



Development of the



*Interac* **TIP**

Final Report



# **Development of the InteracTIP Final Report**

**Prepared by:**

**David Plummer & Associates, Inc.  
1750 Ponce de Leon Boulevard  
Coral Gables, Florida 33134**

**In association with:**

**International Development Advisory Services (IDAS)  
3134 Coral Way, Suite B  
Miami, Florida 33145**

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## **1.0 INTRODUCTION**

Every year, the Miami-Dade Metropolitan Planning Organization (MPO) compiles a document known as the Transportation Improvement Program (TIP). The document presents a comprehensive listing of transportation projects undertaken by various public agencies (and the private sector). The subject report represents the end of a cooperative process whereby independent transportation agencies at various levels suggest a series of improvements to be accomplished over the next five years. The different stages and funding planned for each of the five years is proposed, coordinated with the other transportation agencies and presented for input, to a series of technical and citizen's committees involved in the process. The culmination of the effort is a public hearing before the elected officials comprising the Board of the Metropolitan Planning Organization. Following public comment, the document is adopted for implementation by the various agencies. Preparation of the TIP is required by the federal government and is one of many pre-requisites for continued funding of transportation projects by federal agencies.

While the document can, and is often amended monthly (projects added, deleted or modified), the process is repeated every year. Each cycle considers amendments, changes in the plans and updates to reflect the completion of projects that were completed in the previous year.

The MPO has long contemplated the development of an Interactive Transportation Improvement Program (InteracTIP). The concept behind this project is to automate the development of the TIP document every year while at the same time: improving consistency; reformatting the book into a more user-friendly document; developing the ability to create special reports answering questions from the general public as well as public officials; facilitating the analysis of the data contained in the report; and, last but not least, providing easy access to information by the public in a meaningful and easy-to-use format via the Internet.

The MPO asked a consultant team to tackle the development of this tool, however, the help of the Miami-Dade e-Government Department was also secured in order to facilitate the effort and ensure consistency with other applications residing at the Miami-Dade Web Portal. Finally, the cooperation of the agencies participating in the TIP process was also obtained. The development of the InteracTIP has been a team effort resulting in the completion of a very powerful and user-friendly tool that will be very helpful to the MPO and the public in general.

## **2.0 PURPOSE OF THE REPORT**

The purpose of this report is to document the development of the InteracTIP tool. The report presents the background leading to the decision to create the InteracTIP, the process used to develop it, the concept behind it, as well as the functions that it performs. Additionally, other documents describing different aspects of the product are listed. More in-depth technical information is included in those complementary reports.

### 3.0 INTERACTIP CONCEPT

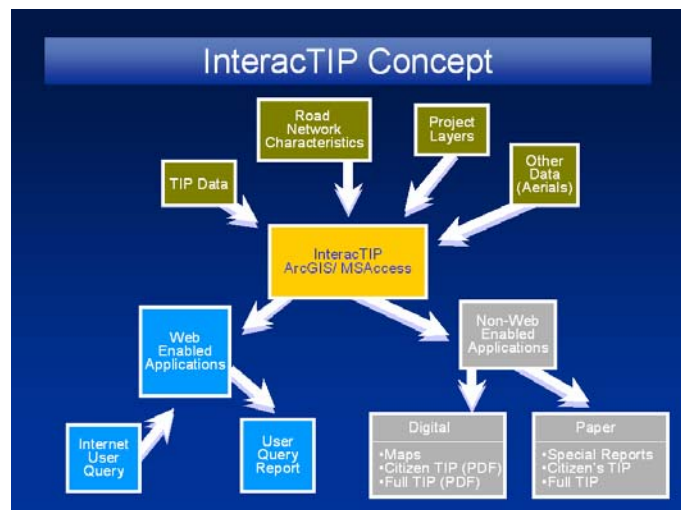
The concept of the InteracTIP was developed after careful consideration of the needs of the Miami-Dade MPO. These needs included:

- Facilitating the production of the TIP document every year
- Making the TIP documents more user-friendly
- Simplifying the process of extracting meaningful information from the documents
- Making the information available to the public over the Internet

The project represents a significant improvement over the previous documents in terms of amount of information, user-friendliness, and ease of use. Some of the needs were self-imposed by the MPO. Other needs, such as the user-friendliness aspect, were requested by the Federal Highway Administration (FHWA). The overall objective is to ensure that TIP information is both easily accessible and easy to understand by the general public. Information availability is critical to ensure that the public is able to participate effectively in the transportation planning process.

Exhibit 1

The overall concept of the InteracTIP was based upon the existing TIP process and software available to the various parties involved (see Exhibit 1). In essence, data in various forms is input into a centralized geo-database that resides at the MPO. The database then drives two sets of applications: one that operates locally (non-web enabled) at the MPO; the second is a web-enabled, interactive application





on the Internet.

The non-web enabled application is used by MPO staff to prepare hard (paper) copies of two TIP documents (the Standard Version, and the Citizen's Version). The geo-database includes a number of pre-established queries that answer the most typical questions posed by the public and public officials. Furthermore, the open architecture and off-the-shelf software used for the InteracTIP, allow an infinite number of queries to be executed. Output and/or the result of such queries can be formatted into both tabular and geographic (map) forms.

## 4.0 INTERACTIP COMPONENTS

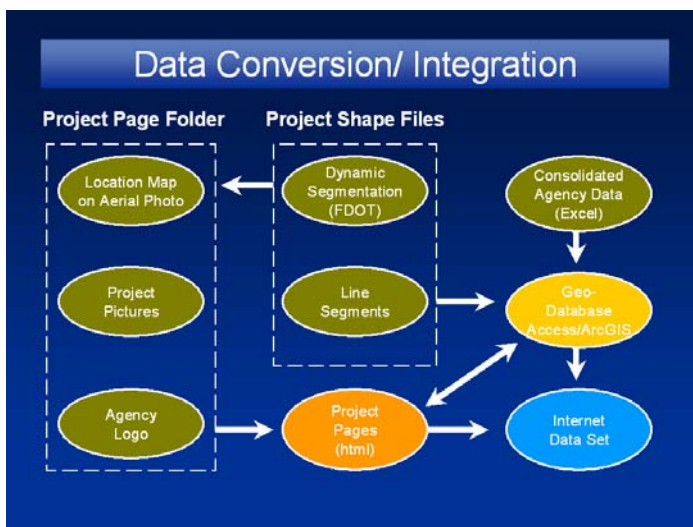
The major components of the InteracTIP system are described in more detail in the following sections. These components are: the geo-database, the non-web applications and the web-enabled application.

### 4.1 Geo-Database

The geo-database is the heart of the InteracTIP. This database includes a series of pieces of information about proposed transportation projects: general (text format) project description and miscellaneous details; funding information (source, timing); and geographic location information that allows mapping of the improvements. Additionally, the user is allowed to specify the sections of the Standard (printed) TIP where the project is to be listed.

Furthermore, other graphic information (pictures, drawings, graphics, etc.) can be associated with specific projects to further facilitate and enhance the project descriptions as needed. The geo-database ties together the geographic and non-geographic information about each project while providing the structure necessary to easily prepare reports and extract information using queries (see Exhibit 2).

Exhibit 2

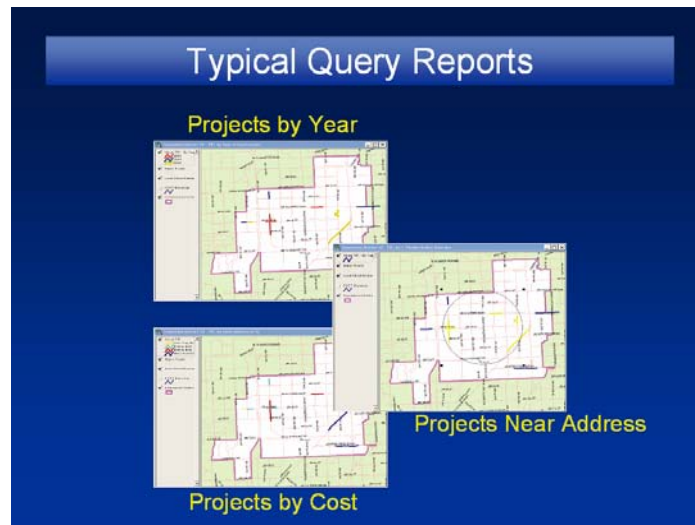


#### 4.1.1 Standard Query Reports and Maps

There are several reports and maps that are prepared by the MPO every year based on the information in the new TIP. These reports represent information of general interest and/or information typically requested by agencies, elected officials and/or members of the public (see

Exhibit 3). These standard queries, provided by the MPO, are accessible through the InteracTIP main menu. A list of these queries is provided below.

Exhibit 3



#### 4.1.2. Custom Queries

- Programmed projects by Commission District
- Programmed projects by municipality
- Completed projects by Commission District
- Completed project by municipality
- \$500K projects by Commission District
- \$500K projects by municipality
- Programmed projects by agency
- Programmed projects by type of project
- Programmed projects by funding source
- Programmed projects by construction year
- Unfunded projects by municipality
- Capacity improvements

Additional information can be extracted from the database through the use of queries. In essence, projects can be listed and catalogued based on any number of variables. The only requirement is that the information is contained in the database.

The queries can take the form of tabular listings showing the desired pieces of information. Typical tabular formats may be a list of projects with one, two or more columns displaying the extracted variables such as length, cost, agency, etc. Alternatively, projects meeting a specific criteria, such as being within a certain range of values (e.g. projects with cost between \$1 and \$2 million) can also be extracted. Furthermore, the projects can be sorted and/or grouped by any variable desired by the user.

Map-type queries work in a similar fashion. Projects can be extracted or selected based on any specific variable and displayed in map form using color coding to portray additional information about the projects. Map queries can also show projects against other geographic information such as Commission District Boundaries.

## **4.2 Non-Web Applications**

The non-web applications reside locally at a computer in the MPO office. These applications allow the MPO staff to perform several specific tasks as well as access to the information as a general resource for their day-to-day operations. There are two primary applications: the Standard TIP and the Citizen's Version TIP.

### **4.2.1. Standard TIP**

This application generates a hard (paper) copy, standard, full version of the Transportation Improvement Program. The application creates all the needed sections and subsections of the

report based on the projects selected for each section. Only three different page formats (forms) are used in order to provide a relatively uniform appearance among all sections while accommodating specific needs for each section. These sections include:

Green Pages (Federally Funded)

White Pages (Adopted Funding)

- Primary State Highways and intermodal (with subsections by type)
- Florida Turnpike Enterprises
- Miami-Dade Expressway Authority
- Secondary Gas Tax
- Road Impact Fees
- Local Option Gas Tax
- Private Sector
- Aviation Development
- Miami-Dade Seaport
- Miami-Dade Transit
- Tri-County Commuter Rail Authority
- Non-Motorized Component
- Intelligent Transportation Systems (ITS)
- Transportation Disadvantaged
- Resourceful Utilization of Streets and Highways (RUSH)

Yellow Pages (Unfunded Projects)

- Primary State Highways and Intermodal (with subsections by type)

- Florida Turnpike Enterprise
- Miami-Dade Expressway Authority
- Secondary Gas Tax
- Road Impact Fees
- Local Option Gas Tax
- Private Sector
- Aviation Development
- Miami-Dade Seaport
- Miami-Dade Transit
- Tri-County Commuter Rail Authority
- Non-Motorized Component
- Intelligent Transportation Systems (ITS)
- Transportation Disadvantaged
- Resourceful Utilization of Streets and Highways (RUSH)

In addition to the hard copy of the standard TIP, an electronic version (pdf) of the report is also generated. The electronic version is used for downloading directly from the MPO web page for anyone who may be interested in the document.

#### **4.2.2. Citizens Version of the TIP**

The “Citizen’s Version” is a hard copy (paper) report designed to provide an overview the TIP to the general public. It is a condensed report that does not attempt to list every project or the funding/timing information. Instead, the report highlights major projects, the agencies responsible for the TIP, as well as recently completed or ongoing transportation projects. The emphasis includes comprehensive, easy to read project descriptions and photos to make the

document more attractive and easier to follow. An electronic (pdf) version of the report is also generated for posting at the MPO's web site.

### 4.3. Web-Enabled Application

The web-enabled application that is part of the InteracTIP was developed in very close coordination and with the assistance of the e-Government Department of Miami-Dade County. The application was designed to bring meaningful TIP information to Internet users at their convenience. The application is driven by the same data in the geo-database described above. Assistance from e-Government proved to be very effective in using the same general structure, look and feel of several similar applications that reside in the Miami-Dade Web Portal. All these applications, including the InteracTIP, reside under the section entitled "My Neighborhood". The InteracTIP information can be accessed by selecting "Transportation Improvements" in the menu of options under My Neighborhood. This menu option name is both consistent with the name of other options and is readily understandable to the user. The Transportation Improvements option in My Neighborhood allows the users to get a map and/or a list of transportation projects near a specific location in the county. The application also provides access to an attractively designed "Project Page" for each project.

#### 4.3.1. Interactive Maps and Lists

The Transportation Improvement option in My Neighborhood is similar in functionality to other options, yet a few refinements were added to make it even more versatile. Upon entering the Transportation Improvements page, all mapable projects are shown on a county-wide map (see Exhibit 4). The

Exhibit 4



projects are color-coded by type. The user can zoom into a specific area or obtain project-specific information by selecting any of the projects shown on the map. The user can also extract projects near a specific location or by type. Additionally, the Internet user can request a listing of projects that are not mapable. Location-specific maps can be generated by entering an address, an intersection or by selecting one of several dozen landmarks available from a list (see Exhibit 5). Any of the tables or maps can also be generated in a printer-friendly format (see Exhibit 6).

Exhibit 5

#### 4.3.2. Project Pages

A project page was created for each project in the TIP. The text information contained in each page is listed below.

- Project Name
- From
- To
- Project Type
- Current Status
- Next Step
- Contact Person
- Phone No.
- E-mail address
- Agency
- Comments
- Contact Person e-mail address (link to e-mail application)

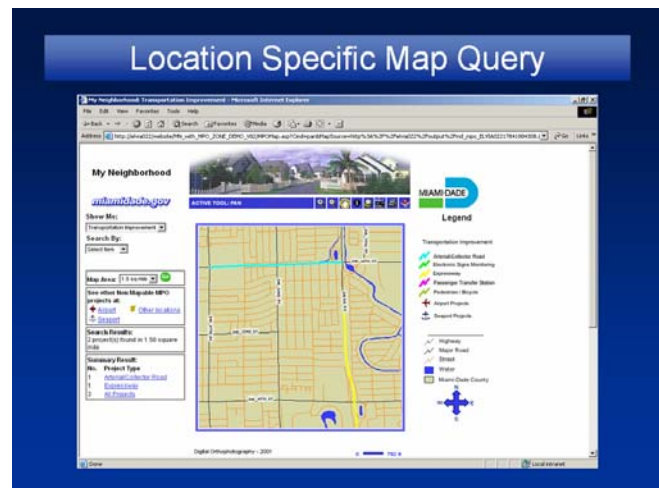
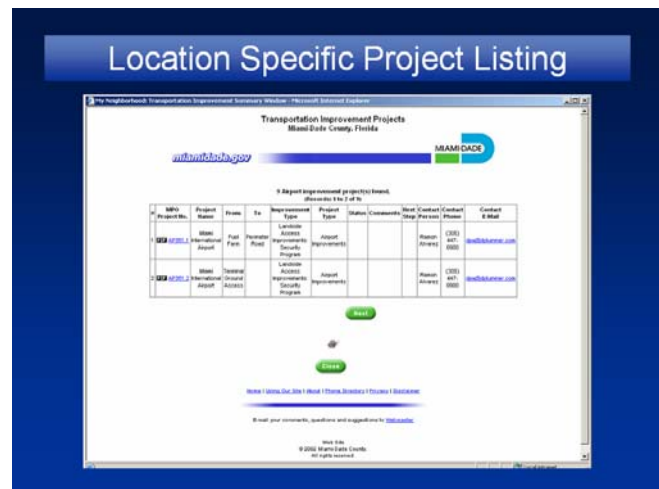


Exhibit 6



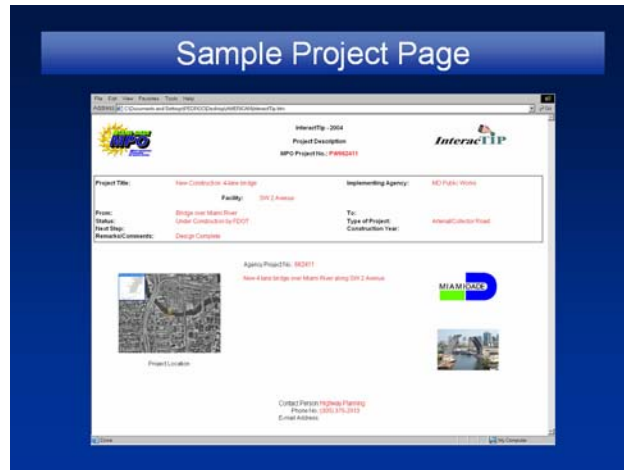
The layout, however, is not tabular. Instead, the text information is expanded with a



longer, more detailed description and this is supplemented with a project location map on an aerial photo, the logo of the responsible agency and/or to two pictures/illustrations of the project (see Exhibit 7).

Access to the project pages is by clicking on the color line on the map representing the project location or by clicking on the “MPO Project Number” link that is part of every table generated by this application. The project page can be printed using the web browser print function.

Exhibit 7



## **5.0 SYSTEM PLATFORM**

The InteracTIP has been designed to be open in architecture using off-the-shelf software. Data format compatibility has also been used to facilitate data entry. Automation of numerous routine functions was done using macro-functions and/or Visual Basic.

### **5.1 GEO-DATABASE**

The data component of the database is in Microsoft Access. MS Access is a relational database software package. The software is very versatile and powerful when it comes to data manipulation, generation of reports, and extraction of information using data range queries.

The geographic, fully integrated and compatible component of the geo-database is driven by ArcGIS. This GIS package allows the creation of shape files depicting the location of transportation projects. It also provides for the creation of maps and data extraction using geographic based queries (e.g. projects within the boundaries of a specific municipality).

### **5.2 DATA ENTRY**

Data entry was designed to take advantage of the process previously used to gather the TIP information from various agencies every year. All agencies participating in the process are members of the standing TIP committee lead by the MPO.

1. Florida Department of Transportation (District 6)
2. Florida Turnpike Enterprise
3. Miami-Dade Expressway Authority
4. Miami-Dade Department of Public Works
5. Miami-Dade Aviation Development
6. Miami-Dade Seaport
7. Miami-Dade Transit

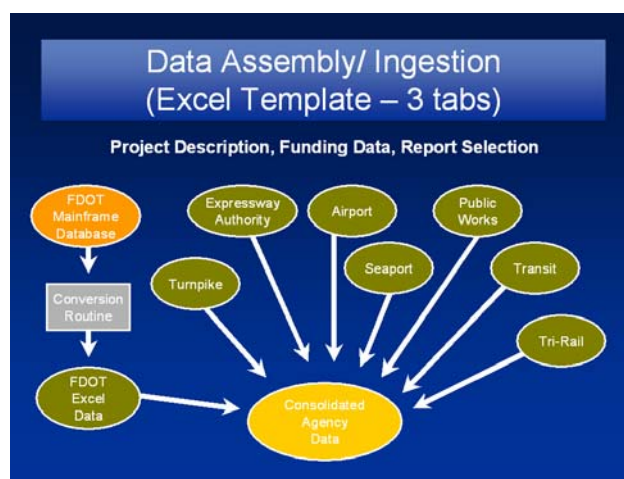
## 8. Tri-County Commuter Rail Authority

Previous to the InteracTIP, each agency submitted the information for their projects in different formats, using Excel. The InteracTIP has retained Excel as the project information software to be used by the agencies. However, the format of the information has been standardized and expanded to make the data base both uniform and more informative.

Each cycle of the TIP begins (every year) with the distribution of Excel templates to every agency. The MPO provides each agency with a copy of the template used the previous year by the corresponding agency to list their projects.

Each agency is then asked to update the template by deleting, adding or editing project information as needed. The edited templates are collected by the MPO for the conversion and assembly of the composite database that becomes the current year TIP (see Exhibit 8).

Exhibit 8



### 5.3 FDOT DATA CONVERSION

The agency that is responsible for the largest number of projects is the Florida Department of Transportation (FDOT). Fortunately, the FDOT keeps their list of planned projects and funding information in a central database referred to as the “Work Program”. The Work Program is kept in their central (mainframe) computer system. FDOT agreed to, and developed, a routine to allow the conversion of the work program information into data that can be used for the development of the paper document by local MPO’s. In the case of Miami-Dade, the routine also supports conversion to MS Excel and MS Access formats. While handling of individual project data is not needed, a few, relatively simple steps are still needed to effect the desired

conversion. Simply stated, the work program data is downloaded, as a text file from the mainframe computer. The routine then allows the user to convert the text data file into two Excel files with specific formats compatible with the TIP data provided by other agencies.

## **5.4 MY NEIGHBORHOOD APPLICATION**

The Transportation Improvements application is located in the My Neighborhood section of the Miami-Dade Web portal. The application is a variation of other similar applications where specific types of information can be extracted for a particular geographical areas. The software platform used to provide the Internet linkage is ArcIMS. The software and the specific application routine reside at one of Miami-Dade Web servers and it is maintained by the e-Government Department. The data that is displayed in the interactive maps, in response to user queries, comes from the InteracTIP geo-database that resides locally at the MPO server.

A simple routine is used by the MPO to extract several pre-selected fields for all data records (projects). This smaller data subset is created monthly after the MPO completes the processing of TIP amendments for that month. A few days later, an automatic routine residing at the e-Government server uploads the fresh dataset and gets it ready to go on-line, replacing the previous version of the same dataset. In addition to the project data subset, project pages (in html format) for each project are also delivered to e-Government as part of the same upload.

## **6.0 SYSTEM INSTALLATION AND TESTING**

Each component of the database, software and routines were installed at the MPO's server and thoroughly tested as part of the final delivery process. The MPO verified operation and functionality and accepted the InteracTIP in final form. All data is for the 2003-2004 TIP and it is ready to be updated as part of the 2004-2005 cycle.

### **6.1 Non-Web Application**

The non-web application products installed, tested and delivered to the MPO included:

- Excel database templates containing the TIP data for each agency.
- Consolidated MS Access geodatabase (including project location shape files).
- FDOT Work program data conversion routine
- All data manipulation routines needed to assemble the database and create reports.
- One folder per project containing a location map, agency logo and any available project pictures.
- A paper and an electronic copy of the Standard TIP
- A paper and an electronic copy of the Citizens Version of the TIP.

In addition to the testing by the MPO, participating agencies also reviewed the final products during the final testing stages of the project.

### **6.2 My Neighborhood**

The Transportation Improvement application within My Neighborhood, while developed for the MPO, it is owned and maintained by the e-Government Department. The data that drives the applications however, is owned and maintained by the MPO. The TIP data subset for the Internet application, including project data and project pages, was installed at the MPO server.

The uploading routine was tested and the operation and display of the data, interactively over the Internet, was also thoroughly tested. This testing included informal, internal testing by Miami-Dade departments over the Miami-Dade computer Intranet. That testing was then followed by an unofficial (unannounced) release on the Internet. Final release was then made official through series of routine notices advising the public about the availability and features of the new application.

## **7.0 TRAINING**

Training on the InteracTIP was done at three different levels.

- One-on-one training of MPO staff: These consisted of approximately ten half-day sessions where every aspect of the product was explained, demonstrated and practiced with MPO personnel. This training ensures that the MPO will have the expertise needed to continue using the InteracTIP in future years.
- Data-Entry Training: These consisted of two sessions with members of the TIP Committee. The first session explained the database format and data-entry (update) process. The second session was to answer questions after the agencies had a chance to try the data updates on their own.
- Final Demonstration/Training: This was a one-day session with selected MPO staff to provide a full explanation of the product, features and capabilities.

## **8.0 PROJECT SYSTEM DOCUMENTATION**

The documentation of this project is contained in five separate reports targeting different audiences as follows.

### **8.1 Final Report**

The Final (this) Report is intended as a technical overview document that explains the concept of the system and how it was assembled. It is intended for Transportation Engineers and Planners interested in what the InteracTIP is and what it does.

### **8.2 Executive Summary**

This is a very short and simplified explanation of what is the InteracTIP. It is intended for the general public, elected officials and transportation technical managers.

### **8.3 Training Manual**

The Training Manual explains the system in detail. It explains step-by-step what needs to be done from data intake to the generation of various reports, maps and datasets for the My Neighborhood application as well as generation of certain queries. This document is intended for those that will have day-to-day hands-on use of the system.

### **8.4 Installation Manual**

The installation manual is a short technical document focusing on the software components and data folders. The document explains how to install the software.



## **8.5 My Neighborhood Data Preparation, Maintenance and Transfer Manual**

The manual provides a comprehensive list of all data files used by the system as well as their contents and structure. Detailed step by step explanation of data updating procedures are also provided

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