CITY OF NEWARK
STORMWATER UTILITY PROGRAM

POLICY: DATA CONDITIONS

PURPOSE:

The procedures necessary to build a stormwater billing file typically require that several datasets be combined and/or be manipulated in order to generate a final master billing file. Several steps are required in the process, and the amount of time required for completing each of the steps is directly related to the quality of the data maintained within each of the various datasets. Therefore, the purpose of this Billing Policy Paper is to report the findings of a preliminary data evaluation process that has been completed by the Project Team to determine the quality of the datasets maintained by or that are available to the City of Newark. One of the results from this preliminary data evaluation process is that the Project Team can provide a more detailed time and cost estimate that will be necessary to develop the final master stormwater billing file.

INTRODUCTION:

The Project Team requested and received various database and GIS data files for the purpose of evaluating the usefulness of this data in building a billing file for the City of Newark's stormwater utility. A list of the data files requested, received and reviewed, along with a brief explanation of each are as follows:

City GIS Files

- Most current Licking County digital aerial photograph (1998);
- Parcel Layer – property boundary information, parcel I.D. numbers, address information and property measurement data.

City Billing File

- Copies of several data tables containing a variety of information from the current City of Newark water and wastewater billing system. Two of these tables were used in this analysis.

Licking County Auditor Property Data

- Property Tax Parcel Database Table – parcel listing used by the Licking County Auditor's office in billing property taxes; and
- Land Use Codes – land use data used by the Licking County Auditor's office.

The analysis procedures and findings for each dataset are provided in the next section, and more detailed information is provided the Appendix A to this document.

DATA ANALYSIS:

The database tables that were requested and received by the Project Team typically comprise the necessary data used to build a stormwater billing file. Since it would be very costly to verify the accuracy of the various data files, the Project Team must rely on the data on an "as is" basis. So, the only "review" of the data consists of looking for missing, incomplete or inconsistent data from one file to the other, and to determine the most economical means of merging the data files for use in building a stormwater billing file.

All of the datasets requested and received by the Project Team were evaluated individually and then evaluated collectively for the purpose of determining the current condition and usefulness in building a stormwater billing file. A summary of the findings from this analysis is provided below. More specific findings that relate to each dataset individually and collectively are presented in Appendix A.

City GIS Files

The City of Newark's Geographic Information Systems (GIS) Department provided two of the files that will be used in building the stormwater billing file. These files include:

- City of Newark Aerial Photograph (1998); and
- City of Newark Parcel Data Layer (GIS parcel information).

The dated aerial photography immediately presents an issue as to how to capture the impervious area for any new development or re-development that has occurred within the City since 1998. Typically, communities will gather site plans (as-built site plans preferred) and measure the impervious area using those site plans. A process will need to be determined by City staff as to the most efficient means of collecting and measuring the impervious area for these properties. However, the Project Team understands that Licking County intends to "fly" new aerial photography in early 2005, and be able to provide a current version to the Project Team by mid-2005.

The Parcel Data Layer database table contains 26,167 records. There are 417 records that do not contain an entry (blank) in the EPIN field, and 247 records in the table that contain the same (duplicate) EPIN entry. The EPIN appears to be a parcel identification number for each record. In reviewing data associated with the duplicate entries, the records contained a differing property size entry, which indicates that the records differ and that they should not contain the same EPIN entry.

The Parcel Data Layer information presents another issue with regard to the EPIN data field. The data found in this field does not correspond to the parcel identification number that is currently used and maintained by the Licking County Auditor's office. The Parcel Data Layer EPIN field contains a 20-digit parcel identification number, and the Licking County Auditor Property Data (see below) PIN (Parcel Identification Number) field contains a 13-digit number. Therefore, use of the EPIN field for establishing a direct relationship to the Licking County Auditor Property Data is not possible using the EPIN data.

The Parcel Data Layer does include data fields that when joined together yields property address information. However, when a street number has not been assigned to a particular property or properties with the same street name, duplicate entries are created in this process. A query process was performed to temporarily remove the records with duplicated addresses. The Parcel Data Layer table was reduced from 26,167 records to 15,876 records. Another series of queries were then performed to determine how many records in the Parcels Data Layer database match records in the Licking County Auditor Property Data file, and that match a record in the City Billing File (see below) using the combined address data.

A similar series of queries were performed on the Licking County Auditor Property Data and on the City Billing File to combine the address information in a manner that can be used to join the tables with the Parcel Data Layer table. Entries with duplicated addresses were temporarily removed as well. The Licking County Auditor Property Data table was reduced from 20,174 records to 17,142 records by eliminating the duplicate address entries, and by eliminating the records where no address information exists (blank). The City Billing File was reduced from 19,002 records to 17,887 records by eliminating the duplicate address entries.

Of the 15,876 records in the Parcel Data Layer table (temporary), 10,895 records matched with a record in the Licking County Auditor Property Data table, or 42% (10,895 / 26,167). Of the 15,876 records in the Parcel Data Layer table (temporary), 10,274 records matched with a record in the City Billing File table, or 39% (10,274 / 26,167).

Therefore, a great deal of database reconciliation will be necessary to match the records in the Parcel Data Layer table with a record in the Licking County Auditor Property Data table, and with a record in the City Billing File.

Summary

The City of Newark's GIS Parcel Data and dated aerial photograph present some issues for using this data in developing a stormwater billing file. Due to the fact that the Parcel Data table contains a property identification number (EPIN) that does not directly correspond with the parcel identification number used by the Licking County Auditor, and the fact that impervious areas for all new development or re-development within the City since 1998 must somehow be captured, this data present issues that must be resolved before or during the process of building the stormwater billing file.

The aerial photograph issue appears to be less of a factor as the Project Team understands that Licking County has ordered new aerial photographs to be "flown" in the spring of 2005, and that these photographs will be available to the Project Team by mid-2005.

The property identification number issue cannot be easily overcome. The Project Team recommends that the Licking County Auditor Property Data is first completely reconciled with records in the City Billing File. After which, the GIS Parcel Data Layer will be reconciled with that merged table. By approaching the reconciliation in this manner, an active billing account (City Billing File) with a landuse code (Licking County Auditor Property Data) representing a non-residential property (NON) will be reconciled to the Parcel Data Layer table. In other words,

in order to build the stormwater billing file, only non-residential properties will be located in the GIS data, and have an impervious area measurement generated for them. Every attempt will be made to locate those properties (GIS Parcel Data Layer) where impervious area exists and no active billing account exists for the property. In those cases, a stormwater only billing account must be created in order to bill the property owner.

Licking County Auditor Property Data

After several attempts by various parties, the City of Newark was finally able to receive a copy of the Licking County Auditor's Property Data file in January 2005. This file contains data that will be used by the Project Team in estimating the number of non-residential properties, determining the number of single-family residential properties, selecting a representative random sample of those single-family residential properties for the purpose of generating the Equivalent Residential Unit (ERU), and for determining the usefulness of the data in the process of developing a stormwater billing file.

This data table contains information such as a landuse code, owner name, property address (as maintained by Licking County) and billing addresses. Although the Project Team cannot certify the accuracy of this data, the data will be relied upon for developing the estimates previously mentioned. The owner data will be particularly important when it is necessary to create a stormwater only billing account (See City Water and Wastewater Billing File section below), and for establishing a master-sub relationship for adjacent properties with same ownership.

The Licking County Auditor Property Data table contains 20,174 records. Each record represents a property within the City of Newark (based upon taxing districts). No records exist in the table having a duplicate Parcel Identification Number (PIN), or that having a missing (blank) entry. Therefore, the PIN field can be used as a unique record identifier (index or primary key). This table can also be used for estimating the number of non-residential properties within the City of Newark since no records exist where the landuse data is missing (blank).

Issues arose when attempting to match the Licking County Auditor Property Data table with records in the City Billing File (see below) and with records in the City GIS Parcel Data (see above).

The Licking County Auditor Property Data table contains a Parcel Identification Number (PIN) field with a 13-digit number entered for each record. This field does not directly correspond to a field in the Parcel Data Layer table as this table contains a field titled EPIN that contains a 20-digit parcel identification number. The City Billing File contains a field titled WPHONE that contains entries (not all records) with 16 characters including hyphens and a decimal point that appears to be a version of the Licking County Auditor PIN. When the Project Team manually compared the Licking County Auditor Property Data PIN field with the WHPONE field in the City Billing File, it appeared that the entries in the WPHONE field could be manipulated and then used to attempt to match records to the PIN field by first removing the hyphens and decimal.

A query was designed to extract and then combine the data from the WPHONE field in the City Billing File to a new field called PIN. This data field was then used to determine how many

records in the City Billing File had a matching record in the Licking County Auditor Property Data PIN field. The result was a match on 14,562 records, or 77% (14,562 / 19002). The Project Team considers this matching percentage to be exceptionally high. However, there are still 4,440 records in the City Billing File (19,002 – 14,562) that will need to be manually reconciled to a record in the Licking County Auditor Property Data table.

Next, the Project Team attempted to match the Licking County Auditor Property Data with records in the City of Newark's GIS Parcel Data Layer table. As was previously mentioned (See the City GIS Files section above), the Parcels Data Layer table contains the EPIN field that contains a property identification number but it is comprised of a 20-digit number that does not match the 13-digit PIN used by the Auditor. Obviously, this data field could not be used to match records in the Licking County Auditor Property Data table using the PIN field. Therefore, an attempt was made to match records in the Licking County Auditor Property Data table with a record in the Parcels Data Layer table using address information.

After a series of queries were performed on each table to move and combine address data in a manner that could be used for address comparison purposes, and any duplicate records were temporarily removed, a query was performed to determine the number of records in the Licking County Auditor Property Data table with a record in the Parcels Data Layer table. The result was a match on 10,895 records, or 42% (10,895 / 26,167).

Summary

The Licking County Auditor Property Data contains critical pieces of data that will be necessary for both estimating the costs for the remaining phases of Newark's Stormwater Utility, and for preparing a stormwater billing file. Although the Project Team cannot certify the accuracy of the data in this file, they will rely on this data for performing the estimates and preparing the billing file. Any errors that may result from incomplete or inaccurate data can be resolved either during the database reconciliation process or through error correction once billing begins.

The Project Team achieved a very high (77%) match of records from the Licking County Auditor Property Data table with a record in the City Billing File. However, the Project Team only achieved a 42% match when attempting to match a record in the Licking County Auditor Property Data table with a record in the City of Newark's GIS Parcel Layer table. The Project Team recommends that the Licking County Auditor Property Data table is first reconciled with the City Billing File (all active billing files are matched to a record in the Licking County Auditor Property Data table), and then this data is used to extract the non-residential properties that need to be reconciled to a record in the GIS Parcels Layer table.

City Water and Wastewater Billing File (City Billing File)

The City of Newark provided the Project Team with a digital copy of several data tables extracted from the current water and wastewater billing file. From previous discussions, it appears that this file will be used as the base file for which the stormwater billing data information will be added and later billed. However, it should be noted that this file only contains records for properties that currently receive a water and/or wastewater bill. Accounts

will need to be created (stormwater only) for those properties that contain impervious area and that do not currently receive a water or wastewater bill from the City.

The City of Newark provided the Project Team with several data tables used in the current water/wastewater billing system. The Project Team used two of the tables provided by the City for this analysis. The two tables are as follows:

- UBCUST01 – contains customer information such as a customer number, a property number, a rate code, a route code, the service address and billing address, billing and payment history and an active flag field that designates currently active records.

- UBMTRM – contains information for a particular property such as the customer number, property number, meter number, start date and end date, and an active/inactive code field.

These tables contain information that will prove to be very helpful in the process of building the stormwater billing file. For example, the rate code information may be used in conjunction with the County landuse information to determine the current land use for a property.

The Project Team first analyzed the tables individually, then attempted to merge the tables using any common data fields for the purpose of matching records that are currently active (UBCUST01) with a meter size (UBMTRM) for the purposes of estimating the number of residential and non-residential customers in the billing system based upon meter size. The resulting table was then used to attempt to merge the billing file data with the Licking County Auditor Property Data table and then with the City GIS files.

The Project Team performed several queries and manipulated the current data in order to merge the UBCUST01 and UBMTRM tables and to extract the residential and non-residential properties. The complete series of queries and data manipulation steps are outlined in Appendix A.

After completing the merge of the UBCUST01 table with the UBMTRM table, the Project Team then attempted to merge this file with the Licking County Auditor Property Data table and then with the City GIS files. The results of these merge attempts were also provided in the City GIS Files and Licking County Auditor Property Data sections above.

Issues arose when attempting to match the City Billing File with records in the Licking County Auditor Property Data table (see above) and with records in the City GIS Parcel Data (see above).

The Licking County Auditor Property Data table contains a Parcel Identification Number (PIN) field with a 13-digit number entered for each record. This field does not directly correspond to a field in the City Billing File. The City Billing File contains a field titled WPHONE that contains entries (not all records) with 16 characters including hyphens and a decimal point. However, in manually comparing the Licking County Auditor Property Data PIN field with the WHPONE field in the City Billing File, it appeared that the entries in the WPHONE field could be used in matching records to the PIN field by removing the hyphens and decimal.

A query was designed to extract and then combine the data from the WPHONE field in the City Billing File to a new field called PIN. This data field was then used to determine how many records in the City Billing File had a matching record in the Licking County Auditor Property Data PIN field. The result was a match on 14,562 records, or 77% (14,562 / 19002). The Project Team considers this matching percentage to be exceptionally high. However, there are still 4,440 records in the City Billing File (19,002 – 14,562) that will need to be manually reconciled to a record in the Licking County Auditor Property Data table.

The Parcel Data Layer (City GIS Files) information also presents an issue with regard to the EPIN data field. The data found in this field does not correspond to the parcel identification number that is currently used and maintained by the Licking County Auditor's office or with the WPHONE field used in the City Billing File. The Parcel Data Layer EPIN field contains a 20-digit parcel identification number, and the Licking County Auditor Property Data (see above) PIN (Parcel Identification Number) field contains a 13-digit number. The City Billing File WPHONE field contains 16 characters including hyphens and a decimal point. Therefore, use of the EPIN field for establishing a direct relationship to the Licking County Auditor Property Data or with the City Billing File was not possible.

The Parcel Data Layer does include data fields that when joined together yields property address information. However, when a street number has not been assigned to a particular property or properties with the same street name, duplicate entries exist in the address field. A query process was performed to temporarily remove the records with duplicated addresses. The Parcel Data Layer table was reduced from 26,167 records to 15,876 records. Another series of queries was performed to determine how many records in the Parcels Data Layer database match records in the Licking County Auditor Property Data file and that match a record in the City Billing File (see below) using the combined address data.

A similar series of queries were performed on the Licking County Auditor Property Data and on the City Billing File to combine the address information in a manner that can be used to join the tables with the Parcel Data Layer table. Entries with duplicated addresses were temporarily removed as well. The Licking County Auditor Property Data table was reduced from 20,174 records to 17,142 records by eliminating the duplicate address entries, and by eliminating the records where no address information exists (blank). The City Billing File was reduced from 19,002 records to 17,887 records by eliminating the duplicate address entries.

Of the 15,876 records in the Parcel Data Layer table (temporary), 10,895 records matched with a record in the Licking County Auditor Property Data table, or 42% (10,895 / 26,167). Of the 15,876 records in the Parcel Data Layer table (temporary), 10,274 records matched with a record in the City Billing File table, or 39% (10,274 / 26,167).

Summary

The current water and wastewater billing file provided by the City of Newark is a critical piece of data that will be necessary in building the stormwater billing file. This dataset appears to be the most logical base from which the stormwater billing file should be developed. However, this file only contains billing records for properties that currently receive water service and/or wastewater

service from the City. Accounts will need to be created (stormwater only) for those properties that contain impervious area and that do not currently receive a water or wastewater bill from the City.

The rate code and meter size information that is maintained in this file will be very useful in determining residential and non-residential parcels located within the City. This data will be used in conjunction with the land use information that was provided by the Licking County Auditor's office for determining the number of residential and non-residential properties located within the City of Newark.

However, no direct link was found for merging the City Billing File with either the Licking County Auditor Property Data table or with the City GIS Parcel Data Layer table. The three data tables were altered and manipulated in order to achieve the merge percentages of 77% (City Billing File to Licking County Auditor Property Data table) and 39% (City Billing File to the City GIS Parcel Data Layer table). Of particular concern is the very low percentage that was achieved in matching the City Billing File with the City GIS Parcel Data Layer table. The City GIS Parcel Data Layer table information will ultimately be used to locate and measure the impervious areas for all non-residential properties, and this information must be linked back to the City Billing File for the purpose of billing stormwater charges. If this matching percentage is not improved through manual database reconciliation, there is potential for impervious areas to go unbilled.

The Project Team recommends that the City Billing File be first reconciled with the Licking County Auditor Property Data table. This reconciled table can then be used to extract the non-residential properties that will require impervious area measurements. This table then should be reconciled back to the City Billing File to insure that all non-residential properties and their impervious area measurements are accounted for.

SUMMARY

The Project Team has through Technical Advisory Committee (TAC) discussions, and through meetings with various department personnel, identified the initial key components (datasets) that may be required and/or used to build the stormwater billing file. Copies of these various datasets were requested and received by the Project Team either prior to or soon after their initial visit on January 6, 2005. The Project Team performed a thorough evaluation of the datasets both individually and collectively, and has determined that a combination of several datasets will be necessary to prepare a complete stormwater billing file.

No single dataset received and reviewed can be used alone for building the stormwater billing file. A combination of several datasets will be necessary to prepare a complete stormwater billing file. The Project Team has determined that the current City water and wastewater billing file should be used as the base or master dataset to which the stormwater billing information should be merged. However, this file does not include records for properties that currently do not

receive water and/or wastewater services, and that may contain impervious areas. A stormwater only record will need to be created for billing those properties.

The aerial photography is dated (1998), and this will require that the number of newly developed or newly re-developed properties need to be determined, and a procedure for measuring the impervious areas will need to be established. However, the Project Team understands that Licking County has planned to "fly" new aerial photography in the spring of 2005. This will certainly reduce the workload that would otherwise be necessary in measuring the impervious area for all non-residential properties

As would be expected, the datasets necessary for building the stormwater billing file will require computerized and/or manual manipulation and reconciliation in order to properly combine the datasets into a usable stormwater billing file. The stormwater data will then need to be "merged" into the City's water and wastewater billing file and tested prior to billing stormwater charges.

From the analysis provided above and in Appendix A, the Project Team has determined that several thousand records will need to be manually reconciled in order to properly compile the impervious area data into the current water/wastewater billing system. Of particular concern is the very low percentage that was achieved in matching the City Billing File with the City GIS Parcel Data Layer table. The City GIS Parcel Data Layer table information will ultimately be used to locate and measure the impervious areas for all non-residential properties, and this information must be linked back to the City Billing File for the purpose of billing stormwater charges. If this matching percentage is not improved through manual database reconciliation, there is potential for impervious areas to go unbilled.

The Project Team recommends that the City Billing File be first reconciled with the Licking County Auditor Property Data table. This reconciled table can then be used to extract the non-residential properties that will require impervious area measurements. This table then should be reconciled back to the City Billing File to insure that all non-residential properties and their impervious area measurements are accounted for.

The manual database reconciliation process will first reconcile the 4,440 records in the Billing File with a record in the Licking County Auditor Property Data table. Once completed, 100% of the records in the current City water/wastewater billing file will be matched to a master property record in the Licking County Auditor Property Data table. Then, the non-residential properties will be extracted from this combined table and the manual database reconciliation process will reconcile these records to a master record in the Parcels Data Layer table. When this process has been completed, the Project Team will then identify any records in the Parcels Data Layer table that were not successfully matched to a record in the Billing File, but that contain impervious areas. These additional records will be reconciled to a record in the Billing File, or a stormwater only billing account will be created.

All 4,440 unmatched records in the Billing File will require reconciliation to the Licking County Auditor Property Data table. Of the 15,272 records in the Parcels Data Layer table that do not match with a record in the Licking County Auditor Property Data table, and the 15,893 records in the Parcels Data Layer table that do not match with a record in the Billing File, only those records

with impervious area will be reconciled. The Project Team cannot estimate the number of records that will contain impervious area (impervious area has not been measured) at this time.

ACTION:

Approved: _____ Date: _____

APPENDIX A

CITY OF NEWARK
STORMWATER UTILITY PROGRAM
DATA CONDITIONS
DETAILED PROCEDURES AND FINDINGS

All of the datasets requested and received by the Project Team were evaluated individually and then evaluated collectively for the purpose of determining the current condition of and usefulness of the data in building a stormwater billing file. A summary of the findings from this analysis was provided in the main body of this document. More specific findings that related to each dataset individually and collectively are presented in this Appendix. Copies of all data files and the files created through this analysis can be found on the accompanying CD.

Database Files

The Project Team evaluated several database tables using Microsoft Access™ software. Each of the tables was first evaluated individually for data integrity, and then a review was performed using several combinations of the tables (collectively) for relational integrity.

Typical steps in reviewing a database table for data integrity are as follows:

- Note the number of records in the table;

- Identify the key data fields within the table;
- Locate the indexed field or fields within the table;
- Query for duplicate values in the indexed data field(s); and
- Query for records with missing or erroneous data in key data fields.

Typical steps in reviewing a database table for relational integrity are as follows:

- Determine which data fields (if any) are either directly used for relating one or more other database tables (one-to-one, one-to-many, or many-to-one), or that can be used or manipulated to create a relationship to one or more other database tables.

The tables used and reviewed in this analysis are as follows:

- City Water and Wastewater Billing File (Billing File);
- City GIS Parcel Layer Table (Parcel Data); and
- Licking County Auditor's Property Data File.

City Water and Wastewater Billing File (Billing File)

This data table was provided by the City of Newark and is a current copy of the water and wastewater billing file. The City also provided copies of several other billing related tables, but only the UBCUST01 (Customer Information) table and UBMTRM (Water Meter) tables were used in this analysis.

The key data fields identified in the UBCUST01 table are as follows:

- CUSTNO – this is a unique customer account number.
- PROPNO – this field identifies the property location for the CUSTNO.
- RATE – this field contains a code that can be broken down to identify those customer records located inside and outside (I = inside, O = outside) of the City of Newark, the type of property associated with the record (residential, commercial, industrial, institutional and governmental), and the service(s) provided (water only, water and sewer, sewer only).
- ACTFLG – the active flag field identifies those records that are currently active in the billing system.
- ROUTE – this field contains various entries, but those with entries equal to 1, 35 or 65 indicate situations where the structures have been torn down (demolished).
- SRVADR – this field provides the service address for the particular record.

- WPHONE – this field provides a hyphenated parcel ID number that may relate this table to the Licking County Property Data.
- MTRNO – this field provides the water meter number associated with the SERVADR field, PROPNO field and CUSTNO field.
- COMPANY – this field provides the name of the customer currently receiving utility service(s) at this location.

The key data fields identified in the UBMTRM table are as follows:

- MTRNO – this field provides the water meter number associated with a property. This field contains data similar to that found in the MTRNO field in the UBCUST01 table.
- CUSTNO – this field contains a customer account number similar to that found in the CUSTNO field in the UBCUST01 table.
- ACTIVE – this field contains a code that indicates that the record is currently active in the billing system. The data in this field does not correspond to the data found in the ACTFLG field of the UBCUST01 table.
- SIZE – this field contains the water meter size for the MTRNO and CUSTNO field.
- PROPNO – this field identifies the property, and this field contains information similar to that found in the PROPNO field in the UBCUST01 table.

The findings for these tables are found below, along with an explanation of the process that was followed to extract data necessary to estimate the number of residential and non-residential properties. The number of residential and non-residential properties is necessary in order to determine two key pieces of information necessary for building the stormwater billing file. The two key pieces of information are as follows:

1. To estimate and extract the residential population from which to assign random numbers and select those properties to be measured in determining the Equivalent Residential Unit (ERU).
2. To estimate the number of non-residential properties that will need to be measured for stormwater billing purposes.

After reviewing the data found in the UBCUST01 and UBMTRM tables, it was determined that neither of the tables provided the necessary information to extract the two necessary tables listed above. Therefore, a process was followed that would end with this information. The process and results are as follows:

Initially, a series of queries was performed on the UBCUST01 table and the UBMTRM table to determine data integrity. Then a series of queries were performed to locate and extract active records for the purpose of determining the residential and non-residential billing records. The information from these processes is provided below:

<u>Data Integrity – UBCUST01</u>

1. The number of records in the complete UBCUST01 table = 43,246.

2. The number of records in the complete UBCUST01 table without an entry (blank) or with duplicate entries in the CUSTNO field = 0.

3. The number of records in the complete UBCUST01 table without an entry in the PROPNO field = 0.

4. The number of records in the complete UBCUST01 table with duplicate entries in the PROPNO field = 31,244.

5. The City of Newark did not provide any data that could be used to determine if any entries in the PROPNO field are invalid.

6. The number of records in the complete UBCUST01 table without an entry in the RATE field = 1.

7. The number of records in the complete UBCUST01 table that appear to have invalid entries in the RATE field = 5,775 (99 = 38, 999 = 2, DEF = 5,662, C51 = 1, OH = 1, BS! = 21, BW! = 50).

8. The number of records in the complete UBCUST01 table with the ACTFLG field = P (active records) = 19,590.

9. The number of records in the complete UBCUST01 table with the ACTFLG entry other than = P = 33 (ACTFLG = N).

10. The number of records in the complete UBCUST01 table without an entry (blank) in the ACTFLG field = 23,623.

11. The number of records in the complete UBCUST01 table without an entry (blank) in the ROUTE field = 0.

12. The number of records in the complete UBCUST01 table that appear to have invalid entries in the ROUTE field = 5,666 (0 = 2, 999 = 5,664).

13. The number of records in the complete UBCUST01 table with an entry of 1, 35 or 65 in the ROUTE field = 653 (1 = 90, 35 = 447, 65 = 116).

14. The number of records in the complete UBCUST01 table without an entry in the SRVADR field = 0.

15. The number of records in the complete UBCUST01 table with duplicate entries in the SRVADR field = 31,443.

16. The number of records in the complete UBCUST01 table with duplicate entries in the SRVADR field and that have an ACTFLG = P = 273.

17. The number of records in the complete UBCUST01 table with duplicate entries in the SRVADR field and that have an ACTFLG = P and are Fire Line records = 50.

18. The number of records in the complete UBCUST01 table without an entry (blank) in the WPHONE field = 15,872.

19. The number of records in the complete UBCUST01 table without an entry (blank) in the WPHONE field and having an ACTFLG = P = 4,320.

20. The number of records in the complete UBCUST01 table with duplicate entries in the WPHONE field and that have an ACTFLG = P = 6,186.

21. The number of records in the complete UBCUST01 table without an entry (blank) in the MTRNO field = 404.

22. The number of records in the complete UBCUST01 table without an entry in the MTRNO field and with an ACTFLG = P = 400.

23. The number of records in the complete UBCUST01 table with duplicate entries in the MTRNO field = 29,366.

24. The number of records in the complete UBCUST01 table with duplicate entries in the MTRNO field and with an ACTFLG = P = 6,926.

25. The number of records in the complete UBCUST01 table without an entry in the COMPANY field = 0.

26. The number of records in the complete UBCUST01 table with duplicate entries in the COMPANY field = 17,319.

27. The number of records in the complete UBCUST01 table with duplicate entries in the COMPANY field and with an ACTFLG = P = 5,421.

<u>Data Integrity – UBMTRM</u>

1. The number of records in the complete UBMTRM table = 30,224.

2. The number of records in the complete UBMTRM table without an entry (blank) in the MTRNO field = 1.

3. The number of records in the complete UBMTRM table with a duplicate entry in the MTRNO field = 4.

4. The number of records in the complete UBMTRM table without an entry (blank) in the CUSTNO field = 14,107.

5. The number of records in the complete UBMTRM table with duplicate entries in the CUSTNO field = 2,994.

6. The number of records in the complete UBMTRM table without an entry (blank) in the ACTIVE field = 9.

7. The number of records in the complete UBMTRM table with the ACTIVE field = A = 21,061.

8. The number of records in the complete UBMTRM table with the ACTIVE field having an entry other than A = 9,154 (AA = 1, AB = 12, AE = 1, AI = 2, AK = 3, AQ = 1, AS = 2, AY = 2, B = 7, BA = 2, I = 9,097, IA = 19, II = 1).

9. The number of records in the complete UBMTRM table without an entry (blank) in the SIZE field = 20.

10. The number of records in the complete UBMTRM table without an entry in the SIZE field and having an entry of A in the ACTIVE field = 4.

11. The number of records in the complete UBMTRM table that appear to have an invalid entry in the SIZE field = 206 (SR = 1, 1" = 9, 1.2 = 1, 1.5 = 1, 1-1/2 = 6, 2" = 1, 3.4 = 1, ¾ B = 1, ¾" = 4, ¾-F = 1, 3\4 = 1, 4" = 1, A = 4, F ¾ = 2, F3/4 = 141, F-3/4 = 30, NONE = 1).

12. The number of records in the complete UBMTRM table that appear to have an invalid entry in the SIZE field and having an entry in the ACTIVE field = A = 156 (1 SR = 1, 1" = 9, 1.2 = 1, 1.5 = 1, 1-1/2 = 3, 2" = 1, 3.4 = 1, ¾ B = 1, ¾" = 4, ¾-F = 1, 4" = 1, A = 4, F ¾ = 2, F3/4 = 103, F-3/4 = 22, NONE = 1).

13. The number of records in the complete UBMTRM table without an entry (blank) in the PROPNO field = 3,637.

14. The number of records in the complete UBMTRM table without an entry in the PROPNO field and having the ACTIVE field entry = A = 876.

<u>Extracting the Residential and Non-Residential Active Records</u>

Several queries were necessary to extract the residential and non-residential properties from the UBCUST01 table. The Project Team relied on the data provided and has not verified the accuracy of the data. The UBMTRM table was used in conjunction with the UBCUST01 table in this process as the UBMTRM table contains the water meter size data (SIZE). The procedures used in this process are as follows:

1. Locate the records in the UBCUST01 table having an ACTFLG = P. This query extracted only those records in the table that are currently active in the billing system. The number of records found by this query = 19,590 (Table "1 – UBCUST ACTFLG = P").

2. Locate any records in Table "1 – UBCUST ACTFLG = P" having a duplicate entry in the MTRNO field. This query extracted those active records having a duplicate entry in the MTRNO field. Since it was already determined that no duplicate entries exist within the UBCUST01 table CUSTNO field and that there are several records in the UBMTRM table without an entry (blank) in the CUSTNO field, matching Table 1 to the UBMTRM table will need to be accomplished using the MTRNO field. Duplicate entries in the MTRNO field (UBCUST01 table) will overstate the number of water meters outstanding when joined to the UBMTRM table. The number of records found by this query = 336 (Table "1d – Duplicate MTRNO in ACTFLG = P").

3. Locate any records in Table "1d – Duplicate MTRNO in ACTFLG = P" that have a ROUTE field entry equal to 1, 35 or 65. This query locates any records that are in active status (UBCUST01 table) but that have been torn down or demolished. The Project Team assumes that the ROUTE field entries are correct. The number of records found by this query = 82 (Table "1e – Table 1d ROUTE = 1 Or 35 Or 65").
4. Locate any records in Table "1d – Duplicate MTRNO in ACTFLG = P" that have a ROUTE field entry not equal to 1, 35 or 65. The number of records found by this query = 254 (Table "1f – Table 1d ROUTE Not 1 Or 35 Or 65").
5. Table Check

    a. Table Check – Table 1d = 336 records
    Table 1e = 82 records
    Table 1f = 254 records

    336 – 82 = 254 (okay)

    b. Set the CUSTNO field as the Primary Key for tables 1, 1d, 1e, 1f (procedure was successful – no blank or duplicate entries in the CUSTNO field).

    c. Check Table "1e – Table 1d ROUTE = 1 Or 35 Or 65" for duplicate records in the MTRNO field. The query found 58 records.

    d. Check Table "1f – Table 1d ROUTE Not 1 Or 35 Or 65" for duplicate records in the MTRNO field. The query found 231 records.

    e. Determine how many records in Table "1e – Table 1d ROUTE = 1 Or 35 Or 65" that are also found in Table "1d – Duplicate MTRNO in ACTFLG = P". Join the tables on the CUSTNO field. The query found 82 matching records. Okay.

    f. Determine how many records in Table "1f – Table 1d ROUTE Not 1 Or 35 Or 65" that are also found in Table "1d – Duplicate MTRNO in ACTFLG = P". Join the tables on CUSTNO field. The query found 254 records. Okay.

6. Query Table "1 – UBCUST ACTFLG = P" grouping and counting the MTRNO field. Sort the MTRNO Count query results field descending.

a. Query Results =

NONE = 51
TORNDOWN = 49
SEWER = 47
NOMETER = 23
TORN DOWN = 15
NO METER = 5
DISCONT = 2

7. Locate any records in Table "1 – UBCUST ACTFLG = P" where the RATE field contains "O". This query will locate any active records that are located outside of the City. The query found 306 records (Table "1g – ACTFLG = P Outside City").
   a. Set the CUSTNO field as the Primary Key.

8. Determine if any of the records in Table "1g – ACTFLG = P Outside City" have any matching records in:

   a. Table 1g in Table "1d – Duplicate MTRNO in ACTFLG = P" = 38 records (Table "1h – Outside City to Delete From Table 1 1d 1e 1f").

   b. Table 1g in Table "1e - Table 1d ROUTE = 1 Or 35 Or 65" = 1 record.

   c. Table 1g in Table "1f - Table 1d ROUTE Not 1 Or 35 Or 65" = 37 records.
      1. (a) should be equal to (b) + (c). 38 = 1 + 37. Okay.

9. Perform a Delete Query to delete all records in Table "1h – Outside City to Delete From Table 1 1d 1e 1f" from:

   a. Table "1 – UBCUST ACTFLG = P". Number of records deleted = 38. Revised number of records in Table 1 = 19,552 records (19590 – 38 = 19,552).

   b. Table "1d – Duplicate MTRNO in ACTFLG = P". Number of records deleted = 38. Revised Table 1d = 298 records (336 – 38 = 298).

   c. Table "1e - Table 1d ROUTE = 1 Or 35 Or 65". Number of records deleted = 1. Revised Table 1e = 81 records (82 – 1 = 81).

   d. Table "1f - Table 1d ROUTE Not 1 Or 35 Or 65". Number of records deleted = 37. Revised Table 1f = 217 records (254 – 37 = 217).

   e. Table "1g - ACTFLG = P Outside City". Number of records deleted = 38. Revised Table 1g = 268 records (306 – 38 = 268).

10. Perform a Delete Query to delete the remaining records in Table "1e - Table 1d ROUTE = 1 Or 35 Or 65" from:

    a. Table "1 – UBCUST ACTFLG = P". Number of records deleted = 81. Revised Table 1 = 19,471 records (19,552 – 81 = 19,471).

    b. Table "1d - Duplicate MTRNO in ACTFLG = P". Number of records deleted = 81. Revised Table 1d = 217 records (298 – 81 = 217).

        1. Table "1d - Duplicate MTRNO in ACTFLG = P" should contain the same records as is found in Table "1f - Table 1d ROUTE Not 1 Or 35 Or 65". Table 1d = 217 records and Table 1f = 217 records. Okay.

11. Query Table "1d – Duplicate MTRNO in ACTFLG = P" grouping and counting the MTRNO field. Sort the MTRNO Count query results field descending.

    a. Query Results =

        NONE = 56
        NOMETER = 22
        TORNDOWN = 10 (Table "1j – Table 1d TORNDOWN")
        SEWER = 8
        NO METER = 5
        TORN DOWN = 3 (Table "1i – Table 1d – TORN DOWN")
        DISCONT = 1 (Table "1k – Table 1d – DISCONT")

    b. Set the CUSTNO field as the Primary Key for tables 1i, 1j and 1k.

12. Perform a Delete Query to delete all records in tables 1i, 1j and 1k from Table "1 – UBCUST ACTFLG = P".

    a. Table 1i in Table "1 – UBCUST ACTFLG = P" = 3 records deleted. Revised Table "1 – UBCUST ACTFLG = P" = 19,468 (19,471 –3 = 19,468).

    b. Table 1j in Table "1 – UBCUST ACTFLG = P" = 10 records deleted. Revised Table "1 – UBCUST ACTFLG = P" = 19,458 (19,468 – 10 = 19,458).

    c. Table 1k in Table "1 – UBCUST ACTFLG = P" = 1 record deleted. Revised Table "1 – UBCUST ACTFLG = P" = 19,457 (19,458 – 1 = 19,457).

13. Determine how many records in Table "1g – ACTFLG = P Outside City" having a matching record in Table "1 – UBCUST ACTFLG = P". Number of records matching = 268. Number of records in Table 1g = 268. Okay.

14. Perform a Delete Query to delete all records from Table "1g - ACTFLG = P Outside City" from Table "1 – UBCUST ACTFLG = P". Number of records deleted = 268. Revised Table "1 – UBCUST ACTFLG = P" = 19,189 records (19,457 – 268 = 19,189).

15. Query the UBMTRM table to find all records with the ACTIVE field = "A". Number of records found = 21,061 (Table "2 – UBMTRM ACTIVE = A").

16. Determine if any records exist in Table "2 – UBMTRM ACTIVE = A" having duplicate entries in the CUSTNO field. The number of duplicate records = 268.

17. Remove duplicates in the CUSTNO field from Table "2- UBMTRM ACTIVE = A". The revised number of records in Table "2 – UBMTRM ACTIVE = A" is 20,897.

18. Determine if any records in Table "1i - – Table 1d – TORN DOWN" are found in Table "2 – UBMTRM ACTIVE = A". Join the tables on the PROPNO field. Number of matching records = 2.

19. Determine if any records in Table "1j - – Table 1d TORNDOWN" are found in Table "2 – UBMTRM ACTIVE = A". Join the tables on the PROPNO field. Number of matching records = 6.

20. Determine if any records in Table "1k - – Table 1d – DISCONT" are found in Table "2 – UBMTRM ACTIVE = A". Join the tables on the PROPNO field. Number of matching records = 1.

21. Perform a Delete Query to delete the records in Table "2 – UBMTRM ACTIVE = A" having matching records in tables 1i, 1j and 1k.

    a. Table 1i in Table "2 – UBMTRM ACTIVE = A" = 2 records deleted. The revised number of records in Table "2 – UBMTRM ACTIVE = A" = 20,895 (20,897 – 2 = 20,895).

    b. Table 1j in Table "2 – UBMTRM ACTIVE = A" = 6 records deleted. The revised number of records in Table "2 – UBMTRM ACTIVE = A" = 20,889 (20,895 – 6 = 20, 889).

    c. Table 1k in Table "2 – UBMTRM ACTIVE = A" = 1 record deleted. The revised number of records in Table "2 – UBMTRM ACTIVE = A" = 20,888 (20,889 – 1 = 20, 888).

22. Perform a Delete Query to delete the records in Table "1d – Duplicate MTRNO in ACTFLG = P" having matching records in tables 1i, 1j and 1k.

    a. Table 1i in Table "1d – Duplicate MTRNO in ACTFLG = P" = 3 records deleted. The revised number of records in Table "1d – Duplicate MTRNO in ACTFLG = P" = 214 (217 – 3 = 214).

b. Table 1j in Table "1d – Duplicate MTRNO in ACTFLG = P" = 10 records deleted. The revised number of records in Table "1d – Duplicate MTRNO in ACTFLG = P" = 204 (214 – 10 = 214).

c. Table 1k in Table "1d – Duplicate MTRNO in ACTFLG = P" = 1 record deleted. The revised number of records in Table "1d – Duplicate MTRNO in ACTFLG = P" = 203 (204 – 1 = 203.

23. Query Table "1d – Duplicate MTRNO in ACTFLG = P" having matching records in Table "1 – UBCUST ACTFLG = P" and having an entry in the RATE field equal to "99". Join the tables on the MTRNO field, the CUSTNO field and the PROPNO field. The query found 10 matching records (Table 1d1 – Table 1d – Rate Code = 99". (Review of these records indicates that all of these records are non-residential).

24. Query Table "1d – Duplicate MTRNO in ACTFLG = P" having matching records in Table "1 – UBCUST ACTFLG = P" and having an entry in the RATE field equal to "BS1". Join the tables on the MTRNO field, the CUSTNO field and the PROPNO field. The query found 19 matching records (Table 1d2 – Table 1d – Rate Code = BS1". (Review of these records indicates that all of these records are non-residential).

25. Query Table "1d – Duplicate MTRNO in ACTFLG = P" having matching records in Table "1 – UBCUST ACTFLG = P" and having an entry in the RATE field equal to "BW1". Join the tables on the MTRNO field, the CUSTNO field and the PROPNO field. The query found 46 matching records. (Table 1d3 – Table 1d – Rate Code = BW1". (Review of these records indicates that these records are mixed between residential and non-residential).

    Note: One additional record (CUSTNO 60,899 with RATE = 999 was deleted from Table "1 – UBCUST ACTFLG = P". The revised number of records in Table "1 – UBCUST ACTFLG = P" = 19,188 (19,189 – 1 = 19188).

26. Perform a Delete Query to delete all records in Table "1 – UBCUST ACTFLG = P" having matching records in tables 1d1, 1d2 and 1d3.

    a. Table 1d1 in Table "1 – UBCUST ACTFLG = P" = 10 records deleted. The revised number of records in Table "1 – UBCUST ACTFLG = P" = 19,178 (19,188 – 10 = 19,178).

    b. Table 1d2 in Table "1 – UBCUST ACTFLG = P" = 19 records deleted. The revised number of records in Table "1 – UBCUST ACTFLG = P" = 19,159 (19,178 – 19 = 19,159).

    c. Table 1d3 in Table "1 – UBCUST ACTFLG = P" = 46 records deleted. The revised number of records in Table "1 – UBCUST ACTFLG = P" = 19,113 (19,159 – 46 = 19,113).

27. Perform a Delete Query to delete all records in Table "1d – Duplicate MTRNO in ACTFLG = P" having matching records in tables 1d1, 1d2 and 1d3.

    a. Table 1d1 in Table "1d – Duplicate MTRNO in ACTFLG = P" = 10 records deleted. The revised number of records in Table "1d – Duplicate MTRNO in ACTFLG = P" = 193 (203 – 10 = 193).

    b. Table 1d2 in Table "1d – Duplicate MTRNO in ACTFLG = P" = 19 records deleted. The revised number of records in Table "1d – Duplicate MTRNO in ACTFLG = P" = 174 (193 – 19 = 174).

    c. Table 1d3 in Table "1d – Duplicate MTRNO in ACTFLG = P" = 46 records deleted. The revised number of records in Table "1d – Duplicate MTRNO in ACTFLG = P" = 128 (174 – 46 = 128).

    Note: One additional record (CUSTNO 60,899 was deleted from Table "1d – Duplicate MTRNO in ACTFLG = P". The revised number of records in Table "1d – Duplicate MTRNO in ACTFLG = P" = 127 (128 – 1 = 127).

28. Query Table "1 – UBCUST ACTFLG = P" for entries in the MTRNO field equal to:

    a. SEWER = 8 records (Table "1d4 – Table 1d MTRNO = SEWER").

    b. NONE = 7 records (Table "1d5 – Table 1d MTRNO = NONE").

    c. NOMETER = 1 record (Table "1d6 – Table 1d MTRNO = NOMETER").

29. Query Table "1 – UBCUST ACTFLG = P" for blank entries in the MTRNO field. The number of records found = 397 (Table "1a – Table 1 MTRNO Is Null". Make the CUSTNO field the Primary Key.

30. Perform a Delete Query to delete all records in Table "1 – UBCUST ACTFLG = P" having matching records in tables 1d4, 1d5 and 1d6.

    a. Table 1d4 in Table "1 – UBCUST ACTFLG = P" = 8 records deleted. The revised number of records in Table "1 – UBCUST ACTFLG = P" = 19,105 (19,113 – 8 = 19,105).

    b. Table 1d5 in Table "1 – UBCUST ACTFLG = P" = 7 records deleted. The revised number of records in Table "1 – UBCUST ACTFLG = P" = 19,098 (19105 – 7 = 19,098).

    c. Table 1d6 in Table "1 – UBCUST ACTFLG = P" = 1 record deleted. The revised number of records in Table "1 – UBCUST ACTFLG = P" = 19,097 (19,098 – 1 = 19,097).

31. Perform a Delete Query to delete all records in Table "1d – Duplicates MTRNO in ACTFLG = P" having a matching record in tables 1d4, 1d5 and 1d6.

    a. Table 1d4 in Table "1d – Duplicates MTRNO in ACTFLG = P" = 8 records deleted. The revised number of records in Table "1d – Duplicates MTRNO in ACTFLG = P" = 119 (127 – 8 = 119).

    b. Table 1d5 in Table "1d – Duplicates MTRNO in ACTFLG = P" = 7 records deleted. The revised number of records in Table "1d – Duplicates MTRNO in ACTFLG = P" = 112 (119 – 7 = 112).
    c. Table 1d6 in Table "1d – Duplicates MTRNO in ACTFLG = P" = 1 record deleted. The revised number of records in Table "1d – Duplicates MTRNO in ACTFLG = P" = 111 (112 – 1 = 111).

32. Perform a new Find Duplicates Query on the MTRNO field in Table "1 – UBCUST ACTFLG = P". The number of records found = 111. Note: the number of records found with this query should equal the number of records remaining in Table 1d – Duplicate MTRNO in ACTFLG = P". Table 1d = 111 records. Okay.

33. Research and remove the remaining duplicate records in Table "1 – UBCUST ACTFLG = P". The revised number of records in Table "1 – UBCUST ACTFLG = P" = 19,052 (19,097 – 45 = 19,052).

34. Perform a Select Query to determine how many records in Table "1 – UBCUST ACTFLG = P" have a matching record in Table "2 – UBMTRM ACTIVE = A". The number of matching records = 8,474 when joined on the CUSTNO field. The number of matching records = 18,585 when joined on the MTRNO field.

35. Perform a Find Unmatched Query to locate the records in Table "1 – UBCUST ACTFLG = P" without a matching record in Table "2- UBMTRM ACTIVE = A". Join the tables on the MTRNO field. The query found 468 records. (19,052 – 468 = 18,584). Okay. Table "3a – In Table 1 Not In Table 2".

36. Perform a Find Unmatched Query to locate the records in Table "2 – UBMTRM ACTIVE A" without a matching record in Table "1 – UBCUST ACTFLG = P". Join the tables on the MTRNO field. The query found 2,303 records (20,888 – 2,303 = 18,585). Okay. Table "3b – In Table 2 Not In Table 1".

37. Locate those records in Table "1 – UBCUST ACTFLG = P" that have an entry of "FIRE LINE" in the ADDRESS2 field. The number of records found = 50 records (Table "1d7 – Table 1 With Address2 = Fire Line".

38. Perform a Delete Query to delete all records in Table"1 – UBCUST ACTFLG = P" having a matching record in table 1d7. The CUSTNO field in Table "1d7 – Table 1 With Address2 = Fire Line" must be the Primary Key field.

a. Table 1d7 in Table "1 – UBCUST ACTFLG = P" = 50 records deleted. The revised number of records in Table "1 – UBCUST ACTFLG = P" = 19,002 (19,052 – 50 = 19,002).

39. Perform a Find Duplicates Query on the MTRNO field in Table "2 – UBMTRM ACTIVE = A". Research and remove any duplicates from Table "2 – UBMTRM ACTIVE = A" found at this point. One duplicate record was removed. The revised number of records in Table "2 – UBMTRM ACTIVE = A" = 20,887 (20,888 – 1 = 20,887). Make the MTRNO field the Primary Key.
    Note: The one record without a MTRNO entry was deleted. The revised number of records in Table "2 – UBMTRM ACTIVE = A" = 20,886 (20,887 – 1 = 20,886).

40. Perform a Delete Query to delete all records in Table "2 – UBMTRM ACTIVE = A" having a matching record in table 1d7. Before running this query, change the Primary Key to the MTRNO field in Table "1d7 – Table 1 With Address2 = Fire Line".

    a. Table 1d7 in Table "2 – UBMTRM ACTIVE = A" = 48 records deleted. The revised number of records in Table "2 – UBMTRM ACTIVE = A" = 20,838 (20,886 – 48 = 20,838).

41. Perform a Make Table Query to determine how many records in Table "1 – UBCUST ACTFLG = P" have a matching record in Table "2 – UBMTRM ACTIVE = A". Join the tables on the MTRNO field. Add the CUSTNO, RATE, PROPNO, MTRNO and ACTFLG fields from Table "1 – UBCUST ACTFLG = P" and the ACTIVE and SIZE fields from Table "2 – UBMTRM ACTIVE = A" to the output. The number of matching records = 8,455 when joined on the CUSTNO field. The number of matching records = 18,536 when joined on the MTRNO field. Table "3 – Table 1 Matching MTRNO Table 2".

42. Perform a Find Unmatched Query to locate the records in Table "1 – UBCUST ACTFLG = P" without a matching record in Table "2- UBMTRM ACTIVE = A". Join the tables on the MTRNO field. The query found 466 records. (19,002 – 466 = 18,536). Okay. Table "3a1 – In Table 1 Not In Table 2". Delete Table "3a – In Table 1 Not In Table 2".

43. Perform a Find Unmatched Query to locate the records in Table "2 – UBMTRM ACTIVE A" without a matching record in Table "1 – UBCUST ACTFLG = P". Join the tables on the MTRNO field. The query found 2,302 records (20,838 – 2,302 = 18,536). Okay. Table "3b1 – In Table 2 Not In Table 1". Delete Table "3b – In Table 2 Not In Table 1".

44. Perform a Query on Table "3 – Table 1 Matching MTRNO Table 2" grouping and counting the SIZE field. Table "4 – Table 3 Meter Size Distribution".

SIZE	CountOfSIZE
1	627
1 1/2	249
1 SR	1
1"	9

SIZE	CountOfSIZE
1.2	1
1.5	1
1/2	5756
1-1/2	2
12	3
2	212
3	35
3.4	1
3/4	11492
3/4 B	1
3/4"	1
4	27
6	4
A	3
F 3/4	2
F3/4	97
F-3/4	9

45. Count the number of residential meters: = 17,359. One of the three records without an entry in the SIZE field has an entry in the RATE field = RI1. Therefore, this record was categorized as residential. The number of residential records = 17,360 (17,359 + 1 = 17,360).

46. Count the number of non-residential meters: = 1,174. Two of the three records without an entry in the SIZE field have an entry in the RATE field = CI1. Therefore, these records were categorized as non-residential. The number of non-residential records = 1,176 (1,174 + 2 = 1,176).

47. Add the number of records in tables 1d1, 1d2, 1d3, 1d4, 1d5, 1d6, 3a1 and 3b1 to either the residential or non-residential totals above:

    a. Table 1d1 = 10 records (all non-residential). The revised number of non-residential records = 1,186 (1,176 + 10 = 1,186).

    b. Table 1d2 = 19 records (all non-residential). The revised number of non-residential records = 1,205 (1,186 + 19 = 1,205).

    c. Table 1d3 = 46 records (32 are non-residential and 14 are residential). The revised number of non-residential records = 1,237 (1,205 + 32 = 1,237). The revised number of residential records = 17,374 (17,360 + 14 = 17,374).

d. Table 1d4 = 8 records (all residential). The revised number of residential records = 17,382 (17,374 + 8 = 17,382).

e. Table 1d5 = 7 records (all residential). The revised number of residential records = 17,389 (17,382 + 7 = 17,389).

f. Table 1d6 = 1 record (non-residential). The revised number of non-residential records = 1,238 (1,237 + 1 = 1,238).

g. Table 3a1 = 466 records (138 are non-residential and 328 are residential). The revised number of non-residential records = 1,376 (1,238 + 138 = 1,376). The revised number of residential records = 17,717 (17,389 + 328 = 17,717).

h. Table 3b1 = 2,302 records (92 are non-residential and 2,210 are residential). The revised number of non-residential records = 1,468 (1,376 + 92 = 1,468). The revised number of residential records = 19,927 (17,717 + 2,210 = 19,927).

Licking County Auditor Property Data (County Parcels)

The Licking County Auditor (indirectly through billing consultant) provided this data file. The file contains some of the data fields used by the County Auditor for billing property taxes. According to a note that was included with the data, only taxing districts 54, 55, 56, and 88 are properties located within the City of Newark. The key data fields in this file include the following:

- PIN – this field contains a 13-digit parcel identification number that should correspond with parcel number data in the City GIS data. The first two digits of the PIN contain the taxing district code.
- LEGAL NAME- this field contains the name of the owner or owners of the property.
- LUC – this field contains a 3-digit code that identifies the current landuse for the property.
- STRNO – this field contains the property street number.
- STRNAME – this field contains the property street name, street type and City.

The findings for this table can be found below, along with an explanation of the process that was followed to extract data that may be used to estimate the time required for reconciling the property data with the current water and wastewater billing data file and with the current GIS parcel data. Any mismatched records will need to be reconciled in order to match the water and wastewater billing data with a parcel in the GIS parcel data. This matching process is necessary so that all non-residential impervious area measurements are associated with a billing record

After reviewing the data found in the County Parcels table, it was determined that currently no data field exists for directly relating the table to the water and wastewater billing data file or to the GIS Parcel Data. Therefore, a process was followed that attempted to match as many records as possible using the provided data fields.

Initially, a series of queries was performed on the County Parcels table to determine data integrity. Then a series of queries were performed in an attempt to match as many County Parcels records as possible to a record in the water and wastewater billing data file (See the City Water and Wastewater Billing File section above). The process is provided below:

Data Integrity – County Parcels

1. The number of records in the complete County Parcels table = 20,174.

2. The number of records in the complete County Parcels table without an entry (blank) in the PIN field = 0.

3. The number of records in the complete County Parcels table with a duplicate entry in the PIN field = 0.

4. The number of records in the complete County Parcels table with a taxing district code of 54 = 19,625.

5. The number of records in the complete County Parcels table with a taxing district code of 55 = 77.

6. The number of records in the complete County Parcels table with a taxing district code of 56 = 458.

7. The number of records in the complete County Parcels table with a taxing district code of 57 = 0.

8. The number of records in the complete County Parcels table with a taxing district code of 88 = 14 (19,625 + 77 + 458 + 14 = 20,174).

9. The number of records in the complete County Parcels table without an entry (blank) in the LEGAL NAME field = 0.

10. The number of records in the complete County Parcels table without an entry (blank) in the LUC field = 0.

11. The count of records in the complete County Parcels table for the various entries in the LUC field are as follows:

LUC	Count	Description
100	16	A-AG VAC LAND
110	13	A-AG VACANT LAND CAUV
111	8	A-CASH FARM CAUV
112	1	A-LIVESTOCK FARM CAUV

LUC	Count	Description
121	4	A-TIMBER
190	3	A-OTHER AG
199	1	A-OTHER AG CAUV
300	39	I-IND VACANT LAND
310	1	I- FOOD&DRINK PROCESS PLANTS AND STORAG
320	4	I - FOUNDERIES&HEAVY MANUFACT PLANTS
330	19	I - MEDIUM MANUFACTURING & ASSEMBLY
340	6	I - LIGHT MANUFACTURING & ASSEMBLY
350	12	I - INDUSTRIAL WAREHOUSES
360	1	I - INDUSTRIAL TRUCK TERMINALS
399	15	I - OTHER INDUSTRIAL STRUCTURES
400	298	C - COMMERCIAL VACANT LAND
401	235	C - APARTMENTS 4-19 RENTAL UNITS
402	18	C - APARTMENTS 20-39 RENTAL UNITS
403	42	C - APARTMENTS 40 OR MORE RENTAL UNITS
410	3	C - MOTELS AND TOURIST CABINS
411	3	C - HOTELS
412	10	C - NURSING HOMES & PRIVATE HOSPITALS
415	7	C - TRAILER OR MOBILE HOME PARK
419	5	C - OTHER COMMERCIAL HOUSING
420	31	C - SMALL (UNDER 10,000SF) DETACH RETAI
421	4	C - SUPERMARKETS
422	4	C - DISCOUNT STORES & JR. DEPT STORES
425	5	C - NEIGHBORHOOD SHOPPING CENTER
426	7	C - COMMUNITY SHOPPING CENTER
427	1	C - REGIONAL SHOPPING CENTER
429	64	C - OTHER RETAIL STRUCTURES
430	69	C - RESTURANT, CAFETERIA, AND/OR BAR
435	16	C - DRIVE-IN REST/FOOD SERVICE FACILITY
439	9	C - OTHER FOOD SERVICE STRUCTURE
440	3	C - DRY CLEANING PLANTS & LAUNDRIES
441	4	C - FUNERAL HOMES
442	59	C - MEDICAL CLINICS AND OFFICES
444	11	C - FULL SERVICE BANKS
445	7	C - SAVINGS AND LOAN
447	89	C - OFFICE BUILDING 1-2 STORIES
448	3	C - OFFICE BLDG 3 OR MORE STORIES WALKUP
449	7	C - OFFICE BLDG 3 OR MORE STORIES ELEVAT
450	17	C - CONDOMINIUM OFFICE UNITS
452	31	C - AUTOMOTIVE SERVICE STATION
453	8	C - CAR WASHES
454	31	C - AUTO CAR SALES AND SERVICES

LUC	Count	Description
455	24	C - COMMERCIAL GARAGES
456	106	C - PARKING GARAGE STRUCTURE & LOTS
462	1	C - GOLF DRIV RANGE & MINI GOLF COURSES
463	5	C - GOLF COURSES
464	1	C - BOWLING ALLEYS
465	11	C - LODGE HALLS AND AMUSEMENT PARKS
480	65	C - COMMERCIAL WAREHOUSES
482	3	C - COMMERCIAL TRUCK TERMINALS
499	457	C - OTHER COMMERCIAL STRUCTURES
500	1848	R-RES VACANT
501	160	R-RES VACANT
502	9	R-RES VACANT
503	7	R-RES VACANT
504	1	R-RES VACANT
510	12701	R-SINGLE FAMILY
511	770	R-SINGLE FAMILY
512	12	R-SINGLE FAMILY
520	628	R- 2 FAMILY DWEL
521	29	R- 2 FAMILY DWEL
530	88	R- 3 FAMILY DWEL
531	4	R- 3 FAMILY DWEL
550	885	R-CONDO
560	48	R - MOBILE HOME
561	5	R - MOBILE HOME
599	172	R - OTHER RES
600	5	E - USA-OWNED EXEMPT PROPERTY
610	31	E - STATE OF OHIO-OWNED EXEMPT PROPERTY
620	44	E - COUNTY-OWNED EXEMPT PROPERTY
640	98	E - EXEMPT PROPERTY OWNED BY MUNICIPALS
650	50	E - EXEMPT PROPERTY OWNED BY BD OF EDUC.
660	10	E - EXEMPT PROPERTY OWNED PARK DIST.PUB
670	10	E - EXEMPT PROP OWNED COL-ACAD-PRI SCHOO
680	153	E-PRI. CHARITABLE EXEMPTIONS:HOSPITAL &H
685	132	E - CHURCHES, ETC., PUBLIC WORSHIP
690	3	E - GRAVEYARDS, MONUMENTS, CEMETERIES
710	198	E - COMM REINVEST AREA TAX ABATEMENT
720	2	E - MUNICIPAL IMPROVE TAX ABATEMENT
740	16	E - OTHER TAX ABATEMENT
830	72	C - COM LND&IMP OWND BY PUB UT, NOT RR
840	2	U - RAILROAD REAL PROP USED IN OPERATION
850	1	U - RAILROAD REAL PROP NOT USED OPERATIO

LUC	Count	Description
860	2	U - RAILROAD PER PROP USED IN OPERATIONS
880	37	U - PUB UTIL PER PROP OTHER THAN RRS
540	22	R- HOUSE TRAILER ON REAL ESTATE
541	1	R- HOUSE TRAILER ON REAL UNPLAT 0-9.99 ACR
542	1	R- HOUSE TRAILER ON REAL UNPLAT 10-10.99 ac

12. The number of records in the complete County Parcels table without an entry (blank) in the STRNO field = 2,603.

13. The number of records in the complete County Parcels table without an entry (blank) in the STRNAME field = 272.

Matching County Parcels to Record in Billing File

Table "1 – UBCUST ACTFLG = P" UBCUST01 table contains a version of the County PIN in the WPHONE field, but the data contains 16 characters including hyphens and a decimal. An example of the data found in the WPHONE field of the UBCUSTO1 table is as follows:

54-262824-00.000

The PIN field in County Parcels contains a 13-digit entry without hyphens or a decimal included. An example of the data found in the PIN field of the County Parcels table is as follows:

5426282400000

To determine if the data in the UBCUST01 WPHONE field could be manipulated and used to match records from the County Parcels table, data in the other data fields of each table was compared.

The UBCUST01 COMPANY field shows HOTTINGER,DEBBIE M.
The UBCUST01 SRVADR field shows 10TH ST,N,393,

The County Parcels LEGAL NAME field shows HOTTINGER ROGER & DEBORAH
The County Parcels STRNO field shows 393
The County Parcels STRNAME field shows N TENTH ST NEWARK

These records match based on the address data and owner/user data. Therefore, in order to attempt to match records from both tables, either the County Parcels PIN field must be manipulated (add hyphens and decimal) to correspond with the WPHONE field in UBCUST01, or the WPHONE field in UBCUST01 must be manipulated (remove hyphens and decimal) to

correspond with the PIN field in County Parcels. Since the County Auditor maintains parcel data for all properties located within the County, the Project Team determined that the WPHONE field in UBCUST01 should be manipulated to correspond to the PIN field in County Parcels. One query was necessary to extract and/or manipulate the data in the WPHONE field in UBCUST01 for this purpose. The query information is listed below:

1. A function was built to extract and combine data from the WPHONE field in table "1 – UBCUST ACTFLG = P" resulting in a field entry that corresponds to the PIN field in County Parcels. The query extracted the left 2 characters, the 4th through 10th characters, the 11th through 13th characters and the right 3 characters (excluded the hyphens and the decimal), creating a 13-digit field entry. A new table was prepared and named "2b – UBCUST Combined PIN".

2. A query was performed to determine the number of records in table "2b – UBCUST Combined PIN" that have a matching record in table "1 – County Parcels" joining on the PIN field in table "1 – County Parcels" and the newly created PIN field in table "2b – UBCUST Combined PIN". The number of matching records = 14,562. This represents an initial match of 77% of the records (14,562 / 19,002). Note that the WPHONE field contains 4,135 records without an entry (blank).

3. Since the match above did not successfully match 100% of the records from table "1 – County Records" and table "2b – UBCUST Combined PIN", the Project Team attempted to increase the matching percentage by manipulating the SRVADR field in table "2b – UBCUST Combined PIN" and the STRNO and STRNAME fields in table "1 – County Parcels" in order to make each resulting address field correspond to the other. Two new tables were created after performing several queries to manipulate the address data. The two new tables are table "1d – County Parcels Combined Address" and table "2a – UBCUST COMBO SRVADDRESS".

4. A new query was performed to determine the number of records in table "1d – County Parcels Combined Address" have a matching record in table "2a – UBCUST COMBO SRVADDRESS". The number of matching records = 15,251, or 80%. However, this matching process was not used as the combining of address information in table "2a – UBCUST COMBO SRVADDRESS" resulted in creating 1,606 duplicate entries. Subtracting 1,606 from the number of matching records (15,251 – 1,606 = 13,645), and comparing the revised number of matching records with the number of matching records using the PIN field (see Step 2 above) results in fewer matched. Therefore, without research and without further manipulating the address data, the best match that can be achieved is 77%.

City GIS Parcel Layer Table (Parcel Data)

This table was provided by the City of Newark's GIS Department and it contains the parcel data associated with the GIS Parcel Layer. The key data fields identified in the PARCELS table include:

- EPIN – this field contains a 20-digit property number that should correspond with the Licking County Auditor's parcel identification number.
- OWNR_FRST1 – this field contains the first name of the property owner.
- OWNR_LAST1 – this field contains the last name of the property owner.
- OWNR_FRST2 – this field contains the first name of any second owner that may exist for a property.
- OWNR_LAST2 – this field contains the last name of any second owner that may exist for a property.
- STR_NO1 – this field contains the street number for the property.
- STR_NAME1 – this field contains the street direction (if any) and street name for the property.

The findings for this table can be found below, along with an explanation of the process that was followed to extract data that may be used to estimate the time required for reconciling the GIS parcel data with the current water and wastewater billing data file. Any mismatched records will need to be reconciled in order to match the water and wastewater billing data with a parcel in the GIS parcel data. This matching process is necessary so that all non-residential impervious area measurements are associated with a billing record.

After reviewing the data found in the PARCELS table, it was determined that currently no data field exists for directly relating the table to the water and wastewater billing data file. Therefore, a process was followed that attempted to match as many records as possible using the provided data fields.

Initially, a series of queries was performed on the PARCELS table to determine data integrity. Then a series of queries were performed in an attempt to match as many PARCELS records as possible to a record in the water and wastewater billing data file (See the City Water and Wastewater Billing File section below). The process and results are as follows:

Data Integrity – PARCELS

1. The number of records in the complete PARCELS table = 26,167.

2. The number of records in the complete PARCELS table without an entry (blank) in the EPIN field = 417 (Table "1f – Parcels Blank EPIN").

3. The number of records in the complete PARCELS table with a duplicate entry in the EPIN field = 247 (Table "1g – Duplicate EPIN in PARCELS).

4. The number of records in the complete PARCELS table without an entry (blank) in the OWNR_LAST1 field = 848 (Table "1a1 – PARCELS Blank OWNR_LAST1").

5. The number of records in the complete PARCELS table without an entry (blank) in the OWNR_LAST1 and OWNR_LAST2 fields = 842 (Table 1a2 – PARCELS Blank OWNR_LAST1 and Blank OWNR_LAST2").

6. The number of records in the complete PARCELS table without an entry (blank) in the STR_NAME1 field = 836 (Table 1a3 – PARCELS Blank STR_NAME1").

7. The number of records in the complete PARCELS table without an entry (blank) in the STR_NO1 field = 6,821 (Table 1a4 – PARCELS Blank STR_NO1").

8. The number of records in the complete PARCELS table without an entry (blank) in the STR_NO1 and STR_NAME1 fields = 766 (Table 1a5 – PARCELS Blank STR_NO1 and Blank STR_NAME1").

Matching PARCELS to Record in Billing File

The UBCUST01 table contains property address information in the SRVADR field. The PARCELS table contains property address information in the STR_NO1 and STR_NAME1 fields. Since the UBCUST01 WPHONE field contains a reference to a County parcel identification number, but this number contains 13 digits, it does not correspond to the EPIN field in the PARCELS table. Therefore, the address information was used in the UBCUST01 and PARCELS tables in an attempt to match as many records as possible.

As was indicated in the data integrity section for the UBCUST01 table, the complete UBCUST01 table contained 43,246 records and 31,443 of those records did not contain an entry (blank) in the SRVADR field. The revised UBCUST01 table (UBCUST ACTFLG = P) contains 19,002 records and all of these records have an entry in the SRVADR field. However, the entries in the SRVADR field do not correspond to the format of the address information provided in the PARCELS table. The SRVADR field contains address information in one data field delimited by commas. An example of the UBCUST01 SRVADR field data for a property located at 948 SHARON VALLEY RD. is shown below:

"SHARON VALLEY RD,,948,"

The PARCELS table has the street number (STR_NO1) and street name and type (STR_NAME1) split into two data fields, using the normal addressing convention (948 in the STR_NO1 field, and SHARON VALLEY RD in the STR_NAME1 field). Therefore, in order to attempt to match this "like" data, the UBCUST01 and PARCELS data must be manipulated. The procedures followed in that process are as follows:

1. Research and remove any duplicate records (EPIN) in the PARCELS table. The revised number of records in the PARCELS table = 26,043 (124 records removed).

   Note: The AREA_FT and AREA2 fields contained differing values for the duplicate records reviewed. Therefore, one of the records was randomly chosen and deleted.

2. Determine how many records still remain in the PARCELS table and that do not have an entry (blank) in the EPIN field. The number of records found = 417.

   a. Delete these records from the PARCELS table. The revised number of records in the PARCELS table = 25,626 (26,043 – 417 = 25,626).

3. Export the "UBCUST ACTFLG = P" table to Excel™.

4. Using the "Text to Columns" tool, divide the SRVADR field data into separate fields.

5. Import the revised "UBCUST ACTFLG = P" table back into Access™.

6. Join the STR_NO1 field and the STR_NAME1 fields into a new data field titled ADDRESS in the PARCELS table.

7. Locate any records in the revised PARCELS table having a missing (blank) entry in the ADDRESS field.

   a. Delete these records from the PARCELS table. The revised number of records in the PARCELS table = 25,278 (25,626 – 348 = 25,278).

8. Join the SRVADR3, SRVADR2 and SRVADR1 fields in the UBCUST ACTFLG = P table into a new data field titled Combined Address.

9. Query to determine number of matching records in the UBCUST ACTFLG = P table and the PARCELS table joining the tables on the Combined Address and ADDRESS fields. The number of matching records = 13,663 (Table "44 – Matching UBCUST and GIS PARCELS").