

2026 WASHINGTON GIS CONFERENCE



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Relationship Goals

Linking Construction Drawings to a Map

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Presentation Roadmap

- Why Relationships Matter
- Problem Statement
- Key Takeaways
- About The Tools
- General Workflow
- Putting It All Together
- Final Product - Demo
- Lessons Learned

Audience Participation!



Describe your familiarity with
database relationships?

Why Relationships Matter

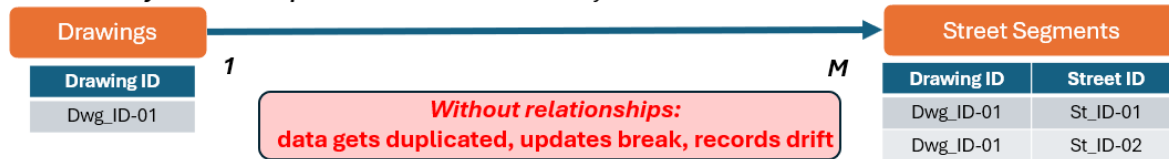
- Avoid duplicate data
- Keep records linked
- Ensure consistency

Basic Database Relationship Concepts

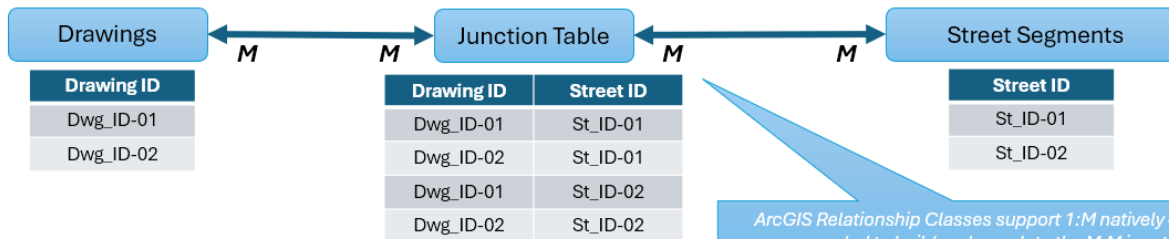
One-to-One Relationship Each record relates exactly to another in another table



One-to-Many Relationship One record relates to many others



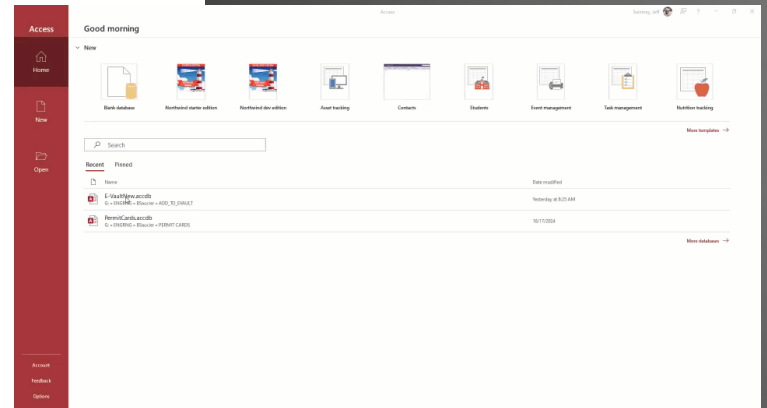
Many-to-Many Relationship Requires a junction table to link both sides



ArcGIS Relationship Classes support 1:M natively — FME is needed to build and populate the M:M junction

Problem Statement

- Tacoma building new document management system – a SharePoint repository using Microsoft Graph as a gateway
- Construction drawings needed new intake process to replace the clunky Access method
- Wanted map-based method to associate drawings to street segments
- Wanted external access to tables for additional access for 3rd party apps like Tableau
- Needed to think out of the box for a new way to associate 3 different inputs together (drawings, streets, work orders)



Key Takeaways



This solution is a key business integration with GIS



A solid foundational backend makes data magic happen



Build solid relationships between data to relate parts in different environments



Think out of the ArcGIS box – use all tools in your toolbox

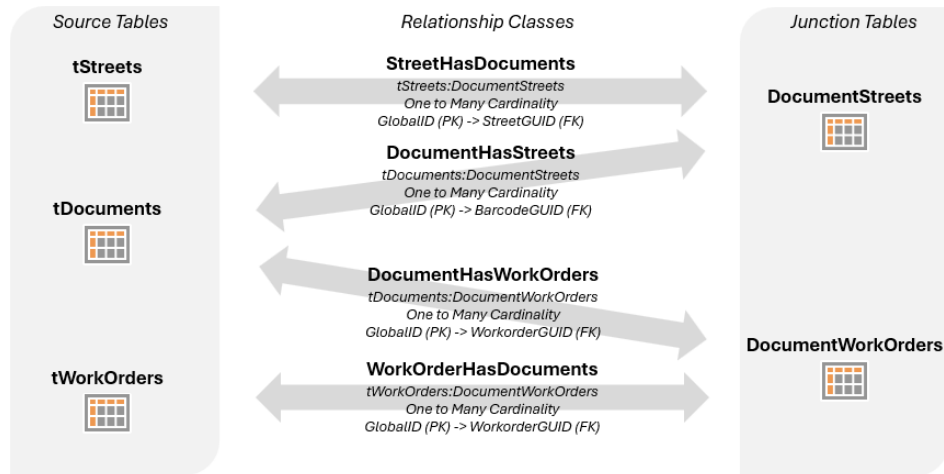


Lean into AI for ideas and coding – but always be skeptical

About the Tools – Enterprise Geodatabase

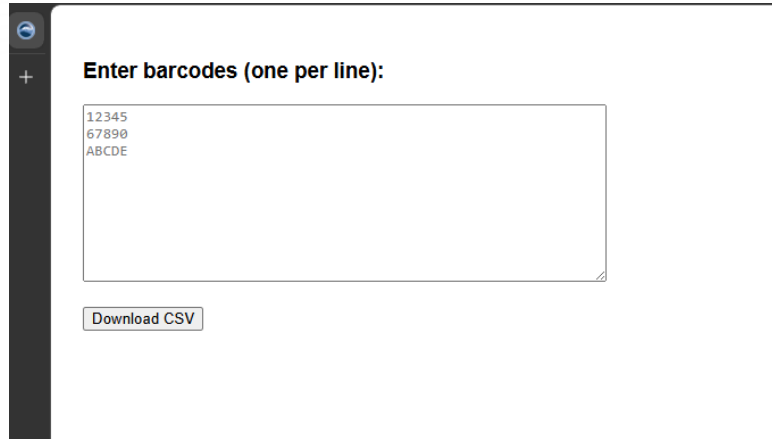
- Used to store and relate attribute data but bare minimum. GIS is NOT the system of record – system of engagement
- Geodatabase contains the relationship classes between tables to generate and keep the primary and foreign keys straight

Geodatabase Relationships

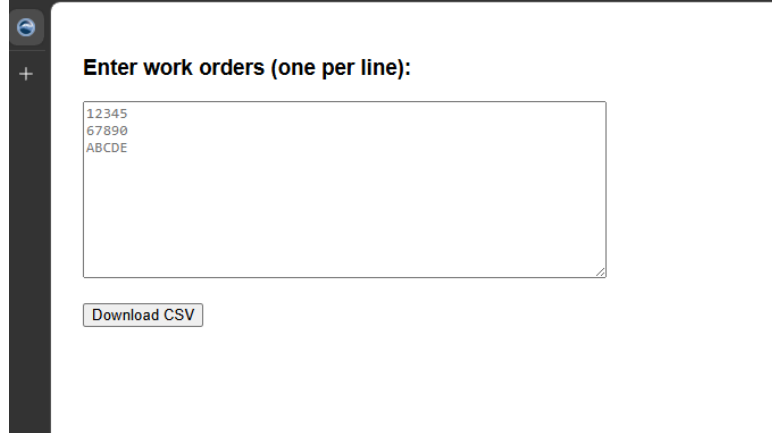


About the Tools – *HTML CSV Generators*

- Stand alone HTML pages with basic functionality
- Created simple method for user to create list of values for input into the app
- The list keeps the data entry cleaner and formatted properly
- Can copy/paste from other applications like Excel



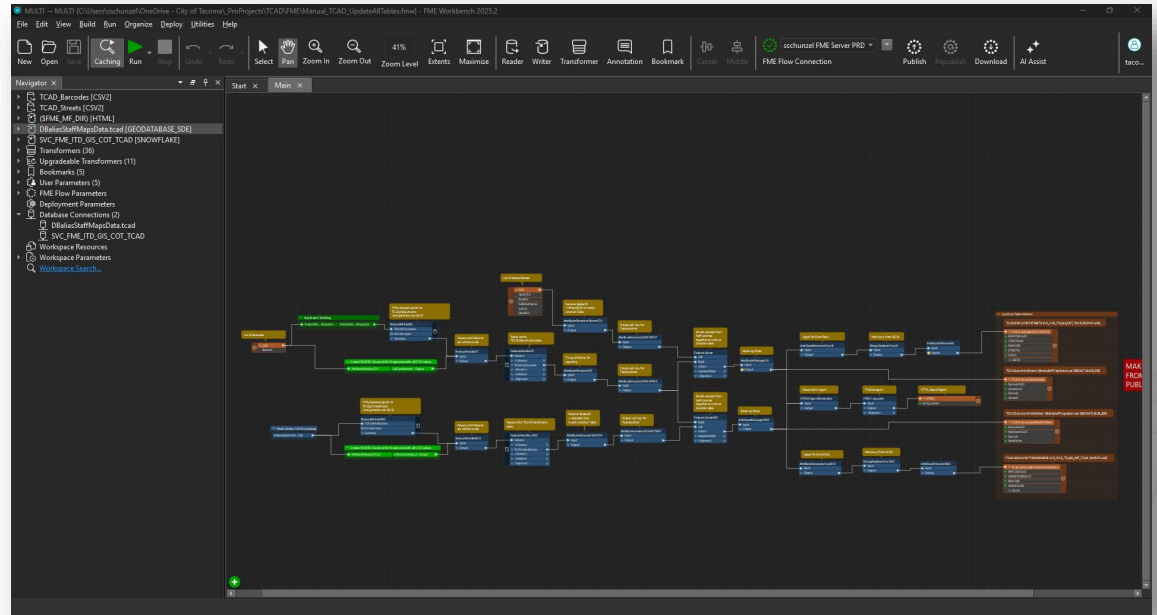
The screenshot shows a web interface for generating CSV files. On the left is a dark vertical sidebar with a blue circular refresh icon and a white plus sign. The main content area has a title "Enter barcodes (one per line):" in bold. Below the title is a large text input field containing the text "12345", "67890", and "ABCDE" on separate lines. At the bottom of the input field is a small "Download CSV" button.



The screenshot shows a web interface for generating CSV files. On the left is a dark vertical sidebar with a blue circular refresh icon and a white plus sign. The main content area has a title "Enter work orders (one per line):" in bold. Below the title is a large text input field containing the text "12345", "67890", and "ABCDE" on separate lines. At the bottom of the input field is a small "Download CSV" button.

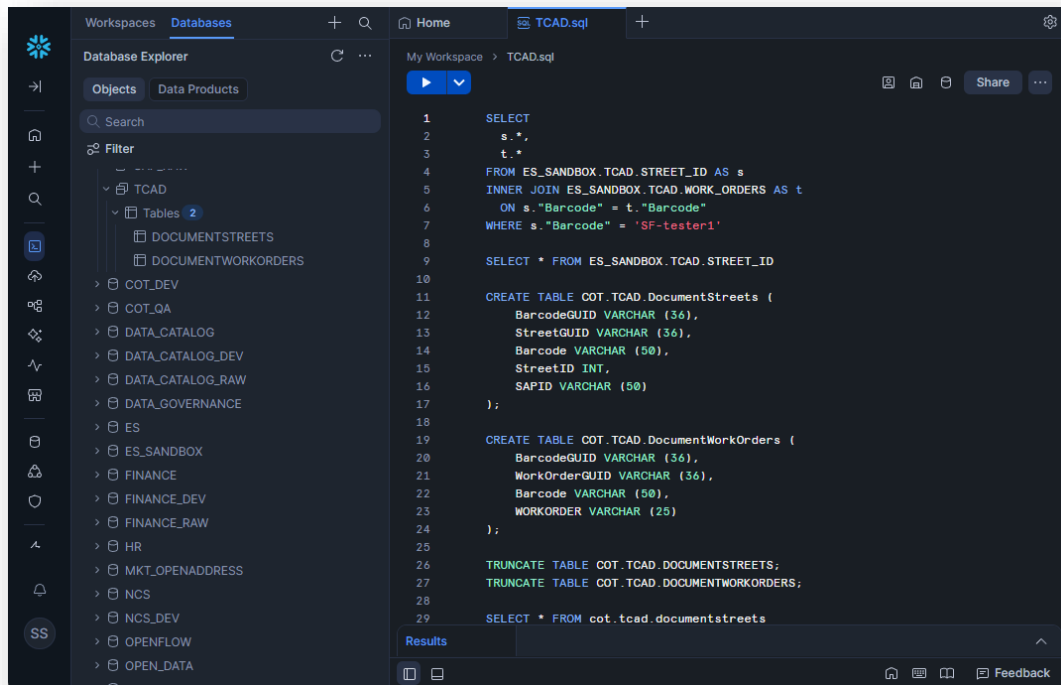
About the Tools – *FME*

- The brains behind the processing
- Graphical workbench to visually build an ETL to smash 3 inputs together
- Many different transformers to mold data
- Use both Form (to build workflow) and Flow (to publish on server and build app to embed into ExB)



About the Tools – *Snowflake*

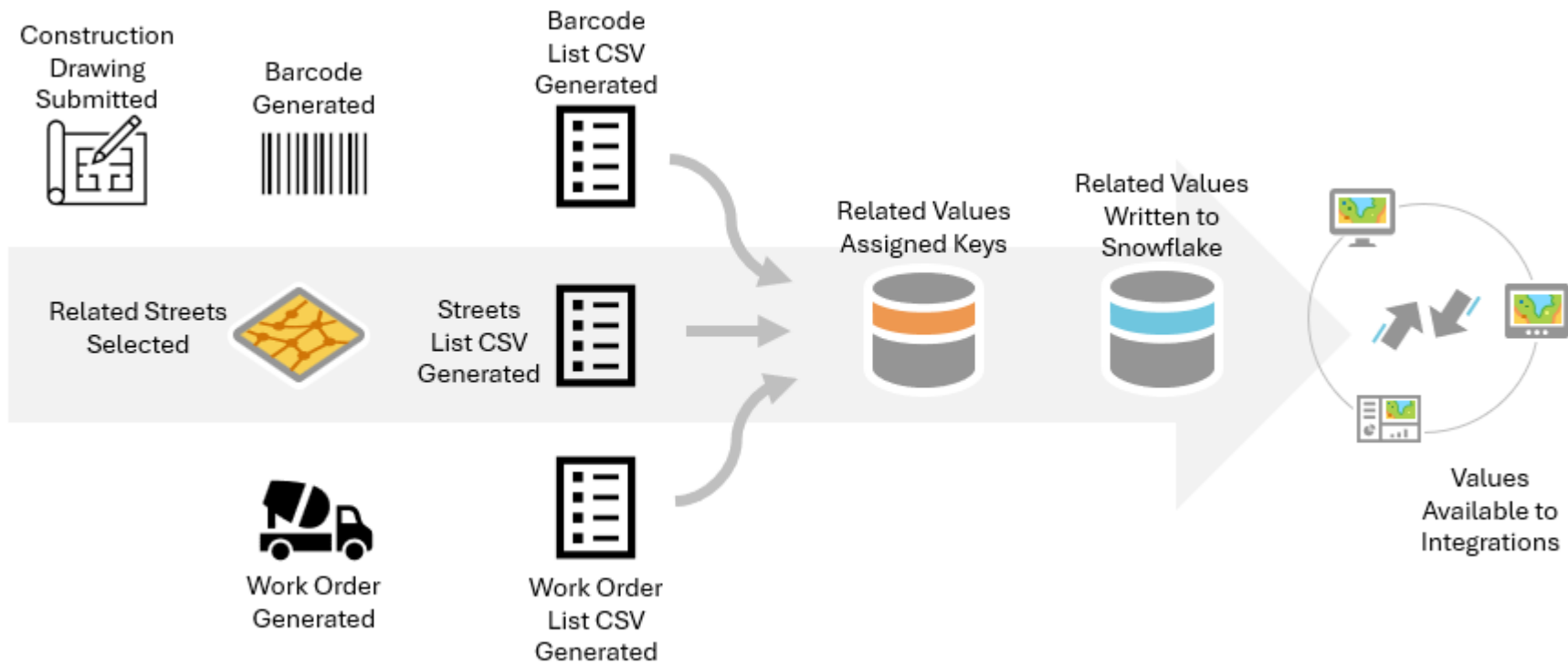
- Cloud based data repository
- Chosen over internal SQL Server because city already owns it and leans heavily into it
- Tables are natively web-based
- Very accessible by other applications and integrations



The screenshot displays the Snowflake web interface. On the left, the 'Database Explorer' pane shows a tree view of databases and tables. The 'TCAD' database is expanded, showing tables like 'DOCUMENTSTREETS' and 'DOCUMENTWORKORDERS'. The main pane shows a SQL query in the 'TCAD.sql' editor. The query consists of three parts: a SELECT statement with a join, two CREATE TABLE statements for 'COT.TCAD.DocumentStreets' and 'COT.TCAD.DocumentWorkOrders', and a TRUNCATE statement followed by a SELECT statement. The 'Results' pane at the bottom is currently empty.

```
1 SELECT
2   s.*,
3   t.*
4 FROM ES_SANDBOX.TCAD.STREET_ID AS s
5 INNER JOIN ES_SANDBOX.TCAD.WORK_ORDERS AS t
6   ON s."Barcode" = t."Barcode"
7 WHERE s."Barcode" = 'SF-tester1'
8
9 SELECT * FROM ES_SANDBOX.TCAD.STREET_ID
10
11 CREATE TABLE COT.TCAD.DocumentStreets (
12   BarcodeGUID VARCHAR (36),
13   StreetGUID VARCHAR (36),
14   Barcode VARCHAR (50),
15   StreetID INT,
16   SAPID VARCHAR (50)
17 );
18
19 CREATE TABLE COT.TCAD.DocumentWorkOrders (
20   BarcodeGUID VARCHAR (36),
21   WorkOrderGUID VARCHAR (36),
22   Barcode VARCHAR (50),
23   WORKORDER VARCHAR (25)
24 );
25
26 TRUNCATE TABLE COT.TCAD.DOCUMENTSTREETS;
27 TRUNCATE TABLE COT.TCAD.DOCUMENTWORKORDERS;
28
29 SELECT * FROM cot.tcad.documentstreets
```

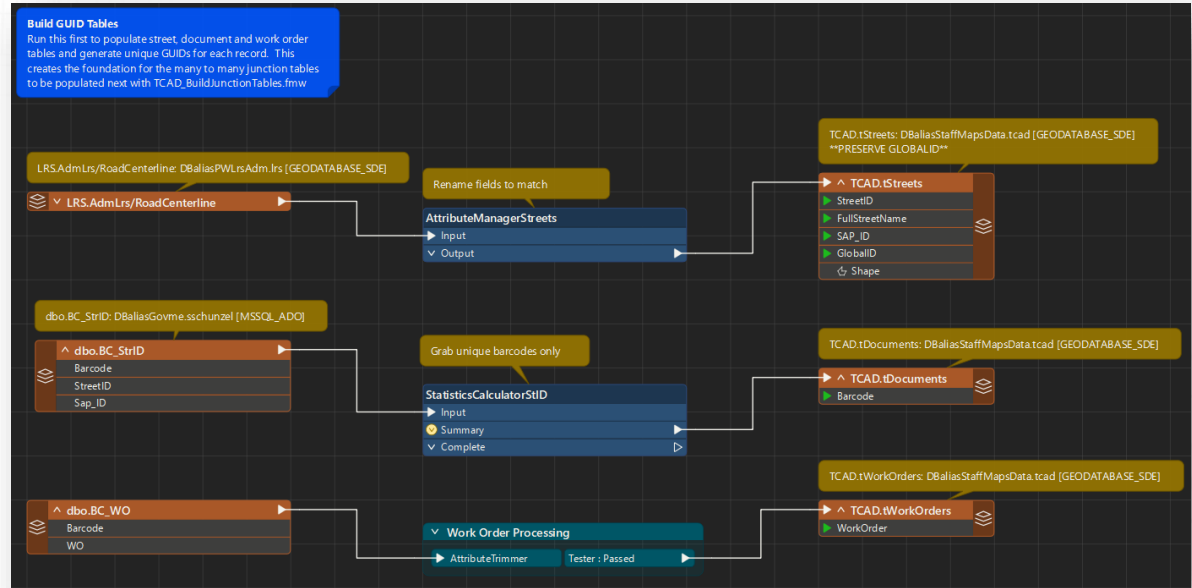
General workflow



Putting it together

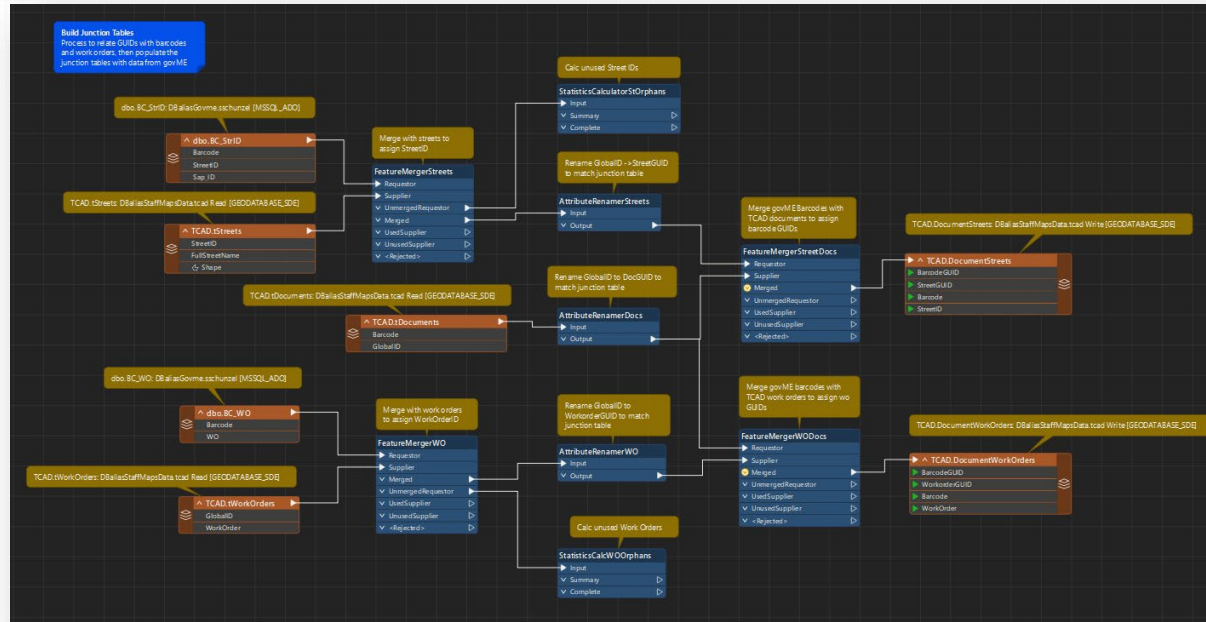
– Initial population

- Need to import reference information into related tables to build GUIDs for PK/FKs
- Only done once for existing BCs and WOs
- Streets will be a regular pull to stay up to date



Putting it together – Junction Tables

- Junction tables are the many to many repositories in enterprise geodatabase
- This process imports existing BC and WO history and builds new GUIDs for PK & FK
- Only done once



Putting it together – App Interface

- One stop shop user interface for input and processing
- Builds the input CSVs from lists and map
- Upload CSVs into an embedded Flow application to link the records
- Runs the main workspace

TCAD Record Linker 2.0

1. Enter/Export Barcodes/Workorders

The purpose of this app is to relate document barcodes (and optionally work orders) with street segments then merge them together into a database for retrieval by any of the inputs.

To accomplish this, lists of barcodes & optional work orders need to be generated and supplied to link to related streets.

Click the buttons below to open this app in a new window to enter one or more values into your list. These values can be entered manually or copied and pasted from a document if already in a list format.

Once done, click the download CSV button to download the list in a CSV file that you can upload into FME in the 3rd and last step.

Generate Barcodes

Generate Work Orders
(Optional)

2. Select & Export Streets to link to Records

Map view showing street segments in red. Includes search bar, zoom controls, and a 'Clear all' button. Layers panel shows 'TCAD Streets' selected. Map data is attributed to WSU Facilities Services GIS, City of Tacoma, WA State Parks GIS, Esri, TomTom, Garmin, and others. Powered by Esri.

3. Link Records Together

FME:Flow

Link Records

Select the CSVs with barcodes, street ids and optional workorders to add to the TCAD document tables. Make sure to scroll down to see the work order CSV box

Upload Barcodes CSV*

Upload Files
Drop files here or browse file system
OR
Browse Resources

+ Enter URL/Path

Upload Streets CSV*

Putting it together – *Validations*

- Need confirmation that records were actually written and associated
- 2 methods to validate in the app

Application Report

3.Link Records Together

Barcodes, Work Orders
and Streets linked

Barcode Entered	Street Name	Street ID	Barcode GUID	Street GUID
TestBC	E 11TH ST	27442	{ECA3383A-BCED-41D7-9067-C617A7E49D16}	{8C25746C-E81A-42C9-BC5E-CD3F94D102A9}

Barcode Entered	Work Order	Barcode GUID	Work Order GUID
TestBC	XYZ	{ECA3383A-BCED-41D7-9067-C617A7E49D16}	{B8DA1CF1-26C8-4873-B654-21CA82E13977}
TestBC	abc	{ECA3383A-BCED-41D7-9067-C617A7E49D16}	{D7F52A1F-4F2E-4F1D-A467-DA71FDF8BD40}

Map Popup

E 11TH ST

Zoom to

StreetID	27442
FullStreetName	E 11TH ST
SAP ID	ST-SR-ST0027442
GlobalID	{8C25746C-E81A-42C9-BC5E-CD3F94D102A9}
created_user	TCAD
created_date	5/6/2026, 8:34 AM
last_edited_user	TCAD
last_edited_date	5/6/2026, 8:34 AM
SHAPE_Length	1276.143916

Related barcodes

TestBC
1

Last edited by TCAD on 5/6/2026, 8:34 AM.

Final Product - Demo

TCAD Record Linker 2.0

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[Generate Barcodes](#)

[Generate Work Orders](#)
(Optional)

2. Select & Export Streets to link to Records

WSU Facilities Services GIS, City of Tacoma, WA State Parks GIS, Esri, TomTom, Garmin, SafeGraph, CdoTechnologies, Inc, METI/NASA, U... Powered by Esri

3. Link Records Together

FME:Flow

Link Records

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Upload Barcodes CSV*

Upload Files
Drop files here or browse file system

OR

[Browse Resources](#)

+ Enter URL/Path

Upload Streets CSV*

Upload Files
Drop files here or browse file system

<https://gisapps.tacoma.gov/tools/exportBC>

AI Can Hallucinate – Be Critical!

There is no text input widget. Is there another way to capture freeform text in exb?

Excellent catch  — you're right.

In ArcGIS Enterprise 11.5, Experience Builder does not include a true *Text Input* widget (that feature only exists in ArcGIS Online ExB or custom widgets).

The featuremerger doesn't work the way you think - it requires common fields to join on. I can't leave the Join On parameters blank. Do you have another alternative?


Thought for 8s >

Good catch — thank you. You're right: **FeatureMerger** requires a join key. My earlier suggestion to leave it blank was wrong; apologies for the confusion.

i'm not finding any of those configuration options anywhere in the sidebar template and there isn't a table template. Are you sure this is even possible?

You're correct — and thanks for flagging it: after digging in, the situation's a bit more nuanced. For ArcGIS Instant Apps in ArcGIS Enterprise 11.5, the ability to export selected features to CSV via the "Sidebar" template is *supported*, but there are some prerequisites and caveats — and *selecting features then exporting only those* may not behave exactly like you hoped.

There are no widgets in instant apps in 11.5. Can you clarify what you mean?

Excellent catch  — and you're absolutely right.

In ArcGIS Enterprise 11.5, **Instant Apps** use a simplified, *capability-based configuration* (not widgets like Experience Builder or Web AppBuilder). So when I mentioned "widgets" earlier, I meant **built-in configuration panels** in the Instant App editor — not separate add-on widgets.

Lessons Learned

- Relationships are... Complicated
- Dream big, then focus on one thing at a time and build slowly
- AI can be a great partner – if used properly
 - Can be the ultimate YES person – set prompts to be critical instead of confirming
 - Likes to make up tools or functions that 'should' exist but don't
 - Hot Take – Claude gave the best technical guidance, followed by Copilot, Gemini and finally ChatGPT



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