Thefts from Automobiles: Using Data to Address Community Problems

An Analysis of Thefts from Automobiles Utilizing NIBRS Data
Roy City, Utah

March 2002

Utah Commission on Criminal and Juvenile Justice, Research and Data Unit & Roy City Police Department

CCJJ
Utah Commission on Criminal and Juvenile Justice

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Introduction

In a recent crime victimization survey conducted by the Utah Commission on Criminal and Juvenile Justice (CCJJ), it was found that most Utahns feel safe in their homes and neighborhoods. Despite overall feelings of safety, however, a majority responded that they believe crime has increased over the past three years and will continue to increase over the next three years. This in spite of a 21-year low in reported crime in the State of Utah.

The survey results also showed a large percentage of crimes that go unreported to law enforcement officials. Of these were incidents of theft from motor vehicles. Fifty-two percent of the victims of this crime in 2000 indicated that they did not report the crime to law enforcement officials. The reasons cited by respondents for not reporting this type of crime included that the crime was not important enough to report, the crime was caused by the victims' own carelessness, the victim didn't believe the police could help, or that the victim dealt with the crime in another manner. In addition, a 1998 CCJJ property crime analysis and report found that theft from motor vehicles was the most common type of larceny in Utah.

While some may initially believe that these types of crimes have minimal effects on victims, it is important to recognize the profound effects of even minor crimes can have on citizens perceptions of crime in general and feelings of personal safety. This may help explain why the majority of respondents to the survey believed that crime had increased and will continue to increase despite the dramatic drop in crime experienced in Utah and the rest of the country. Not only are property crimes problematic in public areas such as schools, parks and businesses, they are particularly troublesome when they occur at personal residences.

With these factors in mind, the Utah Statistical Analysis Center (SAC), located within CCJJ, has conducted an analysis utilizing National Incident-based Reporting System (NIBRS) data looking at the crime of theft from motor vehicles in a local community, Roy City. The purpose of this analysis and report is twofold: 1) to provide Roy City with valid and useful information that will lead to the formation of policies and programs to lower the number of thefts from motor vehicles; and 2) to demonstrate the usefulness of NIBRS data collection and analysis to other law enforcement agencies in the State. Included in this process will be the use of crime mapping using NIBRS data. The Utah SAC will post this study on its web site, as well as make presentations to local agencies in an effort to demonstrate the tactical utility NIBRS data can provide.

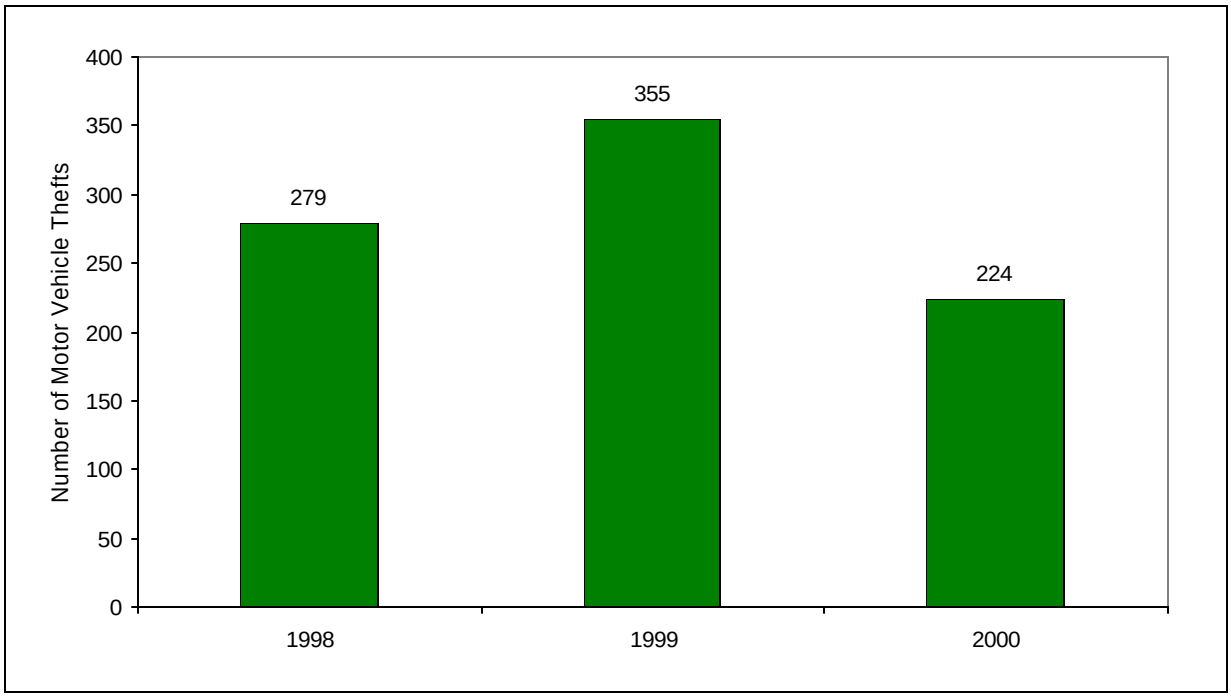
Roy City

Roy City is located 30 miles north of Salt Lake City with a population of approximately 30,000 residents. The police department is one of Utah's pioneer NIBRS agencies utilizing the system since 1995. All of the crime reported in Roy City is encompassed in its NIBRS data collection system. Initial reviews of data, as well as anecdotal information from officers, have indicated that theft from motor vehicles is one of the most critical crime problems within Roy City. The police chief also indicated that citizens are tired of this particular problem and are demanding that the police do something to address the issue.

Analysis

To begin, the total number of reported incidents of theft from motor vehicles within Roy City from 1998 through 2000 is shown in **Figure 1** below.

Figure 1: Theft from Motor Vehicles 1998 - 2000



* Includes theft of motor vehicle parts and accessories.

There were a total of 858 reported incidents during this time frame. 1999 may have been an anomaly with a 27% increase over 1998. The incidents then decreased 40% between 1999 and 2000.

Figure 2: Theft From Motor Vehicle vs. Theft of Motor Vehicle Parts/Accessories 1998 - 2000

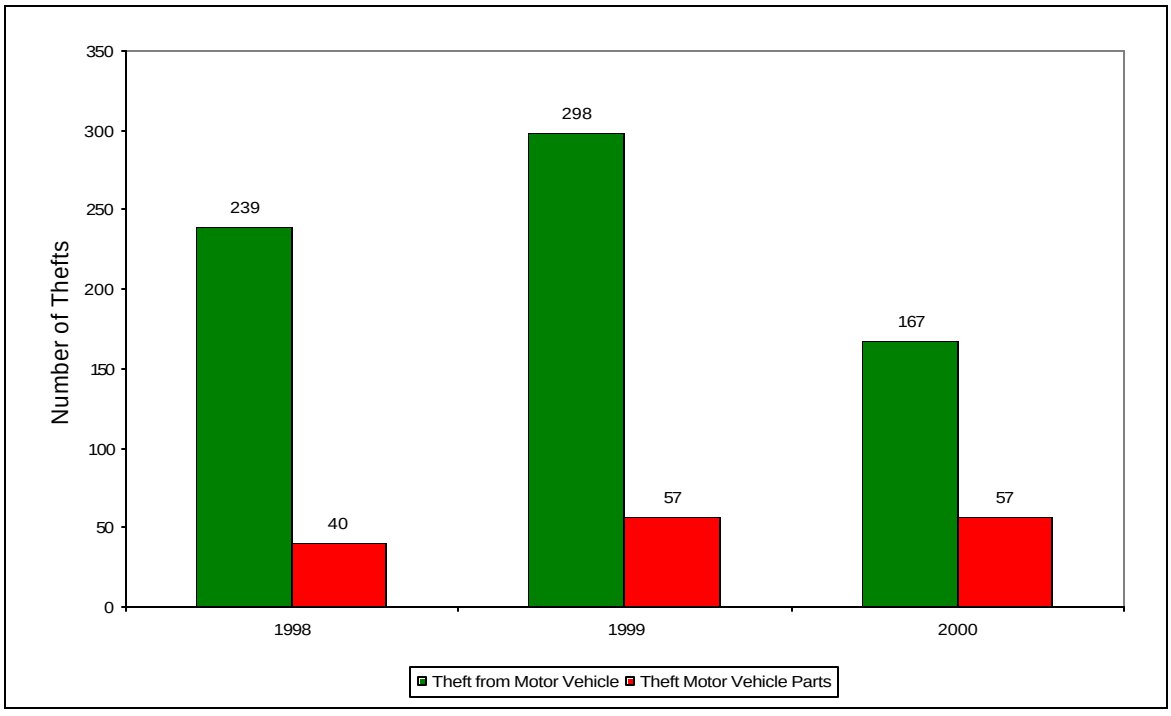


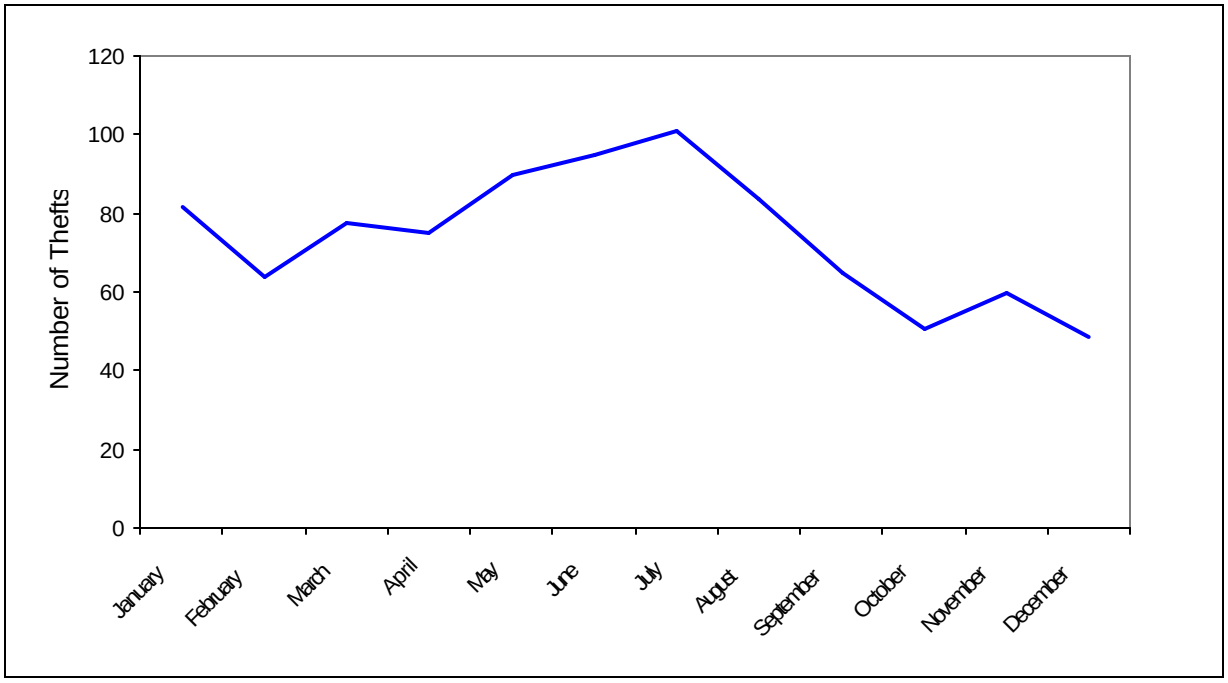
Figure 2 shows the distribution of theft of items from motor vehicles versus theft of motor vehicle parts/accessories from 1998 through 2000. Clearly, theft of items from motor vehicles was more common.

Between 1998 and 1999, theft from motor vehicles increased 25% while theft of motor vehicle parts/accessories increased 43%. Between 1999 and 2000, theft from motor vehicles decreased 44% while theft of motor vehicle parts remained the same. **Figure 2** makes it quite clear that Roy City's primary problem is with theft of items from motor vehicles, while theft of parts and accessories is secondary.

Uncovering Patterns Utilizing Month, Day and Hour Data

NIBRS data can be helpful in uncovering patterns of when a particular type of crime occurs. Looking at Roy City's NIBRS data, we are able to discern several significant patterns. One obvious limitation is that theft from motor vehicles is almost always committed, by design of course, without witnesses, including the victim. The victim is usually only able to give the police an estimated time frame in which the crime occurred. Despite this limitation, however, several patterns emerge when looking at the month, day, and hour of thefts from motor vehicles. **Figure 3** shows a seasonal pattern when looking at thefts by month.

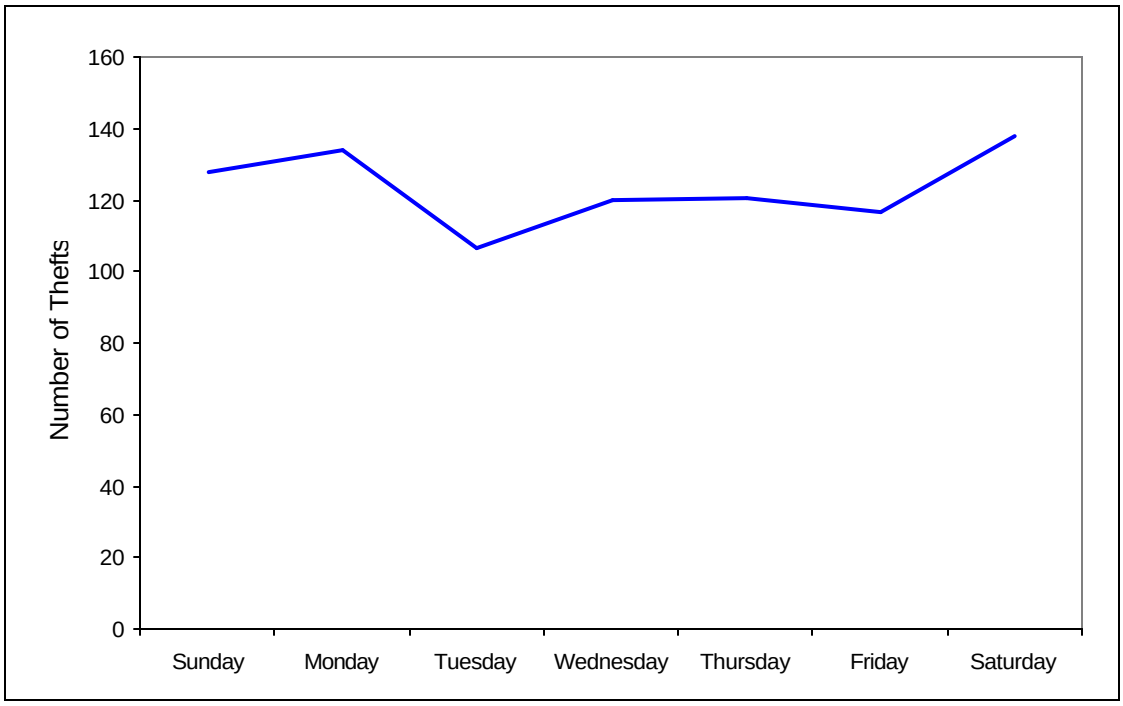
Figure 3: Theft from Motor Vehicles by Month, 1998 - 2000



This crime most commonly occurred in the summer months, and occurred less frequently in the winter months (with the exception of January.) While the months of June through August account for 25% of a year, 32% of the thefts took place during that time period. Similarly, only 18% of thefts occurred from October through December.

Figure 4 indicates the day of the week that thefts from motor vehicles occurred.

Figure 4: Theft from Motor Vehicles by Day of Week, 1998 - 2000



Nearly half of the thefts occurred over weekends. Spikes on Sunday and Monday reflect a lag in the time thefts occurred and when they were reported to police. For example, the spike of reported incidents on Monday most likely represents thefts that occurred Saturday or Sunday, but were not noticed or reported until Monday. Nevertheless, this information is valuable as it shows that a large number of the incidents took place on weekends.

Figure 5: Theft from Motor Vehicles by Time of Day, 1998 - 2000

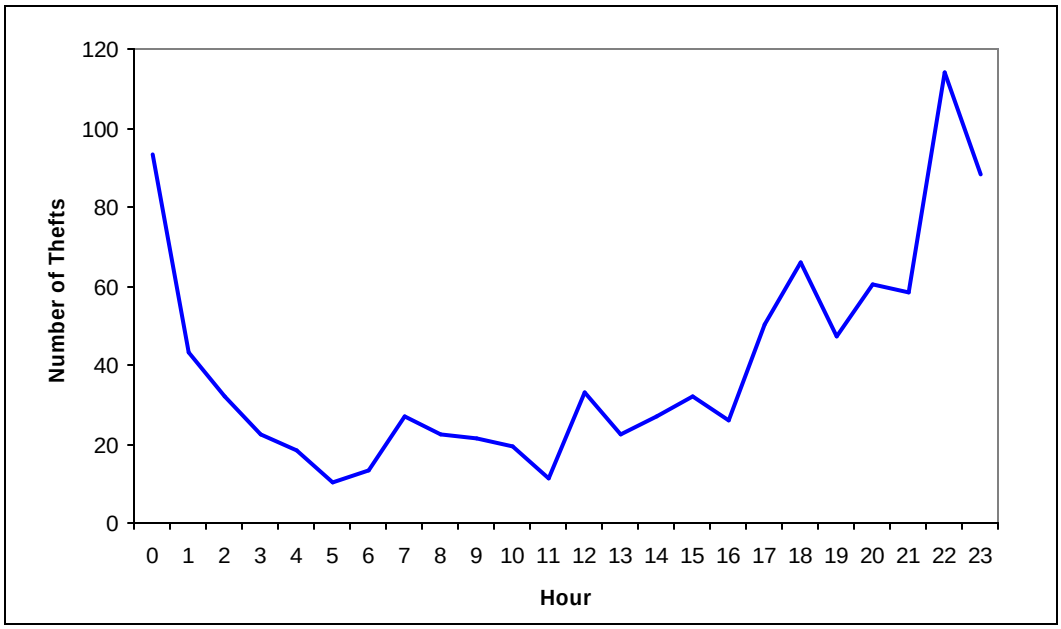


Figure 5 shows that 42% of the thefts were reported to police, or reported as occurring, between the hours of 10 p.m. (2200 hours) and 4 a.m. As the figure depicts, there are noticeable peaks at 7 a.m., noon, and 6 p.m. (1800 hours). These correspond to times when victims were most apt to discover the crime when leaving home, at lunch, or at the end of the workday and report it to police. The times do not necessarily reflect the time the crime actually occurred.

Figure 6: Theft from Motor Vehicles by Time of Day, Winter vs. Summer 1998 - 2000

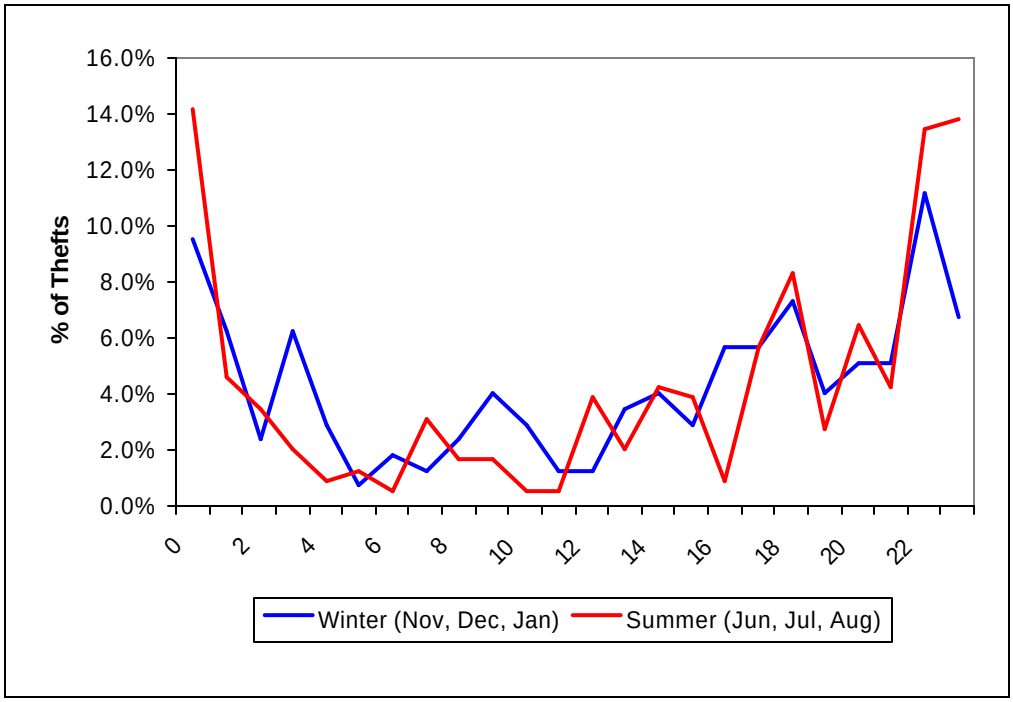


Figure 6 compares the time of day thefts were committed in summer and winter months. The patterns are somewhat different. During winter months, 43% of the thefts were reported to have occurred, or were reported to police, between 8 a.m. and 7 p.m. This compares to 34% during the summer months. This is most likely reflective of temperature, school and the amount of daylight. Police indicate a large percentage of thefts from motor vehciles are carried out by juveniles. During summer months, juveniles generally stay out later in the evening, and warm temperatures enable them to stay outdoors longer and more comfortably. That may, in part, explain why more of the thefts occur during the evening hours during the summer.

Figure 7: Theft from Motor Vehicle by Days of the Week, Winter vs. Summer 1998 - 2000

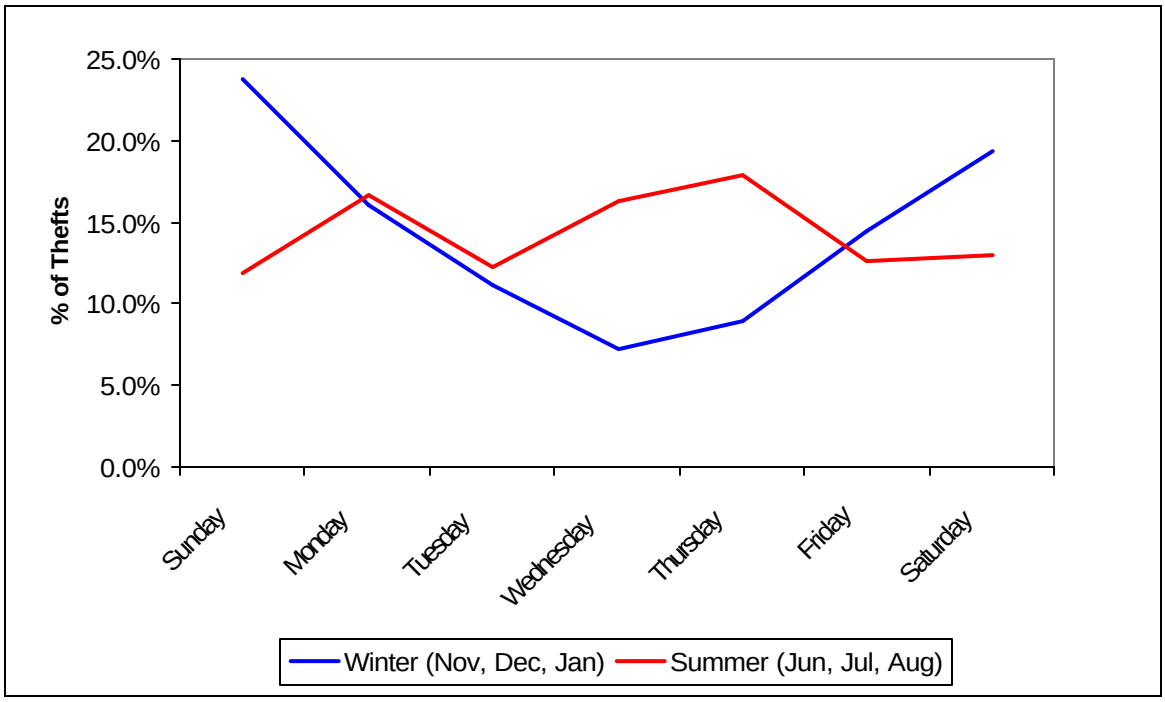


Figure 7 shows that the distribution of thefts during the week changes fairly dramatically when comparing summer and winter months. During winter months, a majority of the thefts occurred over weekends and bottomed-out during the middle of the week. Summer months provide a more stable distribution with the peak actually occurring during the week.

Again, this may be reflective juveniles committing this offense. During winter months, kids are in school and home earlier in the evening. Weekends would provide the best opportunity to commit the thefts. In constrast, during the summer when kids are out of school, they are more likely to be out and about throughout the week. This could assist in explaining the pattern shown in **Figure 7**.

Summary of Month, Day and Hour Data

Looking at the data presented thus far regarding month, day and hour information, one can see several distinct patterns. Thefts from motor vehicles occurred most frequently in summer months, and least frequently during winter months. The spike in January shown in **Figure 3** appears to be the result of an exceedingly high number of thefts that occurred in January of 1998. Thefts in January of 1999 and 2000 were similar in number to those in November and December of all three years.

A large proportion of thefts occurred during nighttime hours, between 8 p.m. and 7 a.m. During winter months, more thefts occurred during the day, between 8 a.m. and 7 p.m., compared to summer months. This is likely due to the colder temperatures during evenings in winter, and the fact that it becomes dark earlier in winter providing cover to commit these offenses earlier in the day. Also, during winter months, people are more likely to park their cars in garages and less likely to leave windows open. This lessens the opportunities available to offenders. Also, as stated previously, kids and school could be a compelling factor.

The patterns of seasonality and time of offense are most likely due to three primary factors: school, temperature, and daylight. As will be shown in the next section, arrests indicate juveniles commit the majority of these offenses. During summer months, with school out, juveniles stay out later in warm weather and commit more thefts during the evening and late night hours. The school schedule helps explain the spike of offenses on weekends during winter months.

Location of Thefts from Motor Vehicles

Thefts from motor vehicles most commonly occurred at personal residences. A fairly large percentage also occurred at parking lots and garages. **Table 1** shows the location type of all thefts from motor vehicles.

Table 1: Location Type of Theft from Motor Vehicles 1998 - 2000

Location	*n*	%
Residence/Home	607	54.2
Parking Lot/Garage	269	24.0
Highway/Road/Alley	113	10.1
Other/Unknown	28	2.5
School/College	22	2.0
Specialty Store	20	1.8
Service/Gas Station	18	1.6
Convenience Store	7	0.6
Restaurant	6	0.5
Rental Storage Facility	5	0.4
Commercial/Office Building	5	0.4
Grocery/Supermarket	4	0.4
Construction Site	3	0.3
Bar/Night Club	3	0.3
Bank/Savings and Loan	2	0.2
Church/Synagogue/Temple	2	0.2
Government/Public Building	2	0.2
Field/Woods	1	0.1
Department/Discount Store	1	0.1
Hotel/Motel/Etc.	1	0.1

Type of Property Stolen

Table 2 details information about the type of property stolen from motor vehicles. Data showed that seventy-eight percent of the stolen items were never recovered, 10% were recovered, and 12% were destroyed or damaged. Vehicle parts and accessories are the most common type of property stolen, along with other expected items such as money, compact discs, electronic devices, wallets and purses.

Table 2: Type of Property Stolen From Motor Vehicles 1998 - 2000

Property Type	*n*	%
Vehicle Parts/Accessories	499	24.8
Other	329	16.4
Money	140	7.0
Recordings-Audio/Visual	122	6.1
Radios/TVs/VCRs	121	6.0

Table 2, Continued: Type of Property Stolen From Motor Vehicles 1998 - 2000

Property Type	*n*	%
Purses/Handbags/Wallets	114	5.7
Automobiles	111	5.5
Office-type Equipment	92	4.6
Household Goods	82	4.1
Tools	72	3.6
Credit/Debit Cards	70	3.5
Merchandise	58	2.9
Nonnegotiable Instruments	50	2.5
Clothes/Furs	41	2.0
Consumable Goods	33	1.6
Jewelry/Precious Metals	18	0.9
Computer Hardware/Software	11	0.5
Firearms	9	0.4
Trucks	9	0.4
Negotiable Instruments	5	0.2
Other Motor Vehicles	4	0.2
Pending Inventory	4	0.2
Alcohol	3	0.1
Bicycles	3	0.1
Drugs/Narcotics	2	0.1
Structures-Other	2	0.1
Buses	1	0.1
Recreational Vehicles	1	0.1
Structures-Other Commercial	1	0.1
Structures-Public/Community	1	0.1
Structures-Storage	1	0.1

Offenders, Arrestees, and Victims

Offender information is difficult to gather with this type of offense. As mentioned earlier, the identity, or any characteristics, of the offender is often unknown because the crimes occur without witnesses. For this reason, a look at arrestees is more accurate and appropriate. It should be noted that few incidents of theft from motor vehicles resulted in an arrest.

There were a total of 253 arrests associated with the 858 incidents (29%) included in this analysis. The average age of the arrestees was 16 years, and 97% were males. Seventy-two percent were residents of Roy City, and 83% were students in the 11th grade or lower. There was an average of 46 days between incident date and arrest date. In 26% of the incidents where an arrest was made, the arrest took place on the same date that the crime occurred. This likely occurred when the victim had a good idea who stole the property or the offender was caught in the act of committing the offense.

Looking at victims, 97% were individuals while 3% were businesses. Of the individuals, 65% were male. The average age of the victims was 33 years, and 86% were citizens of Roy City.

Table 3 compares the type of property stolen when an arrest took place with the age of the arrestee. This analysis was conducted at the request of the Roy Police Department. Detectives were curious to see if older thiefs were more likely to steal more sophisticated items or items that were more difficult to get money from. For example, vehicle parts and accessories stolen may require the thief to know of a chop-shop or other avenue to sell the item to. Whereas, juvenile offenders may look for the quick payoff, such as cash or music CDs. To a certain extent, that pattern does emerge. Arrestees over 18 were more likely to steal vehicle parts and accessories. Arrestees 18 and under were more likely to steal items not attached to an automobile, such as money, purses, CDs, etc.

Table 3: Type of Property Stolen Compared to Age of Arrestee, 1998 - 2000

18 Years of Age or Under

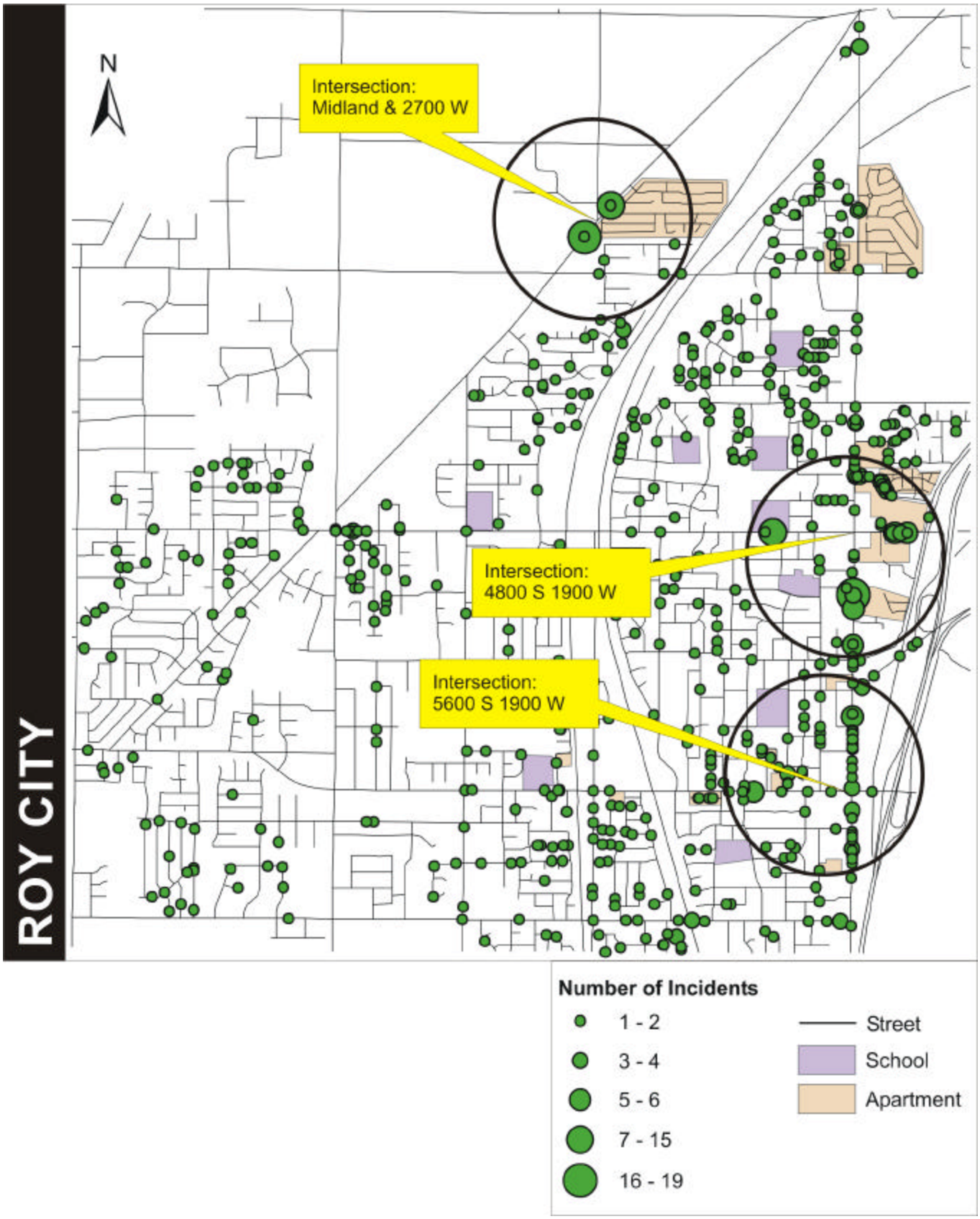
Property Type	*n*	%
Other	114	17.4
Vehicle Parts/Accessories	88	13.5
Money	82	12.5
Purses/Handbags/Wallets	55	8.4
Radios/TVs/VCRs	44	6.7
Household Goods	37	5.7
Recordings-Audio/Visual	34	5.2
Office-type Equipment	29	4.4
Credit/Debit Cards	29	4.4
Consumable Goods	26	4.0
Merchandise	26	4.0
Automobiles	22	3.4
Tools	19	2.9
Jewelry/Precious Metals	18	2.8
Computer Hardware/Software	10	1.5
Clothes/Furs	8	1.2
Nonnegotiable Instruments	6	0.9
Alcohol	4	0.6
Bicycles	2	0.3
Drugs/Narcotics	1	0.2

Over 18 Years of Age

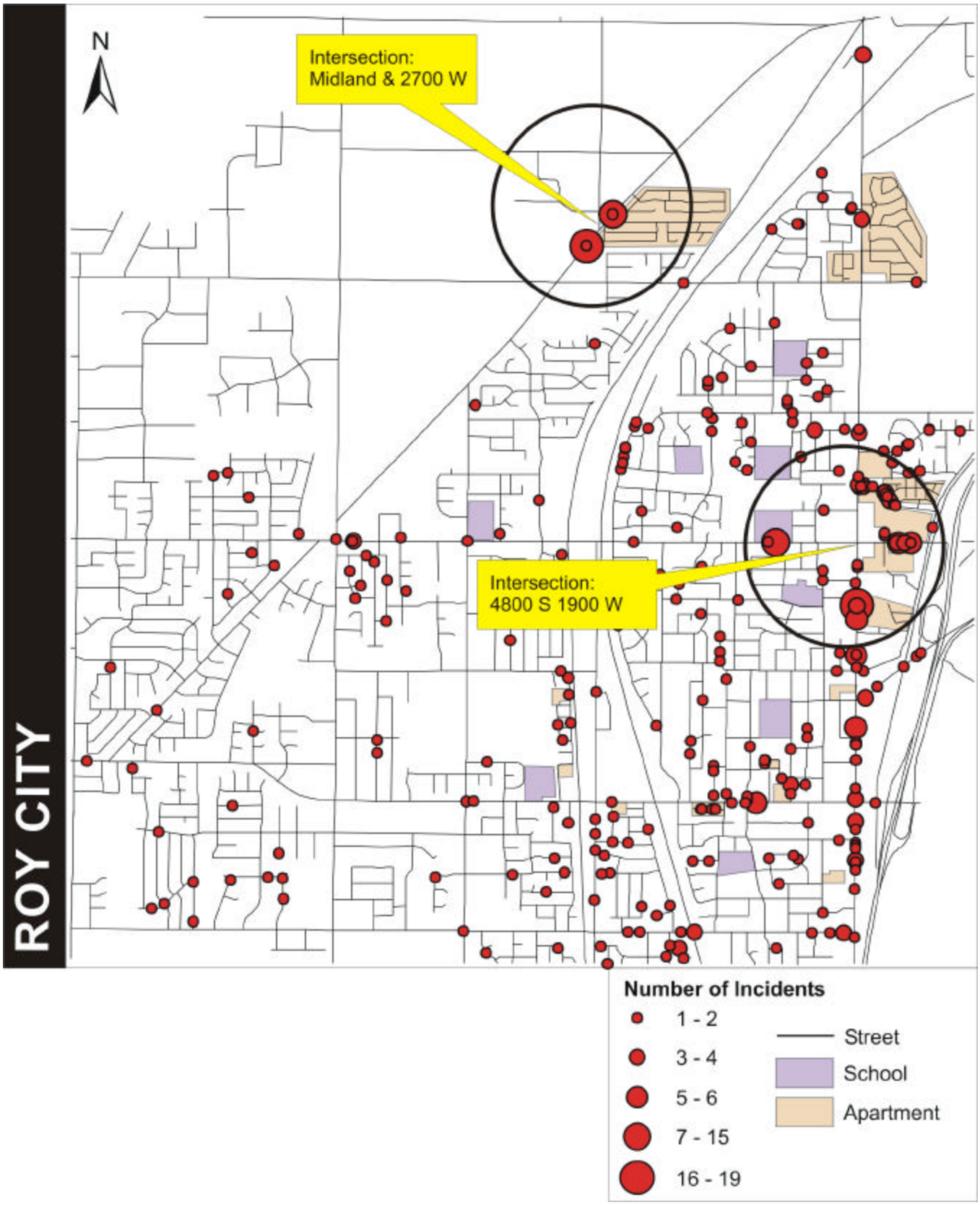
Property Type	*n*	%
Vehicle Parts/Accessories	48	26.1
Other	27	14.7
Money	17	9.2
Household Goods	11	6.0
Purses/Handbags/Wallets	11	6.0
Office-type Equipment	9	4.9
Radios/TVs/VCRs	8	4.3
Credit/Debit Cards	8	4.3
Recordings-Audio/Visual	7	3.8
Automobiles	7	3.8
Merchandise	6	3.3
Tools	5	2.7
Clothes/Furs	5	2.7
Computer Hardware/Software	4	2.2
Jewelry/Precious Metals	3	1.6
Consumable Goods	3	1.6
Other Motor Vehicles	2	1.1
Nonnegotiable Instruments	2	1.1
Structures-Storage	1	0.5

Spatial Analysis of Theft from Motor Vehicles

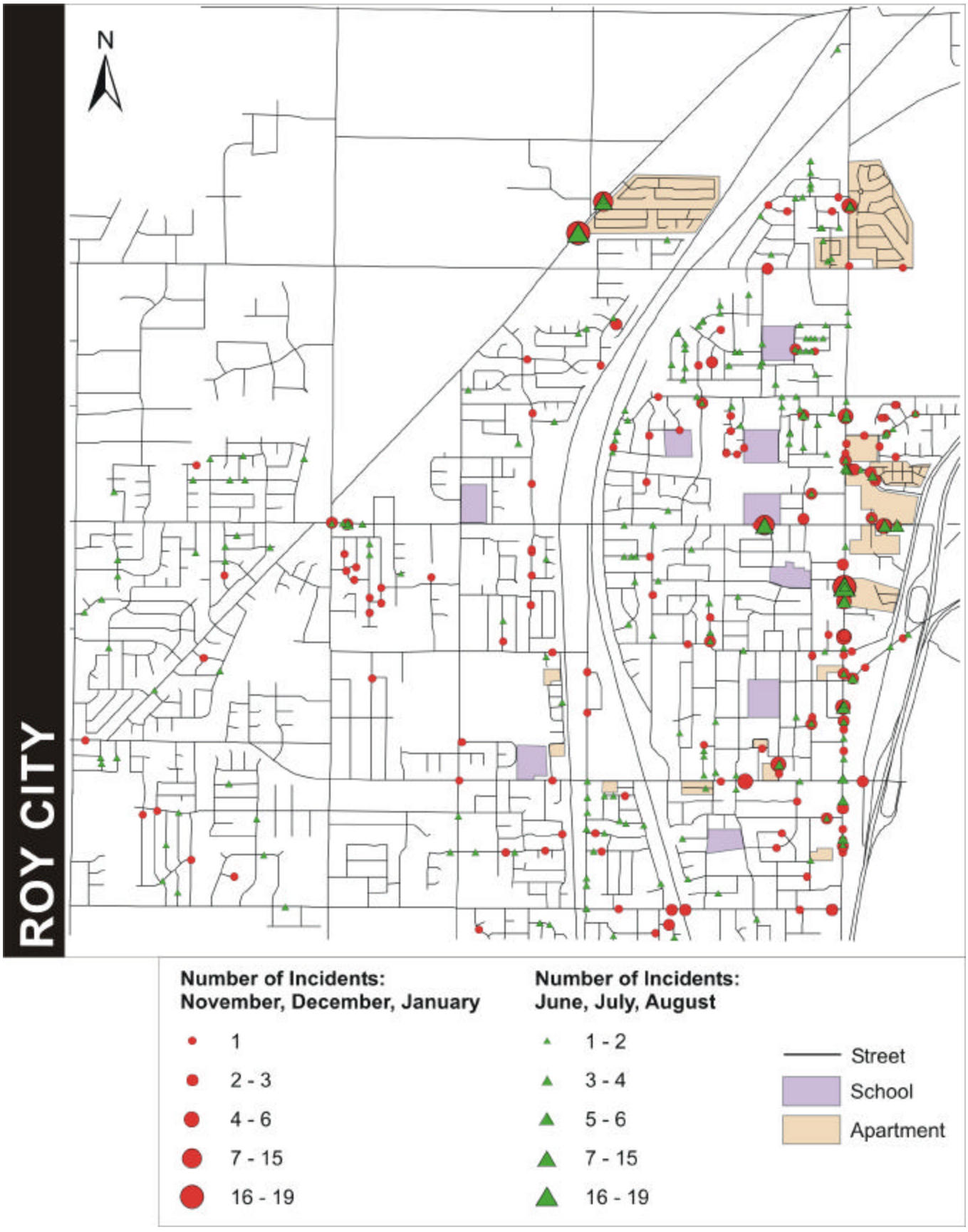
The following pages examine the geographic distribution of theft from motor vehicles in Roy City. It includes analysis by year, season, day of week, and property type.



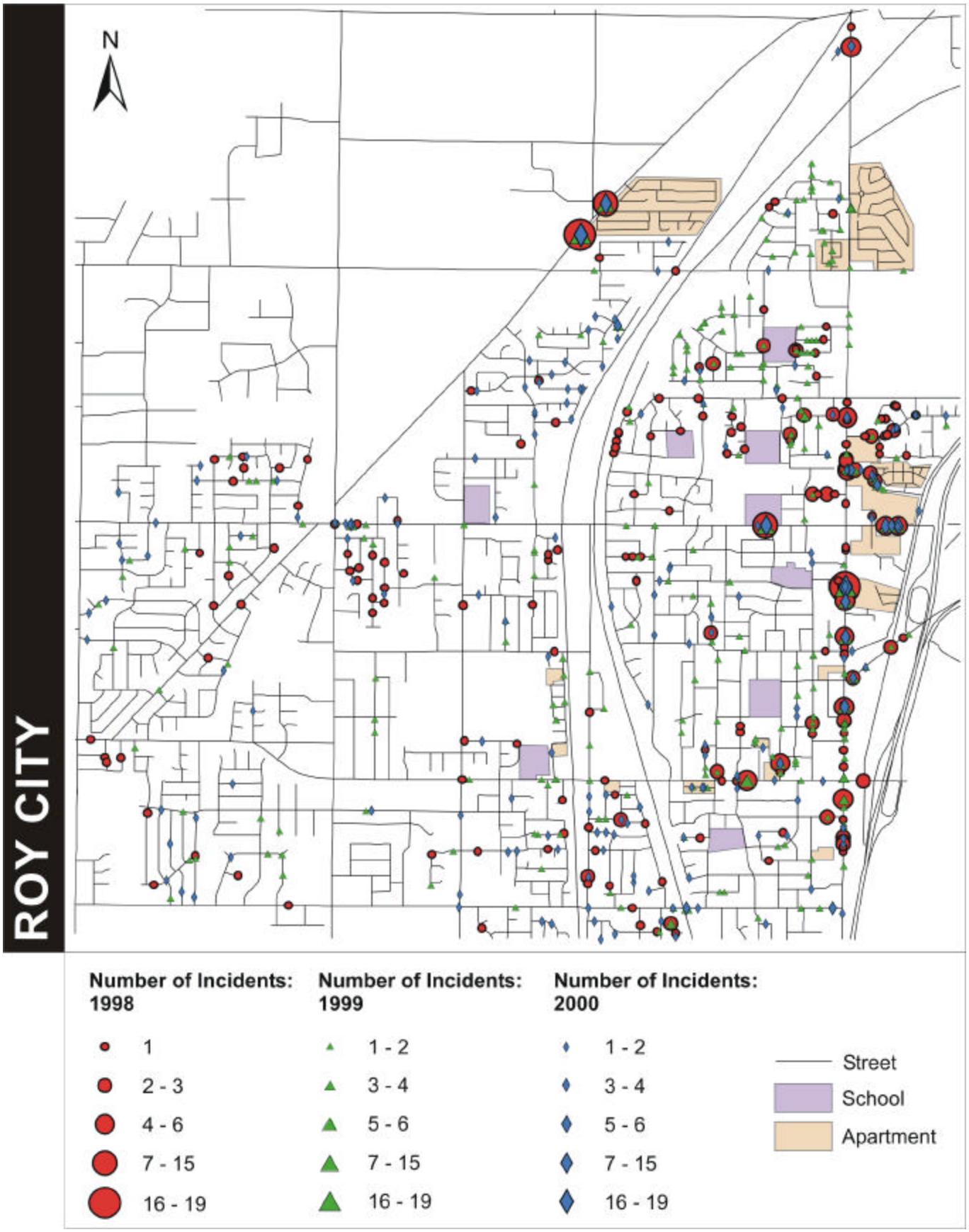
Theft from Autos: 1998 to 2000 The map above shows unique incidents of thefts from motor vehicles in Roy between 1998 and 2000. The points are graduated to show multiple occurrences in the same locations. Circles indicate areas with especially high incidents of theft from motor vehicles. From the map, it is clear that 1900 West in Roy has experienced a lot of this type of crime. There also appear to be many incidents in and around apartment complexes.



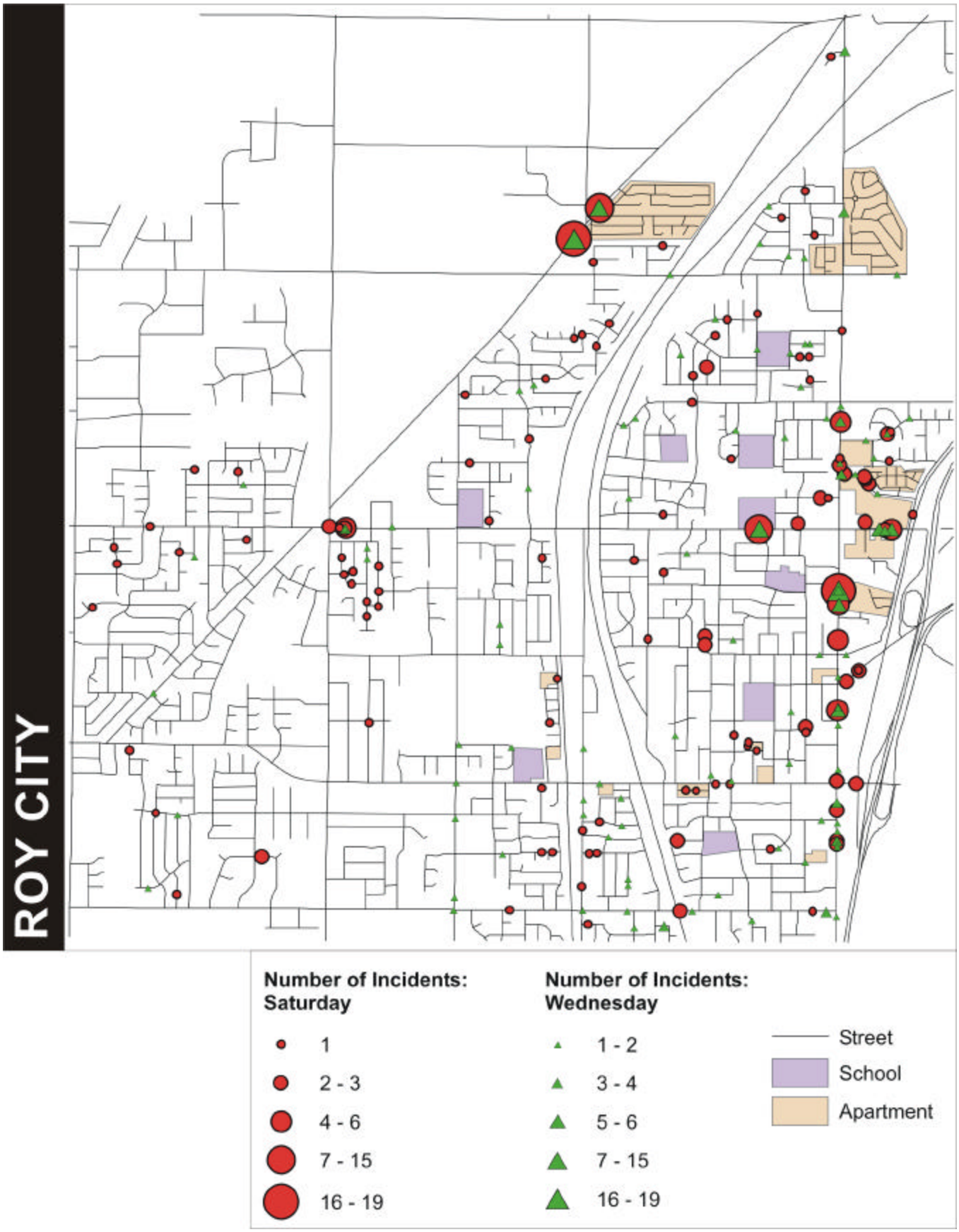
Theft of Motor Vehicle Parts & Accessories: 1998 to 2000 This map shows a unique advantage of IBR data. We are able to spatially analyze specific types of thefts from motor vehicles. Theft of parts and accessories was chosen because they are the items most frequently stolen in thefts from motor vehicles. Again, there have been many occurrences along 1900 West and around apartment complexes. It should be noted that 1900 West is a main street with many businesses.



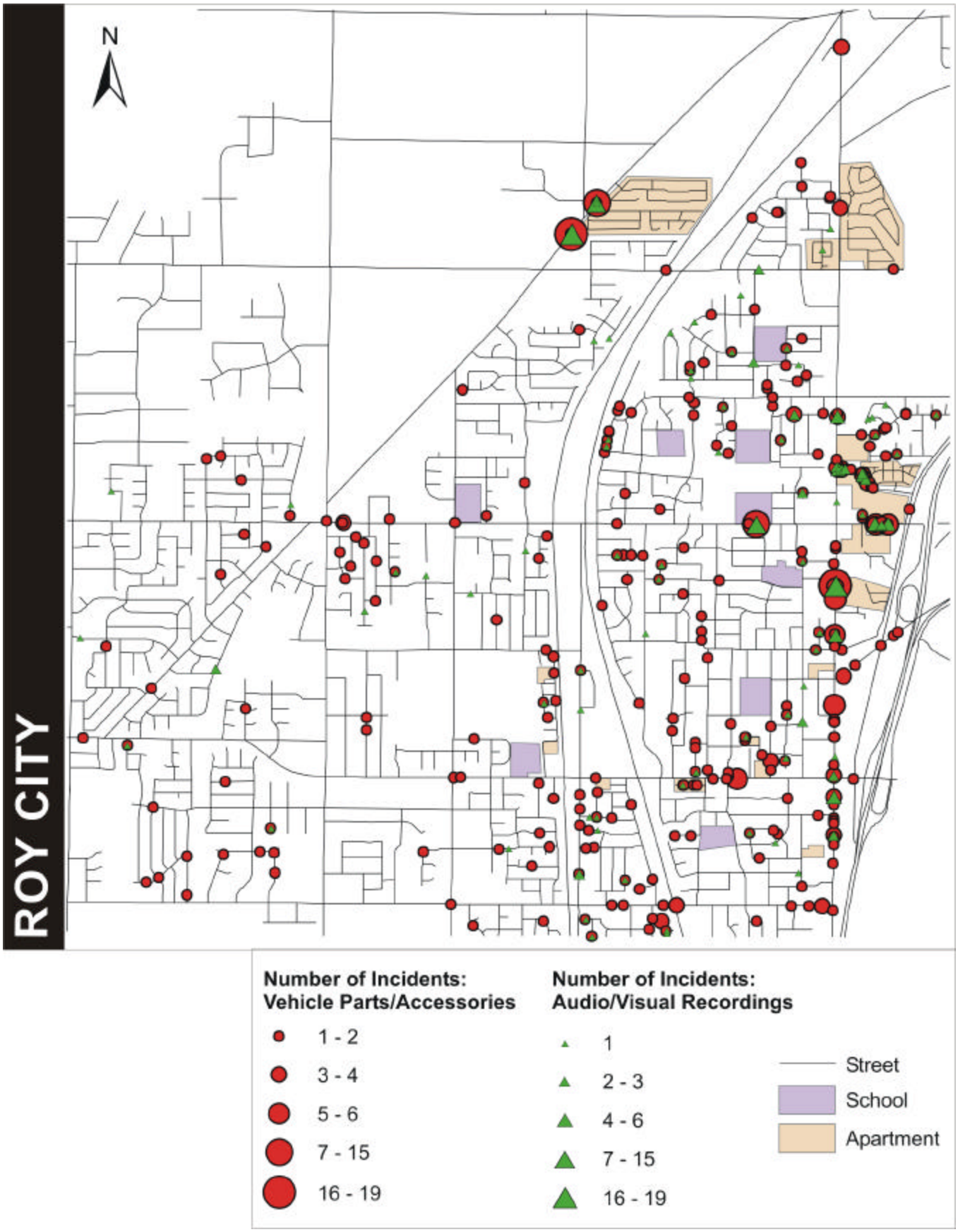
Thefts From Autos - Winter vs. Summer Months: 1998 to 2000 In the map above, winter incidents are reflected by red circles and summer incidents are reflected by green triangles. Although the most frequent locations for these offenses do not vary much seasonally, it does appear that the offenses spread around the city more in the summer months.



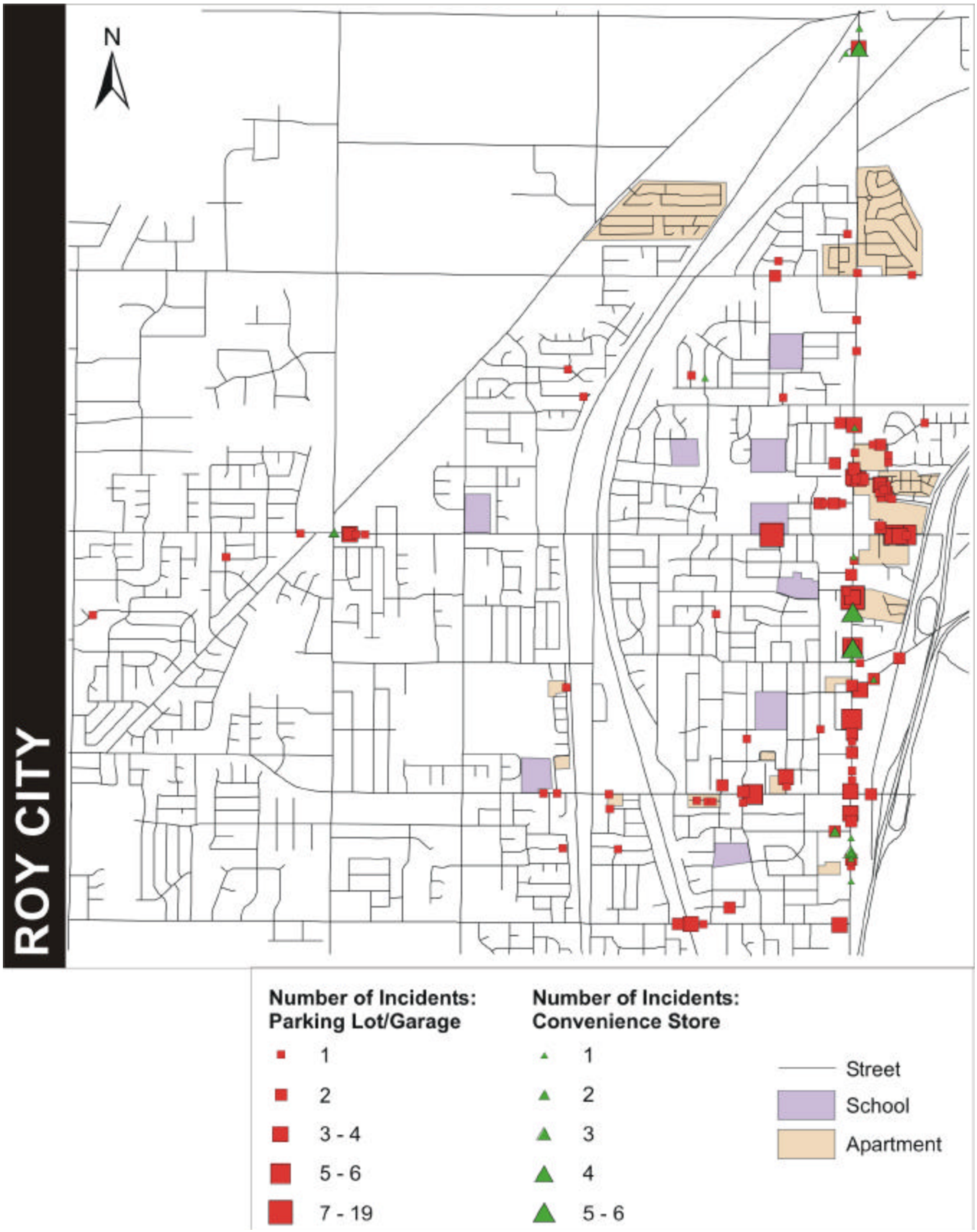
Theft from Autos by Year: 1998 to 2000 The map above is a bit difficult to interpret. It shows incidents by year. Again, there is the similar collection of offenses in each year along 1900 West and around apartment complexes. Otherwise, no clear pattern among the three years is evident.



Theft from Autos Midweek vs. Weekend: 1998 to 2000 The map above shows theft from motor vehicles as they occurred in the middle of the week versus the weekend. Similar patterns emerge that were found in the seasonal spatial analysis. It is more common to find incidents dispersed over a larger area on the weekend versus weekdays.



Theft from Motor Vehicles: Parts/Accessories vs. Recordings - 1998 to 2000 The map above looks to see if there are different patterns depending upon the type of item stolen from an auto. Theft of parts/accessories is more common, which is clearly reflected in the analysis above, and likely is the reason for the increased dispersion of this type of theft.



Theft from Motor Vehicles: Parking Lot/Garage vs. Convenience Store The map above shows the spatial distribution of theft from motor vehicles by the most common location types identified in the IBR analysis of Roy. Again, thefts most commonly occurred in parking lots and garages which is reflected in the frequency and spatial distribution of these offenses. As expected, most of these events occurred along 1900 West in Roy.

Improving Conditions Utilizing IBR Information: Roy City

The practical implications of the analysis are substantial for the Roy City Police Department. The two primary areas for immediate use are criminal patrol tactics and crime reduction and prevention measures. Further analysis will no doubt lead to other specific and more focused applications.

The analysis has provided information that supports several operational changes. Chief among these is the identification of specific areas of the city where this crime tends to take place. Changes in patrol schedules and response procedures in these areas would definitely reduce thefts in the areas that they most often occur. Most importantly, schedules and response procedures specifically designed utilizing seasonal, day of week, and time of day information would have very positive results.

Perhaps more effective use of the analysis will come from educational programs directed toward potential victims. NIBRS data and analysis allows the Roy City Police Department to target citizens and businesses in areas of the city where this crime most often occurs. Educational programs can give specific information regarding where and when the crimes tend to occur, items most commonly stolen, and simple steps residents can take to protect their property. In addition to targeting potential victims, the data shows that a majority of these crimes are perpetrated by students. A preventive school program would help educate and deter potential perpetrators of this crime.

The analysis also shows areas of data collection that could be improved. Chief among these is the type of property stolen. The category of "other" is often entered in this data field. While further investigation is needed to determine the cause, the resolution may be as simple as encouraging and educating officers to be more diligent in reviewing the categories before entering the corresponding code. Another solution could be expanding the categories if it is found that commonly stolen items are not currently included.

Data Analysis: Issues and Discussion

This section briefly discusses some of the problems the Utah SAC encountered in pursuing this analysis. Perhaps the most obvious data problem we encountered was during our “time of day” analysis. We initially proceeded thinking the IBR field of INC_TIME, or incident time, reflected the time the offense occurred. However, with an offense such as theft from a motor vehicle, this time is rarely known. Most often, the offense occurs overnight or while the victim is at work. Instead of the time the theft from the motor vehicle occurred, this field often reflects the time the offense was reported to law enforcement. This is why we see peaks in the morning, noon, and after work. These are the times the offense is discovered and reported to police.

In conducting our analysis, we were hoping to create information the police could use for tactical purposes. It quickly became apparent that the time of day analysis would not assist the police department in determining times for patrol units to be looking for thefts from autos. It is important to understand what data is actually recorded in the recordset.

Another shortcoming of the data analyzed was the frequency with which values were recorded as “Other.” For example, when looking at the type of property stolen, “Other” was the second most frequent response, accounting for 16.4% of all property stolen. When data is recorded as “Other”, analysis becomes less useful. In the analysis for Roy City, a list of incident numbers with “Other” recorded was forwarded to the police department for further investigation. **Table 4** provides a listing of some of the property types coded as “Other”. Some of the more frequently used property types include backpacks, dayplanners, car windows (likely destroyed in the course of the theft), and briefcases. Some of these items could have been recorded using existing IBR categories. For example, 36 of the “Other” items were CDs in a CD Case. These could have simply been coded using the existing category of “Recordings - Audio/Visual.”

Table 4: Itemized List of "Other" Values Coded in Property Stolen

AIR MATTRESS	1	DART CASE/DART SET	5
AM/FM CD PLAYER	1	DASHBOARD	6
AMPLIFIER	3	DAYPLANNER	20
ANGEL WITH HEART	1	DIARY	1
BABY CRIB	1	DOG	1
BACKPACK	11	DONOR CARD	1
BAG	15	DOOR	1
BANK BAG	1	DRILL	7
BASEBALL BAT	1	DRILL CASE	1
BASKETBALL	1	DUCK DECOY	1
BASEBALL	2	ELECTRONIC CROSS OVER	1
BASEBALL HAT	1	EMERGENCY CAR KIT	1
BASEBALL MITT	1	EQUALIZER	3
BINDER	3	EXTENSION CORD	1
BINOCULARS	3	FANNY PACK	1
BIRTH CERTIFICATE	1	FINGERNAIL CLIPPERS	1
BOARDS	1	FIRE EXTINGUISHER	2
BOOK	2	FISHING POLE	5
BRIEFCASE	7	FISHING POLE CASE	1
BUCKET, PLASTIC	1	FISHING REEL	1
CABLE TESTER	1	FISHING VEST	1
CALIPERS	1	FLASHLIGHT (MAGLITE)	1
CANVAS	1	FLOAT TUBE	1
CAR ASHTRAY	4	GOLF BAG	3
CAR BATTERY	2	GOLF CLUBS	7
CAR CHROME TRIM	1	GPS DEVICE	1
CAR DECAL	1	GRINDER	1
CAR DISTRIBUTOR	1	HACKY SAC	1
CAR DOOR	1	HAIRBRUSH	1
CAR EXPIRATION STICKER	2	HAND TOOL	4
CAR FOG LIGHTS	1	IDENTIFICATION BADGE	1
CAR HUBCAPS	1	JACKET	2
CAR LICENSE PLATE BRACKET	2	JEEP CONSOLE	1
CAR OWNER'S MANUAL	1	JUMPER CABLES	1
CAR REGISTRATION	1	KEYCHAIN	1
CAR STEERING WHEEL COVER	1	KEYS	3
CAR TAIL LIGHTS	1	KNIFE SHEATH	1
CAR TINTED HEADLIGHT COVERS	1	KNIVES	1
CAR TRANSMISSION LOCK	1	LASER PEN	1
CAR WINDOW	24	LAWNMOWER ENGINE	1
CAR WINDSHIELD VISOR	2	LIBRARY CARD	1
CARRYON BAG	1	LIGHTER	3
CARRYING CASE W/SCRIPTURES	1	MASK	1
CASE LOGIC BLK NYLON CASE	2	MEMBERSHIP CARD	2
CASSETTE TAPE	1	MILITARY ID CARD	1
CASSETTE TAPE CASE	1	MILITARY TRAINING SUIT	1
CD/CASSETTE ADAPTOR	1	MONEY CLIP	1
CD CHANGER	1	NAIL GUN	1
CELLULAR PHONE	1	NAILS	1
CELLULAR PHONE BATTERY	1	NECKLACE	1
CELLULAR PHONE CASE	4	OIL BOTTLE	1
CHAIR	1	PAGER	1
CIGARETTE CASE	1	PAPERS	1
CIGARETTE LIGHTER ADAPTOR/CHARGER	1	PATCH	1
CLAY BOWL	1	PHONE CARD	1
CLOTHING	2	PICTURES	1
COLOGNE	2	PLASTIC DOCUMENT CASE	1
COMPACT DISCS IN CD CASE	36	POKEMON CARDS	1
COMPASS	1	POOL CUE	1
COMPRESSOR	1	PORTFOLIO	1
CONCERT TICKET	1	POWER SAW	1
COUGH SYRUP	1	PROPANE BOTTLE	1

Several useful hints aided in conducting the spatial analysis. First was the use of graduated symbols. Graduated symbols increase the size of the point with an increase in frequency of occurrence. Our initial analysis did not include graduated symbols and clear patterns did not emerge. In ArcMap, when two events occur in the same location, the two points are simply overlaid. If you are not using graduated symbols and have 16 events at the same location, the points are superimposed on one another to look as if a single occurrence took place. Graduated symbols assist in resolving this issue.

The superimposing phenomena was also problematic when comparing multiple types of events. For example, this occurred when looking at thefts from motor vehicles that occurred in the winter versus summer months. When using the same symbol but different color to represent these events, we found that a larger circle point might superimpose over a smaller circle point, making it look like the smaller circle point never occurred. For this reason, this analysis used triangle or diamond points in front of circle points when comparing multiple types of events. For example, if 10 thefts occurred in the summer and 10 thefts occurred in the winter in the same location, the triangle (representing the summer) would appear in front of the circle (representing winter). If we were to use only circle points, two circles of equal magnitude would be superimposed on one another. The circle on the back layer (summer months) would be completely covered by the circle on the front layer (winter months), making it appear that no thefts occurred at that location during summer months.

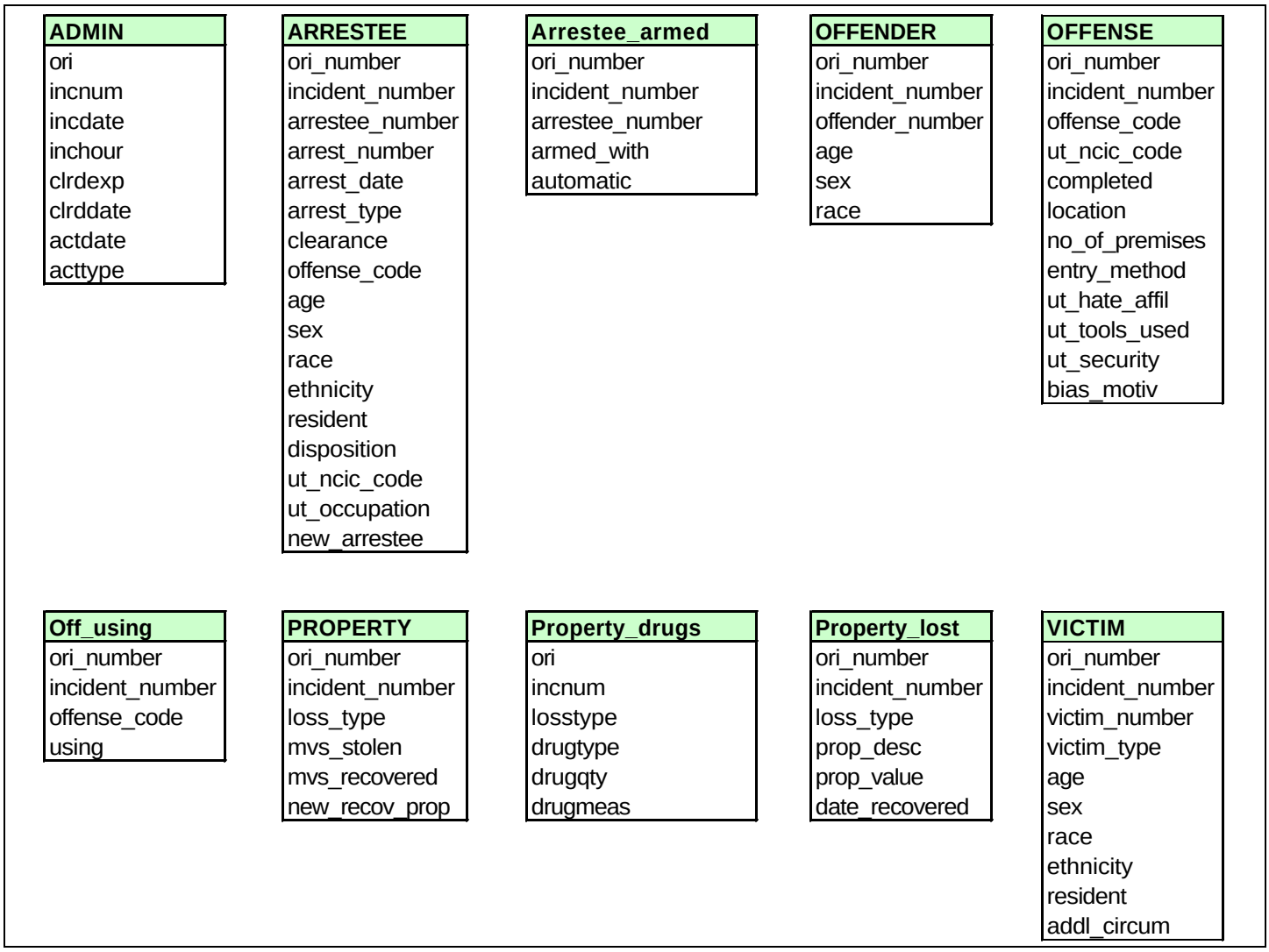
SQL Analysis and Microsoft Access

The data analysis in this report was completed primarily using Microsoft Access and SQL (Structured Query Language) statements within Access. Results from SQL queries were often copied and pasted into Microsoft Excel for the purpose of developing the tables and charts used in this report. The Utah SAC uses both Microsoft Office Professional 2000 and Microsoft Office XP Professional. Maps used in this report were developed using ESRI's ArcMap and ArcCatalog products.

As in other states, Utah receives IBR data from local agencies that participate in the IBR program. Currently, 73.5% of Utah's population is covered by law enforcement agencies that are either reporting IBR data, testing their IBR systems, or are in the beginning phases of implementing IBR systems. Data received from these agencies is stored in Utah's IBR repository. The repository is a relational database. A few of the most relevant tables in this database are reflected in **Figure 8**.

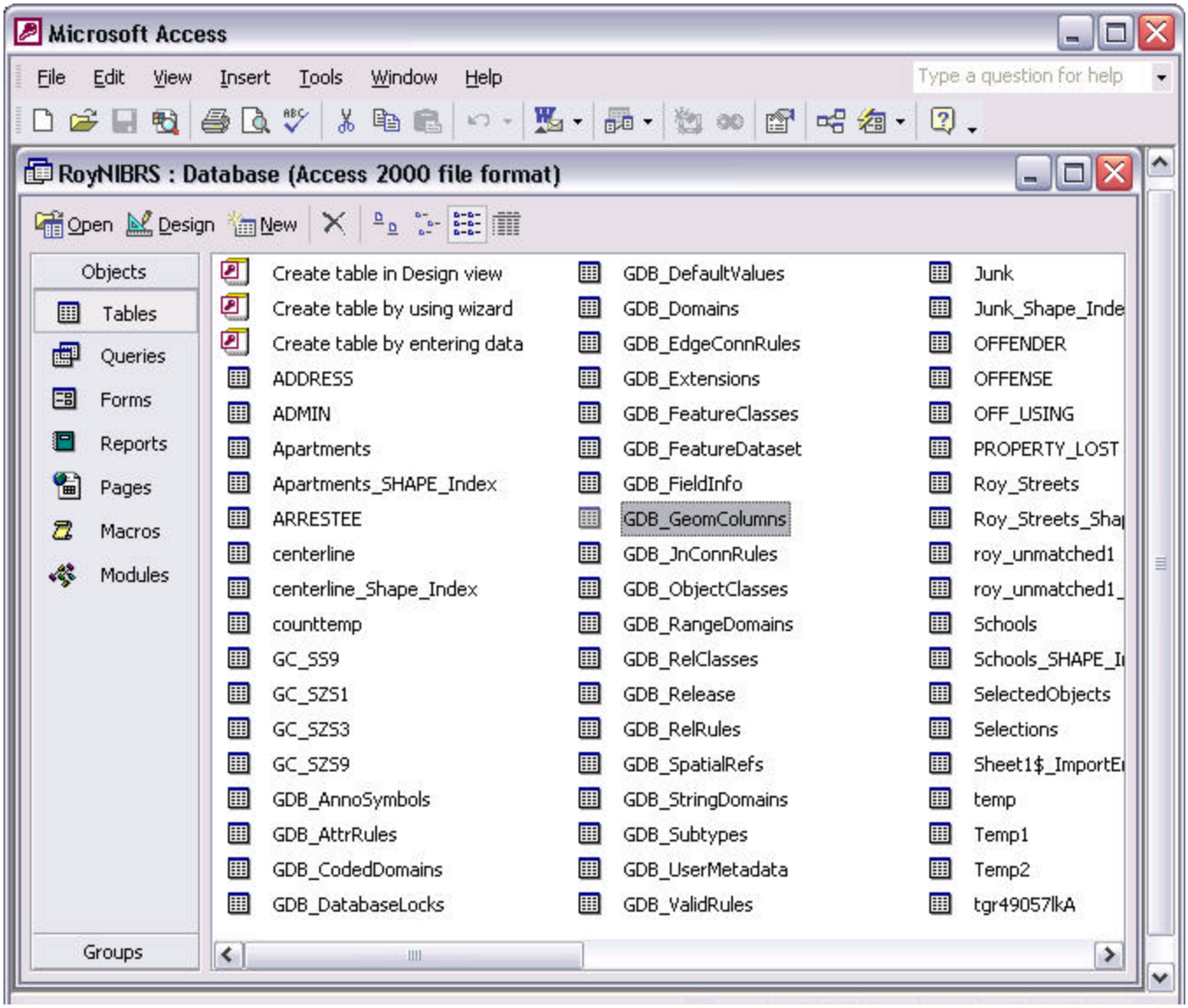
The Utah Department of Public Safety (DPS) is responsible for maintaining this repository. DPS has developed an interactive tool that allows data extraction from the repository using common SQL statements. In this manner, the Utah SAC extracted the data for this study into comma-delimited text files, which were then imported into Microsoft Access for analysis.

Figure 8: Utah IBR Repository Table Layout



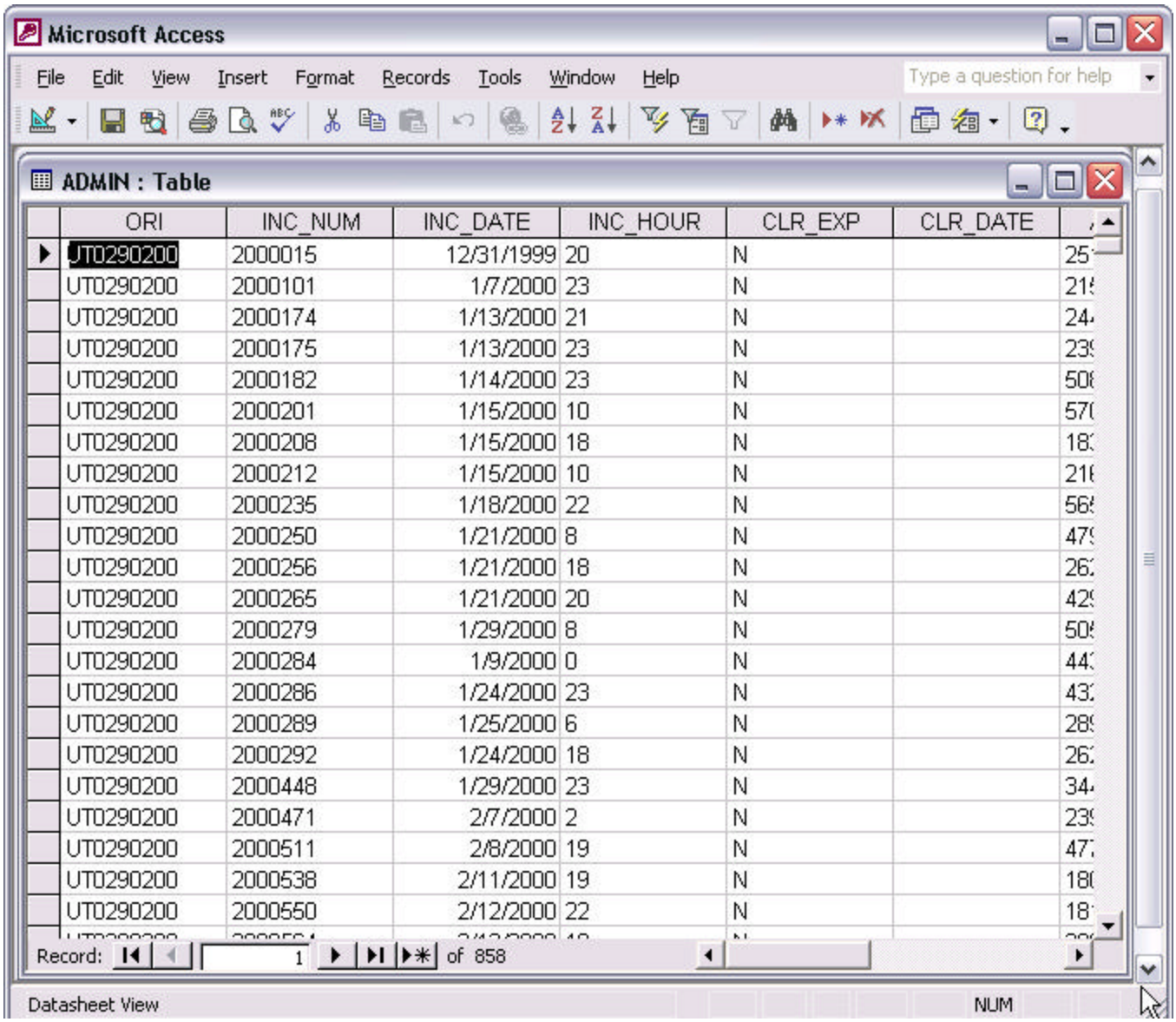
Overview of Microsoft Access

The next several pages graphically display how the Utah SAC uses Microsoft Access for some analysis purposes. This section is meant to orient readers, enabling them to understand the process. After the graphical example, the report will examine the actual SQL statements that produced the analysis in this report.

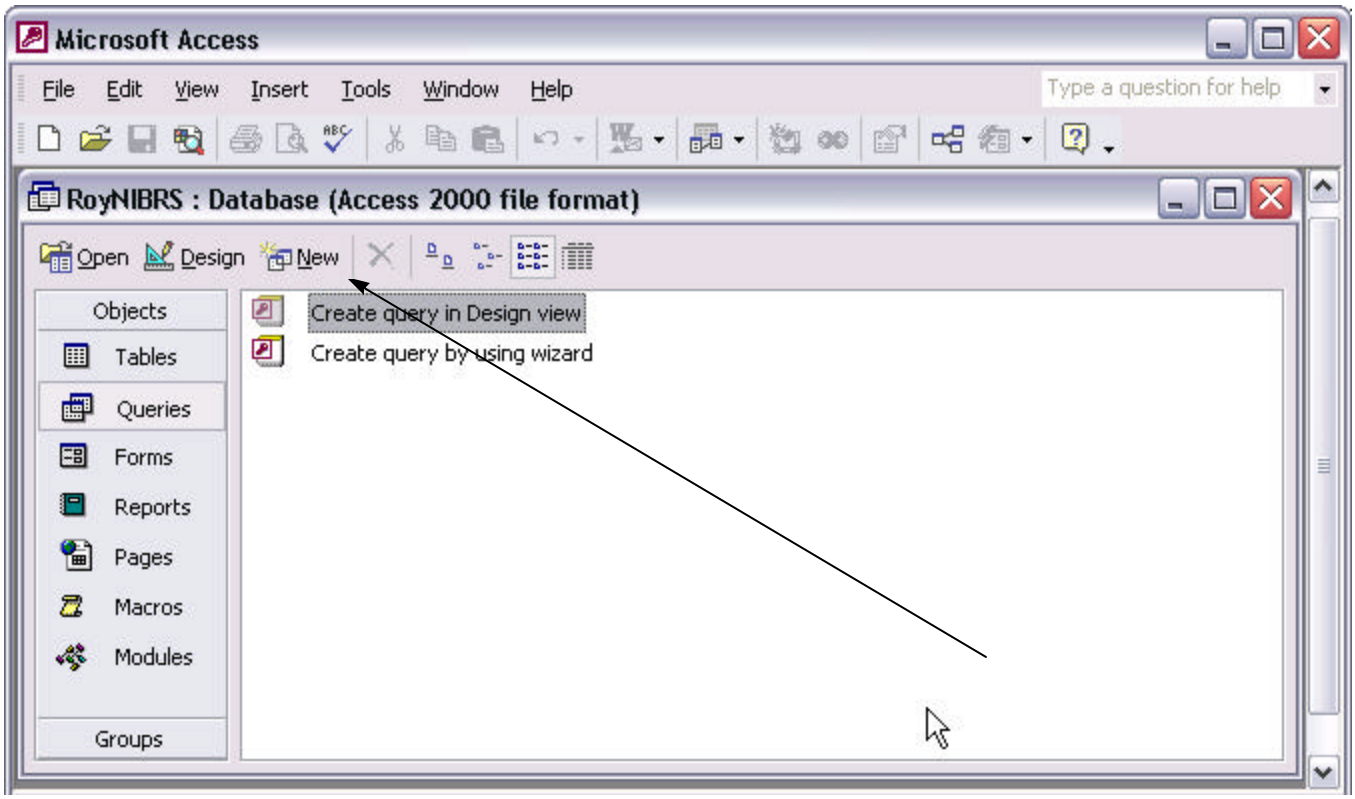


The figure above shows the view of Microsoft Access as users enter the application. On the left-hand column is a list of Objects supported in Access. For the Utah SAC's research purposes, we are generally only concerned with the **Tables** objects and **Queries** objects. The right-hand pane provides a list of items of the appropriate object type. In the example above, the right-hand pane displays all of the Tables included in this analysis. Although there are numerous tables listed, most are associated with and created by ArcMap for the geographic analysis. The more common IBR tables from **Figure 8** imported into Access and used for this analysis are also present, such as ADMIN, ARRESTEE, OFFENDER, OFFENSE, etc.

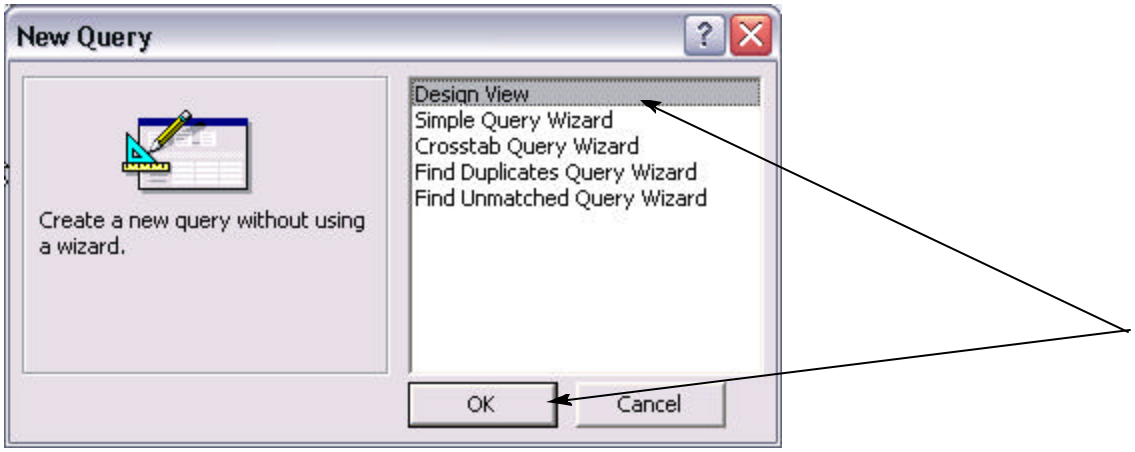
To view Queries, users simply click "Queries" on in the left-hand column.



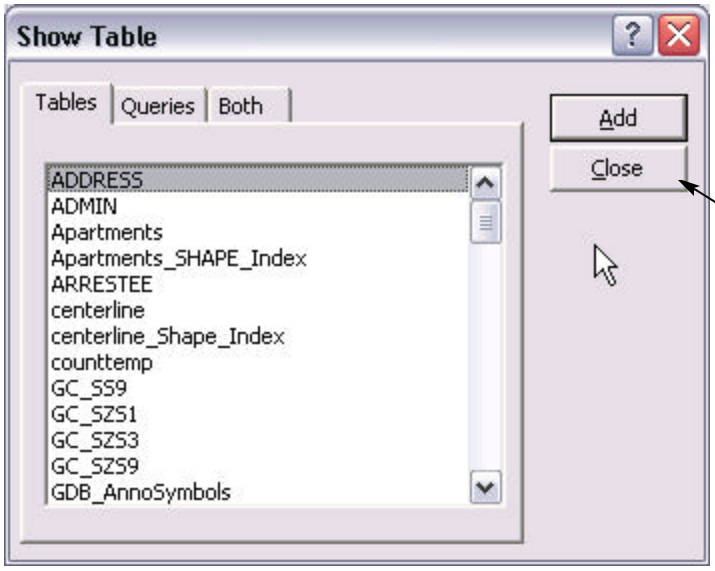
By double-clicking one of the Tables in the right-hand pane, the appropriate Table is loaded in datasheet mode. In the example above, the ADMIN table has been opened. At the bottom of the window, Access shows it is in "Datasheet View" and that there are 858 records in the Table. Across the top of the ADMIN table are the columns or datafields. Individual rows of data show data values associated with each datafield.



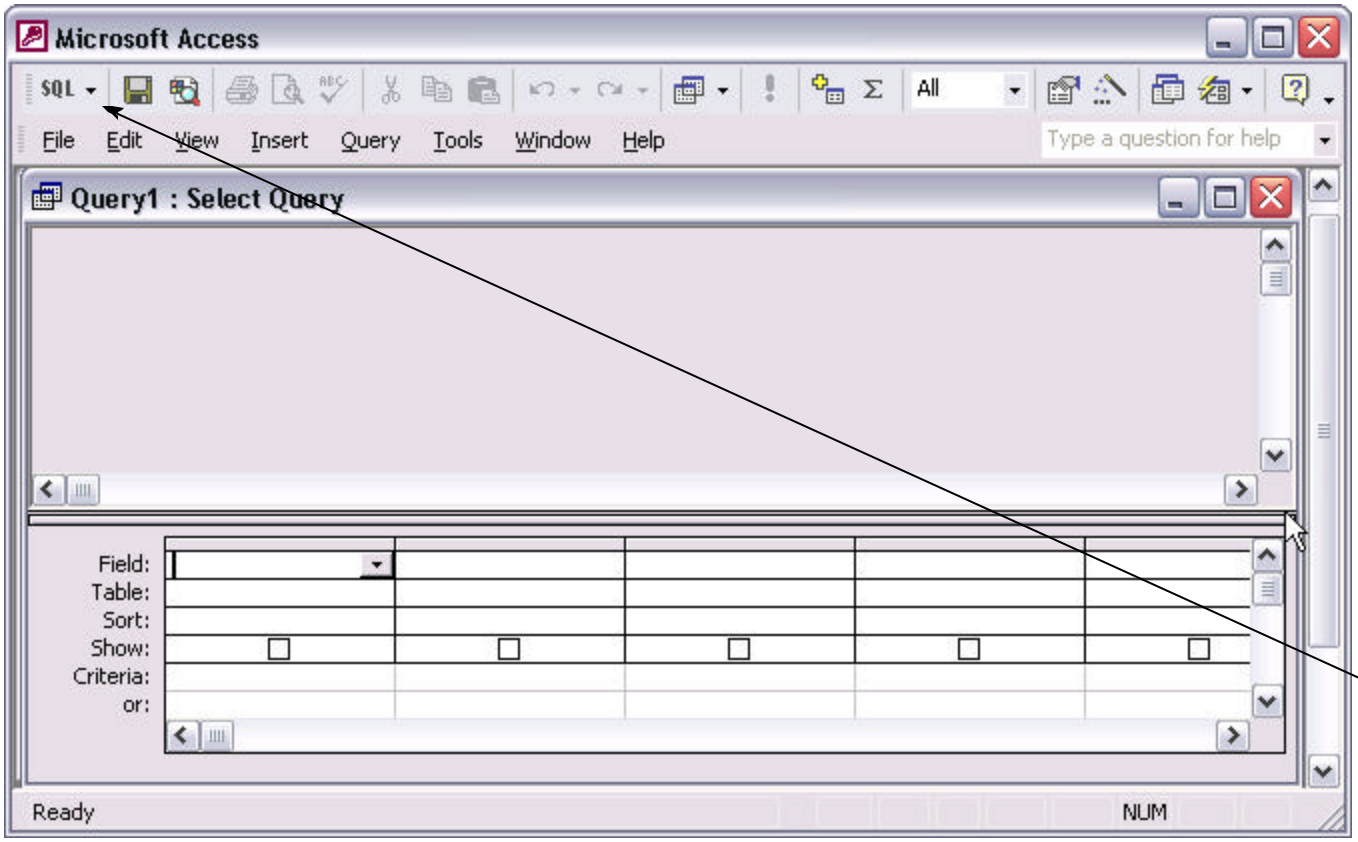
In the figure above, the **Queries** option has been selected. No saved Queries are shown in the right-hand pane. All of the queries for this analysis were done using SQL statements. The following set of images will demonstrate how that is accomplished. First, select the "New" button indicated by the arrow.



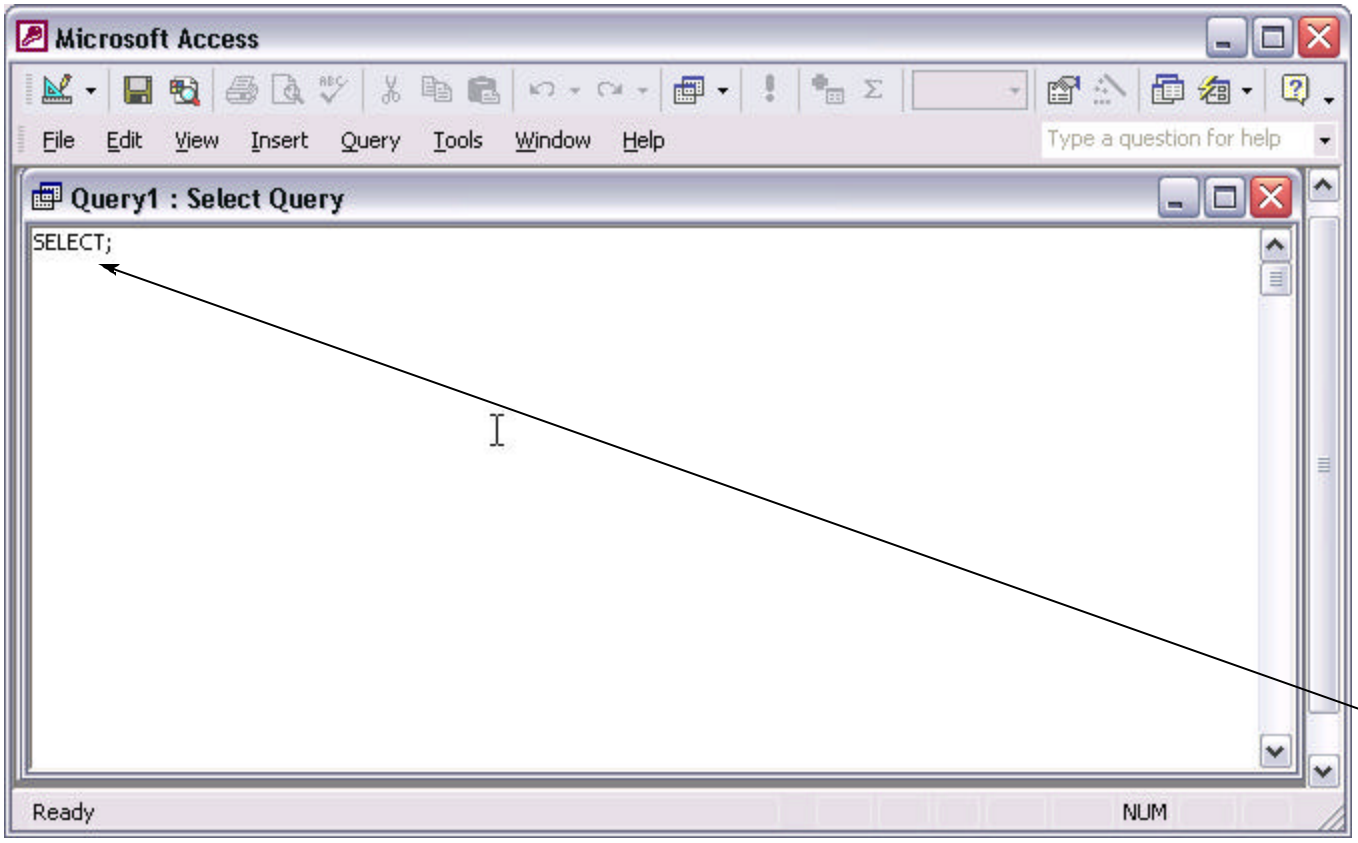
Upon hitting the "New" button, the above dialog box will appear. It provides several Query options. Select the default option shown above, "Design View", then select the OK button.



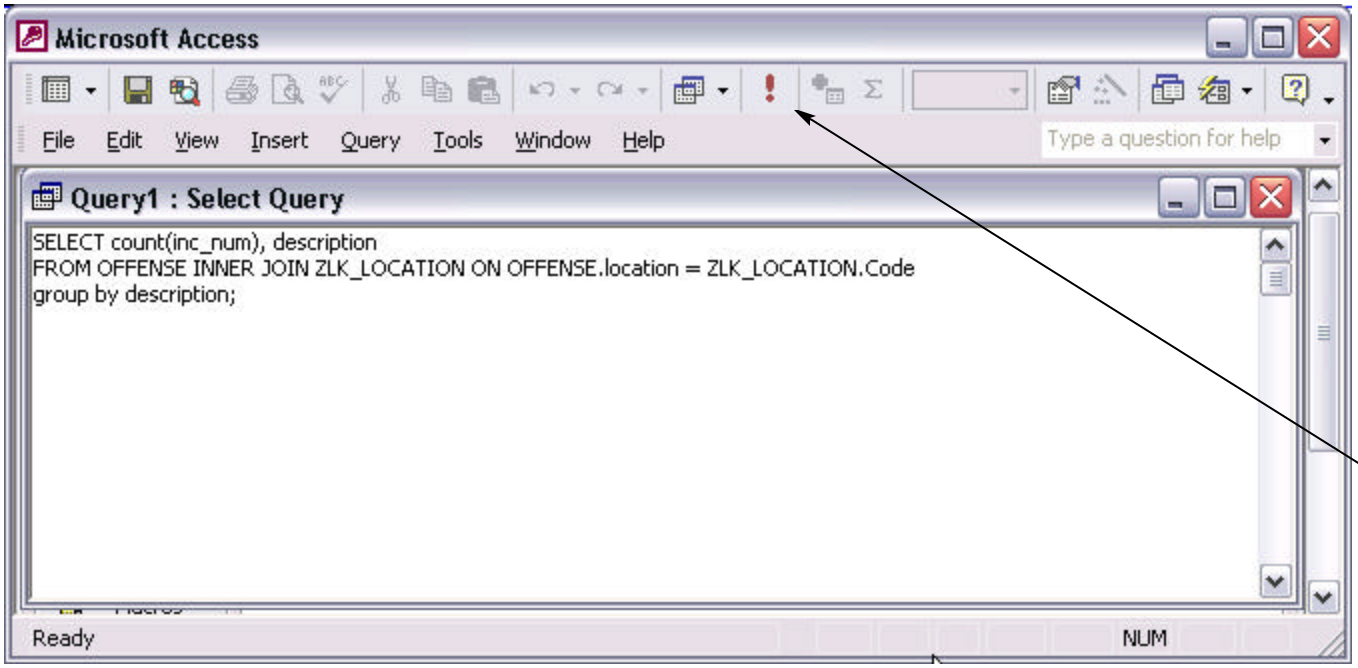
Next, the above dialog box appears asking the user to select a Table or Query to use for the new Query (you can actually query an existing query). When simply using SQL Statements, do not select any Tables or Queries. Instead, select the **CLOSE** button.



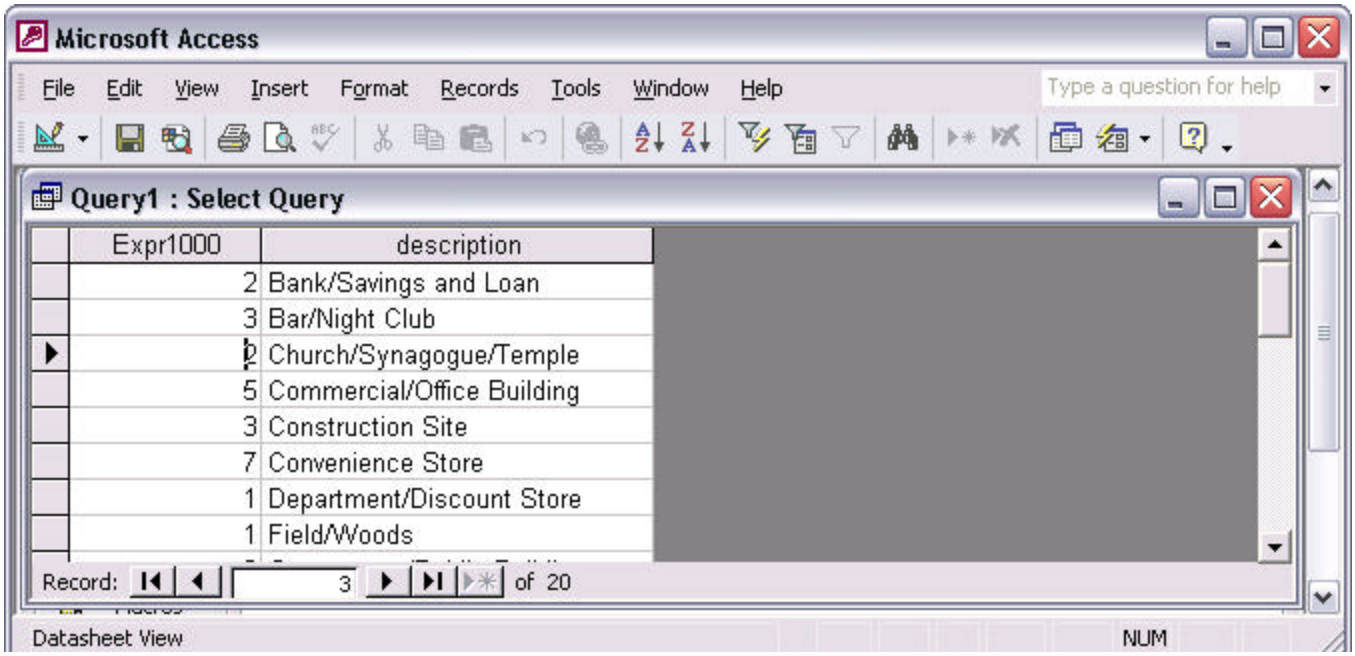
Next, the Query Designer grid appears. This is a simple way to create and run Queries. However, the user can bypass this tool when using SQL statements. At this point, select the **SQL button** indicated by the arrow.



Access is now in SQL writing mode. It has already begun the first SQL statement by placing "SELECT" at the beginning. This is much like a text editor. The user can enter SQL Statements from here and run the query.



The example above is an SQL query run for this analysis that counts the different location types where the thefts from motor vehicles occurred. The semi-colon at the end of the statement is optional. In common SQL structure, the syntax begins with a **SELECT** statement, identifies the tables to select **FROM** and/or **JOIN**, and ends with a **WHERE** or, in this case, a **GROUP BY** statement. Once the statement is written, select the "!" button to run the query.



Above are the final results. The column headed "Expr1000" is the frequency count of the location description found in column headed "description". For example, two thefts from motor vehicles occurred at a "Bank/Savings and Loan." These results can be copied and pasted directly into Microsoft Excel where they can be crafted into tables or charts.

SQL Code for Roy City Analysis

As stated previously, Utah's IBR data is housed in a relational database repository. Data for this analysis was extracted from that repository using simple SQL statements that identified relevant incidents using dates, the Roy City Police Department's ORI (Originating Agency Identifier), and the IBR offense codes for theft from motor vehicles and theft of motor vehicle parts and assessories. The following sections outline the SQL statements used to analyze thefts from motor vehicles in Roy City. The main tables extracted from the IBR repository included ADMIN (labeled theftsIII), ARRESTEE, OFFENDER, OFFENSE, OFF_USING, PROPERTY_LOST, and VICTIM. Lookup tables were also used which assisted in translating coded values into meaningful values (i.e. location type of 03 translates into Bar/Night Club). Usually incidents between these tables are linked via incident number and agency ORI. However, in the case of this analysis, because all incidents occurred within the same agency, only incident number was used to link tables.

Figure 1 SQL

Figure 1 displays the number of thefts from motor vehicles that occurred in each of the three years analyzed. The SQL code pulls the data FROM the Administrative segment (labeled theftsIII) which includes incident date parsed into segments that allow for analysis by month and year. Here a count was conducted in the SELECT statement and results were GROUPED by year. Microsoft Access has a date function called DatePart that will extract parts of a date. For example, for the date 1/1/2000, the function can extract the month as January, the year as 2000, and the day of week (Sunday through Saturday). These data were extracted into their own fields.

```
SELECT year, count(year)
FROM theftsIII
GROUP BY year
```

Figure 2 SQL

Figure 2 displays the number of offenses by year as either theft from motor vehicles or as theft of motor vehicle parts or accessories. These are the two offense codes used to extract the data, and therefore would be the only two offenses that would appear in this query. Again, this is a frequency count FROM the Administrative segment (theftsIII) that is GROUPED BY the type of offense. This query has a WHERE clause that limits the data by year. This query was individually run for each of the three years in question.

```
SELECT offense, count(offense)
FROM theftsIII
WHERE year='1998'
GROUP BY offense
```

Figure 3 SQL

Figure 3 shows the number of incidents by month of year. Again, this data was taken FROM the incident date, with the month of year parsed, housed in the Admin table (theftsIII). The SQL statement COUNTS the number of incidents that occurred, then GROUPS them into months of the year.

```
SELECT month, count(month)
FROM theftsIII
GROUP BY month
```

Figure 4 SQL

Figure 4 shows the distribution of these offenses throughout the week. The data came FROM the Administrative segment (theftsIII). The SQL code COUNTS the number of incidents then GROUPS them by day.

```
SELECT day, count(day)
FROM theftsIII
GROUP BY day
```

Figure 5 SQL

Figure 5 shows the distribution of offenses by time of day. The analysis looks at incident hour (inc_hour) housed in the Administrative segment or theftsIII table. The SQL codes SELECTS and COUNTS the inc_hour and GROUPS BY the inc_hour. Incident hour is coded in a military time scheme, 0:00 Hours to 24:00 Hours. This data proved somewhat problematic in that it often reflected the time the incident was reported rather than the time the incident occurred.

```
SELECT count(inc_num), inc_hour
FROM theftsIII
GROUP BY inc_hour
```

Figure 6 SQL

Figure 6 examines the time of day these offenses occurred for both winter and summer months. Again, the analysis used data in the Administrative segment (theftsIII). The query was run twice, once for winter months and once for summer months. The example below contains the winter months query. The SQL code SELECTS and GROUPS BY inc_hour, but uses the WHERE clause to only select those incidents that occurred in either November, December, or January.

```
SELECT inc_hour, count(inc_hour)
FROM theftsIII
WHERE month in ('11', '12', '1')
GROUP BY inc_hour
```

Figure 7 SQL

Figure 7 shows the day of week of these offenses by winter or summer months. The analysis used data in the Administrative segment (theftsIII). Again, the query was run twice, once each for summer and winter months. The SQL code SELECTS and GROUPS BY day (of week). The WHERE clause limits the selection to the months in question. In the example, those months include November, December, and January.

```
SELECT day, count(day)
FROM theftsIII
WHERE month in ('11', '12', '1')
GROUP BY day
```

Table 1 SQL

Table 1 examines the location type where these offenses occurred. Although the SQL looks a bit more complicated, the query is similar to the previous queries. This time we are SELECTING the location "description" and GROUPING BY the location "description". The difference here is that the SQL links two tables. One table is the OFFENSE table. The second table is the ZLK_LOCATION table, which is a lookup table detailing the coding structure of the "location" variable. By linking the tables, the output of the query will return items such as Bar or Parking Lot rather than a numerical code. When linking tables, the query must identify a common variable to match records. In the query below, "Code" (which is the numerical code for offense location) was used to link the two tables.

```
SELECT count(inc_num), description
FROM OFFENSE INNER JOIN ZLK_LOCATION ON OFFENSE.location=LK_LOCATION.Code
GROUP BY description
```

Table 2 SQL

Table 2 shows the type of property stolen. This data was taken from the PROPERTY_LOST table and joined with the ZLK_PROPERTY lookup table. Again, the lookup table simply provides a text description of the code used for property type. The tables were linked using the "Code" variable common to both tables. The SQL code SELECTS and COUNTS the description of the PROPERTY and GROUPS BY that property description.

```
SELECT description, count(inc_num)
FROM PROPERTY_LOST INNER JOIN ZLK_PROPERTY ON PROPERTY_LOST.Prop_Desc =
ZLK_PROPERTY.Code
GROUP BY description
```

Table 3 SQL

Table 3 shows the type of property stolen where the age of the arrestee was 18 years of age or younger or over 18 years of age. This is the most complex query used in that it joins three different tables. First, the PROPERTY_LOST table was joined to the ARRESTEE table using the incident number (INC_NUM). This was done to get the arrestee's age. Second, the PROPERTY_LOST table was joined to the ZLK_PROPERTY table using the Code variable (property code). This was done to get a text description of the numerical property type code. The query SELECTS and COUNTS the description of the property, then it GROUPS BY the type of property. This query was run once for each age group. In the example below, the WHERE clause selects only those arrestees who were over the age of 18 at the time of the offense.

```
SELECT description, count(description)
FROM (PROPERTY_LOST INNER JOIN ARRESTEE ON PROPERTY_LOST.INC_NUM =
ARRESTEE.INC_NUM) INNER JOIN ZLK_PROPERTY ON PROPERTY_LOST.Prop_Desc =
ZLK_PROPERTY.Code
WHERE arrestee.age>18
GROUP BY description
```

Sample of Other SQL Code Used In Analysis

```
1) SELECT description, count(inc_num)
FROM VICTIM INNER JOIN ZLK_VICTIM_TYPE ON VICTIM.Vict_Type = LK_VICTIM_TYPE.Code
GROUP BY description;

2) SELECT sex, count(sex)
FROM victim
WHERE vict_type="I"
GROUP BY sex

3) SELECT avg(age)
FROM victim
WHERE (vict_type="I") and (age not in (0, 99))

4) SELECT race, count(race)
FROM victim
WHERE vict_type="I"
GROUP BY race
```

The SQL code examples above, when appropriate, were run for both victims and arrestees. The above examples are regarding victims only.

1) Looks at victim type. The victim type was almost always an individual rather than a business or governmental entity.

2) Looks at victim gender. The WHERE clause limits this to "I" or individual, in that businesses do not have gender characteristics.

3) Looks at the average age of the victim. Again it only looks at individuals and eliminates any records where the victim's age is coded as "0" or "99". These values are often used with missing data and would make the calculation of average erroneous. This statement uses the "avg" function to calculate an average.

4) Looks at the victim's race. Again, this query only looks at records where the victim is an individual.

SQL Code Used to Extract IBR Data From the State Repository

Main IBR Tables

The following statements extracted all data from the specifed IBR Repository table where the ORI matched the Roy City ORI.

```
SELECT * FROM admin WHERE ori_number="UT0290200"
SELECT * FROM offense WHERE ori_number="UT0290200"
SELECT * FROM property_lost WHERE ori_number="UT0290200"
SELECT * FROM off_using WHERE ori_number="UT0290200"
SELECT * FROM offender WHERE ori_number="UT0290200"
SELECT * FROM victim WHERE ori_number="UT0290200"
SELECT * FROM arrestee WHERE ori_number="UT0290200"
```

Lookup Tables

The following statements extracted all data from the lookup tables housed on the IBR Repository. The lookup tables were used to correlate descriptive data values with obscure coded values.

```
SELECT * FROM lk_armed_with
SELECT * FROM lk_bias
SELECT * FROM lk_except_clear
SELECT * FROM lk_location
SELECT * FROM lk_property
SELECT * FROM lk_property_loss
SELECT * FROM lk_susp_of_using
SELECT * FROM lk_victim_type
```

Next all tables were narrowed to include only incidents that occurred between January 1, 1998 and December 31, 2000.

We began with the ADMIN table previously extracted. It contains the inc_date or incident date. From ADMIN, we pulled all incident numbers (inc_num) that occurred within that date range, and placed them into a temporary table called Temp as follows:

```
SELECT inc_num INTO Temp FROM ADMIN WHERE inc_date between #01/01/1998# and #12/31/2000#
```

Using this set of extracted incident numbers in Temp (all of which occurred during the period of interest), we selected only those records from each of the "Major" IBR tables that had the same incident number. Each was extracted into its own temporary table as follows:

```
SELECT * into tempADMIN FROM ADMIN WHERE inc_num in (SELECT inc_num FROM Temp)
SELECT * into tempARRESTEE FROM ARRESTEE WHERE inc_num in (SELECT inc_num FROM Temp)
SELECT * into tempOFFENDER FROM OFFENDER WHERE inc_num in (SELECT inc_num FROM Temp)
SELECT * into tempOFFENSE FROM OFFENSE WHERE inc_num in (SELECT inc_num FROM Temp)
SELECT * into tempOFF_USING FROM OFF_USING WHERE inc_num in (SELECT inc_num FROM Temp)
SELECT * into tempPROPERTY_LOST FROM PROPERTY_LOST WHERE inc_num in (SELECT inc_num FROM Temp)
SELECT * into tempVICTIM FROM VICTIM WHERE inc_num in (SELECT inc_num FROM Temp)
```

The next step was to further narrow the incidents to those coded as theft from automobiles or theft of motor vehicle parts or accessories. These are coded in the OFFENSE table as 23F or 23G. Another Temporary table was created, Temp2, that contained the incident numbers (inc_num) of all offense incidents that included one of these types of offenses as follows:

SELECT DISTINCT inc_num into Temp2 FROM tempOFFENSE WHERE offense IN ("23F", "23G")

Next we deleted the following tables: ADMIN, ARRESTEE, OFFENDER, OFFENSE, OFF_USING, PROPERTY_LOST, VICTIM

Finally, we used the extracted set of incident numbers in Temp2 (which are incidents that included at least one theft from motor vehicle or theft of motor vehicle parts/accessories) to select only those records from each of the "Major" IBR tables as follows:

SELECT * into ADMIN FROM tempADMIN WHERE inc_num in (SELECT inc_num FROM Temp2)
SELECT * into ARRESTEE FROM tempARRESTEE WHERE inc_num in (SELECT inc_num FROM Temp2)
SELECT * into OFFENDER FROM tempOFFENDER WHERE inc_num in (SELECT inc_num FROM Temp2)
SELECT * into OFFENSE FROM tempOFFENSE WHERE inc_num in (SELECT inc_num FROM Temp2)
SELECT * into OFF_USING FROM tempOFF_USING WHERE inc_num in (SELECT inc_num FROM Temp2)
SELECT * into PROPERTY_LOST FROM tempPROPERTY_LOST WHERE inc_num in (SELECT inc_num FROM Temp2)
SELECT * into VICTIM FROM tempVICTIM WHERE inc_num in (SELECT inc_num FROM Temp2)

What now remains are the "Major" IBR tables (ADMIN, ARRESTEE, OFFENDER, OFFENSE, OFF_USING, PROPERTY_LOST, and VICTIM). Each of these tables includes only those incidents that occurred in Roy City between 1998 and 2000 and include at least one theft from a motor vehicle or theft of motor vehicle parts or accessories. The lookup tables are also still available.