

THE ROUGE RIVER PROJECT  
A WORLD CLASS EFFORT



BRINGING OUR RIVER BACK TO LIFE

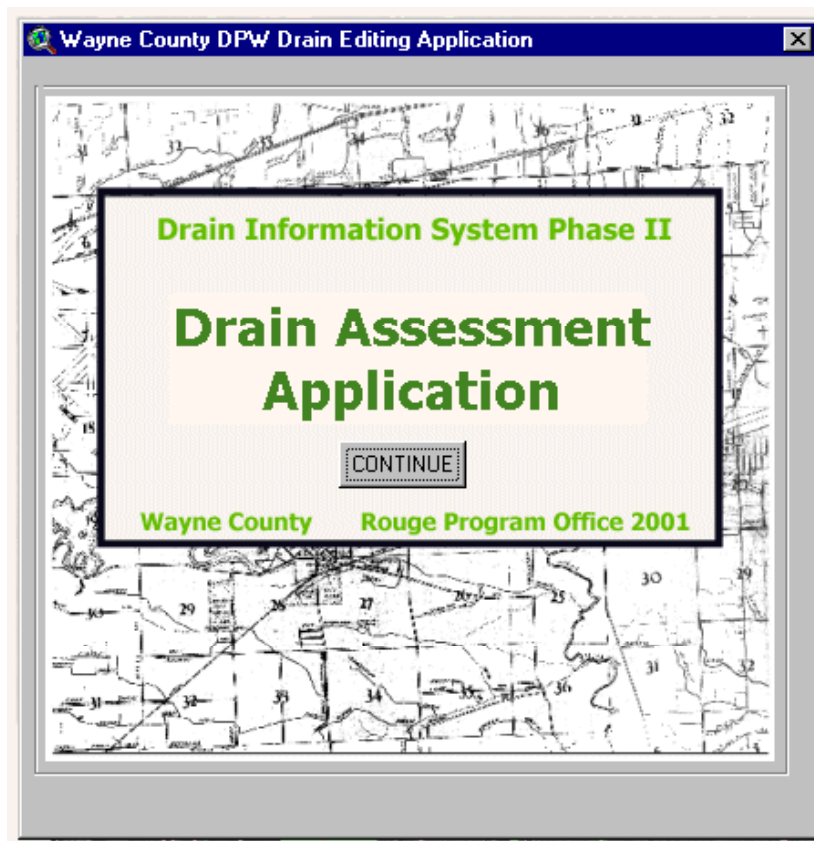
# Rouge River National Wet Weather Demonstration Project

**Wayne County, Michigan**

## Wayne County Drain Information System Phase II

Task 4 Memorandum: Drain Assessment Application Prototype

RPO-GIS-TR46



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April 2002

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## ACKNOWLEDGMENTS

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### Rouge River National Wet Weather Demonstration Project

#### MISSION STATEMENT

The mission of the Rouge River National Wet Weather Demonstration Project is to demonstrate effective solutions to water quality problems facing an urban watershed highly impacted by wet weather and develop potential solutions and implement projects which will lead to the restoration of water quality in the Rouge River. The project will address both conventional and toxic pollutants to:

- provide a safe and healthy recreational river resource for present and future generations;
- re-establish a healthy and diverse ecosystem within the Rouge River Watershed;
- protect downstream water resources such as the Detroit River and Lake Erie; and
- help ensure compliance with federal, state, and local environmental laws which protect human health and the environment.

This will be accomplished through the development, implementation, and financial integration of technical, social, and institutional frameworks leading to cost-efficient and innovative watershed-based solutions to wet weather problems. This watershed-based national demonstration project will provide other municipalities across the nation facing similar problems with guidance and, potentially, effective solutions.

## PREFACE

The Rouge River and its watershed are a primary source of pollution to the Detroit River and Lake Erie. The Clean Water Act of 1972 intended to make waterways "fishable and swimmable" by 1983. Although that goal has not been reached, great progress has been made in improving water quality in most waterways. The Rouge River Remedial Action Plan (RAP) provided a basis for which The Rouge River National Wet Weather Demonstration Project (Rouge Project) efforts were created: it identified the major sources of pollution and measured the relative contributions of each. The RAP is the continuing foundation for the Rouge Project and presents a framework for addressing the problems within the Rouge River by looking beyond treatment and focusing instead on prevention methods.

The Rouge Project was established under the initial Rouge Grant 1 from the United States Environment Protection Agency, Region 5, and enabled Wayne County to initiate a comprehensive watershed-wide pollution-control approach that addresses combined sewer overflow (CSO), storm water management, and other nonpoint source controls through the application of innovative technologies, progressive financial and institutional arrangements, and creative public involvement and education programs.

Rouge Grants 2, 4 and 5 provide the framework for the progression and implementation of Project goals as Wayne County continues its mission to develop potential solutions and implement projects which will lead to the restoration of water quality in the Rouge River. The Project will address both conventional and toxic pollutants to:

- provide a safe and healthy recreational river resource for present and future generations;
- re-establish a healthy and diverse ecosystem within the Rouge River Watershed;
- protect downstream water resources such as the Detroit River and Lake Erie; and
- help ensure compliance with federal, state, and local environmental laws which protect human health and environment.

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Under Rouge Grant 2, the Rouge Project will build on lessons learned from Grant 1 efforts and focus on further integration of the goals of the overall Mission. To this end, Rouge Grants 2, 4 and 5 concentrate on the following key Project areas:

- **Watershed Management** will continue under Rouge Grants 2, 4 and 5 with the development and evaluation of wet weather and storm water alternatives, the planning of long-term monitoring programs, and the ongoing efforts to enhance instream water quality, monitor rain and flow levels, data analysis, and present recommendations.
- **Nonpoint Source Pollution Control** will provide for the storm water management, permit applications, and development of financial and institutional alternatives for wet-weather watershed management in concert with enhanced efforts to establish institutional partnerships. Toward the goal of institutional partnering, several community projects will be undertaken with watershed communities. Additional efforts include the inventory of wetlands and measurement of pollutant loads from abandoned dumps and air deposition with possible remediation of some sites.
- **CSO Construction Coordination** will continue to monitor the construction of CSO demonstration projects established under Grant 1. Additional planning and assistance will allow project coordinators to make additional recommendations on the design criteria of future CSO abatement facilities.
- **Public Involvement and Information** will reach and interact with more stakeholders, institutions, and regulatory agencies, thus fostering a renewed understanding and continued commitment to reducing pollution, and continuing the transfer of watershed management approaches way beyond the project. It will be the central mechanism for transmittal of the Project's Decision Support System tools, processes, and information necessary for sustaining a watershed management support system directly to varied audiences both within and outside the Rouge watershed.

Additional information on the Rouge River Project is available from many sources, including the Wayne County Department of Environment (WCDOE) and the Rouge Program Office (RPO). The Rouge website <http://www.RougeRiver.com> contains substantial information on the Project and it's findings and technical products.

## ABSTRACT

This document describes the work completed for Task #4 of the Drain Information System Phase II project. The goal of this task was to create a prototype of a drain assessment application that could be implemented when the Wayne County parcel data becomes available. This document details the steps necessary to create this prototype.

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**1.0 INTRODUCTION.** This document describes the work completed for Task #4 of the Drain Information System Phase II work plan (URBSW 7.12). The goal of this task was to create a prototype of a drain assessment application that could be implemented when the Wayne County parcel data becomes available. Due to the long maturation of this project, more of the County parcel data was available than originally anticipated when the work plan was initiated. There remains, at this time, one major known limitation of the County parcel polygon data for use in this application prototype, specifically, that the smallest geographic unit of data in the system is the parcel polygon. Since parcels are often split by drainage districts, this poses a limitation in terms of actual visualization for the user as well as for potential GIS-based applications for Quality Assurance/Quality Control (QA/QC). However, most of the drain assessment calculation process is solely a database application and does not require sub-parcel delineation to function.

Another limitation in the underlying data for the prototype application is the absence of accurate drainage district boundaries. These boundaries are expected to eventually be generated either by or on behalf of the Wayne County GIS Management Unit, but were not available at the time this application was developed. For this application, an approximation of the boundaries was deemed sufficient for use.

***How the assessment process has been accomplished to date.***

- The spatial component of the work, making district assignments to parcels and parts of parcels, and the manual populating of a tabular database has been done essentially by hand using paper maps.
- For this application, the GIS serves as a platform to aid the user to see the 'approximate' district (because actual district boundaries are not yet available), to select a district, perform the calculation, and export the results into a common ASCII interchange format.
- This application was prototyped and tested using data for Van Buren Township.

## 2.0 APPLICATION

### 2.1 PROGRAM OPERATION

The Drain Assessment Application was created using ArcView 3.2 GIS software. The programming and customization exists entirely as ArcView Avenue scripts and tools embedded in an ArcView project file [dis2\_asmnt.apr]. The basic user interface consists of three custom buttons (shown below) presented on the ArcView View button bar.



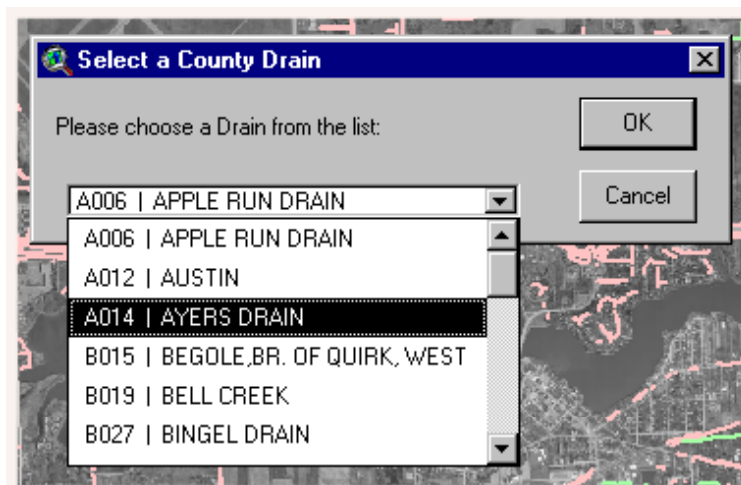
The “I” and “D” buttons provide the user with tools to locate a drain or district on the map, and the “C” button accesses the assessment calculation function. All standard ArcView tools and interface components remain available for maximum flexibility for the user.

### 2.2 NAVIGATION TOOLS

While not essential to this assessment calculation process itself, a number of County drain-related themes are referenced in this ArcView project file. A basic theme of interest is the Wayne County aerial imagery for Van Buren Township. Overlaying this layer, the user can see the County drain line work as developed in Task #1 of this work plan. The “I” button helps the user locate a drain by its ID.

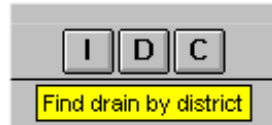


When the “Find Drain by ID” button is clicked, the user will be presented with the dialog box shown below.

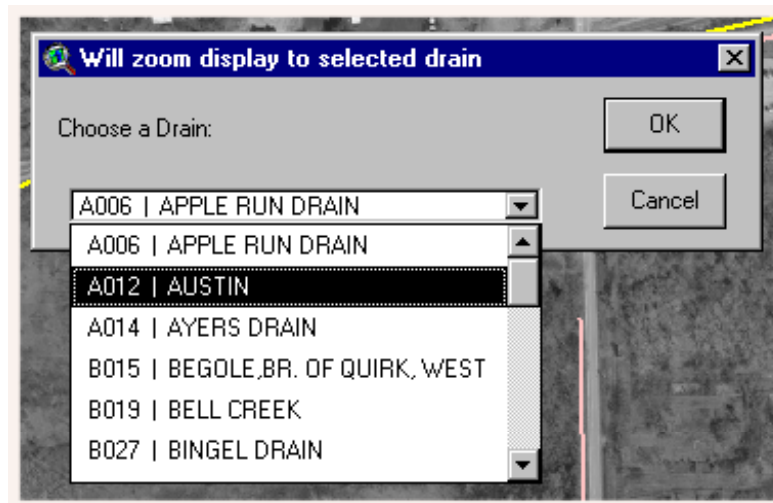


This dialog box lists all drains that exist either completely or partially within the pilot area (Van Buren Township). When a drain is selected, the corresponding features will be located in the County Drain shape file. The display will zoom to that location and the county drains will blink several times to aid in their identification, and then remain shown in the ArcView default selection color [yellow].

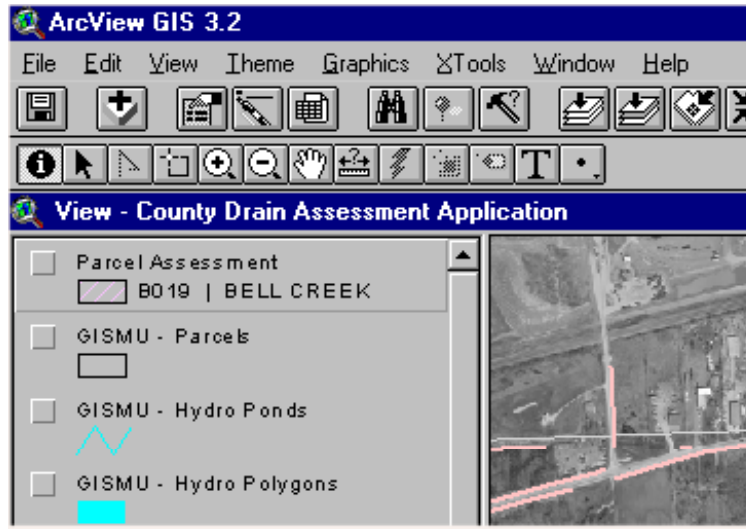
The second tool is “Find Drain by District” and is accessed through the button labeled “D.”



When clicked, this button will present the user with the dialog box shown below.



This dialog box is essentially the same as the box used on the “Find Drain by ID” tool, and will present the same list of drains. However, when a drain is selected from this box, the program will search for a polygon that represents all parcels assessed to this district or geographically within and touching the selected drainage district boundary. This polygon is set as the “theme definition” for the first theme in the View document, as shown below:

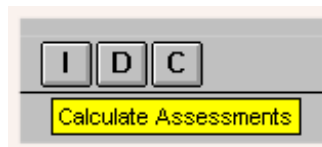


If no district is found, the user will be informed through a dialog box. If a polygon is found, the display will be moved and zoomed to the extent of that polygon. Note that the theme will not automatically be visible. If the user would like to see the specific polygon then the theme can be made visible by clicking in the visibility check box through normal ArcView methods.

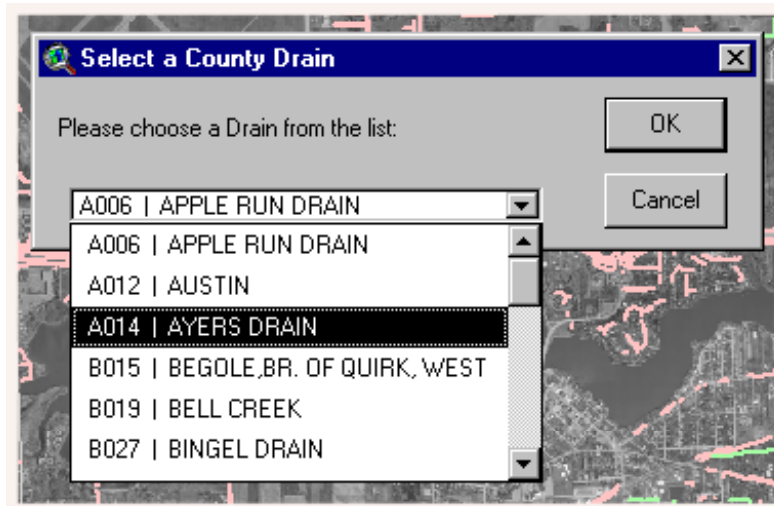
Please note also that this polygon will be, in almost every case, not the exact Drain District boundary. These assessment polygons were created by merging all parcel polygons together based on the assessment code. Therefore, if any part of a parcel is assessed to a district, then the entire parcel will be included in this larger composite polygon. It was presumed that this would be a reasonable, surrogate for the actual drain district polygons which are expected to be generated either by or on behalf of the County GIS Management Unit, but were not available at the time this application was developed.

### 2.3 COUNTY DRAIN ASSESSMENT

The third and final button executes the actual drain assessment calculations and exports the results to a file. This button is labeled “C” for “Calculate Assessments”.



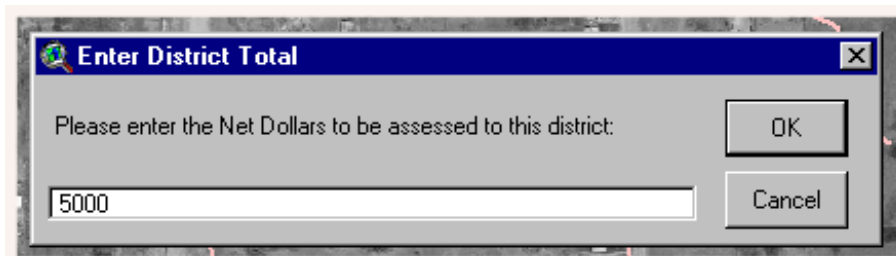
When clicked, this button will present the user with the dialog box shown below.



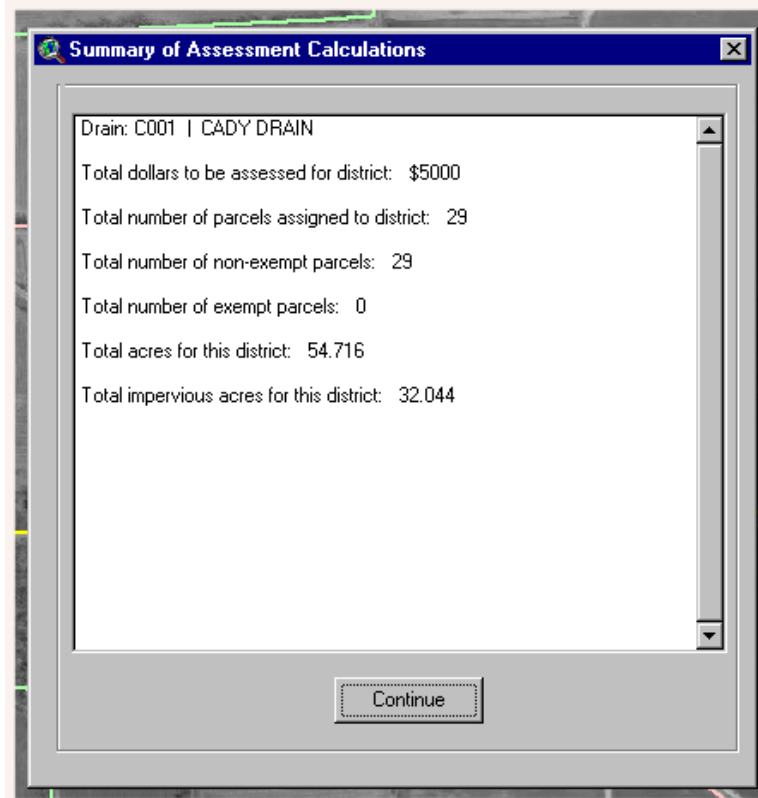
This dialog box serves the same function as the Drain selection dialog box used for both the other drain locating buttons.

Once a drain is selected, the program will search for that drain in the County Drains file. It will then zoom to that County Drain which will blink several times. The program will next search for the Assessment polygon. If one is not found, a message will be displayed in a dialog box.

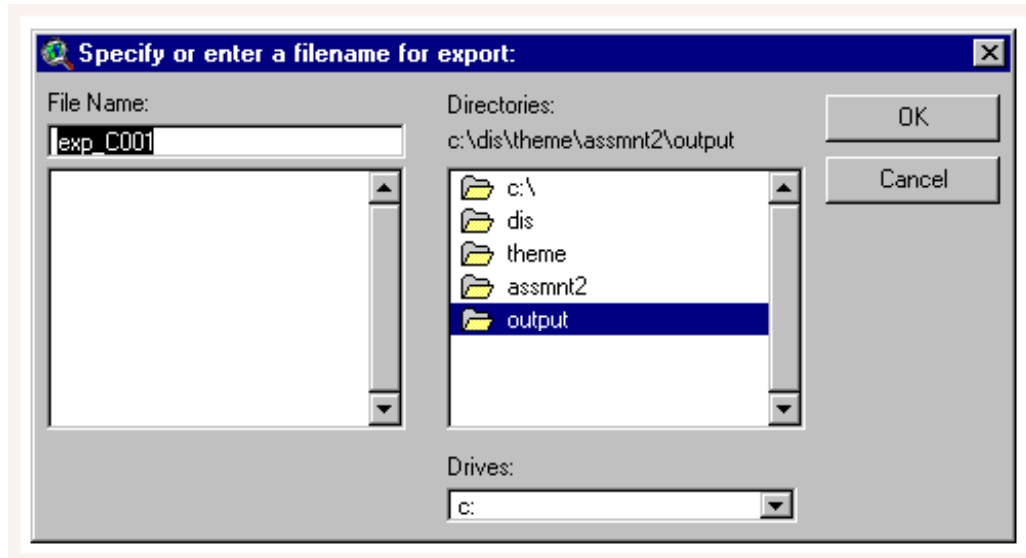
(Please note that only drainage districts that fall entirely within Van Buren Township are represented in the current prototype data files, therefore many drains will be found with IDs that will not be found with districts since they overlap the Township boundary and cannot be entirely shown.) If the Assessment polygon is found, the user will next be prompted for an assessment dollar value as shown below:



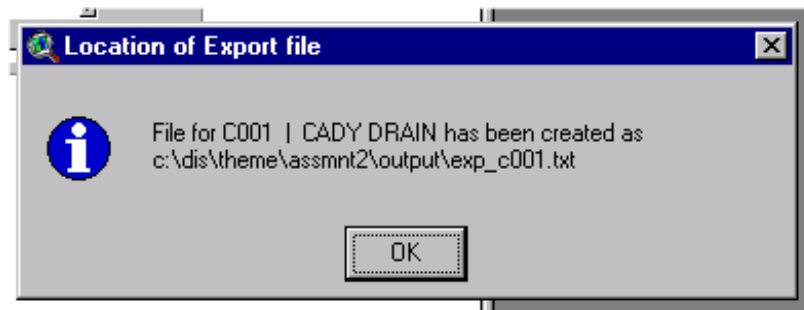
This dollar value is the amount of money to be assessed to that entire district. The program uses this information along with the DOE/DPW provided formula to proportion the net assessment to each parcel. The formula is presented in Appendix A. When the calculations have been performed, the program will present summary results in the dialog box shown below:



This dialog box serves to confirm the drain and dollar assessment that were selected or entered by the user. It also lists the total number of parcels assigned to a district, number of parcels that are coded exempt, total acres of the district and total of the impervious bs acreage calculation for all parcels. The user must then click the “continue” button, and they will be presented with a standard Windows file save dialog box shown below.



A default file name will be entered for the user starting with the “exp” and ending in the Drain ID and will be directed to the \output directory. The user may change the file name or destination directory as desired. After selecting the “OK” button, the user will be presented with the following dialog box as a confirmation that the process was completed.



Once “OK” is clicked, the user will be presented with the following dialog box. This box provides a convenient method to remove the just created theme from the View window. If the user chooses “No”, the theme can still be removed at any time through the normal ArcView pull down menus. (View/theme/delete).



**APPENDIX A**  
**WAYNE COUNTY DEPARTMENT OF ENVIRONMENT**  
**DIVISION OF PUBLIC WORKS**  
**DRAIN ASSESSMENT CALCULATION**

The Drain Assessment Calculation as used in this program is as follows:

**Step 1: Impervious Acres per parcel are computed as follows:**

Property Classified as:

“A”	Agricultural	Acres * 0.10
“C”	Commercial	Acres * 0.85
“I”	Industrial	Acres * 0.15
“R”	Residential	
	less than 1.5 Acres	Acres * 0.35
	Greater than 1.5 Acres	$((\text{Acres} - 1.5) * .10) + .525$

Note: For this program the residential split is set so that parcels that are exactly equal to 1.5 acres are calculated as Acres \* 0.35

Parcels coded with any exempt codes shown in the following list are not included in any calculation and are assumed to have an impervious area of zero.

“G”	Cemetery
“B”	Church
“E”	County Government
“K”	Detroit City owned
“C”	Federal Government
“J”	Local Government
“M”	Miscellaneous
“H”	Railroad
“A”	School
“S”	State Government

**Step 2:**

Impervious Acres for all non-exempt parcels are summed. A percent of total is developed for each non-exempt parcel.

**Step 3:**

This percent of total is multiplied by the “net dollars to be assessed” to develop the estimated dollar assessment for each parcel.