Job Costing on The HP3000

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Bellamah Corporation is one of the Southwest's leading diversified real estate developers with operations in Arizona, New Mexico, Colorado, Oklahoma, and Texas. Our construction management information requirements cover Land Development, General Contracting (light commercial), and Housing Divisions. Our Job Cost System was developed to be a management and operations tool in controlling costs and financing projects under construction. This system is a user-oriented operating system and was designed cooperatively with participating management and staff from the above divisions. The Information Services Department coordinated the development, design, and implementation of the approximately sixty stream and twenty screen COBOL Programs on our HP3000-III System. At present, three divisions and one major land joint venture are using the system across a multi-state operating environment.

The main objective of the Job Cost System is to assist divisional management in maintaining control of numerous jobs while maximizing the profitability of each job under construction. The system is capable of supporting these objectives for the following types of projects:

- General Contracting
- Housing
- Joint Ventures
- Lots
- Multiple Family Units
- Projects
- Subdivisions
- Tracts

In addition, the system is on-line oriented and automatically supports our other corporate information systems. A database has been developed to facilitate the use of advanced query and report writers such as QUIZ which is currently installed. The system should have the capability to interface with the following future expansion requirements:

- Purchase Orders (installed in housing)
- Projection Analysis on Prices, Costs, and Estimates (installed in housing)
- Percentage Completion Reporting
- Estimating
- Bill of Materials
- Scheduling
- Cash Flow Analysis
- AIA Billing Calculations
- Retention Calculations
- Customer Profiles
- Unit Cost Control

Before proceeding with a look at some of the output reports, let's take a brief look at the information flow and job cost database.

(See Page 2)

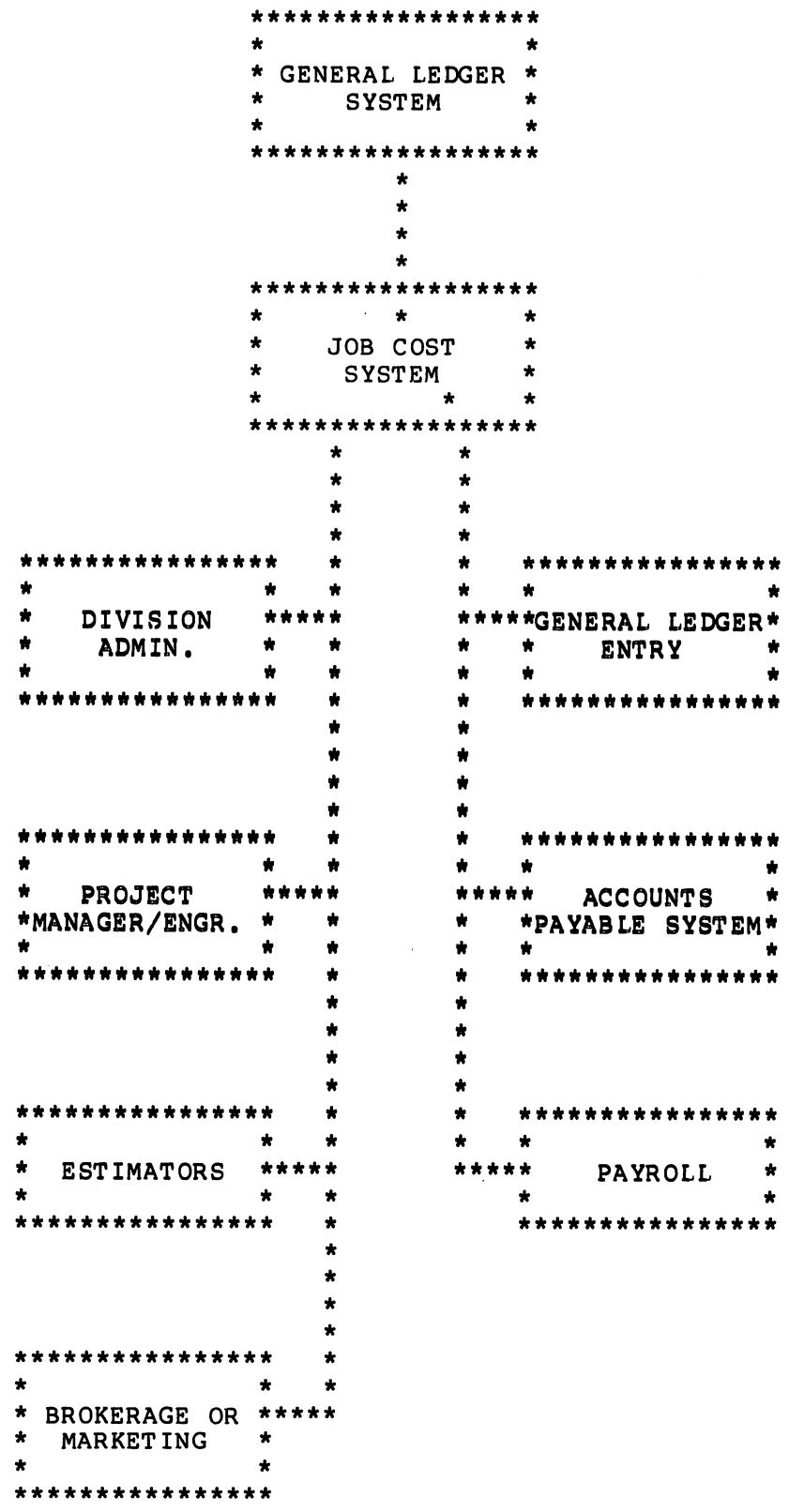
The three accounting based systems, general ledger, payroll, and accounts payable, gather financial transactions that are fed to the job cost and general ledger databases. At the present time we are processing these systems in an on-line data capture environment. As you can see from the diagram, non-financial transaction information may be entered into the system by project managers, estimators, division administrators, project engineers, brokerage and marketing personnel. The non-financial data elements break out primarily by functional area such as changes in construction status, marketing status, tax rates, zoning, estimates, sale dates, etc.

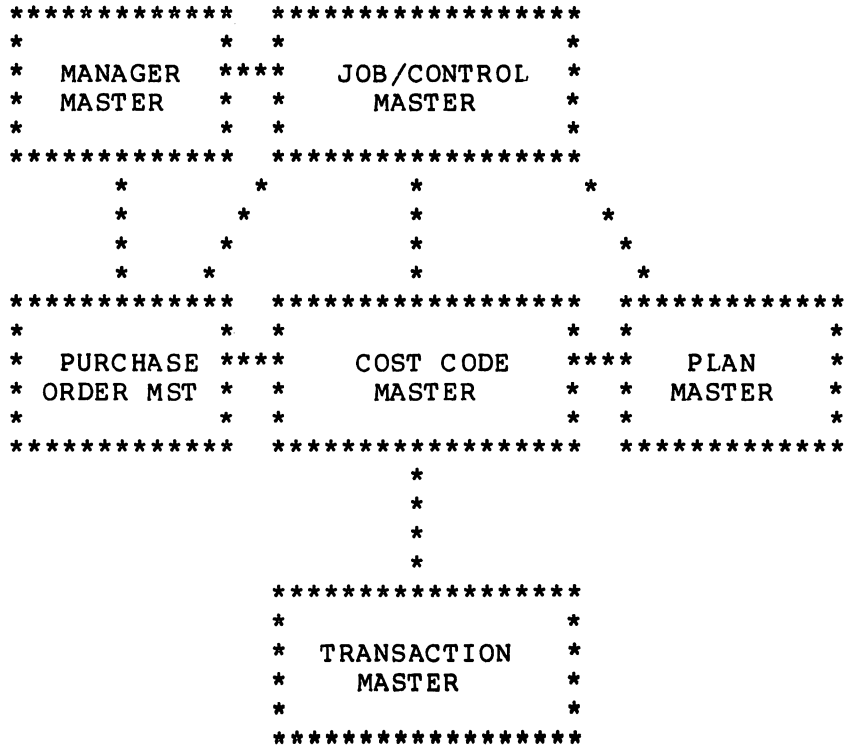
Principle data sets of the job cost database are shown in the following diagram:

(See Page 3)

The job master data contains information for each job/project/parcel and various control levels such as subdivision, city, function, and region for housing. General contracting and land differ, but are basically similar. These records are created by processing a start order or through file maintenance. The cost code master summarizes data by cost code within a job/project/parcel. These records are read from the plan master and loaded at the time start orders are processed or through file maintenance. The transaction master holds all financial transactions for each job by cost code. The purchase order data set contains all outstanding purchase orders for each job and is presently used only by the Housing Division. The manager data set is used to measure performance and summarize information by project manager. The plan master data set contains estimates and information by cost code and phase for each model elevation under housing and a standard set of cost codes with no estimates for land. These estimates are entered by file maintenancing the parcel later. Gen-

JOB COST SYSTEM
INFORMATION FLOW





eral Contracting loads their estimates by file maintenancing the cost code and estimate after the start order has been entered since each project is unique.

We will now look at some of the output reports grouped by Housing, General Contracting, and Land Development. The orientation will generally be from senior management to divisional administrative personnel.

HOUSING

Housing divisional management uses the job cost system to maximize unit profit, control costs and jobs, and finance jobs under construction. To review unit profit a Profit Analysis (Fig. 1, Appendix A) is prepared showing the gross profit amount, gross profit as a percentage of sales, profit per square foot, and net profit estimated along with column subtotals. To get an overall look at each housing job, a Job Cost Status (Fig. 2, Appendix A) can be run anytime. To examine the construction and marketing status, a Sales Analysis (Fig. 3, Appendix A) is used to see what stage construction and marketing are in. To project a sales price based on hard and lot costs, factors for gross receipts tax, profit and overhead, interest costs, closing costs, marketing commissions, discount points, lot cost, and marketing price may be entered by subdivision and a Housing Inventory Price Projection (Fig. 4, Appendix A) run by subdivision. These projected sales prices are compared to those entered by brokerage marketing showing differences with appropriate subtotals. Factors may be varied for different "what if" situations used in examining selling prices and costs. A Builders' Risk Insurance Report (Fig 5, Appendix A) is run to determine the value of all open houses under construction. This value is then submitted to our insurance company for purposes of determining insurability under our builders' risk policy.

To assist divisional management in financing housing, an Appraised Value Report (Fig. 6, Appendix A) is prepared and given to our various lending institutions. This allows us to borrow up to a negotiated percentage of the total loan value. This report shows the lending institution the status of each job and our total costs to date by each job with column totals by subdivision and city. In addition to the Appraised Value Report, a Housing Inventory Evaluation Report (Fig. 7, Appendix A) is prepared showing the lot fair market value, construction cost, total costs, market value, and sales price for each job under construction grouped under sold houses, unsold houses, and vacant lots with appropriate subtotals.

Although housing division middle management and project management have access to most of the previously described reports, they make a large number of decisions base on data at the cost code level within a job.

The Housing Work In Process Report (Fig. 8, Appendix A) summarizes charges for each cost code by major

category such as subcontract, labor, materials, and other. The cost codes are totalled and compared to a base estimate to develop a variance amount which is printed in the right hand column if it exceeds a predetermined amount. Subtotals are taken on hard costs for subcontract, labor, material, other, total costs, total estimate, and total variance. Job totals are also taken on the above plus non-hard costs. At this point variance figures are calculated for subcontract, labor, materials, other, and total costs. Various information regarding job status is printed at the top of this single page per job report. A manager may find it necessary to look at the transactions for a particular cost code. If further detail is needed, a Job Cost Ledger Report (Fig. 9, Appendix A) can be requested showing a complete transaction history by cost code by job. Cost code totals are again compared to base estimates developing variances. An option exists to select only cost codes having variances if desired. The detail transaction run is occasionally used by accounts payable personnel to verify that a certain vendor has received payment.

In addition to the above, an individual cost code may be displayed showing a summary of its charges, estimate, variance, and outstanding purchase orders. Detail transactions are displayed below the summary line followed by outstanding purchase orders.

The plan master data set is used to load master base estimates for a particular housing model and elevation. Estimators and project managers are primarily concerned with the use and upkeep of this data set. The Plan Master Listing (Fig. 10, Appendix A) shows the individual cost code amounts by subcontract, labor, material, and other along with subtotals by major category and other miscellaneous data by model and elevation. Cost codes are loaded into the cost code master either at the time a start order is processed or by entering file maintenance. The Plan Master Phase Listing (Fig. 11, Appendix A) is a finer break out showing all phases under cost codes within a particular model and elevation. We use the phase codes to print the purchase orders. In addition to hard copy, a cost code and its associated phases may be displayed on a terminal. The estimators or project managers also have the ability to compare different model cost codes by amount and dollars per square foot to see if anything looks out of line using the Plan Master Cost Code Comparison (Fig. 12, Appendix A). For a quick overall summary, they can run a Job Cost Estimate Listing (Fig. 13, Appendix A).

QUIZ can be used to display and print numerous combinations of existing data elements from the plan master, job cost master, cost code master, and purchase order master data sets. Using a generalized query/report writer greatly enchances the ultimate use of the system.

GENERAL CONTRACTING

General Contracting management requests a Work In Process Summary (Fig. 14, Appendix A) to review their overall condition. Middle management and project managers generally refer to a Work In Process Cost Code Summary (Fig. 15, Appendix A) to review charges, base estimates, variances, contract amounts, percent complete, and balances to complete figures by cost code for a particular job. If further investigation is needed, a General Contracting Ledger Report (Fig. 16, Appendix A) may be run to examine the transactions supporting each cost code. Copies of report may be requested by the owner or architect on some jobs. Individual cost codes may be displayed here as described in the Housing Section. The facilities of QUIZ are also available to the management in General Contracting.

LAND

Land Division management can request a Vacant Land Inventory (Fig. 17, Appendix A) to get an overall picture of their operations or to use with potential buyers, lending institutions, and at periodic pricing meetings. Land Division management and project engineers may obtain a Job Cost/Variance Report (Fig. 18, Appendix A) which contains a detail listing of charges by cost code with appropriate subtotals by cost code, parcel, city, and state. Summary figures are compared to base estimates which are loaded at the time start orders are entered or later file maintenanced to determine variances. Miscellaneous information is printed at the top of the page such as zoning status, number of acres/lots, etc. Individual cost codes may be displayed here as previously referred to in the Housing Section. Again, the full facilities of QUIZ are available. An Appraised Value Report by lot is available and is similar to the one described in Housing.

These are some of the ways that Bellamah uses its Job Cost System to monitor costs, control projects, and finance projects on our HP3000. We have left the Purchase Order Subsystem for another time due to the length of this presentation. It covers the area of manager performance and additional disbursement analysis.

Thank you for your interest in our area. We would be happy to answer any questions you may have.