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Corporate Planning Model for a Construction Materials Producer

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How a model was 'fine-tuned' until it could answer almost any hypothetical question about its company—

A CORPORATE PLANNING MODEL FOR A CONSTRUCTION MATERIALS PRODUCER

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CEMENT, aggregate, ready-mix concrete, and asphaltic concrete are a large, basic segment of the construction materials industry.

Portland cement had its start early in the 19th Century when an English bricklayer named Aspdin first made portland cement by burning a combination of limestone and clay on his kitchen stove. Today, cement production is a closely controlled chemical process combining limestone, iron, silicon, and a small amount of other ingredients. It is essential that a plant be located close to good limestone reserves and to the marketplace because of the very high freight costs.

Capitol Aggregates, Inc., a wholly owned subsidiary of the H. B. Zachry Company, is a prominent name in worldwide heavy and industrial construction. Capitol was formed in 1957 in Austin, Tex., as an offshoot of a parent company construction project in that city, to produce a limited amount of sand and gravel. Soon Capitol entered the Austin ready-mix market and constructed a new aggregate plant in the area. Several other operations have been added since in various parts of Texas. The major addition to production and sales came in 1965, when another cement plant went on stream.

The company; the future

Capitol plans to play a major role in the growing Texas economy. There seems little doubt that it will. It is a company whose management has learned to plan ahead. It knows its industry and it has assessed where it is going. It has taken a clear-eyed look at company strengths and weaknesses. It learned, years ago, the need to define in specific terms its hopes and goals. It weighs alternatives and

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evaluates them on a cost-benefit basis. It develops forecasts, plans, and budgets, which it updates on an annual basis.

Capitol Aggregates, in short, knows how to plan. But the company recently decided to fine-tune its planning by improving the techniques and speed of evaluating alternatives.

The objective of the special project was to develop an integrated model of the revenue, cost, and operating characteristics of the combined corporate operations. This model was to be used by corporate management to determine how changes in the market, changes in supply conditions, changes in production facilities, and so forth, might affect profitability, return on assets, and cash flow; and how those effects could be influenced by management.

It was decided that the model would be designed to handle more than just an aggregate-cement-ready-mix company. It was, in fact, developed so that it could handle any organization that can be described in terms of products flowing through cost centers containing fixed costs and variable costs which can be represented by a linear function.

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To design the model the following tasks were accomplished first:

1. Charting the material and cost flows of the corporation (Exhibit 1, page 45).
2. Analyzing the types of planning and operating decisions made currently and anticipated in the future.

The material and cost flow chart shows the physical operation, knowledge of which is essential to model building.

The decision chart enabled us to build a model that will be the most responsive to the needs of management based upon the types of planning and operating decisions to be made.

Material and cost flow chart

The material and cost flow chart is similar to a process flow chart. But we incorporated these elements:

1. Each block in the chart generally represents an operation that can specifically be identified by process and/or equipment, and for which there can be identified the number of operating and supervisory personnel, and in some cases (where appropriate) direct depreciation. Direct depreciation would include depreciation on machinery represented in that particular block.

The blocks on this chart could be interpreted to refer to idealized cost centers in the context of cost accounting. We made sure that there was a direct correlation between the model and the accounting system.

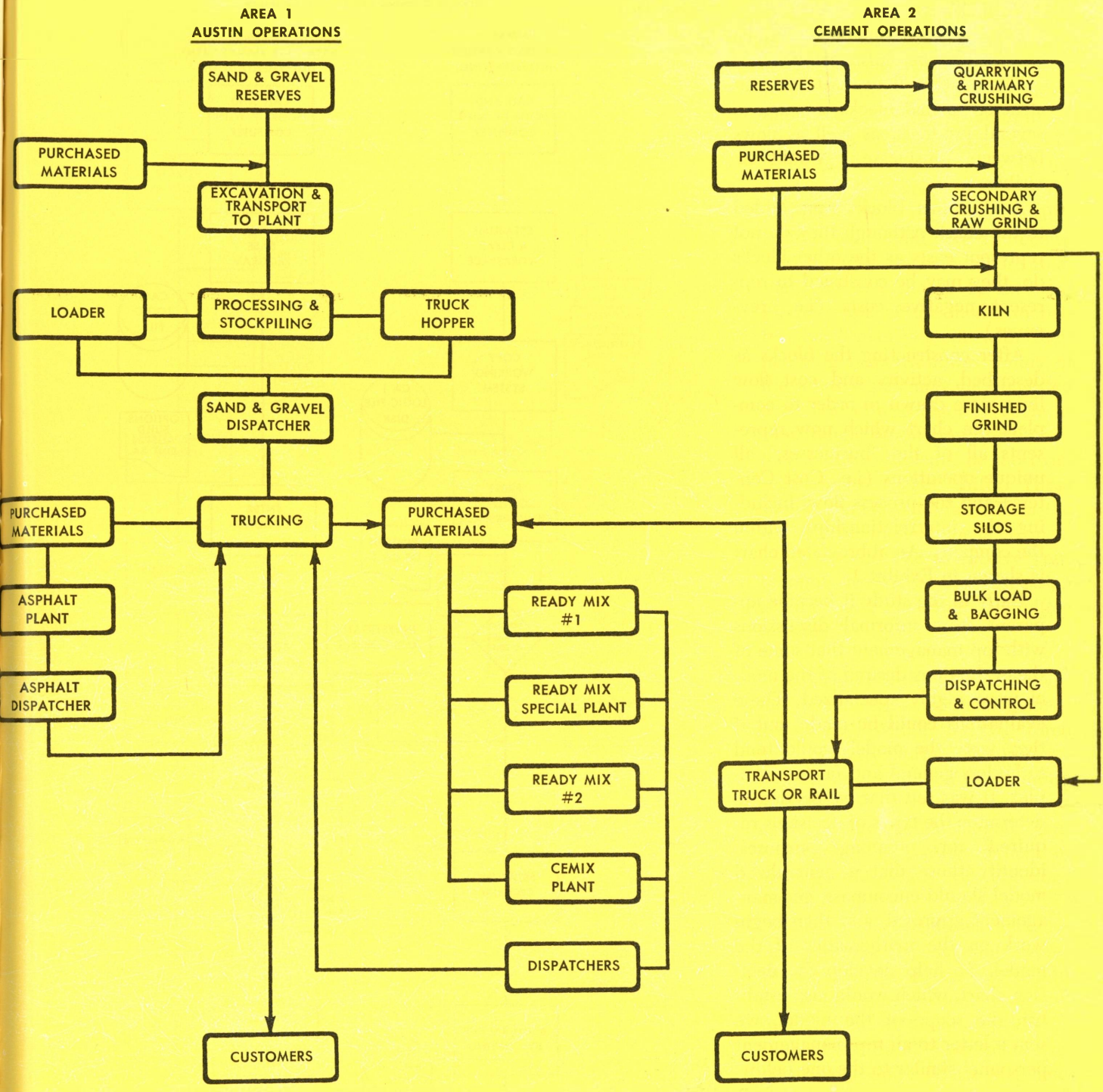
2. Outside purchases (referred to as "Purchased Materials") were also considered to be an operation, and hence a cost center; therefore, they were represented by blocks on the material and cash flow chart. The chart would thus contain all of the cost elements incurred by the corporation in the conduct of its business.

3. The corporation consists of the following "businesses":

Aggregates
Bulk cement

EXHIBIT I

Abbreviated Material and Cost Flow Chart



Bagged cement
Asphalt
Ready-mix
Cemix (a bagged product for do-it-yourselfers consisting of cement, sand, gravel, and other additives)
Clinker sales (cement in a stage just before finish grinding).

The material flow chart was constructed so that blocks common to several products, as well as flows between "businesses," would be visible.

4. Customer blocks were added to the chart. Although they do not represent costs as the other blocks do, they may be construed to represent negative costs (i.e., revenues).

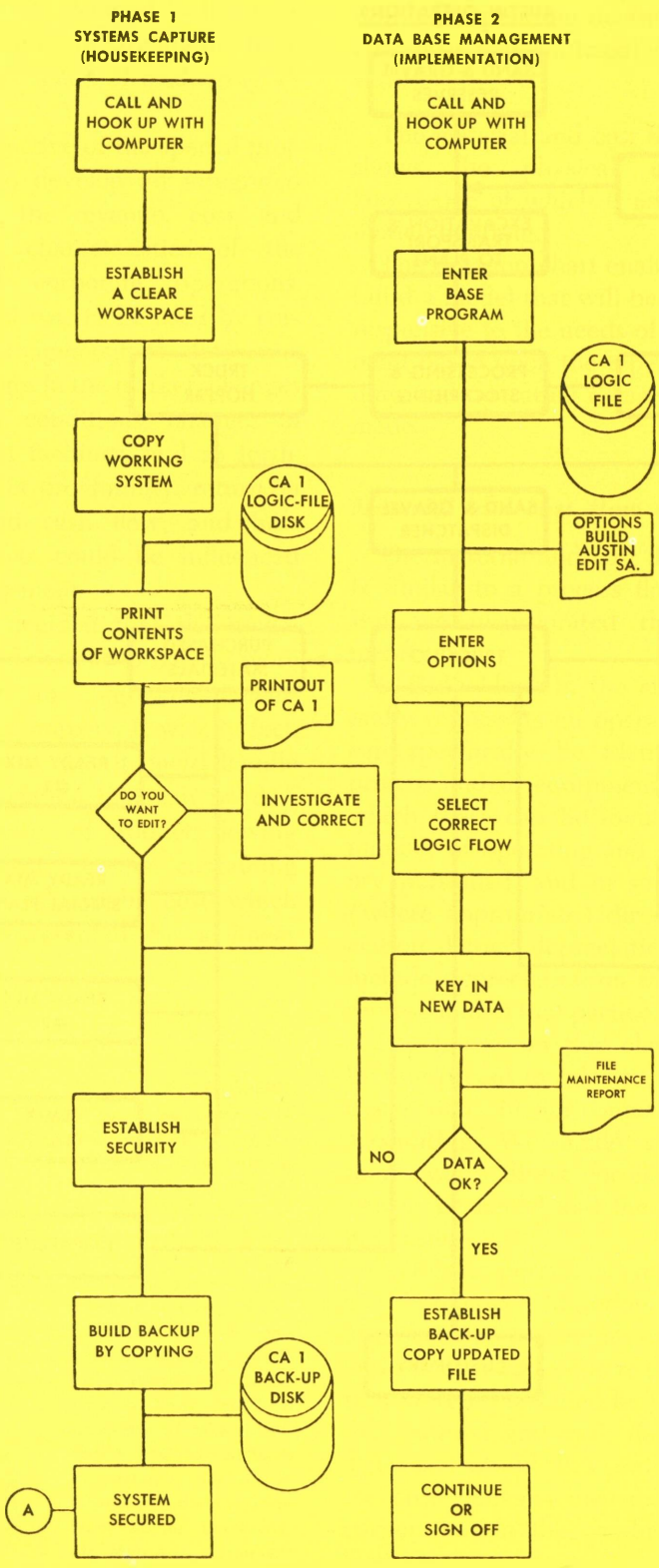
After constructing the blocks as described, activity and cost flow lines were drawn in order to complete the chart which now represents all of the "businesses," all unique operations (i.e., Cost Centers) and the process flow, including the interrelationships within the company. An abbreviated chart is shown in Exhibit 1.

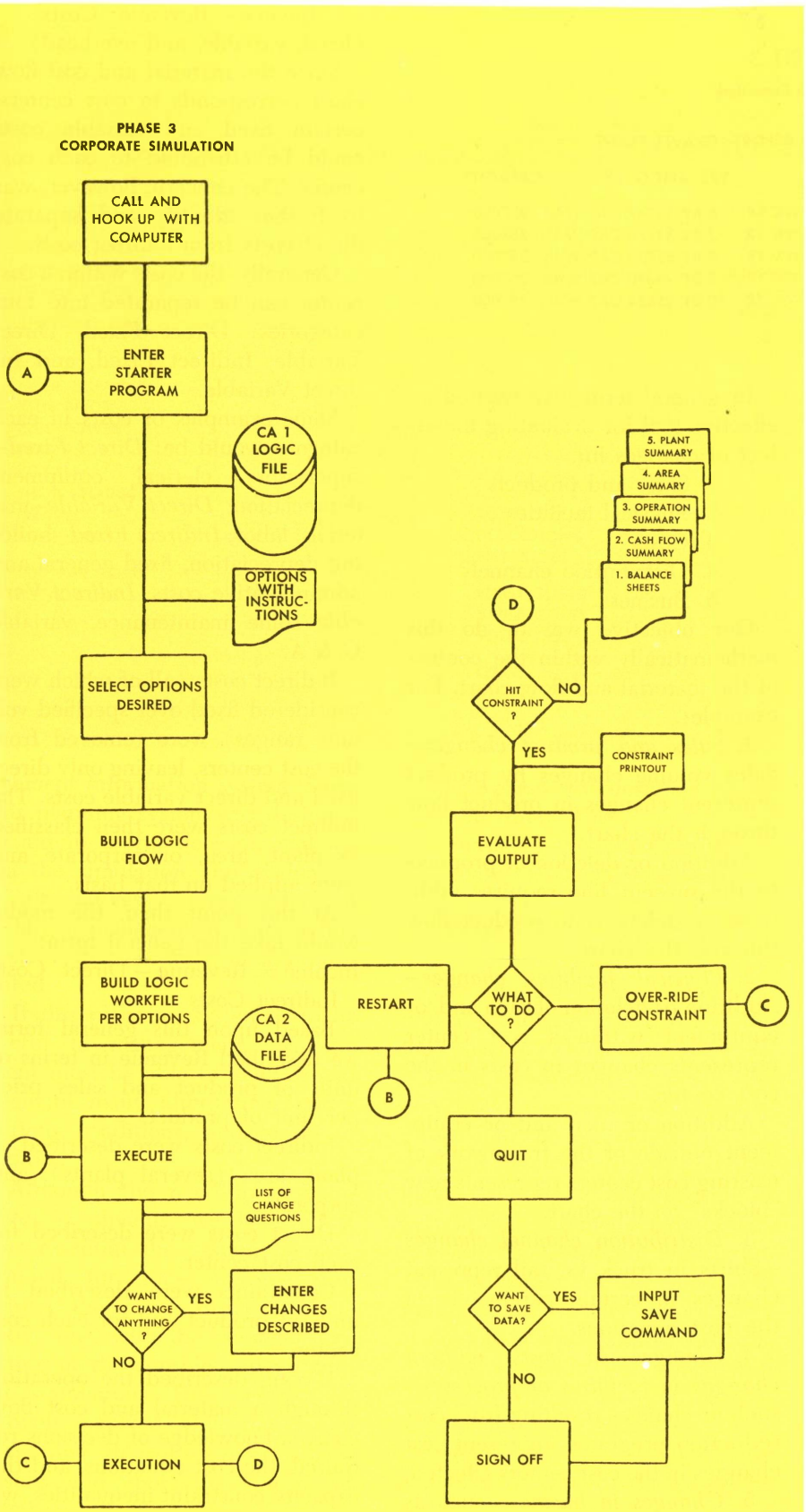
Early in the study it became apparent from informal discussions with top management that some of the evaluations desired of the model were highly specialized. These evaluations could be made, but if they were the model would tend to be less general and far too complex. It was felt that we needed to determine the types of decisions required for planning purposes, identify those that a generalized model should encompass, get management approval, and then begin work on the mathematics of the model. To help develop the decision chart, which would also establish the scope of the model, we sent a letter to all top management personnel similar to the one below.

"At this point it is desirable that management give some additional thought to those areas where present and future decisions will be made. All of the points and problems raised to date probably lend themselves to solution in one form or another. However, as each spe-

EXHIBIT 2

Systems Overview and General Approach





cial case is included, the model becomes far more complex and less general, thereby restricting its usefulness. We also ask that you use the material and cost flow chart and note where decisions are made. This will aid you in listing the kinds of decisions that are made.

"The model is to be a tool to help corporate management determine the effect on profitability of alternative courses of action. To assist in defining the scope of the model and to keep it within the bounds of flexibility and manageability, we would like to receive your thoughts regarding those areas that you feel should be included in the scope of the model to better assist management with their planning responsibilities. Many of the areas which may be suggested may fall into categories such as short-range production and inventory control problems, or short-run reaction to market shifts. These should probably not fall within the scope of the model to be developed.

"We would like to receive your thoughts and ideas for discussion at the next steering committee meeting."

As a result of the letter the steering committee—a top management group with whom the task force met regularly during the project—arrived at a number of planning decisions. It was agreed that a model would be developed, general enough in nature to help in making the kinds of decisions listed.

Some of the decisions management would be making were: Should we acquire reserves? Should we supplement present reserves? When should we abandon reserves? Should we build new plants or modify old ones? What size and type of equipment should we have? How large should our trucking fleet be? How do we evaluate the effect of new markets on our facilities? Should we consider a new business or business opportunities? There were also many other questions too numerous to list.

It was further decided that all

EXHIBIT 3

Constraints Exceeded

CONSTRAINT EXCEPTION REPORT—GRAVEL PLANT

COMMENTS	YRS AMT OVER	CAPACITY
185 CY PER HR, 10 HR DAY, 5 DAY WK, 51 WK YR	6 BY 15547 CAP WAS	357000
185 CY PER HR, 10 HR DAY, 5 DAY WK, 51 WK YR	7 BY 34174 CAP WAS	357000
185 CY PER HR, 10 HR DAY, 5 DAY WK, 51 WK YR	8 BY 53733 CAP WAS	357000
185 CY PER HR, 10 HR DAY, 5 DAY WK, 51 WK YR	9 BY 74270 CAP WAS	357000
185 CY PER HR, 10 HR DAY, 5 DAY WK, 51 WK YR	10 BY 95834 CAP WAS	357000

alternatives would be evaluated from a total corporate standpoint, i.e., how changes in one "business" would affect other parts of the corporation.

Alternatives would be measured and evaluated through the following output:

1. Pro forma reports for specified number of years
   - Statements of income
     - Corporate
     - Area (a grouping of plants in a geographical region)
     - Plant
     - Product
   - Balance sheets
   - Cash flow
   - R.O.A. (Return on Assets)
   - Plant operating reports
   - Other financial ratios
2. Constraint reports for a specified number of years.

   The purpose of these reports is to list production and/or material constraints exceeded at any cost center, identify the year, and then simulate alternatives to alleviate the constraints.

The next step was to begin the mathematical construction of the model.

Development of the model

The material and cost flow chart (Exhibit 1) represents the physical operation, and the decision chart represents the kinds of decisions required for planning purposes.

Having developed the above two documents, we then needed to describe in even more general terms what we wanted the model to do before we could begin the mathematical construction.

In general terms, we wanted an effective tool for evaluating the effect of changes in:

1. Sales and products
2. Physical facilities
3. Costs
4. Distribution channels
5. Business.

Our objective was to do this mathematically within the context of the material and flow chart. For example:

1. *Sales and product changes*—Sales volume changes by product represent changes in product flow through the chart.

Addition or deletion of products to the present line requires additions or deletions to product flow through the chart.

2. *Physical facilities changes*—Addition or deletion of men and/or equipment within a cost center represents changes in costs in the cost center.

Addition of men and/or equipment outside of the framework of existing cost centers represents new "blocks" on the chart.

3. *Distribution channel changes*—Shifts in truck vs. rail represent changes in certain parameters in the cost equations.

4. *Changes in costs without changes in facilities or processes*—such as changes resulting from cost reduction programs—represent cost changes in the cost centers affected.

5. *Changes in business*—such as adding "pre-stressed concrete" which would require additional processes—would require adding appropriate new blocks to the chart.

The model then took on the form:

$$\text{Income} = \text{Revenue} - \text{Costs}$$

(fixed, variable, and overhead)

Since the material and cost flow chart corresponds to cost centers, certain fixed and variable costs could be attributed to each cost center. The concern, however, was to further identify and separate direct costs from indirect costs.

Generally, the costs within a cost center can be separated into four categories: Direct Fixed, Direct Variable, Indirect Fixed, and Indirect Variable.

Some examples of costs in each category would be: *Direct Fixed*—supervisory, clerical, equipment depreciation; *Direct Variable*—materials, labor; *Indirect Fixed*—building depreciation, fixed general and administrative costs; *Indirect Variable*—some maintenance, variable G & A.

Indirect costs (all of which were considered fixed over specified volume ranges) were removed from the cost centers, leaving only direct fixed and direct variable costs. The indirect costs were then classified as plant, area, or corporate and were applied on that basis.

At this point then, the model would take the general form:

$$\text{Income} = \text{Revenue} - \text{Direct Costs} - \text{Indirect Costs}$$

Based upon this general form, we described Revenue in terms of units of product and sales price per unit of product.

Indirect costs were described as plant, area (several plants), and corporate.

Direct costs were described for each cost center.

Constraints were described in units of product and for each cost center.

Having described the operation through a material and cost flow chart, a knowledge of decisions required, the cost equations, and the capacity constraint inequalities, we were now in a position to: (1) complete the data collection, (2) define output reports, (3) complete the system design, and (4) program, test, and use the model.

This planning system, was designed to be one module of a man-

EXHIBIT 4

Plant Level Reports

COST DETAIL, PLANT NO. 14 NEW AUSTIN GRAVEL PLANT

	Period 1	Period 2	Period 3	Period 4	Period 5
FIXED COSTS:					
DIRECT LABOR	0	137280			
DEPRECIATION	0	221286			
TOT FXD COST	0	358566			
VAR COSTS:					
OPER SUPPLIES	0	1847			
KILN BRICK	0	9233			
ELEC POWER	0	23294			
REPAIRS	0	33237			
ROYALTY	0	51702			
SHOP CHARGES	0	7386			
GRAVEL PURCH	0	80876			
MISC EXP	0	7386			
TOT VAR COST	0	214961			
TOTAL COST	0	573527			

PLANT INCOME, PLANT NO. 14 NEW AUSTIN GRAVEL PLANT

	Period 1	Period 2	Period 3	Period 4	Period 5
SALES:					
SAND	0	167918	176415	185341	194720
GRAVEL	0	204422	214767	225633	237049
FILL MATRL	0	58559	61522	64635	67906
TYPE I SACK	0	91260	95878	100729	105826
I C GRAVEL	0	199555	209653	220261	231406
TOTAL SALES	0	721714	758235	796599	836907
DEDUCTIONS	0	0	0	0	0
NET SALES	0	721714	758235	796599	836907
FIXED COSTS	0	358566	334573	314700	298487
VRBLE COSTS	0	214961	226862	239454	252771
TOTAL COST	0	573527	561435	554154	551258
OPRTG INCM	0	148187	196800	242445	285649

agement information system. Since this planning system was designed to aid in useful decision making, via the simulation and evaluation of alternatives, it forms a part of a larger management information system that is truly decision-oriented.

If this planning system is to be useful to management, management must be able to analyze and evaluate many alternatives under various conditions, and to do so rapidly.

Although the need for a computer is obvious, we believed it was essential the system be programed for time sharing. We wanted the system to be an interactive one, with the manager-user sitting at the console and guiding the simulations. The user can be actively involved while the system is running. He can see intermediate results and abort the run if an alternative indicates unsatisfactory results. It is also possible to make changes while the system run is in progress. This can be done by observing results, or, where desired, by testing an alternative under different conditions after observing preliminary results.

The system was designed to operate in three phases:

Phase I—System Capture
Phase II—Data Base Management
Phase III—Corporate Simulation.

The complete overview and general approach are described in the flow chart in Exhibit 2, pages 46-47.

Phase I—System Capture—the entering and securing of the programs into the computer.

Phase II—Data Base Management—the entering and securing of current data and model parameters.

Phase III—Corporate Simulation—the utilization of the model to simulate the various alternatives evaluated in the planning process.

Data collection was considered during the development of the cost and constraint equations. We, therefore, did not develop any equation for which data would be impossible to obtain.

The existing costs in each cost center were examined, generally according to the following steps:

1. Classify costs as direct and indirect.
2. Reclassify, where appropriate, the indirect costs to plant level, area level (more than one plant) or corporate level.
3. Examine the direct costs and reclassify them as fixed and variable where appropriate.
4. Update fixed costs from source data.
5. Update variable costs through time study or estimation. (This step, as expected, required the most time and effort.)
6. Convert all variable costs to cost per unit of finished product.
7. Estimate production capacity constraints. (This was done by operating management.)
8. Estimate any material capacity constraints. (This was also done by operating management.)
9. Document all data into a format compatible for input into the computer program.

Other data collected:

1. Product prices
2. Sales volume, by product and by geographical area
3. Raw material prices by item
4. Wage and salary rates
5. Fringe benefits
6. Original and book value of all assets

EXHIBIT 5

Area Level Summary Report

OPERATING SUMMARY, AREA 01 AUSTIN

	Period 1	Period 2	Period 3	Period 4	Period 5
PLANT 01	280211	251442	266468	280805	294453
PLANT 03	30657	32730	35611	41317	43245
PLANT 04	201112	0	0	0	0
PLANT 06	117611	134145	149651	162477	171631
PLANT 10	16606	17144	19173	22299	22793
PLANT 12	0	0	0	0	0
PLANT 14	0	148187	196800	242445	285649
TOT OPR INC	646197	583648	667703	749343	817771
AR SPRT COST					
ADMIN+SALES	228161	233655	240433	250649	261595
TOT AD+SL EX	228161	233655	240433	250649	261595
TOT AR INC	418036	349993	427270	498694	556176
OPR RATIOS					
INC/SALES	17	14	16	17	17
PLANT ASSETS	3569915	3419370	3297306	3220333	3174439
OVHD ASSETS	62471	62934	66620	70265	73164
TOT ASSETS	3632386	3482304	3363926	3290598	3247603
AVG ASSETS	2533934	3557345	3423115	3327262	3269101
PERCH R O A	16.5	9.8	12.5	15.0	17.0

7. Future depreciation and debt retirement schedules
8. Other pertinent balance sheet data.

The information collected for the present year and entered into the model represented the "base case" in the planning system.

All "what if" questions for the present year are compared in various ways with the base case. The "what if" alternative is compared with the "base case" by incremental income, profits, return on assets, and cash generated. Also, any capacity constraints exceeded are evaluated.

Since the effects of most "what if" alternatives are more than one year in duration, it is necessary to forecast a "base case" for a specified number of years. This is possible within the planning system by stating expected price, cost, or growth rates as specified percentages in simple or compound rates. Net value of assets into the future is projected through depreciation tables.

The "base case" actually represents what the company would look like without changing physical facilities, without cost improvement projects, and subject to certain assumptions about price, cost, and growth.

Simulation results are presented in formal reports that cover one or more specified periods, depending on the needs of the user. These reports present financial information in a variety of forms as well as indicating when capacities are exceeded.

Generally, but not necessarily, constraint reports denoting where physical capacities were exceeded are requested first. This is a simple line report showing the item affected and some general information regarding the constraint violation. (See Exhibit 3, page 48.)

The ultimate purpose of the model is displayed in several key pro forma financial reports that present the alternative results in intelligible, condensed, and related form. In the following paragraphs we discuss some of the more important output reports at various levels and how they can be used.

At the lowest level of reporting, we have an opportunity to review the results of projections and evaluate the profit contribution of the various products.

The plant income report quickly displays to the user the various products and their related sales contribution, the total fixed and variable costs, and the resulting net operating income for the plant. (See Exhibit 4, page 49.)

Pertinent summarized information appears on this report about the various plants within the geographically defined area. In addition, certain operating ratios are presented, as are the totaled plant and administrative asset investments. A return on the total area assets invested is then displayed. (See Exhibit 5, this page.)

Corporate level

Reporting at all levels is essential to the successful use of the simulation results; however, it is at the corporate level that all of the factors and interrelationships are brought into total perspective. The ultimate answers to the "what if . . ." questions now present themselves in various forms in the following reports. (See Exhibit 6, page 51.)

Corporate Overview—This single-page report brings into focus some of the major items of concern regarding an alternative review, such as net cash flow, return on assets, and income.

Cash Flow Summary—A summary of all major items expected to affect cash, finalized in a net cash flow figure for each period. This analysis should be of particular interest to the potential borrower/investor.

Corporate Operating Summary—Area results of operation are carried forward and presented with corporate level income and expense considerations (general and administrative, interest, Federal income taxes, and others) to provide a final expected net income for the given period.

The reports in themselves present a relatively simple financial picture of what the future might hold for the entity. In fact, they represent a massive array of information that required a great deal of sophisticated programing, proj-

ect planning, data gathering, and implementation effort. The end products justify the effort; meaningful output is the reward.

Application and use

An idea becomes a working tool only when it is translated into action.

The initial "live" test of the model results involved a twofold demand upon its capabilities. The detailed operating budgets and profit forecasts for the coming year, normally done manually, were to be prepared. And the company was considering a $5.5-million expansion involving new plants in Austin, Tex., and certain improvements at the cement plant in San Antonio. It was a fitting first test for the planning model.

Formal budgets are a "must" for a company wishing to grow and remain successful; but they are easier to discuss than to accomplish, particularly in a many-faceted operation with several locations, each location having several plants. The plants, too, may have subsections.

Good analysis and budgeting require proper attention to all items within the sphere of study. Careful consideration should be given to each element of cost as it affects the demands put upon the facility.

Before the company adopted our planning system, difficulties occurred frequently in manually gathering, reviewing, and extending the data, and presenting the realistic effects of the forecasted demands. The time element alone was a major obstacle in budget preparation.

We looked then to the model and its programed mathematical equations, relationships, and formulas to solve these problems for us, and many more. In effect, we would ask questions of the model, and the answer would promptly come to us in the form of a useful financial/statistical report. These reports became a major tool in the management of company affairs for the next 12 months.

The managers, sales force, and superintendents review the existing "base case," asking such questions as where they stand at present, and what they can expect in the way of change for the next year. Simply put, we give the model information different from that in the base case, and ask what the effect of those changes would be. To illustrate, if we:

> Decrease sales volumes in all plants by 10 per cent . . .

EXHIBIT 6

Corporate Level Reports

CAPITOL AGGREGATES CORPORATE OPERATING SUMMARY

	Period 1	Period 2	Period 3	Period 4	Period 5
OPERATING INCOME:					
. . . AREA .01	418036				
. . . AREA .02	1947960				
. . . AREA .03	97451				
TOTAL	2463447				
GEN+ADMN	238989				
EXPLORATION	14207				
OTHR INC+EXP	(37015)				
PRFT SHRING	264334				
TOT ADMN EXP	480515				
OPER INC	1982932				
INTEREST	485042				
INC BEF FIT	1497890				
FED INC TAX	718987				
INVEST CRT	(331722)				
NET INC	1110625				
PERCENTAGES:					
NT INC/SALES	11				
PERC R O A I	17				
NET INC/EQTY	18				
EQTY/T ASSET	47				
AVG ASSETS	12013204				

CAPITOL AGGREGATES CORPORATE CASH FLOW SUMMARY

	Period 1	Period 2	Period 3	Period 4	Period 5
NET INCOME	1110625				
DEPRECIATION	948047				
SHT TRM DEBT	0				
DEPLETION	6080				
NEW L T DEBT	3354000				
TOTAL AVLBLE	5418752				
ASSET REPLMT	448890				
PRPSED ASSET	4290000				
SHT DEBT RTR	300000				
SCH DEBT RTR	1087846				
REC REQRMNTS	477280				
INV REQRMNTS	(97734)				
LAND INVESTM	0				
OTHER ASSETS	0				
ACCTS PAYBLE	335271				
TAX LIABLTS	0				
TOTAL RQRMNT	6841553				
NET CASH FLW	(1422801)				
DEBT/ASSETS	.53				
TOTAL DEBT	6960254				
POLICY DEBT	6717607				
AVAILABLE	(242647)				

CAPITOL AGGREGATES CORPORATE BALANCE SHEET

	Period 1	Period 2	Period 3	Period 4	Period 5
CASH	(1122801)				
RECEIVABLES	1566772				
INVENTORIES	420477				
CURR ASSETS	864448				
PLT+EQUP	13637602				
ACUM DPRCTN	3941461				
NET PLT+EQUP	9696141				
LAND	2016370				
OTHER ASSETS	593920				
TOTAL ASSETS	13170879				
SHT TERM DEBT	0				
CRR PORT LTD	1168440				
ACCTS PAYBLE	664729				
FIT PAYBLE	0				
CURR LIABLTS	1833169				
LNG TRM DEBT	5127085				
TOTL LIABLTS	6960254				
OWNERS EQTY	6210625				
LIABLTS+EQTY	13170879				
CURRENT RATIO	.5				
	.47				

CAPITOL AGGREGATES CORPORATE OVERVIEW REPORT

	Period 1	Period 2	Period 3	Period 4	Period 5
CURRENT RATIO	.5	.9	1.5	1.9	2.4
EQTY/ASSETS	.47	.30	.35	.38	.45
TOTAL ASSETS	13170879	25191364	25247775	28770269	28953701
NT CASH FLOW	(1422801)	819801	476423	1129449	1329290
AREA 01 P/L	418036	349993	427268	498695	556177
PERC R O A I	17	10	13	15	17
AREA 02 P/L	1947960	1550535	3495365	3978810	4356416
PERC R O A I	25	11	17	19	20
AREA 03 P/L	97451	106518	112772	116939	116016
PERC R O A I	242	148	190	219	227
NET INCOME BEF INT+TAXS	1982932	1664312	3438134	3904374	4262708
R O A I BEF INT+TAXS	17	9	14	14	15
NET INCOME	1110625	1205395	1114257	1603144	1552675

Many of the "what if" questions would go unanswered if we had to rely solely on a manual approach. Now they are answered promptly, accurately, and in good form. The company is very pleased with the first real test of the model . . .

Increase costs of labor by three per cent . . .
Reduce production capacity of Plant 1 by 33 per cent . . .
Borrow five million dollars payable monthly over ten years at an annual interest rate of eight per cent . . .
Expect receivable balances in relation to sales to decline by ten per cent . . .
Increase inventory at Plant 2 by 100 per cent . . .
Shift all variable costs in Plant 3 to a fixed classification . . . and so on,

then, have we exceeded any capacities?

What will our profits be at various levels of operation?
What will the return on assets be?
Will we have sufficient operating cash available to sustain operations?
What will our current ratio be?
Is product X in Plant 1 yielding a profit? And many more.

Yes, it does sound rather simple and casual; however, the fact remains that many of the questions would go unanswered had we to rely solely on the manual approach. The questions were answered promptly, accurately, and in good form. The company is very pleased with the first real test of the model and looks for even greater success on next year's operating budget preparation.

$5.5 million expansion

The operating budget involved only one year of expanded information. In this case we were interested in the effects of the proposed expansion over a seven-year period. The same basic questions again, but an answer for each year—will we make it over the long term with the investment requirement, cash flows, and sales forecasts presented for the seven-year term?

The results of this expansion program via the planning system—the mathematical expansion in this case—also were well received, evidenced by the fact that the construction program is well under way and nearing completion. Needless to say, management felt much more comfortable about making the investment decision armed with the model output information.

A "double-barreled" success hopefully leads us to additional success and future profitable achievements. Simulation results regarding a $23-million three-phase expansion program scheduled for the near future are now in management's hands. Initial review indicates a successful model run and there are encouraging signs regarding feasibility of the expansion program itself. Could the company make the right decision without the planning model? That, of course, is difficult to say; it is felt, however, that the final decision will be arrived at without many of the uncertainties that would have otherwise clouded it.

Conclusion

The basic objectives of this project have been achieved. We hope in the future to tie in to existing live systems (general ledger accounting) now on other computer facilities. Such an interface would allow "on the spot" progress monitoring of operations. The result would be truly a live and responsive management tool. Also, we look to such possibilities as break-even analysis (in chart form), application of the model in other affiliated companies . . . the list goes on and on.

A tremendous by-product of the entire effort, certainly worth mentioning, was the learning experience for the entire team involved in the project. They now know much more about the company, its products, potentials, costs, and people. This result was unexpected, but has proven to be highly valuable.