Welcome to the 2013 Hazus Conference

ATKINS

Best Practices for CDMS Updates & UDF Data Preparation

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Plan Design Enable

Overview

- You've been tasked with a CDMS update or UDF analysis project
- What do you need to know before starting?
- What challenges will you run into along the way?
- Where can you find information to help?

Most Important Factor

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Garbage in, Garbage Out

Your First Questions

- What are you going to update?
  - GBS, Essential Facilities, Demographics?
  - Add in new data
  - UDF
- Where is your data coming from?
  - Federal, state, local
  - Contractors
  - Do you have metadata?!

Your First Questions

- How much are we updating?
  - Full County
  - Parcels that intersect ##yr floodplain
  - Parcels that intersect blocks that intersect ##yr floodplain
  - Are we only concerned with flooding?

Importance of First Questions

- Budget
- Schedule
- Scope

- Hazard Data
- Model
- Inventory

General Building Stock updates

- GBS is the aggregated building stock used in Hazus
- Requires certain attributes
- Field matching strategies
- Missing data Strategies
- Making assumptions

General Building Stock updates

- Square Footage - (double)
- Year Built - (short integer)
- Number of Stories - (short integer)
- Building Value - (double)
- Content Value - (double)
- Building Type - (string)
- Occupancy Type - (string)
- Block (and Tract) - (string)

General Building Stock updates

- Field matching strategies
- Occupancy type matching is most time consuming

Table 3.1 HAZUS Building Occupancy Classes

HAZUS Label	Occupancy Class	Standard Industrial Codes (SIC)
Residential		
RES1	Single Family Dwelling	
RES2	Mobile Home	
RES3A	Multi Family Dwelling - Duplex	
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	
RES6	Nursing Home	8051, 8052, 8059
Commercial		
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 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

Flood User Manual

Field Names for Occupancy Matching

- Description
- Zone
- Land Use Zone
- Zoning Description
- Use Type
- Use Code
- Present Use

Project Specific Occupancies

Present Use	HAZUS CODE
Single Family(Res Use/Zone)	RES1
Duplex	RES3
Triplex	RES3B
4-Plex	RES3B
Single Family(C/I Zone)	RES1
Houseboat	RES1
Mobile Home	RES2
Single Family(C/I Use)	RES1
Apartment	RES3E
Apartment(Mixed Use)	RES3E
Apartment(Co-op)	RES3E
Apartment(Subsidized)	RES3E
Condominium(Residential)	RES3C
Condominium(Mixed Use)	RES3C
Townhouse Plat	RES3C
Mobile Home Park	RES2
Condominium(M Home Pk)	RES2
Retirement Facility	RES6
Hotel/Motel	RES4
Rehabilitation Center	RES4
Residence Hall/Dorm	RES5
Group Home	RES4
Resort/Lodge/Retreat	RES4
Nursing Home	RES6
Shopping Ctr(Nghbrhood)	COM1
Shopping Ctr(Community)	COM1
Shopping Ctr(Regional)	COM1
Shopping Ctr(Maj Retail)	COM1
Shopping Ctr(Specialty)	COM1
Retail(Line/Strip)	COM1
Retail Store	COM1
Retail(Big Box)	COM1
Retail(Discount)	COM1
Office Building	COM4
Office Park	COM4
Medical/Dental Office	COM7
Condominium(Office)	COM4
Farm	AGR1
Greenhse/Nrsry/Hort Srvc	COM1

Present Use	HAZUS CODE
Parking(Assoc)	COM10
Auditorium//Assembly Bldg	COM9
Auto Showroom and Lot	COM1
Bank	COM5
Car Wash	COM1
Church/Welfare/Relig Srvc	REL1
Club	COM8
Conv Store without Gas	COM1
Conv Store with Gas	COM1
Restaurant(Fast Food)	COM1
Governmental Service	GOV1
Hospital	COM6
Parking(Commercial Lot)	COM10
Parking(Garage)	COM10
Restaurant/Lounge	COM1
School(Public)	EDU1
School(Private)	EDU1
Service Station	COM3
Tavern/Lounge	COM1
Post Office/Post Service	GOV1
Vet/Animal Control Srvc	COM7
Grocery Store	COM1
Daycare Center	RES4
Mini Lube	COM3
Warehouse	IND1
High Tech/High Flex	IND5
Industrial Park	IND1
Service Building	COM3
Industrial(Gen Purpose)	IND1
Industrial(Heavy)	IND1
Industrial(Lignt)	IND2
Air Terminal and Hangers	COM10
Mini Warehouse	IND1
Terminal(Rail)	COM1
Terminal(Marine/Comm Fish)	COM1
Terminal(Grain)	AGR1
Terminal(Auto/Bus/Other)	COM1
Utility, Public	COM4
Utility, Private (Radio/T.V.)	COM4

Project Specific Occupancies

Zoning Description	Occupancy Type
AGRICULTURAL DISTRICT	EDU1
AGRICULTURAL DISTRICT	GOV1
AGRICULTURAL DISTRICT	REL1
AGRICULTURAL DISTRICT	RES1
COMMERCIAL BUSINESS DISTRICT	COM1
HIGHWAY BUSINESS DISTRICT	COM1
HIGHWAY BUSINESS DISTRICT	GOV1
LAKE RESIDENTIAL DISTRICT	RES1
MULTI-FAMILY RESIDENTIAL DISTRICT	RES1
MULTI-FAMILY RESIDENTIAL DISTRICT	RES3A
OPEN SPACE RESIDENTIAL	RES1
PLANNED UNIT DEVELOPMENT DISTRICT	RES1
PLANNED UNIT DEVELOPMENT DISTRICT	RES3A
RESTRICTED INDUSTRIAL DISTRICT	IND2
SINGLE FAMILY COMMUNITY RESIDENTIAL DISTRICT	COM8
SINGLE FAMILY COMMUNITY RESIDENTIAL DISTRICT	RES1
SINGLE FAMILY RESIDENTIAL DISTRICT	RES1
SINGLE FAMILY RESIDENTIAL RESTRICTED	COM8
SINGLE FAMILY RESIDENTIAL RESTRICTED	RES1
SINGLE FAMILY RESIDENTIAL three units per acre DISTRICT	RES1
SINGLE FAMILY RESTRICTED RESIDENTIAL DISTRICT	RES1
Service station	COM3
HOTEL LIMITED SVC	RES4
HOTEL LIMITED SVC	RES4
HOTEL LIMITED SVC	RES4
HOTEL	RES4
RETIREMENT HOME	RES6
GROUP CARE HOMES	RES6
HEALTH CLUB	COM8
CLUB HOUSE	COM8
RESTAURANT	COM1

General Building Stock updates

- Missing data Strategies
- Making assumptions
- Do you use Hazus defaults
- Do you query/summarize/average the data you have
- Should you use what the manual says?

Content Values

Table 14.6 Default Hazus Contents Value Percent of Structure Value

No.	Label	Occupancy Class	Contents Value (%)
		Residential	
1	RES1	Single Family Dwelling	50
2	RES2	Mobile Home	50
3	RES3	Multi Family Dwelling	50
4	RES4	Temporary Lodging	50
5	RES5	Institutional Dormitory	50
6	RES6	Nursing Home	50
		Commercial	
7	COM1	Retail Trade	100
8	COM2	Wholesale Trade	100
9	COM3	Personal and Repair Services	100
10	COM4	Professional/Technical/ Business Services	100
11	COM5	Banks	100
12	COM6	Hospital	150
13	COM7	Medical Office/Clinic	150
14	COM8	Entertainment & Recreation	100
15	COM9	Theaters	100
16	COM10	Parking	50
		Industrial	
17	IND1	Heavy	150
18	IND2	Light	150
19	IND3	Food/Drugs/Chemicals	150
20	IND4	Metals/Minerals Processing	150
21	IND5	High Technology	150
22	IND6	Construction	100

Square Footage

Table 3.17 Assumed Typical Building Square Footage by Specific Occupancy

Occupancy	Square Footage
RES3A	3,000
RES3B	3,000
RES3C	8,000
RES3D	12,000
RES3E	40,000
RES3F	60,000
RES4	135,000
RES5	25,000
RES6	25,000
COM1	110,000
COM2	30,000
COM3	10,000
COM4	80,000
COM5	4,100
COM6	55,000
COM7	7,000
COM8	5,000
COM9	12,000
COM10	145,000
IND1	30,000
IND2	30,000
IND3	45,000
IND4	45,000
IND5	45,000
IND6	30,000
AGR1	30,000
REL1	17,000
GOV1	11,000
GOV2	11,000
EDU1	130,000
EDU2	50,000

Flood Tech Manual

Populating Missing GBS Data

- Do you do it for a local or regional level
- Do you take a subsample of your dataset for all occupancies, all occupancies within a certain square footage, only a certain local level within a year “year built” time frame?
- What if you don’t have year built either?
- Is there any documentation for data – content values, square footage factors, etc…?

GBS Update

- You will have to make assumptions
- All assumptions should be clearly documented
- Can you stand behind your decisions?
- Will your client agree with them?
- Are you going to use this same for UDF?

User Defined Facilities

- Structures you want to analyze on a site-specific basis
- * Caution: Hazus was designed as a **Regional** loss estimation model…not necessarily designed for site-specific analysis
- Take numbers with a grain of salt…view as a portfolio rather than individual buildings

User Defined Facilities - Questions

- What are you going to analyze?
  - Residential, businesses, Essential Facilities, etc.
  - What hazards are you modeling?
- Will the data be rolled up to the block?
  - How much data will need to be included?
  - Building footprints vs. parcels

EF as UDF

- EF loss model returns *Damage State Probabilities* and *Loss of Use Days* only
- If you want replacement and content cost losses consider converting your EF points to UDF-ready points

Data Collection

- Tax Assessor
- Building Departments
- GIS Departments
- State insurance offices
- Commercial sources for property data

UDF for Flood

- Pre-process your data outside of Hazus
- Ensure all points fall within Study Region
- Clip points to flood depth grid (SCOPE)
- On import, MUST be an **Access .mdb table**, not a pgdb point file
- Damage Function ID field uses the Hazus defaults for Occupancy…a bug (SCHEDULE)

* Chapter 6 of Flood User Manual

UDF for Flood

- Lots of Data! Do you need it all?

UDF for Flood

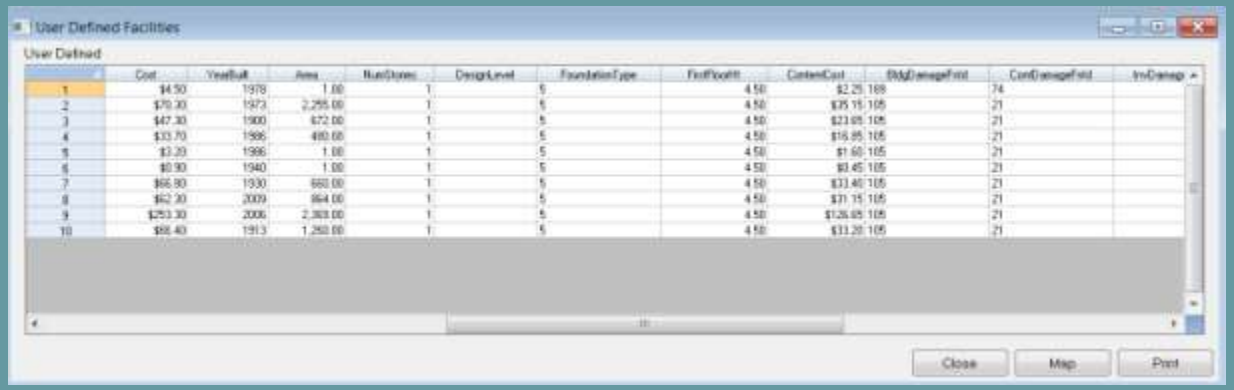
- Clip points to your flood depth grid

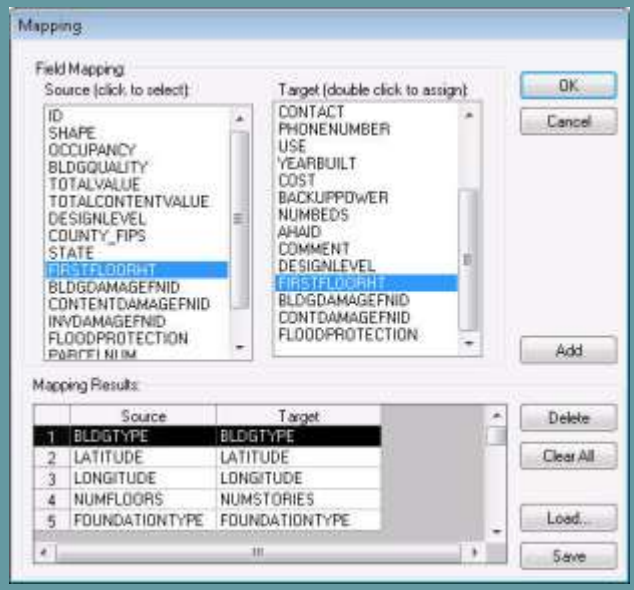
UDF for Flood

- Parcels vs. Building Footprints

Required Fields for Flood UDF

- Avoid headaches, ensure correct data types:
  - Occupancy, BldgType, FoundationType, FirstFloorHt, Cost, ContentCost, YearBuilt, NumStories, DesignLevel, BldgDamageFnID, ContDamageFnID, Latitude, Longitude





Foundation Type – Important!

- Flood model

Table 3.11 Default Floor Heights Above Grade to Top of Finished Floor (Riverine)

ID	Foundation Type	Pre-FIRM	Post-FIRM
1	Pile	7 ft	8 ft
2	Pier (or post and beam)	5 ft	6 ft
3	Solid Wall	7 ft	8 ft
4	Basement (or Garden Level)	4ft	4 ft[1]
5	Crawlspace	3 ft	4 ft
6	Fill	2 ft	2 ft
7	Slab	1 ft	1 ft[1]

Source Data: Expert Opinion

Notes:

1 Typically not allowed, but may exist

UDF for Flood

- OMG, I have no attribute data!

- Set these default constraints:
  - **YearBuilt = Null**
  - It is recommended that the user look for the trends of surrounding buildings and set the YearBuilt to the trend or to set it to 1970.
  - **Occupancy = 'RES1'**
  - It is recommended that the user look for the trends of surrounding buildings and set the Occupancy to the trend.
  - **NumStories = 1**
  - **Foundationty = 7**
  - **FloodProtection = 0**
  - If the building is near a dam or a dike, set the FloodProtection to that level.
  - Other fields:
    - The most fields extract from the Flooded Parcels directly or query combinations with **Hazus** Occupancy Code

Earthquake UDF

- Most Important Attribute
  - Earthquake Building Type
- Slow runtime (speed a limitation of ArcMap)
- Use AEBM for most accurate EQ modeling

* Chapter 8 of Earthquake User Manual

Earthquake Foundation Type

- Foundation Type has no effect on ground-shaking; Used in **Landslide** model only
- FL/EQ foundation equivalents:

FL FOUNDATION TYPES	EQ FOUNDATION TYPES
Pile	Pile
Pier	Drilled Pier, Elevated Pier
Solid Wall	Perimeter (Shallow)
Basement	Perimeter (Shallow)
Crawl Space	Perimeter (Shallow)
Fill	Slab
Slab	Slab

Be Accountable

Hazus Project Documentation

Purpose

The HAZUS-MH user community strives to create projects that are based on credible scientific analysis of hazards. Part of the process of establishing credibility is proper documentation of the processes used and assumptions made with regard to a project. This document is intended to provide guidance to HAZUS-MH users that will assist them with properly documenting a HAZUS-MH project.

Disclaimer: The model referenced in this document does not replace or supersede any Flood Insurance Rate (FIRM) Maps or any other official document or product generated to meet the requirements of any state, federal, or local program. It is intended for planning purposes only.

Part I: Project Background

Which version of HAZUS-MH and ArcGIS was used? Be sure to include any patches that may have been installed. *Example: HAZUS-MH MR2 Service Pack 2 ArcGIS 9.1 Service Pack 2*

Describe the purpose of the project (For example, was the HAZUS-MH project designed to address a regional/local need and/or it was part of a risk assessment): *Example:*
This project was completed to address a need to prepare a loss estimation for the community of Anytown, USA.

Describe the project team including organization names. You may also want to include the names of key project staff: *Example:*
John Smith, Project Lead, Somewhere County, USA
Jenny Smith, Technical Review Committee Chair, Somewhere County, USA
Joe Johnson, Structural Engineer, Flood Company

Describe the project duration: *Example February thru May, 2007*

Part II: Inventory

If improvements were made in the HAZUS-MH provided inventory, provide the following information:

Questions/Discussion

Look for an Atkins Best Practices guide, Fall 2013

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