BullPiezo Quick User Manual

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This manual is meant to be only a quick reference for users. It describes the user interface and the steps needed to produce the final outputs. One requirement is that Piezo csv data must be prepared using the PeakConverter before running BullPiezo.

1. Overview

The BullPiezo software package was developed as a piezo data application from one of the WIM archive projects. The main objectives are to compute Seasonal Adjustment Factor (SAF), Annual Average Daily Traffic (AADT), and Monthly Average Daily Traffic (MADT) from csv piezo data. Computation of SAF, AADT, and MADT follows the formulae established by FHWA TMG-2001 [1].

The software consists of five tabs, which are shown in Figure 1. It initially started by writing codes to compute seasonal adjustment factors for VC sites, and then more functions were gradually added. The present version provides five main functions implemented in each tab:

- **Piezo Input** Tab: computes SAF, AADT, and MADT from Piezo csv data.
- **TMG Input** Tab: computes SAF, AADT, and MADT from TMG .cla formatted data
- **WIM Input** Tab: computes SAF, AADT, and MADT from WIM csv data
- **TMG Reporting** Tab: generates TMG-2001 formatted ASCII data from piezo csv data, which includes .sta, .vol and .cla files.
- **Plots/Reports** Tab: plots or creates pdf reports using the produced SAF, AADT, and MADT data
AADT, MADT, SAF COMPUTATION DESCRIPTION

Average Annual Daily Traffic (AADT) can be computed in two ways, i.e., by a simple average or an average of an average. AASHTO recommends the average of an average approach, i.e.,

\[
AADT = \frac{1}{7} \sum_{j=1}^{12} \left[ \frac{1}{n} \sum_{k=1}^{n} Vol_{ijk} \right]
\]

where:

Vol = daily traffic for day k, of day-of-week i, and month j

i = day of week

j = month of year

k = week of the month

n = the number of days of that day of the week during that month
This computation starts by computing the average day-of-week (DOW) volume for each month by averaging the same DOW of the each month. This produces 7 values for each month (total=12 *7). Each DOW volume is next averaged over 12 months, which results in seven values. An average of the seven values becomes AADT.

Let $MADT_j$ denote the average daily traffic for month $j$. Seasonal adjustment factor for month $j$ ($SAF_j$) is then computed using:

$$SAF_j = \frac{AADT}{MADT_j}$$

An option for selecting a week as weekdays only or all seven days was implemented. If the “week days only” option is selected, MADT and SAF are computed using only weekdays. However, AADT is always computed using seven days of week. The “week days only” option should be used if the short count data are collected only during the weekdays (Monday through Friday), and that data needs to be adjusted.
2. How to Generate SAF, AADT, and MADT Data

1. Point folders to proper locations using the Browse buttons.

For classification data, you should have a folder structure similar to the following. The folders should be one above site folders as shown in Figure 2.

![Folder selection example](image)

Figure 2: Folder selection example

2. Select a site from the **Piezo Sites** list shown in Site Database group.

3. Enter the Begin and End dates of the year. Check data availability of the site using the Check Data Availability button. (It should be noted that the Year does not have to be defined as Jan 1st to Dec 31st. It can be any period, for example, 6/1/2007 to 8/1/2008. The important part is the ending year because ending year is used as the output file names.)

4. Click on the **Compute All** button to produce all necessary files.
Note-1: AADT is always computed using seven days of week, regardless of the selection in the “Days in Week” checkboxes. However, SAF and MADT can be produced by either weekdays only or all 7 days of the week.

Note-2: You should produce multiple years for each site to make it more convenient for yearly comparative plots.

Note-3: The TMG formatted (.cla files) or WIM data can be similarly used to produce the SAF, AADT, and MADT data from the corresponding site.

3. Plots from Generated SAF, AADT, and MADT Data

Plots can be made for average daily volumes of vehicle groups, monthly average daily truck volumes, seasonal adjustment factors for each vehicle group, and a pdf table of seasonal adjustment factors using the Plots/Reports tab (Figure 3).

For use these function, the user must first select the Site Output Folder using the Browse button, which should give a list of the sites and years of the available output data in the folder.
Selecting multiple items on the Data List and then clicking one of the plot buttons would produce a plot of multiple years in a single plot area, which are intended for uses in comparison of different years. Sample plots are shown next.

**Plot Average Daily Volume**: This button provides a graph of average daily volume distribution as shown below.
**Plot Monthly Average Daily Truck Volume**: This provides average daily truck volumes for each month.

![Monthly Average Daily Truck Volume, Station 198](image1)

**Plot Seasonal Adjustment Factors**: This button plots monthly adjustment factors for each vehicle group selected by the combo-box.

![Seasonal Adjustment Factors, Station 198, PASSVEH](image2)
4. Generate TMG-2001 Formatted Data

BullPiezo allows users to generate TMG-2001 formatted data from the piezo csv data, using the TMG Reporting tab (Figure 4). In order to use this function, first a piezo csv site folder and the destination output folder must be specified using the browser buttons. Next, the year and month must be specified. Multiple months can be computed by one click if multiple months are specified by comma separation or a range through a dash line.

The output filenames are formatted in the following way:

MN###YYMM.CLA

where MN=abbreviation of Minnesota, ### = three digit site number, YY=two digit year, MM=two digit month. The same rule is applied to .Vol and .Sta files.

Note: The TMG Input tab expects this monthly format of file names.
Generate Monthly FHWA TMG-2001 Formatted Data Using Piezo Class Data (*.csv)

Piezo csv Site Folder [e.g., "Z:\WCV\newcsv\000137"]
[Y:\WCV\newcsv\000137]  Browse Folder

TMG Destination Folder [e.g., "Z:\WCV\tmp"]
[Y:\WCV\Processed]  Browse Folder

Year:  Ex: 2012  Months:  Ex: 05-01-11

Build a TMG Station Description Report [.STA]  Generate TMG Volume Data [.VOL]  Generate TMG Classification Data [.CLA]

Figure 4: TMG Reporting tab