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Migrating ArcGIS Roads and Highways data from ArcMap to ArcGIS Pro 3.2

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Differences between Roads and Highways in ArcMap vs Roads and Highways in ArcGIS Pro

The migration of Roads and Highways from ArcMap to ArcGIS Pro provides new capabilities and tools for users in the transportation industry. These include things like support for complex shapes like loops, cul de sacs, ramps, and branch route shapes, event editing capabilities in Pro, moving certain tools to geoprocessing allowing for scripting, selection sets, and a greater level of control, as well as other new capabilities in Event Editor such as Undo/Redo support.

Roads and Highways in ArcMap differs from Roads and Highways in ArcGIS Pro in a few key areas, including the underlying architecture used by the software and the type of versioning that supports this new architecture.

Service Oriented Architecture

While Roads and Highways in ArcMap supports route editing using direct connections to multiuser geodatabases (SDE files), in ArcGIS Pro, Roads and Highways has moved to a service-oriented architecture. This new architecture supports a modern Web GIS model. Instead of using a direct database connection to access data, users will now consume feature services that have been published with LRS data and the linear referencing capability enabled to do their route editing. This service-oriented editing approach was already utilized with Event Editor and now carries over to route editing and geoprocessing tool usage in ArcGIS Pro.

Branch Versioning

Roads and Highways data in a multiuser geodatabase that is used in ArcGIS Pro must be branch versioned. Branch versioning is a new type of versioning designed for multiuser editing in a service-oriented environment. Instead of utilizing a direct connection to the geodatabase, branch versioned data is designed to be edited and managed using the version management capability on web services, while still processing operations at similar speeds to a client-server editing experience. For more information about the benefits of branch versioning, see the Branch Versioning section of [Enterprise data management strategies](#).

Version Management Service

When publishing a service with branch versioned data using ArcGIS Pro, users will see the Version Management capability. When Version Management is enabled on a service, familiar operations such as creating and deleting versions, edit sessions, and Undo/Redo support will be available using a service in ArcGIS Pro, Event Editor, as well as in other web apps, and other 3rd party applications.

Steps to migrate Roads and Highways data from ArcMap to ArcGIS Pro

Before publishing a service with Roads and Highways data that has linear referencing and version management capabilities enabled in ArcGIS Pro, the LRS needs to be upgraded for use in ArcGIS Pro and branch versioning must be enabled. *Note: The geodatabase version must be 10.6 or newer to utilize branch versioning.*

The following steps prepare a Roads and Highways geodatabase currently used in ArcMap for use in ArcGIS Pro. It is important to follow the steps in the order provided to ensure the process is completed correctly.

Note: It's recommended you create a backup of your database before beginning this process.

For more information on branch versioning requirements, see [Register a dataset as branch versioned](#).

1. Stop any services and other connections to the geodatabase.
2. Post all outstanding edits in versions other than DEFAULT up to the DEFAULT version of the geodatabase.
3. Delete all child, grand-child, and other versions so only DEFAULT remains.
4. If you have any external systems that receive updates from the LRS (via the Relocate Events or Export Network tools), sync those systems with the LRS to the current date before moving to the new step.
5. Un-version all items within the geodatabase that participate in the LRS including the LRS minimum schema items (centerline, calibration points, redline, and centerline sequence), all LRS Networks, LRS Events, LRS Intersections, and tables that begin with LRS_.
6. *Create a feature dataset with the same spatial reference and XYZM tolerance/resolution as your LRS Network feature class in the geodatabase. Move the centerline, calibration point, redline, all LRS Network, LRS Event, and LRS Intersection feature classes into the feature dataset. To create a feature dataset, see [Create Feature Dataset](#).*
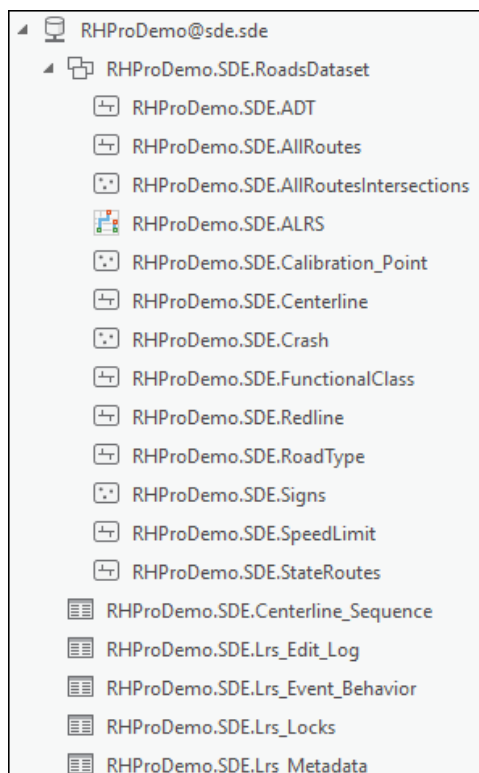   *Note: The data owner for the LRS should create the feature dataset.*

Figure 1: Minimum schema items within Feature Dataset

7. Add Global IDs to all feature classes and tables in the geodatabase that participate in the LRS (including the LRS_EditLog table). The LRS_EventBehavior, LRS_Locks, and LRS_Metadata tables do not need Global IDs. To add Global IDs, use the Add Global IDs geoprocessing tool or the manage option in the Catalog window in Pro.
8. Enable editor tracking on all feature classes and tables in the geodatabase using UTC as the time zone (including the LRS_EditLog table). The LRS_EventBehavior, LRS_Locks, and LRS_Metadata tables do not need editor tracking enabled. To enable editor tracking, see Enable or disable editor tracking or the manage option in the Catalog window in Pro.
9. In ArcGIS Pro, run the Modify LRS geoprocessing tool in the Location Referencing toolbox to upgrade the LRS. Select the connection file as the Input Workspace, then select the LRS in the current LRS drop down. All other fields for minimum schema items (centerline, calibration point, centerline sequence, and redline) should populate automatically. You do not need to change any of the parameters to run the tool and successfully upgrade the LRS.
   Note 1: The user that executes the Modify LRS geoprocessing tool needs to have privileges to add a field to the LRS_EditLog table in the geodatabase.
   Note 2: If you have intersections configured with your LRS, you will get a message when this tool runs alerting you to the intersections being in the ArcMap format.
   Note 3: If you had different event behaviors set for Realign and Realign Overlaps in ArcMap, you may receive a message about what behavior is configured for Realign Route when running the tool.
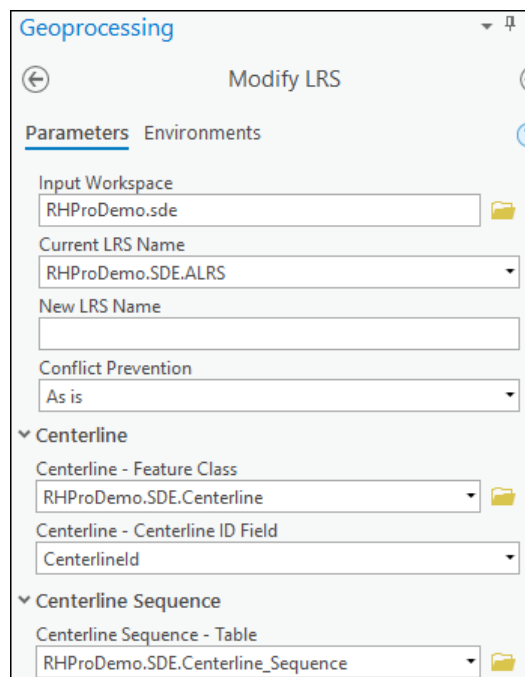

Figure 2: Modify LRS geoprocessing tool in ArcGIS Pro

10. Open the LRS_EditLog table and verify that a field called "Processed" has been added to the table. Verify that all the records in the table have a value of 1 in the Processed field.

11. Roads and Highways in ArcGIS Pro has expanded 3D support. To ensure measures on your routes continue to be in 3D in ArcGIS Pro, a python script called Migrate Calibration Points has been created to update existing calibration points to ensure they have a Z value populated and create any calibration points in the loop portions of routes with complex shapes to ensure they calibrate correctly in ArcGIS Pro. You can find the script at https://github.com/Esri/lrs-migration-toolset. Download the toolbox and follow the steps in the word document to execute the tool within ArcGIS Pro.
12. LRS Intersections that were utilized in ArcMap are not compatible with the new intersection format in ArcGIS Pro. If you wish to continue to utilize intersections, you should create new LRS Intersections or new LRS Intersections from existing dataset then generate the new intersections.
13. If any of the LRS Events in the geodatabase are configured to store referents and any of the referents stored are LRS Intersections, the Intersection feature class and IntersectionIDs need to be updated to reference the new intersections created in the step above. A python script called Fix Intersections as Referents in LRS Events has been created to automatically make these updates to the referents. You can find the script at https://github.com/Esri/lrs-migration-toolset. Download the toolbox and follow the steps in the word document to execute the tool within ArcGIS Pro.
Note: If no referents are modeled on any LRS Events in the geodatabase, there is no need to execute the script.
14. There is no Realign Overlaps event behavior option in ArcGIS Pro. If you had different event behaviors configured for Realign Route and Realign Overlaps in any LRS Events in ArcMap, you may want to verify the desired Realign Route event behavior is configured for those LRS Events in ArcGIS Pro. You can view the event behaviors configured for each LRS event by viewing the LRS Event properties.
15. In the ArcGIS Pro catalog window, right click the connection file and choose Geodatabase Connection Properties. Change the versioning type for your connection file from traditional to branch.
Note: Once this step is complete, you will not be able to access the connection file from ArcMap any longer.
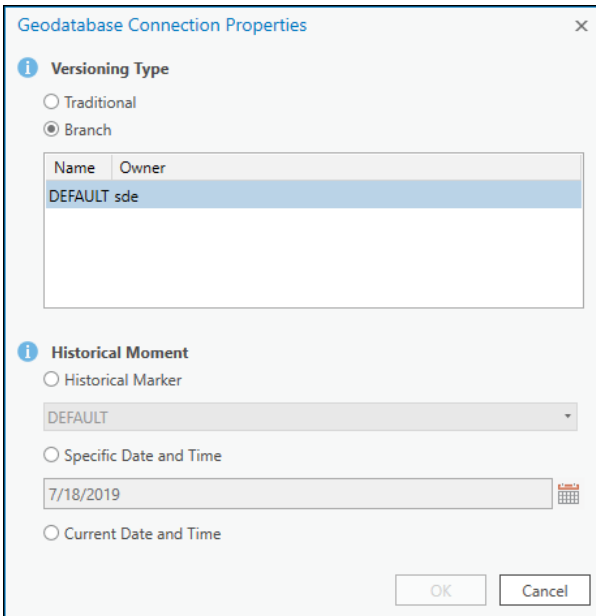
Figure 3: Geodatabase connection properties in ArcGIS Pro

16. Version the feature dataset and tables that participate in the LRS except for the LRS_EventBehavior, LRS_Locks, LRS_Metadata tables. To register as versioned with branch versioned data, right click the feature dataset in the catalog window in Pro. Select manage, then check versioning, select branch, then OK. The item will be branch versioned, GlobalIDs will be added, archiving will be enabled, and Editor Tracking in UTC will be enabled.
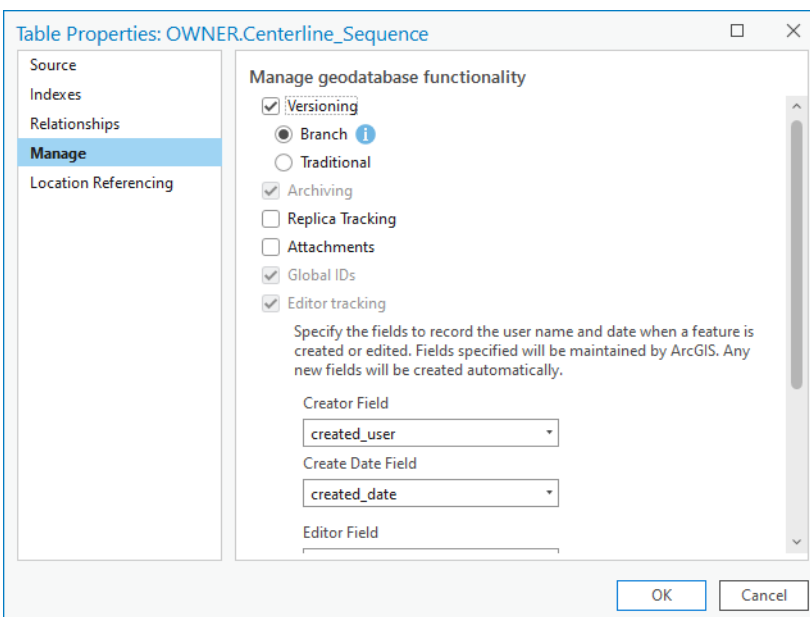

Figure 4: Branch versioning

You can verify that a feature was branched versioned by right clicking the feature, choosing properties, navigating to the source tab, and verifying the versioning type in the grid.
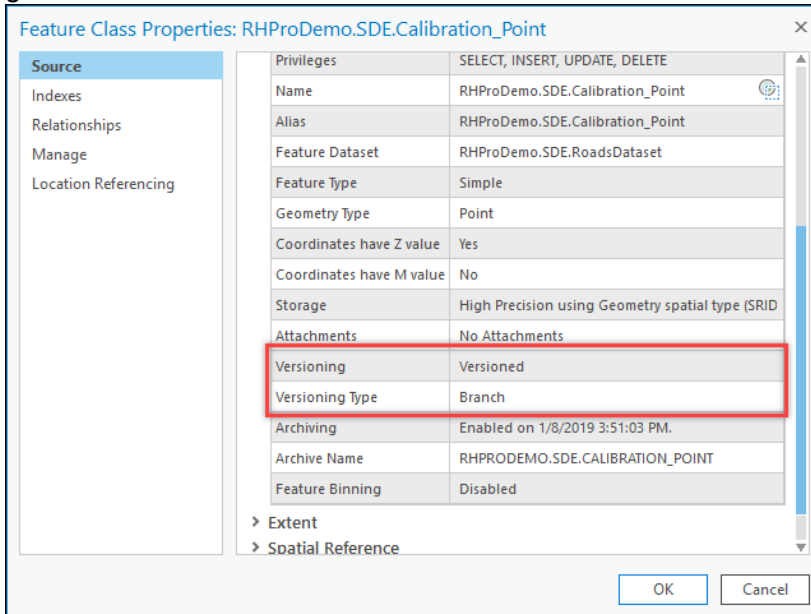

Figure 5: Feature Class properties in ArcGIS Pro

17. Your LRS has now been fully upgraded to use in ArcGIS Pro. You can now add layers to the map and publish your service. For more information on publishing a linear referencing enabled service, see Share as web layers with linear referencing and version management.
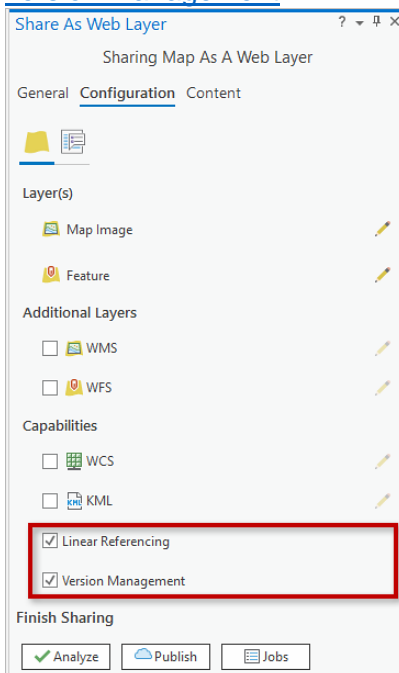

Figure 6: Configuration options when publishing a service in ArcGIS Pro

18. If there are any complex shaped routes (ramps, branches, etc.) that had physical gaps inserted in order to be calibrated in ArcMap, those gaps can now be closed/removed via a cartographic realignment. Add the feature service published in step 11 to ArcGIS Pro and use the edit feature vertices tool to cartographically realign the route(s).

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