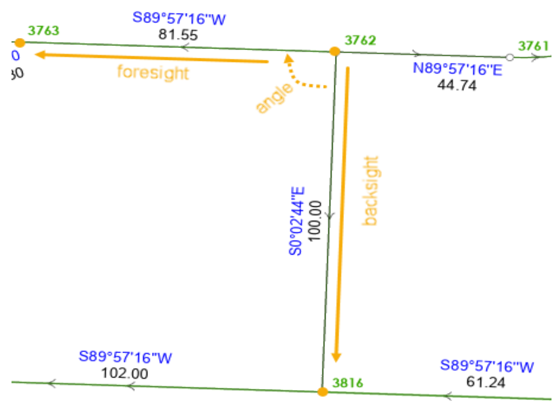
Distances

The distances recorded on plans and in deed descriptions in the US are universally accepted to represent horizontal ground distances. While these values can be scaled to any projection surface, the values themselves are independent of the projection.

The DynAdjust engine refers to this measurement type as the direct slope distance and is the best match for these parcel boundary values. Since the distance dimensions of parcel fabric lines are horizontal, they are converted to their equivalent slope distances when the parcel lines are sent to the DynAdjust engine. These slope distances are calculated on the fly using the elevation values stored in the Z attribute field on the parcel fabric points feature class. If no z-values are present on the fabric points, then the distance value is treated as horizontal and near sea level. The elevations are used to account for elevation above sea level as described in the section “Ground to grid corrections.”

Direction sets

A *direction set* is composed of an origin point (the from point), a backsight line (reference line), and multiple foresight lines. Direction sets are processed in the least-squares analysis as follows:



Direction set with one derived angle.

- The angles formed by the direction set are the measurements used in the least-squares engine. The angles are derived from the direction values of the backsight and foresight lines.
- In the figure, point 3762 is the origin point of the direction set. The backsight or reference direction is the line from point 3762 to point 3816. The foresight direction is the line from point 3762 to point 3763.
- Any point in the parcel fabric that has multiple lines connecting to it may have multiple direction sets.
- When there are adjacent cadastral records, two direction sets are created for the same origin point. This is done to account for the possibility of different bases of bearings (rotations) being used for different cadastral records.

[Learn more about least-squares adjustment and the parcel fabric.]

Geodetic Azimuths and Ellipsoid Arc Distances

The measurement types geodetic azimuth and ellipsoid arc distance in the DynAdjust engine are used by the adjustment analysis after conversion from the ellipsoid-based lines such as rhumb line, true-mean bearing, forward geodetic, and reverse geodetic. The type of geodetic line is defined by a field called *AzimuthType*. This field needs to be added to the lines feature class to opt in to this capability.

[Learn more about the configuration steps to use geodetic lines.]

The value stored in the direction field is treated as one of these types and is converted into the equivalent geodetic azimuth value for processing in the adjustment engine.

In this same configuration, the value stored in the Distance field is treated as an ellipsoid arc distance. This value can be scaled before it is input into the adjustment engine. The ellipsoid arc distance is scaled when the value is at an elevation and needs to be reduced to the ellipsoid surface. If the *IsCOGOGround* field is set to True, the ellipsoid arc distance value is multiplied by the scale factor value in the Scale field before it is input into the least-squares engine as an ellipsoid arc distance. The value in the *Scale* field is not a combined scale factor; it is a factor that relates only to the elevation correction for scale. The formula for scaling the ellipsoid arc distance value is as follows:

```
ellipsoid arc distance on the ellipsoid = scale
factor * ellipsoid arc distance at elevation
```

Ellipsoid arc distances are the only measurement type that is scaled in this way when input into the least-squares adjustment engine. Standard distance measurements are scaled by converting to a slope distance, as described in the parcel fabric Z attribute processing in the “Distances” section.

Geodetic latitude and longitude

The measurement types of geodetic latitude and geodetic longitude in the DynAdjust engine are used in the parcel fabric model exclusively for specifying weights on parcel fabric points.

The coordinate values stored in the X and Y fields of weighted points are converted into geodetic latitudes and longitudes using the Esri projection engine. These converted values are then processed in the DynAdjust least-squares analysis. It is important to note that only the weighted points undergo this conversion for application as a measurement type. Although the coordinates of constrained and free points are used in the adjustment process, they do not serve as measurement types in this context. These weighted point coordinates are considered “floating control” and can be assigned different accuracies based on the method of capture. For example, a point may be captured by using a heads-up digitized position taken from a fence corner visible on orthophoto imagery. This point can be given a lower accuracy estimate and combined in the same adjustment process with the constrained and free points.

Geoprocessing, user experience, and analysis layers

ArcGIS Parcel Fabric customers can use geoprocessing and Python scripting tools to schedule and run adjustment analyses of parcel fabrics. Two geoprocessing tools are used for (1) running a least-squares analysis, and then (2) applying analysis results to update and improve coordinate positions of parcel fabric points.

Improvements to maintaining dimension attributes of property boundaries are becoming ever more important. Once a re-adjustable network of property lines has been built, it serves as a data validation framework. As new property boundary data is added, or edits are made, the adjustment analysis can be rerun to confirm the quality of the new data.

The two-step user experience

In contrast to the traditional approach seen in other least-squares adjustment tools, with analysis and adjustment combined within a single tool, the parcel fabric workflow introduces a two-step method. The process begins with a distinct initial step: generating analysis results and storing them in separate GIS feature classes using the *Analyze Parcels By Least Squares Adjustment* geoprocessing tool.

This workflow allows for the presentation and visualization of information from the DynAdjust engine in distinct analysis layers. By doing so, it matches the engine's output, and ensures that the parcel data remains independent from the least-squares analysis results. A key advantage of this methodology is the ability to evaluate the output without modifying the original data.

Once satisfied with the results, a second geoprocessing tool, *Apply Parcel Least Squares Adjustment*, can be used to make changes to the original parcel corner positions. This two-step process enhances efficiency and data integrity.

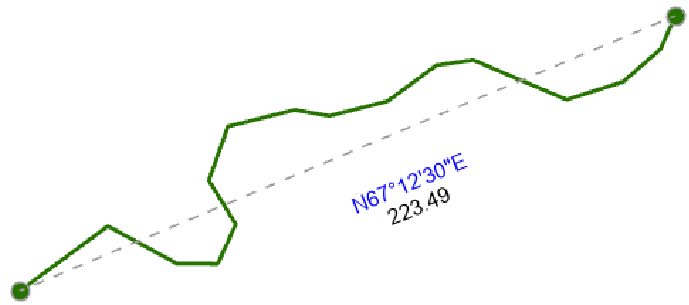
The adjustment can also be made to ignore constrained points, allowing the easier detection of outliers within the network. This analysis type is called Consistency check.

Learn more about least-squares adjustment and the parcel fabric.

Natural boundaries and least-squares analysis

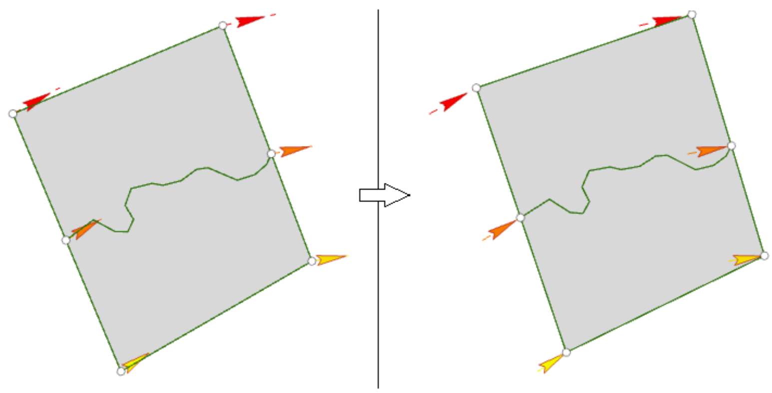
As we've seen from the previous sections, even though we refer to a COGO line feature as a two-point line, a feature's geometry may have additional vertices along its path. In the context of the least-squares analysis, we continue to consider the feature a two-point line, because there are two points that are of primary importance, these being the start point and the end point. The additional internal vertices that occur at the bends in the line are used for defining the shape of a natural boundary. From a conceptual viewpoint, there is an imaginary straight line that connects the end point and start point, and it is defined by the COGO attributes. The imaginary line exists only if there are COGO attribute values, and these are processed in the least-squares analysis tool.

To illustrate, the following natural boundary represented by the green line has COGO attributes that define the direction and distance between the start and end of the feature:

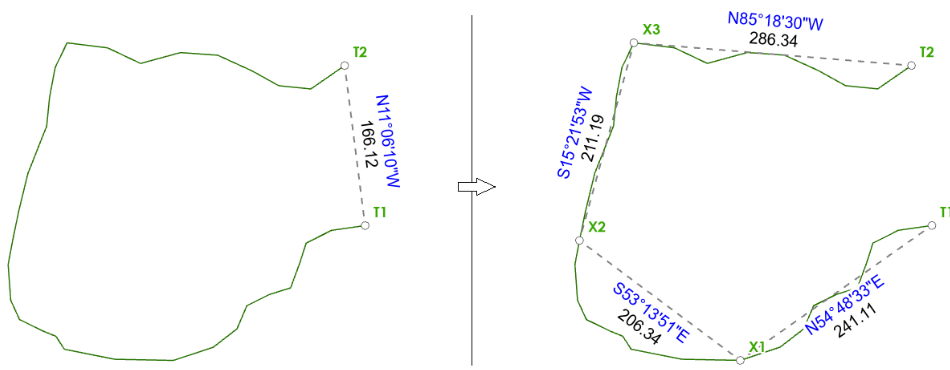


The least-squares analysis uses the values from the COGO attribute fields and does not consider the complete feature geometry; the only element of geometry that is relevant are the end point and to-point of the polyline feature. However, when running the second step to apply the adjustment results and update the mapped geometry, the natural boundary polyline between the fabric end points is updated using a similarity transformation.

The graphic below shows the natural boundary represented as separating two parcels. The first step least-squares analysis has been run, and the vectors show the changes in the position of the fabric points. When the adjustment is applied in the second step as shown on the right side of the image, the general shape of the natural boundary is not distorted:



Since the properties of natural boundaries do not conform to the typical two-point COGO line, in the context of a least-squares analysis there are some additional geometry-related aspects to be considered.

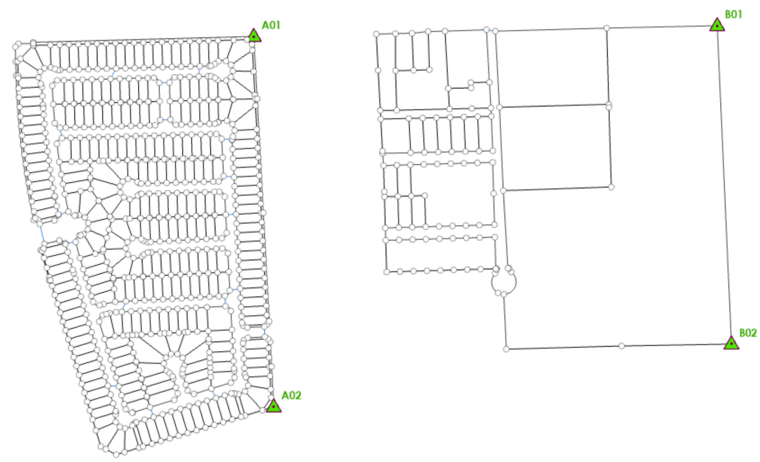


In this example, the left side shows a single feature that is a natural boundary, with the dashed line representing the COGO attributes that will be used in the least-squares analysis.
The right side represents the preferred and recommended way to represent this natural boundary feature. The feature is split at the locations of fabric points X1, X2, and X3 into four separate features, as this provides a more balanced distribution of the measurements representing the shape of this natural boundary. These measurements can be assigned a lower weight in the network to account for situations where the digital representation of the natural boundary line is less accurate than other COGO lines. This may be considered if, for example, the natural boundary was created through heads-up digitizing.

Learn more about weighting measurement values.

Establishing connectivity for road rights-of-way

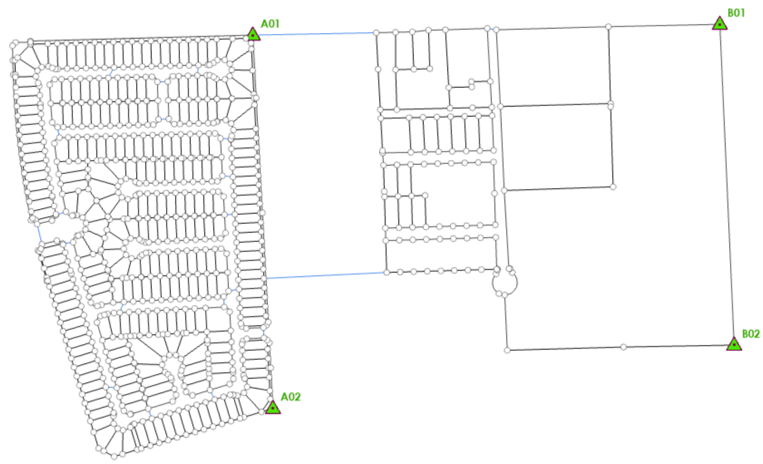
The least-squares analysis can be run on separate networks simultaneously. For example, in the graphic below, the least-squares adjustment will process the two subdivisions separately. The network of boundary lines and connection lines attached to the control points A01 and A02 will not be influenced in any way by the network of lines attached to B01 and B02.



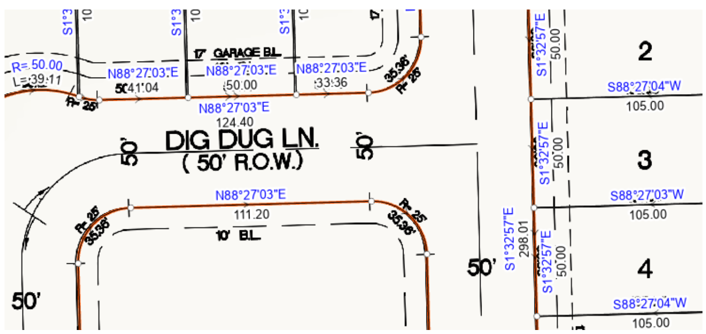
This is a powerful capability, avoiding the need to iterate through many networks and running the adjustment analysis on one network at a time. This is useful when applying the process of building, over time, a single larger adjustable area. In the interim, the smaller groups of parcel fabric lines do not need to be connected.

Learn more about the requirements for connectivity in least squares adjustment.

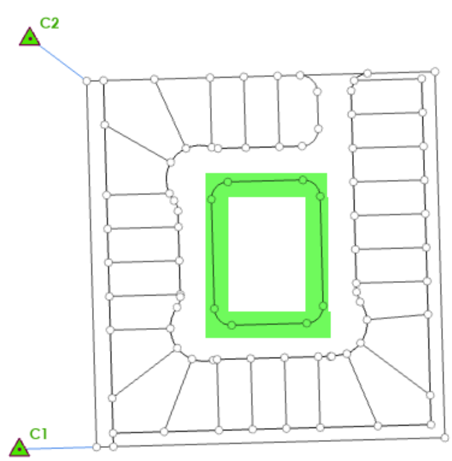
In this example, these two independent networks can be converted into a single adjustable boundary network by adding a minimum of two connection lines and using record-based or survey-sourced COGO attributes that define the relative separation between them.



While this capability to simultaneously run separate networks is powerful, it can also lead to unexpected results when using a weighted least-squares analysis. In spaces such as road rights-of-way between blocks of parcels, there is often no explicit connectivity defined on the original document; instead, the width of the right-of-way is recorded. In the following example, it's 50 feet:



This whole subdivision can be entered using a set of lines resulting in the following network connected to the control points C1 and C2:

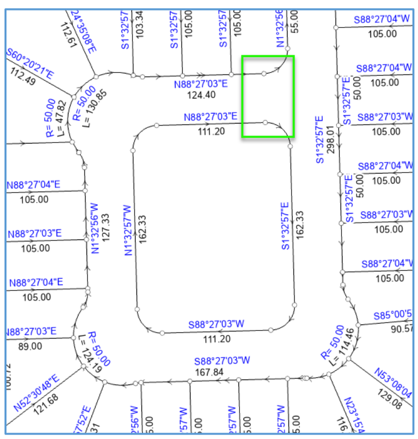


While all the lines represented on the subdivision document have been entered, there is no connection between the lines that are attached to the control points, and the lines forming the internal block, shown highlighted.

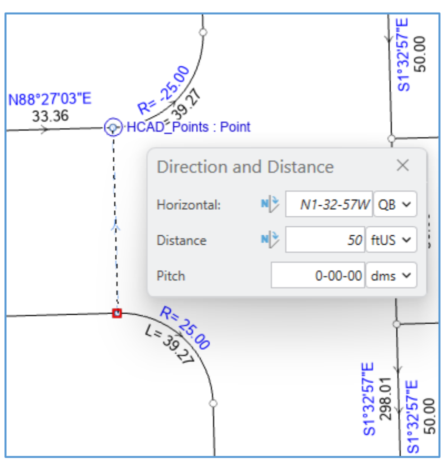
When the least-squares analysis processes the lines in this subdivision, they are treated as two separate networks, one for the non-highlighted lines, and the second for the inner set of highlighted lines. Since the internal block is not connected to any control points, it is treated as a consistency check, and not as a weighted least-squares analysis.

To remedy this, at least two connection lines are required to form a single network that is attached to the control points. While there is no direct line on the original document, the width of the right-of-way should be recorded in the fabric as part of the system of record. This also allows the weighted least-squares analysis to proceed as expected.

The first step is to find pairs of points that are placed directly across from one another and that are therefore orthogonally 50 feet apart. In this example, there is only one such pair of points shown highlighted here:

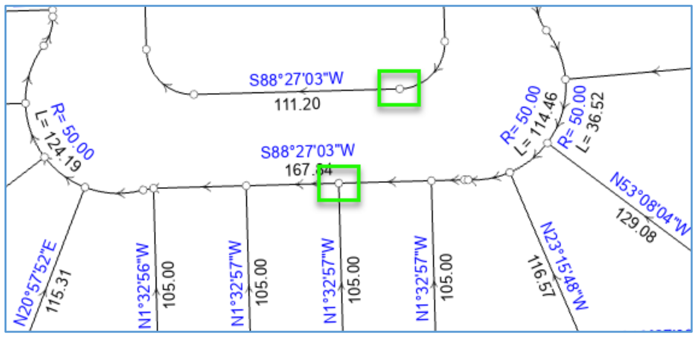


The connection line can be added, matching the direction of the north-south lines, and using the 50-foot width as the distance:

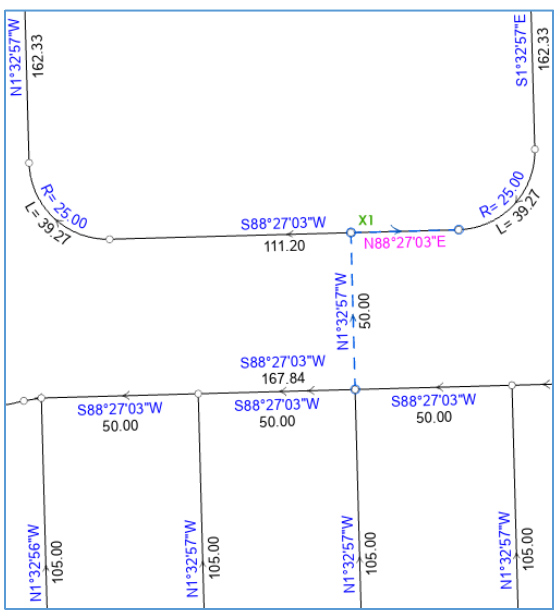


The inner block needs to be connected by at least one other point pair, a different technique can be used to accomplish this.
First, identify a location on the opposite, southern side of the inner block, where two points can be found that are not orthogonal, but are across the street from one another.

Let's choose these two points:



Knowing that the road right-of-way is 50 feet and knowing that the road frontages on each side are parallel, a pair of connection lines and a new fabric point to connect them can be created as shown in the following illustration:



Note that the new point (called X1 in this case) is created and sits on top of the 111.20 ft line. Note also that the second line has only a direction attribute and does not have a distance attribute. The distance is not necessary; it is not part of the recorded document, and it is also not easy to calculate. The direction is needed to establish the orthogonality with the first line, recalling that direction sets are processed by using the difference between the direction values. The 90-degree angle will be defined when these lines are processed in the adjustment engine as a direction set.

A note on feature selections

It is important when running the least-squares analysis to make sure that the connection lines are selected. Although the least-squares analysis can process a selection of parcel polygons, internally it will use the lines that bound those polygons. In this polygon selection approach, you are not directly selecting the line features that are the ultimate source of the information that is processed. Therefore, when doing a least-squares analysis it's recommended that the lines are selected directly. This ensures that you are not excluding the connection lines and ensures that the correct set of lines and COGO attributes is being processed.

Summary

ArcGIS Parcel Fabric enables cadastral organizations to efficiently store and manage parcel-based measurement data along with its associated metadata. As the authoritative source for multi-purpose land parcel information systems, these organizations can capture and maintain essential metrics that support fit-for-purpose requirements.

The solution allows storage and publication of key metadata—such as capture method, date, spatial accuracy, and historical lineage—ensuring traceability, and fit-for-purpose metrics. Built-in data quality management tools evaluate critical factors like topology and attribute accuracy, helping maintain high standards of reliability.

Proven in real-world implementations, ArcGIS Parcel Fabric offers a practical, scalable approach to managing measurement-based land parcel information. Migrating existing datasets into the parcel fabric is straightforward, enabling organizations to quickly realize the benefits of a modern, standards-based cadastral framework.

Learn more about creating a parcel fabric and loading your data.

Get Started Now

Esri has a global network of offices, distributors, and partners to help you modernize your cadastral system with ArcGIS Parcel Fabric. Are you ready to get started?

Get started today.

Esri, the global market leader in geographic information system (GIS) software, location intelligence, and mapping, helps customers unlock the full potential of data to improve operational and business results.

Founded in 1969 in Redlands, California, USA, Esri software is deployed in more than 350,000 organizations globally and in over 200,000 institutions in the Americas, Asia and the Pacific, Europe, Africa, and the Middle East. Esri has partners and local distributors in over 100 countries on six continents, including Fortune 500 companies, government agencies, nonprofits, and universities. With its pioneering commitment to geospatial information technology, Esri engineers the most innovative solutions for digital transformation, the Internet of Things (IoT), and advanced analytics.

Visit us at esri.com.

For more information, visit
Esri.com/ArcGIS-For-Land

Contact Esri

380 New York Street
Redlands, California 92373-8100 USA

1 800 447 9778
T 909 793 2853
F 909 793 5953
info@esri.com
esri.com

Offices worldwide
esri.com/locations