MARIN MUNICIPAL WATER DISTRICT

GIS Database Design & Data Dictionary

Marin Municipal Water District
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Introduction

This introduction provides a description of the background, purpose, and objectives of this document, as well as a description of the other sections contained in this document.

Background

The Marin Municipal Water District ("the District") began its GIS project in October 1992. After extensive analysis of departmental needs, it was concluded that GIS technology, integrated with existing systems, would become an integral part of MMWD's future operations. Many related projects have been implemented to support this goal including the following:

- Installation of a network
- Deployment of personal computers
- The migration from manual drafting methods to the use of AutoCAD
- Negotiations with the County to obtain a digital parcel base map
- Upgrades to various databases, hardware platforms, and operating systems

The vision for the system included a highly integrated GIS and Work Order Management System. During this time, a Work Order Management System was developed and implemented by Alpine Information Systems, to assist with facility management. In addition, BaySys Technologies, Inc. was selected to provide fully integrated, easy to use, GIS editing, mapping, and viewing applications.

MMWD's paper maps were scanned into a digital format. This conversion effort experienced numerous delays by the conversion vendor Hammon, Jensen, Wallen, & Associates. Plans for a successful conversion effort were defined in June 1996 by Environmental Systems Resource Institute (ESRI). These plans included:

- The collection of facility coordinates using global positioning system (GPS) equipment
- Providing quality assurance/quality checking on delivered data
- Performing the adjustment of MMWD's water system to the County's parcel base map, by MMWD's records department staff

In March 1997, all of the converted map data was delivered to MMWD. Since June of 1998, Records/Engineering have been working to bring all data up to date. Users may view what areas have been updated through the Arcview MMWD Infrastructure application. Please contact the GIS department and/or your GIS Users Group Representative if you have questions.

Future GIS plans include:

- The integration of the District's AutoCAD drawing files with the GIS
- Continue to reproduce MMWD Dropsheet and System Maps
- Interfaces to hydraulic modeling software and the SCADA system
- Participation in a county wide effort, with 23 other agencies, to obtain and share digital data
- The development of a watershed management GIS
- Explore additional areas where GIS could be used beneficially (i.e. Entitlements, Spatial management of historical documents online, such as pump/tank books, valve books, etc.)

Purpose

This document provides a guide for the continuing development of MMWD's GIS. Because the needs of MMWD will continue to change, it is anticipated that this document will be modified and added to as the GIS matures. Because of this, the design document should be viewed as a dynamic not a static document.

In the near term this document will be used as a guideline to complete the following tasks:

- Continued effiency customization of MMWD's GIS
- Completion of the interactive link between the GIS and the Work Order System (WOS) developed by Alpine Systems
- Completion of the link between the PI-Open database (Billing) and the GIS

In the long term, this design will be used as input to the development of ArcView applications, an interface between the GIS and the AutoCAD systems, and additional ARC/INFO based GIS application development.

Objectives of the Database Design

The objectives of the GIS database design are to define the specific data elements, valid data values for these elements, and physical formats of the GIS database. Because most, if not all, of the data that are normally part of a water utility GIS are defined in the Work Order System (WOS), related WOS tables and the link between the GIS and WOS will also be described in this document.

Eight primary components need to be described:

- Cartographic layers or themes
- INFO Database feature attribute tables (FAT)
- INFO Database related data tables
- MMWD GIS internal INFO tables
- Map annotation
- Valid data values
- The map library (Librarian) structure

These components meet the specific application requirements of MMWD, with the underlying goals of maintaining data consistency and integrity, reducing data redundancy through normalization of the database, and optimizing system performance.

This physical database design defines the exact data elements, field definitions, and valid data values of the layers and attribute tables in the database. To help ensure that database optimization proceeds in a logical manner, the goals of the database design that have been followed by ESRI and MMWD are:

- Application Requirements
  The database must contain sufficient data and be structured to support MMWD's applications.
- Performance
  Operations performed on the database should be completed as quickly as possible. It is clearly impossible to optimize performance of all operations. Therefore, in practice, this goal is closely related to specific application goals.
- Ease of Use
  The design should minimize the steps required to perform database operations and should minimize the complexity of any single step in a given operation.
- Minimize Data Redundancy
  The design should strive to minimize data storage requirements among all District departments and to limit the need to perform updates in more than one place. This accomplished through data normalization.
- Flexibility
  The design should be organized in a manner such that data required for additional applications can be added without adversely affecting either the original design or additional applications.
- Support for Critical Business Requirements
  The design anticipates requirements unique to MMWD's business functions.
- Simplicity
  The design should be kept as simple as possible.

Document Overview

This document is composed of three sections, including this introduction.

1. Introduction
   This section provides a description of the background, purpose, and objectives of this document.

2. Database Design Considerations
   This section provides a general overview of the concepts, terms, and design considerations used in an ARC/INFO® GIS database development.

3. Data Dictionary
   The section provides a description of MMWD's GIS database including GIS layers, feature attribute tables, annotation, data validation requirements, and descriptions of related INFO and WOS data tables. The first part of this section provides a description of the entity relationship diagramming principles that are used to show relationships between the various databases and tables.

Database Design Considerations

General database design issues are those that affect either all layers or more than one layer in the database. Decisions about these database issues will affect the amount of storage, performance, ease of access, database integrity, database maintenance, output products, and database creation. This section provides basic information about the physical data structure of ARC/INFO software and describes the internal MMWD GIS Database tables. It should be noted that not all ARC/INFO data structures are relevant to the current design (e.g., REGIONS, ROUTES, and SECTIONS). However, these have been included because they may be relevant to future applications.

Database issues are discussed in the subsections indicated below:

- Overview of ARC/INFO Concepts and Terminology
  Discusses basic concepts of the ARC/INFO data model and describes BTI extensions to the model.
- Coordinate System and Projection
  Discusses the coordinate system and projection files.
- Relates
  Explains the relate structure.
- Lookup Tables
  Explains the concept of lookup tables to symbolize features.
- Map Libraries
  Discusses basic library concepts and how these concepts are applied in the database.
- Annotation
  Discusses how MMWD implements feature annotation and non-feature annotation.
- Images
  Explains the use of scanned images within ARC/INFO.
- Naming Conventions
  Describes the naming of data layers, data items, and other database constructs.
- External RDBMS Tables
  Discusses certain considerations related to maintaining portions of the database in INFORMIX®.
- MMWD INFO Database Tables
  Describes INFO tables that are required by MMWD's GIS.
- Work Order System Tables
  Provides an overview of the WOS tables.

Overview of ARC/INFO Concepts and Terminology

Map Data

Map data communicates the location, shape, and relationships among spatial features on the surface of the earth. Each feature has a specific geographic location defined in terms of a spatial coordinate system such as latitude/longitude, State Plane, or UTM. It also has basic characteristics such as feature type and size. In a map, all relevant feature aspects are directly represented on the map sheet in either graphic or text form.

ARC/INFO is used to translate both the location and properties of spatial features into digital form. The locations are defined through topological data structures (ARC), while the attributes are specified in tabular database files (INFO). Separate storage of the spatial and attribute components facilitates data management and update functions.

In ARC/INFO spatial features are represented in vector format as a set of x, y Cartesian coordinates. The three basic feature types are points, lines, and areas. In general, a point is used to illustrate a feature whose shape is too small to be defined as an area on a map of a given scale. An example of a feature represented as a point is a cathodic test station. A line (or arc) is used to illustrate the location of a map feature that is too narrow to be displayed as an area, such as a stream or a water main. A line can also represent information with no physical shape such as a contour line. A polygon is used to illustrate an area of homogeneous characteristics, such as lakes, watersheds, reservoirs, or jurisdictional boundaries.

Additional map features include nodes, sections, routes, and regions. A node is the beginning or endpoint of a line, and depicts point features directly associated with the endpoints of the line segments. In the MMWD data model, a node is used to represent a feature that affects pressure and flow in the water network. An example is a valve located at one of the ends of a water main segment and a fitting located at the other end. A section corresponds to either whole line segments or parts of arcs in route systems. A route is a collection of sections that share a common representation. An example is a meter reading route that may run along a series of sections represented by roads. The sections do not have to be topologically contiguous.

Map features are organized, in ARC/INFO, into layers or themes. A layer is a logical set of thematic data that extends over an entire geographic area of interest. Examples of layers include soils and parcels. Layers can contain feature types singly or in combination. The only restriction is that point and polygon features cannot reside in the same coverage. Additionally, the identification of a route system presumes the existence of an underlying arc configuration.

A layer is physically partitioned and stored in ARC/INFO as a set of coverages or map sections. A coverage covers a subset of the geographic area covered by a layer and can simply be thought of as the digital equivalent of a paper map sheet. Coverages are defined specifically for ease of data retrieval and manipulation. Where data density is high, multiple coverages are required. If data density is low, a single coverage may be sufficient. In the latter case, the layer and coverage are essentially synonymous terms. Coverages are created and maintained in ARC/INFO through a map library scheme (LIBRARIAN). MMWD has currently four (4) layers of data within its' map library:

1) DISTRIB (representing potable facilities)
2) RECYCLED (representing recycled facilities)
3) ABANDON (representing abandoned facilities)
4) PARCELS (representing Marin county assessor's parcel data)

Layers may be simple or complex in nature. Simple layers generally represent a single feature. Examples of simple layers are polygons representing watershed boundaries or lines representing contours. Complex layers include network layers and link layers. A network layer contains information about both polygons and lines. For example, a parcel map may be created as a network layer, in which information is stored about the parcel areas as well as about the surveyed boundary lines. A link layer contains information about lines and points (or nodes). For example, an ARC/INFO representation of a distribution system may be created as a link layer, in which information is stored about mains as lines, about valves and tanks as nodes, and about cathodic test stations as points. The MMWD data model employs both simple layers and link layers.

Areas representing the same class of information can be defined as regions. In this way, related information can be effectively maintained in a single layer even if different classes of information overlap. For example, vegetation and land use at various scales can be stored together.

A route system contains all routes that represent the same class of information, such as a river system route. The purpose of a route system is to enable appropriate attribution independent of the underlying line topology (i.e., to avoid splitting arcs each time attribute values change). Route systems also allow existing linear data that have been recorded as route measures to be mapped and analyzed. For example, transportation departments typically maintain large databases of events with route measures such as Route 10 milepost 23.

Certain types of geographic data and analysis take advantage of raster or cell based geoprocessing capabilities. A grid is based on a combined raster-based (grid cell) spatial model and a relational database that manages all attributes associated with cell values. A group of cells forms a feature. Grids are particularly useful in addressing locational problems where the location and its surroundings are as important as, if not more important than, the feature makeup. Examples of this are modeling or projecting noise impacts from proposed airport sites or determining the population affected by a hazardous chemical spill where concentration diminishes away from the source.

A second type of raster data is imagery. This includes images that occupy a continuous geographic space of interest such as aerial or satellite photography. It also includes images associated with features in the geographic space of interest, such as a scanned engineering drawing of a pump station or a photograph of a complex valve assembly. Such images may be registered to vector layers for display and update purposes or may simply as a reference.

Attribute and Descriptive Data

In an ARC/INFO database, descriptive data about map features are stored in database files called feature attribute tables (FATs) and related data tables. Feature attribute tables are directly linked to the map features. Related data tables, in turn, are linked to the feature attribute tables and other data tables. The actual data are stored as distinct items or attributes.

Data tables or related data tables are designed for the storage of feature specific information. They facilitate the definition of a normalized data structure – information common to all layer features is stored in the FAT while information specific to a given feature is referred to in an associated table. Thus, they constitute a repository of information additional (or external) to the parent FAT. In some instances, they are indeed referred to as external data tables.

The logical linkages between different tables are created through relate structures or simply relates. Relates define the relevant parameters such as from-item and database type, which are necessary for creating and maintaining the linkage between two tables. In cases of very complex relationships between two tables, a key file may need to be created. A key file is a special type of data table that mediates the complex relationship between the two tables but contains no attribute information additional to those two tables.

Items, or attributes, are the vehicle for actual storage of descriptive information in both FAT and data tables. Such records are typically derived from utility operational records such as forms, permits, tables, and reports. This information can assume different forms such as codes or numeric values and the different item types must be able to handle this diversity. Initially attributes in the geographic database are likely to contain the descriptive data such as words, numbers, and alphanumeric characters easily stored in tabular files. In applications developed after the initial data capture has been completed, many utilities display more complex forms of descriptive data such as reports or document images as attributes of map features, by using scanned image storage and retrieval.

Attributes may be distinguished in three ways:

- Whether they are system generated or user defined
- By the types of values stored in them
- By the way that they are stored internally in the computer

Attributes in ARC/INFO are defined by either the user or the system itself. User defined attributes may be added to the FATs or stored in other tables defined by the user. ARC/INFO automatically generates certain attributes when FATs are created. The other tables may reside in INFO or in an external database such as INFORMIX.

System Generated Attributes

System generated attributes define three characteristics of map features. First, they define feature identity. These attributes are the *cover#* and the *cover-id*. The *cover-id* attribute is initially generated by the system and is set equal to the value contained in the *cover#* item, but it may be subsequently modified by the user.

Second, the system generates geometric attributes such as the length of arcs and the area and perimeter of polygons. The geometric attributes are always in the same unit of measure as the coverage coordinate system units.

Third, the system generates attributes that define topological relationships between features in the same coverage. Topology is always defined for linear features. The topological attributes are the *from-node* and *to-node*, beginning and terminating the line. If polygons exist then the polygon on the right (*rpoly*) and left sides of the line (*lpoly*) are defined. These relationships are defined by carrying *cover#* in these attributes.

In addition to the mandatory system generated attributes required by the FATs the design also requires that certain tables in the water utility layers contain two additional system generated attributes called *feature_id* and *wnm_type*. These items are required and maintained by MMWD's GIS. The *feature_id* is a feature identifier that is unique across the database and is used as a relate item to various INFO tables. The *feature_id* value is generated and maintained by the MMWD's GIS Edit module. The value found in *wnm_type* indicates the type of water distribution that is represented by the feature. For example, an arc representing a water main will have a *wnm_type* value of "WMAIN".

User Defined Attributes

Three types of user defined attributes exist:

- Codes
- Measurement values
- Names or text strings

Code Attributes

A code attribute contains numeric or alphabetic codes that define distinct types or categories such as pipe material. The codes are a short form for text descriptions of the categories. They may be as simple as a dichotomous item (e.g., Yes or No codes) or as complex as an item that supports all possible codes for soils in a soil database.

Numeric codes generally begin with a "1", "10", "1000", and so forth, and rise sequentially. If there is random code order, then the codes have no inherent numeric meaning. However, the order may also be designed to reflect hierarchy, frequency, or relative significance. Alphabetic codes are sometimes used instead of numeric codes. This may occur where there is an existing convention or where this choice makes intuitive sense. If appropriate, when defining code attributes, a value should be defined to indicate that the value is unknown rather

than simply leaving the value empty. This will eliminate the possibility that person initially entering the data simply forgot to enter a value.

Measurement Attributes

Measurement attributes have numeric values that indicate a measurement, such as cover depth, pumping capacity, or recorded length of a main. They are typically continuous but may also be ordinal. They may be expressed as raw values or percentages and the names generally reflect the existence of a unit of measure.

Unlike the code attributes, missing or other values should not be assigned a positive value because such assignment is liable to confuse numeric operations (e.g., calculation of the average elevation of control points). An alternative option is to assign such values a negative number (e.g., "-9") and then select only those records greater than or equal to zero before performing mathematical operations. If the values are left blank, INFO will automatically assign a value of "0".

An important question related to measurement attributes is whether and how the measurement units should be represented. For example, measurements can be represented either in numeric form (e.g., 30.00) or in character form (e.g. 30 ft. or 30.00 inches or 30.00 miles^2 or 30.00 acres). The main advantage of the former approach is that the entries can be mathematically manipulated (e.g., selection of all aquifers deeper than 30 ft.). The advantage of the latter approach is that entries are presented in a fashion to which the user is accustomed (e.g., 300 ft.) and the units of measure are unambiguous. MMWD has elected to represent measurements in numeric form.

The design approach generally taken is to provide the numeric form with the units of measure (where they may be ambiguous) given in a separate attribute. To distinguish between the two, often a _U suffix (for "units") may be assigned to the units attribute name. The current version of the database design has not identified any attributes where the measurement units may be ambiguous, so this convention has not been used.

Name Attributes

Name attributes may contain either alphabetic or alphanumeric names. They generally serve two functions in the database. First, they may contain the English language equivalent of codes. Second, they may store place name information for geographic features. Name attributes are generally used by MMWD's GIS in place of code values.

Internal Storage of Attributes

The third way that attributes can be distinguished is by the way that they are stored in the computer. In the INFO database, this is determined by the item (attribute) definition that consists of the following three elements:

- Item width – The number of bytes to store the item
- Output width – The number of columns used to display the item value
- Item Type – The type of data stored in the item

The item width and output width may be different because decimal and binary representations of the same numeric value have different widths. If no output width is specified, the default is the item width. The INFO types supported by ARC are shown below.

Type	Width	Uses	Stored As
B (Binary)	2 or 4	Store large/small numbers economically	Binary
C (Character)	320	Store alphanumeric data	ASCII
D (Date)	8	Store dates	Binary
F (Floating)	4 or 8	Store extremely large/small numbers	ASCII
I (Integer)	1 to 16	Codes	ASCII
N (Numeric)	1 to 16	Store decimal numbers as characters	ASCII

Use of the binary or floating (for decimal) types is highly economical and their use is recommended where possible. For example, the range for a two (2) byte binary is ±32,767 (a 2,5,B) and for a four (4) byte binary is ±2,147,483,648 (a 4,10,B).

Tables

Tables are the physical structures in which attributes reside. Tables may either be FATs or other types of tables.

Feature Attribute Tables

In FAT, for every feature in the coverage, there is a corresponding record in the FAT. The possible FATs in ARC/INFO are as follows:

- Polygon attribute table (PAT)
- Arc attribute table (AAT)
- Point attribute table (PAT)
- Node attribute table (NAT)
- Section attribute table (SEC)
- Route attribute table (RAT)
- Region attribute table (PAT)

The system generated attributes for each FAT are represented below. Specific features are required in order for MMWD's GID Edit module to function. The values contained in these attributes are set when the user defines the facility represented by the FAT, sets data values in related data tables, and digitizes the feature. These required attributes are shaded.

In a polygon attribute table (PAT) there are four standard items automatically assigned by ARC/INFO and four assigned by the MMWD GIS Edit module. They are as follows:

PAT

Item Name	Data Type	Description
area	(8,18,F,5) (4,12,F,3)	Units in square coverage units – double precision, single precision
perimeter	(8,18,F,5) (4,12,F,3)	Units in coverage units – double precision, single precision
cover#	(4,5,B)	Polygon identifier – Generated and maintained by ARC/INFO
cover-id	(4,5,B)	User-ID – Generated by ARC/INFO but user can modify
feature_id	(24,24,C)	Contains a combination of the workstation machine id and the date and time that the feature was created. Generated and maintained by MMWD's GIS Edit Module.
wnm_type	(16,16,C)	Identifies the facility represented by the FAT entry.
symcode	(4,5,B)	Used to symbolize features based on data values.
symcode2	(4,5,B)	Used to symbolize features based on data values.

In an arc attribute table (AAT), there are seven ARC/INFO items and four MMWD GIS Edit Module items automatically assigned:

AAT

Item Name	Data Type	Description
fnode#	(4,5,B)	From-node internal number –Starting point of arc
tnode#	(4,5,B)	To-node internal number – Ending point of arc
lpoly	(4,5,B)	Left polygon, if only a line coverage – Set to zero
rpoly	(4,5,B)	Right polygon, if only a line coverage – Set to zero
length	(8,18,F,5)	Units in coverage units – Double precision
<cover>#	(4,5,B)	Arc identifier – Generated and maintained by ARC/INFO
<cover>-id	(4,5,B)	User-ID – Generated by ARC/INFO but user can modify
feature_id	(24,24,C)	Contains a combination of the workstation machine id and the date and time that the feature was created. Generated and maintained by MMWD's GIS Edit Module.
wnm_type	(16,16,C)	Identifies the facility represented by the FAT entry.
symcode	(4,5,B)	Used to symbolize features based on data values.
symcode2	(4,5,B)	Used to symbolize features based on data values.

In a point attribute table (PAT) there are four standard items automatically assigned by ARC/INFO and four assigned by MMWD's GIS Edit Module. They are as follows:

PAT

Item Name	Data Type	Description
area	(8,18,F,5)	Units in square coverage units – double precision
primeter	(8,18,F,5)	Units in coverage units – double precision
<cover>#	(4,5,B)	Point identifier – Generated and maintained by ARC/INFO
<cover>-id	(4,5,B)	User-ID – Generated by ARC/INFO but user can modify
feature_id	(24,24,C)	Contains a combination of the workstation machine id and the date and time that the feature was created. Generated and maintained by MMWD's GIS Edit Module.
wnm_type	(16,16,C)	Identifies the facility represented by the FAT entry.
symcode	(4,5,B)	Used to symbolize features based on data values.
symcode2	(4,5,B)	Used to symbolize features based on data values.

In a node attribute table (NAT) there are four standard items automatically assigned by ARC/INFO and six assigned by MMWD's GIS Edit Module. They are as follows:

NAT

Item Name	Data Type	Description
arc#	(4,5,B)	Arc internal number - Generated and maintained by ARC/INFO
<cover>#	(4,5,B)	Node identifier – Generated and maintained by ARC/INFO
<cover>-id	(4,5,B)	User-ID – Generated by ARC/INFO but user can modify
feature_id	(24,24,C)	Contains a combination of the workstation machine id and the date and time that the feature was created. Generated and maintained by MMWD's GIS Edit Module
wnm_type	(16,16,C)	Identifies the facility represented by the FAT entry.
angle	(4,4,I)	Used to define symbol display angle.
elevation	(8,9,N,2)	User or application entered value.
symcode	(4,5,B)	Used to symbolize features based on data values.
symcode2	(4,5,B)	Used to symbolize features based on data values.

In a section table (SEC), there are eight standard items automatically assigned by ARC/INFO. MMWD's GIS does not currently use sections.

SEC

Item Name	Data Type	Description
routelink#	(4,5,B)	Link item to the RAT – Generated and maintained by ARC/INFO
arclink#	(4,5,B)	Link item to the AAT – Generated and maintained by ARC/INFO
f-pos	(4,12,F,3)	From position – Start position of a section along an arc
t-pos	(4,12,F,3)	To position – End position of a section along an arc
f-meas	(4,12,F,3)	From measure – Start position of a section along a route
t-meas	(4,12,F,3)	To measure – End position of a section along a route
<cover>#	(4,5,B)	Arc identifier – Generated and maintained by ARC/INFO
<cover>-id	(4,5,B)	User-ID – Generated by ARC/INFO but user can modify

In a route table (RAT), there are two standard items automatically assigned by ARC/INFO. MMWD's GIS does not currently use routes.

RAT

Item Name	Data Type	Description
<cover>#	(4,5,B)	Arc identifier – Generated and maintained by ARC/INFO
<cover>-id	(4,5,B)	User-ID – Generated by ARC/INFO but user can modify

In all FATs, <cover># and <cover>-id automatically default to the coverage name and cannot be different from it.

The region-arc relationship is expressed in the region subclass polygon arc list (PAL) file. Its structure is identical to the polygon PAL, listing the arcs and nodes for the region. Region attributes are stored in a subclass polygon attribute table (PAT), named like the coverage PAT followed by the region name. Regions are not currently used by MMWD's GIS.

Coordinate System and Projection

All ARC/INFO data structures, including coverages, grids, and triangulated irregular networks (TINs) have an associated projection file (PRJ). In addition, the ARC/INFO LIBRARIAN™ system contains projection information. The projection file contains uniform information for all data structures. Coordinate system compatibility will therefore be assured prior to initiation of spatial operations. The coordinate system for the MMWD GIS database will be State Plane coordinates.

Relates

Relate structures establish logical linkages between two tables or files, a "from-table", and a "to-table". They involve six required parameters and are stored as records in an INFO file known as the relate file. Relates are processed through the RELATE command set that functions in ARC and INFO.

There are four classes of relationships between tables that relates need to support:

- One-To-One
  For every occurrence of a value of the relate item in the "from-table" there is one and only one occurrence in the "to-table".
- One-To-Many
  For every occurrence of a value of the relate item in the "from-table" there are multiple occurrences in the "to-table".
- Many-To-One
  For multiple occurrences of a value of the relate item in the "from-table" there is one and only one occurrence in the "to-table".
- Many-To-Many

For multiple occurrences of a value of the relate item in the "from-table" " there are multiple occurrences in the "to-table".

The simple relates (one-to-many and many-to-one) can be directly processed by definition of the relate parameters. Processing of the more complex one-to-many and many-to-many relationships requires, in addition to the relate definition, either the use of the CURSORS command or the creation of key tables. While the first option may be practicably adopted for the one-to-many relationship, generation of a key table is highly recommended for the still more involved many-to-many relationship. The current version of MMWD's GIS uses CURSORS exclusively to maintain the relate environment.

In addition, a case of non-matched values may occur between two related tables. Such cases of many-to-some indicate that certain occurrences of values in the from-table may have no corresponding values in the to-table, and vice versa. Many-to-some situations may represent either allowable or error conditions in the database. For example in the relationship between valves and valve inspections, every valve inspection record should have a matching valve record since a record of valve inspection must be associated with a valve. If a no match condition is found, in this relationship, it constitutes an error condition. The reverse relationship between valves and valve inspection records does not necessarily have to hold, since a valve may not have yet been inspected.

ARC supports four types of relates:

- Linear
  This is the most generic type of relate and is the slowest in terms of performance unless the relate item is indexed.
- Ordered
  This is a fast relate, but requires that the related table be sorted by the relate column (see below).
- Link
  This is the fastest type of relate because the record number in the related table is used as the relate item.
- Table
  This relate forces records in the first table to relate to a record in the related table even if there is not an exact match in the values of the relate item. It is a useful relate when classifying features.

Every relate structure involves a definition of six required parameters that are stored as a single record in an INFO file known as the relate file. These parameters and their definition are shown below:

- RELATION (8,8,C)
  This is the name of the relate, and is used to invoke the relate environment. The relate must begin with an alphabetic character.
- TABLE-ID (128,128,C)
  This is the name of the table or view (if using a relational database other than INFO) to which the relate is established (i.e., the to-table). The name can include the path name if the table is located in another directory or workspace. It should be noted that the relate definition only includes the table related to and not the

table from which the relate is defined. Any table that contains the item name can relate to the table identified by this item.

- Database (8,8,C)
  The name of the DBMS in which the related file is stored. For MMWD, this will be either INFO or INFORMIX.
- Item (16,16,C)
  This is the name of the INFO item in the from-table that must be present in order to establish the relate.
- Column (32,32,C)
  This is the item name in the to-table used as the relate item. The item definition of the column item must be the same as the from-table item though the name may differ.
- Type (16,16,C)
  One of the four types of relates discussed above.

The following should be considered by the programmer in choosing the relate item (in either the from-table or the to-tables), during application development:

- ARC/INFO generated and maintained items (e.g., FNODE#) should not be employed even if allowed.
- ARC/INFO generated and user-maintained items (i.e. <cover>-id) should generally not be used.
- The relate item in the from-table always functions as a foreign key in that table. Therefore, it is subject to all the limitations that apply to the choice of foreign keys.
- The relate item in the to-table might function as the primary key in that table. In that case, it is subject to all the limitations that apply to the choice of primary keys.

Relate files may store up to 100 relate definitions. They are necessary if the user wishes to preserve the created relate structure for future sessions. The stored relate can the be invoked by issuing the RESTORE RELATE command and specifying the names of both the relate file and the relation. WNM does not currently use stored relates. The relate environment is created at session start-up and maintained for the duration of the session.

ARC can only support up to four related tables. This means that any data more than three tables removed from an FAT cannot be spatially manipulated.

Lookup Tables

LUT and MARWNM.SYM

Lookup tables (LUTs) support text and symbol information relating to particular items in the associated FAT or data table. They serve to convey information presented in a tabular file but not add to it. In this, they differ from data or related tables that incorporate information in addition to that stored in the FAT. Typically, the text and symbol information is directly accessed through specialized ARCPLOT™ commands. Lookup tables accessed in this fashion must be INFO tables. The structure of lookup tables is shown below:

Text Labels

Lookup Item (Same item in FAT)	LABEL

Symbols

Lookup Item (Same item in FAT)	SYMBOL

Only a single LABEL or SYMBOL item (or both) can reside in a given lookup table. Other items, representing additional text or symbol information, may exist but must have a different name. It is possible to design one master lookup table to support all coverages or individual ones to support each individual item. A master lookup table would require a non-overlapping code scheme across all coverages.

Typically, only a single level of text or symbol information is required for a given item and so the single LABEL or SYMBOL item is sufficient. On occasion, additional information may be needed. In this situation, both a LABEL and another item are required. The additional item requires a relate structure for access.

Some tables simply contain valid values for codes that will not be used for symbol or text placement. These tables do not have to contain a LABEL or SYMBOL item and may be INFO or RDBMS tables.

MMWD's GIS utilizes a table called MARWNM.SYM shown on the following page:

MARWNM.SYM

Item	Format	Description
wnm_type	16,16,C	Feature type. Corresponds to related data table name.
item1	16,16,C	Name of first item used to symbolize the feature.
value1	16,16,C	Value of first item that will symbolize the feature.
item2	16,16,C	Name of second item used to symbolize the feature.
value2	16,16,C	Value of second item that will symbolize the feature.
item3	16,16,C	Name of third item used to symbolize the feature.
value3	16,16,C	Value of third item that will symbolize the feature.
item4	16,16,C	Name of fourth item used to symbolize the feature.
value4	16,16,C	Value of fourth item that will symbolize the feature.
symbol	4,5,B	Symbol number
symcode	4,5,B	Unique code assigned to specific combination of item values for a given value of wnm_type.

The use of this table allows features to be symbolized by as many as four item values. For example, a water main may be symbolized by its usage (raw or potable), its operational status (in service or abandoned), its material, and the diameter range that it falls in. This provides greater flexibility than the single item allowed by the LUT. The representation of features may be changed by simply changing the value for *symbol* found in the MARWNM.SYM table.

A relate, based on the value for *symcode* in the FAT, is established between the FAT and the MARWNM.SYM table when a coverage is opened. This relate establishes the symbology for all features during the ensuing MMWD GIS session.

Symbol Sets

ARC/INFO provides four default symbol sets. The sets are organized as three symbol tables (one for each graphic primitive) and a default text or font set. The four tables are as follows:

- PLOTTER.LIN
  Provides default line symbols
- PLOTTER.MRK
  Provides default marker symbols.
- PLOTTER.SHD
  Provides default polygon shade patterns
- PLOTTER.TXT
  Provides text sets.

MMWD'S GIS provides four additional tables that are utility specific version of the four default tables. They are:

- MARSYM.LIN
- MARSYM.MRK
- MARSYM_PLOT.MRK
- MARSYM_SCREEN.MRK
- MARSYM.SHD
- MARSYM.TXT

Map Libraries

While layers provide a consistent structure for storing geographic data, they contain only one set of features for a single continuous geographic area. The LIBRARIAN™ subsystem of ARC/INFO allows collections of layers to be partitioned and organized into a map library. An ARC/INFO map library is similar in organization and use to a traditional library containing books and periodicals. Both types of libraries organize their contents for easy access and retrieval of information – the books in a traditional library are indexed using a card catalog while the data in an ARC/INFO map library are indexed by spatial location.

An ARC/INFO library partitions data by layers and by tiles. A layer, as described earlier, is the digital equivalent of a data theme covering the geographic area of interest. A tile is the digital equivalent of a map sheet in a paper map series. The intersection of a layer and tile is called a map section. A map section contains only one kind of data for one area. Each map section constitutes an ARC/INFO coverage, and acts as the unit for storing data in the map library. LIBRARIAN functions include creating a map library and inserting data into it, managing and reporting on the data in a library, and extracting data from a library for user applications.

ARC/INFO map libraries are most useful when one or more of the following situations are present:

- Large amounts of data must be handled
- Data consistency is important
- The database will be maintained over a long period
- Queries are frequent and will be based on subsets of the entire database
- System wide access to the data is required
- Simultaneous editing in different geographic areas

The design of the map library must be carefully considered because the selected structure will affect database maintenance procedures, data access, and overall system performance. One of the primary considerations in map library design is the tile structure. Tiles may be any shape and size, but their boundaries should be stable because the tile structure is the map library component most difficult to change. Tiles can be defined using a regular grid such as map sheet boundaries or by physical features such as major roads, both of which tend to be stable. Geographic areas that are used as units of analysis, such as planning areas, can also be used to define a tile structure. Geographic units that are subject to change, such as political districts,

should not be used as tiles.

The tile structure should also enhance data access performance. If data access and analysis units coincide with the tile structure, spatial searches and extracts will be more efficient. Tiles should contain approximately the same amount of data. The volume of data stored in a tile coverage (map section) should be kept to a reasonable amount so that processing time in the user workspace and drawing time is manageable. The maximum number for each of these three feature classes is unlimited. However, the recommended limit to the number of map features stored in one tile coverage is 2,000-3,000 polygons, 2,000-6,000 arcs, and 5,000-8,000 points. These general guidelines will vary depending on feature complexity, number of users, system size, and system configuration. MMWD's tile will follow the existing paper drop map index.

A map library can only have one INDEX coverage, which defines the tile structure for the library and applies to all layers in the library. If there is a need to have a different tile structure for certain layers because of data density or scale considerations; then those layers must be placed in a separate map library. Another reason for putting data in a separate library is for restricted access and security considerations. Data from different libraries can be used together as long as they are in the same projection and coordinate system.

Annotation

MMWD'S GIS uses multiple annotation subclass tables. A subclass table will exist for each type of annotation being placed. Levels are not used. MMWD'S GIS will maintain and synchronize annotation with actual FAT and related data table attribute values. For example, if the value for main diameter is changed, this change will be automatically reflected in the annotation. A sample annotation table is shown below:

<COVER>.TAT<annotation name>

Item	Format	Description
<cover>#	4,5,B	The internal feature number.
generic-id	4,5,B	User id
feature_id	24,24,C	Unique feature id

MMWD'S GIS also provides the capability to add and manipulate annotation that is not directly related to a feature. This is referred to as "generic" annotation and is typically used for placing notes on maps.

Images

Images are digital pictures made up of regularly spaced cells called picture elements or pixels. Pixels are cells similar to those in a grid. They are the smallest unit of an image and represent a rectangular location and its value. Pixels are organized in rows and columns the same as cells in a grid. An image is drawn through a presentation of the pixels similar to the dots on a television screen. A picture is formed by a composite display of rows and columns of pixels.

Images can be stored in several ways. Geographically referenced images (i.e., aerial photos) are best maintained through an image catalog. The catalog is an INFO data file that contains an image path name and coordinate information. Each individual image is maintained as a separate record. The images can then be accessed through data catalog operations. Ideally, each catalog contains images of the same thematic information. Different catalogs are maintained for different classes of images (e.g. a separate one for aerial photographs and for satellite images). Theoretically, all the images in a given catalog could be accessed as a single logical image.

Images can also be maintained as attributes. This is an appropriate option if the images are not referenced to a particular geography but are associated with a feature or associated data. For example, images of scanned documents or permits, as-built drawings, and facility blueprints are all candidates for this form of storage. The image attributes may reside in a feature attribute table or a related data table.

Generally, the attributes will contain the path name of the image file. The format of the entry will vary depending on whether the full path name is specified or whether a system variable (e.g., $IMAGEPATH) is substituted for part of the path name.

Under the former approach, a wide field has to be defined (e.g., 128 characters wide) to allow for the full path name. An advantage of this approach is that the location of every image file is explicitly available for review or editing in the attribute field. Disadvantages include the field width and the necessity to modify path names (if required) at the record level.

Under the latter approach, the relevant system variable (or variables) is defined in the ".cshrc" file. Each separate variable can then be used to specify the path name for a given directory. The entry in the attribute field contains the system variable and the name of the individual image file. The main advantage of this approach is that editing of path names can occur at the system variable rather than the individual record level. An additional advantage is that the field width is considerably shortened. A disadvantage is that the full path name (including the image name) is effectively defined in two locations rather than a single one. This approach is utilized by WNM.

The MMWD GIS system currently has two main image types: 1) Orthophoto imagery, which is comprised of 200 scale orthophotos along the urbanized eastern corridor of Marin county, as
well as 400 scale orthophotos in the central and western portions of the county. Each of the 200 and 400 scale orthophotos have their own image catalog, allowing users to view each

dataset as a seemless layer. 2) More generalized aerial photography, usually collected from other federal agencies (USGS). Most of the imagery that MMWD has is in the form of USGS quads or quarterquads for various areas throughout the county. 3) Document imagery. As of the following date, the following documents have been electronically linked to our spatial data:

09/01/99

a) Service Cards. Service sketches are stored on the system, with access allowed through Arcview. Users can select a particular service and view its sketch immediately.

For more specified information on imagery and its' location on the MMWD GIS system, please go to the DATA DICTIONARY section.

Naming Conventions

Several considerations guide the naming approach to the database layers, tables, and items in the design. The names are designed to reflect the type of captured geographic features, to preserve the current District manner of representing feature attributes, or to comply with standards adopted during the development of MMWD'S GIS.

Layers

Layer names capture the theme of a given layer. The intent is that the user be able to identify the general nature of the layer from its name alone. Layer names are limited to eight characters. The first character must be alphabetic. An established MMWD GIS naming convention is followed for water distribution layers.

Tables

Four types of tables specified in the database design. These are INFO feature attribute tables, INFO related data tables, INFORMIX tables, and WNM system INFO tables. Key tables and look-up tables are not supported by MMWD'S GIS. The normal MMWD GIS naming convention has been followed for INFO tables. INFORMIX tables follow the naming convention established by the Work Order System. MMWD'S GIS creates and maintains the INFO tables and the Work Order System creates and maintains the INFORMIX tables.

- Feature Attribute Tables
  These tables store the attributes of the primary graphic features. FAT names default to the layer name. They are automatically assigned an extension as per the type of table. For example, the attributes of DISTRIB arc features are stored in the DISTRIB.AAT while those of the node features are placed in the DISTRIB.NAT. The layer name component of FAT names is limited to eight characters. The first character must be alphabetic.
- INFO Related Data Tables
  These tables are used for storing information specific to particular geographic features. In the GIS implementation at MMWD, limited use is being made of these types of tables. They are generally named for the represented feature and use the extension ".DAT". Data table names are limited to eight characters plus the extension. The extension is limited to three characters. Related data tables maintained by MMWD's GIS must begin with the letter "W".
- INFORMIX Tables
  These tables are similar in use to the INFO related data tables in that some of the tables store information specific to particular geographic features. However, the INFORMIX database also address non-GIS data needs and contains tables not normally found in a GIS system.

MMWD GIS System INFO tables

These tables are used by MMWD'S GIS to maintain system parameters related to the execution of the MMWD GIS Edit module. These tables are standardized across installations and their structure may not be modified by customers. In limited cases, the contents of the tables may be updated by an application developer familiar with maintaining the MMWD GIS code.

Items

Item names are designed to convey the attribute represented by an item in abbreviated fashion. For ARC/INFO, item names are limited to sixteen characters, can have no spaces, must begin with an alphabetic character, and are case sensitive.

In the work order system, internal field names, different from names presented to the user, are used. For the purposes of this document, both names will be shown. Because ARC/INFO does not support user names in the same manner as the work order system, "masking" code was developed to translate user names into internal field names when accessing tables residing in INFORMIX via ARC/INFO. The use of this masking code is transparent to the user of either system. The implementation of the masking code is discussed in the next section.

MMWD GIS System Tables

The MMWD GIS utilizes a number of INFO database tables in order to enable many of its' functions. These tables are normally not accessed by the customer. However, it is important that their existence is documented in the event that the customer elects to develop their own applications. Additional information regarding the use of these tables may be found in the MMWD GIS Application Maintenance Guide.

<layer>.BCK

Item	Format	Description	Domain	Input	Related Table
BACK_COVER	12,12,C	Edit coverage name.	Valid edit coverage name.	System	
COVER1	100,100, C	Full path name of a background coverage.	Valid coverage name.	User	
COVER2	100,100, C	Full path name of a background coverage.	Valid coverage name.	User	
COVER3	100,100, C	Full path name of a background coverage.	Valid coverage name.	User	
COVER4	100,100, C	Full path name of a background coverage.	Valid coverage name.	User	
COVER5	100,100, C	Full path name of a background coverage.	Valid coverage name.	User	
COVER6	100,100, C	Full path name of a background coverage.	Valid coverage name.	User	

This table is used to track background coverages associated with a given edit coverage. This table is first populated by MMWD's GIS Edit Module when a coverage is opened and background coverages are specified or when background coverages are specified for a coverage that is already open. A version of this table must be present for each layer in the database that is being maintained by MMWD's GIS Edit Module.

THEME.DAT

Item	Format	Description	Domain	Input	Related Table
COVER_NAME	12,12,C	Coverage name	Valid coverage name	System	
THEME_TYPE	8,8,C	WNM theme	Valid MMWD Edit theme	System	
CREATOR	20,20,C	Person who created the coverage.	Not blank	System	
DATE_CREATED	8,10,D	The date that the coverage was created.	Valid date	System	
MODIFIED_BY	20,20,C	Person who last modified the coverage.	Optional	System	
LAST_SAVED	8,10,D	Date the coverage was last saved.	Valid date	System	
BACK_COVER	12,12,C	Background coverage name.	Optional	System	

This table is used to track the theme associated with a given edit coverage. This table must be present in the INFO database that is being maintained by MMWD's GIS Edit Module.

MARWNM.SYM

Item	Format	Description	Domain	Input	Related Table
WNM_TYPE	16,16,C	Feature type. Corresponds to related data table name.	Valid WNM feature type.	N/A.	
ITEM1	16,16,C	Name of first item used to symbolize the feature.	Blank or valid item name	N/A.	
VALUE1	16,16,C	Value of first item that will symbolize the feature.	Blank or valid item value	N/A.	
ITEM2	16,16,C	Name of second item used to symbolize the feature.	Blank or valid item name	N/A.	
VALUE2	16,16,C	Value of second item that will symbolize the feature.	Blank or valid item value	N/A.	
ITEM3	16,16,C	Name of third item used to symbolize the feature.	Blank or valid item name	N/A.	
VALUE3	16,16,C	Value of third item that will symbolize the feature.	Blank or valid item value	N/A.	

MARWNM.SYM (Continued)

ITEM4	16,16,C	Name of fourth item used to symbolize the feature.	Blank or valid item name	N/A.	
VALUE4	16,16,C	Value of fourth item that will symbolize the feature.	Blank or valid item value	N/A.	
SYMBOL	4,5,B	Symbol number	Valid symbol from MARSYM.MRK or MARSYM.LIN symbol tables.	N/A.	
SYMCODE	4,5,B	Unique code assigned to specific combination of item values for a given value of wnm_type.	>0, Uniqueness required within table.	N/A.	<cover>.AAT <cover>.NAT <cover>.PAT

This table is used to drive symbology for features maintained by MMWD'S GIS. This table must be present in the INFO database that is being maintained by MMWD'S GIS Edit Module.

WIMAGE.DAT

Item	Format	Description	Domain	Input	Related Table
FEATURE_ID	24,24,C	Unique feature id.	>0 Uniqueness required across the database.	System	<cover>.AAT <cover>.NAT <cover>.PAT
CATALOG	100,100, C	Full path name of the image catalog.	Valid image catalog path name.	User	None
IMAGE	128,128, C	Name of the image associated with the feature.	Valid image name	User	None

This table is used to associate images with specific features. This table must be present in the INFO database being maintained by MMWD'S GIS Edit Module.

Work Order System Tables

As far as the GIS is concerned, the work order system consists of two main tables. The Network Master File contains attributes common to all water distribution network features represented as arcs in the GIS. The Equipment Master File contains attributes common to all other water distribution features. Subcategories within each of these two main files contain more specific feature data. These subcategories are described in detail in the Data Dictionary section of this document.

The data fields shown below are available for every record stored in the Equipment Master File (Equipfil) and the Network Master File (Networks), regardless of Category/Sub-Category.

Equipfil

Field Label	Internal Field Name	Field Type
Infrastructure ID	equ_number	char(12)
Category	equ_category	char(6)
Sub-Category	equ_subcat	char(6)
Locator Code	equ_locator_code	char(1)
Jurisdiction	equip_locator_jurs	char(6)
Address	equip_locator_addr	char(96)
Common Site Name	equ_common_area	char(40)
Common Facility Name	equ_common_facilit	char(40)
Service #	equ_service	char(8)
Descriptn	equ_description	char(65)
Status	equ_status	char(6)
Condition	equ_condition	char(6)
Dept Code	equ_dvsn	char(10)
Vendor #	equ_vendor	char(10)
Model #	equ_model	char(30)
Serial #	equ_serial	char(30)
Parts Lst?	equ_parts_list	char(1)
Parts Lst same as	equ_parts_equip	char(12)
Purch Dt	equ_purch_date	date
Purch Cst	equ_purch_cost	decimal(10,2)
Hourly Rt	equ_hourly_rate	decimal(6,2)
Est Life	equ_est_life	integer
Est Life Units	equ_est_unit	char(1)
Job	equ_job_no	char(8)
Location	equ_loc_desc1	char(65)
Location Descrptn	equ_loc_desc2	char(65)
Current Readings		
Hours	equ_acc_hours	decimal(10,2)

Equipfil (Continued)

Field Label	Internal Field Name	Field Type
Miles	equ_acc_miles	integer
Gallons	equ_acc_gallons	integer
CCFs	equ_acc_ccfs	integer
Acre Ft	equ_acc_acft	integer
Last Date Updated	equ_updt	date
Last Update By	equ_who	char(10)
Property #	equ_property_no	char(20)
Charge to Account	equ_acct	char(20)
Drop Sheet	equ_grid	char(6)
Charge To Dept	equ_chg_dvsn	char(10)
Parent ID	equ_parent	char(12)
GIS Flag	equ_gis_flag	char(1)
GIS Coverage	equ_gis_cover	char(12)

Network

Field Label	Internal Field Name	Field Type
Network ID	net_number	char(12)
Start ID	net_from_id	char(12)
End ID	net_to_id	char(12)
Category	net_category	char(6)
Sub-Category	net_subcat	char(6)
Locator Code	net_locator_code	char(1)
Jurisdiction	net_locator_jurs	char(6)
Address	net_locator_addres	char(96)
Common Site Name	net_common_area	char(40)
Common Facility Name	net_common_facilit	char(40)
Descriptn	net_description	char(65)
Status	net_status	char(6)
Condition	net_condition	char(6)
Dept Code	net_dvsn	char(10)
Zone	net_zone	char(6)
Forc/Grav	net_force_grav	char(1)
Pressure	net_pressure	char(10)
% Grade	net_grade	smallint
Est Life	net_est_life	integer
Est Life Units	net_est_unit	char(1)
Charge To Dept	net_chg_dvsn	char(10)
Charge To Account	net_acct	char(20)
Install Dt	net_install_date	date
Size	net_size	decimal(7,2)
Length	net_length	decimal(7,2)

Network (Continued)

Field Label	Internal Field Name	Field Type
Material	net_matl	char(20)
Job Numbr	net_job_no	char(8)
Location	net_loc_desc1	char(65)
Location Descriptn	net_loc_desc2	char(65)
Last Date Updated	net_updt	date
Last Update By	net_who	char(10)
Drop Sheet	net_grid	char(6)
Parent ID	net_parent	char(12)
GIS Flag	net_gis_flag	char(1)
GIS Coverage	net_gis_cover	char(12)

The shaded items were added to accommodate the GIS/WOS link. The column titled "Field Label" contains the name of the field that is presented to the user, while the column "Internal Field Name" contains the field name that is internally by applications. The "masking code" allows GIS users to refer to items by their field label names rather than the internal field name. A diagram outlining this appears in Section 3.

DATA DICTIONARY

Entity Relationship Diagram Overview

The various components of the Entity Relationship model figures used throughout this section are shown below:

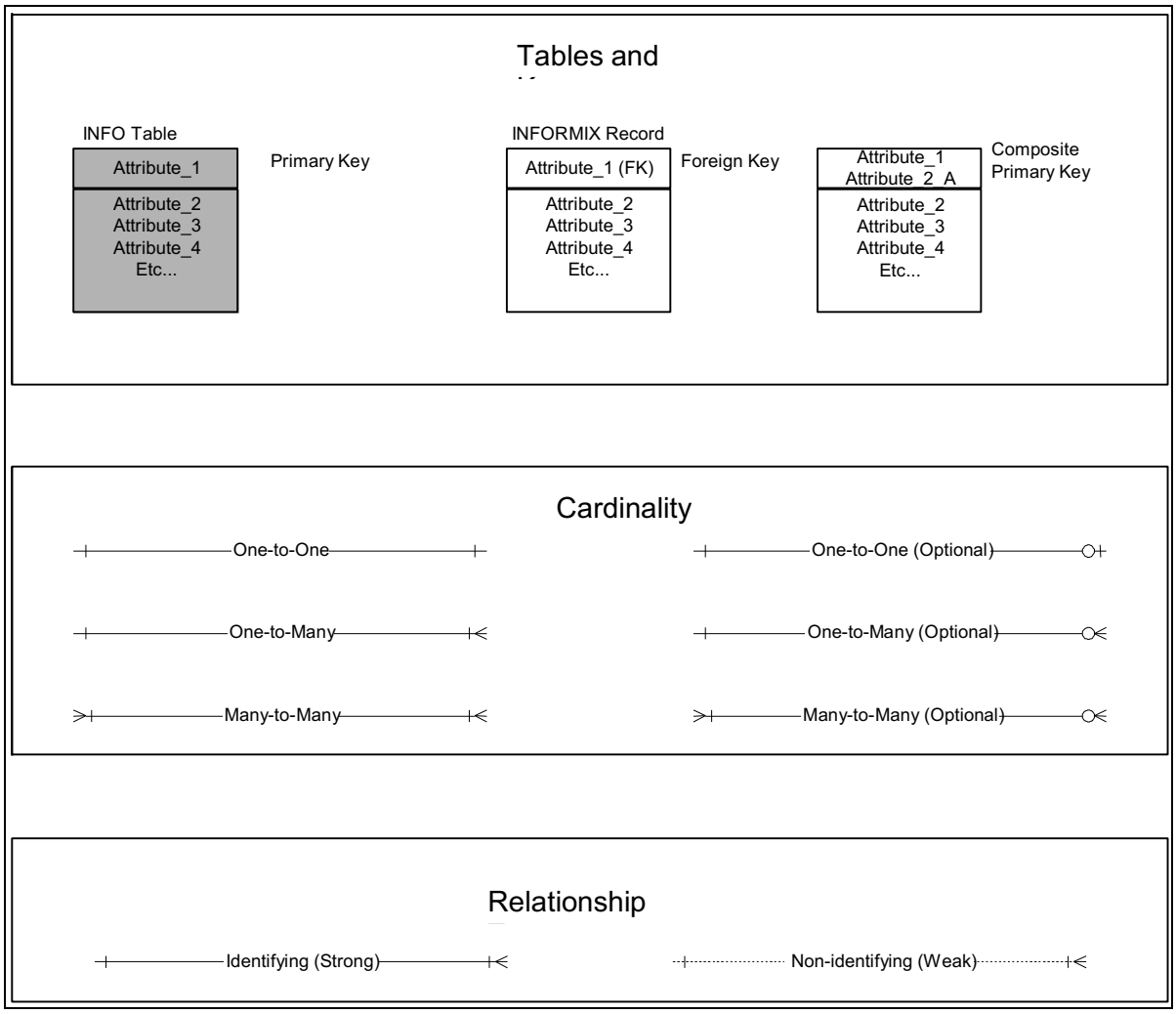


Figure 3-1 – Entity Relationship Diagram Components

WATER DISTRIBUTION NETWORK DATABASE

General Description

The **DISTRIB** and **RECYCLED** layers contains MMWD's non-recycled (potable) and recycled water distribution network in a basic arc, node, and point data model structure. Arcs are used to represent water distribution mains. Nodes are used to represent hydraulically significant facilities such as valves, tanks, and pump stations. Points are used to represent cathodic protection stations. In addition to this, services and firelines are also represented as points. This is significant because it is contrary to the typical representation of these features by arcs as seen at other utilities. However, this is more of a symbolization issue, and will not affect MMWD's ability to utilize any of MMWD's GIS Edit module. Currently, there are no features being represented as polygons in the water database, other than tax assessor's parcels.

Several items found in the tables are necessary for compatibility with the MMWD WNM modules. For example, the item *wnm_type* is necessary to identify the type of facility being represented by the FAT. These WNM required items are described in detail in the ensuing subsections. The MMWD Edit module also require that the value used within the *wnm_type* item match the INFO data table name for those tables stored in INFO. In MMWD's case, a node representing a fire hydrant has a *wnm_type* value of "WFIREHYD" and a corresponding entry in the WFIREHYD.DAT INFORMIX table.

Central to the GIS implementation at MMWD has been the necessity to link the GIS and the WOS. This link allows users adding, deleting, or otherwise manipulating features in the GIS to access and edit the WOS at the same time. The implementation of this link is diagrammed below:

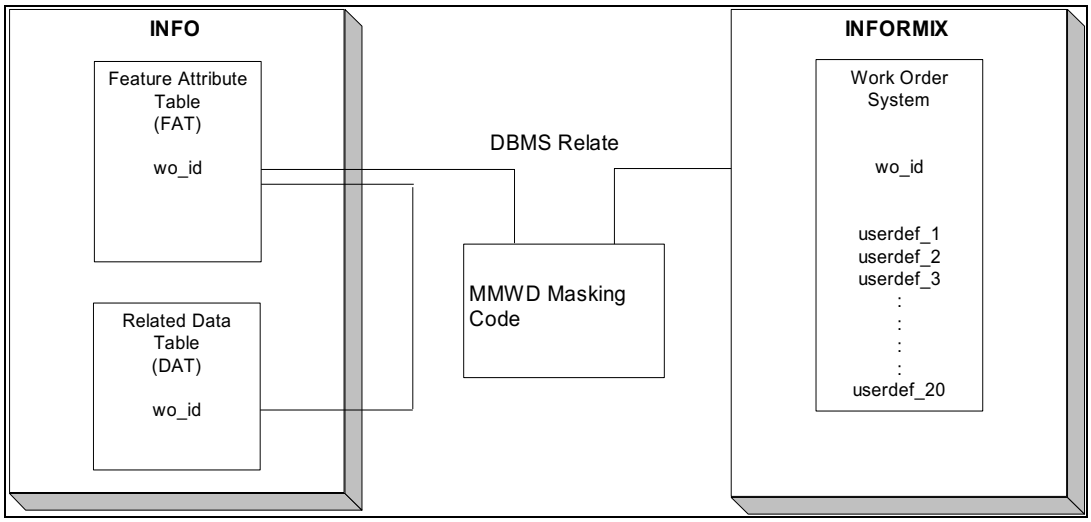


Figure 3-2: Masking Code Implementation

The INFO table item *wo_id* is a concatenation of *facility_code*, a dash (-), and *facility_id*. In the WOS, *facility_code* and *facility_id* are not present. The masking code will create the appropriate masks to allow the GIS users to refer to features by name and item (e.g., Address) rather than the internal field name used in INFORMIX (e.g. *net_locator_addres*).

A relate using *wo_id* will be established between the FAT and the DAT tables. The data residing in these tables will be periodically extracted from the PI-Open® database into an ASCII file. MMWD'S GIS Edit module has been modified to provide a function that will allow the related data tables to be populated with the data from the ASCII file. This function is required because ARC/INFO does not have a DATABASE INTEGRATOR™ function for PI-Open. This data extract and loading will be done as a step in the data conversion process. It is anticipated that after all of MMWD's data has been converted, the fire hydrant data will be maintained entirely within the GIS.

The design also supports the ability to shift features to their actual GPS points. Attributes to record the GPS data are present in the NAT. An AML function has been written that will shift all nodes (and by implication, all arc endpoints) containing GPS values, to their actual x,y coordinates.

DISTRIB

Arcs	Nodes	Points
Mains (PI)	End Point (EP)	Service (SV)
	Hydrant (HY)	Fireline (FL)
	Large Meter (MD)	Corrosion Test Station (CS)
	Pump Station (PS)	
	Check Valve (RC)	
	Relief Valve (RF)	
	Regulator (RG)	
	Tee (TE)	
	Water Tank (TK)	
	Non-recycled Valve (VA)	
	Flocculent Tank (TP)	

RECYCLED

Arcs	Nodes	Points
Mains (PR)	End Point (EP)	Service (SV)
	Recycled Hydrant (HR)	Fireline (FL)
	Large Meter (MD)	Corrosion Test Station (CS)
	Pump Station (PS)	
	Check Valve (RC)	
	Relief Valve (RF)	
	Regulator (RG)	
	Tee (TE)	
	Water Tank (TK)	
	Recycled Valve (VR)	
	Flocculent Tank (TP)	

Currently MMWD is only maintaining records of valves and hydrants in the recycled layer. MMWD'S GIS Edit module will be customized to allow the spatial editing of the other features should MMWD elect to represent them in the GIS.

Features contained in the two water distribution layers are shown above. The two-character code used by MMWD to categorize features is also shown.

DISTRIBUTION LAYER

Layer Name: DISTRIB
Data location: Tiled workspaces reside @ /DATA/LIB/
Creation Date: April 1996
Update: 7 Tiles updated as of 3.1.99
Created By: Marin County
Data Source: MMWD
Notes:

Description
This layer contains water mains and associated node and point features along with annotation. The facilities in this layer include mains, valves, tanks, hydrants, services, and other node and point features. There are no polygon features in this layer. Each INFO table will contain an item called *facility_code*. This item contains a two-character code, that when concatenated with a dash (-), and the item *facility_id,* will uniquely identify the feature. This concatenation is stored in the item *wo_id*. The item *wo_id* is equivalent to the fields' *equ_number* and *net_number* found in the INFORMIX EQUIPFIL and NETWORKS files respectively. The first two characters of these fields will contain the characters in the INFO table item *facility_code*.

Coverage Characteristics
Precision: double
Units: feet
Projection: State Plane

Feature Classes
Arcs
Nodes
Points
Annotation

Arcs

INFO Feature Attribute Table(s)
DISTRIB.AAT – Non-recycled water network arcs
INFORMIX Master File -
NETWORKS – Network Master File
WNM_TYPE – WMAIN
FACILITY_CODE – PI
INFO Related Table(s)
None
INFORMIX Category/Subcategory: MAIN/MAIN – Distribution Pipe/Non-recycled water

Nodes

Feature Attribute Table(s)
DISTRIB.NAT – Non-recycled water network nodes
INFORMIX Related File(s)
EQUIPFIL: – Equipment Master File
WNM_TYPE – WFIREHYD
FACILITY_CODE – HY
INFO Related Table(s)
WFIREHYD.DAT – Non-recycled water fire hydrants
INFORMIX Related File(s)
None

WNM_TYPE(s) – WMDMETER
FACILITY_CODE – MD
INFO Related Table(s)
None
INFORMIX Category/Subcategory: METERS/SYSTEM – Mainline system meters
XMITS/FLOWS – Large flow meter transmitters

WNM_TYPE(s) – WPUMPSTA
FACILITY_CODE – PS
INFO Related Tables
None
INFORMIX Category/Subcategory: PUMP/STATN – Pump stations

WNM_TYPE(s) – WTANK
FACILITY_CODE – TK (tanks, steel tanks, bolted steel tanks, concrete tanks, redwood tanks)
TP (flocculation tanks)
INFO Related Tables
None
INFORMIX Category/Subcategory: TANK/TANK – Tanks
TANK/STEEL – Steel tanks
TANK/BLTSTL – Bolted steel tanks
TANK/CNCRTE – Concrete tanks
TANK/REDWD – Redwood tanks
TANK/FLOC – Flocculation tanks

WNM_TYPE(s) – WVALVE
FACILITY_CODE – RC (tank check valves)
VA (potable valve)
RG, RF (altitude diaphragm valve)
RG, RF (diaphragm valves)
INFO Related Tables
None
INFORMIX Category/Subcategory: VALVE/ALTDIA – Altitude diaphragm valves
VALVE/DIAPH – Diaphragm valves
VALVE/POTABL – Potable water valves
VALVE/TKCHK – Tank check valves

WNM_TYPE(s) – WPIPEFIT
FACILITY_CODE – EP (End point), TE (Tee)
INFO Related Tables
None
INFORMIX Category/Subcategory: PIPFIT/TEE
PIPFIT/ENDPT

WNM_TYPE(s) – WVALVE
FACILITY_CODE – RG
INFO Related Tables
None
INFORMIX Category/Subcategory: VALVE/ALTDIA – Altitude diaphragm valves
VALVE/DIAPH – Diaphragm valves

Points

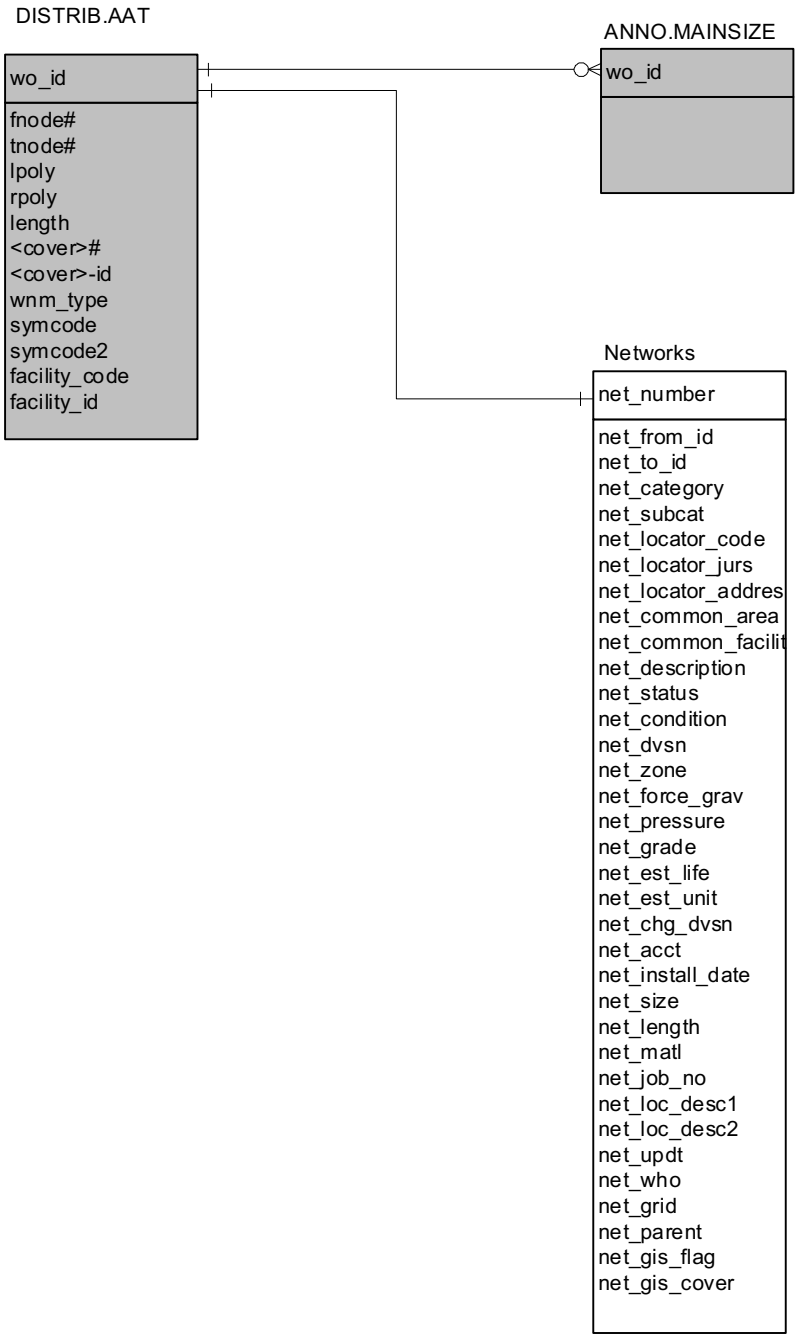
Feature Attribute Table(s)
DISTRIB.PAT – Non-recycled water network points
INFORMIX Related File(s)
EQUIPFIL: – Equipment Master File

WNM_TYPE – WCRTSTST
FACILITY_CODE – CS
INFO Related Table(s):
None
INFORMIX Category/Subcategory: Multiple (See File Definitions)

WNM_TYPE – WSERVICE
FACILITY_CODE – SV
INFO Related Table(s)
None
INFORMIX Category/Subcategory: SERV/SERV

WNM_TYPE – WFIRELIN
FACILITY_CODE – FL
INFO Related Table(s)
None
INFORMIX Category/Subcategory: SERV/FLINE

DISTRIB (Arcs) Entity Relationship Diagram



DISTRIB (Arcs) Record Layouts

DISTRIB.AAT

Item Name	Data Type	Description	Domain	Input	Related Table
fnode#	4,5,B	From-node internal number Starting point of arc	>0	System	
tnode#	4,5,B	To-node internal number Ending point of arc	>0	System	
lpoly	4,5,B	Left polygon if only a line coverage – Set to zero	≥0	System	
rpoly	4,5,B	Right polygon, if only a line coverage – Set to zero	≥0	System	
length	8,18,F,5	Units in coverage units – Double precision	≥0	System	
<cover>#	4,5,B	Arc identifier – Generated and maintained by ARC/INFO	>0, sequential starting with 1	System	
<cover>-id	4,5,B	User-ID – Generated by ARC/INFO but user can modify	≤0≥, uniqueness not required	System	
wnm_type	16,16,C	Identifies the facility represented by the FAT entry.	WMAIN	System	
symcode	4,5,B	Used to symbolize features based on data values.	>0	System	
symcode2	4,5,B	Used to symbolize features based on data values.	>0	System	
facility_code	2,2,C	MMWD code identifying the type of feature	= PI	System	
facility_id	9,9,C	MMWD facility id number	>0	System	
wo_id	12,12,C	Concatenation of facility_code, a dash (-), and facility_id	Unique alphanumeric string	System	network

Notes:

1. The item *feature_id* is not being used in the MMWD implementation. Instead, the item *wo_id* will be used to uniquely identify features and to establish the relate environment to INFORMIX data.

Network

Internal Field Name	Field Type	Field Label	Domain	Input
net_number	char(12)	Network ID	Unique	System
net_from_id	char(12)	Start ID		System
net_to_id	char(12)	End ID		System
net_category	char(6)	Category	Main	System
net_subcat	char(6)	Sub-Category	Main	System
net_locator_code	char(1)	Locator Code		User
net_locator_jurs	char(6)	Jurisdiction		User
net_locator_addres	char(96)	Address		User
net_common_area	char(40)	Common Site Name		User
net_common_facilit	char(40)	Common Facility Name		User
net_description	char(65)	Descriptn		User
net_status	char(6)	Status		User
net_condition	char(6)	Condition		User
net_dvsn	char(10)	Dept Code		User
net_zone	char(6)	Zone		User
net_force_grav	char(1)	Forc/Grav		User
net_pressure	char(10)	Pressure		User
net_grade	smallint	% Grade		User
net_est_life	integer	Est Life		User
net_est_unit	char(1)	Est Life Units		User
net_chg_dvsn	char(10)	Charge To Dept.		User
net_acct	char(20)	Charge To Account		User
net_install_date	date	Install Dt	Valid date	User
net_size	decimal(7,2)	Size	Valid size	User
net_length	decimal(7,2)	Length		User
net_matl	char(20)	Material	Valid material	User
net_job_no	char(8)	Job Numbr		User
net_loc_desc1	char(65)	Location		User
net_loc_desc2	char(65)	Location Descriptn		User
net_updt	date	Last Date Updated		System
net_who	char(10)	Last Update By		System
net_grid	char(6)	Drop Sheet		User
net_parent	char(12)	Parent ID		System
net_gis_flag	char(1)	GIS Flag		System
net_gis_cover	char(12)	GIS Coverage		System

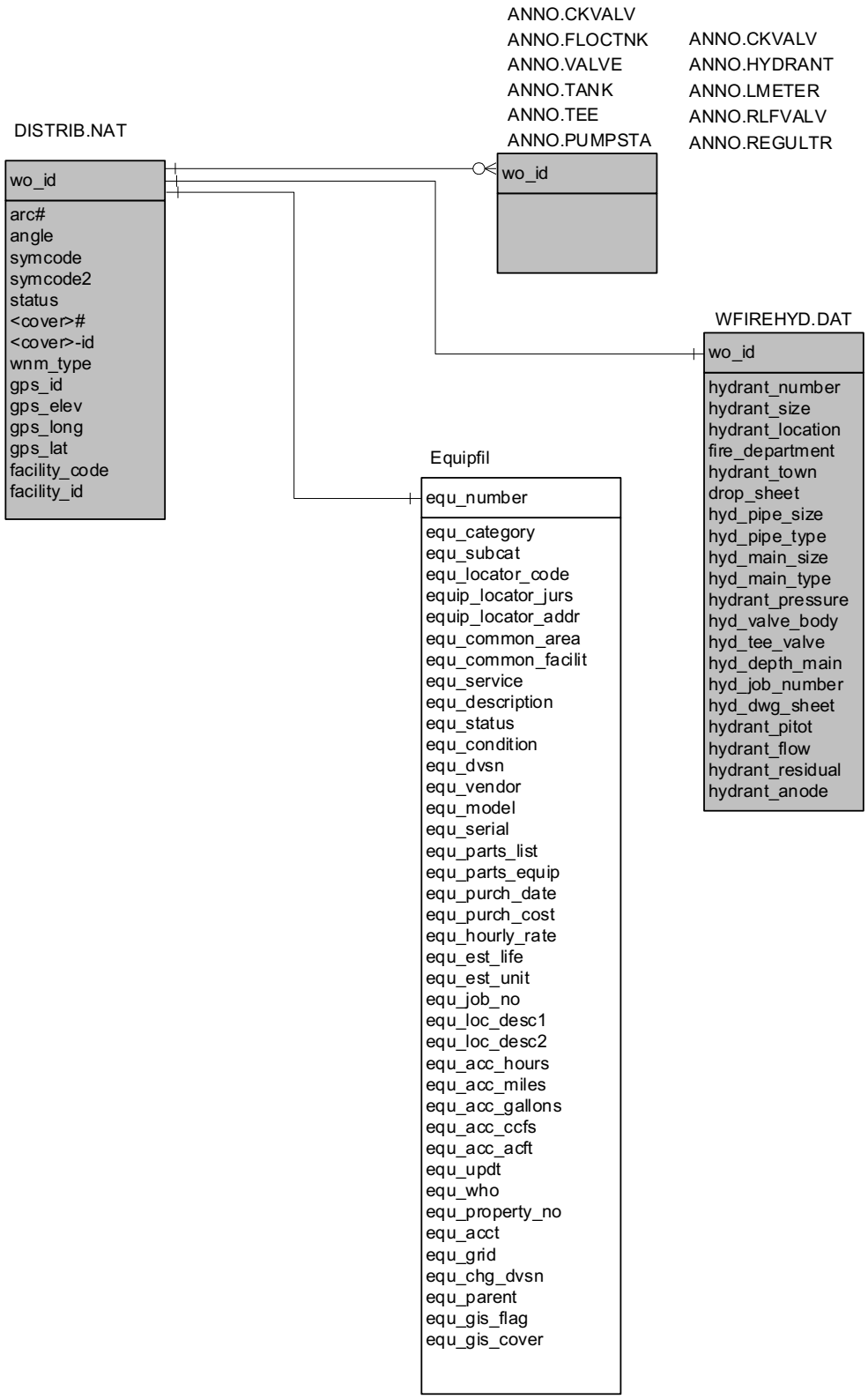
Mains

For category/sub-category MAIN/MAIN, the following user defined fields are present:

Network

Internal Field Name	Field Type	Field Label	Domain	Input
net_usr_desc_1	char(20)	Type		User
net_usr_desc_2	char(20)	Friction Factor		User
net_usr_desc_3	char(20)	Depth Buried		User
net_usr_desc_4	char(20)	Cover		User
net_usr_desc_5	char(20)	Corrosion Protection		User
net_usr_desc_6	char(20)	Cathodic Id		User
net_usr_desc_7	char(20)	Design Pressure		User

DISTRIB (Nodes) Entity Relationship Diagram



DISTRIB (Nodes) Record Layouts

DISTRIB.NAT

Item Name	Data Type	Description	Domain	Input	Related Table
arc#	4,5,B	Arc internal number - Generated and maintained by ARC/INFO	>0	System	
<cover>#	4,5,B	Arc identifier – Generated and maintained by ARC/INFO	>0, sequential starting with 1	System	
<cover>-id	4,5,B	User-ID – Generated by ARC/INFO but user can modify	≤0≥, uniqueness not required	System	
wnm_type	16,16,C	Identifies the facility represented by the FAT entry.	WFIREHYD WMDMETER WPUMPSTA WTANK WVALVE WPIPEFIT	System	
angle	4,4,I	Used to define symbol display angle	≤ 360	System/ User	
symcode	4,5,B	Used to symbolize features based on data values.	>0	System	
symcode2	4,5,B	Used to symbolize features based on data values.	>0	System	
gps_id	7,7,I	Identification assigned to the node if a GPS record exists for the feature represented by the node.	Unique number	User	
gps_elev	8,9,N,2	Elevation measured by GPS equipment.	≥0	User	
gps_long	8,9,N,2	Longitude measured by GPS equipment.	≥0	User	
gps_lat	8,9,N,2	Latitude measured by GPS equipment.	≥0	User	
facility_code	2,2,C	MMWD code identifying the type of feature	=EP,HY,MD, PS,RC,RF,RG, TE,TK,VA,TP	System	
facility_id	9,9,C	MMWD facility id number	>0	System	
wo_id	12,12,C	Concatenation of facility_code, a dash (-), and facility_id	Unique alphanumeric string	System	EQUIPFIL

Notes:
1. The item feature_id is not being used in the MMWD implementation. Instead, the item wo_id will be used to uniquely identify features and to establish the relate environment to INFORMIX data.

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_number	char(12)	Infrastructure ID	Unique	System
equ_category	char(6)	Category	meters, xmits, pump, tank, valve	System
equ_subcat	char(6)	Sub-Category	system, flows statn, tank, steel, bltstl, cncrte, redwd, floc, altdia, diaph, potabl, tkchk	System
equ_locator_code	char(1)	Locator Code		User
equip_locator_jurs	char(6)	Jurisdiction		User
equip_locator_addr	char(96)	Address		User
equ_common_area	char(40)	Common Site Name		User
equ_common_facilit	char(40)	Common Facility Name		User
equ_service	char(8)	Service #		User
equ_description	char(65)	Descriptn		User
equ_status	char(6)	Status		User
equ_condition	char(6)	Condition		User
equ_dvsn	char(10)	Dept Code		User
equ_vendor	char(10)	Vendor #		User
equ_model	char(30)	Model #		User
equ_serial	char(30)	Serial #		User
equ_parts_list	char(1)	Parts Lst?	y, n	User
equ_parts_equip	char(12)	Parts Lst same as		User
equ_purch_date	date	Purch Dt	Valid date	User
equ_purch_cost	decimal(10,2)	Purch Cst		User
equ_hourly_rate	decimal(6,2)	Hourly Rt		User
equ_est_life	integer	Est Life		User
equ_est_unit	char(1)	Est Life Units		User
equ_job_no	char(8)	Job		User
equ_loc_desc1	char(65)	Location		User
equ_loc_desc2	char(65)	Location Descrptn		User
		Current Readings		
equ_acc_hours	decimal(10,2)	Hours		User
equ_acc_miles	integer	Miles		User
equ_acc_gallons	integer	Gallons		User
equ_acc_ccfs	integer	CCFs		User
equ_acc_acft	integer	Acre Ft		User
equ_updt	date	Last Date Updated	Valid date	System
equ_who	char(10)	Last Update By		System
equ_property_no	char(20)	Property #		User

Equipfil (Continued)

Internal Field Name	Field Type	Field Label	Domain	Input
equ_acct	char(20)	Charge to Account		User
equ_grid	char(6)	Drop Sheet		User
equ_chg_dvsn	char(10)	Charge To Dept		User
equ_parent	char(12)	Parent ID		System
equ_gis_flag	char(1)	GIS Flag		System
equ_gis_cover	char(12)	GIS Coverage		System

Hydrants

Hydrant data is stored in the WFIREHYD_DAT INFORMIX table as shown below:

WFIREHYD_DAT

Item Name	Data Type	Description	Domain	Input
wo_id	12,12,C	Concatenation of facility_code, a dash (-), and facility_id	Unique alphanumeric string	System
hydrant_number	5,5,C	Usually a 4 digit number. May end with an 'F' indicating that the hydrant is a fireline.		User
hydrant_size	4,4,C	The size of the hydrant in inches		User
hydrant_location	55,55,C	Property address where the hydrant is located		User
fire_department	12,12,C	Fire department that has jurisdiction of the hydrant		User
hydrant_town	15,15,C	City/town where the hydrant is located.		User
drop_sheet	5,5,C	The drop map sheet and drop map number.		
hyd_pipe_size	2,2,I	The pipe size in inches		User
hyd_pipe_type	8,8,C	Code that defines the hydrant pipe type		User
hyd_main_size	3,3,I	The size of the main, in inches, feeding the hydrant		User
hyd_main_type	6,6,C	Type of main feeding the hydrant		User
hydrant_pressure	3,3,I	Pressure in lbs. per square in.		User
hyd_valve_body	6,6,C	The distance between the valve and body in feet and inches.		User
hyd_valve_tee	6,6,C	The distance between the valve and tee in feet and inches.		User
hyd_depth_main	5,5,C	Depth of the main serving the hydrant in feet and inches		User
hyd_job_number	8,8,C	Job number		User
hyd_dwg_sheet	2,2,I	Sheet number of job		
hydrant_pitot	6,6,I	Pitot gauge reading		User
hyd_flow	4,4,I	Flow in gallons per minute		User
hyd_residual	4,4,I	Water pressure when hydrant is operating		User
hydrant_anode	1,1,C	Defines if an anode is installed	Y, N	User

System Meters

For category/sub-category METERS/SYSTEM, the following user defined fields are present:

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_1	char(20)	Size		User
equ_usr_desc_2	char(20)	Make		User
equ_usr_desc_4	char(20)	Registration		User
equ_usr_desc_5	char(20)	Read Type		User
equ_usr_desc_6	char(20)	Gears		User
equ_usr_desc_8	char(20)	Power Supply		User
equ_usr_desc_9	char(20)	Scaled Output		User
equ_usr_desc_12	char(20)	MT Flange Shape		User
equ_usr_desc_13	char(20)	# of Bolts		User
equ_usr_desc_16	char(20)	Min Forward Flw		User
equ_usr_desc_17	char(20)	Avg Forward Flw		User
equ_usr_desc_18	char(20)	Max Forward Flw		User
equ_usr_desc_20	char(20)	Min Reverse Flw		User
equ_usr_desc_21	char(20)	Avg Reverse Flow		User
equ_usr_desc_22	char(20)	Max Reverse Flow		User

Large Flow Meter Transmitters

For category/sub-category XMITS/FLOWS, the following user defined fields are present:

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_1	char(20)	Manufacturer		User
equ_usr_desc_4	char(20)	Part #		User
equ_usr_desc_5	char(20)	Range		User
equ_usr_desc_6	char(20)	Accuracy		User
equ_usr_desc_7	char(20)	Meter Size		User
equ_usr_desc_8	char(20)	Calib. Constant		User
equ_usr_desc_9	char(20)	Fullscale Flow		User
equ_usr_desc_10	char(20)	Gallons/Pulse		User
equ_usr_desc_16	char(20)	Gears		User
equ_usr_desc_17	char(20)	MT Flange Shape		User
equ_usr_desc_18	char(20)	# of Bolts		User

Pump Stations

For category/sub-category PUMP/STATN, the following user defined fields are present:

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_1	char(20)	PG&E Acct#		User
equ_usr_desc_2	char(20)	Type of Com.		User
equ_usr_desc_3	char(20)	Primary Volt		User
equ_usr_desc_4	char(20)	Service Size		User
equ_usr_desc_5	char(20)	Main Dis		User
equ_usr_desc_6	char(20)	Line Volts:		User
equ_usr_desc_7	char(20)	A/B		User
equ_usr_desc_8	char(20)	A/C		User
equ_usr_desc_9	char(20)	B/C		User
equ_usr_desc_11	char(20)	Classification		User
equ_usr_desc_12	char(20)	Number Pumps		User
equ_usr_desc_13	char(20)	Pumping Cap.		User
equ_usr_desc_14	char(20)	Frame Construct		User
equ_usr_desc_15	char(20)	Siding Type		User
equ_usr_desc_16	char(20)	Fence Type		User
equ_usr_desc_17	char(20)	Steps Type		User
equ_usr_desc_18	char(20)	Retain Wall Typ		User
equ_usr_desc_19	char(20)	Pit/Box Type		User
equ_usr_desc_20	char(20)	Int.Drain Type		User
equ_usr_desc_21	char(20)	Ext. Drain Type		User
equ_usr_desc_22	char(20)	Roof Typ/Gutter		User
equ_usr_desc_23	char(20)	Door Specs/MFG		User
equ_usr_desc_24	char(20)	Window/Vent MFG		User
equ_usr_desc_25	char(20)	Paved Site		User
equ_usr_desc_26	char(20)	Sec. Cod Req'd		User

Tanks

For category/sub-category TANK/TANK, the following user defined fields are present:

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_1	char(20)	Tank Use		User
equ_usr_desc_2	char(20)	Ladder Specs.		User
equ_usr_desc_3	char(20)	Width		User
equ_usr_desc_4	char(20)	Length		User
equ_usr_desc_6	char(20)	Diameter		User
equ_usr_desc_7	char(20)	Height		User

Equipfil (Continued)

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_8	char(20)	Bottom Elev.		User
equ_usr_desc_9	char(20)	Top Elev.		User
equ_usr_desc_10	char(20)	Capacity (Gal.)		User
equ_usr_desc_16	char(20)	Foundation Type		User
equ_usr_desc_18	char(20)	Sample Tap		User
equ_usr_desc_19	char(20)	Lower Lift Pump		User
equ_usr_desc_20	char(20)	Upper Lift Pump		User
equ_usr_desc_21	char(20)	Year Installed		User
equ_usr_desc_23	char(20)	Storage Class		User
equ_usr_desc_24	char(20)	Surface Area		User
equ_usr_desc_25	char(20)	Ring Surf. Area		User
equ_usr_desc_26	char(20)	Paved Ring (?)		User
equ_usr_desc_27	char(20)	Adequacy Rating		User

Steel Tanks

For category/sub-category TANK/STEEL, the following user defined fields are present:

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_1	char(20)	Tank Use		User
equ_usr_desc_2	char(20)	Ladder Specs.		User
equ_usr_desc_3	char(20)	Width		User
equ_usr_desc_4	char(20)	Length		User
equ_usr_desc_6	char(20)	Diameter		User
equ_usr_desc_7	char(20)	Height		User
equ_usr_desc_8	char(20)	Bottom Elev.		User
equ_usr_desc_9	char(20)	Top Elev.		User
equ_usr_desc_10	char(20)	Capacity (Gal.)		User
equ_usr_desc_16	char(20)	Foundation Type		User
equ_usr_desc_18	char(20)	Sample Tap		User
equ_usr_desc_19	char(20)	Lower Lift Pump		User
equ_usr_desc_20	char(20)	Upper Lift Pump		User
equ_usr_desc_21	char(20)	Year Installed		User
equ_usr_desc_23	char(20)	Storage Class		User
equ_usr_desc_24	char(20)	Surface Area		User
equ_usr_desc_25	char(20)	Ring Surf. Area		User
equ_usr_desc_26	char(20)	Paved Ring (?)		User
equ_usr_desc_27	char(20)	Adequacy Rating		User

Bolted Steel Tanks

For category/sub-category TANK/BLTSTL, the following user defined fields are present:

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_1	char(20)	Tank Use		User
equ_usr_desc_2	char(20)	Ladder Specs.		User
equ_usr_desc_3	char(20)	Width		User
equ_usr_desc_4	char(20)	Length		User
equ_usr_desc_6	char(20)	Diameter		User
equ_usr_desc_7	char(20)	Height		User
equ_usr_desc_8	char(20)	Bottom Elev.		User
equ_usr_desc_9	char(20)	Top Elev.		User
equ_usr_desc_10	char(20)	Capacity (Gal.)		User
equ_usr_desc_16	char(20)	Foundation Type		User
equ_usr_desc_18	char(20)	Sample Tap		User
equ_usr_desc_19	char(20)	Lower Lift Pump		User
equ_usr_desc_20	char(20)	Upper Lift Pump		User
equ_usr_desc_21	char(20)	Year Installed		User
equ_usr_desc_23	char(20)	Storage Class		User
equ_usr_desc_24	char(20)	Surface Area		User
equ_usr_desc_25	char(20)	Ring Surf. Area		User
equ_usr_desc_26	char(20)	Paved Ring (?)		User
equ_usr_desc_27	char(20)	Adequacy Rating		User

Concrete Tanks

For category/sub-category TANK/CNCRTE, the following user defined fields are present:

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_1	char(20)	Tank Use		User
equ_usr_desc_2	char(20)	Ladder Specs.		User
equ_usr_desc_3	char(20)	Width		User
equ_usr_desc_4	char(20)	Length		User
equ_usr_desc_6	char(20)	Diameter		User
equ_usr_desc_7	char(20)	Height		User
equ_usr_desc_8	char(20)	Bottom Elev.		User
equ_usr_desc_9	char(20)	Top Elev.		User
equ_usr_desc_10	char(20)	Capacity (Gal.)		User
equ_usr_desc_16	char(20)	Foundation Type		User
equ_usr_desc_18	char(20)	Sample Tap		User

Equipfil (Continued)

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_19	char(20)	Lower Lift Pump		User
equ_usr_desc_20	char(20)	Upper Lift Pump		User
equ_usr_desc_21	char(20)	Year Installed		User
equ_usr_desc_23	char(20)	Storage Class		User
equ_usr_desc_24	char(20)	Surface Area		User
equ_usr_desc_25	char(20)	Ring Surf. Area		User
equ_usr_desc_26	char(20)	Paved Ring (?)		User
equ_usr_desc_27	char(20)	Adequacy Rating		User

Redwood Tanks

For category/sub-category TANK/REDWD, the following user defined fields are present:

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_1	char(20)	Tank Use		User
equ_usr_desc_2	char(20)	Ladder Specs.		User
equ_usr_desc_3	char(20)	Width		User
equ_usr_desc_4	char(20)	Length		User
equ_usr_desc_6	char(20)	Diameter		User
equ_usr_desc_7	char(20)	Height		User
equ_usr_desc_8	char(20)	Bottom Elev.		User
equ_usr_desc_9	char(20)	Top Elev.		User
equ_usr_desc_10	char(20)	Capacity (Gal.)		User
equ_usr_desc_16	char(20)	Foundation Type		User
equ_usr_desc_18	char(20)	Sample Tap		User
equ_usr_desc_19	char(20)	Lower Lift Pump		User
equ_usr_desc_20	char(20)	Upper Lift Pump		User
equ_usr_desc_21	char(20)	Year Installed		User
equ_usr_desc_23	char(20)	Storage Class		User
equ_usr_desc_24	char(20)	Surface Area		User
equ_usr_desc_25	char(20)	Ring Surf. Area		User
equ_usr_desc_26	char(20)	Paved Ring (?)		User
equ_usr_desc_27	char(20)	Adequacy Rating		User

Flocculation Tanks

For category/sub-category TANK/FLOC, the following user defined fields are present:

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_1	char(20)	Tank Use		User
equ_usr_desc_2	char(20)	Ladder Specs.		User
equ_usr_desc_3	char(20)	Width		User
equ_usr_desc_4	char(20)	Length		User
equ_usr_desc_6	char(20)	Diameter		User
equ_usr_desc_7	char(20)	Height		User
equ_usr_desc_8	char(20)	Bottom Elev.		User
equ_usr_desc_9	char(20)	Top Elev.		User
equ_usr_desc_10	char(20)	Capacity (Gal.)		User
equ_usr_desc_16	char(20)	Foundation Type		User
equ_usr_desc_18	char(20)	Sample Tap		User
equ_usr_desc_19	char(20)	Lower Lift Pump		User
equ_usr_desc_20	char(20)	Upper Lift Pump		User
equ_usr_desc_21	char(20)	Year Installed		User
equ_usr_desc_23	char(20)	Storage Class		User
equ_usr_desc_24	char(20)	Surface Area		User
equ_usr_desc_25	char(20)	Ring Surf. Area		User
equ_usr_desc_26	char(20)	Paved Ring (?)		User
equ_usr_desc_27	char(20)	Adequacy Rating		User

Altitude Diaphragm Valves

For category/sub-category VALVE/ALTDIA, the following user defined fields are present:

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_1	char(20)	Manufacturer		User
equ_usr_desc_3	char(20)	Type		User
equ_usr_desc_5	char(20)	Size		User
equ_usr_desc_7	char(20)	Pilot Type		User
equ_usr_desc_9	char(20)	Pilot Make		User
equ_usr_desc_11	char(20)	Pressure In		User
equ_usr_desc_13	char(20)	Pressure Out		User

Diaphragm Valves

For category/sub-category VALVE/DIAPH, the following user defined fields are present:

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_1	char(20)	Manufacturer		User
equ_usr_desc_3	char(20)	Type		User
equ_usr_desc_5	char(20)	Size		User
equ_usr_desc_7	char(20)	Pilot Type		User
equ_usr_desc_9	char(20)	Pilot Make		User
equ_usr_desc_11	char(20)	Pressure In		User
equ_usr_desc_13	char(20)	Pressure Out		User
equ_usr_desc_16	char(20)	Catalog #		User
equ_usr_desc_17	char(20)	Kit #		User
equ_usr_desc_18	char(20)	Volts		User
equ_usr_desc_19	char(20)	Limit Switch		User
equ_usr_desc_20	char(20)	Limit SW Cat #		User
equ_usr_desc_21	char(20)	Limit SW Ser #		User
equ_usr_desc_23	char(20)	Coil #		User

Potable Water Valves

For category/sub-category VALVE/POTABL, the following user defined fields are present:

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_1	char(20)	Manufacturer		User
equ_usr_desc_2	char(20)	Valve Type		User
equ_usr_desc_3	char(20)	Connection Type		User
equ_usr_desc_4	char(20)	Valve Box Desc		User
equ_usr_desc_5	char(20)	Function		User
equ_usr_desc_6	char(20)	No of Turns		User
equ_usr_desc_7	char(20)	Valve Depth		User
equ_usr_desc_8	char(20)	Size in Inches		User
equ_usr_desc_9	char(20)	Open Left-Right		User
equ_usr_desc_10	char(20)	Position		User
equ_usr_desc_11	char(20)	Job Number		User
equ_usr_desc_12	char(20)	Valve Book Page		User

Tank Check Valves

For category/sub-category VALVE/TKCHK, the following user defined fields are present:

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_1	char(20)	Manufacturer		User
equ_usr_desc_5	char(20)	Size		User

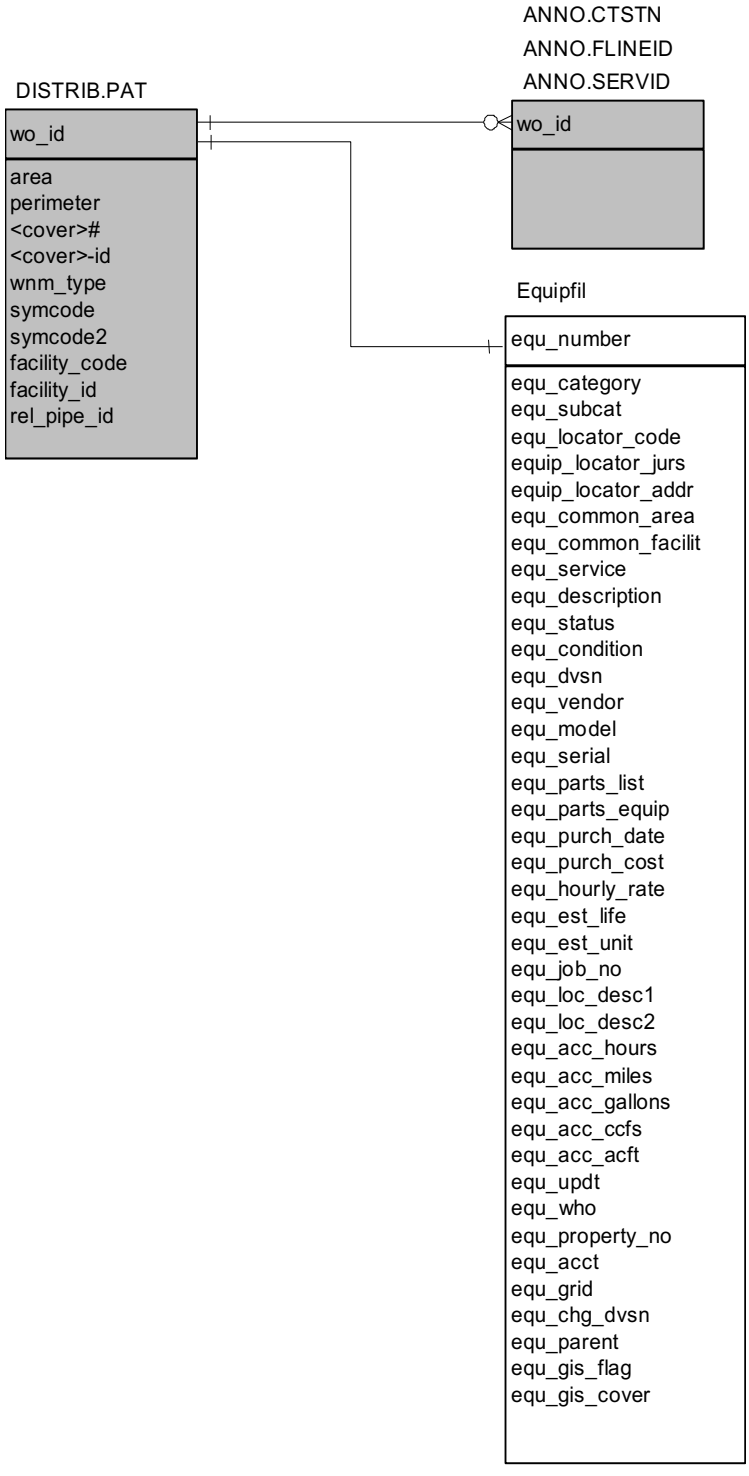
Pipe Fittings - Tee's

For the category/sub/category PIPFIT/TEE, there are no user-defined fields

Pipe Fittings - End Points

For the category/sub/category PIPFIT/ENDPT, there are no user-defined fields

DISTRIB (Points) Entity Relationship Diagram



DISTRIB (Points) Record Layouts

DISTRIB.PAT

Item Name	Data Type	Description	Domain	Input	Related Table
area	4,12,F,3	N/A	0	System	
perimeter	4,12,F,3	N/A	0	System	
<cover>#	4,5,B	Arc identifier – Generated and maintained by ARC/INFO	>0, sequential starting with 1	System	
<cover>-id	4,5,B	User-ID – Generated by ARC/INFO but user can modify	≤0≥, uniqueness not required	System	
wnm_type	16,16,C	Identifies the facility represented by the FAT entry.	WSERVICE WFIRELIN WCRTSTST	System	
symcode	4,5,B	Used to symbolize features based on data values.	>0	System	
symcode2	4,5,B	Used to symbolize features based on data values.	>0	System	
facility_code	2,2,C	MMWD code identifying the type of feature	= SV, FL, CT	System	
facility_id	9,9,C	MMWD facility id number	>0	System	
wo_id	12,12,C	Concatenation of facility_code, a dash (-), and facility_id	Unique alphanumeric string	System	EQUIPFIL
rel_pipe_id	12,12,C	The wo_id value of the main associated with the service, fireline, or CT station.	Unique alphanumeric string	System	DISTRIB.AAT

Notes:

1. The item feature_id is not being used in the MMWD implementation. Instead, the item wo_id will be used to uniquely identify features and to establish the relate environment to INFORMIX data.

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_number	char(12)	Infrastructure ID	Unique	System
equ_category	char(6)	Category	various	System
equ_subcat	char(6)	Sub-Category	various	System
equ_locator_code	char(1)	Locator Code		User
equip_locator_jurs	char(6)	Jurisdiction		User
equip_locator_addr	char(96)	Address		User
equ_common_area	char(40)	Common Site Name		User
equ_common_facilit	char(40)	Common Facility Name		User
equ_service	char(8)	Service #		User
equ_description	char(65)	Descriptn		User
equ_status	char(6)	Status		User
equ_condition	char(6)	Condition		User
equ_dvsn	char(10)	Dept Code		User
equ_vendor	char(10)	Vendor #		User
equ_model	char(30)	Model #		User
equ_serial	char(30)	Serial #		User
equ_parts_list	char(1)	Parts Lst?	y, n	User
equ_parts_equip	char(12)	Parts Lst same as		User
equ_purch_date	date	Purch Dt	Valid date	User
equ_purch_cost	decimal(10,2)	Purch Cst		User
equ_hourly_rate	decimal(6,2)	Hourly Rt		User
equ_est_life	integer	Est Life		User
equ_est_unit	char(1)	Est Life Units		User
equ_job_no	char(8)	Job		User
equ_loc_desc1	char(65)	Location		User
equ_loc_desc2	char(65)	Location Descrptn		User
		Current Readings		
equ_acc_hours	decimal(10,2)	Hours		User
equ_acc_miles	integer	Miles		User
equ_acc_gallons	integer	Gallons		User
equ_acc_ccfs	integer	CCFs		User
equ_acc_acft	integer	Acre Ft		User
equ_updt	date	Last Date Updated	Valid date	System
equ_who	char(10)	Last Update By		System
equ_property_no	char(20)	Property #		User
equ_acct	char(20)	Charge to Account		User
equ_grid	char(6)	Drop Sheet		User
equ_chg_dvsn	char(10)	Charge to Dept		User
equ_parent	char(12)	Parent ID		System
equ_gis_flag	char(1)	GIS Flag		System
equ_gis_cover	char(12)	GIS Coverage		System

Corrosion Test Stations

For the Corrosion Control Test Stations (CTS), the equipment ID's first two characters, "CS", indicate that the equipment is a CTS. The CTS category defines the type of system the CTS is on. The CTS sub-category defines the actual system number the CTS is on. The following is an example of the Category/Sub-Category combination:
Category MACP (CTS System Type: MACP = magnesium anode for asbestos concrete pipe)
Sub-Category 0336 (CTS System Number = 0336).

There are approximately 20 CTS system types, and approximately 2100 CTS System Numbers. Regardless of the CTS Category/Sub-category combination, the following user defined fields are present:

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_1	char(20)	Insulator		User
equ_usr_desc_2	char(20)	Anode Number		User
equ_usr_desc_3	char(20)	Anode Type		User
equ_usr_desc_4	char(20)	Pipe Type		User
equ_usr_desc_5	char(20)	Connects To		User

Services

For category/sub-category SERV/SERV, the following user defined fields are present:

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_1	char(20)	Area/Book		User
equ_usr_desc_2	char(20)	Fireline Xref		User
equ_usr_desc_3	char(20)	Customer#		User
equ_usr_desc_4	char(20)	Customer Name		User
equ_usr_desc_5	char(20)	Customer Phone		User
equ_usr_desc_6	char(20)	Service Pipesze		User
equ_usr_desc_7	char(20)	Service Piptyp		User
equ_usr_desc_8	char(20)	Backflow ID		User
equ_usr_desc_9	char(20)	Internal BFP		User
equ_usr_desc_10	char(20)	Resi Code		User
equ_usr_desc_11	char(20)	Dwelling Units		User
equ_usr_desc_12	char(20)	System #		User
equ_usr_desc_13	char(20)	Pressure lbs.		User
equ_usr_desc_14	char(20)	Pressure Code		User
equ_usr_desc_15	char(20)	Agreements		User
equ_usr_desc_16	char(20)	Main Size		User

Equipfil (Continued)

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_17	char(20)	Main Type		User
equ_usr_desc_18	char(20)	Cover		User
equ_usr_desc_19	char(20)	Meter to Main		User
equ_usr_desc_20	char(20)	Meter #		User
equ_usr_desc_21	char(20)	Meter Size		User
equ_usr_desc_22	char(20)	Meter Type		User
equ_usr_desc_23	char(20)	Route Seq#		User
equ_usr_desc_24	char(20)	# Registers		User
equ_usr_desc_25	char(20)	Serv Install Dt		User
equ_usr_desc_26	char(20)	# ULFT Loans		User
equ_usr_desc_27	char(20)	# ULFT Rebates		User
equ_usr_desc_28	char(20)	Last Update		User
equ_usr_desc_29	char(20)	Route Status		User
equ_usr_desc_30	char(20)	Last Reading(s)		User

Fire Lines

For category/sub-category SERV/FLINE, the following user defined fields are present:

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_1	char(20)	Area/Book		User
equ_usr_desc_2	char(20)	Service Xref		User
equ_usr_desc_3	char(20)	Customer#		User
equ_usr_desc_4	char(20)	Customer Name		User
equ_usr_desc_5	char(20)	Customer Phone		User
equ_usr_desc_6	char(20)	Service Pipesze		User
equ_usr_desc_7	char(20)	Service Piptyp		User
equ_usr_desc_8	char(20)	Backflow ID		User
equ_usr_desc_9	char(20)	Internal BFP		User
equ_usr_desc_10	char(20)	Resi Code		User
equ_usr_desc_11	char(20)	Dwelling Units		User
equ_usr_desc_12	char(20)	System #		User
equ_usr_desc_13	char(20)	Pressure lbs.		User
equ_usr_desc_14	char(20)	Pressure Code		User
equ_usr_desc_15	char(20)	Agreements		User
equ_usr_desc_16	char(20)	Main Size		User
equ_usr_desc_17	char(20)	Main Type		User
equ_usr_desc_18	char(20)	Cover		User
equ_usr_desc_19	char(20)	Meter to Main		User
equ_usr_desc_20	char(20)	Meter #		User
equ_usr_desc_21	char(20)	Meter Size		User

Equipfil (Continued)

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_22	char(20)	Meter Type		User
equ_usr_desc_23	char(20)	Route Seq#		User
equ_usr_desc_24	char(20)	# Registers		User
equ_usr_desc_25	char(20)	Serv Install Dt		User
equ_usr_desc_26	char(20)	# ULFT Loans		User
equ_usr_desc_27	char(20)	# ULFT Rebates		User
equ_usr_desc_28	char(20)	Last Update		User
equ_usr_desc_29	char(20)	Route Status		User
equ_usr_desc_30	char(20)	Last Reading(s)		User

RECYCLED LAYER

Description
This layer contains recycled water mains and associated node features and annotation. The facilities uniquely defined in the WOS for this layer are mains, valves, and, hydrants. In the future all types of features that are present in the DISTRIB layer will also be uniquely defined in this layer. There are no polygon features in this layer. Each INFO table will contain an item called *facility_code*. This item contains a two-character code, that when concatenated with a dash (-), and the item *facility_id,* will uniquely identify the feature. This concatenation is stored in the item *wo_id*. The item *wo_id* is equivalent to the fields' *equ_number* and *net_number* found in the INFORMIX EQUIPFIL and NETWORKS files respectively. The first two characters of these fields will contain the characters in the INFO table item *facility_code*.

Coverage Characteristics
Precision: double
Units: feet
Projection: State Plane

Feature Classes
Arcs
Nodes
Annotation

RECYCLED

Arcs	Nodes	Points
Mains (PR)	End Point (EP)	Service (SV)
	Recycled Hydrant (HR)	Fireline (FL)
	Large Meter (MD)	Corrosion Test Station (CS)
	Pump Station (PS)	
	Check Valve (RC)	
	Relief Valve (RF)	
	Regulator (RG)	
	Tee (TE)	
	Water Tank (TK)	
	Recycled Valve (VR)	
	Flocculent Tank (TP)	

Currently the District is only maintaining records of valves and hydrants in the recycled layer. MMWD'S GIS Edit module will be customized to allow the spatial editing of the other features should MMWD elect to represent them in the GIS.

Arcs

INFO Feature Attribute Table(s)
RECYCLED.AAT – Recycled water network arcs
INFORMIX Master File -
NETWORKS – Network Master File

WNM_TYPE – WRMAIN
FACILITY_CODE – PR
INFO Related Table(s)
None
INFORMIX Related File(s)
Category/Subcategory: MAIN/RCYCLD – Distribution Pipe/ Recycled water

Nodes

Feature Attribute Table(s)
RECYCLED.NAT –Recycled water network nodes
INFORMIX Related File(s)
EQUIPFIL: – Equipment Master File

WNM_TYPE – WRFIREHY
FACILITY_CODE – HR
INFO Related Table(s)
WRFIREHY.DAT –Recycled water fire hydrants
INFORMIX Related File(s)
None

WNM_TYPE(s) – WRMDMETE

FACILITY_CODE – MD
INFO Related Table(s)
None
INFORMIX Category/Subcategory: METERS/SYSTEM – Mainline system meters
XMITS/FLOWS – Large flow meter transmitters

WNM_TYPE(s) – WRPUMPST
FACILITY_CODE – PS
INFO Related Tables
None
INFORMIX Category/Subcategory: PUMP/STATN – Pump stations
WNM_TYPE(s) – WRTANK
FACILITY_CODE – TK (tanks, steel tanks, bolted steel tanks, concrete tanks, redwood tanks)
TP (flocculation tanks)
INFO Related Tables
None
INFORMIX Category/Subcategory: TANK/TANK – Tanks
TANK/STEEL – Steel tanks
TANK/BLTSTL – Bolted steel tanks
TANK/CNCRTE – Concrete tanks
TANK/REDWD – Redwood tanks
TANK/FLOC – Flocculation tanks

WNM_TYPE(s) – WRVALVE
FACILITY_CODE – RC (tank check valves)
VR (recycled valve)
RG, RF (altitude diaphragm valve)
RG, RF (diaphragm valves)
INFO Related Tables
None
INFORMIX Category/Subcategory: VALVE/ALTDIA – Altitude diaphragm valves
VALVE/DIAPH – Diaphragm valves
VALVE/POTABL – Potable water valves
VALVE/TKCHK – Tank check valves

WNM_TYPE(s) – WRPIPEFI
FACILITY_CODE – EP (End point), TE (Tee)
INFO Related Tables
None
INFORMIX Category/Subcategory: None

Points

Feature Attribute Table(s)
DISTRIB.PAT – Non-recycled water network points
INFORMIX Related File(s)

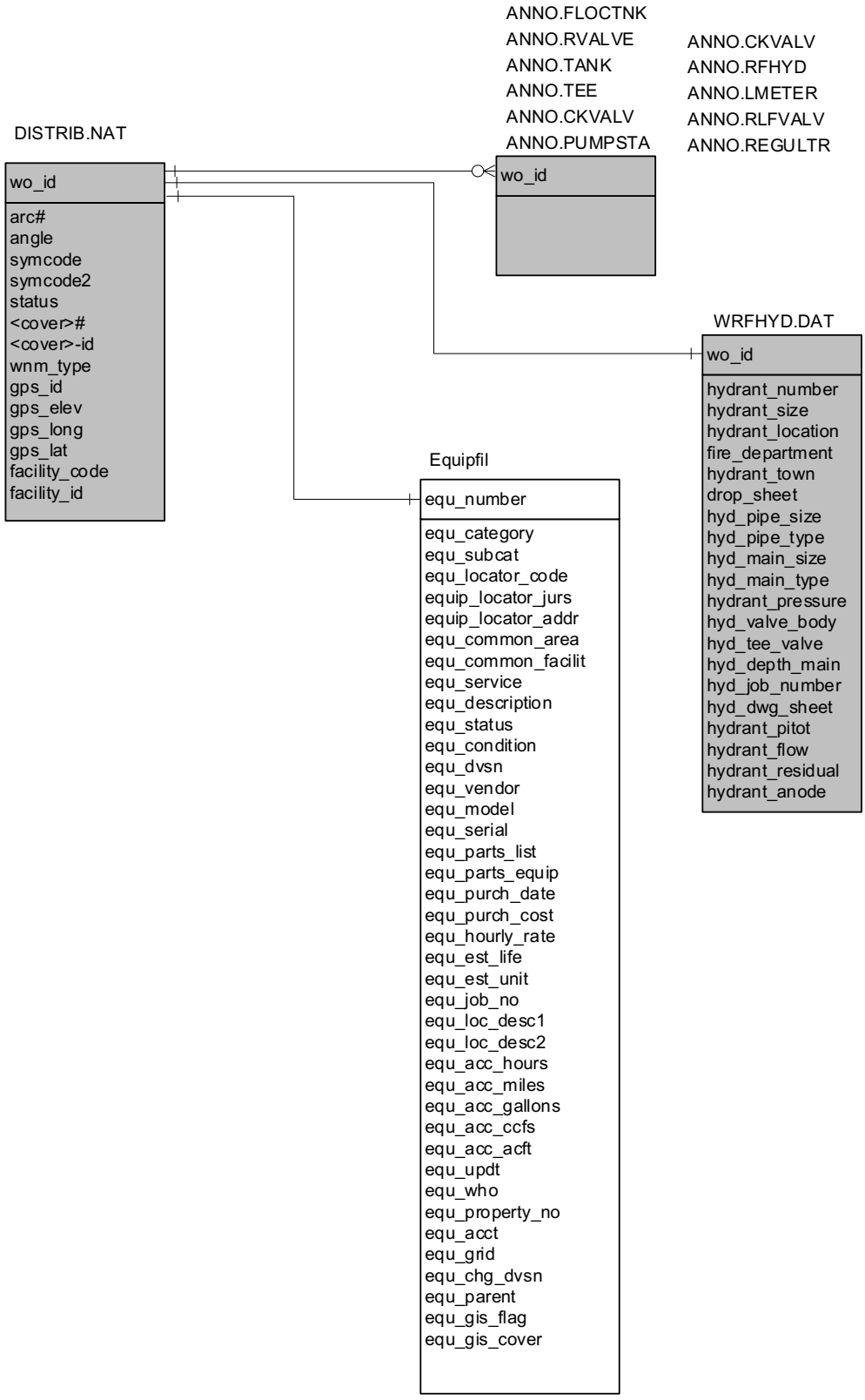
EQUIPFIL: – Equipment Master File

WNM_TYPE – WRCRTSTS
FACILITY_CODE – CS
INFO Related Table(s):
None
INFORMIX Category/Subcategory: Multiple (See File Definitions)

WNM_TYPE – WRSERVIC
FACILITY_CODE – SV
INFO Related Table(s)
None
INFORMIX Category/Subcategory: SERV/SERV

WNM_TYPE – WRFIRELI
FACILITY_CODE – FL
INFO Related Table(s)
None
INFORMIX Category/Subcategory: SERV/FLINE

RECYCLED (Arcs) Entity Relationship Diagram



RECYCLED (Arcs) Record Layouts

RECYCLED.AAT

Item Name	Data Type	Description	Domain	Input	Related Table
fnode#	4,5,B	From-node internal number Starting point of arc	>0	System	
tnode#	4,5,B	To-node internal number Ending point of arc	>0	System	
lpoly	4,5,B	Left polygon if only a line coverage – Set to zero	≥0	System	
rpoly	4,5,B	Right polygon, if only a line coverage – Set to zero	≥0	System	
length	8,18,F,5	Units in coverage units – Double precision	≥0	System	
<cover>#	4,5,B	Arc identifier – Generated and maintained by ARC/INFO	>0, sequential starting with 1	System	
<cover>-id	4,5,B	User-ID – Generated by ARC/INFO but user can modify	≤0≥, uniqueness not required	System	
wnm_type	16,16,C	Identifies the facility represented by the FAT entry.	WRMAIN	System	
symcode	4,5,B	Used to symbolize features based on data values.	>0	System	
symcode2	4,5,B	Used to symbolize features based on data values.	>0	System	
facility_code	2,2,C	MMWD code identifying the type of feature	=PR	System	
facility_id	9,9,C	MMWD facility id number	>0	System	
wo_id	12,12,C	Concatenation of facility_code, a dash (-), and facility_id	Unique alphanumeric string	System	network

Notes:
1. The item feature_id is not being used in the MMWD implementation. Instead, the item wo_id will be used to uniquely identify features and to establish the relate environment to INFORMIX data.

Network

Internal Field Name	Field Type	Field Label	Domain	Input
net_number	char(12)	Network ID	Unique	System
net_from_id	char(12)	Start ID		System
net_to_id	char(12)	End ID		System
net_category	char(6)	Category	Main	System
net_subcat	char(6)	Sub-Category	Rcycld	System
net_locator_code	char(1)	Locator Code		User
net_locator_jurs	char(6)	Jurisdiction		User
net_locator_addres	char(96)	Address		User
net_common_area	char(40)	Common Site Name		User
net_common_facilit	char(40)	Common Facility Name		User
net_description	char(65)	Descriptn		User
net_status	char(6)	Status		User
net_condition	char(6)	Condition		User
net_dvsn	char(10)	Dept Code		User
net_zone	char(6)	Zone		User
net_force_grav	char(1)	Forc/Grav		User
net_pressure	char(10)	Pressure		User
net_grade	smallint	% Grade		User
net_est_life	integer	Est Life		User
net_est_unit	char(1)	Est Life Units		User
net_chg_dvsn	char(10)	Charge To Dept.		User
net_acct	char(20)	Charge To Account		User
net_install_date	date	Install Dt	Valid date	User
net_size	decimal(7,2)	Size	Valid size	User
net_length	decimal(7,2)	Length		User
net_matl	char(20)	Material	Valid material	User
net_job_no	char(8)	Job Numbr		User
net_loc_desc1	char(65)	Location		User
net_loc_desc2	char(65)	Location Descriptn		User
net_updt	date	Last Date Updated		System
net_who	char(10)	Last Update By		System
net_grid	char(6)	Drop Sheet		User
net_parent	char(12)	Parent ID		System
net_gis_flag	char(1)	GIS Flag		System
net_gis_cover	char(12)	GIS Coverage		System

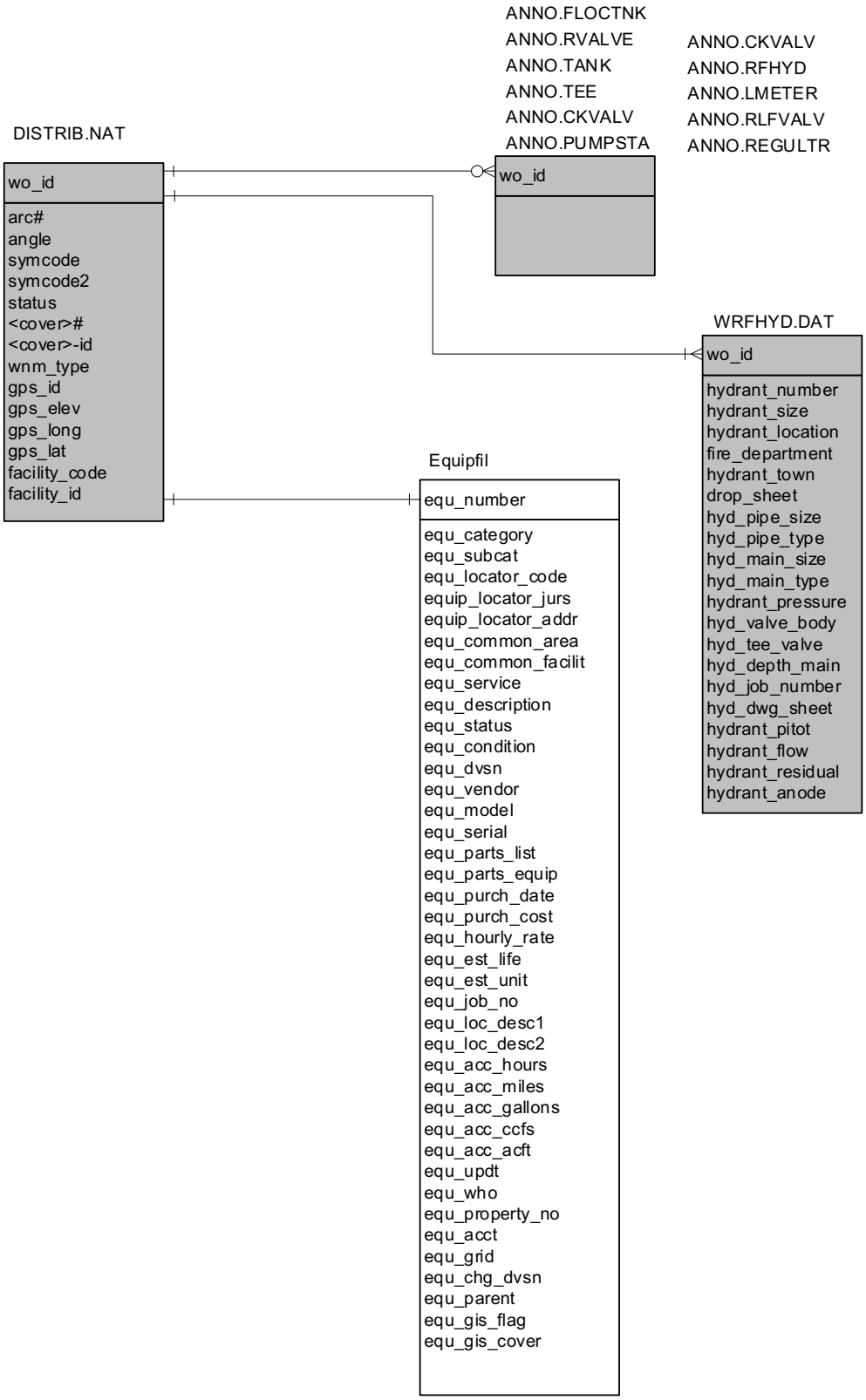
Recycled Mains

For category/sub-category MAIN/RCYCLD, the following user defined fields are present:

Network

Internal Field Name	Field Type	Field Label	Domain	Input
net_usr_desc_1	char(20)	Type		User
net_usr_desc_2	char(20)	Friction Factor		User
net_usr_desc_3	char(20)	Depth Buried		User
net_usr_desc_4	char(20)	Cover		User
net_usr_desc_5	char(20)	Corrosion Protection		User
net_usr_desc_6	char(20)	Cathodic Id		User
net_usr_desc_7	char(20)	Design Pressure		User

RECYCLED (Nodes) Entity Relationship Diagram



RECYCLED (Nodes) Record Layouts

RECYCLED.NAT

Item Name	Data Type	Description	Domain	Input	Related Table
arc#	4,5,B	Arc internal number - Generated and maintained by ARC/INFO	>0	System	
<cover>#	4,5,B	Arc identifier – Generated and maintained by ARC/INFO	>0, sequential starting with 1	System	
<cover>-id	4,5,B	User-ID – Generated by ARC/INFO but user can modify	≤0≥, uniqueness not required	System	
wnm_type	16,16,C	Identifies the facility represented by the FAT entry.	WRFIREHY WRVALVE WRMDMETE WRPUMPST WRVALVE WRPIPEFI	System	
angle	4,4,I	Used to define symbol display angle	≥360	System/ User	
symcode	4,5,B	Used to symbolize features based on data values.	>0	System	
symcode2	4,5,B	Used to symbolize features based on data values.	>0	System	
gps_id	7,7,I	Identification assigned to the node if a GPS record exists for the feature represented by the node.	Unique number	User	
gps_elev	8,9,N,2	Elevation measured by GPS equipment.	≥0	User	
gps_long	8,9,N,2	Longitude measured by GPS equipment.	≥0	User	
gps_lat	8,9,N,2	Latitude measured by GPS equipment.	≥0	User	
facility_code	2,2,C	MMWD code identifying the type of feature	= VR, HR EP, MD, PS, RC, RF, RG, TE, TK, TP	System	
facility_id	9,9,C	MMWD facility id number	>0	System	
wo_id	12,12,C	Concatenation of facility_code, a dash (-), and facility_id	Unique alphanumeric string	System	EQUIPFIL

Notes:
1. The item feature_id is not being used in the MMWD implementation. Instead, the item wo_id will be used to uniquely identify features and to establish the relate environment to INFORMIX data.

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_number	char(12)	Infrastructure ID	Unique	System
equ_category	char(6)	Category	valve	System
equ_subcat	char(6)	Sub-Category	rcycld	System
equ_locator_code	char(1)	Locator Code		User
equip_locator_jurs	char(6)	Jurisdiction		User
equip_locator_addr	char(96)	Address		User
equ_common_area	char(40)	Common Site Name		User
equ_common_facilit	char(40)	Common Facility Name		User
equ_service	char(8)	Service #		User
equ_description	char(65)	Descriptn		User
equ_status	char(6)	Status		User
equ_condition	char(6)	Condition		User
equ_dvsn	char(10)	Dept Code		User
equ_vendor	char(10)	Vendor #		User
equ_model	char(30)	Model #		User
equ_serial	char(30)	Serial #		User
equ_parts_list	char(1)	Parts Lst?	y, n	User
equ_parts_equip	char(12)	Parts Lst same as		User
equ_purch_date	date	Purch Dt	Valid date	User
equ_purch_cost	decimal(10,2)	Purch Cst		User
equ_hourly_rate	decimal(6,2)	Hourly Rt		User
equ_est_life	integer	Est Life		User
equ_est_unit	char(1)	Est Life Units		User
equ_job_no	char(8)	Job		User
equ_loc_desc1	char(65)	Location		User
equ_loc_desc2	char(65)	Location Descrptn		User
		Current Readings		
equ_acc_hours	decimal(10,2)	Hours		User
equ_acc_miles	integer	Miles		User
equ_acc_gallons	integer	Gallons		User
equ_acc_ccfs	integer	CCFs		User
equ_acc_acft	integer	Acre Ft		User
equ_updt	date	Last Date Updated	Valid date	System
equ_who	char(10)	Last Update By		System
equ_property_no	char(20)	Property #		User
equ_acct	char(20)	Charge to Account		User
equ_grid	char(6)	Drop Sheet		User
equ_chg_dvsn	char(10)	Charge to Dept		User
equ_parent	char(12)	Parent ID		System
equ_gis_flag	char(1)	GIS Flag		System
equ_gis_cover	char(12)	GIS Coverage		System

Recycled Hydrants

Recycled hydrant data is stored in the WRFIREHY_DAT INFORMIX table as shown below:

WRFIREHY_DAT

Item Name	Data Type	Description	Domain	Input
wo_id	12,12,C	Concatenation of facility_code, a dash (-), and facility_id	Unique alphanumeric string	System
hydrant_number	5,5,C	Usually a 4 digit number. May end with an 'F' indicating that the hydrant is a fireline.		User
hydrant_size	4,4,C	The size of the hydrant in inches		User
hydrant_location	55,55,C	Property address where the hydrant is located		User
fire_department	12,12,C	Fire department that has jurisdiction where the hydrant is located.		User
hydrant_town	15,15,C	City/town where the hydrant is located.		User
drop_sheet	5,5,C	The drop map sheet and drop map number.		
hyd_pipe_size	2,2,I	The pipe size in inches		User
hyd_pipe_type	8,8,C	Code that defines the hydrant pipe type		User
hyd_main_size	3,3,I	The size of the main, in inches, feeding the hydrant		User
hyd_main_type	6,6,C	The type of main feeding the hydrant		User
hydrant_pressure	3,3,I	Pressure in pounds per square in.		User
hyd_valve_body	6,6,C	The distance between the valve and body in feet and inches.		User
hyd_valve_tee	6,6,C	The distance between the valve and tee in feet and inches.		User
hyd_depth_main	5,5,C	Depth of the main serving the hydrant in feet and inches		User
hyd_job_number	8,8,C	Job number		User
hyd_dwg_sheet	2,2,I	Sheet number of job		
hydrant_pitot	6,6,I	Pitot gauge reading		User
hyd_flow	4,4,I	Flow in gallons per minute		User
hyd_residual	4,4,I	Water pressure when hydrant is operating		User
hydrant_anode	1,1,C	Defines if an anode is installed	Y, N	User

System Meters

For category/sub-category METERS/SYSTEM, the following user defined fields are present:

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_1	char(20)	Size		User
equ_usr_desc_2	char(20)	Make		User
equ_usr_desc_4	char(20)	Registration		User
equ_usr_desc_5	char(20)	Read Type		User
equ_usr_desc_6	char(20)	Gears		User
equ_usr_desc_8	char(20)	Power Supply		User
equ_usr_desc_9	char(20)	Scaled Output		User
equ_usr_desc_12	char(20)	MT Flange Shape		User
equ_usr_desc_13	char(20)	# of Bolts		User
equ_usr_desc_16	char(20)	Min Forward Flw		User
equ_usr_desc_17	char(20)	Avg Forward Flw		User
equ_usr_desc_18	char(20)	Max Forward Flw		User
equ_usr_desc_20	char(20)	Min Reverse Flw		User
equ_usr_desc_21	char(20)	Avg Reverse Flow		User
equ_usr_desc_22	char(20)	Max Reverse Flow		User

Large Flow Meter Transmitters

For category/sub-category XMITS/FLOWS, the following user defined fields are present:

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_1	char(20)	Manufacturer		User
equ_usr_desc_4	char(20)	Part #		User
equ_usr_desc_5	char(20)	Range		User
equ_usr_desc_6	char(20)	Accuracy		User
equ_usr_desc_7	char(20)	Meter Size		User
equ_usr_desc_8	char(20)	Calib. Cconstant		User
equ_usr_desc_9	char(20)	Fullscale Flow		User
equ_usr_desc_10	char(20)	Gallons/Pulse		User
equ_usr_desc_16	char(20)	Gears		User
equ_usr_desc_17	char(20)	MT Flange Shape		User
equ_usr_desc_18	char(20)	# of Bolts		User

Pump Stations

For category/sub-category PUMP/STATN, the following user defined fields are present:

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_1	char(20)	PG&E Acct#		User
equ_usr_desc_2	char(20)	Type of Com.		User
equ_usr_desc_3	char(20)	Primary Volt		User
equ_usr_desc_4	char(20)	Service Size		User
equ_usr_desc_5	char(20)	Main Dis		User
equ_usr_desc_6	char(20)	Line Volts:		User
equ_usr_desc_7	char(20)	A/B		User
equ_usr_desc_8	char(20)	A/C		User
equ_usr_desc_9	char(20)	B/C		User
equ_usr_desc_11	char(20)	Classification		User
equ_usr_desc_12	char(20)	Number Pumps		User
equ_usr_desc_13	char(20)	Pumping Cap.		User
equ_usr_desc_14	char(20)	Frame Construct		User
equ_usr_desc_15	char(20)	Siding Type		User
equ_usr_desc_16	char(20)	Fence Type		User
equ_usr_desc_17	char(20)	Steps Type		User
equ_usr_desc_18	char(20)	Retain Wall Typ		User
equ_usr_desc_19	char(20)	Pit/Box Type		User
equ_usr_desc_20	char(20)	Int.Drain Type		User
equ_usr_desc_21	char(20)	Ext. Drain Type		User
equ_usr_desc_22	char(20)	Roof Typ/Gutter		User
equ_usr_desc_23	char(20)	Door Specs/MFG		User
equ_usr_desc_24	char(20)	Window/Vent MFG		User
equ_usr_desc_25	char(20)	Paved Site		User
equ_usr_desc_26	char(20)	Sec. Cod Req'd		User

Tanks

For category/sub-category TANK/TANK, the following user defined fields are present:

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_1	char(20)	Tank Use		User
equ_usr_desc_2	char(20)	Ladder Specs.		User
equ_usr_desc_3	char(20)	Width		User
equ_usr_desc_4	char(20)	Length		User
equ_usr_desc_6	char(20)	Diameter		User
equ_usr_desc_7	char(20)	Height		User

Equipfil (Continued)

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_8	char(20)	Bottom Elev.		User
equ_usr_desc_9	char(20)	Top Elev.		User
equ_usr_desc_10	char(20)	Capacity (Gal.)		User
equ_usr_desc_16	char(20)	Foundation Type		User
equ_usr_desc_18	char(20)	Sample Tap		User
equ_usr_desc_19	char(20)	Lower Lift Pump		User
equ_usr_desc_20	char(20)	Upper Lift Pump		User
equ_usr_desc_21	char(20)	Year Installed		User
equ_usr_desc_23	char(20)	Storage Class		User
equ_usr_desc_24	char(20)	Surface Area		User
equ_usr_desc_25	char(20)	Ring Surf. Area		User
equ_usr_desc_26	char(20)	Paved Ring (?)		User
equ_usr_desc_27	char(20)	Adequacy Rating		User

Steel Tanks

For category/sub-category TANK/STEEL, the following user defined fields are present:

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_1	char(20)	Tank Use		User
equ_usr_desc_2	char(20)	Ladder Specs.		User
equ_usr_desc_3	char(20)	Width		User
equ_usr_desc_4	char(20)	Length		User
equ_usr_desc_6	char(20)	Diameter		User
equ_usr_desc_7	char(20)	Height		User
equ_usr_desc_8	char(20)	Bottom Elev.		User
equ_usr_desc_9	char(20)	Top Elev.		User
equ_usr_desc_10	char(20)	Capacity (Gal.)		User
equ_usr_desc_16	char(20)	Foundation Type		User
equ_usr_desc_18	char(20)	Sample Tap		User
equ_usr_desc_19	char(20)	Lower Lift Pump		User
equ_usr_desc_20	char(20)	Upper Lift Pump		User
equ_usr_desc_21	char(20)	Year Installed		User
equ_usr_desc_23	char(20)	Storage Class		User
equ_usr_desc_24	char(20)	Surface Area		User
equ_usr_desc_25	char(20)	Ring Surf. Area		User
equ_usr_desc_26	char(20)	Paved Ring (?)		User
equ_usr_desc_27	char(20)	Adequacy Rating		User

Bolted Steel Tanks

For category/sub-category TANK/BLTSTL, the following user defined fields are present:

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_1	char(20)	Tank Use		User
equ_usr_desc_2	char(20)	Ladder Specs.		User
equ_usr_desc_3	char(20)	Width		User
equ_usr_desc_4	char(20)	Length		User
equ_usr_desc_6	char(20)	Diameter		User
equ_usr_desc_7	char(20)	Height		User
equ_usr_desc_8	char(20)	Bottom Elev.		User
equ_usr_desc_9	char(20)	Top Elev.		User
equ_usr_desc_10	char(20)	Capacity (Gal.)		User
equ_usr_desc_16	char(20)	Foundation Type		User
equ_usr_desc_18	char(20)	Sample Tap		User
equ_usr_desc_19	char(20)	Lower Lift Pump		User
equ_usr_desc_20	char(20)	Upper Lift Pump		User
equ_usr_desc_21	char(20)	Year Installed		User
equ_usr_desc_23	char(20)	Storage Class		User
equ_usr_desc_24	char(20)	Surface Area		User
equ_usr_desc_25	char(20)	Ring Surf. Area		User
equ_usr_desc_26	char(20)	Paved Ring (?)		User
equ_usr_desc_27	char(20)	Adequacy Rating		User

Concrete Tanks

For category/sub-category TANK/CNCRTE, the following user defined fields are present:

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_1	char(20)	Tank Use		User
equ_usr_desc_2	char(20)	Ladder Specs.		User
equ_usr_desc_3	char(20)	Width		User
equ_usr_desc_4	char(20)	Length		User
equ_usr_desc_6	char(20)	Diameter		User
equ_usr_desc_7	char(20)	Height		User
equ_usr_desc_8	char(20)	Bottom Elev.		User
equ_usr_desc_9	char(20)	Top Elev.		User
equ_usr_desc_10	char(20)	Capacity (Gal.)		User
equ_usr_desc_16	char(20)	Foundation Type		User
equ_usr_desc_18	char(20)	Sample Tap		User

Equipfil (Continued)

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_19	char(20)	Lower Lift Pump		User
equ_usr_desc_20	char(20)	Upper Lift Pump		User
equ_usr_desc_21	char(20)	Year Installed		User
equ_usr_desc_23	char(20)	Storage Class		User
equ_usr_desc_24	char(20)	Surface Area		User
equ_usr_desc_25	char(20)	Ring Surf. Area		User
equ_usr_desc_26	char(20)	Paved Ring (?)		User
equ_usr_desc_27	char(20)	Adequacy Rating		User

Redwood Tanks

For category/sub-category TANK/REDWD, the following user defined fields are present:

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_1	char(20)	Tank Use		User
equ_usr_desc_2	char(20)	Ladder Specs.		User
equ_usr_desc_3	char(20)	Width		User
equ_usr_desc_4	char(20)	Length		User
equ_usr_desc_6	char(20)	Diameter		User
equ_usr_desc_7	char(20)	Height		User
equ_usr_desc_8	char(20)	Bottom Elev.		User
equ_usr_desc_9	char(20)	Top Elev.		User
equ_usr_desc_10	char(20)	Capacity (Gal.)		User
equ_usr_desc_16	char(20)	Foundation Type		User
equ_usr_desc_18	char(20)	Sample Tap		User
equ_usr_desc_19	char(20)	Lower Lift Pump		User
equ_usr_desc_20	char(20)	Upper Lift Pump		User
equ_usr_desc_21	char(20)	Year Installed		User
equ_usr_desc_23	char(20)	Storage Class		User
equ_usr_desc_24	char(20)	Surface Area		User
equ_usr_desc_25	char(20)	Ring Surf. Area		User
equ_usr_desc_26	char(20)	Paved Ring (?)		User
equ_usr_desc_27	char(20)	Adequacy Rating		User

Flocculation Tanks

For category/sub-category TANK/FLOC, the following user defined fields are present:

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_1	char(20)	Tank Use		User
equ_usr_desc_2	char(20)	Ladder Specs.		User
equ_usr_desc_3	char(20)	Width		User
equ_usr_desc_4	char(20)	Length		User
equ_usr_desc_6	char(20)	Diameter		User
equ_usr_desc_7	char(20)	Height		User
equ_usr_desc_8	char(20)	Bottom Elev.		User
equ_usr_desc_9	char(20)	Top Elev.		User
equ_usr_desc_10	char(20)	Capacity (Gal.)		User
equ_usr_desc_16	char(20)	Foundation Type		User
equ_usr_desc_18	char(20)	Sample Tap		User
equ_usr_desc_19	char(20)	Lower Lift Pump		User
equ_usr_desc_20	char(20)	Upper Lift Pump		User
equ_usr_desc_21	char(20)	Year Installed		User
equ_usr_desc_23	char(20)	Storage Class		User
equ_usr_desc_24	char(20)	Surface Area		User
equ_usr_desc_25	char(20)	Ring Surf. Area		User
equ_usr_desc_26	char(20)	Paved Ring (?)		User
equ_usr_desc_27	char(20)	Adequacy Rating		User

Altitude Diaphragm Valves

For category/sub-category VALVE/ALTDIA, the following user defined fields are present:

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_1	char(20)	Manufacturer		User
equ_usr_desc_3	char(20)	Type		User
equ_usr_desc_5	char(20)	Size		User
equ_usr_desc_7	char(20)	Pilot Type		User
equ_usr_desc_9	char(20)	Pilot Make		User
equ_usr_desc_11	char(20)	Pressure In		User
equ_usr_desc_13	char(20)	Pressure Out		User

Diaphragm Valves

For category/sub-category VALVE/DIAPH, the following user defined fields are present:

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_1	char(20)	Manufacturer		User
equ_usr_desc_3	char(20)	Type		User
equ_usr_desc_4	char(20)	Size		User
equ_usr_desc_5	char(20)	Pilot Type		User
equ_usr_desc_9	char(20)	Pilot Make		User
equ_usr_desc_11	char(20)	Pressure In		User
equ_usr_desc_13	char(20)	Pressure Out		User
equ_usr_desc_16	char(20)	Catalog #		User
equ_usr_desc_17	char(20)	Kit #		User
equ_usr_desc_18	char(20)	Volts		User
equ_usr_desc_19	char(20)	Limit Switch		User
equ_usr_desc_20	char(20)	Limit SW Cat #		User
equ_usr_desc_21	char(20)	Limit SW Ser #		User
equ_usr_desc_23	char(20)	Coil #		User

Recycled Water Valves

For category/sub-category VALVE/RCYCLD, the following user defined fields are present:

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_1	char(20)	Manufacturer		User
equ_usr_desc_2	char(20)	Valve Type		User
equ_usr_desc_3	char(20)	Connection Type		User
equ_usr_desc_4	char(20)	Valve Box Desc		User
equ_usr_desc_5	char(20)	Function		User
equ_usr_desc_6	char(20)	No of Turns		User
equ_usr_desc_7	char(20)	Valve Depth		User
equ_usr_desc_8	char(20)	Size in Inches		User
equ_usr_desc_9	char(20)	Open Left-Right		User
equ_usr_desc_10	char(20)	Position		User
equ_usr_desc_11	char(20)	Job Number		User
equ_usr_desc_12	char(20)	Valve Book Page		User

Tank Check Valves

For category/sub-category VALVE/TKCHK, the following user defined fields are present:

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_1	char(20)	Manufacturer		User
equ_usr_desc_5	char(20)	Size		User

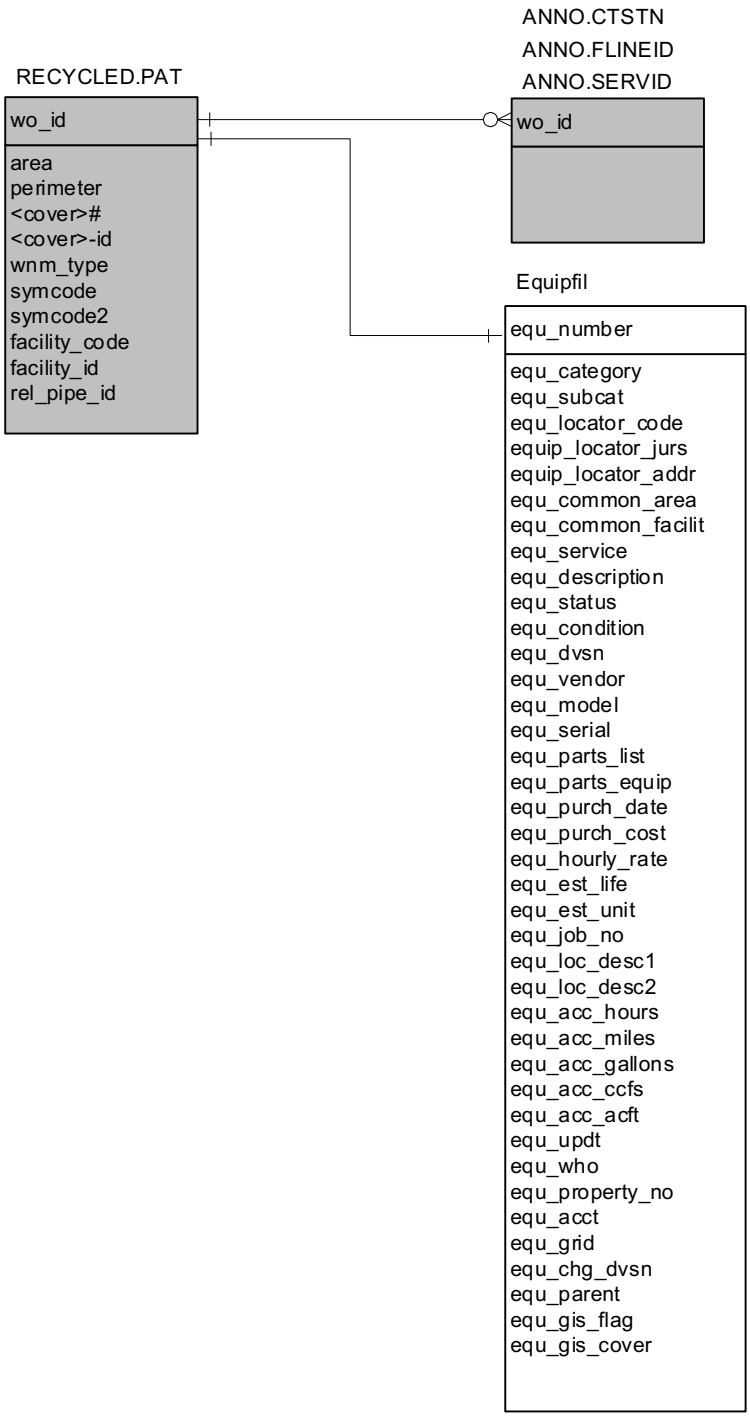
Pipe Fittings - Tee's

For the category/sub/category PIPFIT/TEE, there are no user-defined fields

Pipe Fittings - End Points

For the category/sub/category PIPFIT/ENDPT, there are no user-defined fields

Recycled (Points) Entity Relationship Diagram



Note: An EQUIPFIL table has not been defined for recycled layer point features at this time. It is present in this diagram for consistency with the previous diagrams.

RECYCLED (Points) Record Layouts

DISTRIB.PAT

Item Name	Data Type	Description	Domain	Input	Related Table
area	4,12,F,3	N/A	0	System	
perimeter	4,12,F,3	N/A	0	System	
<cover>#	4,5,B	Arc identifier – Generated and maintained by ARC/INFO	>0, sequential starting with 1	System	
<cover>-id	4,5,B	User-ID – Generated by ARC/INFO but user can modify	≤0≥, uniqueness not required	System	
wnm_type	16,16,C	Identifies the facility represented by the FAT entry.	WRSERVIC WRFIRELI WRCSTSTS	System	
symcode	4,5,B	Used to symbolize features based on data values.	>0	System	
symcode2	4,5,B	Used to symbolize features based on data values.	>0	System	
facility_code	2,2,C	MMWD code identifying the type of feature	= SV, FL, CS	System	
facility_id	9,9,C	MMWD facility id number	>0	System	
wo_id	12,12,C	Concatenation of facility_code, a dash (-), and facility_id	Unique alphanumeric string	System	EQUIPFIL
rel_pipe_id	12,12,C	The wo_id value of the main associated with the service, fireline, or CT station..	Unique alphanumeric string	System	RECYCLED.AAT

Notes:
1. The item feature_id is not being used in the MMWD implementation. Instead, the item wo_id will be used to uniquely identify features and to establish the relate environment to INFORMIX data.

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_number	char(12)	Infrastructure ID	Unique	System
equ_category	char(6)	Category	meters, xmits, pump, tank, valve	System
equ_subcat	char(6)	Sub-Category	system, flows statn, tank, steel bltstl, cncrte redwd, floc altdia, diaph, rcycld, tkchk	System
equ_locator_code	char(1)	Locator Code		User
equip_locator_jurs	char(6)	Jurisdiction		User
equip_locator_addr	char(96)	Address		User
equ_common_area	char(40)	Common Site Name		User
equ_common_facilit	char(40)	Common Facility Name		User
equ_service	char(8)	Service #		User
equ_description	char(65)	Descriptn		User
equ_status	char(6)	Status		User
equ_condition	char(6)	Condition		User
equ_dvsn	char(10)	Dept Code		User
equ_vendor	char(10)	Vendor #		User
equ_model	char(30)	Model #		User
equ_serial	char(30)	Serial #		User
equ_parts_list	char(1)	Parts Lst?	y, n	User
equ_parts_equip	char(12)	Parts Lst same as		User
equ_purch_date	date	Purch Dt	Valid date	User
equ_purch_cost	decimal(10,2)	Purch Cst		User
equ_hourly_rate	decimal(6,2)	Hourly Rt		User
equ_est_life	integer	Est Life		User
equ_est_unit	char(1)	Est Life Units		User
equ_job_no	char(8)	Job		User
equ_loc_desc1	char(65)	Location		User
equ_loc_desc2	char(65)	Location Descrptn		User
		Current Readings		
equ_acc_hours	decimal(10,2)	Hours		User
equ_acc_miles	integer	Miles		User
equ_acc_gallons	integer	Gallons		User
equ_acc_ccfs	integer	CCFs		User
equ_acc_acft	integer	Acre Ft		User
equ_updt	date	Last Date Updated	Valid date	System
equ_who	char(10)	Last Update By		System
equ_property_no	char(20)	Property #		User

Equipfil (Continued)

Internal Field Name	Field Type	Field Label	Domain	Input
equ_acct	char(20)	Charge to Account		User
equ_grid	char(6)	Drop Sheet		User
equ_chg_dvsn	char(10)	Charge To Dept		User
equ_parent	char(12)	Parent ID		System
equ_gis_flag	char(1)	GIS Flag		System
equ_gis_cover	char(12)	GIS Coverage		System

Corrosion Test Stations

For the Corrosion Control Test Stations (CTS), the equipment ID's first two characters, "CS", indicate that the equipment is a CTS. The CTS category defines the type of system the CTS is on. The CTS sub-category defines the actual system number the CTS is on. The following is an example of the Category/Sub-Category combination:
Category MACP (CTS System Type: MACP = magnesium anode for asbestos concrete pipe)
Sub-Category 0336 (CTS System Number = 0336).

There are approximately 20 CTS system types, and approximately 2100 CTS System Numbers. Regardless of the CTS Category/Sub-category combination, the following user defined fields are present:

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_1	char(20)	Insulator		User
equ_usr_desc_2	char(20)	Anode Number		User
equ_usr_desc_3	char(20)	Anode Type		User
equ_usr_desc_4	char(20)	Pipe Type		User
equ_usr_desc_5	char(20)	Connects To		User

Services

For category/sub-category SERV/SERV, the following user defined fields are present:

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_1	char(20)	Area/Book		User
equ_usr_desc_2	char(20)	Fireline Xref		User
equ_usr_desc_3	char(20)	Customer#		User
equ_usr_desc_4	char(20)	Customer Name		User
equ_usr_desc_5	char(20)	Customer Phone		User
equ_usr_desc_6	char(20)	Service Pipesize		User
equ_usr_desc_7	char(20)	Service Piptyp		User
equ_usr_desc_8	char(20)	Backflow ID		User
equ_usr_desc_9	char(20)	Internal BFP		User
equ_usr_desc_10	char(20)	Resi Code		User
equ_usr_desc_11	char(20)	Dwelling Units		User
equ_usr_desc_12	char(20)	Service #		User
equ_usr_desc_13	char(20)	Pressure lbs.		User
equ_usr_desc_14	char(20)	Pressure Code		User
equ_usr_desc_15	char(20)	Agreements		User
equ_usr_desc_16	char(20)	Main Size		User
equ_usr_desc_17	char(20)	Main Type		User
equ_usr_desc_18	char(20)	Cover		User
equ_usr_desc_19	char(20)	Meter to Main		User
equ_usr_desc_20	char(20)	Meter #		User
equ_usr_desc_21	char(20)	Meter Size		User
equ_usr_desc_22	char(20)	Meter Type		User
equ_usr_desc_23	char(20)	Route Seq#		User
equ_usr_desc_24	char(20)	# Registers		User
equ_usr_desc_25	char(20)	Serv Install Dt		User
equ_usr_desc_26	char(20)	# ULFT Loans		User
equ_usr_desc_27	char(20)	# ULFT Rebates		User
equ_usr_desc_28	char(20)	Last Update		User
equ_usr_desc_29	char(20)	Route Status		User
equ_usr_desc_30	char(20)	Last Reading(s)		User

Fire Lines

For category/sub-category SERV/FLINE, the following user defined fields are present:

Equipfil

Internal Field Name	Field Type	Field Label	Domain	Input
equ_usr_desc_1	char(20)	Area/Book		User
equ_usr_desc_2	char(20)	Fireline Xref		User
equ_usr_desc_3	char(20)	Customer#		User
equ_usr_desc_4	char(20)	Customer Name		User
equ_usr_desc_5	char(20)	Customer Phone		User
equ_usr_desc_6	char(20)	Service Pipesize		User
equ_usr_desc_7	char(20)	Service Piptyp		User
equ_usr_desc_8	char(20)	Backflow ID		User
equ_usr_desc_9	char(20)	Internal BFP		User
equ_usr_desc_10	char(20)	Resi Code		User
equ_usr_desc_11	char(20)	Dwelling Units		User
equ_usr_desc_12	char(20)	Service #		User
equ_usr_desc_13	char(20)	Pressure lbs.		User
equ_usr_desc_14	char(20)	Pressure Code		User
equ_usr_desc_15	char(20)	Agreements		User
equ_usr_desc_16	char(20)	Main Size		User
equ_usr_desc_17	char(20)	Main Type		User
equ_usr_desc_18	char(20)	Cover		User
equ_usr_desc_19	char(20)	Meter to Main		User
equ_usr_desc_20	char(20)	Meter #		User
equ_usr_desc_21	char(20)	Meter Size		User
equ_usr_desc_22	char(20)	Meter Type		User
equ_usr_desc_23	char(20)	Route Seq#		User
equ_usr_desc_24	char(20)	# Registers		User
equ_usr_desc_25	char(20)	Serv Install Dt		User
equ_usr_desc_26	char(20)	# ULFT Loans		User
equ_usr_desc_27	char(20)	# ULFT Rebates		User
equ_usr_desc_28	char(20)	Last Update		User
equ_usr_desc_29	char(20)	Route Status		User
equ_usr_desc_30	char(20)	Last Reading(s)		User

DIMENSION LAYER

Description
This layer contains dimension lines and text. There are no point or polygon features in this layer. The data for this layer resides entirely within INFO.

Coverage Characteristics
Precision: double
Units: feet
Projection: State Plane

Feature Classes
Arcs
Nodes
Annotation

Arcs

INFO Feature Attribute Table(s)
WDIMENS.AAT – Dimension arcs
INFORMIX Master File - None

WNM_TYPE – WDIMENS
FACILITY_CODE – N/A
INFO Related Table(s)
None
INFORMIX Related File(s)
None

Nodes

INFO Feature Attribute Table(s)
WDIMENS.NAT – Dimension nodes
INFORMIX Master File - None

WNM_TYPE – WDIMENS
FACILITY_CODE – N/A
INFO Related Table(s)
None
INFORMIX Related File(s)
None

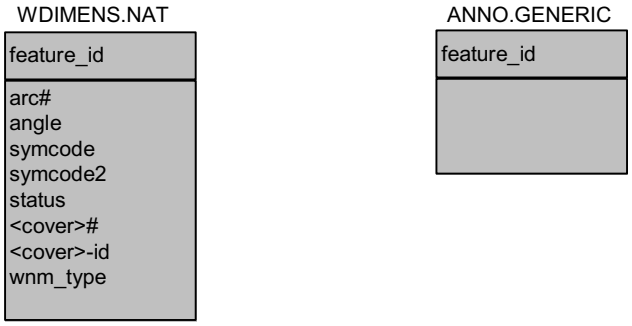
WDIMENS (Arcs) Entity Relationship Diagram

WDIMENS (Arcs) Record Layouts

WDIMENS.AAT

Item Name	Data Type	Description	Domain	Input	Related Table
fnode#	4,5,B	From-node internal number Starting point of arc	>0	System	
tnode#	4,5,B	To-node internal number Ending point of arc	>0	System	
lpoly	4,5,B	Left polygon if only a line coverage – Set to zero	≥0	System	
rpoly	4,5,B	Right polygon, if only a line coverage – Set to zero	≥0	System	
length	8,18,F,5	Units in coverage units – Double precision	≥0	System	
<cover>#	4,5,B	Arc identifier – Generated and maintained by ARC/INFO	>0, sequential starting with 1	System	
<cover>-id	4,5,B	User-ID – Generated by ARC/INFO but user can modify	≤0≥, uniqueness not required	System	
feature_id	24,24,C	Contains a combination of the workstation machine id and the date and time that the feature was created. Generated and maintained by MMWD'S Edit Module.	Unique alphanumeric string	System	
wnm_type	16,16,C	Identifies the facility represented by the FAT entry.	N/A	System	
symcode	4,5,B	Used to symbolize features based on data values.	>0	System	
symcode2	4,5,B	Used to symbolize features based on data values.	>0	System	

WDIMENS (Nodes) Entity Relationship Diagram



WDIMENS (Nodes) Record Layouts

WDIMENS.NAT

Item Name	Data Type	Description	Domain	Input	Related Table
arc#	4,5,B	Arc internal number - Generated and maintained by ARC/INFO	>0	System	
<cover>#	4,5,B	Arc identifier – Generated and maintained by ARC/INFO	>0, sequential starting with 1	System	
<cover>-id	4,5,B	User-ID – Generated by ARC/INFO but user can modify	≤0≥, uniqueness not required	System	
feature_id	24,24,C	Contains a combination of the workstation machine id and the date and time that the feature was created. Generated and maintained by MMWD'S Edit Module.	Unique alphanumeric string	System	
wnm_type	16,16,C	Identifies the facility represented by the FAT entry.	N/A	System	None
angle	4,4,I	Used to define symbol display angle	≤ 360	System/ User	
symcode	4,5,B	Used to symbolize features based on data values.	>0	System	
symcode2	4,5,B	Used to symbolize features based on data values.	>0	System	

PARCEL LAYER

Layer Name: PARCELS
Creation Date: April 1996
Created by: Marin County
Description: This layer contains parcel boundaries and parcel numbers. It is delivered to MMWD once every six month or once a year from the County of Marin in DXF format. It is translated into ARC/INFO and built as a polygon coverage.

Data Source:
Notes:

Layer Characteristics

Precision: Double
Units: Feet
Projection: State Plane

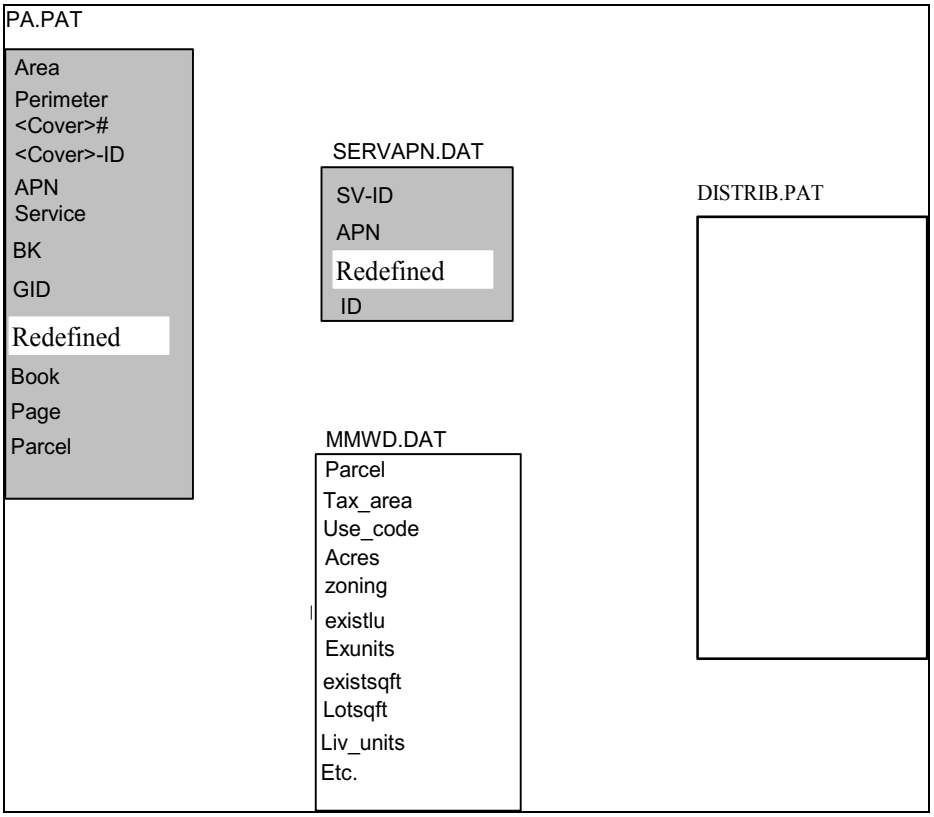
Feature Classes Polygons

INFO Feature Attribute Table(s)
PA.PAT – Non-recycled water network arcs
INFO Related Tables
PA.DAT

Layers/coverages included here are:

Layer/Coverage	Layer/File Name	Layer/File Type
Parcels	PARCELS	Poly
Parcel Attributes	PARCEL.DAT	INFO File
Service –APN File	SERVAPN.DAT	INFO File
GPS Points	GPS	Point
GPS Point Attributes	GPS.DAT	INFO File
Map Library Tile Boundaries	TILES	Poly
Tiles and Drop Sheets	TIDROPS	Poly

PARCEL (Polygons) Entity Relationship Diagram



Parcel Data Table

File Name: PARCEL.DAT
Creation Date: 05/96
Created by: County of Marin
Description:
Data Source:
Notes: This file has been renamed PARCEL.DAT so that it will match the parcel layer polygon attribute table PARCELS.PAT

PARCEL.DAT

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	ALTERNATE NAME	INDEXED?
1	PARCEL	8	8	C	-	PARC	-
9	TAX_AREA	6	6	C	-	-	
15	USE_CODE	8	3	F	0	-	
23	ACRES	8	15	F	2	-	
31	ZONING	25	25	C	-	-	
56	EXISTLU	8	3	F	0	-	
64	EXUNITS	8	11	F	1	-	
72	EXISTSQFT	8	15	F	0	-	
80	LOTSQFT	8	10	F	0	-	
88	POTLU	8	3	F	0	-	
96	POTUNITS	8	12	F	2	-	
104	POTSQFT	8	13	F	0	-	
112	LIV_UNITS	8	5	F	0	-	
120	PLANDVALUE	8	9	F	0	-	
128	PIMPRVALUE	8	9	F	0	-	
136	JUNO	8	3	F	0	-	
144	TRACT	8	7	F	0	-	
152	TRAFZONE	8	4	F	0	-	
160	PLANAREA	8	2	F	0	-	
168	COMMPLAN	8	3	F	0	-	
176	BOOK	3	3	C	-	-	
179	PAGE	5	5	C	-	-	
184	BLOCK	6	6	C	-	-	
190	LASTDATE	8	7	F	0	-	
198	LASTTYPE	4	4	C	-	-	
202	BASEYEAR	8	3	F	0	-	
210	EXEMPTION	8	9	F	0	-	
218	SENIOR	2	2	C	-	-	
220	S_NUMBER	8	8	C	-	-	
228	S_UNIT	2	2	C	-	-	
230	S_DIRECT	2	2	C	-	-	
232	S_STREET	26	26	C	-	-	
258	S_TYPE	4	4	C	-	-	
262	S_ZIP	10	10	C	-	-	
272	S_POST	2	2	C	-	-	
274	OWNER1	32	32	C	-	-	
306	OWNER2	32	32	C	-	-	
338	ADDRESS1	32	32	C	-	-	
370	ADDRESS2	32	32	C	-	-	

402	ADDRESS3	32	32	C	-	-
434	ADDRESS4	32	32	C	-	-
466	DEEDREF	10	10	C	-	-
476	DEEDDATE	8	7	F	0	-
484	TAG	11	11	C	-	-

PARCELS.PAT
==========

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	ALTERNATE NAME	INDEXED?
1	AREA	8	18	F	5	-	
9	PERIMETER	8	18	F	5	-	
17	PARCELS#	4	5	B	-	-	
21	PARCELS-ID	4	5	B	-	-	
25	PARCEL	8	8	C	-	-	
33	WNM_TYPE	16	16	C	-	-	
49	SYMCODE	4	5	B	-	-	
53	SYMCODE2	4	5	B	-	-	
	** REDEFINED ITEMS **						
25	BK	3	3	C	-	-	
28	PG	2	2	C	-	-	
30	BLK	1	1	C	-	-	
31	PCL	2	2	C	-	-	

Parcel Data Tables

File Name: MMWD.DAT
Location: /DATA/LIB/DATABASE
Creation Date: 05/96
Updated: 10/98
Created by: County of Marin
Description: Tax/Zoning attribute data from the county, to link to PARCELS.PAT.
Data Source: Marin County
Notes: This is a database file, and resides in the INFO directory within the above workspace.

MMWD.DAT
==========

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	ALTERNATE NAME	INDEXED?
1	PARCEL	8	8	C	-	-	
9	TAX_AREA	6	6	C	-	-	
15	USE_CODE	8	3	F	0	-	
23	ACRES	8	15	F	2	-	
31	DEEDREF	10	10	C	-	-	
41	DEEDDATE	6	6	C	-	-	
47	LIV_UNITS	8	8	F	0	-	
55	PLANDVALUE	8	15	F	0	-	
63	PIMPRVALUE	8	15	F	0	-	
71	LASTDATE	8	7	F	0	-	

79	LASTTYPE	4	4	C	-			-	
83	BASEYEAR	8	3	F	0			-	
91	EXEMPTION		8	9		F	0		-
99	SENIOR	2	2	C	-			-	
101	S_NUMBER		8	8		C	-		-
109	S_UNIT	2	2	C	-			-	
111	S_DIRECT	2	2	C	-			-	
113	S_STREET	26	26	C	-			-	
139	S_TYPE	4	4	C	-			-	
143	S_ZIP	10	10	C	-			-	
153	S_POST	2	2	C	-			-	
155	OWNER1	32	32	C	-			-	
187	OWNER2	32	32	C	-			-	
219	ADDRESS1	32	32	C	-			-	
251	ADDRESS2	32	32	C	-			-	
283	ADDRESS3	32	32	C	-			-	
315	ADDRESS4	32	32	C	-			-	

File Name: GEOCODES.DAT
Location: /DATA/LIB/DATABASE
Creation Date: 05/96
Updated: 10/98
Created by: County of Marin
Description: Special district county attribute data, to link to PARCELS.DAT
Data Source: Marin County
Notes: This is a database file, and resides in the INFO directory within the above workspace.

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC		ALTERNATE NAME		INDEXED?
1	PARCEL	8	8	C	-			-	
9	JUNO	8	3	F	0			-	
17	COMMPLAN		8	4		F	0		-
25	COMMUNITY		8	3		F	0		-
33	CLUBLIST	10	10	C	-			-	
43	PLANAREA	8	2	F	0			-	
51	TRACT	8	7	F	0			-	
59	TRAFZONE	8	4	F	0			-	
67	CWPAREAS		8	2		F	0		-
75	FLOODZONE		8	3		F	0		-
83	URBANSERV		8	3		F	0		-
91	SPHERES	8	3	F	0			-	
99	FIREDIST	8	4	F	0			-	
107	SANITARY	8	4	F	0			-	
115	ELEMSCHOOL		8	4		F	0		-
123	HIGHSCHOOL		8	4		F	0		-
131	WATERDIST		8	4		F	0		-
139	FAULTZONE		8	2		F	0		-
147	FLOODPLAIN		8	5		F	0		-
155	RIDGES	8	3	F	0			-	
163	PARKS	8	5	F	0			-	
171	COASTPLAN		8	3		F	0		-
179	SUPERDIST	8	2	F	0			-	
187	BFCZONE	8	4	F	0			-	

195	DAMFAIL	8	2	F	0	-
203	TAG	1	1	C	-	-
204	ALQUISTP	8	2	F	0	-

File Name: GEONAME.DAT
Location: /DATA/LIB/DATABASE
Creation Date: 05/96
Updated: 10/98
Created by: County of Marin
Description: Lookup Table (LUT) for describing county attribute info.
Data Source: Marin County
Notes: This is a database file, and resides in the INFO directory within the above workspace.

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	ALTERNATE NAME	INDEXED?
1	FIELDNAME	10	10	C	-	-	
11	GEOCODE	8	8	F	0	-	
19	DESCRIPT	44	44	C	-	-	

File Name: SERVAPN.DAT
Location: /DATA/LIB/DATABASE
Creation Date: 05/96
Updated: 10/98
Created by: HJW, MMWD, ESRI.
Description: Contains relationship information between water service points and Assessor parcel numbers (PARCEL).
Data Source: MMWD
Notes: This is a database file, and resides in the INFO directory within the above workspace.

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	ALTERNATE NAME	INDEXED?
1	FACILITY_ID	9	9	C	-	-	
10	PARCEL	8	8	C	-	-	
18	APN	10	10	C	-	-	
28	PARCEL_X	8	18	F	5	-	
36	PARCEL_Y	8	18	F	5	-	
44	SERVICE_X	8	18	F	5	-	
52	SERVICE_Y	8	18	F	5	-	
60	PARCEL_XY	40	40	C	-	-	
100	SERVICE_XY		40	40	C	-	-

GPS Points Layer

Layer Name: GPS.PAT
Creation Date:
Created by: MMWD
Description: Layer containing GPS points that were used in data adjustment process
Data Source:
Notes:

GPS.PAT
==========

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	ALTERNATE NAME	INDEXED?
1	AREA	4	12	F	3	-	
5	PERIMETER	4	12	F	3	-	
9	GPS#	4	5	B	-	-	
13	GPS-ID	4	5	B	-	-	
17	Z	16	16	N	12	-	
33	FAC	10	10	C	-	-	

GPS LAYER

File Name: GPS.DAT
Creation Date:
Created by:
Description:
Data Source:
Notes:

GPS.DAT
==========

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	ALTERNATE NAME	INDEXED?
1	GPS-ID	6	6	I	-	-	
7	Z	16	16	N	12	-	
23	FAC	10	10	C	-	-	

Z item contains elevation values of GPS points.

TILES LAYER

Coverage Name: TILES.PAT
Creation Date:
Created by:
Description: TILES coverage outlines tile boundaries. Each tile covers 16 drop sheets or MMWD map sheets.
Data Source: MMWD
Notes:

TILES.PAT
==========

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	ALTERNATE NAME	INDEXED?
1	AREA	4	12	F	3	-	
5	PERIMETER	4	12	F	3	-	
9	TILES#	4	5	B	-	-	
13	TILES-ID	4	5	B	-	-	
17	DROPMAP	4	4	C	-	-	
21	SHEET	3	3	C	-	-	

TIDROPS LAYER

Layer Name: TIDROPS.PAT
Creation Date:
Created by:
Description: Combination of tiles and drop sheets. There are 16 drop sheets per tile.
Data Source:
Notes:

TIDROPS.PAT
==========

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	ALTERNATE NAME	INDEXED?
1	AREA	4	12	F	3	-	
5	PERIMETER	4	12	F	3	-	
9	TIDROPS#	4	5	B	-	-	
13	TIDROPS-ID	4	5	B	-	-	
17	DROPMAP	4	4	C	-	-	
21	SHEET	3	3	C	-	-	
24	MAP	7	7	C	-	-	

INDEX LAYER

Layer Name: INDEX
Data location: /DATA/LIB/DATABASE
Creation Date: April 1996
Created By: Marin County
This layer contains the boundary tile coverage. Each tile is 8000 ft. by 12000 ft. Each tile can be sub-divided into 16 dropsheets.
Data Source: MMWD
Notes:

Layer Characteristics

Precision: Double
Units: Feet
Projection: State Plane

Feature Classes Polygons

INFO Feature Attribute Table(s) None.

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	ALTERNATE NAME	INDEXED?
1	AREA	8	18	F	5	-	
9	PERIMETER	8	18	F	5	-	
17	INDEX#	4	5	B	-	-	
21	INDEX-ID	4	5	B	-	-	
25	TILE-NAME	32	32	C	-	-	
57	LOCATION	128	128	C	-	-	
185	TILE	4	4	C	-	-	
189	PARCELS	1	1	C	-	-	
190	DISTRIB	1	1	C	-	-	
191	RECYCLED	1	1	C	-	-	
192	ABANDON	1	1	C	-	-	
**	REDEFINED ITEMS **						
185	ALPHA	1	1	C	-	-	
186	NUM	2	2	C	-	-	

Layer Name: DROPSHEET
Data location: /DATA/LIB/DATABASE
Creation Date: April 1996
Created By: Marin County
This layer contains the dropsheet coverage.
Each tile is 2000 by 3000 ft.
Data Source: MMWD
Notes:

Layer Characteristics

Precision: Double
Units: Feet
Projection: State Plane

Feature Classes Polygons

INFO Feature Attribute Table(s) None.

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC		ALTERNATE NAME	INDEXED?
1	AREA	4	12	F	3		-	
5	PERIMETER	4	12	F	3		-	
9	DROPSHEET#		4	5		B	-	-
13	DROPSHEET-ID		4	5		B	-	-
17	DROPMAP	4	4	C	-		-	
21	SHEET	3	3	C	-		-	
24	MAP	7	7	C	-		-	

HIEARCHICAL DICTIONARY

Below is a diagram outlining the hiearchical structure of all remaining datasets:

/data

/county

/adm administrative boundaries

cnty-line this is a coverage of the boundary of Marin County, no shoreline.

contempo_ori this is the original 2 parcels for the Contempo Marin area that we got from the county with the various trailer footprints added. We replaced this area with the parcels we digitized using the orthos and the parcels book 900 pg 1-3

countybound Another coverage of the county boundary with shoreline: doesn't match cnty-line

houseboat These are the houseboat footprints we got in the county parcel layer. We extracted these into a seperate cover since they overlapped other parcels we are concerned with and do not use any of these for water services.

mad_sfarea this is a portion of R. Gavin McGhie's USA Managed Areas Database clipped for Marin

mpa_sfarea this is a portion of R. Gavin McGhie's Marine Protected Areas Database clipped for Marin

park_bnds this is a combo of multiple park coverages for Marin used for posters, contains the major parks in Marin County

polbnd this is a coverage of the cities of Marin in raw form (from ETAK??)

polbnd2 this is the same as polbnd except it has been edited for poster use

primitives this is the primitive coverage which complements the parcels layer with right-of-ways and common area closures

quads this directory contains quad sheet corner points and quad sheet boundaries for the drg USGS images in /ortho4/images

wtrshdbnd_sp mmwd watershed boundary, stateplane nad83, taken from parcels layer (accurate)

wtrshdbnd_utm mmwd watershed boundary, utm zone 10, taken from parcels layer.

mmwd_proprt all parcels owned by MMWD, extracted from most recent parcel layer

marincnty_os all parcels owned by Marin County Open Space from

	most recent parcel layer
/archaeol	
/birds	
/census	
/censustract	1995 censustract info.
/tiger	1995 tiger line files
/cultural	
/fire	
fiel04	from Andrew Maxwell SFSU. Has database with columns rc, and flag1, flag2, flag3, and flag4 boundary of coverage extends well beyond Watershed. UTM (fiel04 relates to fire.indat, with ID# as relate item, fire.indat not found in dataset)
fign01	from Andrew Maxwell SFSU. Has database with columns rc, and flag1, flag2, flag3, and flag4 of coverage extends well beyond Watershed. UTM Only arcs and points.
firefinal	same fie104 and fign01, except clipped to watershed boundary, only no. times burned in database.
firenolakes	same as firefinal, except lake areas shown as never having burned.
polyfires.vmp	polygon fire coverage from Vegetation management plan. Only data in pat is no.times burned. Supposedly a database with a relate item that has dates, but not found on system. This database has comma's between dates, so arc will create separate items unless commas are edited out. 12-11-98- gavin looking at back up tapes for the dbf.
pntfires.vmp	small ignitions and their date and cause. Apparently, start points for fires mapped in polyfires are not included.
/gps.burns	Prescribed burns mapped by the gps have been appended into coverages by year, by area. Thus, burns in the Phoenix Lake area are in that subdirectory by year (97all and 98all). Wildfires are under the wildfire directory. Unless otherwise noted, as of 2-1-99, all coverages are in utm.

/geology

geology.sp	limited geology of the Mt. Tam watershed
serp	
slide.key	
slides.vmp	Original USGS slide file
tam_slide	Landslides around Mt. Tam

/soils

soils	Soils for Mt. Tam watershed
soils.vmp	Soils for Mt. Tam watershed and outlying areas
soils.key	Soils key

/gps

gpspoints	points which indicate valves which were gps'ed

/hydro

reservoirs.vmp	Reservoirs of MMWD
big_lakes	MMWD lakes (Kent, Phoenix, Lagunitas, Alpine, Nicasio, Bon Tempe)
all_lakes	All waterbodies in Marin Co.
water_el	All large lakes of Marin Co., including MMWD lakes.
streams	Streams coverage
marinstreams	Streams for marin county only.
shoreline_sm	Small scale shoreline
shoreline_lg	Large scale shoreline
units.vmp	Erosional hazard differentiations

/poster
/sfsu
/sourcedata
/etak

etak.doc	source metadata file for roads info. (attribute descriptions)

/topo

orthocontour200	5 foot contour info. for infrastructure area
orthocontour400	10 foot contour info. for watershed area

/trans

wtrshd_roads.gps	*wtrshd_roads.gps* is coverage of roads on the watershed, plus one or two roads in Giacomini open space. Roads were gps'ed by Ari Golan, who worked as an intern. Coverage not edited for dangles and other problems. Does not include Bolinas Fairfax Road.
wtrshd_trails.gps	*wtrshd_trails.gps* is coverage of trails on the

watershed. Data was gathered with GPS, mostly by volunteers. About 90 percent complete. Most missing trails are unauthorized (e.g. paradigm).

/veg

/data
/lib
/logos
/plots
/state
baycounty Bay area counties
calcounty California counties
cal_bnd California boundary

/ortho1
/ortho2 symbolic link to /ortho2...contains additional orthophotos
/ortho3 symbolic link to /ortho3...contains additional orthophotos
index200 coverage of 200 scale orthophoto tile boundary
index400 coverage of 400 scale orthophoto tile boundary
**.tif* orthophoto .tif files (imagery)

/cards
/services workspace containing all scanned imagery cards
backcard back of scanned service cards (drawing)
frontcard front of scanned service cards (data)

/leakreports workspace containing all scanned leak reports

/images
/doq digital orthophoto USGS quarter-quads.
bolinas_ne.bil
bolinas_nw.bil
bolinas_se.bil
bolinas_sw.bil
double_pt_ne.bil
double_pt_nw.bil
inverness_ne.bil
inverness_nw.bil
inverness_se.bil
inverness_sw.bil
san_geronimo_ne.bil
san_geronimo_nw.bil
san_geronimo_se.bil
san_geronimo_sw.bil

san_rafael_ne.bil
san_rafael_nw.bil
san_rafael_se.bil
san_rafael_sw.bil

/drg

cnty-line

Description of SINGLE precision coverage cnty-line

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		5	28		

NODES		6
ANNOTATIONS	(blank)	8

SECONDARY FEATURES

Arc Segments	756

TOLERANCES

Fuzzy=	18.678 N	Dangle=	0.000 N

COVERAGE BOUNDARY

Xmin=	5843423.500	Xmax=	6030203.500
Ymin=	2131552.750	Ymax=	2312394.250

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection	STATEPLANE
Zone	3326
Datum	NAD83
Units	FEET
Spheroid	GRS1980
Parameters:	

contempo_orig

Description of DOUBLE precision coverage contempo_orig

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		78			
POLYGONS		72	32	Yes	

NODES 77

SECONDARY FEATURES

Tics	4
Arc Segments	326
Polygon Labels	71

TOLERANCES

Fuzzy=	0.346 V	Dangle=	0.000 N

COVERAGE BOUNDARY

Xmin=	5975932.252	Xmax=	5977785.787
Ymin=	2195939.854	Ymax=	2199395.629

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection	STATEPLANE
Zone	3326
Datum	NAD83
Units	FEET
Spheroid	GRS1980
Parameters:	

countybound

Description of DOUBLE precision coverage countybound

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		455	36		
POLYGONS		7	28	Yes	
NODES		455			

ANNOTATIONS (blank) 10

SECONDARY FEATURES

Tics 4
Arc Segments 220486

TOLERANCES

Fuzzy= 17.348 VDangle= 0.000 N

COVERAGE BOUNDARY

Xmin= 5834390.000 Xmax= 6007869.000
Ymin= 2125631.000 Ymax= 2298602.000

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection STATEPLANE
Zone 3326
Datum NAD83
Units FEET
Spheroid GRS1980
Parameters:

houseboat

Description of DOUBLE precision coverage houseboat

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data(bytes)	Spatial Index?	Topology?
ARCS		3136			
POLYGONS		372	32	Yes	
NODES		3136			

SECONDARY FEATURES

Tics	4
Arc Segments	3136
Polygon Labels	371

TOLERANCES

Fuzzy=	0.300 V	Dangle=	0.000 N

COVERAGE BOUNDARY

Xmin=	5981664.912	Xmax=	5984660.621
Ymin=	2145972.883	Ymax=	2148141.316

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection	STATEPLANE
Zone	3326
Datum	NAD83
Units	FEET
Spheroid	GRS1980

mad_sfarea

Description of SINGLE precision coverage mad_sfarea

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		120	28		
POLYGONS		70	416	Yes	
NODES		8856			

SECONDARY FEATURES

Tics	251
Arc Segments	1354
Polygon Labels	69

TOLERANCES

Fuzzy=	0.920 V	Dangle=	0.000 V

COVERAGE BOUNDARY

Xmin=	2338893.500	Xmax =	1174383.000
Ymin=	1425434.625	Ymax =	2567459.750

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection	ALBERS
Units	METERS
Spheroid	CLARKE1866
Parameters:	
1st standard parallel	29 30 0.000
2nd standard parallel	45 30 0.000
central meridian	-96 0 0.000
latitude of projection's origin	23 0 0.000
false easting (meters)	0.00000
false northing (meters)	0.00000

mpa_sfarea

Description of SINGLE precision coverage mpa_sfarea

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		1908	38		
POLYGONS		86	1656	Yes	
NODES		1871	22		

SECONDARY FEATURES

Tics	1763

Arc Segments	92618
Polygon Labels	83

TOLERANCES

Fuzzy=	0.201 V	Dangle=	0.000 V

COVERAGE BOUNDARY

Continue?

Xmin=	372017.625	Xmax=	99814.102
Ymin=	273123.531	Ymax=	257544.438

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection	ALBERS
Datum	NAD27
Units	METERS
Spheroid	CLARKE1866
Parameters:	
1st standard parallel	34 0 0.000
2nd standard parallel	30 0.000
central meridian	-120 0 0.00
latitude of projection's origin	0 0 0.000
false easting (meters)	0.00000

park_bnds

Description of DOUBLE precision coverage park_bnds

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		61			
POLYGONS		6	424	Yes	
NODES		57			

SECONDARY FEATURES

Tics	251
Arc Segments	9995

Polygon Labels 5

TOLERANCES

Fuzzy =	3.007 V	Dangle=	0.000 N

COVERAGE BOUNDARY

Xmin=	5916137.581	Xmax=	5992344.089
Ymin=	2125631.000	Ymax=	2211093.500

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection	STATEPLANE
Zone	3326
Datum	NAD83
Units	FEET
Spheroid	GRS1980
Parameters:	

polbnd

Description of SINGLE precision coverage polbnd

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		92			
POLYGONS		38	16	Yes	
NODES		66			
ANNOTATIONS	(blank)	17			

SECONDARY FEATURES

Arc Segments	3823
Polygon Labels	37

TOLERANCES

Fuzzy=	13.308 V	Dangle=	0.000 V

COVERAGE BOUNDARY

Xmin=	5874977.000	Xmax=	6008057.000
Ymin=	2135067.750	Ymax=	2247268.250

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection	STATEPLANE
Zone	3326
Datum	NAD83
Units	FEET
Spheroid	GRS1980
Parameters:	

polbnd2

Description of SINGLE precision coverage polbnd2

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		110			
POLYGONS		40	42	Yes	
NODES		82			
ANNOTATIONS	(blank)	17			

SECONDARY FEATURES

Arc Segments	5702
Polygon Labels	38

TOLERANCES

Fuzzy=	13.308 V	Dangle=	5000.000 V

COVERAGE BOUNDARY

Xmin=	5874977.000	Xmax=	6008057.000
Ymin=	2135067.750	Ymax=	2247268.250

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection	STATEPLANE
Zone	3326
Datum	NAD83
Units	FEET
Spheroid	GRS1980
Parameters:	

primitives

Description of DOUBLE precision coverage primitives

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		71964	32		
POINTS		6			
ANNOTATIONS	DXF	6			

SECONDARY FEATURES

Tics	4
Arc Segments	490463

TOLERANCES

Fuzzy=	18.196 N	Dangle=	0.000 N

COVERAGE BOUNDARY

Xmin=	5835513.185	Xmax=	6005103.152
Ymin=	2129038.206	Ymax=	2310993.247

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection	STATEPLANE
Zone	3326
Datum	NAD83
Units	FEET
Spheroid	GRS1980
Parameters:	

quadbnd

Description of SINGLE precision coverage quadbnd

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		37	28		
POLYGONS		15	42	Yes	
NODES		24			

SECONDARY FEATURES

Tics	4
Arc Segments	37
Polygon Labels	14

TOLERANCES

Fuzzy=	18.623 V	Dangle=	0.000 V

COVERAGE BOUNDARY

Xmin=	5841387.500	Xmax=	6021429.000
Ymin=	2100984.250	Ymax =	2287212.500

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection	STATEPLANE
Zone	3326
Datum	NAD83
Units	FEET
Spheroid	GRS1980
Parameters:	

quadcorner

Description of SINGLE precision coverage quadcorner

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
POINTS		24	40		

SECONDARY FEATURES

Tics	4

TOLERANCES

Fuzzy=	0.623 N	Dangle=	0.000 N

COVERAGE BOUNDARY

Xmin=	5841387.500	Xmax=	6021429.000
Ymin=	2100984.250	Ymax=	2287212.500

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection	STATEPLANE
Zone	3326
Datum	NAD83
Units	FEET
Spheroid	GRS1980
Parameters:	

wtrshdbnd_sp

Description of DOUBLE precision coverage wtrshdbnd_sp

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		23			
POLYGONS		2	64	Yes	
NODES		23			

SECONDARY FEATURES

Tics	4
Arc Segments	9080
Polygon Labels	1

TOLERANCES

Fuzzy=	4.698 V	Dangle=	0.000 N

COVERAGE BOUNDARY

Xmin=	5920644.910	Xmax =	5967620.967
Ymin=	2160015.138	Ymax =	2197557.826

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection	STATEPLANE
Zone	3326
Datum	NAD83
Units	FEET
Spheroid	GRS1980
Parameters:	

wtrshdbnd_utm

Description of DOUBLE precision coverage WTRSHDBND_UTM

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		23			
POLYGONS		2	64	Yes	
NODES		23			

SECONDARY FEATURES

Tics	4
Arc Segments	9080
Polygon Labels	1

TOLERANCES

Fuzzy=	2.876 V	Dangle=	0.000 N

COVERAGE BOUNDARY

Xmin=	524253.153	Xmax=	538792.109
Ymin=	4195484.459	Ymax=	4206705.244

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection	UTM
Zone	10
Datum	NAD27
Units	METERS
Spheroid	CLARKE1866
Parameters:	

mmwd_proprt

Description of DOUBLE precision coverage MMWD_PROPRT

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		472			
POLYGONS		309	32	Yes	
NODES		381			

SECONDARY FEATURES

Tics	4
Arc Segments	19291
Polygon Labels	305

TOLERANCES

Fuzzy=	11.378 V	Dangle=	0.000 N

COVERAGE BOUNDARY

Xmin=	5901444.018	Xmax=	6000351.218

Ymin=	2137517.684	Ymax=	2251292.843

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection	STATEPLANE
Zone	3326
Datum	NAD83
Units	FEET
Spheroid	GRS1980
Parameters:	

marincnty_os

Description of DOUBLE precision coverage MARINCNTY_OS

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		2773			
POLYGONS		370	32	Yes	
NODES		2544			

SECONDARY FEATURES

Tics	4
Arc Segments	21962
Polygon Labels	341

TOLERANCES

Fuzzy=	13.071 V	Dangle=	0.000 N

COVERAGE BOUNDARY

Xmin=	5868764.335	Xmax=	5999477.725
Ymin=	2148255.073	Ymax=	2262173.249

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection	STATEPLANE
Zone	3326
Datum	NAD83
Units	FEET
Spheroid	GRS1980
Parameters:	

fiel04

Description of SINGLE precision coverage fiel04

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		861			
POLYGONS		419	36	Yes	
NODES		480			
ANNOTATIONS	(blank)	0			

SECONDARY FEATURES

Tics	4
Arc Segments	3726
Polygon Labels	418

TOLERANCES

Fuzzy=	2.446 V	Dangle=	10.007 N

COVERAGE BOUNDARY

Xmin=	521949.281	Xmax=	542253.875
Ymin=	4191986.000	Ymax=	4207614.000

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

NO COORDINATE SYSTEM DEFINED

fign01

Description of SINGLE precision coverage fign01

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		418	28		
POINTS		418			
ANNOTATIONS	(blank)	0			

SECONDARY FEATURES

Tics	4
Arc Segments	6222

TOLERANCES

Fuzzy=	0.000 N	Dangle=	0.000 N

COVERAGE BOUNDARY

Xmin=	-122.750	Xmax=	-122.519
Ymin=	37.876	Ymax=	38.018

STATUS

Coverage is 1% covered by edit masks, BUILD or CLEAN to restore topology

NO COORDINATE SYSTEM DEFINED

firefinal

Description of SINGLE precision coverage firefinal

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		424			
POLYGONS		183	20	Yes	
NODES		257			
ANNOTATIONS	(blank)	0			

SECONDARY FEATURES

Tics	4
Arc Segments	2116
Polygon Labels	182

TOLERANCES

Fuzzy=	2.204 V	Dangle=	10.007 N

COVERAGE BOUNDARY

Xmin=	524254.031	Xmax=	538771.125
Ymin=	4195600.000	Ymax=	4206765.500

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

NO COORDINATE SYSTEM DEFINED

firenolakes

Description of SINGLE precision coverage firenolakes

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		517			
POLYGONS		202	20	Yes	
NODES		333			
ANNOTATIONS	(blank)	0			

SECONDARY FEATURES

Tics	4
Arc Segments	4031
Polygon Labels	201

TOLERANCES

Fuzzy=	1.173 V	Dangle=	10.007 N

COVERAGE BOUNDARY

Xmin=	524254.031	Xmax=	538771.125
Ymin=	4195600.000	Ymax=	4206765.500

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

NO COORDINATE SYSTEM DEFINED

polyfires.vmp

Description of DOUBLE precision coverage polyfires.vmp

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		908			
POLYGONS		452	96	Yes	
NODES		494			

SECONDARY FEATURES

Tics	4
Arc Segments	3860
Polygon Labels	451

TOLERANCES

Fuzzy=	6.768 V	Dangle=	0.000 N

COVERAGE BOUNDARY

Xmin=	5913326.035	Xmax=	5979189.515
Ymin=	2148017.340	Ymax=	2200401.896

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection	STATEPLANE
Zone	3326
Datum	NAD83
Units	FEET
Spheroid	GRS1980
Parameters:	

pntfires.vmp

Description of DOUBLE precision coverage pntfires.vmp

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
POINTS		898	60		

SECONDARY FEATURES

Tics	4

TOLERANCES

Fuzzy=	5.841 N	Dangle=	0.000 N

COVERAGE BOUNDARY

Xmin=	5923707.152	Xmax=	5982117.375
Ymin=	2147389.059	Ymax=	.138

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection	STATEPLANE
Zone	3326
Datum	NAD83
Units	FEET

Spheroid Parameters: GRS1980

geology.sp

Description of DOUBLE precision coverage geology.sp

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		72			
POLYGONS		45	40	Yes	
NODES		54			

SECONDARY FEATURES

Tics	4
Arc Segments	732
Polygon Labels	45

TOLERANCES

Fuzzy=	4.051 V	Dangle=	0.000 N

COVERAGE BOUNDARY

Xmin=	5920921.099	Xmax=	5959950.894
Ymin=	2161239.061	Ymax=	2197791.437

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection	STATEPLANE
Zone	3326
Datum	NAD83
Units	FEET
Spheroid	GRS1980
Parameters:	

serp

Description of SINGLE precision coverage serp

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		170			
POLYGONS		41		Preliminary	
NODES		269			

SECONDARY FEATURES

Arc Segments	2520
Polygon Labels	35

TOLERANCES

Fuzzy=	1.000 V	Dangle=	10000.000 V

COVERAGE BOUNDARY

Xmin=	529216.125	Xmax=	536386.562
Ymin=	4195597.000	Ymax=	4205638.000

STATUS

Use BUILD or CLEAN to create Topology from Preliminary POLYGONS.

NO COORDINATE SYSTEM DEFINED

slides.vmp

Description of DOUBLE precision coverage slides.vmp

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		683			
POLYGONS		484	32	Yes	
NODES		508			

SECONDARY FEATURES

Tics	4
Arc Segments	5077
Polygon Labels	483

TOLERANCES

Fuzzy =	7.344 V	Dangle=	0.000 N

COVERAGE BOUNDARY

Xmin=	5913034.947	Xmax=	5985095.241
Ymin=	2147238.901	Ymax=	2209548.309

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection	STATEPLANE
Zone	3326
Datum	NAD83
Units	FEET

Spheroid Parameters:	GRS1980

tam_slide

Description of SINGLE precision coverage tam_slide

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		665			
POLYGONS		142	72	Yes	
NODES		588			

SECONDARY FEATURES

Tics	40
Arc Segments	9827
Polygon Labels	141

TOLERANCES

Fuzzy=	4.690 V	Dangle=	0.000 N

COVERAGE BOUNDARY

Xmin=	5920651.500	Xmax=	5967550.000
Ymin=	2160085.250	Ymax=	2196305.500

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection	STATEPLANE
Zone	3326
Datum	NAD83
Units	FEET
Spheroid	GRS1980

Parameters:

soils

Description of DOUBLE precision coverage soils

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		879			
POLYGONS		147	68	Yes	
NODES		744			

SECONDARY FEATURES

Tics	4
Arc Segments	6853
Polygon Labels	267

TOLERANCES

Fuzzy=	4.690 V	Dangle=	0.000 N

COVERAGE BOUNDARY

Xmin=	5920651.500	Xmax =	5967550.000
Ymin=	2160085.250	Ymax =	2196305.500

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection	STATEPLANE
Zone	3326
Datum	NAD83
Units	FEET
Spheroid	GRS1980
Parameters:	

soils.vmp

Description of DOUBLE precision coverage soils.vmp

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		728			
POLYGONS		309	52	Yes	
NODES		430			

SECONDARY FEATURES

Tics	4
Arc Segments	8927
Polygon Labels	308

TOLERANCES

Fuzzy=	7.344 V	Dangle=	0.000 N

COVERAGE BOUNDARY

Xmin=	5913034.947	Xmax=	5985095.241
Ymin=	2147238.901	Ymax=	2209548.309

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection	STATEPLANE
Zone	3326
Datum	NAD83
Units	FEET
Spheroid	GRS1980
Parameters:	

gpspoints

Description of SINGLE precision coverage gpspoints

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
POINTS		2418	42		

SECONDARY FEATURES

Tics	4

TOLERANCES

Fuzzy=	7.771 N	Dangle=	0.000 N

COVERAGE BOUNDARY

Xmin=	5927075.500	Xmax=	6000888.000
Ymin=	2136617.000	Ymax=	2214331.750

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

NO COORDINATE SYSTEM DEFINED

big_lakes

Description of DOUBLE precision coverage big_lakes

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		49	52		
POLYGONS		7	50	Yes	
NODES		49			

SECONDARY FEATURES

Tics	4
Arc Segments	1235
Polygon Labels	6

TOLERANCES

Fuzzy=	10.744 V	Dangle=	0.000 N

COVERAGE BOUNDARY

Xmin=	5912059.000	Xmax=	5963841.000
Ymin=	2169463.750	Ymax=	2230732.250

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection	STATEPLANE
Zone	3326
Datum	NAD83
Units	FEET
Spheroid	GRS1980
Parameters:	

all_lakes

Description of DOUBLE precision coverage all_lakes

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		102	52		
POLYGONS		39	50	Yes	
NODES		102			
ANNOTATIONS	(blank)	16			

SECONDARY FEATURES

Tics	4
Arc Segments	2298
Polygon Labels	25

TOLERANCES

Fuzzy=	14.000 V	Dangle=	0.000 N

COVERAGE BOUNDARY

Xmin=	5854265.500	Xmax=	5995494.000
Ymin=	2130688.250	Ymax=	2276906.250

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection	STATEPLANE
Zone	3326
Datum	NAD83
Units	FEET
Spheroid	GRS1980
Parameters:	

reservoirs.vmp

Description of DOUBLE precision coverage reservoirs.vmp

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		22			
POLYGONS		8	40	Yes	
NODES		20			

SECONDARY FEATURES

Tics	4
Arc Segments	659
Polygon Labels	13

TOLERANCES

Fuzzy=	3.924 V	Dangle=	0.000 N

COVERAGE BOUNDARY

Xmin=	5925923.676	Xmax=	5964277.666
Ymin=	2169460.827	Ymax=	2193124.363

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection	STATEPLANE
Zone	3326
Datum	NAD83
Units	FEET
Spheroid	GRS1980
Parameters:	

shoreline_lg

Description of DOUBLE precision coverage shoreline_lg

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		626	36		
POLYGONS		8	32	Yes	
NODES		625			

SECONDARY FEATURES

Tics	4
Arc Segments	224665
Polygon Labels	7

TOLERANCES

Fuzzy=	21.689 V	Dangle=	0.000 N

COVERAGE BOUNDARY

Xmin=	5828055.358	Xmax=	6044948.663
Ymin=	2104273.119	Ymax=	2312973.973

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection	STATEPLANE
Zone	3326
Datum	NAD83
Units	FEET
Spheroid	GRS1980
Parameters:	

shoreline_sm

Description of DOUBLE precision coverage shoreline_sm

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		212			
POLYGONS		8	32	Yes	
NODES		211			

SECONDARY FEATURES

Tics	4
Arc Segments	47706
Polygon Labels	7

TOLERANCES

Fuzzy=	8.321 V	Dangle=	0.000 N

COVERAGE BOUNDARY

Xmin=	5916122.591	Xmax=	6037667.958
Ymin=	2110911.671	Ymax=	2217000.126

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection	STATEPLANE
Zone	3326
Datum	NAD83
Units	FEET
Spheroid	GRS1980
Parameters:	

streams

Description of DOUBLE precision coverage streams

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		622	56		
POLYGONS		29	24	Yes	
NODES		735			
ANNOTATIONS	(blank)	25			

SECONDARY FEATURES

Tics	4
Arc Segments	11611

TOLERANCES

Fuzzy=	16.774 V	Dangle=	0.000 N

COVERAGE BOUNDARY

Xmin=	5853151.000	Xmax=	6005380.000
Ymin=	2131710.500	Ymax=	2286835.000

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection	STATEPLANE
Zone	3326
Datum	NAD83
Units	FEET
Spheroid	GRS1980
Parameters:	

marinstreams

Description of DOUBLE precision coverage marinstreams

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		484	56		
NODES		613			
ANNOTATIONS	(blank)	25			

SECONDARY FEATURES

Tics	4
Arc Segments	9026

TOLERANCES

Fuzzy=	16.774 V	Dangle=	0.000 N

COVERAGE BOUNDARY

Xmin=	5853150.000	Xmax=	5998100.500
Ymin=	2131710.500	Ymax=	2286835.000

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection	STATEPLANE
Zone	3326
Datum	NAD83
Units	FEET
Spheroid	GRS1980
Parameters:	

units.vmp

Description of DOUBLE precision coverage units.vmp

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		344			
POLYGONS		194	30	Yes	
NODES		247			

SECONDARY FEATURES

Tics	4
Arc Segments	3191
Polygon Labels	193

TOLERANCES

Fuzzy=	6.075 V	Dangle=	0.000 N

COVERAGE BOUNDARY

Xmin=	5921094.830	Xmax=	5980254.644
Ymin =	2159046.169	Ymax=	2197768.472

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection	STATEPLANE
Zone	3326
Datum	NAD83
Units	FEET
Spheroid	GRS1980
Parameters:	

wtrshd_roads.gps

Description of SINGLE precision coverage wtrshd_roads.gps

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		206	68		
NODES		317			

SECONDARY FEATURES

Tics	4
Arc Segments	19799

TOLERANCES

Fuzzy=	4.765 N	Dangle=	0.000 N

COVERAGE BOUNDARY

Xmin=	1360581.875	Xmax=	1407476.500
Ymin=	518199.781	Ymax=	558247.500

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection	STATEPLANE
Zone	3326
Datum	NAD27
Units	FEET
Spheroid	CLARKE1866
Parameters:	

wtrshd_trails.gps

Description of SINGLE precision coverage wtrshd_trails.gps

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		198	78		
NODES		517			

SECONDARY FEATURES

Tics	4
Arc Segments1	6826

TOLERANCES

Fuzzy =	3.112 N	Dangle=	0.000 N

COVERAGE BOUNDARY

Xmin=	1380487.875	Xmax=	1408767.375
Ymin=	520133.938	Ymax=	551253.750

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection	STATEPLANE
Zone	3326
Datum	NAD27
Units	FEET
Spheroid	CLARKE1866
Parameters:	

baycounty

Description of SINGLE precision coverage baycounty

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		43	28		
POLYGONS		12	16	Yes	
NODES		34			

SECONDARY FEATURES

Arc Segments	2273
Polygon Labels	11

TOLERANCES

Fuzzy=	24.959 V	Dangle=	0.000 N

COVERAGE BOUNDARY

Xmin=	454577.438	Xmax=	660240.062
Ymin=	4078753.50	Ymax=	4300325.500

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

NO COORDINATE SYSTEM DEFINED

calcounty

Description of SINGLE precision coverage calcounty

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		1176			
POINTS		91			
ANNOTATIONS	(blank)	0			

SECONDARY FEATURES

Arc Segments	138068		

TOLERANCES

Fuzzy=	4.994 N	Dangle=	4.994 N

COVERAGE BOUNDARY

Xmin=	-426581.188	Xmax=	564464.125
Ymin=	-612066.500	Ymax=	453180.188

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

NO COORDINATE SYSTEM DEFINED

cal_bnd

Description of SINGLE precision coverage cal_bnd

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		40	80		
POLYGONS		28	48	Yes	
NODES		867			

SECONDARY FEATURES

Tics	23
Arc Segments	5336
Polygon Labels	27

TOLERANCES

Fuzzy=	2.000 V	Dangle=	0.000 N

COVERAGE BOUNDARY

Continue?			
Xmin=	-2355015.000	Xmax=	-1645873.750
Ymin=	1241852.500	Ymax=	2452496.500

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection	ALBERS	
Units	METERS	
Spheroid	CLARKE1866	
Parameters:		
1st standard parallel	29 30	0.000
2nd standard parallel	45 30	0.000
central meridian	-96 0	0.000
latitude of projection's origin	23 0	0.000
false easting (meters)	0.00000	

false northing (meters)	0.00000