E.C.JORDANCO

CONSULTING ENGINEERS

COMPUTER AUTOMATION MASTER PLAN:

FINAL REPORT

NOVEMBER 20, 1984

COMPUTER STEERING COMMITTEE:

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SECTION 2

EXECUTIVE SUMMARY

Many goals have been reached toward a comprehensive Computer Automation Master Plan. The following milestones have been reached:

- Identified work functions that should be implemented first (see Tables 1a and 1b).
- Begun software specifications, which will soon be sent to software suppliers.
- Selected Intergraph as the vendor for a computer-aided design and drafting (CADD) system, and identified a cost-effective system configuration for implementation over a two-year period, in four stages (see Table 2a and Figure 1):
 - An Intergraph 751 (VAX-11/750) with one workstation, delivered as soon as possible for technical applications.
 - Four additional workstations to implement CADD functions, in the second quarter of 1985.
 - Additional workstations in the fourth quarter of 1985.
 - An additional Intergraph 751 and more workstations in 1986.
- Selected an IBM System/38 as an upgrade to our data management system, and identified a cost-effective configuration to begin implementation (see Table 2b and Figure 1).
- Performed a cost analysis indicating that a good return on investment is possible, given a strong commitment to implementation and support (see Tables 3a and 3b).

There is a possibility, as with most successful computer systems, that the addition of more functions and higher levels of usage of identified functions will accelerate our two-year plans for revenue production and equipment needs. Automated Systems (ASD) is prepared to respond to the equipment needs by expanding central computer equipment or adjusting system priorities to satisfy company goals. ASD is also prepared to suggest and support alternatives, as addressed in Section 7. In any event, budgets for 1985 could include allowances for accelerating second-year purchases (up to an additional \$500,000), as described in Section 7.

Additional work is necessary to complete a Master Plan for implementation of these systems. Serious discussions of all recommendations and decisions should take place as soon as possible, and should include all Division Managers, Department Heads, and ASD management personnel. Discussions would be in large-and small-group work sessions, and where appropriate, would include potential graphics workstation operators and key terminal users.

RECOMMENDATIONS BY CONSULTANT, KENTON JOHNSON

Communications, cooperation, and strong guidelines are necessary to make new computer systems work. With the increased availability of personal computers at home and in-house, comes a hope that these powerful small computers can be used effectively, independent of computer professionals and central computer resources. All the rhetoric in the world will not convince anyone otherwise, but increased awareness and services will. Therefore, I recommend the following:

- Immediately act on bringing in a central computer systems or timesharing, announcing firm schedules as well as guidelines on how to acquire the use of the new facilities.
- Fill all open ASD requisitions at a high priority, and be prepared to raise the level of ASD salaries to bring in top people from around the country.
- Take time at all weekly staff meetings to hear brief reports from Steering Committee representatives and provide feedback directly to the ASD Manager, or through Steering Committee members, to bring about increased awareness at all levels.
- Support brown-bag informational sessions on CADD, personal computers, and general computer applications.
- Aggressively support training sessions and coordination meetings during normal work hours.
- Standardize spreadsheet, database, and word processing software on IBM PCs with an eye toward conversion to central computers.
- Strongly urge Department Heads who must select or develop IBM PC software, to make sure that it is easily convertible to central computers.

There is a large investment made, both personal and corporate, into any computer system and software package. This investment is, at most, 25 percent salvaged when moving software from one computer to another, unless they both have the same software operating system. The more database and procedures creation, and re-learning time there are, the less the investment is salvaged.

There is a natural reluctance on management and worker alike to change systems, because of the disruption of productive time and the loss of comfortable computer skills. Even in view of the potential gains from conversion, applications are usually left where they are first implemented. Sometimes they are abandoned in favor of new, higher-production or easier-to-use software. Only for central MIS systems, or in the absence of the old computer, are applications converted.

Since PCs and VAXs or System/38s do $\underline{\text{not}}$ run the same operating system, and removing or downgrading PCs will be very difficult, you will find that almost

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<u>all current</u> PC applications will be either abandoned or never converted. Therefore, the implementation cost will be 75 to 100 percent lost.

As long as the potential gain exceeds the investment, all is well. However, if that investment is not brought out in purchase decisions, then economic, opportunity, and synergistic losses are highly possible. Recently, PC software purchasers have down-played these potential losses.

Also, PC software and hardware purchases made without proper ASD involvement is undermining the expensive efforts of the Steering Committee, study participants, software specifiers, and company officers.

There is a clean, fair process in place to help and guide all computerization. Please use it.

Annual Factors
Staff Person Cost = \$ 75,000
Rate/Salary Increase = 1.05
Company Growth Rate = 1.25
Graphics Tera Hours = 3,600
Other Tera Hours = 1,800

Table 1a- Selected Functions Summary, Technical/Graphics (Updated from "Master Plan: Initial Report," Table 2, Pg. 3 and from "Master Plan: Intermediate Report," Table 1, Pg. 5)

		T y Pro	- Lr	ng	Auto.	Number of	Tine	Client Computr	Adjusted First	Soft-	Modified First	Iepl.	Impl.	Predicted First	Sport	Support	Predicted Second
Department/Division		p duc e (:1			Time (Hr)	Terminals Data Tech Grph	Value (\$)	Charges (\$)	Year Net (\$)	Cost (\$)	Year Net (\$)	Staff (Nus)	Cost (\$)	Year Net (\$)	Staff (Num)	Cost (\$)	Year Net
RECOMMENDED FUNCTI	ONS- IMPLEMENTED IN FIRST SIX MONTHS								20	-						*******	***************************************
All Departments	Statistical Analyses	T 1	0	6	4,500	.25	118,800	15,000	95,190	20,000	75,190	.20	15,000	60,190	.10	7,500	150,176
Civil	DTM- Site Planning & Highway Design	T	5	6	2,500	.28	108,750		65,250	5,000	60,250	.50	37,500	22,750	. 25	18,750	89,578
Civil		6	3	6	8,100	.75	139,320		69,660	37,500	32,160	.75	56,250	-24,090	.50	37,500	72,684
Civil	Runoff Calculations	T	5	3	1,250	.14	35,625		24,938	2,000	22,938	.20	15,000	7,938	.10	7,500	27,563
Hydro	Turbine Selection & Purhse Geometry	T	5	6	3,825	.43	166,388		99,833	2,000	97,833	.50	37,500	60,333	. 20	15,000	155,019
Hydro	Annual Control of the	T	5	3	3,400	.38	149,600	10,000	114,720	500	114,220	.50	37,500	76,720	.20	15,000	150,518
Laboratory	Statistics	T	5	6	1,125	.13	47,250	,	28,350	1,000	27,350	.20	15,000	12,350	.10	7,500	39,769
Planning			5	6	500	.06	25,245		15,147	2,000	13,147	.20	15,000	-1,853	.10	7,500	the same of the same of
Water/Wastewater		T 1	0	6	100	.01	4,400		2,970	2,000	970	.30	22,500	-21,530	.10	7,500	16,664
Water/Wastewater			5	6	960	.11	42,240		25,344	500	24,844	.30	22,500	2,344	.10	7,500	-4,648 34,508
Water/Wastewater		T 1	0	6	1,500	.08	51,000		34,425	1,000	33,425	.50	37,500	-4,075	.10	7,500	50,400
Water/Wastewater			0	6	2,700	.15	118,800		80,190	1,000	79,190	.50	37,500	41,690	.10	7,500	
Water/Wastewater			0	6	1,620	.09	72,900		49,208	500	48,708	.30	22,500	26,208	.10		130,489
Instrumentation	The state of the s		3	Ā	7,290	.68	240,570		120,285	CADD	120,285	.50	37,500			7,500	76,269
Piping			2	3	6,336	.88	183,744				59,388	.40	•	82,785	.10	7,500	200,65
		-	3	-	13,500	1.25	256,500		80,388				30,000	29,388	.20	15,000	100,875
Structural			3						128,250	25,000	103,250	.50	37,500	65,750	. 20	15,000	204,750
Structural			•	6	7,200	1.33	316,800	222 21	158,400	1,000	157,400	.25	18,750	138,650	.10	7,500	267,356
Structural			10	12	5,850	.33	257,400	40,000		10,000	145,830	.25	18,750	127,080	.20	15,000	336,866
Structural	or actains an account according		3	6	12,636	2.34	555,984	20,000	297,992	20,000	277,992	. 25	18,750	259,242	. 20	15,000	493,049
arth Sciences	Groundwater Model- Segol- 2-D & 3-D	1 1	10	6	500	.03	16,500	50,000	61,138	2,000	59,138	.50	37,500	21,638	.10	7,500	75,27
					05 305	**** ****	2 202 211			******		*****		********			*******
	Recommended Sub-Totals	12			85,392	6.11 3.56	2,907,816	135,000	1,707,506		1,553,506	7.60	570,000	983,506	3.15	236,250	2,667,835
	Recommended Sub-Averages		6	6	4,270	.38 .89	145,391	27,000	85,375	8,105	77,675	.38	28,500	49,175	.16	11,813	133,392
EN 04-04 EURETT	TONG - INDICHENTED IN CCCOMP CIT MONTHS					**** ****						*****		*******	*****		*******
	IONS- IMPLEMENTED IN SECOND SIX MONTHS	T 1		3	100	AT	27 404		10 430	200	17 000	24	15 444				
ydro			5	6	600	.03	23,400		18,428	500	17,928	. 20	15,000	2,928	.10	7,500	17,79
rchitectural		-	_	-	1,440	.08	28,800		17,280	CADD	17,280	.50	37,500	-20,220	. 20	15,000	10,55
rchitectural			2	6	900	.13	18,000		6,750	20,000	-13,250	.30	22,500	-35,750	. 10	7,500	1,969
lectrical		-	3	6	1,620	.15	42,120		21,060	10,000	11,060	.50	37,500	-26,440	. 20	15,000	17,168
lectrical		_	4	6	2,700	.19	70,200			15,000	24,488	.30	22,500	1,988	.10	7,500	59,259
lectrical		_	4	6	2,700	.19	70,200		39,488	CADD	39,488	.30	22,500	16,988	.10	7,500	59,259
Instrumentation	-40. Paris		2	6	960	.13	30,720		11,520	CADD	11,520	.50	37,500	-25,980	.20	15,000	473
Instrumentation			2	2	180	.03	4,680		2,048	CADD	2,048	.50	37,500	-35,453	.20	15,000	-16,616
Instrumentation	P&ID's	-	2	6	120	.02	5,280		1,980	CADD	1,980	.50	37,500	-35,520	.20	15,000	-16,223
Mechanical		100	2	6	2,700	.25	51,300		25,650	CADD	25,650	.40	30,000	-4,350	.10	7,500	35,044
Mechanical	,	170	3	6	2,700	. 25	64,800		32,400	CADD	32,400	.40	30,000	2,400	.10	7,500	46,856
Piping	Equipment Enjoyer		2	6	7,150	.99	207,350		77,756	CADD	77,756	.40	30,000	47,756	.10	7,500	126,230
Piping	1170 01.100		2	6	250	.07	9,000	20,000	23,375	5,000	18,375	.20	15,000	3,375	.10	7,500	22,313
Piping			2	6	6,885	.96	179,010		67,129	10,000	57,129	.30	22,500	34,629	.10	7,500	107,632
Piping			2	6	6,885	.96	179,010		67,129	CADD	67,129	.30	22,500	44,629	.10	7,500	107,632
iping	System Isometrics		2	6	446	.06	11,596		4,349	CADD	4,349	.30	22,500	-18,152	.10	7,500	-2,234
arth Sciences	Ground Water Model-Konikow-Bredehft		2	6	250	.07	8,250	7,000	10,094	1,000	9,094	.20	15,000	-5,906	.10	7,500	4,758
arth Sciences	Ground Water Model-R&D-Prickett		2	6	200	.08	9,900	10,000	13,713	1,000	12,713	.20	15,000	-2,298	.10	7,500	9,778
arth Sciences			2	6	350	.10	11,550	8,000	12,331	1,000	11,331	.20	15,000	-3,659	.10	7,500	8,236
industrial Process	Flow Diagrams		2	3	3,000	.42	120,000		52,500	CADD	52,500	.75	56,250	-3,750	. 25	18,750	54,141
ndustrial Process			2	3	1,875	.26	61,875		27,070	CADD	27,070	.75	56,250	-29,180	. 25	18,750	15,996
ndustrial Process		100	5	3	675	.04	27,000		18,900	CADD	18,900	.30	22,500	-3,600	.10	7,500	18,50
ndustrial Process	Heat Balance	T 1	0	6	640	.04	37,120	4,000	29,056	1,000	28,056	.20	15,000	13,056	.10	7,500	39,254
						**** ****			•••••	******		*****		*******	*****		*******
	Follow-On Sub-Totals		5 1	23	45,326	.39 5.09	1,271,161	49,000	619,491			8.50					
			5 1				1,271,161		619,491	64,500	554,991	8.50	637,500	-82,509	3.10	232,500	727,779
	Follow-On Sub-Totals Follow-On Sub-Averages				45,326	.39 5.09 .06 .30	1,271,161	49,000 9,800		64,500 6,450		8.50 .37	637,500 27,717	-82,509 -3,587	3.10	232,500	727,779 31,647
EXISTING FUNCTIO				5	1,971	.06 .30	55,268	9,800	619,491 26,934	64,500 6,450	554,991 24,130	8.50 .37	637,500 27,717	-82,509 -3,587	3.10	232,500	727,779 31,647
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ivil & Environment	Follow-On Sub-Averages ONS - CURRENTLY IMPLEMENTED IN-HOUSE (WILL Lal Cv1/Hyd/Srvy/WsteWt/WtrWste- 9 Pgms	LL BE C	3 5	S RTED	1,971 TO THE 7,200	.80 **** **** .06 .30	55,268	9,800	619,491 26,934	64,500 6,450	554,991 24,130	8.50 .37	637,500 27,717	-82,509 -3,587	3.10	232,500	727,77 31,66
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ivil & Environment arth Resources RECOMMENDED FUNCTI urvey lectrical VAC cheduling	FOILOW-ON Sub-Averages DNS - CURRENTLY IMPLEMENTED IN-HOUSE (WILL tal Cv1/Hyd/Srvy/WsteWt/MtrWste- 9 Pgms Geotech and Sold/Haz Waste- 4 Pgms IONS- CURRENTLY IMPLEMENTED IN-HOUSE (WILL COGO with plotter output Ld/Relay/Shrt Crct/Grnd Mat Pgms Heat/Cool Loads Schedules	LL BE C T T LL BE C T T T T T	CONVER 5 2 CONVER 10 7 5	5 RTED 3 3 3 3 12	1,971 TO THE 7,200 260 TO THE 400 840 4,050	.06 .30 **** **** NEW SYSTEM) .80 .07 NEW SYSTEM, WHEN .02 .07 .04 1.13	55,268 	9,800 41,000 6,500	137,075 8,193 10,000 25,221 12,600 41,411	64,500 6,450 ************************************	554,991 24,130 	8.50 .37 ***** 1.00 .50 .40 .50	637,500 27,717 75,000 37,500 22,500 30,000 37,500 45,000	-82,599 -3,587 ********* 62,075 -29,307 -14,500 -9,779	3.10 .13 ***** .50 .25	232,500 10,109 37,500 18,750 7,500 15,000	727,779 31,643 ************************************
ivil & Environment arth Resources RECOMMENDED FUNCTI urvey lectrical VAC cheduling	Follow-On Sub-Averages ONS - CURRENTLY IMPLEMENTED IN-HOUSE (WILL tal Cv1/Hyd/Srvy/WsteWt/WtrWste- 9 Pgms Geotech and Sold/Haz Waste- 4 Pgms IONS- CURRENTLY IMPLEMENTED IN-HOUSE (WILL COSO with plotter output Ld/Relay/Shrt Crct/Grnd Hat Pgms Meat/Cool Loads Schedules Process Calculations	LL BE C T T T LL BE C T T T T T T	CONVER 5 2 CONVER 10 7 5 2	5 RTED 3 3 3 12 6	1,971 TO THE 7,200 260 TO THE 400 840 4,050 900	.06 .30 **** **** NEW SYSTEM) .80 .07 NEW SYSTEM, WHEN .02 .07 .04 1.13 .25	137,250 3,870 PRACTICAL) 33,600 18,000 165,645 36,000	9,800 41,000 6,500	137,075 8,193 10,000 25,221 12,600	64,500 6,450 ********* 0 0 2,000 5,000 1,000 2,000 2,000	554,991 24,130 	8.50 .37 ***** 1.00 .50 .40 .50 .60	75,000 37,500 37,500 22,500 30,000 37,500	-82,599 -3,587 ********* 62,075 -29,307 -14,500 -9,779 -25,900	3.10 .13 ***** .50 .25	232,500 10,109 37,500 18,750 7,500 15,000 15,000	727,779 31,647 ************************************
ivil & Environment arth Resources RECOMMENDED FUNCTI urvey lectrical VAC cheduling ndustrial Process	Follow-On Sub-Averages ONS - CURRENTLY IMPLEMENTED IN-HOUSE (WILL tal Cv1/Hyd/Srvy/WsteWt/MtrWste- 9 Pgms Geotech and Sold/Haz Waste- 4 Pgms IONS- CURRENTLY IMPLEMENTED IN-HOUSE (WILL COEO with plotter output Ld/Relay/Shrt Crct/Grnd Hat Pgms Meat/Cool Loads Schedules Process Calculations	LL BE C T T T LL BE C T T T T T T	CONVER 5 2 CONVER 10 7 5	5 RTED 3 3 3 3 12	1,971 TO THE 7,200 260 TO THE 400 840 4,050	.06 .30 **** **** NEW SYSTEM) .80 .07 NEW SYSTEM, WHEN .02 .07 .04 1.13	55,268 	9,800 41,000 6,500	137,075 8,193 10,000 25,221 12,600 41,411	64,500 6,450 ************************************	554,991 24,130 	8.50 .37 ***** 1.00 .50 .40 .50	637,500 27,717 75,000 37,500 22,500 30,000 37,500 45,000	-82,599 -3,587 	3.10 .13 .50 .25 .10 .20 .20	232,500 10,109 37,500 18,750 7,500 15,000 15,000	727,77° 31,66° ***********************************
ivil & Environment arth Resources RECOMMENDED FUNCTI jurvey Clectrical IVAC icheduling industrial Process	Follow-On Sub-Averages ONS - CURRENTLY IMPLEMENTED IN-HOUSE (WILL tal Cv1/Hyd/Srvy/WsteWt/MtrWste- 9 Pgms Geotech and Sold/Haz Waste- 4 Pgms IONS- CURRENTLY IMPLEMENTED IN-HOUSE (WILL COEO with plotter output Ld/Relay/Shrt Crct/Grnd Hat Pgms Meat/Cool Loads Schedules Process Calculations	LL BE C T T T LL BE C T T T T T T	CONVER 5 2 CONVER 10 7 5 2	5 RTED 3 3 3 12 6	1,971 TO THE 7,200 260 TO THE 400 840 4,050 900	.06 .30 **** **** NEW SYSTEM) .80 .07 NEW SYSTEM, WHEN .02 .07 .04 1.13 .25	137,250 3,870 PRACTICAL) 33,600 18,000 165,645 36,000	9,800 41,000 6,500	137,075 8,193 10,000 25,221 12,600 41,411 13,500 34,965	64,500 6,450 ********* 0 0 2,000 5,000 1,000 2,000 2,000	554,991 24,130 	8.50 .37 ***** 1.00 .50 .40 .50 .60	637,500 27,717 75,000 37,500 22,500 30,000 37,500 45,000 26,250	-82,599 -3,587 -3,587 -29,307 -14,500 -9,779 -25,900 -5,589 -26,000	3.10 .13 ***** .50 .25 .10 .20 .20 .20 .25 .25	232,500 10,109 37,500 18,750 7,500 15,000 15,000 18,750	727,777 31,660 148,701 -13,538 3,281 18,144 -788 89,017 -932 27,838
ivil & Environment arth Resources RECOMMENDED FUNCTI urvey lectrical VAC cheduling ndustrial Process	FOILOW-ON Sub-Averages ONS - CURRENTLY IMPLEMENTED IN-HOUSE (WILL tal Cv1/Hyd/Srvy/WsteWt/MtrWste- 9 Pgms Geotech and Sold/Haz Waste- 4 Pgms IONS- CURRENTLY IMPLEMENTED IN-HOUSE (WILL COGO with plotter output Ld/Relay/Shrt Crct/Grnd Mat Pgms Heat/Cool Loads Schedules Process Calculations Pumping Systems	LL BE CT T T T T T T T T T T T T T T T T T T	CONVER 5 2 CONVER 10 7 5 2 2	5 3 3 3 RTED 3 3 12 6 3	1,971 TO THE 7,200 260 TO THE 400 840 4,050 900 1,200	.06 .30 **** **** NEW SYSTEM) .80 .07 NEW SYSTEM, WHEN .02 .07 .04 1.13 .25	137,250 3,870 PRACTICAL) 33,600 18,000 165,645 36,000 44,400	9,800 	619,491 26,934 	64,500 6,450 0 0 2,000 5,000 1,000 2,000 2,000 500	554,991 24,130 137,075 8,193 8,000 20,221 11,600 39,411 11,500 34,465	8.50 .37 ***** 1.00 .50 .30 .40 .50 .60 .50 .35	75,000 37,500 37,500 22,500 30,000 37,500 45,000 37,500 26,250	-82,599 -3,587 	3.10 .13 .50 .25 .10 .20 .20 .20 .25 .25	232,500 10,109 37,500 18,750 7,500 15,000 15,000 18,750 18,750	727,777 31,667 ***********************************
ivil & Environment arth Resources RECOMMENDED FUNCTI urvey lectrical VAC cheduling ndustrial Process	Follow-On Sub-Averages ONS - CURRENTLY IMPLEMENTED IN-HOUSE (WILL tal Cv1/Hyd/Srvy/WsteWt/MtrWste- 9 Pgms Geotech and Sold/Haz Waste- 4 Pgms IONS- CURRENTLY IMPLEMENTED IN-HOUSE (WILL COED with plotter output Ld/Relay/Shrt Crct/Grnd Mat Pgms Meat/Cool Loads Schedules Process Calculations Pumping Systems	LL BE C	3	5 RTED 3 3 3 3 12 6 3	1,971 TO THE 7,200 260 TO THE 400 840 4,050 900 1,200 15,250	.06 .30 **** **** NEW SYSTEM) .80 .07 NEW SYSTEM, WHEN .02 .07 .04 1.13 .25 .07	137,250 3,870 PRACTICAL) 33,600 18,000 44,400	9,800 	619,491 26,934 137,075 8,193 10,000 25,221 12,600 41,411 13,500 34,965	64,500 6,450 0 0 2,000 5,000 1,000 2,000 2,000 500	554,991 24,130 137,075 6,193 8,000 20,221 11,600 39,411 11,500 34,465	8.50 .37 ***** 1.00 .50 .40 .50 .60 .50 .35	75,000 37,500 37,500 30,000 37,500 45,000 37,500 26,250	-82,509 -3,587 -3,587 -29,307 -14,500 -9,779 -25,900 8,215	3.10 .13 ***** .50 .25 .10 .20 .20 .20 .25 .25	232,500 10,109 37,500 18,750 7,500 15,000 15,000 18,750 146,250	727,775 31,647 31,647 148,706 -13,538 3,281 18,144 -788 89,017 -984 27,838
ivil & Environment arth Resources RECOMMENDED FUNCTI urvey lectrical VAC cheduling ndustrial Process	FOILOW-ON Sub-Averages ONS - CURRENTLY IMPLEMENTED IN-HOUSE (WILL tal Cv1/Hyd/Srvy/WsteWt/MtrWste- 9 Pgms Geotech and Sold/Haz Waste- 4 Pgms IONS- CURRENTLY IMPLEMENTED IN-HOUSE (WILL COGO with plotter output Ld/Relay/Shrt Crct/Grnd Mat Pgms Heat/Cool Loads Schedules Process Calculations Pumping Systems	LL BE C	CONVER 5 2 CONVER 10 7 5 2 2	5 3 3 3 3 3 12 6 3	1,971 TO THE 7,200 260 TO THE 400 840 4,050 900 1,200	.06 .30 **** **** NEW SYSTEM) .80 .07 NEW SYSTEM, WHEN .02 .07 .04 1.13 .25 .07 **** 2.45 .31	137,250 3,870 PRACTICAL) 33,600 18,000 44,400	9,800 	619,491 26,934 137,075 8,193 10,000 25,221 12,600 41,411 13,500 34,965	64,500 6,450 0 0 2,000 5,000 1,000 2,000 2,000 500 12,500 1,563	554,991 24,130 137,075 6,193 8,000 20,221 11,600 39,411 11,500 34,465	8.50 .37 ***** 1.00 .50 .40 .50 .60 .50 .35	637,500 27,717 75,000 37,500 22,500 30,000 37,500 45,000 37,500 26,250	-82,599 -3,587 ************************************	3.10 .13 .50 .25 .10 .20 .20 .20 .25 .25	232,500 10,109 37,500 18,750 7,500 15,000 15,000 18,750 18,750 146,250 18,281	727,779 31,643 ************************************
civil & Environment arth Resources RECOMMENDED FUNCTI Survey Elling HAPAC Scheduling Endustrial Process Endustrial Process	Follow-On Sub-Averages DNS - CURRENTLY IMPLEMENTED IN-HOUSE (WILL tal Cv1/Hyd/Srvy/Mstewt/MtrWste- 9 Pgms Geotech and Sold/Haz Waste- 4 Pgms IONS- CURRENTLY IMPLEMENTED IN-HOUSE (WILL COSO with plotter output Ld/Relay/Shrt Crct/Grnd Mat Pgms Meat/Cool Loads Schedules Process Calculations Pumping Systems Implemented Sub-Totals Implemented Sub-Averages	LL BE C	3	5 RTED 3 3 3 3 12 6 3 5	1,971 70 THE 7,200 260 TO THE 400 840 4,050 900 1,200	.06 .30 **** **** NEW SYSTEM) .80 .07 NEW SYSTEM, WHEN .02 .07 .04 1.13 .25 .07 **** 2.45 .31	137,250 3,870 PRACTICAL) 33,600 18,000 165,635 44,400	9,800 	137,075 8,193 10,000 25,221 12,600 41,411 13,500 34,965	64,500 6,450 0 0 2,000 5,000 1,000 2,000 5,000 1,563	554,991 24,130 	8.50 .37 ***** 1.00 .50 .40 .50 .60 .35 **** 4.15 .52	637,500 27,717 75,000 37,500 22,500 30,000 37,500 45,000 37,500 26,250 311,250 38,906	-82,599 -3,587 -3,587 -29,307 -14,500 -9,779 -25,900 -5,590 8,215	3.10 .13 .50 .25 .10 .20 .20 .20 .25 .25	232,500 10,109 	31,643 ************************************
civil & Environment arth Resources RECOMMENDED FUNCTI Survey Elling HAPAC Scheduling Endustrial Process Endustrial Process	FOILOW-ON Sub-Averages ONS - CURRENTLY IMPLEMENTED IN-HOUSE (WILL tal Cv1/Hyd/Srvy/WsteWt/MtrWste- 9 Pgms Geotech and Sold/Haz Waste- 4 Pgms IONS- CURRENTLY IMPLEMENTED IN-HOUSE (WILL COGO with plotter output Ld/Helay/Shrt Crct/Grnd Mat Pgms Heat/Cool Loads Schedules Process Calculations Pumping Systems Implemented Sub-Totals Implemented Sub-Averages GRAND TOTALS	LL BE CT TT	3	5 3 3 3 3 12 6 3 3 5	1,971 7,200 260 TO THE 400 840 4,050 900 1,200 15,250 1,906	.06 .30	137,250 3,870 PRACTICAL) 33,600 165,645 36,000 44,400 	9,800 	619,491 26,934 	2,000 5,000 1,000 2,000 5,000 1,000 2,000 2,000 12,500 1,563	554,991 24,130 	8.50 .37 ***** 1.00 .50 .30 .40 .50 .50 .35 ***** 4.15 .52 ***** 20.25 1	637,500 27,717 	-82,509 -3,587 -29,307 -29,307 -14,500 -9,779 -25,900 -5,589 -26,000 8,215 -40,785 -5,098	3.10 .13 ***** .50 .25 .10 .20 .20 .25 .25 .25 .25	232,500 10,109 37,500 18,750 7,500 15,000 15,000 18,750 18,750 144,250 18,250 18,250 18,500	727,779 31,643 ************************************
Civil & Environment Earth Resources	Follow-On Sub-Averages DNS - CURRENTLY IMPLEMENTED IN-HOUSE (WILL tal Cv1/Hyd/Srvy/Mstewt/MtrWste- 9 Pgms Geotech and Sold/Haz Waste- 4 Pgms IONS- CURRENTLY IMPLEMENTED IN-HOUSE (WILL COSO with plotter output Ld/Relay/Shrt Crct/Grnd Mat Pgms Meat/Cool Loads Schedules Process Calculations Pumping Systems Implemented Sub-Totals Implemented Sub-Averages	LL BE CT TT	3	5 3 3 3 3 12 6 3 3 5	1,971 70 THE 7,200 260 TO THE 400 840 4,050 900 1,200	.06 .30 **** **** NEW SYSTEM) .80 .07 NEW SYSTEM, WHEN .02 .07 .04 1.13 .25 .07 **** 2.45 .31	137,250 3,870 PRACTICAL) 33,600 18,000 165,635 44,400	9,800 	137,075 8,193 10,000 25,221 12,600 41,411 13,500 34,965 222,965 35,371 2,609,963 66,083	2,000 5,000 1,000 2,000 5,000 1,000 2,000 2,000 12,500 1,563	554,991 24,130 	8.50 .37 ***** 1.00 .50 .40 .50 .60 .35 **** 4.15 .52	75,000 37,500 37,500 30,000 37,500 45,000 37,500 45,000 37,500 26,250 	-82,599 -3,587 -3,587 -29,307 -14,500 -9,779 -25,900 -5,590 8,215	3.10 .13 .50 .25 .10 .20 .20 .20 .25 .25 .25	232,500 10,109 	727,77 31,64 ************************************

OTHER FUNCTIONS WILL BE IMPLEMENTED AFTER THE SELECTED FUNCTIONS

Figure 1 - EQUIPMENT CONF JRATION AND PLACEMENT

CLIENTS	FLORIDA ADMIN PROJECT	TS ADMIT	O.C.	MI ADMI MKT	CHIGAN		STON PROJECTS	LEGEND (47)-CUEBUT SYSTA TREMINAS GRANA OSSISS WAS CARLOWNES STATEMENT STATEMENTS STATEMENTS STATEMENTS STATEMENTS STATEMENTS CHESTONES STATEMENTS CONSOLE " (6) - ENTERGANDED SYSTAM PRINTERS (6) - ENTERGANDED SYSTAM PRINTERS (6) - ELECTION SYSTAM PRINTERS (6) - IN PERFORMANCE WORTH CARLOWNESS (7) - CUEBUT SYSTAMENTS (7) - PC STANDALOME WIPKINTERS
BAXTER SN CLIENTS INDUSTRIAL PM CLIENTS OTHER PSP SUPPORT NEEP CZ (A)		1ST Sit MONTHS	240 SIX MONTHS					HARBOR GCORPORATE MARKETING MATG SUPPORT
BAXTER 5S DESIGN ADMIN MECH PIPING PURCH TIE TIE TIE TIE	12 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2			⊣	CENTRAL PROCESS			FINANCIAL PROJECT INGT ACCOUNTING FM SAFRAT """ """ """ """
ADM ARCH HVAC STRUCT FILE TO THE TO T		(A) (A) (B) (B) (C) (C) (C) (C) (C) (C) (C) (C) (C) (C			SYSTEMS MGT. AUTOMATED SYSTEMS			HAKBOR 4 CIVIL EARTH RESOURCES ROO
BAXTER DESIGN INSTRUM'N ELECT. A.A.		SE CONTRACTOR OF THE PARTY OF T			USER SERVICE			2 E.R. CIVIL/ENVIR DIV (My) (My) (My) (My) (My) (My) (My) (My)
BAXTER ADM DESIGN CIVIL/ENVIRO REPR EST SCHED CONSTRJY SUR			e	8	**			HARBOR 2 CIVIL ENVIRONMENTAL CIVIL W.WATER WWATER CIVIL W.WATER WWATER CIVIL W.WATER WWATER CIVIL W.WATER WWATER CIVIL W.WATER CONTRACT CIVIL W.WATER CONTRACT CONTRACT CONTRAC
BAXTER 3S DESIGN MODEL SHOP SAN				v		WORD PROCESSING ADMINISTRATION	E 8	HARBOR ADMINISTRATION LIBRY ADM PETE GRAPH 7785
SEAUS BABATAD ONA SUAER	SEBAICE BO		F. 65 65		T338	OPK 2	ANALYTICAL LAB GEOT	15° Six Mustres 240 Six Mustres 240 Gix Mustres
			-	IST SIX MOUTHS	SHO SIX MONTHS	2ND YEAR		