



ArcGIS Pipeline Referencing/ArcGIS Roads and Highways: Preparing and Utilizing Web Services for Creating and Editing Linear Referenced Data and with the REST API

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Location Referencing across the ArcGIS Platform



Linear Referencing REST API

Provides a simple, open web interface to linear referencing services hosted by ArcGIS Enterprise.

Linear Referencing Service

Apply Edits Acquire locks Locks Check Events Concurrencies Generate Events Create Version
Remove Overlapping Centerlines Derive Event Measures Append Routes Delete Version Geometry to Measure
Measure to Geometry Query Attribute Set Translate Apply Event Behaviors Release Locks Generate Routes

<http://esriurl.com/LRAPI>

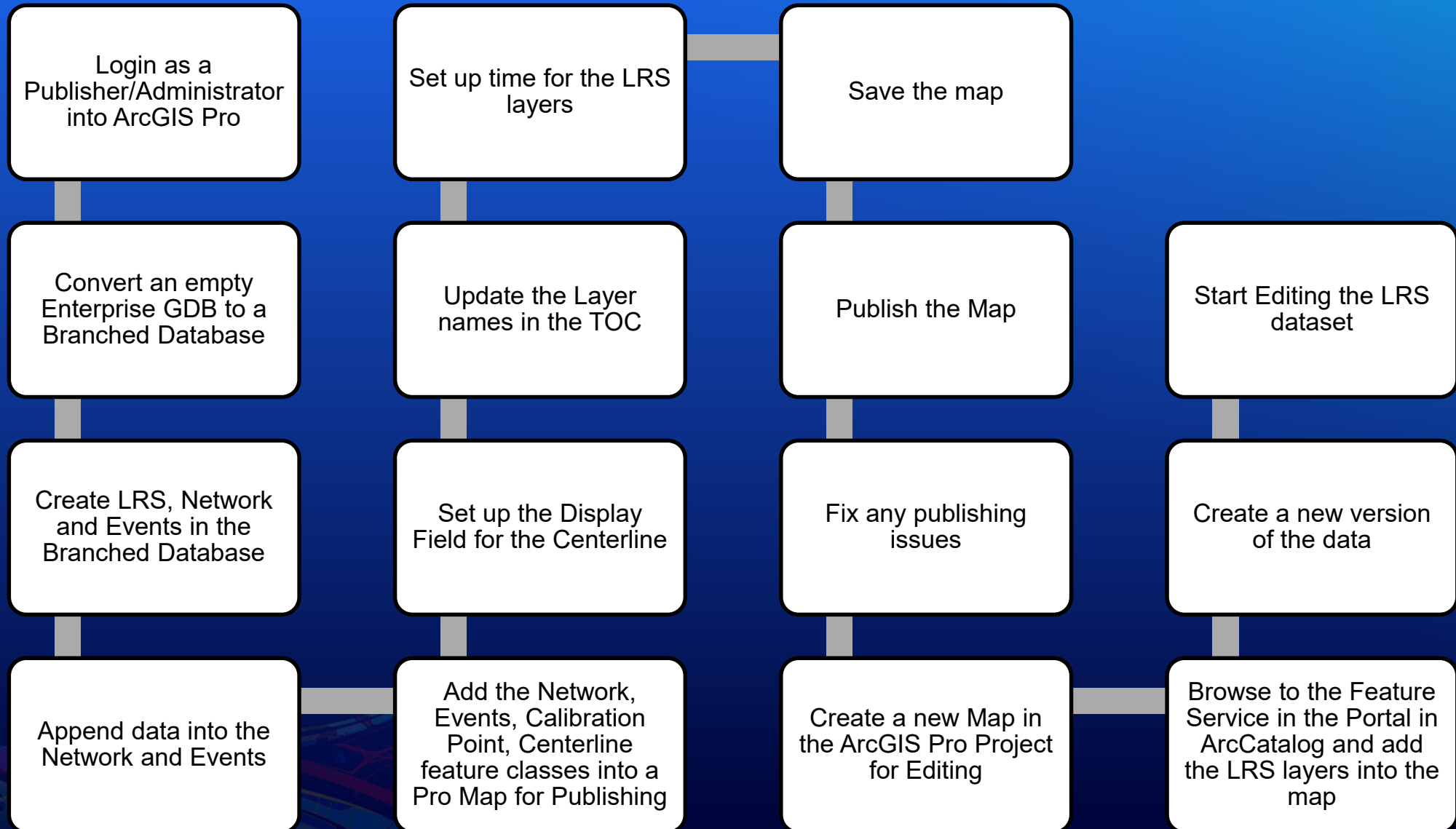
Supports Esri's Feature Services Architecture – feature service editing across the ArcGIS Platform including ArcGIS Pro and web apps



Demo: Publishing data with LR capability



Step by step workflow for publishing a LR capable service



Step1: Minimum Requirements

ArcGIS Enterprise with Location Referencing License

The screenshot shows the ArcGIS Enterprise Administration console. The user is logged in as Captain James T Kirk. The 'Organization' tab is selected, and the 'Licenses' sub-tab is active. Under the 'Add-on licenses' section, four extension cards are visible:

- Location Referencing:** 13 assigned, 187 available, 200 total. Compatible user types: 4.
- Maritime Bathymetry:** 0 assigned, 200 available, 200 total. Compatible user types: 4.
- Maritime Charting:** 0 assigned, 200 available, 200 total. Compatible user types: 3.
- Network Analyst:** 0 assigned, 200 available, 200 total. Compatible user types: 5.

ArcGIS Pro with Location Referencing extension enabled

Licensing

ArcGIS Pro Concurrent Use License

Name	Licensed	Expires
Basic	No	N/A
Standard	No	N/A
Advanced	Yes	Never

Active License Manager: esrilm

Esri Extensions

Name	Licensed	Expires
Data Interoperability	Yes	Never
Data Reviewer	Yes	Never
Defense Mapping	No	Never
Geostatistical Analyst	Yes	Never
Image Analyst	Yes	Never
LocateXT	Yes	Never
Location Referencing	Yes	Never
Maritime	No	Never
Network Analyst	Yes	Never

- Login to ArcGIS Pro as a portal Publisher or Administrator

Project Map Insert Analysis View Edit Imagery Location Referencing Share

Clipboard: Cut, Copy, Paste, Copy Path

Navigate: Explore, Bookmarks, Go To XY

Layer: Add Preset, Add Graphics Layer

Selection: Select, Select By Attributes, Select By Location, Clear

Inquiry: Measure, Locate, Infographics, Coordinate Conversion

Labeling: Pause, Lock, View Unplaced, More, Convert

Offline: Download Map, Sync, Remove

Contents

Search

Drawing Order

Publishing

Publishing

1:3,616

117.1856831°W 34.0548221°N

Selected Features: 0

Catalog

Project Portal Favorites

Search Project

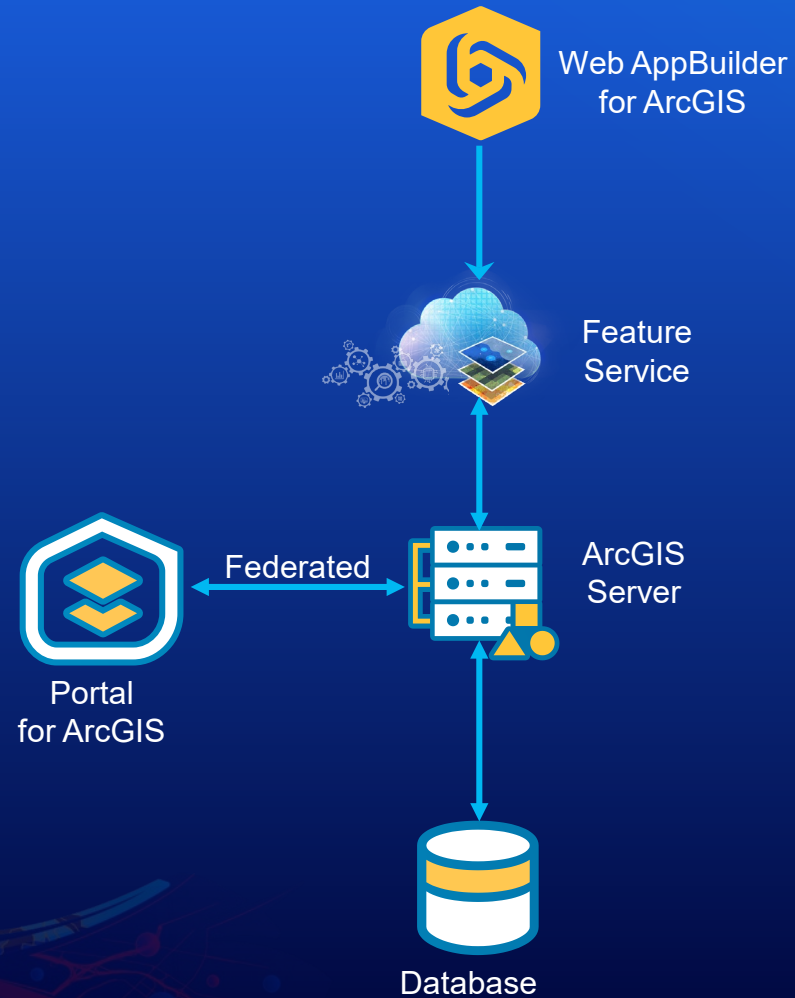
- Maps
- Toolboxes
- Databases
- Styles
- Folders
- Locators

Create Features



Demo : Editing using REST

Using a widget to edit LR data





Demo: Creating routes using GPS points

Automating Route Creation

GPS Data

FromDate	RouteName	LineName	Geometry
8/9/1987	Route1	Line1	[[-3481021.317968227, 2281351.0378997885], [-3482076.734164469, 2277557.052377548],
5/23/1979	Route2	Line2	[[-3728222.956765428, 1826067.4875118732], [-3724030.73253835, 1828448.272776533]]
5/23/1979	Route3	Line3	[[-3606193.5889483243, 2105115.9415522404], [-3606183.4829974025, 2105181.650738407
1/29/1993	Route4	Line4	[[-3691548.5179754347, 2593741.732342072], [-3691528.2860605195, 2593797.88446074],
5/23/1979	Route5	Line5	[[-3728222.956765428, 1826067.4875118732], [-3739352.9302403107, 1819857.106880558
8/9/1987	Route6	Line6	[[-3606193.5889483243, 2105115.9415522404], [-3593840.414507769, 2101885.0051007494
11/30/1973	Route7	Line7	[[-3716481.329986289, 1975845.451734487], [-3755485.4383295253, 1971946.315503914],
5/23/1979	Route8	Line8	[[-3732685.0885891616, 1853679.220017884], [-3734415.7754164934, 1851568.2121008076
11/30/1973	Route9	Line9	[[-3676818.997565806, 1988055.6677995399], [-3687550.9646188617, 2030472.8480567634
8/9/1987	Route10	Line10	[[-3499006.0628385097, 2129789.852178011], [-3486624.7946221307, 2129874.4291085936
5/23/1979	Route11	Line11	[[-3422781.570602961, 1715779.9925364032], [-3423002.660711959, 1716209.0819013193]]
5/23/1979	Route12	Line12	[[-3733268.3613727465, 1835298.724298682], [-3728222.956765428, 1826067.4875118732]]
2/16/1982	Route13	Line13	[[-3750932.053735532, 2356558.3523796797], [-3752942.7659214437, 2357274.142942846]]
1/29/1993	Route14	Line14	[[-3710826.7582902163, 2630597.275100559], [-3719812.645830199, 2649450.5917245112]]
1/25/1971	Route15	Line15	[[-3620266.263230704, 2215219.739716623], [-3619947.2838817835, 2216211.0064348727]]
1/29/1993	Route16	Line16	[[-3723917.222594768, 2712262.264329102], [-3724952.6601564363, 2713676.108614266]]
2/16/1982	Route17	Line17	[[-3634060.4410228357, 2366536.574877236], [-3650581.9939376265, 2368024.5190798156
1/29/1993	Route18	Line18	[[-3561957.92971652, 2346084.034417622], [-3552420.0924930423, 2362496.203692913], [-
1/29/1993	Route19	Line19	[[-3516782.286472298, 2443111.6691018753], [-3490750.9786269516, 2431278.059895154]]
5/23/1979	Route20	Line20	[[-3722514.3727101907, 1809324.5318246633], [-3722507.277580023, 1809273.030943416]]
1/29/1993	Route21	Line21	[[-3723917.222594768, 2712262.264329102], [-3720172.433168359, 2720126.399191331]]

LRS Routes



- XY to Point
- Point to Line
- Append Routes
- Generate Calibration Points
- Generate Routes

OR

- XY to Point
- Point to Line
- Copy to Centerline
- Use Create Route tool for each route

Conflict prevention

Conflict prevention averts explicit and logical conflicts that could occur when editing in a multiuser geodatabase in the case where more than one users are editing the same route in different versions.

Only available when using

- Feature service with linear referencing capability
- Branched versioning

3 Stages

- Acquire locks
- View locks
- Release locks



Demo: Reassigning a route

Reassigning a route



Online help and samples

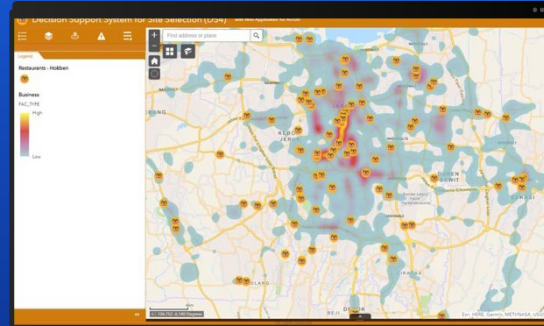


Linear Referencing REST API: Resources



<http://esriurl.com/LREST>

- REST API developer guide
- Sample LRS enabled services
- Sample web apps



<http://esriurl.com/LRWIDGET>

- Web App builder samples

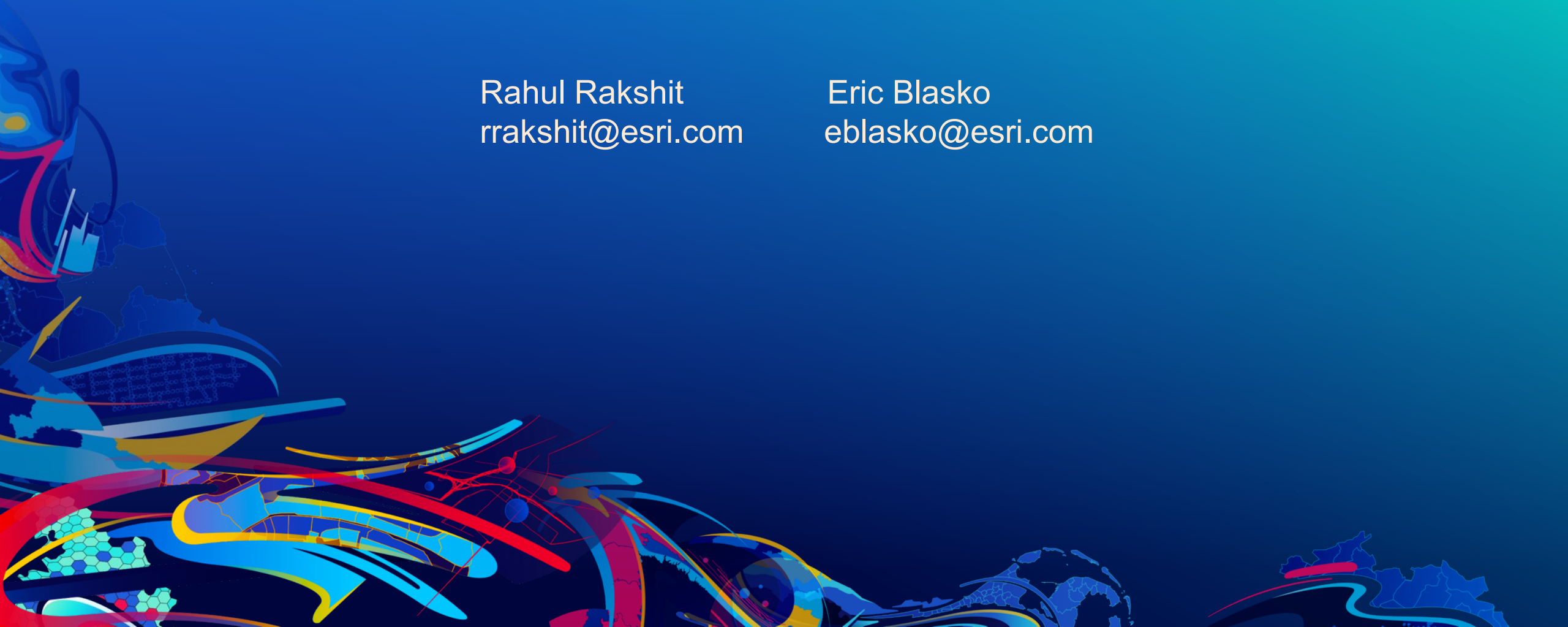
Quick Recap

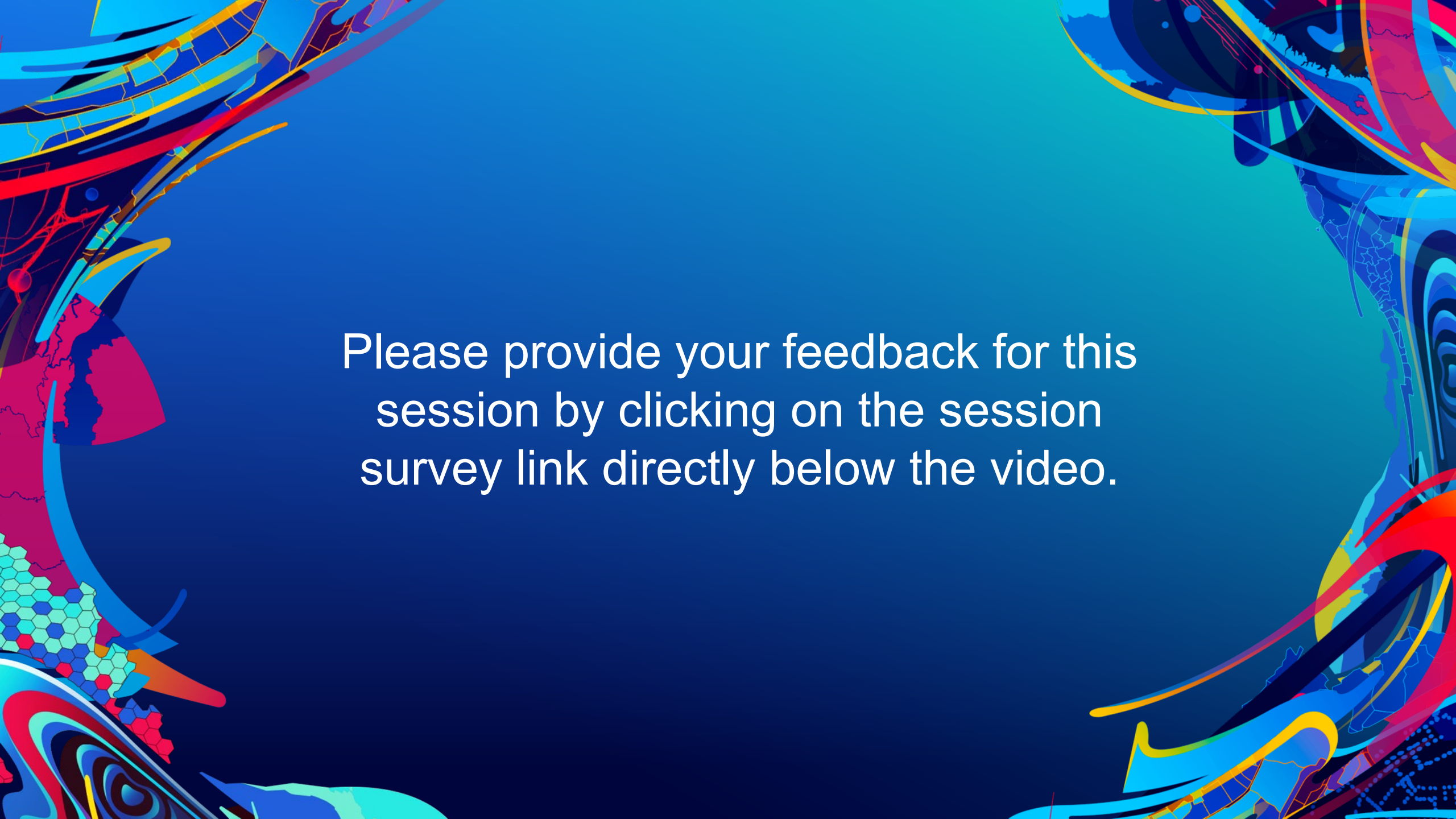
- ArcGIS Pro publishes, consumes, and then edits LRS feature services from ArcGIS Enterprise.
- Portal handles identity, sharing (of the feature service), and roles/privileges/access that would previously have been file based (.sde connection files) or administered directly in the database.
- Versioned editing is handled via the version management service, allowing Pro and web apps to have versioning capabilities through the rest endpoint without direct database access at the desktop client level.
- Branch versioned database is required for editing a LR feature service.

Thanks

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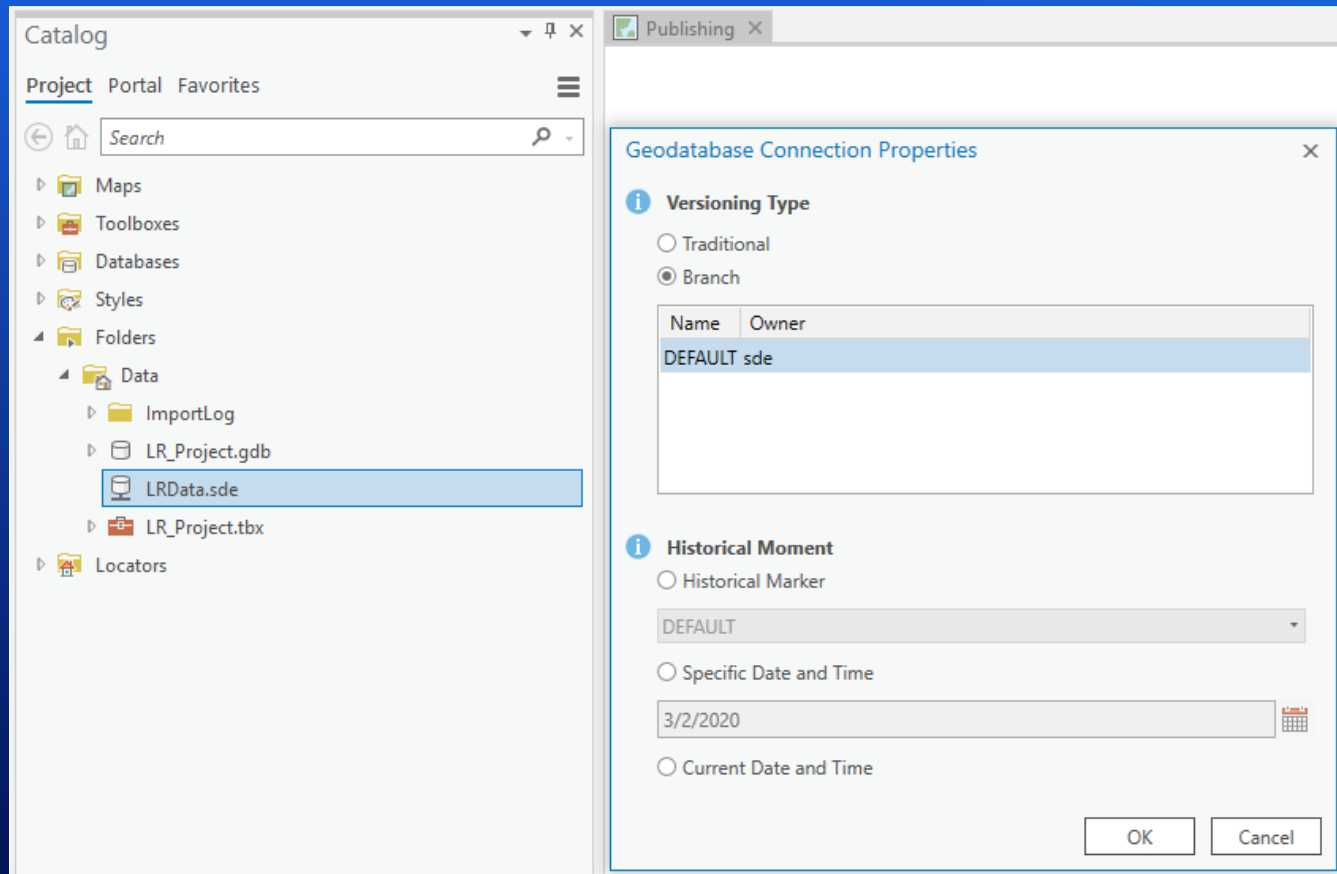


Please provide your feedback for this session by clicking on the session survey link directly below the video.

Helpful steps in ArcGIS Pro



Step2: Configure a branch versioned database



- Right-click your database connection and choose Geodatabase connection properties
- Set your Versioning Type to Branch

More info: <http://esriurl.com/BV>

Step3: Create LRS and append data

Geoprocessing ▾ ⌵ ✕

← Create LRS +

Parameters Environments ?

Input Location
LRData.sde

LRS Name
LRS

Centerline Feature Class Name
Centerline

Calibration Point Feature Class Name
Calibration_Point

Redline Feature Class Name
Redline

Centerline Sequence Table Name
Centerline_Sequence

Spatial Reference
NAD_1983_California_Teale_Albers

XY Tolerance
0.001 Meters

Z Tolerance
0.001 Meters

XY Resolution
0.0001 Meters

Z Resolution
0.0001 Meters

Run

Catalog Geoprocessing

Geoprocessing ▾ ⌵ ✕

← Create LRS Network +

Parameters Environments ?

Input Location
LRData.sde

LRS Name
LRS

LRS Network Name
Network12

Route ID Field
Routeld

Route Name Field
RouteName

From Date Field
FromDate

To Date Field
ToDate

Derive From Line Network

Include Fields to Support Lines

Measure Unit
Meters

Run

Catalog Geoprocessing

Geoprocessing ▾ ⌵ ✕

← Append Routes +

Parameters Environments ?

Source Routes
Continuous_Load

LRS Network
Network1

Route ID Field
Routeld

Route Name Field
RouteName

From Date Field
FromDate

To Date Field
ToDate

Field Map

Output Fields +	Source	Properties
FromDate	Merge Rule	First
ToDate	D:\VRH\ComplexShapes\Corr	
Routeld	FromDate	
RouteName		
	Add New Source ▾	

Load Type
Add

Run

Catalog Geoprocessing

Geoprocessing ▾ ⌵ ✕

← Create LRS Event +

Parameters Environments ?

Parent LRS Network
Network1

Event Name
LineEvent1

Geometry Type
Line

Event ID Field
EventId

Route ID Field
FromRouteld

From Date Field
FromDate

To Date Field
ToDate

Location Error Field
LocError

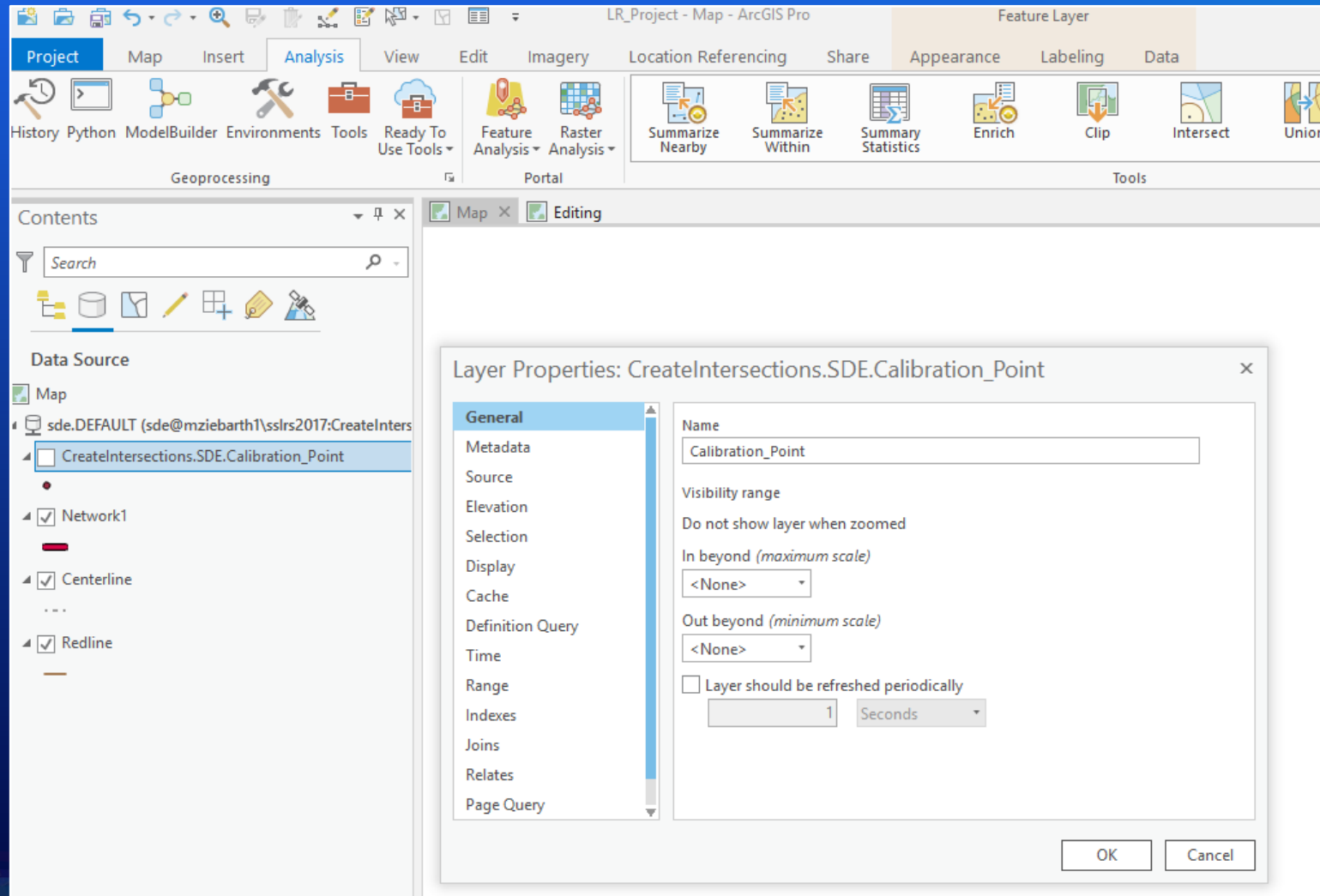
Measure Field
FromMeasure

To Measure Field
ToMeasure

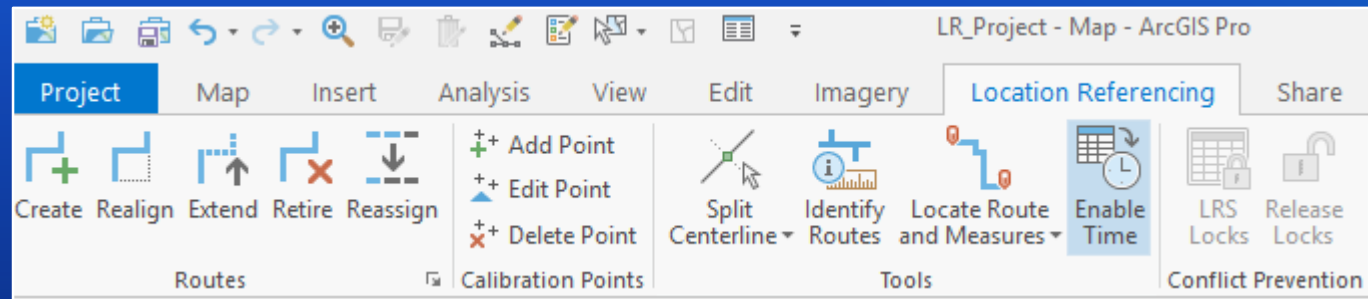
Run

Catalog Geoprocessing

Step4: Rename Layers



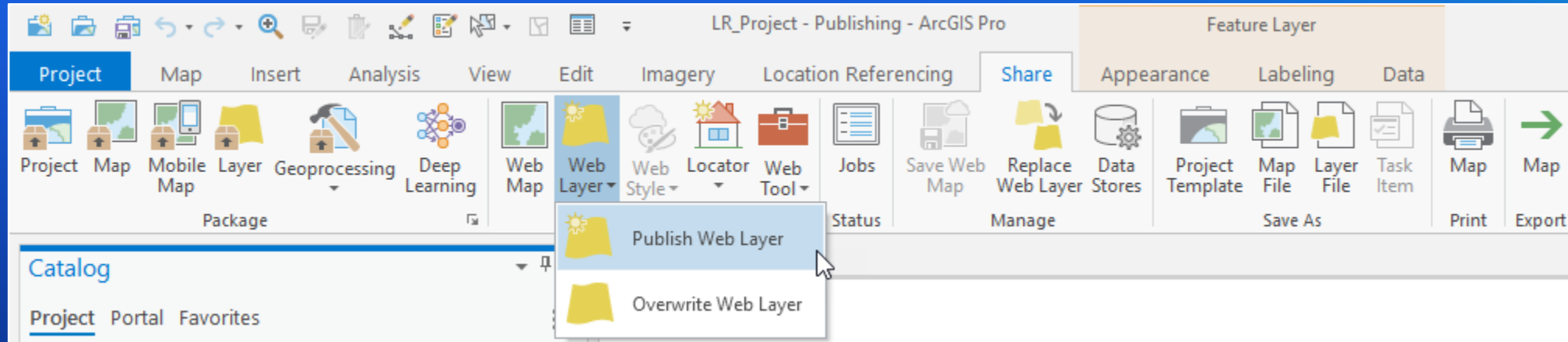
Step5: Set up time awareness



Step6: Set up the display field for the centerline

The screenshot displays the ArcGIS interface. On the left, the 'Contents' pane shows a 'Drawing Order' list with layers: Map, Calibration_Point, Network1, Centerline (highlighted), and Redline. On the right, the 'Layer Properties: Centerline' dialog box is open, showing the 'Display' tab. The 'Display field' dropdown is open, showing a list of fields: OBJECTID, Centerlineid, GlobalID, Creator, Date_Created, Editor, Date_Edited, and SHAPE.STLength(). The 'Scale symbols' checkbox is checked. The 'OK' and 'Cancel' buttons are visible at the bottom right of the dialog box.

Step7: Publish the service with Linear Referencing Capability



Step7: Publish the service with LR Capability

Share As Web Layer
Sharing Map As A Web Layer

General Configuration Content

Item Details

Name: LR_Edits

Summary: Map for editing location referencing datasets

Tags: LR, Editing

Data

Reference registered data
 Copy all data

Layer Type

Feature
 Map Image

Location

Portal Folder: Select or create folder

Server and Folder: https://rakshit.esri.com/server (Hosting Server)

Share with

Everyone
 ArcGIS Enterprise

Finish Sharing

Analyze Publish Jobs

Share As Web Layer
Sharing Map As A Web Layer

General Configuration Content

Layer(s)

- Map Image
- Feature

Additional Layers

- WMS
- WFS

Capabilities

- WCS
- KML
- Linear Referencing
- Version Management

Finish Sharing

Analyze Publish Jobs

Share As Web Layer
Sharing Map As A Web Layer

General Configuration Content Messages

Search Analyzer Results

LR Edits

- 00231 Layer's data source must be registered with the server
- 00323 Shared instance pools do not support Version Manager
- 24097 The layer name exposes the fully qualified dataset name
- 24034 Layer's data source is z-aware and no default z-value is
- 24041 Layer does not have a feature template set (3)
- 24104 All LRS Networks within the LRS are not in the list of lay

Type: Errors
Code: 00231
Severity: High
Status: Unresolved
Name:
Description: Layer's data source must be registered with the server (3)

Finish Sharing

Analyze Publish Jobs

Add data store

Provide connection details for your data store

Title: LRDataEdits

Tags: LR

Portal Folder: roads (root)

Publisher database connection

SERVER=mziebarth1;INSTANCE=sdesqlserver:mziebarth1\sslr2017;DBCLIENT=sqlserver

Server database connection

Same as publisher database connection

SERVER=mziebarth1;INSTANCE=sdesqlserver:mziebarth1\sslr2017;DBCLIENT=sqlserver

Select the servers to which you want to add your data store

Server	Status
<input checked="" type="checkbox"/> https://rakshit.esri.com/server (Hosting Server)	?

Share with

Everyone
 ArcGIS Enterprise

Groups

Create Cancel

Share As Web Layer
Sharing Map As A Web Layer

General Configuration Content Messages

Instance Type

Dedicated instance
 Shared instance

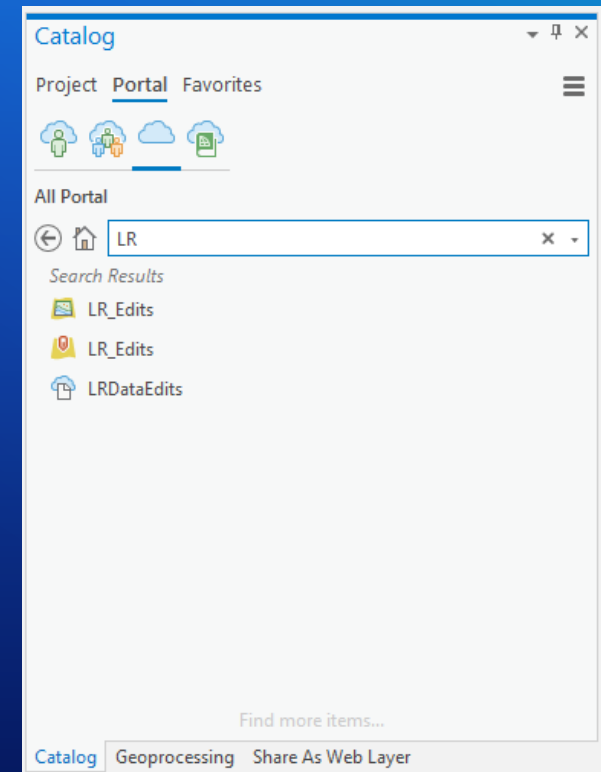
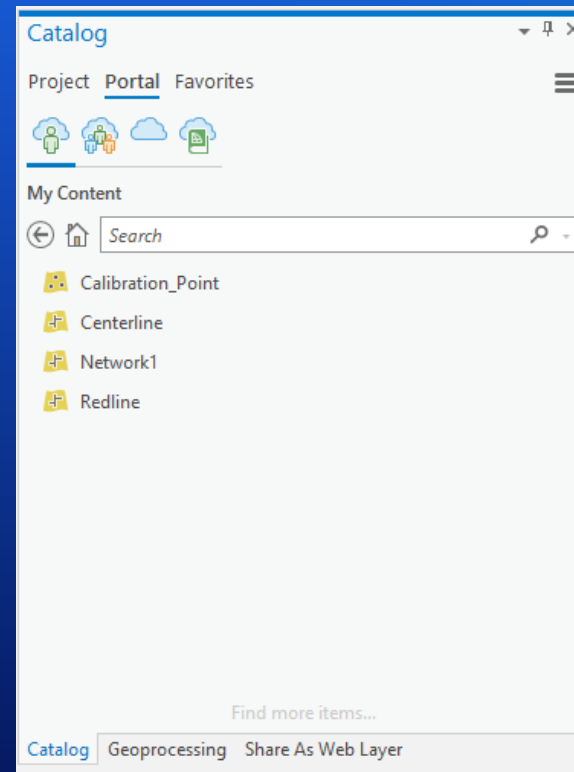
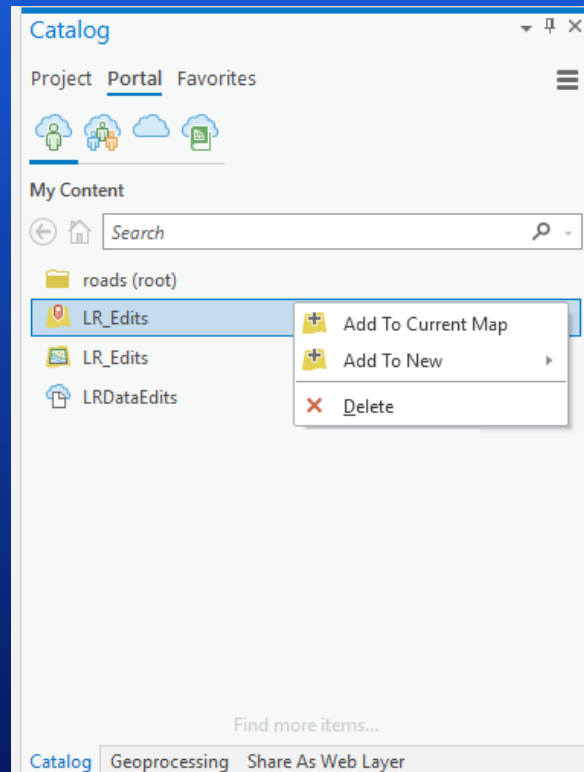
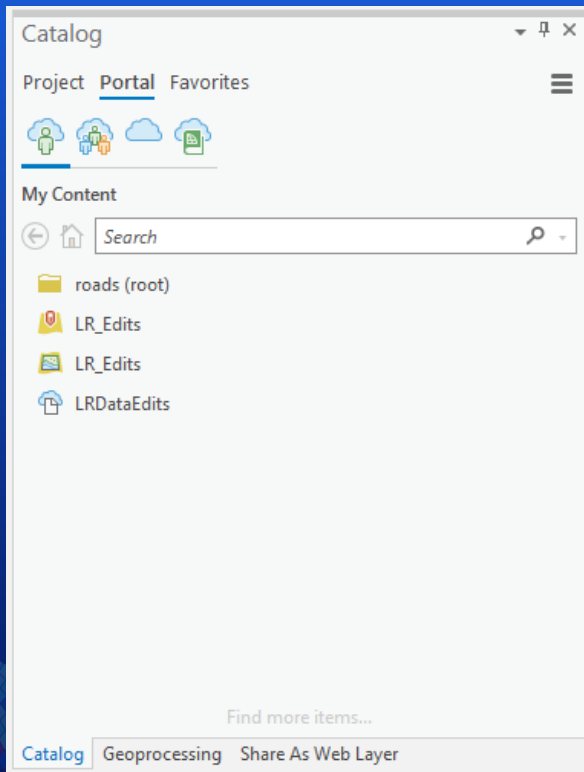
Number of instances per machine

Minimum: 1
Maximum: 2

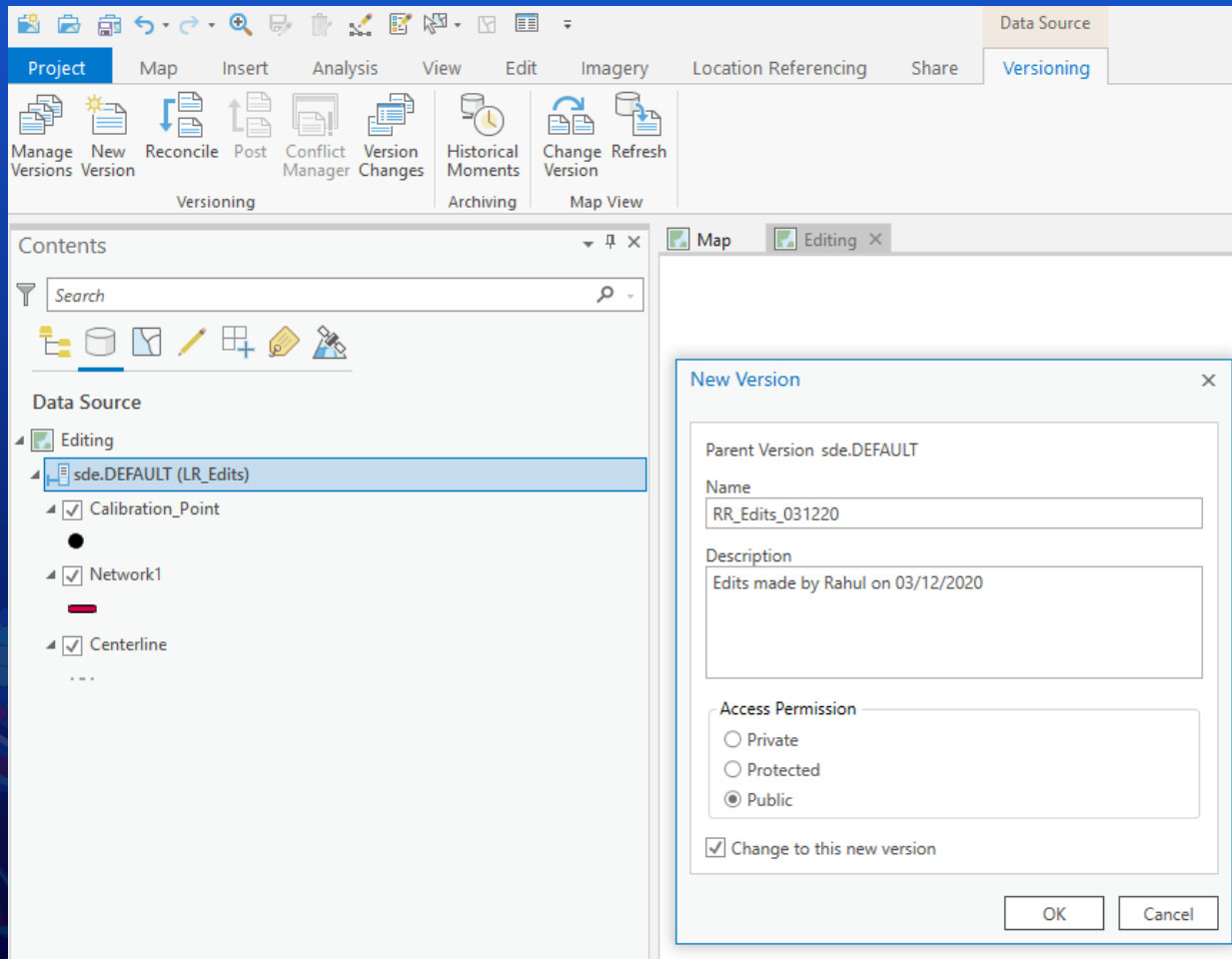
Finish Sharing

Analyze Publish Jobs

Step8: Add the Data from Portal to edit



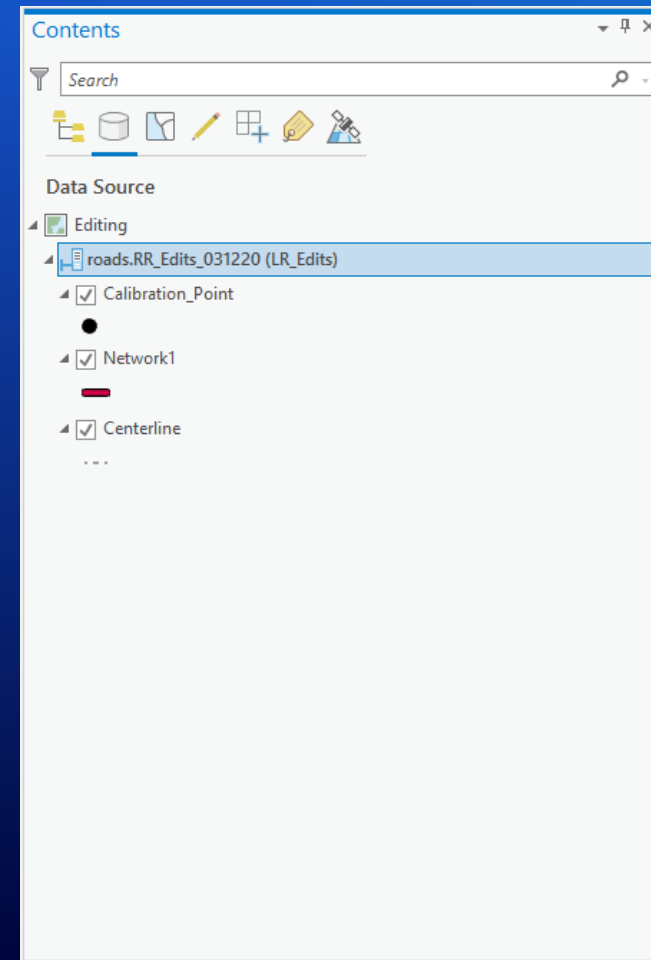
Step9: Create a new version for the data



The screenshot shows the software interface with the 'Versioning' tab selected in the ribbon. The 'Contents' pane on the left shows the 'sde.DEFAULT (LR_Edits)' data source expanded, with 'Calibration_Point', 'Network1', and 'Centerline' visible. A 'New Version' dialog box is open in the center, with the following fields and options:

- Parent Version: sde.DEFAULT
- Name: RR_Edits_031220
- Description: Edits made by Rahul on 03/12/2020
- Access Permission: Private, Protected, Public
- Change to this new version

Buttons for 'OK' and 'Cancel' are at the bottom right of the dialog.

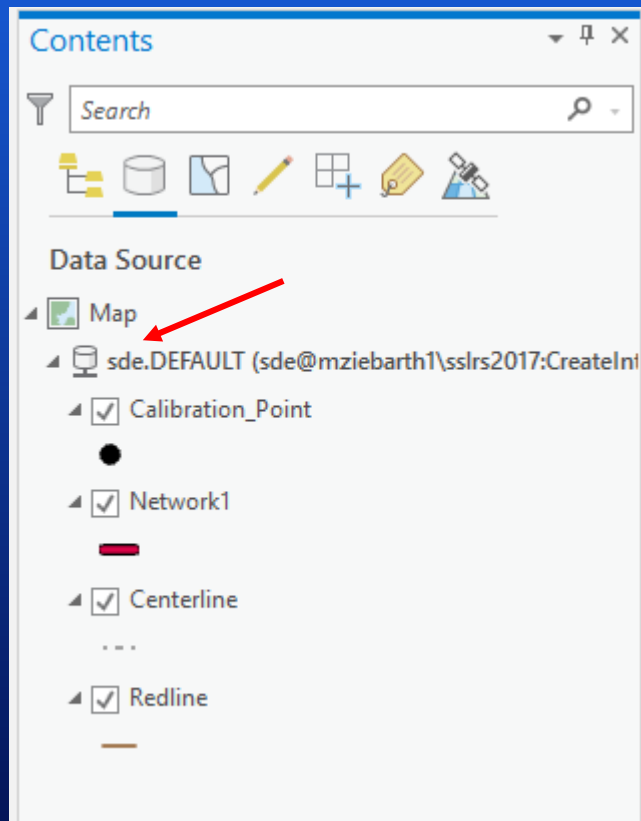


The screenshot shows the 'Contents' pane on the right side of the software interface. The 'Data Source' section is expanded to show 'Editing'. Under 'Editing', the 'roads.RR_Edits_031220 (LR_Edits)' data source is selected and expanded, showing a tree view of its contents:

- Calibration_Point
-
- Network1
-
- Centerline
- ...

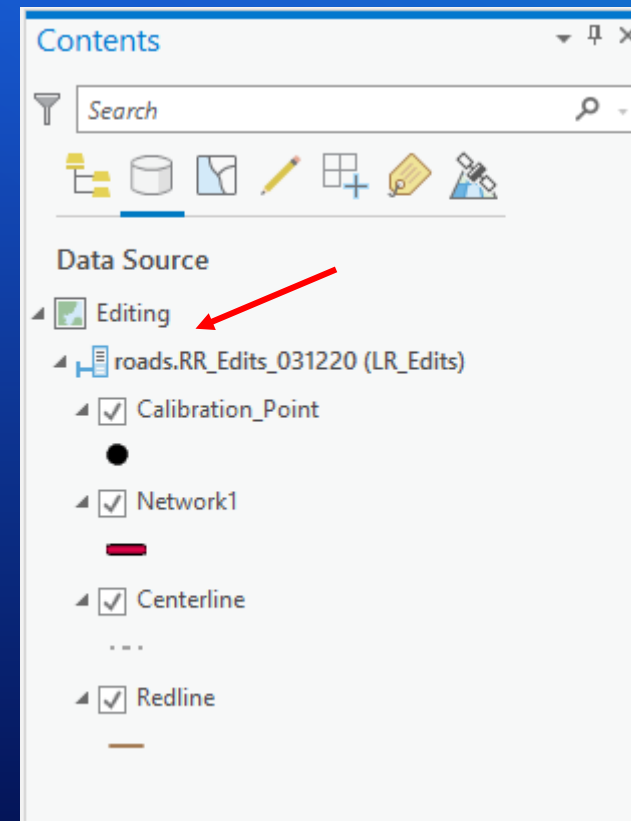
Confirming the source of data is a feature service

Direct Connect



- Data Loading
- Publishing

Feature Service



Editing

Any changes in the data structure needs republishing of the feature service



esri®

THE
SCIENCE
OF
WHERE®