MapStats

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City of Pittsburgh, Bureau of Police

Presented to the
9th Crime Mapping Research Conference

March 30, 2007

Presentation

- Introduction / Overview
- Situation
- History of MapStats
- Tour of MapStats
- Roadmap for the future
- Final Thoughts

Introduction

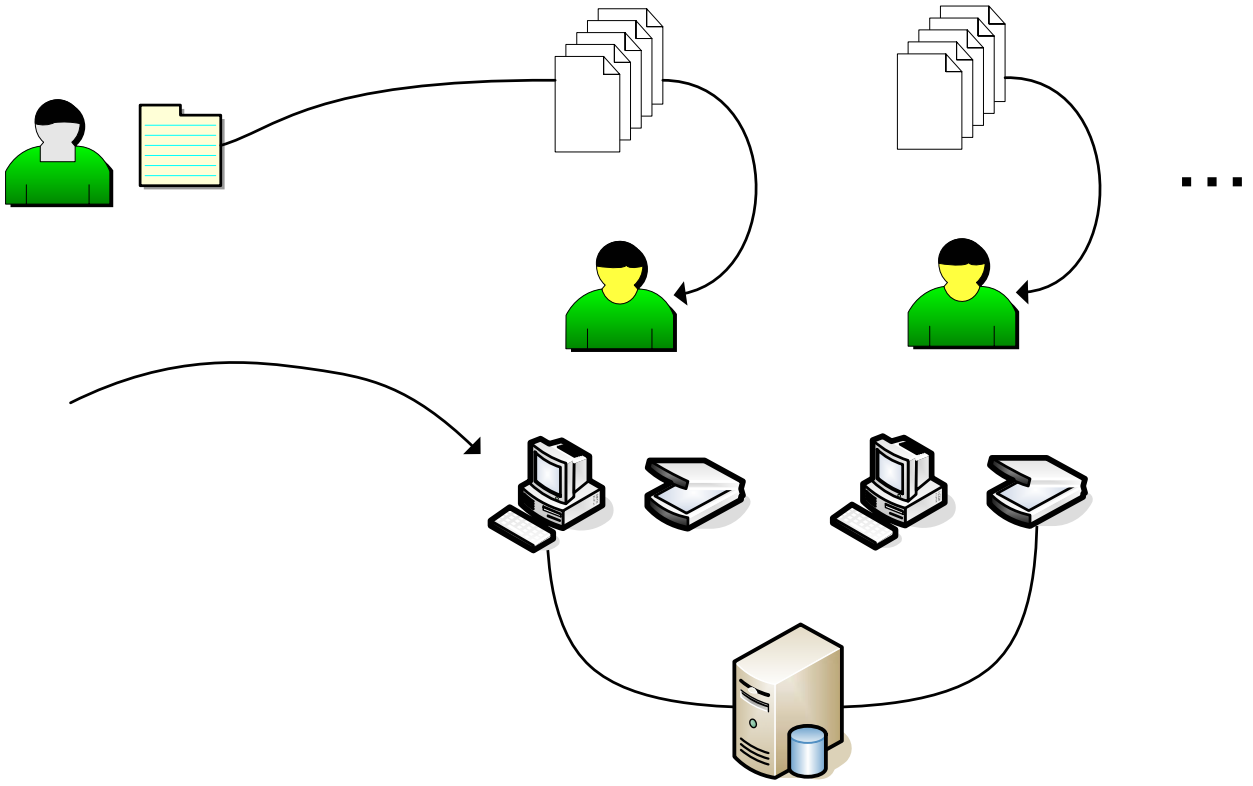
- City of Pittsburgh Police
  - Approximately 900 officers
  - Approximately 300 cars
  - 5 zones to cover 55 square miles of the city
- All information is processed
  - CRIMES – Record Management System
  - IMS – MO; systems to analysis data
  - Scan incident reports into imaging system
    - Immediate availability
  - Etc. – Many other systems manage data
- Data integration is effective
  - Oracle and SQL Server base

Situation

- Officers report daily incidents to Zones
  - **Investigative 3.0 Form (also called the Incident Report)**
  - **Offense 2.0 Form**
  - **Supplemental Form**
  - **Arrest Form**
  - **Warrant Arrest Supplement Field**
  - **Etc.**
- Zones scan reports into imaging system
- Reports are then processed by Record Room
- Small gap in time from scanning to records

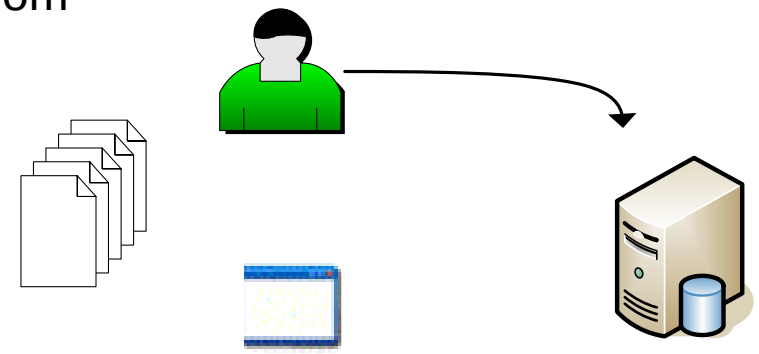
Process Flow

At Zone



Process Flow

At Record Room



GIS needs

- Zone commanders require accurate and current data crime analysis
  - Strategic decisions to combat crime trends
- Frontline supervisors and officers must have the ability to interpret data in a timely manner
- Efficient data presentation methods must be deployed
  - Mapping:
    - A picture speaks a thousand words
    - Visual trends can be comprehended faster than tabular reports
  - Reporting tools i.e. Charts, Graphs
    - Detailed and summarized data is essential as well
    - A balance of the two methods must be considered

Challenge

- Provide timely access of incident data
  - Daily review of data which includes yesterday's stats
- Present information in an intuitive manner
- Ensure data is as accurate as possible
  - Method for scrubbing bad data while ensuring integrity of reported data

Solution: MapStats

- Graphical Information System
- Intranet based
- Complete data integration
  - Police data (incidents)
  - City Planning data (maps)
  - Public Works data (new streets)

History of MapStats

- Carnegie Mellon University
  - Grant to study GIS and Crime Statistics
  - First artifacts: ArcView 3.0 maps and Access data
    - Required:
      - manual data entry into Access forms
      - manual data export procedures
      - Cut & Paste routine prior to viewing maps
  - System was a Proof of Concept
    - Prototype produced valuable results

Paradox

Zone Commander learned paradox

Created crude databases to mimic log books

- Evidence
- Reports
- Arrests
- Court time

Discarded log books for automation (1994)

History of MapStats

1st Application Version

- MARS – Mapping and Reporting System
  - Oracle Forms system
  - Integration into scanning SQL Server system
    - Retrieved the “index fields”
    - All relevant data was available
    - Manual data scrubbing was required
    - Utilized ArcView Avenue marcos
  - Narrowed the scanning to Record Room gap
  - Required installation of many applications
    - ArcView; Oracle Forms; Custom application
  - In addition to GIS, Reporting feature were included
    - Commander’s Reports

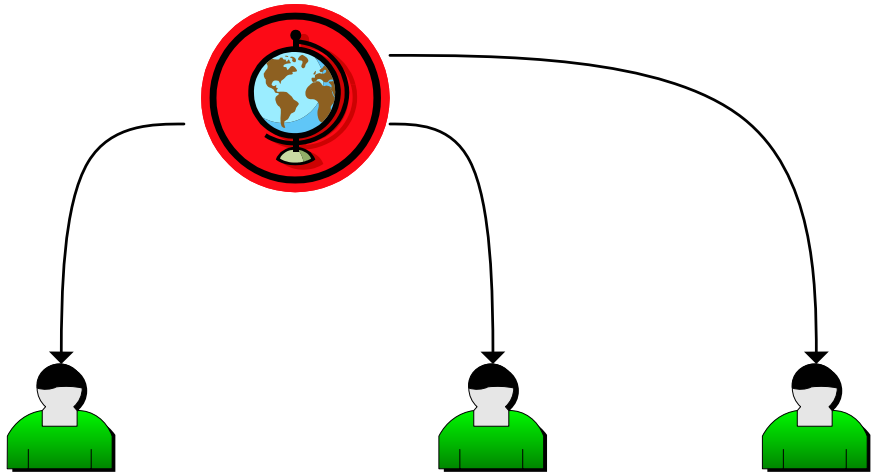
History of MapStats

1st Intranet Version

- MapStats – Mapping Statistics
  - ArcIMS intranet solution
  - ArcSDE – Oracle solutions
    - Directly tied into City Planning and Public Works
  - Tighter integration into scanning system
  - Many new automated data scrubbing routines
    - Power of Oracle and ArcSDE
  - Utilized Java
    - More power to reports
    - Added Charting

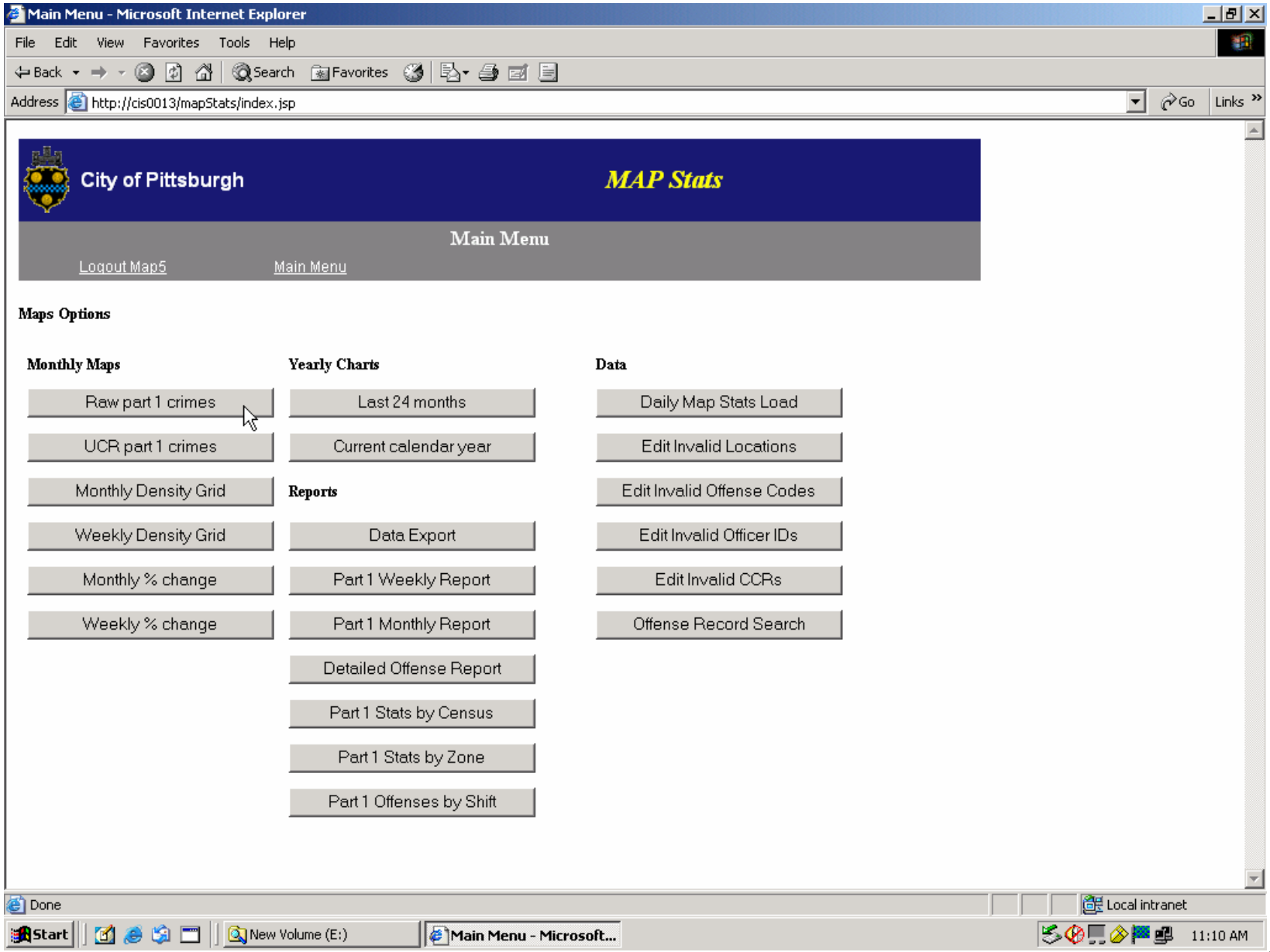
Tour of MapStats

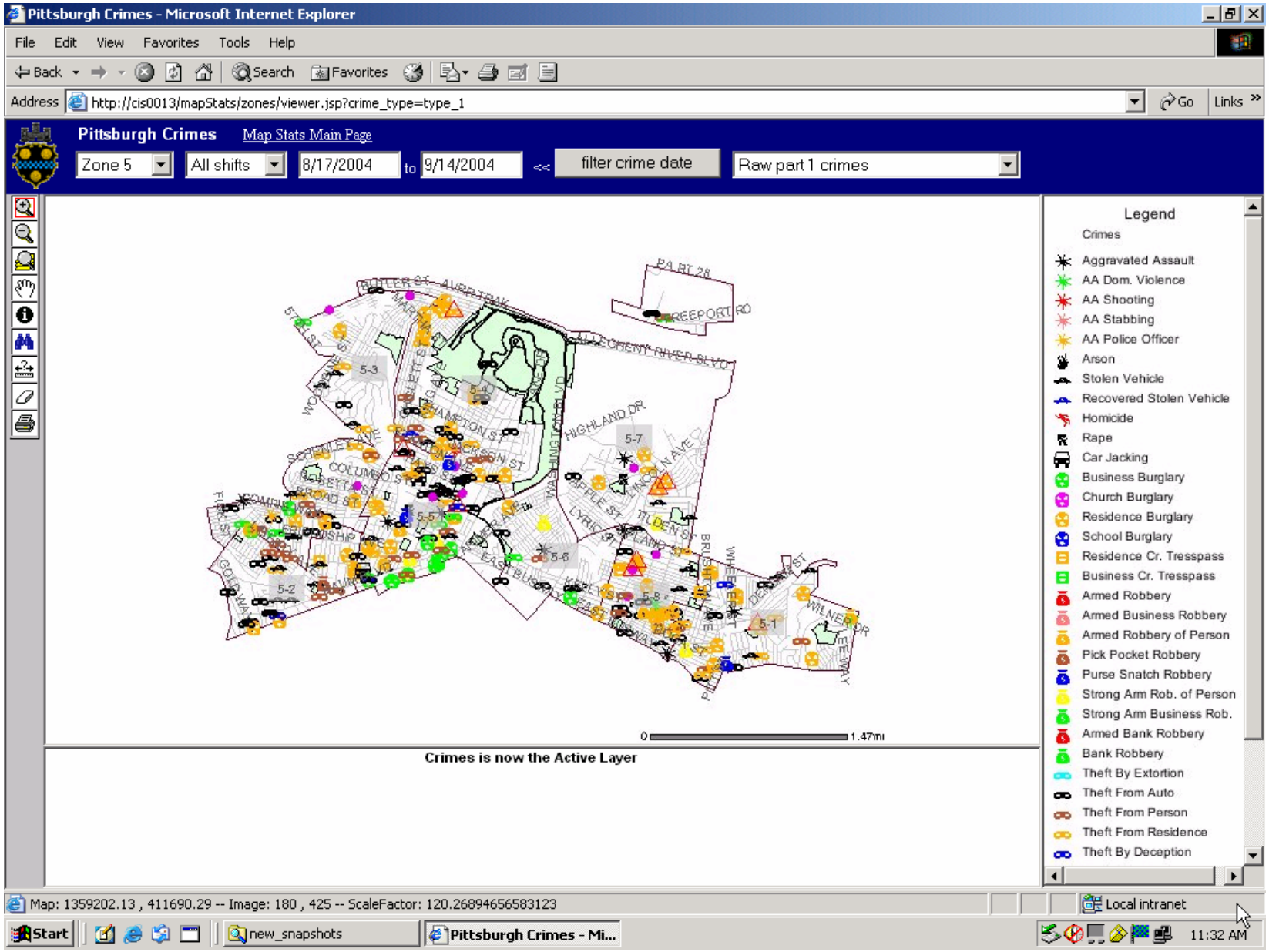
Basic Modes
Determined by User Login



Tour of MapStats

Analysis


Main Menu - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://cis0013/mapStats/index.jsp
Go Links
City of Pittsburgh
MAP Stats
Main Menu
Logout Map5
Main Menu
Maps Options
Monthly Maps
Raw part 1 crimes
UCR part 1 crimes
Monthly Density Grid
Weekly Density Grid
Monthly % change
Weekly % change
Yearly Charts
Last 24 months
Current calendar year
Reports
Data Export
Part 1 Weekly Report
Part 1 Monthly Report
Detailed Offense Report
Part 1 Stats by Census
Part 1 Stats by Zone
Part 1 Offenses by Shift
Data
Daily Map Stats Load
Edit Invalid Locations
Edit Invalid Offense Codes
Edit Invalid Officer IDs
Edit Invalid CCRs
Offense Record Search
Done
Local intranet
Start
New Volume (E:)
Main Menu - Microsoft...
11:10 AM


Pittsburgh Crimes - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://cis0013/mapStats/zones/viewer.jsp?crime_type=type_1
Go Links
Pittsburgh Crimes
Map Stats Main Page
Zone 5
All shifts
8/17/2004
to
9/14/2004
<<
filter crime date
Raw part 1 crimes
Legend
Crimes
Aggravated Assault
AA Dom. Violence
AA Shooting
AA Stabbing
AA Police Officer
Arson
Stolen Vehicle
Recovered Stolen Vehicle
Homicide
Rape
Car Jacking
Business Burglary
Church Burglary
Residence Burglary
School Burglary
Residence Cr. Tresspass
Business Cr. Tresspass
Armed Robbery
Armed Business Robbery
Armed Robbery of Person
Pick Pocket Robbery
Purse Snatch Robbery
Strong Arm Rob. of Person
Strong Arm Business Rob.
Armed Bank Robbery
Bank Robbery
Theft By Extortion
Theft From Auto
Theft From Person
Theft From Residence
Theft By Deception
5-1
5-2
5-3
5-4
5-5
5-6
5-7
5-8
0
1.47mi
Crimes is now the Active Layer
Map: 1359202.13 , 411690.29 -- Image: 180 , 425 -- ScaleFactor: 120.26894656583123
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Start
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Pittsburgh Crimes - Mi...
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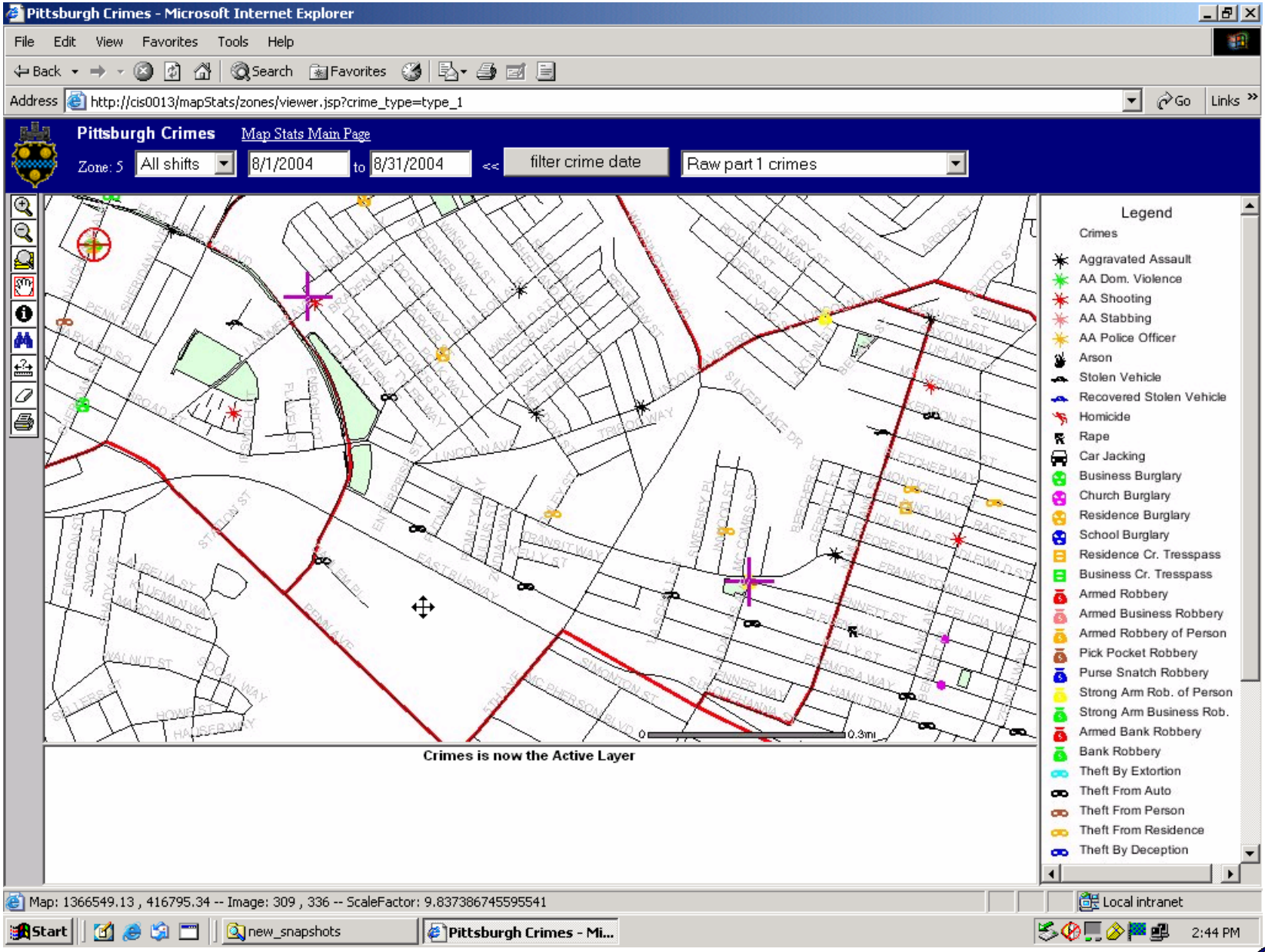
Pittsburgh Crimes - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://cis0013/mapStats/zones/viewer.jsp?crime_type=type_1
Go Links
Pittsburgh Crimes
Map Stats Main Page
Zone: 5
All shifts
8/1/2004
to
8/31/2004
<<
filter crime date
Raw part 1 crimes
Legend
Crimes
Aggravated Assault
AA Dom. Violence
AA Shooting
AA Stabbing
AA Police Officer
Arson
Stolen Vehicle
Recovered Stolen Vehicle
Homicide
Rape
Car Jacking
Business Burglary
Church Burglary
Residence Burglary
School Burglary
Residence Cr. Tresspass
Business Cr. Tresspass
Armed Robbery
Armed Business Robbery
Armed Robbery of Person
Pick Pocket Robbery
Purse Snatch Robbery
Strong Arm Rob. of Person
Strong Arm Business Rob.
Armed Bank Robbery
Bank Robbery
Theft By Extortion
Theft From Auto
Theft From Person
Theft From Residence
Theft By Deception
0
0.3mi
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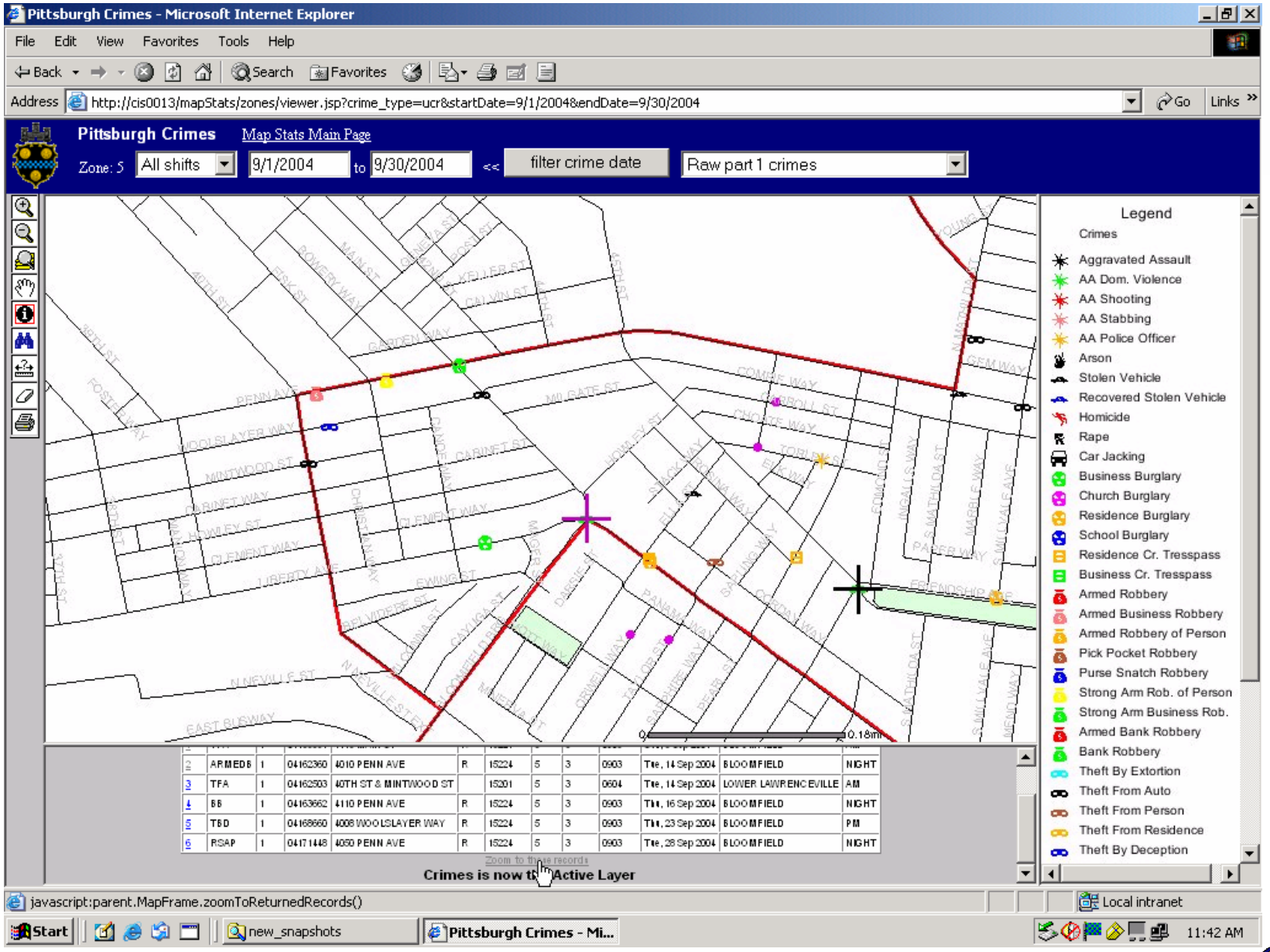
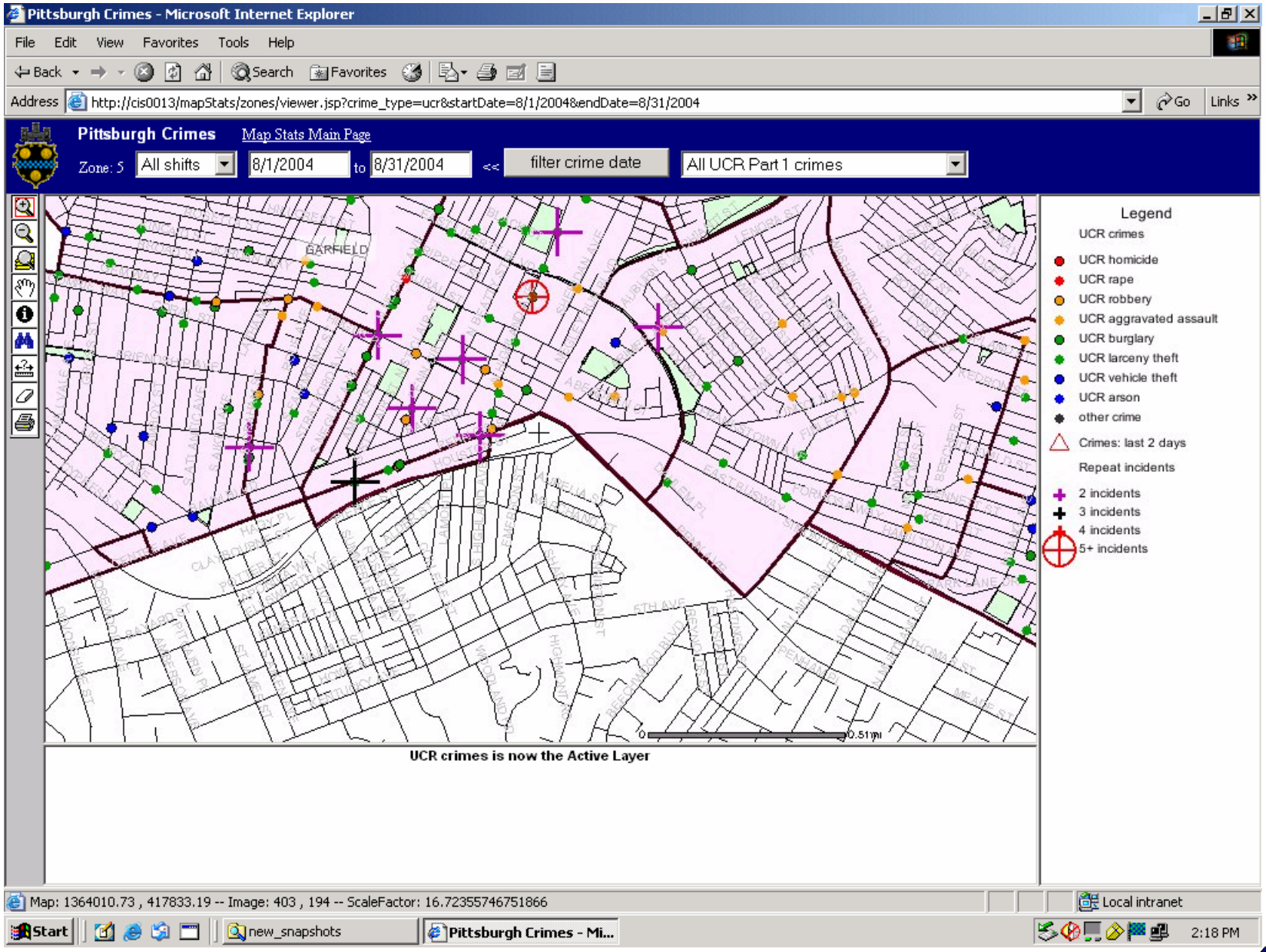
2:44 PM


Pittsburgh Crimes - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://cis0013/mapStats/zones/viewer.jsp?crime_type=ucr&startDate=9/1/2004&endDate=9/30/2004
Go Links
Pittsburgh Crimes
Map Stats Main Page
Zone: 5
All shifts
9/1/2004
to
9/30/2004
<<
filter crime date
Raw part 1 crimes
Legend
Crimes
Aggravated Assault
AA Dom. Violence
AA Shooting
AA Stabbing
AA Police Officer
Arson
Stolen Vehicle
Recovered Stolen Vehicle
Homicide
Rape
Car Jacking
Business Burglary
Church Burglary
Residence Burglary
School Burglary
Residence Cr. Tresspass
Business Cr. Tresspass
Armed Robbery
Armed Business Robbery
Armed Robbery of Person
Pick Pocket Robbery
Purse Snatch Robbery
Strong Arm Rob. of Person
Strong Arm Business Rob.
Armed Bank Robbery
Bank Robbery
Theft By Extortion
Theft From Auto
Theft From Person
Theft From Residence
Theft By Deception
0 0.18mi
2 ARMEDB 1 04162360 4010 PENN AVE R 15224 5 3 0903 Tue, 14 Sep 2004 BLOOMFIELD NIGHT
3 TFA 1 04162503 40TH ST & MINTWOOD ST 15201 5 3 0604 Tue, 14 Sep 2004 LOWER LAWRENCEVILLE AM
4 BB 1 04163662 4110 PENN AVE R 15224 5 3 0903 Thu, 16 Sep 2004 BLOOMFIELD NIGHT
5 TBD 1 04168660 4008 WOOLSLAYER WAY R 15224 5 3 0903 Thu, 23 Sep 2004 BLOOMFIELD PM
6 RSAP 1 04171448 4050 PENN AVE R 15224 5 3 0903 Tue, 28 Sep 2004 BLOOMFIELD NIGHT
Zoom to these records
Crimes is now the Active Layer
javascript:parent.MapFrame.zoomToReturnedRecords()
Local intranet
Start
new_snapshots
Pittsburgh Crimes - Mi...
11:42 AM

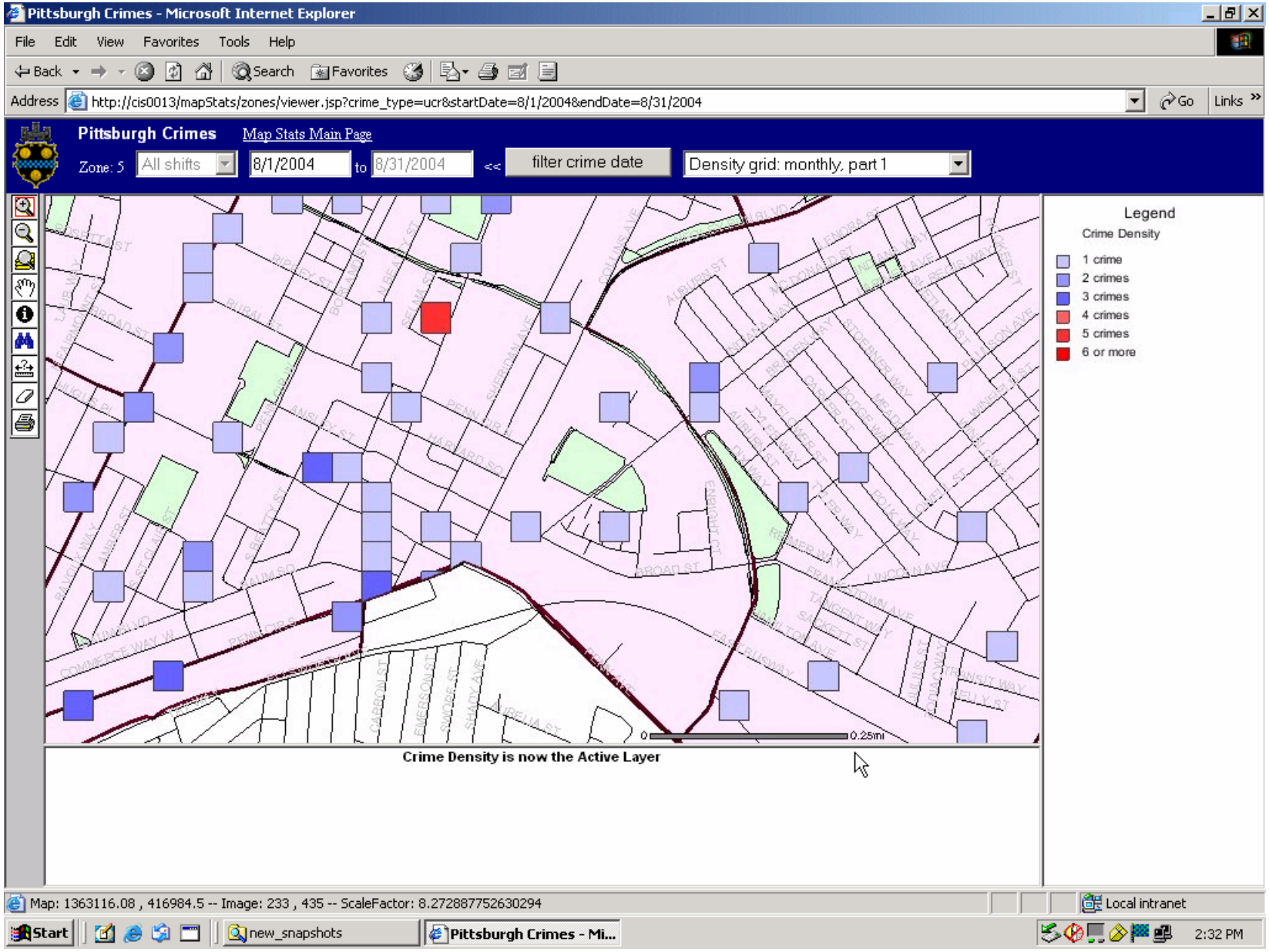

Pittsburgh Crimes - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://cis0013/mapStats/zones/viewer.jsp?crime_type=ucr&startDate=8/1/2004&endDate=8/31/2004
Go Links
Pittsburgh Crimes
Map Stats Main Page
Zone: 5
All shifts
8/1/2004
to
8/31/2004
<<
filter crime date
All UCR Part 1 crimes
GARFIELD
Legend
UCR crimes
UCR homicide
UCR rape
UCR robbery
UCR aggravated assault
UCR burglary
UCR larceny theft
UCR vehicle theft
UCR arson
other crime
Crimes: last 2 days
Repeat incidents
2 incidents
3 incidents
4 incidents
5+ incidents
0
0.51mi
UCR crimes is now the Active Layer
Map: 1364010.73 , 417833.19 -- Image: 403 , 194 -- ScaleFactor: 16.72355746751866
Local intranet
Start
new_snapshots
Pittsburgh Crimes - Mi...
2:18 PM

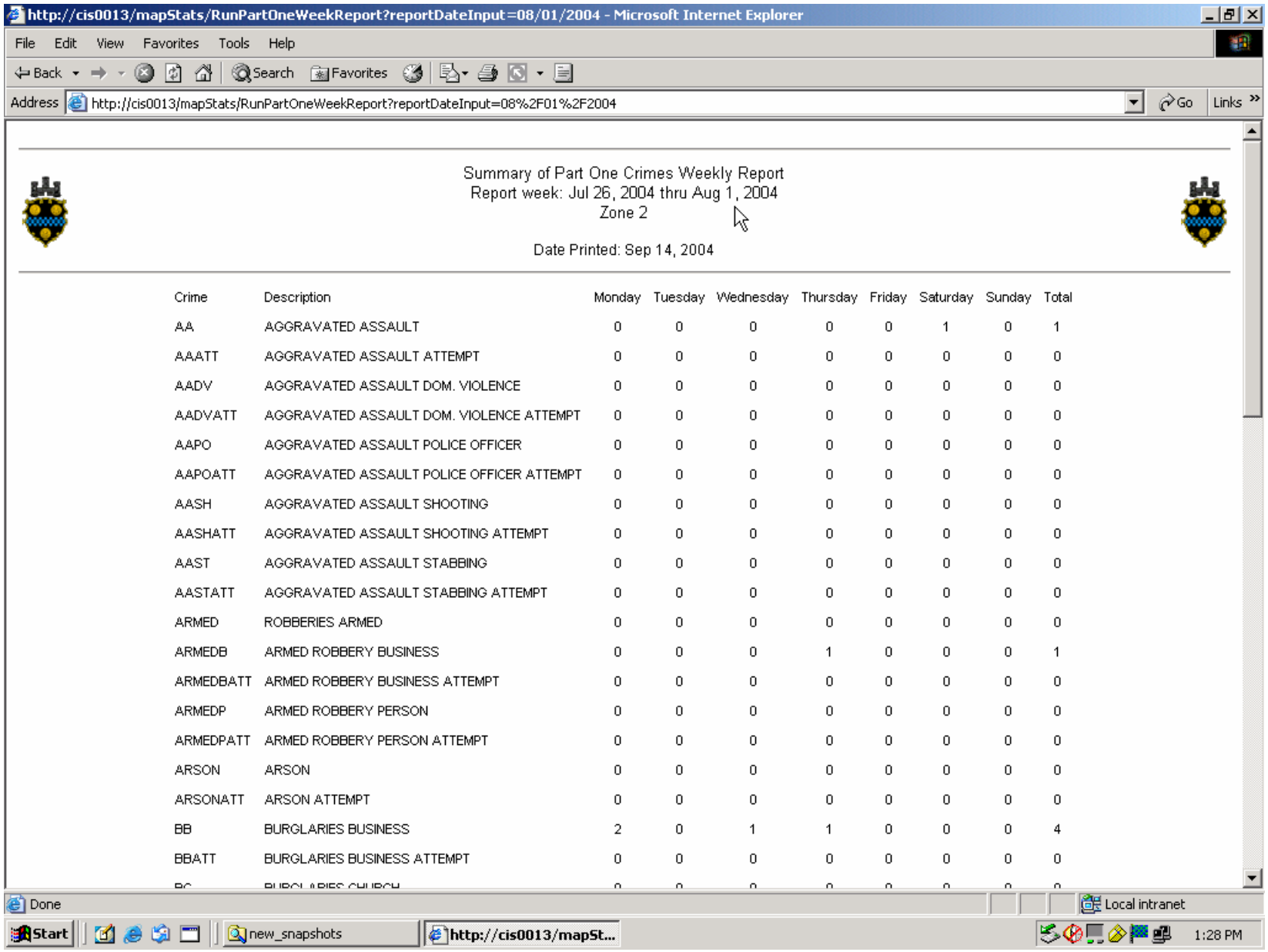
Raw data

Current crimes symbol

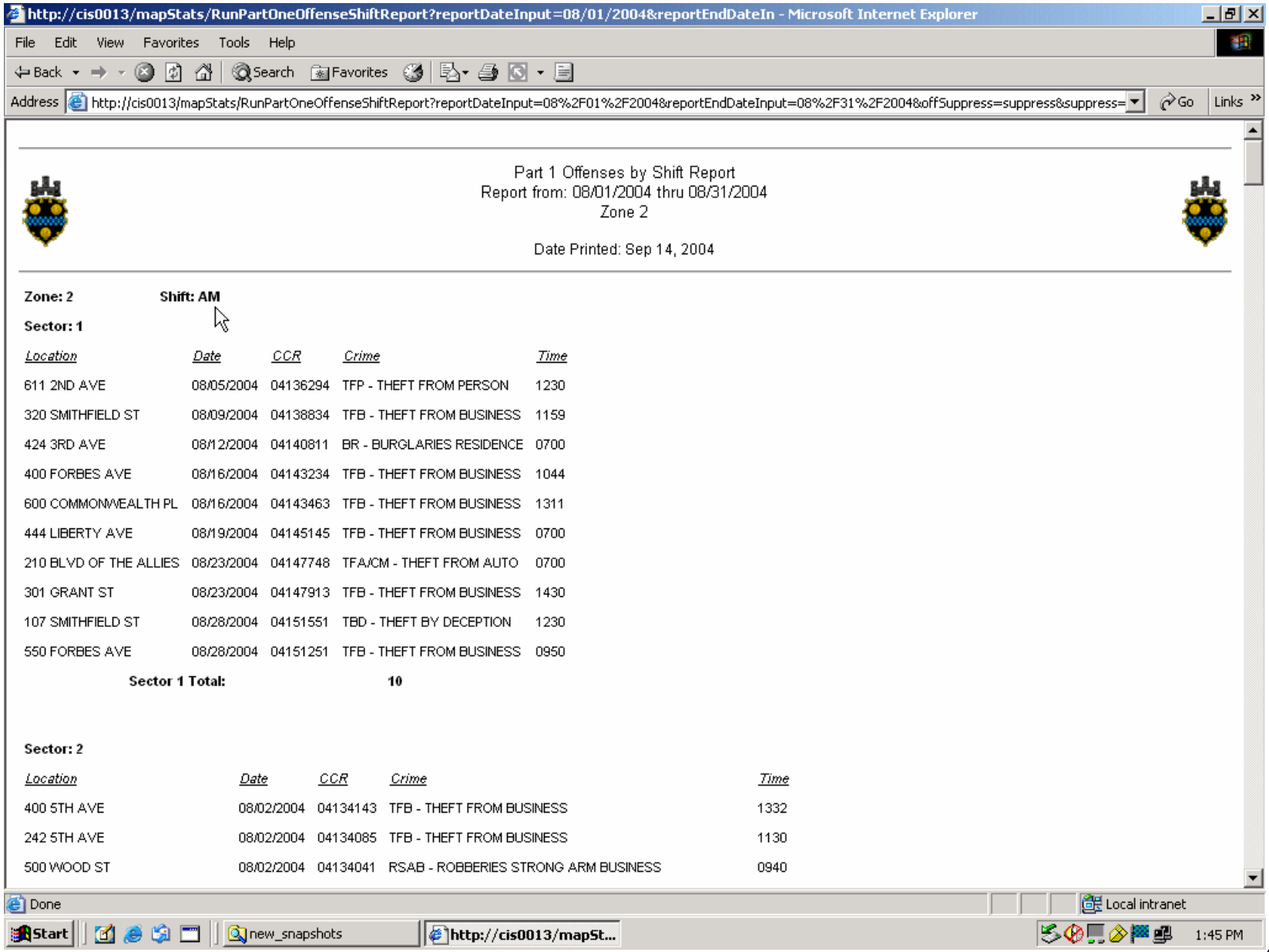
Data UCR coded

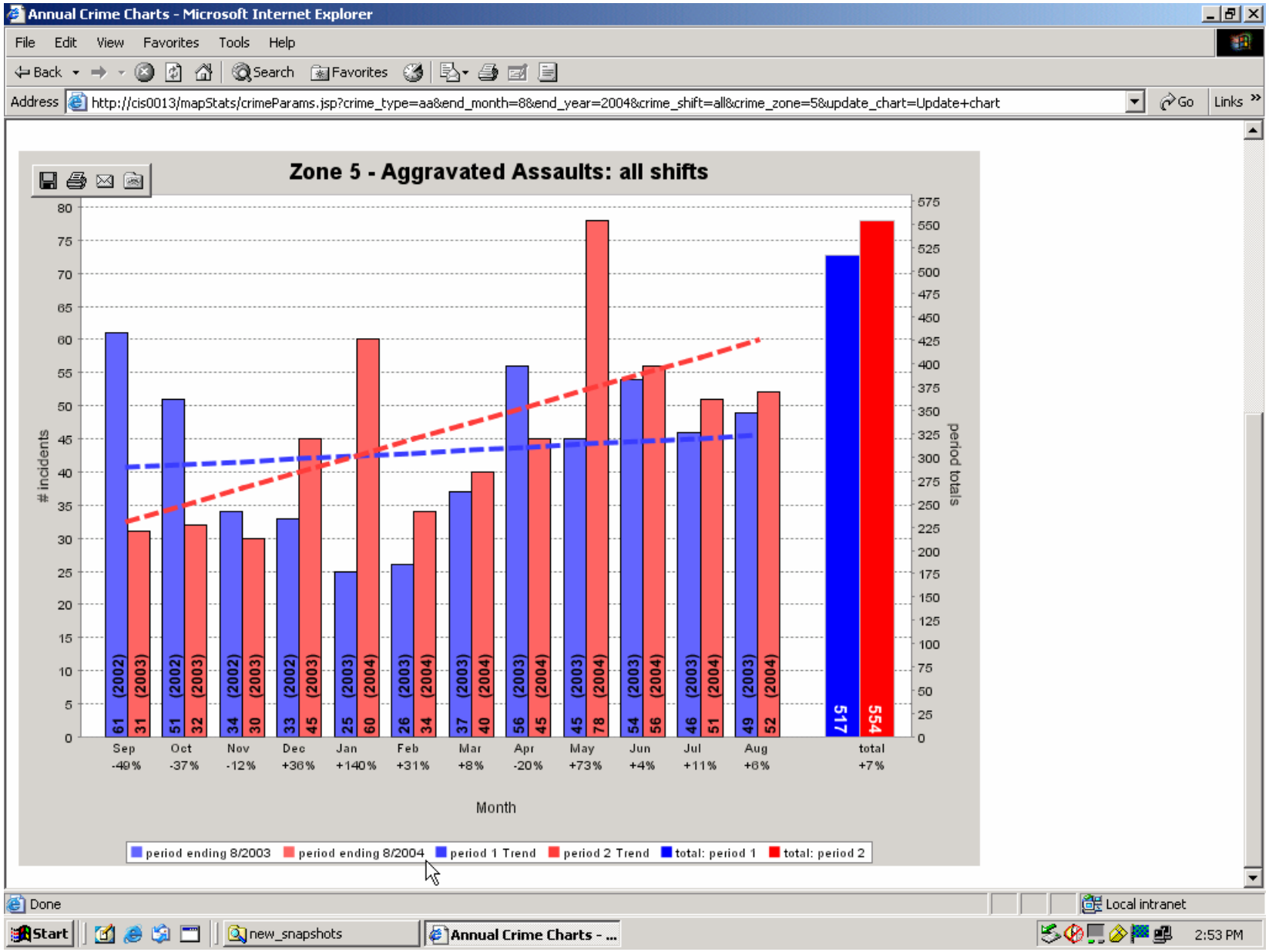
Multiple crimes geocoded at same address symbol

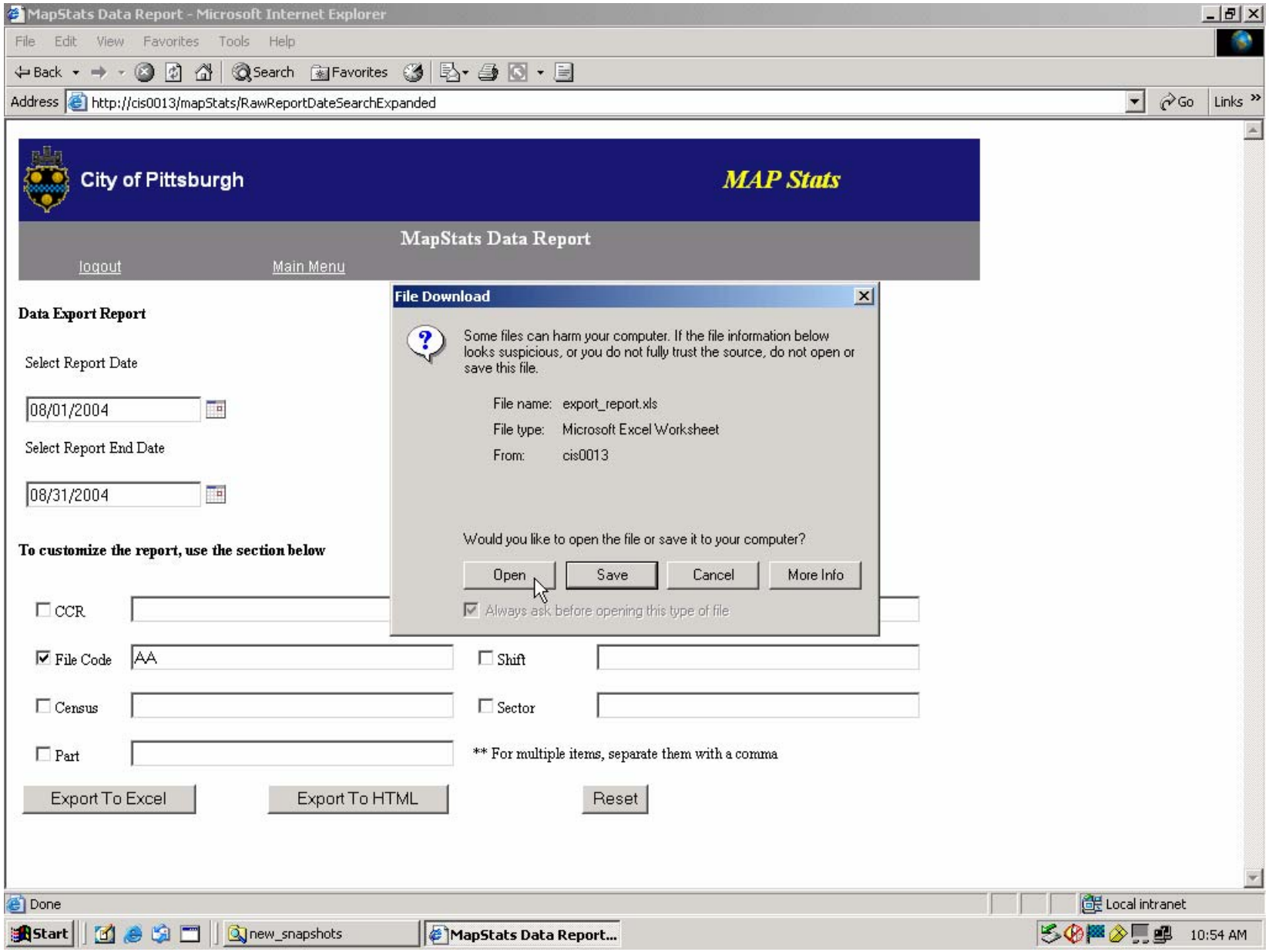

Pittsburgh Crimes - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://cis0013/mapStats/zones/viewer.jsp?crime_type=ucr&startDate=8/1/2004&endDate=8/31/2004
Go Links
Pittsburgh Crimes
Map Stats Main Page
Zone: 5
All shifts
8/1/2004
to
8/31/2004
<<
filter crime date
Density grid: monthly, part 1
Legend
Crime Density
1 crime
2 crimes
3 crimes
4 crimes
5 crimes
6 or more
0
0.25mi
Crime Density is now the Active Layer
Map: 1363116.08 , 416984.5 -- Image: 233 , 435 -- ScaleFactor: 8.272887752630294
Local intranet
Start
new_snapshots
Pittsburgh Crimes - Mi...
2:32 PM

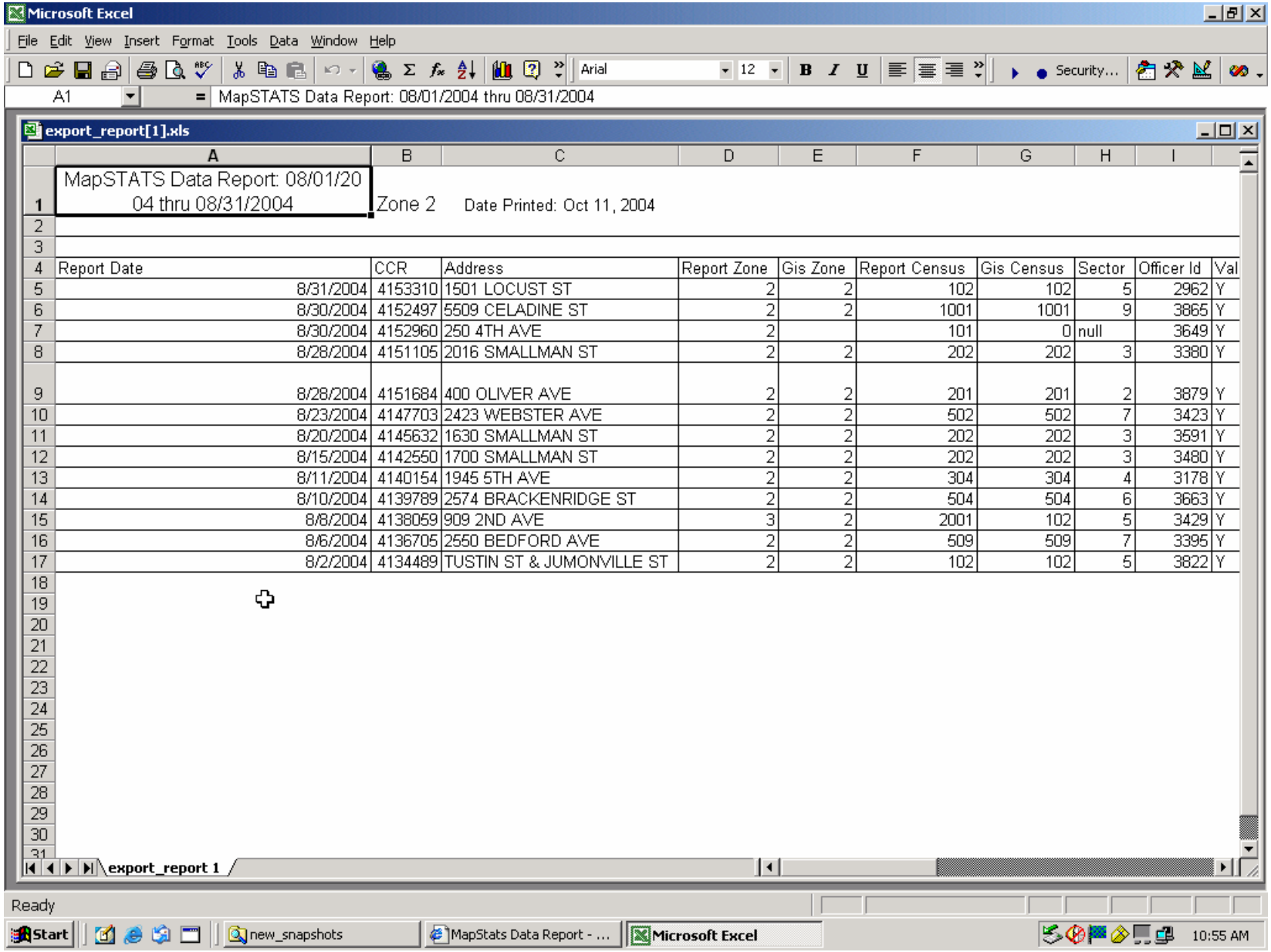


Crime	Description	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Total
AA	AGGRAVATED ASSAULT	0	0	0	0	0	1	0	1
AAATT	AGGRAVATED ASSAULT ATTEMPT	0	0	0	0	0	0	0	0
AADV	AGGRAVATED ASSAULT DOM. VIOLENCE	0	0	0	0	0	0	0	0
AADVATT	AGGRAVATED ASSAULT DOM. VIOLENCE ATTEMPT	0	0	0	0	0	0	0	0
AAPO	AGGRAVATED ASSAULT POLICE OFFICER	0	0	0	0	0	0	0	0
AAPOATT	AGGRAVATED ASSAULT POLICE OFFICER ATTEMPT	0	0	0	0	0	0	0	0
AASH	AGGRAVATED ASSAULT SHOOTING	0	0	0	0	0	0	0	0
AASHATT	AGGRAVATED ASSAULT SHOOTING ATTEMPT	0	0	0	0	0	0	0	0
AAST	AGGRAVATED ASSAULT STABBING	0	0	0	0	0	0	0	0
AASTATT	AGGRAVATED ASSAULT STABBING ATTEMPT	0	0	0	0	0	0	0	0
ARMED	ROBBERIES ARMED	0	0	0	0	0	0	0	0
ARMEDB	ARMED ROBBERY BUSINESS	0	0	0	1	0	0	0	1
ARMEDBATT	ARMED ROBBERY BUSINESS ATTEMPT	0	0	0	0	0	0	0	0
ARMEDP	ARMED ROBBERY PERSON	0	0	0	0	0	0	0	0
ARMEDPATT	ARMED ROBBERY PERSON ATTEMPT	0	0	0	0	0	0	0	0
ARSON	ARSON	0	0	0	0	0	0	0	0
ARSONATT	ARSON ATTEMPT	0	0	0	0	0	0	0	0
BB	BURGLARIES BUSINESS	2	0	1	1	0	0	0	4
BBATT	BURGLARIES BUSINESS ATTEMPT	0	0	0	0	0	0	0	0
BC	BURGLARIES CHURCH	0	0	0	0	0	0	0	0


http://cis0013/mapStats/RunPartOneOffenseShiftReport?reportDateInput=08/01/2004&reportEndDateIn - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://cis0013/mapStats/RunPartOneOffenseShiftReport?reportDateInput=08%2F01%2F2004&reportEndDateInput=08%2F31%2F2004&offSuppress=suppress&suppress=
Go Links
Part 1 Offenses by Shift Report
Report from: 08/01/2004 thru 08/31/2004
Zone 2
Date Printed: Sep 14, 2004
Zone: 2 Shift: AM
Sector: 1
Location Date CCR Crime Time
611 2ND AVE 08/05/2004 04136294 TFP - THEFT FROM PERSON 1230
320 SMITHFIELD ST 08/09/2004 04138834 TFB - THEFT FROM BUSINESS 1159
424 3RD AVE 08/12/2004 04140811 BR - BURGLARIES RESIDENCE 0700
400 FORBES AVE 08/16/2004 04143234 TFB - THEFT FROM BUSINESS 1044
600 COMMONWEALTH PL 08/16/2004 04143463 TFB - THEFT FROM BUSINESS 1311
444 LIBERTY AVE 08/19/2004 04145145 TFB - THEFT FROM BUSINESS 0700
210 BLVD OF THE ALLIES 08/23/2004 04147748 TFA/CM - THEFT FROM AUTO 0700
301 GRANT ST 08/23/2004 04147913 TFB - THEFT FROM BUSINESS 1430
107 SMITHFIELD ST 08/28/2004 04151551 TBD - THEFT BY DECEPTION 1230
550 FORBES AVE 08/28/2004 04151251 TFB - THEFT FROM BUSINESS 0950
Sector 1 Total: 10
Sector: 2
Location Date CCR Crime Time
400 5TH AVE 08/02/2004 04134143 TFB - THEFT FROM BUSINESS 1332
242 5TH AVE 08/02/2004 04134085 TFB - THEFT FROM BUSINESS 1130
500 WOOD ST 08/02/2004 04134041 RSAB - ROBBERIES STRONG ARM BUSINESS 0940
Done
Local intranet
Start
new_snapshots
http://cis0013/mapSt...
1:45 PM


Annual Crime Charts - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://cis0013/mapStats/crimeParams.jsp?crime_type=aa&end_month=8&end_year=2004&crime_shift=all&crime_zone=5&update_chart=Update+chart
Go Links
Zone 5 - Aggravated Assaults: all shifts
incidents
period totals
Month
Sep -49% 61 (2002) 31 (2003)
Oct -37% 51 (2002) 32 (2003)
Nov -12% 34 (2002) 30 (2003)
Dec +36% 33 (2002) 45 (2003)
Jan +140% 25 (2003) 60 (2004)
Feb +31% 26 (2003) 34 (2004)
Mar +8% 37 (2003) 40 (2004)
Apr -20% 56 (2003) 45 (2004)
May +73% 45 (2003) 78 (2004)
Jun +4% 54 (2003) 56 (2004)
Jul +11% 46 (2003) 51 (2004)
Aug +6% 49 (2003) 52 (2004)
total +7% 517 554
period ending 8/2003
period ending 8/2004
period 1 Trend
period 2 Trend
total: period 1
total: period 2
Done
Local intranet
Start
new_snapshots
Annual Crime Charts - ...
2:53 PM

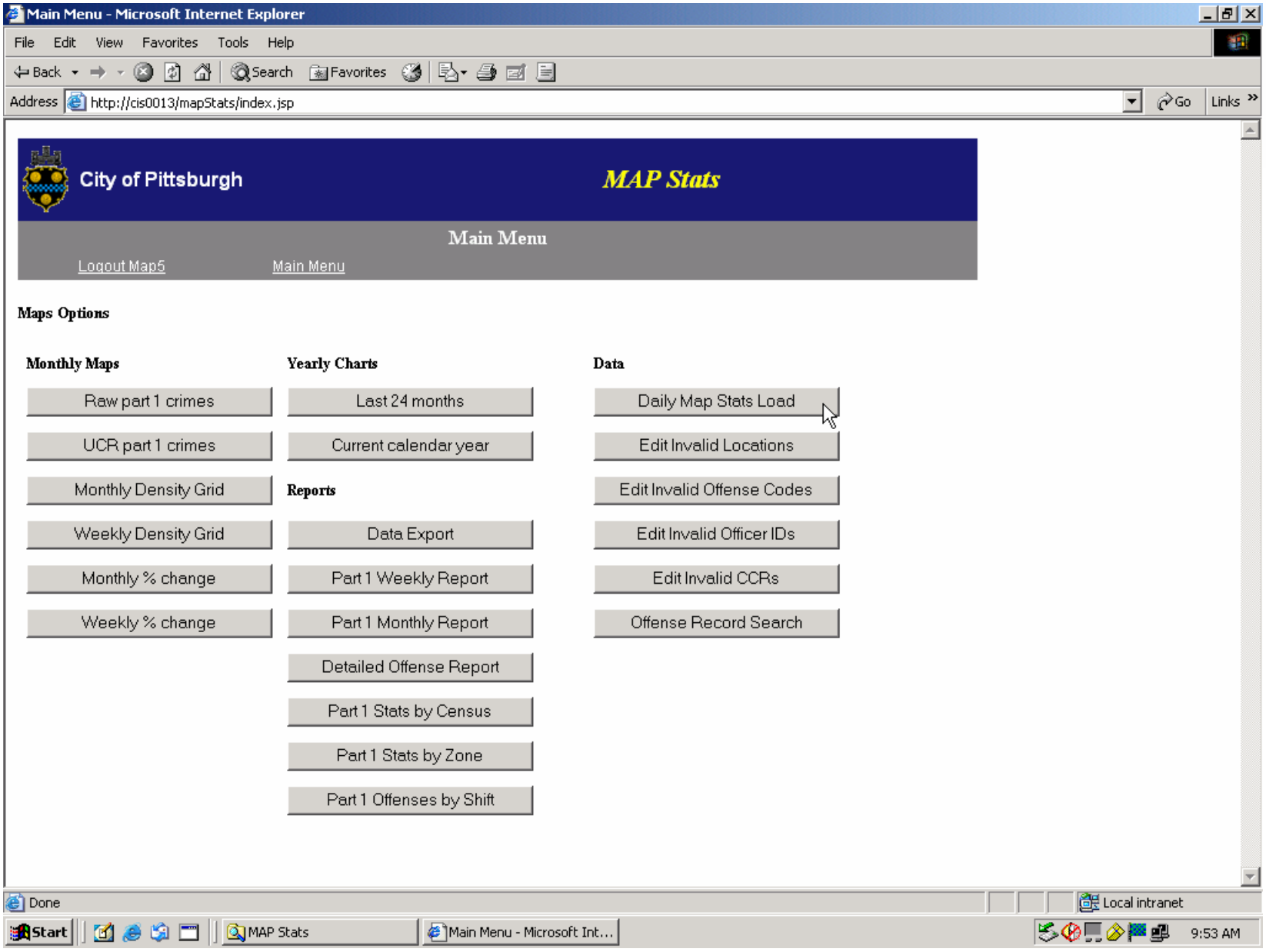

MapStats Data Report - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://cis0013/mapStats/RawReportDateSearchExpanded
Go Links
City of Pittsburgh
MAP Stats
MapStats Data Report
logout
Main Menu
Data Export Report
Select Report Date
08/01/2004
Select Report End Date
08/31/2004
To customize the report, use the section below
CCR
File Code
AA
Shift
Census
Sector
Part
** For multiple items, separate them with a comma
Export To Excel
Export To HTML
Reset
File Download
Some files can harm your computer. If the file information below looks suspicious, or you do not fully trust the source, do not open or save this file.
File name: export_report.xls
File type: Microsoft Excel Worksheet
From: cis0013
Would you like to open the file or save it to your computer?
Open
Save
Cancel
More Info
Always ask before opening this type of file
Done
Local intranet
Start
new_snapshots
MapStats Data Report...
10:54 AM



	A	B	C	D	E	F	G	H	I	
1	MapSTATS Data Report: 08/01/2004 thru 08/31/2004	Zone 2	Date Printed: Oct 11, 2004							
2										
3										
4	Report Date	CCR	Address	Report Zone	Gis Zone	Report Census	Gis Census	Sector	Officer Id	Val
5	8/31/2004	4153310	1501 LOCUST ST	2	2	102	102	5	2962	Y
6	8/30/2004	4152497	5509 CELADINE ST	2	2	1001	1001	9	3865	Y
7	8/30/2004	4152960	250 4TH AVE	2		101	0	null	3649	Y
8	8/28/2004	4151105	2016 SMALLMAN ST	2	2	202	202	3	3380	Y
9	8/28/2004	4151684	400 OLIVER AVE	2	2	201	201	2	3879	Y
10	8/23/2004	4147703	2423 WEBSTER AVE	2	2	502	502	7	3423	Y
11	8/20/2004	4145632	1630 SMALLMAN ST	2	2	202	202	3	3591	Y
12	8/15/2004	4142550	1700 SMALLMAN ST	2	2	202	202	3	3480	Y
13	8/11/2004	4140154	1945 5TH AVE	2	2	304	304	4	3178	Y
14	8/10/2004	4139789	2574 BRACKENRIDGE ST	2	2	504	504	6	3663	Y
15	8/8/2004	4138059	909 2ND AVE	3	2	2001	102	5	3429	Y
16	8/6/2004	4136705	2550 BEDFORD AVE	2	2	509	509	7	3395	Y
17	8/2/2004	4134489	TUSTIN ST & JUMONVILLE ST	2	2	102	102	5	3822	Y

Tour of MapStats

Retrieve Data


Main Menu - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://cis0013/mapStats/index.jsp
Go Links
City of Pittsburgh
MAP Stats
Main Menu
Logout Map5
Main Menu
Maps Options
Monthly Maps
Raw part 1 crimes
UCR part 1 crimes
Monthly Density Grid
Weekly Density Grid
Monthly % change
Weekly % change
Yearly Charts
Last 24 months
Current calendar year
Reports
Data Export
Part 1 Weekly Report
Part 1 Monthly Report
Detailed Offense Report
Part 1 Stats by Census
Part 1 Stats by Zone
Part 1 Offenses by Shift
Data
Daily Map Stats Load
Edit Invalid Locations
Edit Invalid Offense Codes
Edit Invalid Officer IDs
Edit Invalid CCRs
Offense Record Search
Done
Local intranet
Start
MAP Stats
Main Menu - Microsoft Int...
9:53 AM

Data scrubbing

Invalid Street Intersections:

Original Report Address:	**ALLEGHENY BL & WASHINGTON BL**
Standardized, Corrected Address:	**ALLEGHENY BLVD & WASHINGTON BLVD**
Message:	Street A: UNABLE TO FIND STREET / Street B: VALID STREET
Possible Candidates:	STREET A :: ALCON ST :: ALEXANDER ST :: ALEXANDER ST BRG :: ALLEGHENY AVE :: ALLEGHENY SQ E :: ALLEGHENY SQ W :: ALLEGHENY RIVER BLVD / STREET B: VALID

Street A: Prefix: [ ] Name: [ALLEGHENY] Type: [BLVD] Suffix: [ ]

Street B: Prefix: [ ] Name: [WASHINGTON] Type: [BLVD] Suffix: [ ]

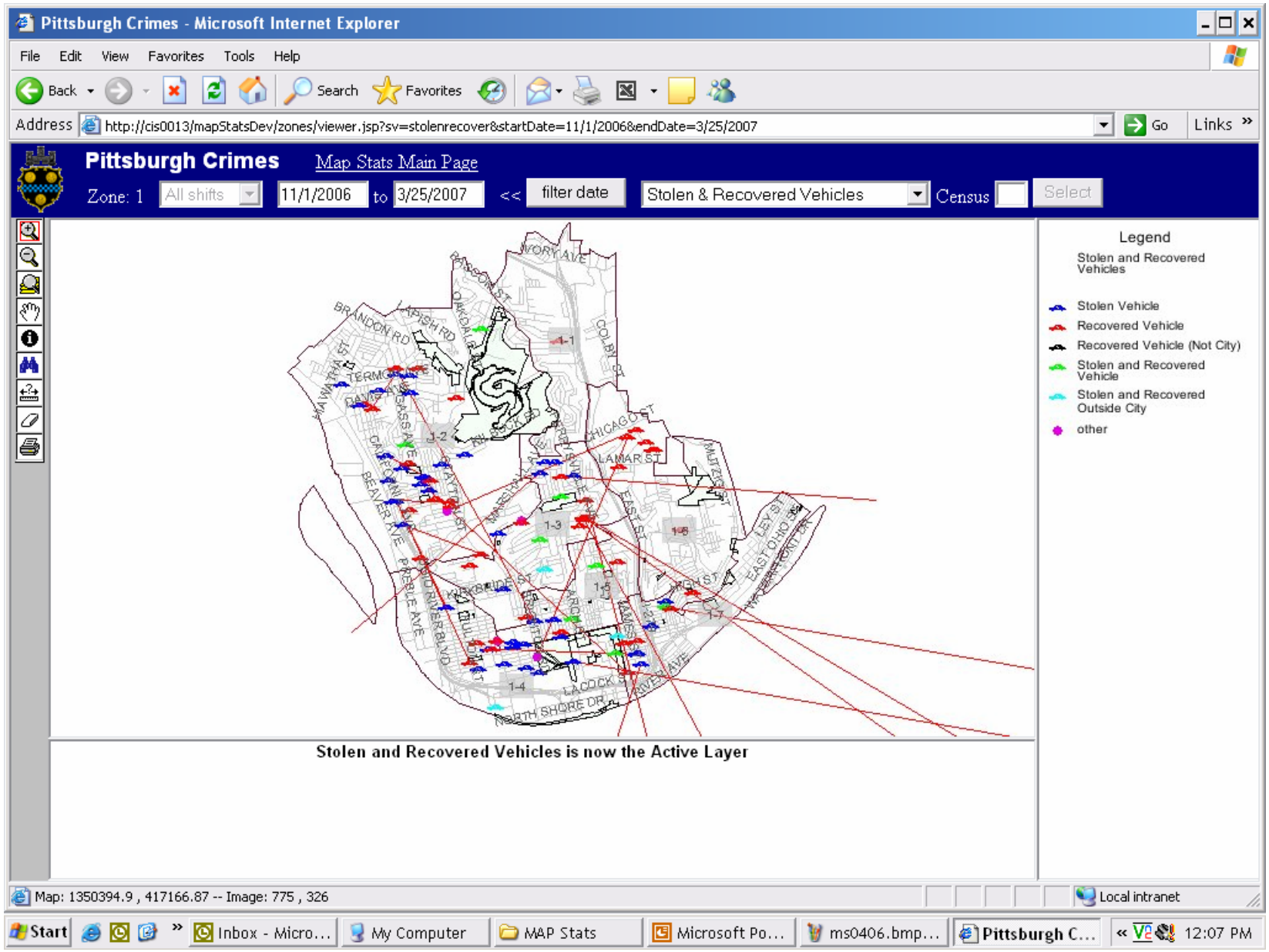
Revalidate

CCR #:	Load #Date:	Report #Date:	Report #Zone:
0464222	04/26/2004	04/21/2004	5

Submit for Review

Road Map to the Future

- Improve accuracy
  - Bureau is installing mobile laptops into patrol cars (APRS); Reporting will be complete in the field
  - Integrate data scrubbing into APRS
- The data gap has been narrowed
  - Room for improvement
  - Move the data retrieval to the APRS side
- Stolen and Recovery analysis maps


Pittsburgh Crimes - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://cis0013/mapStatsDev/zones/viewer.jsp?sv=stolenrecover&startDate=11/1/2006&endDate=3/25/2007
Go Links
Pittsburgh Crimes
Map Stats Main Page
Zone: 1
All shifts
11/1/2006
to
3/25/2007
<<
filter date
Stolen & Recovered Vehicles
Census
Select
Legend
Stolen and Recovered Vehicles
Stolen Vehicle
Recovered Vehicle
Recovered Vehicle (Not City)
Stolen and Recovered Vehicle
Stolen and Recovered Outside City
other
Stolen and Recovered Vehicles is now the Active Layer
Map: 1350394.9 , 417166.87 -- Image: 775 , 326
Local intranet
Start
Inbox - Micro...
My Computer
MAP Stats
Microsoft Po...
ms0406.bmp...
Pittsburgh C...
12:07 PM

Final Thoughts