

BEFORE THE COUNCIL OF THE
METROPOLITAN SERVICE DISTRICT

FOR THE PURPOSE OF AWARDING A) Resolution No. 91-1444
MULTI-YEAR CONTRACT FOR A MODELING)
SYSTEM TO SIMULATE SOLID WASTE) Introduced by Rena Cusma,
GENERATION, REDUCTION, TRANSPORT) Executive Officer
AND DELIVERY)

WHEREAS, Resolution No. 91-1400A authorized the issuance of a Request of Proposals for a computer modeling system to simulate regional waste flow; and

WHEREAS, The Fiscal Year 1990/1991 and 1991/1992 Metro budgets appropriate up to \$215,000 to execute this contract; and

WHEREAS, The Metro evaluation committee has reviewed four proposals, interviewed proposers, and recommended award of contract to Cambridge Systematics, Inc.; and

WHEREAS, The resolution was submitted to the Executive Officer for consideration and was forwarded to the Council for approval; NOW THEREFORE,

BE IT RESOLVED

That the Council of the Metropolitan Service District awards a multi-year contract (Exhibit A) in the amount of \$200,000 to Cambridge Systematics, Inc., for a modeling system to simulate solid waste generation, reduction, transport and delivery.

ADOPTED by the Council of the Metropolitan Service District this 9th day of May, 1991.


Tanya Collier, Presiding Officer

EXHIBIT "A"

SCOPE OF WORK

MODELING SYSTEM TO SIMULATE SOLID WASTE GENERATION, REDUCTION, TRANSPORT AND DELIVERY

Contract Objectives

Cambridge Systematics, Inc. (CS) shall provide Metro with a simulation system to accurately model regional waste flow. At the conclusion of tasks described below, Metro will have a fully functional Geographic Information System application that can be used to estimate the impact of management practices and policies on waste generation, reduction, transport, and delivery for both short- (less than 3 years) and long-term (up to 20 years) analyses.

This simulation system will be used for both short-term management of the solid waste system and long-range planning. Both functions will be considered during the planning and implementation of the work.

The Scope of Work for this contract has been refined from the tasks identified in the Request for Proposals (RFP #91R-4-SW). The Scope of Work in this contract includes all of the tasks and subtasks identified in the RFP. The methodologies for completing these tasks are explained further in CS RFP proposal on file in Metro's Solid Waste Department.

Project Organization

The work will be divided into two Phases. During Phase I CS will produce a preliminary design of the modeling system, detailed workplans, timelines, and budgets for each task. After Metro review and approval of the deliverables produced by CS during Phase I, Phase II will be initiated. The work products from Phase I will be the basis for the scope of work for Phase II.

CS agrees that the work plans and budgets produced during Phase I will be consistent with what CS represented to Metro in its proposal. The final scope of work from Phase I and responsibilities of CS are to be determined during Phase I and shall become part of this agreement.

Metro will use a committee of local solid waste professionals to serve as advisers to this project as needed for specific topics. The recommendations of this committee will help Metro staff give directions to CS during the performance of this contract.

PHASE I

Phase I system design will include: (1) specification of model parameters, data collection, and statistical procedures; (2) conceptual design of the software macros to be written by CS; (3) workplans for each of the work tasks; (4) budgets for each of the work tasks.

During Phase I CS shall complete the following work:

Data Inventory. Existing data will be surveyed to determine potential for use in the modeling system. Metro and other data sources will be examined.

Model Specification. CS shall specify the structure and steps to be used in selecting parameters of the waste generation model (Task 2 in Phase II) and the choice models (Tasks 3 and 4 in Phase II). This specification shall include the overall structural framework of the modeling system showing basic components, relationships among these components, and the nature of the relationships (e.g. information flows, material flows, or feedback). The structure of the model components and the functional form proposed for all equations shall also be specified. CS shall work with Metro staff to specify waste type categories, waste generator categories, choices faced by decision makers, and the structure of choices ("decision tree") faced by decision makers.

Data Collection Plan. Based on the data inventory, data needs will be identified by CS. Metro and CS shall agree upon data to be collected as part of this contract prior to the initiation of data collection. A plan for collecting data will then be prepared by CS. Most waste generation data collection is expected to involve nonresidential generators. The type of data collection may include surveys of generators and/or weighing of waste. The data collection will also include a survey of haulers at regional facilities to collect origin/destination data needed to estimate coefficients of the choice models.

Statistical Analysis Plan. CS shall specify detailed plans for model estimation including but not limited to procedures and statistical decision criteria.

Catalog of User-Specified Conditions. CS shall produce a catalog of user-specified conditions that the system must be capable of simulating based on the management and policy constraints of interest to Metro staff. While the details of these conditions may be modified during Phase II because of data availability or other limitations, Phase I will produce a catalog of conditions based on the current knowledge of CS and Metro.

Software Specification. The software used for the simulation system shall be ARC/INFO (or ARC and a compatible database management package such as ORACLE) for Hewlett-Packard (HP) workstations. The Phase I plan will include the conceptual design of the software application to be written by CS. Details such as menu structure, input/output data files, and other specifications shall be determined during Phase II. As represented in the

CS proposal, the software will allow: (1) casual users to produce summary reports with a minimum amount of training, (2) more advanced users to simulate the effect of user-specified conditions, and (3) Metro technical staff to update and modify model equations.

Detailed Work Plan by Task. A written work plan for each of the tasks identified in Phase II shall be submitted for review and approval by Metro. These plans shall include a complete timeline and budget by task.

Acceptance Criteria. Final acceptance of the simulation system shall depend on a demonstration that it can be used to accurately simulate historic waste flows. The prototype simulation system produced in Task 5 of Phase II will be used by Metro staff to backcast waste generation and deliveries during 1985 to 1991. Metro and CS shall agree during Phase I on performance targets given the limitations and availability of data. Metro expects that this shall include sensitivity analysis.

Appropriate CS staff shall attend at least one meeting at the Metro Portland office at the beginning of this task. As part of this planning meeting Metro staff shall provide information on the solid waste system, key management and policy questions of interest, Metro data resources, and Metro computer resources.

After review and approval of the written system design and work produced during Phase I, Metro shall pay CS for time and materials up to \$16,000. Phase I shall be completed within four (4) weeks of contract signing.

PHASE II

Phase II will include five (5) major work tasks.

Task 1. Data collection and processing.

In accordance with the data collection plans developed in Phase I, CS and/or its subcontractors shall conduct primary data collection. CS shall be responsible for data coding, editing, cleaning, and other data management procedures. CS shall be responsible for obtaining all equipment necessary for the data collection agreed on during Phase I. CS shall provide Metro with all data and documentation in a format to be determined during Phase I.

Task 2. Develop statistical models that can be used to estimate waste generation rates within local geographic areas of the Metro region.

Analysis: CS shall conduct all necessary statistical analysis using accepted statistical procedures for identifying significant explanatory variables and estimating model coefficients.

The analyses will be conducted using existing data and/or original data collected as part of this project (as determined in Phase I).

Task Product and Schedule: CS shall provide written documentation of the statistical analyses and model structure. The level of detail shall be sufficient for independent replication and evaluation of the results. CS shall also provide data files used in the analyses in a format to be determined during Phase I. This task shall be initiated at completion of Phase I and shall be completed within seven (7) months.

Task 3. Develop choice models to simulate the behavior of generators and haulers who decide among alternative disposal methods, transport modes, and delivery facilities.

Analysis: CS shall conduct all necessary statistical analysis using accepted statistical procedures to identify significant explanatory variables and estimate model coefficients of the individual choice models (as specified in the RFP these choices include the waste generator's decision to recycle; the waste generator's choice of self-haul or commercial haul; the commercial hauler's choice of vehicle type; and the hauler's choice of facility).

Task Product and Schedule: CS shall provide written documentation of the statistical analyses and model structure. The level of detail shall be sufficient for independent replication of the work. CS shall also provide data files used in the analyses in a format to be determined during Phase I. This task shall be initiated at completion of Phase I and shall be completed within seven (7) months.

Task 4. Develop spatial analysis algorithms that can be used to estimate flow patterns that satisfy conditions specified by the user.

Algorithm development and testing: Algorithms will be developed by CS to implement each type of user-specified condition specified in the Phase I catalog.

Task Product and Schedule: This task will be conducted in conjunction with the GIS software development in Task 5. The products will be written documentation of user-specified conditions and all necessary software and data tables for implementation. The level of detail shall be sufficient for independent replication of the work. This task shall be initiated at the completion of Phase I and will be completed within eleven (11) months.

Task 5. Develop an ARC/INFO (or ARC and a compatible database management software) application to simulate waste flow in the Metro region using the models developed in previous tasks.

Software Development: The ARC/INFO application shall be developed by CS. This application shall use the ARC Macro Language (AML) and shall be developed on HP or SUN workstations. All programming code shall be provided to Metro.

Minimum Standards: Minimum specification standards for the software application were listed in the RFP and were included as part of the CS proposal on file at the Metro office. These standards are adopted by this reference and shall be the basis for Metro's evaluation of successful completion of this task.

Task Product and Schedule: CS shall provide Metro with ARC/INFO macros necessary to run the simulations using Metro's HP workstations and databases. At the completion of this task, CS shall provide a prototype application for use and review by Metro. At that time, CS shall provide written documentation of the software structure and a user manual with sufficient detail for Metro staff who are unfamiliar with the system to become proficient users. This task shall be completed within eleven (11) months.

Training: At the time the prototype is presented to Metro, appropriate CS staff shall conduct in-person training of Metro staff at the Metro office.

Task 6. System validation and maintenance.

Acceptance Testing: The prototype simulation system will be used to backcast historic waste flows to regional facilities (1985 to 1991). System changes during this period include the closure of St. Johns Landfill to all waste except construction and demolition debris, the opening of the Metro/Riedel Compost Facility (and associated flow control), the opening of Metro Central transfer station, the acceptance of special wastes at the Hillsboro Landfill, and a change to charging all Metro customers on a weight basis. The acceptance criteria agreed upon during Phase I will be used to determine whether performance of the simulation system is adequate, given the limitations of the data.

Validation: If the simulation system fails to satisfy the acceptance criteria, CS shall perform appropriate diagnostics to determine the most likely causes of failure. Corrections agreed upon by Metro shall be made by CS to successfully simulate historic waste flows.

Maintenance: CS shall provide a detailed plan for updating and maintaining the simulation system. This will include procedures for using actual delivery tonnages to update model equations and data files. After completion of this contract, Metro shall be responsible for making updates and maintaining the system.

Schedule: This task shall be completed within twelve (12) months.

Project Management

The Metro project manager will be Terry Petersen (Metro Solid Waste Department). The CS project manager will be David Reinke. All questions concerning project management and contract obligations will be directed through the project managers.

Gerry Uba (Metro Planning & Development Department) will assist the Metro project manager in this project and shall be considered by CS as the other key Metro contact person.

Travel Commitments

Appropriate CS staff shall commit to at least eight (8) person-trips to the Metro office in Portland during the conduct of this project. The topic of these meetings will include project planning, presentation of analytical results, and training of Metro staff. The schedule of these meetings will be determined during Phase I.

Metro Advisory Committee

CS agrees to attend at least three (3) meetings of the advisory committee. The first will be held during Phase I at which time the technical plans can be reviewed by the committee. The second meeting will be during Task 3 of Phase II at which time the choice models can be reviewed. A final meeting will be held near the end of Phase II at which time the final product can be reviewed. All meetings will be scheduled to correspond to travel necessary for conducting the work tasks and will not require separate trips to Portland by CS.

Publications

For a period of one year after the completion of this project, Metro and CS will jointly author any refereed professional publications that result from this project. Thereafter, Metro and CS may independently use data and other information from this project for publications.

Billing Procedures

The total amount of payment to CS shall not exceed \$200,000. All billing invoices shall be submitted to Metro on or prior to the fifteenth day of the month payment is requested. After approval by Metro, Metro will pay the consultant within 15 working days.

Monthly invoices shall include a breakdown of the total requested payment by task.

Billing Rates

Billing rates for CS are as shown in the proposal on file in the Metro office.

TP:JC - April 29, 1991
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PERSONAL SERVICES AGREEMENT

THIS AGREEMENT dated this _____ day of _____ 1991, is between the METROPOLITAN SERVICE DISTRICT, a municipal corporation, hereinafter referred to as "METRO," whose address is 2000 S.W. First Avenue, Portland, OR 97201-5398, and Cambridge Systematics, Inc., hereinafter referred to as "CONTRACTOR," whose address is 2855 Telegraph Avenue, Suite 305, Berkely, CA 94705, for the period of _____ through _____ and for any extensions thereafter pursuant to written agreement of both parties.

W I T N E S S E T H :

WHEREAS, This Agreement is exclusively for Personal Services;

NOW, THEREFORE, IT IS MUTUALLY AGREED AS FOLLOWS:

CONTRACTOR AGREES:

1. To perform the services and deliver to METRO the materials described in the Scope of Work attached hereto;
2. To provide all services and materials in a competent and professional manner in accordance with the Scope of Work;
3. All applicable provisions of ORS chapters 187 and 279, and all other terms and conditions necessary to be inserted into public contracts in the State of Oregon, are hereby incorporated as if such provision were a part of this Agreement, including but not limited to ORS 279.310 to 279.320.

Specifically, it is a condition of this contract that Contractor and all employers working under this Agreement are subject employers that will comply with ORS 656.017 as required by 1989 Oregon Laws Chapter 684.

4. To maintain records relating to the Scope of work on a generally recognized accounting basis and to make said records available to METRO at mutually convenient times;

5. To indemnify and hold METRO, its agents and employees harmless from any and all claims, demands, damages, actions, losses and expenses, including attorney's fees, arising out of or in any way connected with its performance of this Agreement, with any patent infringement arising out of the use of CONTRACTOR'S designs or other materials by METRO and for any claims or disputes involving subcontractors;

6. To comply with any other "Contract Provisions" attached hereto as so labeled; and

7. CONTRACTOR shall be an independent contractor for all purposes, shall be entitled to no compensation other than the compensation provided for in the Agreement. CONTRACTOR hereby certifies that it is the direct responsibility employer as provided in ORS 656.407 or a contributing employer as provided in ORS 656.411.

In the event CONTRACTOR is to perform the services described in this Agreement without the assistance of others, CONTRACTOR hereby agrees to file a joint declaration with METRO to the effect that CONTRACTOR

services are those of an independent contractor as provided under Chapter 864 Oregon Laws, 1979.

METRO AGREES:

1. To pay CONTRACTOR for services performed and materials delivered in the maximum sum of TWO HUNDRED THOUSAND AND NO/100THS (\$200,000.00) DOLLARS and in the manner and at the time designated in the Scope of Work; and
2. To provide full information regarding its requirements for the Scope of Work.

BOTH PARTIES AGREE:

1. That METRO may terminate this Agreement upon giving CONTRACTOR five (5) days written notice without waiving any claims or remedies it may have against CONTRACTOR;
2. That, in the event of termination, METRO shall pay CONTRACTOR for services performed and materials delivered prior to the date of termination; but shall not be liable for indirect or consequential damages;
3. That, in the event of any litigation concerning this Agreement, the prevailing party shall be entitled to reasonable attorney's fees and court costs, including fees and costs on appeal to an appellate court;

4. That this Agreement is binding on each party, its successors, assigns, and legal representatives and may not, under any condition, be assigned or transferred by either party; and

5. That this Agreement may be amended only by the written agreement of both parties.

CAMBRIDGE SYSTEMATICS, INC.

METROPOLITAN SERVICE DISTRICT

By: _____

By: _____

Title: _____

Title: _____

Date: _____

Date: _____

APPROVED AS TO FORM:

By: _____

Title: _____

Date: _____

TP:JC
MAY 3 1991
MODEL\CAMBRIDG.PSA

WHAT IS THE "MODEL"?

Cambridge Systematics' expertise is quantitative models that predict how individual decision makers choose among the options available to them. There is a special field of economic analysis and statistics that is devoted to such "individual choice models". The models have been successfully applied by Cambridge Systematics to predict the behavior of decision makers in fields as diverse as transportation, telecommunications, and marketing.

In the case of forecasting waste flow in the Metro solid waste system, decision makers include generators who decide whether or not to recycle and haulers who decide among alternative disposal facilities. The probability that a household will participate in curbside recycling can be predicted using explanatory variables such as household income, education, and geographic location. The probability that a hauler will choose a particular facility can be predicted based on variables such as travel time and tip fee.

Cambridge Systematics will provide the technical expertise Metro needs to develop predictive equations for the solid waste system. Once developed, Metro will have a reliable basis for forecasting waste flows as management practices and policies change.

BUDGET

A total of \$215,00 was budgeted for this work during FY 1990-91. The contract amount is \$200,000. At least part of this savings is due to the decision to combine the current modeling work of the Solid Waste and Planning & Development Departments.

EXECUTIVE OFFICER'S RECOMMENDATION

The Executive Officer recommends adoption of Resolution No. 91-1444.

SOLID WASTE COMMITTEE REPORT

CONSIDERATION OF RESOLUTION NO. 91-1444, FOR THE PURPOSE OF
AWARDING A MULTI-YEAR CONTRACT FOR A MODELING SYSTEM TO
SIMULATE SOLID WASTE GENERATION, REDUCTION, TRANSPORT AND
DELIVERY

Date: May 9, 1991

Presented by: Councilor DeJardin

Committee Recommendation: At the May 7, 1991 meeting, the Committee voted unanimously to recommend Council adoption of Resolution No. 91-1444. Voting in favor were Councilors DeJardin, Gardner, McFarland, McLain and Wyers.

Committee Issues/Discussion: Terry Petersen, Associate Solid Waste Planner, explained that this resolution would approve award of a waste forecasting contract to Cambridge Systematics. The object of the contract is to perform the technical work to enable Planning and Development and Solid Waste Department staff to answer questions about the quantity and location of waste generation, and the impact of various policy choices.

He said Cambridge Systematics is nationally recognized in this field, and also has considerable local and previous Metro experience. Additionally, the software proposed can be maintained with in-house staff.

Councilor Gardner said that questions will be forthcoming about other proposals, particularly regarding the relative costs and reasons why the other proposals were deemed less desirable.

Mr. Petersen explained that the proposals were within \$1000 of each other. Cost was a factor when balanced against the work which will be received for the cost.

Councilor Wyers asked if staff is confident that the task can be completed for \$200,000. Mr. Petersen indicated there might be additional requests for funds for update and improvement, but no additional costs directly in conjunction with this work.

Gerry Uba, Senior Management Analyst, explained that a subcommittee of the Solid Waste Technical Committee will be advising the contractor. Councilor Wyers asked that the names of these individuals be provided to the Solid Waste Committee when the advisory committee is formed.

STAFF REPORT

IN CONSIDERATION OF RESOLUTION NO. 91-1444 FOR THE PURPOSE OF AWARDING A MULTI-YEAR CONTRACT FOR A MODELING SYSTEM TO SIMULATE SOLID WASTE GENERATION, REDUCTION, TRANSPORT AND DELIVERY

Date: April 29, 1991

Presented by: Bob Martin
Rich Carson

CONTRACT OBJECTIVE

Cambridge Systematics, Inc. shall provide Metro with a simulation system to accurately model regional waste flow. At the conclusion of the contract, Metro will have a Geographic Information System application that can be used by the Solid Waste and Planning & Development Departments to estimate the impact of management practices and policies on waste generation, recycling, transport, and delivery to facilities.

RFP PROCESS

An RFP was issued by Metro on February 15, 1991. Proposals were received from Cambridge Systematics Inc. (Berkeley), ECO Northwest (Eugene), Tellus Institute (Boston), and Wilsey and Ham Pacific (Portland). An evaluation committee consisting of staff members from Solid Waste, Planning & Development, and Transportation reviewed the proposals and conducted interviews.

STAFF RECOMMENDATION

The recommendation of the evaluation committee is to award the contract to Cambridge Systematics. The strengths of their proposal include:

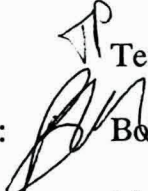
- Unmatched technical expertise. Cambridge Systematics is recognized nationally and internationally as one of the top consulting firms in developing the kind of models Metro requested in the RFP.
- The proposed software (ARC/INFO or ARC and a compatible database management package) can easily be maintained and updated by Metro staff. Technical support will be available from Metro's Data Resource Center.
- The proposed budget includes a considerable amount of primary data collection.
- Cambridge Systematics has a proven record of doing technical modeling work for Metro and other local clients.



METRO

2000 S.W. First Avenue
Portland, OR 97201-5398
503/221-1646

Memorandum

DATE: May 9, 1991
TO: Councilor Jim Gardner
FROM: Terry Petersen, Solid Waste Planner
THROUGH:  Bob Martin, Solid Waste Director
RE: May 9, 1991 Council Agenda Item 7.3

At the May 7, 1991 Council Solid Waste Committee meeting you asked about the budgets of proposals submitted in response to RFP #91R-4-SW (Modeling System for Simulating Solid Waste Generation, Reduction, Transport, and Delivery).

The proposal budgets were as follows:

ECO Northwest	\$200,000
Cambridge Systematics	199,999
Tellus Institute	199,984
Wilsey & Ham Pacific	199,979

There is only a \$21 difference between the highest and the lowest proposal. Other factors, such as technical plans and experience, were the basis for recommending Cambridge Systematics.

TP:ay