# Project Workflow West Virginia Hazus-MH Flood Model Building Inventory

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## **PROJECT OVERVIEW**

West Virginia University (WVU) is responsible for supporting activities that can prevent or reduce the significant losses that result from disasters. Successful mitigation activities are based on careful assessment of what may occur in the event of a disaster.

In recognition of the importance of planning in mitigation activities, the Federal Emergency Management Agency (FEMA) has created Hazus - a powerful geographic information system (GIS) based disaster mitigation tool. This tool enables communities of all sizes to estimate damages and losses from hurricanes, floods and earthquakes to measure the impact of various mitigation practices that might help to reduce those losses.

The ability of Hazus-MH to generate credible loss estimations is based on high quality information about the buildings and infrastructure at risk to these hazards. While Hazus-MH includes these inventory, the sources from which that information is derived are course in nature and may not accurately represent local conditions. Local parcel and Computer-Aided-Mass Appraisal (CAMA) data can be used to significantly enhance the quality of the analysis that Hazus-MH performs. Using a Federal Emergency Management Agency provided grant, The Polis Center has prepared a tool and supporting workflow that describes how to use the tool in order to process parcel and CAMA data into a form that can be consumed by Hazus-MH and used for generating enhanced flood risk assessments.

This workflow describes the detailed processes associated with completing the following tasks.

#### TASKS

- 1. Update Hazus inventory assets
  - i. Domains and Matrices
  - ii. Improvements table
  - iii. Building Inventory
  - iv. User Defined Facilities
  - v. General Building Stock
- 2. Create Data Sources
  - i. Parcel Points
  - ii. Flood Boundary
  - iii. Census Blocks and Census Tracts

Deliverables submitted by The Polis Center in support of this project include:

- **1.** Building Inventory creation tools
- 2. Hazus Update tools
- 3. Data Source processing tools
- 4. Workflow

## FILE MANAGEMENT

#### BACKUPS

Hazus does not support server-based workflows. Therefore, this project is based on work that is performed on a local drive.

Work performed on local PCs will need to be periodically secured. References to the Q:\drive in this workflow refer to the backup server used at Polis. It is recommended that an equivalent backup location be identified when this workflow is completed outside of Polis.

C:\Projects\Hazus\_Projects\PDM\_WestVirginia Local project drive Q:\PDM\_WestVirginia Backup drive at Polis

#### **PROJECT MANAGEMENT**

Project documentation is stored under the following directory structure:

| C:\Projects\Hazus_Projects\F | PDM_WestVirginia\Project_Management |
|------------------------------|-------------------------------------|
| Status                       | Project management progress reports |
| Advisory                     | Manuals and User Guide              |
| Workshops                    | Meetings and workshop materials     |
|                              |                                     |

#### DATA MANAGEMENT

Data sets are managed under the following directory structure:

| C:\Projects\Hazus_Projects\PDM | M_WestVirginia\Data_Management |
|--------------------------------|--------------------------------|
| Data_Sources                   | Pre-processed data             |
| Hazus_Updates                  | Updated WV statewide tables    |
| Models                         | Analysis data and results      |

Data sources received from various agencies are organized by provider:

| WestVirginia\Data_Management\Data_Sources            |
|--|
| <county name=""> County regional data</county>       |
| CAMA Data received from <county name=""> WV</county> |
| Data received from <county name=""> WV</county>      |
| Data received from FEMA website                      |
|  |

Updated Hazus inventory is organized by inventory type and vendor.

C:\Projects\Hazus\_Projects\PDM\_WestVirginia\Data\_Management\Hazus\_Updates\<County Name>

| User_Defined_Facilities | Hazus User Defined Facilities geodatabase |
|-------------------------|---|
| Tools                   | Hazus Updates FME tools                   |
| General_Building_Stock  | bndryGBS geodatabase                      |

Model data sets are organized by county. The Model folder contains the results of the analysis as well as the hazard and inventory datasets used as inputs into the model. The modeling is performed in a Hazus Study Region built for each county.

C:\Projects\Hazus\_Projects\ PDM\_WestVirginia\Data\_Management\Models <County Name> <br/>
County Name> model results<br/>
Template Templates and tools used for modeling

C:\Projects\Hazus\_Projects\PDM\_WestVirginia\Data\_Management\Models\<County Name>\ Analysis Inventory data, hazards, tools

| MXD_Documents | Production and final mapping documents |
|---------------|--|
| Reports       | Workflow, Logs and Process documents   |

C:\Projects\Hazus\_Projects\PDM\_WestVirginia\Data\_Management\Models\<County Name>\ Analysis

Inventory Hazards Tools Working Boundaries, Building Inventory, Improvements Flood and surge boundary inputs to model Scripts used to develop inventory Temporary area for work in progress

#### **DOCUMENT MANAGEMENT**

The workflow document is maintained by Polis for use by both teams working on the Pre-Disaster Mitigation (PDM) project for West Virginia.

The name of the file is:

 $\label{eq:linear} ...C:\Projects\Hazus\_Projects\PDM\_West\Virginia\Data\_Management\Models\<County\Name>\Reports\Workflow docx$ 

The following abbreviations are used throughout the document:

| [TBD]  | To Be Determined                |
|--------|---------------------------------|
| [PIO]  | Process Improvement Opportunity |
| [Name] | Contributions required by       |
| [Rev]  | Major revision marker           |

## TASK 1 – PREPARE COUNTY DATA SOURCES

Hazus-MH Vsn 2.2 statewide datasets needs to be updated before the individual county study regions will be made. The General Building Stock needs to be updated on a county by county basis.

The first task is to setup a county folder that contains the source materials, mapping templates, tools, non-Hazus data sets and final reports.

## TASK 1.1 - PREPARE DATA SOURCES

## TASK 1.1.1 - COUNTY DATA FOLDERS

A \Template folder has been created that contains the data source folder structure and tools used to prepare the source data for each county.

Copy the county template contents from C:\Projects\Hazus\_Projects\PDM\_WestVirginia\Data\_Management\Data\_Sources\Template

То

C:\Projects\Hazus\_Projects\PDM\_WestVirginia\Data\_Management\Data\_Sources\<County Name>

NOTE: Images in this workflow were captured using Berkeley County as an example. In the workflow procedures we inserted Berkeley where the workflow calls for <County Name>. Simply insert the name of the county that you are processing.

#### TASK 1.1.2 - COUNTY DATA FILES

Template documents need to be setup for each county. Rename all templates and change the file properties. Modify the contents to reflect the active <County\_Name>.

Rename:

| From: | WV_County_*.*                    |
|-------|----------------------------------|
| To:   | WV <county name=""> *.*</county> |

- Update the File Properties on all <County\_Name> documents
- Subject: <County\_Name> Author: <Enter your name here> Comments: <Comments> Category: PDM WestVirginia Company: <Your organization name>
- Open each document and replace all occurrences:
  - From: <County Name>
    - To: active county name (e.g. "Berkeley")

## TASK 1.2 - PREPARE MODEL AND WORKING FOLDERS

#### TASK 1.2.1 – COPY TEMPLATE FOLDER

A \Template folder has been created that contains templates for the project model source materials, outputs, templates and tools to be used for each county. You need to copy the template folder contents and rename the files that they contain so that they are ready for the county that you are modeling.

 Copy the template contents from C:\Projects\Hazus\_Projects\PDM\_WestVirginia\PDM\Data\_Management\Models\Template

to

C:\Projects\Hazus\_Projects\PDM\_WestVirginia\Data\_Management\Models\<County\_Name>

Copy the county template contents from
 C:\Projects\Hazus\_Projects\PDM\_West Virginia\Data\_Management\Hazus\_Updates\Template

То

C:\Projects\Hazus\_Projects\PDM\_ WestVirginia\Data\_Management\ Hazus\_Updates \<County Name>

#### TASK 1.2.2 – RENAME TEMPLATE FILES

The template documents need to be renamed for your county.

Rename all templates and change the file properties in all folders and subfolders under C:\Projects\Hazus\_Projects\PDM\_West Virginia\Data\_Management\Models\<County\_Name> and under C:\Projects\Hazus\_Projects\PDM\_ WestVirginia\Data\_Management\ Hazus\_Updates \<County Name>. Modify the contents to reflect the name of the county that you are modeling.

Rename:

| From: | WV_County_*.*                   |   |
|-------|---------------------------------|---|
| To:   | WV <county name=""> *.</county> | 4 |

- Update the File Properties on all <County\_Name> documents Subject: <County\_Name> Author: <Enter your name here> Comments: / Category: PDM West Virginia Company: Polis
- Open each document and replace all occurrences:
   From: 
   County\_Name> or <County Name>
  To: active county name (e.g. "Berkeley")

## TASK 1.3 – DOWNLOAD COUNTY DATA FILES

#### TASK 1.3.1– DATA EXCHANGE

West Virginia University has setup a data exchange FTP site to provide a data portal to exchange parcel and CAMA datasets. Typical data sets to exchange include:

- Inventory sources (CAMA Assessment, Parcel Polygon)
- Supporting documents (WV Appraisal Manual, User Guide)

The FTP site can be accessed by connecting to the Host and entering the Username and Password provided. The connection can be established by downloading FileZilla software which ensures a quick and easy way to download data from FTP site.

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#### TASK 1.3.2 – DOWNLOAD FILES

1. Download CAMA Assessment geodatabase from the FTP site to

C:\Projects\Hazus\_Projects\PDM\_WestVirginia\Data\_Management\Data\_Sources\<County Name>\CAMA\_Assessment\ <County Name>\_WVU.mdb

This database contains CAMA table that is used to create Building Inventory

2. Download the Parcel SHP files from the FTP site to.

C:\Projects\Hazus\_Projects\PDM\_WestVirginia\Data\_Management\ Data\_Sources\County\<<County Name>>\Parcels <County Name>\_parcel\_features.mdb

Parcel centroids will be linked to 'Improvement' records to determine the locations for the buildings.

 Download the NFHL Data-County data from the FEMA Map Service Center. (<u>http://msc.fema.gov</u>).

This data represents the current National Flood Hazard Layer for the county.

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|            | Product ID<br>NFHL_S4003C   | Latest Study Effective Date<br>07/07/2009 | Latest LOMR Effective Date | Stre<br>SMB | Download |

- Save the downloaded data to C:\Projects\Hazus\_Projects\PDM\_WestVirginia\Data\_Management\ Data\_Sources\<County Name>\DFIRM
- 5. The downloaded file will be in WinZIP format. Unzip the file to the \DFIRM folder.

## TASK 2 – PREPARE COUNTY INVENTORY DATA

## TASK 2.1 – PREPARE BOUNDARIES

Boundaries will be needed to clip buildings to the flood study area and assign the appropriate Census Tract and Block numbers to the Hazus inventory.

#### TASK 2.1.1 - PREPARE HAZUS BOUNDARIES

Tools have been written to generate County and Census Block feature classes.

1. Start ArcMap and open the MXD named:

#### ...\Models\\_<County Name>\MXD\_Documents WV <County Name> DataSources.mxd

2. If not already active, activate the **Data Interoperability** extension under the ArcMap Customize>Extensions menu.



Note: As of the date of this workflow, the Data Interoperability extension and Hazus-MH 2.2 can co-exist on the same machine. However, the Data Interoperability extension must be deactivated in order to actually use Hazus-MH. While inconvenient, this simply means that you need to deactivate the Data Interoperability extension to use Hazus-MH and vice versa.

Note: This workflow references FME. FME, formerly known as Feature Manipulation Engine, is a an integration of Spatial ETL tools for data transformation and translation produce by Safe Software Inc. of Surrey, British Columbia. Esri and Safe Software have a collaborative agreement that allows Esri relevant portions of FME to be made available as the Data Interoperability extension.

- 3. Open ArcToolbox and add the WV\_<County Name> FME Boundaries toolbox to ArcTools from: ...\Models\<County Name>\Analysis\Tools\ WV <County Name>\
  - 🖃 🚳 WV <County Name> FME Boundaries
    - 🕰 1. Export Hazus Boundaries
    - 😤 2. Parcel Polygons to Parcel Centroids
    - 🕰 3. Flood Boundary Creator

4. Right-click on the **WV <County Name> FME Boundaries** toolbox and select **Properties**. Change 'County' with <County Name> for both the tool **Name** and **Label** to WV <County Name> FME Boundaries. Click **Apply** and then click **OK**.

| General Hel  | p <sup>e</sup>  |  |
|--------------|---|--|
| Name!        | WV_Berkley_FRE Boundaries   |  |
| Label:       | WV_Berkley_FME_Boundaries   |  |
| Location:    | $C: \forall {\tt Projects}   {\tt Hezus\_Projects}   {\tt PDM\_West} \ {\tt Virginia}   {\tt Dets\_Management}   {\tt Models}   {\tt Transformed}   {\tt Transformed}   {\tt Nodels}   {\tt Nodels}   {\tt Transformed}   {\tt Nodels}   {\tt $ |  |
| Alles:       |   |  |
| Description: | Tools to create the following:1. Parcel Centroids from Parcel Polygon2.<br>County Boundary, Census Block and Census Tract extractors3. Fload<br>Boundary (DPBM 100-year) creator  |  |
|              |   |  |

5. Right-click | Edit the 1. Export Hazus Boundaries tool to open up the FME workbench.



- Set the input Published Parameters | Source to: ...\HazusData\_22\WV\ bndrygbs.mdb
- Set the output Published Parameters | Destination to: ...\Models\<County Name>\Analysis\Inventory\Boundaries\
   WV\_<County Name>\_Boundaries\_GDB.mdb

| WV_B  | erkeley_Boundaries_GD8 [GEODATA<br>stination Esri Personal Geodatabase  |                                  |
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 Right-click on the County\_Tester transformer sprocket to open the Tester Parameters. Change the CountyName value Right Value parameter as needed to select the county you are modeling.

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9. Click **OK** to close the Tester Parameters window.



- 10. Click the **Save** button **I** to save the changes to the FME script.
- 11. Run the script and review the log file.

This script generates census blocks and a county boundary for the study county.

- 12. Add the county and census block boundary output layers to the MXD and review the results.
- 13. If the data is correct right-click in the FME workbench log window and choose **Save Text** to save the log file to
  - ...\Models\<County Name>\Reports\Logs\
    - WV <County Name> Boundaries creator <yymmdd>.txt

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14. Save the changes and exit the FME workbench.

#### TASK 2.1.2 – PREPARE PARCEL POINTS

Tools have been written to generate a Parcel Points feature class.

- If necessary, open the MXD named: ...\Models\<County Name>\MXD\_Documents WV\_<County Name>\_DataSources.mxd
- If not already completed, add the WV\_<County Name> FME Boundaries toolbox to ArcTools from:
  - ...\Models\<County Name>\Tools\
- 3. Right-click | Edit the **2. Parcel Polygons to Parcel Centroids** tool to open up the FME workbench.



- 4. Set the input Published Parameters | Source to:
  - ...\PDM\_WestVirginia\Data\_Management\Data\_Sources\<County Name>\Parcels\ <County Name>\_parcel\_features.mdb



5. Set the output Published Parameters | Destination to: ...\Models\<County Name>\Analysis\Working\

#### WV\_<County Name>\_Working\_GDB.mdb



6. Scroll to the end of the script window and click the sprocket symbol on the ParcelPoints output feature class to open the Feature Type Properties window.

| Feature Type Properties                                    | 22                       |     |
|--|--------------------------|-----|
| 📴 General 🔥 User Attributes 🔗 Format Attributes 🕼 Format F | Perameters               |     |
| Name Farameters  |                          |     |
| Feature Type Name: Danystochult                            |                          |     |
| Fanout By Attribute:                                       | 2                        |     |
| General Perameters   | 2                        |     |
| Allowed Geometries: geodb_point                            | - 53061 - V ParceiPoints | 0.6 |
| Writer: WV_Berkeley_Working_GDB [GEODATABASE_MD8]          | - O -                    |     |
| Detabase Username:   |                          |     |
| Dynamic Froperties   |                          |     |
| Scheme Sources:  | 1.1                      |     |

7. Click the Format Parameters tab and make sure that Table exists is set to No.

This is necessary the first time a tool is run. If you choose to re-run the tool you need to change this setting to Yes.

| General               | 🔶 User Att      | ributes  | Format Attributes | Format Parameters |   |
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| Drop Table First:     |                 | No   |                   | •                 | ٠ |
| 0                     | bject ID Field: | OBJECTI  | D                 |                   | ٠ |
| 0                     | hiert ID Alias: | 08JECT1  | D.                | 1                 |   |

8. Click **Ok** to close the Feature Type Properties window.



- 9. Click the **Save** button to save the changes to the FME script.
- 10. Run the script and review the log file.
- 11. Add the Parcel Points feature class to the MXD and review the results.

Hint: You may want to add your source polygon features to the map for reference.

12. If the Parcel Points feature class appears correct, save the log file to ...\Models\<County Name>\Reports\Logs\

WV <County Name> Parcel Polygons to Parcel Centroids <yymmdd>.txt

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| and a state  |  |   |              |

Save the changes to the FME tool and exit the FME workbench.

#### TASK 2.1.3 - PREPARE FLOOD BOUNDARY

Tools have been written to generate a Flood Boundary feature class. This will be used later in the workflow to select only the buildings that intersect the flood inundation area so that you can more quickly import those buildings into Hazus and conduct a loss estimation study.

IMPORTANT! This script extracts A and AE zones from the DFIRM data to generate the 1 percent flood risk area. If you wish to model a different flood hazard you need to adjust the script as needed to reflect that need.

- If not already open, open the MXD named: ...\Models\<County Name>\MXD\_Documents
   WV <County Name> DataSources.mxd
- If not already added, add the WV\_<County Name> FME Boundaries toolbox to ArcTools from: ...\Models\<County Name>\Tools\
- 3. Right-click Edit the **3. Flood Boundary Creator** tool to open up the FME workbench.



- 4. Set the input Published Parameters | Source to:
  - ...\PDM\_WestVirginia\Data\_Management\Data\_Sources\<County Name>\DFIRM\ S\_FLD\_HAZ\_AR.shp



 Set the output Published Parameters | Destination to: ...\Models\<County Name>\Analysis\Inventory\Boundaries\ WV <County Name> Boundaries GDB.mdb

|           | PER.ZA        | R (0)                                   |
|-----------|---------------|---|
| ABASE_M   | DB.           | ×                                       |
| Berkeley, | laundaries_GD | 0.md) 📖 💌                               |
| E         | OK            | Cancel                                  |
|           | BASE_MI       | NBASE_MOB<br>Centimery Brownforces (c2) |

- 6. Click the Save button to save the changes to the FME script.
- 7. Run the script and review the log file.
- 8. Add the output flood boundary to the MXD and review the results.
- 9. If all OK, save the log file to
  - ...\Models\<County Name>\Reports\Logs\

WV <County Name> Flood Boundary Creator <yymmdd>.txt

- 10. Save the changes to the FME tool and exit the FME workbench.
- 11. Save the WV\_<County Name>\_DataSources.MXD and exit ArcMap.

## TASK 2.2 - PREPARE BUILDING INVENTORY

IMPORTANT: One of the key components of the inventory update process is identifying domain values that are applied within the county CAMA data and defining how those relate to Hazus required values. This is accomplished in this workflow through the creation of domain and matrix tables. It was assumed in the preparation of this workflow that the matrix tables and domains applied to Berkeley County also universally apply to other West Virginia counties. If this is not the case, it will be necessary to create matrix table appropriate to each county where values are not consistent with those used for Berkeley County as outlined in Appendix 1 and 2.

Building Inventory is a dataset that contains the location of buildings as well as attributes about their design characteristics and use that are needed to conduct a hazard risk assessment. Building Inventory (BI) becomes the foundational feature class for the Hazus General Building Stock (aggregated data) and Hazus User Defined Facilities (individual points).

Typically Building Inventory is created from parcel and assessor databases. This workflow is developed from Parcel centroids (to provide the locations) and CAMA Assessor data (to provide the building attributes) as the primary data sources.

Building Inventory is "generic" – it is a defined schema that has been designed to work with Hazus and other modeling tools across all projects. The scripts are setup for Berkeley County, but may be modified for other counties if necessary.

The workflow to create/maintain Building Inventory starts with the County Parcels. Duplicate Parcel Identifiers (PIDs) are dissolved along common boundaries to account for multi-parcel ownership. Parcel polygons are reduced to points at the centroids of each parcel.



TASK 2.2.1 – CONVERT CAMA SOURCE DATA TO ENHANCED CAMA

For this portion of the workflow you will import a table called Matrix\_LUC\_hzOccCo table into the FME transformer. This will result in creating a new field with Hazus occupancy classes in the enhanced CAMA table. This serves as an intermediate step to generating Building Inventory.

Below is a screenshot of the matrix table: Matrix\_LUC\_hzOccCode.

| 10 + | CAMADeccode + | Description +                        | hzOccCode -r | Click to Add - |  |
|------|---------------|--------------------------------------|--------------|----------------|--|
| 5    | 100           | Residential Vacant                   | NA           |                |  |
| 6    | 101           | Residential 1 Family                 | RE51         |                |  |
| 7    | 102           | Residential 2 Family                 | RES3A        |                |  |
| 8    | 103           | Residential 3 Family                 | RES38        |                |  |
| 9    | 104           | Residential 4 Family                 | RE538        |                |  |
| 10   | 105           | Mixed Residential/Commercial         | RES1         |                |  |
| 11   | 105           | Condominium (common element)         | RESIA        |                |  |
| 12   | 107           | Condominium (fee simple)             | RES3A        |                |  |
| 13   | 108           | Mobile Home                          | RES2         |                |  |
| 14   | 109           | Auxiliary Improvement                | COMM         |                |  |
| -15  | 110           | Salvage Value Building               | COM4         |                |  |
| 10   | 112           | Active Farm                          | AGRI         |                |  |
| 17   | 113           | Inactive Farm                        | AGR1         |                |  |
| 18   | 114           | Conservation easement perpetual      | NA           |                |  |
| 19   | 115           | Unsound Residential Structure        | RES1         |                |  |
| 20   | 123           | Large Vac Tract - Unknown Potential  | NA.          |                |  |
| 21   | 200           | Vacant Apartment Land                | NA           |                |  |
| 22   | 201           | Residen. Structure on Apartment land | RES1         |                |  |
| 23   | 211           | Apartment-Garden (1-3 stories)       | RE53B        |                |  |
| 24   | 212           | Apartment-High Rise                  | RE53F        |                |  |
| 25   | 213           | Mobile Home Park                     | RES2         |                |  |
| 26   | 300           | Vacant Commercial Land               | NA           |                |  |
| 27   | 301           | Resid. Structure on Commercial Land  | RES1         |                |  |
| 28   | 330           | Unsound Commercial Structure         | COM1         |                |  |
| 29   | 314           | Hotel/Motel-High Rise                | RE54         |                |  |
| 30   | 315           | Hotel/Motel-Low Rise                 | RES4         |                |  |
| 31   | 316           | Nursing Home                         | RESG         |                |  |
| 32   | 318           | Boarding and Rooming Houses          | RESS         |                |  |
| 33   | 319           | Mixed Commercial/Residential         | COMI         |                |  |
| 34   | 321           | Restaurant                           | COM8         |                |  |
| 35   | 323           | Food Stand                           | COMB         |                |  |
| 36   | 325           | Franchise Food                       | COM8         |                |  |
| 37   | 326           | toe House                            | COM8         |                |  |
| - 30 | 327           | Bar/Lounge                           | COMB         |                |  |
| 39   | 328           | Night Club/Dinner Theater            | COM9         |                |  |
| 40   | 330           | Kwik Lube                            | COM3         |                |  |
| 41   | 331           | Auto Dealer-Full Service             | COM3         |                |  |
| 42   | 332           | Auto Service Garage                  | COMB         |                |  |

This Matrix\_LUC\_hzOccCode documents the translation of LUC names to Hazus specific occupancy classes. The West Virginia Appraisal Manual 2014 served as a guide for creating the template version of this table for Berkeley County. The Matrix\_LUC\_hzOccCode table that was created for Berkeley County is provided in the template located in.

 $...\Data\_Management\Data\_Sources\Template\Assessor$ 

WV\_County\_Assessor\_GDB.mdb

You may either use the template Matrix\_LUC\_hzOccCode table, which means that you are assuming that the codes match those for the county that you are modeling, or you may update this table using the instructions in Appendix 1 which outlines <u>steps to create and import the</u> <u>"Matrix\_LUC\_hzOccCode"</u> table in WV\_County\_Assessor\_GDB.mdb. If you need to update the Matrix\_LUC\_hzOccCode table to reflect values unique to the county you are modeling, you should complete the process described in Appendix 1 and then return to this point in the workflow.

Tools have been written to generate enhanced CAMA table. Complete the following tasks to apply these tools.

1. If necessary, start ArcMap and open the MXD named: ...\Models\<County Name>\MXD\_Documents WV\_<County Name>\_BI\_Products.mxd 2. This map document opens with no layers displayed. For reference you may want to add the following layers:

C:\Projects\Hazus\_Projects\PDM\_West Virginia\Data\_Management\Data\_Sources\<County Name>\Parces

o Parcel boundaries

C:\Projects\Hazus\_Projects\PDM\_West Virginia\Data\_Management\Models\Berkley\_Test\Analysis\Working\WV\_<County Name>\_Working\_GDB.mdb

o Parcel points

C:\Projects\Hazus\_Projects\PDM\_West Virginia\Data\_Management\Models\<County Name>\Analysis\Inventory\Boundaries\WV\_<County Name>\_Boundaries\_GDB

- <County Name>DFIRM100
- o Blocks
- o County
- 3. If not already added, add the **WV\_<County Name> FME BI Products** toolbox to ArcTools from: ...\Models\<County Name>\Tools\



4. Right-click on the FME toolbox and select **Properties**. Change the tool **Label** to **WV** <**County Name> FME BI Products**.

| General Inel | P  |
|--------------|--|
| Name:        | WV_Berkley_FME_B1_Products   |
| Label:       | WV_Berkeley_FME BI Products  |
| Location:    | C:\Projects\Hazus_Projects\PDM_West Virginia\Data_Management\Models\8+   |
| Akas:        |  |
| Description: | These tools generate several intermediary data tables and feature<br>classes which are used in creating Building Inventory. the CAMA data is<br>the data from which required fields are selected, calculated or processed<br>to obtain B1 (building inventory). The toos also include domain creators<br>which transform the CAMA codes to values recognizable by Hazus. |
|              |  |

5. Right-click | Edit the **1.cama to CAMA** tool to open up the FME workbench.

| 2. CAMA to    |   | Open<br>Batch |   |
|---------------|---|---------------|---|
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6. Set the input Published Parameters | Source to:

...\ PDM\_WestVirginia\Data\_Management\Data\_Sources\<County

Name>\CAMA\_Assessment\ <County Name>\_WVU.mdb

This is the assumed name of the county provide database containing the assessors CAMA data since this name was used for the Berkeley County source CAMA data. Change this database name as appropriate for other counties.

7. Set the output Published Parameters | Destination to: ...\ PDM\_WestVirginia\Data\_Management\Data\_Sources\<County Name>\CAMA\_Assessment\ WV\_<County Name>\_Assessor\_GDB.mdb

| 40 E-1899 to CAMA  |   | - B I   |
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8. Click the sprocket on the CAMA output feature class and then click the Format Parameters tab. Verify that Table Exists is set to No.

| 🕒 General | User Att        | ributes   | Format Attributes | Format Parameters |   |   |
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|           | Table exists:   | No  |                   | •]                | • | • |
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| Trunce    | te Table First: |   |                   | -                 | • |   |

9. Click **OK** to close the Feature Type Properties window.



to save the changes to the FME script.

11. Run the script and review the log file.

The log file should reflect the same number of input and output records. For example, for Berkeley County, the source data contained 54,650 records and the Destination data reflected the same count and content.

| UNK | ARDEN NOLLVII                          | 7538   | 1.14160   |   |   |   |  |  |
|-----|--|--|---|---|---|---|--|--|
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| JNK | ARDEN NOLLVII                          | 7408   | UNK   | 1608  |   | C+  | RES1   | 0  |
| JNK | TUSCARORA                              | 8091   | UNK   | 1680  |   | C+  | RES1   | Ũ  |
| JNK | RUSSETT                                | 59   | UNK   | 1232  |   | C   | RES1   | 0  |
| UNK | TUSCARORA                              | B144   | UNK   | 1732  |   | C+  | RES1   | 0  |
| JNK | TUSCARORA                              | 0  | UNK   | 0   |   | UNK   | NA   | 0  |
| JNK | RUSSETT                                | 82   | UNK   | 1596  |   | c   | RE51   | 0  |
| UNK | TUSCARORA                              | 8224   | UNK   | 1792  |   | C+  | RES1   | 0  |
|     | INK<br>INK<br>INK<br>INK<br>INK<br>INK | INK TUSCARORA<br>INK RUSSETT<br>INK TUSCARORA<br>INK TUSCARORA<br>INK RUSSETT<br>INK TUSCARORA   | INK TUSCARORA 8091<br>INK RUSSETT 59<br>INK TUSCARORA 8144<br>INK TUSCARORA 0<br>INK RUSSETT 82<br>INK TUSCARORA 8224 | INK TUSCARORA 8091 UNK<br>INK RUSSETT 59 UNK<br>INK TUSCARORA 8144 UNK<br>INK TUSCARORA 0 UNK<br>INK RUSSETT 82 UNK<br>INK TUSCARORA 8224 UNK | INK         TUSCARORA         8091         UNK         1508           INK         TUSCARORA         8091         UNK         1680           INK         RUSSETT         59         UNK         1232           INK         TUSCARORA         8144         UNK         1732           INK         TUSCARORA         0         UNK         0           INK         RUSSETT         82         UNK         1596           INK         TUSCARORA         8224         UNK         1792 | INK         TUSCARORA         8091         UNK         1680           INK         TUSCARORA         8091         UNK         1680           INK         RUSSETT         59         UNK         1232           INK         TUSCARORA         B144         UNK         1732           INK         TUSCARORA         0         UNK         0           INK         RUSSETT         82         UNK         1596           INK         TUSCARORA         8224         UNK         1792 | INK         INK         IDDS         CF           INK         TUSCARORA         8091         UNK         1680         C+           INK         RUSSETT         59         UNK         1232         C           INK         TUSCARORA         B144         UNK         1732         C+           INK         TUSCARORA         0         UNK         0         UNK           INK         RUSSETT         B2         UNK         1596         C           INK         TUSCARORA         8224         UNK         1792         C+ | INK         TUSCARORA         8091         UNK         1680         C+         RES1           INK         TUSCARORA         8091         UNK         1680         C+         RES1           INK         RUSSETT         59         UNK         1232         C         RES1           INK         TUSCARORA         B144         UNK         1732         C+         RES1           INK         TUSCARORA         0         UNK         0         UNK         NA           INK         RUSSETT         82         UNK         1596         C         RES1           INK         TUSCARORA         8224         UNK         1792         C+         RES1 |

12. If the output appears OK, save the log file to

| \Models\ <county name="">\Reports\Logs\</county>                |
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| kins al text  |  |  |                       |             |

13. Save the changes you made to the FME script and exit the FME workbench.

#### TASK 2.2.2 - CONVERT CAMA TO IMPROVEMENTS

Creating an Improvements table serves as an intermediate step to creating BI (Building Inventory). The Improvements table consists of domains where the CAMA codes are converted to descriptive attributes. This is achieved by creating MS Access database domain and matrix tables. Refer to the Appendix 1. In addition, the CAMA cost values are aggregated by the occupancy classes. Refer to Appendix 1 <u>Creating ImpCost table</u> for guidance on what assumptions were used.

The matrix table and domains created for this section of the workflow include:

- 1. Matrix table
  - Matrix\_LUC\_hzOccCode
- 2. Domains:
  - Domain\_ImpCondition
  - Domain\_ImpType
  - Domain\_ImpFoundation

Tools have been written to generate Improvements table.

- 1. Start ArcMap if necessary and open the MXD named: ...\Models\<County Name>\MXD\_Documents WV\_<County Name>\_BI\_Products.mxd
- Add the WV\_<County Name> FME BI Products toolbox to ArcTools from: ...\Models\<County Name>\Tools\

3. Right-click | Edit the 2. CAMA to Improvements tool to open up the FME workbench.



 Set the input Published Parameters | Source to: ...\ PDM\_WestVirginia\Data\_Management\Data\_Sources\<County Name>\CAMA\_Assessment\ WV\_<County Name>\_Assessor\_GDB.mdb

5. Set the output Published Parameters | Destination to: ...\Models\<County Name>\Analysis\Inventory\Improvements\

WV\_<County Name>\_Improvements.mdb



- 6. Click the **Save** button **I** to save the changes to the FME script.
- 7. Run the script and review the log file.

For Berkeley County the source CAMA data included 54,650 records. The destination data – Improvements records included 44,650 records. This means that that there were 10,000 failed records. Our research showed that these included records without DWELVAL,COMVAL and OBYVAL values. It also included records with LUC codes of 100,123,300,600,604,700 which were deemed inappropriate for the desired modeling purposes.

- If all appears OK, save the log file to ...\Models\<County Name>\Reports\Logs\
   WV <County Name> CAMA to Improvements <yymmdd>.txt
- 9. Save the changes to the FME script and exit the FME workbench.

#### TASK 2.2.3 - CONVERT IMPROVEMENTS TO BUILDING POINTS

Tools have been written to generate building points from the improvement data created in the previous task.

- If necessary start ArcMap. Then open the MXD named: ...\Models\<County Name>\MXD\_Documents WV\_<County Name>\_BI.mxd
- 2. Add the **WV\_<County Name> FME BI Products** toolbox to ArcTools from: ...\Models<County Name>\Tools\
- 3. Right-click | Edit the **3. Improvements to Building Points** tool to open up the FME workbench.



- Set the input Published Parameters | Source to: ...\Analysis\Working\
   WV <County Name> Working GDB.mdb
- Set the second input Published Parameters | Source to: ...\Models\<County Name>\Analysis\Inventory\Improvements\ WV\_<County Name>\_Improvements.mdb
- Set the output Published Parameters | Destination to: ...\Analysis\Working\ WV\_<County Name>\_Working\_GDB.mdb
- 7. Click the sprocket on the **Building Points** feature class and then click the **Format Parameters** tab. Make sure that Table exists is set to **No**.

This is necessary the first time a tool is run. If you choose to re-run the tool you need to change this setting to Yes.

| General | 🗢 User Att      | ributes  | Format Attributes | Format Parameters | 1 |
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| Dro     | op Table First: | No   |                   | •                 |   |
| 0       | bject ID Field: | OBJECTI  | D                 |                   | ٠ |
| 0       | biect ID Alias: | 08JECT1  | D.                |                   |   |

8. Click **OK** to close the Feature Type Properties window.



to save the changes to the FME script.

- 10. Run the script and review the log file.
- 11. Add the **Building Points** feature class to the map and review the results. Verify that building points have been generated and that there are no obvious issues with the data output.

For Berkeley County, the source data included 44,650 improvements. The parcel points included 53,061 points. The join between the parcel points and improvement data yielded 39,219 building points.

12. If that data appears OK, save the log file to

...\Models\<County Name>\Reports\Logs\

WV <County Name> Improvements to Building Points <yymmdd>.txt

- 13. Save the changes to the FME script and exit the FME workbench.
- 14. Save the changes to the Map document.

#### TASK 2.2.4 - CONVERT BUILDING POINTS TO BUILDING INVENTORY

The following matrices and domains were created prior to building the FME script for Building Inventory. Domains are tables created in an MS Access geodatabase which give the description of the codes. Matrices are tables created in an MS Access geodatabase which convert the codes into Hazus specific codes.

VERY IMPORTANT! – This workflow assumes that the same domains and matrix values will be applicable to each county in West Virginia. If this is not the case, it will be necessary to create domains and matrix tables unique to each county. This process is described in Appendix 2.

The domains and matrices created for this workflow include:

- 1. Domains:
  - Domain\_Year\_built
  - Domain\_FirstFloorHt: This domain is not created. It is imported into "FirstFloorHt\_Mapper" transformer in the "4. Building Points to Building Inventory" FME script.

The domains which give the description of the attributes present within the BI are used as reference for creating the matrices below. These domains are listed below:

- Domain\_BldgCondition
- Domain\_BldgFoundation
- Domain\_BldgConstruction
- 2. Matrices:
  - Matrx\_BldgCondition
  - Matrix\_BldgConstruction
  - Matrix\_BldgCondition

#### 3. XFactors\_DolSqFt

Tools have been written to generate a Building Inventory feature class based on the domains and matrix tables as well as the Building Points created earlier in the workflow.

1. Start ArcMap if necessary and then open the MXD named: ...\Models\<County Name>\MXD Documents

WV <County Name> BI Products.mxd

- Add the WV\_<County Name> FME BI Products toolbox to ArcTools from: ...\Models\<County Name>\Tools\
- 3. Right-click | Edit the **4. Building Points to Building Inventory** tool to open up the FME workbench.



- Set the input Published Parameters | Source to: ...\Analysis\Working\ WV\_<County Name>\_Working\_GDB.mdb
- Set the output Published Parameters | Destination to: ...\Models\<County Name>\Analysis\Inventory\Building\_Inventory WV\_<County Name>\_BI\_GDB.mdb



- 6. Click the **Save** button **I** to save the changes to the FME script.
- 7. Run the script and review the log file.
- 8. Add the output Building Inventory to the MXD and review the results.
- 9. If the data appears OK, save the log file to
  - ...\Models\<County Name>\Reports\Logs\

#### WV <County Name> Building Points to Building Inventory <yymmdd>.txt

- 10. Save to the changes to the FME script and exit the FME workbench.
- 11. Save the changes to the map document and exit ArcMap.

#### TASK 2.3 – HAZUS UPDATES

#### TASK 2.3.1 - CONVERT BUILDING INVENTORY TO USER DEFINED FACILITIES

Tools have been written to generate Hazus-MH flood model compliant User Defined Facility inventory.

Note: This tool also generates a Hazus-MH earthquake compliant User Defined Facility inventory table if needed. This workflow does not address importing that table into an earthquake study region but the steps are fundamentally the same as doing so with a flood user defined facility inventory.

1. Start ArcMap and open the MXD named:

#### ...\Models\<County Name>\MXD\_Documents WV\_<County Name>\_Hazus\_Updates.mxd

2. For contextual purposes, add the following layers to the map.

C:\Projects\Hazus\_Projects\PDM\_West Virginia\Data\_Management\Models\<County name>\Analysis\Inventory\Boundaries\WV\_<County Name>\_Boundaries\_GDB.mdb

o Blocks

• County

C:\Projects\Hazus\_Projects\PDM\_West Virginia\Data\_Management\Models\Berkley\_Test\Analysis\Inventory\Building\_Inventory\ WV\_<County Name\_BI\_GDB.mdb

o Bl

- 3. Add the **WV\_<County Name>FME\_Hazus Updates** toolbox to ArcTools from: ...\Data\_Management\Models\Berkeley\Analysis\Tools
- 4. Right-click | Edit the **BI to UDF** tool to open up the FME workbench.



- Set the input Published Parameters | Source to: ...\Models\<County Name>\Analysis\Inventory\Building\_Inventory WV\_<County Name>\_BI\_GDB.mdb
- Set the second input Published Parameters | Source to: ...\Models\<County Name>\Analysis\Inventory\Boundaries\ WV\_<County Name>\_Boundaries\_GDB.mdb
- Set the output Published Parameters | Destination to: ...\Hazus\_Updates\<County Name>\User\_Defined\_Facilities WV\_<County Name>\_Hazus\_Import\_UDF.mdb



- 8. Click the **Save** button **IIII** to save the changes to the FME script.
- 9. Run the script and review the log file.
- 10. Add the output User Defined Facilities to the MXD and review the results.
- 11. If all OK, save the log file to
  - ...\Models\<County Name>\Reports\Logs\

WV <County Name> Building Inventory to User Defined Facilities<yymmdd>.txt

12. Save the changes to the FME script and exit the FME workbench.

#### TASK 2.3.2 – CONVERT BUILDING INVENTORY TO GENERAL BUILDING STOCK

Tools have been written to generate General Building Stock.

- If necessary, start ArcMap and open the MXD named: ...\Models\<County Name>\MXD\_Documents WV\_<County Name>\_Hazus\_Updates.mxd
- Add the WV\_<County Name> FME BI Products toolbox to ArcTools from: ...\Hazus\_Updates\<County Name>\Tools

3. Right-click | Edit the **BI to GBS** tool to open up the FME workbench.



- Set the second input Published Parameters |Source to: ...\Models\Berkeley\Analysis\Inventory\Boundaries\ WV\_<County Name>\_Boundaries\_GDB.mdb
- Set the first input Published Parameters | Source to: ...\Models\<County Name>\Analysis\Inventory\Building\_Inventory WV\_<County Name>\_BI\_GDB.mdb
- Set the output Published Parameters | Destination to: ...\Hazus\_Updates\<County Name>\General\_Building\_Stock WV\_<County Name>\_CDMS\_Import\_GBS.mdb
- 4. Verify that the flBldgType\_Mapper is properly mapped to the output GBS table. It should appear as shown below. You do not want to see any red arrow. Green fields in the output table indicate that matching fields have been identified in the input table. If all fields in the GBS table are not shown in green or yellow, you need to map them as shown below by dragging the arrow in the input to the target arrow in the output.





- 5. Click the Save button to save the changes to the FME script.
- 6. Run the script and review the log file.
- 7. Add the output GBS table to the MXD and review the results to verify that they look reasonable.

8. If all appears OK, save the log file to

...\Models\<County Name>\Reports\Logs\ WV <County Name> Building Inventory to General Building Stock<yymmdd>.txt

- 9. Save the changes to the FME script and exit the FME workbench.
- 10. Save your changes the map and exit ArcMap.

## TASK 3 – UPDATE HAZUS GBS INVENTORY

Hazus-2.2 comes bundled with default inventory data. The Hazus default inventory data is segregated into geodatabases for each State. The State default data is the master from which Hazus Study Regions are extracted. Hazus performs natural disaster analysis against the Study Region.

The Hazus-provided general building stock aggregate data sets valuations are based on 2010 census data and other sources. These data can typically be improved with locally available assessor's data and parcel information such as is the case in West Virginia. Selected aggregate data sets will be updated on a county by county basis prior to modeling.

## TASK 3.1 – UPDATE GENERAL BUILDING STOCK DATA

Building Inventory is used to update the aggregated inventory in Hazus prior to modeling. Each BI point represents an assessor record that has been linked to a mapped building location. The default Hazus GBS data is updated using the Building Inventory to re-aggregate each Census Block.

The GBS is updated in Hazus using CDMS. The database which will contain the updated Hazus GBS is: C:\HazusData\_22\WV\bndrygbs.mdb

In the following pages, tasks will be completed to update the Hazus General Building Stock. The GBS records will be generated from the Building Inventory created in Task 2.

#### TASK 3.1.1 – QUERY "BEFORE" HAZUS GBS

CDMS will be used to query the GBS records currently in Hazus. After the new GBS has been imported into Hazus, the "before" and "after" snapshots should be compared to make sure that the database has been accurately updated and that updates represent an enhancement of the inventory rather than a reduction in quality.

- 1. Start CDMS.
- 2. Make sure that the **Current State** is pointing to C:\HazusData\_22\WV.
- 3. Click the Query/Export Statewide Datasets button.
- 4. Choose **County** for Geographic Area.
- 5. Select **<County\_Name>** County.
- 6. Choose Aggregated Data for Data Layer.
- 7. Choose the **Building Counts by Census Tract, Building Square Footage by Census Tract, Exposure Content by Census Tract**, and **Structure Exposure by Census Tract** Data layers.

Note that you will be updating both Census Tract and Census Block values but you are only querying Census Tract values for comparison purposes.

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| case select one of the following:   | Query/Export States            | ide Datasets                         |                |                         |                    |
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|   |                                |                                      |                |                         |                    |

- 8. Click the Search button.
- 9. Click the **Export to Geodatabase** button and choose **Export all layers**.

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|  | Please specify the layers to export |                          |
|  | Export currently selected layer     | Export to Geodatabase    |
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10. Save the geodatabases to:

C:\Projects\Hazus\_Projects\PDM\_WestVirginia\Data\_Management\Hazus\_Updates\ <County Name>\General\_Building\_Stock WV\_<County\_Name>\_CDMS\_Export\_GBS\_Default.mdb

#### TASK 3.1.2 – LOAD GENERAL BUILDING STOCK INTO THE CDMS REPOSITORY

General Building Stock is loaded into Hazus to replace the default aggregate data. The expectation is that the Assessor data is more accurate than the default GBS.

- 1. Click the CDMS Home button and then select Import into CDMS Repository from File.
- 2. Browse to Select a file for Import and browse to:

C:\Projects\Hazus\_Projects\PDM\_WestVirginia\Data\_Management\Hazus\_Updates\<Co unty Name>\General\_Building\_Stock\

#### WV\_<County Name>\_CDMS\_Import\_GBS.mdb

3. Check only the Earthquake hazard beneath the Select a File to Import option. This indicates you will provide the attributes to update the earthquake mapping schemes. Selected attributes are available in the building inventory for this purpose. The Flood and Hurricane hazards are not selected because this release of CDMS does not update those mapping schemes correctly.

NOTE: You are doing this because CDMS does not use the information in its present release that could be applied to updating flood mapping schemes.

- 4. Select Aggregated Data as the Inventory Category.
- 5. Click on Import Site Specific Data to Aggregate Data to replace the existing GBS inventory.

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|--|--|--|
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| rase select one of the following                             | Import into CONS Repository  |  |
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| d Est CORS   |  |  |

- 6. Click **Yes** when prompted to acknowledge that all existing data will be replaced.
- 7. Select **GBS** from the **Input Table Selection** dropdown box and click **OK**.
- 8. Click the Load button on the Import from Buildings/Parcels: Data Field Matching panel.
- 9. Navigate to:

...\Data\_Management\Hazus\_Updates\<County Name>\Tools and select the mapping table called: GBS.fmp

| Comprehensive Data Management System (CD | (MS)                 |                             |                         |   |  |  |  | 222  |
|--|----------------------|-----------------------------|-------------------------|---|--|--|--|--|
| File Tools W Help                        |                      |                             |                         |   |  |  |  |  |
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| ease select one of the following:        | Import from Building | ge/Parcels:                 | Data Fiel               | d Matching                              |  |  |  |  |
| Import into CDMS Repository from File    | Define Source(from   | ) and Desti                 | nation (to              | ) Field Matches                         |  |  |  |  |
|  | Source (from) Fields | Source (from) Fields (clics |                         |   | Destination (to) Fields (click to select)      |  |  |  |
| import into CDMS Repository from         | to select)           |                             | Field Na                | ime                                     | Field  | Type Field Lengt   | h Default  | Group Id   |
| Hazus-MH Study Region                    | 495kgGaany           |                             | Building                | Quality                                 | Test   | 1  |  | 3  |
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| Building-Specific Data                   | tFirstFlooret        |                             | Longitude               |   | Numb   | er.  |  | 4  |
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| Input File Name: WV_Berkeley_CDM5_Impo   | Field Matches        | + Add N                     | Nation                  |   |  |  |  |  |
| Data Category: Appropriate Data          | Source               | Destinat                    | lon                     | Field Type                              | Field L  | ength Default  | Value !  |  |
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|  | eqBidgType           | EQ Build                    | ing Type                | Text                                    | 5  |  |  | Theorem.   |
|  | eqDesignLevel        | Design L                    | evel                    | Text                                    | 2  | LC - Low   | ( )  | THURSDAY.  |
|  | hzBldgCost           | Building                    | Value                   | Number                                  |  |  |  | ad Save  |
|  | hzContCost           | Content                     | value                   | Number                                  |  |  |  |  |
|  | hzOccCode            | Occupan                     | cy                      | text                                    | 0  |  |  | ×Remove  |
|  | hzbiogArea           | Area                        | 444                     | Number                                  |  |  |  | The second to the second                                     |
| Exit CDMS                                | 27                   |                             |                         |   |  |  |  |  |

- 10. Click **Continue**.
- 11. Click **OK** when prompted to **Categorize Fields**.
- 12. Click **OK** on the **Area Field Type, Building Value Field Type** and **Content Value Field Type** windows.



13. The NumStories field is numeric. It does not need to be categorized. Just click OK.



- 14. Choose **Year is in 4-digit format** for the Year Built Field Type.
- 15. The remaining Source values should accurately match the Destination values. Continue Category Matching the following GBS fields:

#### Building Quality Occupancy Class

- 16. When prompted, choose Use system defaults for General Building Type Mapping Schemes.
- 17. A CDMS Data Import Success message box will appear (assumes the import was successful). Click OK, and the results will be available in the CDMS Repository as shown below.



18. Review the imported records by clicking on the View button.

| С |      | eposito | ry (Not yet transferr | red into Statewide Laye | rs)     |             |             |  |
|---|------|---------|-----------------------|-------------------------|---------|-------------|-------------|--|
|   |      |         | Category              | Layer                   | Records | Upload Date | Uploaded By |  |
|   | View | Remove  | Aggregated Data       | Aggregated Data         | 939     | 10/24/2012  | ADS\kmickey |  |
|   |      |         |                       |                         |         |             |             |  |

- 19. On the CDMS Repository Home screen, select the **Aggregated Data** layer to transfer to Hazus.
- 20. Click the **Transfer to Statewide Dataset** button, and select **Yes** to initiate the transfer of data from the repository into Hazus.



- 21. Select All the available datasets from the Transfer Aggregated Data to Statewide Databases dialog box.
- 22. Set the option to Update General Building Mapping Schemes.
- 23. Set the option to Process All Tracts/Blocks in County.
- 24. Click **OK**.
- 25. Answer **OK** when prompted to replace the GBS contents from all Tracks and Blocks. The GBS contents of Census Blocks and Tracts not included in the Building Inventory will be set to zero. Only use this option if the Building Inventory reflects the entire county.

| Transfer Aggregat | ed Data to Statewide Databa   | ases   |  |   |
|-------------------|---|--|--|---|
|                   | Please select the datase<br>Statewide databases and   | ts to be transferred to t<br>I then click OK to contin   | the HAZUS-MH<br>ue:  |   |
|                   | Building Counts by Cens<br>Building Counts by Cens<br>Building Square Footage<br>Building Square Footage<br>Exposure Content by Ce<br>Exposure Content by Ce<br>Structure Exposure by C<br>Structure Exposure b | sus Block<br>sus Tract<br>e By Census Block<br>e By Census Tract<br>nsus Block<br>nsus Tract<br>ensus Block<br>DMS | Select All   | ×   |
|                   | Tract/Block Process<br>Process only in<br>Process all tra<br>Update Geners  | You have sele<br>result in all tra<br>Are you absol  | cted to process all co<br>acts/blocks not includ<br>utely sure you would | unty tracts/blocks. This action will<br>led in this import to be set to zero.<br>like to proceed? |
|                   | Cancel  |  | ОК   | UK Cancel   |

26. Click **OK** when prompted to acknowledge that 1 county will be affected by this transfer.



When the process is complete a new record will be added to the Statewide Layer Modification History.

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| arrest Male   | Description | 115-        | STREET, STREET |                   |                 |                        | Contraction of the local distance of the loc |

27. Select the Display Statewide Modification History Report icon. Export the PDF to: ...\Models\County\ <County\_Name> \Reports\Hazus\ WV <County Name> CDMS Transactions <yymmdd>.pdf

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|--------|-----------------------|---------------------------------------|---------------------|-------------|-------------|--|
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| State  | wide Dataset Modifica | tion History                          |                     |             |             |  |
| State  | Category              | Dataset                               | Records<br>Affected | Upload Date | Uploaded By |  |
|        |                       |                                       |                     |             |             |  |

#### TASK 3.1.3 - QUERY "AFTER" HAZUS GBS

The updated GBS will be compared to the previous values to make sure that the Hazus database accurately reflects the Building Inventory. These steps are only needed if the GBS has been updated.

- 1. Start CDMS.
- 2. Make sure that the Current State is pointing to c:\HazusData\_22\WV.
- 3. Select Query/Export Statewide Datasets
- 4. Search By Geographic Area to County from the dropdown list.
- 5. Select <County\_Name> and move it to the Selected Geographical Areas
- 6. Set the Search By Data Layer to Aggregated Data from the dropdown list.
- 7. Select the following Aggregated Data Layers: Building Counts By Census Tract Building Square Footage By Census Tract Exposure Content By Census Tract Structure Exposure By Census Tract
8. Click Search.

| le Tools 🤯 Help   |  |  |
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| 😵 FEMA  | Welcome to the Hazus-MH<br>Comprehensive Data Management System  |  |
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- 9. Click on the Export to Geodatabase button on the Search Statewide Datasets panel.
- 10. Set the Export Option to Export all layers when prompted. Click Submit.
- 11. Save the exported Geodatabase file to:

C:\Projects\Hazus\_Projects\PDM\_WestVirginia\Data\_Management\Hazus\_Updates\<County Name>\General\_Building\_Stock

WV\_<County\_Name>\_CDMS\_Export\_GBS\_Updated.mdb

12. Close CDMS.

# TASK 4 – CREATE A NEW FLOOD STUDY REGION AND IMPORT THE USER DEFINED FACILITIES

In this final task you will first create a new study region. Because you updated the general building stock already, that updated inventory will be reflected in the study region. Hazus-MH does not currently support update of user defined facilities with CDMS so you will import those directly into the study region.

## TASK 4.1 - CREATE STUDY REGION IN HAZUS

Before running the tool to import User Defined Facilities to the Study Region, create a Study Region named: WV\_<County Name>\_FL.

- 1. Start Hazus-MH.
- 2. Create a Flood Study Region for <County Name>, WV.
  - Name: WV\_<County Name>\_FL

# Description: <County Name> Flood Risk Analysis using updated UDF and GBS

| Enter below a name which uniquely identi<br>characters long             | ifies your region. The name can be up to 50   |
|---|---|
| ondisotoro rong.  | inte your region. The fidine curries up to be |
| WV_Berkeley_FL  |   |
| Region description (optional):<br>Berkeley Flood Risk Analysis using uc | dpated UDF and GBS                            |

- 3. Set the Study Region Hazard Type to **Flood** and create the Study Region.
- 4. Open the study region that you just created.

#### TASK 4.2 - IMPORT USER DEFINED FACILITIES TO THE STUDY REGION

- 1. Navigate to Inventory | User Defined Facilities.
- 2. Right-click in the open area of the User Defined Facilities window and select Import.
- 3. Navigate to ...Data\_Management\Hazus\_Updates\Template\User\_Defined\_Facilities and select WV\_County\_Hazus\_Import\_UDF.mdb
- 4. Select Table **UDF** from the Table List and click **OK**.



5. In the Mapping window select the **Load** button.

| Source (click to select)<br>OBJECTID<br>SHAPE<br>OCCUPANCY<br>BLDGTYPE<br>BLDGQUALITY<br>TOTALCONTENTVALUE<br>DESIGNLEVEL<br>COUNTY, FIPS<br>NUMFLODRS<br>LATITUDE<br>LONGITUDE<br>STATE<br>FOUNDATIONTYPE<br>FIRSTELOORHT |   | Target (double click to<br>OCCUPANCY<br>NAME<br>ADDRESS<br>CITY<br>STATEA<br>2IPCODE<br>CONTACT<br>PHONENUMBER<br>YEARBUILT<br>COST<br>BACKUPPOWER<br>NUMSTORIES<br>AREA<br>CONTENTCOST<br>SHEI TERPAPACITY | satight | Cancel  |
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| (apping Results  | _ |   |         |         |
| Source   | - | Target  | î.      | Delete  |
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|  |   |   |         | Load    |
|  |   |   | *       | 100     |

- 6. Navigate to ...\Data\_Management\Hazus\_Updates\Template\Tools choose UDF.sav.
- 7. Click **OK** to begin loading the UDF inventory.

NOTE: This method of importing user defined facilities into a Hazus study region is appropriate if you have less than 10,000 facilities. We do not anticipate any county in West Virginia exceeding this number. If you need to import more than 10,000 facilities, other methods of importing the facilities should be considered since the import processing time can considerably increase beyond that amount.

- 8. When the inventory has finished loading, close the Inventory window then reopen it and click the Map button to verify that it has loaded successfully.
- 9. You are now ready to use Hazus-MH to perform a flood risk assessment.

# APPENDIX 1 FME MATRIX TABLE AND DOMAIN TABLES DEVELOPMENT PROCESS FOR IMPROVEMENTS

The following mapping schemes were applied to create the Improvements table which contains several important attributes used to create Building Inventory.

Firstly, it is important to understand what Domain and Matrix table represent. Domains are tables created in the access geodatabase which give the description of the codes. The description field in the table is keyed in by referring to the specifications or manual. Matrices are tables created in the access geodatabase which convert the Cama codes into Hazus specific codes.

The Pilot assumptions including domain and matrix tables can be customized by County as the requirements change.

## I CAMA TO CAMA

#### Matrix\_LUC\_hzOccCode

The matrix table "Matrix\_LUC\_hzOccCode" is created prior to running Cama to CAMA FME script. The purpose of this is to enhance the cama Look-Up Code (LUC) table so that the data can be preprocessed based on the Hazus occupancy classes. The Hazus occupancy codes/ classes serve as a guide to convert the existing cama attributes to Hazus specific attributes.

The source cama LUC table created for Berkeley County was provided in text file format. This text file included LUC code list and the description of the codes. Below is a screenshot of the LUC table text file. The following portion of the workflow assumes that source cama LUC tables would also be provided in this format for other counties.

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| VAL                     |            |        | HSG                                  |         |
|                         |            |        |                                      |         |
| 100                     |            |        | Residential T Eardly                 |         |
| 102                     |            |        | Residential 2 Family                 | 12      |
| 103                     |            |        | Residential 3 Family                 | - 17    |
| 104                     |            |        | Residential 4 Family                 |         |
| 105                     |            |        | Mixed Residential/Commercial         |         |
| 106                     |            |        | condominium (common element)         |         |
| 107                     |            |        | Condominium (fee simple)             | 1.0     |
| 108                     |            |        | MOD11e Home                          |         |
| 109                     |            |        | Auxillary improvement                |         |
| 112                     |            |        | Artiva Farm                          |         |
| 113                     |            |        | Inactive Farm                        |         |
| 114                     |            |        | Conservation easement perpetual      |         |
| 115                     |            |        | Unsound Residential structure        |         |
| 123                     |            |        | Large Vac Tract - Unknown Potential  |         |
| 200                     |            |        | Vacant Apartment Land                |         |
| 201                     |            |        | Residen. Structure on Apartment land |         |
| 211                     |            |        | Apartment-Garden (1-3 stories)       |         |
| 212                     |            |        | Apartment-High Rise                  |         |
| 213                     |            |        | MODT IE HORE PARK                    |         |
| 301                     |            |        | mostd structure on commercial Land   |         |
| 310                     |            |        | Unsound Connercial Structure         |         |
| 314                     |            |        | Hotel/Motel-High Rise                |         |
| 315                     |            |        | Hotel/Motel-Low Rise                 |         |
| 316                     |            |        | Nursing Home                         |         |
| 31.8                    |            |        | Boarding and Rooming Houses          |         |
| 31.9                    |            |        | Wixed Contercial/Residential         |         |
| 321                     |            |        | Restaurant                           |         |
| 323                     |            |        | Food Stand                           |         |
| 323                     |            |        | Tra House                            |         |
| 327                     |            |        | Bar / ounde                          |         |
| 328                     |            |        | Night club/pinner Theater            |         |
| 330                     |            |        | Kwik Lube                            |         |
| 331                     |            |        | Auto Dealer-Full Service             |         |
| 332                     |            |        | Auto Service Garage                  |         |
| 333                     |            |        | service station with Bays            |         |
| 334                     |            |        | Service Station without Bays         |         |
| 335                     |            |        | Truck Stop                           |         |
| 350                     |            |        | Car Wash-Manual                      |         |
| 9.91                    |            |        | Car wash-Auconacic                   |         |
| 4.0                     |            |        | 18                                   |         |
| and and a second second |            |        |                                      |         |

Task 1: Create Matrix LUC hzOccCode table

- 1. Open WV\_<County Name>\_Assessor.mdb located in ...\PDM\_WestVirginia\Data\_Management\Data\_Sources\<County Name>\Assessor
- Delete the template Matrix\_LUC\_hzOccCode that is currently in the WV\_<County Name>\_Assessor.mdb database.
- 3. Import the LUC source text file and rename it to "**Matrix\_LUC\_hzOccCode**". Rename the fields 1 and 2 with the field names "CAMAOccCode" and "Description" respectively.
- 4. Add a new field to the Matrix\_LUC\_hzOccCode table that is text format and name it hzOccCode.

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| II in my market   |  |  |             |

5. Key in appropriate values in the **hzOccCode** code field by referring to "Domain\_hzOccCode" in the "WV\_<County Name>\_BI\_GDB.mdb" located in

...\PDM\_WestVirginia\Data\_Management\Models\<County\_Name>\Analysis\Inventory\B uilding\_Inventory

Note: you may wish to consult the following table which relates Hazus-MH Occupancy Codes to Standard Industrial Classification Codes. You can view descriptions of these codes on the OSHA website at <a href="https://www.osha.gov/pls/imis/sicsearch.html">https://www.osha.gov/pls/imis/sicsearch.html</a>.

| Hazus<br>Label | Occupancy Class                             | Standard Industrial Codes (SIC)  |
|----------------|---|--|
|                | Re  | sidential  |
| RES1           | Single Family Dwelling                      |  |
| RES2           | Mobile Home                                 |  |
| RES3A          | Multi Family Dwelling - Duplex              | 0  |
| RES3B          | Multi Family Dwelling - 3-4 Units           |  |
| RES3C          | Multi Family Dwelling - 5-9 Units           |  |
| RES3D          | Multi Family Dwelling - 10-19 Units         |  |
| RES3E          | Multi Family Dwelling - 20-49 Units         |  |
| RES3F          | Multi Family Dwelling - 50+ Units           |  |
| RES4           | Temporary Lodging                           | 70   |
| RES5           | Institutional Dormitory                     | 0  |
| RES6           | Nursing Home                                | 8051, 8052, 8059   |
|                | Cor   | nmercial   |
| COM1           | Retail Trade                                | 52, 53, 54, 55, 56, 57, 59   |
| COM2           | Wholesale Trade                             | 42, 50, 51   |
| COM3           | Personal and Repair Services                | 72, 75, 76, 83, 88   |
| COM4           | Business/Professional/Technical<br>Services | 40, 41, 44, 45, 46, 47, 49, 61, 62, 63, 64, 65, 67, 73, 78 (except 7832), 81, 87, 89 |
| COM5           | Depository Institutions                     | 60   |
| COM6           | Hospital                                    | 8062, 8063, 8069   |
| COM7           | Medical Office/Clinic                       | 80 (except 8051, 8052, 8059, 8062, 8063, 8069)                                       |
| COM8           | Entertainment & Recreation                  | 48, 58, 79 (except 7911), 84   |
| COM9           | Theaters                                    | 7832, 7911   |
| COM10          | Parking                                     |  |
|                | In  | dustrial   |
| IND1           | Heavy                                       | 22, 24, 26, 32, 34, 35 (except 3571, 3572), 37                                       |
| IND2           | Light                                       | 23, 25, 27, 30, 31, 36 (except 3671, 3672, 3674), 38, 39                             |
| IND3           | Food/Drugs/Chemicals                        | 20, 21, 28, 29   |
| IND4           | Metals/Minerals Processing                  | 10, 12, 13, 14, 33   |
| IND5           | High Technology                             | 3571, 3572, 3671, 3672, 3674   |
| IND6           | Construction                                | 15, 16, 17   |
|                | Ag  | riculture  |
| AGR1           | Agriculture                                 | 01, 02, 07, 08, 09   |
|                | Religion                                    | n/Non-Profit   |
| REL1           | Church/Membership Organizations             | 86   |

# 6. Save the table.

| Califa Cartons | Description                          | arthurney a think in date |
|----------------|--------------------------------------|---------------------------|
| 5 200          | Residential Vacant                   | ALL CONTRACTOR OFFICE     |
| 10.101         | Residential ) Family                 | 0071                      |
| 7.102          | Residential 2 Panels                 | MPN18.                    |
| (\$ 10)        | Respondial Litaryly                  | MATCH .                   |
| 9.104          | Residential & Family                 | 105538                    |
| 20 125         | Mixed Residential/Commercial         | 853                       |
| 11 199         | Epideminam immon elementi            | HISSA.                    |
| 12 182         | Condovrament/Seg saviple1            | 1873.1A                   |
| 13.158         | telebule Human                       | mesa .                    |
| 24 329         | Augulary insprovement                | COMM                      |
| 15 100         | Saturge Value Building               | CONM                      |
| 38.112         | Active Farm                          | AURI                      |
| 17.139         | Inactive Parm.                       | AOTL                      |
| 10 114         | Conservation easement percentual     | 044                       |
| 18 115         | Unspund Residential Structure        | 16552                     |
| 20 121         | Large Vec Tract - Unknown Potential  | MA .                      |
| 21:290         | Vesent Aperbraniti Letur             | NA.                       |
| 12-291         | Resident Ithattoni on Asartment land | 19225                     |
| 27.211         | Aportment-lawden () - Esturies)      | 10238                     |
| 26.212         | Appartment Aigh Rive                 | HESHE                     |
| 25 213         | Mobile Horns Fark                    | W252                      |
| 28.300         | Variand Conversion Land              | NA.                       |
| 27.381         | Restal Structure on Commoncial Land  | HEEL                      |
| 28.148         | Unsound Confinencial Structure       | DOM:                      |
| 20.004         | Hosel/Worsi-High File                | 18254                     |
| 00.000         | Hotel/Wated-Lose Rise                | 11/234                    |
| 10.134         | Running Horner                       | 10218                     |
| 32,118         | Roarding and Rooming Houses          | 10058                     |
| 33.009         | Mixed Commential/Neuderitial         | CONT                      |
| 31(222         | Restaurant.                          | COME                      |
| 35 333         | Food Stand                           | COME                      |
| 35.323         | Frenchise Food                       | COME                      |
| 17.529         | 10e H0000                            | COMI                      |
| 34.542         | Ber/Linunge                          | (OW)                      |
| 29 128         | Night Club/Okyser Sheater            | COME                      |
| 40 330         | Work Luber                           | COME                      |
| 45.115         | Auto Dealer-Full Service             | COME                      |

## Task 2: Update the Occupancy Mapper transformer

The following instructions provide the method to update the Occupancy Mapper transformer in the **1.cama\_to\_CAMA FME script** using the matrix table "Matrix\_LUC\_hzOccCode". The Occupancy Mapper transformer maps the values of the codes to appropriate Hazus occupancy classes

Once the Matrix\_LUC\_HzOccCode table has been updated you are ready to import the updated values into the FME tool.

- 1. Start ArcMap and open **WV\_<County Name>\_BI\_Products.mxd** located in ....\PDM\_West Virginia\Data\_Management\Models\<County Name>\MXD\_Documents
- Add the WV\_<County Name> FME BI Products toolbox to ArcTools from: ...\Models\<County Name>\Tools\
- 3. Right-click on the 1.cama\_to\_CAMA FME tool and choose Edit.
- 4. Click the sprocket in the upper right corner of the **OccupancyClass** Mapper to open the AttributeValue Parameters window.



- 5. Before completing the next step, make sure the contents in the Source Value and Destination Value fields are empty. In order to do this, click on the first row and press "Delete" on the keyboard. Do this for all the rows.
- 6. Click the **Import** button and choose **Source and Destination Values**.

| ransformer             |                                 |                        |
|------------------------|---------------------------------|------------------------|
| Transformer Name:      | OccupancyClass_Mapper           |                        |
| ttribute Selection     |                                 |                        |
| Source Attribute:      | 4 LUC                           |                        |
| lestination Attribute: | heOccCode                       |                        |
| Default Value:         | UNK                             |                        |
| lapping Parameters     |                                 |                        |
| Mapping Directions     | Forward (Source To Destination) |                        |
| alue Map               |                                 |                        |
| Source Value           | Destination Value               |                        |
|                        |                                 |                        |
|                        |                                 |                        |
|                        |                                 |                        |
|                        |                                 |                        |
|                        |                                 |                        |
| +                      | •                               | Import                 |
| +                      | •                               | Inperture Source Value |

- 7. Select Esri Geodatabase (Personal Geodb) for the Format
- Click the Browse button and browse to WV\_<County Name>\_Assessor\_GDB.mdb in ...\Hazus\_Projects\PDM\_West Virginia\Data\_Management\ Data\_Sources\<County Name>\ Assessor\



- 9. Click the Next button to access the Attributes Values Import Wizard.
- 10. Select the feature type **Matrix\_LUC\_hzOccCode** and click the **Next** button.

| Attribute Velues Im                         | port Winard                       | and the states        |   | 1.8          |
|---|-----------------------------------|-----------------------|---|--------------|
| Select Feature Typ<br>The following feature | pes<br>sture type(x) were found a | the dataset. Select t | e feature types co  | ntaining the |
| ettribule(s) of m                           | terest.                           |                       |   | 10.000       |
| -n /  | Feature Types                     |                       |   | _            |
| Nest jill                                   | 12 Matrix 3UC.)                   | aOccCode              |   |              |
| -14   |                                   |                       |   |              |
|   |                                   |                       |   |              |
| 1 68.                                       |                                   |                       |   |              |
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| S.  | Q, riter                          |                       | Select all (2   | Sorted       |
| Č,  | Q, riter                          |                       | M Select all (2   | Sorted       |

11. For Attributes for Source Value select **CAMAOccCode** as shown below and click the **Next** button.

| Trar                                     | is former   |                                   |
|--|---|-----------------------------------|
| Attribute Values I                       | import Wisard   | - B.                              |
| Select Attribute<br>The following a      | s for 'Source Value'<br>(tribute(s) were found in the selected feature typ<br>due to meet to 'So are Value' | e(x). Select an attribute to scan |
|  | Attributes  |                                   |
| 25                                       | Show format attributes  |                                   |
| Dest. Here                               | CAMAOccCode   |                                   |
| -  | Description<br>peodb oid  |                                   |
| 6.A                                      | hzOccCode   |                                   |
| 1-8                                      | 10  |                                   |
| 2-1-2                                    |   |                                   |
|  |   |                                   |
| -  |   |                                   |
| and the second second                    | Q, Filter   | Sorted                            |
|  |   |                                   |
| a la | - Rech  | These Canad                       |

12. Select **hzOccCode** as the Destination Value attribute and click the **Next** button.

| Attribute Values In  | rport Wiced   |
|--|---|
| Select Attributes<br>The following at<br>for potential val | for 'Destination Value'<br>tribute(s) were found in the selected feature type(s). Select an attribute to scar<br>lives to import to Destination Value'. |
| The second   | Attributes  |
|  | CAMAOccCode<br>Description  |
|  | geods_oid<br>ItaDicCode<br>ID   |
| 158  |   |
|  |   |
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|  |   |

- 13. Click the **Import** button to import the source and destination value attributes.
- 14. Make sure under "Attribute Selection" of the "AttributeValueMapper Parameters" window, the following features are updated:
  - Source Attribute is set to "LUC" (this is the attribute from the source data that will be used to convert to hzOccCode)
  - o Destination Attribute is named as "hzOccCode"
  - Default Value is set to "UNK"

| Transformer Name:  | OctopercyClass_Happer   |          |
|--|---|----------|
| Attribute Selection  |   |          |
| Source Attribute:  | o wc  |          |
| Destriation Alterbute:   | TurDicicade   |          |
| Default Value:   | UNIC  | 00       |
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| Source Value   | Destination Value   | ł        |
| Source Value   | Destination Value   | 1        |
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| Source Value<br>& 101<br>& 102<br>& 103<br>& 103<br>& 104      | Destination Value<br>& RESI<br>& RESI<br>& RESIA<br>& RESIB<br>& RESIB  | 1        |
| Source Value<br>A 100<br>k 101<br>k 102<br>k 103<br>k 104<br>+ | Destination Value<br>A RESS<br>A RESSA<br>A RESSB<br>A RESSB<br>A RESSB | incort • |

15. The Attribute Value Parameters window is now set for the Transformer "OccupancyClass\_Mapper". Click the **OK** button.

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|---|--|-----|
| Tanform Name  | Geoupaney/Class, Mapper  |     |
| Athina Selector   |  |     |
| Source Attribute:   | Q LDC  |     |
| Athenation Athenation   | hzCiccCode   |     |
| Default Value:  | Unit.  |     |
| Income Deservation  |  |     |
| The second se |  |     |
| Magging Directions  | Forward (Source To Destination)  | • • |
| Happing Directions<br>Water Magn<br>Source Walker   | Farward (Source To Destination)<br>Destination Value   | • • |
| Magging Direction<br>whe Mag<br>Source Wilve  | Farward (Source To Destinution)<br>Destination Value   | • • |
| Magging Directors<br>www.Mag<br>Source Volue<br>& 201   | Personnet (Source To Destination) Destination Value  | • • |
| Magging Directors<br>whe Map<br>Source Volue<br>& 100<br>& 101<br>& 102   | Persent (Source To Destination) Cestination Value Cost Value K #ESIA K #ESIA   | • • |
| Massing Directions<br>when Mag<br>Source Value<br>& 101<br>& 102<br>& 103                                       | Persand Source To Destination<br>Destination Value<br><b>K</b> 1955<br>& 1953<br>& 2534<br>& 2534<br>& 2538  | • • |
| Massing Directions<br>when Mag<br>Source Value<br>A 101<br>Å 102<br>Å 103<br>Å 104                              | Personal Source To Destination<br>Destination Value<br>& With<br>& RESS<br>& RESS<br>& RESS<br>& RESS<br>& RESS  | •   |
| Magging Direction<br>skie Mag<br>Source Volue<br>A 101<br>A 101<br>A 103<br>A 103<br>A 104<br>+                 | Parmand (Source To Destination) Destination Value  UNIO  K ITELL  K ITELL |     |

- 16. The Occupancy Mapper transformer is now updated.
- 17. Click the Save button to save the changes to the script.
- 18. Close the FME script.

#### **ASSUMPTIONS:**

The codes in LUC for which the description are unmatchable with Hazus occupancy class are assigned "UNK". This will be processed in the CAMA to Improvements tool to convert them to appropriate Hazus Occupancy Classes.

# **II CAMA TO IMPROVEMENTS**

The following domain tables are created in MS Access prior to running the CAMA to Improvements tool. The domain tables are exported to WV\_<CountyName>\_Improvements.mdb; from where they are imported in to the "CAMA to Improvements" FME script. The purpose of creating these domain tables is to convert the CAMA codes to descriptive attributes.

#### Domain\_ImpCondition

#### Domain\_ImpType

#### Domain\_ImpFoundation

For each domain Task 1 outlines creating domain tables and Task 2 outlines importing domain tables into FME script.

#### Domain\_ImpCondition

Task 1: Create Domain\_ImpCondition

- 1. Open WV\_<County Name>\_Assessor.mdb located in ...\PDM\_WestVirginia\Data\_Management\Data\_Sources\<County Name>\Assessor
- 2. Create a query in MS Access to find the unique values for Grade.

| Grade Va  | lues            |          |        |    | - (B) \$ | 22     | 🗇 Grade Val 🖂 🕮 🕮       |
|-----------|-----------------|----------|--------|----|----------|--------|-------------------------|
| 6         | AMA             |          |        |    |          | -      | GRADE Field -           |
|           | A               |          |        |    |          |        |                         |
|           | OBJECTID        |          |        |    |          |        |                         |
|           | 2091            |          |        |    |          |        |                         |
|           | ADRSTR          |          | -      |    |          |        | 0                       |
|           | CITYNAME        |          |        |    |          |        | 11-                     |
|           | AREASUM         |          |        |    |          |        | 8+                      |
|           | ADRSUF2         |          |        |    |          |        | C                       |
|           | GRADE           |          |        |    |          |        | C-                      |
|           | COMPAN          |          |        |    |          |        | C*                      |
|           | STORIES         |          |        |    |          |        | D                       |
|           | PARED           |          | *      |    |          | 1.00   | D-                      |
| 1         |                 |          |        |    |          |        | D+                      |
| 127       | 10              | - 107    | 0.0111 | -  |          | ilen i | E                       |
| Field     | GRADE Field GRA | GRADE    |        |    |          | *      | E-                      |
| Table:    | CAMA            | CAMA     |        |    |          | -      | E+                      |
| Total     | First           | Group By |        |    |          |        | UNK                     |
| Show      | 191             | 12       | 10     | 25 | -        |        | x                       |
| Criteria: |                 |          |        |    |          |        | X-                      |
| 01        |                 |          |        |    |          | *      |                         |
|           | 4.10            |          |        |    | P.       |        | Record 14 1 1 of 18 + M |

3. Export the table created from the query to WV\_<County Name>\_Improvements.mdb as Domain\_ImpCondition located in

> ...\PDM\_WestVirginia\Data\_Management\Models\<County Name>\Analysis\Inventory\Improvements

- 4. Create a new text field named **ImpCondition**.
- 5. Key in values in the **ImpCondition** field based on the West Virginia Appraisal Manual. ("WV Appraisal Manual 2014". Refer to page 21)

| 10 | <ul> <li>CAMA_Gr</li> </ul> | ad - ImpConditic - Cho |
|----|-----------------------------|------------------------|
|    | A                           | GOOD                   |
|    | 2.A-                        | GOOD                   |
|    | 3 A+                        | 6000                   |
|    | 4.8                         | AVERAGE                |
|    | 58-                         | AVERAGE                |
|    | 6 8+                        | AVERAGE                |
|    | 7 C                         | EAIR                   |
|    | 8 C-                        | FAIR                   |
|    | 9 C+                        | FAIR                   |
|    | 10 D                        | POOR                   |
|    | 11 D-                       | POOR                   |
|    | 12 D+                       | POOR                   |
|    | 13 E                        | UNSOUND                |
|    | 14 E-                       | UNSOUND                |
|    | 15 E+                       | UNSOUND                |
|    | 16 X                        | EXCELLENT              |
|    | 17 X-                       | EXCELLENT              |
| 1  | Vew)                        |                        |

6. Save the table.

Task 2: Import Domain\_ImpCondition into "Condition ValueMapper" transformer

- 1. Start ArcMap and open **WV\_<County Name>\_BI\_Products.mxd** located in ...\PDM\_West Virginia\Data\_Management\Models\<County Name>\MXD\_Documents
- 2. Right-click on the 2.CAMA to Improvements FME tool and choose Edit.
- 3. Click the sprocket in the upper right corner of the **ImpCondition\_Mapper** to open the AttributeValue Parameters window.



Before continuing make sure the contents in the Source Value and Destination Value fields are empty. In order to do this, click on the first row and press "Delete" on the keyboard. Do this for all the rows.

| Transformer Name:      | ImpCondition_Mapper             |           |
|------------------------|---------------------------------|-----------|
| Attribute Selection    |                                 |           |
| Source Attribute:      | Q GRADE                         | • •       |
| Destination Attribute: | ImpCondition                    | A COLORED |
| Default Value:         | UNK                             |           |
| Mapping Parameters     |                                 |           |
| Mapping Direction:     | Forward (Source To Destination) | • •       |
| Value Map              |                                 |           |
|                        |                                 |           |
| Source Value           | Destination Value               |           |
| Source Value<br>+      | Destination Value               | ingort    |

- 4. Click the **Import** button and choose **Source and Destination Values**.
- 5. Select Esri Geodatabase (Personal Geodb) for the Format

Click the Browse button and browse to
 ...\PDM\_WestVirginia\Data\_Management\Models\Template\Analysis\
 Inventory\Improvements\
 WV\_<County Name>\_Improvements.mdb

| Select Source Datase<br>Select a source data<br>the dataset will be p | t<br>iset to be read. The dataset will be scanned, and a list of feature<br>resented. | types in |
|---|---|----------|
| Destruit<br>VIEB  | Reader  |          |
| + / NEB<br>Transition   | Format: Esri Geodatabase (Personal Geodb)   |          |
| Paramete  | Dataset: nprovements\WV_Berkeley_Improvements.mdb                                     | .) 📑     |
| Coordinat   | Parameters Coord. System: Read from source  |          |
|   |   |          |

- 7. Click the Next button to access the Attributes Values Import Wizard.
- 8. Select the feature type **Domain\_ImpCondition** and click the **Next** button.



9. For Attributes for Source Value select CAMA\_Grade and click the Next button.

| Select Attributes I<br>The following att<br>for potential values | ar 'Source Value'<br>ribute(s) were found in the selected feature type)s<br>in to import to 'Source Value'. | ). Select an attribute to scan |
|--|---|--------------------------------|
| N.   | Attributes  |                                |
| 770  | CAMA, Gradu<br>geodb_oxi<br>ID<br>ImpCondition  |                                |
| V2   | Q, FRIE   | V Sorted                       |
| r 100 1  |   |                                |

10. Select ImpCondition as the Destination Value attribute and click the Next button.

| The following<br>for potential v | for Destination value<br>influte(s) were found in the selected feature type(s). Select an attribute to scan<br>use to import to Destination Value'. | E. |
|----------------------------------|---|----|
| S.F.J.                           | Attributes  |    |
| No.                              | CAMA_Grade<br>geotb_oid<br>D<br>ImpCondition  |    |
| 1                                | Q, Fitter   |    |

- 11. Click the **Import** button to import the source and destination value attributes.
- 12. Make sure under "Attribute Selection" of the "AttributeValueMapper Parameters" window, the following features are updated:
  - o Source Attribute is set to "GRADE"
  - o Destination Attribute is named as "ImpCondition"
  - o Default Value is set to "UNK"

| Transformer<br>Transformer Namer<br>Attribute Selection   | ImpCandition_Mapper   |    |
|---|---|----|
| Source Attribute:   | & GRADE .   |    |
| Destination Attributer  | ImpCondition  |    |
| Default Value   | UNK   | 1. |
| Value Mags  |   |    |
| Value Map<br>Source Value   | Destination Value   |    |
| Natur Magt<br>Source Value<br>& A+  | Destination Value   |    |
| Value Map<br>Source Value<br>& A+<br>& A+   | Destination Value   | Î  |
| Walue Map<br>Source Value<br>& A+<br>& A-<br>& B  | Destination Value<br>k GOOD<br>k GOOD<br>k GOOD<br>k AVERAGE                                |    |
| Nalue Magi<br>Scorce Value<br>& A+<br>& A-<br>& B<br>& B<br>& B+  | Destination Value<br><b>k</b> GOOD<br><b>k</b> GOOD<br><b>k</b> AVERAGE<br><b>k</b> AVERAGE |    |
| Nalue Map<br>Source Value<br>& A+<br>& A-<br>& B<br>& B-<br>& B-  | Destination Value<br>k GOOD<br>k GOOD<br>k AVERAGE<br>k AVERAGE<br>k AVERAGE<br>k AVERAGE   |    |
| Nature Mage<br>Source Value<br>& A<br>& A<br>& A<br>& A<br>& B<br>& B<br>& B<br>& B<br>& B<br>& B<br>& B<br>& B<br>& B<br>& B | Destination Value  K GOOD  K GOOD  K AVERAGE  K AVERAGE  K AVERAGE  K DVFRAGE               |    |

13. The Attribute Value Parameters window is now set for the Transformer "ImpCondition\_Mapper". Click the **OK** button.

# Domain\_ImpType

Task 1: Create Domain\_ImpType

- 1. Open the **WV\_<County Name>\_Assessor.mdb** located in ...\PDM\_WestVirginia\Data\_Management\Data\_Sources\<County Name>\Assessor
- 2. Create an MS Access query to find the unique values for EXTWALL.

| ExtWall V | /alues   |           | - | 23   |                                      |
|-----------|--|-----------|---|------|--------------------------------------|
| C         | AMA  |           |   |      |                                      |
|           | *  |           |   |      |                                      |
|           | OBJECTID<br>ZIP1<br>ADRSTR<br>ADRNO<br>CITYNAME<br>AREASUM | ≡         |   |      | ExtWall Values                       |
|           | ADRSUF2  |           |   |      | 03                                   |
|           | GRADE  |           |   |      | 04                                   |
|           | hzOccCode  |           |   |      | 05                                   |
|           | COMVAL   |           |   |      | 06                                   |
|           | DARIES   |           |   |      | 07                                   |
|           |  |           |   | -    | 08                                   |
|           |  |           |   |      | 09                                   |
| Field     | EXTMANL Fields EX  | EXTRACALL |   |      | UNK                                  |
| Table:    | CAMA   | CAMA      |   |      |                                      |
| Total:    | First  | Group By  |   |      |                                      |
| Sort:     |  |           |   |      |                                      |
| Show:     |  |           |   |      |                                      |
| Criteria: |  |           |   | _ 11 | Record: I4 🔸 1 of 10 🗼 🕨 🗮 📉 No Filt |
| OI:       |  |           |   | - 11 |                                      |
|           |  |           |   | -    |                                      |
|           |  |           |   |      |                                      |
|           |  |           |   |      |                                      |

3. Export the table that the query created to WV\_<County Name>\_Improvements.mdb as Domain\_ImpType

Located in: ...\PDM\_WestVirginia\Data\_Management\Models\<County Name>\Analysis\Inventory\Improvements

- 4. Create a new text field named ImpType.
- 5. Key in the values in the description **ImpType** field based on West Virginia Appraisal Manual. ("WV Appraisal Manual 2014". Refer to page 56)

|   | ID •  | CAMA_EXTV + | ImpType + Click to Add + |  |
|---|-------|-------------|--------------------------|--|
|   |       | 01          | FRAME                    |  |
|   | 2     | 02          | BRICK OR STON            |  |
|   | 3     | 03          | ALUMINIUM                |  |
|   | 4     | 04          | ASBESTOS                 |  |
|   | 5     | 05          | CONCRETE BLO             |  |
|   | б     | 06          | STUCCO                   |  |
|   | 7     | 07          | BRICK                    |  |
|   | 8     | 08          | STONE                    |  |
|   | 5     | 09          | MASONRY                  |  |
| ÷ | (New) |             |                          |  |

6. Save the table.

#### Task 2: Import Domain\_ImpType

- 1. Start ArcMap and open **WV\_<County Name>\_BI\_Productss.mxd** located in ...\PDM\_West Virginia\Data\_Management\Models\<County Name>\MXD\_Documents
- 2. Right-click on the 2.CAMA to Improvements FME tool and choose Edit.
- 3. Click the sprocket in the upper right corner of the **ImpTypeMapper** to open the AttributeValue Parameters window.

| ImpCondMapper() | Se ImpTypeMapper |                     |
|-----------------|------------------|---------------------|
| (               | (> Output        | P NulAttriscer_Text |

Make sure the contents in the Source Value and Destination Value fields are empty. In order to do this, click on the first row and press "Delete" on the keyboard. Do this for all the rows.

| 14938-17V 85           |                                 |        |  |
|------------------------|---------------------------------|--------|--|
| Transformer Name:      | ІтрТуреМаррег                   |        |  |
| Attribute Selection    |                                 |        |  |
| Source Attribute:      | G EXTWALL                       | •      |  |
| Destination Attribute: | ImpType                         |        |  |
| Default Value:         | UNK                             |        |  |
| Mapping Parameters     |                                 |        |  |
| Mapping Directions     | Porward (Source To Destination) | • •    |  |
| Value Map              |                                 |        |  |
| Source Value           | Destination Value               |        |  |
|                        |                                 |        |  |
|                        |                                 |        |  |
|                        |                                 |        |  |
|                        |                                 |        |  |
|                        |                                 |        |  |
| + - + - *              | *                               | port 💌 |  |

- 4. Click the Import button and choose Source and Destination Values.
- 5. Select Esri Geodatabase (Personal Geodb) for the Format.
- 6. Click the Browse button and browse to

...\PDM\_WestVirginia\Data\_Management\Models\Template\Analysis\Inventory\Improv ements\

WV\_<County Name>\_Improvements.mdb

| Select a source data<br>the dataset will be p | aset to be read. The dataset will be scanned, and a list<br>presented. | of feature typ | oes in |
|---|--|----------------|--------|
| Destroit                                      | Reader   |                |        |
| Transfor                                      | Format: Esri Geodatabase (Personal Geodb)                              | *              |        |
| Lookup  | Dataset: nprovements\WV_Berkeley_Improvemen                            | ts.mdb 🛄       | P      |
| Coordina                                      | Parameters Coord. System: Read from sou                                | irce           |        |
| 170   |  |                |        |

- 7. Click the Next button to access the Attributes Values Import Wizard.
- 8. Select the feature type **Domain\_ImpType** and click the **Next** button.

| attribute(s) of inter | est.  Feature Types  Domain ImpCondition  Domain ImpFoundation  Domain ImpType  Improvements Improvements FAILED |                     |
|-----------------------|--|---------------------|
|                       | Q Filter   | Select all 🔽 Sorted |

9. For Attributes for Source Value select **CAMA\_EXTWALL** as shown below and click the **Next** button.

| for potential value | Attributes                | ect an attroute to scan |
|---------------------|---------------------------|-------------------------|
|                     | CAMA_EXTWALL<br>geodb_oid |                         |
|                     | ImpType                   |                         |
| 1000                | Q, Her                    |                         |

10. For Attributes for Destination Value select **ImpType** as shown below and click the **Next** button.

| Select Attributes<br>The following at<br>for potential val | for Destination Value?<br>ribute(s) were found in the selected feature type(<br>.es to import to Destination value'. | it). Select an attribute to scan |
|--|--|----------------------------------|
| Ser.   | Attributes   |                                  |
| No.  | CAMA_EXTWALL<br>geodb_oid<br>ID<br>bmpType   |                                  |
| 0.00   | Q nher   | V Sorted                         |

- 11. Click the **Import** button to import the source and destination value attributes.
- 12. Make sure under "Attribute Selection" of the "AttributeValueMapper Parameters" window, the following features are updated:
  - Source Attribute is set to "EXTWALL"
  - Destination Attribute is named as "ImpType"
  - o Default Value is set to "UNK"

| Transformer Name   | Two Two eManage  |
|--|--|
| transformer Name:  | Implypemapper  |
| Attribute Selection  |  |
| Source Attribute:  | 🔷 EXTWALL 💌 💌  |
| Destination Attribute:   | ІтрТуре  |
| Default Value:   | UNK  |
| Mapping Direction:   | Forward (Source To Destination)  |
| Mapping Direction:   | Forward (Source To Destination)  |
| Mapping Direction:<br>Value Map<br>Source Value  | Forward (Source To Destination)  |
| Mapping Direction:<br>Value Map<br>Source Value<br><u>k</u> 01<br><u>k</u> 02                | Forward (Source To Destination)  |
| Mapping Direction:<br>Value Map<br>Source Value<br><u>k</u> 01<br><u>k</u> 02<br><u>k</u> 03 | Forward (Source To Destination) <ul> <li> </li> <li></li></ul>   |
| Mapping Direction:<br>Value Map<br>Source Value<br>k 01<br>k 02<br>k 03<br>k 04              | Forward (Source To Destination)           Destination Value <ul> <li></li></ul>  |
| Mapping Direction:<br>Value Map<br>Source Value<br>k 01<br>k 02<br>k 03<br>k 04<br>k 05      | Forward (Source To Destination)           Destination Value           & FRAME           & BRICK OR STONE           & ALUMINIUM           & ASBESTOS           & CONCRETE BLOCK |

- 13. The Attribute Value Parameters window is now set for the Transformer "ImpTypeMapper".
- 14. Click the **OK** button.

# Domain\_ImpFoundation

Task 1: Create Domain\_ImpFoundation

- 1. Open WV\_<County Name>\_Assessor.mdb located in ...\PDM\_WestVirginia\Data\_Management\Data\_Sources\<County Name>\Assessor
- 2. Create an MS Access query to find the unique values for **BSMT**.

| BSMT Va  | lues  |                       | _ 0 | 23 |   |
|--|---|-----------------------|-----|----|---|
|  | AMA<br>*<br>OBJECTID<br>ZIP1<br>ADRSTR<br>ADRNO<br>CITYNAME<br>AREASUM<br>ADRSUF2 |                       |     |    | BSMT Values □ EX<br>BSMT Field →<br>1<br>2<br>3 |
| Field:<br>Table:<br>Total:<br>Sort:<br>Show:<br>Criteria:<br>or: | BSMT Field: [BSMT]<br>CAMA<br>First   | (BSMT)  CAMA Group By |     |    | 4<br>Record: H ≪ 1 of 5 → H ▷□ Ŋ                |
|  |   |                       |     | •  |   |

3. Export the table to WV\_<County Name>\_Improvements.mdb as Domain\_ImpFoundation

Located in: ...\PDM\_WestVirginia\Data\_Management\Models\<County Name>\Analysis\Inventory\Improvements

- 4. Create a new text field named ImpFoundation.
- 5. Key in the values in the description **ImpFoundation** field based on West Virginia Appraisal Manual. ("WV Appraisal Manual 2014". Refer to page 59)

| 10 +  | CAMA_BSMC -          | ImpFoundat +                                  | Click to Add  |   |   |
|-------|----------------------|---|---|---|---|
| 1     | 1                    | NONE  |   |   |   |
| 2     | 2                    | CRAWL   |   |   |   |
| 3     | 3                    | BASEMENT                                      |   |   |   |
| 4     | 4                    | BASEMENT                                      |   |   |   |
| (New) |                      |   |   |   |   |
|       |                      |   |   |   |   |
|       |                      |   |   |   |   |
|       |                      |   |   |   |   |
|       | 2<br>3<br>4<br>(New) | CAMA_ESM -<br>1<br>2.2<br>3.3<br>4.4<br>(New) | CAMA_BSWL - Improundue +     I NONE     2 2 CRAWL     3 3 BASEMENT     4 4 BASEMENT     (New) | CAMA_BSM + ImpFoundat + CAX to Add     1 NONE     2.2 CRAWL     3.3 BASEMENT     4.4 BASEMENT     (New) | CRANA_BSM - ImpFoundat - Chor to Add -     I NONE     Z 2 CRAWL     3 3 BASEMENT     4.4 BASEMENT     (New) |

6. Save the table.

Task 2: Import Domain\_ImpFoundation

- 1. Start ArcMap and open **WV\_<County Name>\_BI\_Updates.mxd** located in ....\PDM\_West Virginia\Data\_Management\Models\<County Name>\MXD\_Documents
- 2. Right-click on the 2.CAMA to Improvements FME tool and choose Edit.
- 3. Click the sprocket in the upper right corner of the **ImpFoundationType\_Mapper** to open the AttributeValue Parameters window.



Make sure the contents in the Source Value and Destination Value fields are empty. In order to do this, click on the first row and press "Delete" on the keyboard. Do this for all the rows.

| AttributeValueMapp     | er Parameters                   |                             |    |
|------------------------|---------------------------------|-----------------------------|----|
| Transformer            |                                 |                             |    |
| Transformer Name:      | ImpFoundationType_Mapper        |                             |    |
| Attribute Selection    |                                 |                             |    |
| Source Attribute:      | SMT                             | • •                         |    |
| Destination Attribute: | ImpFoundationType               |                             |    |
| Default Value:         | UNK                             | 💌                           |    |
| Mapping Parameters     |                                 |                             |    |
| Mapping Direction:     | Forward (Source To Destination) |                             |    |
| Value Map              |                                 |                             |    |
| Source Value           | Destination Value               |                             |    |
|                        |                                 |                             |    |
|                        |                                 |                             |    |
|                        |                                 |                             |    |
|                        |                                 |                             |    |
| <b>1</b>               | _                               |                             |    |
| T = A 7 A              | -                               | Source Value                | _  |
| Help                   | OK                              | Destination Value           |    |
|                        |                                 | Source And Destination Valu | es |

- 4. Click the Import button and choose Source and Destination Values.
- 5. Select Esri Geodatabase (Personal Geodb) for the Format
- 6. Click the **Browse** button and browse to

...\PDM\_WestVirginia\Data\_Management\Models\Template\Analysis\ Inventory\Improvements\

WV\_<County Name>\_Improvements.mdb



- 7. Click the Next button to access the Attributes Values Import Wizard.
- 8. Select the feature type **Domain\_ImpFoundation** and click the **Next** button.

| attribute(s) of re | Feature Types      |                      |
|--------------------|--------------------|----------------------|
| 1                  | Domain ImpConditio | n<br>ion<br>D        |
| Y-                 | Q File             | Select will 🗵 Sorted |

9. For Select Attributes for Source Value choose **CAMA\_BSMT** as shown below and click the **Next** button.

| for potential value | Attributes   | eest an announe to scan |
|---------------------|--|-------------------------|
| 7                   | CAMA_BSMT<br>geodb_orid<br>ID<br>ImpFoundationType |                         |
|                     | Q, Filter  | Sorted                  |

10. For Select Attributes for Destination Value choose **ImpFoundationType** as shown below and click the **Next** button.

| The following a<br>for potential w | thrbute(s) were found in the selected feature type(s)<br>slues to import to 'Destination Value'. | . Select an attribute to scan |
|------------------------------------|--|-------------------------------|
| - AL                               | Attributes   |                               |
| No.                                | CAMA_BSMT<br>geodb_oid<br>20<br>[ImpFoundationType   | _                             |
|                                    | Q, Filter  | V Sorted                      |

- 11. Click the **Import** button to import the destination value attributes.
- 12. Make sure under "Attribute Selection" of the "AttributeValueMapper Parameters" window, the following features are updated:
  - o Source Attribute is set to "BSMT"
  - Destination Attribute is named as "ImpFoundationType"
  - o Default Value is set to "UNK"

| 🤗 AttributeValueMapp   | er Paramet  | ers                  |          | x |
|------------------------|-------------|----------------------|----------|---|
| Transformer            |             |                      |          |   |
| Transformer Name:      | ImpFounda   | tionType_Mapper      |          |   |
| Attribute Selection    |             |                      |          |   |
| Source Attribute:      | SMT         |                      | •        |   |
| Destination Attribute: | ImpFounda   | tionType             |          |   |
| Default Value:         | UNK         |                      | 💌        |   |
| Mapping Parameters     |             |                      |          |   |
| Mapping Direction:     | Forward (Se | ource To Destination | n) 🔻 🔽   |   |
| Value Man              |             |                      |          |   |
|                        | D           | tin tin a Malua      |          |   |
| Source value           | De          |                      |          |   |
| K I                    | K<br>L      | CRANN                |          |   |
| K 2                    | K<br>L      | DASEMENT             |          | - |
| k A                    | k k         | BASEMENT             |          |   |
|                        | ~           | CHIERT               |          |   |
|                        | _           |                      |          |   |
| + • .                  | Ŧ           |                      | Import 🔻 |   |
| Help                   |             | ОК                   | Cancel   |   |
|                        |             |                      |          |   |

13. The Attribute Value Parameters window is now set for the Transformer "ImpFoundationType\_Mapper". Click the **OK** button.

# Creating ImpCost from CAMA table

In order to create a single cost field that gives the cost of each building, the following fields from the CAMA table are used for calculating the improvement cost (ImpCost):

- 1. COMVAL: represents the commercial value.
- 2. DWELVAL: represents residential or dwelling value
- 3. OBYVAL: represents other building yard value, which is an additional cost field added to COMVAL and DWELVAL.

The following assumptions were made in the template with respect to building cost for occupancy classes. You may modify these assumptions at your discretion.

• The building cost for commercial occupancy classes are derived from COMVAL and OBYVAL. Refer to "Other\_OccCode\_Cost\_Cal" in the "2. CAMA to Improvements" FME script.



• The building cost for residential are derived from DWELVAL and OBYVAL. Refer to "RES\_Cost\_Cal" in the "2. CAMA to Improvements" FME script.



 The building cost for occupancy classes other than commercial or residential are derived from COMVAL+DWELVAL. Refer to "Other\_OccCode\_Cost\_Cal" in the "2. CAMA to Improvements" FME script.

| ExpressionEvaluator Parameter   | Her. her   |
|---|------------|
| Taskretan: 2000   | -          |
| Deutossiers Adminutes : JopCoat   |            |
| <ul> <li>Pell Postar Motore</li> <li>Public Postar Motore</li> <li>Public Postar Postar</li> <li>Pitel Postar Postar</li> <li>Pitel Postar Postar</li> <li>Pitel Postar Postar</li> <li>Pitel Postar</li> <li>Pitel Postar</li> </ul> | ACTONICIAE |
|   |            |

- The undefined or unknown (UNK) occupancy classes are defaulted to commercial or residential based on the cost value provided for those respective records. The following assumptions are made with respect to "UNK" occupancy class assignment:
  - o "UNK" Records with COMVAL are assigned COM1 hazus occupancy class
  - $_{\odot}$  "UNK" Records with DWELVAL are assigned RES1 hazus occupancy class

# APPENDIX 2 FME MATRIX TABLES AND DOMAIN DEVELOPMENT FOR BUILDING INVENTORY

For the template, the following domain and matrix tables were created and imported into the FME script "**4.Building Points To Building Inventory**" prior to running the FME script. You may update these at your discretion to reflect differences between the pilot county and your county.

Note: Domains are tables created in the access geodatabase which give the description of the codes. Matrices are tables created in the access geodatabase which convert the codes into Hazus specific codes.

#### 1. Domains:

- Domain\_YearBuilt
- Domain\_FirstFloorHt: This domain is not created. It is imported into "FirstFloorHt\_Mapper" transformer in the "4. Building Points to Building Inventory" FME script.

The domains below are not created but used as references for creating the matrices: Matrix\_BldgConstruction, Matrix\_BldgFoundation and Matrix\_BldgCondition

These domains can be found in the "WV\_<County Name>\_BI\_GDB.mdb" located in

...\PDM\_WestVirginia\Data\_Management\Models\<County Name>\Analysis\Inventory\Building\_Inventory

- Domain\_BldgConstruction
- Domain\_BldgFoundation
- Domain\_BldgCondition
- 2. Matrices:
  - Matrix\_BldgConstruction
  - Matrix\_BldgFoundation
  - Matrix\_BldgCondition
- 3. XFactors\_DolSqFt: This table is created using an FME script. It is imported into "ImpArea\_Mapper" transformer in the"4. Building Points to Building Inventory" FME script to populate the records without Building Area.

# I. DOMAINS

## Domain\_YearBuilt

This domain is created to populate the missing or blank year built records in the cama data. The most frequently occurring, or mode, year built per occupancy is used to populate the blank year built. You may modify this for your needs at your discretion.

Task 1: Create Domain\_YearBuilt using FME script.

- Open WV\_<County Name>\_BI\_Products.mxd located in ...\Data\_Management\Models\Berkeley\MXD\_Documents
- 2. Right click | edit **3a. Domain Year Built Creator**.
- 3. Set the Source file to:
  - ...\<County Name>\Analysis\Inventory\Improvements\ WV\_<County Name>\_Improvements.mdb
- Set the Destination file to: ...\<County Name>\Analysis\Inventory\Building\_Inventory WV\_<County Name>\_BI\_GDB.mdb

| Banker James and Coloration of the second of the seco | 40 С. н. 2<br>на на на на на<br>на на на на<br>на на на<br>на на на<br>на на<br>на на<br>на на<br>на на<br>на на<br>на<br>на<br>на<br>на<br>на<br>на<br>на<br>на<br>на<br>на<br>на<br>на<br>н | In Long Amount<br>In State of Long<br>With Color<br>Mines Color<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added<br>Added |
|---|---|---|
| Industria      Topological     Second S |   |   |

5. The **Year Built Tester** transformer tests for values in Year\_Built which are "null" or "0" or "<1800" or "2020".

| Constraints (2000/0000)     Constraints (2000/0000)     Constraints (2000/0000)     Constraints     Const | Ann a second sec   | Plan and have    | Part Tail and Mar ()<br>Prid (M)<br>Part Tail<br>()<br>()<br>()<br>()<br>()<br>()<br>()<br>()<br>()<br>()<br>()<br>()<br>() | 2<br>2<br>2<br>2<br>2<br>2<br>2<br>2<br>2<br>2<br>2<br>2<br>2<br>2                              |
|---|--|------------------|---|---|
| Luck 5     Conjent Thinese sam, sheet     Conjent 7     Store 1     Store | Ner Coast<br>1 - Gi Van A<br>2 - B Van A<br>3 - B Van A<br>4 - G Van Auf<br>4 - G Van Auf | Opcostr Reprinte | Negris Mote<br>Menende<br>Anternate<br>(1) Automate<br>Theorem  | Dirich<br>Dirich<br>Artin<br>Dirich<br>Dirich<br>Arthur<br>Arthur<br>Arthur<br>Arthur<br>Arthur |
| Extension   | +  |                  |   |   |

6. The **Year Built Statistics Calculator** calculates the most frequently occurring year built or Mode.



7. The **Occupancy Code duplicate remover** groups the records by Occupancy Code and assigns the Mode year built values to the corresponding occupancy codes.



8. Under the Writers menu, select Add Feature Type and rename it to Domain\_YearBuilt.

A new feature type will be added to the destination geodatabase. (refer screenshots below)

9. The destination table **Domain\_YearBuilt** contains the Year Built values for the corresponding occupancy classes.



10. Right-click on the transformer **Domain\_Year\_Built**. Select **Copy attributes from a transformer**. Select **AttributeKeeper** transformer from the dropdown list.



- 11. Save and run the script.
- 12. Open the output table **Domain\_YearBuilt** from "WV\_<County Name>\_BI\_GDB.mdb".

|    | Domain_YearBuilt  | t           |                  |   |  | 23 |
|----|-------------------|-------------|------------------|---|--|----|
| 2  | OBJECTID 👻        | hzOccCode 👻 | AvgYearBuil 👻    |   |  |    |
|    | 13                | AGR1        | 1900             |   |  |    |
|    | 14                | COM4        | 2008             |   |  |    |
|    | 15                | RES1        | 2005             |   |  |    |
|    | 16                | RES2        | 1965             |   |  |    |
|    | 17                | RES3A       | 1920             |   |  |    |
|    | 18                | RES3B       | 1920             |   |  |    |
| *  | (New)             |             |                  |   |  |    |
|    |                   |             |                  |   |  |    |
|    |                   |             |                  |   |  | _  |
|    |                   |             |                  |   |  |    |
|    |                   |             |                  |   |  |    |
|    |                   |             |                  |   |  |    |
|    |                   |             |                  |   |  |    |
|    |                   |             |                  |   |  |    |
| Re | cord: I4 → 1 of 6 | ► N M       | No Filter Search | 1 |  |    |

<u>Task 2:</u> Import Domain\_YearBuilt into "YearBuilt\_Mapper" transformer in the **Building Points To Building Inventory** FME script.

1. Start ArcMap and open WV\_<County Name>\_BI\_Products.mxd located in

...\PDM\_West Virginia\Data\_Management\Models\<County Name>\MXD\_Documents

- 2. Right-click on the 4. Building Points to Building Inventory FME tool and choose Edit.
- 3. Click the sprocket in the upper right corner of the "YearBuilt\_Mapper" to open the AttributeValue Parameters window.

Make sure the contents in the Source Value and Destination Value fields are empty. In order to do this, click on the first row and press "Delete" on the keyboard. Do this for all the rows.

4. Click the **Import** button and choose **Source and Destination Values**.

| -                      |                     |              |                    |               |
|------------------------|---------------------|--------------|--------------------|---------------|
| Transformer            |                     |              |                    |               |
| Transformer Name:      | YearBuilt_Mapper    |              |                    |               |
| Attribute Selection    |                     |              |                    |               |
| Source Attribute:      | YearBuilt           |              | •                  |               |
| Destination Attribute: | YearBuilt           |              |                    |               |
| Default Value:         | 1970                |              | 💌                  |               |
| Mapping Parameters     |                     |              |                    |               |
| Mapping Direction:     | Forward (Source To  | Destination) | • •                |               |
| Value Man              |                     |              |                    |               |
|                        | <b>D</b> <i>C C</i> |              |                    |               |
| Source Value           | Destinatio          | on Value     |                    |               |
|                        |                     |              |                    |               |
|                        |                     |              |                    |               |
|                        |                     |              |                    |               |
|                        |                     |              |                    |               |
|                        |                     |              |                    |               |
|                        |                     |              |                    |               |
| +                      | x                   |              | Import 💌           |               |
| + - • • •              | x                   |              | Import  Source Val | ue            |
| + - A V A              | <b>x</b>            | ОК           | Import  Source Val | ue<br>n Value |

- 5. Select Esri Geodatabase (Personal Geodb) for the format.
- 6. Click the **Browse** button and browse to

...\PDM\_WestVirginia\Data\_Management\Models\<County Name>\Analysis\Inventory\Building\_Inventory WV\_<County Name>\_BI\_GDB.mdb

- 7. Click the **Next** button to access the Attributes Values Import Wizard.
- 8. Select the feature type **Domain\_YearBuilt** and click the **Next** button.

| Attribute Value                               | o Import Waard  | 1.0                              |
|---|---|----------------------------------|
| Select Feature<br>The follows<br>attribute()) | t Typen<br>g Texture type(() were found in the dataset. Select<br>of Interest.<br>Restore Type:   | the Resture types containing the |
| St.   | Company Yuangkuit     Domman, Jobiot.Code     Domman, Jobiot.Code     Matrix, BidgConstruction     Matrix, BidgConstruction     Matrix, MidlighTaundatian     Matrix, MidlighType     Matrix, MidlighType |                                  |
| -   | Q.me  | Solect al (2) Sorted             |

9. For Attributes for Source Value select **hzOccCode** as shown below and click the **Next** button.

| 47) 44                  | tributeValueMapper Parameters  | 18                          |
|-------------------------|--|-----------------------------|
| TI                      | ohme.  |                             |
| Select Attribute Values | Import Winerd<br>In for "Source Value"<br>Altifute()) were frond in the selected Seature type(s)<br>altifute()) were frond in the selected Seature type(s) | Select an attribute to scan |
| STO .                   | Attributes   |                             |
|                         | AvgVerBuilt<br>geo(b) out<br>PetOccLode  |                             |
| (To                     | COLICE TO  |                             |
| -                       | Q, Fitter  | IZ Sorted                   |
| IND                     | - Bath   | Next > Caccel               |
| 71                      | 144 to   |                             |

10. Select the feature type AvgYearBuilt for the Destination Value and click the Next button.

|  | in Amitu   | teValueMapper Paramete   | HS.                               |                  |        |
|--|--|--|-----------------------------------|------------------|--------|
|  | Tarato   |  |                                   |                  |        |
| ANIDA  | e Values Impr  | ort Wiczel <sup>11</sup>   | -                                 |                  | 1.4    |
| Select Part ( In Control of Contr | Attributes for<br>following attributes<br>peter following attributes<br>peter follow | Destination Volue<br>which were fixed in the as<br>to report to Destination to<br>Attributes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes<br>Withoutes | hertari finatara (reseta)<br>dari | Select an oldela |        |
|  | -  | Q me   |                                   | 17               | Sorted |
| reg  |  |  | - Bet                             | field >          | Canoli |

- 11. Click the **Import** button to import the destination value attributes.
- 12. Make sure under "Attribute Selection" of the "AttributeValueMapper Parameters" window, the following features are updated:
  - o Source Attribute is set to "YearBuilt"
  - o Destination Attribute is named as "YearBuilt"
  - o Default Value is set to "1970"

| 🍣 AttributeValueMapp   | per Parameters                  |
|------------------------|---------------------------------|
| Transformer            |                                 |
| Transformer Name:      | YearBuilt_Mapper                |
| Attribute Selection    |                                 |
| Source Attribute:      |                                 |
| Destroying Attributes  |                                 |
| Destination Attribute: | YearBuilt                       |
| Default Value:         | 1970 💌                          |
| Mapping Parameters     |                                 |
| Mapping Direction:     | Forward (Source To Destination) |
|                        |                                 |
| Value Map              |                                 |
| Source Value           | Destination Value               |
| ₿ AGR1                 | k 1900                          |
| k COM4                 | <u>k</u> 2008 ≡                 |
| k RES1                 | k 2005                          |
| k RES2                 | k 1965                          |
| k RES3A                | k 1920 -                        |
| + - * • •              | Import V                        |
| Help                   | OK Cancel                       |

13. The Attribute Value Parameters window is now set for the Transformer "**YearBuilt\_Mapper**". Click the **OK** button.

# Domain\_FirstFloorHt

"Domain\_FirstFloorHt" is the domain table located in "WV\_County\_BI\_GDB.mdb" under,

...\PDM\_WestVirginia\Data\_Management\Models\<County Name>\Analysis\Inventory\Building\_Inventory

<u>Task 1:</u> Import Domain\_FirstFloorHt into "FirstFloorHt\_Mapper" transformer in the **Building Points To Building Inventory** FME script.

1. Start ArcMap and open WV\_<County Name>\_BI\_Updates.mxd located in

...\PDM\_West Virginia\Data\_Management\Models\<County Name>\MXD\_Documents

- 2. Right-click on the 4. Building Points to Building Inventory FME tool and choose Edit.
- 3. Click the sprocket in the upper right corner of the **FirstFloorHt\_Mapper** to open the AttributeValue Parameters window.



Make sure the contents in the Source Value and Destination Value fields are empty. In order to do this, click on the first row and press "Delete" on the keyboard. Do this for all the rows.

4. Click the Import button and choose Source and Destination Values.

| Taroforner Nane:       | PirstFloorHt_Mapper             |
|------------------------|---------------------------------|
| Attribute Selection    |                                 |
| Source Attribute:      | G BogFoundation                 |
| Destination Attribute: | PretFloorHt                     |
| Default Value:         | L                               |
| Mapping Parameters     |                                 |
| Mapping Direction:     | Forward (Source To Cestination) |
| ialue Map              |                                 |
| Source Value           | Destination Value               |
|                        |                                 |
|                        |                                 |
|                        |                                 |
|                        |                                 |
|                        |                                 |
| + - • • •              | * Impert                        |

- 5. Select Esri Geodatabase (Personal Geodb) for the Format
- 6. Click the Browse button and browse to

...\PDM\_WestVirginia\Data\_Management\Models\<County Name>\Analysis\Inventory\Building\_Inventory WV\_<County Name>\_BI\_GDB.mdb

- 7. Click the Next button to access the Attributes Values Import Wizard.
- 8. Select the feature type **Domain\_FirstFloorHt** and click the **Next** button.



9. For Select Attributes for Source Value select **Description** as shown below and click the **Next** button.

| IT BUSTO TO  |  |
|--|--|
| Attribute Values Im  | port Witwed  |
| Select Attributes I<br>The following att<br>for potential values | (or 'Destination Value'<br>ribute(s) were found in the selected feeture type(s). Select an altribute to scan<br>as to import to 'Destination Value'. |
| ~  | Atbibutes  |
|  | Show format attributes   |
| Sale grant   | Code   |
| -  | Description<br>areadb.ord  |
| 100 A  | OBJECTED   |
|  |  |
| 327 38   |  |
| 12.1   |  |
|  |  |
|  | Q, Film (V) Sorted   |
|  |  |
|  |  |

10. Select the feature type **Code** for the Destination Value and click the **Next** button.

| Transformer  |  |                                     |
|--|--|-------------------------------------|
| ribute Values Imp  | nt Wigard  | P.                                  |
| lect Attributes fo<br>The following attri<br>for potential value | 'Source Value'<br>ute(s) were found in the selected featur<br>to import to 'Source Value'. | e type(s). Select an attribute to s |
| N.   | Attributes   |                                     |
| 10   | Code<br>Description<br>geodb_oid<br>OBJECTID   |                                     |
| 4  | Q, Fitter  | ₩ Sorted                            |
|  |  |                                     |

- 11. Click the **Import** button to import the destination value attributes.
- 12. Make sure under "Attribute Selection" of the "AttributeValueMapper Parameters" window, the following features are updated:
  - Source Attribute is set to "BldgFoundation"
  - Destination Attribute is named as "FirstFloorHt"
  - Default Value is set to "1"
| Transformer Name:   | ProfFloorHt_Mapper                    |   |
|---|---------------------------------------|---|
| Ittribute Selection   |                                       |   |
| Source Attribute:   | @ BidgFoundation                      |   |
| Destination Attribute:  | Fratfloortt                           |   |
| Default Value:  | 1                                     |   |
| alue Map  |                                       |   |
| alue Map<br>Source Value  | Destination Value                     |   |
| alue Map<br>Source Value  | Destination Value                     |   |
| alue Map<br>Source Value<br>& Crewl                               | Destination Value                     |   |
| alue Map<br>Source Value<br>& December<br>& Crawl<br>& Fill       | Destination Value                     |   |
| alue Map<br>Source Value<br>& Crawl<br>& Fill<br>& Pier           | Destination Value                     | ĺ |
| alue Map<br>Source Value<br>& Crawl<br>& Fill<br>& Pile<br>& Pile | Destination Value  k 3  k 2  k 5  k 7 |   |

13. The Attribute Value Parameters window is now set for the Transformer "FirstFloorHt\_Mapper". Click the **OK** button.

# **II. MATRICES**

The purpose of creating the below Matrix tables is to convert the cama codes into Hazus compliant codes, so that the features can be imported into Hazus for the analyses.

### Matrix\_BldgConstruction

Task 1: Create Matrix\_BldgConstruction

- 1. Open **WV\_<County Name>\_BI.mdb** located in ...\PDM\_WestVirginia\Data\_Management\Models\<County Name>\Analysis\Inventory\Building\_Inventory
- Import the Domain\_BldgConstruction table from WV\_County\_Improvements.mdb located in ...\PDM\_WestVirginia\Data\_Management\Models\<County Name>\Analysis\Inventory\Improvements



Note: The purpose of importing the domain table is to inherit the source column "ImpType" which contains the source values that will be converted to Hazus compliant values in the matrix table.

3. Select the **Domain\_ImpType** table and click **OK**.

| nport Objecta                                | 0.0          |
|--|--------------|
| Tables Quenes Forms Reports Mecros Mo        | 5.im         |
| Domain JapCondition<br>Domain Indefoundation | OK.          |
| Dumain TroType<br>LDE_COLUMNITY              | Canal        |
| IZIE Detabasekodis<br>Inprovenients          | Select 44    |
| SelectedObjects                              | Deselect All |
|  | Options >>   |
|  |              |
|  |              |
|  |              |
|  |              |
|  |              |
|  |              |
|  |              |
|  |              |
| <u> </u>                                     |              |

- 4. The table "Domain\_ImpType" is now imported into "WV\_County\_BI\_GDB.mdb".
- 5. Rename the table name from Domain\_ImpType to **Matrix\_BldgConstruction** and open the table.
- 6. Click on the **Design View** button on top left hand corner of the Access window.

| A CHI THE AVER   | 140                            | Metric_BldgConstruction   |
|--|--------------------------------|---|
| Plant Could Edd  | mal Data Datamaie Tools Pietda | Table   |
| New Pada Press During  | The Latendry Cleanses -        | Refresh<br>Alt - X Special - Mars -<br>Art - X Special - Mars - |
| Detergent Varw   | ID                             | ImpType + Click to Auhr +                                       |
| print P  | 01                             | FRAME   |
| Progificable New   | 2 02                           | BRICK OR STOP   |
| ten (haran an a   | 3.08                           | ALUSONIUM   |
| PigstOsat View   | 4.04                           | ASSESTOS  |
|  | 5.05                           | CONCRETE BLO  |
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| in the second se | 7.07                           | BRICK   |
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| Damast, FeatFlootH   | 9.09                           | MASONRY   |
| Dumain, httDictCade  | (New)                          |   |
| 🛄 GDB_Columnitinte   |                                |   |
| GOB_SeenCetures  |                                |   |
| COB_humkestionshes   |                                |   |
| GOB_ReeRAtationchigTypes   |                                |   |
| 10 408, Remi   |                                |   |

7. Delete the field **CAMA\_EXTWALL**. Rename the field "ImpType" to **Bldg\_Extwall**. Also, add another field with the name **Bl\_BldgConstruction** with the format "text" and length "10". Please see the screenshots below.

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|--|---|--|--|---|--|
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| Al Aven Opens 9 4<br>Jerri, J<br>F(H,f), Occare<br>1 (1), HP, Joocare<br>2 (1), HP, Joocare<br>2 (1), HP, Joocare<br>2 (1), HP, Joocare<br>3 (1), HP, Joocare<br>3 (1), HP, Joocare<br>3 (1), HP, Joocare<br>4 (1), HP | Tried Taure<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00<br>1.00 | Outa Yyee<br>Aadohuurbear<br>Text<br>Text  | Al Access Dands () ()<br>Intern. ()<br>IL () () () () () () () () () () () () ()   | Field Marrie<br>10<br>Elidy, Extentil<br>Elit-Brogconninotion | Geie Type<br>Astriktomber<br>Text  |
| Off, Statistical and Apple     Off, Statistical and Apple     Off, Statistical and Apple     Off, Statistical and Apple     Off, Statistical     Off, Statistical  | Dennis kontan<br>Profi Sca<br>Fassat<br>Kasut Masa  |  | COL Sendantenengen<br>COL Sendantenengengen<br>COL Sendantenengengen<br>COL Sens Senser, Sen | General Lookup<br>Field Sca 18<br>Preval<br>Input Mask        |  |

 Refer to the code description provided in West Virginia Appraisal Manual 2014 pages 56 and 57 and, based on your judgement, enter the most probable construction material in the BI\_BIdgConstruction field.

*Note: Also refer to the "Domain\_BldgConstruction" table located in "WV\_<County Name>\_BI\_GDB" under* 

...\PDM\_WestVirginia\Data\_Management\Models\<County Name>\Analysis\Inventory\Building\_Inventory

9. The complete matrix table should look similar to the one below.

|    | Matrix_BldgConstruction      | - •                   | 23 |  |
|----|------------------------------|-----------------------|----|--|
| 2  | Bldg_Extwall 👻               | BI_BIdgConstruction - |    |  |
|    | FRAME                        | Wood                  |    |  |
|    | BRICK                        | Brick                 |    |  |
|    | ALUMINIUM                    | Wood                  |    |  |
|    | ASBESTOS                     | Wood                  |    |  |
|    | CONCRETE BLOCK               | Brick                 |    |  |
|    | STUCCO                       | Umasonry              |    |  |
|    | BRICK OR STONE               | Brick                 |    |  |
|    | STONE                        | Brick                 |    |  |
|    | MASONRY                      | Umasonry              |    |  |
| *  |                              |                       |    |  |
| Re | cord: H 🚽 1 of 9 🛛 🕨 👫 No Fi | ter Search            |    |  |

Task 2: In this task you will import the "Matrix\_BldgConstruction" in to "BldgConstruction\_Mapper" in the "Building Points To Building Inventory" FME script.

- 1. Start ArcMap and open **WV\_<County Name>\_BI\_Products.mxd** located in ...\Data\_Management\Models\<County Name>\MXD\_Documents
- 2. Right-click on the 4. Building Points to Building Inventory FME tool and choose Edit.
- 3. Click the sprocket in the upper right corner of the **Building Construction Mapper** to open the AttributeValue Parameters window.



Make sure the contents in the Source Value and Destination Value fields are empty. In order to do this, click on the first row and press "Delete" on the keyboard. Do this for all the rows.

4. Click the Import button and choose Source and Destination Values.

| AttributeValueMapp     | er Parameters   |                   | ×             | 1               |
|------------------------|-----------------|-------------------|---------------|-----------------|
| Transformer            |                 |                   |               |                 |
| Transformer Name:      | BldgConstructio | n_Mapper          |               |                 |
| Attribute Selection    |                 |                   |               |                 |
| Source Attribute:      | ImpType         |                   |               |                 |
| Destination Attribute: | BldgConstructio | n                 |               |                 |
| Default Value:         | Wood            |                   | 💌             |                 |
| Mapping Parameters     |                 |                   |               |                 |
| Mapping Direction:     | Forward (Source | e To Destination) |               |                 |
| Value Map              |                 |                   |               |                 |
| Source Value           |                 | Destination Valu  | Je            |                 |
|                        |                 |                   |               |                 |
|                        |                 |                   |               |                 |
|                        |                 |                   |               |                 |
|                        |                 |                   |               |                 |
| + - * * *              | ×               |                   | Import 🔻      |                 |
|                        |                 |                   | Source Value. |                 |
| Help                   |                 | OK                | Destination V | alue            |
|                        |                 |                   | Source And D  | estination Valu |

- 5. Select Esri Geodatabase (Personal Geodb) for the Format.
- 6. Click the **Browse** button and browse to

...\PDM\_WestVirginia\Data\_Management\Models\Berkeley\Analysis\Inventory\Building\_ Inventory

- WV\_<County Name>\_BI\_GDB.mdb
- 7. Click the Next button to access the Attributes Values Import Wizard.
- 8. Select the feature type Matrix\_BldgConstruction and click the Next button.



9. For the Select Attributes for Source Value choose **Bldg\_Extwall** as shown below and click the **Next** button.

| Transformer                              |  |                                      |
|--|--|--------------------------------------|
| Transformer Mater                        | : Régligenterten Magnes  | 20                                   |
| Attribute Values Im                      | port Wizard  |                                      |
| Select Attributes                        | or 'Source Value'  |                                      |
| The following att<br>for potential value | rbute(s) were found in the selected feature<br>es to import to 'Source Value'. | type(s). Select an attribute to scan |
|  |  |                                      |
| LP J                                     | Attributes   |                                      |
| P. U                                     | Show format attributes   |                                      |
| Real Plane                               | BI BldgCombruction   |                                      |
|  | Bidg Extwall   |                                      |
|  | geodb_oid  |                                      |
| 10                                       |  |                                      |
| / AL = 8.2                               |  |                                      |
| 12-1-100                                 |  |                                      |
|  |  |                                      |
| 10 mil 1                                 |  |                                      |
| 10.00                                    | 1  |                                      |
|  | Q, Pflue   | W. Sorted                            |
|  |  | 1000000                              |
|  |  |                                      |

10. Select the feature type **BI\_BIdgConstruction** for Destination Value and click the **Next** button.

| Select Attributes<br>The following at<br>for potential val | for 'Destination Value'<br>intuite(s) were found in the selected features<br>to import to 'Destination Value'. | re type(x). Select an attribute to scan |
|--|--|---|
| Store Store  | Attributes<br>Show format attributes<br>ELSIdgConstruction<br>Bidg_Estwall<br>geodb_old                        |   |
| 110  | Q. (1)=  | V Sorted                                |

- 11. Click the **Import** button to import the destination value attributes.
- 12. Make sure under the "Attribute Selection" of the "AttributeValueMapper Parameters" window, the following features are updated:
  - Source Attribute is set to "ImpType"
  - Destination Attribute is named as "BldgConstruction"
  - Default Value is set to "Wood"

| Transformer Name   | BldgConstru   | ction_l                      | Mapper   |      |
|--|---------------|------------------------------|--|------|
| Attribute Selection  |               |                              |  |      |
| Source Attribute   | : 🗳 ImpType   | 2                            |  | •    |
| Destination Attribute  | : BldgConstru | ction                        |  |      |
| Default Value  | : Wood        |                              |  |      |
|  |               |                              |  |      |
| Mapping Parameters   |               |                              |  |      |
| Mapping Direction  | : Forward (So | ource T                      | o Destinatio   | n) 🔻 |
|  |               |                              |  |      |
| talian Mara  |               |                              |  |      |
| Value Map  |               |                              |  |      |
| Value Map<br>Source Value  |               | Des                          | tination Va  | lue  |
| Value Map<br>Source Value<br>K BRICK OR STO  | NE            | Des<br>K                     | tination Va<br>Brick                                   | ilue |
| Value Map<br>Source Value<br><u>&amp; BRICK OR STO</u><br><u>&amp;</u> CONCRETE BL                   | NE<br>OCK     | Des<br>k<br>k                | tination Va<br>Brick<br>Brick                          | lue  |
| Value Map<br>Source Value<br><u>k</u> BRICK OR STO<br><u>k</u> CONCRETE BL<br><u>k</u> ALUMINIUM     | NE<br>OCK     | Des<br>k<br>k<br>k           | tination Va<br>Brick<br>Brick<br>Wood                  | lue  |
| Value Map<br>Source Value<br>K BRICK OR STO<br>K CONCRETE BL<br>K ALUMINIUM<br>K ASBESTOS            | NE<br>OCK     | Des<br>k<br>k<br>k<br>k      | tination Va<br>Brick<br>Brick<br>Wood<br>Wood          | lue  |
| Value Map<br>Source Value<br>K BRICK OR STO<br>K CONCRETE BL<br>K ALUMINIUM<br>K ASBESTOS<br>K BRICK | NE<br>OCK     | Des<br>k<br>k<br>k<br>k<br>k | tination Va<br>Brick<br>Brick<br>Wood<br>Wood<br>Brick | lue  |

13. The BldgConstruction\_Mapper transformer is now updated in the script.

## Matrix\_BldgFoundation

Task 1: Create Matrix\_BldgFoundation

- 1. Open WV\_<County Name>\_BI.mdb located in ...\PDM\_WestVirginia\Data\_Management\Models\<County Name>\Analysis\Inventory\Building\_Inventory
- Import the "Domain\_BldgFoundation" table from "WV\_County\_Improvements.mdb" located in ...\PDM\_WestVirginia\Data\_Management\Models\<County Name>\Analysis\Inventory\Improvements



Note: The purpose of importing the domain table is to inherit the source column "ImpFoundation" which contains the source values that will be converted to Hazus compliant values in the matrix table.

3. Select the Domain\_ImpFoundation table and click OK.



The table "Domain\_ImpFoundation" is now imported into "WV\_County\_BI\_GDB.mdb".

- 4. Rename the table name from **Domain\_ImpFoundation** to **Matrix\_BldgFoundation** and open the table.
- 5. Click on the **Design View** button on top left hand corner of the MS Access window.

| A                         |   |   | Table Tools                              | Microsoft A                                      |
|---------------------------|---|---|--|--|
| File Home Create Extern   | nal Data Da   | tabase Tools                                  | Fields Table                             |  |
| View Paste Format Painter | <sup>A</sup> ↓ Ascen<br><sup>A</sup> ↓ Desce<br><sup>A</sup> ↓ Desce<br><sup>A</sup> ↓ Remo | ding 🌾 Sele<br>nding 🔚 Adva<br>ve Sort 🐨 Togo | tion -<br>nnced -<br>gle Filter All - De | ew ∑ Totals<br>ve ﷺ Spelling<br>elete + ∰ More + |
| Datasheet View            | 50  | n a riner                                     | ĸ  | ecords   |
| PivotTable View           | Materia Pl  | deFoundation                                  |  |  |
| -                         |   | groundation                                   | DCA C InterFacility                      | obstan Add                                       |
| PivotChart View           | ID  | - CAIVIA                                      | _BSIVI + ImpFoundat                      | - Click to Add -                                 |
| 5                         |   | <u>1</u> 1                                    | NONE                                     |  |
| Design View Types         |   | 2 2   | CRAWL                                    |  |
| Community (Community)     | -   | 3 3   | BASEMENT                                 |  |
|                           |   | 44  | BASEMENT                                 |  |
| GDB_Items_Shape_Index     | *   | (New)   |  |  |
| GDB_ItemTypes             |   |   |  |  |
| GDB_ReplicaLog            |   |   |  |  |
| GDB SpatialRefs           |   |   |  |  |
| Matrix BldgCondition      | -   |   |  |  |
|                           |   |   |  |  |

 Delete the CAMA\_BSMT field. Rename the field ImpFoundationType field to Bldg\_Bsmt. Also, add another field with the name BI\_BldgFoundation with the format "text" and length "10". Please see the screenshots below.

| A  | Market Market   | A a martin   |  | Mers Jiegfou   |
|--|---|--|--|--|
| Harris Contraction Contractions  | Character Bank  | The first Date of the second s   | Address Office Defension Taxes On<br>Construction Construction<br>Address Office Construction<br>Construction Construction<br>Construction Construction<br>Construction Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction<br>Construction | The second secon |
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7. Key in values in the **BI\_BIdgFoundation** field similar to the example shown below.

|    | Bldg_Bsmt -      | dation                                   | 23       |
|----|------------------|--|----------|
|    | BASEMENT         | Basement                                 |          |
|    | CRAWL            | Crawl                                    |          |
|    | SLAB             | Slab                                     |          |
| *  |                  |  |          |
|    |                  |  |          |
| Re | cord: 🖂 🕂 1 of 3 | -> > > > > × > × > × > × > × > × > × > × | No Filte |

<u>Task 2</u>: Import the "Matrix\_BldgFoundation" in to "BldgFoundation\_Mapper" in the "**Building Points To Building Inventory**" FME script.

- 1. Start ArcMap and open **WV\_<County Name>\_BI\_Products.mxd** located in ...\PDM\_West Virginia\Data\_Management\Models\<County Name>\MXD\_Documents
- 2. Right-click on the **4. Building Points to Building Inventory** FME tool and choose **Edit**.
- 3. Click the sprocket in the upper right corner of the **Building Construction Mapper** to open the AttributeValue Parameters window.



Make sure the contents in the Source Value and Destination Value fields are empty. In order to do this, click on the first row and press "Delete" on the keyboard. Do this for all the rows.

4. Click the **Import** button and choose **Source and Destination Values**.

| AttributeValueMapp     | er Parameters                   | <b>x</b>                    |
|------------------------|---------------------------------|-----------------------------|
| Transformer            |                                 |                             |
| Transformer Name:      | BldgFoundation_Mapper           |                             |
| Attribute Selection    |                                 |                             |
| Source Attribute:      | 4 ImpFoundation                 | • •                         |
| Destination Attribute: | BldgFoundation                  |                             |
| Default Value:         | Slab                            | 💌                           |
| Mapping Parameters     |                                 |                             |
| Mapping Direction:     | Forward (Source To Destination) |                             |
| Value Map              | <u></u>                         |                             |
| Source Value           | Destination Value               |                             |
|                        |                                 |                             |
|                        |                                 |                             |
|                        |                                 |                             |
|                        |                                 |                             |
| +                      | X                               | Import                      |
|                        |                                 | Source Value                |
| Help                   | ОК                              | Destination Value           |
|                        |                                 | Source And Destination Valu |

- 5. Select Esri Geodatabase (Personal Geodb) for the Format
- 6. Click the Browse button and browse to

...\PDM\_WestVirginia\Data\_Management\Models\Berkeley\Analysis\Inventory\Building\_ Inventory

- WV\_<County Name>\_BI\_GDB.mdb
- 7. Click the **Next** button to access the Attributes Values Import Wizard.
- 8. For feature type select Matrix\_BldgFoundation and click the Next button.

| attribute(s) of in | Feature Types   | e resoure officer containing one- |
|--------------------|---|-----------------------------------|
| Sto.               | Domain_YearBuilt     Domain_YearBuilt     Domain_hzDccCode     Metrix_BidgCondition     Metrix_BidgCondition     Metrix_bidgCondition     Metrix_bidgCondition     Matrix_hzBidgCondition     Matrix_hzBidgType     Metrix_traftcrCode_Defaults     RMSMeans     XFactors_DolSqFt | •                                 |
| 110                | Q, Mar  | 🖀 Select al 🛛 Sorted              |

9. For Select Attributes for Source Value choose **Bldg\_Bsmt** as shown below and click the **Next** button.

| The following attributes for<br>for potential values    | 'Source Value'<br>te(s) were found in the selected feature type(s). Select an attribute to scan<br>to import to 'Source Value'. |
|---|---|
| B Source  <br>Destruction<br>V NED<br>V NED<br>Transfer | Attributes C Show format attributes   |
| Loekup  | BI_BldgFoundation   |
| Paramete  | Bldg_Bsmt   |
| je star   |   |
|   | Q Filter Sorted   |

10. Select the feature type **BI\_BIdgFoundation** and click the **Next** button.

| for potential values | Attributes             |   |
|----------------------|------------------------|---|
| Transfor<br>Transfor | Show format attributes | 1 |
| Parent               | Bldg_Bsmt<br>geodb_oid |   |
|                      | Q Filter               | 1 |

- 11. Click the **Import** button to import the destination value attributes.
- 12. Make sure under "Attribute Selection" of the "AttributeValueMapper Parameters" window, the following features are updated:
  - Source Attribute is set to "ImpFoundation"
  - Destination Attribute is named as "BldgFoundation"
  - Default Value is set to "Slab"

| 🏘 AttributeValueMapp   | per Parameters                  |
|------------------------|---------------------------------|
| Transformer            |                                 |
| Transformer Name:      | BldgFoundation_Mapper           |
| Attribute Selection    |                                 |
| Source Attribute:      | ♦ ImpFoundation                 |
| Destination Attribute: | BldgFoundation                  |
| Default Value:         | Slab 📖 💌                        |
| Mapping Parameters     |                                 |
| Mapping Direction:     | Forward (Source To Destination) |
| Value Map              |                                 |
| Source Value           | Destination Value               |
| ✗ BASEMENT             | k Basement                      |
| k CRAWL                | k Crawl                         |
| <b>k</b> SLAB          | k Slab                          |
|                        |                                 |
|                        |                                 |
| + - * * *              | Import V                        |
| Help                   | OK Cancel                       |

13. The BldgFounation\_Mapper transformer is now updated in the script.

### Matrix\_BldgCondition

Task 1: Create Matrix\_BldgCondition

- 1. Open WV\_<County Name>\_BI.mdb located in ...\PDM\_WestVirginia\Data\_Management\Models\<County Name>\Analysis\Inventory\Building\_Inventory
- 2. Import the **Domain\_BldgCondition** table from **WV\_County\_Improvements.mdb** located in ...\PDM\_WestVirginia\Data\_Management\Models\<County Name>\Analysis\Inventory\Improvements



Note: The purpose of importing the domain table is to inherit the source column "ImpCondition" which contains the source values that will be converted to Hazus compliant values in the matrix table.

3. Select the **Domain\_ImpCondition** table and click **OK**.



The table "Domain\_ImpCondition" is now imported into "WV\_County\_BI\_GDB.mdb".

4. Rename the table name from **Domain\_ImpCondition** to **Matrix\_BldgCondition** and open the table.

| a grand                  |                |   |  | In the Market                 | latrix_BldgCondition                                | 1-1 |
|--------------------------|----------------|---|--|-------------------------------|---|-----|
| File Home Create         | Externa        | Data Databas  | e Topis Fields   | Table                         |   |     |
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| Datasheet View           | . <del>.</del> | 10 •  | CAMA_Grad +  | ImpConditic.+                 | Elick to Add +                                      | -   |
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| ProofTable View          |                | 2   | A-   | GOOD                          |   |     |
|                          |                | 3   | Δ+   | GOOD                          |   |     |
| FigotChart View          |                | 4   | 8  | AVERAGE                       |   |     |
|                          |                | 5   | 8-   | AVERAGE                       |   |     |
| Design View              |                | 6   | 8+   | AVERAGE                       |   |     |
| TADGROUND AND A          |                | 7   | C  | FAIR                          |   |     |
| Domain_BidgConstruction  |                | 8   | Ç-   | FAIR                          |   |     |
| Domain_BidgFoundation    |                | 9   | C+   | FAIR                          |   |     |
| Domain FirstFloorHt      |                | 10  | D  | POOR                          |   |     |
| Domain httls://ode       |                | 11  | D-   | POOR                          |   |     |
| 2 Doutin_inforcone       |                | 12  | D+   | POOR                          |   |     |
| GDE_Columninfo           |                | 13  | E  | UNSOUND                       |   |     |
| GDE_GeomColumns          |                | 14  | E-   | UNSOUND                       |   |     |
| GD8_BenRelationships     |                | 15  | E+   | UNSOUND                       |   |     |
| GDE_ItenRelationshipType |                | 16  | x  | EXCELLENT                     |   |     |
| GDB Barry                |                | 17  | Х-   | EXCELLENT                     |   |     |
| GDB_Rems_Shape_Index     |                | (New)   |  |                               |   |     |
| GDB ItemTypes            |                |   |  |                               |   |     |

5. Click on the **Design View** button on top left hand corner of the MS Access window.

6. Delete the **CAMA\_GRADE** field. Rename the field **ImpFoundationType** to **Bldg\_Grade**. Also, add another field with the name **BI\_BldgCondition** with the format "text" and length "10". Please see the screenshots below.

| A a month  |  | Main, RidgConitio | A L STORE  | 1   | MatocilityCond   |
|--|--|-------------------|--|---|--|
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 Key in appropriate values in BI\_BldgCondition. Refer to the code description provided in West Virginia Appraisal Manual 2014 page 47 and based on your judgement enter the condition of the building ranging from Low to Medium to High under "BI\_BldgCondition" field.

Note: Also refer to the "Domain\_BldgCondition" table located in "WV\_<County Name>\_BI\_GDB" under

...\PDM\_WestVirginia\Data\_Management\Models\<County Name>\Analysis\Inventory\Building\_Inventory 8. Delete any duplicates in the **Bldg\_Grade**. The complete matrix table should look similar to the one below.

|   | Bldg_Grade 👻 | BI_BldgCondition | - |  |
|---|--------------|------------------|---|--|
|   | EXCELLENT    | High             |   |  |
|   | GOOD         | High             |   |  |
|   | AVERAGE      | Medium           |   |  |
|   | FAIR         | Low              |   |  |
|   | POOR         | Low              |   |  |
|   | UNK          | Medium           |   |  |
|   | UNSOUND      | Low              |   |  |
| * |              |                  |   |  |

<u>Task 2</u>: Import the "Matrix\_BldgCondition" in to "BldgCond\_Mapper" in the "**Building Points To Building Inventory**" FME script.

- 1. Start ArcMap and open **WV\_<County Name>\_BI\_Products.mxd** located in ...\PDM\_West Virginia\Data\_Management\Models\<County Name>\MXD\_Documents
- 2. Right-click on the **4. Building Points to Building Inventory** FME tool and choose **Edit**.
- 3. Click the sprocket in the upper right corner of the **Building Construction Mapper** to open the AttributeValue Parameters window.



Make sure the contents in the Source Value and Destination Value fields are empty. In order to do this, click on the first row and press "Delete" on the keyboard. Do this for all the rows.

4. Click the Import button and choose Source and Destination Values.

| 🤗 AttributeValueMapp   | er Parameters                   |                               |
|------------------------|---------------------------------|-------------------------------|
| Transformer            |                                 |                               |
| Transformer Name:      | BldgCond_Mapper                 |                               |
| Attribute Selection    |                                 |                               |
| Source Attribute:      | Gamma ImpCondition              | •                             |
| Destination Attribute: | BldgCondition                   |                               |
| Default Value:         | Medium                          | 💌                             |
| Mapping Parameters     |                                 |                               |
| Mapping Direction:     | Forward (Source To Destination) | • •                           |
| Value Map              |                                 |                               |
| Source Value           | Destination Value               |                               |
|                        |                                 |                               |
|                        |                                 |                               |
|                        |                                 |                               |
|                        |                                 |                               |
| + - * * *              | Ŧ                               | Import 🔻                      |
|                        |                                 | Source Value                  |
| Help                   | OK                              | Destination Value             |
|                        |                                 | Source And Destination Values |

- 5. Select Esri Geodatabase (Personal Geodb) for the format.
- 6. Click the **Browse** button and browse to
  - ...\PDM\_WestVirginia\Data\_Management\Models\Berkeley\Analysis\Inventory\Building\_Inventory WV\_<County Name>\_BI\_GDB.mdb
- 7. Click the Next button to access the Attributes Values Import Wizard.
- 8. Select the feature type **Matrix\_BldgCondition** and click the **Next** button.

| ~   | Feature Types  |            |
|-----|--|------------|
| N.  | Domain_YearBuilt Domain_hzOccCode Matrix_BidgCondition Matrix_BidgConstruction Matrix_BidgFoundation Matrix_hzBidgToundation Matrix_hzBidgType Matrix_hzBidgType Matrix_hzOtcCode_Defaults RM5Means XFectors_DolSqFt |            |
| 100 | Q Filter   | ielect all |

9. For Select Attributes for Source Value choose **Bldg\_Grade** as shown below and click the **Next** button.

| tor potential value | Attributes<br>Attributes<br>Show format attributes<br>81_BldgCondition<br>81dg_Grade<br>geodb_oid |          |
|---------------------|---|----------|
| -                   | Q Filter  | I Sortad |

10. Select the feature type **BI\_BIdgCondition** for the Destination Value and click the **Next** button.

| The following attrib<br>for potential values | ute(s) were found in the selected feature type(s). So<br>to import to 'Destination Value'. | elect an attribute to scan |
|--|--|----------------------------|
| A NEE  | Attributes   |                            |
| Lockup                                       | BI_BIdgCondition   |                            |
|  | Bldg_Grade<br>geodb_oid  |                            |
|  | Q Filter   | Sorted                     |

- 11. Click the **Import** button to import the destination value attributes.
- 12. Make sure under "Attribute Selection" of the "AttributeValueMapper Parameters" window, the following features are updated:
  - Source Attribute is set to "ImpCondition"
  - Destination Attribute is named as "BldCondition"
  - Default Value is set to "Medium"

| Transformer Name:   | BidgCond_Mapper  |     |
|---|--|-----|
| Attribute Selection   |  |     |
| Source Attribute:   | ImpCondition   | • • |
| Destination Attribute:  | BidgCondition  |     |
| Default Values  | Medium   |     |
| Value Map   |  |     |
| Value Map<br>Source Value   | Destination Value  |     |
| Value Map<br>Source Value   | Destination Value  | j   |
| Value Map<br>Source Value<br>& AVERAGE<br>& EXCELLENT                               | Destination Value  | Ē   |
| Value Map<br>Source Value<br>& AVERAGE<br>& EXCELLENT<br>& FAJR                     | Destination Value<br>& Medium<br>& High<br>& Low                 | Ľ   |
| Value Map<br>Source Value<br>& AVERAGE<br>& EXCELLENT<br>& FAIR<br>& GOOD           | Destination Value<br>k Medium<br>k High<br>k Low<br>k High       | E   |
| Indue Map<br>Source Value<br>& AVERAGE<br>& EXCELLENT<br>& FAIR<br>& GOOD<br>& POOR | Destination Value<br>k Migh<br>k Low<br>k High<br>k Low<br>k Low | E   |

The BldgCond\_Mapper transformer is now updated in the script.

# III. XFACTORS\_DOLSQFT TABLE

This table is created to calculate Average Dollar per Square Foot using the Improvements table. It is imported into "ImpArea\_Mapper" transformer in the "4 Building Points to Building Inventory" FME script to populate the missing Building Area.

Task 1: Create "XFactors\_DolSqFt" table

1. Start ArcMap and open WV\_<County Name>\_BI\_Products.mxd located in

...\PDM\_West Virginia\Data\_Management\Models\<County Name>\MXD\_Documents

- Right-click | Edit the toolbox named 3b. XFactors Dollar Per Square Foot Creator under WV <County Name> FME BI Products.
- 3. Set the Source file to:
  - ...\<County Name>\Analysis\Inventory\Improvements\ WV\_<County Name>\_Improvements.mdb
- 4. Set the Destination file to:
  - ...\<County Name>\Analysis\Inventory\Building\_Inventory WV\_<County Name>\_BI\_GDB.mdb



Notes:

• The "AvgArea\_Calculator" and "AvgCost\_Calculator" transformers calculate the average area and average cost respectively, from the Improvements table, which are grouped by the Occupancy Codes.

| And Service Servi  |   |  |
|--|---|--|
| feature later day  |   |  |
| C Artoni<br>C Artoni<br>C Artonic functionen<br>C Artonic (III)<br>C Artonic (III) | Seg     Transition resolution     Seg errs instantion - Shale seg, - Winne     Seg errs instantion - Shale seg errs     Seg errs |  |

- The Average Cost values and Average Area values are merged into one table using the Feature Merger transformer.
- Cama Dollar per Square Foot (caDolSqFt) is calculated by dividing AvgCost/AvgArea.
- The null values from Average Area are filtered and replaced by Average Area values calculated using RS Means from Hazus data.

Note: RS Means is obtained from Hazus. The instructions on how to obtain RS means is outlined at the end of the <u>Appendix 2</u>. RS means table is created within the "WV\_<County Name>"\_BI\_GDB.mdb.

In the next steps you will import RS Means table into "RSMeans\_Mapper" transformer.



Make sure the contents in the Source Value and Destination Value fields are empty. In order to do this, click on the first row and press "Delete" on the keyboard. Do this for all the rows.

5. Click the Import button and choose Source and Destination Values.

| Carefornia.         |                                 |          |     |
|---------------------|---------------------------------|----------|-----|
| Tarafaner Name      | R@Next_Paper                    | 11       |     |
| thinky to Sensition |                                 |          |     |
| Source Altribute:   | 4 he0ccCade                     | - (*)    |     |
| Anthelies Anthelies | PuDelSaP1                       | 11       |     |
| Default Islam       | 194                             | 99 B     | 100 |
| lagging Panameters  |                                 | 11111111 | -   |
| Happing Direction   | Forward Disurce To Destination) |          | -   |
| alie Maga           |                                 |          |     |
| Source Value        | Destination Value               |          |     |
|                     |                                 |          |     |
|                     |                                 | - 11     |     |
|                     |                                 |          |     |
|                     |                                 |          |     |
| •                   | -                               | at_ •    |     |
| •                   | -                               | set      |     |

- 6. Select Esri Geodatabase (Personal Geodb) for the Format.
- 7. Click the Browse button and browse to
  - ...\PDM\_WestVirginia\Data\_Management\Models\Berkeley\Analysis\Inventory\Building\_ Inventory

# WV\_<County Name>\_BI\_GDB.mdb

- 8. Click the Next button to access the Attributes Values Import Wizard.
- 9. Select the feature type **RSMeans** and click the **Next** button.

| Source B<br>Destruction   | Feature Types   |                       |
|---|---|-----------------------|
| e a Mel<br>e Turento<br>e | Domain_VearBuilt<br>Domain_hzOccCode<br>Matrix_BldgCondition<br>Matrix_BldgConstruction<br>Matrix_BldgFoundation<br>Matrix_hzBldgTope<br>Matrix_hzBldgType<br>Matrix_hzEdtnType<br>Matrix_hzEdtnType<br>Matrix_hzFdtnType<br>Matrix_bzOccCode_Defaults<br>RSMeans<br>XFactors_DolSqFt<br>Select a | E<br>T<br>T<br>Sorted |

10. For Select Attributes for Source Value choose **hzOccCode** as shown below and click the **Next** button.

| Select Attributes for<br>The following attribu<br>for potential values | 'Source Value'<br>ite(s) were found in the selected feature type(s). Select an attribute to scan<br>to import to 'Source Value'. |
|--|--|
| Studd<br>Hell<br>Hell<br>Hell<br>Harmed<br>Hell<br>Harmed<br>Condres   | Attributes Show format attributes geodb_oid hzOccCode ID RSMeans   |
|  | Q Filter Sorted  |
| Help   | < Back Next > Cancel   |

11. Select the feature type **RSMeans** for the Destination Value and click the **Next** button.

| The following attrib<br>for potential value | oute(s) were found in the selected feature type(s). Select an attribute to sci<br>s to import to 'Destination Value'. | an |
|---|---|----|
| Production of Press                         | Attributes  |    |
| Transfor                                    | Show format attributes  |    |
| E Lookup                                    | geodb_oid   | ٦  |
| Coordera                                    | hzOccCode   |    |
|   | ID  |    |
| The second second                           | RSMeans   |    |
| A 28  |   |    |
|   |   |    |
| SP  |   |    |
| 1.1.1.1                                     |   |    |
|   |   |    |
| T   |   |    |
|   | Q Filter  | _  |
|   |   |    |
|   |   |    |

- 12. Click the **Import** button to import the destination value attributes.
- 13. Make sure under "Attribute Selection" of the "AttributeValueMapper Parameters" window, the following features are updated:
  - Source Attribute is set to "hzOccCode"
  - o Destination Attribute is named as "hzDolSqFt"
  - Default Value is set to "166" (Average of the RS mean values)

| R | AttributeValueMapper Pa                            | rameters X        |  |  |  |  |
|---|--|-------------------|--|--|--|--|
|   | Transformer  |                   |  |  |  |  |
|   | Transformer Name: RSM                              | eans_Mapper       |  |  |  |  |
|   | Attribute Selection                                |                   |  |  |  |  |
|   | Source Attribute: 💚 h                              | zOccCode 🔹 💌      |  |  |  |  |
|   | Destination Attribute: hzDo                        | lSqFt             |  |  |  |  |
|   | Default Value: 166                                 |                   |  |  |  |  |
|   | Mapping Parameters                                 |                   |  |  |  |  |
|   | Mapping Direction: Forward (Source To Destination) |                   |  |  |  |  |
|   | Value Map  |                   |  |  |  |  |
|   | Source Value                                       | Destination Value |  |  |  |  |
|   | 🕺 AGR1   | k 106.43          |  |  |  |  |
|   | k COM1   | k 76.21           |  |  |  |  |
|   | k COM10  | k 109.6           |  |  |  |  |
|   | k COM2   | <b>k</b> 106.43   |  |  |  |  |
|   | <b>k</b> сомз                                      | k 129.25          |  |  |  |  |
|   | + - * * * *  | Import 🔻          |  |  |  |  |
|   | Help   | OK Cancel         |  |  |  |  |

Notes:

- It is assumed that Hazus DolSqFt (obtained from RS Means) is nearly half of Cama DolSqFt. Hence, hzDolSqFt is divided by 2.
- The AvgCost is divided by the resultant CaDolSqFt to obtain missing AvgArea.
- The destination table contains AvgCost, AvgArea and CaDolSqFt fields.
- 14. Under the Writers tab, select Add Feature Type and name the feature xFactors\_DolSqFt.

A new feature type will be added to the destination geodatabase.



15. Right-click on the transformer **xFactors\_DolSqFt**. Select **Copy attributes from a transformer**. Select the **AttributeKeeper** transformer from the dropdown list.

| n                   |  | ×   | Gar<br>Tang<br>Tangan<br>Tangan  | inne<br>Jae-c<br>Jae<br>Jae-1                      |   |
|---------------------|--|-----|--|--|---|
|                     | TADAT - CALANA<br>Addetar - Calan<br>Refer - Calan<br>Refer - Calan<br>Refer - Calan |     | Nauna<br>Maaki<br>Kaana Joo, Yaanan Sya<br>Layaya<br>Ma Kaasaani<br>Yang Kaasaani<br>Yang Kaasaani Yaana<br>Yang Kaasaa Yaana<br>Yang Kaasaa Yaana<br>Yaana Yaana<br>Yaada Yaada Yaada Yaada Yaada Yaada Yaada<br>Yaada Yaada Yaa | A<br>Sant<br>More<br>Socialization<br>The<br>Inter | Interdence         Interdence           Interdence         Interdence |
| 16. Save and run th | e script.  | Ede |  | 8678 0   |   |
|                     |  |     | 1000 1000 1000 1000 1000 1000 1000 100   |  |   |

17. Open WV\_<County Name>\_Bl.mdb and open the table named xFactors\_DolSqFt.

a then it a e - -

| CIBIECTIC | + hzGrrCode - | Ave_Cost +    | Avg Area -    | CaDolSqFt -  |
|-----------|---------------|---------------|---------------|--------------|
|           | AGR1          | 104536.190476 | 2325.91666667 | 44.944082466 |
|           | 397 COM4      | 221934.333333 | 1810          | 122.61565377 |
|           | 398 RE51      | 107785.039936 | 1745.11305541 | 61.763929277 |
|           | 399 RE52      | 25438.0589971 | 1550.13402062 | 16.423134166 |
|           | 400 RES3A     | 83675.2723735 | 2264.32382892 | 36.953756925 |
|           | 401 RES38     | 98856.9178082 | 2961.87142857 | 33.376505426 |
|           | 402 COM1.     | 336916.819484 | 8841.80080001 | 38.30        |
|           | 403 COM10     | 33152         | 604.96050365  | 54.          |
|           | 404 COM2      | 483441.732283 | 9084.68913433 | 53.21        |
|           | 405 COM3      | 186519.793103 | 2885.18635363 | 64.62        |
|           | 406 COM5      | 687325.128205 | 5413.28761286 | 126.9        |
|           | 407.COM7      | 532093.1R1818 | 4410.03838895 | 120.65       |
|           | 408 COM8      | 314789.568966 | 2810.42565377 | 111.9        |
|           | 409 COM9      | 1605666       | 19117.2758662 | 83.9         |
|           | 410 EDU1      | 1211850       | 13938.9233954 | 86.5         |
|           | 411-GOV2      | 124990        | 1069.20444825 | 116.         |
|           | 432 INO1      | 706572.941176 | 10839.5020507 | 65.18        |
|           | A13 IND2      | 3014416.2963  | 19062.6007009 | 53.21        |
|           | 414 IND3      | 205368,125    | 1965,72849956 | 103.3        |
|           | 415 REL1      | 384592        | 4288.73153053 | 89.67        |
|           | 416 RES4      | 64074.4444444 | 676.533042387 | 94.7         |
|           | 417 HE55      | 16455         | 161.434317669 | 101.9        |
|           | 418 8656      | 33705         | 538.160564197 | 103.5        |
| IN        | iew)          |               |               |              |

<u>Task 2:</u> Import the "xFactors\_DolSqFt" in to "ImpArea\_Mapper" in the **4. Building Points to Building Inventory** FME script.

- 1. Start ArcMap and open WV\_<County Name>\_BI\_Products.mxd located in ...\PDM\_West Virginia\Data\_Management\Models\<County Name>\MXD\_Documents
- 2. Right-click on the 4. Building Points to Building Inventory FME tool and choose Edit.
- 3. Click the sprocket in the upper right corner of the **ImpArea Mapper** to open the AttributeValue Parameters window.



Make sure the contents in the Source Value and Destination Value fields are empty. In order to do this, click on the first row and press "Delete" on the keyboard. Do this for all the rows.

4. Click the **Import** button and choose **Source and Destination Values**.

| Transformer Name:      | ImpArea_Mapper                  |  |
|------------------------|---------------------------------|--|
| Attribute Selection    |                                 |  |
| Source Attribute:      | Q haOccCode • •                 |  |
| Destination Attribute: | BidgArea                        |  |
| Default Value:         | 4747.6                          |  |
| Manoing Racameters     |                                 |  |
| Mapping Direction:     | Forward (Source To Destination) |  |
| Value Map              |                                 |  |
| Source Value           | Destination Value               |  |
|                        |                                 |  |
| 1                      |                                 |  |
| -                      |                                 |  |
|                        |                                 |  |
|                        |                                 |  |
| + - * * *              | t =                             |  |

- 5. Select Esri Geodatabase (Personal Geodb) for the format
- Click the Browse button and browse to ...\PDM\_WestVirginia\Data\_Management\Models\Berkeley\Analysis\Inventory\Building\_Inventory

#### WV\_<County Name>\_BI\_GDB.mdb

7. Click the Next button to access the Attributes Values Import Wizard.

8. Select the feature type XFactors\_DolSqFt and click the Next button.



9. For Attributes for Source Value select hzOccCode as shown below and click the Next button.

| No. | Attributes<br>Show formet attributes<br>Avg_Ares<br>Avg_Cost<br>CaDolSqFt<br>geodb_oid<br>heOccCode<br>OBJECTID |           |
|-----|---|-----------|
| 110 | Q, che  | 12 Sorted |

10. Select the feature type Avg\_Area and click the Next button.

| The following at for potential val | rbute(ii) were found in the selected feature<br>es to import to Destination Value'.<br>Attributes | e type(s). Select an attribute to scan |
|------------------------------------|---|--|
| <b>X</b>                           | Avg_Area<br>Avg_Cost<br>CeDolSqFt<br>geodb_oid<br>htDocCode<br>OBJECTID                           |  |
| 100                                | Q, Filter   | 2 Sorted                               |

- 11. Click the **Import** button to import the destination value attributes.
- 12. Make sure under "Attribute Selection" of the "AttributeValueMapper Parameters" window, the following features are updated:
  - o Source Attribute is set to "hzOccCode"
  - o Destination Attribute is named as "BldArea"
  - Default Value is set to "4747.6" (which is calculated by taking the average of the AvgArea values)

| Transformer Nam  | e: ImpArea  | Mapper                               |        |  |  |  |
|--|-------------|--------------------------------------|--------|--|--|--|
| and a second and a second period   |             |                                      |        |  |  |  |
| Attribute Selection  |             |                                      |        |  |  |  |
| Source Attribut  | te:  hzO    | ccCode                               |        |  |  |  |
| Destination Attribute: BldgArea  |             |                                      |        |  |  |  |
| Default Value: 4747.6  |             |                                      |        |  |  |  |
|  |             |                                      |        |  |  |  |
| Mapping Parameter  | S           |                                      |        |  |  |  |
| Mapping Direction  | on: Forward | (Source To Destinatio                | n) 🔻 🔽 |  |  |  |
|  |             |                                      |        |  |  |  |
| value Map  |             |                                      |        |  |  |  |
| Source Value   | Des         | tination Value                       |        |  |  |  |
| 🕺 AGR1   | k           | 2325.91666666667                     | _      |  |  |  |
|  | k           | 8841.80080000633                     |        |  |  |  |
| k COM1   | L           | 604.963503649635                     |        |  |  |  |
| k COM1<br>k COM10  | ~           |                                      |        |  |  |  |
| k COM1<br>k COM10<br>k COM2  | k           | 9084.68913433177                     |        |  |  |  |
| k         COM1           k         COM10           k         COM2           k         COM3 | k<br>k      | 9084.68913433177<br>2886.18635363169 |        |  |  |  |
| k         COM1           k         COM10           k         COM2           k         COM3 | k<br>k      | 9084.68913433177<br>2886.18635363169 |        |  |  |  |

The "ImpArea\_Mapper" transformer is now updated in the script.

# IV RS MEANS TABLE

The replacement values of the buildings in Hazus database were developed by applying the RS Means for typical building floor areas for each occupancy class.

Source: https://www.fema.gov/summary-databases-hazus-multi-hazard

**Purpose of using RS Means**: The RS Means data is derived from 2010 Census. This data is used to calculate the following:

- Missing building area values by dividing Average Cost with cama Dollar per Square Foot. Refer to the transformer "AvgArea\_Evaluator" in the FME script "<u>3b. XFactors Dollar Per</u> <u>Square Foot Creator</u>"
- Replacement Cost field in the "ReplCost\_Evaluator" transformer in the FME script "4. Building Points to Building Inventory"

It is very unlikely that you will need to update this table for West Virginia counties. However, the procedure for doing so is provided below.

#### Task 1: Export RS Means table from Hazus

1. Open the Hazus Study Region.

Note: Refer to Task 4.1 which outlines the steps to create a study region in Hazus.

2. Under Inventory/General Building Stock, click Valuation Parameters.



3. Right-click on the Valuation Parameters table and choose Export.

| colocere | nt Cost   |                             |  |          |                          |
|----------|-----------|-----------------------------|--|----------|--------------------------|
| _        | Occupance | HarusDefration              | Bondario Exercite  | MaareC   |                          |
| t        | HEST      | Single Fanaly Divelling     | Relet to httPESTRepEont  | 2 18     | Add New Record           |
| 2        | 0112      | Handactured Housing         | Manufactured Housing   | 9        | (Delete Televined Reveal |
| 1        | HES3A     | Hulti Family Dwalling Ltm   | Duples :   | -1       |                          |
|          | HES38     | HubiFamily Dwelling Lan     | Troine Quadr   |          | Inset:                   |
| 5        | RES3C     | Multi Family Develling Line | 59 with  | 1        | Louis                    |
| 6        | RES30     | Multi Family Dwelling Live  | 10-19 and s  | 1        | ribou                    |
| 7        | RE3 M     | Multi Family Dreeling   to: | 20-49 units  | 1        | Data Dictionate          |
|          | RESOF     | Hulti Family Dwelling Lian  | 50+ units  | 1        | Para Provinsi            |
| .0.      | RES4      | Tene Lodging                | Hotel, medium  | - 14     | Meta Data                |
| 10       | REST      | IsoMutional Domitory        | Dom, nedum   | 2017 58  |                          |
| 11       | RESE.     | Nusing Hone                 | Nuting hone  | 307.001  |                          |
| 12       | 00641     | Finited Trade               | Dept Stars, 1 at   | 109.60   |                          |
| 33       | 2M00      | Wholesale Trade             | Washoute: mediav   | 106.43   |                          |
| 14       | CON3      | Personal and Repair Ser     | Galage, Report   | 129.25   |                          |
| 15       | 00044     | Protessional/ Technical/    | Diffice, Medium  | 175.24   |                          |
| 16       | DOM5      | Barks                       | Bark   | 253.94   |                          |
| 17       | DONE.     | Hospital                    | Hoopital, Nedhare  | 305.67   |                          |
| 10       | DOM7      | Medical Office/Cire:        | Med Office, mediate  | 341.31   |                          |
| 19       | DOME      | Entertainment & Recreati    | Restaurant   | 2273 988 |                          |
| 20       | DOM9      | Treaters                    | Movie Theatre  | 167.90   |                          |
| 21.      | COM18     | Parking                     | Paking peage   | 24.21    |                          |
| 72       | RD1       | Heavy                       | Factory, snall   | 15137    |                          |
| 23       | P4D/2     | Light                       | Watchisse, median  | 188.43   |                          |
| 1000     | 7.1.40A   |                             | all second and a second se |          | 1.41                     |

4. Export the "Replacement Cost" table in Tab-delimited text file format.



5. Export the "RES1 Replacement Cost" table as shown below in.xls format.

|      | Deicripton | HeightClass  | AverageBateColt | FinishedBasementCost  | United +  |
|------|------------|--------------|-----------------|---|---|
| 1    | Economy    | 1 story      | 84.03           | 25.50   | - 10  |
| 1    | Economy    | 2 story      | \$6.11          | 14.35   | -   |
| 3    | Economy    | 3-\$1049     | 9611            | 14.35   | -   |
| 4    | Economy    | Split level  | <b>\$159</b>    | 54.25   |   |
| ÷\$  | Anarage    | 1 story      | 11520           | 30.00   |   |
| 8    | Average    | 2 day        | 112.40          | 19.75   |   |
| 1    | Average    | Satoly       | 118 19          | Band No.  | w Record  |
|      | Average:   | Spir level   | 104.03          | Distant C   | daran Marrie  |
|      | Cyelox     | 1 IKAY       | 143 00          | And all a lot and a lot | analysis carries  |
| 10   | Custow     | 2 anoty      | 141.49          | brandt.   |   |
| -11  | Cathorn    | Satory       | 147.21          | -   |   |
| - 14 | C. Luchare | STRE BANKE   | 125.70          | Toport  |   |
| 14   | Lung       | Zana         | 1/301           | Date Die  | dimpane .   |
| 12   | Lung       | a youry      | 174 21          |   | and the second se |
| 10   | 1 James    | Paris Includ | 156.01          | Meta O  | sta   |
|      |            |              |                 |   |   |

- 6. Open the **RES1 Replacement Cost** table and calculate the average value of **AverageBaseCost** field. This gives the RES1 RS Means value.
- Import the "Replacement Cost" table into "WV\_<County Name>\_BI\_GDB.mdb" located in ...\PDM\_WestVirginia\Data\_Management\Models\Berkeley\Analysis\Inventory\Building\_I nventory

| Whet de<br>Choose | Inter separates your fields? Select the appropriate delimiter and<br>the delimiter that separates your fields, | see how your best is affected in the preview t | elow,     |       |    |
|-------------------|--|--|-----------|-------|----|
| 12 Peets          | pw Contains Field Names Text Qui   | affer: (none)                                  |           |       |    |
|                   | -  |  |           |       |    |
| Occupant          | y HasusDefinition  | OccupancyExample                               | MeansCost | Sot   | 1  |
| ESI.              | Bingle Family Desiling   | Harof agained Vension                          | 41.07     | È l   | 2  |
| ED2               | Mulai Family Dualling - amall  | Demlas   | 0119 69   | 6 1   | r. |
| PETR              | Multi Family Desiling - small  | Trivia (Conda                                  | 00.05     |       |    |
| RSSC              | Multi Family Duelling - medium   | 5-9 units                                      | 0.79.48   |       |    |
| ES3D              | Multi Family Dwelling - medium   | 10-19 units                                    | 168.00    | £     |    |
| E53E              | Multi Family Dwelling - large  | D-49 units                                     | 504.50    |       |    |
| ESSF              | Multi Family Dwelling - large  | 50+ units                                      | \$73.63   | 6     |    |
| EBA               | Temp. Lodging  | Botel, medium                                  | 185.42    | 20    |    |
| ESS               | Institutional Dormitory  | Dorm, medium                                   | 203.86    | ii I  |    |
| E56               | Nursing Home   | Nursing home                                   | 207.02    | 22    |    |
| DH1               | Netail Trade   | Dept Store, 1 st                               | 109.60    | 23    |    |
| CM2               | Wholesale Trade  | Harehouse, Medium                              | 106,43    | 44    |    |
| :0M3              | Personal and Repair Services   | Gerage, Repair                                 | 129.25    | 15    | -  |
| <li>1 1</li>      |  |  |           | - + 1 |    |

8. Rename the table to **RSMeans** and click **Finish** button.

The table is now imported into "WV\_<County Name>\_BI\_GDB.mdb".

| Text World |   | and inte |
|------------|---|----------|
| -          | That's all the information the instand metals to import your data |          |
| 25         | Bener A. Talia.   |          |
| <u></u>    |   |          |
|            |   |          |
|            | 1 voldtile a vont for grafoe my table after inputing the data.    |          |
|            |   |          |
| Algweet    | Canvel Agest Texts  | SHARE    |

9. The table is now ready to be used in III Create and Import "XFactors\_DolSqFt" <u>step 8 of Task</u> <u>1</u>

# **APPENDIX 3 ADDITIONAL ASSUMPTIONS**

The following additional assumptions were made while creating the tools that generated Building Inventory for the pilot project.

1. NumStories:

The null values are replaced with 1

2. BldgArea:

The null values are calculated by using Hazus RSMeans and Cama Avg Cost

Refer to "3b. XFactors Dollar Per Square Foot Creator" FME script

3. ReplCost:

The replacement cost field is calculated by multiplying the AvgArea by RSMeans

Refer to "4. Building Points to Building Inventory" FME script

| ExpressionEvaluator Param                    | neters 📒                               |
|--|--|
| Transformer                                  |  |
| Transformer Name:                            | ost Evaluator                          |
|  |  |
| Destination Attribute: ReplC                 | ost                                    |
| Arithmetic Expression                        |  |
|  | @\blue(BldeArea)*@                     |
| FME Feature Attributes                       | (@value(BiogArea)*@<br>Value(RMSMeans) |
| Published Parameters                         |  |
| Private Parameters     EME Easture Eurotions |  |
| String Functions                             |  |
| Math Functions                               |  |
| Math Operators                               |  |
| ·  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

### 4. ContCost:

Is calculated by multiplying ImpCost (Cama Building Cost) by 1.5.

Refer to "4. Building Points to Building Inventory" FME script

|  | Dutput                    |               |
|--|---------------------------|---------------|
| ## Expression                          | nEvaluator Parameters     | -             |
| Transforme<br>Transform<br>Destination | r<br>mer Name: ContCost   | MADA          |
| Anthretic 8                            | Expression                |               |
| P FME Fe                               | ature Attributes   @Value | (ImpCool)*1.5 |
| Publish                                | ed Parameters             |               |
| i Private                              | Parameters                |               |
| O PHE PE                               | ature Punctions           |               |
| L Math R                               | runcsons.                 |               |
| Li-Math C                              | merators                  |               |
|  |                           |               |
|  |                           |               |

5. FirstFloorHt:

Is obtained from Hazus which is based on the Foundation type.

Refer to "Domain\_FirstFloorHt" located in "WV\_<County Name>\_BI\_GDB" under

...\PDM\_WestVirginia\Data\_Management\Models\<County name>\Analysis\Inventory\Building\_Inventory

|          | 🛄 Domain_FirstFloorHt 🛛 📼 |               |           |   |       |  |
|----------|---------------------------|---------------|-----------|---|-------|--|
| $\angle$ | OBJECTID 🔻                | Description 👻 | Code      | - |       |  |
|          | 1                         | Pile          | 7         |   |       |  |
|          | 2                         | Pier          | 5         |   |       |  |
|          | 3                         | Wall          | 7         |   |       |  |
|          | 4                         | Basement      | 4         |   |       |  |
|          | 5                         | Crawl         | 3         |   |       |  |
|          | 6                         | Fill          | 2         |   |       |  |
|          | 7                         | Slab          | 1         |   |       |  |
| *        | (New)                     |               |           |   |       |  |
| Re       | cord: I4 4 1 of 7         | ► ► ► ►       | No Filter | S | earch |  |