



# CONCOCTING A GIS

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**Designing a Geodatabase Optimized for Data Maintenance and Map Production**

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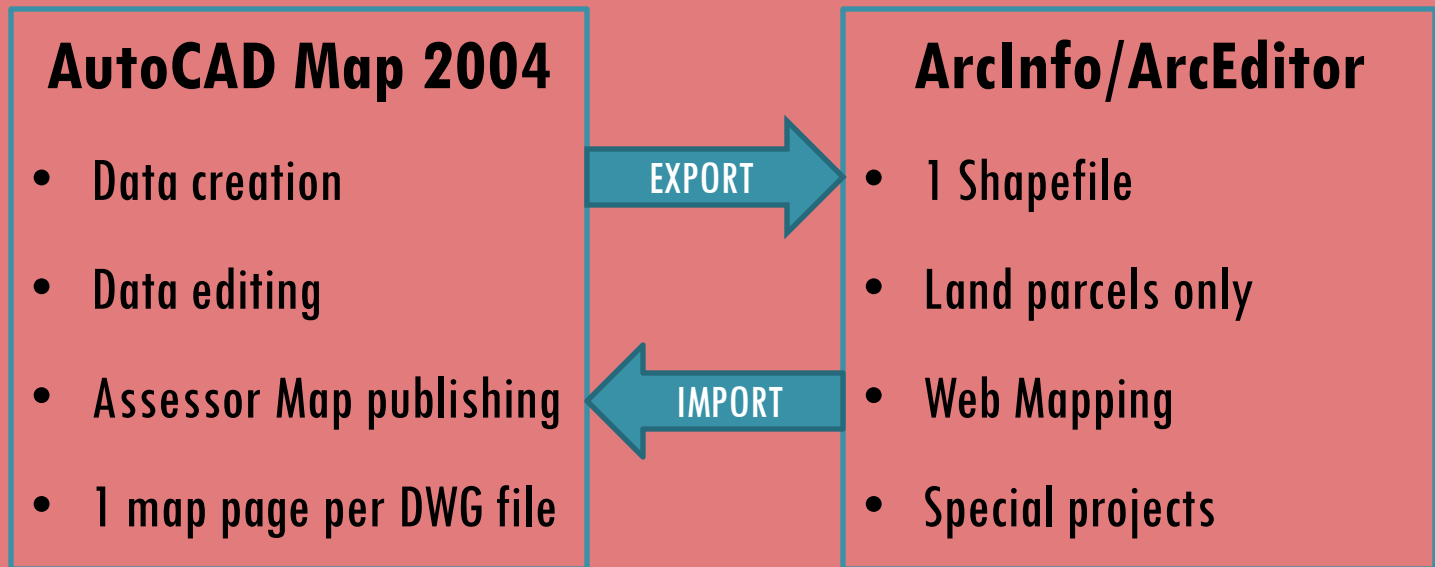
# KERN COUNTY STATISTICS

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- Size of Kern County
  - 8,162 square miles
  - 5,223,552 acres
  - 753,070 residents (in 2005)
- 11 Incorporated Cities
  - Arvin, Bakersfield, California City, Delano, Maricopa, McFarland, Ridgecrest, Shafter, Taft, Tehachapi, Wasco
- 2007-08
  - 383,133 tax bills
  - \$968 million
- 389,763 land parcels in GIS
- 16,217 map pages
  - 2,720 AutoCAD-drawn
  - 13,497 hand-drawn
- Projections for 2025
  - Population will double
  - 160,000 new homes
- **5 mappers**

# OUR CURRENT MAPPING SYSTEM

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# PROBLEMS WITH OUR CURRENT MAPPING SYSTEM

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- Two datasets - CAD & GIS - don't always match
- CAD data is not georeferenced
- GIS layers don't stay aligned with each other
- Difficult to administer
  - Keeping GIS caught up
  - Keeping track of thousands of CAD files
  - Too difficult to maintain all the GIS layers we want
  - Too difficult to release new editions for web

# LAYERS NEEDED FOR ASSESSMENT MAPPING

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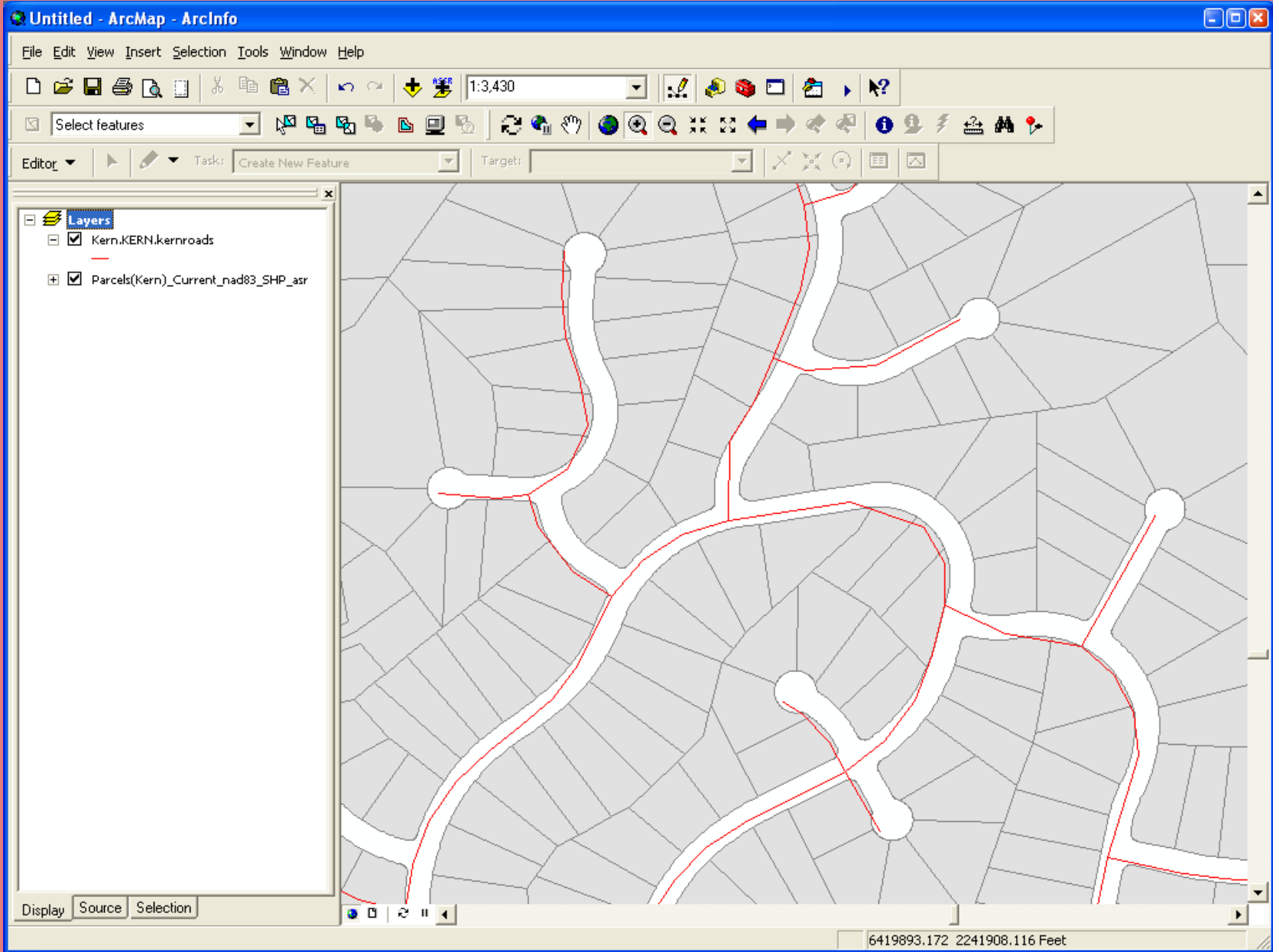
- Parcel boundaries
- Parcel lines (with COGO data)
- Legal Lot boundaries
- Subdivision boundaries
- PLSS Section boundaries
- Street centerlines
- Street Right-of-Way lines
- Railroad centerlines
- Waterway centerlines
- Easement lines
- Address points
- Assessor Page boundaries

# LAYERS CREATED IN OTHER DEPTS.

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- **PLSS SECTIONS (Engineering/GIS Dept.)**
  - Pretty good in most areas
- **STREET CENTERLINES (Engineering/GIS Dept.)**
  - E-911 routing
  - Poor accuracy (not entirely from survey sources)
  - Poorly georeferenced

# THE STREETS OF BAKERSFIELD...



# EXISTING DATA MODELS

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- ESRI Parcel Data Model
  - Too complex
- ESRI Cadastral Editor (Survey Analyst)
  - Too specialized
  - Too far-reaching
- Sidwell Parcel Builder
  - Proprietary
- ACS Parcel Editor
  - Limited toolsets
  - Optimized for analysis rather than data maintenance
  - They just don't work the way we want them to



# WHAT WE WANT

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- Non-proprietary
- Flexible / Generic
- Efficient / Easy to Use
- Automated
- Consistent

**ARE WE ASKING  
FOR TOO MUCH  
???**

**No, but the price we pay  
is  
CUSTOM PROGRAMMING.**


# THE CONCOCTION

ArcCatalog - ArcInfo - Q:\ASSESSOR\_GDB\Test1.gdb

File Edit View Go Tools Window Help

Location: Q:\ASSESSOR\_GDB\Test1.gdb Stylesheet: FGDC

- +\_CAD
- +\_ESS\_COGO
- +\_GIS
- AcadCustom
- Airphoto
- ASSESSOR\_GDB
  - Concocting
  - Project\_Notebook
  - Test1.gdb**
    - Cadastral\_CAS\_NAD83FT
      - ASR\_MASTER
      - parcel\_land\_points
      - parcel\_land\_relate
      - parcel\_min\_points
      - parcel\_min\_relate
      - scratch\_lines
      - scratch\_points
      - scratch\_polygons
      - street\_cl\_relate
      - street\_row\_relate
      - subd\_bndy\_relate
      - subd\_points
      - tra\_points
    - feat\_types\_table
    - parcel\_land\_tags
    - parcel\_min\_tags
    - street\_cl\_tags
    - street\_row\_tags
    - subd\_bndy\_tags
  - Stacking Parcels - Lines to Polygons.txt
  - Test1.mxd
  - VB Code.txt
- AssrMaps
- BoardOfTrade
- CaseMaps
- CCMA
- CD Subscription
- Databases Listings



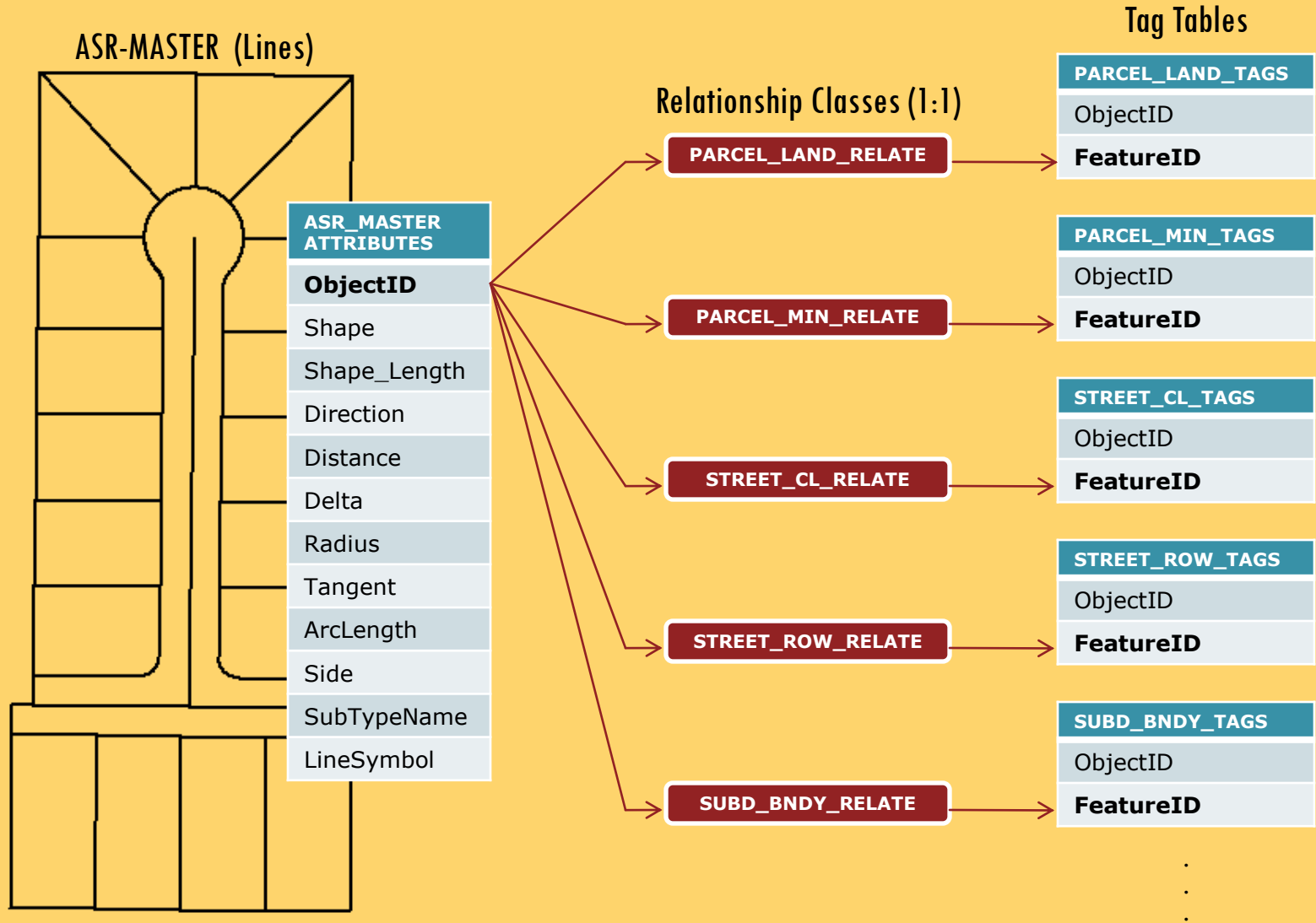
File Geodatabase selected

# BASIC SYSTEM SPECIFICATIONS

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- All features modeled as line segments and arcs
  - One single LINE feature class
  - A line feature is drawn only once, even if several feature types overlap
  - Each line is “tagged” as 1 or more feature types, stored in database tables
  - Topology is used simply to keep linework clean
- Polygon attributes stored in points
- Polygons are generated when needed, from lines and points
- Maps are generated automatically or semi-automatically when needed, using queries, geoprocessing models, and reference tables

# BASIC LOGICAL DESIGN



# TAGGING FEATURES (THE HARD WAY)

The screenshot shows the ArcMap interface with the following components:

- Layers Panel:** Shows a layer named "ASR\_MASTER" which is checked and selected.
- Main Map Area:** Displays a grid of parcels. One parcel in the middle row is highlighted with a cyan border and contains a cyan 'X' symbol.
- Attributes Window:** Opened on the right, showing a tree view of tags for the selected feature. The tree structure is as follows:
  - ASR\_MASTER
    - 529
      - subd\_bndy\_tags
      - parcel\_min\_tags
      - parcel\_land\_tags
        - 529
      - street\_cl\_tags
      - street\_row\_tags
    - 531
      - subd\_bndy\_tags
      - parcel\_min\_tags
      - parcel\_land\_tags
        - 531
      - street\_cl\_tags
      - street\_row\_tags
        - 531
    - 533
      - subd\_bndy\_tags
      - parcel\_min\_tags
      - parcel\_land\_tags
        - 533
      - street\_cl\_tags
      - street\_row\_tags
        - 533
    - 537
      - subd\_bndy\_tags
      - parcel\_min\_tags
      - parcel\_land\_tags
        - 537
      - street\_cl\_tags
      - street\_row\_tags
        - 537
    - 539
      - subd\_bndy\_tags
      - parcel\_min\_tags
      - parcel\_land\_tags
        - 539

A context menu is open over the "street\_row\_tags" node for feature 531, with the following options:

- Add Selected
- Add New
- Remove All

The status bar at the bottom shows the coordinates: 6217096.88 2323940.724 Feet.

# FEATURES TAGGED

The screenshot shows the ArcMap interface with the following components:

- Layers Panel:** Shows a layer named "ASR\_MASTER" which is checked and selected.
- Map View:** Displays a grid of parcels. One parcel in the middle row is highlighted with a cyan border and contains a blue 'X' symbol.
- Attributes Table:** A table with two columns: "Property" and "Value". It lists the hierarchical structure of the selected feature (FeatID 529).

Property	Value
OBJECTID	25
FeatID	529

The Attributes table also shows a tree view of the feature's structure:

- ASR\_MASTER
  - 529
    - subd\_bndy\_tags
    - parcel\_min\_tags
    - parcel\_land\_tags
      - 529
    - street\_cl\_tags
    - street\_row\_tags
      - 529
  - 531
    - subd\_bndy\_tags
    - parcel\_min\_tags
    - parcel\_land\_tags
      - 531
    - street\_cl\_tags
    - street\_row\_tags
      - 531
  - 533
    - subd\_bndy\_tags
    - parcel\_min\_tags
    - parcel\_land\_tags
      - 533
    - street\_cl\_tags
    - street\_row\_tags
      - 533
  - 537
    - subd\_bndy\_tags
    - parcel\_min\_tags
    - parcel\_land\_tags
      - 537
    - street\_cl\_tags
    - street\_row\_tags
      - 537
  - 539
    - subd\_bndy\_tags
    - parcel\_min\_tags
    - parcel\_land\_tags

14 features

6217100.077 2324122.941 Feet

# TAGGED FEATURE EXTRACTION (STEP 1)

The screenshot shows the ArcMap interface with the 'Attributes of parcel\_land\_tags' table open. The table contains 12 records with columns 'OBJECTID' and 'FeatID'. A context menu is open over the table, with 'Select All' highlighted. The 'Layers' panel on the left shows the 'ASR\_MASTER' layer selected, with several sub-layers including 'parcel\_land\_tags'.

**Attributes of parcel\_land\_tags**

OBJECTID	FeatID
1	1597
2	1678
3	1714
4	1800
5	1930
6	1931
7	1935
8	1976
9	2052
10	2126
11	1582
12	1591

Record: 1 Show: All Selected Records (54 out of 54 Selected)

# TAGGED FEATURE EXTRACTION (STEP 2)

The screenshot shows the ArcMap interface with the 'Attributes of parcel\_land\_tags' table open. The table contains 12 records with columns 'OBJECTID' and 'FeatID'. A context menu is open over the table, with 'Related Tables' selected, showing a list of related tables including 'parcel\_land\_relate : ASR\_MASTER'. The 'Layers' panel on the left shows the 'ASR\_MASTER' layer selected. The status bar at the bottom indicates the current record is 1 of 12, and the map coordinates are 6217413.364, 2323032.832 Feet.

OBJECTID	FeatID
1	1597
2	1678
3	1714
4	1800
5	1930
6	1931
7	1935
8	1976
9	2052
10	2126
11	1582
12	1591

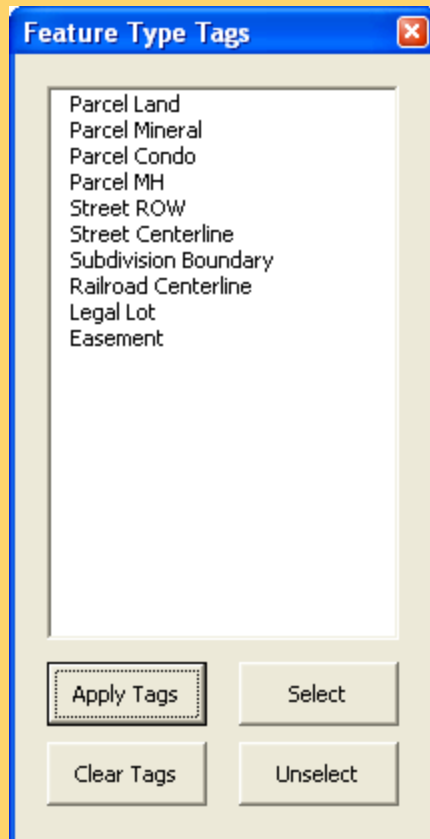
Record: 1 of 12 Show: All Selected

6217413.364 2323032.832 Feet

Displays the relationship classes that the current table participates in



# TAGGING FEATURES (THE EASY WAY)

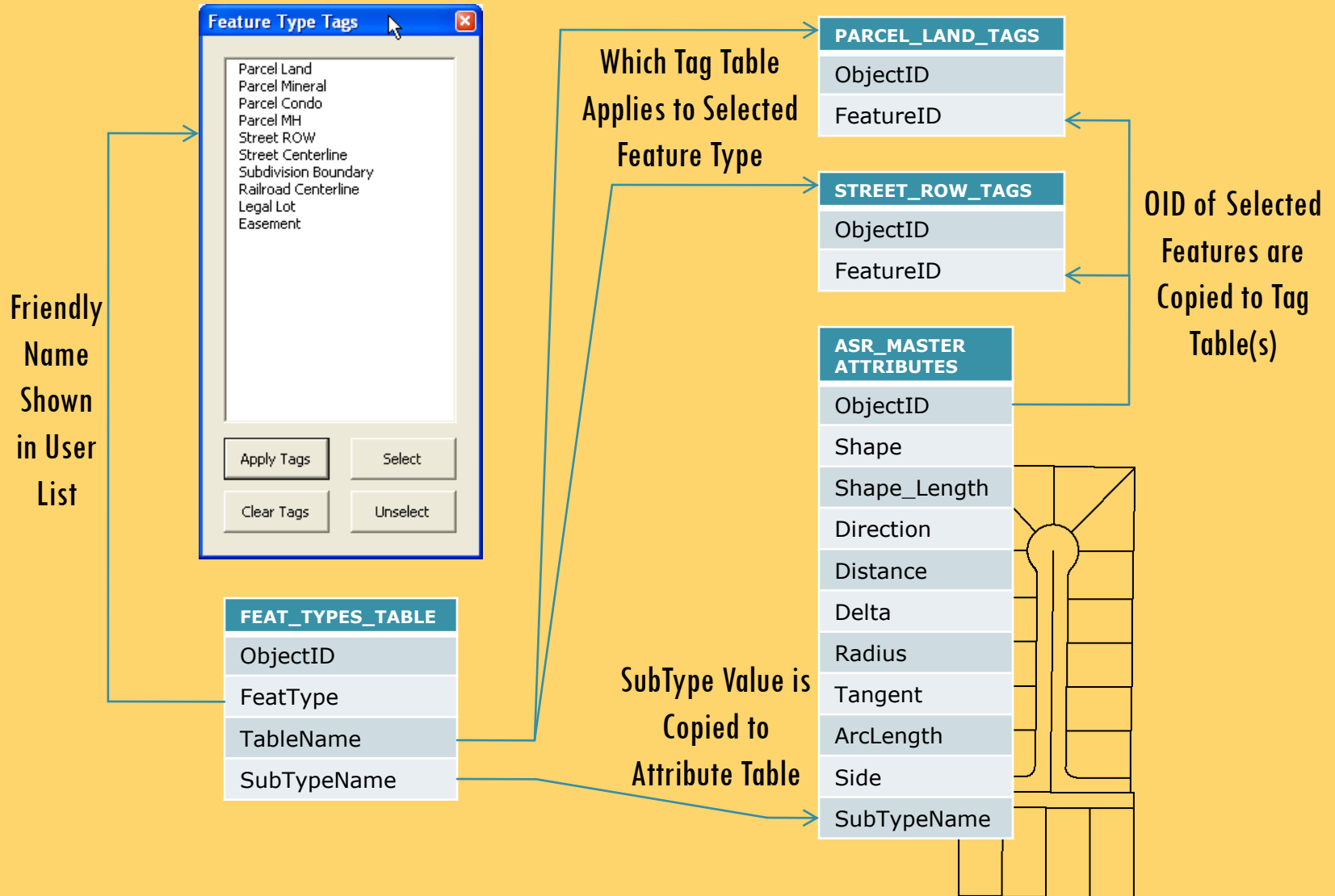


**Feature Tagging Tool  
(Visual Basic Form)**

FEAT_TYPES_TABLE
ObjectID
FeatType
TableName
SubTypeName

**Standalone Table That  
Defines Each Feature Type**

# HOW THE TAGGING TOOL WORKS



# APPLYING TAGS

The screenshot displays the ArcMap interface with the following components:

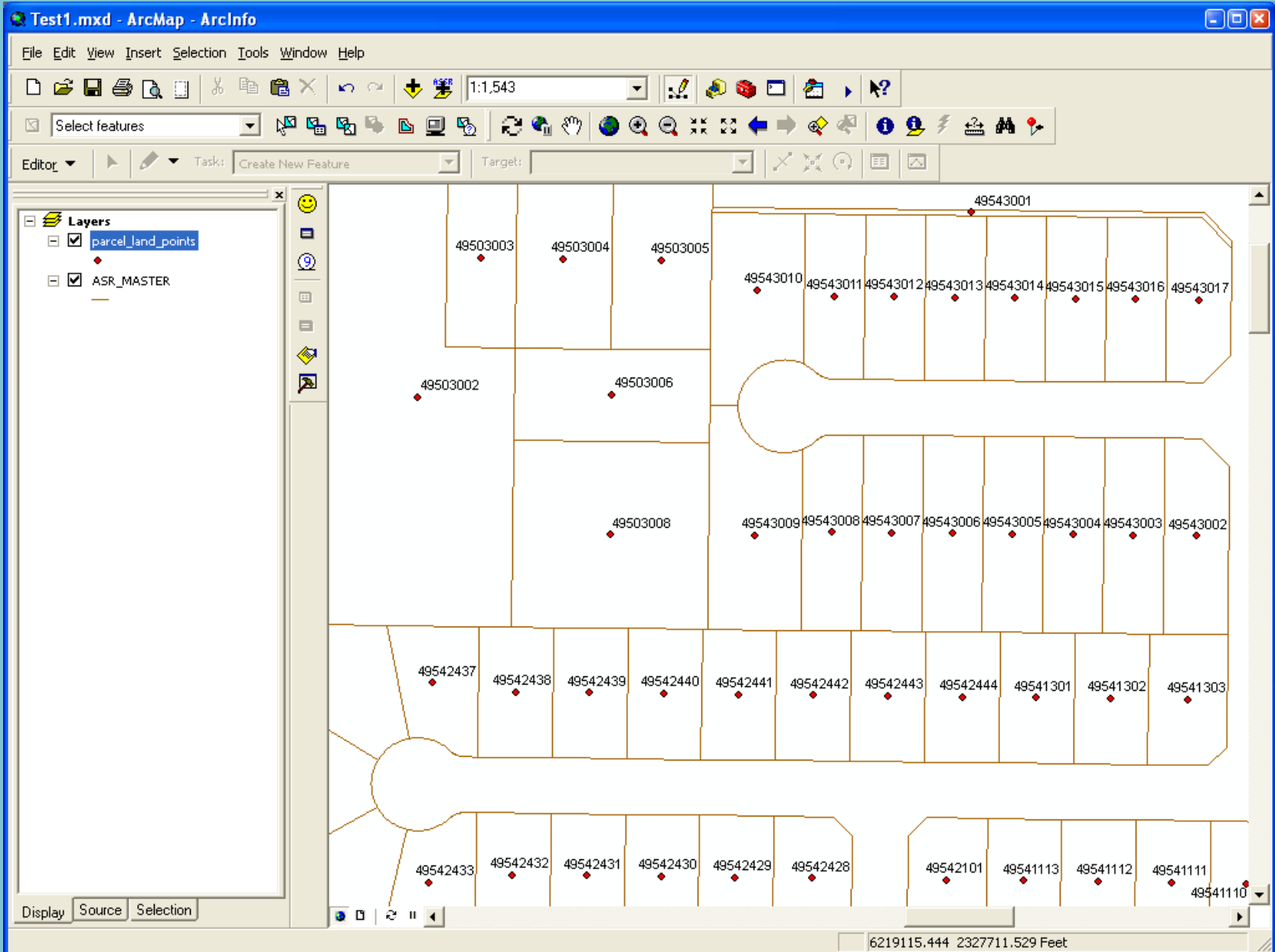
- Title Bar:** Test1.mxd - ArcMap - ArcInfo
- Menu Bar:** File Edit View Insert Selection Tools Window Help
- Toolbars:** Standard toolbar with icons for file operations, navigation, and editing. The 'Select features' toolbar is active.
- Editor:** Shows 'Create New Feature' as the current task.
- Layers Panel:** Contains a layer named 'ASR\_MASTER' which is checked.
- Map View:** Shows a grid of parcels with a cyan-colored feature highlighted. The feature is a horizontal strip with a semi-circular end on the left.
- Feature Type Tags Dialog:** A floating dialog box on the right side of the map. It contains a list of feature types:
  - Parcel Land
  - Parcel Mineral
  - Parcel Condo
  - Parcel MH
  - Street ROW (highlighted)
  - Street Centerline
  - Subdivision Boundary
  - Railroad Centerline
  - Legal Lot
  - EasementAt the bottom of the dialog are four buttons: 'Apply Tags', 'Select', 'Clear Tags', and 'Unselect'. A mouse cursor is pointing at the 'Apply Tags' button.
- Status Bar:** At the bottom left, it reads 'Number of Features selected: 14'. At the bottom right, it shows coordinates: '6217198.356 2323591.24 Feet'.

# COMMON PROBLEM SOLVED

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- Have you ever moved a parcel line and it no longer aligned with the TRA line?
- By modeling line segments that don't overlap, and generating all polygons as needed, all derived layers will ALWAYS be perfectly aligned with each other
- A single line segment can be “tagged” as a parcel line AND a tax rate area line
- Now moving a parcel line also moves the TRA line (because it's the same line segment)

# GENERATING POLYGONS



# LINES TO POLYGONS (ARCINFO)

The screenshot displays the 'Feature To Polygon' dialog box in ArcGIS. The dialog is titled 'Feature To Polygon' and has a blue header bar. It contains the following fields and options:

- Input Features:** A list box containing 'ASR\_MASTER'. To the right are icons for adding (+), removing (X), moving up (↑), and moving down (↓).
- Output Feature Class:** A text field containing the path 'Q:\ASSESSOR\_GDB\Test1.gdb\Cadastral\_CA5\_NAD83FT\ASR\_MASTER\_FeatureToPolygon'. To the right is a browse icon.
- XY Tolerance (optional):** A text field and a dropdown menu set to 'Feet'.
- Preserve attributes:** A checked checkbox.
- Label Features (optional):** A dropdown menu set to 'parcel\_land\_points' with a browse icon to its right.

At the bottom of the dialog are buttons for 'OK', 'Cancel', 'Environments...', and '<< Hide Help'. A faint globe icon is visible in the background of the dialog.

To the right of the dialog is a help window titled 'Feature To Polygon'. It contains the following text:

**Feature To Polygon**  
Creates an output polygon feature class from input line and/or polygon features.

The help window includes a diagram illustrating the process. The top part, labeled 'INPUT', shows a green square with a black line crossing it. A downward arrow points to the bottom part, labeled 'OUTPUT', which shows the same green square with a purple polygon and a yellow triangle overlaid on it, representing the result of the conversion.

# GENERATING MAPS

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- Maps are generated when needed, using a combination of:
  - Queries / Definition Queries
    - Line Features
    - Annotation Features
  - Geoprocessing models
    - Generate polygons
    - Extract lines for feature types relevant to map
  - Reference tables
    - Feature Symbology
    - Layout elements

# GENERATING MAPS

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- Process not designed yet
- Need to nail down a good working prototype first
- Generic data structure should lend itself to any map publishing requirements



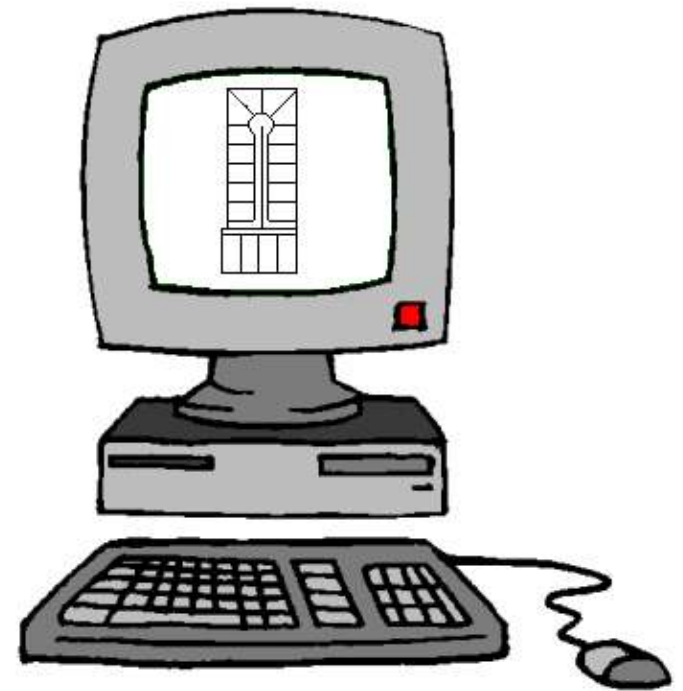
# WHERE WE ARE NOW

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- We have a parcel polygon shapefile aligned with section corners
  - Must be converted to lines
- We have a prototype File GDB with a small amount of data
- We need to add linework for features other than parcels
- We need to program the Tagging Tool (the heart of the system)
- We need to define subtypes and topology rules
- We need to design map generation procedures
- We need more time to experiment

# WILL IT WORK?

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We hope so.

**THAT'S IT, I THINK**

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