



CENSUS DATA AND SQL SERVER 2008. WINNING!

Scott Rae and David Raybuck – NCTCOG



Census Uses in RIS

- Demographic Forecasting
- Annual Population Estimates
- Small Area Estimates
- Storm Impact Modeling
- Web Geographic Profiles
- Mitigation Planning
- Delineation of Geographies
- Alternative Futures/Scenarios

Census Data Design



Summary File 1 and Public Law

1990
2000
2010



Summary File 3

2000



American Community Survey

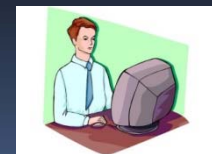
1 Year
3 Year
5 Year



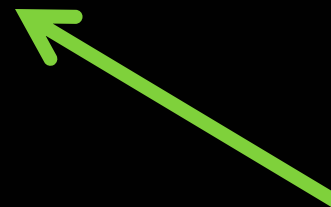
Internal
Users



Data Bank



Web Users



Radius Summaries (emeritus) Circa 2001-2010

NCTCOG
North Central Texas Council of Governments

Search NCTCOG

Programs > Topics A-J > Topics K-Z > Departments > Services > About Us

DFW maps

my maps | save map | [Click here to see the new DFWmaps.com](#) | [View More Maps and Data](#)

map a location
Enter as much information as you know:
Address or Intersection:

City, Zipcode:

Label the Address with:

 Tell me more about the address

places of interest
-- Select --
or go to a coordinate
aerial photography
 2007 Aerial Photos
 2005 Aerial Photos

Click or drag a rectangle on the map to:
 Recenter Zoom In Zoom Out Query a Location

2000 Census Information
1/2-mile radius from point
Total Population: 3,724
Male: 1,889
Female: 1,835
Total Housing Units: 1,765
[more...](#)

2000 Census Sample Data (SF3)
[general profile](#)
[social profile](#)
[economic profile](#)
[income & poverty profile](#)
[housing profile](#)
Radius: 1/2, 1, 2, 3, 5, 7, 10 mi.

2030 Demographic Forecast
1/2-mile radius from point
Year 2030:
Population: 4,545
Households: 2,030
Employment: 2,129
Radius: 1/2, 1, 2, 3, 5, 7, 10 mi.
[more...](#)

Labor Market
View a labor market report around current point
Radius: 5, 10, 15 mi.

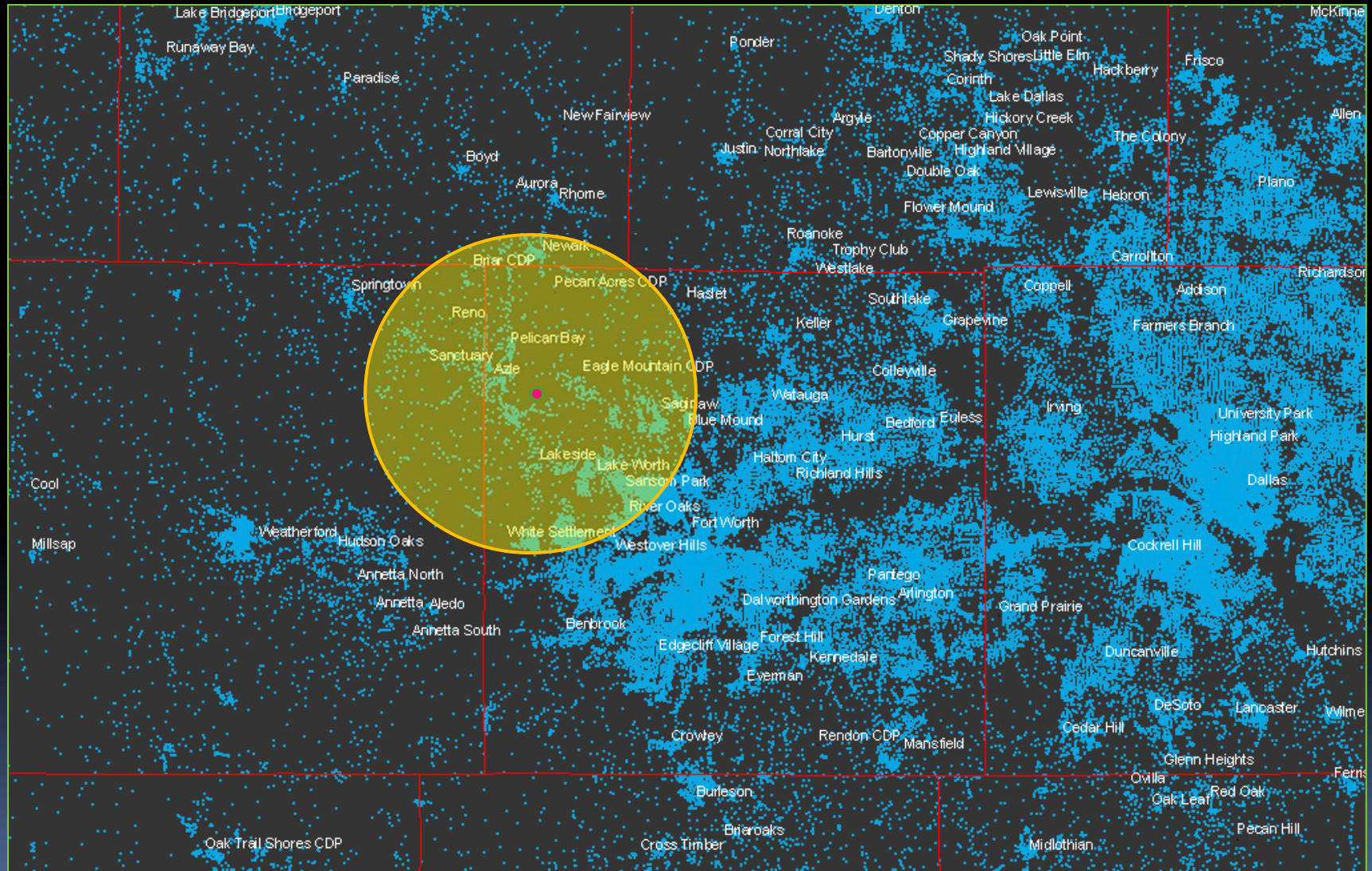
City Information
City of Arlington:
[NCTCOG Regional Almanac](#)
[Phone Directory](#)
City Council District 3:
Robert Rivera

Representative Information
Texas House District 93:
Paula Hightower Pierson
Texas Senate District 9:
Chris Harris
U.S. Congress District 6:
Joe Barton

print | email map | map size:

[Start Over](#)

Census Block Centroids



Radius Summary Antiques

- ESRI Recordset (Loop Sum)
- ESRI Constructed Query (Loop Query Build)
- SQL Algebra

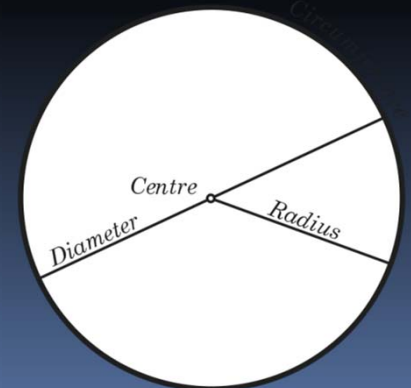
tg

$$\sin^2 \alpha + \cos^2 \alpha = 1$$
$$\int (x + \cos x + \operatorname{tg} x) / dx = 0$$
$$\sin^2 \alpha = \frac{1 - \cos^2 \alpha}{2}$$

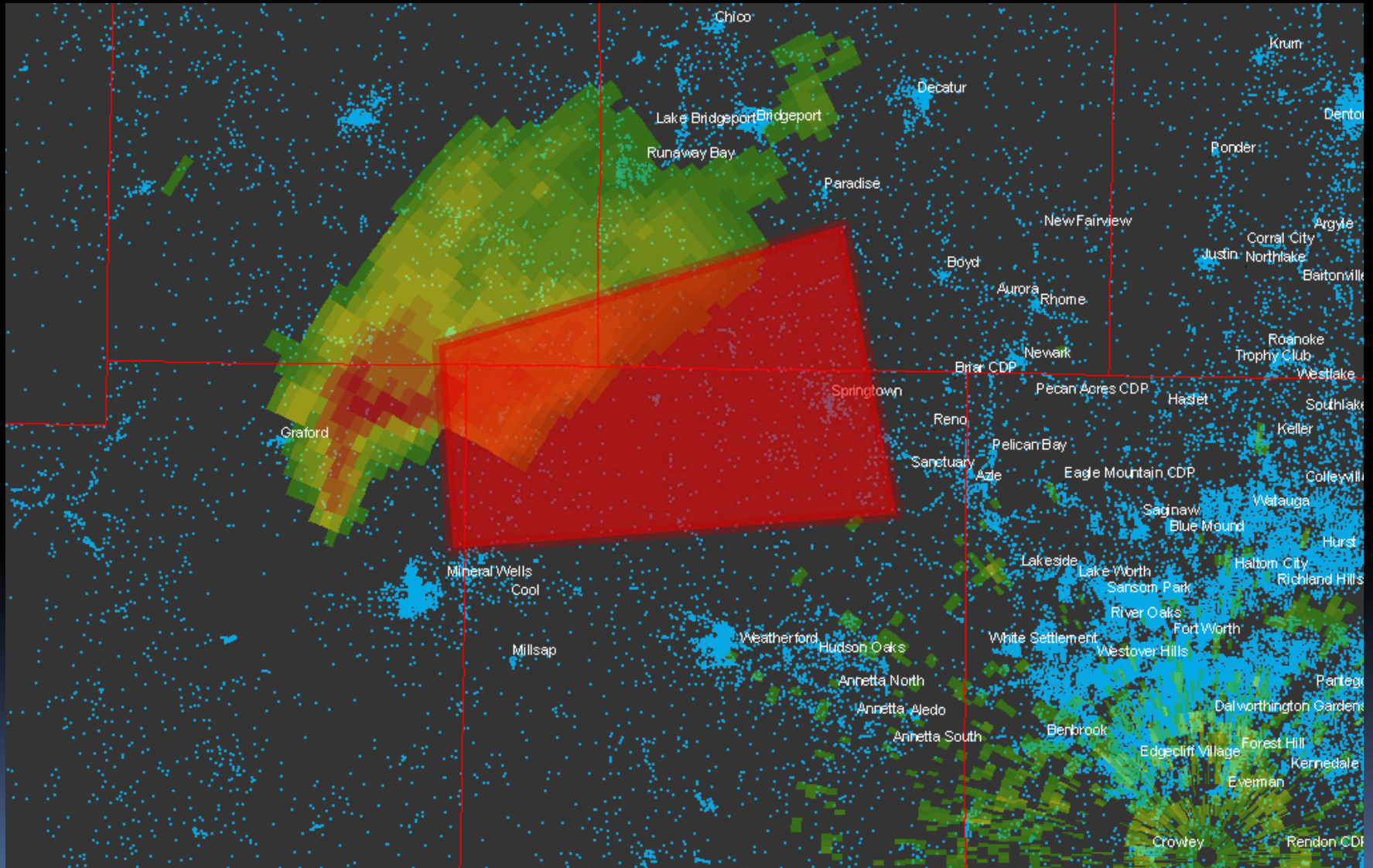
Selecting by Circle

	ID	LOGRECNO	PLACE	TRACT	BLKGRP	BLOCK	NAME	INTPTLAT	INTPTLON	xcoord	ycoord	Latitude	Longitude
1	4	0117289	0130	030200	1	1027	Block 1027	+33363931	-096535088	2567834.25	7184611.5	33.363931	-96.535
2	5	0117290	0130	030200	1	1028	Block 1028	+33363866	-096538650	2567355	7185342	33.363866	-96.5386
3	6	0117291	0130	030200	1	1029	Block 1029	+33366374	-096539762	2566768	7185614.5	33.366374	-96.5397
4	7	0117292	0130	030200	1	1040	Block 1040	+33346979	-096553154	2562707	7178874	33.346979	-96.5531
5	8	0117293	0130	030200	1	1041	Block 1041	+33351688	-096553018	2563017.75	7180391.5	33.351688	-96.553
6	9	0117294	0130	030200	1	1042	Block 1042	+33349424	-096552831	2563095.25	7179475	33.349424	-96.5528
7	10	0117295	0130	030200	1	1043	Block 1043	+33349408	-096551857	2563383.5	7179471	33.349408	-96.5518
8	11	0117296	0130	030200	1	1044	Block 1044	+33350338	-096551829	2563389.25	7179802.5	33.350338	-96.5518
9	13	0117297	0130	030200	1	1045	Block 1045	+33351573	-096551783	2563397.75	7180248	33.351573	-96.5517
10	14	0117298	0130	030200	1	1046	Block 1046	+33355234	-096552289	2563160.5	7181648	33.355234	-96.5522

- $\text{power}(\text{power}((@ptdx - [xcoord]), 2) + \text{power}((@ptdy - [ycoord]), 2), 0.5) < @bufferstring$



Census Block Centroids



Selecting by Polygon

```
select @pointtext="o"
```

```
select @cn=0
```

```
select @i=1
```

```
while @i < @vertexcount
```

```
begin
```

```
select @vbx=convert(varchar(16),(select x from #vertex where idx=@i))
```

```
select @vty=convert(varchar(16),(select y from #vertex where idx=@i))
```

```
select @vbx1=convert(varchar(16),(select x from #vertex where idx=(@i+1)))
```

```
select @vty1=convert(varchar(16),(select y from #vertex where idx=(@i+1)))
```

```
select @pointtext=@pointtext+" "
```

```
select @pointtext=@pointtext+"(Case when (" + @vty + "<=" + @pty + ") and (" + @vty1 + ">" + @pty + ") or (" + @vty + ">" + @pty + ") and (" + @vty1 + "<=" + @pty + ")) THEN "
```

```
select @pointtext=@pointtext+"(Case when " + @ptx + "<(" + @vbx + " + ((((" + @pty + "-" + @vty + ")/(" + @vty1 + "-" + @vty + ")) * (" + @vbx1 + "-" + @vbx + "))) then 1 else 0 end)"
```

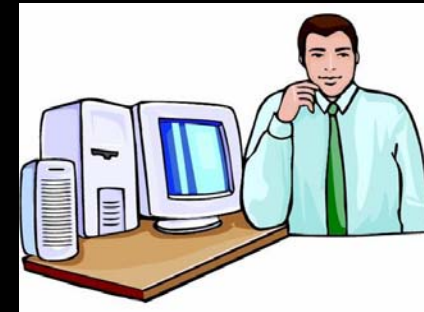
```
select @pointtext=@pointtext+" else 0 end)"
```

```
set @i=@i+1
```

```
end
```

```
exec("insert into #geotemp2 select * from #geotemp
```

```
where charindex('.',(' + @pointtext + ')/2.0)>0")
```



SQL 2008 Spatial

NAME	INTPTLAT	INTPTLON	xcoord	ycoord	Latitude	Longitude	geog
Block 1027	+33363931	-096535088	2567834.25	7184611.5	33.363931	-96.535	0xE6100000010C13807F4A95AE40400AD7A3703D2258C0
Block 1028	+33363866	-096538650	2567355	7185342	33.363866	-96.5386	0xE6100000010C2C103D2993AE40400A68226C782258C0
Block 1029	+33366374	-096539762	2566768	7185614.5	33.366374	-96.5397	0xE6100000010C670DDE57E5AE4040AD69DE718A2258C0
Block 1040	+33346979	-096553154	2562707	7178874	33.346979	-96.5531	0xE6100000010C08B3D0CE69AC4040BADA8AFD652358C0
Block 1041	+33351688	-096553018	2563017.75	7180391.5	33.351688	-96.553	0xE6100000010CA532C51C04AD404008AC1C5A642358C0
Block 1042	+33349424	-096552831	2563095.25	7179475	33.349424	-96.5528	0xE6100000010C0038F6ECB9AC4040A54E4013612358C0
Block 1043	+33349408	-096551857	2563383.5	7179471	33.349408	-96.5518	0xE6100000010CFA7ABE66B9AC4040B37BF2B0502358C0
Block 1044	+33350338	-096551829	2563389.25	7179802.5	33.350338	-96.5518	0xE6100000010CE54526E0D7AC4040B37BF2B0502358C0
Block 1045	+33351573	-096551783	2563397.75	7180248	33.351573	-96.5517	0xE6100000010C0C94145800AD4040014D840D4F2358C0
Block 1046	+33355234	-096552289	2563160.5	7181648	33.355234	-96.5522	0xE6100000010CB136C64E78AD40407A36AB3E572358C0

- `update test2008.dbo.TxGeo_Logrecno set geog= geography::STPointFromText('POINT(' + STR(Longitude, 20, 16) + ' ' + STR(Latitude, 20, 16) + ')', 4326)`

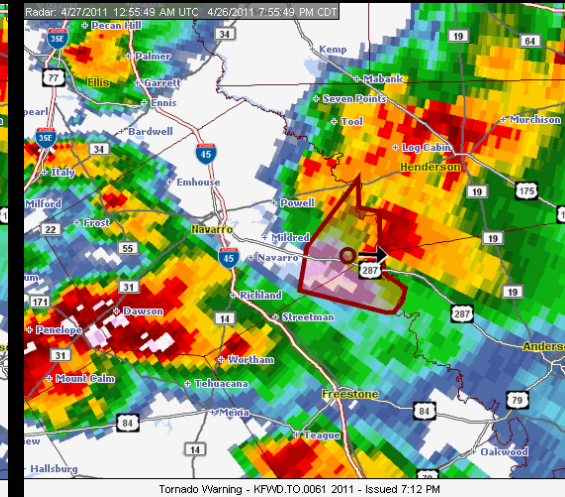
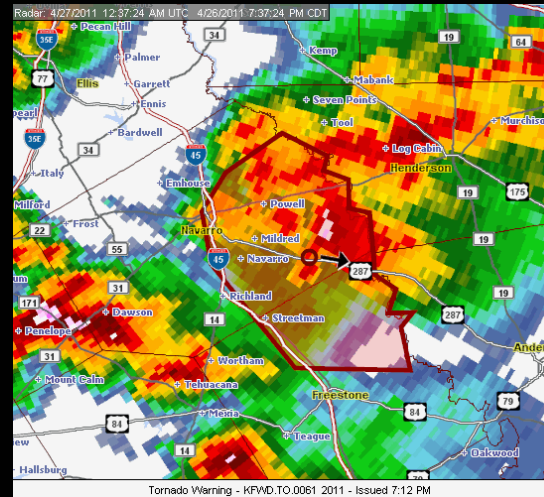
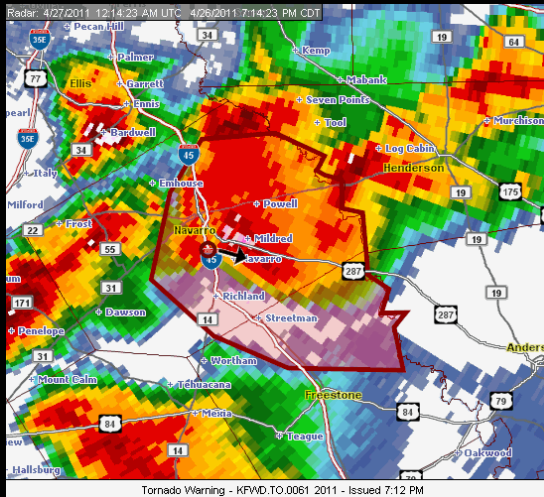
SQL 2008 Spatial Selecting by Polygon

- set @g =
geography::STGeomFromText('POLYGON ((-
96 31.4,-97 32.1,-97.1 32.1,-97.5 31.7 , -97.8
31.7, -96 31.4))', 4326);
- SELECT * FROM dbo.txgeo_B
WHERE (@g.STIntersects(geog)) = 1

Advantages

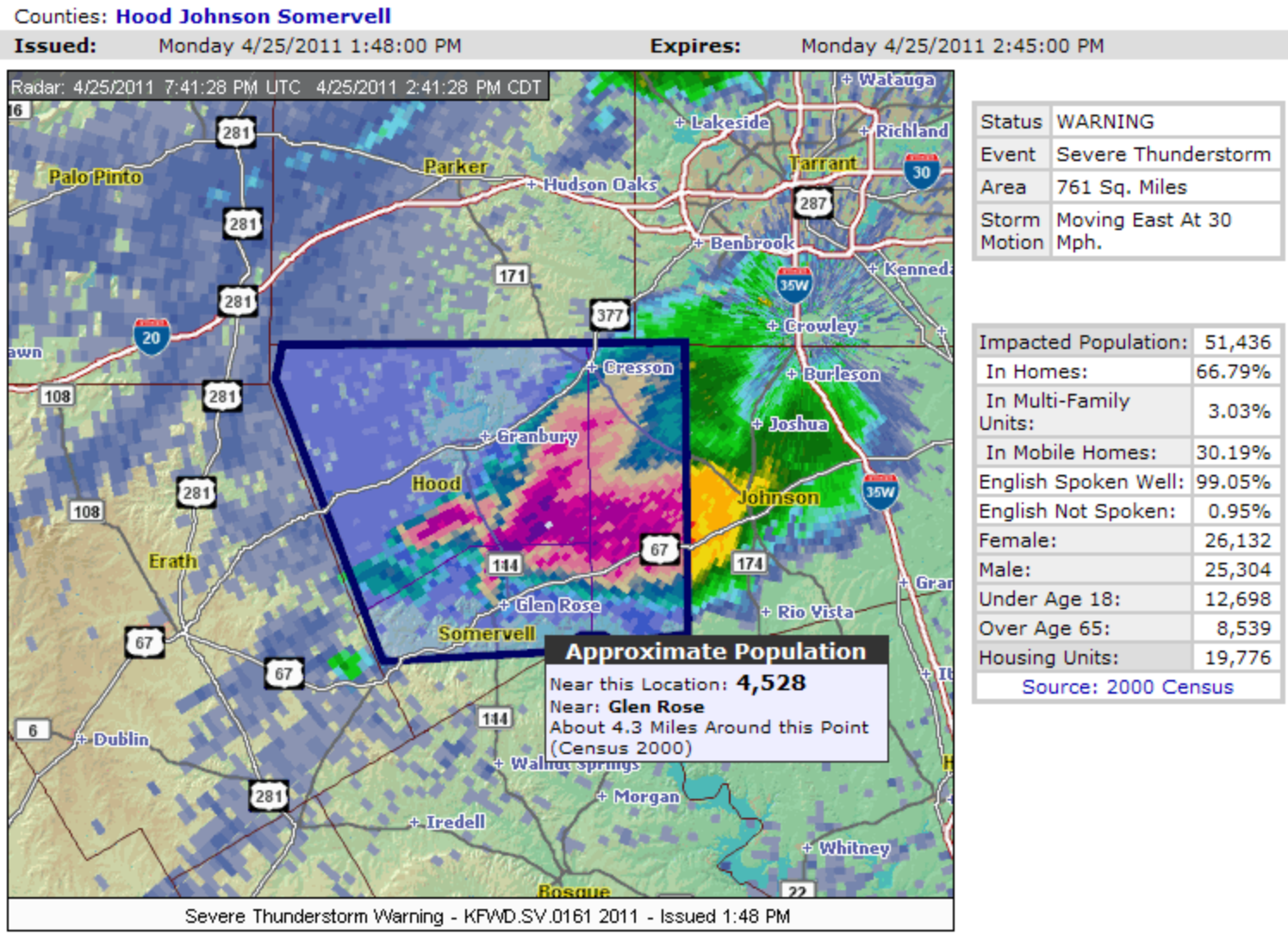
- Speed
- Indexing
- Expand to Millions of Records
- No Geodatabase Overhead
- TSQL
- Spatial types on Spatial Types

Polygon Updating



Updated	Area Impacted	Storm Direction	Storm Speed	Persons in Path	Housing Units in Path
7:12:00 PM	855.36 sq miles	East-southeast	32 mph	36,468	13,346
7:22:00 PM	770.81 sq miles	East	25 mph	33,074	12,187
7:38:00 PM	644.52 sq miles	East	33 mph	12,001	4,544
7:50:00 PM	156 sq miles	East	21 mph	954	407

Dynamic Census Image Map



Microsoft SQL Server Management Studio

File Edit View Query Project Debug Tools Window Community Help

New Query

master Execute

Object Explorer

- Triggers
- Indexes
- Statistics
- dbo.Overlap_Grid_CensusE
- dbo.Spatial_Census_Block_
- dbo.Spatial_Census_Block_
- dbo.Spatial_Census_BlockC
- dbo.Spatial_Census_BlockC
- dbo.Spatial_Census_Tract_
- dbo.Spatial_Census_Tract_
- dbo.Spatial_Census_Tract_
- dbo.Spatial_CensusTracts_
- dbo.Spatial_Cities_Region
- dbo.Spatial_Council_District
- dbo.Spatial_Counties_Texa
- dbo.Spatial_Envir_NOAA_S
- dbo.Spatial_EP_Parcel_Poir
- dbo.Spatial_EP_Parcel_Poir
- dbo.Spatial_OrthoIndex
- dbo.Spatial_Quadkey
- dbo.Spatial_Quadkey_L13
- dbo.Spatial_Quadkey_Nort
- dbo.Spatial_Quadkey_Nort
- dbo.Spatial_Quadkey_Nort
- dbo.Spatial_TSZ_GIS
- dbo.Spatial_WatershedClus
- dbo.Spatial_Zipcodes_TA_2

SQLQuery2.sql -...ter (sa (232))* SQLQuery1.sql ...ster (sa (219))

```
48      , [P021008]
49      , [P021013]
50      , [Spanish_Speaking]
51      , [Asian_Speaking]
52      , [European_Speaking]
53      , [Other_Speaking]
54      , [P024008]
55      , [h033001]
```

Results Spatial results Messages

Select spatial column: geom

Select label column: (None)

Zoom: Show grid lines

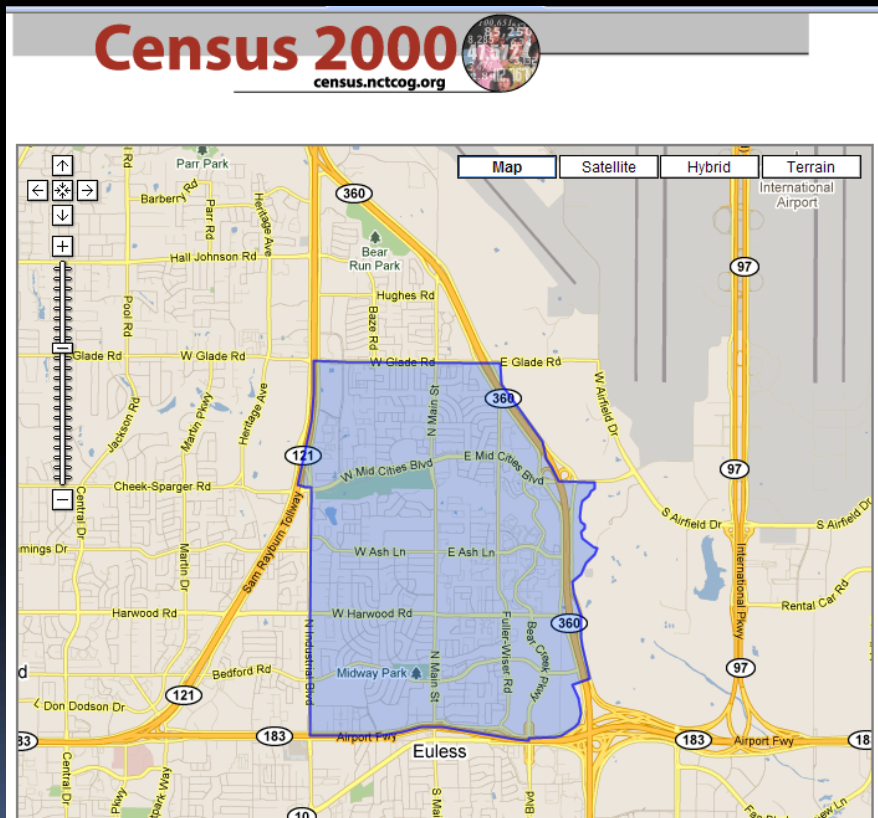
Query executed successfully. nctsql05 (10.0 RTM) sa (232) master 00:00:18 1000 rows

Ready

Mapping Spatial Data Type

Google Maps/Internet

SQL 2008



.NET Handler
GeoRSS



FME Workbench



The Logic

Inferring numeric polygon values from
another polygon layer



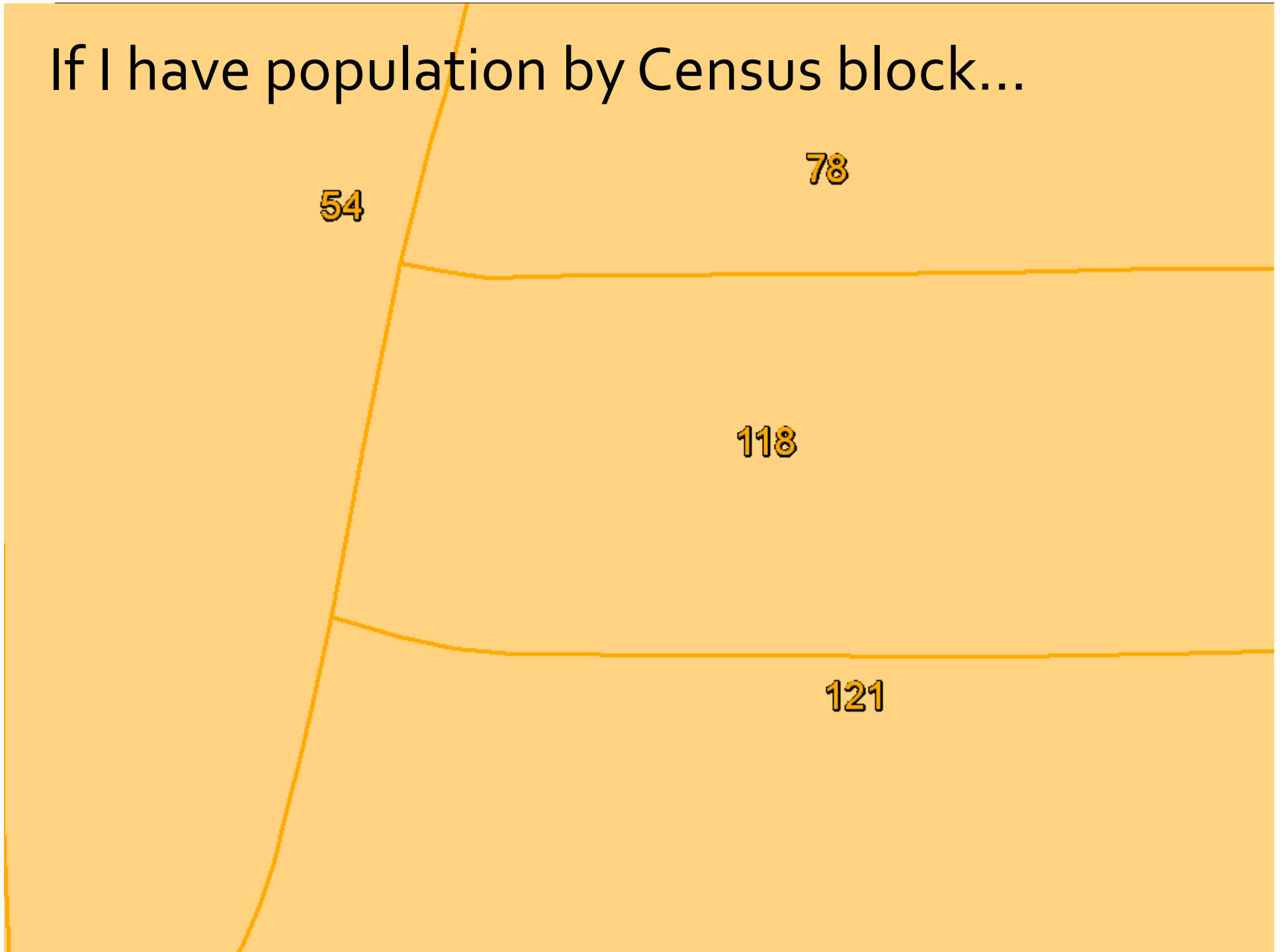
If I have population by Census block...

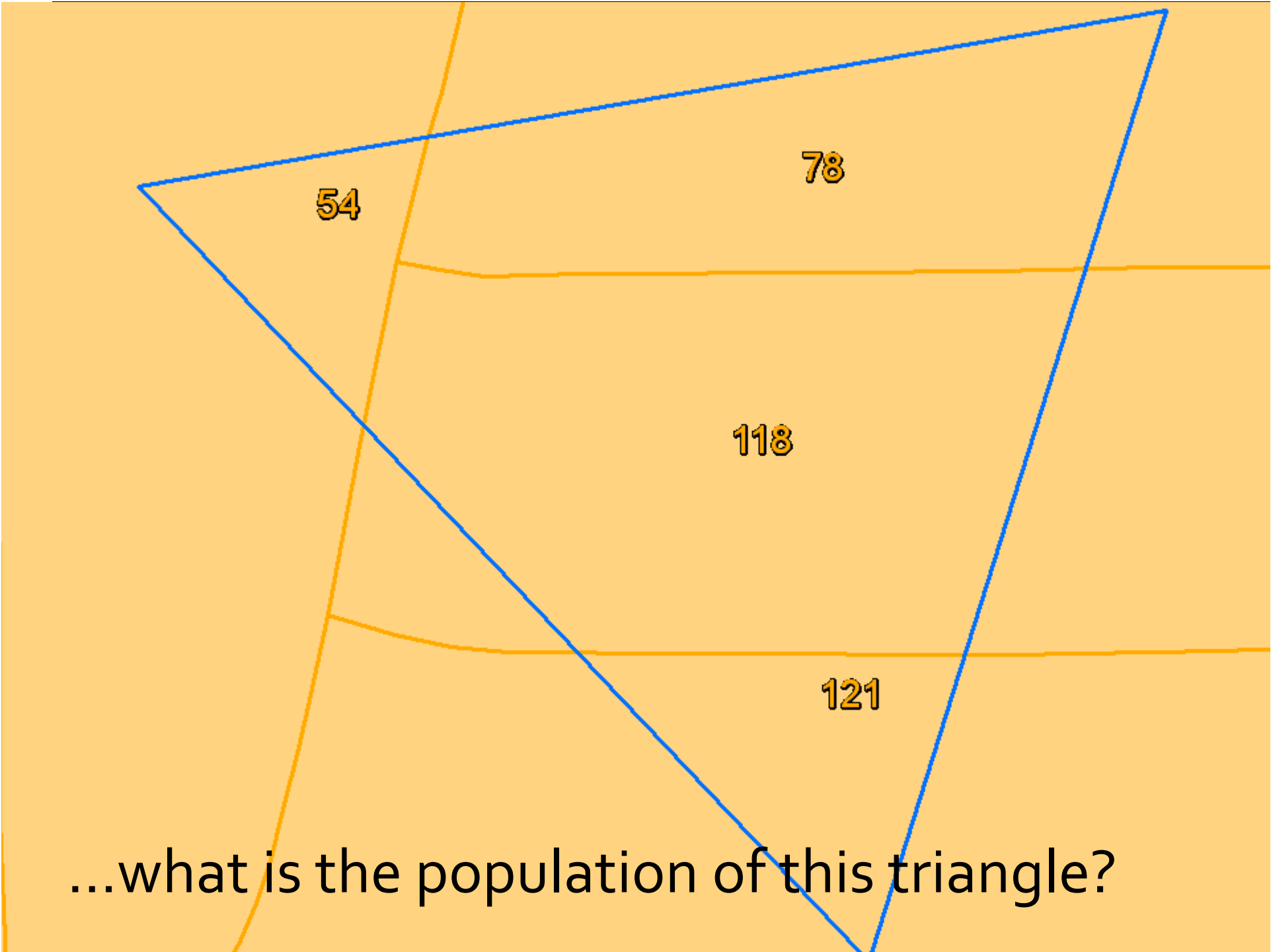
54

78

118

121





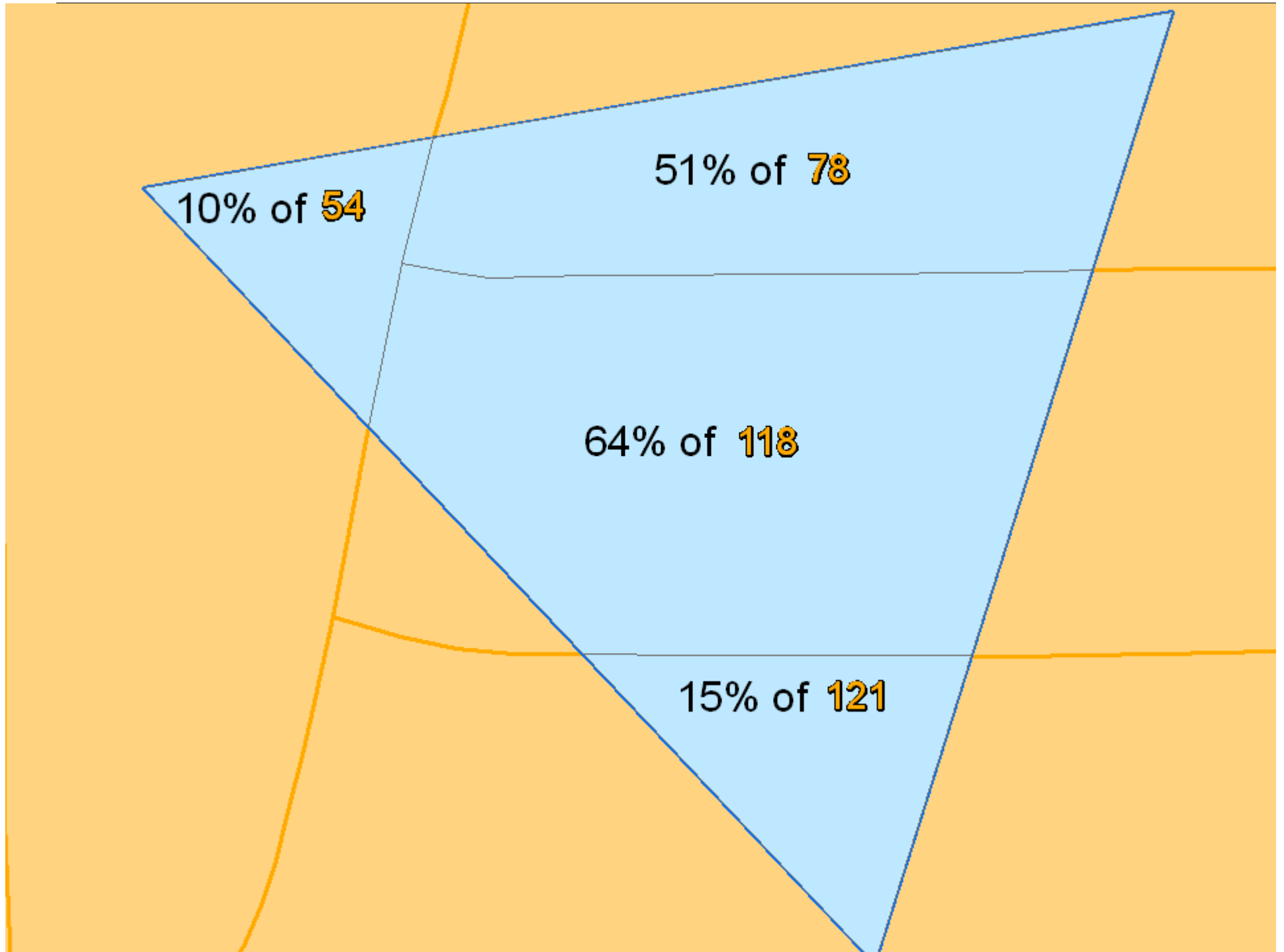
...what is the population of this triangle?

10% of **54**

51% of **78**

64% of **118**

15% of **121**



10% of **54**
= **5**

51% of **78** = **40**

64% of **118** = **75**

15% of **121**
= **18**

40 + 5 + 75 + 18 = 138

The ArcGIS Way

1. Calculate original area into source field
2. ArcToolbox → Intersect source with target
3. Calculate new area into result field
4. Calculate overlap % (result area / original area)
5. Multiply this % by value(s) to infer
6. Summary Statistics → Sum (group by Unique ID of target)

The SQL Server 2008 Way

```
SELECT Target.UniqueID, SUM(PercentOfTarget
    * SourceValue) FROM
(
    SELECT Source.UniqueID, Target.UniqueID,
    Source.SourceValue,
    Source.geom.STIntersection(Target.geom).ST
    Area() / Target.geom.STArea() AS
    PercentOfTarget FROM Target INNER JOIN
    Source on
    Source.geom.STIntersects(Target.geom) = 1
)
GROUP BY Target.UniqueID
```

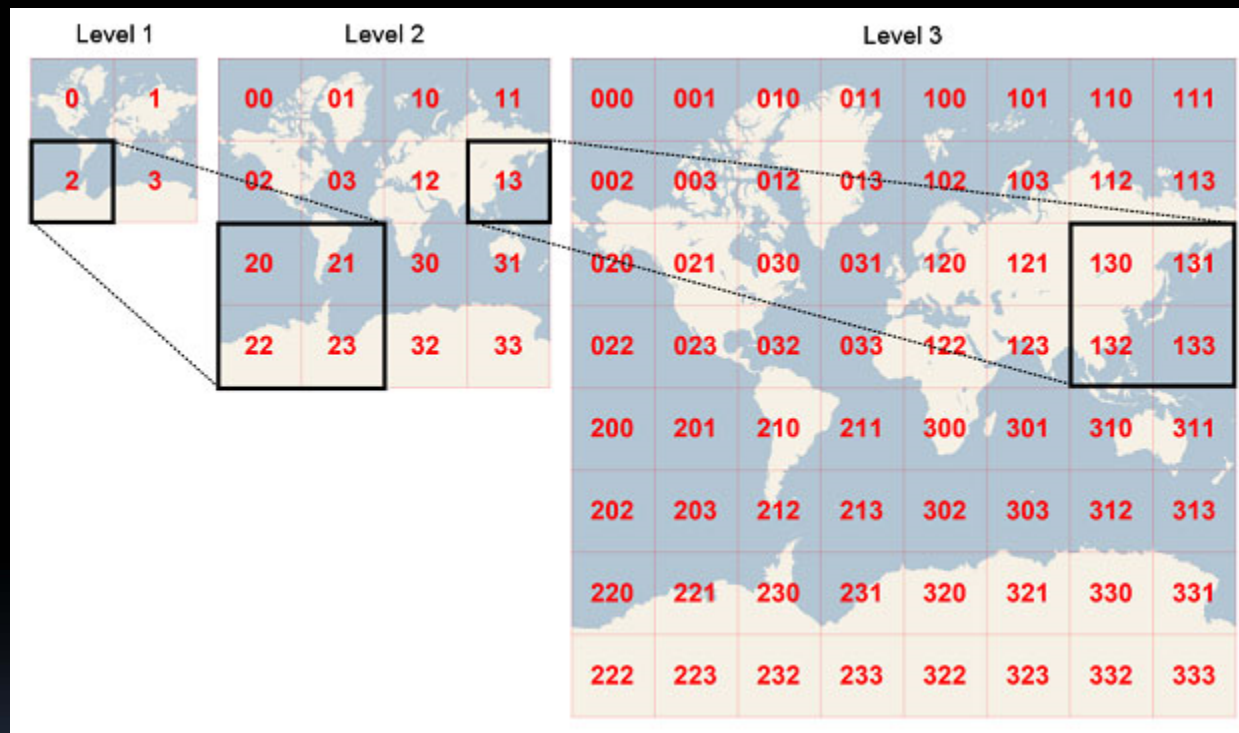


The Grid

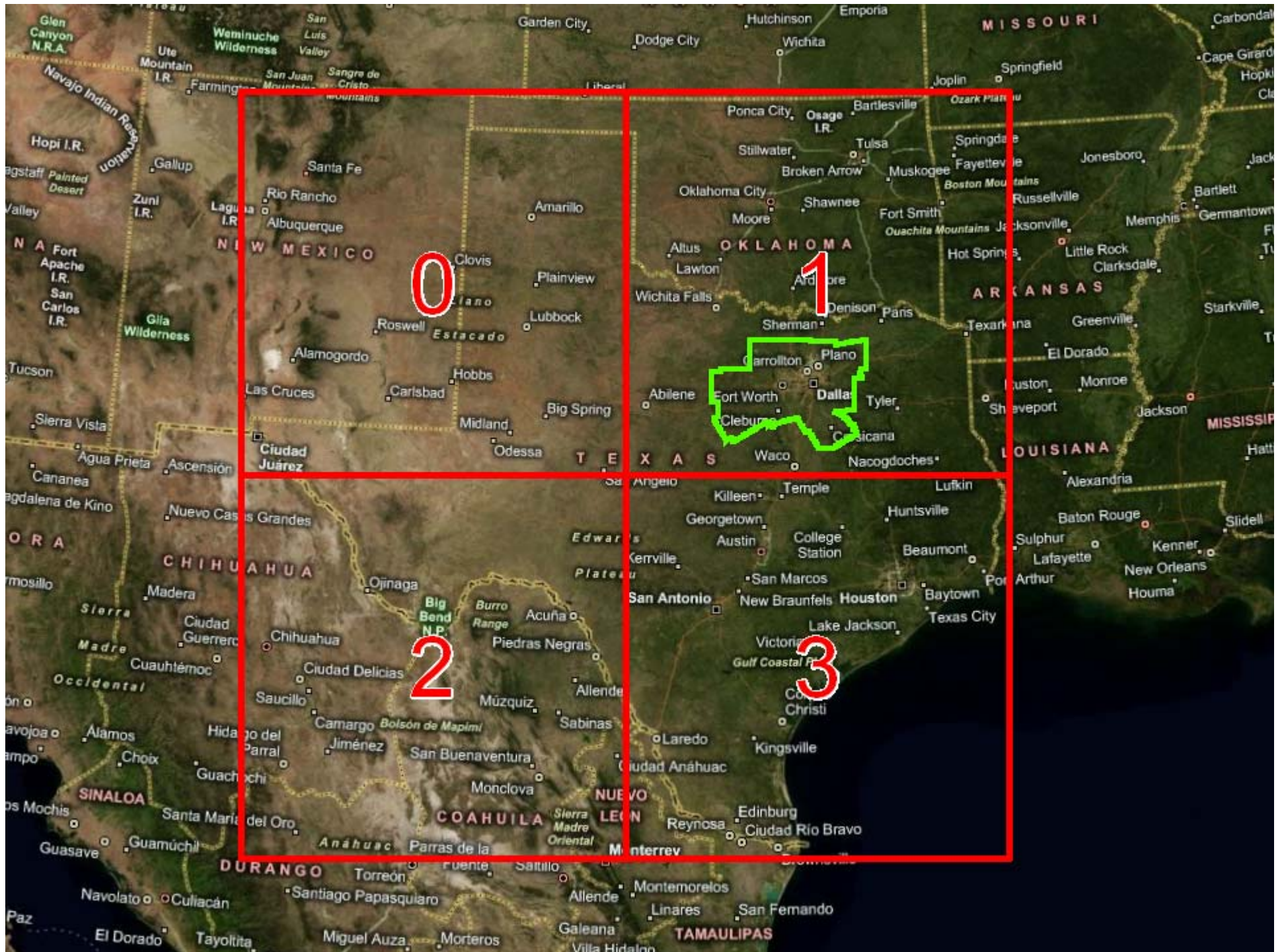
Optimizing for the web

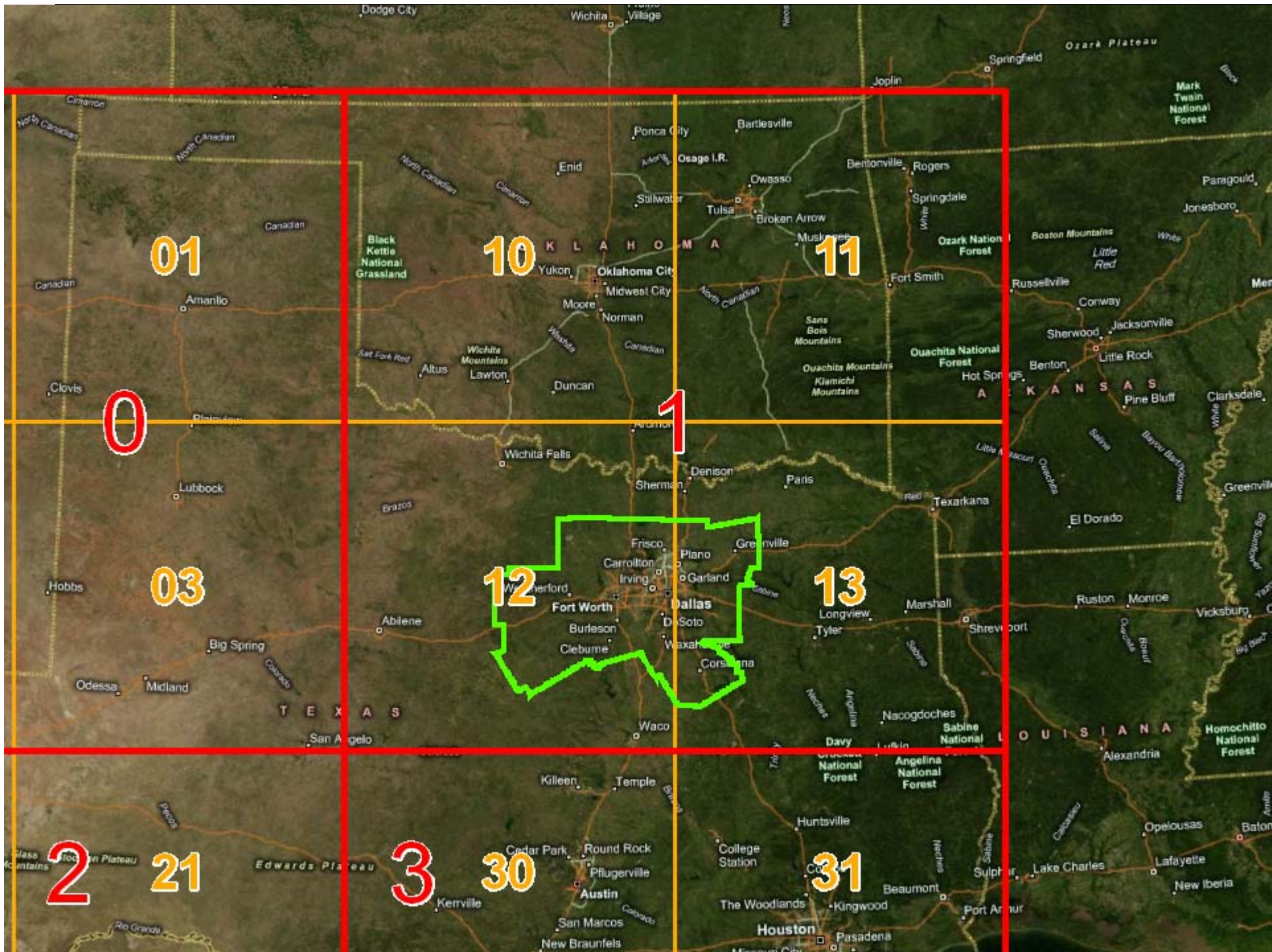


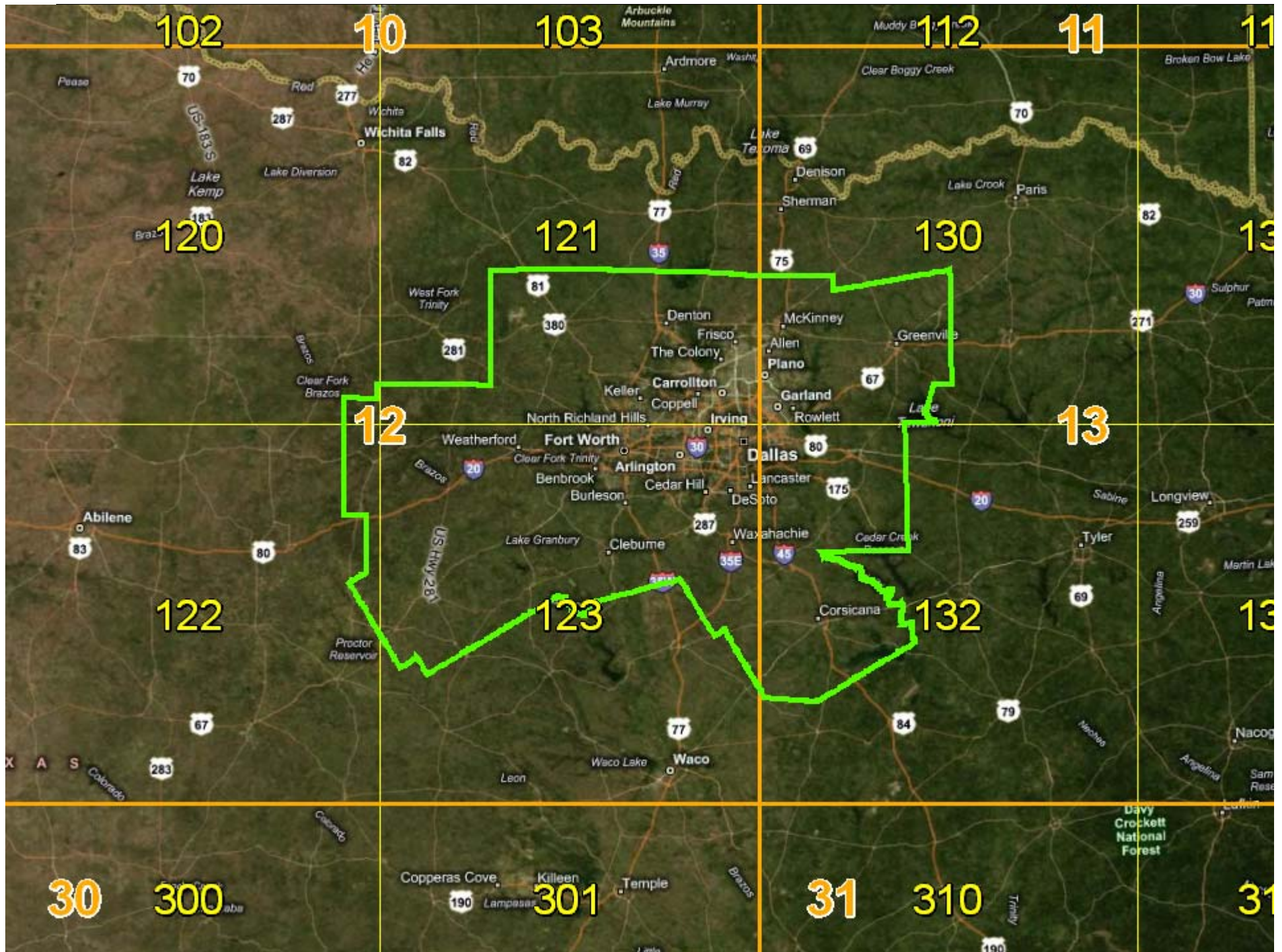
Bing Maps Tile Quadkeys

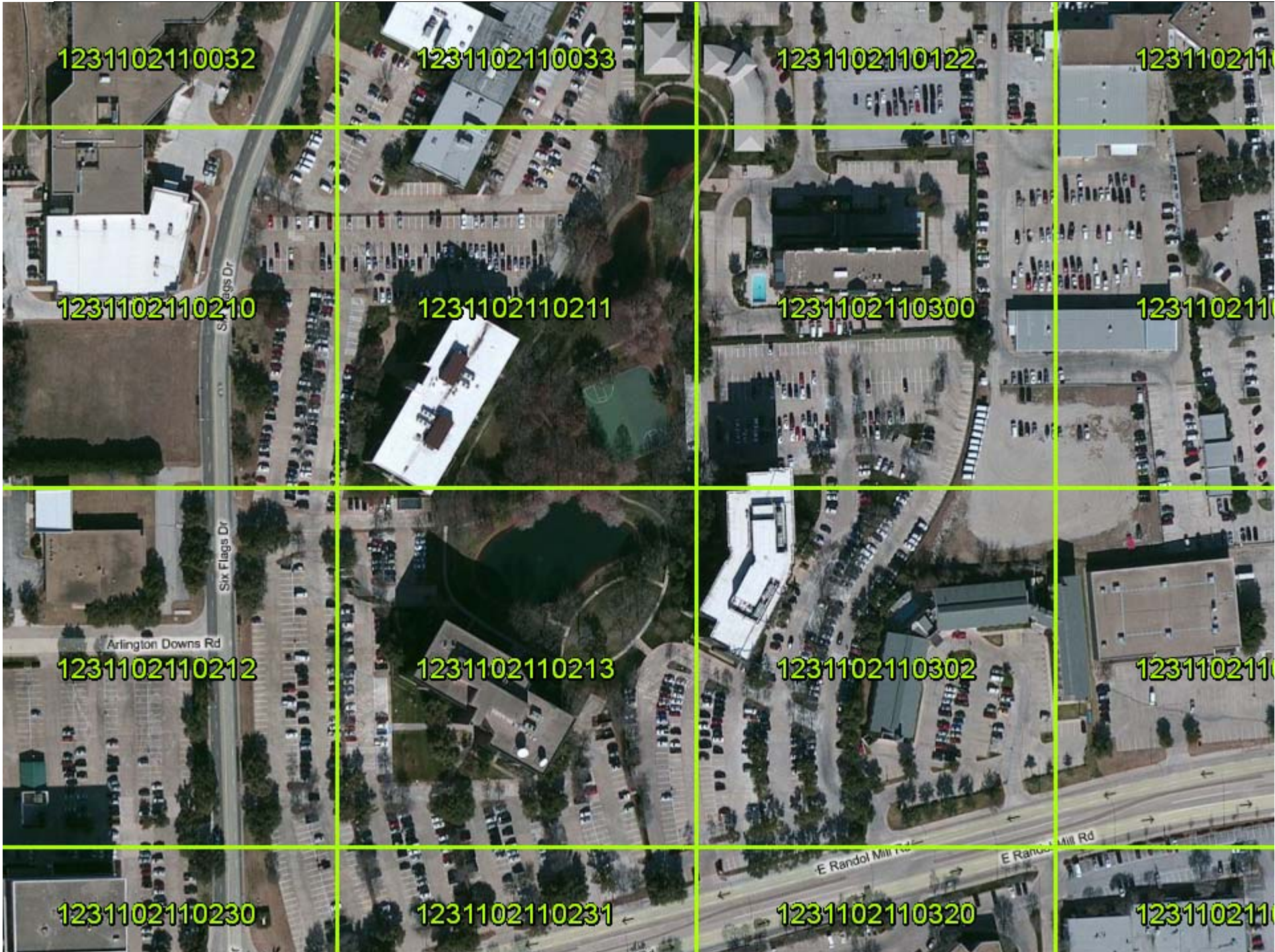


- Length of the key in digits indicates the level of detail (aka zoom level)
- Each quadkey starts with the quadkey of the parent grid (the next largest square containing it)









1231102110032

1231102110033

1231102110122

1231102110211

1231102110210

1231102110211

1231102110300

1231102110211

1231102110212

1231102110213

1231102110302

1231102110211

1231102110230

1231102110231

1231102110320

1231102110211

Six Flags Dr

Arlington Downs Rd

E Randol Mill Rd

Building the Grid

```
--*** ADJUSTABLE VARIABLES ****--
```

```
--use the appropriate unit of measurement for the projection you are using (ie feet if state plane):
```

```
declare @sidelength float = 100 --length of one side of largest grid
```

```
declare @originX float = 0 --left X coordinate of largest grid cell
```

```
declare @originY float = 0 --bottom Y coordinate of largest grid cell
```

```
declare @levels int = 4 --number of tiers to subdivide into 2x2 grids
```

```
--**** END OF ADJUSTABLE VARIABLES****
```

```
declare @leftX float = @originX
```

```
declare @rightX float = @leftX + @sidelength
```

```
declare @bottomY float = @originY
```

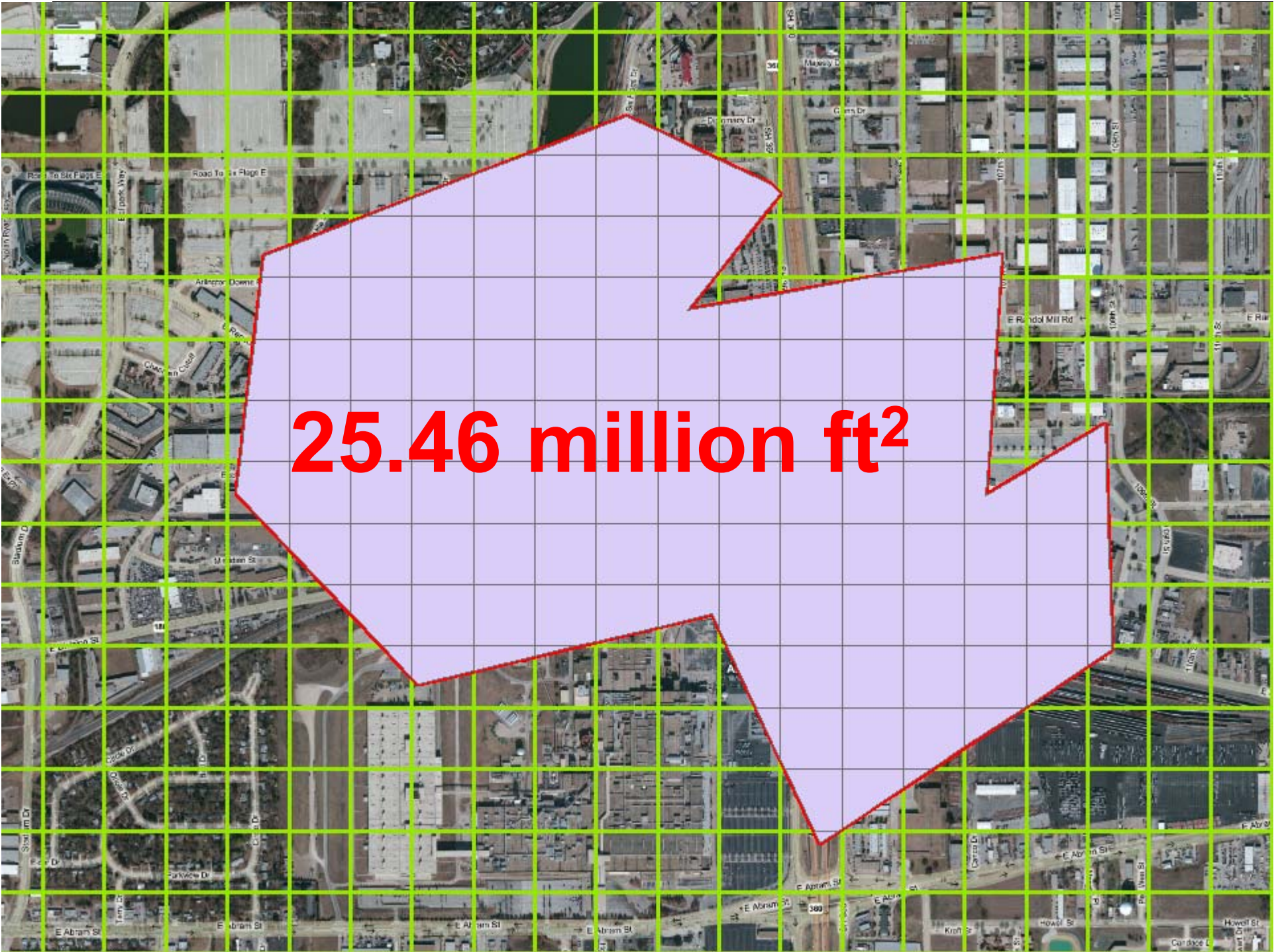
```
declare @topY float = @bottomY + @sidelength
```

```
--create largest grid
```

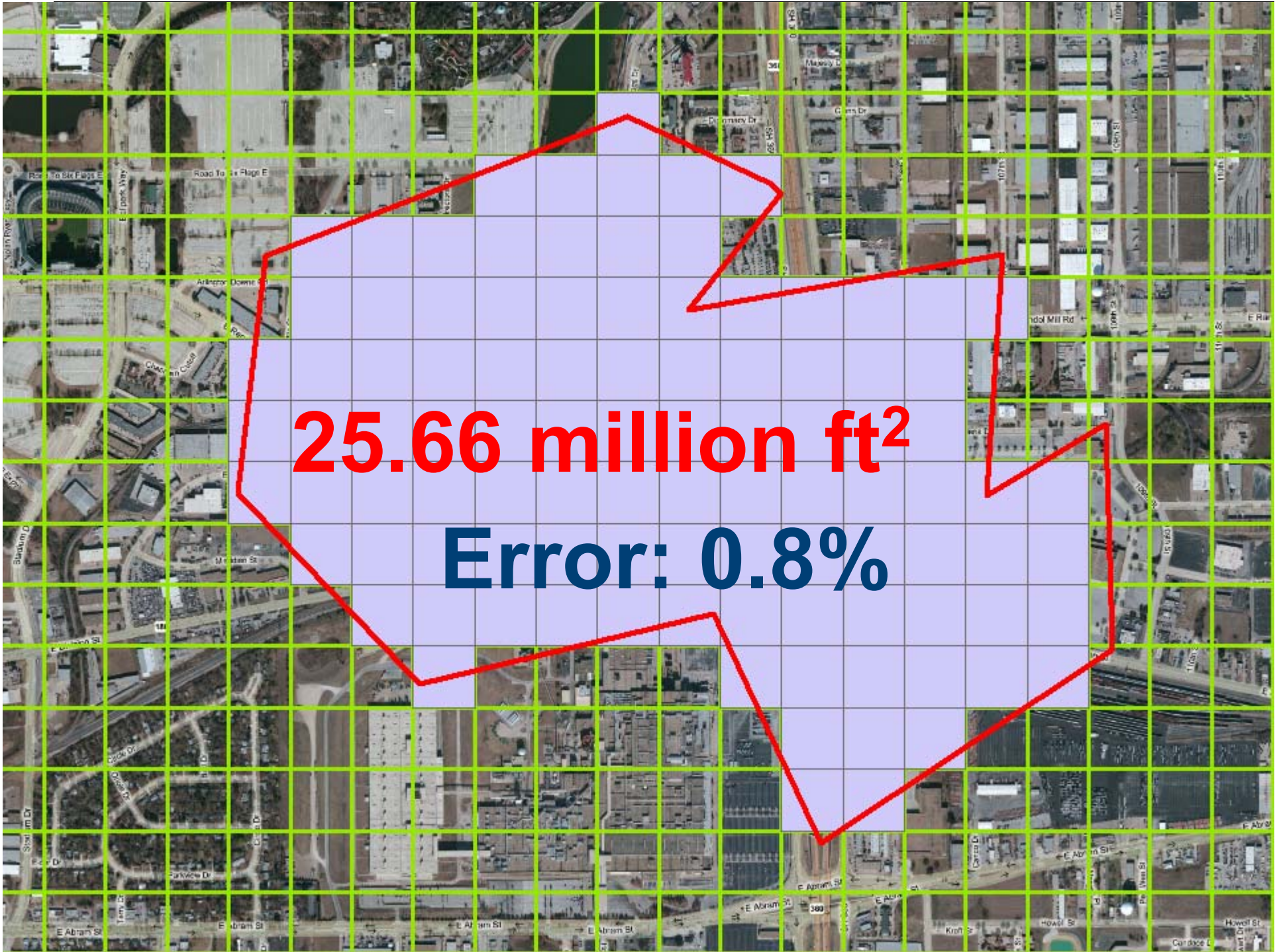
```
declare @g geometry
```

```
set @g = geometry::STGeomFromText('POLYGON((' + str(@leftX, 20, 5) + ' ' + str(@bottomY, 20, 5) + ', ' + str(@rightX, 20, 5) + ' ' + str(@bottomY, 20, 5) + ', ' + str(@rightX, 20, 5) + ' ' + str(@topY, 20, 5) + ', ' + str(@leftX, 20, 5) + ' ' + str(@topY, 20, 5) + ', ' + str(@leftX, 20, 5) + ' ' + str(@bottomY, 20, 5) + '))', 2276)
```

Etc...



25.46 million ft²



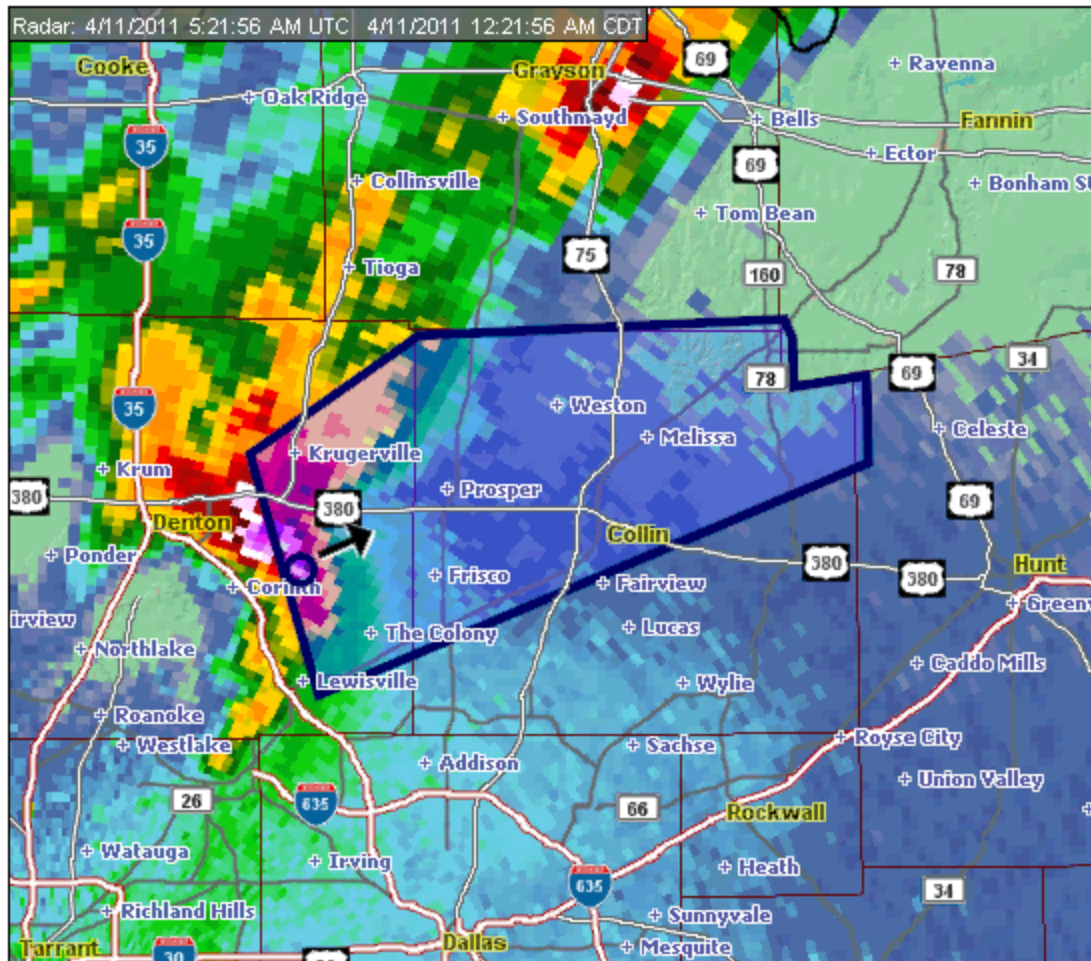
25.66 million ft²

Error: 0.8%

Severe Thunderstorm Warning

Counties: **Collin Denton**

Issued: Monday 4/11/2011 12:23:00 AM **Expires:** Monday 4/11/2011 12:52:00 AM (Originally 1:15:00 AM)



Severe Thunderstorm Warning - KFWD.SV.0041 2011 - Issued 12:23 AM

Status	WARNING
Event	Severe Thunderstorm
Area	708 Sq. Miles
Storm Motion	Moving Northeast At 50 Mph.

Impacted Population:	36,896
In Homes:	77.67%
In Multi-Family Units:	1.42%
In Mobile Homes:	20.91%
English Spoken Well:	98.42%
English Not Spoken:	1.58%
Female:	17,780
Male:	19,116
Under Age 18:	10,520
Over Age 65:	3,174
Housing Units:	12,416

Source: 2000 Census

Find a Location

Address, location name, or zip code:

616 Six Flags Drive, Arlington, TX 76011

Label the location:

Go

Tell me more about the location

Map Contents

Tools

Aerial Photography

- 1999 ▶
- 2001 ▶
- 2003 ▶
- 2005 ▶
- 2007 ▶
- 2009 ▶

Boundaries

Census

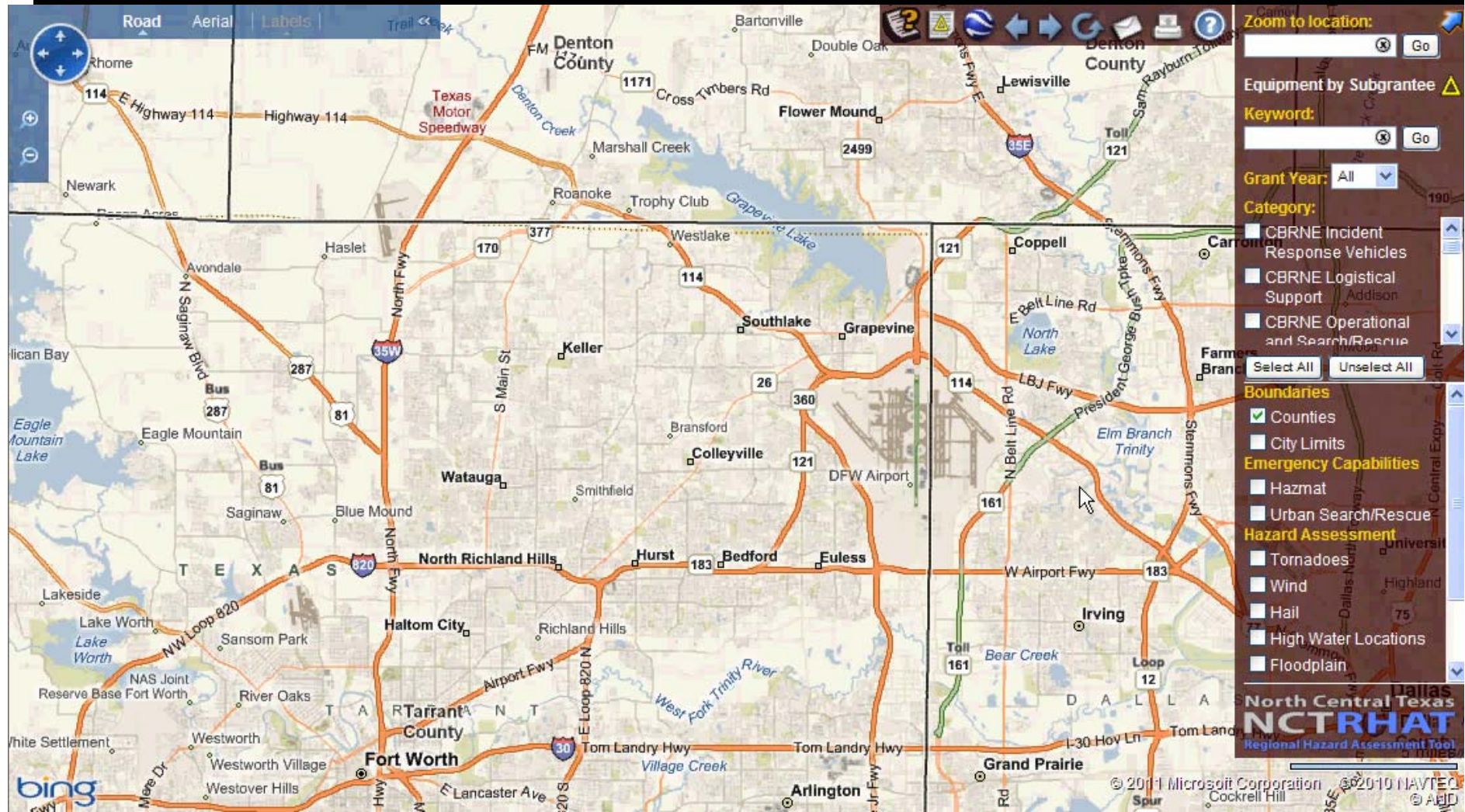
Environment

Miscellaneous

Transportation

Weather

Map interface showing a route from Arlington, TX to Plano, TX. The map includes navigation controls, map style options (Roads, Aerial, Hybrid), and a sidebar with map content categories. The route is highlighted in green and purple, passing through Allen and Plano. The map shows major roads like US-75 and I-75, and landmarks like Russell Creek Park and Jack Carter Park. A scale bar indicates 4 km and 2 mi. The NCTCOG logo is visible in the bottom right corner.



Zoom to location:

Equipment by Subgrantee

Keyword:

Grant Year: All

Category:

- CBRNE Incident Response Vehicles
- CBRNE Logistical Support
- CBRNE Operational and Search/Rescue

Boundaries

- Counties
- City Limits

Emergency Capabilities

- Hazmat
- Urban Search/Rescue

Hazard Assessment

- Tornadoes
- Wind
- Hail
- High Water Locations
- Floodplain

North Central Texas
NCTRHA
 Regional Hazard Assessment Tool

© 2011 Microsoft Corporation © 2010 NAVTEQ © AFD

Questions?

Scott Rae - srae@nctcog.org

David Raybuck - draybuck@nctcog.org

