DEVELOPMENT OF A DECISION SUPPORT SYSTEM FOR FLOOD CONTROL MANAGEMENT

by

Kwame A. Agyare

A Thesis
Submitted to the Faculty of Graduate Studies
in Partial Fulfillment of the Requirements
for the Degree of
MASTER OF SCIENCE
IN
CIVIL ENGINEERING

Department of Civil Engineering
University of Manitoba
Winnipeg, Manitoba

National Library
of Canada

Bibliothèque nationale
du Canada

Canadian Theses Service

Service des thèses canadiennes

Ottawa, Canada
K1A 0N4

ISBN 0-315-76964-5

DEVELOPMENT OF A DECISION SUPPORT SYSTEM FOR FLOOD CONTROL MANAGEMENT

BY

KWAME A. AGYARE

A Thesis submitted to the Faculty of Graduate Studies of the University of Manitoba in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

ABSTRACT

A decision support system which can assist in the process of generating and evaluating alternative flood control measures for flood management is developed. The system incorporates the technologies of geographic information systems and expert systems, both of which have achieved recent successful application in several aspects of watershed management, and integrates these tools with the use of a relational database management software and optimization to facilitate the generation and selection of suitable flood control solutions. The system takes advantage of the increases in computing power currently available to the everyday user to enhance the intercommunication between each module for improved system design and operation.

A case study of the application of the decision support system to a flood management problem located near the City of Winnipeg flood control system is subsequently carried out. Several suitable flood control alternatives are generated for the area, and a methodology by which these solutions may be evaluated is put forward. Final results confirm the usefulness of developing such integrated tools to address the flood management problem and indicate that such tools can aid in the comprehension, analysis, generation and evaluation processes.

ACKNOWLEDGEMENTS

I wish to express my sincere gratitude to my academic adviser, Dr. S.P. Simonovic, for his invaluable advice and guidance during the research related to this thesis and in the preparation of this thesis, and for providing me with financial support for my M.Sc program.

I would also like to thank Mr. Bruce Hicks of the Remote Sensing division of the Manitoba Department of Natural Resources, Mr. John Toye of the Water Resources division of the Manitoba Department of Natural Resources, Mr. Mike Fedak of the Department of Energy and Mines in Manitoba and the late Malcolm Brown of the Department of Geography at the University of Manitoba, who in various ways assisted in providing support towards this research project.

Finally, I would like to thank my colleagues at FIDS (Facility for Intelligent Decision Support systems in Water Resources) here at the University of Manitoba, for providing me with encouragement and inspiration towards the completion of the project.

TABLE OF CONTENTS

Page

LIST OF FIGURES

LIST OF TABLES

DEVELOPMENT OF A DECISION SUPPORT SYSTEM FOR FLOOD CONTROL MANAGEMENT

1. INTRODUCTION.

1.1 STATEMENT OF THE PROBLEM.

The issue of making optimal planning and policy decisions, in water resources planning and management in general and flood-control management in particular, is one that has received continued attention in recent years. This is in light of the fact that despite millions of dollars being spent each year on both structural and non-structural measures of flood-control, flooding continues to present a hazard in many parts of the world, leading to considerable damage to property and in some cases loss of life.

One main focus in attempts to deal with this problem has been to try to obtain a better and more comprehensive understanding of the cause-effect components of the situation being examined. Many of the problems encountered in water resources, however, are often ill-structured and the very nature of such problems often calls for some form of subjective evaluation or informed judgement, (Fedra and Loucks, 1985), in addition to the use of formal numerical models for their resolution. Problems also arise out of the fact that different groups of affected persons may not agree on what should be the best solution to a prevailing water resources problem.

Several approaches have been made to resolve these particular issues. These include interactively involving users or affected parties in the decision making process, (Loucks et al. 1985), (Johnson, 1990) and the use of an expert systems approach, (Savic and Simonovic, 1991), (Arnold and Sammons, 1988) to bring a high level of expert opinion into the decision-making process.

Recent trends in the solution of such problems have been to aggregate several models, both procedural and heuristic, into integrated software tools which are able to address the relevant parts of the problem domain. Such collections of interactively linked models designed for impact exploration, synthesis and evaluation have been termed decision support systems, (Sprague and Carlson, 1982).

Decision support systems (DSS) have been used in recent water resources studies, (Savic and Simonovic, 1991), (Johnson, 1990), to enhance the interactive modelling process and to aid in providing a more comprehensive understanding of water resources problems.

The development of such integrated software tools has been enhanced in recent years by the increase in the amount of computer power available to the everyday user, and also from the emergence of several technologies such as geographic information systems (GIS) and expert systems (ES) which have been successfully applied to various aspects of water resources, (Muzik, 1988), (Wolfe and Neale, 1988), (Silfer et al, 1987).

At the ninth session of the International Hydrological Programme (IHP) Council held in Paris in 1990, the council, as part of the fourth phase of the IHP (1990-1995), set up a sub-programme to study experiences with modern water resources planning and management methods taking into account risk factors. The objectives of the sub-programme are to demonstrate the usefulness of the application of computer based decision support systems in water resources planning and management and to create within water resources planners and managers, decision makers as well as within the public the need to use interactive decision making and to incorporate risk factors.

The focus of this study is to utilize the advancements in technology in the field of water resources to develop a computer based decision support system which can effectively examine the issues involved in flood management, thus leading to more effective solutions to the flooding problem. This system will combine the use of optimization techniques and other numerical models with GIS, to facilitate spatial decision support, ES and engineering expertise to facilitate intelligent decision support in the problem domain, and the use of relational database management software to facilitate model data input and data management.

Several important issues need to be addressed in the development of such systems including the effective integration of GIS, ES and numerical modelling in a decision support framework, and the inter-communication between these modules.

Another important issue is that of faciltating data input to numerical models. The use of formal flood plain damage models such as the US Army Corps of Engineeers, Flood Damage Analysis package has sometimes been hindered by the daunting task of data acquisition and formatting, and in some instances inadequate time to learn the proper use of such models results in inaccurate results being obtained. Efforts must to be made in the development of any interactive system to provide maximum assistance in data input and formatting to enhance the systems use, and the system to be developed addresses this issue.

The purpose of this research is therefore to develop a decision support system that will assist in providing solutions to flood management problems. The system is intended to address all of the issues described above and to provide the user with comprehensive support in the problem domain. Focus will be given to the role of geographic information systems towards decision-making in the domain of flood management, both as a tool for analysis and also in the role of providing graphical display of spatial data and evaluation of generated alternatives.

Subsequent to the development of the system, a case study of a flood management problem situation, located upstream of the City of Winnipeg flood control system will be performed to investigate the utility of using such a DSS, and recommendations will be made on the integration of this work into the decision-making process.

1.2 FLOOD CONTROL PLANNING.

In order to effectively address the flood control planning process (Figure 1), there is a need to be able to make optimal decisions at every point in the process. The engineering component of the process begins with the definition of engineering objectives from addressing the social needs and objectives given, through the design of the selected flood control measure or measures, to the management of the operational system. The generation and evaluation of alternative flood control measures is of prime concern in this area. It is often in this area where decisions based on poor judgement or the failure to examine all possible flood control solutions to a problem may lead to failure of the generated solution. The use of incorrect data as well as inefficient data management during the modelling process may also lead to inadequate or overdesigned solutions.

It is in these particular areas of the planning process i.e. from the process of specifying engineering objectives to the selection of an appropriate flood control plan, where this research work will focus on designing an interactive computer based decision support system to help formulate and evaluate optimal solutions towards aiding in the planning process.

Utilizing a decision support system in this area will bring into the analytical process efficient data handling and management techniques coupled with the efficient use of models both analytical and heuristic as well as a systematic, hierarchical and modular approach to the process of alternative evaluation, which would lead to better proposals being made. It is the intention in this research work to develop such a system which would provide these capabilities, resulting in optimal flood control planning and management solutions.

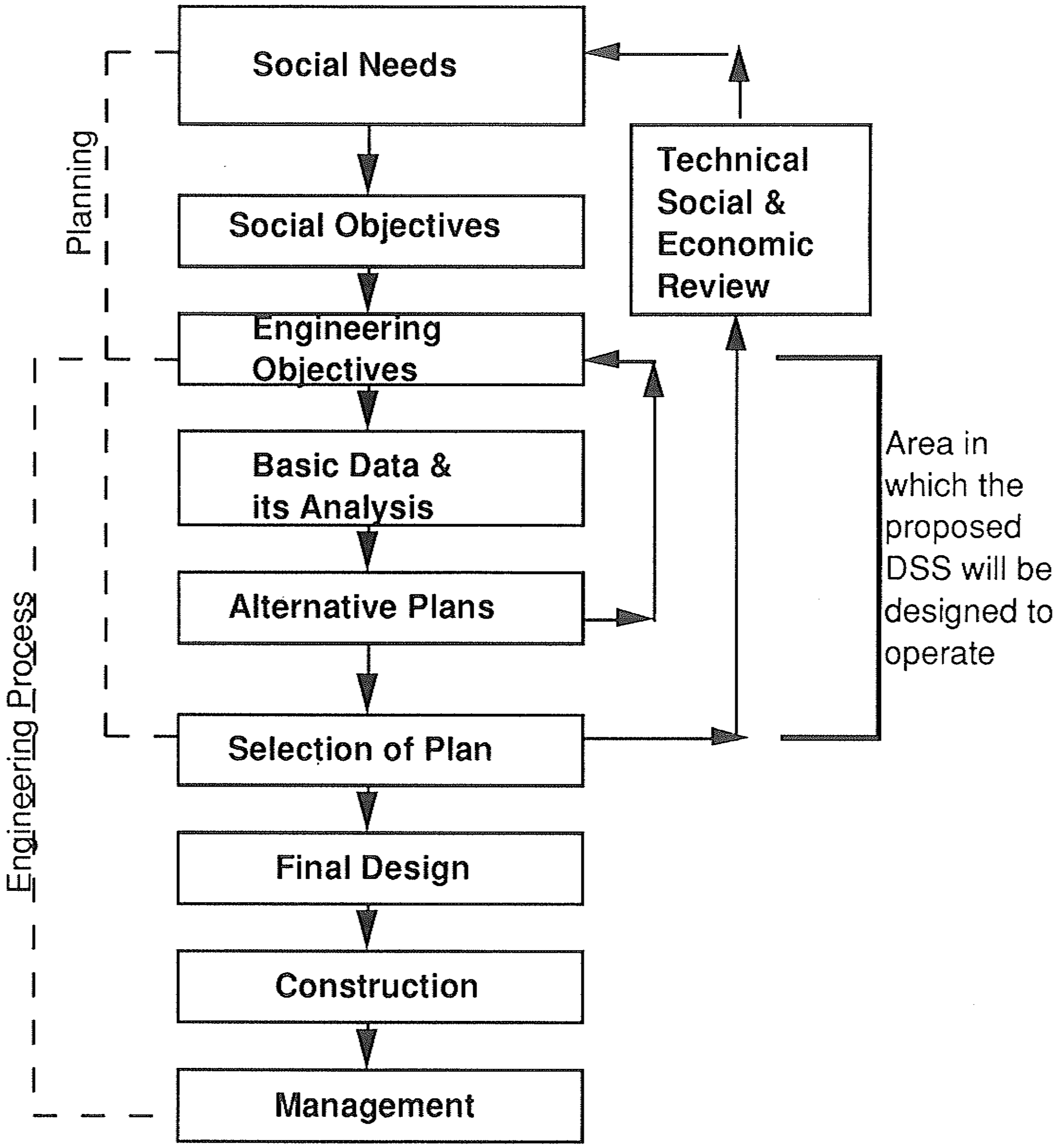


FIGURE 1. THE FLOOD CONTROL PLANNING PROCESS

1.3 SCOPE OF THE WORK.

This investigation focuses on the development of a decision support system which can assist in the generating and evaluation of alternative solutions to flood management problems, and its application to a case study flood control system. The integration of the available technologies such as geographic information systems, expert systems and optimization models into a single DSS is fairly new to the field of water resources, and it is aimed at showing the usefulness and benefits that can be derived from utilizing this approach in the domain of flood management.

Chapter 2 gives a literature review of research related to the topic. A review of recent efforts being made in the field of water resources where decision support systems have been applied to aid in watershed management is carried out. Also, a review of recent applications in the field of geographic information systems which are emerging as an effective technology for application to many flood management problems is presented.

Chapter 3 presents the various aspects and components involved in the development of the decision support system for flood management. This section gives a detailed description of each of the components of the DSS and discusses the inter-communication between each module. Also addressed are the hardware requirements and design structure of the DSS.

Chapter 4 discusses the flood damage analysis procedure and describes how the decision support system developed can be used to assist in the analysis procedure and provide a greater understanding of the problem domain to the user. Chapter 5 deals with the application of the methodology derived to a case study. The chapter deals with the use of the DSS in a flood management situation located upstream of the City of Winnipeg flood control structure, and investigates the usefulness of the DSS in this particular locality.

Chapter 6 is a discussion of the results obtained from the analyses performed in the previous chapter. Chapter 7 presents conclusions and recommendations.

2. LITERATURE REVIEW.

Current and on-going efforts in the field of water resources planning and management to incorporate the available technologies into tools for decision support are reviewed in this chapter. A review of recent applications in the field of geographic information systems as they have been successfully applied to various aspects of water resources policy and planning is also carried out, since these systems form a major component of the system to be developed in this research. The potential of GIS for being incorporated into integrated decision supporting tools is also examined.

2.1 DECISION SUPPORT SYSTEMS IN WATER RESOURCES.

Decision support systems have received much attention in the field of watershed management because of their usefulness in assisting planners and engineers in examining the various issues involved in the water resources planning process, especially their capability for providing support for the generation and evaluation of alternative solutions to such problems. One major challenge in designing such comprehensive modelling systems for policy-making and planning has been to build these models in such a way as to make them easily useable, and to make their output more useful to the prospective users, (Fedra and Loucks, 1985).

Some important and necessary characteristics of DSS have been identified by Simonovic (1990). These are:

- to assist managers in the decision-making process for un-structured and semi-structured problems;
- to support and enhance managerial judgment;
- to improve the effectiveness of the decision-maker;

- to combine the use of models or any analytical techniques with data access functions;
- to emphasize flexibility and adaptibility with respect to respect changes in the context of the decision process; and
- to focus on features which make the DSS interactive.

These characteristics also serve as guidelines for potential developers of such systems in to develop complete and user-friendly systems that will provide maximum assistance to the user.

A review of some recent applications of DSS in water resources planning and management as well as a discussion of some of the issues involved in the task are herein presented.

2.1.1 DSS IN PLANNING AND MANAGEMENT.

There are currently several applications of the development of decision support systems in this area. Kunreuther and Miller (1985) developed an interactive micro-analytical modelling system to support policy analysis in dealing with flood hazards. The authors put forward a framework for policy analysis under five headings: 1) Problem Formulation - where the problem is clearly defined so that the policy analyst can structure a set of questions; 2) Interested Parties and Relevant Information - where the views of a set of interested parties are identified; 3) Developing Alternate Scenarios - where different characteristics of homeowners and different flooding situations are generated; 4) Evaluation of Strategies - where the impact of strategies on various stakeholders are examined; and 5) Learning over time - where the system may be altered to incorporate new information and analytical procedures. The central component of the decision support system is an interactive modelling shell written in Fortran 77 code which is able to interface with several models and guides the user towards generating solutions.

The potential impacts of increased computer power with respect to the development of interactive computer models for water resources planning and policy modelling is discussed by Fedra and Loucks (1985). The authors advocate the combination of various tools under a common organizational framework such as is typified by workstation architecture, with multiple windowing displays for multi-tasking. They also stress a highly modular approach to integrated tool design which must also be hierarchically organized and allow for compatible databases, to ensure smooth transition from one mode to another or from one level of detail to another.

Several reviews have been made on the use of decision support systems in water resource management. Johnson (1986) reviews a number of examples including micro-computer based applications, flash-flood warning and regional water-monitoring systems, water supply and reservoir operating decision support systems, and the use of computer-aided planning (CAP) and expert systems to provide support for decison-making. Continued development in this direction is envisaged by the author, with anticipated increases in microcomputer technologies and decreasing costs of hardware and software equipment.

Johnson (1990) presents an interactive modelling system which aids in the reservoir operating policy modelling process for multi-purpose reservoir operations planning. The computer-aided planning system integrates state-of-the-art simulation and optimization techniques, colour graphics displays and interactive computing interfaces into a coherent system that has user-friendly interfaces to assist the decision-maker in solving domain specific problems. The software developed was embedded in a comprehensive public involvement program to enable concerned parties to learn about the reservoir system's limitations and opportunities in order to create greater participation in the operations planning process.

In an effort to streamline database design for decision support, Armstrong and Densham (1990) outline a methodology for conceptual database design for spatial decision support systems which exploits the features of a data model embedded in relational database management software (RDBMS). They outline a strategy which can be employed to construct functionally integrated spatial databases which can support locational analysis and spatial decision-making in watershed management.

Davis et al. (1991) developed a DSS which estimates the effects of potential land-use and land management policies on water quality and the cost of implementing these policies. The DSS consists of 3 modules: a policy module to generate a suite of policies; a catchment module to estimate the effects of these policies; and a query module to query the estimates obtained from the catchment module. In this particular system, policies, which in some cases may be expressed in general terms, were translated into specific instructions in order to enable computer analysis and operational interpretation. The consultation for the model developed, although utilizing a rule-based approach, did not contain any expertise incorporated into it, but this aspect of development was proposed in future modifications.

Turcotte and Mtundu (1992) describe a computer-based decision support system which determines water discharges through a network of control structures and canals. The system comprises of a relational database that provides structure information to a FORTRAN program using structured query language (SQL) statements embedded in the program. They use a RDBMS to separate structure information from discharge information, which reduces the size of the computational programs and facilitates file maintenance and also makes information on discharge control structures readily available for other initiatives.

The development of decision support systems for watershed management are ever increasing and their utility towards solving both procedural and descriptive problems is being examined in many aspects of water resources.

2.1.2 EXPERT SYSTEMS WITHIN DSS.

The use of expert system technology in the field of water resources planning has been widely documented in several sources. Knowledge-based or expert systems provide a means by which expertise, rules of thumb and engineering judgement can be incorporated into decision support systems to make available a high level of know-how which can be used to address semi- or unstructured parts of water resources problem domains.

A summary of some expert systems currently being developed to provide support for decision-making in water resources engineering is detailed in Simonovic and Savic (1990). The authors also elaborate on a pilot expert system REZES for aiding in reservoir management and operations. The inherent subjective nature of most water resources problem require the use of an approach whereby engineering expertise can be incoporated into the consultation to assist in generating optimal solutions to ill-structured problems.

Savic and Simonovic (1991), develop an interactive reservoir modelling system using the intelligent decision support system approach. An expert systems approach is combined with formal reservoir models, experience in their use, heuristics and rules-of-thumb to produce and "intelligent" DSS. This tool is developed for the purpose of aiding users in selecting and using the best formal model or models for single multi-purpose reservoir analysis.

2.2 USE OF GEOGRAPHIC INFORMATION SYSTEMS.

The analysis and resolution of water resources problems in recent years has been enhanced by the simulation of the effects of proposed solutions on a geographic database using the technology of geographic information systems (GIS). A GIS has been described as " a powerful set of tools for collecting, storing, retrieving at will, transforming, and displaying spatial data from the real world for a particular set of purposes ", (Burrough, 1987). The application of GIS technology in hydrologic and watershed studies has been demonstrated in many recent studies, (see eg., White, 1989, Muzik, 1988, Silfer et al., 1987).

GIS's have been used to perform several tasks under the watershed management domain such as basin and sub-watershed delineation and hydrologic modelling. They have also been used to aid in the visual comprehension of the results of spatial analysis. These successful applications of GIS technology in water resources have led to the investigation of possible integration of this technology into the decision support system framework to enhance the decision-making process. The inclusion of a module capable of transforming and analyzing geographic data brings an effective spatial analyzing component into DSS, and has led to such systems which rely heavily on this aspect being termed spatial decision support systems (SDSS).

Spatial decision support systems in general are designed to focus on limited problem domains, making use of a variety of data types, and they bringing numerical modelling capabilities to bear on the problem and rely on graphical displays to convey visual comprehension to the decision-maker, (Armstrong and Densham, 1990). They have also been defined as computer-based analytical systems for addressing management problems with domains having a spatial dimension, (Buehler and Wright, 1991a).

The information contained in a GIS represents a model of the real world situation and thus, providing the data is accurate, simulations of crisis events can be modelled on a geographic database and the effects of these catastrophes can be visualized and examined. There are several areas where research on utilizing GIS technology to provide decision support is being carried out, and some recent applications are discussed.

2.2.1 WATERSHED MANAGEMENT USING GIS.

GIS have been applied to hydrologic modelling in many recent studies. Muzik (1988) presents an approach whereby a hydrologic model which uses the Soil Conservation Service (SCS) rainfall-runoff procedure interfaces with a GIS to provide information on physical land characteristics for input into the model.

Oslin et al, 1988, outlines a system being developed named STREAMS (Soil, Transport, Rainfall, Erosion and Mapping System) which is designed to facilitate data transfer between computer systems for the purpose of flood plain and watershed management. This system integrates remote sensing and GIS with current hydrology, hydraulic, erosion and sediment transport models to enhance modelling processes in the watershed.

A comparison of runoff volume estimation techniques firstly, by using an SCS model and providing data input manually, and with a method relying solely on GIS, is elaborated on in Stuebe and Johnson, (1988). The authors perform trials on six watersheds of varying nature and results obtained indicate that the use of GIS in this task represents a viable alternative to traditional modelling techniques, and the authors suggest that the GIS method may prove advantageous in large and complex study areas where large amounts of data need to be manipulated.

Hodge et al, (1988), discusses efforts to link a distributed physical process model ARMSED to the geographic information system GRASS. This model has since become part of the GRASS GIS program and obtains input from the user as well as a basin delineation program also incorporated in GRASS named WATERSHED. The WATERSHED program utilizes an elevation map layer and uses it to derive watershed and sub-basin boundaries.

Vieux et al, (1988) describe a method for finite element analysis of hydrologic response areas using GIS. Their method, based on the Green and Ampt equations, utilizes a Triangular Irregular Network (TIN) generated by the GIS software ARC/INFO to determine the hydrologic response for various nodes in the watershed.

2.2.2 MODEL DATA INPUT USING GIS.

The use of a geographic database to provide input data to hydrologic models has been highlighted in several studies. Cline et al. (1989) use a commercially available computer-aided drafting package, AutoCAD, to input geographic data into a Watershed Information System developed to assist users in the preparation of input files for a hydrologic simulation model HEC-1. Wolfe and Neale (1988) use the GIS GRASS to generate input data for a distributed parameter hydrologic model (FESHM). By using the GIS in data development they cut down on the processing time for this typically time-consuming task. Oloufa et al, 1992, describe a method for extending a GIS to represent boreholes as complex three-dimensional objects. They also elaborate on a method for storing such data in a relational database.

Sasowsky and Gardner (1991) use a grid-cell GIS to parameterize a quasi-physically based surface runoff model named SPUR (Simulation of Production and Utilization of Rangelands), in which a watershed is configured as a set of stream segments and contributing areas. GIS programs were written for the processing of digital elevation data, digital soil maps and also to create tabular files for soil characteristics to facilitate the task.

The growing number of applications of GIS in the water resources planning and management field are an indication of the growing wide acceptance of these models, and the work undertaken in this research project investigates their utility in a decision support system framework.

3. DECISION SUPPORT SYSTEM COMPONENTS.

As a prelude to the development of the DSS, focus needs to be made on several issues pertinent to the proposed system including the most appropriate architectural structure to use as well and the issue of providing a suitable operating system platform and environment in which the DSS will function. These issues, including a description of the various features of the integrated tool developed, are discussed in this chapter.

3.1 ARCHITECTURE OF THE DSS.

Traditionally, the architecture of decision support systems has been classified into three main approaches, (Simonovic, 1990). This classification evolved to give potential designers a conceptual tool for constructing a DSS; to support the evaluation and characterization of possible systems; and to present a practical and constructive definition of a DSS, (Simonovic, 1990). These approaches include the functional approach which is decision process oriented; a tool based architecture; and a third approach, which is a combination of the first two, and utilizes beneficial features from both. This latter approach, known as the combined architecture approach, is modular and adaptive, and is particularly suited for integrating several components of the system which may be accessed randomly.

Several practical applications of this modular approach have been proposed by Johnson (1990) and Arnold and Sammons (1988). An adaptation of the modular approach was derived for the development of the decision support system. This design was selected in order to facilitate communication between the various components of the system and also to be able to incorporate the respective technologies into one tool for addressing different parts of the flood management problem. This design is illustrated in Figure 2.

In general, a DSS is made up of 3 major components, the system manager, database module and the modelbase module. The system manager which is centrally located, is the component which integrates the other parts of the system and also controls all the processes in the system. The database component is the module that handles data storage manipulation and extraction from the system. It also provides facilities for updating and modifying data used by the system. The modelbase component of the system is the part which contains the different process models pertinent to the problem domain. This module provides the facilities for integration between models and also provides the facilities for linking these models with the database. The inclusion of a display and graphics subsystem into the DSS enhances the input of data into the models, provides an improved user interface for the user, and aids in the visual comprehension of spatial information used by the model. A more detailed description of each subsystem is discussed in sections 3.3 to 3.7.

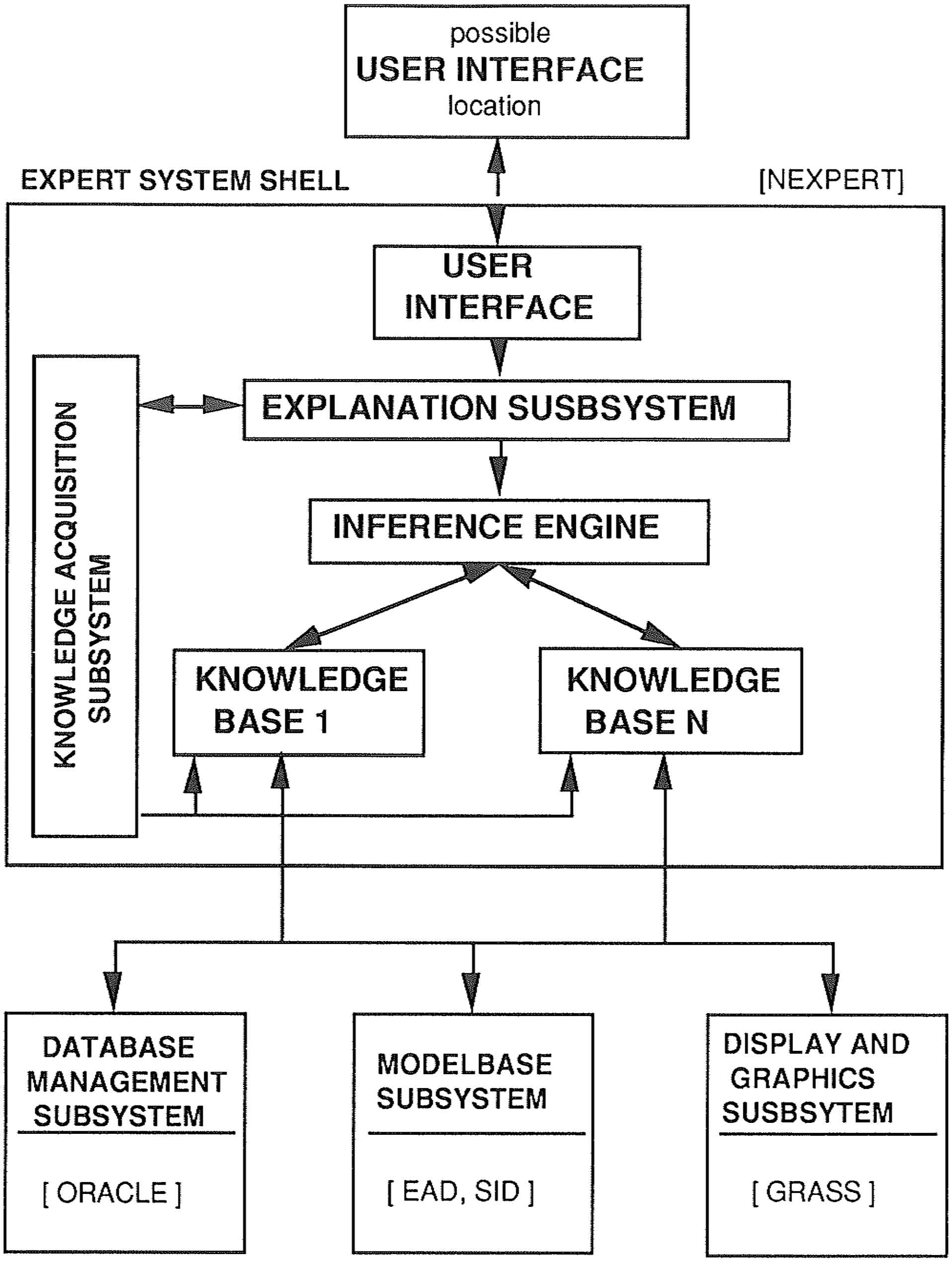


FIGURE 2. PROPOSED ARCHITECTURAL DESIGN OF DSS UTILIZING A MODULAR APPROACH.

3.2. DSS OPERATING PLATFORM.

With cheaper and more computer power becoming available to potential developers of integrated systems the task of model development is facilitated by quicker data access and quicker inter-communication between different module components running on the same platform. This situation also enhances the creation of interfaces engineered to support traditional planning and decision-making procedures, which will in turn lead to greater comprehension and a greater acceptance of models developed. In the development of decision support systems it is important to select an operating platform which provides the capability of communication between each module of the system and also allows for easy linkage between these components. A workstation platform provides these capabilities as well as providing the environment for the performance of multiple tasking.

A Sun Microsystems Sparc 1+ workstation with a 340MB hard disk and 28MB of RAM memory was selected as the platform for development of the DSS. This computer is also connected to a 150MB cartridge tape drive and an Epson LX-810 line printer for data entry and printing output respectively.

There are several benefits to be derived from developing decision support systems on a workstation platform. Firstly, the computing power that is a general characteristic of these platforms enables fast and efficient systems to be developed. They also enable multi-tasking to be performed with ease and several applications may be run simultaneously. Also, the multiple windowing display programs often coupled with these applications, allow several screens to be displayed at once, thus the operator can interact with different components of the model to the detail required. This also aids in comprehension of model output both analytically and visually (in this particular case, the OpenWindows windowing system is used). Workstation display screens can, in general display a larger work area than personal computers due to their larger screens. For these reasons the workstation platform was selected as the most suitable one for DSS development.

3.3 THE DSS SHELL/ SYSTEM MANAGER.

The central feature of a DSS is the system manager which controls the various parts of the system. This centrally located component (or shell) co-ordinates the individual tasks carried out by the respective parts of the system and is directly linked to the user interface of the system which is the link between the user and the system The tasks that must be performed by the system manager are to control purposes and integrate other parts of the system so it must be centrally located, (Simonovic, 1990).

There are several issues to be considered in selecting or designing this component including the type of communication required between each module, the speed of communication and the time-frame of development. The shell used in the DSS development is discussed below.

3.3.1 NEXPERT OBJECT.

The module selected in this research to control the various parts of the system is a knowledge-based expert system shell named NEXPERT OBJECT, herein referred to as NEXPERT. This shell was chosen for its ability to be readily integrated, on the Sun workstation, with the other components of the system such as a relational database management system and the GIS, which run on the same platform.

Selecting a shell which can communicate with other software that is to be integrated into the system also has the advantage of cutting down on the time taken to develop a prototype for trials by the developer and by prospective clients. Using an already manufactured shell frees the developer from the tedious task of writing masses of computer code to link each module to the rest.

NEXPERT contains a graphical user interface that is the link between the user and the system. It is also directly linked to the explanation subsystem of the ES which has the capability of providing the user with help screens. This explanation subsystem can also be customized by the developer to provide query-specific help instructions which provide help related to the specific task being performed. It is also possible with this particular shell to link to a more comprehensive or more graphical interface which is tailored to a particular institution's needs.

The inference engine of the ES shell is the actual component which determines the search strategy and order that is utilized to develop the required knowledge. This engine triggers in turn, the knowledge bases that need to be fired and in the correct order. Both forward chaining and backward chaining search strategies are available in the shell.

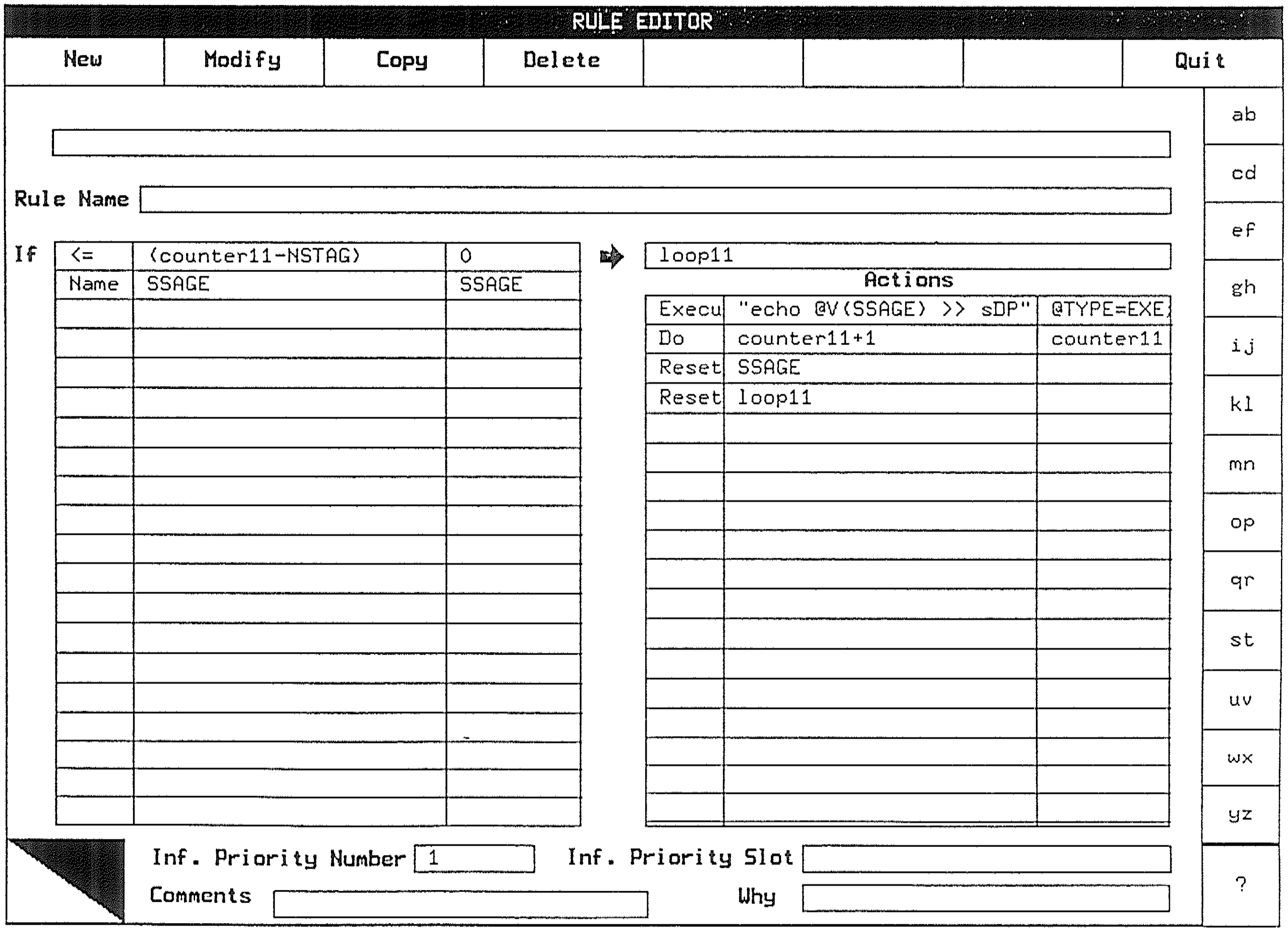
Several knowledge bases may be contained in the system. Each of these knowledge bases has access directly to the other modules of the DSS, e.g, the database management subsystem, the modelbase subsystem and the display/graphics subsystem, as shown in Figure 2. NEXPERT incorporates an applications development environment which facilitates the process of entering rules to the knowledge base. Rules may be entered through a rule editor (see Figure 3.) in the standard IF, THEN format.

3.4 MODELBASE COMPONENT.

The modelbase subsystem of the DSS contains analytical models which are accessed by the knowledge bases to perform procedural and analytical tasks. For this particular problem domain, i.e. flood management, this module is comprised of software for carrying out a structure inventory of damage (SID), computing the estimated annual damage or flood damage from a particular flood event (EAD), and also the geographic information system (GRASS). These programs are discussed below.

3.4.1 GRASS .

The Geographic Resource Analysis Support System, (GRASS), GIS, was developed by the US Army Corps of Engineers and is a public domain geographic



Rule Name

If

<=	(counter11-NSTAG)	0
Name	SSAGE	SSAGE

→ loop11

Actions

Execu	"echo @V(SSAGE) >> sDP"	@TYPE=EXE
Do	counter11+1	counter11
Reset	SSAGE	
Reset	loop11	

Inf. Priority Number 1

Inf. Priority Slot

Comments

Why

Figure 3. Rule editor in NEXPERT

information system. It is an integrated set of programs designed to provide digitizing, image processing, map production and geographical information system capabilities to users. GRASS provides many routines which assist in analyzing watersheds and also provides capabilities to display geographic data on screen which can assist the user in the visual comprehension of queries performed.

3.4.2 SID.

The Structure Inventory of Damage (SID) analysis program is part of the Flood Damage Analysis Package developed by the US Army Corps of Engineers. It is designed to assist in the systematic and expeditious collection, management, and processing of data related to structures subject to flooding. Its prime function is to generate elevation-damage functions by damage categories and reaches. SID can also perform an analysis of some non-structural flood control measures and generate a modified elevation-damage curve based on user input specified. Non-structural measures which SID is capable of analyzing are Flood proofing, structure relocation and raise- to- target - elevation analysis.

3.4.3 EAD.

The Expected Annual Damage (EAD) analysis program was developed to assist in economic evaluation of flood plain management plans, US Army Corps of Engineers (1989). The program computes inundation reduction benefits. Damage may be computed in three modes:

Damage for a specific event;
Expected annual damage for a specific year or years; and
Equivalent annual flood damage given a particular
discount rate and period of analysis.

In calculating damage for a specific event several damage categories such as urban, agricultural and residential may be analyzed at the same time and these are totalled for each plan and each reach selected. Expected annual damage may also be computed for conditions existing in the past or expected in the future. Equivalent annual damage can be computed when a discount rate and a period of analysis is specified. EAD also has the capability to analyze several structural flood control measures.

3.5 DATABASE SUBSYSTEM.

The database subsystem is the part of the system which facilitates data storage and manipulation. It is important, in the development of large applications programs which utilize large amounts of data and have several programs communicating with each other, to have a module which has the capability of providing efficient data storage, handling and manpulation services to each program and the system as a whole. A relational database manager named ORACLE was selected for the task and some of its features are discussed below.

3.5.1 ORACLE.

The database management system contains a relational database management system, ORACLE, which can be used for making queries of the domain specific information as well as being used for intermediary or final report generation. NEXPERT is fully integrated with ORACLE through a database bridge whereby instructions made through the "actions" block of the knowledge base rules in Structured Query Language (SQL) are readily interpreted by ORACLE and the required information is generated. Data from other components of the system can be loaded into ORACLE and manipulated by SQL commands and can be output in the required format for use by pertinent models.

3.6 DISPLAY/ GRAPHICS SUBSYSTEM

One of the major roles of the display/graphics subsystem is to improve the comprehension of the spatial and time-dependent information utilized by the system by providing visual diagrams of the results of analyses performed. This feature aids the decision-maker in comprehending the results of various alternatives thus leading to a more optimal choice of measure.

The user interface developed for the system to be designed plays a key role in the effective interpretation of commands from the user and results from the system. In this particular case, NEXPERT, which is to control the consultation session, contains a built-in user interface called the session controller which provides an adequate user-machine communication interface for most general purposes. NEXPERT, however, has the capability of enabling a more graphical user-interface to be built on top of the application and this interface may be customized to a particular firm's or agency's needs.

3.7 EXPERT SYSTEM COMPONENT.

The use of an expert system shell as the central part of the system provides an easy way whereby heuristics and rules-of-thumb can be incorporated into the consultation in areas where engineering expertise may benefit the user. Any rule or hypothesis in the knowledge base can be expanded to include subjectivity and heuristics into the consultation by specifying the knowledge base in the required rule.

The use of NEXPERT as the system manager also allows the DSS to take advantage of many of the features that are characteristic of such expert system shells and use these to an advantage. One such feature is the consultation trace option normally found in most ES shells. This allows the user to monitor the reasoning which led to the arrival of a particular conclusion or solution.

Expert systems provide a way in which a high level of engineering expertise can be provided in a limited domain to the user of the system in order to assist him in providing solutions to the specific task on hand. They can also be used to enrich the experience of the user towards the particular task, thus enabling him to make more informed decisions to ill-structured problems. Such knowledge bases containing heuristics and rules-of-thumb may be accessed by the user as required.

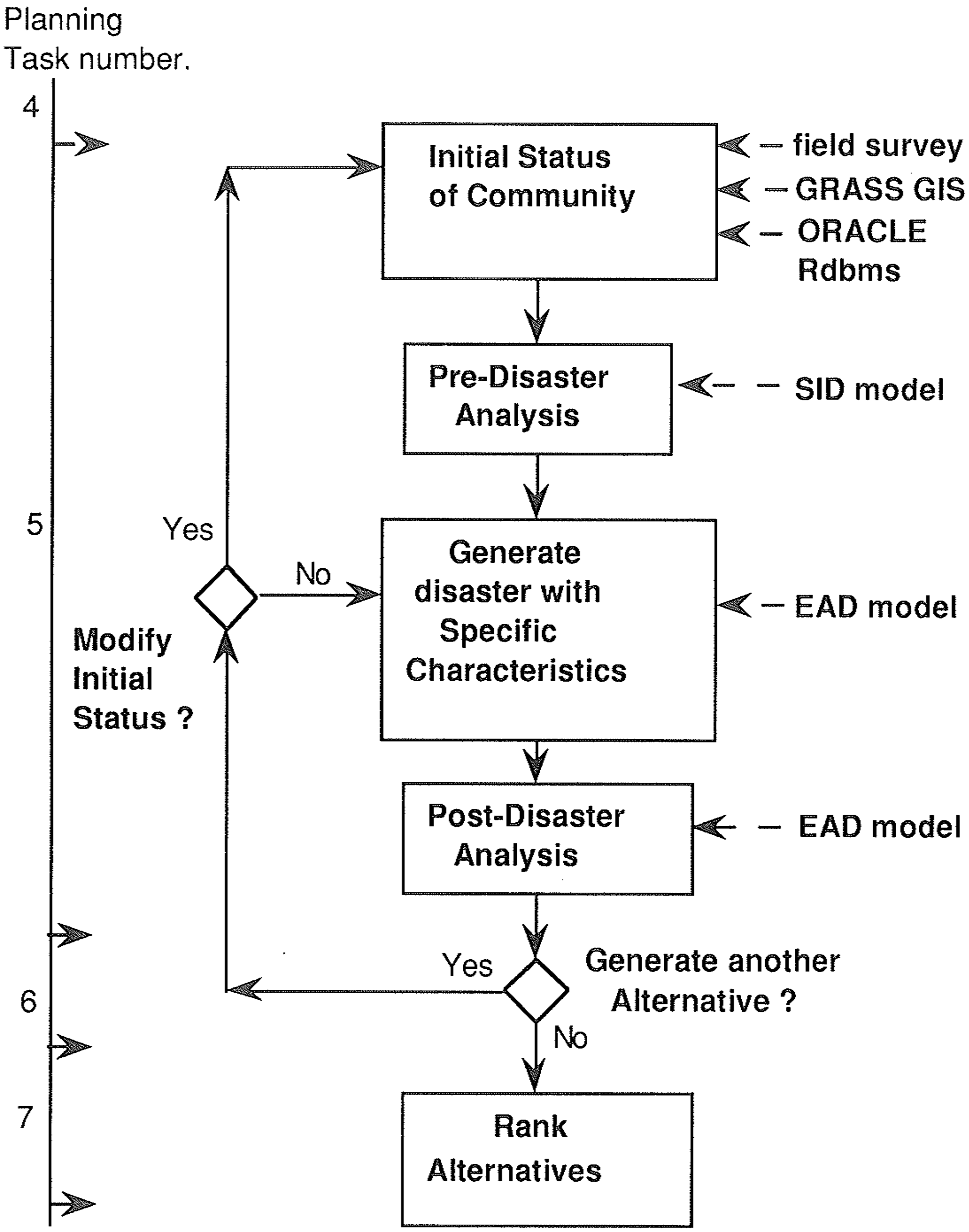
4. DECISION SUPPORT SYSTEM OPERATION.

4.1 FLOOD DAMAGE ANALYSIS PROCEDURE.

The DSS provides support for carrying out the flood damage analysis procedure as shown in Figure 4. The first part of the procedure comprises the survey of all information related to the flood plain, including locational and structural data. This data is then transferred into the SID program which performs a structure inventory of damage and outputs the aggregated elevation-damage curves for each reach. This data is then transferred to a data storage file for use by the EAD program which computes the flood damage or expected annual damage based on specified flooding parameters. Other consequences of each flood such as the total area flooded and also the cost of implementing flood proofing measures is computed and made available for alternative comparison. The detailed procedure for the analysis is elaborated on below.

4.2 GENERATING INITIAL COMMUNITY STATUS.

The process of generating the initial status of the communities in the study area is discussed under three main headings; conducting a field survey of the region, geographic data input using the GIS and updating the relational database.



4 - Eng. Objectives
5 - Basic Data & Analysis
6 - Alternative Plans
7 - Selection of Plan

FIGURE 4. DIAGRAM OF THE FLOOD DAMAGE ANALYSIS PROCEDURE

4.2.1 FIELD SURVEY

A field survey is normally carried out to obtain detailed information on the characteristics of the study area if detailed information on the basin is not available. Information such as the type, cost and ownership of buildings in the region must be obtained to be able to accurately represent the amount of damages that will be incurred by each homeowner as well as the region as a whole. However, where adequate data on these charactersitics have already been documented, or where certain characteristics such as house prices do not vary much within the basin, average values may be used throughout the basin for preliminary analysis purposes. A detailed field survey should however be made before any major flood control plan is implemented. Data from this process is entered into the study area database as will be described in the following sections.

4.2.2 GEOGRAPHIC DATA INPUT

A major aspect in the use of any simulation model is the task of acquiring the necessary data for its effective use. As well, this data usually has to be formatted specifically (pre-processed) before it can be used in the model. Advances in the field of remote sensing technology have, over the years, made geographic data more readily available as input to geographic information systems and hydrologic models, and these procedures have been documented in several studies, as detailed in Chapter 2. Geographical features such as land-use, land cover and elevation data can be extracted from areal photos or satellite pictures more easily than before, and this has led to such information being cheaper and easier to obtain. Such data often may be obtained from provincial or federal departments, or it may be input from ordinary paper maps by the use of a scanner or a digitizer. Data which is input by the user by scanning or digitizing normally has to be checked for accuracy and errors due to equipment.

Data obtained from provincial or federal agencies may consist of several map layers, each containing features which contribute towards the complete description of the study area. A typical cross-section of map layers which make up a study area are as listed below:

Layer A	Designated Area	e.g.,	golf courses, airstrips;
Layer B	Building	e.g.,	fire stations, houses, museums;
Layer C	Structure	e.g.,	smoke stacks, storage tanks;
Layer D	Roadway/Railway	e.g.,	paved roads, bridges, rail lines;
Layer E	Utility	e.g.,	electrical poles, water towers;
Layer G	Hydrography	e.g.,	bogs, ditches, dykes, marshes, ponds;
Layer H	Hypsography	e.g.,	contours, water levels;
Layer J	Land Cover	e.g.,	orchards, trees;
Layer K	Textual	e.g.,	road names, cities, towns, villages.

Table 1. Typical map layers contained in a geographical map.

GRASS facilitates the task of data input and management by providing the routines for analyzing and extracting data from these map layers to assist in generating a complete inventory of the flood plain, i.e., assisting in the field survey process. Data such as topographical data and structural data are input into the GIS and manipulated to produce output files, which can in turn be loaded into the relational database manager, ORACLE. This is part of the process of building up the community inventory database.

4.2.3 UPDATING THE RELATIONAL DATABASE

The relatonal database contains fields which represent the parameters which the structure inventory analysis model (SID) requires for the program to run effectively. This comprises data such as the location of each building in the flood plain, the owner, the cost of structure the damage category of each structure, etc. Appendix A-1. details the list of fields contained in the database and what they represent. Appendix A-2. also lists the SQL commands used to create these fields in the database. Data from GRASS provides input for the fields ROWN, COLE, IBDLG, ADJ and IDRCH. The information on the location, reach and structure identification number are obtained from GRASS by running the {sites} program in GRASS. This program performs a site occurrence report based on 1 or more map layers, and writes these statistics to a data file. The data output produced by this program can be read and re-formatted by a Fortran computer program and then loaded into the database fields in ORACLE by using the SQL command SQLLOAD, (Appendix A-3).

This information, inputted from GRASS, then serves as the basis for entering the information required for the other fields. This can easily be done using SQL commands. For example, the SQL command

```
UPDATE Adolphe
SET  V1FS = 50000
WHERE  IBDLG = 365;
```

performs the task of assigning a value of $50,000 to building number 365,(IBDLG=365).

Thus the existing conditions in the flood plain can be efficiently documented by using the information from the GIS and field survey. The completely updated database can be output to a file using the SQL command SQLREPORT (Appendix A-4), making such information available for use by SID.

4.3 PRE-DISASTER ANALYSIS.

An important task of the DSS is in providing input for the two damage models to be used in the flood damage analysis, namely SID and EAD. NEXPERT, as the system manager, assists in the input of data into these models by providing a sequential consultation designed to maintain the focus of the user on a particular task till each sub-task is completed. This is important because the manner in which records are listed in these models' input files, which corresponds to the manner in which records are read, does not cater to the focusing on one specific task fromstart to end. This also prevents the user from omitting necessary data needed to run the model based on the criteria he specifies, and thus save costly time which may be spent in debugging the input data.

Such a hierarchial procedure also improves the comprehension of the user towards the analysis procedure as a whole and can thus help in the selection of different alternatives to examine. It also leads to a greater acceptance of the DSS since the analysis procedure can more easily blend into the decision-making process. This interactive process is described below.

4.3.1 INTERACTIVE MODELLING

The rules stored in the expert system's knowledge base govern the order in which each question is put to the user. These rules are listed in Appendix B-1. A backward-chaining inference control strategy was used to provide an efficient consultation, since the number of possible outcomes was not large. A diagram illustrating the backward-chaining layout is shown in Figure 5.

For the SID consultation, the user is first prompted by the Session controller in NEXPERT for a title for the particular run, (as shown in Figure 6), which will be used on all output for the program. After this, the user is then prompted to specify whether any non-structural flood control measures will be applied to structures in the flood plain, and if

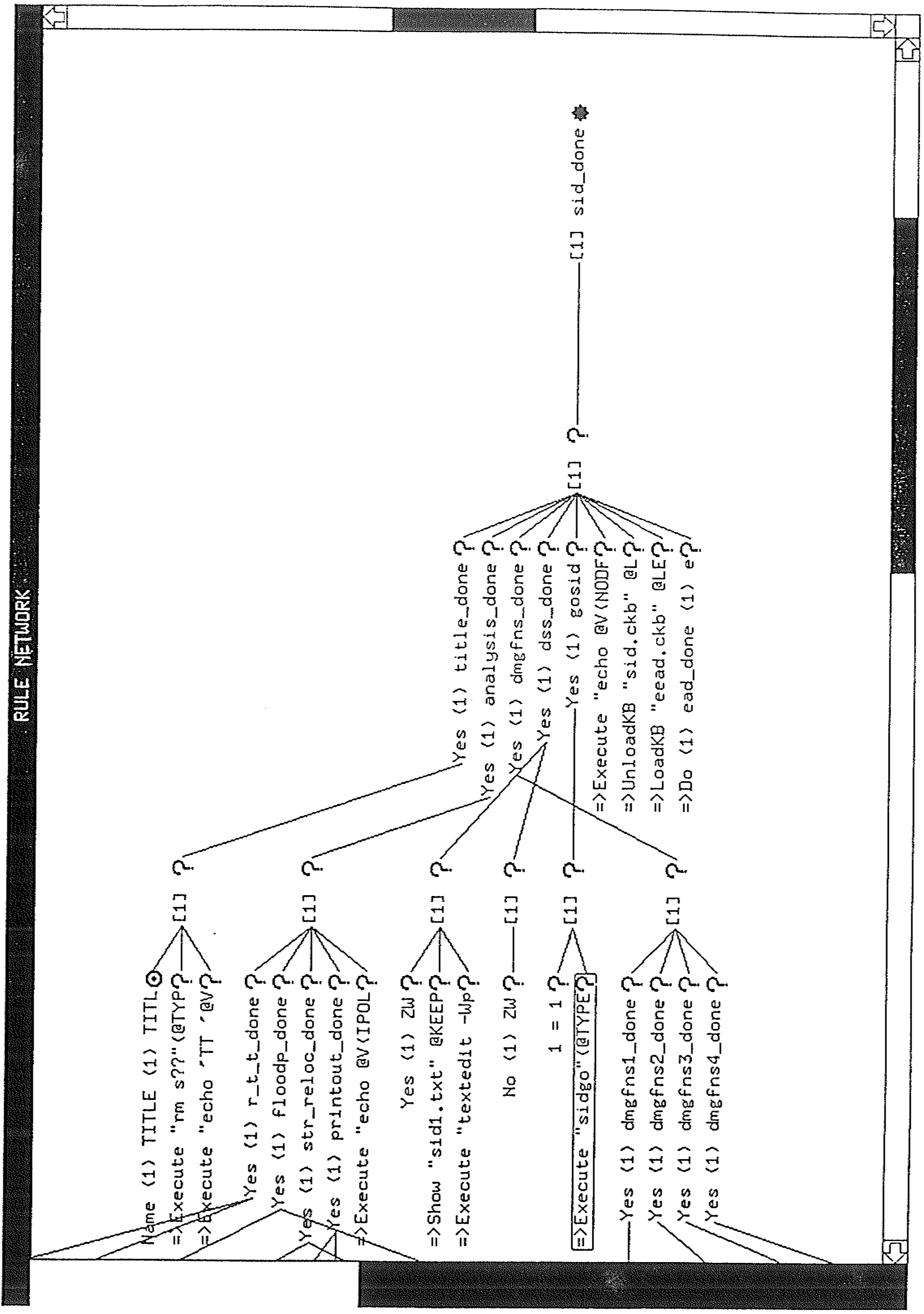
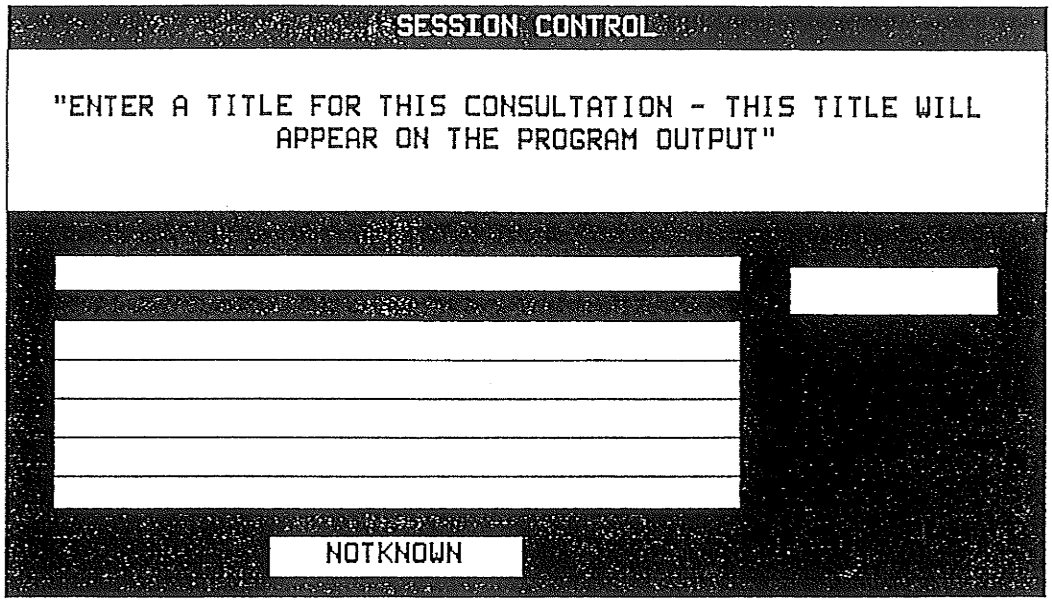


Figure 5. Schematic of the backward-chaining process



"ENTER A TITLE FOR THIS CONSULTATION - THIS TITLE WILL APPEAR ON THE PROGRAM OUTPUT"

Figure 6. Session Control window in NEXPERT

so the type of measure to be applied. Three options are provided in the model namely, raise-to-target-elevation analysis, flood-proofing analysis and relocation of structures analysis, to be used for the analysis. For each measure selected, the inference mechanism determines the rules which need to be selected in order to prompt the user for information which must be provided for the proper implementation of the measure.

The system then prompts the user for information related to the flood plain such as the number of damage categories, the number of damage reaches and the different damage functions that may be applied to a particular category. The damage function for a particular structure or category of structures represents the manner in which the elevation-damage relationship is defined for that particular category or structure. The damage function may be represented as an elevation - percent-damage relationship (i.e. if the flood level is 1ft above the first floor level then 20% of the structure value can be said to be lost, and so on), or it may be represented as an elevation - direct-damage relationship (where the different flood levels correspond to a certain amount of damage). The user, upon specification of a damage category is prompted for a name of a damage function and also whether the damage function values to be input are elevation - percent-damage values or elevation - direct-damage values, and then NEXPERT prompts for these values to be input. The session continues until all values needed for the model to run are input.

All the values obtained from this hierarchically oriented consultation process are written to data files whose filenames correspond to the respective record names of the program for efficient program documentation (i.e., all input data for record 'J1' are written to a file named 'sJ1', 'J2' records to 'sJ2', etc) . After all the necessary values are obtained, Fortran programs, (listed in Appendix C), read the respective files and combine these results with the output obtained from the ORACLE session to produce an input data file for use by the SID model. Thus the user can generate several different scenarios using NEXPERT and obtain the elevation-damage relationships for them.

The user has the option, after running the SID program, to specify that the output be written to a data storage utility named HECDSS, where it may be accessed subsequently by the EAD program.

4.4 GENERATING FLOOD MANAGEMENT ALTERNATIVES

The selection of the type of structural or non-structural flood control measures to use in a given situation depends on several factors such as the physical and economic feasibility of the proposed measure, the stage of the expected flood, the amount of flood warning time that may be given, and the velocity and duration of the expected flood. For the most part, flood control measures classified as structural are normally implemented over a regional scale such as reservoirs, dyke and dams, whilst non-structural measures are generally implemented to individual or small groups of structures.

The optimal choice of implementation of structural or non-structural measures or a combination of both must be based both on the physical parameters outlined above and also on engineering expertise in the area of flood management. Expertise is required for several reasons. For example, incentives may be provided to householders in the flood plain to implement certain types of flood control measures for their own safety, but regardless of the risk, they may for one reason or another refuse to implement these measures. They may also be reluctant to provide funds in the form of levies or taxes for large scale structural flood control measures if the anticipated floods have not materialized in recent times, even though severe flooding is likely to occur in the region. Attractive flood insurance rates may also not be taken advantage of due to a false sense of security by these residents.

This human factor as well as the experience of engineers in applying the available measures in other relevant flooding situations needs to be taken into account when selecting flood control measures for a particular area, and one way in which this information can be collated and provided to the user of the DSS to access and make and informed decision is through the use of expert systems.

Although an expert system which incorporates this necessary knowledge is currently not integrated into the system, it is planned to be added in future research work to be implemented on the system.

4.5 POST-DISASTER ANALYSIS

Subsequent to the generation of the elevation-damage relationships produced by the SID model, the system loads up the knowledge base containing the consultation for the damage model, EAD. Likewise, NEXPERT generates a systematic hierarchical consultation for the input of the required data needed to run the model. A description of the consultation is given below.

4.5.1 INTERACTIVE MODELLING

The user is first prompted to enter a title for the consultation which will be used on all program output. Then the user is asked whether a period of analysis consultation is to be performed and if this is true the necessary data needed is prompted for. This data includes the length of the period of analysis, the year representing existing conditions, the year in which the plan becomes operational, and other relevant data. The user may also specify an affluence factor which represents the change in the value of a structure or its contents over the period of analysis.

The user is then asked to specify the number of different plans to be evaluated in this particular computer run. This is the number of different flooding scenarios to be used in this particular consultation. Upon specifying the number, the user is asked how the flood data for this run will be input. Data may be input in three different formats, exceedance-frequency values, flow values or stage values. Each format may require additional data to be provided and NEXPERT prompts the user to provide additional information as shown below:

SELECTION		REQUIRED DATA		ADDITIONAL DATA
Exceedance-frequency values	---->	flow-frequency values	---->	stage- flow values
	---->	stage-frequency values		-
Flow values	---->	stage-flow values		-
Stage values		-		-

All the above options also require the input of information on the elevation-damage relationships existing in each reach. This data may be input manually or may be retrieved directly from the HECDSS data storage file created by the SID program by specifying the alternative name and pathname of the data.

All the data received from the consultation are written to data files and upon completion of the input process a Fortran program reads these files and formats the data into an input file which is read by EAD. The rules for the consultation are listed in Appendix B-2. The EAD program is then run and the values of damage or expected annual damage can be obtained.

4.5.2 FLOODING CONSEQUENCES

There are several indicators that may be computed in order to determine the consequences of a particular flooding event or a series of flooding events. These indicators provide some of the necessary information which can be utilized to rank the set of alternative flood control plans generated. A number of indicators may be generated from the consultation process developed, and these are discussed below.

Expected Annual Damage

The expected annual damage is a frequency weighted sum of damage for a range of possible damaging flood events, and can be visualized as what might be expected to occur in the present or any future year. By using the EAD program, the expected annual damage is determined by computing a damage-frequency matrix from input data and then weighting each damage value according to its percent chance of exceedance.

Specific Event Flood Damage

Damage may be computed for a specific event, such as a historical flood event or a future anticipated event, by selecting this option in the EAD program consultation and entering in the required value.

Area Flooded by a Specific Event

The area flooded by a specific flood event may be computed by using the GRASS program. The elevation corresponding to the particular event is input to NEXPERT and the flooded area corresponding to this stage is displayed on the elevation map. The GRASS program {report} is then accessed to generate a report on the total area taken up by the displayed flooded area, and this is then multiplied by actual area of each cell to arrive at the actual flooded area.

Individual Structure Damage

Individual structure damage may be determined by first comparing the flood stage for the particular event to the ground elevation of the building as listed in column ADJ of the structure inventory database. If flooding is found to have occurred, by the ground elevation being lower than the flood stage, then a multiplication of the damage function for the particular structure and the cost of the structure will yield the damage done to it.

5. CASE STUDY - GREATER WINNIPEG AREA FLOOD MANAGEMENT.

5.1 INTRODUCTION

The city of Winnipeg in Manitoba, Canada, and areas along the banks of the Red River upstream of the city, (see Figure 7.), have a history of flooding which dates back several decades. These floods have caused much damage and destruction, the most notable in recent decades being the Red River flood of 1950. In the years subsequent to this event several flood control measures were put in place, aimed at providing flood protection for the residents of the city of Winnipeg. A primary dyking system was constructed soon after the 1950 flood to protect some of the low-lying areas along the Red, Assiniboine and Seine rivers throughout the city. The Red River floodway was completed in 1968; the Portage diversion in 1970; and the Shellmouth Reservoir in 1972. The operation of this flood control system maintains upstream water levels to their natural levels, and thus does not reduce the flood hazard of areas upstream of the Red River floodway. During the most recent instances of high water levels on the Red River, i.e., 1974 and 1979, residents upstream of the floodway incurred heavy damages with some buildings being washed away and several residents having to be evacuated from the area.

The area chosen for this study, highlighted in Figure 7 and detailed in Figure 8, represents an area of 10 x 13 sq km. just upstream of the inlet control structure and Red River floodway which provide flood protection for the City of Winnipeg. The main community in the region is St Adolphe, Manitoba. The main occupation of dwellers in the area is farming. The average cost of buildings in the township is $80,000 and in surrounding areas the average cost is $50,000. A dyke known as the West dyke which is part of the flood control works for the city of Winnipeg, runs from north to south through

Figure 7. City of Winnipeg and surrounding areas

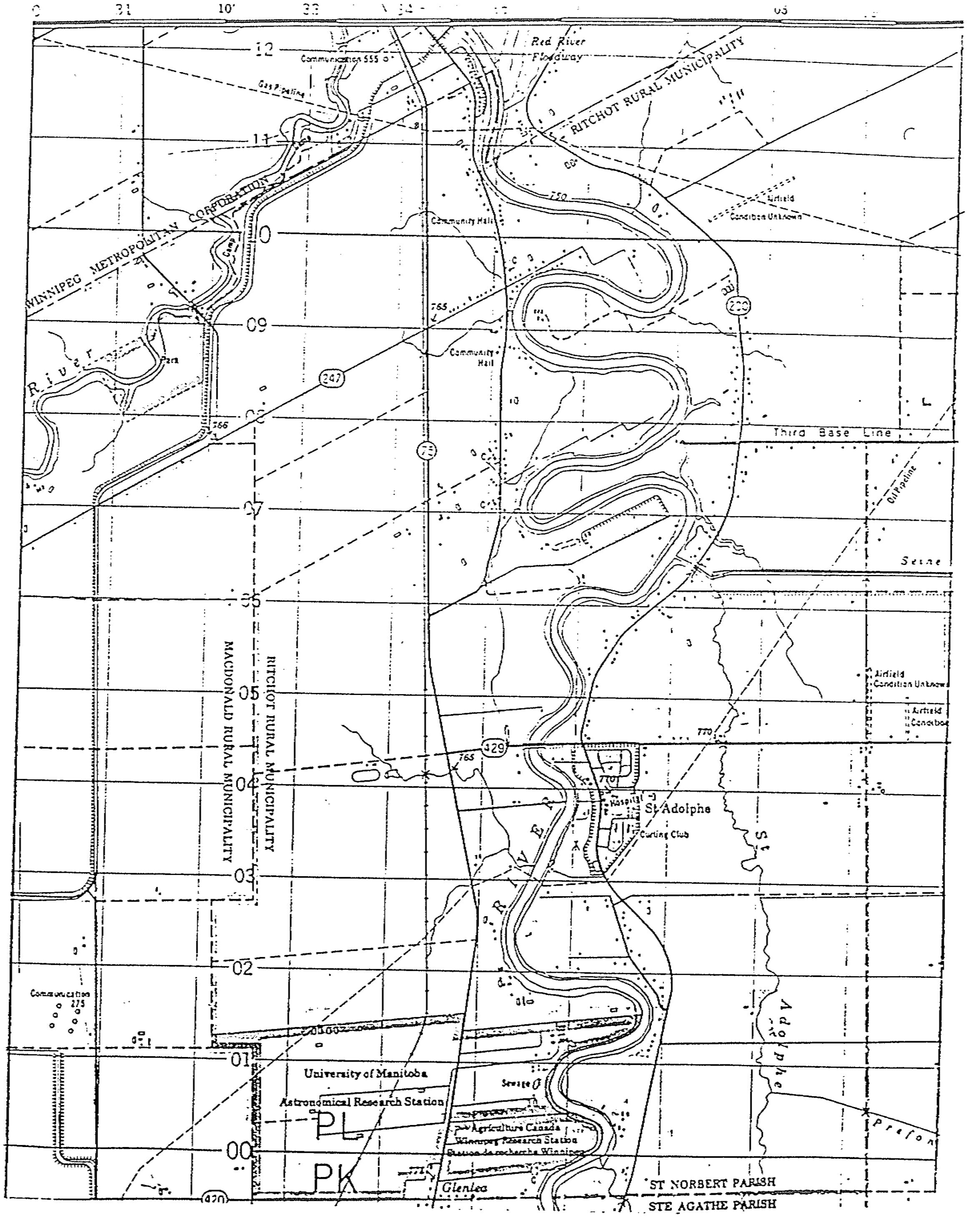


Figure 8. Diagram of the study area

the western part of the study area. Buildings located west of this dyke are protected to a height of 787.4 ft above sea level, which is the elevation of the dyke.

Apart from a few ring dykes around some of the buildings in the region, the area is vulnerable to floods which in general have a small return period. It is intended to use the DSS to generate and evalutate suitable flood control measures for the area and recommend measures which can be taken to protect the communities in the region .

5.2 DATA ACQUISITION, FORMATTING AND INPUT.

Data for the study area was obtained from several agencies including the Water Resource and Remote Sensing Branches of the Manitoba Department of Natural Resources. Pre-processing of data for model input is discussed under the headings geographic data, hydrologic data and database input.

Geographic Data

In Winnipeg, the Remote Sensing division of the Manitoba Department of Natural Resources is the agency that distributes geographic data. These data comes in files covering a typical 1:20000 map area and each file consists of several map layers. Pre-processing was done after obtaining the data files from the agency. The data was obtained in the DLG format, which was close to an acceptable format used in the GRASS GIS software. The GRASS program import.to.vect was used to translate these files into GRASS digit format which is the format used by GRASS to perform analyses. Vector data files that made up the study area were joined together by running the GRASS program Vpatch. The two main map layers to be used in the analysis i.e., the *elevation* map layer and the *buildings* map layer, were pre-processed as follows.

To prepare the *elevation* map layer , the GRASS program digit was run and lines and areas that were not assigned contour values were given values by clicking on them with the mouse and assigning them. These vector files were then converted to raster format using the vect.to.cell program in GRASS. In order to generate a continuous surface from the contour layers the program Gsurface was run. This program fills grid-cell values with interpolated values, using numerical approximation techniques. The resultant map was edited after this program was run to ensure that important features on the map such as the West Dyke had the correct elevations. This was done by running the digit program to digitize the corrections on a new map and then by combining the old map and the corrections map using the combine program. This procedure resulted in obtaining a corrected and authentic *elevation* map layer.

The elevation map for the study area, generated from the above procedure, contained elevations that ranged from 705.4 ft at the surface of the Red river to 820.2 ft at the top of the Inlet Control structure. The contour intervals obtained after running the interpolation program {Gsurface} was 3.3 ft. A diagram of this is shown in Figure 9. Thirty-four intermediate values were generated.

With respect to processing the *buildings* map layer, the GRASS program {digit} was also run. In order to be able to determine the elevation at a particular structure or building a single point was marked for every building on a new cell map. By overlaying this new map on the elevation map the elevation corresponding to these points is determined, and this is taken to be the ground elevation for each respective building. These reference elevations are used in the subsequent analyses. The {sites} program was used to perform analyses on the *buildings* map layer and the *elevation* map layer to generate information on the coordinates of each building in the flood plain as well as the ground elevation at each location. Each building was given a unique identification number in the process. The information i.e. North coordinate position, East coordinate position, identification number and ground elevation, provide the neceesary data to fill the ROWN, COLE, SITENO and ADJ columns respectively in the database.

Hydrologic Data

Data for the annual flood peaks (see Table 3) and the stage-discharge relationship (see Table 4 and Figure 12) at the inlet control structure were obtained from the Water Resources Branch of the Manitoba Department of Natural Resources. The average cost of buildings in built up areas was $80,000 and elsewhere $50,000. The majority of buildings in the township were classified as two-storey no-basement (2SNB) buildings and the average classification elsewhere was single-storey no-basement (1SNB) buildings, and these values were used as approximate values throughout the study area. The elevation - percent-damage function relationships were obtained from U.S. Federal Insurance Agency (1970) curves for similar building categories. The discharge - probability-exceedance frequency curve was generated for the flow values obtained in Figure 13. Buildings east of the West Dyke were assigned to category 1 and buildings west of the West Dyke were classified as being in category 2.

Database Input

Data from the GRASS program is input into the database by the commands given in Appendix A-3. These values are used as the basis for updating the remaining columns in the database. The commands used to update the database which are based on information pertinent to the study area are as listed in Appendix A-5. The resultant updated database is as listed in Appendix F.

YEAR	FLOW (cfs)	YEAR	FLOW (cfs)	YEAR	FLOW (cfs)
1913	45100	1935	15000	1957	23100
1914	15600	1936	37700	1958	18500
1915	11500	1937	7750	1959	35000
1916	71200	1938	15400	1960	68700
1917	39700	1939	12600	1961	17000
1918	14300	1940	17600	1962	59600
1919	23500	1941	41800	1963	23300
1920	22200	1942	45600	1964	35400
1921	58700	1943	42200	1965	64200
1922	23100	1944	17400	1966	88200
1923	42000	1945	52500	1967	61000
1924	13400	1946	38100	1968	18000
1925	51400	1947	38100	1969	75800
1926	32200	1948	36700	1970	80100
1927	36800	1949	69000	1971	58900
1928	24300	1950	48100	1972	57600
1929	37500	1951	103600	1973	18900
1930	38700	1952	37600	1974	96500
1931	24300	1953	12600	1975	61900
1932	37500	1954	18500	1976	64800
1933	38700	1955	53700	1977	6600
1934	15600	1956	68800	1978	67000

Table 2. **Annual Flood Peaks**

STAGE	FLOW (cfs)	STAGE	FLOW (cfs)	STAGE	FLOW (cfs)
708*	13000	749	54000	759	94000
712*	15000	750	57000	760	100000
716*	17000	751	60000	761	106000
720*	19000	752	64000	762	115000
724*	21000	753	68000	763	126000
728*	24000	754	72000	764	140000
732*	26000	755	75000	765	160000
736*	30000	756	80000	766	180000
740*	35000	757	84000	767	205000
744*	41000	758	88000	768	230000
748	50000				

* - estimated values

Table 3. **Stage-discharge values for St. Adolphe**

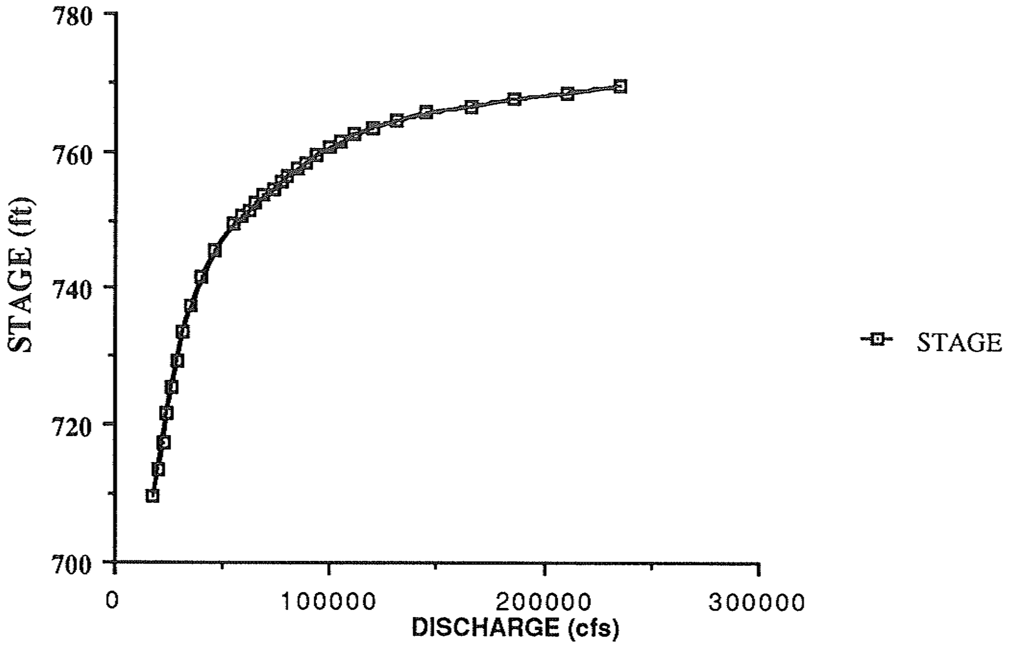


Figure 9. **Stage-discharge relationship.**

5.3 STRUCTURE INVENTORY ANALYSIS.

The SID program was used to determine the elevation-damage relationship for the existing conditions in the region. The consultation for data input into the model was as described in the previous chapter. Buildings situated in the area west of the West Dyke are protected from flooding of the Red River to a height of 787.4 ft and this was taken into

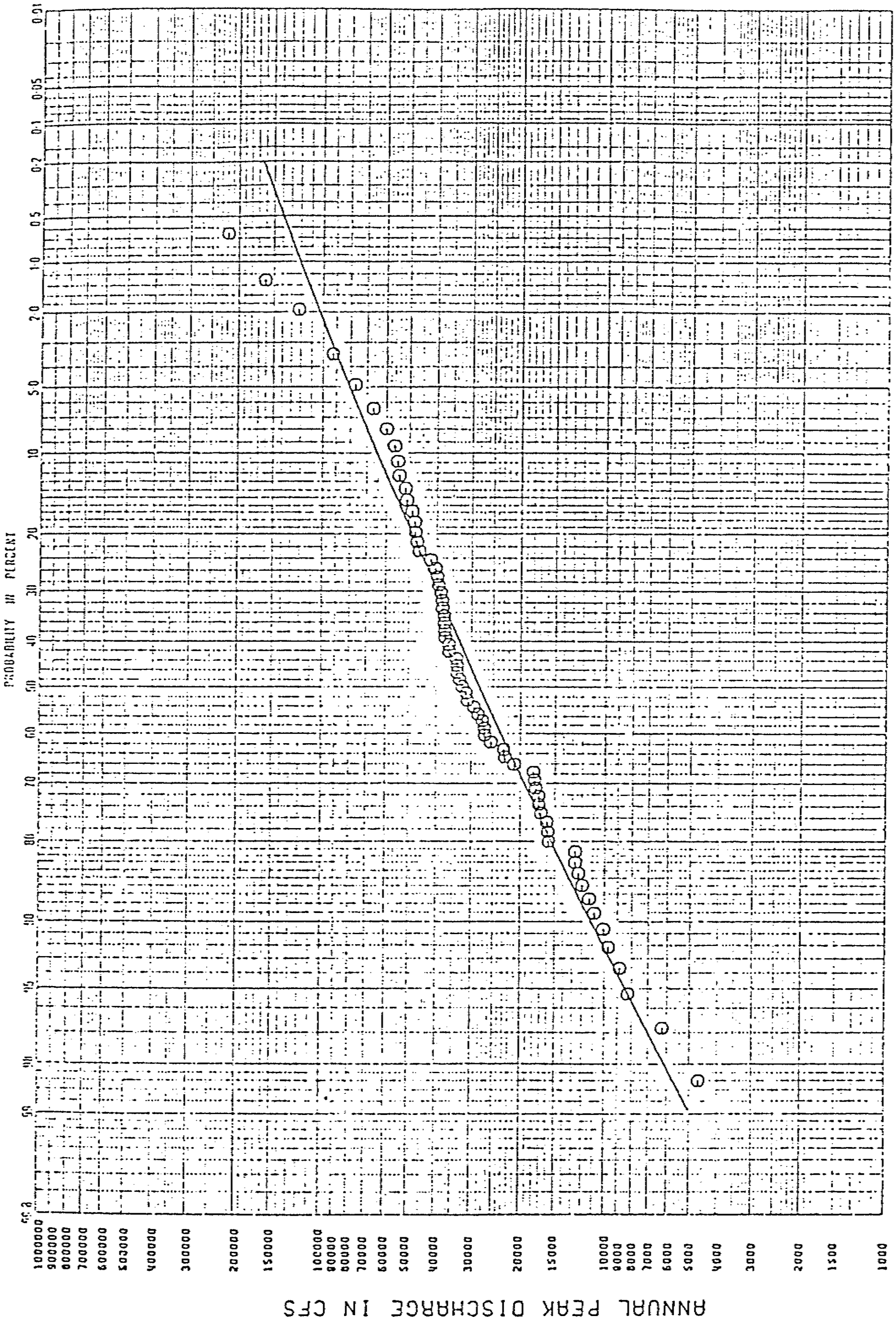


Figure 10. Discharge - probability curve

account when generating the elevation-damage relationship for this area, by specifying in the consultation that all these buildings are flood-proofed to a height of 787.4 ft.

The elevation-damage relationship was also generated for a number of flood control measures that were deemed both physically and economically feasible to be applied to the region. These measures were applied to only the buildings east of the west dyke, since the West Dyke offered the remaining dwellings some form of protection. Three non-structural measures and one structural measure were considered as both ecenomically and physically feasible measures in the region.

The feasible flood control measures investigated are as shown in Table 4 below

1. Existing Conditions.
2. Raising individual structures to a height of 3ft.
3. Raising individual structures to a height of 5ft.
4. Flood Proofing individual structures to a height of 3ft.
5. Flood Proofing individual sructures to a height of 5ft.
6. Relocation of structures to above the 754.0 ft.
7. Dyking along the Red River to the 725.4 ft level, i.e, a 20ft dyke.
8. Dyking along the Red River to the 745.4 ft level, i.e, a 40ft dyke.

Table 4. Feasible flood control measures.

Raising individual structures and flood proofing analyses were performed to a maximum height of 5 ft which is the recommended maximum height taking into account the economic burden to householders and aesthetics, (U.S. Army Corps of Engineers, 1987). Also, average annual cost as a percentage of structure value data was available for the application of such measures to heights of 3ft and 5ft, and since a cost of measure analysis was to be performed these heights were chosen.

Relocation of structures above a height of 750.4ft was also investigated. Several structures had ground elevation below this elevation and from an inspection of the flood plain, there was land available to relocate these structures above this level. The only structural flood control measure considered in the analysis was dyking of the Red River. This was investigated to heights of 20ft and 40ft.

The SID consultation was performed for each of the eight options, and the formatted input files and the output generated from each of these consultations are listed in Appendix D-1 and Appendix D-2, respectively. Output from the SID program for consultations from alternatives 1, 2, 3 and 6 were saved in a data storage utility provided with the programs named HECDSS. This utility makes the elevation-damage data readily available for use by the damage model EAD. The SID model did not permit flood-proofing analysis to be performed on more than one category, and so for options 4,5,7 and 8 the elevation-damage relationship was calculated for category 1 and then added manually to the elevation-damage relationship for category 2 obtained from consultation 1. The elevation-damage relationships for these categories are shown in Table 5.

STAGE (ft)	Alternative 4 (x $1000)	Alternative 5 (x $1000)	Alternative 6 (x $1000)	Alternative 7 (x $1000)
709	0	0	0	0
713	23.8	23.8	0	0
717	27.5	27.5	0	0
721	35.1	35.1	0	0
725	48.2	48.2	0	0
729	70.8	50.0	70.8	0
733	77.5	77.5	95.1	0
737	124.5	124.8	124.8	0
741	149.2	149.2	172.2	0
745	331.9	179.7	364.6	0
749	497.0	497.0	598.2	598.2
753	837.9	837.9	961.7	961.7
757	1435.3	1230.0	1435.0	1435.0
761	2677.8	1757.6	2787.4	2787.4
765	4167.8	3484.2	4487.8	4487.8
769	5752.2	5752.2	6649.8	6649.8
773	8555.0	8555.0	11374.0	11374.0
777	23001.0	16018.0	23062.0	23062.0

Table 5. Elevation-damage data for alternatives 4,5,7 & 8.

5.4 DAMAGE ANALYSIS.

Two particular damage analyses were performed: damage for a specific flood event and expected annual damage over a 50 year period.

Damage for a Specific Event

An analysis of damage for specific events was performed for 3 separate flood events, i.e., the 1950, 1970 and 1974 floods. The 1950 flood was the largest flood in 100 years, and the 1974 flood was the largest in recent decades. The damage accruing from each of these alternatives is shown in Table 7.

Expected Annual Damage

The analytical model EAD was used to compute the expected annual damage for a period of 50 years . The consultation was run interactively as described in the previous section and data from the SID model consultation was loaded into the EAD model for the respective options. The data values used for the computation of the expected annual damage are as listed below

1	Period of Analysis	50 years	
2	Study Year	1992	Year representing existing conditions
3	Base Year	1995	Year when plan takes effect
4	Dollar Year	1992	
5	Affluence Factor	1.2	
6	Discount Rate	5%	
7	Price Level Index	1.0	

Table 6. Data for expected annual damage computations.

	Damage for specific event			Expected Annual Damage			Equivalent Annual Dam.
Measure	1950	1970	1974	2004	2024	2044	
1	2571.0	1319.3	2212.8	389.8	525.0	707.2	435.6
2	1613.7	979.6	1446.1	269.2	362.6	488.4	300.9
3	1261.9	779.9	1137.2	208.4	280.7	378.1	232.9
4	2479.0	1288.4	2149.7	354.8	477.9	643.7	396.5
5	1673.2	1133.9	1533.4	301.3	405.9	546.7	336.8
6	865.0	0	592.1	44.7	60.2	81.1	49.9
7	2571.0	1319.3	2212.8	379.4	510.9	688.2	423.9
8	2571.0	1319.3	2212.8	293.7	395.5	532.7	382.2

Table 7. Damage and estimated annual damage results

5.5 COST COMPUTATION.

Average annual costs as a percentage of structure value data were obtained from U.S. Federal Insurance Agency (1970) data on estimate costs of implementing specific flood control measures. These values are listed in Table 8. The total estimated cost of implementing each non-structural flood control measure in the study area is computed by multiplying the number of structures to which the measure was applied by the cost of each measure. There were 702 buildings in category 1, having an average price of $50,000, and 509 buildings in category 2, with an average price of $80,000. The resultant annual costs are shown in the Table 8.

	Estimated Average annual cost as a percentage of Structure value	Total Cost (x $1,000)
Existing Conditions	-	-
Flood Proofing to 3ft - Flood Wall	1.2	909.8
Flood Proofing to 3ft - Levee	0.5	379.1
Flood Proofing to 5ft - Flood Wall	1.6	1213.1
Flood Proofing to 5ft - Levee	0.7	530.7
Raising Structures to 3ft	2.1	1592.2
Raising Structures to 5ft	2.1	1592.2
Relocation of Structures - Demolish old ones	4.6	3487.7
Relocation of Structures - Leave structures standing	8.7	6596.3
Dyking Red River to height of 240m	-	
Dyking Red River to height of 241m	-	

Table 8. **Costs of implementing flood control measures.**

6. DISCUSSION OF RESULTS.

The decision support system developed in this research work was used to automate the process of generating alternative measures of flood control, and was used to compute indicators of the inundation-reduction benefits to be obtained from applying each measure such as damage from specific events, expected annual damage and the equivalent annual damage. The plots of the values computed for these indicators are shown in Figures 14-16 respectively. The results are discussed in the next section.

6.1 DAMAGE COMPUTATION RESULTS

An observation of the damage caused by specific events, Figure 11., shows that alternative 6 (i.e., relocating structures above a height of 754.0ft) was the measure that reduced damages the most in all the flood events. In the case of the flood of 1970 magnitude, this measure was successful in preventing any damage being incurred by householders living in the region. Alternatives 2 through 5 were also successful in reducing the damage below that which would prevail if existing conditions were to remain. Raising structures by a specified amount however proved to be more effective in reducing damages from these events than flood proofing to similar heights. This was generally due to the fact that both flood protection measures are breached by the selected floods, and since the damage curve for the raising structures options would begin at a higher elevation than that of the flood proofing options, damage by raising structures to 3ft and 5ft was less than flood proofing to 3ft and 5ft.

The expected annual damage, as mentioned previously, is the frequency weighted sum of damage for the full range of possible damaging flood events. It represents the damage for a particular set of hydrologic, hydraulic and damage conditions. Expected annual damage

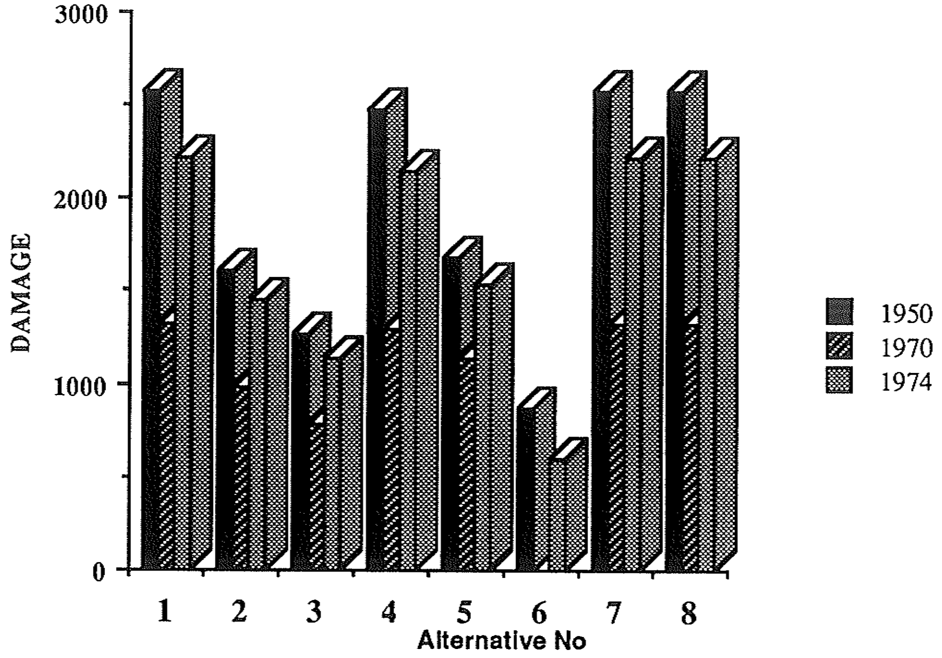


Figure 11. Damages for the magnitudes of the 1950, 1970 & 1974 floods

was computed for each year of the period of analysis and used in computing the equivalent annual damage. In determining the equivalent annual damage, each year's expected annual damage is discounted back to the base year and then amortized over the period of analysis. The discounting formula used was:

$$P = F * \frac{1}{(1+i)^N}$$

where

P = Present amount of some future amount.

F = Future amount.

N = Number of years the future amount is from present.

i = Discount rate.

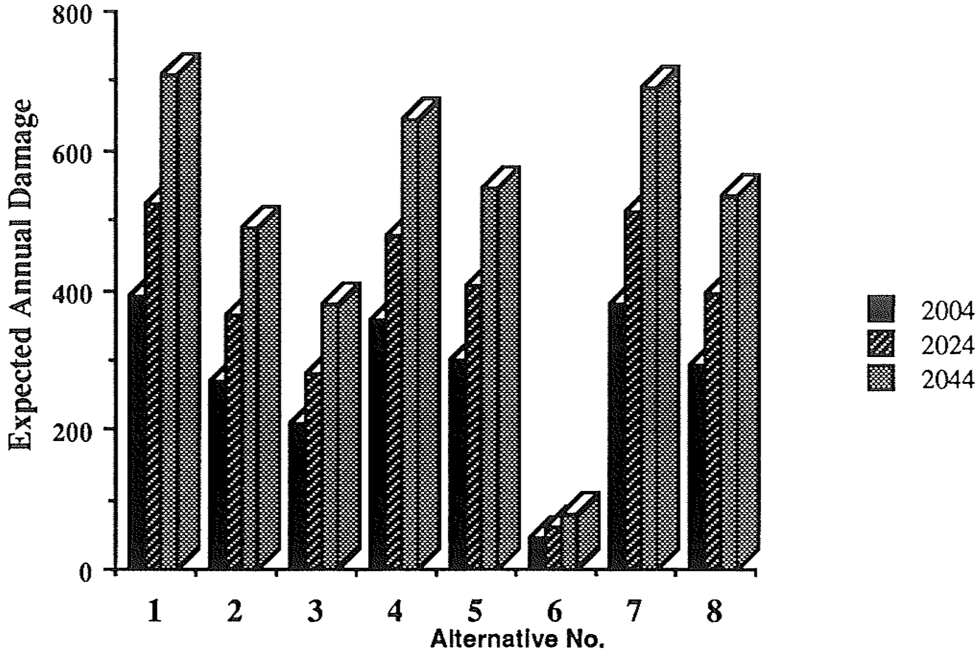


Figure 12. Expected annual damages for years 2004, 2024 & 2044.

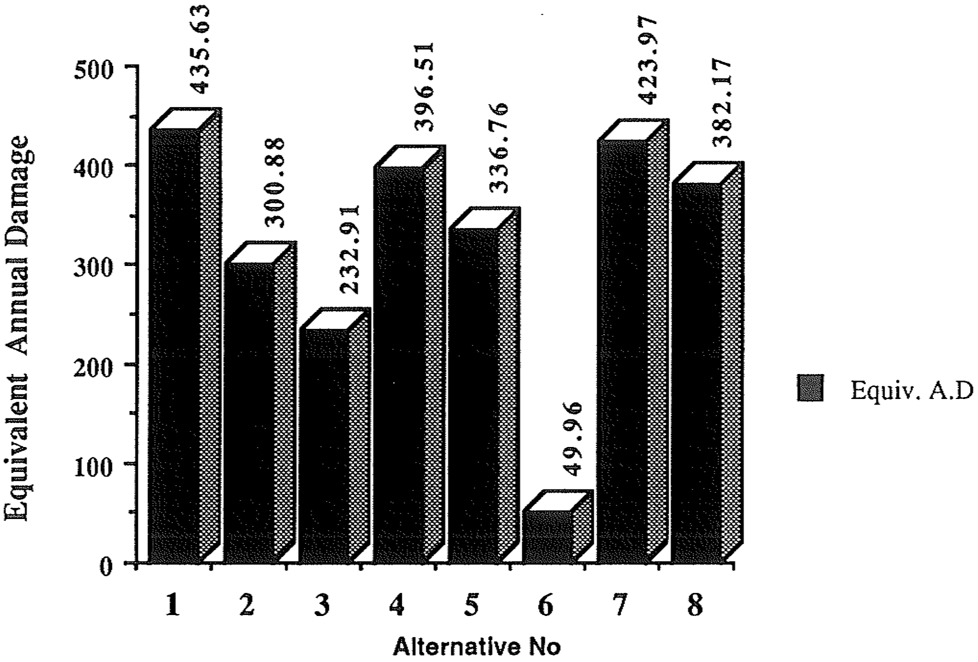


Figure 13. Equivalent Annual Damages.

The present amount of all future amounts over the period of analysis is then amortized using the formula:

$$A = P * \frac{i(1+i)^N}{(1+i)^N - 1}$$

where A = Equivalent annual amount.

The values obtained for the equivalent annual damages for each of the alternative measures are shown in Figure 13. It is seen that alternative number 6 is the measure that has the lowest value of equivalent annual damage, whilst alternative number 7 has the lowest value next to the existing conditions. The structure raising alternatives had lower equivalent annual damage values than the corresponding flood proofing values. Alternative 7, which is the dyking of the Red River to a height of 745 ft proved to be a more efficient measure than flood proofing to a height of 3ft, on the basis of these values.

The inundation reduction benefits of a flood plain management measure are the flood damages prevented by the plan. If it is assumed that the equivalent annual damage computed for the period of analysis represents damage to activities which would occupy the flood plain without a flood management plan, then the inundation reduction benefits can be computed by subtracting the equivalent annual damage for each measure from the equivalent annual damage without the plan.

Average annual costs of implementing the chosen flood control measures to the community as a whole were computed and shown in Table 8. These values showed that the flood proofing options would be the least costly to implement and the relocation of structures and the Red River dyking options the most expensive.

All the values obtained through the consultation are indicators of the benefits and costs that are associated with the implementation of the various structural and non-structural flood control measures that were selected for the analysis, and these values may form the basis for a multi-objective analysis in order to select the most suitable measure for implementation.

6.2 SPATIAL INTERPRETATION

The incorporation of the GIS software into the decision support system architecture provides a powerful tool for the display and manipulation of the results of the analyses performed in the previous chapters. This helps the user of the integrated tool to visualize the results obtained from the various alternatives generated in the previous sessions and allow the user to examine the consequences of these floods in detail, thus enabling a more complete understanding of each measure. There are several ways in which the GIS incorporated can provide visual support to the planning process and these are discussed below.

Showing the flooded areas

In cases where it is desired to examine the consequences of flooding from specific events, flooded areas resulting from these measures can be displayed both in 2-dimension and 3-dimensional overlay on an elevation map layer. This gives a representation of the area which will be flooded by this event. It is possible to utilize the routines provided in the GRASS GIS program to assist in performing backwater calculations along the reach to determine accurately the elevations at various points along the reach. For small reaches or study areas, such as the current project area under study with a size of 10 x 13km, the stage to which a particular flood rises may be displayed as a constant level surface across the reach to provide an adequate flooded area representation.

Displaying damage by elevation.

Another visual display which can help the user to select the particular measure to be applied to the study area is a display of the resultant damage at every point in the reach for every level of elevation. For example, at elevation 750.4 it will be useful to display the variation in damages throughout the reach for a particular flood control alternative. This will assist in locating areas at high risk of sustaining major damages due to a particular flood at a particular elevation and thus highlighting these areas for special attention measures such as possible relocation of structures.

To be able to derive these maps, the damage function relationships for each structure or category of structures is utilized to obtain the elevation-damage relationships. These functions are used in conjunction with the GRASS program Ginfer to generate a new map which is an aggregation of the damages incurred by each building in the reach at a particular elevation. The GRASS program Ginfer is an inference engine which applies a set of user-specified rules to named map layers, U.S.Army CERL, (1988).

The procedure to be used is as follows:

1. The damage functions are first used to determine the actual damage to each building at intervals of 3ft.

2. The GRASS program <u>Ginfer</u> is used to interprete rules listed in a text file by the user and interpretes these to produce a new map layer. A typical rule that is used to generate the damage value for a building is as follows:

```
IFMAP        flooded area   725ft
ANDIFMAP     elevation      705ft
ANDIFMAP     buildings      1
THENMAPHYP   result         40000
```

Interpreted, this rule means that if the 3 maps "flooded area", "elevation" and "buildings" are overlain on each other, and there is a value representing 725ft in the map layer named "flooded area" and there is a value representing 705ft in the "elevation" map layer and if there is a cell representing category 1 in the "building" layer, the assign the value of 40,000 to this cell in a new map layer named "result". [$40,000 is the value computed to be the damage to a building of category 1 submerged to 20ft (725 ft - 705 ft)]

3. By establishing similar rules for the range of the damage function in intervals of say 3ft, the damages incurred for each cell in the map at a particular map layer can be computed and displayed in varying colours for easy interpretation.

4. The consultation for viewing these damage maps is controlled by NEXPERT, which would first prompt the user for the flood to use (i.e. 1970 flood). Then the consultation would then prompt for an elevation layer to view and upon

selection of an elevation layer the damages for every cell on the map is displayed.

7. CONCLUSIONS AND RECOMMENDATIONS

The research work presented in this thesis dealt with the development of a computer aided decision support system designed to provide comprehensive support in the domain of flood control planning, and outlined ways in which such an software tool comprising of an integration of technologies such as expert systems, geographic information systems, flood damage models and other routines can be used towards enhancing the solution process.

The interactive nature of the consultations outlined in the report, as well as the useful domain specific help facilities associated with each rule in the knowledge base of NEXPERT enable the user to quickly familiarize himself with the various tasks involved, such as data input to damage models and the proper selection of variables for model input. The use of already developed interactive shell, NEXPERT, with integratable capabilities also eliminated the time that would have been used in writing linkage code in order to establish the communication links between the various parts of the system.

The running of all the software to be integrated on a similar platform, the workstation platform, enables efficient linkage and inter-communication between the various system components and enables runtime speeds to be kept minimal. The workstation architecture also provided a conducive environment for the development of the system.

Geographic information systems played a key role in addressing the spatial aspects of the problem domain, from its role in providing data input to the damage models to help generate the complete structure inventory to its role in aiding the decision-maker in the visual comprehension of the consequences of the various flood management alternatives. There are several other ways in which GIS can be used to enhance the planning process. In the analysis performed individual structures or categories of structures were predefined from maps and these categories were then flood proofed using the same measure. The GIS could be used to identify clumps or clusters of buildings which are amenable to be grouped into one category whereby joint flood control measures such as a ring dyke may be built around these structures. Identifying criteria such as a proximity distance of 20metres and and elevation range of 3 to 5 ft may be used to determine which structures may be grouped.

The use of a relational database to handle the storage and retrieval of data for use by the damage model facilitated the data handling process. In this project, the study are which made up an area of 10 x 13 km contained 1213 buildings. With a larger and more built up area under examination the data requirements would become large, and the question of ease of data storage and retrieval would be highly important if an efficient database manager were not employed. By being able to easily access, modify and retrieve information stored in the structure inventory database different flood plain scenarios can be constructed and investigated. The information in the database can also be retrieved and used for other inter-agency purposes and will serve as a valuable resource of watershed statistics which can be updated periodically.

There are several areas where the current system can benefit from further work and these are discussed briefly

FUTURE RESEARCH WORK

A complete inventory of all entities within the flood plain such as crops, livestock, utilities, etc, will provide a basis for inputting and obtaining a complete account of the study area and a more accurate damage assessment can then be carried out.

The incorporation of knowledge bases containing engineering expertise to be applied in semi- or ill- structured areas such as the selection of the type of non-structural measures to apply and how to administer these measures (whether applied to individual structures or groups of structures) would further enhance the interactive process by providing online expertise to the user's fingertips.

The collection of additional hydologic and hydraulic data such as channel morphology, and the inclusion of a model for hydrologic computations such as the HEC-2 model would enable accurate water surface elevation computations to be determined along the river reach.

The possible incoporation of multi-media applications such as animation - whereby the flood wave is simulated along the flood plain - and sound effects - providing accompanying sound which varies depending on the flood magnitude may help to improve the consultation process.

REFERENCES

Armstrong M.P. and Densham P.J. (1990) "Database organization strategies for spatial decision support systems", Int. Journal of Geographic Information Systems, Vol.4, No.1, pp. 3-20.

Arnold, J.G. and Sammons, N.B. (1988) "Decision Support System for Selection Inputs to a Basin Scale Model", Water Resources Bulletin, Vol 24, No.4, pp. 749-759.

Buehler, K.A. and Wright, J.R. (1991a) "Bayesian Reasoning Shell For Land Management. I: Structure and Function", Journal of Computing in Civil Engineering, Vol.5, No.3, pp. 267-281.

Buehler, K.A. and Wright, J.R. (1991b) "Bayesian Reasoning Shell For Land Management. II: Implementation", Journal of Computing in Civil Engineering, Vol.5, No.3, pp. 267-281.

Burrough, P.A. (1987) "Principles of Geographic Information Systems for Land Resources Assessment", Clarendon Press, Walton Street, Oxford OX2 6DP, United Kingdom.

Cline, T.J., Molinas, A. and Julien, P.Y. (1989) "An Auto-Cad-Based System For The Hydrologic Model HEC-1", Water Resources Bulletin, Vol.25, No.3, pp. 641-652.

Davis, J.R., Nanninga, P.M., Biggins, J. and Laut, P. (1991) "Prototype Decision Support System For Analyzing Impact Of Catchment Policies", Journal Of Water Resources Planning And Management, Vol.117, No.4, pp. 399-414.

Fedra, K. (1985) "A Modular Interactive Simulation System For Eutrophication And Regional Development", Water Resources Research, Vol.21, No.2, pp. 143-152.

Fedra, K. and Loucks, D.P. (1985) "Interactive Computer Technology for Planning and Policy Modelling", Water Resources Bulletin, Vol.21, No.2, pp. 114-122.

Goodrich, D.C., Woolhiser, D.A. and Keefer, T.O. (1991) "Kinematic Routing Using Finite Elements On A Triangular Irregular Network", Water Resources Research, Vol.27, No.6, pp. 995-1003.

Harrison, D.C. (1986) "Organization of the Water Policy Process 'From the Bottom Up': The Red River Valley of the North Experiment", Water Resources Bulletin, Vol.22, No.5, pp. 731-743.

Hodge, W., Larson, M. and Goran, W. (1988) "Linking The Armsed Process Model With The GRASS Geographic Information System", Proceedings of the International Symposium on Modeling in Agricultural, Forest, and Rangeland Hydrology, Chicago. ASAE, St. Joseph, Michigan, U.S.A.

Johnson, L.E. (1986) "Water Resources Management Decision Support Systems", Journal of Water Resources Planning and Management, Vol.112, No.3, pp 308-325.

Johnson, L.E. (1990) "Computer-Aided Planning For Multi-Purpose Reservoir Operating Policies", Water Resources Bulletin, Vol.26, No.2, pp. 299-311.

Kunreuther, H. and Miller, L. (1985) "Interactive Computer Modelling For Policy Analysis: The Flood Hazard Problem", Water Resources Research, Vol.21, No.2, pp. 105-113.

Labadie, J.W. and Sullivan, C.H. (1986) "Computerized Decision Support Systems for Water Managers", Journal of Water Resources Planning and Management, Vol 112, No.3, pp 299-307.

Loucks, D.P, Kindler, J. and Fedra, K. (1985) "Interactive Water Resources Modelling: An Overview", Water Resources Res. Vol.21, No.2, pp 95-102.

Loucks, D.P, Taylor, M.R. and French, P.N. (1985) "Interactive Data Management for Resource Planning and Analysis", Water Resources Res. Vol.21, No.2, pp. 131-142.

Moore, I.D., Panuska, J.C., Grayson, R.B. and Srivastava, K.P. (1988) "Application Of Digital Topographic Modelling In Hydrology", Proceedings of the International Symposium on Modeling in Agricultural, Forest, and Rangeland Hydrology, Chicago. ASAE, St. Joseph, Michigan, U.S.A.

Muzik, I. (1988) "Application Of GIS Procedure For Design Flood Hydrographs", Proceedings of the International Symposium on Modeling in Agricultural, Forest, and Rangeland Hydrology, Chicago. ASAE, St. Joseph, Michigan, U.S.A.

Neumann, P., Fett, W. and Schultz, G.A. (1990) "A Geographic Information System As A Database For Distributed Hydrological Models", Proceedings of the International Symposium on Remote Sensing in Water Resources, IAH, Netherlands

Neuron Data Incorporated (1991) " Nexpert Object version 2.0 User's Guide", 156 University Avenue, Palo Alto, California, U.S.A.

Oslin, A.J., Westsmith, R.A. and Morgan, D.S. (1988) "Streams: A Basin and Soil Erosion Model Using CADD, Remote Sensing And GIS To Facilitate Watershed Management", Proceedings of the International Symposium on Modeling in Agricultural, Forest, and Rangeland Hydrology, Chicago. ASAE, St. Joseph, Michigan, U.S.A.

Sasowsky, K.C. and Gardner, T.W. (1991) "Watershed Configuration And GIS Parameterization For Spur Model Hydrologic Simulations", Water Resources Bulletin, Vol.27, No.1, pp. 7-18.

Savic, D.A. and Simonovic, S.P. (1991) "An Interactive Approach To Selection And Use Of Single Multipurpose Reservoir Models", Water Resources Res. Vol.27, No.10, pp. 2509-2521.

Simonovic S.P and Savic, D.A. (1990) "Intelligent Decision Support and Reservoir Management and Operations", Journal of Computing in Civil Engineering, Vol.3, No.4, pp. 367-385.

Simonovic S.P (1990) "Lecture notes for course number 23.728, Intelligent Decision Support Systems in Water Resources", University of Manitoba, Winnipeg, Manitoba.

Sprague, R.H.Jr and Carlson, E.D. (1982) "Building Effective Decision Support Systems ", Englewood Cliffs, Prentice Hall, New Jersey.

Stuebe, M.M. and Johnston, D.M. (1990) "Runoff Volume Estimation Using GIS Techniques", Water Resources Bulletin, Vol.26, No.4, pp. 611-620.

Turcotte, B.R. and Mtundu, N.D. (1992) "Linking DataBases to Hydraulic Computations", Journal of Computing in Civil Engineering, Vol.6, No.1, pp.63-71.

United States Army Corps of Engineers (1989) "Expected Annual Flood Damage (EAD) Computation User's Manual", Hydrologic Engineering Centre, 609 Second Street, Davis, California 95616-4687, U.S.A.

United States Army Corps of Engineers (1989) " Structure Inventory of Damage Analysis (SID) User's Manual", Hydrologic Engineering Centre, 609 Second Street, Davis, California 95616-4687, U.S.A.

United States Army Corps of Engineers (1991) "GRASS version 3.1 User's Manual", Construction Engineering Research Laboratory, Champaign, Illinois, U.S.A.

White, D. (1988) "Grid-Based Application Of Runoff Curve Numbers", Journal of Water Resources Planning and Management, Vol 114, No.6, pp 601-613.

Wolfe, M.L. and Neale, C.M.U. (1988) "Input Data Development for a Distributed Parameter Hydrologic model", Proceedings of the International Symposium on Modeling in Agricultural, Forest, and Rangeland Hydrology, Chicago. ASAE, St. Joseph, Michigan, U.S.A.

Vieux, B.E., Bralts, V.F. and Segerlind, L.J. (1988) "Finite Element Analysis of Hydrologic Response areas Using Geographic Information Systems", Proceedings of the

International Symposium on Modeling in Agricultural, Forest, and Rangeland Hydrology, Chicago. ASAE, St. Joseph, Michigan, U.S.A.

APPENDIX A: DATABASE INVENTORY COMMANDS

APPENDIX A

APPENDIX A-1: GLOSSARY OF DATABASE COMMANDS

KODE1 - Identification record.
IDRCH - Damage reach identification code.
IBDLG - Structure identification code.
ROWN - North coordinate point.
COLE - East coordinate point.
ADJ - Elevation of reference flood at the structure in feet.
STOPO - Elevation of reference point selected for the structure in feet; either of
(1) First floor elevation, or
(2) Ground flood elevation.
DELT - Distance between water surface elevation that can cause damage to begin, and first floor.
DELTB - Distance between elevation of basement floor and first floor.
DELTG - Distance between first floor and ground floor.
NEWSTR - (0) for existing structure,
(1) for new structure.
KODE2 - Identification record.
IDCAT - Damage category to which structure is assigned.
ID1FS - I.D. code for damage potential function of structure.
V1FS - Total value of structure in $1,000.
ID1FC - I.D. code for damage potential function of contents.
V1FC - Total value of contents in $1,000.
ID1FO - I.D. code for damage potential function of other items.
V1FO - Total value of other items in $1,000.
IADDR - Column for comments and record keeping.

APPENDIX A

APPENDIX A-2 COMMANDS FOR CREATING DATABASE TABLES.

- -

```
CREATE TABLE ADOLPHE
(KODE1          CHAR(5),
 IDRCH          CHAR(5),
 IBDLG          NUMBER(8),
 ROWN           NUMBER(8),
 COLE           NUMBER(8),
 ADJ            NUMBER(8),
 STOPO          NUMBER(8),
 DELTZ          NUMBER(8),
 DELTB          NUMBER(8),
 DELTG          NUMBER(8),
 IFUNC          NUMBER(2),
 NEWSTR         NUMBER(1),
 KODE2          CHAR(5),
 IDCAT          CHAR(8),
 ID1FS          CHAR(3),
 V1FS           NUMBER(5),
 ID1FC          CHAR(3),
 V1FC           NUMBER(5),
 ID1FO          CHAR(3),
 V1FO           NUMBER(5),
 IADDR          CHAR(32),
 CATEGNO        NUMBER(4),
 DAMAGENO       NUMBER(2));
```

APPENDIX A

APPENDIX A-3 COMMANDS FOR LOADING DATA FROM GRASS.

```
LOAD DATA
INFILE  siterpt.rst
INTO TABLE ADOLPHE
(IBDLG          POSITION(01:05) INTEGER EXTERNAL,
 COLE           POSITION(08:14) INTEGER EXTERNAL,
 ROWN           POSITION(18:25) INTEGER EXTERNAL,
 DAMAGENO       POSITION(29:30) INTEGER EXTERNAL,
 CATEGNO        POSITION(35:37) INTEGER EXTERNAL)
```

APPENDIX A-4 COMMANDS TO OUTPUT DATA FROM DATABASE

```
#DT 1 1 3 8 9 13 17 18 25 27 33 38 41 46 49 55 57 63 65
72 73 74 75 #
#DT 2 1 3 8 9 13 17 18 24 25 28 29 33 34 36 37 41 42 44
45 49 50 81 #
.DECLARE KODE1 a2
.DECLARE IDRCH a1
.DECLARE IBDLG 9999
.DECLARE ROWN 9999999
.DECLARE COLE 999999
.DECLARE ADJ 999
.DECLARE STOPO 999
.DECLARE DELTZ 9
.DECLARE DELTB 9
.DECLARE DELTG 9
.DECLARE IFUNC 9
.DECLARE KODE2 a2
.DECLARE IDCAT a7
.DECLARE ID1FS a3
.DECLARE V1FS 99999
.DECLARE ID1FC a3
.DECLARE V1FC 99999
.DECLARE ID1FO a3
.DECLARE V1FO 99999
.DECLARE IADDR a31
.DEFINE  seldata
         SELECT KODE1, IDRCH, IBDLG, ROWN, COLE, ADJ,   STOPO,
         DELTZ, DELTB, DELTG, IFUNC,
           KODE2, IDRCH, IBDLG, IDCAT, ID1FS, V1FS,
           ID1FC, V1FC, ID1FO, V1FO, IADDR
         INTO KODE1, IDRCH, IBDLG, ROWN, COLE, ADJ,
           STOPO, DELTZ, DELTB, DELTG, IFUNC, KODE2,
           IDRCH, IBDLG, IDCAT, ID1FS, V1FS, ID1FC,
           V1FC, ID1FO, V1FO, IADDR
         FROM ADOLPHE
         WHERE IBDLG > 0
         ORDER BY IBDLG
```

APPENDIX A

```
..
.DEFINE body
          #T  1  .PRINT
          KODE1  #NC
          .PRINT IDRCH
          #NC  .PRINT
          IBDLG  #NC
          .PRINT ROWN
          #NC  .PRINT
          COLE   #NC
          .PRINT   ADJ
          #NC  .PRINT
          STOPO  #NC
          .PRINT DELTZ
          #NC  .PRINT
          DELTB  #NC
          .PRINT DELTG
          #NC  .PRINT
          IFUNC  #NC
          #TE   #T   2
          .PRINT KODE2
          #NC  .PRINT
          IDRCH  #NC
          .PRINT IBDLG
          #NC  .PRINT
          IDCAT  #NC
          .PRINT  ID1FS
          #NC  .PRINT
          V1FS    #NC
          .PRINT  ID1FC
          #NC  .PRINT
          V1FC    #NC
          .PRINT  ID1FO
          #NC  .PRINT
          V1FO    #NC
          .PRINT IADDR
          #NC #TE
.DEFINE head
.DEFINE foot
.REPORT seldata body head foot
.STOP
```

APPENDIX A

APPENDIX A-5 COMMANDS TO UPDATE THE DATABASE

```
UPDATE ADOLPHE
SET      KODE1 = 'SL'
WHERE    IBDLG < '2000';
UPDATE   ADOLPHE
SET      KODE2 = 'SD'
WHERE    IBDLG < '2000';
UPDATE   ADOLPHE
SET      IDRCH = '1'
WHERE    IBDLG > '0';
UPDATE   ADOLPHE
SET      DELTZ = '0'
WHERE    IBDLG < '2000';
UPDATE   ADOLPHE
SET      DELTB = '0'
WHERE    IBDLG < '2000';
UPDATE   ADOLPHE
SET      DELTG = '2'
WHERE    IBDLG < '2000';
UPDATE   ADOLPHE
SET      IFUNC = '0'
WHERE    IBDLG < '2000';
UPDATE   ADOLPHE
SET      NEWSTR = '0'
WHERE    IBDLG < '2000';
UPDATE   ADOLPHE
SET      ADJ =    '705.0'
WHERE    IBDLG < '2000';
UPDATE   ADOLPHE
SET      ID1FS = 'HR1'
WHERE    DAMAGENO = '2';
UPDATE   ADOLPHE
SET      ID1FS = 'HR2'
WHERE    DAMAGENO = '1';
UPDATE   ADOLPHE
SET      IDCAT ='CAT1'
WHERE    IBDLG < '1114';
```

APPENDIX A

```
UPDATE  ADOLPHE
SET     IDCAT ='CAT2'
WHERE   IBDLG > '1113';
UPDATE  ADOLPHE
SET     STOPO = (CATEGNO + 214)/0.3048
WHERE   IBDLG < '2000';
UPDATE  ADOLPHE
SET     V1FS = '50'
WHERE   DAMAGENO = '1';
UPDATE  ADOLPHE
SET     V1FS = '80'
WHERE   DAMAGENO = '2';
UPDATE  ADOLPHE
SET     IADDR = 'EAST_OF_DYKE'
WHERE   IBDLG < '1114';
UPDATE  ADOLPHE
SET     IADDR = 'WEST_OF_DYKE'
WHERE   IBDLG > '1113';
```

APPENDIX B: EXPERT SYSTEMS CONSULTATIONS

APPENDIX B1: RULES FOR SID CONSULTATION.

```
CONDITIONS :
    Yes         r_t_t_done
    Yes         floodp_done
    Yes         str_reloc_done
    Yes         printout_done
HYPOTHESIS :    analysis_done
ACTIONS :
    Execute     "echo @V(IPOL) @V(IPROF) @V(IEVAC) @V(IPRNT) >> sJ1"    @TYPE=EXE;
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Show        "/home/agyare/txt/df1.txt"      @KEEP=FALSE;@WAIT=FALSE;@RECT=0,280,480,255;
    Name        IT      IT
    Name        NSTAG   NSTAG
HYPOTHESIS :    df_done
ACTIONS :
    Execute     "echo @V(IT) >> sDF"    @TYPE=EXE;
    Execute     "echo @V(NSTAG) >> sDF" @TYPE=EXE;
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Show        "/home/agyare/txt/dmgfns1.txt"  @KEEP=FALSE;@WAIT=FALSE;@RECT=0,280,480,255;
    Name        NODF    NODF
    Name        1       counter3
    Yes         loop3
HYPOTHESIS :    dmgfns1_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Show        "/home/agyare/txt/dmgfns2.txt"  @KEEP=FALSE;@WAIT=FALSE;@RECT=0,280,480,255;
    Name        NODC    NODC
    Execute     "echo @V(NODC) > sDC"   @TYPE=EXE;
    Name        1       counter4
    Yes         loop4
HYPOTHESIS :    dmgfns2_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Show        "/home/agyare/txt/dmgfns3.txt"  @KEEP=FALSE;@WAIT=FALSE;@RECT=0,280,480,255;
    Name        NODR    NODR
    Name        1       counter5
    Yes         loop5
HYPOTHESIS :    dmgfns3_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Show        "/home/agyare/txt/dmgfns4.txt"  @KEEP=FALSE;@WAIT=FALSE;@RECT=0,280,480,255;
    Name        AGG     AGG
HYPOTHESIS :    dmgfns4_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Yes         dmgfns1_done
    Yes         dmgfns2_done
    Yes         dmgfns3_done
    Yes         dmgfns4_done
HYPOTHESIS :    dmgfns_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Show        "/home/agyare/txt/drt.txt"      @KEEP=FALSE;@WAIT=FALSE;@RECT=0,280,480,255;
    Name        JDR     JDR
    Name        DTITLE  DTITLE
    Name        REFFLD  REFFLD
    Name        STRELV  STRELV
```

```
    Execute     "echo @V(NODR) >> sDR"  @TYPE=EXE;
    Execute     "echo @V(JDR) >> sDR"   @TYPE=EXE;
    Execute     "echo @V(DTITLE) >> sDR"        @TYPE=EXE;
    Execute     "echo @V(REFFLD) >> sDR"        @TYPE=EXE;
    Execute     "echo @V(POLELV) >> sDR"        @TYPE=EXE;
    Execute     "echo @V(PROELV) >> sDR"        @TYPE=EXE;
    Execute     "echo @V(EVCELV) >> sDR"        @TYPE=EXE;
    Execute     "echo @V(STRELV) >> sDR"        @TYPE=EXE;
HYPOTHESIS :    drt_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Yes         ZW
HYPOTHESIS :    dss_done
ACTIONS :
    Show        "/home/agyare/txt/sid1.txt"     @KEEP=TRUE;@WAIT=FALSE;@RECT=0,275,480,340;
    Execute     "textedit -Wp 0 660 -Ws 480 200 sSDDM"  @TYPE=EXE;
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    No          ZW
HYPOTHESIS :    dss_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Is          IPROFv  "NEW STRUCTURES WRT ZERO DAMAGE"
HYPOTHESIS :    floodp1_done
ACTIONS :
    Do          4       IPROF
    Do          j5_done j5_done
    Do          j6_done j6_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Is          IPROFv  "NEW STRUCTURES WRT TARGET LEVEL"
HYPOTHESIS :    floodp1_done
ACTIONS :
    Do          2       IPROF
    Do          j5_done j5_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Is          IPROFv  "ALL STRUCTURES WRT ZERO DAMAGE"
HYPOTHESIS :    floodp1_done
ACTIONS :
    Do          3       IPROF
    Do          j5_done j5_done
    Do          j6_done j6_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Is          IPROFv  "ALL STRUCTURES WRT TARGET LEVEL"
HYPOTHESIS :    floodp1_done
ACTIONS :
    Do          1       IPROF
    Do          j5_done j5_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Yes         floodp2_done
HYPOTHESIS :    floodp_done
ACTIONS :
    Show        "/home/agyare/txt/floodp.txt"   @KEEP=FALSE;@WAIT=FALSE;@RECT=0,280,480,255;
    Do          floodp1_done    floodp1_done
    Do          test2   test2
        INFERENCE PRIORITY :    1
```

```
NAME :
CONDITIONS :
    No          floodp2_done
HYPOTHESIS :    floodp_done
ACTIONS :
    Do          0       IPROF
    Do          0       PROELV
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    =           1       1
HYPOTHESIS :    gosid
ACTIONS :
    Show        "/home/agyare/txt/gosid1.txt"   @KEEP=FALSE;@WAIT=FALSE;@RECT=0,280,480,255;
    Execute     "echo @V(NODF) @V(NODC) @V(NODR) @V(AGG) > sJ2" @TYPE=EXE;
    Execute     "sidgo" @TYPE=EXE;@WAIT=TRUE;
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    =           1       1
HYPOTHESIS :    grass
ACTIONS :
    Execute     "/home/agyare/GRASS.src/go &"   @TYPE=EXE;
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Show        "/home/agyare/txt/j3.txt"       @KEEP=FALSE;@WAIT=FALSE;@RECT=0,280,480,255;
    Name        NJPOL   NJPOL
    Execute     "echo @V(NJPOL) > sJ3"  @TYPE=EXE;
    Name        1       counter6
    Yes         loop6
HYPOTHESIS :    j3_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Show        "/home/agyare/txt/j5.txt"       @KEEP=FALSE;@WAIT=FALSE;@RECT=0,280,480,255;
    Name        NJPRF   NJPRF
    Execute     "echo @V(NJPRF) > sJ5"  @TYPE=EXE;
    Name        1       counter8
    Yes         loop8
HYPOTHESIS :    j5_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Show        "/home/agyare/txt/j6.txt"       @KEEP=FALSE;@WAIT=FALSE;@RECT=0,280,480,255;
    Execute     "echo  @V(NJPRF) > sJ6" @TYPE=EXE;
    Name        1       counter9
    Yes         loop9
HYPOTHESIS :    j6_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Show        "/home/agyare/txt/j8.txt"       @KEEP=FALSE;@WAIT=FALSE;@RECT=0,280,480,255;
    Name        NJEVAC  NJEVAC
    Execute     "echo @V(NJEVAC) > sJ8" @TYPE=EXE;
    Name        1       counter10
    Yes         loop10
HYPOTHESIS :    j8_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Show        "/home/agyare/txt/ja.txt"       @KEEP=FALSE;@WAIT=FALSE;@RECT=0,280,480,255;
    Execute     "echo @V(NJPOL) > sJA"  @TYPE=EXE;
    Name        1       counter7
    Yes         loop7
HYPOTHESIS :    ja_done
```

```
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    <=          (counter10-NJEVAC)       0
    Name        JEVAC   JEVAC
HYPOTHESIS :    loop10
ACTIONS :
    Execute     "echo @V(JEVAC) >> sJ8" @TYPE=EXE;
    Do          counter10+1     counter10
    Reset       JEVAC
    Reset       loop10
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    >           (counter10-NJEVAC)       0
HYPOTHESIS :    loop10
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    <=          (counter11-NSTAG)        0
    Name        SSAGE   SSAGE
HYPOTHESIS :    loop11
ACTIONS :
    Execute     "echo @V(SSAGE) >> sDP" @TYPE=EXE;
    Do          counter11+1     counter11
    Reset       SSAGE
    Reset       loop11
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    >           (counter11-NSTAG)        0
HYPOTHESIS :    loop11
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    <=          (counter12-NSTAG)        0
    Name        PERCENTPP       PERCENTPP
HYPOTHESIS :    loop12
ACTIONS :
    Execute     "echo @V(PERCENTPP) >> sPC"      @TYPE=EXE;
    Do          counter12+1     counter12
    Reset       PERCENTPP
    Reset       loop12
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    >           (counter12-NSTAG)        0
HYPOTHESIS :    loop12
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    <=          (counter13-NSTAG)        0
    Name        PERCENTD        PERCENTD
HYPOTHESIS :    loop13
ACTIONS :
    Execute     "echo @V(PERCENTD) >> sDD"       @TYPE=EXE;
    Do          counter13+1     counter13
    Reset       PERCENTD
    Reset       loop13
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    >           (counter13-NSTAG)        0
HYPOTHESIS :    loop13
        INFERENCE PRIORITY :    1
NAME :
```

```
CONDITIONS :
    <=          (counter3-NODF) 0
    Yes         df_done
    Name        1       counter11
    Yes         loop11
    Yes         pcdd_done
HYPOTHESIS :    loop3
ACTIONS :
    Do          counter3+1      counter3
    Reset       IT
    Reset       NSTAG
    Reset       df_done
    Reset       pcdd
    Reset       pcdd_done
    Reset       loop11
    Reset       loop3
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    >           (counter3-NODF) 0
HYPOTHESIS :    loop3
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    <=          (counter4-NODC) 0
    Name        JDCT    JDCT
    Name        TITDC   TITDC
    Name        POLMAX  POLMAX
    Name        PRFMAX  PRFMAX
HYPOTHESIS :    loop4
ACTIONS :
    Execute     "echo @V(JDCT) @V(TITDC) @V(POLMAX) @V(PRFMAX) >> sDC"  @TYPE=EXE;
    Do          counter4+1      counter4
    Reset       JDCT
    Reset       TITDC
    Reset       POLMAX
    Reset       PRFMAX
    Reset       loop4
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    >           (counter4-NODC) 0
HYPOTHESIS :    loop4
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    <=          (counter5-NODR) 0
    Yes         drt_done
HYPOTHESIS :    loop5
ACTIONS :
    Do          counter5+1      counter5
    Reset       JDR
    Reset       DTITLE
    Reset       REFFLD
    Reset       POLELV
    Reset       PROELV
    Reset       EVCELV
    Reset       test1
    Reset       test2
    Reset       test3
    Reset       drt_done
    Reset       loop5
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    >           (counter5-NODR) 0
```

```
HYPOTHESIS :    loop5
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    <=          (counter6-NJPOL)        0
    Name        JPOL    JPOL
HYPOTHESIS :    loop6
ACTIONS :
    Execute     "echo @V(JPOL) >> sJ3"  @TYPE=EXE;
    Do          counter6+1      counter6
    Reset       JPOL
    Reset       loop6
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    >           (counter6-NJPOL)        0
HYPOTHESIS :    loop6
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    <=          (counter7-NJPOL)        0
    Name        DPOL    DPOL
HYPOTHESIS :    loop7
ACTIONS :
    Execute     "echo @V(DPOL) >> sJA"  @TYPE=EXE;
    Do          counter7+1      counter7
    Reset       DPOL
    Reset       loop7
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    >           (counter7-NJPOL)        0
HYPOTHESIS :    loop7
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    <=          (counter8-NJPRF)        0
    Name        JPRF    JPRF
HYPOTHESIS :    loop8
ACTIONS :
    Execute     "echo @V(JPRF) >> sJ5"  @TYPE=EXE;
    Do          counter8+1      counter8
    Reset       JPRF
    Reset       loop8
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    >           (counter8-NJPRF)        0
HYPOTHESIS :    loop8
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    <=          (counter9-NJPRF)        0
    Name        DPRF    DPRF
HYPOTHESIS :    loop9
ACTIONS :
    Execute     "echo @V(DPRF) >> sJ6"  @TYPE=EXE;
    Do          counter9+1      counter9
    Reset       DPRF
    Reset       loop9
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    >           (counter9-NJPRF)        0
HYPOTHESIS :    loop9
        INFERENCE PRIORITY :    1
```

```
NAME :
CONDITIONS :
    Is          pcdd    "DIRECT DAMAGE VALUES"
    Show        "/home/agyare/txt/damage.txt"   @KEEP=FALSE;@WAIT=FALSE;@RECT=0,280,480,255;
    Name        1       IDF
    Execute     "echo @V(IDF) >> sDF"   @TYPE=EXE;
    Name        1       counter13
    Yes         loop13
HYPOTHESIS :    pcdd_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Is          pcdd    "PERCENT DAMAGE VALUES"
    Show        "/home/agyare/txt/percent.txt"  @KEEP=FALSE;@WAIT=FALSE;@RECT=0,280,480,255;
    Name        0       IDF
    Execute     "echo @V(IDF) >> sDF"   @TYPE=EXE;
    Name        1       counter12
    Yes         loop12
HYPOTHESIS :    pcdd_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Is          IPRNTv  "SUPPRESS DAMREACH/ DAMFN PRINTOUT"
HYPOTHESIS :    printout1_done
ACTIONS :
    Do          4       IPRNT
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Is          IPRNTv  "NORMAL PRINTOUT FOR ALL DAMREACHES"
HYPOTHESIS :    printout1_done
ACTIONS :
    Do          0       IPRNT
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Is          IPRNTv  "SUPPRESS STRUCTURE PRINTOUT"
HYPOTHESIS :    printout1_done
ACTIONS :
    Do          1       IPRNT
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Is          IPRNTv  "SUPPRESS DAMFUNCTION PRINTOUT"
HYPOTHESIS :    printout1_done
ACTIONS :
    Do          2       IPRNT
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Is          IPRNTv  "SUPPRESS DAMFUNCTION & STRUCT PRINTOUT"
HYPOTHESIS :    printout1_done
ACTIONS :
    Do          3       IPRNT
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Yes         printout1_done
HYPOTHESIS :    printout_done
ACTIONS :
    Show        "/home/agyare/txt/printout.txt" @KEEP=FALSE;@WAIT=FALSE;@RECT=0,280,480,255;
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Is          IPOLv   "ALL STRUCTURES TO DESIG. FLOOD LEVEL"
HYPOTHESIS :    r_t1_done
```

```
ACTIONS :
    Do          1       IPOL
    Do          j3_done j3_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Is          IPOLv   "ALL STRUCTURES WITHIN DAMCAT"
HYPOTHESIS :    r_t1_done
ACTIONS :
    Do          3       IPOL
    Do          j3_done j3_done
    Do          ja_done ja_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Is          IPOLv   "NEW STRUCTS TO DESIG. FLOOD LEVEL"
HYPOTHESIS :    r_t1_done
ACTIONS :
    Do          2       IPOL
    Do          j3_done j3_done
    Do          ja_done ja_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Is          IPOLv   "ONLY NEW STRUCTURES WITHIN DAMCAT"
HYPOTHESIS :    r_t1_done
ACTIONS :
    Do          4       IPOL
    Do          j3_done j3_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Yes         r_t_done
HYPOTHESIS :    r_t_t_done
ACTIONS :
    Show        "/home/agyare/txt/r_t1_done.txt"        @KEEP=FALSE;@WAIT=FALSE;@RECT=0,280,
    Do          r_t1_done       r_t1_done
    Do          test1   test1
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    No          r_t_done
HYPOTHESIS :    r_t_t_done
ACTIONS :
    Do          0       IPOL
    Do          0       POLELV
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Yes         grass
    Yes         title_done
    Yes         analysis_done
    Yes         dmgfns_done
    Yes         dss_done
    Yes         gosid
HYPOTHESIS :    sid_done
ACTIONS :
    UnloadKB    "/home/agyare/new/sid.ckb"      @LEVEL=WIPEOUT;
    LoadKB      "/home/agyare/new/eead.ckb"     @LEVEL=ENABLE;
    Do          ead_done        ead_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Is          IEVACv  "ALL STRUCTS WITH ZERO.ELEV BELOW SPEC"
HYPOTHESIS :    str_reloc1_done
ACTIONS :
```

```
    Do          3       IEVAC
    Do          j8_done j8_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Is          IEVACv  "NEW STRUCTS WITH REF.ELEV BELOW SPEC"
HYPOTHESIS :    str_reloc1_done
ACTIONS :
    Do          2       IEVAC
    Do          j8_done j8_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Is          IEVACv  "ALL STRUCTS WITH REF.ELEV BELOW SPEC."
HYPOTHESIS :    str_reloc1_done
ACTIONS :
    Do          1       IEVAC
    Do          j8_done j8_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Is          IEVACv  "NEW STRUCTS WITH ZERO.ELEV BELOW SPEC."
HYPOTHESIS :    str_reloc1_done
ACTIONS :
    Do          4       IEVAC
    Do          j8_done j8_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Yes         str_reloc2_done
HYPOTHESIS :    str_reloc_done
ACTIONS :
    Show        "/home/agyare/txt/str_reloc_done.txt"   @KEEP=FALSE;@WAIT=FALSE;@RECT=0,280,
    Do          str_reloc1_done str_reloc1_done
    Do          test3   test3
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    No          str_reloc2_done
HYPOTHESIS :    str_reloc_done
ACTIONS :
    Do          0       IEVAC
    Do          0       EVCELV
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    =           IPOL    3
HYPOTHESIS :    test1
ACTIONS :
    Do          0       POLELV
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    =           IPOL    4
HYPOTHESIS :    test1
ACTIONS :
    Do          0       POLELV
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    =           IPOL    2
HYPOTHESIS :    test1
ACTIONS :
    Do          POLELV  POLELV
        INFERENCE PRIORITY :    1
NAME :
```

```
CONDITIONS :
    =           IPOL    1
HYPOTHESIS :    test1
ACTIONS :
    Do          POLELV  POLELV
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    =           IPOL    0
HYPOTHESIS :    test1
ACTIONS :
    Do          0       POLELV
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    =           IPROF   0
HYPOTHESIS :    test2
ACTIONS :
    Do          0       PROELV
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    =           IPROF   3
HYPOTHESIS :    test2
ACTIONS :
    Do          0       PROELV
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    =           IPROF   2
HYPOTHESIS :    test2
ACTIONS :
    Do          PROELV  PROELV
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    =           IPROF   1
HYPOTHESIS :    test2
ACTIONS :
    Do          PROELV  PROELV
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    =           IPROF   4
HYPOTHESIS :    test2
ACTIONS :
    Do          0       PROELV
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    =           IEVAC   0
HYPOTHESIS :    test3
ACTIONS :
    Do          0       EVCELV
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    =           IEVAC   4
HYPOTHESIS :    test3
ACTIONS :
    Do          EVCELV  EVCELV
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    =           IEVAC   3
HYPOTHESIS :    test3
```

```
ACTIONS :
    Do           EVCELV  EVCELV
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    =            IEVAC   2
HYPOTHESIS :    test3
ACTIONS :
    Do           EVCELV  EVCELV
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    =            IEVAC   1
HYPOTHESIS :    test3
ACTIONS :
    Do           EVCELV  EVCELV
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Show         "/home/agyare/txt/sid100.txt"   @KEEP=FALSE;@WAIT=FALSE;@RECT=0,280,480,455;
    Name         TITLE   TITLE
HYPOTHESIS :    title_done
ACTIONS :
    Execute      "rm s??"        @TYPE=EXE;
    Execute      "echo 'TT '@V(TITLE) > sTT"     @TYPE=EXE;
        INFERENCE PRIORITY :    1
NAME :
```

APPENDIX B2: RULES FOR EAD CONSULTATION.

```
CONDITIONS :
    Name         eNCAT   eNCAT
    Execute      "echo @V(eNCAT) > eCN"  @TYPE=EXE;
    Name         1       count2
    Yes          lp2
HYPOTHESIS :    damcat_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Yes          title_done_ead
    Yes          period_done
    Yes          damcat_done
    Yes          plan_done
    Yes          reach_done
    Yes          eFR_done
    Yes          stagedam_done
    Yes          printout_done
    Yes          show_flood
HYPOTHESIS :    ead_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Is           eFR     "EXCEEDANCE-FREQUENCY VALUES"
HYPOTHESIS :    eFR_done
ACTIONS :
    Do           eNFRQ21 eNFRQ21
    Do           eNFRQ21 eNFRQ2
    Do           eNFRQ21 eNFRQ1
    Execute      "echo @V(eNFRQ1) > eFR" @TYPE=EXE;
    Do           1       count5
    Do           lp5     lp5
    Do           eFRDAM_done     eFRDAM_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Is           eFR     "SINGLE FLOW VALUES"
HYPOTHESIS :    eFR_done
ACTIONS :
    Do           eNFRQ1  eNFRQ1
    Do           eNFRQ1  eNFRQ2
    Execute      "echo '-' @V(eNFRQ1) > eFR"     @TYPE=EXE;
    Do           eFRDAM_done     eFRDAM_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Is           eFRDAM1_done    "FLOW VALUES"
HYPOTHESIS :    eFRDAM_done
ACTIONS :
    Do           1       count6
    Do           lp6     lp6
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Is           eFRDAM1_done    "STAGE VALUES"
HYPOTHESIS :    eFRDAM_done
ACTIONS :
    Do           1       count7
    Do           lp7     lp7
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    <=           (count1-eNHIS)  0
    Name         eIDYRS  eIDYRS
HYPOTHESIS :    lp1
ACTIONS :
```

```
    Execute     "echo  @V(eIDYRS) >> eDY"       @TYPE=EXE;
    Do          count1+1        count1
    Reset       eIDYRS
    Reset       lp1
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    >           (count1-eNHIS)  0
HYPOTHESIS :    lp1
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    <=          (count2-eNCAT)  0
    Name        eNMCAT  eNMCAT
HYPOTHESIS :    lp2
ACTIONS :
    Execute     "echo  @V(eNMCAT) >> eCN"       @TYPE=EXE;
    Do          count2+1        count2
    Reset       eNMCAT
    Reset       lp2
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    >           (count2-eNCAT)  0
HYPOTHESIS :    lp2
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    <=          (count3-eIPLNN) 0
    Name        eNMPLN  eNMPLN
HYPOTHESIS :    lp3
ACTIONS :
    Execute     "echo  @V(eNMPLN) >> ePN"       @TYPE=EXE;
    Do          count3+1        count3
    Reset       eNMPLN
    Reset       lp3
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    >           (count3-eIPLNN) 0
HYPOTHESIS :    lp3
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    >           (count4-eIRCH)  0
HYPOTHESIS :    lp4
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    <=          (count4-eIRCH)  0
    Name        eNMRCH  eNMRCH
HYPOTHESIS :    lp4
ACTIONS :
    Execute     "echo  @V(eNMRCH) >> eRN"       @TYPE=EXE;
    Do          count4+1        count4
    Reset       eNMRCH
    Reset       lp4
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    <=          (count5-eNFRQ2) 0
    Name        eFREQ2  eFREQ2
HYPOTHESIS :    lp5
ACTIONS :
    Execute     "echo  @V(eFREQ2) >> eFR"       @TYPE=EXE;
    Do          count5+1        count5
```

```
    Reset       eFREQ2
    Reset       lp5
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    >           (count5-eNFRQ2) 0
HYPOTHESIS :    lp5
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    <=          (count6-eNFRQ1) 0
    Name        ePFRQ1  ePFRQ1
HYPOTHESIS :    lp6
ACTIONS :
    Execute     "echo  @V(ePFRQ1) >> eQF"       @TYPE=EXE;
    Do          count6+1        count6
    Reset       ePFRQ1
    Reset       lp6
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    >           (count6-eNFRQ1) 0
HYPOTHESIS :    lp6
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    <=          (count7-eNFRQ2) 0
    Name        ePFRQ2  ePFRQ2
HYPOTHESIS :    lp7
ACTIONS :
    Execute     "echo  @V(ePFRQ2) >> eQF"       @TYPE=EXE;
    Do          count7+1        count7
    Reset       ePFRQ2
    Reset       lp7
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    >           (count7-eNFRQ2) 0
HYPOTHESIS :    lp7
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Name        eIPOA   eIPOA
    Name        eISTDYR eISTDYR
    Name        eIBASYR eIBASYR
    Name        eIDOLYR eIDOLYR
    Yes         period3_done
    Name        eRATE   eRATE
    Name        eCPLI   eCPLI
HYPOTHESIS :    period2_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Name        eNHIS   eNHIS
    Execute     "echo @V(eNHIS) > DY"   @TYPE=EXE;
    Name        1       count1
    Yes         lp1
HYPOTHESIS :    period3_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Yes         period1_done
HYPOTHESIS :    period_done
ACTIONS :
    Do          period2_done    period2_done
    Execute     "echo @V(eIPOA) @V(eISTDYR) @V(eIBASYR) @V(eIDOLYR) @V(eNHIS) > eJ1"
```

```
    Execute     "echo @V(eRATE) @V(eCPLI) > eJ2"        @TYPE=EXE;
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    No          period1_done
HYPOTHESIS :    period_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Name        eIPLNN  eIPLNN
    Execute     "echo @V(eIPLNN) > ePN" @TYPE=EXE;
    Name        1       count3
    Yes         1p3
HYPOTHESIS :    plan_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Is          eJDGPRv "NO OUTPUT SUPPRESSED"
HYPOTHESIS :    printout_done
ACTIONS :
    Do          0       eJDGPR
    Execute     "echo @V(eJDGPR) > ePP" @TYPE=EXE;
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Is          eJDGPRv "SUPPRESS INPUT DATA PRINTOUT"
HYPOTHESIS :    printout_done
ACTIONS :
    Do          1       eJDGPR
    Execute     "echo @V(eJDGPR) > ePP" @TYPE=EXE;
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Is          eJDGPRv "SUPPRESS COMPUTED FLOW/STAGE PRINTOUT"
HYPOTHESIS :    printout_done
ACTIONS :
    Do          2       eJDGPR
    Execute     "echo @V(eJDGPR) > ePP" @TYPE=EXE;
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Is          eJDGPRv "SUPPRESS COMPUTED E.A.D. PRINTOUT"
HYPOTHESIS :    printout_done
ACTIONS :
    Do          4       eJDGPR
    Execute     "echo @V(eJDGPR) > ePP" @TYPE=EXE;
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Is          eJDGPRv "SUPPRESS SUMMARY BY REACH PRINTOUT"
HYPOTHESIS :    printout_done
ACTIONS :
    Do          16      eJDGPR
    Execute     "echo @V(eJDGPR) > ePP" @TYPE=EXE;
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Is          eJDGPRv "SUPPRESS GRAND SUMMARY BY REACH PRINTOUT"
HYPOTHESIS :    printout_done
ACTIONS :
    Do          32      eJDGPR
    Execute     "echo @V(eJDGPR) > ePP" @TYPE=EXE;
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Is          eJDGPRv "SUPPRESS ALL SUMMARY PRINTOUT"
```

```
HYPOTHESIS :    printout_done
ACTIONS :
    Do          64      eJDGPR
    Execute     "echo @V(eJDGPR) > ePP" @TYPE=EXE;
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Name        eIRCH   eIRCH
    Execute     "echo @V(eIRCH) > eRN"  @TYPE=EXE;
    Name        1       count4
    Yes         lp4
HYPOTHESIS :    reach_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Execute     "/home/agyare/G/Gshow"  @TYPE=EXE;
HYPOTHESIS :    show_flood
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    No          eSTGDAM
HYPOTHESIS :    stagedam_done
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Yes         eSTGDAM
HYPOTHESIS :    stagedam_done
ACTIONS :
    Show        "/home/agyare/txt/ead1.txt"     @KEEP=FALSE;@WAIT=TRUE;@RECT=0,280,480,255;
    Execute     "cp /home/agyare/new/sSDDM /home/agyare/new/eSDDM"      @TYPE=EXE;
    Execute     "textedit -Wp 0 660 -Ws 485 200 eSDDM"  @TYPE=EXE;
        INFERENCE PRIORITY :    1
NAME :
CONDITIONS :
    Show        "/home/agyare/txt/ead100.txt"   @KEEP=FALSE;@WAIT=FALSE;@RECT=0,280,480,400;
    Name        eTITLE  eTITLE
HYPOTHESIS :    title_done_ead
ACTIONS :
    Execute     "rm e??"        @TYPE=EXE;
    Execute     "echo 'TT' @V(eTITLE) > eTT "   @TYPE=EXE;
        INFERENCE PRIORITY :    1
NAME :
```

APPENDIX C: FORTRAN PROGRAMS

APPENDIX C1: FORTRAN PROGRAMS FOR FORMATTING SID FILES.

```
C
C
C
CHARACTER*6  JPOL
OPEN(1,FILE='file1')
OPEN(2,FILE='result10.s')
OPEN(3,FILE='sJ1')
OPEN(4,FILE='sJ2')
C
C for J1 required record
READ(3,*)IPOL,IPROF,IEVAC,IPRNT
WRITE(2,10)IPOL,IPROF,IEVAC,IPRNT
  10    FORMAT('J1',I6,I8,I8,8X,I8)
C
C for J2 required record
READ(4,*)NODF,NODC,NODR,AGG
WRITE(2,15)NODF,NODC,NODR,AGG
  15    FORMAT('J2',I6,I8,I8,F8.1)
  99 END
```

```
DIMENSION DPOL(10)
CHARACTER*10 LINE,PTER
OPEN(1,FILE='file1')
OPEN(2,FILE='result1.s')
OPEN(3,FILE='sJA')
PTER='sJA'
DO WHILE (LINE .NE. PTER)
  READ(1,*,END=30)LINE
        END DO
CLOSE(1)
        IF(LINE.EQ.PTER)THEN
  READ(3,*)NJPOL
  DO 20 I=1,NJPOL
    READ(3,*,END=30)DPOL(I)
  20   CONTINUE
  WRITE(2,40)(DPOL(I),I=1,NJPOL)
  40      FORMAT('JA',6X,6F8.1)
ENDIF
  30 M=1
  99    END
```

```
DIMENSION JPRF(10)
CHARACTER*10 LINE,PTER
CHARACTER*7  JPRF
OPEN(1,FILE='file1')
OPEN(2,FILE='result2.s')
OPEN(3,FILE='sJ5')
```

```
PTER='sJ5'
DO WHILE (LINE .NE. PTER)
  READ(1,*,END=30)LINE
        END DO
CLOSE(1)
        IF(LINE.EQ.PTER)THEN
  READ(3,*)NJPRF
  DO 20 I=1,NJPRF
    READ(3,*,END=30)JPRF(I)
  20   CONTINUE
  WRITE(2,40)NJPRF,(JPRF(I),I=1,NJPRF)
  40       FORMAT('J5',I6,6A8)
ENDIF
  30 M=1
  99    END
```

```
DIMENSION JPOL(10)
CHARACTER*10 LINE,PTER
CHARACTER*6  JPOL
OPEN(1,FILE='file1')
OPEN(2,FILE='result33.s')
OPEN(3,FILE='sJ3')
PTER='sJ3'
DO WHILE (LINE .NE. PTER)
  READ(1,*,END=30)LINE
        END DO
CLOSE(1)
        IF(LINE.EQ.PTER)THEN
  READ(3,*)NJPOL
  DO 20 I=1,NJPOL
    READ(3,*,END=30)JPOL(I)
  20   CONTINUE
  WRITE(2,40)NJPOL,(JPOL(I), I=1,NJPOL)
  40       FORMAT('J3',I6,6A8)
ENDIF
  30 M=1
  99    END
```

```
DIMENSION DPRF(10)
CHARACTER*10 LINE,PTER
OPEN(1,FILE='file1')
OPEN(2,FILE='result3.s')
OPEN(3,FILE='sJ6')
PTER='sJ6'
DO WHILE (LINE .NE. PTER)
  READ(1,*,END=30)LINE
```

```
        END DO
CLOSE(1)
        IF(LINE.EQ.PTER)THEN
  READ(3,*)NJPRF
  DO 20 I=1,NJPRF
    READ(3,*,END=30)DPRF(I)
  20   CONTINUE
  WRITE(2,40)(DPRF(I),I=1,NJPRF)
  40      FORMAT('J6',6X,6F8.1)
ENDIF
  30 M=1
  99     END
```

```
CHARACTER*10 ZW1,ZW2,ZW3
OPEN(1,FILE='sSDDM')
OPEN(2,FILE='result5.s')
READ(1,*,END=30)ZW1,ZW2,ZW3
WRITE(2,40)ZW1,ZW2,ZW3
  40     FORMAT('ZW',A14,A8,A16)
  30 M=1
  99     END
```

```
DIMENSION IT(100),NSTAG(100),IDF(100),ISAGE(200,200)
DIMENSION IPERCENT(200,200),IPERCENTX(200),ISAGEX(200)
DIMENSION IDAMAGE(200,200),IDAMAGEX(200)
OPEN(1,FILE='sJ2')
OPEN(2,FILE='result6.s')
OPEN(3,FILE='sDF')
OPEN(4,FILE='sDP')
OPEN(5,FILE='sPC')
OPEN(6,FILE='sDD')
C
READ(1,*)NODF
IF(NODF.EQ.1)THEN
GO TO 55
ENDIF
CLOSE(1)
        DO 20 I=1,NODF
          READ(3,*) IT(I)
          READ(3,*) NSTAG(I)
          READ(3,*) IDF(I)
          WRITE(2,30)IT(I),NSTAG(I),IDF(I)
  30      FORMAT('DF',3X,I3,I8,7X,I1)
          READ(4,*)(ISAGE(I,J),J=1,NSTAG(I))
  WRITE(2,31)(ISAGE(I,J),J=1,NSTAG(I))
  31      FORMAT('DP',I6,9(I8),/,'DP',I6,9(I8))
  IF(IDF(I).EQ.0)THEN
```

```
          READ(5,*)(IPERCENT(I,J),J=1,NSTAG(I))
          WRITE(2,32)(IPERCENT(I,J),J=1,NSTAG(I))
  32      FORMAT('PC',I6,9(I8),/,'PC',I6,9(I8))
  ELSE
          READ(6,*)(IDAMAGE(I,J),J=1,NSTAG(I))
          WRITE(2,333)(IDAMAGE(I,J),J=1,NSTAG(I))
 333      FORMAT('DD',I6,9(I8),/,'DD',I6,9(I8))
  ENDIF
  20    CONTINUE
        GO TO 999
C
  55   CLOSE(1)
          READ(3,*) ITX
          READ(3,*) NSTAGX
          READ(3,*) IDFX
          WRITE(2,130)ITX,NSTAGX,IDFX
 130      FORMAT('DF',3X,I3,I8,7X,I1)
          READ(4,*)(ISAGEX(J),J=1,NSTAGX)
  WRITE(2,131)(ISAGEX(J),J=1,NSTAGX)
 131      FORMAT('DP',I6,9(I8),/,'DP',I6,9(I8))
  READ(3,*)CODE
  IF(IDFX.EQ.0)THEN
          READ(5,*)(IPERCENTX(J),J=1,NSTAGX)
          WRITE(2,132)(IPERCENTX(J),J=1,NSTAGX)
 132      FORMAT('PC',I6,9(I8),/,'PC',I6,9(I8))
  ELSE
          READ(6,*)(IDAMAGEX(J),J=1,NSTAGX)
          WRITE(2,444)(IDAMAGEX(J),J=1,NSTAGX)
 444      FORMAT('DD',I6,9(I8),/,'DD',I6,9(I8))
  ENDIF
 999      END
```

```
DIMENSION JDCT(100),TITDC(100),POLMAX(100),PRFMAX(100)
CHARACTER*7  JDCT
CHARACTER*23 TITDC
OPEN(1,FILE='sDC')
OPEN(2,FILE='result7.s')
C
READ(1,*)NODC
write(*,*)'hello'
        DO 20 I=1,NODC
          READ(1,*)JDCT(I),TITDC(I),POLMAX(I),PRFMAX(I)
          WRITE(2,30)JDCT(I),POLMAX(I),PRFMAX(I),TITDC(I)
  30      FORMAT('DC',6X,A8,F8.1,F8.1,A32)
  20    CONTINUE
  99    END
```

APPENDIX D: INPUT AND OUTPUT FILES

APPENDIX D1: INPUT FILES FOR SID CONSULTATION.

```
TT   TEST 1 - EXISTING CONDITIONS
J1     0       1       0               3
J2     2       2       1     4.0                       35
J5     1 CAT2
ZW    A=win     E=1992        F=plan1
DF   HR1      20
DP     0       1       2       3       4       5       6       7       8
DP     9      10      11      12      13      14      15      16      17
DP    18      19
PC     0       1       8      14      18      22      25      28      29
PC    30      32      36      41      45      48      51      54      57
DP    60      63
DF   HR2      20
DP     0       1       2       3       4       5       6       7       8
DP     9      10      11      12      13      14      15      16      17
DP    18      19
PC     0       4      23      32      38      45      50      53      55
PC    55      55      58      63      65      72      77      82      87
DP   100     100
DC       CAT1                               EAST_OF_DYKE
DC       CAT2                               WEST_OF_DYKE
DR     1   705.4     0.0   787.4     0.0   705.0
DT   DAMAGE_REACH_ONE
SL     1    2    5500423  630950     705     787                       2
SD     1    2    CAT1   HR2 50                  EAST_OF_DYKE
SL     1    3    5500396  630949     705     787                       2
SD     1    3    CAT1   HR2 50                  EAST_OF_DYKE
SL     1    4    5500373  630949     705     784                       2
SD     1    4    CAT1   HR2 50                  EAST_OF_DYKE
SL     1    5    5500367  630973     705     784                       2
SD     1    5    CAT1   HR2 50                  EAST_OF_DYKE
SL     1    6    5500343  630946     705     787                       2
SD     1    6    CAT1   HR2 50                  EAST_OF_DYKE
SL     1    7    5500360  630921     705     784                       2
SD     1    7    CAT1   HR2 50                  EAST_OF_DYKE
SL     1    8    5500082  632415     705     784                       2
SD     1    8    CAT1   HR2 50                  EAST_OF_DYKE
SL     1    9    5500080  632448     705     787                       2
SD     1    9    CAT1   HR2 50                  EAST_OF_DYKE
SL     1    10   5500080  632463     705     784                       2
SD     1    10   CAT1   HR2 50                  EAST_OF_DYKE
SL     1    11   5500110  632500     705     787                       2
SD     1    11   CAT1   HR2 50                  EAST_OF_DYKE
SL     1    12   5500044  632494     705     787                       2
SD     1    12   CAT1   HR2 50                  EAST_OF_DYKE
```

```
TT    TEST 2 - RAISING STRUCTURES TO A HEIGHT OF 3FT
J1      3        1        0                 3
J2      2        2        1      4.0                          35
J3      1 CAT1
JA               3
J5      1 CAT2
ZW     A=win     E=1992        F=plan2
DF    HR1       20
DP      0        1        2        3        4        5        6        7        8
DP      9       10       11       12       13       14       15       16       17
DP     18       19
PC      0        1        8       14       18       22       25       28       29
PC     30       32       36       41       45       48       51       54       57
PC     60       63
DF    HR2       20
DP      0        1        2        3        4        5        6        7        8
DP      9       10       11       12       13       14       15       16       17
DP     18       19
PC      0        4       23       32       38       45       50       53       55
PC     55       55       58       63       65       72       77       82       87
PC    100      100
DC        CAT1                                   EAST_OF_DYKE
DC        CAT2                                   WEST_OF_DYKE
DR      1    705.4     0.0    787.4      0.0    705.0
DT    DAMAGE_REACH_ONE
SL      1     2     5500423  630950     705      787                              2
SD      1     2     CAT1    HR2 50                     EAST_OF_DYKE
SL      1     3     5500396  630949     705      787                              2
SD      1     3     CAT1    HR2 50                     EAST_OF_DYKE
SL      1     4     5500373  630949     705      784                              2
SD      1     4     CAT1    HR2 50                     EAST_OF_DYKE
SL      1     5     5500367  630973     705      784                              2
SD      1     5     CAT1    HR2 50                     EAST_OF_DYKE
SL      1     6     5500343  630946     705      787                              2
SD      1     6     CAT1    HR2 50                     EAST_OF_DYKE
SL      1     7     5500360  630921     705      784                              2
SD      1     7     CAT1    HR2 50                     EAST_OF_DYKE
SL      1     8     5500082  632415     705      784                              2
SD      1     8     CAT1    HR2 50                     EAST_OF_DYKE
SL      1     9     5500080  632448     705      787                              2
SD      1     9     CAT1    HR2 50                     EAST_OF_DYKE
SL      1    10     5500080  632463     705      784                              2
SD      1    10     CAT1    HR2 50                     EAST_OF_DYKE
SL      1    11     5500110  632500     705      787                              2
SD      1    11     CAT1    HR2 50                     EAST_OF_DYKE
SL      1    12     5500044  632494     705      787                              2
SD      1    12     CAT1    HR2 50                     EAST_OF_DYKE
```

```
TT   TEST 3 - RAISING STRUCTURES TO A HEIGHT OF 5FT
J1     3       1       0               3
J2     2       2       1     4.0                       35
J3     1 CAT1
JA             5
J5     1 CAT2
ZW    A=win     E=1992        F=plan3
DF   HR1      20
DP     0       1       2       3       4       5       6       7       8
DP     9      10      11      12      13      14      15      16      17
DP    18      19
PC     0       1       8      14      18      22      25      28      29
PC    30      32      36      41      45      48      51      54      57
PC    60      63
DF   HR2      20
DP     0       1       2       3       4       5       6       7       8
DP     9      10      11      12      13      14      15      16      17
DP    18      19
PC     0       4      23      32      38      45      50      53      55
PC    55      55      58      63      65      72      77      82      87
PC   100     100
DC       CAT1                               EAST_OF_DYKE
DC       CAT2                               WEST_OF_DYKE
DR     1   705.4     0.0   787.4     0.0   705.0
DT   DAMAGE_REACH_ONE
SL     1    2    5500423  630950     705     787                       2
SD     1    2    CAT1   HR2 50                   EAST_OF_DYKE
SL     1    3    5500396  630949     705     787                       2
SD     1    3    CAT1   HR2 50                   EAST_OF_DYKE
SL     1    4    5500373  630949     705     784                       2
SD     1    4    CAT1   HR2 50                   EAST_OF_DYKE
SL     1    5    5500367  630973     705     784                       2
SD     1    5    CAT1   HR2 50                   EAST_OF_DYKE
SL     1    6    5500343  630946     705     787                       2
SD     1    6    CAT1   HR2 50                   EAST_OF_DYKE
SL     1    7    5500360  630921     705     784                       2
SD     1    7    CAT1   HR2 50                   EAST_OF_DYKE
SL     1    8    5500082  632415     705     784                       2
SD     1    8    CAT1   HR2 50                   EAST_OF_DYKE
SL     1    9    5500080  632448     705     787                       2
SD     1    9    CAT1   HR2 50                   EAST_OF_DYKE
SL     1    10   5500080  632463     705     784                       2
SD     1    10   CAT1   HR2 50                   EAST_OF_DYKE
SL     1    11   5500110  632500     705     787                       2
SD     1    11   CAT1   HR2 50                   EAST_OF_DYKE
SL     1    12   5500044  632494     705     787                       2
SD     1    12   CAT1   HR2 50                   EAST_OF_DYKE
```

```
TT   TEST 4 - FLOOD PROOFING OF STRUCTURES TO A HEIGHT OF 3FT
J1     0       3       0               3
J2     2       2       1     4.0                      35
J5     1 CAT1
J6             3
ZW    A=win     E=1992        F=plan4
DF   HR1      20
DP     0       1       2       3       4       5       6       7       8
DP     9      10      11      12      13      14      15      16      17
DP    18      19
PC     0       1       8      14      18      22      25      28      29
PC    30      32      36      41      45      48      51      54      57
PC    60      63
DF   HR2      20
DP     0       1       2       3       4       5       6       7       8
DP     9      10      11      12      13      14      15      16      17
DP    18      19
PC     0       4      23      32      38      45      50      53      55
PC    55      55      58      63      65      72      77      82      87
PC   100     100
DC       CAT1                               EAST_OF_DYKE
DC       CAT2                               WEST_OF_DYKE
DR     1   705.4     0.0   787.4     0.0   705.0
DT   DAMAGE_REACH_ONE
SL     1    2    5500423  630950     705     787                       2
SD     1    2    CAT1   HR2 50                  EAST_OF_DYKE
SL     1    3    5500396  630949     705     787                       2
SD     1    3    CAT1   HR2 50                  EAST_OF_DYKE
SL     1    4    5500373  630949     705     784                       2
SD     1    4    CAT1   HR2 50                  EAST_OF_DYKE
SL     1    5    5500367  630973     705     784                       2
SD     1    5    CAT1   HR2 50                  EAST_OF_DYKE
SL     1    6    5500343  630946     705     787                       2
SD     1    6    CAT1   HR2 50                  EAST_OF_DYKE
SL     1    7    5500360  630921     705     784                       2
SD     1    7    CAT1   HR2 50                  EAST_OF_DYKE
SL     1    8    5500082  632415     705     784                       2
SD     1    8    CAT1   HR2 50                  EAST_OF_DYKE
SL     1    9    5500080  632448     705     787                       2
SD     1    9    CAT1   HR2 50                  EAST_OF_DYKE
SL     1    10   5500080  632463     705     784                       2
SD     1    10   CAT1   HR2 50                  EAST_OF_DYKE
SL     1    11   5500110  632500     705     787                       2
SD     1    11   CAT1   HR2 50                  EAST_OF_DYKE
SL     1    12   5500044  632494     705     787                       2
SD     1    12   CAT1   HR2 50                  EAST_OF_DYKE
```

```
TT   TEST 5 - FLOOD PROOFING OF STRUCTURES TO A HEIGHT OF 5FT
J1       0       3       0               3
J2       2       2       1     4.0                      35
J5     1 CAT1
J6               5
ZW    A=win     E=1992        F=plan5
DF   HR1      20
DP       0       1       2       3       4       5       6       7       8
DP       9      10      11      12      13      14      15      16      17
DP      18      19
PC       0       1       8      14      18      22      25      28      29
PC      30      32      36      41      45      48      51      54      55
PC      60      63
DF   HR2      20
DP       0       1       2       3       4       5       6       7       8
DP       9      10      11      12      13      14      15      16      17
DP      18      19
PC       0       4      23      32      38      45      50      53      55
PC      55      55      58      63      65      72      77      82      87
PC     100     100
DC       CAT1                               EAST_OF_DYKE
DC       CAT2                               WEST_OF_DYKE
DR       1   705.4     0.0   787.4     0.0   705.0
DT   DAMAGE_REACH_ONE
SL     1    2    5500423  630950     705     787                       2
SD     1    2    CAT1   HR2 50                  EAST_OF_DYKE
SL     1    3    5500396  630949     705     787                       2
SD     1    3    CAT1   HR2 50                  EAST_OF_DYKE
SL     1    4    5500373  630949     705     784                       2
SD     1    4    CAT1   HR2 50                  EAST_OF_DYKE
SL     1    5    5500367  630973     705     784                       2
SD     1    5    CAT1   HR2 50                  EAST_OF_DYKE
SL     1    6    5500343  630946     705     787                       2
SD     1    6    CAT1   HR2 50                  EAST_OF_DYKE
SL     1    7    5500360  630921     705     784                       2
SD     1    7    CAT1   HR2 50                  EAST_OF_DYKE
SL     1    8    5500082  632415     705     784                       2
SD     1    8    CAT1   HR2 50                  EAST_OF_DYKE
SL     1    9    5500080  632448     705     787                       2
SD     1    9    CAT1   HR2 50                  EAST_OF_DYKE
SL     1    10   5500080  632463     705     784                       2
SD     1    10   CAT1   HR2 50                  EAST_OF_DYKE
SL     1    11   5500110  632500     705     787                       2
SD     1    11   CAT1   HR2 50                  EAST_OF_DYKE
SL     1    12   5500044  632494     705     787                       2
SD     1    12   CAT1   HR2 50                  EAST_OF_DYKE
```

```
TT   TEST 6 - RELOCATION OF STRUCTURES
J1     0       1       3               3
J2     2       2       1      4.0                     35
J5     1 CAT2
J8     1 CAT1
ZW    A=win     E=1992        F=plan6
DF   HR1       20
DP     0        1       2       3       4       5       6       7       8
DP     9       10      11      12      13      14      15      16      17
DP    18       19
PC     0        1       8      14      18      22      25      28      29
PC    30       32      36      41      45      48      51      54      57
PC    60       63
DF   HR2       20
DP     0        1       2       3       4       5       6       7       8
DP     9       10      11      12      13      14      15      16      17
DP    18       19
PC     0        4      23      32      38      45      50      53      55
PC    55       55      58      63      65      72      77      82      87
PC   100      100
DC        CAT1                                EAST_OF_DYKE
DC        CAT2                                WEST_OF_DYKE
DR     1   705.4     0.0    787.4    754.0   705.0
DT   DAMAGE_REACH_ONE
SL     1     2    5500423  630950     705     787                     2
SD     1     2    CAT1    HR2 50                   EAST_OF_DYKE
SL     1     3    5500396  630949     705     787                     2
SD     1     3    CAT1    HR2 50                   EAST_OF_DYKE
SL     1     4    5500373  630949     705     784                     2
SD     1     4    CAT1    HR2 50                   EAST_OF_DYKE
SL     1     5    5500367  630973     705     784                     2
SD     1     5    CAT1    HR2 50                   EAST_OF_DYKE
SL     1     6    5500343  630946     705     787                     2
SD     1     6    CAT1    HR2 50                   EAST_OF_DYKE
SL     1     7    5500360  630921     705     784                     2
SD     1     7    CAT1    HR2 50                   EAST_OF_DYKE
SL     1     8    5500082  632415     705     784                     2
SD     1     8    CAT1    HR2 50                   EAST_OF_DYKE
SL     1     9    5500080  632448     705     787                     2
SD     1     9    CAT1    HR2 50                   EAST_OF_DYKE
SL     1    10    5500080  632463     705     784                     2
SD     1    10    CAT1    HR2 50                   EAST_OF_DYKE
SL     1    11    5500110  632500     705     787                     2
SD     1    11    CAT1    HR2 50                   EAST_OF_DYKE
SL     1    12    5500044  632494     705     787                     2
SD     1    12    CAT1    HR2 50                   EAST_OF_DYKE
```

```
TT   TEST 7 -  DYKING THE RED RIVER TO A HEIGHT OF 20FT
J1     0       1       0              3
J2     2       2       1     4.0                     35
J5     1 CAT1
ZW    A=win     E=1992      F=plan7
DF   HR1      20
DP     0       1       2       3       4       5       6       7       8
DP     9      10      11      12      13      14      15      16      17
DP    18      19
PC     0       1       8      14      18      22      25      28      29
PC    30      32      36      41      45      48      51      54      57
PC    60      63
DF   HR2      20
DP     0       1       2       3       4       5       6       7       8
DP     9      10      11      12      13      14      15      16      17
DP    18      19
PC     0       4      23      32      38      45      50      53      55
PC    55      55      58      63      65      72      77      82      87
PC   100     100
DC       CAT1                               EAST_OF_DYKE
DC       CAT2                               WEST_OF_DYKE
DR     1   705.4     0.0   725.4     0.0   705.0
DT   DAMAGE_REACH_ONE
SL     1     2     5500423  630950     705     787                       2
SD     1     2     CAT1    HR2 50                   EAST_OF_DYKE
SL     1     3     5500396  630949     705     787                       2
SD     1     3     CAT1    HR2 50                   EAST_OF_DYKE
SL     1     4     5500373  630949     705     784                       2
SD     1     4     CAT1    HR2 50                   EAST_OF_DYKE
SL     1     5     5500367  630973     705     784                       2
SD     1     5     CAT1    HR2 50                   EAST_OF_DYKE
SL     1     6     5500343  630946     705     787                       2
SD     1     6     CAT1    HR2 50                   EAST_OF_DYKE
SL     1     7     5500360  630921     705     784                       2
SD     1     7     CAT1    HR2 50                   EAST_OF_DYKE
SL     1     8     5500082  632415     705     784                       2
SD     1     8     CAT1    HR2 50                   EAST_OF_DYKE
SL     1     9     5500080  632448     705     787                       2
SD     1     9     CAT1    HR2 50                   EAST_OF_DYKE
SL     1    10     5500080  632463     705     784                       2
SD     1    10     CAT1    HR2 50                   EAST_OF_DYKE
SL     1    11     5500110  632500     705     787                       2
SD     1    11     CAT1    HR2 50                   EAST_OF_DYKE
SL     1    12     5500044  632494     705     787                       2
SD     1    12     CAT1    HR2 50                   EAST_OF_DYKE
```

```
TT   TEST 8 -  DYKING THE RED RIVER TO A HEIGHT OF 40FT
J1      0       1       0               3
J2      2       2       1     4.0                      35
J5      1 CAT1
ZW    A=win     E=1992        F=plan8
DF   HR1      20
DP      0       1       2       3       4       5       6       7       8
DP      9      10      11      12      13      14      15      16      17
DP     18      19
PC      0       1       8      14      18      22      25      28      29
PC     30      32      36      41      45      48      51      54      57
PC     60      63
DF   HR2      20
DP      0       1       2       3       4       5       6       7       8
DP      9      10      11      12      13      14      15      16      17
DP     18      19
PC      0       4      23      32      38      45      50      53      55
PC     55      55      58      63      65      72      77      82      87
PC    100     100
DC       CAT1                               EAST_OF_DYKE
DC       CAT2                               WEST_OF_DYKE
DR      1   705.4     0.0   745.4     0.0   705.0
DT   DAMAGE_REACH_ONE
SL      1    2    5500423  630950     705     787                       2
SD      1    2    CAT1   HR2 50                    EAST_OF_DYKE
SL      1    3    5500396  630949     705     787                       2
SD      1    3    CAT1   HR2 50                    EAST_OF_DYKE
SL      1    4    5500373  630949     705     784                       2
SD      1    4    CAT1   HR2 50                    EAST_OF_DYKE
SL      1    5    5500367  630973     705     784                       2
SD      1    5    CAT1   HR2 50                    EAST_OF_DYKE
SL      1    6    5500343  630946     705     787                       2
SD      1    6    CAT1   HR2 50                    EAST_OF_DYKE
SL      1    7    5500360  630921     705     784                       2
SD      1    7    CAT1   HR2 50                    EAST_OF_DYKE
SL      1    8    5500082  632415     705     784                       2
SD      1    8    CAT1   HR2 50                    EAST_OF_DYKE
SL      1    9    5500080  632448     705     787                       2
SD      1    9    CAT1   HR2 50                    EAST_OF_DYKE
SL      1    10   5500080  632463     705     784                       2
SD      1    10   CAT1   HR2 50                    EAST_OF_DYKE
SL      1    11   5500110  632500     705     787                       2
SD      1    11   CAT1   HR2 50                    EAST_OF_DYKE
SL      1    12   5500044  632494     705     787                       2
SD      1    12   CAT1   HR2 50                    EAST_OF_DYKE
```

APPENDIX D2: OUTPUT FILES FOR SID CONSULTATION.

```
******************************************************
*       Structure Inventory for Damage Analysis      *
*       Users Manual (March 1989)                    *
*       Version  2.0.04;  August 1991                *
*       Sun Unix Workstation                         *
*       Run date 09APR92   time 05:22:57             *
******************************************************


             SSSSSSSS   IIIIIIII   DDDDDDD
             SS            II      DD     DD
             SS            II      DD     DD
             SSSSSSSS      II      DD     DD
                   SS      II      DD     DD
                   SS      II      DD     DD
             SSSSSSSS   IIIIIIII   DDDDDDD


        ***************************************
        *  U.S. Army Corps of Engineers       *
        *  The Hydrologic Engineering Center  *
        *  609 Second Street, Suite B         *
        *  Davis, California 95616            *
        *  (916) 756-1104                     *
        ***************************************
```

```
     TEST 1 - EXISTING CONDITIONS

                DAMAGE_REACH_ONE
           ( Damages are in $1,000 )

               Damage Categories
 ********************************************
 * Elevation* CAT1    * CAT2      *  Total  *
 *----------*---------*-----------*---------*
 *   705.00 *     0.0 *       0.0 *     0.0 *
 *   709.00 *     9.2 *       0.0 *     9.2 *
 *   713.00 *    23.8 *       0.0 *    23.8 *
 *   717.00 *    27.5 *       0.0 *    27.5 *
 *   721.00 *    35.1 *       0.0 *    35.1 *
 *   725.00 *    51.6 *       0.0 *    51.6 *
 *   729.00 *    70.8 *       0.0 *    70.8 *
 *   733.00 *    95.1 *       0.0 *    95.1 *
 *   737.00 *   124.8 *       0.0 *   124.8 *
 *   741.00 *   172.2 *       0.0 *   172.2 *
 *   745.00 *   364.6 *       0.0 *   364.6 *
 *   749.00 *   598.2 *       0.0 *   598.2 *
 *   753.00 *   961.7 *       0.0 *   961.7 *
 *   757.00 *  1435.3 *       0.0 *  1435.3 *
 *   761.00 *  2787.4 *       0.0 *  2787.4 *
 *   765.00 *  4487.8 *       0.0 *  4487.8 *
 *   769.00 *  6649.8 *       0.0 *  6649.8 *
 *   773.00 * 11374.9 *       0.0 * 11374.9 *
 *   777.00 * 23062.6 *       0.0 * 23062.6 *
 *   781.00 * 30688.3 *       0.0 * 30688.3 *
 *   785.00 * 38032.6 *       0.0 * 38032.6 *
 *----------*---------*---------*---------*--
 *   787.40 * 43313.6 *       0.0 * 43313.6 *  PROELV
 *----------*---------*---------*---------*-
 *   789.00 * 46591.5 *  4338.6 *   50930.1 *
 *   793.00 * 52414.9 *  4732.4 *   57147.3 *
 *   797.00 * 53588.9 *  4829.3 *   58418.2 *
 *   801.00 * 54590.4 *  4912.5 *   59502.9 *
 *   805.00 * 55411.4 *  4978.5 *   60389.8 *
 *   809.00 * 55784.3 *  5008.1 *   60792.3 *
 *   813.00 * 55787.1 *  5016.7 *   60803.8 *
 *   817.00 * 55787.1 *  5017.2 *   60804.3 *
 *   821.00 * 55787.1 *  5017.2 *   60804.3 *
 *   825.00 * 55787.1 *  5017.2 *   60804.3 *
 *   829.00 * 55787.1 *  5017.2 *   60804.3 *
 *   833.00 * 55787.1 *  5017.2 *   60804.3 *
 *   837.00 * 55787.1 *  5017.2 *   60804.3 *
 *   841.00 * 55787.1 *  5017.2 *   60804.3 *
 ********************************************
 Damage category  CAT1    identified as            EAST_OF_DYKE
 Damage category  CAT2    identified as            WEST_OF_DYKE
 Damage category    OTHER identified as  OTHER DAMAGE CATEGORIES
```

```
     TEST 2 - RAISING STRUCTURES TO A HEIGHT OF 3FT

                          DAMAGE_REACH_ONE
                        ( Damages are in $1,000 )

                         Damage Categories
*******************************************
* Elevation* CAT1      * CAT2     *  Total  *
*----------*-----------*---------*---------*
*   705.00 *     0.0   *     0.0 *     0.0 *
*   709.00 *     0.0   *     0.0 *     0.0 *
*   713.00 *    13.7   *     0.0 *    13.7 *
*   717.00 *    25.7   *     0.0 *    25.7 *
*   721.00 *    28.7   *     0.0 *    28.7 *
*   725.00 *    37.5   *     0.0 *    37.5 *
*   729.00 *    59.2   *     0.0 *    59.2 *
*   733.00 *    73.8   *     0.0 *    73.8 *
*   737.00 *   103.1   *     0.0 *   103.1 *
*   741.00 *   130.2   *     0.0 *   130.2 *
*   745.00 *   222.3   *     0.0 *   222.3 *
*   749.00 *   410.2   *     0.0 *   410.2 *
*   753.00 *   662.2   *     0.0 *   662.2 *
*   757.00 *  1082.6   *     0.0 *  1082.6 *
*   761.00 *  1714.8   *     0.0 *  1714.8 *
*   765.00 *  3209.9   *     0.0 *  3209.9 *
*   769.00 *  4857.1   *     0.0 *  4857.1 *
*   773.00 *  7186.7   *     0.0 *  7186.7 *
*   777.00 * 14036.0   *     0.0 * 14036.0 *
*   781.00 * 25494.8   *     0.0 * 25494.8 *
*   785.00 * 32296.8   *     0.0 * 32296.8 *
*----------*---------*---------*---------*-*
*   787.40 * 36713.2   *     0.0 * 36713.2 *  PROELV
*----------*---------*---------*---------*-*
*   789.00 * 40118.9 *  4338.6   * 44457.5 *
*   793.00 * 48532.3 *  4732.4   * 53264.7 *
*   797.00 * 52864.1 *  4829.3   * 57693.4 *
*   801.00 * 53851.7 *  4912.5   * 58764.2 *
*   805.00 * 54815.0 *  4978.5   * 59793.5 *
*   809.00 * 55552.5 *  5008.1   * 60560.6 *
*   813.00 * 55787.1 *  5016.7   * 60803.8 *
*   817.00 * 55787.1 *  5017.2   * 60804.3 *
*   821.00 * 55787.1 *  5017.2   * 60804.3 *
*   825.00 * 55787.1 *  5017.2   * 60804.3 *
*   829.00 * 55787.1 *  5017.2   * 60804.3 *
*   833.00 * 55787.1 *  5017.2   * 60804.3 *
*   837.00 * 55787.1 *  5017.2   * 60804.3 *
*   841.00 * 55787.1 *  5017.2   * 60804.3 *
*******************************************
Damage category  CAT1    identified as          EAST_OF_DYKE
Damage category  CAT2    identified as          WEST_OF_DYKE
Damage category    OTHER identified as  OTHER DAMAGE CATEGORIES
```

```
TEST 3 - RAISING STRUCTURES TO A HEIGHT OF 5FT

                         DAMAGE_REACH_ONE
                       ( Damages are in $1,000 )

                         Damage Categories
********************************************
* Elevation* CAT1    * CAT2      *  Total  *
*----------*---------*---------------------*
*   705.00 *     0.0 *       0.0 *     0.0 *
*   709.00 *     0.0 *       0.0 *     0.0 *
*   713.00 *     3.4 *       0.0 *     3.4 *
*   717.00 *    20.8 *       0.0 *    20.8 *
*   721.00 *    27.5 *       0.0 *    27.5 *
*   725.00 *    32.8 *       0.0 *    32.8 *
*   729.00 *    43.7 *       0.0 *    43.7 *
*   733.00 *    67.5 *       0.0 *    67.5 *
*   737.00 *    87.2 *       0.0 *    87.2 *
*   741.00 *   118.5 *       0.0 *   118.5 *
*   745.00 *   140.2 *       0.0 *   140.2 *
*   749.00 *   312.7 *       0.0 *   312.7 *
*   753.00 *   513.2 *       0.0 *   513.2 *
*   757.00 *   866.4 *       0.0 *   866.4 *
*   761.00 *  1337.3 *       0.0 *  1337.3 *
*   765.00 *  2401.1 *       0.0 *  2401.1 *
*   769.00 *  4007.1 *       0.0 *  4007.1 *
*   773.00 *  6030.2 *       0.0 *  6030.2 *
*   777.00 *  9957.3 *       0.0 *  9957.3 *
*   781.00 * 20333.5 *       0.0 * 20333.5 *
*   785.00 * 29029.4 *       0.0 * 29029.4 *
*----------*---------*-----------*---------*
*   787.40 * 32856.5 *       0.0 * 32856.5 *  PROELV
*----------*---------*-----------*---------*
*   789.00 * 35706.6 *  4338.6 *   40045.2 *
*   793.00 * 44709.7 *  4732.4 *   49442.1 *
*   797.00 * 51796.8 *  4829.3 *   56626.2 *
*   801.00 * 53346.4 *  4912.5 *   58258.9 *
*   805.00 * 54295.7 *  4978.5 *   59274.1 *
*   809.00 * 55255.9 *  5008.1 *   60263.9 *
*   813.00 * 55777.0 *  5016.7 *   60793.8 *
*   817.00 * 55787.1 *  5017.2 *   60804.3 *
*   821.00 * 55787.1 *  5017.2 *   60804.3 *
*   825.00 * 55787.1 *  5017.2 *   60804.3 *
*   829.00 * 55787.1 *  5017.2 *   60804.3 *
*   833.00 * 55787.1 *  5017.2 *   60804.3 *
*   837.00 * 55787.1 *  5017.2 *   60804.3 *
*   841.00 * 55787.1 *  5017.2 *   60804.3 *
********************************************
Damage category  CAT1    identified as             EAST_OF_DYKE
Damage category  CAT2    identified as             WEST_OF_DYKE
Damage category    OTHER identified as  OTHER DAMAGE CATEGORIES
```

```
         TEST 4 - FLOOD PROOFING OF STRUCTURES TO A HEIGHT OF 3FT

                          DAMAGE_REACH_ONE
                        ( Damages are in $1,000 )

                          Damage Categories
 *****************************************
 * Elevation* CAT1    * CAT2    *  Total  *
 *----------*---------*-------------------*
 *   705.00 *     0.0 *     0.0 *     0.0 *
 *   709.00 *     0.0 *     0.0 *     0.0 *
 *   713.00 *    23.8 *     0.0 *    23.8 *
 *   717.00 *    27.5 *     0.0 *    27.5 *
 *   721.00 *    35.1 *     0.0 *    35.1 *
 *   725.00 *    48.2 *     0.0 *    48.2 *
 *   729.00 *    70.8 *     0.0 *    70.8 *
 *   733.00 *    77.5 *     0.0 *    77.5 *
 *   737.00 *   124.8 *     0.0 *   124.8 *
 *   741.00 *   149.2 *     3.4 *   152.7 *
 *   745.00 *   331.9 *    20.8 *   352.7 *
 *   749.00 *   497.0 *    41.8 *   538.8 *
 *   753.00 *   837.9 *    75.8 *   913.4 *
 *   757.00 *  1435.3 *   148.8 *  1584.2 *
 *   761.00 *  2677.8 *   303.8 *  2981.6 *
 *   765.00 *  4167.8 *   526.2 *  4694.0 *
 *   769.00 *  5752.2 *   823.2 *  6575.4 *
 *   773.00 *  8555.0 *  1402.4 *  9957.5 *
 *   777.00 * 23001.2 *  2398.9 * 25400.2 *
 *   781.00 * 30623.9 *  3059.3 * 33683.2 *
 *   785.00 * 37783.1 *  3652.4 * 41435.5 *
 *----------*---------*---------*---------*
 *   787.40 * 43132.1 *  4071.5 * 47203.6 *  PROELV
 *----------*---------*---------*---------*
 *   789.00 * 46146.0 *  4338.6 * 50484.6 *
 *   793.00 * 52414.9 *  4732.4 * 57147.3 *
 *   797.00 * 53588.9 *  4829.3 * 58418.2 *
 *   801.00 * 54590.4 *  4912.5 * 59502.9 *
 *   805.00 * 55411.4 *  4978.5 * 60389.8 *
 *   809.00 * 55784.3 *  5008.1 * 60792.3 *
 *   813.00 * 55787.1 *  5016.7 * 60803.8 *
 *   817.00 * 55787.1 *  5017.2 * 60804.3 *
 *   821.00 * 55787.1 *  5017.2 * 60804.3 *
 *   825.00 * 55787.1 *  5017.2 * 60804.3 *
 *   829.00 * 55787.1 *  5017.2 * 60804.3 *
 *   833.00 * 55787.1 *  5017.2 * 60804.3 *
 *   837.00 * 55787.1 *  5017.2 * 60804.3 *
 *   841.00 * 55787.1 *  5017.2 * 60804.3 *
 *****************************************
 Damage category  CAT1    identified as            EAST_OF_DYKE
 Damage category  CAT2    identified as            WEST_OF_DYKE
 Damage category    OTHER identified as  OTHER DAMAGE CATEGORIES
```

```
        TEST 5 - FLOOD PROOFING OF STRUCTURES TO A HEIGHT OF 5FT

                          DAMAGE_REACH_ONE
                        ( Damages are in $1,000 )

                            Damage Categories
*******************************************
* Elevation* CAT1    * CAT2    *   Total  *
*----------*---------*--------------------*
*   705.00 *     0.0 *     0.0 *      0.0 *
*   709.00 *     0.0 *     0.0 *      0.0 *
*   713.00 *    23.8 *     0.0 *     23.8 *
*   717.00 *    27.5 *     0.0 *     27.5 *
*   721.00 *    35.1 *     0.0 *     35.1 *
*   725.00 *    48.2 *     0.0 *     48.2 *
*   729.00 *    50.0 *     0.0 *     50.0 *
*   733.00 *    77.5 *     0.0 *     77.5 *
*   737.00 *   124.8 *     0.0 *    124.8 *
*   741.00 *   149.2 *     3.4 *    152.7 *
*   745.00 *   179.7 *    20.8 *    200.5 *
*   749.00 *   497.0 *    41.8 *    538.8 *
*   753.00 *   837.9 *    75.5 *    913.4 *
*   757.00 *  1230.0 *   148.8 *   1378.9 *
*   761.00 *  1757.6 *   303.8 *   2061.4 *
*   765.00 *  3484.2 *   526.2 *   4010.4 *
*   769.00 *  5752.2 *   823.2 *   6575.4 *
*   773.00 *  8555.0 *  1402.4 *   9957.5 *
*   777.00 * 16018.7 *  2398.9 *  18417.6 *
*   781.00 * 30231.5 *  3059.3 *  33290.8 *
*   785.00 * 37381.3 *  3652.4 *  41033.7 *
*----------*---------*---------*----------*
*   787.40 * 42609.3 *  4071.5 *  46680.8 *  PROELV
*----------*---------*---------*----------*
*   789.00 * 46146.0 *  4338.6 *  50484.6 *
*   793.00 * 51795.6 *  4732.4 *  56528.0 *
*   797.00 * 53588.9 *  4829.3 *  58418.2 *
*   801.00 * 54590.4 *  4912.5 *  59502.9 *
*   805.00 * 55411.4 *  4978.5 *  60389.8 *
*   809.00 * 55784.3 *  5008.1 *  60792.3 *
*   813.00 * 55787.1 *  5016.7 *  60803.8 *
*   817.00 * 55787.1 *  5017.2 *  60804.3 *
*   821.00 * 55787.1 *  5017.2 *  60804.3 *
*   825.00 * 55787.1 *  5017.2 *  60804.3 *
*   829.00 * 55787.1 *  5017.2 *  60804.3 *
*   833.00 * 55787.1 *  5017.2 *  60804.3 *
*   837.00 * 55787.1 *  5017.2 *  60804.3 *
*   841.00 * 55787.1 *  5017.2 *  60804.3 *
*******************************************
Damage category  CAT1    identified as             EAST_OF_DYKE
Damage category  CAT2    identified as             WEST_OF_DYKE
Damage category    OTHER identified as  OTHER DAMAGE CATEGORIES
```

```
   TEST 6 - RELOCATION OF STRUCTURES

                     DAMAGE_REACH_ONE
                ( Damages are in $1,000 )

                     Damage Categories
******************************************
* Elevation * CAT1   * CAT2    *  Total  *
*-----------*--------*---------*---------*
*   705.00  *    0.0 *     0.0 *     0.0 *
*   709.00  *    0.0 *     0.0 *     0.0 *
*   713.00  *    0.0 *     0.0 *     0.0 *
*   717.00  *    0.0 *     0.0 *     0.0 *
*   721.00  *    0.0 *     0.0 *     0.0 *
*   725.00  *    0.0 *     0.0 *     0.0 *
*   729.00  *    0.0 *     0.0 *     0.0 *
*   733.00  *    0.0 *     0.0 *     0.0 *
*   737.00  *    0.0 *     0.0 *     0.0 *
*   741.00  *    0.0 *     0.0 *     0.0 *
*   745.00  *    0.0 *     0.0 *     0.0 *
*   749.00  *    0.0 *     0.0 *     0.0 *
*   753.00  *    0.0 *     0.0 *     0.0 *
*-----------*--------*---------*---------*
*   754.00  *    0.0 *     0.0 *     0.0 *  EVCELV
*-----------*--------*---------*---------*
*   757.00  *    0.0 *     0.0 *     0.0 *
*   761.00 *  1029.8 *     0.0 *  1029.8 *
*   765.00 *  2448.6 *     0.0 *  2448.6 *
*   769.00 *  4365.1 *     0.0 *  4365.1 *
*   773.00 *  8972.5 *     0.0 *  8972.5 *
*   777.00 * 20659.7 *     0.0 * 20659.7 *
*   781.00 * 28285.5 *     0.0 * 28285.5 *
*   785.00 * 35629.8 *     0.0 * 35629.8 *
*----------*---------*---------*---------*
*   787.40 * 40910.8 *     0.0 * 40910.8 *  PROELV
*----------*---------*---------*---------*
*   789.00 * 44188.8 *  4338.6 * 48527.4 *
*   793.00 * 50012.1 *  4732.4 * 54744.5 *
*   797.00 * 51186.1 *  4829.3 * 56015.4 *
*   801.00 * 52187.6 *  4912.5 * 57100.1 *
*   805.00 * 53008.6 *  4978.5 * 57987.0 *
*   809.00 * 53381.5 *  5008.1 * 58389.5 *
*   813.00 * 53384.3 *  5016.7 * 58401.0 *
*   817.00 * 53384.3 *  5017.2 * 58401.5 *
*   821.00 * 53384.3 *  5017.2 * 58401.5 *
*   825.00 * 53384.3 *  5017.2 * 58401.5 *
*   829.00 * 53384.3 *  5017.2 * 58401.5 *
*   833.00 * 53384.3 *  5017.2 * 58401.5 *
*   837.00 * 53384.3 *  5017.2 * 58401.5 *
*   841.00 * 53384.3 *  5017.2 * 58401.5 *
******************************************
Damage category  CAT1    identified as             EAST_OF_DYKE
```

```
    TEST 7 -  DYKING THE RED RIVER TO A HEIGHT OF 20FT

                        DAMAGE_REACH_ONE
                   ( Damages are in $1,000 )

                        Damage Categories
 *******************************************
 * Elevation* CAT1    * CAT2    *  Total    *
 *----------*---------*---------*----------*
 *   705.00 *     0.0 *     0.0 *      0.0 *
 *   709.00 *     0.0 *     0.0 *      0.0 *
 *   713.00 *     0.0 *     0.0 *      0.0 *
 *   717.00 *     0.0 *     0.0 *      0.0 *
 *   721.00 *     0.0 *     0.0 *      0.0 *
 *   725.00 *     0.0 *     0.0 *      0.0 *
 *----------*---------*---------*----------*
 *   725.40       0.0 *     0.0 *      0.0 *  PROELV
 *----------*---------*---------*----------*
 *   729.00 *    70.8 *     0.0 *     70.8 *
 *   733.00 *    95.1 *     0.0 *     95.1 *
 *   737.00 *   124.8 *     0.0 *    124.8 *
 *   741.00 *   172.2 *     3.4 *    175.7 *
 *   745.00 *   364.6 *    20.8 *    385.4 *
 *   749.00 *   598.2 *    41.8 *    640.0 *
 *   753.00 *   961.7 *    75.5 *   1037.2 *
 *   757.00 *  1435.3 *   148.8 *   1584.2 *
 *   761.00 *  2787.4 *   303.8 *   3091.3 *
 *   765.00 *  4487.8 *   526.2 *   5014.0 *
 *   769.00 *  6649.8 *   823.2 *   7473.0 *
 *   773.00 * 11374.9 *  1402.4 *  12777.3 *
 *   777.00 * 23062.6 *  2398.9 *  25461.5 *
 *   781.00 * 30688.3 *  3059.3 *  33747.6 *
 *   785.00 * 38032.6 *  3652.4 *  41684.9 *
 *   789.00 * 46591.5 *  4338.6 *  50930.1 *
 *   793.00 * 52414.9 *  4732.4 *  57147.3 *
 *   797.00 * 53588.9 *  4829.3 *  58418.2 *
 *   801.00 * 54590.4 *  4912.5 *  59502.9 *
 *   805.00 * 55411.4 *  4978.5 *  60389.8 *
 *   809.00 * 55784.3 *  5008.1 *  60792.3 *
 *   813.00 * 55787.1 *  5016.7 *  60803.8 *
 *   817.00 * 55787.1 *  5017.2 *  60804.3 *
 *   821.00 * 55787.1 *  5017.2 *  60804.3 *
 *   825.00 * 55787.1 *  5017.2 *  60804.3 *
 *   829.00 * 55787.1 *  5017.2 *  60804.3 *
 *   833.00 * 55787.1 *  5017.2 *  60804.3 *
 *   837.00 * 55787.1 *  5017.2 *  60804.3 *
 *   841.00 * 55787.1 *  5017.2 *  60804.3 *
 *******************************************
Damage category  CAT1    identified as             EAST_OF_DYKE
Damage category  CAT2    identified as             WEST_OF_DYKE
Damage category    OTHER identified as  OTHER DAMAGE CATEGORIES
```

```
   TEST 8 -  DYKING THE RED RIVER TO A HEIGHT OF 40FT

                      DAMAGE_REACH_ONE
                  ( Damages are in $1,000 )

                      Damage Categories
*********************************************
* Elevation* CAT1    * CAT2    *  Total     *
*----------*---------*---------*------------*
*   705.00 *     0.0 *     0.0 *        0.0 *
*   709.00 *     0.0 *     0.0 *        0.0 *
*   713.00 *     0.0 *     0.0 *        0.0 *
*   717.00 *     0.0 *     0.0 *        0.0 *
*   721.00 *     0.0 *     0.0 *        0.0 *
*   725.00 *     0.0 *     0.0 *        0.0 *
*   729.00 *     0.0 *     0.0 *        0.0 *
*   733.00 *     0.0 *     0.0 *        0.0 *
*   737.00 *     0.0 *     0.0 *        0.0 *
*   741.00 *     0.0 *     3.4 *        3.4 *
*   745.00 *     0.0 *    20.8 *       20.8 *
*----------*---------*---------*------------*
*   745.40 *     0.0 *    22.0 *       22.0 *  PROELV
*----------*---------*---------*------------*
*   749.00 *   598.2 *    41.8 *      640.0 *
*   753.00 *   961.7 *    75.5 *     1037.2 *
*   757.00 *  1435.3 *   148.8 *     1584.2 *
*   761.00 *  2787.4 *   303.8 *     3091.3 *
*   765.00 *  4487.8 *   526.2 *     5014.0 *
*   769.00 *  6649.8 *   823.2 *     7473.0 *
*   773.00 * 11374.9 *  1402.4 *    12777.3 *
*   777.00 * 23062.6 *  2398.9 *    25461.5 *
*   781.00 * 30688.3 *  3059.3 *    33747.6 *
*   785.00 * 38032.6 *  3652.4 *    41684.9 *
*   789.00 * 46591.5 *  4338.6 *    50930.1 *
*   793.00 * 52414.9 *  4732.4 *    57147.3 *
*   797.00 * 53588.9 *  4829.3 *    58418.2 *
*   801.00 * 54590.4 *  4912.5 *    59502.9 *
*   805.00 * 55411.4 *  4978.5 *    60389.8 *
*   809.00 * 55784.3 *  5008.1 *    60792.3 *
*   813.00 * 55787.1 *  5016.7 *    60803.8 *
*   817.00 * 55787.1 *  5017.2 *    60804.3 *
*   821.00 * 55787.1 *  5017.2 *    60804.3 *
*   825.00 * 55787.1 *  5017.2 *    60804.3 *
*   829.00 * 55787.1 *  5017.2 *    60804.3 *
*   833.00 * 55787.1 *  5017.2 *    60804.3 *
*   837.00 * 55787.1 *  5017.2 *    60804.3 *
*   841.00 * 55787.1 *  5017.2 *    60804.3 *
*********************************************
Damage category  CAT1    identified as          EAST_OF_DYKE
Damage category  CAT2    identified as          WEST_OF_DYKE
Damage category    OTHER identified as  OTHER DAMAGE CATEGORIES
```

APPENDIX D3: INPUT FILES FOR EAD CONSULTATION.

```
TT  TEST 1 - DAMAGE FOR EXISTING CONDITIONS
J1    50    1992    1995    1992       3
J2     5
CN     2 CAT1    CAT2
PN     1 EXISTING CONDITIONS
DY     3    1950    1970    1974
RN     1 DAMAGE_REACH_ONE
FR     1      17      99      98      95      90      80      70      60
FR    50      40      30      20      10       5       2       1     0.5
FR   0.2
QF     1            5000    6000    8500   11200   15000   19000   23500
QF 28000   33000   40000   49000   62000   80000  100000  120000  140000
FR160000
SQ     1      16     708     712     716     720     724     728     732
SQ   736     740     744     748     752     756     760     764     768
QS     1           13000   15000   17000   19000   21000   24000   26000
QS 30000   35000   41000   50000   64000   80000  100000  140000  230000
ZR A=win        B=1     C=DG    E=1992  F=plan1
RC       CAT1       1995     1.5
RC       CAT2       1995     1.5
EJ     1
```

```
TT  TEST 2 - DAMAGE FOR RAISING STRUCTURES 3FT
J1      50    1992    1995    1992       3
J2       5
CN       2 CAT1    CAT2
PN       1 RAISING STRUCTURES 3FT
DY       3    1950    1970    1974
RN       1 DAMAGE_REACH_ONE
FR       1      17      99      98      95      90      80      70      60
FR      50      40      30      20      10       5       2       1     0.5
FR     0.2
QF       1            5000    6000    8500   11200   15000   19000   23500
QF   28000   33000   40000   49000   62000   80000  100000  120000  140000
FR160000
SQ       1      16     708     712     716     720     724     728     732
SQ     736     740     744     748     752     756     760     764     768
QS       1           13000   15000   17000   19000   21000   24000   26000
QS   30000   35000   41000   50000   64000   80000  100000  140000  230000
ZR A=win       B=1      C=DG    E=1992  F=plan2
RC       CAT1       1995     1.5
RC       CAT2       1995     1.5
EJ       1
```

```
TT  TEST 3 - DAMAGE FOR RAISING STRUCTURES 5FT
J1      50    1992    1995    1992       3
J2       5
CN       2 CAT1    CAT2
PN       1 RAISING STRUCTURES 5FT
DY       3    1950    1970    1974
RN       1 DAMAGE_REACH_ONE
FR       1      17      99      98      95      90      80      70      60
FR      50      40      30      20      10       5       2       1     0.5
FR     0.2
QF       1            5000    6000    8500   11200   15000   19000   23500
QF   28000   33000   40000   49000   62000   80000  100000  120000  140000
QF160000
SQ       1      16     708     712     716     720     724     728     732
SQ     736     740     744     748     752     756     760     764     768
QS       1           13000   15000   17000   19000   21000   24000   26000
QS   30000   35000   41000   50000   64000   80000  100000  140000  230000
ZR A=win        B=1     C=DG    E=1992  F=plan3
RC       CAT1        1995     1.5
RC       CAT2        1995     1.5
EJ       1
```

```
TT  TEST 4 - FLOOD PROOFING TO A HEIGHT OF 3FT
J1    50    1992    1995    1992       3
J2     5
CN     2 CAT1    CAT2
PN     1 FLOOD PROOFING TO 3FT
DY     3    1950    1970    1974
RN     1 DAMAGE_REACH_ONE
FR     1      17      99      98      95      90      80      70      60
FR    50      40      30      20      10       5       2       1     0.5
FR   0.2
QF     1            5000    6000    8500   11200   15000   19000   23500
QF 28000   33000   40000   49000   62000   80000  100000  120000  140000
FR160000
SQ     1      16     708     712     716     720     724     728     732
SQ   736     740     744     748     752     756     760     764     768
QS     1           13000   15000   17000   19000   21000   24000   26000
QS 30000   35000   41000   50000   64000   80000  100000  140000  230000
SD     1      18     709     713     717     721     725     729     733
SD   737     741     745     749     753     757     761     765     769
SD   773     777
DG     1               0    23.8    27.5    35.1    48.2    70.8    77.5
DG 124.5   149.2   331.9   497.0   837.9  1435.3  2677.8  4167.8  5752.2
DG8555.0 23001.2
RC       CAT1       1995     1.5
RC       CAT2       1995     1.5
EJ     1
```

```
TT  TEST 5 - FLOOD PROOFING TO A HEIGHT OF 5FT
J1      50    1992    1995    1992       3
J2       5
CN       2 CAT1    CAT2
PN       1 FLOOD PROOFING TO 5FT
DY       3    1950    1970    1974
RN       1 DAMAGE_REACH_ONE
FR       1      17      99      98      95      90      80      70      60
FR      50      40      30      20      10       5       2       1     0.5
FR     0.2
QF       1            5000    6000    8500   11200   15000   19000   23500
QF 28000   33000   40000   49000   62000   80000  100000  120000  140000
QF160000
SQ       1      16     708     712     716     720     724     728     732
SQ     736     740     744     748     752     756     760     764     768
QS       1           13000   15000   17000   19000   21000   24000   26000
QS 30000   35000   41000   50000   64000   80000  100000  140000  230000
SD       1      18     709     713     717     721     725     729     733
SD     737     741     745     749     753     757     761     765     769
SD     773     777
DG       1               0    23.8    27.5    35.1    48.2    50.0    77.5
DG 128.4   149.2   179.7   497.0   837.9  1230.0  1757.6  3484.2  5752.2
DG8555.0 16018.7
RC       CAT1        1995     1.5
RC       CAT2        1995     1.5
EJ       1
```

```
TT  TEST 6 - RELOCATION OF STRUCTURES ABOVE 754.0FT LEVEL
J1    50    1992    1995    1992       3
J2     5
CN     2 CAT1    CAT2
PN     1 RELOCATION OF STRUCTURES
DY     3    1950    1970    1974
RN     1 DAMAGE_REACH_ONE
FR     1      17      99      98      95      90      80      70      60
FR    50      40      30      20      10       5       2       1     0.5
FR   0.2
QF     1            5000    6000    8500   11200   15000   19000   23500
QF 28000   33000   40000   49000   62000   80000  100000  120000  140000
QF160000
SQ     1      16     708     712     716     720     724     728     732
SQ   736     740     744     748     752     756     760     764     768
QS     1           13000   15000   17000   19000   21000   24000   26000
QS 30000   35000   41000   50000   64000   80000  100000  140000  230000
ZR A=win        B=1     C=DG    E=1992  F=plan6
RC      CAT1        1995     1.5
RC      CAT2        1995     1.5
EJ     1
```

```
TT  TEST 7 -  DYKING THE RED RIVER TO A HEIGHT OF 20FT
J1    50    1992    1995    1992       3
J2     5
CN     2 CAT1    CAT2
PN     1  DYKING THE RED RIVER TO 725.4FT
DY     3    1950    1970    1974
RN     1 DAMAGE_REACH_ONE
FR     1      17      99      98      95      90      80      70      60
FR    50      40      30      20      10       5       2       1     0.5
FR   0.2
QF     1            5000    6000    8500   11200   15000   19000   23500
QF 28000   33000   40000   49000   62000   80000  100000  120000  140000
FR160000
SQ     1      16     708     712     716     720     724     728     732
SQ   736     740     744     748     752     756     760     764     768
QS     1           13000   15000   17000   19000   21000   24000   26000
QS 30000   35000   41000   50000   64000   80000  100000  140000  230000
SD     1      18     709     713     717     721     725     729     733
SD   737     741     745     749     753     757     761     765     769
SD   773     777
DG     1               0       0       0       0       0    70.8    95.1
DG 124.8   172.2   364.6   598.2   961.7  1435.3  2787.4  4487.8  6649.8
DG11374. 23062.6
RC       CAT1       1995     1.5
RC       CAT2       1995     1.5
EJ     1
```

APPENDIX D4: OUTPUT FILES FOR EAD CONSULTATION.

```
******************************************************
*       Expected Annual Flood Damage Program         *
*       Users Manual (March 1989)                    *
*       Version  2.0.01;  June 1991                  *
*       Sun Unix                                     *
*       Run date 14APR92   time 11:36:56             *
******************************************************


            EEEEEEEE      AA      DDDDDDDD
            E           AA  AA    DD      DD
            E          AA    AA   DD      DD
            EEEEE     AA      AA  DD      DD
            E         AAAAAAAAAA  DD      DD
            E         AA      AA  DD      DD
            EEEEEEEE  AA      AA  DDDDDDDD

        ***************************************
        *  U.S. Army Corps of Engineers       *
        *  The Hydrologic Engineering Center  *
        *  609 Second Street, Suite B         *
        *  Davis, California 95616            *
        *  (916) 756-1104                     *
        ***************************************

     ++++++++++++++++++++++++++++++++++++++++++++
     + Expected Annual Flood Damage Computation +
     + 761-X6-L7580     Sun Unix                +
     + Version Date     June 6, 1991            +
     ++++++++++++++++++++++++++++++++++++++++++++
```

```
  TEST 1 - DAMAGE FOR EXISTING CONDITIONS

** EXPECTED ANNUAL FLOOD DAMAGE **

**       FOR REACH  1 =      1 DAMAGE_REACH_ONE

**       WITH PLAN  1 =  EXISTING CONDITIONS

** INPUT DATA YEARS   =  1950  1970  1974

** PERIOD OF ANALYSIS =    50 YEARS

** DISCOUNT RATE      =   5.0000 PERCENT

** DAMAGE BASE        =       1992 DOLLARS

----------------------------------------------------------------------

              STUDY      BASE    .................. DECADE YEARS ......
  DAMAGE       YEAR      YEAR         10        20        30        40
   CATEGORIES     1992      1995      2004      2014      2024      2034
----------------------------------------------------------------------
 1 CAT1       326.04    340.94    389.83    452.41    525.04    609.33
 2 CAT2         0.00      0.00      0.00      0.00      0.00      0.00
----------------------------------------------------------------------
     TOTAL    326.04    340.94    389.83    452.41    525.04    609.33


----------------------------------------------------------
..........    END OF  EQUIVALENT
        50    PERIOD    ANNUAL  ..... HISTORIC EVENTS .....
      2044      2044    DAMAGE     1950      1970      1974
------------------------------------------------------------
    707.15    707.15    435.63    172.86    233.87
      0.00      0.00      0.00      0.00      0.00   0.00
------------------------------------------------------------
    707.15    707.15    435.63    172.86    233.87 248.44
```

```
 TEST 2 - DAMAGE FOR RAISING STRUCTURES 3FT

** EXPECTED ANNUAL FLOOD DAMAGE **

**       FOR REACH  1 =      1 DAMAGE_REACH_ONE

**       WITH PLAN  1 =  RAISING STRUCTURES 3FT

** INPUT DATA YEARS   =  1950  1970  1974

** PERIOD OF ANALYSIS =    50 YEARS

** DISCOUNT RATE      =   5.0000 PERCENT

** DAMAGE BASE        =       1992 DOLLARS


----------------------------------------------------------------------

               STUDY       BASE   ................. DECADE YEARS ......
  DAMAGE        YEAR       YEAR         10         20         30       40
   CATEGORIES      1992       1995       2004       2014       2024   2034
----------------------------------------------------------------------
 1 CAT1       225.20     235.48     269.25     312.47     362.64     420.86
 2 CAT2         0.00       0.00       0.00       0.00       0.00       0.00
----------------------------------------------------------------------
     TOTAL    225.20     235.48     269.25     312.47     362.64     420.86



----------------------------------------------------------
..........    END OF  EQUIVALENT
        50    PERIOD    ANNUAL  ..... HISTORIC EVENTS .....
      2044      2044    DAMAGE      1950      1970      1974
------------------------------------------------------------
    488.42    488.42    300.88    119.39    161.53 171.60
      0.00      0.00      0.00      0.00      0.00   0.00
------------------------------------------------------------
    488.42    488.42    300.88    119.39    161.53 171.60
```

```
  TEST 3 - DAMAGE FOR RAISING STRUCTURES 5FT

** EXPECTED ANNUAL FLOOD DAMAGE **

**       FOR REACH  1 =      1 DAMAGE_REACH_ONE

**       WITH PLAN  1 =  RAISING STRUCTURES 5FT

** INPUT DATA YEARS   =  1950  1970  1974

** PERIOD OF ANALYSIS =    50 YEARS

** DISCOUNT RATE      =   5.0000 PERCENT

** DAMAGE BASE        =       1992 DOLLARS


----------------------------------------------------------------------

               STUDY      BASE   ................. DECADE YEARS ......
   DAMAGE       YEAR      YEAR        10        20        30        40
    CATEGORIES     1992      1995      2004      2014      2024   2034
----------------------------------------------------------------------
 1 CAT1       174.32    182.28    208.42    241.88    280.71    325.77
 2 CAT2         0.00      0.00      0.00      0.00      0.00      0.00
----------------------------------------------------------------------
     TOTAL    174.32    182.28    208.42    241.88    280.71    325.77



----------------------------------------------------------
..........    END OF  EQUIVALENT
        50    PERIOD    ANNUAL   ..... HISTORIC EVENTS .....
      2044      2044    DAMAGE     1950     1970     1974
------------------------------------------------------------
    378.07    378.07    232.91     92.42    125.04 132.83
      0.00      0.00      0.00      0.00      0.00   0.00
------------------------------------------------------------
    378.07    378.07    232.91     92.42    125.04 132.83
```

```
  TEST 4 - FLOOD PROOFING TO A HEIGHT OF 3FT

** EXPECTED ANNUAL FLOOD DAMAGE **

**       FOR REACH  1 =      1 DAMAGE_REACH_ONE

**       WITH PLAN  1 =  FLOOD PROOFING TO 3FT

** INPUT DATA YEARS   =  1950  1970  1974

** PERIOD OF ANALYSIS =    50 YEARS

** DISCOUNT RATE      =   5.0000 PERCENT

** DAMAGE BASE        =       1992 DOLLARS


-----------------------------------------------------------------------

               STUDY      BASE   ................. DECADE YEARS ......
   DAMAGE       YEAR      YEAR        10        20        30        40
    CATEGORIES     1992      1995      2004      2014      2024   2034
-----------------------------------------------------------------------
 1 CAT1       296.77    310.33    354.82    411.79    477.89    554.62
 2 CAT2         0.00      0.00      0.00      0.00      0.00      0.00
-----------------------------------------------------------------------
     TOTAL    296.77    310.33    354.82    411.79    477.89    554.62



----------------------------------------------------------
..........   END OF  EQUIVALENT
        50   PERIOD    ANNUAL  ..... HISTORIC EVENTS .....
      2044     2044    DAMAGE    1950      1970      1974
------------------------------------------------------------
    643.65   643.65    396.51  157.34    212.87 226.14
      0.00     0.00      0.00    0.00      0.00   0.00
------------------------------------------------------------
    643.65   643.65    396.51  157.34    212.87 226.14
```

```
  TEST 5 - FLOOD PROOFING TO A HEIGHT OF 5FT

** EXPECTED ANNUAL FLOOD DAMAGE **

**       FOR REACH  1 =      1 DAMAGE_REACH_ONE

**       WITH PLAN  1 =  FLOOD PROOFING TO 5FT

** INPUT DATA YEARS   =  1950  1970  1974

** PERIOD OF ANALYSIS =    50 YEARS

** DISCOUNT RATE      =   5.0000 PERCENT

** DAMAGE BASE        =       1992 DOLLARS


----------------------------------------------------------------------

               STUDY      BASE     ................. DECADE YEARS ......
  DAMAGE        YEAR      YEAR          10         20         30      40
   CATEGORIES      1992      1995     2004       2014       2024    2034
----------------------------------------------------------------------
 1 CAT1       252.05    263.56    301.35    349.73    405.87    471.03
 2 CAT2         0.00      0.00      0.00      0.00      0.00      0.00
----------------------------------------------------------------------
     TOTAL    252.05    263.56    301.35    349.73    405.87    471.03



----------------------------------------------------------
..........    END OF  EQUIVALENT
        50    PERIOD    ANNUAL   ..... HISTORIC EVENTS .....
      2044      2044    DAMAGE     1950      1970     1974
------------------------------------------------------------
    546.65    546.65    336.76    133.63    180.79 192.06
      0.00      0.00      0.00      0.00      0.00   0.00
------------------------------------------------------------
    546.65    546.65    336.76    133.63    180.79 192.06
```

```
  TEST 6 - RELOCATION OF STRUCTURES ABOVE 754.0FT LEVEL

** EXPECTED ANNUAL FLOOD DAMAGE **

**       FOR REACH  1 =      1 DAMAGE_REACH_ONE

**       WITH PLAN  1 =  RELOCATION OF STRUCTURES

** INPUT DATA YEARS   =  1950  1970  1974

** PERIOD OF ANALYSIS =    50 YEARS

** DISCOUNT RATE      =   5.0000 PERCENT

** DAMAGE BASE        =       1992 DOLLARS

----------------------------------------------------------------------

               STUDY      BASE   ................. DECADE YEARS ......
  DAMAGE        YEAR      YEAR        10         20         30      40
   CATEGORIES     1992      1995     2004       2014       2024   2034
----------------------------------------------------------------------
 1 CAT1        37.39     39.10     44.70      51.88      60.21   69.87
 2 CAT2         0.00      0.00      0.00       0.00       0.00    0.00
----------------------------------------------------------------------
     TOTAL     37.39     39.10     44.70      51.88      60.21   69.87


----------------------------------------------------------
..........   END OF  EQUIVALENT
        50   PERIOD    ANNUAL  ..... HISTORIC EVENTS .....
      2044     2044    DAMAGE     1950      1970      1974
------------------------------------------------------------
     81.09    81.09     49.96    19.82     26.82  28.49
      0.00     0.00      0.00     0.00      0.00   0.00
------------------------------------------------------------
     81.09    81.09     49.96    19.82     26.82  28.49
```

```
  TEST 7 -  DYKING THE RED RIVER TO A HEIGHT OF 20FT

** EXPECTED ANNUAL FLOOD DAMAGE **

**       FOR REACH  1 =      1 DAMAGE_REACH_ONE

**       WITH PLAN  1 =   DYKING THE RED RIVER TO 725.4FT

** INPUT DATA YEARS   =  1950  1970  1974

** PERIOD OF ANALYSIS =    50 YEARS

** DISCOUNT RATE      =   5.0000 PERCENT

** DAMAGE BASE        =       1992 DOLLARS


----------------------------------------------------------------------

               STUDY      BASE   ................. DECADE YEARS ......
   DAMAGE       YEAR      YEAR        10        20        30        40
    CATEGORIES     1992      1995      2004      2014      2024   2034
----------------------------------------------------------------------
 1 CAT1       317.32    331.81    379.39    440.30    510.99    593.02
 2 CAT2         0.00      0.00      0.00      0.00      0.00      0.00
----------------------------------------------------------------------
     TOTAL    317.32    331.81    379.39    440.30    510.99    593.02



----------------------------------------------------------
..........    END OF  EQUIVALENT
        50    PERIOD    ANNUAL  ..... HISTORIC EVENTS .....
      2044      2044    DAMAGE     1950     1970     1974
------------------------------------------------------------
    688.23    688.23    423.97    168.24    227.61 241.79
      0.00      0.00      0.00      0.00      0.00   0.00
------------------------------------------------------------
    688.23    688.23    423.97    168.24    227.61 241.79
```

```
  TEST 8 -  DYKING THE RED RIVER TO A HEIGHT OF 40FT

** EXPECTED ANNUAL FLOOD DAMAGE **

**        FOR REACH  1 =      1 DAMAGE_REACH_ONE

**        WITH PLAN  1 =   DYKING THE RED RIVER TO 745.4FT

** INPUT DATA YEARS    =  1950  1970  1974

** PERIOD OF ANALYSIS =    50 YEARS

** DISCOUNT RATE       =   5.0000 PERCENT

** DAMAGE BASE         =       1992 DOLLARS


----------------------------------------------------------------------

               STUDY       BASE    ................. DECADE YEARS ......
  DAMAGE        YEAR       YEAR          10         20         30       40
   CATEGORIES      1992       1995      2004       2014       2024    2034
----------------------------------------------------------------------
 1 CAT1       245.62     256.84     293.67     340.81     395.53    459.02
 2 CAT2         0.00       0.00       0.00       0.00       0.00      0.00
----------------------------------------------------------------------
     TOTAL    245.62     256.84     293.67     340.81     395.53    459.02



----------------------------------------------------------
..........     END OF  EQUIVALENT
        50     PERIOD    ANNUAL  ..... HISTORIC EVENTS .....
      2044       2044    DAMAGE     1950      1970      1974
------------------------------------------------------------
    532.72     532.72    328.17    130.22    176.18 187.16
      0.00       0.00      0.00      0.00      0.00   0.00
------------------------------------------------------------
    532.72     532.72    328.17    130.22    176.18 187.16
```

APPENDIX E: STRUCTURE INVENTORY LISTINGS

```
KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1              1    5500419     630907        787        787          0
SL    1              2    5500423     630950        787        787          0
SL    1              3    5500396     630949        787        787          0
SL    1              4    5500373     630949        784        784          0
SL    1              5    5500367     630973        784        784          0
SL    1              6    5500343     630946        787        787          0
SL    1              7    5500360     630921        784        784          0
SL    1              8    5500082     632415        784        784          0
SL    1              9    5500080     632448        787        787          0
SL    1             10    5500080     632463        784        784          0
SL    1             11    5500110     632500        787        787          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1             12    5500044     632494        787        787          0
SL    1             13    5500021     632542        784        784          0
SL    1             14    5500050     632566        787        787          0
SL    1             15    5500070     632529        787        787          0
SL    1             16    5500178     632546        784        784          0
SL    1             17    5500175     632492        787        787          0
SL    1             18    5500199     632491        787        787          0
SL    1             19    5500231     632566        787        787          0
SL    1             20    5501601     630747        784        784          0
SL    1             21    5501488     630920        787        787          0
SL    1             22    5501384     631418        784        784          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1             23    5501369     631473        787        787          0
SL    1             24    5501439     631463        784        784          0
SL    1             25    5502416     630777        771        771          0
SL    1             26    5502465     630806        771        771          0
SL    1             27    5502490     630841        771        771          0
SL    1             28    5502544     630801        771        771          0
SL    1             29    5502470     630762        771        771          0
SL    1             30    5502184     632105        787        787          0
SL    1             31    5502406     632564        784        784          0
SL    1             32    5503113     631631        771        771          0
SL    1             33    5503034     631581        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1             34    5503068     631601        771        771          0
SL    1             35    5503014     631631        771        771          0
SL    1             36    5503059     631645        768        768          0
SL    1             37    5504668     632085        771        771          0
SL    1             38    5504712     632070        771        771          0
SL    1             39    5504717     632144        771        771          0
SL    1             40    5506666     631616        771        771          0
SL    1             41    5506500     632168        771        771          0
SL    1             42    5506400     632314        771        771          0
SL    1             43    5506335     632304        771        771          0
SL    1             44    5506164     632294        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1             45    5506099     632279        771        771          0
SL    1             46    5506114     632324        771        771          0
SL    1             47    5506084     632314        771        771          0
SL    1             48    5507649     631566        771        771          0
SL    1             49    5507724     631702        771        771          0
SL    1             50    5507674     631727        771        771          0
SL    1             51    5507934     632374        771        771          0
SL    1             52    5508135     632529        771        771          0
SL    1             53    5508175     632349        768        768          0
SL    1             54    5508265     632123        768        768          0
SL    1             55    5508546     632088        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1             56    5508346     632519        771        771          0
SL    1             57    5508441     632554        771        771          0
SL    1             58    5508401     632700        771        771          0
SL    1             59    5500112     634561        771        771          0
SL    1             60    5500474     635778        771        771          0
SL    1             61    5500485     635811        768        768          0
SL    1             62    5500518     635778        771        771          0
SL    1             63    5500540     635773        768        768          0
SL    1             64    5500579     635773        771        771          0
SL    1             65    5500129     636557        745        745          0
SL    1             66    5500134     636590        755        755          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1             67    5500101     636601        761        761          0
SL    1             68    5500129     636618        761        761          0
SL    1             69    5500118     636640        768        768          0
SL    1             70    5500074     636634        764        764          0
SL    1             71    5500491     636563        764        764          0
SL    1             72    5500540     636563        758        758          0
SL    1             73    5500540     636601        761        761          0
SL    1             74    5500590     636519        771        771          0
SL    1             75    5500650     636530        758        758          0
SL    1             76    5500699     636579        761        761          0
SL    1             77    5500672     636640        768        768          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1             78    5500721     636629        764        764          0
SL    1             79    5500776     636398        751        751          0
SL    1             80    5500831     636261        751        751          0
SL    1             81    5500891     635614        764        764          0
SL    1             82    5500880     635564        768        768          0
SL    1             83    5501171     635745        761        761          0
SL    1             84    5501144     635712        761        761          0
SL    1             85    5501182     635674        768        768          0
SL    1             86    5501215     635674        768        768          0
SL    1             87    5501325     635597        771        771          0
SL    1             88    5501325     635647        764        764          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1             89    5501330     635795        761        761          0
SL    1             90    5501357     635773        761        761          0
SL    1             91    5501390     635778        764        764          0
SL    1             92    5501467     635839        768        768          0
SL    1             93    5501456     635729        768        768          0
SL    1             94    5501242     636634        768        768          0
SL    1             95    5501204     636612        768        768          0
SL    1             96    5501533     635899        761        761          0
SL    1             97    5501478     635915        758        758          0
SL    1             98    5501933     635504        764        764          0
SL    1             99    5501933     635559        764        764          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            100    5501988     635608        764        764          0
SL    1            101    5502021     635564        751        751          0
SL    1            102    5501983     635570        761        761          0
SL    1            103    5501977     635389        768        768          0
```

```
SL    1            104    5502147     634747        771        771          0
SL    1            105    5502180     635252        771        771          0
SL    1            106    5502252     635263        761        761          0
SL    1            107    5502252     635312        761        761          0
SL    1            108    5502186     635334        768        768          0
SL    1            109    5502098     635279        771        771          0
SL    1            110    5502104     635312        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            111    5502093     635361        768        768          0
SL    1            112    5502542     634796        771        771          0
SL    1            113    5502257     635850        761        761          0
SL    1            114    5502312     636069        761        761          0
SL    1            115    5501643     635789        768        768          0
SL    1            116    5501835     636700        755        755          0
SL    1            117    5501884     636694        761        761          0
SL    1            118    5501418     636788        768        768          0
SL    1            119    5501401     636837        768        768          0
SL    1            120    5501451     636815        768        768          0
SL    1            121    5501451     636864        764        764          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            122    5501484     636881        761        761          0
SL    1            123    5501555     636892        771        771          0
SL    1            124    5502378     636437        764        764          0
SL    1            125    5502345     636420        764        764          0
SL    1            126    5502290     636420        764        764          0
SL    1            127    5502328     636557        758        758          0
SL    1            128    5502252     636541        758        758          0
SL    1            129    5502246     636612        755        755          0
SL    1            130    5502482     636601        761        761          0
SL    1            131    5502433     636678        758        758          0
SL    1            132    5502477     636689        755        755          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            133    5502449     636760        755        755          0
SL    1            134    5502317     636738        758        758          0
SL    1            135    5502317     636799        758        758          0
SL    1            136    5502285     636782        761        761          0
SL    1            137    5502169     636842        758        758          0
SL    1            138    5502169     636875        761        761          0
SL    1            139    5502093     636782        755        755          0
SL    1            140    5500655     636585        758        758          0
SL    1            141    5502583     635176        764        764          0
SL    1            142    5502668     635170        755        755          0
SL    1            143    5502724     635182        748        748          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            144    5502769     635176        748        748          0
SL    1            145    5502758     635119        764        764          0
SL    1            146    5502826     635114        768        768          0
SL    1            147    5503469     634967        768        768          0
SL    1            148    5503395     634984        771        771          0
SL    1            149    5503362     635283        771        771          0
SL    1            150    5503418     635763        764        764          0
SL    1            151    5503333     635757        768        768          0
SL    1            152    5503102     635729        768        768          0
SL    1            153    5503023     636118        768        768          0
SL    1            154    5502944     636101        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            155    5502944     636141        771        771          0
SL    1            156    5502639     636474        761        761          0
SL    1            157    5502651     636586        758        758          0
SL    1            158    5502713     636575        755        755          0
SL    1            159    5502752     636530        755        755          0
SL    1            160    5502803     636541        755        755          0
SL    1            161    5502848     636519        755        755          0
SL    1            162    5502899     636519        755        755          0
SL    1            163    5502950     636502        755        755          0
SL    1            164    5503034     636333        768        768          0
SL    1            165    5503034     636276        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            166    5502989     636310        771        771          0
SL    1            167    5502978     636338        768        768          0
SL    1            168    5502775     636592        755        755          0
SL    1            169    5502938     636806        771        771          0
SL    1            170    5503029     636801        768        768          0
SL    1            171    5503034     636699        758        758          0
SL    1            172    5503362     636192        768        768          0
SL    1            173    5503401     636186        771        771          0
SL    1            174    5503452     636175        771        771          0
SL    1            175    5503345     636310        768        768          0
SL    1            176    5503395     636299        768        768          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            177    5503390     636338        768        768          0
SL    1            178    5503446     636293        771        771          0
SL    1            179    5503412     636304        768        768          0
SL    1            180    5503474     636270        768        768          0
SL    1            181    5503497     636259        768        768          0
SL    1            182    5503542     636248        771        771          0
SL    1            183    5503531     636180        768        768          0
SL    1            184    5503570     636180        768        768          0
SL    1            185    5503627     636158        768        768          0
SL    1            186    5503723     635988        751        751          0
SL    1            187    5503260     635926        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            188    5504066     635390        768        768          0
SL    1            189    5504087     635419        771        771          0
SL    1            190    5504124     635415        771        771          0
SL    1            191    5504179     635441        768        768          0
SL    1            192    5504211     635532        771        771          0
SL    1            193    5504324     635342        771        771          0
SL    1            194    5504343     635386        768        768          0
SL    1            195    5504357     635357        771        771          0
SL    1            196    5504390     635357        768        768          0
SL    1            197    5504554     635353        768        768          0
SL    1            198    5504601     635342        768        768          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            199    5504529     635707        774        774          0
SL    1            200    5504539     635736        778        778          0
SL    1            201    5504558     635780        781        781          0
SL    1            202    5504554     635849        778        778          0
SL    1            203    5504477     635944        771        771          0
SL    1            204    5504543     635951        771        771          0
SL    1            205    5504539     635969        771        771          0
SL    1            206    5504532     635995        771        771          0
SL    1            207    5504423     635966        764        764          0
SL    1            208    5504434     635988        764        764          0
```

```
SL    1            209    5504441     636024        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            210    5504401     636057        771        771          0
SL    1            211    5504364     636020        764        764          0
SL    1            212    5504284     636050        771        771          0
SL    1            213    5504259     636057        764        764          0
SL    1            214    5504248     636086        768        768          0
SL    1            215    5503931     636035        741        741          0
SL    1            216    5503854     635962        728        728          0
SL    1            217    5503821     635973        728        728          0
SL    1            218    5503836     636174        768        768          0
SL    1            219    5503595     636177        771        771          0
SL    1            220    5503562     636308        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            221    5503533     636334        771        771          0
SL    1            222    5503530     636359        768        768          0
SL    1            223    5503519     636385        768        768          0
SL    1            224    5503515     636407        764        764          0
SL    1            225    5503519     636432        764        764          0
SL    1            226    5503541     636454        764        764          0
SL    1            227    5503588     636494        764        764          0
SL    1            228    5503610     636505        764        764          0
SL    1            229    5503592     636425        764        764          0
SL    1            230    5503577     636407        764        764          0
SL    1            231    5503584     636374        768        768          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            232    5503610     636367        768        768          0
SL    1            233    5503639     636367        771        771          0
SL    1            234    5503621     636305        771        771          0
SL    1            235    5503617     636250        771        771          0
SL    1            236    5503650     636312        771        771          0
SL    1            237    5503683     636319        768        768          0
SL    1            238    5503646     636254        771        771          0
SL    1            239    5503679     636254        771        771          0
SL    1            240    5503661     636199        771        771          0
SL    1            241    5503679     636188        771        771          0
SL    1            242    5503705     636199        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            243    5503726     636210        768        768          0
SL    1            244    5503745     636206        768        768          0
SL    1            245    5503770     636195        768        768          0
SL    1            246    5503792     636206        771        771          0
SL    1            247    5503778     636272        768        768          0
SL    1            248    5503818     636214        771        771          0
SL    1            249    5503843     636221        771        771          0
SL    1            250    5503869     636214        771        771          0
SL    1            251    5503814     636279        768        768          0
SL    1            252    5503847     636279        771        771          0
SL    1            253    5503825     636323        768        768          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            254    5503737     636330        768        768          0
SL    1            255    5503763     636334        771        771          0
SL    1            256    5503781     636341        771        771          0
SL    1            257    5503708     636327        771        771          0
SL    1            258    5503737     636254        768        768          0
SL    1            259    5503712     636257        771        771          0
SL    1            260    5503661     636370        771        771          0
SL    1            261    5503679     636370        771        771          0
SL    1            262    5503683     636400        771        771          0
SL    1            263    5503664     636392        771        771          0
SL    1            264    5503657     636454        764        764          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            265    5503639     636509        764        764          0
SL    1            266    5503668     636516        768        768          0
SL    1            267    5503708     636472        768        768          0
SL    1            268    5503701     636516        768        768          0
SL    1            269    5503734     636465        768        768          0
SL    1            270    5503759     636465        771        771          0
SL    1            271    5503726     636385        771        771          0
SL    1            272    5503752     636396        771        771          0
SL    1            273    5503774     636385        771        771          0
SL    1            274    5503810     636392        771        771          0
SL    1            275    5503836     636392        768        768          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            276    5503854     636345        768        768          0
SL    1            277    5503858     636403        771        771          0
SL    1            278    5503880     636410        771        771          0
SL    1            279    5503810     636462        768        768          0
SL    1            280    5503832     636462        771        771          0
SL    1            281    5503858     636465        771        771          0
SL    1            282    5503883     636454        771        771          0
SL    1            283    5503814     636505        771        771          0
SL    1            284    5503839     636513        768        768          0
SL    1            285    5503887     636516        771        771          0
SL    1            286    5503912     636290        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            287    5503887     636225        768        768          0
SL    1            288    5503912     636225        771        771          0
SL    1            289    5503938     636217        768        768          0
SL    1            290    5503956     636228        771        771          0
SL    1            291    5503974     636228        768        768          0
SL    1            292    5504011     636228        771        771          0
SL    1            293    5503971     636312        768        768          0
SL    1            294    5503916     636359        768        768          0
SL    1            295    5503923     636389        771        771          0
SL    1            296    5503931     636414        771        771          0
SL    1            297    5503923     636454        768        768          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            298    5503923     636472        771        771          0
SL    1            299    5503923     636498        768        768          0
SL    1            300    5503752     636556        764        764          0
SL    1            301    5503865     636542        768        768          0
SL    1            302    5503883     636549        771        771          0
SL    1            303    5503920     636545        771        771          0
SL    1            304    5503949     636542        771        771          0
SL    1            305    5503920     636520        771        771          0
SL    1            306    5503931     636593        768        768          0
SL    1            307    5503887     636593        768        768          0
SL    1            308    5503821     636560        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            309    5503825     636582        768        768          0
SL    1            310    5503836     636604        768        768          0
```

```
SL    1            311    5503985     636538        768        768          0
SL    1            312    5503963     636596        771        771          0
SL    1            313    5503985     636600        771        771          0
SL    1            314    5504022     636593        771        771          0
SL    1            315    5504025     636567        768        768          0
SL    1            316    5504018     636538        771        771          0
SL    1            317    5504007     636323        771        771          0
SL    1            318    5504051     636319        771        771          0
SL    1            319    5504087     636363        768        768          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            320    5504117     636287        768        768          0
SL    1            321    5504058     636217        771        771          0
SL    1            322    5504127     636750        771        771          0
SL    1            323    5504153     636768        771        771          0
SL    1            324    5504182     636808        768        768          0
SL    1            325    5504241     636735        771        771          0
SL    1            326    5504189     636698        771        771          0
SL    1            327    5504215     636662        771        771          0
SL    1            328    5504106     636184        768        768          0
SL    1            329    5504109     636210        768        768          0
SL    1            330    5504127     636203        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            331    5504146     636199        771        771          0
SL    1            332    5504168     636195        768        768          0
SL    1            333    5504182     636170        768        768          0
SL    1            334    5504211     636177        771        771          0
SL    1            335    5504157     636272        771        771          0
SL    1            336    5504189     636257        771        771          0
SL    1            337    5504193     636319        768        768          0
SL    1            338    5504204     636356        771        771          0
SL    1            339    5504208     636392        771        771          0
SL    1            340    5504211     636454        771        771          0
SL    1            341    5504211     636483        768        768          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            342    5504219     636513        768        768          0
SL    1            343    5504219     636534        771        771          0
SL    1            344    5504226     636564        771        771          0
SL    1            345    5504197     636567        768        768          0
SL    1            346    5504273     636545        771        771          0
SL    1            347    5504273     636516        768        768          0
SL    1            348    5504262     636491        768        768          0
SL    1            349    5504262     636451        771        771          0
SL    1            350    5504270     636148        771        771          0
SL    1            351    5504266     636217        771        771          0
SL    1            352    5504241     636228        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            353    5504248     636254        768        768          0
SL    1            354    5504248     636308        771        771          0
SL    1            355    5504281     636246        771        771          0
SL    1            356    5504270     636367        768        768          0
SL    1            357    5504259     636403        771        771          0
SL    1            358    5504357     636108        771        771          0
SL    1            359    5504321     636108        771        771          0
SL    1            360    5504310     636126        768        768          0
SL    1            361    5504317     636203        771        771          0
SL    1            362    5504346     636188        768        768          0
SL    1            363    5504379     636177        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            364    5504415     636170        768        768          0
SL    1            365    5504313     636279        771        771          0
SL    1            366    5504339     636246        768        768          0
SL    1            367    5504361     636265        771        771          0
SL    1            368    5504379     636254        768        768          0
SL    1            369    5504397     636228        768        768          0
SL    1            370    5504419     636217        771        771          0
SL    1            371    5504306     636330        768        768          0
SL    1            372    5504332     636319        771        771          0
SL    1            373    5504350     636316        771        771          0
SL    1            374    5504368     636308        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            375    5504401     636297        771        771          0
SL    1            376    5504419     636279        771        771          0
SL    1            377    5504437     636283        771        771          0
SL    1            378    5504459     636283        771        771          0
SL    1            379    5504375     636363        771        771          0
SL    1            380    5504350     636363        768        768          0
SL    1            381    5504328     636378        768        768          0
SL    1            382    5504328     636403        771        771          0
SL    1            383    5504335     636443        771        771          0
SL    1            384    5504339     636469        771        771          0
SL    1            385    5504343     636494        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            386    5504332     636513        768        768          0
SL    1            387    5504332     636542        771        771          0
SL    1            388    5504354     636556        768        768          0
SL    1            389    5504375     636575        768        768          0
SL    1            390    5504408     636578        771        771          0
SL    1            391    5504390     636505        768        768          0
SL    1            392    5504397     636531        771        771          0
SL    1            393    5504426     636531        771        771          0
SL    1            394    5504448     636527        771        771          0
SL    1            395    5504383     636465        771        771          0
SL    1            396    5504401     636462        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            397    5504390     636421        768        768          0
SL    1            398    5504386     636385        768        768          0
SL    1            399    5504419     636410        768        768          0
SL    1            400    5504441     636410        768        768          0
SL    1            401    5504467     636414        771        771          0
SL    1            402    5504496     636418        771        771          0
SL    1            403    5504485     636381        771        771          0
SL    1            404    5504408     636739        768        768          0
SL    1            405    5504419     636713        771        771          0
SL    1            406    5504430     636571        771        771          0
SL    1            407    5504452     636575        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            408    5504470     636582        771        771          0
SL    1            409    5504492     636571        768        768          0
SL    1            410    5504510     636575        771        771          0
SL    1            411    5504470     636523        768        768          0
SL    1            412    5504488     636520        771        771          0
SL    1            413    5504510     636527        771        771          0
SL    1            414    5504536     636520        768        768          0
SL    1            415    5504554     636527        771        771          0
```

```
SL    1            416    5504580     636527        771        771          0
SL    1            417    5504605     636520        768        768          0
SL    1            418    5504623     636509        768        768          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            419    5504445     636458        768        768          0
SL    1            420    5504463     636458        771        771          0
SL    1            421    5504492     636462        771        771          0
SL    1            422    5504532     636458        771        771          0
SL    1            423    5504569     636462        771        771          0
SL    1            424    5504587     636454        768        768          0
SL    1            425    5504612     636462        768        768          0
SL    1            426    5504481     636035        771        771          0
SL    1            427    5504488     636071        768        768          0
SL    1            428    5504467     636075        771        771          0
SL    1            429    5504459     636141        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            430    5504459     636188        771        771          0
SL    1            431    5504477     636221        771        771          0
SL    1            432    5504485     636250        771        771          0
SL    1            433    5504503     636272        771        771          0
SL    1            434    5504503     636297        771        771          0
SL    1            435    5504503     636319        768        768          0
SL    1            436    5504518     636400        768        768          0
SL    1            437    5504507     636144        771        771          0
SL    1            438    5504525     636126        768        768          0
SL    1            439    5504532     636024        768        768          0
SL    1            440    5504536     636046        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            441    5504565     636031        768        768          0
SL    1            442    5504587     636031        768        768          0
SL    1            443    5504598     636097        771        771          0
SL    1            444    5504565     636112        768        768          0
SL    1            445    5504507     636199        771        771          0
SL    1            446    5504525     636188        768        768          0
SL    1            447    5504543     636170        771        771          0
SL    1            448    5504565     636174        771        771          0
SL    1            449    5504587     636166        771        771          0
SL    1            450    5504612     636163        771        771          0
SL    1            451    5504547     636232        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            452    5504554     636254        771        771          0
SL    1            453    5504550     636279        768        768          0
SL    1            454    5504558     636305        771        771          0
SL    1            455    5504576     636319        771        771          0
SL    1            456    5504576     636294        771        771          0
SL    1            457    5504547     636327        771        771          0
SL    1            458    5504547     636356        771        771          0
SL    1            459    5504561     636392        771        771          0
SL    1            460    5504565     636418        771        771          0
SL    1            461    5504594     636410        768        768          0
SL    1            462    5504612     636410        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            463    5504620     636392        771        771          0
SL    1            464    5504620     636348        771        771          0
SL    1            465    5504620     636323        771        771          0
SL    1            466    5504620     636301        771        771          0
SL    1            467    5504620     636276        771        771          0
SL    1            468    5504609     636254        771        771          0
SL    1            469    5504605     636225        771        771          0
SL    1            470    5504550     636567        768        768          0
SL    1            471    5504580     636582        771        771          0
SL    1            472    5504605     636571        768        768          0
SL    1            473    5504638     636589        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            474    5504616     636702        771        771          0
SL    1            475    5504652     636720        768        768          0
SL    1            476    5504609     635940        771        771          0
SL    1            477    5504638     635962        771        771          0
SL    1            478    5504656     636002        768        768          0
SL    1            479    5504663     635966        771        771          0
SL    1            480    5504663     635940        771        771          0
SL    1            481    5504663     636082        768        768          0
SL    1            482    5504663     636115        768        768          0
SL    1            483    5504663     636133        771        771          0
SL    1            484    5504656     636159        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            485    5504656     636210        768        768          0
SL    1            486    5504663     636243        768        768          0
SL    1            487    5504671     636290        771        771          0
SL    1            488    5504663     636316        771        771          0
SL    1            489    5504663     636334        771        771          0
SL    1            490    5504663     636356        771        771          0
SL    1            491    5504667     636385        771        771          0
SL    1            492    5504663     636429        768        768          0
SL    1            493    5504671     636451        771        771          0
SL    1            494    5504671     636472        771        771          0
SL    1            495    5504667     636498        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            496    5504667     636516        768        768          0
SL    1            497    5504663     636545        771        771          0
SL    1            498    5504693     636578        771        771          0
SL    1            499    5504689     636133        768        768          0
SL    1            500    5504689     636177        768        768          0
SL    1            501    5504747     636108        768        768          0
SL    1            502    5504773     636115        764        764          0
SL    1            503    5504773     636082        764        764          0
SL    1            504    5504784     636060        761        761          0
SL    1            505    5504827     636837        771        771          0
SL    1            506    5504911     636115        751        751          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            507    5504919     636071        751        751          0
SL    1            508    5504966     636101        755        755          0
SL    1            509    5505156     636148        771        771          0
SL    1            510    5505181     636126        768        768          0
SL    1            511    5505188     636155        771        771          0
SL    1            512    5505516     636075        761        761          0
SL    1            513    5505473     636079        771        771          0
SL    1            514    5505393     636093        761        761          0
SL    1            515    5505349     636159        771        771          0
SL    1            516    5505356     636225        768        768          0
SL    1            517    5505389     636195        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
```

```
SL    1            518    5505389     636217        771        771          0
SL    1            519    5505575     636319        771        771          0
SL    1            520    5506956     634094        771        771          0
SL    1            521    5507000     634065        768        768          0
SL    1            522    5507020     634089        771        771          0
SL    1            523    5507029     634114        768        768          0
SL    1            524    5506981     634128        771        771          0
SL    1            525    5506835     634463        758        758          0
SL    1            526    5506874     634473        755        755          0
SL    1            527    5507102     634585        758        758          0
SL    1            528    5507146     634454        758        758          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            529    5507122     634473        755        755          0
SL    1            530    5507170     634488        755        755          0
SL    1            531    5507156     634517        755        755          0
SL    1            532    5507335     634434        771        771          0
SL    1            533    5507335     634483        768        768          0
SL    1            534    5507384     634536        771        771          0
SL    1            535    5507418     634556        768        768          0
SL    1            536    5507452     634575        768        768          0
SL    1            537    5507476     634458        771        771          0
SL    1            538    5507491     634488        771        771          0
SL    1            539    5507501     634420        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            540    5507622     634493        768        768          0
SL    1            541    5507219     634998        755        755          0
SL    1            542    5507267     635022        771        771          0
SL    1            543    5507326     635046        771        771          0
SL    1            544    5507233     635037        764        764          0
SL    1            545    5507253     635129        784        784          0
SL    1            546    5507190     635134        784        784          0
SL    1            547    5507156     635114        787        787          0
SL    1            548    5507097     635221        764        764          0
SL    1            549    5507068     635236        771        771          0
SL    1            550    5507034     635236        787        787          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            551    5506990     635309        778        778          0
SL    1            552    5506952     635343        781        781          0
SL    1            553    5506927     635382        787        787          0
SL    1            554    5506845     635187        778        778          0
SL    1            555    5506864     635474        771        771          0
SL    1            556    5506835     635537        768        768          0
SL    1            557    5506879     635523        768        768          0
SL    1            558    5506879     635542        768        768          0
SL    1            559    5506879     635586        768        768          0
SL    1            560    5506641     635955        768        768          0
SL    1            561    5506592     635960        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            562    5506558     636004        768        768          0
SL    1            563    5506485     636004        768        768          0
SL    1            564    5506495     636038        768        768          0
SL    1            565    5506471     636115        764        764          0
SL    1            566    5506660     636101        771        771          0
SL    1            567    5506854     636076        764        764          0
SL    1            568    5506893     636028        768        768          0
SL    1            569    5505844     636183        768        768          0
SL    1            570    5505941     636237        781        781          0
SL    1            571    5505960     636276        771        771          0
SL    1            572    5505912     636300        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            573    5505834     636227        768        768          0
SL    1            574    5505810     636290        771        771          0
SL    1            575    5505698     636329        771        771          0
SL    1            576    5505718     636358        771        771          0
SL    1            577    5505786     636382        768        768          0
SL    1            578    5505820     636412        768        768          0
SL    1            579    5505815     636450        771        771          0
SL    1            580    5505781     636441        771        771          0
SL    1            581    5505805     636504        768        768          0
SL    1            582    5505951     636533        771        771          0
SL    1            583    5506087     636514        768        768          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            584    5506145     636509        758        758          0
SL    1            585    5506145     636538        761        761          0
SL    1            586    5506203     636669        764        764          0
SL    1            587    5506213     636698        768        768          0
SL    1            588    5506140     636800        771        771          0
SL    1            589    5506135     636820        771        771          0
SL    1            590    5506169     636800        771        771          0
SL    1            591    5506203     636805        771        771          0
SL    1            592    5506354     636791        764        764          0
SL    1            593    5507000     636004        761        761          0
SL    1            594    5507000     636047        758        758          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            595    5506786     636723        738        738          0
SL    1            596    5506850     636791        745        745          0
SL    1            597    5506884     636805        745        745          0
SL    1            598    5506981     636810        745        745          0
SL    1            599    5507209     636504        761        761          0
SL    1            600    5507258     636504        764        764          0
SL    1            601    5507501     635231        768        768          0
SL    1            602    5507501     635032        764        764          0
SL    1            603    5507544     634939        768        768          0
SL    1            604    5507564     634993        778        778          0
SL    1            605    5507598     634978        778        778          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            606    5507617     635105        781        781          0
SL    1            607    5507646     635148        771        771          0
SL    1            608    5507676     635119        781        781          0
SL    1            609    5507690     635173        771        771          0
SL    1            610    5508322     636786        722        722          0
SL    1            611    5508356     636553        738        738          0
SL    1            612    5508331     636543        738        738          0
SL    1            613    5508200     636441        738        738          0
SL    1            614    5508113     636285        758        758          0
SL    1            615    5508089     636276        764        764          0
SL    1            616    5507909     636174        748        748          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            617    5507923     636013        764        764          0
SL    1            618    5507855     635440        768        768          0
SL    1            619    5507855     635479        768        768          0
SL    1            620    5507923     635484        768        768          0
SL    1            621    5507729     635192        774        774          0
SL    1            622    5507739     635226        771        771          0
```

```
SL    1            623    5507768     635168        784        784          0
SL    1            624    5507763     635139        784        784          0
SL    1            625    5507807     635114        778        778          0
SL    1            626    5507787     635003        771        771          0
SL    1            627    5507904     635158        774        774          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            628    5507909     635119        771        771          0
SL    1            629    5507870     634939        771        771          0
SL    1            630    5507884     634964        771        771          0
SL    1            631    5507894     634993        771        771          0
SL    1            632    5507923     634954        771        771          0
SL    1            633    5507948     634944        771        771          0
SL    1            634    5507986     634949        768        768          0
SL    1            635    5507982     635003        771        771          0
SL    1            636    5507952     635027        771        771          0
SL    1            637    5508030     635017        771        771          0
SL    1            638    5508035     635119        781        781          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            639    5507977     635148        778        778          0
SL    1            640    5508006     635168        774        774          0
SL    1            641    5508040     635163        774        774          0
SL    1            642    5508069     635153        774        774          0
SL    1            643    5508089     635100        778        778          0
SL    1            644    5508113     634935        771        771          0
SL    1            645    5508166     634915        771        771          0
SL    1            646    5508152     634949        771        771          0
SL    1            647    5508176     635003        771        771          0
SL    1            648    5508438     635148        771        771          0
SL    1            649    5508482     635158        778        778          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            650    5508560     635124        781        781          0
SL    1            651    5501435     633265        778        778          0
SL    1            652    5504310     633759        771        771          0
SL    1            653    5504429     633673        771        771          0
SL    1            654    5504395     633776        771        771          0
SL    1            655    5504497     633844        771        771          0
SL    1            656    5508854     633444        771        771          0
SL    1            657    5508918     633431        771        771          0
SL    1            658    5508750     635090        787        787          0
SL    1            659    5510195     634857        768        768          0
SL    1            660    5510208     634876        768        768          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            661    5510221     634921        764        764          0
SL    1            662    5510247     635051        768        768          0
SL    1            663    5510188     635057        768        768          0
SL    1            664    5510078     635459        761        761          0
SL    1            665    5510117     635705        771        771          0
SL    1            666    5510182     636392        758        758          0
SL    1            667    5510136     636392        771        771          0
SL    1            668    5510052     636412        774        774          0
SL    1            669    5510085     636463        771        771          0
SL    1            670    5509851     636548        787        787          0
SL    1            671    5509709     636502        787        787          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            672    5510039     635854        771        771          0
SL    1            673    5510143     634941        764        764          0
```

```
SL    1            674    5510104     634967        764        764          0
SL    1            675    5510091     634896        768        768          0
SL    1            676    5510085     634844        768        768          0
SL    1            677    5510039     634837        771        771          0
SL    1            678    5510065     634921        764        764          0
SL    1            679    5509806     634436        771        771          0
SL    1            680    5509903     635096        771        771          0
SL    1            681    5509961     635304        748        748          0
SL    1            682    5509974     635446        751        751          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            683    5509968     635660        764        764          0
SL    1            684    5509936     635803        748        748          0
SL    1            685    5509948     635628        748        748          0
SL    1            686    5509942     635595        751        751          0
SL    1            687    5509929     635556        755        755          0
SL    1            688    5509877     635511        771        771          0
SL    1            689    5509871     635440        745        745          0
SL    1            690    5509916     635394        751        751          0
SL    1            691    5509903     635330        748        748          0
SL    1            692    5509825     635356        771        771          0
SL    1            693    5509884     635232        745        745          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            694    5509702     634785        771        771          0
SL    1            695    5509735     634921        768        768          0
SL    1            696    5509709     634960        771        771          0
SL    1            697    5509787     635278        738        738          0
SL    1            698    5509845     635232        741        741          0
SL    1            699    5509858     635187        745        745          0
SL    1            700    5509825     635168        755        755          0
SL    1            701    5509780     635122        764        764          0
SL    1            702    5509754     635239        745        745          0
SL    1            703    5509715     635181        745        745          0
SL    1            704    5509663     635142        755        755          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            705    5509683     634908        771        771          0
SL    1            706    5509638     634921        771        771          0
SL    1            707    5509644     634779        771        771          0
SL    1            708    5509612     634837        771        771          0
SL    1            709    5509586     634785        771        771          0
SL    1            710    5509553     634688        771        771          0
SL    1            711    5509534     634753        771        771          0
SL    1            712    5509501     634669        768        768          0
SL    1            713    5509489     634623        771        771          0
SL    1            714    5509476     634572        768        768          0
SL    1            715    5509482     634526        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            716    5509437     634533        771        771          0
SL    1            717    5509495     634844        771        771          0
SL    1            718    5509560     635135        771        771          0
SL    1            719    5509534     635116        755        755          0
SL    1            720    5509469     635388        768        768          0
SL    1            721    5509430     635388        768        768          0
SL    1            722    5509411     635427        771        771          0
SL    1            723    5509346     635407        768        768          0
SL    1            724    5509385     635394        768        768          0
SL    1            725    5509346     635485        771        771          0
SL    1            726    5509398     635466        768        768          0
```

```
KODE1 IDRCH      IBDLG      ROWN      COLE       ADJ     STOPO     DELTZ
----- ----- ---------- --------- --------- --------- --------- ---------
SL    1            727   5509333    635032       771       771         0
SL    1            728   5509320    634980       771       771         0
SL    1            729   5509262    634980       781       781         0
SL    1            730   5509223    634908       781       781         0
SL    1            731   5509281    635032       781       781         0
SL    1            732   5509262    635019       784       784         0
SL    1            733   5509203    634980       781       781         0
SL    1            734   5509139    635025       778       778         0
SL    1            735   5509106    635019       774       774         0
SL    1            736   5509054    635025       778       778         0
SL    1            737   5509029    635019       778       778         0

KODE1 IDRCH      IBDLG      ROWN      COLE       ADJ     STOPO     DELTZ
----- ----- ---------- --------- --------- --------- --------- ---------
SL    1            738   5509041    634973       778       778         0
SL    1            739   5509288    635414       768       768         0
SL    1            740   5509041    635116       784       784         0
SL    1            741   5509029    635187       758       758         0
SL    1            742   5508983    635194       758       758         0
SL    1            743   5508964    635226       758       758         0
SL    1            744   5508931    635232       755       755         0
SL    1            745   5508938    635304       748       748         0
SL    1            746   5508912    635278       755       755         0
SL    1            747   5508821    635356       758       758         0
SL    1            748   5508795    635420       764       764         0

KODE1 IDRCH      IBDLG      ROWN      COLE       ADJ     STOPO     DELTZ
----- ----- ---------- --------- --------- --------- --------- ---------
SL    1            749   5508769    635459       768       768         0
SL    1            750   5508756    635394       764       764         0
SL    1            751   5510637    636338       755       755         0
SL    1            752   5510713    636351       764       764         0
SL    1            753   5510681    636382       755       755         0
SL    1            754   5510707    636426       745       745         0
SL    1            755   5510782    636558       751       751         0
SL    1            756   5510550    636696       781       781         0
SL    1            757   5510556    636733       787       787         0
SL    1            758   5510594    636771       787       787         0
SL    1            759   5510600    634380       771       771         0

KODE1 IDRCH      IBDLG      ROWN      COLE       ADJ     STOPO     DELTZ
----- ----- ---------- --------- --------- --------- --------- ---------
SL    1            760   5510694    634399       771       771         0
SL    1            761   5510587    634700       771       771         0
SL    1            762   5510537    634763       771       771         0
SL    1            763   5510587    634769       768       768         0
SL    1            764   5510393    635014       764       764         0
SL    1            765   5510430    635001       768       768         0
SL    1            766   5510506    634869       768       768         0
SL    1            767   5510518    634844       768       768         0
SL    1            768   5510550    634876       768       768         0
SL    1            769   5510587    634819       771       771         0
SL    1            770   5510506    635014       764       764         0

KODE1 IDRCH      IBDLG      ROWN      COLE       ADJ     STOPO     DELTZ
----- ----- ---------- --------- --------- --------- --------- ---------
SL    1            771   5510493    635064       768       768         0
SL    1            772   5510399    635171       771       771         0
SL    1            773   5510462    635202       755       755         0
SL    1            774   5510531    634989       764       764         0
SL    1            775   5510568    634951       764       764         0
SL    1            776   5510581    634989       761       761         0
SL    1            777   5510644    634794       771       771         0
SL    1            778   5510656    634825       768       768         0
```

```
SL    1            779   5510700    634782       768       768         0
SL    1            780   5510700    634713       771       771         0
SL    1            781   5510750    634700       771       771         0

KODE1 IDRCH      IBDLG      ROWN      COLE       ADJ     STOPO     DELTZ
----- ----- ---------- --------- --------- --------- --------- ---------
SL    1            782   5510788    634731       771       771         0
SL    1            783   5510813    634756       768       768         0
SL    1            784   5510813    634669       771       771         0
SL    1            785   5510851    634738       764       764         0
SL    1            786   5510907    635102       738       738         0
SL    1            787   5510863    635127       738       738         0
SL    1            788   5510951    635051       738       738         0
SL    1            789   5510951    634713       758       758         0
SL    1            790   5510964    634637       758       758         0
SL    1            791   5511014    634694       755       755         0
SL    1            792   5511045    635309       771       771         0

KODE1 IDRCH      IBDLG      ROWN      COLE       ADJ     STOPO     DELTZ
----- ----- ---------- --------- --------- --------- --------- ---------
SL    1            793   5511083    635346       768       768         0
SL    1            794   5511127    635296       771       771         0
SL    1            795   5511158    635271       768       768         0
SL    1            796   5511071    635717       771       771         0
SL    1            797   5511114    635723       771       771         0
SL    1            798   5511114    635779       771       771         0
SL    1            799   5511221    635528       771       771         0
SL    1            800   5511108    634662       758       758         0
SL    1            801   5511071    634631       758       758         0
SL    1            802   5511152    634530       771       771         0
SL    1            803   5511190    634518       771       771         0

KODE1 IDRCH      IBDLG      ROWN      COLE       ADJ     STOPO     DELTZ
----- ----- ---------- --------- --------- --------- --------- ---------
SL    1            804   5511240    634568       771       771         0
SL    1            805   5511234    634600       768       768         0
SL    1            806   5511259    634650       764       764         0
SL    1            807   5511284    634618       768       768         0
SL    1            808   5511303    634568       768       768         0
SL    1            809   5511453    635742       771       771         0
SL    1            810   5511453    635409       771       771         0
SL    1            811   5511535    635372       768       768         0
SL    1            812   5511372    635497       771       771         0
SL    1            813   5511328    635535       771       771         0
SL    1            814   5511366    635547       771       771         0

KODE1 IDRCH      IBDLG      ROWN      COLE       ADJ     STOPO     DELTZ
----- ----- ---------- --------- --------- --------- --------- ---------
SL    1            815   5511409    635560       768       768         0
SL    1            816   5511391    635591       771       771         0
SL    1            817   5511422    635591       771       771         0
SL    1            818   5511359    635591       771       771         0
SL    1            819   5511366    635309       768       768         0
SL    1            820   5511340    635277       771       771         0
SL    1            821   5511409    635277       771       771         0
SL    1            822   5511384    635183       771       771         0
SL    1            823   5511416    635202       771       771         0
SL    1            824   5511491    635202       771       771         0
SL    1            825   5511466    635158       771       771         0

KODE1 IDRCH      IBDLG      ROWN      COLE       ADJ     STOPO     DELTZ
----- ----- ---------- --------- --------- --------- --------- ---------
SL    1            826   5511491    635146       771       771         0
SL    1            827   5511522    635139       771       771         0
SL    1            828   5511573    635133       771       771         0
SL    1            829   5511623    635133       768       768         0
```

```
SL    1            830    5511642     635146        771        771          0
SL    1            831    5511654     635108        768        768          0
SL    1            832    5511824     635309        768        768          0
SL    1            833    5511974     635397        771        771          0
SL    1            834    5511635     634750        761        761          0
SL    1            835    5512068     635466        768        768          0
SL    1            836    5512081     635516        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            837    5512125     635528        771        771          0
SL    1            838    5512156     635497        771        771          0
SL    1            839    5512326     635585        768        768          0
SL    1            840    5512301     635616        771        771          0
SL    1            841    5511447     634650        761        761          0
SL    1            842    5511478     634631        764        764          0
SL    1            843    5511491     634323        771        771          0
SL    1            844    5511548     634600        764        764          0
SL    1            845    5511541     634643        761        761          0
SL    1            846    5511617     634600        768        768          0
SL    1            847    5511591     634637        764        764          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            848    5511667     634618        774        774          0
SL    1            849    5511673     634650        771        771          0
SL    1            850    5511730     634731        764        764          0
SL    1            851    5511755     634643        784        784          0
SL    1            852    5511780     634738        768        768          0
SL    1            853    5511805     634618        784        784          0
SL    1            854    5511836     634706        778        778          0
SL    1            855    5511868     634700        781        781          0
SL    1            856    5511843     634562        787        787          0
SL    1            857    5511899     634562        787        787          0
SL    1            858    5511974     634669        774        774          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            859    5511811     633759        784        784          0
SL    1            860    5511773     633840        787        787          0
SL    1            861    5511799     633884        784        784          0
SL    1            862    5511698     633997        784        784          0
SL    1            863    5511635     633959        784        784          0
SL    1            864    5511623     634028        784        784          0
SL    1            865    5511585     633991        787        787          0
SL    1            866    5511912     634198        771        771          0
SL    1            867    5511962     634217        774        774          0
SL    1            868    5512012     634204        784        784          0
SL    1            869    5512062     634323        784        784          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            870    5511999     634480        787        787          0
SL    1            871    5512062     634625        771        771          0
SL    1            872    5512119     634606        774        774          0
SL    1            873    5512125     634562        784        784          0
SL    1            874    5512207     634562        771        771          0
SL    1            875    5512200     634468        787        787          0
SL    1            876    5512514     635710        771        771          0
SL    1            877    5512533     635798        768        768          0
SL    1            878    5512564     635773        768        768          0
SL    1            879    5512589     635836        771        771          0
SL    1            880    5512627     635936        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
```

```
SL    1            881    5512627     636005        768        768          0
SL    1            882    5512589     636037        771        771          0
SL    1            883    5512671     635805        768        768          0
SL    1            884    5512715     635798        771        771          0
SL    1            885    5512715     635861        768        768          0
SL    1            886    5512803     635817        768        768          0
SL    1            887    5512866     635861        771        771          0
SL    1            888    5501702     636940        761        761          0
SL    1            889    5501744     636950        764        764          0
SL    1            890    5502004     636961        755        755          0
SL    1            891    5502062     636929        758        758          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            892    5502093     636935        758        758          0
SL    1            893    5501874     637929        771        771          0
SL    1            894    5501822     637961        771        771          0
SL    1            895    5500083     639695        768        768          0
SL    1            896    5500057     639721        771        771          0
SL    1            897    5501291     639898        771        771          0
SL    1            898    5502374     639861        771        771          0
SL    1            899    5502442     639898        771        771          0
SL    1            900    5503056     639913        771        771          0
SL    1            901    5503108     639919        771        771          0
SL    1            902    5504855     636961        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            903    5504810     636990        771        771          0
SL    1            904    5504827     637075        771        771          0
SL    1            905    5504832     637120        768        768          0
SL    1            906    5504849     637251        771        771          0
SL    1            907    5504821     637285        771        771          0
SL    1            908    5504685     637364        771        771          0
SL    1            909    5504651     637387        771        771          0
SL    1            910    5504781     637426        771        771          0
SL    1            911    5504793     637466        771        771          0
SL    1            912    5504793     637517        768        768          0
SL    1            913    5504656     637965        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            914    5504696     637988        771        771          0
SL    1            915    5505104     637761        768        768          0
SL    1            916    5505155     637772        768        768          0
SL    1            917    5504135     638696        771        771          0
SL    1            918    5504169     638702        768        768          0
SL    1            919    5504044     639042        771        771          0
SL    1            920    5504135     639048        771        771          0
SL    1            921    5504186     639036        771        771          0
SL    1            922    5504203     638951        771        771          0
SL    1            923    5504231     639031        771        771          0
SL    1            924    5504328     639036        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1            925    5504294     639201        771        771          0
SL    1            926    5504294     639263        771        771          0
SL    1            927    5504333     639257        771        771          0
SL    1            928    5504356     639201        768        768          0
SL    1            929    5504401     639070        771        771          0
SL    1            930    5504481     639025        771        771          0
SL    1            931    5504503     639053        771        771          0
SL    1            932    5504696     639138        771        771          0
SL    1            933    5504702     639053        768        768          0
SL    1            934    5504741     639048        771        771          0
```

```
SL    1           935    5504730     639008        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1           936    5504861     638821        771        771          0
SL    1           937    5504866     639048        771        771          0
SL    1           938    5504753     639167        768        768          0
SL    1           939    5504968     639031        771        771          0
SL    1           940    5504861     639376        771        771          0
SL    1           941    5504872     639427        771        771          0
SL    1           942    5504895     639552        771        771          0
SL    1           943    5504866     639660        768        768          0
SL    1           944    5504900     639881        771        771          0
SL    1           945    5504940     639904        771        771          0
SL    1           946    5505269     638974        768        768          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1           947    5505331     638917        768        768          0
SL    1           948    5505388     638934        768        768          0
SL    1           949    5505354     638985        771        771          0
SL    1           950    5505478     638129        771        771          0
SL    1           951    5505495     637982        768        768          0
SL    1           952    5506108     636910        768        768          0
SL    1           953    5506317     636939        771        771          0
SL    1           954    5506340     636956        771        771          0
SL    1           955    5506505     636893        758        758          0
SL    1           956    5506312     637058        768        768          0
SL    1           957    5506329     637160        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1           958    5506488     637143        768        768          0
SL    1           959    5506471     637262        768        768          0
SL    1           960    5506329     637324        768        768          0
SL    1           961    5506306     637557        764        764          0
SL    1           962    5506295     637619        771        771          0
SL    1           963    5506300     637959        768        768          0
SL    1           964    5506323     637988        771        771          0
SL    1           965    5506363     638900        768        768          0
SL    1           966    5506765     637154        751        751          0
SL    1           967    5506839     637217        771        771          0
SL    1           968    5507111     636950        745        745          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1           969    5507185     636956        741        741          0
SL    1           970    5507253     636984        748        748          0
SL    1           971    5507276     637029        741        741          0
SL    1           972    5507026     637307        764        764          0
SL    1           973    5506992     637330        764        764          0
SL    1           974    5506760     637324        771        771          0
SL    1           975    5506720     637313        764        764          0
SL    1           976    5506692     637324        764        764          0
SL    1           977    5506720     637358        764        764          0
SL    1           978    5506680     637387        764        764          0
SL    1           979    5507451     637319        761        761          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1           980    5507310     637319        755        755          0
SL    1           981    5507241     637381        755        755          0
SL    1           982    5507179     637387        751        751          0
SL    1           983    5507219     637421        761        761          0
SL    1           984    5507207     637574        771        771          0
SL    1           985    5507361     637370        768        768          0
```

```
SL    1           986    5507406     637341        768        768          0
SL    1           987    5507417     637370        768        768          0
SL    1           988    5507429     637636        771        771          0
SL    1           989    5507474     637670        771        771          0
SL    1           990    5507497     637625        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1           991    5507542     637540        771        771          0
SL    1           992    5507587     637528        771        771          0
SL    1           993    5507633     637523        768        768          0
SL    1           994    5507621     637455        768        768          0
SL    1           995    5507655     637568        768        768          0
SL    1           996    5507644     637676        771        771          0
SL    1           997    5507667     637715        771        771          0
SL    1           998    5507735     637670        771        771          0
SL    1           999    5507718     637721        771        771          0
SL    1          1000    5507763     637721        771        771          0
SL    1          1001    5507803     637693        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1          1002    5507820     637591        768        768          0
SL    1          1003    5507774     637551        771        771          0
SL    1          1004    5507916     637579        768        768          0
SL    1          1005    5508251     637080        761        761          0
SL    1          1006    5506907     639218        755        755          0
SL    1          1007    5507026     639127        755        755          0
SL    1          1008    5507037     639189        755        755          0
SL    1          1009    5507156     639223        755        755          0
SL    1          1010    5507162     639172        755        755          0
SL    1          1011    5507213     639195        755        755          0
SL    1          1012    5507389     639127        755        755          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1          1013    5507440     639116        755        755          0
SL    1          1014    5507593     639116        784        784          0
SL    1          1015    5507684     638968        755        755          0
SL    1          1016    5507650     639807        778        778          0
SL    1          1017    5507882     639785        761        761          0
SL    1          1018    5507888     639331        761        761          0
SL    1          1019    5507956     639359        755        755          0
SL    1          1020    5508188     639507        755        755          0
SL    1          1021    5508024     638878        755        755          0
SL    1          1022    5507961     638878        755        755          0
SL    1          1023    5508012     638764        764        764          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1          1024    5507984     638747        764        764          0
SL    1          1025    5508012     638458        771        771          0
SL    1          1026    5507995     638407        771        771          0
SL    1          1027    5507990     638339        771        771          0
SL    1          1028    5507990     638220        771        771          0
SL    1          1029    5507990     637993        771        771          0
SL    1          1030    5508001     637942        771        771          0
SL    1          1031    5507950     637942        771        771          0
SL    1          1032    5507961     637829        771        771          0
SL    1          1033    5508007     637721        768        768          0
SL    1          1034    5507939     637698        768        768          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1          1035    5507899     637693        771        771          0
SL    1          1036    5507865     637732        768        768          0
```

```
SL    1           1037    5508069     637579        771        771          0
SL    1           1038    5508063     637545        771        771          0
SL    1           1039    5508075     637506        768        768          0
SL    1           1040    5508103     637477        771        771          0
SL    1           1041    5508217     637540        771        771          0
SL    1           1042    5508273     637579        768        768          0
SL    1           1043    5508256     637613        778        778          0
SL    1           1044    5508324     637710        787        787          0
SL    1           1045    5508273     637749        787        787          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1           1046    5508285     637829        758        758          0
SL    1           1047    5508307     637868        758        758          0
SL    1           1048    5508341     637920        758        758          0
SL    1           1049    5508364     639478        755        755          0
SL    1           1050    5508375     639921        755        755          0
SL    1           1051    5511977     637622        784        784          0
SL    1           1052    5511927     637509        781        781          0
SL    1           1053    5511871     637459        781        781          0
SL    1           1054    5511839     637534        781        781          0
SL    1           1055    5511802     637491        781        781          0
SL    1           1056    5511752     637522        774        774          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1           1057    5511808     637616        784        784          0
SL    1           1058    5511695     637466        774        774          0
SL    1           1059    5510230     637077        771        771          0
SL    1           1060    5510236     637146        771        771          0
SL    1           1061    5509886     637484        778        778          0
SL    1           1062    5509911     637516        781        781          0
SL    1           1063    5509698     637422        771        771          0
SL    1           1064    5509754     637447        771        771          0
SL    1           1065    5509754     637503        768        768          0
SL    1           1066    5509810     637484        781        781          0
SL    1           1067    5509460     637666        787        787          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1           1068    5509504     637722        787        787          0
SL    1           1069    5509328     637541        774        774          0
SL    1           1070    5509322     637497        764        764          0
SL    1           1071    5509278     637491        764        764          0
SL    1           1072    5509234     637516        705        705          0
SL    1           1073    5509259     637585        771        771          0
SL    1           1074    5509222     637572        764        764          0
SL    1           1075    5509284     637685        784        784          0
SL    1           1076    5509197     637697        774        774          0
SL    1           1077    5509209     637741        781        781          0
SL    1           1078    5509153     637722        758        758          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1           1079    5508971     637509        784        784          0
SL    1           1080    5509009     637578        774        774          0
SL    1           1081    5508978     637610        771        771          0
SL    1           1082    5508896     637616        781        781          0
SL    1           1083    5508827     637553        784        784          0
SL    1           1084    5508777     637578        787        787          0
SL    1           1085    5508721     637585        784        784          0
SL    1           1086    5508859     637735        774        774          0
SL    1           1087    5508896     637791        774        774          0
SL    1           1088    5508827     637754        781        781          0
SL    1           1089    5508783     637735        784        784          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1           1090    5508740     637722        781        781          0
SL    1           1091    5508752     637766        781        781          0
SL    1           1092    5508633     637472        787        787          0
SL    1           1093    5508627     637610        787        787          0
SL    1           1094    5508514     637422        771        771          0
SL    1           1095    5508539     637534        781        781          0
SL    1           1096    5508520     637635        764        764          0
SL    1           1097    5508483     637566        771        771          0
SL    1           1098    5508508     637785        781        781          0
SL    1           1099    5508571     637754        774        774          0
SL    1           1100    5508608     637741        781        781          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1           1101    5508690     637729        781        781          0
SL    1           1102    5508690     637766        778        778          0
SL    1           1103    5508639     637804        771        771          0
SL    1           1104    5508978     639257        784        784          0
SL    1           1105    5509053     639275        787        787          0
SL    1           1106    5509009     639325        787        787          0
SL    1           1107    5508545     639457        755        755          0
SL    1           1108    5508427     639476        755        755          0
SL    1           1109    5508452     639513        755        755          0
SL    1           1110    5508564     639551        755        755          0
SL    1           1111    5508621     639551        755        755          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1           1112    5508564     639613        755        755          0
SL    1           1113    5508571     639889        755        755          0
SL    1           1114    5508633     639895        761        761          0
SL    1           1115    5504135     630051        771        771          0
SL    1           1116    5503088     630465        771        771          0
SL    1           1117    5504540     630727        768        768          0
SL    1           1118    5506294     630463        771        771          0
SL    1           1119    5506796     630122        768        768          0
SL    1           1120    5506766     630157        771        771          0
SL    1           1121    5507458     630067        761        761          0
SL    1           1122    5507493     630057        758        758          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1           1123    5507483     630137        758        758          0
SL    1           1124    5507458     630202        755        755          0
SL    1           1125    5507498     630232        751        751          0
SL    1           1126    5508988     631558        768        768          0
SL    1           1127    5509192     631543        768        768          0
SL    1           1128    5509246     631669        771        771          0
SL    1           1129    5509338     631757        768        768          0
SL    1           1130    5509387     631849        768        768          0
SL    1           1131    5509425     631694        738        738          0
SL    1           1132    5509459     631606        751        751          0
SL    1           1133    5509493     631577        764        764          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1           1134    5509479     631422        755        755          0
SL    1           1135    5509440     631358        755        755          0
SL    1           1136    5509425     631319        751        751          0
SL    1           1137    5509508     631601        768        768          0
SL    1           1138    5509537     631669        764        764          0
SL    1           1139    5509586     631718        764        764          0
SL    1           1140    5509537     631543        761        761          0
SL    1           1141    5509630     631742        768        768          0
```

```
SL    1           1142    5509659     631587        764        764          0
SL    1           1143    5509625     631417        758        758          0
SL    1           1144    5509732     631470        764        764          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1           1145    5509790     631558        771        771          0
SL    1           1146    5509770     631762        768        768          0
SL    1           1147    5509853     631179        768        768          0
SL    1           1148    5509897     631213        768        768          0
SL    1           1149    5510091     631256        771        771          0
SL    1           1150    5510130     631271        771        771          0
SL    1           1151    5509970     632199        768        768          0
SL    1           1152    5510135     631111        768        768          0
SL    1           1153    5510154     631159        768        768          0
SL    1           1154    5510353     631242        768        768          0
SL    1           1155    5510392     631213        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1           1156    5510732     631091        771        771          0
SL    1           1157    5510757     631047        771        771          0
SL    1           1158    5510815     631149        771        771          0
SL    1           1159    5510956     631140        771        771          0
SL    1           1160    5510776     631106        771        771          0
SL    1           1161    5510864     632660        758        758          0
SL    1           1162    5511014     632903        781        781          0
SL    1           1163    5510669     631033        771        771          0
SL    1           1164    5511346     631028        771        771          0
SL    1           1165    5511351     631083        771        771          0
SL    1           1166    5511366     631137        768        768          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1           1167    5512590     631058        771        771          0
SL    1           1168    5511924     633087        745        745          0
SL    1           1169    5511879     633082        755        755          0
SL    1           1170    5511218     632954        784        784          0
SL    1           1171    5511265     633250        787        787          0
SL    1           1172    5511340     633256        784        784          0
SL    1           1173    5511378     633325        768        768          0
SL    1           1174    5511504     633401        768        768          0
SL    1           1175    5511604     633495        771        771          0
SL    1           1176    5512194     633759        781        781          0
SL    1           1177    5512062     633332        761        761          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1           1178    5512326     633407        768        768          0
SL    1           1179    5512363     633451        768        768          0
SL    1           1180    5512414     633420        768        768          0
SL    1           1181    5512476     633539        768        768          0
SL    1           1182    5512464     633570        774        774          0
SL    1           1183    5512495     633639        774        774          0
SL    1           1184    5512533     633671        774        774          0
SL    1           1185    5512489     633702        774        774          0
SL    1           1186    5512407     633991        791        791          0
SL    1           1187    5512432     634079        787        787          0
SL    1           1188    5512464     634072        784        784          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1           1189    5512564     633376        758        758          0
SL    1           1190    5512696     633300        755        755          0
SL    1           1191    5512765     633520        768        768          0
SL    1           1192    5512803     633551        771        771          0
```

```
SL    1           1193    5512947     633420        771        771          0
SL    1           1194    5512947     633476        771        771          0
SL    1           1195    5512884     633495        771        771          0
SL    1           1196    5512866     633715        768        768          0
SL    1           1197    5512809     633802        768        768          0
SL    1           1198    5512778     633834        768        768          0
SL    1           1199    5512753     633878        771        771          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1           1200    5512702     633959        764        764          0
SL    1           1201    5512684     633840        771        771          0
SL    1           1202    5512709     633746        771        771          0
SL    1           1203    5512677     633765        771        771          0
SL    1           1204    5512615     633984        771        771          0
SL    1           1205    5512721     634123        745        745          0
SL    1           1206    5512740     634079        761        761          0
SL    1           1207    5512753     634035        771        771          0
SL    1           1208    5512778     634003        764        764          0
SL    1           1209    5512790     633947        764        764          0
SL    1           1210    5512853     633953        764        764          0

KODE1 IDRCH      IBDLG       ROWN       COLE        ADJ      STOPO      DELTZ
----- ----- ---------- ---------- ---------- ---------- ---------- ----------
SL    1           1211    5512853     633909        764        764          0
SL    1           1212    5512897     633897        761        761          0
SL    1           1213    5512941     633859        758        758          0

1213 rows selected.
```

```
IBDLG IDCAT    IDI     VIFS     DELTG IADDR
--------- -------- --- ---------- ---------- ------------------------------
    1 CAT1     HR2       50          2 EAST_OF_DYKE
    2 CAT1     HR2       50          2 EAST_OF_DYKE
    3 CAT1     HR2       50          2 EAST_OF_DYKE
    4 CAT1     HR2       50          2 EAST_OF_DYKE
    5 CAT1     HR2       50          2 EAST_OF_DYKE
    6 CAT1     HR2       50          2 EAST_OF_DYKE
    7 CAT1     HR2       50          2 EAST_OF_DYKE
    8 CAT1     HR2       50          2 EAST_OF_DYKE
    9 CAT1     HR2       50          2 EAST_OF_DYKE
   10 CAT1     HR2       50          2 EAST_OF_DYKE
   11 CAT1     HR2       50          2 EAST_OF_DYKE

IBDLG IDCAT    IDI     VIFS     DELTG IADDR
--------- -------- --- ---------- ---------- ------------------------------
   12 CAT1     HR2       50          2 EAST_OF_DYKE
   13 CAT1     HR2       50          2 EAST_OF_DYKE
   14 CAT1     HR2       50          2 EAST_OF_DYKE
   15 CAT1     HR2       50          2 EAST_OF_DYKE
   16 CAT1     HR2       50          2 EAST_OF_DYKE
   17 CAT1     HR2       50          2 EAST_OF_DYKE
   18 CAT1     HR2       50          2 EAST_OF_DYKE
   19 CAT1     HR2       50          2 EAST_OF_DYKE
   20 CAT1     HR2       50          2 EAST_OF_DYKE
   21 CAT1     HR2       50          2 EAST_OF_DYKE
   22 CAT1     HR2       50          2 EAST_OF_DYKE

IBDLG IDCAT    IDI     VIFS     DELTG IADDR
--------- -------- --- ---------- ---------- ------------------------------
   23 CAT1     HR2       50          2 EAST_OF_DYKE
   24 CAT1     HR2       50          2 EAST_OF_DYKE
   25 CAT1     HR2       50          2 EAST_OF_DYKE
   26 CAT1     HR2       50          2 EAST_OF_DYKE
   27 CAT1     HR2       50          2 EAST_OF_DYKE
   28 CAT1     HR2       50          2 EAST_OF_DYKE
   29 CAT1     HR2       50          2 EAST_OF_DYKE
   30 CAT1     HR2       50          2 EAST_OF_DYKE
   31 CAT1     HR2       50          2 EAST_OF_DYKE
   32 CAT1     HR2       50          2 EAST_OF_DYKE
   33 CAT1     HR2       50          2 EAST_OF_DYKE

IBDLG IDCAT    IDI     VIFS     DELTG IADDR
--------- -------- --- ---------- ---------- ------------------------------
   34 CAT1     HR2       50          2 EAST_OF_DYKE
   35 CAT1     HR2       50          2 EAST_OF_DYKE
   36 CAT1     HR2       50          2 EAST_OF_DYKE
   37 CAT1     HR2       50          2 EAST_OF_DYKE
   38 CAT1     HR2       50          2 EAST_OF_DYKE
   39 CAT1     HR2       50          2 EAST_OF_DYKE
   40 CAT1     HR2       50          2 EAST_OF_DYKE
   41 CAT1     HR2       50          2 EAST_OF_DYKE
   42 CAT1     HR2       50          2 EAST_OF_DYKE
   43 CAT1     HR2       50          2 EAST_OF_DYKE
   44 CAT1     HR2       50          2 EAST_OF_DYKE

IBDLG IDCAT    IDI     VIFS     DELTG IADDR
--------- -------- --- ---------- ---------- ------------------------------
   45 CAT1     HR2       50          2 EAST_OF_DYKE
   46 CAT1     HR2       50          2 EAST_OF_DYKE
   47 CAT1     HR2       50          2 EAST_OF_DYKE
   48 CAT1     HR2       50          2 EAST_OF_DYKE
   49 CAT1     HR2       50          2 EAST_OF_DYKE
   50 CAT1     HR2       50          2 EAST_OF_DYKE
   51 CAT1     HR2       50          2 EAST_OF_DYKE
   52 CAT1     HR2       50          2 EAST_OF_DYKE
   53 CAT1     HR2       50          2 EAST_OF_DYKE
   54 CAT1     HR2       50          2 EAST_OF_DYKE
   55 CAT1     HR2       50          2 EAST_OF_DYKE

IBDLG IDCAT    IDI     VIFS     DELTG IADDR
--------- -------- --- ---------- ---------- ------------------------------
   56 CAT1     HR2       50          2 EAST_OF_DYKE
   57 CAT1     HR2       50          2 EAST_OF_DYKE
   58 CAT1     HR2       50          2 EAST_OF_DYKE
   59 CAT1     HR2       50          2 EAST_OF_DYKE
   60 CAT1     HR2       50          2 EAST_OF_DYKE
   61 CAT1     HR2       50          2 EAST_OF_DYKE
   62 CAT1     HR2       50          2 EAST_OF_DYKE
   63 CAT1     HR2       50          2 EAST_OF_DYKE
   64 CAT1     HR2       50          2 EAST_OF_DYKE
   65 CAT1     HR2       50          2 EAST_OF_DYKE
   66 CAT1     HR2       50          2 EAST_OF_DYKE

IBDLG IDCAT    IDI     VIFS     DELTG IADDR
--------- -------- --- ---------- ---------- ------------------------------
   67 CAT1     HR2       50          2 EAST_OF_DYKE
   68 CAT1     HR2       50          2 EAST_OF_DYKE
   69 CAT1     HR2       50          2 EAST_OF_DYKE
   70 CAT1     HR2       50          2 EAST_OF_DYKE
   71 CAT1     HR2       50          2 EAST_OF_DYKE
   72 CAT1     HR2       50          2 EAST_OF_DYKE
   73 CAT1     HR2       50          2 EAST_OF_DYKE
   74 CAT1     HR2       50          2 EAST_OF_DYKE
   75 CAT1     HR2       50          2 EAST_OF_DYKE
   76 CAT1     HR2       50          2 EAST_OF_DYKE
   77 CAT1     HR2       50          2 EAST_OF_DYKE

IBDLG IDCAT    IDI     VIFS     DELTG IADDR
--------- -------- --- ---------- ---------- ------------------------------
   78 CAT1     HR2       50          2 EAST_OF_DYKE
   79 CAT1     HR2       50          2 EAST_OF_DYKE
   80 CAT1     HR2       50          2 EAST_OF_DYKE
   81 CAT1     HR2       50          2 EAST_OF_DYKE
   82 CAT1     HR2       50          2 EAST_OF_DYKE
   83 CAT1     HR2       50          2 EAST_OF_DYKE
   84 CAT1     HR2       50          2 EAST_OF_DYKE
   85 CAT1     HR2       50          2 EAST_OF_DYKE
   86 CAT1     HR2       50          2 EAST_OF_DYKE
   87 CAT1     HR2       50          2 EAST_OF_DYKE
   88 CAT1     HR2       50          2 EAST_OF_DYKE

IBDLG IDCAT    IDI     VIFS     DELTG IADDR
--------- -------- --- ---------- ---------- ------------------------------
   89 CAT1     HR2       50          2 EAST_OF_DYKE
   90 CAT1     HR2       50          2 EAST_OF_DYKE
   91 CAT1     HR2       50          2 EAST_OF_DYKE
   92 CAT1     HR2       50          2 EAST_OF_DYKE
   93 CAT1     HR2       50          2 EAST_OF_DYKE
   94 CAT1     HR2       50          2 EAST_OF_DYKE
   95 CAT1     HR2       50          2 EAST_OF_DYKE
   96 CAT1     HR2       50          2 EAST_OF_DYKE
   97 CAT1     HR2       50          2 EAST_OF_DYKE
   98 CAT1     HR2       50          2 EAST_OF_DYKE
   99 CAT1     HR2       50          2 EAST_OF_DYKE

IBDLG IDCAT    IDI     VIFS     DELTG IADDR
--------- -------- --- ---------- ---------- ------------------------------
  100 CAT1     HR2       50          2 EAST_OF_DYKE
  101 CAT1     HR2       50          2 EAST_OF_DYKE
  102 CAT1     HR2       50          2 EAST_OF_DYKE
  103 CAT1     HR2       50          2 EAST_OF_DYKE
```

```
       128 CAT1     HR2         50          2 EAST_OF_DYKE
       129 CAT1     HR2         50          2 EAST_OF_DYKE
       130 CAT1     HR2         50          2 EAST_OF_DYKE
       131 CAT1     HR2         50          2 EAST_OF_DYKE
       132 CAT1     HR2         50          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       133 CAT1     HR2         50          2 EAST_OF_DYKE
       134 CAT1     HR2         50          2 EAST_OF_DYKE
       135 CAT1     HR2         50          2 EAST_OF_DYKE
       136 CAT1     HR2         50          2 EAST_OF_DYKE
       137 CAT1     HR2         50          2 EAST_OF_DYKE
       138 CAT1     HR2         50          2 EAST_OF_DYKE
       139 CAT1     HR2         50          2 EAST_OF_DYKE
       140 CAT1     HR2         50          2 EAST_OF_DYKE
       141 CAT1     HR2         50          2 EAST_OF_DYKE
       142 CAT1     HR2         50          2 EAST_OF_DYKE
       143 CAT1     HR2         50          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       144 CAT1     HR2         50          2 EAST_OF_DYKE
       145 CAT1     HR2         50          2 EAST_OF_DYKE
       146 CAT1     HR2         50          2 EAST_OF_DYKE
       147 CAT1     HR2         50          2 EAST_OF_DYKE
       148 CAT1     HR2         50          2 EAST_OF_DYKE
       149 CAT1     HR2         50          2 EAST_OF_DYKE
       150 CAT1     HR1         80          2 EAST_OF_DYKE
       151 CAT1     HR1         80          2 EAST_OF_DYKE
       152 CAT1     HR2         50          2 EAST_OF_DYKE
       153 CAT1     HR1         80          2 EAST_OF_DYKE
       154 CAT1     HR2         50          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       155 CAT1     HR2         50          2 EAST_OF_DYKE
       156 CAT1     HR2         50          2 EAST_OF_DYKE
       157 CAT1     HR2         50          2 EAST_OF_DYKE
       158 CAT1     HR1         80          2 EAST_OF_DYKE
       159 CAT1     HR1         80          2 EAST_OF_DYKE
       160 CAT1     HR1         80          2 EAST_OF_DYKE
       161 CAT1     HR1         80          2 EAST_OF_DYKE
       162 CAT1     HR1         80          2 EAST_OF_DYKE
       163 CAT1     HR1         80          2 EAST_OF_DYKE
       164 CAT1     HR1         80          2 EAST_OF_DYKE
       165 CAT1     HR1         80          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       166 CAT1     HR1         80          2 EAST_OF_DYKE
       167 CAT1     HR1         80          2 EAST_OF_DYKE
       168 CAT1     HR1         80          2 EAST_OF_DYKE
       169 CAT1     HR1         80          2 EAST_OF_DYKE
       170 CAT1     HR1         80          2 EAST_OF_DYKE
       171 CAT1     HR1         80          2 EAST_OF_DYKE
       172 CAT1     HR1         80          2 EAST_OF_DYKE
       173 CAT1     HR1         80          2 EAST_OF_DYKE
       174 CAT1     HR1         80          2 EAST_OF_DYKE
       175 CAT1     HR1         80          2 EAST_OF_DYKE
       176 CAT1     HR1         80          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       177 CAT1     HR1         80          2 EAST_OF_DYKE
       178 CAT1     HR1         80          2 EAST_OF_DYKE
```

```
       179 CAT1     HR1         80          2 EAST_OF_DYKE
       180 CAT1     HR1         80          2 EAST_OF_DYKE
       181 CAT1     HR1         80          2 EAST_OF_DYKE
       182 CAT1     HR1         80          2 EAST_OF_DYKE
       183 CAT1     HR1         80          2 EAST_OF_DYKE
       184 CAT1     HR1         80          2 EAST_OF_DYKE
       185 CAT1     HR1         80          2 EAST_OF_DYKE
       186 CAT1     HR1         80          2 EAST_OF_DYKE
       187 CAT1     HR1         80          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       188 CAT1     HR2         50          2 EAST_OF_DYKE
       189 CAT1     HR2         50          2 EAST_OF_DYKE
       190 CAT1     HR2         50          2 EAST_OF_DYKE
       191 CAT1     HR2         50          2 EAST_OF_DYKE
       192 CAT1     HR2         50          2 EAST_OF_DYKE
       193 CAT1     HR2         50          2 EAST_OF_DYKE
       194 CAT1     HR2         50          2 EAST_OF_DYKE
       195 CAT1     HR2         50          2 EAST_OF_DYKE
       196 CAT1     HR2         50          2 EAST_OF_DYKE
       197 CAT1     HR2         50          2 EAST_OF_DYKE
       198 CAT1     HR2         50          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       199 CAT1     HR1         80          2 EAST_OF_DYKE
       200 CAT1     HR1         80          2 EAST_OF_DYKE
       201 CAT1     HR1         80          2 EAST_OF_DYKE
       202 CAT1     HR1         80          2 EAST_OF_DYKE
       203 CAT1     HR1         80          2 EAST_OF_DYKE
       204 CAT1     HR1         80          2 EAST_OF_DYKE
       205 CAT1     HR1         80          2 EAST_OF_DYKE
       206 CAT1     HR1         80          2 EAST_OF_DYKE
       207 CAT1     HR1         80          2 EAST_OF_DYKE
       208 CAT1     HR1         80          2 EAST_OF_DYKE
       209 CAT1     HR1         80          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       210 CAT1     HR1         80          2 EAST_OF_DYKE
       211 CAT1     HR1         80          2 EAST_OF_DYKE
       212 CAT1     HR1         80          2 EAST_OF_DYKE
       213 CAT1     HR1         80          2 EAST_OF_DYKE
       214 CAT1     HR1         80          2 EAST_OF_DYKE
       215 CAT1     HR1         80          2 EAST_OF_DYKE
       216 CAT1     HR1         80          2 EAST_OF_DYKE
       217 CAT1     HR1         80          2 EAST_OF_DYKE
       218 CAT1     HR1         80          2 EAST_OF_DYKE
       219 CAT1     HR1         80          2 EAST_OF_DYKE
       220 CAT1     HR1         80          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       221 CAT1     HR1         80          2 EAST_OF_DYKE
       222 CAT1     HR1         80          2 EAST_OF_DYKE
       223 CAT1     HR1         80          2 EAST_OF_DYKE
       224 CAT1     HR1         80          2 EAST_OF_DYKE
       225 CAT1     HR1         80          2 EAST_OF_DYKE
       226 CAT1     HR1         80          2 EAST_OF_DYKE
       227 CAT1     HR1         80          2 EAST_OF_DYKE
       228 CAT1     HR1         80          2 EAST_OF_DYKE
       229 CAT1     HR1         80          2 EAST_OF_DYKE
       230 CAT1     HR1         80          2 EAST_OF_DYKE
       231 CAT1     HR1         80          2 EAST_OF_DYKE
```

```
     IBDLG IDCAT    IDI       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       232 CAT1     HR1         80          2 EAST_OF_DYKE
       233 CAT1     HR1         80          2 EAST_OF_DYKE
       234 CAT1     HR1         80          2 EAST_OF_DYKE
       235 CAT1     HR1         80          2 EAST_OF_DYKE
       236 CAT1     HR1         80          2 EAST_OF_DYKE
       237 CAT1     HR1         80          2 EAST_OF_DYKE
       238 CAT1     HR1         80          2 EAST_OF_DYKE
       239 CAT1     HR1         80          2 EAST_OF_DYKE
       240 CAT1     HR1         80          2 EAST_OF_DYKE
       241 CAT1     HR1         80          2 EAST_OF_DYKE
       242 CAT1     HR1         80          2 EAST_OF_DYKE

     IBDLG IDCAT    IDI       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       243 CAT1     HR1         80          2 EAST_OF_DYKE
       244 CAT1     HR1         80          2 EAST_OF_DYKE
       245 CAT1     HR1         80          2 EAST_OF_DYKE
       246 CAT1     HR1         80          2 EAST_OF_DYKE
       247 CAT1     HR1         80          2 EAST_OF_DYKE
       248 CAT1     HR1         80          2 EAST_OF_DYKE
       249 CAT1     HR1         80          2 EAST_OF_DYKE
       250 CAT1     HR1         80          2 EAST_OF_DYKE
       251 CAT1     HR1         80          2 EAST_OF_DYKE
       252 CAT1     HR1         80          2 EAST_OF_DYKE
       253 CAT1     HR1         80          2 EAST_OF_DYKE

     IBDLG IDCAT    IDI       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       254 CAT1     HR1         80          2 EAST_OF_DYKE
       255 CAT1     HR1         80          2 EAST_OF_DYKE
       256 CAT1     HR1         80          2 EAST_OF_DYKE
       257 CAT1     HR1         80          2 EAST_OF_DYKE
       258 CAT1     HR1         80          2 EAST_OF_DYKE
       259 CAT1     HR1         80          2 EAST_OF_DYKE
       260 CAT1     HR1         80          2 EAST_OF_DYKE
       261 CAT1     HR1         80          2 EAST_OF_DYKE
       262 CAT1     HR1         80          2 EAST_OF_DYKE
       263 CAT1     HR1         80          2 EAST_OF_DYKE
       264 CAT1     HR1         80          2 EAST_OF_DYKE

     IBDLG IDCAT    IDI       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       265 CAT1     HR1         80          2 EAST_OF_DYKE
       266 CAT1     HR1         80          2 EAST_OF_DYKE
       267 CAT1     HR1         80          2 EAST_OF_DYKE
       268 CAT1     HR1         80          2 EAST_OF_DYKE
       269 CAT1     HR1         80          2 EAST_OF_DYKE
       270 CAT1     HR1         80          2 EAST_OF_DYKE
       271 CAT1     HR1         80          2 EAST_OF_DYKE
       272 CAT1     HR1         80          2 EAST_OF_DYKE
       273 CAT1     HR1         80          2 EAST_OF_DYKE
       274 CAT1     HR1         80          2 EAST_OF_DYKE
       275 CAT1     HR1         80          2 EAST_OF_DYKE

     IBDLG IDCAT    IDI       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       276 CAT1     HR1         80          2 EAST_OF_DYKE
       277 CAT1     HR1         80          2 EAST_OF_DYKE
       278 CAT1     HR1         80          2 EAST_OF_DYKE
       279 CAT1     HR1         80          2 EAST_OF_DYKE
       280 CAT1     HR1         80          2 EAST_OF_DYKE
       281 CAT1     HR1         80          2 EAST_OF_DYKE
       282 CAT1     HR1         80          2 EAST_OF_DYKE
       283 CAT1     HR1         80          2 EAST_OF_DYKE
       284 CAT1     HR1         80          2 EAST_OF_DYKE
       285 CAT1     HR1         80          2 EAST_OF_DYKE
       286 CAT1     HR1         80          2 EAST_OF_DYKE

     IBDLG IDCAT    IDI       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       287 CAT1     HR1         80          2 EAST_OF_DYKE
       288 CAT1     HR1         80          2 EAST_OF_DYKE
       289 CAT1     HR1         80          2 EAST_OF_DYKE
       290 CAT1     HR1         80          2 EAST_OF_DYKE
       291 CAT1     HR1         80          2 EAST_OF_DYKE
       292 CAT1     HR1         80          2 EAST_OF_DYKE
       293 CAT1     HR1         80          2 EAST_OF_DYKE
       294 CAT1     HR1         80          2 EAST_OF_DYKE
       295 CAT1     HR1         80          2 EAST_OF_DYKE
       296 CAT1     HR1         80          2 EAST_OF_DYKE
       297 CAT1     HR1         80          2 EAST_OF_DYKE

     IBDLG IDCAT    IDI       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       298 CAT1     HR1         80          2 EAST_OF_DYKE
       299 CAT1     HR1         80          2 EAST_OF_DYKE
       300 CAT1     HR1         80          2 EAST_OF_DYKE
       301 CAT1     HR1         80          2 EAST_OF_DYKE
       302 CAT1     HR1         80          2 EAST_OF_DYKE
       303 CAT1     HR1         80          2 EAST_OF_DYKE
       304 CAT1     HR1         80          2 EAST_OF_DYKE
       305 CAT1     HR1         80          2 EAST_OF_DYKE
       306 CAT1     HR1         80          2 EAST_OF_DYKE
       307 CAT1     HR1         80          2 EAST_OF_DYKE
       308 CAT1     HR1         80          2 EAST_OF_DYKE

     IBDLG IDCAT    IDI       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       309 CAT1     HR1         80          2 EAST_OF_DYKE
       310 CAT1     HR1         80          2 EAST_OF_DYKE
       311 CAT1     HR1         80          2 EAST_OF_DYKE
       312 CAT1     HR1         80          2 EAST_OF_DYKE
       313 CAT1     HR1         80          2 EAST_OF_DYKE
       314 CAT1     HR1         80          2 EAST_OF_DYKE
       315 CAT1     HR1         80          2 EAST_OF_DYKE
       316 CAT1     HR1         80          2 EAST_OF_DYKE
       317 CAT1     HR1         80          2 EAST_OF_DYKE
       318 CAT1     HR1         80          2 EAST_OF_DYKE
       319 CAT1     HR1         80          2 EAST_OF_DYKE

     IBDLG IDCAT    IDI       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       320 CAT1     HR1         80          2 EAST_OF_DYKE
       321 CAT1     HR1         80          2 EAST_OF_DYKE
       322 CAT1     HR1         80          2 EAST_OF_DYKE
       323 CAT1     HR1         80          2 EAST_OF_DYKE
       324 CAT1     HR1         80          2 EAST_OF_DYKE
       325 CAT1     HR1         80          2 EAST_OF_DYKE
       326 CAT1     HR1         80          2 EAST_OF_DYKE
       327 CAT1     HR1         80          2 EAST_OF_DYKE
       328 CAT1     HR1         80          2 EAST_OF_DYKE
       329 CAT1     HR1         80          2 EAST_OF_DYKE
       330 CAT1     HR1         80          2 EAST_OF_DYKE

     IBDLG IDCAT    IDI       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       331 CAT1     HR1         80          2 EAST_OF_DYKE
       332 CAT1     HR1         80          2 EAST_OF_DYKE
       333 CAT1     HR1         80          2 EAST_OF_DYKE
       334 CAT1     HR1         80          2 EAST_OF_DYKE
```

```
       335 CAT1     HR1         80          2 EAST_OF_DYKE
       336 CAT1     HR1         80          2 EAST_OF_DYKE
       337 CAT1     HR1         80          2 EAST_OF_DYKE
       338 CAT1     HR1         80          2 EAST_OF_DYKE
       339 CAT1     HR1         80          2 EAST_OF_DYKE
       340 CAT1     HR1         80          2 EAST_OF_DYKE
       341 CAT1     HR1         80          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- --------------------------------
       342 CAT1     HR1         80          2 EAST_OF_DYKE
       343 CAT1     HR1         80          2 EAST_OF_DYKE
       344 CAT1     HR1         80          2 EAST_OF_DYKE
       345 CAT1     HR1         80          2 EAST_OF_DYKE
       346 CAT1     HR1         80          2 EAST_OF_DYKE
       347 CAT1     HR1         80          2 EAST_OF_DYKE
       348 CAT1     HR1         80          2 EAST_OF_DYKE
       349 CAT1     HR1         80          2 EAST_OF_DYKE
       350 CAT1     HR1         80          2 EAST_OF_DYKE
       351 CAT1     HR1         80          2 EAST_OF_DYKE
       352 CAT1     HR1         80          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- --------------------------------
       353 CAT1     HR1         80          2 EAST_OF_DYKE
       354 CAT1     HR1         80          2 EAST_OF_DYKE
       355 CAT1     HR1         80          2 EAST_OF_DYKE
       356 CAT1     HR1         80          2 EAST_OF_DYKE
       357 CAT1     HR1         80          2 EAST_OF_DYKE
       358 CAT1     HR1         80          2 EAST_OF_DYKE
       359 CAT1     HR1         80          2 EAST_OF_DYKE
       360 CAT1     HR1         80          2 EAST_OF_DYKE
       361 CAT1     HR1         80          2 EAST_OF_DYKE
       362 CAT1     HR1         80          2 EAST_OF_DYKE
       363 CAT1     HR1         80          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- --------------------------------
       364 CAT1     HR1         80          2 EAST_OF_DYKE
       365 CAT1     HR1         80          2 EAST_OF_DYKE
       366 CAT1     HR1         80          2 EAST_OF_DYKE
       367 CAT1     HR1         80          2 EAST_OF_DYKE
       368 CAT1     HR1         80          2 EAST_OF_DYKE
       369 CAT1     HR1         80          2 EAST_OF_DYKE
       370 CAT1     HR1         80          2 EAST_OF_DYKE
       371 CAT1     HR1         80          2 EAST_OF_DYKE
       372 CAT1     HR1         80          2 EAST_OF_DYKE
       373 CAT1     HR1         80          2 EAST_OF_DYKE
       374 CAT1     HR1         80          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- --------------------------------
       375 CAT1     HR1         80          2 EAST_OF_DYKE
       376 CAT1     HR1         80          2 EAST_OF_DYKE
       377 CAT1     HR1         80          2 EAST_OF_DYKE
       378 CAT1     HR1         80          2 EAST_OF_DYKE
       379 CAT1     HR1         80          2 EAST_OF_DYKE
       380 CAT1     HR1         80          2 EAST_OF_DYKE
       381 CAT1     HR1         80          2 EAST_OF_DYKE
       382 CAT1     HR1         80          2 EAST_OF_DYKE
       383 CAT1     HR1         80          2 EAST_OF_DYKE
       384 CAT1     HR1         80          2 EAST_OF_DYKE
       385 CAT1     HR1         80          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- --------------------------------
       386 CAT1     HR1         80          2 EAST_OF_DYKE
       387 CAT1     HR1         80          2 EAST_OF_DYKE
       388 CAT1     HR1         80          2 EAST_OF_DYKE
       389 CAT1     HR1         80          2 EAST_OF_DYKE
       390 CAT1     HR1         80          2 EAST_OF_DYKE
       391 CAT1     HR1         80          2 EAST_OF_DYKE
       392 CAT1     HR1         80          2 EAST_OF_DYKE
       393 CAT1     HR1         80          2 EAST_OF_DYKE
       394 CAT1     HR1         80          2 EAST_OF_DYKE
       395 CAT1     HR1         80          2 EAST_OF_DYKE
       396 CAT1     HR1         80          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- --------------------------------
       397 CAT1     HR1         80          2 EAST_OF_DYKE
       398 CAT1     HR1         80          2 EAST_OF_DYKE
       399 CAT1     HR1         80          2 EAST_OF_DYKE
       400 CAT1     HR1         80          2 EAST_OF_DYKE
       401 CAT1     HR1         80          2 EAST_OF_DYKE
       402 CAT1     HR1         80          2 EAST_OF_DYKE
       403 CAT1     HR1         80          2 EAST_OF_DYKE
       404 CAT1     HR1         80          2 EAST_OF_DYKE
       405 CAT1     HR1         80          2 EAST_OF_DYKE
       406 CAT1     HR1         80          2 EAST_OF_DYKE
       407 CAT1     HR1         80          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- --------------------------------
       408 CAT1     HR1         80          2 EAST_OF_DYKE
       409 CAT1     HR1         80          2 EAST_OF_DYKE
       410 CAT1     HR1         80          2 EAST_OF_DYKE
       411 CAT1     HR1         80          2 EAST_OF_DYKE
       412 CAT1     HR1         80          2 EAST_OF_DYKE
       413 CAT1     HR1         80          2 EAST_OF_DYKE
       414 CAT1     HR1         80          2 EAST_OF_DYKE
       415 CAT1     HR1         80          2 EAST_OF_DYKE
       416 CAT1     HR1         80          2 EAST_OF_DYKE
       417 CAT1     HR1         80          2 EAST_OF_DYKE
       418 CAT1     HR1         80          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- --------------------------------
       419 CAT1     HR1         80          2 EAST_OF_DYKE
       420 CAT1     HR1         80          2 EAST_OF_DYKE
       421 CAT1     HR1         80          2 EAST_OF_DYKE
       422 CAT1     HR1         80          2 EAST_OF_DYKE
       423 CAT1     HR1         80          2 EAST_OF_DYKE
       424 CAT1     HR1         80          2 EAST_OF_DYKE
       425 CAT1     HR1         80          2 EAST_OF_DYKE
       426 CAT1     HR1         80          2 EAST_OF_DYKE
       427 CAT1     HR1         80          2 EAST_OF_DYKE
       428 CAT1     HR1         80          2 EAST_OF_DYKE
       429 CAT1     HR1         80          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- --------------------------------
       430 CAT1     HR1         80          2 EAST_OF_DYKE
       431 CAT1     HR1         80          2 EAST_OF_DYKE
       432 CAT1     HR1         80          2 EAST_OF_DYKE
       433 CAT1     HR1         80          2 EAST_OF_DYKE
       434 CAT1     HR1         80          2 EAST_OF_DYKE
       435 CAT1     HR1         80          2 EAST_OF_DYKE
       436 CAT1     HR1         80          2 EAST_OF_DYKE
       437 CAT1     HR1         80          2 EAST_OF_DYKE
       438 CAT1     HR1         80          2 EAST_OF_DYKE
       439 CAT1     HR1         80          2 EAST_OF_DYKE
```

```
  440 CAT1     HR1        80          2 EAST_OF_DYKE

IBDLG IDCAT    ID1      VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
  441 CAT1     HR1        80          2 EAST_OF_DYKE
  442 CAT1     HR1        80          2 EAST_OF_DYKE
  443 CAT1     HR1        80          2 EAST_OF_DYKE
  444 CAT1     HR1        80          2 EAST_OF_DYKE
  445 CAT1     HR1        80          2 EAST_OF_DYKE
  446 CAT1     HR1        80          2 EAST_OF_DYKE
  447 CAT1     HR1        80          2 EAST_OF_DYKE
  448 CAT1     HR1        80          2 EAST_OF_DYKE
  449 CAT1     HR1        80          2 EAST_OF_DYKE
  450 CAT1     HR1        80          2 EAST_OF_DYKE
  451 CAT1     HR1        80          2 EAST_OF_DYKE

IBDLG IDCAT    ID1      VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
  452 CAT1     HR1        80          2 EAST_OF_DYKE
  453 CAT1     HR1        80          2 EAST_OF_DYKE
  454 CAT1     HR1        80          2 EAST_OF_DYKE
  455 CAT1     HR1        80          2 EAST_OF_DYKE
  456 CAT1     HR1        80          2 EAST_OF_DYKE
  457 CAT1     HR1        80          2 EAST_OF_DYKE
  458 CAT1     HR1        80          2 EAST_OF_DYKE
  459 CAT1     HR1        80          2 EAST_OF_DYKE
  460 CAT1     HR1        80          2 EAST_OF_DYKE
  461 CAT1     HR1        80          2 EAST_OF_DYKE
  462 CAT1     HR1        80          2 EAST_OF_DYKE

IBDLG IDCAT    ID1      VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
  463 CAT1     HR1        80          2 EAST_OF_DYKE
  464 CAT1     HR1        80          2 EAST_OF_DYKE
  465 CAT1     HR1        80          2 EAST_OF_DYKE
  466 CAT1     HR1        80          2 EAST_OF_DYKE
  467 CAT1     HR1        80          2 EAST_OF_DYKE
  468 CAT1     HR1        80          2 EAST_OF_DYKE
  469 CAT1     HR1        80          2 EAST_OF_DYKE
  470 CAT1     HR1        80          2 EAST_OF_DYKE
  471 CAT1     HR1        80          2 EAST_OF_DYKE
  472 CAT1     HR1        80          2 EAST_OF_DYKE
  473 CAT1     HR1        80          2 EAST_OF_DYKE

IBDLG IDCAT    ID1      VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
  474 CAT1     HR1        80          2 EAST_OF_DYKE
  475 CAT1     HR1        80          2 EAST_OF_DYKE
  476 CAT1     HR1        80          2 EAST_OF_DYKE
  477 CAT1     HR1        80          2 EAST_OF_DYKE
  478 CAT1     HR1        80          2 EAST_OF_DYKE
  479 CAT1     HR1        80          2 EAST_OF_DYKE
  480 CAT1     HR1        80          2 EAST_OF_DYKE
  481 CAT1     HR1        80          2 EAST_OF_DYKE
  482 CAT1     HR1        80          2 EAST_OF_DYKE
  483 CAT1     HR1        80          2 EAST_OF_DYKE
  484 CAT1     HR1        80          2 EAST_OF_DYKE

IBDLG IDCAT    ID1      VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
  485 CAT1     HR1        80          2 EAST_OF_DYKE
  486 CAT1     HR1        80          2 EAST_OF_DYKE
  487 CAT1     HR1        80          2 EAST_OF_DYKE
  488 CAT1     HR1        80          2 EAST_OF_DYKE
  489 CAT1     HR1        80          2 EAST_OF_DYKE
  490 CAT1     HR1        80          2 EAST_OF_DYKE
  491 CAT1     HR1        80          2 EAST_OF_DYKE
  492 CAT1     HR1        80          2 EAST_OF_DYKE
  493 CAT1     HR1        80          2 EAST_OF_DYKE
  494 CAT1     HR1        80          2 EAST_OF_DYKE
  495 CAT1     HR1        80          2 EAST_OF_DYKE

IBDLG IDCAT    ID1      VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
  496 CAT1     HR1        80          2 EAST_OF_DYKE
  497 CAT1     HR1        80          2 EAST_OF_DYKE
  498 CAT1     HR1        80          2 EAST_OF_DYKE
  499 CAT1     HR1        80          2 EAST_OF_DYKE
  500 CAT1     HR1        80          2 EAST_OF_DYKE
  501 CAT1     HR1        80          2 EAST_OF_DYKE
  502 CAT1     HR1        80          2 EAST_OF_DYKE
  503 CAT1     HR1        80          2 EAST_OF_DYKE
  504 CAT1     HR1        80          2 EAST_OF_DYKE
  505 CAT1     HR2        50          2 EAST_OF_DYKE
  506 CAT1     HR2        50          2 EAST_OF_DYKE

IBDLG IDCAT    ID1      VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
  507 CAT1     HR2        50          2 EAST_OF_DYKE
  508 CAT1     HR2        50          2 EAST_OF_DYKE
  509 CAT1     HR2        50          2 EAST_OF_DYKE
  510 CAT1     HR2        50          2 EAST_OF_DYKE
  511 CAT1     HR2        50          2 EAST_OF_DYKE
  512 CAT1     HR2        50          2 EAST_OF_DYKE
  513 CAT1     HR2        50          2 EAST_OF_DYKE
  514 CAT1     HR2        50          2 EAST_OF_DYKE
  515 CAT1     HR2        50          2 EAST_OF_DYKE
  516 CAT1     HR2        50          2 EAST_OF_DYKE
  517 CAT1     HR2        50          2 EAST_OF_DYKE

IBDLG IDCAT    ID1      VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
  518 CAT1     HR2        50          2 EAST_OF_DYKE
  519 CAT1     HR2        50          2 EAST_OF_DYKE
  520 CAT1     HR2        50          2 EAST_OF_DYKE
  521 CAT1     HR2        50          2 EAST_OF_DYKE
  522 CAT1     HR2        50          2 EAST_OF_DYKE
  523 CAT1     HR2        50          2 EAST_OF_DYKE
  524 CAT1     HR2        50          2 EAST_OF_DYKE
  525 CAT1     HR2        50          2 EAST_OF_DYKE
  526 CAT1     HR2        50          2 EAST_OF_DYKE
  527 CAT1     HR2        50          2 EAST_OF_DYKE
  528 CAT1     HR2        50          2 EAST_OF_DYKE

IBDLG IDCAT    ID1      VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
  529 CAT1     HR2        50          2 EAST_OF_DYKE
  530 CAT1     HR2        50          2 EAST_OF_DYKE
  531 CAT1     HR2        50          2 EAST_OF_DYKE
  532 CAT1     HR2        50          2 EAST_OF_DYKE
  533 CAT1     HR2        50          2 EAST_OF_DYKE
  534 CAT1     HR2        50          2 EAST_OF_DYKE
  535 CAT1     HR2        50          2 EAST_OF_DYKE
  536 CAT1     HR2        50          2 EAST_OF_DYKE
  537 CAT1     HR2        50          2 EAST_OF_DYKE
  538 CAT1     HR2        50          2 EAST_OF_DYKE
  539 CAT1     HR2        50          2 EAST_OF_DYKE

IBDLG IDCAT    ID1      VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
  540 CAT1     HR2        50          2 EAST_OF_DYKE
  541 CAT1     HR2        50          2 EAST_OF_DYKE
```

```
       542 CAT1     HR2          50            2 EAST_OF_DYKE
       543 CAT1     HR2          50            2 EAST_OF_DYKE
       544 CAT1     HR2          50            2 EAST_OF_DYKE
       545 CAT1     HR2          50            2 EAST_OF_DYKE
       546 CAT1     HR2          50            2 EAST_OF_DYKE
       547 CAT1     HR2          50            2 EAST_OF_DYKE
       548 CAT1     HR2          50            2 EAST_OF_DYKE
       549 CAT1     HR2          50            2 EAST_OF_DYKE
       550 CAT1     HR2          50            2 EAST_OF_DYKE

     IBDLG IDCAT    ID1        VIFS        DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       551 CAT1     HR2          50            2 EAST_OF_DYKE
       552 CAT1     HR2          50            2 EAST_OF_DYKE
       553 CAT1     HR2          50            2 EAST_OF_DYKE
       554 CAT1     HR2          50            2 EAST_OF_DYKE
       555 CAT1     HR2          50            2 EAST_OF_DYKE
       556 CAT1     HR2          50            2 EAST_OF_DYKE
       557 CAT1     HR2          50            2 EAST_OF_DYKE
       558 CAT1     HR2          50            2 EAST_OF_DYKE
       559 CAT1     HR2          50            2 EAST_OF_DYKE
       560 CAT1     HR2          50            2 EAST_OF_DYKE
       561 CAT1     HR2          50            2 EAST_OF_DYKE

     IBDLG IDCAT    ID1        VIFS        DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       562 CAT1     HR2          50            2 EAST_OF_DYKE
       563 CAT1     HR2          50            2 EAST_OF_DYKE
       564 CAT1     HR2          50            2 EAST_OF_DYKE
       565 CAT1     HR2          50            2 EAST_OF_DYKE
       566 CAT1     HR2          50            2 EAST_OF_DYKE
       567 CAT1     HR2          50            2 EAST_OF_DYKE
       568 CAT1     HR2          50            2 EAST_OF_DYKE
       569 CAT1     HR2          50            2 EAST_OF_DYKE
       570 CAT1     HR2          50            2 EAST_OF_DYKE
       571 CAT1     HR2          50            2 EAST_OF_DYKE
       572 CAT1     HR2          50            2 EAST_OF_DYKE

     IBDLG IDCAT    ID1        VIFS        DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       573 CAT1     HR2          50            2 EAST_OF_DYKE
       574 CAT1     HR2          50            2 EAST_OF_DYKE
       575 CAT1     HR2          50            2 EAST_OF_DYKE
       576 CAT1     HR2          50            2 EAST_OF_DYKE
       577 CAT1     HR2          50            2 EAST_OF_DYKE
       578 CAT1     HR2          50            2 EAST_OF_DYKE
       579 CAT1     HR2          50            2 EAST_OF_DYKE
       580 CAT1     HR2          50            2 EAST_OF_DYKE
       581 CAT1     HR2          50            2 EAST_OF_DYKE
       582 CAT1     HR2          50            2 EAST_OF_DYKE
       583 CAT1     HR2          50            2 EAST_OF_DYKE

     IBDLG IDCAT    ID1        VIFS        DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       584 CAT1     HR2          50            2 EAST_OF_DYKE
       585 CAT1     HR2          50            2 EAST_OF_DYKE
       586 CAT1     HR2          50            2 EAST_OF_DYKE
       587 CAT1     HR2          50            2 EAST_OF_DYKE
       588 CAT1     HR2          50            2 EAST_OF_DYKE
       589 CAT1     HR2          50            2 EAST_OF_DYKE
       590 CAT1     HR2          50            2 EAST_OF_DYKE
       591 CAT1     HR2          50            2 EAST_OF_DYKE
       592 CAT1     HR2          50            2 EAST_OF_DYKE
       593 CAT1     HR2          50            2 EAST_OF_DYKE
       594 CAT1     HR2          50            2 EAST_OF_DYKE
```

```
     IBDLG IDCAT    ID1        VIFS        DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       595 CAT1     HR2          50            2 EAST_OF_DYKE
       596 CAT1     HR2          50            2 EAST_OF_DYKE
       597 CAT1     HR2          50            2 EAST_OF_DYKE
       598 CAT1     HR2          50            2 EAST_OF_DYKE
       599 CAT1     HR2          50            2 EAST_OF_DYKE
       600 CAT1     HR2          50            2 EAST_OF_DYKE
       601 CAT1     HR2          50            2 EAST_OF_DYKE
       602 CAT1     HR2          50            2 EAST_OF_DYKE
       603 CAT1     HR2          50            2 EAST_OF_DYKE
       604 CAT1     HR2          50            2 EAST_OF_DYKE
       605 CAT1     HR2          50            2 EAST_OF_DYKE

     IBDLG IDCAT    ID1        VIFS        DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       606 CAT1     HR2          50            2 EAST_OF_DYKE
       607 CAT1     HR2          50            2 EAST_OF_DYKE
       608 CAT1     HR2          50            2 EAST_OF_DYKE
       609 CAT1     HR2          50            2 EAST_OF_DYKE
       610 CAT1     HR2          50            2 EAST_OF_DYKE
       611 CAT1     HR2          50            2 EAST_OF_DYKE
       612 CAT1     HR2          50            2 EAST_OF_DYKE
       613 CAT1     HR2          50            2 EAST_OF_DYKE
       614 CAT1     HR2          50            2 EAST_OF_DYKE
       615 CAT1     HR2          50            2 EAST_OF_DYKE
       616 CAT1     HR2          50            2 EAST_OF_DYKE

     IBDLG IDCAT    ID1        VIFS        DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       617 CAT1     HR2          50            2 EAST_OF_DYKE
       618 CAT1     HR2          50            2 EAST_OF_DYKE
       619 CAT1     HR2          50            2 EAST_OF_DYKE
       620 CAT1     HR2          50            2 EAST_OF_DYKE
       621 CAT1     HR2          50            2 EAST_OF_DYKE
       622 CAT1     HR2          50            2 EAST_OF_DYKE
       623 CAT1     HR2          50            2 EAST_OF_DYKE
       624 CAT1     HR2          50            2 EAST_OF_DYKE
       625 CAT1     HR2          50            2 EAST_OF_DYKE
       626 CAT1     HR2          50            2 EAST_OF_DYKE
       627 CAT1     HR2          50            2 EAST_OF_DYKE

     IBDLG IDCAT    ID1        VIFS        DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       628 CAT1     HR2          50            2 EAST_OF_DYKE
       629 CAT1     HR2          50            2 EAST_OF_DYKE
       630 CAT1     HR2          50            2 EAST_OF_DYKE
       631 CAT1     HR2          50            2 EAST_OF_DYKE
       632 CAT1     HR2          50            2 EAST_OF_DYKE
       633 CAT1     HR2          50            2 EAST_OF_DYKE
       634 CAT1     HR2          50            2 EAST_OF_DYKE
       635 CAT1     HR2          50            2 EAST_OF_DYKE
       636 CAT1     HR2          50            2 EAST_OF_DYKE
       637 CAT1     HR2          50            2 EAST_OF_DYKE
       638 CAT1     HR2          50            2 EAST_OF_DYKE

     IBDLG IDCAT    ID1        VIFS        DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       639 CAT1     HR2          50            2 EAST_OF_DYKE
       640 CAT1     HR2          50            2 EAST_OF_DYKE
       641 CAT1     HR2          50            2 EAST_OF_DYKE
       642 CAT1     HR2          50            2 EAST_OF_DYKE
       643 CAT1     HR2          50            2 EAST_OF_DYKE
       644 CAT1     HR2          50            2 EAST_OF_DYKE
       645 CAT1     HR2          50            2 EAST_OF_DYKE
       646 CAT1     HR2          50            2 EAST_OF_DYKE
```

```
       647 CAT1     HR2         50          2 EAST_OF_DYKE
       648 CAT1     HR2         50          2 EAST_OF_DYKE
       649 CAT1     HR2         50          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       650 CAT1     HR2         50          2 EAST_OF_DYKE
       651 CAT1     HR2         50          2 EAST_OF_DYKE
       652 CAT1     HR2         50          2 EAST_OF_DYKE
       653 CAT1     HR2         50          2 EAST_OF_DYKE
       654 CAT1     HR2         50          2 EAST_OF_DYKE
       655 CAT1     HR2         50          2 EAST_OF_DYKE
       656 CAT1     HR2         50          2 EAST_OF_DYKE
       657 CAT1     HR2         50          2 EAST_OF_DYKE
       658 CAT1     HR2         50          2 EAST_OF_DYKE
       659 CAT1     HR2         50          2 EAST_OF_DYKE
       660 CAT1     HR2         50          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       661 CAT1     HR2         50          2 EAST_OF_DYKE
       662 CAT1     HR2         50          2 EAST_OF_DYKE
       663 CAT1     HR2         50          2 EAST_OF_DYKE
       664 CAT1     HR2         50          2 EAST_OF_DYKE
       665 CAT1     HR2         50          2 EAST_OF_DYKE
       666 CAT1     HR2         50          2 EAST_OF_DYKE
       667 CAT1     HR2         50          2 EAST_OF_DYKE
       668 CAT1     HR2         50          2 EAST_OF_DYKE
       669 CAT1     HR2         50          2 EAST_OF_DYKE
       670 CAT1     HR2         50          2 EAST_OF_DYKE
       671 CAT1     HR2         50          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       672 CAT1     HR2         50          2 EAST_OF_DYKE
       673 CAT1     HR2         50          2 EAST_OF_DYKE
       674 CAT1     HR2         50          2 EAST_OF_DYKE
       675 CAT1     HR2         50          2 EAST_OF_DYKE
       676 CAT1     HR2         50          2 EAST_OF_DYKE
       677 CAT1     HR2         50          2 EAST_OF_DYKE
       678 CAT1     HR2         50          2 EAST_OF_DYKE
       679 CAT1     HR2         50          2 EAST_OF_DYKE
       680 CAT1     HR2         50          2 EAST_OF_DYKE
       681 CAT1     HR2         50          2 EAST_OF_DYKE
       682 CAT1     HR2         50          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       683 CAT1     HR2         50          2 EAST_OF_DYKE
       684 CAT1     HR2         50          2 EAST_OF_DYKE
       685 CAT1     HR2         50          2 EAST_OF_DYKE
       686 CAT1     HR2         50          2 EAST_OF_DYKE
       687 CAT1     HR2         50          2 EAST_OF_DYKE
       688 CAT1     HR2         50          2 EAST_OF_DYKE
       689 CAT1     HR2         50          2 EAST_OF_DYKE
       690 CAT1     HR2         50          2 EAST_OF_DYKE
       691 CAT1     HR2         50          2 EAST_OF_DYKE
       692 CAT1     HR2         50          2 EAST_OF_DYKE
       693 CAT1     HR2         50          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       694 CAT1     HR2         50          2 EAST_OF_DYKE
       695 CAT1     HR2         50          2 EAST_OF_DYKE
       696 CAT1     HR2         50          2 EAST_OF_DYKE
       697 CAT1     HR2         50          2 EAST_OF_DYKE
       698 CAT1     HR2         50          2 EAST_OF_DYKE
       699 CAT1     HR2         50          2 EAST_OF_DYKE
       700 CAT1     HR2         50          2 EAST_OF_DYKE
       701 CAT1     HR2         50          2 EAST_OF_DYKE
       702 CAT1     HR2         50          2 EAST_OF_DYKE
       703 CAT1     HR2         50          2 EAST_OF_DYKE
       704 CAT1     HR2         50          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       705 CAT1     HR2         50          2 EAST_OF_DYKE
       706 CAT1     HR2         50          2 EAST_OF_DYKE
       707 CAT1     HR2         50          2 EAST_OF_DYKE
       708 CAT1     HR2         50          2 EAST_OF_DYKE
       709 CAT1     HR2         50          2 EAST_OF_DYKE
       710 CAT1     HR2         50          2 EAST_OF_DYKE
       711 CAT1     HR2         50          2 EAST_OF_DYKE
       712 CAT1     HR2         50          2 EAST_OF_DYKE
       713 CAT1     HR2         50          2 EAST_OF_DYKE
       714 CAT1     HR2         50          2 EAST_OF_DYKE
       715 CAT1     HR2         50          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       716 CAT1     HR2         50          2 EAST_OF_DYKE
       717 CAT1     HR2         50          2 EAST_OF_DYKE
       718 CAT1     HR2         50          2 EAST_OF_DYKE
       719 CAT1     HR2         50          2 EAST_OF_DYKE
       720 CAT1     HR2         50          2 EAST_OF_DYKE
       721 CAT1     HR2         50          2 EAST_OF_DYKE
       722 CAT1     HR2         50          2 EAST_OF_DYKE
       723 CAT1     HR2         50          2 EAST_OF_DYKE
       724 CAT1     HR2         50          2 EAST_OF_DYKE
       725 CAT1     HR2         50          2 EAST_OF_DYKE
       726 CAT1     HR2         50          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       727 CAT1     HR2         50          2 EAST_OF_DYKE
       728 CAT1     HR2         50          2 EAST_OF_DYKE
       729 CAT1     HR2         50          2 EAST_OF_DYKE
       730 CAT1     HR2         50          2 EAST_OF_DYKE
       731 CAT1     HR2         50          2 EAST_OF_DYKE
       732 CAT1     HR2         50          2 EAST_OF_DYKE
       733 CAT1     HR2         50          2 EAST_OF_DYKE
       734 CAT1     HR2         50          2 EAST_OF_DYKE
       735 CAT1     HR2         50          2 EAST_OF_DYKE
       736 CAT1     HR2         50          2 EAST_OF_DYKE
       737 CAT1     HR2         50          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       738 CAT1     HR2         50          2 EAST_OF_DYKE
       739 CAT1     HR2         50          2 EAST_OF_DYKE
       740 CAT1     HR2         50          2 EAST_OF_DYKE
       741 CAT1     HR2         50          2 EAST_OF_DYKE
       742 CAT1     HR2         50          2 EAST_OF_DYKE
       743 CAT1     HR2         50          2 EAST_OF_DYKE
       744 CAT1     HR2         50          2 EAST_OF_DYKE
       745 CAT1     HR2         50          2 EAST_OF_DYKE
       746 CAT1     HR2         50          2 EAST_OF_DYKE
       747 CAT1     HR2         50          2 EAST_OF_DYKE
       748 CAT1     HR2         50          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
```

```
       749 CAT1     HR2        50          2 EAST_OF_DYKE
       750 CAT1     HR2        50          2 EAST_OF_DYKE
       751 CAT1     HR2        50          2 EAST_OF_DYKE
       752 CAT1     HR2        50          2 EAST_OF_DYKE
       753 CAT1     HR2        50          2 EAST_OF_DYKE
       754 CAT1     HR2        50          2 EAST_OF_DYKE
       755 CAT1     HR2        50          2 EAST_OF_DYKE
       756 CAT1     HR2        50          2 EAST_OF_DYKE
       757 CAT1     HR2        50          2 EAST_OF_DYKE
       758 CAT1     HR2        50          2 EAST_OF_DYKE
       759 CAT1     HR1        80          2 EAST_OF_DYKE

     IBDLG IDCAT    IDI      VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       760 CAT1     HR1        80          2 EAST_OF_DYKE
       761 CAT1     HR1        80          2 EAST_OF_DYKE
       762 CAT1     HR1        80          2 EAST_OF_DYKE
       763 CAT1     HR1        80          2 EAST_OF_DYKE
       764 CAT1     HR1        80          2 EAST_OF_DYKE
       765 CAT1     HR1        80          2 EAST_OF_DYKE
       766 CAT1     HR1        80          2 EAST_OF_DYKE
       767 CAT1     HR1        80          2 EAST_OF_DYKE
       768 CAT1     HR1        80          2 EAST_OF_DYKE
       769 CAT1     HR1        80          2 EAST_OF_DYKE
       770 CAT1     HR1        80          2 EAST_OF_DYKE

     IBDLG IDCAT    IDI      VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       771 CAT1     HR1        80          2 EAST_OF_DYKE
       772 CAT1     HR1        80          2 EAST_OF_DYKE
       773 CAT1     HR1        80          2 EAST_OF_DYKE
       774 CAT1     HR1        80          2 EAST_OF_DYKE
       775 CAT1     HR1        80          2 EAST_OF_DYKE
       776 CAT1     HR1        80          2 EAST_OF_DYKE
       777 CAT1     HR1        80          2 EAST_OF_DYKE
       778 CAT1     HR1        80          2 EAST_OF_DYKE
       779 CAT1     HR1        80          2 EAST_OF_DYKE
       780 CAT1     HR1        80          2 EAST_OF_DYKE
       781 CAT1     HR1        80          2 EAST_OF_DYKE

     IBDLG IDCAT    IDI      VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       782 CAT1     HR1        80          2 EAST_OF_DYKE
       783 CAT1     HR1        80          2 EAST_OF_DYKE
       784 CAT1     HR1        80          2 EAST_OF_DYKE
       785 CAT1     HR1        80          2 EAST_OF_DYKE
       786 CAT1     HR1        80          2 EAST_OF_DYKE
       787 CAT1     HR1        80          2 EAST_OF_DYKE
       788 CAT1     HR1        80          2 EAST_OF_DYKE
       789 CAT1     HR1        80          2 EAST_OF_DYKE
       790 CAT1     HR1        80          2 EAST_OF_DYKE
       791 CAT1     HR1        80          2 EAST_OF_DYKE
       792 CAT1     HR1        80          2 EAST_OF_DYKE

     IBDLG IDCAT    IDI      VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       793 CAT1     HR1        80          2 EAST_OF_DYKE
       794 CAT1     HR1        80          2 EAST_OF_DYKE
       795 CAT1     HR1        80          2 EAST_OF_DYKE
       796 CAT1     HR1        80          2 EAST_OF_DYKE
       797 CAT1     HR1        80          2 EAST_OF_DYKE
       798 CAT1     HR1        80          2 EAST_OF_DYKE
       799 CAT1     HR1        80          2 EAST_OF_DYKE
       800 CAT1     HR1        80          2 EAST_OF_DYKE
       801 CAT1     HR1        80          2 EAST_OF_DYKE
       802 CAT1     HR1        80          2 EAST_OF_DYKE
```

```
       803 CAT1     HR1        80          2 EAST_OF_DYKE

     IBDLG IDCAT    IDI      VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       804 CAT1     HR1        80          2 EAST_OF_DYKE
       805 CAT1     HR1        80          2 EAST_OF_DYKE
       806 CAT1     HR1        80          2 EAST_OF_DYKE
       807 CAT1     HR1        80          2 EAST_OF_DYKE
       808 CAT1     HR1        80          2 EAST_OF_DYKE
       809 CAT1     HR1        80          2 EAST_OF_DYKE
       810 CAT1     HR1        80          2 EAST_OF_DYKE
       811 CAT1     HR1        80          2 EAST_OF_DYKE
       812 CAT1     HR1        80          2 EAST_OF_DYKE
       813 CAT1     HR1        80          2 EAST_OF_DYKE
       814 CAT1     HR1        80          2 EAST_OF_DYKE

     IBDLG IDCAT    IDI      VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       815 CAT1     HR1        80          2 EAST_OF_DYKE
       816 CAT1     HR1        80          2 EAST_OF_DYKE
       817 CAT1     HR1        80          2 EAST_OF_DYKE
       818 CAT1     HR1        80          2 EAST_OF_DYKE
       819 CAT1     HR1        80          2 EAST_OF_DYKE
       820 CAT1     HR1        80          2 EAST_OF_DYKE
       821 CAT1     HR1        80          2 EAST_OF_DYKE
       822 CAT1     HR1        80          2 EAST_OF_DYKE
       823 CAT1     HR1        80          2 EAST_OF_DYKE
       824 CAT1     HR1        80          2 EAST_OF_DYKE
       825 CAT1     HR1        80          2 EAST_OF_DYKE

     IBDLG IDCAT    IDI      VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       826 CAT1     HR1        80          2 EAST_OF_DYKE
       827 CAT1     HR1        80          2 EAST_OF_DYKE
       828 CAT1     HR1        80          2 EAST_OF_DYKE
       829 CAT1     HR1        80          2 EAST_OF_DYKE
       830 CAT1     HR1        80          2 EAST_OF_DYKE
       831 CAT1     HR1        80          2 EAST_OF_DYKE
       832 CAT1     HR1        80          2 EAST_OF_DYKE
       833 CAT1     HR1        80          2 EAST_OF_DYKE
       834 CAT1     HR1        80          2 EAST_OF_DYKE
       835 CAT1     HR1        80          2 EAST_OF_DYKE
       836 CAT1     HR1        80          2 EAST_OF_DYKE

     IBDLG IDCAT    IDI      VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       837 CAT1     HR1        80          2 EAST_OF_DYKE
       838 CAT1     HR1        80          2 EAST_OF_DYKE
       839 CAT1     HR1        80          2 EAST_OF_DYKE
       840 CAT1     HR1        80          2 EAST_OF_DYKE
       841 CAT1     HR1        80          2 EAST_OF_DYKE
       842 CAT1     HR1        80          2 EAST_OF_DYKE
       843 CAT1     HR1        80          2 EAST_OF_DYKE
       844 CAT1     HR1        80          2 EAST_OF_DYKE
       845 CAT1     HR1        80          2 EAST_OF_DYKE
       846 CAT1     HR1        80          2 EAST_OF_DYKE
       847 CAT1     HR1        80          2 EAST_OF_DYKE

     IBDLG IDCAT    IDI      VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       848 CAT1     HR1        80          2 EAST_OF_DYKE
       849 CAT1     HR1        80          2 EAST_OF_DYKE
       850 CAT1     HR1        80          2 EAST_OF_DYKE
       851 CAT1     HR1        80          2 EAST_OF_DYKE
       852 CAT1     HR1        80          2 EAST_OF_DYKE
       853 CAT1     HR1        80          2 EAST_OF_DYKE
```

```
       854 CAT1     HR1         80          2 EAST_OF_DYKE
       855 CAT1     HR1         80          2 EAST_OF_DYKE
       856 CAT1     HR1         80          2 EAST_OF_DYKE
       857 CAT1     HR1         80          2 EAST_OF_DYKE
       858 CAT1     HR1         80          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- --------------------------------
       859 CAT1     HR1         80          2 EAST_OF_DYKE
       860 CAT1     HR1         80          2 EAST_OF_DYKE
       861 CAT1     HR1         80          2 EAST_OF_DYKE
       862 CAT1     HR1         80          2 EAST_OF_DYKE
       863 CAT1     HR1         80          2 EAST_OF_DYKE
       864 CAT1     HR1         80          2 EAST_OF_DYKE
       865 CAT1     HR1         80          2 EAST_OF_DYKE
       866 CAT1     HR1         80          2 EAST_OF_DYKE
       867 CAT1     HR1         80          2 EAST_OF_DYKE
       868 CAT1     HR1         80          2 EAST_OF_DYKE
       869 CAT1     HR1         80          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- --------------------------------
       870 CAT1     HR1         80          2 EAST_OF_DYKE
       871 CAT1     HR1         80          2 EAST_OF_DYKE
       872 CAT1     HR1         80          2 EAST_OF_DYKE
       873 CAT1     HR1         80          2 EAST_OF_DYKE
       874 CAT1     HR1         80          2 EAST_OF_DYKE
       875 CAT1     HR1         80          2 EAST_OF_DYKE
       876 CAT1     HR1         80          2 EAST_OF_DYKE
       877 CAT1     HR1         80          2 EAST_OF_DYKE
       878 CAT1     HR1         80          2 EAST_OF_DYKE
       879 CAT1     HR1         80          2 EAST_OF_DYKE
       880 CAT1     HR1         80          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- --------------------------------
       881 CAT1     HR1         80          2 EAST_OF_DYKE
       882 CAT1     HR1         80          2 EAST_OF_DYKE
       883 CAT1     HR1         80          2 EAST_OF_DYKE
       884 CAT1     HR1         80          2 EAST_OF_DYKE
       885 CAT1     HR1         80          2 EAST_OF_DYKE
       886 CAT1     HR1         80          2 EAST_OF_DYKE
       887 CAT1     HR1         80          2 EAST_OF_DYKE
       888 CAT1     HR2         50          2 EAST_OF_DYKE
       889 CAT1     HR2         50          2 EAST_OF_DYKE
       890 CAT1     HR2         50          2 EAST_OF_DYKE
       891 CAT1     HR2         50          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- --------------------------------
       892 CAT1     HR2         50          2 EAST_OF_DYKE
       893 CAT1     HR2         50          2 EAST_OF_DYKE
       894 CAT1     HR2         50          2 EAST_OF_DYKE
       895 CAT1     HR2         50          2 EAST_OF_DYKE
       896 CAT1     HR2         50          2 EAST_OF_DYKE
       897 CAT1     HR2         50          2 EAST_OF_DYKE
       898 CAT1     HR2         50          2 EAST_OF_DYKE
       899 CAT1     HR2         50          2 EAST_OF_DYKE
       900 CAT1     HR2         50          2 EAST_OF_DYKE
       901 CAT1     HR2         50          2 EAST_OF_DYKE
       902 CAT1     HR2         50          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- --------------------------------
       903 CAT1     HR2         50          2 EAST_OF_DYKE
       904 CAT1     HR2         50          2 EAST_OF_DYKE
```

```
       905 CAT1     HR2         50          2 EAST_OF_DYKE
       906 CAT1     HR2         50          2 EAST_OF_DYKE
       907 CAT1     HR2         50          2 EAST_OF_DYKE
       908 CAT1     HR2         50          2 EAST_OF_DYKE
       909 CAT1     HR2         50          2 EAST_OF_DYKE
       910 CAT1     HR2         50          2 EAST_OF_DYKE
       911 CAT1     HR2         50          2 EAST_OF_DYKE
       912 CAT1     HR2         50          2 EAST_OF_DYKE
       913 CAT1     HR2         50          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- --------------------------------
       914 CAT1     HR2         50          2 EAST_OF_DYKE
       915 CAT1     HR2         50          2 EAST_OF_DYKE
       916 CAT1     HR2         50          2 EAST_OF_DYKE
       917 CAT1     HR2         50          2 EAST_OF_DYKE
       918 CAT1     HR2         50          2 EAST_OF_DYKE
       919 CAT1     HR2         50          2 EAST_OF_DYKE
       920 CAT1     HR2         50          2 EAST_OF_DYKE
       921 CAT1     HR2         50          2 EAST_OF_DYKE
       922 CAT1     HR2         50          2 EAST_OF_DYKE
       923 CAT1     HR2         50          2 EAST_OF_DYKE
       924 CAT1     HR2         50          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- --------------------------------
       925 CAT1     HR2         50          2 EAST_OF_DYKE
       926 CAT1     HR2         50          2 EAST_OF_DYKE
       927 CAT1     HR2         50          2 EAST_OF_DYKE
       928 CAT1     HR2         50          2 EAST_OF_DYKE
       929 CAT1     HR2         50          2 EAST_OF_DYKE
       930 CAT1     HR2         50          2 EAST_OF_DYKE
       931 CAT1     HR2         50          2 EAST_OF_DYKE
       932 CAT1     HR2         50          2 EAST_OF_DYKE
       933 CAT1     HR2         50          2 EAST_OF_DYKE
       934 CAT1     HR2         50          2 EAST_OF_DYKE
       935 CAT1     HR2         50          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- --------------------------------
       936 CAT1     HR2         50          2 EAST_OF_DYKE
       937 CAT1     HR2         50          2 EAST_OF_DYKE
       938 CAT1     HR2         50          2 EAST_OF_DYKE
       939 CAT1     HR2         50          2 EAST_OF_DYKE
       940 CAT1     HR2         50          2 EAST_OF_DYKE
       941 CAT1     HR2         50          2 EAST_OF_DYKE
       942 CAT1     HR2         50          2 EAST_OF_DYKE
       943 CAT1     HR2         50          2 EAST_OF_DYKE
       944 CAT1     HR2         50          2 EAST_OF_DYKE
       945 CAT1     HR2         50          2 EAST_OF_DYKE
       946 CAT1     HR2         50          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- --------------------------------
       947 CAT1     HR2         50          2 EAST_OF_DYKE
       948 CAT1     HR2         50          2 EAST_OF_DYKE
       949 CAT1     HR2         50          2 EAST_OF_DYKE
       950 CAT1     HR2         50          2 EAST_OF_DYKE
       951 CAT1     HR2         50          2 EAST_OF_DYKE
       952 CAT1     HR2         50          2 EAST_OF_DYKE
       953 CAT1     HR2         50          2 EAST_OF_DYKE
       954 CAT1     HR2         50          2 EAST_OF_DYKE
       955 CAT1     HR2         50          2 EAST_OF_DYKE
       956 CAT1     HR2         50          2 EAST_OF_DYKE
       957 CAT1     HR2         50          2 EAST_OF_DYKE
```

```
     IBDLG IDCAT    ID1        VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       958 CAT1     HR2          50          2 EAST_OF_DYKE
       959 CAT1     HR2          50          2 EAST_OF_DYKE
       960 CAT1     HR2          50          2 EAST_OF_DYKE
       961 CAT1     HR2          50          2 EAST_OF_DYKE
       962 CAT1     HR2          50          2 EAST_OF_DYKE
       963 CAT1     HR2          50          2 EAST_OF_DYKE
       964 CAT1     HR2          50          2 EAST_OF_DYKE
       965 CAT1     HR2          50          2 EAST_OF_DYKE
       966 CAT1     HR2          50          2 EAST_OF_DYKE
       967 CAT1     HR2          50          2 EAST_OF_DYKE
       968 CAT1     HR2          50          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1        VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       969 CAT1     HR2          50          2 EAST_OF_DYKE
       970 CAT1     HR2          50          2 EAST_OF_DYKE
       971 CAT1     HR2          50          2 EAST_OF_DYKE
       972 CAT1     HR2          50          2 EAST_OF_DYKE
       973 CAT1     HR2          50          2 EAST_OF_DYKE
       974 CAT1     HR2          50          2 EAST_OF_DYKE
       975 CAT1     HR2          50          2 EAST_OF_DYKE
       976 CAT1     HR2          50          2 EAST_OF_DYKE
       977 CAT1     HR2          50          2 EAST_OF_DYKE
       978 CAT1     HR2          50          2 EAST_OF_DYKE
       979 CAT1     HR2          50          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1        VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       980 CAT1     HR2          50          2 EAST_OF_DYKE
       981 CAT1     HR2          50          2 EAST_OF_DYKE
       982 CAT1     HR2          50          2 EAST_OF_DYKE
       983 CAT1     HR2          50          2 EAST_OF_DYKE
       984 CAT1     HR2          50          2 EAST_OF_DYKE
       985 CAT1     HR2          50          2 EAST_OF_DYKE
       986 CAT1     HR2          50          2 EAST_OF_DYKE
       987 CAT1     HR2          50          2 EAST_OF_DYKE
       988 CAT1     HR2          50          2 EAST_OF_DYKE
       989 CAT1     HR2          50          2 EAST_OF_DYKE
       990 CAT1     HR2          50          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1        VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
       991 CAT1     HR2          50          2 EAST_OF_DYKE
       992 CAT1     HR2          50          2 EAST_OF_DYKE
       993 CAT1     HR2          50          2 EAST_OF_DYKE
       994 CAT1     HR2          50          2 EAST_OF_DYKE
       995 CAT1     HR2          50          2 EAST_OF_DYKE
       996 CAT1     HR2          50          2 EAST_OF_DYKE
       997 CAT1     HR2          50          2 EAST_OF_DYKE
       998 CAT1     HR2          50          2 EAST_OF_DYKE
       999 CAT1     HR2          50          2 EAST_OF_DYKE
      1000 CAT1     HR2          50          2 EAST_OF_DYKE
      1001 CAT1     HR2          50          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1        VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
      1002 CAT1     HR2          50          2 EAST_OF_DYKE
      1003 CAT1     HR2          50          2 EAST_OF_DYKE
      1004 CAT1     HR2          50          2 EAST_OF_DYKE
      1005 CAT1     HR2          50          2 EAST_OF_DYKE
      1006 CAT1     HR2          50          2 EAST_OF_DYKE
      1007 CAT1     HR2          50          2 EAST_OF_DYKE
      1008 CAT1     HR2          50          2 EAST_OF_DYKE
      1009 CAT1     HR2          50          2 EAST_OF_DYKE
      1010 CAT1     HR2          50          2 EAST_OF_DYKE
      1011 CAT1     HR2          50          2 EAST_OF_DYKE
      1012 CAT1     HR2          50          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1        VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
      1013 CAT1     HR2          50          2 EAST_OF_DYKE
      1014 CAT1     HR2          50          2 EAST_OF_DYKE
      1015 CAT1     HR2          50          2 EAST_OF_DYKE
      1016 CAT1     HR2          50          2 EAST_OF_DYKE
      1017 CAT1     HR2          50          2 EAST_OF_DYKE
      1018 CAT1     HR2          50          2 EAST_OF_DYKE
      1019 CAT1     HR2          50          2 EAST_OF_DYKE
      1020 CAT1     HR2          50          2 EAST_OF_DYKE
      1021 CAT1     HR2          50          2 EAST_OF_DYKE
      1022 CAT1     HR2          50          2 EAST_OF_DYKE
      1023 CAT1     HR2          50          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1        VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
      1024 CAT1     HR2          50          2 EAST_OF_DYKE
      1025 CAT1     HR2          50          2 EAST_OF_DYKE
      1026 CAT1     HR2          50          2 EAST_OF_DYKE
      1027 CAT1     HR2          50          2 EAST_OF_DYKE
      1028 CAT1     HR2          50          2 EAST_OF_DYKE
      1029 CAT1     HR2          50          2 EAST_OF_DYKE
      1030 CAT1     HR2          50          2 EAST_OF_DYKE
      1031 CAT1     HR2          50          2 EAST_OF_DYKE
      1032 CAT1     HR2          50          2 EAST_OF_DYKE
      1033 CAT1     HR2          50          2 EAST_OF_DYKE
      1034 CAT1     HR2          50          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1        VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
      1035 CAT1     HR2          50          2 EAST_OF_DYKE
      1036 CAT1     HR2          50          2 EAST_OF_DYKE
      1037 CAT1     HR2          50          2 EAST_OF_DYKE
      1038 CAT1     HR2          50          2 EAST_OF_DYKE
      1039 CAT1     HR2          50          2 EAST_OF_DYKE
      1040 CAT1     HR2          50          2 EAST_OF_DYKE
      1041 CAT1     HR2          50          2 EAST_OF_DYKE
      1042 CAT1     HR2          50          2 EAST_OF_DYKE
      1043 CAT1     HR2          50          2 EAST_OF_DYKE
      1044 CAT1     HR2          50          2 EAST_OF_DYKE
      1045 CAT1     HR2          50          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1        VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
      1046 CAT1     HR2          50          2 EAST_OF_DYKE
      1047 CAT1     HR2          50          2 EAST_OF_DYKE
      1048 CAT1     HR2          50          2 EAST_OF_DYKE
      1049 CAT1     HR2          50          2 EAST_OF_DYKE
      1050 CAT1     HR2          50          2 EAST_OF_DYKE
      1051 CAT1     HR2          50          2 EAST_OF_DYKE
      1052 CAT1     HR2          50          2 EAST_OF_DYKE
      1053 CAT1     HR2          50          2 EAST_OF_DYKE
      1054 CAT1     HR2          50          2 EAST_OF_DYKE
      1055 CAT1     HR2          50          2 EAST_OF_DYKE
      1056 CAT1     HR2          50          2 EAST_OF_DYKE

     IBDLG IDCAT    ID1        VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- ------------------------------
      1057 CAT1     HR2          50          2 EAST_OF_DYKE
      1058 CAT1     HR2          50          2 EAST_OF_DYKE
      1059 CAT1     HR2          50          2 EAST_OF_DYKE
      1060 CAT1     HR2          50          2 EAST_OF_DYKE
```

```
      1061 CATI      HR2         50            2 EAST_OF_DYKE
      1062 CATI      HR2         50            2 EAST_OF_DYKE
      1063 CATI      HR2         50            2 EAST_OF_DYKE
      1064 CATI      HR2         50            2 EAST_OF_DYKE
      1065 CATI      HR2         50            2 EAST_OF_DYKE
      1066 CATI      HR2         50            2 EAST_OF_DYKE
      1067 CATI      HR2         50            2 EAST_OF_DYKE

     IBDLG IDCAT     ID1        VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- --------------------------------
      1068 CATI      HR2         50            2 EAST_OF_DYKE
      1069 CATI      HR2         50            2 EAST_OF_DYKE
      1070 CATI      HR2         50            2 EAST_OF_DYKE
      1071 CATI      HR2         50            2 EAST_OF_DYKE
      1072 CATI      HR2         50            2 EAST_OF_DYKE
      1073 CATI      HR2         50            2 EAST_OF_DYKE
      1074 CATI      HR2         50            2 EAST_OF_DYKE
      1075 CATI      HR2         50            2 EAST_OF_DYKE
      1076 CATI      HR2         50            2 EAST_OF_DYKE
      1077 CATI      HR2         50            2 EAST_OF_DYKE
      1078 CATI      HR2         50            2 EAST_OF_DYKE

     IBDLG IDCAT     ID1        VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- --------------------------------
      1079 CATI      HR2         50            2 EAST_OF_DYKE
      1080 CATI      HR2         50            2 EAST_OF_DYKE
      1081 CATI      HR2         50            2 EAST_OF_DYKE
      1082 CATI      HR2         50            2 EAST_OF_DYKE
      1083 CATI      HR2         50            2 EAST_OF_DYKE
      1084 CATI      HR2         50            2 EAST_OF_DYKE
      1085 CATI      HR2         50            2 EAST_OF_DYKE
      1086 CATI      HR2         50            2 EAST_OF_DYKE
      1087 CATI      HR2         50            2 EAST_OF_DYKE
      1088 CATI      HR2         50            2 EAST_OF_DYKE
      1089 CATI      HR2         50            2 EAST_OF_DYKE

     IBDLG IDCAT     ID1        VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- --------------------------------
      1090 CATI      HR2         50            2 EAST_OF_DYKE
      1091 CATI      HR2         50            2 EAST_OF_DYKE
      1092 CATI      HR2         50            2 EAST_OF_DYKE
      1093 CATI      HR2         50            2 EAST_OF_DYKE
      1094 CATI      HR2         50            2 EAST_OF_DYKE
      1095 CATI      HR2         50            2 EAST_OF_DYKE
      1096 CATI      HR2         50            2 EAST_OF_DYKE
      1097 CATI      HR2         50            2 EAST_OF_DYKE
      1098 CATI      HR2         50            2 EAST_OF_DYKE
      1099 CATI      HR2         50            2 EAST_OF_DYKE
      1100 CATI      HR2         50            2 EAST_OF_DYKE

     IBDLG IDCAT     ID1        VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- --------------------------------
      1101 CATI      HR2         50            2 EAST_OF_DYKE
      1102 CATI      HR2         50            2 EAST_OF_DYKE
      1103 CATI      HR2         50            2 EAST_OF_DYKE
      1104 CATI      HR2         50            2 EAST_OF_DYKE
      1105 CATI      HR2         50            2 EAST_OF_DYKE
      1106 CATI      HR2         50            2 EAST_OF_DYKE
      1107 CATI      HR2         50            2 EAST_OF_DYKE
      1108 CATI      HR2         50            2 EAST_OF_DYKE
      1109 CATI      HR2         50            2 EAST_OF_DYKE
      1110 CATI      HR2         50            2 EAST_OF_DYKE
      1111 CATI      HR2         50            2 EAST_OF_DYKE

     IBDLG IDCAT     ID1        VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- --------------------------------
```

```
      1112 CATI      HR2         50            2 EAST_OF_DYKE
      1113 CATI      HR2         50            2 EAST_OF_DYKE
      1114 CAT2      HR2         50            2 WEST_OF_DYKE
      1115 CAT2      HR2         50            2 WEST_OF_DYKE
      1116 CAT2      HR2         50            2 WEST_OF_DYKE
      1117 CAT2      HR2         50            2 WEST_OF_DYKE
      1118 CAT2      HR2         50            2 WEST_OF_DYKE
      1119 CAT2      HR2         50            2 WEST_OF_DYKE
      1120 CAT2      HR2         50            2 WEST_OF_DYKE
      1121 CAT2      HR2         50            2 WEST_OF_DYKE
      1122 CAT2      HR2         50            2 WEST_OF_DYKE

     IBDLG IDCAT     ID1        VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- --------------------------------
      1123 CAT2      HR2         50            2 WEST_OF_DYKE
      1124 CAT2      HR2         50            2 WEST_OF_DYKE
      1125 CAT2      HR2         50            2 WEST_OF_DYKE
      1126 CAT2      HR2         50            2 WEST_OF_DYKE
      1127 CAT2      HR2         50            2 WEST_OF_DYKE
      1128 CAT2      HR2         50            2 WEST_OF_DYKE
      1129 CAT2      HR2         50            2 WEST_OF_DYKE
      1130 CAT2      HR2         50            2 WEST_OF_DYKE
      1131 CAT2      HR2         50            2 WEST_OF_DYKE
      1132 CAT2      HR2         50            2 WEST_OF_DYKE
      1133 CAT2      HR2         50            2 WEST_OF_DYKE

     IBDLG IDCAT     ID1        VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- --------------------------------
      1134 CAT2      HR2         50            2 WEST_OF_DYKE
      1135 CAT2      HR2         50            2 WEST_OF_DYKE
      1136 CAT2      HR2         50            2 WEST_OF_DYKE
      1137 CAT2      HR2         50            2 WEST_OF_DYKE
      1138 CAT2      HR2         50            2 WEST_OF_DYKE
      1139 CAT2      HR2         50            2 WEST_OF_DYKE
      1140 CAT2      HR2         50            2 WEST_OF_DYKE
      1141 CAT2      HR2         50            2 WEST_OF_DYKE
      1142 CAT2      HR2         50            2 WEST_OF_DYKE
      1143 CAT2      HR2         50            2 WEST_OF_DYKE
      1144 CAT2      HR2         50            2 WEST_OF_DYKE

     IBDLG IDCAT     ID1        VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- --------------------------------
      1145 CAT2      HR2         50            2 WEST_OF_DYKE
      1146 CAT2      HR2         50            2 WEST_OF_DYKE
      1147 CAT2      HR2         50            2 WEST_OF_DYKE
      1148 CAT2      HR2         50            2 WEST_OF_DYKE
      1149 CAT2      HR2         50            2 WEST_OF_DYKE
      1150 CAT2      HR2         50            2 WEST_OF_DYKE
      1151 CAT2      HR2         50            2 WEST_OF_DYKE
      1152 CAT2      HR2         50            2 WEST_OF_DYKE
      1153 CAT2      HR2         50            2 WEST_OF_DYKE
      1154 CAT2      HR2         50            2 WEST_OF_DYKE
      1155 CAT2      HR2         50            2 WEST_OF_DYKE

     IBDLG IDCAT     ID1        VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- --------------------------------
      1156 CAT2      HR2         50            2 WEST_OF_DYKE
      1157 CAT2      HR2         50            2 WEST_OF_DYKE
      1158 CAT2      HR2         50            2 WEST_OF_DYKE
      1159 CAT2      HR2         50            2 WEST_OF_DYKE
      1160 CAT2      HR2         50            2 WEST_OF_DYKE
      1161 CAT2      HR2         50            2 WEST_OF_DYKE
      1162 CAT2      HR2         50            2 WEST_OF_DYKE
      1163 CAT2      HR2         50            2 WEST_OF_DYKE
      1164 CAT2      HR2         50            2 WEST_OF_DYKE
      1165 CAT2      HR2         50            2 WEST_OF_DYKE
```

```
      1166 CAT2     HR2         50          2 WEST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- --------------------------------
      1167 CAT2     HR2         50          2 WEST_OF_DYKE
      1168 CAT2     HR2         50          2 WEST_OF_DYKE
      1169 CAT2     HR2         50          2 WEST_OF_DYKE
      1170 CAT2     HR2         50          2 WEST_OF_DYKE
      1171 CAT2     HR1         80          2 WEST_OF_DYKE
      1172 CAT2     HR1         80          2 WEST_OF_DYKE
      1173 CAT2     HR1         80          2 WEST_OF_DYKE
      1174 CAT2     HR1         80          2 WEST_OF_DYKE
      1175 CAT2     HR1         80          2 WEST_OF_DYKE
      1176 CAT2     HR1         80          2 WEST_OF_DYKE
      1177 CAT2     HR1         80          2 WEST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- --------------------------------
      1178 CAT2     HR1         80          2 WEST_OF_DYKE
      1179 CAT2     HR1         80          2 WEST_OF_DYKE
      1180 CAT2     HR1         80          2 WEST_OF_DYKE
      1181 CAT2     HR1         80          2 WEST_OF_DYKE
      1182 CAT2     HR1         80          2 WEST_OF_DYKE
      1183 CAT2     HR1         80          2 WEST_OF_DYKE
      1184 CAT2     HR1         80          2 WEST_OF_DYKE
      1185 CAT2     HR1         80          2 WEST_OF_DYKE
      1186 CAT2     HR1         80          2 WEST_OF_DYKE
      1187 CAT2     HR1         80          2 WEST_OF_DYKE
      1188 CAT2     HR1         80          2 WEST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- --------------------------------
      1189 CAT2     HR1         80          2 WEST_OF_DYKE
      1190 CAT2     HR1         80          2 WEST_OF_DYKE
      1191 CAT2     HR1         80          2 WEST_OF_DYKE
      1192 CAT2     HR1         80          2 WEST_OF_DYKE
      1193 CAT2     HR1         80          2 WEST_OF_DYKE
      1194 CAT2     HR1         80          2 WEST_OF_DYKE
      1195 CAT2     HR1         80          2 WEST_OF_DYKE
      1196 CAT2     HR1         80          2 WEST_OF_DYKE
      1197 CAT2     HR1         80          2 WEST_OF_DYKE
      1198 CAT2     HR1         80          2 WEST_OF_DYKE
      1199 CAT2     HR1         80          2 WEST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- --------------------------------
      1200 CAT2     HR1         80          2 WEST_OF_DYKE
      1201 CAT2     HR1         80          2 WEST_OF_DYKE
      1202 CAT2     HR1         80          2 WEST_OF_DYKE
      1203 CAT2     HR1         80          2 WEST_OF_DYKE
      1204 CAT2     HR1         80          2 WEST_OF_DYKE
      1205 CAT2     HR1         80          2 WEST_OF_DYKE
      1206 CAT2     HR1         80          2 WEST_OF_DYKE
      1207 CAT2     HR1         80          2 WEST_OF_DYKE
      1208 CAT2     HR1         80          2 WEST_OF_DYKE
      1209 CAT2     HR1         80          2 WEST_OF_DYKE
      1210 CAT2     HR1         80          2 WEST_OF_DYKE

     IBDLG IDCAT    ID1       VIFS      DELTG IADDR
---------- -------- --- ---------- ---------- --------------------------------
      1211 CAT2     HR1         80          2 WEST_OF_DYKE
      1212 CAT2     HR1         80          2 WEST_OF_DYKE
      1213 CAT2     HR1         80          2 WEST_OF_DYKE

1213 rows selected.
```