City of Killeen
Fire Department Map Book Project
Start to Finish
The Presentation
What We Hope to Achieve

• Share KFD Map Book History and the importance of an informative, effective, and user friendly emergency location support source.

• Communicate How and Why we Created the New Map Books.

• Lessons Learned
Where Is Killeen?

- Killeen is in Bell County, Texas
- The region is commonly referred to as “The Heart of Texas”
Killeen & Bell County

Killeen is located on the West side of Bell County, approximately 15 miles west of the IH 35 corridor.
What Does Killeen look like?

- Current Population is approximately 113,000
- Area inside Killeen City Limits is 45.35 sq. miles.
Killeen Fire Department Station Locations and Response Areas

- Killeen currently has 7 fire stations, and two new stations on the way
- Response areas includes all of the City Limits, parts of Fort Hood, the Killeen ETJ, and some additional county areas outside the ETJ
Map Book History

Transitioning into technology
Maps for Fire Dept
Before 1965

- FD used folded Maps bought from local retailers
- The Killeen population was approximately 31,000 and a city limits area of 21 sq. miles
- Maps contained no FD data
- FD needed something with up to-date street information with additional data to include response areas and hydrant locations
New Map Books in 1965

- Book in every vehicle
- Hard Ring Binder
- Replaceable pages
- Photocopies of Hand Drawn Maps
- All Manually Maintained
1965-2006

- No substantial changes in design
- Every book is different and individually maintained
- No technology utilized
- All books out of date
Map Book Page From 2001

- Overall Map with response areas
- Book list 7 Stations but map shows only 5
- Map Books got larger but the basic concept and the maintenance issues remained
What's Wrong With This Picture?  
(Two Index Sheets from Same Map Book)
What’s wrong with the old Map Books?

• About 55 map books city wide
  – all different, out-of-date, and inadequate

• Maintenance Nightmare
  – all index sheets manually typed and maps were hand drawn.

• Used 4 people and a ton of hours to update

• No established overall maintenance procedures
  – Every station or driver doing their “own thing”

• No GIS technology utilized
Emergency Vehicle Dispatch

Then and Now
Up to 1999 Killeen used a Radio Dispatch System

- Killeen managed its own dispatch system
- Calls came into Central Station
- Dispatcher contacts proper Fire Station with dispatch call using a radio system
1999 To Present  Killeen has been part of a County Wide Dispatch System

- The Bell County Communications Center opened its door in 1999, the first combined dispatch center in the United States to dispatch all county agencies from one building. The center serves the emergency needs of more than 260,000 people in Bell County.
Killeen Upgrades Vehicles With Mobile Data Terminals (MDTs)
MDT Issues

• Not always reliable
• Street Data out-of-date
• Radio data transmission doesn’t arrive on time 35% of the time
• Street Centerline data updated locally, on every MDT, from BCCC download or cd
MDT Issues Continued

- BCCC Street Address Ranges not accurate = address location on map not interpolated to proper location.
• When the MDTs failed to provide the information needed, responders relied on Old Faithful (the gray Map Book)
Why Did We Need New Map Books?

• From the maintenance perspective:
  – Automated Maintenance Procedures
    to provide consistent, rich, and up-to-date
    information

• From the user perspective:
  – Because the MDT’s are never going to be a
    single solution for event location
  – FD ‘demanded’ a tangible product for back-up
    in vehicles
More of ….. Why Did We Need New Map Books?

• The current map books were just not good enough, out-of-date, and inadequate

• Map Book Production and Updates needed to be managed by a single department

• FD asks IT/GIS to produce an improved Map Book product utilizing GIS technology
So………What Did We Do?

• First, we understood the need but needed staff to support the project
• We had a Project Manager and Database Administrator (vacant) but needed a GIS technician
• Eventually, we acquired a position through the budget process
• Hired Shannon
• Tasked Shannon to manage the Map Book project
The Project
Defining the Mission

• GIS Staff (Colen & Shannon) Meet with FD Chiefs
• Identify Items Requiring Change
• FD Develops ‘Wish List’
• GIS Staff Plans Project Outline

Now, how do we develop the end result?
Planning the Mission

Key Questions

• What kind of software?
• Training Needs?
• Time Involved?
• Ease of Update Process?
• Staff Requirements?
A Key Factor -- Killeen’s Evolving GIS

Killeen Enterprise GIS
- 9.1 ArcSDE Versioned Work Environment
- Final Phase of Initial 5 Year Master Plan
- Data Conversion Process 90% Complete

Problem
– Minimal GIS Staff

Still Evolving….few ‘go to’ users in other departments
*Most users proficient with Autodesk products but have little formal ArcGIS training
Options

1. Use City’s AutoCAD Resources
   - Map Books being designed in CAD for other departments
   - Rich technical support on staff
   - Cumbersome conversion process (convert all new SDE data back to CAD)
   - New GIS Staff has no training in AutoCAD

2. Purchase 3rd Party Software
   - Many choices on the market
   - But, additional maintenance required
   - Basically, more software to keep up with
3. DS Map Book
   - Free download from ESRI/EDN
   - Developer sample, not supported by ESRI
   - Great application, tons of support on ESRI user forums
   - Testing environment proved tricky – multiple crashes/no explanation

4. MPS Atlas
   - ESRI application under the PLTS product umbrella
   - Can purchase stand alone – same cost as other ESRI extensions
   - Full technical support and release updates provided by ESRI, under maintenance subscription
MPS Atlas

- Upgraded as core products released
- Batch processed map series
- Streamlined/upgraded maintenance workflow process
- Geodatabase driven (*shapefiles not supported)
-- Maintenance
  - Dan or User Forums
Getting Started

First, You Need a Polygon

- MPS Atlas requires an AOI Feature Class to develop map series

\[ AOI = \text{Area of Interest} \]

(any polygon feature class)

Answer for Killeen – a New Grid
Choosing the Grid

• Current city grid or response zones = NO

• Several grid cell samples developed for FD review
  – FD involved in EVERY step of initial product development
    • Gave ‘ownership’ of the project to FD staff

FD chose scale (final scale = 1:2,500)
Constructing the Grid

- Many ways to build grid (wizards, scripts, tools, software)
- Editing still required
- Personal preference on approach – as always, there are usually several ways to do something in GIS

Just use ArcMap!
Creating a Custom Grid in Arc Map

(AOI Data Source)

• Create empty polygon feature class and add to Arc Map – start editing!
• Change scale to desired output size (our case: 1:2,500)
• Coordinates from fixed extent
*Bottom Left

X = 10,357,845,8187
Y = 3,081,743,35382

*Top Left
*Etc...

After all X,Y coordinates have been input – result is one grid cell

Now, just copy & paste!
• Once the AOI feature class is created, the map series construction can begin
• MPS Atlas allows dynamic text, graphics (no need to perform repetitive tasks)
• Now, just create the maps
Most Requested

- The most requested item on the FD’s list was to have color-coded hydrants
- GPM (Gallons Per Minute) values are extremely important during calls
Map Sheet Scale Comparison

Then…….1” = 630’

Now….. 1” = 280’
Key Changes

• Color Coded Response Areas
• Symbolized Hydrant Flow Data
• Hydrology and Flood Zone Data
• More Detail
• Adjacent Map Sheet Locater
Indexing

• No index creation function in MPS Atlas 9.1
  • But, can create with geoprocessing tools

Dissolve

• Dissolve street centerline segments

Merge

• Merge streets, grid, fire response zones

Edit table data as needed
Lessons Learned

• Mistakes
  – Not soliciting the end user (EMTs and other emergency vehicle staff) for map book design ideas
  – Utilized City print facilities for production of map books
Goals

• Acquire additional feedback from end users
• Develop maintenance procedures
• Establish reproduction schedule
• Re-design index functionality
• Improve cartographic design
• Evaluate grid-options
Contact

Colen Wilson
GIS Project Manager
254-501-7885
cwilson@ci.killeen.tx.us

Shannon Deckert
GIS Analyst
254-501-7707
sdeckert@ci.killeen.tx.us